

Hydrocarbon Exploration program - Exploration Well Asopus-1 in Block 2 – Ionian Sea

ECF3008

Environmental & Social Baseline Study (ESBS)

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CHECKED BY	LDK Consultants / RSK International Projects Group	
APPROVED BY	Costis NICOLOPOULOS, Head of Environment and Water Department, LDK Dave WATSON, Director, RSK	07.08.2026
PROJECT REPRESENTATIVE	Panagiotis KARATOKIS, Head of HSE, Energean Greece	07.08.2026

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TABLE OF CONTENTS

1	Introduction	1
1.1	Background	1
1.2	Scope	1
1.3	Legal framework	3
1.3.1	National legislative framework for hydrocarbon exploration and production	3
1.3.1.1	National Law 2289/1995	3
1.3.1.2	National Law 4001/2011	3
1.3.2	Baseline legislative framework	4
1.3.2.1	Main legislative framework for biodiversity protection	4
1.3.2.1.1	Habitats Directive (92/43/EEC)	4
1.3.2.1.2	Directive on the conservation of wild birds (2009/147/EC)	4
1.3.2.1.3	Convention on migratory species	4
1.3.2.1.4	Agreement on the conservation of cetaceans in the Black Sea, Mediterranean Sea, and contiguous Atlantic area	5
1.3.2.1.5	Agreement on the conservation of African-Eurasian migratory waterbirds	5
1.3.2.1.6	Ramsar Convention	5
1.3.2.1.7	Bern Convention	5
1.3.2.1.8	Convention on Biological Diversity	5
1.3.2.1.9	Agreement for the establishment of the General Fisheries Commission for the Mediterranean	6
1.3.2.1.10	European Council Regulation No. 2371/2002 on the conservation and sustainable exploitation of fisheries resources under the Common Fisheries Policy	6
1.3.2.2	Main legislative framework for the prevention of marine pollution	6
1.3.2.2.1	Directive for the safety of offshore oil and gas facilities (2013/30/EC)	6
1.3.2.2.2	National Law 4409/2016 for the framework for safety in offshore hydrocarbon exploration and exploitation operations, transposition of Directive 2013/30/EU, amendment of Presidential Decree 148/2009, and other provisions	6
1.3.2.2.3	Water Framework Directive 2000/60/EU	7
1.3.2.2.4	Marine Strategy Framework Directive 2008/56/EC	7
1.3.2.2.5	Law 3983/2011 for the National Strategy for the protection and management of marine environment	7
1.3.2.2.6	Environmental liability Directive (2004/35/EC)	7
1.3.2.2.7	Directive 2009/123/EC, which amends Directive 2005/35/EC on ship-source pollution	8
1.3.2.2.8	Bathing water Directive (2006/7/EC)	8
1.3.2.2.9	Barcelona Convention	8
1.3.2.2.10	International Convention for the prevention of pollution from ships	8
1.3.2.2.11	Treaty on oil pollution preparedness, response and cooperation	9
1.3.2.2.12	UN Convention on the law of the sea	9
1.3.2.2.13	Stockholm Convention on persistent pollutants	9
1.3.2.2.14	International Convention for the safety of life at sea	9

1.3.2.2.15	International Convention on the establishment of an international fund for compensation for oil pollution damage _____	9
1.3.2.2.16	Directive 96/82/EC of the Council on the control of major-accident hazards involving dangerous substances (SEVESO II Directive) _____	10
1.3.2.2.17	Ballast water management Convention _____	10
1.3.2.2.18	IPPC Directive (2008/1/EC) _____	10
1.3.2.2.19	Convention for the prevention of marine pollution by dumping of wastes and other matter (London Convention) _____	10
1.3.2.2.20	Regulation (EC) No. 1907/2006 concerning the registration, evaluation, authorisation and restriction of chemicals _____	10
1.3.2.3	National targets of environmental protection _____	11
1.3.2.3.1	Greek Action Plan for combating desertification _____	11
1.3.2.3.2	National biodiversity strategy _____	11
1.3.2.4	Compliance with greenhouse gas emission mitigation and climate change adaptation requirements ____	11
1.3.2.4.1	National climate law (Law 4936/2022) _____	11
1.3.2.4.2	National Strategy for climate change adaptation _____	11
1.3.2.4.3	National energy and climate plan _____	12
1.3.2.5	Main legislative framework for environmental management and planning _____	12
1.3.2.5.1	Directive 2014/89/EU on maritime spatial planning _____	12
1.3.2.5.2	Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment (SEA Directive) _____	12
1.3.2.5.3	National legislation for strategic environmental assessment _____	13
1.3.2.5.4	Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention) ____	13
1.3.2.5.5	Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (EIA Directive) _____	13
1.3.2.5.6	National legislation based on Law 1650/1986 _____	14
1.3.2.5.7	Directive 2008/98/EC on waste and repealing certain Directives (Waste Framework Directive) _____	14
1.3.2.5.8	Aarhus Convention _____	14
1.3.2.6	Main legislative framework for social welfare and human rights _____	15
1.3.2.6.1	Social welfare legislation in Greece _____	15
1.3.2.6.2	Human rights framework in Greece _____	15
1.3.2.6.3	International human rights framework _____	16
1.3.2.6.4	International labour rights regulations _____	16
1.3.2.7	Protection and management of underwater cultural heritage _____	17
1.3.3	Specific legislative framework for Block 2 _____	17
1.3.4	International industry standards _____	20
1.3.4.1	Best available techniques _____	20
1.3.4.2	Good oilfield practice and good international industry practice _____	21
1.3.4.3	IPIECA and OGP guidelines _____	22
1.4	Environmental consultant _____	22
2	Environmental baseline desktop study _____	26
2.1	Seabed conditions _____	26

2.1.1	Bathymetry	26
2.1.2	Geomorphology	29
2.1.3	Geology	31
2.1.4	Sediments	34
2.1.5	Seismicity, tectonics and geological hazards	36
2.1.5.1	Tectonics	36
2.1.5.2	Seismicity	41
2.1.5.3	Active gas seeping and pockmark field	43
2.1.5.4	Submarine volcanoes	47
2.1.5.5	Gravitational mass movements	48
2.1.5.6	Tsunami	51
2.2	Ocean circulation and physical parameters	53
2.2.1	Sea circulation and currents	53
2.2.2	Tidal amplitude	63
2.2.3	Waves	65
2.2.4	Water column	69
2.2.5	Seawater quality indicators	83
2.2.5.1	Marine Strategy Framework Directive	83
2.2.5.1.1	MSFD regions and subregions	83
2.2.5.1.2	MSFD indicators for good environmental status	84
2.2.5.1.3	Status of territorial (marine) waters under MSFD	88
2.2.5.1.4	MSFD reporting data review based on WISE/EIONET central data repository	89
2.2.5.2	Water Framework Directive	92
2.2.5.2.1	Methodology for the assessment of surface water quality under WFD	92
2.2.5.2.2	Status of the coastal water bodies under WFD	93
2.2.5.2.3	Register of protected areas under Article 6 of WFD	97
2.3	Meteorology, climate, and air quality	104
2.3.1	Climate	104
2.3.2	Meteorological conditions	106
2.3.2.1	Precipitation and temperature	106
2.3.2.2	Wind	110
2.3.3	Climate change	113
2.3.3.1	Change of mean annual temperature and total annual precipitation	113
2.3.3.2	Sea level	115
2.3.4	Flood risk	117
2.3.5	Air quality	121
2.4	Ecosystems and marine fauna	129
2.4.1	Benthic fauna	129

2.4.2	Alien and cryptogenic species	136
2.4.3	Plankton	137
2.4.4	Marine fish fauna	142
2.4.5	Marine mammals	155
2.4.5.1	Survey data availability and knowledge gaps	158
2.4.5.2	Fin whale (<i>Balaenoptera physalus</i>)	161
2.4.5.3	Sperm whale (<i>Physeter macrocephalus</i>)	164
2.4.5.4	Cuvier's beaked whale (<i>Ziphius cavirostris</i>)	167
2.4.5.5	Risso's dolphin (<i>Grampus griseus</i>)	170
2.4.5.6	Striped dolphins (<i>Stenella coeruleoalba</i>)	172
2.4.5.7	Short-beaked common dolphin (<i>Delphinus delphis</i>)	175
2.4.5.8	Bottlenose dolphin (<i>Tursiops truncatus</i>)	178
2.4.5.9	Rough-toothed dolphin (<i>Steno bredanensis</i>)	181
2.4.5.10	Mediterranean monk seal (<i>Monachus monachus</i>)	183
2.4.5.11	Cetacean habitat in the Mediterranean / Ionian	185
2.4.6	Sea turtles	190
2.4.7	Strandings of marine mammals and sea turtles	196
2.4.8	Birds	200
2.4.8.1	Pelagic seabirds	201
2.4.8.1.1	Scopoli's Shearwater (<i>Calonectris diomedea</i>)	204
2.4.8.1.2	Yelkouan Shearwater (<i>Puffinus yelkouan</i>)	208
2.4.8.1.3	European Storm-petrel (<i>Hydrobates pelagicus</i>)	212
2.4.8.1.4	Audouin's Gull (<i>Larus audouinii</i>)	213
2.4.8.2	Migratory Flyway	217
2.5	Designated areas for the conservation of biodiversity	222
2.5.1	Natura Network 2000	222
2.5.1.1	GR2230010 SAC marine area of the Diapontia islands	223
2.5.1.2	GR2230008 SPA Diapontia Islands: Othoni, Ereikousa, Mathraki and rocky islets	224
2.5.1.3	IT9150002 SAC Otranto Coast – Santa Maria di Leuca	228
2.5.1.4	IT9150009 SAC Ugento Coast	229
2.5.1.5	IT 9150015 SAC & SPA Gallipoli Coast and St. Andrea Island	231
2.5.2	Cetacean Critical Habitats designated by ACCOBAMS	234
2.5.3	Important Marine Mammal areas	237
2.5.3.1	IMMA Ionian Archipelago	239
2.5.3.1.1	Summary of ecological significance	239
2.5.3.1.2	Jurisdictional description	239
2.5.3.1.3	Population dynamics and conservation status	240
2.5.3.1.4	Criterion-based assessments	240
2.5.4	Ecologically or Biologically Significant marine Areas	240
2.5.4.1	MED-3 EBSA South Adriatic Ionian Strait	241

2.5.4.1.1	General information	241
2.5.4.1.2	Area details	242
2.5.4.2	MED-5 EBSA Hellenic Trench	243
2.5.4.2.1	General information	243
2.5.4.2.2	Area details	244
2.5.5	Important Sharks and Ray Areas	244
2.5.5.1	ISRA Santa Maria di Leuca	246
2.5.5.1.1	Summary	246
2.5.5.1.2	Description of habitat	246
2.5.5.1.3	ISRA criterion A – vulnerability	247
2.5.5.1.4	Sub – criterion C1 – reproductive areas	247
2.5.5.2	ISRA Otranto Channel	247
2.5.5.2.1	Summary	247
2.5.5.2.2	Description of habitat	248
2.5.5.2.3	Sub – criterion C1 – Reproductive areas	248
2.5.5.3	ISRA Western Apulian Coast	249
2.5.5.3.1	Summary	249
2.5.5.3.2	Description of habitat	249
2.5.5.3.3	CRITERION A – VULNERABILITY	249
2.5.5.3.4	SUB-CRITERION C2 – FEEDING AREAS	249
2.5.6	Key Biodiversity Areas	250
2.5.6.1	KBA 2844 Cape Otranto and Cape Santa Maria di Leuca coast	252
2.5.6.2	KBA 2908 Vlora Bay, Karaburun Peninsula and Cika mountain	252
2.5.6.3	KBA 2943 Diapontia islands (Othonoi, Ereikousa, Mathraki) and surrounding islets	252
2.5.6.4	KBA 2910 Lake Butrinti	253
2.5.6.5	KBA 1169 Lagoons of Kerkyra island	253
2.5.7	Marine Protected Areas	253
2.5.8	Important Bird Areas	255
2.5.9	Ionian Marine National Park	256
2.5.10	Fisheries Restricted Areas	258
2.5.10.1.1	FRA Lophelia reef off Capo Santa Maria di Leuca	260
2.5.10.1.2	FRA Otranto Channel	260
2.5.10.1.3	FRA Deep water fisheries restricted area (1,000 m)	260
2.5.11	Specially Protected Areas of Mediterranean Importance	261
2.5.11.1.1	SPAMI IT 5: Torre Guaceto Marine protected and natural reserve	262
2.5.11.1.2	SPAMI IT10: Porto Cesareo Marine Protected Area	263
2.5.11.1.3	SPAMI AL1: Karaburun Sazan National Marine Park	264
2.5.12	Ramsar sites	266
2.5.12.1	Ramsar site Le Cesine coastal wetland	267
2.5.12.2	Ramsar site Butrint wetland complex	268
2.5.13	Emerald network of areas of special conservation interest	268

2.5.13.1	EMERALD AL0000014 Karaburun–Orikum–Dukat National Park	269
2.5.13.2	EMERALD AL0000004 Butrinti National Park	270
2.6	Anthropogenic environment	270
2.6.1	Settlement structure and land use	270
2.6.1.1	Spatial planning framework	270
2.6.1.2	Administrative framework and settlement structure	274
2.6.1.3	Land use characteristics	276
2.6.1.4	Offshore study area	280
2.6.1.5	Transboundary context: Italian Adriatic/Ionian Coast	280
2.6.2	Maritime uses	280
2.6.2.1	Maritime spatial planning framework	280
2.6.2.2	Shipping and navigation	282
2.6.2.3	Fishing grounds and fisheries management framework	285
2.6.2.4	Aquaculture	292
2.6.2.5	Maritime tourism	294
2.6.2.6	Maritime cables	296
2.6.2.7	Military training and exercise areas	299
2.6.2.8	Other Offshore Installations	300
2.6.2.8.1	Offshore oil and gas exploration and exploitation	300
2.6.2.8.2	Other Offshore Windfarms	300
2.6.3	Cultural heritage	301
2.6.3.1	Terrestrial cultural heritage	301
2.6.3.2	Underwater cultural heritage	307
2.6.3.2.1	The Northern Ionian Sea as a maritime cultural landscape	307
2.6.3.2.2	Maritime connectivity and navigation networks	308
2.6.3.2.3	The Corfu-Otranto corridor and the archaeological record of the northern Ionian Sea	310
2.6.3.2.4	Archaeological potential of the wider project area	316
2.7	Socioeconomic environment	317
2.7.1	Demographics	317
2.7.1.1	Administrative context and study area population	317
2.7.1.2	Age structure	318
2.7.1.3	Seasonal population variation	319
2.7.2	Economic activities	320
2.7.2.1	National economic context	320
2.7.2.2	Local economic context	321
2.7.2.3	Sectoral structure of regional economies	325
2.7.3	Employment and labour market	326
2.7.3.1	National labour market context	326
2.7.3.2	Local labour market context	328
2.7.4	Fisheries and aquaculture	332

2.7.4.1	Greek fishing sector context	333
2.7.4.1.1	Fleet composition	333
2.7.4.1.2	Catch volumes and value	333
2.7.4.1.3	Species composition	334
2.7.4.1.4	Fishing effort and geographic distribution	335
2.7.4.1.5	Employment	337
2.7.4.1.6	Stock sustainability	338
2.7.4.2	Fishing economy and communities	338
2.7.4.3	Fisheries and transboundary context	339
2.7.4.4	Aquaculture	342
2.7.5	Tourism	342
2.7.5.1	Ionian Islands region and Corfu regional unit	342
2.7.5.1.1	Tourism volume and revenue	342
2.7.5.1.2	Accommodation capacity	343
2.7.5.1.3	Tourist assets and coastal dependency	344
2.7.5.1.4	Seasonality	345
2.7.5.2	Epirus region and Thesprotia regional unit	346
2.7.5.2.1	Tourism volume and revenue	346
2.7.5.2.2	Accommodation capacity	347
2.7.5.2.3	Tourist assets	347
2.7.5.2.4	Seasonality	348
2.8	Social and Technical Infrastructure	349
2.8.1	Social infrastructure	349
2.8.1.1	Health Services	349
2.8.1.1.1	National healthcare context	349
2.8.1.1.2	Local healthcare context	350
2.8.1.2	Social Protection	353
2.8.1.3	Education	354
2.8.1.3.1	National education system	354
2.8.1.3.2	Regional and local educational infrastructure	356
2.8.2	Transport infrastructure	357
2.8.2.1	Road network	357
2.8.2.2	Air connections	359
2.8.2.3	Port facilities	360
2.8.2.4	Maritime traffic	360
2.8.3	Technical and environmental infrastructure	362
2.8.3.1	Water supply	362
2.8.3.2	Wastewater management	362
2.8.3.3	Solid waste management	363
2.8.3.4	Electricity - telecommunications - natural gas	363
2.8.3.4.1	Electric power transmission network	363

2.8.3.4.2	Natural gas network	366
2.8.3.4.3	Telecommunications network	367
2.8.3.4.4	Renewable energy sources	368
2.9	Acoustic environment	369
3	Environmental baseline survey – field report and data interpretation executive summary	374
3.1	Introduction	374
3.1.1	LOT 01: Geophysical survey campaign	374
3.1.2	LOT 02: Environmental survey campaign	374
3.2	Survey design and methods	375
3.2.1	Geophysical survey campaign (LOT 01)	375
3.2.1.1	Survey platform, positioning, and AUV operations	375
3.2.1.2	Geophysical and environmental sensors	379
3.2.1.3	Visual inspection and imaging (CATHX)	379
3.2.1.4	Oceanographic and acoustic monitoring (mooring line)	380
3.2.1.5	Passive Acoustic Monitoring	382
3.2.1.6	Marine mammal mitigation protocols	383
3.2.2	Environmental survey campaign (LOT 02)	384
3.2.2.1	Sampling design	384
3.2.2.2	Seawater and plankton methodology	388
3.2.2.2.1	Physicochemical characteristics of the water column (CTD Profiling)	388
3.2.2.2.2	Chemical characteristics of seawater	388
3.2.2.2.3	eDNA in bottom seawater (fish communities)	389
3.2.2.2.4	Phytoplankton methodology	389
3.2.2.2.5	Zooplankton and ichthyoplankton (fish larvae) methodology	389
3.2.2.3	Sediments and infauna methodology	390
3.2.2.3.1	Sediment field measurements and macroscopic description	390
3.2.2.3.2	Physical and chemical characteristics of sediment	390
3.2.2.3.3	Macrozoobenthos (infauna) methodology	390
3.2.2.4	Marine mammal and sea turtle monitoring methodology	391
3.2.2.5	Avifauna monitoring methodology	391
3.3	Results and discussion	393
3.3.1	Geophysical survey campaign (LOT 01)	393
3.3.1.1	Seabed morphology and acoustic data	393
3.3.1.2	Mound-like morphology	397
3.3.1.3	Fault scarps morphologies	405
3.3.1.4	Mud volcanoes	407
3.3.1.5	Cables and trench	407
3.3.1.6	Sonar contacts recognized in the study area	411
3.3.1.7	Sub-surface stratigraphy interpretation from SBP	411

3.3.1.8	Fluids/acoustic anomalies in SBP profiles	417
3.3.1.9	Existence of unstable hydrates	419
3.3.1.10	Geohazards assessment	419
3.3.1.11	CATHX data interpretation	423
3.3.1.12	Marine cultural heritage – Target T057	424
3.3.1.13	Currents	430
3.3.1.14	Underwater noise	433
3.3.1.15	Analysis of deployed PAM data for marine mammal records	437
3.3.1.16	Marine mammal and sea turtle sightings	440
3.3.2	Environmental survey campaign (LOT 02)	446
3.3.2.1	Seawater and plankton results	446
3.3.2.1.1	Physicochemical characteristics of the water column	446
3.3.2.1.2	Chemical characteristics of seawater	465
3.3.2.1.3	Correlation among analytical results – seawater	486
3.3.2.1.4	Detailed description of results – phytoplankton	487
3.3.2.1.5	Detailed description of results – zooplankton	499
3.3.2.1.6	Detailed description of results – ichthyoplankton	508
3.3.2.2	Sediments and infauna results	509
3.3.2.2.1	Summary of results	509
3.3.2.2.2	Detailed description of results – sediments	512
3.3.2.2.3	Correlation among analytical results – Sediment	536
3.3.2.2.4	Detailed description of results – Infauna	537
3.3.2.3	Seabed habitats (AUV investigation)	551
3.3.2.4	Marine litter (AUV investigation)	557
3.3.2.5	Seawater and plankton discussion	563
3.3.2.5.1	Seawater discussion	563
3.3.2.5.2	Phytoplankton discussion	566
3.3.2.5.3	Mesozooplankton discussion	567
3.3.2.5.4	Ichthyoplankton discussion	567
3.3.2.6	Sediment and infauna discussion	568
3.3.2.6.1	Sediment discussion	568
3.3.2.6.2	Infauna discussion	571
3.3.2.6.3	Seabed habitat discussion	571
3.3.2.6.4	Marine litter discussion	573
3.3.2.7	Marine mammal and sea turtle sightings	574
3.3.2.8	Avifauna observations	579
3.3.2.8.1	Survey effort	579
3.3.2.8.2	Avifauna observations	581
4	Conclusions	597
4.1	Bathymetry and seabed morphology	597
4.2	Shallow stratigraphy and geohazard assessment	597

4.3	Underwater cultural heritage and man-made features	597
4.4	Oceanographic and acoustic baseline	598
4.5	Seawater results	598
4.5.1	Physic-chemical characteristics of the water column (CTD profiles)	598
4.5.2	Total Suspended Solids (TSS), Total Organic Carbon (TOC) and nutrients	599
4.5.3	Metals and metalloids	599
4.5.4	Total Petroleum Hydrocarbons (TPH) and Polycyclic Aromatic Hydrocarbons (PAHs)	599
4.6	Plankton results	600
4.6.1	Phytoplankton community	600
4.6.2	Zooplankton community	600
4.6.3	Ichthyoplankton	600
4.7	Sediment Results	600
4.7.1	Physic-chemical measurements and macroscopic description	600
4.7.2	Grain-size and other physic-chemical variables	601
4.7.3	Total Organic Carbon (TOC) and nutrients	601
4.7.4	Metals and metalloids	601
4.7.5	Total Petroleum Hydrocarbons (TPH) and Polycyclic Aromatic Hydrocarbons (PAHs)	602
4.7.6	Microplastics	602
4.8	Infauna results	602
4.8.1	Macrozoobenthos community	602
4.9	Benthic biocoenoses	603
4.9.1	AUV-based characterisation of benthic habitats and biocoenoses	603
4.10	Marine litter	603
4.10.1	AUV-based characterisation of marine litter	603
4.11	Fish fauna	603
4.12	Marine mammal and sea turtle monitoring effort and encounters	604
4.13	Avifauna monitoring effort and observations	605
4.14	Environmental designations and regulatory frameworks	606
4.15	Settlement structure and land use	607
4.16	Maritime uses	607
4.17	Demographics	609
4.18	Economic activities	609
4.19	Employment and labour market	609
4.20	Fisheries and aquaculture	610

4.21	Tourism	610
4.22	Social infrastructure	611
5	References	612
6	Photographic documentation	634
7	Annexes	657
7.1	Annex 01 List of marine fish fauna species	657
7.2	Annex 02 Geophysical survey report	674
7.3	Annex 03A Report on possible ruins of an ancient shipwreck	675
7.4	Annex 03B Archaeological baseline assessment report	676
7.5	Annex 04 Current meter data analysis report	677
7.6	Annex 05 Acoustic data analysis report	678
7.7	Annex 06 Environmental baseline survey report	679

TABLES

Table 1-1: Lead Environmental Consulting Companies	22
Table 1-2: ESBS Study Team	23
Table 1-3: Collaborating Companies Supporting the ESBS	25
Table 2-1: Yearly and monthly current speed occurrence [%] and directions at “ASOPUS-1A” at surface. (Source: SAT-OCEAN current statistics report, 2026)	58
Table 2-2: Yearly and monthly current speed occurrence [%] and directions at “ASOPUS-1A”, 200 m below surface. (Source: SAT-OCEAN current statistics report, 2026)	58
Table 2-3: Yearly and monthly current speed occurrence [%] and directions at “ASOPUS-1A”, 900 m below surface. (Source: SAT-OCEAN current statistics report, 2026)	59
Table 2-4: Yearly and monthly wave HS occurrence [%] at “ASOPUS-1A” (Source: SAT-OCEAN wave statistics report, 2026)	66
Table 2-5: Yearly and monthly wave DP occurrence [%] at “ASOPUS-1A” (Source: SAT-OCEAN wave statistics report, 2026)	67
Table 2-6: Qualitative descriptors for determining good environmental status (GES)	86
Table 2-7: MSFD Environmental Monitoring Parameters and Assessment Criteria for Sampling Station “Othonoi (Ionio)”	87
Table 2-8: NEAT application results for representative Ionian coastal water bodies (HCMR, 2012-2015)	89
Table 2-9: NEAT application results per Marine Reporting Unit (MRU), (HCMR, 2012-2015)	89
Table 2-10: Definition of Ecological and Chemical Status of surface water bodies	93
Table 2-11: Ecological quality as an overall expression of the structure and function of the biological communities	93
Table 2-12: Ecological and chemical status of coastal water bodies within the Epirus River Basin District (EL05) (Source: 2nd Revision of the RBMPs)	95
Table 2-13: Ecological and chemical status of coastal water bodies within the Western Sterea Ellada River Basin District (EL04) (Source: 2nd Revision of the RBMPs)	95
Table 2-14: Protected areas under the WFD in the boarder area	99
Table 2-15: State of Greek bathing waters in the broader area (Ministry of Environment & Energy, 2024)	100
Table 2-16: Weather data (1971-2000) for island Othonoi. Source: Hellenic National Meteorological Service (Source: http://www.hnms.gr)	106
Table 2-17: Weather data for island Corfu and Igoumenitsa for the period 2010-2019. Source: meteorological stations of the National Observatory of Athens (Source: https://meteo.gr/climate/)	108

Table 2-18: Yearly and monthly wind speed occurrence [%] at “ASOPUS-1A” at 10m above sea level. (Source: SAT-OCEAN wind statistics report, 2026)	111
Table 2-19: Yearly and monthly wind direction occurrence [%] at “ASOPUS-1A” at 10m above sea level. (Source: SAT-OCEAN wind statistics report, 2026)	111
Table 2-20: Regulatory EU Standards and WHO Guideline Limit Values for Regulated Air Pollutants (Source: 2024 Baseline Data)	121
Table 2-21: Minimum and maximum depth and seabed type of occurrence for the most frequently recorded species in literature sources for the Eastern Ionian Sea (Source: Salomidi et al., 2022)	131
Table 2-22: Number of georeferenced records collected as bycatch from experimental fishing surveys specifically for the Eastern Ionian Sea (Source: Salomidi et al., 2022)	131
Table 2-23: Anthozoan species of conservation interest in the Mediterranean Sea and their geographic range within the wider study area (Sources: IUCN, 2016; Otero et al., 2017; Salomidi et al., 2022).	133
Table 2-24: Fish species with high conservation status (Vulnerable, Endangered, and Critically Endangered) in the project’s vicinity, based on the IUCN Mediterranean Red List assessment.	145
Table 2-25: Frequency of occurrence of the elasmobranch species caught in hauls conducted in between depths of 200-800 m of the Eastern Ionian Sea during MEDITS surveys from 2001-2014 (Source: Damalas et al., 2022).	147
Table 2-26: Occurrence by depth for selected chondrichthyan species identified during 1983-2016 in the Eastern Ionian Sea, demonstrating their prevalence in deep-water environments (Source: Otero & Mytilineou, 2019)	148
Table 2-27: Chondrichthyan species with geographic ranges overlapping the project vicinity, their conservation status, and protection under relevant international, European, and national legislation and fisheries regulations	150
Table 2-28: Marine mammal species recorded in the Mediterranean Sea, their conservation status (IUCN Red Lists), protection under relevant national and international legislation and conventions, and presence in the Ionian Sea	156
Table 2-29: Mean group size (G), Density (animals/km ²) (D), and Abundance (A, 95% CI) for the two Stata around the Block 2 from the pan _mediterranean aerial survey. Strata 18, and 22b for the species that abundance was estimated based on design-based distance sampling (Supplementary material - Panigada et al., 2024).	159
Table 2-30: Estimated Abundance of the Sperm whale (Physeter macrocephalus) in the Mediterranean Sea and Hellenic Trench	166
Table 2-31: Habitat preferences and ecological predictors for key cetacean species in the Ionian Sea	187
Table 2-32: Sea turtle species recorded in the Mediterranean Sea, their IUCN conservation status, occurrence in the immediate project area based on IUCN spatial data, and protection under relevant national and international legislation and conventions	191
Table 2-33: Main pelagic seabird species presence status and major habitats in the Ionian Sea. Marked with bolt are the is the pelagic neritic marine habitats, relevant to the survey area.	202

Table 2-34: IUCN Red List threat status and the protection status under relevant national / international legislation and conventions for the main pelagic seabirds species present in the Ionian Sea. _____	203
Table 2-35: Natura 2000 sites in the broader area _____	223
Table 2-36: Habitat types present on the site GR2230010 and assessment for them _____	223
Table 2-37: Species referred to in Article 4 of Directive 2009/147/EC and site evaluation for them ____	225
Table 2-38: Habitat types present on the site IT9150002 and assessment for them _____	228
Table 2-39: Species listed in Annex II of Directive 92/43/EEC and site evaluation for them (IT9150002) _____	228
Table 2-40: Habitat types present on the site IT9150009 and assessment for them _____	230
Table 2-41: Species referred to in Article 4 of Directive 2009/147/EC and listed in Annex II of Directive 92/43/EEC and site evaluation for them (IT9150009) _____	230
Table 2-42: Habitat types present on the site IT9150015 and assessment for them _____	231
Table 2-43: Species referred to in Article 4 of Directive 2009/147/EC and listed in Annex II of Directive 92/43/EEC and site evaluation for them (IT9150015) _____	232
Table 2-44: Critical Habitats for Cetaceans in the broader area (Source: ACCOBAMS) _____	236
Table 2-45: Important Shark and Ray Areas (ISRAs) in the broader area _____	246
Table 2-46: Key Biodiversity Areas (KBAs) within a 100 km radius of the Exploration Well Asopus 1A _	251
Table 2-47: Marine Protected Areas (MPAs) within a 100 km radius of the Exploration Well Asopus 1A _____	254
Table 2-48: Important Bird Areas (IBAs) within a 100 km radius of the Exploration Well Asopus 1A ____	256
Table 2-49: Fisheries Restricted Areas (FRAs) in the broader area _____	259
Table 2-50: Ramsar sites within a 100 km radius of the Exploration Well Asopus 1A _____	266
Table 2-51: Municipalities of the Corfu Regional Unit and their populations _____	274
Table 2-52: Main land use categories in the Corfu Regional Unit (km ²) _____	277
Table 2-53: Local fishing prohibition zones within the Jurisdiction of the Corfu Port Authority _____	289
Table 2-54: Local fishing prohibition zones within the Jurisdiction of the Igoumenitsa Port Authority ____	290
Table 2-55: Submarine cables in the wider study area _____	296
Table 2-56: Designated cultural heritage sites _____	306
Table 2-57: Evolution of resident population 2011-2021 _____	317
Table 2-58: Age structure of the population of the study area 2021 _____	319
Table 2-59: Seasonal population and tourism-related population equivalent _____	320
Table 2-60: GDP trends in Greece and the study area (Current Prices, € million) _____	323
Table 2-61: Contribution of the Study Area to National GDP (2023) _____	323

Table 2-62: Contribution of the study area to National GDP (2023)	324
Table 2-63: Gross Value Added (GVA) by Main Economic Sector in the Ionian Islands and Epirus Regions (2023)	325
Table 2-64: Quantity and value of catches by category, Greece (2023-2024)	334
Table 2-65: Monthly catch totals by category, Greece, 2024 (fresh catches, tonnes)	337
Table 2-66: Key tourism indicators, Ionian Islands Region, 2023–2024	343
Table 2-67: Key tourism indicators, Epirus Region, 2023–2024	346
Table 2-68: Summary of Key Health System Indicators (Greece and EU Average)	350
Table 2-69: Primary health care infrastructure by region, 2024-2025	351
Table 2-70: Number of hospitals by region (2021-2024)	351
Table 2-71: Social care units, personnel and beneficiaries, Greece, (2021 and 2023)	354
Table 2-72: Key National Education Indicators, Greece (School Year 2023/2024)	355
Table 2-73: Educational Infrastructure in the Study Area (School Year 2023/2024)	356
Table 2-74: Higher Education Institutions in the Study Area	357
Table 2-75: Installed capacity of RES and HECHP units in the interconnected system, January 2022 (Source: DAPEEP Summary Information Bulletin on Renewable Energy Sources (RES) and High-Efficiency Combined Heat and Power (HECHP) PowerPoint Presentation)	369
Table 3-1: Project projection parameters	375
Table 3-2: AUV geophysical survey requirements	376
Table 3-3: AUV HUGIN 4500 plus sensor payload	379
Table 3-4: Setting of the PAM system	382
Table 3-5 – Theoretical and real coordinates of sampling stations of Asopus-1A (Datum: WGS84, Projection: UTM zone 34N)	386
Table 3-6: Theoretical and real coordinates of ichthyoplankton transects (Datum: WGS84, Projection: UTM zone 34N)	387
Table 3-7: Seabed gradient classification	393
Table 3-8: Start/end position and length of the cables detected within the study	408
Table 3-9: Hazard evaluation qualitative criteria	419
Table 3-10: Evaluation qualitative risk	420
Table 3-11: Summary of geophysical results	420
Table 3-12: Target T057: Description and parameters	428
Table 3-13: Basic statistics of current speed at SPCM “upper” and SPCM “lower”. (Source: Lighthouse 2026)	432

Table 3-14: Underwater noise analysis – daily values of L10, L50 and L90 for centered 63 Hz and 125 Hz third-octave bands of peak sound pressure level (SPLpeak)	433
Table 3-15: Underwater noise analysis – daily values of L10, L50 and L90 for centered 63 Hz and 125 Hz third-octave bands for root mean square sound pressure level (SPLrms)	435
Table 3-16: Summary of marine mammal and sea turtle encounters (visual sightings and acoustic detections) recorded during the LOT 01 campaign	443
Table 3-17: Total Suspended Solids (TSS), Total Organic Carbon (TOC) and Nutrient concentrations in seawater samples	471
Table 3-18: Heavy and Trace Metal concentrations in seawater samples collected at the Asopus-1A and Northern station groups, including the associated Blank Stations and all three Reference Stations	479
Table 3-19: Hydrocarbon concentrations (C _{≤10} , C ₁₀ – C ₄₀ and TPH) in seawater samples collected at the Asopus-1A and Northern Station groups, including the associated Blank Stations and all three Reference Stations	481
Table 3-20: Polycyclic Aromatic Hydrocarbons (PAHs) in seawater samples collected at the Asopus-1A and Northern station groups, including the associated Blank Stations and all three Reference Stations	483
Table 3-21: Polycyclic Aromatic Hydrocarbons (PAHs) in seawater samples collected at the Asopus-1A and Northern station groups, including the associated Blank Stations and all three Reference Stations	484
Table 3-22: Absolute values of species number (S) and mean values of abundance (N° ind. m ⁻²) and diversity indices: Shannon-Wiener index H' (loge), Pielou evenness index (J'), Simpson index (λ), and Margalef richness index (d)	507
Table 3-23: Surface sediment Temperature, pH and red-ox potential (ORP)	512
Table 3-24: Grain size distribution of the main fractions (gravel, sand, silt, clay), Folk (1954, 1974) and Shepard (1954) classification, and other physical characteristics of surface sediments	515
Table 3-25: TOC, Total Nitrogen (N-Tot) and Total Phosphorous (P-Tot) content in surface sediments	519
Table 3-26: Concentrations of Metals and Metalloids in surface sediments	527
Table 3-27: Concentrations of Metals and Metalloids in surface sediments	527
Table 3-28: Concentrations of Hydrocarbon Fractions (C _{≤12} , C _{>12}) and their sum (TPH) in surface sediments	530
Table 3-29: Polycyclic Aromatic Hydrocarbons (PAHs) in surface sediments	534
Table 3-30: Polycyclic Aromatic Hydrocarbons (PAHs) in surface sediments	535
Table 3-31: Microplastics in surface sediments (1 µm – 5 mm), qualitative identification by micro-Raman and FTIR spectroscopy	536
Table 3-32: Absolute values of species number (S) and mean values of abundance (N° ind. m ⁻²) and diversity indices: Shannon-Wiener index H' (loge), Pielou evenness index (J'), Simpson index (λ), and Margalef richness index (d)	544

Table 3-33: Application of the M-AMBI index at the sampling stations. Reported are the values of AMBI, diversity (H'), number of taxa (S), M-AMBI, and the corresponding Ecological Status – Asopus-1A, Northern station group and Reference stations _____	549
Table 3-34: Results of the application of the AMBI index at the sampling stations. The table reports the percentages of organisms belonging to the five ecological groups, the percentage of organisms not assigned to any ecological group (N.A.), as well as species richness and diversity – Asopus-1A, Northern station group and Reference stations _____	550
Table 3-35: Results of the AUV mosaic analysis across the investigated areas (Asopus-1A and northern station group, Blank stations, and Reference stations), including the surveyed area, presence/absence of marine litter, item categories classified according to the MSFD Joint List, and corresponding abundances (total and items km ⁻²) _____	558
Table 3-36: Summary of marine mammal and sea turtle encounters (visual sightings and acoustic detections) recorded during the LOT 02 environmental baseline field survey _____	577
Table 3-37: Summary of distances travelled by the survey vessel and the length of avifauna visual observations transects during LOT02 field survey _____	579
Table 3-38: Bird species and number of individuals recorded in the survey areas _____	581
Table 7-1: Marine fish species within the project's vicinity and their IUCN Red List conservation status (based on IUCN spatial range data accessed May 2026). _____	658

FIGURES

Figure 2-1: Mediterranean Sea bathymetry, showing the main basins, sea regions, and major rivers (adapted from Sammartino et al., 2022)	26
Figure 2-2: Bathymetric map of the broader area (based on GEBCO bathymetric data)	27
Figure 2-3: 3D morphology of the northern Greek Ionian Sea (Source: INTERREG 2001)	28
Figure 2-4: 3D morphology of the northern Italian Ionian Sea (Source: INTERREG 2001)	28
Figure 2-5: Macro-scale morphostructural framework and main geomorphological elements of the Eastern Mediterranean Sea (adapted from Otero & Mytilineou, 2022)	29
Figure 2-6: Spatial distribution of the Apulian Platform, Apulian Escarpment, and adjacent subduction zones in the Northern Ionian Sea (Source: NOAA)	30
Figure 2-7: Submarine canyons in the NE Ionian margin (Source: Otero & Mytilineou, 2022)	31
Figure 2-8: Simplified structural map of the Eastern Mediterranean Basins, displaying major structural domains (such as accretionary wedges and thin crust) and the primary tectonic structures, including thrust, normal, and strike-slip faults (Source: Tugend et al., 2019)	32
Figure 2-9: Tectonostratigraphic chart of the Apulia margin. SAB: South Adriatic Basin; AP: Apulian Platform; (Source: Tugend et al., 2019)	33
Figure 2-10: Schematic map of the main sedimentary domains surrounding the study area (Source: Del Ben A. et al., 2015) (yellow line indicates the location of the schematic profile of Figure 2-10)	34
Figure 2-11: Schematic section of the south Adria plate, the Ionian units directly overthrust the lesser buoyant South Apulia basin which produced the recent more advanced position of the Hellenic front in the Corfu offshore (Source: Del Ben A. et al., 2015)	34
Figure 2-12: Regional bathymetric and tectonic setting influencing sedimentation in the broader area (adapted from Tugend et al., 2019).	35
Figure 2-13: Seafloor sediment lithology distribution map of the Mediterranean Sea region with pockmarks (green dots) used in this paper (Source: Spatola et al., 2025). <i>Note: The map is not exhaustive and may depict areas containing pockmarks as zones without them, as it only includes data from studies reporting precise pockmark locations</i>	36
Figure 2-14: Active geological processes along Mediterranean continental margins and deep basins. BC: Blanes Canyon; CC: Cap de Creus Canyon; FR: Florence Rise; LFC: La Fonera Canyon; MR: Mediterranean Ridge; SZ: subduction zone (Source: Miramontes et al., 2023).	37
Figure 2-15: Map of the major tectonic lines in the wider Northern Ionian Sea area, illustrating the regional tectonic framework and plate boundaries (Source: European Atlas of the Seas)	38
Figure 2-16: Detailed map of known active faults in the broader Northern Ionian Sea and Western Greece region, adjacent to the Block 2 concession area (Source: Seismotectonic Atlas of Greece v1.1 Department of Geology & Geoenvironment, Section of Geophysics-Geothermics, NKUA, Greece)	39

Figure 2-17: Interpreted CROP section M8, crossing the study area with NW-SE direction (Source: Finetti I.R. et al., 2018) (Interpreted CROP-M8 on the southeastern extension of the Apulian platform, characterized by a flat setting, and interrupted by a few minor faults, probably connected to small shear movement. On the lower right corner, the survey area location (red polygon) is shown in map 65 (Mod. from Finetti I.R. et al., 2018)) _____ 40

Figure 2-18: 3D seismic volume provided by Energean (IL: 1057; XL: 4054) showing structural framework (two seismic profiles within the study area (IL: 1057; XL:4054). On the left, the location of the profiles with the borders of the LOT01 in light blue) _____ 40

Figure 2-19: Portion of the Crop-M8 seismic profile (Portion of the CROP-M8 seismic profile cropped at 1800ms (The location of the seismic profile is displayed in the lower left corner). At a depth of 1500ms an high reflectivity reflector is detected along the entire profile. It is interpreted as possible MES/GS level (Source: Brancatelli G. et al., 2022)) _____ 41

Figure 2-20: Seismotectonic map of the Central Mediterranean area (topography and bathymetry are from GEBCO 1 min data set and Medimap Group Bathymetry compilation (Loubrieu et al., 2007)). _____ 42

Figure 2-21: Map of major active seismogenic faults and historical seismicity (catalogue compilation 1901–2020) in the wider Northern Ionian Sea and Western Greece region. The map illustrates that the highest density of epicenters occurs along the peripheral tectonic margins (e.g., the Calabrian Arc and Hellenic Trench), relative to the structurally uplifted Apulian platform where Block 2 is located (Source: Seismotectonic Atlas of Greece v1.1, NKUA) _____ 43

Figure 2-22: Simplified typical fluid flow processes, and relative seafloor morphologies (e.g., pockmarks, mud volcanoes, brine pools), acoustic anomalies (both in the water column and in the sub-seabed) and potential sources (Modified from Spatola et al., 2025; after Ma et al., 2021) _____ 44

Figure 2-23: Slope map of the Mediterranean Sea region highlighting the distribution of pockmarks (green dots) (Source: Spatola et al., 2025) Note: The map is not exhaustive and may depict areas containing pockmarks as zones without them, as it only includes data from studies reporting precise pockmark locations. _____ 45

Figure 2-24: Pockmark susceptibility map of the Italian continental margins and adjacent areas. The map is presented in a reclassified form based on the Jenks method, with original pockmark occurrence probability values reported below the colorbar (VL: Very Low, L: Low, M: Moderate, H: High, VH: Very High). This map indicates the potential or probability for pockmark formation rather than existing pockmarks, following international guidelines on susceptibility modelling. Highly susceptible areas represent zones that may host future pockmarks or existing unmapped ones. Note: The area of very high susceptibility around the Maltese islands (Strait of Sicily) is attributed to the extensive presence of over 2,000 previously mapped pockmarks (Source: Spatola et al., 2025). _____ 46

Figure 2-25: Distribution of magmatic submarine volcanoes in the wider regional area (Source: European Atlas of the Seas) _____ 47

Figure 2-26: Distribution of deep-sea mud volcanoes (indicated by red circles) clustered along the East Mediterranean Ridge (Source: Otero & Mytilineou, 2022) _____ 48

Figure 2-27: Landslide susceptibility map in the wider project area (Source: EMODNET) _____ 50

Figure 2-28: Epicentres of earthquakes that resulted in tsunamis having intensities of three or higher on the Sieberg-Ambraseys tsunami intensity scale (colored circles, after Maramai et al., 2014); white rectangles show tsunamigenic fault areas with annotations indicating their tsunamigenic potential; locations where historic meteotsunamis surpassed an amplitude of 0.5 m are marked with colored stars (Source: Lionello et al., 2023; modified from Pérez Gómez et al., 2022). _____ 51

Figure 2-29: Map displaying the primary causes and historical triggers of tsunamis in the wider Ionian Sea and Hellenic Shelf region (Source: Seismotectonic Atlas of Greece v1.1 Department of Geology & Geoenvironment, Section of Geophysics-Geothermics, NKUA, Greece) _____ 52

Figure 2-30: Map of the general circulation patterns in the Mediterranean basin with a schematic of basic characteristics of the Eastern Mediterranean general circulation based on results from Robinson et al. (1991). 1: Pelops Anticyclone (recurrent), 2: Cretan Cyclone (permanent), 3: Ierapetra Anticyclone (recurrent), 4: Mersa-Matruh Anticyclone (permanent), 5: Rhodes Cyclone, MMJ: Mid-Mediterranean Jet. Areas 1) the southeast Ionian (latitude of 37° N.), 2) the Lybian Sea i.e., the area south of Crete, 3) the eastern Levantine, i.e., the area west of 30° E, 4) the south Aegean Sea, i.e., south of latitude 37.6° N. and 5) the North Aegean Sea, i.e. north of 37.6° N. (Source: Otero & Mytilineou, 2022) _____ 53

Figure 2-31: Representation of Ionian Sea circulation: a) Surface, b) Intermediate layer (Source: Malanotte-Rizzoli et al., 1997) _____ 55

Figure 2-32: BiOS decadal inversions of the Ionian circulation and pathways of the principal water masses (Source: Gacic et al., 2010) _____ 55

Figure 2-33: Two different ways of the surface circulations of the Eastern Mediterranean Sea and the Ionian Sea _____ 56

Figure 2-34: Schematic representation of the Mediterranean overturning circulation pathways at three different depth ranges: surface to upper ocean (0–150 m, red), intermediate (150–1000 m, green), and deep/abyssal (>1000 m, blue). Downward purple arrows denote locations of deep-water formation (Source: Pinardi et al., 2023) _____ 57

Figure 2-35: Current speed and direction frequency (%) at "ASOPUS-1A" for the entire period for different depths (Source: SAT-OCEAN current statistics report, 2026) _____ 61

Figure 2-36: Current speed and direction frequency (%) at "ASOPUS-1A" for each month for the surface and for 200 and 900 m below the surface. (Source: SAT-OCEAN current statistics report, 2026) _____ 62

Figure 2-37: Spatial distributions of amplitude (left column) and phase (right column) of the main semidiurnal (M2 and S2) and diurnal (K1 and O1) tidal constituents in the Mediterranean Sea, based on high-resolution hydrodynamic model simulations validated against tide gauges (Source: Palma et al., 2020) _____ 64

Figure 2-38: Regional tidal amplitude (Source: European Atlas of the Seas) _____ 65

Figure 2-39: Monthly wave significant height (HS) and direction frequency (%) at "ASOPUS-1A" at 10m above sea level. (Source: SAT-OCEAN wave statistics report, 2026) _____ 68

Figure 2-40: Wave significant height (HS) and direction frequency (%) at "ASOPUS1A" at 10m above sea level for the entire period. (Source: SAT-OCEAN wave statistics report, 2026) _____ 69

Figure 2-41: Basin-wide distribution at the surface of the Mediterranean Sea of (A) temperature and (B) salinity (Source: Schroeder et al., 2023; based on CMEMS reanalysis)	70
Figure 2-42: Basin-wide distribution at the depth of the salinity maximum (excluding the first 100 m) of (A) potential temperature and (B) salinity (Source: Schroeder et al., 2023; based on CMEMS reanalysis).	71
Figure 2-43: Time series of salinity in the S. Adriatic and Nitrate in the S. Adriatic and the NE Ionian	72
Figure 2-44: Location of physicochemical water measurements from OGS and HCMR (Source: https://fleetmonitoring.euro-argo.eu/)	73
Figure 2-45: Pressure/ temperature diagram – Argo Float 6903822	74
Figure 2-46: Pressure/ temperature diagram – Argo Float 6903296	74
Figure 2-47: Pressure/ temperature diagram – Argo Float 6903263	75
Figure 2-48: Pressure/ salinity diagram – Argo Float 6903822	75
Figure 2-49: Pressure/ salinity diagram – Argo Float 6903296	76
Figure 2-50: Pressure/ salinity diagram – Argo Float 6903263	76
Figure 2-51: Pressure/ Dissolved Oxygen diagram – Argo Float 6903822	77
Figure 2-52: Pressure/ Dissolved Oxygen diagram – Argo Float 6903263	77
Figure 2-53: Selected Argo Float stations	78
Figure 2-54: Pressure/ salinity and temperature diagram – Argo Float 6903296- Location 274	78
Figure 2-55: Pressure/ salinity and temperature diagram – Argo Float 6903296- Location 273	79
Figure 2-56: Pressure/ temperature, salinity and dissolved oxygen diagram – Argo Float 6903263- Location 344	79
Figure 2-57: Pressure/ temperature, salinity and dissolved oxygen diagram – Argo Float 6903263- Location 345	80
Figure 2-58: Pressure/ temperature, salinity and dissolved oxygen diagram – Argo Float 6903263- Location 346	81
Figure 2-59: Pressure/ temperature, salinity and dissolved oxygen diagram – Argo Float 6903263- Location 347	81
Figure 2-60: Pressure/ temperature, salinity and dissolved oxygen diagram – Argo Float 6903263- Location 348	82
Figure 2-61: Marine regional units (MRUs, MSFD Greece)	84
Figure 2-62: The sampling sites of the SFD “open sea” network of Greece	85
Figure 2-63: Othonoi (Ionio) MSFD sampling point in the broader area	86
Figure 2-64: Methodology for determining surface water status	92
Figure 2-65: WFD coastal water bodies of Greece in the broader area	94

Figure 2-66: Ecological and Chemical Status Classification of IT water bodies in the broader area (Source: WISE FRESHWATER, WFD Italy, Italy Country Profiles on Water Framework Directive WISE Freshwater, accessed in May 2026)	97
Figure 2-67: Protected water bodies in the study area according to the Article 6 of WFD (Source: European Environmental Agency, EEA 2019)	98
Figure 2-68: State of bathing waters in the broader area (Source: EEA 2025)	100
Figure 2-69: Köppen-Geiger climate classification in the Mediterranean region for the 1985–2014 period. Data extracted from the IPCC WG1-AR6 Interactive Atlas (Source: Lionello et al., 2023 and Gutiérrez et al., 2021)	104
Figure 2-70: Sunlight data for the island of Othonoi (Source: Hellenic National Meteorological Service, 1971-2000)	107
Figure 2-71: Precipitation data for the island of Othonoi (Source: Hellenic National Meteorological Service, 1971-2000)	107
Figure 2-72: Temperature data for the island of Othonoi (Source: Hellenic National Meteorological Service 1971-2000)	108
Figure 2-73: Temperature data for the island of Kerkyra (Source: National Observatory of Athens, 2010-2019)	109
Figure 2-74: Temperature data for Igoumenitsa (Source: National Observatory of Athens, 2010-2019)	109
Figure 2-75: Precipitation data for Kerkyra and Igoumenitsa (Source: National Observatory of Athens, 2010-2019)	110
Figure 2-76: Monthly wind speed and direction frequency (%) at "ASOPUS1A" AT 10m above sea level. (Source: SAT-OCEAN wind statistics report, 2026)	112
Figure 2-77: Wind speed and direction frequency (%) at "ASOPUS1A" AT 10m above sea level for the entire period. (Source: SAT-OCEAN wind statistics report, 2026)	113
Figure 2-78: Change of mean annual temperature (top row, °C) and total annual precipitation (bottom row, %) with respect to the 1986–2005 period for 2 °C (left column) and 4 °C (right column) global warming levels, based on CMIP6 simulations (Source: Gutiérrez et al., 2021).	114
Figure 2-79: Annual mean change of number of days with maximum temperature above 40 °C (top row, number of days) and of maximum 1-day precipitation (bottom row, %) with respect to the 1986–2005 period for 2 °C (left column) and 4 °C (right column) global warming levels, based on EURO-CORDEX simulations (Source: Gutiérrez et al., 2021)	115
Figure 2-80: Mean sea level projections representative of the Mediterranean Sea under two climate change scenarios (RCP4.5 and RCP8.5) for the 21st century. Shaded areas indicate the 17%–83% and the 5%–95% probability intervals, and solid lines represent the multimodel ensemble median (Source: Kopp et al., 2014; via Marcos et al., 2023).	116
Figure 2-81: Sea level change (2005) and coastline changes based on satellite data (2025) (Source: European Atlas of the Seas)	117

Figure 2-82: Areas of potential significant flood risk (EL04, EL05) (Source: 1st Revision of the FRMPs)	119
Figure 2-83: Flood Hazard and Flood Risk Map of Italy (Source EEA, 2019, https://discomap.eea.europa.eu/floodsviewer)	120
Figure 2-84: PM _{2.5} annual mean – 2024 (EEA)	122
Figure 2-85: PM ₁₀ annual mean – 2024 (EEA)	122
Figure 2-86: CO annual mean – 2024 (EEA)	123
Figure 2-87: NO annual mean – 2024 (EEA)	123
Figure 2-88: NO ₂ annual mean – 2024 (EEA)	124
Figure 2-89: NO _x as NO ₂ annual mean – 2024 (EEA)	124
Figure 2-90: SO ₂ annual mean – 2024 (EEA)	125
Figure 2-91: As in PM annual mean – 2024 (EEA)	125
Figure 2-92: Pb in PM annual mean – 2024 (EEA)	126
Figure 2-93: Cd in PM annual mean – 2024 (EEA)	126
Figure 2-94: BaPin PM annual mean – 2024 (EEA)	127
Figure 2-95: C ₆ H ₆ in PM annual mean – 2024 (EEA)	127
Figure 2-96. EUSeaMap (2025) habitat types (Source: EUNIS 2007/full-detail classification)	129
Figure 2-97. Recorded presence of vulnerable sessile invertebrate taxa across the Eastern Ionian Sea	130
Figure 2-98. Number of alien and cryptogenic records per 10 km × 10 km grid cell, included in the dataset (Source: Katsanevakis et al., 2020)	136
Figure 2-99: Spatial patterns of fish species richness in the Mediterranean Sea based on superimposed expert-drawn maps. (A) All fish species (n=625), (B) ray-finned fish species (n=545), (C) elasmobranchs (n=80), (D) endemic fish species (n=79), (E) alien fish species (n=127) [data modified from 91]. Colors express species occurrence from blue (little or no occurrence) to red (highest occurrence). The size of the cell is 0.160.1 degree. doi:10.1371/journal.pone.0011842.g002 (Source: Coll et al., 2010)	144
Figure 2-100: Predicted abundance of shark specimens	149
Figure 2-101: Predicted abundance of spinetail devil ray	149
Figure 2-102: Line transects survey data from 12 organizations for a 20-year period (1997 - 2016) (Source: Mannoci et al., 2018)	158
Figure 2-103: ACCOBAMs survey Initiative ASI and their survey design for aerial surveys (Source: Panigada et al., 2024).	159
Figure 2-104: Spatial distribution of historical and recent marine mammal (and sea turtle) sightings and acoustic detections in the wider Ionian Sea and Block 2 area	160
Figure 2-105: Fin whale distribution in the Mediterranean Sea, Blue indicates the presence of the Mediterranean fin whale subpopulation, yellow shows its regular distribution range, and red represents the NENA subpopulation (Source: Espada et al., 2024).	162

Figure 2-106: Predicted abundance of fin whales (Source: Canadas et al., 2023 - ACCOBAMS Survey Initiative).	163
Figure 2-107: Predicted abundances of sperm whales (expressed as number of animals per grid cell) derived from Density Surface Modelling - Boisseau et al., 2024 (Source: ACCOBAMS survey Initiative).	166
Figure 108 Predicted abundance of beaked whales in the Mediterranean Sea (Source: Canadas et al., 2018)	169
Figure 2-109: Predicted abundance of Risso's dolphins (Source: Cañadas et al., 2023 - ACCOBAMS Survey Initiative).	171
Figure 2-110: Predicted abundance of Striped dolphins (Source: Canadas et al., 2023 - ACCOBAMS Survey Initiative)	173
Figure 2-111: Summer distribution of striped dolphins according to topographic and oceanographic variables (Source: Azzolino et al., 2020)	174
Figure 2-112: Common dolphin strandings (Source: Vale et al., 2021)	175
Figure 2-113: Minimum distance travelled by an adult common dolphin which was identified by individual photo id (Source: Genov et al., 2012).	176
Figure 2-114: Predicted abundance of Striped or common dolphin (Source: Canadas et al., 2023 - ACCOBAMS Survey Initiative)	177
Figure 2-115: Predicted abundance of small dolphins (striped, common dolphins) (Source: Canadas et al., 2023 - ACCOBAMS Survey Initiative)	177
Figure 2-116: Distribution of bottlenose dolphin sightings (n=8389) taken from 43 research groups in the Mediterranean Sea (Source: Bellingeri et al., 2025)	179
Figure 2-117: Predicted abundance of bottlenose dolphins (Canadas et al., 2023 - ACCOBAMS Survey Initiative)	180
Figure 2-118: Species distribution modelling habitat suitability under present conditions (2009-2021), decade 2045-2055 under two simulations of the climate system (RCP4.5 and 8.5). Color gradient spans from blue (no suitable area) to red (highest suitability). Lower row: Scenarios of range change between present and future scenarios (RCP 4.5 and 9.5). Red areas: predicted to be lost; green areas: predicted to remain occupied; blue areas: predicted to remain unoccupied; white areas: predicted to be gained (Source: D'Amen et al., 2025)	181
Figure 2-119: Sightings and stranding locations of rough toothed dolphins in the Mediterranean (Source: Foskolos et al., 2023)	182
Figure 2-120: Spot the Monk Observatory eDNA distribution map, green dot: positive, white dot: negative, grey dot: to be analysed (Source: University of Milano-Bicocca Spot the Monk observatory – Spot the Monk observatory, accessed in May 2026)	184
Figure 2-121: Map showing the sightings of <i>Monachus monachus</i> between 2015 and 2024. The color coding has been selected in respect of the year of the sighting: 2015: purple, 2016: blue, 2017: burgundy, 2020: green, 2021: yellow, 2022: orange, 2023: violet (Source: Gradella, 2024)	184

Figure 2-122: Map showing the sightings of *Monachus monachus* between 2015 and 2024. The color coding has been selected in respect of the year of the sighting: 2015: purple, 2016: blue, 2017: burgundy, 2020: green, 2021: yellow, 2022: orange, 2023: violet. (Source: Gradella, 2024) _____ 185

Figure 2-123: Biogeography of Sea Turtles in the Mediterranean Sea (Source: Hochscheid et al., 2019)
Description: Map displaying 216 nesting sites, 316 satellite telemetry tracks, and modelled foraging areas for loggerhead turtles across the Mediterranean basin _____ 193

Figure 2-124: Neritic foraging and wintering sites for loggerhead turtles *Caretta caretta* (orange areas and arrows) and green turtles *Chelonia mydas* (green arrows). Neritic areas correspond to the continental shelves, which are conventionally delimited by the 200 m isobath (solid line) (Source: Casale et al., 2018) _____ 194

Figure 2-125: Satellite telemetry data showing sea turtle movement in 2025 (left) and 2024 (right) (Source: ARCHELON) _____ 194

Figure 2-126: Satellite telemetry data showing sea turtle movement during the period 2020 – 2022 (left) and 2019 (right) (Source: ARCHELON) _____ 195

Figure 2-127: Main known migratory corridors for adult loggerhead turtles *Caretta caretta* (females and males) during reproductive migrations from and to the breeding sites (asterisk). Light brown areas represent migratory funnels in the open sea while darker strips represent paths along the coasts, typically in shallow waters. (Source: Casale et al., 2018) _____ 196

Figure 2-128: Main known migratory corridors for adult female green turtles *Chelonia mydas* during reproductive migrations from the breeding sites (in asterisk). Light green areas represent migratory funnels in the open sea while darker strips represent paths along the coasts, typically in shallow waters. (Source: Casale et al., 2018) _____ 196

Figure 2-129: Map of toponyms and the location of stranding events for the loggerhead turtle *Caretta caretta* and the green turtle *Chelonia mydas* for the period 2010–2021 (Source: http://arch.her.hcmr.gr/papers/ACMFE35_1-12.pdf) _____ 197

Figure 2-130. Species composition of stranding records in the Ionian Sea, showing the distribution across total records and within individual animal groups (sea turtles, cetaceans) _____ 198

Figure 2-131. Cause of stranding of individuals (below), categorized by animal groups (sea turtles, cetaceans, monk seals) _____ 198

Figure 2-132. Spatial distribution of stranding records for loggerhead (*Caretta caretta*) and green (*Chelonia mydas*) sea turtles in the Ionian Sea. To enhance clarity, stranding records were grouped using a 5 × 5 km grid and the abundance of strandings is depicted by varying dot size and color _____ 199

Figure 2-133. Spatial distribution of stranding records for whales (blue dots), dolphins (yellow dots) and monk seals (*Monachus monachus*; red dots) in the Ionian Sea. To enhance clarity, stranding records were grouped using a 5 × 5 km grid and the abundance of strandings is depicted by varying dot size _____ 200

Figure 2-134. Annual primary production in the Mediterranean Sea (Source: Salgado-Hernanz et al. 2022) _____ 201

Figure 2-135. Foraging tracks of Scopoli's Shearwaters during the breeding season, tagged on Diapontia islands in 2022 (left) and in 2024 (right) (Source: NCC, Mom & Biotopia 2022, Karagianni et al. 2024) _____ 205

Figure 2-136. Scopoli's shearwater wintering dispersal and foraging area during the breeding season from a single individual that bred on Strofades, based on geolocator data (Source: Karris et al. 2011) _____ 206

Figure 2-137. Scopoli's shearwater GPS telemetry tracks from colonies outside the Ionian Sea. [1] pre-laying movements of 17 individuals from Hal Far Colony on Malta (source: BirdLife Malta, Seabird Tracking Database <https://data.seabirdtracking.org/dataset/2522>), [2] movements of 9 individuals from Hal Far Colony on Malta (source: BirdLife Malta, Seabird Tracking Database <https://data.seabirdtracking.org/dataset/954>), [3] movements of 26 individuals during incubation period from Tremini Archipelago in Italy (source: J.G. Cecere, G. Gaibani & S. Imperio, Seabird Tracking Database <https://data.seabirdtracking.org/dataset/783>) (Source: Seabird Tracking Database <https://data.seabirdtracking.org>) _____ 207

Figure 2-138. Post-fledging movements of 14 juvenile Yelkouan Shearwaters (left) and migration routes of 3 adult Yelkouan Shearwaters (right) from Malta, based on GPS tracking data (Source: Gatt et al. 2025) _____ 209

Figure 2-139. Tracks of 5 Yelkouan Shearwaters from Lastovo archipelago in Croatia, based on GPS/GSM telemetry data (Source: Mendez & Bukreev 2022) _____ 210

Figure 2-140. Tracks of 2 Yelkouan Shearwaters from Rdum tal-Madonna colony on Malta during chick-rearing period (Source: BirdLife Malta, Seabird Tracking Database <https://data.seabirdtracking.org/dataset/1935>). _____ 210

Figure 2-141. Migratory routes of Audouin's Gulls breeding in the Aegean Sea (Source: Hellenic Ornithological Society, <https://ornithologiki.gr/en/public-awareness-education/information/our-news/2028-aegean-journeys-and-beyond>) _____ 215

Figure 2-142. Tracks of 30 Audouin's Gulls (25 adults and 5 chicks) from Lastovo colony in Croatia (Source: Association BIOM, Seabird Tracking Database <https://data.seabirdtracking.org/dataset/2467>). _____ 215

Figure 2-143. The location of the Ionian Sea along the Black Sea - Mediterranean Flyway for migratory birds (red square) [left] and the general migration pattern of Western Palaearctic passerines [right] (Source: BirdLife International, <https://datazone.birdlife.org/about-our-science/flyways> and Busse et al. 2014). _____ 217

Figure 2-144. Suggested directions and concentrations of migratory streams in Europe and the Middle East, primarily based on radar, infrared and moon-watch data (Source: Bruderer & Leichti 1999). _____ 218

Figure 2-145. Migration routes of the European Honey Buzzard (*Pernis apivorus*) during autumn (left) and spring migration period (right) (Source: Panuccio et al. 2013). _____ 219

Figure 2-146. Examples of raptor and soaring birds migration routes in the southern Italy: Spring migration routes of Pallid Harriers (*Circus macrourus*) (left) and autumn migration routes of Common Crane (*Grus grus*) (right) (Source: Corso & Cardelli 2004. Mingozzi et al. 2013). _____ 219

Figure 2-147. Routes of 28 juvenile honey buzzards migrating from Finland to sub-Saharan Africa in relation to zonal wind speed (Uwind, colour scale) encountered en route (Vansteelant et al. 2017) _____ 220

Figure 2-148: Sites of Natura 2000 Network in the broader area	222
Figure 2-149: Critical Habitats for Cetaceans in the broader area (Source: ACCOBAMS)	236
Figure 2-150: Important Marine Mammals Areas in the broader area (IMMAs)	238
Figure 2-151: Area of Interest (Aoi) Southern Adriatic and Northern Ionian Sea (Source: IMMA e-atlas)	239
Figure 2-152: Ecologically or Biologically Significant Marine Areas (EBSAs) in the broader area	241
Figure 2-153: Important Sharks and Rays Areas in the broader area (ISRAs)	245
Figure 2-154: Key Biodiversity Areas (KBAs) in the broader area	251
Figure 2-155: Marine Protected Areas (MPAs) in the broader area	254
Figure 2-156: Important Bird Areas (IBAs) in the broader study area (Source: BIRDLIFE)	256
Figure 2-157: Ionian Marine National Park (Source: NECCA, May 2025)	258
Figure 2-158: Fisheries Restricted Areas (FRAs) in the broader area	259
Figure 2-159: Specially Protected Areas of Mediterranean Importance (SPAMIs) in the Mediterranean Basin	262
Figure 2-160: Ramsar sites in the broader area	267
Figure 2-161: Emerald Network of Areas of Special Conservation Interest in the broader area	269
Figure 2-162: Regional Spatial Planning and Development Framework of the Ionian Islands Region	272
Figure 2-163: Regional Spatial Planning and Development Framework of the Epirus Region	273
Figure 2-164: Urban Plan of the city of Igoumenitsa	280
Figure 2-165: Maritime spatial units	281
Figure 2-166: Average vessel traffic density (all vessel types), 2017–2024, in the Ionian Sea and wider Project area	283
Figure 2-167: Average traffic density (cargo and tanker), 2017–2024, in the Ionian Sea and wider Project area	284
Figure 2-168: Average vessel traffic density (passenger), 2017–2024, in the Ionian Sea and wider Project area	284
Figure 2-169: Divisions of FAO fishing areas	285
Figure 2-170: GFCM geographical sub-areas	286
Figure 2-171: GFCM Fisheries Restricted Areas in the wider Project area	287
Figure 2-172: Main commercial fishing prohibitions for fishing vessels under the Greek flag	288
Figure 2-173: AIS-derived apparent fishing effort, June 2025–June 2026, Global Fishing Watch	291
Figure 2-174: Distribution of aquaculture facilities in the wider study area	293
Figure 2-175: Vessel Density for sailing, pleasure craft and high-speed craft (Annual average 2017-2024)	295

Figure 2-176: Submarine cables in relation to the Project area	299
Figure 2-177: Offshore Oil and Gas installations (source EMODNET)	300
Figure 2-178: Offshore Wind Farms and Ocean Energy projects (source EMODNET)	301
Figure 2-179: Designated onshore cultural heritage sites	305
Figure 2-180: Ionian-Adriatic basin in the Bronze Age: more entangled sites (C. De Mitri 2024)	309
Figure 2-181: Strait of Otranto and Ionian Sea: probable route of the wreck and main sites with Corinthian ceramics from the late 8th and early 7th century BC (C. De Mitri 2024)	309
Figure 2-182: The location of the targets inspected during the deepwater archaeological survey that was conducted by the Ephorate of Underwater Antiquities (EUA) of the Hellenic Ministry of Culture, Education and Religious Affairs, in collaboration with the Hellenic Centre for Marine Research (HCMR). (Kourkoumelis & Sakellariou 2015)	312
Figure 2-183: The Poseidon 1 shipwreck: a. The mound of the main cargo concentration; b. Africana II C 2 amphora neck; c. Africana I C amphora neck; d. Two iron anchors; e. A marble mortar (holmos); f. Africana III A (Keay 25.1 type) amphora. (Kourkoumelis & Sakellariou 2015)	313
Figure 2-184: The Poseidon 2 shipwreck: a. The concentration of black stones and amphorae sherds; b. The concentration of amphorae and coarse ware; c. A bronze vase; d. Keay 61 A amphora. (Kourkoumelis & Sakellariou 2015)	314
Figure 2-185: Recovery of amphora from the early Archaic shipwreck discovered within the Otranto Channel. (https://www.archaeology.wiki/blog/2026/06/11/the-shipwreck-in-the-strait-of-ottranto/)	315
Figure 2-186: GDP evolution 2015-2024 in the study area (Current Prices, € million)	323
Figure 2-187: 2025 Sectoral employment distribution in Greece (Source: NACE Rev.2)	327
Figure 2-188: Employment rate (20–64 years) in the study area regions compared with Greece and the EU average, 2016-2025 (%)	331
Figure 2-189: Unemployment rate in the study area regions compared with Greece and the EU average, 2014-2023 (%)	332
Figure 2-190: Sectoral distribution of employment by NACE Rev. 2 sector in the study area regions and Greece, 2021	332
Figure 2-191: Composition of the Greek Catch volume by major category (2024)	334
Figure 2-192: Principal species caught by the Greek fishing fleet (2024)	335
Figure 2-193: Catches for Greece and the Coasts of Epirus and Corfu (2015-2024)	336
Figure 2-194: Trawling activity in relation to the proposed OWF Messapia Project area (Messapia EIS, 2025). The red circle indicates the location of the proposed OWF Messapia Project.	340
Figure 2-195: Driftline fishing activities in relation to the proposed OWF Messapia Project area (Messapia EIS, 2025). The red circle indicates the location of the proposed OWF Messapia Project.	341
Figure 2-196: Purse seine fishing activities in relation to the proposed OWF Messapia Project area (Messapia EIS, 2025). The red circle indicates the location of the proposed OWF Messapia Project.	341

Figure 2-197: Turnover from Administrative Sources, of enterprises in the Accommodation division (division 55 of NACE Rev. 2 classification), in the Corfu Regional Unit, 2019–2025 ((in thousand €) <i>Note: For 2023 Q4 Extraordinary transactions were recorded in the data. Therefore, they are not published as they are not comparable (ELSTAT)</i> _____	345
Figure 2-198: Turnover from Administrative Sources, of enterprises in the Accommodation division (division 55 of NACE Rev. 2 classification), in the Thesprotia Regional Unit, 2019–2025 ((in thousand €). <i>Note: For 2023 Q3 Extraordinary transactions were recorded in the data. Therefore, they are not published as they are not comparable (ELSTAT)</i> _____	348
Figure 2-199: Road network of the Port of Igoumenitsa (Source: Study for the update of the Port of Igoumenitsa Masterplan in 2013) _____	359
Figure 2-200: Vessels traffic in the wider project area (Source: https://EMODnet.ec.europa.eu/geoviewer/ , June 2026) _____	361
Figure 2-201: Wastewater treatment plants in Corfu and Igoumenitsa (Source: https://astikalimata.ypeka.gr/wtp , June 2026) _____	363
Figure 2-202: Greek Interconnected Electricity Transmission System (Source: Χάρτης Γραμμών Μεταφοράς ΑΔΜΗΕ, June 2026) _____	364
Figure 2-203: Map Excerpt from the “Greek Interconnected Electricity Transmission System: A Roadmap to 2032” in the broader project area (Source IPTO / ΑΔΜΗΕ) _____	366
Figure 2-204: Natural Gas Distribution Network in Greece (Source ΔΕΣΦΑ) _____	366
Figure 2-205: Coverage area of the television signal transmission center in the Corfu and Igoumenitsa region (Source: https://www.digea.gr/el/hartis-kalypsis , June 2026) _____	368
Figure 2-206: Total energy supply by source (Source: International Energy Agency (IEA) , https://www.iea.org/countries/greece , June 2026) _____	368
Figure 2-207: Prevailing (left) and intermittent (right) marine noises caused by ocean shipping traffic (Source: Bradley et al., 2008) _____	371
Figure 2-208: Sources of anthropogenic noise in marine environment (Source: Bradley et al., 2008) _____	372
Figure 2-209: (a) Map showing the average SPL _{peak} for all recordings in each one of the 13 stations. (b) Bar-chart and violin plots comparing the SPL _{peak} value statistical distribution between the 3 ecoregions, i.e. N. Ionian, S. Ionian and Inner Ionian (Source: Fakiris et al., 2023) _____	373
Figure 3-1: M/V ECO ONE _____	376
Figure 3-2: AUV Kongsberg HUGIN 4500 _____	376
Figure 3-3: LOT 01 Geophysical survey area _____	377
Figure 3-4: Line plan with AUV geophysical mission patterns _____	378
Figure 3-5: Example of line plan with AUV Low-Passes mission pattern _____	378
Figure 3-6: Geographical location of the mooring line for oceanographic and acoustic monitoring _____	380
Figure 3-7: Sketch showing the position of the two single point current meters _____	381

Figure 3-8: LOT02 sampling stations	386
Figure 3-9: 2D Bathymetry DTM of the study area (2x2 m cell)	393
Figure 3-10: 2D Slope map of the study area (2x2 m cell)	394
Figure 3-11: 3D Bathymetric DTM of the study area (2x2 m cell)	395
Figure 3-12: 2D HISAS mosaic of the study area (0.5x0.5 m cell)	396
Figure 3-13: SBP line M07_I10: Example of MTD material on SBD data.	397
Figure 3-14: Bathymetric data and profile of exposed harder sediments associated with MTD in the central sector of the study area	398
Figure 3-15: Detail of 3D bathymetry DTM on spurs and grooves morphologies visible in the central sector of the study area	398
Figure 3-16: Steep/Very steep slope gradients associated with harder sediment morphologies in the central sector of the study area	399
Figure 3-17: A detail of HISAS data on MTD harder sedimentsA. Upper panel: Zoomed view of the area characterized by MTD harder sediments highlighted by the red dashed box in the upper left corner. MTD harder sediments are mapped in black while “fs” indicate fine sediment around. Lower panel: Zoomed area showing the acoustic contrast typical of more consolidated bodies	400
Figure 3-18: Different acoustic reflectivity zones recognized in the central sector of the study area.	400
Figure 3-19: Fold structures recognized on the seabed. Upper panel: MBES data on the central sector of the study area showing elongated and narrow mounded-like morphologies with slight curvature. Middle panel: A detail of the acoustic response of the elongated structure described above. HISAS data allows to detect the fold cores with its internal layering. Lower panel: Schematic representation of the exposed fold cores showing their elliptical and concentric geometry. Red and green dotted lines show the similarity between the sketch and a fold recognized on the HISAS mosaic	401
Figure 3-20: Overview of the northern sector of the study area. Red dashed line: Limit of the northern sector of the study area Black dashed lines: Example of several mound-like morphologies organized in clusters	402
Figure 3-21: Isolated mound recognized in the northern sector of the study area	403
Figure 3-22: Detail of the Southern flank of the isolated mound recognized in the northern sector of the study area. Upper Panel: 3D view on the southern flank of the isolated mound found in the northern sector of the study area. Yellow dashed line shows the mottled seafloor top limit; black arrows indicate the MTD harder sediments. Lower Panel: A detail of the southern flank of the isolated mound on HISAS data: MTD consolidated sediments (delimited by orange line) and mottled seafloor (delimited by dashed black lines) are recognized	404
Figure 3-23: Detail of the northern flank of the isolated mound recognized in the northern sector of the study area. Upper Panel: 3D view on the northern flank of the isolated mound found in the northern sector of the study area. Red arrows indicate the depressions visible on its flank. Lower Panel: A detail of the northern flank of the isolated mound on HISAS data: more consolidated (delimited by orange line) and coarse sediment (cs, delimited by black dotted line), are recognized	405

Figure 3-24: Fault scarps overview with bathymetric profiles on two arbitrary lines	406
Figure 3-25: Detail of acoustic data on the major fault scarp recognised in the NW part of the study area. Blue line: Fault plane detected on SBP data. Pink polygons: High-sonar reflectivity corresponding to MTD harder sediments	407
Figure 3-26: Overview of the surveyed area showing the positions of the identified subsea cables/trench, as mapped from HISAS and MBES data	408
Figure 3-27: Cables trench detected on MBES as a narrow and deep incision.	409
Figure 3-28: Cables trench detected on HISAS with a detail of the lateral spoil heaps.	410
Figure 3-29: Detail of the cable identified in the northern sector of the study area.	411
Figure 3-30: Detail of SBP line M03_I10: Facies f1a with truncated layers on the isolated mound identified in the northern sector of the study area	412
Figure 3-31: Detail of SBP line M05_I10: Harder sediments of MTD material	412
Figure 3-32: Detail of SBP line M01_I05: Facies F1b and MTD material (facies f2) exposed on the fault scarp	413
Figure 3-33: Detail of SBP line M03_I05: Fractures layers in the facies f1b vs undisturbed layers in the facies f1a	413
Figure 3-34: Detail of SBP line M01_x02: Isolated lens related to the 2° MTD event recognized in the northern part of the study area	414
Figure 3-35: Detail of SBP line M04_x04: Internal structure of the MTD shows an alternation of chaotic and stratified bodies	415
Figure 3-36: Detail of SBP line M05_x11: An example of the folded structures recognized in the facies f2 (MTD material)	415
Figure 3-37: Detail of SBP line M01_I11: Example of Facies f2 showing a high thickness variability within the study area	416
Figure 3-38: Detail of SBP line M01_I10: Reflector R3 cut by a deep normal fault	416
Figure 3-39: Limit of shallow fluids/biogenic gas (light-blue polygons) detected in the survey area	417
Figure 3-40: – Detail of SBP line M05_x11: Possible evidence of fluids causing the blanking (Wipe-out) of the seismic signal	418
Figure 3-41: Detail of SBP line M03_I10: Wipe-out effect under the isolated mound recognized in the northern sector of the study area	418
Figure 3-42: Geohazard map enlarged to Asopus 1A exploration well (designed by Lighthouse SpA, see Annex 02)	422
Figure 3-43: D6a sampling area with detailed view of seabed	423
Figure 3-44: Detailed view of traces left by Van Veen grab sampler at D3b location	424

Figure 3-45: Target T057 recognized in HISAS and MBES data. Upper panel: A detail of the target identified on the HISAS acoustic data thanks to its higher reflectivity. Lower panel: 3D image of the target with HISAS data superimposed on MBES data	425
Figure 3-46: Detailed view of amphoras present at T057	426
Figure 3-47: SBP line T057_I08: buried part of the target T057 identified on the seismic data during Visual Inspection	427
Figure 3-48: SPCM “upper” validated data: time series of velocities components (u, v, w in m/s) and current speed m/s) and flowing direction (° N)	430
Figure 3-49: SPCM “lower” validated data: time series of velocities components (u, v, w in m/s) and current speed (m/s) and flowing direction (° N)	431
Figure 3-50: SPCM “upper” validated data: time series of seawater pressure (dBar) and temperature (° C)	431
Figure 3-51: SPCM “lower” validated data: time series of seawater pressure (dBar) and temperature (° C)	432
Figure 3-52: Current rose at SPCM “upper” and SPCM “lower”	432
Figure 3-53: Underwater noise analysis: daily values of L10, L50 and L90 for centered 63 Hz and 125 Hz third-octave bands for peak sound pressure level (SPL _{peak})	434
Figure 3-54: Vessel density a) annual average and b) April 2024 monthly average. AIS data elaborated by EMODNET (https://EMODnet.ec.europa.eu/en/human-activities)	434
Figure 3-55: Underwater noise analysis: daily values of L10, L50 and L90 for centered 63 Hz and 125 Hz third-octave bands for root mean square sound pressure level (SPL _{rms})	436
Figure 3-56: Example of underwater noise of anthropic origin, probably airgun source, on 10 th April. LTSA on the upper panel, spectrogram on the lower panel	436
Figure 3-57: Example of underwater noise of anthropic origin, probably ship noise superimposed to high-frequency active sonar, on 17 th April. LTSA on the upper panel, spectrogram on the lower panel	437
Figure 3-58: Deployment Day 08.04.2026 – Clicks from multiple sperm whales	438
Figure 3-59: Deployment day 22.04.2026 - Cuvier’s beaked whale clicks recorded, shown in LTSA (upper panel) and spectrogram (lower panel) and typical waveform (lower left) , power spectrum (lower central) and Wigner plot (lower right) associated to one click	439
Figure 3-60: Long term average spectrum on day 19.04.2026 showing clear signs of high-frequency vocalizations (clicks and whistles) from not well identified odontocetes, probably a Risso’s Dolphin, during several hours of the day (from 03:00 to 07:00)	439
Figure 3-61: Deployment day 08.04.2026, LTSA with the sign of a sudden noise highlighted by the dashed black line and acoustic sounds from mammals highlighted by the yellow boxes (upper panel) and spectrogram showing the sudden noise at 2:08 AM (probable explosion, lower panel)	440

Figure 3-62: Meteorological and environmental conditions (including wind direction and force, sea state, swell, visibility, sun glare, and precipitation) recorded during the LOT 01 marine fauna monitoring effort	441
Figure 3-63: Spatial distribution of the marine mammal and sea turtle encounters (visual and acoustic) during the LOT 01 campaign	445
Figure 3-64: Physic-chemical variables of the water column in vertical section. Asopus-1A, northern station group and Blank stations are represented, as they are aligned along the transect; Reference Stations are excluded. Station names are shown on the map and above each variable panel	452
Figure 3-65: Vertical profiles of the main physic-chemical variables of the water column, well Asopus-1A – station D1a	453
Figure 3-66: Vertical profiles of the main physic-chemical variables of the water column, well Asopus-1A – station D3a	454
Figure 3-67: Vertical profiles of the main physic-chemical variables of the water column, well Asopus-1A – station D5a	455
Figure 3-68: Vertical profiles of the main physic-chemical variables of the water column – station D1b	456
Figure 3-69: Vertical profiles of the main physic-chemical variables of the water column – station D3b	457
Figure 3-70: Vertical profiles of the main physic-chemical variables of the water column – station D5b	458
Figure 3-71: Vertical profiles of the main physic-chemical variables of the water column, Blank stations – station D6a	459
Figure 3-72: Vertical profiles of the main physic-chemical variables of the water column, Blank stations – station D6b	460
Figure 3-73: Vertical profiles of the main physic-chemical variables of the water column, Blank stations – station D7b	461
Figure 3-74: Vertical profiles of the main physic-chemical variables of the water column, Reference stations – Othonoi Ref	462
Figure 3-75: Vertical profiles of the main physic-chemical variables of the water column, Reference stations – Kerkyra Ref	463
Figure 3-76: Vertical profiles of the main physic-chemical variables of the water column, Reference stations – Italy Ref	464
Figure 3-77: Total Suspended Solids (TSS) in seawater samples collected at the Asopus-1A (a) and northern station group (b); each panel includes the respective Blank Stations and all three Reference Stations	466
Figure 3-78: Nutrient concentrations in seawater samples collected at the Asopus-1A station group; each panel includes the respective Blank Stations and all three Reference Stations	469
Figure 3-79: Nutrient concentrations in seawater samples collected at the northern station group; each panel includes the respective Blank Stations and all three Reference Stations	470
Figure 3-80: Concentrations of As (a), Ba (b) and Cu (c) in seawater samples collected at the Asopus-1A station group, including the associated Blank Stations and all three Reference Stations	475

Figure 3-81: Concentrations of Fe (a), Ni (b) and Zn (c) in seawater samples collected at the Asopus-1A station group, including the associated Blank Stations and all three Reference Stations	476
Figure 3-82: Concentrations of As (a), Ba (b) and Cu (c) in seawater samples collected at the Northern station group, including the associated Blank Stations and all three Reference Stations	477
Figure 3-83: Concentrations of Fe (a), Ni (b) and Zn (c) in seawater samples collected at the northern station group, including the associated Blank Stations and all three Reference Stations	478
Figure 3-84: Canonical Analysis of Principal Coordinates (CAP) of chemical variables measured in the water column	486
Figure 3-85: Abundance of phytoplankton community along stations of Asopus-1A, Blank and Reference stations	488
Figure 3-86: Abundance of phytoplankton community along the Northern station group, Blank and Reference stations	489
Figure 3-87: Taxonomic composition of the phytoplankton community in Asopus-1A, Blank and Reference stations	490
Figure 3-88: Taxonomic composition of the phytoplankton community in the northern station group, Blank and Reference stations	491
Figure 3-89: MSD analysis based on the species/abundance matrix of the phytoplankton community related to the factor depth	491
Figure 3-90: MSD analysis based on the species/abundance matrix of the phytoplankton community related to the factor area	492
Figure 3-91: Some representative taxa of the station D1a: <i>Microflagellates</i> indet. (a), <i>Cryptophyceae</i> (b), <i>Heterocapsa minima</i> (c) and <i>Thalassionema nitzschioides</i> (d)	492
Figure 3-92: Some representative taxa of the station D3a: <i>Pseudo-nitzschia delicatissima</i> complex. (a), <i>Achnanthes</i> sp. (b), <i>Gephyrocapsa huxleyi</i> (c) and <i>Katodinium</i> sp. (d)	493
Figure 3-93: Some representative taxa of the station D5a: <i>Proboscia alata</i> (a), <i>Oxytoxum scolopax</i> (b), <i>Syracosphaera pulchra</i> (c) and <i>Euglenophyceae</i> nd. (d)	493
Figure 3-94: Some representative taxa of the station D6a: <i>Cryptophyceae</i> nd. (a), <i>Gymnodinium</i> sp. (b), <i>Calyptrosphaera</i> sp. (c) and <i>Haslea Wawriake</i> (d)	494
Figure 3-95: Some representative taxa of the station D1b: <i>Ollicola vangoorii</i> (a), <i>Heterocapsa</i> sp. (b), <i>Euglenophyceae</i> nd. (c) and <i>Neocalyptrella robusta</i> (d)	494
Figure 3-96: Some representative taxa of the station D3b: <i>Euglena</i> sp. (a), <i>Oxytoxum viride</i> (b), <i>Dictyocha fibula</i> (c) and <i>Chrysochromulina parkeae</i> (d)	495
Figure 3-97: Some representative taxa of the station D5b: <i>Oxytoxum variabile</i> (a), <i>Leptocylindrus mediterraneus</i> (b), <i>Helicosphaera carterii</i> (c) and <i>Euglenophyceae</i> nd. (d)	495
Figure 3-98: Some representative taxa of the station D6b: <i>Leucocryptos marina</i> (a), <i>Amphidinium</i> sp. (b), <i>Microflagellates</i> nd. (c) and <i>Syracosphaera hystrica</i> (d)	496

Figure 3-99: Some representative taxa of the station D7b: <i>Thalassionema</i> sp. (a), <i>Torodinium</i> sp. (b), <i>Discosphaera tubifera</i> (c) and <i>Scyphosphaera apsteinii</i> (d)	496
Figure 3-100: Some representative taxa of the station Othonoi Ref: <i>Lingulaulax polyedra</i> (a), <i>Microflagellates</i> nd. (b), <i>Umbilicosphaera sibogae</i> (c) and <i>Pterosperma cristatum</i> (d)	497
Figure 3-101: Some representative taxa of the station Kerkyra Ref: <i>Hemialulus hauckii</i> (a), <i>Tripos teres</i> (b), <i>Thalassionema nitzschioides</i> (c) and <i>Microflagellates</i> nd (d)	497
Figure 3-102: Some representative taxa of the station Italy Ref: <i>Gephyrocapsa huxleyi</i> (a), <i>Synechococcus</i> sp. (b), <i>Eutreptiella</i> sp. (c) and <i>Gymnodinium</i> sp. (d)	498
Figure 3-103: – Percentage composition of the mesozooplankton community, based on the main ecological categories (holoplankton and meroplankton). Within the holoplankton, the copepod component was analysed separately, as it represents a significantly representative fraction of the community – Asopus-1A, Blank and Reference stations	500
Figure 3-104: – Percentage composition of the mesozooplankton community, based on the main ecological categories (holoplankton and meroplankton). Within the holoplankton, the copepod component was analysed separately, as it represents a significantly representative fraction of the community – Northern station group, Blank and Reference stations	500
Figure 3-105: Cluster analysis (Bray–Curtis similarity) of the mesozooplankton communities in the Block 2 area Asopus-1A Northern and Reference stations (Othonoi Ref, Kerkyra Ref, and Italy Ref)	501
Figure 3-106: Percentage composition of the copepod crustacean component, based on the main families. Percentage abundances of the adult copepod community are shown for the different sampling stations – Asopus-1A and Reference stations	502
Figure 3-107: Percentage composition of the copepod crustacean component, based on the main families. Percentage abundances of the adult copepod community are shown for the different sampling stations – Northern station group and Reference stations	503
Figure 3-108: Percentage composition of the copepod crustacean component according to the main families. Percentage abundances of the juvenile community (copepodites) are shown for the different sampling stations – Asopus-1A and Reference stations	503
Figure 3-109: Percentage composition of the copepod crustacean component according to the main families. Percentage abundances of the juvenile community (copepodites) are shown for the different sampling stations – Northern station group and Reference stations	504
Figure 3-110: <i>Haloptilus longicornis</i> (a); <i>Arietellus pavoninus</i> (b); <i>Augaptilus glacialis</i> (c)	505
Figure 3-111: <i>Cavolina</i> sp. (a); <i>Tomopteris</i> sp. (b); <i>Euphasia</i> sp. (c); <i>Anchylomera blossevillei</i> (d)	506
Figure 3-112: <i>Brachiolaria larvae</i> (a); <i>Auricularia larvae</i> (b); <i>Harmothoe</i> sp. (c)	507
Figure 3-113: <i>Hygophum benoiti</i> (a); <i>Lampanyctus pusillus</i> (b)	509
Figure 3-114: Granulometric characteristics of surface sediments	514
Figure 3-115: TOC, N-Tot, and P-Tot concentrations in surface sediments collected at the Asopus-1A station group; each panel includes the respective Blank Stations and all three Reference Stations	517

Figure 3-116: TOC, N-Tot, and P-Tot concentrations in surface sediments collected at the Northern station group; each panel includes the respective Blank Stations and all three Reference Stations	518
Figure 3-117: Metal and metalloid concentrations in surface sediments collected at the Asopus-1A station group: Al (a), As (b), Ba (c) and Cd (d). Each panel includes the associated Blank Stations and all three Reference Stations	521
Figure 3-118: Metal and metalloid concentrations in surface sediments collected at the Asopus-1A station group: Cu (a), Fe (b), Pb (c) and Hg (d). Each panel includes the associated Blank Stations and all three Reference Stations	522
Figure 3-119: Metal and metalloid concentrations in surface sediments collected at the Asopus-1A station group: Ni (a), Cr-Tot (b), V (c) and Zn (d). Each panel includes the associated Blank Stations and all three Reference Stations	523
Figure 3-120: Metal and metalloid concentrations in surface sediments collected at the northern station group: Al (a), As (b), Ba (c) and Cd (d). Each panel includes the associated Blank Stations and all three Reference Stations	524
Figure 3-121: Metal and metalloid concentrations in surface sediments collected at the northern station group: Cu (a), Fe (b), Pb (c) and Hg (d). Each panel includes the associated Blank Stations and all three Reference Stations	525
Figure 3-122: Metal and metalloid concentrations in surface sediments collected at the northern station group: Ni (a), Cr-Tot (b), V (c) and Zn (d). Each panel includes the associated Blank Stations and all three Reference Stations	526
Figure 3-123: Hydrocarbons in surface sediments collected at the Asopus-1A station group: C>12 (a), Total Petroleum Hydrocarbons (TPH) (b). Each panel includes the associated Blank Stations and all three Reference Stations	529
Figure 3-124: Hydrocarbons in surface sediments collected at the northern station group: C>12 (a), Total Petroleum Hydrocarbons (TPH) (b). Each panel includes the associated Blank Stations and all three Reference Stations	530
Figure 3-125: Polycyclic Aromatic Hydrocarbons (PAHs) in surface sediments collected at the Asopus-1A station group: Fluoranthene (a), Pyrene(b) and Σ PAHs (c). Each panel includes the associated Blank Stations and all three Reference Stations	532
Figure 3-126: Polycyclic Aromatic Hydrocarbons (PAHs) in surface sediments collected at the northern station group: Fluoranthene (a), Pyrene(b) and Σ PAHs (c). Each panel includes the associated Blank Stations and all three Reference Stations	533
Figure 3-127: Taxonomic composition of the macrozoobenthos, expressed as the percentage contribution of taxonomic groups to total abundance (left) and to total species richness (right), for the entire study area; Reference stations: Othonoi Ref, Kerkyra Ref and Italy Ref)	538
Figure 3-128: nMDS plot based on the species / abundance matrix of the macrobenthic community, for the entire study area (Block 2: Asopus-1A and Northern station group; Reference stations: Othonoi Ref, Kerkyra Ref and Italy Ref)	539

Figure 3-129: Mean abundances of the macrobenthic community and total number of species recorded at the sampling stations – Asopus-1A and Reference stations	540
Figure 3-130: Mean abundances of the macrobenthic community and total number of species recorded at the sampling stations – northern station group and Reference stations	541
Figure 3-131: Graphical representation of Shannon-Wiener diversity index H' (loge; a) and Pielou evenness index (J' ; b) of the macrobenthic community – Asopus-1A and Reference stations	543
Figure 3-132: Graphical representation of Shannon-Wiener diversity index H' (loge; a) and Pielou evenness index (J' ; b) of the macrobenthic community – northern station group and Reference stations	544
Figure 3-133: Macrobenthic community structure across the sampling stations – Asopus-1A and Reference stations	546
Figure 3-134: Macrobenthic community structure across the sampling stations – northern station group and Reference stations	546
Figure 3-135: Carbonate oozes, consisting of skeletal material from planktonic organisms (coccolithophores, foraminifera and pteropod molluscs)	547
Figure 3-136: <i>Golfingia</i> sp. (a), <i>Neopseudocapitella brasiliensis</i> (b), <i>Paradiopatra quadricuspis</i> (c), <i>Aricidea (Acmira) assimilis</i> (d)	548
Figure 3-137: Detailed table referring to stations D1a, D2a, D3a and D4a; representative screenshots are reported, organised with the corresponding coordinates (WGS84-UTM32N - m) and depths (m). The EUNIS (2022) biocenotic classification is provided, along with a detailed description of the identified habitat type and any associated facies or species recorded	553
Figure 3-138: Detailed table referring to stations D5a, D6a and D6b; representative screenshots are reported, organised with the corresponding coordinates (WGS84-UTM32N - m) and depths (m). The EUNIS (2022) biocenotic classification is provided, along with a detailed description of the identified habitat type and any associated facies or species recorded	554
Figure 3-139: Detailed table referring to stations D1b, D2b and D3b; representative screenshots are reported, organised with the corresponding coordinates (WGS84-UTM32N - m) and depths (m). The EUNIS (2022) biocenotic classification is provided, along with a detailed description of the identified habitat type and any associated facies or species recorded.	555
Figure 3-140: Detailed table referring to stations D4b, D5b, D6b and D7b; representative screenshots are reported, organised with the corresponding coordinates (WGS84-UTM32N - m) and depths (m). The EUNIS (2022) biocenotic classification is provided, along with a detailed description of the identified habitat type and any associated facies or species recorded	556
Figure 3-141: Detailed table referring to Reference stations (Othonoi Ref, Kerkyra Ref and Italy Ref); representative screenshots are reported, organised with the corresponding coordinates (WGS84-UTM32N - m) and depths (m). The EUNIS (2022) biocenotic classification is provided, along with a detailed description of the identified habitat type and any associated facies or species recorded	557

Figure 3-142: Asopus-1A - station D4a: images of individual marine litter items extracted from the AUV mosaics. For each item, a detailed description, its location, and its main identifying characteristics are provided _____	560
Figure 3-143: Asopus-1A and Northern station group - station D6b (Blank): images of individual marine litter items extracted from the AUV mosaics. For each item, a detailed description, its location, and its main identifying characteristics are provided _____	561
Figure 3-144: Northern station group - station D2b: images of individual marine litter items extracted from the AUV mosaics. For each item, a detailed description, its location, and its main identifying characteristics are provided _____	562
Figure 3-145: Northern station group - station D4b: images of individual marine litter items extracted from the AUV mosaics. For each item, a detailed description, its location, and its main identifying characteristics are provided _____	562
Figure 3-146: Northern station group - station D5b: images of individual marine litter items extracted from the AUV mosaics. For each item, a detailed description, its location, and its main identifying characteristics are provided _____	563
Figure 3-147: Kerkyra Ref – Reference station: images of individual marine litter items extracted from the AUV mosaics. For each item, a detailed description, its location, and its main identifying characteristics are provided _____	563
Figure 3-148: Biocenotic Map – Asopus-1A and northern station group and Reference stations (Othonoi Ref, Kerkyra Ref, Italy Ref) _____	573
Figure 3-149: Survey vessel tracks conducted by the marine fauna observation team during the LOT 02 field survey _____	574
Figure 3-150: Meteorological and environmental conditions (including wind direction and force, sea state, swell, visibility, sun glare, and precipitation) recorded during the LOT 02 marine fauna monitoring effort _____	576
Figure 3-151: Spatial distribution of the marine mammal and sea turtle encounters recorded during the LOT 02 field survey _____	578
Figure 3-152: Track of the survey vessels and their section associated with visual observations of avifauna during the ESBS ASOPUS 1A Ionian Sea LOT02 field survey _____	580
Figure 3-153: Track of the survey vessels and their section associated with visual observations of avifauna during the ESBS ASOPUS 1A Ionian Sea LOT02 field survey with the Block 2 area _____	581
Figure 3-154: Scopoli's Shearwater: Locations and number of individuals recorded in the wider area _	584
Figure 3-155: Scopoli's Shearwater: Locations and number of individuals recorded in the wider area _	585
Figure 3-156: Yelkouan Shearwater: Locations and number of individuals recorded in the wider area _	586
Figure 3-157: Audouin's Gull: Locations and number of individuals recorded in the wider area _____	587
Figure 3-158: Audouin's: Locations and number of individuals recorded in the wider area _____	588

Figure 3-159: Other gull and tern species: Locations and number of individuals recorded in the wider area	589
Figure 3-160: Other gull and tern species: Locations and number of individuals recorded in the wider area	590
Figure 3-161: Mediterranean Gull: Locations and number of individuals recorded in the wider area	591
Figure 3-162: Garganey: Locations and number of individuals recorded in the wider area	592
Figure 3-163: Herons and egrets: Locations and number of individuals recorded in the wider area	593
Figure 3-164: Waders: Locations and number of individuals recorded in the wider area	594
Figure 3-165: Raptors: Locations and number of individuals recorded in the wider area	595
Figure 3-166: Migratory passerines: Locations and number of individuals recorded in the wider area	596

ACRONYMS AND ABBREVIATIONS

ABBREVIATION	EXPLANATION
ACCOBAMS	Agreement on the Conservation of Cetaceans in the Black Sea, Mediterranean Sea, and Contiguous Atlantic Area
ADA	Aquaculture Development Area
ADCP	Acoustic Doppler Current Profiler
AEWA	Agreement on the Conservation of African-Eurasian Migratory Waterbirds
AICU	Area of Informal Concentration of Units
AIS	Atlantic-Ionian Stream / Automatic Identification System
AMBI	AZTI Marine Biotic Index
AoI	Area of Interest
ARPA	Regional Environmental Protection Agency (Italy)
ASW	Adriatic Surface Water
AUV	Autonomous Underwater Vehicle
BAT	Best Available Techniques
BIOS	Bimodal Oscillating System
BWM	Ballast Water Management
CAP	Canonical Analysis of Principal Coordinates
CBD	Convention on Biological Diversity
CCH	Cetacean Critical Habitat
CDM	Cuttings Dispersion Modelling
CHP / HECHP	High-Efficiency Combined Heat and Power
CITES	Convention on International Trade in Endangered Species
CMS	Convention on Migratory Species (Bonn Convention)
CNR	National Research Council (Italy)
CTD	Conductivity, Temperature, Depth (Profiling)
DCM	Deep Chlorophyll Maximum
DIPA	Directorate of Environmental Licensing (Greece)
DO	Dissolved Oxygen
DOATAP	Hellenic National Academic Recognition and Information Centre
DTM	Digital Terrain Model
EAP	Environmental Action Plan
EBSA	Ecologically or Biologically Significant Marine Area
eDNA	Environmental DNA
EEA	European Environment Agency
EIA	Environmental Impact Assessment
EIONET	European Environment Information and Observation Network
EIS	Environmental Impact Study
ELD	Environmental Liability Directive
ELPE / HELPE	Hellenic Petroleum
ELSTAT	Hellenic Statistical Authority
EMDW	Eastern Mediterranean Deep Water

ABBREVIATION	EXPLANATION
EMODnet	European Marine Observation and Data Network
EOPYY	National Organisation for the Provision of Health Services
EQR	Ecological Quality Ratio
ERL	Effects Range-Low
ESBS	Environmental & Social Baseline Study
ESIA	Environmental and Social Impact Assessment
EUA	Ephorate of Underwater Antiquities
FAO	Food and Agriculture Organization
FFC	Flat Field Correction
FRA	Fisheries Restricted Area
FRMP	Flood Risk Management Plan
FTIR	Fourier-Transform Infrared Spectroscopy
GES	Good Environmental Status
GFCM	General Fisheries Commission for the Mediterranean
GFSPSD	General Framework for Spatial Planning and Sustainable Development
GG / FEK	Government Gazette (Greece)
GIIP	Good International Industry Practice
GIS	Geographic Information System
GOP	Good Oilfield Practice
GSA	Geographical Sub-Area
GUP	General Urban Plan
HCMR	Hellenic Centre for Marine Research
HEI	Higher Education Institution
HEREMA	Hellenic Hydrocarbon Resources Management Company
HISAS	High-Resolution Synthetic Aperture Sonar
HNMS	Hellenic National Meteorological Service
IAP	Ionian Abyssal Plain
IBA	Important Bird Area
ICCAT	International Commission for the Conservation of Atlantic Tunas
ICCPR	International Covenant on Civil and Political Rights
ICESCR	International Covenant on Economic, Social and Cultural Rights
ICPC	International Cable Protection Committee
ICZM	Integrated Coastal Zone Management
ILO	International Labour Organization
IMMA	Important Marine Mammal Area
IMO	International Maritime Organization
IPIECA	International Petroleum Industry Environmental Conservation Association
IPPC	Integrated Pollution Prevention and Control
ISRA	Important Shark and Ray Area
ISW	Ionian Surface Water
IUCN	International Union for Conservation of Nature
JMD	Joint Ministerial Decision
KBA	Key Biodiversity Area

ABBREVIATION	EXPLANATION
LAT	Lowest Astronomical Tide
LIW	Levantine Intermediate Water
LoQ	Limit of Quantification
LTSA	Long Term Spectral Average
LUP	Local Urban Plan
MAG	Magnetometer
M-AMBI	Multivariate AZTI Marine Biotic Index
MARPOL	International Convention for the Prevention of Pollution from Ships
MAW	Modified Atlantic Mediterranean Water
MBBS	Multibeam Backscatter
MBES	Multibeam Echosounder
MD	Ministerial Decision
MEDITS	Mediterranean International Trawl Survey
MMJ	Mid-Mediterranean Jet
MMO	Marine Mammal Observer
MMPATF	Marine Mammal Protected Areas Task Force
MoEE / YPEN	Ministry of Environment and Energy
MoRDF	Ministry of Rural Development and Food
MPA	Marine Protected Area
MRU	Marine Regional Unit
MSD / nMDS	non-Metric Multi-Dimensional Scaling
MSFD	Marine Strategy Framework Directive
MSP	Maritime Spatial Planning
MTD	Mass Transport Deposit
NACE	Nomenclature of Economic Activities
NAGREF-INALE	Institute of Marine Biological Resources and Inland Waters Fisheries
NAVTEX	Navigational Telex
NEAT	Nested Environmental Status Assessment
NECP	National Energy and Climate Plan
NGO	Non-Governmental Organization
NIG	North Ionian Gyre
NMPI	National Marine Park of the Ionian Sea
OADA	Organised Aquaculture Development Area
OGP	International Association of Oil and Gas Producers
OPRC	Oil Pollution Preparedness, Response and Co-operation
ORP	Redox Potential
OSM	Oil Spill Modelling
OWF	Offshore Wind Farm
PAHs	Polycyclic Aromatic Hydrocarbons
PAM	Passive Acoustic Monitoring
PD	Presidential Decree
PERMANOVA	Permutational Multivariate Analysis of Variance
POPs	Persistent Organic Pollutants

ABBREVIATION	EXPLANATION
PSV	Platform Supply Vessel
QRA	Quantitative Risk Assessment
RAE	Regulatory Authority for Energy
RBD	River Basin District
RBMP	River Basin Management Plan
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals
RES	Renewable Energy Sources
RoMH	Register of Major Hazards
RSF	Regional Spatial Framework
RSLR	Relative Sea Level Rise
SAB	South Apulia Basin
SAC	Special Area of Conservation
SAU	Spatial Assessment Unit
SBP	Sub-Bottom Profiler
SEA	Strategic Environmental Assessment
SEIA	Strategic Environmental Impact Assessment
SOLAS	International Convention for the Safety of Life at Sea
SPA	Special Protection Area
SPAMI	Specially Protected Areas of Mediterranean Importance
SPCM	Single Point Current Meter
SPL _{peak}	Peak Sound Pressure
SPL _{rms}	Root Mean Square Sound Pressure
SQA-MA	Environmental Quality Standards - Annual Average (Standard di Qualità Ambientale - Media Annuale)
SSC	Species Survival Commission
SSS	Side-Scan Sonar
SUP	Special Urban Plan
SVP	Sound Velocity Profiler (SVP/CTD Probe)
TMW	Transitional Mediterranean Water
TN	Total Nitrogen
TOC	Total Organic Carbon
ToE	Terms of Environment
TP	Total Phosphorus
TPH	Total Petroleum Hydrocarbons
TSS	Total Suspended Solids
UNCLOS	United Nations Convention on the Law of the Sea
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UTM	Universal Transverse Mercator
VME	Vulnerable Marine Ecosystem
WCPA	World Commission on Protected Areas
WFD	Water Framework Directive
WGS84	World Geodetic System 1984

ABBREVIATION	EXPLANATION
WHO	World Health Organization
WISE	Water Information System for Europe
WWTP	Wastewater Treatment Plant
ZUC / ZOE	Zones of Urban Control

1 Introduction

1.1 Background

Offshore area of Block 2 is located approximately 20 km west of the Island of Corfu, in the Northern Ionian Sea, at water depths ranging approximately from 750 to 1,200 m. On the administrative level, the Block 2 covers the area located within the Regional Unit of Corfu of the Ionian Islands Region, while its western limit follows the boundary line between the continental shelf areas of Italy and Greece according to the respective agreement of May 24, 1977, which establishes this boundary line in accordance with the principle of the median line. Within this framework, the immediate focus of operations is the Asopus-1A exploration well. Positioned in the central-western portion of Block 2, the well sits at a water depth of 842.5 m.

Total E&P Greece B.V., a subsidiary of Total S.A, and its partners Hellenic Petroleum S.A. and Edison International S.p.A., were selected in 2016 as preferred bidders to conduct Exploration and Production of Hydrocarbons in Offshore Block 2 in the Ionian Sea, Greece. The Lease agreement was initiated in March 2017 by the Greek Ministry of Environment and Energy (MoEE) and the Block 2 Joint Venture Partnership. The Agreement was reviewed by the Court of Audit and finally it was ratified by the Parliament on the 15th of March 2018 (Law 4525/2018, GG 47A/2018).

Total E&P Greece BV was set as the Operator with 50% participating interest, Hellenic Petroleum with 25% participating interest and Edison International with 25% participating interest, having exclusive rights to explore for and produce commercial quantities of hydrocarbons in Block 2.

In December of 2020, Energean Hellas Ltd, acquired from Total its entire 50% working interest share and obtained operatorship position in Block 2. In December 2021, Energean Hellas acquired from its affiliate Energean International E&P S.p.A. (following a change of control of Edison International E&P S.p.A. by the acquisition of its parent company by the Energean group) the 25% share in Block 2. c. Following the above transfers, Energean Hellas Ltd held 75% participating interest in Block 2 and HELPE WEST KERKYRA held the remaining 25%.

On 11 March 2026, ExxonMobil completed its farm into the Block 2 concession. The new participating interests are as follows: ExxonMobil (60%), Energean Hellas Ltd (30%), and HELLENiQ UPSTREAM WEST KERKYRA (10%). Energean Hellas will remain the Operator of the concession during the exploration stage.

1.2 Scope

The framework of the Environmental and Social Baseline Study (ESBS), as indicated in the Lease Agreement (Article 12.14), includes the recording of the current status of environmental parameters and resources, in the period before the start of exploration activities. Since the overall exploration program will be executed in phases (differentiated in relation to time, place and type of works), the Baseline Report specified in the Lease Agreement, is to be carried out in stages in order to include information about the relevant wider and immediate study area. The first (1st) stage Baseline Report already prepared at earlier stages (RINA, 2018), presented existing E&S information for the wider study area which, according to the Approval of the SEA Study and included the entire Exploration and Exploitation Concession Area of Block 2 (since no immediate areas of operations were specified at the given time).

The ESBS study for Exploration well 1A of Block 2 in the Ionian Sea is developed to establish a comprehensive, evidence-based understanding of the pre-existing environmental conditions prior to the commencement of the Asopus-1 exploration well drilling operations.

In accordance with the national legislative framework, specifically Article 12 of Law 4525/2018, establishing this baseline is a mandatory requirement that serves distinct legal, protective, and operational functions. Under Article 12.14, the baseline report is legally required to document the exact condition of the environmental parameters and resources prior to the onset of operations. This creates a definitive reference point that legally delineates any pre-existing environmental conditions or damage from potential future liabilities arising from the lessee's exploration activities.

Furthermore, the baseline acts as the foundational benchmark mandated by the SEA approval for the Ionian Sea (Respective Approval No. 30373/ 03.07.2017). To accurately assess potential operational impacts, the baseline must capture data that enables a dual-scale monitoring approach: distinguishing between the “wider area” (the entire concession area) and the “immediate area” of direct impact. By recording the current state of key environmental sectors—such as marine water physicochemical properties, current dynamics, local meteorology, the health of the seabed surface layer, marine habitats, benthic species, and megafauna—the baseline provides the necessary inputs to form a reliable foundation for future environmental monitoring programs. This ensures that any subsequent environmental changes can be quantitatively tracked, measured against environmental indicators on an annual basis, and mitigated in adherence to Good Oilfield Practices.

This 1st Baseline Report presented the E&S conditions of the wider study area, based on desktop analysis of literature data (“secondary data”). Before any subsequent exploration works (i.e. exploration drilling activities envisaged for Phase 2 and Phase 3 of the Exploration Program), a second (2nd) stage Baseline Report is deemed to be prepared based on field surveys (“primary data”) focusing on both the “wider” area as well as the “immediate” study area, in order to present more detailed information and highlight any existing liability.

It is noted that the description of the environmental and social conditions with regards to the wider area will be complementary for each stage of ESB, since environmental information will be updated and integrated over time, to enable the recording of any development trends. The description of the condition of the immediate area will strictly depend on the specific area where the exploration drilling activities will be carried out.

The Phase 2 ESBS has been prepared by the Main Environmental Consultant (LDK Consultants S.A. / RSK IPG), incorporating primary field data acquired by the Survey Contractor (Lighthouse SpA) alongside relevant secondary desktop information. The study aims to establish a detailed and scientifically robust environmental and social baseline for both the wider project area and the immediate project footprint by integrating existing literature and available datasets with newly acquired primary field data. The overall objective is to develop a comprehensive baseline dataset that complies with applicable Greek and EU legislation and aligns with international oil and gas industry best practices.

To properly characterize the environmental dynamics of the concession area and the Asopus-1A exploration well location, these comprehensive field surveys targeted the geophysical, oceanographic, chemical, and biological components of the marine environment. The field operations encompassed high-resolution surveys designed to map seabed morphology, assess potential geohazards, and locate underwater cultural

heritage, combined with integrated environmental monitoring and sampling to capture a comprehensive ecological baseline.

Following the completion of the abovementioned requirements, the formal process of Environmental Permitting commences by the preparation and submission of the detailed Environmental and Social Impact Assessment (ESIA) as per the legislative requirements governed by L.4014/2011 and MD 170225/2014 as they currently stand. Moreover, additional and/or more specific requirements and obligations of the lessee, arise from the Ionian SEA Study for the exploration and exploitation of hydrocarbons in the Ionian Sea, and respective environmental permit (ref. number 30373, 03.07.2017).

The final ESBS as approved by the Client will be submitted to the Lessor (Hellenic Republic for review in accordance with Article 12.14 of the ratified Lease Agreement (Law 4525/2018).

1.3 Legal framework

1.3.1 National legislative framework for hydrocarbon exploration and production

The national legislative framework for hydrocarbon exploration and production is:

1.3.1.1 National Law 2289/1995

National Law 2289/1995 (Official Gazette A' 27 / 08.02.1995) "Exploration, research and exploitation of hydrocarbons and other provisions" established Greece's foundational hydrocarbons regime by confirming State ownership of all subsurface resources and introducing a licensing system for private exploration and production under strict state control. The law introduces a structured licensing system based on competitive tenders or negotiated awards, requiring companies to demonstrate technical and financial capability and to commit to binding work programmes divided into exploration phases with strict timelines. It regulates the full upstream lifecycle, from geological surveys and seismic exploration to exploratory drilling and, in the event of a commercial discovery, the granting of production rights subject to State approval of development plans and environmental permitting. It also defines the fiscal regime through royalties, taxation, and potential bonus payments, while embedding strong environmental obligations, including compliance with EU directives, mandatory environmental impact assessments, and decommissioning requirements. Importantly, the law grants the State extensive regulatory control, including oversight of operations, approval of transfers of participating interests, and the ability to enforce compliance or terminate rights where obligations are not met, thereby creating a contract-based but firmly state-controlled hydrocarbons regime.

1.3.1.2 National Law 4001/2011

National Law 4001/2011 (Official Gazette A' 179 / 22.08.2011) "On the operation of electricity and natural gas energy markets, on the exploration, production and transportation networks of hydrocarbons, and other regulatory provisions" introduces institutional modernization of the energy market, strengthens the role of the Regulatory Authority for Energy (RAE) as an independent regulator, clearly separates regulatory from operational State functions, and integrates hydrocarbons into a unified energy system covering electricity,

natural gas, and transmission networks. At the same time, it enhances transparency and competition in licensing procedures, promotes EU principles of market access, and establishes a more structured and stringent regulatory oversight framework for energy activities, without altering the core principle of Law 2289/1995 regarding State ownership of natural resources, but instead transforming the overall regime from a purely contractual concession model into a hybrid system in which the market operates under strong regulatory and institutional supervision.

1.3.2 Baseline legislative framework

1.3.2.1 Main legislative framework for biodiversity protection

The main legislative framework for the protection of biodiversity includes the following:

1.3.2.1.1 Habitats Directive (92/43/EEC)

The Habitats Directive (officially known as Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora) was adopted in 1992 in response to the Bern Convention. The Directive aims to protect approximately 230 habitat types and 1,000 species listed in its Annexes, which are considered to be of European interest based on the Directive's criteria. Directive 92/43/EEC forms the basis of European nature conservation policy, together with the Wild Birds Directive. It established the extensive European ecological network of protected areas known as Natura 2000 (Special Areas of Conservation – SACs, and Special Protection Areas – SPAs).

1.3.2.1.2 Directive on the conservation of wild birds (2009/147/EC)

The Birds Directive, officially known as Directive 2009/147/EC on the Conservation of Wild Birds, was adopted in 2009 and replaced Directive 79/409/EEC of April 2, 1979, on the conservation of wild birds. The Directive aims to protect approximately 500 bird species found in the EU and their critical habitats by designating Special Protection Areas (SPAs) within the Natura 2000 network, regulating activities that directly threaten bird populations, and promoting scientific research.

1.3.2.1.3 Convention on migratory species

The Convention on the Conservation of Migratory Species of Wild Animals, commonly known simply as the CMS or the Bonn Convention, aims to conserve terrestrial, marine, and avian migratory species throughout their migratory range. It is an intergovernmental treaty concluded under the auspices of the United Nations Environment Programme (UNEP) and concerns the conservation of wildlife and habitats on a global scale. The Convention was signed in 1979 in Bonn and entered into force in 1983. The Convention on Migratory Species is the only global intergovernmental organization, established under the United Nations, dedicated exclusively to the conservation and management of terrestrial, aquatic, and avian migratory species throughout their migratory range. The Convention on Migratory Species and its related agreements set

policies and provide further guidance on specific issues through Strategic Plans, Action Plans, resolutions, decisions, and guidelines.

1.3.2.1.4 Agreement on the conservation of cetaceans in the Black Sea, Mediterranean Sea, and contiguous Atlantic area

The Agreement on the Conservation of Cetaceans in the Black Sea, the ACCOBAMS is a cooperation tool for the conservation of marine biodiversity in the Mediterranean and Black Seas. The purpose of the Agreement is to reduce threats to cetaceans in the waters of the Mediterranean and Black Seas, as well as to improve the existing knowledge. According to the ACCOBAMS Conservation Plan (Annex 2 of the Agreement), the contracting Parties are called upon to designate and manage areas that serve as habitats for cetaceans as specially protected areas.

1.3.2.1.5 Agreement on the conservation of African-Eurasian migratory waterbirds

The Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA) is an intergovernmental treaty dedicated to the conservation of migratory waterbirds and their habitats across Africa, Europe, the Middle East, Central Asia, Greenland and the Canadian Archipelago. Developed under the framework of the Bonn Convention (CMS) and administered by the United Nations Environment Programme (UNEP), AEWA brings together countries and the wider international conservation community in an effort to establish coordinated conservation and management of migratory waterbirds throughout their entire migratory range.

1.3.2.1.6 Ramsar Convention

The Convention on Wetlands of International Importance, especially as Waterfowl Habitat, known as the “Ramsar Convention”, named after the Persian city, where it was signed in 1971, provides for the protection of wetland ecosystems.

1.3.2.1.7 Bern Convention

The Bern Convention for the Conservation of Wildlife and Natural Habitats of Europe, also known simply as the Bern Convention, is an international legal instrument in the field of Nature Conservation, aimed at protecting the natural heritage of Europe and certain countries in Africa. The Convention was signed on September 19, 1979, and came into force on June 1, 1982. It specifically concerns the protection of natural habitats and endangered species, including migratory species.

1.3.2.1.8 Convention on Biological Diversity

The Convention on Biological Diversity (CBD) informally known as the Biodiversity Convention, is a multilateral treaty. The Convention has three main objectives:

- Conservation of biodiversity,
- Sustainable use of its components, and
- Fair and equitable sharing of the benefits arising from genetic resources.

1.3.2.1.9 Agreement for the establishment of the General Fisheries Commission for the Mediterranean

The Agreement for the Establishment of the General Fisheries Commission for the Mediterranean (GFCM) is a binding international treaty established under Article XIV of the Food and Agriculture Organization (FAO) Constitution. It was adopted in 1949 and entered into force in 1952. The treaty's primary objective is to ensure the long-term conservation and sustainable use of marine living resources, as well as the protection of marine ecosystems across the Mediterranean and Black Sea regions.

1.3.2.1.10 European Council Regulation No. 2371/2002 on the conservation and sustainable exploitation of fisheries resources under the Common Fisheries Policy

The Council Regulation (EC) No 2371/2002 of 20 December 2002 on the conservation and sustainable exploitation of fisheries resources under the Common Fisheries Policy has application to the conservation of common dolphins in the Mediterranean. This arises from the powers and duties the Regulation provides to EC institutions regarding fisheries conservation (coupled with integration of environmental protection requirements) and from the powers the Regulation provides to Member States (coupled with the access restriction in case of waters within 12 nautical miles of coastal Member States’).

1.3.2.2 Main legislative framework for the prevention of marine pollution

1.3.2.2.1 Directive for the safety of offshore oil and gas facilities (2013/30/EC)

On 28 June 2013, the European Commission published the Offshore Safety Directive. The purpose of this Directive is to reduce as much as possible the occurrence of major accidents related to offshore oil and gas operations and to limit their consequences.

1.3.2.2.2 National Law 4409/2016 for the framework for safety in offshore hydrocarbon exploration and exploitation operations, transposition of Directive 2013/30/EU, amendment of Presidential Decree 148/2009, and other provisions

National Law 4409/2016 Official Gazette A' 136/28.07.2016) “Framework for safety in offshore hydrocarbon exploration and exploitation operations, transposition of Directive 2013/30/EU, amendment of Presidential Decree 148/2009, and other provisions.” which transposes European Directive 2013/30/EU into Greek law, establishes a comprehensive offshore safety and environmental risk management regime for hydrocarbon activities in Greek waters. This law introduces detailed requirements for operators of offshore installations, including the obligation to prepare and submit major hazard reports, implement certified safety and environmental management systems, conduct systematic risk assessments, and maintain fully operational emergency response and oil spill contingency plans. It also establishes stricter rules for the design, construction, operation, and decommissioning of offshore facilities, ensuring that all activities are subject to continuous technical oversight and preventive safety controls aimed at avoiding major accidents. On the institutional level, the law strengthens the role of the national competent authority

(today the Hellenic Hydrocarbon Resources Management Company – HEREMA) as an independent regulator responsible for licensing safety documentation, conducting inspections, monitoring compliance, and enforcing corrective measures where necessary.

1.3.2.2.3 Water Framework Directive 2000/60/EU

The Water Framework Directive (WFD) (Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000) was adopted to establish a framework for Community action in the field of water policy. The Directive commits to achieving good qualitative and quantitative status of their waters (including marine waters up to 1 nautical mile from the coast). It is considered a framework directive because it outlines the necessary steps to reach a common objective, rather than adopting the more traditional approach of fixed limit values. The Directive aims to achieve “Good” overall status for all groundwater and surface waters (rivers, lakes, transitional and coastal waters) within the EU. The WFD integrates qualitative, ecological, and quantitative objectives for the protection of aquatic ecosystems and the good status of all water resources, introducing the concept of integrated management at the scale of River Basin Districts (RBDs).

1.3.2.2.4 Marine Strategy Framework Directive 2008/56/EC

The Marine Strategy Framework Directive (MSFD) was adopted on 17 June 2008. The criteria and methodological standards were revised in 2017, leading to the new Commission Decision on Good Environmental Status (GES). Annex III of the Directive was amended in 2017 to better link ecosystem components, human pressures, and impacts on the marine environment with the 11 MSFD descriptors and the new decision on Good Environmental Status.

The European Commission approved the report for the first implementation cycle of the Directive in June 2020. This report, under Article 20 of the Directive, shows that while the EU framework for marine environmental protection is one of the most comprehensive and ambitious worldwide, it needs to be strengthened to address major pressures such as overfishing and unsustainable fishing practices, plastic litter, nutrient enrichment, underwater noise, and other forms of pollution.

1.3.2.2.5 Law 3983/2011 for the National Strategy for the protection and management of marine environment

Law 3983/2011 “National Strategy for the Protection and Management of Marine Environment - Harmonization with Directive 2008/56/EC of the European Parliament and the Council of June 17, 2008, and other provisions”, GG 144/A/17-6- 2011.

1.3.2.2.6 Environmental liability Directive (2004/35/EC)

The Environmental Liability Directive (ELD) 2004/35/EC came into force in 2009. Unlike Directive 96/82/EC (Seveso II Directive), which applies to large high-risk installations, the Environmental Liability Directive applies to all enterprises regardless of size, including those active in the energy sector, as defined in Annex III of the Directive. The ELD applies to waters governed by the Water Framework Directive 2000/60/EC,

which defines "surface waters" to include territorial waters. Consequently, environmental liability may be assigned for any damage occurring within 12 nautical miles from the coastline.

1.3.2.2.7 Directive 2009/123/EC, which amends Directive 2005/35/EC on ship-source pollution

Directive 2009/123/EC, which amends Directive 2005/35/EC on ship-source pollution and the introduction of penalties, including criminal penalties for infringements, aims to strengthen the legal framework addressing illegal discharges of polluting substances.

1.3.2.2.8 Bathing water Directive (2006/7/EC)

The Bathing Water Directive (2006/7/EC) was initially enacted in 1975, and its main objective is to ensure public health and protect the aquatic environment of coastal and inland areas from pollution. Bathing waters can be coastal or inland (rivers, lakes). For waters to fall under the Directive, comply with its mandatory quality standards, and be subject to monitoring and information obligations.

1.3.2.2.9 Barcelona Convention

Barcelona Convention for the Protection of Marine Environment and Coastal areas of the Mediterranean: which was adopted on February 16, 1976, during a conference of Mediterranean coastal states held in Barcelona. The Barcelona Convention, its amendments, and protocols were ratified by Greece through Laws 855/1978, 1634/1986, 3022/2002 and, 3497/2006 and 1634/1986. The main objectives of the Convention are:

- The assessment and control of marine pollution.
- The assurance of sustainable management of natural marine and coastal resources.
- The integration of the environment into economic and social development.
- The protection of the marine environment and coastal zones through the prevention and reduction of pollution, and, as far as possible, the elimination of pollution, whether of marine or land-based origin.
- The protection of natural and cultural heritage.
- The strengthening of solidarity among the coastal States of the Mediterranean.
- The contribution to the improvement of quality of life.

1.3.2.2.10 International Convention for the prevention of pollution from ships

International Convention for the Prevention of Pollution from Ships (MARPOL) which is the main international convention addressing the prevention of pollution of the marine environment from ships, whether caused by operational or accidental reasons. The Convention includes regulations aimed at preventing and minimizing pollution from ships, both accidental pollution and pollution from routine operations.

1.3.2.2.11 Treaty on oil pollution preparedness, response and cooperation

In July 1989, a summit of leading industrialized nations in Paris called on the International Maritime Organization (IMO) to further develop measures for the prevention of pollution from ships. This request was approved by the IMO Assembly in November of the same year, and work began on drafting a convention aimed at providing a global framework for international cooperation in responding to major incidents or threats of marine pollution. The contracting parties to the International Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC) are required to establish measures for responding to pollution incidents, either at the national level or in cooperation with other countries.

1.3.2.2.12 UN Convention on the law of the sea

United Nations Convention on the Law of the Sea (UNCLOS) also known as the Law of the Sea Convention or the Law of the Sea Treaty, is the international agreement that resulted from the Third United Nations Conference on the Law of the Sea (UNCLOS III), held between 1973 and 1982. The Convention defines the rights and responsibilities of nations regarding their use of the world's oceans, establishing guidelines for operations, environmental protection, and the management of marine natural resources. Concluded in 1982, the Convention replaced four treaties from 1958. UNCLOS came into force in 1994.

1.3.2.2.13 Stockholm Convention on persistent pollutants

Stockholm Convention on Persistent Organic Pollutants (POPs) which is an international environmental treaty, signed in 2001 and entered into force in May 2004, aiming to eliminate or restrict the production and use of persistent organic pollutants.

1.3.2.2.14 International Convention for the safety of life at sea

International Convention for the Safety of Life at Sea (SOLAS) regarding Noise Emissions on Ships. The main objective of the SOLAS Convention, adopted in 1974, is to establish the minimum standards for the construction, equipment, and operation of ships to ensure their safety.

1.3.2.2.15 International Convention on the establishment of an international fund for compensation for oil pollution damage

International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (FUND). The purposes of the Fund Convention are:

- To provide compensation for pollution damage to the extent that the protection provided by the 1969 Civil Liability Convention is inadequate.
- To provide relief to shipowners regarding the additional financial burden imposed on them by the 1969 Civil Liability Convention. This relief is subject to conditions designed to ensure compliance with maritime safety and other conventions.
- To implement the relevant objectives set out in the Convention.

1.3.2.2.16 Directive 96/82/EC of the Council on the control of major-accident hazards involving dangerous substances (SEVESO II Directive)

Directive 96/82/EC of the Council on the Control of Major-Accident Hazards Involving Dangerous Substances (SEVESO II Directive) which requires the identification by EU Member States of high-risk industrial sites, the adoption of appropriate measures to prevent major accidents involving dangerous substances, and the limitation of their consequences for humans and the environment.

1.3.2.2.17 Ballast water management Convention

The International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM Convention) is an international treaty adopted by the IMO in 2004 and entered into force in 2017 to prevent the spread of harmful aquatic organisms and pathogens through ships' ballast water and sediments. Ships use ballast water for stability and safe operation, but when ballast water taken in one region is discharged in another, invasive species can be introduced into foreign marine ecosystems, causing environmental, economic, and public health damage. The Convention requires ships to manage ballast water through approved procedures and treatment systems, maintain a ship-specific approved Ballast Water Management Plan (BWMP).

1.3.2.2.18 IPPC Directive (2008/1/EC)

IPPC Directive (2008/1/EC) which establishes the issuance of permits for industrial and agricultural activities with a high pollution potential. The issuance of this permit requires compliance with certain environmental requirements so that businesses themselves undertake the prevention and reduction of pollution they may cause.

1.3.2.2.19 Convention for the prevention of marine pollution by dumping of wastes and other matter (London Convention)

This Convention is one of the first global conventions for the protection of the marine environment from human activities and has been in force since 1975. Its aim is to promote effective control of all sources of marine pollution and to take all practical measures to prevent marine pollution caused by the dumping of waste and other matter.

1.3.2.2.20 Regulation (EC) No. 1907/2006 concerning the registration, evaluation, authorisation and restriction of chemicals

The Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) Regulation, which entered into force on June 1, 2007, requires manufacturers and importers of chemical products to assess the risks arising from the use of chemical substances and to manage those risks.

1.3.2.3 National targets of environmental protection

1.3.2.3.1 Greek Action Plan for combating desertification

The Action Plan provides a framework of measures aimed at preventing and mitigating desertification, which must be applied nationally according to the ecological and socio-economic context of each threatened area. These measures take the form of integrated programs covering all activity sectors (agriculture, forests, livestock, water resources, fauna, special socio-economic actions), incorporated into regional development programs, and implemented with a temporal and spatial plan for each threatened area.

1.3.2.3.2 National biodiversity strategy

The National Biodiversity Strategy for the period 2014–2029 and the corresponding five-year Action Plan were approved in September 2014 by MD 40332 PD 2383/B/8.9.2014). The vision for 2050, according to the National Biodiversity Strategy, is as follows: Greece's biodiversity, and the ecosystem functions it supports, i.e., the country's natural capital, is assessed, managed rationally, effectively protected, and restored both as an intrinsic value and due to its essential contribution to prosperity and economic well-being. The primary objective by 2050 is to prevent destructive changes caused by biodiversity loss.

1.3.2.4 Compliance with greenhouse gas emission mitigation and climate change adaptation requirements

1.3.2.4.1 National climate law (Law 4936/2022)

National Climate Law (Law 4936/2022). Law 4936/2022 establishes Greece's comprehensive and legally binding climate governance framework, setting quantified emissions reduction targets of –55% by 2030, –80% by 2040, and climate neutrality by 2050, and operationalising these targets through sectoral carbon budgets, multi-level planning mechanisms, and mandatory integration into environmental permitting procedures. It introduces a dual mitigation–adaptation architecture covering all major economic sectors, including energy, transport, buildings, industry, agriculture, and land use, while embedding climate risk and emissions considerations into project-level decision-making. The law further creates governance, monitoring, and enforcement mechanisms, supported by financial instruments and EU-aligned regulatory tools, ensuring accountability and compliance. By applying horizontally across spatial planning, infrastructure, and economic policy, it transforms climate action from a strategic objective into a binding legal obligation, effectively reshaping Greece's development model toward a low-carbon, climate-resilient economy.

1.3.2.4.2 National Strategy for climate change adaptation

National Strategy for Climate Change Adaptation (onshore facilities). The European Commission approved the EU strategy for climate change adaptation in April 2013 (COM (2013) 216). The EU strategy aims to encourage action by Member States, ensure policy making and decision making based on more comprehensive data and information, and integrate climate change adaptation considerations into all relevant policy areas. In December 2014, the Ministry of Environment, Energy and Climate Change (now the

Ministry of Environment and Energy / YPEN), the Foundation for Biomedical Research of the Academy of Athens, and the Bank of Greece (BoG) signed a memorandum of cooperation that, among other things, concerned the drafting of the National Strategy for Climate Change Adaptation (NECCA).

1.3.2.4.3 National energy and climate plan

The National Energy and Climate Plan constitutes a Strategic Plan for Climate and Energy issues and presents a roadmap for achieving specific Energy and Climate Targets by 2030. The NECP presents and analyzes Priorities and Policy Measures across a wide range of developmental and economic activities, making the text a reference for the next decade.

1.3.2.5 Main legislative framework for environmental management and planning

1.3.2.5.1 Directive 2014/89/EU on maritime spatial planning

Maritime Spatial Planning (MSP) is developed at both cross-border and cross-sectoral levels to ensure that human activities at sea are carried out in an efficient, safe, and sustainable manner. MSP contributes to the effective management of marine activities and the sustainable use of marine and coastal resources by creating a framework for consistent, transparent, sustainable, and evidence-based decision-making. In this context, the European Parliament and the Council adopted Directive 2014/89/EU establishing a framework for maritime spatial planning, with the aim of creating a common approach to MSP across Europe.

Directive 2014/89/EU was transposed into the Greek legal order through Law 4546/2018, entitled “Transposition into Greek Legislation of Directive 2014/89/EU Establishing a Framework for Maritime Spatial Planning.” Through this law, the national framework for Maritime Spatial Planning (MSP) was established, aiming to promote the sustainable development of maritime economies, the sustainable use of marine resources, and the coordination of activities taking place within the marine environment.

1.3.2.5.2 Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment (SEA Directive)

The SEA Directive prescribes the use of the impact assessment tool, to be used on a strategic level, i.e. in the programming phase for those plans or programmes that can potentially produce environmental effects. The SEA procedure, in accordance with the text of the Directive (Article 2b), includes the following thematic units:

- Strategic Environmental Assessment (SEA) Report preparation.
- Conducting consultations of the SEA Report.
- Co-evaluation of the environmental study and the results of the consultation in decision-making and
- Provision of information regarding the decision.

1.3.2.5.3 National legislation for strategic environmental assessment

Greece implements the Strategic Environmental Assessment (SEA) Directive 2001/42/EC primarily through Joint Ministerial Decision 107017/2006 “Approval of the Strategic Environmental Assessment (SEA) procedure for plans and programmes, in compliance with Directive 2001/42/EC”. Under this system, any strategic instrument—such as sectoral policies, spatial planning frameworks, or energy and infrastructure programmes—must undergo an ex-ante evaluation of likely significant environmental effects, including the analysis of reasonable alternatives and the “no action” scenario. The SEA process requires the preparation of an Environmental Report, followed by public consultation and, where applicable, transboundary consultation in line with international obligations, with environmental authorities required to ensure that mitigation measures are integrated and that implementation is subsequently monitored.

1.3.2.5.4 Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention)

The Convention on Environmental Impact Assessment in a Transboundary Context, commonly known as the Espoo Convention, was adopted in Espoo, Finland, on 25 February 1991 and entered into force on 10 September 1997. It establishes an international procedural framework for assessing the environmental effects of proposed activities that may cause significant adverse impacts beyond the jurisdiction of the State in which they are planned (United Nations Economic Commission for Europe [UNECE], 1991) .

The Convention requires the Party of origin, namely the State under whose jurisdiction a proposed activity is planned, to take all appropriate and effective measures to prevent, reduce and control significant adverse transboundary environmental impacts.

1.3.2.5.5 Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (EIA Directive)

Environmental Impact Assessment (EIA) was firstly introduced in Europe in 1985 through the EIA Directive (85/337/EEC). It represents the first key instrument in European Union’s environmental policy that puts into force the obligation to account the environmental parameter / impact of projects / activities at the stage of implementation of decisions. It was amended by 97/11/EC following a whole new service industry on the environmental impact assessment sector

It has been further amended twice through Directive 2003/35/EC (harmonized public participation process with provisions of Aarhus Convention) and Directive 2009/31/EC. This was eventually codified by Directive 2011/92/EU of 13 December 2011. The final amendment to the present date entered into force on 15 May 2014 through Directive 2014/52/EU aiming to simplify the rules for assessing the potential effects of projects on the environment. The update is in line with the drive for smarter regulation, so it reduces the administrative burden. It also improves the level of environmental protection, with a view to making business decisions on public and private investments more sound, more predictable and sustainable in the longer term.

1.3.2.5.6 National legislation based on Law 1650/1986

Greek legislative framework was enriched with the first attempt to protect the environment in 1986. L.1650/1986 was approximating the first EIA Directive by also regulating several environmental matters, which were quite radical for the time. The approximation was quite detailed and the matters that were allowed to the country member states certain degree of flexibility; the above law was leaning to the stricter rendering. The Directive amendments led to the national legislation amendments introduced by L.3010/2002. Main changes introduced included the compliance with new Directive, decentralization and the introduction of the screening process. More recently the legal framework was reformed through L.4014/2011 as amended by JMD. 5688/2018. This was accompanied by several JMDs, MDs and Circulars aiming together with the main law to improve the overall output and increase the added value of the procedures.

1.3.2.5.7 Directive 2008/98/EC on waste and repealing certain Directives (Waste Framework Directive)

The Waste Framework Directive provides the primary legislative framework for the collection, transport, recovery, and disposal of waste. Waste is defined as "any substance or object which the holder discards or intends or is required to discard", while "waste treatment" is defined as "any recovery or disposal operation, including preparation prior to recovery or disposal". According to the Waste Framework Directive, a distinction must be made between:

- The temporary storage of waste pending its collection,
- The collection of waste, and
- The storage of waste pending treatment.

1.3.2.5.8 Aarhus Convention

The United Nations Economic Commission for Europe (UNECE) Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters was adopted on 25 June 1998 in the city of Aarhus, Denmark, during the Fourth Ministerial Conference in the framework of the "Environment for Europe" process. The Convention:

- Links environmental and human rights.
- Recognizes that we have an obligation towards future generations.
- States that sustainable development can only be achieved with the participation of all interested parties.
- Connects governmental accountability and environmental protection.
- Focuses on the interactions between citizens and public authorities within a democratic framework.

1.3.2.6 Main legislative framework for social welfare and human rights

1.3.2.6.1 Social welfare legislation in Greece

National legislation on social welfare includes:

- Articles 29 and 30 of Presidential Decree 141/2013.
- Establishment of the Asylum Service by Law 3907/2011, which began operating in June 2013. It is the first independent structure in Greece responsible for examining international protection applications. The same law established the Appeals Authority, which reviews appeals against decisions of the Asylum Service rejecting international protection applications at first instance, as well as the Reception and Identification Service, through which a system of first reception and registration of the data and needs of those entering Greece without legal formalities was launched, including individuals wishing to seek asylum. Currently, the operation of all three services is regulated by Law 4375/2016.
- Article 1 (IA) (2) of Law 4093/2012, as amended by Article 6 of Law 4472/2017.
- Article 10 of Law 3220/2004.
- Joint Ministerial Decision (KYA) G4a/F.225/161 (GG 108/B/15.2.1989).
- Article 235 of Law 4389/2016.
- Article 93 of Law 4387/2016.

1.3.2.6.2 Human rights framework in Greece

The Greek authorities make every possible effort to ensure that the level of protection of fundamental rights is upheld by all state bodies and institutions, to guarantee the rules of a free, non-discriminatory democratic society. In the hierarchy of legal rules that guarantee the protection of fundamental rights, the Greek Constitution, as the supreme law, includes a special chapter on individual and social rights (Part B - Articles 4-25) (Greek Council for Refugees, 2019).

The Hellenic National Commission for Human Rights (HNCHR), as an independent advisory body of the State on matters of Human Rights protection, constitutes the National Human Rights Institution (NHRI). According to UN principles, within the scope of its powers granted by its founding law, it is tasked with monitoring developments in its areas of activity, addressing the competent state services, and undertaking initiatives to raise public awareness (Greek Council for Refugees, 2019). The HNCHR places special importance on the status of international protection and has issued a series of related decisions (reports, statements, announcements), such as the recent reference report on refugees (September 2019), which outlines the HNCHR's positions on the reception and housing of applicants for international protection, the detention of applicants for international protection, international protection procedures at the first and second instance, unaccompanied minors, the pushback of third-country nationals at the Greek-Turkish borders, and the integration of refugees in Greece (Greek Council for Refugees, 2019).

Additionally, the National Action Plan for Human Rights was established by the Greek State for the period 2014-2016 in order to strengthen, implement, and protect fundamental rights in Greece.

1.3.2.6.3 International human rights framework

International human rights law is founded upon the Universal Declaration of Human Rights and is constituted of 9 core international human rights instruments with additional optional protocols. The relevant international human rights instruments are listed below:

- The International Covenant on Civil and Political Rights.
- The International Covenant on Economic, Social and Cultural Rights.
- The Convention against Torture and other Cruel, Inhuman or Degrading Treatment or Punishment.
- The Convention on the Rights of the Child.
- The International Convention on the Elimination of All Forms of Racial Discrimination.
- The Convention on the Elimination of All Forms of Discrimination against Women.
- The Convention on the Rights of Persons with Disabilities.
- The International Convention on the Protection of the Rights of All Migrant Workers and Members of Their Families.
- The International Convention for the Protection of All Persons from Enforced Disappearance.

1.3.2.6.4 International labour rights regulations

The International Labour Organization (ILO) is a UN agency that sets labour standards, develops policies and devises programmes promoting decent work for all women and men.

The fundamental instruments are:

- Freedom of Association and Protection of the Right to Organise Convention, 1948 (No. 87)
- Right to Organise and Collective Bargaining Convention, 1949 (No. 98)
- Forced Labour Convention, 1930 (No. 29) (and its 2014 Protocol)
- Abolition of Forced Labour Convention, 1957 (No. 105)
- Minimum Age Convention, 1973 (No. 138)
- Worst Forms of Child Labour Convention, 1999 (No. 182)
- Equal Remuneration Convention, 1951 (No. 100)
- Discrimination (Employment and Occupation) Convention, 1958 (No. 111)
- Occupational Safety and Health Convention, 1981 (No. 155)
- Promotional Framework for Occupational Safety and Health Convention, 2006 (No. 187)

Greece has ratified the following conventions of ILO:

- Greece has ratified 75 Conventions and 2 Protocols, of which 52 are currently in force. Eleven Conventions have been denounced, and 12 instruments have been abrogated. Of the 75 Conventions and 2 Protocols ratified by Greece, 2 have been ratified in the past 12 months.
- Fundamental Conventions: 10 out of 10.
- Governance (Priority) Conventions: Greece has not ratified Convention C129 – Labour Inspection (Agriculture), 1969.
- Technical Conventions: 62 of 178.

1.3.2.7 Protection and management of underwater cultural heritage

The protection and management of underwater cultural heritage within Greece is governed principally by Law 4858/2021, Code of Legislation for the Protection of Antiquities and Cultural Heritage in General. Under the provisions of this legislation, all antiquities located within Greek territory, territorial waters and areas under Greek jurisdiction are afforded legal protection, irrespective of whether they have been previously identified or formally designated.

Responsibility for the protection, management and archaeological investigation of underwater cultural heritage rests with the Ephorate of Underwater Antiquities (EUA), which constitutes the competent authority for the assessment and management of submerged archaeological resources.

1.3.3 Specific legislative framework for Block 2

The specific legislative framework of Block 2 includes the following:

- Block 2 was initially awarded to a joint venture comprising TotalEnergies, Edison, and Hellenic Petroleum. The relevant Lease Agreement was executed with the Hellenic Republic on 31 October 2017 and subsequently ratified by Law 4525/2018 (Official Gazette A' 47 / 15.03.2018) Ratification of the Leasing Agreement between the Hellenic Republic and the companies "Total E&P Greece B.V.", "Edison International S.p.A." and "Hellenic Petroleum S.A." for the granting of the authorization for the exploration and exploitation of hydrocarbons in the maritime Area 2, Ionian Sea., granting exclusive rights for the exploration and production of hydrocarbons within the concession area.
- Subsequent amendments to the joint venture composition resulted in a revised partnership structure. Specifically, following the consent of the Minister of Environment and Energy granted under Decision No. ΥΠΕΝ/ΔΥΔΠ/27224/552/10.03.2026, Energean holds 30% of the relevant rights, while the companies "ExxonMobil Exploration and Production Greece (Crete) B.V." ("ExxonMobil") and "Helleniq Upstream West Corfu Single-Member S.A." ("Helleniq") hold 60% and 10% of the relevant rights respectively (collectively, Energean, ExxonMobil, and Helleniq are referred to as the "Co-lessees").
- The approval of the Strategic Environmental Assessment study for the exploration and exploitation of hydrocarbons in eleven marine areas in the Ionian Sea, Respective SEA Approval No. 30373, 03.07.2017.

Article 12 of Law 4525/2018 states the reference terms and conditions concerning the environmental protection measures to be followed during the execution of the exploration program:

12.1 All terms in this Article 12 will be considered according to the legislation in force, unless otherwise provided herein.

12.2 The Lessee shall:

- conduct all Petroleum Operations in a manner which will ensure the protection of environment in accordance with Good Oilfield Practices;
- carry out all Petroleum Operations in full compliance with:
 - Environmental Laws;
 - the Law on Offshore Safety;
 - the approved Strategic Environmental Assessment (SEA);

- iv. the Terms of Environment (ToE) resulting from the relevant Environmental Impact Assessment (EIA) procedure; and
- v. any additional Environmental Action Plan (EAP), pursuant to this Article and Good Oilfield Practices, while ensuring that such operations are properly monitored;
- c) employ modern and appropriate techniques in accordance with Good Oilfield Practices, for preventing any environmental damage that might be caused by the Petroleum Operations, and for minimizing the environmental impacts of the Petroleum Operations and works within the Contract Area and in adjoining or neighboring or more distant areas;
- d) properly and timely implement any Laws in force regarding the safety of Hydrocarbons exploration and production activities during the period of Petroleum Operations;
- e) procure that the documentation on environmental compliance in conducting Petroleum Operations, such as SEA, ToE or EAPs and associated documents are made available to its employees and to its contractors and their subcontractors to develop adequate and proper awareness of the measures and methods of environmental protection to be used in conducting Petroleum Operations; and
- f) ensure that any agreement between the Lessee and its contractors and their sub-contractors relating to the Petroleum Operations shall include the terms as set out in this Article 12 and any established measures and methods for the implementation of the Lessee's obligations in relation to the environment under this Agreement.

12.3 The Lessee undertakes for the purposes of this Agreement to take all necessary and adequate steps:

- to fully and timely fulfill all requirements of applicable Environmental Laws; and
- to prevent environmental damage to the Contract Area and neighboring or more distant areas being caused by Petroleum Operations.

12.4 If the Lessor has on reasonable grounds reason to believe that any works or installations erected by the Lessee or any operations carried out by the Lessee are endangering or may endanger persons or any property of any other person or are causing pollution or are harming wildlife or the environment to a degree which the Lessor deems unacceptable, the Lessee may take remedial measures within such period as may be determined by the Lessor and may repair any damage to the environment, the costs of such remedial action to be borne by the Lessee. If the Lessor deems it necessary, it may require the Lessee to discontinue Petroleum Operations in whole or in part until the Lessee has taken such remedial measures or has repaired any damage.

12.5 The measures and methods to be applied by the Lessee for purposes of complying with the terms of this Article 12 shall be determined in timely consultation and agreed with the Lessor prior to the commencement of the relevant Petroleum Operations, and whenever there is a significant change in the scope or method of carrying out Petroleum Operations, and the Lessee shall take into account Good Oilfield Practices as well as the relevant requirements of the ToE.

12.6 Pursuant to the above 12.2(a) provision, the Lessee shall prepare and submit to the competent governmental authority, an Environmental Impact Study (EIS) for the relevant Petroleum Operations in respect of which an EIA procedure is required. The EIS shall, as a minimum:

- a) fully comply with the requirements of the EIA legislation in force;
- b) meet the requirements and guidelines set out by SEA; and

c) be prepared by a third party with adequate expertise in the field of environmental studies, which will be appointed by the Lessee to work on its behalf

12.7 Each project, work, activity or any other part of the Petroleum Operations that is subject to an EIA, shall commence only after the ToE have been approved.

12.8 Any modification, expansion, improvement or modernization of a project, work, activity or any other part of the Petroleum Operations with approved ToE, requires compliance with the relevant provisions of EIA legislation. The same applies for the renewal (time extension) of the ToE decision.

12.9 In case of activities for which an EIA is not mandatory but nevertheless it is reasonably expected that some minor environmental impacts may occur, as in particular for the case of seismic surveys, the Lessee shall prepare an EAP, to determine, assess and mitigate these impacts, focusing on prevention and minimization thereof in accordance with Good Oilfield Practices.

12.10 The EAP shall be submitted to the Lessor for review and must be complied with by the Lessee.

12.11 The Lessee shall include in each Annual Work Programme and Budget to be submitted to the Lessor, an environmental report on the work to be undertaken as provided in that document, as well as on the work undertaken in accordance with the preceding Annual Work Programme and Budget.

12.12 Before carrying out any drilling activities, the Lessee shall fully meet the requirements of the applicable legislation for safety, contingency (i.e. oil spill, fire, accident, emissions etc.) and major hazard management plans.

12.13 In the event of any emergency or accident arising from Petroleum Operations affecting the environment, the Lessee shall immediately notify the Lessor, giving details of the incident and immediately implement the relevant contingency plan. In dealing with any emergency or accident affecting the environment, the Lessee shall at all times take such action as is prudent and necessary in accordance with the Environmental Laws and Good Oilfield Practices in the circumstances.

12.14 The Lessee shall not be liable for any environmental condition or damage existing in the Contract Area prior to the commencement of the Lessee's operation therein and nothing in this Agreement shall be construed to hold the Lessee liable in relation to any such pre-existing condition of damage. For this purpose, a baseline report shall be prepared by the Lessee, to detail the condition of the environmental parameters and resources at the time prior to operation commencement. The baseline report shall be submitted for review to the Lessor. If no objections will rise by the latter within twenty (20) Business Days, the report is deemed accepted.

Moreover, the approval of the Strategic Environmental Assessment study for the exploration and exploitation of hydrocarbons in eleven marine areas in the Ionian Sea (Respective SEA Approval No 30373, 03.07.2017) in chapter C, states the requirements for monitoring:

1. To monitor the significant environmental impacts, an integrated system shall be developed on the basis of the following principles:

1.1. Monitoring shall concern both the condition of the environment in the wider area affected by the works of hydrocarbons exploration and areas of direct impact.

1.2. For the purposes of monitoring, wider area shall mean at least the entire applicable active exploration and exploitation concession area. In this area, physical and chemical properties of key environmental sectors shall be recorded, such as mainly:

- marine waters, including their physical and chemical properties as well as the dynamics of currents,
- local meteorology, particularly to the extent it affects water dynamics,
- the surface layer of the seabed, particularly regarding its role in the health of marine ecosystems.

1.3. In the immediate area, monitoring should cover all the above and additionally include magnitude and indicators related to

- the implementation of environmental conditions to be approved for each individual project,
- compliance with safety procedures related to the prevention of accidents with environmental impact.

1.4. The spatial and temporal density of the recordings, and the means used to make them (e.g. permanent or mobile stations, suitable vessels etc.) must be selected according to the scale of the phenomena to be monitored, with appropriate variations between the immediate and wider area.

1.5. In the wider area, to understand and correlate the parameters, integrated computational simulations with analytical forecasting potential shall be developed, using existing initiatives such as the "Poseidon" system (www.poseidon.hcmr.gr). Measurements and recordings in the wider area should be designed and conducted in a manner that allows the validation of computational results.

1.6. The collection and processing of data for the monitoring of environmental impacts should be conducted annually. During each year, data shall be collected on a more regular basis, to allow trending with a shorter temporal development.

1.7. Environmental indicators will be used as key monitoring parameters which should represent in a comprehensive way important aspects of the developments with regards to the quality of the environment.

1.8. Once the production prospects have been finalized, a seismicity activity monitoring system should be established, using appropriate technology and the existing seismographic network. This system should actively contribute to the safety of the production facilities, by monitoring the temporal evolution of the local micro-seismicity and macro-seismicity, as well as of other data related to the deformation of the ground. The technical details of the above system and the way in which it will comply with the above guidelines and safety requirements pursuant to L. 4409/2016 will be a distinct part of the relevant Environmental Impact Assessment (EIA)

1.3.4 International industry standards

1.3.4.1 Best available techniques

The concept of Best Available Techniques (BAT), as incorporated within the broader European environmental legislation, is further elaborated and operationalized in the offshore industry through the European Commission's "Best Available Techniques Guidance Document on Upstream Hydrocarbon Exploration and

Production (2019)”, which constitutes the most recent comprehensive European reference document concerning environmental protection practices applicable to offshore hydrocarbon activities.

In particular, the BAT Guidance Document highlights the importance of implementing environmentally optimized drilling fluid systems, reducing the discharge of hazardous substances, applying robust well integrity and blowout prevention measures, ensuring proper containment and handling of chemicals, minimizing fugitive emissions, and establishing comprehensive monitoring and emergency response procedures.

1.3.4.2 Good oilfield practice and good international industry practice

The term “Good Oilfield Practice” is used by certain national oil and gas regulatory authorities to describe the approach expected from operators working in their jurisdictions. The term “Good Oilfield Practice” is used by certain national oil and gas regulatory authorities to describe the approach expected from operators working in their jurisdictions. Unfortunately, it is not a clearly defined concept, and as such, its meaning can be interpreted in different ways.

A commonly accepted definition of “Good Oilfield Practice” is the following:

“The practices and procedures used in the oil industry worldwide by prudent and diligent operators under conditions and circumstances related to Hydrocarbon Activities, primarily aiming to ensure:

- Sustainable viability achieved through resource preservation of oil and natural gas, implying the use of appropriate methods and procedures to maximize hydrocarbon recovery in a technically and economically viable way, with corresponding control of reserve decline and minimization of surface losses,
- Operational safety, involving the use of methods and procedures that promote occupational safety and accident prevention,
- Environmental protection, which requires the adoption of methods and procedures that minimize the impact of Hydrocarbon Activities on the environment.”

“Good International Industry Practice (GIIP)” is defined as follows:

“The exercise of professional skill, diligence, prudence, and foresight that would reasonably be expected from skilled and experienced professionals engaged in the same type of undertaking under the same or similar circumstances globally. Circumstances that skilled and experienced professionals may consider when assessing the range of available pollution prevention and control techniques may include, but are not limited to, varying levels of environmental degradation and assimilative capacity, as well as differing levels of economic and technical feasibility.” The World Bank Group's Health, Safety & Environmental (HSE) Guidelines, established in 2007, are technical reference documents that provide examples of approaches based on Good International Industry Practice. The Equator Principles and the Performance Standards of the International Finance Corporation (IFC) refer to these guidelines when defining acceptable performance levels.

1.3.4.3 IPIECA and OGP guidelines

The International Petroleum Industry Environmental Conservation Association (IPIECA), the International Association of Oil and Gas Producers (OGP), have produced international industry environmental guidelines. These include the IPIECA & OGP ‘Guide to Developing Biodiversity Action Plans for the Oil and Gas Sector’ (2005), report 254 “Environmental management in the upstream oil and gas industry” (2020), report 520 “Oil spill preparedness and response: an introduction” (2015).

1.4 Environmental consultant

The Environmental and Social Baseline Study (ESBS) was prepared by **LDK Consultants SA – Environment and Water Department**, in collaboration with **RSK International Projects Group (RSK IPG)**.

To deliver the full scope of the ESBS and its supporting technical studies, a multidisciplinary team of environmental specialists and subject-matter experts was assembled. The study team comprises specialists from LDK Consultants SA, RSK IPG, and a number of specialist subcontractors and collaborating organisations, each responsible for specific technical workstreams.

The contact details of the lead environmental consulting companies are presented in Table 1-1, while the multidisciplinary study team responsible for the preparation of the ESBS and supporting studies is provided in Table 1-2.

Table 1-1: Lead Environmental Consulting Companies

COMPANY	LDK CONSULTANTS SA	
Address:	21 Thivaidos Passage, 145 64, Kifisia	
Telephone:	+30 210 8196700	
Email:	env@ldk.gr, cni@ldk.gr	
Web:	www.ldk.gr	
Contact Person:	Costis Nicolopoulos, Head of Environment and Water Department LDK, Project Manager	
COMPANY	RSK INTERNATIONAL PROJECTS GROUP (IPG)	
Address:	65 Sussex Str, Glasgow, G41 1DX, UK	
Telephone:	+44 (0)1928 726006	
Email:	dwatson@rsk.co.uk	
Web:	www.rskgroup.com	
Contact Person:	Dave Watson, Director	

The ESBS was prepared by an interdisciplinary team of environmental engineers, marine scientists, geologists, ecologists, biologists, social specialists, economists, GIS experts, archaeologists, and other technical experts with extensive experience in environmental assessment, offshore developments, and infrastructure projects.

Table 1-2: ESBS Study Team

NAME	EXPERTISE / SPECIALISATION	COMPANY
Overall Project Coordination		
Costis Nicolopoulos	MSc Environmental Engineer, Project Manager / Environmental Permitting of Infrastructure Projects	LDK Consultants SA
Dr Dave Watson	BSc (Hons) Marine and Freshwater Biology, PhD in Marine Chemistry, Director, Oil Spill and Cutting drilling modelling lead reviewer & Project Director	RSK IPG
ESBS and Supporting Studies		
Eleni Avramidi	MSc Environmental Engineer, Marine Biology Researcher / ESBS Coordinator	LDK Consultants SA
Kathy Bradshaw	BSc (Hons) Biology with Education (Dip Ed), MB Administration, MSc Marine Resource Development and Protection, MCIWEM, C.WEM. Technical Director, Marine lead and PM Support	RSK IPG
Mina Paidousi	MSc Chemical Engineer	LDK Consultants SA
Nikos Misyris	BSc Geology & Geoenvironment, MSc in Energy	LDK Consultants SA
Despoina Athanasiou	MSc Environmental Engineer	LDK Consultants SA
Melina Mikelis	MA in International Comparative Law/ Sociology	LDK Consultants SA
Elena Ioannaki	MSc Environmental Engineer	LDK Consultants SA
Konstantina Kousta	MSc Mining Engineer	LDK Consultants SA
Petros Vitalis	MSc Environmental Scientist, GIS Expert	LDK Consultants SA
Katerina Mpoutsikou	MSc Chemical Engineer	LDK Consultants SA
Dr. Frithjof Kuepper	PhD Marine Biologist	LDK Consultants SA
Dr. Kalliopi Gkikopoulou	PhD Biologist, Marine Mammal Observer (MMO)	LDK Consultants SA
Ioanna Koutsomichou	Marine Geologist, Marine Mammal Observer (MMO)	LDK Consultants SA
Jakob Fric	Physicist, Avifauna Expert	LDK Consultants SA
Efstratios Bourdakos	Forester, Avifauna Expert	LDK Consultants SA
Chrysanthi Synodinou	MSc Economist	LDK Consultants SA
Dr. Nikos Papadopoulos	Research Director, Head of the Laboratory of Geophysical Satellite Remote Sensing & Archaeoenvironment	LDK Consultants SA, FORTH, GeoSat ReSeaArch
Dr. Alexis Tourtas	Research Associate, Laboratory of Geophysical Satellite Remote Sensing & Archaeoenvironment	LDK Consultants SA, FORTH, GeoSat ReSeaArch
Alexandra Pierozynska	Marine Biologist & Geologist, Marine Mammal Observer (MMO)	LDK Consultants SA Lighthouse SpA
Pietro Leanza	MSc in Biodiversity and Evolution, Avifauna Expert	LDK Consultants SA Lighthouse SpA
Dr. Joe Green	BSc (Hons), PhD Marine Oil Spill Response, Associate Director, Project Manager, ESIA Chapter review (Non-Routine) OSM / CDM review support & lead chemical use and post-drill monitoring plan.	RSK IPG
Ruairidh Norwood	BSc (Hons) Marine Biology, MSc Environmental Management, Marine Consultant, Assistant Project Manager	RSK IPG

NAME	EXPERTISE / SPECIALISATION	COMPANY
Sam Olsen	BSc (Hons) Marine Biology, MS: Global wildlife health and conservation, Senior Marine Consultant, Biological & Physical Env. ESBS & ESIA Reviewer coordinating /support	RSK IPG
Andrew Bendell	BSc (Hons) Marine Biology and Oceanography, MSc Marine Resource Development & Protection, Associate Director, Biological Env. ESBS & ESIA	RSK IPG
Dr Matthew Richmond	BSc Biology with Oceanography, MSc Marine Biology, PhD Marine Biodiversity and Biogeography, Principal Marine Consultant, Barcelona Convention	RSK IPG
Hellen O'Neil	BSc (Hons) Geography, MSc Science of Health, Safety and the Environment, Associate Director, Cumulative Impacts	RSK IPG
Georgia Harris	BSc Marine Vertebrate Zoology, MSc Marine Environmental Protection, Biological Env. & Cumulative Impact support	RSK IPG
Dr Natalie Sokol	PhD Climate and Development, Climate Change	RSK IPG
James Brocklehurst	BSc International Environmental Biogeoscience, Principal Marine Consultant, ESIA Env. Management Plan (Pollution Prevention Plan, Chemical Use Plan)	RSK IPG
Patrick Clark	MA Management, BSc Geological Science, Director, Physical Env. ESBS & Project/Data Documentation	RSK, HYDROFIX
Greg Tandy	BSc Ocean Science, MSc Hydrography, Diploma in Harbour Masters. ESR /ESBS Reviewer & Project/Data Documentation support	RSK, HYDROFIX
Bruce Murdoch	ME Mechanical Engineering, QRA / RoMH Lead	RSK, PD&MS
Dr Niall Brady	BA, MA, PhD, Marine Archaeologist, Socio-economic Env. ESBS Reviewer & Project/Data Documentation	RSK, ADCO

To support the preparation of the ESBS, additional specialist companies and organisations were engaged to undertake dedicated technical studies, reviews and assessments in accordance with their areas of expertise (see Table 1-3).

These companies provided specialist inputs including geophysical and environmental surveys, underwater acoustics, current analysis, cultural heritage, and other specialist technical services.

Table 1-3: Collaborating Companies Supporting the ESBS

COMPANY / ORGANISATION	DETAILS
	Lighthouse SpA Team provides insightful information on seabed morphology, site analyses, and a full range of solutions for construction across all project phases, from project inception to feasibility analysis, engineering, physical development/construction, and completion. The company employs experienced surveyors, geologists, and geophysicists who have consistently proven to be its most valuable asset, offering tailor-made solutions from beginning to end through the smart use of knowledge and technology. Responsible for: • LOT 1 – Geophysical Surveys: Comprehensive geophysical survey to deliver high-quality datasets, including multibeam echosounder (MBES) bathymetry, multibeam backscatter (MBBS), sub-bottom profiler (SBP), side-scan sonar (SSS), and magnetometer data. • LOT 2 – Environmental Surveys: Integrated environmental survey to deliver marine, physical, biological, and socio-economic data across both the wider Block 2 area and the immediate drilling well location.
	Lighthouse SpA / Bluemetoccean Srl Responsible for the preparation of the Acoustic Data Analysis Report and the Current Meter Data Analysis Report, based on data collected during the LOT 01 Geophysical Survey Campaign.
	Lighthouse SpA / EcoTechSystems Srl. Responsible for the preparation of the Environmental Baseline Survey Report, based on data collected during the LOT 02 Environmental Survey Campaign.
	Hydrofix is an RSK company and a marine geoscience consultancy specialising in offshore site investigation, seabed preparation, and construction support throughout the project life cycle. Responsible for: Geophysical review, assessment, and reporting.
	ADCO Archaeology is an Irish specialist archaeology and marine heritage consultancy focused on underwater, coastal, and maritime archaeology. The company works on infrastructure and development projects where there may be archaeological or heritage impacts in marine, freshwater, or intertidal environments. Responsible for: Socio-economic marine cultural heritage review and assessment, and Cultural Heritage Management Plan.
	Since 1996, the Laboratory of Geophysical-Satellite Remote Sensing & Archaeo-environment (GeoSat ReSeArch LAB) of IMS/FORTH has been active in basic and applied research in the fields of geophysical prospection, satellite remote sensing, aerial reconnaissance, geographical information systems (GIS), 3D reconstruction, virtual reality applications, and archaeo-environment. It has been widely and internationally recognised due to the quality of its research projects, services provided, and training of students and professionals both in Greece and abroad. Responsible for: Review of registries, interpretation of magnetometer data, and development of the Cultural Heritage Management Plan.

2 Environmental baseline desktop study

2.1 Seabed conditions

2.1.1 Bathymetry

The Asopus-1A exploration well is located in the northern part of the Ionian Sea, specifically positioned between the coastlines of southern Italy and western Greece. The broader Ionian Sea represents a major marine region within the Eastern Mediterranean, bordered by North Africa, Italy, Sicily, and Greece. Recognised as the deepest marine basin in the Mediterranean, it is characterised by submarine canyons that terminate in basins exceeding 4,000 m in depth, with the maximum recorded depth occurring at the Vavilov Deep (over 5,100 m) approximately 30 miles southwest of the Peloponnese (Sammartino et al., 2022). Oceanographically and morphologically, the Ionian basin acts as a transitional basin, maintaining direct water exchanges with the Western Mediterranean via the Strait of Sicily, the Adriatic Sea via the Strait of Otranto, and the Aegean-Levantine Sea. This interconnected regional framework, along with the specific project location, is shown in Figure 2-1.

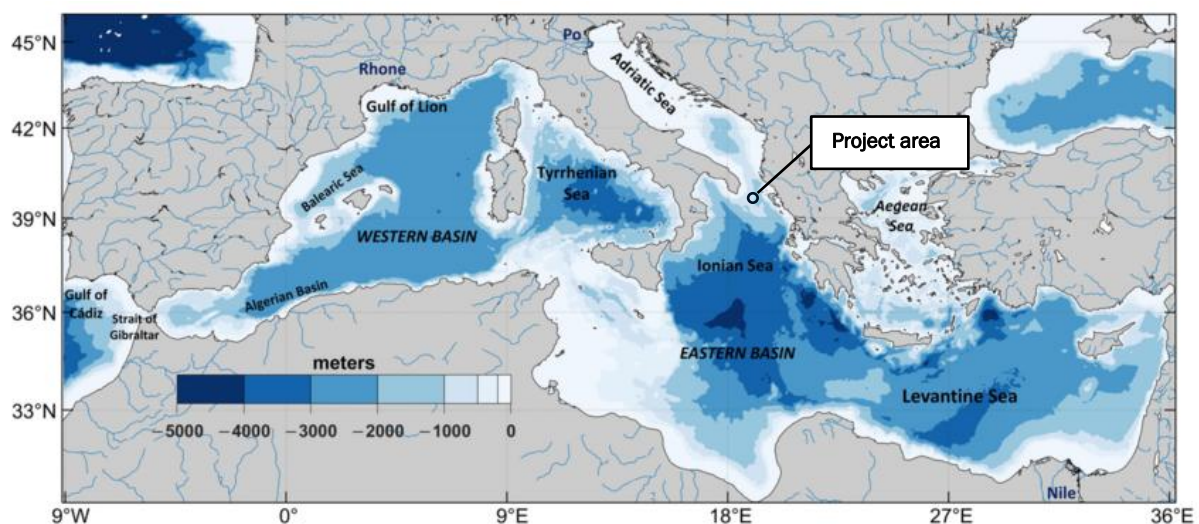


Figure 2-1: Mediterranean Sea bathymetry, showing the main basins, sea regions, and major rivers (adapted from Sammartino et al., 2022)

Within the northern sector of the Ionian Sea, the regional bathymetry exhibits spatial variation. From the shallower shelf of the northeastern sector adjacent to the Diapontia islands, a submarine slope drops down towards the central-eastern sector of the northern Ionian basin, reaching depths of approximately 1,200 m along the margin of Corfu. The Block 2 concession area is located southwest of the base of this regional slope, situated in deep waters ranging from 750 to 1,200 m. As shown in the bathymetric map in Figure 2-2, within the concession itself, the seafloor transitions into a relatively flat profile that gradually ascends over a distance of approximately 100 km toward the Italian continental slope.

The Asopus-1A exploration well is located in the central-western sector of Block 2. The local bathymetry at the well site falls within the shallower-to-mid range of the concession, sitting at a water depth of 842.5 m.

Based on the sub-regional bathymetric contours, the seabed at this specific location reflects the relatively flat and gently ascending bathymetric characteristics observed southwest of the regional submarine slope.

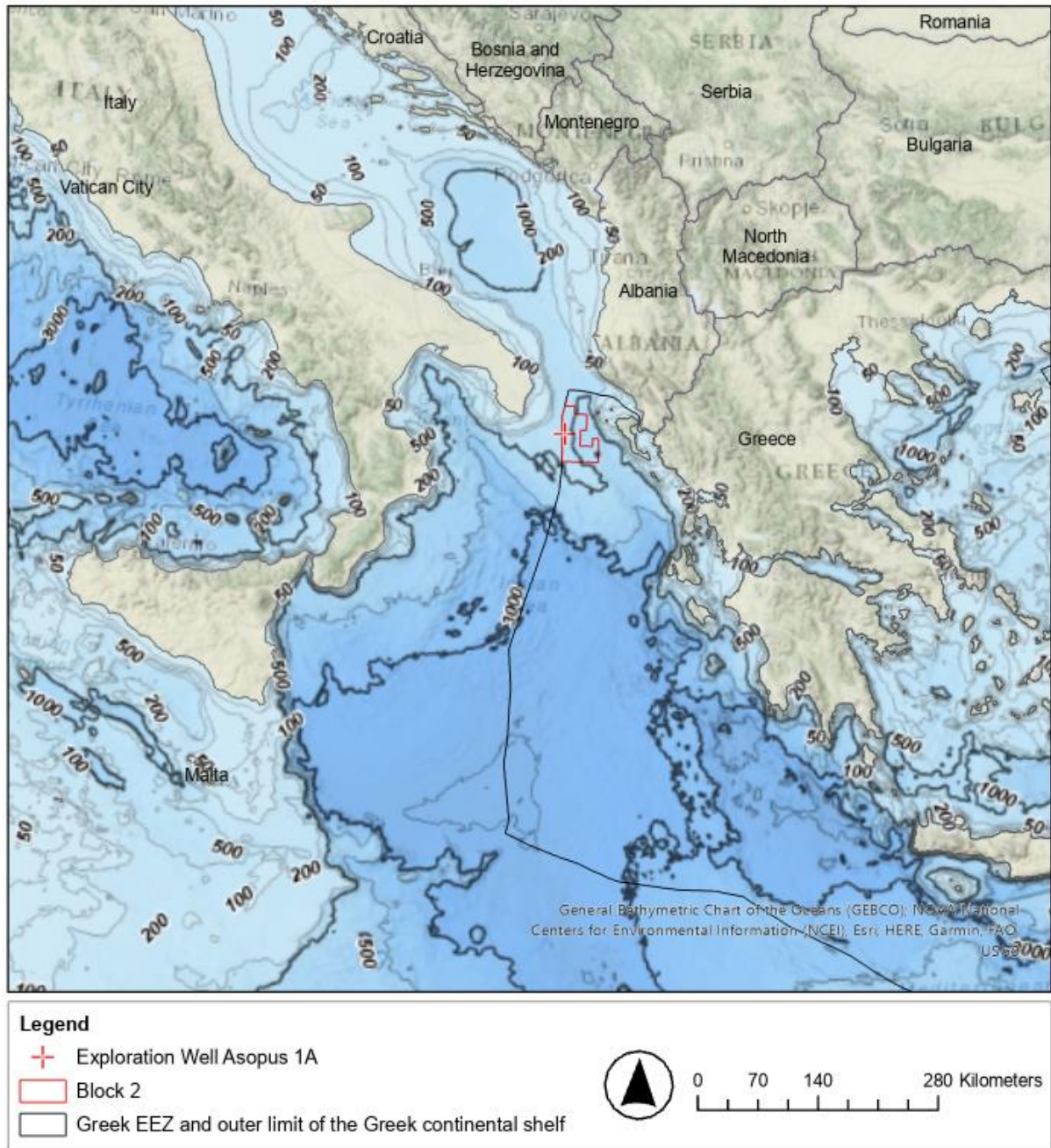


Figure 2-2: Bathymetric map of the broader area (based on GEBCO bathymetric data)

Furthermore, the three-dimensional seabed morphology of this northern Ionian domain is visualized in Figure 2-3 and Figure 2-4.

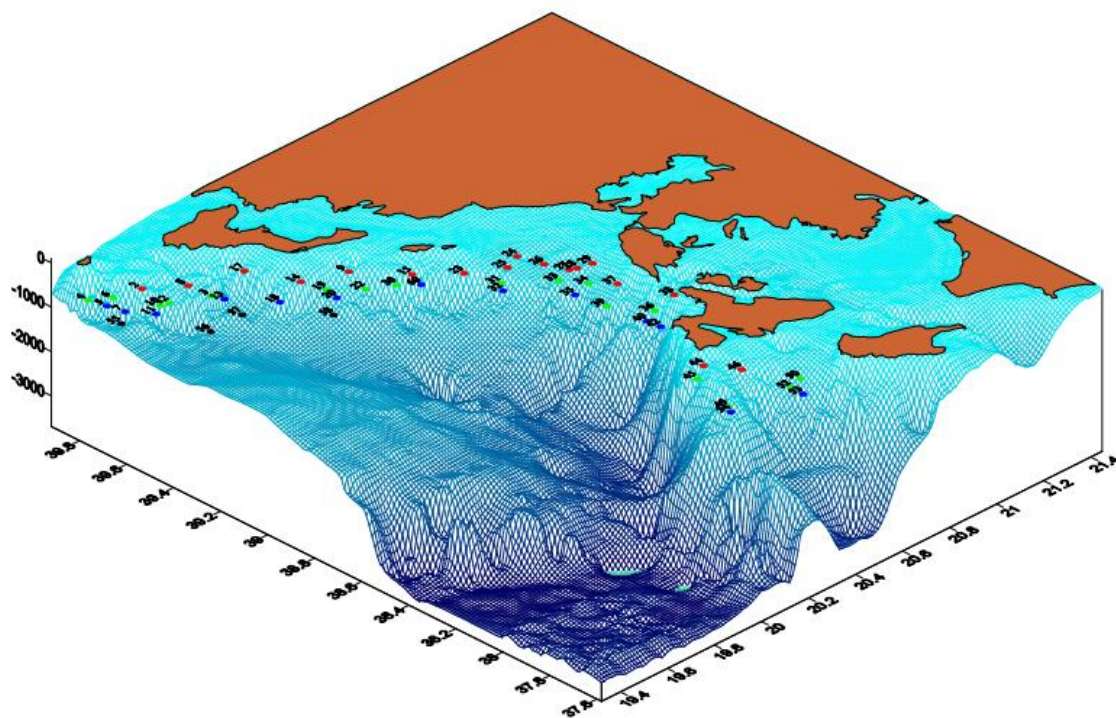


Figure 2-3: 3D morphology of the northern Greek Ionian Sea (Source: INTERREG 2001)

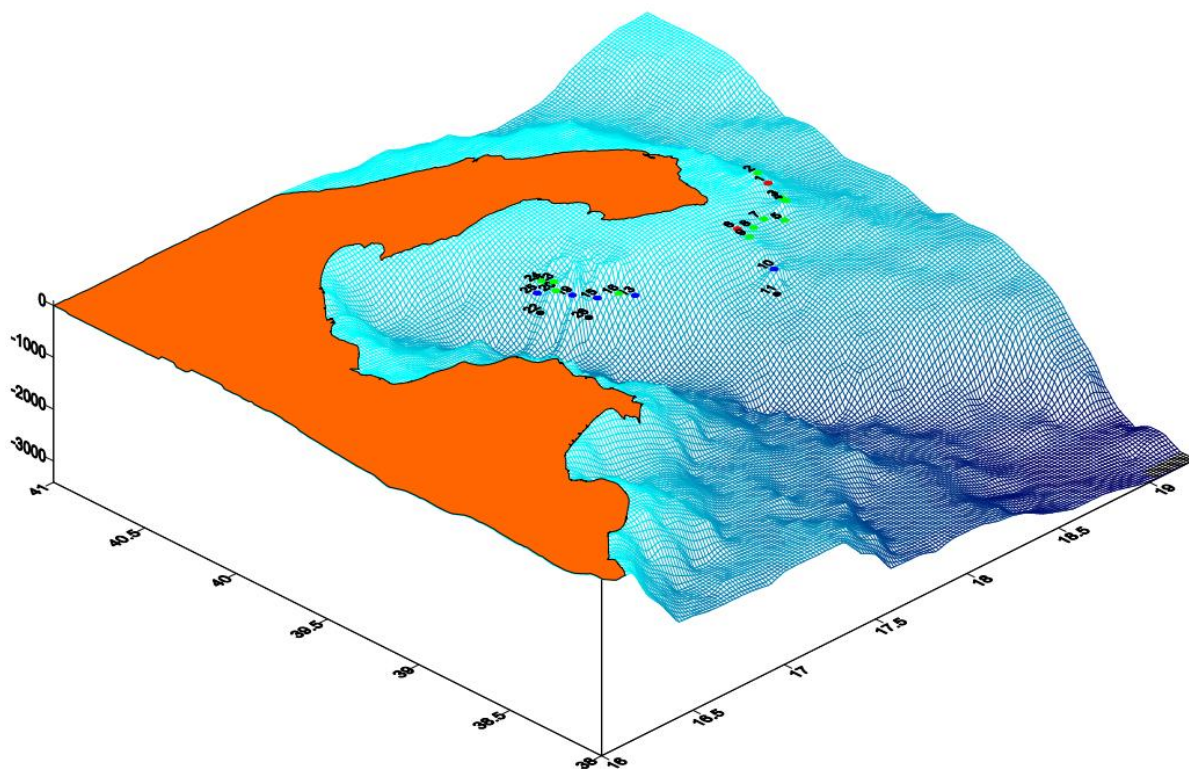


Figure 2-4: 3D morphology of the northern Italian Ionian Sea (Source: INTERREG 2001)

2.1.2 Geomorphology

At a macro-scale, the morphostructural framework of the Eastern Mediterranean is dominated by prominent features, including the Hellenic Trench, the Calabrian Arc, the Apulian Escarpment, the Mediterranean Ridge, and the Herodotus Abyssal Plain. Furthermore, the seafloor topography contains large submarine elevations, specifically the Bannock, Cyrene, and Medina seamounts (Otero & Mytilineou, 2022). These regional features and structural domains are illustrated in Figure 2-5.

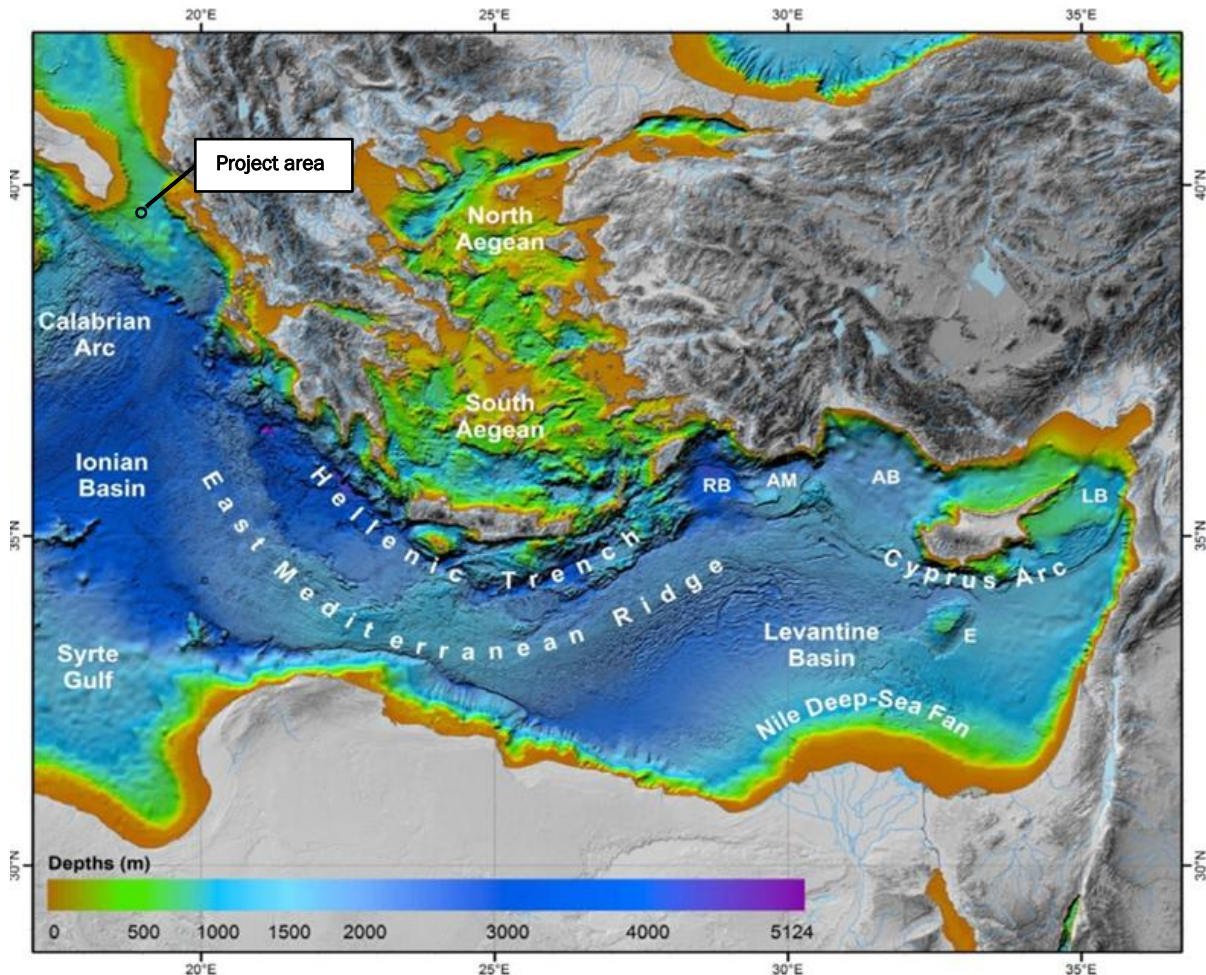


Figure 2-5: Macro-scale morphostructural framework and main geomorphological elements of the Eastern Mediterranean Sea (adapted from Otero & Mytilineou, 2022)

The Ionian Sea is divided by the Kefallonia strike-slip fault into distinct northern and southern sectors. The southern sector exhibits a complex and rugged seafloor morphology driven by regional seismicity and active faulting, which have formed valleys, gulfs, and submarine canyons. Conversely, the northern sector acts as a southward extension of the Adriatic Sea (Otero & Mytilineou, 2022). Within this northern domain, the primary geological elements comprise the Apulian Platform, the Apulian Escarpment, the Calabrian Arc, and the Hellenic Trench. The Apulian Escarpment constitutes a steep structural slope exceeding 1,000 m in height, effectively separating the Apulian Platform to the north from the Calabrian Arc to the south. Bounding the study area to the west, the Calabrian Arc forms an accretionary prism characterized by rugged topography,

while the Hellenic Trench delineates the eastern boundary. These sub-regional features are depicted in Figure 2-6.

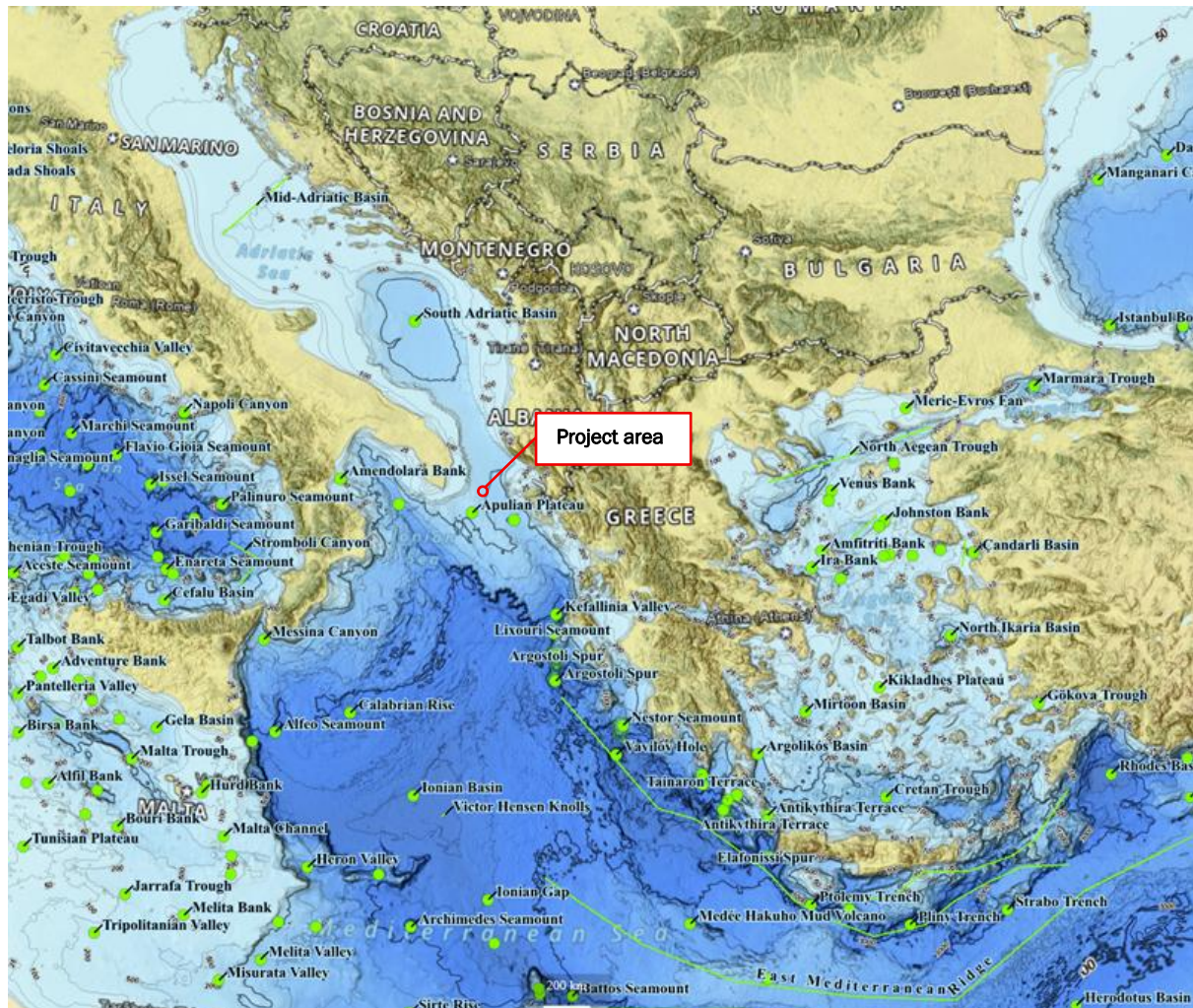


Figure 2-6: Spatial distribution of the Apulian Platform, Apulian Escarpment, and adjacent subduction zones in the Northern Ionian Sea (Source: NOAA)

Adjacent to the Apulian Platform, the steeply sloping margin of Western Greece follows a NW-SE trend from the Othonoi Islands to Lefkas Island. At the base of this slope, a broad submarine valley runs longitudinally from Othonoi to the southwest of the Paxoi Islands. The eastern slope of this valley, particularly west of Othonoi and Corfu, is cut by submarine gullies. These erosional features have widths ranging from 200 to 800 meters and lengths between 3 and 6.7 km, and are predominantly classified as “Type 3” blind canyons. Further south, the margin is dissected by numerous smaller V-shaped canyons. The spatial distribution of these canyon systems is presented in Figure 2-7.

Geomorphologically, the Asopus-1A exploration well is situated on the distal sector of the Apulian Platform. The local seafloor morphology is structurally controlled by a regional “horst and graben” tectonic regime driven by deep normal faulting. This tectonic displacement produces a step-like bathymetric profile characterised by undulating, mound-like features. Furthermore, this specific structural positioning geographically isolates the well site from the steep continental margins, submarine canyons, and erosional gullies that dissect the seafloor further east off the coast of Western Greece.

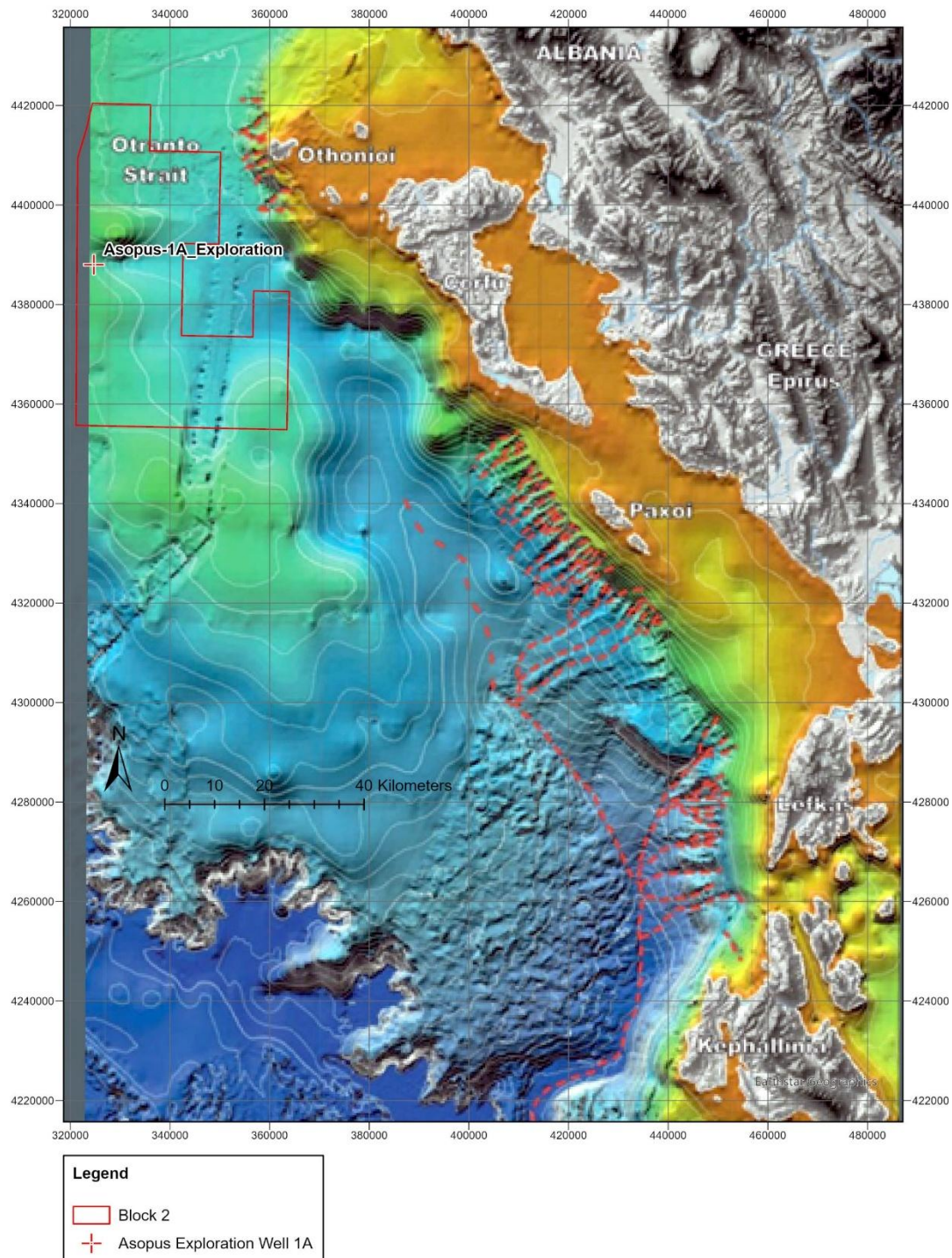


Figure 2-7: Submarine canyons in the NE Ionian margin (Source: Otero & Mytilineou, 2022)

2.1.3 Geology

The Eastern Mediterranean Sea is geologically dominated by the convergence of the African plate with the Eurasian plate. The Asopus-1A exploration well is located in the southern part of the Adria Microplate, which is a continental lithospheric block separated from the primary African Plate. A comprehensive view of these

regional structural domains, including the Calabrian Prism, the Mediterranean Ridge, and the underlying thin crust of the Ionian Basin, is provided in the simplified structural map in Figure 2-8.

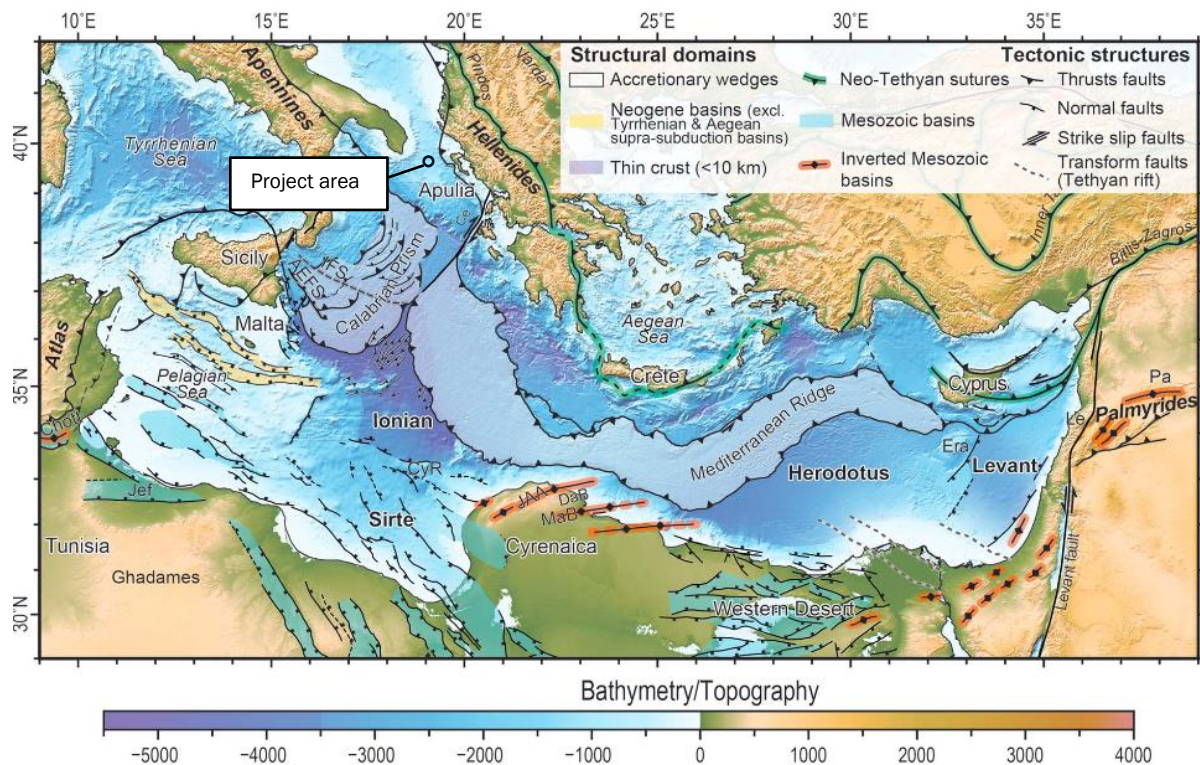


Figure 2-8: Simplified structural map of the Eastern Mediterranean Basins, displaying major structural domains (such as accretionary wedges and thin crust) and the primary tectonic structures, including thrust, normal, and strike-slip faults (Source: Tugend et al., 2019)

The Asopus-1A well is located on the Apulian Platform, a wide carbonate block that experienced progressive individualization of deeper basins, such as the South Adriatic Basin. The Adria microplate here consists of a thick Mesozoic carbonate platform, reaching up to 5 km in thickness, underlain by a discontinuous layer of Permo-Triassic siliciclastic continental sediments and Burano evaporites. In the southwestern part of the Apulian carbonate platform, the paleo-margin separating the platform from the deep Ionian Basin oceanic crust is still preserved (Tugend et al., 2019).

The complex tectonostratigraphic evolution of the Apulian margin, from its Permian-Triassic rifting phase to its transition from shallow marine carbonates to siliciclastic sedimentation in the Oligocene-Early Miocene, is summarized in the vertical profile in Figure 2-9 (Tugend et al., 2019).

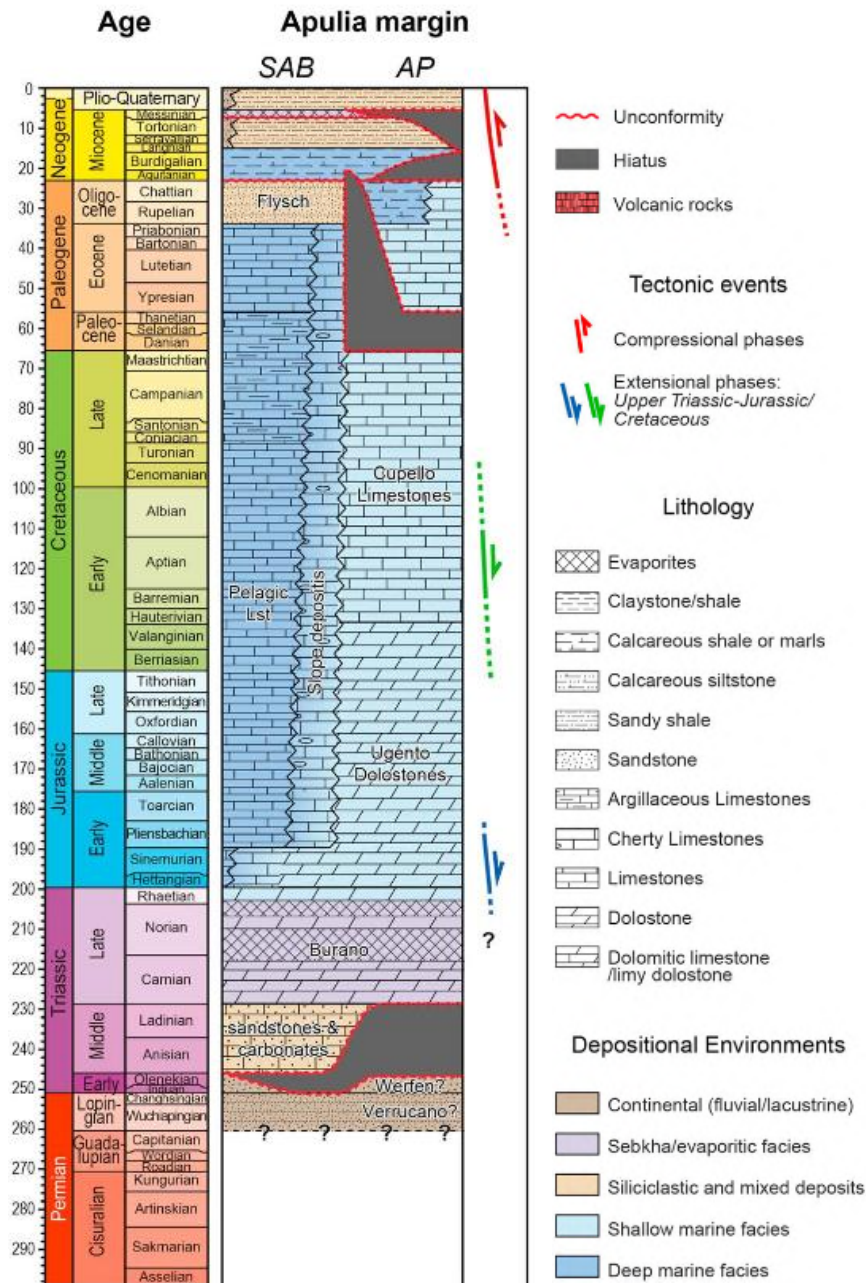


Figure 2-9: Tectonostratigraphic chart of the Apulia margin. SAB: South Adriatic Basin; AP: Apulian Platform; (Source: Tugend et al., 2019)

Figure 2-10 presents a schematic map of the main sedimentary domains surrounding the Asopus-1A location. The local geology at the well site is governed by the regional tectonic regime. The Apulia platform is uplifted due to the displacement of deep normal faults, creating a characteristic “horst and graben” structure. This structural setup, which is widely developed across the onshore and offshore parts of the Apulia platform, is illustrated in the schematic section in Figure 2-11. Consequently, the seabed at the exact Asopus-1A drilling site is expected to feature the Apulian carbonate platform either exposed at the seabed or covered by a very thin layer of post-Miocene sediments, with potential localized structural influences from the Messinian evaporites (Messinian Unit).

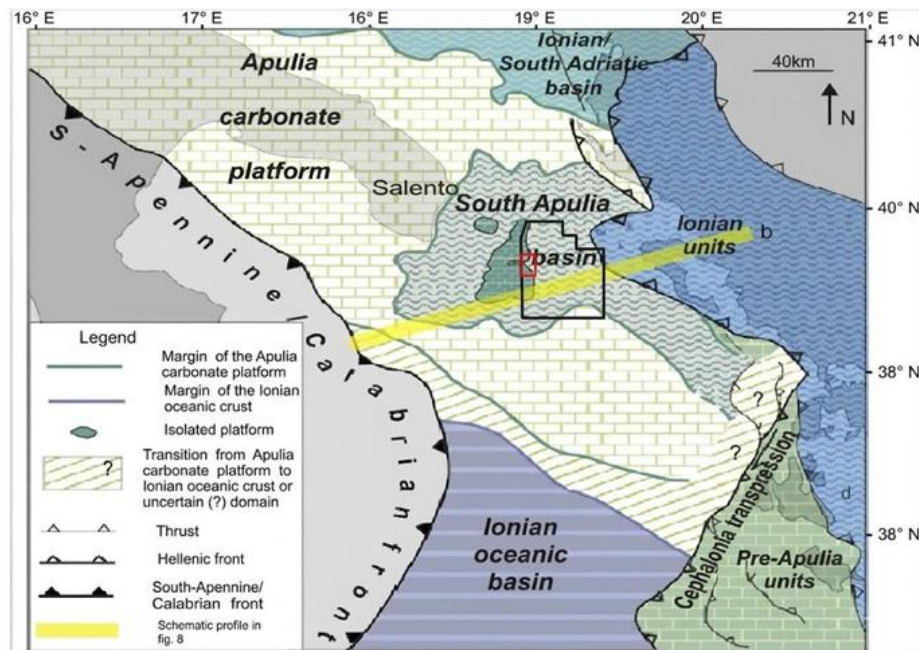


Figure 2-10: Schematic map of the main sedimentary domains surrounding the study area (Source: Del Ben A. et al., 2015) (yellow line indicates the location of the schematic profile of Figure 2-10)

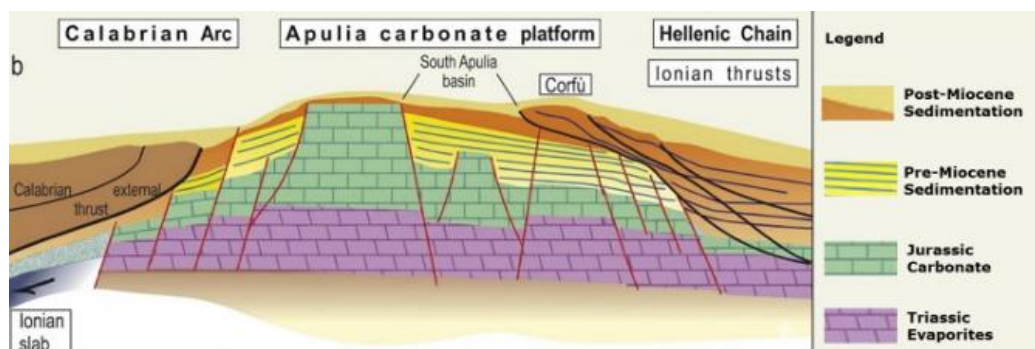


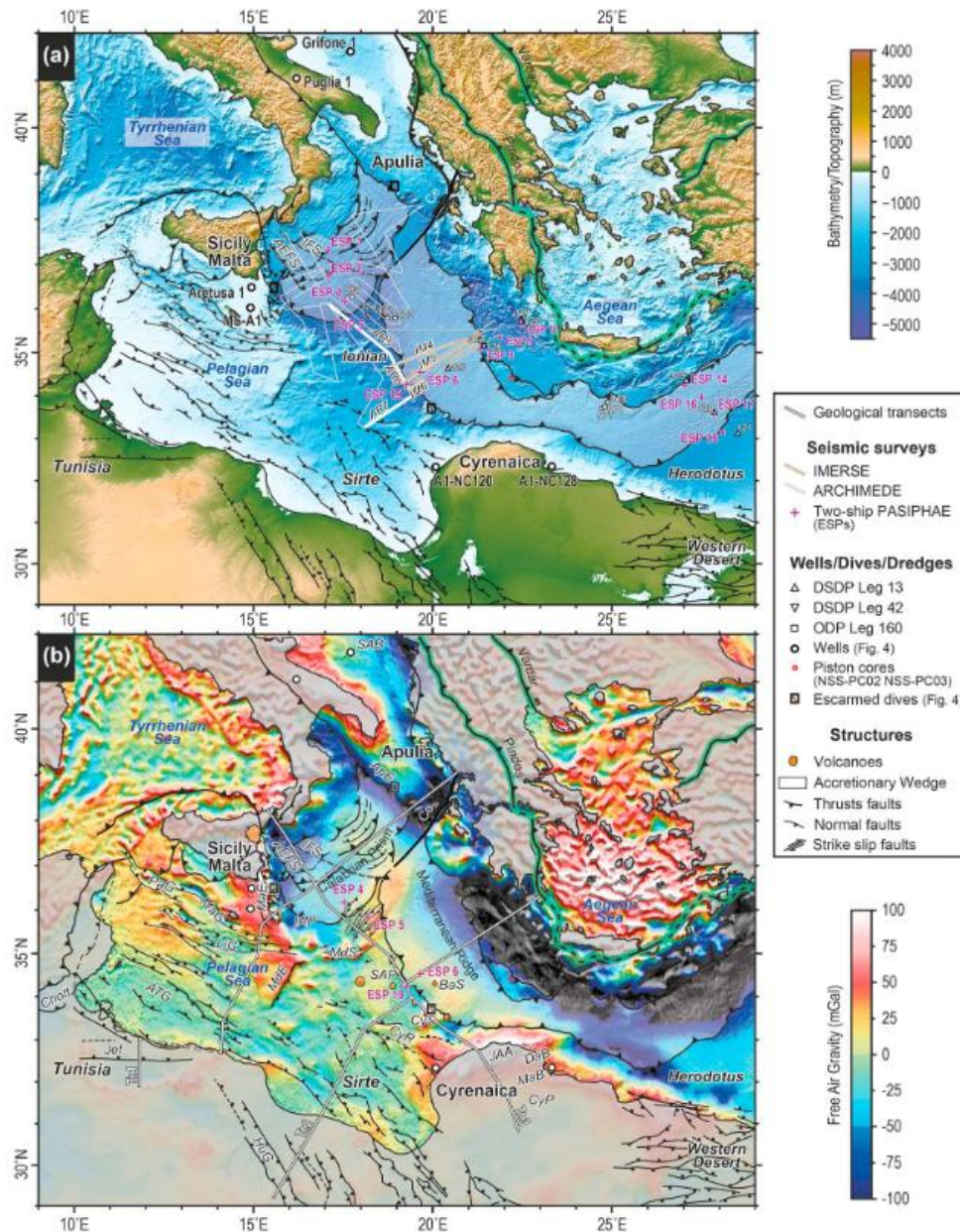
Figure 2-11: Schematic section of the south Adria plate, the Ionian units directly overthrust the lesser buoyant South Apulia basin which produced the recent more advanced position of the Hellenic front in the Corfu offshore (Source: Del Ben A. et al., 2015)

2.1.4 Sediments

Information regarding the sedimentary history of the Ionian Basin is primarily derived from the Deep-Sea Drilling Project (DSDP) and the Ocean Drilling Program (ODP), which have mainly documented the Neogene sedimentary sequences (Tugend et al., 2019). Sedimentation in these areas is primarily controlled by regional tectonics, forming turbiditic and gravity-driven deposits. Indirect observations of deeper sedimentary sequences come from mud volcanoes over the Mediterranean Ridge, which act as natural channels transporting deep material to the seafloor (Tugend et al., 2019).

Focusing on the Apulian Segment, where Block 2 and the Asopus-1A exploration well are located in the northern Ionian Sea (as depicted in Figure 2-2 and Figure 2-12), historical wells and dredges document a long stratigraphic evolution (Tugend et al., 2019). The oldest sediments recovered from this segment

correspond to siliciclastic continental deposits attributed to the Permian and Lower Triassic, which are locally overlain by Middle Triassic sandstones and carbonates (Tugend et al., 2019). The overlying Upper Triassic is characterized by evaporites and dolostones of the Burano Formation, locally reaching up to 1.8 km in thickness (Tugend et al., 2019). Shallow marine carbonate conditions prevailed over the Apulian platform until the Paleogene (Tugend et al., 2019). This was followed by a major transition from carbonates to siliciclastic sedimentation during the Oligocene-Early Miocene, marking the involvement of the Apulian platform in the common foredeep of the Apennines and Dinarides orogenic system (Tugend et al., 2019).



Reprocessed sections from the ARCHIMEDE and IMERSE reflection seismic surveys shown in their study are indicated by thicker lines: AR5, AR6, AR7, IM5, IM4 and IM6. (b) Free-air gravity map overlain by the horizontal gradient showing the main morphostructural features of the area. AEFA: Alfeo-Etna Fault system; ApE: Apulia Escarpment; ATG: Ashtart-Tripolitania Graben; BaS: Bannock Seamount; Ce: Cephalonia Fault; CyR: Cyrenaica Ridge; CyP: Cyrenaica Platform; CyS: Cyrene Seamount; DaB: Darnah Basin; HuG: Hun Graben; IAP: Ionian Abyssal Plain; IFS: Ionian Fault System; JAA: Jabal Al Akhdar; Jef: Jeffara Basin; LiG: Linosa Graben; MaB: Mamarica Basin; MaE: Malta Escarpment; MaG: Malta Graben; MdE: Medina Escarpment; MdS: Medina Seamount; PaG: Pantellaria Graben; SAB: South Adriatic Basin; SAP: Sirte Abyssal Plain (Source: Tugend et al., 2019)

Figure 2-12: Regional bathymetric and tectonic setting influencing sedimentation in the broader area (adapted from Tugend et al., 2019).

On a wider basin scale, superficial seafloor sediment mapping across the Mediterranean Sea indicates that the wider project area falls predominantly within the mud and muddy sand categories (Spatola et al., 2025).

As illustrated in the seafloor sediment distribution map (Figure 2-13), these fine-grained cohesive substrates are characteristic of the region. Notably, these specific muddy and sandy sediment types play a key role in controlling the spatial distribution of certain seabed features, as they are highly susceptible to fluid-escape pockmarks (Spatola et al., 2025). Further details regarding the potential occurrence of these pockmarks and active gas seeping within the study area are provided later in Section 2.1.5.3.

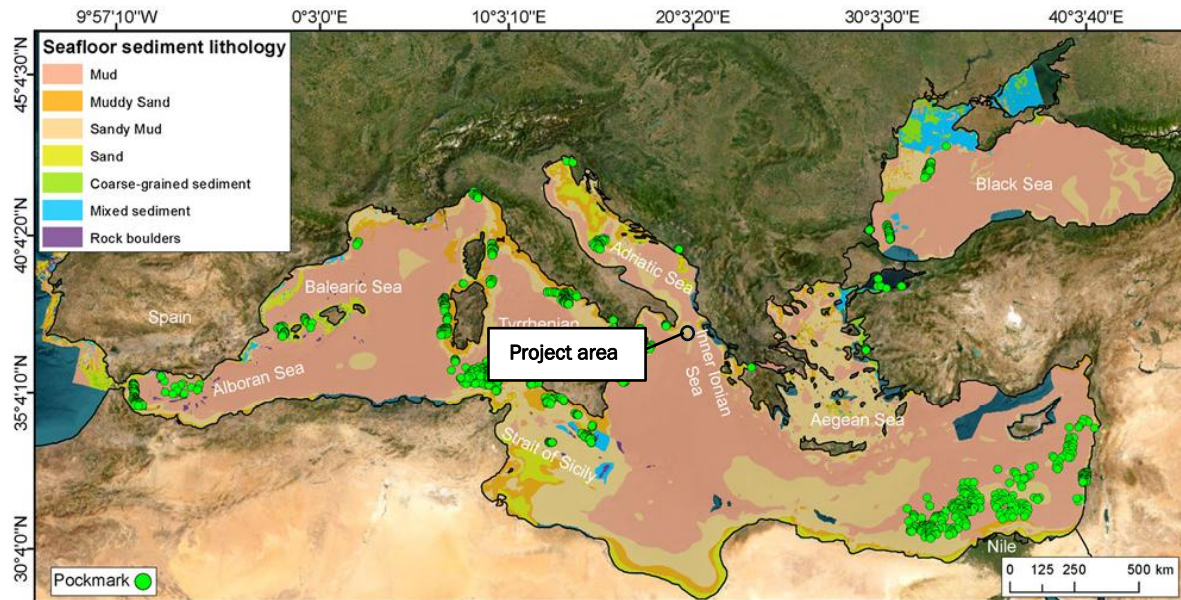


Figure 2-13: Seafloor sediment lithology distribution map of the Mediterranean Sea region with pockmarks (green dots) used in this paper (Source: Spatola et al., 2025). Note: The map is not exhaustive and may depict areas containing pockmarks as zones without them, as it only includes data from studies reporting precise pockmark locations

2.1.5 Seismicity, tectonics and geological hazards

2.1.5.1 Tectonics

The geological processes driving geohazards in the Mediterranean Sea are closely tied to the basin's overarching tectonic framework. On a regional scale, the Eastern Mediterranean Sea is currently more tectonically active compared to the Western basin (which is separated by the Sicily Channel). This is largely due to the presence of two major subduction zones: the Hellenic subduction zone (south of Greece) and the Calabrian subduction zone (south of Italy) (Miramontes et al., 2023). These subduction zones strongly control the regional seafloor morphology and govern the distribution of active geological processes across the basin (see Figure 2-14).

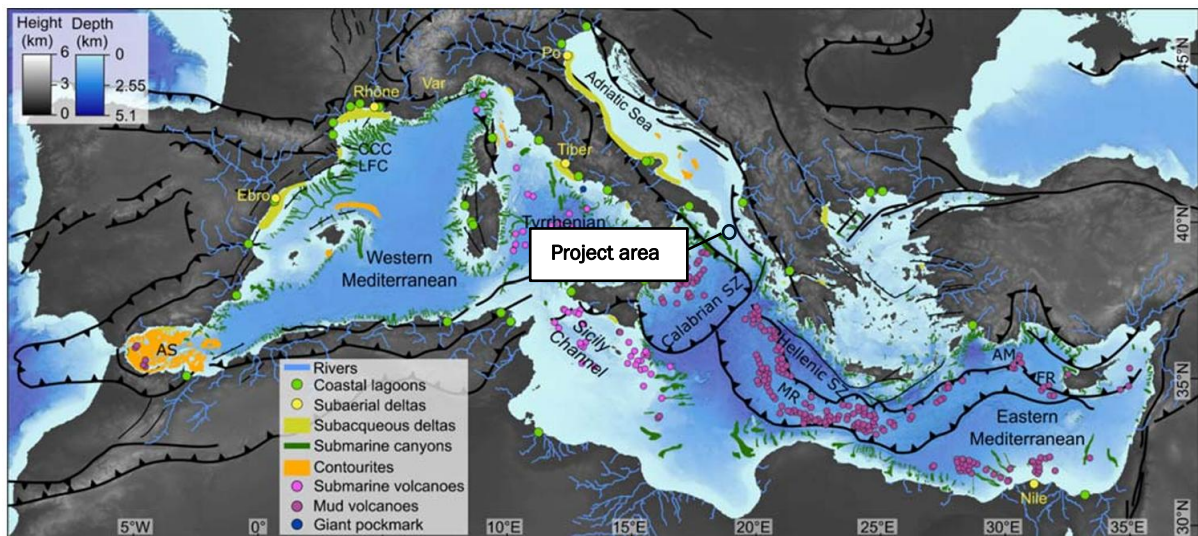


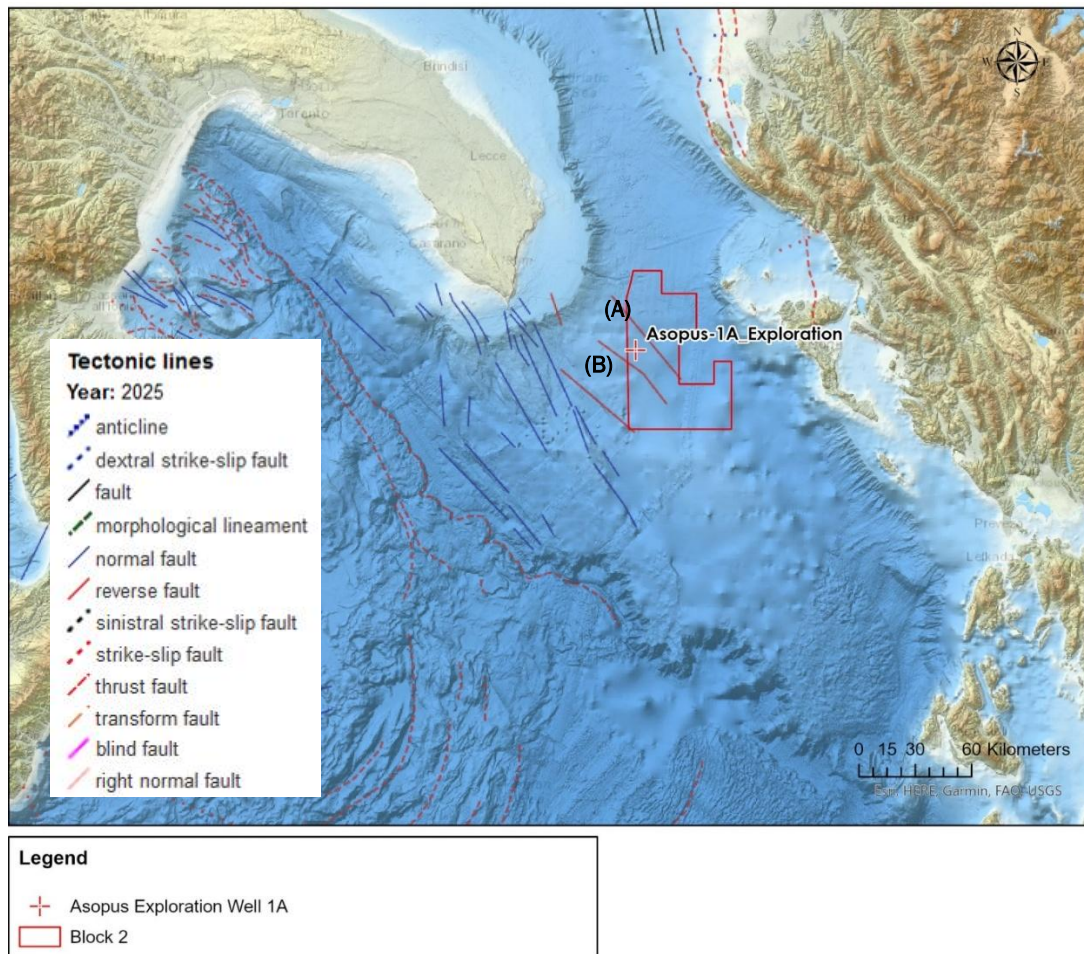
Figure 2-14: Active geological processes along Mediterranean continental margins and deep basins. BC: Blanes Canyon; CC: Cap de Creus Canyon; FR: Florence Rise; LFC: La Fonera Canyon; MR: Mediterranean Ridge; SZ: subduction zone (Source: Miramontes et al., 2023).

As already described in this study, the Asopus-1A exploration well is located within the southern part of the Adria Microplate, belonging to the Apulian platform geological unit. The broader tectonic evolution of this region involves a highly complex history spanning from the Permian to the Quaternary. This period is marked by historical rifting that created several extensional basins, periods of anoxic sedimentation, and the subsequent development of regional normal faults during the Tethyan rifting. Furthermore, in the Early Pliocene, the southern Apennine/Calabrian nappes overthrust the southwestern margin of the Apulia carbonate platform, with extension and transpression continuing to affect the region up to the Plio-Quaternary.

As per Tugend et al., 2019, recent deep seismic and stratigraphic analyses indicate that the deep Ionian Basin is floored by a thin oceanic crust, generally less than 8 to 10 km thick. The formation of the Ionian Basin is dated to the late Early Jurassic to Middle Jurassic, following an initial episode of Late Triassic to Early Jurassic rifting. In the broader paleogeographic context, the Ionian Basin represents the remnant of a short-lived oceanic basin that opened as a transient secondary branch of the Neo-Tethys Ocean. This seafloor spreading phase was driven by the left-lateral motion of the African plate relative to Eurasia and occurred contemporaneously with the propagation and opening of the Central Atlantic Ocean.

Deep seismic reflection studies across the broader Ionian basin and the adjacent Ionian Abyssal Plain (IAP) reveal a highly complex tectonic history characterized by a Miocene tectonic inversion. Beneath the IAP, the crust is interpreted to be of oceanic origin with a thickness of approximately 7.2 km. During the late Triassic to early Jurassic rifting and the subsequent NW-SE seafloor spreading of the Ionian basin, a series of SW-NE striking oceanic normal faults were formed. Subsequently, during the Tortonian to early Messinian periods, a major plate tectonic reorganization induced a regional compressive regime. This led to the tectonic inversion of the basin, wherein the inherited oceanic normal faults were reactivated as thick-skinned, NW-vergent reverse faults dipping at 60–65°. This compressive reactivation accommodated a bulk shortening of 3.5–5% across the basin and created well-developed syntectonic sedimentary basins (Gallais et al., 2011).

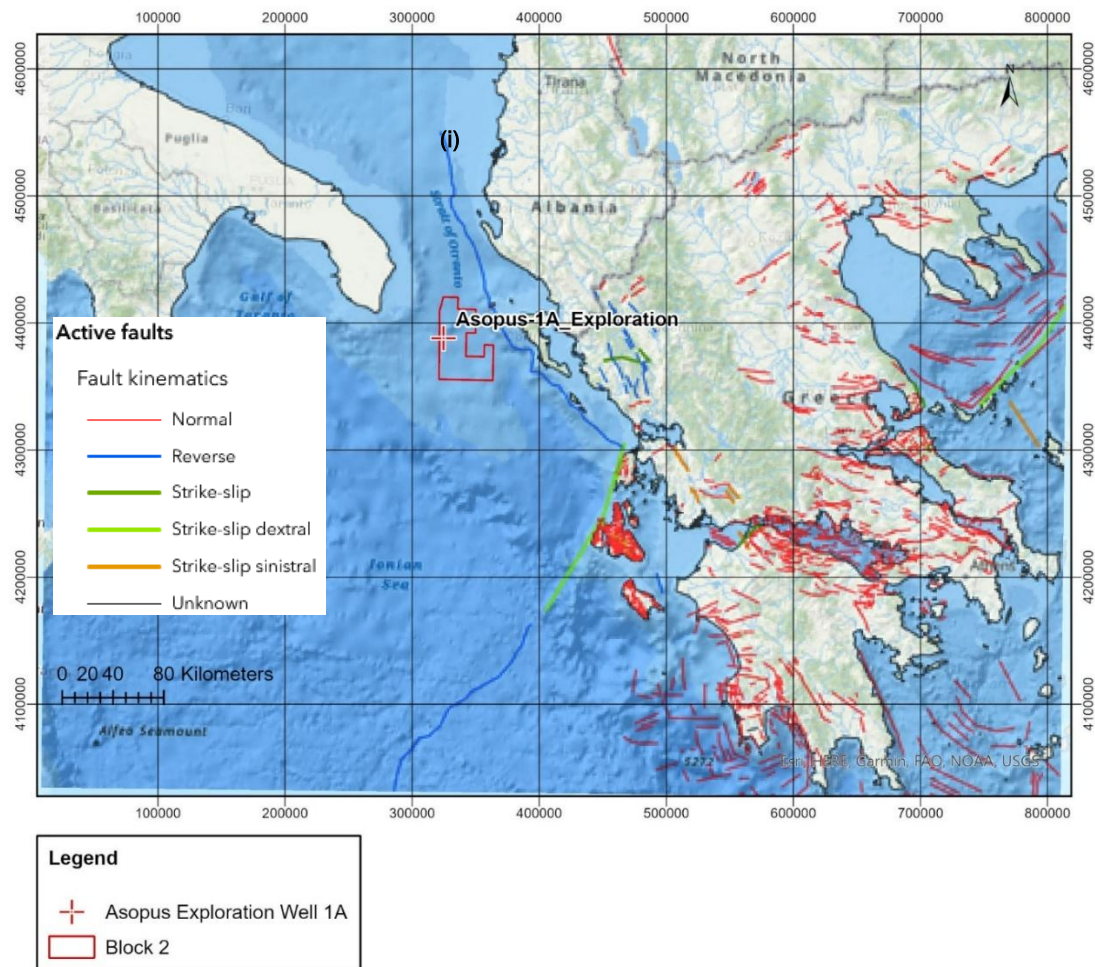
The broader geodynamic framework of the region is illustrated in Figure 2-15, which utilizes spatial data from the European Atlas of the Seas to display the major tectonic lines governing the wider Northern Ionian Sea.



(A) Type: reverse fault, Age: Pleistocene, Reference: Delben A., Geletti R., Mocnik A., 2010. Relation between recent tectonics and inherited Mesozoic structures of the central-southern Adria plate. *Boll. Geof. Teor. Appl.*, v. 51, n. 2-3, pp. 99-115. Comment: Compressive (inverted from normal fault), NW-SE oriented. Active during Middle/Upper Pleistocene.
(B) Type: reverse fault, Age: Pleistocene, Reference: Delben A., Geletti R., Mocnik A., 2010. Relation between recent tectonics and inherited Mesozoic structures of the central-southern Adria plate. *Boll. Geof. Teor. Appl.*, v. 51, n. 2-3, pp. 99-115. Comment: Compressive (inverted from normal fault), NW-SE oriented. Active during Middle/Upper Pleistocene.

Figure 2-15: Map of the major tectonic lines in the wider Northern Ionian Sea area, illustrating the regional tectonic framework and plate boundaries (Source: European Atlas of the Seas)

Figure 2-16 provides a depiction of the active seismogenic fault network. Sourced from the Seismotectonic Atlas of Greece, this figure maps the known active faults.



(i) Kreemer, C., and Chamot-Rooke, N. (2004)

Figure 2-16: Detailed map of known active faults in the broader Northern Ionian Sea and Western Greece region, adjacent to the Block 2 concession area (Source: Seismotectonic Atlas of Greece v1.1 Department of Geology & Geoenvironment, Section of Geophysics-Geothermics, NKUA, Greece)

Starting from the Permian-Middle Triassic (250-300 Ma), the Adria microplate was involved in the Ionian rifting that gave rise to several extensional basins. During the Middle-Upper Triassic (250-210 Ma), the area was characterized by anoxic sedimentation and evaporite deposition (Burano Formation), which ended due to a global cooling event and sea-level fall at the end of the Norian. Subsequent Tethyan rifting during the Upper Triassic-Lower Jurassic (180-210 Ma) caused the fragmentation of the existing platform, resulting in a separation between shallow water and basinal domains and the development of regional normal faults. From the Early Cretaceous (145 Ma), the Dinaric/Hellenic thrust belt moved gradually onto the Adria foreland, causing a transition to siliciclastic sedimentation. In the Early Pliocene (5 Ma), the southern Apennine/Calabrian nappes overthrust the southwestern margin of the Apulia carbonate platform, and extension-with-compression/transpression continued to affect the region up to the Plio-Quaternary. To understand these deep geodynamic processes, the wider area was crossed from NW to SE by the regional seismic section “CROP M-8” (shown in Figure 2-17).

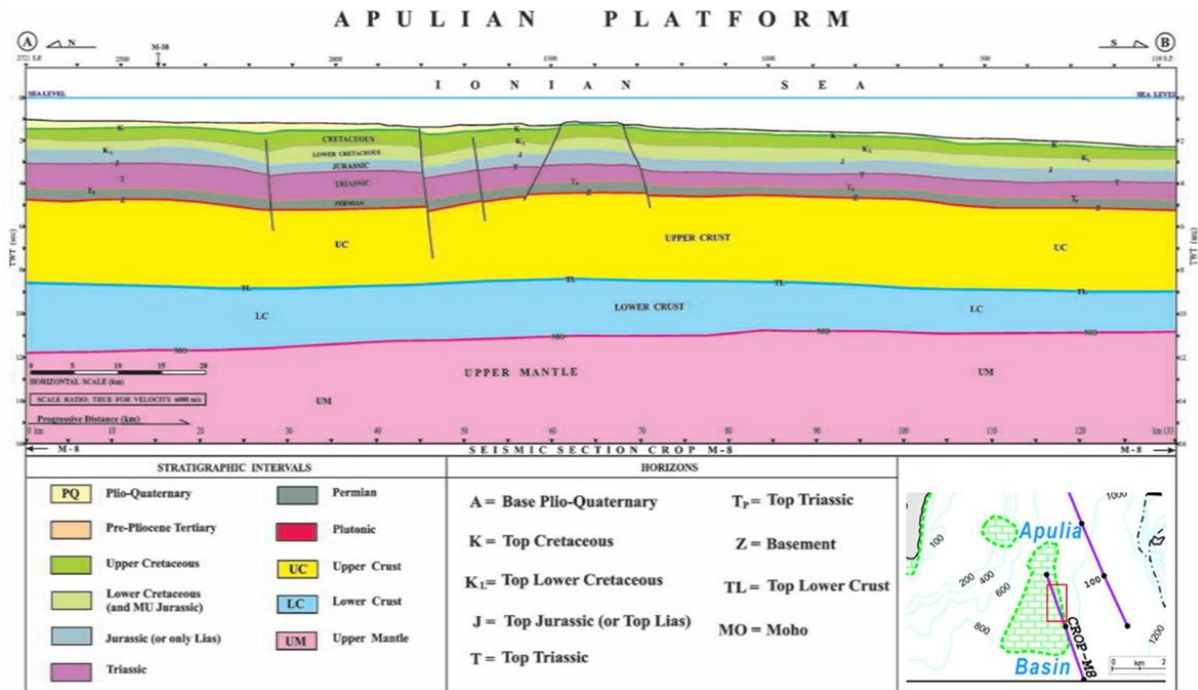


Figure 2-17: Interpreted CROP section M8, crossing the study area with NW-SE direction (Source: Finetti I.R. et al., 2018) (Interpreted CROP-M8 on the southeastern extension of the Apulian platform, characterized by a flat setting, and interrupted by a few minor faults, probably connected to small shear movement. On the lower right corner, the survey area location (red polygon) is shown in map 65 (Mod. from Finetti I.R. et al., 2018))

At the Asopus-1A exploration well location, the local tectonic regime is dominated by normal faults that displace the uplifted Apulian platform. As evidenced by the 3D seismic volume across the area (Figure 2-18), these normal faults create a “horst and graben” structural framework, providing accommodation space for the overlying sedimentary basins. Seismic profiles crossing the site identify a distinct horizon in the deep subsurface, interpreted as the Messinian Erosional Surface and/or the Messinian Gessoso-Solfifera Formation (MES/GS) (Figure 2-19). The well is situated in a structurally flat, fault-displaced carbonate platform environment, separated from the active compressive subduction zones (Hellenic and Calabrian arcs) that bound the wider Ionian basin.

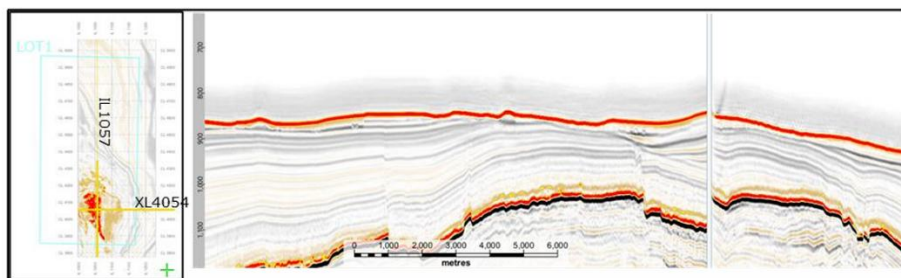


Figure 2-18: 3D seismic volume provided by Energean (IL: 1057; XL: 4054) showing structural framework (two seismic profiles within the study area (IL: 1057; XL:4054). On the left, the location of the profiles with the borders of the LOT01 in light blue)

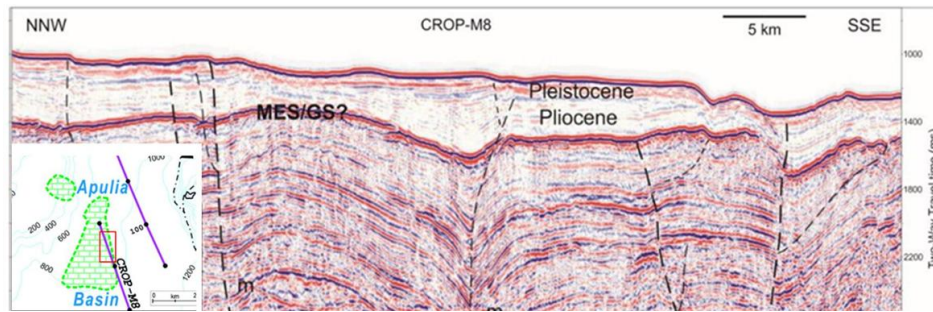
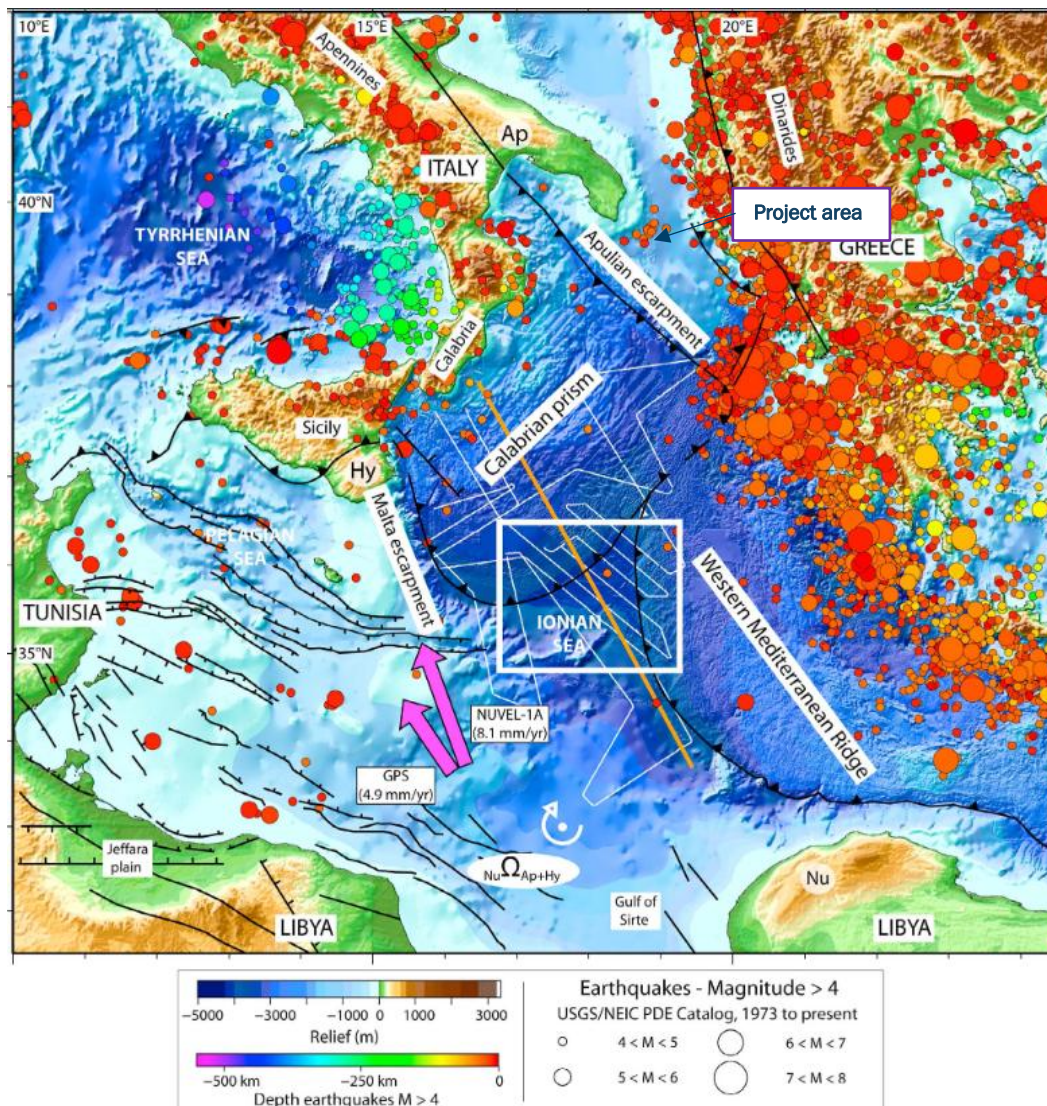


Figure 2-19: Portion of the Crop-M8 seismic profile (Portion of the CROP-M8 seismic profile cropped at 1800ms (The location of the seismic profile is displayed in the lower left corner). At a depth of 1500ms an high reflectivity reflector is detected along the entire profile. It is interpreted as possible MES/GS level (Source: Brancatelli G. et al., 2022))

2.1.5.2 Seismicity

The seismotectonic setting of the Ionian basin is controlled by the slow convergence of the African (Nubia) and Eurasian tectonic plates (Figure 2-20). Regional measurements show the area consists of several independently moving microplates (Gallais et al., 2011). The Apulian platform and the Ionian Sea form the “Ionian-Apulian microplate,” which rotates counterclockwise relative to Nubia. This movement causes diffuse internal deformation across the Ionian basin, resulting in weak to moderate background seismicity (Gallais et al., 2011).



Black lines show major fault systems (modified from the Geodynamic Map of the Mediterranean (Commission for the Geological Map of the World, <http://ccgm.free.fr>) and offshore regions beneath the Pelagian Sea from Raulin et al. [2011]). Earthquake hypocenters are from the National Earthquake Information Center (NEIC) catalog (<http://neic.usgs.gov>). Magenta arrows show the convergence between Africa and Eurasia according to the NUVEL-1A model [DeMets et al., 1994] and the GPS pole of rotation proposed by D'Agostino et al. [2008]. White point surrounded by curved white arrow shows the Eulerian pole of rotation NuWAp+Hy, which indicates the poles of rotation relative to Nubia (Nu), obtained considering Apulia (Ap) and the Hyblean Plateau (Hy) as a single microplate [D'Agostino et al., 2008]. Thin white lines show the position of the Archimede seismic cruise (1997, R/V Le Nadir), and thin orange line shows the position of the line PrisMed01 acquired during the PrisMed cruise (1993, R/V Le Nadir) (Source: Gallais et al., 2011).

Figure 2-20: Seismotectonic map of the Central Mediterranean area (topography and bathymetry are from GEBCO 1 min data set and Medimap Group Bathymetry compilation (Loubrieu et al., 2007)).

Seismic activity in Western Greece and the Ionian Sea includes frequent small to medium earthquakes, coupled with an elevated occurrence of strong seismic events. This regional seismicity is driven by active faults distributed along tectonic margins, notably the Calabrian Arc subduction complex to the west and the Hellenic Trench to the east and southeast. Historical data (1901–2020) mapped against active faults (Figure 2-21) demonstrate a direct correlation between earthquake epicenters and the active fault network. The highest concentration of historical seismicity tracks the major plate boundaries of the Hellenic Trench and the Calabrian Arc.

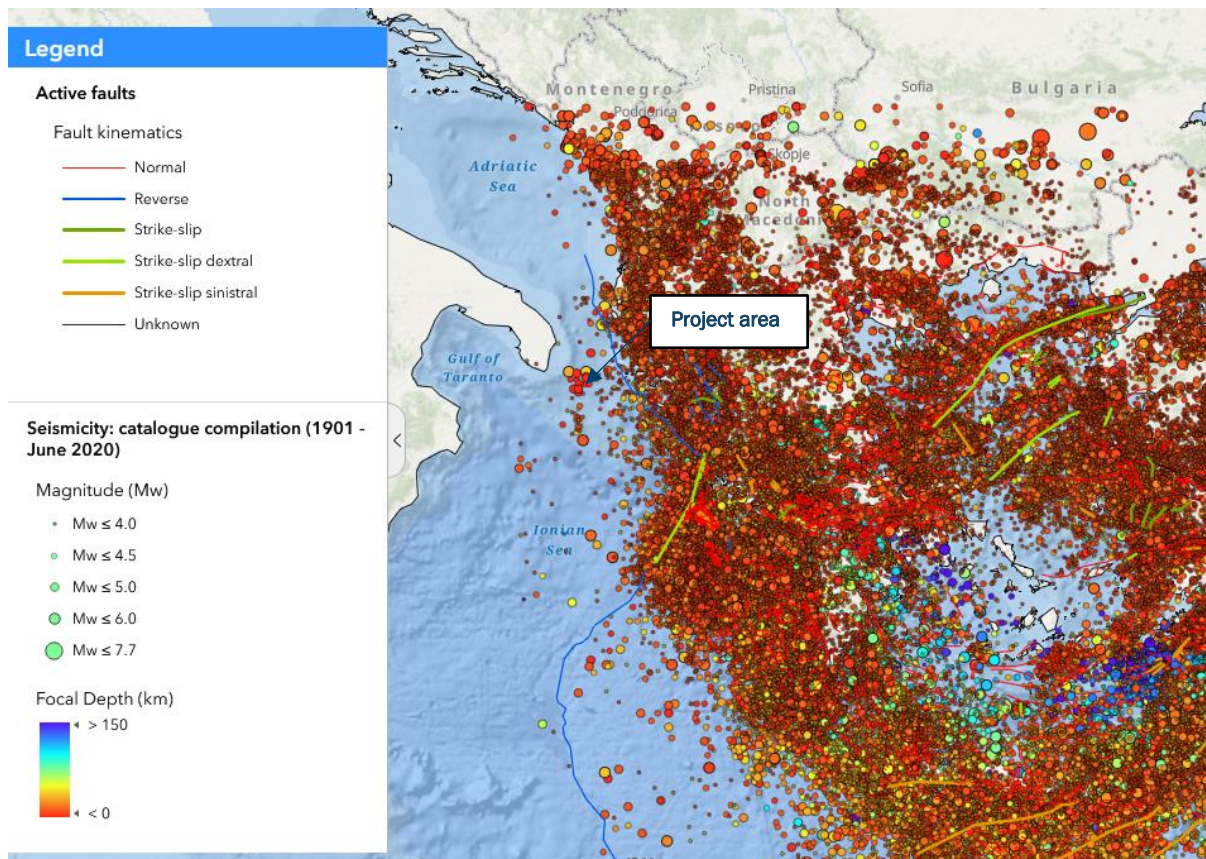


Figure 2-21: Map of major active seismogenic faults and historical seismicity (catalogue compilation 1901–2020) in the wider Northern Ionian Sea and Western Greece region. The map illustrates that the highest density of epicenters occurs along the peripheral tectonic margins (e.g., the Calabrian Arc and Hellenic Trench), relative to the structurally uplifted Apulian platform where Block 2 is located (Source: Seismotectonic Atlas of Greece v1.1, NKUA)

The Asopus-1A well is located on the structurally uplifted Apulian platform. Based on the spatial distribution of historical seismicity and active faults (Figure 2-21), the site is characterized by weak to moderate background seismicity. The map confirms that the well location is situated away from the high density of earthquake epicenters and active seismogenic faults concentrated along the peripheral tectonic margins of the Calabrian Arc and Hellenic Trench.

2.1.5.3 Active gas seeping and pockmark field

The seafloor of the Mediterranean Sea, particularly in areas with thick sedimentary basins and accretionary wedges, hosts numerous active cold seeps (Miramontes et al., 2023). Submarine cold seeps are the surface manifestations of the upward migration of over pressured fluids from underlying sedimentary strata (Judd & Hovland, 2007; Miramontes et al., 2023). These fluids are typically emitted at low temperatures and consist predominantly of gaseous methane, which can be of either microbial or thermogenic origin (Miramontes et al., 2023).

As these over pressured fluids and gases ascend to the seafloor, they can cause the collapse of subsurface sediments, resulting in the formation of distinct morphological depressions known as “pockmarks” (Judd & Hovland, 2007; Miramontes et al., 2023). These pockmark fields and gas venting sites act as critical

ecological hotspots; the expelled methane and hydrogen sulfides serve as energy sources that sustain specialized, chemosynthetic deep-sea ecosystems, including bacterial mats and symbiont-bearing invertebrates (Miramontes et al., 2023). Furthermore, the anaerobic oxidation of methane at these seeping sites often triggers the precipitation of methane-derived authigenic carbonate structures (such as nodules, crusts, and chimneys), which provide hard substrates for these unique biological communities (Miramontes et al., 2023).

Gas in the sediment pores has been observed across the Hellenic shelf. Pockmarks are crater-like seabed structures formed by the rapid expulsion of gases through the seabed, causing the displacement of fine-grained sediments. Several seismic surveys in the Ionian Sea have identified acoustic anomalies which are related to the presence of biogenic or thermogenic gas in sediment interstices. In the broader project area, specifically in the eastern Corfu shelf/slope, gas-charged sediments, pockmarks, and hydrothermal vents have been discovered.

In general, fluids within marine sediments tend to migrate upward toward the seafloor due to buoyant forces, resulting in fluid emissions that are typically categorized into two main types: cold seeps (characterized by low-temperature discharges, mostly methane) and hydrothermal vents. These fluid flow processes are responsible for creating a variety of seafloor morphologies, including pockmarks, mud volcanoes, and brine pools, and can trigger distinct acoustic anomalies both in the water column (e.g., gas flares) and the sub-seabed. A comprehensive visual summary of these fluid flow processes and their resulting morphological features is illustrated in Figure 2-22.

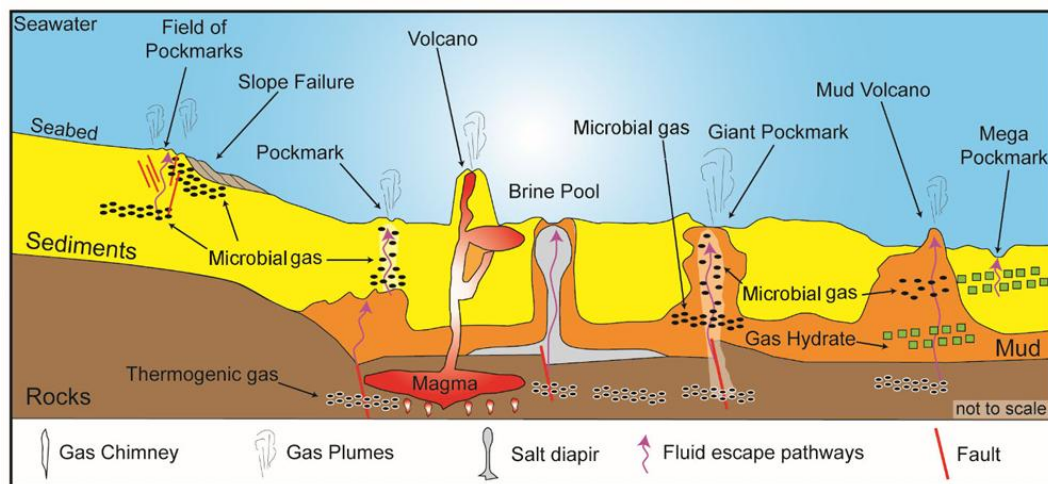


Figure 2-22: Simplified typical fluid flow processes, and relative seafloor morphologies (e.g., pockmarks, mud volcanoes, brine pools), acoustic anomalies (both in the water column and in the sub-seabed) and potential sources (Modified from Spatola et al., 2025; after Ma et al., 2021)

Seismic surveys in the Aegean and Ionian Seas (e.g., the 1981 and 1983 R.R.S. Shackleton and R.R.S. Discovery cruises) have identified acoustic anomalies, including acoustic turbid zones, gas pockets, gas plumes, enhanced reflectors, columnar disturbances, wipeouts, and morphological features such as pockmarks, domes, mud volcanoes, and elongated depressions. These features are associated with the presence of biogenic or thermogenic gas in sediment interstices. Gas-charged sediments typically occur in Pleistocene, deltaic, and pre-Quaternary open-sea environments. Furthermore, a 2002 chirp sonar survey across the Calabrian margin, Calabrian accretionary wedge, Taranto Trench, and Apulian foreland revealed

widespread mound structures. These were interpreted as coral mounds up to 50 m high on the Apulian plateau, alongside isolated mounds at depths of 800 to 1,600 m and grouped mounds at depths of 600 to 800 m. The survey additionally recorded isolated and grouped mud diapirs distributed across the region.

Regionally across the Mediterranean Sea, the spatial distribution and genesis of pockmarks depend on physical environmental parameters such as slope gradients and seafloor lithology (Spatola et al., 2025). Statistical analyses indicate that 72% of documented pockmarks occur in low-gradient environments on slopes gentler than 4° (Figure 2-23). Actively venting pockmarks can occur on steeper terrain, indicating a link between fluid migration and structural pathways such as normal faults. The relationship between pockmark occurrence and specific seafloor sediment lithologies is detailed in section 2.1.4. Regional maps illustrating pockmark distribution are incomplete, as they rely exclusively on studies reporting precise geographic coordinates. Consequently, the absence of mapped pockmarks in a specific zone indicates a lack of published high-resolution data rather than their confirmed absence (Spatola et al., 2025).

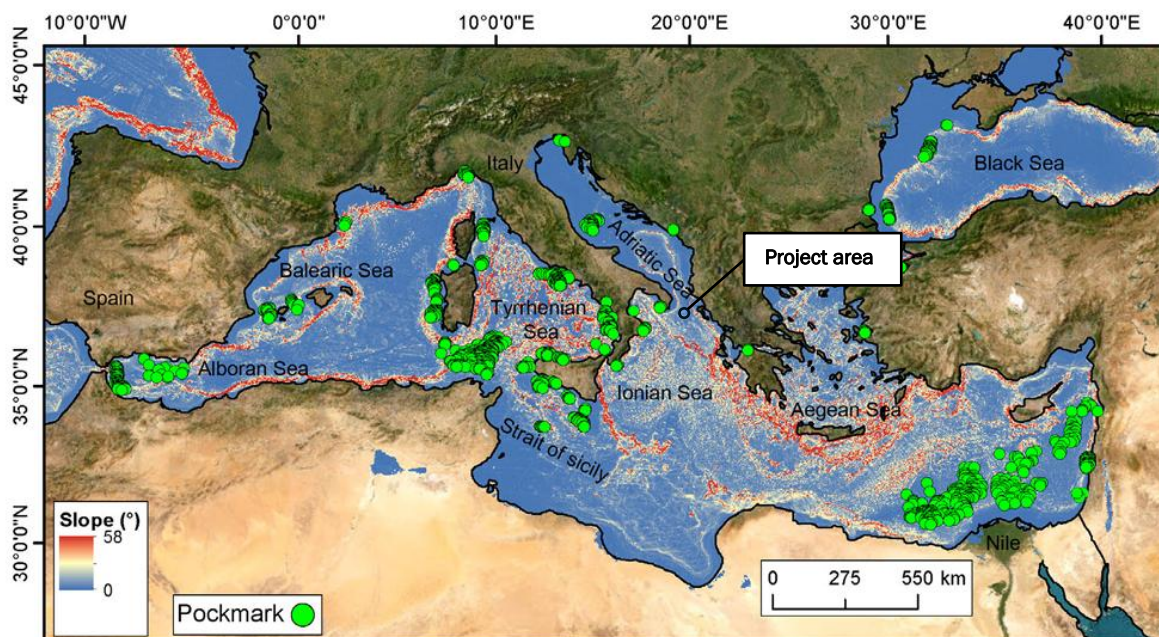


Figure 2-23: Slope map of the Mediterranean Sea region highlighting the distribution of pockmarks (green dots)
(Source: Spatola et al., 2025) Note: The map is not exhaustive and may depict areas containing pockmarks as zones without them, as it only includes data from studies reporting precise pockmark locations.

A susceptibility map of the Italian continental margins and adjacent marine regions (Figure 2-24) models the probability of pockmark formation (Spatola et al., 2025). This assessment utilizes an artificial neural network methodology based on 5,932 documented pockmarks and six geological and morphometric predictors: distance to faults, slope, aspect, bathymetry, sediment type, and sediment thickness. The predictive model indicates that areas of moderate to very high susceptibility are concentrated on continental slopes affected by fault systems, supporting the role of faults and fractures as pathways for deep fluid migration to the seafloor. This mapping identifies the spatial probability of pockmark formation rather than the exact locations of existing features. Consequently, highly susceptible areas represent zones that may host future fluid expulsion events or unmapped pockmarks (Spatola et al., 2025).

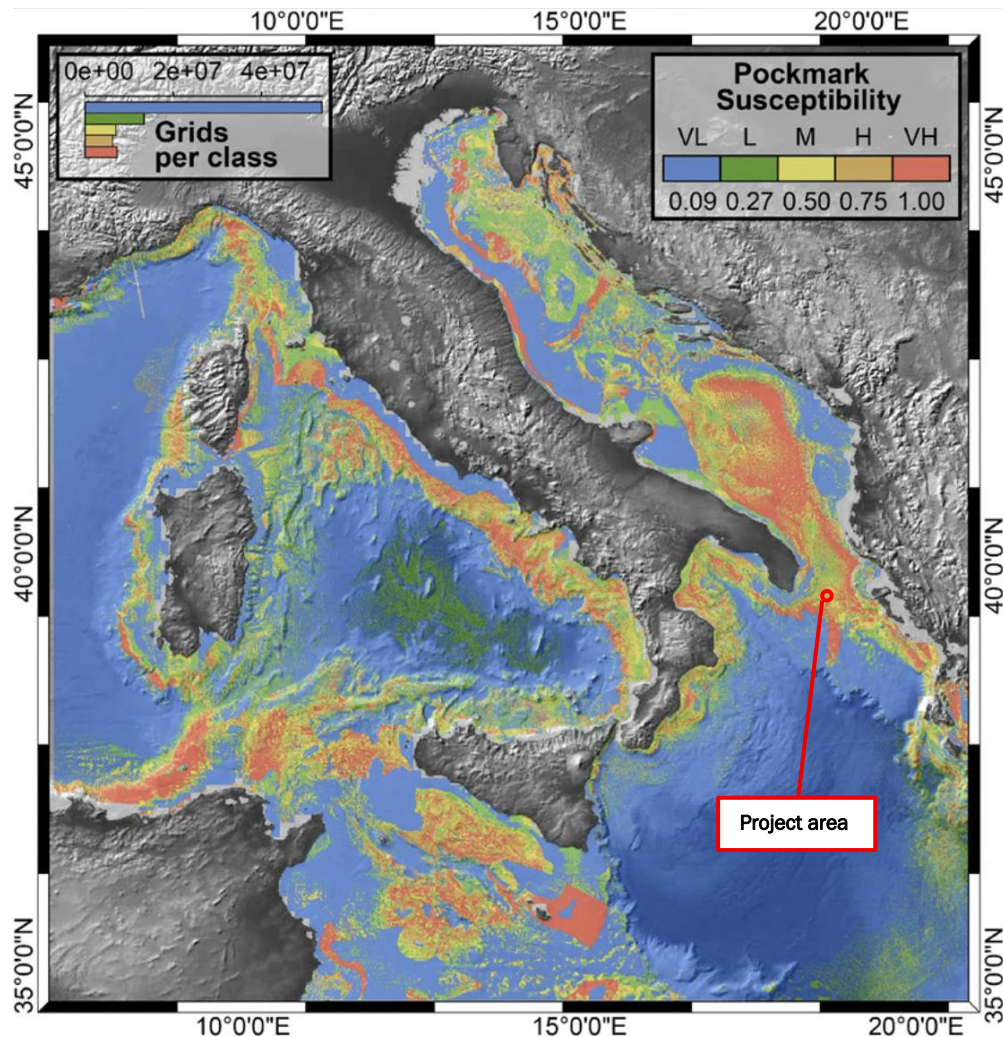


Figure 2-24: Pockmark susceptibility map of the Italian continental margins and adjacent areas. The map is presented in a reclassified form based on the Jenks method, with original pockmark occurrence probability values reported below the colorbar (VL: Very Low, L: Low, M: Moderate, H: High, VH: Very High). This map indicates the potential or probability for pockmark formation rather than existing pockmarks, following international guidelines on susceptibility modelling. Highly susceptible areas represent zones that may host future pockmarks or existing unmapped ones. Note: The area of very high susceptibility around the Maltese islands (Strait of Sicily) is attributed to the extensive presence of over 2,000 previously mapped pockmarks (Source: Spatola et al., 2025).

The distribution map (Figure 2-23) illustrates an absence of previously documented pockmarks in the project area. However, the susceptibility map (Figure 2-24) suggests that the project area is situated within a broader zone characterised by varying levels of pockmark susceptibility, potentially ranging from moderate to higher degrees. This indicates that the regional topographical and geological conditions, such as possible underlying fault systems, might provide occasional pathways for deep fluid migration. Consequently, while there are no currently mapped pockmarks or active gas seeps at the exact well site, the predictive model implies that the location falls within a generally susceptible area that may have some spatial probability to host unmapped features or potential future fluid expulsion events.

2.1.5.4 Submarine volcanoes

Magmatic submarine volcanoes in the wider regional area are primarily associated with the active tectonic zones of the Tyrrhenian Sea and offshore Sicily, as well as the South Aegean Sea within the Santorini volcanic province (Figure 2-25).

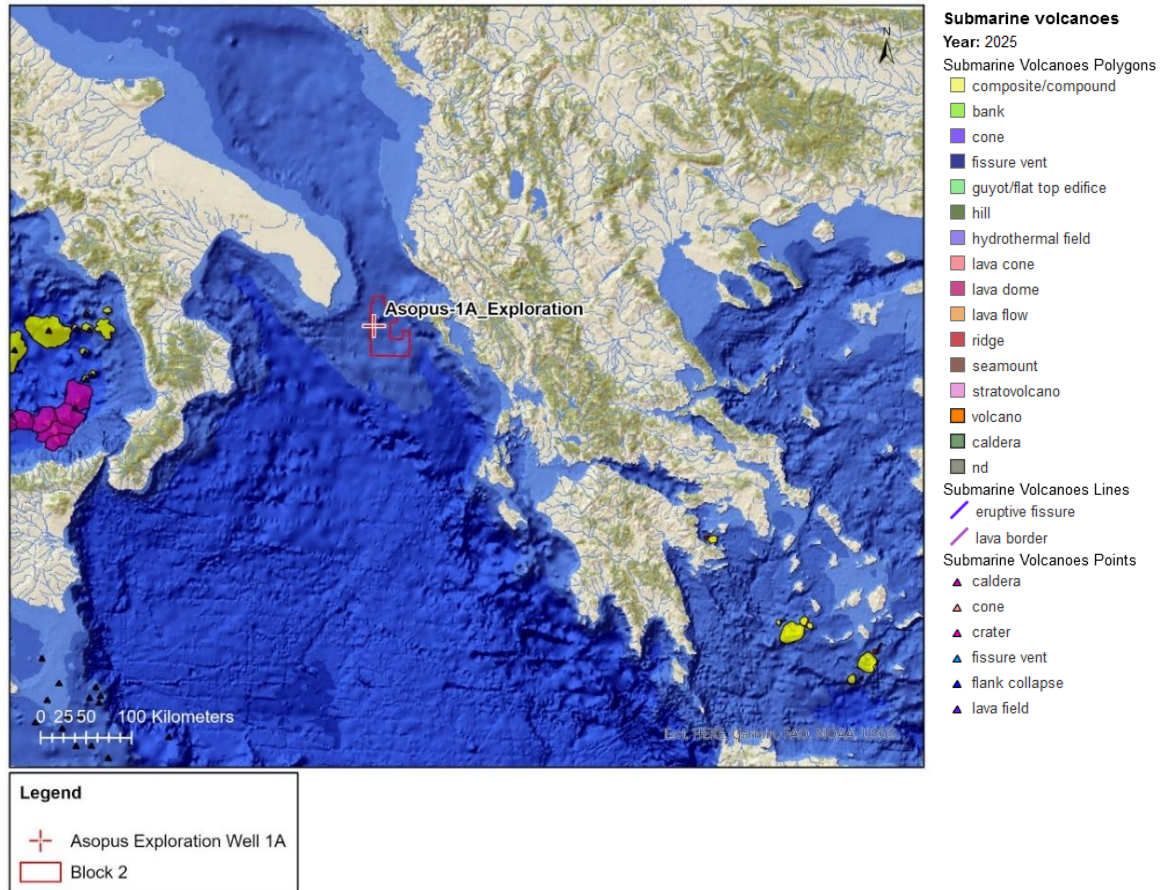


Figure 2-25: Distribution of magmatic submarine volcanoes in the wider regional area (Source: European Atlas of the Seas)

In addition to magmatic features, the Eastern Mediterranean deep seafloor hosts mud volcanoes that function as submarine cold seeps. These structures form from the seafloor eruption of clay-rich sediments, driven by the upward migration of overpressured fluids, primarily microbial or thermogenic methane. Mud volcanoes are structurally linked to tectonic faulting and are distributed along the Mediterranean Ridge and the Calabrian Arc (Otero & Mytilineou, 2022; Miramontes et al., 2023).

Within the Eastern Ionian and Libyan Seas, these features cluster along tectonic belts into specific mud volcano fields, such as Pan di Zuccherò, Prometheus II, Olimpi, Southern Belt, and United Nations. Because they support concentrated microbial activity and chemosynthetic fauna, they represent vulnerable deep-sea ecosystems. Their regional distribution relative to the Block 2 project area is illustrated in Figure 2-26 (Otero & Mytilineou, 2022).

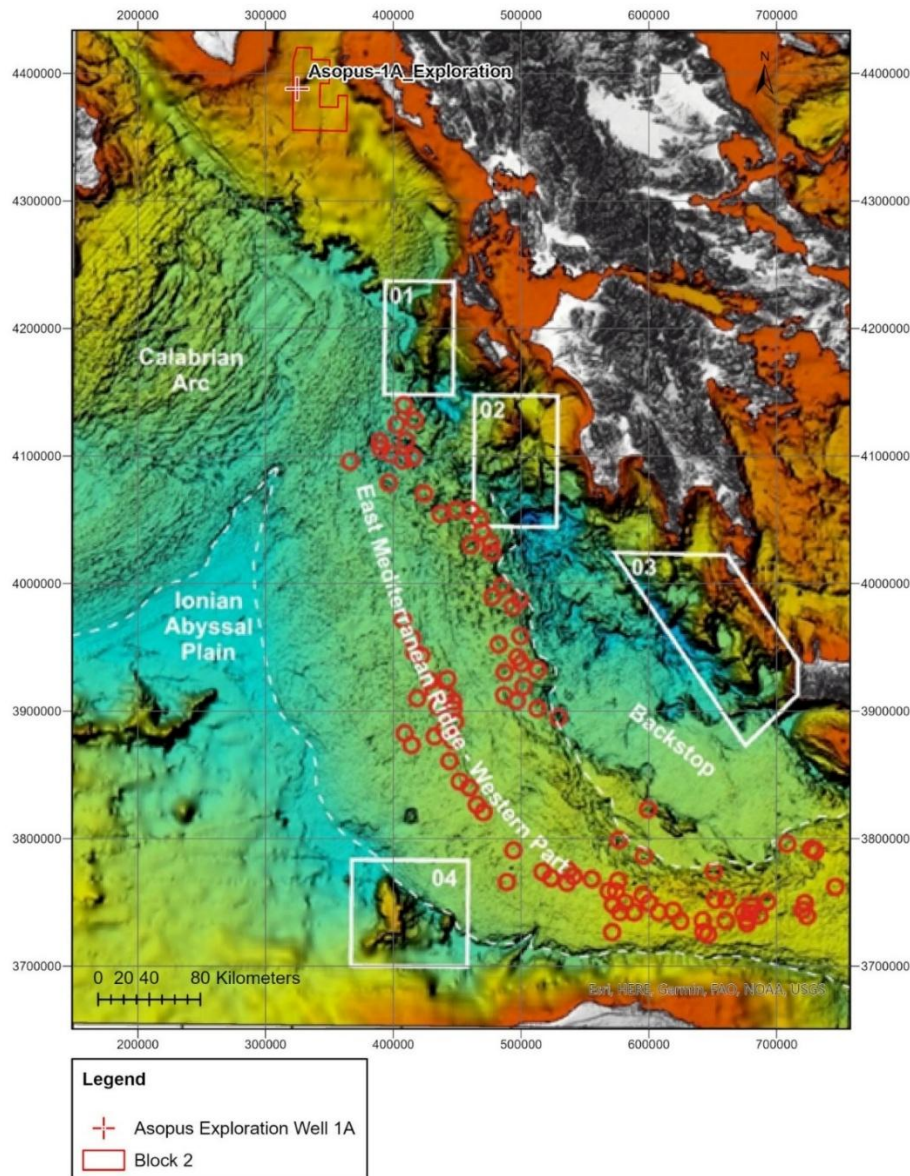


Figure 2-26: Distribution of deep-sea mud volcanoes (indicated by red circles) clustered along the East Mediterranean Ridge (Source: Otero & Mytilineou, 2022)

Based on the spatial distribution illustrated in the above figures and the information provided, it is expected that the probability of encountering either active magmatic volcanoes or deep-sea mud volcanoes at the Asopus-1A well location is low.

2.1.5.5 Gravitative mass movements

Gravitative mass movements are significant geological hazards associated with steep slopes and fault scarps in the submarine realm. Scientific literature indicates that gravitational mass movements have been observed all across the shelf in the Aegean and Ionian seas affecting the late Pleistocene and Holocene deposits. The causes of landslides in the whole region of the Hellenic shelf are the earthquakes and the sediment liquefaction. Other factors that can cause the movements are the slope steepening and the gas

(methane) in the sediment pores. The main region that mass movements have been observed is the Gulf of Corinth and the shelf adjacent to the Lefkada-Kefallinia transform fault and the shelves bordering the North Aegean Trough (Ferentinos et al., 2014, Fischer et al., 2015).

Figure 2-27 presents a landslide susceptibility map encompassing the wider project area, derived from the European Marine Observation and Data Network (EMODnet). This cartography was developed utilizing the maximum entropy (MaxEnt) statistical model, based on an extensive dataset of submarine landslide points across European seas (Innocenti et al., 2020). Through an iterative variable selection process, the model identified seabed slope and bathymetry (depth) as the two essential environmental variables determining landslide susceptibility. Slope is the predominant driving factor, contributing 82% to the model's predictive capacity, while depth contributes the remaining 18% (Innocenti et al., 2020).

The resulting assessment indicates the likelihood or tendency of the seabed to experience landslides, operating on the foundational assumption that if a submarine landslide has occurred at a specific location, that area remains susceptible to future occurrences (Innocenti et al., 2020). Consequently, the map identifies where events may occur, but it does not predict when or how frequently they will happen, nor their potential size and magnitude. The spatial distribution confirms that susceptibility is exceptionally high in tectonically active regions, such as the central and western Mediterranean Sea, and in marine areas affected by widespread volcanism, including the Aegean arc (Innocenti et al., 2020).

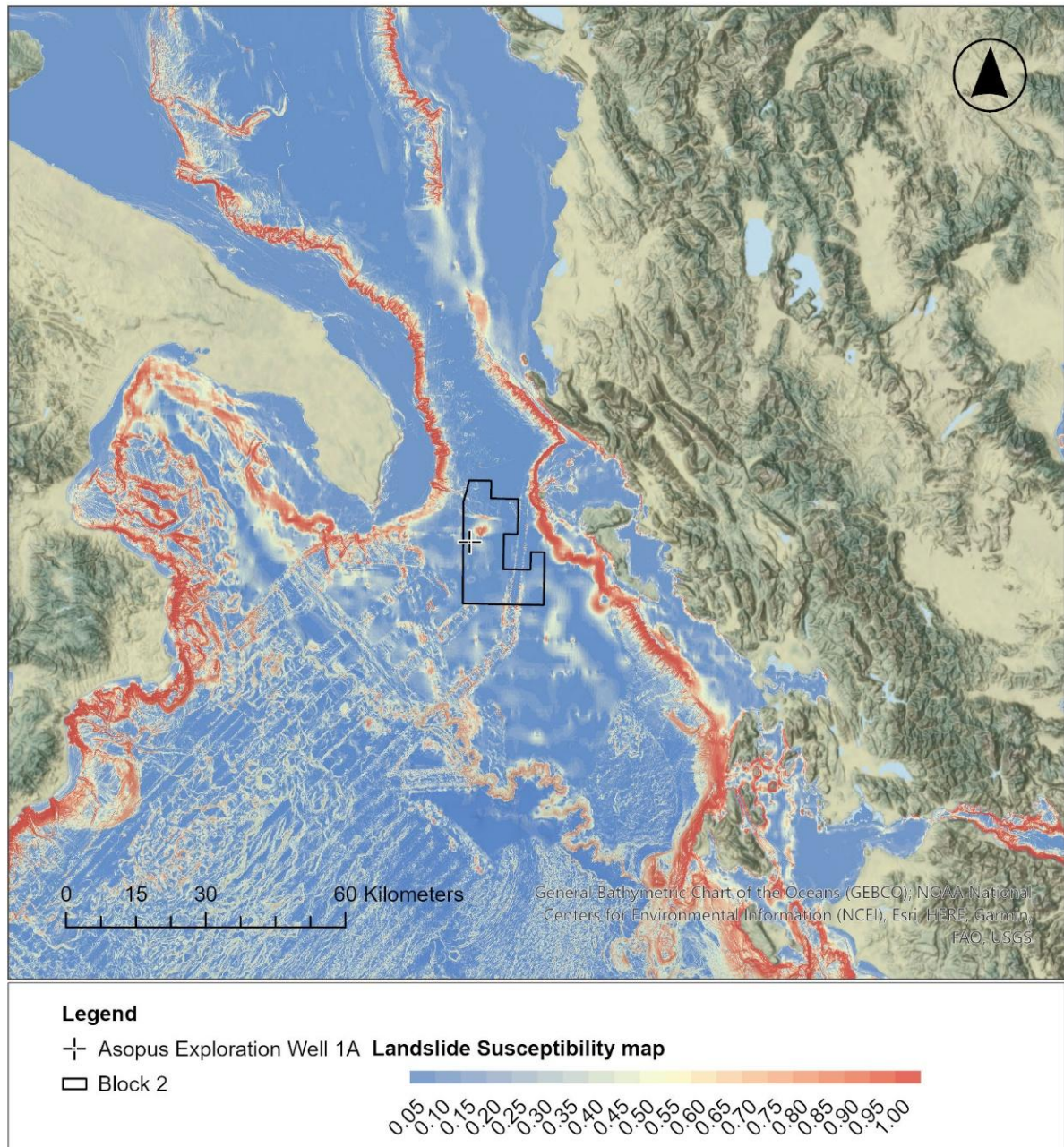


Figure 2-27: Landslide susceptibility map in the wider project area (Source: EMODNET)

Considering the regional spatial datasets and predictive models, the assessment of the Asopus-1A well location indicates a low susceptibility to gravitative mass movements. The regional landslide susceptibility map (Figure 2 28) demonstrates that the specific project area is situated in a zone characterised by low susceptibility values, as indicated by the underlying blue shading. Based on the relatively gentle local slope gradients, it is expected that the probability of encountering submarine landslides or gravitative mass movements at the Asopus-1A well location is low.

2.1.5.6 Tsunami

The largest tsunamis in the Mediterranean Sea are generated along the Hellenic Arc, located south-east of the project area, where the African plate subducts beneath the Euro-Asian plate, creating strong tectonic tensions. Furthermore, tsunamis can be generated along regional microplates, such as the Adriatic microplate (which directly influences the Ionian Sea), as well as along active fault lines connected to local subduction zones. While landslide-induced tsunamis are less frequent in the Mediterranean Sea, slope failures can still occur at shelf breaks, primarily triggered by seismic earthquakes or volcanic collapses and flows. The basin-wide distribution of historical tsunami epicenters, meteotsunamis, and major tsunamigenic fault areas is illustrated in Figure 2-28.

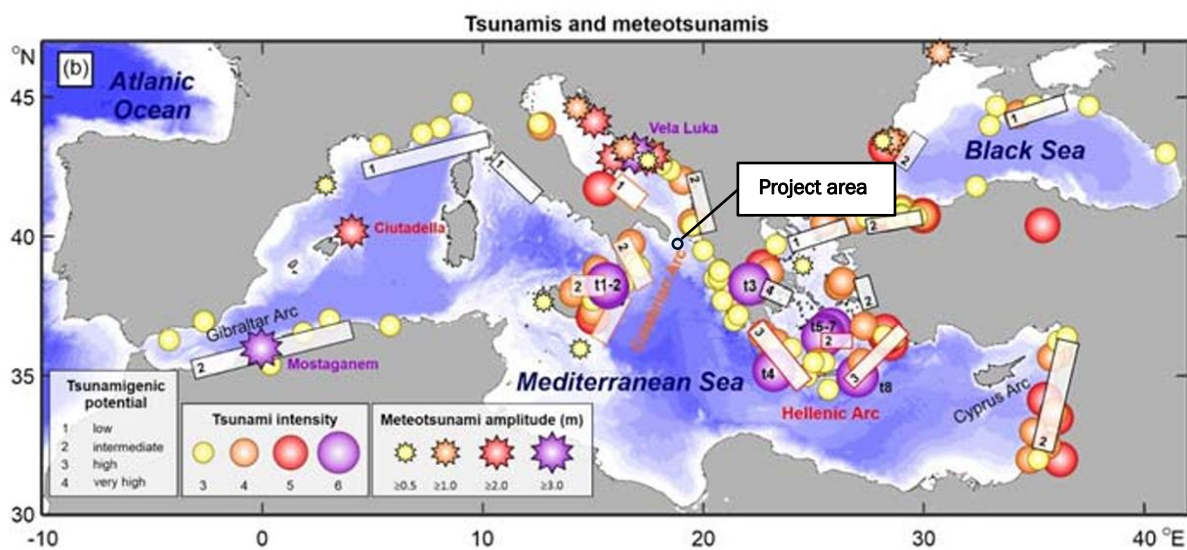


Figure 2-28: Epicentres of earthquakes that resulted in tsunamis having intensities of three or higher on the Sieberg-Ambraseys tsunami intensity scale (colored circles, after Maramai et al., 2014); white rectangles show tsunamigenic fault areas with annotations indicating their tsunamigenic potential; locations where historic meteotsunamis surpassed an amplitude of 0.5 m are marked with colored stars (Source: Lionello et al., 2023; modified from Pérez Gómez et al., 2022).

In the Hellenic Shelf, a total of 160 probable and definite tsunami events has been recorded since AD 1628. While the region of Corfu itself has not been recently affected by a tsunami, geomorphological, sedimentary, and microfaunal evidence proves that several palaeo-tsunamis impacted Corfu during the Holocene. The east coast of Corfu was affected by high-energy wave impacts from the south, possibly caused by “tele-tsunamis” from the major seismic zone of the Hellenic Trench. Moreover, the southwest coast of Corfu is at risk from tele-tsunamis from both western and southern directions, which can be triggered in the Hellenic Trench, by Mount Etna, or by local submarine landslides at the steeply sloping continental shelf. The various potential triggers for these events are outlined in Figure 2-29, which shows the tsunami causes in the region.

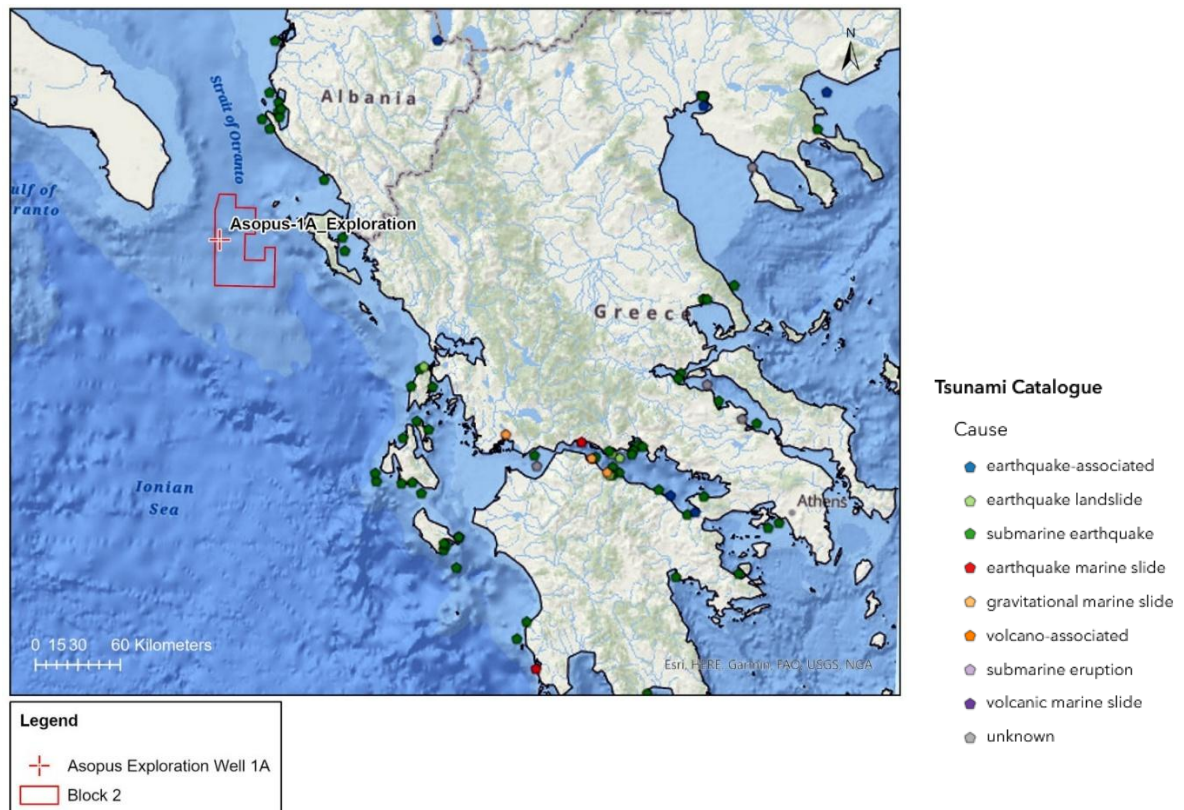


Figure 2-29: Map displaying the primary causes and historical triggers of tsunamis in the wider Ionian Sea and Hellenic Shelf region (Source: Seismotectonic Atlas of Greece v1.1 Department of Geology & Geoenvironment, Section of Geophysics-Geothermics, NKUA, Greece)

Based on the regional seismotectonic data and the spatial distribution of historical tsunamigenic epicentres and major fault areas illustrated in Figure 2-28, the probability of a major tsunami originating at the Asopus-1A well location is assessed as low, primarily because the site is geographically separated from the high-potential subduction zones of the Hellenic Arc and lacks the steep local bathymetric gradients typically associated with massive submarine landslides.

2.2 Ocean circulation and physical parameters

2.2.1 Sea circulation and currents

The water flow structures and the currents in the Eastern Mediterranean are characterized by different scales ranging from sub-basin, i.e., flows extending throughout most of the basin's lateral extent, to mesoscale, i.e., cyclones or anticyclones with dimensions in the order of ~100 km. Most of the mesoscale water flow structures are permanent, while some of them are recurrent and show seasonal and inter-annual flow variations. Figure 2-30 shows the most prominent circulation features of the Mediterranean basin.

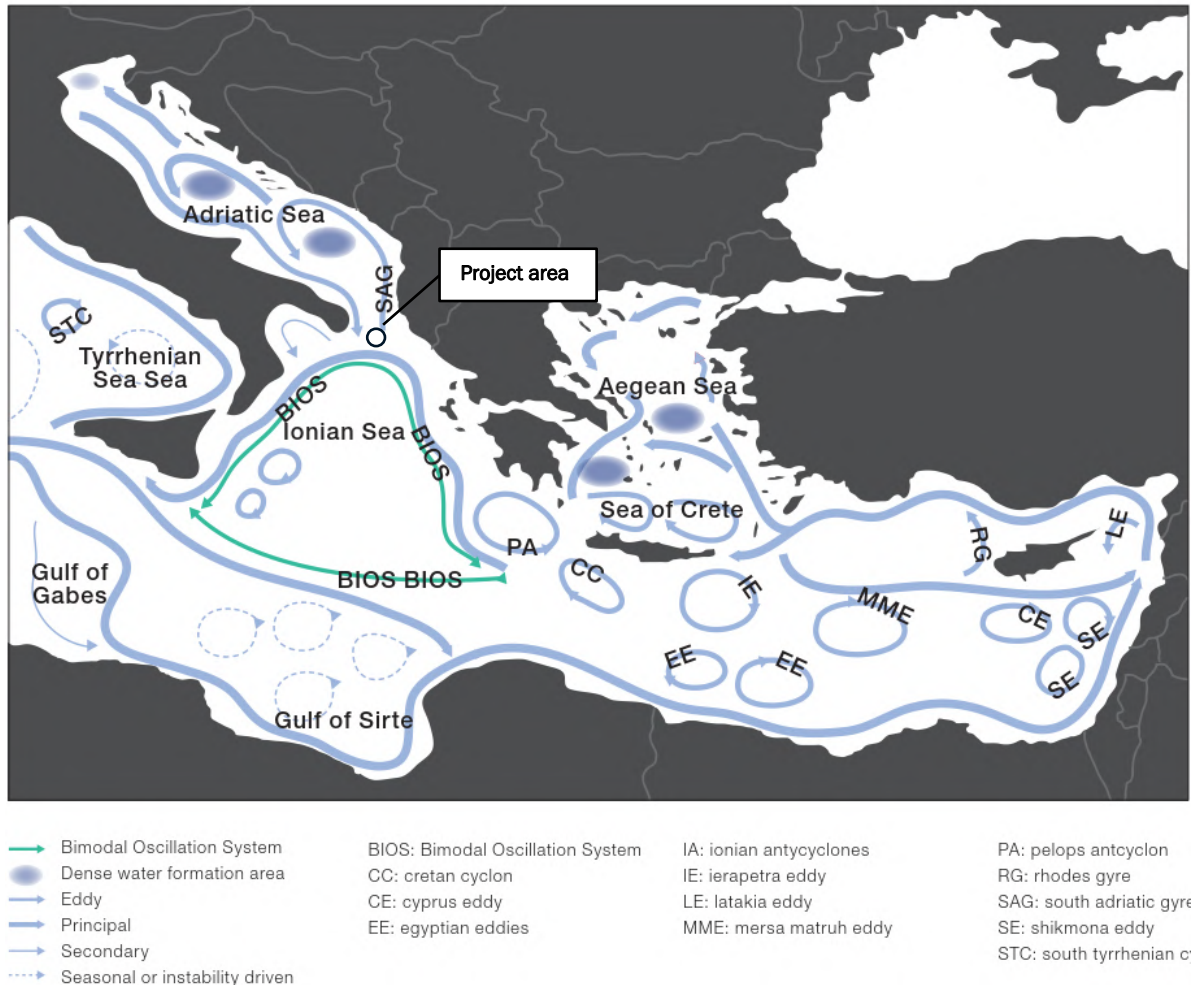


Figure 2-30: Map of the general circulation patterns in the Mediterranean basin with a schematic of basic characteristics of the Eastern Mediterranean general circulation based on results from Robinson et al. (1991). 1: Pelops Anticyclone (recurrent), 2: Cretan Cyclone (permanent), 3: Ierapetra Anticyclone (recurrent), 4: Mersa-Matruh Anticyclone (permanent), 5: Rhodes Cyclone, MMJ: Mid-Mediterranean Jet. Areas 1) the southeast Ionian (latitude of 37° N.), 2) the Lybian Sea i.e., the area south of Crete, 3) the eastern Levantine, i.e., the area west of 30° E, 4) the south Aegean Sea, i.e., south of latitude 37.6° N. and 5) the North Aegean Sea, i.e. north of 37.6° N. (Source: Otero & Mytilineou, 2022)

The general oceanographic conditions in the Mediterranean Sea define it as a "concentration basin," where evaporation far exceeds precipitation and river runoff. This water deficit, combined with temperature and salinity gradients, drives an anti-estuarine circulation; evaporation is higher in the eastern half, causing the water level to decrease and salinity to increase from west to east. The resulting pressure gradient pushes relatively cool, low-salinity water from the Atlantic across the Mediterranean basin. This water warms up to the east, where it becomes saltier and then sinks in the Levantine Sea before circulating west and exiting through the Strait of Gibraltar (Coll et al., 2010). Thus, the Eastern Mediterranean receives lower salinity water from outside and then it generates and exports high-salinity water masses to the neighboring basins of the Black Sea and the Western Mediterranean (Otero & Mytilineou, 2022).

The Ionian Sea exchanges waters with its adjacent basins as follows: a) with the Western Mediterranean (WMed) through the Strait of Sicily, b) with the Adriatic Sea through the Otranto Strait, and c) with the Levantine and Aegean Seas through the Cretan Passage and west Cretan Straits respectively. All water masses formed in the EMed are advected to the WMed through the Ionian Sea and in return water masses of WMed origin are advected towards the Levantine Sea through the Ionian. Finally, the Ionian Sea is the direct recipient of dense waters produced in the Adriatic Sea (Schlitzer et al., 1991, Malanotte-Rizzoli et al., 1997). The major water masses found in the Ionian Sea are described in the following paragraphs.

The surface water of the Ionian Sea with origin from the Atlantic Ocean is called the Modified Atlantic Mediterranean Water (MAW) and enters from the Straits of Gibraltar and moves eastwards through the Strait of Sicily. MAW is transferred inside the Ionian Sea by a stream of water called Atlantic - Ionian Stream (AIS) which leads to the Cretan Passage, where it is renamed Mid-Mediterranean Jet (MMJ) and travels to the Levantine Sea. Another water flow influencing the surface characteristics of the Ionian Sea is the Adriatic Surface Water (ASW), which is produced in the north Adriatic Sea and advected through the Otranto Strait with ASW salinity in the Ionian Sea appearing lower than that of the MAW. The surface water of the Ionian Sea (during summer months) is called Ionian Surface Water (ISW). The surface circulation in the Ionian Sea is shown in Figure 2-31.

The intermediate layer of water is called the Levantine Intermediate Water mass (LIW). It is mainly produced in the Levantine basin during the winter, and it travels to the Ionian Sea through the Cretan Passage at depths of ~150-500 m. After entering the Ionian Sea, part of it follows a direct path towards the Sicily Strait and thereon into the WMed, while a second branch travels along the Greek coast towards Otranto and the Adriatic (Bensi et al., 2016). The exchange or renewal time scale of the LIW is approximately ~25 years (Otero & Mytilineou, 2022). The intermediate circulation in the Ionian Sea is shown in Figure 2-31.

The deeper layer of water occurring at depths greater than 1,600 m across the eastern Mediterranean is the Eastern Mediterranean Deep Water (EMDW). Below the LIW layer, a transitional water mass occur (Transitional Mediterranean Water, TMW). The main source of EMDW is considered the dense water masses created mainly in Adriatic Sea in winter (Schlitzer et al., 1991). However, observations have shown that deep waters formed locally in the Aegean Sea have contributed to the formation of EMDW but in lesser quantities compared to the Adriatic deep-water production (Ovchinnikov et Plakhin, 1965, El-Gindy et El-Din, 1986). The exchange or renewal time scale for these deep waters is in the order of 80 to 100 years. Furthermore, the speeds of the current flows in the Eastern Mediterranean at depths greater than 2000 m are generally in the order of ~2-5 cm/sec with maximum values around 10 cm/sec, though deep and near-bottom abyssal currents can exhibit notable increases in speed due to bottom-trapped topographic Rossby waves (Otero & Mytilineou, 2022).

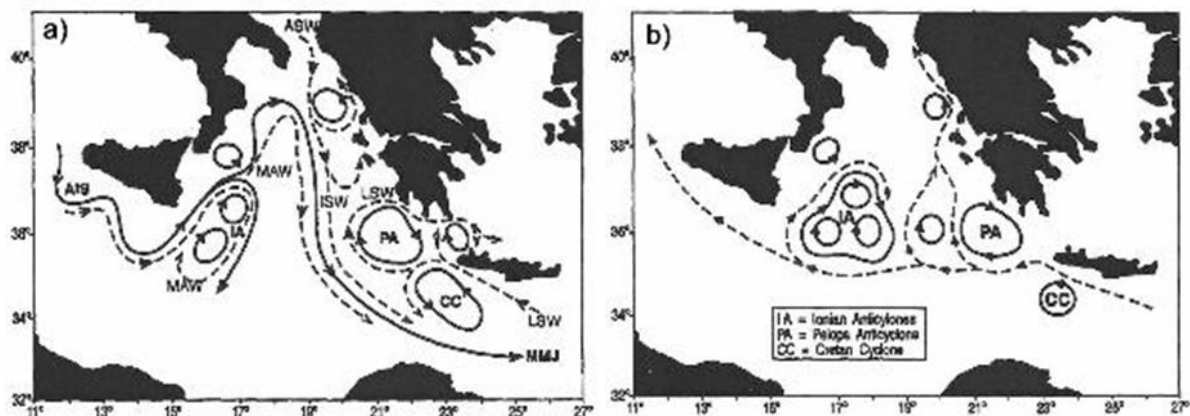


Figure 2-31: Representation of Ionian Sea circulation: a) Surface, b) Intermediate layer (Source: Malanotte-Rizzoli et al., 1997)

The surface/intermediate circulation in the North Ionian Sea is subject to quasi-decadal reversals of a circulation feature named North Ionian Gyre (NIG). Thus, during the EMT period and up to 1997 the NIG was an anticyclone, while between 1997 and 2006 it reversed into a cyclone, to change once more into an anticyclone after 2006 and up to 2012. According to this theory, the cyclonic NIG mode results into inflow of saline water masses from the Levantine along the Greek coast towards the Adriatic Sea, while the anticyclonic NIG mode brings less saline MAW masses towards the Adriatic (Borzelli et al., 2009, Gacic et al., 2010, 2011). A schematic representation of the two NIG modes is shown in Figure 2-32.

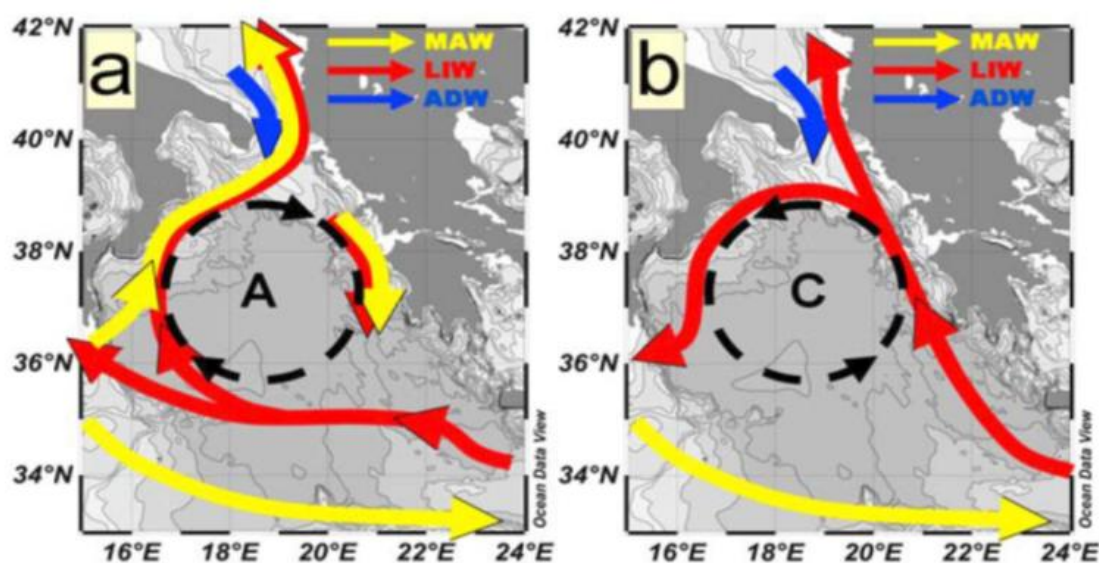


Figure 2-32: BiOS decadal inversions of the Ionian circulation and pathways of the principal water masses (Source: Gacic et al., 2010)

Another theory supports that the changes of the whole Ionian Sea occur due to the changes of the course of the Atlantic Stream towards the Adriatic (anticyclonic NIG) or towards the Cretan Passage (cyclonic NIG), which are related to the production of dense water in the Adriatic or in the Aegean respectively. Figure 2-33 shows the two different ways of the surface circulations of the Eastern Mediterranean Sea and the Ionian Sea. Low salinity masses of the MAW are represented with blue color, the high salinity masses of the Aegean

and Levantine Sea with red color and the dense water of the Aegean and the Adriatic deep in blue color (Velaoras et al. 2014)

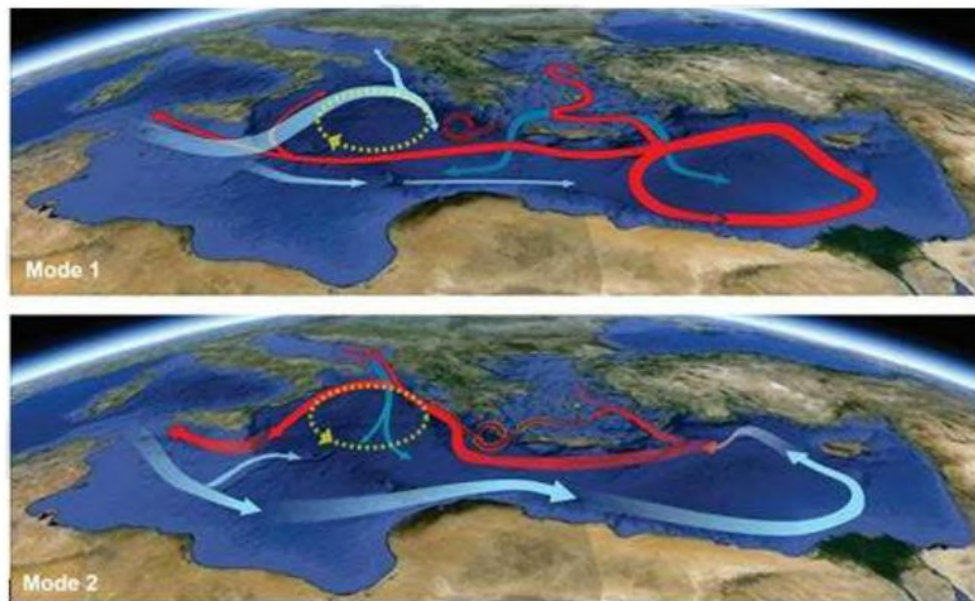


Figure 2-33: Two different ways of the surface circulations of the Eastern Mediterranean Sea and the Ionian Sea

In addition to the horizontal surface circulation patterns, the Mediterranean Sea exhibits a vigorous overturning circulation driven by dense and deep-water formation processes. This basin-wide vertical circulation can be conceptualized into three primary interconnected pathways: the surface to upper ocean circulation (typically 0–150 m depth), the intermediate circulation (150–1000 m), and the deep to abyssal circulation (>1000 m) (see Figure 2-34). Atlantic Water enters through the Strait of Gibraltar and travels eastward in the surface layer, eventually transforming into warmer, saltier intermediate water in the eastern basin. This intermediate water flows westward, feeding deep water formation processes in specific marginal regions—such as the Adriatic Sea, Aegean Sea, and the Gulf of Lion—before returning toward the Atlantic. The abyssal circulation is characterized by deep cyclonic paths connected to these specific deep-water sources.

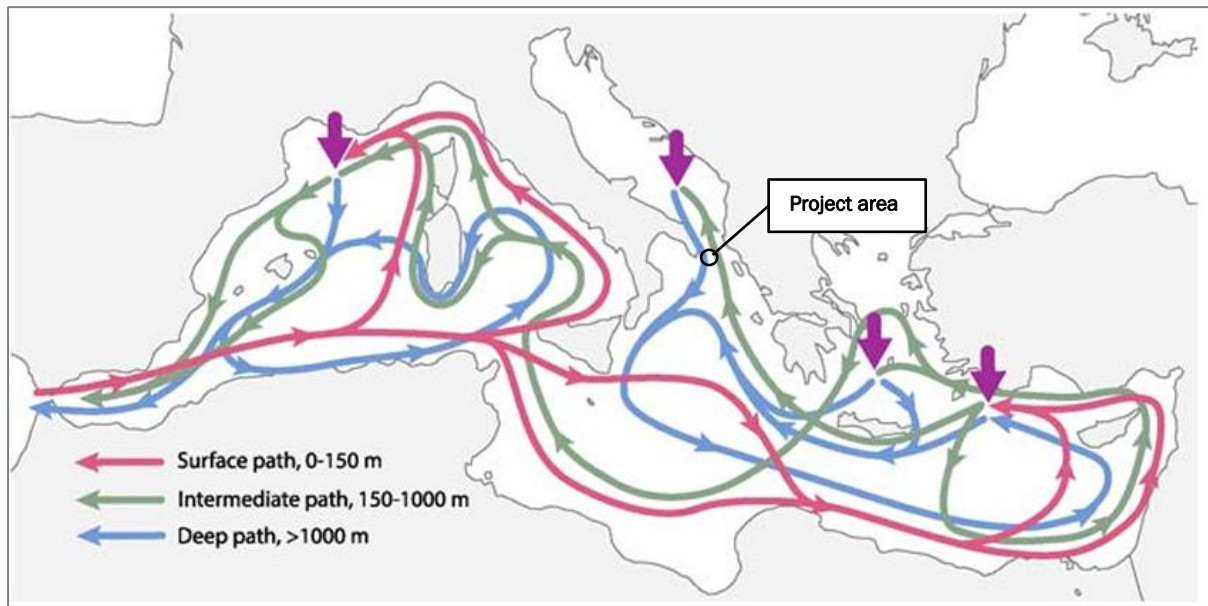


Figure 2-34: Schematic representation of the Mediterranean overturning circulation pathways at three different depth ranges: surface to upper ocean (0–150 m, red), intermediate (150–1000 m, green), and deep/abyssal (>1000 m, blue). Downward purple arrows denote locations of deep-water formation (Source: Pinardi et al., 2023)

SAT-OCEAN conducted a MET-OCEAN study for ENERGEAN SA to model currents at the location of the exploration well ASOPUS-1A (SAT-OCEAN current statistics report, 2026). The study is based on HYCOM (Hybrid Coordinate Ocean Model), a widely recognized hybrid vertical coordinate model known for its accuracy and efficiency in ocean modeling. The analysis combines satellite data with numerical modeling over a 10-year period, from January 1, 2015, to December 31, 2024.

For the current analysis the extreme wave values were derived by calculations based on methods such as Peak-Over-Threshold, block maxima distribution, Weibull, GEV, GPD. The basic method consists of fitting a theoretical 3-parameter distribution to an empirical distribution yielded by magnitude data (speed or height).

The methods used for the derivation of extremes include the extrapolation of the theoretical distribution to a list of decreasing probability values. The parameters used for the theoretical distributions are the shape, scale and location, which were yielded by maximum-likelihood between the empirical and theoretical distributions. The method to determine these parameters consisted of calculating the shape and scale in a wide set of locations and then to retain from all obtained triplets the one that best satisfies a goodness-of-fit criterion between the 2 distributions. The goodness-of-fit coefficient that needed to be minimized was the maximum of the distance between empirical and theoretical distributions. Moreover, in order to focus the analysis on the upper distribution tail only, the criterion was restricted to the upper 99% percentile of the empirical distribution.

The speed and directions (toward) of currents, at the study area for the entire time series and monthly periods (during January 2015 – December 2024) for the study area can be seen in Table 2-1 (at the surface), Table 2-2 (200 m below surface) and Table 2-3 (900 m below surface).

Table 2-1: Yearly and monthly current speed occurrence [%] and directions at “ASOPUS-1A” at surface. (Source: SAT-OCEAN current statistics report, 2026)

SPEED (M/S)	YRL	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0.00 - 0.10	19.47	0.91	1.15	1.24	1.47	2.05	2.56	2.4	2.21	1.8	1.61	0.9	1.17
0.10 - 0.20	31.49	2.05	1.86	2.34	2.85	3.1	3.03	3.07	3.14	2.87	2.67	2.07	2.44
0.20 - 0.30	19.12	1.72	1.5	1.87	1.72	1.6	1.19	1.31	1.57	1.54	1.72	1.64	1.74
0.30 - 0.40	9.21	1.12	0.93	1.05	0.68	0.48	0.4	0.5	0.46	0.72	0.85	1.05	0.98
0.40 - 0.50	4.54	0.75	0.57	0.48	0.33	0.18	0.14	0.22	0.14	0.26	0.38	0.57	0.5
0.50 - 0.60	2.44	0.43	0.29	0.27	0.2	0.09	0.03	0.07	0.09	0.11	0.17	0.38	0.29
0.60 - 0.70	1.43	0.21	0.21	0.13	0.07	0.05	0.04	0.03	0.02	0.05	0.09	0.33	0.2
0.70 - 0.80	0.77	0.15	0.14	0.06	0.02	0.05	0.01	0.03	0	0.02	0.04	0.15	0.11
0.80 - 0.90	0.56	0.1	0.09	0.07	0.03	0.02	0	0	0	0.01	0.05	0.13	0.07
0.90 - 1.00	0.36	0.08	0.08	0.03	0.01	0	0	0	0	0	0.03	0.07	0.04
1.00 - 1.10	0.24	0.04	0.05	0.04	0	0.01	0	0	0	0	0.02	0.04	0.03
1.10 - 1.20	0.12	0.03	0.02	0.02	0	0	0	0	0	0	0	0.02	0.02
1.20 - 1.30	0.06	0.02	0.01	0	0	0	0	0	0	0	0	0.01	0.01
1.30 - 1.40	0.07	0.01	0.02	0.01	0	0	0	0	0	0	0	0.02	0.01
MOST FREQUENT DIRECTION (TOWARD)	SW	WSW	N	N	N	N	SW	SW	SW	SW	NNW	N	NW
MOST FREQUENT DIRECTION OF STRONGEST CURRENT (TOWARD)	SW	SW	SW	N	SW	NNE	SW	SW	SW	SW	NNE	N	NNE

Table 2-2: Yearly and monthly current speed occurrence [%] and directions at “ASOPUS-1A”, 200 m below surface. (Source: SAT-OCEAN current statistics report, 2026)

SPEED (M/S)	YRL	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0.00 - 0.10	85.52	6.67	6.16	7.17	6.97	7.57	7.38	7.64	7.64	7.38	7.24	6.93	6.77
0.10 - 0.20	4.47	0.97	0.8	0.47	0.42	0.07	0.01	0	0	0.01	0.39	0.47	0.87
0.20 - 0.30	0	0	0	0	0	0	0	0	0	0	0	0	0
0.30 - 0.40	0	0	0	0	0	0	0	0	0	0	0	0	0
0.40 - 0.50	0	0	0	0	0	0	0	0	0	0	0	0	0
0.50 - 0.60	0	0	0	0	0	0	0	0	0	0	0	0	0
0.60 - 0.70	0	0	0	0	0	0	0	0	0	0	0	0	0
0.70 - 0.80	0	0	0	0	0	0	0	0	0	0	0	0	0
0.80 - 0.90	0	0	0	0	0	0	0	0	0	0	0	0	0
0.90 - 1.00	0	0	0	0	0	0	0	0	0	0	0	0	0

SPEED (M/S)	YRL	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1.00 - 1.10	0	0	0	0	0	0	0	0	0	0	0	0	0
1.10 - 1.20	0	0	0	0	0	0	0	0	0	0	0	0	0
1.20 - 1.30	0	0	0	0	0	0	0	0	0	0	0	0	0
1.30 - 1.40	0	0	0	0	0	0	0	0	0	0	0	0	0
MOST FREQUENT DIRECTION (TOWARD)	NW	NW	NW	NW	NW	NW	NW	NW	NW	WNW	NW	NW	NW
MOST FREQUENT DIRECTION OF STRONGEST CURRENT (TOWARD)	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW

Table 2-3: Yearly and monthly current speed occurrence [%] and directions at “ASOPUS-1A”, 900 m below surface.

(Source: SAT-OCEAN current statistics report, 2026)

SPEED (M/S)	YRL	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0.00 - 0.10	89.98	7.64	6.95	7.64	7.39	7.64	7.39	7.64	7.64	7.39	7.64	7.39	7.63
0.10 - 0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.20 - 0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.30 - 0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.40 - 0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.50 - 0.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.60 - 0.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.70 - 0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.80 - 0.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.90 - 1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.00 - 1.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.10 - 1.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.20 - 1.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.30 - 1.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MOST FREQUENT DIRECTION (TOWARD)	NNE	NNE	NNE	NNE	NNE	NNE	NNE	NNE	NNE	NNE	NNE	NNE	NNE
MOST FREQUENT DIRECTION OF STRONGEST CURRENT (TOWARD)	N	N	N	N	N	N	N	N	N	N	N	N	N

The current statistics in the study area are presented through rose diagrams for the entire year and different depths (Figure 2-35) and for every month at the surface and 200m and 900m below surface (Figure 2-36). Currents at the exploration well Asopus-1A appear to flow predominantly towards NW, NNW, N and NNE.

At the surface, the directions of the currents appear to have a seasonal variation. More specifically, from October to May currents tend to flow towards NNW, N and NNE more often than other directions. While from June to September the directions of the currents toward ESE and SE are more likely. As the depth increases, the direction and the speed of the currents become more stable. From a minor depth (close to the surface) currents flow toward NW with speed less than 0.2 m/s. For depths between 300m and 700 m below surface the currents directions remain NW but the speed decreases to less than 1m/s. From 800m below surface to the seabed the speed remains less than 1m/s but the directions changes from NW to NNE.

The speed and direction of the currents below the surface do not show any significant variation throughout the year.

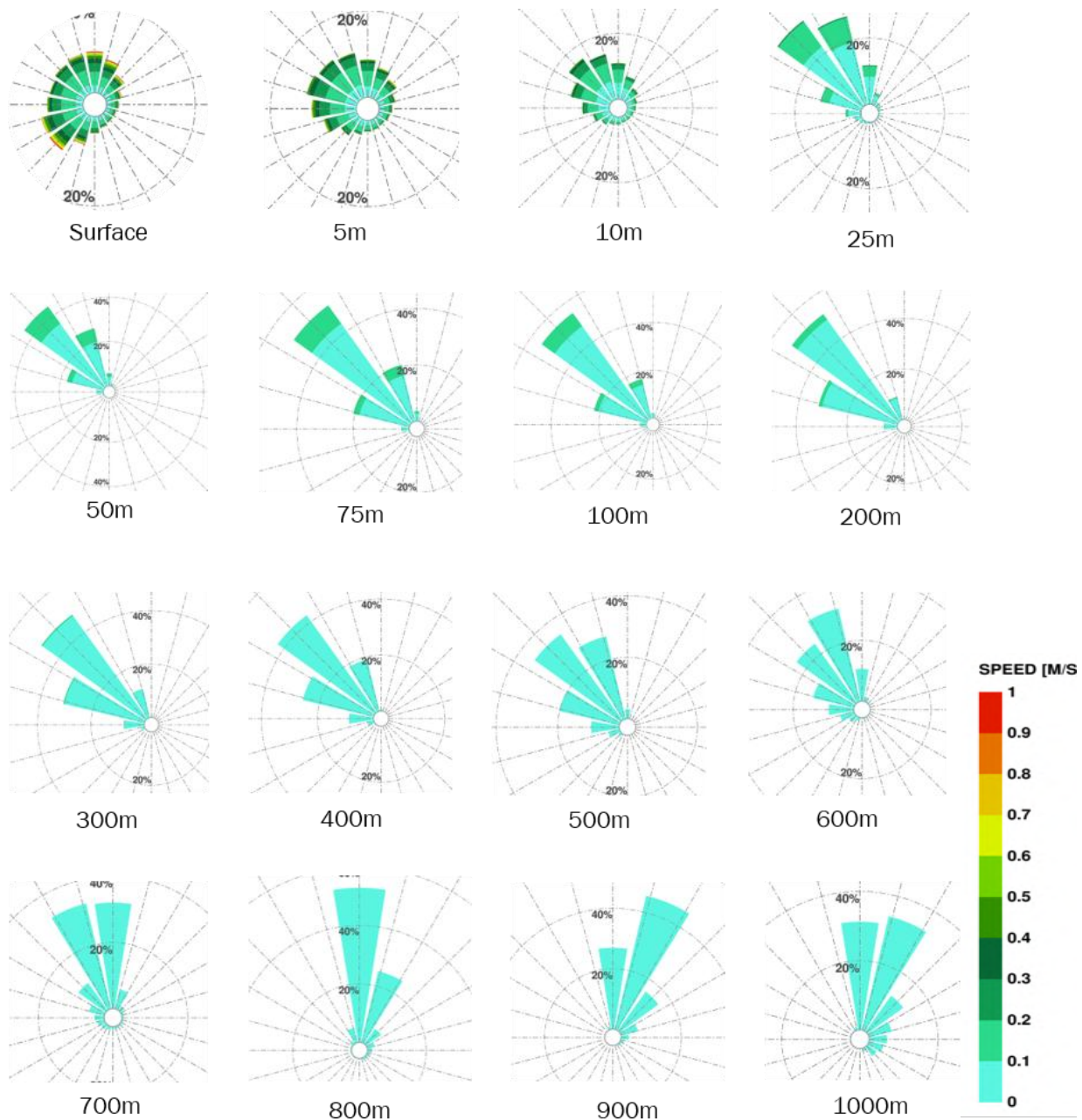


Figure 2-35: Current speed and direction frequency (%) at "ASOPUS-1A" for the entire period for different depths
(Source: SAT-OCEAN current statistics report, 2026)

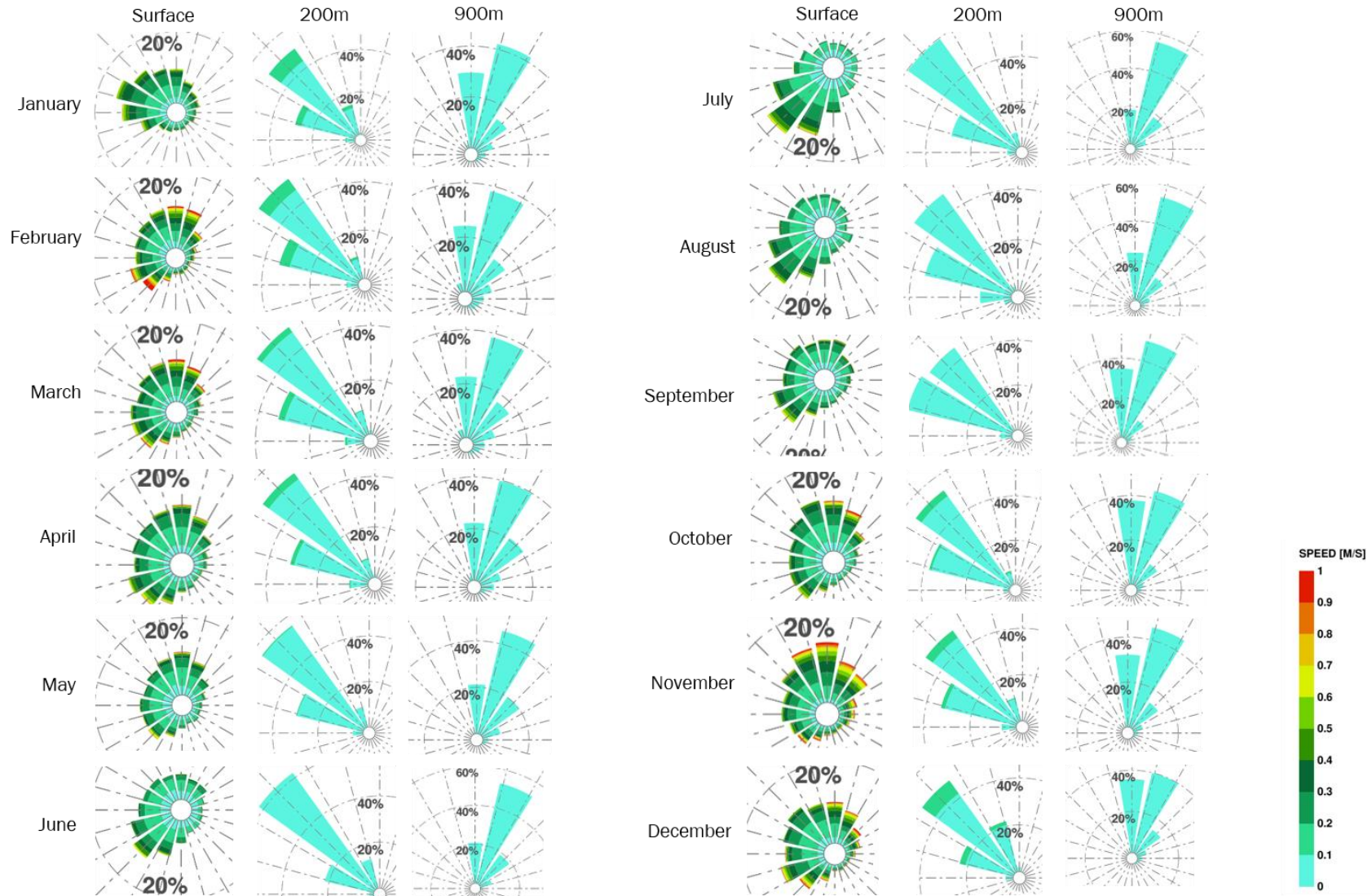


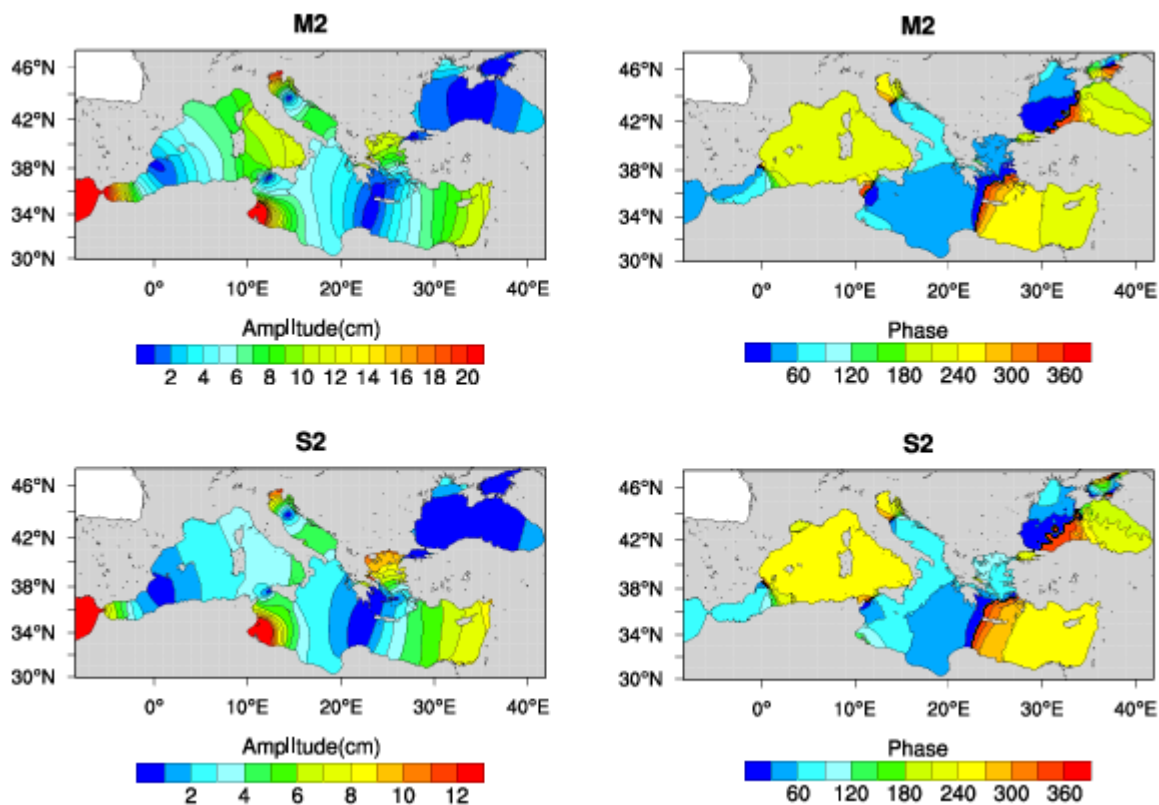
Figure 2-36: Current speed and direction frequency (%) at "ASOPUS-1A" for each month for the surface and for 200 and 900 m below the surface. (Source: SAT-OCEAN current statistics report, 2026)

2.2.2 Tidal amplitude

Ocean tides in the Mediterranean Sea are low in comparison with most major ocean basins (Lionello et al., 2023). Because the tidal amplitudes are relatively small, their behavior across the basin can be modeled using a few primary tidal constituents, specifically the semidiurnal (M2 and S2) and diurnal (K1 and O1) components (Lionello et al., 2023).

Due to the restricted size and complex geometry of the basin, the tidal wave exhibits a back-and-forth movement and propagates around "amphidromic points", where the local tidal range is zero (Lionello et al., 2023). The spatial distribution of the amplitude and phase for the main semidiurnal and diurnal tidal constituents across the Mediterranean is illustrated in Figure 2-37 (Palma et al., 2020).

While the largest water bodies are forced directly by astronomical tidal forces inside the basin, the marginal seas and gulfs are predominantly forced by the periodic variations of sea level along their open boundaries. For example, the tides in the Adriatic Sea, located immediately north of the project area, are mostly forced by the oscillations at the Otranto Strait, which connects it to the wider Ionian Sea. (Note: This specific mechanism regarding the Adriatic Sea and the Otranto Strait is based on general oceanographic principles for the region and is not explicitly detailed in the provided textbook excerpts; you may want to independently verify this specific regional detail).



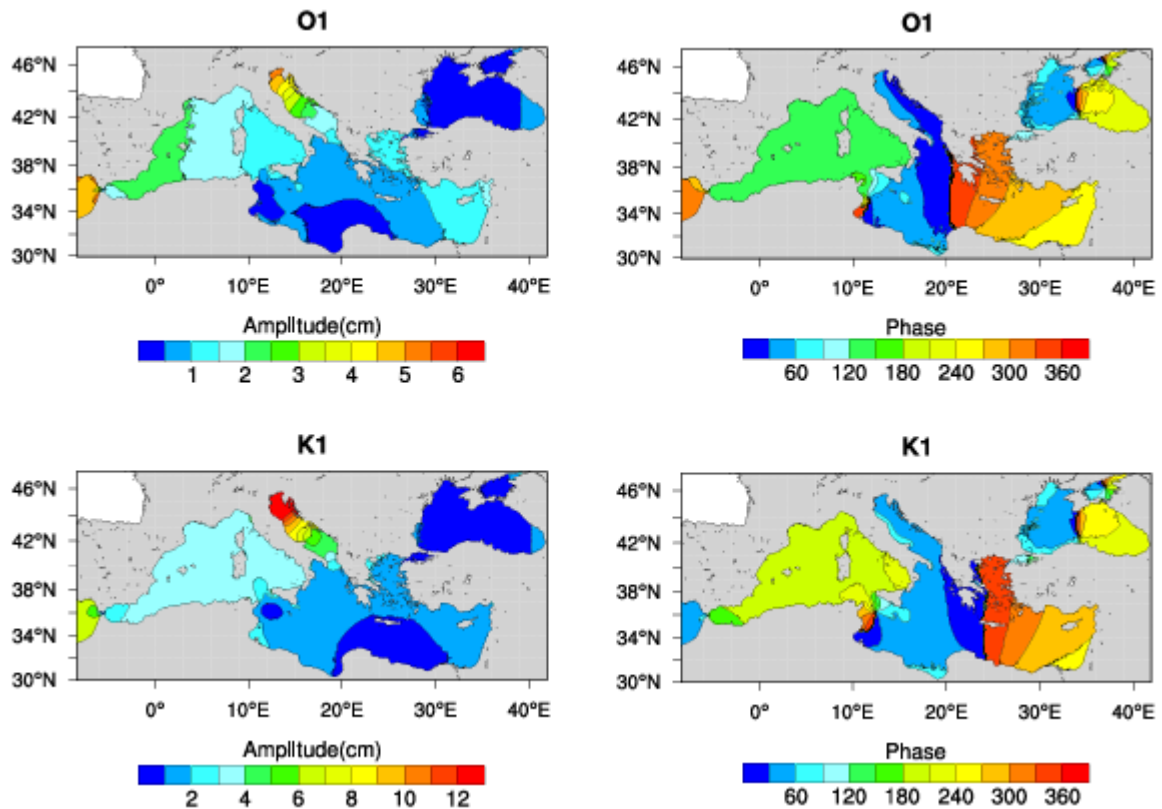


Figure 2-37: Spatial distributions of amplitude (left column) and phase (right column) of the main semidiurnal (M2 and S2) and diurnal (K1 and O1) tidal constituents in the Mediterranean Sea, based on high-resolution hydrodynamic model simulations validated against tide gauges (Source: Palma et al., 2020)

The regional observations presented in Figure 2-38 are based on a tidal model from the European Atlas of the Seas, which integrates eight years of satellite altimetry data alongside measurements from approximately 7,300 coastal tidal gauge stations.

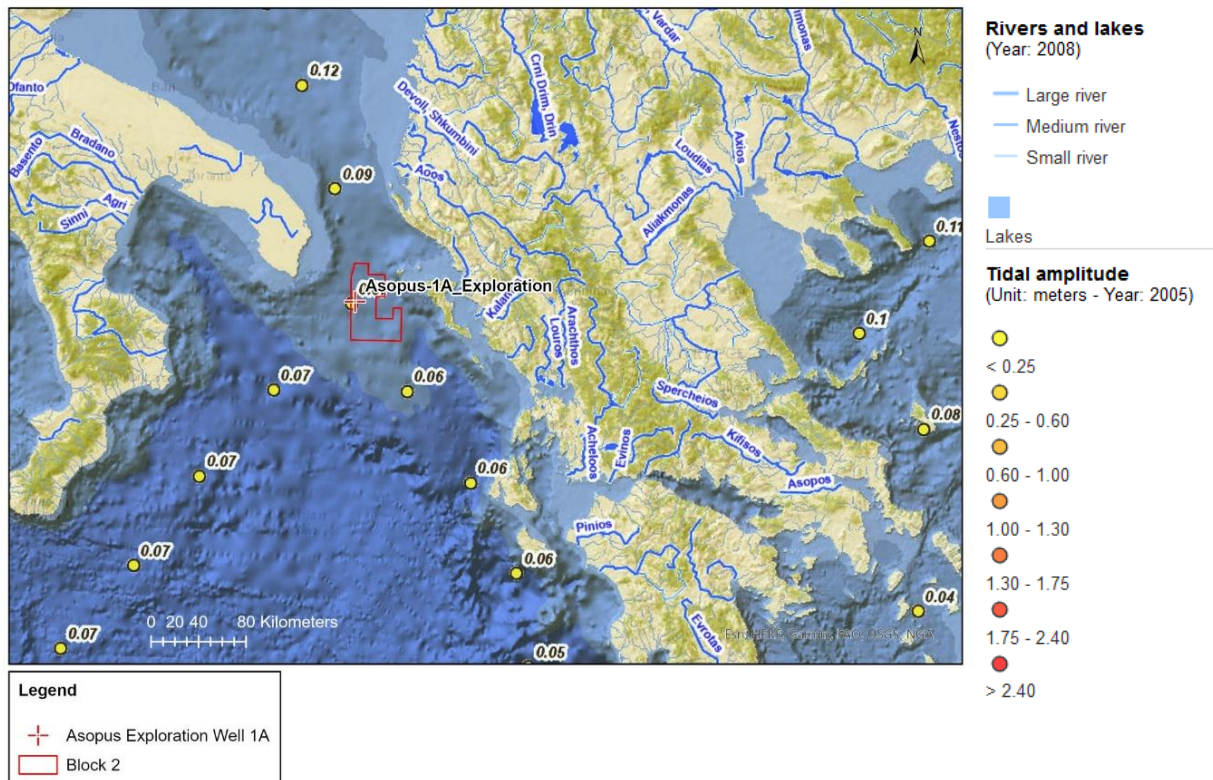


Figure 2-38: Regional tidal amplitude (Source: European Atlas of the Seas)

The broader project area exhibits a low tidal regime, characterized by a micro-tidal environment. As illustrated by the data point located within the marine zone, the recorded tidal amplitude is measured at 0.07 meters. According to the corresponding map legend for tidal amplitude, this value falls within the lowest designated category of < 0.25 meters (represented by the light-yellow marker). This small tidal range indicates that hydrodynamic variations driven by astronomical tides are minimal across this maritime region, suggesting that local coastal and marine processes are primarily influenced by other physical factors, such as wind-driven waves or atmospheric pressure systems, rather than tidal fluctuations.

2.2.3 Waves

SAT-OCEAN conducted a MET-OCEAN study for Energean SA to assess wave characteristics at the location of the ASOPUS-1A exploration well (SAT-OCEAN Wave Statistics Report, 2026). The study is based on dedicated high-resolution nested hindcast models with data assimilation capabilities. Similar to the wind study described in the previous chapter, the analysis covers a 10-year period, from January 1, 2015, to December 31, 2024.

For the analysis and modeling of the wave characteristics the WaveWatch III was used. WaveWatch III is a third-generation wave model developed at NOAA/NCEP in the spirit of the global ocean wave prediction model. The data used to run the model includes a merged global wind product combining archived satellite and numerical weather model wind data. WaveWatch III solves the spectral action density balance equation for wavenumber-direction spectra. This equation implicit assumption is that properties of the medium (water

depth and current) as well as the wave field itself vary on time and space scales that are much larger than the variation scales of a single wave.

The governing equations of WaveWatch III include refraction and straining of the wave field due to temporal and spatial variations of the mean water depth and of the mean current (tides, surges etc.), when applicable. Parameterizations of physical processes (source terms) include wave growth and decay due to the actions of wind, nonlinear resonant interactions, dissipation ('whitecapping'), bottom friction, surf-breaking (i.e., depth-induced breaking) and scattering due to wave-bottom interactions. Wave propagation is considered to be linear. Relevant nonlinear effects such as resonant interactions are, therefore, included in the source terms (physics). Also, the model includes several alleviation methods for the Garden Sprinkler Effect, sub-grid representation of unresolved islands, and dynamically updated ice coverage.

The methodology followed for the wave analysis is similar to the wind characteristic study. The extreme wave values were derived by calculations based on methods such as Peak-Over-Threshold, block maxima distribution, Weibull, GEV, GPD. The basic method consists of fitting a theoretical 3-parameter distribution to an empirical distribution yielded by magnitude data (speed or height).

The methods used for the derivation of extremes include the extrapolation of the theoretical distribution to a list of decreasing probability values. The parameters used for the theoretical distributions are the shape, scale and location, which were yielded by maximum-likelihood between the empirical and theoretical distributions. The method to determine these parameters consisted of calculating the shape and scale in a wide set of locations and then to retain from all obtained triplets the one that best satisfies a goodness-of-fit criterion between the 2 distributions. The goodness-of-fit coefficient that needed to be minimized was the maximum of the distance between empirical and theoretical distributions. Moreover, in order to focus the analysis on the upper distribution tail only, the criterion was restricted to the upper 99% percentile of the empirical distribution.

For the wave analysis the following parameters were calculated:

- Significant Wave Height (HS m). Significant wave height is the average height of the highest one-third (33%) of all waves occurring over a given period.
- Primary Peak Wave Period (TP s). The primary peak wave period is the time (in seconds) it takes for two consecutive crests of the most energetic wave system to pass a single point.
- Primary Peak Wave Direction (compass degree with "coming from" convention).

The wave significant height and direction occurrence (%) for the entire time series and monthly periods (during January 2015 – December 2024) for the study area can be seen in Table 2-4 and Table 2-5.

Table 2-4: Yearly and monthly wave HS occurrence [%] at "ASOPUS-1A" (Source: SAT-OCEAN wave statistics report, 2026)

HS (M)	YRL	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0.00 - 0.50	38	1.58	1.98	2.17	2.95	3.81	4.75	3.99	4.68	4.13	3.42	2.33	2.21
0.50 - 1.00	31	2.46	1.88	2.94	2.71	2.86	2.4	3.03	2.78	2.54	2.7	2.23	2.49
1.00 - 1.50	16.84	2.03	1.55	1.71	1.61	1.19	0.78	1.18	0.91	1.04	1.52	1.64	1.69
1.50 - 2.00	7.84	1.2	1.14	0.86	0.64	0.41	0.25	0.26	0.12	0.4	0.53	1.02	1
2.00 - 2.50	3.48	0.7	0.57	0.41	0.2	0.16	0.03	0.02	0	0.1	0.17	0.49	0.61

HS (M)	YRL	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2.50 - 3.00	1.58	0.3	0.31	0.22	0.08	0.04	0	0.01	0	0.01	0.1	0.24	0.27
3.00 - 3.50	0.72	0.13	0.15	0.11	0.01	0.01	0	0	0	0	0.02	0.17	0.11
3.50 - 4.00	0.37	0.05	0.09	0.05	0.01	0	0	0	0	0	0.02	0.07	0.08
4.00 - 4.50	0.11	0.02	0.04	0.01	0.01	0	0	0	0	0	0	0	0.02
4.50 - 5.00	0.05	0.01	0.02	0	0	0	0	0	0	0	0	0.01	0
5.00 - 5.50	0.01	0	0	0	0	0	0	0	0	0	0	0.01	0
5.50 - 6.00	0.01	0	0	0	0	0	0	0	0	0	0	0.01	0
6.00 - 6.50	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 2-5: Yearly and monthly wave DP occurrence [%] at “ASOPUS-1A” (Source: SAT-OCEAN wave statistics report, 2026)

DIRECTION	YRL	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
N	2.02	0.09	0.07	0.07	0.18	0.07	0.3	0.39	0.23	0.25	0.2	0.08	0.09
NNE	0.11	0	0.01	0.01	0	0.01	0.03	0.01	0.01	0.02	0	0.01	0
NE	0.1	0.01	0.02	0.01	0	0.01	0	0	0.01	0.01	0.01	0.01	0.01
ENE	0.09	0	0	0	0.02	0.01	0.01	0	0.01	0.01	0	0.01	0.01
E	0.06	0	0.02	0.01	0	0.01	0	0	0.01	0	0	0	0.01
ESE	0.13	0.01	0.02	0.02	0.01	0	0	0	0	0	0.01	0.01	0.04
SE	0.77	0.09	0.1	0.09	0.05	0.03	0.03	0.01	0	0.04	0.13	0.08	0.11
SSE	5.99	0.82	0.59	0.7	0.61	0.37	0.16	0.07	0.05	0.34	0.79	0.88	0.6
S	14.74	0.95	1.49	1.57	1.58	1.59	0.72	0.7	0.6	0.64	1.8	1.92	1.17
SSW	10.57	1.27	1.01	1.14	1.06	0.96	0.48	0.17	0.27	0.48	1.02	1.41	1.3
SW	14.52	1.12	1.1	1.33	1.23	1.54	1.35	0.91	0.93	1.72	0.96	1.2	1.11
WSW	4.82	0.14	0.3	0.4	0.43	0.6	0.59	0.68	0.67	0.53	0.27	0.09	0.12
W	2.1	0.07	0.12	0.14	0.19	0.27	0.26	0.2	0.25	0.28	0.16	0.09	0.08
WNW	2.03	0.17	0.12	0.18	0.16	0.25	0.25	0.14	0.16	0.2	0.17	0.08	0.14
NW	13.23	1.11	0.88	1.03	0.93	1.13	1.45	1.09	1.54	0.99	1.01	0.81	1.25
NNW	28.73	2.61	1.91	1.79	1.75	1.64	2.58	4.11	3.72	2.71	1.94	1.53	2.45

The wave characteristics in the study area are presented through rose diagrams for every month (Figure 2-39) and for the entire year (Figure 2-40) based on the abovementioned data. Waves at the exploration well Asopus-1A appear to occur predominantly from NNW with significant heights less than 1m. During months October to April, the occurrence of waves with significant height higher than 3.5m is more likely, especially in February, November and December. Waves with such significant heights can occur from the NNW, S and SSW.

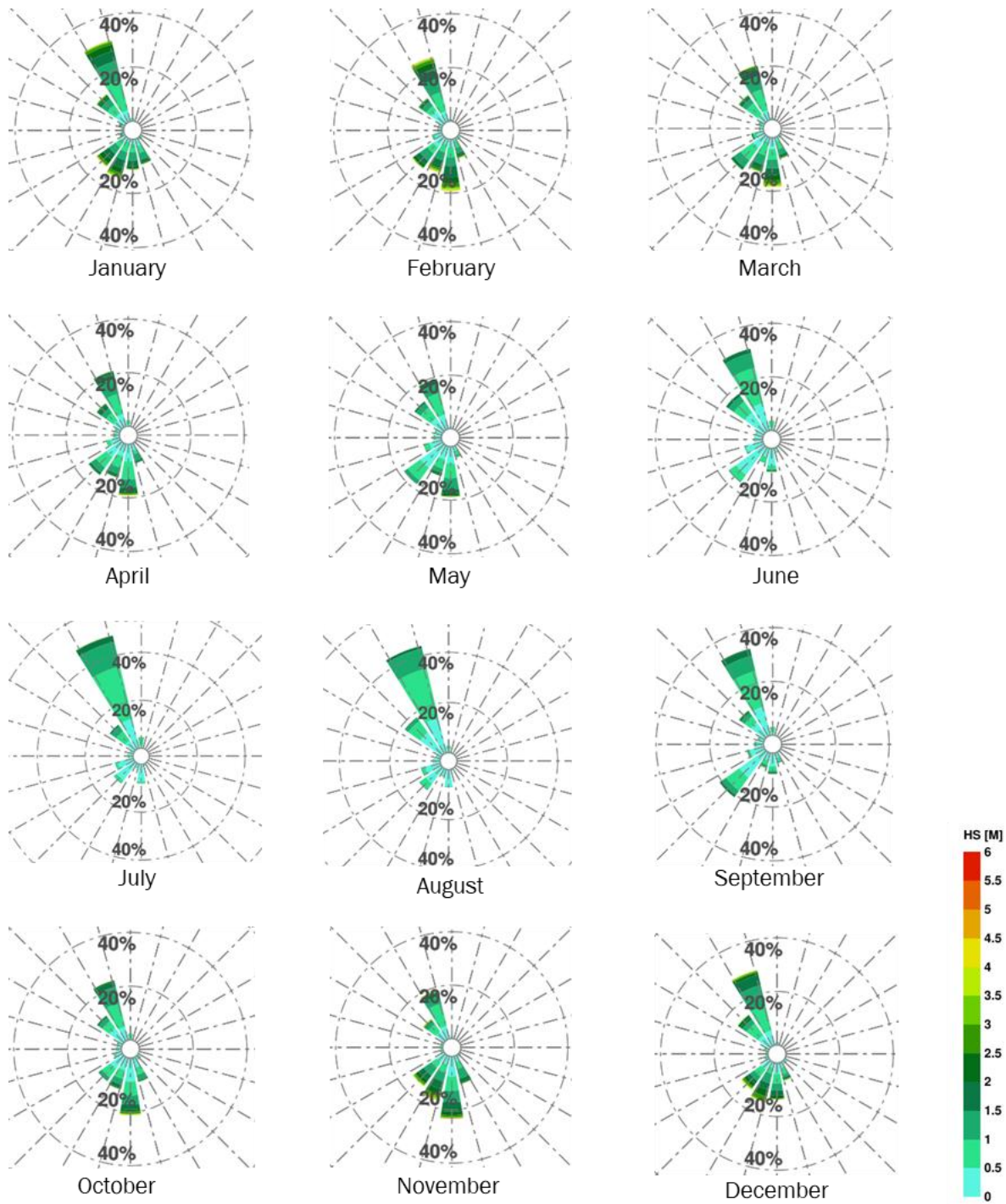


Figure 2-39: Monthly wave significant height (HS) and direction frequency (%) at "ASOPUS-1A" at 10m above sea level. (Source: SAT-OCEAN wave statistics report, 2026)

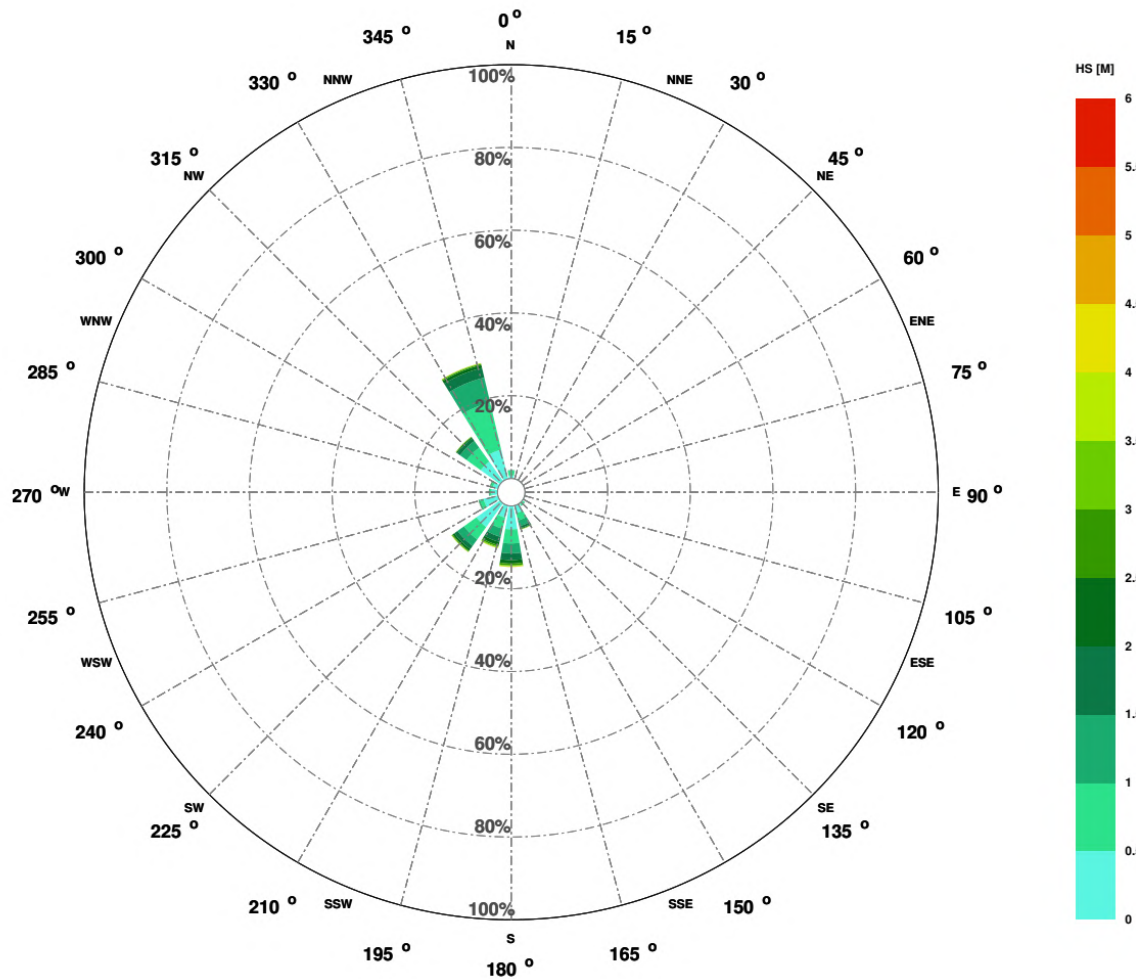


Figure 2-40: Wave significant height (HS) and direction frequency (%) at “ASOPUS1A” at 10m above sea level for the entire period. (Source: SAT-OCEAN wave statistics report, 2026)

2.2.4 Water column

The physical and chemical properties of the water column in the Eastern Ionian Sea display a highly stratified structure. A characteristic feature of the Mediterranean deep sea is its homothermy from depths of 300 – 500 m down to the bottom (Coll et al., 2010). In the eastern basin, deep-sea temperatures are relatively warm and vary between 13.5°C and 15.5°C, accompanied by a high salinity of 37.5–39.5 psu, unlike the Atlantic Ocean, there are no thermal boundaries in the deep sea of the Mediterranean (Coll et al., 2010). The water column profile features a seasonal pycnocline (where water density increases rapidly with depth) that typically develops from mid-spring to mid-fall, peaking in late August between depths of 30 to 80 m (Otero & Mytilineou, 2019). Beneath this, there is a permanent pycnocline in the open waters of the Ionian Sea between depths of 400-600 m, and below 600-700 m, density gradients are minimal, reflecting a stable deep-water environment (Otero & Mytilineou, 2019).

These local water column characteristics are defined by the broader regional hydrography of the Mediterranean Sea. At the basin scale, surface waters exhibit a distinct west-to-east gradient. Sea Surface Temperature generally increases from the north-west to the south-east, while Sea Surface Salinity is governed by the inflow of relatively fresh Atlantic Water that becomes progressively saltier as it travels

eastward (Figure 2-41). Below the surface layer, the Intermediate Water is defined by a subsurface salinity maximum, typically found between 250 and 600 m depth. At these depths, temperature and salinity also follow a regional gradient, reflecting the basin's general cyclonic circulation (Figure 2-42).

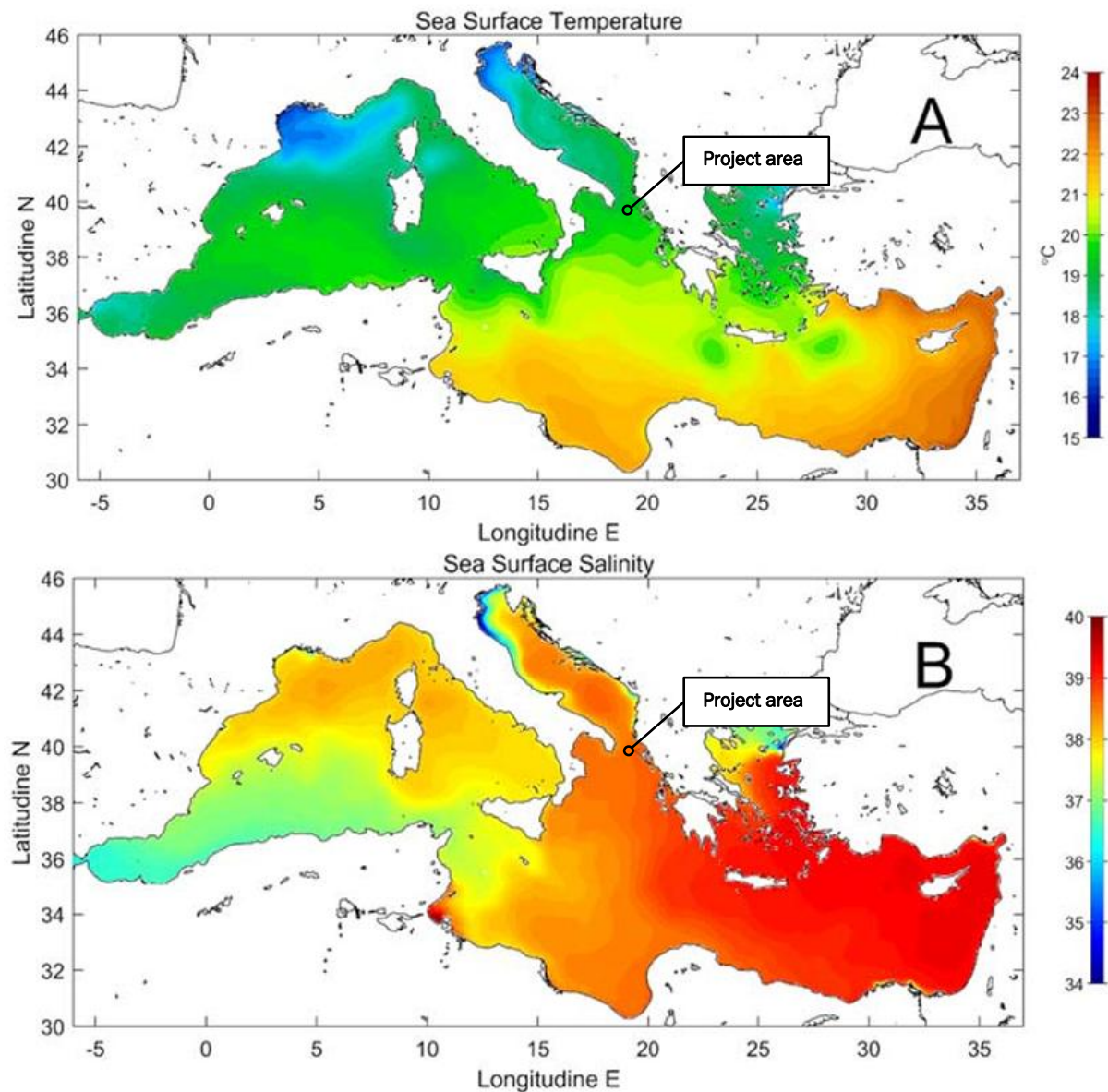


Figure 2-41: Basin-wide distribution at the surface of the Mediterranean Sea of (A) temperature and (B) salinity
(Source: Schroeder et al., 2023; based on CMEMS reanalysis)

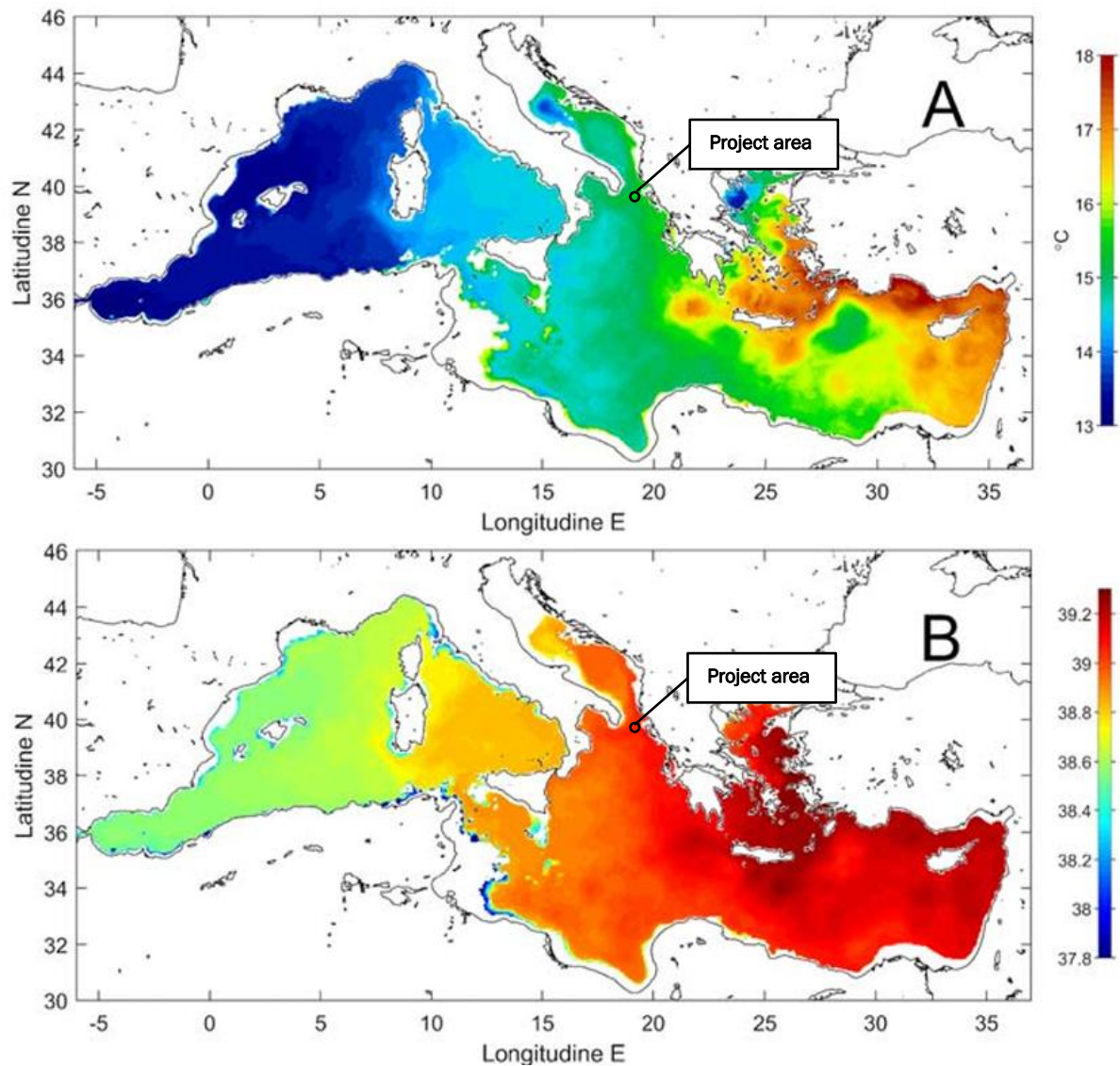


Figure 2-42: Basin-wide distribution at the depth of the salinity maximum (excluding the first 100 m) of (A) potential temperature and (B) salinity (Source: Schroeder et al., 2023; based on CMEMS reanalysis).

The Adriatic Surface Water (ASW) flows towards the Ionian Sea and influences the surface characteristics of Ionian water, such as salinity. Moreover, it has been found that the average salinity in the Northern Ionian and the South Adriatic Sea varies on a decennial scale, indicating that the Adriatic and Ionian oceanographic parameters change in parallel. Bensi et al. (2016), after analyzing data collected between 2006-2014 from three observatories, found that in the northern Ionian Sea, thermohaline variability is associated with the periodical reversals of the North Ionian Gyre (NIG). Salinity in this region increases when the NIG is anticyclonic and vice-versa. Moreover, the decennial variability of salinity and nutrients and the effects of the Bimodal Oscillating System (BiOS) have been studied by Civitarese et al. (2010), who confirmed that such variations in concentrations occur in the region of the northern Ionian Sea due to the effects of the BiOS. As shown in Figure 2-43, an increase in the 200-800 m average salinity in the South Adriatic occurred between 1986 and 1989 (from 38.6 to 38.72) and a decrease occurred between 1989-1996 (from 38.72 to 38.65). A further increase occurred after 1996 until 2005 (38.65-38.78) and another decrease occurred

between 2005-2008 (38.78-38.73). Similar decadal variations of nutrients (nitrates) appear to occur in the southern Adriatic and the northern Ionian Sea.

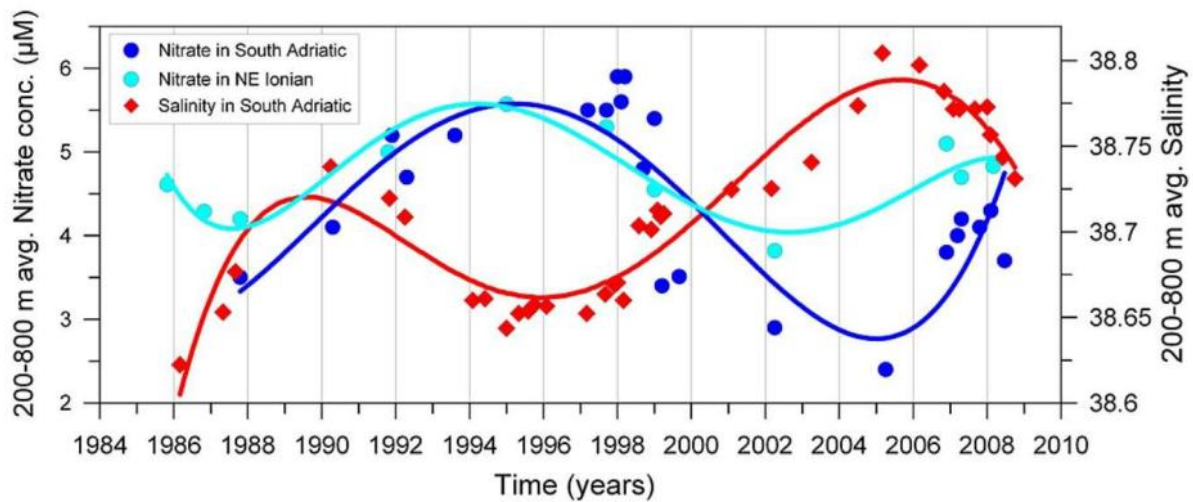


Figure 2-43: Time series of salinity in the S. Adriatic and Nitrate in the S. Adriatic and the NE Ionian

The region is generally oligotrophic; nutrient concentrations (such as phosphates, nitrates, and silicates) are depleted in the surface layer but increase rapidly in a transitional layer 100-200 m thick, eventually stabilizing in the deeper waters (Otero & Mytilineou, 2019). In addition, recent measurements of the Ionian and Adriatic temperature and salinity profiles have been performed by the National Institute of Oceanography and Applied Geophysics (OGS) and the Hellenic Centre of Marine Research (HCMR) with the use of Argo floats (Figure 2-44).

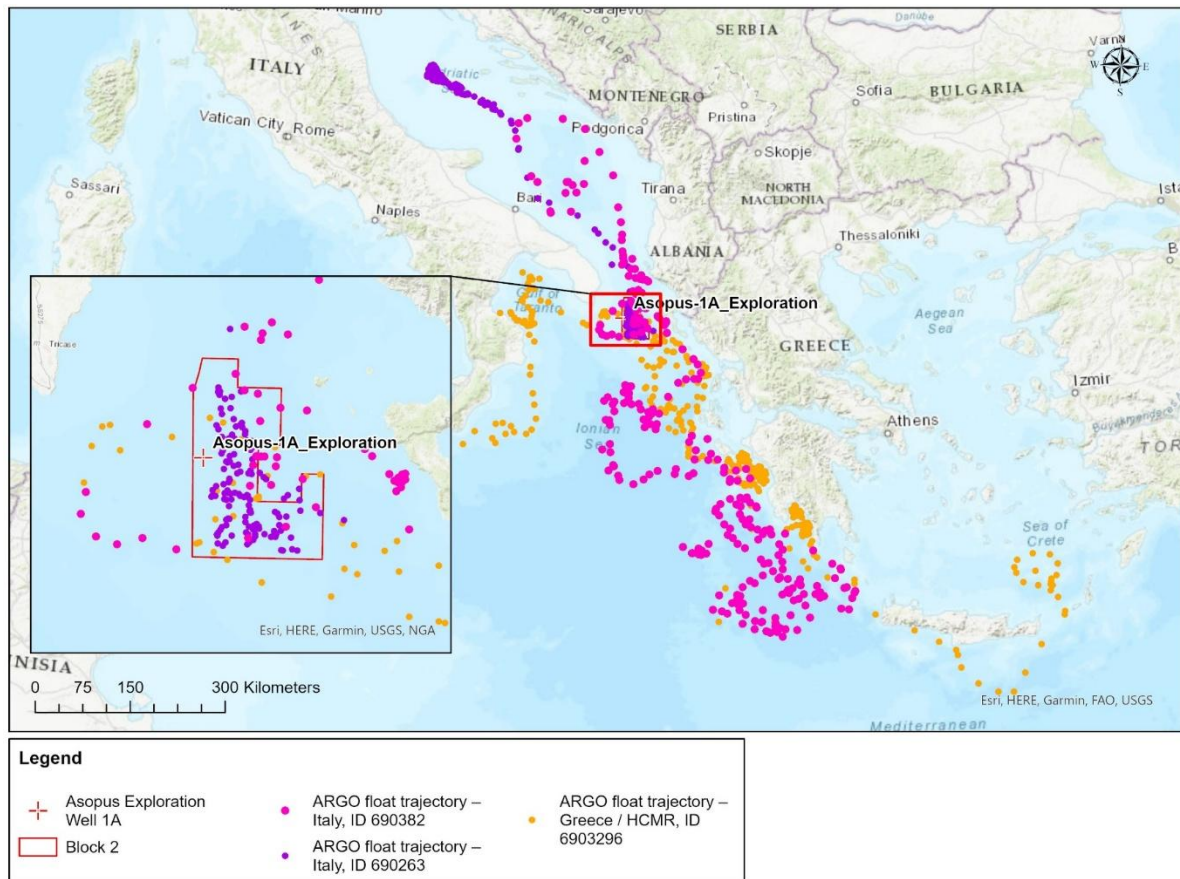


Figure 2-44: Location of physicochemical water measurements from OGS and HCMR (Source: <https://fleetmonitoring.euro-argo.eu/>)

More specifically, Argo Float 6903822 was launched on 01.06.2022 by OGS. It has performed measurements in 287 locations starting from the Hellenic Trench, towards the Ionian Sea and finally the Adriatic Sea. Argo Float 6903296 was launched on 13.09.2021 by HCMR. It has performed measurements in 350 locations starting from the south Aegean, towards the Hellenic trench, the Ionian Sea, and the Gulf of Taranto. Argo Float 6903263 was launched on 23.03.2019 by OGS. It has performed measurements in 444 locations, starting from the Adriatic Sea, towards the Ionian Sea where the last measurement took place (30.04.2025).

Pressure, temperature, salinity, and dissolved oxygen data were collected from several locations, including the area of Block 2. For each location, these measurements were performed across several depths. The Argo float data substantiate the documented stratification of the Ionian Sea. The Pressure/Temperature diagrams (Figure 2-45 to Figure 2-52) display a consistent pattern: a steady decrease in temperature within the upper 400 meters of the water column, stabilizing at approximately 13.8°C at greater depths, characteristic of the basin's deep homothermy.

Regarding salinity, the measurements from the three vessels in the area of Block 2 (Figure 2-48 to Figure 2-50) show that the lower levels of salinity (38.68 – 38.85 psu) occur where the pressure is lower (0-100 decibars), close to sea level. Salinity reaches its higher values (38.9 – 39.14 psu) at pressure levels between 100 and 400 decibars, corresponding to the flow of the Levantine Intermediate Water mass. For pressure levels higher than 400 decibars, salinity gradually decreases and stabilizes around 38.8 psu.

Dissolved Oxygen (DO) levels are intrinsically linked to depth (Figure 2-51 and Figure 2-52). DO levels are higher close to the sea level (lower pressure values) where oxygen is near saturation, and they gradually decrease as pressure increases (higher depth values). Following a decline in the transition layer, DO levels in the deep waters stabilize around 4.2 mL/L. This deep-water oxygenation is maintained in part by regional oceanographic processes, such as the Eastern Mediterranean Transient, which facilitated the advection of oxygenated waters into the basin's deeper layers (Otero & Mytilineou, 2022).

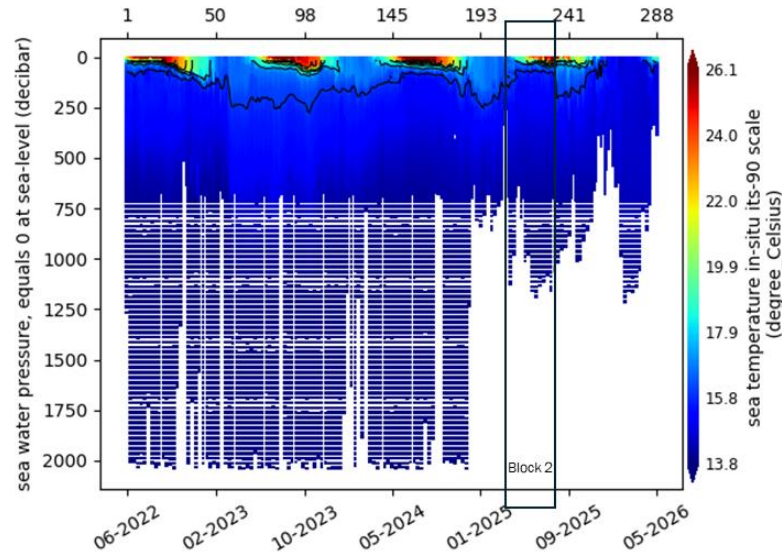


Figure 2-45: Pressure/ temperature diagram – Argo Float 6903822

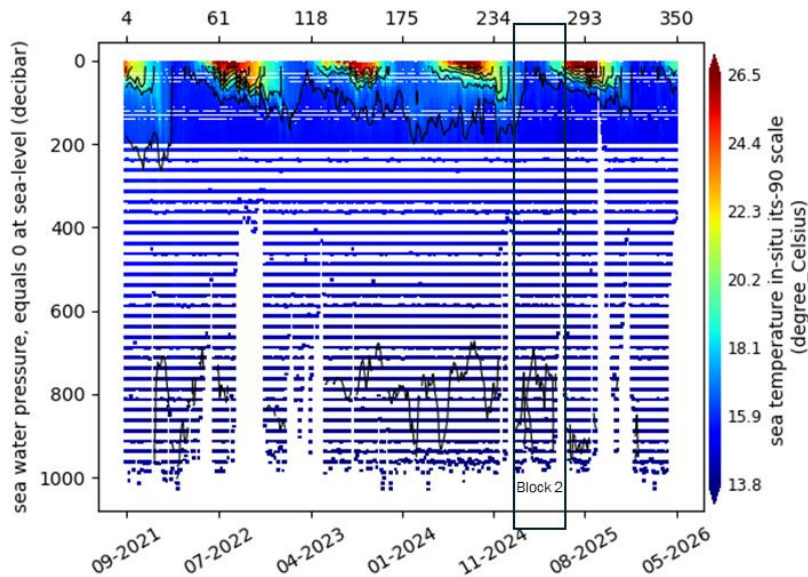


Figure 2-46: Pressure/ temperature diagram – Argo Float 6903296

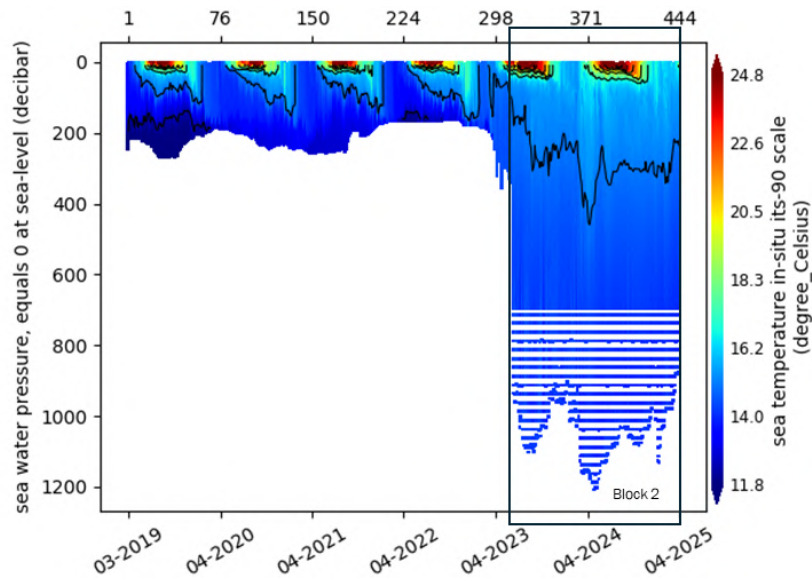


Figure 2-47: Pressure/ temperature diagram – Argo Float 6903263

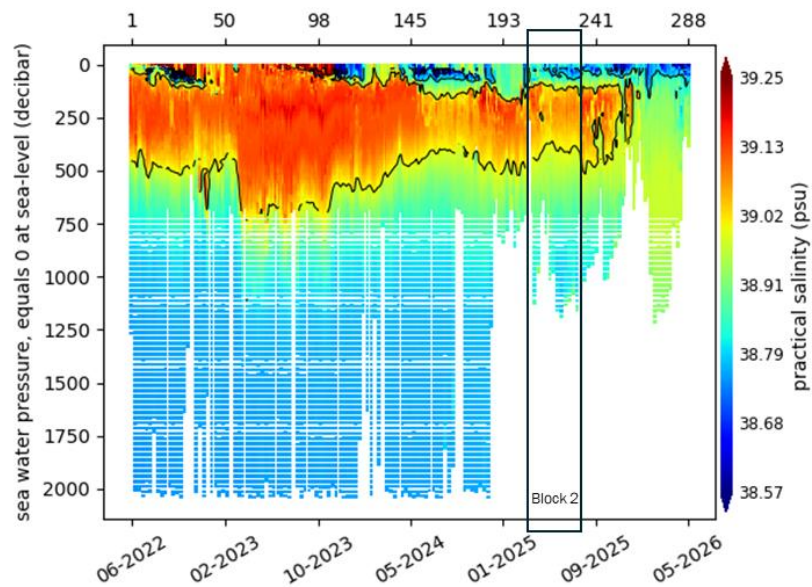


Figure 2-48: Pressure/ salinity diagram – Argo Float 6903822

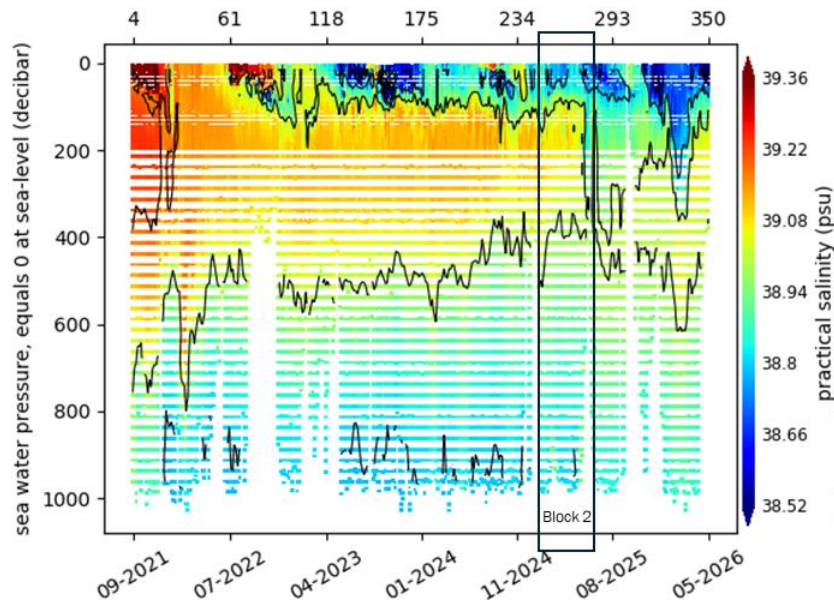


Figure 2-49: Pressure/ salinity diagram – Argo Float 6903296

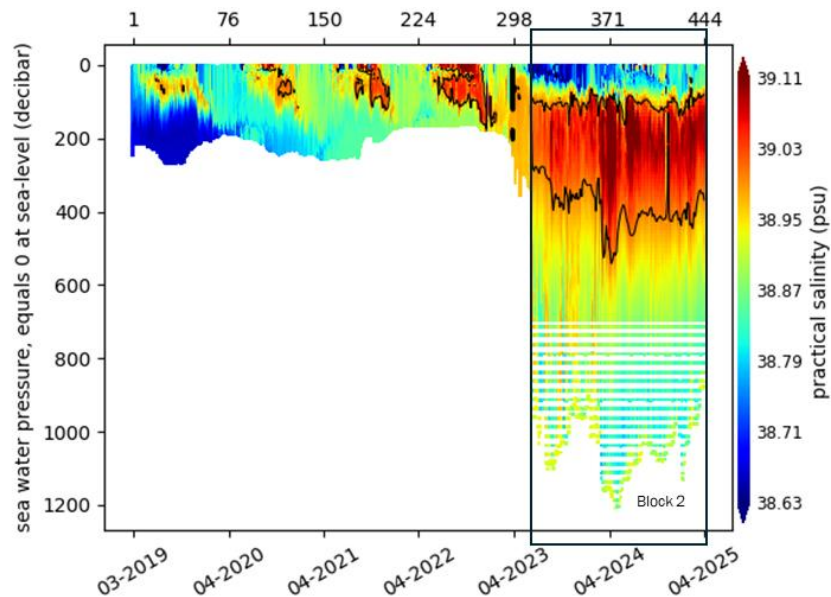


Figure 2-50: Pressure/ salinity diagram – Argo Float 6903263

The measurements that took place from the three vessels in the area of Block 2, show that the lower levels of salinity (38.68 – 38.85 psu) occur where the pressure is also lower (0-100 decibars) (close to the sea level). Salinity reaches its higher values (38.9 – 39.14 psu) for pressure levels between 100 and 400 decibars. For pressure levels higher than 400 decibars, salinity gradually decreases to 38.8 psu.

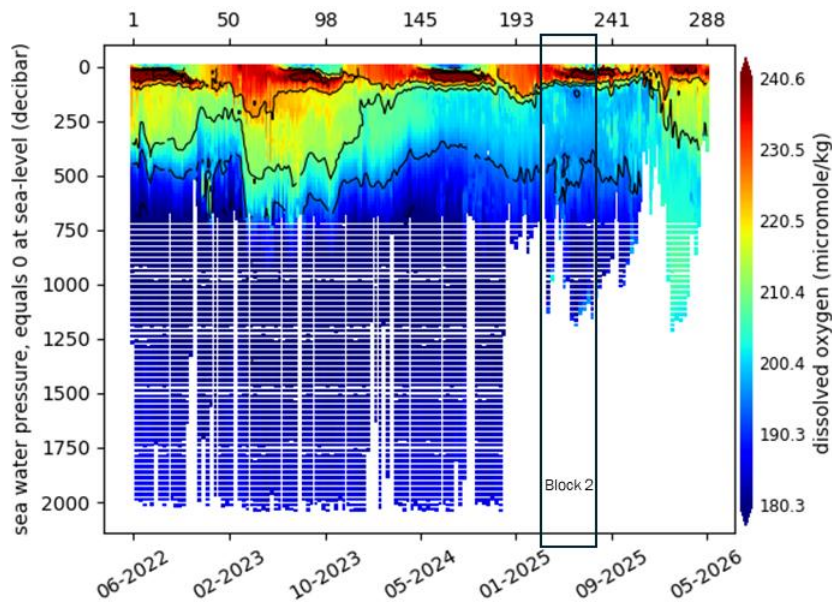


Figure 2-51: Pressure/ Dissolved Oxygen diagram – Argo Float 6903822

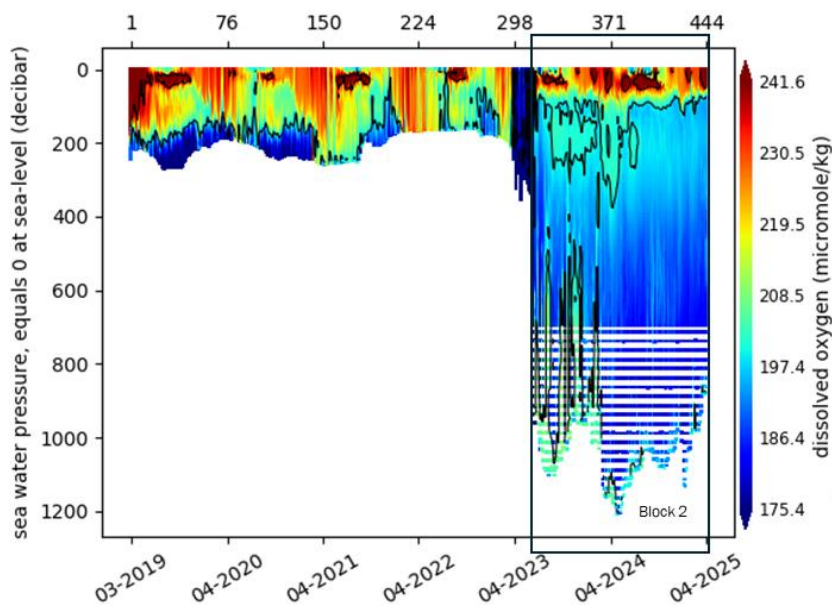


Figure 2-52: Pressure/ Dissolved Oxygen diagram – Argo Float 6903263

To understand the specific oceanographic conditions in the immediate area of the Asopus-1A exploration well, several measurement stations were selected close to the drilling location. Specifically, data from these seven localized stations (see Figure 2-53 for the locations) are presented in Figure 2-54 to Figure 2-60, detailing the variations in pressure, temperature, salinity, and dissolved oxygen down to the operational depths.

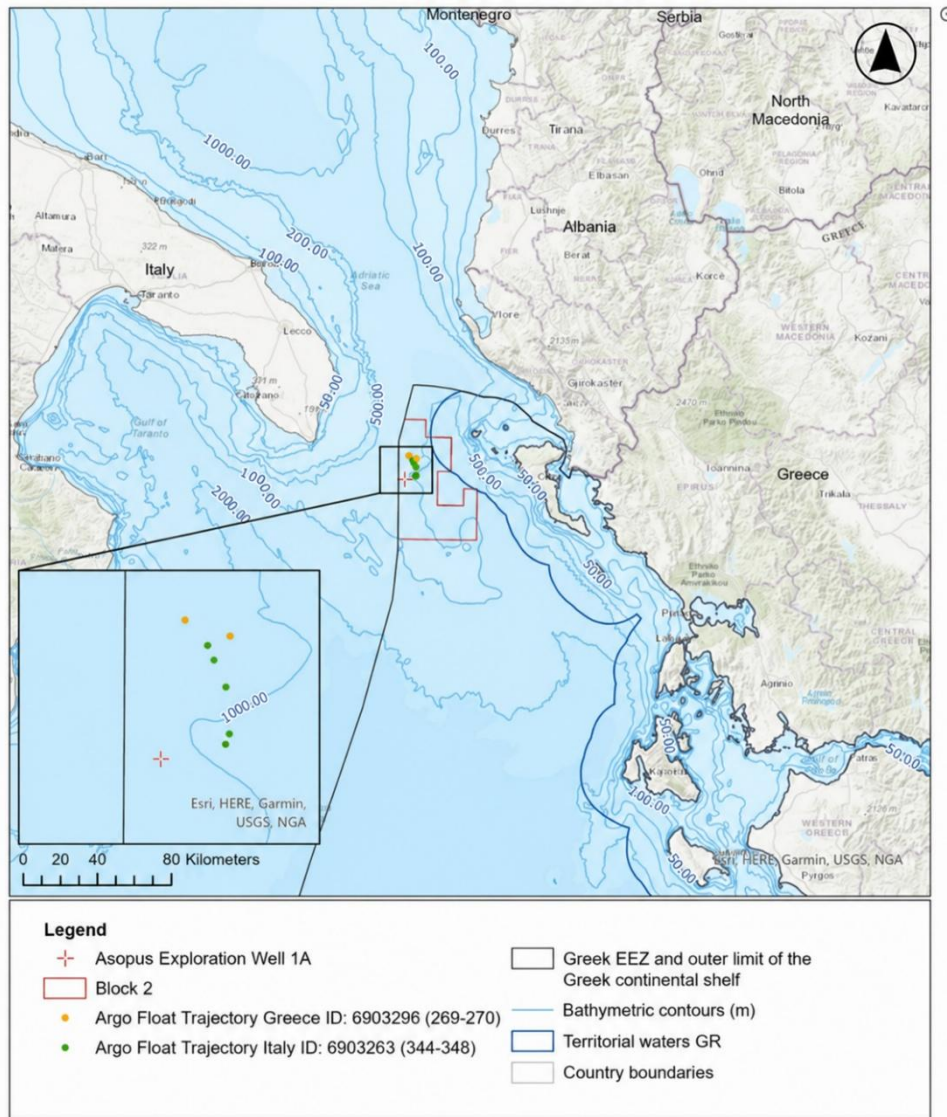


Figure 2-53: Selected Argo Float stations

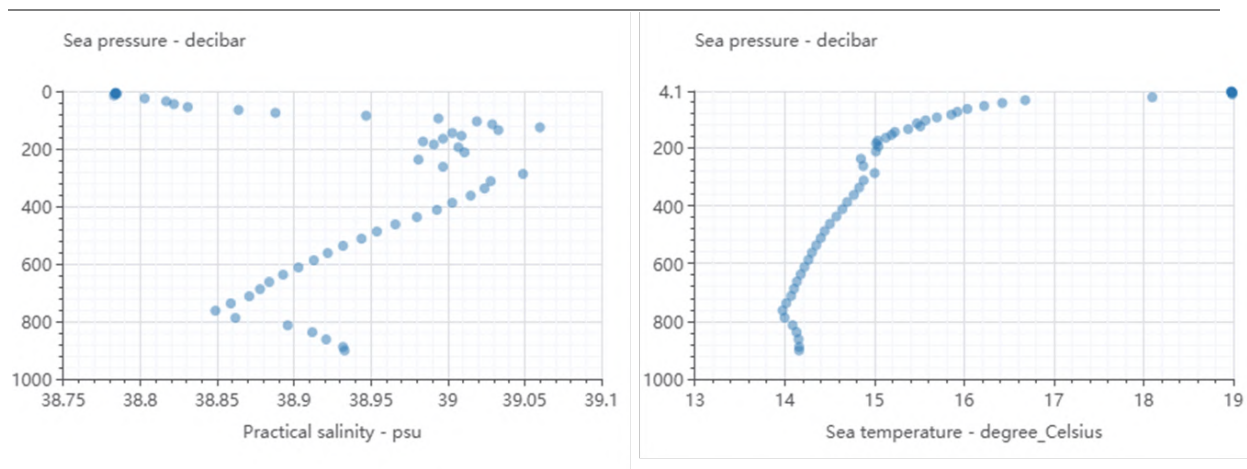


Figure 2-54: Pressure/ salinity and temperature diagram – Argo Float 6903296- Location 274

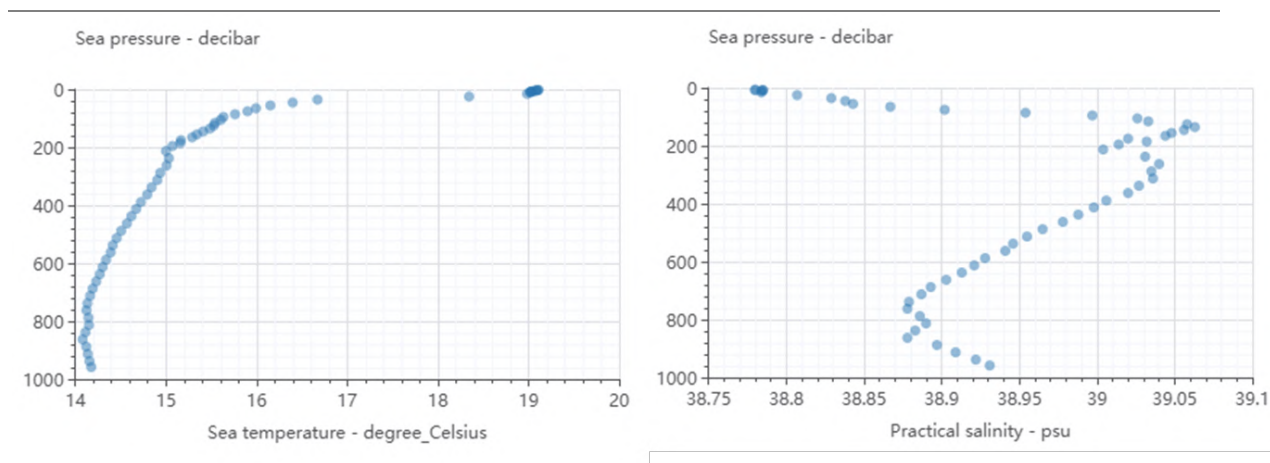


Figure 2-55: Pressure/ salinity and temperature diagram – Argo Float 6903296- Location 273

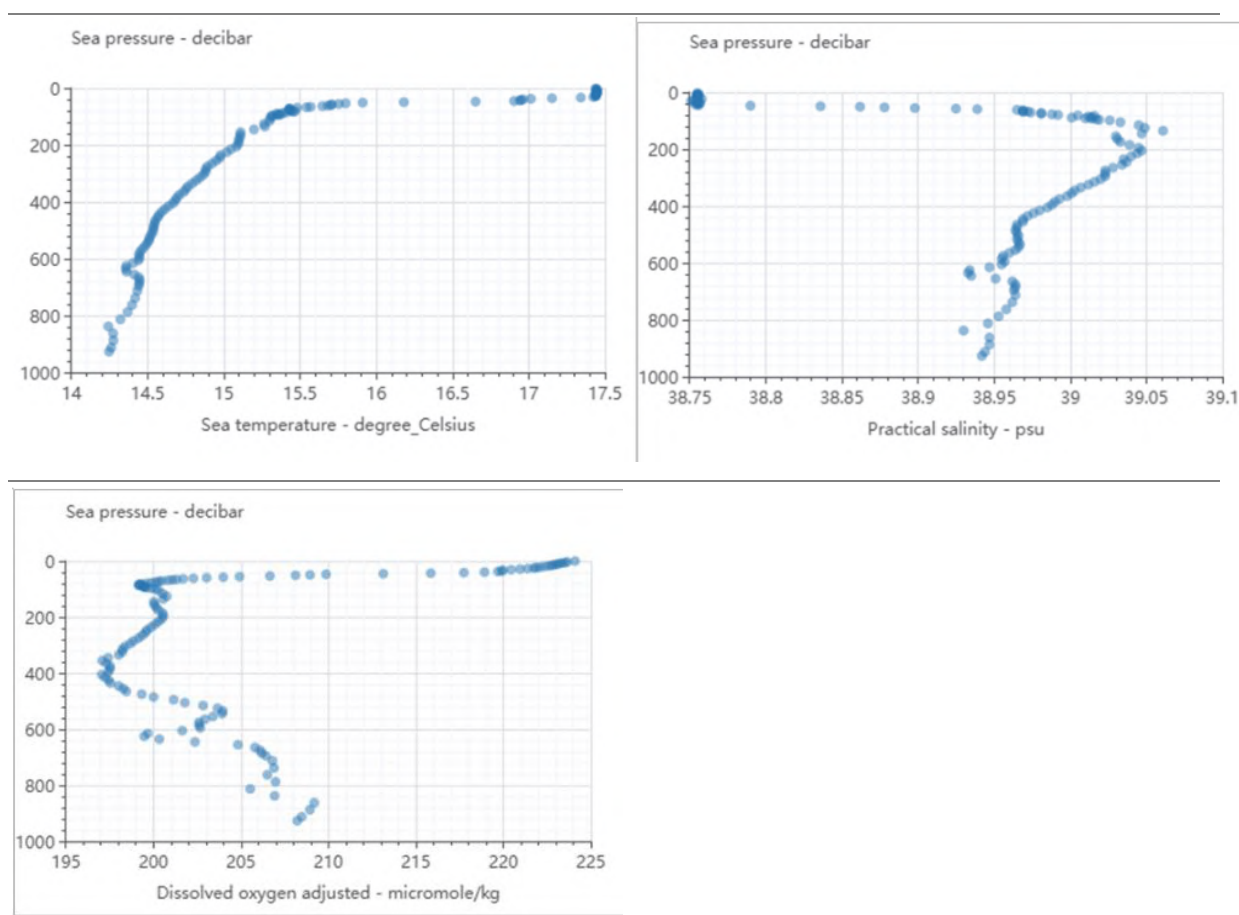


Figure 2-56: Pressure/ temperature, salinity and dissolved oxygen diagram – Argo Float 6903263- Location 344

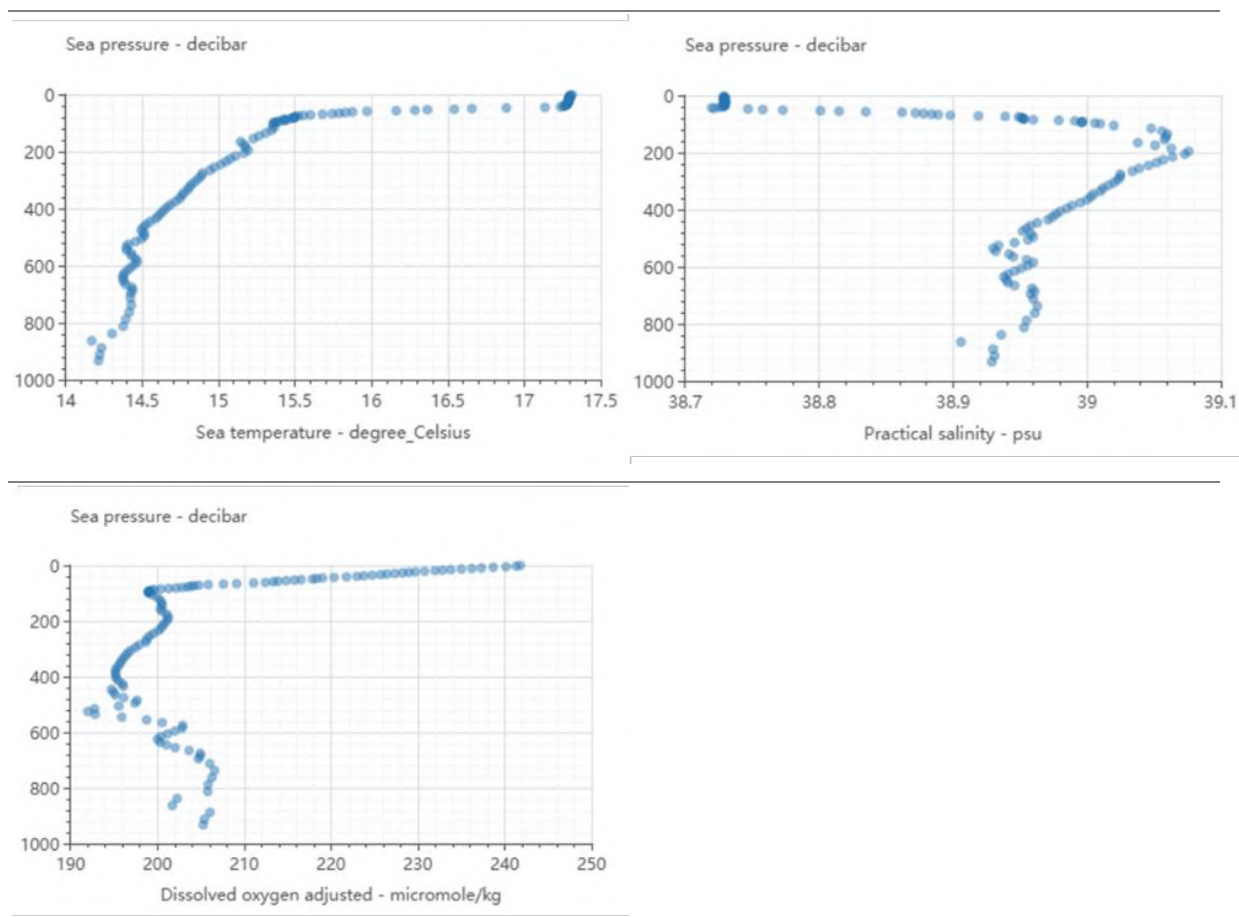
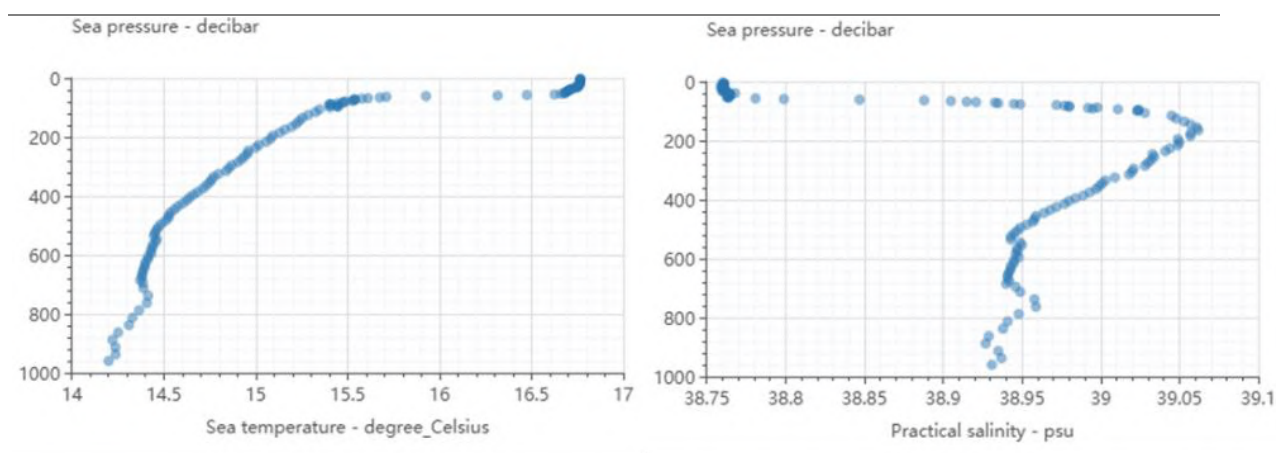


Figure 2-57: Pressure/ temperature, salinity and dissolved oxygen diagram – Argo Float 6903263- Location 345



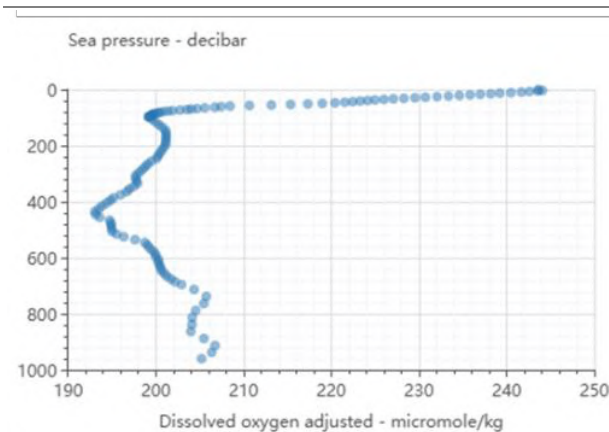


Figure 2-58: Pressure/ temperature, salinity and dissolved oxygen diagram – Argo Float 6903263- Location 346

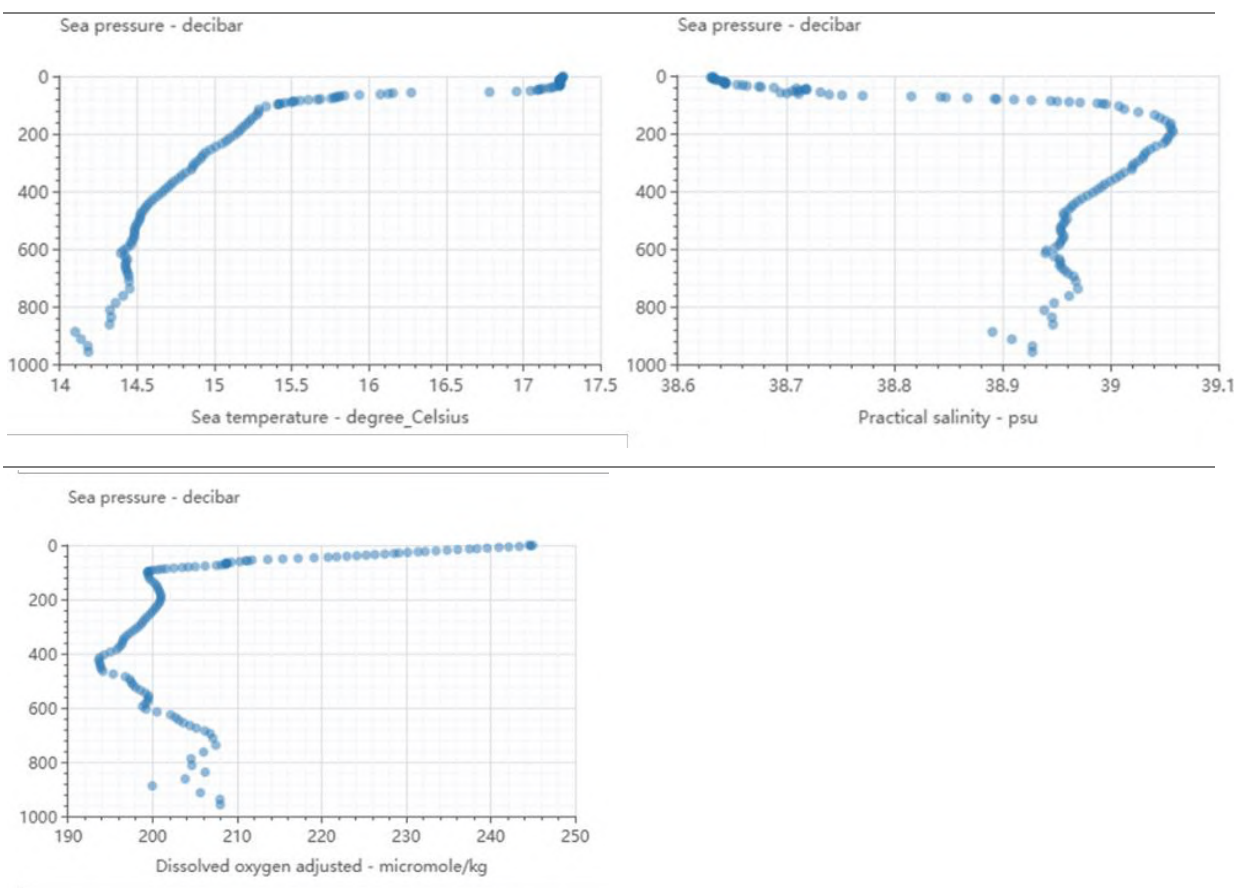


Figure 2-59: Pressure/ temperature, salinity and dissolved oxygen diagram – Argo Float 6903263- Location 347

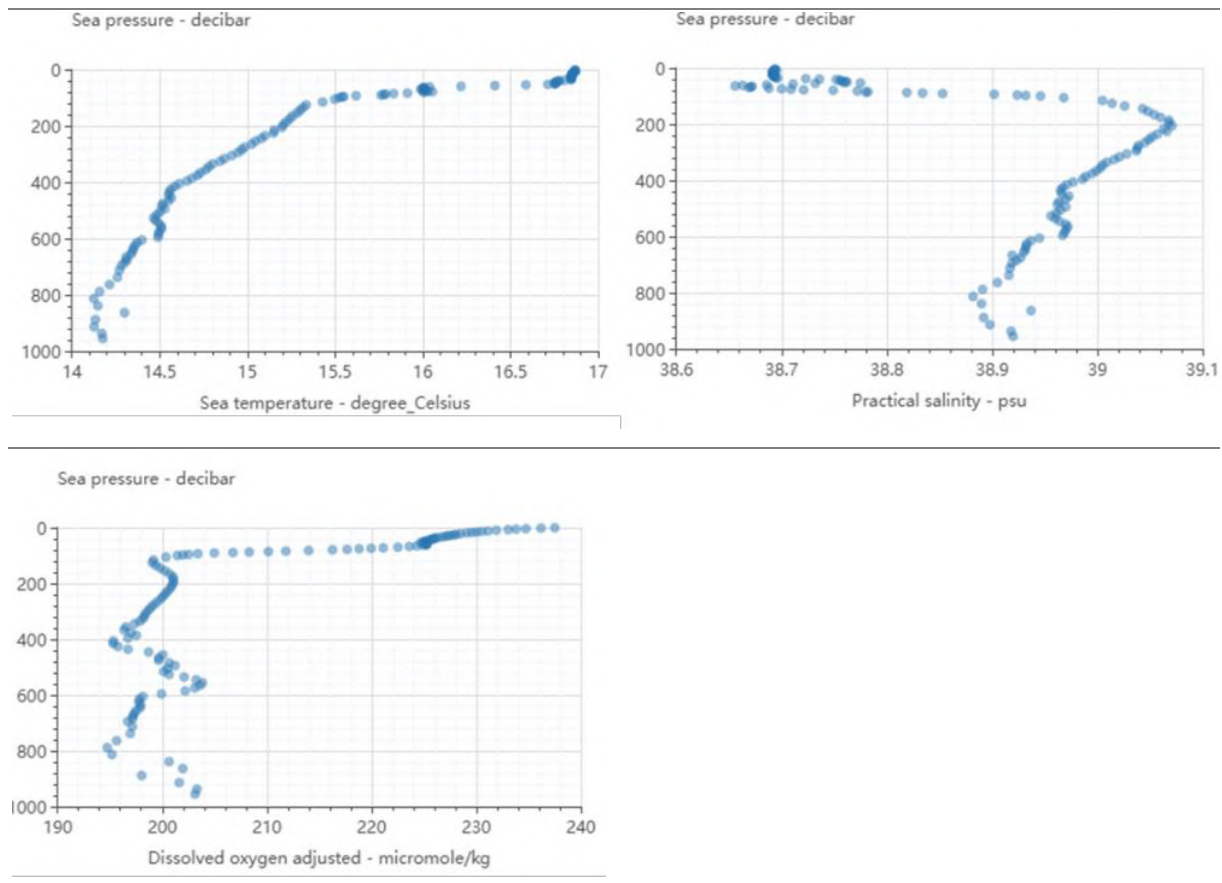


Figure 2-60: Pressure/ temperature, salinity and dissolved oxygen diagram – Argo Float 6903263- Location 348

A review of the multi-parameter diagrams from the seven stations within the buffer zone confirms that the local water column mirrors the wider regional stratification of the Ionian Sea. In the upper water layers, temperature, salinity, and dissolved oxygen display notable gradients, reflecting the presence of the seasonal and permanent pycnoclines. However, as the pressure increases beyond 400 to 600 decibars (corresponding to greater depths), these parameters gradually lose their variability. The data demonstrates a consistent stabilization in the deeper layers across all seven sampled locations, indicating a uniform deep-water mass with minimal lateral or vertical gradients in the immediate project vicinity.

At the specific location of the Asopus-1A well, situated at a water depth of 842.5 m, the oceanographic conditions are positioned below the permanent pycnocline. Based on the local station data, the deep-sea environment here is stable and isolated from seasonal surface influences. At this operational depth, the water column is characterized by the typical Eastern Mediterranean deep-sea homothermy, with temperatures remaining constant at approximately 13.8°C. Salinity stabilizes around 38.8 psu, and dissolved oxygen maintains a steady level of approximately 4.2 mL/L.

2.2.5 Seawater quality indicators

2.2.5.1 Marine Strategy Framework Directive

2.2.5.1.1 MSFD regions and subregions

Within the framework of the monitoring programs for the continuous assessment of the environmental status of marine waters, approved by Ministerial Decision No. 126635/2016 (B' 3799), and in accordance with the terms and conditions of Article 11 of Law 3983/2011 (A' 144), the competent authorities responsible for carrying out the required actions to monitor the quality of marine waters are designated as (Government Gazette 11/B/11.01.2017) are the Hellenic Centre for Marine Research (HCMR / ΕΛ.ΚΕ.Θ.Ε.) & the Institute of Marine Biological Resources and Inland Waters Fisheries (NAGREF – INALE / ΕΘΙΑΓΕ ΙΝΑΛΕ).

These authorities operate under the supervision of the General Secretariat for Natural Environment and Water of the Ministry of Environment and Energy, which is responsible for providing guidance and direction, coordinating, evaluating, and controlling their activities. Within the scope of its powers according to Articles 11 and 19 of Law 3983/2011, the General Secretariat is responsible for the design and coordinated implementation of monitoring programs for the quality of marine waters.

According to the MSFD, Article 4 explicitly establishes the geographical framework for the directive by defining the Marine Regions and Subregions.

Specifically, Article 4(1) divides European marine waters into four macro-regions: the Baltic Sea, the North-east Atlantic Ocean, the Mediterranean Sea, and the Black Sea. To account for the specificities of areas, Article 4(2) further subdivides the North-east Atlantic Ocean and the Mediterranean Sea into distinct subregions. For the Mediterranean Sea, these subregions are designated as the Western Mediterranean Sea, the Adriatic Sea, the Ionian Sea and the Central Mediterranean Sea, and the Levantine Sea. These designated regions and subregions serve as the fundamental environmental and administrative units for regional cooperation, monitoring, and the implementation of marine strategies across the European Union.

As shown in Figure 2-48, Block 2 falls within the “Ionian Sea and the Central Mediterranean Sea” and “Adriatic Sea” marine MSDF subregions. The Exploration Well Asopus 1A falls within the “Ionian Sea and the Central Mediterranean Sea” subregion in the wider “Mediterranean Sea” MSDF Region.

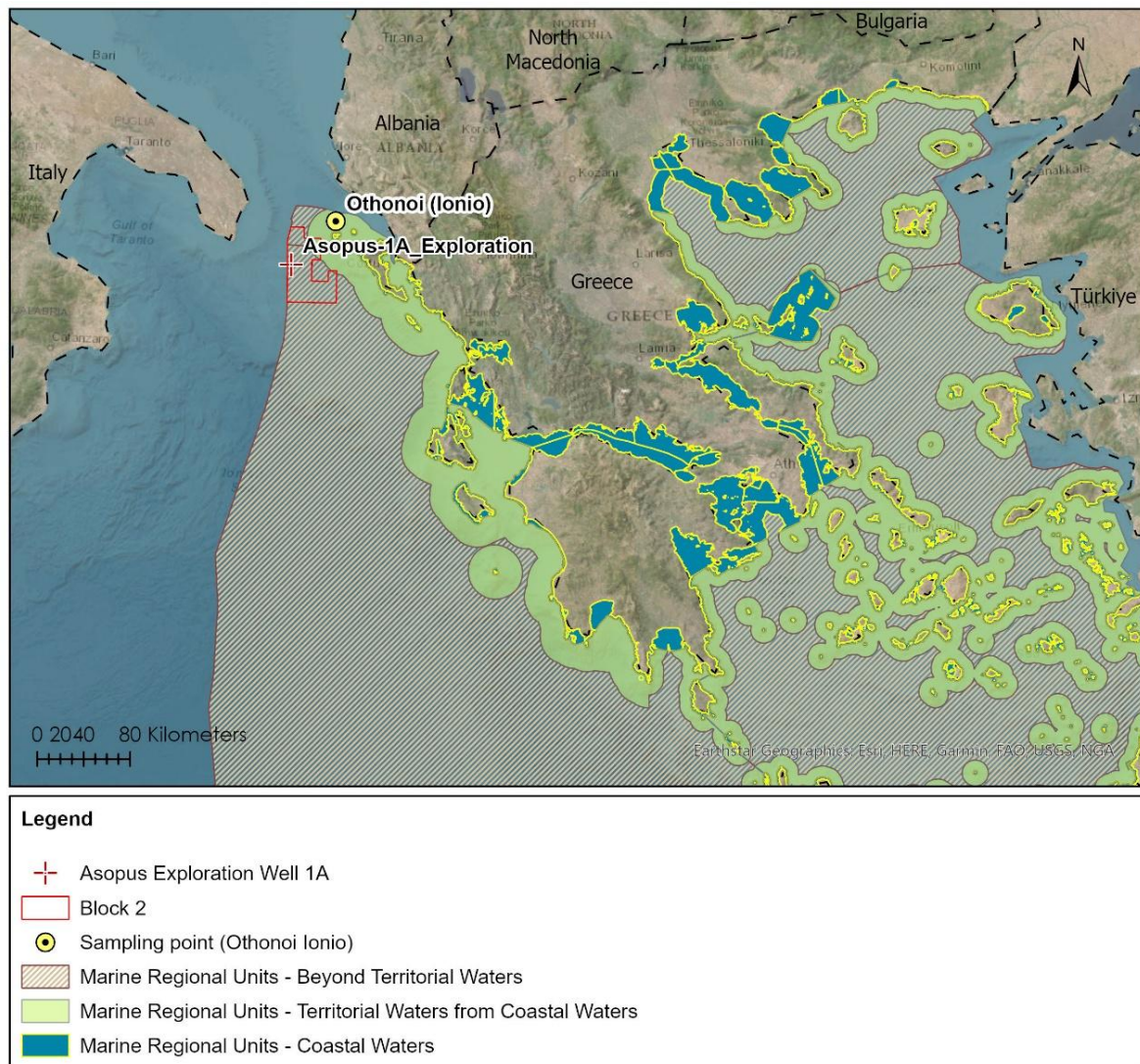


Figure 2-61: Marine regional units (MRUs, MSFD Greece)

2.2.5.1.2 MSFD indicators for good environmental status

According to Article 11 of the MSFD, Greece has the obligation to present a set of monitoring activities (monitoring programs) in the marine waters under its jurisdiction, to cover the requirements of the 11 Descriptors of the Good Environmental Status (GES), defined by the MSFD. The MSFD monitoring programs are a combination of new monitoring activities and ongoing monitoring activities, deriving from other legal obligations of the Member States, as are the marine Natura sites monitoring for the implementation of the Habitats & Birds Directives, the coastal water bodies monitoring for the implementation of the Water Framework Directive (WFD) and the Fisheries Data Collection Framework (DCF - COM 199/2008) implementing the rules of the EU Common Fisheries Policy (COM 1380/2013). As far as the new monitoring activities (specific to the MSFD implementation), each Member State must decide which of the 56 GES Criteria (or Attributes) of the 11 Descriptors proposed by the MSFD are suitable for the GES definition in the marine waters under its jurisdiction.

The Greek MSFD monitoring network is a combination of five existing networks of sampling sites and a new network built for the specific needs of the “open sea” aspects under MSFD (see Figure 2-62). The design of

these networks focuses on different environmental targets, but the synthesis can give the global evaluation of the GES in the Greek Seas.

Measurements of temperature, salinity and turbidity were foreseen in all sampling sites in the Greek territory during each monitoring or research project and are also foreseen in the WFD and MSFD monitoring programs.

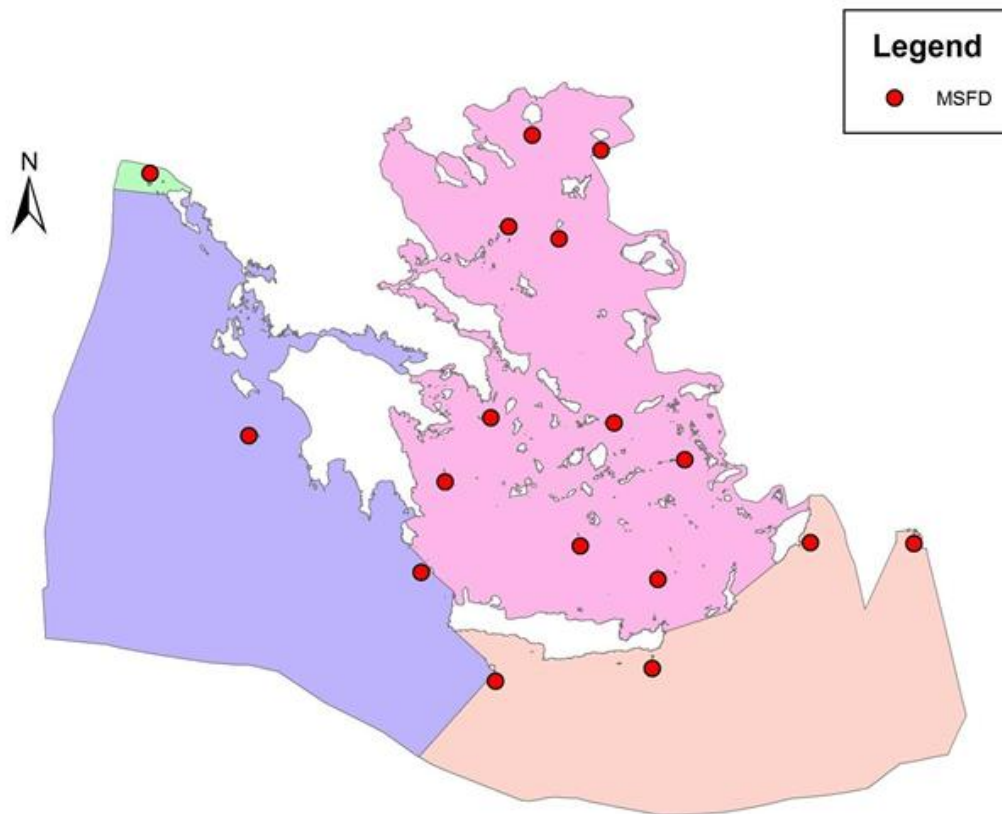


Figure 2-62: The sampling sites of the SFD “open sea” network of Greece

As shown in Figure 2-63, the sampling point nearest to the exploration well is “Othonoi (Ionio)”, located at coordinates 19.397145°E, 39.968071°N (WGS84, decimal degree).

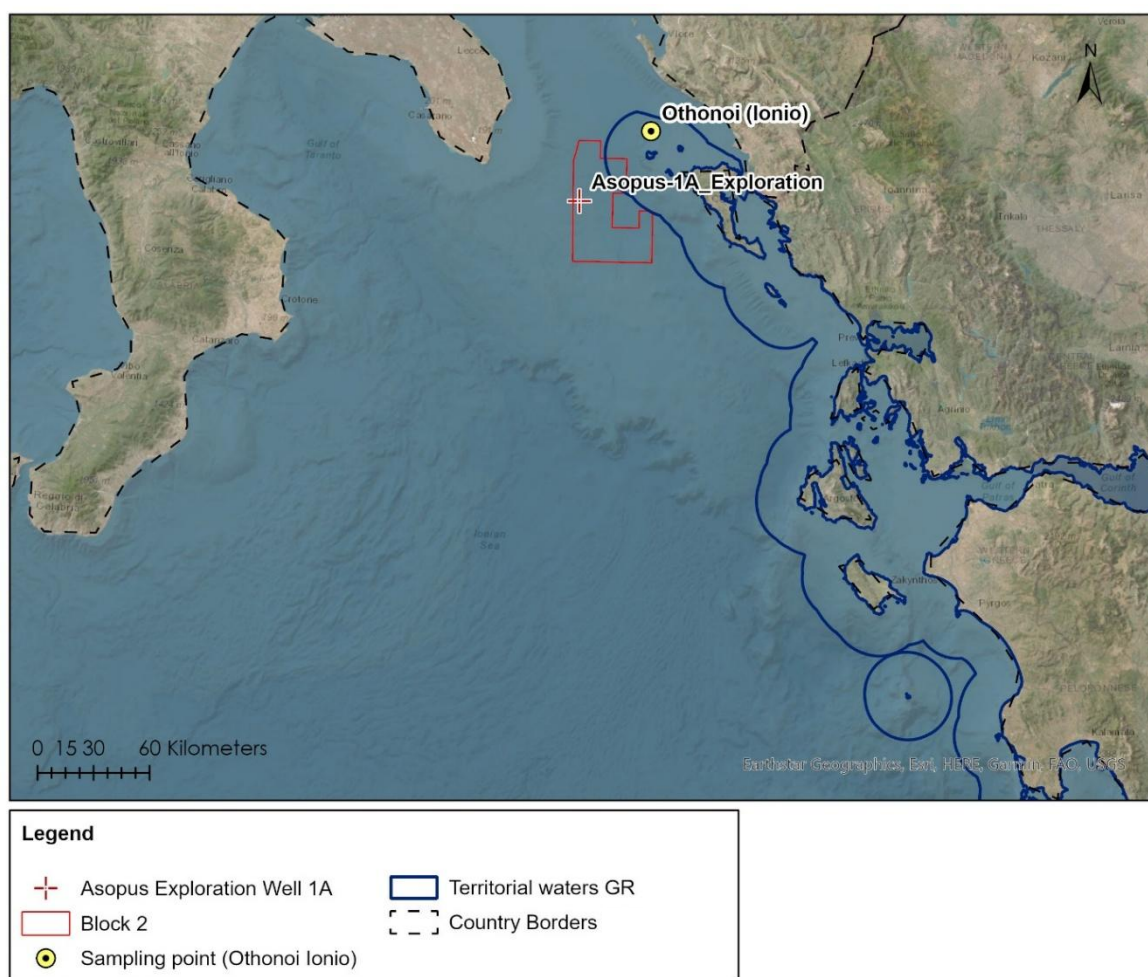


Figure 2-63: Othonoi (Ionio) MSFD sampling point in the broader area

GES is determined at the level of the marine region or subregion based on the qualitative descriptors defined by the MSFD, which are summarized in Table 2-6. The specific environmental monitoring parameters and assessment criteria for the “Othonoi (Ionio)” sampling station are detailed in Table 2-7.

Table 2-6: Qualitative descriptors for determining good environmental status (GES)

QUALITATIVE DESCRIPTORS	DESCRIPTION BASED ON MSFD
D1 – BIOLOGICAL DIVERSITY	Biological diversity is maintained. The quality and occurrence of habitats and the distribution and abundance of species are in line with prevailing physiographic, geographic and climatic conditions.
D2 – NON-INDIGENOUS SPECIES	Non-indigenous species introduced by human activities are at levels that do not adversely alter the ecosystems.
D3 – COMMERCIALY EXPLOITED FISH AND SHELLFISH	Populations of all commercially exploited fish and shellfish are within safe biological limits, showing an age and size distribution indicative of a healthy stock.
D4 – MARINE FOOD WEBS	All elements of marine food webs occur at normal abundance and diversity, at levels capable of ensuring long-term abundance of species and retention of their reproductive capacity.
D5 – EUTROPHICATION	Human-induced eutrophication is minimised, especially adverse effects such as biodiversity loss, ecosystem degradation, harmful algal blooms and oxygen deficiency in bottom waters.

QUALITATIVE DESCRIPTORS	DESCRIPTION BASED ON MSFD
D6 – SEA-FLOOR INTEGRITY	Sea-floor integrity is at a level that ensures the structure and functions of ecosystems are safeguarded and that benthic ecosystems are not adversely affected.
D7 – HYDROGRAPHICAL CONDITIONS	Permanent alteration of hydrographical conditions does not adversely affect marine ecosystems.
D8 – CONTAMINANTS	Concentrations of contaminants are at levels not giving rise to pollution effects.
D9 – CONTAMINANTS IN FISH AND SEAFOOD	Contaminants in fish and other seafood for human consumption do not exceed levels established by Community legislation or other relevant standards.
D10 – MARINE LITTER	Properties and quantities of marine litter do not cause harm to the coastal and marine environment.
D11 – ENERGY, INCLUDING UNDERWATER NOISE	Introduction of energy, including underwater noise, is at levels that do not adversely affect the marine environment.

Table 2-7: MSFD Environmental Monitoring Parameters and Assessment Criteria for Sampling Station “Othonoi (Ionio)”

DESCRIPT OR	SUBJECT / TOPIC	MPA NETWORK / STATION NAME	CRITERIA	SAMPLING FREQUENCY	WHAT IT IS / WHAT EACH CRITERION ASSESSES
D1	Biodiversity	Open sea / Othonoi (Ionio)	D1C6, D6C4, D6C5	D1C6: 2 times / 2 years, cold-war period. D6C4–D6C5: 1 time / 6 years	D1C6: Assesses the condition of the habitat type, including biotic and abiotic structure, functions, typical species composition, and relative abundance. D6C4: Assesses the extent of loss per habitat type due to anthropogenic pressures. D6C5: Assesses the extent of adverse impacts from anthropogenic pressures on the condition of the habitat type.
D2	Non-indigenous species	Open sea	D2C1	1 time / 6 years up to 1–2 times / 2 years	D2C1: Assesses the number of new non-indigenous species introduced into the natural environment through human activities per six-year assessment period.
D4	Elements of marine food webs	Open sea	D4C1, D4C2, D4C3	2 times per year / 2 years	D4C1: Assesses the diversity of each trophic guild, i.e., the species composition and relative abundance. D4C2: Assesses the balance of total abundance across trophic guilds. D4C3: Assesses the size-class distribution of individuals within trophic guilds.

DESCRIPTOR	SUBJECT / TOPIC	MPA NETWORK / STATION NAME	CRITERIA	SAMPLING FREQUENCY	WHAT IT IS / WHAT EACH CRITERION ASSESSES
D5	Eutrophication	Open sea	D5C1, D5C2, D5C3, D5C4, D5C5, D5C6, D5C7, D5C8	2 times per year – 2 times / 2 years. 1–2 times / 6 years	D5C1: Assesses nutrient concentrations in the water column. D5C2: Assesses chlorophyll-a concentrations. D5C3: Assesses the number, spatial extent, and duration of harmful algal blooms. D5C4: Assesses water column transparency. D5C5: Assesses dissolved oxygen concentration near the seabed. D5C6: Assesses the abundance of opportunistic macroalgae. D5C7: Assesses the composition, relative abundance, or depth distribution of macrophyte communities. D5C8: Assesses the composition and relative abundance of macrofaunal communities.
D6	Sea-floor integrity	Open sea	D6C3, D6C5	1 time / 6 years	D6C3: Assesses the spatial extent of each Broad Habitat Type adversely affected by physical disturbances, through changes in biotic and abiotic structure and functions. D6C5: Assesses the extent of adverse impacts from anthropogenic pressures on the condition of the habitat type.
D7	Alteration of hydrographical conditions	Open sea	D7C1, D7C2	D7C1: 2 times per year / 2 years. D7C2: 1 time / 6 years	D7C1: Assesses the spatial extent and distribution of permanent alterations to hydrographical conditions, such as changes in wave regimes, currents, salinity, and temperature. D7C2: Assesses the spatial extent of benthic habitats adversely affected due to permanent alterations of hydrographical conditions.
D8	Concentrations of contaminants	Open sea	D8C1 water, D8C1 sediments	Water: 2 times / 6 years. Sediments: 1 time / 6 years	D8C1: Assesses the concentrations of contaminant substances in marine waters and seabed sediments to determine whether they exceed regulatory or accepted thresholds.
D10	Marine litter	Open sea	D10C2	2 times per year / 2 years	D10C2: Assesses the composition, quantity, and spatial distribution of micro-litter on the coastline, surface water column, and seabed sediments.

2.2.5.1.3 Status of territorial (marine) waters under MSFD

The Nested Environmental Status Assessment (NEAT)¹ was applied to the Ionian Sea (Table 2-8) by HCMR in the framework of the EU project MEDCIS for testing different Spatial Assessment Units (SAUs), ecological

¹ The Tool “NEAT” (Borja et al., 2016) is an integrative method to assess the environmental status of the study area under the MSFD, 2008/56/EC. NEAT uses a combination of high-level integration of habitats and spatial units and an averaging approach, allowing for specification on structural and spatial levels, applicable to any geographical scale

components and indicators in the software. NEAT is a step forward compared to other assessment systems (Borja et al., 2016), ensuring a transparent implementation of aggregating various indicators in a comparable and systematic way. The NEAT was applied using data from the Greek coastal water bodies monitoring program (WFD monitoring 2012-2015). It should be noted that NEAT application for territorial (open sea) waters is an approximation based on coastal water body monitoring data. The ecological quality of territorial waters (up to 6 nm distance from the coast) is unknown, because usually the coastal water bodies do not exceed a distance of 1 nm from the coast with the exception of gulfs and bays.

Table 2-8: NEAT application results for representative Ionian coastal water bodies (HCMR, 2012-2015)

SAU (SPATIAL ASSESSMENT UNIT)	AREA (KM²)	TOTAL SAU WEIGHT	NEAT VALUE	STATUS CLASS	CONFIDENCE	BENTHIC FAUNA	BENTHIC VEGETATION
Greek coasts in the Ionian Sea	2510.82	0.285	0.67	Good	55.8	0.63	0.69
Inner Ionian archipelagos (Echinades)	1103.36	0.125	0.70	Good	84.3	0.71	0.65
Corfu (city)	20.15	0.002	0.63	Good	55.7	0.54	0.69
Eastern coasts of Corfu Sea	85.66	0.01	0.54	Moderate	75.8	0.53	0.51
Igoumenitsa Bay	8.74	0.001	0.56	Moderate	55.7	0.50	0.60
South Amvrakikos	271.31	0.031	0.28	Poor	87.4	0.16	0.36
North Amvrakikos	149.74	0.017	0.19	Bad	56.5	0.27	0.13

Table 2-9: NEAT application results per Marine Reporting Unit (MRU), (HCMR, 2012-2015)

COASTAL AND TERRITORIAL	PERCENTAGE IN NON-GES OVER TOTAL COASTAL & TERRITORIAL	NEAT VALUE	OVERALL TROPHIC STATUS
Ionian - Adriatic	2	0.677	Good
North Aegean	12	0.759	Good
Central Aegean	5	0.760	Good
South Aegean	0	0.791	Good
Levantine	0	0.837	High

2.2.5.1.4 MSFD reporting data review based on WISE/EIONET central data repository

A review of the MSFD reporting system was conducted using the Water Information System for Europe (WISE), including WISE Marine and the EIONET Central Data Repository, in order to retrieve the most recent and

(Uusitalo et al., 2016). The analysis provides an overall assessment for each case study area and a separate assessment for each of the ecosystem components included in the assessment. The final value has an associated uncertainty value, which is the probability of being determinately in a certain class status (Uusitalo et al., 2016).

officially reported marine environmental information available at EU level. This review aimed to assess the availability and spatial resolution of MSFD monitoring data relevant to the project area, as reported by EU Member States under the requirements of Directive 2008/56/EC.

Although the Greek MSFD monitoring documentation formally identifies Othonoi (Ionio) / ΟΠΘΣ 1 as an open-sea monitoring station and defines the applicable descriptors, criteria and sampling frequencies, the reviewed national MSFD reports do not provide publicly available, station-specific raw monitoring results or measured values for this individual sampling point. Instead, the available results are generally presented and interpreted at the broader marine subregion level, such as the Ionian Sea and Central Mediterranean / Ionian-Adriatic assessment area. Therefore, the Othonoi Station can be referenced as an official MSFD monitoring node relevant to the wider project area, but no site-specific monitoring dataset or analytical results for this exact point were identified in the reviewed reports.

Based on the reviewed Greek MSFD reports (Special Secretariat for Water, 2018) (retrieved from WISE EIONET), the results and Good Environmental Status (GES) assessments are not presented for the individual Othonoi (Ionio) / ΟΠΘΣ 1 sampling station. Instead, the available assessments are mainly presented at the broader marine subregion level, namely the Ionian Sea / Ionian-Adriatic assessment area.

Overall, the wider Ionian area appears to achieve Good Environmental Status (GES) for most of the assessed descriptors, although some data gaps and uncertainties remain.

- For Descriptor D1 – Biodiversity, available information indicates that the status of several species has improved, although favourable conservation status is not achieved for all species. For benthic habitats and biological quality elements, the Ionian-Adriatic area is generally assessed as being in GES.
- For Descriptor D2 – non-indigenous species, the reports indicate a decreasing trend in the introduction of new non-indigenous species during the 2012–2017 period in most Greek marine subregions, including the Ionian Sea.
- For Descriptor D3 – Commercial fish and shellfish, 10 out of 11 assessed fish stocks in the Ionian Sea were found to be in GES, although two of these assessments were based on low-confidence data. For one stock, assessment was not possible.
- For Descriptor D4 – Marine food webs, the available time series for the Ionian Sea, particularly for small pelagic fish such as anchovy and sardine, were too limited to allow a robust GES assessment.
- For Descriptor D5 – Eutrophication, the Ionian-Adriatic area is generally assessed as being in GES. Only approximately 2% of the water body area does not achieve GES, mainly corresponding to the Amvrakikos Gulf and Navarino Bay.
- For Descriptor D6 – Seafloor integrity, the available data suggest that most benthic habitats achieve GES. However, the assessment includes considerable uncertainty, as a significant proportion of the area remains classified as unknown due to limited data availability.
- For Descriptor D7 – Hydrographical conditions, there is no indication of widespread non-GES conditions in the Ionian area. The assessment is mainly based on case-specific information, and permanent hydrographical alterations are generally considered acceptable when their effects remain spatially limited.
- For Descriptor D8 – Contaminants, the available data indicate that Greek marine waters, including the Ionian Sea, generally achieve GES. Contaminant concentrations do not generally exceed the applicable environmental quality standards, with exceedances mainly associated with enclosed or semi-enclosed polluted gulfs.

- For Descriptor D9 – Contaminants in seafood, available data indicate that contaminant concentrations in edible tissues do not exceed the maximum levels established under EU legislation; therefore, GES is achieved where data are available.
- For Descriptor D10 – Marine litter, the Ionian-Adriatic area shows partial evidence of GES, particularly for beach litter. However, the overall assessment remains limited due to insufficient data for all marine litter criteria.
- For Descriptor D11 – Underwater noise, no robust GES conclusion can be drawn, as no official threshold values have been established for Greek marine waters for impulsive or continuous underwater noise.

In conclusion, the wider Ionian Sea / Ionian-Adriatic assessment area is generally considered to be in Good Environmental Status for several assessed MSFD descriptors, especially D3, D5, D8 and partly D1, D6 and D10. Nevertheless, important limitations remain for D4, due to insufficient time series, D6, due to areas of unknown status, D10, due to partial data coverage, and D11, due to the absence of established threshold values.

Based on the reviewed Italian MSFD documentation (ISPRA, 2020a; ISPRA, 2020b; Ministry of Environment, Land and Sea Protection, 2018a; 2018b) (retrieved from WISE EIONET), the assessment of marine environmental status is not presented at the level of individual sampling points, but mainly at the level of Marine Reporting Units (MRUs), corresponding to the Italian marine subregions. For the purposes of the present assessment, the relevant Italian reporting unit is the Ionian Sea and Central Mediterranean Sea subregion (“Mar Ionio e Mediterraneo Centrale” / ISCMS).

The Italian MSFD reports indicate that the available monitoring and assessment information for this subregion varies significantly between descriptors. For some descriptors, such as eutrophication, contaminants and marine litter, monitoring datasets are available and include data from EIONET/WFD, ARPA-MSFD and CNR-MSFD programmes. However, the reports frequently note limitations related to spatial coverage, temporal coverage and the absence of sufficiently long time series, which restrict the possibility of drawing fully robust GES conclusions for all criteria.

For commercial fish and shellfish (Descriptor 3), the Ionian Sea and Central Mediterranean subregion shows a clear pressure signal, as none of the assessed stocks were found to be within safe biological limits, while a large proportion of stocks remained not formally assessed. For food webs (Descriptor 4), the available information was insufficient to determine whether GES had been achieved. For eutrophication (Descriptor 5), the monitoring network includes coastal and marine stations from EIONET, ARPA-MSFD and CNR-MSFD, but a fully threshold-consistent assessment was limited by the absence of sufficiently long time series for some parameters, including chlorophyll-a.

For contaminants in the marine environment (Descriptor 8) and contaminants in seafood (Descriptor 9), the Italian reports identify limitations in data coverage. Nevertheless, the available data generally do not indicate widespread critical conditions, although mercury exceedances in biota are noted for Descriptor 8. For marine litter (Descriptor 10), monitoring data are available for beach litter, floating litter, seafloor litter and micro-litter. In the Ionian Sea and Central Mediterranean subregion, plastics represent the dominant component of marine litter, and specific seafloor litter data are available for GSA19, corresponding to the Ionian Sea. For underwater noise (Descriptor 11), only exploratory acoustic measurements were available, and no robust GES conclusion could be drawn due to the absence of established baseline levels and threshold values.

Overall, the Italian MSFD documentation provides useful subregional information for the Ionian Sea and Central Mediterranean Sea, but it does not provide a complete, station-specific GES assessment. The available evidence supports a cautious interpretation: some descriptors are supported by monitoring data, while others remain affected by methodological limitations, insufficient spatial or temporal coverage, or the absence of agreed threshold values.

2.2.5.2 Water Framework Directive

2.2.5.2.1 Methodology for the assessment of surface water quality under WFD

The WFD requires each surface water body to be classified in terms of its ecological and chemical quality. For those water bodies not designated as heavily modified or artificial, this ecological quality is described in terms of “Ecological status”. According to the WFD, the ecological status of a water body is an overall expression of the structure and function of its biological community, which should consider natural physiographic, geographical and climatic factors, together with physical and chemical conditions, including those resulting from human activities. This is an expression of the quality of the structure and functioning of surface water ecosystems as indicated by the condition of several quality elements. Chemical status is either “good” or “Failing to achieve good status”.

Ecological status and Chemical status are combined to provide an assessment of overall surface water status. The following diagram illustrates how these various elements are combined and how the “one-out, all-out” principle is applied. The relevant quality elements for classifying a particular water body depend on whether the water body is a river, estuary or coastal water body. Standards and condition limits define the class boundaries applicable to the different quality elements, and these are set out in the WFD Guidelines (2016).

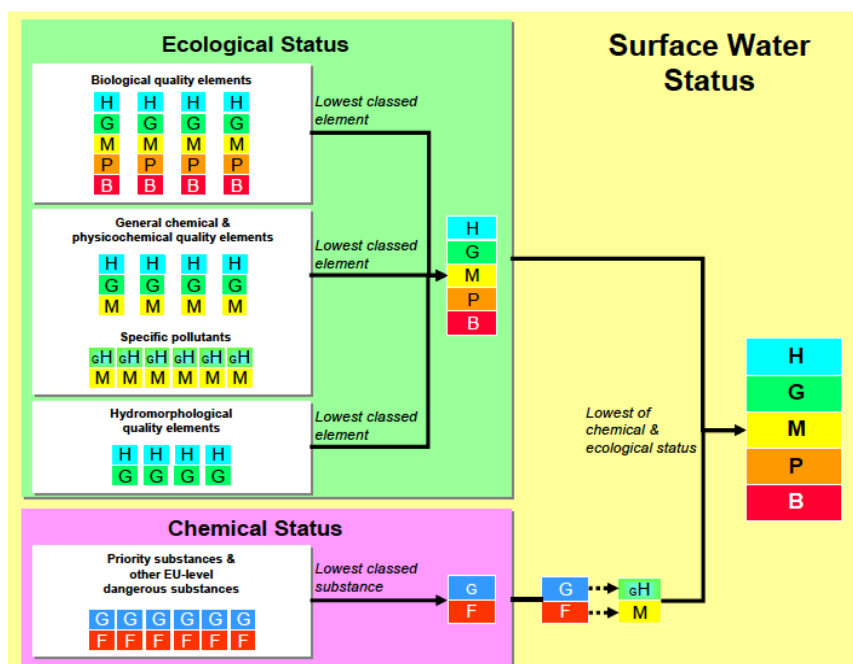


Figure 2-64: Methodology for determining surface water status

Table 2-10: Definition of Ecological and Chemical Status of surface water bodies

ECOLOGICAL STATUS	DEFINITION
High	No disturbance in the structure and function of the communities, or only minor deviations
Good	Low levels of disturbance, but only slight deviations in the structure and function of the communities
Moderate	Moderate deviations and significant effects
Poor	Major biological alterations and substantial deviation
Bad	Severe biological alterations and large deviation
CHEMICAL STATUS	DEFINITION
Good	None of the environmental quality standards established for priority substances and other dangerous substances identified at EU-level is being exceeded
Fail	Failing to achieve good status

Table 2-11: Ecological quality as an overall expression of the structure and function of the biological communities

BIOLOGICAL QUALITY ELEMENTS	RIVERS	LAKES	TRANSITIONAL WATERS	COASTAL WATERS
Phytoplankton	√	√	√	√
Macroalgae and Angiosperms			√	√
Macrophytes and Phytobenthos	√	√		
Benthic invertebrate fauna	√	√	√	√
Fish fauna	√	√	√	

2.2.5.2.2 Status of the coastal water bodies under WFD

The closest to the project River Basin Districts (RBDs) are the Western Central Greece (Sterea Ellada) River Basin District (EL04) and the Epirus River Basin District (EL05). The most recent 2nd revision of the RBMP for EL04 was approved in June 2024 (Government Gazette A' 84/12.06.2024), while the 2nd revision of the RBMP for EL05 was approved in May 2024 (GG A' 71/17.05.2024).

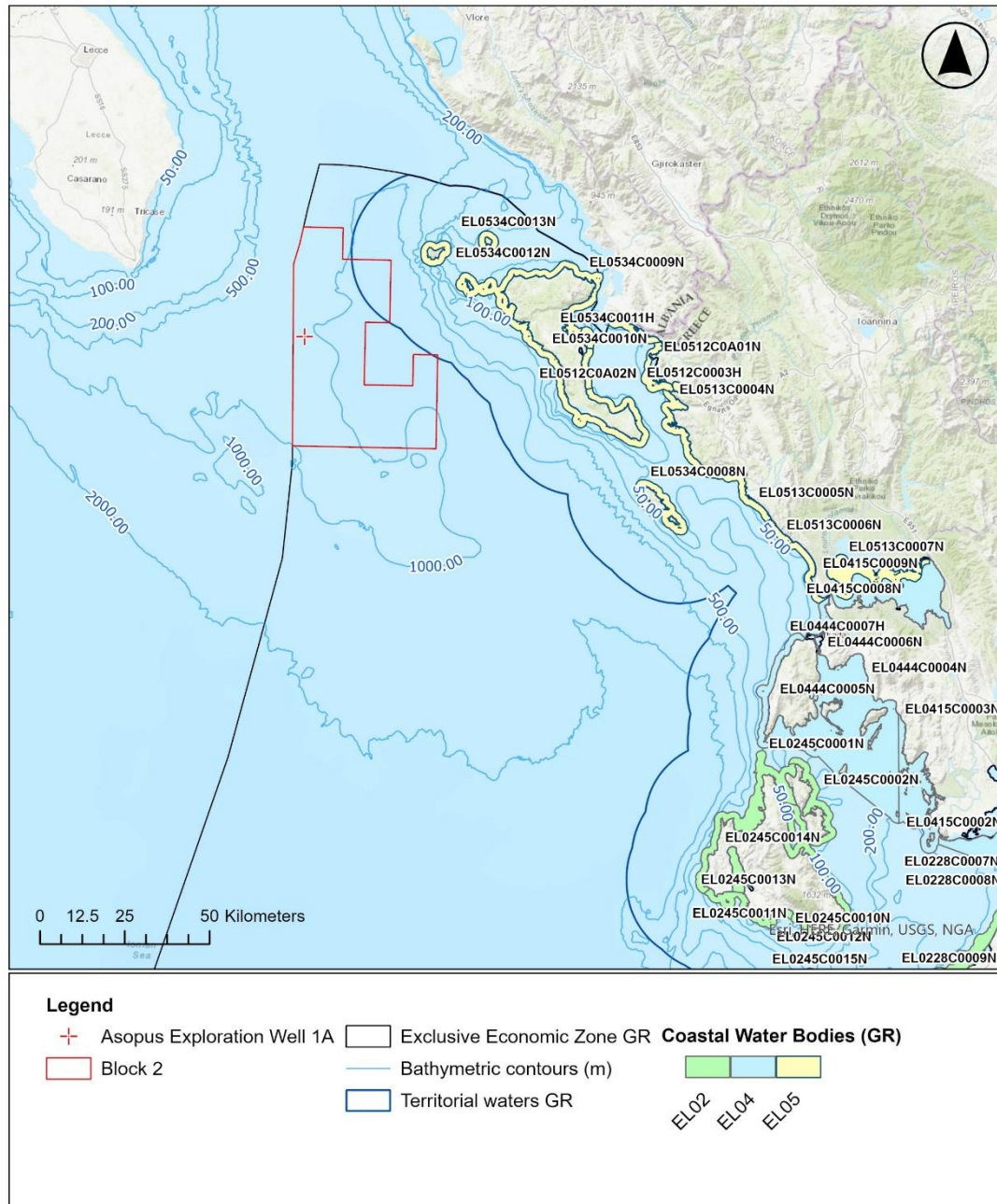


Figure 2-65: WFD coastal water bodies of Greece in the broader area

As shown in the above figure, the nearest to the project coastal water bodies are distributed along the coastline of Epirus and the Ionian Islands, including the coastal zones of Corfu, Paxoi and the mainland coast extending southwards towards the Ambracian Gulf. These water bodies form part of the Greek RBDs EL02 (Western Greece), EL04 (Western Central Greece) and EL05 (Epirus), and have been delineated for the assessment and management of ecological and chemical water quality under the WFD.

The ecological and chemical status assessment presented below is based on the approved 2nd Revision River Basin Management Plans for the Epirus River Basin District (EL05) and the Western Sterea Ellada River Basin District (EL04). Under Directive 2000/60/EC, the ecological status or ecological potential and the

chemical status of each coastal water body are assessed separately, based on biological quality elements, supporting physicochemical parameters and the concentrations of priority substances.

Table 2-12: Ecological and chemical status of coastal water bodies within the Epirus River Basin District (EL05)

(Source: 2nd Revision of the RBMPs)

WATER BODY CODE	WATER BODY NAME	ECOLOGICAL STATUS / POTENTIAL	CHEMICAL STATUS	OVERALL STATUS
EL0534C0013N	Erikousa Island	Good	Good	Good
EL0534C0012N	Othonoi Island	Good	Good	Good
EL0534C0009N	Western and northern coasts of Corfu	Good	Good	Good
EL0534C0010N	Western coasts of the Corfu Sea – Benitses	Good	Good	Good
EL0534C0011H	Garitsa Bay and Port of Corfu	Less than Good	Less than Good	Less than Good
EL0512C0A01N	Northern section of the eastern coasts of the Corfu Sea	Moderate	Good	Moderate
EL0512C0A02N	Southern section of the eastern coasts of the Corfu Sea	Moderate	Good	Moderate
EL0512C0003H	Igoumenitsa Bay	Less than Good	Good	Less than Good
EL0513C0004N	Epirus coasts along the Ionian Sea	Good	Good	Good
EL0513C0005N	Parga coasts	Good	Good	Good
EL0513C0006N	Nikopolis Bay	Good	Good	Good
EL0513C0007N	Northern Amvrakikos Gulf	Poor	Less than good	Poor

Table 2-13: Ecological and chemical status of coastal water bodies within the Western Sterea Ellada River Basin

District (EL04) (Source: 2nd Revision of the RBMPs)

WATER BODY CODE	WATER BODY NAME	ECOLOGICAL STATUS / POTENTIAL	CHEMICAL STATUS	OVERALL STATUS
EL0415C0008N	Dermata Bay	Good	Good	Good
EL0415C0009N	Southern Amvrakikos Gulf	Poor	Good	Poor
EL0444C0004N	Western Inner Ionian Archipelago – Echinades Islands and Vasiliki Bay	Moderate	Good	Moderate
EL0444C0005N	Western coasts of Lefkada	Good	Good	Good
EL0444C0006N	Lefkada Bay	Good	Good	Good
EL0444C0007H	Lefkada Strait	Less than Good	Good	Less than Good

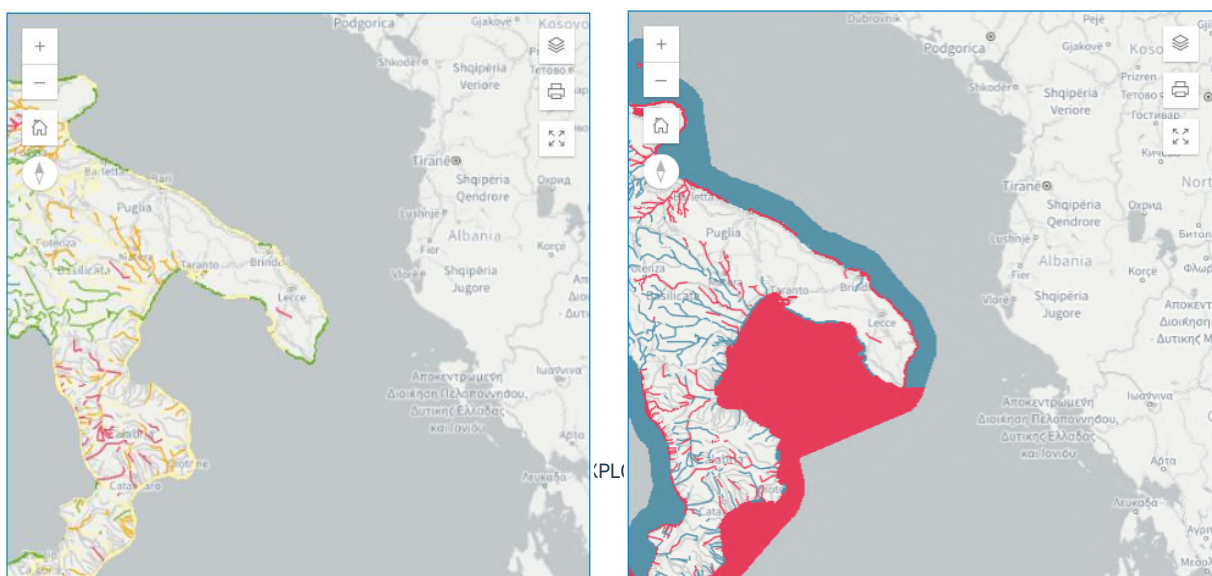
Within the Epirus River Basin District (EL05), the coastal water bodies of Erikousa Island, Othonoi Island, the western and northern coasts of Corfu, the western coasts of the Corfu Sea–Benitses, the Epirus coastline along the Ionian Sea, the Parga coastline and Nikopolis Bay are classified as having Good ecological and good chemical status. Garitsa Bay and the Port of Corfu are classified as having ecological potential below Good and chemical status failing to achieve Good. The northern and southern sections of the eastern coasts of the Corfu Sea have Moderate ecological status and good chemical status, while Igoumenitsa Bay has ecological potential below good and good chemical status. The Northern Amvrakikos Gulf is classified as having Poor ecological status and good chemical status.

Within the Western Sterea Ellada River Basin District (EL04), Dermata Bay, the western coasts of Lefkada and Lefkada Bay are classified as having Good ecological and good chemical status. The Southern Amvrakikos Gulf has Poor ecological status and good chemical status. The Western Inner Ionian Archipelago–Echinades Islands and Vasiliki Bay water body is classified as having Moderate ecological status and good chemical status, while Lefkada Strait has ecological potential below good and good chemical status.

Overall, most of the coastal water bodies along the coasts of Corfu, Epirus and Lefkada are classified as having Good ecological and chemical status. The principal exceptions are enclosed or anthropogenically influenced marine areas, including Garitsa Bay and the Port of Corfu, Igoumenitsa Bay, the eastern coasts of the Corfu Sea, Lefkada Strait and parts of the Inner Ionian Archipelago. In the Amvrakikos Gulf, both the northern and southern coastal water bodies are characterised by Poor ecological status, despite achieving good chemical status. The available classifications indicate that localised deterioration is mainly associated with enclosed gulfs, port areas and locations subject to comparatively stronger anthropogenic pressures.

According to the 3rd RBMP of Italy, the ecological status of coastal water bodies in the Apulia region, including the coastal waters of the Salento Peninsula located closest to the Project area, is generally classified as Good to Moderate. Approximately 39.0% of assessed surface water bodies achieve Good Ecological Status, while 30.1% are classified as Moderate, with smaller proportions classified as Poor (13.6%), Bad (3.1%), or High (4.5%). The ecological assessment reflects the condition of biological quality elements, hydromorphological characteristics and supporting physico-chemical parameters, indicating that most coastal waters maintain functioning marine ecosystems, although localized pressures from urban, agricultural and coastal activities remain evident in certain areas.

The chemical status assessment indicates that most Italian coastal water bodies in the wider Apulia region achieve the objectives of the WFD. Approximately 75.1% of assessed water bodies are classified as having Good Chemical Status, while 15.8% are reported as Failing to Achieve Good Status, and 9.1% remain of Unknown Status. Overall, the results suggest that contaminant concentrations in most coastal waters comply with applicable environmental quality standards, although localized exceedances associated with historical industrial activities, urban discharges and port-related pressures persist in specific coastal sectors. Consequently, the coastal waters closest to the Project area are generally considered to be in satisfactory chemical condition, supporting the achievement of the environmental objectives established under the Water Framework Directive.



■ High ■ Good ■ Unknown ■ Moderate ■ Poor ■ Bad ■ Good ■ Failing to achieve good ■ Unknown

Figure 2-66: Ecological and Chemical Status Classification of IT water bodies in the broader area (Source: WISE FRESHWATER, WFD Italy, Italy | Country Profiles on Water Framework Directive | WISE Freshwater, accessed in May 2026)

2.2.5.2.3 Register of protected areas under Article 6 of WFD

Article 6 of the WFD requires the establishment of a register or registers of all areas lying within each river basin district which have been designated as requiring special protection under specific Community legislation for the protection of their surface water and groundwater or for the conservation of habitats and species directly depending on water. Designated protected areas under Article 6 of the WFD based on MD 51/2007 (Annex V) and the 1st Update of the respective RBMPs of Epirus, N. Peloponnese and W. Greece include the following categories:

- Water bodies used for the abstraction of water intended for human consumption according to Article 7 of PD 51/2007 (Article 7 of the WFD).
- Areas with presence of aquatic species of economic importance.
- Water bodies characterized as recreational waters, including areas designated as bathing waters coasts.
- Areas vulnerable to the presence of nutrient substances including designated Nitrate Vulnerable Zones (NVZs); and
- Areas with water bodies whose quality preservation or improvement is important for the conservation of habitats or species, including Natura 2000 sites.

Designated protected water bodies in the study area as defined above, are presented in the Figures below.

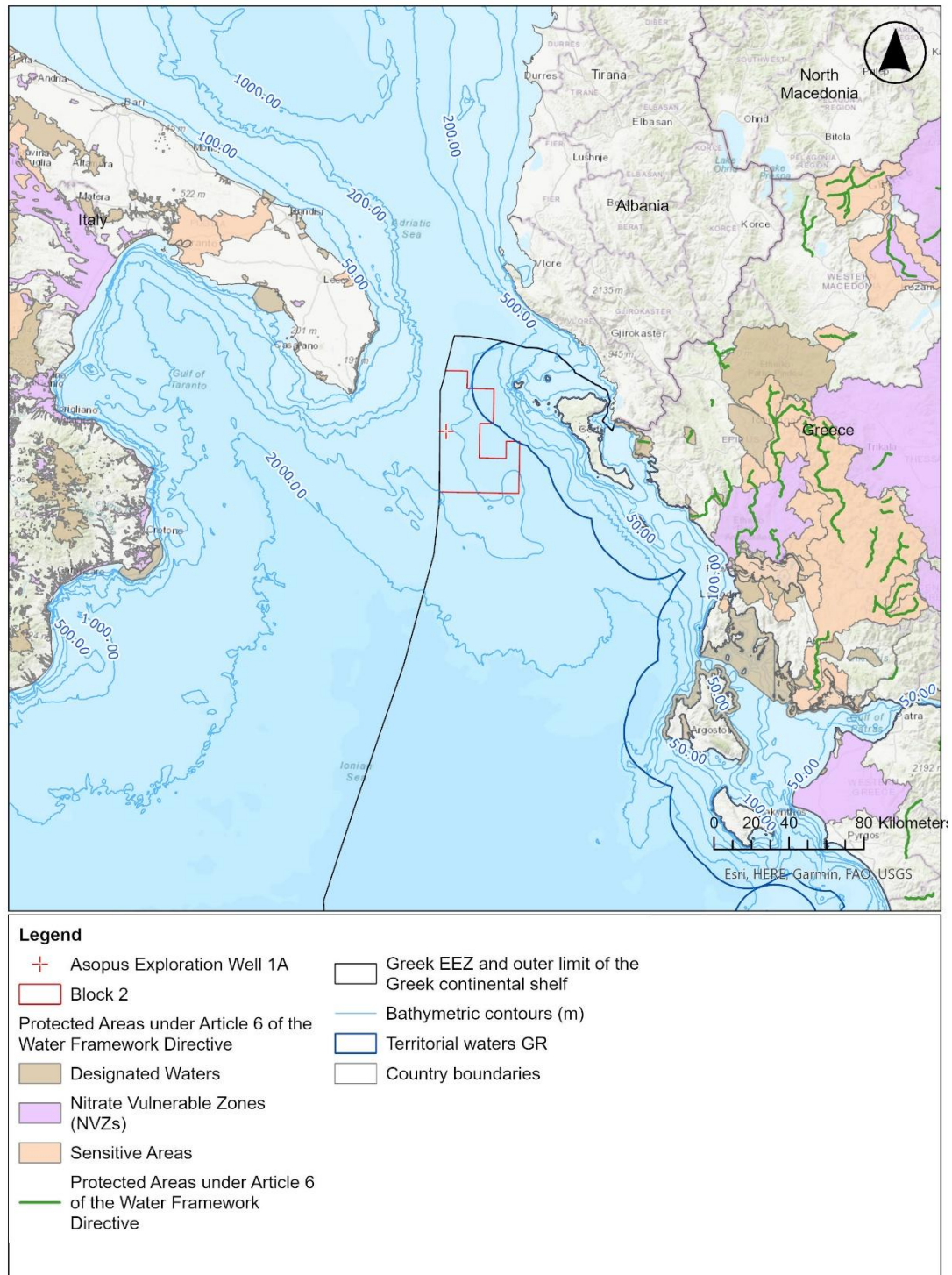


Figure 2-67: Protected water bodies in the study area according to the Article 6 of WFD (Source: European Environmental Agency, EEA 2019)

Table 2-14 presents the protected areas identified within the vicinity of the Exploration Well Asopus 1A, including the nearest protected areas located in both Greece and Italy. For each protected area, the corresponding code, protection type, and the approximate minimum distance from the proposed well location are provided.

Table 2-14: Protected areas under the WFD in the boarder area

COUNTRY	PROTECTED AREA CODE	PROTECTED AREA TYPE	APPROX. DISTANCE FROM ASOPUS 1A (KM)
Greece	ELY222KR031	Water Framework Directive (coastal/protected water)	~15
Greece	ELY222KR057	Water Framework Directive (coastal/protected water)	~17
Greece	ELY222KR056	Water Framework Directive (coastal/protected water)	~18
Greece	ELY222KR053	Water Framework Directive (coastal/protected water)	~20
Greece	ELY222KEK009	Water Framework Directive Protected Area	~21
Greece	EL0512NA04	Designated Water	~28
Greece	EL0512NA02	Designated Water	~34
Greece	EL0511NA01	Designated Water	~38
Greece	ELCSA07	Sensitive Area	~40
Greece	EL0511L000000001HBA	Designated Water	~42
Italy	IT16EUAP1192	Protected Area (WFD layer)	~125
Italy	IT16EUAP1191	Protected Area (WFD layer)	~130
Italy	IT16EUAP1194	Protected Area (WFD layer)	~132
Italy	IT16EUAP0110	Protected Area (WFD layer)	~135
Italy	IT16EUAP0683	Protected Area (WFD layer)	~138
Italy	IT16EUAP0577	Protected Area (WFD layer)	~140

Bathing waters constitute protected areas under the WFD and are designated in accordance with the requirements of the Bathing Water Directive (Directive 2006/7/EC). Their quality is monitored annually to protect public health and to ensure that bathing waters achieve and maintain at least “sufficient” quality, with classifications ranging from “Poor” to “Excellent” based on microbiological parameters and long-term monitoring results.

Figure 2-68 shows the spatial distribution and classification of the designated bathing waters in the broader area, including the coastal areas of western Greece and southern Italy.

Greece has one of the largest bathing water monitoring programmes in Europe, with more than 1,700 designated bathing waters monitored annually under the provisions of the Bathing Water Directive (Directive 2006/7/EC). According to the European Bathing Water Quality in 2025 report published by the European Environment Agency (EEA), Greece continues to rank among the best-performing European countries in terms of bathing water quality. Approximately 97% of monitored bathing waters were classified as Excellent, with almost all remaining sites classified as Good or Sufficient. Only a very small proportion of bathing waters were classified as Poor, demonstrating the consistently high quality of Greece's coastal recreational waters (European Environment Agency (EEA), 2025).

Italy operates one of the most extensive bathing water monitoring programmes in Europe, with more than 5,500 designated bathing waters monitored annually in accordance with the Bathing Water Directive (Directive 2006/7/EC). According to the European Bathing Water Quality in 2025 report published by the European Environment Agency (EEA), Italy maintains a very high standard of bathing water quality. Approximately 96% of bathing waters were classified as Excellent, while only a small proportion were classified as Good, Sufficient, or Poor (European Environment Agency (EEA), 2025).

Albania has designated 119 bathing waters under the Bathing Water Directive monitoring framework, with annual assessments carried out in accordance with the methodology applied by the European Environment Agency (EEA). According to the European Bathing Water Quality in 2025 report, Albania exhibits a lower proportion of bathing waters classified as Excellent compared with the European Union average. Approximately 16% of Albanian bathing waters achieved an Excellent classification, while around 38% were classified as Good and approximately 23% as Sufficient. A further 23% were classified as Poor, representing the highest proportion of poor-quality bathing waters among the countries included in the assessment (EEA, 2025).

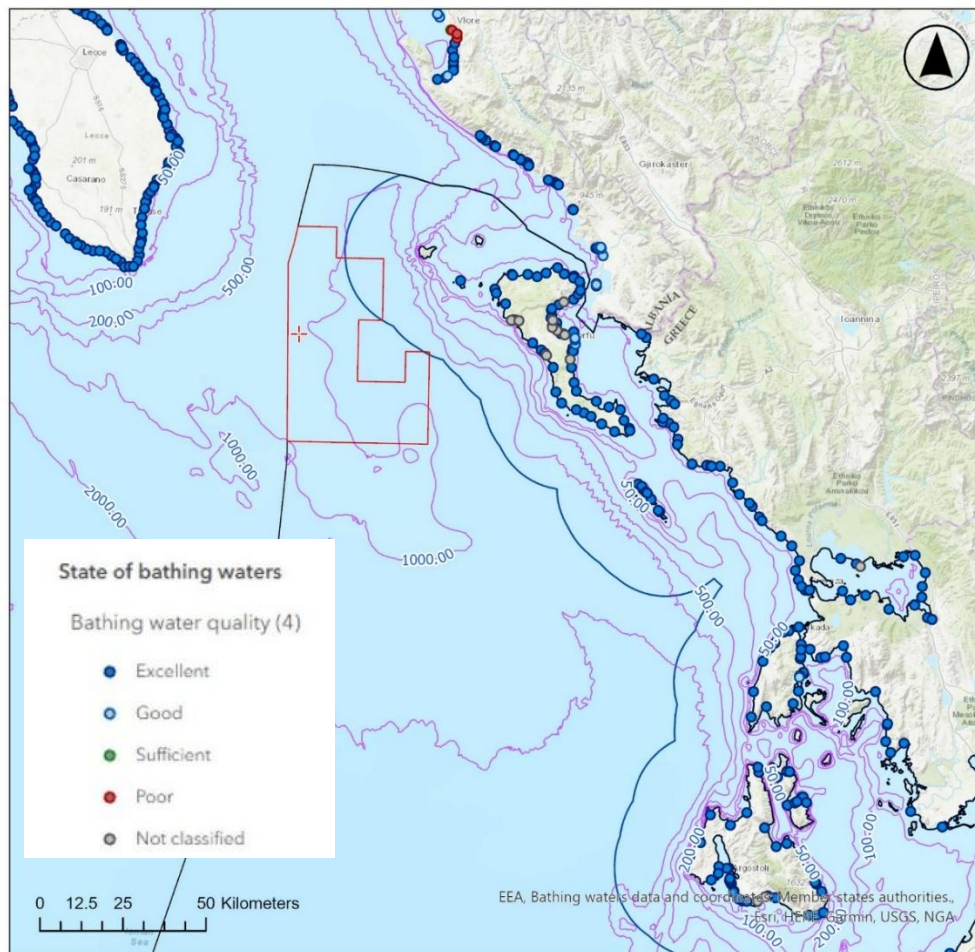


Figure 2-68: State of bathing waters in the broader area (Source: EEA 2025)

As shown in the above figure, the bathing waters closest to the project are located along the Greek coastline of Epirus and the Ionian Islands, while the nearest Italian bathing waters are situated along the Apulia coast, at considerably greater distances from the proposed exploration site.

The names and characteristics of the Greek bathing water profiles located closest to the project are presented in the following table.

Table 2-15: State of Greek bathing waters in the broader area (Ministry of Environment & Energy, 2024)

NO.	BEACH / BATHING WATER NAME	BATHING WATER CODE	MUNICIPALITY / COUNTRY	BATHING WATER QUALITY
1	Agios Stefanos	ELBW059118060101	Corfu / Greece	Excellent
2	Arillas	ELBW059118065101	Corfu / Greece	Excellent
3	Mathraki	ELBW059118042101	Corfu / Greece	Excellent
4	Agios Georgios Pagon	ELBW059118019101	Corfu / Greece	Excellent
5	Rovinia	ELBW059118109101	Corfu / Greece	Excellent
6	Agia Triada	ELBW059118108101	Corfu / Greece	Excellent
7	Agios Petros–Ampelakia	ELBW059118017101	Corfu / Greece	Excellent
8	Palaiokastritsa West	ELBW059118061101	Corfu / Greece	Excellent
9	Palaiokastritsa East	ELBW059118039101	Corfu / Greece	Excellent
10	Apotrypiti	ELBW059118113101	Corfu / Greece	Not classified
11	Canal D'Amour	ELBW059118032101	Corfu / Greece	Excellent
12	Sidari	ELBW059118026101	Corfu / Greece	Excellent
13	Astrakeri	ELBW059118021101	Corfu / Greece	Excellent
14	Roda	ELBW059118051101	Corfu / Greece	Excellent
15	Almyros	ELBW059118059101	Corfu / Greece	Excellent
16	Peritheia–Agios Spyridonas	ELBW059118029101	Corfu / Greece	Excellent
17	Apsaros–Kalamaki	ELBW059118034101	Corfu / Greece	Excellent
18	Kalamionas	ELBW059118020101	Corfu / Greece	Excellent
19	Pipitos	ELBW059118016101	Corfu / Greece	Excellent
20	Mpataria	ELBW059118112101	Corfu / Greece	Not classified
21	Avlaki	ELBW059118024101	Corfu / Greece	Excellent
22	Gimari	ELBW059118045101	Corfu / Greece	Excellent
23	Nissaki	ELBW059118043101	Corfu / Greece	Excellent
24	Kerasia	ELBW059118063101	Corfu / Greece	Excellent
25	Glyfa	ELBW059118106101	Corfu / Greece	Excellent
26	Barbati	ELBW059118027101	Corfu / Greece	Excellent
27	Ypsos 1	ELBW059118022101	Corfu / Greece	Excellent
28	Ypsos 2	ELBW059118069101	Corfu / Greece	Excellent
29	Dasia 1	ELBW059118057101	Corfu / Greece	Excellent
30	Dasia 2	ELBW059118071101	Corfu / Greece	Excellent
31	Agios Nikolaos–Dasia	ELBW059118105101	Corfu / Greece	Excellent
32	Dafnila	ELBW059118036101	Corfu / Greece	Excellent
33	Kommeno	ELBW059118050101	Corfu / Greece	Excellent
34	Gouvia	ELBW059118044101	Corfu / Greece	Excellent
35	Gouvia–Molfetta	ELBW059118104101	Corfu / Greece	Excellent
36	Kontokali	ELBW059118040101	Corfu / Greece	Excellent
37	Panagia Sotiriotissa	ELBW059118103101	Corfu / Greece	Excellent
38	Tramountana Vidou	ELBW059118068101	Corfu / Greece	Excellent

NO.	BEACH / BATHING WATER NAME	BATHING WATER CODE	MUNICIPALITY / COUNTRY	BATHING WATER QUALITY
39	Agia Aikaterini	ELBW059118025101	Corfu / Greece	Excellent
40	Alykes Potamou	ELBW059118038101	Corfu / Greece	Excellent
41	Emporiko	ELBW059118102101	Corfu / Greece	Excellent
42	Bania tou Alekou	ELBW059118066101	Corfu / Greece	Excellent
43	N.A.O.K.	ELBW059118041101	Corfu / Greece	Excellent
44	Palaiopoli	ELBW059118037101	Corfu / Greece	Excellent
45	Kanoni	ELBW059118067101	Corfu / Greece	Excellent
46	Pontikonisi	ELBW059118055101	Corfu / Greece	Excellent
47	Aiolos Beach–Gastouri	ELBW059118111101	Corfu / Greece	Excellent
48	Benitses	ELBW059118028101	Corfu / Greece	Excellent
49	Agios Ioannis Strongylis	ELBW059118033101	Corfu / Greece	Excellent
50	Mesoggi–Moraitika	ELBW059118056101	Corfu / Greece	Excellent
51	Petriti	ELBW059118047101	Corfu / Greece	Excellent
52	Alykes	ELBW059118058101	Corfu / Greece	Excellent
53	Lefkimmi–Bouka–Melikia	ELBW059118064101	Corfu / Greece	Excellent
54	Agios Petros–Sotiras–Lefkimmi	ELBW059118100101	Corfu / Greece	Excellent
55	Kavos 1	ELBW059118030101	Corfu / Greece	Excellent
56	Kavos 2	ELBW059118070101	Corfu / Greece	Excellent
57	Chanoula	ELBW059118031101	Corfu / Greece	Excellent
58	Gardeno	ELBW059118018101	Corfu / Greece	Excellent
59	Marathias	ELBW059118052101	Corfu / Greece	Excellent
60	Issos	ELBW059118053101	Corfu / Greece	Excellent
61	Agios Georgios	ELBW059118054101	Corfu / Greece	Excellent
62	Chalikouna	ELBW059118017101*	Corfu / Greece	Excellent
63	Agios Matthaïos	ELBW059118035101	Corfu / Greece	Excellent
64	Agios Gordios–Kato Garouna	ELBW059118023101	Corfu / Greece	Excellent
65	Gialiskari	ELBW059118110101	Corfu / Greece	Excellent
66	Kontogialos	ELBW059118049101	Corfu / Greece	Excellent
67	Glyfada	ELBW059118048101	Corfu / Greece	Excellent
68	Ermones	ELBW059118046101	Corfu / Greece	Excellent
69	Drepano–Makrygiali	ELBW059077009101	Igoumenitsa / Greece	Excellent
70	Plataria 3	ELBW059077012101	Igoumenitsa / Greece	Excellent
71	Plataria 2	ELBW059077006101	Igoumenitsa / Greece	Excellent
72	Plataria–Oikismos	ELBW059077008101	Igoumenitsa / Greece	Excellent
73	Gallikos Molos	ELBW059077011101	Igoumenitsa / Greece	Excellent
74	Bella Vraka	ELBW059077013101	Igoumenitsa / Greece	Excellent
75	Zavia	ELBW059077004101	Igoumenitsa / Greece	Excellent
76	Keramidi–Ipeiros	ELBW059079087101	Greece	Excellent

NO.	BEACH / BATHING WATER NAME	BATHING WATER CODE	MUNICIPALITY / COUNTRY	BATHING WATER QUALITY
77	Sagiada	ELBW059079086101	Greece	Excellent
78	Megas Ammos	ELBW059077014101	Igoumenitsa / Greece	Excellent
79	Agia Paraskevi	ELBW059077010101	Igoumenitsa / Greece	Excellent
80	Arillas	ELBW059077007101	Igoumenitsa / Greece	Excellent
81	Karavostasi	ELBW059077005101	Igoumenitsa / Greece	Excellent
82	Sarakiniko	ELBW059089076101	Parga / Greece	Excellent
83	Valtos	ELBW059089075101	Parga / Greece	Excellent
84	Parga	ELBW059089073101	Parga / Greece	Excellent
85	Kryoneri	ELBW059089071101	Parga / Greece	Excellent
86	Lichnos	ELBW059089069101	Parga / Greece	Excellent

2.3 Meteorology, climate, and air quality

2.3.1 Climate

The climate of the Mediterranean basin can be comprehensively described using the Köppen-Geiger climate classification system. According to this widely used standard, the Mediterranean region is predominantly characterized by a Mediterranean climate featuring hot or warm summers. These primary climate zones transition into semi-arid and desert climates along the southern and eastern margins of the basin, while humid subtropical, temperate, and continental climates dominate the northern boundaries. Based on this regional classification for the 1985–2014 period, the wider Block 2 project area in the Ionian Sea falls primarily within the “Mediterranean (hot summer)” zone (Figure 2-69).

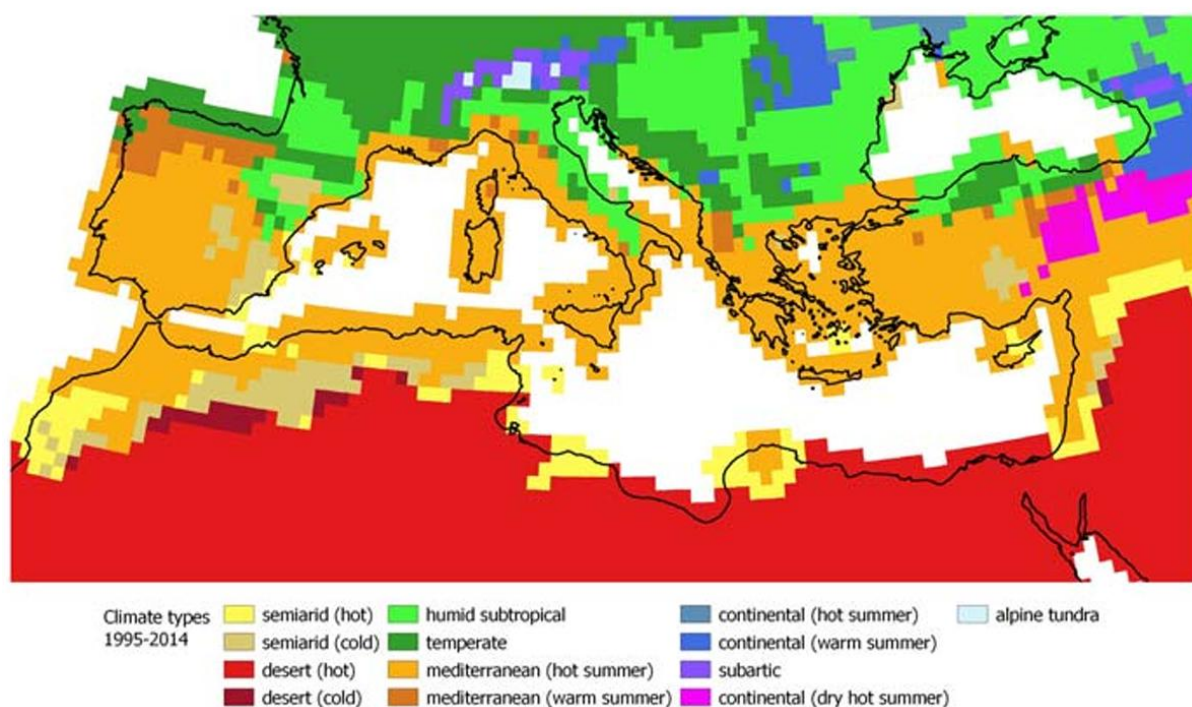


Figure 2-69: Köppen-Geiger climate classification in the Mediterranean region for the 1985–2014 period. Data extracted from the IPCC WG1-AR6 Interactive Atlas (Source: Lionello et al., 2023 and Gutiérrez et al., 2021)

The prevailing weather conditions that regulate the climate in the region are affected by permanent or seasonal atmospheric circulation systems of the North Hemisphere. Such large systems are the Azores Anticyclone, the Siberian winter Anticyclone, the Icelandic Low, and the South Asian Thermal Low. The seasonal movement of these large-scale pressure systems and their interaction with the Polar Front Jet Stream and the Subtropical Jet Stream control to a great degree the weather conditions over the Greek peninsula and generally over the Eastern Mediterranean basin. However, the significant variations of the physiographic characteristics in the region (e.g. topographic features, land-sea contrast, land cover etc.) contribute to the development of local atmospheric circulations imposed on the synoptic scale flow that result in a variety of climate subtypes, classified within the Mediterranean climate type.

The prevailing weather conditions that regulate the climate in the region can be distinguished into two seasons, i.e., the winter season and the summer season, with transition periods between them.

The winter season (mid-November through March), which is characterized by the formation and passage of cyclonic disturbances and primary and secondary low-pressure systems in the Mediterranean basin. However, high pressures are prevalent to the west, east and north of the basin that are associated with the Azores Anticyclone, the Siberian Anticyclone and the southward extension of the northern Europe high-pressure pattern, respectively. Since the general westerly circulation moves southward, the Atlantic cyclone systems move across northern Europe bringing cold maritime air, frequently penetrating into the Mediterranean and encountering warm moist air. These atmospheric conditions favour the cyclogenetic activity (formation of depressions) at the lee of the main mountain ridges, i.e., the Atlas in Morocco, the Alps, the Balkans (Dinaric Alps and Pindos) and the Taurus in Turkey. The most active areas of cyclogenesis include the Gulf of Genoa, Adriatic Sea, Southern Italy, North Africa, Aegean Sea, Black Sea, and Cyprus. The main cyclone track is eastward, along the northern coast of Mediterranean basin. An additional track extends from the Atlas along the North Africa coast. Sometimes migratory cyclones remain stationary in the Ionian Sea and the southern Aegean Sea where they may rejuvenate. Because of the frequent passage of cyclones, the region is characterized by high levels of rainfall. The rain patterns correspond with the areas where the cyclone tracks pass, with the Ionian Sea receiving much higher levels of rain than the Aegean Sea. Continental polar air masses may be brought from the NE Europe towards the Balkan Peninsula due to the southward movement of the Siberian cold-core Anticyclone, resulting in relatively NE winds, very low temperatures, cloudiness and snowfalls, even in south Greece.

The summer season (June through September) is characterized by anticyclonic activity. The main climate patterns affecting the weather in the Eastern Mediterranean basin are the Azores Anticyclone, which is intensified developing an extension towards the Central Europe and the South Asian Thermal Low extending over the Anatolian plateau. Meanwhile, the general circulation moves northward resulting in the weakness of the Atlantic cyclones. In addition, since the surface waters of the Mediterranean Sea are relatively cooler compared to the temperatures of the surrounding land, high pressures dominate the region. The atmospheric conditions favour settled weather, characterized by clear skies and almost no rain. However, a trough or the edge of a cold front passing over the northern Greece may cause unstable conditions associated with the co-existence of convergence zones leading to intense convection, thus, heavy convective rainfall is evident in the area. Depressions are not absent in the summer season, but they are usually weak since the anticyclonic character of the large-scale circulation encourages subsidence that contributes to the stabilization of the mid troposphere. The land-sea temperature contrast has as a result the formation of thermal circulations. Sea breeze systems are frequently evident in coastal areas. Sea breeze blows in the afternoon until near sunset when it becomes calm, while land breeze blows in early morning.

The rest of the year is the transition from one season to the other. The transient seasons are characterized by the interchange of the winter/summer type of weather patterns. The transition from winter to summer lasts at least two months (from end-March to May). The approach of spring is indicated by the incipient decay of the Siberian Anticyclone and the discontinuous expansion of the Azores Anticyclone. The cyclonic activity becomes less frequent and less intense as summer approaches. The cyclogenesis in the North Africa becomes the primary center of cyclogenesis, resulting in southerly winds bringing significant amounts of Saharan desert dust. Despite the fact that summer-like weather conditions become more frequent as summer approaches, winter-type cyclones may still appear even until late May. Autumn lasts for about one

month (October) and is characterized by a fairly decisive change from summer to winter regime. When the eastward expansion of the Azores Anticyclone ceases rather abruptly, the winter activity in the cyclogenesis centers increases and the first cyclone may appear by the end of the month. During autumn, heavy rain usually occurs because of the strong contrast between the temperature of the surface waters of the Eastern Mediterranean Sea and the overlying continental air masses that cause strong evaporation.

2.3.2 Meteorological conditions

2.3.2.1 Precipitation and temperature

Surface meteorological stations of the National Observatory of Athens operate in the wider area of interest (island of Kerkyra and Igoumenitsa), from which representative climatic data can be derived for the region. Moreover, the Hellenic National Meteorological Service (HNMS) developed a digital climate atlas based on homogenized time series of the average, maximum and minimum monthly temperature, monthly cumulative precipitation and average monthly sunshine duration. The data comes from a network of stations of the HNMS, which is part of the Global Observing System of the World Meteorological Organization, for a time period between 1971 to 2000. High-resolution climate maps were produced by HNMS, through spatial analysis and spatial interpolation of the homogenized data. From the abovementioned maps of HNMS, data were acquired for the island Othonoi (the closest land to the project, 9km north of Block 2) (Table 2-16, Figure 2-70, Figure 2-71 and Figure 2-72), and from the meteorological station of the National Observatory of Athens for the island Kerkyra (the closest weather station to the project) and Igoumenitsa (the closest weather station in mainland to the project) (Table 2-17, Figure 2-73, Figure 2-74 and Figure 2-75).

Table 2-16: Weather data (1971-2000) for island Othonoi. Source: Hellenic National Meteorological Service (Source: <http://www.hnms.gr>)

	SUNLIGHT (HOURS)	PRECIPITATION (MM)	MIN TEMP (°C)	MAX TEMP (°C)	AVERAGE TEMP (°C)
January	114.87	103.6	5.4	11.87	8.3
February	131.89	113.19	6.13	12.61	9.03
March	169.82	94.49	7.11	14.26	10.64
April	191.37	61.51	9.76	17.03	13.7
May	260.57	32.71	13.11	21.81	18.26
June	306.3	10.75	16.88	25.84	22.09
July	340.61	8.27	18.94	28.99	25.01
August	306.82	16.75	19.4	28.78	24.71
September	232.16	63.47	16.51	25.13	21.67
October	172.82	124.06	13.7	20.96	17.15
November	121.43	178.56	10.32	16.19	13.72
December	100.81	152.48	7.24	14.03	11.01

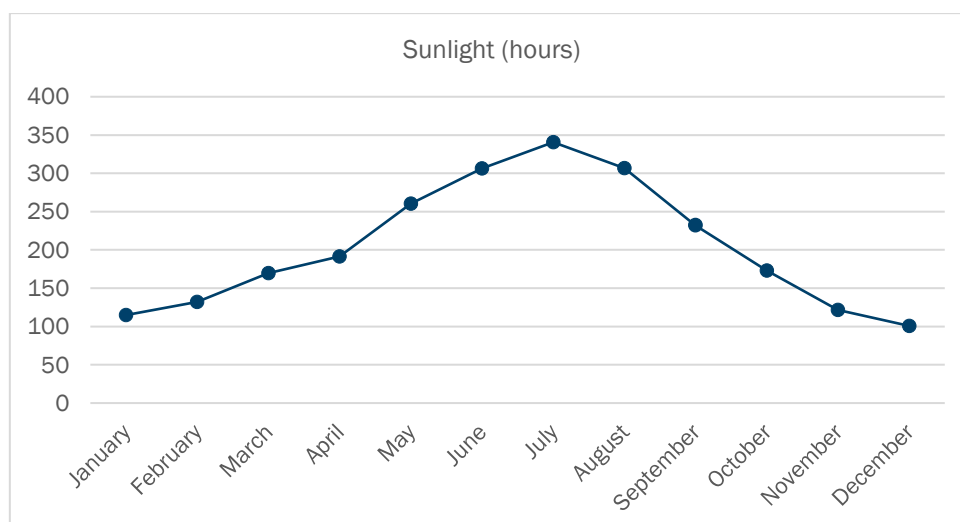


Figure 2-70: Sunlight data for the island of Othonoi (Source: Hellenic National Meteorological Service, 1971-2000)

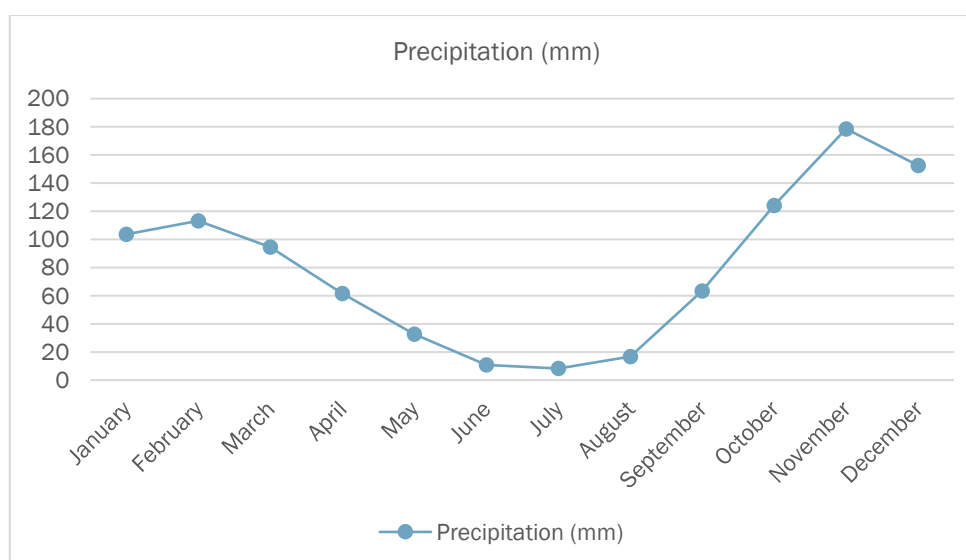


Figure 2-71: Precipitation data for the island of Othonoi (Source: Hellenic National Meteorological Service, 1971-2000)

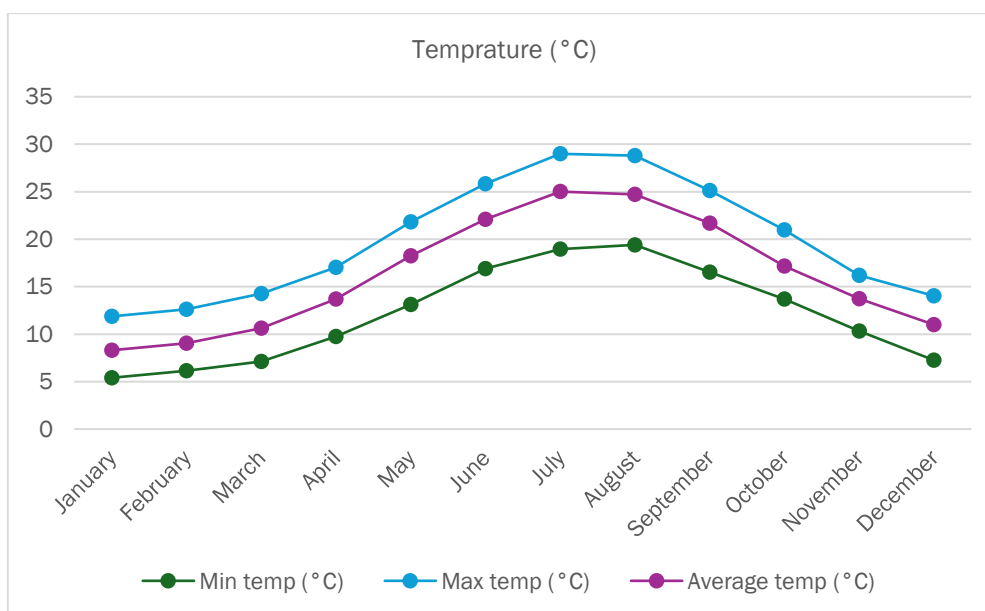


Figure 2-72: Temperature data for the island of Othonoi (Source: Hellenic National Meteorological Service 1971-2000)

Table 2-17: Weather data for island Corfu and Igoumenitsa for the period 2010-2019. Source: meteorological stations of the National Observatory of Athens (Source: <https://meteo.gr/climate/>)

	PRECIPITATION (MM)	AVERAGE TEMP (°C)	MAX TEMP (°C)	MIN TEMP (°C)	PRECIPITATION (MM)	AVERAGE TEMP (°C)	MAX TEMP (°C)	MIN TEMP (°C)
	KERKYRA				IGOYMENITSA			
January	144	10	13.8	6	180	8.6	13.1	5
February	154	11.2	14.9	7.2	168	10.2	14.7	6.4
March	86	12.8	17.1	8.5	116	12	17.8	7.5
April	41	16	20.8	11.3	67	15.3	20.8	10
May	42	19.3	23.9	14.7	83	18.7	24.2	13.4
June	24	23.9	28.8	19	39	23.5	29.3	17.5
July	15	26.5	31.6	21.4	10	26.3	32.2	20
August	8	27.8	32.4	22	10	26.9	32.9	20.7
September	88	23.3	28.2	19	96	22.5	28.2	17.3
October	153	19	23.6	15	176	18	23.4	13.7
November	217	15.5	19.7	11.7	230	14.2	19.3	10.4
December	137	11.3	15.6	7.3	167	9.7	14.6	6

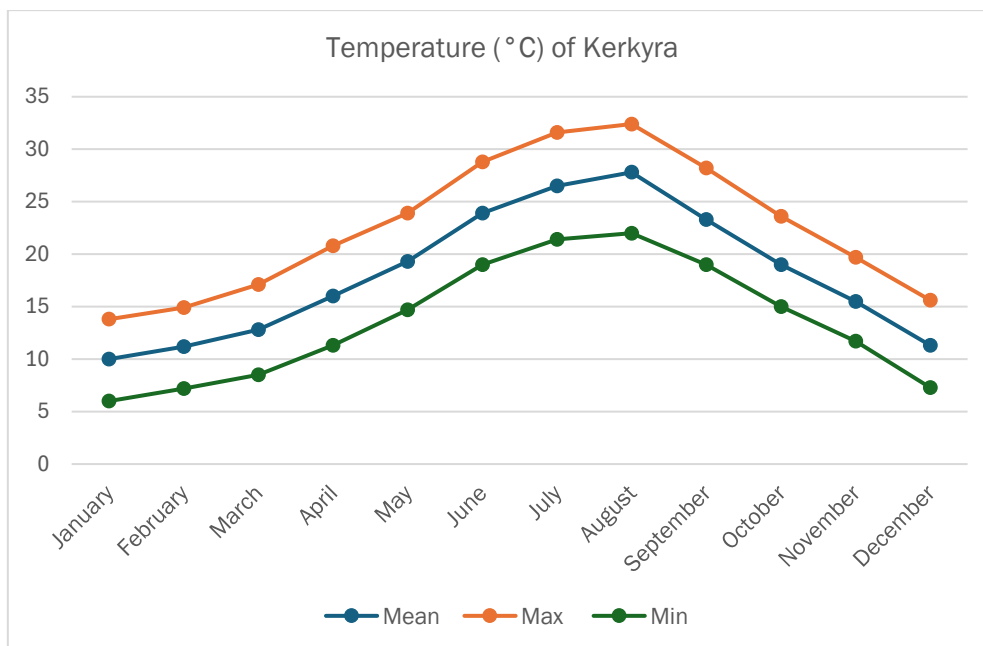


Figure 2-73: Temperature data for the island of Kerkyra (Source: National Observatory of Athens, 2010-2019)

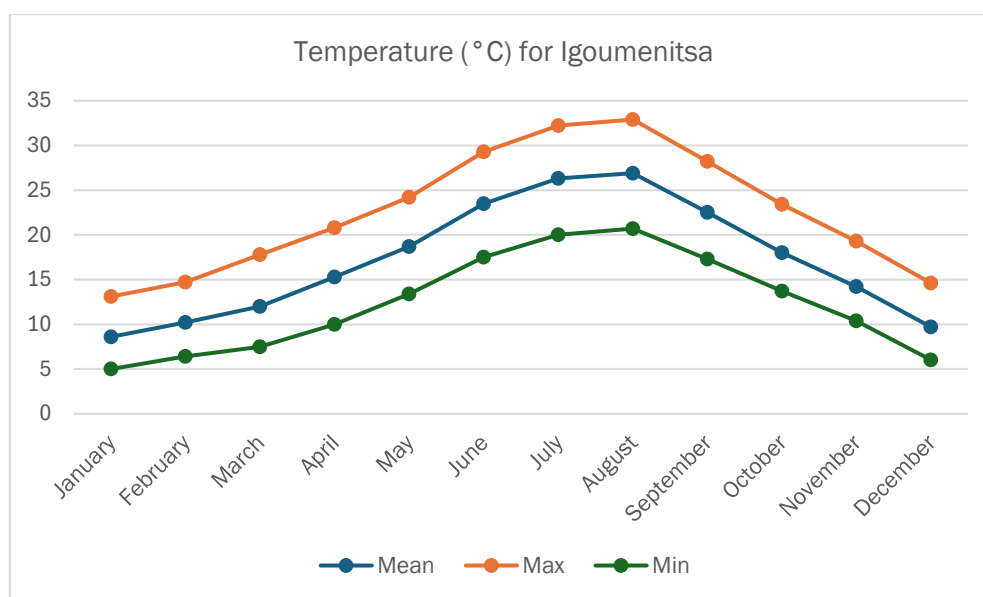


Figure 2-74: Temperature data for Igoumenitsa (Source: National Observatory of Athens, 2010-2019)

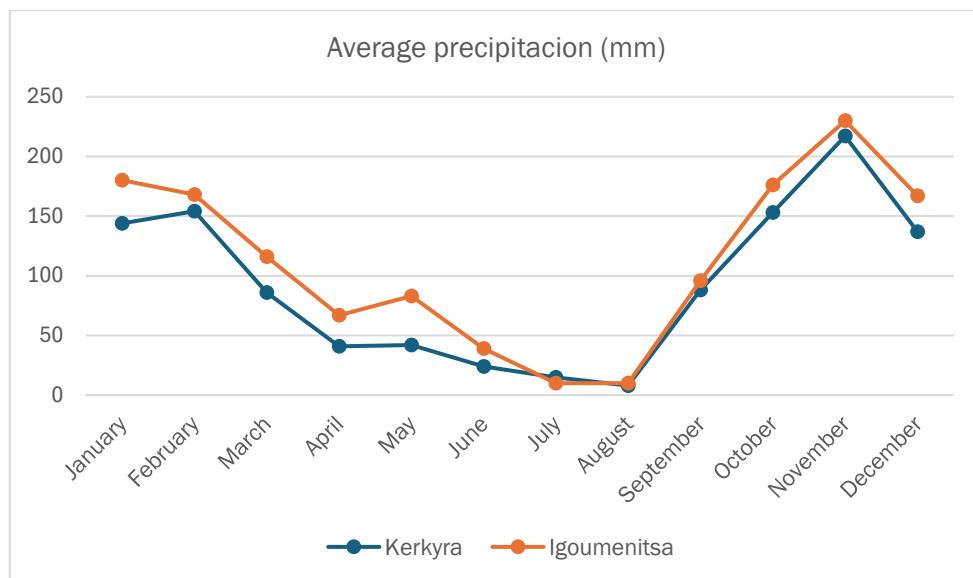


Figure 2-75: Precipitation data for Kerkyra and Igoumenitsa (Source: National Observatory of Athens, 2010-2019)

2.3.2.2 Wind

SAT-OCEAN conducted a MET-OCEAN study for Energean SA to assess wind characteristics at the location of the ASOPUS-1A exploration well (SAT-OCEAN Wind Statistics Report, 2026). The study is based on dedicated high-resolution nested hindcast models with data assimilation capabilities. The analysis combines multisatellite observations with archived hindcast data over a 10-year period, from January 1, 2015, to December 31, 2024.

The extreme wind values were derived by calculations based on methods such as Peak-Over-Threshold, block maxima distribution, Weibull, GEV, GPD. The basic method consists of fitting a theoretical 3-parameter distribution to an empirical distribution yielded by magnitude data (speed or height).

The methods used for the derivation of extremes include the extrapolation of the theoretical distribution to a list of decreasing probability values. The parameters used for the theoretical distributions are the shape, scale and location, which were yielded by maximum-likelihood between the empirical and theoretical distributions. The method to determine these parameters consisted of calculating the shape and scale in a wide set of locations and then to retain from all obtained triplets the one that best satisfies a goodness-of-fit criterion between the 2 distributions. The goodness-of-fit coefficient that needed to be minimized was the maximum of the distance between empirical and theoretical distributions. Moreover, in order to focus the analysis on the upper distribution tail only, the criterion was restricted to the upper 99% percentile of the empirical distribution. Wind magnitude and direction occurrence (%) for the entire time series and monthly periods (during January 2015 – December 2024) for the study area can be seen in Table 2-18 and Table 2-19.

Table 2-18: Yearly and monthly wind speed occurrence [%] at “ASOPUS-1A” at 10m above sea level. (Source: SAT-OCEAN wind statistics report, 2026)

SPEED (M/S)	YRL	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0.00 - 2.00	9.93	0.50	0.66	0.63	0.81	1.17	0.87	0.73	0.94	1.05	1.28	0.65	0.63
2.00 - 4.00	21.68	1.17	1.23	1.69	1.90	2.14	2.33	2.05	2.47	2.22	1.91	1.35	1.23
4.00 - 6.00	21.22	1.37	1.29	1.70	1.90	2.11	2.31	1.98	2.04	1.79	1.60	1.63	1.51
6.00 - 8.00	17.69	1.49	1.18	1.66	1.55	1.54	1.37	1.66	1.34	1.50	1.44	1.42	1.54
8.00 - 10.00	14.50	1.58	1.37	1.37	1.00	0.91	0.82	1.26	1.24	0.96	1.15	1.31	1.54
10.00 - 12.00	8.34	1.24	0.93	0.72	0.67	0.38	0.40	0.62	0.39	0.45	0.65	0.90	0.99
12.00 - 14.00	4.15	0.67	0.58	0.47	0.29	0.19	0.10	0.16	0.05	0.18	0.28	0.51	0.66
14.00 - 16.00	1.66	0.32	0.29	0.15	0.08	0.04	0.01	0.02	0.01	0.04	0.16	0.28	0.25
16.00 - 18.00	0.64	0.12	0.16	0.10	0.01	0.01	0.00	0.00	0.00	0.01	0.02	0.10	0.11
18.00 - 20.00	0.15	0.03	0.05	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.02
20.00 - 22.00	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
22.00 - 24.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 2-19: Yearly and monthly wind direction occurrence [%] at “ASOPUS-1A” at 10m above sea level. (Source: SAT-OCEAN wind statistics report, 2026)

DIRECTION	YRL	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
N	13.42	1.45	1.15	0.84	0.77	0.60	0.96	1.22	1.56	1.32	1.36	0.92	1.28
NNE	2.77	0.22	0.23	0.22	0.18	0.17	0.19	0.14	0.34	0.25	0.27	0.14	0.40
NE	1.36	0.13	0.13	0.12	0.09	0.05	0.08	0.08	0.11	0.16	0.16	0.07	0.18
ENE	1.27	0.15	0.16	0.12	0.11	0.08	0.04	0.02	0.08	0.15	0.14	0.08	0.15
E	1.52	0.14	0.20	0.18	0.10	0.10	0.07	0.03	0.07	0.11	0.18	0.19	0.15
ESE	2.48	0.28	0.23	0.30	0.20	0.22	0.13	0.05	0.10	0.15	0.29	0.34	0.21
SE	6.15	0.63	0.58	0.65	0.63	0.75	0.35	0.12	0.22	0.30	0.57	0.87	0.48
SSE	10.69	0.68	0.99	1.30	1.02	1.20	0.62	0.30	0.37	0.90	1.24	1.23	0.86
S	7.65	0.70	0.86	0.74	0.85	0.83	0.36	0.20	0.30	0.57	0.70	0.86	0.69
SSW	5.02	0.67	0.55	0.49	0.44	0.41	0.30	0.18	0.20	0.42	0.39	0.51	0.47
SW	3.41	0.42	0.29	0.30	0.26	0.31	0.20	0.17	0.23	0.33	0.21	0.36	0.33
WSW	3.00	0.23	0.21	0.24	0.35	0.37	0.24	0.23	0.24	0.23	0.18	0.28	0.19
W	3.13	0.22	0.24	0.27	0.28	0.31	0.33	0.32	0.28	0.28	0.23	0.20	0.17

DIRECTION	YRL	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
WNW	4.03	0.30	0.19	0.41	0.35	0.48	0.46	0.44	0.36	0.30	0.26	0.26	0.23
NW	8.21	0.47	0.52	0.80	0.67	0.67	1.07	0.99	0.87	0.56	0.48	0.45	0.64
NNW	25.87	1.80	1.24	1.50	1.92	1.93	2.83	3.99	3.17	2.19	1.81	1.46	2.04

The wind characteristics in the study area are presented through wind rose diagrams for every month (Figure 2-76) and for the entire year (Figure 2-77) based on the abovementioned data. A wind rose depicts the frequency of occurrence of wind speed in each of the specified wind direction sectors. Winds at the exploration well Asopus-1A appear to occur predominantly from NNW with speeds between 5–10 m/s. During months October to March, the occurrence of winds with speeds higher than 15m/s is more likely, especially in January and February. Winds with such speeds can occur from the NNW, N and SSE.

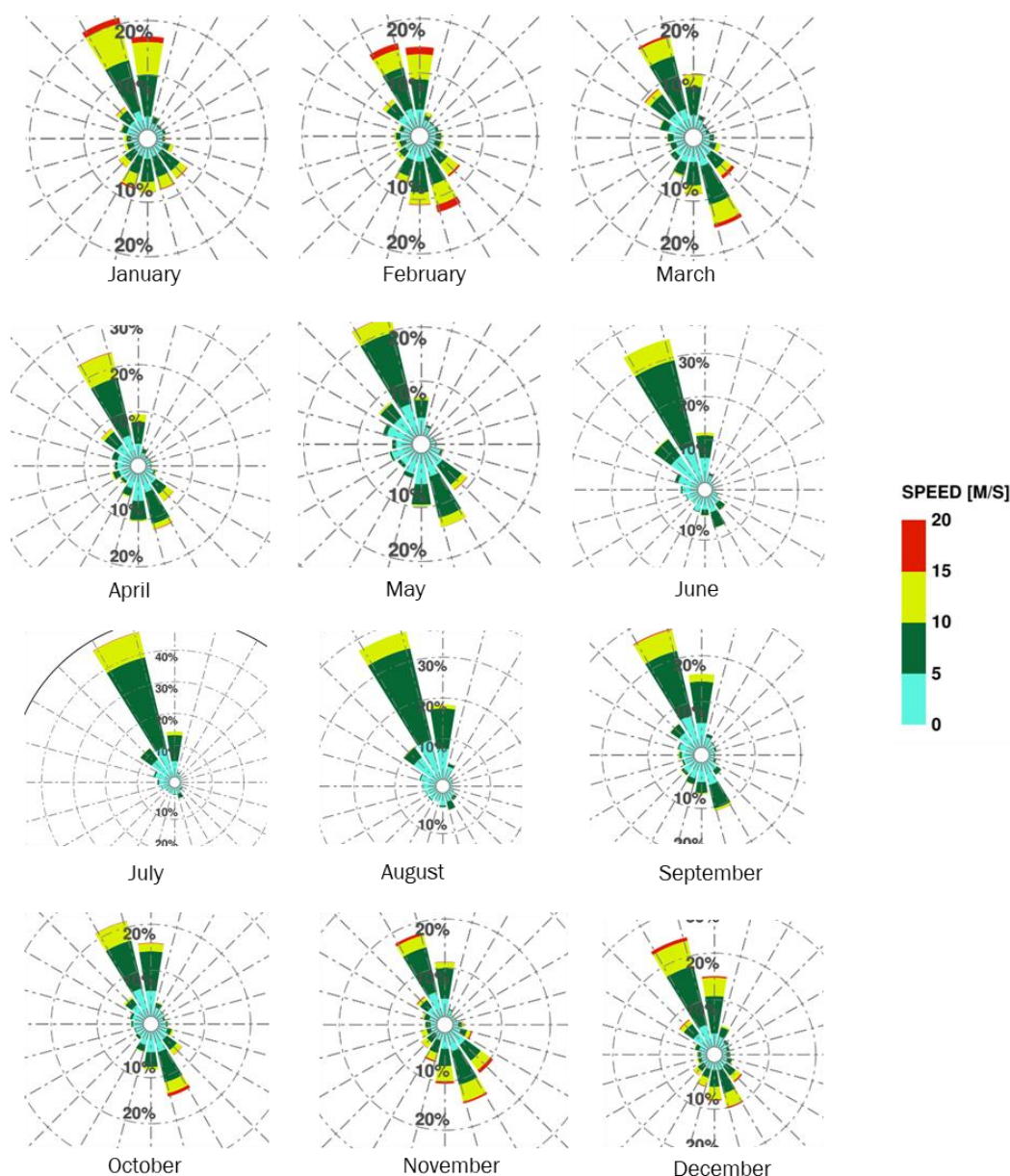


Figure 2-76: Monthly wind speed and direction frequency (%) at "ASOPUS1A" AT 10m above sea level. (Source: SAT-OCEAN wind statistics report, 2026)

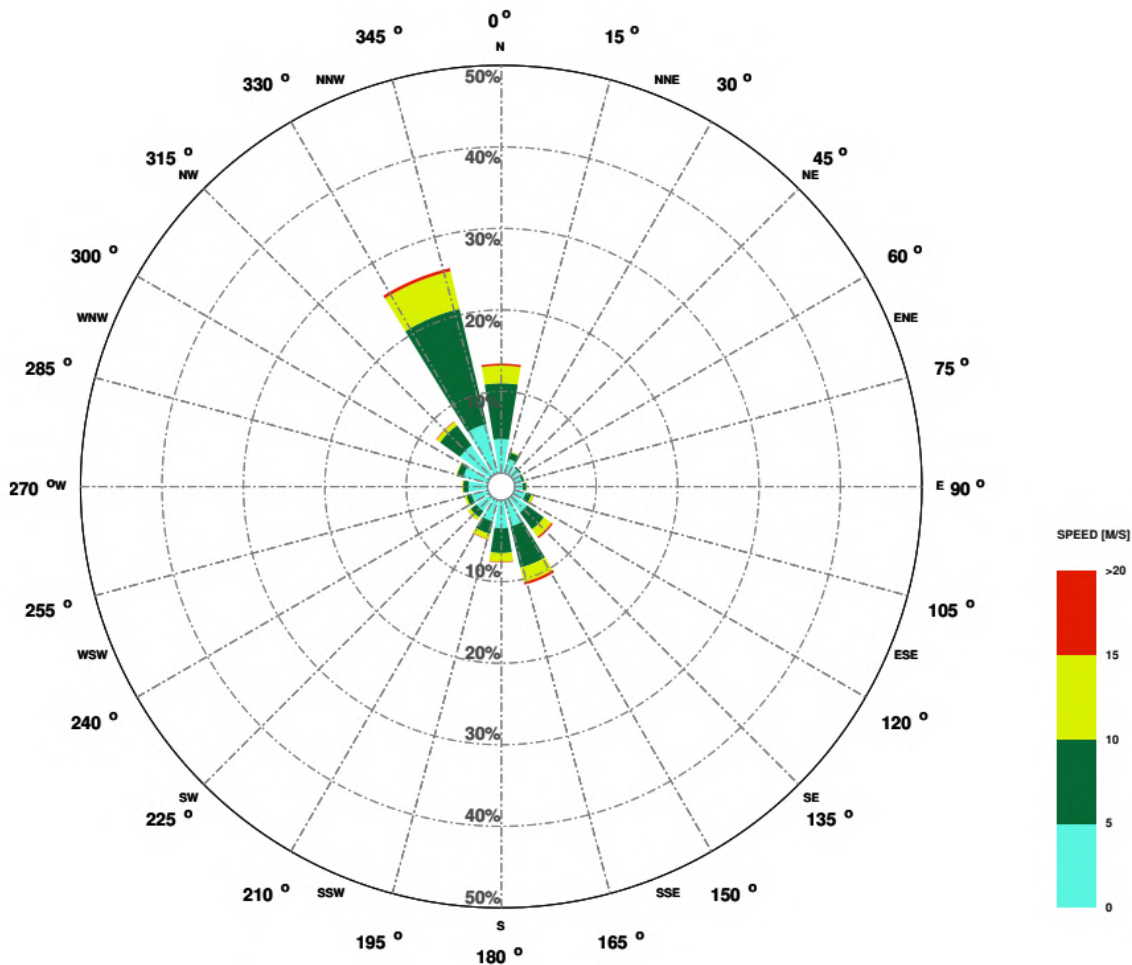


Figure 2-77: Wind speed and direction frequency (%) at "ASOPUS1A" AT 10m above sea level for the entire period.
(Source: SAT-OCEAN wind statistics report, 2026)

2.3.3 Climate change

2.3.3.1 Change of mean annual temperature and total annual precipitation

The Mediterranean region is currently warming approximately 20% faster than the global mean (Lionello & Scarascia, 2018). Global climate model simulations (e.g., CMIP6) project that this warming will continue, with the Mediterranean experiencing larger temperature increases than the global average, particularly during the summer (Lionello & Scarascia, 2018). In addition to these temperature changes, global model simulations project a decrease in total annual precipitation across the basin at a rate of about 4% per degree Celsius of global warming (Lionello & Scarascia, 2018). The spatial distribution of these projected changes under 2°C and 4°C global warming levels is illustrated in Figure 2-78 (Gutiérrez et al., 2021).

The increase in mean temperature is associated with a shift toward higher values across the entire temperature probability distribution. This implies an increase in the intensity and duration of heat waves, resulting in more days above high-temperature thresholds (Lionello & Scarascia, 2020). Regional downscaling models (EURO-CORDEX) project an increase in the number of days with maximum temperatures above 40°C under both the 2°C and 4°C global warming levels (Figure 2-79) (Gutiérrez et al., 2021).

As the atmosphere warms, its moisture content increases following the Clausius-Clapeyron relation, providing a basis for expecting an increase in extreme precipitation (Lionello & Scarascia, 2020). While total annual precipitation is projected to decrease, the Mediterranean region exhibits different behaviors regarding extreme precipitation: the northern part of the region, which includes the project area, shows a projected increase in extreme precipitation, whereas no significant change is evident in the southern parts (Lionello & Scarascia, 2020). These projected changes in maximum 1-day precipitation are also shown in Figure 2-79 (Gutiérrez et al., 2021).

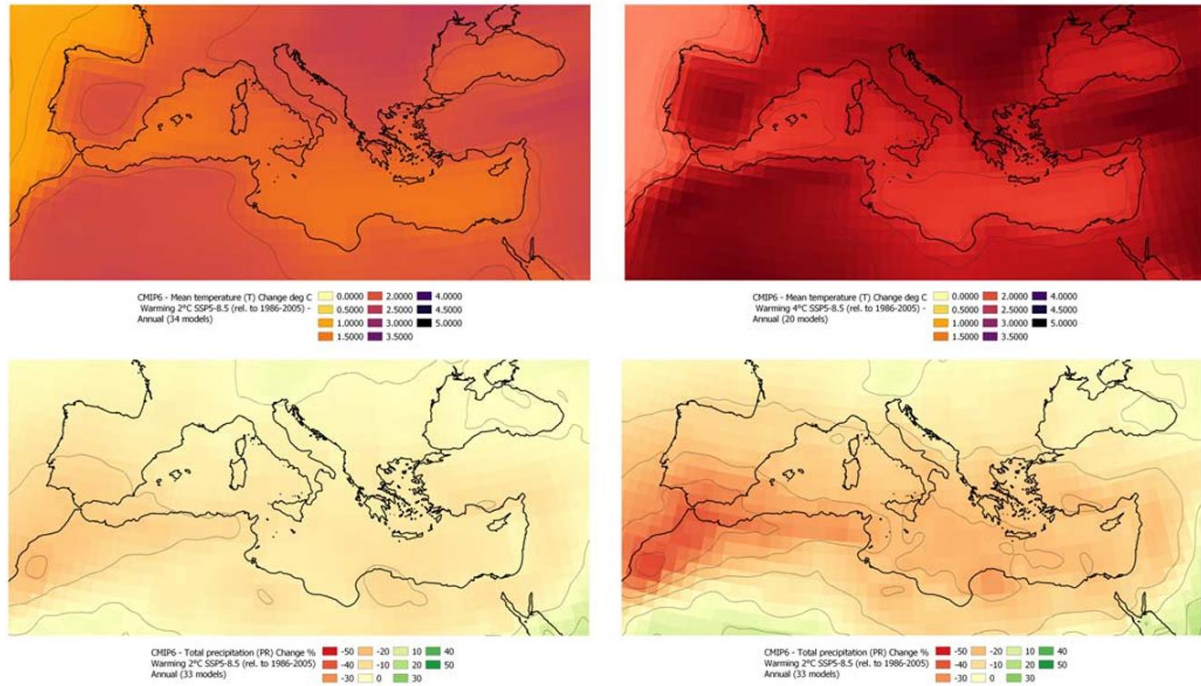


Figure 2-78: Change of mean annual temperature (top row, °C) and total annual precipitation (bottom row, %) with respect to the 1986–2005 period for 2°C (left column) and 4°C (right column) global warming levels, based on CMIP6 simulations (Source: Gutiérrez et al., 2021).

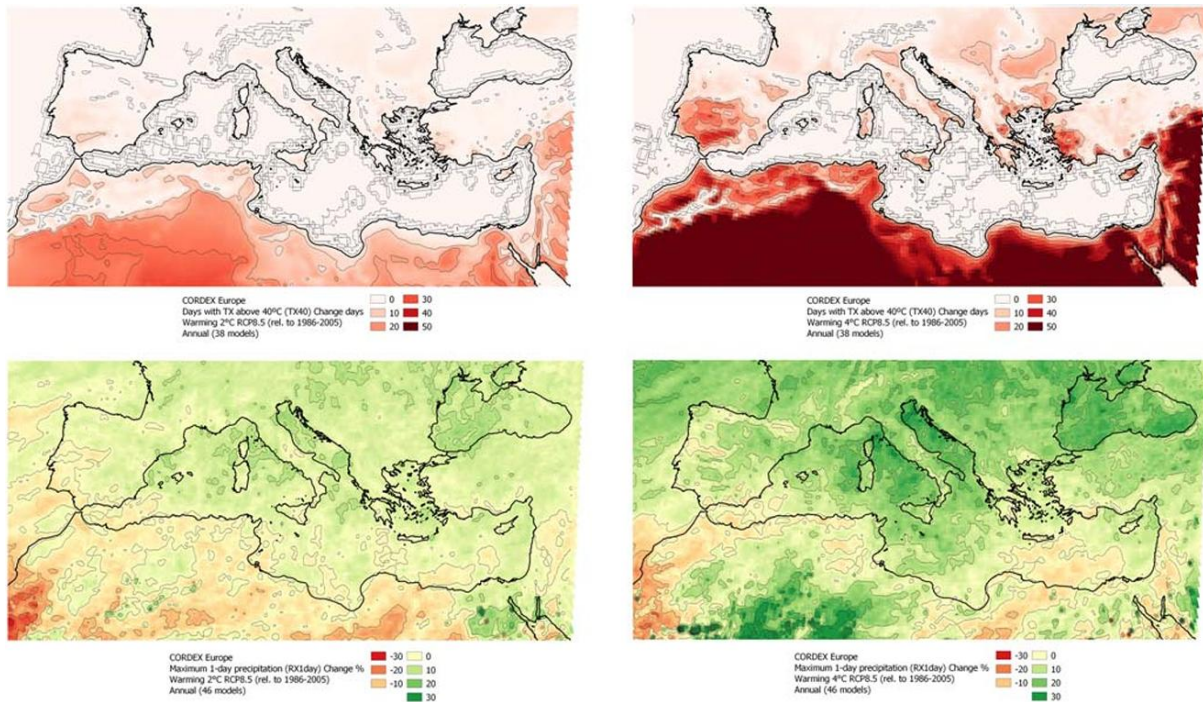


Figure 2-79: Annual mean change of number of days with maximum temperature above 40 °C (top row, number of days) and of maximum 1-day precipitation (bottom row, %) with respect to the 1986–2005 period for 2 °C (left column) and 4 °C (right column) global warming levels, based on EURO-CORDEX simulations (Source: Gutiérrez et al., 2021)

2.3.3.2 Sea level

Future sea level projections for the 21st century have been modeled under varying global climate change scenarios and presented in the study of Marcos et al., 2023. Probabilistic projections specifically representative of the Mediterranean Sea indicate a significant expected rise in the coming decades. By the year 2100, median values predict a mean sea level rise of 54 cm under the intermediate RCP4.5 scenario and 72 cm under the extreme RCP8.5 scenario (Figure 2-80).

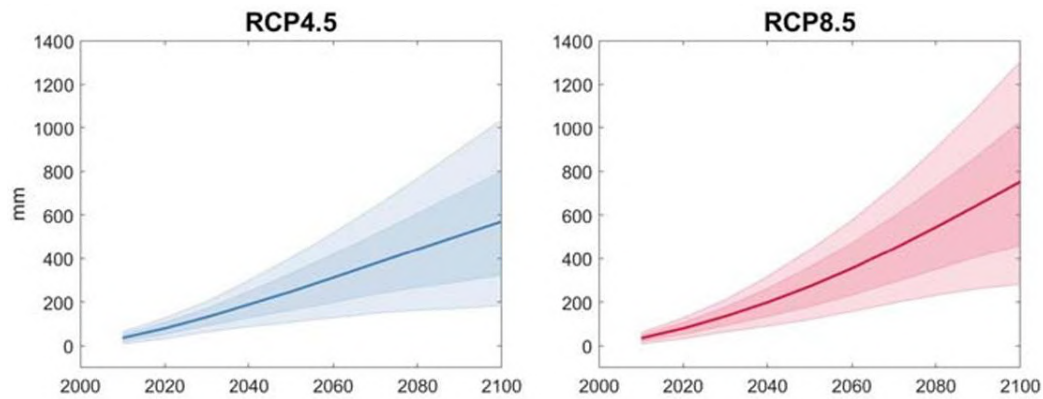


Figure 2-80: Mean sea level projections representative of the Mediterranean Sea under two climate change scenarios (RCP4.5 and RCP8.5) for the 21st century. Shaded areas indicate the 17%–83% and the 5%–95% probability intervals, and solid lines represent the multimodel ensemble median (Source: Kopp et al., 2014; via Marcos et al., 2023).

In the framework of the European Atlas of the Seas, predicted sea level changes have been evaluated across 237 locations placed at approximately 100 km intervals, some 50 to 100 km off Europe's coastline. Relative sea level rise (RSLR) at these locations is extrapolated from the digitization of two maps: the map by Douglas et al. (2001), which provides an estimate of RSLR for the whole of Europe, and the map by Lambeck et al. (1997), which covers a smaller area in more detail (i.e., the North Sea).

Figure 2-81 integrates these RSLR models with coastal migration data, providing visual information on how the shoreline, where the land meets the sea or the ocean, is changing over time. The shoreline-migration map, produced by EMODnet Geology, allows the visualization of pan-European coastal behavior for the period of 2007-2017. The graph identifies areas at different spatial scales experiencing landward migration (erosion or submergence), stability, or seaward migration (accretion or emergence). Tracking these variations on the map provides insight into climate-change effects, and the monitoring of these coastal areas to analyze the effects of erosion can support Integrated Coastal Zone Management (ICZM) initiatives

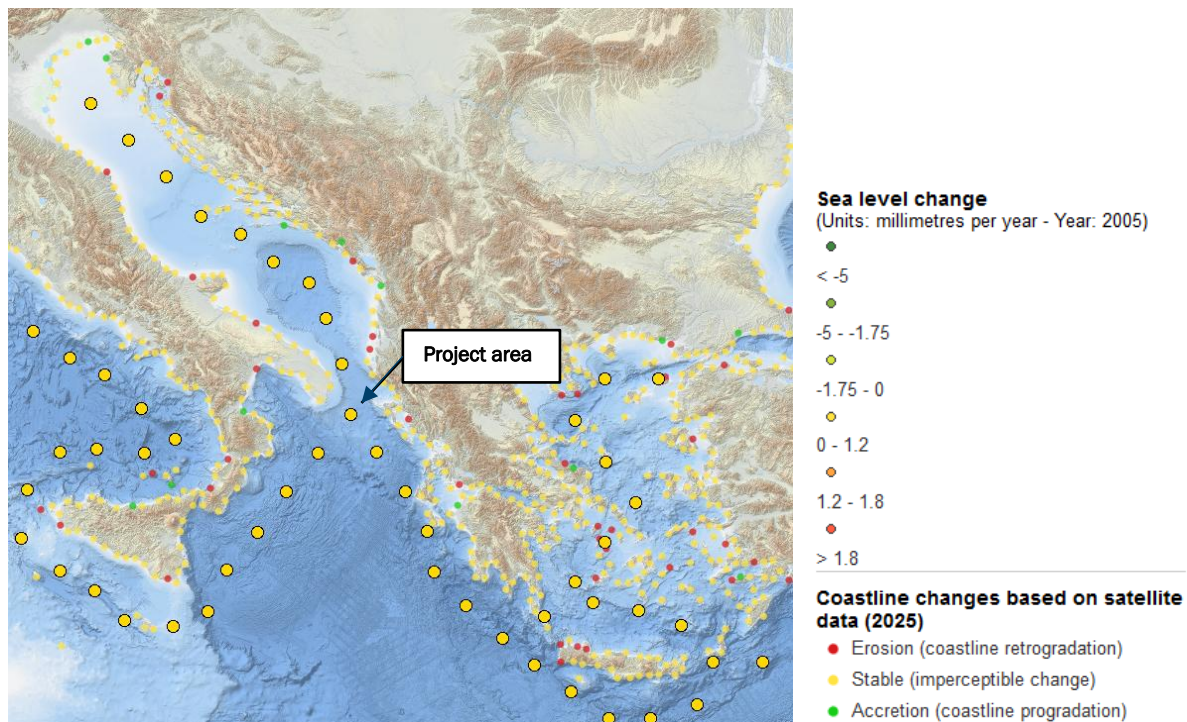


Figure 2-81: Sea level change (2005) and coastline changes based on satellite data (2025) (Source: European Atlas of the Seas)

The data regarding relative sea level rise and coastal migration serve as indicators of the broader climate-change pressures acting upon the Mediterranean basin. As noted by Coll et al. (2010), the Mediterranean Sea's enclosed nature and geological history have historically made it sensitive to changes in climate, sea level, and salinity. Today, climate-driven shifts are projected to grow in importance as a threat to marine biodiversity (Coll et al., 2010).

Beyond sea level fluctuations and coastal erosion, the wider Mediterranean is a recognized climate change hotspot. Seawater in the basin has been warming since at least the 1970s, which has contributed to a northward shift of sea surface isotherms (Coll et al., 2010). This alters marine habitats and enables warm-water species to expand beyond their traditional distributions (Coll et al., 2010). Furthermore, climate models suggest that by the period of 2070–2099, the Mediterranean may experience additional warming of up to 3.1°C (Coll et al., 2010).

These physical shifts act in synergy with seawater acidification resulting from higher CO₂ levels (Otero & Mytilineou, 2019). This process reduces the rate of biogenic calcification in marine organisms, which is expected to influence the marine trophic chain, affecting both planktonic communities and deep-water corals that are becoming rarer in the Mediterranean (Otero & Mytilineou, 2019). Therefore, tracking variations in sea level, coastal stability, and temperature remains a relevant component of the regional baseline, as these climate phenomena contribute to long-term alterations in the ecological resilience of the wider study area.

2.3.4 Flood risk

Directive 2007/60/EC (Floods Directive), which entered into force on 26 November 2007, establishes a common European framework for the assessment and management of flood risks. Its primary objective is to

reduce the adverse consequences of flooding for human health, the environment, cultural heritage and economic activities. The Directive complements WFD 2000/60/EC by promoting integrated river basin management and coordinated flood risk planning across Europe (European Parliament & Council, 2007; European Parliament & Council, 2000).

The Directive requires Member States to identify areas with significant potential flood risk, prepare Flood Hazard Maps and Flood Risk Maps, and develop Flood Risk Management Plans (FRMPs). These plans address all phases of flood risk management, including prevention, protection, preparedness, flood forecasting and early warning systems, while ensuring that flood mitigation measures do not increase flood risks in neighbouring countries (European Parliament & Council, 2007).

Directive 2007/60/EC was transposed into Greek legislation through Joint Ministerial Decision 31822/1542/E103/2010 (Government Gazette B' 1108/21.07.2010). The Directive is implemented through the FRMPs, which are prepared for each River Basin District and reviewed every six years in accordance with the requirements of the Directive (Joint Ministerial Decision 31822/1542/E103/2010).

Implementation in Greece includes the completion of a PFRA, followed by the preparation of Flood Hazard Maps, Flood Risk Maps and Flood Risk Management Plans for all River Basin Districts. Flood Hazard Maps identify flood-prone areas under three probability scenarios (high, medium and low probability or extreme events), whereas Flood Risk Maps assess the potential impacts on population, economic activities, critical infrastructure, environmental receptors, cultural heritage and protected areas (Joint Ministerial Decision 31822/1542/E103/2010).

The Flood Risk Management Plans establish measures for prevention, protection and preparedness, including flood forecasting, early warning systems and emergency response planning. They also integrate river basin management, spatial planning, land-use policies, environmental protection, critical infrastructure management and climate change adaptation into a coordinated flood risk management framework. The Plans are closely coordinated with the WFD, updated every six years and made publicly available through the official Floods Portal of the Ministry of Environment and Energy, ensuring transparency and public participation throughout the planning process.

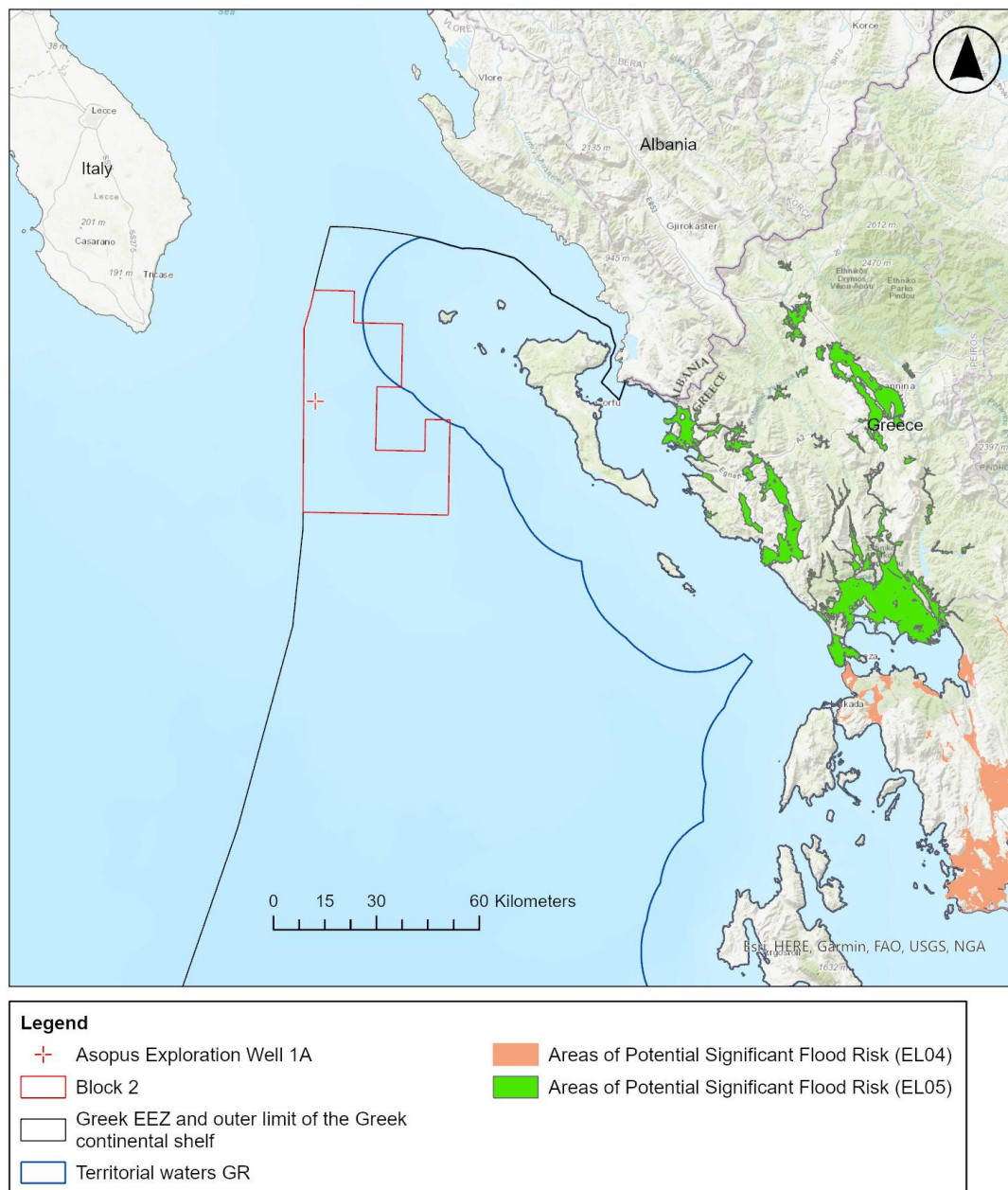


Figure 2-82: Areas of potential significant flood risk (EL04, EL05) (Source: 1st Revision of the FRMPs)

As shown in Figure 2-82, the Exploration Well Asopus 1A and Block 2 are located well outside the Areas of Potential Significant Flood Risk (APSFR) identified in the Greek FRMPs. The nearest designated APSFRs are located on the Greek mainland and include the lower Kalamas River floodplain, the Acheron River floodplain, the Louros–Arta plain, and the lowland areas surrounding the Amvrakikos Gulf. These flood-prone areas are associated with major river catchments and adjacent coastal plains and are clearly separated from the Project area by considerable marine distance.

In Italy, Directive 2007/60/EC was transposed into national legislation through Legislative Decree No. 49/2010 (D.Lgs. 49/2010), in coordination with Legislative Decree No. 152/2006, which incorporates the

WFD, and the existing national hydrogeological planning framework (Legislative Decree No. 49/2010; Legislative Decree No. 152/2006).

Implementation includes the Preliminary Flood Risk Assessment (PFRA), the preparation of Flood Hazard Maps and Flood Risk Maps, and the FRMPs for each River Basin District. These plans are reviewed and updated every six years in accordance with the Directive. Flood Hazard Maps identify areas potentially affected under three flood probability scenarios (high, medium and low probability or extreme events), indicating flood extent, water depth and hydraulic characteristics. Flood Risk Maps evaluate the potential consequences of flooding by considering the exposed population, strategic infrastructure, environmental assets, cultural heritage, economic activities, protected areas and installations with pollution potential (Legislative Decree No. 49/2010).

The responsibility for implementing the Directive lies primarily with the District Basin Authorities (Autorità di Bacino Distrettuale), while the Italian Regions and Autonomous Provinces, in cooperation with the National Civil Protection Department, are responsible for flood forecasting, early warning systems and civil protection planning. The FRMPs establish structural and non-structural measures covering prevention, protection and preparedness, integrating land-use planning, water management, environmental objectives, navigation, port infrastructure, natural flood retention areas and climate change adaptation into a comprehensive flood risk management strategy. Public participation is an integral part of the planning process, with flood-related information and planning documents made available throughout each six-year planning cycle (Italian Ministry of Environment and Energy Security, n.d.; Legislative Decree No. 49/2010).

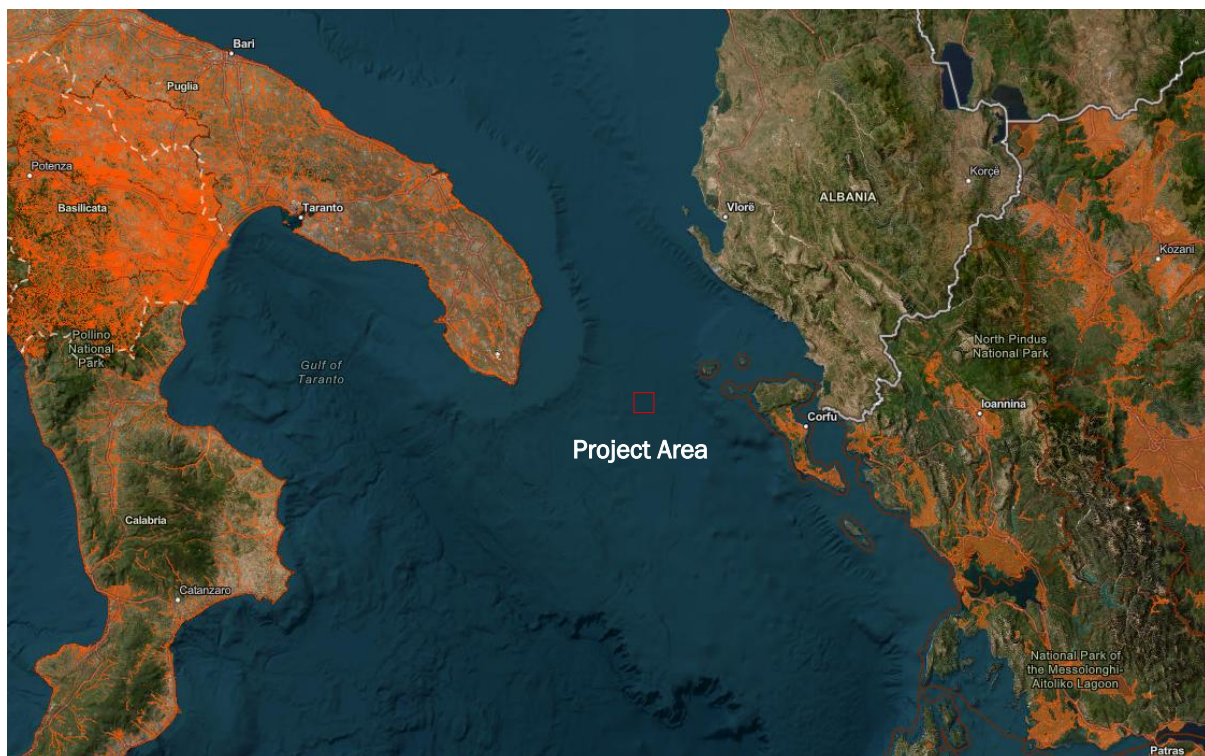


Figure 2-83: Flood Hazard and Flood Risk Map of Italy (Source EEA. 2019, <https://discomap.eea.europa.eu/floodsviwer>)

According to the Italian Flood Hazard and Flood Risk Maps prepared under Directive 2007/60/EC, the nearest areas of significant flood risk (ASFR) to the exploration well Asopus 1A are located along the Apulian coastline, mainly in the vicinity of Otranto, Santa Cesarea Terme, Castro Marina, Tricase Porto and Santa Maria di Leuca. These areas of significant flood risk are associated with river catchments, ephemeral streams and low-lying coastal plains. The proposed offshore Project is located outside these flood hazard and flood risk zones, and no designated flood-prone areas extend into the marine Project area.

2.3.5 Air quality

The analysis of air quality presents the Air Quality Annual Statistics, which offers a comprehensive dataset encompassing twelve (12) air pollutants regulated under current EU legislation. This section examines the state of air quality by utilizing the systematic reporting provided by the European Environment Agency (EEA), which visualizes concentrations through year-by-year maps. A comparative evaluation of the latest reported pollutant concentrations (2024) against EU standards and the stricter World Health Organization (WHO) guideline levels illustrates the broader atmospheric baseline of the region. The specific regulatory thresholds and guideline values retrieved from the EEA reporting datasets for the 12 monitored parameters are summarized in Table 2-20.

Table 2-20: Regulatory EU Standards and WHO Guideline Limit Values for Regulated Air Pollutants (Source: 2024 Baseline Data)

POLLUTANT PARAMETER	EU STANDARD (OR PROXY)	WHO STANDARD
PM _{2.5}	20 µg/m ³ indicative / 25 µg/m ³ limit value	5 µg/m ³
PM ₁₀	40 µg/m ³	15 µg/m ³
NO ₂ (Nitrogen Dioxide)	40 µg/m ³	10 µg/m ³
NO _x as NO ₂	30 µg/m ³	No WHO standard for this statistic
NO (Nitrogen Monoxide)	No EU standard for this statistic	No WHO standard for this statistic
CO (Carbon Monoxide)	No EU standard for this statistic	No WHO standard for this statistic
SO ₂ (Sulfur Dioxide)	20 µg/m ³	No WHO standard for this statistic
BaP in PM (Benzo[a]pyrene)	1.00 ng/m ³	0.12 ng/m ³
As in PM (Arsenic)	6.00 ng/m ³	No WHO standard for this statistic
Pb in PM (Lead)	0.50 µg/m ³	0.5 µg/m ³
Cd in PM (Cadmium)	5.00 ng/m ³	5 ng/m ³
C ₆ H ₆ (Benzene)	5.00 µg/m ³	No WHO standard for this statistic

The spatial variations and annual mean concentration distributions across the European monitoring network for these parameters are mapped in Figure 2-84 – Figure 2-95.

At a broader European level, the primary air pollutants exhibit varying terrestrial and anthropogenic sources. Fine particulate matter (PM_{2.5}) particles are emitted mainly by the combustion of solid fuels for domestic heating, industrial activities, and transport (EEA, 2025a). Secondary PM_{2.5} also forms in the atmosphere when gases combine, with agricultural ammonia (NH₃) emissions significantly contributing to this secondary formation (EEA, 2025a). Similarly, PM₁₀ is emitted mainly by the combustion of solid fuels, industry, agriculture, and transport, but is also influenced by natural sources such as Saharan dust, sea salt, or

volcanoes (EEA, 2025a). The main source of nitrogen dioxide (NO₂) is transport, which emits half of the annual NO_x emissions in Europe, with the highest concentrations generally reported in large, densely populated, and trafficked cities (EEA, 2025a). Conversely, the main national sources of sulfur dioxide (SO₂) are energy supply and industry, which each emit more than 35% of annual SO₂ emissions (EEA, 2025a). Benzo[a]pyrene (BaP) is a carcinogenic pollutant emitted mainly from the combustion of coal, wood, and their derivatives for residential heating, with highest concentrations found in regions where solid fuel use remains prevalent (EEA, 2025a).

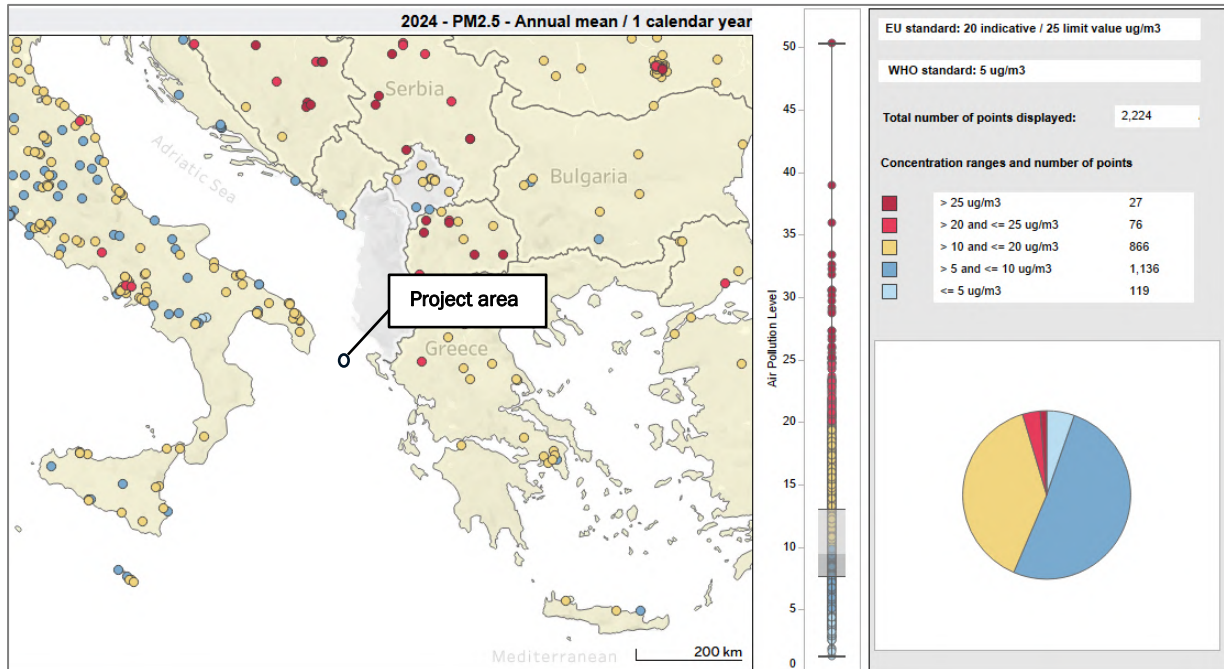


Figure 2-84: PM_{2.5} annual mean – 2024 (EEA)

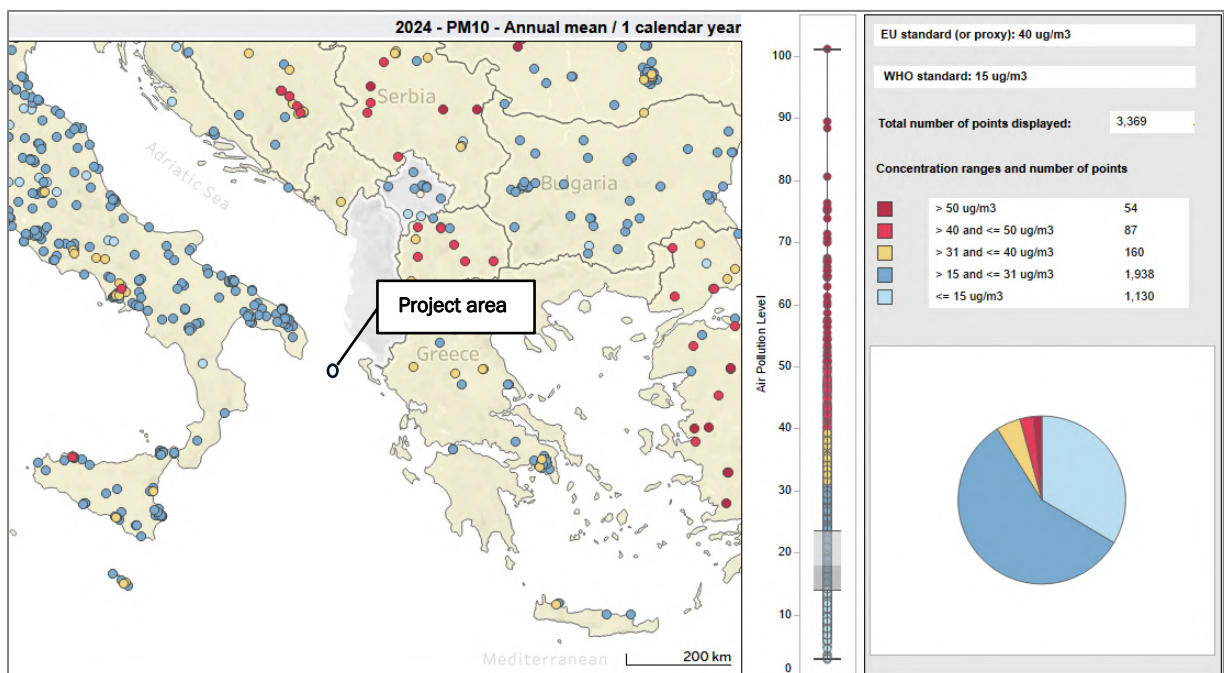


Figure 2-85: PM₁₀ annual mean – 2024 (EEA)

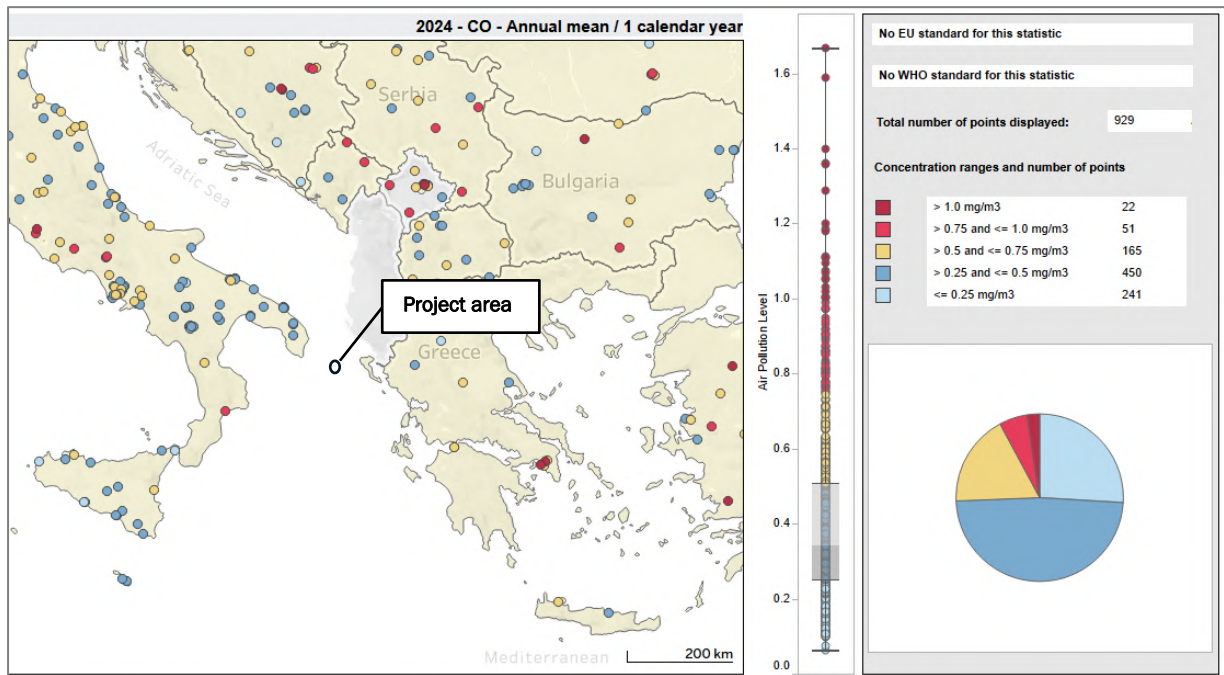


Figure 2-86: CO annual mean – 2024 (EEA)

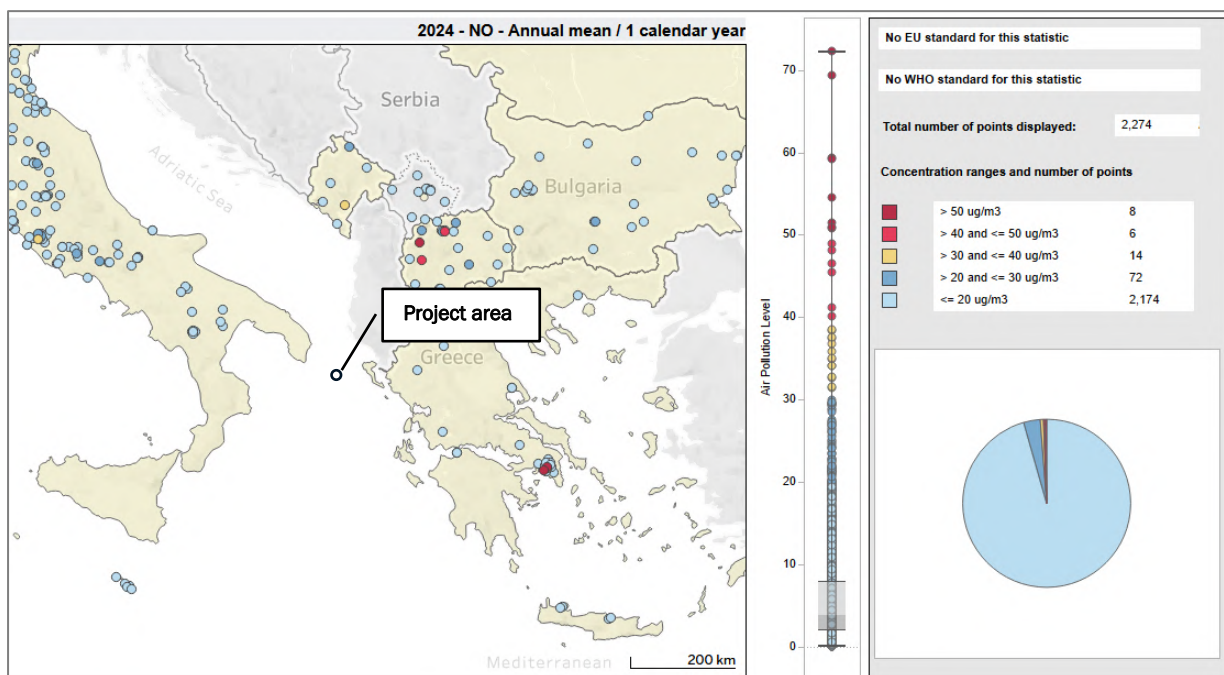


Figure 2-87: NO annual mean – 2024 (EEA)

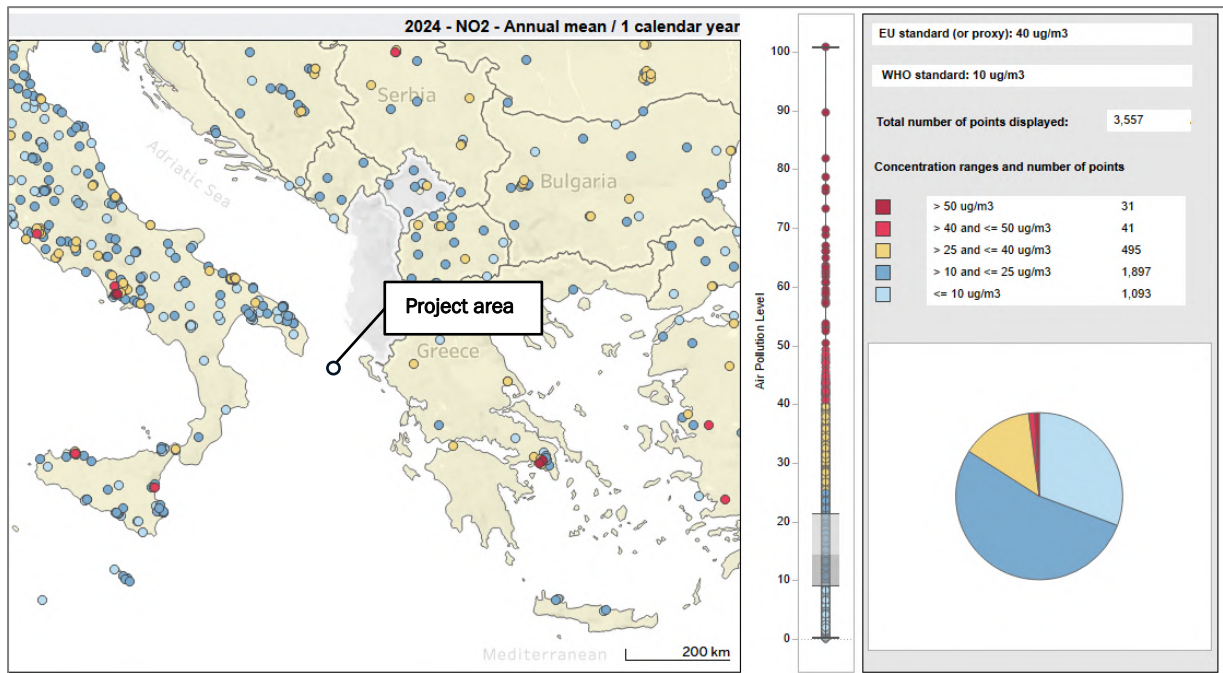


Figure 2-88: NO₂ annual mean – 2024 (EEA)

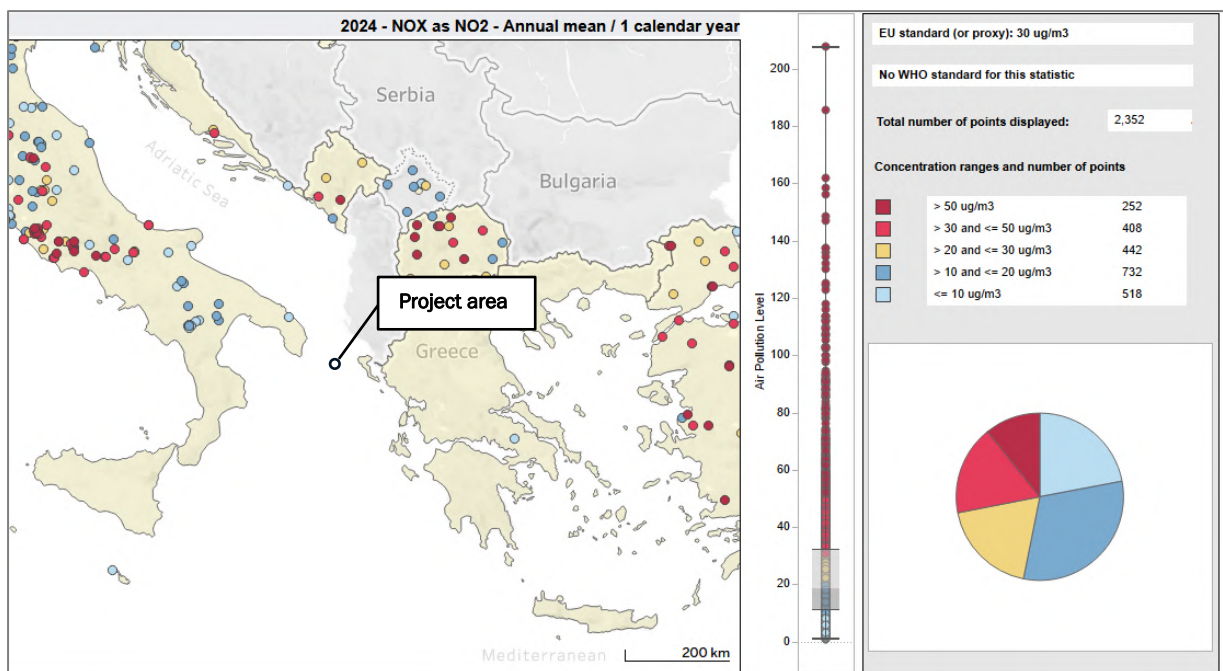


Figure 2-89: NO_x as NO₂ annual mean – 2024 (EEA)

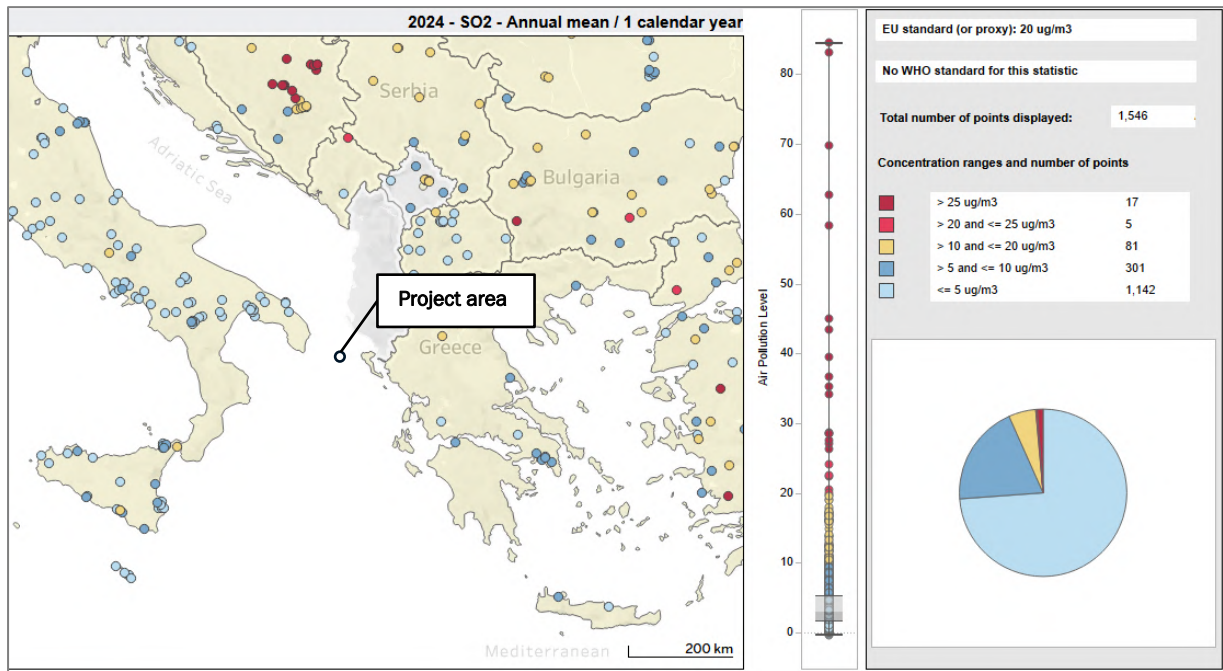


Figure 2-90: SO₂ annual mean – 2024 (EEA)

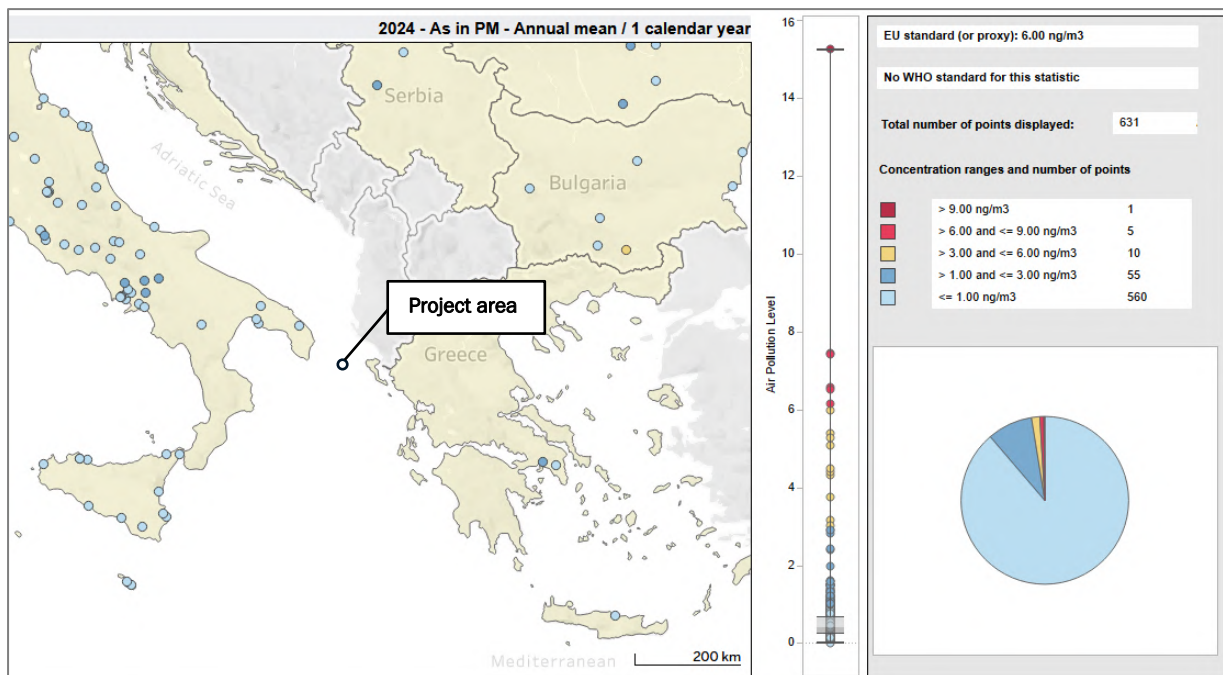


Figure 2-91: As in PM annual mean – 2024 (EEA)

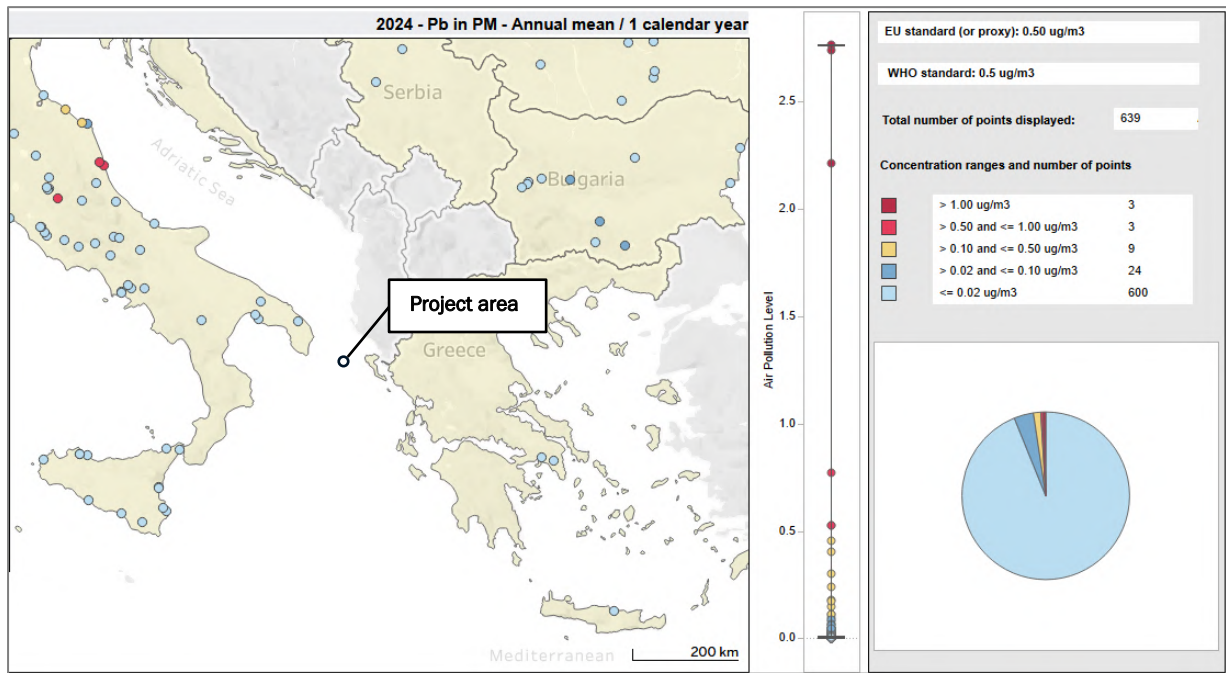


Figure 2-92: Pb in PM annual mean – 2024 (EEA)

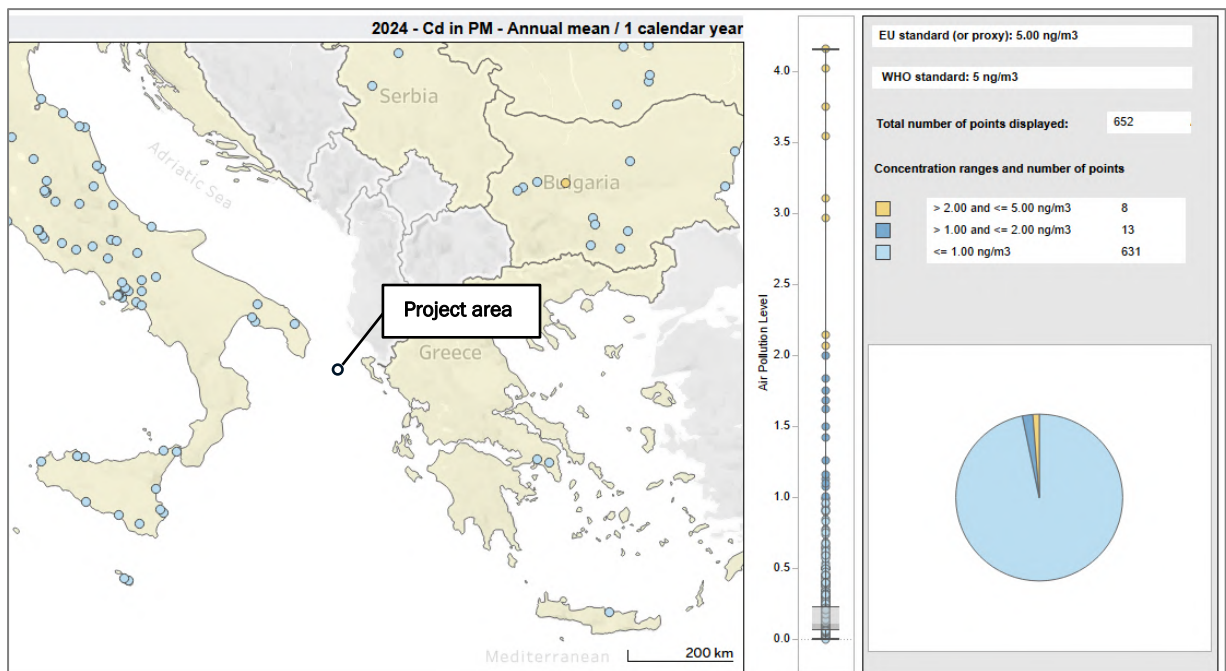


Figure 2-93: Cd in PM annual mean – 2024 (EEA)

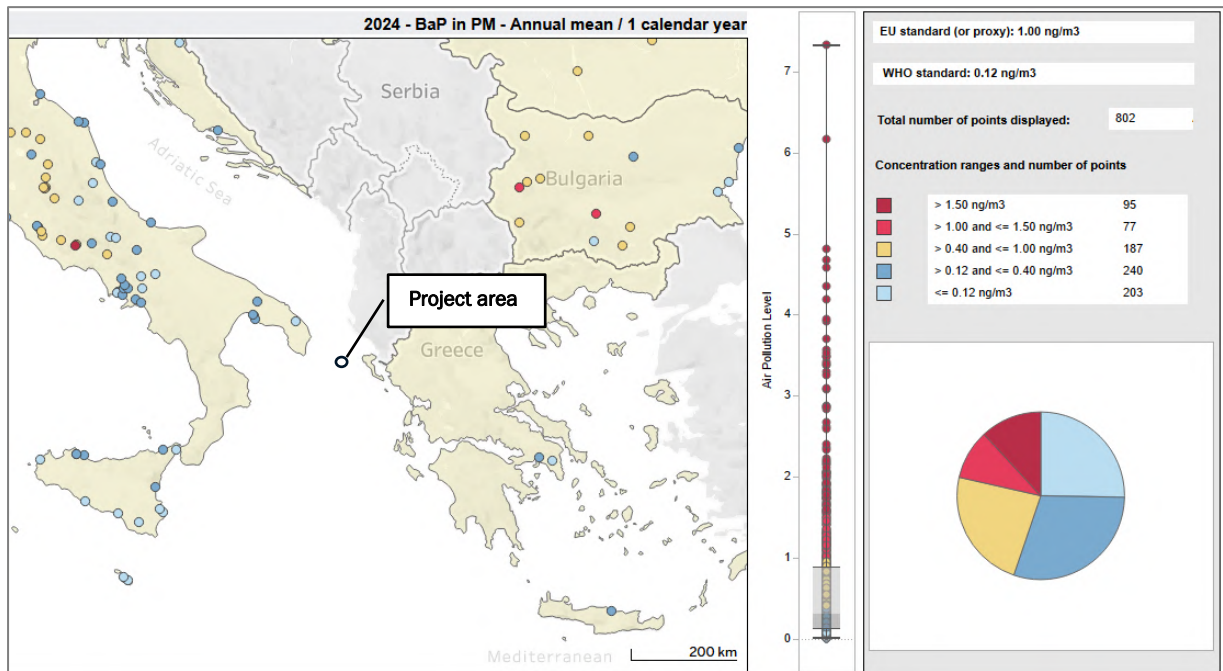


Figure 2-94: BaPin PM annual mean – 2024 (EEA)

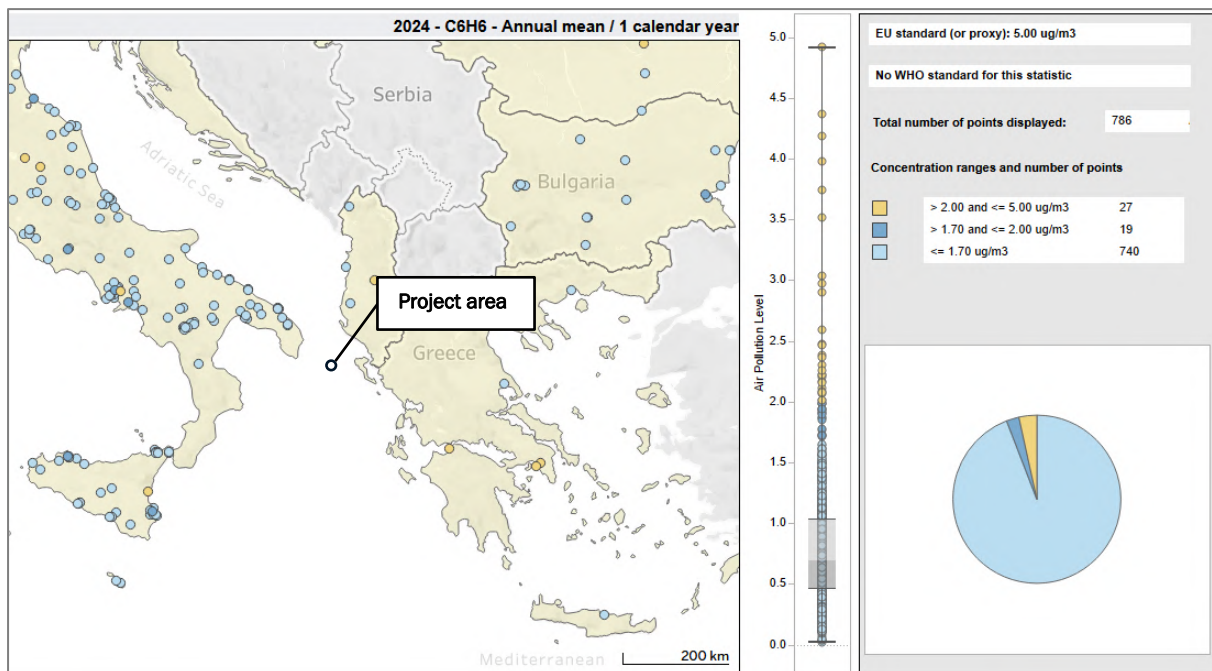


Figure 2-95: C6H6 in PM annual mean – 2024 (EEA)

Given the isolated marine setting of Asopus 1A exploration well, the local air quality is devoid of direct residential, agricultural, or terrestrial industrial influences. Instead, the most significant factor dictating the atmospheric quality in this offshore environment is international shipping and maritime transport.

The maritime industry is integral to global trade but constitutes a substantial source of primary and secondary air pollutants due to the combustion of conventional marine fuels, such as high-sulfur fuel oil (HSFO) and marine diesel oil (MDO) (Roy & Chakraborty, 2025). Globally, shipping commerce accounts for

2–3% of total greenhouse gas (GHG) emissions and is responsible for an estimated 15% of total anthropogenic NO_x emissions and 13% of total SO_x emissions (Smith et al., 2023, as cited in Roy & Chakraborty, 2025). Within the European Economic Area (EEA), ships trading at ports released an estimated 4.46 million tonnes of NO_x, 1.63 million tonnes of SO₂, and 270,000 tonnes of PM_{2.5} in a single year, highlighting the massive scale of maritime emissions (EEA, 2023, as cited in Roy & Chakraborty, 2025).

In coastal regions and active sea-lanes like the Ionian Sea, these emissions have a profound impact on local atmospheric chemistry. Scientific investigations have reported that coastline PM_{2.5} concentrations can rise by 1% to 45% strictly due to shipping emissions (Chen et al., 2018; Jeong et al., 2017; Tao et al., 2017; Viana et al., 2014; Corbett et al., 1999, as cited in Roy & Chakraborty, 2025). The release of SO_x, NO_x, and particulate matter from passing vessels degrades local marine air quality but also facilitates the formation of secondary organic aerosols through atmospheric interactions, serving as the dominant driver of air quality fluctuations in the immediate offshore project area.

2.4 Ecosystems and marine fauna

2.4.1 Benthic fauna

The deep-sea benthic environment of the Eastern Ionian Sea supports diverse biological assemblages adapted to oligotrophic conditions, deep-water homothermy, and high salinity. The seabed at this depth is primarily characterized by soft-sediment plains consisting of fine-grained, muddy, or silty-clay sediments. These deep-sea muds host assemblages of organisms, including soft corals, sponges, polychaetes, crustaceans, echinoderms, and molluscs, that play an essential role in organic matter degradation and nutrient recycling. Figure 2-96 the distribution of benthic substrates as per EUNIS marine habitat classification.

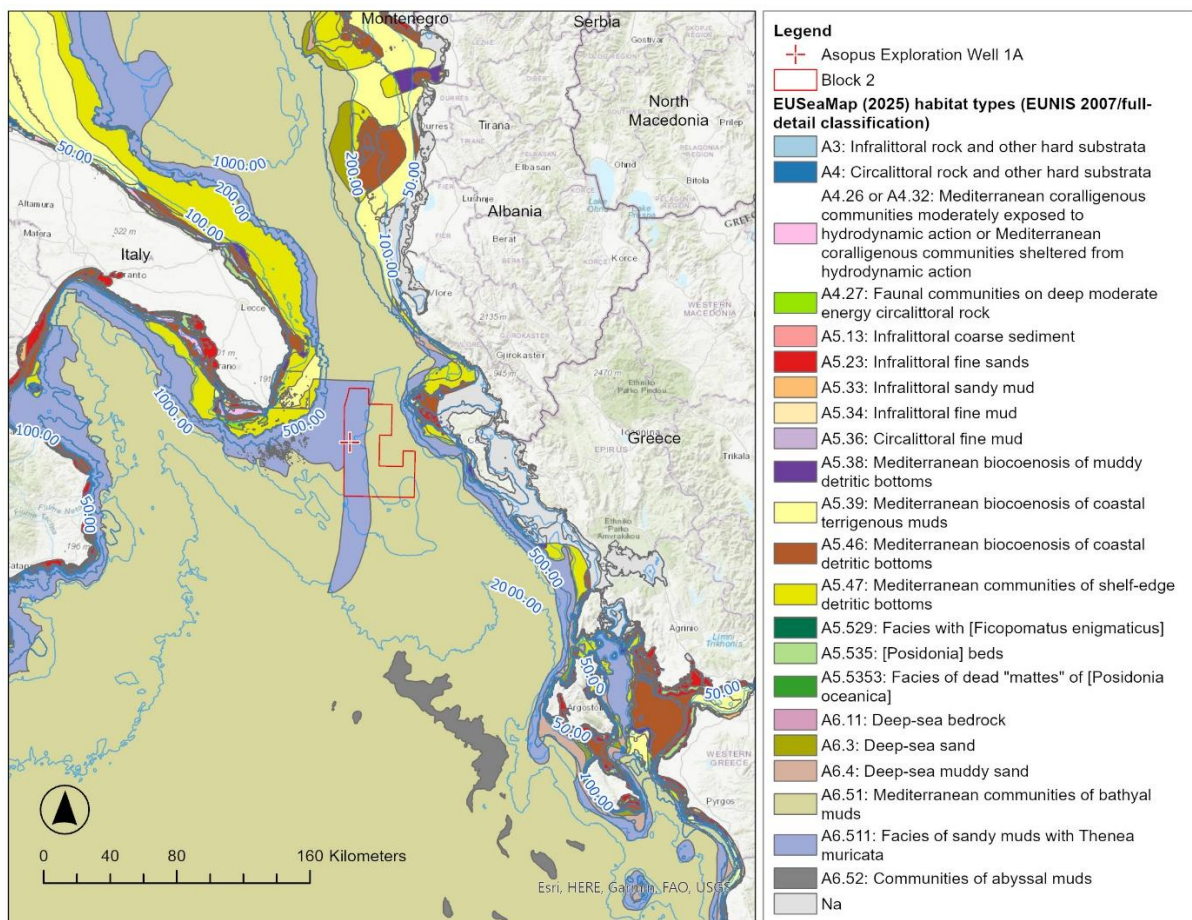


Figure 2-96. EUSeaMap (2025) habitat types (Source: EUNIS 2007/full-detail classification)

Specific areas within these bathyal environments support Vulnerable Marine Ecosystems (VMEs), identified by the presence of fragile, habitat-forming sessile species that possess slow growth rates and low recovery potential following physical disturbances. In the Eastern Ionian Sea, an extensive review of historical literature confirms the presence of 17 key sessile taxa distributed across 84 documented locations (Figure 1) (Salomidi et al., 2022).

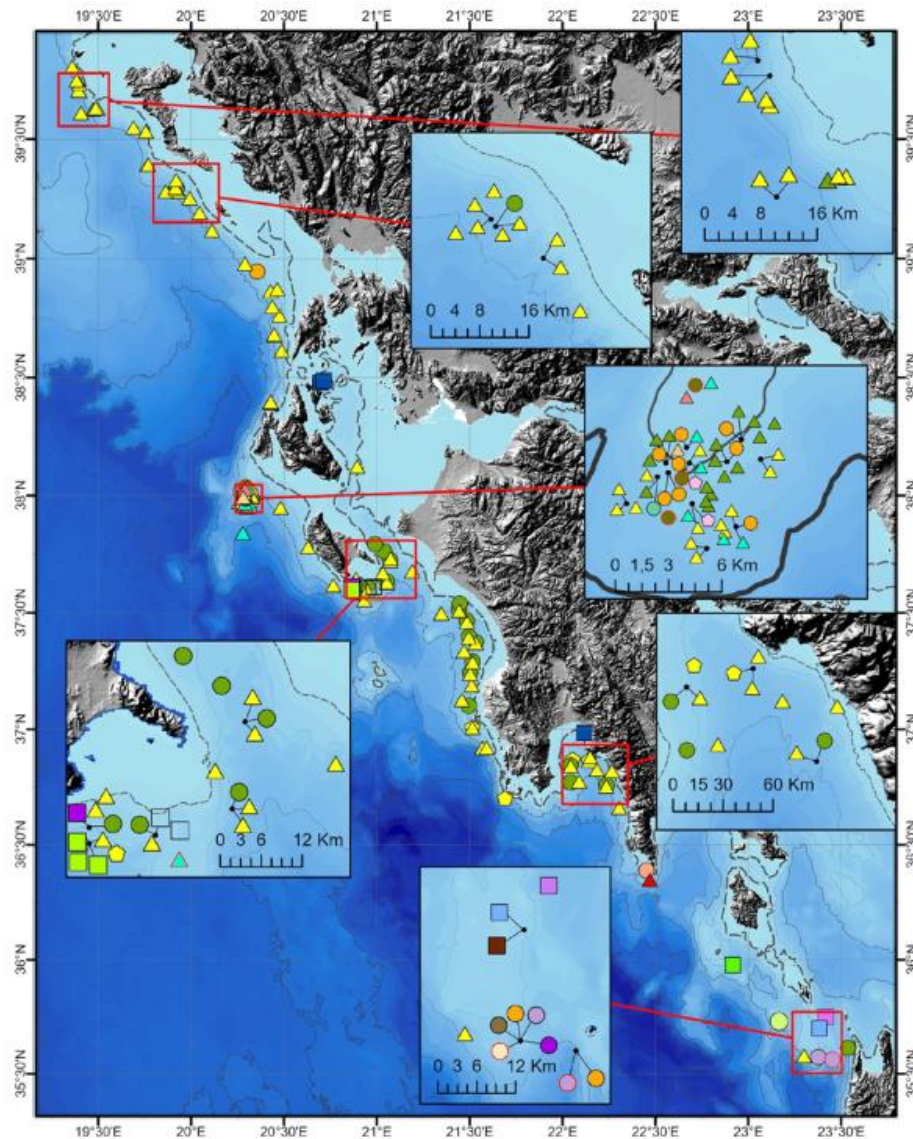


Figure 2-97. Recorded presence of vulnerable sessile invertebrate taxa across the Eastern Ionian Sea

The bathymetric ranges and seabed preferences of the most frequently recorded species in the region (Table 2-21) indicate that bamboo and black corals are the dominant habitat-formers, typically colonizing deep-sea muds between 300 and 1,000 m (Salomidi et al., 2022). The bamboo coral *Isidella elongata* exhibits a nearly continuous distribution in the deep waters of the Eastern Ionian Sea, recorded at depths ranging from 356 to 1,082 m. Black corals also display specific depth affinities within these muddy substrates, with *Leiopathes glaberrima* occurring between 367 and 634 m, and *Antipathes dichotoma* occupying a narrower range between 516 and 600 m (Salomidi et al., 2022). Furthermore, the cockscomb cup coral *Desmophyllum dianthus* is extensively documented between 400 and 968 m. While reef-building cold-water corals are documented in other parts of the Mediterranean, there is currently no evidence of living cold-water coral reefs in the Eastern Ionian Sea, underscoring the dominance of soft-bottom coral gardens in the immediate study region (Salomidi et al., 2022).

Table 2-21: Minimum and maximum depth and seabed type of occurrence for the most frequently recorded species in literature sources for the Eastern Ionian Sea (Source: Salomidi et al., 2022)

TAXA	TAXONOMIC CLASS	MIN DEPTH (M)	MAX DEPTH (M)	SEABED TYPE
<i>Antipathes dichotoma</i>	Anthozoa	516	600	Deep-sea muds
<i>Desmophyllum dianthus</i>	Anthozoa	400	968	Deep-sea muds, deep fossil coral reefs
<i>Isidella elongata</i>	Anthozoa	356	1,082	Deep-sea muds
<i>Leiopathes glaberrima</i>	Anthozoa	367	634	Deep-sea muds

Analyses of photographic material from experimental deep-sea fishing surveys have expanded the known biodiversity baseline of the Eastern Ionian Sea, yielding 162 georeferenced records of vulnerable benthic invertebrates occurring at depth ranges of 163 to 897 m (Table 2-22) (Salomidi et al., 2022). Anthozoans represent the most abundant taxonomic group in the region with 117 occurrence records, heavily dominated by the critically endangered bamboo coral *Isidella elongata* and the vulnerable tall sea pen *Funiculina quadrangularis*. Sponges (Porifera) constitute another vital component of the benthos, prominently featuring the demosponge *Thenea muricata*, which utilizes root-like structures to anchor itself to the soft bathyal muds. These surveys also recorded the rock sponge *Leiodermaium* sp. for the first time in the Eastern Ionian Sea, discovered off the western Peloponnese at a depth of 492 m. The emergent faunal fields are further characterized by a rich diversity of molluscs (such as the giant tun *Tonna galea*), echinoderms, and brachiopods, with the deep-water lamp shell *Gryphus vitreus* recorded in exceptionally high densities in certain locations.

Table 2-22: Number of georeferenced records collected as bycatch from experimental fishing surveys specifically for the Eastern Ionian Sea (Source: Salomidi et al., 2022)

TAXONOMIC GROUP / TAXA	RECORDS (EASTERN IONIAN)	DEPTH RANGE (M)	IUCN STATUS	REGULATORY PROTECTION
Porifera (Sponges)	9			
<i>Agelas oroides</i>	1	499–533	-	-
<i>Leiodermaium</i> sp. (rock sponge)	1	492	-	-
<i>Sarcotragus foetidus</i>	3	271–766	-	Barcelona: II, Bern: II
<i>Thenea muricata</i>	2	165–619	-	-
Unidentified massive sponges	2	165–716	-	-
Anthozoa (Corals, sea pens, anemones)	117			
<i>Alcyonium acaule</i>	1	270	-	-
<i>Antipathes dichotoma</i>	9	516–773	NT	CITES: II, EC: B, Barcelona: II, Bern: III, GFCM
<i>Dendrophyllia cornigera</i>	3	367–634	EN	CITES: II, EC: B, Barcelona: II, GFCM
<i>Desmophyllum dianthus</i>	5	310–600	EN	CITES: II, EC: B, Barcelona: II, GFCM
Elisellidae sp.	1	555	-	-
<i>Funiculina quadrangularis</i>	21	223–856	VU	-
Isididae (incl. <i>Isidella elongata</i>)	68	239–897	CR	Barcelona: II, GFCM
<i>Leiopathes glaberrima</i>	2	380–620	EN	CITES: II, EC: B, Barcelona: II, Bern: III, GFCM

TAXONOMIC GROUP / TAXA	RECORDS (EASTERN IONIAN)	DEPTH RANGE (M)	IUCN STATUS	REGULATORY PROTECTION
<i>Paracyathus pulchellus</i>	1	586	DD	CITES: II, EC: B
<i>Pennatula</i> sp.	2	519–571	VU	-
<i>Swiftia</i> sp.	1	343	-	-
Unidentified corals	3	322–740	-	-
<i>Villogorgia</i> sp.	1	499	-	-
Gastropoda (Molluscs)	13			
<i>Ranella olearium</i>	1	428–609	-	Barcelona: II, Bern: II
<i>Tonna galea</i>	12	163–798	-	Barcelona: II, Bern: II
Brachiopoda (Lamp shells)	18			
<i>Gryphus vitreus</i>	18	223–813	-	-
Echinodermata (Sea urchins, lilies)	5			
<i>Centrostephanus longispinus</i>	1	254–800	-	Barcelona: II, Bern: II
Crinoidea spp.	4	284–865	-	-
Total Occurrences	162			

(Notes: **IUCN Categories:** CR = Critically Endangered, EN = Endangered, VU = Vulnerable, NT = Near Threatened, DD = Data Deficient. **Regulatory Protection:** CITES = Convention on International Trade in Endangered Species; EC = EU Regulation 338/97; Barcelona = Barcelona Convention Annexes; Bern = Bern Convention Annexes; GFCM = Protected under GFCM/43/2019/6 recommendations)

Table 2-23 presents a comprehensive overview of anthozoan species recorded in the Mediterranean Sea based on IUCN 2016, Otero et al., 2017 and Salomidi et al., 2022, providing their geographic range in relation to the project, ecological habitat, conservation status, and regulatory protection. The compilation of this dataset integrates biodiversity and conservation frameworks to represent vulnerable benthic fauna. The potential presence of these species within the wider study area was verified by reviewing the spatial distribution maps provided in IUCN website.

Table 2-23: Anthozoan species of conservation interest in the Mediterranean Sea and their geographic range within the wider study area (Sources: IUCN, 2016; Otero et al., 2017; Salomidi et al., 2022).

SPECIES NAME	IUCN CATEGORY MED 2022	MED LAST ASSESSED	MED ENDEMIC	CITES	PROTOCOL SPA/BD	BERN CONVENTION	GFCM RECOMMENDATIONS	EU HABITATS DIRECTIVE	EU REGULATION TRADE WILD FAUNA AND FLORA SPECIES	IUCN CATEGORY GLOBAL	GLOB LAST ASSESSED	HABITAT AND ECOLOGY	IUCN GEOGRAPHIC RANGE IN THE PROJECT'S WIDER AREA
<i>Isidella elongata</i>	CR	2014									-	Marine Neritic, Marine Deep Benthic	Extant (resident)
<i>Paranemonia vouliagmeniensis</i>	EN	2014	endemic									Marine Neritic	-
<i>Corallium rubrum</i>	EN	2014			III	III	REC.CMGFCM/36/2012/1 On further measures for the exploitation of red coral in the GFCM area	V			-	Marine Neritic	Extant (resident) coastal
<i>Leiopathes glaberrima</i>	EN	2014		II	II	III			B		-	Marine Neritic, Marine Deep Benthic	Extant (resident)
<i>Crassophyllum thessalonicae</i>	EN	2014	endemic									Marine Neritic	-
<i>Desmophyllum dianthus</i>	EN	2014							B	LC	2023	Marine Neritic, Marine Deep Benthic	-
<i>Lophelia pertusa</i>	EN	2014		II	II				B	VU	2023	Marine Deep Benthic	Extant (resident)
<i>Dendrophyllia cornigera</i>	EN	2014							B		-	Marine Neritic, Marine Deep Benthic	Extant (resident)
<i>Cladocora caespitosa</i>	EN			II	II				B	EN	2022	Marine Neritic	Extant (resident)
<i>Madrepora oculata</i>	EN	2014		II	II				B		-	Marine Deep Benthic	Extant (resident)
<i>Ellisella paraplexauroides</i>	VU	2014			II						-	Marine Neritic, Marine Deep Benthic	-

SPECIES NAME	IUCN CATEGORY MED 2022	MED LAST ASSESSED	MED ENDEMIC	CITES	PROTOCOL SPA/BD	BERN CONVENTION	GFCM RECOMMENDATIONS	EU HABITATS DIRECTIVE	EU REGULATION TRADE WILD FAUNA AND FLORA SPECIES	IUCN CATEGORY GLOBAL	GLOB LAST ASSESSED	HABITAT AND ECOLOGY	IUCN GEOGRAPHIC RANGE IN THE PROJECT'S WIDER AREA
<i>Paramuricea clavata</i>	VU	2014									-	Marine Neritic	Extant (resident) coastal
<i>Funiculina quadrangularis</i>	VU									NT	2023	Marine Neritic, Marine Deep Benthic	-
<i>Pennatula rubra</i>	VU	2014										Marine Neritic	Extant (resident) coastal
<i>Pennatula phosphorea</i>	VU									NT	2023	Marine Neritic, Marine Deep Benthic	-
<i>Pteroeides spinosum</i>	VU	2014									-	Marine Neritic, Marine Deep Benthic	Extant (resident) coastal
<i>Dendrophyllia ramea</i>	VU	2014		II					B		-	Marine Deep Benthic	-
<i>Caryophyllia calveri</i>	DD	2014									-	Marine Deep Benthic	-
<i>Caryophyllia smithii</i>	LC	2014									-	Marine Neritic, Marine Deep Benthic	Extant (resident)
<i>Bebryce mollis</i>	DD	2014									-	Marine Neritic, Marine Deep Benthic	Extant (resident)
<i>Swiftia pallida</i>	DD	2014									-	Marine Neritic, Marine Deep Benthic	Extant (resident) coastal
<i>Villogorgia bebrycoides</i>	DD	2014									-	Marine Neritic, Marine Deep Benthic	-
<i>Callogorgia verticillata</i>	NT	2014			II						-	Marine Neritic, Marine Deep Benthic	Extant (resident)
<i>Antipathes dichotoma</i>	NT	2014		II	II	III			B		-	Marine Neritic, Marine Deep Benthic	Extant (resident)

SPECIES NAME	IUCN CATEGORY MED 2022	MED LAST ASSESSED	MED ENDEMIC	CITES	PROTOCOL SPA/BD	BERN CONVENTION	GFCM RECOMMENDATIONS	EU HABITATS DIRECTIVE	EU REGULATION TRADE WILD FAUNA AND FLORA SPECIES	IUCN CATEGORY GLOBAL	GLOB LAST ASSESSED	HABITAT AND ECOLOGY	IUCN GEOGRAPHIC RANGE IN THE PROJECT'S WIDER AREA
<i>Parantipathes larix</i>	NT	2014		II	II				B		-	Marine Neritic, Marine Deep Benthic	Extant (resident)
<i>Alcyonium palmatum</i>	LC	2014									-	Marine Neritic	Extant (resident) coastal
<i>Paralcyonium spinulosum</i>	LC	2014									-	Marine Neritic, Marine Deep Benthic, Other	-
<i>Virgularia mirabilis</i>	LC	2014									-	Marine Neritic, Marine Deep Benthic	Extant (resident) coastal
<i>Kophobelemnon stelliferum</i>										NT	2023	Marine Neritic, Marine Deep Benthic	-

2.4.2 Alien and cryptogenic species

The biodiversity of the Mediterranean Sea is influenced by the introduction of new species, with hundreds of metazoan species recorded as alien (Coll et al., 2010). The majority of these introductions are littoral and sublittoral benthic or demersal species (Coll et al., 2010). The native ranges of most alien species in the Mediterranean are the Indo-Pacific Ocean and the Red Sea, having primarily entered through the Suez Canal or via maritime transport and aquaculture (Coll et al., 2010). Because many of these species are thermophilic, the progressive warming of the Mediterranean Sea favours their establishment and facilitates their spread northwards and westwards (Coll et al., 2010).

A recent assessment compiling 5,376 unpublished records across 19 Mediterranean countries identified 239 alien or cryptogenic taxa (Katsanevakis et al., 2020). The majority of these records belong to the kingdom Animalia (67%), followed by Plantae (27.7%) and Chromista (5.2%) (Katsanevakis et al., 2020). The most frequently reported phyla were Chordata, Mollusca, Chlorophyta, Arthropoda, and Rhodophyta (Katsanevakis et al., 2020). In terms of specific organisms, the most recorded species was the invasive green alga *Caulerpa cylindracea*, followed by the rabbitfish *Siganus luridus*, oysters (*Magallana* sp.), and the lionfish *Pterois miles* (Katsanevakis et al., 2020). In the dataset compiled by Katsanevakis et al. (2020), depth information was provided for the majority of the records, showing that observations almost exclusively occurred in shallow coastal waters. Only a negligible fraction of observations out of the entire dataset took place at depths greater than 100 m (Katsanevakis et al., 2020) (see Figure 2-98).

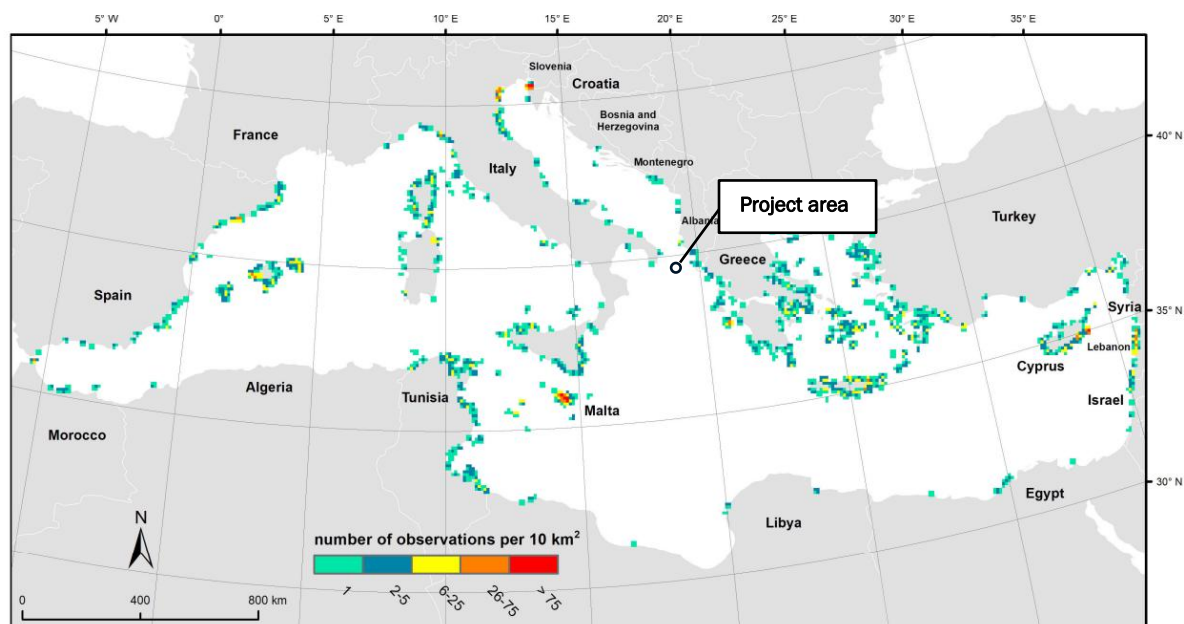


Figure 2-98. Number of alien and cryptogenic records per 10 km × 10 km grid cell, included in the dataset (Source: Katsanevakis et al., 2020)

Based on a comprehensive revision of the marine non-indigenous species (NIS) inventory up to December 2021, over 1,366 taxa were evaluated across the Mediterranean Sea to determine updated basin-wide trends (Zenetos et al., 2022). This revision confirmed a total of 751 established taxa and 242 casual taxa, while 23 species were considered failed introductions and 58 were tagged as cryptogenic (Zenetos et al.,

2022). Taxonomically, Mollusca exhibited the highest diversity among these established and casual NIS (230 taxa), followed closely by Pisces (173 taxa) and Crustacea (170 taxa) (Zenetos et al., 2022).

This updated baseline reveals a highly dynamic biological invasion process, marking a 40% increase in the number of established non-indigenous species within an 11-year period between 2010 and 2021 (Zenetos et al., 2022). Furthermore, the data show an accelerated rate of establishment, reaching 13% between January 2020 and December 2021 (translating to >6% yearly), a figure well above the predictions of earlier invasion theories on establishment success for Mediterranean marine NIS (Zenetos et al., 2022). This increased establishment success was found to be more pronounced in Crustacea (47%) and Pisces (43%) than in Polychaeta (27%) and phytobenthos (30%) (Zenetos et al., 2022).

The seemingly increased rates of NIS establishment over the last two decades may have been triggered by an abrupt regime shift in Sea Surface Temperatures (SST) in the Mediterranean between the mid-1990s and the mid-2000s, which was particularly pronounced in the Eastern Mediterranean and the Adriatic (Zenetos et al., 2022). Coupled with an increase in dedicated research efforts, the continuously rising share of established NIS suggests that Mediterranean communities will be increasingly invaded in the future, marking the unrevertability of biological invasions in the basin (Zenetos et al., 2022).

2.4.3 Plankton

There is a history of plankton-related studies in the Ionian Sea going back to the early 1980s, which is considerably shorter than for other parts of the European seas which have seen plankton research going back to the 1800s. Overall, the Ionian Sea is poorly studied with regards to Planktology. Until 1999, ISI Web of Science lists only 9 records for the search term combination “Ionian Sea” and “Plankton”, while there are 65 literature records for the same search times since the start of the millennium. In this context, it is important to distinguish between the open sea (west of the Ionian Islands and south of the tip of the Italian mainland), the semi-enclosed Gulf of Taranto (southern Italy), the straits between the Ionian Islands and the Greek mainland, and even more enclosed marine inland waters such as Amvrakikos Gulf linked to the open sea only by narrow straits. These systems have very different topographic and hydrographic features – and, consequently, very strongly differing planktonic systems.

It is important to emphasize that early studies (prior to the year 2000) often did not get published in peer-reviewed international journals but rather remained at the level of unpublished grey literature, i.e. internal reports of institutions, governments, funding agencies and conference papers, which makes it difficult to find and retrieve them nowadays.

The first published study for the Ionian Sea region investigated plutonium isotopes in various groups of marine organisms in the Gulf of Taranto (Triulzi et al. 1982).

Panayotidis, Gotsi and co-workers from the Hellenic Centre for Marine Research conducted plankton studies in the shallow, semi-enclosed Amvrakikos Gulf since the early 1990s (Panayotidis et al. 1994). The seasonal variation and spat recruitment pattern of the scallops *Flexopecten glaber* and *Chlamys varia* in the protected aquatic ecosystem of the northwestern Amvrakikos Gulf (Natura 2000) were examined by using a combination of plankton sampling and spat collection techniques during the spring and summer of 2007 (Tsotsios et al. 2016).

High-resolution foraminiferal and calcareous nannoplankton biostratigraphy and reliable paleobathymetry estimates based on plankton-benthos ratios in foraminifera were used to reconstruct in detail Late Neogene vertical motions along the Central Cretan segment of the Hellenic arc (Meulenkamp et al. 1994).

A pan-Mediterranean study included surveys of foraminifers in the Ionian Sea (Pujol and Grazzini 1995) which stood out for exceptionally high productivity by members of this group.

A one dimensional, coupled physical-biological model is used to study the biological production characteristics of the Rhodes and western Ionian basins of the Eastern Mediterranean (Napolitano et al. 1998). The biological model involves single aggregated compartments of phytoplankton, zooplankton, detritus as well as ammonium and nitrate forms of the inorganic nitrogen.

The first more comprehensive plankton study for the Ionian Sea was that by Siokou-Frangou and co-workers, which however was merely published as a conference proceedings paper (Siokou-Frangou et al. 1998).

An extensive study of the nutrient regime in the Eastern Mediterranean including the Ionian Sea since 1985 allowed the detailed description of their spatial and temporal distribution (Souvermezoglou and Krasakopoulou 1998).

One of the earlier studies for the region investigates the distribution of coccolithophorid assemblages from water samples collected in the photic zone of the middle Ionian Sea during a cruise of R/V Urania in November-December 1997 (Malinverno et al. 2003).

Tokarev et al. (1998) show the possibilities of using the characteristics of the bioluminescent fields to monitor the marine planktonic communities. They subsequently applied this approach to identify the small-scale structure of plankton communities of the Black and Ionian Seas by their bioluminescence characteristics (Tokarev et al. 1999).

During a transect from upwelling cells north of Cap Ghir (Morocco) to the eastern Mediterranean Sea in late summer 1999, an eastward unsteady increase of the DMS (dimethyl sulfide)-to-tDMSP (dimethyl sulfonio propionate) ratio from roughly 10% in the Alboran Sea up to 40% in the Ionian Sea was observed (Belviso et al. 2003).

The distribution of coccolithophorid assemblages is analyzed from water samples collected in the photic zone of the middle Ionian Sea during a cruise of R/V Urania in November-December 1997 (Malinverno et al. 2003).

An Italian study investigated the outflow of deep water masses from the Ionian Sea into the western Mediterranean via the Channel of Sicily (Iudicone et al. 2003). This is potentially relevant for deep-water oil and gas exploration and production.

An Italian study (Sabetta et al. 2005) focuses on body size-abundance distributions of nano- and micro-phytoplankton guilds in coastal marine areas of the Southern Adriatic-Ionian region based on data collected during four oceanographic cruises carried out seasonally along the Southern Apulian coast (Adriatic and Ionian Seas, SE Italy).

The Ionian Sea also features in a study of the wider Mediterranean Sea (La Ferla et al. 2005), exploring the variability of microbial biomass and activities (La Ferla et al. 2005). In the euphotic layer, bacterial growth efficiency (BGE) widely ranged between 4% and 50% showing a decreasing trend from estuaries towards pelagic areas in alignment with the trophic gradient from the Northern Adriatic to the Ionian Sea. The Central

Mediterranean Sea showed different trophic regimes in the examined areas and seasons - in the Ionian Sea, the overall balance turned always towards remineralization.

A novel association of the bioluminescent bacterium *Vibrio harveyi* with the hydrozoan *Aglaophenia octodonta* was discovered on the Ionian coasts of Apulia, Italy (Stabili et al. 2006).

The Ionian Sea has the deepest site of Mediterranean Sea, the Matapan-Vavilov Deep (MVD). This hadal canyon with a deepest point located at approximately 5270 m, 56 km SW of city Pylos (Greece). In this context, a metabarcoding study (Smedile et al. 2013) stands out by analyzing hadopelagic microbial assemblages from one of the deepest points ever investigated in such a context worldwide. Comparative analysis of whole-metagenomic data revealed that unlike other deep-sea metagenomes, the prokaryotic diversity in MVD was extremely poor.

Samples from the Ionian Sea also featured in global metagenomic studies of Archaea (Martin-Cuadrado et al. 2008) and Acidobacteria (Quaiser et al. 2008). Both of them are based upon bacterioplankton samples from 500-3,000 m depth in the Ionian Sea. Samples from 3,000 m in the Ionian Sea also revealed high rates of horizontal gene transfer among Archaea (Brochier-Armanet et al. 2011).

The bathypelagial of the Ionian Sea has repeatedly found interest for bioluminescence studies. One driver was the possibility of establishing a neutrino telescope in the ultra-clear and deep Ionian waters, where bioluminescence could be a potential source of errors and detection artefacts (Prieditis et al. 2008).

The occurrence and abundance of dinoflagellate cysts were investigated for the first time at an Ionian locality along the south-eastern coast of Sicily, subject to spring-summer harmful algal events (Rubino et al. 2010). Another study on phytoplankton cysts by some of the same investigators was conducted in the Gulf of Taranto a few years later (Rubino et al. 2016).

The southeastern Adriatic Sea, the transition zone to the Ionian Sea, has been the focus of a number of plankton-related studies.

First insight to the oceanography of the southeastern Adriatic Sea, where coastal water influenced by Albanian rivers comes into contact with the inflowing oligotrophic Eastern Adriatic Current (Ionian Surface Water and Levantine Intermediate Water), was provided by a Croatian-led study (Vilicic et al. 2011).

An unusual phenomenon was recorded in the deep South Adriatic in February 2008: phytoplankton reached their maximum abundance in the aphotic zone, providing biological evidence of a winter convection event in the South Adriatic (Batistic et al. 2012).

The South Adriatic is an entry point for water masses originating from the Ionian Sea and a place of dense water formation for the eastern Mediterranean deep circulation cell. Using a sampling station in the South Adriatic Pit with depth of 1200 m, micro- and nano-phytoplankton abundances, community structure, chlorophyll a concentrations, physical and chemical properties were measured in the winter and spring months for five consecutive years (2009-2013) during different circulating regimes (Ljubimir et al. 2017).

Spatial and temporal variability of phytoplankton were investigated in the southern Adriatic Sea in the period November 2006-June 2008, sampling three stations along the Bari-Dubrovnik transect with a seasonal frequency (Cerino et al. 2012).

Samples for the study of radiolarians in the Southern Adriatic were collected during five cruises at three stations along the Dubrovnik transect (stations S-100 to S-1000) from April 1993 through February

1995. One of the findings was that the populations of most species were renewed by incoming eastern Adriatic currents from the Ionian Sea (Krsinic and Krsinic 2012). The presence and diversity of polycystine radiolarians in the North-Eastern Mediterranean Sea is explored for the first time through the analysis of sinking particles obtained from sediment traps moored in three open marine sites – including in the Ionian Sea (Danelian et al. 2022).

Fine spatial and temporal phytoplankton variability in Mali Ston Bay has been observed for the first time based on physicochemical properties and small herbivorous zooplankton (Calic et al. 2013).

Areal expansion and introduction of new phytoplankton species in the Adriatic Sea might be related to different circulation regimes in the Ionian Sea and the concurrent rise in sea temperature in the Mediterranean in the last decade. In this context, unusual occurrence of Indo-Pacific planktonic diatom species, *Chaetoceros bacteriaströides* and *Chaetoceros pseudosymmetricus*, was noticed in three different marine ecosystems of Adriatic Sea: the Krka Estuary and Telascica Bay in the Central Adriatic, and in southern Adriatic offshore (Calic et al. 2018).

The winter Open Southern Adriatic, i.e. the interface to the Ionian Sea, also features winter phytoplankton blooms which were investigated from 1994 to 2012 in the context of the different circulation regimes in the Ionian Sea, namely to the anticyclonic and cyclonic phases of the Northern Ionian Gyre (NIG), both of which influence the physical and biochemical properties of the Southern Adriatic (Batistic et al. 2019).

This area, the Southern Adriatic Sea, was also investigated for Tintinnid ciliate communities (Njire et al. 2019) and copepod communities (Hure et al. 2020) in pre- and post-winter conditions and for radiolarians year-round (Krsinic and Krsinic 2012) more recently.

Ionian and Adriatic Sea sites also feature as Long-Term Ecological Research (LTER) sampling / survey stations on the Italian coast (Morabito et al. 2018).

Plankton abundance and diversity were investigated in relation to the physical forcing and nutrient concentrations in an area affected by island-trapped waves (ITWs) near Lastovo Island (Adriatic Sea) (Ljubecic et al. 2024).

In the oligotrophic waters of the Mediterranean Sea, during the stratification period, the microbial loop relies on pulsed inputs of nutrients through the atmospheric deposition of aerosols from both natural (e.g., Saharan dust), anthropogenic, or mixed origins. In total, three Saharan dust addition experiments were performed with surface seawater collected from the Tyrrhenian Sea, Ionian Sea, and Algerian basin in the western Mediterranean Sea during the PEACETIME (ProcEss studies at the Air-sEa Interface after dust deposition in the MEditerranean sea) cruise in May-June 2017 (Dinasquet et al. 2022) (Gazeau et al. 2021) (Gazeau et al. 2021) Further studies of atmospheric deposition in the area investigated effects on biogeochemical cycles (Van Wambeke et al. 2021).

The intricate dynamics of siliceous plankton species within the open marine regions of the Greek Seas, focusing on their seasonal and spatial variability. For this purpose, vertical export fluxes of diatoms (DtF), silicoflagellates (SF), and radiolaria (RF) were analyzed in three sediment trap time series obtained from the North Aegean, Cretan, and Ionian Seas (Nikolopoulou et al. 2024). More recently, siliceous plankton flux and radiolarian community structure were investigated in the highly oligotrophic Ionian Sea (Eastern Mediterranean), identifying features of climate variability (Cueille et al. 2025).

The identifying traits of the phytoplankton and bacteria such as biomass, size, shape and their metabolism related to organic matter production and degradation, recognized as indicators of the functioning of a pelagic ecosystem, were observed in the Gulf of Manfredonia (South Adriatic Sea, Italy) in late spring.

Further studies revealed that interannual variations in Adriatic Sea zooplankton mirror shifts in circulation regimes in the Ionian Sea (Batistic et al. 2014).

The Ionian Sea was surveyed by the PEACETIME cruise (May-June 2017), a Mediterranean basin-scale survey covering the Provencal, Algerian, Tyrrhenian, and Ionian basins during the post-spring bloom period which was dedicated to tracking the impact of Saharan dust deposition events on the Mediterranean Sea pelagic ecosystem (Feliú et al. 2020).

The effects of dust deposition on the strength of the biological pump in the Mediterranean Sea by acting as fertilizer and/or ballasting agent were analyzed by monitoring fluxes of mineral dust, particulate organic carbon (POC) and inorganic carbon (PIC), and source-specific lipid biomarkers (i.e., higher plant-derived long-chain fatty acids and phytoplankton-derived alkenones, C30 1,15 diols, and sterols) in sinking particles (van Boxtel et al. 2025).

Vertical distribution, abundance, diversity and community structure of tintinnid assemblages were investigated at monthly intervals at one fixed station in the coastal Ionian Sea, Central Mediterranean, between March 2003 and May 2004. A total of 79 species belonging to 23 genera were identified (Sitran et al. 2007).

A new zooplankton species, an Erythropinae mysid, *Dactylamblyops corberai* n. sp., is described from specimens sampled with a 500-µm plankton net attached to a bottom trawl between 398 and 1859 m depth in the Ionian Sea (eastern Mediterranean), constituting the first *Dactylamblyops* species described from the Mediterranean Sea (San Vicente and Cartes 2011).

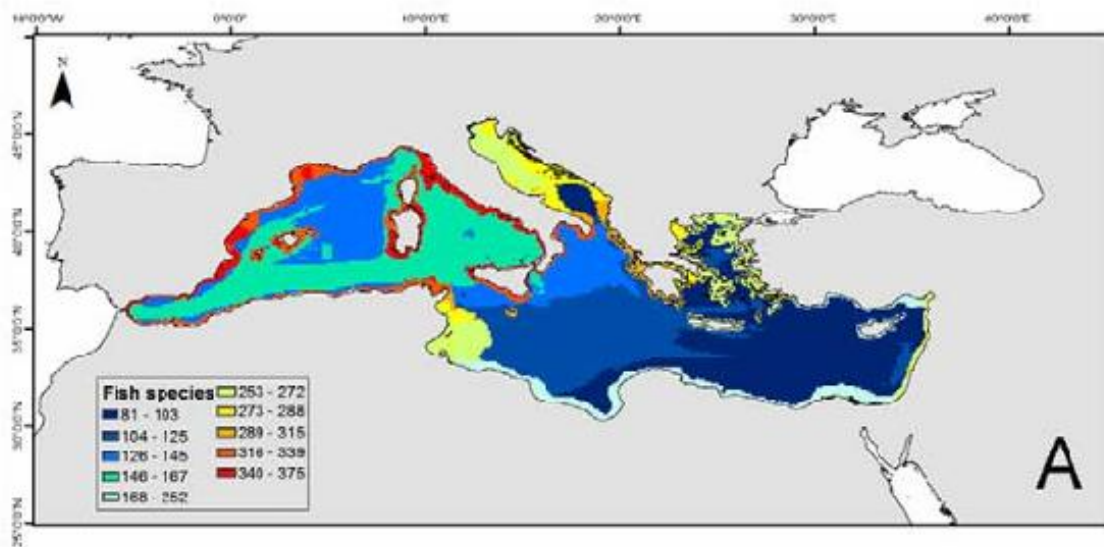
Studies of human impacts have investigated aquaculture (Shumka et al. 2010), including in the in the Mar Piccolo of Taranto (Ionian Sea, Italy) where mussel farms exert a profound impact on plankton communities (Karuza et al. 2016). In the same area, the Mar Piccolo of Taranto, benthic foraminifera and ostracods, and resting stages (cysts) of plankton were analysed from surface sediment samples collected at 20 stations (Ferraro et al. 2017). The Mar Piccolo of Taranto was further chosen as a pilot site in which to investigate how marine cyst banks and plankton affect each other in the living part of the benthic-pelagic coupling (Rubino and Belmonte 2021). Close to there, the distribution of Plankton Resting Stages was investigated in bottom sediments along the confinement gradient of the Taranto Sea System (Ionian Sea, Southern Italy) (Rubino et al. 2024).

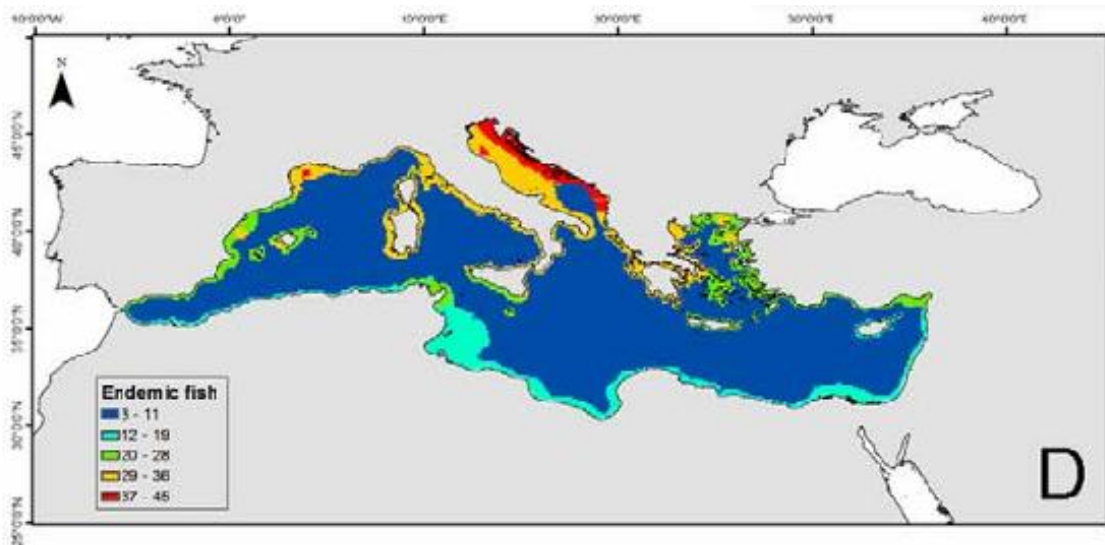
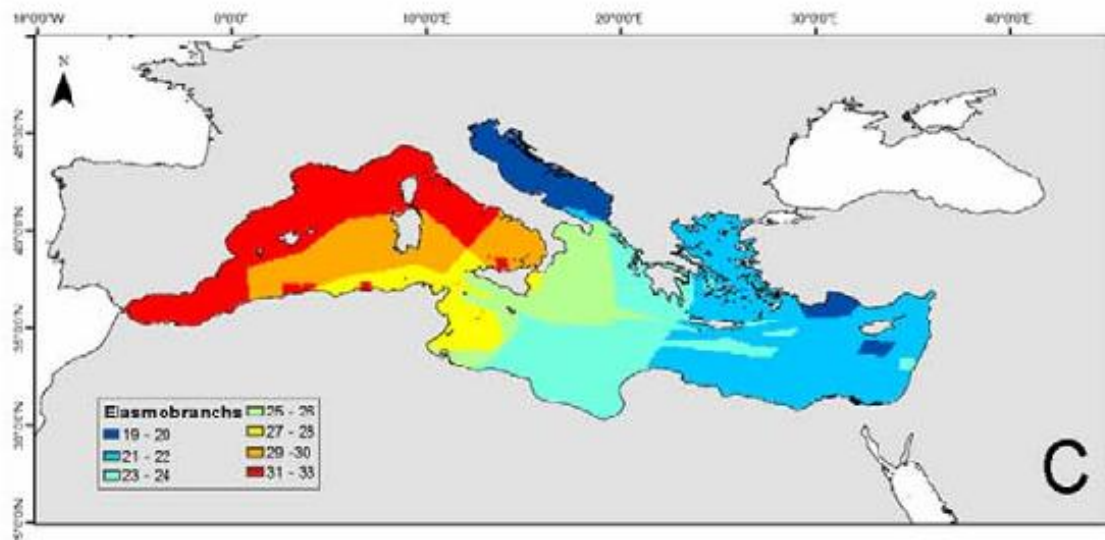
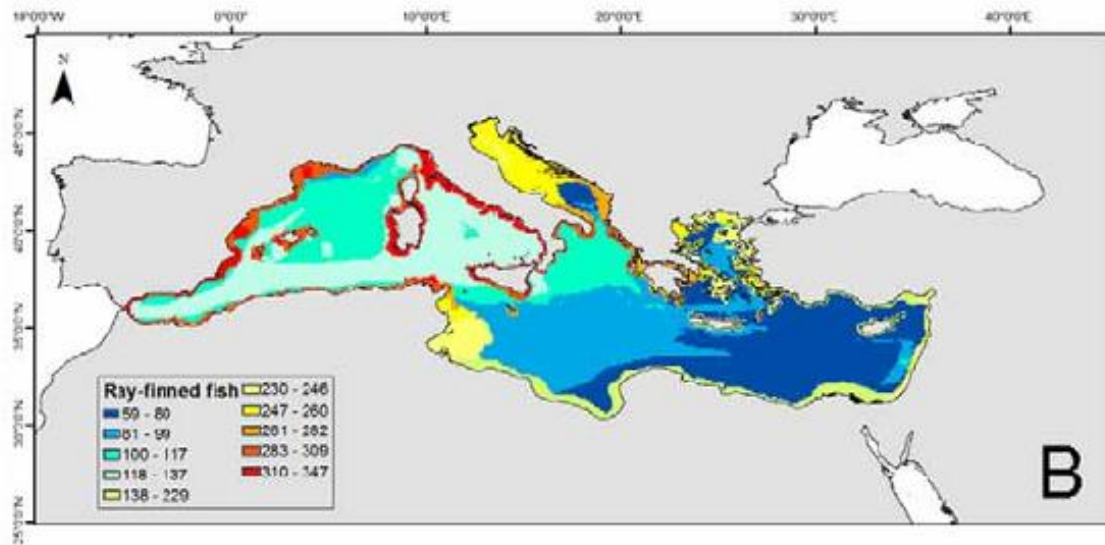
Also close to this area, the first multi-taxa inventory of marine organisms and coastal terrestrial flora recorded in southeastern Salento (Ionian Sea, Italy) was realized during the project "Biodiversity MARE Tricase", which provided the first baseline of species living in the area (Micaroni et al. 2022).

The records of the unarmored dinoflagellate *Gynogonadinium aequatoriale* have been restricted to the western equatorial and the eastern tropical Pacific Ocean. The genus is reported for the first time in the Mediterranean Sea from the coast of Taranto, Ionian Sea (Gómez 2023).

2.4.4 Marine fish fauna

The Mediterranean Sea supports diverse fish assemblages, although species richness generally exhibits a decreasing gradient from the northwestern towards the southeastern basins (Coll et al., 2010). Bony fishes (Actinopterygii) and cartilaginous fishes (Chondrichthyes, which include sharks, rays, skates, and chimaeras) represent major components of the marine megafauna. As presented in Figure 2-99, spatial patterns of species richness vary significantly among different taxonomic groups. While ray-finned fishes largely dominate the overall biodiversity patterns and are concentrated in coastal and continental shelf waters, elasmobranchs are distributed further offshore, with the Adriatic Sea appearing as a recognizable hotspot of fish endemism (Coll et al., 2010).





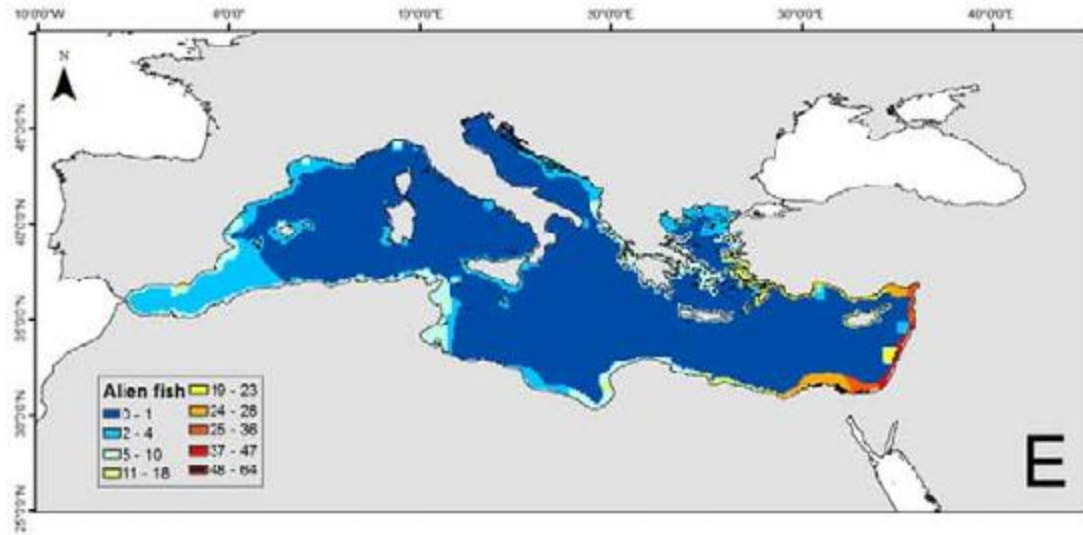


Figure 2-99: Spatial patterns of fish species richness in the Mediterranean Sea based on superimposed expert-drawn maps. (A) All fish species (n=625), (B) ray-finned fish species (n=545), (C) elasmobranchs (n=80), (D) endemic fish species (n=79), (E) alien fish species (n=127) [data modified from 91]. Colors express species occurrence from blue (little or no occurrence) to red (highest occurrence). The size of the cell is 0.160.1 degree.

doi:10.1371/journal.pone.0011842.g002 (Source: Coll et al., 2010)

To assess marine fish species occurring within the project's vicinity and the broader area (100 km buffer zone from the Asopus-1A well), global geographic range data were obtained from the IUCN database (non-exhaustive dataset). For Chondrichthyes, a supplementary desktop review at the Mediterranean scale was undertaken, resulting in the inclusion of 24 and 7 additional species in the respective datasets.

This compilation of geographic range data indicates a highly diverse fish fauna within the broader project area, comprising a total of 410 species. Taxonomically, this assemblage includes 343 ray-finned fishes (Class Actinopterygii), 66 cartilaginous fishes (Class Chondrichthyes), and 1 lamprey (Class Petromyzonti). Within the immediate project area, species richness comprises 371 species, including 310 Actinopterygii, 60 Chondrichthyes, and 1 Petromyzonti.

The list of marine fish fauna occurring within the project's vicinity, based on IUCN spatial range data (accessed May 2026) and including their IUCN Red List threat categories, is provided in Annex 01 of this study.

To present species of elevated conservation concern (categorized as Vulnerable, Endangered, and Critically Endangered), the Mediterranean IUCN Red List assessments were also considered, as they provide a more region-specific evaluation relevant to the project area. Current assessments indicate that nearly half of cartilaginous fish species in the Mediterranean are classified as Critically Endangered, Endangered, or Vulnerable, with decline rates considered more severe than in many other global regions (Sion et al., 2024).

Species classified as Vulnerable, Endangered, or Critically Endangered, according to the Mediterranean IUCN Red List assessment, within the immediate and broader project areas are presented in Table 2-24.

Table 2-24: Fish species with high conservation status (Vulnerable, Endangered, and Critically Endangered) in the project's vicinity, based on the IUCN Mediterranean Red List assessment.

SCIENTIFIC NAME	COMMON NAME	CLASS	ORDER	FAMILY	GENUS	IUCN RED LIST MED ASSESSMENT	ASSESSMENT DATE MED
<i>Dentex dentex</i>	Common dentex	ACTINOPTERYGII	PERCIFORMES	SPARIDAE	Dentex	Vulnerable	2007
<i>Labrus viridis</i>	Green wrasse	ACTINOPTERYGII	PERCIFORMES	LABRIDAE	Labrus	Vulnerable	2008
<i>Sciaena umbra</i>	Brown meagre	ACTINOPTERYGII	PERCIFORMES	SCIAENIDAE	Sciaena	Vulnerable	2007
<i>Mycteroperca marginata</i>	Dusky grouper	ACTINOPTERYGII	PERCIFORMES	EPINEPHELIDAE	Mycteroperca	Endangered	2004
<i>Umbrina cirrosa</i>	Shi drum	ACTINOPTERYGII	PERCIFORMES	SCIAENIDAE	Umbrina	Vulnerable	2007
<i>Thunnus thynnus</i>	Atlantic bluefin tuna	ACTINOPTERYGII	PERCIFORMES	SCOMBRIDAE	Thunnus	Endangered	2009
<i>Galeorhinus galeus</i>	Tope shark	CHONDRICTHYES	CARCHARHINIFORMES	TRIAKIDAE	Galeorhinus	Vulnerable	2016
<i>Alopias vulpinus</i>	Common thresher shark	CHONDRICTHYES	LAMNIFORMES	ALOPIIDAE	Alopias	Endangered	2016
<i>Mobula mobular</i>	Devil ray (Spinetail mobula)	CHONDRICTHYES	MYLIOBATIFORMES	MOBULIDAE	Mobula	Endangered	2016
<i>Sphyrna zygaena</i>	Smooth hammerhead shark	CHONDRICTHYES	CARCHARHINIFORMES	SPHYRNIDAE	Sphyrna	Critically Endangered	2016
<i>Alopias superciliosus</i>	Bigeye thresher shark	CHONDRICTHYES	LAMNIFORMES	ALOPIIDAE	Alopias	Endangered	2016
<i>Carcharodon carcharias</i>	Great white shark	CHONDRICTHYES	LAMNIFORMES	LAMNIDAE	Carcharodon	Critically Endangered	2016
<i>Squatina squatina</i>	Angelshark	CHONDRICTHYES	SQUATINIFORMES	SQUATINIDAE	Squatina	Critically Endangered	2016
<i>Oxynotus centrina</i>	Angular roughshark	CHONDRICTHYES	SQUALIFORMES	OXYNOTIDAE	Oxynotus	Critically Endangered	2016
<i>Isurus oxyrinchus</i>	Shortfin mako shark	CHONDRICTHYES	LAMNIFORMES	LAMNIDAE	Isurus	Critically Endangered	2016
<i>Echinorhinus brucus</i>	Bramble shark	CHONDRICTHYES	SQUALIFORMES	ECHINORHINIDAE	Echinorhinus	Endangered	2016
<i>Cetorhinus maximus</i>	Basking shark	CHONDRICTHYES	LAMNIFORMES	CETORHINIDAE	Cetorhinus	Endangered	2016
<i>Lamna nasus</i>	Porbeagle shark	CHONDRICTHYES	LAMNIFORMES	LAMNIDAE	Lamna	Critically Endangered	2016
<i>Prionace glauca</i>	Blue shark	CHONDRICTHYES	CARCHARHINIFORMES	CARCHARHINIDAE	Prionace	Critically Endangered	2016
<i>Odontaspis ferox</i>	Smalltooth sand tiger shark	CHONDRICTHYES	LAMNIFORMES	ODONTASPIDIDAE	Odontaspis	Critically Endangered	2016
<i>Squatina aculeata</i>	Sawback angelshark	CHONDRICTHYES	SQUATINIFORMES	SQUATINIDAE	Squatina	Critically Endangered	2016
<i>Leucoraja circularis</i>	Sandy skate	CHONDRICTHYES	RAJIFORMES	RAJIDAE	Leucoraja	Critically Endangered	2016
<i>Squatina oculata</i>	Smoothback angelshark	CHONDRICTHYES	SQUATINIFORMES	SQUATINIDAE	Squatina	Critically Endangered	2016
<i>Aetomylaeus bovinus</i>	Bull ray	CHONDRICTHYES	MYLIOBATIFORMES	MYLIOBATIDAE	Aetomylaeus	Critically Endangered	2016
<i>Carcharhinus plumbeus</i>	Sandbar shark	CHONDRICTHYES	CARCHARHINIFORMES	CARCHARHINIDAE	Carcharhinus	Endangered	2016
<i>Dasyatis pastinaca</i>	Common stingray	CHONDRICTHYES	MYLIOBATIFORMES	DASYATIDAE	Dasyatis	Vulnerable	2016
<i>Gymnura altavela</i>	Spiny butterfly ray	CHONDRICTHYES	MYLIOBATIFORMES	GYMNURIDAE	Gymnura	Critically Endangered	2016
<i>Mustelus asterias</i>	Starry smooth-hound	CHONDRICTHYES	CARCHARHINIFORMES	TRIAKIDAE	Mustelus	Vulnerable	2016
<i>Mustelus mustelus</i>	Common smooth-hound	CHONDRICTHYES	CARCHARHINIFORMES	TRIAKIDAE	Mustelus	Vulnerable	2016

SCIENTIFIC NAME	COMMON NAME	CLASS	ORDER	FAMILY	GENUS	IUCN RED LIST MED ASSESSMENT	ASSESSMENT DATE MED
<i>Mustelus punctulatus</i>	Blackspotted smooth-hound	CHONDRI CHTHYES	CARCHARHINIFORMES	TRIAKIDAE	Mustelus	Vulnerable	2016
<i>Myliobatis aquila</i>	Common eagle ray	CHONDRI CHTHYES	MYLIOBATIFORMES	MYLIOBATIDAE	Myliobatis	Vulnerable	2016
<i>Pristis pectinata</i> (possibly extinct)	Smalltooth sawfish	CHONDRI CHTHYES	PRISTIFORMES	PRISTIDAE	Pristis	Critically Endangered	2016
<i>Rhinobatos rhinobatos</i> (possibly extinct)	Common guitarfish	CHONDRI CHTHYES	RHINOPRISTIFORMES	RHINOBATIDAE	Rhinobatos	Endangered	2016
<i>Rostroraja alba</i>	White skate	CHONDRI CHTHYES	RAJIFORMES	RAJIDAE	Rostroraja	Endangered	2016
<i>Leucoraja fullonica</i>	Shagreen skate	CHONDRI CHTHYES	RAJIFORMES	RAJIDAE	Leucoraja	Critically Endangered	2016

In Mediterranean waters, bony fishes are among the most represented faunal groups in terms of both abundance and diversity. To effectively monitor these populations, particularly small pelagic fish, hydroacoustic methods have been employed in the Mediterranean Sea since the 1950s (Leonori et al., 2021). Since 2009, internationally coordinated, extensive, and regular surveys have been conducted within the framework of the MEDIAS (Mediterranean International Acoustic Surveys) action under the EU Data Collection Framework (Leonori et al., 2021). These standardized surveys provide essential fishery-independent data for the management of small pelagics, focusing primarily on the European anchovy (*Engraulis encrasicolus*) and the European sardine (*Sardina pilchardus*) (Leonori et al., 2021).

Regarding the baseline of the wider study area, the Eastern Ionian Sea (designated as Geographical Sub-Area or GSA 20) is characterized by complex topography, including semi-closed basins and deep gulfs with narrow continental shelves. While the Eastern Ionian is generally a low-productivity area, high concentrations of small pelagics are found in specific locations influenced by freshwater inputs and distinct water masses, such as the Ambracian Gulf and the Patraikos Gulf (Leonori et al., 2021). Acoustic survey data from 2013 onwards reveal that in the Eastern Ionian Sea, more than 80% of the anchovy biomass and 50% of the sardine biomass are concentrated in the Ambracian Gulf (Leonori et al., 2021). Furthermore, biomass estimates for both species exhibit high interannual variability, with anchovy estimates consistently remaining higher than those for sardine in this specific region (Leonori et al., 2021).

Beyond the pelagic zone, the deep-sea environment of the Eastern Ionian is characterized by specialized demersal assemblages adapted to the bathyal zones. Prominent deep-water commercial species in the region include the blackbelly rosefish (*Helicolenus dactylopterus*), the blackspot seabream (*Pagellus bogaraveo*), and the wreckfish (*Polyprion americanus*), which often associate with structurally complex habitats such as submarine canyons and shelf breaks.

The Mediterranean Sea historically supported thriving populations of elasmobranchs, however, modern evidence indicates that their abundance and diversity are currently in decline. These declining rates are considered more severe than in many other global regions (Sion et al., 2024). Current assessments from the IUCN Red List of Threatened Species suggest that almost half of the cartilaginous species in the Mediterranean are critically endangered, endangered, or vulnerable (Sion et al., 2024). The life-history characteristics of these species, such as low fecundity, slow growth, and late reproductive maturity, make them highly susceptible to exploitation, and they often experience high mortality rates as bycatch in fisheries (Coll et al., 2010).

In the Eastern Ionian Sea, historical studies reported the presence of 22 elasmobranch species at depths between 300 and 1,200 m during the 1999–2000 period. During these early assessments, the blackmouth catshark (*Galeus melastomus*), the small-spotted catshark (*Scyliorhinus canicula*), and the thornback ray (*Raja clavata*) exhibited the highest abundances (Damalas et al., 2022). Subsequent studies identified the Near Threatened longnose skate (*Dipturus oxyrinchus*) as the most abundant species at depths between 350 and 700 m, in contrast to *Raja clavata* and the marbled electric ray (*Torpedo marmorata*), which dominated catches over the lower continental shelf between 150 and 350 m (Damalas et al., 2022).

Data gathered through the Mediterranean International Trawl Survey (MEDITS) program between 2001 and 2014 provide a detailed baseline for demersal elasmobranchs in the region. As detailed in Table 2-25, the MEDITS data identified the longnose spurdog (*Squalus blainville*) as the second most abundant fish species at depths between 200 and 500 m (Damalas et al., 2022). In the deeper 500–800 m stratum, *Galeus melastomus* and *S. blainville* were observed as the fourth and sixth most abundant species, respectively (Damalas et al., 2022). Overall, the frequency of occurrence highlights that a few resilient species dominate the deep-water catches, while numerous other vulnerable species are encountered with much lower frequency.

Table 2-25: Frequency of occurrence of the elasmobranch species caught in hauls conducted in between depths of 200-800 m of the Eastern Ionian Sea during MEDITS surveys from 2001-2014 (Source: Damalas et al., 2022).

SPECIES	COMMON NAME	FREQUENCY OF OCCURRENCE %
<i>Scyliorhinus canicula</i>	Small-spotted catshark	67.5
<i>Raja clavata</i>	Thornback ray	65.8
<i>Squalus blainville</i>	Longnose spurdog	60.8
<i>Galeus melastomus</i>	Blackmouth catshark	55.8
<i>Dipturus oxyrinchus</i>	Longnose skate	54.2
<i>Etmopterus spinax</i>	Velvet belly	10
<i>Centrophorus uyato</i>	Gulper shark	5.8
<i>Squalus acanthias</i>	Picked dogfish	5.8
<i>Hepranchias perlo</i>	Sharpnose seven-gill shark	3.3
<i>Raja asterias</i>	Mediterranean starry ray	3.3
<i>Torpedo marmorata</i>	Marbled electric ray	3.3
<i>Oxynotus centrina</i>	Angular rough shark	2.5
<i>Dasyatis pastinaca</i>	Common stingray	1.7
<i>Galeorhinus galeus</i>	Tope shark	0.8
<i>Raja montagui</i>	Spotted ray	0.8
<i>Raja rondeletii</i>	Rondelet's ray	0.8
<i>Dalatias licha</i>	Kitefin shark	0.8
<i>Torpedo (Tetronarce) nobiliana</i>	Electric ray	0.8
<i>Torpedo torpedo</i>	Common torpedo	0.8

To further characterize the deep-water assemblages of the Eastern Ionian Sea, historical and contemporary surveys spanning from 1983 to 2016 have documented the specific depth occurrences of these species. As

presented in Table 2-26, twelve species, including the velvet belly lanternshark (*Etmopterus spinax*), the kitefin shark (*Dalatias licha*), and the rabbitfish chimaera (*Chimaera monstrosa*), have been recorded exclusively at depths greater than 200 m, underscoring their obligate deep-water nature in this region (Otero & Mytilineou, 2019). Several other species, such as the picked dogfish (*Squalus acanthias*) and the gulper shark (*Centrophorus cf. uyato*), display over 95% occurrence in these bathyal environments (Otero & Mytilineou, 2019).

Table 2-26: Occurrence by depth for selected chondrichthyan species identified during 1983-2016 in the Eastern Ionian Sea, demonstrating their prevalence in deep-water environments (Source: Otero & Mytilineou, 2019)

Species	Common Name	% Occurrence > 200 m
<i>Chimaera monstrosa</i>	Rabbit fish	100%
<i>Etmopterus spinax</i>	Velvet belly	100%
<i>Dalatias licha</i>	Kitefin shark	100%
<i>Heptranchias perlo</i>	Sharpnose seven-gill shark	100%
<i>Hexanchus griseus</i>	Bluntnose sixgill shark	100%
<i>Prionace glauca</i>	Blue shark	100%
<i>Squalus acanthias</i>	Picked dogfish	96%
<i>Galeus melastomus</i>	Blackmouth catshark	96%
<i>Centrophorus cf. uyato</i>	Gulper shark	95%
<i>Squalus blainville</i>	Longnose spurdog	95%
<i>Dipturus oxyrinchus</i>	Longnose skate	92%
<i>Scyliorhinus canicula</i>	Small-spotted catshark	80%

Beyond localized trawl surveys, spatial predictive modeling is utilized to estimate the broader distribution of these cartilaginous fishes across the Mediterranean. Figure 2-100 shows the predicted abundance of shark specimens, providing a visual representation of their offshore habitat utilization in the Ionian Sea and broader basin. Similarly, Figure 2-101 shows the predicted abundance of the spinetail devil ray (*Mobula mobular*), indicating the distribution patterns of this vulnerable pelagic species across the deep-water zones. Tracking these abundance predictions establishes a macro-level baseline for assessing the potential presence and transit of these highly mobile, threatened megafauna in the vicinity of the offshore exploration block.

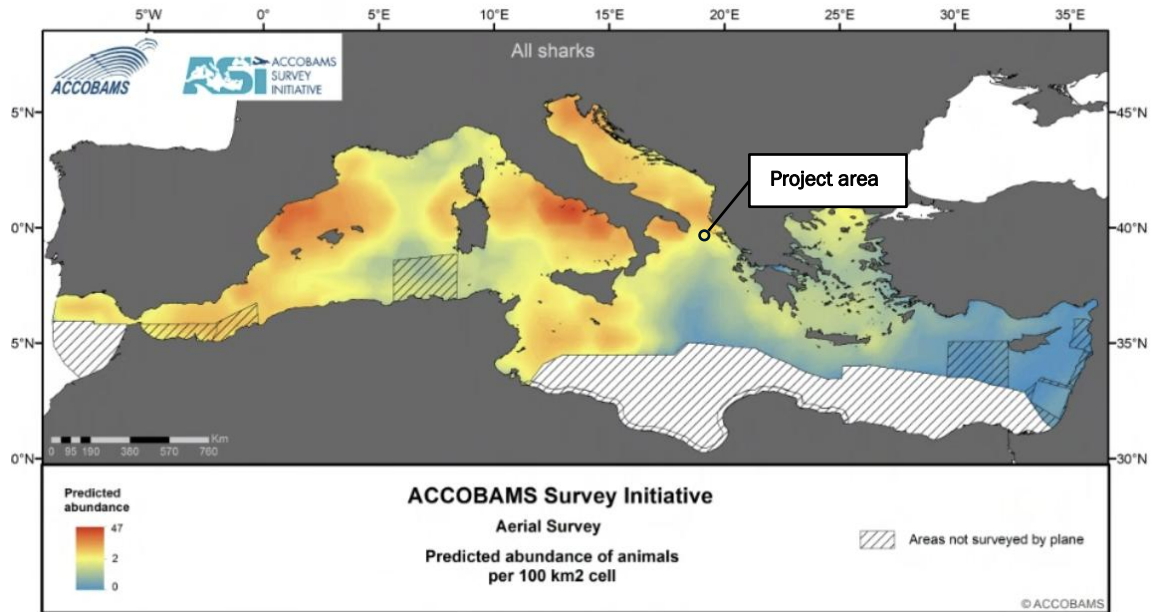


Figure 2-100: Predicted abundance of shark specimens

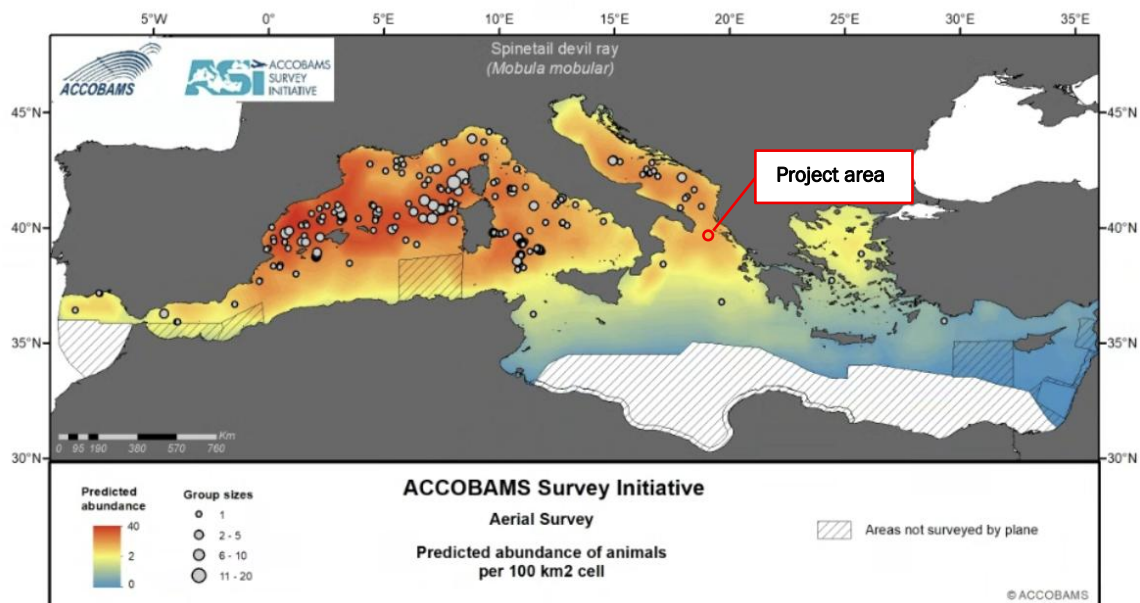


Figure 2-101: Predicted abundance of spinetail devil ray

Table 2-27 summarises the chondrichthyan species whose IUCN geographic ranges overlap the project vicinity, together with their conservation status and protection under relevant international, European, and national legislation, conventions, and fisheries management measures.

Table 2-27: Chondrichthyan species with geographic ranges overlapping the project vicinity, their conservation status, and protection under relevant international, European, and national legislation and fisheries regulations

SCIENTIFIC NAME	VERNACULAR NAME	TO BE RELEASED UNHARMED AND ALIVE FOR COMMERCIAL FISHERIES	PROHIBITED FOR RECREATIONAL FISHING	UNCLAS	BARCELONA CONVENTION ANNEX	CITES	CMIS	CMS SHARKS MOU	ICCAT *19-01: DEFINITION OF OCEANIC, PELAGIC, AND HIGHLY MIGRATORY	GFCM GFCM/42/2018/2 (PROHIBITION OF RETENTION)	GFCM GFCM/44/2021/16 ANNEX I SPECIFIC ACTIONS	IUCN STATUS **	REDLIST MED (UPDATED)	EU NATURE RESTORATION LAW (ANNEX III)	ISRA S	PRESIDENTIAL DECREE 67/1981
<i>Aetomylaeus bovinus</i>	Duckbill eagle ray	II	YES		B II		I & II			II		CR	CR		YES	
<i>Alopias superciliosus</i>	Bigeye thresher	II	YES	I	B II	II	I & II	Annex I	*	II		EN	EN			
<i>Alopias vulpinus</i>	Common thresher	II	YES	I	B II	II	I & II	Annex I	*	II	I	EN	EN		YES	
<i>Carcharhinus brachyurus</i>	Copper shark		YES	I		II						VU	DD			
<i>Carcharhinus plumbeus</i>	Sandbar shark	II	YES	I	B II	II				II	I	EN	EN		YES	
<i>Carcharodon carcharias</i>	White shark	II	YES	I	B II	II	I & II	Annex I	*	II		CR	CR	III	YES	
<i>Centrophorus uyato</i>	Little gulper shark	II	YES		B II	II				II	I	CR	CR		YES	
<i>Centroscymnus coelolepis</i>	Portuguese dogfish											NT	LC			
<i>Cetorhinus maximus</i>	Basking shark	II	YES	I	B II	II	I & II	Annex I	*	II		EN	EN	III	YES	
<i>Chimaera monstrosa</i>	Rabbitfish											VU	NT		YES	
<i>Dasyatis pastinaca</i>	Common stingray	II			B II					II		VU	VU		YES	
<i>Dipturus nidarosiensis</i>	Norwegian skate											EN		III		
<i>Dipturus oxyrinchus</i>	Longnosed skate											VU	NT		YES	
<i>Echinorhinus brucus</i>	Bramble shark	II	YES		B II					II		EN				

SCIENTIFIC NAME	VERNACULAR NAME	TO BE RELEASED AND ALIVE FOR COMMERCIAL FISHERIES	PROHIBITED FOR RECREATIONAL FISHING	UNCL OS	BARCELONA CONVENTION ANNEX	CITES	CM S	CMS SHAR KS MOU	ICCAT *19-01: DEFINITION OF OCEANIC, PELAGIC, AND HIGHLY MIGRATORY	GFCM GFCM/42/2018/2 (PROHIBITION OF RETENTION)	GFCM GFCM/4/2021/16 ANNEX I SPECIES SPECIFIC ACTIONS	IUCN STATUS **	REDLIST MED (UPDATED)	EU NATURE RESTORATION LAW (ANNEX III)	ISRA S	PRESIDENTIAL DECREE 67/1981
<i>Etmopterus spinax</i>	Velvet belly lanternshark											VU	LC		YES	
<i>Galeorhinus galeus</i>	Tope	II	YES		B II	II	II	Annex I		II		CR	VU		YES	
<i>Galeus melastomus</i>	Blackmouth catshark											LC	LC		YES	
<i>Gymnura altavela</i>	Spiny butterfly ray	II	YES		B II					II		CR	CR		YES	
<i>Heptranchias perlo</i>	Sharpnose sevengill Shark				B III						I	NT	DD			Protected
<i>Hexanchus griseus</i>	Bluntnose sixgill shark			I	B III							NT	LC		YES	Protected
<i>Isurus oxyrinchus</i>	Shortfin mako	II	YES	I	B II	II	II	Annex I	*	II		CR	CR		YES	
<i>Lamna nasus</i>	Porbeagle	II	YES	I	B II	II	II	Annex I	*	II		CR	CR			
<i>Leucoraja circularis</i>	Sandy skate	II	YES		B II					II		CR	CR		YES	
<i>Leucoraja naevus</i>	Cuckoo skate											NT	NT			
<i>Mobula mobular</i>	Spinetail devil ray	II	YES		B II	I	I & II	Annex I	*	II		CR	EN	III	YES	Protected
<i>Mustelus asterias</i>	Starry smoothhound		YES		B III	II					I	VU	VU		YES	
<i>Mustelus mustelus</i>	Common smoothhound		YES		B III	II					I	EN	VU		YES	
<i>Mustelus punctulatus</i>	Blackspotted smoothhound		YES		B III	II					I	VU	VU		YES	

SCIENTIFIC NAME	VERNACULAR NAME	TO BE RELEASED UNHARMED AND ALIVE FOR COMMERCIAL FISHERIES	PROHIBITED FOR RECREATIONAL FISHING	UNCL OS	BARCELONA CONVENTION ANNEX	CITES	CM S	CMS SHAR KS MOU	ICCAT *19-01: DEFINITION OF OCEANIC, PELAGIC, AND HIGHLY MIGRATORY	GFCM GFCM/42/2018/2 (PROHIBITION OF RETENTION)	GFCM GFCM/44/2021/16 ANNEX I SPECIES SPECIFIC ACTIONS	IUCN STATUS **	REDLIST MED (UPDATED)	EU NATURE RESTORATION LAW (ANNEX III)	ISRA S	PRESIDENTIAL DECREE 67/1981
<i>Myliobatis aquila</i>	Common eagle ray	II	YES		B II					II		CR	VU		YES	
<i>Odontaspis ferox</i>	Smalltooth sand tiger	II	YES		B II					II		CR	CR			
<i>Oxynotus centrina</i>	Angular roughshark	II	YES		B II					II		CR	CR		YES	
<i>Prionace glauca</i>	Blue shark	II	YES	I	B II	II	II		*	II	I	CR	CR		YES	
<i>Pristis pectinata</i> (possibly extinct)	Smalltooth Sawfish	II	YES		B II	I	I & II	Annex I		II		CR	CR	III		
<i>Raja asterias</i>	Starry skate											NT	NT		YES	
<i>Raja clavata</i>	Thornback skate											NT	NT		YES	
<i>Raja miraletus</i>	Brown skate											LC	LC			
<i>Raja montagui</i>	Spotted skate											LC	LC			
<i>Raja radula</i>	Rough skate											EN	EN		YES	
<i>Raja undulata</i> (presence uncertain)	Undulate skate											NT	NT			
<i>Rhinobatos rhinobatos</i> (possibly extinct)	Common guitarfish	II	YES		B II	II	I & II	Annex I		II		CR	EN	III	YES	
<i>Rhinoptera marginata</i>	Lusitanian cownose ray	II	YES		B II		I & II			II		CR	DD		YES	
<i>Rostroraja alba</i>	White skate	II	YES		B II					II		EN	EN	III	YES	
<i>Scyliorhinus canicula</i>	Smallspotted catshark											LC			YES	
<i>Scyliorhinus stellaris</i>	Nursehound											VU	NT		YES	

SCIENTIFIC NAME	VERNACULAR NAME	TO BE RELEASED AND ALIVE FOR COMMERCIAL FISHERIES	PROHIBITED FOR RECREATIONAL FISHING	UNCLOS	BARCELONA CONVENTION ANNEX	CITES	CMS	CMS SHARKS MOU	ICCAT *19-01: DEFINITION OF OCEANIC, PELAGIC, AND HIGHLY MIGRATORY	GFCM GFCM/42/2018/2 (PROHIBITION OF RETENTION)	GFCM GFCM/44/2021/16 ANNEX I SPECIES SPECIFIC ACTIONS	IUCN STATUS **	REDLIST MED (UPDATED)	EU NATURE RESTORATION LAW (ANNEX III)	ISRAS	PRESIDENTIAL DECREE 67/1981
<i>Somniosus rostratus</i>	Little sleeper shark											LC	DD		YES	
<i>Sphyrna zygaena</i>	Smooth Hammerhead	II	YES	I	B II	II	II	Annex I	*	II		CR	CR		YES	
<i>Squalus acanthias</i>	Spiny dogfish		YES		B III		II	Annex I			I	EN	EN		YES	
<i>Squalus blainville</i>	Longnose spurdog											DD	DD		YES	
<i>Squatina aculeata</i>	Sawback angelshark	II	YES		B II					II		CR	CR		YES	
<i>Squatina oculata</i>	Smoothback angelshark	II	YES		B II					II		CR	CR		YES	
<i>Squatina squatina</i>	Angelshark	II	YES		B II		I & II	Annex I		II		CR	CR	III	YES	
<i>Tetronarce nobiliana</i>	Great torpedo ray											LC	LC			Protected
<i>Torpedo marmorata</i>	Marbled torpedo ray											VU	LC		YES	
<i>Torpedo torpedo</i>	Ocellate torpedo											VU	LC		YES	
<i>Carcharhinus limbatus</i>	Blacktip Shark			I		II						VU	DD			
<i>Leucoraja fullonica</i>	Shagreen Ray												CR			

UNCLOS: Annex I: requires cooperation for the management of of straddling stocks and highly migratory species in the EEZs and the high seas.

CITES: includes species threatened with extinction and provides the greatest level of protection, including restrictions on commercial trade; App II: includes species that, although currently not threatened with extinction, may become so without trade controls. It also includes species that resemble other listed species and need to be regulated in order to effectively control the trade in those other listed species

CMS: App I Range States Parties should endeavour to conserve and, where feasible and appropriate, restore important habitats of those species, minimize obstacles on migratory routes, control the introduction of exotic species and prohibit the catching of listed animals; App II: CMS acts as a framework convention – it does not provide any specific protection to them, but requires that Parties conclude global or regional agreements on specified species.

CMS Shark MoU Annex I: CMS MoU signatories adopted a conservation plan. Updated to COP12 new listings.

Barcelona Convention Annex II: List of endangered and threatened species; Annex III: List of species whose exploitation is regulated. (+)

Rhinobatos rhinobatos is listed in CMS as Appendix I (Mediterranean population) and Appendix II (Global population).

Greek Presidential Decree 67/81: "On the protection of indigenous Flora and Wild Fauna and on the determination of the coordination procedure and the Control on their Research"

International Legal Frameworks and References Below are the legal frameworks and the specific references, documents, and links used to update the species annexes:

CMS (Convention on the Conservation of Migratory Species of Wild Animals): Documents used: "CMS revised-appendices_cop14_e" (effective May 17, 2024) and "CMS 006_COP15_Amendments of Appendices_e" (April 22, 2026).

CMS Sharks MOU (Annex 1): References: <https://sharks.cms.int/species> and <https://www.iucnssg.org/sharksmou.html>.

Barcelona Convention (Annex I & II): Document used: The latest amendment of Annex I & II (Decision IG.27/7, Cairo, December 5, 2025), which entered into force on May 4, 2026. Reference: <https://www.unep.org/unepmap/who-we-are/contracting-parties/specially-protected-areas-protocol-spa-and-biodiversity-protocol>.

UNCLOS (United Nations Convention on the Law of the Sea): General text reference: https://www.un.org/depts/los/convention_agreements/texts/unclos/unclos_e.pdf.

Specific species reference used: ANNEX I. HIGHLY MIGRATORY SPECIES from https://www.un.org/depts/los/convention_agreements/texts/unclos/annex1.htm.

CITES (Convention on International Trade in Endangered Species): Reference: Checklist of CITES Species at <https://checklist.cites.org/#/en>.

ICCAT (International Commission for the Conservation of Atlantic Tunas): Document used: Recommendation 19-01 on fishes considered to be tuna and tuna-like species or oceanic, pelagic, and highly migratory elasmobranchs. Reference: <https://www.iccat.int/Documents/Recs/compendiopdf-e/2019-01-e.pdf>.

EU Nature Restoration Law (Annex III): Document used: REGULATION (EU) 2024/1991 of the European Parliament and of the Council (June 24, 2024). Reference: https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=OJ:L_202401991#anx_III.

GFCM (General Fisheries Commission for the Mediterranean): Prohibition of retention: Recommendation GFCM/42/2018/2 on fisheries management measures for the conservation of sharks and rays. Reference: <https://faolex.fao.org/docs/pdf/mul201606.pdf>. Species-specific actions: Recommendation GFCM/44/2021/16 on additional mitigation measures for the conservation of elasmobranchs (Annex I). Reference: <https://faolex.fao.org/docs/pdf/mul217151.pdf>.

2.4.5 Marine mammals

As a semi-enclosed basin, the Mediterranean has isolated its marine mammal populations from Atlantic source stocks over millennia, producing ecotypes and, in some cases, genetically distinct subpopulations whose viability cannot be supplemented by immigration (e.g. Engelhaupt et al., 2009; Onoufriou et al., 2022). All 12 marine mammal species currently recognised as regular inhabitants of the Mediterranean are genetically distinct from their North Atlantic relatives (Notarbartolo di Sciara et al., 2016). This isolation heightens the conservation significance of every productive habitat within the basin, and nowhere more so than in the Ionian Sea.

The Mediterranean is separated by the Strait of Sicily into western and eastern basins (Kassis & Korres, 2020), and the Ionian Sea occupies the critical zone between them. It is characterised by strong surface connections with both the Strait of Sicily and the Adriatic Sea, and by decadal-scale inversions of basin surface circulation (Celentano & Zambianchi, 2020), making it oceanographically integral to the broader Mediterranean system. Its geomorphological characteristics reinforce this importance further: deep central canyons, steep continental slopes, and productive mesoscale fronts provide suitable habitat for multiple species of conservation concern.

Of the 12 marine mammal species, 11 cetaceans and one pinniped, 10 are known to occur within or adjacent to the Ionian Sea. The long-finned pilot whale (*Globicephala melas*) and killer whale (*Orcinus orca*), whilst present in the western basin, have not been documented as regular Ionian residents. The harbour porpoise subspecies *relicta* represents a small, isolated Black Sea population and is also present in the northern Aegean (Ivanchikova et al., 2024, Cucknell et al., 2016).

Table 2-28 summarises the marine mammal species confirmed or expected to occur within the Block 2 licence area, together with their conservation status and protection under relevant national and international legislation and conventions.

Table 2-28: Marine mammal species recorded in the Mediterranean Sea, their conservation status (IUCN Red Lists), protection under relevant national and international legislation and conventions, and presence in the Ionian Sea

SCIENTIFIC NAME	COMMON NAME	IUCN RED LIST CATEGORY MED	DATE ASSESSED IUCN MED	IUCN RED LIST CATEGORY GLOBAL	DATE ASSESSED IUCN GLOBAL	GR RED LIST	IONIAN PRESENCE	EU HABITATS DIR.	ACCOBAMS, SPA/BD PROTOCOL	BCCEW	CITES	CMS	GFCM /36/2012/2	UNCL OS	PRESIDENTIAL DECREE 67/8
<i>Balaenoptera physalus</i>	Fin whale	EN	2021	VU	2018	EN	Offshore	Annex IV	Annex II	Appendix II	Appendix I	Appendices I and II	*	Annex I	*
<i>Physeter macrocephalus</i>	Sperm whale	EN	2006	VU	2025	EN	Resident; Hellenic Trench * deep canyons	Annex IV	Annex II	Appendix II	Appendix II	Appendices I and II	*	Annex I	
<i>Ziphius cavirostris</i>	Cuvier's beaked whale	VU	2018	LC	2018	VU	Resident; deep canyons	Annex IV	Annex II	Appendix II	Appendix II	Appendix I	*	Annex I	
<i>Stenella coeruleoalba</i>	Striped dolphin	LC	2023	LC	2018	LC	Most abundant species	Annex IV	Annex II	Appendix II	Appendix II	Appendix II	*	Annex I	
<i>Delphinus delphis</i>	Short-beaked common dolphin	EN	2003	LC	2020	EN	Coastal; declining	Annex IV	Annex II	Appendix II	Appendix II	Appendices I and II	*	Annex I	*
<i>Tursiops truncatus</i>	Common bottlenose dolphin	LC	2021	LC	2018	LC	Coastal & offshore	Annexes II & IV	Annex II	Appendix II	Appendix II	Appendix II	*	Annex I	*
<i>Grampus griseus</i>	Risso's dolphin	EN	2020	LC	2018	CR	Offshore; confirmed	Annex IV	Annex II	Appendix II	Appendix II	Appendix II	*	Annex I	
<i>Steno bredanensis</i>	Rough-toothed dolphin	NT	2020	LC	2018	NT	Sporadic	Annex IV	Annex II	Appendix II	Appendix II		*	Annex I	
<i>Globicephala melas</i>	Long-finned pilot whale	EN	2021	LC	2018	-	Absent from Ionian	Annex IV	Annex II	Appendix II	Appendix II		*	Annex I	
<i>Orcinus orca</i>	Killer whale	-	-	DD	2017	-	Absent from Ionian	Annex IV	Annex II	Appendix II	Appendix II	Appendix II	*	Annex I	*
<i>Phocoena phocoena ssp. relicta</i>	Harbour porpoise	-	-	EN	2008	EN	North Aegean Sea & Black Sea; Absent from Ionian	Annexes II & IV	Annex II	Appendix II	Appendix II	Appendix II	*		*
<i>Monachus monachus</i>	Mediterranean monk seal	CR	2008	VU	2023	CR	Coastal; rare offshore	Annexes II & IV	Annex II	Appendix II	Appendix I	Appendices I and II	na		*

- IUCN Red List categories identifying which species are Critically Endangered (CR), Endangered (EN), Vulnerable (VU), or Least Concern (LC)

Source for the above table in terms of the protection status to IUCN (2023). The conservation status of cetaceans in the Mediterranean Sea: trends and changes after a decade of conservation efforts. Gland, Switzerland: IUCN <https://portals.iucn.org/library/sites/library/files/documents/RL-262-005-En.pdf>

- European Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Flora and Fauna (**EU Habitats Directive**). All cetacean species are listed on Annex IV (Strict protection of species) of the Habitats Directive. This Directive requires effective measures to prevent the negative impact of fishing activities (primarily as bycatch, the incidental capture of cetaceans) on cetaceans, with monitoring requirements and catch thresholds set ensuring compliance. The Directive also requires effective measures to prevent the negative impact of shipping on cetaceans (ship strikes and underwater noise).

- Agreement on the Conservation of Cetaceans in the Black Sea, Mediterranean Sea and contiguous Atlantic area (**ACCOBAMS**). ACCOBAMS was created under the auspices of the Bonn Convention. Numerous research initiatives and conservation actions are undertaken under the auspices of ACCOBAMS, including the ACCOBAMS Survey Initiative (ACCOBAMS, 2021b), whose findings greatly contributed to the recent Red List reassessments.
- Convention on the Conservation of European Wildlife and Natural Habitats (**BCCEW**, or the Bern Convention).
- Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (**Barcelona Convention**), with the Mediterranean Action Plan (MAP) and the Protocol Concerning Specially Protected Areas and Biological Diversity of the Barcelona Convention (Mediterranean region) (SPA Protocol).
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (**CITES**).
- Convention on the Conservation of Migratory Species of Wild Animals (**CMS**, or the Bonn Convention). All the assessed Mediterranean cetacean subpopulations are included in the CMS Appendices (Appendix I – Endangered migratory species, and Appendix II - Migratory species conserved through Agreements), with the exception of the Long-finned pilot whale and the Rough-toothed Dolphin.
- Recommendation **GFCM/36/2012/2** on the mitigation of incidental catches of cetaceans in the General Fisheries Commission for the Mediterranean (GFCM) area of application <https://faolex.fao.org/docs/pdf/mul201488.pdf>
- **UNCLOS** (United Nations Convention on the Law of the Sea https://www.un.org/depts/los/convention_agreements/texts/unclos/unclos_e.pdf), είδη του Annex I. Highly migratory species από https://www.un.org/depts/los/convention_agreements/texts/unclos/annex1.htm

2.4.5.1 Survey data availability and knowledge gaps

Despite the ecological importance of the Ionian Sea, dedicated offshore survey coverage has historically been limited, with most existing data arising from opportunistic sightings and from studies conducted in adjacent coastal areas (Figure 2-102). Large-scale Mediterranean-wide surveys have provided quantitative baseline data for the region: the IFAW surveys (Lewis et al., 2018) and, most significantly, the ACCOBAMS Survey Initiative (ASI-I, 2018), which combined aerial line-transect coverage of most of the Mediterranean, including the offshore Ionian Sea, with boat-based acoustic and visual effort in selected high-priority strata (Panigada et al., 2024; Boisseau et al., 2024; Cañadas et al., 2023). A second pan-Mediterranean iteration (ASI-II) is currently being conducted (summer 2026) and results are anticipated to provide updated abundance estimates for key species.

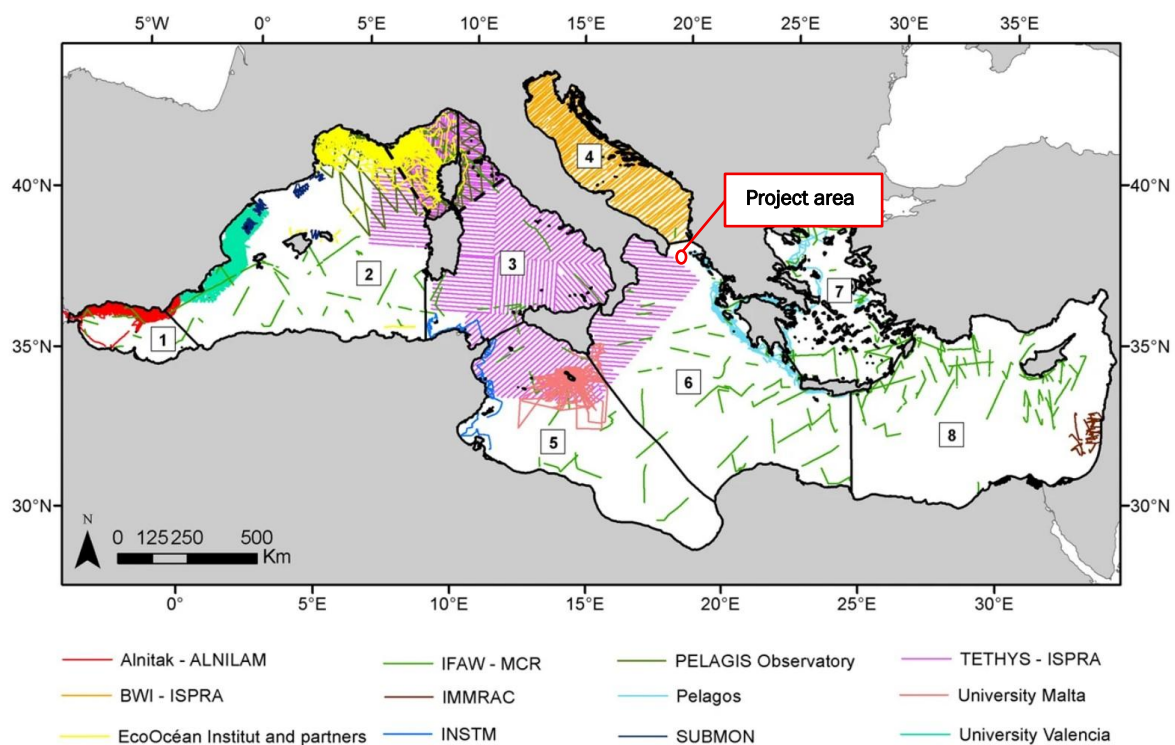


Figure 2-102: Line transects survey data from 12 organizations for a 20-year period (1997 - 2016) (Source: Mannoci et al., 2018)

For Block 2 specifically, the ASI-I survey design encompassed two relevant strata: Stratum 18 (North Ionian) and Stratum 22b (Hellenic Trench East) (Figure 2-103, Panigada et al., 2024). Design-based distance-sampling estimates from those strata form the primary quantitative reference point for regional abundance and are summarised in Table 2-29. The value of these strata-specific estimates, their spatial resolution and seasonal coverage are insufficient to characterise local occurrence, habitat-use patterns, or acoustic activity within the licence Block 2. This underscores the need for dedicated, high-resolution visual and passive acoustic monitoring surveys prior to any exploration or development activity in Block 2.

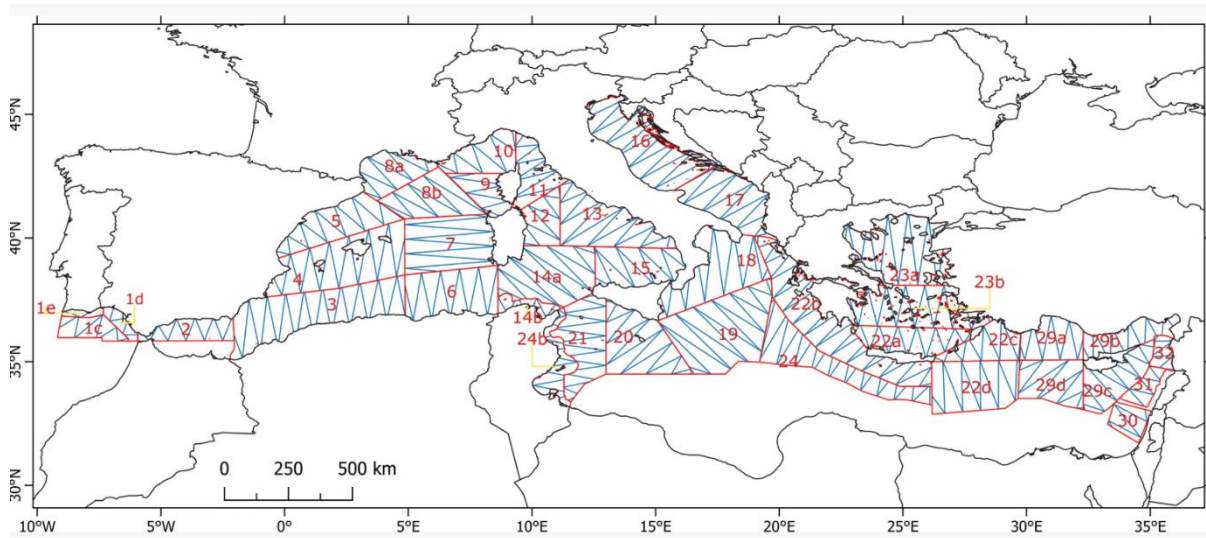


Figure 2-103: ACCOBAMs survey Initiative ASI and their survey design for aerial surveys (Source: Panigada et al., 2024).

Table 2-29: Mean group size (G), Density (animals/km²) (D), and Abundance (A, 95% CI) for the two Strata around the Block 2 from the pan_mediterranean aerial survey. Strata 18, and 22b for the species that abundance was estimated based on design-based distance sampling (Supplementary material - Panigada et al., 2024).

SPECIES	18			22B		
	G	D	A (95% CI)	G	D	A (95% CI)
Fin Whale			0			0
Rissos dolphin	8.50	0.0164	1,242 (334 4 616)	21.00	0.0204	2,192 (452 10624)
Bottlenose dolphin	3.5	0.0130	986 (270 3592)	5.50	0.0126	1358 (502 3679)
Large dolphins	5.17	0.0285	2167 (668 7027)	10.67	0.0337	3632 (1119 - 11788)
Small dolphins	14.54	0.3243	24583 (12434 48604)	11.95	0.1977	21281 (8914 50806)
Striped or Common dolphin	10.50	0.0585	4438 (1435 13720)	3	0.0090	971 (307 3071)
Striped dolphin	16.47	0.2598	19693 (9222 42 053)	15.07	0.1454	15646 (5199 47083)
Common dolphin	6	0.0056	423 (82 2174)	0	0	0
Cuvier's beaked whale s	2	0.0025	264 (72 969)	2	0.0021	231 (64 831)

Figure 2-104 shows the spatial distribution and occurrence of marine mammals and sea turtles across the wider Ionian Sea. The map integrates three distinct datasets to present a comprehensive view of regional megafauna presence:

- Historical sightings (1986–2011): Data sourced from the ADRIPLAN project.
- Recent field data (2024): Visual sightings collected during the ESBS for the Apulia Offshore Wind Farm (OWF) in Italy.
- Seismic survey detections (November 2022): Visual sightings and Passive Acoustic Monitoring (PAM) detections recorded by Energean during seismic surveys within and adjacent to the Block 2 concession.

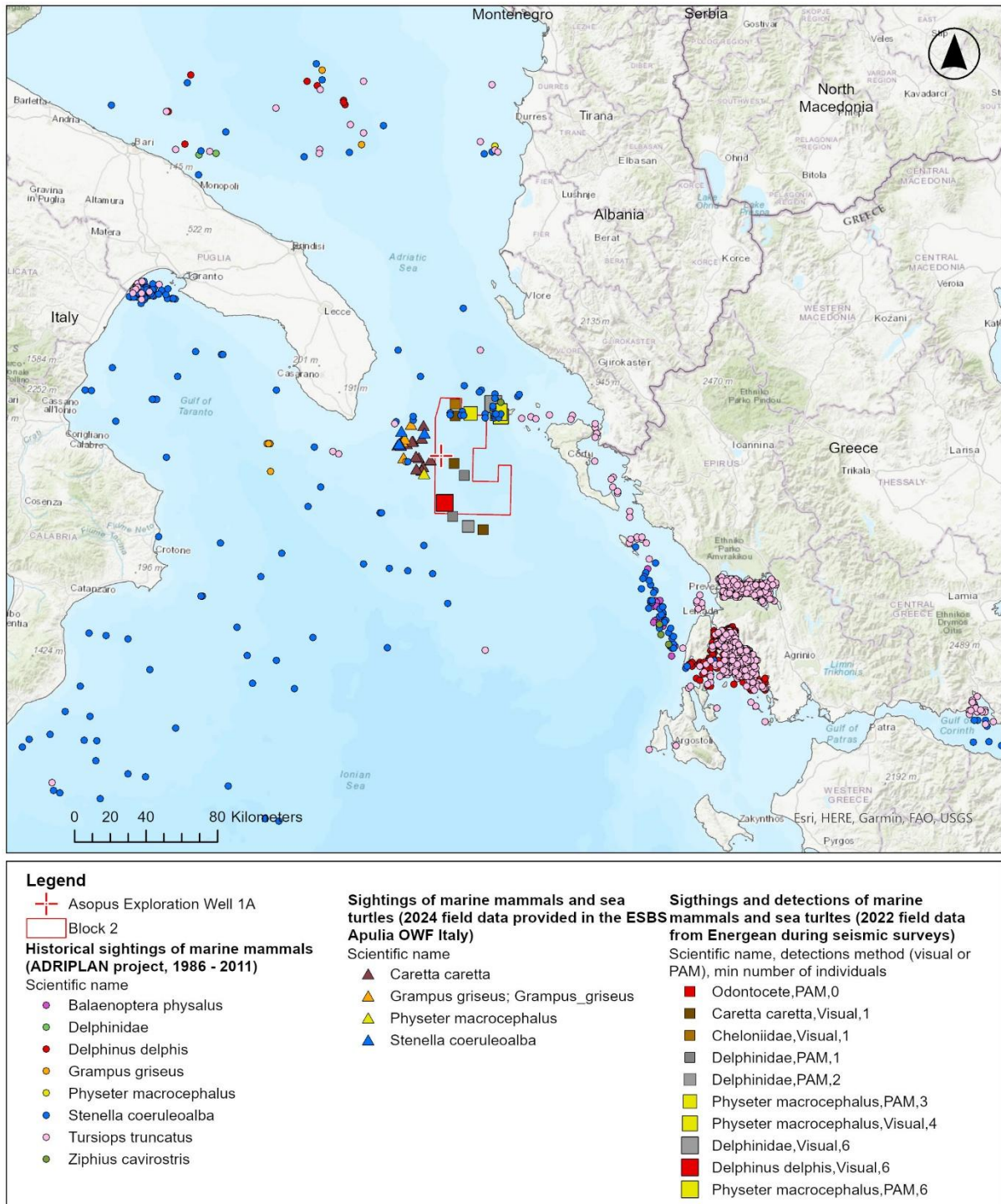


Figure 2-104: Spatial distribution of historical and recent marine mammal (and sea turtle) sightings and acoustic detections in the wider Ionian Sea and Block 2 area

Based on the above map, key species detected in the vicinity of the project area include deep-diving odontocetes such as the sperm whale (*Physeter macrocephalus*) and the Cuvier's beaked whale (*Ziphius cavirostris*), alongside widely distributed delphinids like the striped dolphin (*Stenella coeruleoalba*), Risso's dolphin (*Grampus griseus*), short-beaked common dolphin (*Delphinus delphis*), and the common bottlenose dolphin (*Tursiops truncatus*).

2.4.5.2 Fin whale (*Balaenoptera physalus*)

Introduction

The fin whale (*Balaenoptera physalus*) is the second-largest animal on Earth and the only resident baleen whale in the Mediterranean Sea (Notarbartolo di Sciara et al., 2003). The Mediterranean subpopulation is genetically discrete from the North Atlantic stock (Bérubé et al., 1998) and is currently listed as Endangered on the IUCN Red List (Panigada et al., 2021; IUCN, 2023). Within the basin, the Ionian Sea has historically been treated as a transit and secondary feeding region, but recent passive acoustic and visual monitoring has revealed a more persistent and ecologically meaningful presence than once assumed (Sciacca et al., 2023).

Population Identity

Mediterranean fin whales form a resident, genetically distinct subpopulation, separated from North Atlantic conspecifics by limited gene flow through the Strait of Gibraltar (Bérubé et al., 1998; Palsbøll et al., 2004). Recent acoustic work has identified at least two distinct song patterns within the basin and contiguous Gulf of Cádiz, suggesting possible within-basin structuring, though current evidence is insufficient to split the subpopulation, and a single management unit remains the most parsimonious assumption (Panigada et al., 2021).

Seasonal exchanges with the Atlantic have been documented at Gibraltar, westward in May–October and eastward in November–March, but these movements involve a relatively small number of animals and do not undermine the resident status of the Mediterranean stock (Gauffier et al., 2018).

Distribution and Habitat in the Mediterranean

Fin whales in the Mediterranean concentrate in deep, offshore waters of the western and central basin, from north and east of the Balearic Islands through the Ligurian, the Tyrrhenian Sea, and into the Ionian Sea (Panigada et al., 2021). Summer aggregations occur in highly productive frontal systems of the Corsican–Ligurian–northern Tyrrhenian region, the core of the Pelagos Sanctuary, where upwelling supports dense swarms of the northern krill *Meganyctiphanes norvegica*, the species' principal prey in the basin (Druon et al., 2012).

Habitat selection is tightly coupled to chlorophyll-a fronts: roughly 80% of sightings occur within 10 km of predicted frontal habitat (Druon et al., 2012). Whales also avoid waters with anomalously high sea-surface temperatures, a behaviour with clear implications under Mediterranean warming trends (Azzellino et al., 2008). Winter distribution is more dispersed; late-winter feeding aggregations have been documented in the Strait of Sicily (Canese et al., 2006; Panigada et al., 2017), confirming that the central Mediterranean, including the western approaches to the Ionian Sea, is not merely a corridor but an active foraging zone (Druon et al., 2012).

Ionian Sea

The eastern Sicilian shelf-break, the Gulf of Catania, the Strait of Messina, and the Gulf of Taranto add further productive features used by fin whales.

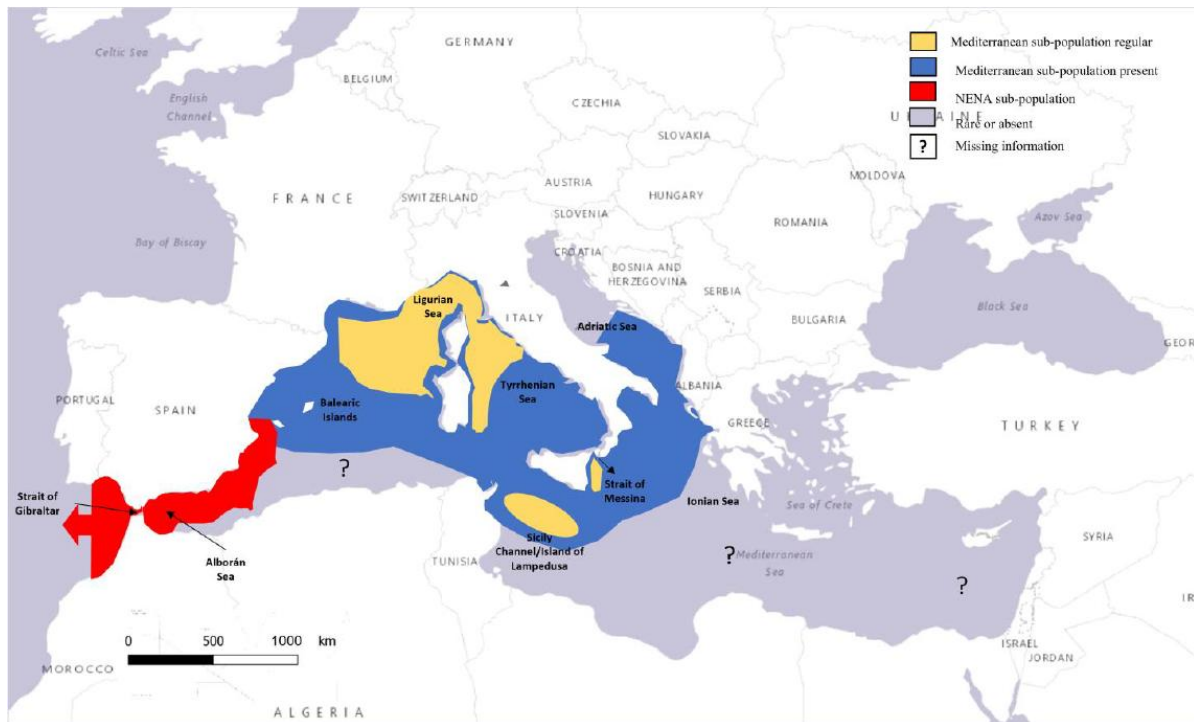


Figure 2-105: Fin whale distribution in the Mediterranean Sea, Blue indicates the presence of the Mediterranean fin whale subpopulation, yellow shows its regular distribution range, and red represents the NENA subpopulation (Source: Espada et al., 2024).

Fin whales are recorded in the Ionian Sea year-round, although abundance and behaviour vary seasonally. The Strait of Messina is an important autumn transit corridor and seasonal feeding area for fin whales (Aïssi et al., 2008). Along eastern Sicily, particularly in the Gulf of Catania, fin whale foraging has been observed and sustained vocal activity recorded through passive acoustic monitoring (Sciacca et al., 2015, 2023). Fin whales are present in the Northeast Ionian and occasionally in the Hellenic Trench (Frantzis et al., 2003), while recurrent, though infrequent, sightings have been reported from the Gulf of Taranto and the northern Ionian Sea (Bearzi et al., 2011).

Fin whale abundance in the Ionian Sea, including the area of Block 2 is estimated by the ACCOBAMs survey Initiative (Canadas et al., 2023) in Figure 2-106.

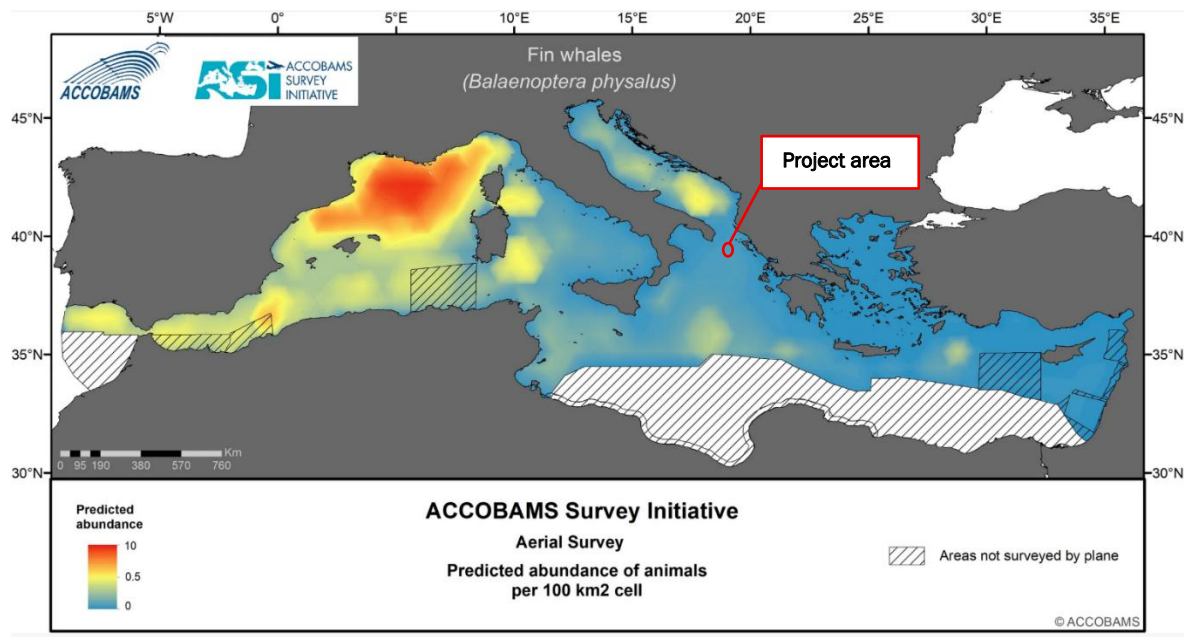


Figure 2-106: Predicted abundance of fin whales (Source: Canadas et al., 2023 - ACCOBAMS Survey Initiative).

Acoustic evidence

Sciaccia et al. (2023), analysing a full annual cycle of recordings from the Ionian Sea, documented 20 Hz song sequences lasting from 10 minutes to over 4.5 hours, with patterned inter-note intervals consistent with the Mediterranean acoustic group. The authors concluded that the central-eastern Ionian functions as a regular transit area between the western and eastern Mediterranean, with whales using the region for several days at a time before moving toward Lampedusa, the Sicily Channel or, via the Strait of Messina, the Tyrrhenian Sea (Sciaccia et al., 2023).

Feeding ecology in the Ionian

Direct dietary data for the Ionian remain limited. Foraging behaviour has been observed off eastern Sicily (Panigada et al., 2021), and along the Block 2 area Druon et al., (2012) has predicted a foraging area for the whales all year round using 10-year dataset (2000-2011).

Threats

The Ionian Sea lies at the intersection of the Mediterranean's major shipping routes, making vessel strikes the primary direct threat to fin whales, particularly in aggregation areas such as the Strait of Messina, eastern Sicily, and the Hellenic Trench (Panigada et al., 2006, 2021). Shipping and seismic activity also generate underwater noise that can interfere with communication and alter whale behaviour (Castellote et al., 2012; Viola et al., 2017). Additional pressures include exposure to organochlorine pollutants and microplastics, which accumulate through the food web (Fossi et al., 2016), and climate change, which is expected to modify prey availability and reduce habitat suitability through warming waters and shifting oceanographic conditions (Azzellino et al., 2008).

2.4.5.3 Sperm whale (*Physeter macrocephalus*)

The sperm whale is the largest of the odontocetes (toothed whales) and the most sexually dimorphic cetacean, with adult males reaching up to 18 m and 50 tonnes – nearly double the size of mature females (Whitehead, 2003). The species has a cosmopolitan distribution, occurring from the equator to the edges of the polar regions in all major ocean basins, but is typically associated with deep waters beyond the continental shelf, particularly along steep slopes, submarine canyons, and seamounts with elevated productivity. Globally, the sperm whale is classified as Vulnerable on the IUCN Red List, but in the Mediterranean is Endangered, due to genetically isolation from the Atlantic (Engelhaupt et al., 2009), somewhat smaller in body size, reaching approximately 12 m (Mazzariol et al., 2011; Caruso et al., 2015), and increased threats with fewer than 2,500 mature individuals and a continuing decline (Lewis et al., 2018; Boisseau et al., 2024).

The sperm whale is a key species of conservation concern in the Ionian Sea and the Mediterranean basin more broadly. The Hellenic Trench system provides critical habitat for foraging, socialising, and calving, supporting a resident endangered subpopulation of few hundred individuals that displays strong site fidelity, distinct acoustic culture (Hersh et al., 2026), and reduced body size relative to Atlantic conspecifics. Deep slope habitats broadly associated with the 500–2,000 m isobaths on both the Italian and Greek sides of the basin should be treated as a primary sensitivity zone for offshore exploration activities.

Diving, Foraging and Acoustics

Sperm whales are deep-diving species, routinely foraging at depths of 400–1,800 m (Teloni et al., 2008; Watwood et al., 2006). The species produces powerful broadband echolocation clicks (centred around 5–25 kHz, with source levels reaching 230 dB re 1 µPa @ 1 m), which are used for both foraging and communication (Møhl et al., 2000). Mediterranean tagging studies using high-resolution movement and acoustic tags and passive acoustic monitoring indicate that sperm whales in the basin dive to depths of around 600 to 800 m to forage (Watwood et al., 2006; Skarsoulis et al., 2022), while starting the search foraging phase in shallower than typical depths recorded in other oceanic environments. Foraging dives typically last on average 45 minutes, with surface intervals of 8–12 minutes (Watwood et al., 2006). Mediterranean sperm whales exhibit distinct coda repertoires, notably the “3+1” and “3++1” types along other type of codas, which differ from those described in other ocean basins and support the recognition of a culturally and acoustically distinct subpopulation (Pavan et al., 2000; Drouot et al., 2004), with both males and females to produce coda (Frantzis and Alexiadou, 2008). A recent large-scale analysis of sperm whale coda repertoires identified two distinct dialect groups in the western and eastern Mediterranean basin, providing evidence of cultural evolution within this isolated, IUCN-Endangered population and demonstrating how vocal-pattern analysis can inform conservation (Hersh et al., 2026).

Diet

Stomach-content and stable-isotope studies show that sperm whales in the region feed primarily on medium-sized squids, reflecting local cephalopod communities (Roberts, 2003). More detailed analyses from Greek strandings confirm a diverse squid-based diet dominated by *Histioteuthidae* (*Histioteuthis bonnellii*, *H. reversa*), alongside *Ommastrephidae*, *Octopoteuthidae*, *Onychoteuthidae*, and several other families, with fish occurring only in small amounts (Foskolos et al., 2020; Koutouzi et al., 2026; Garibaldi & Podestà, 2014).

Overall, Mediterranean sperm whales specialise on mesopelagic and bathypelagic cephalopods, typically smaller prey than those recorded in Atlantic populations (Foskolos et al., 2020).

Social Structure

Sperm whales are matrilineal, with stable units of ~10–20 females and immatures in tropical and temperate waters; maturing males disperse to higher latitudes before returning to breed as adults (Whitehead, 2003). Adult males are largely solitary or loosely associated with female groups during breeding. Photo-identification in the Hellenic Trench has confirmed long-term social units with consistent membership alongside solitary males (Frantzis et al., 2014).

Reproduction

Sperm whales reproduce slowly: females mature at 7–13 years, gestation lasts ~14–16 months, and calving intervals average 4–6 years (Best et al., 1984). Mediterranean calving occurs year-round, with possible summer–autumn peaks. Frequent calf and juvenile sightings in the Hellenic Trench suggest the area serves as both feeding and calving habitat (Frantzis et al., 2014).

Mediterranean Distribution

Sperm whale habitat in the Mediterranean is strongly associated with deep waters and steep bathymetric gradients. In the Western Basin, core areas include the waters around the Balearic Islands (Pirrotta et al., 2011, 2020), the Gulf of Lion, the Ligurian Sea, the Tyrrhenian Sea (Paola et al., 2025), and waters around the Algerian Front. In the central and eastern Mediterranean, sperm whales occur in the Strait of Sicily, throughout the Ionian Sea, and most prominently along the Hellenic Trench off western and southern Greece, including the adjacent slope systems (Frantzis et al., 2014; Frantzis et al., 2019), in the Aegean Sea (Oztuk et al., 2013; Ryan et al., 2014), south coast of Turkey (Awbery et al., 2022; Dede et al., 2022).

Distribution in the Ionian Sea

The Hellenic Trench is one of the most important sperm whale habitats in the eastern Mediterranean, with PCRI's multidecadal surveys and photo-identification work documenting over 200 individuals showing strong site fidelity, including stable female-calf units and solitary males, confirming its role as both a feeding ground and nursery (Frantzis, 1999; Frantzis et al., 2014). Offshore the Hellenic Trench acoustic surveys have also confirmed feeding sperm whale habitat (Thompson et al., 2023).

Acoustic monitoring from the NEMO-SN1 deep-sea cabled observatory off eastern Sicily (Catania, ~25 km offshore at ~2,100 m depth), and from dedicated towed-array surveys, has further confirmed year-round sperm whale presence in the basin. Body-size estimates derived from inter-pulse intervals indicate that most animals fall in the 9–12 m range, consistent with the smaller body size reported for Mediterranean sperm whales generally (Caruso et al., 2015). Basin-wide acoustic surveys under the ACCOBAMS Survey Initiative (ASI, 2018–2019) identified the Ionian, particularly the Hellenic Trench and the deep waters of the central Ionian, as one of the highest-density sperm whale areas in the Mediterranean (Lerebourg et al., 2023).

Occasional sightings and strandings have also been reported from the Strait of Otranto and the southern Adriatic. Recurring strandings along the Italian Ionian coast, particularly in the Gulf of Taranto, Calabria, and Apulia, further support the species' regular presence within the basin. Deep slope habitats broadly

associated with the 500–2,000 m isobaths on both sides of the basin should therefore be treated as a primary sensitivity zone for offshore exploration activities.

Abundance Estimates

Estimating sperm whale abundance in the Mediterranean is mainly from acoustic surveys (Lewis et al., 2018, Boisseau et al., 2024) (see Table 2-30, Figure 2-107).

Table 2-30: Estimated Abundance of the Sperm whale (*Physeter macrocephalus*) in the Mediterranean Sea and Hellenic Trench

REGION	ESTIMATED ABUNDANCE	SOURCE
Mediterranean-wide	< 2,500 mature individuals	Lewis et al. (2018); Boisseau et al. (2024)
Eastern Mediterranean	Several hundred individuals	Frantzis et al. (2014); Lerebourg et al. (2023)
Hellenic Trench (catalogue)	> 200 photo-identified individuals	Frantzis et al. (2014, 2019)

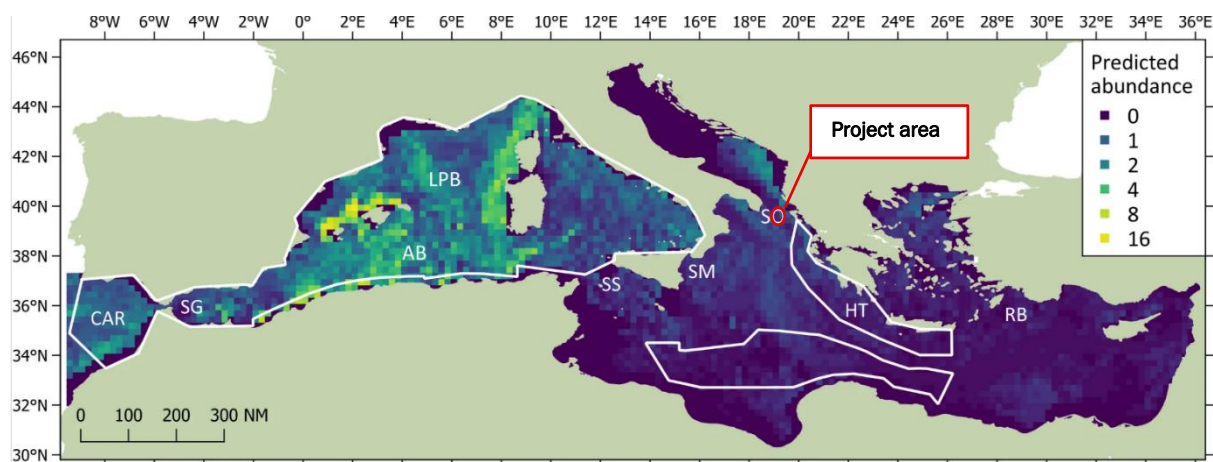


Figure 2-107: Predicted abundances of sperm whales (expressed as number of animals per grid cell) derived from Density Surface Modelling - Boisseau et al., 2024 (Source: ACCOBAMs survey Initiative).

Conservation Status & Threats

Vessel strikes are the primary cause of mortality, driven by the overlap of shipping lanes with core Hellenic Trench habitat (Frantzis et al., 2019; Skarsoulis et al., 2022). Fisheries entanglement, particularly in longlines, poses additional risk (Pace et al., 2015). Underwater noise disrupts echolocation and foraging, and has been linked to atypical strandings, including the 1996 Kyparissiakos Gulf event (Frantzis, 1998; Tyack et al., 2011). As apex predators, sperm whales accumulate POPs and heavy metals with documented impacts on immunity and reproduction (Fossi et al., 2013), and plastic ingestion has been recorded in stranded individuals (de Stephanis et al., 2013; Alexiadou et al., 2019). Climate-driven prey shifts in a warming Mediterranean may further compromise foraging and habitat use (Gambaiani et al., 2009). Underwater noise including seismic surveys can induce reduction in foraging effort in sperm whales (Miller

et al., 2009), which could result in population disturbance especially in an endangered population (Boisseau et al., 2026).

2.4.5.4 Cuvier's beaked whale (*Ziphius cavirostris*)

Beaked whales (Family Ziphiidae) are among the most difficult to study cetaceans globally, due to their elusive behaviour, prolonged time submerged, and their oceanic habitats. In the Mediterranean Sea, the only resident beaked whale species is the *Ziphius cavirostris*, previously known as Goosed-beaked whale, and now renamed Cuvier's beaked whale (Rogers et al., 2024).

Cuvier's beaked whale is a medium-sized odontocete, reaching lengths of 6–7 m and weights of approximately 2,500–3,000 kg. Males are distinguished by a pair of conical teeth that erupt at the tip of the lower jaw; females and juveniles lack erupted teeth (Heyning, 1989). Colouration is highly variable, ranging from dark grey to tan or cream towards the head, with extensive scarring (Rosso et al., 2011), particularly in adult males, resulting from intraspecific interactions. Cuvier's beaked whale s in the Mediterranean form a genetically distinct cluster, separated from the Atlantic and Indo-Pacific populations, and further structure within the Mediterranean itself, splitting into two distinct eastern and western clusters with possible distinct management units (Onourfiou et al., 2022).

Diving Behaviour

Cuvier's beaked whale is a deep-diving cetacean, performing deep foraging dives at average depths of 1000 m (Tyack et al., 2006) lasting between 50-60 minutes in duration, which are followed by shallower silent decompression dives (~1 h duration in total), a full dive cycle deep foraging dives and shallower non acoustic dives last approximately 2 hours. During this cycle beaked whales spent only a small proportion of time at the surface (6%) (Tyack et al., 2006), making their visual detection probabilities low during boat and aerial surveys.

In the Mediterranean, acoustic studies using towed hydrophones and fixed recorders have detected characteristic frequency-modulated (FM) upsweep echolocation clicks produced during foraging dives, providing a non-invasive method for monitoring presence in deep-water habitats (Zimmer et al., 2005; Giorli et al., 2016). Acoustic studies have shown that beaked whales forage both at night and day with a non-predictable variability (Giorli et al., 2016; Constaratas et al., 2024).

Group Size and Social Structure

Cuvier's beaked whale s are typically observed in small groups of 2–7 individuals, often comprising a female with calf or small mixed-sex associations (Baird et al, 2006, Podesta et al., 2016). Solitary adults, particularly males, are also frequently recorded. In the Ionian sea beaked whales were recorded in group sizes ranging between 1-3 individuals (HELPE monitoring reports).

Diet

Cuvier's beaked whale s are foraging mainly with mesopelagic and bathypelagic squid and cephalods (Satos et al., 2006, Koutouzi et al., 2026). Stomach content analyses from stranded individuals in the eastern Mediterranean, Greece, indicate a more specialized foraging ecology than other deep diving species to diet

dominated by meso pelagic and deep-water cephalopods, including *Histioteuthis* spp. (33%, Koutouzi et al., 2026), Other important prey include *Galiteuthis armata*, *Histioteuthis reversa*, *Octopoteuthis sicula*, and *Chiroteuthis veranii*, all characteristic of mesopelagic and bathypelagic habitats, submarine canyons and deep-water habitats. This specialization may make them vulnerable to changes in deep-sea prey availability, which could be affected by human activities such as seismic exploration and noise pollution (Koutouzi et al., 2026).

Mediterranean-Wide Distribution

Cuvier's beaked whale is distributed throughout the Mediterranean basin, from the west to the east (Podesta et al., 2005, 2016). It is found in areas characterised by steep bathymetric gradients, submarine canyons, and depths typically exceeding 1,000 m (Frantzis et al., 2003; Cañadas et al., 2018).

Based on modelling work and polled data from different surveys Cañadas showed the Ionian Sea as one important habitat for the beaked whales (Cañadas et al., 2018). The Hellenic Trench, extending along the western coast of Greece from the northern Ionian Sea to the Libyan Sea south of Crete, represents one of the most important habitat areas for the species in the entire Mediterranean (Frantzis et al., 2003; 2014). Other areas such as the southern Adriatic Sea (Brager et al., 2014, Constaratas et al., 2024) and south Turkish waters and Levantine Sea (Awbery et al., 2022), are also considered to support potentially high densities of beaked whales.

Ionian Sea

Sighting and stranding data indicate that *Z. cavirostris* is regularly present in several areas of the Ionian Sea (Gnone et al., 2023), including the eastern Ionian slope from Corfu to western Crete, encompassing the western margin of the Hellenic Trench (Frantzis et al., 2009); the Gulf of Taranto (northern Ionian, Italian waters), where strandings have been documented (Carlucci et al., 2020); the deep waters west of Kefalonia and Zakynthos, where encounter rates during dedicated surveys are among the highest recorded in the Mediterranean; and the steep continental margin between Italy and Greece (Panigada et al., 2024).

Baseline surveys for the Ionian block by NCC have confirmed the presence of Cuvier's beaked whale s and the habitat suitability of the Ionian Sea for the species (HELPE monitoring reports).

Annual acoustic analysis from a bottom-mounted hydrophone has revealed the year-round presence of Cuvier's beaked whale s in the Southern Adriatic Sea as a "hotspot", with increased acoustic presence during the autumn months (Constaratas et al., 2024).

Abundance

The ACCOBAMS Survey Initiative (ASI), conducted in 2018–2019, represented the first synoptic aerial survey of the Mediterranean Sea. The survey covered 344,835 km² across four Ionian strata (Blocks 18, 19, 22b, and 24), with 10,614 km of transect effort. Only 15 Cuvier's beaked whale s sightings were recorded Mediterranean-wide, reflecting the species' extremely low detectability due to prolonged dive durations and brief surface intervals. The resulting abundance estimate of 2,929 individuals (95% CI: 1,407–6,096) for the whole Mediterranean represents the first statistically robust basin-wide figure, although confidence intervals remain wide owing to low encounter rates and uncorrected availability bias (Panigada, et al., 2024).

For the Ionian North (Stratum 18) the abundance from aerial surveys was estimated at 262 (72 – 969 95% CI) (Panigada et al., 2024).

Habitat Modelling

Habitat suitability models for Cuvier's beaked whale in the Mediterranean consistently identify increased depth, slope and underwater canyons as a strong predictor of beaked whales habitat (Azzellino et al., 2008, Moulins et al., 2007, Canadas et al., 2014;2018 and Podesta et al., 2016).

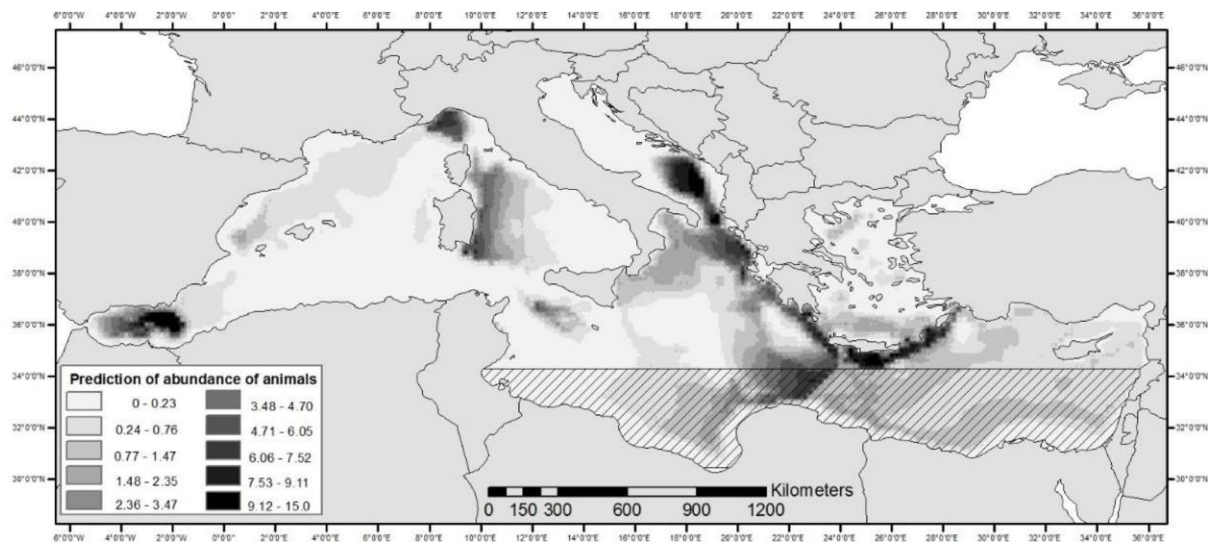


Figure 108 Predicted abundance of beaked whales in the Mediterranean Sea (Source: Canadas et al., 2018)

Threats

Acoustic Sensitivity and Anthropogenic Noise

Cuvier's beaked whale is widely regarded as one of the cetacean species most sensitive to anthropogenic noise, particularly mid-frequency active sonar (MFAS) used in naval exercises (Tyack et al., 2011). Multiple mass stranding events worldwide have been causally linked to sonar exposure (Frantzis 2000), with affected animals exhibiting symptoms consistent with decompression-like syndrome, including gas bubble lesions in tissues (Fernández et al., 2005).

Mediterranean Mass Strandings Linked to Anthropogenic Noise: The following mass stranding events in or adjacent to the Ionian Sea have been associated with anthropogenic acoustic activity. In Greece, in 1996 (Kyparissiakos Gulf), fourteen Cuvier's beaked whale s (*Ziphius cavirostris*) stranded alive or dead along a 38 km stretch of coastline, coinciding with NATO naval exercises involving sonar use in the adjacent Ionian Sea (Frantzis, 1998; Frantzis et al., 2003). In 1997, additional beaked whale strandings in the Ionian region were temporally associated with military exercises conducted in the same area. In 2011, a mass stranding event on Corfu beginning on 30 November resulted in at least 13 confirmed deaths along the western coast of the island, with unconfirmed reports suggesting that total mortality may have exceeded 50 individuals. The event was attributed to anthropogenic activity, although no seismic surveys were active at the time. In February 2022, three Cuvier's beaked whale s stranded alive on Corfu's west coast. Although the definitive cause was not ascertained, the event spatially and temporally coincided with a 2D seismic survey using the

research vessel SW “Cook”, located within 25 nautical miles of the strandings. Due to concerns regarding this overlap, Greece’s Ministry of the Environment and Energy ordered a temporary halt to the surveys on 24 February. These events prompted ACCOBAMS to designate the Hellenic Trench and adjacent waters as an Area of Special Concern for Beaked Whales, recommending precautionary measures for military and industrial noise-generating activities (IMMA 2017).

Seismic Survey Impacts: Airgun arrays used in hydrocarbon exploration generate high-intensity, low-frequency pulses (typically 10–200 Hz, with harmonics extending to higher frequencies) that propagate over large distances in deep water. Although Cuvier’s beaked whales vocalise at higher frequencies (~25–70 kHz with peak level at 40 kHz, Zimmer et al., 2005), behavioural responses to seismic noise have been documented, including: Cessation of foraging echolocation during airgun exposure, horizontal displacement from survey areas, extended post-exposure recovery periods before resumption of normal diving behaviour.

Modelling studies suggest that even moderate received levels (140–160 dB re 1 µPa) may trigger avoidance responses in beaked whales (Boisseau et al., 2026), with potential energetic consequences if animals are displaced from preferred foraging habitat during critical periods (DeRuiter et al., 2013; Pirota et al., 2019).

Cumulative Noise Exposure: Seismic surveys represent an additive pressure to existing noise from shipping traffic (Pirota et al., 2012) (the Ionian Sea lies along major Mediterranean shipping routes), military exercises, and other industrial activities. Cumulative noise exposure may exceed tolerance thresholds even where individual sources appear moderate.

Data Gaps

Availability bias, arising from the species' prolonged submergence, remains a significant source of uncertainty in abundance estimation and distribution studies especially when surveys or mitigation efforts are performed by visual means or with passive acoustic monitoring but with towed hydrophone arrays which have a low probability of detection for beaked whales. Long ocean bottom mounted hydrophones are recommended to assess the seasonal occurrence of beaked whales in the broader area and to better understand the presence of this vulnerable species to the area. Passive acoustic monitoring is an efficient way to identify occurrence and abundance of deep diving species with automated methods to assist in analysis of large amount of data.

2.4.5.5 Risso's dolphin (*Grampus griseus*)

Risso's dolphin (*Grampus griseus*) is a medium-sized delphinid (3–4 m, 300–500 kg) recognisable by its blunt head, tall falcate dorsal fin, and heavily scarred, pale body (Baird, 2009). Globally, it favours continental slope and oceanic habitats across temperate to tropical waters. In the Mediterranean, it is patchily distributed, with higher densities in the western basin (Ligurian Sea, Gulf of Lion, Alboran Sea) and localised records in the central and eastern basin (Bearzi et al., 2011, Frantzis et al., 2003, Cipriano et al., 2023). The Mediterranean subpopulation is classified as Endangered on the IUCN Red List.

Biology and Ecology

Group size and social structure. Groups typically comprise 3–30 individuals (Mediterranean mean: 5–15), with moderate site fidelity and stable associations documented by photo-ID studies (Marglietta et al., 2018)

Azzellino et al., 2016). In the Ionian Sea, and the Gulf of Taranto, group size of Risso's dolphins range between 2-42 (mean 19), with feeding behaviour to be associated with smaller groups, while resting and traveling involved larger and more tightly organized groups (Cipriano et al., 2022).

Risso's dolphins are specialist squid-feeders, targeting cephalopods such as *Histioteuthis* spp., *Todarodes sagittatus*, and *Illex coindetii*; fish are a minor component (Clarke, 1996; Blanco et al., 2006). Foraging typically occurs at night, with dives reaching approximately 200–600 m (Arranz et al., 2016). In the Mediterranean, dietary studies have identified at least 14 cephalopod species, with *Histioteuthis reversa* (27%) and *Illex coindetii* (22.6%) being most prominent, indicating some opportunistic flexibility (Koutouzi et al., 2026; Luna et al., 2023). Overall, Risso's dolphins appear capable of exploiting a broad range of cephalopod prey depending on local and seasonal availability, suggesting opportunistic feeding on seasonal cephalopod blooms (Luna et al., 2023).

Their echolocation clicks have a centroid frequency ~22-39 kHz and can be distinguished from other Delphinidae clicks after careful analysis (Soldevilla et al., 2008).

Ionian Sea

In the Ionian Sea, the species occurs principally in deep waters (400–1,500 m), with sightings concentrated along the Hellenic Trench margins (Frantzis et al., 2003), the Gulf of Taranto (Cipriano et al., 2022;2025), and offshore Calabrian waters (Azzellino et al., 2016; Carlucci et al., 2020; Cipriano et al., 2023; 2025, Menniti & Vella,2022). Encounter rates during large scale mediterranean surveys show a lower frequency than for striped dolphins (Ollier et al., 2023).

The ACCOBAMS Survey Initiative (ASI) aerial surveys (2018–2019) recorded Risso's dolphin in low numbers across Ionian transects (Panigada et al., 2024, Cañadas et al., 2023). The species nonetheless remains among the least studied cetaceans in the area, with substantial gaps in local abundance estimates, population structure, and habitat use.

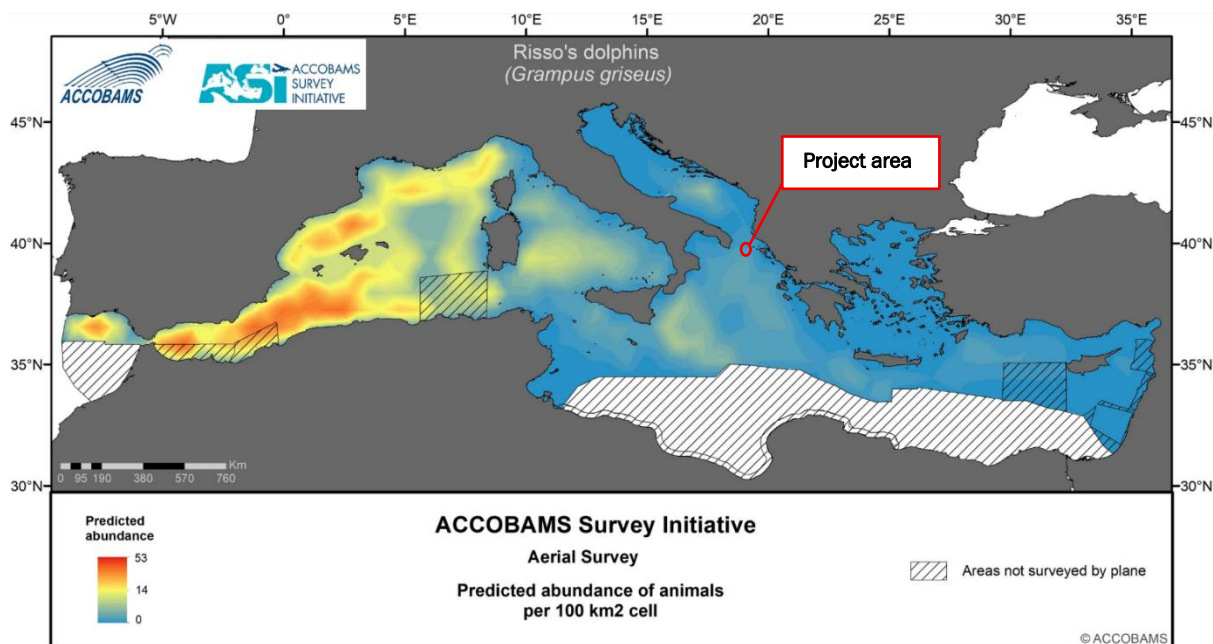


Figure 2-109: Predicted abundance of Risso's dolphins (Source: Cañadas et al., 2023 - ACCOBAMs Survey Initiative).

Block 2 in the central Ionian Sea encompasses continental slope habitat (400–1,500 m) where Risso's dolphins are likely to occur, and Risso's dolphin has been sighted during the dedicated environmental survey in March 2026.

Anthropogenic Threats

As long-lived apex predators, Risso's dolphins bioaccumulate organochlorines (PCBs, DDT metabolites) and heavy metals, with high PCB burdens and potential immunotoxic and reproductive effects documented in stranded western Mediterranean baleen whales (Fossi et al., 2006); Ionian Sea animals are likely similarly exposed. Plastic ingestion poses an additional concern: stranded individuals have occasionally contained debris, and microplastics have been identified as a cause of death in at least one eastern Mediterranean individual (Koutouzi et al., 2026), while elevated macro-litter density in the Calabrian Ionian Sea raises further risk for foraging animals (Fanizza et al., 2026). Bycatch mortality in the Ionian Sea is unquantified but likely given habitat overlap with fishing effort along the continental slope (Notarbartolo di Sciara, 2016). Anthropogenic noise from shipping, seismic surveys, and military sonar can mask communication, cause chronic stress, and trigger avoidance or displacement (Pirotta et al., 2019), with major shipping routes and hydrocarbon exploration in the Ionian Sea exposing resident animals to cumulative noise from multiple sources. Finally, warming SST and shifts in cephalopod prey distribution driven by climate change may alter habitat suitability, with uncertain implications for the Ionian population (Azzellino et al., 2017).

2.4.5.6 Striped dolphins (*Stenella coeruleoalba*)

The striped dolphin (*Stenella coeruleoalba*) is the most abundant cetacean in the Mediterranean Sea and one of the most widely distributed delphinids globally. It is a medium-sized odontocete, reaching 1.8–2.6 m in length, characterised by a distinctive blue-grey and white colouration with a prominent lateral stripe running from the eye to the anus. The species is classified as *Least Concern* globally by the IUCN, but the Mediterranean subpopulation is assessed as *Least Concern* on the IUCN Red List, reflecting ongoing population declines driven by fisheries bycatch, disease epizootics, contaminant accumulation, and climate-driven ecosystem changes (Aguilar, 2000; IUCN, 2022).

Striped dolphins are typically pelagic and oceanic, preferring waters beyond the continental shelf, predominantly over the continental slope and in deep basins exceeding 1,000 m (Notarbartolo di Sciara & Demma, 2004). In the Mediterranean, their distribution spans from Gibraltar to the Levantine Sea, including the Ligurian Sea, Gulf of Lions, Tyrrhenian Sea, Ionian Sea, and Aegean Sea. The Ionian Sea, between Italy and Greece, represents an important part of the central Mediterranean range (Frantzis et al., 2003; Carlucci et al., 2020).

Distribution

Striped dolphins are the dominant cetacean species across the Mediterranean, inhabiting offshore waters from Gibraltar to the Aegean and Levant basins. Overall delphinid abundance and diversity tend to decrease from west to east in the basin, with the Tyrrhenian and Ionian Seas generally supporting higher abundance than the Sicily Channel or the easternmost portions of the Mediterranean (Gomiero et al., 2018).

Within the Ionian Sea, the striped dolphin is consistently the most frequently encountered cetacean during dedicated surveys, reflecting the region's deep bathymetry and productive pelagic ecosystem (Frantzis et al., 2003; Azzolin et al., 2020). The species shows a preference for offshore waters of the Hellenic Trench and the central Ionian basin. Distribution modelling indicates that higher encounter rates are concentrated in the Gulf of Taranto (northern Ionian, Carlucci et al., 2017) and the Gulf of Corinth (eastern Ionian, Greek waters), both identified as key areas for the species' conservation (Carlucci et al., 2020), and more recent surveys have shown distribution in offshore Ionian waters (Canadas et al., 2023 (Figure 1), Panigada et al., 2024).

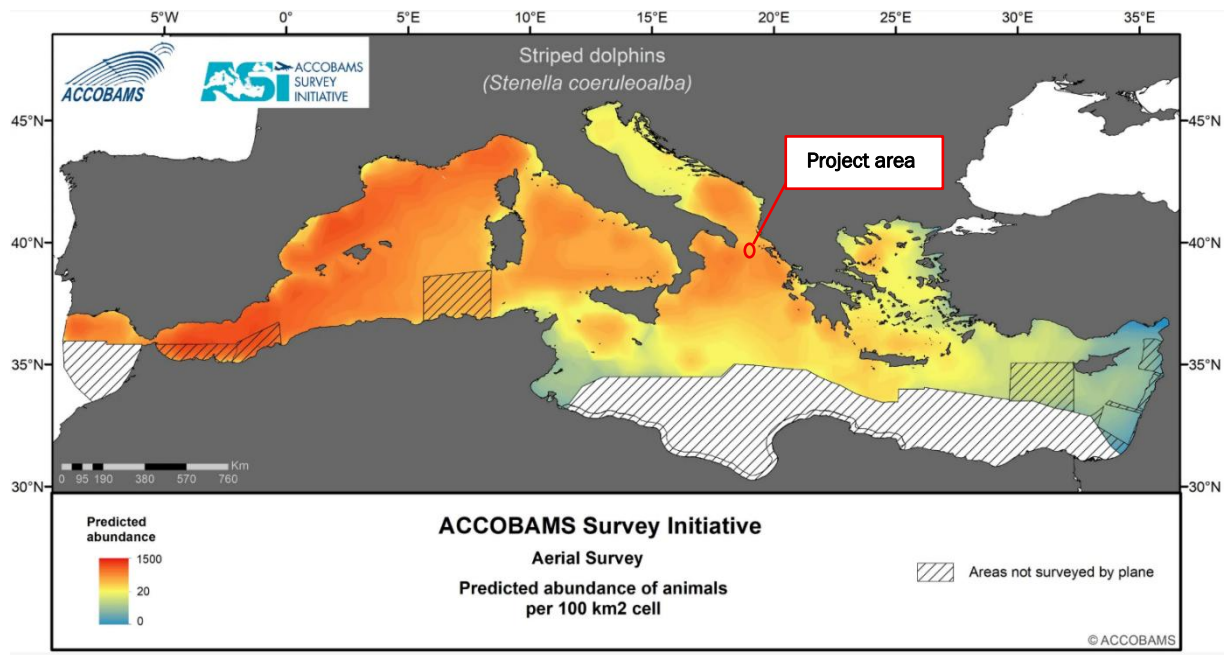


Figure 2-110: Predicted abundance of Striped dolphins (Source: Canadas et al., 2023 - ACCOBAMS Survey Initiative)

With a basin-wide population estimated at approximately 535,000 individuals based on the ACCOBAMS Survey Initiative aerial surveys conducted in 2018–2019 (Panigada et al., 2022)

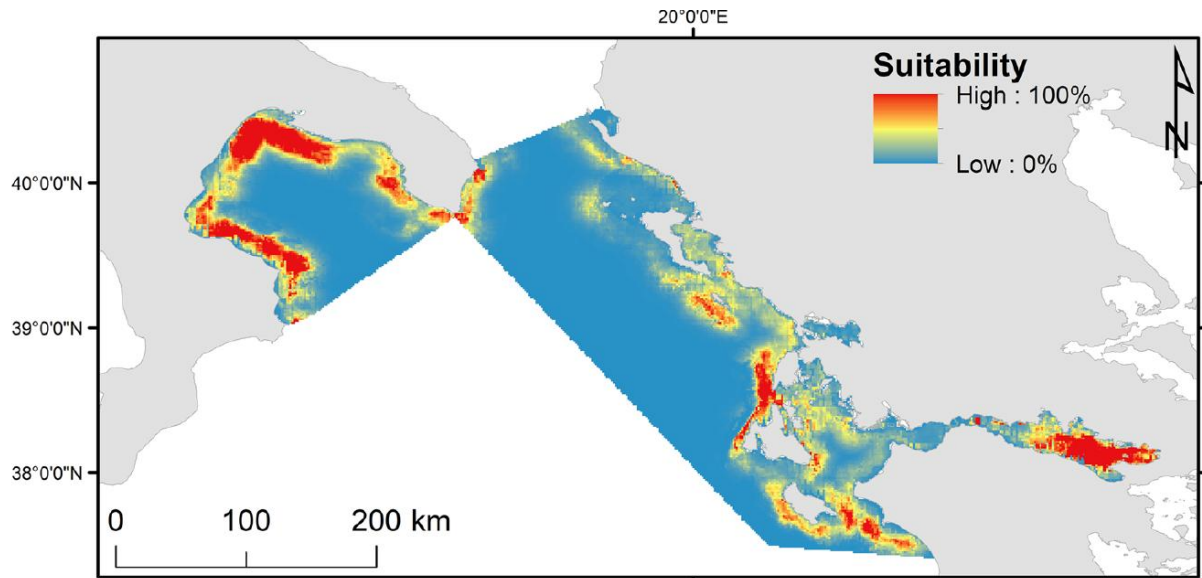


Figure 2-111: Summer distribution of striped dolphins according to topographic and oceanographic variables
(Source: Azzolino et al., 2020)

Striped dolphin distribution in the Mediterranean is shaped mainly by stable bathymetric and topographic features rather than short-term oceanography. Water depth and distance from the 200 m isobath are the strongest predictors, reflecting a preference for deep offshore pelagic habitats along continental slopes and submarine canyons where prey concentrates (Carlucci et al., 2020; Azzolin et al., 2020). Sightings span a wide depth range but cluster along steep continental margins and adjacent deep waters (Carlucci et al., 2017).

Dynamic factors add seasonal structure to striped dolphins habitat modelling in Ionian sea showing a strong preference for warm waters, with optimal mean SST around 25–26.5 °C, warmer than the 22–24 °C reported for the Ligurian Sea. Chlorophyll-a shows only a weak, indirect association, likely mediated by prey availability with a temporal lag (Azzolin et al., 2020).

Acoustic Behaviour

Striped producing broadband echolocation clicks for prey detection and frequency-modulated whistles (5–20 kHz) for communication, group cohesion, and individual recognition through signature calls (Azzolin et al., 2014).

Whistle features distinguish striped dolphins from other Mediterranean delphinids (bottlenose, common, and long-finned pilot whales) with 70–80% classification success, supporting passive acoustic species identification (Azzolin et al., 2014). Mediterranean individuals also produce shorter, lower-frequency whistles than Atlantic populations, indicating population-level differentiation (Azzolin et al., 2013).

Long-term Passive Acoustic Monitoring (PAM) in the western Ionian Sea has clarified offshore behaviour. The Ocean Noise Detection Experiment (OvDE), deployed at ~2,000 m off the Gulf of Catania, collected nearly 5,500 samples in 2005–2006, showing echolocation concentrated at night and twilight (consistent with feeding on vertically migrating mesopelagic prey), whistles distributed throughout the day in social contexts, and seasonal detection peaks in August linked to deep-sea productivity (Sciacca et al., 2017). Wave-glider

PAM surveys across the central Mediterranean further recorded near-continuous delphinid vocalisations offshore but sparse detections in shallow waters, reinforcing the species' pelagic affinity (Gomiero et al., 2018; Ferri et al., 2025).

Bycatch

Striped dolphins in the Mediterranean and Ionian Sea face numerous anthropogenic threats. Bycatch remains a leading mortality cause, with incidental capture in pelagic trawls, gillnets, purse seines, and longlines continuing despite driftnet bans, with mortality potentially exceeding sustainable levels in some areas (Bearzi, 2002; Sala et al., 2022; ACCOBAMS, 2021; Carlucci et al., 2020). Strandings are linked to morbillivirus outbreaks, pollution, and prey depletion, while chronic PCB and DDT exposure compromises immune and reproductive health (Domingo et al., 1995; Raga et al., 2008; Mazzariol et al., 2017; Aguilar, 2000; Fossi et al., 2006).

2.4.5.7 Short-beaked common dolphin (*Delphinus delphis*)

The short-beaked common dolphin (*Delphinus delphis*) is a small delphinid (adult body length 1.7–2.4 m) characterised by a distinctive hourglass flank pattern. From the two common dolphins only the short-beaked common dolphin occurs in the Mediterranean Sea, and genetic studies considered different from the Atlantic one (Natoli et al., 2008). A population reduction is inferred from declining abundance indices, habitat contraction, prey depletion, and ecosystem degradation (Bearzi et al., 2003; Bearzi, 2012; IUCN Red List, 2021–2024).

Mediterranean Distribution

The species no longer maintains a continuous Mediterranean distribution, instead persisting in fragmented, regionally isolated subpopulations (Bearzi et al., 2024). The strongest remaining presence is in the western basin: early 1990s line-transect surveys in the Alborán Sea estimated approximately 14,736 individuals (CV = 0.38; ~0.16 ind/km²), though this baseline likely overestimates current abundance given subsequent declines. In the central Mediterranean, surveys of the Sicily Channel and Maltese waters (1997–2002) recorded densities of ~0.135 ind/km², with more recent analyses indicating continued fragmentation.

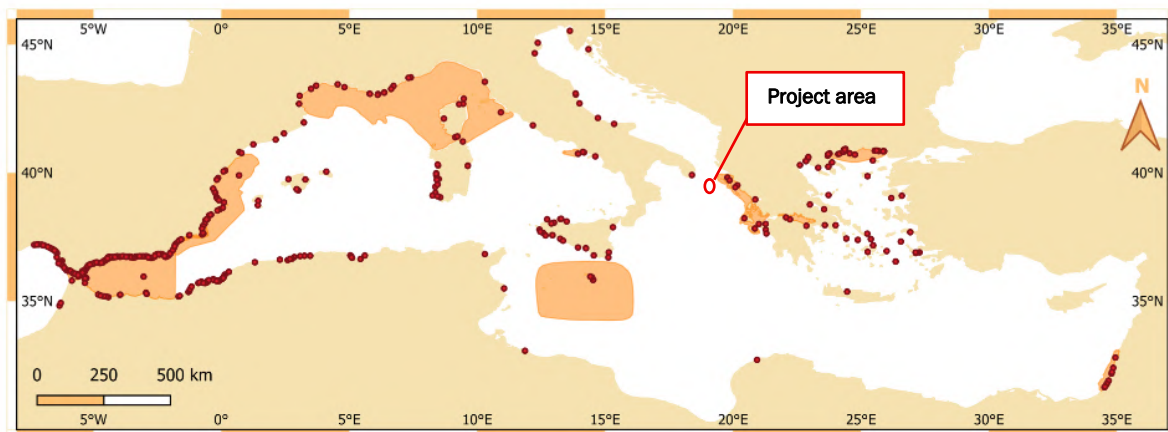


Figure 2-112: Common dolphin strandings (Source: Vale et al., 2021)

Ionian Sea

In the eastern Ionian, the species concentrates around productive coastal habitats off western mainland Greece, Kalamos, Kastos, and Meganisi, forming small or mixed-species groups with striped dolphins (*Stenella coeruleoalba*) and Risso's dolphins. The Gulf of Corinth similarly supports mixed groups in semi-enclosed pelagic habitats (Frantzis et al., 2003; 2009).

The most intensive long-term monitoring in the region was carried out within a 480 km² study area around Kalamos between 1993 and 2003, accumulating over 24,771 km of survey effort across 835 days and recording 428 sightings. Encounter rates collapsed from 2.18 sightings per 100 km in 1997 to just 0.09 in 2004, a roughly 25-fold decline attributed primarily to intensive exploitation of small pelagic fish stocks (anchovy and sardine) (Bearzi et al., 2005, 2006). Reflecting its historical importance, the Kalamos area is designated a Site of Community Importance under the EU Habitats Directive (92/43/EEC) and recognised by ACCOBAMS as a priority area for conservation action.

Although primarily coastal, common dolphins are capable of long-distance movement: Genov et al. (2012) documented an individual travelling between Kalamos (Greece) and Monfalcone in the northern Adriatic via photo-identification (Figure 2-113). The species has also been recorded along the Albanian coast (Bräger et al., 2014).

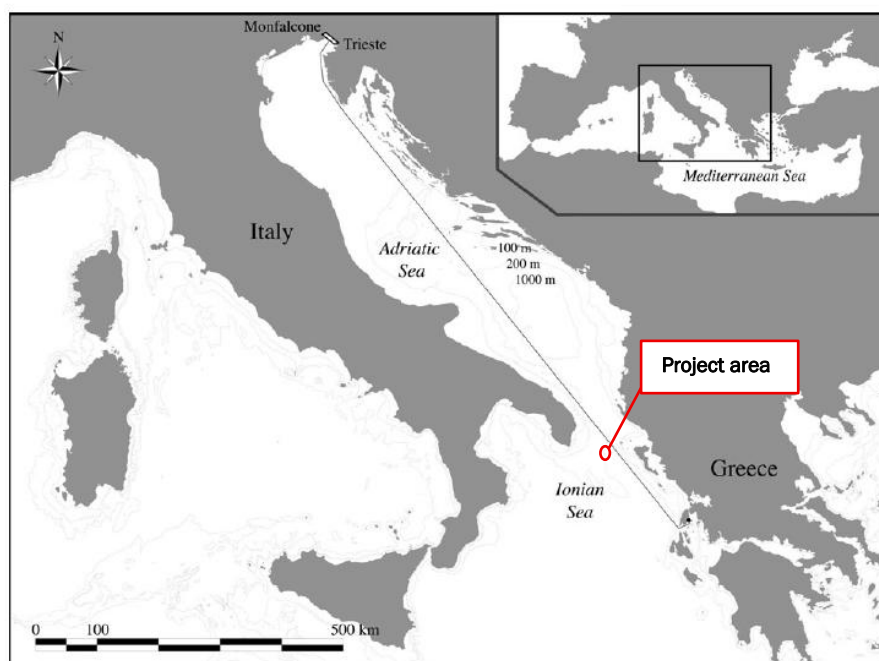


Figure 2-113: Minimum distance travelled by an adult common dolphin which was identified by individual photo id
(Source: Genov et al., 2012).

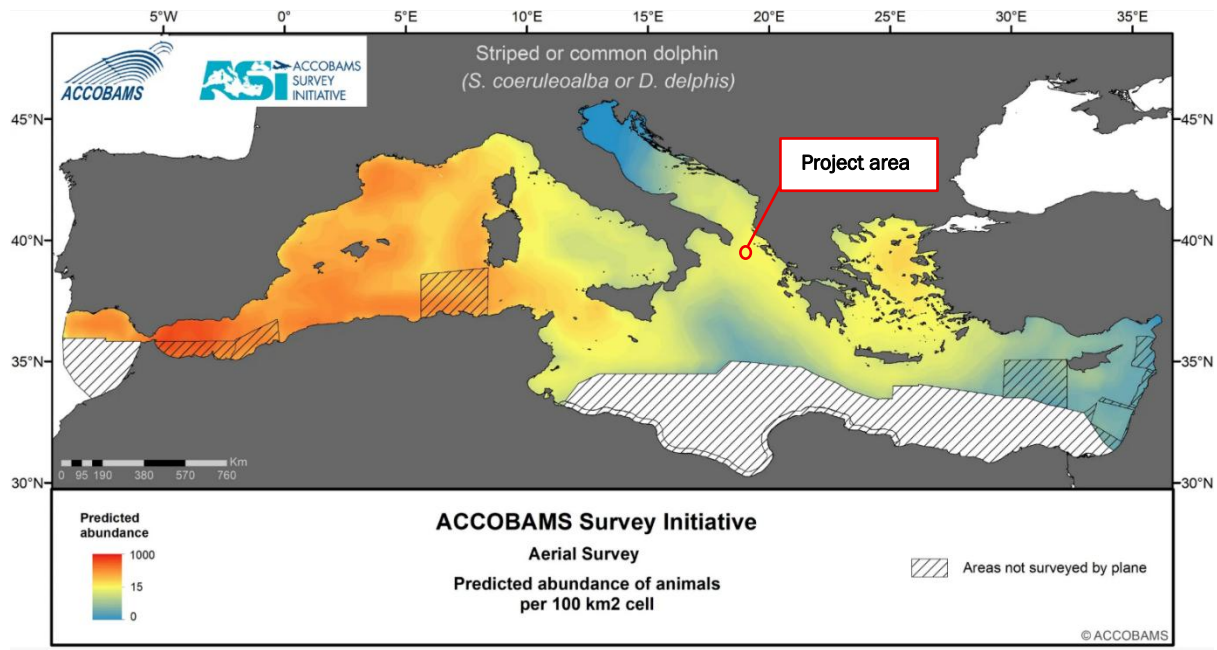


Figure 2-114: Predicted abundance of Striped or common dolphin (Source: Canadas et al., 2023 - ACCOBAMS Survey Initiative)

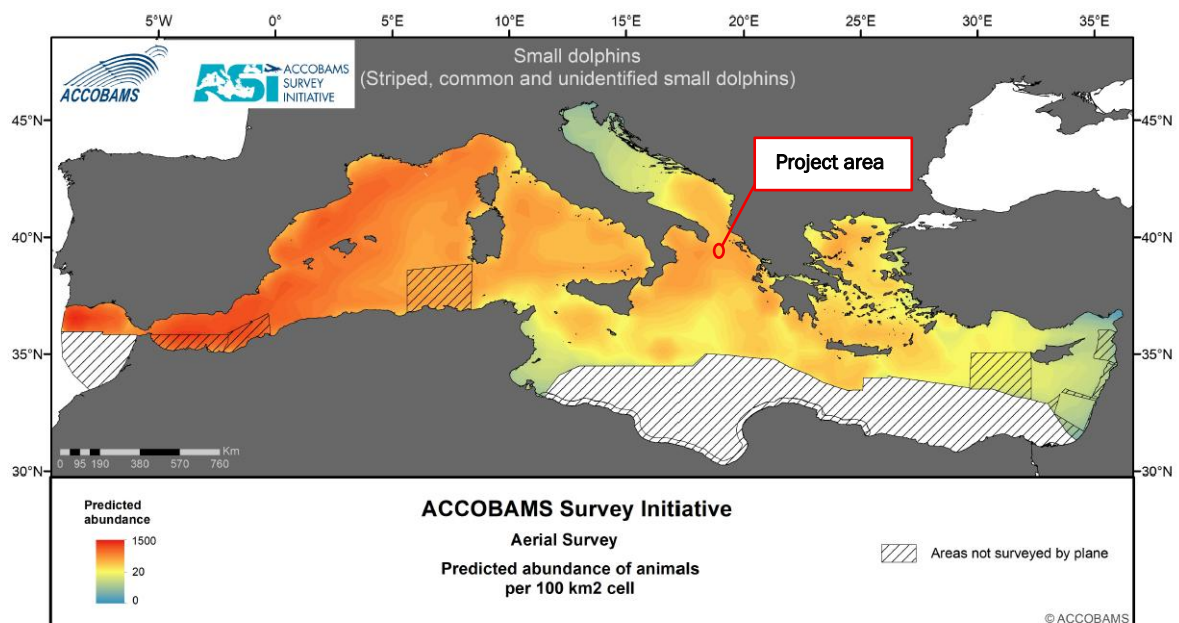


Figure 2-115: Predicted abundance of small dolphins (striped, common dolphins) (Source: Canadas et al., 2023 - ACCOBAMS Survey Initiative)

Habitat

Mediterranean common dolphins typically occur in waters 50–200 m deep, though bimodal depth distribution has been also observed (Canadas et al, 2002), with a second increased probability of occurrence

at larger depths, often associating with bathymetric gradients, shelf-edge features and frontal zones and upwelling areas.

In the eastern Ionian study area, sightings occurred predominantly over seabeds 50–150 m deep, with transparent, oligotrophic surface waters and seagrass-covered shallows (Bearzi et al., 2005). Similarly, surveys off Samos (Aegean Sea) recorded common dolphins in waters 12–100 m deep (mean 60 ± 22 m) (Pietroluongo et al., 2020).

Existing studies focus primarily on coastal and shelf habitats (<200 m depth), reflecting the preference of common dolphins for productive neritic waters rather than deep offshore environment, though in some places can also be found in pelagic waters (>2000 m depth) (Azzelino et al., 2008). The probability of the common dolphin presence has been correlated with the presence of sardines (Giannoulaki et al., 2017).

Common dolphins are opportunistic predators whose diet varies by region and season, primarily comprising small pelagic fish and neritic cephalopods. Stomach content analyses from stranded individuals in the North Aegean Sea reveal a diet dominated by Clupeidae, Myctophidae, Centracanthidae, and Sparidae, with round sardinella — a seasonally abundant species forming large coastal shoals in spring, representing a key foraging resource. Additional prey includes benthopelagic shelf species such as European barracuda (*Sphyraena sphyraena*), *Pagellus* spp., and *Spicara* spp. (Vale et al., 2021; Milani et al., 2016; 2017).

2.4.5.8 Bottlenose dolphin (*Tursiops truncatus*)

The common bottlenose dolphin is a cosmopolitan species found in all oceans except polar and subpolar waters. In the Mediterranean Sea, it is a regularly occurring species and the second most frequently sighted cetacean after the striped dolphin.

It occurs from the Strait of Gibraltar through the Tyrrhenian, Adriatic (Bearzi et al., 1997), Ionian, Aegean, and Levantine sub-basins to the Dardanelles. Highest densities are associated with productive coastal habitats, including semi-enclosed gulfs, archipelagos, estuaries, and areas of upwelling or frontal activity. Mediterranean bottlenose dolphins are not a single homogeneous population but comprise several genetically distinct regional units shaped by habitat use, oceanographic features, and restricted connectivity (Gaspari et al., 2015, Natoli et al., 2005). In the Mediterranean the bottlenose dolphin conservation status has reassessed as Vulnerable by IUCN, except the subpopulation inhabiting the Gulf of Ambracia (Greece), which has been assessed as Critically Endangered (Gonzalvo and Notarbartolo di Sciara, 2021).

Occurrence and Distribution in the Ionian Sea

Tursiops truncatus is a year-round resident of the Ionian Sea, with the highest densities and best-studied populations in the Gulf of Ambracia (Bearzi et al., 2008; Gonzalvo et al., 2016), the Inner Ionian Sea Archipelago, and the Paxoi–Antipaxoi island group (Giovos et al., 2016). Lower-density occurrences extend along the western Greek mainland coast, the main island chain (Corfu to Zakynthos), and offshore waters.

The species shows a strong preference for continental shelf waters (<200 m depth), with distribution closely linked to demersal and semi-pelagic fisheries (Bellingeri et al., 2025; Bearzi et al., 2009). In the Kalamos Archipelago, bottlenose dolphins co-occur with short-beaked common dolphins (*Delphinus delphis*), where dietary niche partitioning likely reduces competition.

Regionally, the population is structured into several semi-connected coastal sub-populations, with Paxoi–Antipaxoi likely functioning as a connectivity corridor between the resident groups noted above. Additional sub-populations in the Gulf of Catania and Gulf of Taranto face similar pressures, particularly fisheries bycatch and prey depletion. Overall, bottlenose dolphins persist across an interconnected regional network under sustained anthropogenic pressure from pollution, fisheries interactions, vessel traffic, and contaminant exposure.

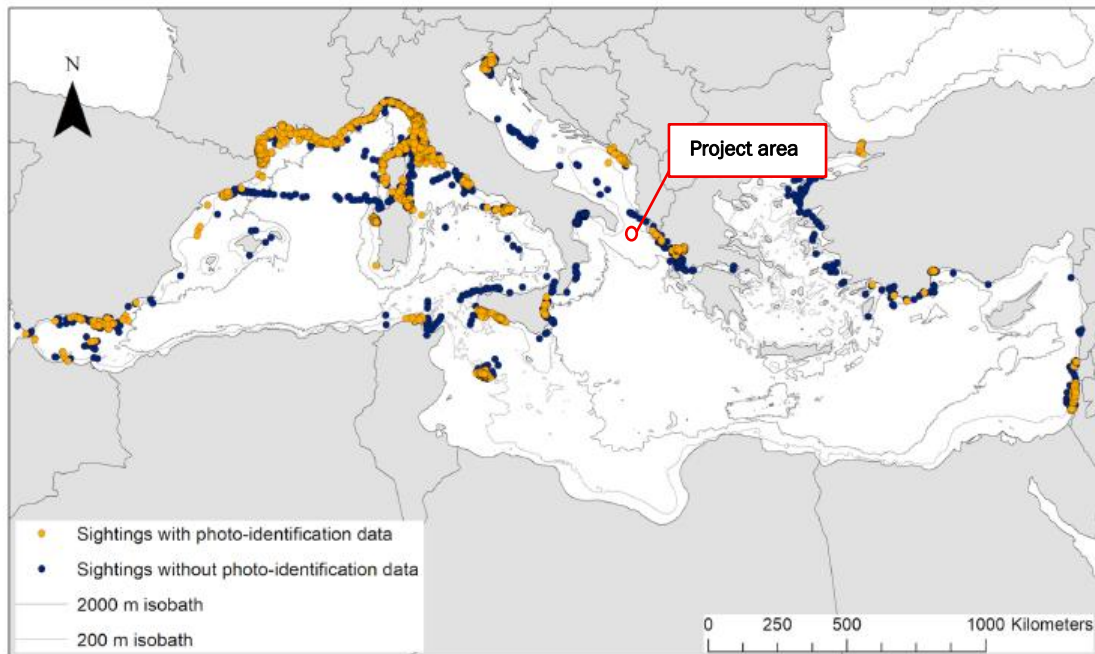


Figure 2-116: Distribution of bottlenose dolphin sightings (n=8389) taken from 43 research groups in the Mediterranean Sea (Source: Bellingeri et al., 2025)

Population Abundance and Density

The ACCOBAMS Survey Initiative provide an estimate of 986 (270 3592 95% CI) individuals for stratum 18 and 1358 (502 3679 95% CI) for the 22b (Panigada et al., 2024) which are relevant for the Black 2 area. On site specific areas such as the Gulf of Ambracia Gonzalvo et al., (2016) has estimated a resident population of 130 to 170 animals.

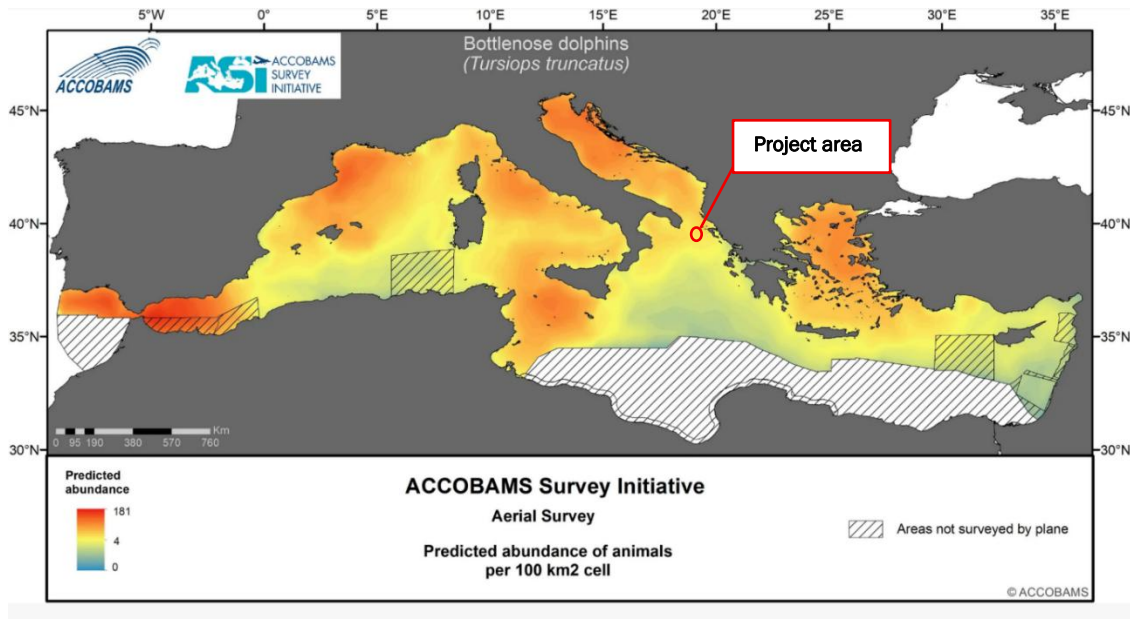


Figure 2-117: Predicted abundance of bottlenose dolphins (Canadas et al., 2023 - ACCOBAMS Survey Initiative)

Feeding Ecology in the Ionian Sea

The species is an apex predator and opportunistic generalist, taking a wide variety of teleost fish, cephalopods, and occasional crustaceans. In Ionian communities, Sparidae and Merlucciidae tend to dominate the demersal component, while pelagic prey includes sardine and anchovy. Individuals also exploit anthropogenic food subsidies, discards and depredation of longline and gill-net gear, behaviour that simultaneously raises bycatch risk (Bearzi et al., 2009).

In the Gulf of Ambracia, photo-identified individuals have been observed surface-feeding on schooling epipelagic fish, though stable isotope analysis reveals a dual reliance on epipelagic and demersal prey, with Sparidae forming a substantial dietary component (Gonzalvo et al., 2016). In the Kalamos Archipelago, individuals rely predominantly on demersal, bottom-associated species.

Documented foraging strategies include solitary hunting, coordinated herding of fish schools, kleptoparasitism from fishing gear, and strand-feeding in shallow margins. Passive acoustic monitoring (PAM) has shown that foraging echolocation peaks during crepuscular and nocturnal periods, consistent with the diel vertical migration of preferred prey (Caruso et al., 2015).

Threats

The main threats affecting bottlenose dolphins in the Ionian Sea are dominated by intensive fisheries interactions, ecological degradation, pollution (Gonzalvo et al., 2016), disturbance, and climate-driven ecosystem change (DiAmen et al., 2025). Bycatch in gillnets and trammel nets is the most immediate direct mortality risk (Bearzi et al., 2008), with documented fatalities and frequent dolphin interactions with fishing gear (often linked to depredation behaviour), while indirect impacts from demersal trawling further reduce survival through prey depletion. Increasing vessel traffic from shipping, tourism, and dolphin-watching operations adds chronic noise and behavioural disturbance, occasionally compounded by military sonar

activity. Finally, rapid regional ocean warming and ecosystem shifts are altering prey distribution and productivity.

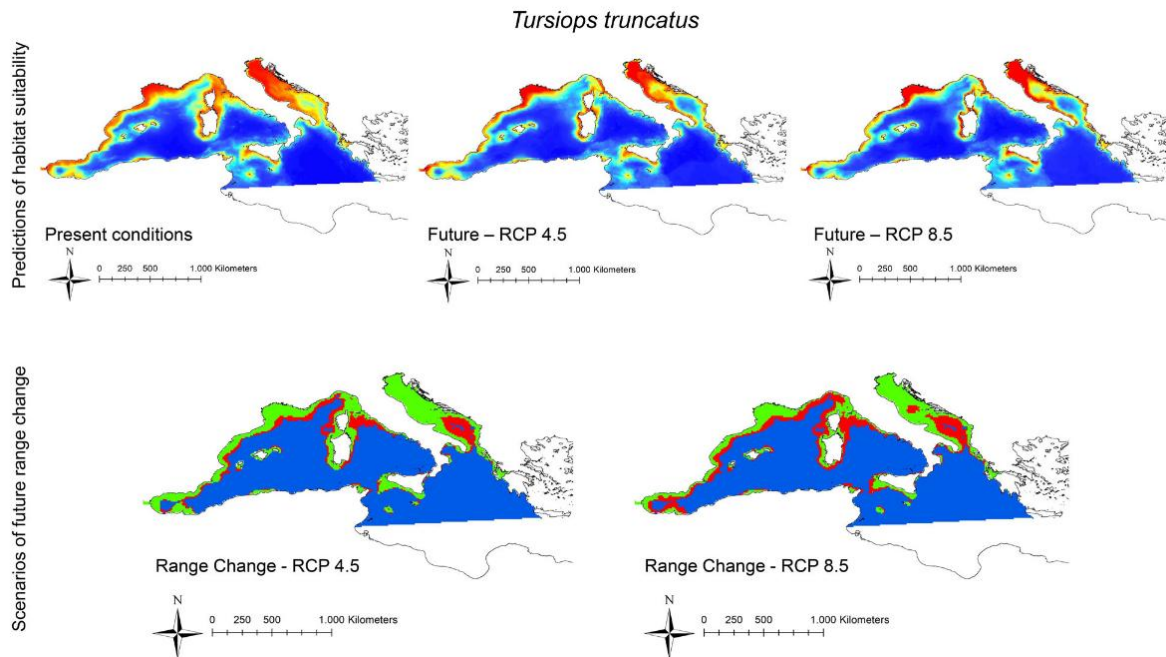


Figure 2-118: Species distribution modelling habitat suitability under present conditions (2009-2021), decade 2045-2055 under two simulations of the climate system (RCP4.5 and 8.5). Color gradient spans from blue (no suitable area) to red (highest suitability). Lower row: Scenarios of range change between present and future scenarios (RCP 4.5 and 9.5). Red areas: predicted to be lost; green areas: predicted to remain occupied; blue areas: predicted to remain unoccupied; white areas: predicted to be gained (Source: D'Amen et al., 2025)

2.4.5.9 Rough-toothed dolphin (*Steno bredanensis*)

The rough-toothed dolphin (*Steno bredanensis*) is the sole member of the genus *Steno*, belonging to the family Delphinidae. Adults range from 2.09 to 2.83 m in length and weigh between 90 and 155 kg, with a distinctively elongated beak, a tall falcate dorsal fin, and 20–27 vertically ridged teeth in both jaws, the feature from which the common name is derived. Globally, it is classified as Least Concern by the IUCN, though the Mediterranean subpopulation has been assessed as Near Threatened due to limited information and knowledge gap about its distribution and abundance (Kerem et al., 2021).

Historical records and key sightings

In the Mediterranean, rough-toothed dolphins are primarily found in the Ionian Sea and eastern basin (Akkaya et al., 2025; Ryan et al., 2014; Boisseau et al., 2010). The Ionian Sea is a key area for the species, highlighted by the largest recorded global aggregation (approximately 160 individuals, observed in 8 groups of 20 individuals each) observed off Cape Passero in 1987 (Watkins et al., 1987), which suggested the species was a regular Mediterranean inhabitant rather than a rare visitor. Since then, sightings, acoustic detections, and strandings have confirmed the central and western Ionian Sea as a core area of occurrence (Caruso et al., 2019).

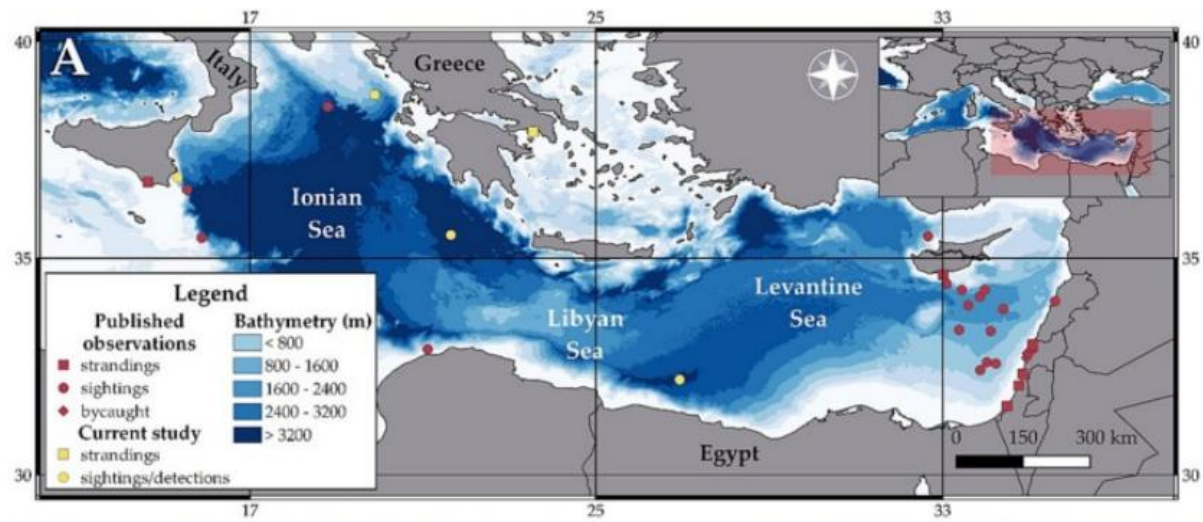


Figure 2-119: Sightings and stranding locations of rough toothed dolphins in the Mediterranean (Source: Foskolos et al., 2023)

Habitat use

Evidence points to seasonal occupation of both shallow coastal waters (Kerem et al., 2012) and deep pelagic environments (Watkins et al., 1987, Kerem et al., 2016, Boisseau et al., 2010, Akkaya et al., 2025) in the Ionian basin. The Ionian Sea, with its complex bathymetry and waters exceeding 1,500 m, is broadly consistent with the species' global preference for deep offshore habitat. Coastal encounters are also reported, particularly where steep submarine slopes bring deep water close to shore, a geomorphological configuration common to parts of the Ionian Sea (Kerem et al., 2016). Foraging ecology is largely unknown in the med for this species, but analysis of stomach contents from a stranding individual in Greece suggest that they feed with epipelagic cephalopods (Foskolos et al., 2023).

Acoustic evidence

Passive acoustic monitoring has substantially contributed to documenting the species in the Ionian Sea. Broad-spectrum clicks and whistles at frequencies of 3-12 kHz, and whistle sequences lasted about 0.5 sec (Watkins et al., 2017). In more recent years, a rough-toothed dolphin sighted offshore eastern Sicily in July 2017 provided acoustic data that were compared with recordings from the same area made in 1987 by Watkins et al. Automated detection algorithms identified distinctive echolocation click patterns and recurring whistle contour shapes across both datasets, strongly suggesting site fidelity or repeated use of the area by this species over three decades (Caruso et al., 2019).

Conservation context

Despite containing some of the Mediterranean's most important records, the offshore Ionian Sea remains poorly monitored. Limited survey effort, possible misidentification with bottlenose dolphins, and low population density limits knowledge of the species in the area. Key threats include bycatch (Kerem et al., 2012), underwater noise, chemical pollution, and plastic ingestion (Foskolos et al., 2023), consistent with pressures documented across the eastern Mediterranean (Kerem et al., 2016).

2.4.5.10 Mediterranean monk seal (*Monachus monachus*)

The Mediterranean Monk Seal (*Monachus monachus*) is the sole pinniped inhabiting the Mediterranean Sea. Globally assessed as Vulnerable under the IUCN Red List, the total number of mature individuals is currently estimated to be between 444 and 600 (Karamanlidis et al., 2023, as cited in Gradella, 2024). Historically widespread across the Mediterranean, Black Sea, and North Atlantic coasts, the species has experienced severe population fragmentation due to centuries of human persecution and habitat degradation (Johnson & Lavigne, 1999b, as cited in Gradella, 2024; Gradella, 2024). Today, the species is confined to three main subpopulations located in the Cabo Blanco peninsula, the Madeira archipelago, and the Eastern Mediterranean basin (Karamanlidis et al., 2015, as cited in Gradella, 2024).

In the Eastern Mediterranean, the species finds refuge along the coastlines of Greece and Turkey, particularly within the Aegean and Ionian Seas (Güçlüsoy et al., 2004, as cited in Gradella, 2024). Greece hosts the largest and most significant portion of the global population, with estimates ranging between 337 and 450 individuals (Karamanlidis, 2024a, as cited in Gradella, 2024). The complex coastal morphology of these areas, featuring numerous isolated marine caves, provides the necessary secluded environments for the seals to rest, pup, and avoid human disturbance (Dendrinos et al., 2007a, as cited in Gradella, 2024).

Although Mediterranean Monk Seals are primarily coastal animals that rely heavily on terrestrial caves (Gradella, 2024), the broader pelagic waters of the Ionian Sea function as an important transit and potential foraging corridor.

The Spot the Monk Observatory, an interactive monitoring project by the University of Milano-Bicocca, tracks the critically endangered Mediterranean monk seal using non-invasive environmental DNA (eDNA) from seawater samples (Valsecchi et al., 2023, as cited in Gradella, 2024). Out of 412 water samples analyzed across the Mediterranean since 2018, 144 samples (34.9%) showed molecular evidence of the species' presence (Valsecchi et al., 2023, as cited in Gradella, 2024). This indicates that over one-third of the tested areas detected monk seal DNA, highlighting that these marine mammals are actively using and recolonizing wider areas of the Mediterranean than previously thought (Gradella, 2024), as detailed in the Spot the Monk Observatory eDNA distribution map (Figure 2-120).

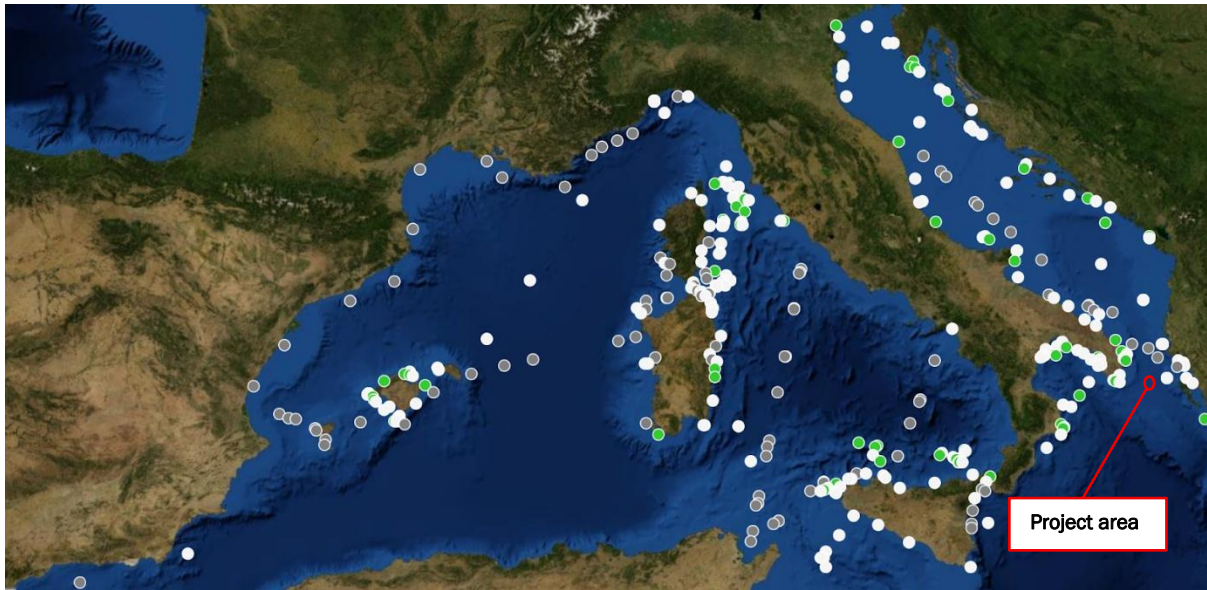


Figure 2-120: Spot the Monk Observatory eDNA distribution map, green dot: positive, white dot: negative, grey dot: to be analysed (Source: University of Milano-Bicocca Spot the Monk observatory – Spot the Monk observatory, accessed in May 2026)

Based on eDNA collections gathered between 2020 and 2021, researchers were able to pinpoint six distinct “hot-spots” of Mediterranean Monk Seal presence (Gradella, 2024). As presented in Figure 2-121, five of these concentration zones are located in Italy, specifically the upper Adriatic (between Istria and the Venice Lagoon), the Salento-Gulf of Taranto (adjacent to the project area), the smaller Sicilian islands, eastern Sardinia-Capreria Canyon, and the Tuscan Archipelago, with one additional hotspot in the Balearic Archipelago (Gradella, 2024).

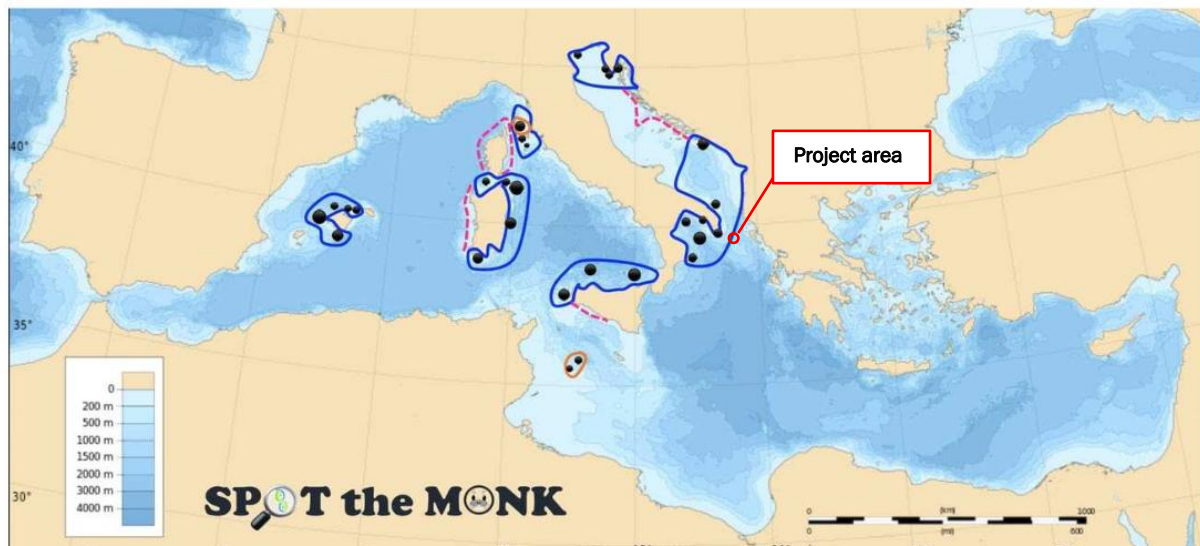


Figure 2-121: Map showing the sightings of *Monachus monachus* between 2015 and 2024. The color coding has been selected in respect of the year of the sighting: 2015: purple, 2016: blue, 2017: burgundy, 2020: green, 2021: yellow, 2022: orange, 2023: violet (Source: Gradella, 2024)

To verify these molecular traces, a comprehensive database of visual sightings, camera trap footage, and stranding records was compiled for the period between 2015 and 2024, confirming multiple encounters along the Italian Ionian and Adriatic coasts, such as in Apulia and Calabria (Gradella, 2024). When the geographic distribution of these recent sightings (Figure 2-122) is compared to the eDNA map, the locations of the Italian sightings align almost perfectly with the identified molecular hotspots (Gradella, 2024). This strong coherence underscores the reliability of the data and emphasizes the critical importance of these local marine areas for the conservation and potential recolonization of the species (Gradella, 2024).



Figure 2-122: Map showing the sightings of *Monachus monachus* between 2015 and 2024. The color coding has been selected in respect of the year of the sighting: 2015: purple, 2016: blue, 2017: burgundy, 2020: green, 2021: yellow, 2022: orange, 2023: violet. (Source: Gradella, 2024)

2.4.5.11 Cetacean habitat in the Mediterranean / Ionian

Table 2-31 presents the habitat preferences and ecological predictors of key cetacean species in the Ionian Sea, with species distributions largely driven by depth-related prey availability. Depth, slope gradient, and the presence of submarine canyons are important factors in determining species distribution across the Ionian Sea. Deep-diving cetaceans (sperm whales and Cuvier's beaked whales), alongside Risso's dolphins, display a strong positive association with steep continental slopes, shelf edges, and submarine canyons. These topographical features act as foraging grounds for their primary prey, which consists of mesopelagic and bathypelagic cephalopods. While the common bottlenose dolphin is typically associated with the shallow continental shelf (0–200 m), the Ionian Sea presents an exception where this species' occurrence peaks at depths of 500–1,000 m along steep slope channels, such as those found in the Gulf of Taranto.

Oceanographic parameters such as Sea Surface Temperature (SST) and Chlorophyll-a concentrations can also define pelagic habitats. The spatial distribution of the fin whale (*Balaenoptera physalus*) can be driven by surface Chlorophyll-a and thermal fronts, which concentrate their primary prey, krill (*Meganyctiphanes*

norvegica), in deep offshore waters. The rough-toothed dolphin (*Steno bredanensis*) is primarily pelagic and tends to show a positive association with the warmer deep oceanic waters of the eastern basin and the Ionian Sea. Other species, like the short-beaked common dolphin, display coastal proximity that can be driven by the availability of small pelagic fish, such as sardines. The combination of steep bathymetry, oceanographic fronts, and specific prey availability generally allows the Ionian Sea to support multiple cetacean species with different ecological niches.

Table 2-31: Habitat preferences and ecological predictors for key cetacean species in the Ionian Sea

VARIABLE	FIN WHALE	SPERM WHALE	CUVIER'S BEAKED WHALE	RISSO'S DOLPHIN	STRIPED DOLPHIN	SHORT-BEAKED COMMON DOLPHIN	BOTTLENOSE DOLPHIN	ROUGH-TOOTHED DOLPHIN	KEY SOURCES
Depth	Strong positive; deep offshore pelagic	Strong positive; slope and deep waters (600 - 3000 m) for foraging on meso/bathypelagic cephalopods	Strong positive; deep waters 200 - 2000 m, peak 750 -1400 m	Strong positive; 500-2500 m, peak on continental slope	Primary predictor; pelagic, >200 m, optimal 200 - 2000 m	bimodal; shallow and deep	Strong positive on shelf (0 to 200 m); Ionian exception with peak 500 - 1000 m; declines sharply beyond 200 m	Strong positive with deep oceanic water	FW: Druon et al. 2012, Panigada et al. 2008, Plard 2025 SW: Praca 2009, Tepsich 2014, Azzellino 2008 CBW: Azzellino 2008, Moulins 2007, Canadas 2018 RD: Azzellino 2008, Canadas 2002, Chicote 2023 SD: Azzellino 2020, Carlucci 2016 CD: Canadas 2002, Canadas & Hammond 2008, Moulins 2018 BD: Bellingeri 2025, Bearzi 2008, Fontanesi 2024 RTD: Kerem 2021, Kerem 2016, Akkaya 2025
Slope gradient	Moderate positive; deep slope areas preferred over inner shelf; slope retained alongside bathymetry, aspect and SST gradient	Strong positive; steep slopes are consistent, canyon-associated	Strong positive; steep slope and canyon; primary topographic predictor with depth	Strong positive; defining habitat feature; canyon walls and upper-mid slope	continental slope 200-1000 m	weak; secondary predictor, less slope-dependent than deep-water species	Strong positive near shelf break; steep slopes channel distribution (e.g. Gulf of Taranto)	Not directly quantified	FW: Panigada et al. 2008, Druon et al. 2012 SW: Azzellino 2008, Tepsich 2014, Praca 2009 Pirrotta 2011 CBW: Azzellino 2008, Canadas 2002, Tepsich 2014 RD: Azzellino 2008, Canadas 2002, Chicote 2023 SD: Azzellino 2020, Carlucci 2016 CD: Canadas 2002, Azzellino 2008 BD: Bellingeri 2025, Fanizza 2018, La Manna 2023 RTD: Kerem 2016, Akkaya 2025
Distance from shelf edge / coast	Offshore	Positive (proximity to shelf edge); also uses deep abyssal waters - dual habitat use	Positive (proximity); peaks near shelf edge and slope break	offshore-slope, but inshore where canyons approach the coast	Greater distance from shelf break = higher occurrence; offshore >5 km from coast	Strong positive coastal proximity; consistently neritic to upper slope	Positive; generally, within or near continental shelf; coastal bias in semi-enclosed basins	Strongly offshore	FW: Druon et al. 2012, Panigada et al. 2005 SW: Tepsich 2014, Praca 2009, Fiori 2014 CBW: Moulins 2008, Canadas 2018, Canadas 2002 2018 RD: Chicote 2023, Azzellino 2016, Fanizza 2018 SD: Azzellino 2020 CD: Canadas & Hammond 2008, Bearzi 2003 BD: Bellingeri 2025, Bearzi 2008, La Manna 2023 RTD: Kerem 2021, Kerem 2016, Akkaya 2025

VARIABLE	FIN WHALE	SPERM WHALE	CUVIER'S BEAKED WHALE	RISSO'S DOLPHIN	STRIPED DOLPHIN	SHORT-BEAKED COMMON DOLPHIN	BOTTLENOSE DOLPHIN	ROUGH-TOOTHED DOLPHIN	KEY SOURCES
Sea surface temperature (SST)	Significant; preference for cooler waters, SST gradient (fronts), warming linked to habitat shifts	indirect; SST fronts and subsurface SST variability as productivity proxies	indirect; broad thermal range; frontal as indirect proxy	indirect; seasonal signal; long-term SST shifts linked to abundance changes	Important dynamic predictor; broad tolerance 10 to 28 °C	Significant negative; rising SST contracts suitable habitat - climate concern	Mixed / seasonally negative; occurrence and group size decline as SST rises in summer	Strong positive with warm water restricts species to eastern basin / Ionian Sea	SW: Drouot & Gannier 2007, Lerebourg 2023, Praca 2009 FW: Panigada et al. 2008, Plard 2025, CBW: Lanfredi 2016, Canadas 2018, RD: Azzellino 2016, Azzellino 2012, Canadas 2018 SD: Azzellino 2020 CD: Canadas & Hammond 2008, Bearzi 2003 BD: Fontanesi 2024, La Manna 2023, Scianna 2023 RTD: Kerem 2021, Kerem 2016, Akkaya 2025
Chlorophyll-a	Strong positive; surface Chl-a (favourable range) and the Chl-a horizontal gradient (fronts) are the core productivity predictors of feeding habitat; concentrates whales on krill-rich fronts	indirect; lagged Chl-a more relevant	indirect	indirect; long-term Chl-a decline linked to abundance decline	Moderate Chl-a associated with forage fish and cephalopod prey	Strong positive; most consistent positive predictor - productive coastal/upwelling waters	Strong positive	concentrated in oligotrophic Levantine Basin	SW: Lerebourg 2023, Praca 2009, Azzellino 2012 FW: Druon et al. 2012, Plard et al. 2024, Panigada et al. 2008 CBW: Lanfredi 2016, Azzellino 2012, Canadas 2018 RD: Azzellino 2016, Azzellino 2012, Tepsich 2014 SD: Azzellino 2020 CD: Canadas & Hammond 2008, Moulins 2018 BD: Soster 2025, La Manna 2023 RTD: Kerem 2021, Kerem 2016
Submarine canyon presence	Indirect / structural rather than obligate; not a primary feature, but canyon-rich Gulf of Lion and Ligurian slope generate the fronts and krill aggregations that drive feeding habitat	Strong positive; canyons a primary feature with depth	Strong positive; canyons	positive; canyons	(not reported as distinct variable; mesoscale fronts/eddies emphasised instead)	Weak / not a primary feature			FW: Plard et al. 2024, Druon et al. 2012, NW Med Slope-Canyon IMMA factsheet SW: Azzellino 2008, Tepsich 2014, Mussi 2014 CBW: Azzellino 2008, D'Amico 2003, Canadas 2018 RD: Chicote 2023, Fanizza 2018, Rosso 2025 CD: Azzellino 2008, Canadas 2002, Moulins 2018 RTD: Kerem 2016, Akkaya 2025, Kerem 2021
Prey / fish availability	Krill (Meganctiphanes norvegica) is the dominant prey	meso/bathypelagic cephalopods	meso/bathypelagic cephalopods	meso/bathypelagic cephalopods	-	small pelagic fish; sardines	opportunistic feeder; distance from fisheries	medium-sized cephalopods	FW: NW Med Slope-Canyon IMMA factsheet, Plard et al. 2024, Druon et al. 2012 BD: Bearzi 2008, Fanizza 2018 RTD: West 2011, Foskolos 2023, Kerem 2016 CD: Giannoulaki 2017

VARIABLE	FIN WHALE	SPERM WHALE	CUVIER'S BEAKED WHALE	RISSO'S DOLPHIN	STRIPED DOLPHIN	SHORT-BEAKED COMMON DOLPHIN	BOTTLENOSE DOLPHIN	ROUGH-TOOTHED DOLPHIN	KEY SOURCES
Ocean currents / fronts	Strong positive; thermal and chlorophyll fronts (SST gradient, Chl-a gradient) and eddy kinetic energy retained in best models - fronts concentrate krill	closer to SST fronts	-	-		-	-	-	FW: Panigada et al., 2024, Druon et al. 2012, Cotte 2011 SW: Gannier 2008
Small-scale fishery / nets	-	-	-	-	-	-	Positive; probability of occurrence rises with likelihood of net presence	-	BD: La Manna 2023

2.4.6 Sea turtles

The Mediterranean Sea supports local populations of both the Loggerhead sea turtle (*Caretta caretta*) and the green sea turtle (*Chelonia mydas*) (Papazekou et al., 2024). Globally, *Caretta caretta* is listed as Vulnerable (IUCN Red List, last assessed in 2015), but its Mediterranean subpopulation is assessed as Least Concern. *Chelonia mydas* is classified globally as Least Concern (IUCN Red List, 2024), whereas the Mediterranean subpopulation is assessed as Near Threatened in the IUCN-SSC Marine Turtle Specialist Group Regional Red List assessment (2022).

The sandy shores of the Ionian Sea host nesting populations of loggerhead sea turtles (Casale et al., 2018). Across the Mediterranean, an estimated 8,000 loggerhead clutches are laid annually, predominantly in the Eastern Mediterranean, especially in Greece (see Figure 2-123) (Hochscheid et al., 2019). Beyond the breeding and nesting season, the eastern Ionian Sea serves as a year-round foraging and developmental habitat for both species across life stages, including males, juveniles, and sub-adults (Papazekou et al., 2024). While the green turtle's breeding areas are confined to the easternmost Mediterranean, primarily Cyprus and Turkey, where more than 2,200 clutches are laid each year, the species utilizes the marine habitats of the eastern Ionian Sea and potentially the southern Adriatic as foraging grounds (Casale et al., 2018; Papazekou et al., 2024; Hochscheid et al., 2019). In addition to the resident species, non-breeding turtles from the Atlantic frequently enter the Mediterranean as visitors, including loggerhead, green, Kemp's ridley, and olive ridley turtles (Hochscheid et al., 2019). Regarding leatherback turtles (*Dermochelys coriacea*), they are regularly observed throughout the basin, including as far east as the Levantine coast (Hochscheid et al., 2019). These are generally large juveniles and adults of both sexes, but no nesting by this species has ever been confirmed in the Mediterranean (Hochscheid et al., 2019).

Table 2-32 presents the sea turtle species with geographic ranges overlapping the immediate project area, based on IUCN spatial data, together with their global IUCN conservation status and protection status.

Table 2-32: Sea turtle species recorded in the Mediterranean Sea, their IUCN conservation status, occurrence in the immediate project area based on IUCN spatial data, and protection under relevant national and international legislation and conventions

SCIENTIFIC NAME	COMMON NAME	IUCN RED LIST CATEGORY GLOBAL	DATE ASSESSED IUCN GLOBAL	PRESENCE IN THE IMMEDIATE PROJECT AREA BASED ON IUCN SPATIAL DATA	HABITAT AND ECOLOGY BASED ON IUCN	EU HABITATS DIR.	ACCOBAMS, SPA/BD PROTOCOL	BCCEW	CITES	CMS	UNCLOS	PRESIDENTIAL DECREE 67/81
<i>Caretta caretta</i>	Loggerhead Turtle	VU	2015	Extant (Breeding)	Marine Neritic, Marine Oceanic, Marine Intertidal	Annexes II & IV	Annex II	Appendix II	Appendix I	Appendices I and II		*
<i>Chelonia mydas</i>	Green Turtle	LC	2024	Extant (Resident)	Marine Neritic, Marine Oceanic, Marine Intertidal, Marine Coastal/Supratidal	Annexes II & IV	Annex II	Appendix II	Appendix I	Appendices I and II		*
<i>Dermochelys coriacea</i>	Leatherback Turtle	VU	2013	Extant (Resident)	Marine Oceanic, Marine Intertidal, Marine Coastal/Supratidal	Annex IV	Annex II	Appendix II	Appendix I	Appendices I and II		*

- IUCN Red List categories identifying which species are Critically Endangered (CR), Endangered (EN), Vulnerable (VU), or Least Concern (LC)

Source for the above table in terms of the protection status to IUCN (2023). The conservation status of cetaceans in the Mediterranean Sea: trends and changes after a decade of conservation efforts. Gland, Switzerland: IUCN <https://portals.iucn.org/library/sites/library/files/documents/RL-262-005-En.pdf>

- European Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Flora and Fauna (**EU Habitats Directive**). All cetacean species are listed on Annex IV (Strict protection of species) of the Habitats Directive. This Directive requires effective measures to prevent the negative impact of fishing activities (primarily as bycatch, the incidental capture of cetaceans) on cetaceans, with monitoring requirements and catch thresholds set ensuring compliance. The Directive also requires effective measures to prevent the negative impact of shipping on cetaceans (ship strikes and underwater noise).

- Agreement on the Conservation of Cetaceans in the Black Sea, Mediterranean Sea and contiguous Atlantic area (**ACCOBAMS**). ACCOBAMS was created under the auspices of the Bonn Convention. Numerous research initiatives and conservation actions are undertaken under the auspices of ACCOBAMS, including the ACCOBAMS Survey Initiative (ACCOBAMS, 2021b), whose findings greatly contributed to the recent Red List reassessments.
- Convention on the Conservation of European Wildlife and Natural Habitats (**BCCEW**, or the Bern Convention).
- Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (**Barcelona Convention**), with the Mediterranean Action Plan (MAP) and the Protocol Concerning Specially Protected Areas and Biological Diversity of the Barcelona Convention (Mediterranean region) (SPA Protocol).
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (**CITES**).
- Convention on the Conservation of Migratory Species of Wild Animals (**CMS**, or the Bonn Convention). All the assessed Mediterranean cetacean subpopulations are included in the CMS Appendices (Appendix I – Endangered migratory species, and Appendix II - Migratory species conserved through Agreements), with the exception of the Long-finned pilot whale and the Rough-toothed Dolphin.
- Recommendation **GFCM/36/2012/2** on the mitigation of incidental catches of cetaceans in the General Fisheries Commission for the Mediterranean (GFCM) area of application <https://faolex.fao.org/docs/pdf/mul201488.pdf>
- **UNCLOS** (United Nations Convention on the Law of the Sea https://www.un.org/depts/los/convention_agreements/texts/unclos/unclos_e.pdf), εἰδη του Annex I. Highly migratory species από το https://www.un.org/depts/los/convention_agreements/texts/unclos/annex1.htm

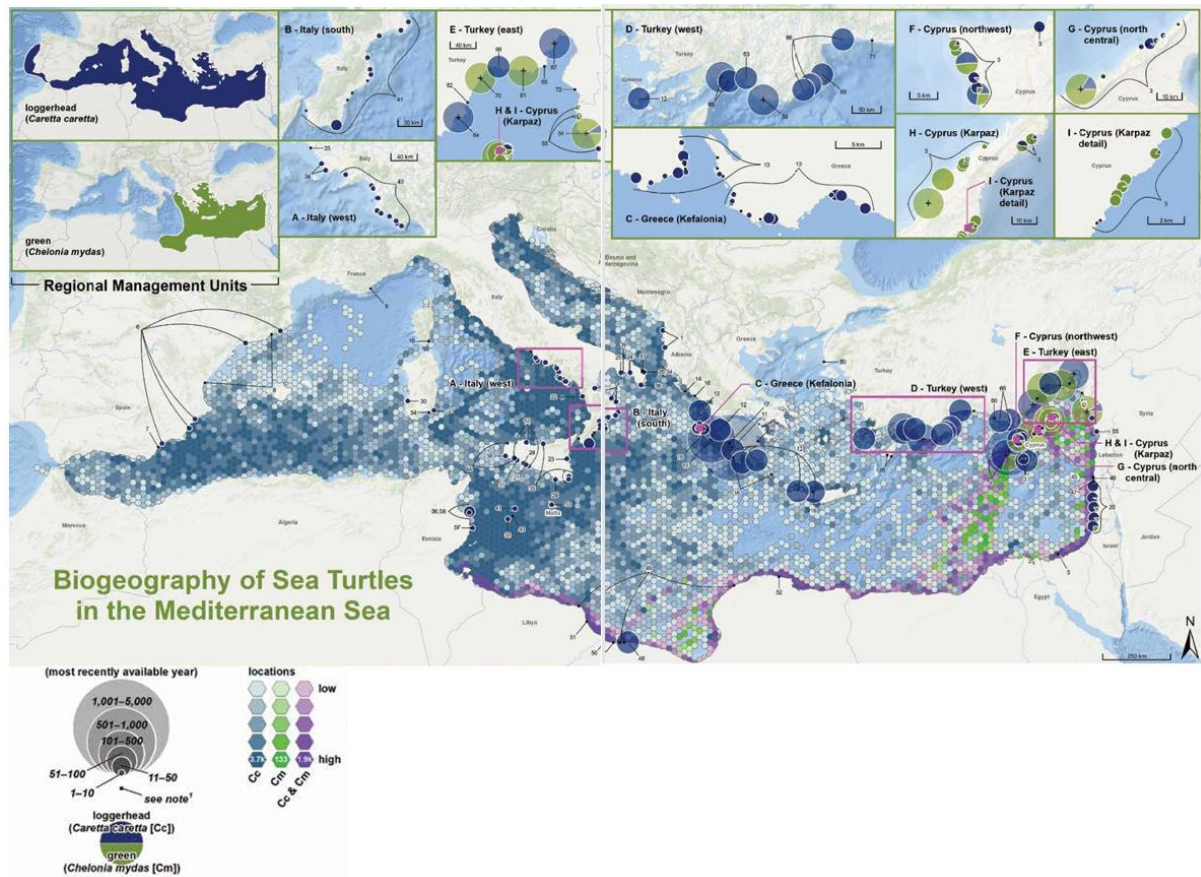


Figure 2-123: Biogeography of Sea Turtles in the Mediterranean Sea (Source: Hochscheid et al., 2019) Description:
Map displaying 216 nesting sites, 316 satellite telemetry tracks, and modelled foraging areas for loggerhead turtles across the Mediterranean basin

In the broader Mediterranean Sea, adult sea turtles of both species exhibit distinct spatial ecology, relying heavily on neritic habitats (continental shelves conventionally delimited by the 200 m isobath) for foraging and wintering (Casale et al., 2018). Relative abundance data derived from tracking and fishery catch rates highlight the most frequented neritic foraging grounds for the loggerhead turtle as the Tunisian shelf, the Adriatic Sea, and the easternmost parts of the Levantine Basin off the coasts of Turkey, Syria, and Egypt (Casale, 2011; Casale et al., 2012e, as cited in Casale et al., 2018). The green turtle primarily forages and winters in the eastern Mediterranean, particularly along the coasts of Libya, Turkey, Cyprus, Syria, Israel, and Egypt (Stokes et al., 2015, as cited in Casale et al., 2018). A synthesis of these identified neritic foraging and wintering sites for both species is presented in Figure 2-124 (Casale et al., 2018).

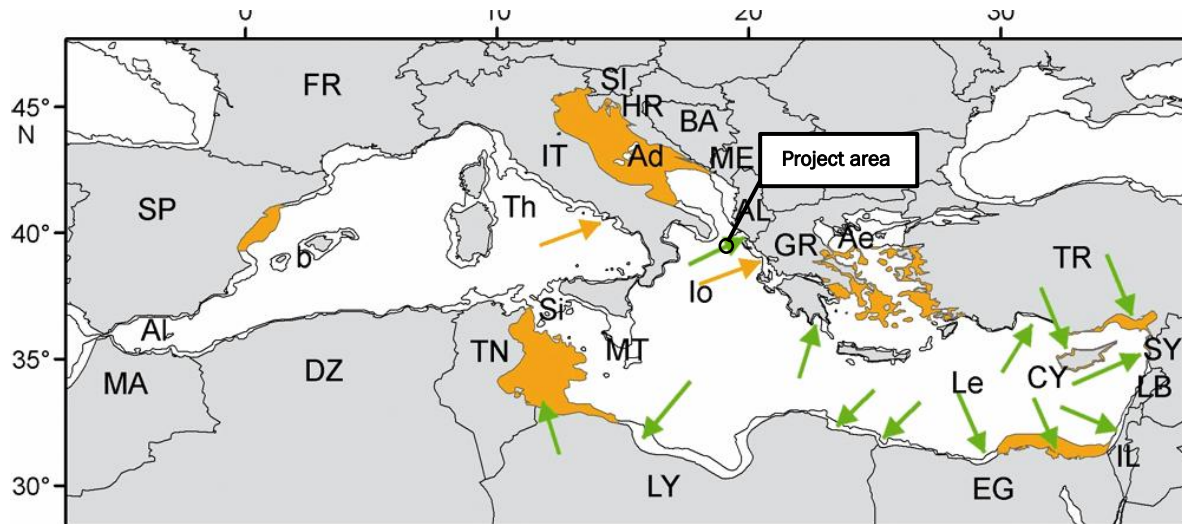


Figure 2-124: Neritic foraging and wintering sites for loggerhead turtles *Caretta caretta* (orange areas and arrows) and green turtles *Chelonia mydas* (green arrows). Neritic areas correspond to the continental shelves, which are conventionally delimited by the 200 m isobath (solid line) (Source: Casale et al., 2018)

The migratory pathways and habitat utilization of sea turtles in the region have been documented through satellite telemetry projects conducted by ARCHELON “The sea turtle protection society in Greece”. Tracking data collected between 2018 and 2025, including the monitoring of nesting females from Kyparissia Bay and male turtles in the Amvrakikos and Kyparissia Gulfs, show movement patterns across the Ionian and Adriatic Seas (Figure 2-125 and Figure 2-126).

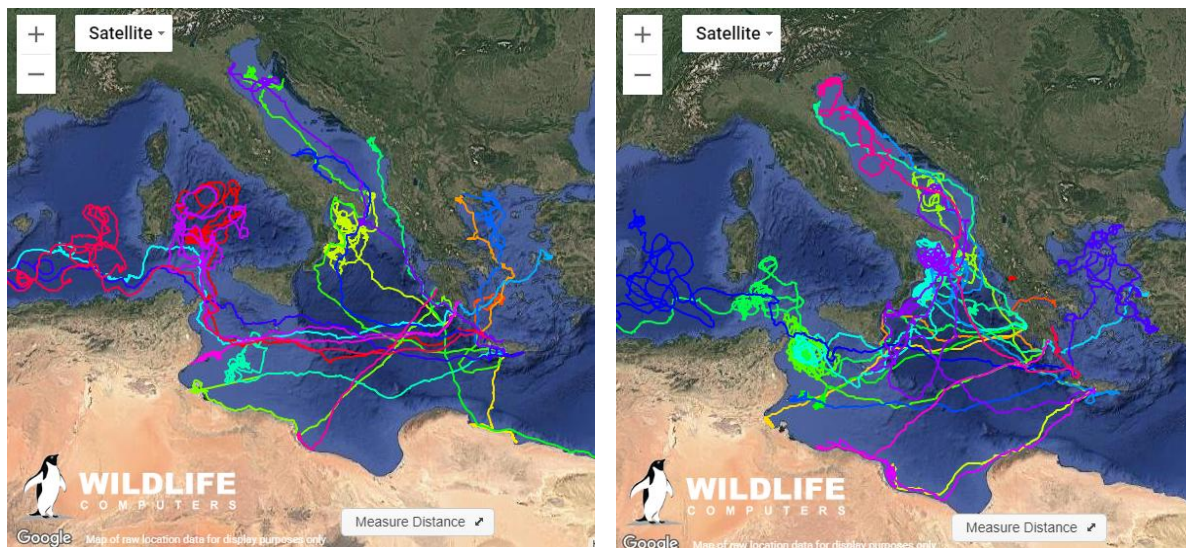


Figure 2-125: Satellite telemetry data showing sea turtle movement in 2025 (left) and 2024 (right) (Source: ARCHELON)

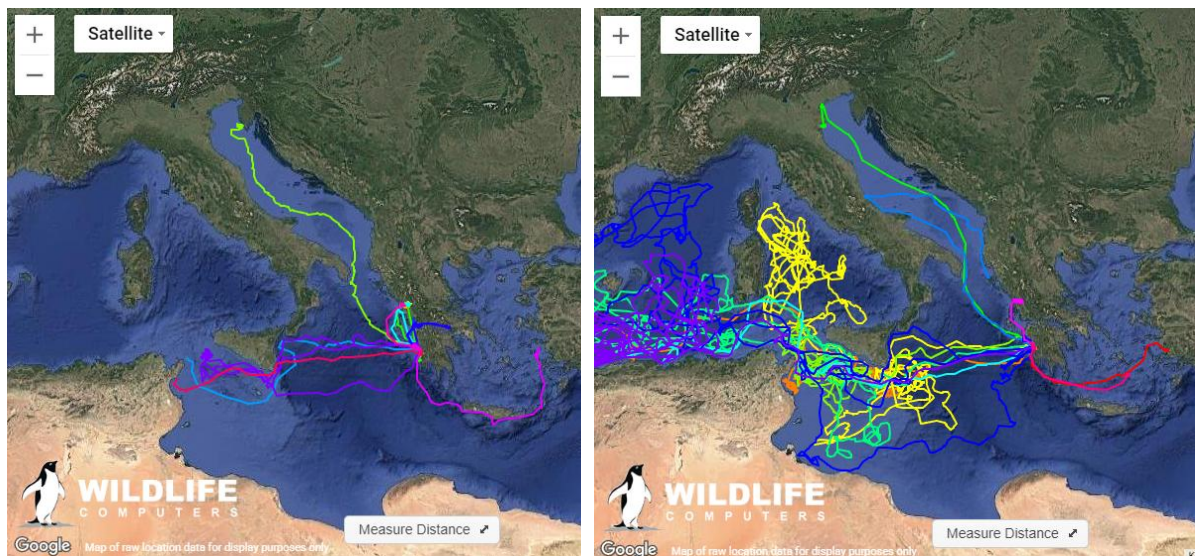


Figure 2-126: Satellite telemetry data showing sea turtle movement during the period 2020 – 2022 (left) and 2019 (right) (Source:ARCHELON)

In addition to the individual movements demonstrated by specific telemetry tracks, broader oceanographic and genetic models confirm that turtles hatching in Greece disperse primarily into the Ionian, south-central Mediterranean, and Adriatic Seas (Casale et al., 2018). For adult loggerhead turtles, the Ionian Sea acts as a critical transit zone. Following the breeding season, loggerheads nesting in Greece undertake specific post-nesting migrations moving north to neritic foraging grounds in the Adriatic Sea during the late summer (Zbinden et al., 2011; Schofield et al., 2013a, as cited in Casale et al., 2018). This considerable inter-basin exchange between the Ionian and Adriatic is funneled through narrow physical passages, most notably the Strait of Otranto (Casale et al., 2018). Because these oceanic and neritic zones in the northern Ionian and southern Adriatic act as major migratory funnels and highly frequented foraging areas, sea turtles here are highly vulnerable to anthropogenic mortality, particularly from incidental catch (bycatch) in regional fisheries (Casale, 2011; Casale et al., 2015, as cited in Casale et al., 2018).

The Italian Tyrrhenian and Adriatic shores provide neritic foraging habitats but are heavily fished, leading to bycatch mortality and high stranding rates, which has necessitated the operation of over 20 sea turtle rescue centers across the country (Hochscheid et al., 2019).

Both species undertake periodic reproductive migrations between their neritic foraging grounds and their respective breeding sites (Casale et al., 2018). Satellite telemetry has revealed that migratory corridors for adult loggerhead turtles (both males and females) are broad when crossing open waters but funnel heavily through narrow physical geographic passages, specifically the Strait of Messina, the Strait of Otranto, and the Sicilian Strait, as mapped in Figure 5 (Zbinden et al., 2011; Schofield et al., 2013a, as cited in Casale et al., 2018). Tracking of adult green turtles has revealed defined migratory pathways predominantly located between Turkey and Egypt, as well as along the northern African coast, highlighted in Figure 6 (Stokes et al., 2015, as cited in Casale et al., 2018). The intersection of these migratory corridors and neritic foraging zones poses a severe conservation challenge, as incidental catch in fisheries (bycatch) operating in these highly frequented oceanic and neritic areas is considered the primary anthropogenic threat to Mediterranean Sea turtles (Casale, 2011, as cited in Casale et al., 2018).

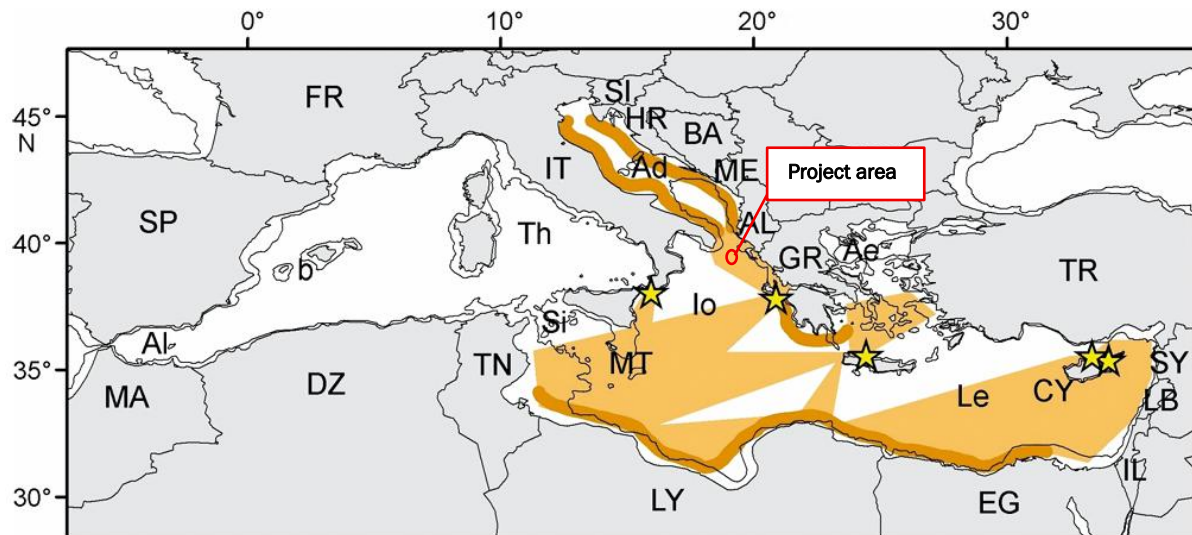


Figure 2-127: Main known migratory corridors for adult loggerhead turtles *Caretta caretta* (females and males) during reproductive migrations from and to the breeding sites (asterisk). Light brown areas represent migratory funnels in the open sea while darker strips represent paths along the coasts, typically in shallow waters. (Source: Casale et al., 2018)

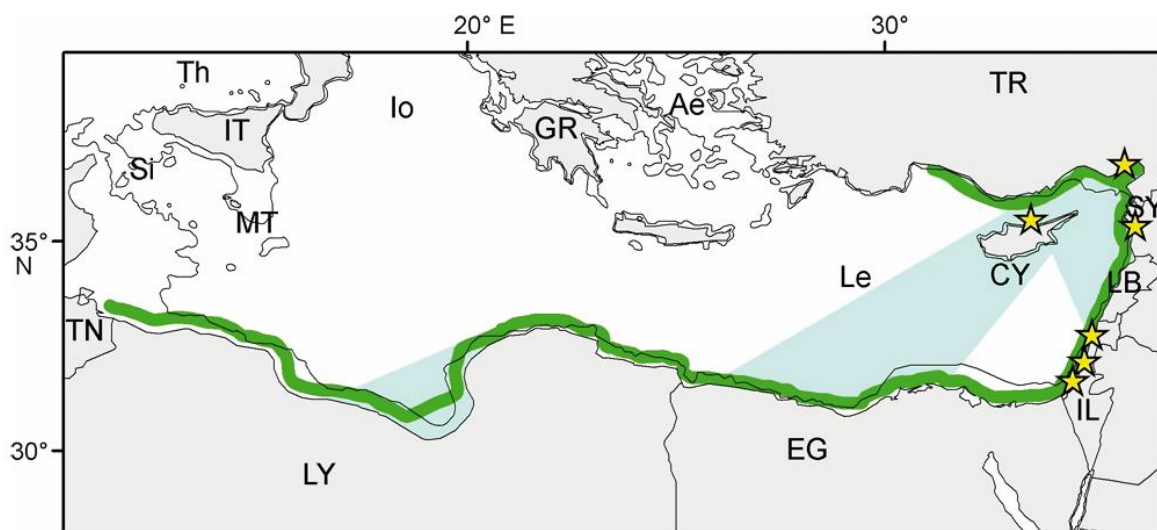


Figure 2-128: Main known migratory corridors for adult female green turtles *Chelonia mydas* during reproductive migrations from the breeding sites (in asterisk). Light green areas represent migratory funnels in the open sea while darker strips represent paths along the coasts, typically in shallow waters. (Source: Casale et al., 2018)

2.4.7 Strandings of marine mammals and sea turtles

Strandings of marine megafauna, including sea turtles, cetaceans, and monk seals, serve as critical indicators of both species' distribution and the extent of anthropogenic pressures in the marine environment.

Across the broader Greek Seas (Aegean, Ionian, and Cretan), a comprehensive dataset recorded 6,591 stranding events for loggerhead (*Caretta caretta*) and 534 for green (*Chelonia mydas*) sea turtles between 2010 and 2021, exhibiting an increasing trend over the years (Figure 2-129) (Despoti et al., 2025). While

the causes for the majority of these strandings remain unknown, approximately 25% of loggerhead and 35% of green turtle strandings showed signs of anthropogenic interactions (Despoti et al., 2025). These interactions primarily include injuries, fishing gear entanglement (such as in longlines and nets), marine litter ingestion, and oil pollution (Despoti et al., 2025). Within the Ionian Sea, specific “hotspot stranding areas” for loggerheads were identified in the Amvrakikos, Kyparissiakos, and Lakonikos Gulfs, as well as Zakynthos Island (Despoti et al., 2025). Furthermore, areas with high rates of fishing gear entanglement included Zakynthos Island, Patraikos, Amvrakikos, and Lakonikos Gulfs (Despoti et al., 2025). Both sea turtle species showed significantly higher numbers of strandings during the summer months (Despoti et al., 2025).

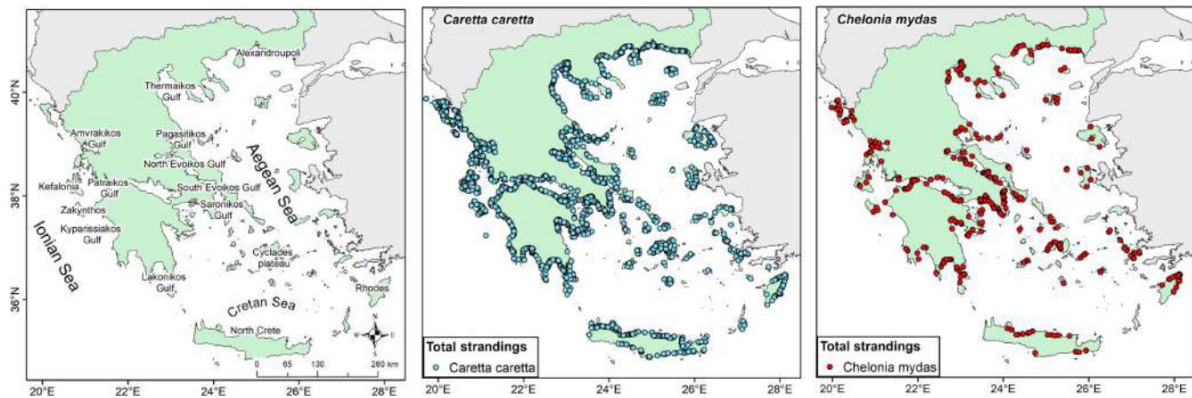


Figure 2-129: Map of toponyms and the location of stranding events for the loggerhead turtle *Caretta caretta* and the green turtle *Chelonia mydas* for the period 2010–2021 (Source: http://arch.her.hcmr.gr/papers/ACMFE35_1-12.pdf)

Focusing on the eastern Ionian Sea, a region overlapping with several Important Marine Mammal Areas (IMMAs) and Cetaceans Critical Habitats (CCHs), a localized database compiled between 2004 and 2021 recorded 1,544 megafauna stranding events (Papazekou et al., 2024). Sea turtles represent the vast majority of these cases (87%), totaling 1,415 incidents, which were predominantly loggerhead turtles alongside 28 records of green turtles (Papazekou et al., 2024). Cetacean strandings accounted for 105 reported incidents during this period, including Cuvier’s beaked whales (*Ziphius cavirostris*), striped dolphins (*Stenella coeruleoalba*), common bottlenose dolphins (*Tursiops truncatus*), short-beaked common dolphins (*Delphinus delphis*), sperm whales (*Physeter macrocephalus*), and one humpback whale (*Megaptera novaeangliae*) (Papazekou et al., 2024). Additionally, 24 strandings of the endangered Mediterranean monk seal (*Monachus monachus*) were recorded (Figure 2-130) (Papazekou et al., 2024). For the vast majority of cetaceans and monk seals in this region, the exact cause of stranding remained unidentified (95% and 88%, respectively), though human-related actions, injuries, and fishing gear interactions were recorded in a fraction of the cases (Figure 2-131) (Papazekou et al., 2024).

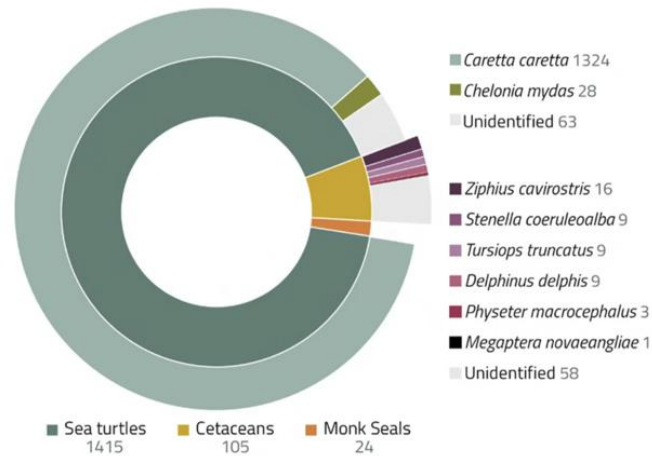


Figure 2-130. Species composition of stranding records in the Ionian Sea, showing the distribution across total records and within individual animal groups (sea turtles, cetaceans)

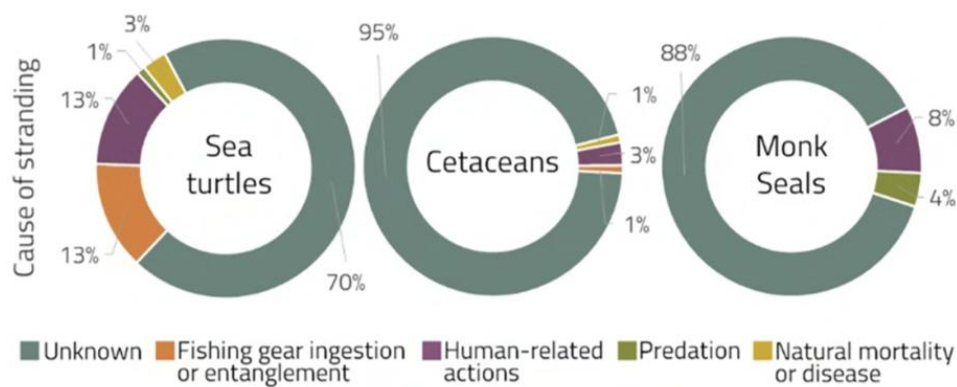


Figure 2-131. Cause of stranding of individuals (below), categorized by animal groups (sea turtles, cetaceans, monk seals)

Spatially, the recorded stranding events exhibit distribution patterns along the coastal zones of the eastern Ionian Sea. The majority of sea turtle strandings are concentrated in the southern Ionian Sea, primarily in the vicinity of Zakynthos, Kefalonia, and Lefkada islands (Figure 2-132) (Papazekou et al., 2024).

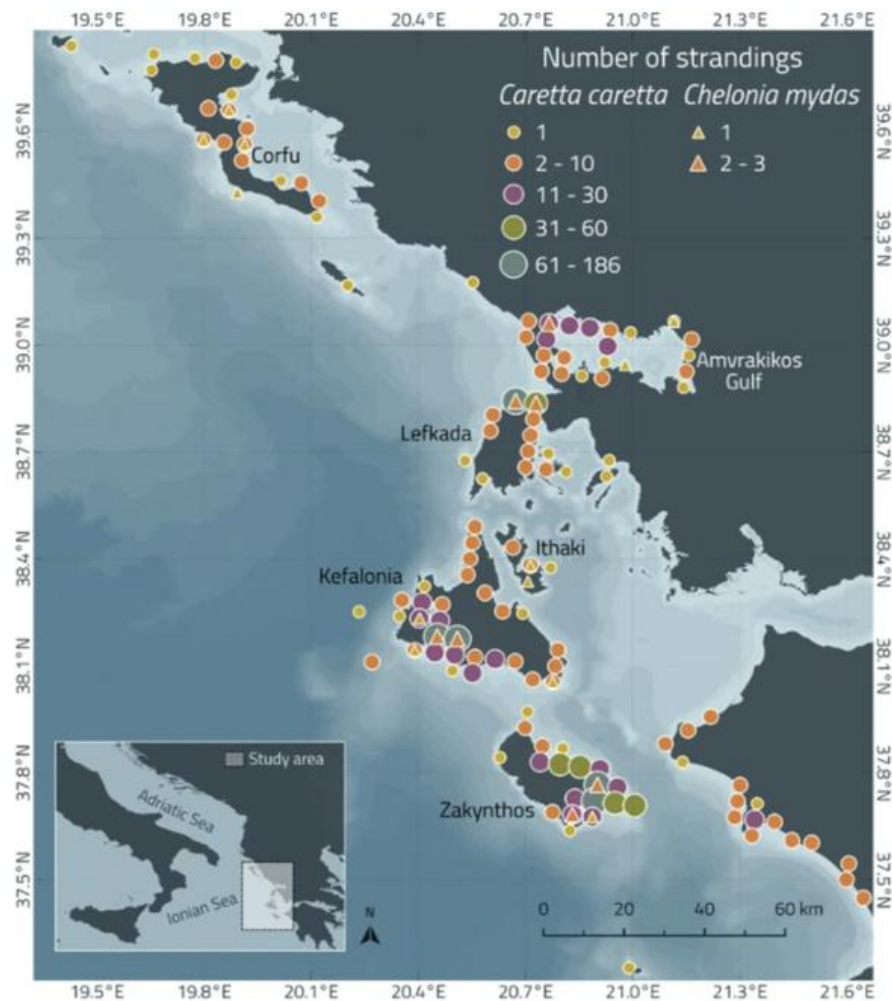


Figure 2-132. Spatial distribution of stranding records for loggerhead (*Caretta caretta*) and green (*Chelonia mydas*) sea turtles in the Ionian Sea. To enhance clarity, stranding records were grouped using a 5 × 5 km grid and the abundance of strandings is depicted by varying dot size and color

Monk seal strandings were predominantly observed near Kefalonia Island (Papazekou et al., 2024). In contrast, stranded dolphins were reported relatively evenly across the entire coastal study area (Figure 2-133) (Papazekou et al., 2024). Whale strandings were notably concentrated along the coasts of Corfu Island (Figure 2-133) (Papazekou et al., 2024). It is important to note that stranding datasets inherently reflect coastal observations, as offshore open-ocean mortalities are difficult to detect, and the probability of a carcass drifting to the shore is highly influenced by seasonal oceanographic conditions and local currents (Papazekou et al., 2024; Despoti et al., 2025). Therefore, while these coastal stranding records confirm the regional presence and vulnerabilities of these species, direct conclusions regarding their exact offshore distribution or their specific spatial relationship to the open-ocean Block 2 area cannot be safely assumed based solely on stranding locations (Papazekou et al., 2024; Despoti et al., 2025).

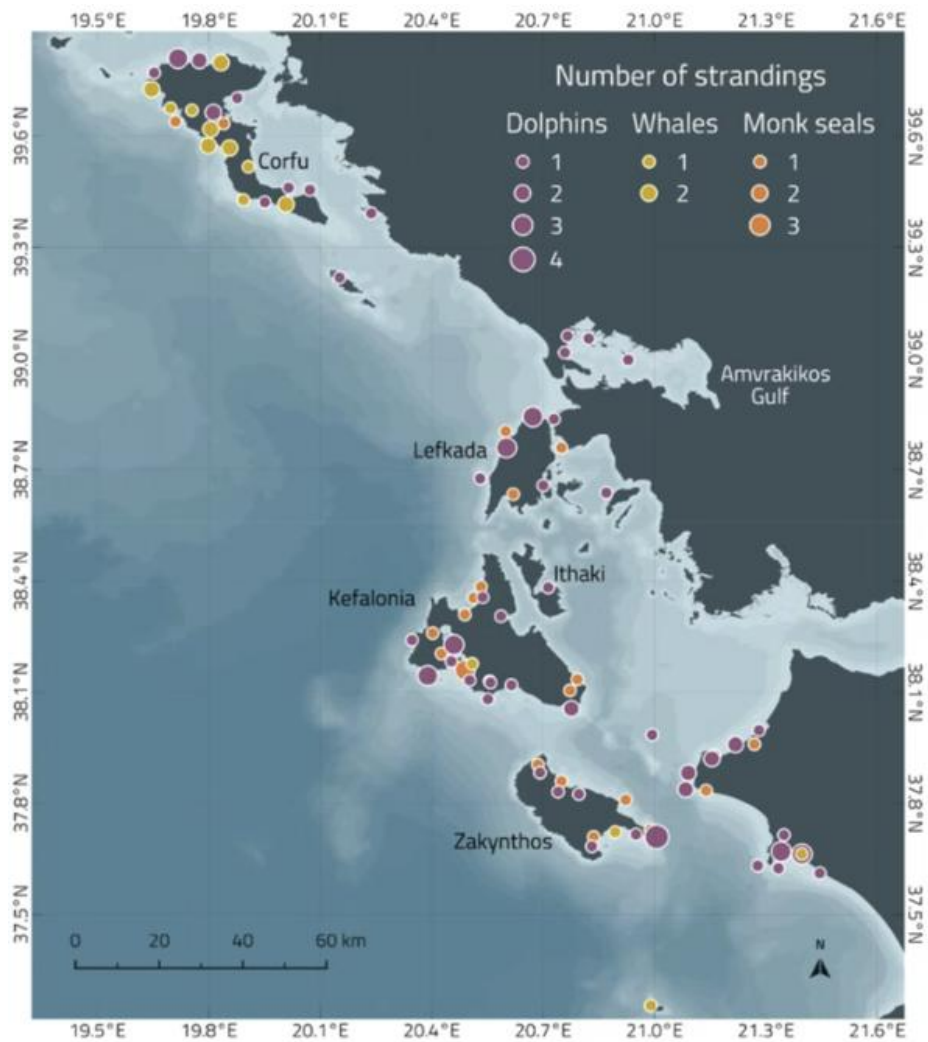


Figure 2-133. Spatial distribution of stranding records for whales (blue dots), dolphins (yellow dots) and monk seals (*Monachus monachus*; red dots) in the Ionian Sea. To enhance clarity, stranding records were grouped using a 5 × 5 km grid and the abundance of strandings is depicted by varying dot size

2.4.8 Birds

The Ionian Sea is located at the central position in the Mediterranean Sea, connecting the Eastern and Western Mediterranean, the Adriatic Sea with the rest of the Mediterranean Sea and together with the Lybian Sea a marine link between the North Africa and the Balkan and the Apennine peninsulas. It is surrounded by an extensive coastline consisting of continental coast and numerous islands and islet that provide vital terrestrial and wetland habitats for the significant populations of bird that reside permanently, breed or winter in the area or traverse it during migration, many of which include threatened species and species of conservation concern (e.g. Portolou et al. 2009, Fric et al. 2012). Although, in general, being highly oligotrophic, with low nutrient and chlorophyll levels, its gulfs (e.g. Amvrakikos Gulf, Patraikos Gulf, Gulf of Corinth) and coastal areas exhibit higher nutrient and chlorophyll levels, mainly due to freshwater and nutrient discharges by the rivers. Therefore, marine areas of the Ionian Sea, especially the northern part of the Ionian provides important foraging areas for seabirds and waterfowl in the area.

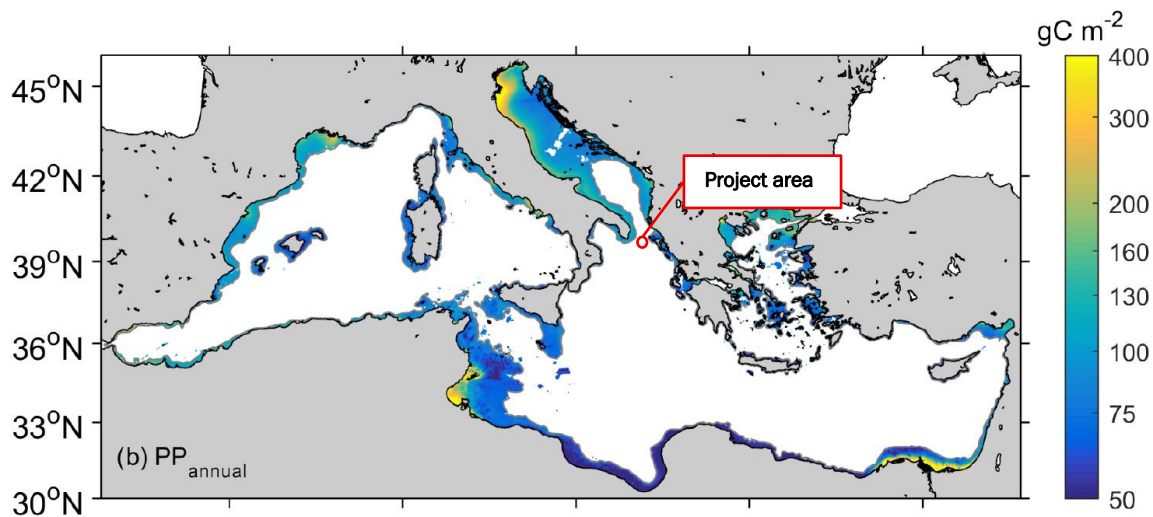


Figure 2-134. Annual primary production in the Mediterranean Sea (Source: Salgado-Hernanz et al. 2022)

The main ornithological importance of the marine and coastal parts of the Northern Ionian Sea include: (A) migratory flyway and stopover sites for migratory birds between Europe and Africa, (B) important breeding and wintering grounds, particularly in the coastal wetlands and river estuaries, for waterbirds, waders, herons and egrets and (C) breeding grounds and foraging areas for pelagic and coastal seabirds. Block 2 is located in the pelagic part of the Northern Ionian Sea, therefore its ornithological importance refers primarily to the pelagic seabird species and migratory birds.

Data availability and knowledge gaps

Despite its importance for avifauna, the available data on birds in the Ionian Sea and particularly in its pelagic regions is very limited. Within the Block 2 area as small number of species were recorded during seismic surveys for the current project in 2022 (ENERGEAN and GeoMar 2022). Outside Block 2 surveys for two other offshore project were conducted in the past, namely Environmental Impact Study for the Messapia offshore wind farm, located west of the current project study area (messapia 2025A, messapia 2025B), and on board visual observations in the Ionian Block Lease, located east of the current project study area (NCC, Mom & Biotopia, 2022, NCC, Mom & Biotopia, 2023 and NCC, Mom & Biotopia, 2024). Additionally, due to the remoteness of the study area, very few records are available from public databases (e.g. GBIF, OBIS, eBird, Observation.org, iNaturalist) and even those refer to opportunistic sightings. Therefore, even though the surveys within the current study did not cover the entire annual cycle, they provide a significant improvement in the knowledge on bird in the study area.

2.4.8.1 Pelagic seabirds

The main species regularly using the pelagic waters of the Northern Ionian Sea include Scopoli's Shearwater (*Calonectris diomedea*), Yelkouan Shearwater (*Puffinus yelkouan*), European Storm-petrel (*Hydrobates pelagicus*), Audouin's Gull (*Larus audouinii*), and Yellow-legged Gull (*Larus michahellis*). The table below (Table 2-33) presents the presence status, habitats of major importance and the seasonal presence of the above seabird species in the Ionian Sea.

Due to very limited ornithological data for the study area, it is not feasible at this point to assess the use of the area by other pelagic and coastal seabird species, which regularly inhabit the Central Mediterranean. The species include Northern Gannet (*Morus bassanus*), Arctic skua (*Stercorarius parasiticus*), Black-legged Kittiwake (*Rissa tridactyla*) and seabirds as Mediterranean Gull (*Larus melanocephalus*), *Larus minutus* (*Hydrocoleus minutus*), as well as other gull and tern species.

Table 2-33: Main pelagic seabird species presence status and major habitats in the Ionian Sea. Marked with bolt are the is the pelagic neritic marine habitats, relevant to the survey area.

SCIENTIFIC NAME	COMMON NAME	PRESENCE STATUS	HABITATS OF MAJOR IMPORTANCE AND THEIR SEASONALITY IN THE IONIAN SEA
<i>Calonectris diomedea</i>	Scopoli's Shearwater	Summer Visitor (breeding)	Marine Oceanic - Epipelagic (0-200m) / Resident, Marine Intertidal - Rocky Shoreline / Breeding Season, Marine Coastal/Supratidal - Sea Cliffs and Rocky Offshore Islands / Breeding Season, Marine Neritic - Pelagic / Resident
<i>Puffinus yelkouan</i>	Yelkouan Shearwater	Resident	Marine Oceanic - Epipelagic (0-200m) / Resident, Marine Neritic - Pelagic / Resident
<i>Hydrobates pelagicus</i>	European Storm-petrel	Rare summer visitor (breeding)	Marine Coastal/Supratidal - Sea Cliffs and Rocky Offshore Islands / -, Marine Neritic - Pelagic / Resident, Marine Neritic - Subtidal Rock and Rocky Reefs / Resident
<i>Larus audouinii</i>	Audouin's Gull	Rare resident	Marine Intertidal - Rocky Shoreline / Resident, Marine Coastal/Supratidal - Sea Cliffs and Rocky Offshore Islands / Breeding Season, Marine Neritic - Pelagic / Resident, Marine Neritic - Subtidal Rock and Rocky Reefs / Resident
<i>Larus michahellis</i>	Yellow-legged Gull	Resident	Marine Intertidal - Rocky Shoreline / Breeding Season, Marine Intertidal - Sandy Shoreline and/or Beaches, Sand Bars, Spits, Etc / Breeding Season, Marine Coastal/Supratidal - Sea Cliffs and Rocky Offshore Islands / Breeding Season, Marine Neritic - Pelagic / Breeding Season, Marine Neritic - Estuaries / Breeding Season, Marine Neritic - Subtidal Rock and Rocky Reefs / Breeding Season, Marine Neritic - Subtidal Loose Rock/pebble/gravel / Breeding Season

Presence status based on Legakis, A. and P. Maragou (2009) *The Red Book of endangered animals of Greece*. Athens, GR : Hellenic Zoological Society. 525pp

Habitats of major importance and their seasonality based on Natural Environment and Climate Change Agency (NECCA) (2024). *The Greek Red List of Threatened Species*. Athens, Greece. Available at redlist.necca.gov.gr, accessed (02/07/2026)

All aforementioned seabird species, apart from the Yellow-legged gull, are species of conservation concern. Yelkouan Shearwater and Audouin's Gull are listed at "Vulnerable" in the European and the global IUCN Red list assessment, while Scopoli's Shearwater, European Storm-petrel and Yellow-legged Gull are listed as "Least Concern". In the Greek national assessment, however, two of the seabird species, European Storm-petrel and Audouin's Gull, are uplisted in comparison to the international assessment, be listed at "Vulnerable" and "Near threatened", respectively. All seabird species, apart from the Yellow-legged gull are listed in the Annex I of the EU Birds Directive and the Appendix II of the Bern Convention, while the Yellow-legged gull is listed in the Appendix III of the Bern Convention. Additionally, Audouin's Gull listed in the Appendices I and II of the Bonn Convention. Furthermore, Audouin's Gull and Yellow-legged gull are listed in the Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA). None of the above seabird species are listed in CITES or the Greek Presidential Decree 67/81. Provided in the table below (Table 2-34). Provides blow are detailed descriptions of the pelagic seabirds' species of conservation concern in the study area: Scopoli's Shearwater (*Calonectris diomedea*), Yelkouan Shearwater (*Puffinus yelkouan*), European Storm-petrel (*Hydrobates pelagicus*) and Audouin's Gull (*Larus audouinii*).

Table 2-34: IUCN Red List threat status and the protection status under relevant national / international legislation and conventions for the main pelagic seabirds species present in the Ionian Sea.

SCIENTIFIC NAME	COMMON NAME	IUCN RED LIST CATEGORY GLOBAL	DATE ASSESSED IUCN GLOBAL	IUCN RED LIST CATEGORY EUROPE	DATE ASSESSED IUCN EUROPE	GR RED LIST	DATE ASSESSED GR RED LIST	TREND IN GREECE	EU BIRDS DIRECTIVE	BERN CONVENTION APPENDIX	BONN CONVENTION APPENDIX	CITES	AEWA
<i>Calonectris diomedea</i>	Scopoli's Shearwater	LC	2018	LC	2021	LC	2023	Stable	Annex I	Appendix II			
<i>Puffinus yelkouan</i>	Yelkouan Shearwater	VU	2018	VU	2021	VU	2023	Decreasing	Annex I	Appendix II			
<i>Hydrobates pelagicus</i>	European Storm-petrel	LC	2018	LC	2021	VU	2023	Unknown	Annex I	Appendix II			
<i>Larus audouinii</i>	Audouin's Gull	VU	2020	VU	2021	EN	2023	Decreasing	Annex I	Appendix II	Appendices I, II		Yes
<i>Larus michahellis</i>	Yellow-legged Gull	LC	2019	LC	2021	LC	2023	Decreasing		Appendix III			Yes

International Union for Conservation of Nature (IUCN) Red List of Threatened Species: Threat categories of extinction risk: Endangered (EN), Vulnerable (VU), or Least Concern (LC). Directive 2009/147/EC of the European Parliament and of the Council on the conservation of wild birds (EU Birds Directive). Annex: I – species and sub-species particularly threatened.

Council of Europe's Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention). Appendix: II - Strictly protected fauna species, III - Protected fauna species

Convention on the Conservation of Migratory Species of Wild Animals (CMS) (Bonn Convention). Appendix: I - Endangered migratory species, II - Migratory species conserved through Agreements

Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA)

2.4.8.1.1 Scopoli's Shearwater (*Calonectris diomedea*)

Scopoli's Shearwater is a pelagic migratory seabird of the order Procellariiformes and one of the most common seabird species of the Mediterranean (NECCA 2024)

Population size and Distribution

The Scopoli's Shearwater spends most of its time at sea and uses land only for breeding. It breeds in the Mediterranean, in Algeria, Croatia, France, Greece, Italy, Malta, Spain (except the Canary Islands), Tunisia and Turkey (NECCA 2024). While the species largest known colony is located on Zembra Island (113,720 – 176,750 pairs, Defos du Rau et al. 2015), other largest national breeding populations are in Greece and in Italy, 8000–11000 pairs (47% of the European population) and 13300–21900 pairs (26% of the European population), respectively (BirdLife International 2021). The majority of the species global population overwinters spends its wintering period in the Atlantic (NECCA 2024), primarily during the period from November to February.

Its largest known colony in Greece is located on Strofades islets which are located south of the Zakynthos Island in the central part of the Ionian Sea. Its colony size has been estimated to be 5,550 pairs (Karris et al. 2017). One more colony of the species in the Ionian Sea is located on Diapontia Islands near Corfu Island in the Northern Ionian Sea. It is located approximately 40 km east from Block 2. Its colony size has been estimated at 60-100 pair (Fric et al. 2012), however this figure is possibly an underestimation because up to 1000 individuals have been recorded in the past rafting in the vicinity of the colony (NCC, Mom & Biotopia 2022). Other colonies in the vicinity of Block 2 are located on Adriatic Tremiti Islands of Caprara and San Domino in Apulia, hosting 100-160 pairs and 200-240 pairs, respectively (Bacetti et al. 2009).

Ecology

Scopoli's shearwaters are migratory and return from their wintering areas back to their breeding areas in late February and March. Egg laying and incubation period lasts from mid-May to early July, chicks hatch in July and fledge in October. They breed on inaccessible coastal cliffs or uninhabited islets in deep crevices and burrows in boulder scree and rocky shores. Before entering the colony at night Scopoli's Shearwaters may form large congregations (rafts) which may consist of several thousand individuals and are generally found up to 5km away from the colony (Fric et al. 2012). They can travel several hundred kilometres per day in search for food. Due to their high mobility and regardless of the colony distribution, large concentrations at-sea ranging from several hundred to few thousand individuals have been recorded at all major fishing grounds in the Aegean and Ionian Sea. Post-breeding dispersal occurs between mid- October and mid-November when birds pass through Gibraltar to the Atlantic Ocean, wintering off the coast of South America and South Africa. Scopoli's Shearwaters from Greece winter in the East Atlantic off the coast of West Africa (Ristow et al. 2000; Karris et al. 2011).

Presence in the study area

Past seabird survey efforts in the wider study area have been very limited and consist of onboard visual observations during offshore seismic surveys during the current project (ENERGEAN & GeoMar 2022), Environmental Impact Study for the Messapia off shore wind farm, located west of the current project study area (messapia 2025A, messapia 2025B), and on board visual observations in the Ionian Block Lease, located east of the current project study area (NCC, Mom & Biotopia, 2022, NCC, Mom & Biotopia, 2023

and NCC, Mom & Biotopia, 2024). Although, the species was not visually recorded during seismic surveys within the study area it was regularly recorded in the Messapia offshore windfarm study area in the west and in the Ionian Block in the east (messapia 2025B, NCC, Mom & Biotopia, 2022, NCC, Mom & Biotopia, 2023 and NCC, Mom & Biotopia, 2024). More specifically, the species was recorded in the wide project area from early spring (March) until autumn (October).

The telemetry data of 10 Scopoli's Shearwaters, equipped with GPS/GSM transmitters, revealed that the main foraging areas of birds on Diapontia Islands are located primarily in the Adriatic, along the Albanian coast and along the western Adriatic coast and that the birds mainly traverse the area of Block 2 on their way towards/from the foraging area (NCC, Mom & Biotopia 2022). Similar foraging patterns have been observed during telemetry survey at the same colony in 2024 (Karagianni et al. 2024) (please see Figures below).

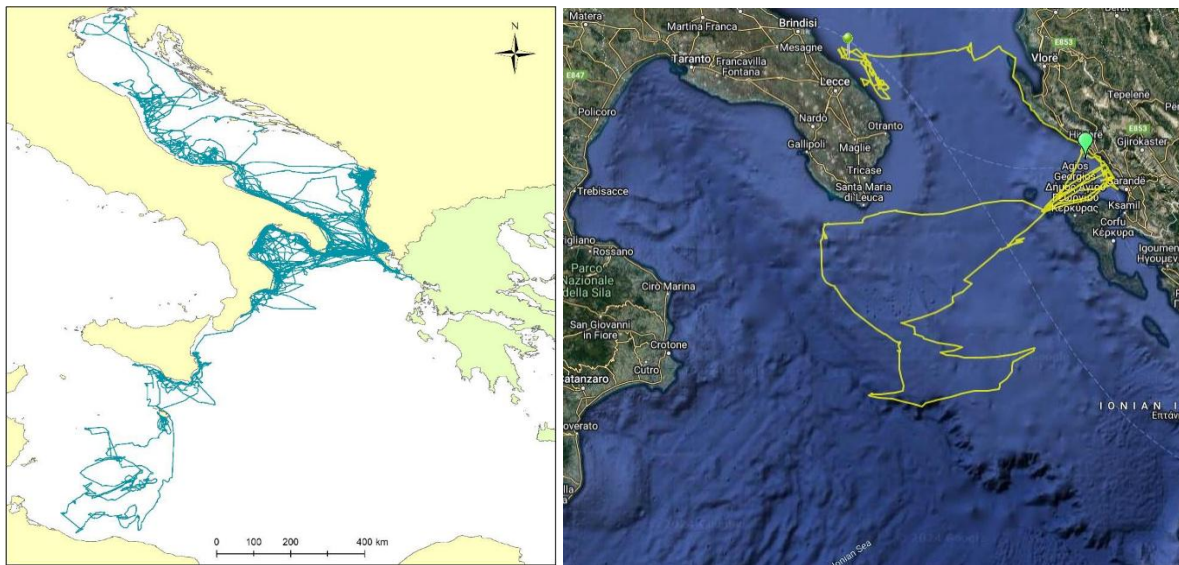


Figure 2-135. Foraging tracks of Scopoli's Shearwaters during the breeding season, tagged on Diapontia islands in 2022 (left) and in 2024 (right) (Source: NCC, Mom & Biotopia 2022, Karagianni et al. 2024)

Based on the geolocation telemetry data, after the breeding season Scopoli's Shearwaters from the Strofades colony in the Ionian Sea migrate through the Straits of Gibraltar to Atlantic Ocean, where they spend their non-breeding season (Karris et al. 2011).

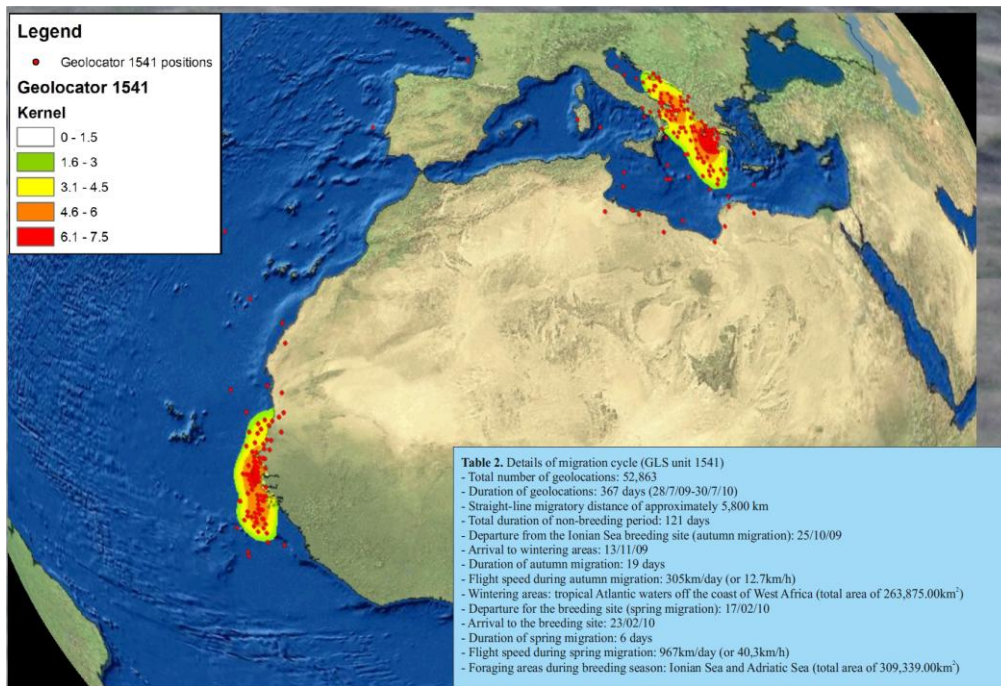
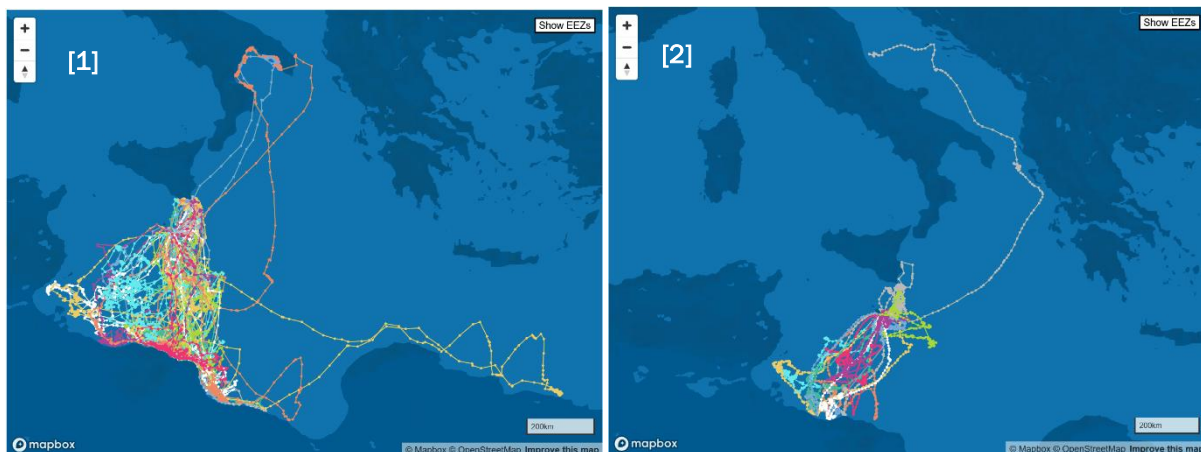


Figure 2-136. Scopoli's shearwater wintering dispersal and foraging area during the breeding season from a single individual that bred on Strofades, based on geolocator data (Source: Karris et al. 2011)

GPS telemetry data has shown that individuals breeding in colonies on Malta and in the Adriatic occasionally traverse the area of Block 2, however their main foraging areas are located outside Block 2.



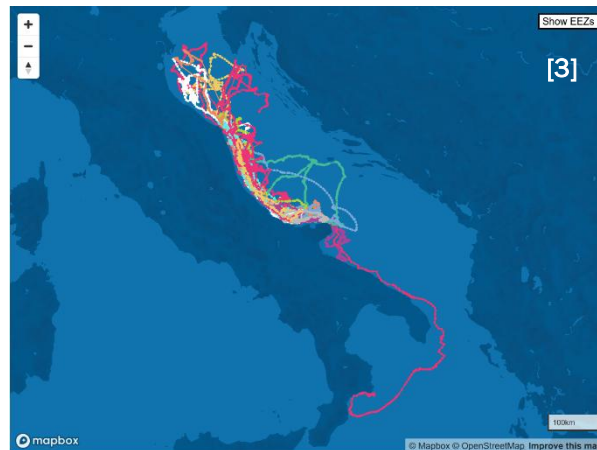


Figure 2-137. Scopoli's shearwater GPS telemetry tracks from colonies outside the Ionian Sea. [1] pre-laying movements of 17 individuals from Hal Far Colony on Malta (source: BirdLife Malta, Seabird Tracking Database <https://data.seabirdtracking.org/dataset/2522>), [2] movements of 9 individuals from Hal Far Colony on Malta (source: BirdLife Malta, Seabird Tracking Database <https://data.seabirdtracking.org/dataset/954>), [3] movements of 26 individuals during incubation period from Tremini Archipelago in Italy (source: J.G. Cecere, G. Gaibani & S. Imperio, Seabird Tracking Database <https://data.seabirdtracking.org/dataset/783>) (Source: Seabird Tracking Database <https://data.seabirdtracking.org>)

Threats

Scopoli's shearwater is characterised as long-lived species with delayed maturity, low fecundity (1 egg per year) and naturally high adult survival. Therefore, even small and sustained increase in the adult mortality may lead to a significant population decline (NECCA 2024). In Greece, the main threats for the species at sea and on land in order of significant are (adopted from NECCA 2024):

Climate Change: currently considered the most significant and long-term threat. Impacts include declines in plankton biomass and changes in food-web dynamics and seasonality of prey abundance. Seabirds are long-lived species with very specialized diets and low ability to adapt rapidly to declines in prey availability with devastating consequences on their reproductive success and in the long-term their survival.

Bycatch in fishing gear: i.e. the incidental capture of individuals of the species in fishing gear, mainly small scale fisheries. Scopoli's Shearwater mainly get bycaught in longlines (Fric *et al.* 2012). Based on the available information the significance of bycatch is considered medium and locally high.

Invasive species: The unintentional introduction of the Black Rat (*Rattus rattus*), through various human activities (livestock breeding, fishing, hunting, lighthouses, collection of plants and animals, etc) is considered the greatest threat for most seabird species. Rat presence has been recorded on a large number of islets which host seabird colonies. Rats predate on seabird eggs, chicks or even adults, subsequently affecting the breeding success of the species. In the case of the Scopoli's Shearwater, rats mainly predate eggs and chicks.

Renewable energy: The Aegean Sea provides favourable conditions for the development of renewable energy installations, which have been shown to have detrimental cumulative effects on seabirds, both during construction and operation, such as the creation of barrier effects to migration and local foraging movements, displacement from optimal foraging and resting grounds, increased energy expenditure,

increased risk of collision especially when close to breeding colonies, degradation or loss of seabird breeding habitats, disturbance from increased human presence and more.

Changes in prey availability / Overfishing: has led to the decline of fish populations and in the long term prey depletion, mainly affecting the species reproductive performance. Studies providing evidence on the impacts of fisheries are missing for the oligotrophic Eastern Mediterranean and are much needed for the Aegean Sea where, little direct evidence exists demonstrating that increased exploitation of small pelagics in the Greek Seas has led to the decline of certain seabird species.

Disturbance: Recreational and other activities, such as tourist boat excursions to islets, amateur fishing, scuba diving, water sports, rock climbing, plant and snail collection, livestock breeding, etc. often coincide with the breeding period of most seabird species. If these take place in close proximity to the colony, they may cause significant disturbance leading to nest or colony abandonment, increased chick predation and exposure to harsh climate conditions.

Marine Pollution: Oil pollution, through accidental oil spills, but also through discharge of ballast water, poses a significant threat to the species, especially when large congregations form during breeding and/or moulting. Oil affects the species by reducing feather insulation, leading to hypothermia or even drowning, but also indirectly causing poisoning and decreased productivity and survival.

Marine Plastics: Pollution by marine litter, in particular plastics, is an emerging threat, affecting most seabird species, through ingestion, entanglement and chemical bioaccumulation. Studies providing evidence on the impacts of marine plastics are much needed for the Aegean Sea.

Chemical pollution: such as heavy metals, mercury and PCBs has harmful effects on hatching and fledging success rates caused by eggshell thinning, reduced egg production, smaller clutches, etc.

2.4.8.1.2 Yelkouan Shearwater (*Puffinus yelkouan*)

Yelkouan Shearwater is a pelagic migratory seabird species that is endemic to the Mediterranean Sea and the Black Sea.

Population size and Distribution

Similar to Scopoli's Shearwater, the Yelkouan Shearwater spend most of its time at sea and uses and only for breeding. It breeds in France, Italy, Malta, Algeria, Tunisia, Croatia and Greece, but breeding is also suspected in Albania, Turkey and Bulgaria (Carboneras et al. 2020). Its European population is estimated at 23,500-40,900 pairs (BirdLife International 2021), while Algeria and Tunisia are estimated to host 8-10 pairs and 176-200 pairs, respectively (Birdlife International 2018). Italy and Greece host the largest species breeding populations with 12,700-19,800 pairs (51% of the European population) and 6,800 – 13,200 pairs (31% of the European population), respectively (BirdLife International 2021).

No colonies of the Yelkouan Shearwater have been located in the Ionian Sea with the nearest colonies being on the Malta and the Adriatic islands of Italy and Croatia. In the Adriatic, the colony sizes of the Yelkouan Shearwater colonies on the Tremini Islands of San Domino and San Nicola in Italy are 30-50 pairs and 70-100 pairs (Bacetti et al. 2009), respectively, while the Lastovo and Vis Island Archipelagos in Croatia host 200-250 pairs and 50-100 pairs, respectively (EEA 2026). Additionally, 1-10 pairs are estimated to breed on Sazan Island in Albania (Bourgeois & Vidal 2008).

Ecology

The majority of its population overwinters in the Black Sea. Breeding birds usually return to the Mediterranean in late-winter and early-spring. In Greece, the breeding season is shifted one month later than in the rest of the Mediterranean (Fric and Portolou 2016). Egg laying and incubation period lasts from mid-April to mid-June. Chick fledge after approximately 2 months. It breeds in burrows, rocky cavities or big caves on rocky coastal and offshore islets, and on steep, inaccessible cliffs on the mainland (Birdlife International 2018), in natural deep crevices and borrows created under rocks (NECCA 2024). Like Scopoli's Shearwaters, Yelkouan Shearwaters enter colonies at night and before entering the colony they may form large congregations (rafts) which may consists of several thousand individuals and are generally found up 5km away from the colony (Fric et al. 2012). They can travel several hundred kilometres per day in search for food. Due to their high mobility and regardless of the colony distribution, large concentrations at-sea ranging from several hundred to several thousand individuals have been recorded at all major fishing grounds in the Aegean. During the breeding season, foraging trips last 1-7 days and the birds may reach 3,040-4,000km away from the colony. Yelkouan Shearwaters feed exclusive on small pelagic prey. From August to October, after the end of the breeding season, most of the Yelkouan Shearwaters migrate to the Black Sea where they overwinter.

Presence in the study area

In the wider study area Yelkouan Shearwaters have been recorded visually in the Messapia offshore windfarm study area, west of the current project study area, from early spring (March) to summer (August) (messapia 2025B), while in the Ionian Block, east the current project study area, the species has been recorded from spring (March-May) to autumn (September-October) (NCC, Mom & Biotopia, 2022, NCC, Mom & Biotopia, 2023 and NCC, Mom & Biotopia, 2024).

Based on the GPS telemetry data of juvenile and adults Yelkouan Shearwaters from colonies in Malta and Croatia the area of the Northern Ionian Sea is used by the species primarily for movements between the breeding and post-breeding/wintering sites, rather than as a foraging area.

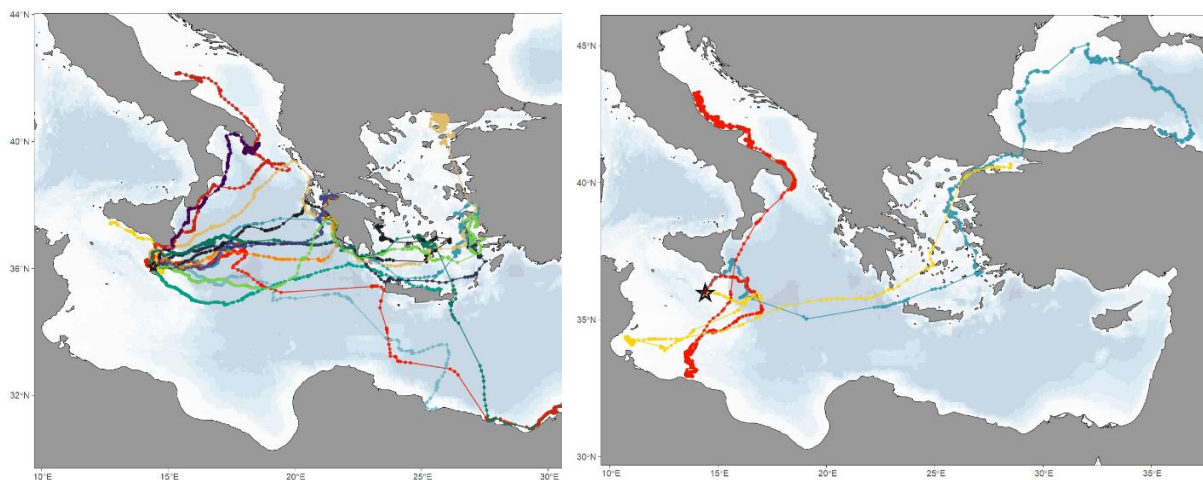


Figure 2-138. Post-fledging movements of 14 juvenile Yelkouan Shearwaters (left) and migration routes of 3 adult Yelkouan Shearwaters (right) from Malta, based on GPS tracking data (Source: Gatt et al. 2025)

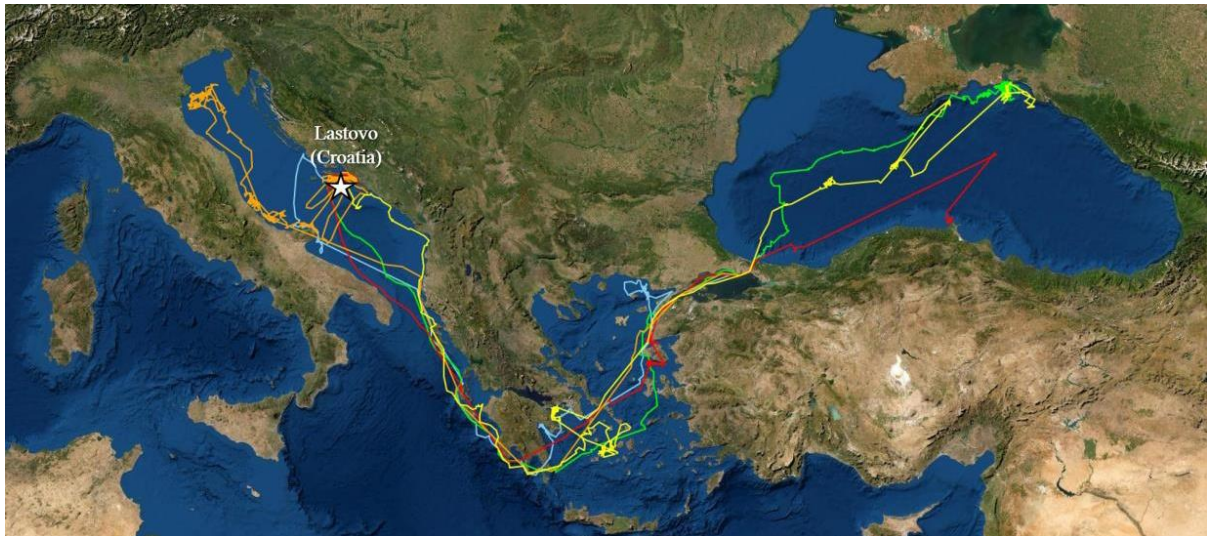


Figure 2-139. Tracks of 5 Yelkouan Shearwaters from Lastovo archipelago in Croatia, based on GPS/GSM telemetry data (Source: Mendez & Bukreev 2022)

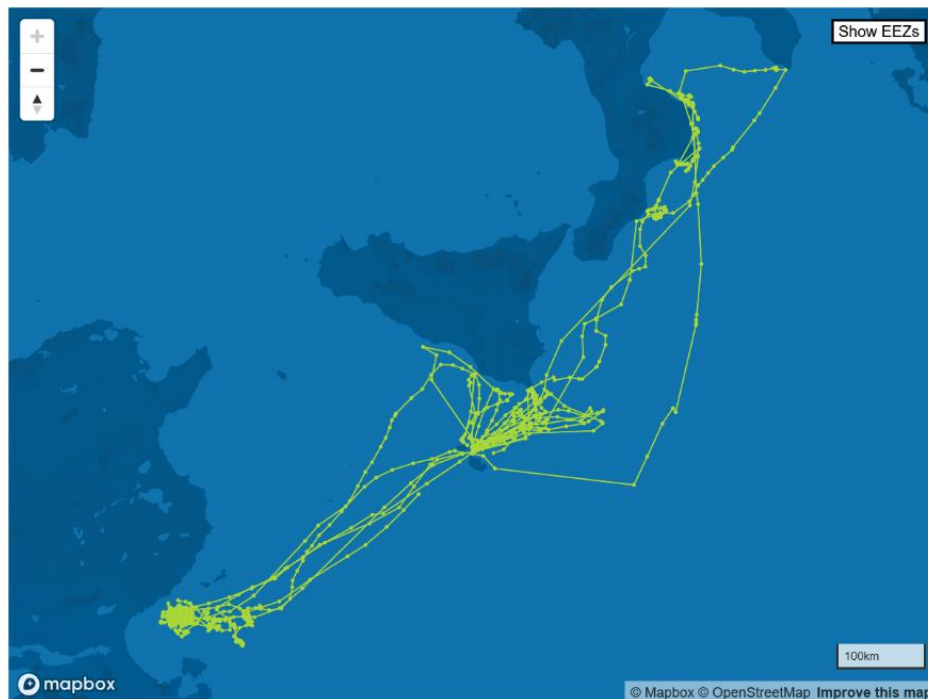


Figure 2-140. Tracks of 2 Yelkouan Shearwaters from Rdum tal-Madonna colony on Malta during chick-rearing period (Source: BirdLife Malta, Seabird Tracking Database <https://data.seabirdtracking.org/dataset/1935>).

Threats

Yelkouan Shearwater is characterised as long-lived species with delayed maturity, low fecundity (1 egg per year) and naturally high adult survival. Therefore, even small and sustained increase in the adult mortality may lead to a significant population decline (NECCA 2024). In Greece, the main threats for the species at sea and on land in order of significant are (adopted from NECCA 2024):

Climate Change: currently considered the most significant and long-term threat. Impacts include declines in plankton biomass and changes in food-web dynamics and seasonality of prey abundance. Seabirds are long-lived species with very specialized diets and low ability to adapt rapidly to declines in prey availability with devastating consequences on their reproductive success and in the long-term their survival.

Bycatch in fishing gear: i.e. the incidental capture of individuals of the species in fishing gear, mainly small-scale fisheries. Yelkouan Shearwater mainly get bycaught in longlines (Fric et al. 2012). Based on the available information the significance of bycatch is considered medium and locally high.

Invasive species: In the Aegean, the unintentional introduction of the Black Rat (*Rattus rattus*), through various human activities (livestock breeding, fishing, hunting, lighthouses, collection of plants and animals, etc) is considered the greatest threat for most seabird species. Rat presence has been recorded on a large number of islets which host seabird colonies. Rats predate on seabird eggs, chicks or even adults, subsequently affecting the breeding success of the species. In the case of the Yelkouan Shearwater, rats mainly predate eggs and chicks. During 2022-23, extensive predation of eggs, chicks and adults birds have been observed on Gyros due to the illegal introduction of feral pigs to the island. The feral pig population is still present on the island and predation is expected to continue in the following years.

Renewable energy: The Aegean Sea provides favourable conditions for the development of renewable energy installations, which have been shown to have detrimental cumulative effects on seabirds, both during construction and operation, such as the creation of barrier effects to migration and local foraging movements, displacement from optimal foraging and resting grounds, increased energy expenditure, increased risk of collision especially when close to breeding colonies, degradation or loss of seabird breeding habitats, disturbance from increased human presence and more.

Changes in prey availability / Overfishing: has led to the decline of fish populations and in the long term prey depletion, mainly affecting the species reproductive performance. Studies providing evidence on the impacts of fisheries are missing for the oligotrophic Eastern Mediterranean and are much needed for the Aegean Sea where, little direct evidence exists demonstrating that increased exploitation of small pelagics in the Greek Seas has led to the decline of certain seabird species.

Disturbance: Recreational and other activities, such as tourist boat excursions to islets, amateur fishing, scuba diving, water sports, rock climbing, plant and snail collection, livestock breeding, etc. often coincide with the breeding period of most seabird species. If these take place in close proximity to the colony, they may cause significant disturbance leading to nest or colony abandonment, increased chick predation and exposure to harsh climate conditions.

Marine Pollution: Oil pollution, through accidental oil spills, but also through discharge of ballast water, poses a significant threat to the species, especially when large congregations form during breeding and/or moulting. Oil affects the species by reducing feather insulation, leading to hypothermia or even drowning, but also indirectly causing poisoning and decreased productivity and survival.

Marine Plastics: Pollution by marine litter, in particular plastics, is an emerging threat, affecting most seabird species, through ingestion, entanglement and chemical bioaccumulation. Studies providing evidence on the impacts of marine plastics are much needed for the Aegean Sea.

Chemical pollution: such as heavy metals, mercury and PCBs has harmful effects on hatching and fledging success rates caused by eggshell thinning, reduced egg production, smaller clutches, etc.

2.4.8.1.3 European Storm-petrel (*Hydrobates pelagicus*)

European Storm-petrel is a pelagic seabird species that lives mainly to the Northeast Atlantic Ocean and the West Mediterranean Sea with the Aegean Sea being considered the eastern limit of its Mediterranean distribution. Storm-petrel residing in the Mediterranean Sea belong to the Mediterranean subspecies of the European Storm-petrel *Hydrobates pelagicus melitensis*.

Population size and Distribution

The Mediterranean subspecies of the European Storm-petrel breeds on Malta, France, Italy, Balearic Islands and Greece. Its population is estimated at 12,000-17,500 pairs, which represent less than 5% of the species global population (NECCA 2024). The species national populations in Italy and Greece are estimated at 3700-4500 pairs (BirdLife International 2021) and 210-285 pairs (NECCA 2024), respectively.

European Storm-petrel is present primarily in the northeastern Atlantic Ocean and the western Mediterranean Sea, while then the central and eastern Mediterranean Sea is much rarer. The recorded presence of at least 8 individuals at Diapondia Island near Corfu in 2022 suggests that the species breeding in the area (NCC, Mom & Biotopia 2022). The species has been regularly observed in the pelagic areas of the Northern Ionian Sea (NCC, Mom & Biotopia 2022, NCC, Mom & Biotopia 2023, NCC, Mom & Biotopia 2024).

Ecology

In Greece the European Storm-petrel breeds in colonies on uninhabited islands. It nests in natural rock crevices. Egg laying period last from mid-April to early July, but eggs are laid primarily in May. Incubation period lasts approximately 6 weeks with hatching during the period between mid-June and late August. Chick rearing period lasts approximately 10 weeks, up until October (NECCA 2024)

European-storm Petrel feed on small fish, molluscs (crustaceans and cephalopods) and zooplankton which are picked from the sea surface (NECCA 2024).

Presence in the study area

In the past The species has been recorded visually in the wide study area, in the Messapia offshore windfarm study area, west of the current project study area in spring (May) (messapia 2025B) and in the Ionian Block, east the current project study area, from summer (June) to autumn (September-October) (NCC, Mom & Biotopia, 2022, NCC, Mom & Biotopia, 2023 and NCC, Mom & Biotopia, 2024).

Threats

Similar to other pelagic seabird species, the European Storm-petrel is a long-lived species with delayed maturity, low fecundity Therefore, even small and sustained increase in the adult mortality may lead to a significant population decline (NECCA 2024). In Greece, the main threats for the species at sea and on land in order of significant are (adopted from NECCA 2024):

Climate Change: currently considered the most significant and long-term threat. Impacts include declines in plankton biomass and changes in food-web dynamics and seasonality of prey abundance. Seabirds are long-lived species with very specialized diets and low ability to adapt rapidly to declines in prey availability with devastating consequences on their reproductive success and in the long-term their survival.

Invasive species: The unintentional introduction of the Black Rat (*Rattus rattus*), through various human activities (livestock breeding, fishing, hunting, lighthouses, collection of plants and animals, etc) is considered the greatest threat for most seabird species. Rat presence has been recorded on a large number of islets which host seabird colonies. Rats predate on seabird eggs, chicks or even adults, subsequently affecting the breeding success of the species. In the case of the European Storm Petrel, rats, when present on active colonies, are known to predate on eggs, chick and even adult birds.

Degradation of breeding habitat: through development of infrastructures on uninhabited islets (e.g., renewable energy installations, holiday homes, piers, aquaculture, etc)

Changes in prey availability / Overfishing: has led to the decline of fish populations and in the long-term prey depletion, mainly affecting the species reproductive performance. Studies providing evidence on the impacts of fisheries are missing and are much needed for the oligotrophic Eastern Mediterranean.

Disturbance: Recreational and other activities, such as tourist boat excursions to islets, amateur fishing, scuba diving, water sports, rock climbing, plant and snail collection, livestock breeding, etc. often coincide with the breeding period of most seabird species. If these take place near the colony, they may cause significant disturbance leading to nest or colony abandonment, increased predation and decreased breeding success.

Marine Pollution: Oil pollution, through accidental oil spills, but also through discharge of ballast water, poses a significant threat to the species, especially when large congregations form during breeding and/or moulting. Oil affects the species by reducing feather insulation, leading to hypothermia or even drowning, but also indirectly causing poisoning and decreased productivity and survival.

Marine Plastics: Pollution by marine litter, in particular plastics, is an emerging threat, affecting most seabird species, through ingestion, entanglement and chemical bioaccumulation. Studies providing evidence on the impacts of marine plastics are much needed for the Eastern Mediterranean.

Chemical pollution: such as heavy metals, mercury and PCBs has harmful effects on hatching and fledging success rates caused by eggshell thinning, reduced egg production, smaller clutches, etc.

2.4.8.1.4 Audouin's Gull (*Larus audouinii*)

Audouin's Gull is an endemic gull species of Mediterranean Sea and the Atlantic coast of Morocco. It is the rarest gulls species breeding in Greece.

Population size and Distribution

Audouin's Gull is endemic to the Mediterranean Sea, that breeds in the Atlantic coast of Morocco to the south west, north to Portugal and east patchily through the Mediterranean to Cyprus and Turkey, including the Balearic Islands, Corsica and Sardinia (BirdLife International 2020). Its global population is estimated at 15,900- 21,800 pairs (BirdLife International 2020) and European at 15,700-21,000 pairs (BirdLife International 2021) with Spain being the species stronghold, hosting 12,100–16,900 pairs. Species national populations in Greece and Italy are estimated at 350–500 pairs and 1,100-1,400 pairs respectively (BirdLife International 2021). From 1998-1999 until 2010 the Greek national population has decreased by 28-33% (NECCA 2024), while more recent surveys have revealed that the population size in the Dodecanese, the species stronghold in Greece, has declined by 65% until 2021-2023 (Kastritis et al. 2023). On the other

hand, Audouin's Gulls colonized Apulia, Italy around 1990. During the last decade an increase in the number of breeding sites and the population size in region has been recorded with estimated Apulian population size during the period 2020-2022 begin 339-607 pairs (Luizzi et al. 2023).

In Greece Audouin's Gull breeds in the Aegean Sea with the nearest colony to Block 2 being located on Kythera Island (Fric et al. 2012). In Apulia, Italy the species breeds at several colonies in the Ionian and the Adriatic Sea. There are 2 colonies in the Gulf of Taranto, Ionian Sea, namely on Sant'Andrea Island, Campo Island and Testa Island, where 225-293 pairs, 0-145 pairs and 0-4 pairs were recorded during the period 2020-2022. In the Adriatic side of Apulia the species breeds at Eremita rock and Giorgio Treviso islet, where 0-7 pairs and 110-222 pairs, respectively have been recorded (Luizzi et al. 2023). During the wintering period individuals breeding the area may disperse throughout the Mediterranean Sea (Fric et al. 2012). Other species colonies in the Adriatic are located in the Archipelagos of the islands Plješac, Mljet and Lastovo, hosting 8-10 pairs, 0-15 pairs and 40-45 pairs, respectively.

Ecology

The species breeds on small uninhabited rocky islets with gentle slopes and sparse vegetation. Egg laying period last from early April to the beginning of May, with most egg hatching taking place in the second half of May. Chicks fledge between late June and early July (Fric et al. 2012).

It prefers coastal habitats and usually feeds along the coast. Its diet consists mostly of epipelagic fish, as well as fisheries discards. It usually forages within 10-14km around its breeding colonies (NECCA 2024).

During non-breeding season the Audouin's Gull may disperse throughout the Mediterranean Sea.

Presence in the study area

Audouin's Gull has not been recorded in the past within the study area or a wider study area (ENERGEAN & GeoMar 2022, messapia 2025B, NCC, Mom & Biotopia, 2022, NCC, Mom & Biotopia, 2023 and NCC, Mom & Biotopia, 2024).

However, the presence of the species in the study area has been recorded by telemetry during post-breeding period. During their post breeding dispersal, individuals breeding in Greece, migrate primarily towards the coastal areas of North Africa and on their way may cross the Ionian Sea and the Block 2 area.

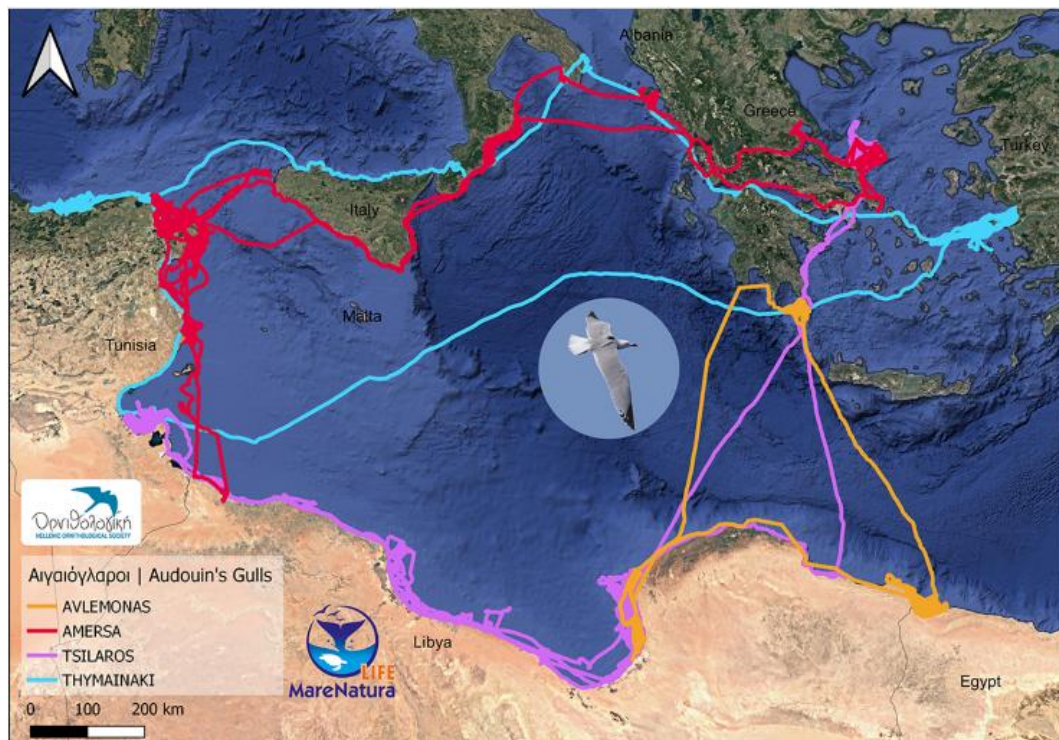


Figure 2-141. Migratory routes of Audouin's Gulls breeding in the Aegean Sea (Source: Hellenic Ornithological Society, <https://ornithologiki.gr/en/public-awareness-education/information/our-news/2028-aegean-journeys-and-beyond>)

Similar dispersal has been observed by individuals breeding in Croatia. Some individuals have crossed the Strait of Otranto and entered the Gulf of Taranto.

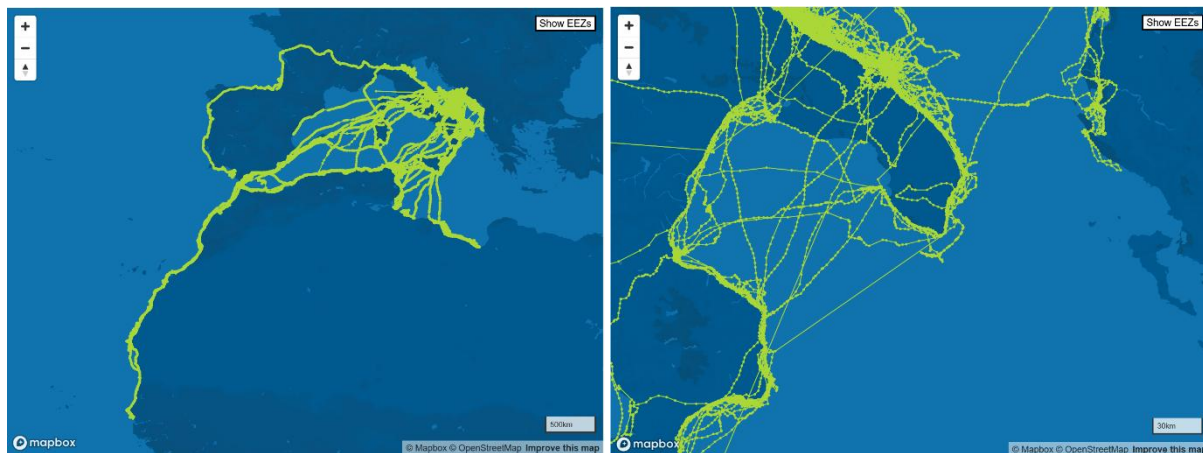


Figure 2-142. Tracks of 30 Audouin's Gulls (25 adults and 5 chicks) from Lastovo colony in Croatia (Source: Association BIOM, Seabird Tracking Database <https://data.seabirdtracking.org/dataset/2467>).

Threats

Audouin's Gull is a long-lived species exhibiting delayed maturity, low fecundity and high adult survival. Therefore, even small and sustained increase in the adult mortality may lead to a significant population

decline (NECCA 2024). In Greece, the main threats for the species at sea and on land in order of significant are (adopted from NECCA 2024):

Climate Change: currently considered the most significant and long-term threat. Impacts include declines in plankton biomass and changes in food-web dynamics and seasonality of prey abundance. Seabirds are long-lived species with very specialized diets and low ability to adapt rapidly to declines in prey availability with devastating consequences on their reproductive success and in the long-term their survival.

Renewable energy: The Aegean Sea provides favourable conditions for the development of renewable energy installations, which have been shown to have detrimental cumulative effects on seabirds, both during construction and operation, such as the creation of barrier effects to migration and local foraging movements, displacement from optimal foraging and resting grounds, increased energy expenditure, increased risk of collision especially when close to breeding colonies, degradation or loss of seabird breeding habitats, disturbance from increased human presence and more.

Bycatch in fishing gear: i.e. the incidental capture of individuals of the species in fishing gear, mainly small scale fisheries. Audouin's Gulls mainly get bycaught in longlines (Fric *et al.* 2012). Based on the available information the significance of bycatch is considered medium and locally high.

Changes in prey availability / Overfishing: has led to the decline of fish populations and in the long term prey depletion, mainly affecting the species reproductive performance. Studies providing evidence on the impacts of fisheries are missing for the oligotrophic Eastern Mediterranean and are much needed for the Aegean Sea where, little direct evidence exists demonstrating that increased exploitation of small pelagics in the Greek Seas has led to the decline of certain seabird species. A typical example is the significant reduction in reproductive success of many Audouin's Gull colonies in Greece, which could be explained by local fluctuations in fish abundance.

Disturbance: Recreational and other activities, such as tourist boat excursions to islets, amateur fishing, scuba diving, water sports, rock climbing, plant and snail collection, livestock breeding, etc. often coincide with the breeding period of most seabird species. If these take place in close proximity to the colony, they may cause significant disturbance leading to nest or colony abandonment, increased chick predation and exposure to harsh climate conditions.

Invasive species: In the Aegean, the unintentional introduction of the Black Rat (*Rattus rattus*), through various human activities (livestock breeding, fishing, hunting, lighthouses, collection of plants and animals, etc) is considered the greatest threat for most seabird species. Rat presence has been recorded on a large number of islets which host seabird colonies. Rats predate on seabird eggs, chicks or even adults, subsequently affecting the breeding success of the species. In the case of the Audouin's Gull, rats usually cause secondary predation of eggs, following attacks by avian predators.

Marine Pollution: Oil pollution, through accidental oil spills, but also through discharge of ballast water, poses a significant threat to the species, especially when large congregations form during breeding and/or moulting. Oil affects the species by reducing feather insulation, leading to hypothermia or even drowning, but also indirectly causing poisoning and decreased productivity and survival.

Marine Plastics: Pollution by marine litter, in particular plastics, is an emerging threat, affecting most seabird species, through ingestion, entanglement and chemical bioaccumulation. Studies providing evidence on the impacts of marine plastics are much needed for the Aegean Sea.

Chemical pollution: such as heavy metals, mercury and PCBs has harmful effects on hatching and fledging success rates caused by eggshell thinning, reduced egg production, smaller clutches, etc. Eggshell and feather samples from Audouin's Gulls colonies in the Aegean suggest low levels of PCBs, OCLs as well as mercury and other heavy metals (Goutner *et al.* 2000, Goutner *et al.* 2001).

2.4.8.2 Migratory Flyway

The main ornithological importance of the wider area of the Ionian Sea stems from the fact that the Ionian Sea and its surrounding coastal and insular areas are located along the Black Sea - Mediterranean Migratory Bird Flyway. The Mediterranean Sea along with the Sahara Desert presents an ecological barrier for the migratory birds, therefore the main migration corridors in the region are located along the Ionian coast and islands of Greece and Italy, rather than across the breadth of the Ionian Sea. The main migratory bird groups traversing the wider region of the Ionian Sea include passerines (e.g. Barboutis *et al.* 2022), soaring birds and raptors (e.g. Panuccio *et al.* 2013, Bounas *et al.* 2025), waterbirds, herons, waders, Pelecaniformes, gulls, terns (Portolou *et al.* 2009, Handrinos *et al.* 2015, YPEN 2020, EEA 2026) and seabirds (e.g. Karris *et al.* 2011).

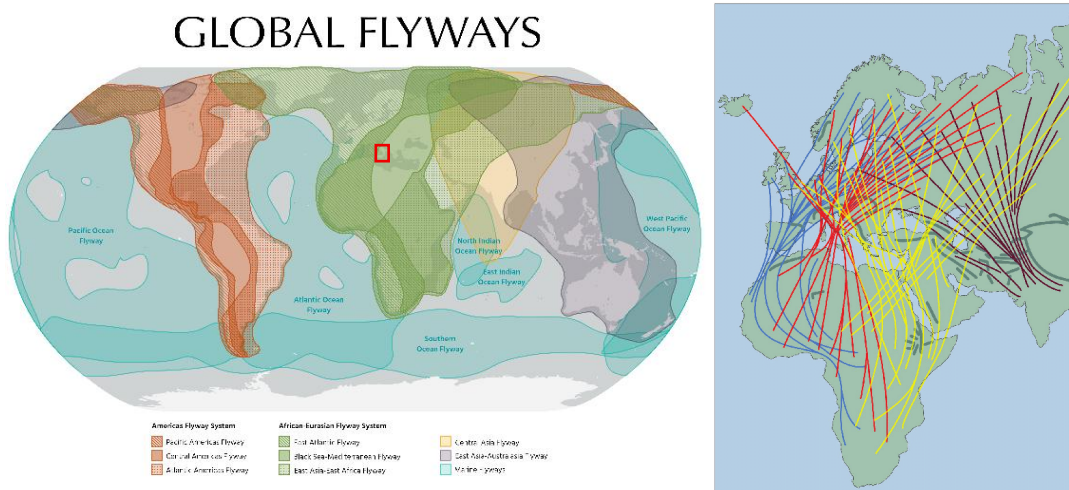


Figure 2-143. The location of the Ionian Sea along the Black Sea - Mediterranean Flyway for migratory birds (red square) [left] and the general migration pattern of Western Palearctic passerines [right] (Source: BirdLife International, <https://datazone.birdlife.org/about-our-science/flyways> and Busse *et al.* 2014).

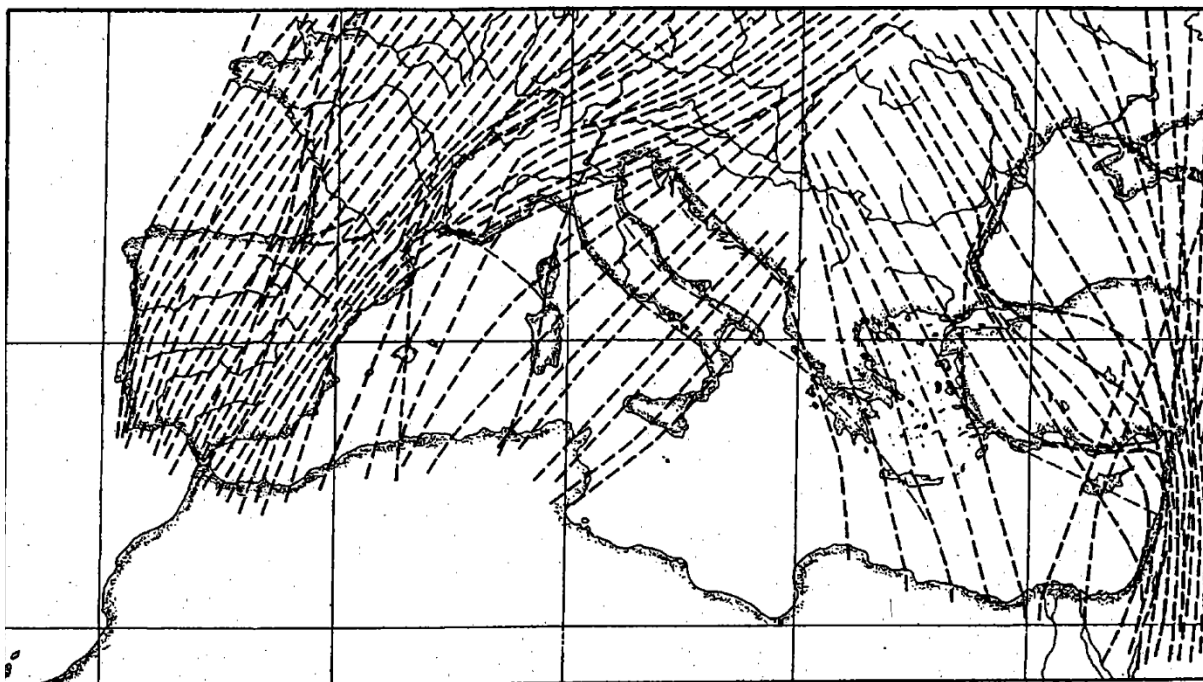


Figure 2-144. Suggested directions and concentrations of migratory streams in Europe and the Middle East, primarily based on radar, infrared and moon-watch data (Source: Bruderer & Leichti 1999).

Passerines present the most numerous group of migratory birds, both in terms of the number of species and the number of individuals involved. Past radar surveys have revealed that the birds migrate in the southern Ionian Sea across a broad front but at a reduced rate compared to the neighboring regions along SW Greece or SE Italy (Casement 1966, Bruderer & Leichti 1999). However, Ionian islands and islets, as well as coastal wetlands consist vital stopover sites for resting and refueling of migratory passerines which cross the Mediterranean Sea and the Sahara desert. It has been estimated, that the number of birds using insular and coastal stopover sites in Greece may amount up to several hundred million birds (Barboutis et al. 2022). Several coastal and insular sites have been identified as being important stopover sites or hosting concentrations of migratory passerines. In Greece, these sites include Strofades island complex and Antikythera (Xirouchakis et al. 2015, Barboutis et al. 2022), Diapontia Islands, islands Kythera, Zakynthos and Corfu including its Antinioti lagoon, Korission lagoon and Lefkimmi salt marsh, as well as, coastal sites of continental Greece: Mani peninsula, Gialova lagoon, Messolonghi lagoon, Achelous estuary and wetlands of the Amvrakikos Gulf (YPEN 2020). Similarly, in Italy, coastal sites hosting significant concentrations of migratory passerines include coast of Sinigaglia river estuary, Marquisate and Neto River and marshes of south-eastern Sicily, Morghella, Marzamemi, Punta Pilieri and Vendicari (EEA 2026).

The wider region of the Ionian Sea is also very important for migratory raptors and soaring birds which migrate along the Central Mediterranean Flyway. Because migratory raptors and soaring avoid crossing large bodies of water, they concentrate at geographical bottlenecks prior to crossing the Mediterranean Sea. Birds using the Central Mediterranean Flyway along the Balkan peninsula concentrate along the western coast of Greece and converge toward sites where the crossing of the Mediterranean Sea is the shortest i.e. Akrotas Cape and Antikythera (Panuccio et al. 2013, Nounas et al. 2025, Mellone et al. 2025). The most numerous raptor species involved in the migration along the eastern part of the Central Mediterranean Flyway in Greece include European Honey Buzzard (*Pernis apivorus*), Western Marsh Harrier (*Circus aeruginosus*), Booted

Eagle (*Hieraaetus pennatus*), Common buzzard (*Buteo buteo*), Black Kite (*Milvus migrans*), Levant Sparrowhawk (*Accipiter brevipes*) and Lesser Kestrel (*Falco naumanni*) (Portolou et al. 2009, Panuccio et al. 2013, YPEN 2020, Mellone 2025).

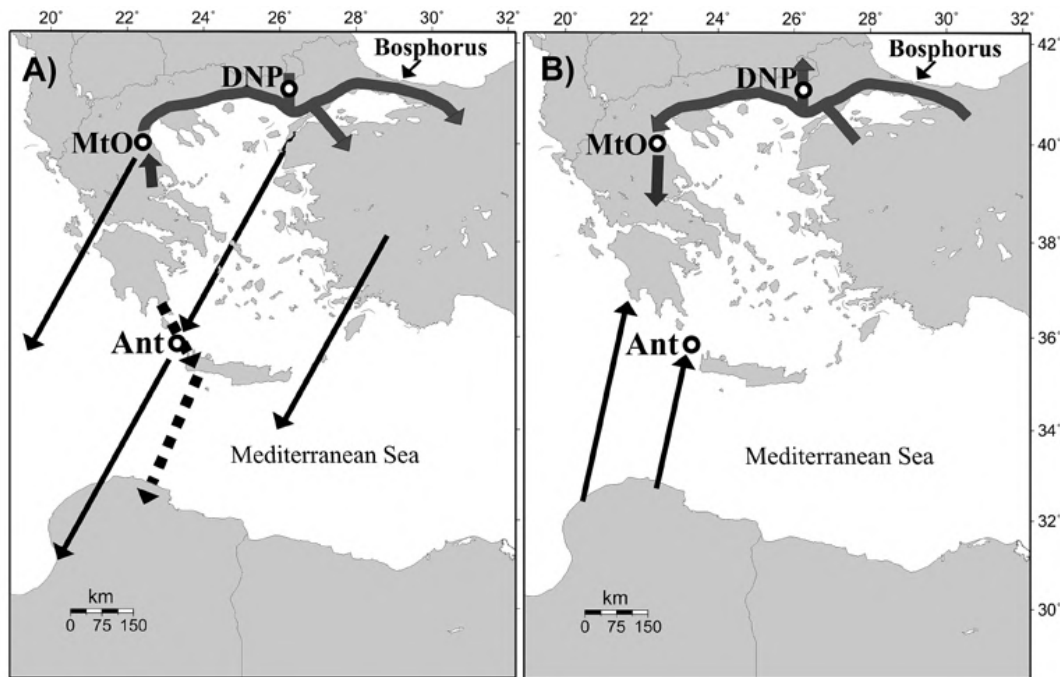


Figure 2-145. Migration routes of the European Honey Buzzard (*Pernis apivorus*) during autumn (left) and spring migration period (right) (Source: Panuccio et al. 2013).

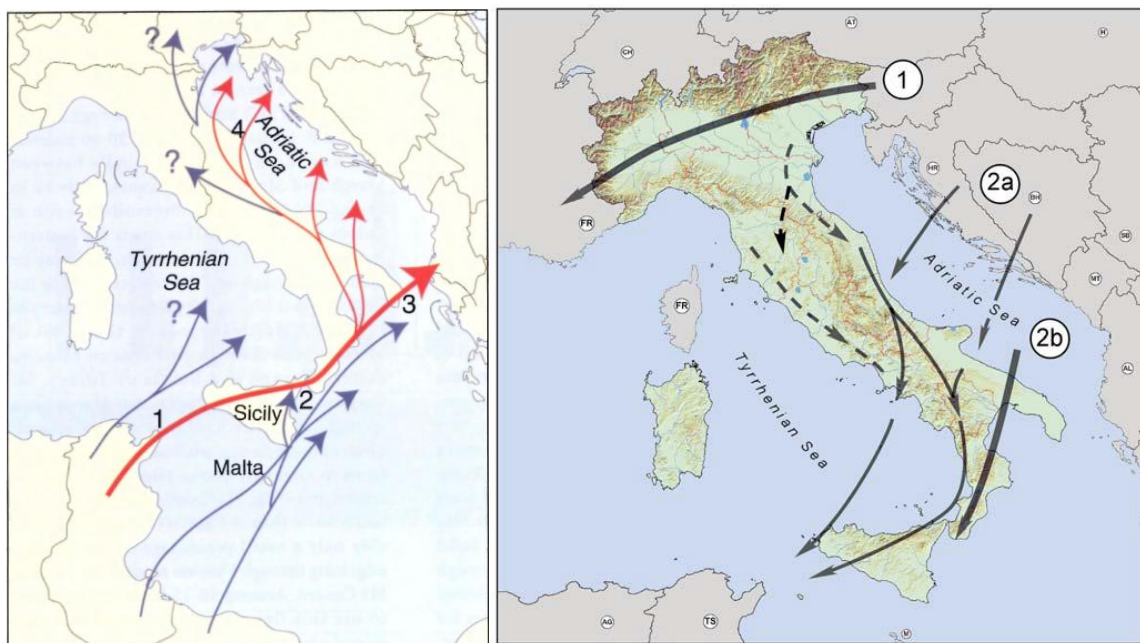


Figure 2-146. Examples of raptor and soaring birds migration routes in the southern Italy: Spring migration routes of Pallid Harriers (*Circus macrourus*) (left) and autumn migration routes of Common Crane (*Grus grus*) (right) (Source: Corso & Cardelli 2004. Mingozzi et al. 2013).

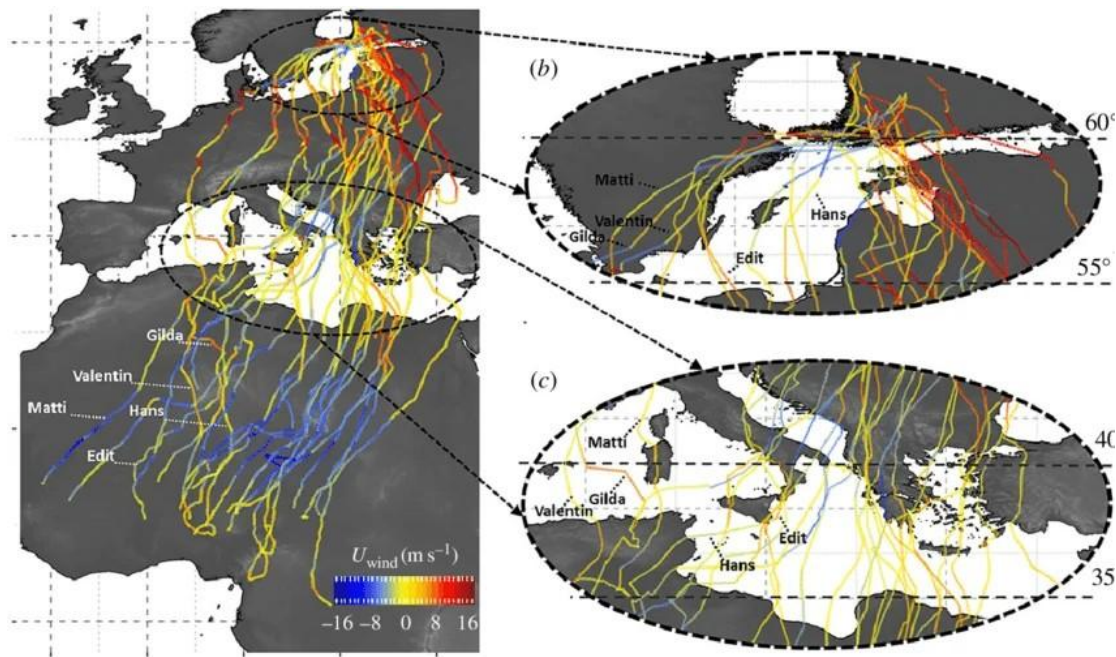


Figure 2-147. Routes of 28 juvenile honey buzzards migrating from Finland to sub-Saharan Africa in relation to zonal wind speed (U_{wind} , colour scale) encountered en route (Vansteelant et al. 2017)

In southern Italy, raptors and soaring birds migrating along the southern Apennine Peninsula concentrate at the Strait of Messina and the Channel of Sicily (Panuccio 2011, Panuccio et al. 2004). The most numerous raptor and soaring bird species that migrate through the Strait of Messina include European Honey Buzzard (*Pernis apivorus*), Western Marsh Harrier (*Circus aeruginosus*), Black Kite (*Milvus migrans*), Red-footed Falcon (*Falco vespertinus*), Common Kestrel (*Falco tinnunculus*) and Montagu's Harrier (*Circus pygargus*), Black Stork (*Ciconia nigra*) and White Stork (*Ciconia ciconia*) (Corso 2001, Panuccio et al. 2004).

There are numerous waterbird, heron, wader, Pelecaniformes, gull and tern species present in the coastal regions of the Ionian Sea. Their presence and movements, either local or migratory, are primarily associated with the presence coastal wetlands in Greece, Italy and Albania. They use these wetlands for foraging, breeding, wintering or as migratory stop-over sites. Some species also use uninhabited islet for breeding and roosting (Portolou et al. 2009, Handrinos et al. 2015, YPEN 2020, EEA 2026).

The migratory patterns of the main seabird species in the area, which are associated with the offshore marine environment, i.e. Scopoli's Shearwater (*Calonectris diomedea*), Yelkouan Shearwater (*Puffinus yelkouan*), European Storm-petrel (*Hydrobates pelagicus*), Audouin's Gull (*Larus audouinii*) and Yellow-legged Gull (*Larus michahellis*), refer primarily to migratory movements between breeding and wintering areas within the Mediterranean Sea and between the Mediterranean Sea and the Atlantic Ocean or the Black Sea, as well as post-breeding dispersal (e.g. Karris et al. 2011, Gatt et al. 2025).

It should be note that ships in the Mediterranean Sea provide important stopover sites for migrating birds, particularly those that traverse large distances over sea. It was estimated that nearly 4 million birds could use ships as stopover sites during migration in the Mediterranean Sea (Sarà et al. 2023). Additionally, seabirds may use offshore infrastructure e.g. offshore production platforms, drilling rigs and support vessels as roosting sites (Ronconi et al. 2015).

Based on the international experience there are different impacts of offshore oil and gas platforms on birds. Direct impacts include collision with infrastructure, incineration in flares, exposure to oil, exhaustion and starvation, provision of roosting and resting sites, or displacement from habitats, while indirect impacts include creation of foraging opportunities, exposure to predators, habitat alteration, and other changes to ecosystems and ecosystem functions (Ronconi et al. 2015).

2.5 Designated areas for the conservation of biodiversity

2.5.1 Natura Network 2000

The European ecological network Natura 2000 is a network of protected natural areas that extends across the entire European Community and aims to ensure the long-term conservation of the most valuable and threatened species and habitats at a satisfactory level. It consists of two categories of sites: (a) Special Protection Areas (SPAs) for birds, as defined in Directive 79/409/EEC on the conservation of wild birds and (b) Special Areas of Conservation (SAC), as defined in Directive 92/43/EEC. In identifying SACs, the habitat types and species listed in Annexes I and II of Directive 92/43/EEC are taken into account, as well as the criteria in Annex III of the same directive.

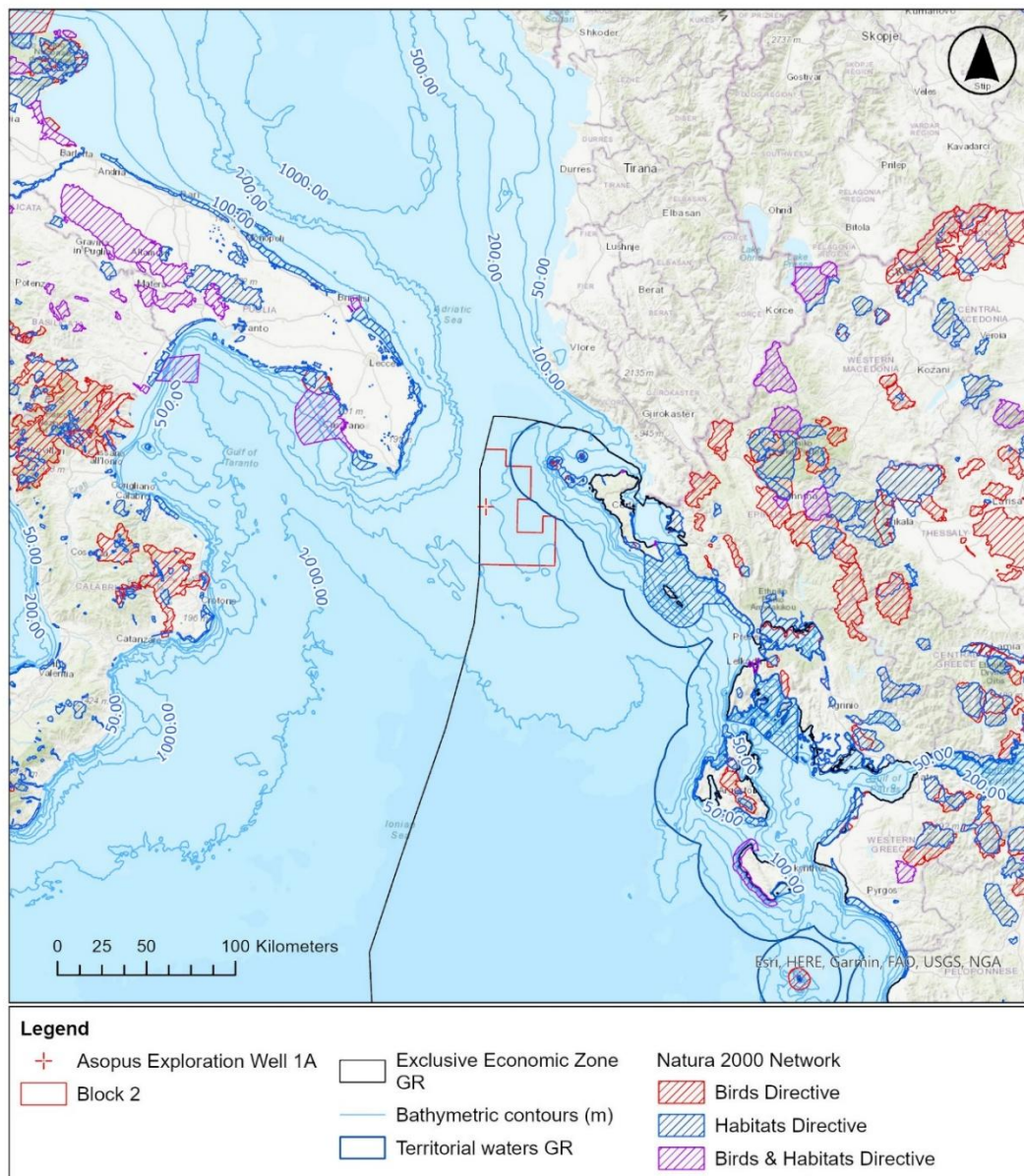


Figure 2-148: Sites of Natura 2000 Network in the broader area

No Natura 2000 sites are located in the immediate vicinity of the exploration well. The nearest Natura 2000 sites to the Asopus 1A well are presented in Table 2-35.

Table 2-35: Natura 2000 sites in the broader area

SITECODE	SITENAME	DESIGNATION	DISTANCE FROM ASOPUS 1A	COUNTRY
GR2230010	MARINE AREA OF THE DIAPONTIA ISLANDS	SAC	~41 KM	GREECE
GR2230008	DIAPONTIA ISLANDS: OTHONI, EREIKOUSA, MATHRAKI AND ROCKY ISLETS	SPA	~41 KM	GREECE
IT9150002	COSTA OTRANTO - SANTA MARIA DI LEUCA	SAC	~53 KM	ITALY
IT9150009	UGENTO COAST	SAC	~66 KM	ITALY
IT9150015	GALLIPOLI COAST AND ST. ANDREA ISLAND	SPA/SAC	~80 KM	ITALY

2.5.1.1 GR2230010 SAC marine area of the Diapontia islands

Diapontia is a small island complex situated at the north-westernmost part of Greece, in the NE Ionian Sea. The complex consists of three main (populated) islands (Othonoi, Erikousa and Mathraki) and some smaller uninhabited rocky islets (Trachia, Platia, Diaplo, Diakopo). This fully marine site extends at depths of 0-50 m and covers an area of 153.38 km². This marine area is characterized by the existence of *Posidonia* beds, mainly in depths between 5-30m.

The site comprises important *Posidonia oceanica* beds (Habitat Type 1120), infralittoral and circalittoral rocks and boulders (Habitat Type 1170), as well as detritic sediments and rhodolith beds (Habitat Type 1110) (see Table 2-7). Littoral biogenic rims of *Dendropoma* / *Neogoniolithon* occur along the most exposed rocky shores of the islands.

Natura 2000 site GR22300010 is not designated for species included in Annex II of Directive 92/43/EEC.

Table 2-36: Habitat types present on the site GR2230010 and assessment for them

CODE	DESCRIPTION	PRIORITY	NP	COVER (HA)	CAVES	DATA QUALITY	SITE ASSESSMENT			
							REPRESENTATIVITY	RELATIVE SURFACE	CONSERVATION	HABITAT GLOBAL
							A/B/C/D	A/B/C	A/B/C	A/B/C
1110	Sandbanks that are constantly covered by shallow seawater			7664		M	A	C	A	A
1170	Reefs			3065		G	A	C	B	B
1120	<i>Posidonia</i> beds	1		4598		G	A	C	A	A
8330	Submerged or partially submerged sea caves					P				

PF: Habitat types 6210, 7130, 9430 priority depend on the habitat characteristics. Letter 'X' indicates that the reported habitat characteristics corresponds to its priority form.

NP: In case that a habitat type no longer exists in the site enter: x (optional)

Cover: Decimal values can be entered

Caves: For habitat types 8310 and 8330 (caves), the number of caves when the estimated surface is not available.

Data Quality: G = Good (e.g. based on surveys), M = Moderate (e.g. based on partial data with some extrapolation), P = Poor (e.g. rough estimation)

Representativity: A = excellent representativity, B = good representativity, C = significant representativity, D = non-significant presence

Relative Surface: A $\geq$ 15%, B = 2-15%, C $\leq$ 2%

Conservation: A = excellent conservation, B = good conservation, C = average or reduced conservation

Global: A = excellent value, B = good value, C = significant value

2.5.1.2 GR2230008 SPA Diapontia Islands: Othoni, Ereikousa, Mathraki and rocky islets

Three inhabited and five uninhabited small islands, covered mainly by conifers, tall maquis and olive groves. Othonoi islands has extensive sea cliffs and rocky slopes (max. altitude 385 m.) Most of the uninhabited islets are covered by low vegetation on a rocky substratum, ideal for nesting seabirds.

An important colony of Cory's Shearwaters (*Calonectris diomedea*) is nesting in Tracheia islet, one of the two known colonies in the Ionian Sea. This colony is very important as it works as a "bridge" connecting birds from the Adriatic and Central Mediterranean with Greek populations. Furthermore, at least 15 pairs of Shags nest in rocky coasts, while the five pairs of Peregrine Falcons is a very dense population for such a small area. Alpine Swifts are also very common during the breeding season, with at least 150 pairs nesting.

Table 2-37: Species referred to in Article 4 of Directive 2009/147/EC and site evaluation for them

SPECIES				POPULATION IN SITE					SITE ASSESSMENT				
CODE	SCIENTIFIC NAME	SENSITIVITY	NP	TYPE	SIZE MIN	SIZE MAX	UNIT	ABUNDANCE	DATA QUALITY	POPULATION	CONSERVATION	ISOLATION	GLOBAL
A103	<i>Falco peregrinus</i>			p	5	5	p		G	C	B	C	B
A122	<i>Crex crex</i>			c				P	DD	C	B	C	C
A210	<i>Streptopelia turtur</i>			c	5000	5000	i		G		B		
A029	<i>Ardea purpurea</i>	1		c				P	DD	D			
A087	<i>Buteo buteo</i>			c	150	150	i		G	D	B		
A338	<i>Lanius collurio</i>			r	80	80	p		G	D			
A391	<i>Phalacrocorax carbo sinensis</i>			c				P	DD	D			
A022	<i>Ixobrychus minutus</i>			c				P	DD	D			
A338	<i>Lanius collurio</i>			c				C	DD	D			
A026	<i>Egretta garzetta</i>			c				P	DD	C	B	C	B
A850	<i>Calonectris diomedea s. str.</i>	1		r	60	60	p		G	C	B	C	B
A197	<i>Chlidonias niger</i>	1		c				P	DD	D			
A321	<i>Ficedula albicollis</i>			c				P	DD	D			
A355	<i>Passer hispaniolensis</i>			c				P	DD	D			
A179	<i>Larus ridibundus</i>			c				P	DD	D			
A230	<i>Merops apiaster</i>			c				P	DD	C	B	C	B
A098	<i>Falco columbarius</i>			w				P	DD	D			
A862	<i>Hydrocoloeus minutus</i>			c				P	DD	D	B		
A100	<i>Falco eleonora</i>			r	15	15	p		G	D			
A226	<i>Apus apus</i>			r	100	100	p		G	D			
A403	<i>Buteo rufinus</i>	1		r				C	DD	C	B	C	C
A073	<i>Milvus migrans</i>	1		c				P	DD	D			
A863	<i>Thalasseus sandvicensis</i>	1		w				P	DD	D			

SPECIES				POPULATION IN SITE			SITE ASSESSMENT					
A249	<i>Riparia riparia</i>			c			P	DD	C	B	C	B
A251	<i>Hirundo rustica</i>			c			P	DD	D	B		
A228	<i>Tachymarptis melba</i>			r	150	150	p	G	B	B	C	B
A863	<i>Thalasseus sandvicensis</i>	1		c			P	DD	D			
A100	<i>Falco eleonora</i>			c	30	30	i	G	D			
A024	<i>Ardeola ralloides</i>	1		c			P	DD	D			
A082	<i>Circus cyaneus</i>			c			P	DD	D	B		
A229	<i>Alcedo atthis</i>			c			P	DD	C	B	C	B
A339	<i>Lanius minor</i>			c			P	DD				
A179	<i>Larus ridibundus</i>			w			P	DD	D			
A176	<i>Larus melanocephalus</i>	1		c			P	DD	C		C	B
A053	<i>Anas platyrhynchos</i>			c			P	DD	D			
A113	<i>Coturnix coturnix</i>			c	5000	5000	i	G	C	B	C	B
A251	<i>Hirundo rustica</i>			r	10	10	p	G	D	B		
A028	<i>Ardea cinerea</i>			c			P	DD	C		C	B
A391	<i>Phalacrocorax carbo sinensis</i>			w			P	DD	D			
A081	<i>Circus aeruginosus</i>	1		c			P	DD	D			
A084	<i>Circus pygargus</i>	1		c			P	DD	D			
A738	<i>Delichon urbicum (urbica)</i>			c			P	DD	C	B	C	B
A464	<i>Puffinus yelkouan</i>	1		c			P	DD	C	B	C	B
A734	<i>Chlidonias hybrida</i>	1		c			P	DD	D			
A176	<i>Larus melanocephalus</i>	1		w			P	DD	C		C	B
A233	<i>Jynx torquilla</i>			c			P	DD				
A260	<i>Motacilla flava</i>			c			P	DD	D			
A392	<i>Phalacrocorax aristotelis desmarestii</i>			p	15	15	p	G	C	C	C	B
A229	<i>Alcedo atthis</i>			w			P	DD	C	B	C	B

SPECIES				POPULATION IN SITE				SITE ASSESSMENT				
A337	<i>Oriolus oriolus</i>			c			P	DD	C	B	C	B
A032	<i>Plegadis falcinellus</i>	1		c			P	DD	D			
A097	<i>Falco vespertinus</i>			c			P	DD	D	B		
A862	<i>Hydrocoloeus minutus</i>			w			P	DD	D	B		
A072	<i>Pernis apivorus</i>			c	200	200	i	G	C	B	C	B
A087	<i>Buteo buteo</i>			p	2	2	p	G	D	B		
A023	<i>Nycticorax nycticorax</i>			c			P	DD	C	B	C	B
A198	<i>Chlidonias leucopterus</i>			c			P	DD	D			
A028	<i>Ardea cinerea</i>			w			P	DD	D			
A080	<i>Circaetus gallicus</i>			c			P	DD	C	B	C	B
A169	<i>Arenaria interpres</i>			c			P	DD	C	B	C	B

Group: A = Amphibians, B = Birds, F = Fish, I = Invertebrates, M = Mammals, P = Plants, R = Reptiles

S: In case that the data on species are sensitive and therefore have to be blocked for any public access enter: Yes

NP: In case that a species is no longer present in the site enter: x (optional)

Type: p = permanent, r = reproducing, c = concentration, w = wintering (for plant and non-migratory species use permanent)

Unit: i = individuals, p = pairs or other units according to the Standard list of population units and codes in accordance with Article 12 and 17 reporting (see reference portal)

Abundance: C = common, R = rare, V = very rare, P = present - to fill if data are deficient (DD) or in addition to population size information

Data Quality: G = Good (e.g. based on surveys), M = Moderate (e.g. based on partial data with some extrapolation), P = Poor (e.g. rough estimation), DD = Data deficient (use this category only, if not even a rough estimation of the population size can be made, in this case the fields for population size can remain empty, but the field 'Abundance' has to be filled in)

Population: A = >15%, B = 2-15%, C = <2%, D = non-significant population

Conservation: A = excellent conservation, B = good conservation, C = average or reduced conservation

Isolation: A = population (almost) isolated, B = population not-isolated, but on the margins of are of distribution, C = population not-isolated withing extended distribution range

Global: A = excellent value, B = good value, C = significant value

2.5.1.3 IT9150002 SAC Otranto Coast – Santa Maria di Leuca

A site of great landscape value, consisting of rocky cliffs plunging into the sea, made of Cretaceous limestone. Its southeast exposure is influenced by the sirocco winds, which carry humidity and create specific warm and humid microclimatic conditions. The marine area features hard-substrate seabeds with high biodiversity and submerged, and semi-submerged caves are widely present. A site of great importance due to the presence of endemic and trans-Adriatic species. There are areas with encrusting algae floors and a significant red coral facies.

Table 2-38: Habitat types present on the site IT9150002 and assessment for them

CODE	DESCRIPTION	PRIORITY	NP	COVER (HA)	CAVES	DATA QUALITY	SITE ASSESSMENT			
							REPRESENTATIVITY	RELATIVE SURFACE	CONSERVATION	HABITAT GLOBAL
							A/B/C/D	A/B/C	A/B/C	A/B/C
1120	Posidonia beds			10.5		M	C	C	B	C
1170	Reefs			1241		G	A	B	B	B
1240	Vegetated sea cliffs of the Mediterranean coasts			27.02		G	A	C	A	A
1410	Mediterranean salt meadows			0.17		G	C	C	B	B
3170	Mediterranean temporary ponds			0.005		G	C	C	B	C
5330	Thermo-Mediterranean and pre-desert scrubs			1.26		G	A	C	A	A
6220	Pseudo-steppe with grasses and annuals of the Thero-Brachypodietea			475.07		G	A	C	B	A
8210	Calcareous rocky slopes with chasmophytic vegetation			3.71		G	A	C	A	A
8310	Caves not open to the public				43	M	A	C	A	A
8330	Submerged or partially submerged sea caves				32	G	A	C	A	

PF: Habitat types 6210, 7130, 9430 priority depend on the habitat characteristics. Letter 'X' indicates that the reported habitat characteristics corresponds to its priority form.

NP: In case that a habitat type no longer exists in the site enter: x (optional)

Cover: Decimal values can be entered

Caves: For habitat types 8310 and 8330 (caves), the number of caves when the estimated surface is not available.

Data Quality: G = Good (e.g. based on surveys), M = Moderate (e.g. based on partial data with some extrapolation), P = Poor (e.g. rough estimation)

Representativity: A = excellent representativity, B = good representativity, C = significant representativity, D = non-significant presence

Relative Surface: A ≥ 15%, B = 2-15%, C ≤ 2%

Conservation: A = excellent conservation, B = good conservation, C = average or reduced conservation

Global: A = excellent value, B = good value, C = significant value

Table 2-39: Species listed in Annex II of Directive 92/43/EEC and site evaluation for them (IT9150002)

GRO UP	CODE	SCIENTIFIC NAME	S	NP	T	SIZE (MIN)	SIZE (MAX)	UNIT	CAT.	D.QUAL	POP.	CON.	ISO.	GLO.
B	A243	<i>Calandrella brachydactyla</i>			r				V	DD	C	A	B	A
B	A010	<i>Calonectris diomedea</i>			c				P	DD	C	A	A	A
B	A081	<i>Circus aeruginosus</i>			c				P	DD	C	A	A	A
B	A082	<i>Circus cyaneus</i>			c				P	DD	C	A	A	A
B	A083	<i>Circus macrourus</i>			c				P	DD	C	A	A	A
B	A084	<i>Circus pygargus</i>			c				P	DD	C	A	A	A
B	A206	<i>Columba livia</i>			r				R	DD	C	A	C	A
R	1279	<i>Elaphe quatuorlineata</i>			p				P	DD	C	B	B	B
R	1293	<i>Elaphe situla</i>			p				P	DD	C	B	B	B
B	A100	<i>Falco eleonorae</i>			c				V	DD	C	A	B	A
B	A103	<i>Falco peregrinus</i>			p				V	DD	C	A	C	A
B	A242	<i>Melanocorypha calandra</i>			p				R	DD	C	A	C	A
M	1310	<i>Miniopterus schreibersii</i>			p				P	DD	C	B	C	B
M	1366	<i>Monachus monachus</i>			p				P	DD	D			
B	A281	<i>Monticola solitarius</i>			p				R	DD	C	A	C	A
M	1316	<i>Myotis capaccinii</i>			p				P	DD	C	B	C	B
P	1883	<i>Stipa austroitalica</i>			p	7500	7500	i		G	B	A	C	A
B	A128	<i>Tetrax tetrax</i>			c				V	DD	C	A	A	A

Group: A = Amphibians, B = Birds, F = Fish, I = Invertebrates, M = Mammals, P = Plants, R = Reptiles

S: in case that the data on species are sensitive and therefore have to be blocked for any public access enter: yes

NP: in case that a species is no longer present in the site enter: x (optional)

Type: p = permanent, r = reproducing, c = concentration, w = wintering (for plant and non-migratory species use permanent)

Unit: i = individuals, p = pairs or other units according to the Standard list of population units and codes in accordance with Article 12 and 17 reporting (see reference portal)

Abundance categories (Cat.): C = common, R = rare, V = very rare, P = present – to fill if data are deficient (DD) or in addition to population size information

Data quality: G = 'Good' (e.g. based on surveys); M = 'Moderate' (e.g. based on partial data with some extrapolation); P = 'Poor' (e.g. rough estimation); VP = 'Very poor' (use this category only, if not even a rough estimation of the population size can be made, in this case the fields for population size can remain empty, but the field "Abundance categories" has to be filled in)

2.5.1.4 IT9150009 SAC Ugento Coast

A site of significant landscape value, where the undulations of the coastal hills slope down towards the sea. A series of natural erosive gullies, known locally as gravinelle, cut through the undulations of the hills. The site is of considerable archaeological interest. The Ugento maquis is the largest maquis area currently present in Salento. The pine forest is home to a population of the endemic *Ophrys parvimaculata*.

Table 2-40: Habitat types present on the site IT9150009 and assessment for them

CODE	DESCRIPTION	PRIORITY	NP	COVER (HA)	CAVES	DATA QUALITY	SITE ASSESSMENT			
							REPRESENTATIVITY	RELATIVE SURFACE	CONSERVATION	HABITAT GLOBAL
							A/B/C/D	A/B/C	A/B/C	A/B/C
1120	Posidonia beds			5433.75			A	C	A	A
1210	Annual vegetation of drift lines			362.25			A	C	A	A
2240	Brachypodietalia dune grasslands with annuals			579.6			B	C	C	C
2250	Coastal dunes with Juniperus spp.			144.9			A	C	A	A
2270	Wooded dunes with Pinus pinea and/or Pinus pinaster			579.6			B	C	B	B
5330	Thermo-Mediterranean and pre-desert scrub			72.45			A	C	A	A
8210	Calcareous rocky slopes with chasmophytic vegetation			72.45			A	B	A	A

PF: Habitat types 6210, 7130, 9430 priority depend on the habitat characteristics. Letter 'X' indicates that the reported habitat characteristics corresponds to its priority form.

NP: In case that a habitat type no longer exists in the site enter: x (optional)

Cover: Decimal values can be entered

Caves: For habitat types 8310 and 8330 (caves), the number of caves when the estimated surface is not available.

Data Quality: G = Good (e.g. based on surveys), M = Moderate (e.g. based on partial data with some extrapolation), P = Poor (e.g. rough estimation)

Representativity: A = excellent representativity, B = good representativity, C = significant representativity, D = non-significant presence

Relative Surface: A ≥ 15%, B = 2-15%, C ≤ 2%

Conservation: A = excellent conservation, B = good conservation, C = average or reduced conservation

Global: A = excellent value, B = good value, C = significant value

Table 2-41: Species referred to in Article 4 of Directive 2009/147/EC and listed in Annex II of Directive 92/43/EEC and site evaluation for them (IT9150009)

GROUP	CODE	SCIENTIFIC NAME	S	NP	T	SIZE (MIN)	SIZE (MAX)	UNIT	CAT.	D.QUAL.	POP.	CON.	ISO.	GLO.
A	5357	<i>Bombina pachypus</i>			p				P	DD	C	C	A	C
P	1883	<i>Stipa austroitalica</i>			p				P	DD	C	C	C	C
R	1279	<i>Elaphe quatuorlineata</i>			p				P	DD	C	C	B	C
R	6095	<i>Zamenis situla</i>			p				P	DD	C	C	B	C

Group: A = Amphibians, B = Birds, F = Fish, I = Invertebrates, M = Mammals, P = Plants, R = Reptiles

S: In case that the data on species are sensitive and therefore have to be blocked for any public access enter: Yes

NP: In case that a species is no longer present in the site enter: x (optional)

Type: p = permanent, r = reproducing, c = concentration, w = wintering (for plant and non-migratory species use permanent)

Unit: i = individuals, p = pairs or other units according to the Standard list of population units and codes in accordance with Article 12 and 17 reporting (see reference portal)

Abundance: C = common, R = rare, V = very rare, P = present - to fill if data are deficient (DD) or in addition to population size information

Data Quality: G = Good (e.g. based on surveys), M = Moderate (e.g. based on partial data with some extrapolation), P = Poor (e.g. rough estimation), DD = Data deficient (use this category only, if not even a rough estimation of the population)

size can be made, in this case the fields for population size can remain empty, but the field 'Abundance' has to be filled in)

Population: A = >15%, B = 2-15%, C = <2%, D = non-significant population

Conservation: A = excellent conservation, B = good conservation, C = average or reduced conservation

Isolation: A = population (almost) isolated, B = population not-isolated, but on the margins of are of distribution, C = population not-isolated withing extended distribution range

Global: A = excellent value, B = good value, C = significant value

2.5.1.5 IT 9150015 SAC & SPA Gallipoli Coast and St. Andrea Island

The island of S. Andrea is a site of notable archaeological importance with settlements from the Bronze Age. The site is characterized by the presence of encrusting algae floors with a 2% percentage of the overall coverage.

Table 2-42: Habitat types present on the site IT9150015 and assessment for them

CODE	DESCRIPTION	PRIORI TY	NP	COVER (HA)	CAVE S	DATA QUALI TY	SITE ASSESSMENT			
							REPRESENT ACTIVITY	RELATIV E SURFAC E	CONSER VATION	HABITAT GLOBAL
							A/B/C/D	A/B/C	A/B/C	A/B/C
1120	Posidonia beds			3235.24		M	A	B	B	B
1150	Coastal lagoons			2.1		P	A	C	A	A
1170	Reefs			1441.78		M	B	C	B	B
1210	Annual vegetation of drift lines			0.17		M	B	C	B	B
1240	Vegetated sea cliffs of the Mediterranean coasts with endemic Limonium spp.			11.54		M	A	C	A	A
1420	Mediterranean and thermo-Atlantic halophilous scrubs (Sarcocornetea fruticosi)			13.07		M	A	C	A	A
2110	Embryonic shifting dunes			1.68		M	A	C	B	B
2120	Shifting dunes along the shoreline with Ammophila arenaria ("white dunes")			1.68		P	A	C	B	B
2230	Malcolmietalia dune grasslands			0.7		M	B	C	B	B
2240	Brachypodietalia dune grasslands with annuals			700.6			A	C	A	A
2250	Coastal dunes with Juniperus spp.			12.31		M	A	C	B	A
2270	Wooded dunes with Pinus pinea and/or Pinus pinaster			28.33		P	C	C	B	C
3170	Mediterranean temporary ponds			210.18			A	C	A	A
3290	Intermittently flowing Mediterranean rivers of the Paspalo-Agrostidion			1.24		M	C	C	C	C

CODE	DESCRIPTION	PRIORITY	NP	COVER (HA)	CAVES	DATA QUALITY	SITE ASSESSMENT			
							REPRESENT ACTIVITY	RELATIVE SURFACE	CONSERVATION	HABITAT GLOBAL
							A/B/C/D	A/B/C	A/B/C	A/B/C
6220	Pseudo-steppe with grasses and annuals of the Thero-Brachypodietea			4.14		M	A	C	A	A

PF: Habitat types 6210, 7130, 9430 priority depend on the habitat characteristics. Letter 'X' indicates that the reported habitat characteristics corresponds to its priority form.

NP: In case that a habitat type no longer exists in the site enter: x (optional)

Cover: Decimal values can be entered

Caves: For habitat types 8310 and 8330 (caves), the number of caves when the estimated surface is not available.

Data Quality: G = Good (e.g. based on surveys), M = Moderate (e.g. based on partial data with some extrapolation), P = Poor (e.g. rough estimation)

Representativity: A = excellent representativity, B = good representativity, C = significant representativity, D = non-significant presence

Relative Surface: A ≥ 15%, B = 2-15%, C ≤ 2%

Conservation: A = excellent conservation, B = good conservation, C = average or reduced conservation

Global: A = excellent value, B = good value, C = significant value

Table 2-43: Species referred to in Article 4 of Directive 2009/147/EC and listed in Annex II of Directive 92/43/EEC and site evaluation for them (IT9150015)

Group	Code	Scientific Name	S	NP	T	Size (Min)	Size (Max)	Unit	Cat.	D.qual.	Pop.	Con.	Iso.	Glo.
A	5357	<i>Bombina pachypus</i>			p				P	DD	D			
B	A293	<i>Acrocephalus melanopogon</i>			c				P	DD	C	B	C	C
B	A229	<i>Alcedo atthis</i>			c				P	DD	C	B	C	C
B	A052	<i>Anas crecca</i>			w				P	DD	C	B	C	C
B	A773	<i>Ardea alba</i>			c				R	DD	C	B	C	C
B	A029	<i>Ardea purpurea</i>			c				P	DD	C	B	C	C
B	A024	<i>Ardeola ralloides</i>			c				P	DD	C	B	C	B
B	A222	<i>Asio flammeus</i>			c				V	DD	D			
B	A059	<i>Aythya ferina</i>			w				P	DD	B	B	C	B
B	A060	<i>Aythya nyroca</i>			c				R	DD	C	B	C	C
B	A021	<i>Botaurus stellaris</i>			c				P	DD	C	B	C	C
B	A243	<i>Calandrella brachydactyla</i>			r				C	DD	B	B	C	B
B	A861	<i>Calidris pugnax</i>			c				P	DD	C	B	C	B
B	A138	<i>Charadrius alexandrinus</i>			r				V	DD	C	C	C	C
B	A734	<i>Chlidonias hybrida</i>			c				P	DD	C	B	C	B
B	A197	<i>Chlidonias niger</i>			c				P	DD	C	B	C	B
B	A031	<i>Ciconia ciconia</i>			c				R	DD	C	B	C	C
B	A081	<i>Circus aeruginosus</i>			w				P	DD	C	B	C	B
B	A082	<i>Circus cyaneus</i>			w				P	DD	C	B	C	B
B	A083	<i>Circus macrourus</i>			c				P	DD	C	B	C	C
B	A084	<i>Circus pygargus</i>			c				P	DD	C	B	C	C
B	A231	<i>Coracias garrulus</i>			c				P	DD	C	C	C	C

Group	Code	Scientific Name	S	NP	T	Size (Min)	Size (Max)	Unit	Cat.	D.qual.	Pop.	Con.	Iso.	Glo.
B	A480	<i>Cyanecula svecica</i>			w				P	DD	C	B	C	B
B	A026	<i>Egretta garzetta</i>			w				R	DD	C	B	C	B
B	A095	<i>Falco naumanni</i>			c	6	10	i		G	C	B	C	C
B	A153	<i>Gallinago gallinago</i>			w				P	DD	C	B	C	C
B	A154	<i>Gallinago media</i>			c				R	DD	C	B	C	C
B	A002	<i>Gavia arctica</i>			w	2	10	i		G	C	B	B	B
B	A189	<i>Gelochelidon nilotica</i>			c				P	DD	C	B	C	B
B	A127	<i>Grus grus</i>			c				P	DD	C	B	C	C
B	A131	<i>Himantopus himantopus</i>			c				R	DD	C	C	C	C
B	A862	<i>Hydrocoloeus minutus</i>			w				P	DD	D			
B	A022	<i>Ixobrychus minutus</i>			c				P	DD	C	B	C	B
B	A181	<i>Larus audouinii</i>			r	30	500	p		G	B	A	A	A
B	A459	<i>Larus cachinnans</i>			p				C	DD	D			
B	A176	<i>Larus melanocephalus</i>			w				P	DD	C	B	C	B
B	A604	<i>Larus michahellis</i>			w				P	DD	D			
B	A179	<i>Larus ridibundus</i>			w				P	DD	D			
B	A156	<i>Limosa limosa</i>			c				R	DD	C	B	C	C
B	A855	<i>Mareca penelope</i>			w				P	DD	C	B	C	C
B	A768	<i>Numenius arquata arquata</i>			w				P	DD	D			
B	A023	<i>Nycticorax nycticorax</i>			c				P	DD	C	B	C	B
B	A094	<i>Pandion haliaetus</i>			c				R	DD	C	B	C	C
B	A621	<i>Passer italiae</i>			r				V	DD	D			
B	A356	<i>Passer montanus</i>			r				P	DD	D			
B	A034	<i>Platalea leucorodia</i>			c				R	DD	C	C	C	C
B	A032	<i>Plegadis falcinellus</i>			c				P	DD	C	B	C	C
B	A140	<i>Pluvialis apricaria</i>			w				P	DD	C	B	C	B
B	A119	<i>Porzana porzana</i>			c				P	DD	C	B	C	B
B	A132	<i>Recurvirostra avosetta</i>			c				V	DD	D			
B	A336	<i>Remiz pendulinus</i>			r				P	DD	D			
B	A276	<i>Saxicola torquatus</i>			r				P	DD	D			
B	A856	<i>Spatula querquedula</i>			c				P	DD	C	B	C	C
B	A193	<i>Sterna hirundo</i>			c				P	DD	C	B	C	B
B	A885	<i>Sternula albifrons</i>			c				P	DD	C	B	C	B
B	A863	<i>Thalasseus sandvicensis</i>			w				P	DD	C	B	C	B
B	A166	<i>Tringa glareola</i>			c				P	DD	C	B	C	B
B	A162	<i>Tringa totanus</i>			w				P	DD	C	B	C	B
B	A892	<i>Zapornia parva</i>			c				P	DD	C	B	C	B

Group	Code	Scientific Name	S	NP	T	Size (Min)	Size (Max)	Unit	Cat.	D.qual.	Pop.	Con.	Iso.	Glo.
M	1304	<i>Rhinolophus ferrumequinum</i>			p				P	DD	B	B	A	B
M	1349	<i>Tursiops truncatus</i>			p				P	DD	D			
P	1883	<i>Stipa austroitalica</i>			p				P	DD	B	B	C	B
R	1224	<i>Caretta caretta</i>			p				P	DD	C	C	C	C
R	1279	<i>Elaphe quatuorlineata</i>			p				P	DD	C	C	B	C

Group: A = Amphibians, B = Birds, F = Fish, I = Invertebrates, M = Mammals, P = Plants, R = Reptiles

S: In case that the data on species are sensitive and therefore have to be blocked for any public access enter: Yes

NP: In case that a species is no longer present in the site enter: x (optional)

Type: p = permanent, r = reproducing, c = concentration, w = wintering (for plant and non-migratory species use permanent)

Unit: i = individuals, p = pairs or other units according to the Standard list of population units and codes in accordance with Article 12 and 17 reporting (see reference portal)

Abundance: C = common, R = rare, V = very rare, P = present - to fill if data are deficient (DD) or in addition to population size information

Data Quality: G = Good (e.g. based on surveys), M = Moderate (e.g. based on partial data with some extrapolation), P = Poor (e.g. rough estimation), DD = Data deficient (use this category only, if not even a rough estimation of the population size can be made, in this case the fields for population size can remain empty, but the field 'Abundance' has to be filled in)

Population: A = >15%, B = 2-15%, C = <2%, D = non-significant population

Conservation: A = excellent conservation, B = good conservation, C = average or reduced conservation

Isolation: A = population (almost) isolated, B = population not-isolated, but on the margins of are of distribution, C = population not-isolated withing extended distribution range

Global: A = excellent value, B = good value, C = significant value

2.5.2 Cetacean Critical Habitats designated by ACCOBAMS

The Agreement on the Conservation of Cetaceans in the Black Sea, Mediterranean Sea, and Contiguous Atlantic Area (ACCOBAMS) aims to conserve cetaceans at the regional level. Under this intergovernmental Agreement, countries commit to protecting all cetacean species and their habitats in the Agreement's area of application. In this context, the members and the Scientific Committee of ACCOBAMS have identified Cetacean Critical Habitats (CCHs), which are areas critical for the survival and conservation of a healthy cetacean population. They include marine habitats important for feeding, reproduction, and rearing of calves, as well as areas important for migration.

A total of 8 CCHs have been identified in Greek marine waters:

- Kalamos
- Eastern Ionian Sea and Gulf of Corinth
- Argosaronic Gulf and southern Euboean Gulf
- Northern Sporades marine area
- Northern Aegean Sea
- Maritime area of the Dodecanese
- Amvrakikos Gulf
- Southwestern Crete and the Hellenic Trench

ACCOBAMS resulted from consultations between the four conventions:

- i. the Barcelona Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean and its Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean,
- j. the Bonn Convention on the Conservation of Migratory Species of Wild Animals,
- k. the Bern Convention on the Conservation of European Wildlife and Natural Habitats.

Due to the migratory characteristics of these species, the agreement was drawn up under the auspices of the Bonn Convention (UNEP/CMS).

The area covered by the agreement consists of all the marine waters of the Black Sea, the Mediterranean Sea, and the adjacent Atlantic area west of the Strait of Gibraltar. The area includes the Pelagos Sanctuary, which is dedicated to marine mammals in the northwestern Mediterranean and was established by France, Italy, and Monaco. ACCOBAMS is the first agreement that commits countries in these regions to cooperate on cetacean conservation. An innovative approach of this agreement is the inclusion of non-coastal countries whose maritime activities may endanger the conservation of cetaceans.

In 2010, the parties to ACCOBAMS adopted a resolution to extend the geographical scope of the agreement area to the exclusive economic zones of Spain and Portugal. In 2022, the agreement has 24 parties: Albania, Algeria, Bulgaria, Croatia, Cyprus, Egypt, France, Georgia, Greece, Italy, Lebanon, Libya, Malta, Monaco, Montenegro, Morocco, Portugal, Romania, Slovenia, Spain, Syria, Tunisia, Turkey, and Ukraine.

As shown, in Figure 2-149, the study area does not fall within the boundaries of any ACCOBAMS Zone.

The closest ACCOBAMS Zone to Exploration Well Asopus 1A is “The Sazani Island - Karaburun Peninsula” in Albania at approximately ~72 km N.

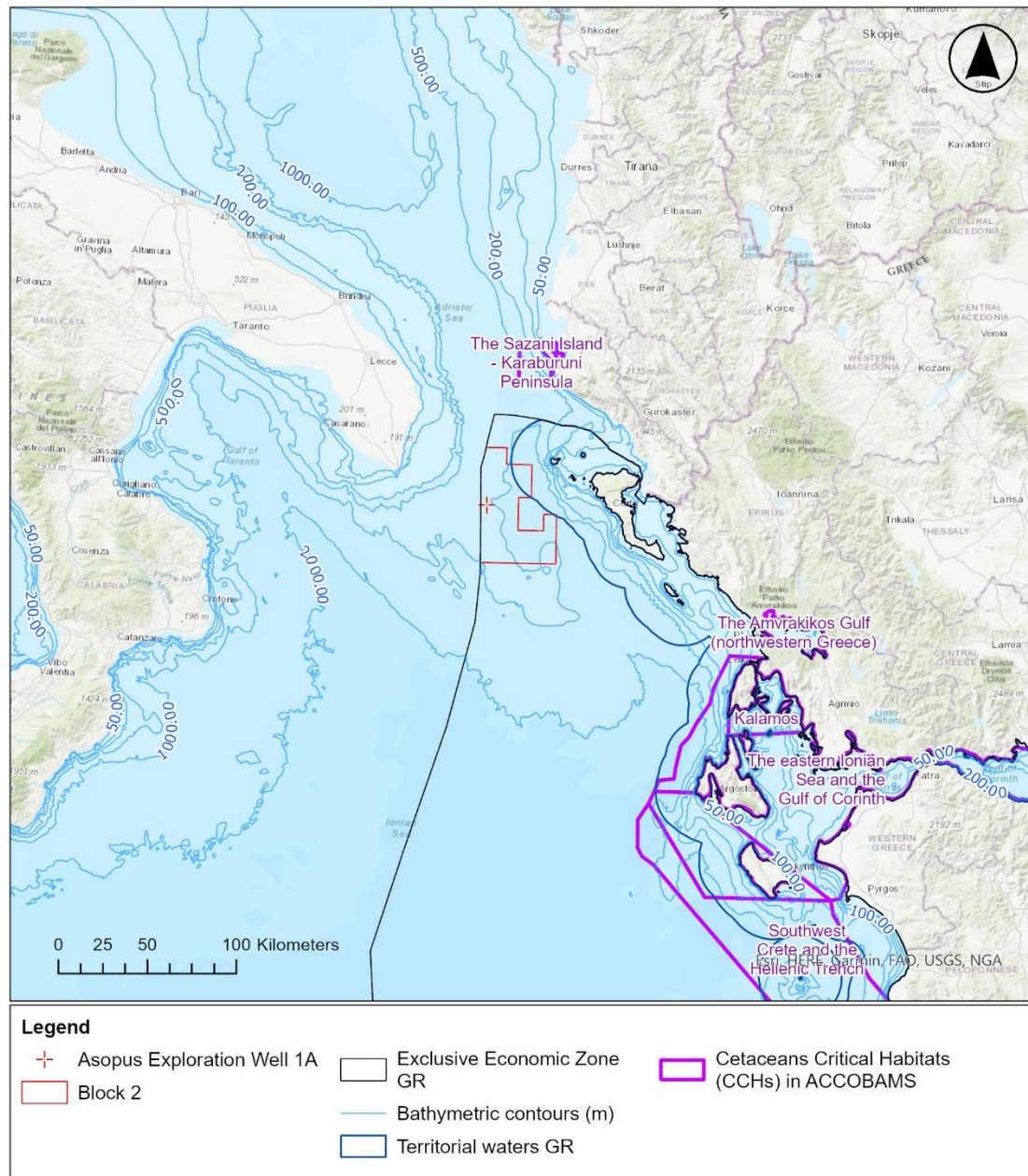


Figure 2-149: Critical Habitats for Cetaceans in the broader area (Source: ACCOBAMS)

The distances between the project and the ACCOBAMS areas are summarized in Table 2-44.

Table 2-44: Critical Habitats for Cetaceans in the broader area (Source: ACCOBAMS)

ACCOBAMS SITE	DISTANCE FROM THE EXPLORATION WELL ASOPUS 1A	DESCRIPTION OF AN AREA OF SPECIAL IMPORTANCE FOR SPECIES
The Sazan Island- Karaburuni Peninsula	72 km	Common dolphin and other cetaceans
The Amvrakikos Gulf (Northwestern Greece)	168 km	Bottlenose dolphin
Kalamos	179km	Common dolphin and other cetaceans

ACCOBAMS SITE	DISTANCE FROM THE EXPLORATION WELL ASOPUS 1A	DESCRIPTION OF AN AREA OF SPECIAL IMPORTANCE FOR SPECIES
The Eastern Ionian Sea & the Gulf of Corinth	158 km	Common dolphin and other cetaceans
Southwest Crete & the Hellenic Trench	187 km	Common dolphin and other cetaceans

2.5.3 Important Marine Mammal areas

The IUCN Marine Mammal Protected Areas Task Force (MMPATF) IMMA programme is a joint initiative of the IUCN Species Survival Commission (SSC) and the World Commission on Protected Areas (WCPA). IMMAs identify discrete portions of habitat that are important for one or more marine mammal species and have the potential to be delineated and managed for conservation.

These areas may merit place-based protection and/or monitoring. As such, IMMAs serve as a spatial data layer reflecting important biodiversity and potentially ecosystem health, highlighting priority sites for conservation. Governments, intergovernmental organisations, conservation groups, and the general public can use IMMAs to guide protection and management efforts.

The closest IMMAs to the project is the Ionian Archipelago IMMA, located approximately 37 km east of Exploration Well Asopus 1A (see Figure 2-150).

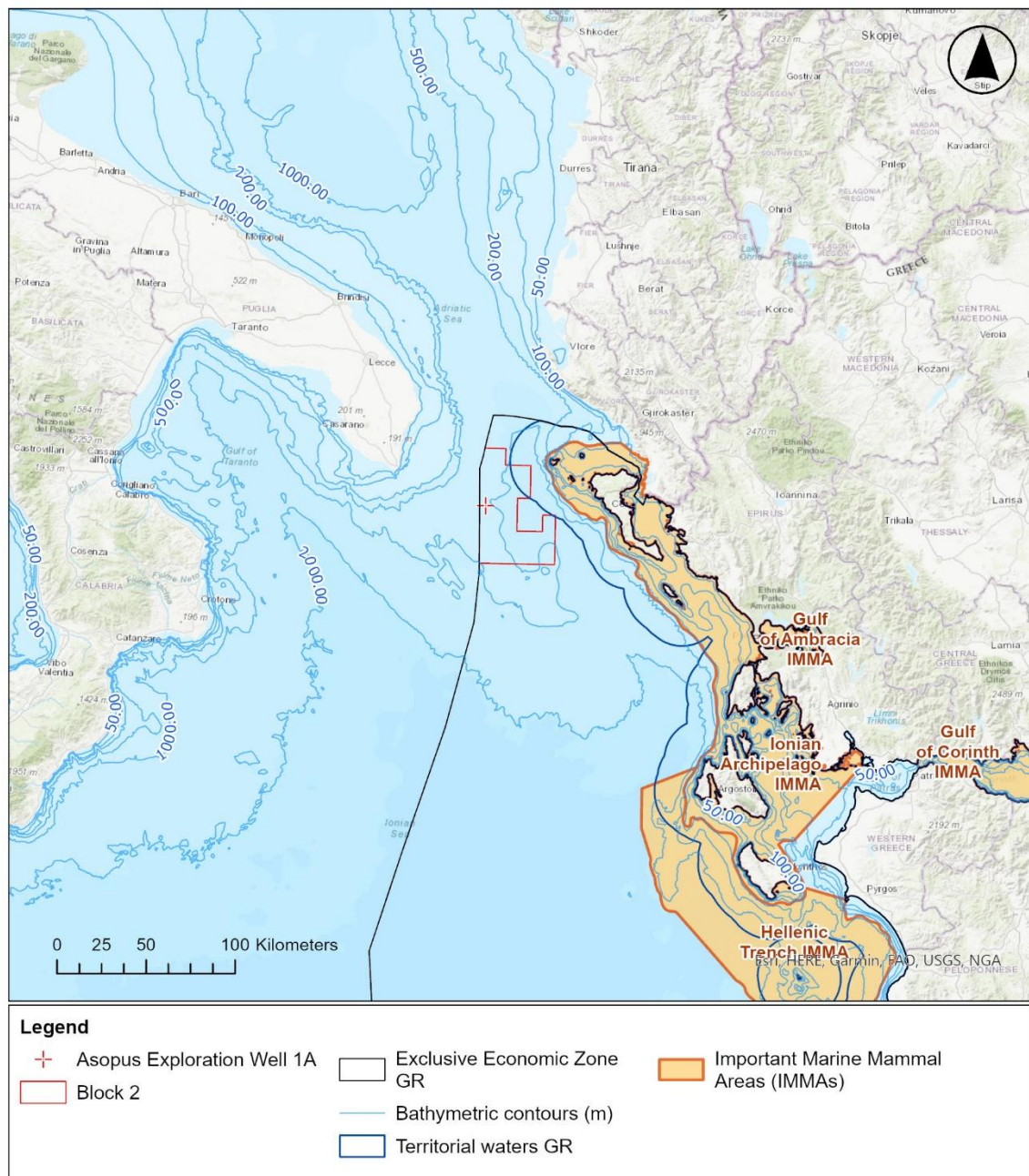


Figure 2-150: Important Marine Mammals Areas in the broader area (IMMAs)

As depicted in Figure 2-151, the project location falls within the “Southern Adriatic and Northern Ionian Sea” Area of Interest (AoI). Areas of Interest (AoI) are specific marine regions that expert panels have evaluated and determined to be of significant interest for the potential future identification and designation of IMMAs. This particular AoI is located within the Mediterranean Sea region and encompasses the maritime jurisdictions of Albania, Croatia, Greece, Italy, and Montenegro. It is important to mention that while this region has been highlighted for its potential ecological significance for marine mammals, it currently holds the status of an AoI and has not yet been officially designated as an IMMA.

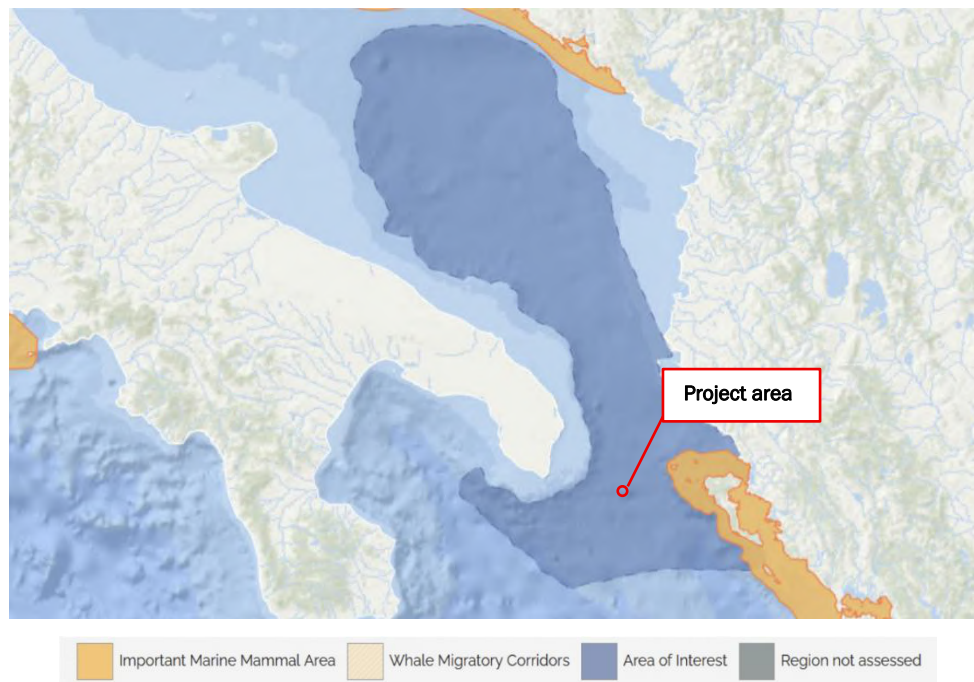


Figure 2-151: Area of Interest (Aol) Southern Adriatic and Northern Ionian Sea (Source: IMMA e-atlas)

2.5.3.1 IMMA Ionian Archipelago

The Ionian Archipelago IMMA encompasses a total geographic extent of 9,606 km². This region is formally designated based on the presence and ecological requirements of two primary qualifying species: the common dolphin (*Delphinus delphis*), which meets Selection Criteria A, B (1), and C (1, 2), and the Mediterranean monk seal (*Monachus monachus*), which satisfies Criteria A and C (1). Furthermore, the area supports a diverse assembly of other documented marine mammal species, including the fin whale (*Balaenoptera physalus*), the common bottlenose dolphin (*Tursiops truncatus*), and Cuvier's beaked whale (*Ziphius cavirostris*).

2.5.3.1.1 Summary of ecological significance

Within the Ionian Archipelago, the Endangered Mediterranean common dolphin population experienced a catastrophic decline between 1995 and 2007. Recent longitudinal monitoring and opportunistic sighting data indicate that these individuals likely range across a broader expanse than previously documented around the archipelago. Concurrently, the region represents one of the most vital global habitats for the Endangered Mediterranean monk seal, supporting an estimated 5.7% to 9.2% of the total global population. Critical breeding habitats used for pupping have been extensively documented within this marine space.

2.5.3.1.2 Jurisdictional description

The IMMA includes the marine environments surrounding Othonoi, Ereikousa, Mathraki, Corfu, Paxoi, Antipaxoi, Lefkada, Cephalonia, Ithaki, and Zakynthos, extending to the mainland Greek coastline. A significant portion of the Inner Ionian Sea Archipelago, covering roughly 866 km², is recognized as a Natura 2000 Site of Community Importance (GR2220003) under the 92/43/EEC Habitats Directive. The IMMA's

outer boundaries are generally defined by the 200-meter depth contour. The entire designated area falls under Greek national jurisdiction within the 6-nautical-mile territorial water limit.

2.5.3.1.3 Population dynamics and conservation status

Common dolphins in the Inner Ionian Sea Archipelago suffered a precipitous decline from approximately 150 to 15 individuals between 1995 and 2007, a trend strongly linked to the overfishing of their primary epipelagic prey. Declining commercial fish landings in recent years further underscore the pressure on these marine resources. Bottlenose dolphins are also present, with approximately 25% of photo-identified individuals displaying high levels of residency. Surveys between 2008 and 2016 recorded sporadic presence of common dolphin groups totaling up to 40 individuals, while over 40 opportunistic sightings were reported through the Ionian Dolphin Project network since 2012. Genetic evidence suggests that common dolphins in the eastern Mediterranean are largely isolated from western populations.

The Mediterranean monk seal (*Monachus monachus*) is taxonomically the sole representative of its genus and is listed as Endangered on the global IUCN Red List. Adult males average 2.4 m in length and 315 kg in weight, while females average 2.0 to 2.4 m and 300 kg. Pups weigh between 15 and 18 kg at birth and reach maturity between 3 and 6 years. Greece hosts a minimum population of 179 adults, which constitutes roughly 40% to 51% of the world's population. Major threats to the species include habitat loss from coastal development, deliberate killing, accidental entanglement in fishing gear, prey depletion, and disease.

2.5.3.1.4 Criterion-based assessments

Under Criterion A (Vulnerability), common dolphins are recognized as an Endangered Mediterranean subpopulation protected under the CMS, Bern Convention, and EU Habitats Directive. Ecosystem modeling has demonstrated that local fisheries have negatively impacted marine biodiversity and weakened the food web. For monk seals, recent studies provide a population estimate of 37 to 60 individuals within the IMMA.

Criterion B (Distribution and Abundance) is supported by evidence of strong site-fidelity for common dolphins; photo-identification efforts between 1995 and 2015 identified 205 individuals, with recent surveys recording recaptures of dolphins previously identified in the Inner Archipelago.

Criterion C (Key Life Cycle Activities) notes the regular observation of offspring in common dolphin groups and the high density of monk seal shelters. The Ionian islands possess at least 194 resting shelters and 2 breeding shelters. Dolphin groups are frequently observed surface-feeding, highlighting the critical nature of these waters as foraging grounds. Conservation measures proposed for the region aim to balance the protection of these fragile populations with the needs of local, fisheries-dependent communities.

2.5.4 Ecologically or Biologically Significant marine Areas

Ecologically or Biologically Significant Marine Areas (EBSAs) are marine regions identified under the Convention on Biological Diversity (CBD) as having high ecological or biological significance. These areas support biodiversity, endangered species, unique ecosystems, or critical life-cycle processes such as breeding and migration. EBSAs are identified based on scientific criteria, including uniqueness, productivity,

vulnerability, and importance for threatened species. While EBSA designation does not impose legal protection, it informs conservation and sustainable management efforts at national and international levels.

The Exploration Well Asopus 1A falls within the “South Adriatic Ionian Strait” EBSA (MED 3) (see Figure 2-152).

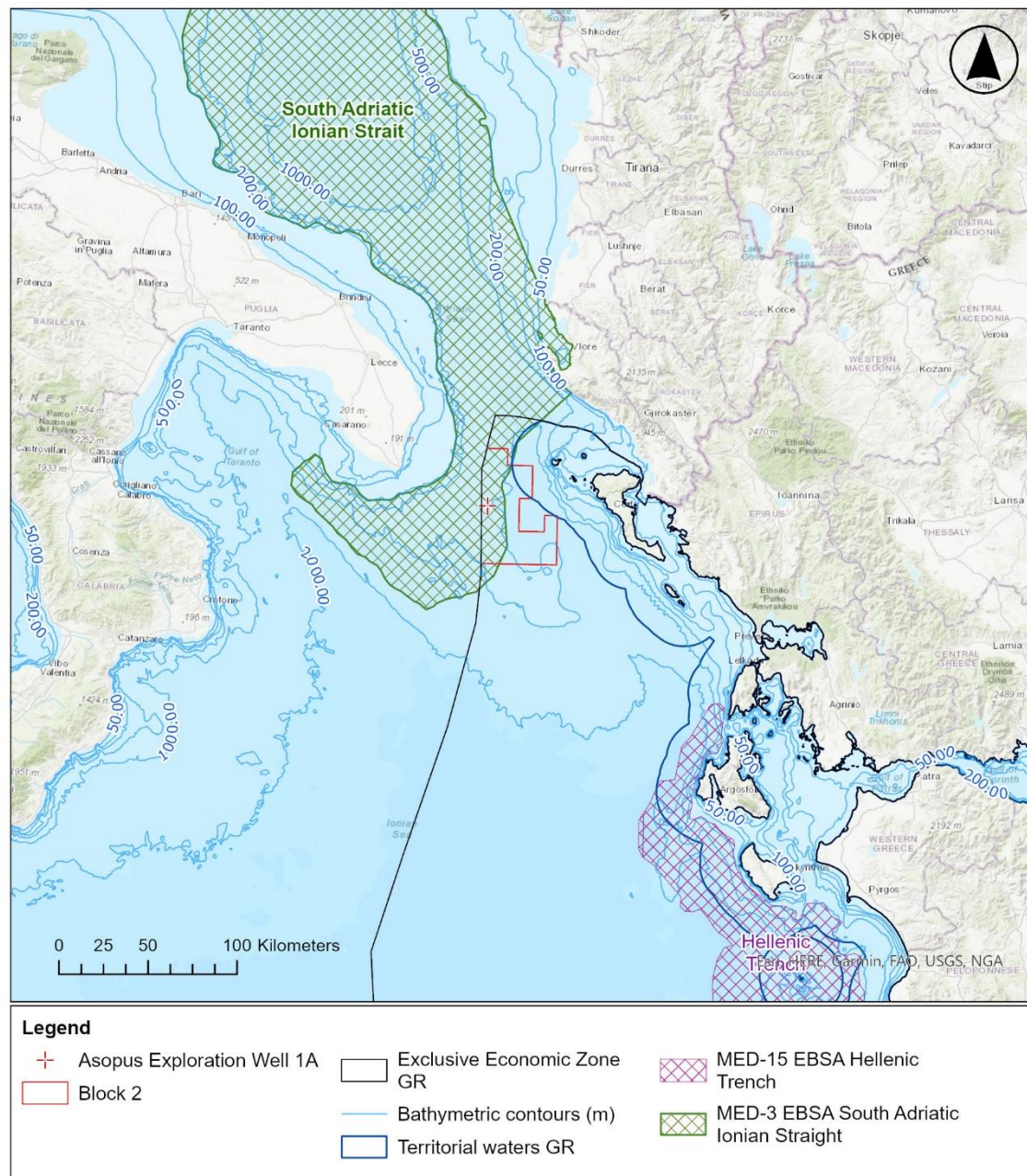


Figure 2-152: Ecologically or Biologically Significant Marine Areas (EBSAs) in the broader area

2.5.4.1 MED-3 EBSA South Adriatic Ionian Strait

2.5.4.1.1 General information

The area is located in the center of the southern part of the Southern Adriatic basin and the northern Ionian Sea. It is characterized by steep slopes, high salinity and a maximum depth ranging between 200 m to 1500

m. Water exchange with the Mediterranean Sea takes place through the Otranto Channel, which has a sill that is 800 m deep. This area contains important habitats for Cuvier's beaked whales (*Ziphius cavirostris*), an Annex II species of the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean (SPA/BD Protocol) in the framework of Barcelona Convention, and significant densities of other megafauna such as the giant devil ray (*Mobula mobular*), striped dolphin (*Stenella coeruleoalba*), Mediterranean monk seal (*Monachus monachus*) and loggerhead turtle (*Caretta caretta*), all of which are listed in Annex II of SPA/BD Protocol. Benthos includes deep-sea cold water coral communities and deep-sea sponge aggregations, representing important biodiversity reservoirs and contributing to the trophic recycling of organic matter. Tuna, swordfish and sharks are also common in this area.

The area described is where the Adriatic Sea meets the Ionian Sea. Water exchange with the Ionian Sea takes place through the Otranto Channel (Artegiani et al., 1996). This area contains important habitats for Mediterranean megafauna and for rare slow-growing deep-water corals.

2.5.4.1.2 Area details

The area is located in the centre of the southern part of the Southern Adriatic basin and in the northern part of the Ionian Sea. It includes the deepest part of the Adriatic Sea on the western side and it encompasses a coastal area in Albania (Sazani Island and Karaburuni peninsula). It also covers the slopes near Santa Maria di Leuca. The area is located in the centre of the southern part of the Southern Adriatic basin and the northern Ionian Sea.

This area is characterized by steep slopes, higher salinity and a maximum depth ranging from 200 m to 1500 m. It can be considered a pelagic oceanic habitat (Fonda-Umani, 1996). It is an area where southern Adriatic deep water (SAdDW) is locally formed. Water exchange with the Mediterranean Sea takes place through the Otranto Channel, whose sill is 800 m deep (Artegiani et al., 1997a). One of the major components forcing the general circulation is the Otranto Channel forcing (Artegiani et al., 1997b). The South Adriatic basin is intruded upon by Levantine Intermediate Water (LIW), a high salinity water mass formed through evaporation in the eastern Mediterranean (Zore-Armanda, 1963). Furthermore, this area encompasses the Bari Canyon, which plays an important role in the dynamics of the Adriatic Sea as it is the main channel facilitating the transport of sediments between the western Adriatic shelf and the southern basin (Oceana, 2014). The South Adriatic Pit is also characterized by open sea zooplankton, particularly euphausiids, also known as krill. There are also mesopelagic and deep zooplankton in the area (Viličić, 2008). This area contains important habitats for Cuvier's beaked whales (*Ziphius cavirostris*), an Annex II species of the SPA/BD Protocol and significant densities of other megafauna such as the giant devil ray (*Mobula mobular*), striped dolphin (*Stenella coeruleoalba*), Mediterranean monk seal (*Monachus monachus*) and loggerhead turtle (*Caretta caretta*) all listed in Annex II of SPA/BD Protocol. Benthos includes species of deep-sea cold-water coral communities, deep-sea sponge aggregations representing important biodiversity reservoirs and contributing to the trophic recycling of organic matter (Fortuna et al., 2014; UNEP-MAP-RAC/SPA, 2014a). Tuna (*Thunnus thynnus*), swordfish (*Xiphias gladius*), and sharks can also be found in the area (UNEP-MAP-RAC/SPA, 2014b). The area hosts cnidarian-rich deep-sea habitats in the depth range of ca. 400-700 m. Recent research reveals the existence of megabenthic communities dominated by a variety of cnidarians, including frame-builders scleractinians (*Madrepora oculata*, *Lophelia pertusa*) (which are a backbone of this cold-water coral communities), stony corals as *Desmophyllum dianthus* and *Stenocyathus*

vermiformis and the yellow coral *Dendrophyllia cornigera*), antipatharians (*Leiopathes glaberrima*) and gorgonians (*Callogorgia verticillata*) as major habitat forming taxa, often in association with sponges like *Pachastrella monilifera* and *Poecillastra compressa* and, subordinately, serpulids (Freiwald et al., 2009; Taviani et al., 2011; Angeletti et al., 2014; Oceana, 2014). Best known examples refer to the south-western margin of the basin where scleractinian-sponge communities (i.e. *Madrepora oculata*, *Lophelia pertusa*, *Dendrophyllia cornigera*, *Desmophyllum dianthus*, *Poecillastra compressa*, *Pachastrella monilifera*) have been documented in the Bari Canyon, Gondola Slide and Dauno Seamount (Angeletti et al., 2014 and references therein). According to recent research, this area encompasses an almost continuous belt of patchy cold water coral sites along the entire south-western margin (Apulian), connecting the Adriatic populations with those inhabiting the Ionian margin - Santa Maria di Leuca coral province (Angeletti et al., 2014). The communities of Santa Maria di Leuca have the most significant growth between 500-700 m depth, which is controlled by oceanographic factors, namely the influx of Adriatic Deep Water (Angeletti et al., 2014). This provides a regular supply of nutrients and particulate organic matter. In 2006, Santa Maria di Leuca was designated under the GFCM as a Fishery Restricted Area (FRA) banning the use of towed gears due to the relationship between the *Lophelia* reef and the occurrence of priority commercial species (e.g. *Aristaeomorpha foliacea*, *Aristeus antennatus*, *Merluccius merluccius*, *Nephrops norvegicus*, *Pagellus bogaraveo*). This area is a site of active coral growth since the latest Pleistocene (Taviani et al., 2011. and the references therein). Deep-sea sponge aggregations represent important biodiversity reservoirs and contribute to the trophic recycling of organic matter (Oceana, 2014). Close to the coral biocoenosis, some typical bathyal species also occur (e.g. *Chimaera monstrosa*, *Dalathias licha*, *Galeus melastomus*, *Aulopus filamentosus*, *Chlorophthalmus agassizi*, *Helicolenus dactylopterus*, *Caelorinchus caelorhincus*) (Oceana, 2014). Due to this area's strong oceanographic conditions, it constitutes an important migratory corridor for megafauna like the short beaked common dolphin (*Delphinus delphis*) and marine turtles (Oceana, 2014).

The area is one of the most important fishing grounds for pelagic species and deep-water bottom trawling. Slow growing deep-water corals are sensitive to bottom trawling, and pelagic species are affected by high fishing pressure and by-catch (Rogers, 2004).

2.5.4.2 MED-5 EBSA Hellenic Trench

2.5.4.2.1 General information

The Hellenic Trench, starting from the Greek Ionian islands to the south of Crete and further north-east towards the SW coast of Anatolia, is a major feature of the seafloor connecting the Central to the Eastern Mediterranean. Due to a number of environmental features, including its geomorphological conditions, this area is important for the survival of threatened, deep-diving marine mammals in the eastern Mediterranean Sea, including both deep-diving cetaceans (sperm and Cuvier's beaked whales), and coastal marine mammals (monk seals and common dolphins). Benthic biodiversity hot spots are also present along the area's steep continental slope south of Crete. Additionally, the oceanographic conditions of the eastern part of the area (Rhodes Gyre) contributes to the biological productivity of the North-East Levantine Sea, which has an extremely oligotrophic background.

The features of the area include: - A deep trench in the seafloor with a particularly steep slope, extending as an arch around Greece from west to east, starting from the Greek Ionian islands, around the Peloponnese,

to the south of Crete and further north-east, past the southern coast of the island of Rhodes towards the south-west coast of Anatolia. The depths included in the area range from 200 to 2000 m. Long-term observations have shown that the Hellenic Trench contains critical habitat of deep-diving cetaceans, such as sperm whales and Cuvier's beaked whales. Presence of the latter species is also supported by a modelling effort undertaken under the auspices of ACCOBAMS's Scientific Committee (Cañadas et al., 2011); - A cyclonic feature of the eastern Mediterranean circulation (Rhodes Gyre) characterized by constant upwelling whereby nutrient-rich deep water is brought up to the surface, enabling higher primary production than in surrounding areas. No systematic observations of cetaceans have been conducted in the Rhodes Gyre, although this feature's oceanographic characteristics, with higher levels of primary productivity than those of the surrounding waters, indicate that the area may be particularly important for secondary consumers in this area; - Coastal hot spots of biodiversity including seagrass (*Posidonia*) meadows, brown algae (*Cystoseira*) forests, coralligenous concretions are present in the area. A number of Natura-2000 sites have been designated in the coastal areas of Crete, Rhodes and smaller islands of the Dodecanese (see figure 2); - Coastal biodiversity hot spots within the Inner Ionian Sea, in the waters between the islands of Lefkada, Kefallonia and Zakynthos and mainland Greece. The area hosts a breeding nucleus of the critically endangered Mediterranean monk seal and is a feeding and breeding area for the endangered short-beaked common dolphin and the vulnerable common bottlenose dolphin.

2.5.4.2.2 Area details

The area is contained in part in the Central Mediterranean sub-region (Eastern Ionian Sea), and in part in the Eastern Mediterranean sub-region (Levantine Sea). The area extends from the Greek Ionian islands to the south of Crete and further to the north-east towards the south-west coast of Anatolia.

Based on available information (e.g., direct observations, models, inference), the area can be subdivided as follows, from west to east: - Inner Ionian Sea, between the islands of Lefkada, Kefallonia and Zakynthos and mainland Greece, which is important for bottlenose dolphin and contains critical habitat for monk seals and common dolphins; Western portion of the Hellenic Trench, from its western boundary to roughly the midpoint of Crete. This is a critical habitat for sperm whales; - Observed and modelled critical habitat of Cuvier's beaked whales throughout the Hellenic Trench; - Rhodes Gyre, which is a habitat for large pelagic mammals and fishes.

The deep area is frequently subjected to naval activity. This includes the use of high energy sonar, which is known to have lethal effects on deep-diving cetaceans. Several atypical mass stranding events of Cuvier's beaked whales, which have been connected to simultaneous navy exercises with both direct and circumstantial evidence, have taken place in the area.

2.5.5 Important Sharks and Ray Areas

The Important Shark and Ray Areas (ISRAs) programme was developed by the IUCN Species Survival Commission Shark Specialist Group to identify and delineate discrete three-dimensional portions of habitat that are critical for the persistence of shark, ray, and chimaera populations. ISRAs are defined using a standardized, evidence-based approach and are designated based on their importance for key life-history processes, such as reproduction, feeding, aggregation, resting, or migration.

ISRAs are not protected areas per se, rather, they represent spatially explicit conservation priorities that can support marine spatial planning, fisheries management, environmental impact assessments, and biodiversity conservation initiatives. By identifying habitats essential for threatened and ecologically important elasmobranch species, ISRAs provide a scientific basis for informing conservation and management actions at local, national, and regional scales.

No ISRAs are located within the immediate project area. However, the wider project area includes the “Western Apulian Coast ISRA”, “Santa Maria di Leuca ISRA”, “Otranto Channel ISRA”, and “Amvrakikos Gulf ISRA” (see Figure 2-153, the distances of which are summarized in Table 2-45).

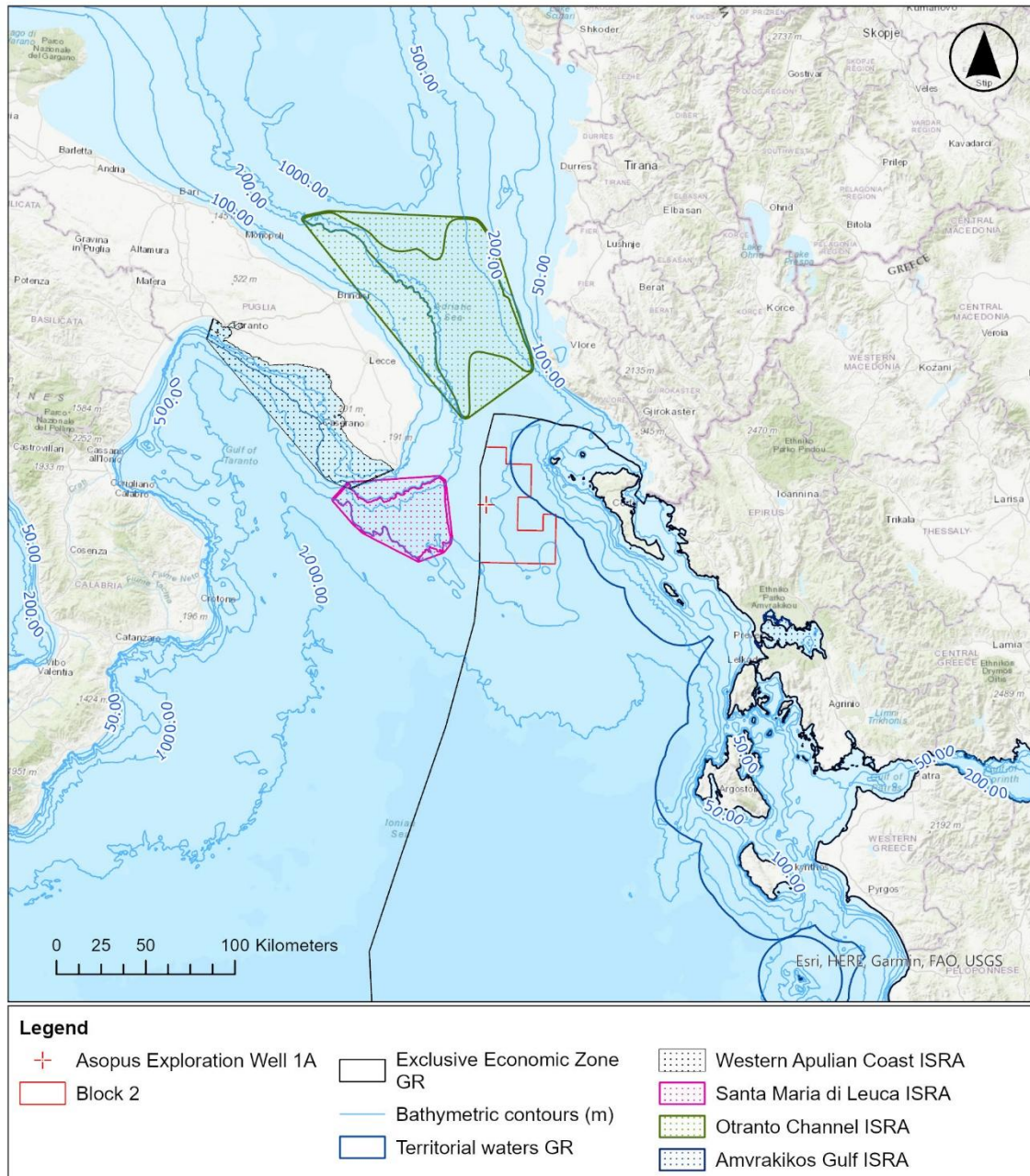


Figure 2-153: Important Sharks and Rays Areas in the broader area (ISRAs)

Table 2-45: Important Shark and Ray Areas (ISRAs) in the broader area

IMPORTANT SHARK AND RAY AREAS (ISRAs)	DISTANCE FROM THE EXPLORATION WELL ASOPUS 1A
Western Apulian Coast ISRA	~56 km
Santa Maria di Leuca ISRA	~20 km
Otranto Channel ISRA	~50 km
Amvrakikos Gulf ISRA	~169 km

2.5.5.1 ISRA Santa Maria di Leuca

2.5.5.1.1 Summary

Santa Maria di Leuca is located along the Apulian continental margin between the southwest Adriatic Sea and northwest Ionian Sea. The area is included in an almost continuous belt of patchy cold-water coral banks that represents a rare example of living *Lophelia-Madrepora*-bearing coral mounds in the Mediterranean Sea. The area is characterised by complex and diverse coral habitat. Greater abundance of demersal fauna has often been recorded inside this area than surrounding areas, indicating refuge effects. This area overlaps with the South Adriatic Ionian Straight Ecologically or Biologically Significant Marine Area. Within this area there are: threatened species and reproductive areas (Velvet Belly Lanternshark *Etmopterus spinax*).

2.5.5.1.2 Description of habitat

Santa Maria di Leuca is located in Italian waters along the Apulian continental margin between the southwest Adriatic Sea and northwest Ionian Sea. This area has a complex seabed topography due to the presence of hard ground, fault escarpments, carbonate mounds, canyons, and other seafloor irregularities (D'Onghia et al. 2012). This area is included in an almost continuous belt of patchy cold water coral banks that represents a rare example of living *Lophelia-Madrepora*-bearing coral mounds in the Mediterranean Sea (Angeletti et al. 2014). The coral communities of Santa Maria di Leuca have the most significant growth between 500–700 m depth, which is controlled by oceanographic features, namely the influx of Adriatic Deep Water (Angeletti et al. 2014). This area has been a site of active coral growth since the late Pleistocene (Taviani et al. 2011). This area also includes deep-sea sponge aggregations that represent important biodiversity reservoirs and contribute to the trophic recycling of organic matter (Mastrototaro et al. 2010; Marín et al. 2014). The complexity and diversity of the coral habitat are likely linked to the energetic trophic system and to hydrographic factors in the northern Ionian Sea, where an important coupling between the water column production process and the transfer of particulate matter to the bottom has been recorded (De Lazzari et al. 1999). Greater abundance of demersal fauna has often been recorded inside this area than surrounding areas, indicating refuge effects (D'Onghia et al. 2019). This area overlaps with the South Adriatic Ionian Straight Ecologically or Biologically Significant Marine Area (CBD 2023). This Important Shark and Ray Area is benthopelagic and is delineated at depths between 350 and 1,100 m based on the distribution of the coral banks of Santa Maria di Leuca.

2.5.5.1.3 ISRA criterion A – vulnerability

The one Qualifying Species within the area is considered threatened with extinction according to the IUCN Red List of Threatened Species. The Velvet Belly Lanternshark is assessed as Vulnerable (Finucci et al. 2021).

2.5.5.1.4 Sub – criterion C1 – reproductive areas

Santa Maria di Leuca is an important reproductive area for one shark species. The Velvet Belly Lanternshark is a common species within the cold-water coral habitat of the area (D'Onghia et al. 2010, 2012, 2016; Carluccio et al. 2021). During September–October 2005, scientific sampling was carried out with longlines and trawl nets in two types of “megahabitat”: inside the coral habitat (refuge area) and outside (fishing area). This revealed refuge effects in the coral habitat and fishing effects outside (D'Onghia et al. 2010, 2017). One of the most abundant bycatch species was the Velvet Belly Lanternshark (D'Onghia et al. 2010). This shark had a multi-modal body size distribution mostly made up of small individuals with sizes between 10 and 16 cm in total length (TL) (D'Onghia et al. 2010). Size-at-birth is 8–14 cm TL (Ebert et al. 2021). An average density of 430 ($\pm$ 497 SD) individuals per km² was estimated for this species inside this area from trawl nets. There was a far greater density in the refuge coral habitat, than in the fishing area (D'Onghia et al. 2010). The high density of the young-of-the-year Velvet Belly Lanternshark indicates that the coral habitat acts as a reproductive area for this species (D'Onghia et al. 2010). During May–June and September–October 2010, scientific sampling was carried out with longlines inside the coral habitat and outside (D'Onghia et al. 2012). The results showed that Velvet Belly Lanternshark were caught with comparable numbers in the two types of megahabitat. However, highly significant differences in the body sizes between the two megahabitats were detected with a greater number of small-medium individuals captured in the coral megahabitat and a greater number of medium-large individuals in the non-coral megahabitat (D'Onghia et al. 2012). This suggests that corals provide a better refuge for the juveniles of this shark, and this area might function seasonally (September–October). Using experimental longlining during the boreal spring–summer and autumn–winter seasons, between 2010 and 2014, the faunal assemblages of five cold-water coral sites located between the southwest Adriatic Sea and the northwest Ionian Sea (along the Apulian continental margin) were evaluated (D'Onghia et al. 2016). The results showed that the highest relative abundance (i.e., catch per-unit-effort; CPUE) of Velvet Belly Lanternshark was in Santa Maria di Leuca, indicating the importance of the area relative to other areas.

2.5.5.2 ISRA Otranto Channel

2.5.5.2.1 Summary

Otranto Channel is located in the southern Adriatic Sea, a sub-basin of the Mediterranean Sea in the waters of Albania and Italy. The area hosts Vulnerable Marine Ecosystems such as beds of the sessile colonial cnidarian *Isidella elongata*, sea pens, deepwater sponges, deepwater corals, and other colonial and solitary coral species. It overlaps with the boundary of the South Adriatic Ionian Straight Ecologically or Biologically Significant Marine Area. Within this area there are reproductive areas (Blackmouth Catshark *Galeus melastomus*).

2.5.5.2.2 Description of habitat

Otranto Channel sits in the southern Adriatic Sea, in the waters of Albania and Italy, and connects the Adriatic with the wider Mediterranean Sea. The channel is within the deep southern basin of the Adriatic and its unique physical features influence the water circulation and water exchange between the Adriatic and the wider Mediterranean Sea (UNEP/MAP-RAC/SPA 2015). Water exchange through this channel is significant, with the Adriatic Sea's entire volume estimated to be exchanged with the Mediterranean Sea through this area every 3–4 years (Franić 2005). A sill that is 800 m deep separates the Adriatic Sea and the Ionian Sea (Fonda Umani 1996). Water masses circulating through the channel are the Adriatic surface water, Ionian surface water, Levantine intermediate water, and Adriatic deep water (McKinney 2007). The area hosts Vulnerable Marine Ecosystems (VMEs) such as beds of the sessile colonial cnidarian *Isidella elongata*, sea pens, deepwater sponges, deepwater corals, and other colonial and solitary coral species. Dominant habitats and communities ("biocoenosis" and "facies") present in the Otranto Channel, listed as priority habitats by the SPA/BD Protocol of the Barcelona Convention (UNEP/MAP-RAC/SPA 2015) comprise: Biocoenosis of shelf-edge detritic bottom (IV.2.3); Biocoenosis of bathyal mud (V.1.1); Facies of soft muds with *Funiculina quadrangularis* (V.1.1.3); Facies of compact muds with *Isidella elongata* (V.1.1.4); and Biocoenosis of deep-sea corals (V.3.1). The habitat in the reproductive hotspots identified for the Qualifying Species was characterised by muddy substrates dominated by the bivalve *Gryphus vitreus* and *I. elongata* (Giannoulaki et al. 2013). The area falls within the South Adriatic Ionian Straight Ecologically or Biologically Significant Marine Area (CBD 2023). This Important Shark and Ray Area is benthic and is delineated from 200 to 900 m based on the bathymetry of the area.

2.5.5.2.3 Sub – criterion C1 – Reproductive areas

Otranto Channel is an important reproductive area for one species of shark. Reproductive areas for the Blackmouth Catshark were identified in the area through the MEDISEH project using data from the Mediterranean International Trawl Survey (MEDITS) from 1994 to 2010 (Giannoulaki et al. 2013). This analysis used data from across Geographical Sub-Area (GSA 18) to identify reproductive areas at a finer scale. The identification of 'nurseries' and 'spawning areas' was based on the use of density measures to identify 'density hot spots' of 'recruits' (juveniles; 45 cm TL) (i.e., areas where the density of these groups was significantly higher than other areas). Note that the use of the term "nurseries" may not match other biological uses of the term. To evaluate the importance that each annual density hotspot played for the population, measures of temporal persistence were used (Giannoulaki et al. 2013). The stability of a density hotspot for recruits or spawners can be assumed to be an indirect measure of the importance of that area for the recruitment/spawning success of the population. The reproductive period for Blackmouth Catshark across GSA 18 occurs in the boreal spring and summer, with recruits (juveniles) more common in late autumn (Giannoulaki et al. 2013). Across the survey years 1999–2010 and across GSA 18, the frequency of positive hauls (hauls where the species was present/all hauls) ranged 0–0.26 (mean = 0.198) and the annual sampled catch ranged 0–1,107 (mean = 526) individuals (Giannoulaki et al. 2013).

Across GSA 18, the recruit and spawner aggregations were relatively localised and generally occurred along the slope parts of Otranto Channel (Giannoulaki et al. 2013). These hotspots with higher densities of recruits and spawners were used to delineate the area (Otranto Channel). "Persistence" of 40–60% was estimated

for both life stages in the area indicating persistent use across survey years (i.e., regular and predictable occurrence) (Giannoulaki et al. 2013).

2.5.5.3 ISRA Western Apulian Coast

2.5.5.3.1 Summary

Western Apulian Coast is located in southeastern Italy. It constitutes the eastern part of the largest gulf in Italy, the Gulf of Taranto. The area includes pelagic waters over the continental shelf. Offshore of the area, there is a deep submarine canyon leading to the 'Taranto Valley', an area reaching 2,200 m depth. This characteristic causes a complex flow pattern of water masses and the occurrence of upwelling events with significant seasonal variability. The area includes Porto Cesareo marine protected area, and the southern part falls within the South Adriatic Ionian Straight Ecologically or Biologically Significant Marine Area. Within this area there are: threatened species and areas important for feeding (Basking Shark *Cetorhinus maximus*).

2.5.5.3.2 Description of habitat

Western Apulian Coast is located in southeastern Italy, in the northern Ionian Sea. It extends from Santa Maria di Leuca to Taranto and borders the Salento (Apulia) peninsula.

The area encompasses pelagic waters over a wide continental shelf. Offshore of the area, the Gallipoli Canyon leads to a deep central trench >2,000 m deep, the Taranto Valley, that connects to the eastern Mediterranean Sea.

The basin-scale circulation is dominated by cyclonic and anticyclonic gyres, generating both mesoscale and sub-mesoscale eddies, upwelling (anticyclonic gyres), and downwelling (cyclonic gyres). This circulation is likely to be the main driver of ecosystem variability (Pinardi et al. 2016 as cited in the ISRA's fact sheet).

This Important Shark and Ray Area is pelagic and is delineated from surface waters (0 m) to 200 m based on the bathymetry of the area.

2.5.5.3.3 CRITERION A – VULNERABILITY

The one Qualifying Species within the area is considered threatened with extinction according to the IUCN Red List of Threatened Species. The Basking Shark is assessed as Endangered (Rigby et al. 2021 as cited in the ISRA's fact sheet).

2.5.5.3.4 SUB-CRITERION C2 – FEEDING AREAS

Western Apulian Coast is an important feeding area for one shark species.

Regular seasonal sightings of Basking Sharks occur in late boreal winter/early spring. Aggregations of up to four individuals ranging in size between 300–900 cm total length (TL), make the Gulf of Taranto a known hotspot of Basking Shark occurrence in the Mediterranean Sea (Carlucci et al. 2014; de Sabata et al. 2014; Mancusi et al. 2020; de Sabata unpubl. data 2023).

Seven (February–March 2013) and 57 (mostly January–March 1977–2013) Basking Shark individuals have been reported in the area. These were reported in Taranto, off Torre Borraco and in the marine protected area of Porto Cesareo (Carlucci et al. 2014 as cited in the ISRA’s fact sheet); and in Porto Cesareo/Gallipoli, a 30 km long stretch within the area, at the mouth of the canyon leading to the Taranto Valley (de Sabata et al. 2014 as cited in the ISRA’s fact sheet).

Many individuals were directly observed cruising on the surface with their mouth open, which is a typical feeding behaviour for this species (Carlucci et al. 2014; de Sabata unpubl. data 2023 as cited in the ISRA’s fact sheet). Such feeding behaviour in late winter/early spring has been shown to correlate to seasonal and interannual variations of phytoplankton biomass in northeastern Sardinia (de Sabata et al. 2013 as cited in the ISRA’s fact sheet) and it is likely that similar correlations occur in Western Apulian Coast.

2.5.6 Key Biodiversity Areas

Key Biodiversity Areas (KBAs) are globally significant sites for conservation – crucial places on our planet where unique species and ecosystems occur in important numbers or extent. The global KBA standard was developed by the International Union for Conservation of Nature and partners. Sites are assessed against quantitative criteria using the best available scientific data on species distributions, populations, and ecosystems.

The KBA Programme aims to identify, map, monitor, and conserve these critical sites worldwide using a standardized scientific framework. According to the current KBA database, more than 16,600 KBAs have been identified globally, covering over 22 million km² and supporting nearly 18,000 qualifying species.

KBAs guide conservation efforts by governments, NGOs, and local communities, attract donor support, and help businesses reduce their impacts on biodiversity. As we face a global environmental crisis, it is crucial to focus our collective efforts on protecting sites that have global significance.

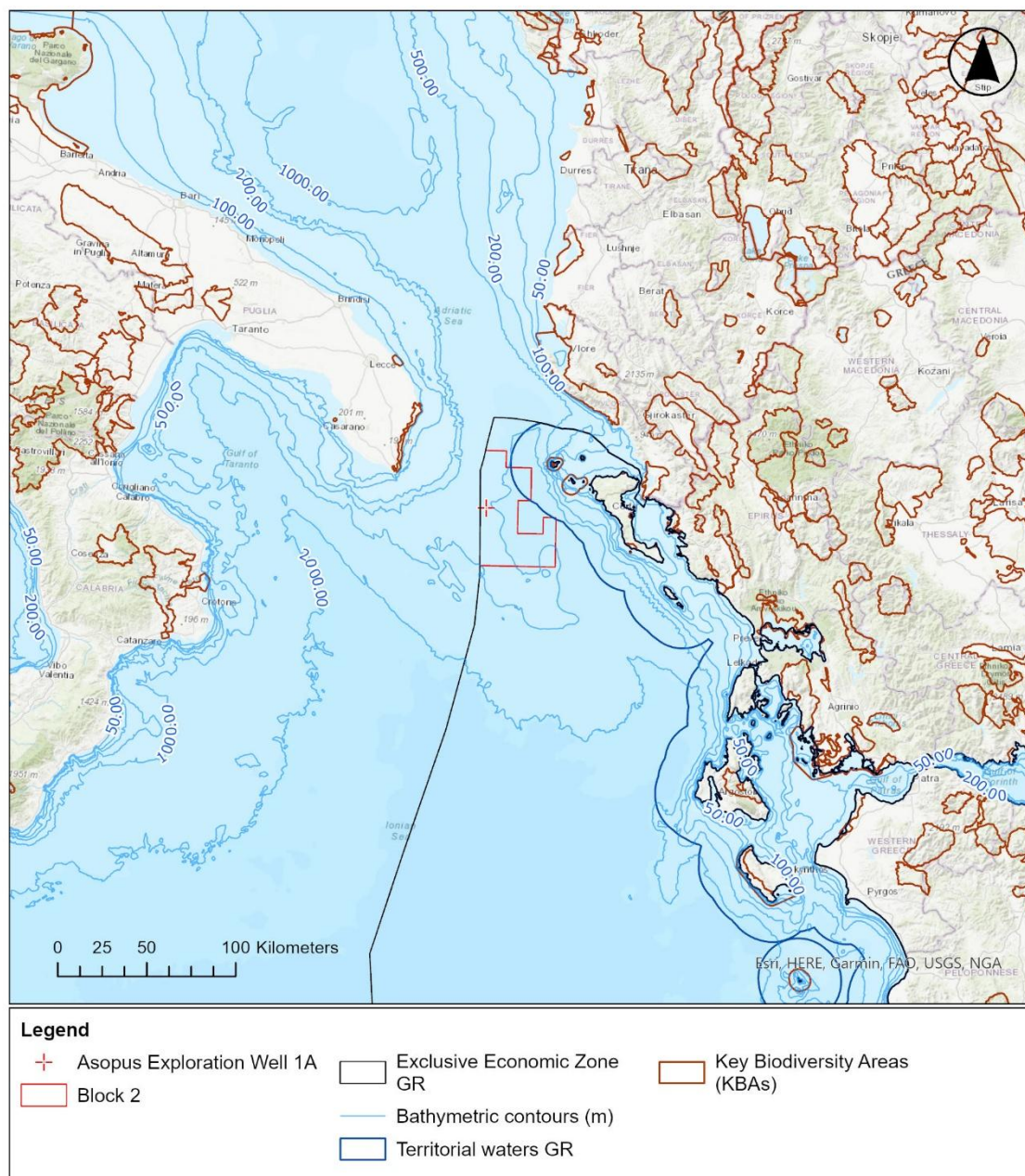


Figure 2-154: Key Biodiversity Areas (KBAs) in the broader area

The nearest KBAs to Exploration Well Asopus 1A are the “Costa tra Capo d'Otranto e Capo Santa Maria di Leuca” in Italy, Vlora Bay, Karaburun, Mali i Cikes in Albania and “Diapontia nisia (Othonoi, Ereikousa, Mathraki) kai nisides” in Greece. The following table summarizes the project’s distances from KBAs within a 100 km radius of the Exploration Well Asopus 1A.

Table 2-46: Key Biodiversity Areas (KBAs) within a 100 km radius of the Exploration Well Asopus 1A

KBA - SITE NAME	KBA - CODE	TOTAL AREA (KM ²)	COUNTRY	DISTANCE FROM ASOPUS 1A
Cape Otranto and Cape Santa Maria di Leuca coast	2844	83.35	Italy	~57km NW

KBA - SITE NAME	KBA - CODE	TOTAL AREA (KM ²)	COUNTRY	DISTANCE FROM ASOPUS 1A
Vlora Bay, Karaburun Peninsula and Cika Mountain	2908	657.34	Albania	~80km N
Diapontia nisia (Othonoi, Ereikousa, Mathraki) kai nisides	2943	152.73	Greece	~40km NE
Isola di Sant'Andrea	2845	2.60	Italy	~ 98km NW
Lake Butrinti	2910	147.92	Albania	~ 88km E
Lagoons of Kerkyra island	1169	19.90	Greece	~80km E

2.5.6.1 KBA 2844 Cape Otranto and Cape Santa Maria di Leuca coast

Site description: A rocky area on the coast of south-east Puglia, south of the town of Otranto. Habitats are dominated by pseudo-steppes, garrigue, pastures and cultivated land. Cultivation and stock-rearing are the main land-uses.

Additional biodiversity: An important “bottleneck” site for raptors migrating along the Adriatic coast in spring. It is considered that more than 3,000 raptors pass each spring, although there is only incomplete data from one year (1989), when a total of about 1,500 birds were counted, mainly harriers *Circus* and *Pernis apivorus*.

2.5.6.2 KBA 2908 Vlora Bay, Karaburun Peninsula and Cika mountain

Site description: This site includes Vlora Bay, Karaburun peninsula, Orikumi lagoon, Sazan island and Cika Mountain. Vlora Bay includes the sea gulf of Vlora and part of the coastal area with rocky shores and cliffs, sandy beaches and a small lagoon (Orikumi). Karaburun peninsula and Sazan island are rocky areas with scattered Mediterranean scrub and are military areas. Cika mountain (previously Llogara IBA AL010) is a mountain area with forests of *Pinus austriaca* and flora typical of calcareous soil.

Additional biodiversity: This site is believed to be important for breeding raptors. *Neophron percnopterus*, *Circaetus gallicus*, *Aquila chrysaetos* and *Hieraaetus fasciatus* were observed in 1991 and 1996, but breeding numbers are unknown.

2.5.6.3 KBA 2943 Diapontia islands (Othonoi, Ereikousa, Mathraki) and surrounding islets

Site description: A group of small islands and rocky islets north-west of the island of Corfu. Human activities include agriculture, fishing and tourism.

Additional biodiversity: This is an important site for breeding seabirds and raptors

Delineation rationale: 2012-12-17 (BL Secretariat): site area updated from 1500 ha to 15273 ha after addition of seaward extension to the site in October 2012 for the Marine eAtlas.

2.5.6.4 KBA 2910 Lake Butrinti

Site description: The site covers four separate coastal wetlands in Corfu. These include brackish lagoons (Korission, Antinioti, and Chalikopoulou), saltpans (Lefkimis) and freshwater marshes and sand-dunes (Korission-Antinioti).

Rationale for qualifying as KBA: This site qualifies as a Key Biodiversity Area of international significance that meets the thresholds for at least one criterion described in the Global Standard for the Identification of KBAs.

Additional biodiversity: Korission and Antinioti lagoons are important for cormorants, herons and ducks, while Lefkimi lagoon is important for shorebirds. Species of global conservation concern that do not meet IBA criteria: *Phalacrocorax pygmeus* (passage), *Aythya nyroca* (passage), *Aquila clanga* (wintering).

2.5.6.5 KBA 1169 Lagoons of Kerkyra island

Site description: A brackish coastal lake in the southern part of Albania, with an outlet to the sea via a channel of about 4 km. The lake (1,630 ha) is used for extensive mussel-farming and hunting, and is surrounded by hills with orchards and scattered maquis. Water-fringe vegetation is poor, apart from an area (50 ha) on the north side that includes *Phragmites*, *Scirpus* and wet grasslands. The channel to the sea has *Salicornia*-covered islands and small coastal marshes. The nearby small lake of Bufi, included within the IBA, is fringed with reedbeds.

Rationale for qualifying as KBA: This site qualifies as a Key Biodiversity Area of international significance that was identified using previously established criteria and thresholds for the identification of Important Bird and Biodiversity Areas (IBAs) and for which available data indicate that it does not meet global KBA criteria and thresholds set out in the Global Standard. KBA identified in the CEPF Ecosystem Profile of the Mediterranean Hotspot (2017). Taxonomy, nomenclature and global threat category follow the 2016 IUCN Red List.

Additional biodiversity: Given that there are few large natural tectonic lakes with reedbeds in the Balkans, the site is believed to be of importance, especially for birds breeding in reedbeds, and criterion B2 has been applied. However, data are incomplete and numbers currently fall below the IBA thresholds; disturbance may also contribute to the low counts. The site also supports substantial numbers of wintering waterbirds; censuses recorded 7,700 individuals in January 1995, and 8,300 individuals in January 1996.

2.5.7 Marine Protected Areas

The conservation of coastal and marine areas is important for maintaining biodiversity and ensuring that ecosystems and their services are fully functional. Marine protected areas (MPAs) are defined geographical areas of the marine environment established and managed to achieve long-term nature conservation and sustainable use. The EU Biodiversity Strategy for 2030 sets a target to protect at least 30% of the EU's land and 30% of the EU's sea areas, including a significant proportion of well-managed MPAs. Greece has established 199 MPAs and the MPA coverage is 4.73% (EEA, 2024).

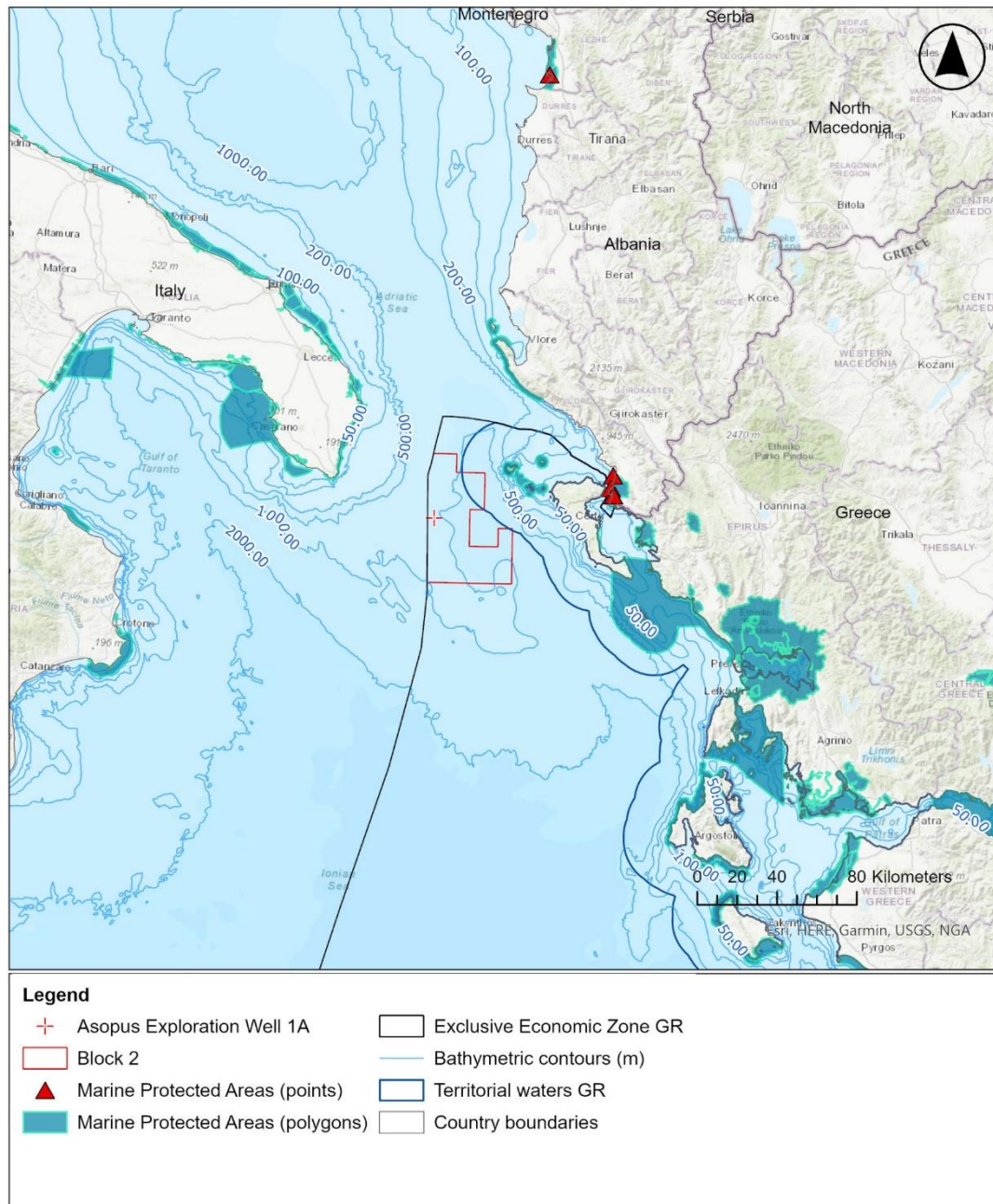


Figure 2-155: Marine Protected Areas (MPAs) in the broader area

Table 2-47 summarizes the distances of Exploration Well Asopus 1A from the MPAs within a 100 km radius of the well location.

Table 2-47: Marine Protected Areas (MPAs) within a 100 km radius of the Exploration Well Asopus 1A

COUNTRY	MARINE PROTECTED AREAS (MPAS)	DISTANCE FROM THE ASOPUS 1A
Greece	Marine Area of the Diapontia Islands	~43 km
Greece	Coastal Marine Zone from Kanoni to Mesongi, Corfu	~81 km
Greece	Paxoi and Antipaxoi Islands and the Wider Marine Area	~93 km

COUNTRY	MARINE PROTECTED AREAS (MPAS)	DISTANCE FROM THE ASOPUS 1A
Greece	Lefkimmi Salt Pans, Corfu	~97 km
Italy	Costa Otranto–Santa Maria di Leuca	~53 km
Italy	Posidonieto Capo San Gregorio–Punta Ristola	~57 km
Italy	Litorale di Ugento	~66 km
Italy	Alimini	~69 km
Italy	Litorale di Gallipoli e Isola S. Andrea	~80 km
Italy	Le Cesine	~93 km
Italy	Montagna Spaccata e Rupi di San Mauro	~96 km
Albania	Karaburun–Sazan Marine National Park	~79 km
Albania	Butrint National Park	~88 km
Greece	Marine Area of the Diapontia Islands	~43 km

2.5.8 Important Bird Areas

Important Bird Areas (IBAs) have been designated and delineated by Birdlife International. Birdlife International's overall objective is to update IBA data from partners every four years. The specific objective of Birdlife International is to record bird species (for IBA areas) in special field protocols and includes reporting threats that may affect birds or the habitat, conservation actions taking place in the area, and bird species observed (BirdLife International, n.d.). The IBAs in the wider area are shown in Figure 2-156.



Figure 2-156: Important Bird Areas (IBAs) in the broader study area (Source: BIRDLIFE)

The distances between the Asopus-1A exploration well and the IBAs located within a 100 km radius of the well location are summarized Table 2-48.

Table 2-48: Important Bird Areas (IBAs) within a 100 km radius of the Exploration Well Asopus 1A

IBA CODE	IBA NAME	DISTANCE FROM THE EXPLORATION WELL ASOPUS 1A	COUNTRY
GR082	Diapontia Islands (Othonoi, Ereikousa, Mathraki) and surrounding islets	~42 km	GREECE
GR083	Lagoons of Kerkyra Island	~78 km	GREECE
IT147	Cape Otranto and Cape Santa Maria di Leuca coast	~54 km	ITALY
IT145	Coastline of Gallipoli and Isola S. Andrea	~79 km	ITALY
IT146	Le Cesine	~93 km	ITALY
AL010	Vlora Bay, Karaburun Peninsula and Cika Mountain	~79 km	ALBANIA
AL012	Lake Butrinti	~88 km	ALBANIA

2.5.9 Ionian Marine National Park

In April 2024, during the international "Our Ocean Conference" that took place in Athens, the Greek State announced the intention of establishing two new extensive Marine Parks, one in the Aegean and one in the Ionian Sea. The new marine parks will protect marine biodiversity, a wide range of marine ecosystems, as well as cultural heritage sites. The parks will be among the largest marine protected areas in the Mediterranean and are expected to significantly accelerate Greece's goal of protecting 30% of its territorial waters by 2030 (WWF Greece, 2024; ARCHELON, 2025).

The Strategic Environmental Assessment for the Ionian Marine Park was approved on 29th of December 2025 and the completion of establishment is expected by the end of 2026 (Ministry of Environment and Energy of Greece, 2025).

The National Marine Park of the Ionian Sea (NMPI - ΕΘΠΙ) represents one of the most significant marine conservation initiatives in the Mediterranean region and constitutes a cornerstone of Greece's strategy for the protection and sustainable management of marine biodiversity. The proposed protected area encompasses an extensive marine and coastal ecosystem within the Ionian Sea, incorporating ecologically important habitats, migratory corridors, breeding grounds, and feeding areas that support a remarkable diversity of marine flora and fauna. The park has been developed through a comprehensive scientific assessment that integrates ecological, oceanographic, socioeconomic, and conservation data in order to establish an effective framework for long-term environmental protection and sustainable resource management.

The geographical extent of the park covers a broad marine region surrounding the Ionian Islands and adjacent coastal waters of western and southern Greece. It includes areas around Zakynthos, Kefalonia, Ithaca, Lefkada, the Inner Ionian Archipelago, the Strofades Islands, the Kyparissia Gulf, and additional offshore and coastal sectors that collectively form a highly interconnected ecological network. The proposed

boundaries incorporate numerous existing Natura 2000 sites and create a unified conservation framework that enhances ecological connectivity between previously fragmented protected areas. This large-scale approach is intended to safeguard critical habitats and ecological processes that operate across regional spatial scales (NECCA, May 2025).

NMPI – ΕΘΠΙ encompasses a wide variety of marine ecosystems that contribute significantly to the biodiversity of the Eastern Mediterranean. These include extensive *Posidonia oceanica* seagrass meadows, coralligenous formations, rocky reefs, marine caves, sandy and muddy seabeds, pelagic ecosystems, coastal lagoons, and deep-sea habitats. These ecosystems provide essential ecological functions, including primary productivity, nutrient cycling, carbon sequestration, coastal protection, and habitat provision for numerous marine species. The ecological integrity of these habitats is fundamental to maintaining ecosystem resilience and supporting the biological productivity of the wider Ionian basin.

The offshore waters of the Ionian Sea also support diverse cetacean communities, including sperm whales (*Physeter macrocephalus*), Cuvier's beaked whales (*Ziphius cavirostris*), bottlenose dolphins (*Tursiops truncatus*), striped dolphins (*Stenella coeruleoalba*), and common dolphins (*Delphinus delphis*). Deep-water habitats, submarine canyons, and productive pelagic ecosystems provide critical feeding and migratory areas for these species. The conservation of cetaceans is of particular importance due to increasing anthropogenic pressures associated with maritime traffic, underwater noise, fisheries interactions, and pollution (NECCA, May 2025).

The park further supports important seabird populations, particularly within remote island complexes such as the Strofades. These islands provide breeding habitats for numerous seabird species that rely on surrounding marine waters for foraging. The ecological relationship between terrestrial nesting sites and adjacent marine feeding grounds highlights the necessity of adopting an integrated land-sea conservation approach. Consequently, the proposed marine park incorporates both marine and coastal components to ensure the protection of ecological processes that extend across ecosystem boundaries.

The National Marine Park of the Ionian Sea (NMPI - ΕΘΠΙ) is located at approximately 150 km E of the Exploration Well Asopus 1A.



Figure 2-157: Ionian Marine National Park (Source: NECCA, May 2025)

2.5.10 Fisheries Restricted Areas

Fisheries restricted areas (FRAs) are geographically defined areas in which some specific fishing activities are temporarily or permanently banned or restricted in order to improve the exploitation patterns and conservation of specific stocks as well as of habitats and deep-sea ecosystems. Special measures for these areas are adopted under the General Fisheries Commission for the Mediterranean and Black Sea (GFCM). In the Mediterranean and the Black Sea, 1,760,000 km² of sea habitats are protected by FRAs established by the GFCM (FAO-GFCM, n.d.). The figure below shows the FRAs located within the wider project area.

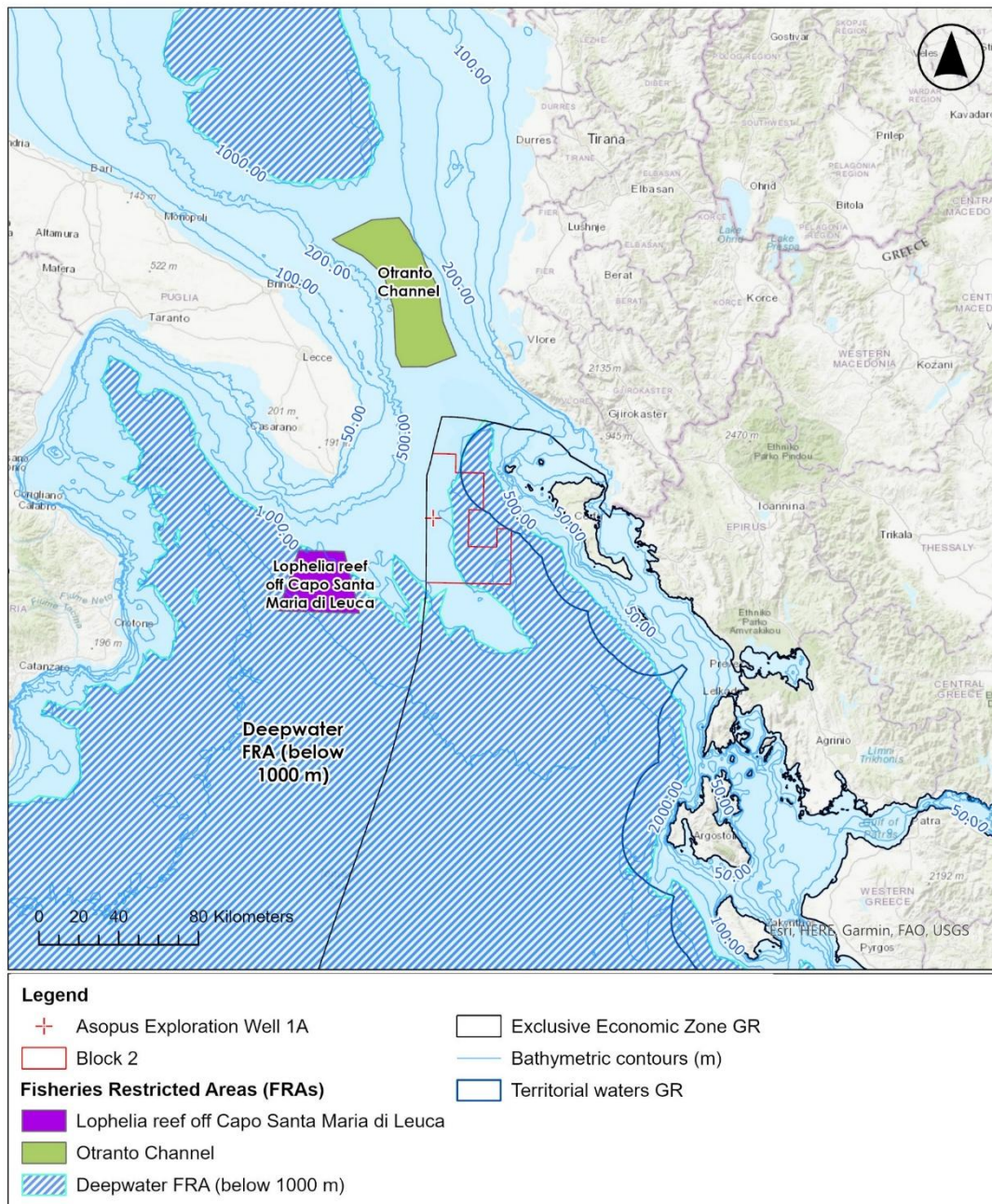


Figure 2-158: Fisheries Restricted Areas (FRAs) in the broader area

Table 2-49 summarizes the distances of Asopus 1A from the FRAs.

Table 2-49: Fisheries Restricted Areas (FRAs) in the broader area

FISHERIES RESTRICTED AREAS (FRAS)	DISTANCE FROM ASOPUS 1A
Lophelia reef off Capo Santa Maria di Leuca	~ 48 km
Otranto Channel	~ 76 km
Deep water fisheries restricted area (1,000 m)	~ 9 km

2.5.10.1.1 FRA Lophelia reef off Capo Santa Maria di Leuca

The Lophelia reef off Capo Santa Maria di Leuca (SML) is a Fisheries Restricted Area (FRA) established to protect a unique ecosystem of cold-water corals. The site is located in GSA 19 and was established in 2006 under GFCM Recommendation REC. GFCM/30/2006/3. It has a surface area of 978 km² and its management objective is the protection of Vulnerable Marine Ecosystems (VME). The FRA is subject to permanent closure and restricts the use of towed dredges and bottom trawl nets. The area is managed by the General Fisheries Commission for the Mediterranean (GFCM).

According to the Sub-Committee on Marine Environment and Ecosystems (SCMEE), the site represents a biodiversity “hot-spot” on the bathyal bottoms of the Mediterranean Sea (SCMEE Report, September 2005, cited in FAO, 2026). The sea-floor physiography consists of coral banks mounded on a gently sloping plateau. The site is located in international waters south of Italy, and the coral reef occurs at depths between 350 m and 1,100 m (SCMEE Report, September 2005, cited in FAO, 2026). Prior to the establishment of the FRA, a fishery from Gallipoli targeting deep-water shrimps (*Aristeus antennatus* and *Aristaeomorpha foliacea*) operated in the surrounding area (SCMEE Report, September 2005, cited in FAO, 2026).

2.5.10.1.2 FRA Otranto Channel

The Otranto Channel Fisheries Restricted Area (FRA) is located in GSA 18 and was established in 2024 under GFCM Recommendation GFCM/47/2024/6. It has a total surface area of 2,702 km², comprising a core area (Zone A) of 1,998 km² and a buffer area (Zone B) of 704 km². The management objective of the FRA is the protection of Vulnerable Marine Ecosystems (VME) and Essential Fish Habitats (EFH).

In Zone A, all demersal fishing activities, including recreational fishing, are prohibited. In Zone B, fishing activities with bottom-set nets, bottom trawls, set longlines, and traps are prohibited for a two-month period between September and November each year.

The Otranto FRA hosts key habitats for commercial species and vulnerable marine ecosystems, including bamboo coral (*Isidella elongata*) and deep-sea sponge communities, which are highly vulnerable to bottom trawling. The central area is closed to bottom fishing and is described as the largest marine reserve created in the Adriatic Sea.

The Otranto Channel is characterised by steep slopes reaching depths of over 900 m and features influencing water circulation and exchange within the Mediterranean basin. Its seabed includes white corals, deep sponge gardens, and significant colonies of bamboo coral, which support species-rich communities and provide spawning and nursery grounds for commercial species such as shrimp, hake, and lobster. The area is also an important habitat for vulnerable and endangered species including dolphins, turtles, sea evils, and Cuvier’s whales.

2.5.10.1.3 FRA Deep water fisheries restricted area (1,000 m)

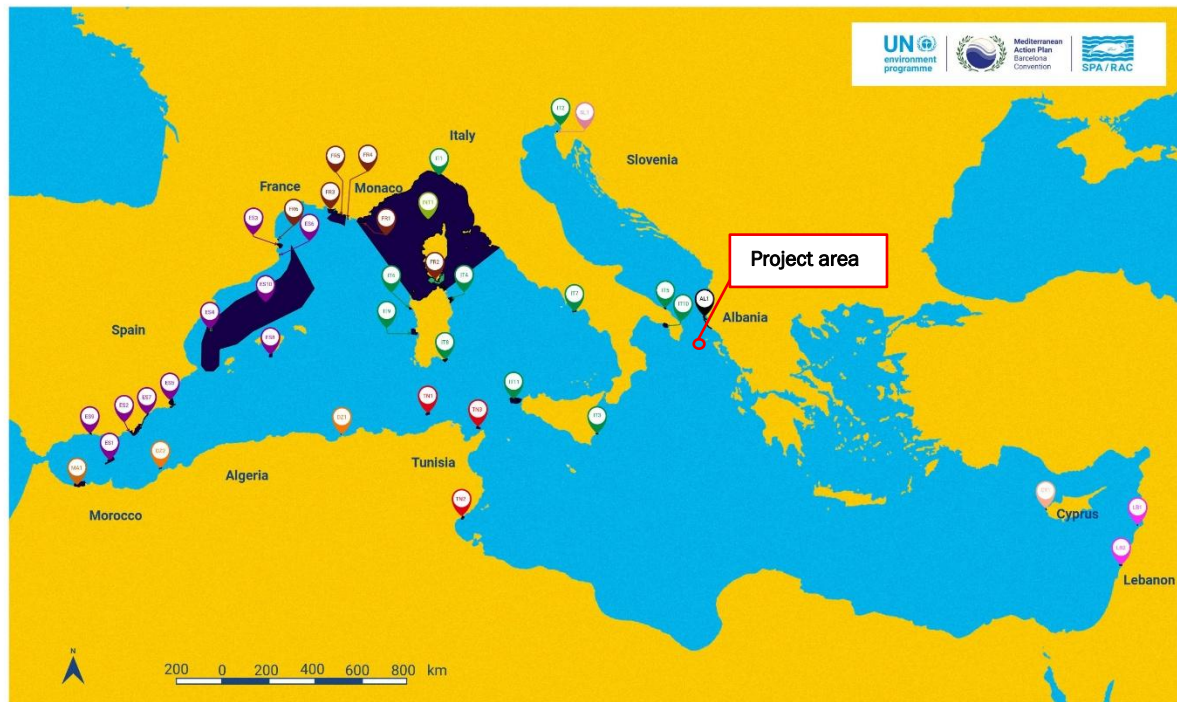
The Deep Water Fisheries Restricted Area (below 1,000 m) is a GFCM FRA covering multiple GSAs and was established in 2005 under GFCM Recommendation REC. GFCM/29/2005/1. It covers a surface area of 1,731,094 km² and its management objective is the protection of Vulnerable Marine Ecosystems (VME) and

Essential Fish Habitats (EFH). The FRA is subject to permanent closure and prohibits the use of towed dredges and trawl nets. It is managed by the General Fisheries Commission for the Mediterranean (GFCM).

2.5.11 Specially Protected Areas of Mediterranean Importance

Specially Protected Areas of Mediterranean Importance (SPAMI) represent marine protected areas declared in the frame of the Barcelona Convention for the Protection of the marine environment and the coastal Region of the Mediterranean Sea. The basic objectives of a SPAMI are protecting the natural heritage, scientific research, and environment education, provided that these are compatible with conservation objectives (RAC/SPA, 2018).

In the context of the Barcelona Convention, and in order to promote cooperation on managing and conserving natural areas and protecting endangered species and their habitats, the Parties have drawn up a List of SPAMIs (RAC/SPA, 2018, EEA, n.d.).



Specially Protected Areas of Mediterranean Importance (SPAMIs)

Albania AL1 : Karaburun Sazan National Marine Park (2016)	Italy - IT1 : Portofino Marine Protected Area (2005) - IT2 : Miramare Marine Protected Area (2008) - IT3 : Plemmirio Marine Protected Area (2008) - IT4 : Tavolara-Punta Coda Cavallo Marine Protected Area (2008) - IT5 : Torre Guaceto Marine Protected Area and Natural Reserve (2008) - IT6 : Capo Caccia-Isola Piana Marine Protected Area (2009) - IT7 : Punta Campanella Marine Protected Area (2009) - IT8 : Capo Carbonara Marine Protected Area (2012) - IT9 : Penisola del Sinis - Isola di Mal di Ventre Marine Protected Area (2012) - IT10 : Porto Cesaereo Marine Protected Area (2012) - IT11 : Egadi Islands Marine Protected Area (2019)	Slovenia SI1 : Landscape Park Strunjan (2019)
Algeria - DZ1 : Banc des Kabyles Marine Reserve (2005) - DZ2 : Habibas Islands (2005)	Lebanon - LB1 : Palm Islands Nature Reserve (2012) - LB2 : Tyre Coast Nature Reserve (2012)	Spain - ES1 : Alboran Island (2001) - ES2 : Cabo de Gata-Níjar Natural Park (2001) - ES3 : Cap de Creus Natural Park (2001) - ES4 : Columbretes Islands (2001) - ES5 : Mar Menor and Oriental Mediterranean zone of the Region of Murcia coast (2001) - ES6 : Medes Islands (2001) - ES7 : Sea Bottom of the Levante of Almeria (2001) - ES8 : Archipelago of Cabrera National Park (2003) - ES9 : Maro - Cerro Gordo Cliffs (2003) - ES10 : Cetaceans Migration Corridor in the Mediterranean (2019)
Cyprus CY1 : Lara-Toxeftra Turtle Reserve (2013)	Morocco MA1 : Al-Hoceima National Park (2009)	Tunisia - TN1 : La Galite Archipelago (2001) - TN2 : Kneiss Islands (2001) - TN3 : Zembra and Zembretta National Park (2001)
France - FR1 : Port Cros National Park (2001) - FR2 : Bouches de Bonifacio Natural Reserve (2009) - FR3 : The Blue Coast Marine Park (2012) - FR4 : The Embiez Archipelago - Six Fours (2012) - FR5 : Calanques National Park (2017) - FR6 : Cerbère-Banyuls Marine Nature Reserve (2019)		
France, Italy, Monaco INT1 : Pelagos Sanctuary for the Conservation of Marine Mammals (2001)		

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Figure 2-159: Specially Protected Areas of Mediterranean Importance (SPAMIs) in the Mediterranean Basin

2.5.11.1.1 SPAMI IT 5: Torre Guaceto Marine protected and natural reserve

For the Torre Guaceto Marine Protected Area and Natural Reserve, the following information was obtained from the Torre Guaceto SPAMI Fact Sheet. The site is located in Italy and was designated as a Marine Protected Area and Natural Reserve in 1991, with its inclusion as a SPAMI in 2008. The legal basis for its establishment is the Interministerial Decree of 4 December 1991, which instituted the Marine Natural Reserve “Torre Guaceto.” The total area of the site is 2.00 hectares, corresponding entirely to marine areas. The coastline length is 8.40 km. The site is classified as a SPAMI and is located within the municipalities of

Brindisi and Carovigno. The protected area extends for approximately 8 km, from the Apani area to the Punta Penna Grossa coastline.

Physical characteristic: The coastline is characterized, along the western sector, by a series of small sub rectangular coves with pocket beaches, until the eastwards projecting promontory of Torre Guaceto. At east of this promontory the coast is mainly sandy, with reduced rocky formations and low rocks emerging right in front of the promontory and eastwards from it (Scogli di Apani), and is characterized by a regular, sinuous coastline. The eastern coastal sector, furthermore, is incised by ten little valleys, oriented from South to North, some continuing also underwater. At Torre Guaceto the dunes maintain their maximal expansion, since there are wide stretches of grey dunes that reach 15 m in height.

Specificity and importance: There are stretches of precoralligenous formations with many organisms in perfect state; particularly numerous are both the yellow and the white sea fans (*Eunicella cavolini*, *Eunicella singularis*). The localised abundance of such species confers to this habitat a special ecological value. Also, the bryozoans *Sertella* sp. and *Myriapora truncata* are very common. Coralligenous formations are comprised between 22 and 30 m depth, with discontinuous distribution and forming a series of patches on the sandy bottom. Coralligenous formations become scarcer at depths greater than 30 m, reaching a depth of 45 m, where the sandy bottom is replaced by mud.

Threats and pressures: The main activities in the vicinity of the MPA are devoted to tourism, coastal fisheries, handmade production, and small-scale agriculture. Moreover, the use of maritime national properties and adjacent areas: impact on aquatic populations deriving from the collection of coastal benthic organisms by visitors of the Reserve; impact on the abiotic compartment of the aquatic environment due to non-authorized entrance of aqua scooters in the southern zone of the MPA; impact on the soil of the coastal zone due to non-authorized parking of cars, added to that the Marine pollution due to the stranding of solid inorganic reject and to the organic charge that is transported along the littoral from the Northern Adriatic.

Ecological characteristics: The dune environment is diverse and is characterized by habitats of interest for the EU such as: dunes with meadows of *Brachypodium pinnatifidum* and annual vegetation; mobile littoral dunes with *Ammophila arenaria* ("White Dunes"); annual vegetation of marine deposition lines, and the coastal rocks with Mediterranean coastal vegetation, with endemic *Limonium* spp. The rocky midlittoral is characterised by the presence of red algae as *Laurencia* sp. and *Corallina elongata*. The rocky infralittoral is characterized by photophyllous algae and by sea urchin barrens and encrusting alga accompanied by the few animal species that resist the grazing activity of sea urchins. *Posidonia oceanica* meadows are one of the most characteristic habitats of the sandy infralittoral. The intricate morphology of the meadows forms a series of microhabitats that provide both food and shelter to numerous organisms, from fish and crustaceans to sponges, bryozoans, hydroids, anthozoans and bivalve molluscs. Patches of *Cymodocea nodosa* are also present.

2.5.11.1.2 SPAMI IT10: Porto Cesareo Marine Protected Area

For the Porto Cesareo Marine Protected Area, the following information was obtained from the Porto Cesareo SPAMI Fact Sheet. The site is located in Italy and was designated as a Marine Protected Area (MPA) in 1997, with its inclusion as a SPAMI in 2012. The legal basis for its designation is the Ministerial Decree dated 12 December 1997 establishing the MPA. The total area of the site is 6,400.00 hectares, all of which correspond to marine areas. The coastline length is 32.70 km. The site is classified as a SPAMI and

represents the only State Marine Reserve in Salento, the largest in Puglia, and the third largest among recently established marine protected areas in Italy. Geographically, the Porto Cesareo MPA is located in the eastern part of the Gulf of Taranto in the northern Ionian Sea, approximately 28 km from Lecce, and lies centrally along the Ionian coast between Taranto and Gallipoli. It falls within the territories of the municipalities of Porto Cesareo and Nardò, in the Province of Lecce. The boundaries of the MPA extend from Punta Prosciutto in the north to Torre Inserraglio in the south, covering approximately 33 km of coastline.

Physical characteristic: The coast of the MPA is very irregular: you can go from calcareous esplanades to sandy beaches, where the coastal dune has a vegetation of shrubs among the gulf. The dunes' cord, that delimits Porto Cesareo's beaches, is very high and large. On the dunes grows up the shrubs like the cuddly juniper, the mastic, the myrtle. In this site there are arboreal species and shrubs together, like maquis scrubland olive and mastic. The coast-line of the MPA is characterized by outcropping of low carbonates at the sea level. This rocky coast is interested by karst phenomenon and real caves.

Specificity and importance: Until the half of the 20th century, in Porto Cesareo marine caves, there was the evidence of presence of the Monk Seal (*Monachus monachus*). In open sea, where the depth is covered by the deep coralligenous, there coral seaweeds, shoal of amberjacks (*Seriola dumerilii*) and dolphinfish (*Coriphenia hippurus*), Sciaena umbra and Epinephelus marginatus. Inside caves, there are lobsters, crabs and morays. In addition to the coralligenous, *Posidonia oceanica* meadows are also abundant.

Threats and pressures: Porto Cesareo has got a very important marine activity, formed by 130 professional fisherman with permission and 250 professional fishermen without. The whole activity of professional fishing is concentrated into the MPA. The coast of the MPA, that counts not more of 10.000 inhabitants in winter, while in the Summer time, there is a great flux of tourists: about 100.000 visitors per year recorded by hoteliers and tour operators, coming for recreational activities as scuba and snorkeling.

Ecological characteristics: Several underwater caves are also interesting naturalistic environment. At the entrance of the caves, there are seaweeds like the *Peyssonnelia*, (coralligenous). The caves have got populations characterized by the presence of fauna: protozoa, poryphorous, molluscs, cnidarians, anellids, arthropods, bryozoans, brachiopods, echinoderms, tunicates and vertebrates. The species more abundant in the zones near the entrance are of incrust type: *Agelas oroides*, *Aplysina cavernicola*, *Oscarella lobularis*, *Chondrosia reniformis* and *Clathrina* spp.

2.5.11.1.3 SPAMI AL1: Karaburun Sazan National Marine Park

Based on the site's fact sheet, Karaburun-Sazan National Marine Park is located in Albania and was designated as a National Park in 2010, with its inclusion as a SPAMI in 2016. The legal basis for its designation is Decision No. 289 dated 28 April 2010, concerning the proclamation of the "National Park" of the marine natural ecosystem near the Karaburun Peninsula and Sazan Island. The total area of the site is 12,570.00 hectares, of which 12,571.00 hectares correspond to marine areas. The coastline length is 84.32 km. The site falls under the SPAMI category and is located within the territory of the Municipality of Vlora, in the Vlora Region. Geographically, the Karaburun-Sazan National Marine Park is situated in southern Albania, along the northern and western shores of the Karaburun Peninsula and around Sazan Island, at the southern end of the Adriatic Sea and the northern boundary of the Ionian Sea.

Physical characteristic: The slopes of Karaburuni Peninsula are locally very steep on the western side and culminating in the central part. The western coast of the Peninsula is incised by caves and deep canyons ending rarely by gravel or sand pocket beaches. It is characterized by high vertical cliffs that are quite eroded and numerous caves, mostly underwater, can be seen where freshwater springs often percolate. The most important canyons are at cape Pëllumbave and at Gryka e Ferrit. On the eastern side, the coastline is lower and is formed in the SW by slanted folds of limestone plunging into the sea. The area encompasses two geomorphological units, terrigen formations which can be heavily eroded (flysh, e.g. and quaternary deposits of molas) and carbonate rocks (limestone and limestone-dolomite, with rudists or globotruncana, of upper-Cretacea, e.g. karstic mountains of Rreza e Kanalit-Karaburuni). This area is certainly the best and most impressive part of Albanian coast for the development of nautical activities such as scuba diving, which is not well developed in Albania.

Specificity and importance: Karaburuni Peninsula is characterized by a very low level of disturbance. It is characterized by the presence of habitats and ecosystems that are endemic to the Mediterranean region, noticeably: Seagrass meadows (*Posidonia oceanica* (surface=1658 ha), *Cymodocea nodosa*, *Zostera marina*), *Lithophyllum byssoides* bioconstructions, Coralligenous community reaching an area of 296 h and Marine caves. It still hides several endangered or threatened species that are included in the Annex II of the Protocol SPA/BD, such as: the mussel date (*Lithophaga lithophaga*), the purple starfish (*Ophidiaster ophidianus*), the coralligenous algae *Lithophyllum byssoides*, the monk seal (*Monachus monachus*), the short-beaked common dolphin (*Delphinus delphis*), and the loggerhead turtle (*Caretta caretta*).

Threats and pressures: The small beaches in the eastern coast of Karaburuni (Raguza, Shen Vasili, Shen Jani) are regularly frequented by tourists, including by excursion boats. Illegal fishing activities are also present in the rocky areas of both sides of Karaburuni Peninsula and sometimes in the western side of Sazani Island. Moreover, the most frequented activities, often associated with damages of habitats, are diving and spear fishing. The following threats have been also identified:

- Degradation of Posidonia meadows
- Degradation of coralligenous communities
- Decreased fish stocks and harvesting of marine invertebrates
- Degradation of geological formations
- Pollution
- Invasive species

Ecological characteristic: Marine habitat types identified in NMP Karaburun-Sazan until 2014 include Biocenosis of mediolittoral caves, Biocenosis of the *Posidonia oceanica* meadows, Coralligenous biocenosis, and Biocenosis of semi-dark caves. The most important and sensitive species in the area Karaburuni Peninsula – Sazani Island are: the Red coral (*Corallium rubrum*), the mussel date (*Lithophaga lithophaga*), the dusky grouper (*Epinephelus marginatus*), the purple starfish (*Ophidiaster ophidianus*), the coralligenous algae *Lithophyllum byssoides*, Cystoseira communities, the monk seal (*Monachus monachus*), the short-beaked common dolphin (*Delphinus delphis*), and the loggerhead turtle (*Caretta caretta*). Moreover, this area hides some important crustaceans like the lobster (*Homarus gammarus*), the crawfish (*Palinurus elephas*), the greater locust lobster (*Scyllarides latus*), and the spiny spider crab (*Maja squinado*).

2.5.12 Ramsar sites

A Ramsar site is a wetland designated as internationally important under the Ramsar Convention, an environmental treaty established in 1971. This treaty aims to promote the conservation and sustainable use of wetlands, which are vital ecosystems characterized by the presence of water. To be classified as a Ramsar site, a wetland must meet specific ecological criteria related to its uniqueness and its role in supporting biodiversity, particularly concerning rare or endangered species (EBSCO, n.d., Ramsar Convention Secretariat, n.d.).

Since the Ramsar Convention took effect in 1975, over 2,500 sites worldwide have received this designation, with participation from more than 170 national governments (Ramsar Convention Secretariat, n.d.).

Table 2-50: Ramsar sites within a 100 km radius of the Exploration Well Asopus 1A

RAMSAR SITES	DISTANCE FROM THE EXPLORATION WELL ASOPUS 1A	COUNTRY
LE CESINE COASTAL WETLAND	≈ 90 km	Italy
BUTRINT WETLAND COMPLEX	≈ 90 km	Albania

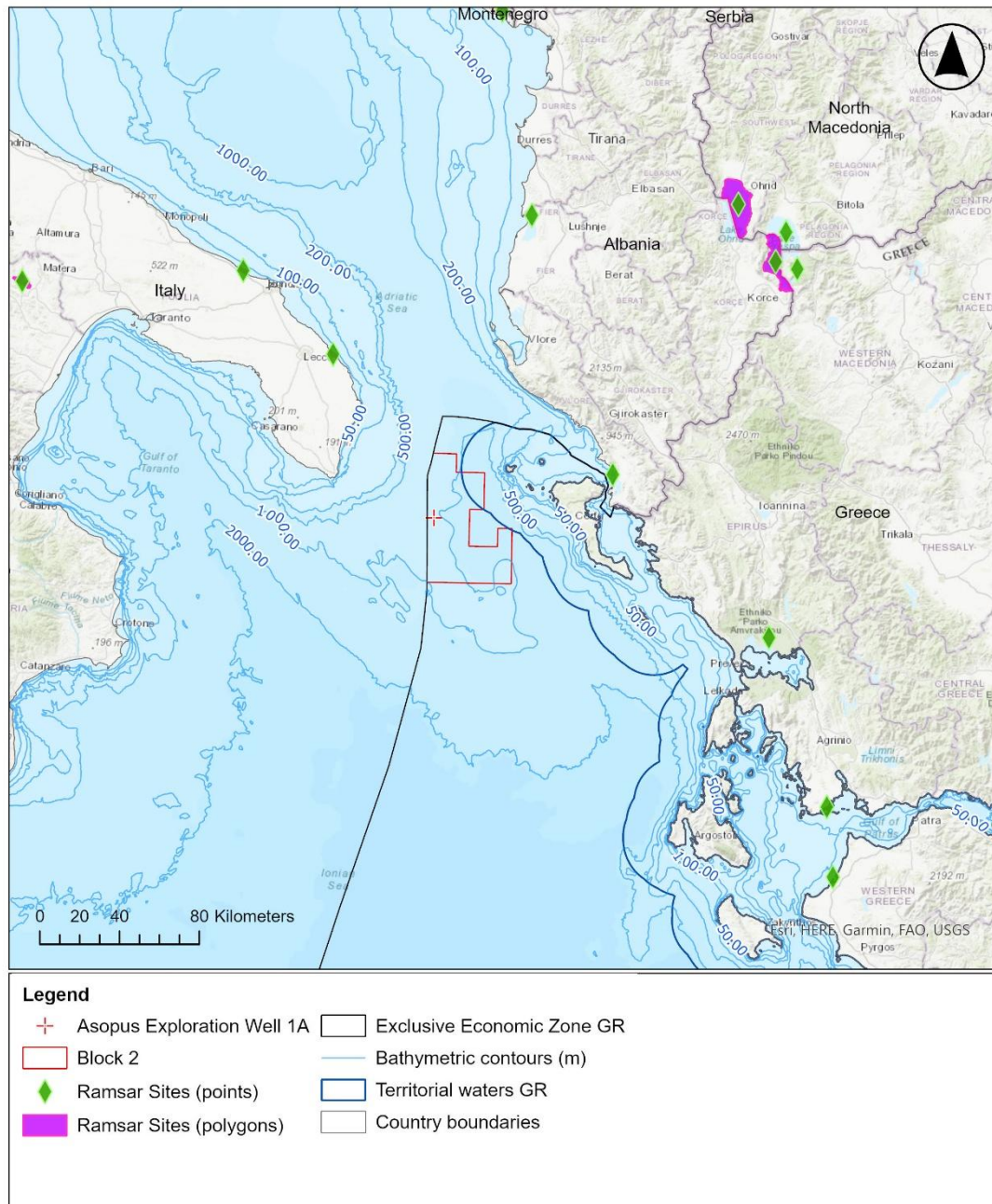


Figure 2-160: Ramsar sites in the broader area

2.5.12.1 Ramsar site Le Cesine coastal wetland

The Ramsar Site of Le Cesine is located in the Apulia Region, within the Municipality of Vernole in the Province of Lecce and covers an area of approximately 620 ha. It represents one of the last remaining sections of the formerly extensive system of coastal marshes and lagoons that occurred along the Apulian coast between Brindisi and Otranto. Behind the coastal dune system are two shallow brackish ponds, separated from the sea by a narrow sand barrier. Salinity varies considerably depending on seasonal rainfall and marine influence. The site includes coastal dunes, marshes, seasonal ponds, reedbeds, pine woodland and Mediterranean scrub. It supports rare plant species and provides important habitats for the migration, wintering and breeding of numerous waterbird species. Its ecological importance is associated with the

diversity of sandy, saline and wetland habitats that occur within a relatively limited coastal area. The main pressures affecting the wetland include reduced freshwater inflows, obstruction of the outlets connecting the ponds to the sea, progressive sediment accumulation and declining summer water levels. These processes may result in increased water temperatures, reduced dissolved oxygen and deterioration of aquatic habitats. For the Project, Le Cesine is considered a sensitive coastal wetland of the Adriatic Sea, particularly important for migratory birds and the ecological continuity of the southern Italian coastline.

2.5.12.2 Ramsar site Butrint wetland complex

The Butrint Ramsar Site is located in south-western Albania, approximately 8 km south of Saranda, close to the Greek border and the Ionian Sea. It covers a total area of approximately 13,500 ha and includes Lake Butrint, Lake Bufi, coastal lagoons, saltwater and freshwater marshes, reedbeds, halophytic areas, rocky coastlines, forests and Mediterranean scrub. Lake Butrint, which covers approximately 1,600 ha, is of tectonic origin and is connected to the Ionian Sea through the natural Vivari Channel. The wetland complex is characterised by exceptionally high biodiversity and supports a large number of plant, fish, amphibian, reptile, bird and mammal species, including globally threatened species. Its freshwater, brackish, saline and marine habitats also provide important spawning, nursery and feeding grounds for fish populations. The site also has outstanding archaeological and cultural importance, as it includes the ancient city of Butrint, which is designated as a UNESCO World Heritage Site. Fishing, mussel farming, livestock grazing, vineyards and cultural tourism are among the principal human activities in the wider area. For the purposes of the Project, Butrint is considered a highly sensitive environmental and cultural receptor due to its ecological connection with the Ionian Sea and the combination of internationally important natural and archaeological values.

2.5.13 Emerald network of areas of special conservation interest

The Emerald Network is an ecological network made up of Areas of Special Conservation Interest. The objective of the Emerald Network is the long-term survival of the species and habitats. The Emerald Network consists of the Areas of Special Conservation Interest (ASCI) designated under Recommendation No. 16 (1989) and Resolution No. 3 (1996) of the Standing Committee to the Bern Convention. Since 4 December 2020, eight countries: Andorra, Georgia, Liechtenstein, the Republic of Moldova, Norway, Switzerland, Ukraine and the United Kingdom have officially adopted Emerald sites on their territories (Council of Europe, n.d., EEA, n.d.).

Before being officially adopted as Emerald Network sites, all sites proposed to join the Network are thoroughly assessed at biogeographical level for their sufficiency to achieve the ultimate objective of the Network. This objective is the long-term survival of the species and habitats of the Bern Convention requiring specific protection measures. These habitats and species are listed respectively in Resolution No. 4 (1996) and Resolution No. 6 (1998) of the Standing Committee to the Bern Convention. Once the areas proposed are officially adopted as Emerald Network sites, they must be designated and managed at national level. The national designation and management measures are decided and put in place to contribute to the main objective of the Network, and their efficiency will be regularly monitored.

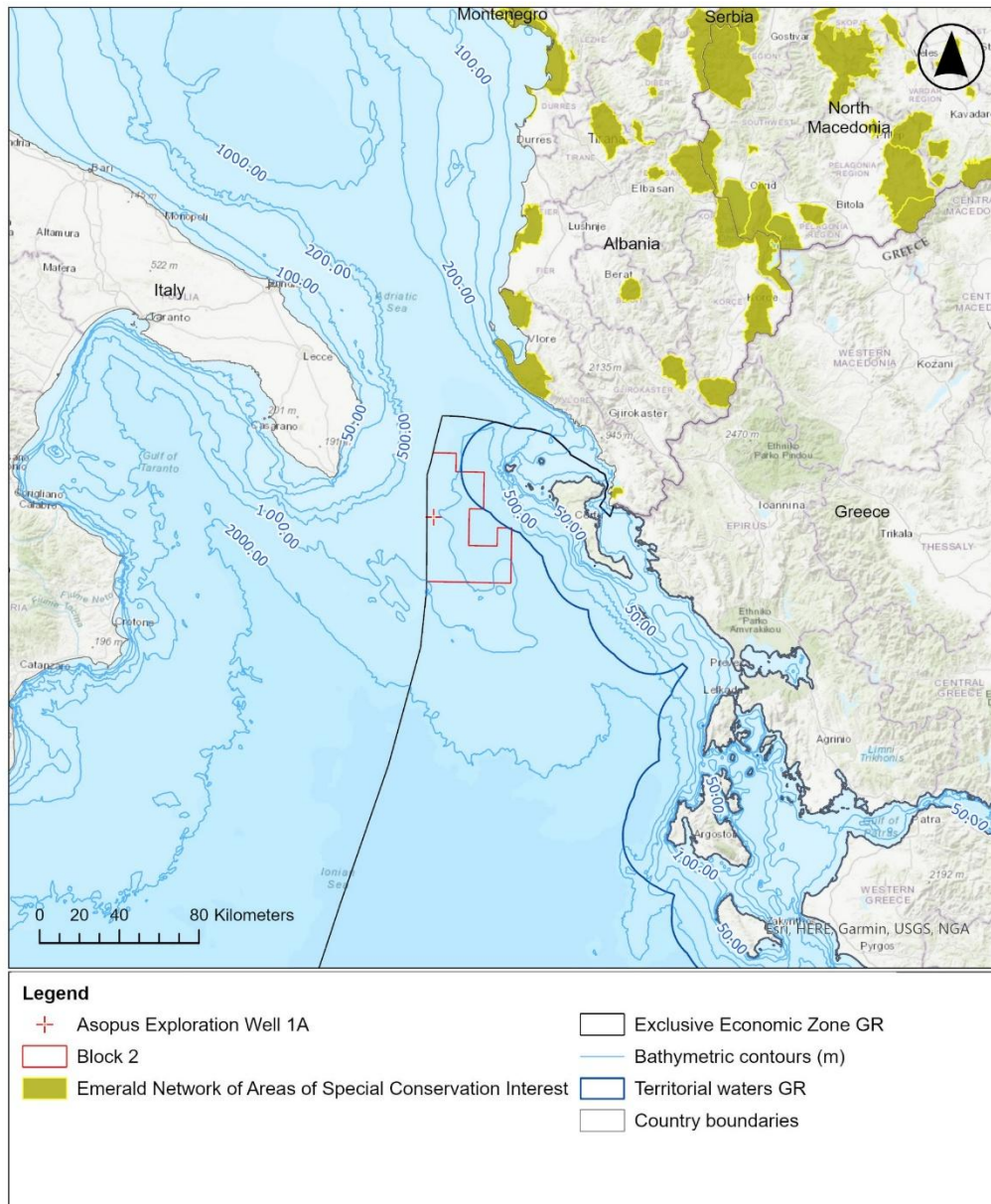


Figure 2-161: Emerald Network of Areas of Special Conservation Interest in the broader area

The closest Emerald Network of Areas of Special Conservation Interest to Asopus 1A Exploration Well are “Butrinti National Park” (Parku Kombetar i Butrintit - AL0000004) at approximately 90 km and “Karaburun-Orikum-Dukat National Park / Parku Kombetar Karaburun-Orikum-Dukat (AL0000014) at ~80 km.

2.5.13.1 EMERALD AL0000014 Karaburun–Orikum–Dukat National Park

Karaburun–Orikum–Dukat is a highly diverse area extending from marine and coastal ecosystems, lagoons and marshes to Mediterranean shrublands, forests and alpine grasslands. Its ecological importance includes the mixed coniferous forests of Llogara, the Orikum Lagoon, *Posidonia oceanica* habitats, rare and endemic plant species, and a rich variety of terrestrial and marine fauna.

2.5.13.2 EMERALD AL0000004 Butrinti National Park

Butrinti National Park is a Mediterranean wetland complex comprising a lake, lagoon and a small area of typical evergreen woodland. It is particularly important for wintering and migratory birds, including herons, egrets and the Dalmatian pelican, and also provides suitable habitat for the Eurasian otter.

2.6 Anthropogenic environment

The assessment focuses on the Corfu Regional Unit, which represents the closest onshore administrative area to Asopus 1A & Block 2, and the Municipality of Igoumenitsa, within the Thesprotia Regional Unit, where the Port of Igoumenitsa shorebase facilities are located. These areas are assessed primarily at municipal and regional unit level, while broader administrative scales are also considered where required by the availability, resolution, or comparability of baseline data.

2.6.1 Settlement structure and land use

2.6.1.1 Spatial planning framework

At national level, the legislative basis for spatial planning is L. 2742/1999 on Spatial Planning and Sustainable Development (GG A' 207/07.10.1999), which established the hierarchical system of national, special sectoral, and regional spatial instruments². At the national level, the General Framework for Spatial Planning and Sustainable Development (GFSPSD) (GG 128/A/03.07.2008) constitutes the national territorial plan, setting strategic spatial priorities applicable across Greece.

With specific relevance to the study area, the GFSPSD designates the city of Corfu as a secondary national pole and envisages possible future elevation to a primary national pole given its historical, cultural, and geopolitical significance. It further identifies the upgrading of the Port of Corfu as a priority transport hub and the strengthening of the Ioannis Kapodistrias International Airport as a major international aviation node³. With respect to port infrastructure relevant to the Project's onshore logistical footprint, the GFSPSD identifies Igoumenitsa as one of Greece's principal international gateways to the Adriatic and Italy and as a strategic transport node within the country's Northern Development Axis, which extends along the Egnatia Motorway across northern Greece. The Framework also recognises the complementary role of Igoumenitsa within the Western Development Axis, where it is associated with the primary national development poles of Ioannina and Patras. In this context, the Port of Igoumenitsa is recognised as a key component of Greece's national and trans-European transport network, supporting passenger and freight connectivity between Greece, the Adriatic region and wider European markets. The GFSPSD further promotes the strengthening of the port's international role as one of the country's principal maritime gateways and identifies its potential development as a multifunctional logistics and freight hub.

The spatial planning framework was modernised through L.4759/2020 "Modernisation of Spatial and Urban Planning Legislation" (GG A' 245/09.12.2020), which streamlined the preparation of spatial frameworks at

² <https://ypen.gov.gr/chorikos-schediasmos/chorotaxia/ethniki-politiki/>

³ Strategic Environmental Assessment of the Regional Operational Programme of the Ionian Islands 2021–2027, http://2014-2020.peponia.gr/wp-content/uploads/2022/03/EpikairoSxedioSMPE_pep_IN21_27_pin1.pdf

all levels, introduced Local Urban Plans (LUPs) and Special Urban Plans (SUPs) as the primary local land use instruments, and formally decoupled terrestrial coastal planning from maritime spatial planning.

At the regional level the operative regional planning instrument for the Corfu Regional Unit is the Regional Spatial Framework for the Ionian Islands (RSF Ionian Islands; GG 16/AAP/05.02.2019), which revised and replaced the earlier Regional Framework for Spatial Planning and Sustainable Development (RFSPSD)⁴. The RSF sets out the spatial development strategy for the Ionian Islands Region and contains provisions directly relevant to the Project. In the extractive industries sector, the RSF explicitly promotes the research and potential exploitation of hydrocarbons in the marine space as an activity of national economic significance, subject to appropriate conditions and restrictions within integrated maritime economy and maritime strategy policies, and on the condition of strict environmental protection standards, taking into account the seismicity of the area and the depth of extraction⁵. This provision constitutes the primary regional spatial planning reference for offshore hydrocarbon exploration activities such as the Exploration Well Asopus 1A in Block 2.

The RSF Ionian Islands also promotes the balanced spatial organisation of land and sea uses, the resolution of conflicting land and maritime uses, and the advancement of maritime spatial planning in conjunction with terrestrial planning. It further provides for the integration of the Ionian Islands Region into the EU Adriatic-Ionian Macro-Regional Strategy (EUSAIR), with specific reference to maritime economic activities and the protection of the marine environment within the broader maritime strategy framework. These provisions establish the regional spatial policy context within which the Exploration Well Asopus 1A falls.

Figure 2-162 gives a visual representation of the spatial development framework of the Ionian Islands Region.

⁴ <https://www.government.gov.gr/periferiako-chorotaxiko-plesio-ionion-nison/>

⁵ Strategic Environmental Assessment of the Regional Operational Programme of the Ionian Islands 2021–2027, http://2014-2020.peponia.gr/wp-content/uploads/2022/03/EpikairoSxedioSMPE_pep_IN21_27_pin1.pdf

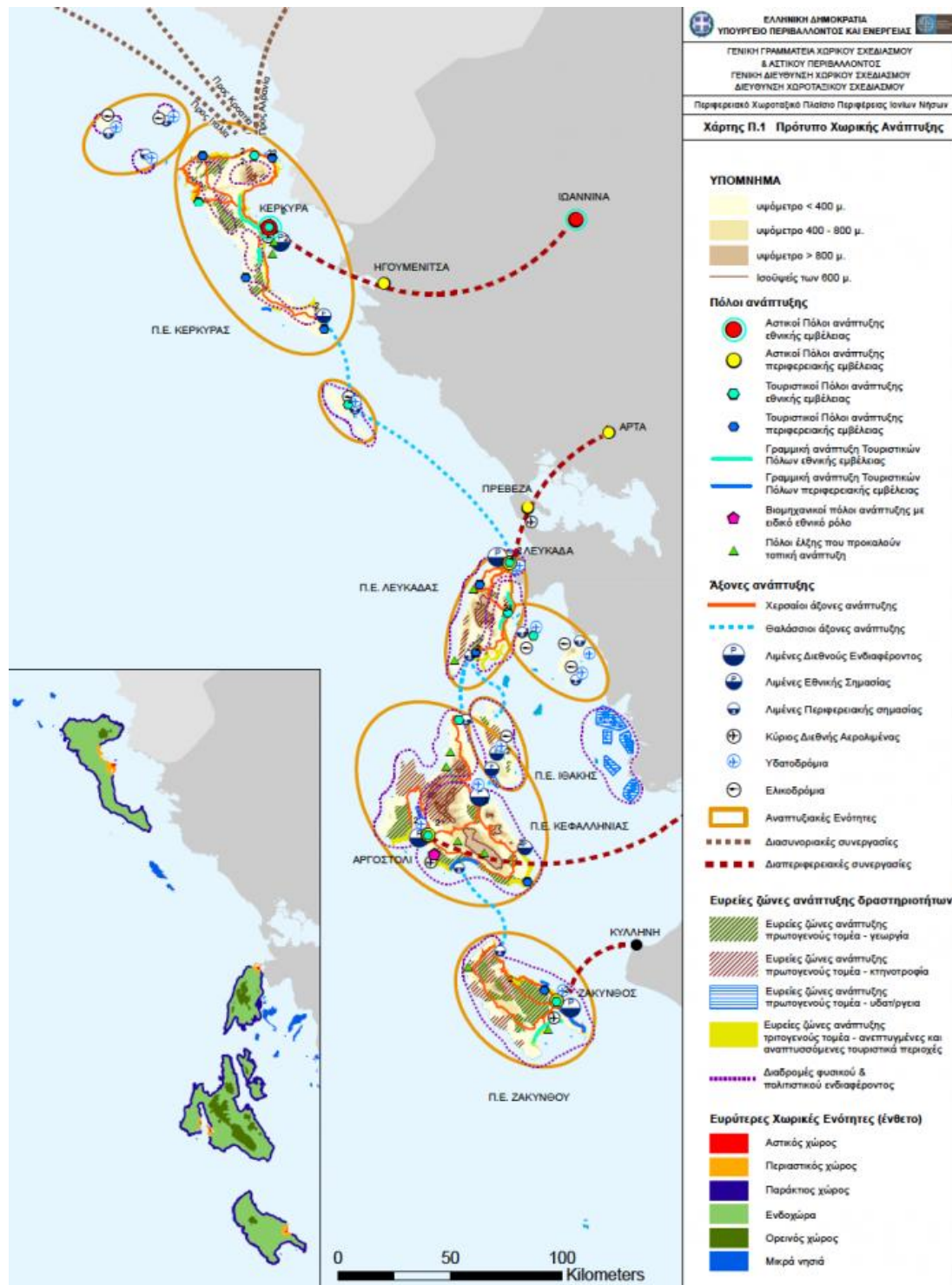


Figure 2-162: Regional Spatial Planning and Development Framework of the Ionian Islands Region⁶

The shorebase facilities at the port of Igoumenitsa is located within the Thesprotia Regional Unit, one of four regional units of the Epirus Region. The operative regional planning instrument for this territory is the RSF Epirus, approved by MD YPEN/DXORS/78523/1208 (GG 286/AAP/28.11.2018). The RSF Epirus recognizes

⁶ <https://www.government.gov.gr/periferiako-chorotaxiko-pleio-ionion-nison/>

the function of the port of Igoumenitsa as a major passenger and freight gateway connecting northwestern mainland Greece with the Ionian Islands and the Adriatic and envisages continued investment in port infrastructure and intermodal connectivity at Igoumenitsa, consistent with its role as the western terminus of the Egnatia Motorway.

Figure 2-163 gives a visual representation of the spatial development framework of the Ionian Islands Region.

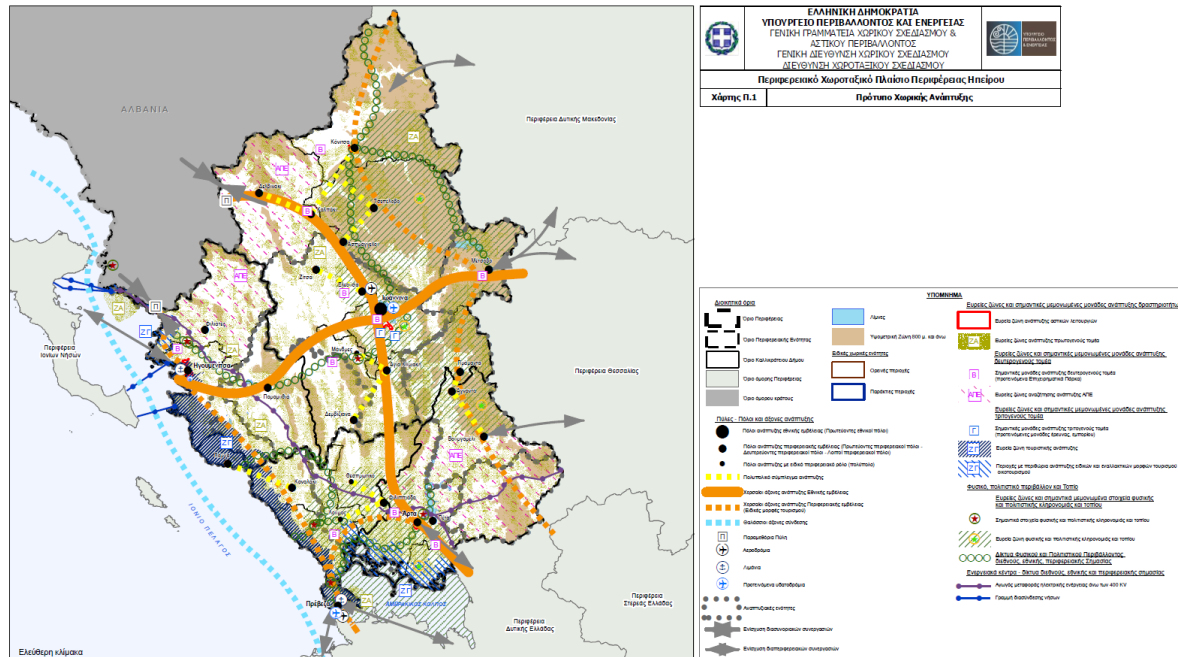


Figure 2-163: Regional Spatial Planning and Development Framework of the Epirus Region⁷

At local level, land use in the Corfu Regional Unit is governed by approved General Urban Plans (GUPs) for the principal settlements. The GUP for the city of Corfu was approved by MD 78140/3271/12.11.1986 (GG 55/D/05.02.1987) under L.1337/1983 and has been subject to a series of subsequent amendments⁸. The GUP for Lefkimmi was approved under the same legislative framework (GG 55/D/05.02.1987). Outside approved urban plan boundaries, land use in extra-urban areas is regulated through Zones of Urban Control (ZUC) designations, including the approved ZOE of Argyrades in the municipal unit of Korission (South Corfu)⁹. The new Local Urban Plans (LUPs) under L.4759/2020, funded by the Recovery and Resilience Facility (RRF), are progressively being prepared across the municipalities of the Region to extend formal land use coverage. The LUP for the Municipality of Central Corfu and Diapontian Islands is currently under preparation as part of the national "Konstantinos Doxiadis" programme and covers all eight Municipal Units of the municipality¹⁰.

Within the Municipality of Igoumenitsa, spatial development and land use are currently regulated by the approved GUP of Igoumenitsa (GG 575/AAP/31.12.2010), as subsequently amended. The GUP establishes the principal land use structure, development zones and spatial planning provisions applicable to the

⁷ https://ypen.gov.gr/wp-content/uploads/2020/11/20200728_Hpeiros_XARTES.zip

⁸ MUNICIPALITY OF CENTRAL CORFU AND DIAPONTIAN ISLANDS URBAN ACCESSIBILITY PLAN (S.A.P.), 05/2025, https://corfu.gr/web-assets/uploads/2025/05/corfu.gr-2025-05-15_10-55-43_825373.pdf

⁹ Strategic Environmental Assessment of the Regional Operational Programme of the Ionian Islands 2021–2027, http://2014-2020.peponia.gr/wp-content/uploads/2022/03/EpikairopSxedioSMPE_pep_IN21_27_pin1.pdf

¹⁰ https://polsxedia.ypen.gov.gr/tps_details/%CE%924_100

municipal area. Although a Special Urban Plan (SUP) for the coastal front of Epirus, including the Municipality of Igoumenitsa, is currently under preparation, this planning instrument has not yet been approved, and the existing GUP remains the statutory local planning framework. The Port of Igoumenitsa is located within a legally designated port zone administered by the Igoumenitsa Port Authority (OLIG S.A.). The Project's use of the port as a PSV logistics base will take place entirely within the existing operational port area and does not require any change to established land use designations, port zoning arrangements, or existing infrastructure.

These local planning instruments govern only onshore territory and have no direct regulatory bearing on Block 2 activities, but they define the land use context of the local communities and port infrastructure relevant to the Project's logistical footprint.

2.6.1.2 Administrative framework and settlement structure

The proposed Asopus-1 exploration well lies approximately 21.5 km (11.6 nautical miles) offshore Mathraki Island, approximately 3.2 km (1.7 nautical miles) from the Italian EZZ and in water depths of approximately 840 m. There are no islands, coastal features, or fixed subsea installations in the immediate vicinity of the well location.

The nearest onshore administrative unit is the Corfu Regional Unit, one of five regional units comprising the Ionian Islands Region. The Ionian Islands Region recorded a total permanent population of 204,532 in the 2021 Population–Housing Census¹¹.

The Corfu Regional Unit encompasses the main island of Corfu as well as the smaller islands of Paxoi, Antipaxoi, and the Diapontian Islands (Othonoi, Ereikoussa, Mathraki). Following the Kallikratis administrative reform (L.3852/2010) and subsequent adjustments under the Kleisthenis I reform (Law 4555/2018), the regional unit is currently subdivided into four municipalities. The Kallikratis reform consolidated the seven pre-existing municipalities into larger administrative entities, aiming to reduce fragmentation and improve public service delivery. Table 2-51 presents the population and spatial characteristics of each municipality as recorded by the 2021 Census.

Table 2-51: Municipalities of the Corfu Regional Unit and their populations¹²

MUNICIPALITY	SEAT	AREA (KM ²)	POPULATION (2021)	DENSITY (INH./KM ²)
Central Corfu & Diapontian Islands	Corfu (city)	232.47	67,112	~289
Paxoi	Gaios	30.1	2,466	~82
North Corfu	Acharavi	205.33	17,278	~84
South Corfu	Lefkimmi	175.13	14,744	~84

¹¹ <https://www.statistics.gr/en/2021-census-res-pop-results> (2021 Population and Housing Census: Resident population by Region, Regional Unit, Municipality and sex, 17.03.2023.)

¹² <https://www.statistics.gr/en/2021-census-res-pop-results> (2021 Population and Housing Census: Resident population by Region, Regional Unit, Municipality and sex, 17.03.2023.), <https://www.ypes.gr/wp-content/uploads/2024/06/STRUCTURE-OPERATION-LRD-ENGLISH-VERSION-2024.pdf>, https://polsxedia.ypen.gov.gr/tps_details/%CE%924_101, https://polsxedia.ypen.gov.gr/tps_details/%CE%924_99, https://polsxedia.ypen.gov.gr/tps_details/%CE%921_14,

MUNICIPALITY	SEAT	AREA (KM ²)	POPULATION (2021)	DENSITY (INH./KM ²)
Corfu Regional Unit (total)	Corfu	643.03	101,600	~158

At the 2021 Census, the Corfu Regional Unit recorded a total permanent population of 101,600 inhabitants, corresponding to a population density of approximately 158 inhabitants per km², well above the national average of approximately 83 inhabitants per km²¹³. The settlement pattern combines a concentrated urban core with a dispersed network of rural and semi-rural communities.

The Municipality of Central Corfu and Diapontian Islands is the most populous, with 67,112 permanent residents. Its seat is the city of Corfu (Kerkyra), which serves simultaneously as the regional capital of the Ionian Islands Region. The city's municipal unit recorded 40,047 permanent residents, of whom 30,737 reside within the urban community boundary¹⁴. The Old Town of Corfu was inscribed on the UNESCO World Heritage List in 2007¹⁵, and together with the New Fortress area constitutes the historic core of the city. The municipality also incorporates the sparsely populated Diapontian Islands (Othonoi: 386 inhabitants, Ereikoussa: 447 inhabitants and Mathraki: 174 inhabitants)¹⁶, which are isolated island communities dependent on ferry links. The Diapontian Islands also rely solely on their interconnection with Corfu for electricity supply¹⁷.

The Municipality of North Corfu (seat: Acharavi) recorded 17,278 permanent residents across an area of 205.33 km², giving a relatively low density of approximately 84 inhabitants per km². The Municipality of South Corfu (seat: Lefkimmi), recorded 14,744 permanent residents across 175.13 km². Its second-largest settlement, the town of Lefkimmi (3,323 residents in the community proper; 5,647 at municipal unit level), functions as the main service centre for the southern part of the island. The Municipality of Paxoi (seat: Gaios), covering the islands of Paxoi and Antipaxoi, is the smallest municipality in the regional unit by population, with approximately 2,466 residents.

Compared to the 2011 Census figure, the 2021 data indicate a moderate demographic contraction: the regional unit of Corfu declined by approximately 2.7% and the wider Ionian Islands Region by approximately 1.6% over the intercensal decade. This trend mirrors the national pattern: Greece's total population fell by 3.1% between 2011 and 2021, from approximately 10.8 million to 10,482,487¹⁸.

In terms of settlement hierarchy, the city of Corfu is classified as a secondary national pole under the General Framework for Spatial Planning and Sustainable Development (Γενικό Πλαίσιο Χωροταξικού Σχεδιασμού και Αειφόρου Ανάπτυξης, ΓΠΧΣΑΑ). The seats of the remaining Regional Units of the Ionian Islands Region, with the exception of Vathy (Ithaca), are classified as “other urban centres with a population exceeding 10,000 inhabitants”, while Lefkada is integrated into the multi-polar cluster of Lefkada–Arta–Preveza. The General Spatial Framework further notes that future elevation of the city of Corfu to a primary national pole is under consideration, on account of its historical role as a centre of knowledge, culture, and international tourism, its UNESCO World Heritage status, and its geopolitical position¹⁹.

¹³ <https://ec.europa.eu/eurostat/documents/12743486/14207633/EL-EN.pdf>

¹⁴ https://www.statistics.gr/documents/20181/17286366/MON_PLI_DHM_OIKISN_2021.xlsx

¹⁵ <https://whc.unesco.org/en/list/978/>

¹⁶ https://www.statistics.gr/documents/20181/17286366/MON_PLI_DHM_OIKISN_2021.xlsx

¹⁷ <https://clean-energy-islands.ec.europa.eu/taxonomy/term/754>

¹⁸ https://elstat-outsourcers.statistics.gr/census_results_2022_en.pdf (2021 Population and Housing Census: Resident population by Region, Regional Unit, Municipality and sex, 17.03.2023.)

¹⁹ Strategic Environmental Assessment of the Regional Operational Programme of the Ionian Islands 2014–2020, http://2014-2020.pepionia.gr/wp-content/uploads/2022/03/EpikaironSMPE_pep_IN21_27_pin1.pdf,

The Municipality of Igoumenitsa constitutes the principal onshore administrative area associated with the Project's maritime logistics activities, as the Port of Igoumenitsa will serve as the operational base for PSV movements supporting the offshore drilling activities. The municipality is located within the Regional Unit of Thesprotia, one of the four regional units comprising the Region of Epirus.

According to the 2021 Population–Housing Census of ELSTAT, the Regional Unit of Thesprotia recorded a permanent population of 40,804 inhabitants, representing approximately 12.8% of the total population of the Region of Epirus (319,991 inhabitants). The Municipality of Igoumenitsa recorded a permanent population of 25,698 inhabitants, corresponding to approximately 63% of the regional unit's population. Compared with the 2011 Census, the municipality experienced a marginal population decline of approximately 0.4%, while the Regional Unit of Thesprotia recorded a decrease of approximately 6.4%, broadly reflecting the wider demographic contraction observed across Epirus and Greece²⁰. The municipal unit of Igoumenitsa recorded 18,562 inhabitants at the 2021 Census, of whom 10,315 reside within the urban community boundary, establishing it as the dominant urban centre of Thesprotia but a relatively small city by national standards²¹.

The present municipal structure was established through the Kallikratis administrative reform (L. 3852/2010), which merged the former municipalities of Igoumenitsa, Syvota, Margariti, Perdika and Parapotamos into a single municipal authority²². The municipality covers an area of approximately 428 km² and extends from the Albanian border region in the north to the coastal areas of the Ionian Sea in the west and southwest. The municipal seat is the city of Igoumenitsa, which also serves as the administrative capital of the Regional Unit of Thesprotia^{23,24}.

2.6.1.3 Land use characteristics

The Corfu Regional Unit covers a total area of 639.9 km². Land use is dominated by agricultural activity, particularly permanent crops, which reflects the island's centuries-long tradition of olive cultivation. Table 2-52 presents the distribution of land across the principal land use categories for the Corfu Regional Unit, as documented in the SEIA of the Ionian Islands Regional Operational Programme (ROP) 2021–2027, drawing on data from the Regional Waste Management Plan of the Ionian Islands (ΠΕΣΔΑ Ιονίων Νήσων)²⁵.

²⁰ https://elstat-outsourcers.statistics.gr/census_results_2022_en.pdf (2021 Population and Housing Census: Resident population by Region, Regional Unit, Municipality and sex, 17.03.2023.)

²¹

https://www.statistics.gr/el/statistics?p_p_id=documents_WAR_publicationsportlet_INSTANCE_VBZOniOvs5VJ&p_p_lifecycle=2&p_p_state=normal&p_p_mode=view&p_p_cacheability=cacheLevelPage&p_p_col_id=column-2&p_p_col_count=4&p_p_col_pos=2&_documents_WAR_publicationsportlet_INSTANCE_VBZOniOvs5VJ_javax.faces.resource=document&_documents_WAR_publicationsportlet_INSTANCE_VBZOniOvs5VJ_in=downloadResources&_documents_WAR_publicationsportlet_INSTANCE_VBZOniOvs5VJ_documentID=526907&_documents_WAR_publicationsportlet_INSTANCE_VBZOniOvs5VJ_locale=el

²² <https://www.thesprotia.gr/dimoi/>

²³ <https://pedepirus.gr/dimos-igoumenitsas/>

²⁴ <https://www.thesprotia.gr/genikes-plirofories/>

²⁵ Strategic Environmental Assessment of the Regional Operational Programme of the Ionian Islands 2021–2027, http://2014-2020.pepionia.gr/wp-content/uploads/2022/03/EpikairpSXedioSMPE_pep_IN21_27_pin1.pdf

Table 2-52: Main land use categories in the Corfu Regional Unit (km²)

MAIN CATEGORY	SUB-CATEGORY	AREA (KM ²)	% OF TOTAL
Agricultural areas	Arable land	28.8	4.5%
	Permanent crops (olive groves, orchards)	332.4	51.9%
	Pastures – transitional woodland/shrub	0.0	0.0%
	Pastures – shrub/herbaceous vegetation	29.7	4.6%
	Pastures – sparse/no vegetation	0.4	0.1%
	Heterogeneous agricultural areas	106.1	16.6%
Forests & semi-natural areas	Forests	3.2	0.5%
	Transitional woodland/shrub	6.8	1.1%
	Shrub/herbaceous vegetation associations	55.3	8.6%
	Sparsely vegetated areas	38.9	6.1%
Inland waters	Terrestrial water bodies	4.1	0.6%
Wetlands	Inland wetlands	0.2	0.0%
	Coastal wetlands	2.8	0.4%
Artificial surfaces	Urban fabric	28.8	4.5%
	Industrial and commercial zones	0.8	0.1%
	Transport networks	0.8	0.1%
	Mines, dumps, construction sites	0.1	0.0%
	Artificial non-agricultural green areas, sport & cultural facilities	0.7	0.1%
TOTAL		639.9	100%

As shown in Table 2-52, permanent crops account for 332.4 km² (51.9%) of the total regional unit area, making them the dominant land use category. This reflects the prevalence of olive cultivation, a defining feature of the Ionian landscape that the Strategic Environmental Impact Assessment (SEIA) of the Ionian Islands Regional Operational Programme (ROP) 2021–2027 recognises as a priority sector for preservation, quality improvement, and vertical integration of agricultural production. Heterogeneous agricultural areas (106.1 km², 16.6%) represent a mix of small-scale cultivation plots, gardens, and agro pastoral uses typical of island farming systems. Arable land accounts for only 28.8 km² (4.5%), confirming that intensive cereal or irrigated crop production is minimal. Semi-natural and scrubland cover represents a combined 104.4 km² (16.3%), with dense forests accounting for only 3.2 km². Artificial surfaces total 31.2 km² (4.9%) of the regional unit area. Urban fabric (28.8 km²) is the dominant artificial land use, concentrated in the city of Corfu and along the north-eastern coastal strip. Industrial and commercial zones are negligible (0.8 km²), confirming the absence of significant manufacturing or heavy industry on the island. Transport infrastructure (0.8 km²) reflects the road network and the Ioannis Kapodistrias International Airport (CFU), located immediately south of the city. Wetland areas, both inland (0.2 km²) and coastal (2.8 km²), are ecologically significant but spatially limited²⁶.

²⁶ Strategic Environmental Assessment of the Regional Operational Programme of the Ionian Islands 2021–2027, http://2014-2020.peponia.gr/wp-content/uploads/2022/03/EpikairoSxedioSMPE_pep_IN21_27_pin1.pdf

At municipal level, across the Municipality of Central Corfu and Diapontian Islands, extensive olive groves and areas dominated by agricultural use combined with significant natural vegetation are the prevailing land cover types. At the same time, the urban settlement of Corfu has experienced notable residential expansion towards the western and southern parts of the island, alongside areas of sclerophyllous vegetation. The Diapontian Islands are mainly characterised by sclerophyllous vegetation, although Ereikoussa and Mathraki also include areas primarily covered by agricultural land with substantial natural vegetation²⁷.

The Municipality of North Corfu similarly contains extensive olive groves, productive agricultural land, and complex cultivation patterns, particularly in the northern part of the island, where several sports and recreational facilities are also located. Western areas are dominated by olive groves, non-irrigated arable land, and mixed cultivation systems, while the eastern side is characterised by sparse vegetation, sclerophyllous vegetation, and natural grasslands. In the southern part of the municipality, a wider mix of land uses is observed, including a mining area in the southwest and sports and recreational facilities in the southeast²⁸.

The Municipality of South Corfu is also largely covered by olive groves, with productive agricultural land and mixed agricultural-natural landscapes concentrated mainly in the northern areas. The Korission municipal unit includes the Korission Lagoon, while forested areas are mainly found in the southern parts of the municipality²⁹. Similarly, the Municipality of Paxoi is dominated by olive groves, alongside productive agricultural land and areas combining agricultural use with significant natural vegetation³⁰.

The overall land use profile of the regional unit is consistent with the spatial development priorities set out in the Regional Spatial Framework for the Ionian, which promotes the protection of the agricultural landscape, the sustainable development of tourism, and the avoidance of conflicts between land uses, particularly along the coastal zone. The settlement pattern reflects this land use structure. The vast majority of Corfu's 208 settlements are small inland villages or hamlets historically associated with olive cultivation, interspersed with larger coastal villages that have evolved into tourism and fishing service centres. No significant industrial zones or extractive land uses are present on the island. The Regional Spatial Framework and the SEIA of the Ionian Islands ROP 2021–2027 note that the extractive sector in the Ionian Islands is limited to industrial minerals and inert materials, organised within designated quarry zones and subject to compatibility requirements with other productive activities and environmental protection constraints. The potential exploration and exploitation of offshore hydrocarbons in the Ionian Sea, explicitly referenced in the SEIA of the Ionian Islands ROP 2021–2027, as an activity of national economic significance, subject to strict environmental protection standards and taking into account the seismicity and water depths of the area, represents a new and distinct land use typology in the marine space, without a precedent in the existing onshore land use framework of the Corfu Regional Unit.

Land use within Igoumenitsa reflects its dual character as a port city and a predominantly rural municipality, as documented in the GUP for Igoumenitsa (approved under GG 575/ΑΑΠ/31.12.2010). The city of Igoumenitsa and its immediate coastal hinterland (Figure 2-164) concentrate the municipality's artificial

²⁷ https://polsxedia.yopen.gov.gr/tps_details/%CE%924_100

²⁸ https://polsxedia.yopen.gov.gr/tps_details/%CE%924_101

²⁹ https://polsxedia.yopen.gov.gr/tps_details/%CE%924_99

³⁰ https://polsxedia.yopen.gov.gr/tps_details/%CE%921_14

surfaces, comprising urban residential fabric, commercial areas, transport infrastructure, and the port zone. The surrounding municipal territory is largely forested and semi-natural, with agricultural land.

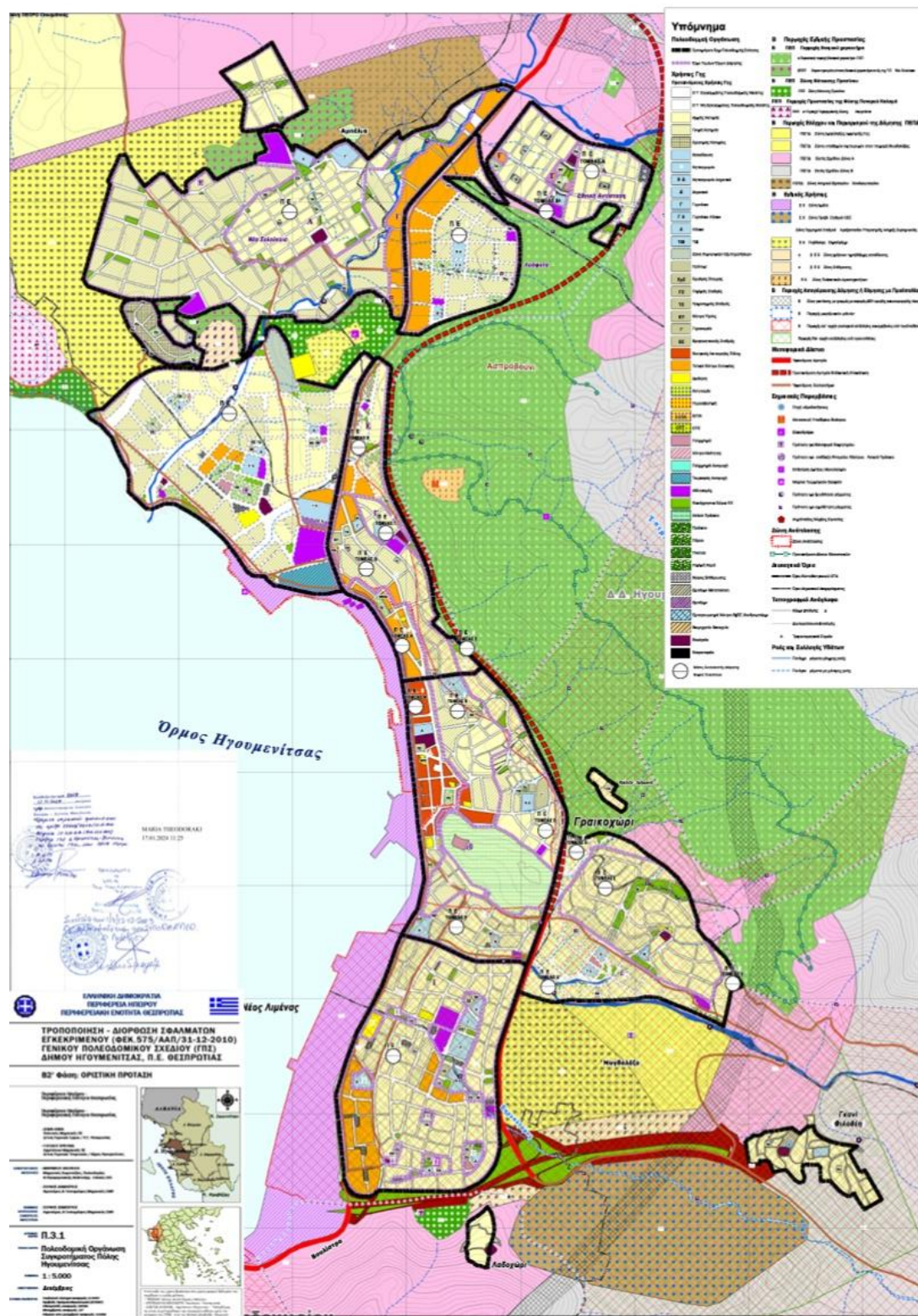


Figure 2-164: Urban Plan of the city of Igoumenitsa³¹

2.6.1.4 Offshore study area

Exploration Well Asopus 1A is almost entirely located beyond Greek territorial waters (the 6-nautical-mile coastal zone), but within the Greek continental shelf under the 1977 Greece–Italy continental shelf delimitation agreement, which established the boundary on the basis of the median line principle³². The Block is characterised by the absence of any permanent human settlement or land use. There are no inhabited islands, structures, or fixed installations within Block 2. The area's human use is exclusively maritime in nature, encompassing fishing, navigation, and previously, seismic survey operations.

2.6.1.5 Transboundary context: Italian Adriatic/Ionian Coast

The Exploration Well Asopus 1A Project is located within Offshore Block 2, in the northern Ionian Sea. The western limit of Block 2 is defined by the Greek–Italian Economic Exclusive Zone (EEZ)/continental shelf boundary. In the wider transboundary context, the Italian coastline potentially relevant to the Exploration Well Asopus 1A Project corresponds to the Apulian (Puglia) coast of southern Italy, particularly the Salento Peninsula and the coastal area bordering the Strait of Otranto, on the opposite side of the northern Ionian Sea.

2.6.2 Maritime uses

2.6.2.1 Maritime spatial planning framework

The regulatory framework for maritime spatial planning (MSP) in Greece is established by Directive 2014/89/EU of the European Parliament and of the Council, which was transposed into Greek legislation through L.4546/2018 (GG 101/A/12-06-2018) and amendment through L.4759/2020 (GG 245/A/9-12-2020). Under Article 3 of L.4546/2018 as amended, MSP is defined as the process by which the competent authority analyses and organises human activities in marine areas in order to achieve the integration of ecological, environmental, economic, social, and cultural objectives, with a view to promoting the sustainable development of maritime economies and marine areas and the sustainable use of marine resources. The Greek MSP framework provides for two planning levels: the National Spatial Strategy for Maritime Space (NSPSMS), which establishes strategic directions and priorities, and Maritime Spatial Frameworks (MSFs), which are intended to provide more detailed spatial planning provisions at sub-national level^{33,34,35}.

In April 2025, the NSPSMS was approved by Cabinet Act 6/17-04-2025 (GG D 227/17.04.2025), developed by the Ministry of Environment and Energy (MoEE) in cooperation with the Ministry of Foreign Affairs (MoFA) and other ministries. The NSPSMS is accompanied by an official map dividing Greek maritime space into

³¹ https://www.apdhp-dm.gov.gr/gps/igoumenitsa_simiaki_trop_gps_5_2_2024.pdf

³² <https://www.energean.com/operations/greece/block-2/>, Offshore Seismic Acquisition Block 2 - Ionian Sea, Environmental Action Plan

³³ <https://ypen.gov.gr/chorikos-schediasmos/chorotaxia/ethniki-politiki/>

³⁴ <https://ypen.gov.gr/gia-proti-fora-sti-chora-thalassios-chorotaxikos-schediasmos/>

³⁵ <https://ypen.gov.gr/chorikos-schediasmos/chorotaxia/nomothesia/>

four spatial units covering the Ionian and Aegean Seas and according to which the Project area falls in Spatial Unit 4 (Figure 2-165)³⁶.

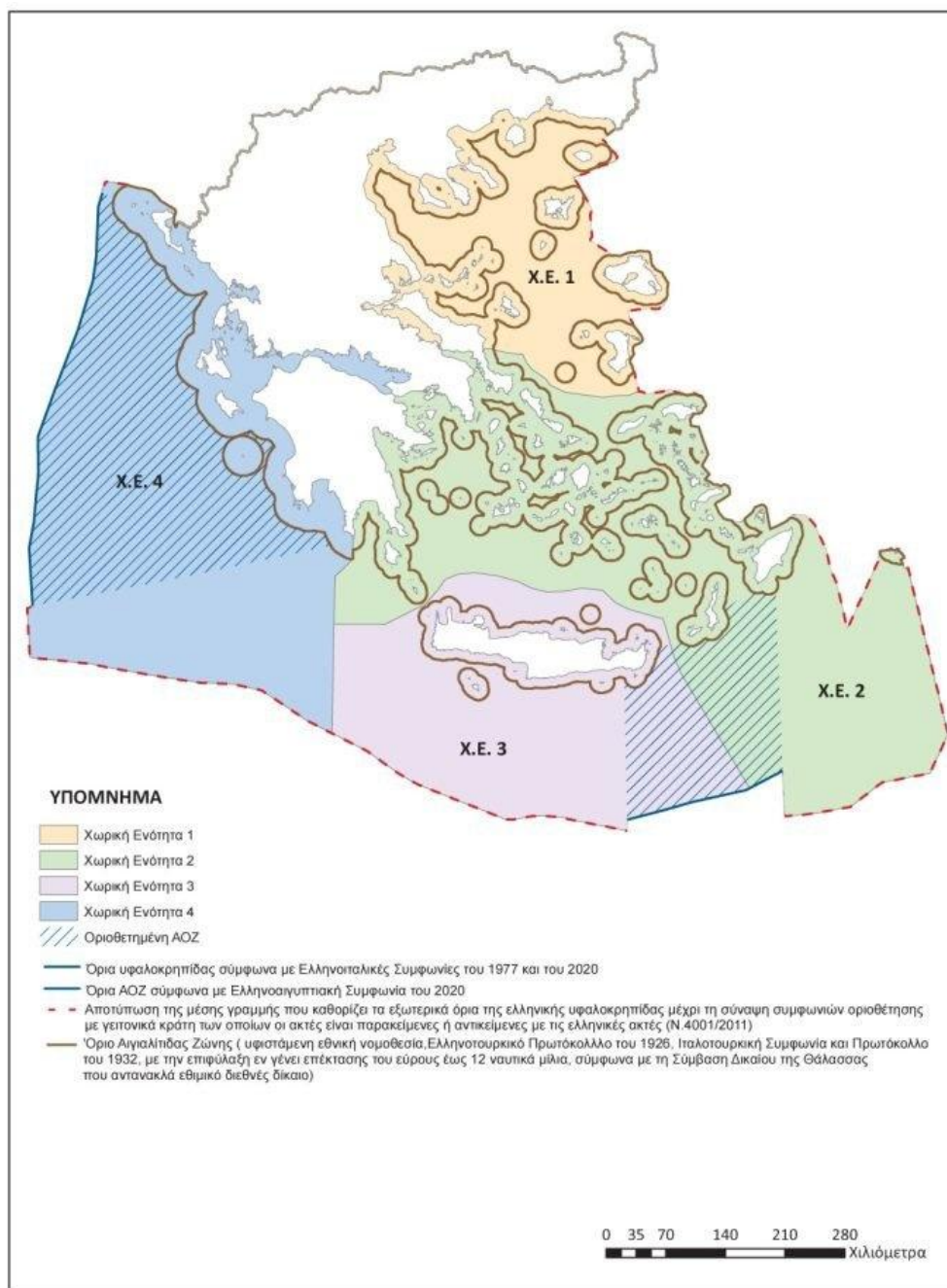


Figure 2-165: Maritime spatial units³⁷

Two accompanying ministerial decisions were published simultaneously: MEE/43090/574/17-04-2025 and MEE/43091/575/17-04-2025 on the technical specifications of the MSP Frameworks (GG D 228/17.04.2025)³⁸.

³⁶ <https://www.government.gov.gr/gia-proti-fora-sti-chora-thalassios-chorotaxikos-schediasmos/>

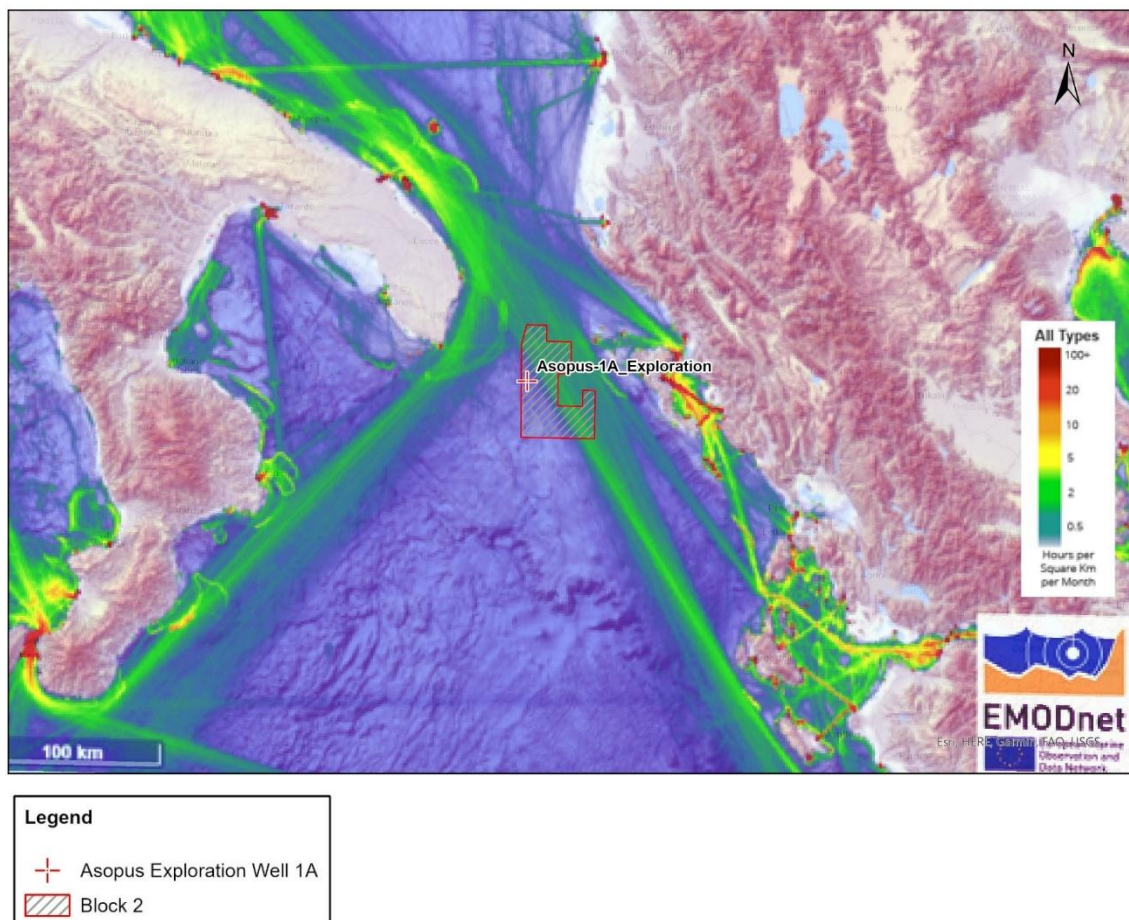
³⁷ <https://ypen.gov.gr/gia-proti-fora-sti-chora-thalassios-chorotaxikos-schediasmos/>

³⁸ <https://maritime-spatial-planning.ec.europa.eu/countries/greece>

The approval of the NSPSMS represents a significant step in the implementation of maritime spatial planning in Greece. However, the MSFs envisaged under L.4546/2018, which are expected to provide more detailed spatial guidance regarding the allocation and management of maritime activities within each spatial unit, have not yet been finalised. In the interim, planning and management of marine and coastal activities continue to be informed by the NSPSMS together with existing national, regional and sector-specific spatial planning instruments. Among these, the Special Spatial Framework for Aquaculture (SSFA) (GG 2505/B/04-11-2011) remains the principal sector-specific instrument addressing the spatial organisation of aquaculture activities in marine and coastal waters. Other sectoral spatial planning frameworks, including those relating to tourism and industry, continue to provide relevant planning guidance where applicable.

2.6.2.2 Shipping and navigation

The Ionian Sea is one of the busiest maritime corridors in the Eastern Mediterranean, connecting the Adriatic Sea the wider Mediterranean basin and routes to the Suez Canal and the Black Sea. Vessel traffic density data generated from Automatic Identification System (AIS) signals, compiled and published annually by the European Marine Observation and Data Network (EMODnet Human Activities)³⁹ as part of its Vessel Density Map product, show that the Ionian Sea contains well-defined high-density shipping corridors running in a broadly NW–SE (Figure 2-166).



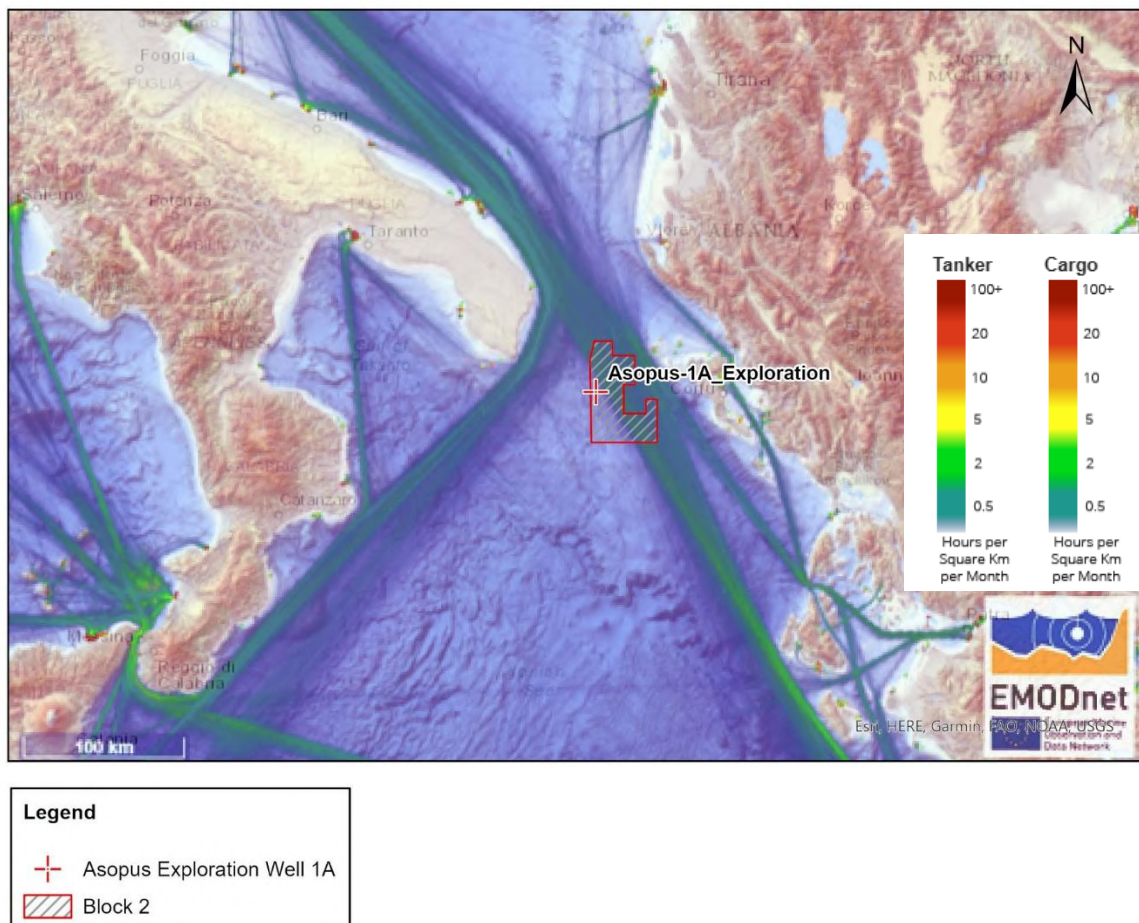
³⁹ <https://EMODnet.ec.europa.eu/en/human-activities>

Figure 2-166: Average vessel traffic density (all vessel types), 2017–2024, in the Ionian Sea and wider Project area

The European Atlas of the Seas (European Commission, DG MARE / DG ENV)⁴⁰, which integrates EMODnet vessel density layers among other maritime spatial datasets, confirms that the sea area west of Corfu, encompassing Exploration Well Asopus 1A, falls within a zone of low vessel traffic, principally generated by cargo and passenger ferry routes between Italian Adriatic ports (Ancona, Bari, Brindisi, Venice) and the ports of Igoumenitsa and Patras on mainland Greece, as well as by tanker traffic transiting the broader Ionian basin.

The overall vessel density pattern indicates that the principal navigation corridors are concentrated west of Corfu and follow a NW–SE alignment through the central Ionian basin. Traffic intensity decreases eastwards towards the Corfu Channel and the nearshore waters of mainland Epirus, where vessel activity is primarily associated with domestic ferry services and local coastal traffic. Exploration Well Asopus 1A lies close to regional vessel transit corridors, but outside the highest-density shipping routes mapped in the wider area.

To support the characterisation of navigation activity relevant to the Exploration Well Asopus 1A, separate EMODnet vessel density layers for cargo/tanker traffic and passenger vessel traffic were also reviewed (Figure 2-167).



⁴⁰ https://ec.europa.eu/maritimeaffairs/atlas/maritime_atlas/

Figure 2-167: Average traffic density (cargo and tanker), 2017–2024, in the Ionian Sea and wider Project area

Cargo and tanker vessels represent the dominant ship classes on the main international transit routes crossing the Ionian Sea. These routes form part of the broader East–West Mediterranean shipping network connecting the Adriatic and Black Sea regions with the central and western Mediterranean, including traffic associated with energy transport and containerised cargo. The EMODnet density maps indicate that the most intensive commercial shipping lanes pass west of Corfu (Figure 2-168).

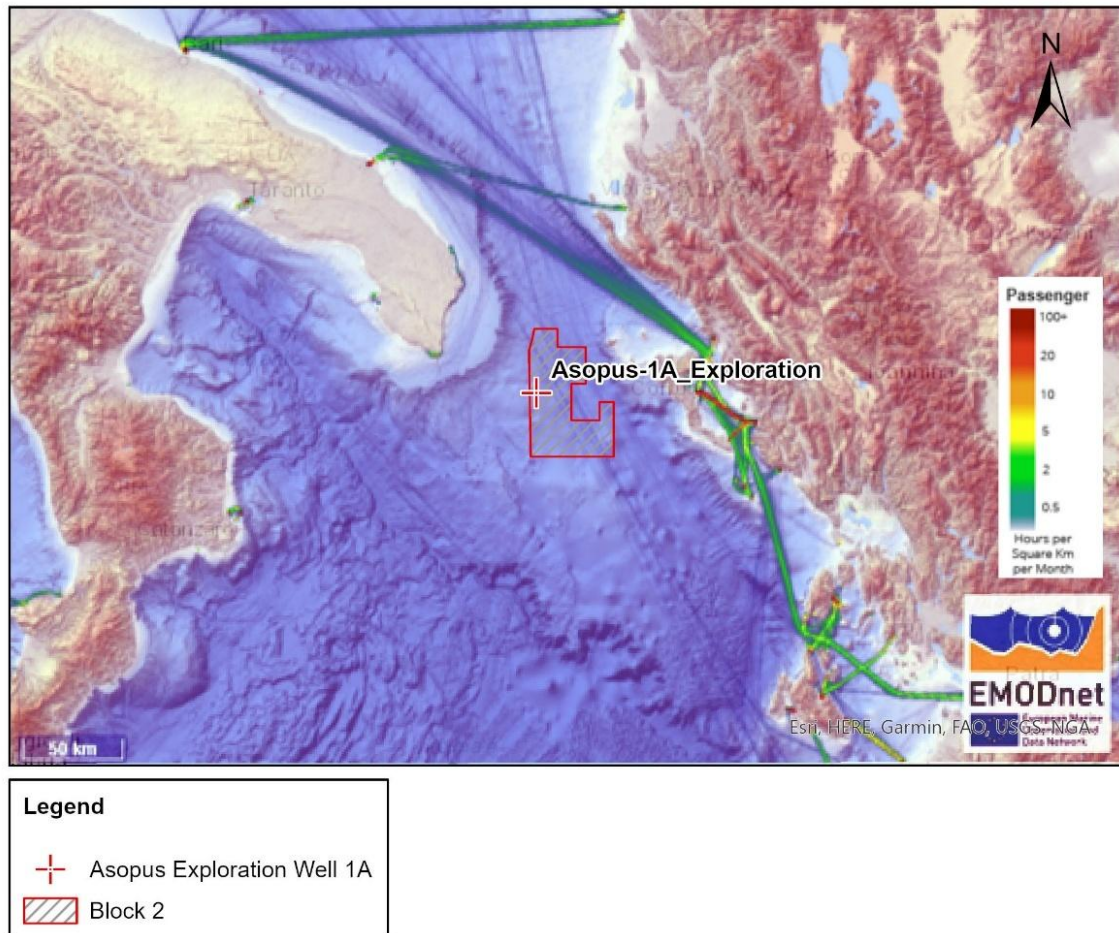


Figure 2-168: Average vessel traffic density (passenger), 2017–2024, in the Ionian Sea and wider Project area

Passenger vessel density is primarily associated with the international ferry network linking the Adriatic ports of Ancona, Bari, Brindisi, and Venice with Igoumenitsa and Patras, as well as domestic ferry connections between Corfu, Igoumenitsa, and Paxos, as well as the Diapontian Islands. The highest passenger vessel densities are concentrated along established ferry corridors crossing the Strait of Otranto and continuing south-eastwards into the Ionian Sea. Additionally, cruise traffic between Venice/Trieste and Eastern Mediterranean ports (Athens/Piraeus, Santorini, Mykonos, Dubrovnik) pass through the Ionian Sea and call

at the port of Corfu. In 2024, Corfu ranked fourth among Greek ports by cruise passenger volume (815,613), after Piraeus (1,730,000), Santorini (1,345,837), and Mykonos (1,293,051)⁴¹.

The Hellenic Coast Guard is the competent national authority for maritime safety, vessel traffic monitoring, search and rescue, and marine pollution response in Greek waters. Vessel traffic monitoring in EU waters more broadly is coordinated through the European Maritime Safety Agency (EMSA) SafeSeaNet system, which links maritime national single windows across EU Member States⁴². The Exploration Well Asopus 1A will introduce a temporary offshore installation within the local shipping environment. Prior to and during operations, appropriate maritime safety procedures and navigational notifications are expected to be implemented by the competent authorities and a safety exclusion zone is expected to be established.

2.6.2.3 Fishing grounds and fisheries management framework

Exploration Well Asopus 1A is located within the Ionian Sea (FAO Division 37.2.2) under the General Fisheries Commission for the Mediterranean (GFCM) and Food and Agriculture Organization of the United Nations (FAO) fisheries statistical classification system. Within the GFCM Geographical Sub-Area (GSA) framework, the wider Ionian basin is subdivided into the Western Ionian Sea (GSA 19), Eastern Ionian Sea (GSA 20), and Southern Ionian Sea (GSA 21)⁴³.

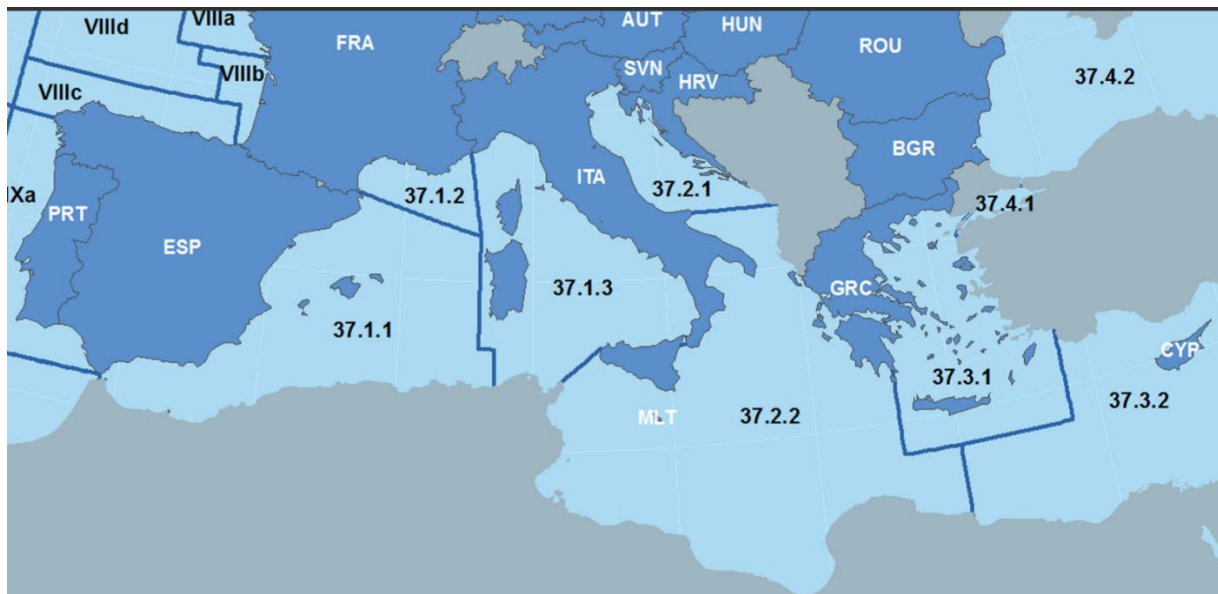


Figure 2-169: Divisions of FAO fishing areas⁴⁴

As shown in Figure 2-170, the proposed Asopus-1 exploration well is located within GSA 19, while the wider Block 2 concession area spans both GSA 19 and GSA 20.

⁴¹ Hellenic Ports Association E.LIM.E., 2024 Cruise Statistics: <https://elime.gr/en/elime-deltio-typou-to-2024-nea-chronia-stathmos-gia-tin-krouaziera/>

⁴² <https://emsa.europa.eu/ssn-main.html>

⁴³ <https://www.fao.org/gfcm/data/maps/gsas/en/>

⁴⁴ https://ec.europa.eu/oceans-and-fisheries/system/files/2016-09/fishing_areas_en.pdf

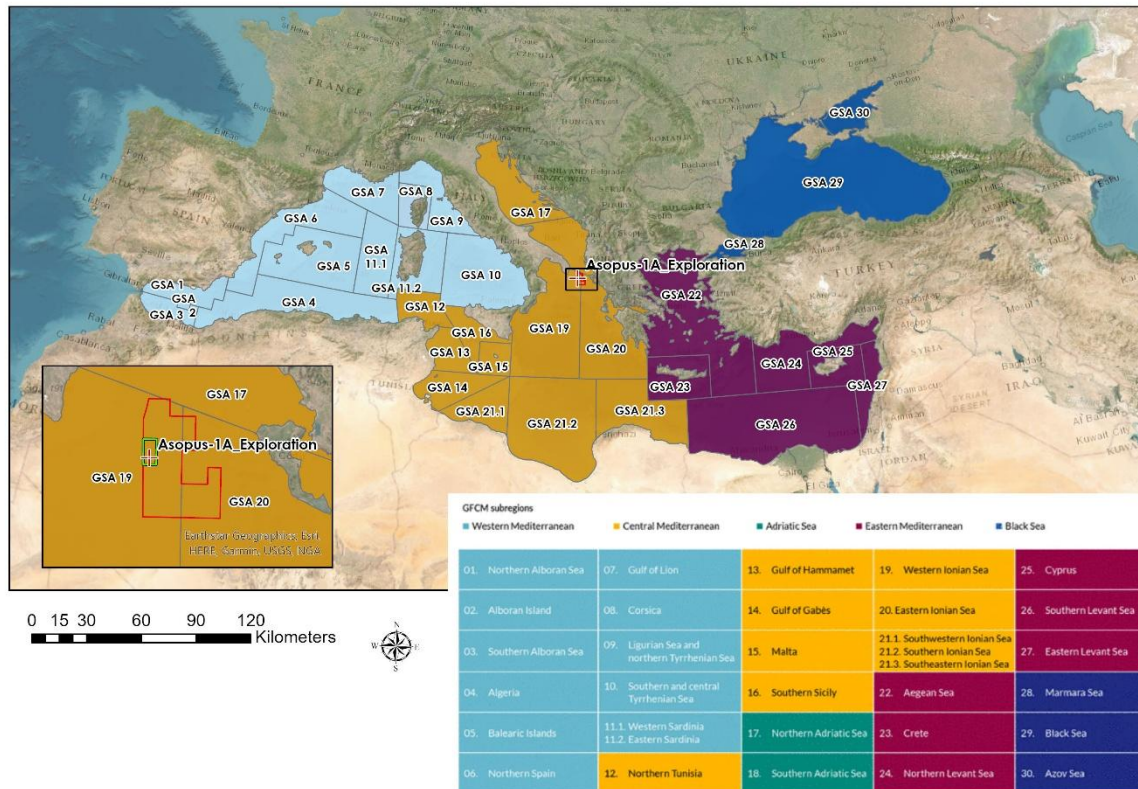


Figure 2-170: GFCM geographical sub-areas⁴⁵

The GFCM is a regional fisheries management organisation (RFMO) established in 1949 under the provisions of Article XIV of the FAO Constitution, with responsibility and authority to oversee fisheries management, undertake scientific evaluations, and take decisions to ensure the sustainability of fisheries resources across its area of application⁴⁶. The GFCM is composed of 24 contracting parties, including Greece; as Greece is a party of the GFCM and a Member State of the European Union (EU), fishing activities in the study area are regulated under both the GFCM framework and the EU Common Fisheries Policy (CFP) which aims to ensure that EU fisheries are sustainable from an environmental, economic and social point of view.

The GFCM also establishes fisheries restricted areas (FRAs), in which specific fishing activities are restricted or banned in order to protect specific stocks, habitats and deep-sea ecosystems. In the Mediterranean and the Black Sea, 1,760,000 km² of sea habitats are protected by ten FRAs established by the GFCM. This includes one large deep-water FRA (1,730,000 km²) in which the use of towed dredges and trawl nets in all waters deeper than 1,000 metres is banned to protect deep-sea benthic habitats. This measure applies directly to portions of Block 2 where water depths exceed 1,000 m. Consequently, bottom-contact fishing activities are formally excluded from those depths regardless of any additional Project-related exclusion zone.

Figure 2-171 illustrates the GCM FRAs in relation to the Exploration Well Asopus 1A.

⁴⁵ https://ec.europa.eu/oceans-and-fisheries/system/files/2016-09/fishing_areas_en.pdf (edited by LDK)

⁴⁶ https://www.europarl.europa.eu/meetdocs/2009_2014/documents/pech/dv/study/study_4.pdf

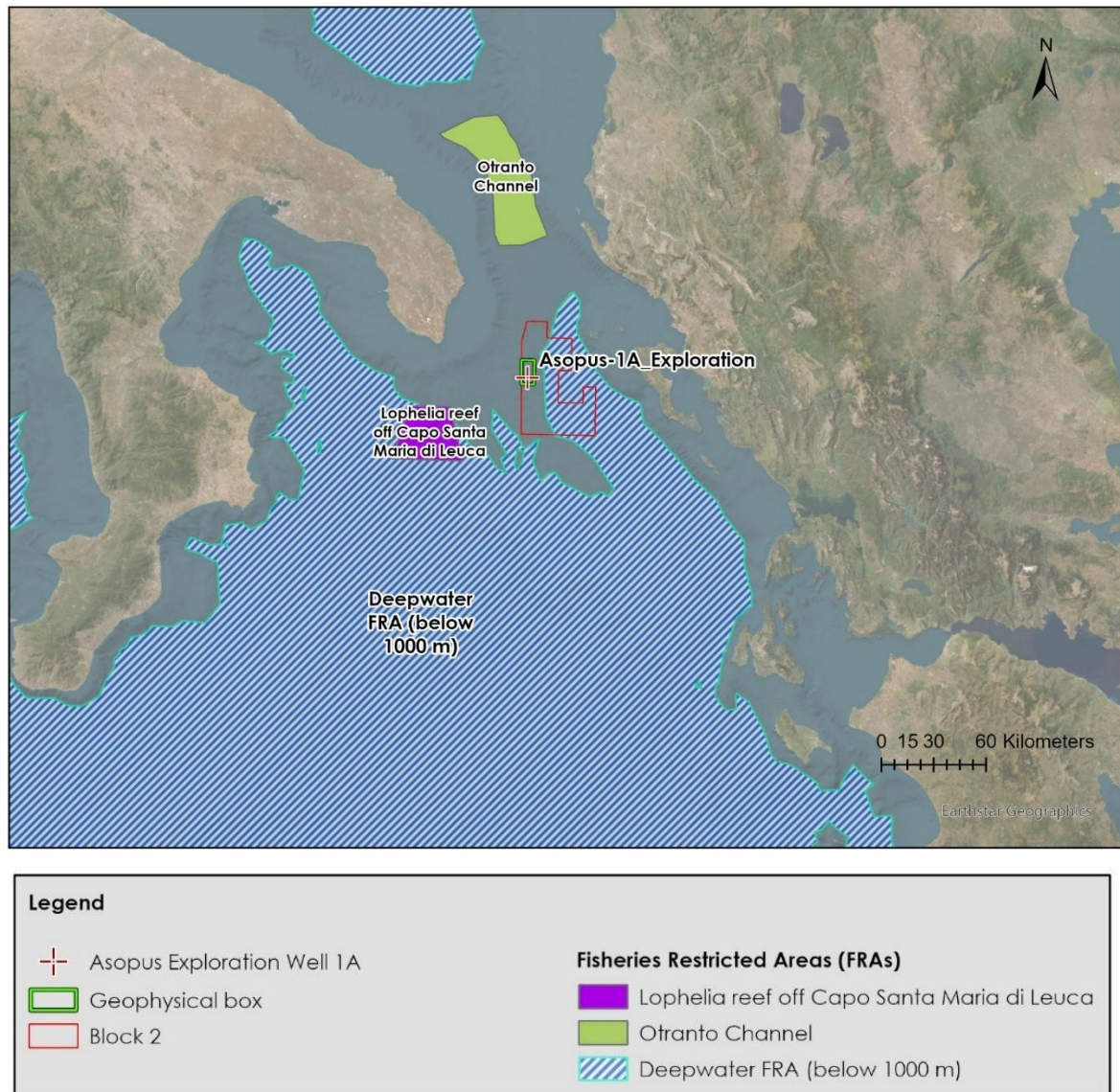


Figure 2-171: GFCM Fisheries Restricted Areas in the wider Project area⁴⁷

At national level, the management of fisheries in Greece falls under the General Directorate of Fisheries, the competent administrative body within the Ministry of Rural Development and Food (MoRDF), which is responsible for the regulation and management of capture fisheries, aquaculture, and fish processing and trade. Its strategic mandate includes the sustainable management of fisheries resources, the enforcement of fishing activity controls, and the promotion of fisheries matters within the EU and international organisations (Article 8, PD 97/2017)⁴⁸. The Hellenic Coast Guard performs enforcement and monitoring functions, including the management of local fishing prohibitions. The map of main commercial fishing prohibitions for fishing vessels under the Greek flag based on the dedicated fisheries monitoring portal of the Hellenic Coast Guard is presented in Figure 2-172.

⁴⁷ <https://www.fao.org/gfcm/data/maps/fras/en/> (edited by LDK)

⁴⁸ <http://www.alieia.minagric.gr/>

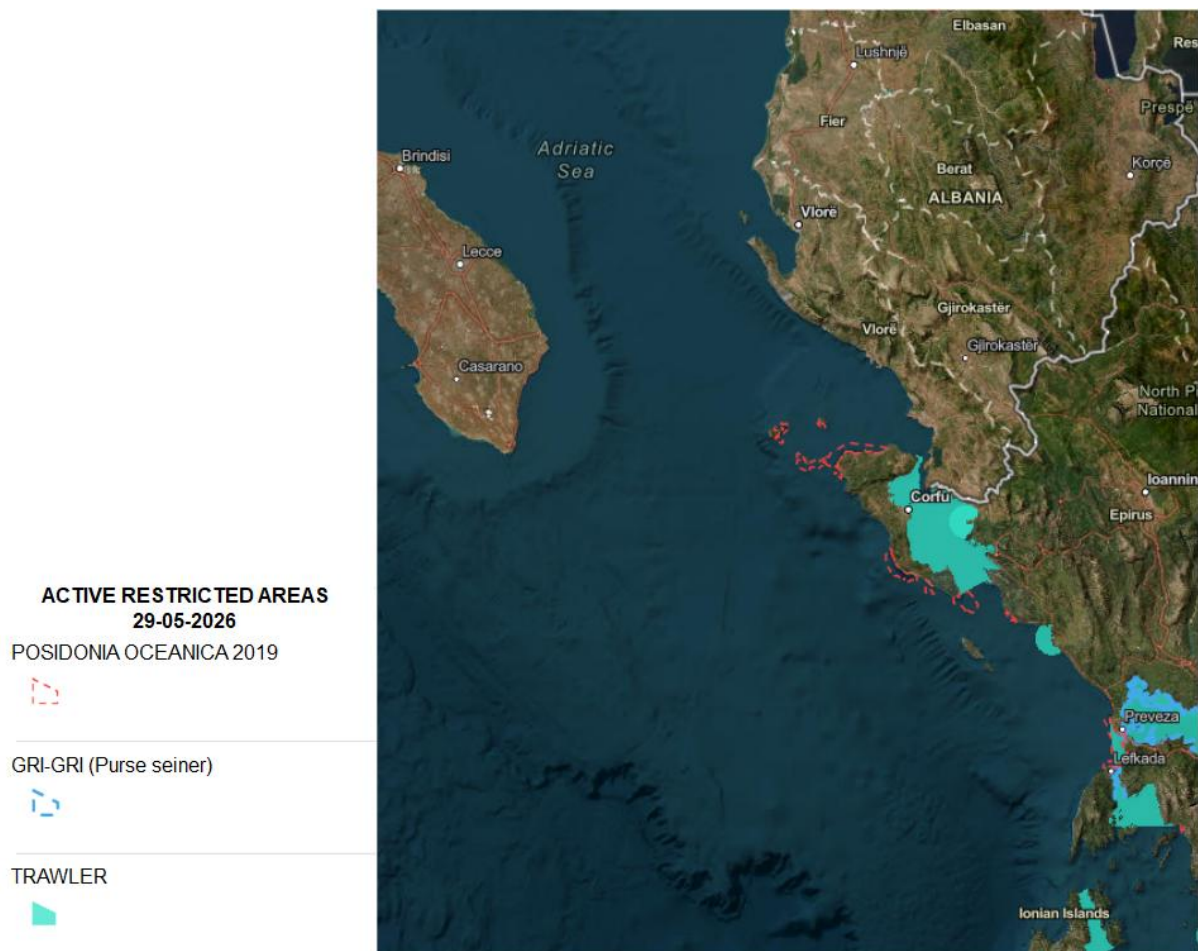


Figure 2-172: Main commercial fishing prohibitions for fishing vessels under the Greek flag ⁴⁹

The Regional Agricultural Development and Control Department for the Ionian, operating under the MoRDF, is the competent territorial body for fisheries administration in the Ionian Islands Region, including the Corfu Regional Unit⁵⁰. The equivalent competent territorial body for fisheries administration in the Thesprotia Regional Unit and the waters adjacent to Igoumenitsa, is the Regional Agricultural Development and Control Department for Thesprotia, operating under the same MoRDF framework⁵¹. At the local level, fisheries activities within the study area are subject to the regulatory oversight of the Port Authorities of Corfu and Igoumenitsa, which are responsible for the implementation and enforcement of applicable maritime regulations and local fishing restrictions within their respective jurisdictions.

The Hellenic Coast Guard publishes local fishing prohibition zones applicable within the jurisdiction of the Corfu Port Authority and the jurisdiction of the Igoumenitsa Port Authority. These spatially defined fisheries restrictions comprise gear-specific restrictions, seasonal trawling prohibitions, archaeological protection zones, seagrass habitat protection measures, and exclusion areas established for navigation safety, aquaculture and bathing activities, established under various Ministerial Decisions (JMD) and other applicable legislation. While these restrictions apply to coastal waters around Corfu and Igoumenitsa, and

⁴⁹ <https://geohub.hcg.gr/portal/apps/instant/minimalist/index.html?appid=269ce2281a9a4de182e911e1ee443b05>

⁵⁰ <https://www.minagric.gr/the-ministry-2/domiorganosi/epoptevomenoi-2/17026-ionio>

⁵¹ <https://www.minagric.gr/the-ministry-2/domiorganosi/epoptevomenoi-2/17008-thesprotia>

therefore do not directly encompass Exploration Well Asopus 1A, they define the existing fisheries management baseline for the nearest coastal fishing communities and reflect the types of gear and activities most relevant to potential interactions with the Project. The principal locally applicable restrictions relevant to the wider study area are summarised in Table 2-53 and Table 2-54.

Table 2-53: Local fishing prohibition zones within the Jurisdiction of the Corfu Port Authority⁵²

LOCATION	PROHIBITED ACTIVITY	SPATIAL SCOPE	LEGAL REFERENCE
Lefkimmi (SW Corfu)	Fishing using trawl nets, dredges, purse seines (gri-gri), boat seines (gripos) and similar towed nets	Marine area bounded by the shoreline and the first 30 m depth contour between the coordinates specified in the MD	MD 2886/142447/26-02-2019 (GG 105/D/2019)
Argyrades (SW Corfu)	Fishing using trawl nets, dredges, purse seines (gri-gri), boat seines (gripos) and similar towed nets	Marine area within the first 30 m depth contour between meridians 19° 59.022'E and 20° 00.887'E	MD 2886/142447/26-02-2019 (GG 105/D/2019)
Moraitika (W Corfu)	Fishing using trawl nets, dredges, purse seines (gri-gri), boat seines (gripos) and similar towed nets	Marine area bounded by the shoreline and the first 30 m depth contour between the coordinates specified in the MD	MD 2886/142447/26-02-2019 (GG 105/D/2019)
Northwestern Corfu	Fishing using trawl nets, dredges, purse seines (gri-gri), boat seines (gripos) and similar towed nets	Marine area enclosed by the coordinate points A–K and within the first 30 m depth contour	MD 2886/142447/26-02-2019 (GG 105/D/2019)
Othonoi (Diapontian Islands)	Fishing using trawl nets, dredges, purse seines (gri-gri), boat seines (gripos) and similar towed nets	Marine area bounded by the shoreline and the first 30 m depth contour between the coordinates specified in the MD	MD 2886/142447/26-02-2019 (GG 105/D/2019)
Ereikoussa (Diapontian Islands)	Fishing using trawl nets, dredges, purse seines (gri-gri), boat seines (gripos) and similar towed nets	Marine area bounded by the shoreline and the first 30 m depth contour between the coordinates specified in the MD	MD 2886/142447/26-02-2019 (GG 105/D/2019)
Marine habitats with seagrass vegetation	Fishing activities that may impact seagrass habitats	Areas containing marine phanerogams, particularly <i>Posidonia oceanica</i> meadows and other marine seagrass habitats	Council Regulation (EC) No. 1967/2006; MD 167378/2007 (GG 241/D/2007, as corrected by GG 392/D/2007)
Underwater Archaeological Site, Southwest Coast of Corfu	Fishing with towed gear, shellfish harvesting using mechanical means, sponge fishing and spearfishing	Declared underwater archaeological area bounded by coordinates A–D specified in the Ministerial Decision	MD ΥΠΠΟ/ΓΑΑΠΚ/ΑΡΧ/Α1/Φ43/59538/3993 (GG 1726/B/2003)
Bathing areas within the jurisdiction of Corfu Port Authority	Fishing with any type of fishing gear	(a) Within 100 m of bathing area marker buoys; (b) within 200 m of the usual swimming limit in unmarked bathing areas; and (c) within 200 m of the shoreline where no bathers are present; applicable from 1 April to 31 October each year	Port Authority Decision No. 2141.1/2939/04-06-2024 (GG 3269/B/2024)
Corfu Strait	Bottom trawling	Marine area landward of the line connecting Amphipagos Cape, Syvota Islet and the northeastern tip of Corfu; applicable from April to October each year	Royal Decree 917/1966 (GG 248/A/1966)

⁵² <https://alieia.hcg.gr/prohibitions/local/kerkyra.php>

LOCATION	PROHIBITED ACTIVITY	SPATIAL SCOPE	LEGAL REFERENCE
Halikiopoulou Lagoon Fish Farm Area, Corfu	All commercial and recreational fishing activities using any gear or method	Marine area outside the fish farm installations enclosed by the line connecting Stratounta Point and Sela Point (Kanoni coast); fishing from the Perama footbridge is also prohibited	Article 63 of MD No. 80 approving the Special Port Regulation of Corfu (GG 126/B/1979)
Underwater Archaeological Site of Kassiopi, Corfu	Fishing with towed gear, shellfish harvesting using mechanical means, sponge fishing and spearfishing	Designated underwater archaeological site of Kassiopi as defined in GG 405/ΑΑΠ/2012	MD ΥΠΑΙΘΠΑ/ΓΔΑΠΚ/ΔΙΠΚΑ /ΤΑΧ/Φ43/96551/251 74/5349/4635 (GG 405/ΑΑΠ/2012)

Table 2-54: Local fishing prohibition zones within the Jurisdiction of the Igoumenitsa Port Authority⁵³

LOCATION	PROHIBITED ACTIVITY	SPATIAL SCOPE	LEGAL REFERENCE
Fanari Bay and Agios Ioannis Bay, Regional Unit of Preveza, Ionian Sea	All fishing activities	Marine area of Fanari Bay and Agios Ioannis Bay	PD 115/2007 (GG 146/A/2007)
Parga coastal area	Fishing using trawl nets, dredges, purse seines (gri-gri), boat seines (gripos) and similar towed nets	Marine area within the first 30 m depth contour from the shoreline and between meridians 20° 17.941'E and 20° 20.357'E	MD 2886/142447/26-02-2019 (GG 105/D/2019)
Drepanos Cape – Nautilus Islet – former Kalamas River estuary area (Igoumenitsa)	All fishing activities	Bathing area located landward of the imaginary line connecting the former Xenia facilities and the red navigation buoy	Port Authority Decision No. 3131.1/8/97/12-08-1997 pursuant to Articles 231 and 295 of the General Port Regulation of Igoumenitsa (GG 479/B/1978)
Coastal bathing areas within the jurisdiction of Igoumenitsa Port Authority	Deployment and retention of fishing gear within 200 m of bathing areas	Organized and non-organized bathing beaches, from 1 June to 15 September each year	Port Committee of Igoumenitsa Decision No. 05/96
Gulf of Igoumenitsa	All fishing activities using any fishing gear (including trawls, handlines, longlines, etc.)	Within the imaginary line connecting Fanou (Kontramourto) Cape – Agios Dionysios – Prasoudi – former Kalamas River estuary	Port Authority Decision No. 3131.1/8/97/12-08-1997 pursuant to Articles 231 and 295 of the General Port Regulation of Igoumenitsa (GG 479/B/1978)
Corfu–Syvota marine area	Bottom trawling	From April to October each year, inside the line connecting Amphipagos Cape (Corfu) with Syvota Islet and extending to the northeastern tip of Corfu	Article 10(6) of Royal Decree 917/1966 (GG 248/A/1966)
Kalamas (Thiamis) River estuary	Bottom trawling	Within 3 nautical miles of the river mouth	Article 7 of Royal Decree 917/1966 (GG 248/A/1966)
Acheron River estuary	Bottom trawling	Within 3 nautical miles of the river mouth	Article 7 of Royal Decree 917/1966 (GG 248/A/1966)

⁵³ <https://alieia.hcg.gr/prohibitions/local/hgou.php>

LOCATION	PROHIBITED ACTIVITY	SPATIAL SCOPE	LEGAL REFERENCE
Coastal zone from south of Igoumenitsa Gulf (Plataria) to the Albanian border	Boat seine fishing (gripos syrónenos apo skafos / "vinzotraata")	Entire coastal zone bounded by points A1 (39° 41'29.659"N, 20° 00'27.063"E) and T1 (39° 28'39.683"N, 20° 13'52.660"E); prohibition applies year-round	MD 2054/131362 (GG 4421/B/2018)

The western Ionian Sea, including the marine area within and surrounding Block 2, supports established commercial fishing activity associated with fleets operating from Corfu and other Ionian Island ports, as well as vessels operating within the wider Ionian basin under applicable national and European fisheries management frameworks. Publicly available fishing-effort data derived from vessel tracking systems (see figure below) indicate persistent fishing activity throughout the wider study area, with the highest concentrations occurring in coastal and shelf waters adjacent to Corfu and the northwestern Greek mainland. Fishing effort is also evident along offshore corridors and shelf-break areas extending into the western Ionian Sea, demonstrating that commercial fishing activity is not restricted exclusively to nearshore waters. Although fishing intensity in the Exploration Well Asopus 1A appears lower than in coastal waters, the area forms part of a wider seascape that is regularly traversed and utilised by commercial fishing vessels operating in the region. Figure 2-173 presents the spatial distribution of apparent fishing effort in the wider western Ionian Sea based on Global Fishing Watch data for the period June 2025 to June 2026.

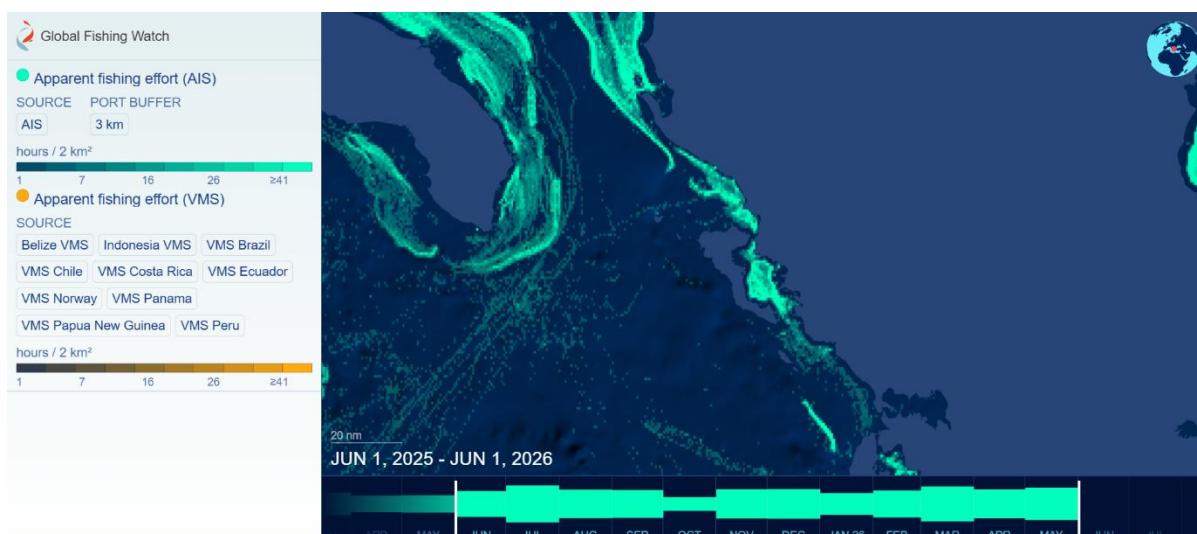


Figure 2-173: AIS-derived apparent fishing effort, June 2025–June 2026, Global Fishing Watch⁵⁴

Greece has typically multi-gear and multi-species fisheries, and similar to other Mediterranean countries, most of the fishing activity takes place within 12 nm from the coast, with approximately 95 percent of the fleet comprising of vessels operating small-scale coastal fisheries⁵⁵. Fishing effort, fleet, predominant fishing methods, target species and economic dependency are further examined in the relevant Section of the Report.

⁵⁴[https://globalfishingwatch.org/map/fishing-activity/default-](https://globalfishingwatch.org/map/fishing-activity/default-public?longitude=19.977139960114233&latitude=40.19982349997228&zoom=5.874471214920341&ITD=&fTD=)

[public?longitude=19.977139960114233&latitude=40.19982349997228&zoom=5.874471214920341&ITD=&fTD=](https://globalfishingwatch.org/map/fishing-activity/default-public?longitude=19.977139960114233&latitude=40.19982349997228&zoom=5.874471214920341&ITD=&fTD=)

⁵⁵ <https://www.fao.org/fishery/facp/grc/en>

Overall, commercial fishing constitutes an existing marine use within the wider project area. While fishing activity is concentrated primarily in coastal waters, commercial fishing vessels also operate in offshore areas of the western Ionian Sea.

2.6.2.4 Aquaculture

Aquaculture constitutes an established but spatially limited maritime use within the wider study area. In Greece, the spatial organisation and development of aquaculture activities are regulated through the Special Framework for Spatial Planning and Sustainable Development for Aquaculture (SFSPSD Aquaculture) (GG 2505/B/04-11-2011), which remains the principal sector-specific spatial planning instrument governing the allocation of aquaculture activities in marine and coastal waters. The Special Framework establishes a hierarchical planning approach based on the designation of Aquaculture Development Areas (ADAs - PAY) which identify coastal marine areas considered suitable for aquaculture development on the basis of environmental, social and spatial planning criteria. Within these areas, aquaculture activities may be organised in three forms: (1) Organised Aquaculture Development Areas (OADAs - POAY) where the total leased area of aquaculture units exceeds 100 ha; (2) Areas of Informal Concentration of Units (AICUs - PASM), comprising up to five aquaculture units with a total leased area below 100 ha and representing a transitional stage prior to the establishment of an OADA; and (3) individual aquaculture units operating outside organised concentrations. Within designated ADAs, the establishment of POAYs is promoted in order to facilitate the spatial concentration and coordinated management of aquaculture units, reduce the environmental footprint of the sector, improve monitoring and infrastructure provision, and minimise conflicts with other marine and coastal uses. OADAs constitute the principal mechanism through which the objectives of the national aquaculture spatial planning framework are implemented at local scale^{56,57}.

Article 5 (III) of the SFSPSD Aquaculture established transitional arrangements for AICUs and set deadlines for their conversion into OADAs. These deadlines have subsequently been extended through legislative amendments, including Article 63 of L.4964/2022 and subsequent amendments adopted in 2024, reflecting the continuing implementation of the aquaculture spatial planning framework at national level.

Within the Corfu Regional Unit, the SFSPSD Aquaculture identifies the North-East Coast of Corfu Island (Code E.5) as an ADA. This area encompasses the existing fish farming activity located in the wider Kassiopi area of north-eastern Corfu. In addition, the framework identifies the Diapontian Islands (Code C.1) as an area of difficult accessibility with significant potential for future aquaculture development. The SFSPSD Aquaculture also recognised several AICU and proposed OADAs in the Ionian Islands through supporting planning studies, including zones in northern Corfu, designated for marine fish farming, north of the Lefkimmi area, designated for marine fish farming, and in the Lefkimmi Salt Pans area, designated for shrimp aquaculture, although these have not subsequently been formalised as designated ADAs⁵⁸.

In the Regional Unit of Thesprotia, aquaculture represents an established maritime use and is supported through the POAY of Thesprotia, established by Presidential Decree (GG 326/D/11.05.2022). The POAY

⁵⁶ Special Framework for Spatial Planning and Sustainable Development for Aquaculture (GG 2505/B/2011)

⁵⁷ Multiannual National Strategic Plan for the Development of Aquaculture (MNSPA) 2021–2030

⁵⁸ Special Framework for Spatial Planning and Sustainable Development for Aquaculture (GG 2505/B/2011)

comprises a series of designated marine aquaculture zones distributed along the Thesprotia coastline and supports an important marine finfish farming sector.

Figure 2-174 presents the distribution of aquaculture facilities within the wider area.

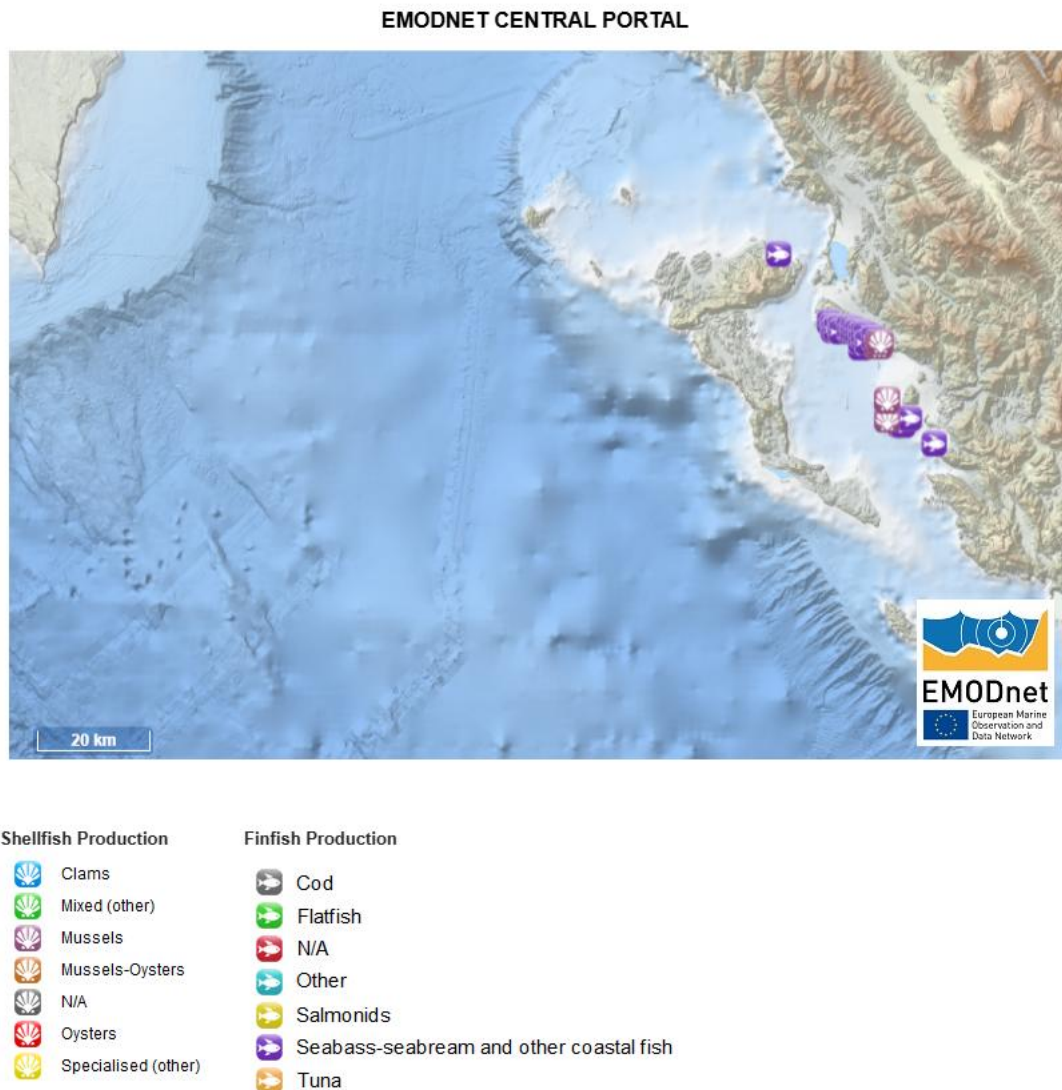


Figure 2-174: Distribution of aquaculture facilities in the wider study area ⁵⁹

Aquaculture constitutes an established maritime use within both the Ionian Islands and the coastal waters of Thesprotia. EMODnet mapping confirms the presence of marine finfish farming facilities along the north-eastern coast of Corfu and the Thesprotia coastline. These aquaculture activities are concentrated within sheltered coastal waters and are spatially distinct from the offshore waters of Block 2 and the proposed Asopus Exploration Well-1A location. Likewise, although aquaculture forms an important maritime activity within the wider Regional Unit of Thesprotia, the Project's shorebase facilities component is confined to the operational use of existing facilities within the Port of Igoumenitsa where no aquaculture production facilities have been identified. Consequently, direct spatial interaction with Project activities is not anticipated.

⁵⁹ <https://EMODnet.ec.europa.eu/geoviewer/>

2.6.2.5 Maritime tourism

Maritime tourism activities in Greek waters operate within a framework established by national tourism, maritime and spatial planning legislation. Recreational and commercial pleasure vessels are primarily regulated through L. 4256/2014 "Touristic Yachts and Other Provisions" (GG A' 92/14.04.2014), as amended and in force, which governs the registration and operation of commercial and private recreational vessels and established the Registry of Touristic Yachts and Small Vessels. The law applies to commercial pleasure yachts, private recreational vessels and commercial day-excursion vessels operating in Greek waters.

At the strategic level, maritime tourism is recognised as a key maritime activity under the NSPSMS, which establishes national strategic directions for the allocation and coexistence of maritime activities, including tourism, shipping, fisheries, aquaculture, environmental protection and offshore energy development.

Tourism development in coastal and island areas is guided by the national spatial planning framework for tourism and the applicable regional spatial planning instruments, which identify tourism, marina infrastructure, cruise tourism and nautical tourism as strategic development sectors for coastal and island regions, including the Ionian Islands and the Epirus coast.

At local level, recreational navigation, charter vessel operations and maritime safety are regulated by the Hellenic Coast Guard through the competent Port Authorities.

Yacht charter and sailing constitute the dominant recreational maritime uses within the wider Project area. The principal recreational navigation corridors include:

- the Corfu Channel between Corfu and the Epirus coast
- the Corfu–Paxos–Antipaxos route
- routes connecting Corfu with the Diapontian Islands
- coastal cruising routes along the Epirus mainland
- offshore passages connecting the Ionian Sea with Adriatic destinations

The Figure 2-175 illustrates the average annual vessel density between 2017 and 2024 for sailing, pleasure craft and high-speed passenger craft.

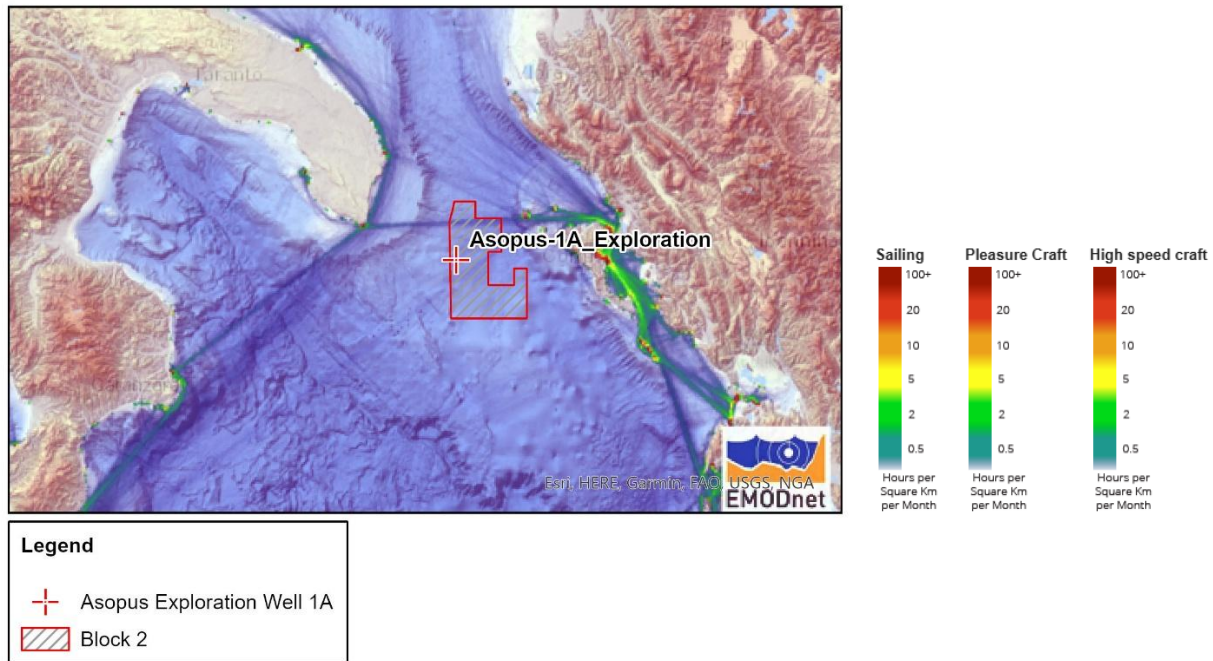


Figure 2-175: Vessel Density for sailing, pleasure craft and high-speed craft (Annual average 2017-2024) ⁶⁰

The main recreational navigation corridors are concentrated in the eastern and south-eastern portions of the wider Project area, within relatively shallow coastal and inter-island waters located well inshore of the Block 2 boundary and Exploration Well Asopus 1A. The open-sea area in which the proposed drilling activities will take place does not constitute a principal recreational navigation corridor, although it may be crossed occasionally by vessels undertaking longer offshore passages between Greece and Italy.

The Port of Igoumenitsa also functions as an important gateway for maritime tourism in north-western Greece. In addition to its role as an international passenger and ferry port connecting Greece with Italy and the Ionian Islands, the port supports recreational navigation and serves as a transit point for yacht and sailing activity operating between the Ionian Islands, the Epirus coast and the Adriatic Sea. Recreational vessel movements associated with the port are concentrated within the Gulf of Igoumenitsa and along established coastal navigation routes linking Igoumenitsa with Syvota, Paxos, Corfu and other Ionian destinations.

Cruise tourism also constitutes an important component of maritime tourism within the wider study area. Corfu is one of the principal cruise destinations in Greece and the Eastern Mediterranean and serves as a regular port of call for cruise itineraries operating between the Adriatic and Eastern Mediterranean. Cruise vessel movements are concentrated along established international navigation routes and within the approach channels to the Port of Corfu. A reference to cruise vessel traffic patterns and passenger vessel navigation routes is provided in §2.6.2.2. From a maritime tourism perspective, cruise activity contributes to seasonal visitor flows and supports a range of associated excursion and recreational activities in the coastal waters of Corfu.

It should be noted that maritime tourism activities exhibit strong seasonality. Activity levels begin increasing during April and May, reach maximum intensity between June and September, and decline during October.

⁶⁰ <https://EMODnet.ec.europa.eu/geoviewer/>

During the winter period (November to March), charter operations, excursion services and recreational boating activity are substantially reduced, although cruise ship calls continue on a limited basis throughout the year. The period June–September therefore represents the peak season for maritime tourism activity within the area, corresponding to the period of highest recreational vessel density in coastal and inter-island waters.

Maritime tourism constitutes an important maritime use within the wider study area; however, these activities are concentrated in coastal and inter-island waters around Corfu, Paxos, Antipaxos, the Diapontian Islands and the adjacent Epirus coast. These activities are spatially distinct from the offshore location of Block 2 and the proposed Exploration Well Asopus 1A well, which is situated in open waters west of Corfu outside the principal recreational navigation and tourism-use areas. Similarly, the Project's onshore logistics component is confined to the operational use of existing facilities within the Port of Igoumenitsa. Potential limited interactions may arise in relation to the temporary presence of Project vessels within the wider northern Ionian Sea which will be evaluated in the relevant ESIA section.

2.6.2.6 Maritime cables

Submarine cables constitute a category of fixed seabed infrastructure of strategic and economic significance whose presence in the marine space must be considered in the context of offshore operations. The protection of submarine cables on the high seas and continental shelf is governed by the United Nations Convention on the Law of the Sea (UNCLOS), Articles 112–115, which establish the freedom to lay submarine cables and impose obligations on states to adopt laws penalising wilful or negligent damage to cables⁶¹. At the operational level, the International Cable Protection Committee (ICPC) recommends that any operator planning work that could affect submarine cables notify the relevant charting authorities, telecommunications companies and appropriate government agencies prior to the commencement of operations⁶².

The Ionian Sea between Greece and Italy hosts a number of active and planned submarine cable systems of international significance presented in Table 2-55:

Table 2-55: Submarine cables in the wider study area⁶³

CABLE SYSTEM	RFS (READY FOR SERVICE)	CABLE LENGTH (KM)	OWNERS	SUPPLIERS	SELECTED LANDING POINTS
Eagle	Q4 2028	1,900	4iG Group, Telecom Egypt	Not specified	Seman (Albania), Sidi Kerir (Egypt), Lecce (Italy)
Jonah	January 2012	2,297	Bezeq International Ltd.	ASN	Tel Aviv (Israel), Bari (Italy)
Asia Africa Europe-1 (AAE-1)	June 2017	25,000	Consortium including China Unicom, Djibouti Telecom, OTEGLOBE, Ooredoo, PCCW, Reliance Jio Infocomm, Telecom Egypt and others	NEC, SubCom	Abu Talat (Egypt), Marseille (France), Chania (Greece), Bari (Italy)

⁶¹ https://www.un.org/depts/los/convention_agreements/texts/unclos/unclos_e.pdf

⁶² <https://www.iscpc.org/information/global-submarine-cable-systems/>

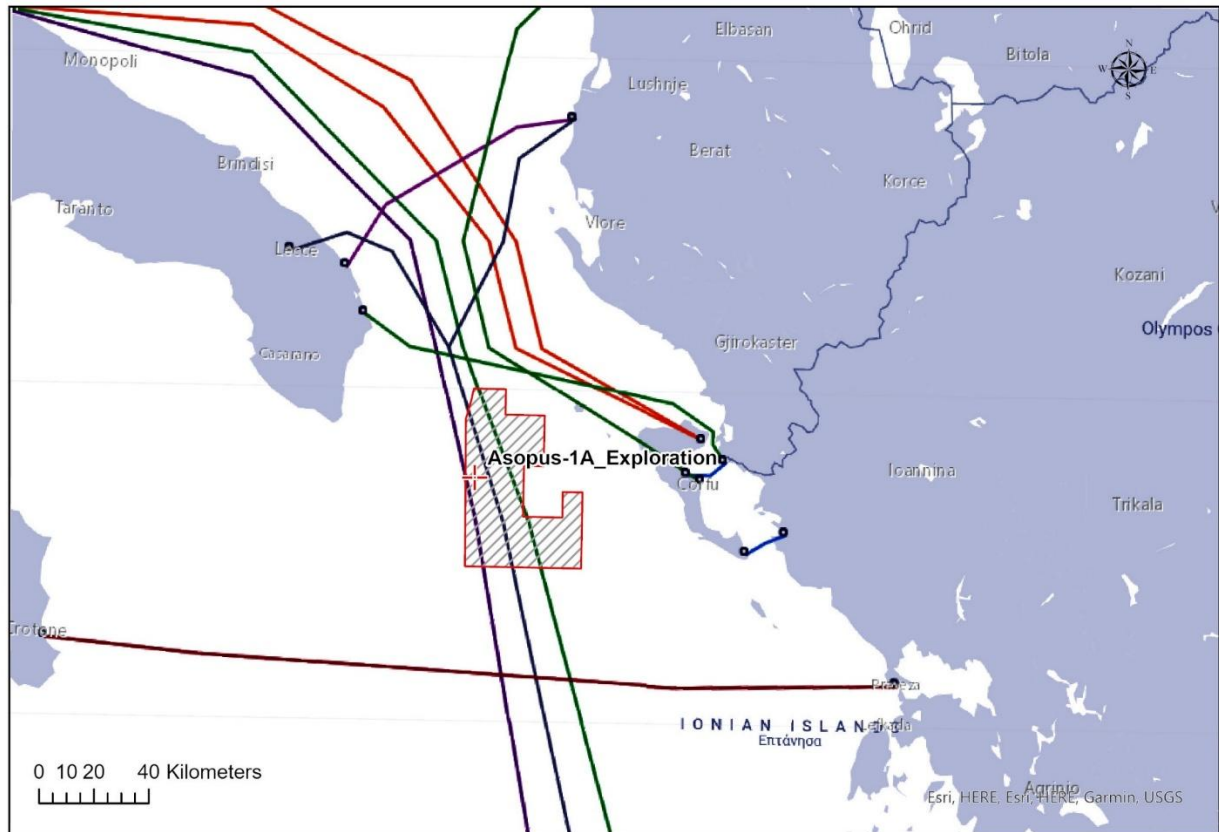
⁶³ <https://www.submarinecablemap.com/>

CABLE SYSTEM	RFS (READY FOR SERVICE)	CABLE LENGTH (KM)	OWNERS	SUPPLIERS	SELECTED LANDING POINTS
Italy-Greece 1 (IG-1)	1995	169	WIS Telecom	Not specified	Otranto (Italy), Aethos (Greece)
Ionian	April 2023	320	IslaLink	Not specified	Crotone (Italy), Preveza (Greece)
OTEGLOBE Kokkini-Bari	June 2004	700	OTEGLOBE	ASN	Kokkini (Greece), Bari (Italy)
Adria-1	September 1996	440	ALBtelecom, Hrvatski Telekom	ASN	Durres (Albania), Dubrovnik (Croatia), Corfu (Greece)
Thetis	2022	660	Vodafone	Nexans	Corfu (Greece), Aethos (Greece), Kavo (Greece), Platania (Greece)

The submarine cable routes in the Ionian Sea are concentrated along corridors crossing the central and southern Ionian basin between the Italian and Greek coasts. The spatial analysis undertaken for the Project indicates that three cable systems are located within the study area and are therefore of direct relevance to the Exploration Well Asopus 1A:

- Eagle (planned), a new trans-Mediterranean cable system connecting Egypt, Albania and Italy;
- Jonah (operational since 2012), linking Israel and Italy through the eastern Mediterranean and Ionian Sea;
- Asia Africa Europe-1 (AAE-1) (operational since 2017), a major international telecommunications cable connecting Asia, Africa and Europe, with landing points including Bari (Italy).

Their locations in relation to the Exploration Well Asopus 1A are presented in Figure 2-176.



Legend

- + Asopus Exploration Well 1A
- Block 2

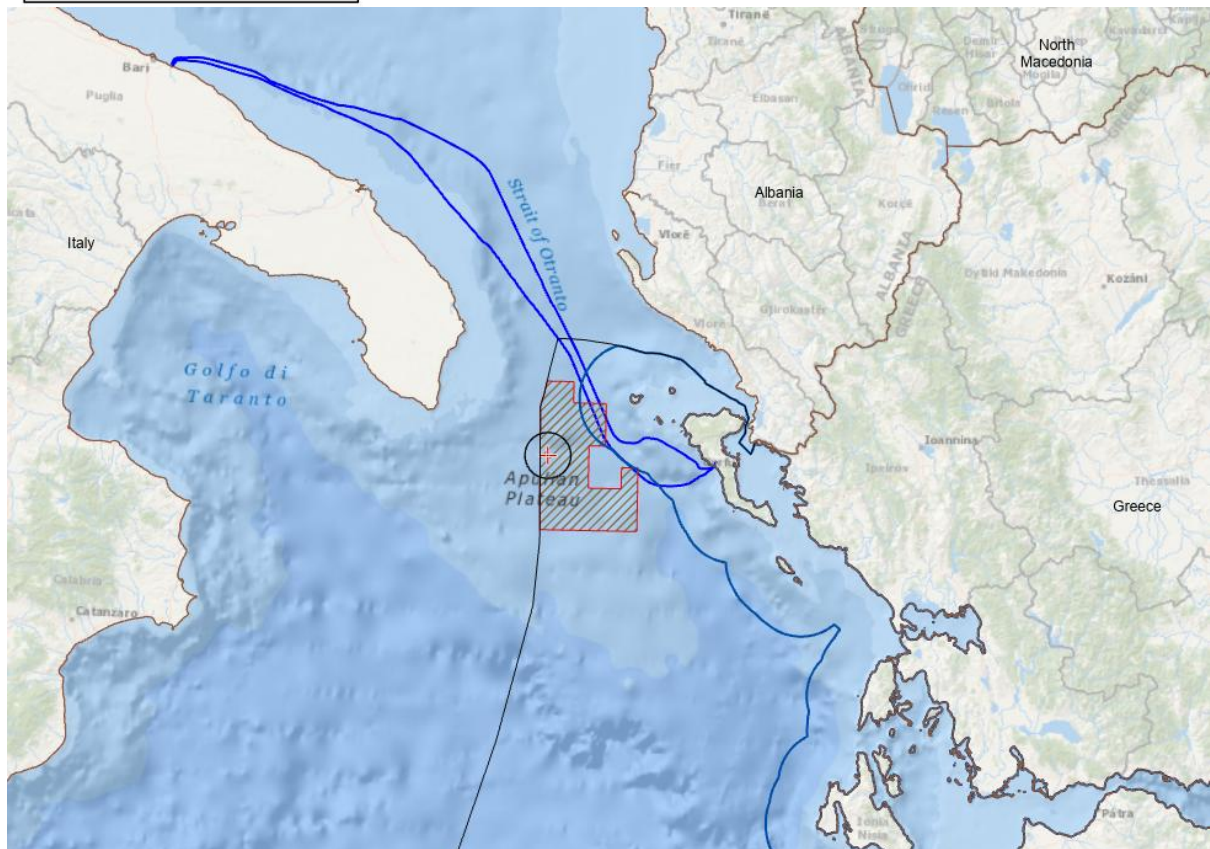


Figure 2-176: Submarine cables in relation to the Project area⁶⁴

The routes of the two COSMOTE submarine cables forming the “Bari–Kokkini” connection are located outside the Asopus 1 exploration well site and beyond the associated 10 km study area. Nevertheless, both cable routes cross the wider Block 2 area.

Submarine cables constitute a fixed infrastructure use of the marine space that must be taken into account in the operational planning of the Project. The primary assessment consideration is the confirmation that no cable routes pass within the operational footprint of the proposed well, and the application of appropriate notification and avoidance procedures in accordance with ICPC guidance and applicable maritime safety requirements.

2.6.2.7 Military training and exercise areas

Military training and exercise activities constitute an established use of the marine environment and may impose temporary or permanent restrictions on navigation and offshore operations. Such activities are conducted by the Hellenic Navy and other competent authorities within designated exercise areas, some of which are permanently established, while others are activated periodically through NAVTEX notices or other maritime notifications.

Information requested from the Hellenic Navy and the Hellenic Coast Guard regarding the military exercise areas:

- Coast Guard: Areas reserved for the conduct of exercises by the Hellenic Navy or other authorities/services: spatial data defining the boundaries of these areas (maps/plans or geographic coordinates), the frequency of such activities on an annual or seasonal basis, and their typical duration.
- Hellenic Navy: Areas reserved for the conduct of exercises by the Hellenic Navy (permanent exercise areas or areas activated through NAVTEX notices): geospatial data defining the boundaries of these areas (printed charts, geographic coordinates, digital image files, or preferably GIS vector datasets), the frequency of such activities on an annual or seasonal basis, and their typical duration.

According to the information provided by the Hellenic Navy Hydrographic Service, there are no permanently established exercise areas, and no temporary restricted or reserved areas currently in force through NAVTEX broadcasts and/or Notices to Mariners within the boundaries of Block 2 and the location of the Exploration Well Asopus 1A.

⁶⁴ <https://www.submarinecablemap.com/>

2.6.2.8 Other Offshore Installations

2.6.2.8.1 Offshore oil and gas exploration and exploitation

Based on the review of available offshore oil and gas installation data, no offshore oil and gas installations have been identified within the immediate area of the Asopus-1A Exploration location. Similarly, no such installations are present within a 100 km buffer around the Asopus-1A well.

Figure 2-177 indicates that existing installations are mainly concentrated along the Italian continental margin and in more distant parts of the Adriatic and Central Mediterranean, while no comparable installation is identified within the immediate vicinity of Asopus-1A. The information was obtained from EMODNET, where it is sourced from the Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR). OSPAR monitors the development of offshore installations and maintains an up-to-date inventory of all offshore oil and gas installations within the OSPAR maritime area.

The nearest identified offshore oil and gas installation is AQUILA 2, located approximately 150 km northwest of Asopus-1A, within Italian waters. AQUILA 2 is associated with crude oil production and is reported as closed down. In addition, approximately 150 km southwest of Asopus-1A, the offshore installations Luna A and B and Hera Lacinia are present, both associated with natural gas production in Italian waters and reported as operational.



Figure 2-177: Offshore Oil and Gas installations (source EMODNET)

2.6.2.8.2 Other Offshore Windfarms

Based on the review of mapped offshore renewable-energy infrastructure (Figure 2-178), no operational offshore renewable-energy installations have been identified within the immediate area of the Asopus-1A

Exploration Well. Similarly, no such installations are present within a 100 km buffer around the Asopus-1A well.

The review was based on the EMODnet Human Activities database, which provides georeferenced information on offshore wind farm locations and their operational status across European seas. The dataset is compiled from multiple European sources and allows identification of operational, consented, planned or proposed offshore wind developments within the wider regional context.

The nearest mapped offshore renewable-energy locations are the planned wind farm areas named “Santa Maria di Leuca” and “Puglia 1”, located in Italian waters approximately 10–15 km from Asopus-1A Exploration Well. Additional planned offshore wind farm areas are identified at greater distances, including the Diapontia Islands wind farms in Greece, approximately 40 km east of Asopus-1A; the “Monopoli” wind farm in Italy, approximately 60 km south; and the “Odra Energia” wind farm in Italy, approximately 80 km west.

Most other mapped windfarm and ocean-energy projects are situated considerably farther away, mainly along the Italian coastline and elsewhere in the Central Mediterranean.

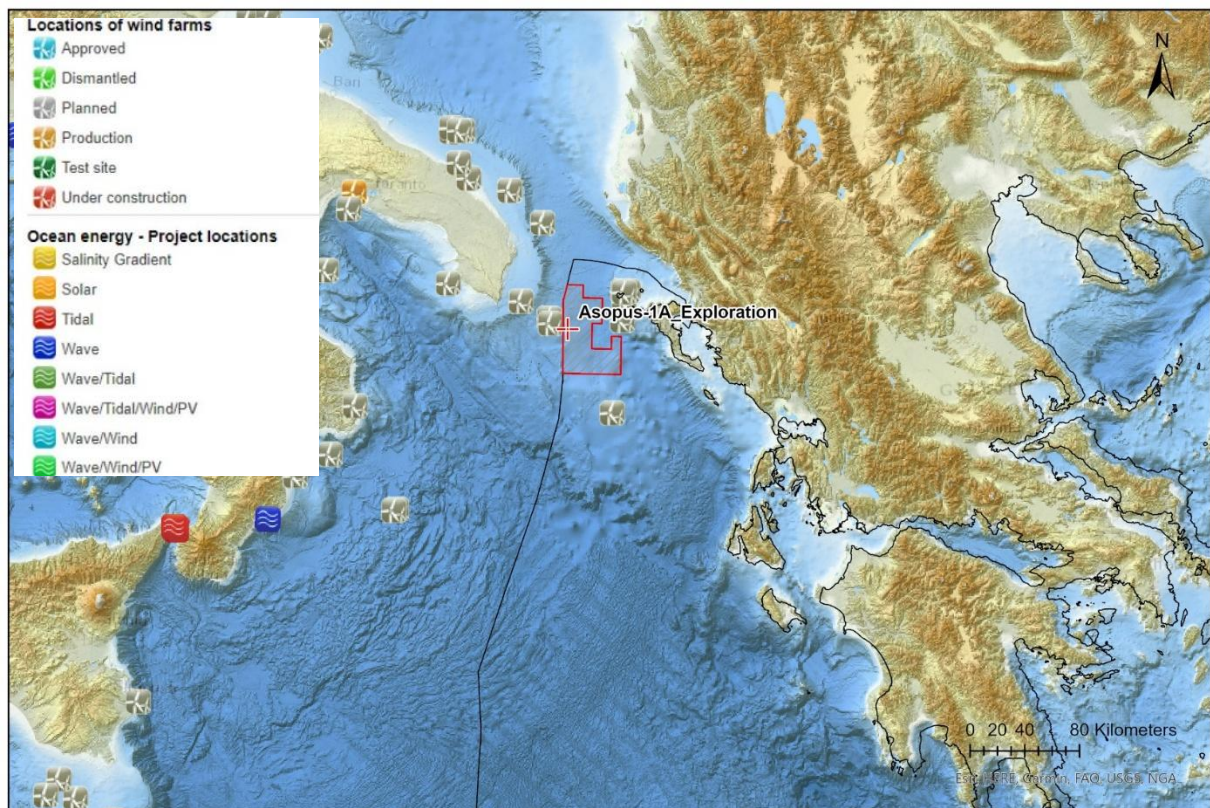


Figure 2-178: Offshore Wind Farms and Ocean Energy projects (source EMODNET)

2.6.3 Cultural heritage

2.6.3.1 Terrestrial cultural heritage

With regard to the legislative and institutional framework, the protection and management of cultural heritage in Greece is governed by L. 4858/2021 "Code of Legislation for the Protection of Antiquities and

Cultural Heritage in General" (GG A' 220/19.11.2021), which codified and updated L. 3028/2002 together with various provisions from subsequent legislative reforms into a single consolidated instrument. Under Article 2 of L. 4858/2021, cultural heritage encompasses all cultural goods located within the borders of Greek territory, including territorial waters and other maritime zones in which Greece exercises relevant jurisdiction in accordance with international law. Immovable monuments include ancient monuments, those predating AD 1830, as well as more recent monuments of historical, artistic, scientific or technological significance. All such monuments are the property of the Greek State and are recorded in the National Archive of Monuments maintained by the Ministry of Culture⁶⁵.

The competent authority for the protection, conservation and management of archaeological sites, monuments and movable antiquities predating AD 1830 within the Corfu Regional Unit is the Ephorate of Antiquities of Corfu (Εφορεία Αρχαιοτήτων Κέρκυρας)⁶⁶, a peripheral service of the Ministry of Culture headquartered in the city of Corfu. The Ephorate is responsible for implementing archaeological legislation, maintaining archaeological records, supervising development activities affecting cultural heritage assets, and ensuring the protection of archaeological resources throughout the Regional Unit. It falls under the General Directorate of Antiquities and Cultural Heritage of the Ministry of Culture⁶⁷.

For the Municipality of Igoumenitsa and the wider Thesprotia Regional Unit, responsibility for the protection, conservation and management of archaeological sites, monuments and movable antiquities dating prior to AD 1830 rests with the Ephorate of Antiquities of Thesprotia (Εφορεία Αρχαιοτήτων Θεσπρωτίας)⁶⁸, a regional service of the Ministry of Culture headquartered in Igoumenitsa. The Ephorate is responsible for implementing archaeological legislation, maintaining archaeological records, supervising development activities affecting cultural heritage assets and ensuring the protection of archaeological resources throughout the Regional Unit. Protection of monuments and cultural assets dating from after AD 1830 falls under the Service of Modern Monuments and Technical Works of Epirus, Northern Ionian and Western Macedonia, which is also competent for the Thesprotia Regional Unit.

The protection, restoration and promotion of monuments and cultural assets dating from after AD 1830 within the Corfu Regional Unit falls under the Service of Modern Monuments and Technical Works of Epirus, Northern Ionian and Western Macedonia (Υπηρεσία Νεωτέρων Μνημείων και Τεχνικών Έργων Ηπείρου, Βορείου Ιονίου και Δυτικής Μακεδονίας)⁶⁹, a Peripheral Service at Directorate level under the General Directorate for Restoration, Museums and Technical Works, headquartered in Ioannina.

The islands of Corfu, Paxoi–Antipaxoi and the Diapontian Islands have a long history of human occupation and maritime activity, reflecting their strategic location along navigation routes linking the Adriatic Sea, the Ionian Sea and the Eastern Mediterranean. Archaeological evidence indicates human presence on Corfu since prehistoric times, while the island developed into an important settlement and maritime centre during the Greek, Roman and Byzantine periods.

In antiquity, Corfu (ancient Corcyra) was one of the most important naval and commercial powers of the Ionian Sea. Its strategic position along maritime trade routes contributed to its prosperity and to its

⁶⁵ <https://nam.culture.gr/en/the-directorate-for-the-management-of-the-national-archive-of-monuments/the-national-archive-of-monuments/>

⁶⁶ <https://www.culture.gov.gr/el/ministry/SitePages/viewyphresia.aspx?iID=1669>

⁶⁷ <https://www.culture.gov.gr/el/ministry/SitePages/viewyphresia.aspx?iID=1304>

⁶⁸ <https://www.culture.gov.gr/el/ministry/SitePages/viewyphresia.aspx?iID=1677>

⁶⁹ <https://www.culture.gov.gr/el/ministry/SitePages/viewyphresia.aspx?iID=1715>

involvement in wider political and military developments of the Greek world. During the Roman and subsequently Byzantine periods, the island retained its importance as a regional administrative and maritime centre.

Following the fragmentation of the Byzantine Empire in the 13th century, Corfu came successively under Venetian, Angevin, French, Russian-Ottoman and British administration before its union with Greece in 1864. The long period of Venetian rule (1386–1797) left a particularly strong imprint on the island's urban form, fortifications and cultural landscape, many elements of which survive today. The fortified historic centre of Corfu Town is recognised as a UNESCO World Heritage Site for its outstanding testimony to Venetian military architecture and urban planning⁷⁰. The smaller islands of Paxoi and Antipaxoi share much of Corfu's historical trajectory, having also formed part of the wider Ionian maritime network under successive Venetian, French, Russian-Ottoman and British administrations. Owing to their sheltered anchorages and position along coastal navigation routes, the islands have historically supported maritime trade, fishing and seafaring activities. Their long association with navigation and coastal settlement contributes to the archaeological potential of both the terrestrial and marine environment⁷¹. The Diapontian Islands (Othonoi, Ereikoussa and Mathraki), located to the northwest of Corfu, occupy an important position near the entrance to the Adriatic Sea. Although permanent settlement developed relatively late compared with Corfu, the islands have historically served as navigational landmarks and stopping points for vessels transiting between the Adriatic and the Ionian Sea. Their strategic location has contributed to the presence of cultural heritage features associated with maritime activity and seafaring traditions⁷².

The mainland component of the shorebase facilities in the Port of Igoumenitsa lies within the Regional Unit of Thesprotia, a region with a long history of human occupation and maritime activity extending from prehistory to the modern era. Archaeological evidence indicates human presence in the area since the Palaeolithic period, with important prehistoric sites identified in the Kokytos Valley and the wider Paramythia area. During the Bronze Age, the region formed part of the wider cultural sphere of Epirus and subsequently became the homeland of the ancient Thesprotians. Its favourable position along maritime routes linking the Ionian Sea, the Adriatic and mainland Greece contributed to the development of important settlements, fortified centres and ports from prehistoric through Hellenistic and Roman times. Historical sources and archaeological investigations document the presence of significant ancient settlements including Ephyra, Gitana, Elea and other centres associated with the political and economic development of ancient Thesprotia. The region subsequently formed part of the Roman, Byzantine, Venetian and Ottoman spheres of influence before its incorporation into the modern Greek state, shaping a layered cultural heritage landscape⁷³.

The long and continuous history of settlement, navigation, trade and military activity throughout the Ionian Islands and the adjacent Epirus mainland has resulted in a rich and diverse cultural heritage resource. This includes archaeological sites, historic settlements, fortifications, religious monuments, cultural landscapes and underwater cultural heritage reflecting the region's strategic role within the wider Adriatic-Ionian maritime corridor (see following section on underwater cultural heritage).

⁷⁰ <https://www.corfuhistory.eu/?p=51>, <https://users.ionio.gr/~cs200405/hisgr.html>

⁷¹ <https://www.paxi.gr/web/index.php/art/138/1/721/istoria.html>, <https://www.corfuhistory.eu/?p=1335>

⁷² https://www.diapontia.gr/2019/11/blog-post_4.html

⁷³ <https://www.thesprotia.gr/istorika-stoicheiaa/>

Given the large number of designated cultural heritage resources present within the Corfu and Thesprotia Regional Units, the baseline focuses on assets that are spatially associated with the study area or that provide a representative overview of the cultural heritage character of Corfu and Thesprotia. The selection is intended to support the assessment of potential Project interactions and does not constitute a complete inventory of all protected cultural heritage assets in the two regional units. Particular attention is given to assets located within the vicinity of the Port of Igoumenitsa and along the coastal areas of Corfu, as these represent the terrestrial components most closely associated with the proposed Project logistics and support activities.

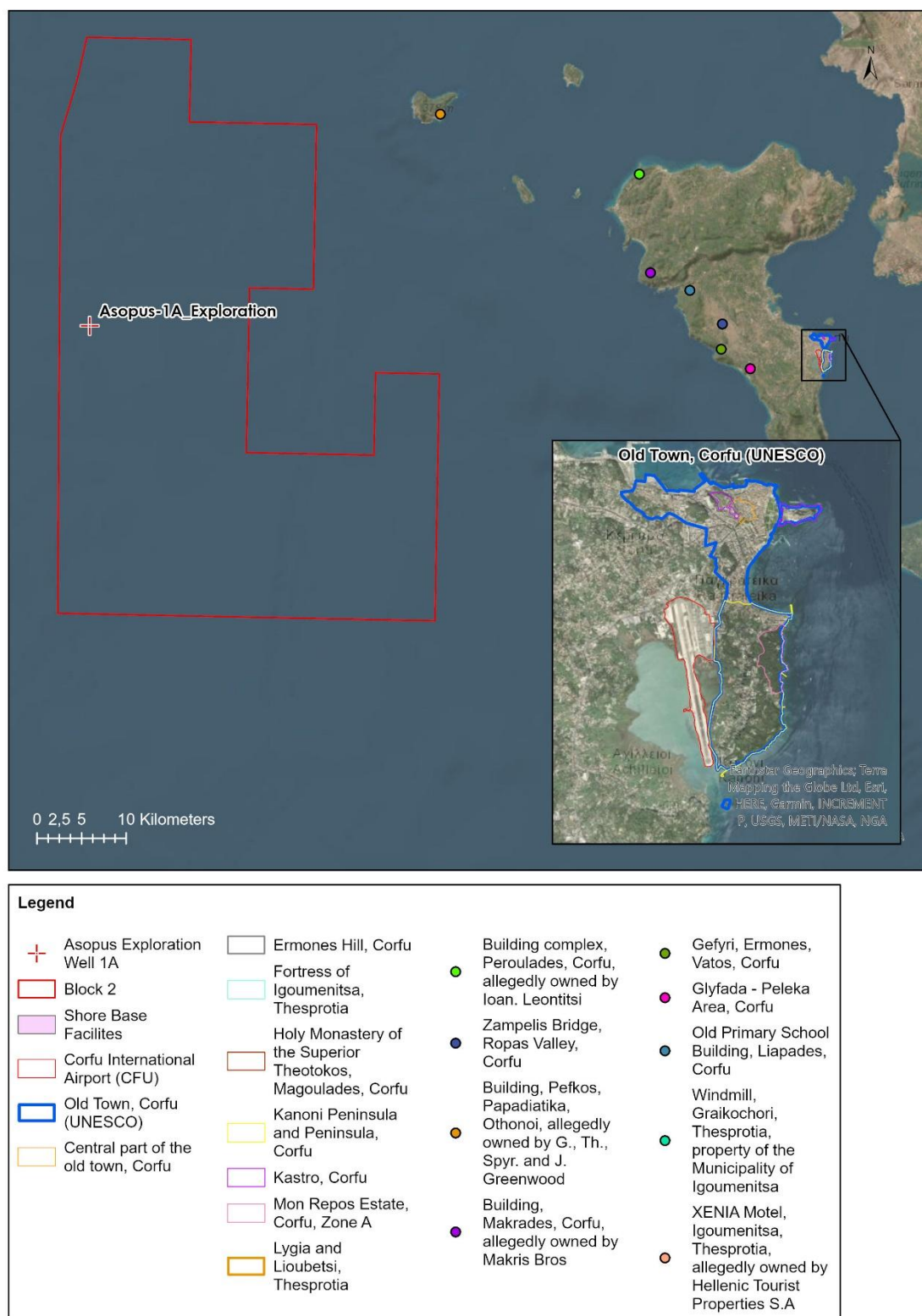


Figure 2-179: Designated onshore cultural heritage sites⁷⁴

The table below lists the onshore designated cultural heritage sites:

⁷⁴ <https://www.arxaiologikoktimatologio.gov.gr/> (edited by LDK)

Table 2-56: Designated cultural heritage sites

NO	MAP LABEL / MONUMENT	AREA	PROTECTED ASSET / DESIGNATION	PROTECTION STATUS / GOVERNMENT GAZETTE
1	OLD TOWN, CORFU (UNESCO)	Corfu	Old Town of Corfu – terrestrial archaeological site	GG 178/AAP/15-05-2012. GG 289/AAP/13-09-2012
2	CENTRAL PART OF THE OLD TOWN, CORFU	Corfu	Central part of the Old Town – historic place and terrestrial archaeological site	GG 178/AAP/15-05-2012
3	MON REPOS ESTATE, CORFU, ZONE A	Corfu	Mon Repos Estate – terrestrial archaeological site and historic place	GG 289/AAP/13-09-2012
4	KANONI PENINSULA AND PENINSULA, CORFU	Corfu	Kanoni peninsula and islet – landscape of natural beauty, historic place and terrestrial archaeological site	GG 178/AAP/15-05-2012. GG 289/AAP/13-09-2012
5	ERMONES HILL, CORFU	Corfu	Ermones Hill – terrestrial archaeological site	GG 271/AAP/2014
6	KASTRO, CORFU	Corfu	Castle / fortification complex, in or associated with the Old Town	Wider Old Town covered by GG 178/AAP/2012 and GG 289/AAP/2012
7	HOLY MONASTERY OF THE SUPERIOR THEOTOKOS, MAGOULADES, CORFU	Corfu	Monastery of Ypsili Theotokos – historic listed monument	Ministerial Decision 4701/03-03-1967. GG 183/B/16-03-1967
8	BUILDING COMPLEX, PEROULADES, CORFU, ALLEGEDLY OWNED BY IOAN. LEONTITSI	Corfu	Leontitsi building complex – work of art	Ministerial Decision YPPE/DILAP/G/65853/3309/13-12-1984; GG 8/B/09-01-1985
9	BUILDING, MAKRADES, CORFU, ALLEGEDLY OWNED BY MAKRIS BROS	Corfu	Makris brothers building / house – work of art	Ministerial Decision YPPE/DILAP/G/65852/3308/13-12-1984; GG 8/B/09-01-1985
10	BUILDING, PEFKOS, PAPADIATIKA, OTHONOI, ALLEGEDLY OWNED BY G., TH., SPYR. AND J. GREENWOOD	Othonoi, Corfu	Building at “Pefkos”, Papadiatika, Othonoi – historic listed monument	Ministerial Decision YPPO/DILAP/G/276/39356/02-08-2000; GG 1025/B/21-08-2000
11	OLD PRIMARY SCHOOL BUILDING, LIAPADES, CORFU	Corfu	Old Primary School building – monument	GG 1902/B/2004
12	LYGIA AND LIoubETSI, THESPROTIA	Igoumenitsa / Thesprotia	Lygia and Lioubetsi – terrestrial archaeological site	Ministerial Decision YPPOT/GDAPK/ARCH/A1/F32/61508/2776; GG 221/AAP/29-08-2011
13	XENIA MOTEL, IGOUMENITSA, THESPROTIA, ALLEGEDLY OWNED BY HELLENIC TOURIST PROPERTIES S.A.	Igoumenitsa, Thesprotia	XENIA Motel of Igoumenitsa – modern / listed architectural monument	YPPO/72334/1964/07-11-2008; GG 542/AAP/27-11-2008
14	FORTRESS OF IGOUMENITSA, THESPROTIA	Igoumenitsa, Thesprotia	Castle / fortress of Igoumenitsa	Decision of the Ministry of Culture and Sports (ΥΠΠΟΑ/ΓΔΑΠΚ/ΔΒΜΑ/ΤΒΜΑΧΜΑΕ/307049/20237/4109/1654), GG 159/AAP/2018-07-31
15	WINDMILL, GRAIKOCHORI, THESPROTIA, PROPERTY OF THE MUNICIPALITY OF IGOUMENITSA	Graikochori, Igoumenitsa, Thesprotia	Windmill of Graikochori	GG 441/B/1996
16	ZAMPELIS BRIDGE, ROPAS VALLEY, CORFU	Ropas Valley, Corfu	Zampelis Bridge	GG 1810/B/2005
17	GEFYRI, ERMONES, VATOS, CORFU	Ermones / Vatos, Corfu	Bridge at Ermones / Vatos	GG 1810/B/2005

NO	MAP LABEL / MONUMENT	AREA	PROTECTED ASSET / DESIGNATION	PROTECTION STATUS / GOVERNMENT GAZETTE
18	GLYFADA – PELEKA AREA, CORFU	Glyfada / Pelekas, Corfu	Area / landscape; not confirmed as an individual ancient monument in reviewed sources	GG 183/B/1967

2.6.3.2 Underwater cultural heritage

GeoSat ReSeArch Lab of the Foundation for Research and Technology Hellas – Institute for Mediterranean Studies (FORTH-IMS) prepared an Archaeological Baseline Report for the proposed Exploration Well Asopus 1A within Block 2. The results of the underwater cultural heritage assessment are presented in the following sections (§2.6.3.2.1 - 2.6.3.2.4). The report is also provided in Annex 03B.

2.6.3.2.1 The Northern Ionian Sea as a maritime cultural landscape

The northern Ionian Sea constitutes a maritime space shaped by long-term interactions between human communities and the marine environment. Rather than functioning solely as a physical barrier separating landmasses, the sea has historically acted as a medium of communication facilitating the movement of people, goods, technologies and ideas across considerable distances. Within this framework, maritime landscapes may be understood as culturally constructed spaces formed through navigation, trade, fishing, migration and other maritime practices that connect coastal communities and distant regions.

The study area lies within the wider maritime zone extending between western Greece, southern Italy and the Adriatic Sea. This region occupies a strategic position within the eastern Mediterranean and encompasses one of the principal maritime gateways of the Mediterranean basin: the Strait of Otranto. Through this narrow passage, maritime traffic moving between the Adriatic and Ionian Seas has been channelled for millennia, creating a dynamic network of routes linking the eastern Mediterranean with southern Italy and the Adriatic hinterland.

The geographical configuration of the region has played a fundamental role in shaping patterns of maritime connectivity. The island of Corfu, situated at the entrance to the Adriatic, occupies a strategic position along routes linking the Greek mainland with southern Italy and the western Mediterranean. Similarly, the Strait of Otranto forms a natural gateway through which maritime traffic has historically passed when travelling between the Adriatic basin and the wider Mediterranean. As a result, the northern Ionian Sea developed as a zone of interaction in which maritime movement and communication became integral elements of the cultural landscape.

Recent approaches within maritime archaeology increasingly emphasise that seascapes should not be viewed merely as spaces separating terrestrial regions but as environments actively shaped by human activity. Maritime routes, navigation practices, exchange networks and shipwreck distributions collectively contribute to the formation of maritime cultural landscapes that extend beyond the limits of individual coastal sites. Within this perspective, offshore environments constitute meaningful cultural spaces that preserve evidence of past maritime activity and provide valuable insights into long-term patterns of connectivity and mobility.

The northern Ionian Sea is particularly well suited to such an approach. Positioned between the eastern Mediterranean, southern Italy and the Adriatic basin, the region has repeatedly facilitated the movement of

people, commodities and ideas across large distances. Archaeological and historical evidence demonstrates that maritime interaction within the wider Ionian-Adriatic region spans several millennia and reflects the enduring importance of maritime communication for economic, political and cultural development.

Although archaeological research has traditionally focused on coastal settlements, harbours and nearshore shipwrecks, recent investigations have demonstrated that offshore environments also preserve important evidence of past maritime activity. These studies highlight the role of offshore spaces as integral components of broader maritime cultural landscapes rather than empty areas situated between coastal centres (Kourkouvelis and Sakellariou, 2015).

2.6.3.2.2 Maritime connectivity and navigation networks

The strategic position of the northern Ionian Sea has favoured maritime connectivity since prehistory, linking the eastern Mediterranean, the Adriatic basin and the Italian peninsula through a network of maritime routes that evolved over time but remained fundamentally oriented towards communication and exchange. The region occupies a pivotal location within the wider Ionian-Adriatic basin, functioning as both a transit zone and a gateway between different cultural and economic spheres.

Archaeological evidence indicates that maritime interaction across the Ionian-Adriatic region began long before the establishment of Greek colonies. During the Bronze Age, contacts between the Aegean world, the western Greek mainland and the Adriatic area reflected in the circulation of materials, technologies and cultural influences. Recent studies emphasise that the Adriatic-Ionian basin should be understood as an interconnected maritime system rather than a series of isolated coastal zones, with maritime mobility playing a fundamental role in the development of regional exchange networks (De Mitri, 2024).

The establishment of Greek colonies in the western Mediterranean during the Archaic period further strengthened the importance of maritime routes through the Ionian Sea. Corcyra (modern Corfu), situated at the entrance to the Adriatic, became one of the principal maritime nodes connecting the Greek world with southern Italy and the Adriatic coast. Its geographical position allowed it to function as an intermediary station for vessels travelling between the eastern and western Mediterranean while also controlling access to the Adriatic basin.

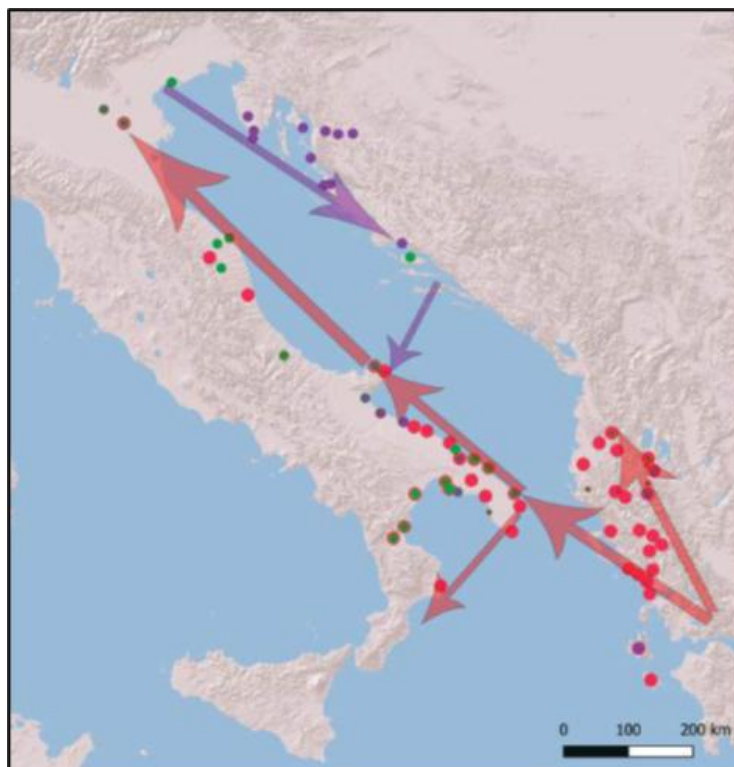


Figure 2-180: Ionian-Adriatic basin in the Bronze Age: more entangled sites (C. De Mitri 2024)



Figure 2-181: Strait of Otranto and Ionian Sea: probable route of the wreck and main sites with Corinthian ceramics from the late 8th and early 7th century BC (C. De Mitri 2024)

During the Classical and Hellenistic periods, increasing political, economic and cultural interaction between Greece, Magna Graecia and the Adriatic contributed to the intensification of maritime traffic throughout the region. The Ionian Sea facilitated the circulation of agricultural products, ceramics, raw materials and manufactured goods, while also supporting the movement of people, military expeditions and colonial ventures. Archaeological evidence from both coastal sites and shipwreck assemblages demonstrates the existence of extensive maritime networks linking the Adriatic and Ionian regions with broader Mediterranean exchange systems (Jurišić, 2000).

The integration of the region into the Roman Empire resulted in a further expansion of maritime communication. Roman maritime transport networks connected production centres and markets across the Mediterranean, creating an unprecedented degree of economic integration. The Adriatic and Ionian Seas formed an essential component of this system, facilitating connections between the eastern Mediterranean, southern Italy, North Africa and the Adriatic provinces. Shipwreck evidence demonstrates that the movement of amphora-borne commodities, including wine, olive oil and other agricultural products, was particularly intensive during the Roman period (Jurišić, 2000).

Long-distance maritime connectivity continued during Late Antiquity, when commercial exchange remained closely associated with major maritime corridors linking the eastern Mediterranean with Italy and the Adriatic. Recent deep-water archaeological investigations in the northern Ionian Sea have identified Late Roman shipwrecks carrying North African amphorae, providing direct evidence for the continued use of offshore navigation routes in the region during the fourth century AD (Kourkoumelis 2013; Kourkoumelis and Sakellariou, 2015).

The strategic importance of the northern Ionian Sea persisted throughout the Byzantine, Venetian and Ottoman periods and continued into the modern era. Commercial shipping, military operations and regional communication networks remained dependent upon the maritime corridor connecting the Ionian and Adriatic Seas through the Strait of Otranto. As a result, the region accumulated a long and diverse record of maritime activity, traces of which survive in the form of shipwrecks and other underwater cultural heritage resources distributed across both coastal and offshore environments.

The archaeological evidence supporting this long-term maritime connectivity and the significance of the Corfu-Otranto corridor are discussed in the following section.

2.6.3.2.3 The Corfu-Otranto corridor and the archaeological record of the northern Ionian Sea

The Strait of Otranto forms the narrow passage between the Adriatic and Ionian Seas and has historically served as a major corridor for maritime communication, trade and navigation between the Adriatic and the wider Mediterranean. Situated between the coast of Apulia in southern Italy and the island of Corfu, the corridor has channelled maritime traffic between the Adriatic basin and the wider Mediterranean for millennia. Consequently, the waters extending west of Corfu and into the northern Ionian Sea formed an integral component of long-distance maritime communication systems linking the eastern Mediterranean, southern Italy, the Adriatic and, ultimately, the wider Mediterranean world. The strategic significance of this corridor derives not only from its geographical position but also from its role as a crossroads of navigation, trade, migration and military activity. Any vessel travelling between the Adriatic and the eastern

Mediterranean necessarily operated within or in proximity to this maritime zone, creating conditions that favoured the accumulation of a rich and diverse underwater archaeological record.

Despite its historical importance, the archaeological investigation of offshore areas within the northern Ionian Sea remained limited for much of the twentieth century. Archaeological research traditionally focused on coastal settlements, harbours, anchorages and shallow-water shipwrecks, while deep-water environments were largely inaccessible due to technological limitations. As a result, the apparent scarcity of offshore archaeological sites often reflected a lack of investigation rather than an absence of past human activity. This perception has changed significantly over the last two decades through the application of marine geophysical survey techniques, remotely operated vehicles (ROVs) and integrated geoarchaeological methodologies. These developments have transformed understanding of submerged cultural landscapes by demonstrating that deep-water environments preserve important archaeological remains and can contribute substantially to the reconstruction of ancient navigation patterns and maritime connectivity.

A significant milestone in this process was the development of collaborative projects between the Ephorate of Underwater Antiquities (EUA) and the Hellenic Centre for Marine Research (HCMR). Since 2000, these collaborations have undertaken a series of archaeological investigations employing advanced marine survey technologies, contributing substantially to the development of deep-water archaeological research in the eastern Mediterranean (Kourkouvelis and Sakellariou, 2015). These projects demonstrated that marine geophysical datasets acquired for scientific or engineering purposes could also be used to identify archaeological remains and evaluate their significance. The emergence of deep-water archaeology has fundamentally altered perceptions of maritime cultural landscapes. Previously, offshore areas were often viewed as transitional spaces separating coastal centres. Contemporary research increasingly recognises them as active cultural spaces shaped by navigation, exchange and repeated maritime practices. Shipwrecks constitute some of the most visible archaeological manifestations of these processes, preserving evidence of trade, technology, seafaring traditions and patterns of mobility. The ability to identify such remains in deep-water environments has therefore expanded the spatial scope of archaeological investigation and highlighted the importance of offshore zones within broader maritime landscapes.

Particularly important for the present study are the investigations conducted in association with the Greece-Italy POSEIDON natural gas pipeline project. These investigations provide perhaps the closest regional and methodological parallel to the current assessment. The project originated from a collaboration between the EUA, HCMR and IGI POSEIDON S.A. and involved the archaeological evaluation of marine geophysical data acquired during engineering surveys undertaken along the proposed pipeline route (Kourkouvelis and Sakellariou, 2015). Approximately 200 km² of bathymetric, side-scan sonar and sub-bottom profiling data were examined from an archaeological perspective in order to identify targets potentially associated with submerged cultural heritage.

The significance of the POSEIDON investigations lies not only in the discoveries themselves but also in the methodology employed. Following detailed interpretation of the geophysical datasets, twelve targets were selected from several hundred anomalies identified during the survey. Selection criteria included the morphology of the targets, their acoustic reflectivity and their compatibility with the surrounding seabed environment. These targets were subsequently investigated through visual inspection using the ROV Max Rover, capable of operating at depths of up to 2,000 m (Kourkouvelis and Sakellariou, 2015).

The investigations resulted in the identification of three previously unknown shipwreck sites, including two Late Roman wrecks and one post-medieval vessel. All three sites were located at depths exceeding 1,000 m, demonstrating that important archaeological remains survive within deep-water environments of the northern Ionian Sea. The discoveries also illustrated the effectiveness of integrating archaeological interpretation into offshore infrastructure projects and highlighted the potential archaeological value of datasets originally acquired for engineering purposes (Kourkouvelis and Sakellariou, 2015).

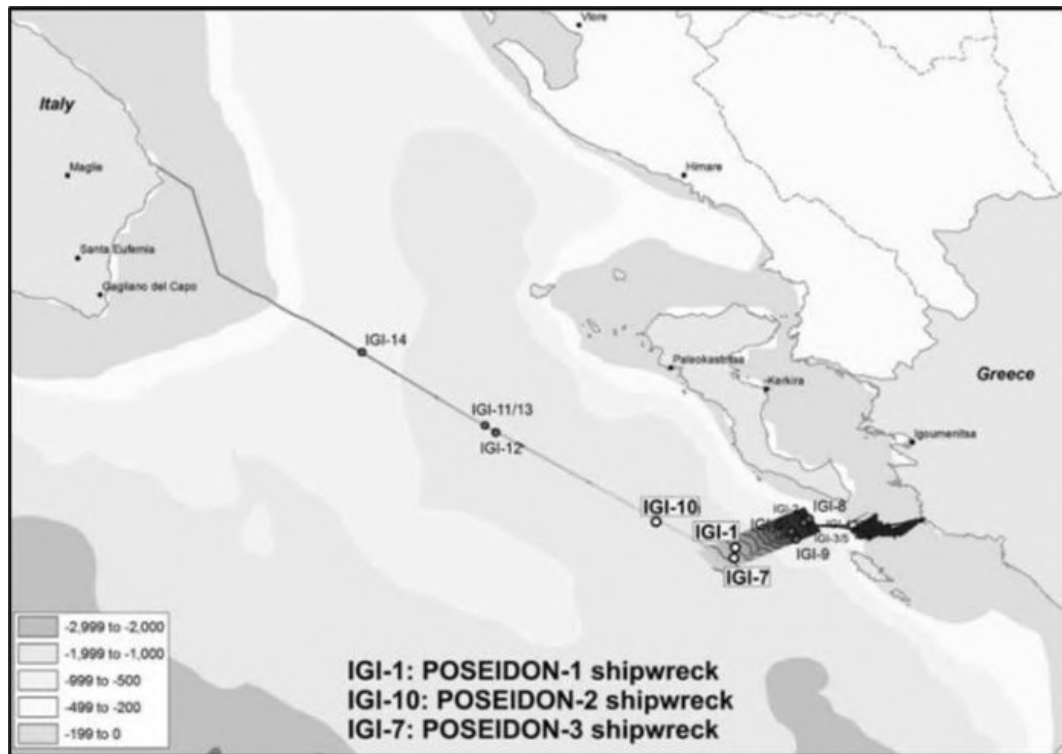


Figure 2-182: The location of the targets inspected during the deepwater archaeological survey that was conducted by the Ephorate of Underwater Antiquities (EUA) of the Hellenic Ministry of Culture, Education and Religious Affairs, in collaboration with the Hellenic Centre for Marine Research (HCMR). (Kourkouvelis & Sakellariou 2015)

The most significant of these discoveries was the wreck designated Poseidon 1. Located at a depth of approximately 1,175 m, the site survives as an elongated mound measuring approximately 15-20 m in length and between 5 and 10 m in width. Much of the wreck remains buried beneath sediment deposits, although visible elements include amphora fragments, anchors and structural remains associated with the vessel. The burial of substantial portions of the site beneath sediment is particularly important because it suggests favourable preservation conditions and the potential survival of archaeological deposits in relatively undisturbed contexts.

Analysis of amphora fragments recovered from Poseidon 1 revealed the presence of North African transport containers, including Africana II C2, Africana I C and Africana IIIA/Keay 25.1 types, dating principally to the fourth century AD (Kourkouvelis and Sakellariou, 2015). These finds indicate participation in long-distance commercial networks linking North Africa, southern Italy and the eastern Mediterranean. The cargo also demonstrates the movement of agricultural products across considerable distances and provides direct archaeological evidence for maritime exchange operating through the northern Ionian Sea during Late Antiquity.

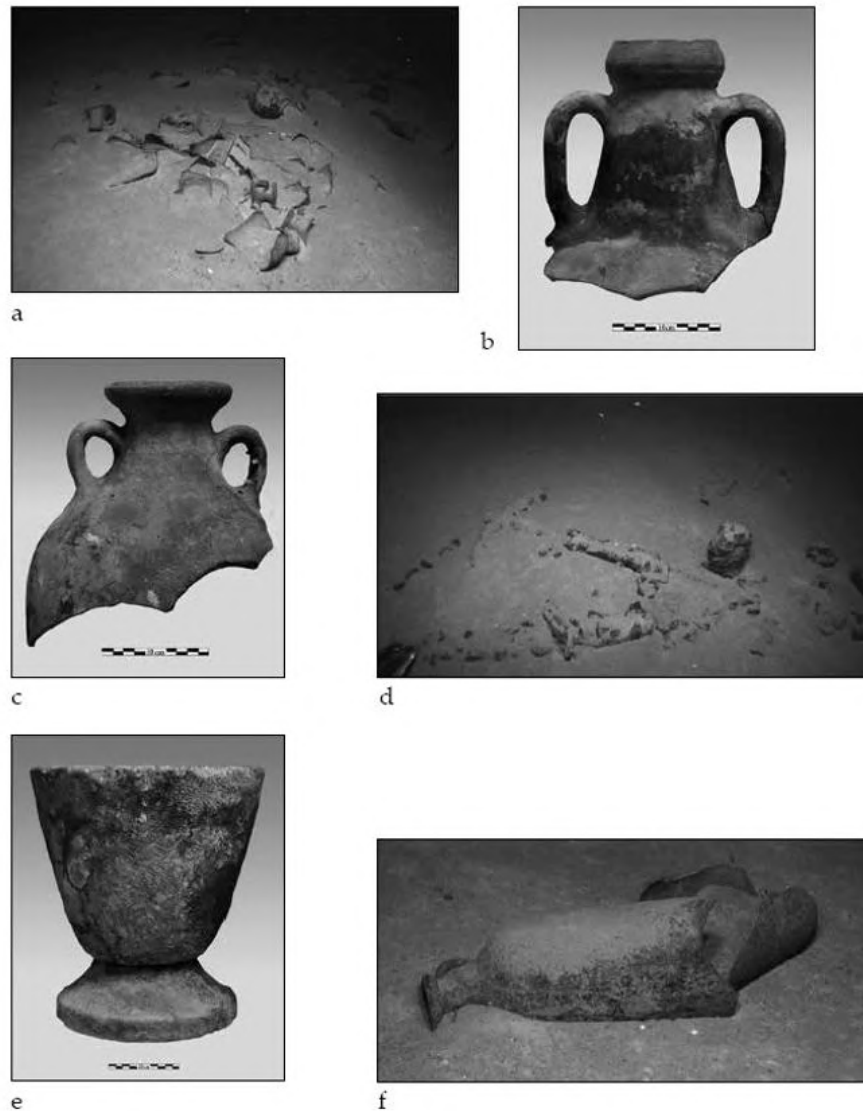


Figure 2-183: The Poseidon 1 shipwreck: a. The mound of the main cargo concentration; b. Africana II C 2 amphora neck; c. Africana I C amphora neck; d. Two iron anchors; e. A marble mortar (holmos); f. Africana III A (Keay 25.1 type) amphora. (Kourkoumelis & Sakellariou 2015)

The second Late Roman shipwreck, Poseidon 2, was discovered at approximately 1,370 m depth. Although less extensively documented, the site also preserved amphora remains associated with a commercial cargo and further reinforced the interpretation of the northern Ionian Sea as an active maritime corridor during the Roman period. Together, the two sites provide direct archaeological evidence for long-distance navigation and commercial exchange within the offshore waters of the region.

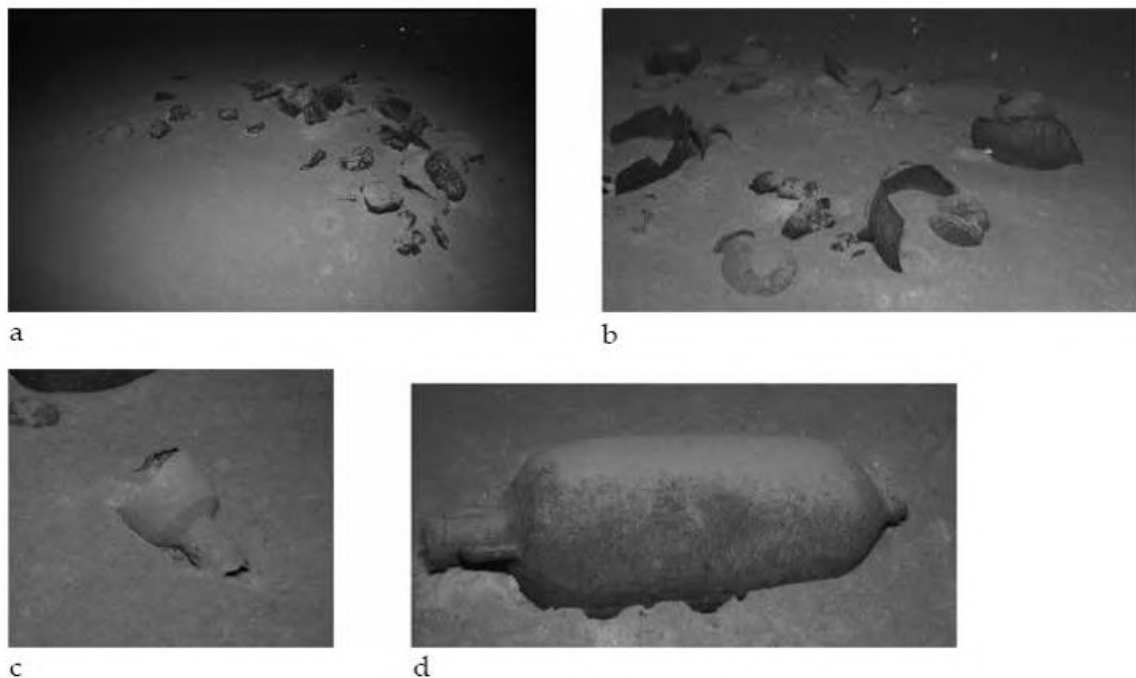


Figure 2-184: The Poseidon 2 shipwreck: a. The concentration of black stones and amphorae sherds; b. The concentration of amphorae and coarse ware; c. A bronze vase; d. Keay 61 A amphora. (Kourkoumelis & Sakellariou 2015)

The implications of the POSEIDON discoveries extend beyond the identification of individual shipwrecks. Perhaps the most important conclusion reached by the investigators concerns the reconstruction of navigation routes through the northern Ionian Sea. Traditionally, vessels travelling between the Adriatic and the eastern Mediterranean were often assumed to have remained close to the coast or to have utilised routes passing through the Corfu Channel. The location of the POSEIDON wrecks suggests a more complex pattern of navigation. According to Kourkoumelis and Sakellariou (2015), the distribution of the sites may indicate that vessels crossed substantial portions of the northern Ionian Sea through offshore routes west of Corfu before continuing towards southern Italy or entering the Adriatic.

This interpretation has important implications for archaeological assessments of offshore development areas. It demonstrates that significant archaeological remains may occur well beyond the limits of traditionally recognised coastal navigation zones and highlights the necessity of considering offshore environments as integral components of maritime cultural landscapes. In this respect, the POSEIDON investigations represent a particularly relevant precedent for the present study, illustrating both the archaeological value of offshore geophysical datasets and the potential for the discovery of previously unknown cultural heritage resources within areas subject to energy infrastructure development.

Additional evidence for the archaeological significance of the wider Ionian region is provided by recent investigations undertaken within the Inner Ionian Sea. Geraga et al. (2020) documented a substantial assemblage of underwater cultural heritage resources ranging chronologically from antiquity to the twentieth century. Their study recorded thirty-six known shipwrecks within the region, eleven of which were systematically investigated using marine geophysical techniques and ground-truthing methods. The results

demonstrate the long-term and continuous use of Ionian maritime routes and provide further evidence for the archaeological richness of the wider maritime landscape.

Particularly noteworthy is the diversity of the documented shipwreck assemblage. The recorded sites include ancient merchant vessels, modern wrecks and remains associated with both World Wars, illustrating the enduring strategic and economic importance of the Ionian Sea. The authors emphasise that maritime activity has left a cumulative archaeological signature spanning more than two millennia and highlight the need for integrated management approaches capable of balancing cultural heritage protection with contemporary maritime uses, including fisheries, shipping and hydrocarbon exploration (Geraga et al., 2020).

The archaeological significance of the Corfu-Otranto corridor has been reinforced further by recent discoveries from the Strait of Otranto itself. Of particular importance is the identification of an Early Archaic shipwreck discovered within the Otranto Channel and recently published by Davidde (2023). The vessel carried a substantial cargo of Corinthian ceramics, including transport amphorae and other ceramic vessels dating to the late eighth and early seventh centuries BC. The assemblage provides rare archaeological evidence for maritime activity during the early phases of Greek expansion towards the western Mediterranean and demonstrates that navigation through the Otranto corridor was already established during the Archaic period (Davidde, 2023). The discovery significantly extends the chronological depth of the archaeological record within the region and contributes to a growing body of evidence indicating that the waters between Corfu and southern Italy functioned as a major maritime communication zone over a period exceeding two millennia.



Figure 2-185: Recovery of amphora from the early Archaic shipwreck discovered within the Otranto Channel.

(<https://www.archaeology.wiki/blog/2026/06/11/the-shipwreck-in-the-strait-of-ottranto/>)

The importance of the Otranto wreck lies not only in its chronology but also in its geographical position. Together with the Late Roman wrecks identified during the POSEIDON investigations, it contributes to a growing body of evidence indicating that the waters between Corfu and southern Italy functioned as a major maritime communication zone over an extended period. The archaeological record therefore reflects a long history of navigation, commerce and cultural interaction that transcends individual periods and demonstrates the persistent significance of the corridor within Mediterranean maritime systems.

Collectively, the available archaeological evidence demonstrates that the Corfu-Otranto corridor cannot be regarded as an archaeologically empty offshore space. Instead, it constitutes a maritime landscape characterised by intensive and long-term human activity. Shipwrecks dating from the Archaic period to modern times illustrate the enduring importance of the region for navigation, trade and communication and confirm the preservation of archaeological remains within both coastal and deep-water environments. Importantly, many of the most significant discoveries have resulted from the archaeological assessment of datasets acquired for engineering and infrastructure projects rather than from dedicated archaeological surveys. This observation strongly suggests that the archaeological record of the northern Ionian Sea remains substantially underexplored and that additional submerged cultural heritage resources are likely to survive within offshore areas that have not yet been systematically investigated. Consequently, the wider study area should be regarded as possessing significant archaeological potential despite the relatively limited number of previously recorded sites within its immediate vicinity.

2.6.3.2.4 Archaeological potential of the wider project area

The assessment of archaeological potential within offshore environments is inherently constrained by the uneven distribution of archaeological investigations and the limited visibility of submerged cultural heritage resources. Consequently, the absence of previously recorded archaeological sites cannot be interpreted as evidence for the absence of archaeological remains. This consideration is particularly relevant in the northern Ionian Sea, where recent discoveries have demonstrated that significant archaeological sites may survive in deep-water environments and may only become apparent through the analysis of marine geophysical datasets.

Several factors indicate that Block 2 possesses archaeological potential. First, the study area is situated within the wider Corfu-Otranto corridor, one of the principal maritime gateways linking the Adriatic basin with the eastern Mediterranean. Archaeological and historical evidence demonstrates the long-term use of this maritime zone for navigation, trade and communication, suggesting that maritime activity may have occurred across both coastal and offshore environments.

Second, archaeological discoveries from the wider northern Ionian Sea demonstrate the presence of submerged cultural heritage resources within comparable offshore settings. Particularly significant are the shipwrecks identified during the POSEIDON pipeline investigations, which provided direct evidence for ancient maritime activity at depths exceeding 1,000 m and demonstrated that important archaeological remains may survive well beyond traditionally recognised coastal navigation corridors (Kourkoumelis and Sakellariou, 2015). The recent discovery of the Archaic shipwreck in the Otranto Channel further reinforces the long-term archaeological significance of the region and extends the documented record of maritime activity to at least the seventh century BC (Davidde, 2023).

Third, environmental conditions within deep-water settings may favour archaeological preservation. The presence of sediment accumulation has reduced direct human interference and limited physical disturbance may contribute to the survival of both exposed and buried archaeological remains. Evidence from the POSEIDON shipwrecks demonstrates that substantial portions of archaeological sites may remain concealed beneath seabed sediments while preserving exposed structural and cargo-related elements.

Finally, the archaeological record of the northern Ionian Sea remains incomplete. Many of the most important discoveries made during the last two decades have resulted from the archaeological assessment of datasets

acquired for engineering and infrastructure projects rather than from dedicated archaeological surveys. This observation strongly suggests that additional archaeological resources are likely to remain undiscovered within offshore areas that have not yet been systematically investigated.

Based on the available evidence, the archaeological potential of Block 2 is assessed as moderate to high, particularly with regard to submerged cultural heritage associated with maritime activity.

2.7 Socioeconomic environment

The assessment focuses on the Corfu Regional Unit, which represents the closest onshore administrative area to Asopus 1A & Block 2, and the Municipality of Igoumenitsa, within the Thesprotia Regional Unit, where the Port of Igoumenitsa shorebase facilities are located. These areas are assessed primarily at municipal and regional unit level, while broader administrative scales are also considered where required by the availability, resolution, or comparability of baseline data.

2.7.1 Demographics

2.7.1.1 Administrative context and study area population

The Corfu Regional Unit and the Municipality of Igoumenitsa within the Thesprotia Regional Unit, sit within two distinct administrative regions, the Ionian Islands Region and the Epirus Region respectively, both of which recorded demographic contraction between the 2011 and 2021 Population.

At national level, Greece recorded a total permanent population of 10,482,487 in the 2021 Census, representing a decline of 3.1% from 10,816,286 in 2011. This contraction reflects a combination of sustained low fertility, outmigration of working-age population during and after the 2008–2015 economic crisis, and natural population decrease. Table 2-57 presents the intercensal population change at national and local level for the two regions of relevance to the Project⁷⁵.

Table 2-57: Evolution of resident population 2011-2021

TERRITORIAL UNIT	2011	2021	CHANGE 2011-2021
Greece (total)	10,816,286	10,482,487	-3.1%
Ionian Islands Region	207,855	204,532	-1.6%
Epirus Region	336,856	319,991	-5.0%
Corfu Regional Unit	104,371	101,600	-2.7%
Thesprotia Regional Unit	43,587	40,804	-6.4%
Municipality of Igoumenitsa	25,814	25,698	-0.4%

The Ionian Islands Region recorded a permanent population of 204,532 in 2021, representing a relatively modest decline of 1.6% over the intercensal decade, the second smallest regional decline in Greece after Attica (-0.4%), and significantly below the national average of -3.1%. This relative demographic resilience is

⁷⁵ https://elstat-outsourcers.statistics.gr/census_results_2022_en.pdf

attributable in large part to the sustained growth of the tourism economy, which has maintained demand for seasonal and permanent labour. The Corfu Regional Unit, with a permanent population of 101,600 in 2021, accounts for approximately 49.7% of the region's total population and declined by 2.7% over the same period, slightly above the regional average but well below the national rate.⁷⁶

The Epirus Region recorded a more pronounced demographic contraction, declining by 5.0% between 2011 and 2021 to reach 319,991 permanent residents, reflecting the region's structural economic challenges and continuing rural depopulation. Within Epirus, the Thesprotia Regional Unit declined by 6.4% to 40,804 inhabitants, the steepest rate among the region's four regional units. The Municipality of Igoumenitsa, however, proved considerably more resilient, recording a marginal decline of just 0.4% to 25,698 inhabitants, reflecting its role as the regional unit's dominant urban centre and the concentration of port-related economic activity that has partially offset the wider depopulation trend⁷⁷.

2.7.1.2 Age structure

At national level, the 2021 Census recorded an age structure of 18.6% aged 0–19, 52% aged 20–59, and 29.4% aged 60 and over, confirming the advanced stage of demographic ageing in Greece⁷⁸.

The age structure data extracted from the 2021 Census reveal broadly similar patterns across the two study areas, with slight differences that reflect their distinct economic and geographic characters. The Corfu Regional Unit closely follows the national profile in most age groups, with a slightly lower share of young people (17.8% aged 0–19) and a moderately elevated share of the 60–79 (24.2% versus 22.1% nationally), consistent with the demographic ageing trend observed across island communities where youth outmigration is a structural feature. The share of the oldest age group (80+) at 7.1% remains close to the national average, suggesting that the ageing process, while present, has not yet reached the more acute levels observed in more isolated or economically marginal Greek regions.

Thesprotia Regional Unit presents a distinctly older age profile. With only 16.6% aged 0–19 and 27.4% aged 60–79 and 9.9% aged 80 and over, Thesprotia displays the most pronounced demographic ageing of any territorial unit in the study area, exceeding even the Epirus Region averages of 25.5% and 9.4% respectively for these age groups. The combined share of population aged 60 and over, reaches 37.3% in Thesprotia, compared to 29.4% nationally, indicating a substantially elevated old-age dependency burden consistent with the regional unit's pattern of rural depopulation and youth outmigration. The Municipality of Igoumenitsa, by contrast, presents a considerably younger and more nationally representative profile; 18.6% aged 0–19, matching the national average exactly, and a combined 60+ share of 32.1%, reflecting the urban concentration effect of the port city, which likely retains a larger working-age population than the regional unit as a whole⁷⁹.

⁷⁶ <https://www.statistics.gr/el/statistics/-/publication/SAM03/2021> ; <https://www.statistics.gr/el/statistics/-/publication/SAM03/2011>

⁷⁷ <https://www.statistics.gr/el/statistics/-/publication/SAM03/2021> ; <https://www.statistics.gr/el/statistics/-/publication/SAM03/2011>

⁷⁸ https://www.statistics.gr/documents/20181/17286366/A1602_SAM03_TB_DC_00_2011_A01_F_BI.xlsx/ed1c7f78-5f1e-c892-7bf0-366d797e1843

⁷⁹ https://www.statistics.gr/el/statistics?p_p_id=documents_WAR_publicationsportlet_INSTANCE_VBZOniOvs5VJ&p_p_lifecycle=2&p_p_state=normal&p_p_mode=view&p_p_cacheability=cacheLevelPage&p_p_col_id=column-

The ageing trend observed across both study areas is consistent with the broader national and European pattern. In 2025, the old-age dependency ratio in the EU (defined as the ratio of the number of elderly people aged 65 years and over, compared to the number of people of working age i.e. 15-64 years) was 34.5% with the highest ratios registered in Italy (39%), Bulgaria (38.7%), Portugal (38.6%), Finland (38.1%), followed by Greece (37.4%)⁸⁰.

Table 2-58: Age structure of the population of the study area 2021

TERRITORIAL UNIT	TOTAL 2021	0-19	20-39	40-59	60-79	80+
Greece (total)	10,482,487	18.6%	22.0%	29.9%	22.1%	7.3%
Ionian Islands Region	204,532	18.6%	20.9%	29.9%	23.1%	7.4%
Epirus Region	319,991	17.6%	19.9%	27.6%	25.5%	9.4%
Corfu Regional Unit	101,599	17.8%	20.6%	30.2%	24.2%	7.1%
Thesprotia Regional Unit	40,804	16.6%	18.1%	28.0%	27.4%	9.9%
Municipality of Igoumenitsa	25,698	18.6%	19.6%	29.6%	24.4%	7.7%

2.7.1.3 Seasonal population variation

The permanent population recorded by the census substantially understates the actual population present during the peak summer season, when tourist arrivals generate a temporary population many times larger than the resident base.

Seasonal population was estimated using a population-equivalent approach, which converts annual tourist overnight stays into a population equivalent by dividing total overnights by 365. The Corfu Regional Unit recorded 7,555,302 overnight stays in hotels and similar establishments in 2024, generating a daily average tourist equivalent of approximately 20,700 persons⁸¹. Added to the permanent population of 101,599, this yields an annualised equivalent population of approximately 122,300, representing a tourism-driven population uplift of approximately 20%. It should be noted that these figures cover hotels and similar establishments only, excluding tourist campsites and short-stay accommodation platforms, which are extensively used in Corfu; the true equivalent population will therefore be materially higher. Given the strong seasonal concentration of tourism, with the vast majority of overnight stays occurring between May and October, peak-day equivalent population during the summer months will substantially exceed the annualised average, placing significant pressure on infrastructure, services, and the coastal environment.

⁸⁰ https://ec.europa.eu/eurostat/databrowser/view/DEMO_PJANIND__custom_5028383/bookmark/table?lang=en&bookmarkId=cca427e9-bd30-4193-9ed1-9667765c645b&c=1676972738082

⁸¹

https://www.statistics.gr/en/statistics?p_p_id=documents_WAR_publicationsportlet_INSTANCE_VBZOniOvs5VJ&p_p_lifecycle=2&p_p_state=normal&p_p_mode=view&p_p_cacheability=cacheLevelPage&p_p_col_id=column-2&p_p_col_count=4&p_p_col_pos=2&documents_WAR_publicationsportlet_INSTANCE_VBZOniOvs5VJ_javax.faces.resource=document&documents_WAR_publicationsportlet_INSTANCE_VBZOniOvs5VJ_in=downloadResources&documents_WAR_publicationsportlet_INSTANCE_VBZOniOvs5VJ_documentID=581118&documents_WAR_publicationsportlet_INSTANCE_VBZOniOvs5VJ_locale=en

By contrast, the Municipality of Igoumenitsa and the wider Thesprotia Regional Unit display a much more modest tourism-driven population variation. The Municipality of Igoumenitsa recorded 376,548 overnight stays in 2024, with the regional unit total of 378,668 confirming that accommodation capacity is almost entirely concentrated within the port city⁸². This generates a daily average tourist equivalent of approximately 1,031 persons, representing an annualised population uplift of approximately 4% on the permanent municipal population of 25,698. The effective population variation in Igoumenitsa is driven primarily by transit passenger volumes through the port rather than destination tourism, and seasonal pressure on local infrastructure and services is therefore considerably lower than in Corfu.

Table 2-59: Seasonal population and tourism-related population equivalent

INDICATOR	CORFU REGIONAL UNIT	MUNICIPALITY OF IGOUMENITSA
Permanent population (2021 Census)	101,599	25,698
Tourist overnight stays (2024)	7,555,302	376,548
Average daily tourist equivalent (overnights/365)	20,700	1,031
Annualised population equivalent	122,300	26,729
Increase above permanent population	20,700	1,031
Population uplift (%)	20.4%	4.0%

2.7.2 Economic activities

2.7.2.1 National economic context

The Greek economy experienced a prolonged period of economic adjustment following the sovereign debt crisis of 2008–2016. During this period, Greece lost more than one-quarter of its GDP in real terms, unemployment increased sharply, investment levels declined significantly, and substantial outward migration of skilled labour (“brain drain”) occurred. GDP per capita in purchasing power standards (PPS) fell from approximately 93% of the EU average in 2008 to around 67% in 2018, reflecting the severity of the economic contraction⁸³.

Following the return to economic growth in 2017 and the successful completion of the European Stability Mechanism adjustment programme in 2018, the Greek economy entered a recovery phase. Economic growth remained positive until the COVID-19 pandemic, which caused a significant but temporary disruption to economic activity. Recovery was rapid thereafter, with real GDP increasing by 8.4% in 2021 and 5.6% in 2022, supported by strong private consumption, investment growth, export performance and a substantial

⁸²

https://www.statistics.gr/en/statistics?p_p_id=documents_WAR_publicationsportlet_INSTANCE_VBZOni0vs5VJ&p_p_lifecycle=2&p_p_state=normal&p_p_mode=view&p_p_cacheability=cacheLevelPage&p_p_col_id=column-2&p_p_col_count=4&p_p_col_pos=2&documents_WAR_publicationsportlet_INSTANCE_VBZOni0vs5VJ_javax.faces.resource=document&documents_WAR_publicationsportlet_INSTANCE_VBZOni0vs5VJ_in=downloadResources&documents_WAR_publicationsportlet_INSTANCE_VBZOni0vs5VJ_documentID=581118&documents_WAR_publicationsportlet_INSTANCE_VBZOni0vs5VJ_locale=en

⁸³ <https://www.bankofgreece.gr/enimerosi/grafeio-typoy/anazhthsh-enhmerwsewn/enhmerwseis?announcement=fc915812-ab24-47ab-9e60-a566653a1f42>

rebound in tourism. Growth continued in 2023, albeit at more moderate rates, while labour market conditions improved steadily and unemployment continued to decline^{84,85}.

According to the latest Annual Report of the Governor of the Bank of Greece (2025), the Greek economy maintained its positive momentum despite heightened geopolitical uncertainty and a challenging international environment. Real GDP increased by 2.1% in both 2024 and 2025, exceeding the euro area average growth rate. Economic expansion was supported primarily by investment, private consumption and net exports, while employment continued to increase and unemployment fell to its lowest level in approximately sixteen years. At the same time, the banking sector strengthened further, with non-performing loans declining to their lowest level since Greece joined the euro area, contributing to improved financing conditions and renewed credit expansion⁸⁶.

According to the EC's Spring 2026 Economic Forecast, the Greek economy maintained its growth momentum in 2025, with GDP growing by 2.1% for the third consecutive year, driven by investment, private consumption, and net exports. Growth is projected to moderate to 1.8% in 2026 and 1.6% in 2027, while remaining above the EU average. Investment is expected to stay robust in 2026, supported by a record inflow of EU funds under the RRF, though the RRF wind-down in 2027 is projected to weigh on growth thereafter. On the labour market, the unemployment rate declined to the lowest recorded since 2008 (8.4% in the final quarter of 2025) and is projected to fall further to 7.9% by 2027, though long-term unemployment, at close to 5%, remains the highest in the EU. Greece is expected to maintain fiscal surpluses over the 2025–2027 period, with the public debt-to-GDP ratio projected to decline steadily towards 134% by end-2027. The outlook is subject to downside risks, including a prolonged energy price shock, which is already driving inflation from 2.9% in 2025 to a projected 3.7% in 2026, as well as potential decrease of services exports, particularly tourism, and broader global economic uncertainty⁸⁷.

Overall, Greece has transitioned from a period of economic crisis and fiscal adjustment to one of sustained growth and improving macroeconomic stability. Continued investment, structural reforms, efficient utilisation of EU funding and improvements in productivity and competitiveness are expected to remain key drivers of long-term economic development.

2.7.2.2 Local economic context

Exploration Well Asopus 1A is associated with two principal regional economies: the Ionian Islands Region, particularly the Corfu Regional Unit, which lies closest to Block 2, and the Epirus Region, particularly the Thesprotia Regional Unit and the Igoumenitsa Municipality, which is proposed to serve as the logistics and supply base for offshore operations.

⁸⁴ <https://www.enterprisegreece.gov.gr/h-ellada-shmera/giati-ellada/h-ellhnikh-oikonomia>

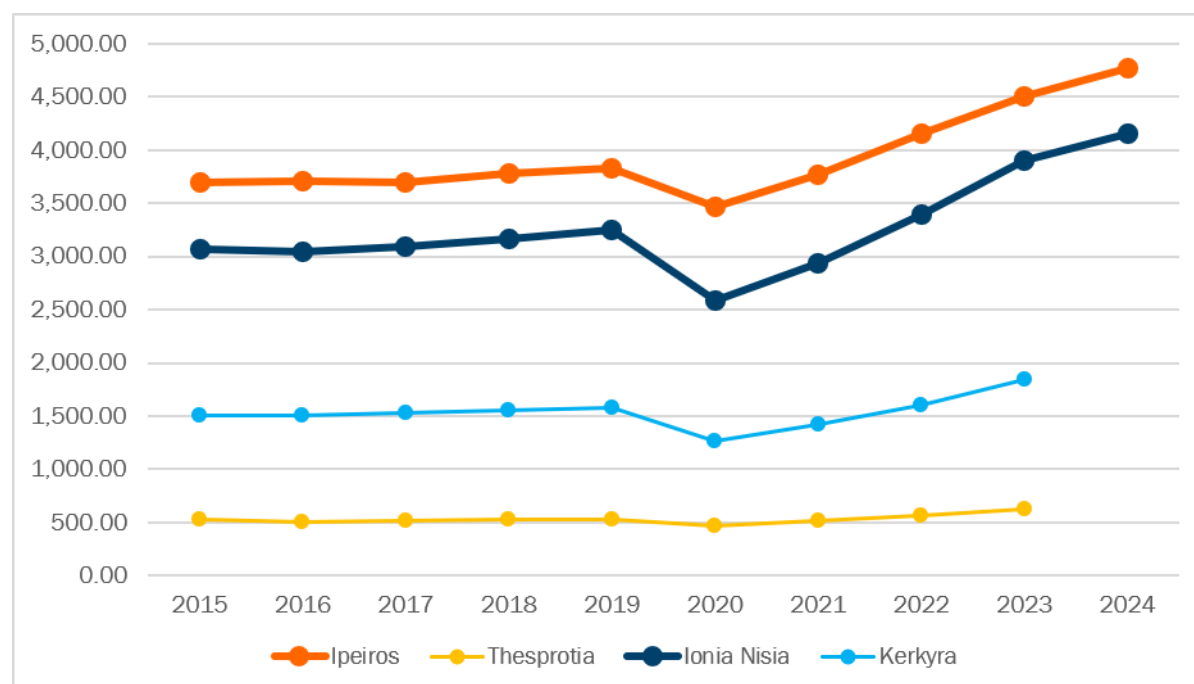
⁸⁵ Annual Report of the Governor of the Bank of Greece 2022 & 2023, <https://www.bankofgreece.gr/ekdoseis-ereyna/ekdoseis/anazhtsh-ekdosewn?mode=preview&categories=bankOfGreecePublications&bankOfGreecePublications=751bdcf2-6284-46b9-b70d-f589fb0aeb10>

⁸⁶ Annual Report of the Governor of the Bank of Greece 2022 & 2023, <https://www.bankofgreece.gr/ekdoseis-ereyna/ekdoseis/anazhtsh-ekdosewn?mode=preview&categories=bankOfGreecePublications&bankOfGreecePublications=751bdcf2-6284-46b9-b70d-f589fb0aeb10>

⁸⁷ https://economy-finance.ec.europa.eu/economic-surveillance-eu-member-states/country-pages-including-country-reports/greece/economic-forecast-greece_en

The economic characteristics of these areas differ significantly. The economy of the Ionian Islands Region is predominantly service-based and heavily dependent on tourism, which represents the principal contributor to regional GDP and employment. While the primary sector remains constrained by structural challenges such as fragmented landholdings, an ageing workforce and pressures associated with insularity and tourism development, the secondary sector is relatively limited and concentrated mainly in construction and small-scale manufacturing. The region's strong reliance on tourism has supported economic growth and recovery in recent years but also creates vulnerability to external shocks, as demonstrated during the COVID-19 pandemic. Consequently, economic diversification, innovation and the development of higher-value productive activities remain important priorities for enhancing the long-term resilience of the regional economy⁸⁸. According to the ROP of Epirus 2021-2027⁸⁹, Epirus faces structural problems of inequalities both in relation to other regions and intra-regionally. Its productive structure includes a strong primary sector with a high share of regional GDP (8.4%), twice the national average and 5.4 times the European average. Epirus has a moderate secondary sector with a GDP (16.8%) close to the national average, while the tertiary sector is the largest in terms of GDP (74.8%) (OECD 2020). Within the Epirus Region, GDP per capita levels vary across regional units. Thesprotia consistently ranks among the highest-performing units in the region, reflecting the strategic role of the Port of Igoumenitsa, which represents a major economic asset within the region, serving as one of Greece's principal passenger and freight gateways to Italy and the wider Adriatic region.

Figure 2-186 illustrates the evolution of regional GDP between 2015 and 2024 using the Eurostat regional accounts data⁹⁰.



⁸⁸ Strategic Environmental Assessment of the Regional Operational Programme of the Ionian Islands 2021-2027, http://2014-2020.pepionia.gr/wp-content/uploads/2022/03/EpikairoSxedioSMPE_pep_IN21_27_pin1.pdf

⁸⁹ https://www.espa-epirus.gr/images/diavouleusi_2021-2027/1o%20CE%A3%CF%87%CE%AD%CE%B4%CE%B9%CE%BF%20%CE%95%CE%A0%20%CE%89%CF%80%CE%B5%CE%B9%CF%81%CE%BF%CF%82%202021-2027.pdf

⁹⁰ https://ec.europa.eu/eurostat/databrowser/view/NAMA_10R_3GDP/default/table?lang=en

Figure 2-186: GDP evolution 2015-2024 in the study area (Current Prices, € million)

The data from Eurostat indicate that both regions experienced gradual economic recovery following the prolonged national economic crisis. The impacts of the COVID-19 pandemic were particularly evident in 2020, when economic activity contracted sharply across Greece. However, the magnitude of the contraction varied considerably between the two regions. The Ionian Islands Region, whose economy is heavily dependent on international tourism, recorded a GDP decline of approximately 20.7% between 2019 and 2020, substantially exceeding the national average contraction of 9.5%. The Corfu Regional Unit experienced a similar decline (-19.5%). By contrast, the Epirus Region recorded a smaller contraction of approximately 9.4%, broadly in line with the national average, reflecting its more diversified economic base. Thesprotia recorded a decline of approximately 11.8% over the same period.

Following the recovery of tourism and the wider economic rebound, both regions returned to a growth trajectory. By 2023, GDP in the Ionian Islands Region had exceeded its pre-pandemic level by approximately 19.7%, while GDP in Epirus exceeded the 2019 level by approximately 17.9%. Similar recovery trends were observed in the Regional Units of Corfu and Thesprotia. These trends demonstrate the resilience of the regional economies and the importance of tourism, transport and logistics activities in supporting economic growth.

Table 2-60: GDP trends in Greece and the study area (Current Prices, € million)

TERRITORIAL UNIT	GDP 2015	GDP 2023	CHANGE 2015–2023	GDP 2019	GDP 2020	COVID-19 CHANGE 2019–2020	RECOVERY (2023) VS 2019
Greece	175,363	224,686	+28.1%	185,181	167,540	-9.5%	+21.3%
Epirus Region	3,701	4,508	+21.8%	3,823	3,465	-9.4%	+17.9%
Thesprotia Regional Unit	525	631	+20.2%	530	468	-11.8%	+19.0%
Ionian Islands Region	3,074	3,898	+26.8%	3,256	2,581	-20.7%	+19.7%
Corfu Regional Unit	1,508	1,846	+22.4%	1,578	1,270	-19.5%	+17.0%

Although the study area encompasses regions that are economically significant at the local and regional level, their contribution to national economic output remains relatively modest. In 2023, the Epirus Region accounted for approximately 2.0% of Greece's GDP, while the Ionian Islands Region contributed approximately 1.7%. At the regional-unit level, Corfu generated approximately 0.8% of national GDP and Thesprotia approximately 0.3%.

Despite their relatively small share of national output, both areas perform important specialised economic functions. Corfu is one of Greece's leading tourism destinations and constitutes a key economic centre of the Ionian Islands Region. Thesprotia hosts the Port of Igoumenitsa, one of the country's most important passenger and freight gateways to Italy and the wider Adriatic region, supporting transport, logistics and maritime services of strategic importance beyond the regional scale.

Table 2-61: Contribution of the Study Area to National GDP (2023)

TERRITORIAL UNIT	GDP 2023 (€ MILLION)	SHARE OF NATIONAL GDP (%)
Greece	224,686	100.0
Epirus Region	4,508	2.0
Thesprotia Regional Unit	631	0.3
Ionian Islands Region	3,898	1.7
Corfu Regional Unit	1,846	0.8

GDP per capita provides additional insight into regional economic performance and living standards. Based on data from ELSTAT, GDP per capita levels within both study-area regions remain below the national average, although the Ionian Islands consistently perform better than Epirus.

GDP per capita in Greece increased from €16,206 in 2015 to €21,301 in 2023. Over the same period, GDP per capita in the Ionian Islands Region increased from €14,878 to €19,502, while the Corfu Regional Unit increased from €14,588 to €18,572. GDP per capita in the Epirus Region remains below the national average, although it has increased steadily over the past decade from €10,950 in 2015 to €13,789 in 2023. The Thesprotia Regional Unit performs somewhat better than the .0regional average, supported partly by the economic contribution of the Port of Igoumenitsa with an increase over the same period from €11,636 to €14,233⁹¹.

Although all territorial units experienced a significant decline during the COVID-19 pandemic in 2020, reflecting the wider economic contraction, GDP per capita recovered significantly thereafter. The recovery was particularly pronounced in the Ionian Islands, reflecting the rebound of international tourism and associated service activities. Nevertheless, GDP per capita in both Corfu and the wider Ionian Islands remains below the national average, that could indicate that the strong tourism economy does not fully translate into productivity levels comparable to other more economically diversified metropolitan regions.

Table 2-62: Contribution of the study area to National GDP (2023)

TERRITORIAL UNIT	2015	2016	2017	2018	2019	2020	2021	2022	2023 (tempo ry)
Greece	16,206	16,189	16,493	16,828	17,272	15,660	17,347	19,568	21,301
Epirus Region	10,950	11,023	11,040	11,316	11,464	10,432	11,415	12,674	13,789
Thesprotia Regional Unit	11,636	11,257	11,421	11,739	11,774	10,404	11,580	12,820	14,233
Ionian Islands Region	14,878	14,811	15,064	15,522	15,997	12,729	14,533	16,928	19,502
Corfu Regional Unit	14,588	14,677	14,964	15,242	15,572	12,583	14,201	16,110	18,572

⁹¹

https://www.statistics.gr/en/statistics?p_p_id=documents_WAR_publicationsportlet_INSTANCE_MrOGiQJSgPHd&p_p_lifecycle=2&p_p_state=normal&p_p_mode=view&p_p_cacheability=cacheLevelPage&p_p_col_id=column-2&p_p_col_count=4&p_p_col_pos=3&_documents_WAR_publicationsportlet_INSTANCE_MrOGiQJSgPHd_javax.faces.resource=document&_documents_WAR_publicationsportlet_INSTANCE_MrOGiQJSgPHd_in=downloadResources&_documents_WAR_publicationsportlet_INSTANCE_MrOGiQJSgPHd_documentID=115366&_documents_WAR_publicationsportlet_INSTANCE_MrOGiQJSgPHd_locale=en

2.7.2.3 Sectoral structure of regional economies

The sectoral composition of gross value added (GVA) in the two study area regions, derived from ELSTAT regional accounts data⁹², reveals fundamentally different economic structures. Tourism and fisheries, which constitute important components of the regional economies and are of particular relevance to the Project area, are examined separately in §2.7.4 and §2.7.5.

Table 2-63: Gross Value Added (GVA) by Main Economic Sector in the Ionian Islands and Epirus Regions (2023)

SECTOR	IONIAN ISLANDS (€M)	% GVA	EPIRUS (€M)	% GVA
Agriculture, forestry & fishing	145	4.3%	152	3.9%
Industry & utilities	178	5.2%	558	14.2%
Construction	93	2.7%	163	4.1%
Trade, transport, accommodation & food	1,611	47.4%	961	24.4%
Public administration, education & health	437	12.8%	985	25.0%
Professional & administrative services	544	16.0%	628	16.0%
Other sectors	394	11.6%	487	12.4%
Total GVA	3,402	100%	3,934	100%

In the Ionian Islands Region, trade, transport, accommodation and food services account for 47.4% of total regional GVA (€1,611 million out of €3,402 million in 2023), reflecting the overwhelming dominance of tourism-related activities. This concentration, combined with the highest regional GVA growth rate nationally (+13.6% in 2023) and the highest per capita GDP growth (+15.2%), confirms that tourism-driven services were the principal engine of economic expansion in the region. Agriculture, forestry and fishing contribute only 4.3% of regional GVA (€145 million), and the secondary sector, including industry, utilities and construction combined, accounts for just 7.9%, underscoring the limited role of productive and extractive activities in the island economy. Within the Region of the Ionian Islands, the Regional Unit of Corfu constitutes the principal economic centre, concentrating approximately half of the region's population. Corfu hosts the majority of tourism infrastructure and dominates regional tourism turnover (67% of the Region)⁹³. The Regional Unit also concentrates commercial activities and transport connections, serving as one of Greece's western gateways through its international airport (over 32,700 flights and over 4.6 million passengers in 2025⁹⁴) and ferry connections.

In Epirus, economic activity is more evenly distributed across sectors. Public administration, education and health (25.0%, €985 million) and trade, transport, accommodation and food services (24.4%, €961 million)

⁹²

https://www.statistics.gr/en/statistics?p_p_id=documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKk04IN&p_p_lifecycle=2&p_p_state=normal&p_p_mode=view&p_p_cacheability=cacheLevelPage&p_p_col_id=column-2&p_p_col_count=4&p_p_col_pos=1&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKk04IN_javax.faces.resource=document&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKk04IN_in=downloadResources&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKk04IN_documentID=582672&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKk04IN_locale=en

⁹³

https://www.statistics.gr/en/statistics?p_p_id=documents_WAR_publicationsportlet_INSTANCE_VBZOni0vs5VJ&p_p_lifecycle=2&p_p_state=normal&p_p_mode=view&p_p_cacheability=cacheLevelPage&p_p_col_id=column-2&p_p_col_count=4&p_p_col_pos=2&_documents_WAR_publicationsportlet_INSTANCE_VBZOni0vs5VJ_javax.faces.resource=document&_documents_WAR_publicationsportlet_INSTANCE_VBZOni0vs5VJ_in=downloadResources&_documents_WAR_publicationsportlet_INSTANCE_VBZOni0vs5VJ_documentID=593560&_documents_WAR_publicationsportlet_INSTANCE_VBZOni0vs5VJ_locale=en

⁹⁴ https://www.cfu-airport.gr/uploads/sys_nodelng/2/2871/CFU%20Traffic%20by%20Country%202025.pdf

are the two largest contributors, followed by professional and administrative services (16.0%), industry and utilities (14.2%), and construction (4.1%). Agriculture, forestry and fishing account for 3.9% of regional GVA (€152 million), despite the nationally significant scale of the region's livestock sector⁹⁵, whose output is largely absorbed by agri-food processing chains captured within the industry and utilities category. The Region benefits from its strategic position on the western gateway of Greece. In particular, the Municipality of Igoumenitsa functions as a major transport and logistics hub through the Port of Igoumenitsa, one of Greece's principal passenger and freight gateways to Italy and Western Europe, supported by the Egnatia Motorway corridor. Currently, about 3 million passengers, 750.000 private cars and 350.000 trucks travel through our port each year⁹⁶. As a result, transport, logistics, trade and related business services play a more important role in the regional economy than in many other peripheral Greek regions.

Overall, the Ionian Islands display a high degree of tourism dependence and associated economic vulnerability, with Corfu representing the region's principal economic and tourism centre. In contrast, Epirus exhibits greater sectoral diversification and a more resilient economic base, supported by public services, industry and logistics, with Igoumenitsa serving as a key transport gateway between Greece and Western Europe. These differing economic structures are relevant to the assessment of potential Project-related effects on regional economic activity.

2.7.3 Employment and labour market

2.7.3.1 National labour market context

Between 2007 and 2018, Greece's labour market was severely affected by the fiscal crisis, with an estimated 725,000 jobs lost. Ten of the thirteen Greek regions employed between 9% and 20% fewer people in 2018 than in 2007⁹⁷. Since then, labour market conditions have improved substantially. National unemployment, which peaked at 27.5% in 2013 has declined progressively thereafter, reaching 8.9% in 2025⁹⁸, and the quarterly of 10.6% in Q1 2026⁹⁹. Despite this improvement, Greece's unemployment rate remains higher than the EU unemployment rate that stood at 6.0% in 2025, and among the highest in the EU, as among EU countries, in 2025, Spain had the highest unemployment rate at 10.5%, followed by Finland (9.7%) and Greece (8.9%)¹⁰⁰.

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https://www.statistics.gr/en/statistics?p_p_id=documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN&p_p_lifecycle=2&p_p_state=normal&p_p_mode=view&p_p_cacheability=cacheLevelPage&p_p_col_id=column-2&p_p_col_count=4&p_p_col_pos=1&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN_javax.faces.resource=document&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN_in=downloadResources&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN_documentID=582672&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN_locale=en

⁹⁶ <https://www.medcruise.com/port/igoumenitsa>

⁹⁷ OECD, Regional Policy for Greece Post-2020, 2020: doi.org/10.1787/cedf09a5-en

⁹⁸ <https://ec.europa.eu/eurostat/databrowser/view/tps00203/default/table>

⁹⁹

https://www.statistics.gr/en/statistics?p_p_id=documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN&p_p_lifecycle=2&p_p_state=normal&p_p_mode=view&p_p_cacheability=cacheLevelPage&p_p_col_id=column-2&p_p_col_count=4&p_p_col_pos=1&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN_javax.faces.resource=document&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN_in=downloadResources&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN_documentID=593955&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN_locale=en

¹⁰⁰ <https://ec.europa.eu/eurostat/web/products-eurostat-news/w/ddn-20260610-3>

The national employment rate for population aged 20 to 64 stood at 71% in 2025, 5.1 percentage points below the EU average, with the third largest gender employment gap in the EU (17.4 percentage points), with 62.3% of women employed compared to 79.7% for men¹⁰¹.

The largest share of employment is concentrated in wholesale and retail trade, transport, accommodation and food service activities (1.92 million persons), followed by public administration, education, health and social work activities (1.08 million persons), and professional, scientific, technical, administrative and support service activities (0.54 million persons). Figure 2-187 presents the employment by main industry (NACE Rev.2) according to the latest available Eurostat data (2025)¹⁰².

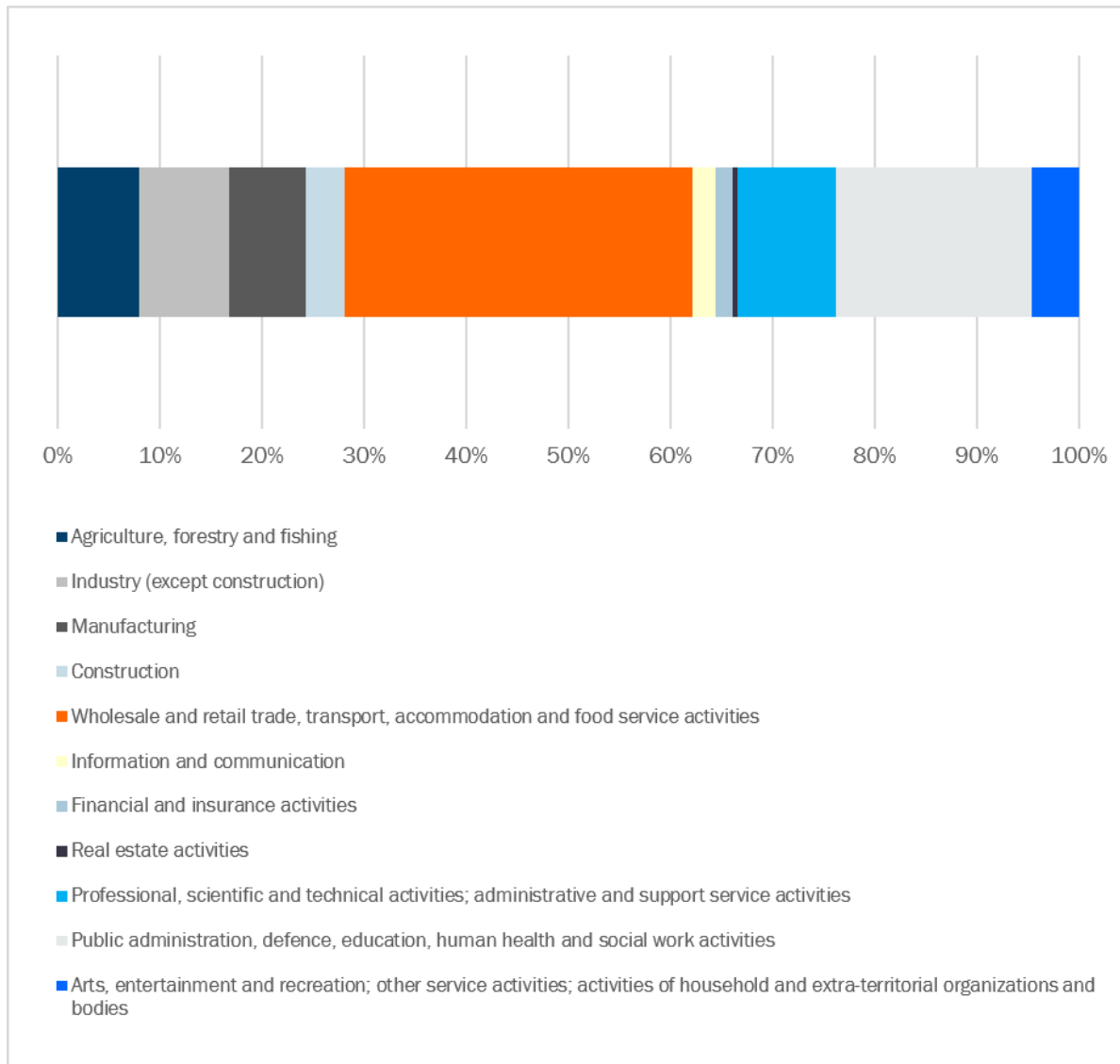


Figure 2-187: 2025 Sectoral employment distribution in Greece (Source: NACE Rev.2)

¹⁰¹ https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Employment_-_annual_statistics

¹⁰² https://ec.europa.eu/eurostat/databrowser/view/nama_10_a10_e__custom_21916330/default/table

According to EURES¹⁰³, labour market conditions in Greece have improved considerably in recent years, supported by economic growth, tourism, investment and digitalisation. Nevertheless, structural challenges remain, including skills mismatches, regional disparities, persistent long-term affecting approximately 49% of unemployed persons as of Q1 2026¹⁰⁴ and relatively low labour force participation among women.

2.7.3.2 Local labour market context

The employment rate in the Ionian Islands Region for the 20-64 age group stood at 68.7% in 2025, below both the national average of 71.0% and the EU27 average of 76.1%. Throughout the period 2016–2025, the regional employment rate remained consistently below the national average by approximately 1.5–3.5 percentage points. The largest decline occurred during the COVID-19 pandemic, when the employment rate fell from 64.7% in 2019 to 60.1% in 2020. Since 2021, the regional labour market has recovered steadily, with the employment rate reaching 68.7% in 2025, exceeding the pre-pandemic level¹⁰⁵.

A pronounced gender gap characterises the regional labour market. In 2025, the male employment rate in the Ionian Islands stood at 78.6%, broadly in line with the national male employment rate of 79.7% and the EU27 male employment average of 80.9%. The female employment rate, at 59.1%, was significantly below the national female employment average of 62.3% and the EU27 female employment average of 71.2%¹⁰⁶.

The Ionian Islands Region recorded an unemployment rate of 9.0% in 2025, broadly in line with the national average of 8.9% but above the EU27 average of 6.0%. The regional unemployment rate declined substantially from 21.4% in 2014 to 12.4% in 2019, indicating a faster improvement than observed nationally over the same period. Following an increase during the COVID-19 pandemic (16.0% in 2020), unemployment fell to 12.9% in 2022 before rising again to 16.2% in 2024. By 2025, the rate had declined sharply to 9.0%, representing the lowest level recorded during the observation period. Overall, unemployment in the Ionian Islands has generally remained below the national average, although the region has experienced greater year-to-year volatility than Greece as a whole¹⁰⁷.

In terms of sectoral employment distribution, Eurostat data indicate a strong concentration of employment in trade, transport, accommodation and food service activities (NACE G-I). In 2022, the most recent year for which complete sectoral employment data are available at NUTS 2 level, NACE G-I accounted for 35,700 of 74,700 employed persons in the Ionian Islands Region, equivalent to approximately 47.8% of total regional employment. This reflects the importance of tourism and related service activities in the regional economy and is consistent with the sectoral GVA composition presented in §2.7.2.3. Public administration, education and health (NACE O-Q) accounted for 10,300 persons (13.8%), agriculture, forestry and fishing (NACE A) for

¹⁰³ https://eures.europa.eu/living-and-working/labour-market-information/labour-market-information-greece_en#national-level---greece

¹⁰⁴

https://www.statistics.gr/en/statistics?p_p_id=documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN&p_p_lifecycle=2&p_p_state=normal&p_p_mode=view&p_p_cacheability=cacheLevelPage&p_p_col_id=column-2&p_p_col_count=4&p_p_col_pos=1&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN_javax.faces.resource=document&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN_in=downloadResources&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN_documentID=593955&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN_locale=en

¹⁰⁵ https://ec.europa.eu/eurostat/databrowser/view/LFST_R_LFE2EMPRT__custom_21914240/default/table

¹⁰⁶ https://ec.europa.eu/eurostat/databrowser/view/LFST_R_LFE2EMPRT__custom_21914240/default/table

¹⁰⁷ <https://ec.europa.eu/eurostat/databrowser/view/tgs00010/default/table?lang=en>

7,200 persons (9.6%), construction (NACE F) for 6,800 persons (9.1%), and industry and utilities (NACE B-E) for 3,700 persons (5.0%), indicating a relatively limited industrial employment base¹⁰⁸.

For the Corfu Regional Unit, in 2021, the most recent year available at NUTS 3 level, trade, transport, accommodation and food service activities (NACE G-I) accounted for 28,690 of 49,540 employed persons, equivalent to 57.9% of total employment. This share exceeds the corresponding figure for the Ionian Islands Region as a whole (47.8%), indicating a particularly high concentration of employment in these activities within the Corfu Regional Unit. Public administration, education and health (NACE O-Q) accounted for 6,960 persons (14.0%), financial and professional services (NACE K-N) for 3,680 persons (7.4%), agriculture, forestry and fishing (NACE A) for 3,530 persons (7.1%), construction (NACE F) for 2,110 persons (4.3%), and industry and utilities (NACE B-E) for 1,880 persons (3.8%).

Sectoral employment data for the period 2000–2021 indicate a substantial shift in the composition of employment within the Corfu Regional Unit. Total employment decreased slightly from 52,450 to 49,540 persons (-5.5%) over the period. However, employment in trade, transport, accommodation and food service activities (NACE G-I) increased from 20,140 to 28,690 persons (+42.5%), while employment in agriculture, forestry and fishing (NACE A) declined from 13,270 to 3,530 persons (-73.4%). As a result, the share of agricultural employment fell from 25.3% of total employment in 2000 to 7.1% in 2021, indicating a reduced role of the primary sector in the local economy. By 2021, NACE G-I activities accounted for 57.9% of total employment in the Corfu Regional Unit, compared with 47.8% for the Ionian Islands Region as a whole. This concentration of employment in trade, transport, accommodation and food service activities highlights the importance of tourism-related services within the local economy and the potential sensitivity of employment and economic activity to seasonal variations in demand.¹⁰⁹

According to the European Commission's labour market information published by EURES (EUROpean Employment Services), the labour market of the Ionian Islands is strongly influenced by the region's tourism-oriented economic structure and insular geography; tourism generates substantial seasonal demand for labour in accommodation, food services, transport and related activities, resulting in a large proportion of temporary and seasonal employment opportunities. Despite strong demand for tourism-related occupations, employers have reported shortages in several skilled and technical professions. In 2023, approximately 23.6% of the economically active population of the Region possessed tertiary education qualifications, while 51.2% had completed secondary education and 25.0% primary education. The Ionian Islands region's GDP per capita, adjusted for purchasing power standards (PPS), amounted to 47.2% of the EU27 average in 2023, remaining below the national average of 55.1% (Eurostat), indicating comparatively lower levels of economic productivity and income generation¹¹⁰.

The Epirus Region recorded an employment rate of 69.0% in 2025 for the 20-64 age group, marginally below the national average of 71.0% but representing a substantial improvement from 54.5% in 2016 and a convergence with the national trajectory¹¹¹.

A gender employment gap remains evident in the regional labour market. In 2025, the male employment rate stood at 74.9%, compared with 79.7% nationally and 78.6% in the Ionian Islands. The female

¹⁰⁸ https://ec.europa.eu/eurostat/databrowser/view/LFST_R_LFE2EN2__custom_7625645/default/table?lang=en

¹⁰⁹ https://ec.europa.eu/eurostat/databrowser/view/nama_10r_3empers__custom_21922259/default/table

¹¹⁰ https://eures.europa.eu/living-and-working/labour-market-information/labour-market-information-greece_en#ionian-islands-%CE%B9%CF%8C%CE%BD%CE%B9%CE%B1-%CE%BD%CE%B7%CF%83%CE%B9%CE%AC

¹¹¹ https://ec.europa.eu/eurostat/databrowser/view/LFST_R_LFE2EMPRT__custom_21914240/default/table

employment rate reached 62.8%, slightly above the national female average of 62.3% and representing a substantial increase from 43.9% in 2021. While a gender gap remains, the difference between male and female employment rates in Epirus (12.1 percentage points) is considerably smaller than that observed in the Ionian Islands (19.5 percentage points)¹¹².

The Epirus Region recorded an unemployment rate of 9.9% in 2025, exceeding both the national average (8.9%) and the EU27 average (6.0%). Unemployment declined markedly from 26.8% in 2014 to 16.4% in 2019, before increasing to 17.9% in 2020 during the COVID-19 pandemic. Since then, the regional labour market has improved steadily, with unemployment falling to 13.3% in 2022 and below 10% by 2025. Despite this improvement, unemployment in Epirus has remained consistently above the national average throughout most of the period, indicating that labour market conditions remain comparatively weaker than in Greece as a whole¹¹³.

The sectoral employment structure of Epirus is more diversified than that of the Ionian Islands. In 2022, trade, transport, accommodation and food services (NACE G-I) accounted for 33,700 of 117,800 employed persons (28.6%), followed by public administration, education and health (NACE O-Q) at 31,800 persons (27.0%), agriculture, forestry and fishing (NACE A) at 20,300 persons (17.2%), and industry and utilities (NACE B-E) at 15,200 persons (12.9%). Compared with the Ionian Islands, employment is distributed more evenly across sectors, indicating a less specialised economic structure. The relatively high share of agricultural employment (17.2% of total employment compared with 3.9% of regional GVA – See §2.7.2.3) suggests lower labour productivity in agriculture than in other sectors of the regional economy¹¹⁴.

At the level of the Thesprotia Regional Unit, in 2021, the most recent year available, total employment stood at 18,080 persons, compared with 17,250 persons in 2020. Trade, transport, accommodation and food service activities (NACE G-I) accounted for 7,820 employed persons, equivalent to 43.2% of total employment, making it the largest employment sector in the regional unit. Agriculture, forestry and fishing (NACE A) accounted for 3,690 persons (20.4%), while public administration, education and health (NACE O-Q) employed 3,540 persons (19.6%). Industry and utilities (NACE B-E) together with construction (NACE F) accounted for 1,570 persons (8.7%), indicating a relatively small industrial employment base.

The sectoral composition of employment in the Thesprotia Regional Unit changed significantly between 2000 and 2021. Total employment declined from 19,640 to 18,080 persons (-7.9%) over the period. Agricultural employment (NACE A) decreased from 6,440 to 3,690 persons (-42.7%), while employment in trade, transport, accommodation and food service activities (NACE G-I) increased from 4,990 to 7,820 persons (+56.7%). As a result, the share of employment in agriculture declined, while the share of employment in service-related activities increased substantially¹¹⁵. This trend is consistent with the broader shift in the regional economy towards service-sector activities observed elsewhere in the Epirus Region.

According to the labour market information published by EURES, seasonal employment remains important, particularly in agriculture and tourism, although the region is less dependent on tourism than the Ionian Islands. In 2023, 37.4% of the economically active population held tertiary education qualifications, compared with 23.6% in the Ionian Islands, while 45.5% had completed secondary education and 17.2%

¹¹² https://ec.europa.eu/eurostat/databrowser/view/LFST_R_LFE2EMPRT__custom_21914240/default/table

¹¹³ <https://ec.europa.eu/eurostat/databrowser/view/tgs00010/default/table?lang=en>

¹¹⁴ https://ec.europa.eu/eurostat/databrowser/view/LFST_R_LFE2EN2__custom_7625645/default/table?lang=en

¹¹⁵ https://ec.europa.eu/eurostat/databrowser/view/nama_10r_3empers__custom_21922259/default/table

primary education. GDP per capita adjusted for purchasing power standards (PPS) reached only 38.1% of the EU27 average in 2023, substantially below both the national average and the level recorded in the Ionian Islands (Eurostat), reflecting the comparatively weaker economic base of the region¹¹⁶.

To facilitate comparison of labour market conditions across the study area, the figures below present selected labour market indicators for the study area against national and/or EU benchmarks. The figures illustrate employment and unemployment performance, as well as the sectoral distribution of employment, highlighting differences in labour market structure, economic specialisation and workforce composition. The data are derived from Eurostat, using the most recent year for which comparable regional data are available. Regarding sectoral employment structure, where values are unavailable, data have been suppressed by Eurostat because of insufficient statistical reliability.

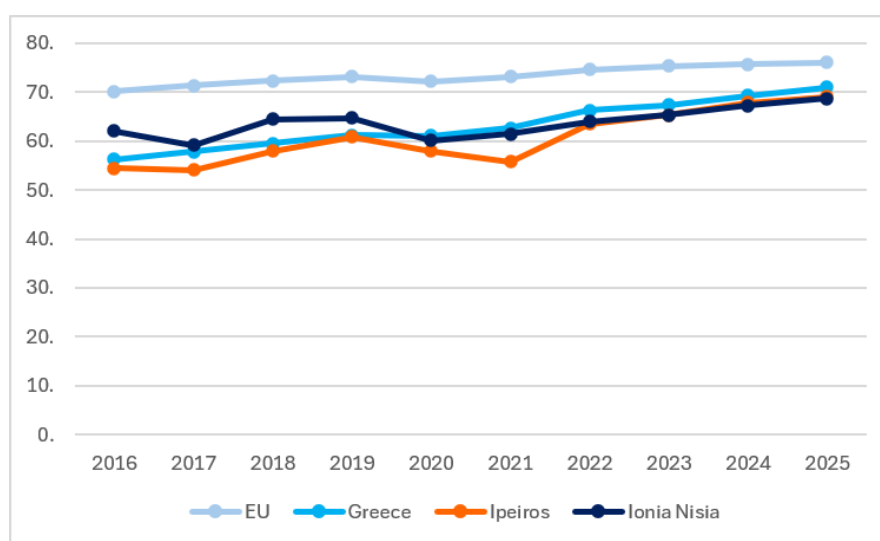
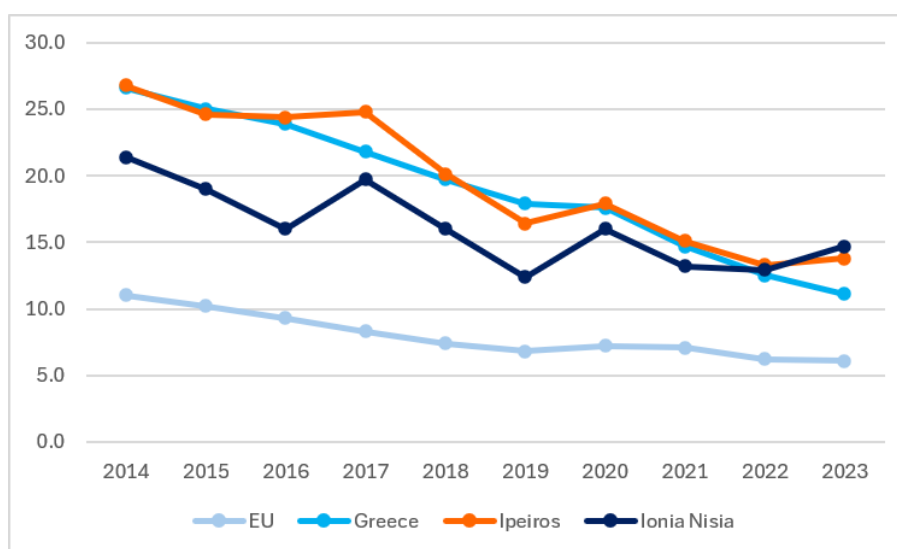


Figure 2-188: Employment rate (20–64 years) in the study area regions compared with Greece and the EU average, 2016-2025 (%)



¹¹⁶ https://eures.europa.eu/living-and-working/labour-market-information/labour-market-information-greece_en#epirus-%CE%AE%CF%80%CE%B5%CE%B9%CF%81%CE%BF%CF%82

Figure 2-189: Unemployment rate in the study area regions compared with Greece and the EU average, 2014-2023 (%)

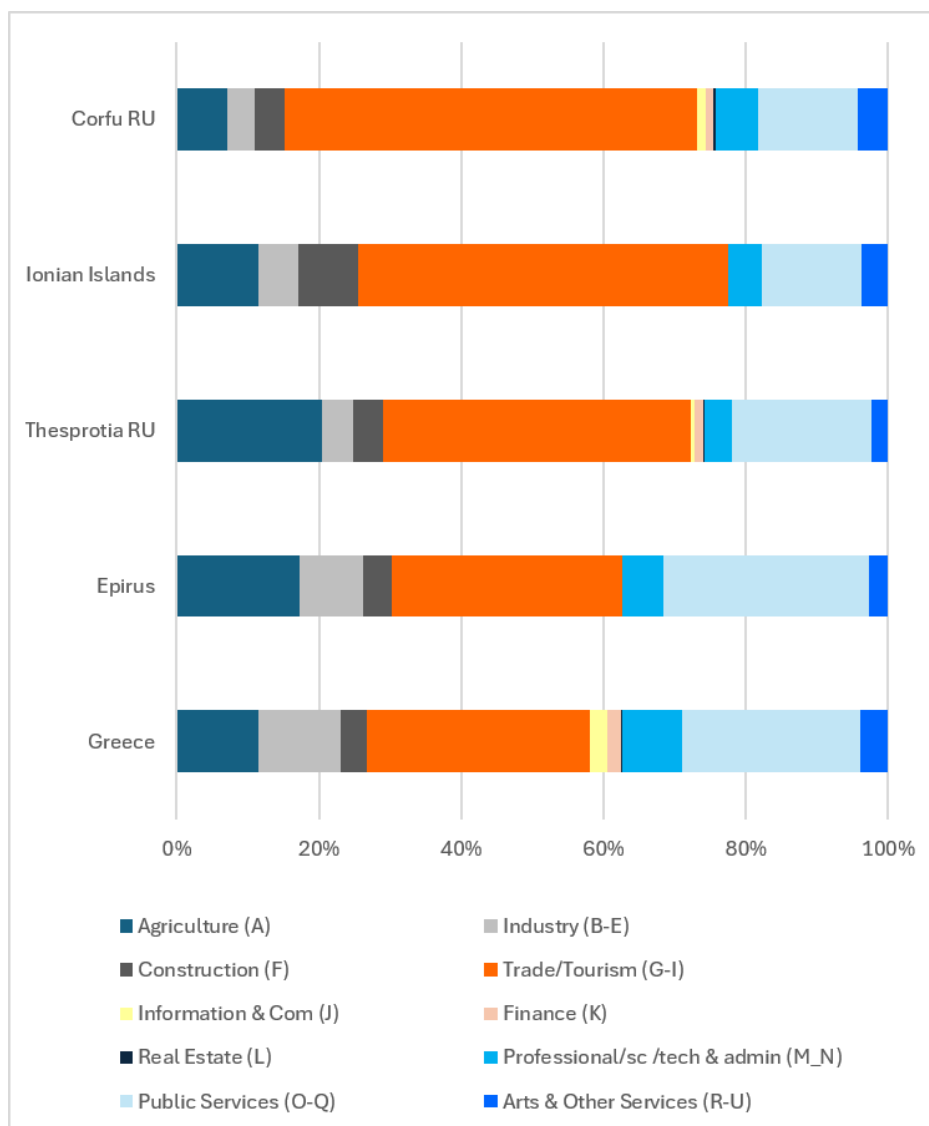


Figure 2-190: Sectoral distribution of employment by NACE Rev. 2 sector in the study area regions and Greece, 2021

2.7.4 Fisheries and aquaculture

This section describes the socio-economic dimensions of fisheries and aquaculture activity relevant to the Project study area, covering fleet composition, fishing effort, catch volumes and species, economic value, and dependency on fishing livelihoods. The spatial dimension of fisheries and aquaculture is addressed in §2.6.2.3 of the maritime uses baseline and is cross-referenced here where relevant. This section focuses on the economic and livelihood dimensions of fisheries.

For fisheries management and stock assessment purposes, the wider project area is considered within the context of the adjacent GFCM GSA 20 (Eastern Ionian Sea) and 19 (Western Ionian Sea), which together represent the principal fisheries management units for the northern Ionian basin. Commercial fisheries

operating within these GSAs are undertaken by both Greek and Italian fleets, reflecting the transboundary nature of fisheries in the region. The transboundary fisheries context is discussed further in §2.7.4.3.

2.7.4.1 Greek fishing sector context

2.7.4.1.1 Fleet composition

According to the Annual Fishing Fleet Report for the 2024 reference year, prepared by the MoRDF pursuant to Article 22 of Regulation (EU) No 1380/2013, on 31 December 2024 the Greek fishing fleet comprised 11,478 fishing vessels with a total tonnage of 60,216.9 GT and engine power of 345,199.18 kW. The fleet is categorised into three groups by gear type: vessels equipped with static gear only (mainly nets, longlines and traps), which account for 11,025 vessels or 96.03% of the total fleet; vessels equipped with bottom otter trawls (OTB); and vessels equipped with purse seines (PS). The vast majority of static gear vessels (95.01%) are classified as small coastal fishing vessels with an overall length of less than 12 metres¹¹⁷.

The dominance of small-scale coastal fishing vessels is a defining structural feature of the Greek fleet. As confirmed by the FAO State of Mediterranean and Black Sea Fisheries 2025, small-scale vessels account for over 90% of the operating fishing fleet in Greece, one of the highest proportions among Mediterranean EU member states¹¹⁸. These vessels generally operate in the coastal areas of mainland Greece and of the islands, contributing to the social and economic cohesion of coastal communities.

Fleet capacity has declined substantially over recent decades. Between 2014 and 2024, the fleet decreased by approximately 26.86% in vessel numbers and 24.53% in gross tonnage. The Common Fisheries Policy, through the measure of permanent cessation of fishing activities, supported financially by the Operational Fisheries Programmes and the ageing of the fishers' population, have played an important role in this decline. However, the Greek fleet remains the most populous at the EU level and is ranked second after Tunisia in the Mediterranean region in terms of the number of active vessels¹¹⁹.

2.7.4.1.2 Catch volumes and value

According to the ELSTAT Sea Fishery Survey 2024, total catches by open sea and inshore fishery vessels amounted to 54,708.3 tonnes in 2024, a decrease of 11.3% compared to 61,679.0 tonnes in 2023. The total value of catches remained virtually unchanged at €249,058.7 thousand (+0.1%), indicating higher average prices per unit weight despite lower volumes¹²⁰.

¹¹⁷ https://oceans-and-fisheries.ec.europa.eu/document/download/9a492567-6128-4987-8559-fa12c034ce3f_en?filename=2024-fleet-capacity-report-greece_en.pdf

¹¹⁸ FAO, State of Mediterranean and Black Sea Fisheries 2025, Rome, 2025

¹¹⁹

https://www.agreri.gr/sites/default/files/projects/The%20fishing%20Sector%20in%20Greece_Social%20and%20Economic%20Dimension_AGRERI_ELGO%20DIMITRA.pdf

¹²⁰

https://www.statistics.gr/en/statistics?p_p_id=documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN&p_p_lifecycle=2&p_p_state=normal&p_p_mode=view&p_p_cacheability=cacheLevelPage&p_p_col_id=column-2&p_p_col_count=4&p_p_col_pos=1&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN_javax.faces.resource=document&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN_in=downloadResources&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN_documentID=571657&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN_locale=en

The catch is divided between two categories.

- Open sea fishery (OTB and PS) accounted for 35,676.9 tonnes (65.2% of total volume) with a value of €107,244.0 thousand, recording a decline of 12.9% in volume and 5.1% in value compared to 2023.
- Inshore fishery accounted for 19,031.3 tonnes (34.8% of total volume) with a value of €141,814.7 thousand, a decline of 8.1% in volume but an increase of 4.4% in value.

The higher per-tonne value of inshore catches (€7,452/tonne) compared to open sea catches (€3,005/tonne) reflects the premium species composition of small-scale inshore fishing, which targets higher-value demersal and coastal species rather than the bulk pelagic species (European anchovy and European pilchard) that dominate open sea landings. Table 2-64 presents the quantity and value of catches by fishery category in 2023 and 2024 according to the latest available data from ELSTAT.

Table 2-64: Quantity and value of catches by category, Greece (2023-2024)

CATEGORY	QUANTITY 2023 (T)	QUANTITY 2024 (T)	CHANGE (%)	VALUE 2023 (€000)	VALUE 2024 (€000)	CHANGE (%)
Open sea fishery	40,967.8	35,676.9	-12.9%	113,023.7	107,244.0	-5.1%
Inshore fishery	20,711.2	19,031.3	-8.1%	135,820.3	141,814.7	+4.4%
Total	61,679.0	54,708.3	-11.3%	248,844.0	249,058.7	+0.1%

2.7.4.1.3 Species composition

According to the ELSTAT Sea Fishery Survey, in 2024, fish accounted for 83.0% of total catch volume (45,404.7 tonnes), cephalopods for 8.5% (4,652.4 tonnes), crustaceans for 8.0% (4,351.9 tonnes), and shellfish for 0.5% (299.4 tonnes).

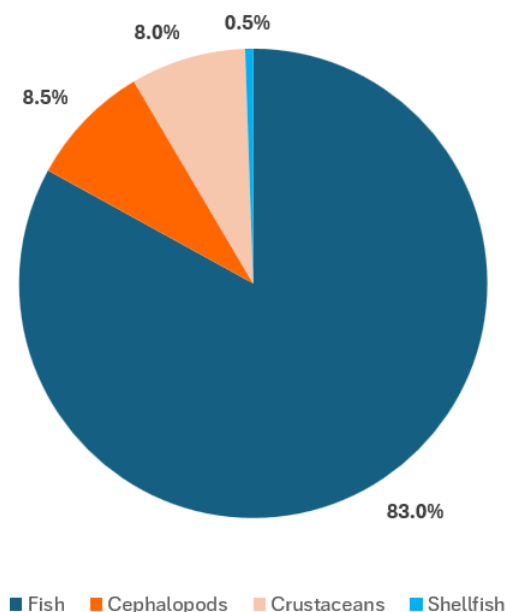


Figure 2-191: Composition of the Greek Catch volume by major category (2024)

The two most caught species were European anchovy (11,921.2 tonnes, 21.8% of total) and European pilchard/sardine (5,569.1 tonnes, 10.2%), which together accounted for 32.0% of total national catch volume and are targeted primarily by PS vessels operating in the Aegean and Ionian seas. Among higher-value demersal species, expected to be more relevant to the inshore fleet operating around Corfu and the Ionian Islands, the most significant by volume were European hake (2,825.6 tonnes), shrimps and prawns (2,662.8 tonnes), round sardinella (2,670.5 tonnes), bogue (2,013.6 tonnes), common octopus (2,044.8 tonnes), and red mullet (1,474.2 tonnes)¹²¹.

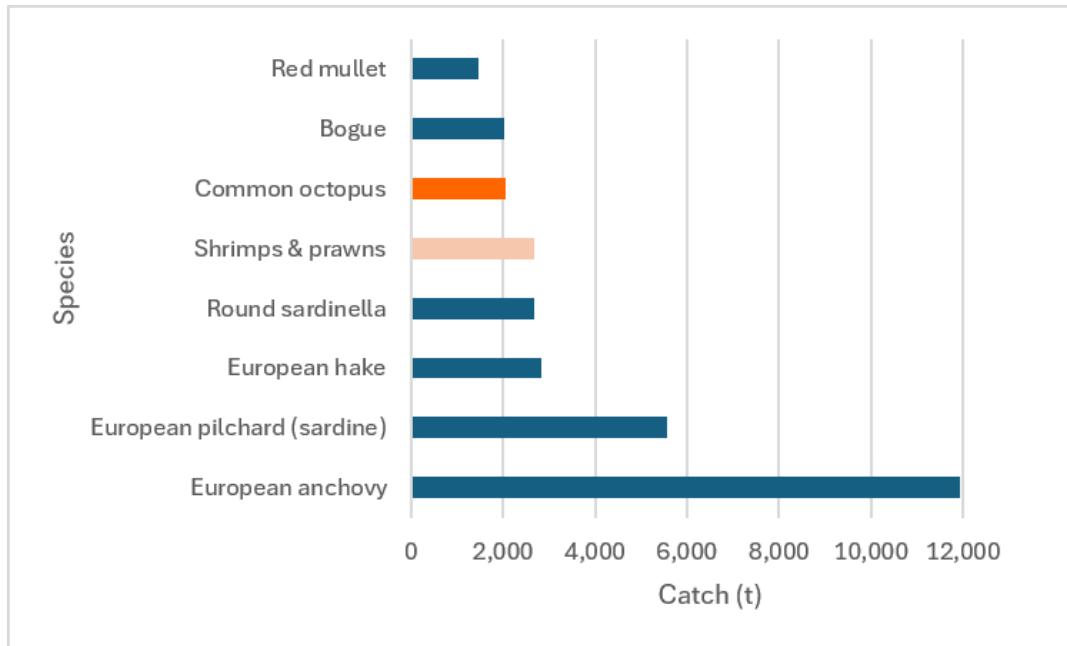


Figure 2-192: Principal species caught by the Greek fishing fleet (2024)

2.7.4.1.4 Fishing effort and geographic distribution

According to the STECF 2025 Annual Economic Report on the EU Fishing Fleet (Scientific, Technical and Economic Committee for Fisheries, STECF 25-03 and 25-07, European Commission Joint Research Centre, 2025), the Greek fleet accumulated 1.53 million days at sea in 2023, a 10% increase compared to 2022. Fishing effort was predominantly concentrated in the Aegean Sea (GSA 22, approximately 69% of total effort), with 28% allocated to the Ionian Sea (GSA 20) and 3% to Crete (GSA 23). Of the total effort, 93.2% was attributed to the small-scale coastal fleet and 6.5% to the large-scale fleet, consistent with the fleet's structural dominance of small vessels ¹²².

Within the Ionian Sea specifically (GSA 20), fishing effort and catch composition are directly relevant to the Project study area. According to ELSTAT's catch-by-fishing-area data, the fishing area designated "Coasts of Epirus and Kerkyra Island", which is the area most directly associated with the nearshore waters of both

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https://www.statistics.gr/en/statistics?p_p_id=documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN&p_p_lifecycle=2&p_p_state=normal&p_p_mode=view&p_p_cacheability=cacheLevelPage&p_p_col_id=column-2&p_p_col_count=4&p_p_col_pos=1&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN_javax.faces.resource=document&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN_in=downloadResources&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN_documentID=571657&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN_locale=en

¹²² <https://publications.jrc.ec.europa.eu/repository/handle/JRC144396>

study area coastal communities, recorded total catches of 807.1 tonnes in 2024, representing 1.5% of national total catches. The adjacent area “Amvrakikos Gulf and coasts of Lefkada island” recorded 453.0 tonnes (0.8%), and the “Coasts of Kefalonia, Zakynthos and Gulf of Patra” area recorded 3,802.0 tonnes (6.9%). The combined western Ionian coast contribution (these three areas together) amounted to approximately 5,062 tonnes, or 9.2% of the national total.

The time series of catches in the “Coasts of Epirus and Kerkyra Island” fishing area between 2015-2024, available from ELSTAT annual statistics on quantity of catch by fishing area¹²³, reveals a notable trend of overall decline. Catches in this area reached a high of 967.9 tonnes in 2019 before declining sharply during the COVID-19 period (876.9 tonnes in 2020), recovering partially to 1,276.4 tonnes in 2022, the highest recorded value in the series, before falling again to 1,004.0 tonnes in 2023 and 807.1 tonnes in 2024. The 2024 figure represents a decline of 16.6% compared to 2023 and of 20.2% compared to the 2019 peak, broadly consistent with the national trend of declining total catch volumes. Figure 2-193 illustrates the evolution of catches for the Coasts of Epirus and Corfu as well as overall in Greece between 2015 and 2024.

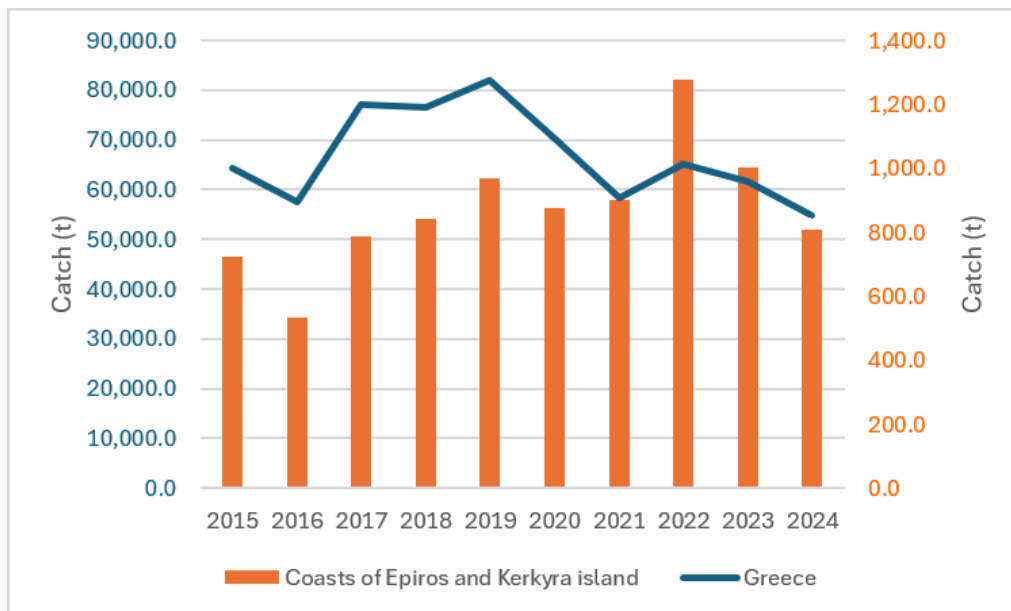


Figure 2-193: Catches for Greece and the Coasts of Epirus and Corfu (2015-2024)

Monthly catch data published by ELSTAT for 2024¹²⁴ confirm a pronounced seasonal pattern in national inshore catches with direct relevance to the Project's drilling schedule. Total monthly catch volumes (fresh catches, all species) ranged from a low of 3,194.2 tonnes in December to a high of 5,320.5 tonnes in April, with elevated volumes sustained across the April–October period (4,100–5,320 tonnes per month) compared to the November–February off-season (3,194–3,879 tonnes per month). This bimodal pattern, with peaks in spring (April–May) and a secondary peak in October, reflects seasonal fishing effort and the

¹²³ <https://www.statistics.gr/en/statistics/-/publication/SPA03/->

¹²⁴

https://www.statistics.gr/en/statistics?p_p_id=documents_WAR_publicationsportlet_INSTANCE_VBZOni0vs5VJ&p_p_lifecycle=2&p_p_state=normal&p_p_mode=view&p_p_cacheability=cacheLevelPage&p_p_col_id=column-2&p_p_col_count=4&p_p_col_pos=2&_documents_WAR_publicationsportlet_INSTANCE_VBZOni0vs5VJ_javax.faces.resource=document&_documents_WAR_publicationsportlet_INSTANCE_VBZOni0vs5VJ_in=downloadResources&_documents_WAR_publicationsportlet_INSTANCE_VBZOni0vs5VJ_documentID=571654&_documents_WAR_publicationsportlet_INSTANCE_VBZOni0vs5VJ_locale=en

regulatory closure periods. European anchovy, the dominant species by volume nationally, peaks strongly in the April–September period (1,364–1,961 tonnes per month) and high-value demersal species including red mullet, European hake, and common pandora show a different seasonal pattern, with higher catches in spring and autumn. The seasonal concentration of fishing effort in the April–October indicates higher economic dependency on fishing income during this period.

Table 2-65: Monthly catch totals by category, Greece, 2024 (fresh catches, tonnes)

MONTH	FISH (T)	CEPHALOPODS (T)	CRUSTACEANS (T)	SHELLFISH (T)	TOTAL (T)
January	2,486.6	467.7	413.2	22.8	3,390.4
February	2,857.0	555.1	423.3	44.0	3,879.4
March	3,740.7	628.2	481.1	46.7	4,896.7
April	4,308.9	559.0	425.2	27.4	5,320.5
May	4,356.0	364.6	299.8	15.2	5,035.5
June	4,871.3	224.6	164.0	13.9	5,273.7
July	4,813.6	187.2	247.1	65.0	5,312.9
August	4,179.6	200.3	265.9	35.8	4,681.5
September	3,731.1	171.4	194.8	2.9	4,100.2
October	4,262.7	413.2	584.6	4.6	5,265.2
November	3,450.2	469.6	427.7	10.6	4,358.1
December	2,347.2	411.5	425.2	10.4	3,194.2

2.7.4.1.5 Employment

At national level, average annual employment in sea fishery amounted to 15,590 persons in 2024, a decrease of 7.4% from 16,843 in 2023¹²⁵. Similar recent data at regional level is not available from either the EC or Hellenic statistical services.

The sectoral composition of employment in the Corfu Regional Unit changed substantially between 2000 and 2021. Total employment declined from 52,450 to 49,540 persons (-5.5%) over the period. The most significant structural shift was the collapse of agricultural employment (NACE A), which fell from 13,270 to 3,530 persons (-73.4%), reducing agriculture's share of total employment from 25.3% to 7.1%. Over the same period, employment in trade, transport, accommodation and food service activities (NACE G-I) expanded from 20,140 to 28,690 persons (+42.5%), increasing its share from 38.4% to 57.9% of total employment¹²⁶. This structural transformation suggests the progressive displacement of agriculture and fishing as primary livelihoods by tourism and related service activities, consistent the declining primary sector GVA share described in §2.7.2.2. The agriculture, forestry and fishing category, which in 2021 accounted for

¹²⁵

https://www.statistics.gr/en/statistics?p_p_id=documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN&p_p_lifecycle=2&p_p_state=normal&p_p_mode=view&p_p_cacheability=cacheLevelPage&p_p_col_id=column-2&p_p_col_count=4&p_p_col_pos=1&documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN_javax.faces.resource=document&documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN_in=downloadResources&documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN_documentID=571657&documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN_locale=en

¹²⁶ https://ec.europa.eu/eurostat/databrowser/view/nama_10r_3empers__custom_21922259/default/table

3,530 persons (7.1%) in Corfu and 3,690 persons (20.4%) in Thesprotia, includes both agricultural and fishing livelihoods, and cannot be disaggregated further from the available Eurostat data. The economic significance of fisheries within this category, and its role in coastal community livelihoods across both study areas, is further examined in detail in §2.7.4.2.

2.7.4.1.6 Stock sustainability

Stock sustainability assessments for the Ionian Sea (GSA 20) are published annually in the ELSTAT Greek Annual Fishing Fleet Report. For 2024, the weighted sustainable harvest indicator (SHI) values for the Ionian Sea fleet segments show improvement compared to 2023 across most gear and vessel size categories, though several demersal species, notably European hake (HKE, F/Fmsy values of 2.17 for trawlers in GSA 20) and deep-water shrimp (DPS, F/Fmsy of 1.13), remain subject to fishing pressure above maximum sustainable yield levels. Small pelagic species (anchovy and pilchard) in GSA 20 show F/Fmsy values well below 1.0 for purse seines (0.041 for anchovy, 0.55 for pilchard), indicating that these stocks are not currently overexploited in the western Ionian.

2.7.4.2 Fishing economy and communities

The economic and livelihood significance of fisheries in the two onshore study areas differs substantially from their contribution to aggregate regional GDP, which as noted in §2.7.2.2, is modest in both regions (agriculture, forestry and fishing account for 4.3% of GVA in the Ionian Islands and 3.9% in Epirus).

In the Corfu Regional Unit, commercial fishing constitutes a limited activity for coastal communities rather than a primary economic driver at the aggregate level. The structural dominance of tourism-related employment (57.9% of total Corfu Regional Unit employment in 2021, as shown in §2.7.3) suggests that fishing represents an income source for a relatively small number of households. However, for those households that are directly dependent on fishing livelihoods, the economic significance of the activity is considerably greater than its share of regional GVA implies, and the combination of fishing and tourism-related incomes is a characteristic feature of small-island coastal economies. This dual dependency is relevant to the impact assessment because disruptions to either sector, or the perception of risk to either, can have disproportionate effects on individual household welfare relative to aggregate economic indicators.

In the Thesprotia Regional Unit, fishing similarly represents a limited economic activity relative to the dominant sectors. Agriculture (20.4% of Thesprotia employment) and trade/transport/services (43.2%) are the two largest employment sectors at NUTS 3 level; fisheries employment is included within the agriculture, forestry and fishing category but represents a small fraction of it considering the catch-by-fishing-area data.

The most recent available data on fleet registration and fishing employment at the level of the Corfu Regional Unit are drawn from the Hydrocarbon Exploration Program Block 2 Environmental and Social Baseline Study (RINA, May 2018), which compiled information provided directly by the Fishing Department of the Corfu Regional Unit (letter of 24 July 2017) and the Corfu Coast Guard Authority (letter of 25 July 2017). According to these sources, there were 520 registered fishing vessels in Corfu at the time of data collection, of which 11 were middle-sized vessels and the remainder were small-sized coastal craft. In the absence of a professional registry, fishing employment was estimated by the Fishing Department at approximately three times the number of registered boats, yielding an indicative estimate of approximately 1,560 persons

working in the fishing sector (boat owners and fishing workers combined). This estimate should be treated with caution as it is acknowledged to be approximate and is now almost a decade old; no more recent official local fleet census has been identified.

Notably, there is no official fish landing market (ιχθυόσκαλα) in Corfu or Igoumenitsa, which means that no official records of daily average fishing production or revenue at local level are compiled. Catches landed by Corfu and Igoumenitsa-based vessels are therefore not captured in OKAA (Central Market and Fishery Organisation) fish landing statistics, and the economic value of locally landed fish cannot be quantified from official published sources. In the absence of a fish landing market in Corfu or Igoumenitsa, catches are likely sold directly locally or transported to other landing markets. The OKAA network of 11 fish landing markets across Greece¹²⁷; the nearest fish landing markets to the study area are likely those of Preveza and Patras, which could capture some of the larger vessel catch from the western Ionian fleet, but most probably not the small-scale inshore catches of vessels of the study area.

2.7.4.3 Fisheries and transboundary context

As noted in §2.6.2, the wider Block 2 concession area spans GSAs 19 and 20, while the proposed Asopus-Exploration Well Asopus 1A is located within GSA 19 (Western Ionian Sea), where the Italian Adriatic–Ionian fleet operates. This transboundary fisheries context is relevant to the baseline, as Italian fishing vessels operating within GSA 19 may also operate within the wider study area. Consequently, Project-related effects have the potential to affect fishing activities across national boundaries.

According to the Environmental Impact Study (EIS) for the Messapia floating offshore wind farm in the Ionian Sea off the coast of Puglia (ERM Italia SpA, on behalf of the project developer, 2025), which assessed the fisheries context for the project located in Italian waters of the northern Ionian Sea, south-east of Capo Santa Maria di Leuca, the Italian fleet in GSA 19 comprises vessels operating from the ports of Gallipoli, Otranto, Castro, Tricase, and Leuca, with total registered vessels of 255 across these offices. Based on 2015 fleet statistics presented in the EIS, small-scale fishing accounted for more than 70% of the GSA 19 fleet. The predominance of the small-scale fleet remains a characteristic of the Italian fishing sector; according to Italy's Annual report on the efforts made by Italy in 2024 to reach a sustainable balance between fishing capacity and fishing opportunities (pursuant to Article 22 of Regulation (EU) No 1380/2013), small-scale fishing comprised 7,976 vessels, representing approximately 69% of the national fishing fleet¹²⁸. The trawl fleet (OTB) is predominantly concentrated in Calabria and Puglia, while approximately 80 longliners operate in the Ionian Sea off Sicily. The overall GSA 19 trawl fleet consisted of 223 vessels with a total tonnage of approximately 4,900 GT and engine power of approximately 34,000 kW.

The principal commercial species targeted by Italian vessels operating in GSA 19 include European hake (*Merluccius merluccius*), pink shrimp (*Parapenaeus longirostris*), and red shrimp (*Aristaeomorpha foliacea*), targeted by the trawl fleet. Long-liners in the area target large pelagic species including swordfish, Atlantic bluefin tuna, and albacore. According to the STECF 2025 Annual Economic Report, 207 Italian hook-and-line vessels (12–18 metres) operated mainly in GSA 10 and GSA 19 in 2023, providing 752 jobs equivalent to

¹²⁷

<https://www.okaa.gr/gr/statistika-alieumaton-okaa-ae/?fishmarket=9&origin=11&year=2024&month=0&fishType=9999&pg=2>

¹²⁸ https://oceans-and-fisheries.ec.europa.eu/document/download/583ea5ef-acd2-41d4-b660-6e772029a409_en?filename=2024-fleet-capacity-report-italia_en.pdf

396 full-time equivalents, targeting swordfish (the most important species by value at approximately €9.2 million per year) and Atlantic bluefin tuna¹²⁹.

The spatial distribution of fishing effort in relation to Block 2 and the Asopus Exploration Well 1A (located immediately east of the Messapia floating offshore wind farm) is not directly quantified in publicly available Italian sources. Nevertheless, the close geographical proximity of the two project areas indicates that they form part of the same regional fisheries setting in the northern Ionian Sea. Consequently, the fisheries baseline developed for the Messapia EIS, including the mapped distribution of fishing effort, provides a relevant and representative source of contextual information for characterising commercial fishing activity within the wider Project area. The Figures below reproduce the fishing effort maps presented in the Messapia EIS for trawling, longline (driftline) fishing and purse seine fishing. Figure 2-194, Figure 2-195, and Figure 2-196 are included for regional context only and should not be interpreted as representing fishing effort specifically within Block 2.

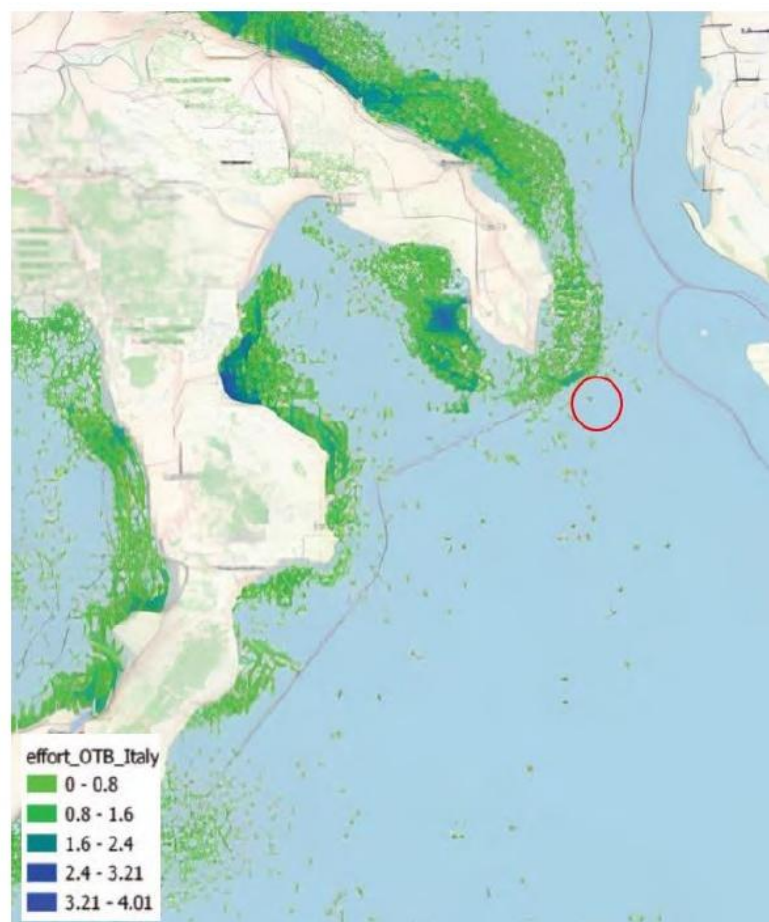


Figure 2-194: Trawling activity in relation to the proposed OWF Messapia Project area (Messapia EIS, 2025). The red circle indicates the location of the proposed OWF Messapia Project.

¹²⁹ <https://publications.jrc.ec.europa.eu/repository/handle/JRC144396>

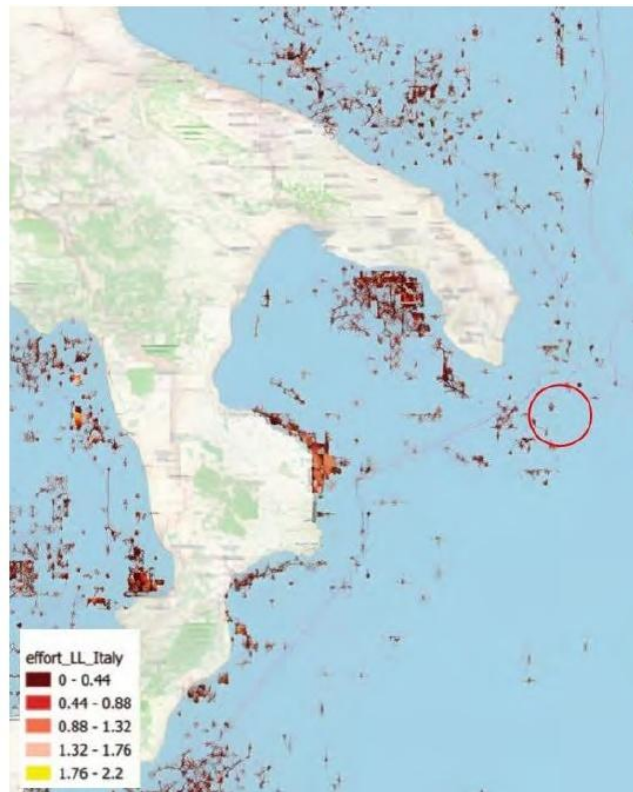


Figure 2-195: Driftline fishing activities in relation to the proposed OWF Messapia Project area (Messapia EIS, 2025).
The red circle indicates the location of the proposed OWF Messapia Project.

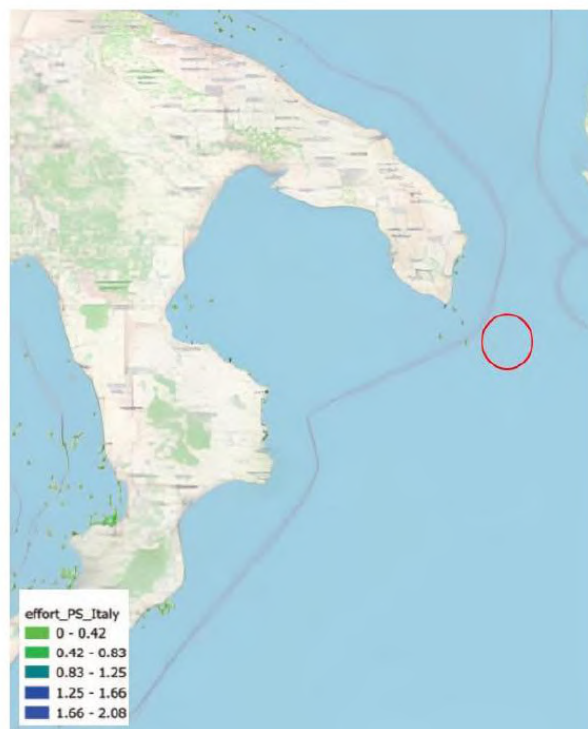


Figure 2-196: Purse seine fishing activities in relation to the proposed OWF Messapia Project area (Messapia EIS, 2025). The red circle indicates the location of the proposed OWF Messapia Project.

2.7.4.4 Aquaculture

The aquaculture baseline for the wider study area is described in the maritime uses section (§2.6.2.4), which covers the Special Framework for Spatial Planning and Sustainable Development for Aquaculture (GG 2505/B/2011), designated ADAs, and the location of existing installations. In socio-economic terms, aquaculture in the Corfu Regional Unit is spatially concentrated in the designated ADA on the north-eastern coast of Corfu (Code E.5, Kassiopi area) and does not constitute a significant component of regional employment or income at aggregate level. The Thesprotia Regional Unit does not host major aquaculture installations within or adjacent to the Project's immediate study area. Block 2 and the Exploration Well Asopus 1AI location do not overlap with any designated ADA or existing aquaculture installation, and no direct spatial interaction between Project activities and aquaculture operations is anticipated, as confirmed in §2.6.2.4.

2.7.5 Tourism

Tourism constitutes a major component of the economies of both the Ionian Islands and Epirus Regions, although its scale, spatial distribution and degree of economic dependence differ significantly between the two regions. In both cases, tourism activity is characterised by strong seasonality, with turnover peaking during the third quarter (July–September) and declining substantially during the winter months, reflecting the predominance of summer tourism demand.

2.7.5.1 Ionian Islands region and Corfu regional unit

2.7.5.1.1 Tourism volume and revenue

The Ionian Islands represent one of Greece's most tourism-dependent regional economies. This is reflected in the sectoral composition of regional GVA, where trade, transport, accommodation and food services account for 47.4% of total regional GVA in 2023, the highest proportion among the sectors of the regional economy. The region also recorded the highest annual increase in GVA (+13.6%) and the highest growth in per capita GDP (+15.2%) among all Greek regions, confirming the central role of tourism-related activities in regional economic development¹³⁰.

According to the Institute of Greek Tourism Confederation (INSETE) regional annual report on competitiveness and structural adjustment in the tourism sector for the year 2024¹³¹, the Ionian Islands Region is one of Greece's five principal tourist destinations, accounting for 9% of all inbound tourist visits and 11% of total tourist overnight stays recorded nationally in 2024, while generating 10% of national tourist receipts. The Region also accounted for approximately 13% of all international air arrivals to Greece in 2024,

¹³⁰

https://www.statistics.gr/en/statistics?p_p_id=documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN&p_p_lifecycle=2&p_p_state=normal&p_p_mode=view&p_p_cacheability=cacheLevelPage&p_p_col_id=column-2&p_p_col_count=4&p_p_col_pos=1&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN_javax.faces.resource=document&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN_in=downloadResources&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN_documentID=582672&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN_locale=en

¹³¹ https://insete.gr/wp-content/uploads/2020/05/25-12_Ionian_Islands.pdf

with its airports handling approximately 3.38 million international passengers. Corfu International Airport was the principal gateway, receiving approximately 2.0 million international arrivals (58% of the regional total).

In 2024, the Ionian Islands Region received 3,433,000 inbound tourist visits (+2% from 2023), generating 24,681,000 overnight stays (-8% from 2023) and €1,984 million in tourist receipts (-3% from 2023). The decline in overnights and receipts despite growth in visits reflects a reduction in average length of stay, from 8.0 to 7.2 nights (-10%) – and a decrease in average spend per visit, from €604 to €578 (-4%).

The United Kingdom remains the largest source market for the Ionian Islands, accounting for 28% of visits (973,000) and 31% of overnight stays (7,554,000) in 2024, though both shares declined from 32% and 35% respectively in 2023. Germany (15% of visits, 15% of overnights), Italy (13% of visits, 12% of overnights), the Netherlands (5%), France (5%), and Poland (5%) are the next largest markets.

The direct contribution of tourism to regional GDP in 2024 is estimated at 75% of regional GDP, the highest ratio of any Greek region, with tourism revenues of €2,912 million representing 10% of the national total.

Table 2-66 presents key tourism indicators for the Region based on INSETE's 2024 regional annual report for the Ionian Islands Region.

Table 2-66: Key tourism indicators, Ionian Islands Region, 2023–2024

INDICATOR	2023	2024	CHANGE (%)
Inbound visits (thousands)	3,378	3,433	+2%
Tourist overnights (thousands)	26,915	24,681	-8%
Tourist receipts (€ million)	2,039	1,984	-3%
Average spend per visit (€)	604	578	-4%
Average spend per overnight (€)	76	80	+6%
Average length of stay (nights)	8.0	7.2	-10%

2.7.5.1.2 Accommodation capacity

Based on INSETE's annual report, in 2024, the Ionian Islands Region had 1,024 hotel establishments with 54,110 rooms and 108,306 beds, representing 10% of national hotel units, 12% of national rooms, and 12% of national beds. In addition to hotel capacity, the region has significant short-stay accommodation capacity. As of July 2024, the Ionian Islands Region ranked among the highest nationally for short-term rental listings, reflecting the extensive use of platforms such as Airbnb, particularly in Corfu. The mean length of stay in hotel establishments in the Ionian Islands Region was 5.4 nights in 2024, among the highest nationally alongside Crete.

The Corfu Regional Unit is by far the dominant accommodation node within the region and the principal tourism gateway through Corfu International Airport, with 413 hotel establishments, 25,497 rooms, and 50,713 beds, accounting for 47% of regional hotel rooms¹³².

Five-star and four-star establishments account for 23% and 28% of Corfu's hotel rooms respectively, indicating a significant premium accommodation segment. Hotel overnights in the Ionian Islands Region reached 14,327,897 in 2024 (+4% from 13,809,340 in 2023), with the Corfu Regional Unit accounting for 53% of regional hotel overnights (7,555,302 nights).

Tourism activity is heavily concentrated within the Regional Unit of Corfu, which is the principal tourism destination and economic centre of the Ionian Islands Region. The overall hotel bed occupancy rate for the Corfu Regional Unit stood at 66.3% in 2024 ¹³³. Since the recovery from the COVID-19 pandemic, accommodation turnover has increased substantially, with third-quarter turnover rising from approximately €209 million in 2019 to €378 million in 2024 (an increase of around 81%). Annual turnover has similarly increased from approximately €320 million in 2019 to over €603 million in 2024, underlining the growing economic importance of tourism to the Regional Unit and its strong dependence on seasonal visitor flows. Quarterly turnover data for accommodation enterprises demonstrate both the scale and the pronounced seasonality of the sector. Turnover peaks consistently during the third quarter (July–September), corresponding to the summer tourist season, while activity during the first and fourth quarters is comparatively limited¹³⁴.

2.7.5.1.3 Tourist assets and coastal dependency

The tourism product of the Ionian Islands Region, and Corfu in particular, is strongly oriented toward sun-and-sea tourism, with coastal access constituting a key draw for the dominant source markets. Corfu held 20 Blue Flag beach awards in 2024, the largest number of any regional unit in the Ionian Islands. The Old Town of Corfu, inscribed on the UNESCO World Heritage List in 2007, constitutes the principal cultural tourism asset of the island and accounts for a large number of visits to archaeological sites and museums within the Corfu Regional Unit: in 2024, 357,158 of the region's total 414,566 archaeological site visitors (86%) were recorded in the Corfu Regional Unit, generating €1,490,206 in site receipts (93% of regional total)¹³⁵.

¹³²

https://www.statistics.gr/en/statistics?p_p_id=documents_WAR_publicationsportlet_INSTANCE_VBZOni0vs5VJ&p_p_lifecycle=2&p_p_state=normal&p_p_mode=view&p_p_cacheability=cacheLevelPage&p_p_col_id=column-2&p_p_col_count=4&p_p_col_pos=2&_documents_WAR_publicationsportlet_INSTANCE_VBZOni0vs5VJ_javax.faces.resource=document&_documents_WAR_publicationsportlet_INSTANCE_VBZOni0vs5VJ_in=downloadResources&_documents_WAR_publicationsportlet_INSTANCE_VBZOni0vs5VJ_documentID=581118&_documents_WAR_publicationsportlet_INSTANCE_VBZOni0vs5VJ_locale=en

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https://www.statistics.gr/en/statistics?p_p_id=documents_WAR_publicationsportlet_INSTANCE_VBZOni0vs5VJ&p_p_lifecycle=2&p_p_state=normal&p_p_mode=view&p_p_cacheability=cacheLevelPage&p_p_col_id=column-2&p_p_col_count=4&p_p_col_pos=2&_documents_WAR_publicationsportlet_INSTANCE_VBZOni0vs5VJ_javax.faces.resource=document&_documents_WAR_publicationsportlet_INSTANCE_VBZOni0vs5VJ_in=downloadResources&_documents_WAR_publicationsportlet_INSTANCE_VBZOni0vs5VJ_documentID=581118&_documents_WAR_publicationsportlet_INSTANCE_VBZOni0vs5VJ_locale=en

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https://www.statistics.gr/en/statistics?p_p_id=documents_WAR_publicationsportlet_INSTANCE_VBZOni0vs5VJ&p_p_lifecycle=2&p_p_state=normal&p_p_mode=view&p_p_cacheability=cacheLevelPage&p_p_col_id=column-2&p_p_col_count=4&p_p_col_pos=2&_documents_WAR_publicationsportlet_INSTANCE_VBZOni0vs5VJ_javax.faces.resource=document&_documents_WAR_publicationsportlet_INSTANCE_VBZOni0vs5VJ_in=downloadResources&_documents_WAR_publicationsportlet_INSTANCE_VBZOni0vs5VJ_documentID=593560&_documents_WAR_publicationsportlet_INSTANCE_VBZOni0vs5VJ_locale=en

¹³⁵ https://insete.gr/wp-content/uploads/2020/05/25-12_Ionian_Islands.pdf

Additional tourism assets in Corfu include numerous designated traditional settlements, the Corfu Trail (a 12-section hiking route), two marinas (Gouvia and Corfu Marina) providing approximately 1,166 berths, complemented by five designated tourist shelters/anchorages and the tourist harbour at Kassiopi. Marine-based tourism is also supported by a wide range of water sports, sailing, sea kayaking and organised diving activities. Following the designation of underwater archaeological sites for recreational diving, Corfu has developed a growing diving tourism sector with accessible wreck sites, including the Junkers Ju 88 aircraft wreck and the SARA shipwreck, together with popular dive locations around Paleokastritsa, Liapades, Angelokastro, Ermones, Nissaki and the Gouvia area. The region's tourism offering is complemented by a growing gastronomic and wine tourism segment linked to local olive oil, kumquat, and wine production¹³⁶.

2.7.5.1.4 Seasonality

Tourism in the Ionian Islands Region and the Corfu regional unit is strongly seasonal. The ELSTAT hotel statistics confirm that the vast majority of arrivals and overnight stays are concentrated in the April to October period, consistent with the pattern of sun-and-sea tourism to the islands¹³⁷. Figure 2-197 illustrates the pronounced seasonality of tourism, with turnover consistently concentrated in the second and third quarters, and the strong post-pandemic recovery of the accommodation sector.

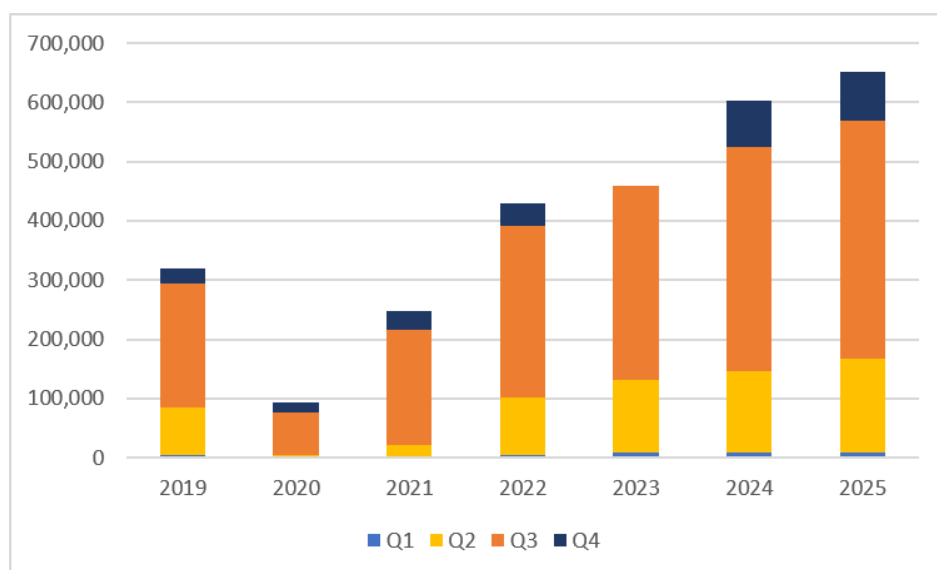


Figure 2-197: Turnover from Administrative Sources, of enterprises in the Accommodation division (division 55 of NACE Rev. 2 classification), in the Corfu Regional Unit, 2019–2025 ((in thousand €) Note: For 2023 Q4 Extraordinary transactions were recorded in the data. Therefore, they are not published as they are not comparable (ELSTAT)

¹³⁶ https://insete.gr/wp-content/uploads/2020/05/25-12_Ionian_Islands.pdf

¹³⁷

https://www.statistics.gr/en/statistics?p_p_id=documents_WAR_publicationsportlet_INSTANCE_VBZOniOvs5VJ&p_p_lifecycle=2&p_p_state=normal&p_p_mode=view&p_p_cacheability=cacheLevelPage&p_p_col_id=column-2&p_p_col_count=4&p_p_col_pos=2&_documents_WAR_publicationsportlet_INSTANCE_VBZOniOvs5VJ_javax.faces.resource=document&_documents_WAR_publicationsportlet_INSTANCE_VBZOniOvs5VJ_in=downloadResources&_documents_WAR_publicationsportlet_INSTANCE_VBZOniOvs5VJ_documentID=593560&_documents_WAR_publicationsportlet_INSTANCE_VBZOniOvs5VJ_locale=en

The tourism profile of the Ionian Islands Region and the Corfu regional unit in particular, is characterised by large-scale international leisure tourism, supported by extensive accommodation infrastructure, international air connections and maritime transport links. The strong concentration of tourism activity during the summer season generates substantial employment and income but also increases the Region's dependence on seasonal visitor flows and its vulnerability to fluctuations in tourism demand and wider economic conditions.

2.7.5.2 Epirus region and Thesprotia regional unit

2.7.5.2.1 Tourism volume and revenue

Tourism plays a significant, although comparatively less dominant, role in the economy of Epirus. Unlike the Ionian Islands, Epirus exhibits a more diversified economic structure in which tourism-related activities coexist with public administration, education, health services, manufacturing and agri-food industries. Trade, transport, accommodation and food services accounted for 24.4% of regional GVA in 2023, approximately half the corresponding share recorded in the Ionian Islands Region¹³⁸.

According to the INSETE Annual Report for the Epirus Region in 2024, the Epirus Region received 2,052,000 inbound tourist visits (+20% from 1,712,000 in 2023), generating 5,391,000 overnight stays (+25% from 4,320,000 in 2023) and €394 million in tourist receipts (+19% from €330 million in 2023).

The region accounted for 5% of national visits, 2% of national overnight stays, and 2% of national receipts in 2024, a markedly smaller share than the Ionian Islands across all three indicators. The very strong growth in visits (+20%), overnights (+25%), and receipts (+19%) in 2024 compared to 2023 is notable, driven primarily by significant increases in the German market (+37% in visits, +61% in overnights) and in the residual "other countries" category. However, the average spend per visit in Epirus (€192 in 2024) is the lowest of all Greek regions, substantially below the national average of €523.

The direct contribution of tourism to the regional economy was estimated at 12% of regional GDP in 2024, generating revenues of approximately €578 million, a far smaller share and absolute amount than the Ionian Islands (75% of GDP, €2,912 million), but a growing one¹³⁹.

Table 2-67: Key tourism indicators, Epirus Region, 2023–2024

INDICATOR	2023	2024	CHANGE (%)
Inbound visits (thousands)	1,712	2,052	+20%
Tourist overnights (thousands)	4,320	5,391	+25%
Tourist receipts (€ million)	330	394	+19%

¹³⁸

https://www.statistics.gr/en/statistics?p_p_id=documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN&p_p_lifecycle=2&p_p_state=normal&p_p_mode=view&p_p_cacheability=cacheLevelPage&p_p_col_id=column-2&p_p_col_count=4&p_p_col_pos=1&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN_javax.faces.resource=document&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN_in=downloadResources&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN_documentID=582672&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN_locale=en

¹³⁹ https://insete.gr/wp-content/uploads/2020/05/25-12_Epirus.pdf

INDICATOR	2023	2024	CHANGE (%)
Average spend per visit (€)	193	192	-1%
Average spend per overnight (€)	77	73	-5%
Average length of stay (nights)	2.5	2.6	+4%

2.7.5.2.2 Accommodation capacity

The Epirus Region had 719,423 hotel arrivals in 2024 (+2% from 708,392 in 2023), with the Thesprotia Regional Unit recording 99,186 hotel arrivals and 378,668 hotel overnights, an occupancy rate of 45.4% in 2024. Within the Regional Unit, the Municipality of Igoumenitsa accounts for virtually all registered hotel tourism activity: in 2024, the municipality recorded 97,880 hotel arrivals and 376,548 hotel overnight stays, representing 99.3% of the Thesprotia regional unit total, with an average hotel occupancy rate of 46.8%¹⁴⁰.

The Region had a total of 433 hotel establishments with 9,259 rooms and 19,113 beds in 2024, of which Ioannina accounts for the largest share¹⁴¹.

Accommodation turnover in the Epirus Region is concentrated along the coastal Regional Units of Preveza and Thesprotia, reflecting the importance of the Ionian coastline as a key tourism destination for the region. While Preveza records the highest accommodation turnover, Thesprotia represents an important tourism area; following the recovery from the COVID-19 pandemic, accommodation turnover in Thesprotia increased steadily, from approximately €14.6 million in 2019 to €24.9 million in 2024, demonstrating sustained growth in tourism demand. By comparison, the Regional Unit of Ioannina records relatively high accommodation turnover owing to its more diversified, year-round tourism market. Overall, the turnover data indicate that tourism in Epirus is strongly concentrated along the coastal corridor during the summer months, although its overall economic scale remains substantially lower than that of the neighbouring Ionian Islands Region¹⁴².

2.7.5.2.3 Tourist assets

Tourism assets in the Epirus Region are dominated by mountain and nature tourism (Zagori, Vikos Gorge, Epirus Mountain villages), cultural heritage in Ioannina, and coastal beaches concentrated in the Preveza and Thesprotia regional units. Within Thesprotia, the coastal areas of Syvota, Plataria, and Perdika constitute the principal leisure tourism destinations, attracting predominantly Greek domestic tourists and a growing German and British segment for sea and nature tourism. Archaeological sites in the Epirus Region received 92,600 visitors in 2024, with Thesprotia accounting for approximately 4% (3,808 visitors, a decline of -8%

¹⁴⁰

https://www.statistics.gr/en/statistics?p_p_id=documents_WAR_publicationsportlet_INSTANCE_VBZOniOvs5VJ&p_p_lifecycle=2&p_p_state=normal&p_p_mode=view&p_p_cacheability=cacheLevelPage&p_p_col_id=column-2&p_p_col_count=4&p_p_col_pos=2&_documents_WAR_publicationsportlet_INSTANCE_VBZOniOvs5VJ_javax.faces.resource=document&_documents_WAR_publicationsportlet_INSTANCE_VBZOniOvs5VJ_in=downloadResources&_documents_WAR_publicationsportlet_INSTANCE_VBZOniOvs5VJ_documentID=581118&_documents_WAR_publicationsportlet_INSTANCE_VBZOniOvs5VJ_locale=en

¹⁴¹ https://insete.gr/wp-content/uploads/2020/05/25-12_Epirus.pdf

¹⁴²

https://www.statistics.gr/en/statistics?p_p_id=documents_WAR_publicationsportlet_INSTANCE_VBZOniOvs5VJ&p_p_lifecycle=2&p_p_state=normal&p_p_mode=view&p_p_cacheability=cacheLevelPage&p_p_col_id=column-2&p_p_col_count=4&p_p_col_pos=2&_documents_WAR_publicationsportlet_INSTANCE_VBZOniOvs5VJ_javax.faces.resource=document&_documents_WAR_publicationsportlet_INSTANCE_VBZOniOvs5VJ_in=downloadResources&_documents_WAR_publicationsportlet_INSTANCE_VBZOniOvs5VJ_documentID=593560&_documents_WAR_publicationsportlet_INSTANCE_VBZOniOvs5VJ_locale=en

from 4,139 in 2023) and generating €3,593 in receipts, indicating a stronger tourism footprint of Preveza and Ioannina relative to Thesprotia¹⁴³.

2.7.5.2.4 Seasonality

The Regional Unit of Thesprotia is characterised by a pronounced seasonal pattern, with accommodation turnover concentrated in the second and third quarters of the year, reflecting the importance of the summer tourism season along the Ionian coast. Following the COVID-19 pandemic, the accommodation sector recovered steadily, with annual accommodation turnover increasing from approximately €14.6 million in 2019 to €24.9 million in 2024, representing an increase of approximately 71%. The highest quarterly turnover was recorded in the third quarter, increasing from approximately €9.2 million in 2019 to €15.0 million in 2024. Although substantially smaller in scale than the tourism economy of Corfu, these trends demonstrate the growing importance of tourism within Thesprotia¹⁴⁴. Figure 2-198 illustrates the pronounced seasonality of tourism in the Thesprotia Regional Unit, with accommodation turnover consistently concentrated in the second and particularly the third quarter of each year. It also demonstrates the steady recovery and continued growth of the accommodation sector following the COVID-19 pandemic, although at a substantially smaller scale than in the Corfu Regional Unit.

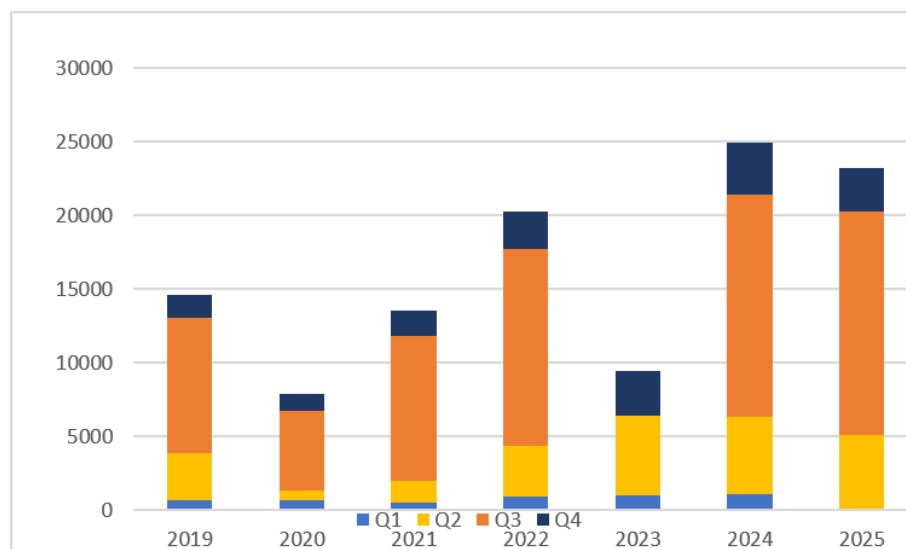


Figure 2-198: Turnover from Administrative Sources, of enterprises in the Accommodation division (division 55 of NACE Rev. 2 classification), in the Thesprotia Regional Unit, 2019–2025 ((in thousand €). Note: For 2023 Q3 Extraordinary transactions were recorded in the data. Therefore, they are not published as they are not comparable (ELSTAT)

¹⁴³ https://insete.gr/wp-content/uploads/2020/05/25-12_Epirus.pdf

¹⁴⁴

https://www.statistics.gr/en/statistics?p_p_id=documents_WAR_publicationsportlet_INSTANCE_VBZOniOvs5VJ&p_p_lifecycle=2&p_p_state=normal&p_p_mode=view&p_p_cacheability=cacheLevelPage&p_p_col_id=column-2&p_p_col_count=4&p_p_col_pos=2&_documents_WAR_publicationsportlet_INSTANCE_VBZOniOvs5VJ_javax.faces.resource=document&_documents_WAR_publicationsportlet_INSTANCE_VBZOniOvs5VJ_in=downloadResources&_documents_WAR_publicationsportlet_INSTANCE_VBZOniOvs5VJ_documentID=593560&_documents_WAR_publicationsportlet_INSTANCE_VBZOniOvs5VJ_locale=en

2.8 Social and Technical Infrastructure

2.8.1 Social infrastructure

2.8.1.1 Health Services

2.8.1.1.1 National healthcare context

Greece's health system is centrally administered, providing coverage for all citizens and legal residents; undocumented migrants typically have access only to emergency care¹⁴⁵. This universal coverage was substantially extended by L. 4368/2016 and JMD A3(γ)/ΓΠ/οικ.25132/4-4-2016, which guaranteed free access to public health structures for uninsured persons and vulnerable social groups, restoring coverage to more than 2 million people who had lost it during the financial crisis due to long-term unemployment or inability to meet social insurance contributions¹⁴⁶. The system is funded by general government revenues and mandatory contributions channelled through a single purchaser, the National Organisation for the Provision of Health Services (EOPYY), with the Ministry of Health (MoH) exercising extensive regulatory authority over national health policy, public hospitals, and health professionals.

According to the latest OECD Report on the State of Health for Greece¹⁴⁷, despite incremental increases in recent years, Greece's health expenditure remains far below the EU average. In 2023, health spending was 8.4 % of GDP, compared to an EU average of 10.0 %; in terms of health spending per capita, the average was EUR 2,191 (PPP adjusted), considerably lower than the EU average of EUR 3,832. The public share of health expenditure stood at only 61% in 2023 – the second lowest proportion in the EU, where the average was 80%. Inpatient services and pharmaceuticals absorbed the largest shares of health resources in 2023, with 43.0% and 29.2% respectively, substantially above the EU average of 28 % and 18%.

Greece has a physician density of 6.6 per 1,000 population, above the OECD average of 3.9, a figure that is very high by EU standards, where the average is 4.3. However, these data include all licensed doctors rather than only those who are professionally active.

Based on OECD data for 2023, hospital bed capacity, at 4.2 beds per 1,000 population, is lower than the EU average of 5.1 beds per 1 000. ELSTAT's annual Hospital Census¹⁴⁸ confirms that the number of hospitals in Greece stood at 266 in 2024, unchanged from 2023, of which 53.0% were private clinics, 124 were Legal Entities of Private Law, and 4 were other Legal Entities of Private Law. However, it is worth noting that hospitals are unevenly distributed across the country, with an almost three- fold difference between the number of beds between regions with the highest and lowest concentrations. Rural hospitals often operate

¹⁴⁵ OECD - European Observatory, State of Health in the EU: Greece Country Health Profile 2025

¹⁴⁶ OECD - European Observatory, State of Health in the EU: Greece Country Health Profile 2019

¹⁴⁷ OECD - European Observatory, State of Health in the EU: Greece Country Health Profile 2025

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https://www.statistics.gr/en/statistics?p_p_id=documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN&p_p_lifecycle=2&p_p_state=normal&p_p_mode=view&p_p_cacheability=cacheLevelPage&p_p_col_id=column-2&p_p_col_count=4&p_p_col_pos=1&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN_javax.faces.resource=document&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN_in=downloadResources&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN_documentID=591906&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN_locale=en

below 50 % capacity, while urban university and tertiary hospitals regularly exceed 90 % occupancy rates, with some high- pressure departments surpassing 100 %, leading to overcrowding and long wait times¹⁴⁹.

Out-of-pocket payments constituted 34% of health spending in 2023, among the highest rates in the EU. Copayments are levied on diagnostic and laboratory tests, outpatient medicines and visits to private providers contracted by EOPYY, but the majority of OOP spending goes on direct payments for services not covered by the benefits package or obtained from the private sector. Greece has the highest level of unmet healthcare needs in the EU. In 2024, according to the EU- SILC survey, 21.9% of people who needed medical care reported that they did not receive it because of cost, travel distance, or waiting times — around six times the EU average of 3.6%. Access varies significantly across regions (16–29%), and the problem is particularly severe among people at risk of poverty, with 32.3% reporting unmet medical needs compared with the EU average of 6.0%¹⁵⁰. An overview of the key health system indicators discussed in this section is provided in the Table 2-68.

Table 2-68: Summary of Key Health System Indicators (Greece and EU Average)

INDICATOR (2023/2024)	GREECE	EU AVERAGE
Health expenditure (% GDP)	8.4%	10.0%
Health expenditure per capita (PPP)	€2,191	€3,832
Public share of health expenditure	61%	80%
Physicians (per 1,000)	6.6	4.3
Hospital beds (per 1,000)	4.2	5.1
Out-of-pocket expenditure	34%	~15%
Unmet healthcare needs	21.9%	3.6%

2.8.1.1.2 Local healthcare context

Healthcare resources in Greece are unevenly distributed across regions, reflecting historical, demographic, and geographic factors. According to the most recent ELSTAT Census of Health Centres and Other Units Providing Primary Health Care Services (2025)¹⁵¹, Greece had 314 Health Centres nationally in 2025 (up from 312 in 2024), supplemented by a wider primary care network comprising 1,430 Regional Medical Offices, 103 Multipurpose Regional Medical Offices, 50 Specialised Regional Medical Offices, 227 Local Medical Offices, and 137 Local Health Units.

The Ionian Islands Region had 12 Health Centres in 2025, the second lowest number of any Greek region after Voreio Aigaio and Dytiki Makedonia (11 each). Medical personnel employed in Ionian Islands Health Centres stood at 82 in 2025, an increase of 5.1% from 78 in 2024 and among the stronger regional growth

¹⁴⁹ OECD - European Observatory, State of Health in the EU: Greece Country Health Profile 2025

¹⁵⁰ OECD - European Observatory, State of Health in the EU: Greece Country Health Profile 2025

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https://www.statistics.gr/en/statistics?p_id=documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN&p_p_lifecycle=2&p_p_state=normal&p_p_mode=view&p_p_cacheability=cacheLevelPage&p_p_col_id=column-2&p_p_col_count=4&p_p_col_pos=1&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN_javax.faces.resource=document&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN_in=downloadResources&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN_documentID=595774&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN_locale=en

rates nationally. Nursing personnel and other non-medical personnel both remained stable at 77 and 50 respectively, and medical equipment increased marginally from 91 to 92 units (+1.1%).

The Epirus Region had 20 Health Centres in 2025, unchanged from 2024. Medical personnel increased markedly from 178 to 190 (+6.7%). Nursing personnel also recorded strong growth, from 362 to 384 (+6.1%), the highest increase of any Greek region. However, other non-medical personnel declined from 161 to 155 (-3.7%), one of only two regions to record a decrease in this category. Medical equipment increased from 190 to 198 units (+4.2%). Table 2-69 provides an overview of the primary healthcare infrastructure of the regions under assessment based on the most recent available ELSTAT data.

Table 2-69: Primary health care infrastructure by region, 2024-2025

REGION	HEALTH CENTRES 2025	MEDICAL STAFF 2025	% CHG 24/25	NURSING STAFF 2025	% CHG 24/25	OTHER STAFF 2025	% CHG 24/25	EQUIPMENT 2025	% CHG 24/25
Greece (total)	314	4,030	+3.1%	4,856	-1.0%	3,469	+2.8%	3,953	+1.9%
Ionian Islands	12	82	+5.1%	77	0.0%	50	0.0%	92	+1.1%
Epirus	20	190	+6.7%	384	+6.1%	155	-3.7%	198	+4.2%

Both regions fall under the jurisdiction of the 6th Regional Health Authority, covering the Peloponnese, Ionian Islands, Epirus, and Western Greece. In 2025, the 6th Regional Health Authority employed a combined total of 1,287 medical personnel, 1,172 nursing personnel, and 819 other non-medical personnel across its Health Centres, Regional Medical Offices, Local Medical Offices, and Local Health Units, the largest number of any Regional Health Authority in Greece (3,278 persons), reflecting the combined geographic scale of the four constituent regions.

At secondary care level, the ELSTAT Hospital Census confirms that the Ionian Islands Region had 6 hospitals in 2024 (2.3% of the national total), a figure that has been stable since 2021. The Epirus Region also had 6 hospitals in 2024, down from 7 in 2021-2023. Together with Voreio Aigaio (7 hospitals), these three regions collectively account for only 7.2% of all Greek hospitals, the lowest concentration of hospital infrastructure of any group of regions nationally, reflecting both their smaller populations and, in the case of the Ionian Islands and Epirus, their more dispersed island and mountainous settlement patterns.

This relatively low number of hospitals is consistent with the primary healthcare infrastructure described above and indicates that both study area regions are among those with the lowest hospital capacity in Greece. As a result, they rely more heavily on the primary care network (Health Centres, Regional Clinics and Local Health Units) and on referrals to larger hospitals for specialised care; principally the General Hospital of Corfu for the Ionian Islands and the General Hospital of Ioannina (University Hospital) for more complex cases from Thesprotia. Table 2-70 presents the evolution of the number of hospitals of the regions under assessment between 2021 and 2024.

Table 2-70: Number of hospitals by region (2021-2024)

REGION	2021	2022	2023	2024	% OF NATIONAL TOTAL (2024)
Greece (total)	267	265	266	266	100.0%
Ionian Islands	6	6	6	6	2.3%

REGION	2021	2022	2023	2024	% OF NATIONAL TOTAL (2024)
Epirus	7	7	7	6	2.3%

In the Corfu Regional Unit, the principal public healthcare facility is the General Hospital of Corfu 'Agia Eirini'¹⁵², located in Kontokali, and is structured into the following sectors and departments:

- Pathological Sector (Departments: Pathological, Nephrological, Cardiological, Pediatric – Neonatological, Pulmonological, Neurological)
- Surgical Sector (Departments: Surgical, Urological, Ophthalmological, Orthopedic, Anesthesiology, Obstetrics/Gynaecology, ENT, Dental)
- Laboratory Sector (Departments: Haematology – Immunology Histocompatibility, Biopathological-Biochemical, Blood Donation, Pathological Anatomical, Radiodiagnostic, Nuclear Medicine, Cytological, Pharmaceutical)
- Mental Health Sector (Departments: Adult Psychiatric Department, Child – Adolescent Psychiatric Department, Mental Health Centre with Decentralized Units)
- Intersectoral Departments (Day Hospital Department, Autonomous Emergency Department,
- Intensive Care Unit)
- Special Units: Mediterranean Anaemia and Sickle Cell Disease
- Other Departments (Paramedical Staff, Social Work)

According to the ESIA for the General Hospital of Corfu 'Agia Eirini' (June 2024) ¹⁵³, the hospital has a total capacity of 332 inpatient beds, comprising 150 medical beds, 140 surgical beds, 32 mental health beds, and 10 beds in specialised and cross-sectoral units. The hospital employs 562 staff members, excluding external collaborators. The hospital is located approximately 8 km from Corfu Town, the island's main urban centre, with an estimated travel time of 17 minutes via the Corfu–Palaiokastritsa National Road. As the island's primary referral hospital, it serves residents from across Corfu, including the municipalities of North Corfu and South Corfu, located approximately 31 km (44 minutes) and 47 km (78 minutes) away, respectively. These travel distances highlight the central role of the hospital in providing secondary healthcare services across the island¹⁵⁴.

Beyond the General Hospital, the Corfu Regional Unit is served by a network of primary care Health Centres and regional clinics distributed across the island, consistent with the dispersed settlement pattern described in §2.6.1. Based on the information from the SEA for the Ionian Islands ROP 2021–2027¹⁵⁵, primary healthcare services in the Regional Unit of Corfu are provided through a network comprising four Health Centres, 11 Regional Clinics (Peripheral Medical Practices), three Multi-purpose Regional Clinics, and one Special Regional Clinic (located at Corfu Prison). The Health Centres are located at Agios Markos, Ano Lefkimmi, Paxoi, and Kassiopi (operating as a Regional Clinic under the Agios Markos Health Centre), providing primary healthcare coverage across the island and its smaller islands.

Private healthcare provision is also significant in Corfu, reflecting both the resident population's needs and the substantial seasonal demand generated by international tourism with several private clinics and

¹⁵² https://www.gnkerkyras.gr/?page_id=3717

¹⁵³ https://pin.gov.gr/wp-content/uploads/2024/08/gnk_mpe_v3_signedx2.pdf

¹⁵⁴ https://pin.gov.gr/wp-content/uploads/2024/08/gnk_mpe_v3_signedx2.pdf

¹⁵⁵ Strategic Environmental Assessment of the Regional Operational Programme of the Ionian Islands 2021–2027, http://2014-2020.pepionia.gr/wp-content/uploads/2022/03/EpikairopSxedioSMPE_pep_IN21_27_pin1.pdf

diagnostic centres operating on the island, including facilities oriented toward international and tourist patients (e.g. Corfu General Clinic, CorfuMedica).

The General Hospital – Health Centre of Filiates is the principal secondary healthcare facility serving the Regional Unit of Thesprotia. Under its approved organisational framework (Government Gazette B'3302/20.09.2017), the hospital has a total capacity of 120 inpatient beds, comprising 60 medical beds and 60 surgical beds. The Medical Service is organised into Medical, Surgical and Laboratory Departments, supported by a High Dependency Unit and an Independent Emergency Department.

The hospital provides a broad range of secondary healthcare services through departments including internal medicine, cardiology, paediatrics, general surgery, orthopaedics, obstetrics and gynaecology, urology, ophthalmology, otorhinolaryngology, anaesthesiology, radiology, pathology, blood transfusion and pharmacy. It also includes specialised units for coronary care, haemodialysis, geriatric/Alzheimer's care, neurology, premature infants, and post-anaesthesia care. In addition to its hospital functions, it operates as a Health Centre, providing both central and peripheral primary healthcare services in accordance with the national primary care system.

The approved organisational structure provides for 55 specialist physician posts across a wide range of medical specialties, supporting the hospital's role as the principal referral hospital for Thesprotia and surrounding border areas¹⁵⁶.

Within the Municipality of Igoumenitsa specifically, primary healthcare is provided through the Health Centre of Igoumenitsa. Within the Municipality of Igoumenitsa. The Health Centre provides 24-hour emergency services, general outpatient medical care, specialist clinics including internal medicine, cardiology, paediatrics, gynaecology and dentistry, as well as diagnostic services through microbiology and radiology laboratories. It also delivers preventive healthcare services, including immunisations, health screening programmes and health promotion initiatives, and is supported by a network of Regional Clinics at Kastri, Parapotamos, Plataria and Syvota, together with the Multi-purpose Regional Clinic of Perdika, extending primary healthcare coverage across the wider municipal area. Patients requiring specialist or inpatient treatment are referred to the General Hospital – Health Centre of Filiates¹⁵⁷.

2.8.1.2 Social Protection

Social protection services in Greece are delivered through a combination of state-run Social Welfare Centres and other public social care units operating under the supervision of the Ministry of Social Cohesion and Family Affairs, municipalities and other public authorities. According to the latest ELSTAT Survey on Social Care Units (2023) published in 2025¹⁵⁸, 77 social care units were operating nationwide, comprising 55 Social Welfare Centre units and 22 other public social care units. These facilities provide services across four main categories: long-term care units for persons with disabilities and chronic conditions, child

¹⁵⁶ <https://www.dypede.gr/wp-content/uploads/%CE%A4%CE%A1%CE%9F%CE%A0%CE%9F%CE%A0%CE%9F%CE%99%CE%97%CE%A3%CE%97-%CE%9F%CE%A1%CE%93%CE%91%CE%9D%CE%99%CE%A3%CE%9C%CE%9F%CE%A5-%CE%93%CE%9D-%CE%9A%CE%A5-%CE%A6%CE%99%CE%9B%CE%99%CE%91%CE%A4%CE%A9%CE%9D-3302-%CE%92-21-09-2017.pdf>

¹⁵⁷ <https://pfy.dypede.gr/ky-igoumenitsas/>

¹⁵⁸ <https://www.statistics.gr/documents/20181/4df937b7-45a5-f18d-937e-47c0ff3699a0>

protection units, rehabilitation units for persons with disabilities, and units serving other vulnerable groups, including homeless persons, victims of violence and people at risk of poverty or social exclusion.

Table 2-71: Social care units, personnel and beneficiaries, Greece, (2021 and 2023)

INDICATOR	SOCIAL WELFARE CENTRES 2021	OTHER PUBLIC UNITS 2021	SOCIAL WELFARE CENTRES 2023	OTHER PUBLIC UNITS 2023
Number of units	55	23	55	22
Personnel	2,339	563	2,166	486
In-patient beneficiaries	2,205	589	2,053	578
Out-patient beneficiaries	616	690	864	1,132

At the regional level, the Ionian Islands and Epirus have relatively limited but established public social protection infrastructure. According to the ELSTAT survey, the Region of the Ionian Islands had 3 public social care units (3.9% of the national total), serving 182 beneficiaries and employing 92 staff. The Region of Epirus had 8 public social care units (10.4% of the national total), serving 231 beneficiaries and employing 247 staff. In both regions, social protection services are primarily delivered through regional Social Welfare Centre branches and specialised facilities providing residential and community-based support for older persons, children, persons with disabilities and other vulnerable groups.

2.8.1.3 Education

2.8.1.3.1 National education system

Compulsory education in Greece comprises two years of kindergarten, six years of primary school, and three years of lower secondary school. The formal education system further includes upper secondary education, Second Chance Schools, post-lower-secondary vocational education and training, post-upper-secondary vocational training, and tertiary education¹⁵⁹. Education at all three levels (primary, secondary, and tertiary) is provided free of charge, funded principally through the state budget.

According to the most recent ELSTAT surveys, covering the school year 2023/2024¹⁶⁰, the national school network comprised 5,618 kindergartens, 4,314 primary schools, 1,847 lower secondary schools, 1,378 upper secondary schools and 491 secondary vocational school units (EPAL/EPAS), serving approximately 1.4 million pupils. The national pupil population continues a long-term declining trend at most levels, consistent with the demographic ageing and fertility decline described in §2.7.1. Between the 2022/2023

¹⁵⁹ <https://eurydice.eacea.ec.europa.eu/eurydice/greece/organisation-education-system-and-its-structure>

¹⁶⁰

https://www.statistics.gr/en/statistics?p_id=documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN&p_p_lifecycle=2&p_p_state=normal&p_p_mode=view&p_p_cacheability=cacheLevelPage&p_p_col_id=column-2&p_p_col_count=4&p_p_col_pos=1&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN_javax.faces.resource=document&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN_in=downloadResources&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN_documentID=594656&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN_locale=en ;
https://www.statistics.gr/en/statistics?p_id=documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN&p_p_lifecycle=2&p_p_state=normal&p_p_mode=view&p_p_cacheability=cacheLevelPage&p_p_col_id=column-2&p_p_col_count=4&p_p_col_pos=1&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN_javax.faces.resource=document&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN_in=downloadResources&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN_documentID=595204&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKko4IN_locale=en

and 2023/2024 school years, enrolment decreased in pre-primary, primary and lower secondary education, while upper secondary enrolment increased modestly. During the same period, teacher-to-pupil ratios improved across pre-primary, primary and lower secondary education, reflecting increased staffing despite declining pupil numbers. Key national education indicators are summarised in Table 2-72.

Table 2-72: Key National Education Indicators, Greece (School Year 2023/2024)

INDICATOR	KINDERGARTENS	PRIMARY	LOWER SECONDARY	UPPER SECONDARY	VOCATIONAL (EPAL/EPAS)
School units	5,618	4,314	1,847	1,378	491
Pupils (2023/24)	167,969	561,890	325,062	236,368	114,556
Change in enrolment vs. 2022/23	-3.1%	-2.1%	-1.8%	+2.6%	+1.3%
Teacher-to-pupil ratio (2023/24)	1:7.6	1:7.2	1:7.9	1:9.9	1:8.0

In accordance with the Hellenic Constitution, higher education in Greece is public, that is, free of charge and provided by Higher Education Institutions (L. 4957/2022). HEIs are legal entities under public law, fully self-governed and include Universities, Polytechnic Schools, the Higher School of Fine Arts and the Higher School of Pedagogical and Technological Education. Pursuant to L. 5094/2024 the licensing of the establishment and operation of branches of foreign parent institutions in Greece in the form of University Legal Entities has been regulated in a manner consistent with the constitutional objectives of higher education. ULE are special purpose legal entities with non-profit status, with the exclusive purpose of providing higher education services which award higher education degrees equivalent to the corresponding degrees conferred by Greek public universities¹⁶¹.

According to the official Hellenic National Academic Recognition and Information Center (DOATAP) list¹⁶² of recognised higher education institutions, Greece currently has:

- 24 public Higher Education Institutions (HEIs) (universities and specialised higher education institutions) following the 2019 integration of all former Technological Education Institutes into university structures.
- 4 recognised non-state university legal entities (foreign university branches) established under the new legislative framework.

According to the most recent ELSTAT Tertiary Education Statistics (academic year 2023/2024), Greece's higher education sector continued to expand despite broader demographic pressures affecting earlier levels of education. Nationally, the number of enrolled undergraduate students increased by 1.3% compared with the previous academic year, reaching 743,892 students, while the number of graduates remained broadly stable (+0.1%). Postgraduate enrolment increased by 0.8%, doctoral enrolment by 3.5%, and the number of doctoral graduates by 4.8%, indicating continued growth in advanced education and research. Over the same

¹⁶¹ <https://eurydice.eacea.ec.europa.eu/euryperia/greece/types-higher-education-institutions>

¹⁶² https://www.doatap.gr/en/home_english/hellenic-institutions

period, however, the total number of teaching staff declined by 4.3%, reflecting ongoing pressures on university staffing¹⁶³.

2.8.1.3.2 Regional and local educational infrastructure

According to the most recent ELSTAT surveys, covering the school year 2023/2024, within the study area, educational infrastructure is well established across both regions. The Ionian Islands Region, including the Regional Unit of Corfu, comprises 143 kindergartens, 103 primary schools, 50 lower secondary schools and 36 upper secondary schools. In the Region of Epirus, which includes the Regional Unit of Thesprotia, the education network consists of 206 kindergartens, 180 primary schools, 81 lower secondary schools and 52 upper secondary schools. Together, these facilities provide comprehensive educational coverage across the study area.

Table 2-73: Educational Infrastructure in the Study Area (School Year 2023/2024)

EDUCATION LEVEL	IONIAN ISLANDS	EPIRUS
Kindergartens	143	206
Primary schools	103	180
Lower secondary schools (Gymnasias)	50	81
Upper secondary schools (Lyceums)	36	52
Total school units	332	519

Higher education infrastructure within the study area comprises two public universities, the Ionian University¹⁶⁴ and the University of Ioannina¹⁶⁵, with campuses distributed across the Ionian Islands and Epirus. According to the most recent ELSTAT Tertiary Education Statistics (academic year 2023/2024)¹⁶⁶, the Ionian University enrolled 7,958 undergraduate students in 2023/2024, representing a 2.0% increase compared with the previous academic year. The university also recorded 1,090 postgraduate students (+5.7%) and 716 doctoral candidates (+35.1%), demonstrating continued growth in postgraduate education and research activity. The University of Ioannina enrolled 28,109 undergraduate students, a slight increase of 0.3% over 2022/2023, together with 1,233 postgraduate students and 1,779 doctoral candidates. Although postgraduate enrolment at the University of Ioannina declined compared with the previous year (-17.0%), undergraduate enrolment remained stable and the university continues to be one of the largest

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¹⁶⁴ <https://ionio.gr/en/>

¹⁶⁵ <https://uoi.gr/>

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https://www.statistics.gr/en/statistics?p_p_id=documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKKo4IN&p_p_lifecycle=2&p_p_state=normal&p_p_mode=view&p_p_cacheability=cacheLevelPage&p_p_col_id=column-2&p_p_col_count=4&p_p_col_pos=1&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKKo4IN_javax.faces.resource=document&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKKo4IN_in=downloadResources&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKKo4IN_documentID=586811&_documents_WAR_publicationsportlet_INSTANCE_qDQ8fBKKo4IN_locale=en

higher education institutions in north-western Greece. Table 2-74 provides an overview of their campuses, academic structure and scale of operation.

Table 2-74: Higher Education Institutions in the Study Area

HIGHER EDUCATION INSTITUTION	MAIN CAMPUS	OTHER CAMPUSES	ACADEMIC STRUCTURE	STUDENTS (2022/2023) / OTHER INFORMATION
Ionian University	Corfu	Kefalonia Lefkada Zakynthos	5 Faculties (12 academic departments): • Humanities • Information Science & Informatics • Music & Audiovisual Arts • Environment • Economic Sciences	• 7,958 undergraduate students • 1,090 postgraduate students • 716 doctoral students • 297 teaching The university awarded 520 undergraduate degrees, 205 postgraduate degrees and 31 doctoral degrees during the 2023/2024 academic year
University of Ioannina	Ioannina	Arta, Preveza, Igoumenitsa	10 Schools (23 academic departments): • Medicine • Engineering • Sciences • Health Sciences • Education • Economics • Fine Arts • Agriculture • Music • Informatics	• 28,109 undergraduate students • 1,233 postgraduate students • 1,779 doctoral candidates • 770 teaching staff During the 2023/2024 academic year, the University awarded 2,550 undergraduate degrees, 328 postgraduate degrees, and 105 doctoral degrees, confirming its role as the principal higher education institution serving north-western Greece

2.8.2 Transport infrastructure

2.8.2.1 Road network

In the Corfu Regional Unit, the road network consists of national, provincial, urban and local roads connecting Corfu Town with the main settlements, tourism areas, port facilities and Corfu International Airport. The principal road axes include National Road 24, connecting Corfu with Paleokastritsa, and National Road 25, connecting Corfu with the Achilleion area, supported by the wider island road network. Road traffic is strongly influenced by the concentration of activities around Corfu Town, the airport and the main port, as well as by seasonal tourism-related mobility during the summer period. Coastal and low-lying road sections are also considered sensitive to climate-related pressures, including flooding, sea-level rise and coastal erosion.

The Municipality of Igoumenitsa is connected to the regional and national road network of Epirus, with the Egnatia Odos motorway starting from Igoumenitsa and continuing eastwards through Thesprotia, Ioannina and Metsovo towards northern Greece. This connection gives Igoumenitsa a strategic role as the western road gateway of the Egnatia corridor, linking maritime transport from the Adriatic with the mainland road network. The local and regional road network also supports access to the Port of Igoumenitsa, surrounding settlements and coastal connections within Thesprotia. Transport infrastructure in the wider Igoumenitsa

area is also relevant in the context of climate adaptation, particularly in coastal and flood-prone areas associated with the lower Kalamas River, the Kalamas Delta and the Igoumenitsa coastal zone.

As previously mentioned, the Egnatia Motorway, a modern controlled-access highway, provides efficient and safe road connections between the area and Northern Greece, enabling short travel times and a high level of road safety.

Igoumenitsa is connected to the rest of Western Greece via the National Road, which terminates at the southern edge of the city.

A key feature of the land transportation network in the study area (see Figure 2-199) as it was first presented within the 2013 Study for the update of the Port of Igoumenitsa Masterplan, is the terminus of the Egnatia Motorway (yellow highlight in the Figure below running in a west to east direction) at the southern edge of the city of Igoumenitsa, where the new port is located.

This main road corridor connects to the Preveza–Igoumenitsa National Road and the Egnatia Motorway to the south, as well as to the old Igoumenitsa–Ioannina National Road to the north.

A network of smaller local roads provides access to the individual districts and neighborhoods of the city.

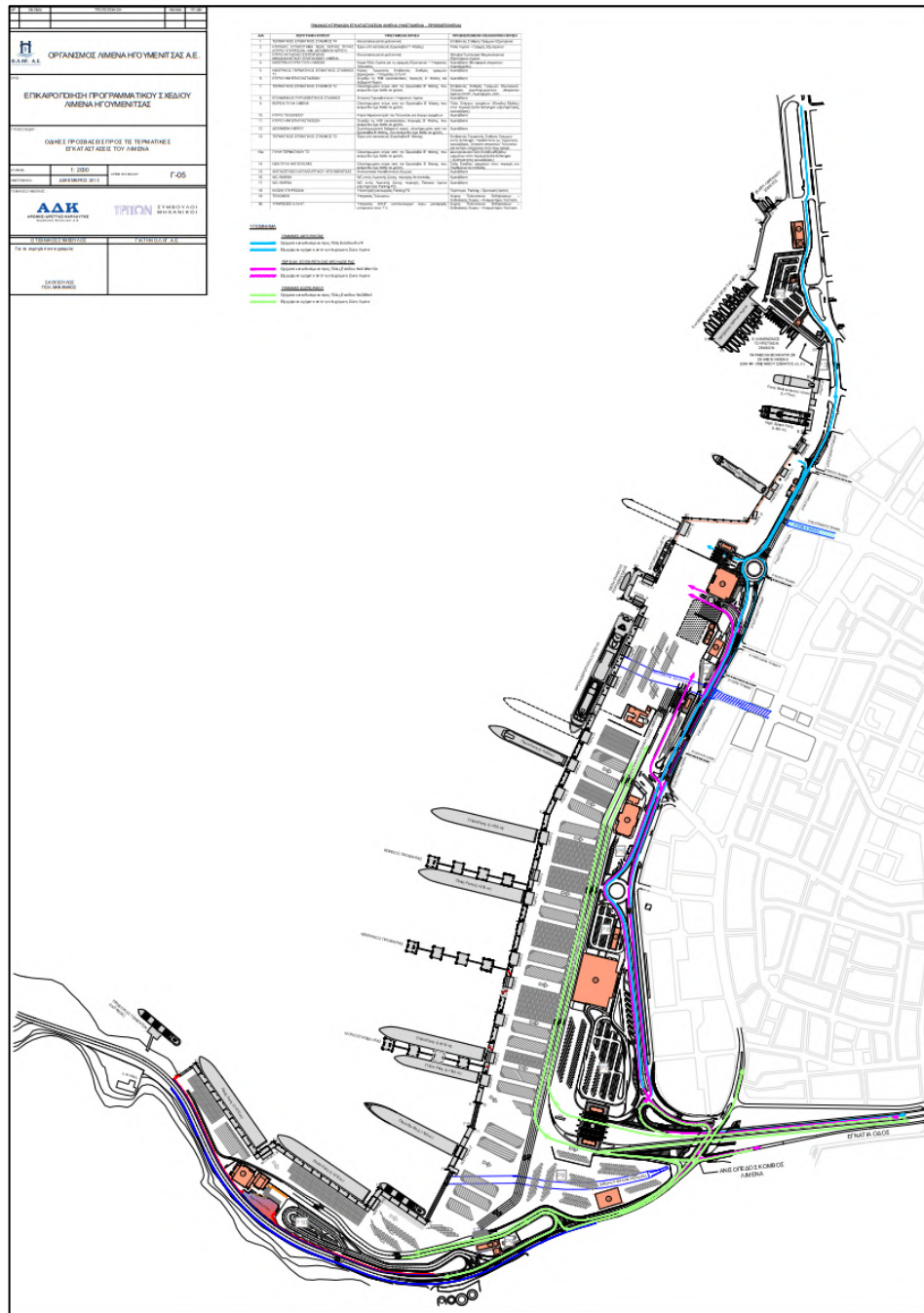


Figure 2-199: Road network of the Port of Igoumenitsa (Source: Study for the update of the Port of Igoumenitsa Masterplan in 2013)

2.8.2.2 Air connections

The Corfu Regional Unit is served by Corfu International Airport “Ioannis Kapodistrias”, which is one of the main air transport gateways of the Ionian Islands. The airport supports domestic and international air connections and plays a central role in the accessibility of the island, particularly during the tourist season. Its proximity to the urban and coastal zone of Corfu also makes it an important transport asset from both operational and climate-resilience perspectives.

The Municipality of Igoumenitsa does not have an airport within its administrative boundaries. Air access to the wider area is provided indirectly through regional airports, primarily Ioannina Airport, while Corfu International Airport may also provide complementary access when combined with ferry connections between Corfu and Igoumenitsa. As a result, air connectivity for Igoumenitsa is secondary to its road and maritime connectivity, with the municipality's transport role being primarily linked to the port and the Egnatia Odos corridor.

2.8.2.3 Port facilities

The Corfu Regional Unit includes an extensive network of port and coastal facilities serving passenger, tourism, recreational and local maritime functions. On Corfu Island, the main port facilities include the Port of Corfu, the Port of Lefkimmi and the Port of Kassiopi, while smaller facilities support local passenger movements, fishing, recreational boating and access to nearby islands and coastal destinations. The Port of Corfu is the main maritime gateway of the island, serving ferry, cruise and tourism-related traffic, while Lefkimmi provides an important connection between southern Corfu and the mainland through Igoumenitsa.

The Port of Igoumenitsa is the principal port facility of the Municipality of Igoumenitsa and one of the most important ports of western Greece. It is classified as a port of national significance and serves domestic and international passenger, vehicle and freight movements. The port supports ferry connections with Corfu, Lefkimmi, Paxoi and Patras, as well as international Adriatic ferry routes to Italy, including Ancona, Venice, Bari and Brindisi. Its direct connection to the Egnatia Odos enhances its function as a multimodal transport node linking maritime traffic with the national and trans-European road network.

2.8.2.4 Maritime traffic

Maritime traffic in Corfu is primarily associated with ferry connections to mainland Greece, local and inter-island passenger services, cruise calls, recreational boating and seasonal tourism-related movements. The Corfu-Igoumenitsa ferry connection is particularly important for the island's accessibility, supporting the movement of residents, visitors, vehicles and goods between Corfu and the mainland. Maritime activity shows a strong seasonal pattern, with increased passenger and tourism-related traffic during the summer period.

In Igoumenitsa, maritime traffic is a defining component of the municipality's transport profile. The port handles domestic ferry services to Corfu, Lefkimmi, Paxoi and other Greek destinations, together with international Adriatic routes to Italian ports. These services support passenger mobility, freight transport, Ro-Ro operations and logistics activity, reinforcing the role of Igoumenitsa as a key gateway between Greece, the Ionian Islands and the Adriatic corridor. Due to the port's location within a coastal and flood-sensitive area, maritime and associated port infrastructure also require consideration in relation to climate resilience, flood risk management and coastal adaptation planning.

EMODNET CENTRAL PORTAL

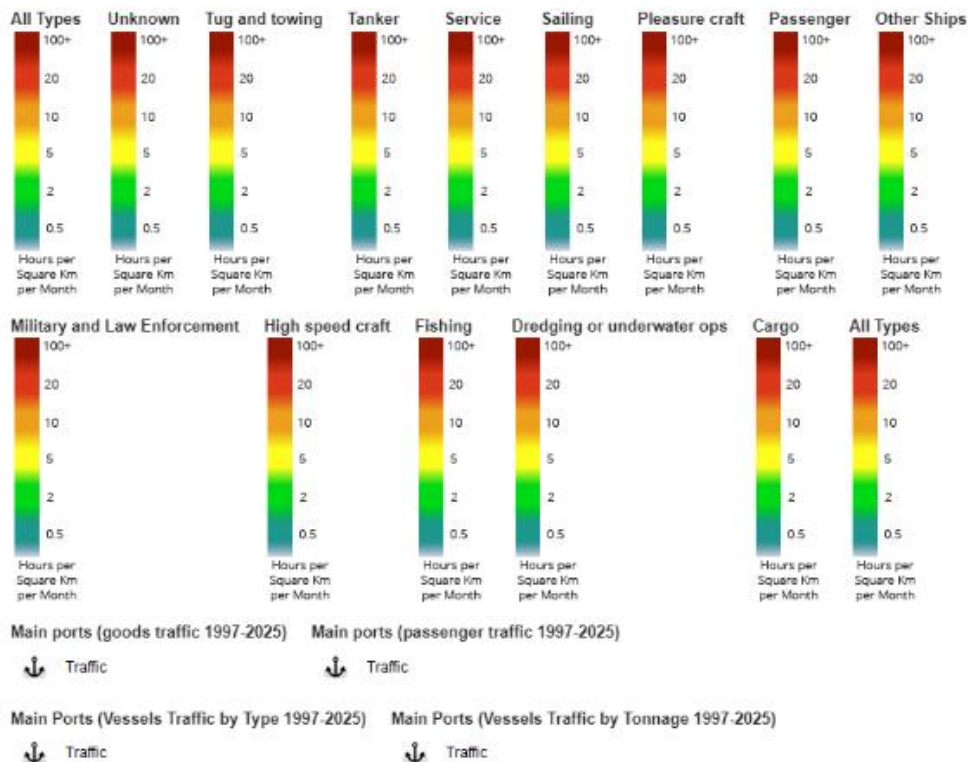
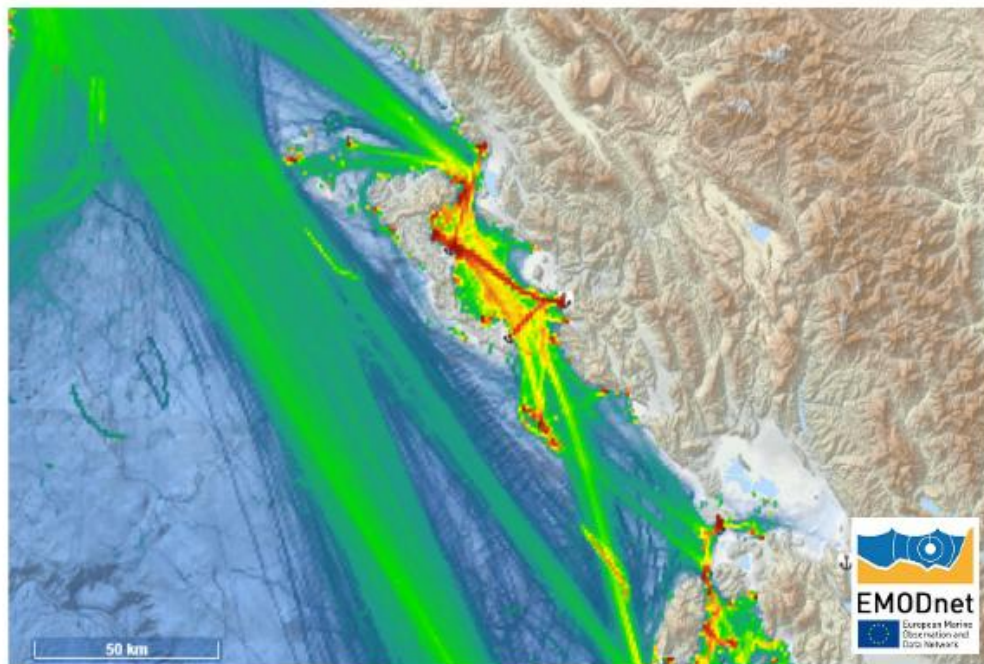


Figure 2-200: Vessels traffic in the wider project area (Source: <https://EMODnet.ec.europa.eu/geoviewer/>, June 2026)

Igoumenitsa appears to be a major traffic concentration point, as several routes start from or end at this port. Corfu also shows high traffic around the port area and its approaches, but the strongest density is observed along the sea corridor connecting Corfu with the mainland.

2.8.3 Technical and environmental infrastructure

2.8.3.1 Water supply

In the Corfu Regional Unit, water supply is provided through local municipal water supply networks and associated infrastructure, including distribution pipelines, pumping stations and storage facilities. Water resource management is linked to the Corfu-Paxoi River Basin, and the reliability of water supply is considered sensitive to seasonal demand, drought conditions and climate-related pressure on available water resources.

In the Municipality of Igoumenitsa, water supply is provided through the municipal distribution network and associated local water infrastructure. Regional planning for Epirus identifies the modernisation of water supply networks, leakage control and water-saving measures as priorities for improving water resource efficiency and long-term system resilience.

2.8.3.2 Wastewater management

In the Corfu Regional Unit, wastewater management is supported by existing wastewater treatment infrastructure, including wastewater treatment plants serving Corfu (EL222001012), Benitses (EL222003136), Moraitika (EL222009017) and Lefkimmi (EL222008013). These facilities form part of the wider wastewater management system of the Ionian Islands Region and are considered important environmental infrastructure, particularly in coastal and tourism-intensive areas.

The city of Igoumenitsa is served by a sewerage network. Wastewater is conveyed to the Wastewater Treatment Plant (WWTP) of Igoumenitsa (EL212001012), located at the western end of the Liotrivia peninsula (as shown in the Figure below), where it undergoes secondary treatment. The Wastewater Treatment Plant of Igoumenitsa operates under the approved Environmental Terms (A.E.P.O.) of the municipal sewerage and wastewater treatment system, published in the GG (FEK) in accordance with Law 4014/2011 and is the closest treatment plant to the Port of Igoumenitsa.

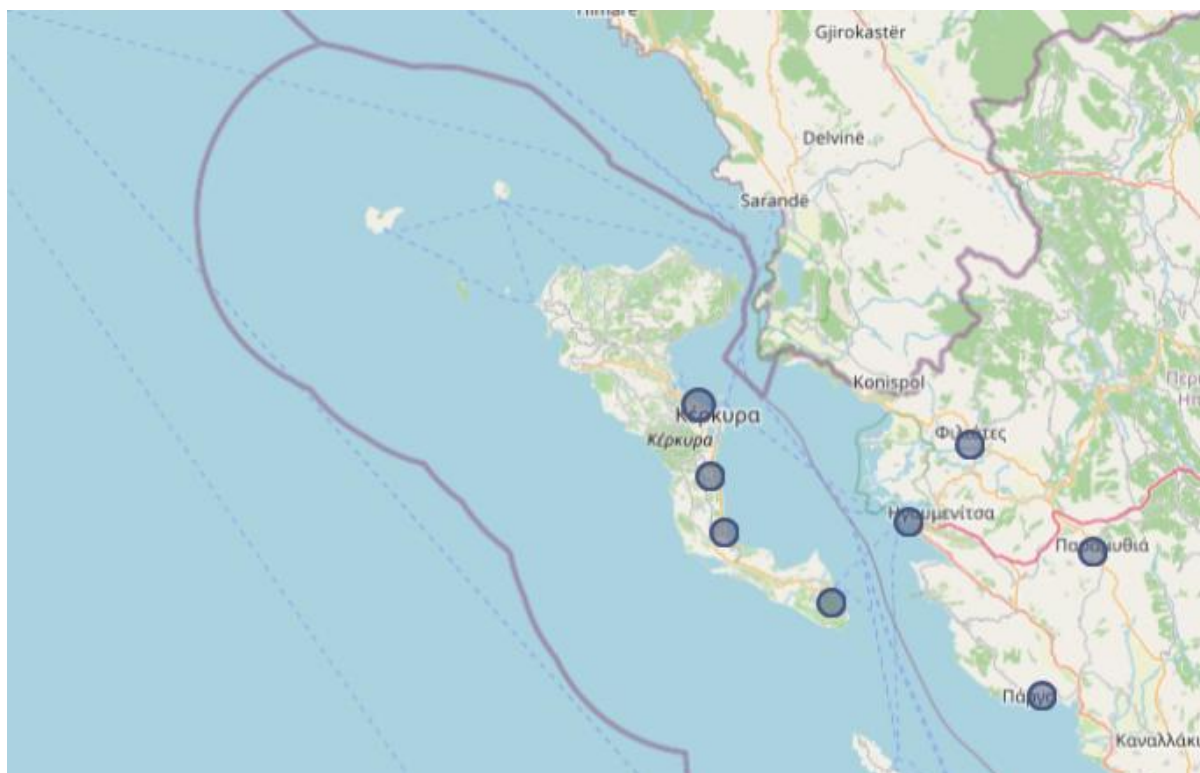


Figure 2-201: Wastewater treatment plants in Corfu and Igoumenitsa (Source: <https://astikalimata.ypeka.gr/wtp> , June 2026)

2.8.3.3 Solid waste management

In the Corfu Regional Unit, solid waste management is organised through regional waste infrastructure, including landfill facilities in Central and South Corfu and a recyclable materials sorting facility located within the Corfu landfill area. The regional waste management system also includes transfer and recycling infrastructure, with continued emphasis on improving waste separation, recycling and climate resilience of waste management facilities.

In the Municipality of Igoumenitsa, solid waste management forms part of the Regional Waste Management Plan for Epirus. The regional system includes waste transfer stations, treatment infrastructure for municipal solid waste serving all local authorities of the Region and planned composting infrastructure for biowaste management in the Igoumenitsa and Preveza Regional Units. Green Point infrastructure is also foreseen at municipal level, including in the main urban centres of Epirus.

2.8.3.4 Electricity - telecommunications - natural gas

2.8.3.4.1 Electric power transmission network

According to Article 2 of Law 4001/2011, the National Electricity Distribution Network (EDDIE) of the

Public Power Corporation (PPC S.A.) is located within Greek territory and consists of medium-voltage (MV), low-voltage (LV) lines, electricity distribution facilities, as well as high-voltage (HV) lines and facilities that have been integrated into this network.

The backbone of the Interconnected Transmission System, as shown in the following Figure, consists of three 400-kV double-circuit lines that transmit electricity primarily from Western Macedonia, which is the most important energy production hub in our country. Approximately 70% of the country's total electricity generation is produced in this region, which is then transmitted to the major consumption centres of Central and Southern Greece, where approximately 65% of the electricity is consumed.

The Interconnected Transmission System also includes 400-kV lines, as well as 150-kV overhead, underground, and submarine cables connecting Andros and the islands of Western Greece—Corfu, Lefkada, Kefalonia, and Zakynthos to the interconnected transmission system, as well as a 66 kV submarine interconnection between Corfu and Igoumenitsa.



Figure 2-202: Greek Interconnected Electricity Transmission System (Source: Χάρτης Γραμμών Μεταφοράς | ΑΔΜΗΕ, June 2026)

The Corfu Regional Unit and the Municipality of Igoumenitsa are both served by the Hellenic Interconnected Electricity Transmission System, operated by the Independent Power Transmission Operator (ADMIE/IPTO), together with the corresponding regional electricity distribution networks. According to ADMIE's transmission

line mapping, the Corfu Regional Unit is connected to the mainland electricity system through high-voltage infrastructure, including the Corfu I and Corfu II substations and associated submarine cable and overhead line connections. This infrastructure provides the upstream transmission capacity required to supply the island's distribution network and major demand centres, including urban areas, tourism-related facilities and transport infrastructure.

The Municipality of Igoumenitsa is connected to the electricity transmission system through the Igoumenitsa high-voltage substation, which forms part of the wider transmission network of Epirus and north-western Greece. This transmission infrastructure supports the local electricity distribution network serving the urban area of Igoumenitsa, the port zone, surrounding settlements and other local demand centres. At regional level, electricity infrastructure planning in Epirus is focused on maintaining and improving network reliability, supporting the integration of renewable energy generation and ensuring adequate capacity to meet future demand. In both Corfu and Igoumenitsa, the electricity transmission and distribution networks constitute critical infrastructure and may be sensitive to climate-related pressures, including extreme weather events, increased cooling demand and potential disruption to coastal or exposed network assets.

According to the “Greek Interconnected Electricity Transmission System: A Roadmap to 2032” charter, the following lines pass through the wider region of Corfu and Igoumenitsa:

- 150 kV overhead transmission lines in Corfu, connecting the Corfu, Agios Vasileios and Messonghi substations.
- 150 kV high-voltage submarine cable connections between Corfu and mainland Greece, via the Igoumenitsa/Thesprotia area.
- 150 kV overhead transmission lines in the mainland Igoumenitsa area, connecting the Igoumenitsa substation with the wider Epirus transmission system, including routes towards Ioannina and the southern coastal part of Epirus.
- Greece–Italy direct-current interconnection, shown as a submarine cable towards Galatina, Italy, with a corresponding direct-current transmission connection towards the Arachthos High-Voltage Centre.

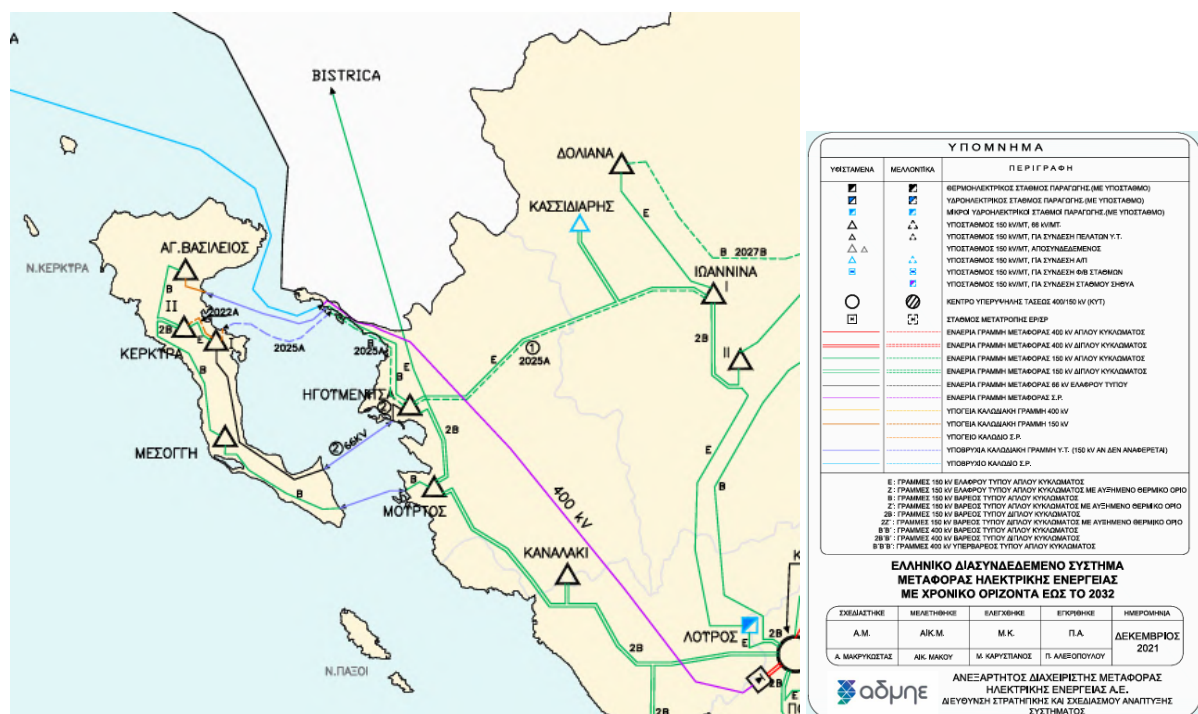


Figure 2-203: Map Excerpt from the “Greek Interconnected Electricity Transmission System: A Roadmap to 2032” in the broader project area (Source IPTO / ΑΔΜΗΕ)

2.8.3.4.2 Natural gas network

The Greek natural gas market is supplied primarily through Russia, Algeria, and Turkey by companies that hold a Supply License. The National Natural Gas Transmission System transports natural gas from the Greek Bulgarian and Greek Turkish borders to consumers located in mainland Greece.

As shown Figure 2-204, the National Natural Gas Pipeline System does not pass through either the Region of Epirus or the Region of the Ionian Islands; consequently, no section of the main pipeline or its transmission branches extends into the study area.

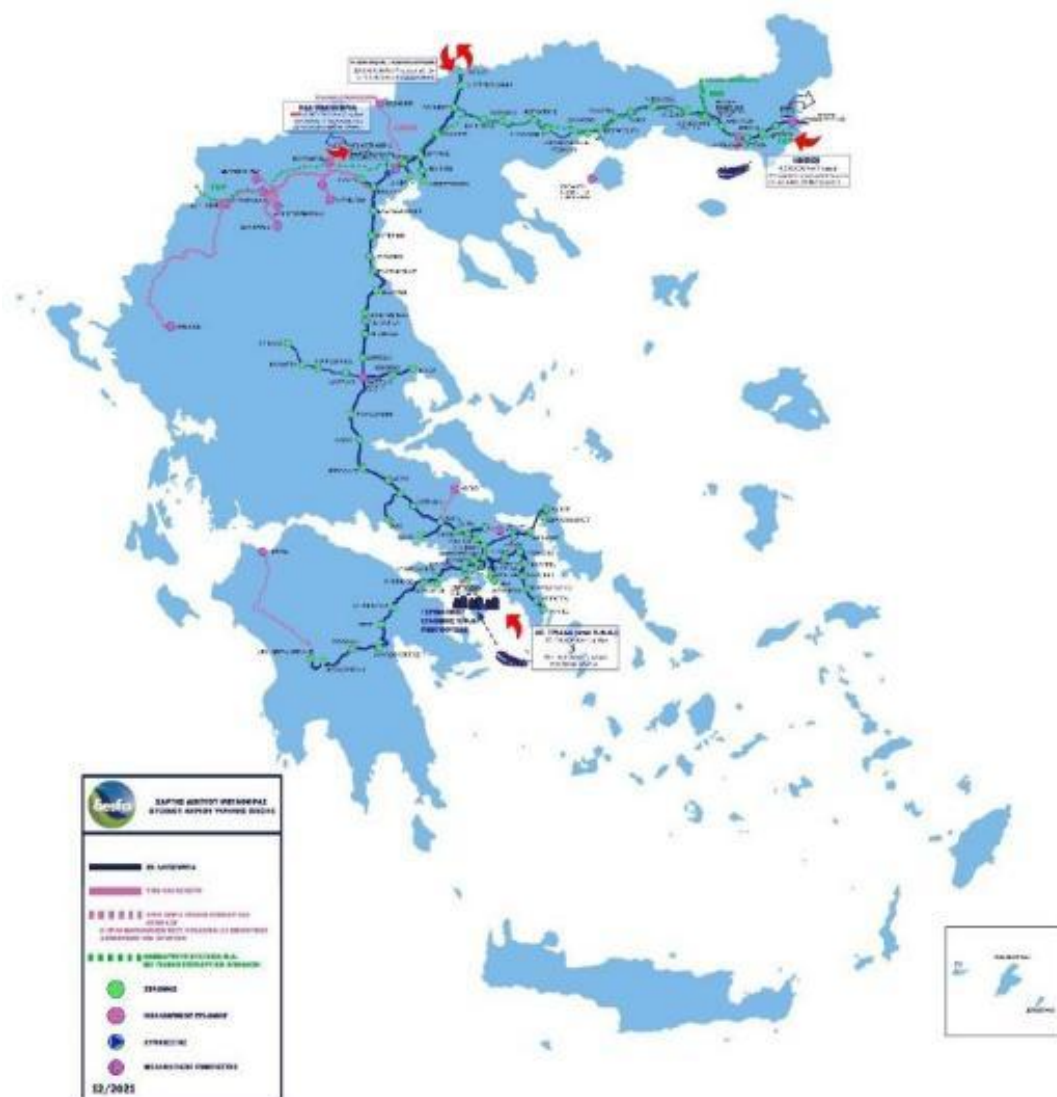


Figure 2-204: Natural Gas Distribution Network in Greece (Source ΔΕΣΦΑ)

2.8.3.4.3 Telecommunications network

The Corfu Regional Unit is served by established electronic communications infrastructure, including fixed-line, mobile and broadband networks, as well as terrestrial digital broadcasting services. Telecommunications infrastructure is particularly important in the island context, supporting residential areas, public services, tourism-related activities, transport infrastructure and emergency communications. Regional planning for the Ionian Islands identifies the strengthening of high-technology information and communication infrastructure, the expansion of tele-services and the wider deployment of fibre-optic networks as priorities for improving connectivity, addressing insularity constraints and enhancing territorial cohesion. Digital terrestrial television coverage is provided through the national Digea network, with coverage and transmitter-centre information available at settlement level.

In the Municipality of Igoumenitsa, telecommunications infrastructure forms part of the wider electronic communications network of the Region of Epirus and serves the urban area, the port zone, public services, businesses and surrounding settlements. The area is served by fixed and mobile telecommunications and internet networks, while regional development planning identifies digital connectivity, broadband infrastructure, fibre-optic networks and 5G deployment as priorities for improving regional accessibility and supporting digital transformation. These networks are considered important supporting infrastructure for the operation of the Port of Igoumenitsa, local economic activity and administrative services, and their continued upgrade is aligned with regional objectives for smart development and improved public and business services.

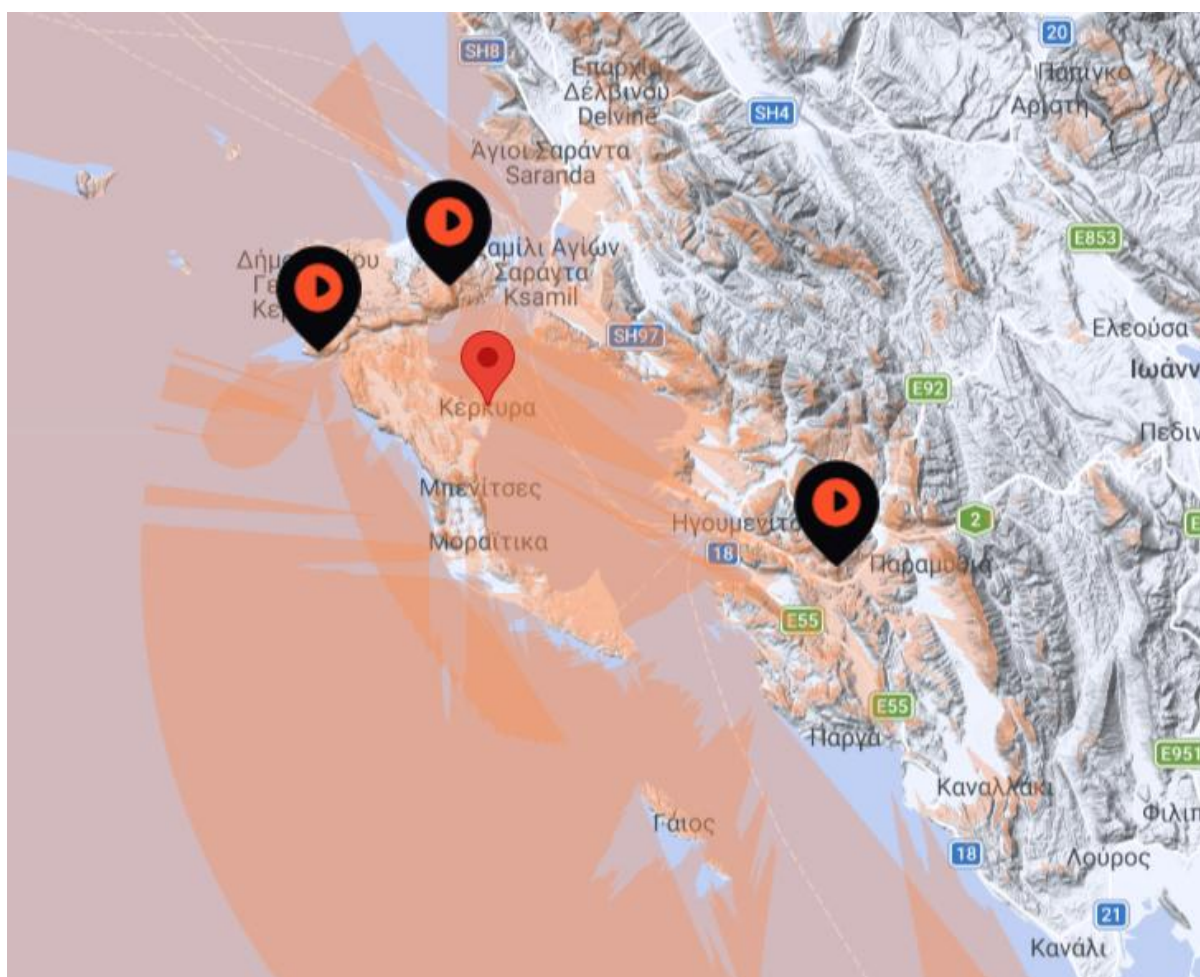


Figure 2-205: Coverage area of the television signal transmission center in the Corfu and Igoumenitsa region (Source: <https://www.digea.gr/el/hartis-kalypsis> , June 2026)

2.8.3.4.4 Renewable energy sources

Greece's energy system is influenced by the structure and needs of the national economy, the development of key productive sectors, prevailing patterns of energy consumption, and the country's integration into the European energy and environmental policy framework. In recent years, energy planning has increasingly been shaped by the objectives of decarbonisation, improved energy efficiency, diversification of supply, security of energy provision, and the transition towards low-carbon and renewable energy sources.

Figure 2-206 presents the total energy supply in Greece by source for the period 1990–2019. Throughout the period, oil remained the dominant energy source, while solid fossil fuels also accounted for a significant share of the national energy mix. Natural gas and renewable energy sources, including wind and solar, increased progressively during the 2000s, reflecting the gradual diversification of the Greek energy system. This trend was temporarily affected by the economic downturn after 2008, which reduced overall energy demand and slowed the expansion of some energy sources.

From approximately 2014 onwards, however, natural gas and renewable energy sources resumed an upward trend, indicating the gradual transition of the national energy system towards a more diversified and lower-carbon energy mix.

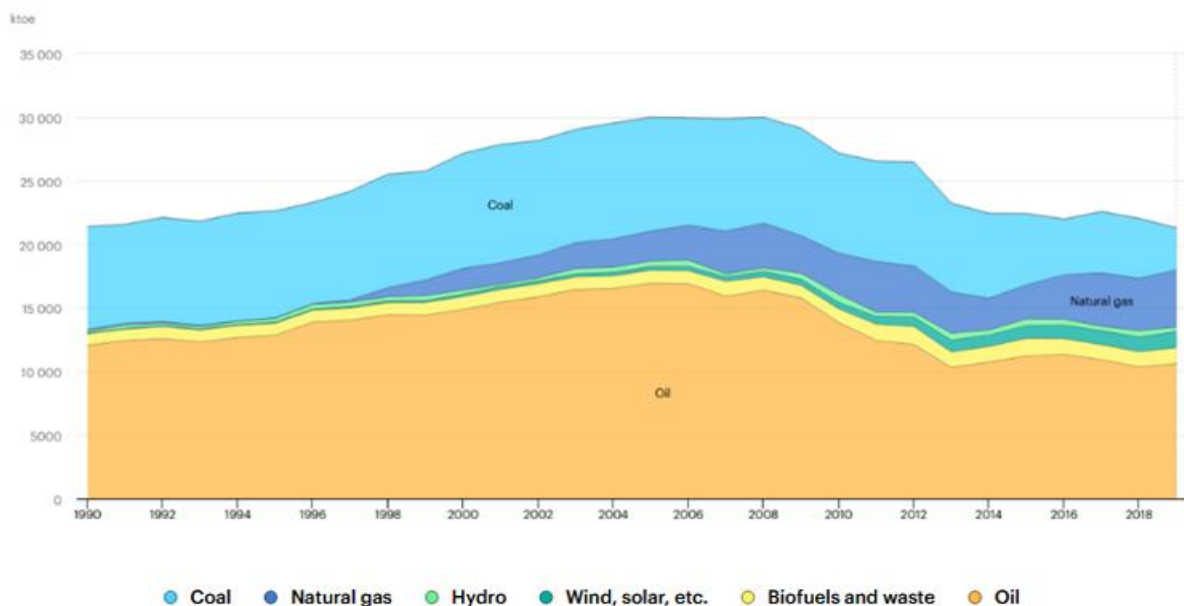


Figure 2-206: Total energy supply by source (Source: International Energy Agency (IEA) ,<https://www.iea.org/countries/greece>, June 2026)

According to the Hellenic Statistical Authority (ELSTAT), total petroleum product consumption in Greece reached 7.03 million metric tonnes in 2024, representing a 2.8% increase compared with 2023. At regional level, Epirus accounted for approximately 4.0% of national petroleum product consumption in 2024, corresponding to an estimated 281,000 metric tonnes. This reflects the region's petroleum demand

associated with road transport, heating, commercial activity, port-related operations and other local economic uses.

The Ionian Islands Region accounted for approximately 2.3% of national petroleum product consumption in 2024, corresponding to an estimated 162,000 metric tonnes. Although lower in absolute terms than Epirus, petroleum product demand in the Ionian Islands is influenced by the insular character of the region, tourism activity, maritime transport, local mobility and seasonal fluctuations in energy use. Overall, both regions represent relatively modest shares of national petroleum product consumption, with Epirus ranking above the Ionian Islands in terms of total regional demand.

According to data from the summary fact sheet on Renewable Energy Sources (RES) and High-Efficiency Combined Heat and Power (CHP) (ΣΗΘΥΑ) for January 2022, the following table presents the installed capacity of RES and CHP units in the Region of Epirus and in the Ionian Islands Region.

Table 2-75: Installed capacity of RES and HECHP units in the interconnected system, January 2022 (Source: DAPEEP Summary Information Bulletin on Renewable Energy Sources (RES) and High-Efficiency Combined Heat and Power (HECHP) PowerPoint Presentation)

REGION	TECHNOLOGY	ENERGY (MWH)	INSTALLED CAPACITY (MW)	LOAD FACTOR
EPIRUS	Photovoltaic stations	16,083	173.48	12%
	Onshore wind	27,371	106.00	35%
	Small hydropower plants	18,752	46.87	54%
	Biogas / biomass	3,552	5.92	81%
	HECHP	0.0	0.00	—
IONIAN ISLANDS	Photovoltaic stations	3,011	30.66	13%
	Onshore wind	22,774	118.00	26%
	Small hydropower plants	0	0.00	—
	Biogas / biomass	59	0.33	24%
	HECHP	0.0	0.00	—

The January 2022 data indicate that the Region of Epirus has a more diversified renewable energy profile than the Ionian Islands Region, with installed capacity distributed across photovoltaic, onshore wind, small hydropower, and biogas/biomass technologies. In contrast, the Ionian Islands Region is dominated by onshore wind energy, with a smaller contribution from photovoltaics and only marginal biogas/biomass capacity. Overall, Epirus has both higher total installed RES capacity and greater technological diversity, while the Ionian Islands Region relies mainly on wind energy and has no recorded small hydropower or HECHP capacity in the interconnected system.

2.9 Acoustic environment

The sources that generate sound in marine environment are both natural and anthropogenic. Natural sources of sound can be biotic (sound coming from living organisms like mammals, fish etc.) and abiotic (sound generated by wind, rain, earthquakes etc.).

Sounds generated by natural biotic sources (such as fish and marine mammals) usually have the following characteristics:

- They occur over an extremely broad frequency range and/or contain wide spectral content (from the very-low-frequency tonal calls of blue whales to the very-high-frequency clicks of echolocating dolphins).
- They are spatially very limited in extent (compared to a storm front) because they are generated by individual creatures.
- They occur over a short time because they are generated by individual creatures, although a pod of porpoises may “talk” endlessly.

Natural abiotic sources of sounds such as precipitation, seismic disturbances, or underwater volcanoes usually have the following characteristics (Bradley et al., 2008):

- They occur over a broad frequency range and/or contain wide spectral content.
- They have a wide distribution (tens to hundreds of miles).
- They may be generated over a long time (hours/days).

Anthropogenic sources of sound are generated by human activities like shipping, fishing activities, hydrocarbon exploration and military operations. These sounds can be prevailing (continuous, background noise) or intermittent (sounds that have a start and an end, creating alternating periods of sound and quiet) (Bradley et al., 2008):

- The contribution of shipping noise in the sea-lanes is twofold. At great distances a freighter is labeled as “Ocean Traffic” under the category of Prevailing Noise as seen in the left Figure 2-207. As the ship gets closer, its individual contribution rises above from of “Ocean Traffic” and becomes “Intermittent and Local Traffic” as seen in right Figure 2-207.
- Although the fishing industry makes use of smaller craft, the number of those vessels is very high. The vessels also add another source of noise, sonar devices, for locating fish. Sonar devices use high-intensity, short tonal bursts (pulses) of sound for their echolocation function.
- Another major source of sound in the sea comes from offshore petroleum exploration and exploitation. For seismic exploration, the seismic reflection profiling uses high-intensity sound to image the earth’s crust. It is the primary technique used by the energy industry for finding and monitoring reserves of oil and natural gas. Exploration is episodic and spatially limited, but the acoustic and seismic signals sent out are intense and cover a reasonably broad frequency range because short bursts of sound (firing of airguns) are used. Oil and gas activities that generate marine noise include drilling, offshore structure emplacement and removal, and production. The associated noise levels from drilling, structures, and production are typically lower than those from seismic surveying. Drill-ship noise comes from both the drilling machinery and the propellers and thrusters for station-keeping. Jack-ups are the most commonly used offshore drilling devices, followed by platform drill rigs. Drilling generates ancillary noise from the movements of supply boats and support helicopters. Emplacement of offshore structures creates localized noise for brief time periods. Powerful support vessels are used to transport these large structures from the point of fabrication to the point of emplacement. Additional noise is generated during oil production activities, which include borehole casing, cementing, perforating, pumping, pipe laying, pile driving, and ship and helicopter support (Hildebrand, 2009). An oil and gas exploration activity might generate Sound pressure Limit (SPL) between 119-127 dB re 1 µPa from oil drilling, and 131-135 dB re 1 µPa from pile driving activities. A drill vessel could generate an acoustic noise of 174-

185 dB re 1 μ Pa SPL, whereas seismic air-guns could even cause higher levels of SPLs over 240 dB re 1 μ Pa (Kuşku et al., 2018).

- Military equipment include a variety of sonar-based devices, like search sonars, acoustic homing devices for torpedoes, mine-hunting sonars, depth finders, obstacle avoidance sensors, and communication systems. Some sonar devices are classified as active and generate sound as part of their search process. Others are classified as passive and only receive. Active sonar systems generally are designed to project their sound beams in limited directions, both horizontally and vertically, because their purpose is to detect and localize potential targets. The lower the frequency of the sound is, the farther it travels before losing enough energy to become ineffectual. The lower-frequency military systems are used to detect other vessels, particularly submarines. When their aim is to detect small targets (e.g., fish), the frequency is increased and the special limits just mentioned become even more pronounced. Operations of military sonar systems often are episodic because they are used for training, experimentation, and systems development.

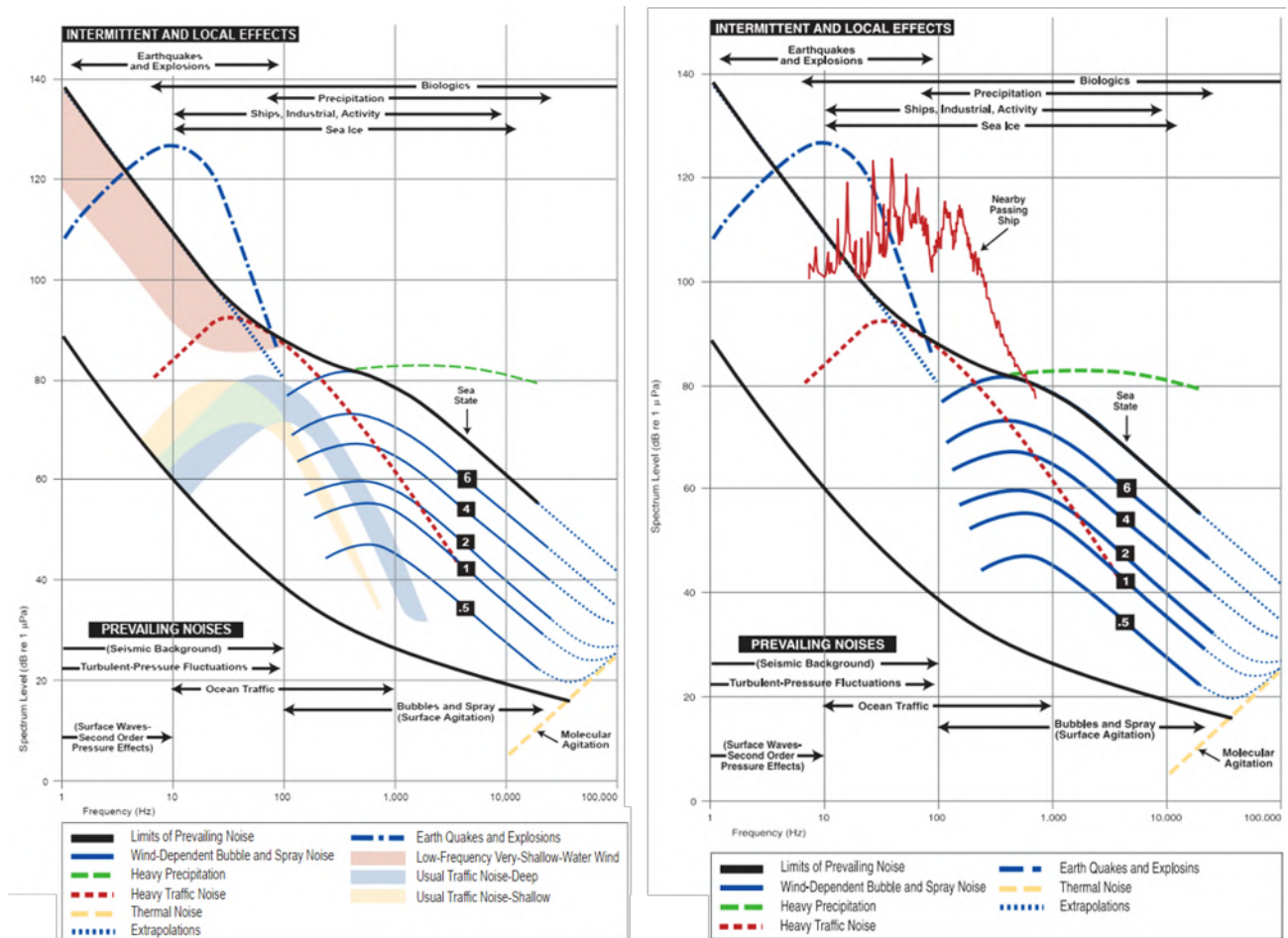


Figure 2-207: Prevailing (left) and intermittent (right) marine noises caused by ocean shipping traffic (Source: Bradley et al., 2008)

There are many additional sources of noise in the ocean that are anthropogenic. Some of these are shown in Figure 2-208. The actual list is long and varied. It includes, but is not limited to, high-speed watercraft, coastal development, and scientific experimentation.

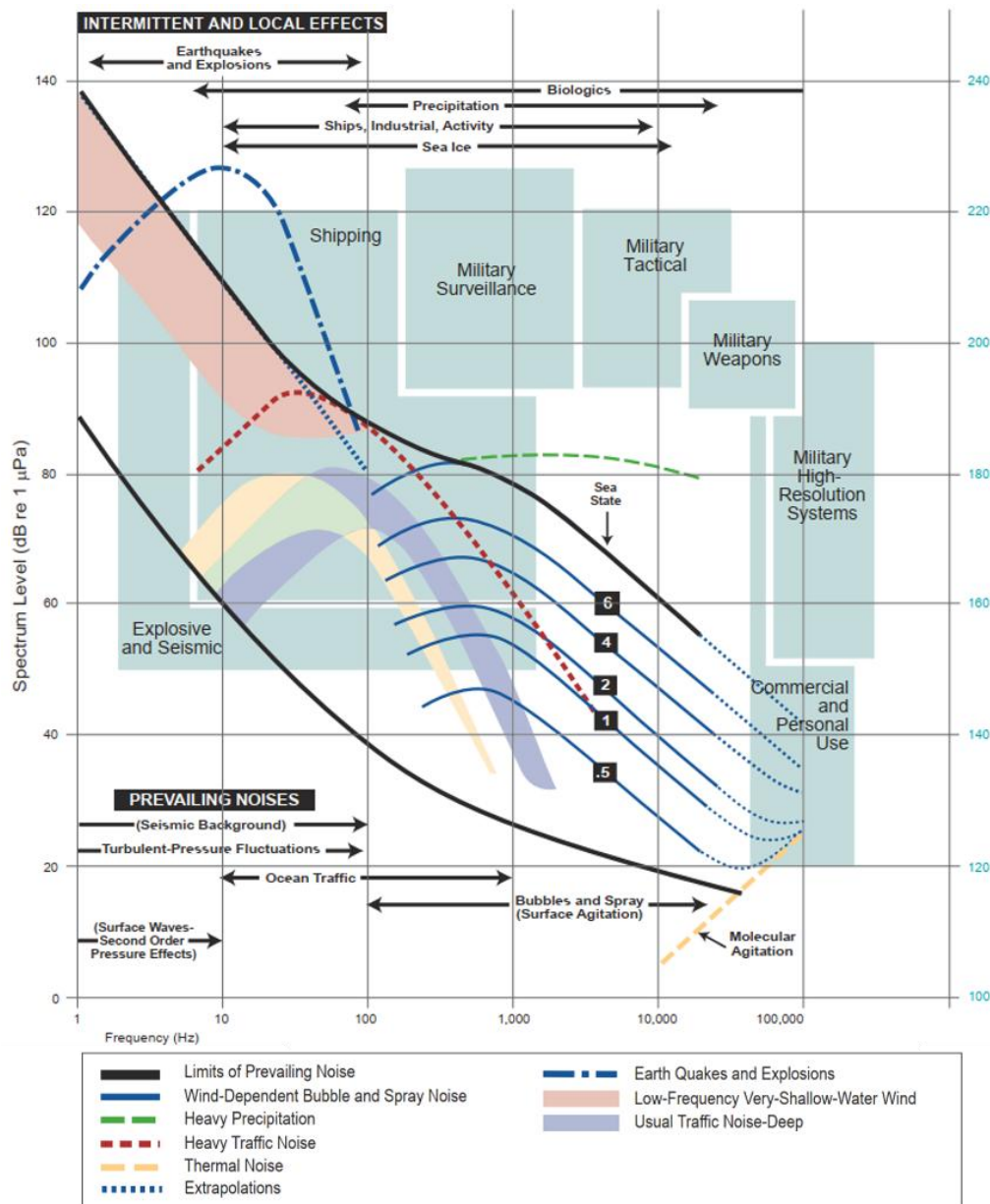


Figure 2-208: Sources of anthropogenic noise in marine environment (Source: Bradley et al., 2008)

Between 2016 and 2023, the Ionian Sea soundscape was monitored under the HELPE Marine Seismic Surveys initiative through a network of thirteen monitoring stations deployed in coastal areas surrounding Marine Protected Areas, extending from the southwestern Peloponnese to Corfu Island (Fakiris et al., 2023). The results, as presented in the Acoustic Data Analysis Report by Lighthouse (2025) (see Annex 05) authored by Fakiris et. al. 2023, indicate that the highest peak sound pressure levels (SPL_{peak}) were recorded in the Inner Ionian (129.2 dB re 1 µPa), followed by the South Ionian (127.7 dB re 1 µPa) and the North Ionian (127.1 dB re 1 µPa) (see Figure 2-209). The observed underwater noise levels were attributed primarily to commercial shipping activity, which is particularly intense in the Inner Ionian, while additional anthropogenic sources, including military operations and sonar use, also contribute to the regional soundscape.

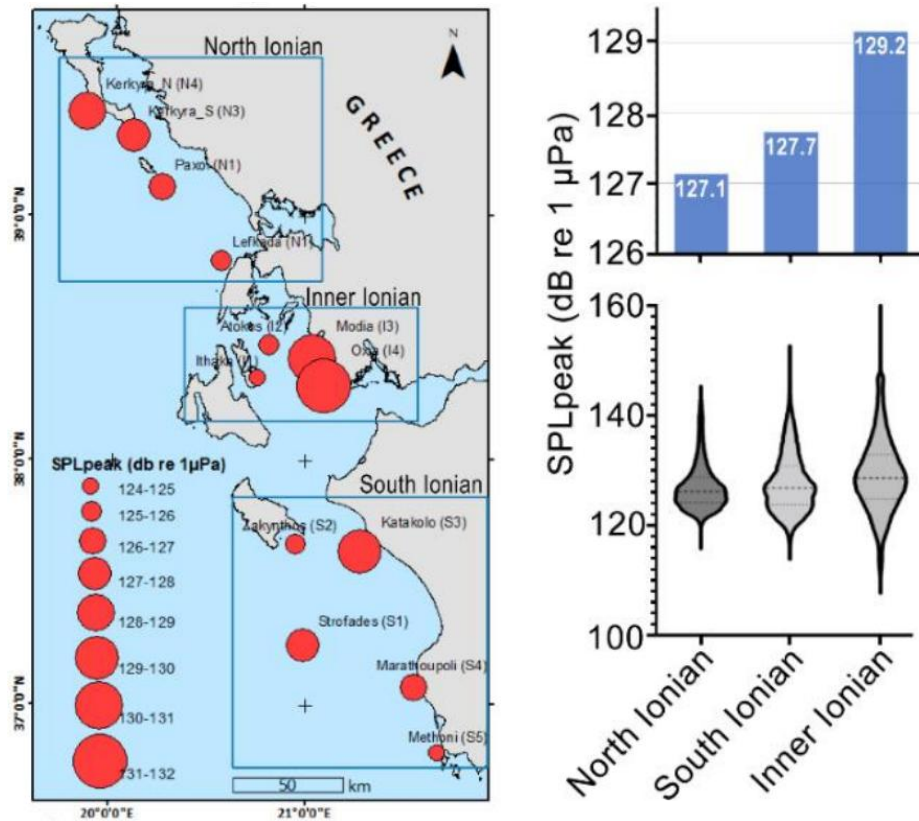


Figure 2-209: (a) Map showing the average SPLpeak for all recordings in each one of the 13 stations. (b) Bar-chart and violin plots comparing the SPLpeak value statistical distribution between the 3 ecoregions, i.e. N. Ionian, S. Ionian and Inner Ionian (Source: Fakiris et al., 2023)

Currently, the acoustic environment in the project area includes natural sources of sound, such as waves, wind, precipitation and marine animals. The non-natural human generated sources of sound include shipping, fishing activities and military exercises.

3 Environmental baseline survey – field report and data interpretation executive summary

3.1 Introduction

The ESBS for the proposed Exploration Well Asopus 1A is supported by a series of specialized technical studies, which are provided as annexes to this report. To acquire the required bathymetric, geophysical, and environmental data, Lighthouse SpA was commissioned by Energean to undertake a comprehensive suite of field surveys. These investigations were conducted through two main operational campaigns: the LOT 01 Geophysical Survey Campaign and the LOT 02 Environmental Survey Campaign.

3.1.1 LOT 01: Geophysical survey campaign

The LOT 01 field operations were carried out between 05.04.2026 – 27.04.2026. The mobilization of personnel and equipment commenced from the Port of Crotona, Italy. This campaign resulted in the preparation of several key technical studies:

- **Geophysical Survey Report (Annex 02)**, authored by Lighthouse SpA.
- **Report on possible Ruins of an Ancient Shipwreck (Annex 03A)**, initially documented by Lighthouse SpA. With regard to the possible ancient shipwreck ruins identified during the survey, a comprehensive **Archaeological Baseline Assessment Report (Annex 03B)** was prepared by the GeoSat ReSeArch Lab of the Foundation for Research and Technology Hellas – Institute for Mediterranean Studies (FORTH-IMS).
- **Current Meter Data Analysis Report (Annex 04)**, jointly authored by Lighthouse SpA and Bluemetocean Srl.
- **Acoustic Data Analysis Report (Annex 05)**, jointly authored by Lighthouse SpA and Bluemetocean Srl.

The methodology, results, and discussion presented below are derived from the technical reports prepared for these campaigns. The complete reports are provided as annexes to this study.

3.1.2 LOT 02: Environmental survey campaign

The LOT 02 Environmental Baseline Survey was undertaken to contribute to the characterization of the environmental and social baseline conditions within the wider Exploration Well Asopus 1A, integrating site-specific data collected during the survey.

The LOT 02 field operations were carried out between 14.03.2026 – 17.03.2026 and 23.03.2026 – 01.04.2026. The mobilization of personnel and equipment commenced from the Port of Crotona, Italy. Lighthouse S.p.A. was appointed by ENERGEAN to execute the full scope of work, while the laboratory EcoTechSystems Srl carried out the specific environmental survey activities. These activities included offshore sampling operations, management and coordination of the analytical program, data elaboration and interpretation, and preparation of the final reporting documentation.

Under the LOT 02 campaign, the following report was prepared:

- **Environmental Baseline Survey Report (Annex 06)**, authored by Lighthouse S.p.A. and EcoTechSystems Srl.

The methodology, results, and discussion presented below are based on the findings documented in the technical report prepared for this campaign. The complete technical report is provided as an annex to this study.

3.2 Survey design and methods

3.2.1 Geophysical survey campaign (LOT 01)

3.2.1.1 Survey platform, positioning, and AUV operations

The offshore geophysical survey and environmental baseline data acquisition were executed from the dedicated survey vessel M/V ECO ONE (Figure 3-1). All positions and coordinates for the survey were referenced to the World Geodetic System 1984 (WGS84) using the Universal Transverse Mercator (UTM) Zone 34 North projection. The vertical datum adopted for the final deliveries was the Lowest Astronomical Tide (LAT). The exact geodetic parameters governing the project are detailed in Table 3-1.

Table 3-1: Project projection parameters

PARAMETER	VALUE
Ellipsoid	World Geodetic System 1984 (WGS 84)
Semi-Major Axis	6,378,137 m
Grid Projection	Universal Transverse Mercator (UTM)
Grid System	UTM – Zone 34 North
Central Meridian (CM)	21
Latitude of Origin	0° Equator
Scale Factor on CM	0.9996



Figure 3-1: M/V ECO ONE

The primary focus of the survey was a 100.2 km² area encompassing the planned Asopus-1A exploration well. Due to the significant water depth in the Block 2 study area (ranging from 600 meters to 1,000 meters), high-resolution seabed mapping was primarily conducted using a Kongsberg HUGIN 4500+ Autonomous Underwater Vehicle (AUV) (Figure 3-2).



Figure 3-2: AUV Kongsberg HUGIN 4500

To satisfy the varied resolution requirements for geomorphological mapping and habitat ground-truthing, the AUV operations were divided into two distinct mission profiles (see Figure 3-3 for survey boundaries, Figure 3-4 for geophysical mission patterns, and Figure 3-5 for low-pass mission patterns):

- Geophysical survey (high-altitude): The primary acoustic mapping phase was conducted at an altitude of approximately 40m above the seabed. The mission utilized a line plan featuring 150m inline spacing and 1,000m crossline spacing, accumulating a total of 773 linear kilometers.
- Low-Pass imaging survey: To visually ground-truth potential biocenoses and investigate cultural heritage targets, the AUV descended to an altitude of 5-7m. It executed tightly spaced 50m x 50m “box-in” grids with a highly dense 3m line spacing across 17 specifically designated sampling stations.

A summary of these mission requirements is presented in Table 3-2.

Table 3-2: AUV geophysical survey requirements

SURVEY AREA	BOX SIZE	MAIN SENSORS	LINE SPACING (INLINE/CROSS)	AUV ALTITUDE	LINES NO. (INLINE/CROSS)	TOTAL LINEAR KM
LOT01	100.2 km ²	HISAS + SBP + MBES + MAG	150 m / 1000 m	~40 m	49 / 14	773 km
Lowpass	37.5 km ²	CATHX + MAG + SBP + MBES	3 m	~5–7 m	17 / NA	14 km

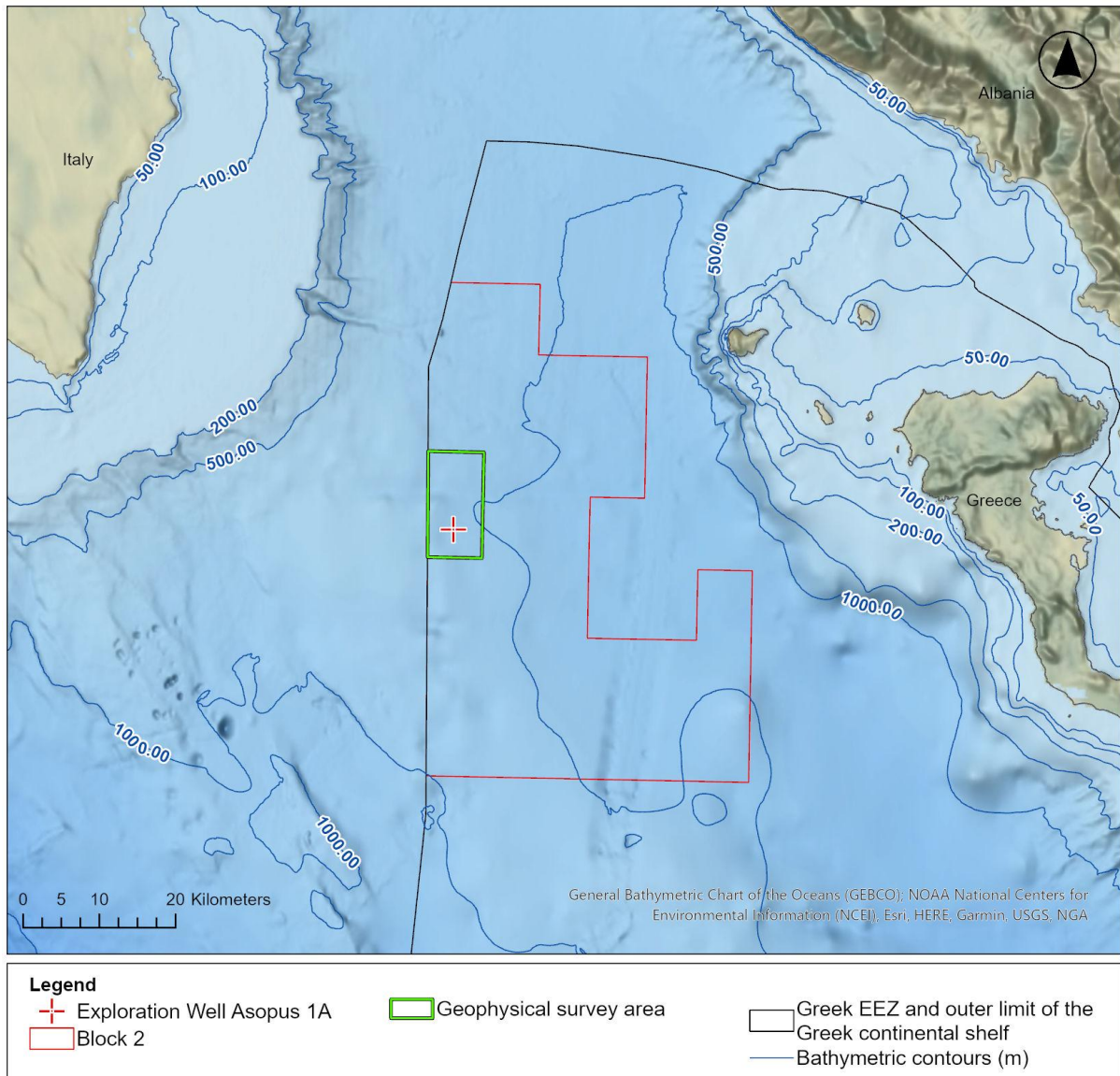


Figure 3-3: LOT 01 Geophysical survey area

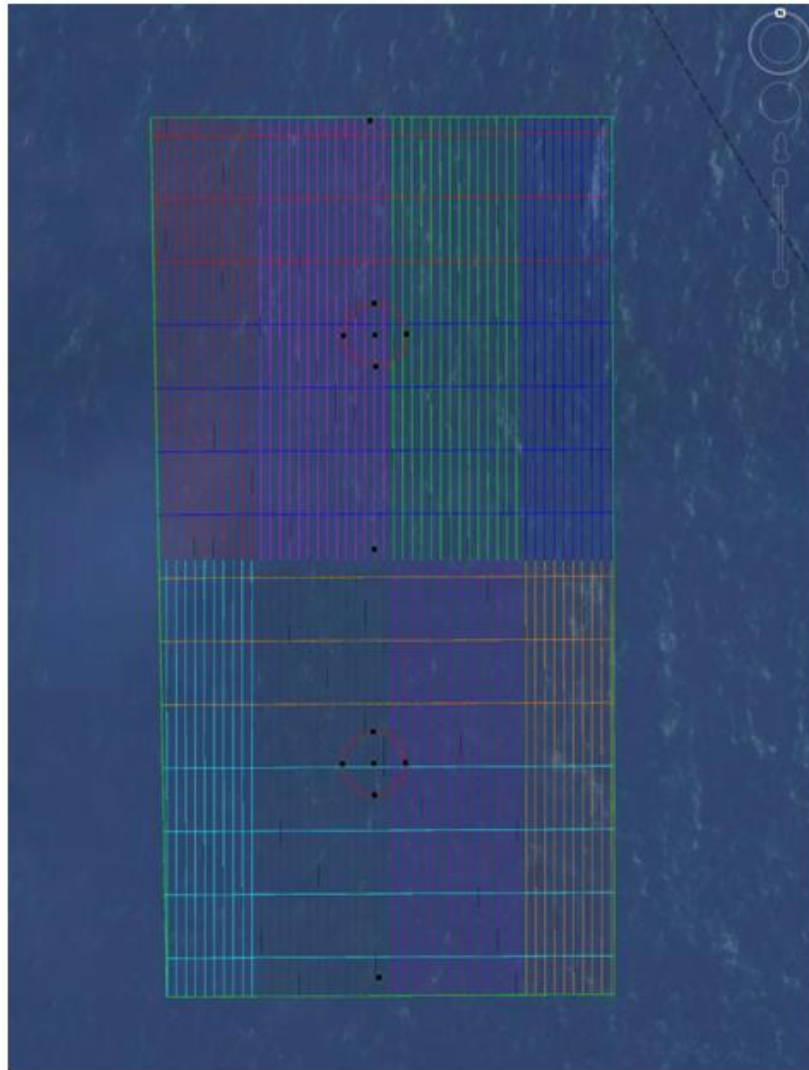


Figure 3-4: Line plan with AUV geophysical mission patterns

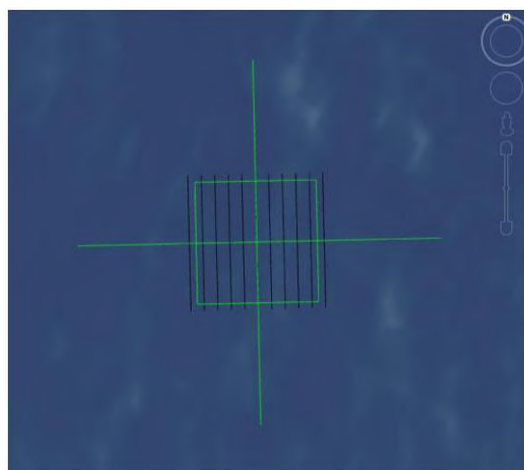


Figure 3-5: Example of line plan with AUV Low-Passes mission pattern

3.2.1.2 Geophysical and environmental sensors

During its missions, the HUGIN AUV utilized a comprehensive, synchronized suite of geophysical, optical, and environmental sensors to characterize the seabed and shallow stratigraphy, as detailed in Table 3-3.

Table 3-3: AUV HUGIN 4500 plus sensor payload

EQUIPMENT TYPE	NAME AND MANUFACTURER
Inertial Measurement Unit	Kongsberg Seatex MGC-R3
Depth Sensor	Paroscientific Digiquartz 8000
Altimeter	Kongsberg Mesotech 1007D
Forward Looking Sonar	Imagenex 837A "Delta T"
Acoustic Doppler Velocity Log	Nortek DVL500
Multibeam Echosounder (MBES)	Kongsberg Maritime EM2040
Interferometric Synthetic Aperture Sonar (HISAS)	Kongsberg Maritime HISAS 1032
Sub Bottom Profiler (SBP)	Edgetech DW-216
Magnetometer (MAG)	Ocean Floor Geophysics OFG-SCM
Still Color Camera	CathX Fast Fly Still 48.5°
Laser Camera	CathX M12 L1000 F1.4
SVP/CTD Probe	SAIV SD208
Methane Sensor	Franatech METS CH4
Turbidity Sensor	Seabird Wetlabs FLNTU(RT)D

The primary remote sensing instruments included:

- **Multibeam Echosounder (MBES):** Bathymetry was captured using a Kongsberg EM2040 system, providing greater than 20% spatial overlap and yielding a 2m Digital Terrain Model (DTM) bin size.
- **Side Scan Sonar (SSS):** High-definition seabed imagery and reflectivity were acquired using a Kongsberg HISAS 1032 (100 kHz) interferometric Synthetic Aperture Sonar, generating 200% area coverage with a 5cm range independent accuracy.
- **Sub-Bottom Profiler (SBP):** An EdgeTech DW-216 Chirp system operating at low frequencies (2-16 kHz) was used to map shallow sub-surface geology.
- **Magnetometer:** An Ocean Floor Geophysics OFG-SCM-Ti6000 self-compensating magnetometer was actively utilized to detect magnetic anomalies and ferrous metallic objects with a 1nT resolution.
- **Environmental sensors:** The AUV was fitted with a Seabird WETLABS FLNTU(RT)D sensor to measure localized chlorophyll fluorescence and turbidity, alongside a Franatech METS CH4 sensor utilized to continuously measure dissolved methane concentrations.

3.2.1.3 Visual inspection and imaging (CATHX)

During the low-altitude passes, ultra-high-definition optical data was gathered to visually map benthic habitats and archaeological targets. The AUV's optical payload included a downward-facing Cathx Fast Fly Color Camera (with a 48.5° field of view) and a Cathx M12 Laser Profiler configured to capture dense 3D point cloud data of the seafloor topography simultaneously with the optical imagery.

Following data acquisition, raw sensor data was subjected to specialized post-processing sequences. Optical imagery from the CathX Camera was processed using CLARITY Software to apply Flat Field Correction (FFC) and orthorectification, before being imported into GLOBAL MAPPER to check overall quality and export the final georeferenced mosaics.

3.2.1.4 Oceanographic and acoustic monitoring (mooring line)

An integrated mooring line for oceanographic and acoustic monitoring was deployed offshore in the Ionian Sea, halfway between Italy and Corfu at coordinates 333412.13 mE, 4374226.35 mN (see Figure 3-6 and Figure 3-7). The deployment commenced on 05.04.2026, and the system was successfully recovered 27.04.2026.

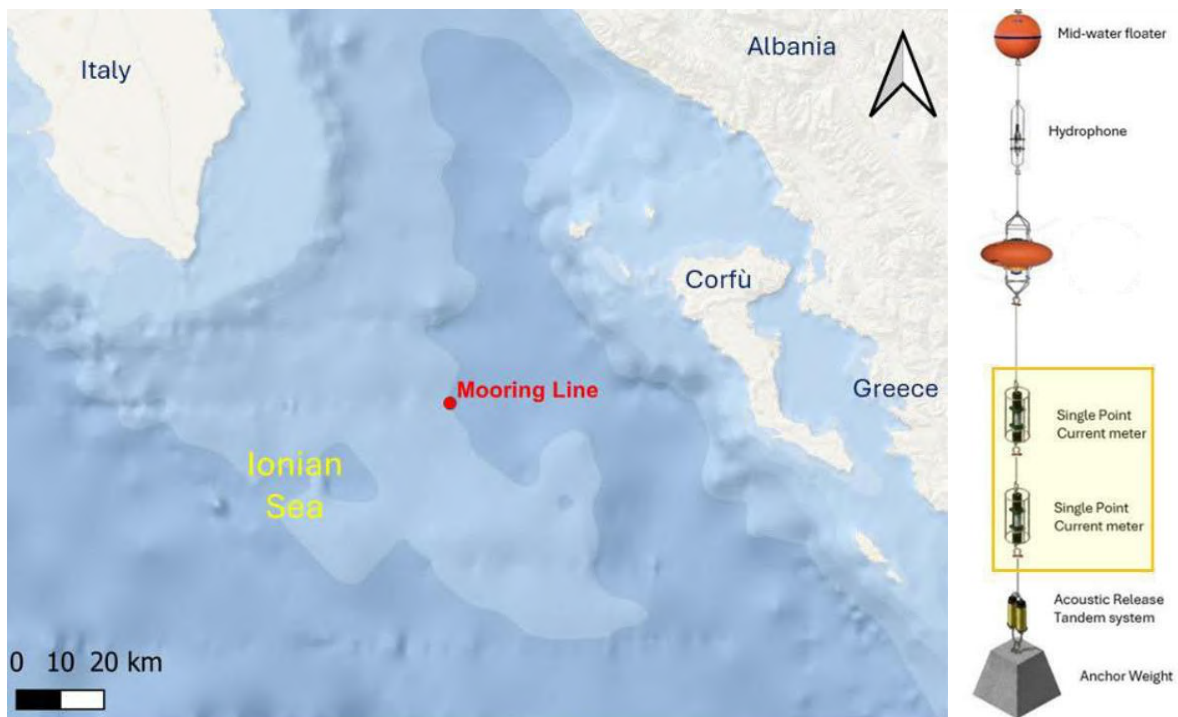


Figure 3-6: Geographical location of the mooring line for oceanographic and acoustic monitoring

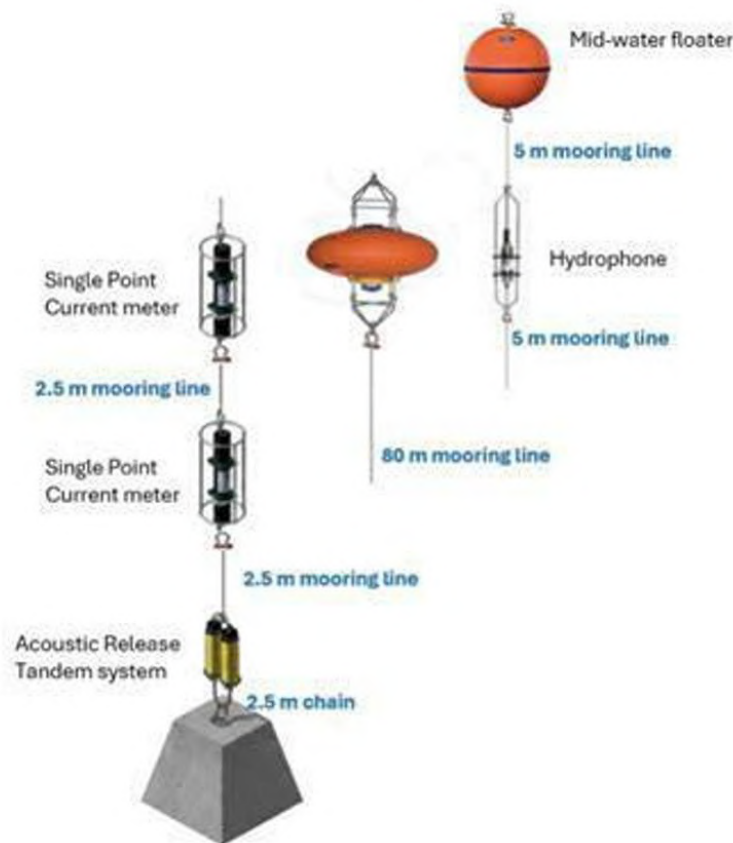


Figure 3-7: Sketch showing the position of the two single point current meters

The mooring system integrated the following equipment:

- Acoustic Doppler Current Profiler (ADCP): A downward-looking Signature 55kHz long-range ADCP was mounted in an elliptical buoy 100m above the seafloor to profile current speed and direction.
- Single point current meters (SPCM): Two Nortek Aquadopp current meters were positioned at approximately 12m (upper) and 7m (lower) above the seabed. These sensors measure water velocity using the physical principle of the Doppler effect. Both were configured with a sampling interval of 10 minutes and an internal averaging interval of 3 minutes.
- Passive Acoustic Monitoring (PAM) system: Positioned approximately at 96.7 m from the seabed level to define a baseline of the soundscape of the area and study the temporal presence of marine mammals. This system consisted of a CO.L.MAR. GP1190 broadband hydrophone and an RTSYS Sylence-LP autonomous low-power sound recorder.

Acoustic data acquisition started on 06.04.2026, and recordings were acquired continuously up to 24.04.2026, 2026, when the mooring line was recovered. The continuous recording setting yielded a total of 1,467 files of 1200 seconds in a .wav format, acquired at a sampling rate of 256 kHz.

Upon recovery of the mooring line, the two single point current meters (SPCM) datasets underwent also rigorous automated physical and instrument-based data QC. This process checked for missing values, error codes, excessive instrument tilt, temporal spikes, rapid rate-of-change anomalies, and pressure discontinuities. Data was flagged using standard oceanographic conventions (1 = good, 2 = probably good,

3 = suspect, 4 = bad, and 9 = missing), and the final database retained only data flagged as good or probably good.

3.2.1.5 Passive Acoustic Monitoring

As already mentioned, for the identification of biological sounds and the presence of marine mammals, a PAM system has been deployed along a mooring line from 06.04.2026 until 27.04.2026. Based on the project's Acoustic Data Analysis Noise Report prepared by Bluemetocean and Lighthouse (June 2026) (see Annex 05) the PAM system was positioned approximately at 96.7 m from the seabed level to define a baseline of the soundscape of the area and study the temporal presence of marine mammals. This system consisted of a CO.L.MAR. GP1190 broadband hydrophone and an RTSYS Sylence-LP autonomous low-power sound recorder.

Table 3-4 presents the setting of the PAM system as laid.

Table 3-4: Setting of the PAM system

EQUIPMENT	SETUP	VALUE
GP 1190 & SYLENCE LP	Sampling Rate	256 kHz
	Bit Depth	24-bit
	Gain	15 dB
	High Pass Filter	3 Hz
	Duty Cycle	100%
	Recoding Rate	Continuous
	Recording Interval	Continuous

The data collected were analyzed using PAMGuard, an open-source, modular software framework that keeps a “human-in-the-loop” for reviewing and selecting bio-acoustic signals. The analysis was divided into 2 separate stages: i) preliminary analysis, including noise monitoring, click and whistle detection, ii) detailed analysis of the detected clicks, involving the setting of a proper Click Classifier based on scientific literature.

Before detailed processing, the entire dataset was reviewed for errors. The data was found to be error-free, except for the first and last deployment days (April 6th and April 27th). These days were discarded from the analysis due to acoustic interference from operational vessels and deployment/recovery operation.

The preliminary analysis processed the sound recordings using frequency band filters and basic detection modules without applying specific species classifiers. For effective analysis, the data were divided into two sets of frequency bands: i) high-frequency 2-48 kHz for detecting odontocetes and ii) low-frequency (1 Hz – 1kHz) for detecting mysticetes (mainly fin-whale).

Each band was analyzed for the sounds of an appropriate subset of species or sources, as described below (see Annex 05):

- High - frequency (2-48 kHz) for detecting odontocetes: The task consisted of processing the sound recordings in PAMGuard using frequency band filters and the Basic Click Detector module without any classifiers, with aim of having an overview of the soundscape at such a deepwater site.

- Low - frequency (1 Hz – 1 kHz) for detecting mysticetes (mainly fin whale): The task consisted of processing the sound recordings in PAMGuard using frequency band filters and the Basic Whistle & Moan Detector module, for detecting calls from fin whales.

To visualize the acoustic data, frequency spectra were calculated for all data using a time average of 60 seconds. These data, called Long-Term Spectral Averages (LTSAs), provide a compressed spectrogram view allowing efficient visual examination of long datasets. During this task, LTSAs were examined for each day of deployment to inspect the automatic detections of marine mammal and anthropogenic sounds. Through this visual scanning of LTSAs, a subset of days was identified in which the spectra showed clear tracks of bioacoustic signals to be further investigated in the subsequent tasks.

Following the preliminary analysis, a detailed classification of detected acoustic signals was conducted through the usage of the PAMGuard Classifier in combination with QC and statistical analysis through MATLAB scripts. Clicks detected by the Basic Click Detector during the preliminary analysis were re-analyzed through a prioritized hierarchical set of four classifiers properly defined to identify clicks of biological origin and classify them according to the mammal species expected in the area. The classifiers were prioritised as follows:

- 30-50 kHz Upsweep, designed to detect the up-sweep characteristic in clicks from Cuvier's beaked whales using the zero crossing parameter,
- 2-15 kHz Peak, developed to identify sperm whales (*Physeter macrocephalus*),
- 15-30 kHz Peak, designed for other odontocetes as Risso's dolphins and striped dolphins,
- 30-50 kHz Peak, developed for Cuvier's beaked whales for which the up-sweep click characteristic was not present or detectable.

The classified results went through a final post-processing step using a custom MATLAB script to reduce false detections according to expected Inter-Click-Interval (ICI) values. Single clicks or tight click clusters were discarded, and verified clicks were grouped as encounters considering a biological valid minimum time gap of 8 minutes for sperm whales and 3 minutes for other odontocetes.

Following the preliminary classification of these biological acoustic signals, the acquired datasets were further utilized to evaluate the broader anthropogenic soundscape. Analysis for assessing the baseline underwater noise measured during the PAM survey was conducted according to the Marine Strategy Framework Directive (MSFD) and industry standard practices. Under MSFD guidance, underwater continuous low-frequency anthropogenic noise is assessed using sound pressure levels measured in the one-third octave bands centered at 63 Hz and 125 Hz, which represent the dominant frequency range of commercial shipping noise—considered the principal source of chronic underwater noise in many European marine waters.

3.2.1.6 Marine mammal mitigation protocols

To minimize potential acoustic disturbance to marine mammals and other sensitive marine fauna, the survey strictly adhered to mitigation procedures adapted from the JNCC and ACCOBAMS guidelines. The core protocols implemented during the AUV operations mandated a continuous 120-minute pre-watch monitoring period prior to any deployment. This pre-watch was conducted visually during daylight hours and supplemented by PAM during nighttime or periods of poor visibility.

During operations, a fixed Exclusion Zone (EZ) with a 750-meter radius around the acoustic source was established and actively monitored. If a marine mammal was detected within this EZ, delayed operations were strictly enforced; the AUV launch was postponed until the animal cleared the zone, followed by an additional mandatory waiting period of 30 minutes for most species, or 80 minutes for deep-diving beaked whales.

Furthermore, a 16-minute soft-start procedure was implemented for the Sub-Bottom Profiler (SBP) while the AUV hovered approximately 40 meters above the seabed, allowing any marine life to leave the area before full acoustic power was reached.

PAMGuard software was used for real-time acoustic detection and data acquisition.

3.2.2 Environmental survey campaign (LOT 02)

3.2.2.1 Sampling design

The environmental baseline survey utilised a total of 16 sampling stations. The sampling strategy was designed with a central station located at the exact Asopus-1A well centre, surrounded by stations at a 500 m radius, along with designated blank stations further out. Furthermore, a northern area was studied using this same spatial logic. The sampling plan and the distribution of the sampling stations are described below (see Figure 3-8).

Asopus-1A station group– Water sampling stations (Physicochemical parameters, eDNA, Phytoplankton, Zooplankton)

- D1a: central station, located at the exploration well centre.
- D3a: 500 m north of the well centre, along the prevailing current direction.
- D5a: 500 m south of the well centre, along the prevailing current direction.
- D6a: blank station, approximately 2 km south of the well centre.
- D6b: blank station, approximately 2 km north of the well centre.

Asopus-1A station group– Sediment sampling stations (Physico-chemical parameters, Microplastics, Macrozoobenthos, AUV mosaics for biocenotic support)

- D1a: exploration well centre station.
- D2a (East), D3a (North), D4a (West) and D5a (South): stations located 500 m from the well centre and positioned along two orthogonal transects, each station corresponding to one of the four cardinal directions.
- D6a: blank station located approximately 2 km south of the well centre.
- D6b: blank station located approximately 2 km north of the well centre.

Northern station group - Water sampling stations (Physico-chemical parameters, eDNA, Phytoplankton, Zooplankton)

- D1b: central station, 6.8 km north of Asopus-1A.
- D3b: 500 m north of the central station, along the prevailing current direction.
- D5b: 500 m south of the central station, along the prevailing current direction.
- D7b: blank station approximately 2 km north of the central station.

- D6b: blank station approximately 2 km south of the central station.

Northern station group - Sediment sampling (Physico-Chemical parameters, Microplastics, Macrozoobenthos, AUV mosaics for biocenotic support)

- D1b: central station, 6.8 km north of Asopus-1A.
- D2b (East), D3b (North), D4b (West) and D5b (South): stations located 500 m from the central station, positioned along two orthogonal transects, each station corresponding to one of the four cardinal directions.
- D7b: blank station located approximately 2 km north of the central station.
- D6b: blank station located approximately 2 km south of the central station.

Three additional Reference stations were included to characterise baseline environmental conditions in areas unaffected by planned extraction activities: Othonoi Ref, Kerkyra Ref, and Italy Ref. The Othonoi Ref and Kerkyra Ref stations, located towards the Greek coastlines of Othonoi Island and Corfu, respectively, and the Italy Ref station, located towards the southern Apulian coast of Italy, were sampled following the same standardised protocol.

Water-column sampling was performed at each of the selected seawater survey locations, namely D1a, D3a and D5a (Asopus-1A station group), D1b, D3b and D5b (northern station group), D6a, D6b and D7b (Blank Stations), and Othonoi Ref, Kerkyra Ref and Italy Ref (Reference Stations). At each station, vertical water-column profiles were acquired and water samples for chemical analyses and phytoplankton community assessment were collected at three discrete depths:

- 1 m below the surface (or simply “Surface”);
- mid-depth (or simply “Middle”);
- 1 m above the seabed, or at the closest safe distance achievable where required to prevent contact with the substrate and safeguard equipment integrity (hereinafter referred to as “Bottom”).

At the same locations, Zooplankton was sampled via vertical net tows in the upper 200 m of the water column, and eDNA samples were collected at the bottom depth.

Sediment sampling was performed at all survey stations, including D1a – D5a (Asopus-1A station group), D1b – D5b (northern station group), D6a, D6b and D7b (Blank Stations), and Othonoi Ref, Kerkyra Ref and Italy Ref (Reference Stations), following a standardised protocol. At each station, a single sediment sample was collected for physico-chemical characterisation, while two replicate samples were collected for benthic community analyses.

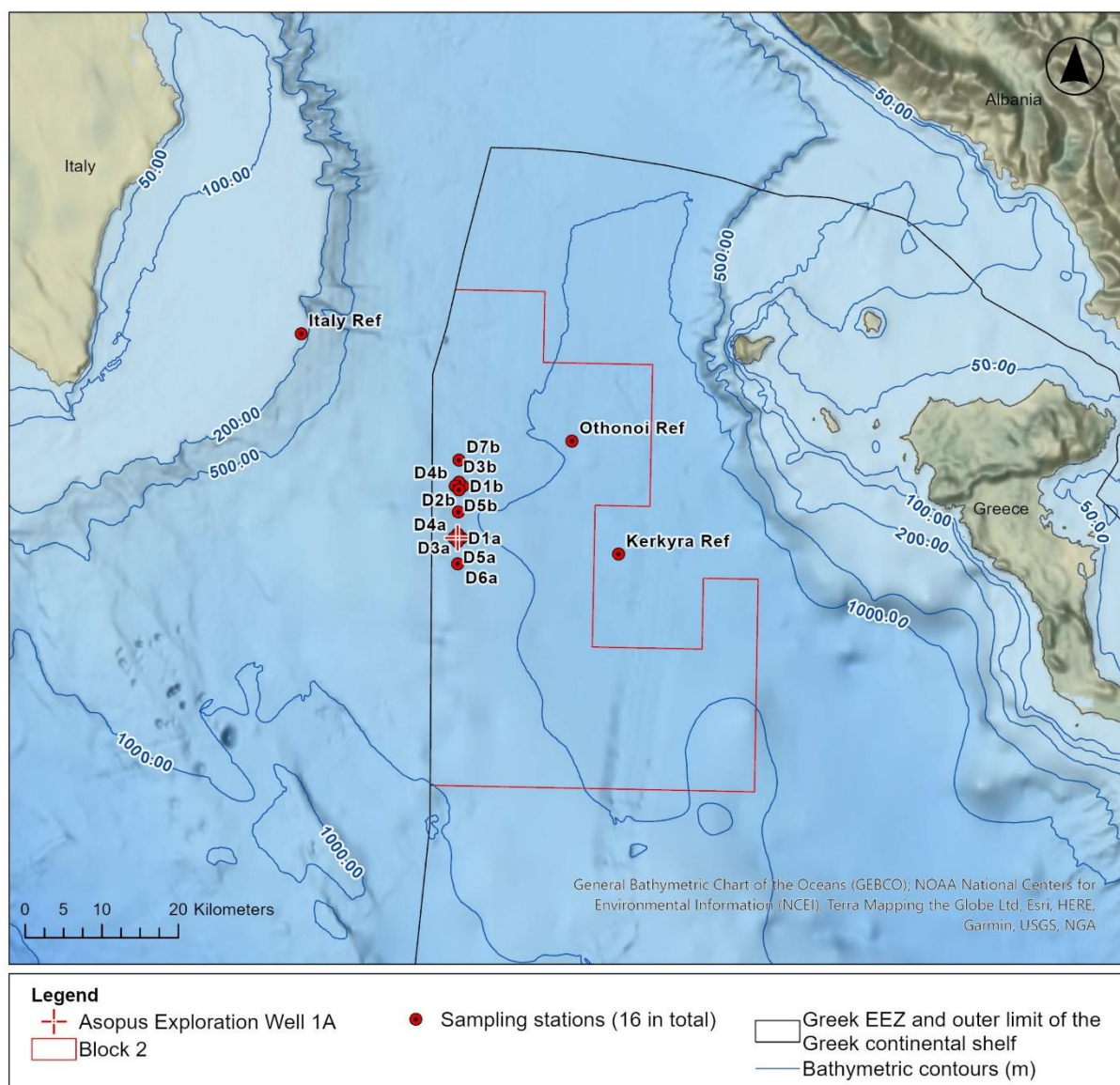


Figure 3-8: LOT02 sampling stations

The coordinates of all sampling stations are reported in Table 3-5.

Table 3-5 – Theoretical and real coordinates of sampling stations of Asopus-1A (Datum: WGS84, Projection: UTM zone 34N)

MATRIX	STATION ID	DEPTH [M]	DATE [DD/MM/YYYY]	THEORETICAL COORDINATES [WGS84-UTM34N]		REAL COORDINATES [WGS84-UTM34N]	
				EASTING [M]	NORTHING [M]	EASTING [M]	NORTHING [M]
Seawater and Plankton *including eDNA	D1a	820.96	30/03/2026	324729.00	4388004.00	324731.39	4388001.68
	D3a	816.32	30/03/2026	324729.00	4388504.00	324737.94	4388494.76
	D5a	818.23	30/03/2026	324729.00	4387504.00	324733.47	4387503.21
	D6a	822.14	30/03/2026	324729.00	4384619.00	324733.40	4384624.90
	D1a	825.8	26/03/2026	324729.00	4388004.00	324714.79	4387992.35

MATRIX	STATION ID	DEPTH [M]	DATE [DD/MM/YYYY]	THEORETICAL COORDINATES [WGS84-UTM34N]		REAL COORDINATES [WGS84-UTM34N]	
				EASTING [M]	NORTHING [M]	EASTING [M]	NORTHING [M]
Sediment and Macrozoobenthos	D2a	831.6	26/03/2026	325229.00	4388004.00	325209.48	4387995.14
	D3a	816.3	27/03/2026	324729.00	4388504.00	324718.19	4388485.56
	D4a	823.6	27/03/2026	324229.00	4388004.00	324222.30	4387989.69
	D5a	832.2	25/03/2026	324729.00	4387504.00	324707.39	4387497.13
	D6a	842.9	25/03/2026	324729.00	4384619.00	324699.00	4384602.25
Seawater and Plankton *including eDNA	D1b	828.23	30/03/2026	324907.00	4394772.00	324909.29	4394768.78
	D3b	822.54	30/03/2026	324907.00	4395272.00	324910.18	4395246.28
	D5b	816.71	30/03/2026	324907.00	4394272.00	324905.12	4394243.06
	D6b	804.55	30/03/2026	324818.00	4391388.00	324819.37	4391370.63
	D7b	826.18	29/03/2026	324907.00	4398157.00	324897.32	4398131.39
Sediment and Macrozoobenthos	D1b	830.6	28/03/2026	324907.00	4394772.00	324898.36	4394747.61
	D2b	839.8	28/03/2026	324907.00	4394772.00	325419.76	4394759.63
	D3b	835.0	28/03/2026	324907.00	4395272.00	324913.68	4395263.14
	D4b	820.5	28/03/2026	324907.00	4394772.00	324401.81	4394758.96
	D5b	825.1	28/03/2026	324907.00	4394272.00	324896.83	4394243.34
	D6b	811.0	28/03/2026	324818.00	4391388.00	324814.41	4391363.63
	D7b	833.3	29/03/2026	324907.00	4398157.00	324903.07	4398121.82
Seawater and Plankton *including eDNA	Othonoi-Ref	922.42	31/03/2026	339643.00	4400634.00	339636.13	4400659.16
	Kerkyra-Ref	1095.36	31/03/2026	345736.00	4385893.00	345721.30	4385919.90
	Italy-Ref	145.00	27/04/2026	304317.00	4414647.00	304313.65	4414649.24
Sediment and Macrozoobenthos	Othonoi-Ref	1065.04	31/03/2026	339643.00	4400634.00	339632.45	4400663.55
	Kerkyra-Ref	1134.16	31/03/2026	345736.00	4385893.00	345716.40	4385915.53
	Italy-Ref	145.00	27/04/2026	304317.00	4414647.00	304312.00	4414652.43

Ichthyoplankton sampling was carried out in accordance with the standard survey protocol to complete the characterisation of the local pelagic ecosystem. Three oblique transects, each approximately 1 km in length, were conducted: two located approximately 500 m east of the Asopus-1A well sites (TR1a) and northern station group (TR1b) and one located approximately 500 m east of the shared Blank station D6b. The coordinates of all ichthyoplankton transects are reported in Table 3-6.

Table 3-6: Theoretical and real coordinates of ichthyoplankton transects (Datum: WGS84, Projection: UTM zone 34N)

TRANSECT ID	DEPTH [M]	DATE [DD/MM/YYYY]	START/END	THEORETICAL COORDINATES [WGS84-UTM34N]		REAL COORDINATES [WGS84-UTM34N]	
				EASTING [M]	NORTHING [M]	EASTING [M]	NORTHING [M]
TR1a	131.47	30/03/2026	Start	325236.68	4387422.36	325236.68	4387422.36
		30/03/2026	End	325262.40	4388075.17	325262.40	4388075.17
TR1b	117.19	30/03/2026	Start	325399.89	4394210.39	325399.89	4394210.39

TRANSECT ID	DEPTH [M]	DATE [DD/MM/YYYY]	START/END	THEORETICAL COORDINATES [WGS84-UTM34N]		REAL COORDINATES [WGS84-UTM34N]	
				EASTING [M]	NORTHING [M]	EASTING [M]	NORTHING [M]
		30/03/2026	End	325411.34	4394924.75	325411.34	4394924.75
TR6b	118.88	30/03/2026	Start	325293.24	4390847.24	325293.24	4390847.24
		30/03/2026	End	325300.08	4391316.48	325300.08	4391316.48

3.2.2.2 Seawater and plankton methodology

3.2.2.2.1 Physicochemical characteristics of the water column (CTD Profiling)

At each water sampling station, a vertical profile of the water column was obtained using a Sea-Bird Electronics SBE19 Plus multi-parameter probe. The instrument was lowered at a descent rate of ≤ 0.5 m/s to allow the sensors to adjust, continuously recording the parameters during the descent. Salinity and depth were calculated as derived parameters following standard UNESCO procedures. The probe recorded the following specific parameters:

- Conductivity: Range 0 – 9 S/m; Resolution 0.00005 S/m; Accuracy ± 0.0005 S/m.
- Temperature: Range -5 to +35 °C; Resolution 0.0001 °C; Accuracy ± 0.005 °C.
- Pressure: Range 0 – 7000 m; Resolution 0.002% of full scale; Accuracy $\pm 0.1\%$ of full scale.
- pH: Measured via AMT Analysenmesstechnik sensor; Range 2 – 11; Resolution 0.01; Accuracy ± 0.05 .
- Dissolved Oxygen (DO): Measured via SBE 43 sensor; Resolution 0.01% of saturation; Accuracy $\pm 2\%$ of saturation.
- Fluorescence (Chlorophyll-a): Measured via Seapoint sensor; Resolution 0.0003 $\mu\text{g/l}$; Accuracy ± 0.003 $\mu\text{g/l}$.
- Turbidity: Measured via Seapoint sensor; Range < 750 FTU; Resolution 0.03 FTU; Accuracy ± 0.05 FTU.
- Water transparency: Measured independently at each station using a Secchi disk.

3.2.2.2.2 Chemical characteristics of seawater

Water quality sampling was performed using a General Oceanics Model 1018 (MWS12) Rosette multi-sampler, equipped with twelve 5-litre Niskin bottles. Seawater was collected at three depths: 1 m below the surface, mid-water, and 1 m above the seabed. The Niskin bottles were rinsed with ambient seawater prior to sampling to prevent mixing materials between stations.

Water aliquots were transferred directly from the Niskin bottles to specific containers, preserved, and analysed by the laboratory with the following methods and limits of quantification (LoQ):

- Total Suspended Solids (TSS) & TOC: TSS stored in 1000-mL containers at 4 °C (7 days holding); analyzed via APHA 2540 D (LoQ 5 mg/L). TOC stored in 500-mL plastic bottles at -20 °C (28 days holding); analyzed via UNI EN 1484 (LoQ 1 mg/L).
- Nutrients: Total Nitrogen (TN), Total Phosphorus (TP), Orthophosphate, Ammoniacal nitrogen, Nitrous nitrogen, and Nitric nitrogen stored in 500-mL plastic bottles at -20 °C (28 days holding). Analyzed via UNI EN ISO 20236, ISO 17294-2, and APHA 4500 methods.

- Metals and Metalloids (Al, As, Ba, Cd, Cr tot, Cu, Co, Fe, Pb, Hg, Ni, Sn, Zn): Preserved with HNO₃ (pH <1) in 100-mL plastic bottles at 4 °C (1 month holding); analyzed via ISO 17294-2:2023 (LoQ 0.5-5 µg/L).
- Hydrocarbons (TPH and PAHs): Light fractions (C6-C10) preserved with HCl (pH <2) in 40-mL glass vials (28 days holding); Heavy fractions (C10-C40) and 16 Priority PAHs stored in 1-L amber glass bottles at 4 °C (7 days holding),. Analyzed via EPA 5021 A, 8015 C, 3510 C, and 8270 E methods.

3.2.2.2.3 eDNA in bottom seawater (fish communities)

To characterize local fish communities (including commercial and non-commercial teleost fish, marine vertebrates, and cephalopods) without the need for bottom trawling, 3-litre seawater samples were collected exclusively from the near-bottom depth. Samples were filtered onboard through 180 µm nylon and 0.45 µm PES filters. The filters were folded, placed in 2 mL tubes, and frozen in the dark at -20 °C (90 days holding time). The laboratory (FEM2-AMBIENTE Srl) extracted DNA using Qiagen PowerWater, performed multi-marker PCR amplification targeting marine fauna (using MiFish, MarVer3, and Ceph18S markers), sequenced the results on an Illumina MiSeq platform, and assigned taxonomy using BLAST against reference databases such as NCBI GenBank and MitoFish.

3.2.2.2.4 Phytoplankton methodology

Phytoplankton was sampled from the Niskin bottles at the three target depths, preserved in 500-mL amber glass bottles with a 2% Lugol's iodine solution, and stored at room temperature or refrigerated at 4 °C in the dark. Laboratory observations utilized an inverted optical microscope (Zeiss Axiovert 40C) following the Utermöhl method at 200X and 400X magnifications to identify taxa grouped into Bacillariophyceae, Dinophyceae, Coccolithophyceae, and other taxa (results expressed in cell/L).

3.2.2.2.5 Zooplankton and ichthyoplankton (fish larvae) methodology

Zooplankton was collected using a WP2 net (57 cm mouth, 200 µm mesh) deployed vertically down to 200 m at 0.1 m/s. To specifically sample early life stages of fish (eggs and larvae), ichthyoplankton was collected using a WP2 net (335 µm mesh) equipped with a weight depressor, towed obliquely at a 45° angle between 50 and 100 m depths along 1 km transects at a maximum speed of 2 knots. Both plankton samples were preserved in 1-L plastic bottles with an ethanol-based fixative (to avoid formalin use) and stored at room temperature (60 days holding time). Zooplankton (ind/m³) and ichthyoplankton (ind/100 m³) analyses were conducted under stereomicroscopes (Leica M80) using counting chambers or gridded Petri dishes. For ichthyoplankton, the identification of fish larvae and eggs was supported by a LEITZ optical microscope with magnifications up to 500x.

3.2.2.3 Sediments and infauna methodology

3.2.2.3.1 Sediment field measurements and macroscopic description

Sediment sampling was executed using a stainless-steel ETS_85A Van Veen grab (0.2 m² sampling area, 40-litre capacity). The grab was weighted to 150 kg to aid seabed penetration and deployed via a Buccella hydraulic geo-winch spooled with 2,500 meters of Dyneema cable.

Upon retrieval, samples were evaluated against US-EPA acceptability criteria. Acceptable samples underwent an in-situ macroscopic description, recording stratigraphy, physical characteristics, Munsell colour, odour, and the presence of concretions or vegetal debris. Field measurements of pH, temperature, and Redox Potential (ORP) were taken using portable XS Instruments probes. Two grab deployments were conducted at each station: the first replicate (R1) was allocated for physical and chemical analysis, and the second (R2) for benthic macroinvertebrate subsampling.

3.2.2.3.2 Physical and chemical characteristics of sediment

Sediment aliquots were homogenized using a stainless-steel spatula. Samples were preserved and analysed using the following methods:

- Grain-size distribution and other physical characteristics: Particle size, specific weight, and humidity stored in 500-mL plastic jars at -20 °C. Analysed via UNI EN 933-1 (Particle size), ASTM D5057-17 (Specific weight), and UNI EN 14346 A (Humidity).
- Organic carbon, carbonates, and nutrients (TN and TP): Stored in 500-mL plastic jars at -20 °C. Analysed via UNI EN 15936 (TOC, LoQ 0.1%), DM 13/9/99 (Carbonates), UNI EN 21663 (TN), and EPA 3051 A / 6010 D (TP).
- Metals and Metalloids: Stored in 500-mL plastic jars at -20 °C. Analysed via EPA and UNI EN methods (LoQ 0.03-1 mg/kg).
- Total hydrocarbons and PAHs: Light fractions (C_{≤12}) preserved with MeOH in 40-mL glass vials at 4 °C. Heavy fractions (C_{>12}) and 16 Priority PAHs stored in 500-mL glass bottles at -20 °C. Analysed via EPA 5021 A, 8015 C, 3550 C, and 8270 E.
- Microplastics (qualitative analysis): Stored in 500-mL glass jars at -20 °C. Analysed for presence/absence via UNI EN ISO 24187:2023.

3.2.2.3.3 Macrozoobenthos (infauna) methodology

The sediment replicate dedicated to macrobenthos was washed onboard over a 0.5 mm mesh stainless-steel sieve using running seawater. The retained biological fraction was transferred to 1000-mL plastic jars and fixed using a 70% ethanol solution to avoid the use of formalin. Laboratory taxonomy and abundance counting (ind./m²) were conducted down to the lowest possible level under stereomicroscopes and optical microscopes, according to UNI EN ISO 16665:2014.

3.2.2.4 Marine mammal and sea turtle monitoring methodology

Two (2) Marine Mammal Observers (MMOs) carried out dedicated watches for marine fauna during survey operations throughout the hours of daylight. The MMOs monitored the area with the naked eye and 7 x 50 reticule binoculars, checking for visual cues such as seabirds, splashes, blows, and sea surface disturbances.

Passive Acoustic Monitoring (PAM) observations were carried out during the night by two (2) dedicated PAM operators. The PAM operations utilized a marine mammal acoustic monitoring system consisting of a hydrophone array connected to a topside processing unit and a laptop running PAMGuard software for real-time acoustic detection and data acquisition.

JNCC Marine Mammal Recording Forms were completed during the watches, capturing the following parameters:

- General survey information: Ship name, client, contractor, survey dates, visual and PAM equipment details (e.g., magnification, height of eye, distance estimation methods), and observer training.
- Watch effort and navigation: Dates and times of the visual and acoustic watches, observer names, vessel position (latitude and longitude), water depth, and vessel speed.
- Environmental and weather conditions: Wind direction and force (using the Beaufort scale), sea state, swell height, visibility limits, and sun glare.
- Sighting and encounter details: Time of the encounter, method of detection (visual, acoustic, or both), bearing and estimated range to the animal, species or species group identification, and physical descriptions.
- Population and behavioural metrics: Total number of individuals detected, life stages (number of adults, juveniles, and calves), observed behaviour, and direction of travel relative to the ship.

3.2.2.5 Avifauna monitoring methodology

The observations of avifauna were based on visual observations carried out during daylight hours. The visual observation methods were based on the European Seabirds at Sea (ESAS) (Tasker et.al 1984, Champhuysen and Garthe 2004) and additionally adapted to Mediterranean conditions (Fric and Gaganis 2009) that was designed for systematic recording of birds, marine mammals and sea turtles, as well as, human activities in the survey area from a moving survey vessel.

Data collection

Survey vessel location at any given moment and its tracks were recorded by handheld GPS device, as well as vessel's GPS devices. The recorded survey conditions included information on sea state (in Beaufort scale and visibility). Furthermore, the presence floating matter, either natural e.g. seaweed or man-made e.g. vessels or platforms were recorded, as they might explain the presence of the recorded marine fauna. Swimming birds, as well as, other marine fauna observed at sea or on land, were recorded in 5 distance bands in relation with the route of the vessel: 0-50m, 50-100m, 100-200m, 200-300m and >300m. Distances of the observed swimming birds were estimated using a ruler (Heinemann 1981, Fric and Gaganis 2009). For flying birds, their location in relation to the vessel transect (inside/outside) and flight direction were recorded. Activity and behaviour of the recorded fauna was recorded to provide information on the space use. Although the method was initially designed for recording from a vessel moving at a constant speed,

for the reasons of consistency of recorded data, the same method was also used while the vessel was stationary at sea, when carrying out other environmental surveys. Binoculars were used for detection of bird at large distances, as well as for the identification of species.

Data analysis

The location of the vessel and the total number of individuals for each recorded species were determined per 1-minute intervals. For spatial analysis, the locations of the recorded individuals were assigned to the location of the survey vessel at the time of observation. The prevailing flight directions per species were estimated as the average recorded flight direction, accounting for the number of individuals recorded.

3.3 Results and discussion

3.3.1 Geophysical survey campaign (LOT 01)

3.3.1.1 Seabed morphology and acoustic data

The MBES data together with Hisas sonar-type data, provided high-resolution mapping of the seabed morphology, enabling the identification of distinct morphological features that highlight the high morphological complexity within the surveyed area (Figure 3-9).

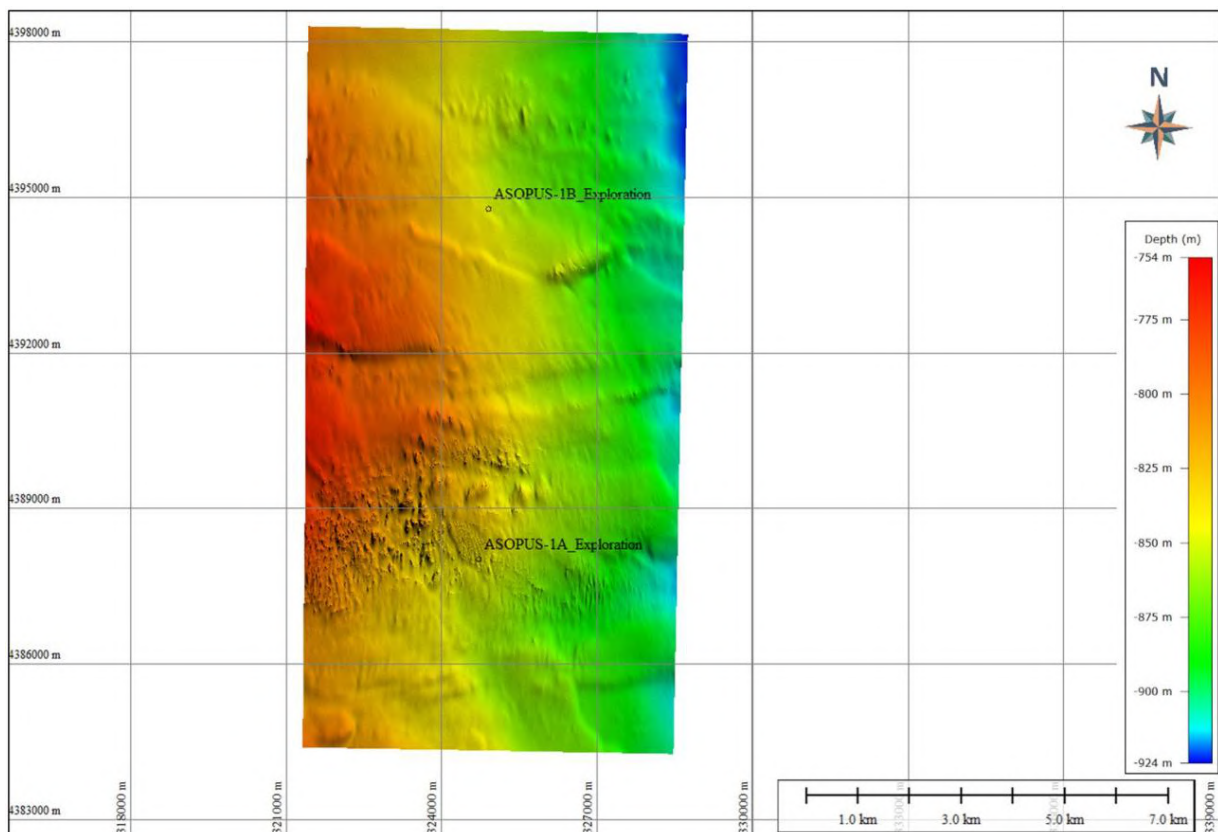


Figure 3-9: 2D Bathymetry DTM of the study area (2x2 m cell)

Table 3-7, shows the seabed categories, based on slope ranges, which have been used to classify the seabed gradient.

Table 3-7: Seabed gradient classification

CLASSIFICATION	SEABED GRADIENT
Very Gentle	< 1°
Gentle	1° - 4.9°
Moderate	5° - 9.9°
Steep	10° - 14.9°
Very Steep	>15°

The study area is located within the distal sector of the Ionian slope (Italian margin). The average slope gradient ranges from very gentle to gentle (from 0 to 10°). Locally, as shown in Figure 3-10, slope gradient reaches higher values up to 38°. The seabed progressively deepens from west to east, in agreement with the continental slope orientation. The water depth ranges from 754.08m LAT at the central portion of the western edge to 924.08 m LAT in the northeastern sector. The water depth at the proposed exploration well Asopus 1A is 842.5 m LAT with a seabed slope of 1.3°.

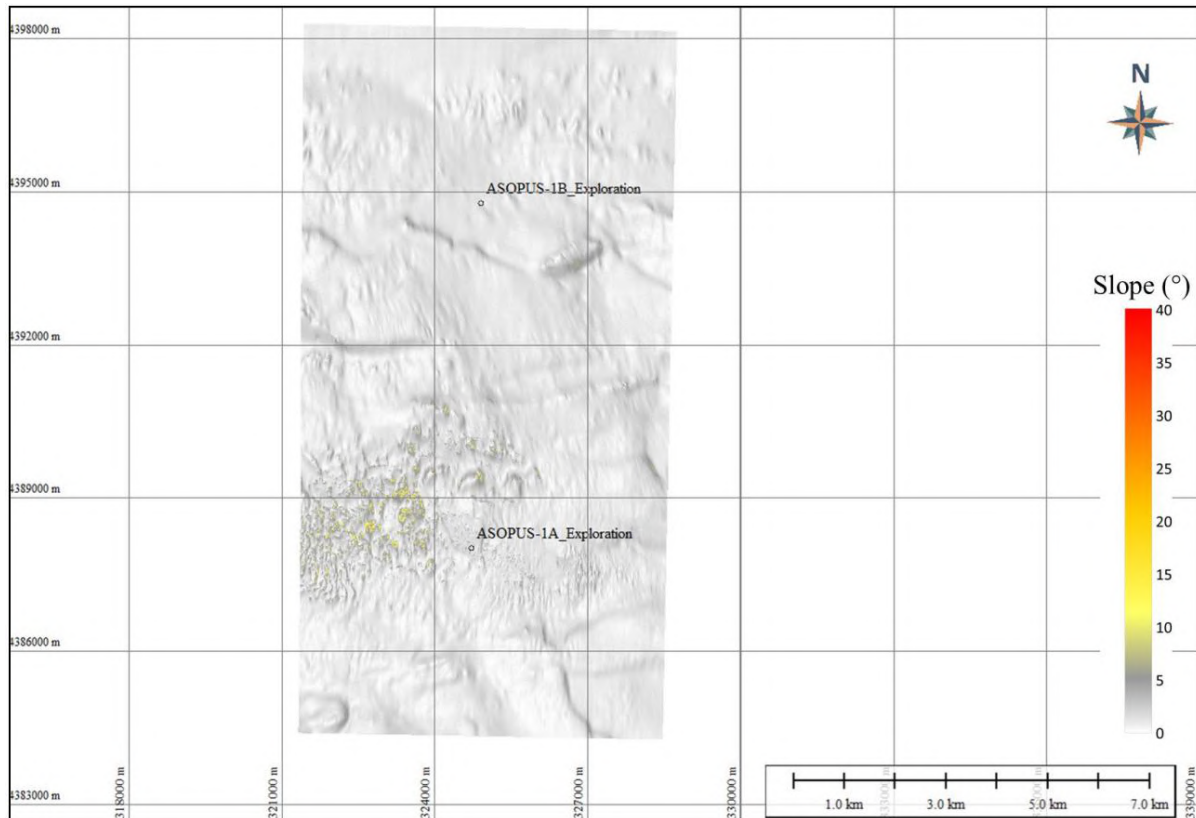


Figure 3-10: 2D Slope map of the study area (2x2 m cell)

As shown in the 3D bathymetric DTM in Figure 3-11 the seafloor appears articulated, with a marked morphological variability reflecting the complex structural framework. The most prominent features observed were the roughly E-W oriented scarps, which reflected tectonic control on large-scale morphology. Fault-related scarps were more noticeable in the central sector, creating a step-like profile with throws of few meters.

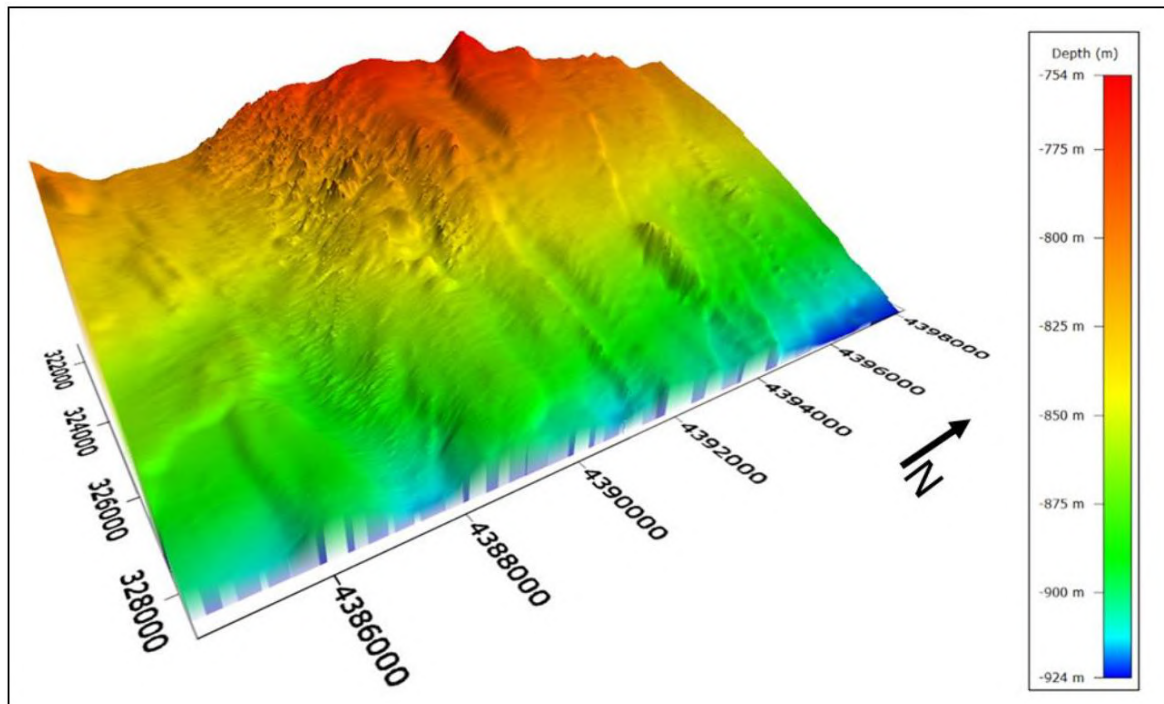


Figure 3-11: 3D Bathymetric DTM of the study area (2x2 m cell)

Bathymetric data preserve the record of past gravitational and depositional processes resulting from sediment slumping and remobilization within shallow, unconsolidated deposits, driven by deformation associated with deep tectonic processes. The rough seafloor is affected by a mass transport deposit (MTD), whose surface results dominated by mound-like morphologies. Mound-like shapes create narrow and elongated seabed features aligned perpendicular to the slope (Figure 3-9 and Figure 3-10). This alignment is diagnostic of a gravity flow with an E-W direction that affect the entire study area.

The MTD material, as inferred from the HISAS data shown in Figure 16 is almost entirely draped by low-reflectivity sediments, interpreted as pelagic cover deposits. However, in some sectors of the study area, the underlying material remains exposed, defining more consolidated sediments clearly visible in the bathymetric 3D map (Figure 3-11). These outcrops can also be identified in the HISAS data due to the high reflectivity typical of harder bodies. (see the detail within the red box in Figure 3-12).

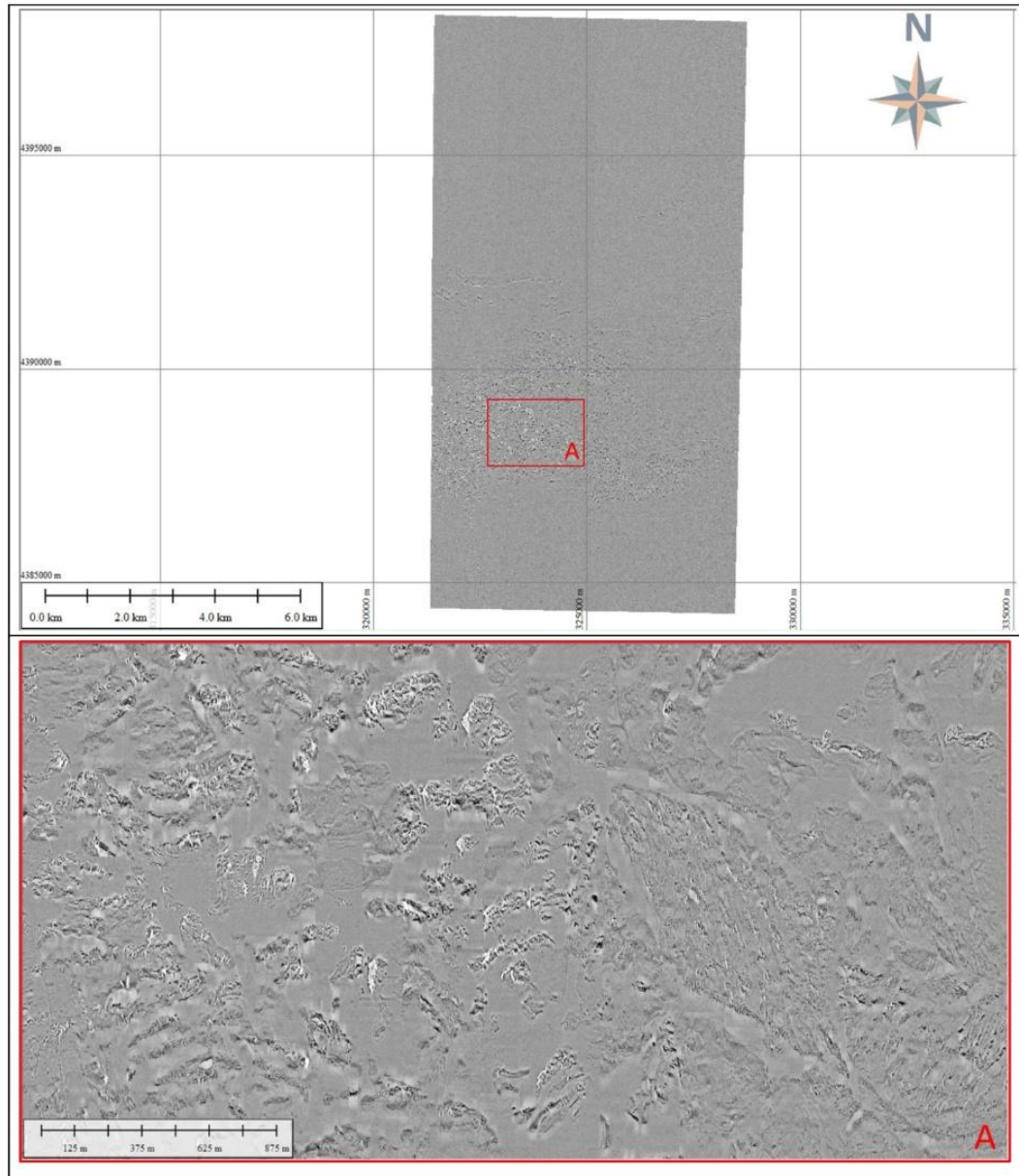


Figure 3-12: 2D HISAS mosaic of the study area (0.5x0.5 m cell)

Figure 3-13 shows an example of the MTD recognised on SBP data with folded structures and chaotic deposits.

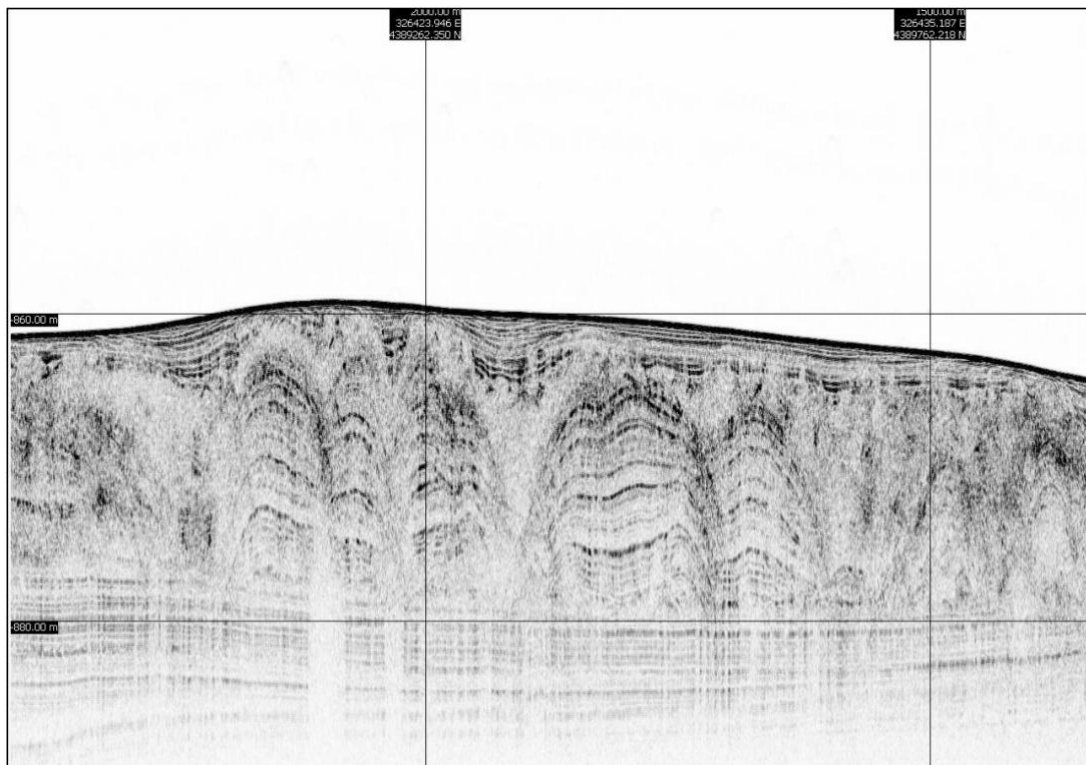


Figure 3-13: SBP line M07_I10: Example of MTD material on SBD data.

All the morphological features and the manmade objects detected on the seafloor of the study area are described in the following paragraphs.

3.3.1.2 Mound-like morphology

Mounds are distributed throughout the study area, creating an undulating seafloor with hummocky appearance. Considering the bathymetric data, mounds are mainly distributed in the central sector of the study area, corresponding to the more consolidated sediments recognized in the study area (Figure 3-14). Here, these features are recognised through their heterogeneous pattern, formed by spurs and grooves (Figure 3-15), significant topographical variation relative to the surrounding seafloor and high-rugosity morphology characterized by irregular lateral boundaries (Figure 3-14). The complex morphology of this sector is associated with the steepest slope gradients, exceeding 15° and reaching a maximum of 38° where outcrops rise abruptly from the seabed because of increasing downslope gradients (Figure 3-16).

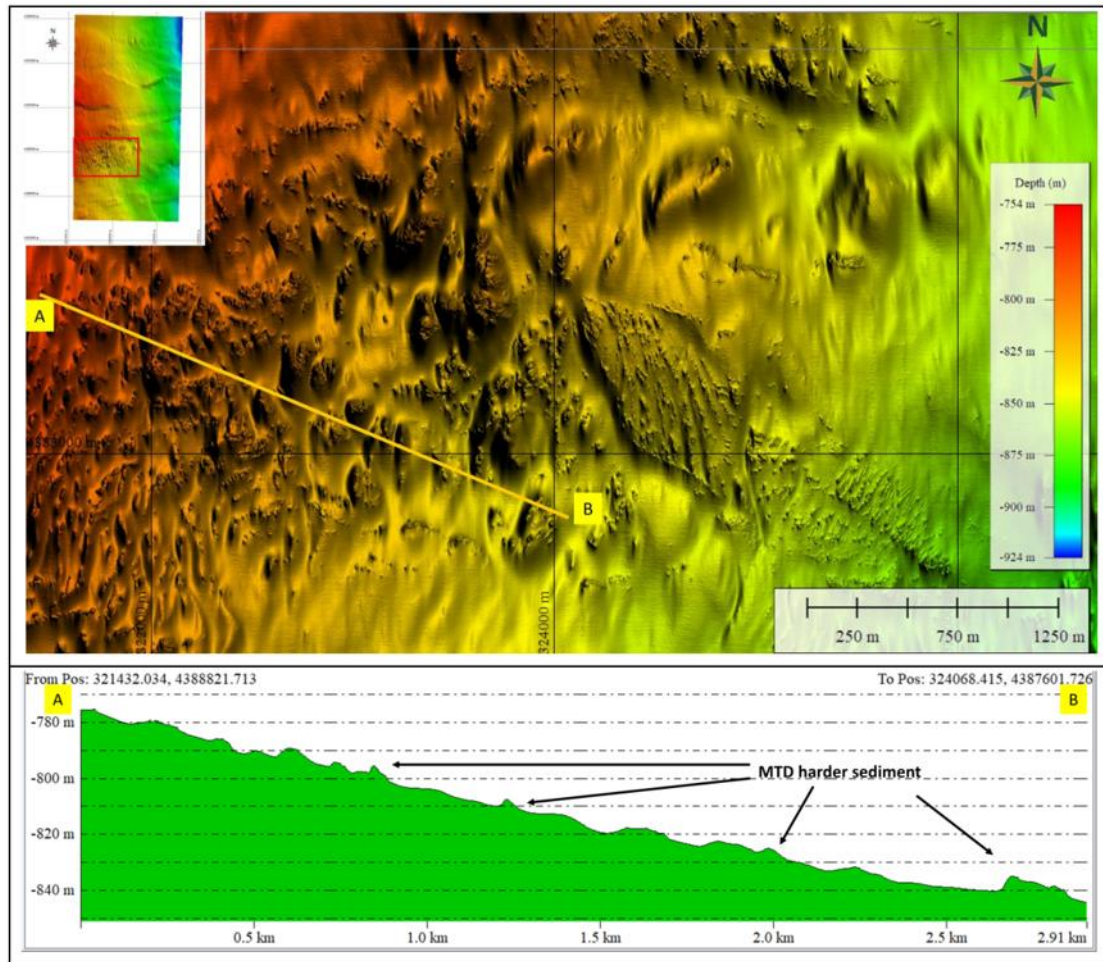


Figure 3-14: Bathymetric data and profile of exposed harder sediments associated with MTD in the central sector of the study area

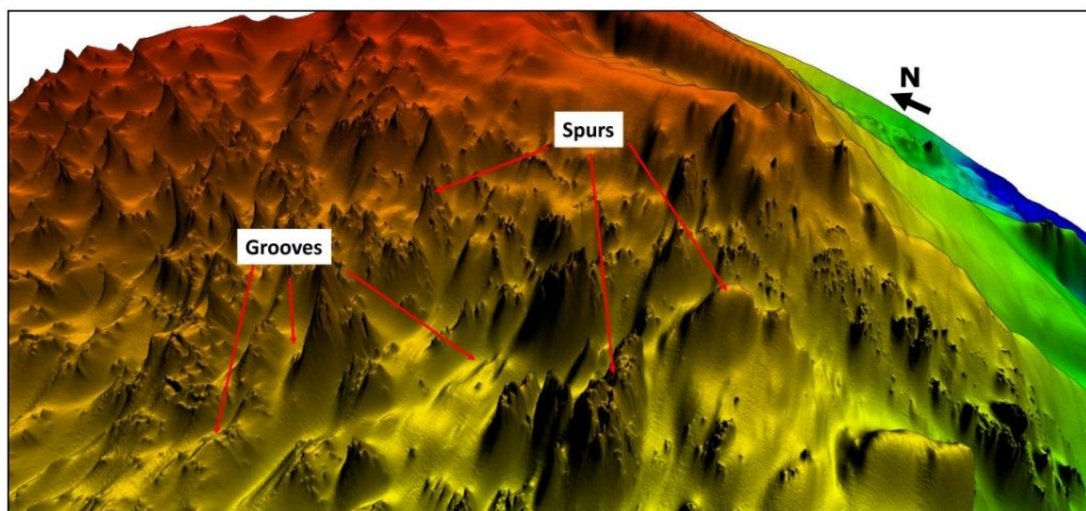


Figure 3-15: Detail of 3D bathymetry DTM on spurs and grooves morphologies visible in the central sector of the study area

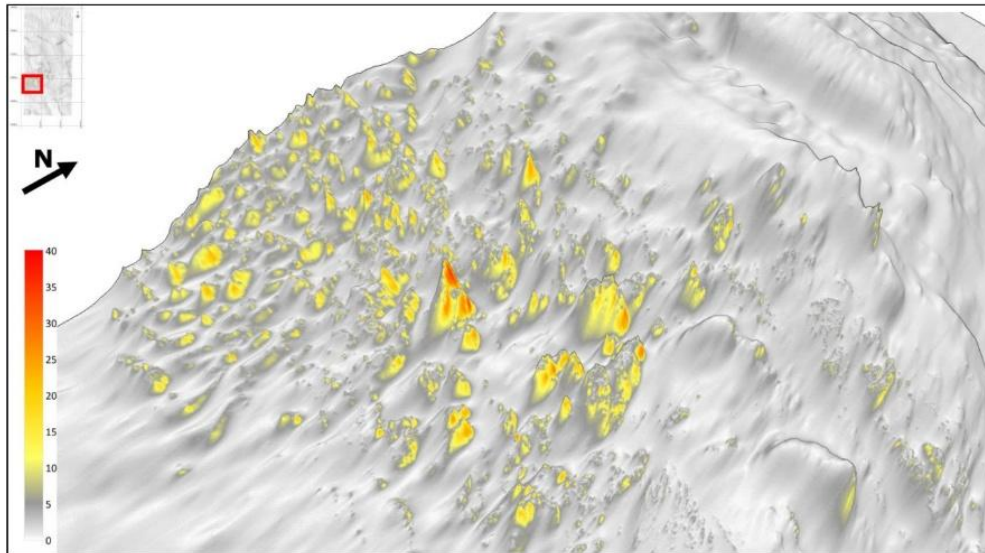


Figure 3-16: Steep/Very steep slope gradients associated with harder sediment morphologies in the central sector of the study area

HISAS mosaic in the central sector appears in large dark areas with rough edges, indicating a strong and heterogeneous acoustic reflectivity from hard surfaces, often contrasted by white shadows behind them, revealing positive reliefs and structures identified as more consolidated sediments (Figure 3-17).

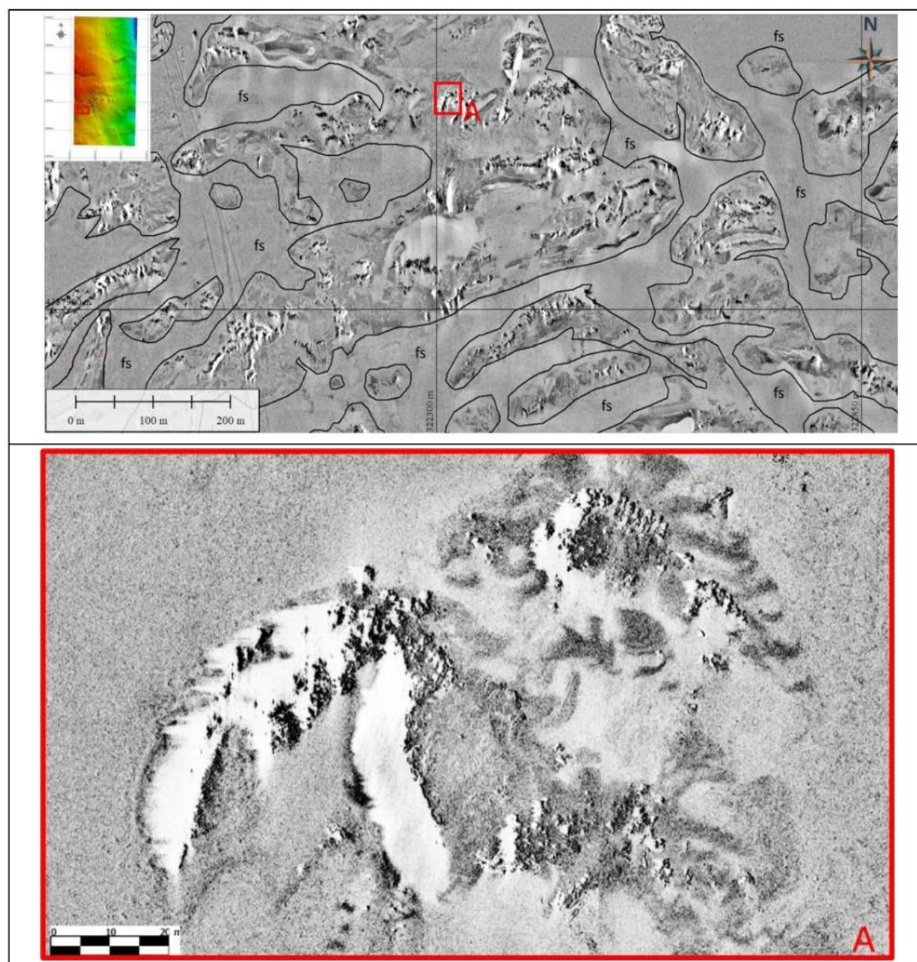


Figure 3-17: A detail of HISAS data on MTD harder sedimentsA. Upper panel: Zoomed view of the area characterized by MTD harder sediments highlighted by the red dashed box in the upper left corner. MTD harder sediments are mapped in black while “fs” indicate fine sediment around. Lower panel: Zoomed area showing the acoustic contrast typical of more consolidated bodies

Locally, these bodies are surrounded by moderate reflectivity sediments interpreted as Subcropping sediments. These features typically exhibit intermediate to higher intensity than the surrounding more recent mobile sediments (such as mud or fine sand) due to their increased compaction and higher bulk density resulting from lithification processes (Figure 3-18).

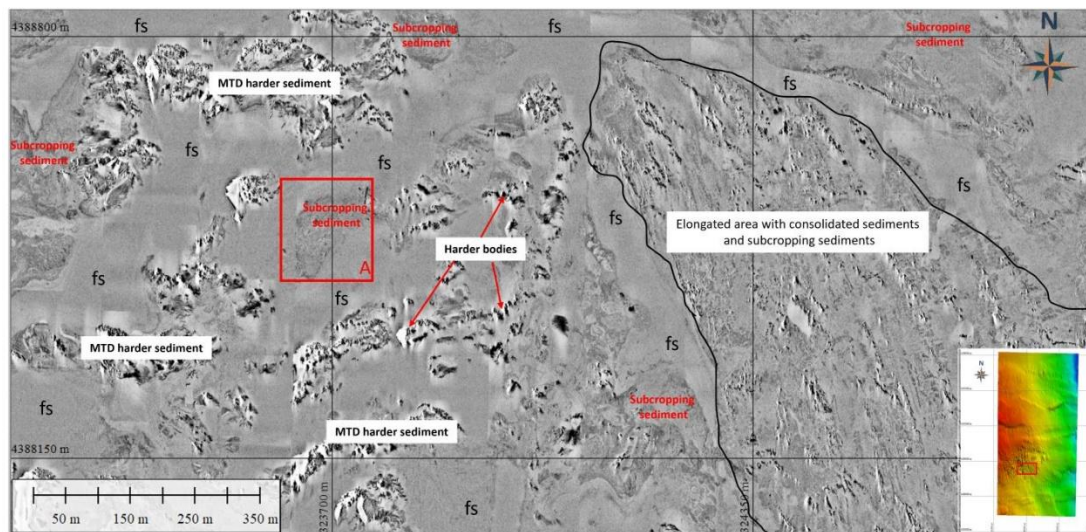


Figure 3-18: Different acoustic reflectivity zones recognized in the central sector of the study area.

In the southern portion of the central sector, the mounds exhibit a strongly elongated and narrow morphology, oriented SW–NE, always perpendicular to the local seafloor slope. They occur as closely spaced, sub-parallel ridges, locally showing slight curvature (Figure 3-19). HISAS data on these features exhibits different reflectivity, varies from moderate to high, showing the internal layering of fold-type structures exposed on the seabed. The internal structure is visible thanks to erosional reworking process of previously deformed sediments. These features are affected by variable degrees of erosion, which locally result in discontinuities in backscatter intensity and, in some cases, complete erosion of the fold crests, leading to the exposure of their cores (Figure 3-19). As shown in Figure 3-19, the exposed fold cores on the seafloor display concentric, elliptical layering.

The shape of the folds is diagnostic of compressional gravity-driven deformation typical of the toe of a downslope-translating sediment mass. The slight curvature of these features reflects the lobate plan-view of the translating sheet (concave-upslope, see Figure 2-20), with the maximum advancement in the centre and lateral retardation at the edges.

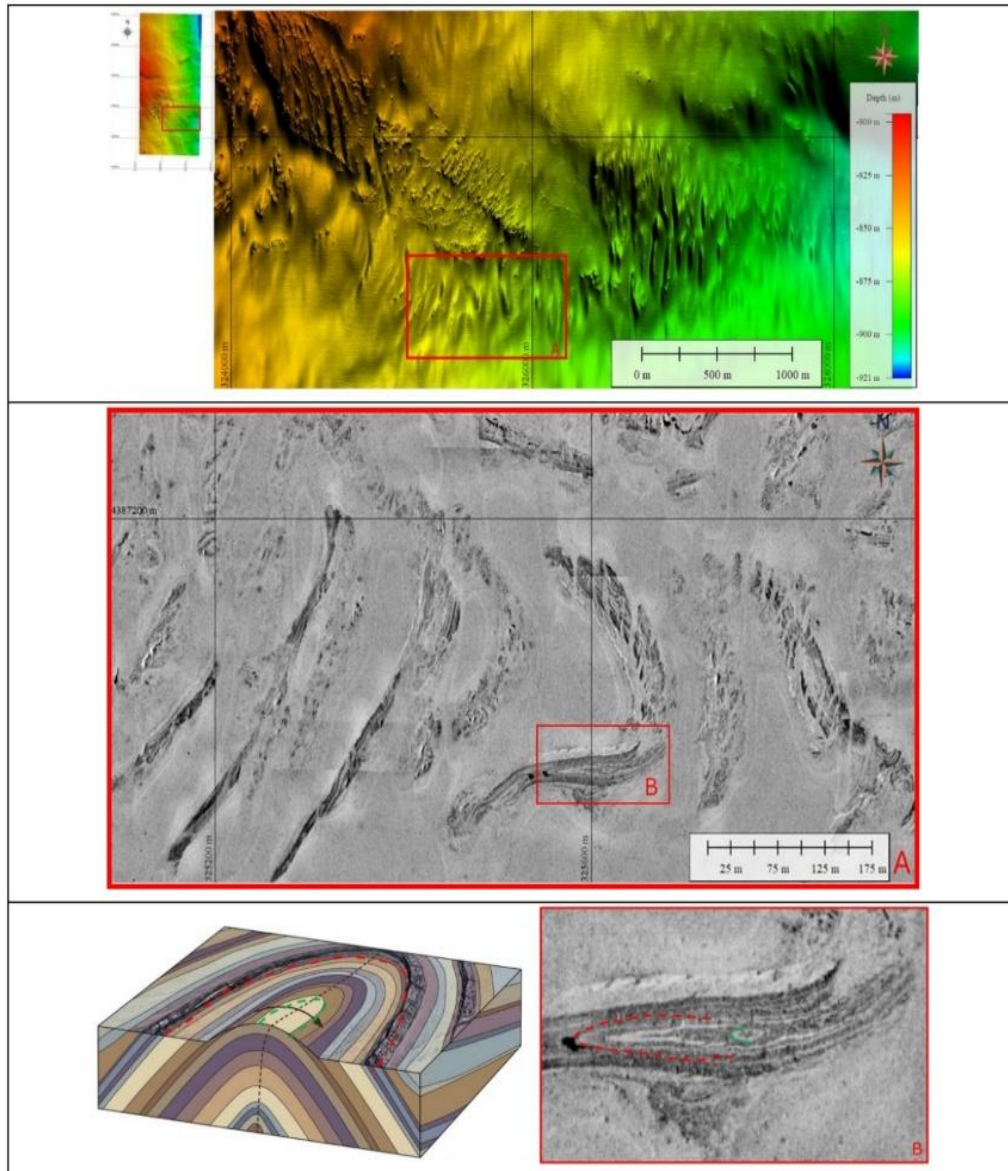


Figure 3-19: Fold structures recognized on the seabed. Upper panel: MBES data on the central sector of the study area showing elongated and narrow mounded-like morphologies with slight curvature. Middle panel: A detail of the acoustic response of the elongated structure described above. HISAS data allows to detect the fold cores with its internal layering. Lower panel: Schematic representation of the exposed fold cores showing their elliptical and concentric geometry. Red and green dotted lines show the similarity between the sketch and a fold recognized on the HISAS mosaic

In the northern sector of the study area, mounds are not widely distributed. They appear mostly organised in few clusters showing a variable topographic relief, with an average height of 2 meters and a maximum height of about 4 meters (Figure 3-20).

As described for the central sector, these structures show a N-S alignment, perpendicular to the slope orientation. The main difference between these structures and the previously described mounds lies in their less-elongated shape and a thicker profile.

Considering the HISAS acoustic data, these features are not detectable because they are fully covered by low-reflectivity sediments interpreted as pelagic sediments (clay or silt). The fine sediment contributes to smoothing the morphology, reducing the slope gradients on the mounds' flanks. Indeed, the average slope values detected on these flanks ranging from 3° to 4°, reaching a maximum value of 5.7°.

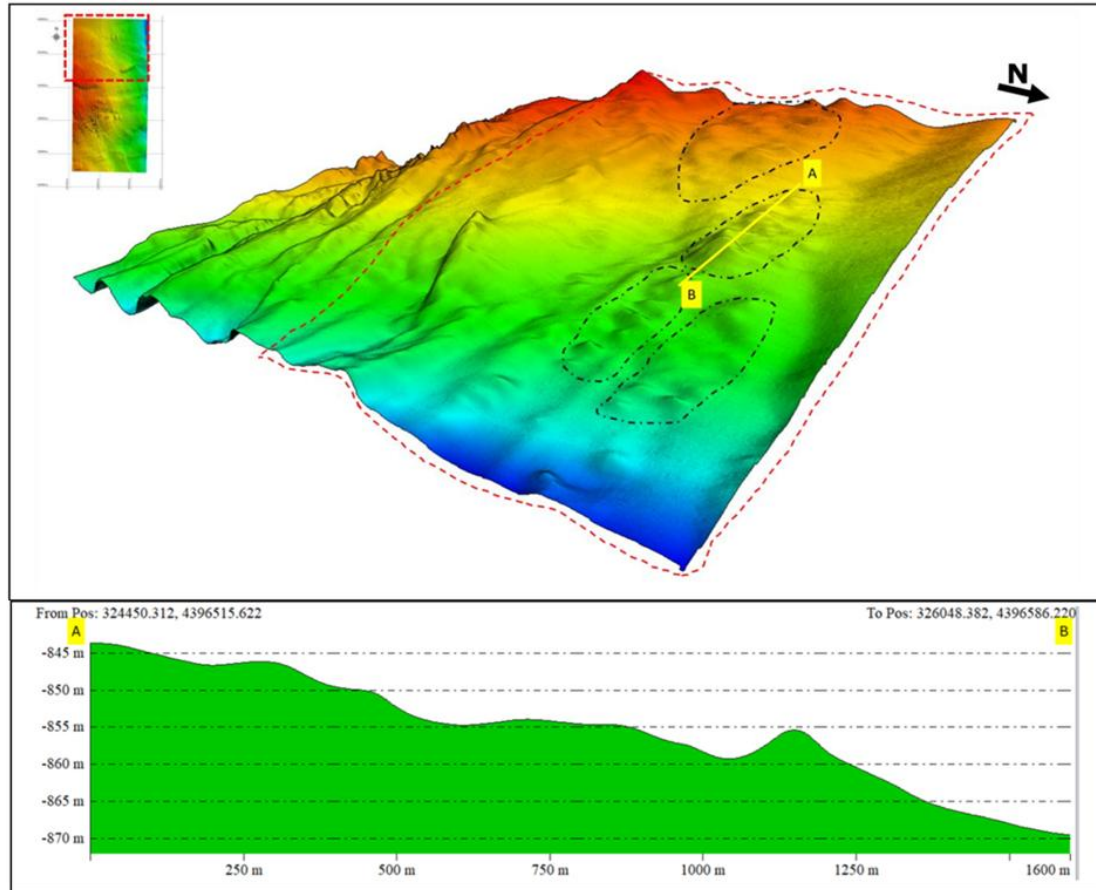


Figure 3-20: Overview of the northern sector of the study area. Red dashed line: Limit of the northern sector of the study area Black dashed lines: Example of several mound-like morphologies organized in clusters

In the same sector a large, isolated mound, oriented SW-NE, is detected. Based on MBES data it shows a length of 1200 m and a width of 450 m (Figure 3-21).

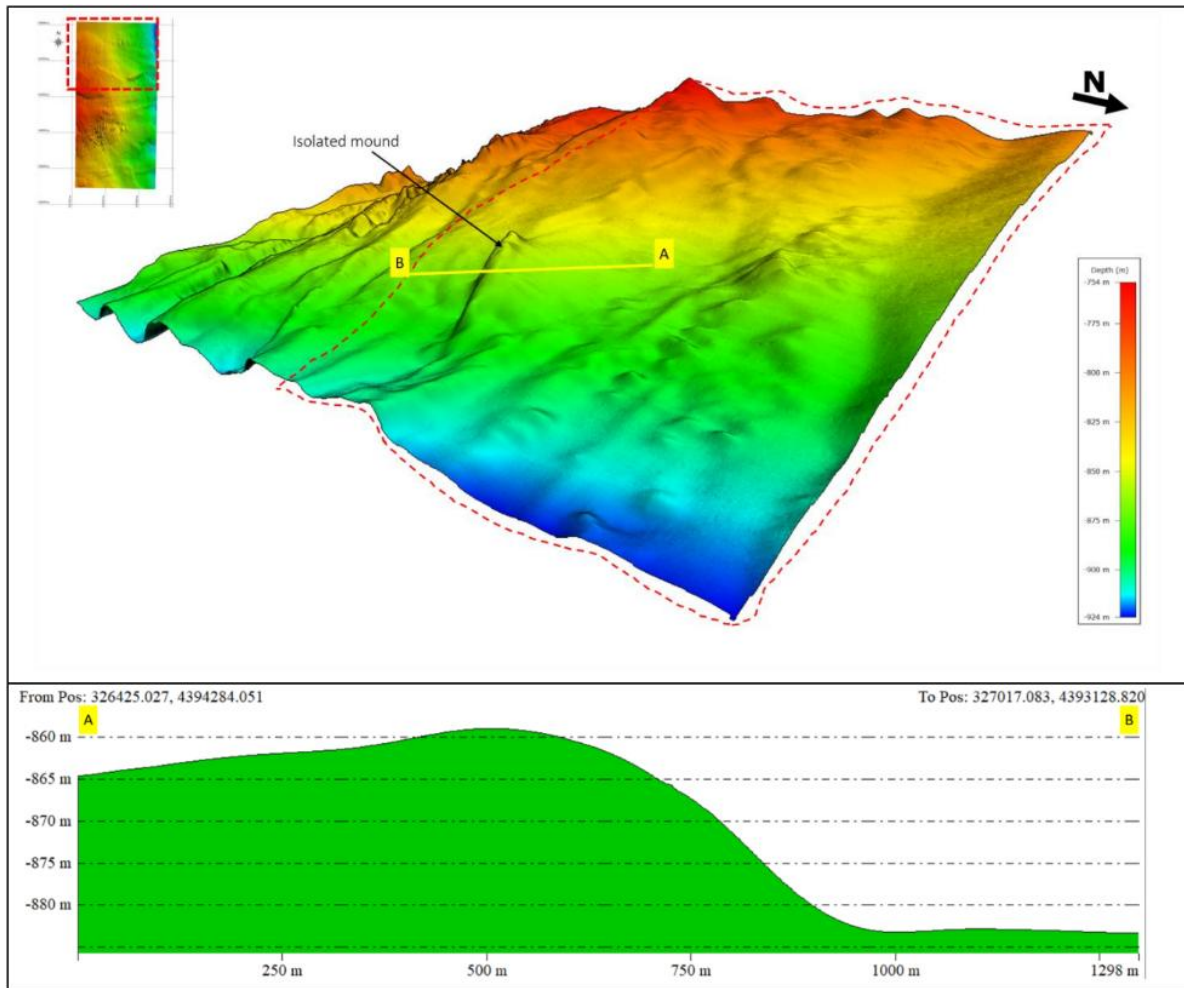


Figure 3-21: Isolated mound recognized in the northern sector of the study area

This structure exhibit different slope gradients on its flanks and HISAS data allowed to identify the different seabed nature of the seafloor:

- the southeastern flank is steeper, reaching a maximum of 6° . HISAS data shows a high reflectivity at the crest of this flank, caused by the local exposure of the underlying more consolidated sediments (Figure 3-22). Toward the slope base, the HISAS data show a patchy and heterogeneous reflectivity pattern that defines this localized area, classified as mottled seafloor, from the surrounding seabed. Its upper boundary is also visible in the MBES data (Upper panel in Figure 3-22). This heterogeneity may reflect variations in sediment composition or bioturbation processes, as it does not appear to be directly controlled by slope gradient or associated with widespread degassing processes.

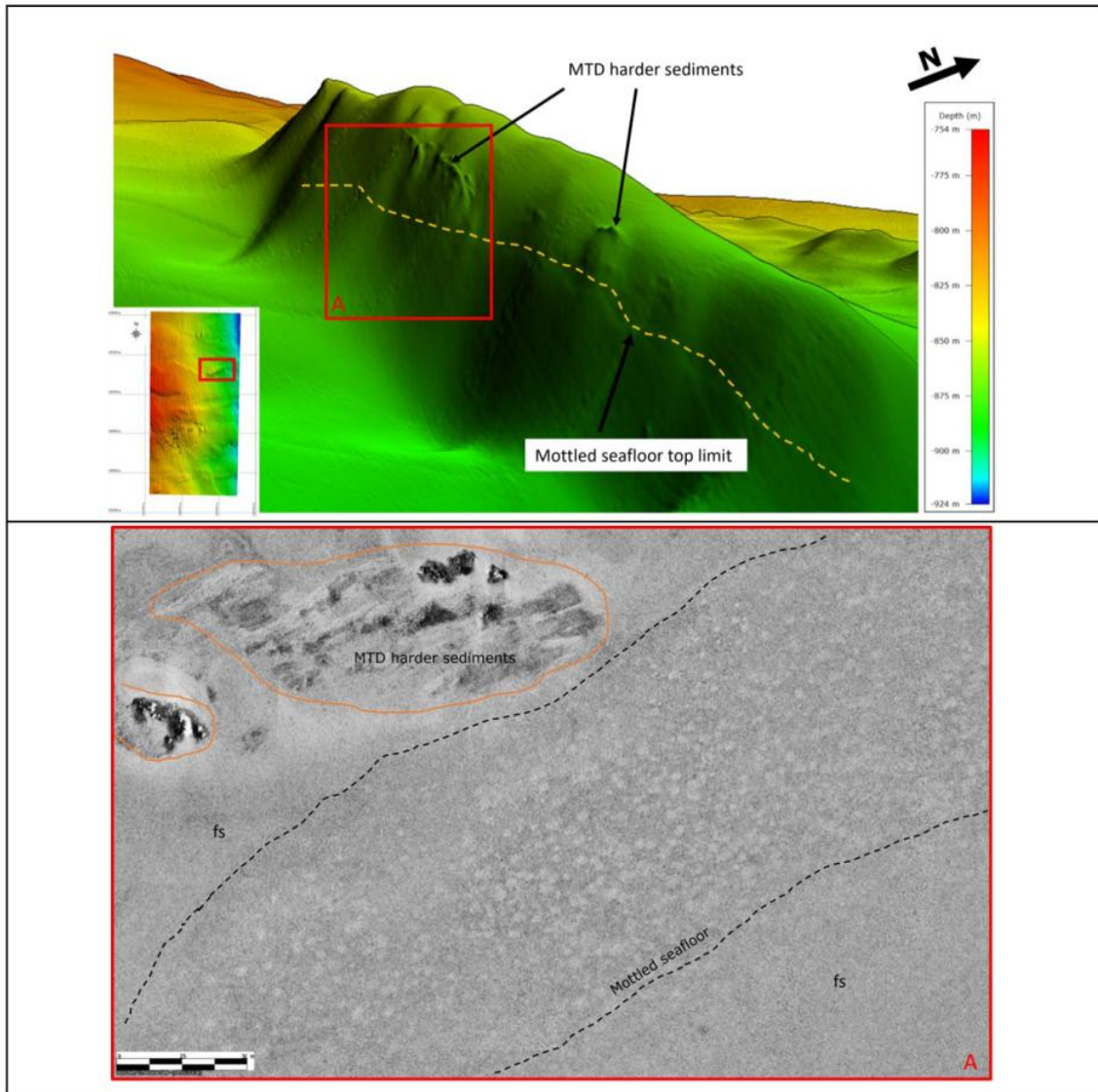


Figure 3-22: Detail of the Southern flank of the isolated mound recognized in the northern sector of the study area.
Upper Panel: 3D view on the southern flank of the isolated mound found in the northern sector of the study area.
Yellow dashed line shows the mottled seafloor top limit; black arrows indicate the MTD harder sediments. Lower Panel: A detail of the southern flank of the isolated mound on HISAS data: MTD consolidated sediments (delimited by orange line) and mottled seafloor (delimited by dashed black lines) are recognized

The northwestern flank is less inclined (maximum 3°), with no exposed bodies. The mound is cross-cut by lineaments with a NW-SE orientation, that influence its morphology, producing elongated ridges and depressions (Figure 3-23). These features are partially identifiable in the HISAS data due to variations in acoustic intensity (Figure 3-23), which appears lower and nearly white in correspondence with the depressions. A change in sedimentation is also observable at the top of the mound, where sediments appear coarser grained compared to those in the northern sector. The intermediate acoustic intensity suggests the presence of more compacted sediments that have not yet resulted in complete exposure of the of the underlying more consolidated sediments.

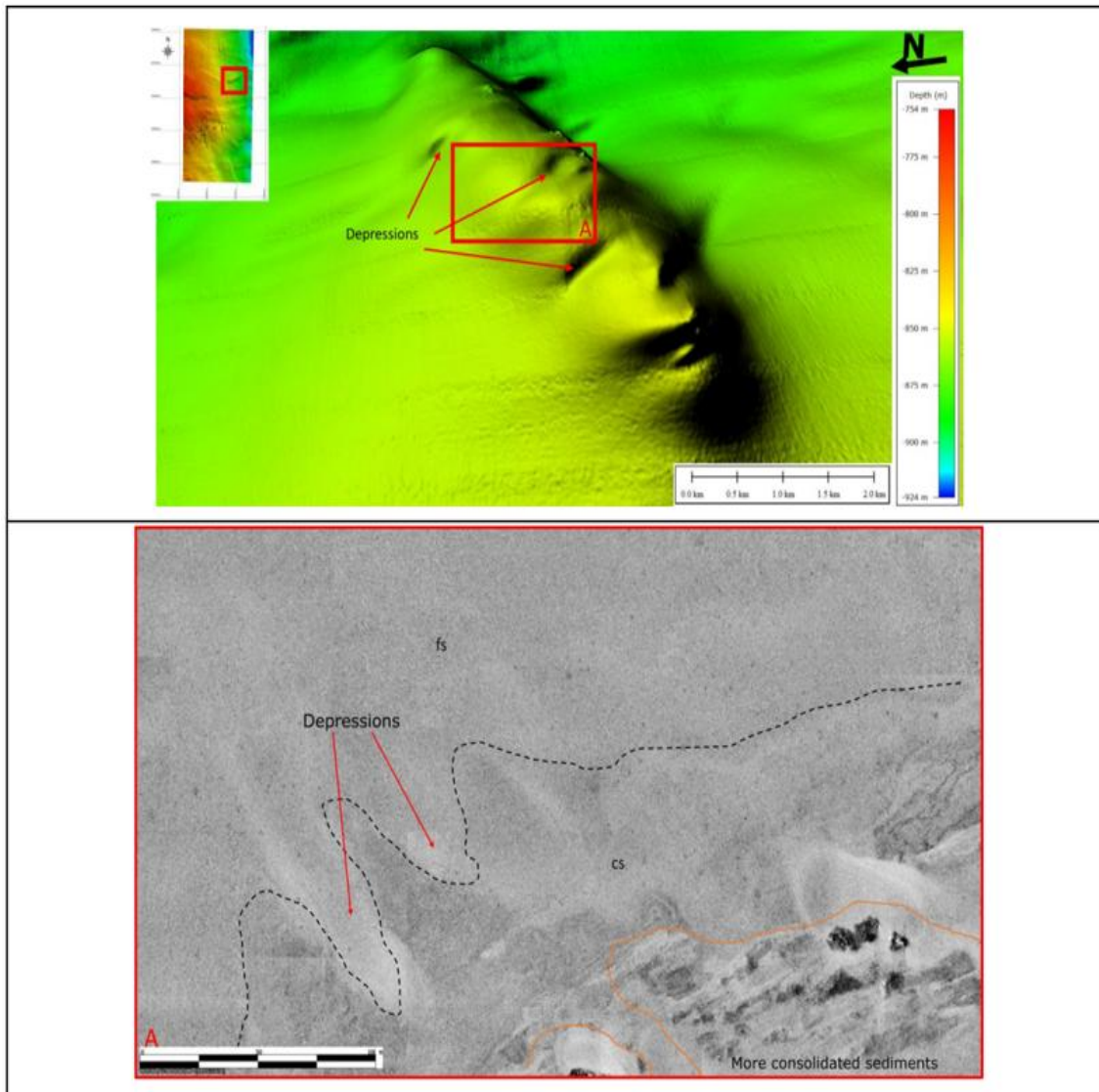


Figure 3-23: Detail of the northern flank of the isolated mound recognized in the northern sector of the study area. Upper Panel: 3D view on the northern flank of the isolated mound found in the northern sector of the study area. Red arrows indicate the depressions visible on its flank. Lower Panel: A detail of the northern flank of the isolated mound on HISAS data: more consolidated (delimited by orange line) and coarse sediment (cs, delimited by black dotted line), are recognized

3.3.1.3 Fault scarps morphologies

The complex structural setting of the study area is also highlighted by the presence of several morphological steps. These features are clearly visible on the seabed showing a height up to 20m with a gently slope gradient varying between 2 and 4° (see Figure 3-24). These steps exhibit a general W–E trend, as shown in, and are widely spaced with an interval of about 1km (Figure 3-24).

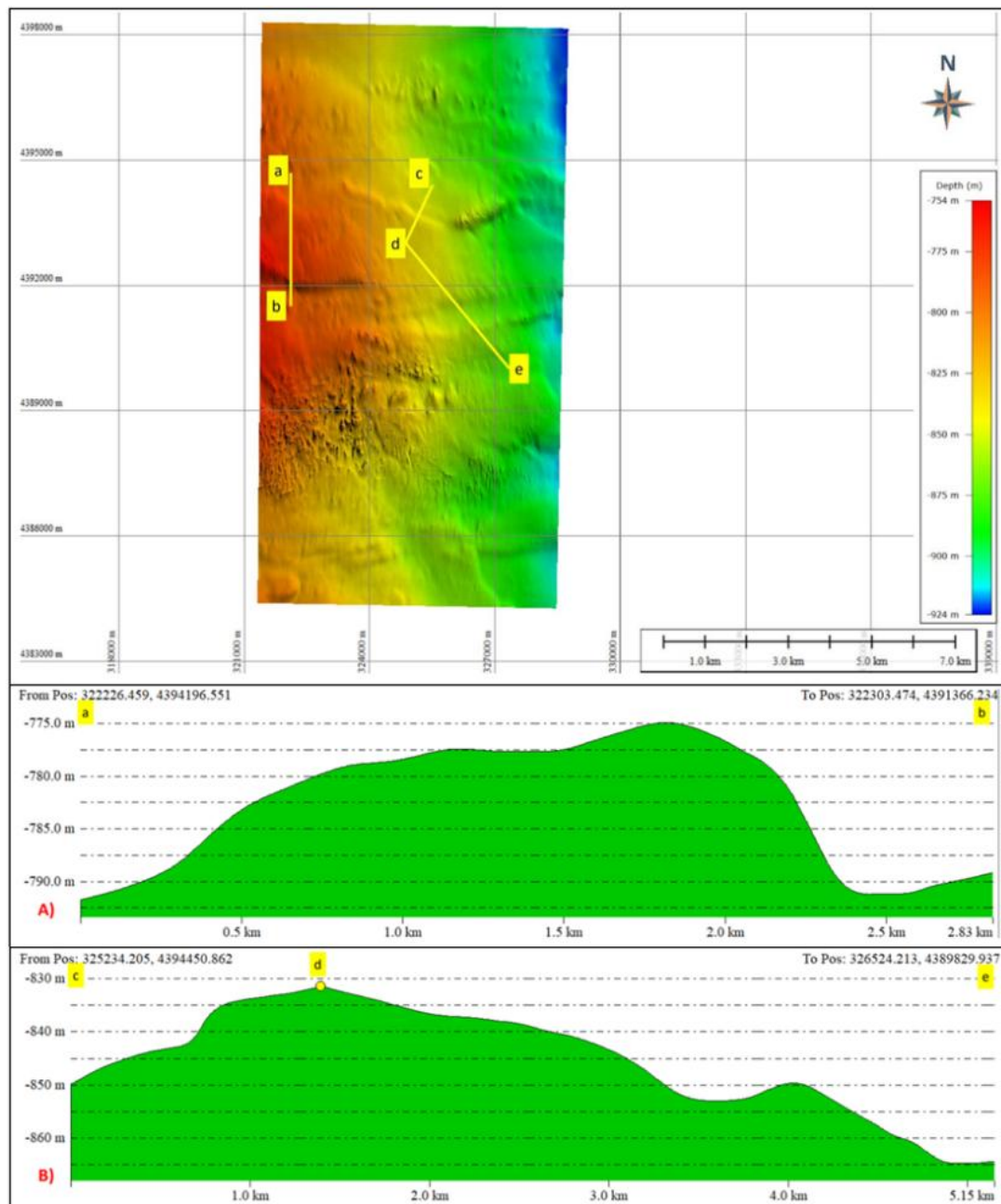


Figure 3-24: Fault scarps overview with bathymetric profiles on two arbitrary lines

Locally, several exposed bodies can be observed along the steps. As visible on HISAS data, these bodies appear scattered and surrounded by the fine sediments that partially bury them (Figure 3-25). The presence of these deposits is related to the morphological step, interpreted as faults scarps, clearly visible on the SBP data. These faults do not directly affect the seafloor morphology, but they created the ideal accommodation space for the accumulation of the harder material underlying the blanket of fine-grained sediments spread across the area.

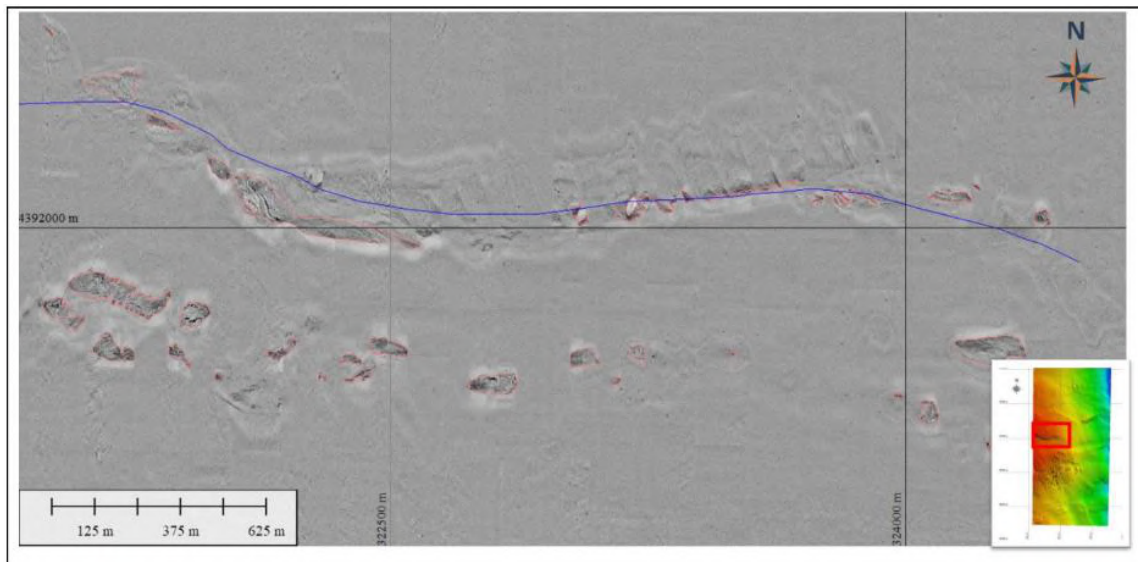


Figure 3-25: Detail of acoustic data on the major fault scarp recognised in the NW part of the study area. Blue line: Fault plane detected on SBP data. Pink polygons: High-sonar reflectivity corresponding to MTD harder sediments

3.3.1.4 Mud volcanoes

Based on the available geophysical and geological data no evidence of mud volcanoes has been identified within the investigated area. These morphological features have not been recognized in the bathymetric and sub-bottom profiler data. In addition, no indications of buried mud volcanoes have been observed in seismic data, as well as fluids rising associated to them. The absence of this morphology contributes significantly to reducing the geohazard risk within the study area.

3.3.1.5 Cables and trench

Figure 3-26 shows the cables/trench identified from datasets, overlaid on the bathymetric DTM of the study area.

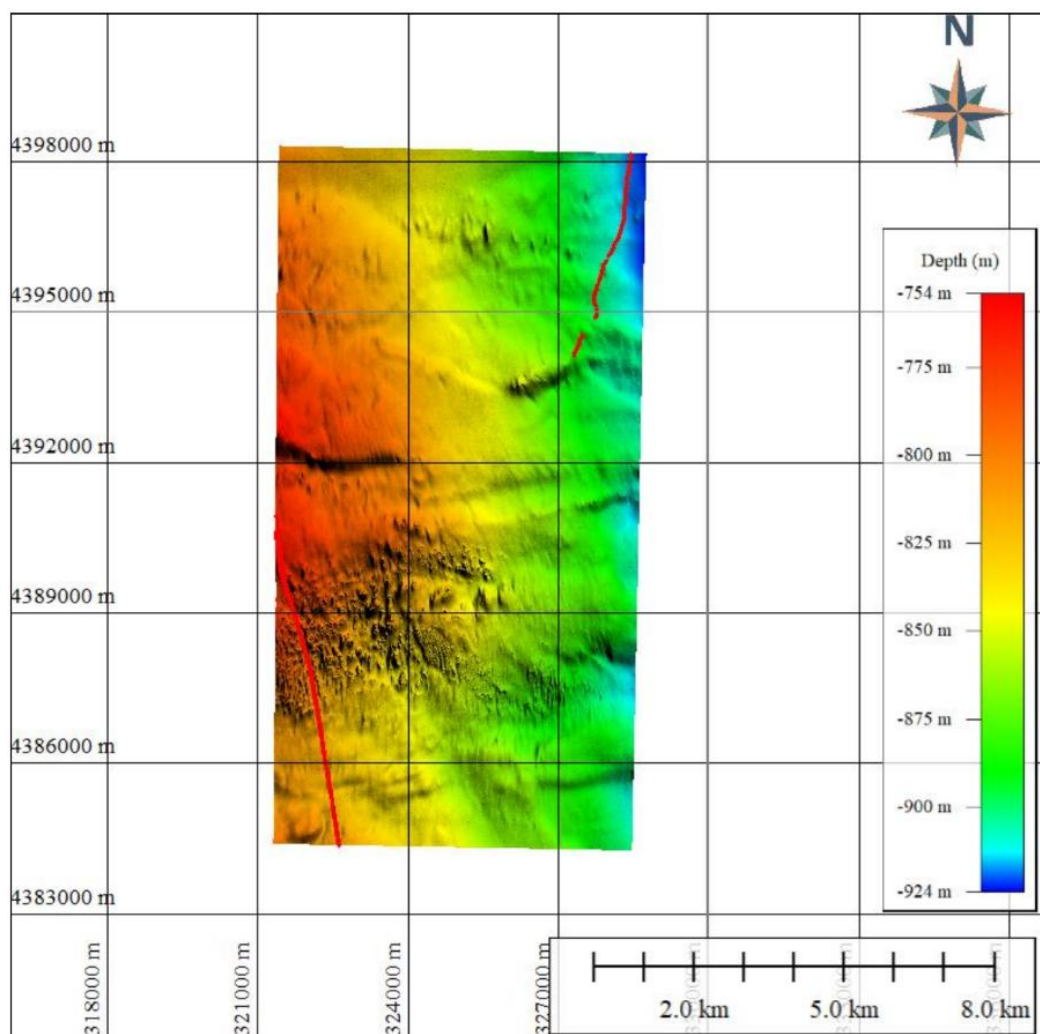


Figure 3-26: Overview of the surveyed area showing the positions of the identified subsea cables/trench, as mapped from HISAS and MBES data

Cables have been primarily detected through HISAS as acoustic facies with high reflectivity. Four different cables have been recognized within the study area, and they are mostly exposed on the seafloor. Table 3-8 shows the start/end position and the length of all the exposed portions of these cables.

Table 3-8: Start/end position and length of the cables detected within the study

CABLE NAME	CABLE ID	EASTING START (M)	NORTHING START (M)	EASTING END (M)	NORTHING END (M)	EXPOSED LENGTH (M)
Unknown	EER001_CBL-01	328449.17	4398147.06	328035.32	4396161.98	2047.16
	EER001_CBL-01	327949.39	4396017.91	327847.80	4395739.21	298.07
	EER001_CBL-01	327755.78	4395455.20	327713.94	4394843.10	642.54
	EER001_CBL-01	327476.12	4394542.97	327298.04	4394120.96	470.00
AAE-1	EER001_CBL-02	322620.12	4384361.64	321371.59	4390632.40	6379.60
	EER001_CBL-03	322628.58	4384360.22	322504.41	4385151.26	801.00
	EER001_CBL-03	322501.56	4385168.50	322496.00	4385203.58	35.22
	EER001_CBL-03	322487.38	4385257.59	322472.19	4385357.35	100.28

CABLE NAME	CABLE ID	EASTING START (M)	NORTHING START (M)	EASTING END (M)	NORTHING END (M)	EXPOSED LENGTH (M)
	EER001_CBL-03	322470.09	4385372.49	322073.67	4387695.83	2358.37
	EER001_CBL-04	322157.67	4387279.20	321846.10	4388624.36	1383.50
	EER001_CBL-04	321837.75	4388657.10	3215667.74	4389576.52	956.70
	EER001_CBL-04	321551.26	4389636.82	321431.71	4390430.81	799.17
	EER001_CBL-04	321431.31	4390584.47	321369.70	43909939.36	354.89

In the south-western sector of the study area a cluster consisting of three cables has been recognised (EER001_CBL-02, EER001_CBL-03, EER001_CBL_04). These segments have been interpreted as belonging to the AAE-1 (Asia-Africa-Europe-1) submarine cable system, in agreement with the cable route displayed in the Submarine Cable Map database.

The cables are predominantly sub-parallel, although local intersections complicate the reconstruction of their paths. Locally, they appear discontinuous, possibly due to partial burial by the fine-grained sediments that characterize the study area. However, no SBP data are available along these interruptions, and therefore the exact path of the cables cannot be reliably reconstructed where they are buried.

In the southernmost portion of the area, the trench excavated for cables installation is clearly visible on bathymetric DTM. MBES data depict it as a narrow and deeply incised feature extended for thousands of meters in length (Figure 3-27)

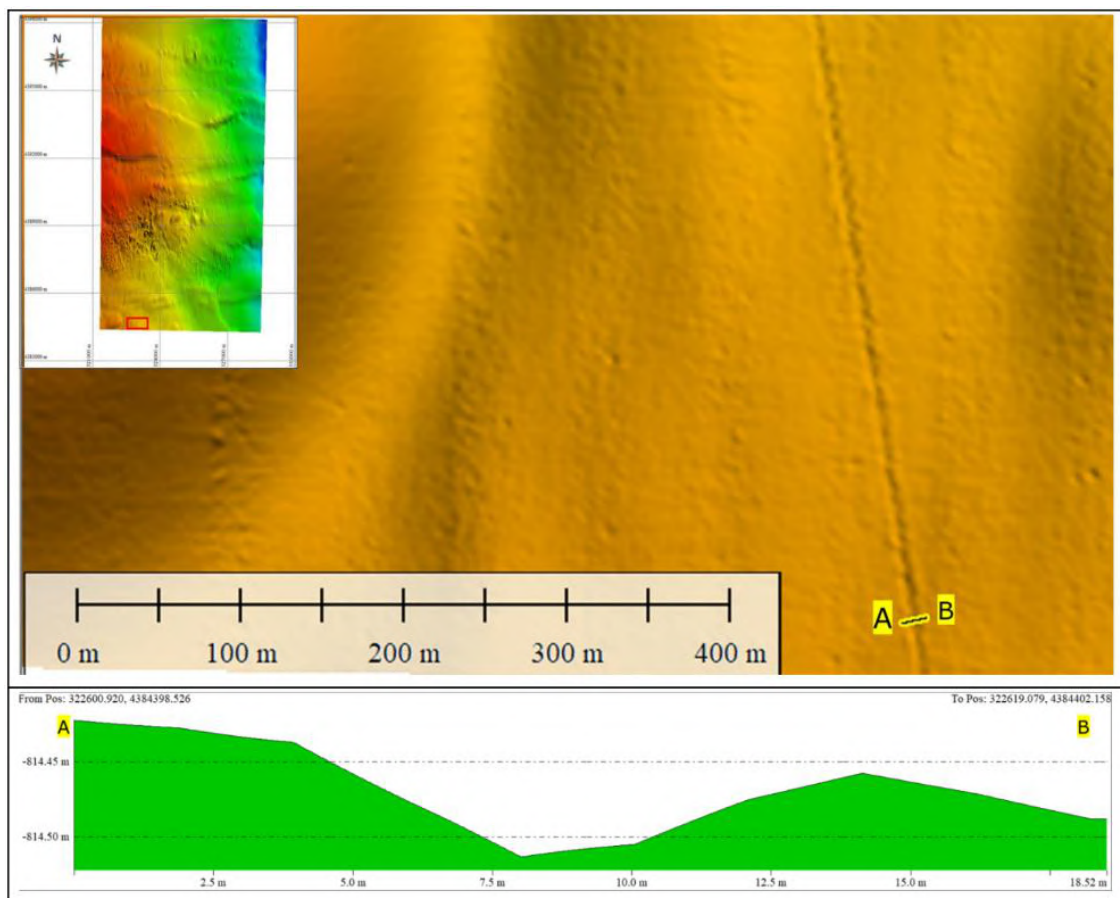


Figure 3-27: Cables trench detected on MBES as a narrow and deep incision.

The higher-resolution HISAS data allow a more accurate delineation of the trench margins, as well as the adjacent spoil heaps resulting from excavation. (Figure 3-28).

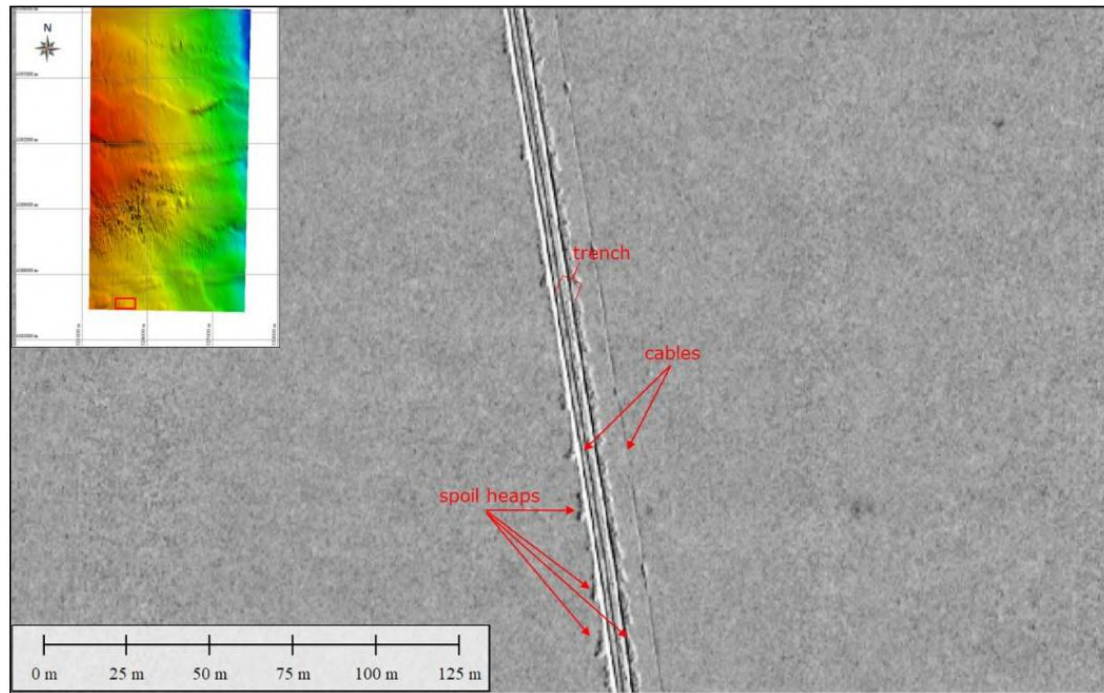


Figure 3-28: Cables trench detected on HISAS with a detail of the lateral spoil heaps.

Moving toward the central sector, the cable trench is no longer visible, as this area is characterized by the MTD harder sediments described above. The presence of these hard substrates possibly prevented trench excavation, and the cables were laid directly on the seafloor. In the northeastern part of the study area, another cable is identified only in the HISAS data, as no associated trench is visible. It appears thin, partially buried, and shows a discontinuous path. The cable terminates near the isolated mound in the northern sector where it appears twisted and is no longer detectable toward the southern part of the study area (Figure 3-29).

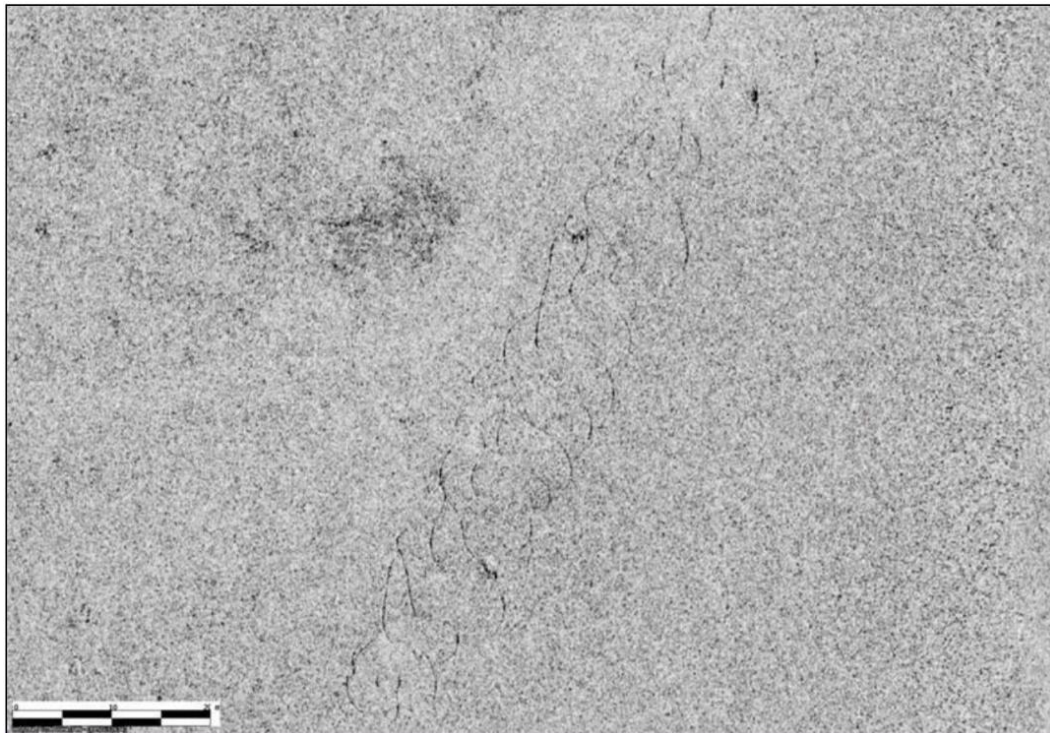


Figure 3-29: Detail of the cable identified in the northern sector of the study area.

3.3.1.6 Sonar contacts recognized in the study area

Within the study area 144 targets have been recognized. The majority of them are irregular or elongated or linear objects of a small scale apart from some ropes and debris. The sonar contact list related to all these targets can be seen in

3.3.1.7 Sub-surface stratigraphy interpretation from SBP

The processing of SBP records was conducted applying a speed of sound in the sediments of 1517m/sec and the data reveal an average penetration of 30m b.s.b.

SBP data reveal a complex and heterogeneous shallow stratigraphy, dominated by a Mass Deposit Transport (MTD) that characterises the entire surveyed area.

The sub-bottom profiler data reveal a complex shallow stratigraphy dominated by the presence of a mass-transport deposit (MTD), whose material is distributed throughout the entire study area. As previously observed in the acoustic dataset, this unit is currently almost entirely draped by subparallel layers with an average thickness of approximately 7.9 m. These sub-parallel strata define the first seismic facies (Facies F1), bounded between the seafloor and reflector R2, which corresponds to the top of the chaotic MTD deposits.

Facies F1 is further subdivided into two sub-facies by reflector R1, which separates the overlying low-to medium-reflectivity strata (Sub-facies F1a) from the underlying sub-parallel strata characterized by medium-to high-amplitude reflectivity (Sub-facies F1b). R1 depth ranges from 0m (not detectable) to 6.5m b.s.b.

Sub-facies F1a consists of sub-parallel layers generally less than 1 m thick, laterally continuous across most of the study area and conformable with the morphology of the MTD. In correspondence with the mounds, a marked reduction in the thickness of Sub-facies F1a is observed, producing a truncated geometry. Figure 3-30 shows a seismic section across the isolated mound located in the northern sector, where the strata of Sub-facies F1a appear truncated against lithified material partially exposed along the mound crest.

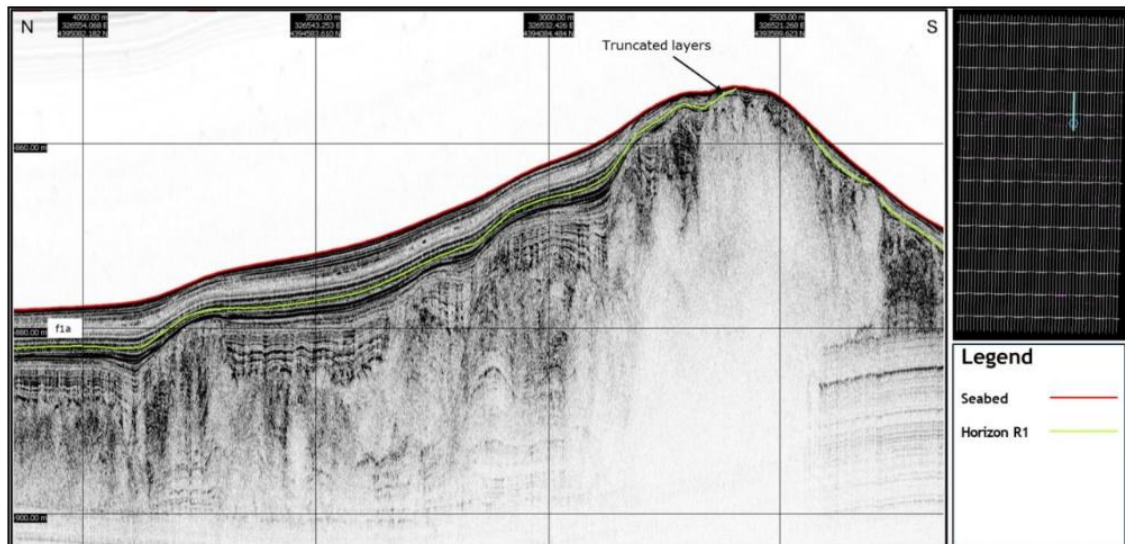


Figure 3-30: Detail of SBP line M03_I10: Facies f1a with truncated layers on the isolated mound identified in the northern sector of the study area

This sedimentary drape is completely absent where harder material incorporated within the MTD is exposed at the seafloor. Figure 3-31 illustrates a seismic section across these harder bodies, which interrupt the continuity of the overlying sedimentary cover.

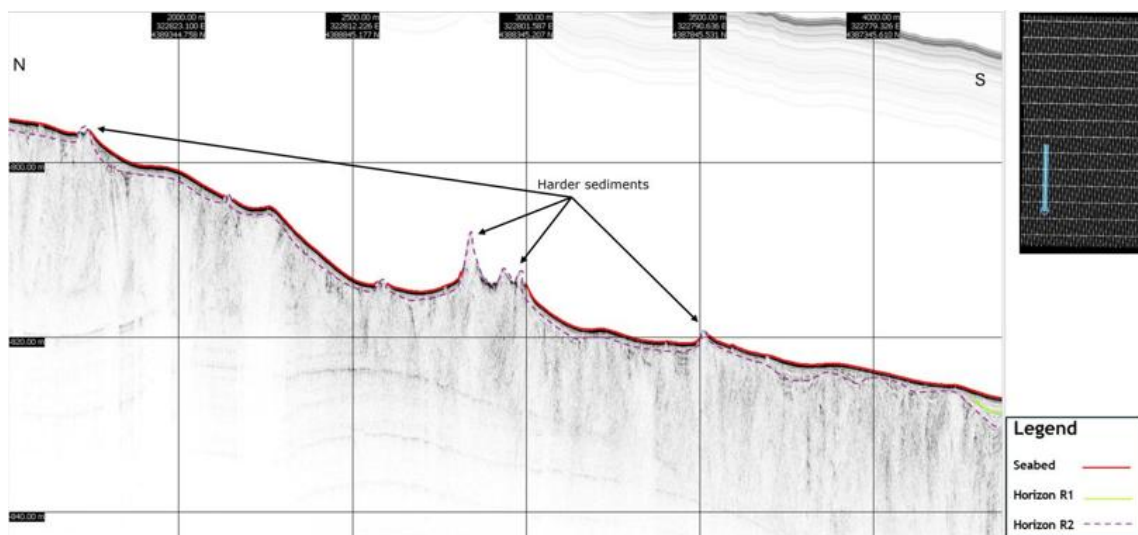


Figure 3-31: Detail of SBP line M05_I10: Harder sediments of MTD material

Furthermore, in the northwestern sector of the study area, the presence of a fault scarp characterized prevented the accumulation of pelagic sediment, resulting in the exposure of the underlying Sub-facies F1b and MTD deposits (Figure 3-32).

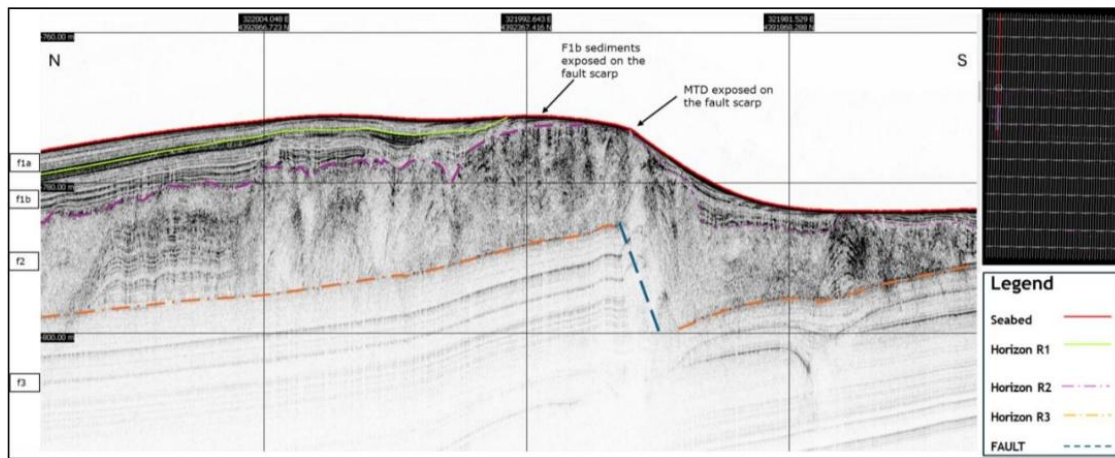


Figure 3-32: Detail of SBP line M01_I05: Facies F1b and MTD material (facies f2) exposed on the fault scarp

Based on granulometric analyses performed on grab-samples material, the deposits composing Subfacies F1a are interpreted as pelagic silty-clay sediments.

Sub-facies F1b is generally thicker than Sub-facies F1a. Reflector R1, marking the top of this subfacies, is characterized by high reflectivity and can be continuously traced throughout the study area, except where harder bodies are exposed. The F1b sub-facies layers follow the morphology of the MTD, filling the accommodation space generated by irregularities of the mass-transport deposit and leading to the formation of small channels and sedimentary basins. Locally, these strata appear fractured, suggesting deformation of the sedimentary succession associated with compressional, gravity-driven folds developed at the toe of the underlying MTD. These fractures may be interpreted as tensile fractures related to fold growth, associated with syn-deformational de-watering processes (Figure 3-33).

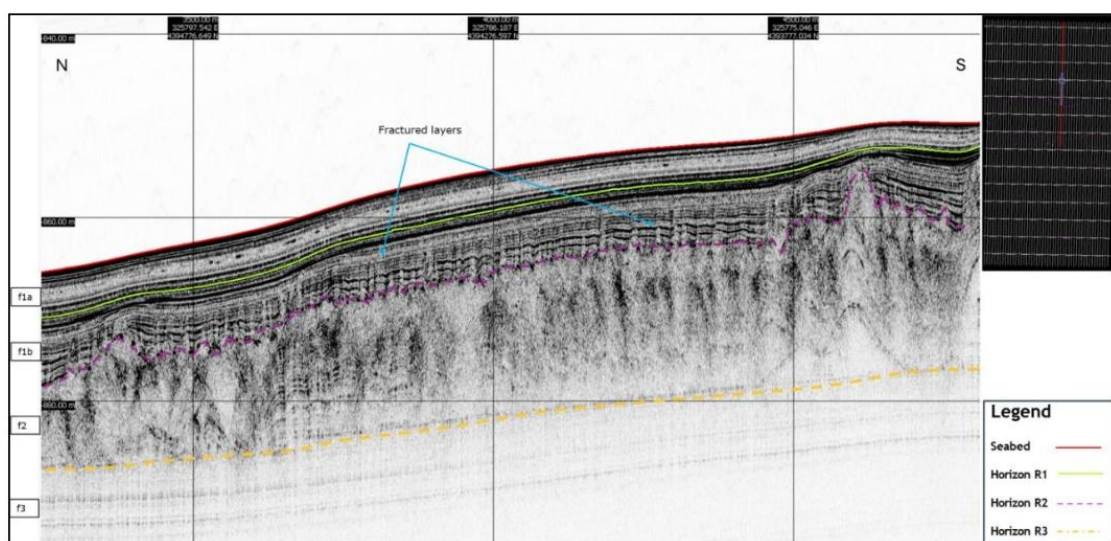


Figure 3-33: Detail of SBP line M03_I05: Fractures layers in the facies f1b vs undisturbed layers in the facies f1a

Considering the high reflectivity displayed in the seismic data, the material composing Sub-facies F1b is interpreted as fine-grained sediment. Where f1b sediments are exposed, their acoustic response is equal to F1a sediments, suggesting a silty-clayey granulometry.

Within Sub-facies F1b, restricted to the northern sector of the study area, another chaotic body has been identified. This unit, in the northernmost part of the study area has an average thickness of 5m. It is interpreted as a second gravitational event whose deposits overlies the main MTD, separating from it only by few thin sub-parallel layers. Moving from north to south, the thickness and lateral extent of this second gravitational unit progressively decrease, eventually forming isolated lenses enclosed within the sub-parallel strata of the same sub-facies (Figure 3-34). The available data do not allow to determine the full extent of this secondary event because the chaotic body continues beyond the northern border of the study area. However, looking at its areal extension, it can be interpreted as the lateral portion of a gravity-driven body extending downslope along the E-W seabed gradient.

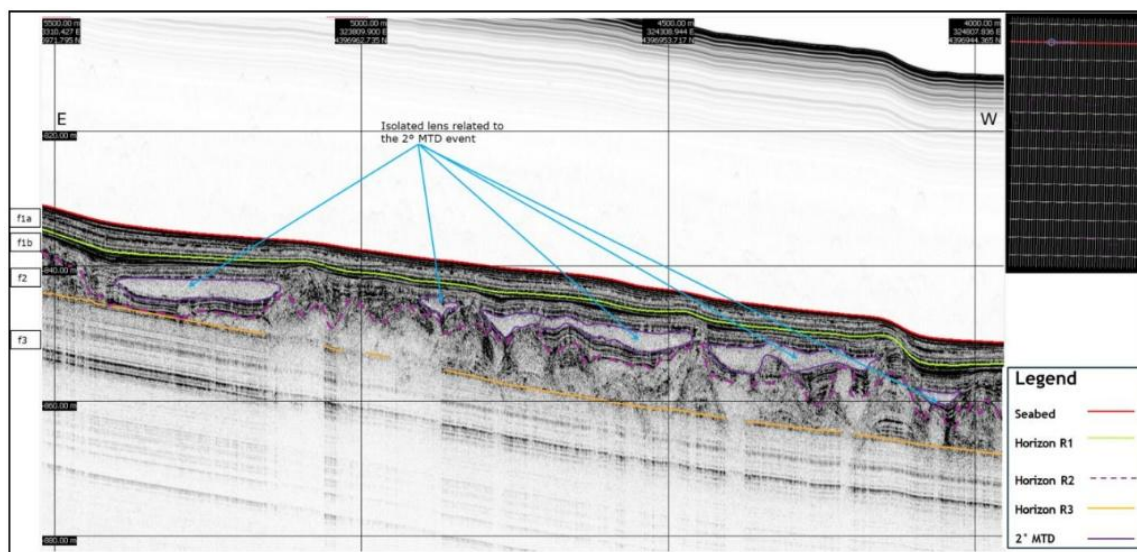


Figure 3-34: Detail of SBP line M01_x02: Isolated lens related to the 2° MTD event recognized in the northern part of the study area

Facies F1b is delimited on the bottom by the reflector R2. It is a low- to medium-amplitude, irregular reflector representing the top of the MTD material. Its depth ranges from 0m (where the MTD material is exposed) to 16.82m b.s.b. (in the northern sector of the study area).

Seismic Facies F2, bounded between reflectors R2 and R3, corresponds to the MTD deposits. The internal architecture of this unit appears highly heterogeneous, displaying an alternation of chaotic bodies characterized by acoustic turbidity and stratified bodies with sub-parallel layering (Figure 3-35).

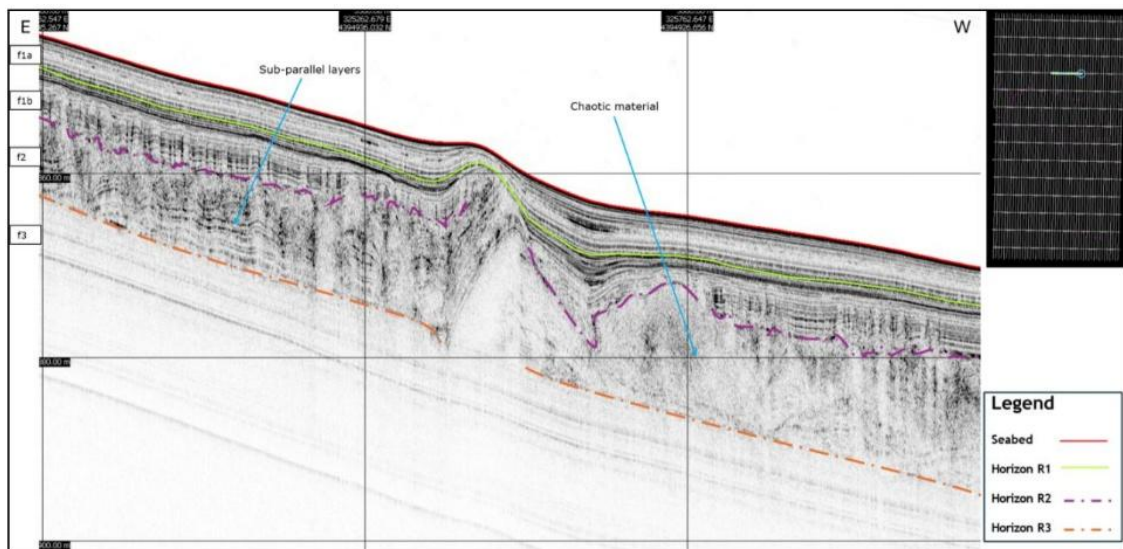


Figure 3-35: Detail of SBP line M04_x04: Internal structure of the MTD shows an alternation of chaotic and stratified bodies

In addition, variations in seismic signal penetration highlight differences in both lithology and degree of lithification within the MTD deposits. In correspondence with lithified material, seismic penetration decreases significantly, producing acoustic blanking effects. Moreover, the MTD deposits appear strongly deformed, as evidenced by fold structures visible both in seismic profiles and, where exposed at the seafloor, in the HISAS acoustic data (Figure 3-36).

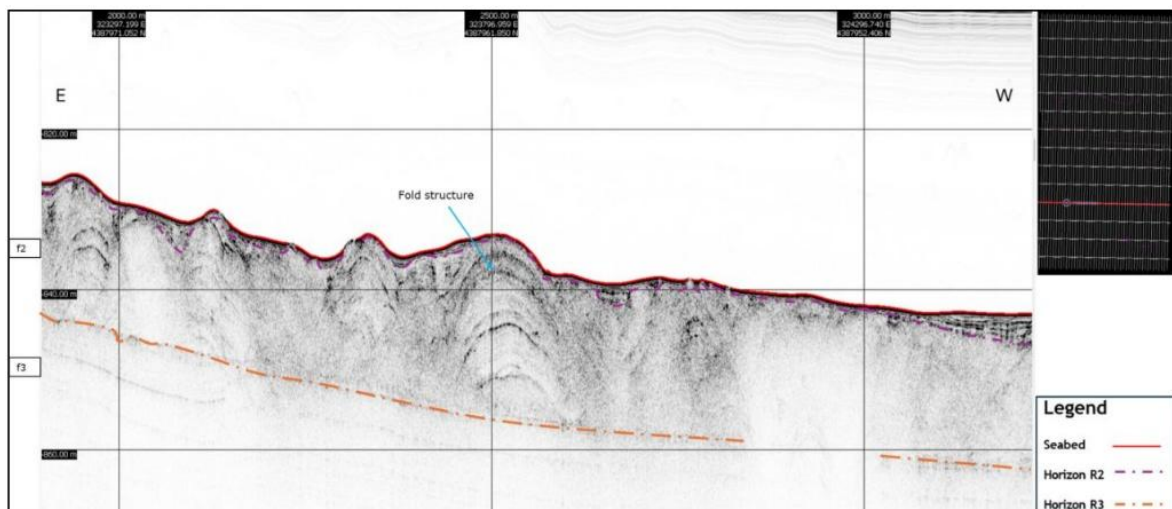


Figure 3-36: Detail of SBP line M05_x11: An example of the folded structures recognized in the facies f2 (MTD material)

Facies F2 exhibits a highly variable thickness, with an average value of 15m (Figure 3-37). Locally, in correspondence of the mound-like morphologies and fault scarps f2 reaches thickness values that can exceed 30m. The highest value is recorded on the isolated mound in the northern sector of the study area where the MTD material reaches a thickness of 35m (see Figure 3-38)

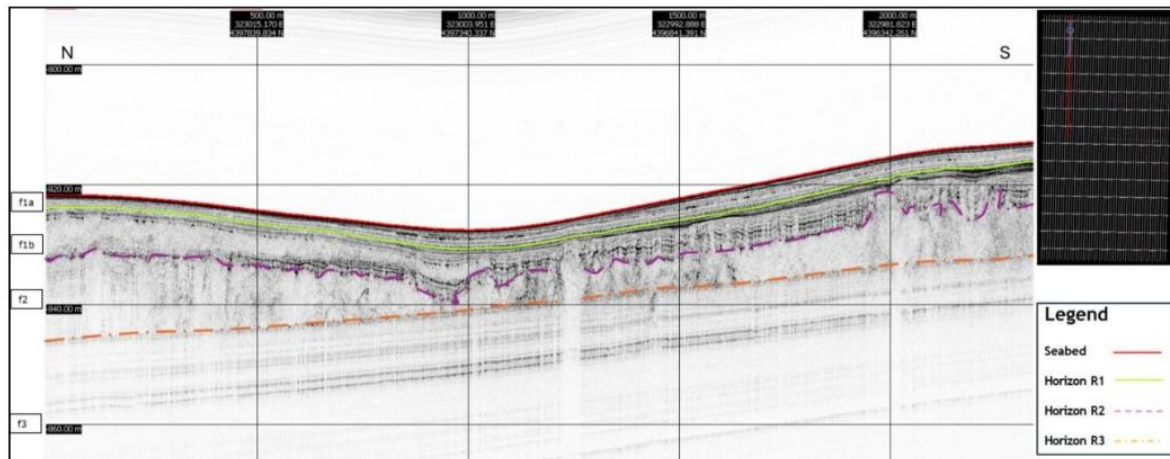


Figure 3-37: Detail of SBP line M01_I11: Example of Facies f2 showing a high thickness variability within the study area

The variable thickness of the MTD across the study area is mainly related to the activity of deep normal faults (>3 m b.s.b.) identified throughout the area, with larger displacements occurring in the western sector. These faults, interpreted as extensional tectonic structures, are characterized by throws of several meters. The MTD material, deposited in situ, progressively filled the accommodation space generated by fault activity, partially smoothing the tectonic displacements associated with these structures. Since Facies F2 is itself affected by tectonic deformation, the MTD is interpreted as a syn-tectonic gravitational deposit.

Facies F2 is delimited on the bottom by the reflector R3. It is a medium-amplitude reflector representing the bottom of the MTD material. Its depth ranges from 0m (where R3 is not detected due to blanking effects described in the following paragraph) to 37m b.s.b. (beneath the isolated mound). The reflector is discontinuous because it is cut by the deep normal faults described above.

The MTD deposits overlie a deeper unit composed of well-defined sub-parallel strata, sharply cut by fault planes, suggesting a relatively stiff and consolidated nature of the sediment (Figure 3-38). The sub-bottom profiler signal terminates within this stratified unit. Deep faults are potentially extended down the maximum detected depth, until they are no longer detectable.

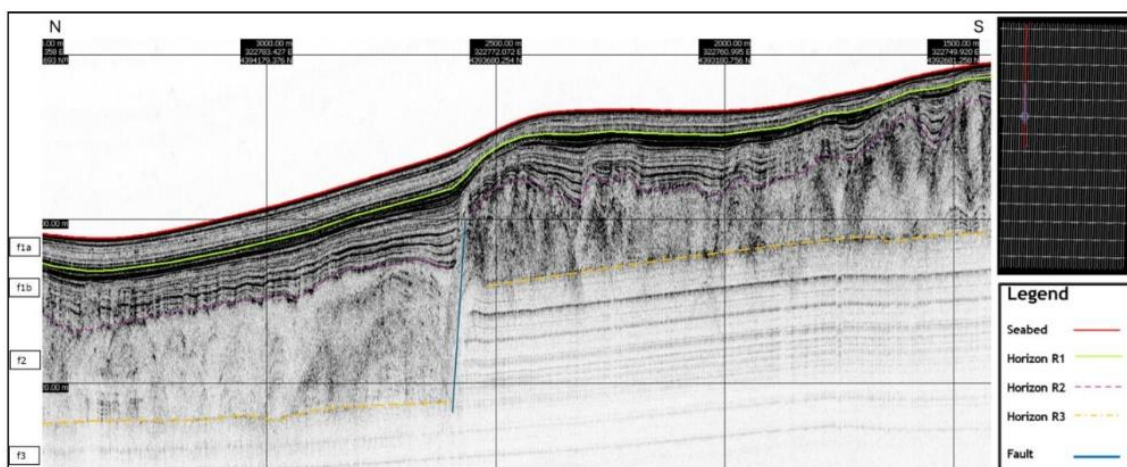


Figure 3-38: Detail of SBP line M01_I10: Reflector R3 cut by a deep normal fault

3.3.1.8 Fluids/acoustic anomalies in SBP profiles

Within the study area, the seismic data are locally affected by strong blanking effects (wipe-out zone). The limit of the fluids/acoustic anomalies detected in the study area is shown in Figure 3-39.

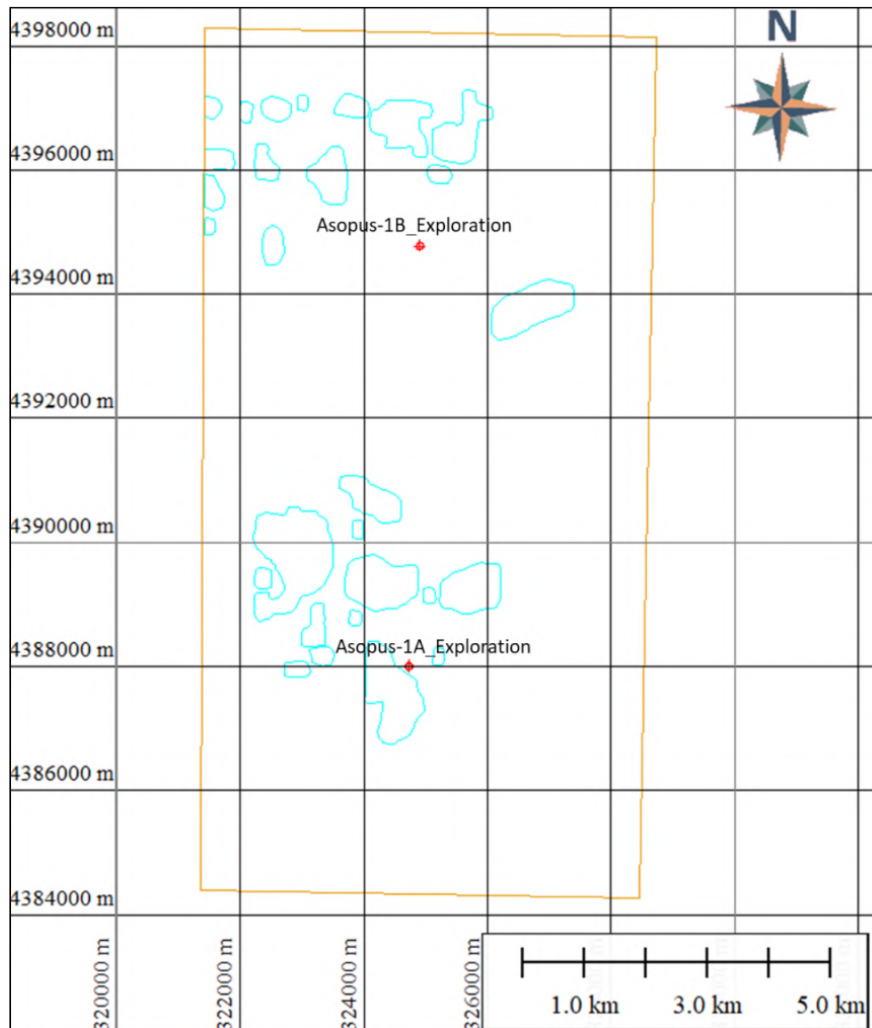


Figure 3-39: Limit of shallow fluids/biogenic gas (light-blue polygons) detected in the survey area

As shown in Figure 3-40, these anomalies affect both seismic facies F2 and F3, producing transparent zones within the deeper part of the seismic profiles. Such effects may reflect localized fluid presence. The origin of these fluids cannot be unequivocally determined from the available seismic dataset alone.

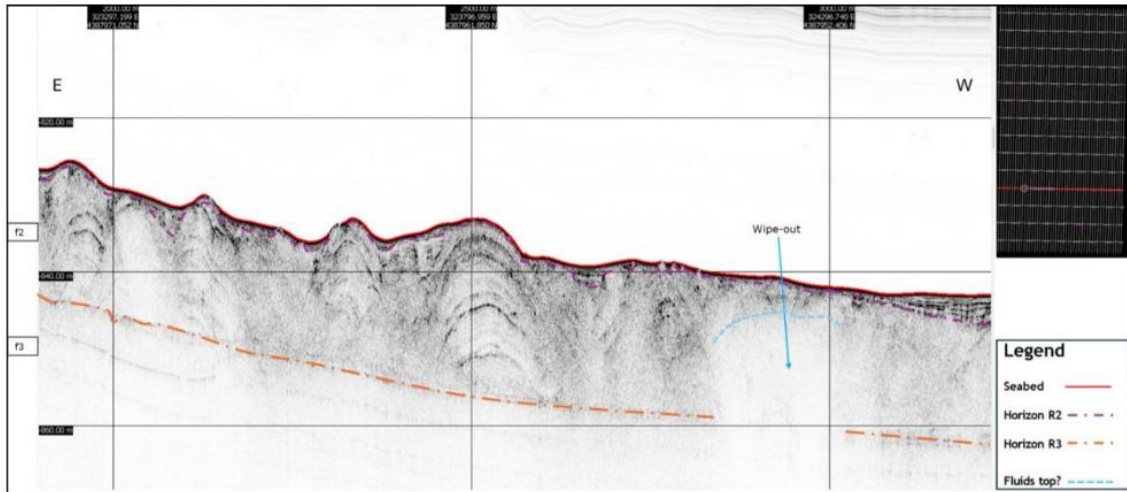


Figure 3-40: – Detail of SBP line M05_x11: Possible evidence of fluids causing the blanking (Wipe-out) of the seismic signal

In the northern sector of the study area acoustic blanking is observed beneath the isolated mound. This mound developed along a fault plane, whose damage zone likely acted as a preferential pathway for fluid migration and/or fluid expulsion from the surrounding sediments, potentially contributing to the observed seismic attenuation beneath the feature. The formation of the isolated mound may also be related to the underlying fault plane. The fault's hanging wall likely acted as a morphological obstacle to the mass-transport deposits, promoting the accumulation of material along the fault scarp (Figure 3-41).

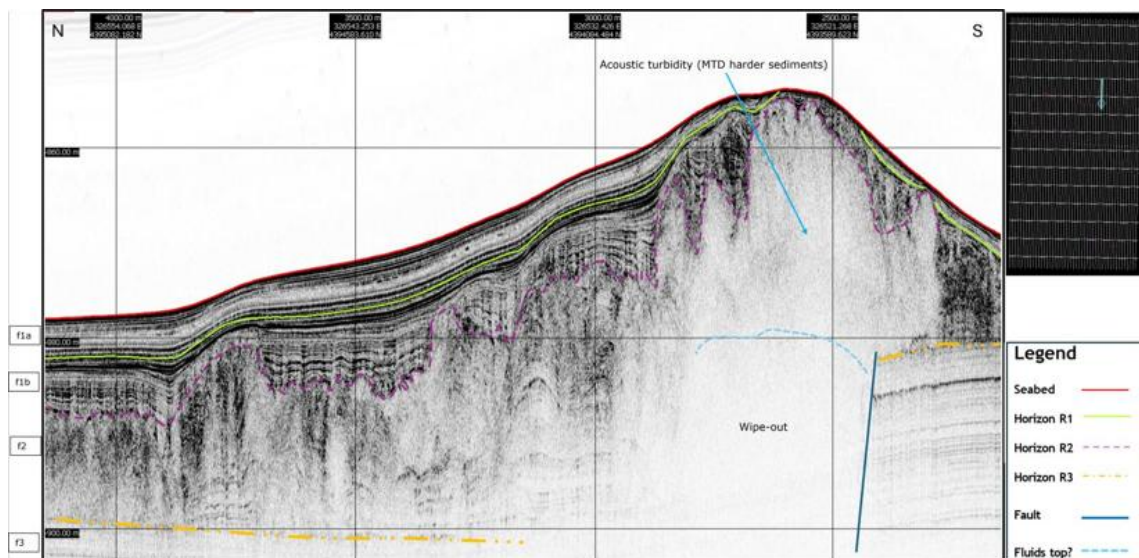


Figure 3-41: Detail of SBP line M03_l10: Wipe-out effect under the isolated mound recognized in the northern sector of the study area

In the central sector of the study area, where the more consolidated sediments of the MTD are exposed, several seismic lines show pronounced acoustic blanking effects. The wipe-out zones are not spatially associated with fault damage zones as the previous case, suggesting a different genetic origin. Considering

the surface data acquired within the study area, no active fluids expulsion features (such as pockmarks, chimney, plumes etc) have been recognized.

Furthermore, in the sub-surface data these acoustic anomalies are not associated with other diagnostic indicators commonly used to infer the presence of fluids such as bright spots, polarity reversals, or velocity pull-down effects.

The observed acoustic response may alternatively reflect fluid-related processes associated with the dewatering of compressional ridges within the MTD deposits. The overlying sediments of seismic facies F1 may act as a sealing unit, contributing to the preservation of the observed acoustic signature by limiting vertical migration processes.

3.3.1.9 Existence of unstable hydrates

Based on the interpretation of the available geophysical datasets no gas hydrates have been identified within the study area. In particular, the sub-bottom profiler data do not show any features typically associated with gas hydrate occurrence that could indicate an increased geohazard risk. As a result, gas hydrates are not expected to represent a relevant geohazard for the proposed development within the study area.

3.3.1.10 Geohazards assessment

The combined interpretation of geophysical data analyses (MBES, HISAS, SBP, MAG) allowed the detection of the main area features and shallow hazards. The hazard evaluation qualitative criteria are summarised in Table 3-9, Table 3-10, and Table 3-11. **Error! Reference source not found.** Figure 3-42 shows a map of the geohazards discussed in chapter 3.3.1.

Table 3-9: Hazard evaluation qualitative criteria

ITEM	MAIN FEATURE	HAZARD
BATHYMETRY	Featureless seabed Very gentle gradient	NEGLIGIBLE
	Featureless seabed Gentle gradient	LOW
	Bedforms Slope instabilities and failures Rough seabed (positive/negative reliefs) Moderate gradient	MODERATE
	Bedforms Slope instabilities and failures, Rough to very rough seabed (positive/negative reliefs) Steep to very steep gradient	HIGH
MORPHOLOGY	Mass transport deposits Shallow gas evidence Outcrops Posidonia oceanica meadows Volcanism Diapirs	NEGLIGIBLE to HIGH: presence of one of more of the morphologic geohazards and their proximity to the route

ITEM	MAIN FEATURE	HAZARD
STRATIGRAPHY	Faulting (shallow/deep faults) Fluid seepage Gas charged sediments Diapiric structure Buried slump Buried channel Erosive surface	NEGLECTIBLE to HIGH: presence of one of more of the stratigraphic geohazards and their proximity to the route
MAN MADE FEATURES, SONAR CONTACTS, MAG ANOMALIES	Sonar contact (wreck, well head, debris etc.) Magnetic anomaly Existing or planned systems (best crossing angle is close to 90°) Anchor and fishing scars	NEGLECTIBLE to HIGH: presence of these hazards and their proximity to the route

Table 3-10: Evaluation qualitative risk

HAZARD POTENTIAL (BASED ON IDENTIFIED FEATURES)	EVALUATION RISK
NEGLECTIBLE	Almost zero risk that the event may occur
LOW	Low risk that the event may occur
MODERATE	Moderate or significant risk that the event may occur
HIGH	High risk, almost certain that the event will occur

Table 3-11: Summary of geophysical results

ITEM	MAIN FEATURES	HAZARD
BATHYMETRY	The surveyed area at the proposed ASOPUS-1A_Exploration wells location is characterized by a rough seafloor with complex morphology. The water depth on the wells' coordinates is 842.5 m for ASOPUS-1A_Exploration with a seabed slope of 1.3°. ASOPUS-1A_Exploration site is in an area where the material of MTD is exposed, creating a maze pattern with grooves covered by fine sediments and spurs made by MTD harder sediments. Considering the planned well's coordinates, ASOPUS-1A Exploration falls in one of these grooves, surrounded by several harder sediment outcrops ranging from 0.2 to 1 m of height. Within 500m radius area around ASOPUS-1A_Exploration, the presence of MTD harder sediments results in a localized increase in slope values along their flanks, which may exceed 10°. No fault scarps morphologies are recognized within the 500m radius area. There is no evidence of active deformation on the seabed or remobilization of the MTD gravity underlying unit. The rough seabed and the presence of harder sediment bodies suggest a LOW drilling risk.	LOW
SEABED MORPHOLOGY	The analysis of the acoustic data of the seafloor in ASOPUS-1A_Exploration site reveals low reflectivity backscatter inside the grooves. This sediment could be interpreted as the same clay/silty pelagic sediment collected in the grab sample during the environmental sampling phase (location D1a). The exposed MTD material shows a high backscatter reflectivity associated with white shadow revealing positive relief. The high reflectivity material is then surrounded by sub-cropping sediments with a medium amplitude, suggesting a coarser sediment if compared to pelagic sediments with the lowest reflectivity. Within 500m radius area around ASOPUS-1A_Exploration location only one anthropic target has been recognized (EER001_T142) at 441.6m (209°): it is an irregular object of small dimensions (1.14 m x 1.00 m x nmh). Considering its dimension and the distance from the proposed well's coordinates it doesn't influence the risk level. ASOPUS-1A_Exploration has a minimum distance from the cables detected within the study area of 2692m considering the AAE-1 cable in the south-western corner of the surveyed area. The distance between ASOPUS-1A_Exploration planned location	LOW

ITEM	MAIN FEATURES	HAZARD
	and the other cable recognized in the NE part of the study area is 6700m. ASOPUS-1A_Exploration is located 8606 m from the target T057 (possible shipwreck's ruins). The presence of MTD harder sediments bodies with high backscatter values suggests a moderate drilling risk but the proposed well location falls on a low reflectivity area. In addition, the 500m-radius area around well position is not interested by relevant targets. The risk is assessed as LOW.	
SHALLOW STRATIGRAPHY	Within 500m radius area around ASOPUS-1A_Exploration the shallow stratigraphy is mainly characterized by the chaotic material of the MTD (seismic facies f2). Here, facies f1 isn't recognized on the seismic data because the fine sediments coverage along the grooves is too thin to be clearly detected in the SBP. On ASOPUS-1A_Explorations location the seismic facies F2 has a thickness of 18.62 m. Within 500m-radius area several blanking effects are recognized. These acoustic anomalies appear localized and discontinuous through the survey area, and they never reach the surface. These strong attenuations could be caused by possible fluids and/or lithology variations along the MTD unit. Considering the first hypothesis, the potential presence of fluids could be related to de-watering processes triggered by the high compression, deformation, and fracturing of the MTD material (as evidenced by the fold structures or tensile fractures observed in the seismic data). These fluids do not reach the surface because they are blocked by the thin, sub-parallel layers of pelagic material of facies f1. There is no other evidence of fluids in both sub-surface and surface data: in particular, no gas seepage gas chimneys, active pockmarks, acoustic plumes have been recognised within the study area. The minimum distance between these acoustic anomalies and ASOPUS-1A_Exploration is 243m (214°): the blanking effect starts at a depth of 8 m b.s.b.. Facies f2 is delimited to the bottom by R3, a medium-reflectivity horizon. On the well's location it is detected at a depth of 19.72 m. No faults displacement affects the stratigraphy within the 500m area around well trajectory. The probability of shallow gas is assessed as LOW because no evidence of gas seepage within the 500m radius area has been detected, also if the presence of fluids cannot be ruled out due to the acoustic blanking effects visible in the seismic data. Furthermore, the nearest blanking effect is observed more than 200m from the planned well's location.	LOW

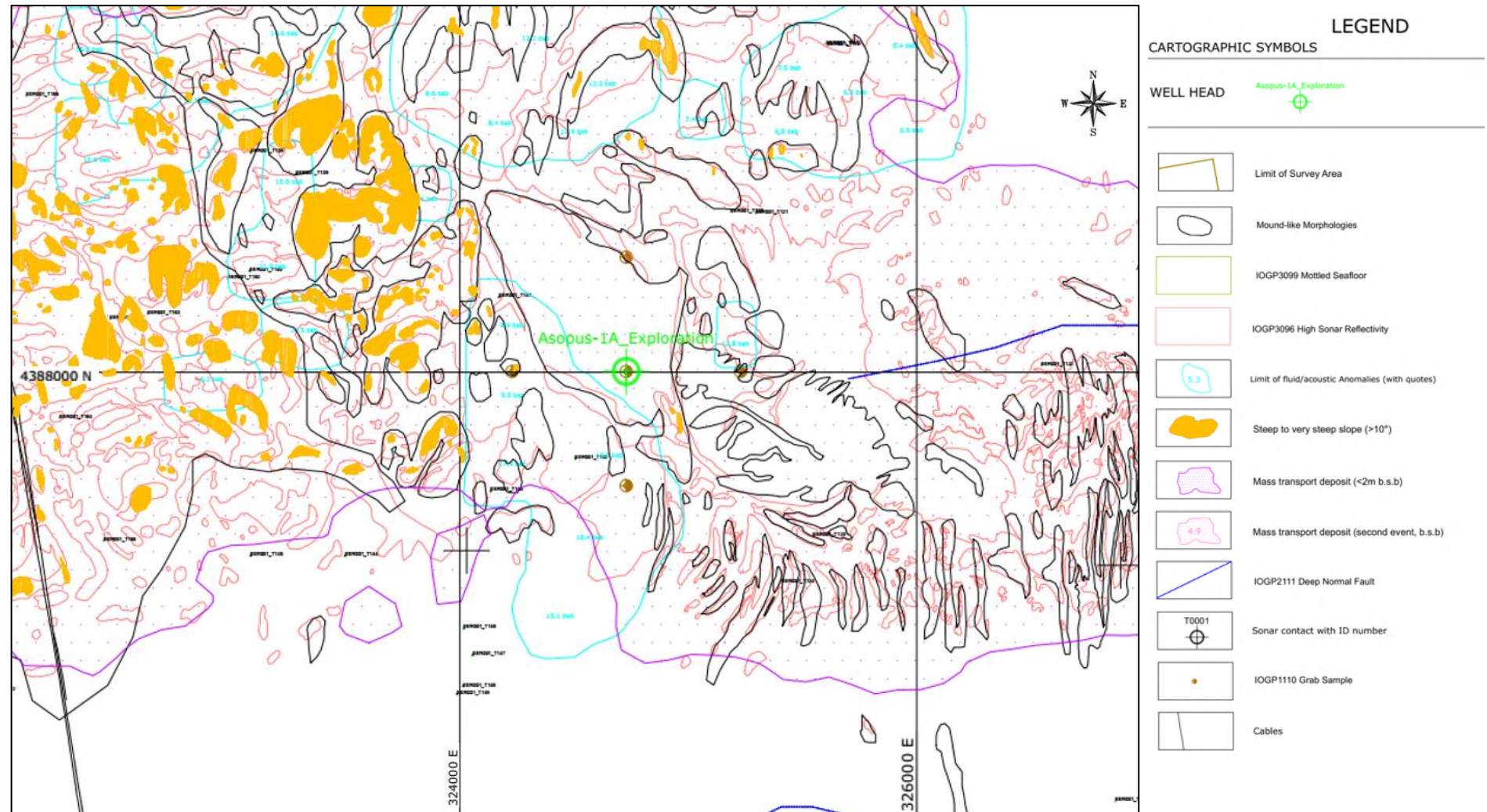


Figure 3-42: Geohazard map enlarged to Asopus 1A exploration well (designed by Lighthouse SpA, see Annex 02)

3.3.1.11 CATHX data interpretation

The resolution of the individual images is approximately 1 mm/pixel, while the mosaics were exported at 5mm/pixel to optimize processing efficiency.

Figure 3-43 shows an example of a CathX mosaic and detailed view of the seabed within the sampling area D6a.

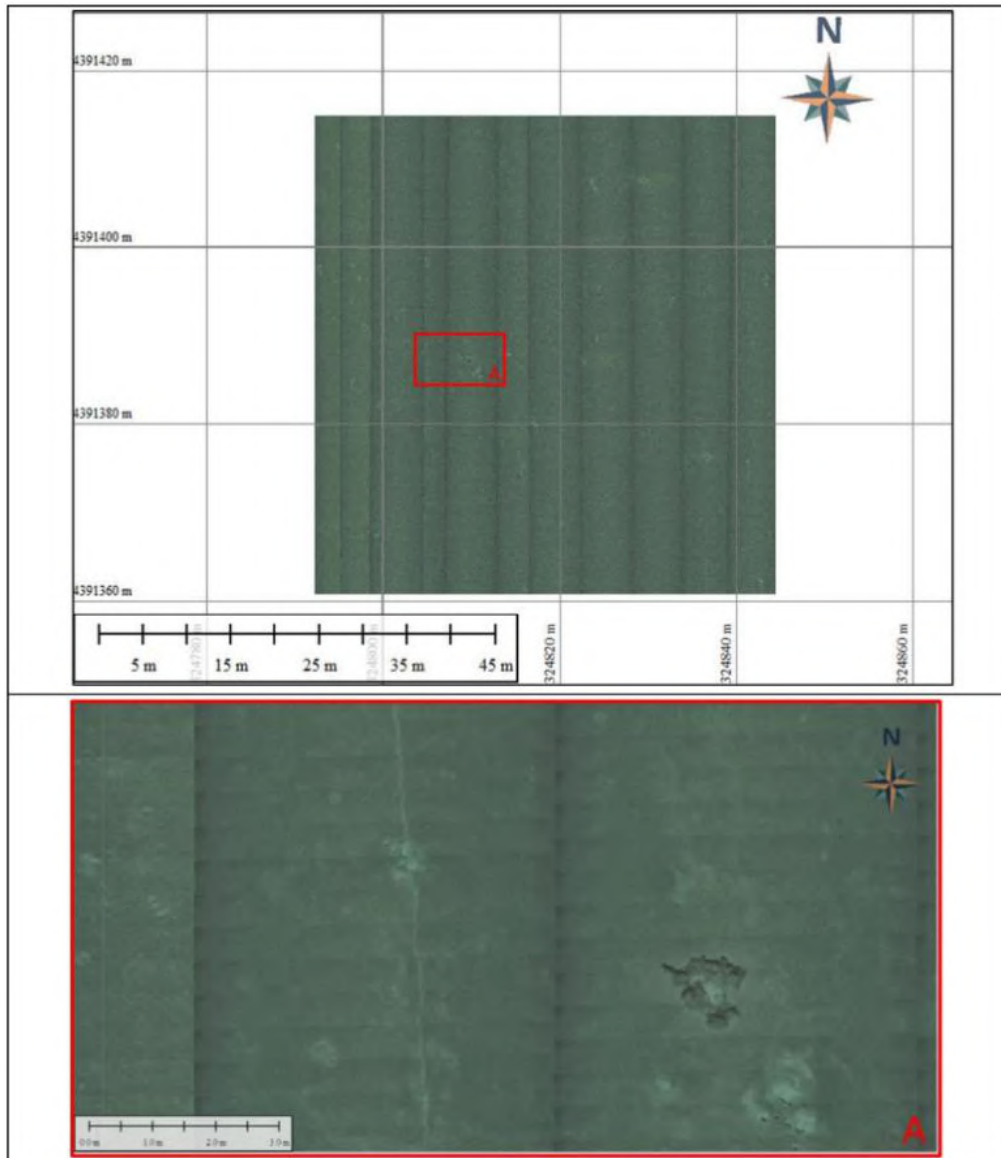


Figure 3-43: D6a sampling area with detailed view of seabed

A detail of D3b box is shown in Figure 3-44 which shows the trace left by the Van Veen grab sampler used during environmental sampling phase.

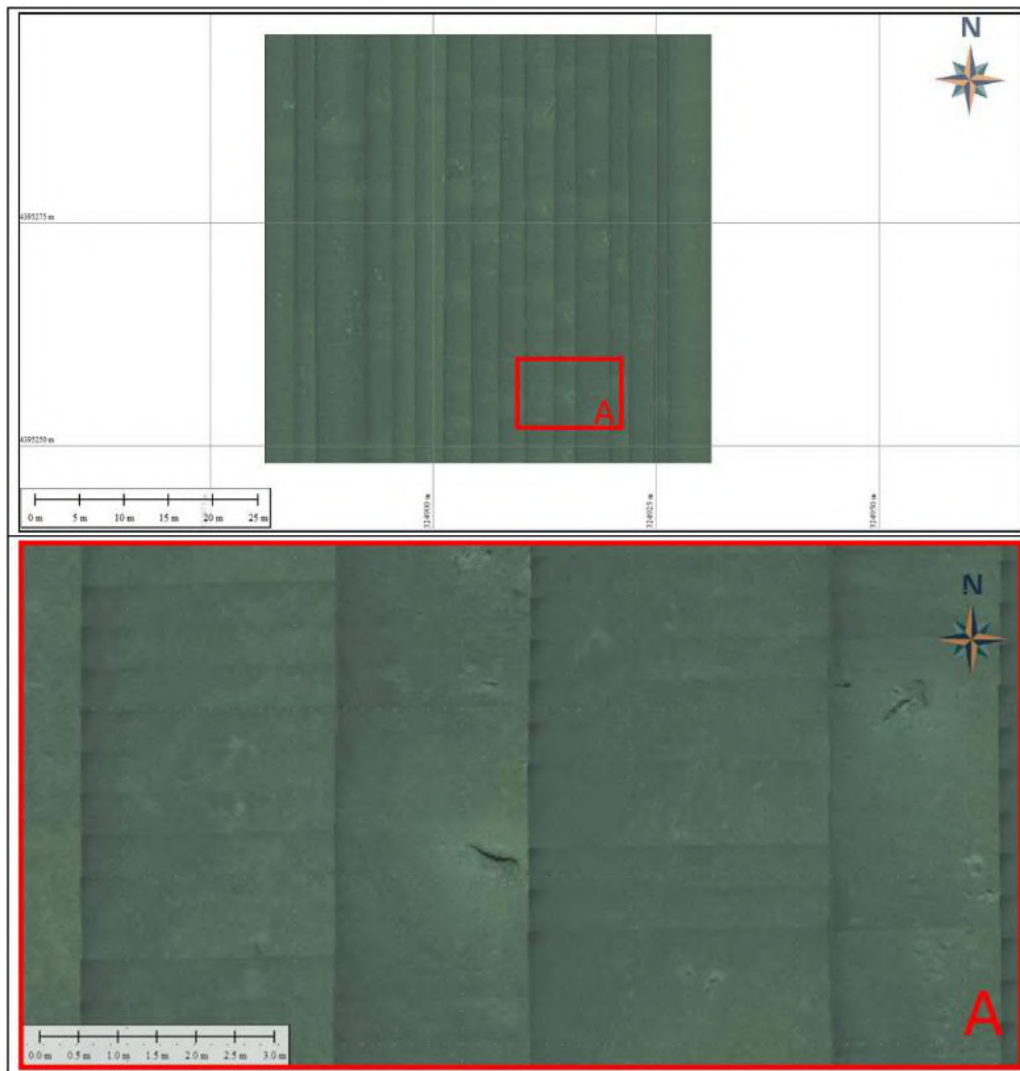


Figure 3-44: Detailed view of traces left by Van Veen grab sampler at D3b location

The analysis of seabed areas through the low pass phase, within the EBS sampling points, did not reveal any risks or hazards due to morphological features and man-made objects.

3.3.1.12 Marine cultural heritage – Target T057

During mission M03 an isolated portion with high acoustic reflectivity and an elongated shape has been recognized on the HISAS mosaic (Figure 3-45). In correspondence of this feature the MBES data showed a mound shape approximately 60 cm higher than the surrounding seabed. Client onboard asked to perform an additional visual inspection on this possible target.

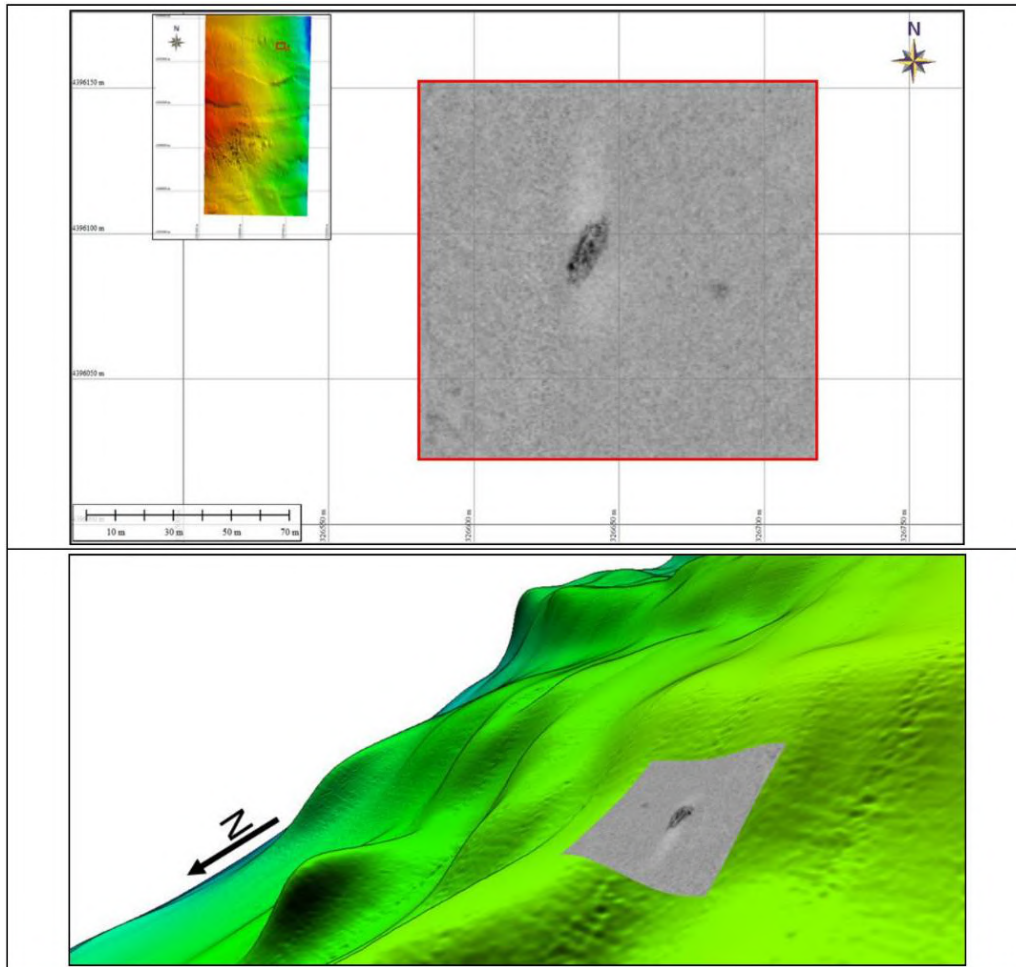


Figure 3-45: Target T057 recognized in HISAS and MBES data. Upper panel: A detail of the target identified on the HISAS acoustic data thanks to its higher reflectivity. Lower panel: 3D image of the target with HISAS data superimposed on MBES data

The visual inspection performed on the target T057 allows to identify a group of amphoras partially buried (Figure 3-46). Around the amphoras is visible a white frame representing the elongated shape already detected on the acoustic data.

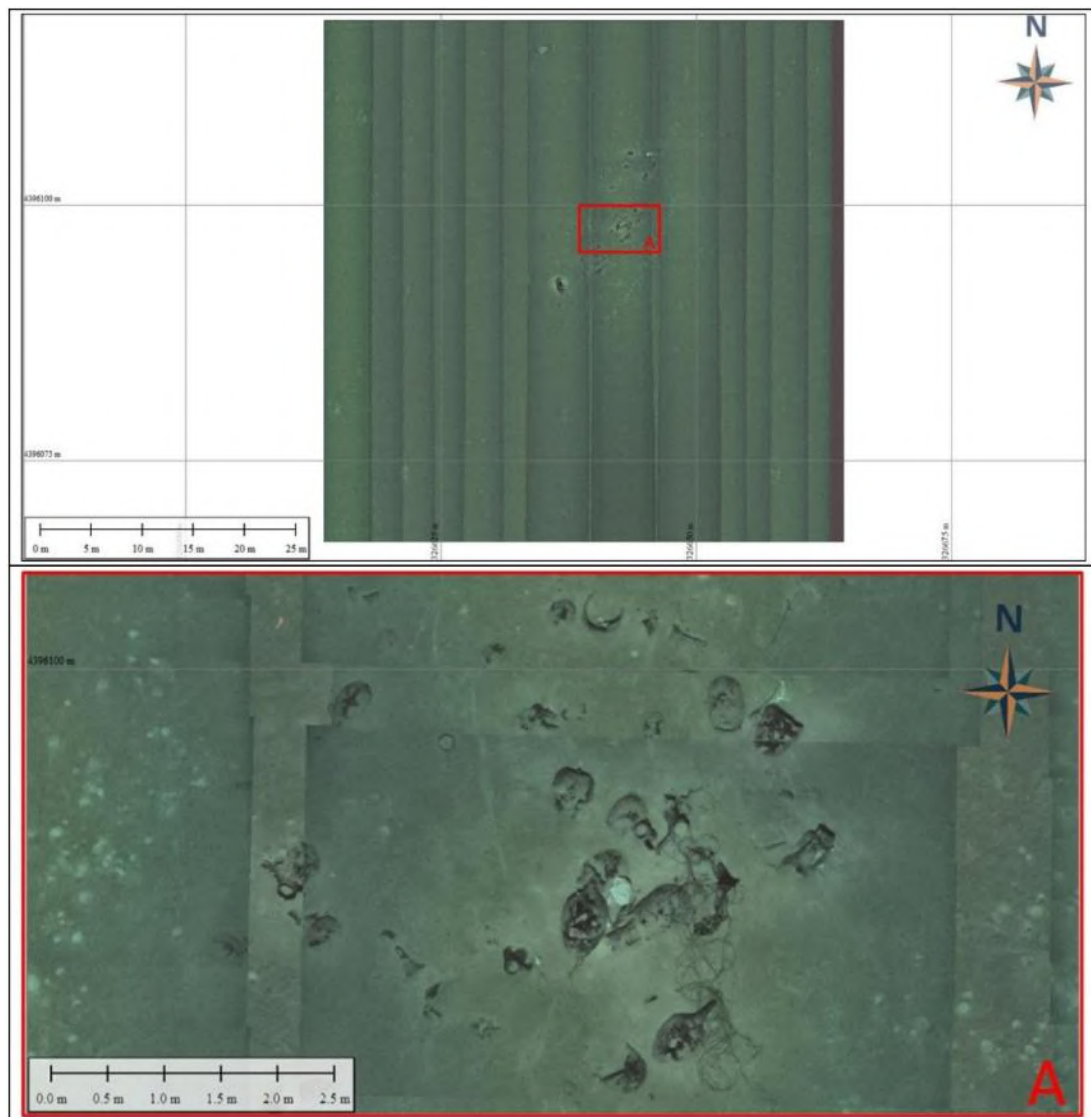


Figure 3-46: Detailed view of amphoras present at T057

The SBP data acquired during Visual inspection on the target box area allowed to identify a buried feature. Figure 3-47 shows the SBP data on the line 8 of T057 target box area.

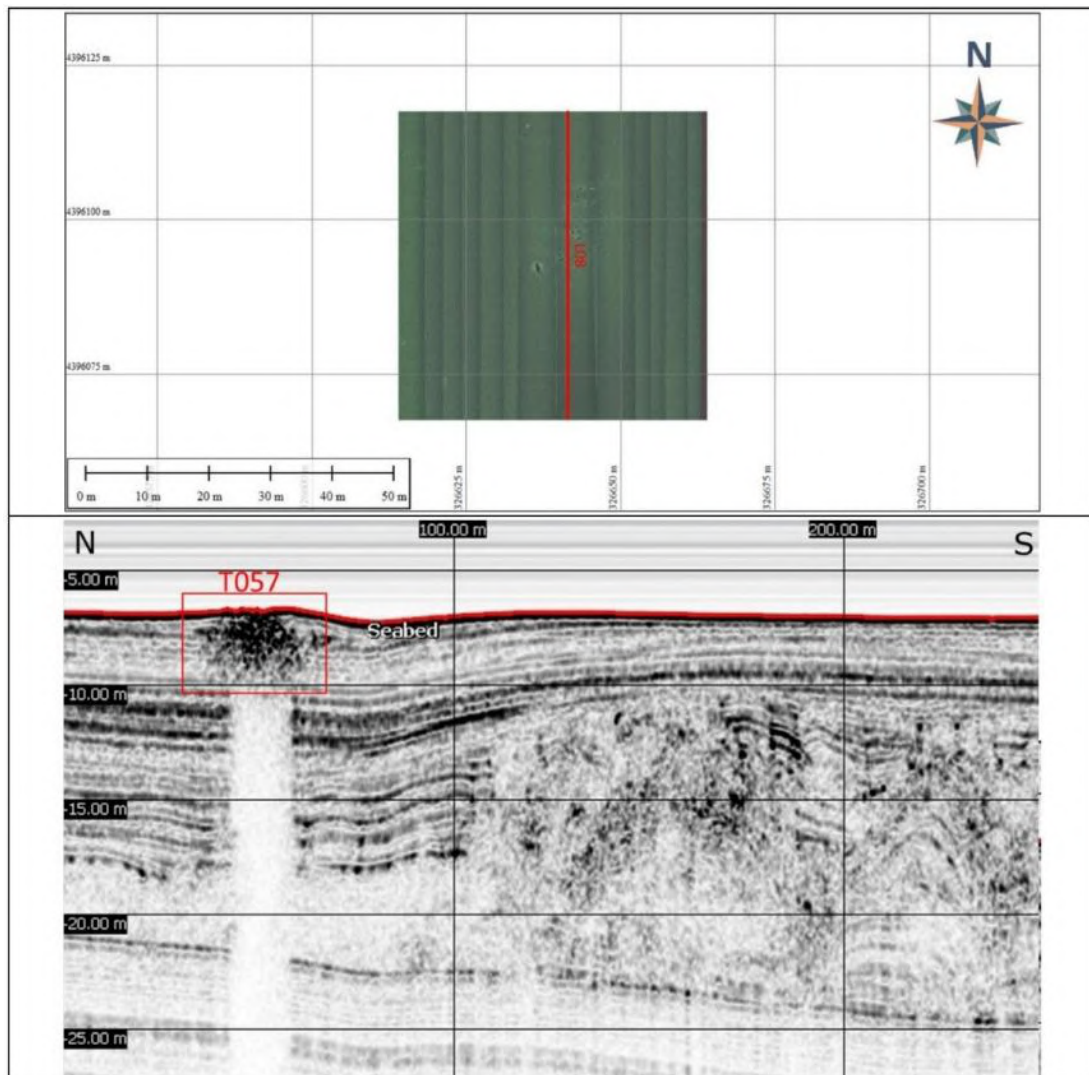


Figure 3-47: SBP line T057_I08: buried part of the target T057 identified on the seismic data during Visual Inspection

Using all the available data the target area has been interpreted as the ruins of an ancient shipwreck, probably made of wood because it is completely eroded on the surface, excepting for a white shadow visible on the Cathx images. As visible on SBP data, the shipwreck ruins are partially buried, justifying the mound structure visible on MBES data. The group of amphoras discovered by the Cathx camera represents the cargo of the ship, which sank along with it.

Table 3-12 summarizes the dimensions and coordinates of surface Target T057.

Table 3-12: Target T057: Description and parameters

FEATURE TYPE	TARGET ID	EASTING (M)	NORTHING (M)	DIMENSIONS (M)	WATER DEPTH (M)	HEIGHT / BURIAL DEPTH (M)	DESCRIPTION
Surface Target	EER001_T057	326640.2	4396095	23.7x8.3x0.6	880.04	2.20below seabed	Possible ruins of an ancient shipwreck comprising scattered objects interpreted as amphorae, with average dimensions of approximately 0.9 m x 0.3 m. The target area is characterized by a buried acoustic anomaly detected on SBP profiles and has been interpreted as the remains of an ancient shipwreck.

GeoSat ReSeArch Lab of the Foundation for Research and Technology Hellas (Institute for Mediterranean Studies (FORTH-IMS)) reviewed and interpreted the geophysical and visual inspection datasets, Lighthouse acquired, for evidence of underwater cultural heritage. They suggested that the target occurs as an isolated anomaly within the wider survey area and is not associated with any known modern infrastructure or seabed installation. Its location within a deep-water environment is comparable to several significant archaeological discoveries made elsewhere in the northern Ionian Sea, including the shipwrecks identified during the POSEIDON pipeline investigations (see §2.6.3.2.32.6.3.2.3).

The dimensions and morphology of Target T057 are consistent with those expected from the remains of a small to medium-sized ancient merchant vessel (Figure 3-45).

Multibeam bathymetric data indicate that the anomaly rises approximately 0.6 m above the surrounding seabed. Although the feature exhibits limited vertical relief, it forms a distinct seabed mound clearly distinguishable from the adjacent sedimentary environment.

Sub-bottom profiler data further indicate the presence of buried material beneath the visible anomaly. This observation suggests that a substantial component of the archaeological deposit may remain concealed beneath seabed sediments and that the exposed remains indicated within acoustic and visual datasets likely represent only part of the original site. The combined geophysical evidence indicates the presence of a coherent archaeological feature exhibiting both exposed and buried components and possessing dimensions consistent with a shipwreck site.

Following identification of the anomaly, a targeted visual inspection was undertaken using the CathX camera system. The imagery revealed a concentration of partially buried amphorae associated with the anomaly and confirmed the archaeological character of the site (Figure 3-46).

The observed amphorae appear clustered within the central portion of the target and are partially embedded within seabed sediments. In addition to the cargo remains, the imagery suggests the presence of a pale

elongated feature corresponding to the principal acoustic anomaly identified within the HISAS data. This feature may represent degraded structural remains or sediment-covered portions of the vessel.

The visual inspection provided direct confirmation that the anomaly is cultural rather than geological in origin and established the presence of diagnostic archaeological material within the site.

The feature appears partially buried and may represent the remains of a vessel lying on the seabed. The limited relief observed within bathymetric data and the apparent degradation of structural elements suggest that the wooden components of the vessel have largely deteriorated, while portions of the cargo and associated deposits remain preserved within the seabed.

The site exhibits notable similarities to the deep-water shipwrecks identified during the Greece-Italy POSEIDON pipeline investigations. In both cases, archaeological remains were detected through marine geophysical survey techniques and subsequently confirmed through visual observations. The partially buried character of the site, the preservation of cargo remains and the occurrence within a deep-water environment are consistent with broader patterns observed in the northern Ionian Sea and elsewhere in the Mediterranean.

The identification of amphorae is particularly significant because such cargoes are commonly associated with maritime trade and transport. While the available imagery does not permit precise chronological attribution, the presence of transport amphorae strongly suggests an ancient date and supports interpretation of the site as a merchant vessel engaged in regional or long-distance maritime exchange.

The amphorae visible within the CathX imagery exhibit elongated ovoid bodies, narrow necks and pointed bases characteristic of transport amphorae. Although the available imagery does not permit secure typological identification, the observable morphology appears broadly consistent with amphora forms associated with the Adriatic production sphere, including Lamboglia 2 and Dressel 6A types. Such containers were widely employed in the transport of wine and other commodities between the late Hellenistic and Early Imperial periods. Given the limitations of the available evidence, this attribution should be regarded as provisional pending detailed archaeological investigation and direct examination of the material.

The discovery of T057 contributes to the growing body of evidence indicating that offshore sectors of the northern Ionian Sea preserve important archaeological resources and that significant shipwreck sites may survive well beyond traditionally recognised coastal navigation corridors. The site therefore represents an important addition to the archaeological record of the wider Corfu-Otranto maritime corridor. It possesses considerable research value and has the potential to contribute to the understanding of ancient navigation, maritime trade and shipbuilding within the northern Ionian Sea.

The deep-water context of the site further enhances its significance. Such environments are comparatively under-investigated and have only recently become accessible through advances in marine survey technology. Consequently, well-preserved deep-water shipwreck sites constitute a relatively rare archaeological resource within the eastern Mediterranean.

T057 represents the principal underwater cultural heritage receptor identified within the survey area and should therefore be considered a sensitive archaeological resource requiring protection from potential project-related impacts.

3.3.1.13 Currents

For current profiling a mooring line was deployed offshore in the Ionian Sea. The deployment started on April 5, 2026, and the entire mooring line was recovered on April 27, 2026. The two single point current meters (SPCM) were located at approximately 12 m (upper) and 7 m (lower) from the seabed level. The SPCM have 3 beams each of which measure the velocity along their own direction then the instrument combines the three beam velocities to reconstruct east velocity (u), north velocity (v) and vertical velocity (w) in m/s.

Time series of velocity components (u, v, w in m/s) and combined current speed (m/s) and flowing direction ($^{\circ}$ N) are shown in Figure 3-48 and Figure 3-49 and of seawater pressure (dBar) and temperature ($^{\circ}$ C) in Figure 3-50 and Figure 3-51.

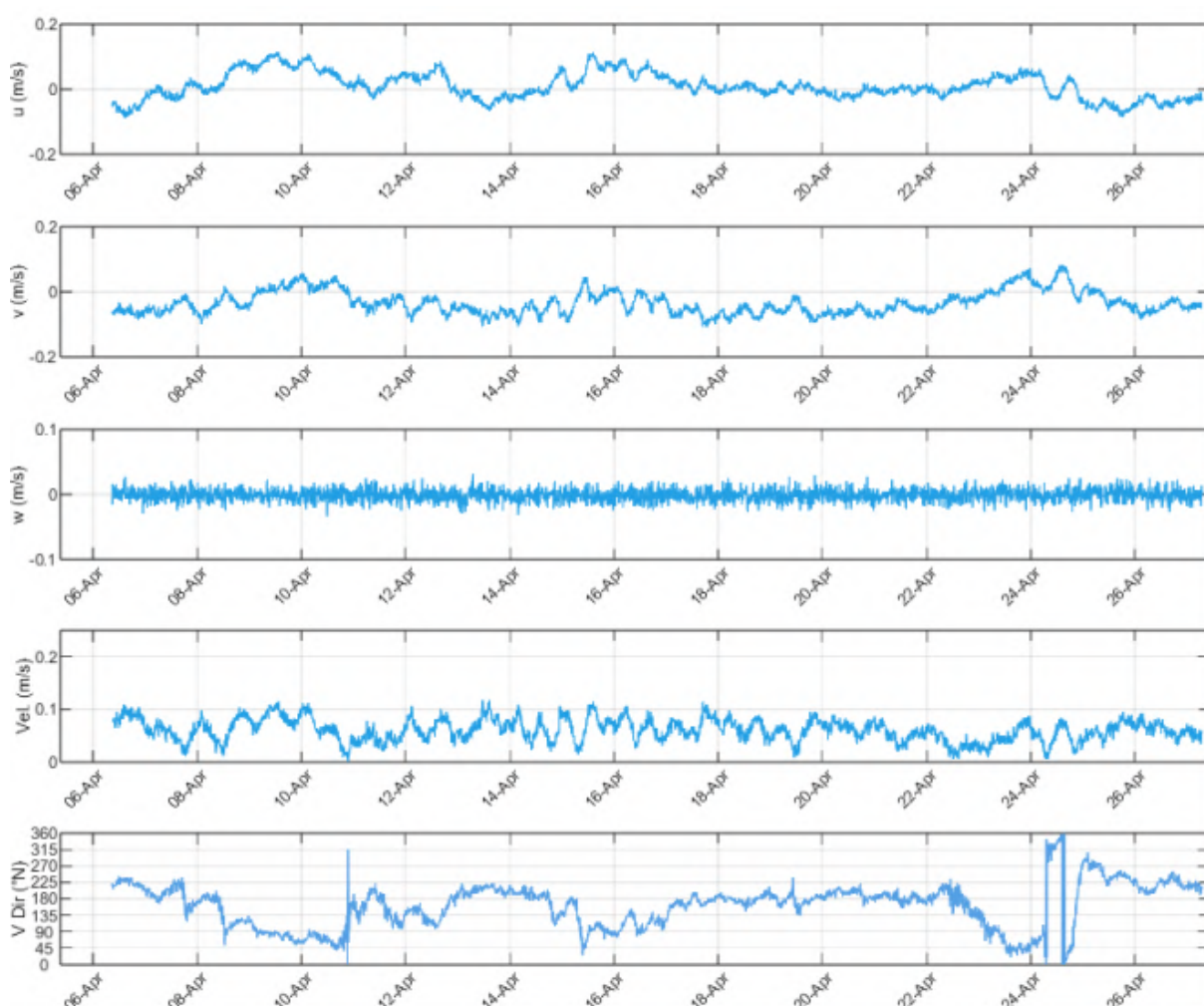


Figure 3-48: SPCM “upper” validated data: time series of velocities components (u, v, w in m/s) and current speed m/s) and flowing direction ($^{\circ}$ N)

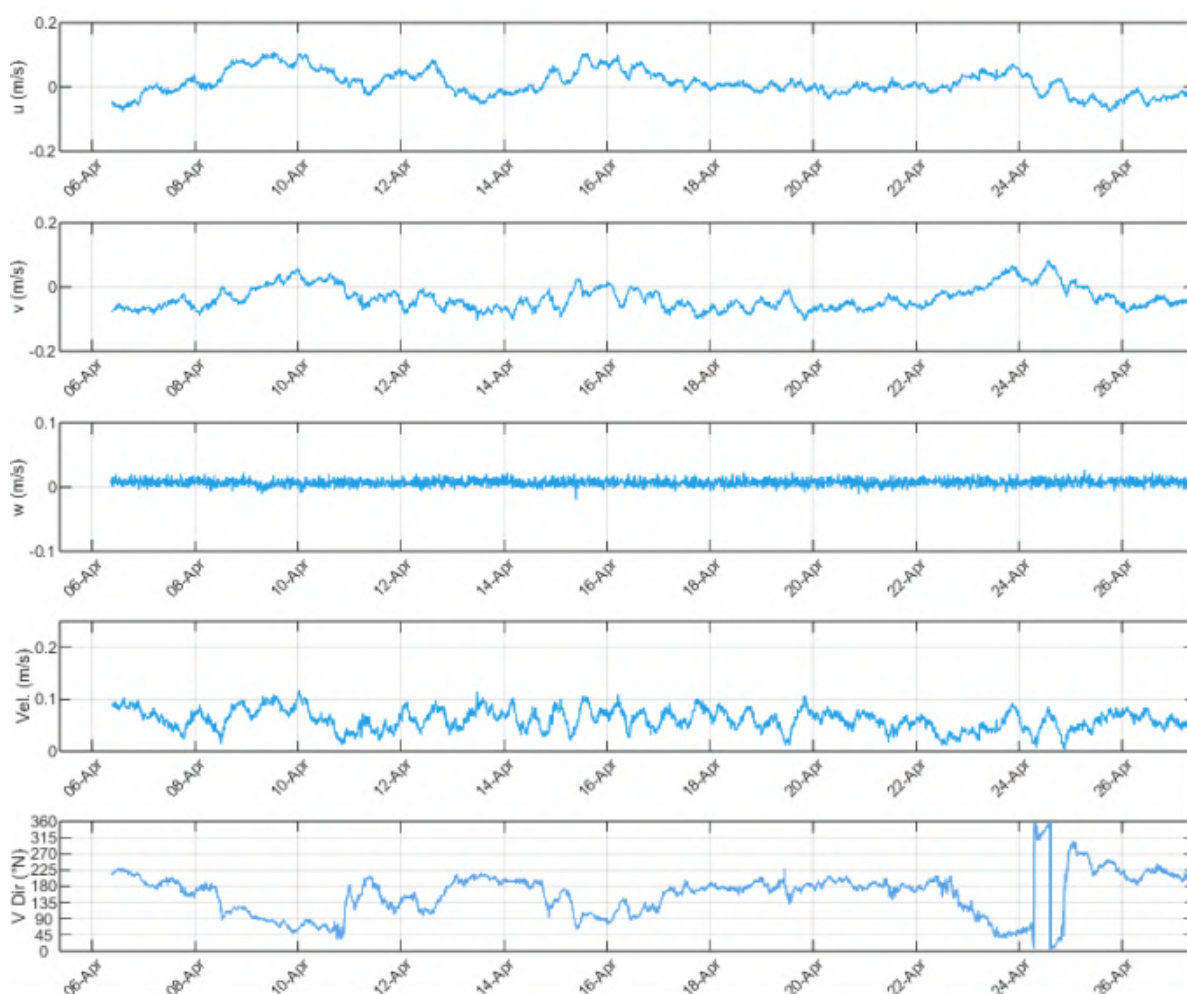


Figure 3-49: SPCM "lower" validated data: time series of velocities components (u, v, w in m/s) and current speed (m/s) and flowing direction (°N)

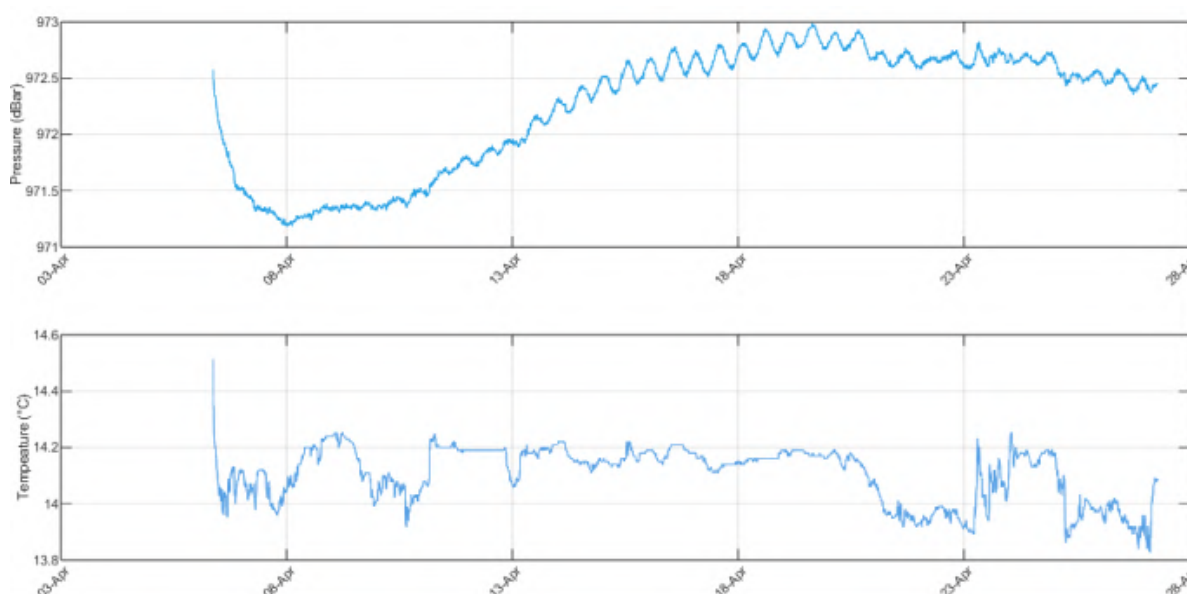


Figure 3-50: SPCM "upper" validated data: time series of seawater pressure (dBar) and temperature (°C)

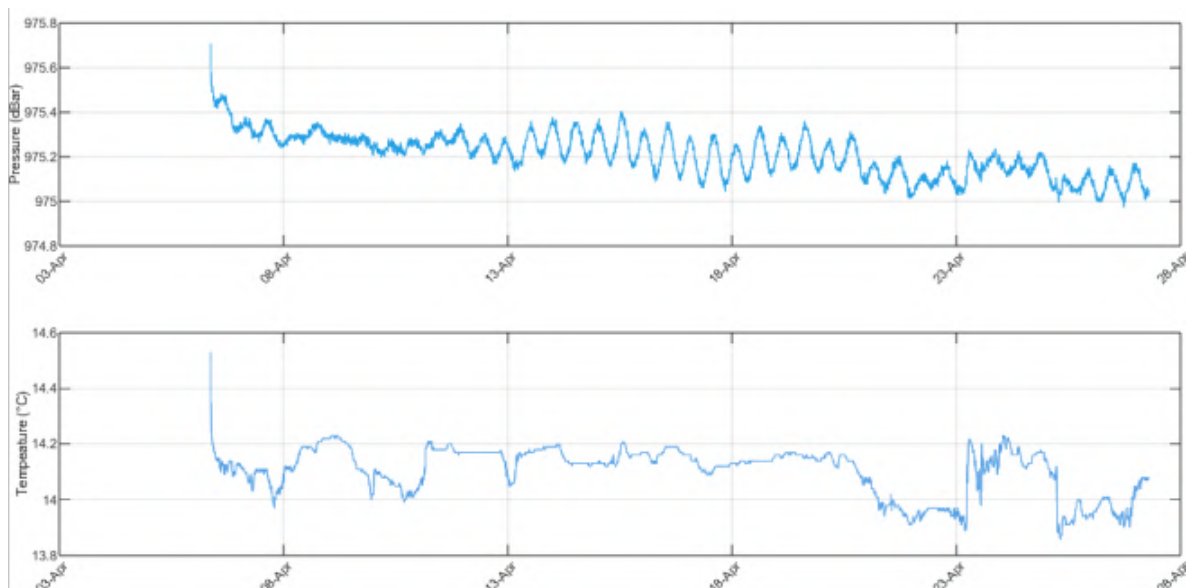


Figure 3-51: SPCM “lower” validated data: time series of seawater pressure (dBar) and temperature (°C)

Statistics of current speed is reported in Table 3-13 for each of the two SPCM analyzed. The sea currents recorded by the two sensors show a very similar behavior, with current speeds generally below 0.10 m/s and flowing towards SSE with few events of currents flowing towards the western and north-western sectors. The maximum current speed recorded over the period was 0.12 m/s.

The corresponding current roses are presented in Figure 3-52.

Table 3-13: Basic statistics of current speed at SPCM “upper” and SPCM “lower”. (Source: Lighthouse 2026)

SENSOR	MIN V M/S	MEAN V M/S	MAX V M/S	NON-EXCEEDANCE PERCENTILES						
				1%	5%	10%	50%	90%	95%	99%
SPCM upper	0.001	0.061	0.116	0.014	0.025	0.032	0.061	0.088	0.096	0.106
SPCM lower	0.004	0.061	0.115	0.016	0.027	0.034	0.061	0.088	0.094	0.102

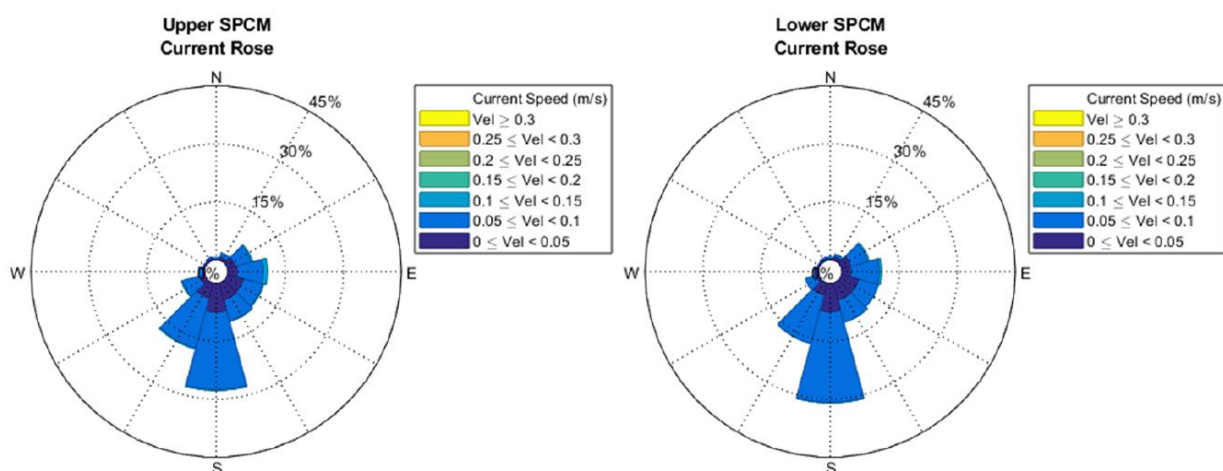


Figure 3-52: Current rose at SPCM “upper” and SPCM “lower”

3.3.1.14 Underwater noise

For underwater noise estimation, a mooring line was deployed offshore in the Ionian Sea (see Annex 05). The deployment started on 06.04 2026, and the entire mooring line was recovered on 27.04 2026. Estimated levels of baseline underwater noise were calculated from the post-processing of the PAMGuard Noise Monitor. The acoustic environment was statistically quantified using daily L10, L50, and L90 percentile levels for both root mean Square Sound Pressure (SPLrms) and peak sound pressure (SPLpeak).

The results for SPLpeak (see Table 3-14 and Figure 3-53) shows L90 average value over the period is at 63Hz-centered band of 100.5 ± 1.2 dB re 1 μ Pa, which is in the range of values typical of moderately shipping-traffic area. It is lower with respect to the peak levels measured in coastal waters around Marine Protected Areas in the Ionian coastal area (see Table 3-14), where vessel traffic is higher.

Table 3-14: Underwater noise analysis – daily values of L10, L50 and L90 for centered 63 Hz and 125 Hz third-octave bands of peak sound pressure level (SPLpeak)

DEPLOYMENT DAY	63 HZ			125 HZ		
	L10	L50	L90	L10	L50	L90
7-Apr	107.5	103.1	99.9	103.8	99.6	96.8
8-Apr	107.8	101.7	99.0	101.4	98.9	96.4
9-Apr	106.3	103.0	100.2	102.9	100.0	96.3
10-Apr	106.7	103.9	100.5	103.0	100.0	96.5
11-Apr	107.0	103.3	99.8	103.9	100.8	98.0
12-Apr	107.5	102.1	99.1	102.9	98.2	94.6
13-Apr	109.5	105.2	101.9	103.4	99.5	96.7
14-Apr	108.8	103.5	100.1	103.5	99.0	95.9
15-Apr	109.6	106.4	103.6	103.5	100.8	98.4
16-Apr	106.6	103.5	101.0	102.3	99.5	97.7
17-Apr	106.3	101.5	98.7	102.5	99.1	96.5
18-Apr	108.4	104.1	100.6	102.9	100.0	96.9
19-Apr	110.1	103.9	100.6	103.5	99.9	97.6
20-Apr	109.4	103.2	99.9	102.7	99.9	96.4
21-Apr	107.9	103.9	101.4	103.8	101.5	99.5
22-Apr	107.2	102.5	98.9	103.2	99.5	95.4
23-Apr	107.7	103.6	101.1	101.9	98.3	96.0
24-Apr	108.9	104.2	101.3	102.2	99.7	97.5
25-Apr	108.2	104.3	102.0	102.0	99.0	96.3
26-Apr	108.6	102.9	100.0	102.5	99.2	96.8
AVERAGE	108.0	103.5	100.5	102.9	99.6	96.8

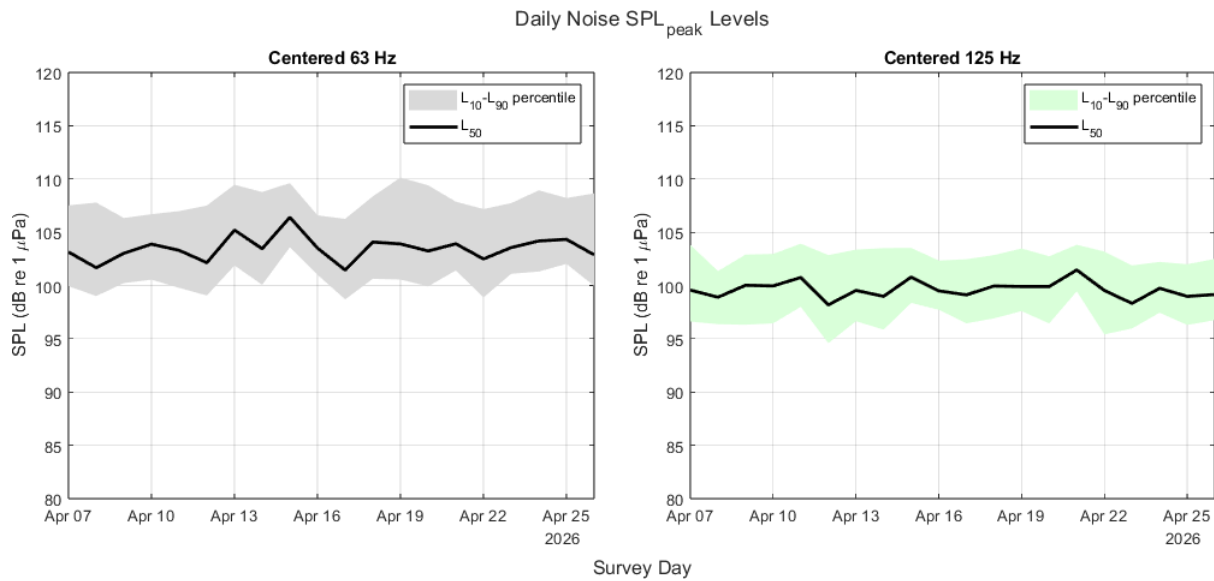


Figure 3-53: Underwater noise analysis: daily values of L10, L50 and L90 for centered 63 Hz and 125 Hz third-octave bands for peak sound pressure level (SPL_{peak})

SPL_{peak} estimation is considered consistent with a soundscape strongly influenced by distant vessel noise, since propeller cavitation noise in the SOFAR channel is the main source of continuous low frequency sound. Figure 3-54 shows the map of annual average vessel density and monthly average during the month of April 2024, available through retrieved from the European Marine Observation and Data Network (EMODnet)'s Human Activities Data Portal, highlighting a quite consistent traffic in the close vicinity of the mooring line location.

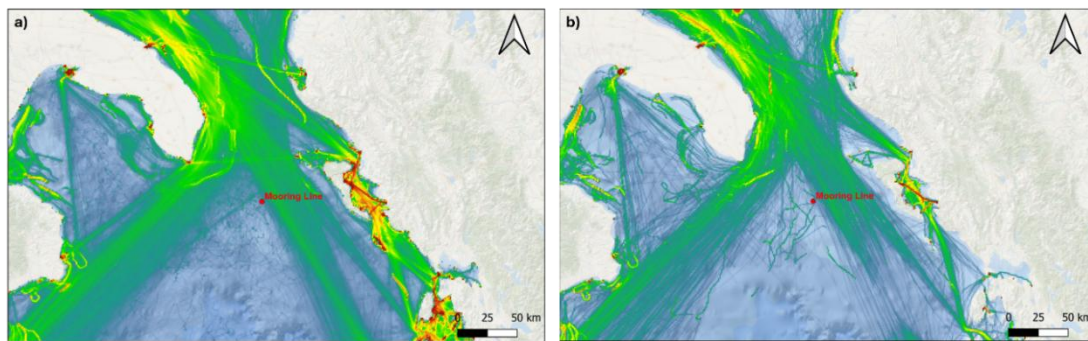


Figure 3-54: Vessel density a) annual average and b) April 2024 monthly average. AIS data elaborated by EMODNET
<https://EMODnet.ec.europa.eu/en/human-activities>

The results for SPL_{rms} (see Table 3-15 and Figure 3-55) show that L90 average value over the period is at 63Hz-centered band of 89.8 ± 1.2 dB re 1 μ Pa. The average difference L10-L90 is 7.2 dB, with maximum values of 9.4 dB indicating a disturbed soundscape characterized by intermittent noise events. Such events are likely traceable in ship noise, but also in military tests of acoustic systems for submarine detection, or seismic surveys related to offshore fossil or renewable energy developments.

Table 3-15: Underwater noise analysis – daily values of L10, L50 and L90 for centered 63 Hz and 125 Hz third-octave bands for root mean square sound pressure level (SPLrms)

DEPLOYMENT DAY	63 HZ			125 HZ		
	L10	L50	L90	L10	L50	L90
7-Apr	96.6	92.4	89.4	92.2	88.3	85.4
8-Apr	96.9	90.8	88.3	89.8	87.6	85.1
9-Apr	95.4	92.3	89.6	91.4	88.7	85.0
10-Apr	95.6	93.1	89.8	91.4	88.7	85.1
11-Apr	96.1	92.6	89.1	92.4	89.4	86.9
12-Apr	96.6	91.3	88.4	91.5	86.9	83.3
13-Apr	98.2	94.2	91.0	91.6	88.1	85.4
14-Apr	97.9	92.6	89.1	91.8	87.5	84.7
15-Apr	98.6	95.6	93.0	91.9	89.4	87.3
16-Apr	95.7	92.8	90.5	90.6	88.1	86.7
17-Apr	95.5	90.7	88.0	90.8	87.8	85.3
18-Apr	97.4	93.3	89.9	91.1	88.7	85.8
19-Apr	99.1	93.0	90.0	91.7	88.5	86.6
20-Apr	98.6	92.6	89.3	91.1	88.7	85.2
21-Apr	96.9	93.1	90.8	92.1	90.2	88.4
22-Apr	96.3	91.6	88.1	91.7	88.2	84.2
23-Apr	96.7	92.7	90.6	90.4	87.0	84.8
24-Apr	98.1	93.3	90.7	90.7	88.5	85.4
25-Apr	97.5	93.5	91.5	90.4	87.7	85.2
26-Apr	97.8	92.1	89.4	90.9	87.9	85.7
AVERAGE	97.1	92.7	89.8	91.3	88.3	85.6

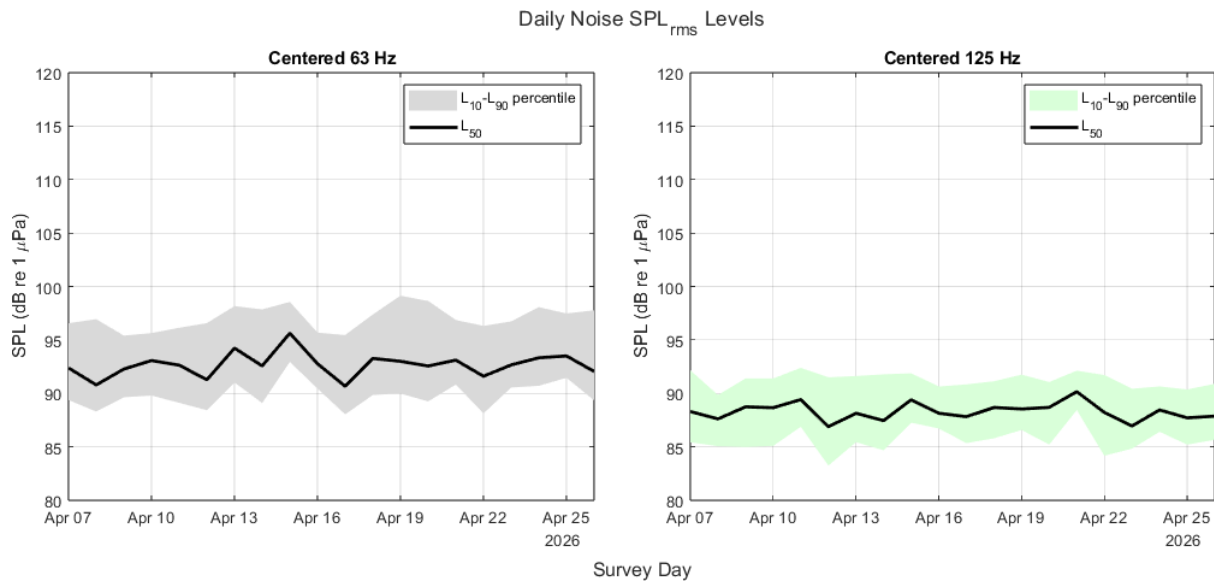


Figure 3-55: Underwater noise analysis: daily values of L10, L50 and L90 for centered 63 Hz and 125 Hz third-octave bands for root mean square sound pressure level (SPL_{rms})

Figure 3-56: Example of underwater noise of anthropic origin, probably airgun source, on 10th April. LTSA on the upper panel, spectrogram on the lower panel and Figure 3-57, respectively, show example of an explosive sound and probable high-frequency active sonar found in the recorded data. Note that an explosion appears as a vertical spike in the LTSA that, when expanded in the spectrogram, has a sharp onset with a reverberant decay.

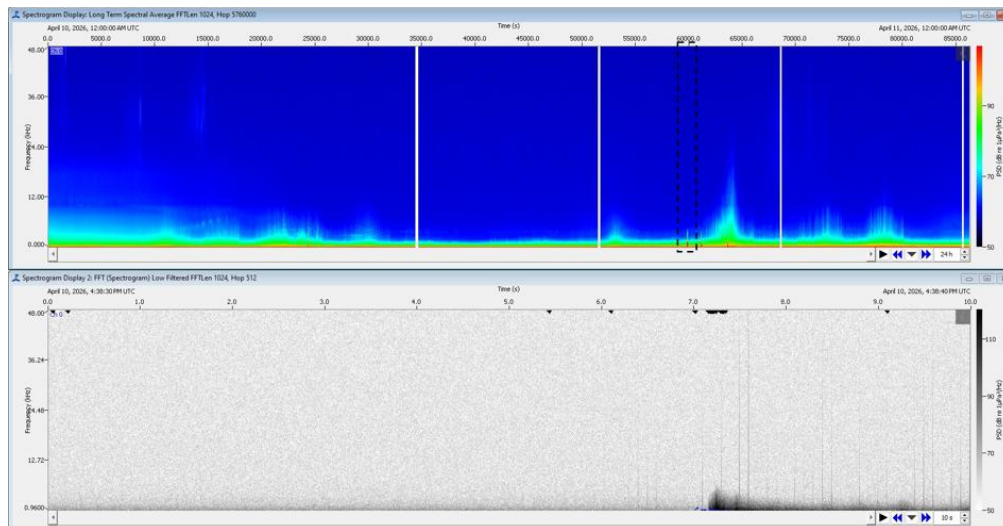


Figure 3-56: Example of underwater noise of anthropic origin, probably airgun source, on 10th April. LTSA on the upper panel, spectrogram on the lower panel

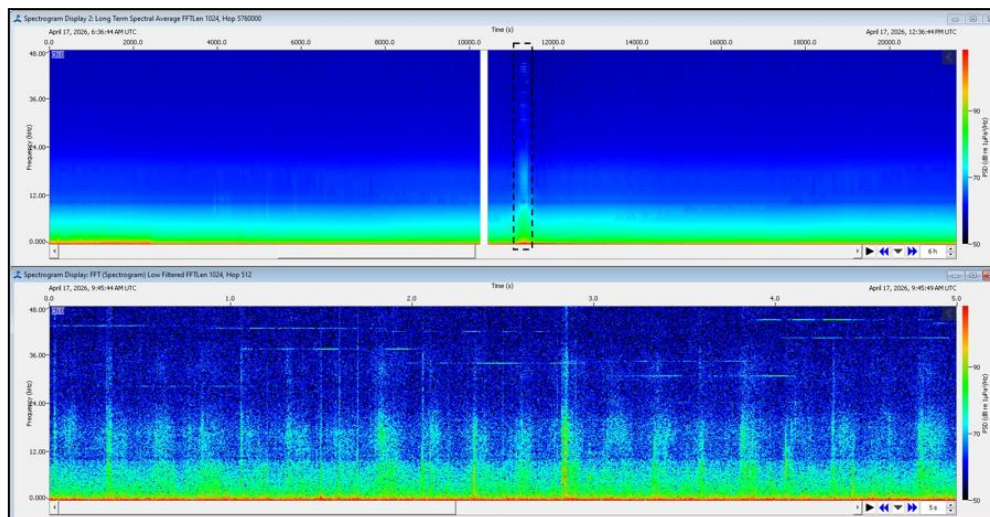


Figure 3-57: Example of underwater noise of anthropic origin, probably ship noise superimposed to high-frequency active sonar, on 17th April. LTSA on the upper panel, spectrogram on the lower panel

3.3.1.15 Analysis of deployed PAM data for marine mammal records

For the identification of biological sounds and the presence of marine mammals, a passive acoustic monitoring (PAM) system has been deployed along a mooring line from 06.04.2026, until 27.04.2026 (see §Oceanographic and acoustic monitoring (mooring line)3.2.1.4). Detailed data is available in the project's Acoustic Data Analysis Noise Report prepared by Bluemetocean and Lighthouse (June 2026) (see Annex 05).

During the monitoring period from 07.05.2026 – 26.04.2026, the PAMGuard software processed approximately 2 TB of acoustic data to isolate and identify marine mammal sounds. Following the established methodology (see 3.2.1.5), the outcomes of the analysis were stored in binary files for further post-processing through MATLAB scripts. During this classification process, false positives related to background noise signals were discarded (identifying 74% false positives for sperm whales, 78% for Cuvier's beaked whales, and about 79% for all other odontocetes). The remaining verified clicks were then grouped in encounters:

- Sperm whales' sounds were recorded almost every day of the deployment, without any evidence of diel pattern through daily hours. In several cases, the signals came from a social group of sperm whales (see Figure 3-58).
- At least thirteen (13) encounters of Cuvier's beaked whale (*Ziphius*) were clearly recorded during the deployment period (see Figure 3-59).
- Some of the encounters classified as "other odontocetes" could be almost certainly assigned to Risso's Dolphin (*Grampus griseus*) in at least one case (April 19, see Figure 3-60), based on the repertoire found in literature coming from sounds recorded in the Atlantic Ocean. However, the sound similarity with Mediterranean Sea's subpopulation cannot be verified.
- Unidentified odontocete whistles were detected throughout the recordings.
- A sort of correlation was found between sudden underwater noise events and the appearance of bioacoustic signs from odontocetes. For example, a sudden sound (probably an explosion) at 2:08 AM followed by high-frequency clicks classified as *Ziphius* (see Figure 3-61). The low-frequency analysis

performed with the aim of detecting fin whale calls did not produce any positive results, suggesting that no fin whale calls were recorded during the 20-day deployment period.

- The low-frequency analysis performed with the aim of detecting fin whale calls did not produce any positive results, suggesting that no fin whale calls were recorded during the 20-day deployment period.

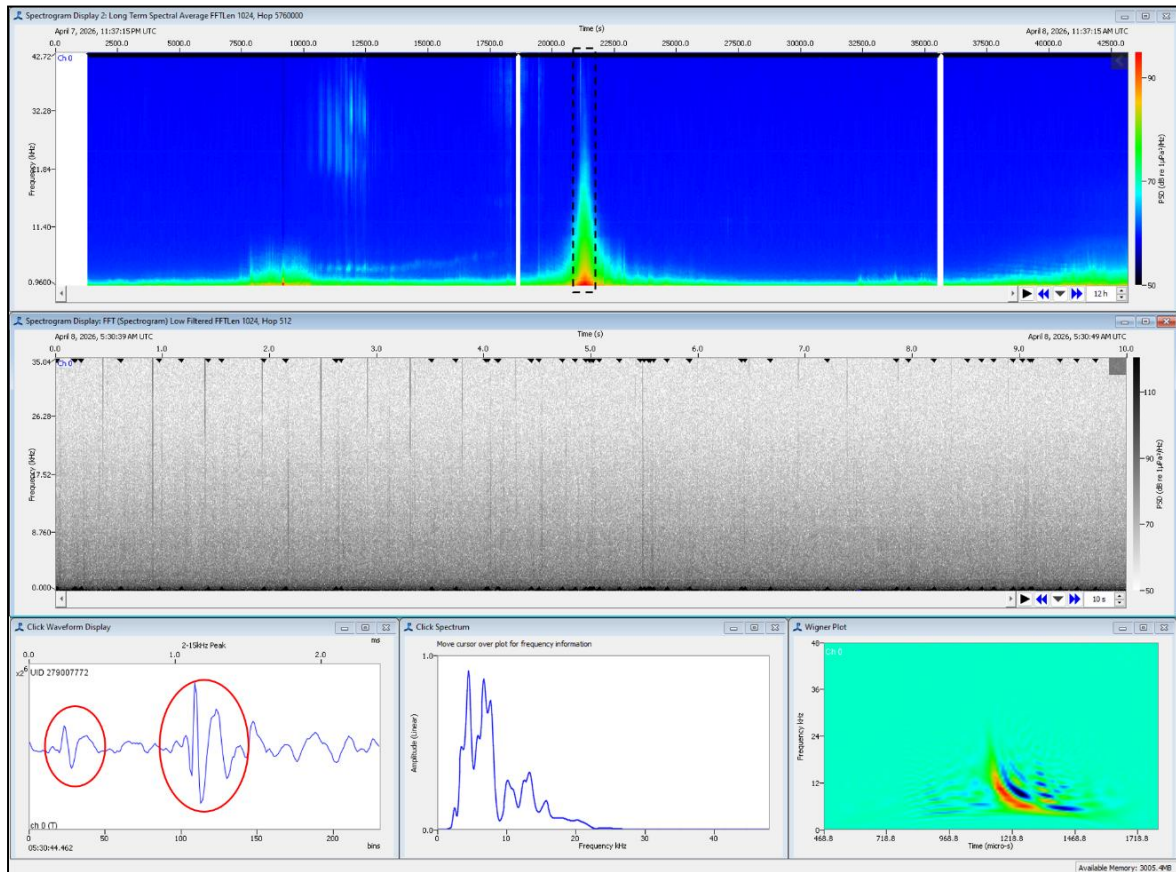


Figure 3-58: Deployment Day 08.04.2026 – Clicks from multiple sperm whales

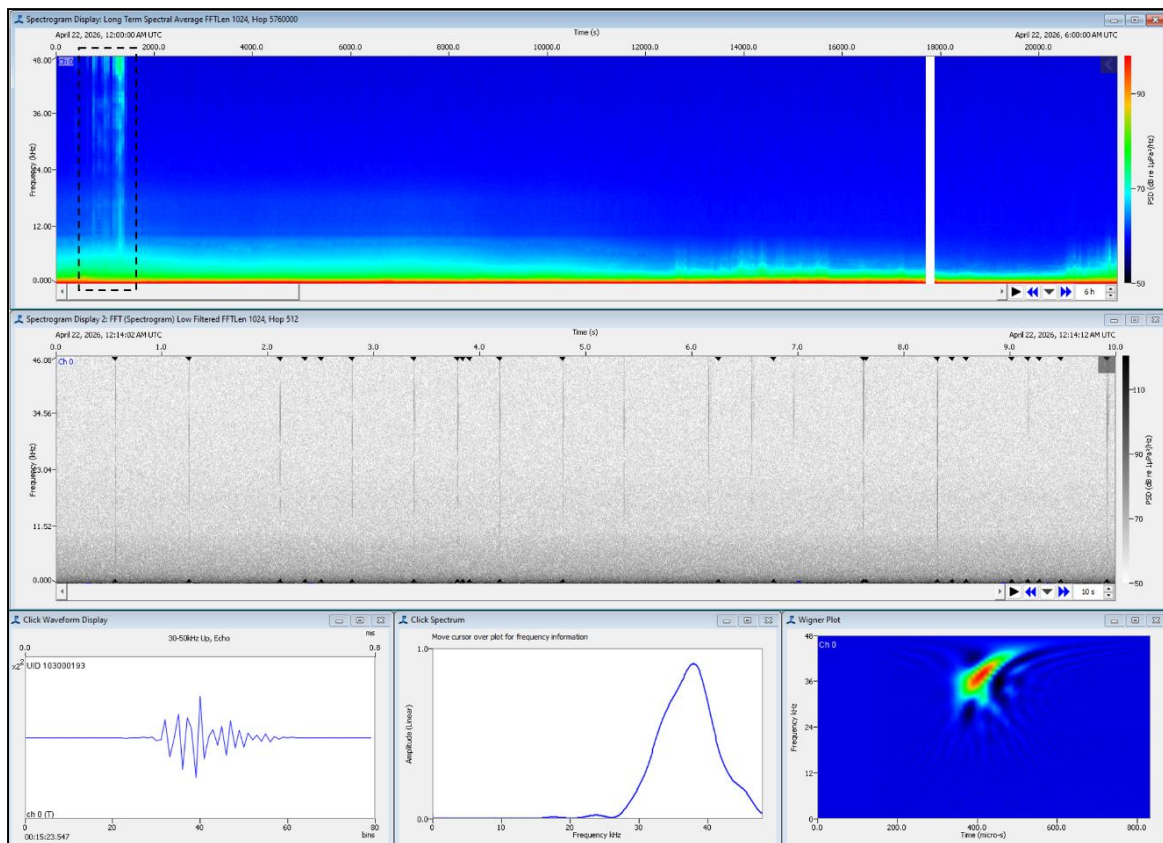


Figure 3-59: Deployment day 22.04.2026 - Cuvier's beaked whale clicks recorded, shown in LTSA (upper panel) and spectrogram (lower panel) and typical waveform (lower left), power spectrum (lower central) and Wigner plot (lower right) associated to one click

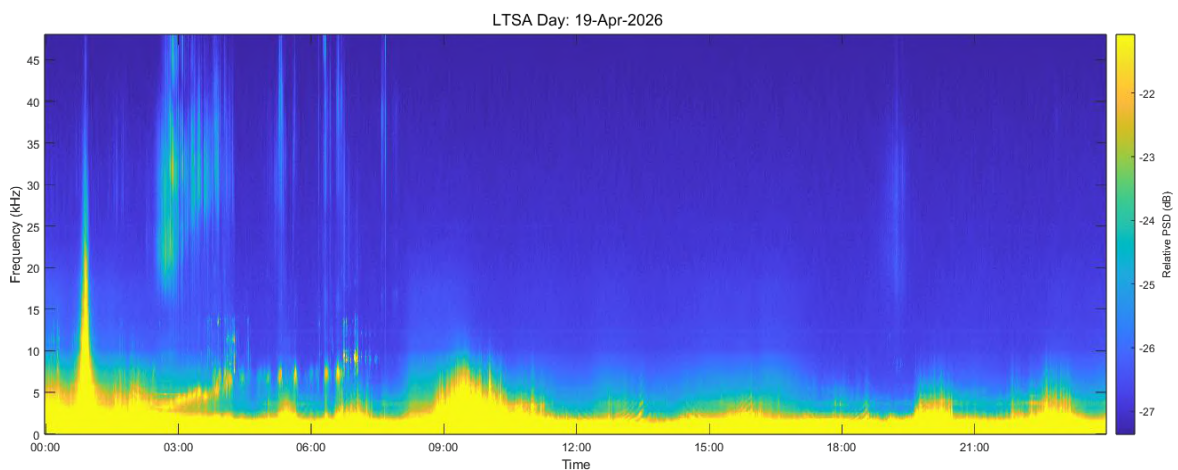


Figure 3-60: Long term average spectrum on day 19.04.2026 showing clear signs of high-frequency vocalizations (clicks and whistles) from not well identified odontocetes, probably a Risso's Dolphin, during several hours of the day (from 03:00 to 07:00)

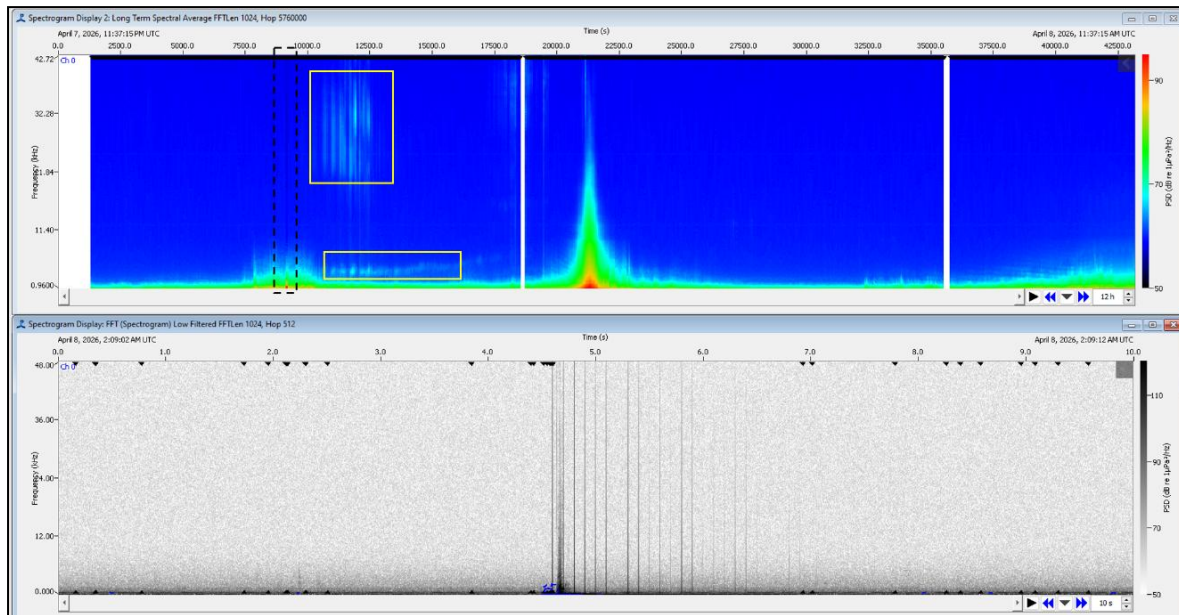


Figure 3-61: Deployment day 08.04.2026, LTSA with the sign of a sudden noise highlighted by the dashed black line and acoustic sounds from mammals highlighted by the yellow boxes (upper panel) and spectrogram showing the sudden noise at 2:08 AM (probable explosion, lower panel)

3.3.1.16 Marine mammal and sea turtle sightings

This section details the observation effort, prevailing meteorological conditions, and recorded encounters with marine mammals and sea turtles during the LOT 01 geophysical baseline field survey.

The marine fauna observation team, consisting of two MMOs / PAMs, conducted monitoring for mitigation purposes and opportunistic sightings between 06.04.2026 and 27.04.2026. Visual observations yielding 223 hours and 58 minutes of effort. PAM totalling 149 hours and 16 minutes. The combined visual and acoustic monitoring effort for the LOT 01 campaign amounted to 373 hours and 14 minutes.

Ambient weather conditions were recorded throughout the survey. Figure 3-62 presents the environmental conditions logged during the marine fauna monitoring periods.

Visibility remained optimal throughout the survey, classified as “Good” (>5 km), and precipitation was absent for nearly 100% of the effort. Wind force was most frequently recorded at Beaufort 4 (~30%) and Beaufort 3 (~27%), with occasional periods of Beaufort 5 (~15%). The prevailing wind direction was from the North West. As a result of these wind patterns, the sea state was predominantly characterized as “Slight” (~60%) and “Choppy” (~30%). Swell conditions were recorded as “Low” (<2 m) for over 80% of the time, with “Medium” swells (2–4 m) accounting for approximately 15% of the observations. Sun glare varied depending on the vessel's heading, with “Strong Behind” (~32%), “None” (~25%), and “Strong Forward” (~22%) being the most frequent classifications.

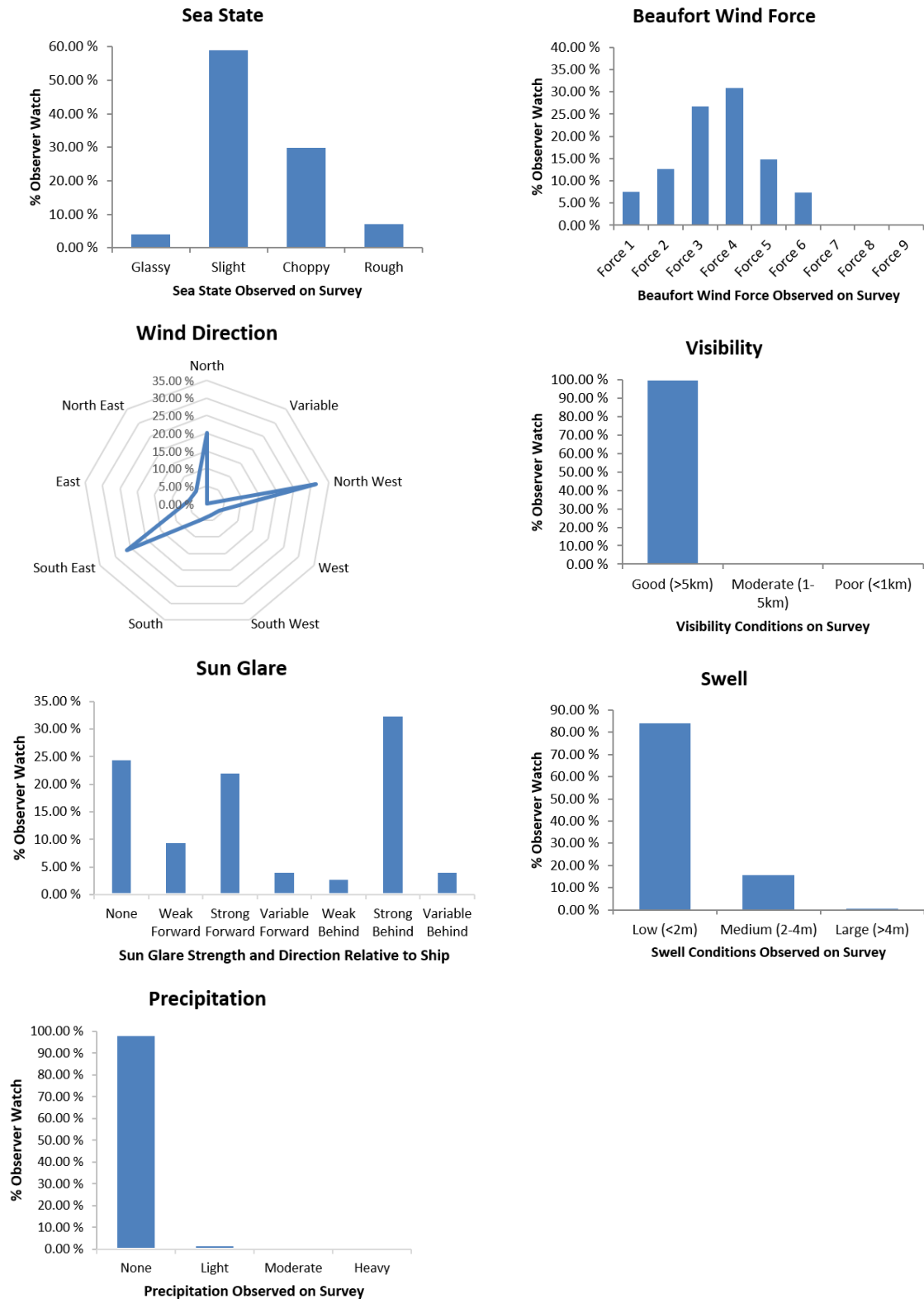


Figure 3-62: Meteorological and environmental conditions (including wind direction and force, sea state, swell, visibility, sun glare, and precipitation) recorded during the LOT 01 marine fauna monitoring effort

A total of six (6) marine megafauna encounters were recorded during the LOT 01 survey, comprising five (5) visual sightings and one (1) acoustic detection. Table 3-16 provides a summary of these records, including

species identification, group sizes, behaviours, and detection coordinates. The breakdown of the encounters is as follows. The spatial distribution of the sightings is shown in Figure 3-63.

- Sea turtles (2 encounters):
 - *Unidentified Sea Turtle (Cheloniidae):* On April 8, a single turtle measuring approximately 1 m was sighted 10 m from the vessel. The animal swam slowly near the port side and executed a dive after 9 minutes. Sun glare prevented species-level identification, though it was noted as a possible loggerhead.
 - *Loggerhead turtle (Caretta caretta):* On April 12, an adult male (identified by its long tail) measuring 1–1.5 m was observed swimming parallel to the port side of the vessel at a range of 25 m during weather standby.
- Dolphins (4 encounters):
 - *Unidentified Dolphins (Delphinidae):* One acoustic detection occurred during nighttime PAM operations on April 9. Additionally, on April 14, a visual sighting of 3 individuals occurred at a distance of 900 m. The animals were observed following a fishing vessel and feeding before diving. Due to the distance and low light, species-level identification was not possible, though their behavior suggested bottlenose dolphins.
 - *Striped dolphins (Stenella coeruleoalba):* Two separate encounters occurred on April 18. The first involved a pod of 5 individuals (3 adults, 2 juveniles) that approached within 7 m of the vessel, riding the waves and jumping before traveling fast toward the northwest. The second encounter involved a larger nursing pod of 12 individuals (6 adults, 3 juveniles, and 3 calves). This pod remained within 20 m of the vessel, socializing and riding the waves for nearly 1.5 hours before departing.

Table 3-16: Summary of marine mammal and sea turtle encounters (visual sightings and acoustic detections) recorded during the LOT 01 campaign

DATE	TIME AT START OF ENCOUNTER (UTC)	TIME AT END OF ENCOUNTER (UTC)	WERE ANIMALS DETECTED VISUALLY AND/ OR ACOUSTICALLY?	POSITION - DEGREES LATITUDE	POSITION - MINUTES LATITUDE	SPECIES OR SPECIES GROUP	DESCRIPTION (VISUAL SIGHTING ONLY)	BEARING TO ANIMAL	RANGE OF ANIMAL (METRES)	TOTAL NUMBER	NUMBER OF ADULTS (VISUAL SIGHTINGS ONLY)	NUMBER OF JUVENILES (VISUAL SIGHTINGS ONLY)	NUMBER OF CALVES (VISUAL SIGHTINGS ONLY)	BEHAVIOUR
2026-04-08	5:30	5:39	v	39° 42.21'N	19° 00.44'E	Sea turtle (Cheloniidae)	Ca. 1m long. It was 0,5 m below the surface so not visible on the pic. It did not come up to breathe, and because of sun glare and wrinkles at the sea surface it was impossible to be sure about the species. Possibly Loggerhead turtle (<i>Caretta caretta</i>).	250	10	1	1			Very close to the port side. Swimming slowly around the vessel, then started to swim away from astern starboard side. It did not surface and after 9 min took a dive and disappeared.
2026-04-09	0:01		a	39° 41.67'N	19° 00.62'E	Dolphins (Delphinidae)								
2026-04-12	18:40	19:25	v	39° 50.04'N	19° 42.40'E	Loggerhead turtle (<i>Caretta caretta</i>)	Ca. 1-1.5m long. Adult male (long tail). Swimming along portside. Appeared twice nearby. Sighting during weather standby in a shelter near North Strait of Corfu.	270	25	1	1			Very close to the vessel. Swimming along the port side. After first encounter dove and disappeared for few min. Later on, came again very close. Obviously, curious.
2026-04-14	4:27	4:30	v	39° 49.94'N	19° 46.82'E	Dolphins (Delphinidae)	Animals were following fishing vessel. Far away, ca. 900m. Seen for few min and dove. Probably bottlenose dolphins since they tend to follow fishing boats. Was still too dark and too far to take a photo and identify the exact species. 2-3 individuals.	120	900	3				Following fishing vessel, feeding and quickly disappeared.
2026-04-18	5:05	5:33	v	39° 37.92'N	18° 56.76'E	Striped dolphins (<i>Stenella coeruleoalba</i>)	Animals had slender body, with a distinctive grey and thin stripe from the eye to the flipper. Difficult to take a good photo due to very extreme sea condition. 5 to 6 (maybe even more)	270	7	5	3	2		Animals were circulating the vessel very close, riding the waves and jumping sometimes. After ca. 30 min they left, travelling fast towards NW.

DATE	TIME AT START OF ENCOUNTER (UTC)	TIME AT END OF ENCOUNTER (UTC)	WERE ANIMALS DETECTED VISUALLY AND/ OR ACOUSTICALLY?	POSITION - DEGREES LATITUDE	POSITION - MINUTES LATITUDE	SPECIES OR SPECIES GROUP	DESCRIPTION (VISUAL SIGHTING ONLY)	BEARING TO ANIMAL	RANGE OF ANIMAL (METRES)	TOTAL NUMBER	NUMBER OF ADULTS (VISUAL SIGHTINGS ONLY)	NUMBER OF JUVENILES (VISUAL SIGHTINGS ONLY)	NUMBER OF CALVES (VISUAL SIGHTINGS ONLY)	BEHAVIOUR
							individuals, and 2 or more juveniles.							
2026-04-18	8:26	7:50	v	39°39.37'N	18°56.56'E	Striped dolphins (<i>Stenella coeruleoalba</i>)	Animals had slender body, with a distinctive grey and thin stripe from the eye to the flipper. Difficult to take a good photo due to very extreme sea condition. Nursing pod. Maybe up to 16 animals (estimated ca. 12). 3 calves, 3 juveniles, and 6 adults.	0	20	12	6	3	3	Animals were socialising, jumping, and riding the waves. Very close to the vessel, curious. After nearly 1,5h disappeared

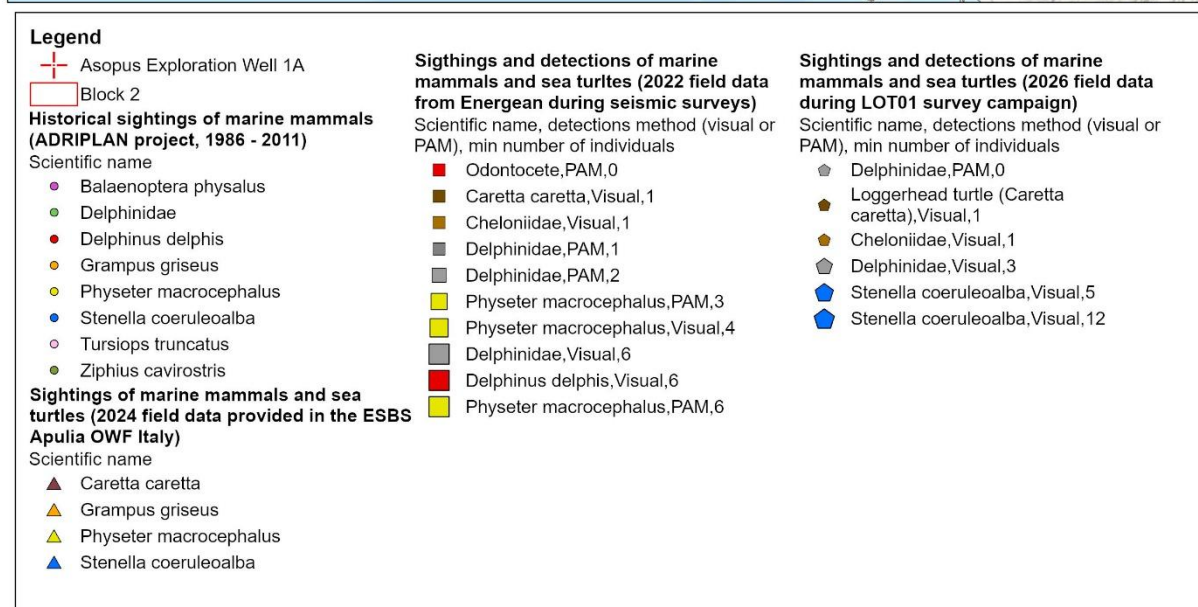
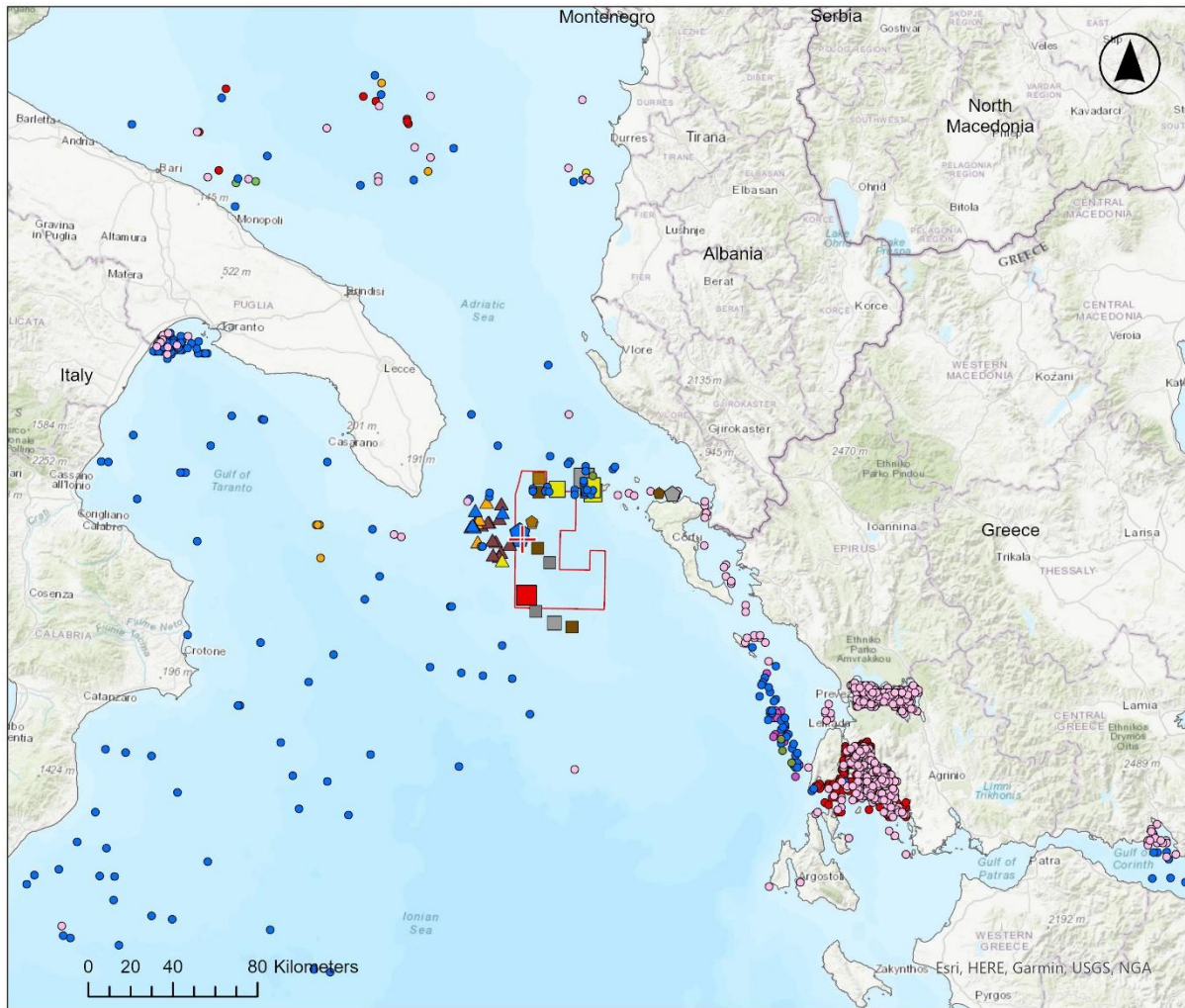


Figure 3-63: Spatial distribution of the marine mammal and sea turtle encounters (visual and acoustic) during the LOT 01 campaign

3.3.2 Environmental survey campaign (LOT 02)

3.3.2.1 Seawater and plankton results

3.3.2.1.1 Physicochemical characteristics of the water column

3.3.2.1.1.1 Temperature

Within the area surrounding the Asopus-1A well site (stations D1a, D3a and D5a), the water column showed a warm, vertically homogeneous surface mixed layer down to ~40 m, with temperatures around 16 °C (max 16.06 °C at D3a). Below, a short thermocline separated this layer from a nearly homogeneous interval extending to ~95 m, with slightly lower temperature. Between ~95 and 140 m, a sharp thermal gradient and an underlying subsurface thermal inversion were observed, followed by an almost constant decrease toward the seabed, reaching minimum values of 14.09 °C at D1a and D5a, with a weak deep inversion below ~700 m. The average temperature was 14.97 ± 0.62 °C.

Within the area surrounding the northern station group (D1b, D3b and D5b), the upper thermocline observed at Asopus-1A was not clearly developed. Instead, a single homogeneous upper layer extended to ~80 m. The deeper structure was comparable to that observed around Asopus-1A, although the deep inversion was less pronounced. The maximum temperature was 16.21 °C at D1b and D5b within the subsurface inversion layer, while the minimum value was 14.09 °C at D1b. The average temperature was 15.03 ± 0.67 °C.

The blank stations (D6a, D6b and D7b) showed broadly comparable thermal structures, with a weaker subsurface inversion at D6a and a less evident deep inversion at D6b and D7b. Temperatures ranged from 13.99 °C at D6a to 16.22 °C at D7b, with an average value of 15.02 ± 0.67 °C, indicating only minor differences with respect to the other areas (and higher similarity with the northern station group).

The Reference Stations showed similar vertical thermal patterns, with differences mainly related to bathymetry and sampling period. Kerkyra Ref, the deepest station, recorded the lowest bottom temperature (13.82 °C, at ~1100 m), whereas Italy Ref, the shallowest station and surveyed approximately one month later, recorded the highest surface temperature in the study area (17.36 °C), likely reflecting seasonal atmospheric warming. Average temperatures were 14.93 ± 0.73 °C at Othonoi Ref, 14.79 ± 0.76 °C, at Kerkyra Ref, and 15.88 ± 0.95 °C, at Italy Ref.

3.3.2.1.1.2 Salinity

Across the Asopus-1A stations the water column showed a vertically homogeneous upper layer extending to ~95 m depth (< 38.8 PSU), with minima of 38.78 PSU at D1a and D3a. Below this layer, a well-defined halocline was observed, locally affected by small-scale instabilities within the depth interval corresponding to the subsurface thermocline and thermal inversion, suggesting mixing between distinct water masses. Salinity increased to maxima centred at ~200 m depth (39.10 PSU at all stations), then gradually decreased below ~250 m toward the lower water column, with a slight near-bottom increase associated with the deep thermal inversion (suggesting the presence of a distinct deeper dewater mass). The average was 38.95 ± 0.09 PSU.

At northern station group the vertical salinity structure was broadly comparable to that observed at Asopus-1A, although the homogeneous upper layer (with minima of 38.78 PSU at all three stations) extended to ~70 – 80 m depth (since the halocline occurred at slightly shallower depths). The salinity maximum was more pronounced and shallower than at Asopus-1A, with values exceeding 39.1 PSU (max 39.17 PSU at all stations), centred at ~160 m. As observed for temperature, the deep salinity inversion was less marked. The average was 38.99 ± 0.11 PSU.

Among the blank stations, salinity patterns reflected their position relative to the well-site areas: D6b and D7b were closer to the northern structure, whereas D6a was more consistent with Asopus-1A, although with slightly higher surface minima (38.81 PSU). Overall, salinity ranged from 38.78 PSU in the surface layer at D6b and D7b to 39.16 PSU at the subsurface maximum (~150 – 180 m). The average was intermediate between that of the two well areas: 38.97 ± 0.10 PSU.

At the Reference Stations, Othonoi Ref and Kerkyra Ref showed vertical salinity distributions broadly consistent with the well-site and blank stations, with the maximum shallower at the former and below 200 m at the latter. Kerkyra Ref recorded the lowest bottom salinity, whereas Italy Ref showed the absolute minimum across all stations below 100 m depth (38.63 PSU), together with a slightly more saline surface layer, likely reflecting its shallower water column and different location. Average values were 38.95 ± 0.11 PSU, 38.92 ± 0.11 PSU and 38.82 ± 0.09 PSU, respectively.

3.3.2.1.1.3 Conductivity

Seawater conductivity, directly linked to salinity through the concentration of dissociated ions, is also influenced by pressure and temperature, as these factors affect ionic mobility. The interrelationship among salinity, temperature, conductivity, and pressure is mathematically defined according to the standard formulation adopted in 1978 (Lewis, 1980; UNESCO, 1988).

Consistently with this dependency, in proximity of the Asopus-1A well site, as across all sampling stations, the vertical conductivity profile closely followed the temperature structure, with only minor departures related to salinity increases. In this area, conductivity ranged from 4.65 to 4.83 S m^{-1} (average: $4.74 \pm 0.06 \text{ S m}^{-1}$) with a minimum recorded at D1a in correspondence with the thermal minimum, and a maximum at the salinity peak at D3a.

At northern station group, conductivity showed a comparable vertical pattern, ranging from 4.65 to 4.87 S m^{-1} and averaging $4.75 \pm 0.07 \text{ S m}^{-1}$, with the minimum at D1b at the thermal minimum and the maximum at D3b within the subsurface thermal inversion (located along the halocline).

The blank stations displayed values consistent with both aforementioned areas, with only minor differences reflecting local thermo-haline variability, ranging from 4.64 S m^{-1} at the bottom of D6a (coinciding with the thermal minimum) to 4.88 S m^{-1} at the thermo-haline peak in D7b. The average value was $4.75 \pm 0.07 \text{ S m}^{-1}$.

At the Reference Stations, conductivity reflected their different thermos-haline conditions, ranging from a minimum of 4.63 S m^{-1} at Kerkyra Ref, associated with lower bottom temperatures, to a maximum of 4.95 S m^{-1} at Italy Ref, corresponding to the surface thermal maximum. Average values were 4.74 ± 0.07 , 4.72 ± 0.07 and $4.81 \pm 0.11 \text{ S m}^{-1}$, respectively.

3.3.2.1.1.4 pH

Around the Asopus-1A well site, pH values were nearly uniform within the upper homogeneous layer, with a surface maximum of 8.28 at D3a. Values decreased markedly across the halocline and then more gradually below it, becoming nearly stable below ~400 m. A further slight drop occurred at the deep thermo-haline inversion, with minimum values of 8.17 at the bottom of D1a and D5a. The average pH was 8.21 ± 0.02 .

At northern stations, the vertical pattern was broadly comparable, although a weak downward decrease persisted through most of the water column. At the deep thermo-haline inversion, pH showed a small abrupt increase followed by a similarly limited decrease. The maximum value was recorded at the surface of D3b (8.28), while the minimum occurred at the bottom of D1b and D5b (8.17). The average pH was 8.20 ± 0.02 .

The blank stations showed the same main vertical structure, with only minor local deviations. The highest value was recorded at the surface of D6b (8.29), whereas minimum values occurred at the bottom of all three stations (8.18). The average pH was 8.21 ± 0.02 , confirming very limited differences with respect to the well-site areas.

At the Reference Stations, pH remained weakly variable, with minor differences related to local conditions, with surface maxima and near-bottom minima: 8.22 – 8.29 at Othonoi Ref, 8.19 – 8.26 at Kerkyra Ref, and 8.23 – 8.27 at Italy Ref. The latter showed the highest average pH despite the narrow overall range, while Kerkyra Ref displayed a deeper anomaly marked by a more pronounced inversion below ~800 m. Average values were 8.23 ± 0.02 , 8.21 ± 0.02 and 8.25 ± 0.02 , respectively.

3.3.2.1.1.5 Dissolved oxygen

In the waters surrounding the Asopus-1A well site, Dissolved Oxygen (DO) was nearly uniform within the upper homogeneous layer, where the highest concentrations were recorded, reaching 4.87 mL L^{-1} at D3a. A well-defined oxycline occurred below this layer, broadly overlapping the halocline. Below it, DO remained relatively stable, with a slight decrease below ~400 m and a local increase at the deep thermo-haline inversion. The minimum value was 3.86 mL L^{-1} at D5a, immediately above the deep inversion. The average concentration was $4.19 \pm 0.27 \text{ mL L}^{-1}$.

Across the northern sampling stations, the vertical DO distribution was broadly comparable, although the decrease below the oxycline was more gradual and a double inversion occurred between ~600 m and the bottom. A maximum of 4.87 mL L^{-1} was recorded at the surface of D5b, while the minimum occurred at D3b above the deepest inversion (3.92 mL L^{-1}). The average was $4.17 \pm 0.22 \text{ mL L}^{-1}$.

The blank stations showed comparable vertical DO profiles, with D6a more closely matching the Asopus-1A pattern and D6b the northern stations pattern. At D7b, DO was slightly lower in the upper half of the water column and moderately more variable in the lower half. Values ranged from a surface maximum of 4.84 mL L^{-1} at D6b to a deep minimum of 3.85 mL L^{-1} at D6a, immediately above the deep inversion. The average concentration was $4.14 \pm 0.22 \text{ mL L}^{-1}$, indicating only minor differences from the well-site areas.

At the Reference Stations, the main DO pattern was preserved, although the deep inversion observed around the well sites and blank stations was not detected. Italy Ref essentially reproduced the upper-water-column structure of the other stations. Minimum and maximum values occurred at the bottom and surface, respectively, of both Greek-side Reference Stations, with identical ranges at Othonoi Ref and Kerkyra Ref

(3.77–4.80 mL L⁻¹). Average DO values were 4.10 ± 0.27 mL L⁻¹ at Othonoi Ref, 4.08 ± 0.29 mL L⁻¹ at Kerkyra Ref, and 4.53 ± 0.25 mL L⁻¹ at Italy Ref.

If considered in terms of saturation percentage, the distribution closely resembled that of DO concentrations. At all stations, saturation remained below 100%, indicating slight to moderate undersaturation throughout the investigated water column. Values ranged from 68.28 to 89.16 % around Asopus-1A, from 69.31 to 88.78 % around northern stations, and from 67.83 to 88.63 % at the blank stations, with comparable averages of 75.41 ± 5.53 %, 75.21 ± 4.53 % and 74.62 ± 4.67 %, respectively. The Reference Stations showed the same general condition, with lower averages at Othonoi Ref and Kerkyra Ref (73.69 ± 5.86 % and 73.17 ± 6.20 %) and a higher average at Italy Ref (82.90 ± 5.95 %), consistent with its shallower water column.

3.3.2.1.1.6 Fluorescence

Around the Asopus-1A well site, chlorophyll fluorescence profiles (expressed as Chl-a equivalent concentrations) were characterized by a well-defined Deep Chlorophyll Maximum (DCM) between ~70 and 100 m depth, within the lower portion of the surface mixed layer and above the halocline. Peak concentrations were around 0.3 µg L⁻¹ Chl-a, reaching a maximum of 0.33 µg L⁻¹ Chl-a at D3a. Surface values were lower, while concentrations below the DCM rapidly declined toward the sensor background level (minimum: 0.03 µg L⁻¹ Chl-a). The average concentration was 0.07 ± 0.07 µg L⁻¹ Chl-a.

At northern stations, a comparable pattern was observed only at D5b. At D1b and D3b, fluorescence remained more uniformly distributed throughout the upper mixed layer rather than forming a distinct DCM. Nevertheless, maximum concentrations were similar among the three stations (up to 0.25 µg L⁻¹ Chl-a) and occurred at shallower depths (generally above ~75 m), consistent with the reduced thickness of the upper homogeneous layer. The average concentration was 0.05 ± 0.06 µg L⁻¹ Chl-a.

The blank stations displayed intermediate characteristics. D6b exhibited the most pronounced DCM, with concentrations reaching 0.30 µg L⁻¹ Chl-a, whereas D6a and D7b showed a more uniform distribution throughout the upper water column. Despite these local differences, concentrations below the productive layer decreased to background values, and the average concentration (0.06 ± 0.06 µg L⁻¹ Chl-a) remained comparable to those observed at the well-site areas.

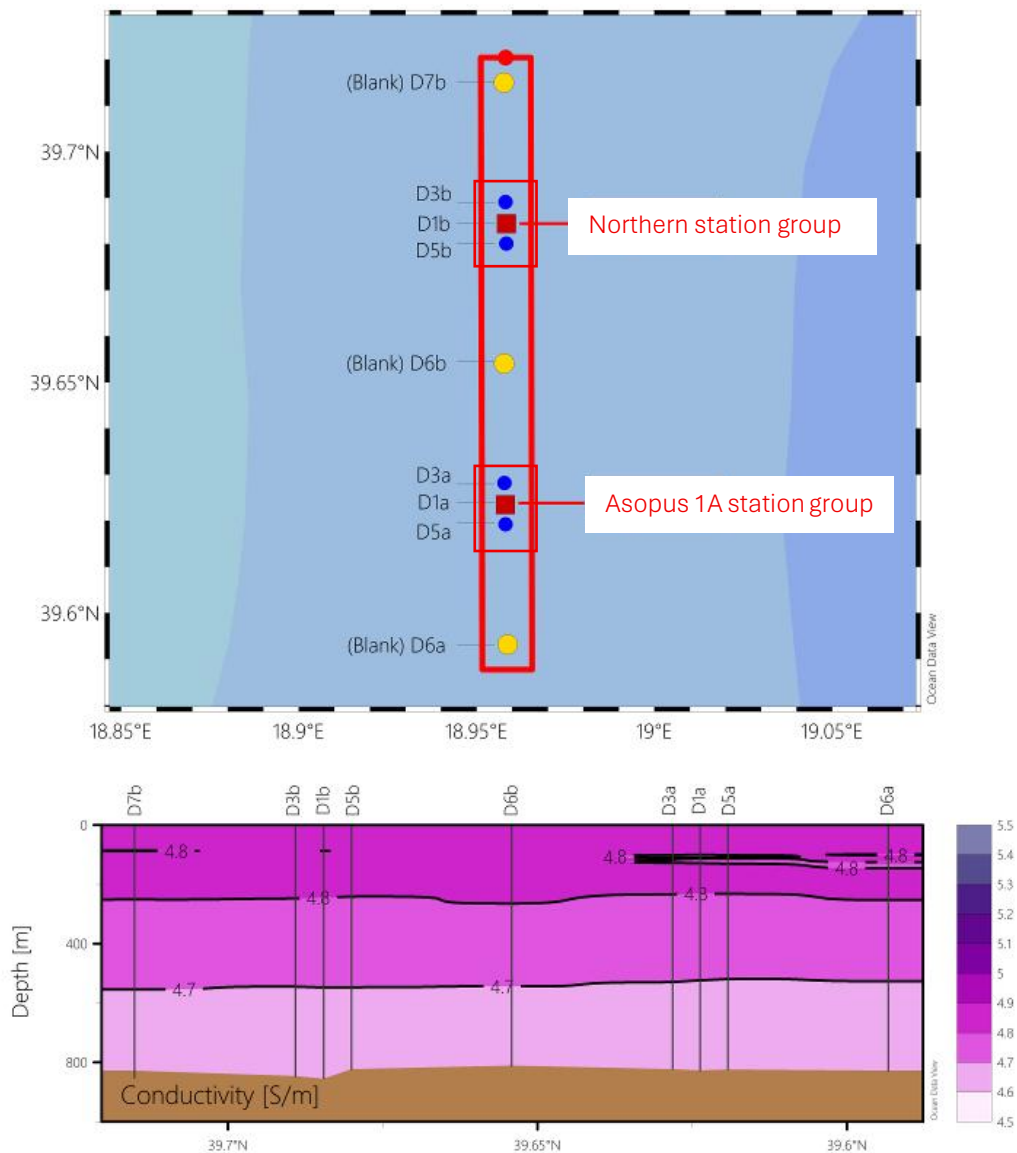
The Reference Stations showed patterns consistent with those observed elsewhere in the study area. Othonoi Ref recorded the highest fluorescence peak among the Reference Stations (0.27 µg L⁻¹ Chl-a), whereas Kerkyra Ref exhibited the deepest development of the productive layer, extending to ~95 – 100 m depth. Italy Ref showed a higher mean fluorescence mainly because its shallower profile was limited to the upper, more productive portion of the water column, yielding an average of 0.16 ± 0.09 µg L⁻¹ Chl-a versus 0.06 ± 0.06 µg L⁻¹ Chl-a at both Othonoi Ref and Kerkyra Ref.

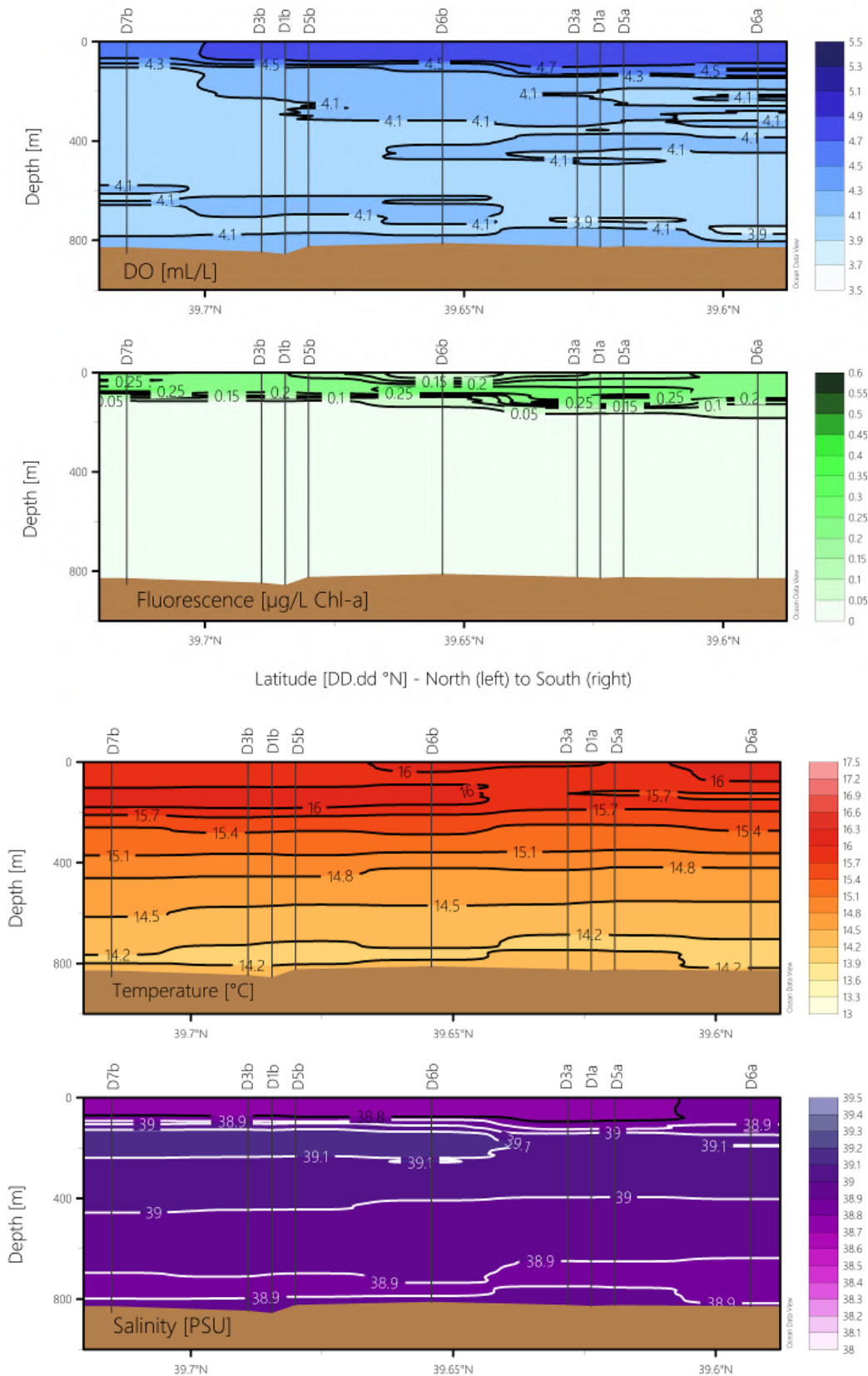
3.3.2.1.1.7 Turbidity

Turbidity was generally low throughout the study area and showed a highly consistent vertical pattern across all station groups. Values exceeded 1 FTU only within the upper few metres of the water column and rapidly decreased below ~8 – 10 m depth, remaining consistently below 0.5 FTU down to the seabed.

Around the Asopus-1A well site, turbidity ranged from 0.32 to 1.19 FTU, with the maximum recorded at the surface of D1a and an average value of 0.36 ± 0.05 FTU. Around the northern stations, values ranged from 0.32 to 1.89 FTU, peaking at the surface of D5b, with an average of 0.35 ± 0.07 FTU. The blank stations showed a comparable distribution, ranging from 0.32 to 1.58 FTU, with the maximum recorded at the surface of D7b and an average of 0.36 ± 0.05 FTU.

At the Reference Stations, turbidity ranged from 0.31 to 2.16 FTU, with the highest value recorded at Othonoi Ref. Average values remained consistent with those observed elsewhere in the study area. The widespread occurrence of values closes to 0.3 FTU throughout the deeper portions of the profiles, including the absolute minimum of 0.31 FTU at Kerkyra Ref, likely reflects the sensor background signal under the optical conditions characterising the investigated waters.





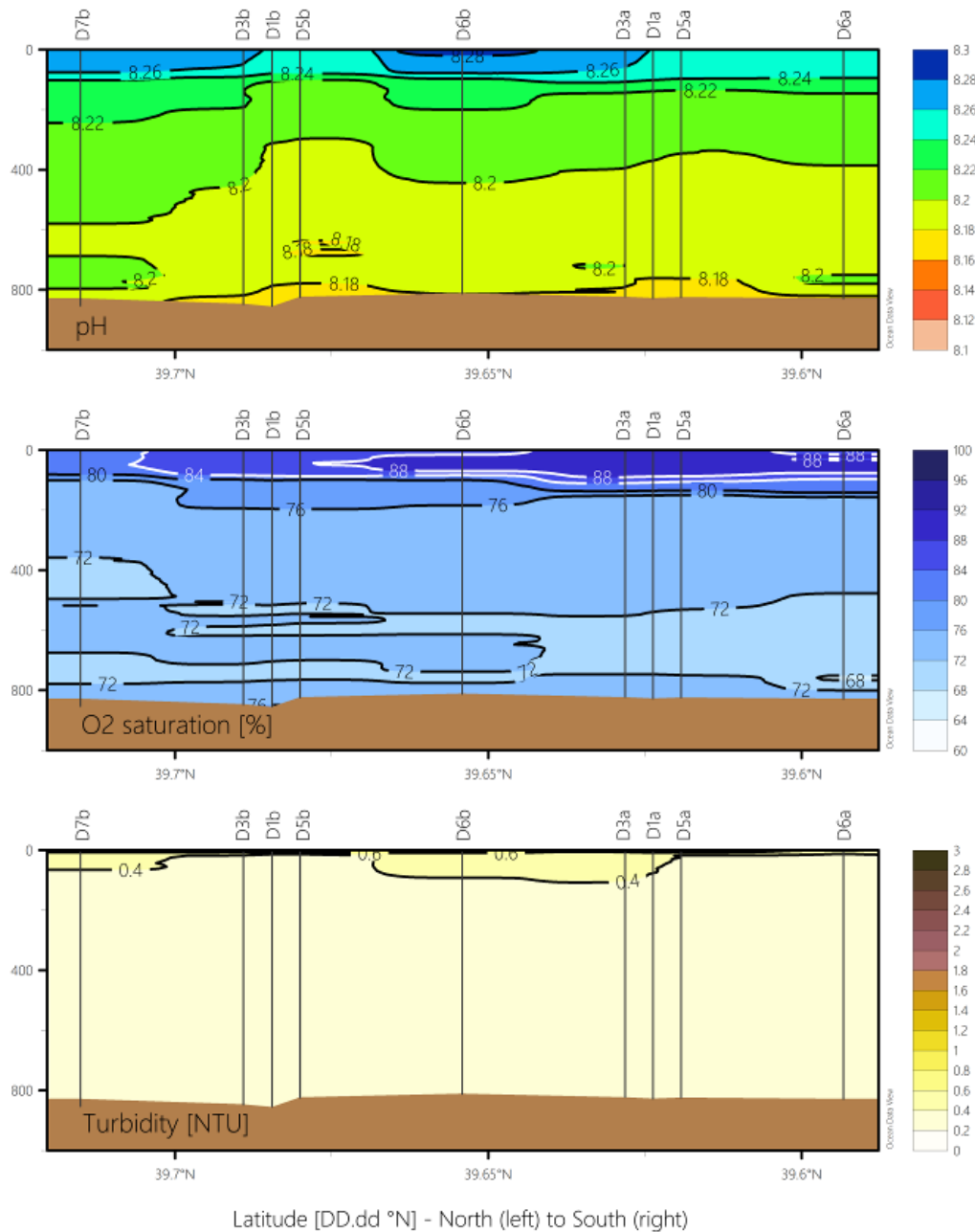


Figure 3-64: Physico-chemical variables of the water column in vertical section. Asopus-1A, northern station group and Blank stations are represented, as they are aligned along the transect; Reference Stations are excluded. Station names are shown on the map and above each variable panel

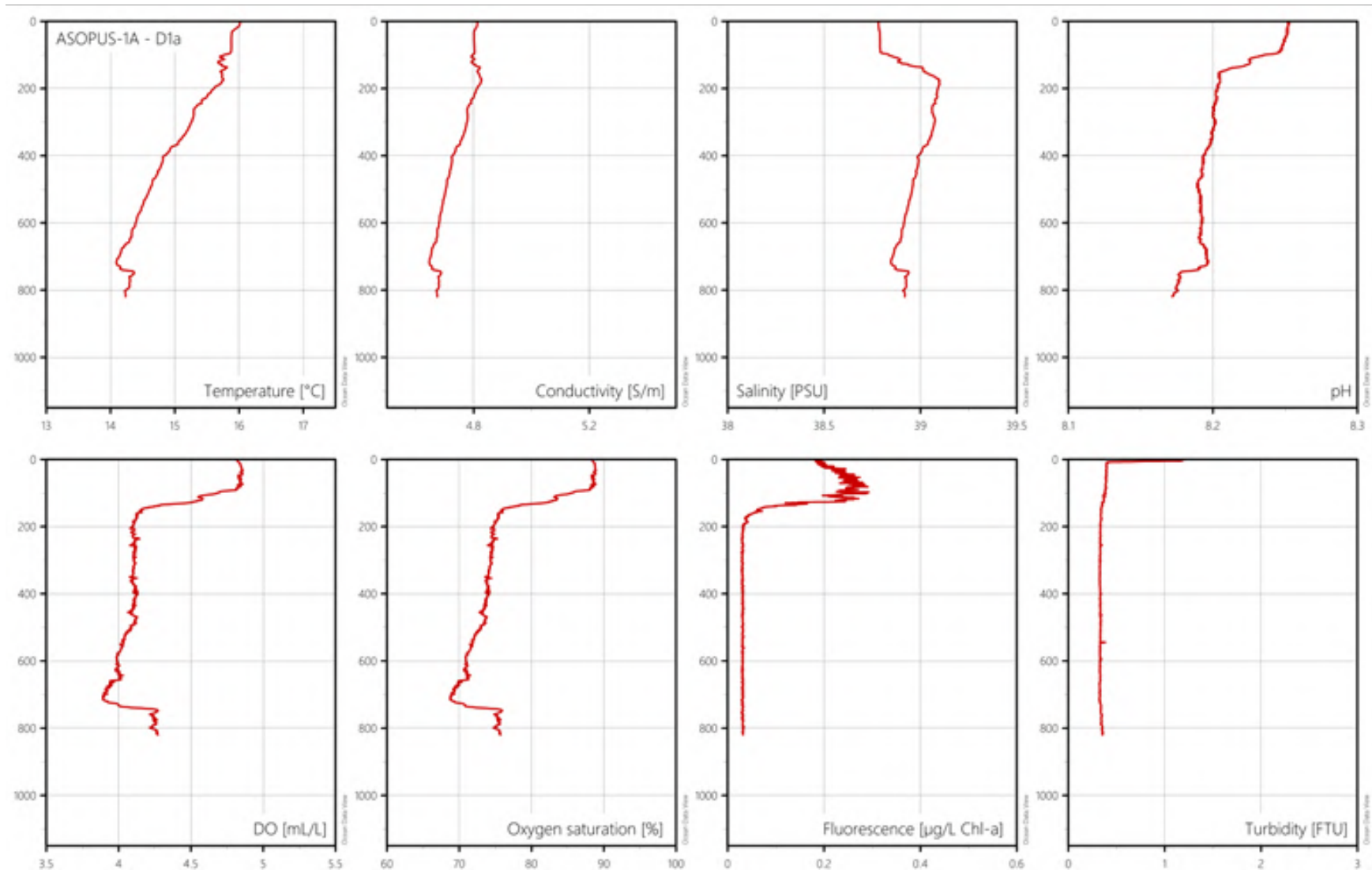


Figure 3-65: Vertical profiles of the main physico-chemical variables of the water column, well Asopus-1A – station D1a

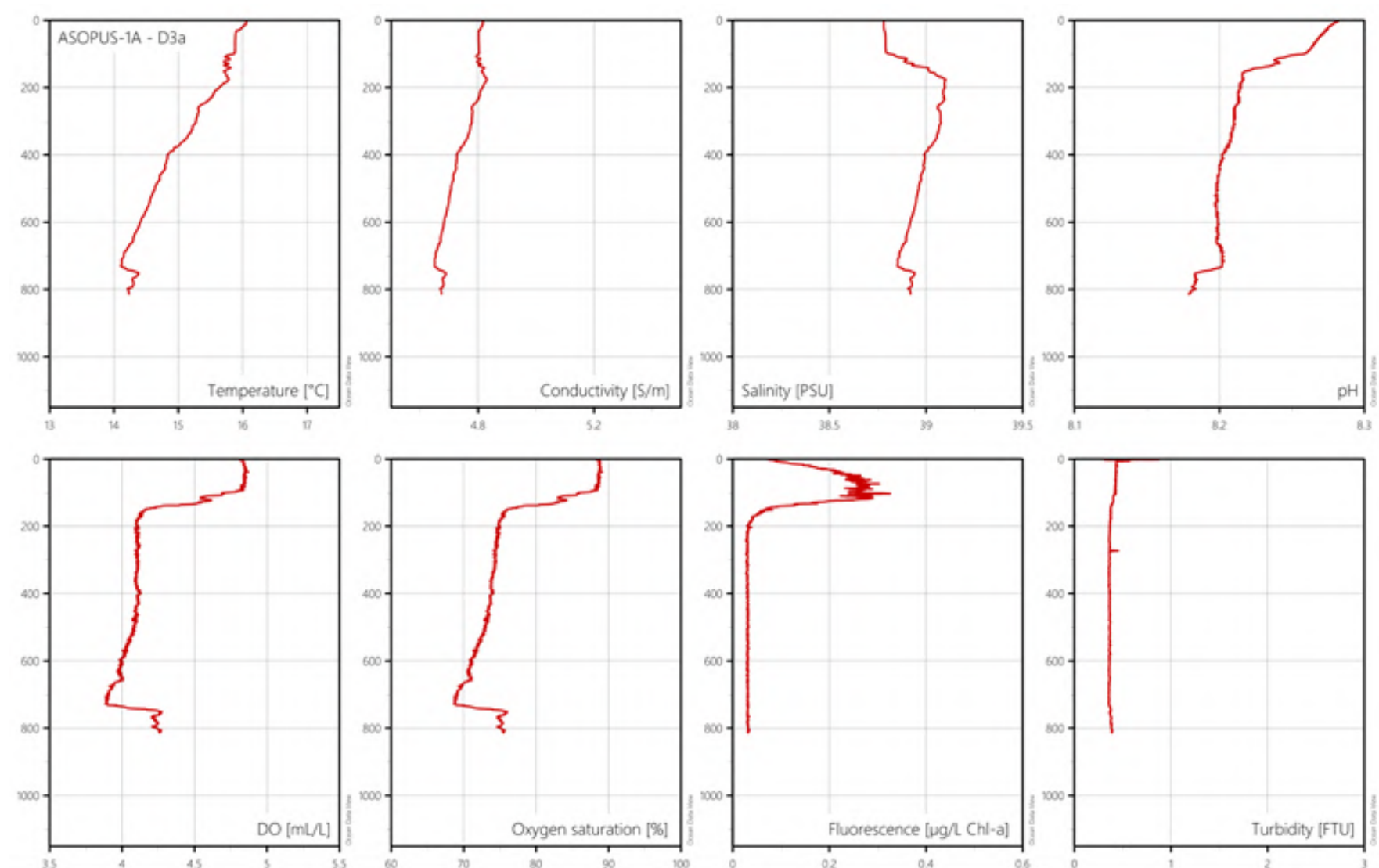


Figure 3-66: Vertical profiles of the main physico-chemical variables of the water column, well Asopus-1A – station D3a

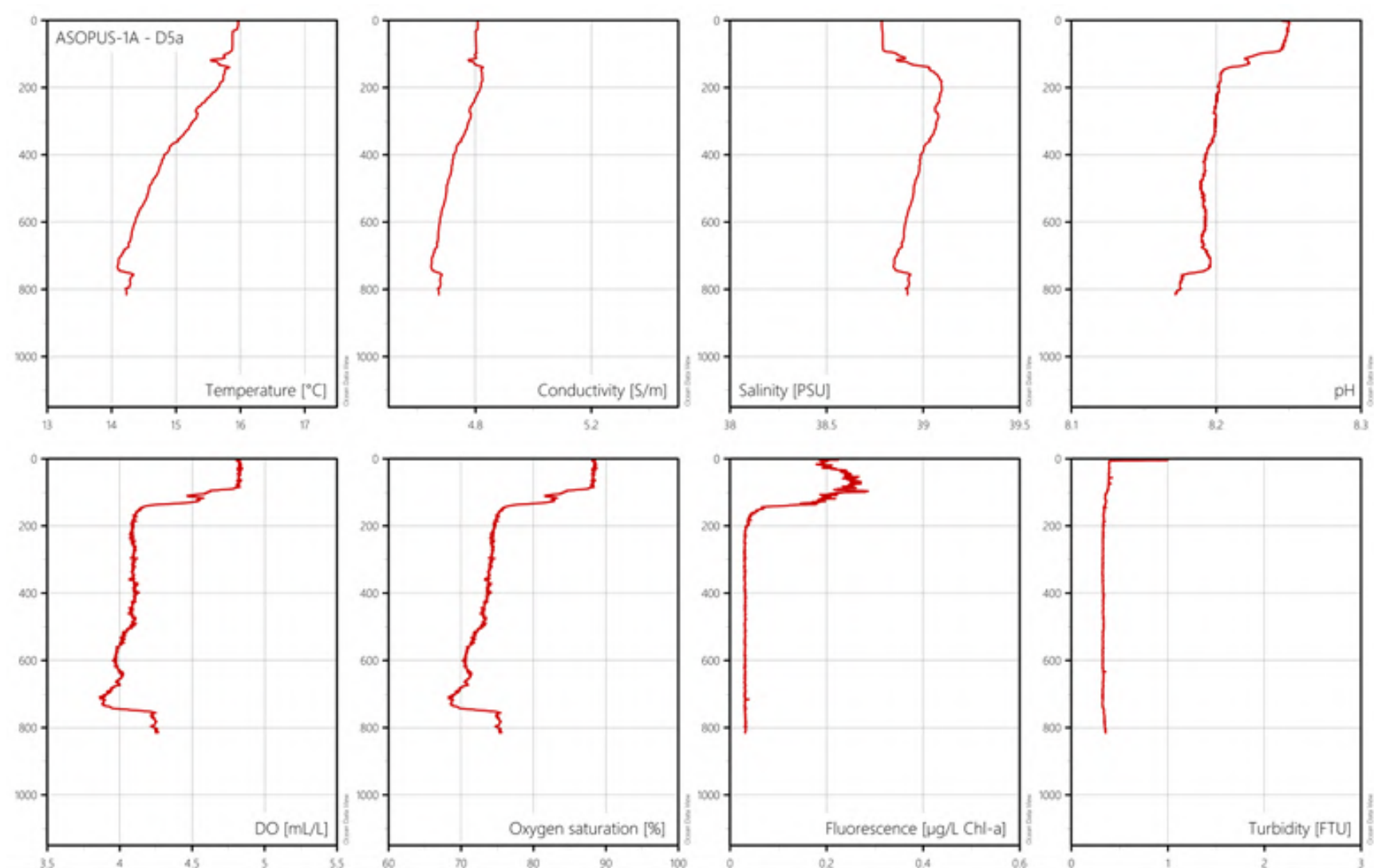


Figure 3-67: Vertical profiles of the main physico-chemical variables of the water column, well Asopus-1A – station D5a

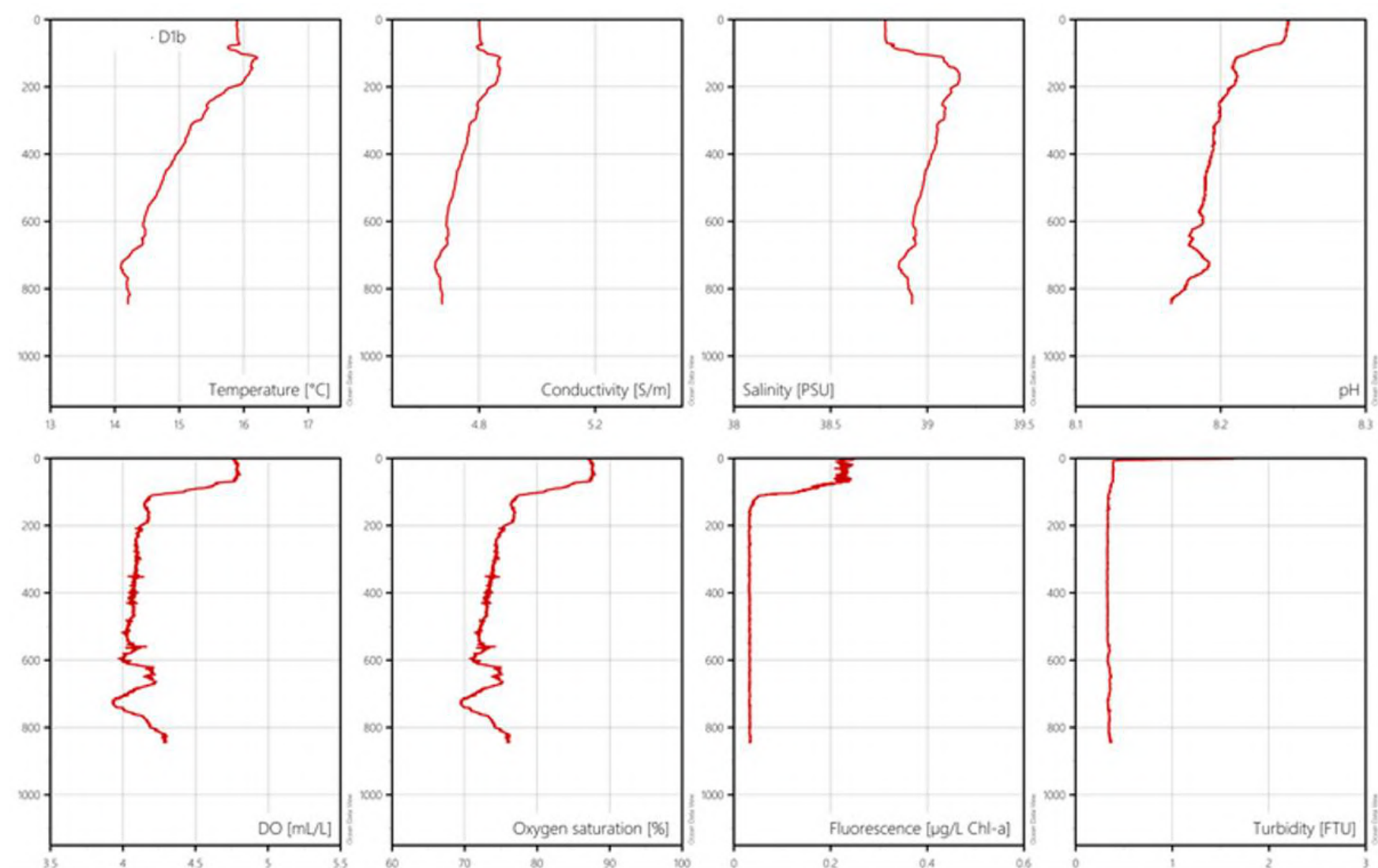


Figure 3-68: Vertical profiles of the main physico-chemical variables of the water column – station D1b

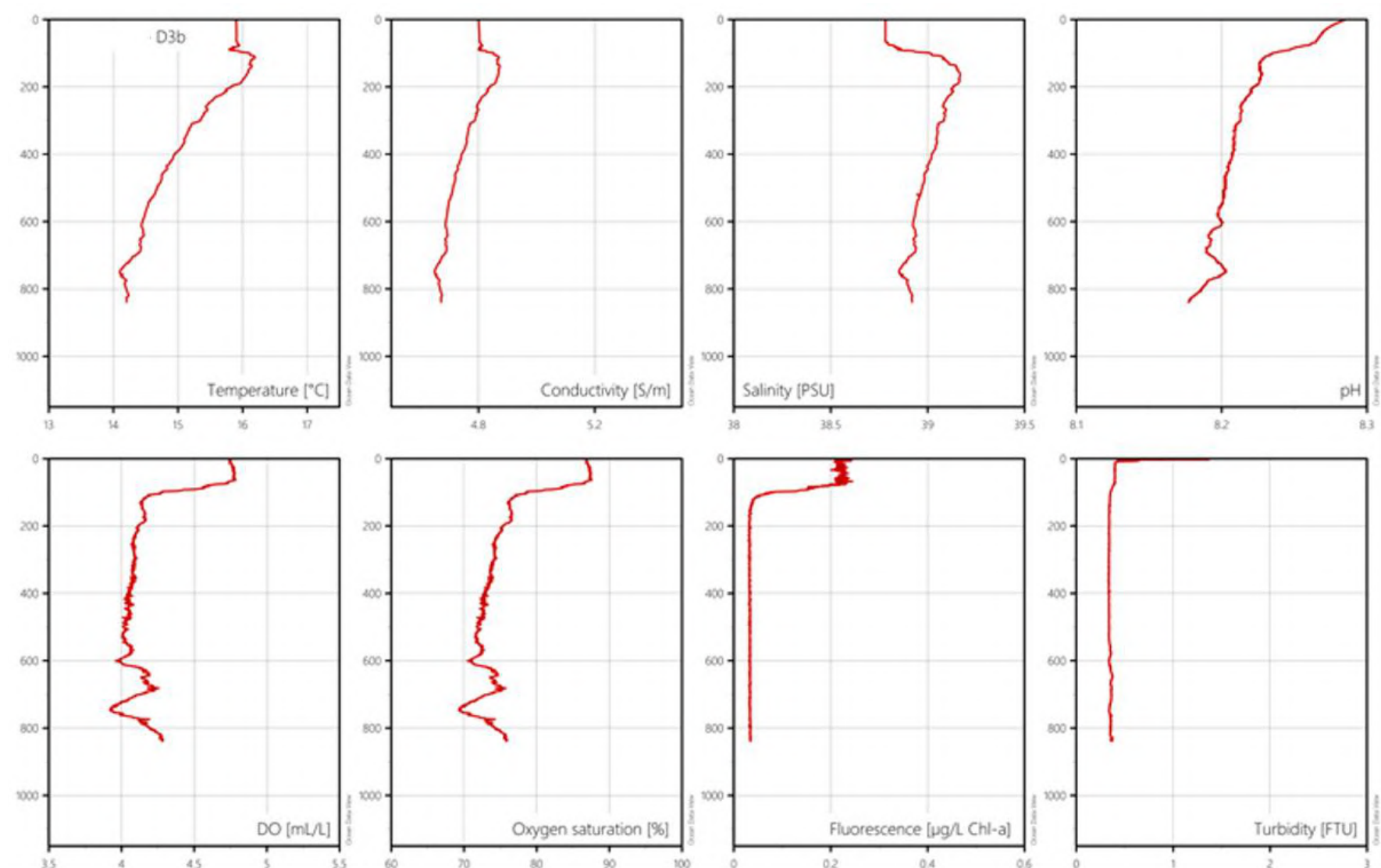


Figure 3-69: Vertical profiles of the main physico-chemical variables of the water column – station D3b

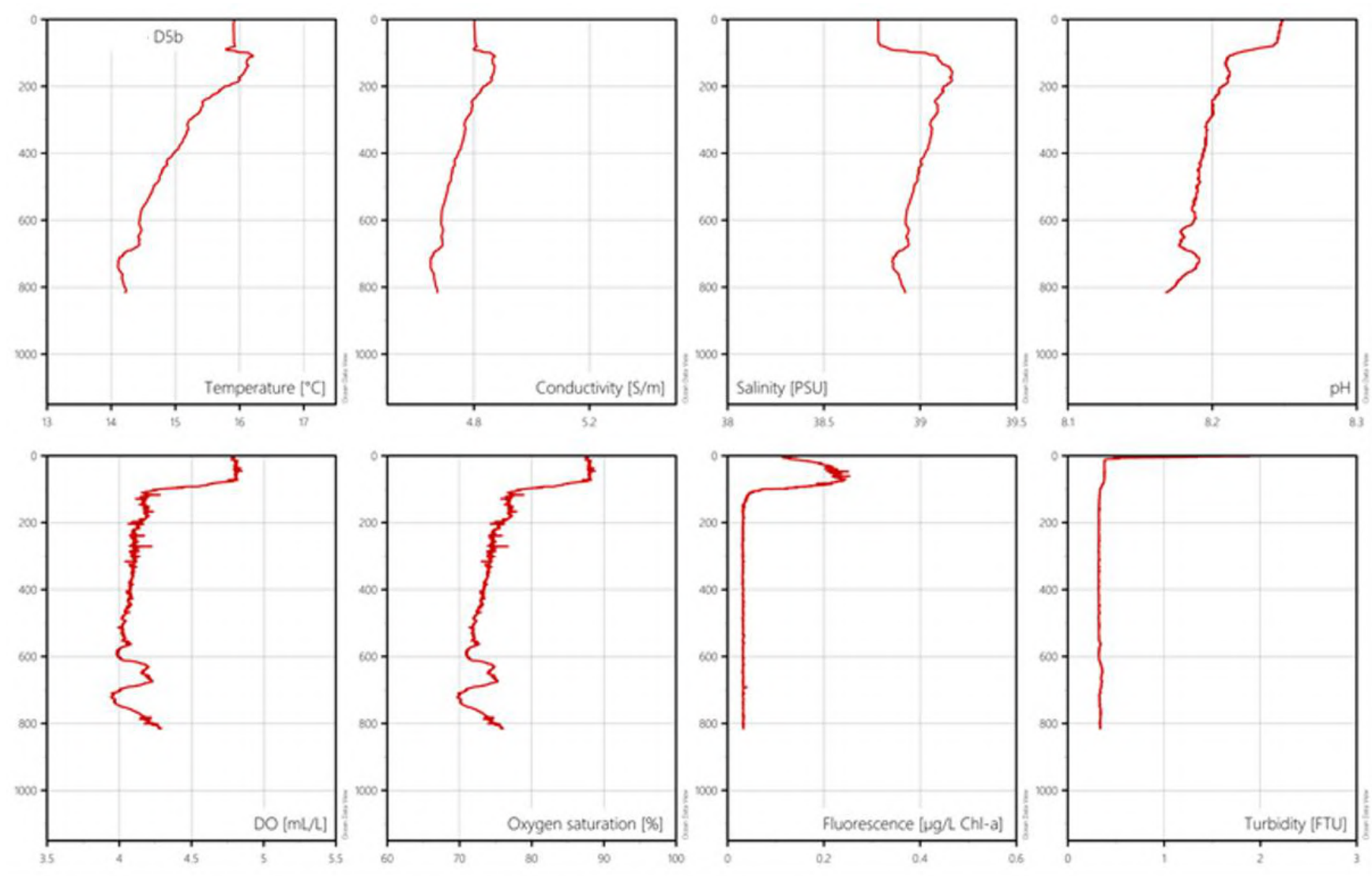


Figure 3-70: Vertical profiles of the main physico-chemical variables of the water column – station D5b

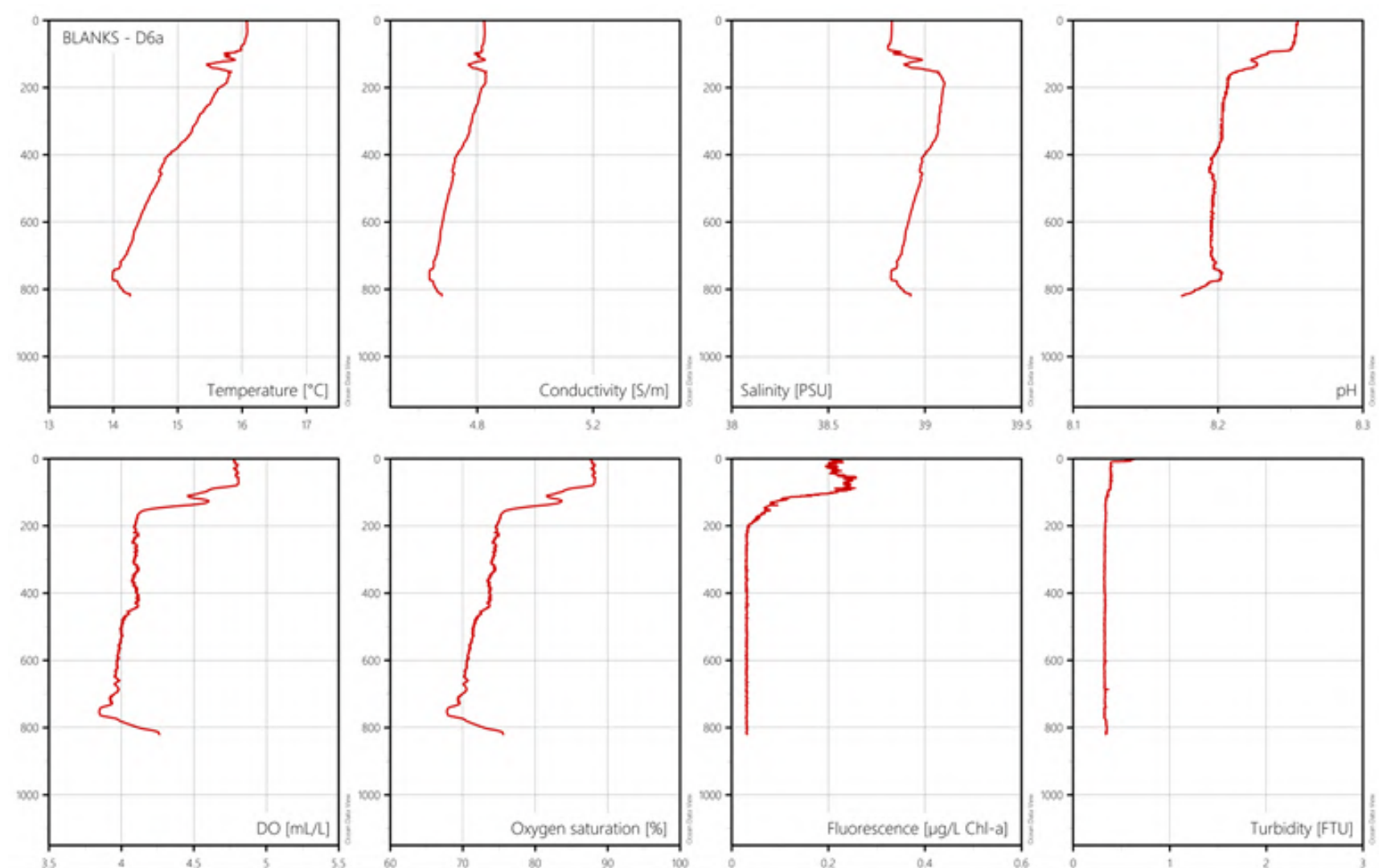


Figure 3-71: Vertical profiles of the main physico-chemical variables of the water column, Blank stations – station D6a

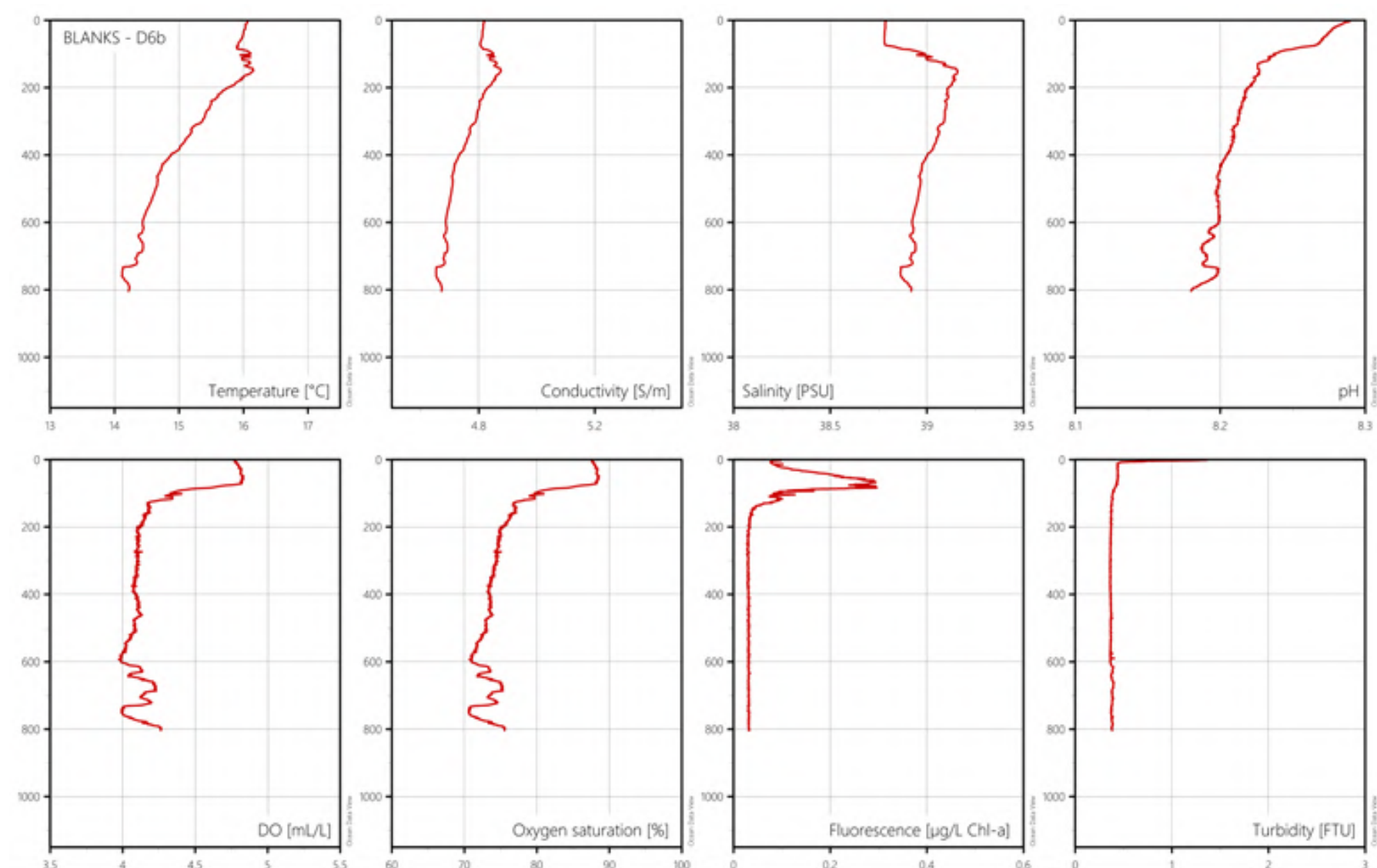


Figure 3-72: Vertical profiles of the main physico-chemical variables of the water column, Blank stations – station D6b

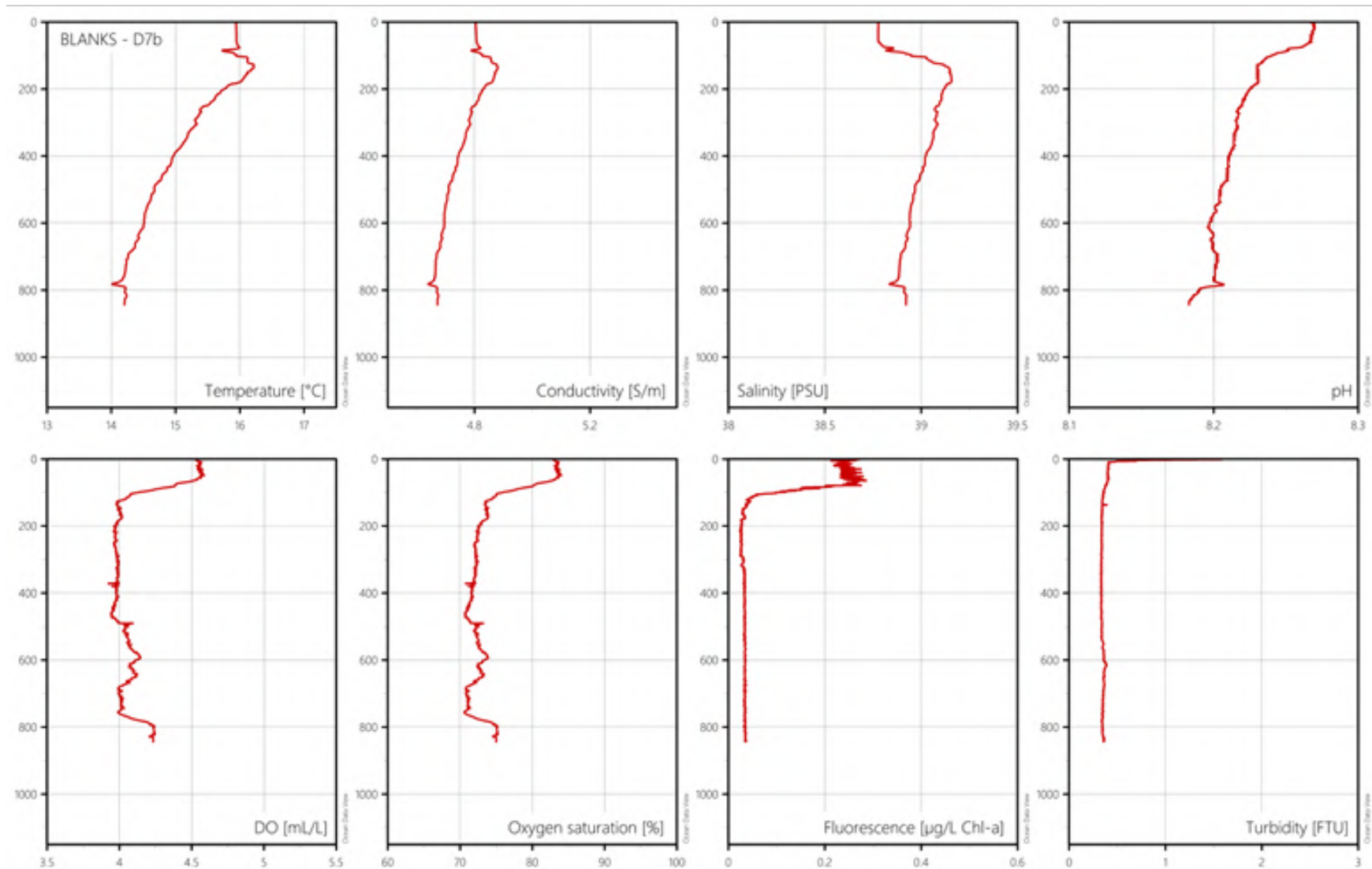


Figure 3-73: Vertical profiles of the main physico-chemical variables of the water column, Blank stations – station D7b

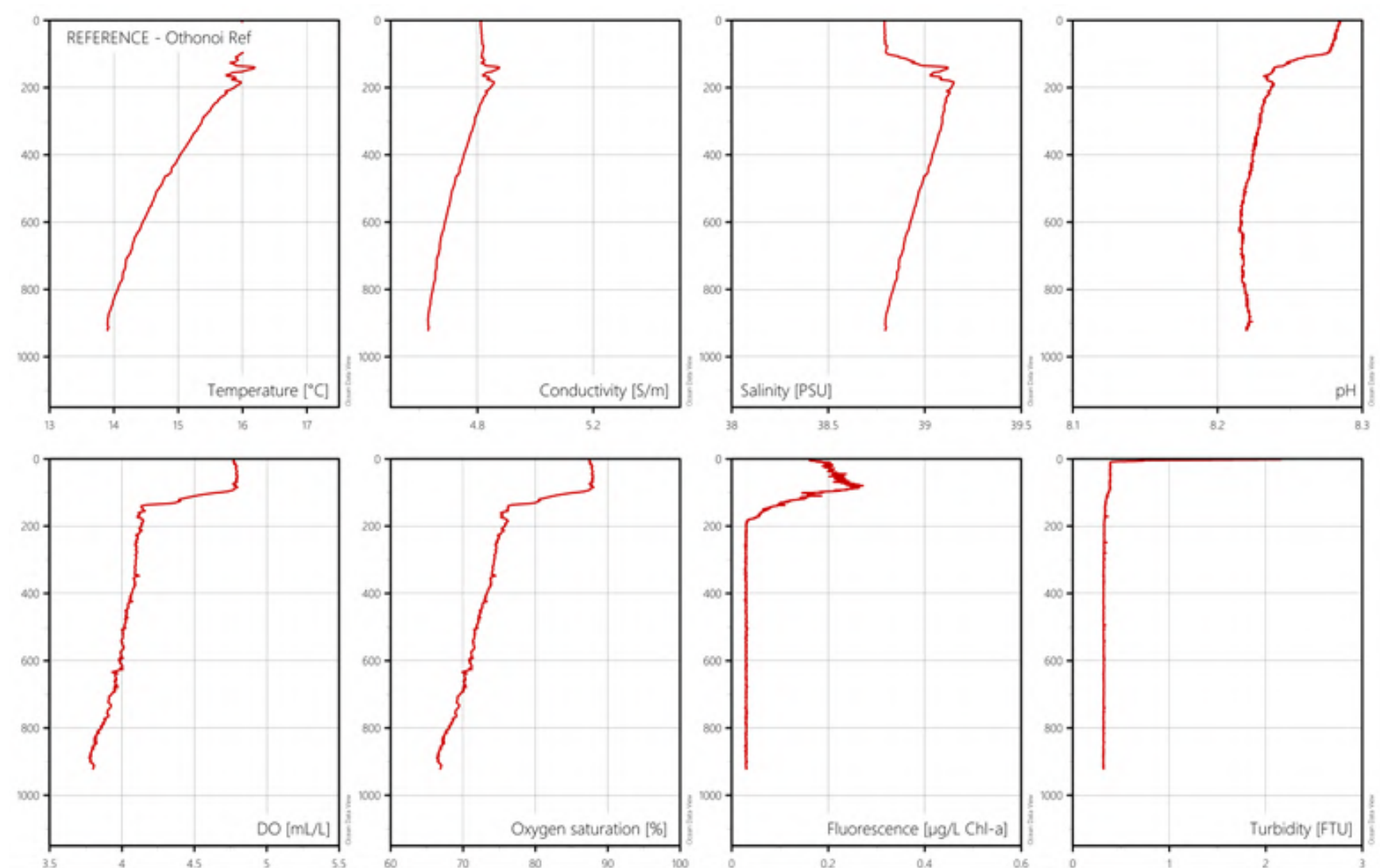


Figure 3-74: Vertical profiles of the main physico-chemical variables of the water column, Reference stations – Othonoi Ref

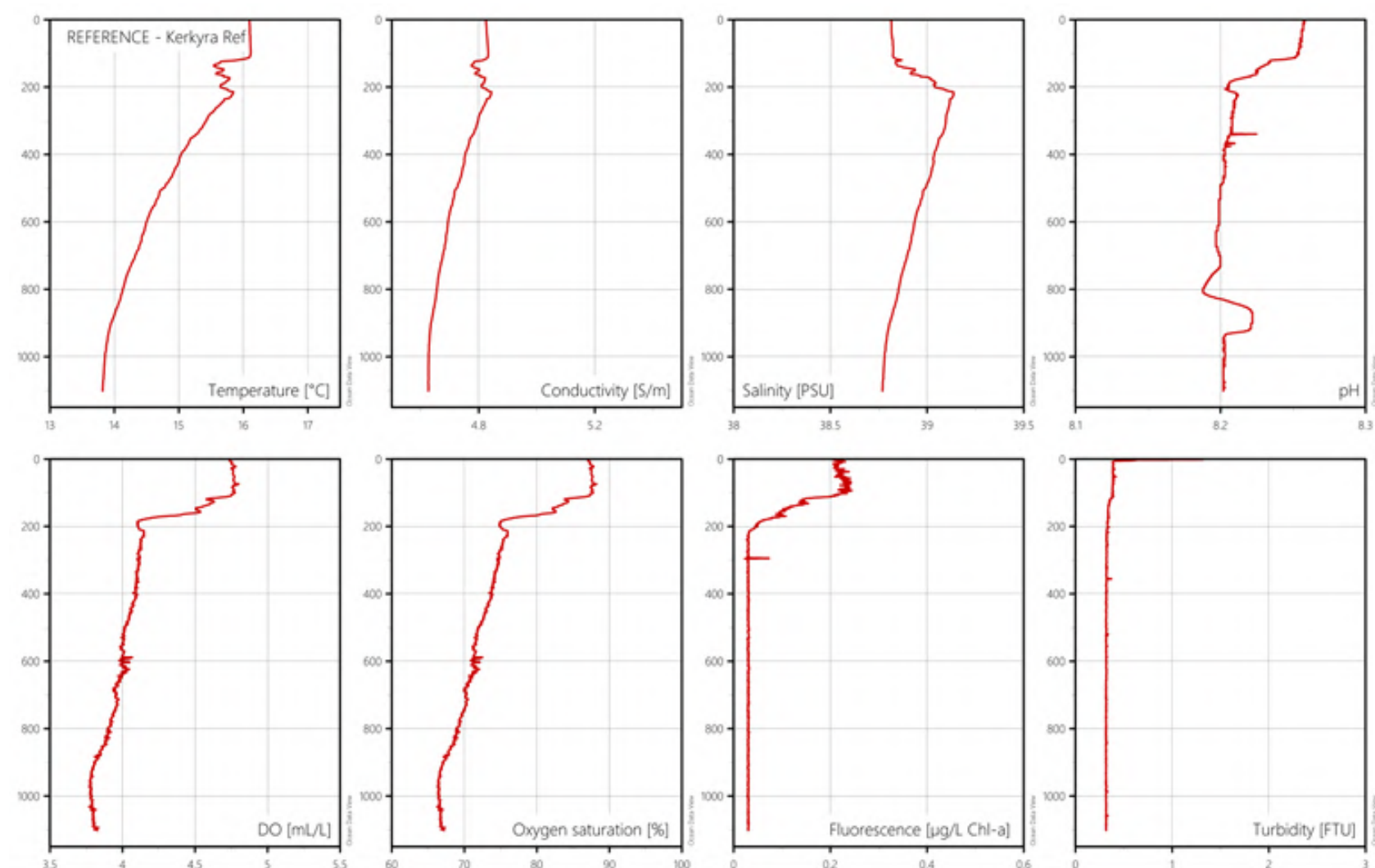


Figure 3-75: Vertical profiles of the main physico-chemical variables of the water column, Reference stations – Kerkyra Ref

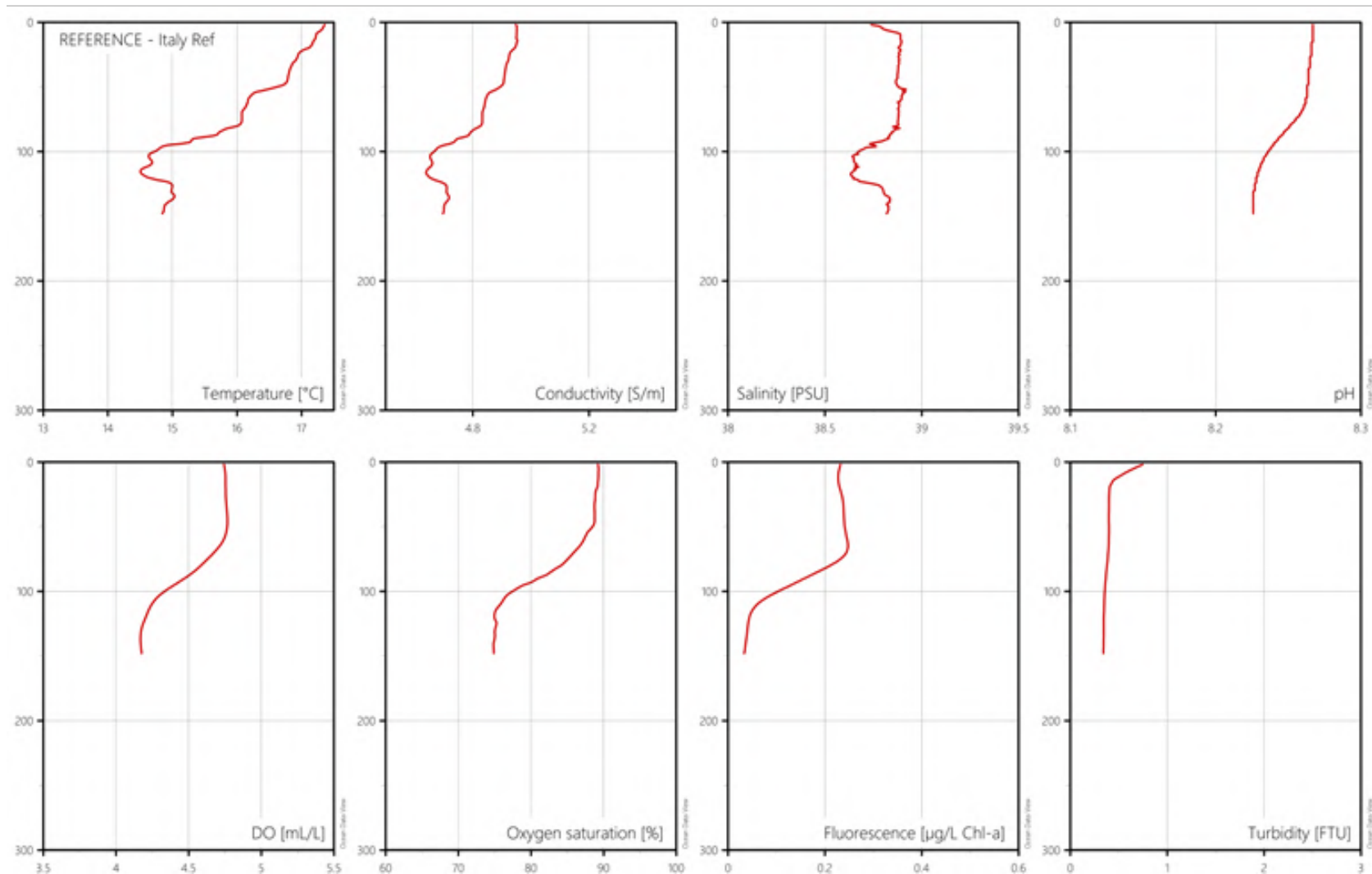


Figure 3-76: Vertical profiles of the main physico-chemical variables of the water column, Reference stations – Italy Ref

3.3.2.1.2 Chemical characteristics of seawater

3.3.2.1.2.1 Total suspended solids and total organic carbon

Around the Asopus-1A well site, Total Suspended Solids (TSS) ranged from 7.8 mg L⁻¹ at the Bottom sampling depth of D3a to 15.0 mg L⁻¹ at the Middle depth of D5a, with an average of 11.01 ± 2.46 mg L⁻¹. Concentrations did not exhibit the same vertical distribution across the three stations.

At the northern stations, TSS showed comparable concentrations, ranging from 7.8 mg L⁻¹ at the Surface of D5b to 13.0 mg L⁻¹ at the Surface of D1b. The average value was 10.19 ± 1.76 mg L⁻¹, confirming the absence of a systematic vertical gradient.

The blank stations showed similarly limited variability, with an overall average of 10.22 ± 2.11 mg L⁻¹, consistent with both well-site areas.

At the Reference Stations, TSS ranged from 6.0 mg L⁻¹ at the Surface of Othonoi Ref to 15.0 mg L⁻¹ at its Middle sampling depth, corresponding to the absolute minimum and maximum observed across the study area, although the overall Reference Station average remained comparable to the other groups (10.46 ± 2.76 mg L⁻¹), confirming the limited spatial variability of TSS.

Total Organic Carbon (TOC) concentrations were below the analytical Limit of Quantification (LoQ) in all samples collected at all sampling depths and sampling stations (i.e., < 1 mg L⁻¹), except at Italy Ref, where quantifiable concentrations were detected only at the Surface and Middle depths, with values of 1.3 and 1.2 mg L⁻¹, respectively.

The results described above are summarized in Table 3-17; TSS concentrations are graphically illustrated in Figure 3-77, where the Asopus-1A and Northern Stations are presented separately, each including the corresponding Blank Stations and all three Reference Stations. TOC is not graphically represented due to the predominance of concentrations below the analytical LoQ

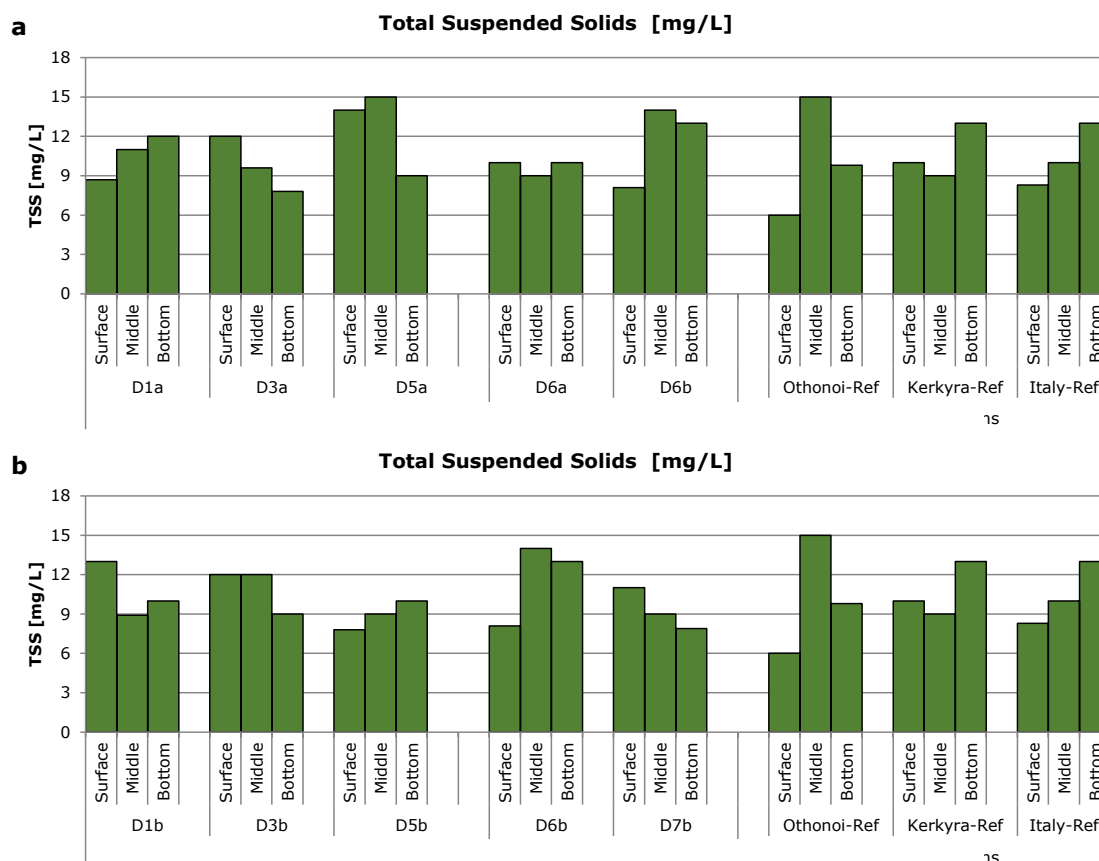


Figure 3-77: Total Suspended Solids (TSS) in seawater samples collected at the Asopus-1A (a) and northern station group (b); each panel includes the respective Blank Stations and all three Reference Stations

3.3.2.1.2.2 Nutrients

Among the investigated Nitrogen nutrients, Ammonium (NH_4^+) around the Asopus-1A well site, NH_4^+ was detected only in four samples: at the Surface of D3a and at all three Sampling Depths of D1a. The highest concentrations were recorded at the Middle and Bottom depths of D1a ($0.010 \text{ mg L}^{-1} \text{ N}$), with an average value of $0.004 \pm 0.004 \text{ mg L}^{-1} \text{ N}$.

Around the Northern station group, NH_4^+ exceeded the LoQ only at the Middle depths of D3b and D5b, reaching a maximum of $0.010 \text{ mg L}^{-1} \text{ N}$ at D3b. The average concentration was $0.002 \pm 0.003 \text{ mg L}^{-1} \text{ N}$.

The Blank stations followed the same general pattern, with most samples below the LoQ, especially at D6a, where NH_4^+ was never quantifiable; the maximum was $0.004 \text{ mg L}^{-1} \text{ N}$ at D6b (Surface) and the average was $0.002 \pm 0.001 \text{ mg L}^{-1} \text{ N}$, consistent with the other areas.

At the Reference Stations, Othonoi Ref and Kerkyra Ref showed values comparable to the other stations, with 50 % of samples below the LoQ. Conversely, at Italy Ref NH_4^+ was quantifiable at all three Sampling Depths and reached the highest concentration recorded in the study area at the Surface ($0.065 \text{ mg L}^{-1} \text{ N}$). Average concentrations were $0.002 \pm 0.001 \text{ mg L}^{-1} \text{ N}$ at Othonoi Ref, $0.004 \pm 0.005 \text{ mg L}^{-1} \text{ N}$ at Kerkyra Ref, and $0.024 \pm 0.036 \text{ mg L}^{-1} \text{ N}$ at Italy Ref.

Nitrite (NO_2^-) concentrations were below the analytical LoQ at all Sampling Stations and Depths around the Asopus-1A well site. Around Northern station group, NO_2^- was quantifiable only at the Bottom of D1b and at

the Middle and Bottom depths of D3b, reaching a maximum of $0.003 \text{ mg L}^{-1} \text{ N}$ at the latter. The average concentration for the Northern station group was $0.002 \pm 0.001 \text{ mg L}^{-1} \text{ N}$.

At the Blank stations, NO_2^- was detected only at the Bottom of D7b ($0.003 \text{ mg L}^{-1} \text{ N}$), yielding an average concentration of $0.001 \pm 0.001 \text{ mg L}^{-1} \text{ N}$.

At the Reference Stations, NO_2^- remained below the LoQ in all samples.

Nitrate (NO_3^-) showed a distribution similar to Nitrite, remaining below the LoQ at all Sampling Stations and Depths around the Asopus-1A well site. Around Northern station group, NO_3^- was quantifiable at Surface and Middle at D3b, and Middle Depth at D5b, where the maximum was recorded ($0.063 \text{ mg L}^{-1} \text{ N}$). The average concentration for the Northern station group area was $0.011 \pm 0.020 \text{ mg L}^{-1} \text{ N}$.

At the Blank stations, NO_3^- was also quantifiable at only three Sampling Depths, with no detections at D7b. The maximum value was $0.017 \text{ mg L}^{-1} \text{ N}$ at D6b Surface, and the average concentration was $0.005 \pm 0.005 \text{ mg L}^{-1} \text{ N}$.

At the Reference Stations, NO_3^- was more frequently detected, although it remained below the LoQ at the Bottom of all three stations. The highest concentration in the study area was recorded at Italy Ref Surface ($0.510 \text{ mg L}^{-1} \text{ N}$). Average concentrations were $0.018 \pm 0.018 \text{ mg L}^{-1} \text{ N}$ at Othonoi Ref, $0.010 \pm 0.009 \text{ mg L}^{-1} \text{ N}$ at Kerkyra Ref, and $0.173 \pm 0.292 \text{ mg L}^{-1} \text{ N}$ at Italy Ref, the latter reflecting the higher Surface concentration recorded at this station.

Total Nitrogen (N-Tot) concentrations were below the LoQ in all samples collected across the study area, including both well-site areas, the Blank stations and the Reference Stations. Therefore, no vertical or spatial distribution pattern could be identified for this nitrogen nutrient.

Among the Phosphorus nutrients, Orthophosphate (PO_4^{3-}) was detected in almost all samples around Asopus-1A, except at D5a Bottom, where it was below the LoQ. Where quantifiable, concentrations generally increased with depth, reaching $0.0035 \text{ mg L}^{-1} \text{ P}$ at D1a Bottom. The average was $0.0021 \pm 0.0008 \text{ mg L}^{-1} \text{ P}$.

Around Northern station group, concentrations were higher on average ($0.0056 \pm 0.0042 \text{ mg L}^{-1} \text{ P}$). A depth-related increase was observed at D3b and D5b, whereas D1b showed the opposite pattern, with the maximum value at the Surface ($0.0167 \text{ mg L}^{-1} \text{ P}$).

The Blank stations showed slightly higher concentrations than the other areas (average: $0.0065 \pm 0.0034 \text{ mg L}^{-1} \text{ P}$), without a consistent vertical trend. The only value below the LoQ occurred at D6a Surface, while the maximum was recorded at D7b Middle ($0.0102 \text{ mg L}^{-1} \text{ P}$).

At the Reference Stations, orthophosphate concentrations were generally higher than the other stations, except at Othonoi Ref, which showed lower and nearly uniform values ($0.0061 \pm 0.0003 \text{ mg L}^{-1} \text{ P}$). Kerkyra Ref and Italy Ref showed higher averages, 0.0125 ± 0.0045 and $0.0123 \pm 0.0006 \text{ mg L}^{-1} \text{ P}$, respectively, with the maximum Reference value recorded at Kerkyra Ref Middle ($0.0161 \text{ mg L}^{-1} \text{ P}$).

Total Phosphorus (P-Tot) was detected in all samples around Asopus-1A, ranging from $12 \text{ } \mu\text{g L}^{-1}$ at D1a Middle to $78 \text{ } \mu\text{g L}^{-1}$ at D1a Surface, with an average of $30.11 \pm 19.41 \text{ } \mu\text{g L}^{-1}$ and no consistent vertical pattern.

Around Northern station group, P-Tot was below the LoQ only at D3b Bottom and reached $90 \mu\text{g L}^{-1}$ at D5b Surface; the average was slightly higher than at Asopus-1A ($36.11 \pm 25.78 \mu\text{g L}^{-1}$), again without a coherent depth-related trend.

The Blank stations showed comparable values, averaging $26.11 \pm 16.36 \mu\text{g L}^{-1}$, with Surface samples below the LoQ at D6a and D6b and a maximum of $54 \mu\text{g L}^{-1}$ at D6b Middle.

At the Reference Stations, several values were below the LoQ, and concentrations were generally lower than in the other areas. Othonoi Ref showed the highest Reference value and average ($46 \mu\text{g L}^{-1}$ at Middle; $24.00 \pm 20.81 \mu\text{g L}^{-1}$), while Kerkyra Ref and Italy Ref averaged 9.00 ± 6.93 and $11.33 \pm 5.51 \mu\text{g L}^{-1}$, respectively.

For assessment purposes, nutrient concentrations were compared with the reference values reported within the Greek MSFD implementation framework (Ministry of Environment and Energy, 2018). Among the nutrients investigated, reference values were available only for NO_3^- and PO_4^{3-} , equal to 0.062 mg L^{-1} and 0.0095 mg L^{-1} , respectively. As described above, NO_3^- exceeded the reference value only at D5b Middle ($0.063 \text{ mg L}^{-1} \text{ N}$) and Italy Ref Surface ($0.510 \text{ mg L}^{-1} \text{ N}$). PO_4^{3-} exceeded the corresponding reference value at D1b Surface ($0.0167 \text{ mg L}^{-1} \text{ P}$), D7b Middle and Bottom, Kerkyra Ref Surface and Middle, and at all Sampling Depths of Italy Ref, with the highest value recorded at Kerkyra Ref Middle ($0.0161 \text{ mg L}^{-1} \text{ P}$). These exceedances were sporadic and spatially inconsistent, occurring at well-site and Northern and Reference Stations and therefore considered representative of natural oceanographic and biogeochemical variability rather than localized nutrient enrichment.

Results are summarized in Table 3-17 and illustrated in Figure 3-78 and Figure 3-79; NO_2^- is not shown, as concentrations were below the analytical LoQ at nearly all sampling stations and depths.

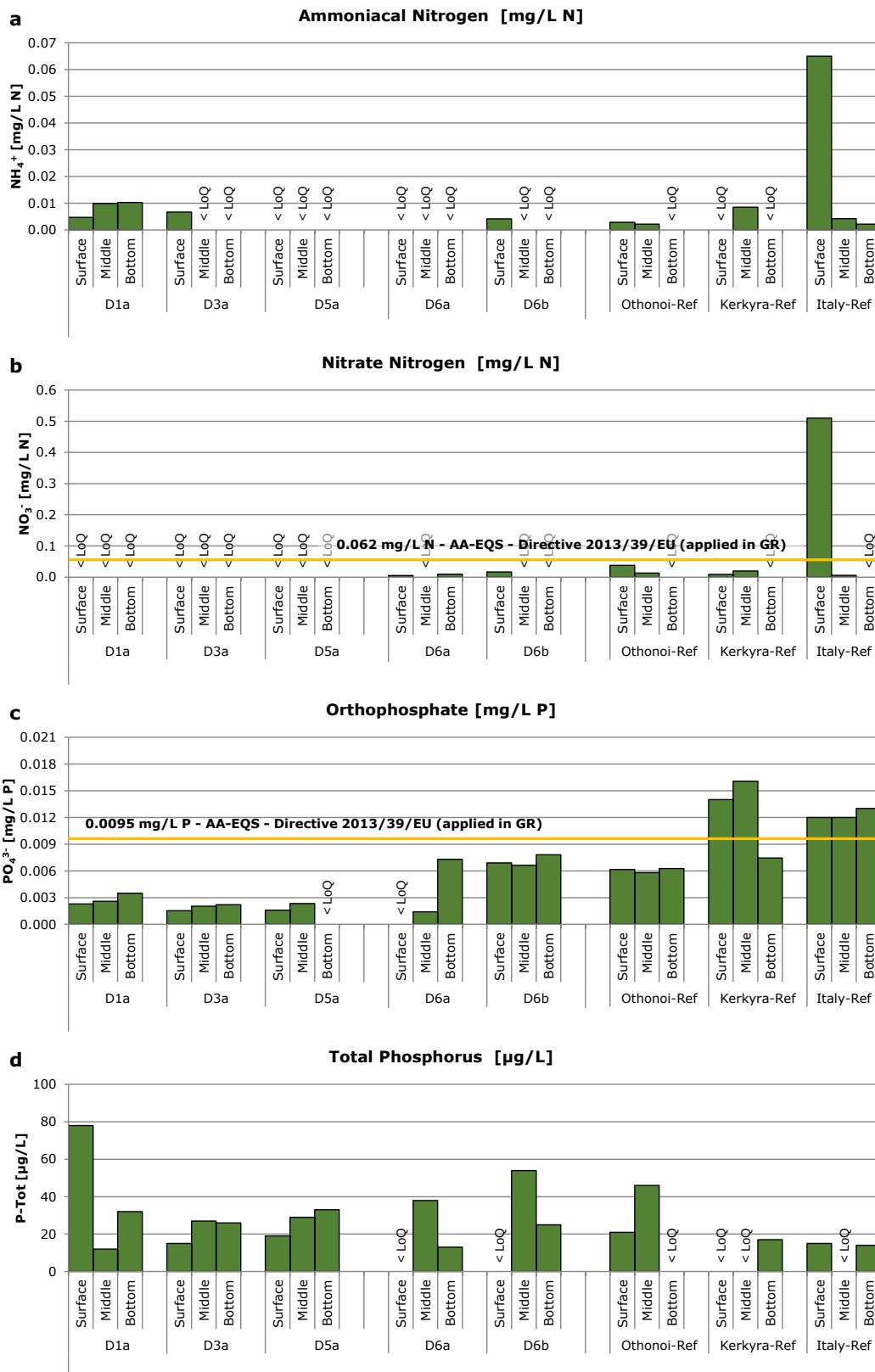


Figure 3-78: Nutrient concentrations in seawater samples collected at the Asopus-1A station group; each panel includes the respective Blank Stations and all three Reference Stations

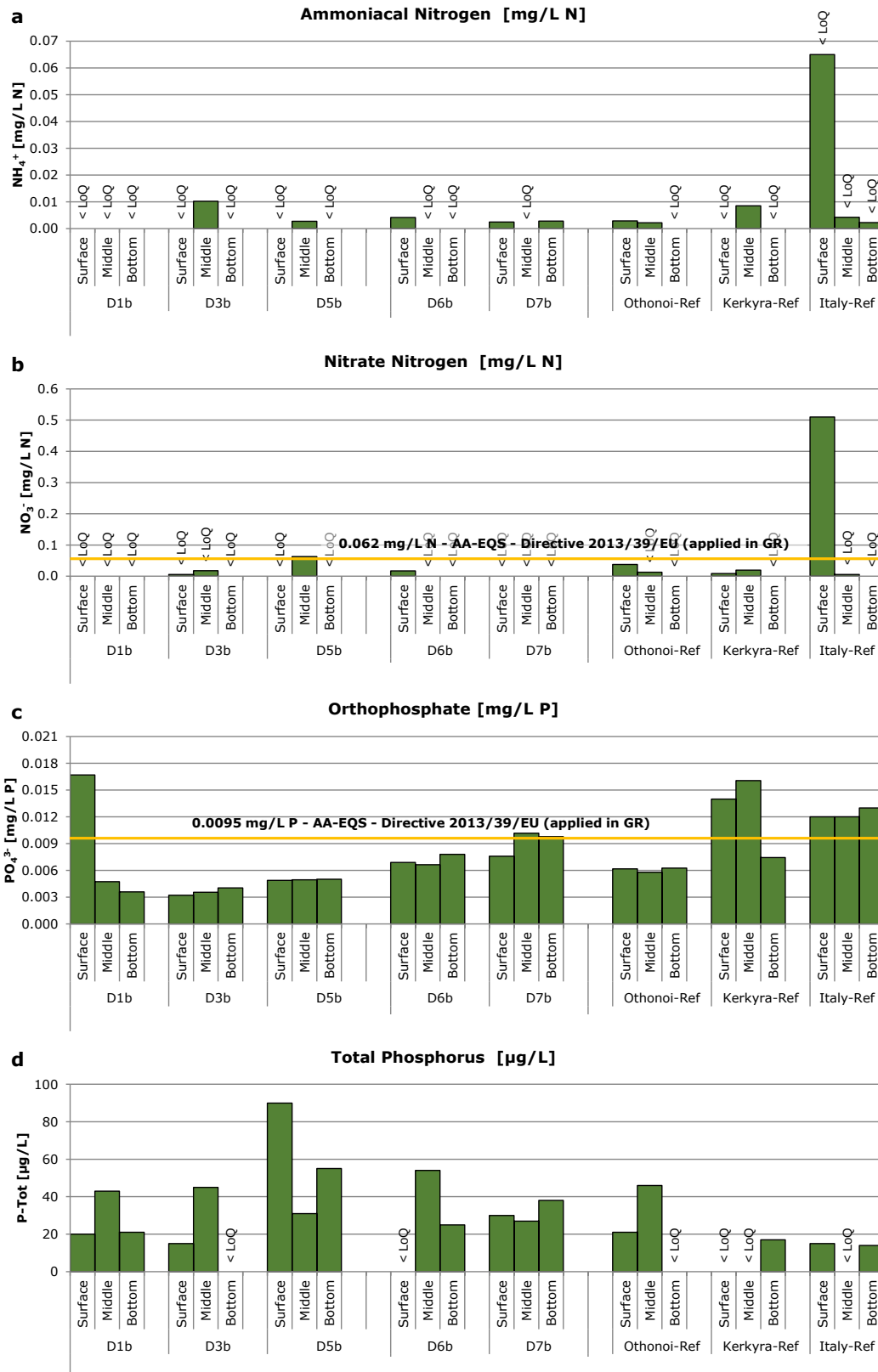


Figure 3-79: Nutrient concentrations in seawater samples collected at the northern station group; each panel includes the respective Blank Stations and all three Reference Stations

Table 3-17: Total Suspended Solids (TSS), Total Organic Carbon (TOC) and Nutrient concentrations in seawater samples

AREA	WELL	STATION ID	SAMPLING DEPTH	TSS	TOC	NUTRIENTS					
				TOTAL SUSPENDED SOLIDS	TOTAL ORGANIC CARBON	TOTAL PHOSPHORUS	AMMONIACAL NITROGEN	NITRITE NITROGEN	NITRATE NITROGEN	TOTAL NITROGEN	ORTHOPHOSPHATE
			M.U.	(mg/L)		(µg/L)	(mg/L N)				(mg/L P)
BLOCK 2	ASOPUS -1A	D1a	Surface	8.7	< 1	78	0.005	< 0.002	< 0.005	< 1	0.0023
			Middle	11.0	< 1	12	0.010	< 0.002	< 0.005	< 1	0.0026
			Bottom	12.0	< 1	32	0.010	< 0.002	< 0.005	< 1	0.0035
		D3a	Surface	12.0	< 1	15	0.007	< 0.002	< 0.005	< 1	0.0015
			Middle	9.6	< 1	27	< 0.002	< 0.002	< 0.005	< 1	0.0020
			Bottom	7.8	< 1	26	< 0.002	< 0.002	< 0.005	< 1	0.0022
		D5a	Surface	14.0	< 1	19	< 0.002	< 0.002	< 0.005	< 1	0.0016
			Middle	15.0	< 1	29	< 0.002	< 0.002	< 0.005	< 1	0.0023
			Bottom	9.0	< 1	33	< 0.002	< 0.002	< 0.005	< 1	< 0.001
	Northern station group	D1b	Surface	13.0	< 1	20	< 0.002	< 0.002	< 0.005	< 1	0.0167
			Middle	8.9	< 1	43	< 0.002	< 0.002	< 0.005	< 1	0.0047
			Bottom	10.0	< 1	21	< 0.002	0.002	< 0.005	< 1	0.0036
		D3b	Surface	12.0	< 1	15	< 0.002	< 0.002	0.005	< 1	0.0032
			Middle	12.0	< 1	45	0.010	0.002	0.018	< 1	0.0036
			Bottom	9.0	< 1	< 10	< 0.002	0.003	< 0.005	< 1	0.0041
		D5b	Surface	7.8	< 1	90	< 0.002	< 0.002	< 0.005	< 1	0.0049
			Middle	9.0	< 1	31	0.003	< 0.002	0.063	< 1	0.0049
			Bottom	10.0	< 1	55	< 0.002	< 0.002	< 0.005	< 1	0.0050
	Blanks	D6a	Surface	10.0	< 1	< 10	< 0.002	< 0.002	0.005	< 1	< 0.001
			Middle	9.0	< 1	38	< 0.002	< 0.002	< 0.005	< 1	0.0014
			Bottom	10.0	< 1	13	< 0.002	< 0.002	0.010	< 1	0.0073
		D6b	Surface	8.1	< 1	< 10	0.004	< 0.002	0.017	< 1	0.0069
			Middle	14.0	< 1	54	< 0.002	< 0.002	< 0.005	< 1	0.0066
			Bottom	13.0	< 1	25	< 0.002	< 0.002	< 0.005	< 1	0.0078
		D7b	Surface	11.0	< 1	30	0.002	< 0.002	< 0.005	< 1	0.0076
			Middle	9.0	< 1	27	< 0.002	< 0.002	< 0.005	< 1	0.0102
			Bottom	7.9	< 1	38	0.003	0.003	< 0.005	< 1	0.0098
IONIAN SEA	Reference stations	Othonoi-Ref	Surface	6.0	< 1	21	0.003	< 0.002	0.038	< 1	0.0062
			Middle	15.0	< 1	46	0.002	< 0.002	0.013	< 1	0.0058
			Bottom	9.8	< 1	< 10	< 0.002	< 0.002	< 0.005	< 1	0.0063
			Surface	10.0	< 1	< 10	< 0.002	< 0.002	0.009	< 1	0.0140

AREA	WELL	STATION ID	SAMPLING DEPTH	TSS	TOC	NUTRIENTS					
				TOTAL SUSPENDED SOLIDS	TOTAL ORGANIC CARBON	TOTAL PHOSPHORUS	AMMONIACAL NITROGEN	NITRITE NITROGEN	NITRATE NITROGEN	TOTAL NITROGEN	ORTHOPHOSPHATE
		Kerkyra-Ref	Middle	9.0	< 1	< 10	0.009	< 0.002	0.020	< 1	0.0161
			Bottom	13.0	< 1	17	< 0.002	< 0.002	< 0.005	< 1	0.0074
		Italy-Ref	Surface	8.3	1.3	15	0.065	< 0.002	0.510	< 1	0.0120
			Middle	10.0	1.2	< 10	0.004	< 0.002	0.006	< 1	0.0120
			Bottom	13.0	< 1	14	0.002	< 0.002	< 0.005	< 1	0.0130
			Directive 2013/39/EU (applied in GR)								
AA-EQS other surface waters			n.d.	n.d.	n.d.	n.d.	n.d.	0.062	n.d.	0.0095	
Legislative Decree No. 172/2015 (Annex 1, Tables 1/A and 1/B)											
SQA-MA (Tab 1/A)				n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
SQA-MA (Tab 1/B)				n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.

3.3.2.1.2.3 Metals and metalloids

Among the investigated trace and heavy metals, Cadmium (Cd), Hexavalent Chromium (Cr VI), Cobalt (Co), Mercury (Hg) and Tin (Sn) were consistently below the analytical LoQ at all Sampling Depths and Stations. Total Chromium (Cr-Tot) was detected only at D3b Middle ($1.7 \mu\text{g L}^{-1}$), while Lead (Pb) was quantifiable in only two samples, both from Italy Ref (16 and $12 \mu\text{g L}^{-1}$ at Middle and Bottom depths, respectively).

Copper (Cu) was quantifiable in few samples, with low and broadly comparable averages around Asopus-1A ($1.06 \pm 1.05 \mu\text{g L}^{-1}$), Northern station group ($1.31 \pm 2.43 \mu\text{g L}^{-1}$) and the Blank stations ($1.92 \pm 1.33 \mu\text{g L}^{-1}$). Among the Reference Stations, Cu averaged $1.63 \pm 1.96 \mu\text{g L}^{-1}$ at Othonoi Ref, remained $< \text{LoQ}$ at Kerkyra Ref, and was markedly higher at Italy Ref ($17.27 \pm 13.12 \mu\text{g L}^{-1}$), where the absolute maximum was recorded at Bottom depth ($30.0 \mu\text{g L}^{-1}$).

Nickel (Ni) showed a broadly similar distribution, with limited detections and low averages around Asopus-1A ($0.77 \pm 0.40 \mu\text{g L}^{-1}$), Northern station group ($0.69 \pm 0.57 \mu\text{g L}^{-1}$) and the Blank stations ($1.13 \pm 0.50 \mu\text{g L}^{-1}$). Among the Reference Stations, Ni averaged $1.30 \pm 0.20 \mu\text{g L}^{-1}$ at Othonoi Ref, remained $< \text{LoQ}$ at Kerkyra Ref, and was higher at Italy Ref ($5.43 \pm 4.76 \mu\text{g L}^{-1}$), where the absolute maximum was recorded at Bottom depth ($10.0 \mu\text{g L}^{-1}$).

Unlike the trace metals discussed above, Arsenic (As), Barium (Ba), Iron (Fe) and Zinc (Zn) were quantifiable at all Sampling Depths and Stations.

Arsenic (As) showed limited spatial variability, with comparable average concentrations around Asopus-1A ($4.91 \pm 0.34 \mu\text{g L}^{-1}$), Northern station group ($4.84 \pm 0.75 \mu\text{g L}^{-1}$) and the Blank stations ($4.42 \pm 0.24 \mu\text{g L}^{-1}$). The highest concentrations ($5.5 \mu\text{g L}^{-1}$) were recorded at D1b Bottom and D5b Surface, whereas all Reference Stations exhibited lower values, particularly Kerkyra Ref, which showed both the lowest average concentration ($1.20 \pm 0.20 \mu\text{g L}^{-1}$) and the absolute minimum value ($1.0 \mu\text{g L}^{-1}$ at Middle depth).

Barium (Ba) displayed a similarly limited range of variability. Average concentrations were slightly lower around Asopus-1A ($7.80 \pm 0.77 \mu\text{g L}^{-1}$) and at the Blank stations ($7.98 \pm 0.64 \mu\text{g L}^{-1}$) than around Northern station group ($8.56 \pm 1.42 \mu\text{g L}^{-1}$). Among the Reference Stations, Kerkyra Ref and Italy Ref exhibited the lowest and highest average concentrations (7.40 ± 0.26 and $8.83 \pm 0.06 \mu\text{g L}^{-1}$, respectively). The absolute minimum and maximum values were recorded at D3a Middle/Bottom ($7.0 \mu\text{g L}^{-1}$) and D3b Middle ($12.0 \mu\text{g L}^{-1}$), respectively.

Iron (Fe) exhibited substantially greater variability than As and Ba. Average concentrations were $53.56 \pm 21.51 \mu\text{g L}^{-1}$ around Asopus-1A, $77.89 \pm 66.69 \mu\text{g L}^{-1}$ around Northern station group and $93.89 \pm 80.05 \mu\text{g L}^{-1}$ at the Blank stations. Among the Reference Stations, Kerkyra Ref showed the lowest average concentration ($48.33 \pm 12.34 \mu\text{g L}^{-1}$), whereas Othonoi Ref exhibited the highest ($132.00 \pm 59.09 \mu\text{g L}^{-1}$). The absolute minimum and maximum values were recorded at D3a ($33 \mu\text{g L}^{-1}$) and D6a Middle ($290 \mu\text{g L}^{-1}$), respectively.

A comparable pattern emerged for Zinc (Zn), with average concentrations of $37.56 \pm 19.77 \mu\text{g L}^{-1}$ around Asopus-1A, $56.33 \pm 34.57 \mu\text{g L}^{-1}$ around Northern station group and $36.78 \pm 9.55 \mu\text{g L}^{-1}$ at the Blank stations. Kerkyra Ref again exhibited the lowest average concentration ($33.33 \pm 4.04 \mu\text{g L}^{-1}$), whereas Othonoi Ref showed the highest ($114.33 \pm 62.58 \mu\text{g L}^{-1}$). Italy Ref displayed concentrations more

comparable to those observed around Northern station group. The absolute minimum and maximum values were $24 \mu\text{g L}^{-1}$ at D3a and D5a Middle and $160 \mu\text{g L}^{-1}$ at Othonoi Ref Bottom, respectively.

For assessment purposes, metal concentrations were compared with the AA-EQS of Directive 2013/39/EU, as applied in Greece, and with the SQA-MA values reported in Annex 1, Tables 1/A and 1/B of Italian D.Lgs 172/2015. Arsenic (As) exceeded the Italian SQA-MA of $5 \mu\text{g L}^{-1}$ in two samples around Asopus-1A (D1a Middle and D3a Middle) and five around Northern station group (D1b and D3b, both at Surface and Bottom, and D5b at Surface), with values between 5.1 and $5.5 \mu\text{g L}^{-1}$; several other samples, including Blank stations and Othonoi Ref, were close to this threshold. Lead (Pb) and Nickel (Ni) exceeded both applicable reference values only at Italy Ref: Pb at Middle and Bottom depths (16 and $12 \mu\text{g L}^{-1}$ vs $1.3 \mu\text{g L}^{-1}$) and Ni at Bottom depth ($10 \mu\text{g L}^{-1}$ vs $8.6 \mu\text{g L}^{-1}$). All other investigated metals exhibited concentrations consistently below the respective regulatory threshold values.

Concentrations of all the investigated metals are provided in Table 3-18. Figure 3-80, Figure 3-81, Figure 3-82 and Figure 3-83 illustrate only those elements quantified in a sufficient number of samples to allow interpretation of their spatial distribution. Metals consistently below the analytical LoQ (Cd, Cr VI, Co, Hg and Sn) and those only sporadically detected (Cr-Tot and Pb) are therefore excluded.

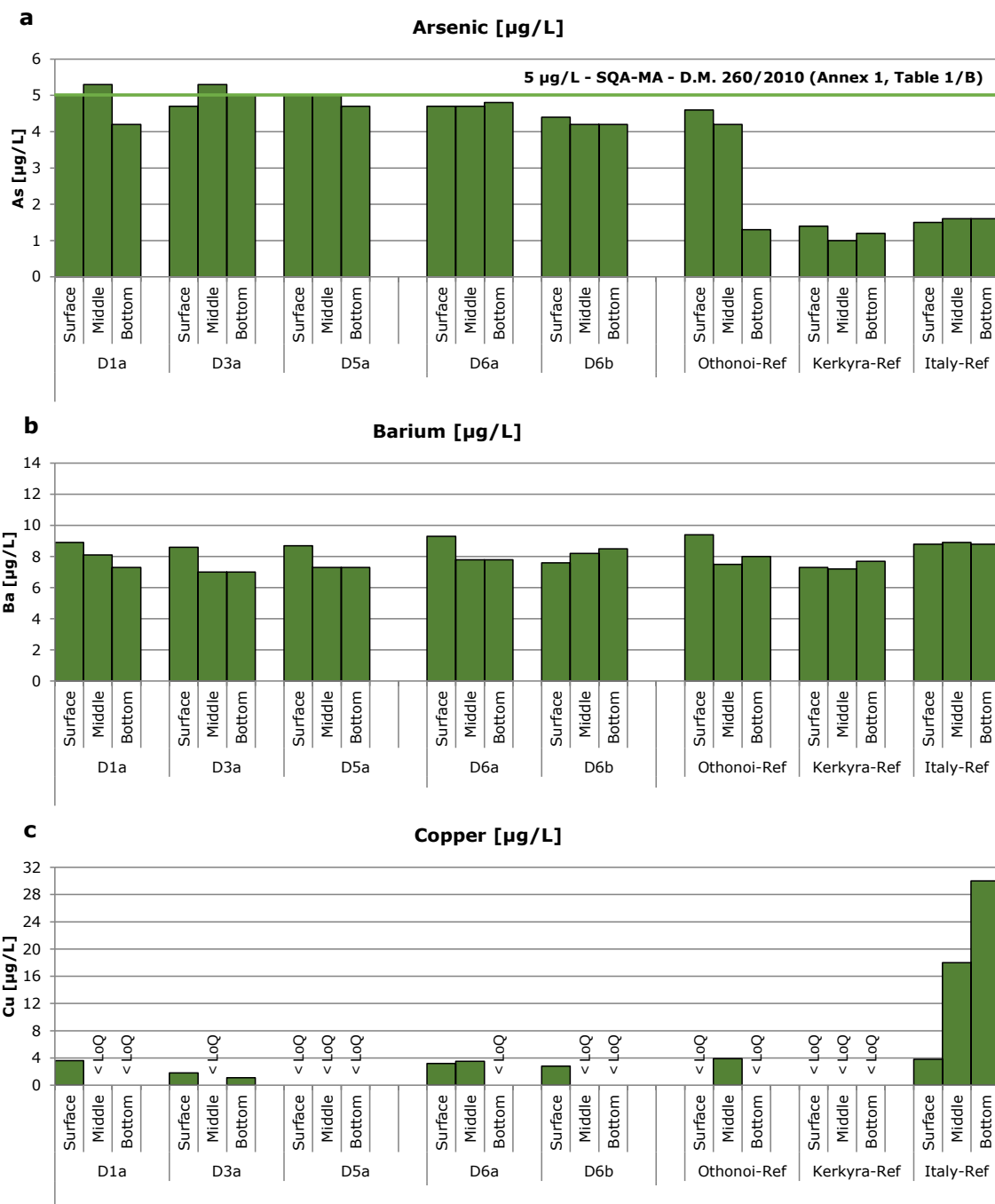


Figure 3-80: Concentrations of As (a), Ba (b) and Cu (c) in seawater samples collected at the Asopus-1A station group, including the associated Blank Stations and all three Reference Stations

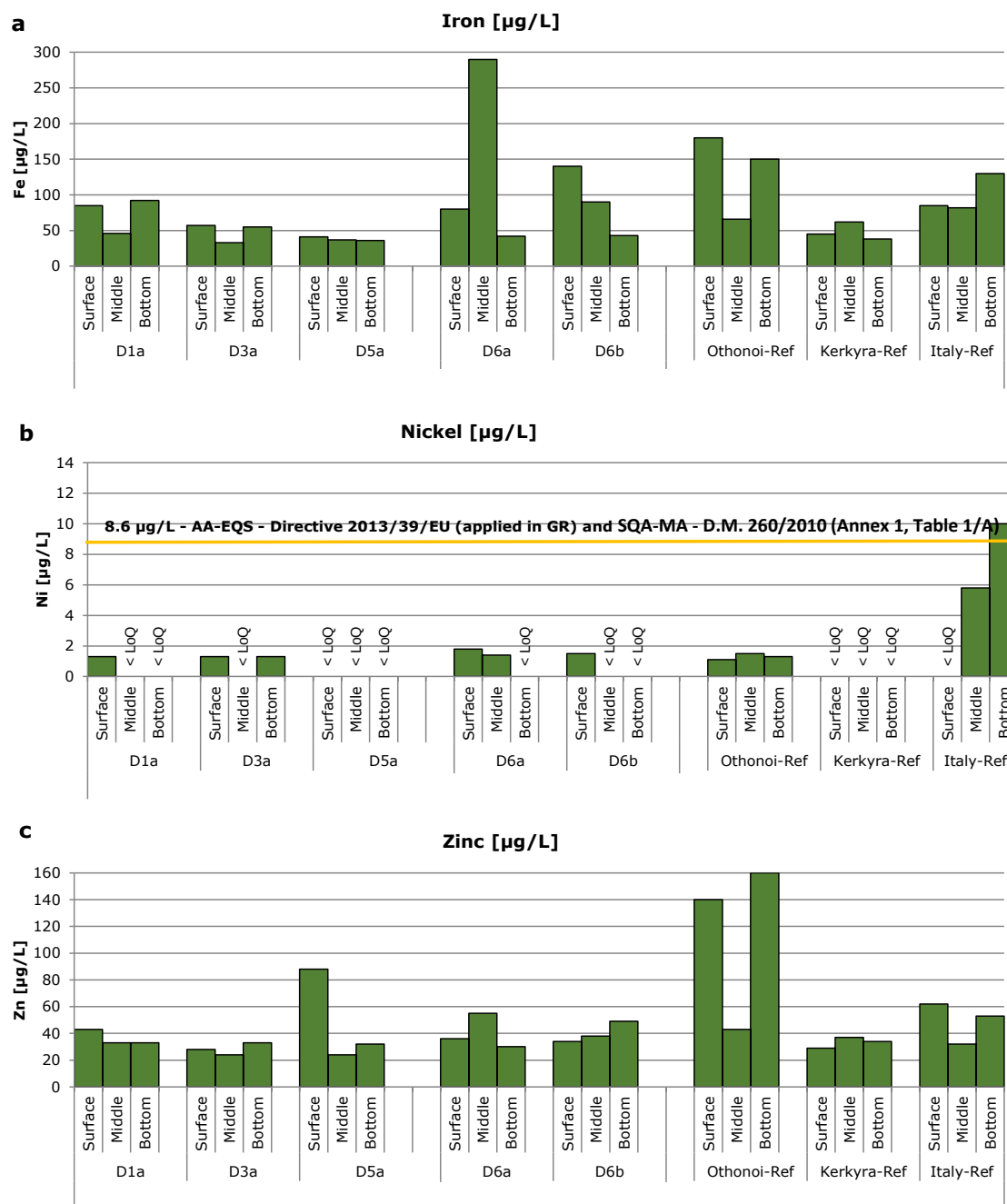


Figure 3-81: Concentrations of Fe (a), Ni (b) and Zn (c) in seawater samples collected at the Asopus-1A station group, including the associated Blank Stations and all three Reference Stations

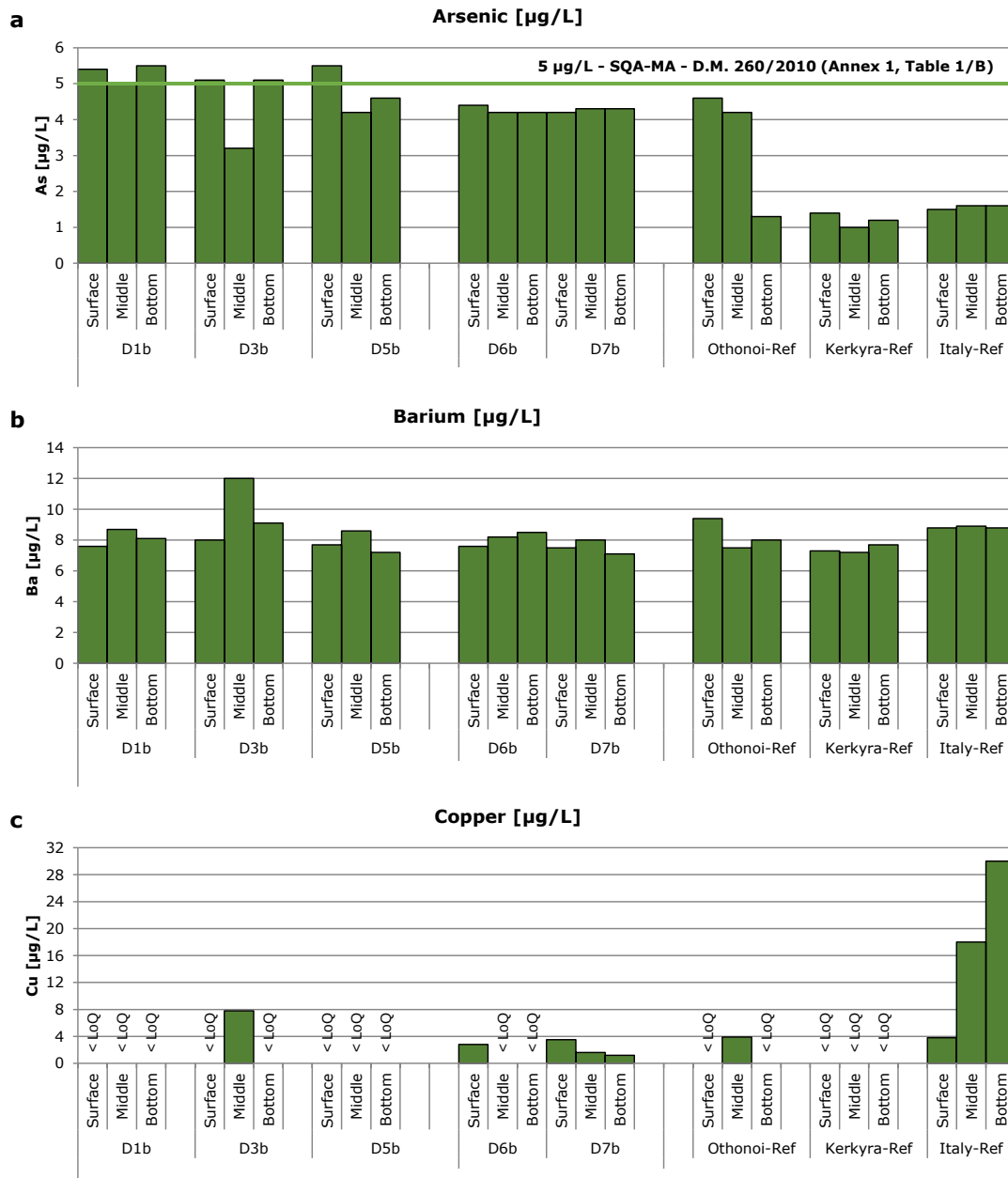


Figure 3-82: Concentrations of As (a), Ba (b) and Cu (c) in seawater samples collected at the Northern station group group, including the associated Blank Stations and all three Reference Stations

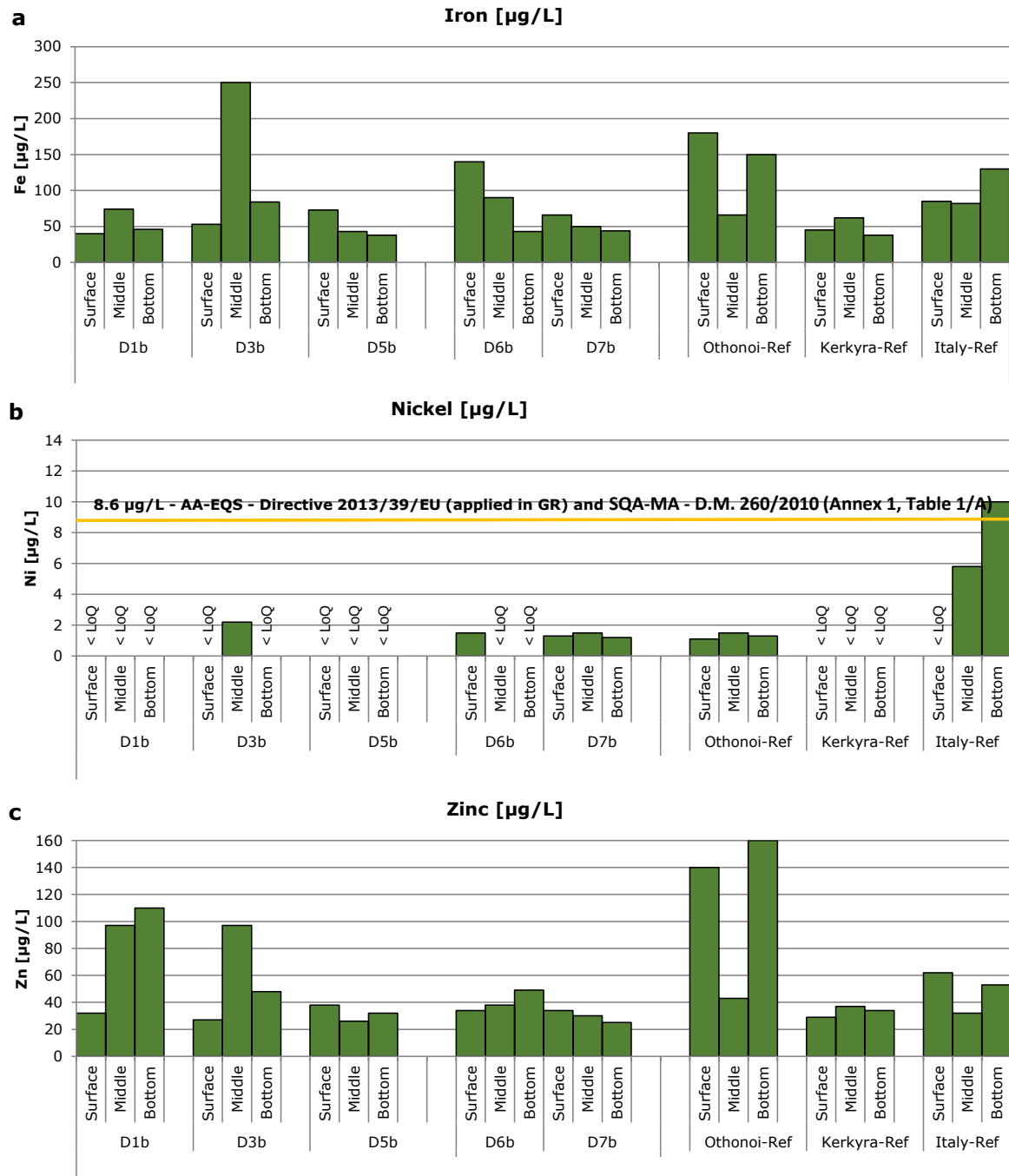


Figure 3-83: Concentrations of Fe (a), Ni (b) and Zn (c) in seawater samples collected at the northern station group, including the associated Blank Stations and all three Reference Stations

Table 3-18: Heavy and Trace Metal concentrations in seawater samples collected at the Asopus-1A and Northern station groups, including the associated Blank Stations and all three Reference Stations

AREA	WELL	STATION ID	SAMPLING DEPTH	HEAVY AND TRACE METALS												
				ARSENIC	BARIUM	CADMIUM	CHROMIUM VI	COBALT	COPPER	IRON	LEAD	MERCURY	NICKEL	TIN	TOTAL CHROMIUM	ZINC
			M.U.	(µg/L)												
BLOCK 2	ASOPUS - 1A station group	D1a	Surface	5.0	8.9	< 0.2	< 0.5	< 1	3.6	85	< 1	< 0.1	1.3	< 1	< 1	43
			Middle	5.3	8.1	< 0.2	< 0.5	< 1	< 1	46	< 1	< 0.1	< 1	< 1	< 1	33
			Bottom	4.2	7.3	< 0.2	< 0.5	< 1	< 1	92	< 1	< 0.1	< 1	< 1	< 1	33
		D3a	Surface	4.7	8.6	< 0.2	< 0.5	< 1	1.8	57	< 1	< 0.1	1.3	< 1	< 1	28
			Middle	5.3	7.0	< 0.2	< 0.5	< 1	< 1	33	< 1	< 0.1	< 1	< 1	< 1	24
			Bottom	5.0	7.0	< 0.2	< 0.5	< 1	1.1	55	< 1	< 0.1	1.3	< 1	< 1	33
		D5a	Surface	5.0	8.7	< 0.2	< 0.5	< 1	< 1	41	< 1	< 0.1	< 1	< 1	< 1	88
			Middle	5.0	7.3	< 0.2	< 0.5	< 1	< 1	37	< 1	< 0.1	< 1	< 1	< 1	24
			Bottom	4.7	7.3	< 0.2	< 0.5	< 1	< 1	36	< 1	< 0.1	< 1	< 1	< 1	32
	Northern station group	D1b	Surface	5.4	7.6	< 0.2	< 0.5	< 1	< 1	40	< 1	< 0.1	< 1	< 1	< 1	32
			Middle	5.0	8.7	< 0.2	< 0.5	< 1	< 1	74	< 1	< 0.1	< 1	< 1	< 1	97
			Bottom	5.5	8.1	< 0.2	< 0.5	< 1	< 1	46	< 1	< 0.1	< 1	< 1	< 1	110
		D3b	Surface	5.1	8.0	< 0.2	< 0.5	< 1	< 1	53	< 1	< 0.1	< 1	< 1	< 1	27
			Middle	3.2	12.0	< 0.2	< 0.5	< 1	7.8	250	< 1	< 0.1	2.2	< 1	1.7	97
			Bottom	5.1	9.1	< 0.2	< 0.5	< 1	< 1	84	< 1	< 0.1	< 1	< 1	< 1	48
		D5b	Surface	5.5	7.7	< 0.2	< 0.5	< 1	< 1	73	< 1	< 0.1	< 1	< 1	< 1	38
			Middle	4.2	8.6	< 0.2	< 0.5	< 1	< 1	43	< 1	< 0.1	< 1	< 1	< 1	26
			Bottom	4.6	7.2	< 0.2	< 0.5	< 1	< 1	38	< 1	< 0.1	< 1	< 1	< 1	32
	Blanks	D6a	Surface	4.7	9.3	< 0.2	< 0.5	< 1	3.2	80	< 1	< 0.1	1.8	< 1	< 1	36
			Middle	4.7	7.8	< 0.2	< 0.5	< 1	3.5	290	< 1	< 0.1	1.4	< 1	< 1	55
			Bottom	4.8	7.8	< 0.2	< 0.5	< 1	< 1	42	< 1	< 0.1	< 1	< 1	< 1	30
		D6b	Surface	4.4	7.6	< 0.2	< 0.5	< 1	2.8	140	< 1	< 0.1	1.5	< 1	< 1	34
			Middle	4.2	8.2	< 0.2	< 0.5	< 1	< 1	90	< 1	< 0.1	< 1	< 1	< 1	38
			Bottom	4.2	8.5	< 0.2	< 0.5	< 1	< 1	43	< 1	< 0.1	< 1	< 1	< 1	49
		D7b	Surface	4.2	7.5	< 0.2	< 0.5	< 1	3.5	66	< 1	< 0.1	1.3	< 1	< 1	34
			Middle	4.3	8.0	< 0.2	< 0.5	< 1	1.6	50	< 1	< 0.1	1.5	< 1	< 1	30
			Bottom	4.3	7.1	< 0.2	< 0.5	< 1	1.2	44	< 1	< 0.1	1.2	< 1	< 1	25
IONIAN SEA	Reference stations	Othonoi-Ref	Surface	4.6	9.4	< 0.2	< 0.5	< 1	< 1	180	< 1	< 0.1	1.1	< 1	< 1	140
			Middle	4.2	7.5	< 0.2	< 0.5	< 1	3.9	66	< 1	< 0.1	1.5	< 1	< 1	43
			Bottom	1.3	8.0	< 0.2	< 0.5	< 1	< 1	150	< 1	< 0.1	1.3	< 1	< 1	160

Area	Well	Station ID	Sampling Depth	Heavy and Trace Metals												
				Arsenic	Barium	Cadmium	Chromium VI	Cobalt	Copper	Iron	Lead	Mercury	Nickel	Tin	Total Chromium	Zinc
		Kerkyra-Ref	Surface	1.4	7.3	< 0.2	< 0.5	< 1	< 1	45	< 1	< 0.1	< 1	< 1	< 1	29
			Middle	1.0	7.2	< 0.2	< 0.5	< 1	< 1	62	< 1	< 0.1	< 1	< 1	< 1	37
			Bottom	1.2	7.7	< 0.2	< 0.5	< 1	< 1	38	< 1	< 0.1	< 1	< 1	< 1	34
		Italy-Ref	Surface	1.5	8.8	< 0.2	< 0.5	< 1	3.8	85	< 1	< 0.1	< 1	< 1	< 1	62
			Middle	1.6	8.9	< 0.2	< 0.5	< 1	18.0	82	16	< 0.1	5.8	< 1	< 1	32
			Bottom	1.6	8.8	< 0.2	< 0.5	< 1	30.0	130	12	< 0.1	10.0	< 1	< 1	53
Directive 2013/39/EU (applied in GR)																
AA-EQS other surface waters				n.d.	n.d.	0.2	n.d.	n.d.	n.d.	n.d.	1.3	n.d.	8.6	n.d.	n.d.	n.d.
Legislative Decree No. 172/2015 (Annex 1, Tables 1/A and 1/B)																
SQA-MA (Tab 1/A)				n.d.	n.d.	0.2	n.d.	n.d.	n.d.	n.d.	1.3	n.d.	8.6	n.d.	n.d.	n.d.
SQA-MA (Tab 1/B)				5	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	4	n.d.

3.3.2.1.2.4 Hydrocarbons (TPH, PAHs)

Among hydrocarbons, Total Petroleum Hydrocarbons (TPH) were analysed as both light-chain hydrocarbons ($C \leq 10$) and heavy-chain hydrocarbons ($C_{10} - C_{40}$), together with Polycyclic Aromatic Hydrocarbons (PAHs), including individual compounds and their sum (Σ PAHs).

Both TPH fractions and all investigated PAHs were below their respective analytical LoQs at all Sampling Depths and Sampling Stations, including both well-site areas, Blank stations and Reference Stations, with no exceptions.

For assessment purposes, it is noted that neither Directive 2013/39/EU, as applied in Greece, nor Italian D.Lgs 172/2015 define reference standards for TPH or its investigated fractions. Conversely, both regulatory frameworks provide standards for selected PAHs, namely Anthracene, Benzo(a)pyrene, Fluoranthene and Naphthalene, with identical reference values. Since all hydrocarbon compounds were below the LoQs, they were also below the above mentioned applicable regulatory reference values where available.

All concentration results for both hydrocarbon fractions and their sum ($C_6 - C_{10}$, $C_{10} - C_{40}$ and TPH) are reported in Table 3-19, while PAH concentrations are presented in Table 3-20 and Table 3-21. No graphical representation is provided, as concentrations were below the respective analytical LoQs in all the collected samples.

Table 3-19: Hydrocarbon concentrations ($C \leq 10$, $C_{10} - C_{40}$ and TPH) in seawater samples collected at the Asopus-1A and Northern Station groups, including the associated Blank Stations and all three Reference Stations

AREA	WELL	STATION ID	SAMPLING DEPTH	PETROLEUM HYDROCARBON FRACTIONS AND TOTAL		
				HYDROCARBONS $C \leq 10$	HYDROCARBONS $C_{10}-C_{40}$	TOTAL PETROLEUM HYDROCARBONS (TPH)
			M.U.	(mg/L)		(μ g/L)
BLOCK 2	ASOPUS - 1A station group	D1a	Surface	< 0.1	< 25	< 0.2
			Middle	< 0.1	< 25	< 0.2
			Bottom	< 0.1	< 25	< 0.2
		D3a	Surface	< 0.1	< 25	< 0.2
			Middle	< 0.1	< 25	< 0.2
			Bottom	< 0.1	< 25	< 0.2
		D5a	Surface	< 0.1	< 25	< 0.2
			Middle	< 0.1	< 25	< 0.2
			Bottom	< 0.1	< 25	< 0.2
	Northern station group	D1b	Surface	< 0.1	< 25	< 0.2
			Middle	< 0.1	< 25	< 0.2
			Bottom	< 0.1	< 25	< 0.2
		D3b	Surface	< 0.1	< 25	< 0.2
			Middle	< 0.1	< 25	< 0.2
			Bottom	< 0.1	< 25	< 0.2
		D5b	Surface	< 0.1	< 25	< 0.2
			Middle	< 0.1	< 25	< 0.2
			Bottom	< 0.1	< 25	< 0.2
	Blanks	D6a	Surface	< 0.1	< 25	< 0.2
			Middle	< 0.1	< 25	< 0.2
			Bottom	< 0.1	< 25	< 0.2
		D6b	Surface	< 0.1	< 25	< 0.2
			Middle	< 0.1	< 25	< 0.2
			Bottom	< 0.1	< 25	< 0.2
		D7b	Surface	< 0.1	< 25	< 0.2

AREA	WELL	STATION ID	SAMPLING DEPTH	PETROLEUM HYDROCARBON FRACTIONS AND TOTAL		
				HYDROCARBONS C≤10	HYDROCARBONS C-10-C-40	TOTAL PETROLEUM HYDROCARBONS (TPH)
IONIAN SEA	Reference stations		Middle	< 0.1	< 25	< 0.2
			Bottom	< 0.1	< 25	< 0.2
		Othonoi-Ref	Surface	< 0.1	< 25	< 0.2
			Middle	< 0.1	< 25	< 0.2
			Bottom	< 0.1	< 25	< 0.2
		Kerkyra-Ref	Surface	< 0.1	< 25	< 0.2
			Middle	< 0.1	< 25	< 0.2
			Bottom	< 0.1	< 25	< 0.2
		Italy-Ref	Surface	< 0.1	< 25	< 0.2
			Middle	< 0.1	< 25	< 0.2
			Bottom	< 0.1	< 25	< 0.2
		Directive 2013/39/EU (applied in GR)				
MAC-EQS other surface waters				n.d.	n.d.	n.d.
Legislative Decree No. 172/2015 (Annex 1, Tables 1/A and 1/B)						
SQA-MA (Tab 1/A)				n.d.	n.d.	n.d.
SQA-MA (Tab 1/B)				n.d.	n.d.	n.d.

Table 3-20: Polycyclic Aromatic Hydrocarbons (PAHs) in seawater samples collected at the Asopus-1A and Northern station groups, including the associated Blank Stations and all three Reference Stations

AREA	WELL	STATION ID	SAMPLING DEPTH	HEAVY AND TRACE METALS										
				ACENAPHTHENE	ACENAPHTHYLENE	ANTHRACENE	BENZO (A)ANTHRACENE	BENZO (A)PYRENE	BENZO (B)FLUORANTHENE	BENZO (E)PYRENE	BENZO (G,H,I)PERYLENE	BENZO (K)FLUORANTHENE	CHRYSENE	DIBENZO [A,E]PYRENE
			M.U.	(µg/L)										
BLOCK 2	ASOPUS - 1A station group	D1a	Surface	< 0.01	< 0.01	< 0.01	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.001	< 0.003	< 0.005
			Middle	< 0.01	< 0.01	< 0.01	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.001	< 0.003	< 0.005
			Bottom	< 0.01	< 0.01	< 0.01	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.001	< 0.003	< 0.005
		D3a	Surface	< 0.01	< 0.01	< 0.01	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.001	< 0.003	< 0.005
			Middle	< 0.01	< 0.01	< 0.01	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.001	< 0.003	< 0.005
			Bottom	< 0.01	< 0.01	< 0.01	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.001	< 0.003	< 0.005
		D5a	Surface	< 0.01	< 0.01	< 0.01	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.001	< 0.003	< 0.005
			Middle	< 0.01	< 0.01	< 0.01	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.001	< 0.003	< 0.005
			Bottom	< 0.01	< 0.01	< 0.01	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.001	< 0.003	< 0.005
	Northern station group	D1b	Surface	< 0.01	< 0.01	< 0.01	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.001	< 0.003	< 0.005
			Middle	< 0.01	< 0.01	< 0.01	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.001	< 0.003	< 0.005
			Bottom	< 0.01	< 0.01	< 0.01	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.001	< 0.003	< 0.005
		D3b	Surface	< 0.01	< 0.01	< 0.01	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.001	< 0.003	< 0.005
			Middle	< 0.01	< 0.01	< 0.01	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.001	< 0.003	< 0.005
			Bottom	< 0.01	< 0.01	< 0.01	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.001	< 0.003	< 0.005
		D5b	Surface	< 0.01	< 0.01	< 0.01	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.001	< 0.003	< 0.005
			Middle	< 0.01	< 0.01	< 0.01	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.001	< 0.003	< 0.005
			Bottom	< 0.01	< 0.01	< 0.01	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.001	< 0.003	< 0.005
	Blanks	D6a	Surface	< 0.01	< 0.01	< 0.01	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.001	< 0.003	< 0.005
			Middle	< 0.01	< 0.01	< 0.01	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.001	< 0.003	< 0.005
			Bottom	< 0.01	< 0.01	< 0.01	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.001	< 0.003	< 0.005
		D6b	Surface	< 0.01	< 0.01	< 0.01	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.001	< 0.003	< 0.005
			Middle	< 0.01	< 0.01	< 0.01	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.001	< 0.003	< 0.005
			Bottom	< 0.01	< 0.01	< 0.01	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.001	< 0.003	< 0.005
		D7b	Surface	< 0.01	< 0.01	< 0.01	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.001	< 0.003	< 0.005
			Middle	< 0.01	< 0.01	< 0.01	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.001	< 0.003	< 0.005
			Bottom	< 0.01	< 0.01	< 0.01	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.001	< 0.003	< 0.005
IONIAN SEA		Othonoi -Ref	Surface	< 0.01	< 0.01	< 0.01	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.001	< 0.003	< 0.005
			Middle	< 0.01	< 0.01	< 0.01	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.001	< 0.003	< 0.005

AREA	WELL	STATION ID	SAMPLING DEPTH	HEAVY AND TRACE METALS										
				ACENAPHTHENE	ACENAPHTHYLENE	ANTHRACENE	BENZO (A)ANTHRACENE	BENZO (A)PYRENE	BENZO (B)FLUORANTHENE	BENZO (E)PYRENE	BENZO (G,H,I)PERYLENE	BENZO (K)FLUORANTHENE	CHRYSENE	DIBENZO [A,E]PYRENE
	Reference stations	Kerkyra-Ref	Bottom	< 0.01	< 0.01	< 0.01	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.001	< 0.003	< 0.005
			Surface	< 0.01	< 0.01	< 0.01	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.001	< 0.003	< 0.005
			Middle	< 0.01	< 0.01	< 0.01	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.001	< 0.003	< 0.005
			Bottom	< 0.01	< 0.01	< 0.01	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.001	< 0.003	< 0.005
		Italy-Ref	Surface	< 0.01	< 0.01	< 0.01	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.001	< 0.003	< 0.005
			Middle	< 0.01	< 0.01	< 0.01	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.001	< 0.003	< 0.005
			Bottom	< 0.01	< 0.01	< 0.01	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.001	< 0.003	< 0.005
			Directive 2013/39/EU (applied in GR)											
MAC-EQS other surface waters				n.d.	n.d.	0.1	n.d.	0.00017	n.d.	n.d.	n.d.	n.d.	n.d.	
Legislative Decree No. 172/2015 (Annex 1, Tables 1/A and 1/B)														
SQA-MA (Tab 1/A)				n.d.	n.d.	0.1	n.d.	0.00017	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
SQA-MA (Tab 1/B)				n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.

Table 3-21: Polycyclic Aromatic Hydrocarbons (PAHs) in seawater samples collected at the Asopus-1A and Northern station groups, including the associated Blank Stations and all three Reference Stations

AREA	WELL	STATION ID	SAMPLING DEPTH	HEAVY AND TRACE METALS											
				DIBENZO [A,H]ANTHRACENE	DIBENZO [A,H]PYRENE	DIBENZO [A,I]PYRENE	DIBENZO [A,L]PYRENE	FLUORANTHENE	FLUORENE	INDENO (1,2,3-C,D)PIRENE	NAPHTHALENE	PERYLENE	PHENANTHRENE	PYRENE	ΣPAHS
		M.U.		(µg/L)											
BLOCK 2	ASOPUS -1A station group	D1a	Surface	< 0.003	< 0.005	< 0.005	< 0.005	< 0.01	< 0.01	< 0.003	< 0.01	< 0.003	< 0.01	< 0.01	< 0.04
			Middle	< 0.003	< 0.005	< 0.005	< 0.005	< 0.01	< 0.01	< 0.003	< 0.01	< 0.003	< 0.01	< 0.01	< 0.04
			Bottom	< 0.003	< 0.005	< 0.005	< 0.005	< 0.01	< 0.01	< 0.003	< 0.01	< 0.003	< 0.01	< 0.01	< 0.04
		D3a	Surface	< 0.003	< 0.005	< 0.005	< 0.005	< 0.01	< 0.01	< 0.003	< 0.01	< 0.003	< 0.01	< 0.01	< 0.04
			Middle	< 0.003	< 0.005	< 0.005	< 0.005	< 0.01	< 0.01	< 0.003	< 0.01	< 0.003	< 0.01	< 0.01	< 0.04
			Bottom	< 0.003	< 0.005	< 0.005	< 0.005	< 0.01	< 0.01	< 0.003	< 0.01	< 0.003	< 0.01	< 0.01	< 0.04
		D5a	Surface	< 0.003	< 0.005	< 0.005	< 0.005	< 0.01	< 0.01	< 0.003	< 0.01	< 0.003	< 0.01	< 0.01	< 0.04
			Middle	< 0.003	< 0.005	< 0.005	< 0.005	< 0.01	< 0.01	< 0.003	< 0.01	< 0.003	< 0.01	< 0.01	< 0.04
			Bottom	< 0.003	< 0.005	< 0.005	< 0.005	< 0.01	< 0.01	< 0.003	< 0.01	< 0.003	< 0.01	< 0.01	< 0.04
	D1b	Surface	< 0.003	< 0.005	< 0.005	< 0.005	< 0.01	< 0.01	< 0.003	< 0.01	< 0.003	< 0.01	< 0.01	< 0.04	
		Middle	< 0.003	< 0.005	< 0.005	< 0.005	< 0.01	< 0.01	< 0.003	< 0.01	< 0.003	< 0.01	< 0.01	< 0.04	

AREA	WELL	STATION ID	SAMPLING DEPTH	HEAVY AND TRACE METALS											
				DIBENZO [A,H]ANTHRACENE	DIBENZO [A,H]PYRENE	DIBENZO [A,I]PYRENE	DIBENZO [A,L]PYRENE	FLUORANTHENE	FLUORENE	INDENO (1,2,3-C,D)PIRENE	NAPHTHALENE	PERYLENE	PHENANTHRENE	PYRENE	ΣPAHS
	Northern station group	D3b	Bottom	< 0.003	< 0.005	< 0.005	< 0.005	< 0.01	< 0.01	< 0.003	< 0.01	< 0.003	< 0.01	< 0.01	< 0.04
			Surface	< 0.003	< 0.005	< 0.005	< 0.005	< 0.01	< 0.01	< 0.003	< 0.01	< 0.003	< 0.01	< 0.01	< 0.04
			Middle	< 0.003	< 0.005	< 0.005	< 0.005	< 0.01	< 0.01	< 0.003	< 0.01	< 0.003	< 0.01	< 0.01	< 0.04
			Bottom	< 0.003	< 0.005	< 0.005	< 0.005	< 0.01	< 0.01	< 0.003	< 0.01	< 0.003	< 0.01	< 0.01	< 0.04
		D5b	Surface	< 0.003	< 0.005	< 0.005	< 0.005	< 0.01	< 0.01	< 0.003	< 0.01	< 0.003	< 0.01	< 0.01	< 0.04
			Middle	< 0.003	< 0.005	< 0.005	< 0.005	< 0.01	< 0.01	< 0.003	< 0.01	< 0.003	< 0.01	< 0.01	< 0.04
			Bottom	< 0.003	< 0.005	< 0.005	< 0.005	< 0.01	< 0.01	< 0.003	< 0.01	< 0.003	< 0.01	< 0.01	< 0.04
			Bottom	< 0.003	< 0.005	< 0.005	< 0.005	< 0.01	< 0.01	< 0.003	< 0.01	< 0.003	< 0.01	< 0.01	< 0.04
	Blanks	D6a	Surface	< 0.003	< 0.005	< 0.005	< 0.005	< 0.01	< 0.01	< 0.003	< 0.01	< 0.003	< 0.01	< 0.01	< 0.04
			Middle	< 0.003	< 0.005	< 0.005	< 0.005	< 0.01	< 0.01	< 0.003	< 0.01	< 0.003	< 0.01	< 0.01	< 0.04
			Bottom	< 0.003	< 0.005	< 0.005	< 0.005	< 0.01	< 0.01	< 0.003	< 0.01	< 0.003	< 0.01	< 0.01	< 0.04
		D6b	Surface	< 0.003	< 0.005	< 0.005	< 0.005	< 0.01	< 0.01	< 0.003	< 0.01	< 0.003	< 0.01	< 0.01	< 0.04
			Middle	< 0.003	< 0.005	< 0.005	< 0.005	< 0.01	< 0.01	< 0.003	< 0.01	< 0.003	< 0.01	< 0.01	< 0.04
			Bottom	< 0.003	< 0.005	< 0.005	< 0.005	< 0.01	< 0.01	< 0.003	< 0.01	< 0.003	< 0.01	< 0.01	< 0.04
		D7b	Surface	< 0.003	< 0.005	< 0.005	< 0.005	< 0.01	< 0.01	< 0.003	< 0.01	< 0.003	< 0.01	< 0.01	< 0.04
			Middle	< 0.003	< 0.005	< 0.005	< 0.005	< 0.01	< 0.01	< 0.003	< 0.01	< 0.003	< 0.01	< 0.01	< 0.04
			Bottom	< 0.003	< 0.005	< 0.005	< 0.005	< 0.01	< 0.01	< 0.003	< 0.01	< 0.003	< 0.01	< 0.01	< 0.04
IONIAN SEA	Reference stations	Othonoi-Ref	Surface	< 0.003	< 0.005	< 0.005	< 0.005	< 0.01	< 0.01	< 0.003	< 0.01	< 0.003	< 0.01	< 0.01	< 0.04
			Middle	< 0.003	< 0.005	< 0.005	< 0.005	< 0.01	< 0.01	< 0.003	< 0.01	< 0.003	< 0.01	< 0.01	< 0.04
			Bottom	< 0.003	< 0.005	< 0.005	< 0.005	< 0.01	< 0.01	< 0.003	< 0.01	< 0.003	< 0.01	< 0.01	< 0.04
		Kerkyra-Ref	Surface	< 0.003	< 0.005	< 0.005	< 0.005	< 0.01	< 0.01	< 0.003	< 0.01	< 0.003	< 0.01	< 0.01	< 0.04
			Middle	< 0.003	< 0.005	< 0.005	< 0.005	< 0.01	< 0.01	< 0.003	< 0.01	< 0.003	< 0.01	< 0.01	< 0.04
			Bottom	< 0.003	< 0.005	< 0.005	< 0.005	< 0.01	< 0.01	< 0.003	< 0.01	< 0.003	< 0.01	< 0.01	< 0.04
		Italy-Ref	Surface	< 0.003	< 0.005	< 0.005	< 0.005	< 0.01	< 0.01	< 0.003	< 0.01	< 0.003	< 0.01	< 0.01	< 0.04
			Middle	< 0.003	< 0.005	< 0.005	< 0.005	< 0.01	< 0.01	< 0.003	< 0.01	< 0.003	< 0.01	< 0.01	< 0.04
			Bottom	< 0.003	< 0.005	< 0.005	< 0.005	< 0.01	< 0.01	< 0.003	< 0.01	< 0.003	< 0.01	< 0.01	< 0.04
Directive 2013/39/EU (applied in GR)															
MAC-EQS other surface waters			n.d.	n.d.	n.d.	n.d.	0.0063	n.d.	n.d.	2	n.d.	n.d.	n.d.	n.d.	
Legislative Decree No. 172/2015 (Annex 1, Tables 1/A and 1/B)															
SQA-MA (Tab 1/A)			n.d.	n.d.	n.d.	n.d.	0.0063	n.d.	n.d.	2	n.d.	n.d.	n.d.	n.d.	
SQA-MA (Tab 1/B)			n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	

3.3.2.1.3 Correlation among analytical results – seawater

The multivariate analysis of the physico-chemical variables in the water column revealed a moderate spatial differentiation among sampling sites, suggesting the presence of environmental gradients mainly associated with nutrient distribution and the particulate fraction.

PERMANOVA analysis showed statistically significant differences exclusively among the different sampling sites, particularly between the well area stations (Asopus-1A and Northern station group) and the Reference sites ($p = 0.001$). Conversely, no significant differences were detected among the different sampling depths within each investigated station (Surface, Middle, Bottom; $p > 0.05$), indicating substantial homogeneity of the water column with respect to the investigated parameters.

In the CAP ordination plot (Figure 3-84), Asopus-1A and Northern station group were clearly separated from the reference sites along the first two canonical axes, highlighting differences in the physico-chemical characteristics of the water column. In particular, the Reference stations showed a stronger association with variables such as ammoniacal nitrogen, orthophosphates, and some dissolved metals, suggesting conditions mainly influenced by the natural biogeochemical dynamics of nutrients. In contrast, the stations located in proximity to the wells appeared to be more strongly correlated with total suspended solids, total phosphorus, barium, and arsenic, indicating a greater influence of the particulate fraction and sediment resuspension processes.

Moreover, the observed variations were sufficiently pronounced to distinguish the stations located near the wells from the control stations (Blank), although not enough to produce a clear separation among them.

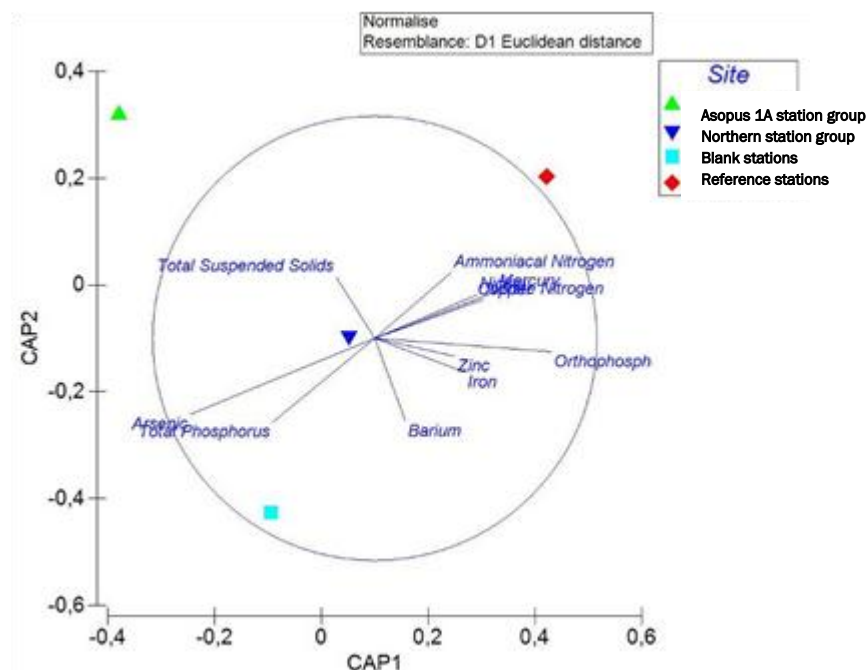


Figure 3-84: Canonical Analysis of Principal Coordinates (CAP) of chemical variables measured in the water column

Overall, the observed pattern likely reflects the natural spatial heterogeneity of a wide and dynamic marine system such as the investigated area, which is characterized by variable hydrodynamic conditions, water

mixing processes, and particulate matter distribution. Therefore, the detected differences appear to be attributable to the natural environmental variability of the system rather than to specific impact factors or anthropogenic disturbance sources.

3.3.2.1.4 Detailed description of results – phytoplankton

3.3.2.1.4.1 Abundance and diversity of phytoplankton community

The species / abundance matrix of the phytoplankton community is presented in Annex 06 Environmental baseline survey report (7.7 APPENDIX C: PHYTOPLANKTON DATA), where data are expressed as cells L⁻¹.

Figure 3-85 showed pronounced spatial variability of phytoplankton abundance between the stations included in the well Asopus-1A, the stations considered as “Blank” and the area of Reference stations.

Within the Asopus-1A area, total phytoplankton abundance ranged from a minimum of 1.69×10^5 cells L⁻¹ at the Middle sampling depth of station D1a to a maximum of 3.09×10^5 cells L⁻¹ recorded at the Surface of the same station. In the corresponding Blank stations (D6a and D6b), the lowest phytoplankton abundance was observed at the Bottom sampling depth of station D6b, whereas the highest value (3.77×10^5 cells L⁻¹) was recorded at the Surface of the same station.

When phytoplankton abundance was disaggregated into the four major taxonomic categories, the community within the Asopus-1A area was largely dominated by the “Other taxa” group. This fraction exhibited a minimum abundance of 1.00×10^5 cells L⁻¹ at the Surface of station D3a, (accounting for 37.75 % of the total phytoplankton abundance), and a maximum abundance of 2.06×10^5 cells L⁻¹ at the Surface of station D1a (66.56 %). Bacillariophyceae represented the second most abundant group, ranging from values below 10^3 cells L⁻¹ (2.79 %) at the Bottom of station D5a to 1.30×10^5 cells L⁻¹ (48.98 %) at the Surface of station D3a. Dinophyceae and Coccolithophyceae were consistently less abundant, remaining below 10^5 cells L⁻¹ at all sampling depths and stations surrounding the Asopus-1A well site.

A comparable taxonomic pattern was observed at the Blank stations of this well-site. The “Other taxa” group remained dominant, with abundances ranging from 4.61×10^4 cells L⁻¹ (58.56% of total phytoplankton abundance) at the Bottom of station D6b to 2.87×10^5 cells L⁻¹ (76.10%) at the Surface of the same station. Bacillariophyceae, Dinophyceae, and Coccolithophyceae exhibited lower abundances, consistently remaining below 10^5 cells L⁻¹ across all sampling depths and stations.

Figure 3-86 showed pronounced spatial variability of phytoplankton abundance between the stations included Northern station group, the stations considered as “Blank” and the area of Reference stations.

Total phytoplankton abundance within the Northern station group area ranged from a minimum of 1.29×10^5 cells L⁻¹ at the Middle sampling depth of station D1b to a maximum of 3.40×10^5 cells L⁻¹ at the Surface of station D3b. At the associated Blank stations (D6b and D7b), phytoplankton abundance varied between 7.87×10^4 cells L⁻¹ at D6b Bottom sampling depth and 3.77×10^5 cells L⁻¹ at the Surface of the same station.

When phytoplankton abundance was partitioned among the four major taxonomic categories, the community within the Northern station group area was largely dominated by the “Other taxa” group, which ranged from 1.03×10^5 cells L⁻¹ (75.52 %) at the Bottom sampling depth of D3b to 2.95×10^5 cells L⁻¹ (86.96 %) at the Surface of the same station. Bacillariophyceae represented the second most abundant group, with

abundances ranging from $< 10^4$ cells L^{-1} at D1b (Bottom) to 4.34×10^4 cells L^{-1} (17.02 %) at the Surface of the same station. Dinophyceae and Coccolithophyceae constituted minor components of the phytoplankton assemblage, generally occurring at abundances below 10^4 cells L^{-1} . The highest abundances recorded for these groups were 2.21×10^4 cells L^{-1} for Dinophyceae at the Surface of D5b and 2.99×10^4 cells L^{-1} for Coccolithophyceae at the Middle depth of D3b.

The associated Blank Stations (D6b and D7b) displayed a comparable taxonomic structure, with the “Other taxa” group representing the dominant component of the phytoplankton assemblage. Abundances ranged from 4.61×10^4 cells L^{-1} (58.56 %) at the Bottom depth of D6b to 2.87×10^5 cells L^{-1} (76.10 %) at the Surface of the same station. Bacillariophyceae, Dinophyceae and Coccolithophyceae constituted subordinate fractions of the community, with abundances consistently below 1×10^5 cells L^{-1} across all sampling depths.

Within the Reference Stations, total phytoplankton abundance ranged from 1.46×10^5 cells L^{-1} in at the Othonoi Ref Bottom sampling depth to 4.16×10^5 cells L^{-1} at the Surface of Kerkyra Ref. As observed at both well-site areas and the associated Blank Stations, the phytoplankton community was dominated by the “Other taxa” group, whose abundance varied from 1.06×10^5 cells L^{-1} (72.13 %; Othonoi Ref, Bottom) to 2.82×10^5 cells L^{-1} at Kerkyra Ref (Surface). Bacillariophyceae represented the second most abundant taxonomic group, with abundances ranging from $< 1 \times 10^5$ cells L^{-1} at the Bottom depth of Othonoi Ref to 1.12×10^5 cells L^{-1} (26.90 %) at the Surface of Kerkyra Ref. Consistent with the patterns observed throughout the study area, Dinophyceae and Coccolithophyceae constituted minor components of the phytoplankton assemblage, with abundances remaining below 1×10^5 cells L^{-1} at all sampling depths across the Reference Stations.

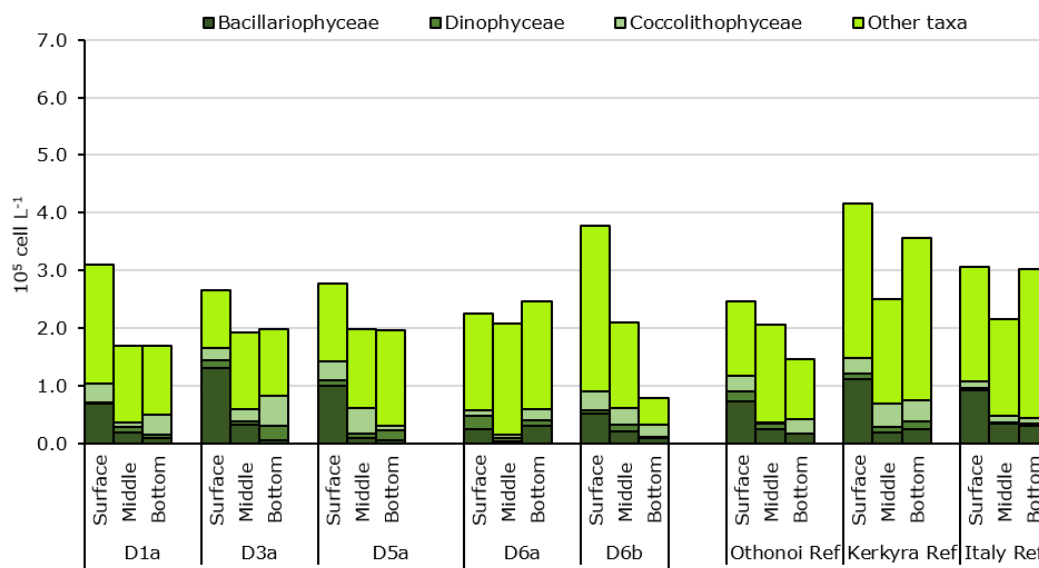


Figure 3-85: Abundance of phytoplankton community along stations of Asopus-1A, Blank and Reference stations

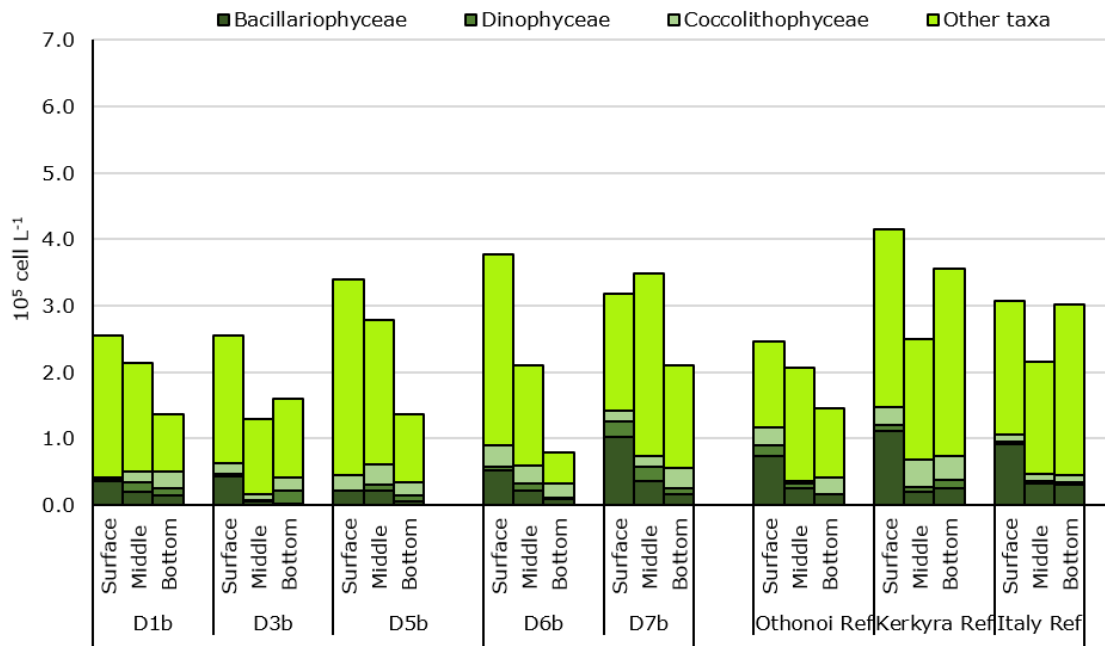


Figure 3-86: Abundance of phytoplankton community along the Northern station group, Blank and Reference stations

Overall phytoplankton taxonomic richness comprised 114 identified taxa, including 29 Bacillariophyceae, 38 Dinophyceae, 18 Coccolithophyceae and 29 taxa grouped within the “Other taxa” category.

Within the Asopus-1A area (Figure 3-87), Dinophyceae and the “Other taxa” category represented the most taxonomically diverse components of the phytoplankton community. Dinophyceae richness ranged from 4 taxa at the Surface of station D3a to 12 taxa at the Surface of station D5a. The “Other taxa” category varied between 5 taxa, recorded at the Bottom of D3a and at all sampling depths of D5a, and 10 taxa, observed at both the Surface and Middle depth of D1a. Coccolithophyceae exhibited comparatively lower richness, with a minimum of 1 taxon at the Surface of D3a and a maximum of 6 taxa recorded at the Bottom of D3a and D5a and at the Middle depth of D1a and D3a. Bacillariophyceae were the least diverse group, ranging from a single taxon at the Bottom of D1a to a maximum of 5 taxa at the Middle depth of D5a. A broadly similar pattern was observed at the associated Blank Stations (D6a and D6b), where Dinophyceae again constituted the most diverse phytoplankton group. Richness varied from 5 taxa at the Surface of D6b to 12 taxa at the Middle depth of the same station. The “Other taxa” category ranged from 5 to 8 taxa, recorded, respectively, at the Middle and at the Surface depth of D6b. Coccolithophyceae richness varied between 2 taxa at the Bottom of D6a and 5 taxa at the Middle and Bottom depths of D6b. Bacillariophyceae were represented by a minimum of 1 taxon at the Surface of D6a and a maximum of 4 taxa at the Middle depth of D6a and at the Bottom of both D6a and D6b.

Within the Northern station group area (Figure 3-88), Dinophyceae represented the most taxonomically diverse phytoplankton group, with richness ranging from 5 taxa at the Surface of D1b to 10 taxa at the Bottom depth of the same station and at the Middle depth of D5b. The “Other taxa” category ranged from 3 taxa at the Bottom of D1b to 9 taxa at the Surface of the same station. Coccolithophyceae showed lower richness, with minimum values recorded at the Middle depth of D1b and D3b and at the Bottom of D3b and D5b, while the maximum richness of 6 taxa was observed in the Bottom waters of D1b. Bacillariophyceae

ranged from 1 taxon at the Middle and Bottom depths of D3b to 6 taxa at the Bottom of D1b. The associated Blank Stations (D6b and D7b) displayed a comparable taxonomic richness pattern, with Dinophyceae again representing the most diverse group, ranged from 5 taxa at the Surface of D6b to 12 taxa at the Middle depth of the same station. The “Other taxa” category showed their minimum of 4 taxa at the middle waters of D7b and their maximum richness value of the Surface of station D6b. Coccolithophyceae ranged from 3 taxa at the Bottom of D7b to 7 taxa at the Middle depth of the same station. Bacillariophyceae were represented by a minimum of 1 taxon at the Surface of D6b and reached a maximum richness of 7 taxa at the Bottom of D6b.

Among the Reference Stations (shown in bot Figure 3-87 and Figure 3-88), the category of “Other taxa” exhibited a higher taxonomic diversity than others, with the lowest value (4) observed at the Middle and Bottom waters of Kerkyra Ref, compared to the highest value (7) recorded at the Surface of the same station and at Othonoi Ref (Middle and Surface). Dinophyceae were characterized by a lower (1) value at the Surface and at the Bottom of Kerkyra Ref and an higher (9) value recorded at the Middle sampling depth of Othonoi Ref. Coccolithophyceae was characterized by a minimum (1) detected at the Bottom waters of Kerkyra Ref, whereas the maximum (5) was recorded at the Surface of Othonoi Ref. Finally, only 2 Bacillariophyceae taxa were identified at the Middle and Bottom of Othonoi Ref and Kerkyra Ref, whereas, the maximum (5) was detected at the Surface of Othonoi Ref.

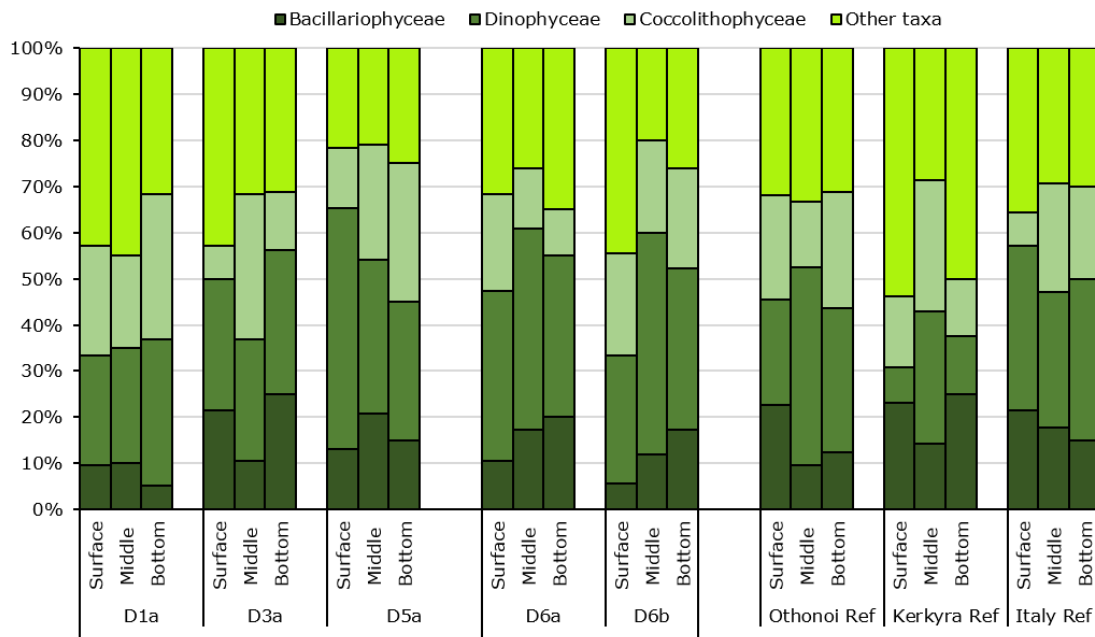


Figure 3-87: Taxonomic composition of the phytoplankton community in Asopus-1A, Blank and Reference stations

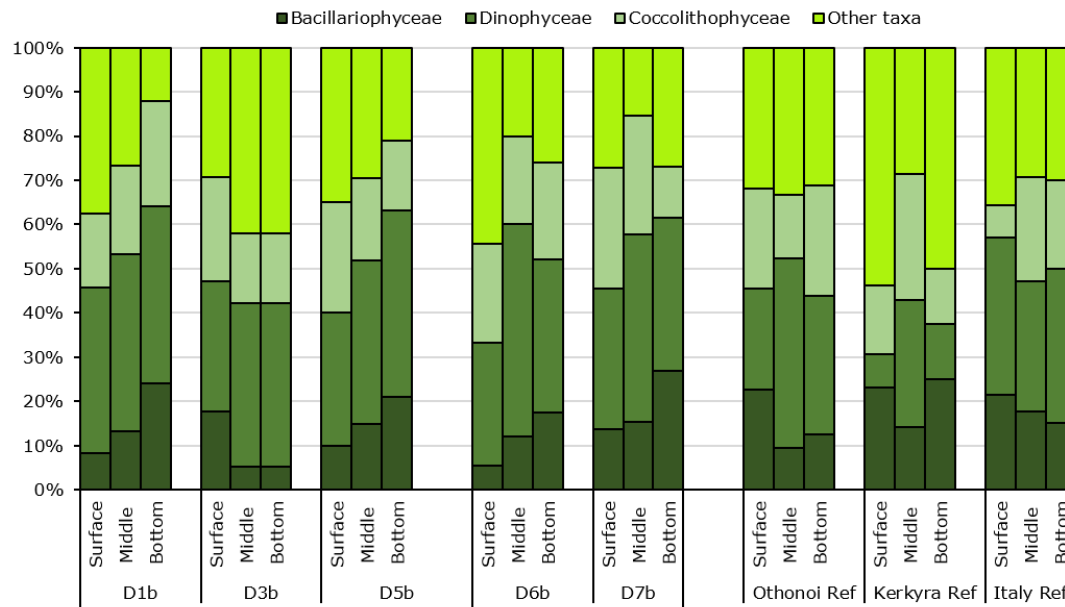


Figure 3-88: Taxonomic composition of the phytoplankton community in the northern station group, Blank and Reference stations

MSD analysis (Figure 3-89) revealed marked differences in phytoplankton community structure among the samples collected at different depths. Consistently, PERMANOVA performed on the species-abundance matrix revealed statistically significant differences based on depth of the column water, with reduction of light's intensity across column water emerging as a potential driving factor ($p < 0.05$). Statistically significant differences were, also, detected either between the stations of the Asopus-1A, Northern station group and Reference stations (Figure 3-90), suggesting the geographical distance between these areas as a potential factor to make variability, in terms of phytoplanktonic community ($p < 0.05$).

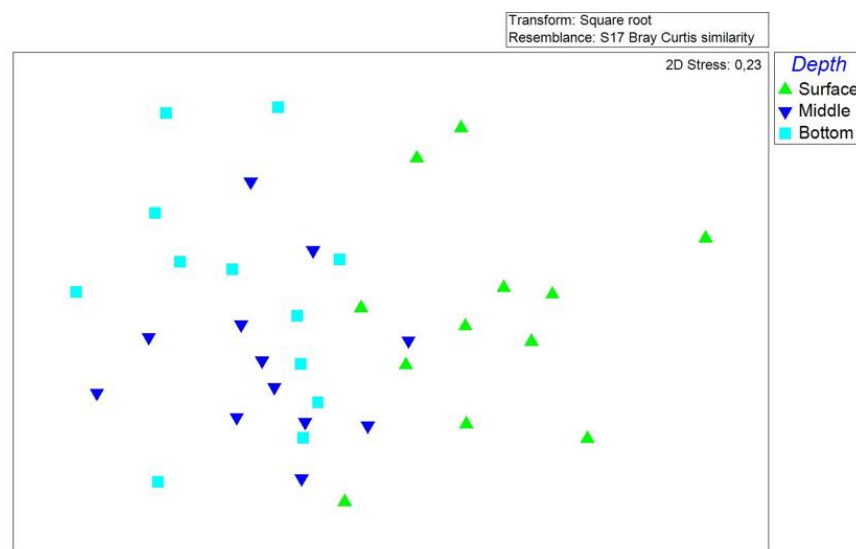


Figure 3-89: MSD analysis based on the species/abundance matrix of the phytoplankton community related to the factor depth

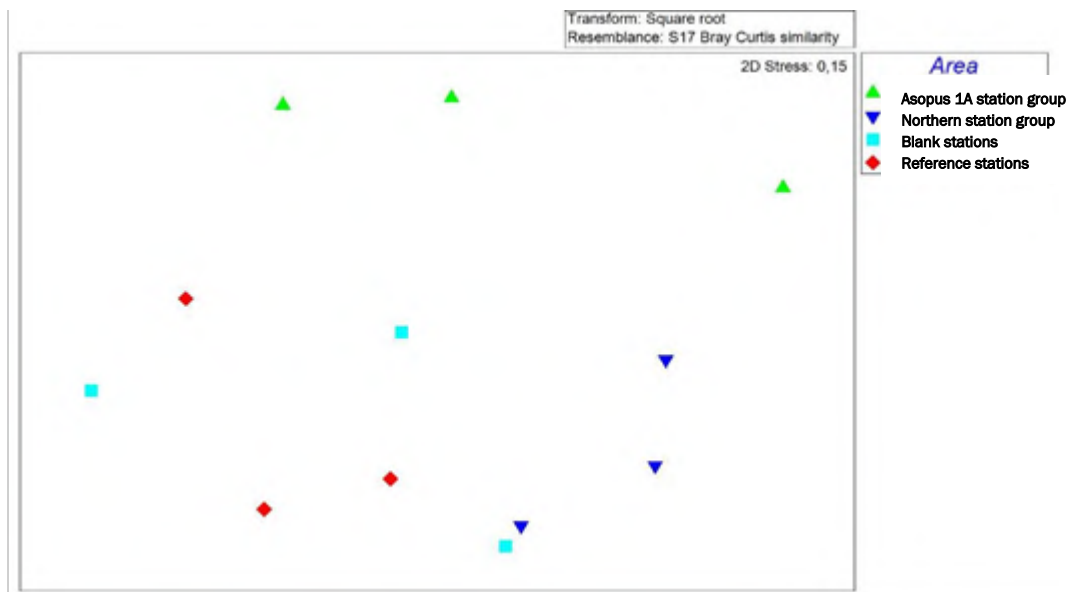


Figure 3-90: MSD analysis based on the species/abundance matrix of the phytoplankton community related to the factor area

The main identified phytoplankton species in the collected samples are shown in the following Figures.

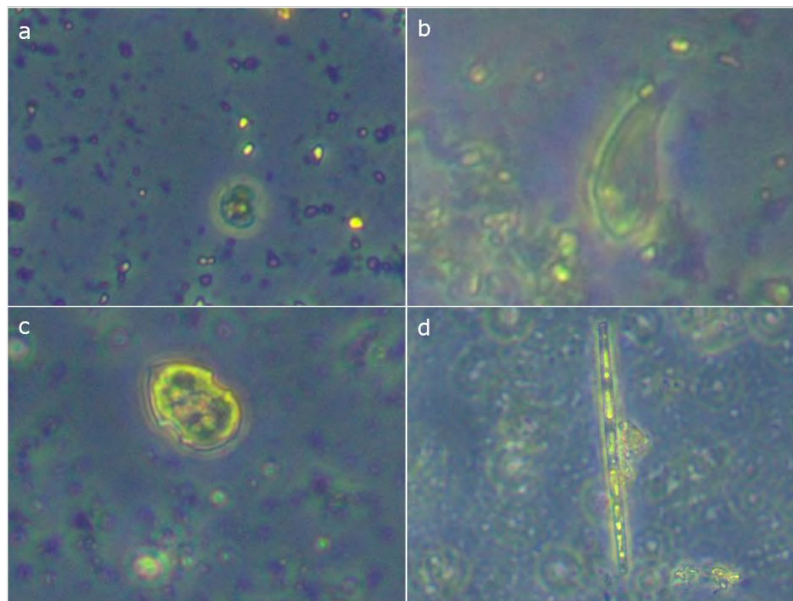


Figure 3-91: Some representative taxa of the station D1a: *Microflagellates* indet. (a), *Cryptophyceae* (b), *Heterocapsa minima* (c) and *Thalassionema nitzschioides* (d)

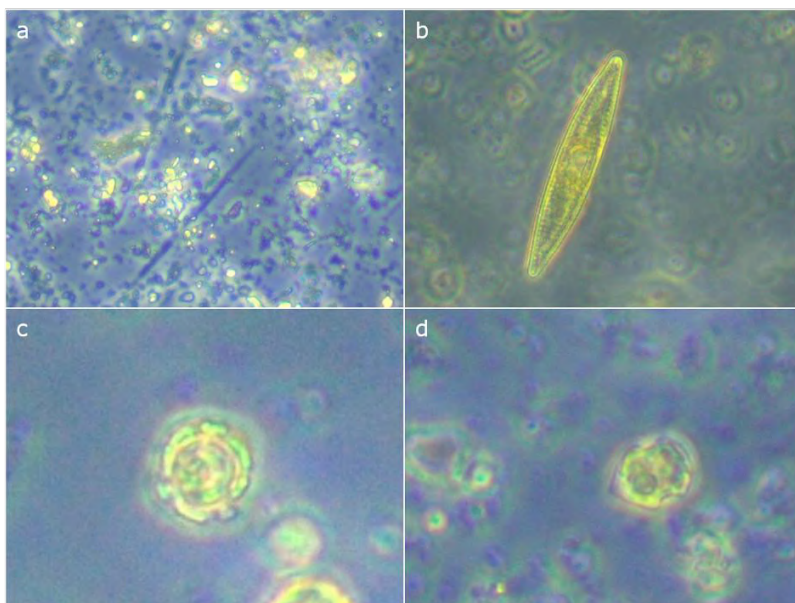


Figure 3-92: Some representative taxa of the station D3a: *Pseudo-nitzschia delicatissima* complex. (a), *Achnanthes* sp. (b), *Gephyrocapsa huxleyi* (c) and *Katodinium* sp. (d)

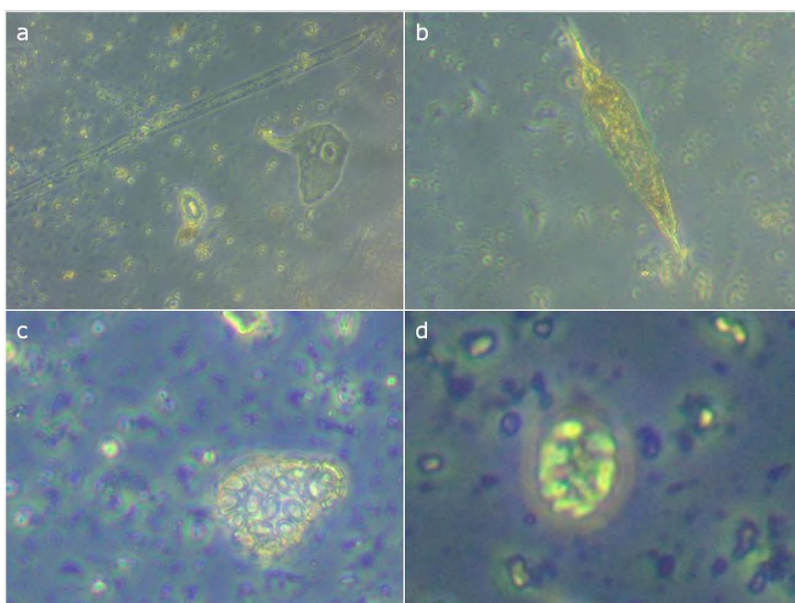


Figure 3-93: Some representative taxa of the station D5a: *Proboscia alata* (a), *Oxytoxum scolopax* (b), *Syracosphaera pulchra* (c) and *Euglenophyceae* nd. (d)

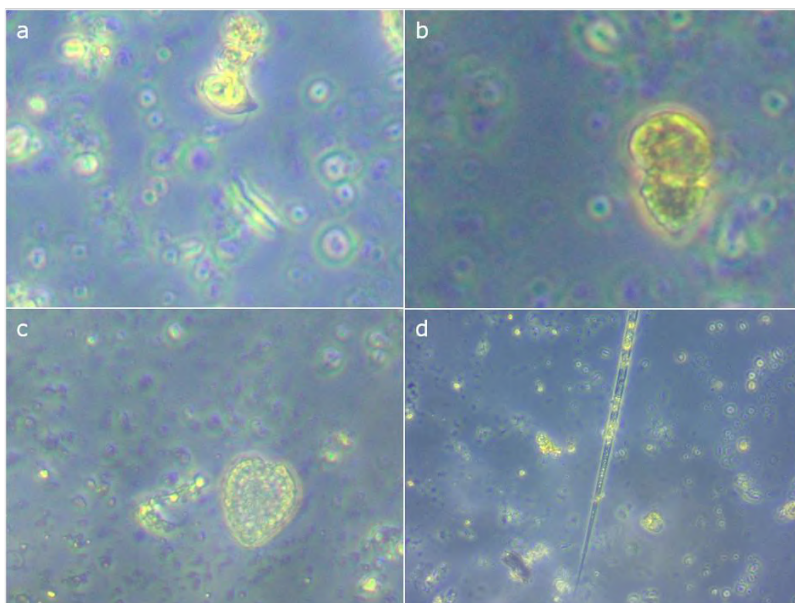


Figure 3-94: Some representative taxa of the station D6a: *Cryptophyceae* nd. (a), *Gymnodinium* sp. (b), *Calyptosphaera* sp. (c) and *Haslea Wawriake* (d)

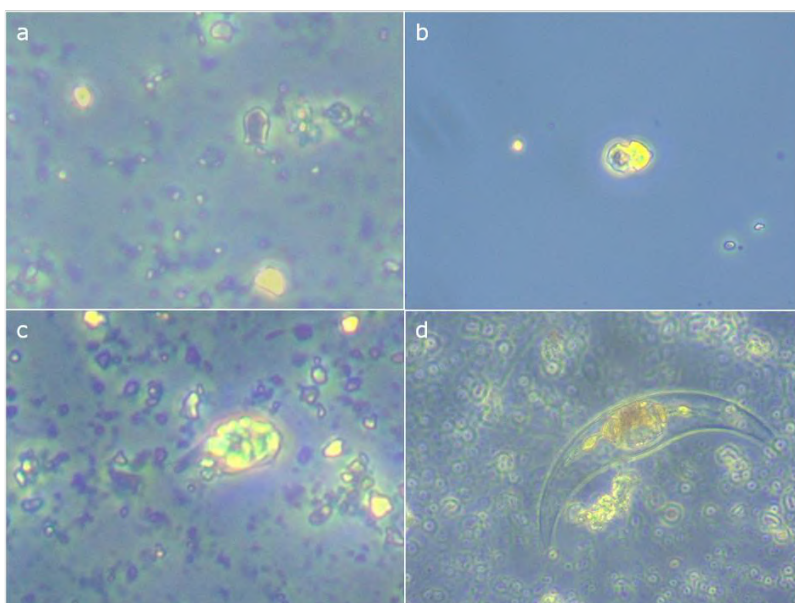


Figure 3-95: Some representative taxa of the station D1b: *Ollicola vangoorii* (a), *Heterocapsa* sp. (b), *Euglenophyceae* nd. (c) and *Neocalyptrella robusta* (d)

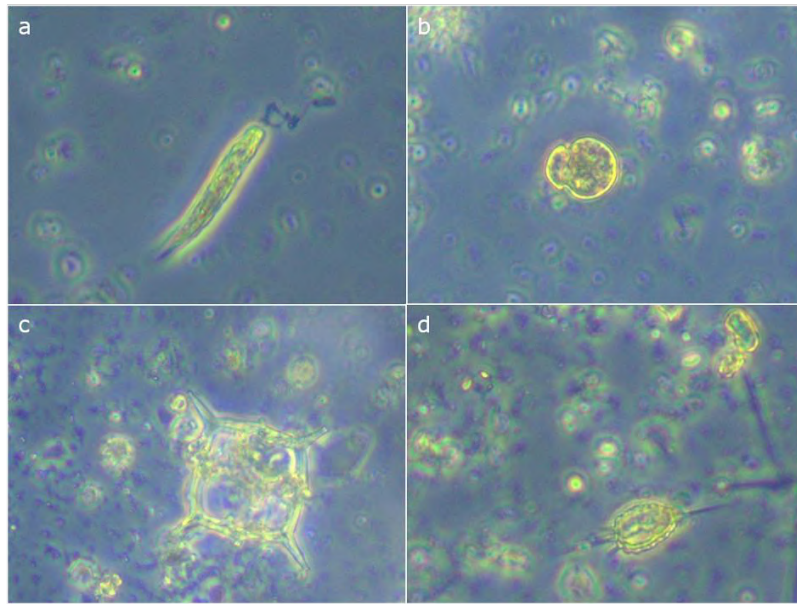


Figure 3-96: Some representative taxa of the station D3b: *Euglena* sp. (a), *Oxytoxum viride* (b), *Dictyocha fibula* (c) and *Chrysochromulina parkeae* (d)

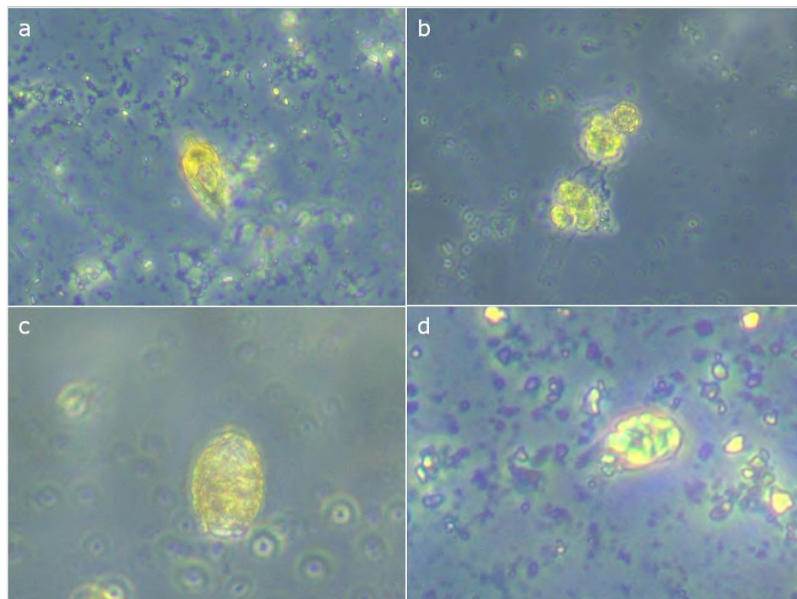


Figure 3-97: Some representative taxa of the station D5b: *Oxytoxum variabile* (a), *Leptocylindrus mediterraneus* (b), *Helicosphaera carterii* (c) and *Euglenophyceae* nd. (d)

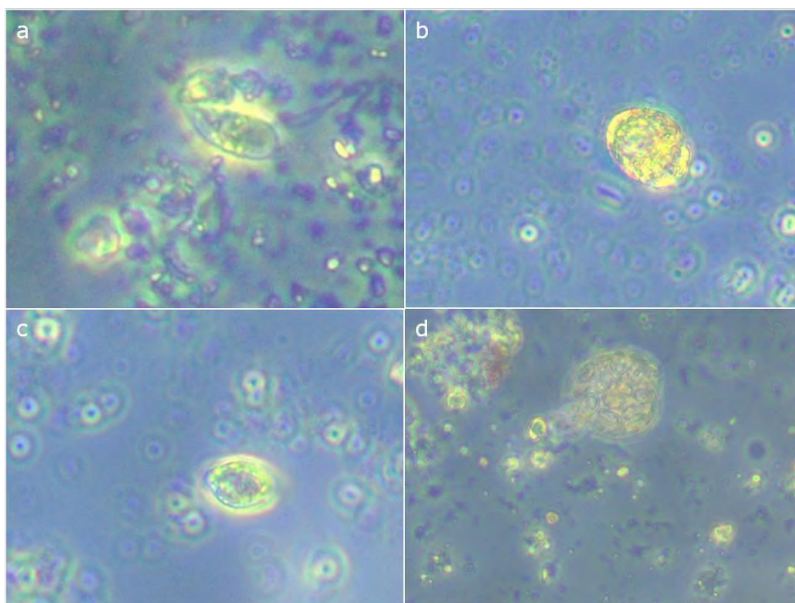


Figure 3-98: Some representative taxa of the station D6b: *Leucocryptos marina* (a), *Amphidinium* sp. (b), *Microflagellates* nd. (c) and *Syracosphaera hystrica* (d)

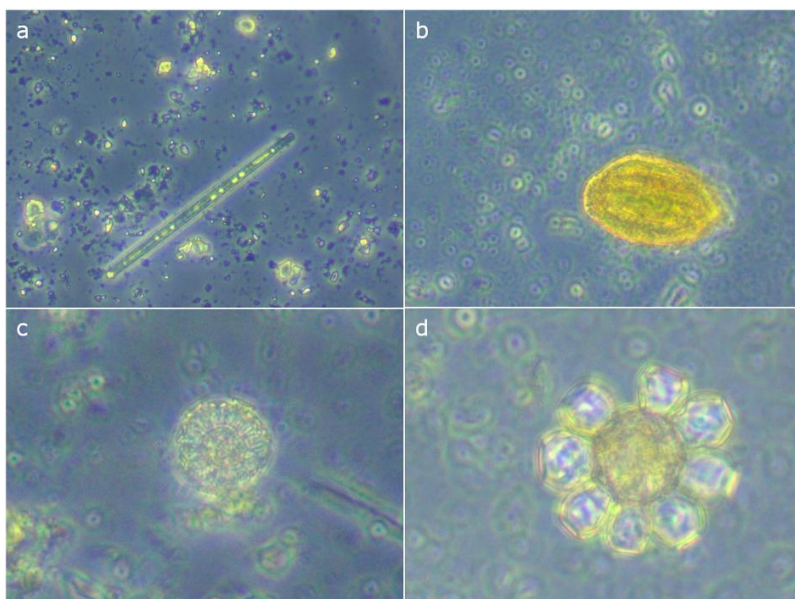


Figure 3-99: Some representative taxa of the station D7b: *Thalassionema* sp. (a), *Torodinium* sp. (b), *Discosphaera tubifera* (c) and *Scyphosphaera apsteinii* (d)

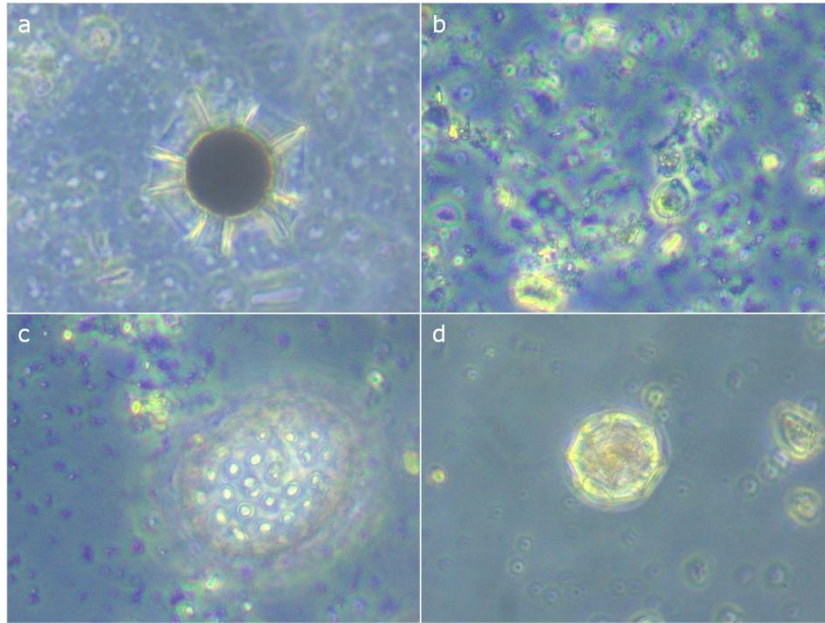


Figure 3-100: Some representative taxa of the station Othonoi Ref: *Lingulaulax polyedra*(a), *Microflagellates* nd. (b), *Umbilicosphaera sibogae* (c) and *Pterosperma cristatum* (d)

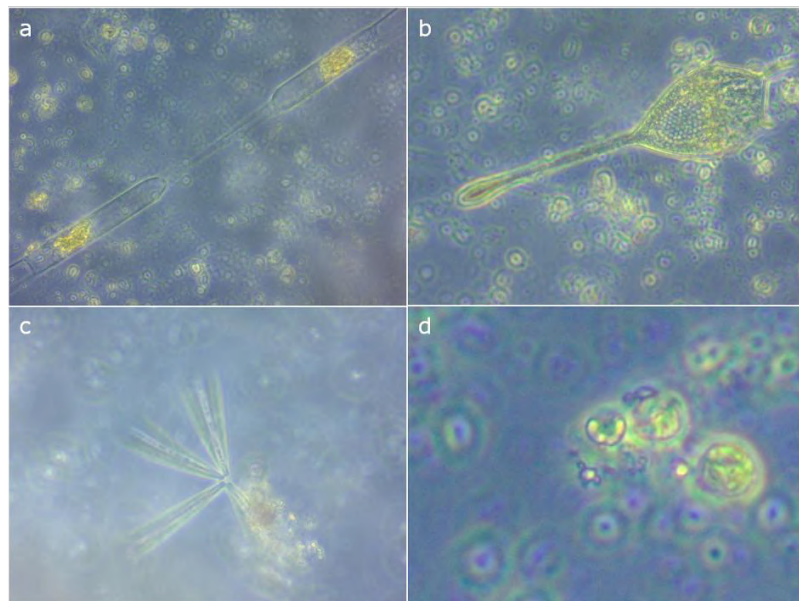


Figure 3-101: Some representative taxa of the station Kerkyra Ref: *Hemialulus hauckii* (a), *Tripos teres* (b), *Thalassionema nitzschioides* (c) and *Microflagellates* nd (d)

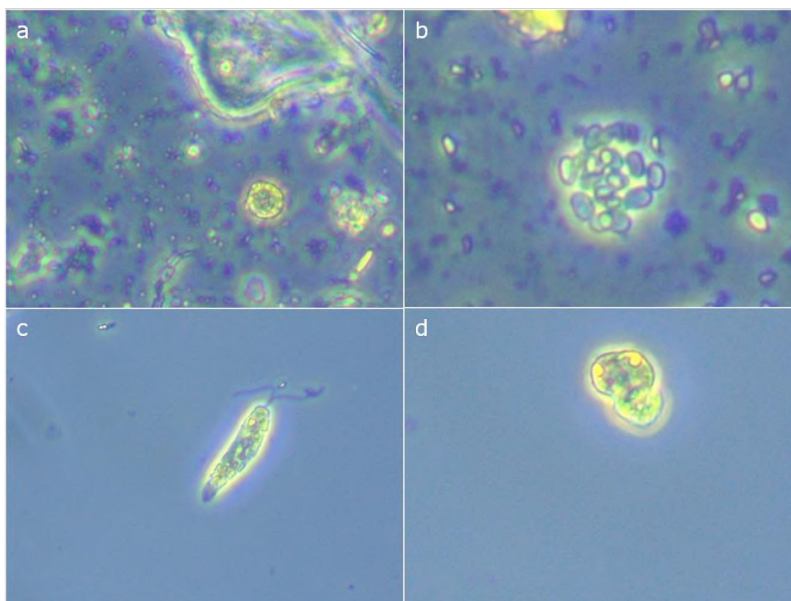


Figure 3-102: Some representative taxa of the station Italy Ref: *Gephyrocapsa huxleyi* (a), *Synechococcus* sp. (b), *Eutreptiella* sp. (c) and *Gymnodinium* sp. (d)

3.3.2.1.4.2 Relationship between environmental variables and the phytoplankton community

The BEST (BIO-ENV, BVSTEP procedure) analysis was applied to identify the subset of environmental variables most strongly associated with the structure of the phytoplankton community. The analysis was performed by comparing the biological similarity matrix with the Euclidean distance matrix calculated from the chemical variables of the water column using Spearman rank correlation. Among the twelve environmental variables considered (total suspended solids, nutrients, and trace metals), the best explanatory subset consisted of Total Phosphorus, Ammoniacal Nitrogen, and Orthophosphate, yielding a correlation coefficient of $p = 0.21$.

The selection of these three variables highlights the predominant role of nutrients in shaping the distribution and composition of the phytoplankton community. From an ecological perspective, this finding is consistent with observations from oligotrophic marine ecosystems, where the availability of nitrogen and phosphorus is one of the primary factors limiting phytoplankton growth. Variations in nutrient concentrations can promote different taxonomic groups, influencing both community abundance and species composition. Furthermore, the exclusive selection of nutrient-related variables in the optimal solution suggests that the trace metals considered (arsenic, barium, copper, iron, mercury, nickel, and zinc) do not exhibit a significant relationship with the observed biological patterns at the spatial and temporal scales investigated.

Nevertheless, the relatively low correlation coefficient obtained ($p = 0.21$) indicates that the identified chemical variables explain only a limited fraction of the overall biological variability. This result suggests that phytoplankton community structure is not driven solely by nutrient availability but rather by the interaction of multiple environmental factors. This aspect is particularly relevant considering the characteristics of the investigated water column. In deep marine environments, depth represents a major ecological gradient that drives significant variations in physical and chemical conditions, including light availability, temperature, water density, nutrient concentrations, and vertical mixing processes.

Phytoplankton distribution is generally restricted to the illuminated upper layers of the water column, whereas deeper waters are often characterized by higher nutrient concentrations resulting from the remineralization of sinking organic matter. Consequently, differences among sampling depths may reflect not only variations in water chemistry but also ecological processes related to vertical stratification, the occurrence of Deep Chlorophyll Maximum, vertical transport of cells, and water mass dynamics.

The weak correlation observed may therefore be attributable to the influence of environmental variables not included in the analysis, such as water column stability, thermocline depth, photosynthetically active radiation (PAR), and local hydrodynamic processes. In addition, part of the biological variability may be driven by biotic factors, including interspecific competition, seasonal succession patterns, and grazing pressure exerted by zooplankton.

Overall, the results indicate that nutrient availability is the principal chemical factor associated with phytoplankton distribution. However, community structure appears to be influenced by a more complex set of ecological and oceanographic processes, in which vertical gradients within the water column and the physical characteristics of the deep marine environment play a key role.

3.3.2.1.5 Detailed description of results – zooplankton

3.3.2.1.5.1 Abundance and diversity of zooplankton community

The qualitative and quantitative analyses performed on the mesozooplankton community of the whole study area showed broadly comparable values between the stations located in the Asopus-1A well area and those located in Northern station group. The reference stations (Othonoi Ref, Kerkira Ref and Italy Ref) also exhibited abundance values consistent with those observed in proximity to the Asopus 1A and northern station group in Block 2.

The species / abundance matrix of the zooplankton community is presented in Annex 06 Environmental baseline survey report (APPENDIX D: ZOOPLANKTON DATA), where data are expressed as ind. m⁻³.

Specifically, an average abundance of individuals per cubic metre (ind. m⁻³) of 264.22 ± 97.50 ind. m⁻³ was recorded at the Asopus-1A well stations, while 328.97 ± 134.02 ind. m⁻³ was recorded at Northern station group. The reference stations Othonoi Ref, Kerkira Ref, and Italy Ref showed abundance values of 314.06 ind. m⁻³, 293.68 ind. m⁻³, and 281.46 ind. m⁻³, respectively, which are quantitatively consistent with those observed in the two well areas.

In the upper 200 m of the water column, corresponding to the investigated layer, surface and subsurface / intermediate waters prevailed. These waters are normally subject to stratification, mesoscale variability, and limited trophic input, consistent with the oligotrophic nature of the Eastern Ionian sector of the Mediterranean Sea. This hydrological setting supports planktonic communities typical of deep pelagic waters, generally characterized by low biomass and high species diversity (Siokou-Frangou et al., 1999).

With regard to the structure of the mesozooplankton community (Figure 3-103 and Figure 3-104), the holoplanktonic component was clearly dominant (contributing 96.65 – 99.14 % of the total abundance in Othonoi Ref and D3a, respectively), with copepods representing the main component of this ecological category (89.76 – 96.47 % of the total abundance in D3b and D1b, respectively). Meroplankton, in contrast, contributed only marginally to the investigated mesozooplankton community (contributing 0.86 – 3.35 % of

the total abundance in D3a and Othonoi Ref, respectively). This distribution of the different ecological groups within the community was essentially consistent both in Block 2 Asopus-1A, Northern station group and at the Reference stations (Othonoi Ref, Kerkira Ref, Italy Ref).

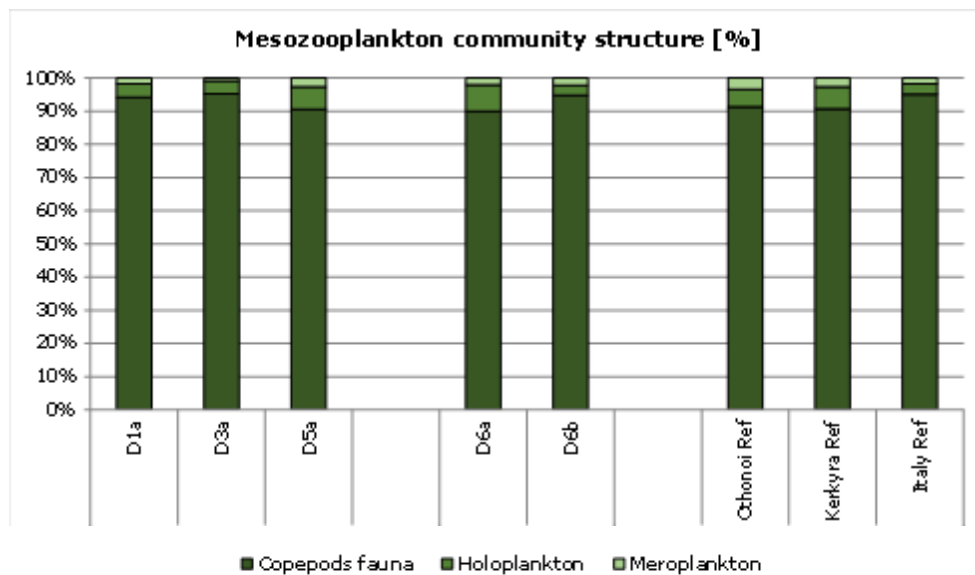


Figure 3-103: – Percentage composition of the mesozooplankton community, based on the main ecological categories (holoplankton and meroplankton). Within the holoplankton, the copepod component was analysed separately, as it represents a significantly representative fraction of the community – Asopus-1A, Blank and Reference stations

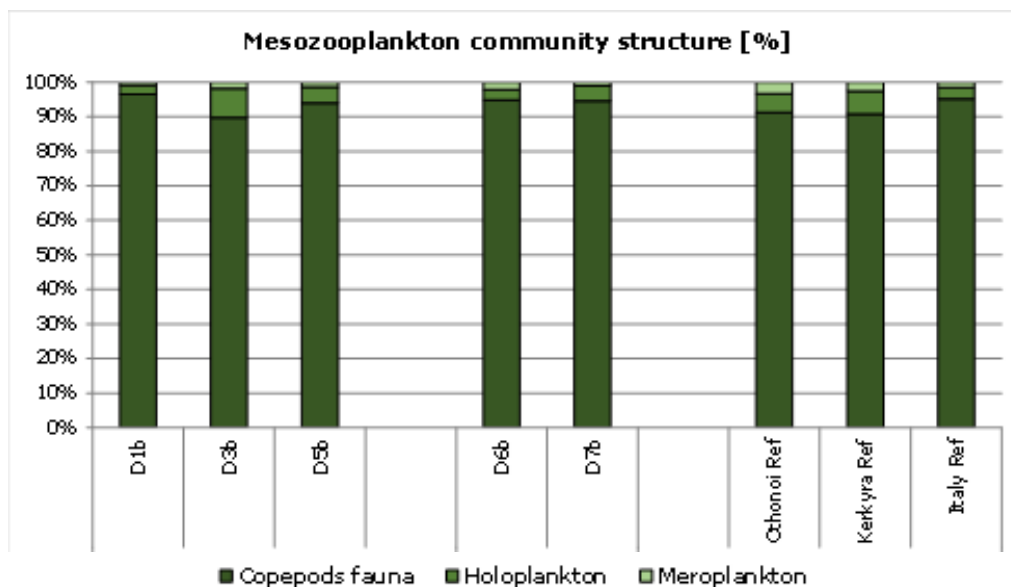


Figure 3-104: – Percentage composition of the mesozooplankton community, based on the main ecological categories (holoplankton and meroplankton). Within the holoplankton, the copepod component was analysed separately, as it represents a significantly representative fraction of the community – Northern station group, Blank and Reference stations

Cluster analysis (Figure 3-105) revealed similarity values ranging between 55 % and 70 % across the different station groups, indicating an overall homogeneity among the mesozooplankton communities. The stations did not cluster consistently according to the sampled areas. All stations investigated in Block 2, including the control points (Blank; D6a, D6b, and D7b) located farther from the wells, showed assemblages comparable to those observed at the Reference stations (Othonoi Ref, Kerkyra Ref, and Italy Ref).

ANOSIM results further indicated weak and statistically non-significant differences among the compared station groups. The global test statistic was $R = 0.19$; considering that the ANOSIM R statistic typically ranges from -1 to +1, with values close to 1 indicating strong separation between groups and values close to 0 indicating high overlap, the result suggests limited differentiation among the analysed communities.

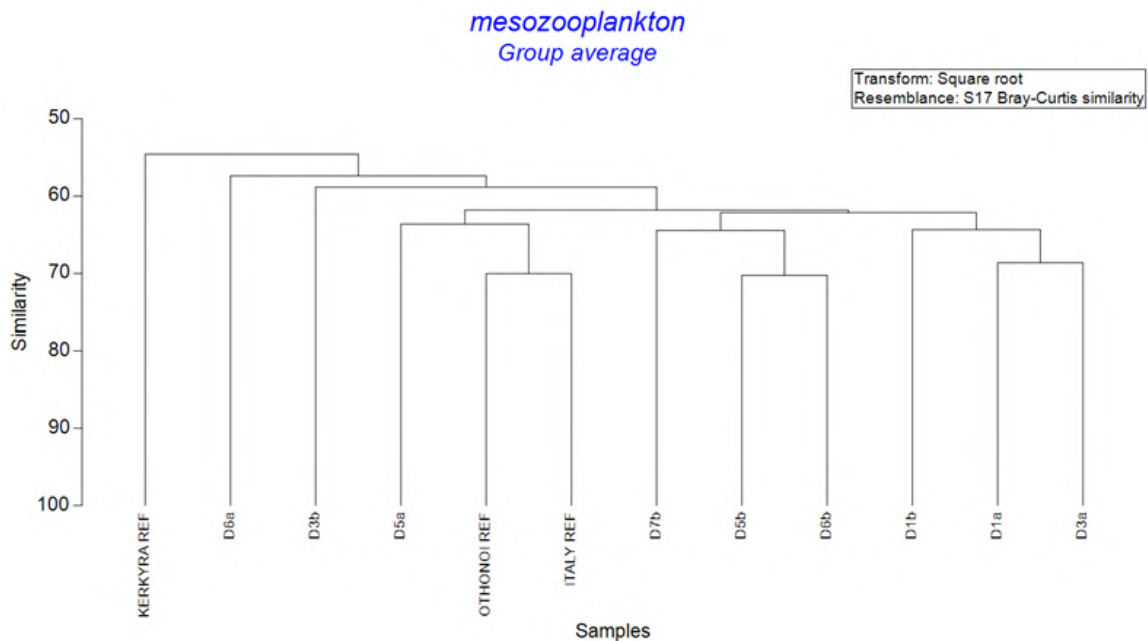


Figure 3-105: Cluster analysis (Bray-Curtis similarity) of the mesozooplankton communities in the Block 2 area Asopus-1A Northern and Reference stations (Othonoi Ref, Kerkyra Ref, and Italy Ref)

With regard to the qualitative analysis of the copepod component, a total of 127 taxa were identified, representing the three main developmental stages: nauplii, copepodites, and adults. Naupliar stages were likely underestimated in the counts, as they often present sizes smaller than 200 μm , corresponding to the mesh size of the net used, which is more suitable for the analysis of the adult component and larger juvenile stages.

The observed biodiversity included copepods belonging to the main planktonic orders (*Calanoida*, *Cyclopoida*, *Mormonilloidea*, *Harpacticoida*, and *Siphonostomatoida*) distributed across 28 families and representative of the main planktonic trophic groups. Adult taxa that could be identified to species level accounted for 92 taxa. The sampled taxonomic richness was high and characterized by the occurrence of numerous rare or sporadic species, typical of meso- and bathypelagic environments and of considerable ecological interest. Among these, species belonging to the families *Aetideidae* (*Aetideus armatus*, *A. giesbrechti*, *Chiridius poppei*, *Euchirella messinensis messinensis*, and *E. rostrata*), *Arietellidae* (*Arietellus pavoninus*), and *Augaptilidae* (*Augaptilus glacialis*, *A. longicaudatus*, *Euaugaptilus hecticus*, *Haloptilus longicornis*, *H. ornatus*, and *H. spiniceps*) were recorded.

The mean percentage taxonomic composition of adults and copepodites highlighted the presence of a recurrent group of dominant families across all sampling stations within the investigated areas (Asopus-1A, Northern station group, and Reference sites). In particular, *Clausocalanidae* consistently accounted for at least 50 % of the collected individuals, increasing up to 65 % when only juvenile copepodite stages were considered. *Augaptilidae*, *Lucicutiidae*, *Corycaeiidae*, and *Oithonidae* also contributed substantially to the assemblage structure.

The species characterizing the adult copepod community (Figure 3-106 and Figure 3-107) were largely consistent with the composition observed in the juvenile stages (Figure 3-108 and Figure 3-109), indicating a close correspondence between the adult and copepodite fractions. The Italy Ref monitoring station showed a higher incidence of *Paracalanidae*, particularly among juvenile stages. This pattern suggests a stronger contribution of neritic waters in this area, in agreement with the wide distribution of the genus *Paracalanus* in the coastal and neritic sectors of the Mediterranean Sea.

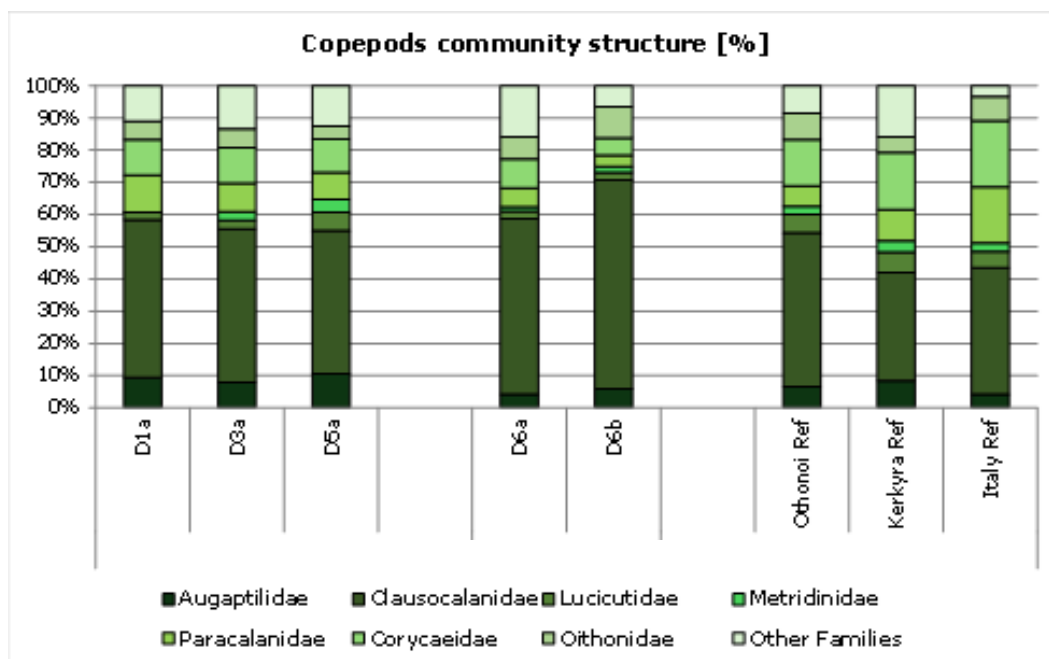


Figure 3-106: Percentage composition of the copepod crustacean component, based on the main families.

Percentage abundances of the adult copepod community are shown for the different sampling stations – Asopus-1A and Reference stations

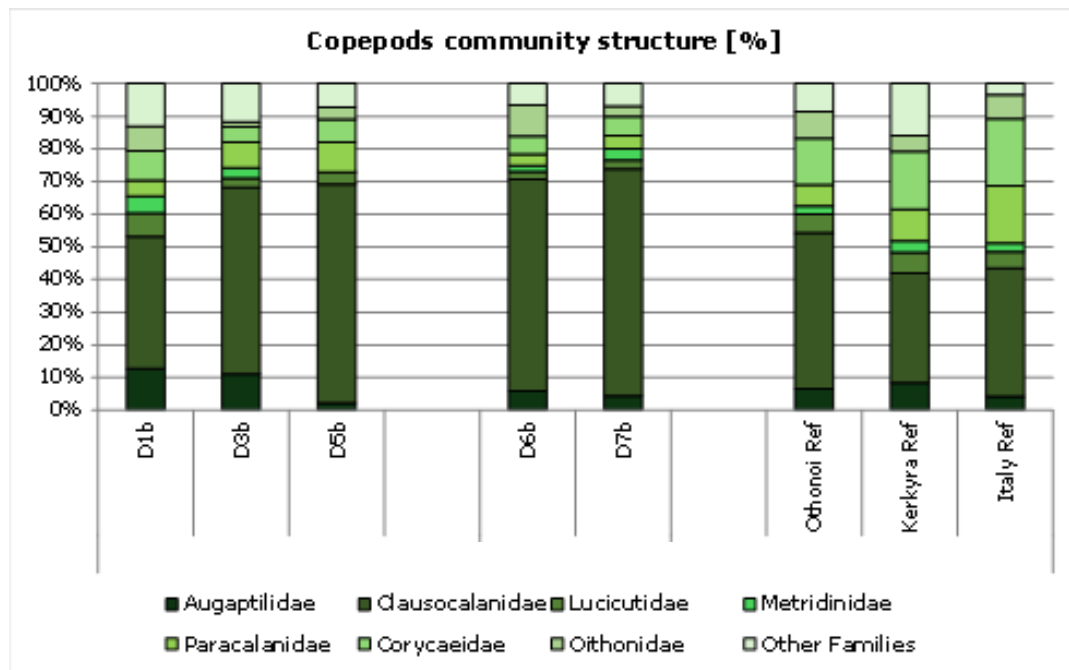


Figure 3-107: Percentage composition of the copepod crustacean component, based on the main families. Percentage abundances of the adult copepod community are shown for the different sampling stations – Northern station group and Reference stations

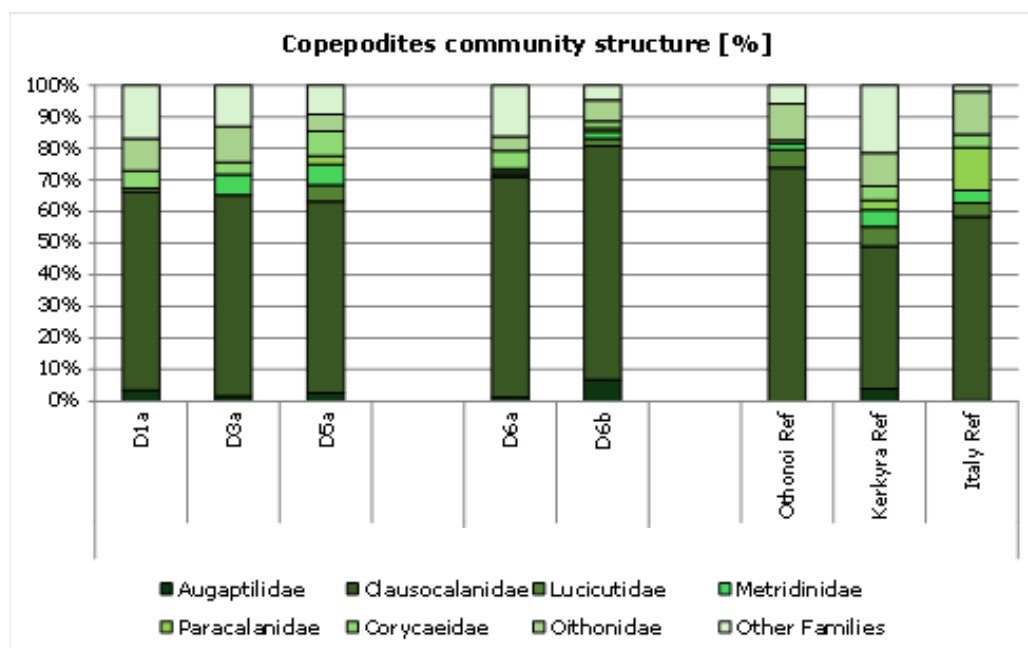


Figure 3-108: Percentage composition of the copepod crustacean component according to the main families. Percentage abundances of the juvenile community (copepodites) are shown for the different sampling stations – Asopus-1A and Reference stations

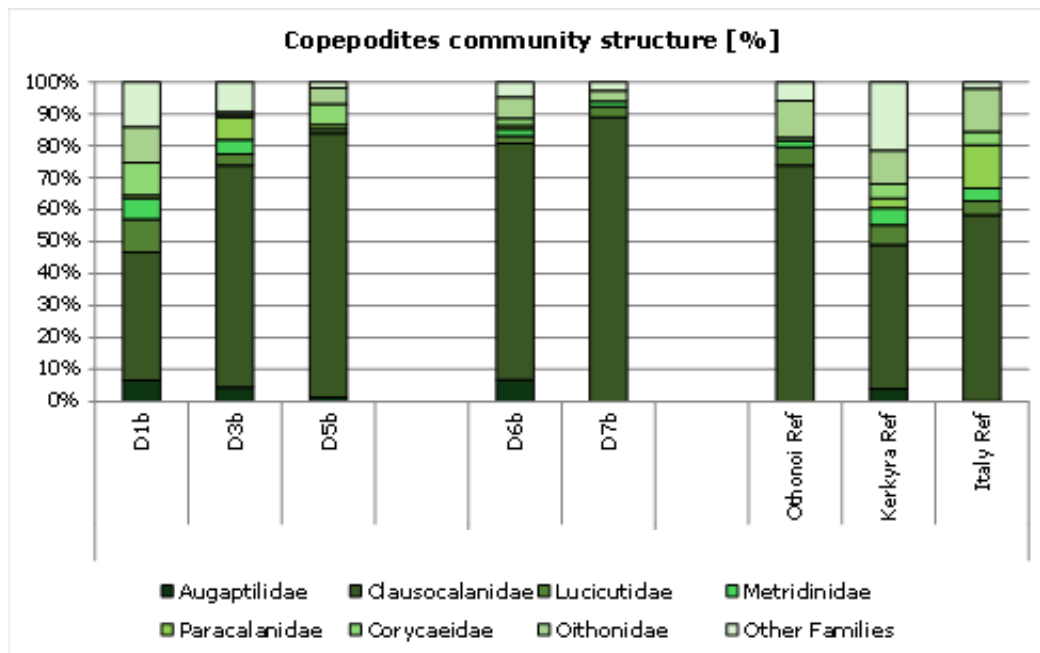


Figure 3-109: Percentage composition of the copepod crustacean component according to the main families. Percentage abundances of the juvenile community (copepodites) are shown for the different sampling stations – Northern station group and Reference stations

Within the adult copepod community, the calanoid copepods *Clausocalanus paululus* (Asopus-1A: mean abundance 40.96 ind. m⁻³; Northern station group: mean abundance 54.14 ind. m⁻³; Reference stations: mean abundance 26.03 ind. m⁻³) and *Haloptilus longicornis* (Figure 3-110a; Asopus-1A: mean abundance 18.72 ind. m⁻³; Northern station group: mean abundance 14.46 ind. m⁻³; Reference stations: mean abundance 10.85 ind. m⁻³) reached the highest abundances. *C. paululus* is a subtropical circumglobal species reported from the Mediterranean Sea within the 0–800 m depth layer, although mainly concentrated in the upper 200 m. It has been recorded in both neritic and oceanic waters, where it may represent one of the most abundant species within the copepod community (Avancini et al., 2006; Vives & Shmeleva, 2007). In contrast, *H. longicornis* is a typically mesopelagic species capable of performing diel vertical migrations, occupying the upper water layers during nighttime.

Other taxa that were particularly representative of the copepod community in terms of abundance included the corycaeid *Agetus limbatus* (Asopus-1A: mean abundance 6.73 ind. m⁻³; Northern station group: mean abundance 4.74 ind. m⁻³; Reference stations: mean abundance 13.23 ind. m⁻³), the paracalanid *Calocalanus styliremis* (Asopus-1A: mean abundance 8.31 ind. m⁻³; Northern station group: mean abundance 4.74 ind. m⁻³; Reference stations: mean abundance 8.11 ind. m⁻³), the corycaeid *Farranula rostrata* (Asopus-1A and Northern station group: mean abundance 5.76 ind. m⁻³ in both areas; Reference stations: mean abundance 10.67 ind. m⁻³), the lucicutiid *Lucicutia flavicornis* (Asopus-1A: mean abundance 5.76 ind. m⁻³; Northern station group: mean abundance 5.52 ind. m⁻³; Reference stations: mean abundance 8.96 ind. m⁻³), and the mormonilloid *Neomormonilla minor* (Asopus-1A: mean abundance 6.72 ind. m⁻³; Northern station group: mean abundance 5.38 ind. m⁻³; Reference stations: mean abundance 1.91 ind. m⁻³). The latter species is characterized in the Mediterranean Sea by a broad vertical distribution and has been regularly collected in the Tyrrhenian Sea at depths ranging between 300 and 1850 m.

Of particular ecological interest was the identification, within Mediterranean biogeographical sector 6 (Ionian Sea), of isolated specimens of *Arietellus pavoninus* (Figure 3-110b) and *Augaptilus glacialis* (Figure 3-110c). These taxa are generally considered rare in the Mediterranean Sea, oceanic in distribution, and associated with deep environments, including mesopelagic, bathypelagic, and abyssal waters. This finding confirms that monitoring activities conducted in deep pelagic areas can provide valuable information on plankton biodiversity, helping to fill knowledge gaps regarding the distribution of rare or poorly documented species.



Figure 3-110: *Haloptilus longicornis* (a); *Arietellus pavoninus* (b); *Augaptilus glacialis* (c)

The remaining non-copepod holoplanktonic component of the mesozooplankton showed high biological diversity, with a total of 53 identified taxa, although abundance values were on average approximately one order of magnitude lower than those recorded for the copepod community. Abundances ranged from a minimum of 7.9 ind. m⁻³ at station D1b to a maximum of 23.7 ind. m⁻³ at station D5b (both located within the Northern station group area).

Part of the identified taxa exhibited cosmopolitan features and broad ecological tolerance, including organisms belonging to Hydrozoa, Pteropoda (e.g. *Cavolina* sp.; Figure 3-111a), Polychaeta (e.g. *Tomopteris* sp.; Figure 3-111b), *Chaetognatha*, *Appendicularia*, and *Thaliacea*, which are typical of the epipelagic zone of the oceanic province. Other taxa were more closely associated with mesopelagic environments, such as Euphausiacea (e.g. *Euphausia* sp.; Figure 3-111c) and Mysida, or with bathypelagic waters, such as some amphipod species (e.g. *Anchylomera blossevillei*; Figure 3-111d), a group that is well represented and diversified in this sector of the Mediterranean Sea.



Figure 3-111: *Cavolina* sp. (a); *Tomopteris* sp. (b); *Euphasia* sp. (c); *Anchylomera blossevillei* (d)

The meroplanktonic component was extremely scarce (14 taxa), particularly with regard to decapod crustaceans. This evidence further supports the interpretation of a mesozooplankton community typical of offshore waters, characterized by a limited contribution of neritic elements and by the absence, in the analysed samples, of larvae attributable to coastal benthic species. Among the most representative taxa were mainly larval stages of Asteroidea (e.g. *Brachiolaria* larvae; Figure 3-112a), Holothuroidea (e.g. *Auricularia* larvae; Figure 3-112b), and representatives of the class Polychaeta (e.g. *Harmothoe* sp.; Figure 3-112c).

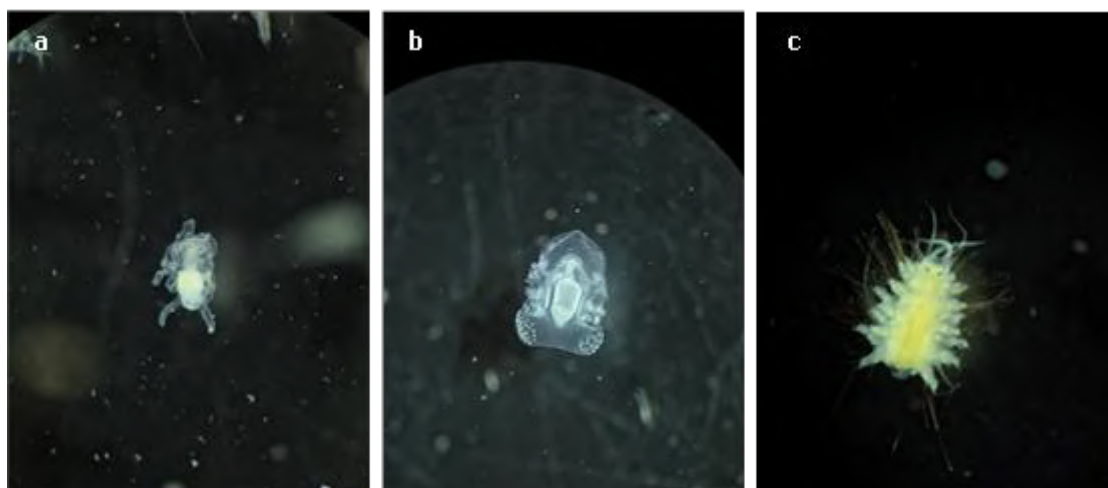


Figure 3-112: *Brachiolaria* larvae (a); *Auricularia* larvae (b); *Harmothoe* sp. (c)

Overall, the results indicate a highly diverse mesozooplankton assemblage typical of deep offshore Ionian waters, with no clear spatial differentiation among the sampled areas and reference stations. The observed patterns appear mainly consistent with the bathymetric and hydrological features of the study area.

Table 3-22: Absolute values of species number (S) and mean values of abundance (N° ind. m⁻²) and diversity indices: Shannon-Wiener index H' (loge), Pielou evenness index (J'), Simpson index (λ), and Margalef richness index (d)

SITE	STATION ID	S	N	D	J'	H'(LOG _e)	λ
ASOPUS -1A	D1a	81	306	13.98	0.68	2.99	0.10
	D3a	90	407	14.81	0.70	3.17	0.10
	D5a	87	245	15.64	0.73	3.26	0.09
Northern station group	D1b	87	315	14.95	0.73	3.25	0.07
	D3b	107	155	21.02	0.67	3.15	0.12
	D5b	85	512	13.46	0.62	2.76	0.15
Blanks	D6a	91	177	17.38	0.67	3.02	0.11
	D6b	80	455	12.91	0.59	2.60	0.18
	D7b	85	306	14.67	0.57	2.51	0.22
Reference stations	Othonoi-Ref	79	344	13.35	0.73	3.18	0.09
	Kerkyra-Ref	102	324	17.48	0.73	3.37	0.06
	Italy-Ref	80	296	13.89	0.70	3.05	0.09

3.3.2.1.5.2 Relationship between environmental variables and the zooplankton community

The BEST analysis, conducted on water-column physico-chemical variables in relation to the species / abundance matrix of the zooplankton community, identified six variables as the best explanatory

combination (Total Suspended Solids, Total Phosphorus, Orthophosphate, Barium, Iron, and Mercury), with a Spearman correlation coefficient of $\rho = 0.51$. This result indicates a moderate relationship between zooplankton community structure and the environmental gradient, suggesting that the community responds to an integrated set of trophic and physicochemical factors rather than to single isolated variables.

From the DistLM analysis, performed using the variables identified as explanatory in the BEST procedure, Total Phosphorus emerged as one of the most relevant drivers, being the only variable showing a statistically significant effect in the marginal test ($p = 0.012$). In an oligotrophic context, phosphorus represents a potentially limiting nutrient for primary productivity and for the pelagic food web. Even small variations in its concentration can influence phytoplankton composition and, consequently, food availability for zooplankton, with potential effects on biomass, taxonomic composition, and trophic strategies (Krom et al., 1991). In oligotrophic environments, relatively small changes in phosphorus availability may therefore be ecologically amplified, leading to shifts in dominance between opportunistic taxa and more specialized species (Thingstad et al., 2005).

Overall, the investigated zooplankton community structure appears to be primarily regulated by a weak but significant gradient in nutrient availability and water-column transparency, with total phosphorus playing an important role as a potential limiting factor and indirect regulator of the pelagic food web.

3.3.2.1.6 Detailed description of results – ichthyoplankton

Analyses of the ichthyoplankton component revealed overall low values of both species diversity and abundance across each of the three surveyed transects in the Block 2 area (TR1a, TR1b, and TR6b), consistent with expectations for communities typical of deep pelagic waters. This pattern suggests a system characterized by a limited presence of larval stages and a predominance of taxa associated with mesopelagic and bathypelagic habitats, in agreement with the oceanographic conditions of the investigated sector.

The larval component was dominated by a single epipelagic species, *Sardina pilchardus*, together with *Scombridae* larvae that could not be identified at genus level, likely belonging to highly mobile taxa widely distributed in temperate Mediterranean waters. The remaining diversity was mainly attributable to mesopelagic species, including *Cyclothone braueri*, *Maurollicus muelleri*, and several representatives of the family *Myctophidae* (e.g. *Hygophum benoiti*; Figure 3-113a), groups that are known to be abundant and structurally important components of deep scattering layer communities. These were complemented by taxa typical of the meso- to bathypelagic domain, such as the paralepidids *Arctozenus risso* and *Paralepis coregonoides*, together with the myctophid *Lampanyctus pusillus* (Figure 3-113b). These species are characterized by broad vertical distributions and trophic behaviors linked to intermediate and deep layers of the water column.

Overall, the observed ichthyoplankton structure reflects a community minimally influenced by neritic inputs and consistent with open-ocean, deep pelagic environments, where larval dynamics are strongly shaped by distance from the coast and water-column depth.

The species / abundance matrix of the ichthyoplankton community is presented in Annex 06 Environmental baseline survey report (APPENDIX E: ICHTHYOPLANKTON DATA), where data are expressed as cells L^{-1} .

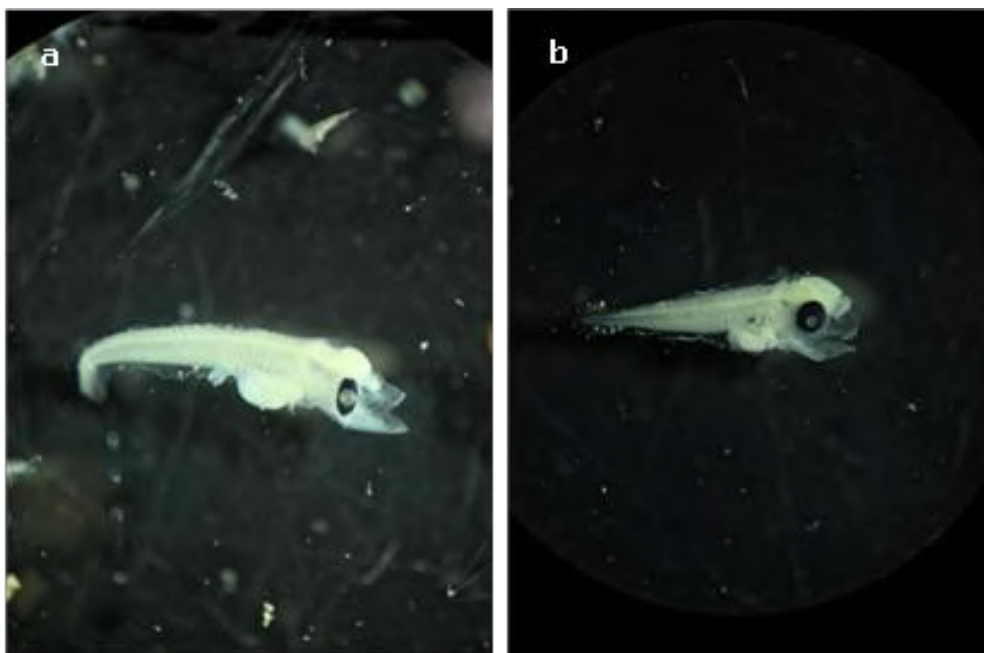


Figure 3-113: *Hygophum benoiti* (a); *Lampanyctus pusillus* (b)

3.3.2.2 Sediments and infauna results

3.3.2.2.1 Summary of results

Field measurements performed immediately after sample recovery indicated sediment temperatures of 13.5 – 15.6 °C, limited pH variability (7.79 – 7.93) and consistently negative ORP values (–169.4 to –120.9 mV), indicative of reducing conditions typical of fine-grained marine sediments. Macroscopic observations suggested highly homogeneous sedimentological conditions throughout the study area, with sediments generally described as “Clayey silt”, medium hydrated, odourless and devoid of shell fragments, plant remains or other noteworthy features.

Grain-size laboratory analyses confirmed the absence of Gravel from all samples, while sand generally represented a minor fraction (< 15 %), except at Italy Ref (23.5 %). Pelitic fractions clearly predominated throughout the study area, with Silt and Clay together accounting for approximately 86 – 100% of the sediment matrix. According to both Folk and Shepard classifications, sediments were predominantly assigned to the “Mud” and “Silty clay” classes, respectively, confirming the granulometric homogeneity of the study area, with Italy Ref exhibiting a slightly coarser texture. Among the other physic-chemical variables investigated in the sediment samples, moisture content showed moderate variability across the study area, with generally higher values at Northern station group, Blank and Reference Stations than around Asopus-1A, whereas sediment density remained remarkably uniform, reflecting the overall homogeneity of the investigated fine-grained deposits.

TOC concentrations were generally low, reaching a maximum of 0.78 % d.s. at station D3b and remaining below the analytical LoQ at several stations, particularly within the Reference area. Carbonate contents exhibited limited spatial variability, ranging from approximately 26 % d.s. at D1a to 34 % d.s. at Italy Ref. Similarly, N-Tot and P-Tot showed relatively homogeneous distributions throughout the study area, with N-

Tot generally around 0.30% d.s. and P-Tot ranging between 312 mg kg⁻¹ d.s. (Italy Ref) and 447 mg kg⁻¹ d.s. (D3b), without any evident differences between well-site, Blank and Reference Stations. Overall, the investigated sediments were characterized by low organic-matter content and relatively uniform nutrient concentrations, consistent with the oligotrophic nature of the study area.

Among metals and metalloids, Cr VI remained consistently below the analytical LoQ, whereas Sn and Hg were only sporadically detected at very low concentrations. Al and Fe were by far the most abundant elements, occurring at concentrations within the order of magnitude of 10⁴ mg kg⁻¹ d.s., while the remaining investigated metals generally occurred within the order of magnitude of 10¹ mg kg⁻¹ d.s. Spatial variability was generally limited, although the Northern station group area tended to exhibit slightly higher concentrations for several elements than Asopus-1A and the associated Blank Stations, whereas Italy Ref frequently showed comparatively lower values. Exceedances of the applicable reference values were identified for As, Ni and Cr-Tot. As concentrations ranged from 4.4 to 14.0 mg kg⁻¹ d.s., exceeding the HCMR ERL value throughout most of the study area and, at selected stations, the Italian SQA-MA threshold (D.Lgs. No. 172/2015, Table 3/B), with the maximum concentration recorded at D5a. Ni concentrations ranged from 21.1 to 62.6 mg kg⁻¹ d.s. and exceeded the HCMR ERL value at all investigated stations, with the highest concentration observed at Othonoi Ref. Cr-Tot concentrations reached up to 67.0 mg kg⁻¹ d.s. at Othonoi Ref and exceeded the Italian SQA-MA threshold (D.Lgs. No. 172/2015, Table 3/B) at a limited number of stations. All remaining investigated metals and metalloids showed concentrations consistently below the applicable regulatory reference values.

Hydrocarbon concentrations in surface sediments were generally low throughout the study area. The light hydrocarbon fraction (C ≤ 12) remained below the analytical LoQ at all stations, whereas the heavier fraction (C > 12) and the corresponding Total Petroleum Hydrocarbons (TPH) were detected at low concentrations, ranging from 8.5 to 20 mg kg⁻¹ d.s., with the maximum concentration observed at D4a. No evident differences were observed among well-site, Blank and Reference Stations, and spatial variability was limited overall. Italy Ref represented the only exception, with both parameters consistently below the analytical LoQ.

Most investigated PAHs were below the analytical LoQ at all stations. Only a limited number of compounds were sporadically detected, mainly Fluoranthene and Pyrene, which represented the most frequently quantified PAHs, occurring at four and five stations, respectively. The highest individual concentrations were recorded for Benzo(b)fluoranthene and Benzo(g,h,i)perylene at Italy Ref, and for Fluoranthene at D6a. Detectable PAHs were confined to a small number of stations, with the highest diversity of quantified compounds and the highest ΣPAHs concentration observed at Italy Ref (11.7 µg kg⁻¹ d.s.), followed by the Blank Station D6a (7.28 µg kg⁻¹ d.s.). All remaining stations showed either no quantifiable PAHs or only isolated detections, resulting in substantially lower ΣPAHs concentrations and no consistent spatial pattern among well-site, Blank and Reference Stations.

All measured concentrations of petroleum hydrocarbons (including both hydrocarbon fractions and TPH) and PAHs (including Σ PAHs) remained well below the applicable reference values adopted in Greece (ERL, HCMR; Long et al., 1995) and the Italian Environmental Quality Standards (SQA-MA; D.Lgs. 172/2015), providing no evidence of hydrocarbon contamination within the investigated sediments.

Qualitative micro-Raman/FTIR screening did not identify any synthetic polymer particles within the investigated size range (1 µm – 5 mm), providing no evidence of detectable microplastic occurrence in any sediment sample collected at the Asopus-1A, Northern station group, the Blank stations or the Reference

Stations. No regulatory threshold values are currently available for microplastics in marine sediments under the Greek or Italian regulatory frameworks considered in the present study.

Analyses of macrobenthic communities revealed an overall homogeneous ecological structure across the Asopus-1A, Northern station group, Blank stations and Reference Stations, with no statistically significant differences among station groups. The observed variability was primarily attributable to natural small-scale heterogeneity of the sedimentary environment.

Benthic communities were characterized by low abundance, reduced species richness and limited diversity, consistent with conditions typically observed in oligotrophic Mediterranean bathyal environments. The ecosystem was dominated by the Mediterranean Upper Bathyal Mud biocenosis (EUNIS code: ME65). A total of 116 individuals belonging to 19 taxa were recorded, with Annelida overwhelmingly dominating both abundance (94.8 %) and species richness (73.7 %). Community structure was largely dominated by the sipunculan *Golfingia* sp., a taxon commonly associated with fine-grained bathyal sediments.

Ecological-quality indices reflected the naturally low-diversity character of these deep-sea communities. M-AMBI values ranged from “Bad” to “Moderate”, whereas AMBI classified most stations as “Undisturbed”, with only isolated cases of “Slightly” or “Moderately disturbed” conditions. Overall, the results were consistent with a naturally oligotrophic bathyal ecosystem rather than with evidence of ecological disturbance.

Consistent with the macrozoobenthic analyses, AUV surveys revealed a generally homogeneous benthic landscape throughout the study area, dominated by the Mediterranean Upper Bathyal Mud biocenosis (EUNIS code: ME65), characterized by fine-grained sediments and benthic assemblages adapted to deep-sea conditions. The seafloor was commonly associated with traces of burrowing and tubicolous organisms, occasional specimens of deep-sea fishes belonging to the family Macrouridae, and locally with facies attributable to the sea anemone *Andresia partenopea*.

A limited rocky outcrop attributable to the Mediterranean Upper Bathyal Rock biocenosis (EUNIS code: ME15) was identified at station D4a (Asopus-1A area). This habitat hosted deep-water coral assemblages attributable to *Antipathella subpinnata* and/or *Callogorgia verticillata*, representing a localized increase in habitat heterogeneity and ecological complexity within the predominantly muddy bathyal environment.

The analysis of AUV mosaics revealed a generally limited presence of marine litter in the investigated areas, with most stations showing no evidence of marine debris. The detected items were discontinuously and locally distributed, with no significant accumulation patterns associated with the Asopus-1A and Northern station group compared to the Blank and Reference stations. The observed distribution suggests that the occurrence of marine litter on the seafloor is primarily controlled by local processes of transport, deposition, and retention of materials, as well as by point-source anthropogenic inputs.

3.3.2.2.2 Detailed description of results – sediments

3.3.2.2.2.1 Sediment field measurements and sediment classification

3.3.2.2.2.1.1 Field measurements of physic-chemical variables

Sediment temperature, measured immediately after grab recovery and onboard sample preparation prior to subsampling, ranged from 13.5 °C at the Blank station shared by both well-site areas (D6b) to 15.6 °C, at Italy Ref, broadly reflecting bottom-water temperatures at the sediment–water interface, with some influence from atmospheric conditions during handling and inspection.

Sediment pH, measured directly in the field following grab recovery, showed limited variability, with values ranging from 7.79 (recorded at both D4a and Othonoi Ref) to 7.93 (only at D6a), consistent with those typically reported for fine-grained bathyal marine sediments.

The Oxidation–Reduction Potential (ORP), measured in situ in the collected sediment samples prior to subsampling, was consistently negative, ranging from –169.4 mV at station D5b to –120.9 mV at D3a, indicating generally reducing conditions characteristic of fine-grained marine sediments throughout the study area.

The temperature, pH, and ORP values measured in all surface sediment samples are presented in the following table (Table 3-23) and have also been included, along with information on the macroscopic characteristics of the sediments, in the dedicated Annex 06 Environmental baseline survey report (APPENDIX G: SEDIMENT DATA SHEETS).

Table 3-23: Surface sediment Temperature, pH and red-ox potential (ORP)

AREA	SITE	STATION ID	TEMPERATURE [°C]	PH	ORP [MV]
BLOCK 2	ASOPUS -1A station group	D1a	13.9	7.82	-153.4
		D3a	13.8	7.83	-168.9
		D5a	13.9	7.88	-120.9
	Northern station group	D1b	13.7	7.79	-167.4
		D3b	14.3	7.84	-168.3
		D5b	13.8	7.85	-162.3
	Blanks	D6a	14.4	7.84	-157.6
		D6b	13.8	7.86	-167.6
		D7b	13.7	7.92	-148.9
IONIAN SEA	Reference stations	Othonoi-Ref	13.6	7.92	-169.4
		Kerkyra-Ref	14.1	7.93	-146.6
		Italy-Ref	13.5	7.87	-158.7

3.3.2.2.2.1.2 Macroscopic description

Macroscopic field observations indicated a highly homogeneous sedimentary environment across the entire study area. Sediments collected at all stations associated with the Asopus-1A and Northern station group

areas, as well as at Blank and Reference Stations, were macroscopically classified by field operators as Clayey Silt, with the sole exception of Italy Ref, where the sediment was described as Slightly Sandy Clayey Silt. In all samples, the estimated sand content was below 25 %, while sediment colour was consistently recorded as 5Y 5/3 according to the Munsell Soil Colour Chart.

Other macroscopic features showed similarly limited variability throughout the study area. No plant remains or macroalgal debris, shell fragments, chromatic variations or dimensional heterogeneities were observed in any of the collected samples. All sediments were described as medium hydrated and odourless, i.e., with no evidence of anomalous odours or other noteworthy macroscopic characteristics.

Overall, the field observations indicated remarkably uniform sedimentological conditions throughout the investigated area, characterised by the predominance of fine-grained cohesive sediments typical of deep offshore depositional environments.

These observations are reported in Annex 06 Environmental baseline survey report (APPENDIX G: SEDIMENT DATA SHEETS), in conjunction with physic-chemical data measured in the field, within sediment samples.

3.3.2.2.1.3 Grain-size distribution and sediment classification

With regard to the investigated sedimentary fractions, Gravel, the coarsest class, was completely absent from all analysed samples. Concentrations were consistently below the LoQ at all stations associated with the Asopus-1A, Northern Stations, the Blank stations, and the Reference Stations.

Concerning the finer sediment fractions, Sand represented a relatively minor component throughout most of the study area. Around Asopus-1A, concentrations ranged from 5.6 % at D2a to 11.4 % at D4a, with an average of 8.82 ± 2.35 %. Slightly higher values were observed around Northern station group, where Sand varied between 9.4 % (D3b) and 13.8 % (D4b), averaging 10.84 ± 1.88 %. The Blank stations exhibited a comparable range (6.5 % at D6a to 13.9 % at D7b) and an average of 9.20 ± 4.06 %. Greater variability characterised the Reference Stations, where Sand ranged from < LoQ at Othonoi Ref to 23.5 % at Italy Ref, yielding an average of 9.37 ± 12.40 %.

Among the pelitic fractions, Silt constituted a major component of all analysed sediments. Around Asopus-1A, concentrations ranged from 42.2 % at D3a to 50.6 % at D2a, with an average of 45.14 ± 3.21 %. Around Northern station group, Silt ranged from 36.3 % at D2b to 46.5 % at D5b, with an average of 42.14 ± 4.54 %. Comparable values were recorded at the Blank stations, where percentages varied between 37.1 % (D7b) and 47.9 % (D6a), averaging 42.83 ± 5.40 %. The Reference Stations exhibited the greatest variability, with values ranging from 31.8 % at Italy Ref to 48.9 % at Othonoi Ref and an average of 42.27 ± 9.30 %. Overall, Blank and Reference Stations showed Silt contents broadly comparable to those observed around both well sites, although Italy Ref was distinguished by markedly lower Silt percentages.

Clay represented the dominant granulometric fraction throughout the study area. Around Asopus-1A, concentrations ranged between 43.8% (D2a) and 48.8% (D3a), with an average of 46.04 ± 2.01 %. Around Northern station group, percentages ranged from 43.0% (D4b) to 52.3% (D2b), with an average of 47.02 ± 4.42 %. Similar values characterised the Blank stations, where clay varied from 45.6 % at D6a to 49.3 % at D6b, averaging 47.97 ± 2.06 %. The Reference Stations showed a wider range, from 44.7% at Italy Ref to 51.1% at Othonoi Ref, yielding an average of 48.37 ± 3.30 %. Overall, clay contents were remarkably similar among the Asopus well-site areas, Blank stations and Reference Stations.

According to the Wentworth (1922) grain-size scale and the Folk classification scheme (1954, 1974), sediments were predominantly classified as “Mud” throughout the study area, including most stations around Asopus-1A, two stations near Northern station group, two Blank stations and the Greek Reference Stations. The only departures from this pattern were represented by “Sandy mud” sediments at D4a and D5a around Asopus-1A, D1b, D2b and D4b around Northern station group, D7b among the Blank stations, and Italy Ref, the latter reflecting its comparatively higher sand content. A similar picture emerged from the Shepard (1954) classification, as modified by Schlee (1973), which assigned most sediments to the “Silty clay” class. Exceptions were limited to D2a within the Asopus-1A area, D6a among the Blank stations, and D3b – D5b around Northern station group, all classified as “Clayey silt”. Overall, both classification schemes consistently indicated the predominance of fine cohesive sediments across all station groups, with a slightly coarser character at Italy Ref.

The primary grain-size fractions and sediment classifications are reported in Table 23 and illustrated in Figure 62. Detailed percentage values for individual sub-fractions are provided in the corresponding dataset within APPENDIX I: DATASETS.

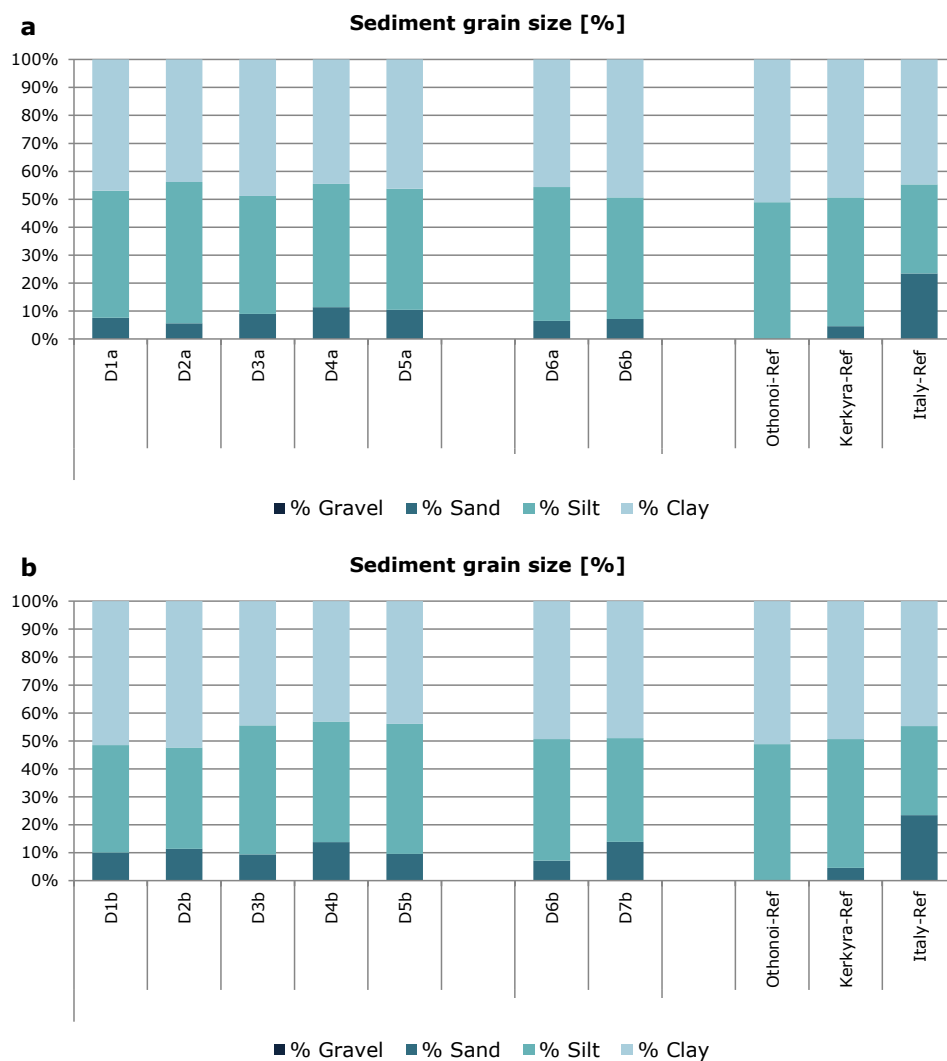


Figure 3-114: Granulometric characteristics of surface sediments

3.3.2.2.1.4 Other physical characteristics of sediments

Sediment Moisture content showed moderate variability across the study area. Around Asopus-1A, values ranged from 32.8 % at D1a to 40.9 % at D4a, with an average of 36.38 ± 3.50 %. Higher values were generally observed around Northern station group, where moisture ranged from 44.7 % at D3b to 47.8 % at D5b, averaging 45.98 ± 1.20 %. The Blank stations exhibited the widest range, from 36.3 % at D7b to 50.1 % at D6a, with an average of 43.00 ± 6.90 %. Similarly elevated values characterized the Reference Stations, where moisture ranged between 44.0 % at Italy Ref and 48.4 % at Othonoi Ref, yielding an average of 46.87 ± 2.50 %.

Sediment Density exhibited very limited spatial variability throughout the study area. Around Asopus-1A, values ranged from 1.8 kg dm^{-3} to 1.9 kg dm^{-3} , averaging $1.82 \pm 0.04 \text{ kg dm}^{-3}$, while around Northern station group they varied between 1.8 and 1.9 kg dm^{-3} , with an average of $1.86 \pm 0.05 \text{ kg dm}^{-3}$. The Blank stations showed consistently high values ($1.90 \pm 0.00 \text{ kg dm}^{-3}$), whereas the Reference Stations ranged from 1.7 kg dm^{-3} at Italy Ref to 1.9 kg dm^{-3} at Kerkyra Ref, averaging $1.80 \pm 0.10 \text{ kg dm}^{-3}$. Overall, sediment density remained remarkably uniform across all station groups, with the slightly lower value observed at Italy Ref likely reflecting its comparatively higher sand content relative to the remaining stations.

Data for moisture content and sediment density are reported in Table 3-24.

Table 3-24: Grain size distribution of the main fractions (gravel, sand, silt, clay), Folk (1954, 1974) and Shepard (1954) classification, and other physical characteristics of surface sediments

SITE	STATION ID	% GRAVEL	% SAND	% SILT	% CLAY	SEDIMENT CLASSIFICATION ACCORDING TO FOLK	SEDIMENT CLASSIFICATION ACCORDING TO SHEPARD	MOISTURE	DENSITY
								(%)	(KG/DM ³)
ASOPUS - 1A station group	D1a	< 0.1	7.6	45.5	46.9	MUD	SILTY CLAY	32.8	1.8
	D2a	< 0.1	5.6	50.6	43.8	MUD	CLAYEY SILT	33.0	1.9
	D3a	< 0.1	9.0	42.2	48.8	MUD	SILTY CLAY	37.1	1.8
	D4a	< 0.1	11.4	44.1	44.5	SANDY MUD	SILTY CLAY	40.9	1.8
	D5a	< 0.1	10.5	43.3	46.2	SANDY MUD	SILTY CLAY	38.1	1.8
Northern station group	D1b	< 0.1	10.0	38.5	51.5	SANDY MUD	SILTY CLAY	45.4	1.9
	D2b	< 0.1	11.4	36.3	52.3	SANDY MUD	SILTY CLAY	46.5	1.9
	D3b	< 0.1	9.4	46.2	44.4	MUD	CLAYEY SILT	44.7	1.8
	D4b	< 0.1	13.8	43.2	43.0	SANDY MUD	CLAYEY SILT	45.5	1.8
	D5b	< 0.1	9.6	46.5	43.9	MUD	CLAYEY SILT	47.8	1.9
Blanks	D6a	< 0.1	6.5	47.9	45.6	MUD	CLAYEY SILT	50.1	1.9
	D6b	< 0.1	7.2	43.5	49.3	MUD	SILTY CLAY	42.6	1.9
	D7b	< 0.1	13.9	37.1	49.0	SANDY MUD	SILTY CLAY	36.3	1.9
Reference stations	Othonoi-Ref	< 0.1	0.1	48.9	51.1	MUD	SILTY CLAY	48.4	1.8
	Kerkyra-Ref	< 0.1	4.6	46.1	49.3	MUD	SILTY CLAY	48.2	1.9
	Italy-Ref	< 0.1	23.5	31.8	44.7	SANDY MUD	SILTY CLAY	44.0	1.7

3.3.2.2.2 Chemical characteristics of sediment

3.3.2.2.2.1 Organic carbon, carbonates and nutrients (TN and TP)

Total Organic Carbon (TOC) concentrations were generally low throughout the study area and frequently below the analytical LoQ. Around Asopus-1A, only D3a and D4a yielded quantifiable concentrations (0.18 and 0.19 % d.s., respectively), while the remaining stations were below the LoQ, resulting in an average concentration of 0.10 ± 0.07 % d.s. Around Northern station group, TOC was quantifiable at four of the five stations, with a maximum of 0.78 % d.s. at D3b and an average of 0.41 ± 0.26 % d.s., the highest among the investigated station groups. Blank stations exhibited intermediate values, ranging from < LoQ at D7b to 0.41 % d.s. at D6a (average: 0.19 ± 0.19 % d.s.). At the Reference Stations, TOC varied between < LoQ at Othonoi Ref and 0.52 % d.s. at Italy Ref, averaging 0.35 ± 0.26 % d.s. Overall, TOC concentrations remained low across the study area, with slightly higher values at Northern station group and the Reference Stations.

Carbonate content showed limited variability and consistently moderate concentrations. Around Asopus-1A, values ranged from 32 % at D3a to 34 % at D1a and D2a, with an average of 33.2 ± 0.8 % d.s. Slightly lower concentrations characterized Northern station group, ranging between 26 % at D3b and 30 % at D2b (average: 28.2 ± 1.5 % d.s.). Blank stations showed intermediate values between 28 % and 33 % (average: 30.7 ± 2.5 % d.s.). Similarly, the Reference Stations ranged from 27 % at Kerkyra Ref to 32 % at Othonoi Ref, averaging 30.0 ± 2.6 % d.s. Overall, carbonate contents were broadly comparable among station groups, with slightly higher values at Asopus-1A.

Total Nitrogen (N-Tot) concentrations exhibited relatively limited variability throughout the study area. Around Asopus-1A, values ranged from 0.29 % d.s. at D2a to 0.32 % d.s. at D1a, D4a and D5a, averaging 0.31 ± 0.01 % d.s. Similar concentrations were observed at the Blank stations (0.26 – 0.35 % d.s.; average: 0.31 ± 0.05 % d.s.) and around Northern station group (0.22 – 0.37 % d.s.; average: 0.28 ± 0.06 % d.s.). Greater variability was observed among the Reference Stations, where concentrations ranged from 0.19 % d.s. at Kerkyra Ref to 0.64 % d.s. at Italy Ref, yielding an average of 0.36 ± 0.24 % d.s. Excluding Italy Ref, N-Tot concentrations were broadly comparable across all station groups.

Total Phosphorus (P-Tot) concentrations were similarly homogeneous throughout the study area. Around Asopus-1A, values ranged from 365 mg kg⁻¹ d.s. at D4a to 447 mg kg⁻¹ d.s. at D5a, with an average of 398 ± 33 mg kg⁻¹ d.s. Around Northern station group, concentrations varied between 371 mg kg⁻¹ d.s. at D1b and 396 mg kg⁻¹ d.s. at D3b, averaging 385 ± 10 mg kg⁻¹ d.s. Blank stations showed a somewhat wider range (332 – 404 mg kg⁻¹ d.s.), with an average of 366 ± 36 mg kg⁻¹ d.s. Among the Reference Stations, concentrations ranged from 312 mg kg⁻¹ d.s. at Italy Ref to 402 mg kg⁻¹ d.s. at Othonoi Ref (average: 354 ± 45 mg kg⁻¹ d.s.). Overall, P-Tot content exhibited limited spatial variability and no clear differences between well-site, Blank and Reference Station groups.

Concentrations of TOC, N-Tot, and P-Tot are reported in Table 3-25 and graphically presented in Figure 3-115 and Figure 3-116.

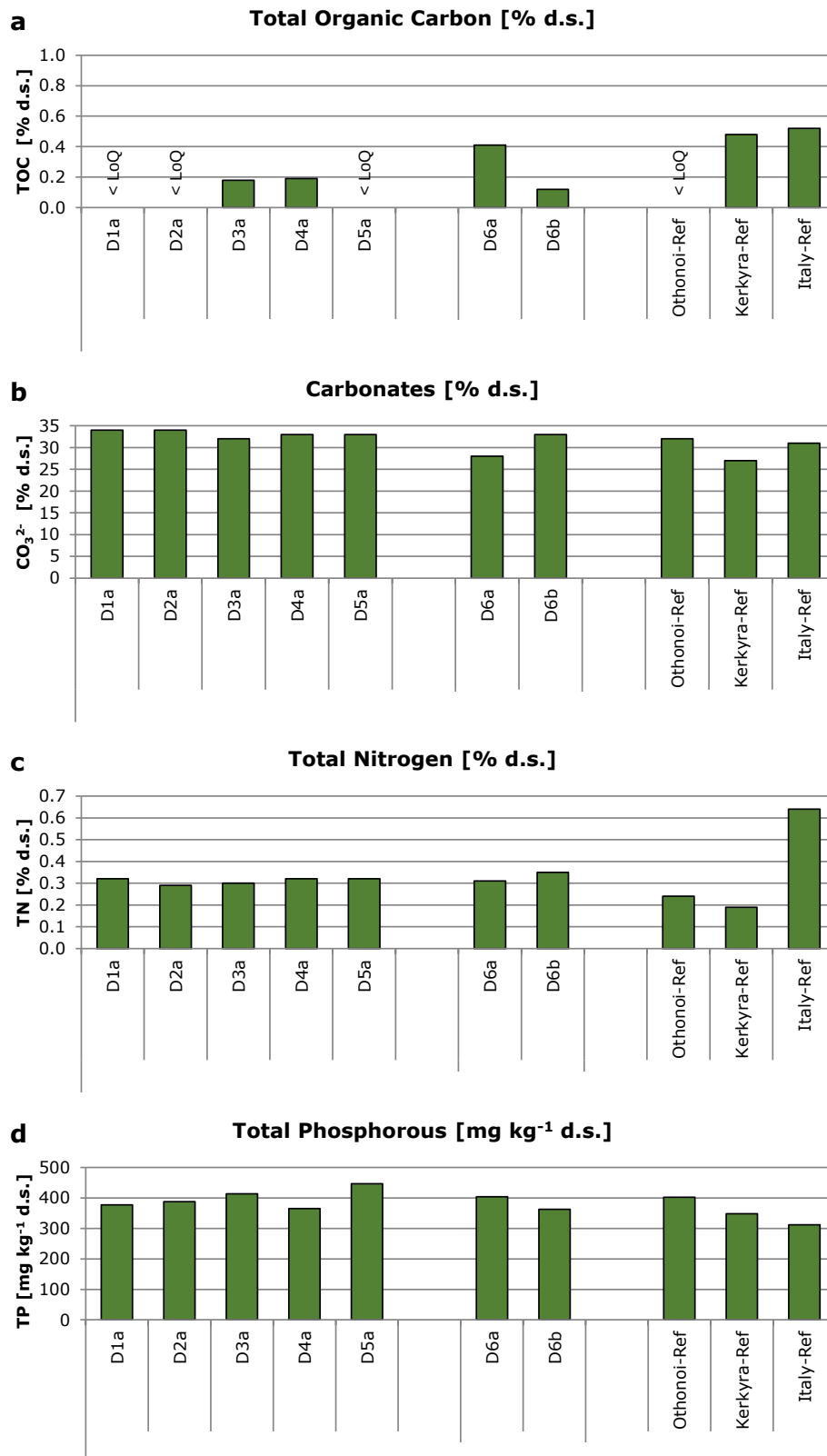


Figure 3-115: TOC, N-Tot, and P-Tot concentrations in surface sediments collected at the Asopus-1A station group; each panel includes the respective Blank Stations and all three Reference Stations

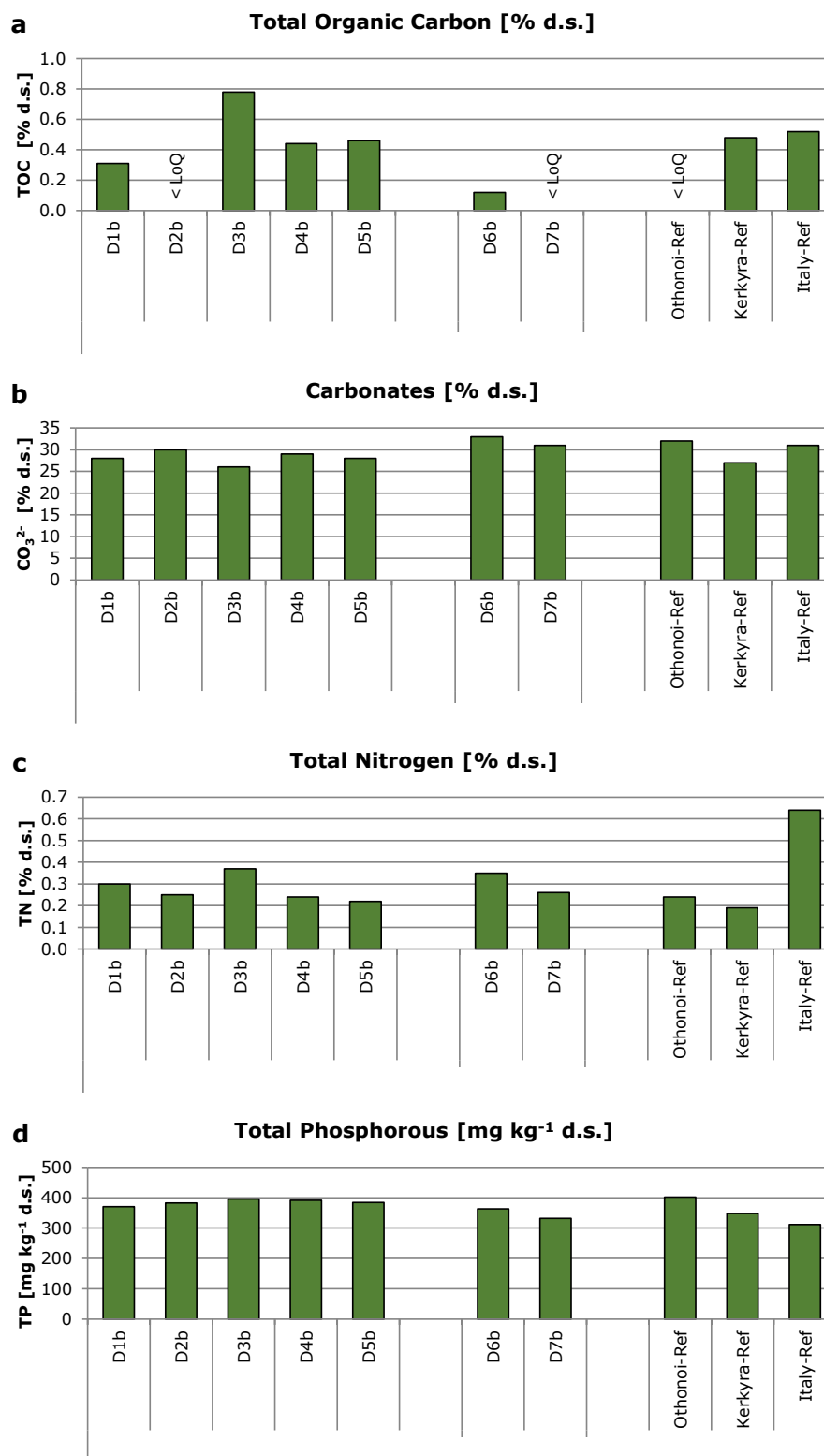


Figure 3-116: TOC, N-Tot, and P-Tot concentrations in surface sediments collected at the Northern station group; each panel includes the respective Blank Stations and all three Reference Stations

Table 3-25: TOC, Total Nitrogen (N-Tot) and Total Phosphorous (P-Tot) content in surface sediments

SITE	STATION ID	ORGANIC CARBON, CARBONATES AND NUTRIENTS			
		TOC	CARBONATES	N-TOT	P-TOT
M.U.		(% D.S.)			(MG/KG D.S.)
ASOPUS -1A station group	D1a	< 0.1	34	0.32	377
	D2a	< 0.1	34	0.29	388
	D3a	0.18	32	0.30	414
	D4a	0.19	33	0.32	365
	D5a	< 0.1	33	0.32	447
Northern station group	D1b	0.31	28	0.30	371
	D2b	< 0.1	30	0.25	383
	D3b	0.78	26	0.37	396
	D4b	0.44	29	0.24	392
	D5b	0.46	28	0.22	384
Blanks	D6a	0.41	28	0.31	404
	D6b	0.12	33	0.35	363
	D7b	< 0.1	31	0.26	332
Reference stations	Othonoi-Ref	< 0.1	32	0.24	402
	Kerkyra-Ref	0.48	27	0.19	348
	Italy-Ref	0.52	31	0.64	312

3.3.2.2.2.2 Metals and metalloids

Among the investigated metals and metalloids, Cr VI was consistently below the analytical LoQ at all stations. Tin (Sn) was also predominantly below the LoQ, with only two quantifiable concentrations recorded and a maximum of 1.04 mg kg⁻¹ d.s. at Othonoi Ref. Mercury (Hg) was largely below the LoQ as well, with only sporadic detections and a maximum concentration of 0.12 mg kg⁻¹ d.s. at D6a. Cadmium (Cd), although quantifiable at all stations, occurred at uniformly low concentrations, ranging from 0.064 mg kg⁻¹ d.s. at Kerkyra Ref to 0.150 mg kg⁻¹ d.s. at both D2a and D6a.

The highest concentrations were recorded for Aluminium (Al) and Iron (Fe), both occurring within the order of magnitude of 10⁴ mg kg⁻¹ d.s. Al ranged from 9750 mg kg⁻¹ d.s. at Italy Ref to 27400 mg kg⁻¹ d.s. at Othonoi Ref, with average concentrations of 20060 ± 4725 mg kg⁻¹ d.s. around Asopus-1A, 23480 ± 1933 mg kg⁻¹ d.s. around Northern station group, 18333 ± 4852 mg kg⁻¹ d.s. at the Blank stations and 18617 ± 8825 mg kg⁻¹ d.s. at the Reference Stations. Fe showed a comparable distribution, ranging from 14300 mg kg⁻¹ d.s. at Italy Ref to 26300 mg kg⁻¹ d.s. at D5a, with average concentrations of 22380 ± 2963 mg kg⁻¹ d.s., 22000 ± 1271 mg kg⁻¹ d.s., 20133 ± 1250 mg kg⁻¹ d.s. and 19233 ± 4636 mg kg⁻¹ d.s. for Asopus-1A, Northern station group, Blank and Reference Stations, respectively.

Most of the remaining quantified elements occurred within the order of magnitude of 10¹ mg kg⁻¹ d.s. Arsenic (As) ranged from 4.4 mg kg⁻¹ d.s. at D6a to 14.0 mg kg⁻¹ d.s. at D5a, with average concentrations of 9.58 ± 3.69 mg kg⁻¹ d.s. around Asopus-1A, 12.40 ± 0.55 mg kg⁻¹ d.s. around Northern station group, 9.47 ± 4.39 mg kg⁻¹ d.s. at the Blank stations and 12.00 ± 1.00 mg kg⁻¹ d.s. at the Reference Stations. Barium

(Ba) ranged from 21.3 mg kg⁻¹ d.s. at Italy Ref to 77.6 mg kg⁻¹ d.s. at D6a, averaging 43.06 ± 3.62, 48.42 ± 4.26, 50.97 ± 23.21 and 37.00 ± 16.01 mg kg⁻¹ d.s. across the four station groups, respectively.

Copper (Cu) ranged from 11 mg kg⁻¹ d.s. at Italy Ref to 26 mg kg⁻¹ d.s. at D4b. Average concentrations were 16.20 ± 2.28 mg kg⁻¹ d.s. around Asopus-1A, 22.00 ± 2.45 mg kg⁻¹ d.s. around Northern station group, 19.00 ± 3.61 mg kg⁻¹ d.s. at the Blank stations and 19.00 ± 7.21 mg kg⁻¹ d.s. at the Reference Stations. Lead (Pb) ranged from 10 mg kg⁻¹ d.s. at D4a to 20 mg kg⁻¹ d.s. at D5b and Othonoi Ref, with average concentrations of 12.80 ± 2.17, 17.40 ± 1.95, 13.33 ± 1.15 and 16.33 ± 4.04 mg kg⁻¹ d.s. for Asopus-1A, Northern station group, Blank and Reference Stations, respectively. Nickel (Ni) ranged from 21.1 mg kg⁻¹ d.s. at Italy Ref to 62.6 mg kg⁻¹ d.s. at Othonoi Ref, averaging 41.96 ± 2.88, 49.50 ± 2.37, 43.10 ± 4.55 and 45.17 ± 21.53 mg kg⁻¹ d.s., respectively. Total Chromium (Cr-Tot) varied between 21 mg kg⁻¹ d.s. at Italy Ref and 67 mg kg⁻¹ d.s. at Othonoi Ref, with average concentrations of 45.20 ± 4.97, 51.60 ± 2.97, 44.67 ± 3.51 and 45.00 ± 23.07 mg kg⁻¹ d.s., respectively. Vanadium (V) ranged from 24 mg kg⁻¹ d.s. at Italy Ref to 58 mg kg⁻¹ d.s. at Othonoi Ref, averaging 38.80 ± 6.14, 46.00 ± 3.67, 35.33 ± 8.62 and 40.33 ± 17.04 mg kg⁻¹ d.s., respectively. Zinc (Zn) ranged from 42 mg kg⁻¹ d.s. at Italy Ref to 78 mg kg⁻¹ d.s. at Othonoi Ref, with average concentrations of 55.40 ± 5.46, 60.40 ± 3.78, 55.67 ± 7.02 and 59.00 ± 18.08 mg kg⁻¹ d.s. for the four station groups.

Overall, Northern station group generally exhibited slightly higher concentrations than Asopus-1A and the Blank stations, whereas the Reference Stations were more heterogeneous due to the comparatively lower concentrations observed at Italy Ref.

For assessment purposes, concentrations were compared with the Sediment Quality Guidelines adopted in Greece (HCMR), based on the ERL values proposed by Long et al. (1995), and with the Italian Environmental Quality Standards (SQA-MA) reported in Legislative Decree (D.Lgs) No. 172/2015. Arsenic (As) exceeded the HCMR ERL value (8.2 mg kg⁻¹ d.s.) at most stations, with the only exceptions being D3a, D4a and D6a; it also exceeded the Italian SQA-MA value reported in Table 3/B (12 mg kg⁻¹ d.s.) at D1a, D5a, D3b, D5b and Othonoi Ref. Nickel (Ni) exceeded the HCMR ERL value (20.9 mg kg⁻¹ d.s.) at all investigated stations. Total Chromium (Cr-Tot) exceeded the Italian SQA-MA value reported in Table 3/B (50 mg kg⁻¹ d.s.) at D5a, D3b, D4b, D5b and Othonoi Ref. All remaining investigated metals and metalloids remained below the applicable regulatory threshold values.

Individual concentrations of metals and metalloids are reported in Table 3-26 and Table 3-27 and graphically represented from Figure 3-117 to Figure 3-122, with exceedances of the applicable threshold levels explicitly highlighted. For consistency across tables and figures, concentrations exceeding the applicable reference values are highlighted using a regulatory-specific colour scheme. In graphical representations, each applicable environmental quality standard and/or threshold value is identified by a coloured horizontal reference line, while in tables the same colour coding is applied to values exceeding the corresponding criterion. Where identical threshold values occur under different regulatory frameworks, a single colour code and reference line are adopted, following the HCMR Sediment Quality Guidelines (Greece).

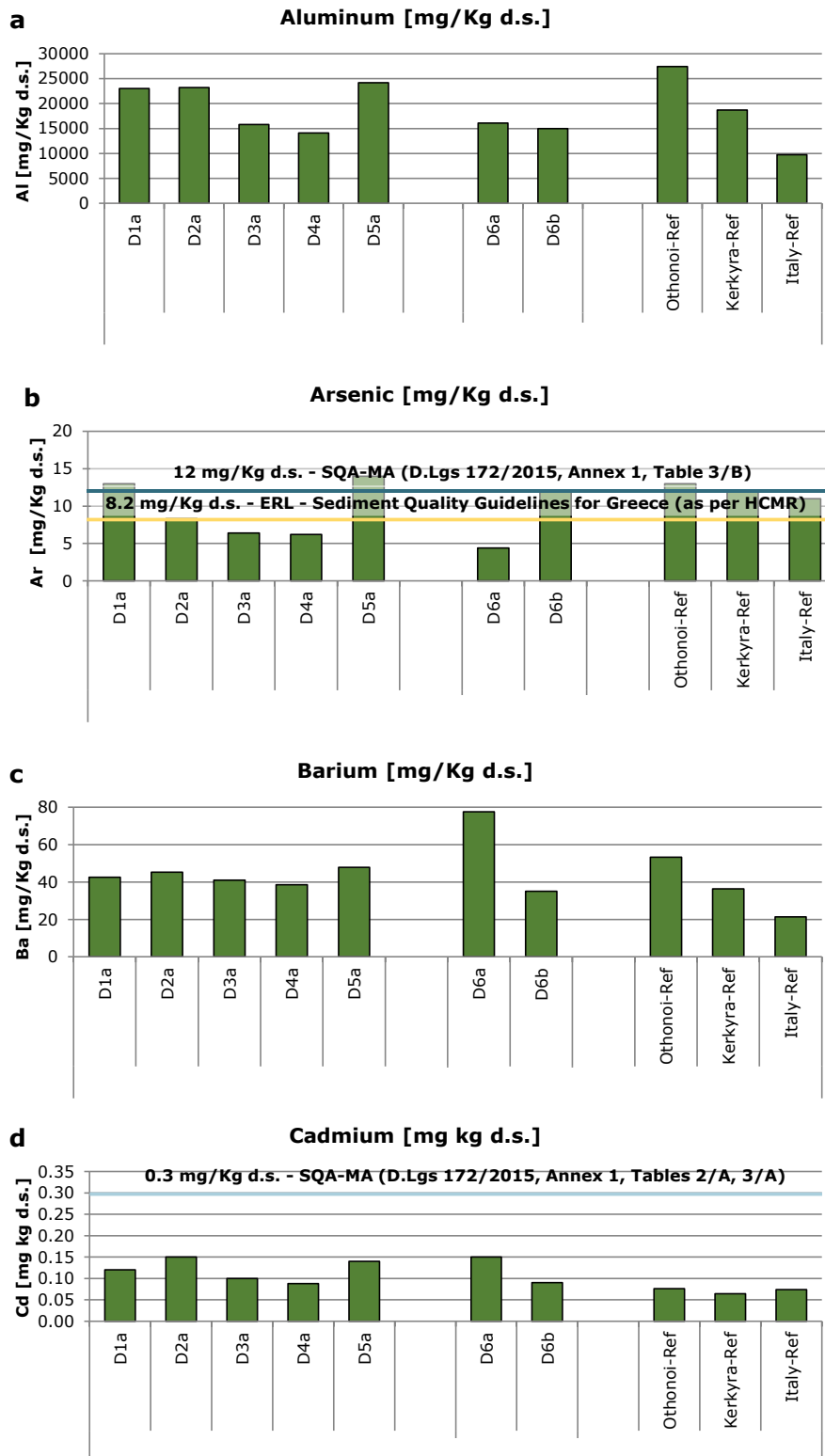


Figure 3-117: Metal and metalloid concentrations in surface sediments collected at the Asopus-1A station group: Al (a), As (b), Ba (c) and Cd (d). Each panel includes the associated Blank Stations and all three Reference Stations

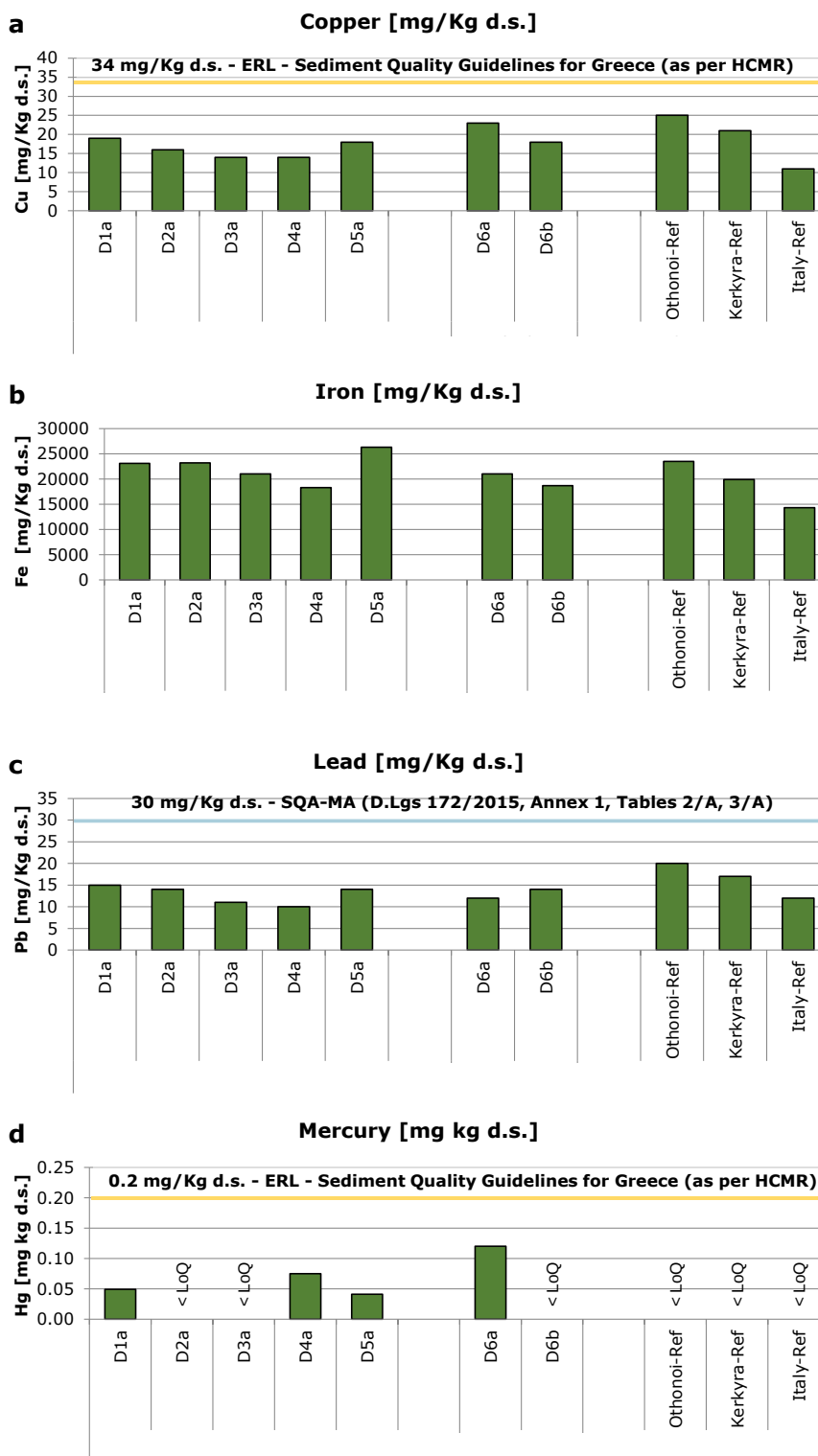


Figure 3-118: Metal and metalloid concentrations in surface sediments collected at the Asopus-1A station group: Cu (a), Fe (b), Pb (c) and Hg (d). Each panel includes the associated Blank Stations and all three Reference Stations

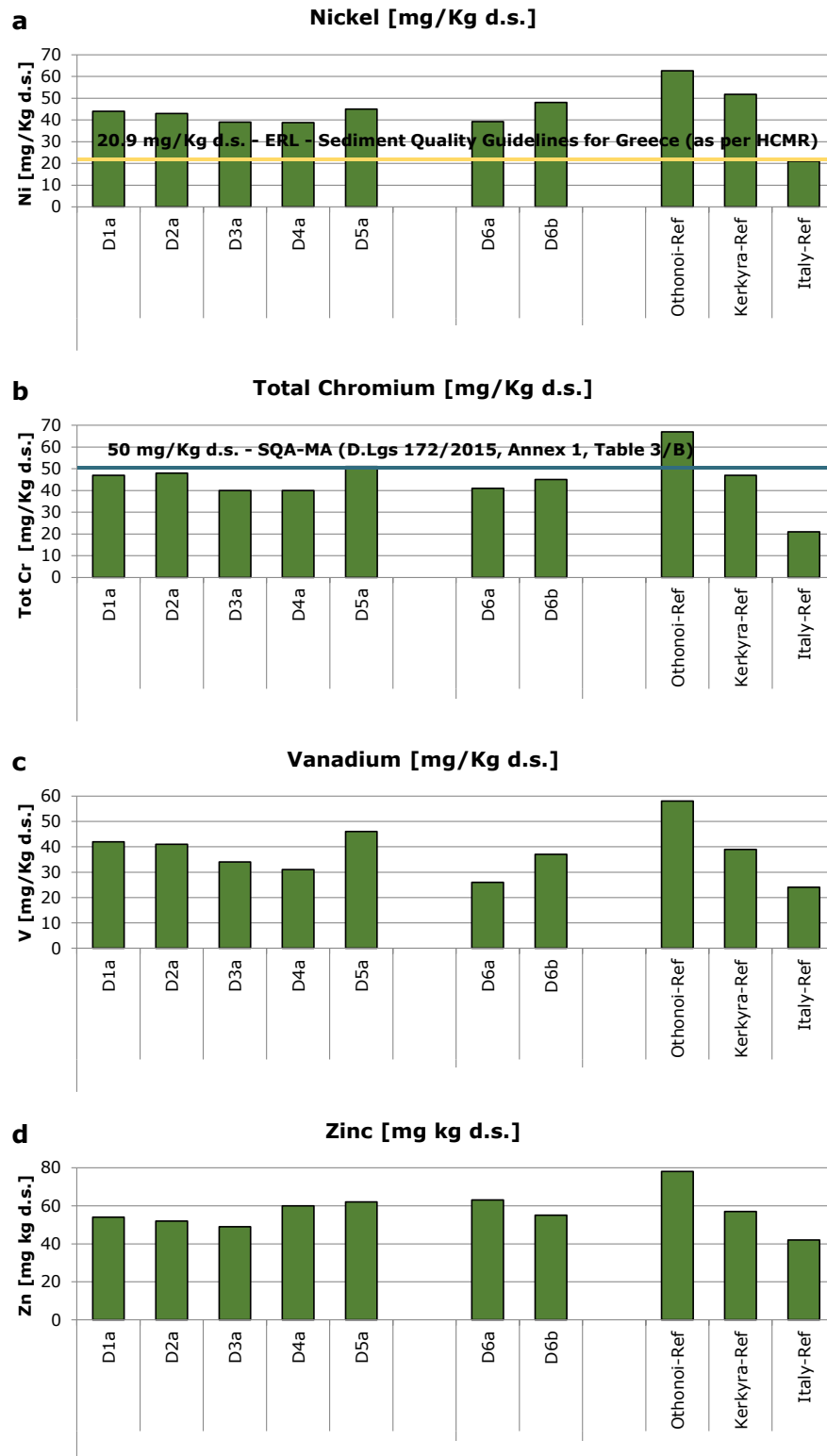


Figure 3-119: Metal and metalloid concentrations in surface sediments collected at the Asopus-1A station group: Ni (a), Cr-Tot (b), V (c) and Zn (d). Each panel includes the associated Blank Stations and all three Reference Stations

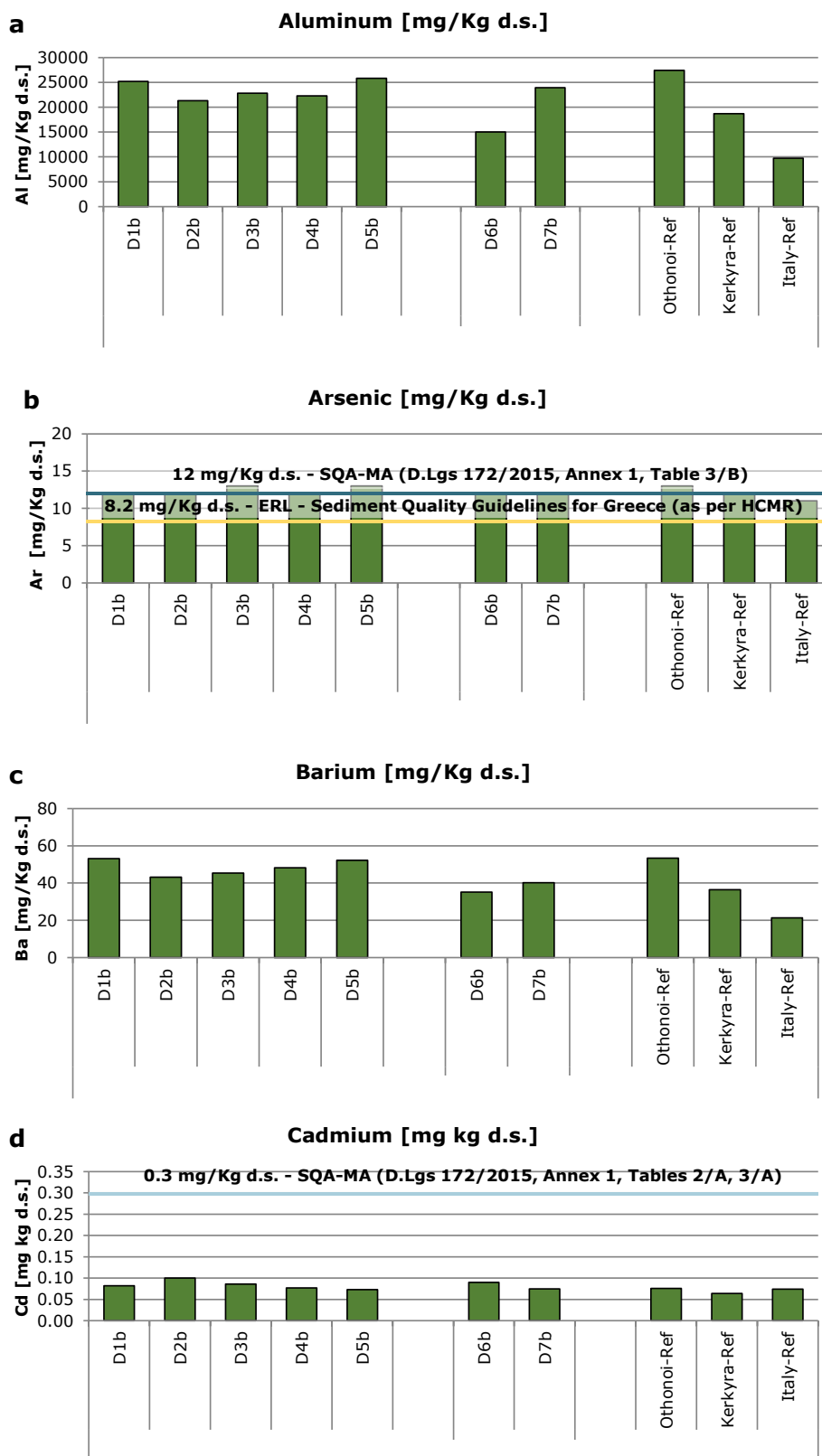


Figure 3-120: Metal and metalloid concentrations in surface sediments collected at the northern station group: Al (a), As (b), Ba (c) and Cd (d). Each panel includes the associated Blank Stations and all three Reference Stations

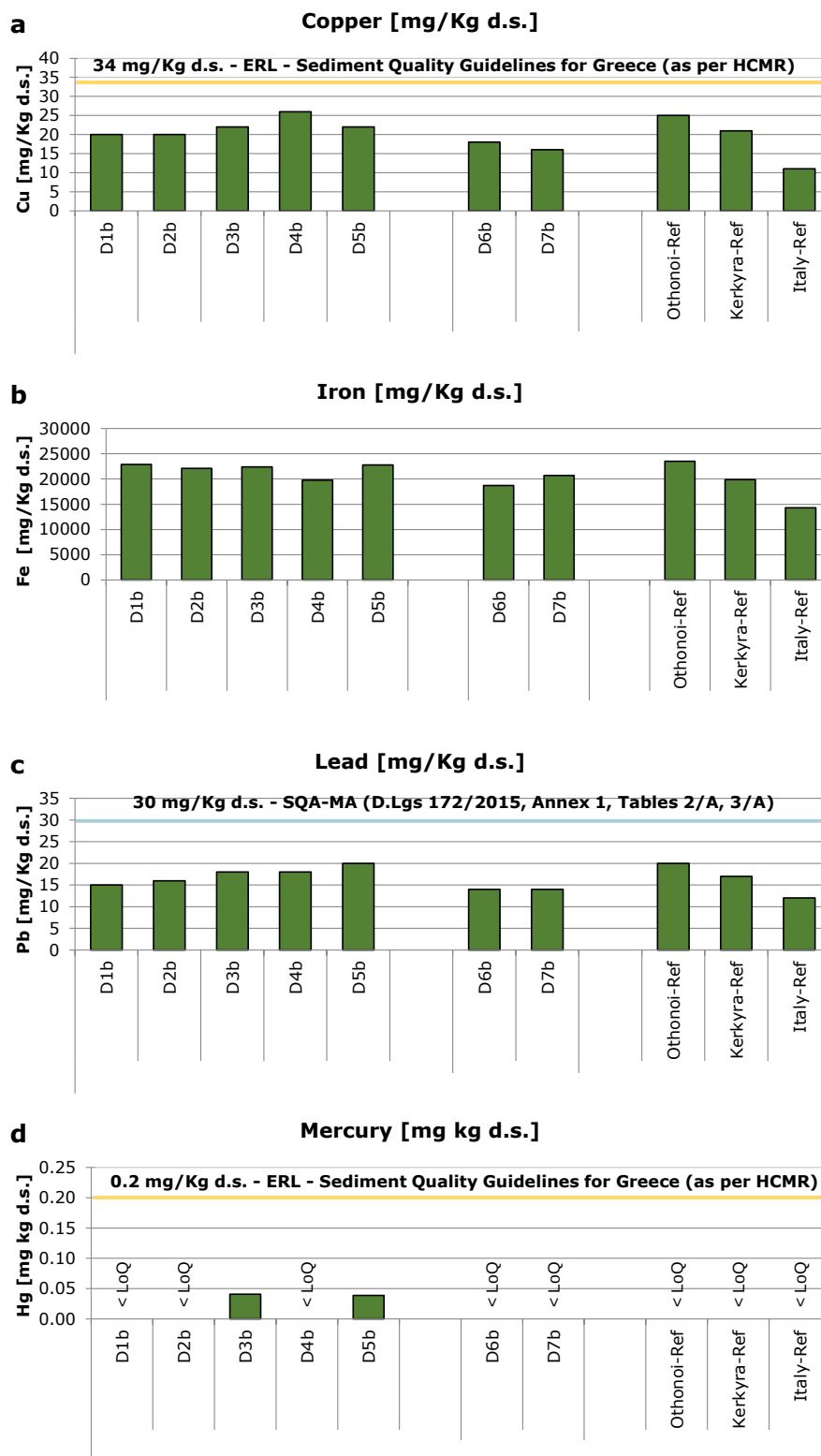


Figure 3-121: Metal and metalloid concentrations in surface sediments collected at the northern station group: Cu (a), Fe (b), Pb (c) and Hg (d). Each panel includes the associated Blank Stations and all three Reference Stations

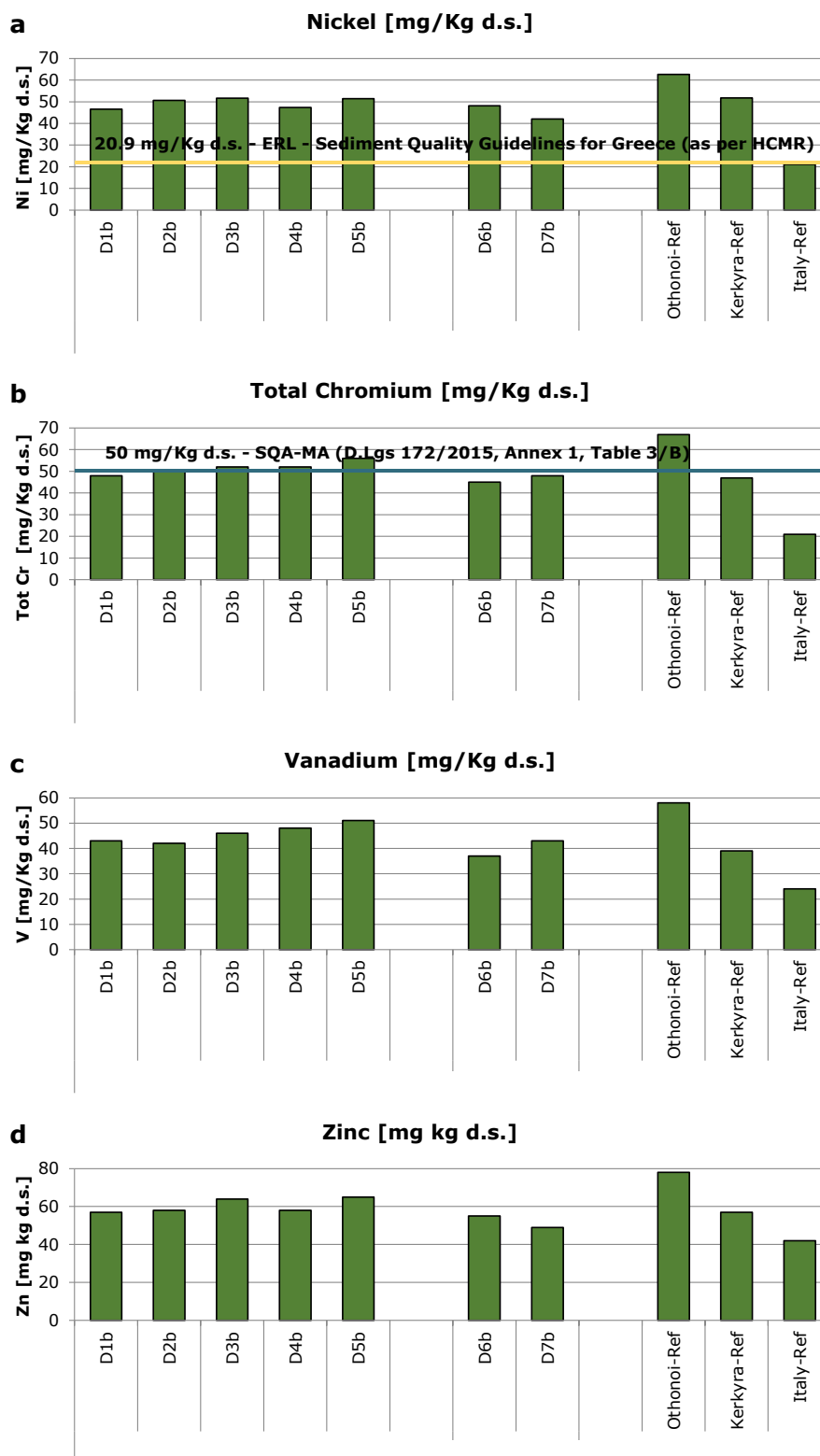


Figure 3-122: Metal and metalloid concentrations in surface sediments collected at the northern station group: Ni (a), Cr-Tot (b), V (c) and Zn (d). Each panel includes the associated Blank Stations and all three Reference Stations

Table 3-26: Concentrations of Metals and Metalloids in surface sediments

SITE	STATION ID	ORGANIC CARBON, CARBONATES AND NUTRIENTS						
		ALUMINUM	ARSENIC	BARIUM	CADMIUM	CHROMIUM VI	COPPER	IRON
M.U.		MG/KG D.S.						
ASOPUS -1A station group	D1a	23000	13.0	42.6	0.120	< 0.1	19	23100
	D2a	23200	8.3	45.2	0.150	< 0.1	16	23200
	D3a	15800	6.4	41.0	0.100	< 0.1	14	21000
	D4a	14100	6.2	38.6	0.088	< 0.1	14	18300
	D5a	24200	14.0	47.9	0.140	< 0.1	18	26300
Northern station group	D1b	25200	12.0	53.1	0.082	< 0.1	20	22900
	D2b	21300	12.0	43.2	0.100	< 0.1	20	22100
	D3b	22800	13.0	45.4	0.086	< 0.1	22	22400
	D4b	22300	12.0	48.2	0.077	< 0.1	26	19800
	D5b	25800	13.0	52.2	0.073	< 0.1	22	22800
Blanks	D6a	16100	4.4	77.6	0.150	< 0.1	23	21000
	D6b	15000	12.0	35.1	0.090	< 0.1	18	18700
	D7b	23900	12.0	40.2	0.075	< 0.1	16	20700
Reference stations	Othonoi-Ref	27400	13.0	53.3	0.076	< 0.1	25	23500
	Kerkyra-Ref	18700	12.0	36.4	0.064	< 0.1	21	19900
	Italy-Ref	9750	11.0	21.3	0.074	< 0.1	11	14300
Sediment Quality Guidelines for Greece (as per HCMR). In the absence of European or national legislation, the ERL values from Long et al., 1995 are used as general reference limits								
ERL (Effects Range-Low)		n.d.	8.2	n.d.	1.2	n.d.	34.0	n.d.
Legislative Decree No. 172/2015 (Annex 1, Tables 2/A, Table 3/A and 3/B)								
SQA-MA (Tab 2/A)		n.d.	n.d.	n.d.	0.3	n.d.	n.d.	n.d.
SQA-MA (Tab 3/A)		n.d.	n.d.	n.d.	0.3	n.d.	n.d.	n.d.
SQA-MA (Tab 3/B)		n.d.	12	n.d.	n.d.	2	n.d.	n.d.

Table 3-27: Concentrations of Metals and Metalloids in surface sediments

SITE	STATION ID	ORGANIC CARBON, CARBONATES AND NUTRIENTS						
		LEAD	MERCURY	NICKEL	TIN	TOTAL CHROMIUM	VANADIUM	ZINC
M.U.		MG/KG D.S.						
ASOPUS -1A station group	D1a	15	0.049	44.0	< 1	47	42	54
	D2a	14	< 0.03	43.0	< 1	48	41	52
	D3a	11	< 0.03	39.0	< 1	40	34	49
	D4a	10	0.075	38.8	< 1	40	31	60
	D5a	14	0.041	45.0	< 1	51	46	62
No	D1b	15	< 0.03	46.6	< 1	48	43	57

SITE	STATION ID	ORGANIC CARBON, CARBONATES AND NUTRIENTS						
		LEAD	MERCURY	NICKEL	TIN	TOTAL CHROMIUM	VANADIUM	ZINC
	D2b	16	< 0.03	50.6	< 1	50	42	58
	D3b	18	0.041	51.6	< 1	52	46	64
	D4b	18	< 0.03	47.3	< 1	52	48	58
	D5b	20	0.039	51.4	1.01	56	51	65
Blanks	D6a	12	0.12	39.2	< 1	41	26	63
	D6b	14	< 0.03	48.1	< 1	45	37	55
	D7b	14	< 0.03	42.0	< 1	48	43	49
Reference stations	Othonoi-Ref	20	< 0.03	62.6	1.04	67	58	78
	Kerkyra-Ref	17	< 0.03	51.8	< 1	47	39	57
	Italy-Ref	12	< 0.03	21.1	< 1	21	24	42
Sediment Quality Guidelines for Greece (as per HCMR). In the absence of European or national legislation, the ERL values from Long et al., 1995 are used as general reference limits								
ERL (Effects Range-Low)		n.d.	8.2	n.d.	1.2	n.d.	34.0	n.d.
Legislative Decree No. 172/2015 (Annex 1, Tables 2/A, Table 3/A and 3/B)								
SQA-MA (Tab 2/A)		n.d.	n.d.	n.d.	0.3	n.d.	n.d.	n.d.
SQA-MA (Tab 3/A)		n.d.	n.d.	n.d.	0.3	n.d.	n.d.	n.d.
SQA-MA (Tab 3/B)		n.d.	12	n.d.	n.d.	2	n.d.	n.d.

3.3.2.2.2.3 Total hydrocarbons ($C \leq 12$ – $C > 12$)

The light hydrocarbon fraction ($C \leq 12$) remained consistently below the analytical LoQ at all investigated stations. In contrast, the heavier hydrocarbon fraction ($C > 12$) was quantifiable throughout most of the study area, although always at relatively low concentrations.

Around the Asopus-1A well area, $C > 12$ hydrocarbons ranged from 15.0 mg kg⁻¹ d.s. at D2a and D5a to 20.0 mg kg⁻¹ d.s. at D4a, with an average concentration of 17.2 ± 2.4 mg kg⁻¹ d.s. Around Northern station group, concentrations varied between 13.0 mg kg⁻¹ d.s. at D4b and D5b and 15.0 mg kg⁻¹ d.s. at D2b and D3b, yielding an average of 14.0 ± 1.0 mg kg⁻¹ d.s. Blank stations exhibited values ranging from 8.5 mg kg⁻¹ d.s. at D7b to 16.0 mg kg⁻¹ d.s. at D6a, with an average of 12.2 ± 3.8 mg kg⁻¹ d.s. Reference Stations showed a concentration below the LoQ at Italy Ref and a maximum of 14.0 mg kg⁻¹ d.s. at Kerkyra Ref; the corresponding average concentration was 9.5 ± 4.9 mg kg⁻¹ d.s.

Given the non-detectability of lighter hydrocarbon fraction, Total Petroleum Hydrocarbons (TPH) concentrations entirely reflected the contribution of the heavier fraction ($C > 12$). Consequently, TPH exhibited the same minimum and maximum concentrations, identical spatial distribution patterns, and the same average values and standard deviations reported for the $C > 12$ fraction.

Overall, concentrations showed limited spatial variability and no consistent differences among well-site, Blank and Reference Stations. The highest concentrations were recorded around the Asopus-1A well area, whereas the lowest values occurred at Italy Ref.

Neither the Greek Sediment Quality Guidelines adopted by HCMR nor the Italian Environmental Quality Standards (D.Lgs 172/2015) provide threshold values for the investigated hydrocarbon fractions or TPH in marine sediments. Therefore, no comparison with regulatory reference values was possible and no exceedances could be identified.

Concentrations of both hydrocarbon fractions are reported in Table 3-28, whereas only C > 12 and TPH concentrations are graphically presented, as they were analytically detected (Figure 3-123 and Figure 3-124).

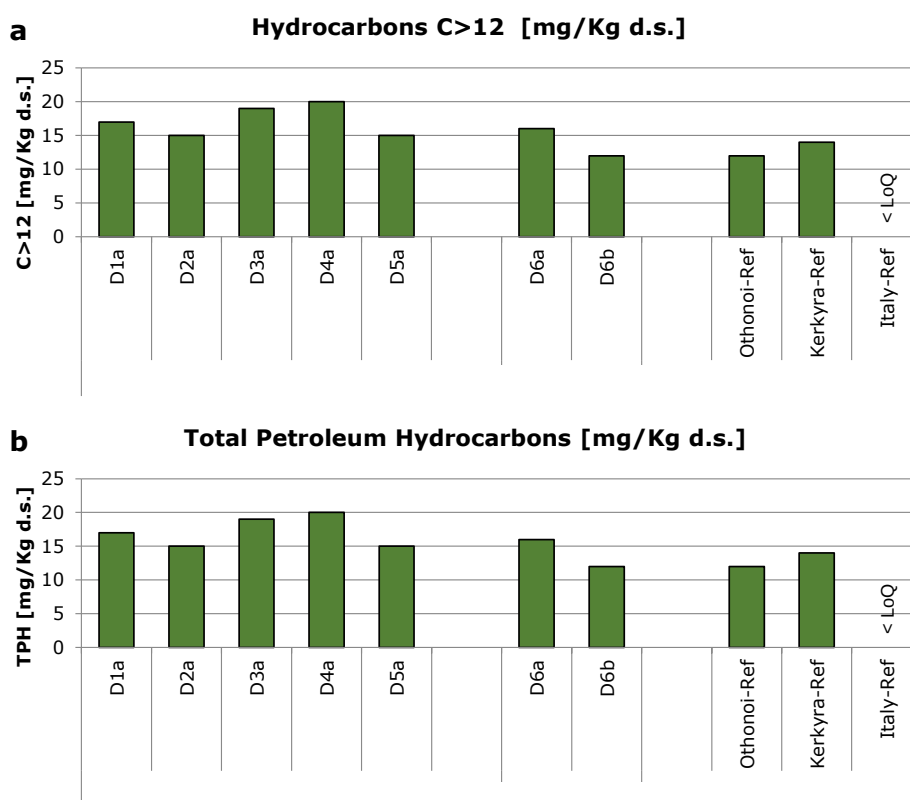


Figure 3-123: Hydrocarbons in surface sediments collected at the Asopus-1A station group: C>12 (a), Total Petroleum Hydrocarbons (TPH) (b). Each panel includes the associated Blank Stations and all three Reference Stations

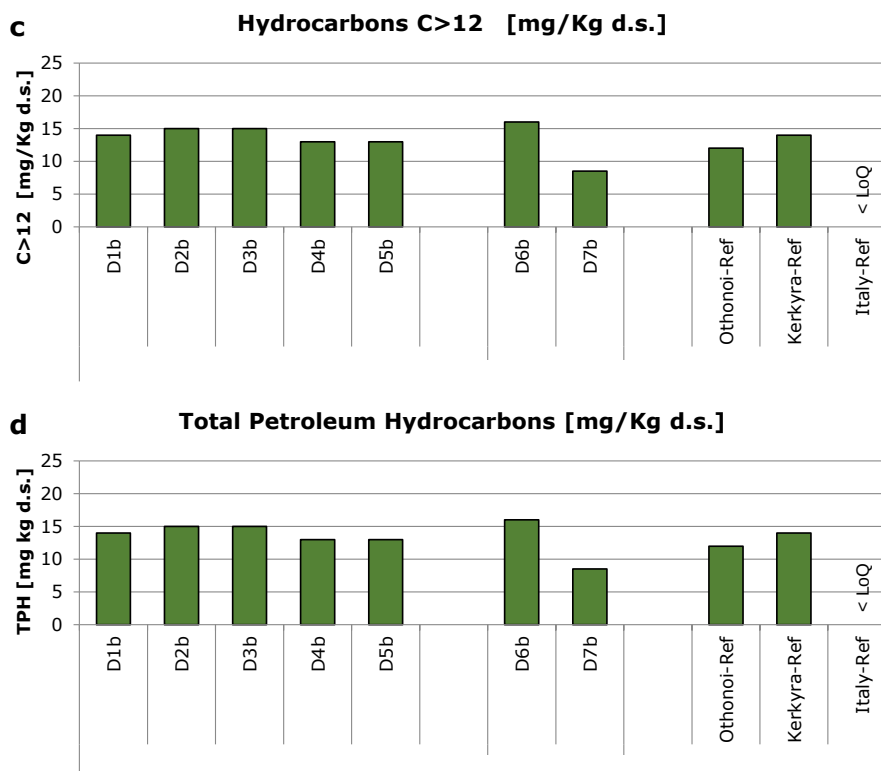


Figure 3-124: Hydrocarbons in surface sediments collected at the northern station group: C>12 (a), Total Petroleum Hydrocarbons (TPH) (b). Each panel includes the associated Blank Stations and all three Reference Stations

Table 3-28: Concentrations of Hydrocarbon Fractions (C≤12, C>12) and their sum (TPH) in surface sediments

SITE	STATION ID	PETROLEUM HYDROCARBON FRACTION AND TOTAL		
		HYDROCARBONS C≤12	HYDROCARBONS C>12	TOTAL PETROLEUM HYDROCARBONS (TPH)
M.U.		MG/KG D.S.		
ASOPUS - 1A station group	D1a	< 1	17	17
	D2a	< 1	15.0	15.0
	D3a	< 1	19.0	19.0
	D4a	< 1	20.0	20.0
	D5a	< 1	15.0	15.0
Northern station group	D1b	< 1	14.0	14.0
	D2b	< 1	15.0	15.0
	D3b	< 1	15.0	15.0
	D4b	< 1	13.0	13.0
	D5b	< 1	13.0	13.0
Blanks	D6a	< 1	16.0	16.0
	D6b	< 1	16.0	16.0

SITE	STATION ID	PETROLEUM HYDROCARBON FRACTION AND TOTAL		
		HYDROCARBONS C _{≤12}	HYDROCARBONS C _{>12}	TOTAL PETROLEUM HYDROCARBONS (TPH)
	D7b	< 1	8.5	8.5
Reference stations	Othonoi-Ref	< 1	12.0	12.0
	Kerkyra-Ref	< 1	14.0	14.0
	Italy-Ref	< 1	< 5	< 5

3.3.2.2.2.4 Polycyclic aromatic hydrocarbons

Most of the investigated PAHs were consistently below the analytical LoQ at all stations. In particular, Acenaphthene, Acenaphthylene, Anthracene, Benzo(a)pyrene, Benzo(k)fluoranthene, Dibenzo[a,h]anthracene, Fluorene and Naphthalene were never quantified.

Only eight compounds showed quantifiable concentrations in one or more samples: Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(g,h,i)perylene, Chrysene, Fluoranthene, Indeno(1,2,3-c,d)pyrene, Phenanthrene and Pyrene. Among these, Fluoranthene and Pyrene were the most frequently detected PAHs, both quantified at five stations (D3b, D4b, D6a, Kerkyra Ref and Italy Ref). Fluoranthene reached a maximum concentration of $1.8 \mu\text{g kg}^{-1}$ d.s. at both D6a and Italy Ref, averaging $0.50 \pm 0.00 \mu\text{g kg}^{-1}$ d.s. around Asopus-1A, $0.96 \pm 0.36 \mu\text{g kg}^{-1}$ d.s. around Northern station group, $0.93 \pm 0.75 \mu\text{g kg}^{-1}$ d.s. at the Blank stations and $1.27 \pm 0.55 \mu\text{g kg}^{-1}$ d.s. at the Reference Stations. Pyrene reached a maximum of $2.0 \mu\text{g kg}^{-1}$ d.s. at Italy Ref, with corresponding average concentrations of 0.50 ± 0.00 , 1.02 ± 0.43 , 0.97 ± 0.81 and $1.30 \pm 0.52 \mu\text{g kg}^{-1}$ d.s. for Asopus-1A, Northern station group, Blank and Reference Stations, respectively.

The remaining quantified PAHs were more sporadic. Chrysene reached a maximum concentration of $1.3 \mu\text{g kg}^{-1}$ d.s. at Italy Ref and was also detected at D6a, while Phenanthrene reached $1.4 \mu\text{g kg}^{-1}$ d.s. at both D6a and Kerkyra Ref. Benzo(a)anthracene was quantified only at D6a ($1.1 \mu\text{g kg}^{-1}$ d.s.). Benzo(b)fluoranthene, Benzo(g,h,i)perylene and Indeno(1,2,3-c,d)pyrene were detected exclusively at Italy Ref, where they reached concentrations of 2.6, 2.1 and $2.0 \mu\text{g kg}^{-1}$ d.s., respectively.

The Σ PAHs concentration was quantifiable only at five stations, reaching the highest values at D6a ($7.28 \mu\text{g kg}^{-1}$ d.s.) and Italy Ref ($11.70 \mu\text{g kg}^{-1}$ d.s.) and including lower values at D3b, D4b and Kerkyra Ref. Average Σ PAHs concentrations were $0.50 \pm 0.00 \mu\text{g kg}^{-1}$ d.s. around Asopus-1A, $1.26 \pm 1.05 \mu\text{g kg}^{-1}$ d.s. around Northern station group, $2.76 \pm 3.91 \mu\text{g kg}^{-1}$ d.s. at the Blank stations and $5.40 \pm 5.73 \mu\text{g kg}^{-1}$ d.s. at the Reference Stations.

Overall, PAH detections were sporadic and confined to a limited number of stations, with the highest diversity of quantified compounds and the highest Σ PAHs concentration observed at Italy Ref, followed by D6a. Comparison with the Sediment Quality Guidelines adopted in Greece by HCMR, based on the ERL values proposed by Long et al. (1995), and with the Italian Environmental Quality Standards (SQA-MA) reported in Legislative Decree (D.Lgs.) No. 172/2015 (Tables 2/A and 3/A), showed that all individual PAH concentrations and Σ PAHs values remained well below the applicable threshold values. Consequently, no exceedances were recorded at any station.

Concentrations of all analysed PAHs are reported in Table 3-29 and Table 3-30. For graphical representation, only those individual PAHs with a higher number of values exceeding the LoQ are shown, together with the summation (Σ PAHs) of all the individual PAH concentrations (Figure 3-125 and Figure 3-126).

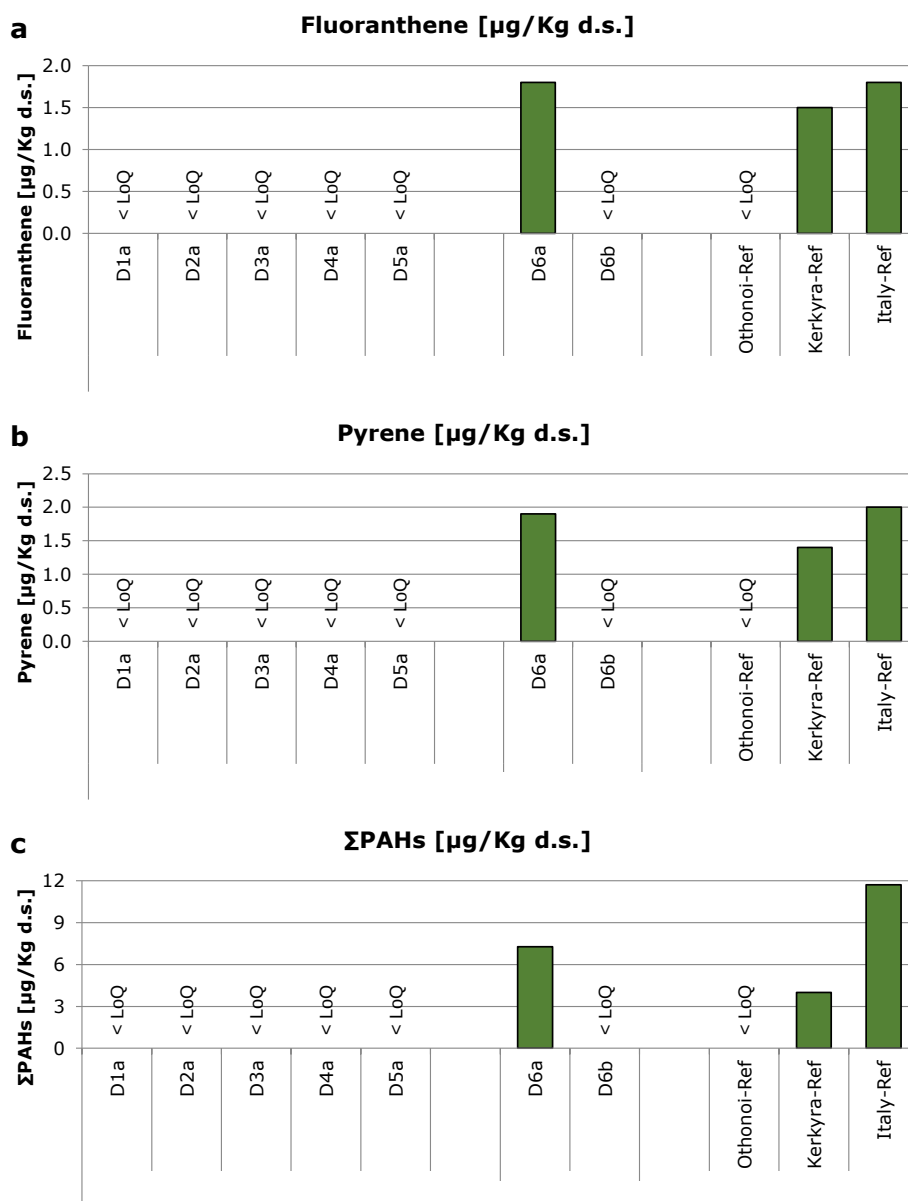


Figure 3-125: Polycyclic Aromatic Hydrocarbons (PAHs) in surface sediments collected at the Asopus-1A station group: Fluoranthene (a), Pyrene(b) and Σ PAHs (c). Each panel includes the associated Blank Stations and all three Reference Stations

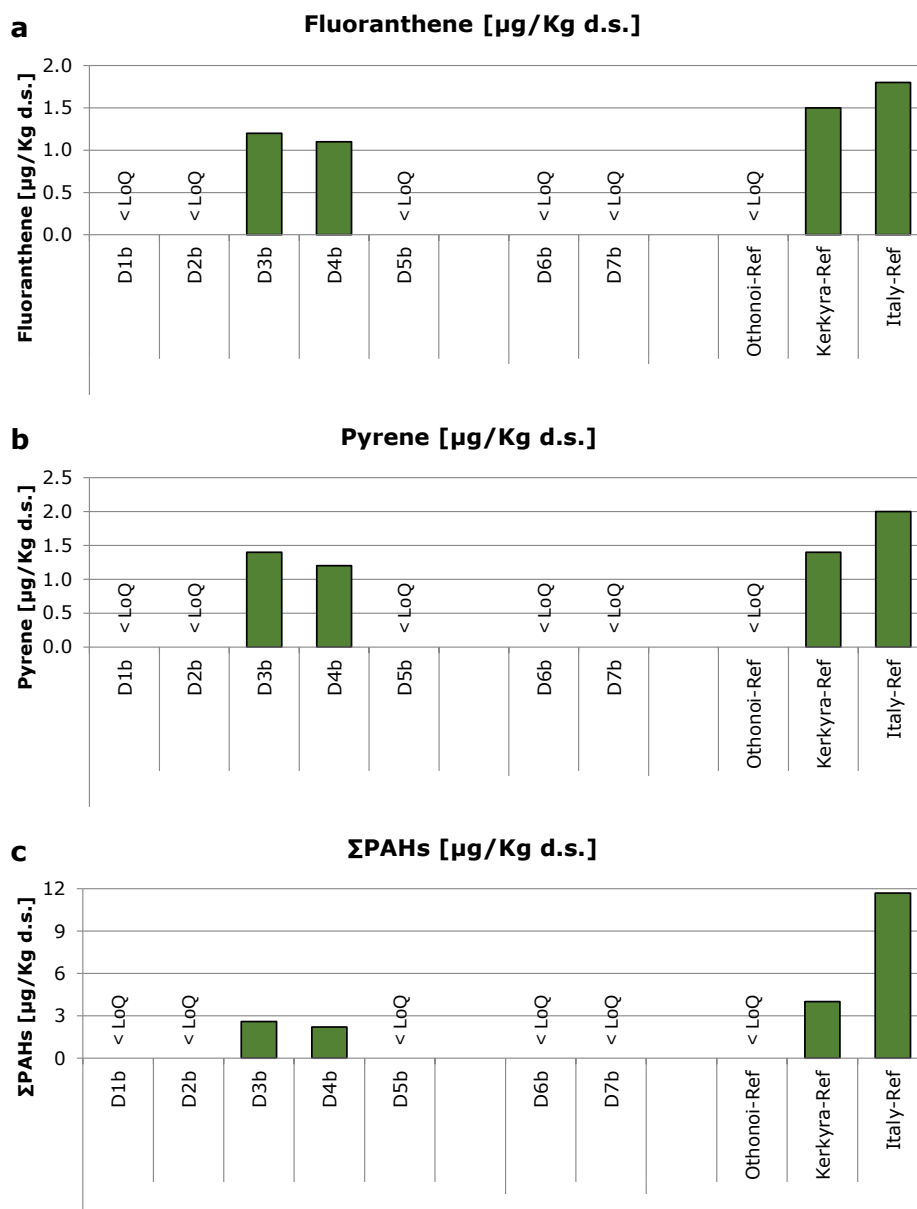


Figure 3-126: Polycyclic Aromatic Hydrocarbons (PAHs) in surface sediments collected at the northern station group: Fluoranthene (a), Pyrene(b) and Σ PAHs (c). Each panel includes the associated Blank Stations and all three Reference Stations

Table 3-29: Polycyclic Aromatic Hydrocarbons (PAHs) in surface sediments

Area	Station ID	Bottom Depth [m]	POLYCYCLIC AROMATIC HYDROCARBONS (PAHS)							
			Acenaphthene	Acenaphthylene	Anthracene	Benzo (a)anthracene	Benzo (a)pyrene	Benzo (b)fluoranthene	Benzo (g,h,i)perylene	Benzo (k)fluoranthene
M.U.										
ASOPUS -1A station group	D1a	825.75	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	D2a	831.61	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	D3a	816.32	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	D4a	823.60	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	D5a	832.24	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Northern station group	D1b	830.59	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	D2b	839.75	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	D3b	835.04	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	D4b	820.52	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	D5b	825.10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Blanks	D6a	842.94	< 1	< 1	< 1	1.10	< 1	< 1	< 1	< 1
	D6b	811.00	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	D7b	833.27	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Reference stations	Othonoi-Ref	1065.04	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	Kerkyra-Ref	1134.16	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	Italy-Ref	145.00	< 1	< 1	< 1	< 1	< 1	2.60	2.10	< 1
Sediment Quality Guidelines for Greece (as per HCMR). In the absence of European or national legislation, the ERL values from Long et al., 1995 are used as general reference limits										
ERL (Effects Range-Low)			16	44	85.3	261	430	n.d.	n.d.	n.d.
Legislative Decree No. 172/2015 (Annex 1, Tables 2/A, Table 3/A and 3/B)										
SQA-MA (Tab 2/A)			n.d.	n.d.	24	n.d.	n.d.	n.d.	n.d.	n.d.
SQA-MA (Tab 3/A)			n.d.	n.d.	24	n.d.	30	40	55	20
SQA-MA (Tab 3/B)			n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.

Table 3-30: Polycyclic Aromatic Hydrocarbons (PAHs) in surface sediments

Area	Station ID	Bottom Depth [m]	POLYCYCLIC AROMATIC HYDROCARBONS (PAHS)								
			Chrysene	Dibenzo [A,H]anthracene	Fluoranthene	Fluorene	Indeno (1,2,3-C,D)pyrene	Naphthalene	Phenanthrene	Pyrene	ΣPAHS
M.U.											
ASOPUS -1A station group	D1a	825.75	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	D2a	831.61	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	D3a	816.32	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	D4a	823.60	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	D5a	832.24	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Northern station group	D1b	830.59	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	D2b	839.75	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	D3b	835.04	< 1	< 1	1.20	< 1	< 1	< 1	< 1	1.40	2.60
	D4b	820.52	< 1	< 1	1.10	< 1	< 1	< 1	< 1	1.20	2.20
	D5b	825.10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Blanks	D6a	842.94	1.10	< 1	1.80	< 1	< 1	< 1	1.40	1.90	7.28
	D6b	811.00	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	D7b	833.27	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Reference stations	Othonoi-Ref	1065.04	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	Kerkyra-Ref	1134.16	< 1	< 1	1.50	< 1	< 1	< 1	1.10	1.40	4.00
	Italy-Ref	145.00	1.30	< 1	1.80	< 1	2.00	< 1	< 1	2.00	11.70
Sediment Quality Guidelines for Greece (as per HCMR). In the absence of European or national legislation, the ERL values from Long et al., 1995 are used as general reference limits											
ERL (Effects Range-Low)			384	63.4	600	19	n.d.	160	240	665	4200
Legislative Decree No. 172/2015 (Annex 1, Tables 2/A, Table 3/A and 3/B)											
SQA-MA (Tab 2/A)			n.d.	n.d.	n.d.	n.d.	n.d.	35	n.d.	n.d.	n.d.
SQA-MA (Tab 3/A)			n.d.	n.d.	110	n.d.	70	35	n.d.	n.d.	n.d.
SQA-MA (Tab 3/B)			n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.

3.3.2.2.3 Microplastics in sediment (qualitative analysis)

Microplastics were consistently not detected throughout all investigated stations, including Asopus-1A and Northern station group, the Blank stations and the three Reference Stations (Othonoi Ref, Kerkyra Ref and Italy Ref). Given the uniform absence of detectable microplastics, no statistical analyses could be performed, nor was any classification of polymer types, particle morphologies, size classes or colours possible.

At present, neither the Sediment Quality Guidelines adopted in Greece (HCMR) nor the Italian Environmental Quality Standards (D.Lgs. No. 172/2015) provide threshold values or environmental quality criteria for microplastics in marine sediments. Consequently, no comparison with regulatory standards could be undertaken. Nevertheless, the analytical results indicate that microplastic concentrations, if present, were below the analytical detection capability of the adopted methodology at all investigated stations.

All analytical results for organochlorine pesticides are presented in Table 3-31. Since microplastics were reported as Not Detected at all sampling stations, no graphical representation is provided.

Table 3-31: Microplastics in surface sediments (1 µm – 5 mm), qualitative identification by micro-Raman and FTIR spectroscopy

AREA	STATION ID	MICROPLASTICS (MICRO-RAMAN/FTIR)
		PRESENCE/ABSENCE/CLASSIFICATION
M.U.		
ASOPUS -1A station group	D1a	Not Detected
	D2a	Not Detected
	D3a	Not Detected
	D4a	Not Detected
	D5a	Not Detected
Northern station group	D1b	Not Detected
	D2b	Not Detected
	D3b	Not Detected
	D4b	Not Detected
	D5b	Not Detected
Blanks	D6a	Not Detected
	D6b	Not Detected
	D7b	Not Detected
Reference stations	Othonoi-Ref	Not Detected
	Kerkyra-Ref	Not Detected
	Italy-Ref	Not Detected

3.3.2.2.3 Correlation among analytical results – Sediment

Multivariate analyses performed on bathyal marine sediments from the investigated area reveal an environmental structure strongly controlled by the interaction of sedimentological, geochemical, and biogeochemical factors typical of deep-sea systems in the eastern Mediterranean. These environments are characterized by high oligotrophy, physical stability, and limited organic matter availability, conditions that

represent the main limiting factors for the structure and functioning of deep benthic ecosystems (Danovaro et al., 2010).

Correlation matrix analysis revealed a clear grain size–bathymetric gradient, with a dominance of the fine fraction increasing with depth ($r = 0.65$). This pattern is consistent with low-energy bathyal environments, where fine-grained sediments prevail and enhanced particle deposition occurs.

Biogeochemical parameters show strong relationships with sedimentary structure. Total organic carbon (TOC) is strongly negatively correlated with carbonates ($r = -0.81$), indicating a clear separation between biogenic carbonate sediments and fine-grained, organic-rich deposits. In addition, total nitrogen exhibits a marked decrease with depth ($r = -0.91$), confirming the progressive reduction in trophic availability in deeper sectors. In oligotrophic bathyal environments, organic matter availability represents one of the main limiting factors and drives strong gradients in the structure of associated communities (Danovaro et al., 2010).

Geochemical variables reveal a distinct cluster of metals (Cr, Ba, V, Fe, Ni, Zn, Pb), which are strongly intercorrelated, suggesting a common predominantly lithogenic origin and a strong control exerted by the fine sediment fraction and pelitic depositional processes. In deep marine environments, numerous trace metals are associated with clay particles and Fe–Mn oxides, which regulate their transport, accumulation, and bioavailability (Horowitz, 1991; Förstner & Wittmann, 1981). This behaviour is consistent with low-energy depositional systems, where the pelitic fraction represents the primary geochemical carrier.

Hydrocarbons (TPH and ΣPAHs) show relationships with organic matter content and depth, indicating a stronger association with shallower sediments enriched in TOC. This is consistent with the strong affinity of hydrocarbons for particulate organic matter and their transport linked to fine particles, which control their distribution in marine sediments (Bouloubassi et al., 2001).

Overall, the bathymetric gradient and the dominance of fine-grained sediments regulate organic matter accumulation and nutrient distribution, whereas metals and hydrocarbons reflect pelitic depositional processes and their association with the sediment organic fraction. These results confirm that, in bathyal systems of the eastern Mediterranean, sedimentary and geochemical structure is tightly linked to vertical organic matter transfer processes and depositional dynamics.

3.3.2.2.4 Detailed description of results – Infauna

3.3.2.2.4.1 Abundance and diversity of macrozoobenthos

In the present study, considering jointly the sampling stations located in the vicinity of the Block 2 area (Northern station group and Asopus-1A well) and the reference stations (Othonoi Ref, Kerkyra Ref, and Italy Ref), a total of 116 benthic macroinvertebrate organisms were collected. Samples were taxonomically identified to the highest possible resolution, allowing the recognition of 19 distinct taxa. A complete list of the species recorded in each sample is reported in 679 (APPENDIX F: INFAUNA DATA), where organism abundance is expressed as individuals per square meter (ind. m^{-2}).

Overall, both in terms of total abundance and species richness (Figure 3-127), the phylum Annelida contributed by far the largest proportion relative to the total, representing 94.8 % of total abundance and 73.7 % of the total number of species. This was followed by crustaceans (phylum Arthropoda), which accounted for 3.4 % of total abundance and 15.8 % of species richness. No organisms belonging to the

phylum Mollusca were identified. The other identified phyla (Echinodermata and Nemertea) collectively contributed marginally, accounting for 1.7 % of total abundance and 10.5 % of the total number of species.

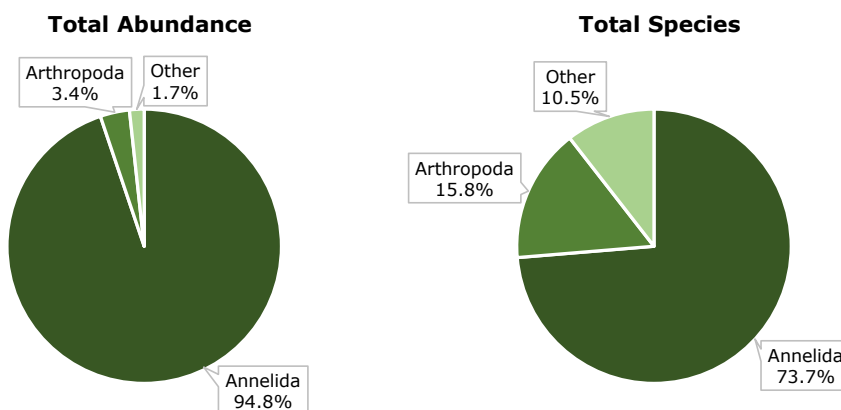


Figure 3-127: Taxonomic composition of the macrozoobenthos, expressed as the percentage contribution of taxonomic groups to total abundance (left) and to total species richness (right), for the entire study area; Reference stations: Othonoi Ref, Kerkyra Ref and Italy Ref)

The nMDS plot (Figure 3-128), constructed from the species / abundance matrix of the macrobenthic community, shows a relatively homogeneous distribution of sampling points within the ordination space, with no clear spatial patterns evident either between the stations within Block 2 area (Asopus-1A and northern station group) or between the control stations (also located within the Block 2 area) and the Reference stations (Othonoi Ref, Kerkyra Ref, and Italy Ref). Indeed, the PERMANOVA analysis did not reveal statistically significant differences among station groups ($p > 0.05$). The minor differences observed in the nMDS plot may be attributable both to spatial variability, particularly between the stations located within the Block 2 area and the reference stations, and to the presence of natural microheterogeneity within the sediment matrix.

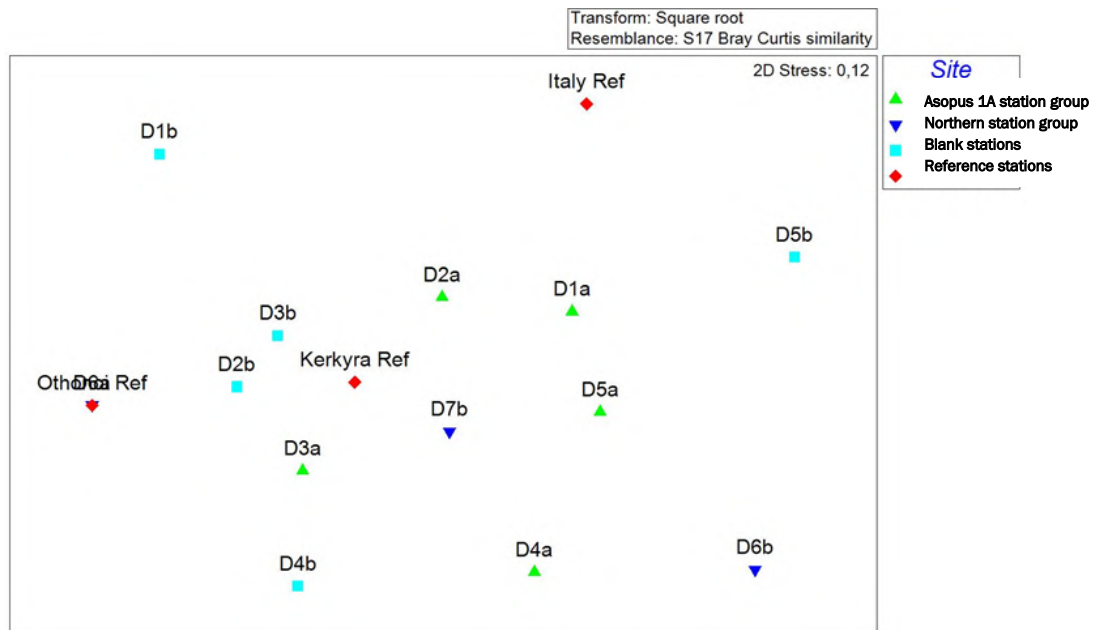


Figure 3-128: nMDS plot based on the species / abundance matrix of the macrobenthic community, for the entire study area (Block 2: Asopus-1A and Northern station group; Reference stations: Othonoi Ref, Kerkyra Ref and Italy Ref)

All investigated sampling stations exhibited low levels of abundance and species richness, consistent with values typically recorded in Mediterranean bathyal environments.

Specifically, the sampling stations located in the vicinity of the Asopus-1A well area showed comparable abundance values, ranging from a minimum of 20 ind. m^{-2} at station D3a to a maximum of 90 ind. m^{-2} at station D4a. In the corresponding control stations (Blank) associated with this well (stations D6a and D6b), the absolute minimum value (5 ind. m^{-2}) and the absolute maximum value (100 ind. m^{-2}) recorded within the Block 2 area for the Asopus-1A well were observed, respectively. Given the substantial overlap among the data, no statistically significant differences were detected among the investigated stations. Only control station D6a showed a greater deviation from the other stations in terms of abundance. However, this deviation appears to be attributable to the natural heterogeneity of the sediment matrix rather than to differentiation associated with a clear ecological pattern. Similarly, species richness values were highly comparable among the different stations investigated within the Block 2 area surrounding the Asopus-1A well. In particular, values ranged from 2 species (stations D2a, D3a, and D4a) to 3 species (stations D1a and D5a). The associated control stations showed values that were only slightly different and represented the extremes of the range observed in the investigated stations: 1 species at control station D6a and 6 species at control station D7b.

Regarding the sampling stations located near Northern station group, a situation entirely comparable to that described for the Asopus-1A well was observed, with abundance values ranging from a minimum of 10 ind. m^{-2} at station D2b to a maximum of 45 ind. m^{-2} at station D5b. In the corresponding control stations (Blank) associated with this well (stations D6b and D7b), abundance values consistent with those recorded at the other stations of the well were detected (100 ind. m^{-2} and 50 ind. m^{-2} , respectively). Also in this case, as reported for the Asopus-1A well, no statistically significant differences were found among the investigated stations. In terms of species richness, highly similar values were also observed among the different stations

within Northern station group. Specifically, values ranged from 1 species (stations D2b and D7b) to 7 species (station D5b).

With regard to the Reference stations (Othonoi Ref, Kerkyra Ref, and Italy Ref), despite the marked spatial variability (stations located at considerable distances both from each other and from the Block 2 area) and bathymetric variability (the Italy Ref station being characterized by a depth of approximately 145 m, thus representing a transition zone between the circalittoral and upper bathyal zones rather than a strictly bathyal environment, unlike all the other investigated stations), comparable levels of abundance and species richness were also recorded among these stations. Furthermore, these values were consistent with those observed at the sampling stations within the Block 2 area, for the Asopus-1A well and Northern station group. Specifically, abundance and species richness values corresponded to 5 ind. m^{-2} and 1 species at Othonoi Ref, 20 ind. m^{-2} and 1 species at Kerkyra Ref, and 50 ind. m^{-2} and 5 species at Italy Ref.

Figure 3-129 and Figure 3-130 show the abundance and species richness values for the stations associated with the Asopus-1A and Northern station group, respectively, the control stations associated with each well (Blank), and the reference stations (Othonoi Ref, Kerkyra Ref, and Italy Ref). Control station D6b is reported in both figures because it is shared between the Asopus-1A and Northern station group, while the reference stations are repeated in both figures in order to provide the most comprehensive comparative framework possible.

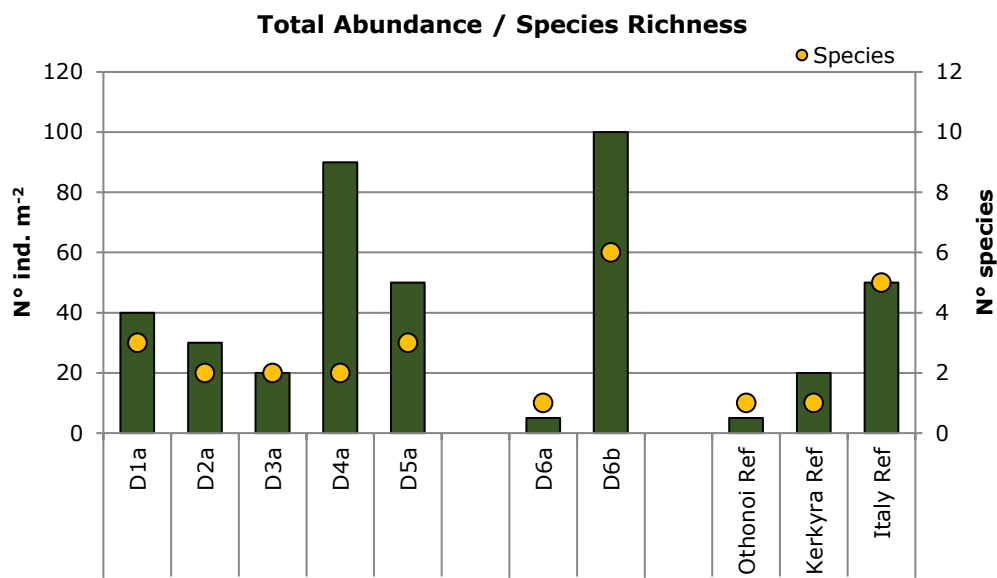


Figure 3-129: Mean abundances of the macrobenthic community and total number of species recorded at the sampling stations – Asopus-1A and Reference stations

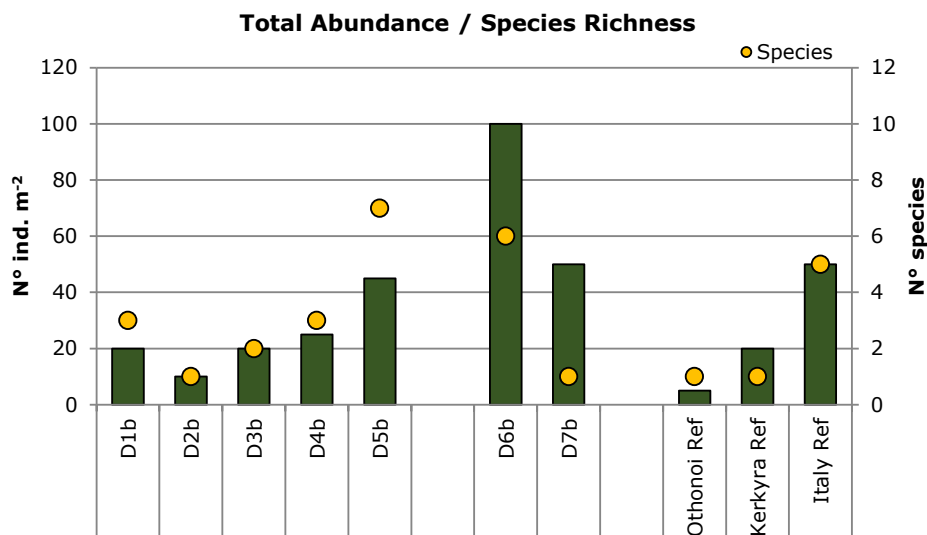


Figure 3-130: Mean abundances of the macrobenthic community and total number of species recorded at the sampling stations – northern station group and Reference stations

The results of the Shannon–Wiener diversity index calculation (H' loge, Figure 3-131a and Figure 3-132a), both for the Block 2 area (Asopus-1A well and Northern station group) and for the Reference stations (Othonoi Ref, Kerkyra Ref, Italy Ref), were consistent with the findings related to total abundance and species richness, showing low diversity levels across all sampling stations.

Specifically, within the Asopus-1A well area, H' values ranged from 0.21 (station D4a) to 0.74 (station D1a). The associated control stations (Blank) showed comparable values, ranging from 0 (station D6a; presence of a single species) to 1.08 (station D6b).

Regarding Northern station group, H' values were comparable to those described above for the Asopus-1A well, ranging from a minimum of 0.56 (station D3b) to a maximum of 1.83 (station D5b). An H' value equal to 0 was recorded at station D2b due to the presence of a single species. Similarly, the associated control stations (Blank) exhibited comparable values, ranging from 0 (station D7b; presence of a single species) to 1.08 (station D6b; control station).

The Reference stations Othonoi Ref and Kerkyra Ref showed H' values equal to 0, due to the occurrence of a single species within the analysed samples. In contrast, the Italy Ref station showed an H' value of 1.36. These values were consistent with those described for the Block 2 area.

The Pielou's evenness index (J'), with reference to the stations located around the Asopus-1A well (Figure 3-131b), showed values deviating from 1 at most investigated stations, indicating a clear dominance of one species over the others identified. Indeed, at these stations (D1a, D2a, D3a, D4a, and D5a), a marked predominance of the sipunculan *Golfingia* sp. was observed. The same pattern was recorded at the control station D6b, whereas at control station D6a the J' index could not be calculated due to the presence of a single species (N.D.).

In contrast, for Northern station group, the Pielou's evenness index (Figure 3-132b) showed values close to 1 at most stations, indicating a relatively even distribution of individuals among the few identified species, except for station D2b, where the index could not be quantified due to the presence of a single species

(N.D.). With regard to the associated control stations (Blank), the dominance of the sipunculan *Golfingia* sp. was observed at station D6b, while the J' index could not be calculated at station D7b (N.D.; presence of a single species).

The Reference stations Othonoi Ref and Kerkyra Ref showed non-quantifiable J' values due to the presence of a single species at both stations (N.D.). Conversely, the Italy Ref station showed a J' value close to 1, indicating a good evenness in the distribution of organisms among the identified species.

These results are consistent with the general pattern observed in the distribution of macrobenthic communities in the Mediterranean Sea, although some local-scale exceptions occur. In particular, Rowe, et al. (1982) reported that both abundance and biomass decrease sharply with increasing depth between 203 and 3659 m, in relation to sedimentological characteristics, with bathyal muds and fine silts typically supporting low-density communities.

Johnson et al. (2007) further linked faunal density and biomass to surface primary productivity, observing a decline in both parameters with increasing depth, attributable to the reduced downward flux of particulate organic carbon (POC) to the seafloor. Additionally, increasing hydrostatic pressure and decreasing temperature with depth further reduce metabolic rates and benthic productivity.

More recent studies (e.g., Pilditch, 2015) confirm that abundance and diversity decrease with depth, highlighting that this reduction is more pronounced for macrofauna and megafauna than for meiobenthos.

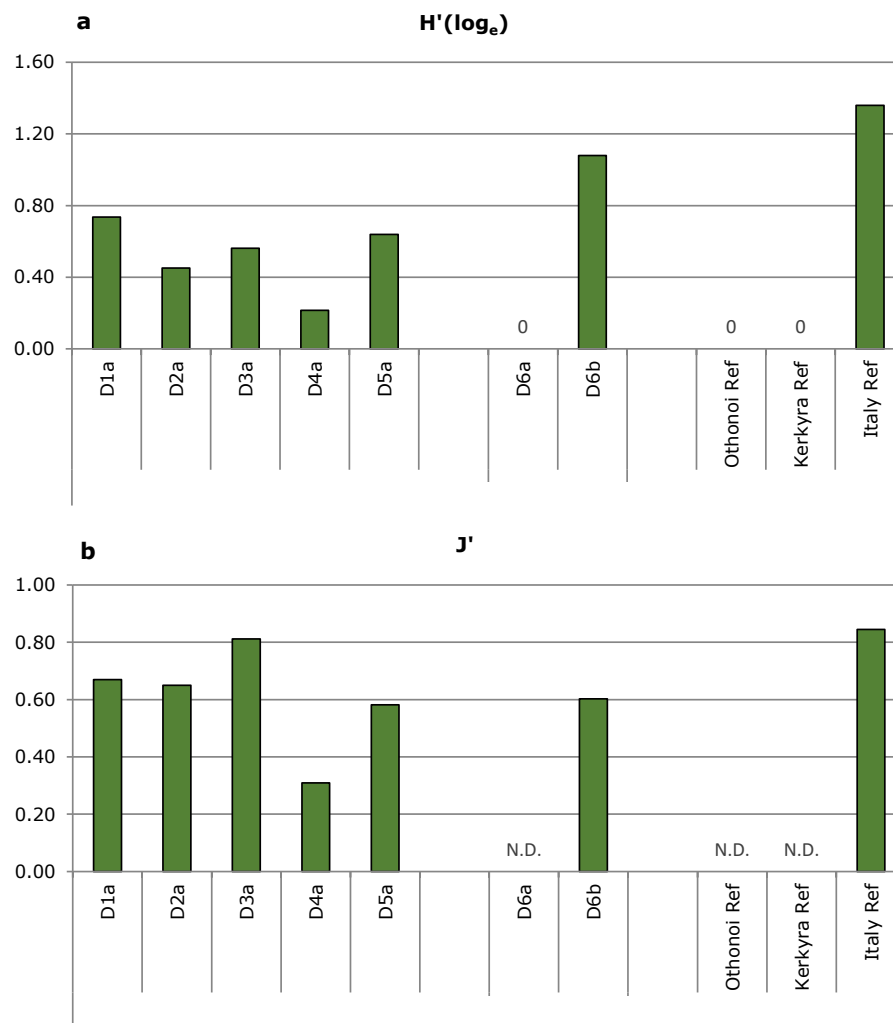


Figure 3-131: Graphical representation of Shannon-Wiener diversity index H' ($\log_e$; a) and Pielou evenness index (J' ; b) of the macrobenthic community – Asopus-1A and Reference stations

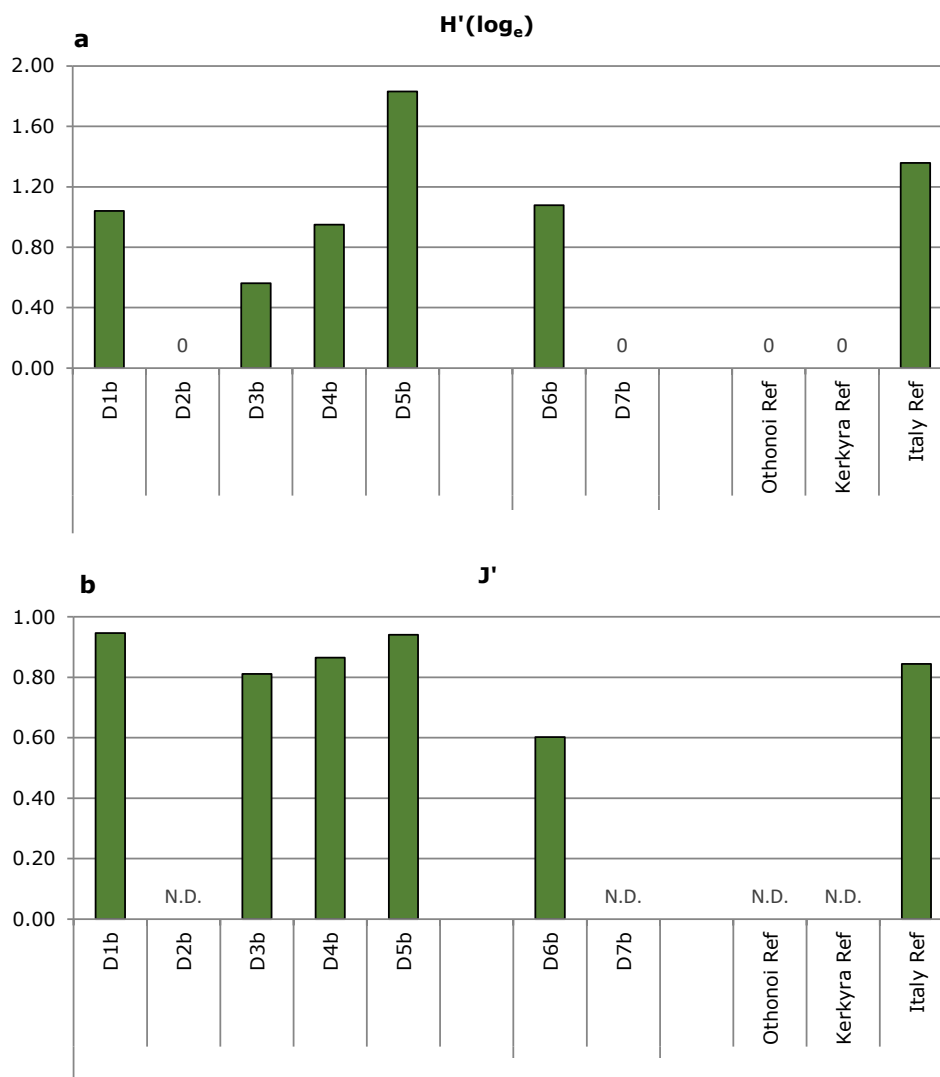


Figure 3-132: Graphical representation of Shannon-Wiener diversity index H' ($\log_e$; a) and Pielou evenness index (J' ; b) of the macrobenthic community – northern station group and Reference stations

In the following table (Table 3-32), for each sampling station, the total number of species (S) and the mean values of abundances (N) and structural indices are reported: Shannon–Wiener index H' ($\log_e$), Pielou's evenness index (J'), Simpson's index (λ), and Margalef's richness index (d).

Table 3-32: Absolute values of species number (S) and mean values of abundance ($N^\circ \text{ ind. m}^{-2}$) and diversity indices: Shannon-Wiener index H' ($\log_e$), Pielou evenness index (J'), Simpson index (λ), and Margalef richness index (d)

AREA	STATION ID	S	N	D	J'	$H'(\text{LOGE})$	λ
ASOPUS - 1A station group	D1a	3	40	0.54	0.67	0.74	0.59
	D2a	2	30	0.29	0.65	0.45	0.72
	D3a	2	20	0.33	0.81	0.56	0.63
	D4a	2	90	0.22	0.31	0.21	0.90

AREA	STATION ID	S	N	D	J'	H'(LOGE)	Λ
	D5a	3	50	0.51	0.58	0.64	0.66
Northern station group	D1b	3	20	0.67	0.95	1.04	0.38
	D2b	1	10	0.00	N.D.	0.00	1.00
	D3b	2	20	0.33	0.81	0.56	0.63
	D4b	3	25	0.62	0.87	0.95	0.44
	D5b	7	45	1.58	0.94	1.83	0.19
Blanks	D6a	1	5	0.00	N.D.	0.00	1.00
	D6b	6	100	1.09	0.60	1.08	0.51
	D7b	1	50	0.00	N.D.	0.00	1.00
Reference stations	Othonoi-Ref	1	5	0.00	N.D.	0.00	1.00
	Kerkyra-Ref	1	20	0.00	N.D.	0.00	1.00
	Italy-Ref	5	50	1.02	0.84	1.36	0.32

The macrobenthic community structure at all investigated stations (Figure 3-133 and Figure 3-134), including both those within the Block 2 area (Asopus-1A and Northern station group) and the Reference sites (Othonoi Ref, Kerkyra Ref, and Italy Ref), was characterized by a clear dominance of the phylum Annelida, mainly represented by the order *Sipuncula* (*Golfingia* sp.).

This predominance is consistent with patterns commonly observed in deep muddy bottoms. In fact, the *sipunculid* *Golfingia* sp. is a benthic organism typical of muddy sediments in the Mediterranean Sea and the northeastern Atlantic, where it lives buried within fine sediments. It is a detritivorous deposit feeder that feeds on organic particles and microorganisms within the sediment, contributing to bioturbation processes and to the recycling of organic matter in deep-sea sediments. Its occurrence is frequently associated with low hydrodynamic environments and high detrital accumulation, and it also shows a considerable tolerance to environmentally stressful conditions and reduced sediment oxygenation (Murina et al., 1999).

The structure of benthic communities in Mediterranean bathyal environments is strongly controlled by the reduced flux of organic matter to the seafloor, typical of an oligotrophic basin. Under such conditions, macrobenthic biomass and diversity are generally low, and communities are dominated by opportunistic and tolerant taxa, particularly annelids and nematodes, which are better adapted to limited trophic availability and fine, poorly oxygenated sediments. The control exerted by particulate organic carbon (POC) flux on deep-sea benthic community structure is well documented in the Mediterranean Sea, where spatial and bathymetric variations in flux directly influence the abundance and composition of benthic groups (Danovaro et al., 1999; Gooday, 2002).

The fine granulometry of bathyal sediments and the resulting reduced interstitial circulation promote low redox potential conditions, further limiting the occurrence of more sensitive taxa such as many molluscs and peracarid crustaceans, which require higher oxygen availability and stable sediment conditions (Levin et al., 2001). In deep-sea systems, moreover, low temperature, high pressure, and increased dissolved CO₂ concentrations influence carbonate chemistry, making CaCO₃ precipitation energetically more costly and potentially less favourable for the formation and maintenance of calcareous structures (Mucci, 1983; Morse & Mackenzie, 1990; Millero, 1995).

Overall, the results indicate a macrobenthic community typical of muddy Mediterranean bathyal environments, characterized by low taxonomic complexity and the strong dominance of a limited number of taxa.

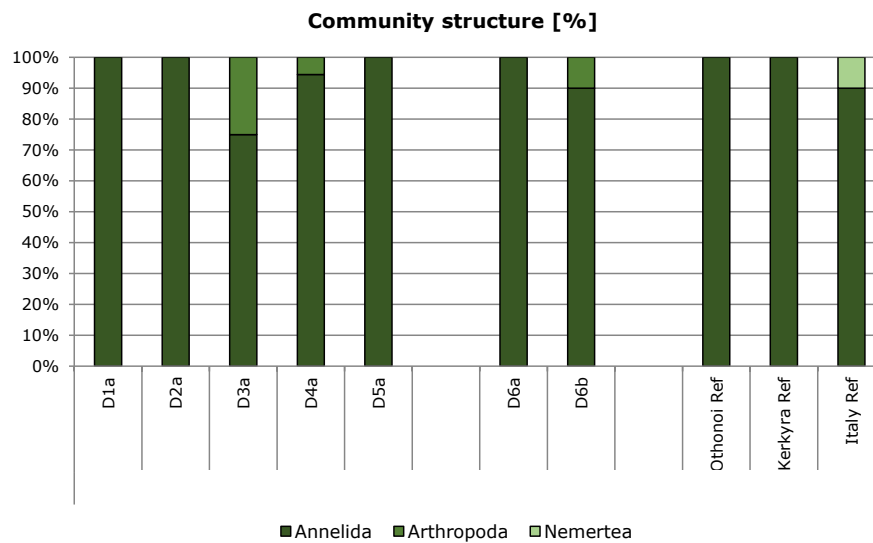


Figure 3-133: Macrobenthic community structure across the sampling stations – Asopus-1A and Reference stations

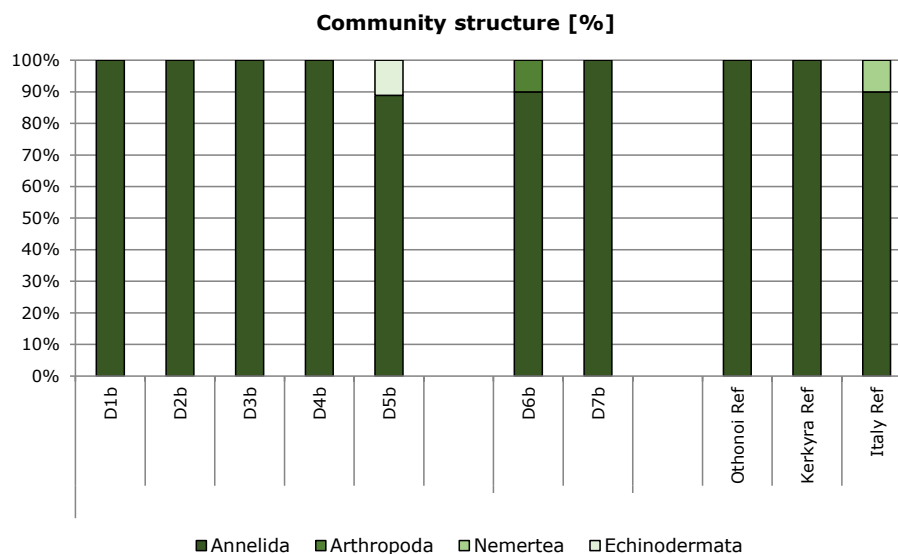


Figure 3-134: Macrobenthic community structure across the sampling stations – northern station group and Reference stations

The entire Block 2 area (Asopus-1A and Northern station group) and the Reference stations (Othonoi Ref, Kerkyra Ref, and Italy Ref) were characterized by the presence of a Mediterranean Upper Bathyal Mud biocoenosis (EUNIS Code: ME65) – VB: Mediterranean bathyal muds (Pérès & Picard, 1964). Bathyal muds are predominantly composed of yellow or grey-blue clayey sediments, which are relatively compact and sparsely inhabited.

At all investigated stations, the bathyal benthic biocenosis was characterized by the presence of carbonate oozes, mainly consisting of skeletal material from planktonic organisms such as coccolithophores, foraminifera, and pteropod molluscs (Figure 3-135). The distribution of biogenic oozes primarily depends on the availability of skeletal material, the dissolution processes affecting the skeletons, and dilution by other sediment types, such as turbidites or clays. The supply of biogenic material is largely controlled by primary productivity, defined as the production of organic matter through photosynthesis and chemosynthesis in the ocean's surface waters. Primary productivity is high near the Equator and in coastal upwelling zones (John P. Rafferty, 2021). Carbonate oozes are mainly found between 1000 and 4500 m depth; below this limit, they tend to dissolve rapidly. This threshold, known as the Calcite Compensation Depth (CCD), represents the depth at which the rate of carbonate accumulation equals the rate of carbonate dissolution (John P. Rafferty, 2021). In the Mediterranean Sea, carbonate oozes occur within sediments of abyssal plains and deep slopes, particularly in oligotrophic areas where pelagic sedimentation is dominated by organic matter and calcareous microfossils. Geochemical studies conducted on deep-sea sediments (1000 – 4087 m) show that their composition includes a high fraction of calcium carbonate associated with planktonic remains, confirming the importance of carbonate oozes as a characteristic sedimentary component of the deep Mediterranean basin (R. Pedrosa-Pàmies et al., 2015).

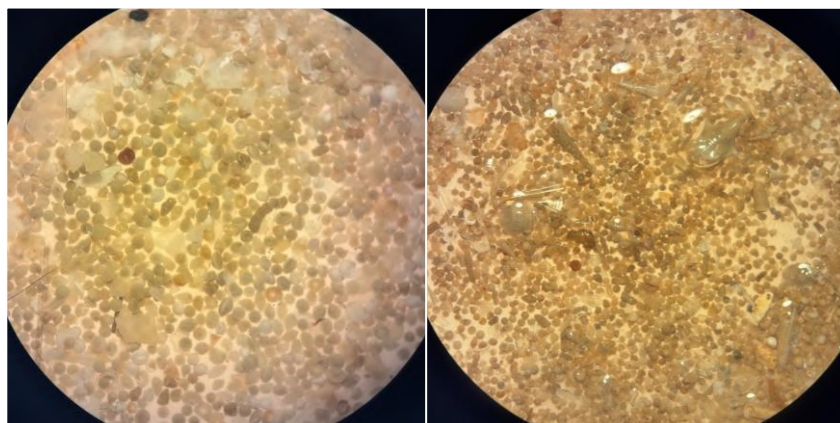


Figure 3-135: Carbonate oozes, consisting of skeletal material from planktonic organisms (coccolithophores, foraminifera and pteropod molluscs)

Among the most representative species identified in the analysed samples, in addition to the sipunculid *Golfingia* sp. (Figure 3-136a), the presence of strictly mud-dwelling polychaetes was recorded, including *Neopseudocapitella brasiliensis* (Figure 3-136b), *Paradiopatra quadricuspis* (Figure 3-136c), and *Aricidea (Acmira) assimilis* (Figure 3-136d).



Figure 3-136: *Golfingia* sp. (a), *Neopseudocapitella brasiliensis* (b), *Paradiopatra quadricuspis* (c), *Aricidea* (*Acmira*) *assimilis* (d)

3.3.2.2.4.2 Assessment of ecological quality (EQRs)

The results of the M-AMBI index (Table 3-33), calculated for each investigated station in the Block 2 area (Asopus-1A and Northern station group) and at the Reference stations (Othonoi Ref, Kerkyra Ref, and Italy Ref), indicate ecological status ranging from “Bad” to “Moderate”.

In particular, with regard to the Asopus-1A well, all investigated stations exhibited a “Poor” ecological status, while the associated control stations (Blank; D6a and D6b) showed a “Bad” and “Moderate” ecological status, respectively.

Similarly, all sampling stations in the Northern area displayed a “Poor” ecological status, with the exception of stations D2b (“Bad” ecological status) and D5b (“Moderate” ecological status). The associated control stations (Blank; D6b and D7b) exhibited ecological statuses of “Moderate” (as also reported above for Asopus-1A) and “Poor”, respectively.

Finally, the Reference stations (Othonoi Ref, Kerkyra Ref, and Italy Ref) showed ecological statuses classified as “Bad”, “Poor”, and “Moderate”, respectively.

Table 3-33: Application of the M-AMBI index at the sampling stations. Reported are the values of AMBI, diversity (H'), number of taxa (S), M-AMBI, and the corresponding Ecological Status – Asopus-1A, Northern station group and

Reference stations

AREA	STATION ID	AMBI	H'	S	M-AMBI	STATUS
	BAD	6	0	0	0.00	BAD
	HIGH	0.5	4.8	50	1.00	HIGH
ASOPUS -1A station group	D1a	0.75	1.06	3	0.31	Poor
	D2a	0.00	0.65	2	0.29	Poor
	D3a	0.00	0.81	2	0.31	Poor
	D4a	0.00	0.31	2	0.27	Poor
	D5a	0.88	0.92	3	0.30	Poor
Northern station group	D1b	0.75	1.50	3	0.35	Poor
	D2b	3.50	0.00	1	0.10	Bad
	D3b	0.75	0.81	2	0.28	Poor
	D4b	1.00	1.37	3	0.33	Poor
	D5b	1.58	2.64	7	0.47	Moderate
Blanks	D6a	3.50	0.00	1	0.10	Bad
	D6b	0.75	1.56	6	0.39	Moderate
	D7b	0.00	0.00	1	0.23	Poor
Reference stations	Othonoi-Ref	3.50	0.00	1	0.10	Bad
	Kerkyra-Ref	0.00	0.00	1	0.23	Poor
	Italy-Ref	0.38	1.96	5	0.43	Moderate

The results of the AMBI index (Table 3-34), showing discordance with those obtained from the M-AMBI index, allowed the identification of a disturbance gradient ranging from “Undisturbed” to “Moderately disturbed”.

Specifically, all sampling stations in the Asopus-1A well area exhibited an “Undisturbed” environmental status, similarly to the associated control station D6b. In contrast, the other associated control station, D6a, showed a “Moderately disturbed” environment.

Regarding Northern station group, all stations displayed an “Undisturbed” condition, except for stations D2b (“Moderately disturbed”) and D5b (“Slightly disturbed”). Both associated control stations (Blank; D6b and D7b) were characterised by an “Undisturbed” environment.

Finally, the Reference stations Kerkyra Ref and Italy Ref showed an “Undisturbed” status, whereas the Othonoi Ref station was classified as “Moderately disturbed”.

Table 3-34: Results of the application of the AMBI index at the sampling stations. The table reports the percentages of organisms belonging to the five ecological groups, the percentage of organisms not assigned to any ecological group (N.A.), as well as species richness and diversity – Asopus-1A, Northern station group and Reference stations

AREA	STATION ID	I(%)	II(%)	III(%)	IV(%)	V(%)	MEAN AMBI	DISTURBANCE CLASSIFICATION	S	H'	N.A. (%)
ASOPUS - 1A station group	D1a	87.50	0.00	0.00	0.00	12.50	0.75	Undisturbed	3	1.06	0.00
	D2a	100.00	0.00	0.00	0.00	0.00	0.00	Undisturbed	2	0.65	0.00
	D3a	100.00	0.00	0.00	0.00	0.00	0.00	Undisturbed	2	0.81	0.00
	D4a	100.00	0.00	0.00	0.00	0.00	0.00	Undisturbed	2	0.31	5.60
	D5a	80.00	10.00	0.00	0.00	10.00	0.88	Undisturbed	3	0.92	0.00
Northern station group	D1b	75.00	25.00	0.00	0.00	0.00	0.75	Undisturbed	3	1.50	0.00
	D2b	100.00	0.00	0.00	0.00	0.00	3.50	Moderately disturbed	1	0.00	0.00
	D3b	75.00	0.00	25.00	0.00	0.00	0.75	Undisturbed	2	0.81	0.00
	D4b	80.00	0.00	0.00	0.00	20.00	1.00	Undisturbed	3	1.37	0.00
	D5b	44.40	33.30	11.10	0.00	11.10	1.58	Slightly disturbed	7	2.64	0.00
Blanks	D6a	100.00	0.00	0.00	0.00	0.00	3.50	Moderately disturbed	1	0.00	0.00
	D6b	89.50	0.00	5.30	0.00	5.30	0.75	Undisturbed	6	1.56	5.00
	D7b	100.00	0.00	0.00	0.00	0.00	0.00	Undisturbed	1	0.00	0.00
Reference stations	Othonoi-Ref	100.00	0.00	0.00	0.00	0.00	3.50	Moderately disturbed	1	0.00	0.00
	Kerkira-Ref	100.00	0.00	0.00	0.00	0.00	0.00	Undisturbed	1	0.00	0.00
	Italy-Ref	77.80	11.10	11.10	0.00	0.00	0.38	Undisturbed	5	1.96	10.00

However, these results should be interpreted with caution and are purely indicative of the actual ecological status. The AMBI and M-AMBI indices were originally developed for coastal marine environments, which typically exhibit higher abundances and diversity. Deep-sea environments, by contrast, are naturally characterized by low abundances and low diversity, and do not display the same community features as coastal habitats on which these indices are based. Therefore, although the values provide an indication of benthic conditions, they cannot be considered fully representative of ecological quality in deep-sea environments.

3.3.2.2.4.3 Relationship between environmental variables and the macrobenthic community

As Multivariate analyses revealed relationships between macrobenthic community structure and the sedimentological and geochemical characteristics of muddy bathyal seafloors across the entire investigated areas (Block 2: Asopus-1A and Northern station group; Reference stations).

The BEST analysis, performed on sedimentological variables (% sand, % silt, % clay) and depth, showed that the combination of depth and % clay content provided the best explanatory set for the observed biological variability, although with a relatively weak correlation ($p = 0.15$). This result suggests that benthic community distribution is partially influenced by the bathymetric gradient and fine sediment grain size. Indeed, in deep Mediterranean muddy environments, the predominance of fine-grained sediments promotes more stable conditions and a higher capacity for organic matter accumulation, thereby influencing macrobenthic

community composition and favouring deposit-feeding taxa and organisms adapted to deep oligotrophic conditions (Basso et al., 2004).

The second-best analysis, based on geochemical variables and contaminants (carbonates, nutrients, metals, and hydrocarbons), identified barium and total chromium as the combination most strongly correlated with biological community structure ($\rho = 0.34$). This higher correlation compared to that obtained using only sedimentological variables suggests that sediment geochemical processes may play a significant role in shaping macrobenthic fauna distribution.

The DistLM analysis, performed using the variables identified as significant in the BEST analyses (depth, % clay, barium, and total chromium), confirmed this trend. In marginal tests, barium was the only statistically significant predictor ($p = 0.026$), explaining approximately 15 % of the total biological variability. The other variables (% clay, depth, and total chromium) were not significant when considered individually. The full model, including all four variables, explained approximately 35.5 % of the observed variation in community structure ($R^2 = 0.355$). Although a substantial proportion of variability remains unexplained (a common situation in deep-sea Mediterranean ecosystems, which are characterised by relatively stable environmental conditions and limited trophic availability) these results indicate that sedimentological and geochemical processes represent important ecological drivers of deep macrobenthic communities.

From an ecological perspective, the role of barium appears particularly relevant. In deep marine sediments, barium commonly occurs as biogenic barite (BaSO_4), formed during the degradation of organic matter in the water column and within sediments. Numerous studies in the Mediterranean Sea have demonstrated that particulate biogenic barium represents an important proxy for organic carbon fluxes and mesopelagic remineralisation processes (Jacquet et al., 2021).

The distribution of Ba in the Mediterranean is closely linked to biogeochemical processes, fine particulate deposition, and organic matter degradation (Jacquet et al., 2021). In deep oligotrophic environments such as the eastern Ionian Sea, where trophic availability is a major limiting factor for benthic ecosystems, relatively elevated Ba concentrations may therefore reflect areas of enhanced organic matter accumulation and fine sediment deposition. In this context, barium does not primarily act as a contaminant, but rather as an indirect tracer of trophic and depositional dynamics influencing macrobenthic community structure.

Under conditions of high organic matter accumulation, sediment oxygen consumption may increase, leading to suboxic conditions that typically reduce benthic abundance and diversity, while favouring tolerant and opportunistic species (Danovaro et al., 1999; Levin et al., 2001). However, barium should not necessarily be interpreted as a direct cause of reduced abundance, but rather as an indirect indicator of specific trophic and sedimentary conditions affecting macrobenthic communities.

Overall, the results suggest that bathyal benthic community distribution in the investigated areas is controlled by a combination of sedimentological and geochemical factors, with fine sediments and processes linked to the deep sedimentary organic matter cycle playing a key ecological role.

3.3.2.3 Seabed habitats (AUV investigation)

The AUV mosaic analyses, integrated with qualitative and quantitative investigations of the macrozoobenthos, allowed a detailed characterization of the biocenotic structure of Asopus-1A, Northern station group and the Reference stations (Othonoi Ref, Kerkyra Ref, Italy Ref). Across the entire Block 2 area

and all reference stations, biocenotic complexity was found to be low, with a homogeneous environmental setting and poorly diversified benthic facies.

Indeed, all investigated stations showed the presence of a Mediterranean Upper Bathyal Mud biocenosis – EUNIS (2022) code: ME65. This bathyal biocenosis is characterized by fine sediments hosting benthic communities adapted to low light conditions, high pressure, and reduced availability of fresh organic matter. Bathyal muddy assemblages generally exhibit low infaunal diversity; however, these organisms play a key role in nutrient recycling and in maintaining the productivity of deep-sea sediments (Tyler et al., 2009; Vanreusel et al., 2016).

Both in the Asopus-1A and Northern station group (Block 2 area) and in the Reference stations (Othonoi Ref, Kerkyra Ref, Italy Ref), the muddy seafloor was characterized by the recurrent presence of traces of tubicolous and burrowing organisms, as well as the identification of deep-sea fish specimens belonging to the family Macrouridae. Locally, particularly within the Block 2 area, reduced facies attributable to the sea anemone *Andresia partenopea* were observed. Near the Northern station group (station D1b), a specimen of the decapod *Paromola cuvieri* was also recorded.

At station D4a of the Asopus-1A well area, within a predominantly bathyal muddy seafloor, a limited area characterized by rocky aggregations was observed: Mediterranean Upper Bathyal Rock – EUNIS (2022) code: ME15.

Mediterranean bathyal rocks, occurring at depths greater than 200 m, represent a type of deep benthic habitat characterized by hard substrates. According to the EUNIS (2022) classification, this habitat is primarily distinguished from circalittoral rocks (MC15) by its depth of occurrence and, consequently, by the biological communities it supports. Unlike circalittoral rocks, where coralligenous formations (MC151 or MC251) may develop due to the presence of photophilic bioconstructors, bathyal rocks occur in environments where light is absent or extremely limited. For this reason, communities associated with ME15 are typical of bathyal environments, with benthic assemblages adapted to low-light conditions, more stable temperatures, and higher pressures. Deep-sea corals may be present on bathyal rocky substrates, including some belonging to deep coralligenous assemblages, but they are not photophilic bioconstructors like those typical of coralligenous habitats. These deep coral species contribute to habitat structural complexity and benthic biodiversity, although their ecology is strongly influenced by the absence of light and the limited availability of resources at greater depths. Specifically, the rocky formation identified at station D4a (Asopus-1A well) was characterized by the presence of corals attributable to *Antipathella subpinnata* or *Callogorgia verticillata*.

This habitat may also function as a nursery and refuge area for several ecologically and commercially important nekto-benthic species, representing a biodiversity hotspot in environments characterized by inherently low biological diversity due to limited light availability, high pressure, low temperatures, and, above all, reduced and discontinuous supply of organic matter from the surface.

In the following figures (Figure 3-137 to Figure 3-141), representative screenshots are provided, organized with their corresponding coordinates (WGS84-UTM34N - m) and depths (m). The EUNIS (2022) biocenotic classification is also reported, together with a detailed description of the identified habitat type and any associated facies or recorded species.

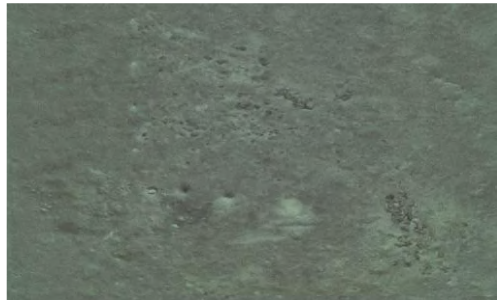
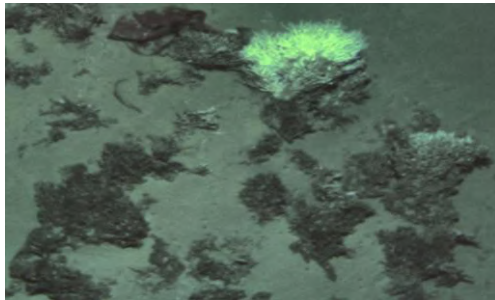
EUNIS code: ME65 - Mediterranean Upper Bathyal Mud (D1a, D2a, D3a, D4a) / EUNIS code: ME15 - Mediterranean Upper Bathyal Rock (D4a)	
D1a WGS84-UTM34N (m): 324731.39 E 4388001.68 N - Depth: 825.8 m 	D2a WGS84-UTM34N (m): 325209.48 E 4387995.14 N - Depth: 831.6 m 
D3a WGS84-UTM34N (m): 324737.94 E 4388494.76 N - Depth: 816.3 m 	D4a WGS84-UTM34N (m): 324222.3 E 4387989.69 N - Depth: 823.6 m 
Vast expanses of clayey mud, generally compact, yellowish or bluish-grey in color, relatively cohesive, sparsely populated by tubicolous and burrowing organisms. Presence of several deep-sea fish specimens belonging to the family Macrouridae (e.g., D2a). At station D4a, the presence of a small aggregation of bathyal rocks colonized by several corals was recorded, probably belonging to <i>Antipathella subpinnata</i> or <i>Callogorgia verticillata</i>.	

Figure 3-137: Detailed table referring to stations D1a, D2a, D3a and D4a; representative screenshots are reported, organised with the corresponding coordinates (WGS84-UTM32N - m) and depths (m). The EUNIS (2022) biocenotic classification is provided, along with a detailed description of the identified habitat type and any associated facies or species recorded

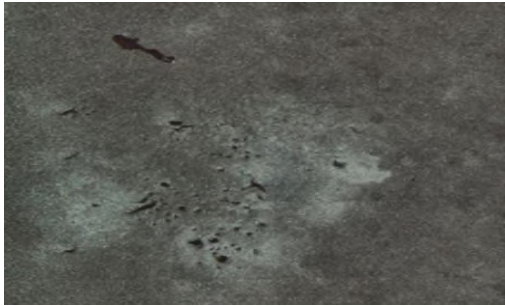
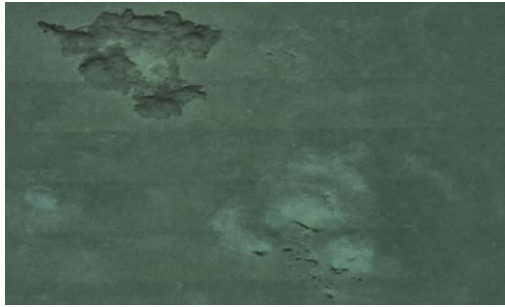
EUNIS code: ME65 - Mediterranean Upper Bathyal Mud			
D5a	WGS84-UTM34N (m): 324707.39 E 4387497.13 N - Depth: 832.2 m	D6a	WGS84-UTM34N (m): 324699 E 4384602.25 N - Depth: 842.9 m
			
D6a	WGS84-UTM34N (m): 324699 E 4384602.25 N - Depth: 842.9 m	D6b	WGS84-UTM34N (m): 324814.41 E 4391363.63 N - Depth: 811.0 m
			
Vast expanses of clayey mud, generally compact, yellowish or bluish-grey in color, relatively cohesive, sparsely populated by tubicolous and burrowing organisms. Presence of several deep-sea fish specimens belonging to the family Macrouridae. Presence of several actinarian specimens probably attributable to <i>Andresia partenopea</i> (D6a).			

Figure 3-138: Detailed table referring to stations D5a, D6a and D6b; representative screenshots are reported, organised with the corresponding coordinates (WGS84-UTM32N - m) and depths (m). The EUNIS (2022) biocenotic classification is provided, along with a detailed description of the identified habitat type and any associated facies or species recorded

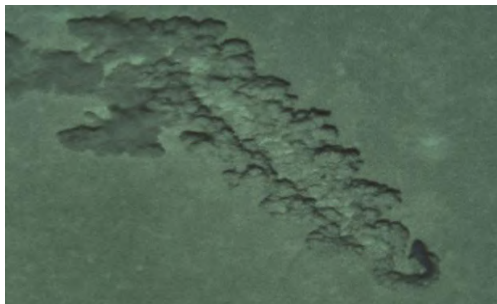
EUNIS code: ME65 - Mediterranean Upper Bathyal Mud					
D1b WGS84-UTM34N (m): 324898.36 E 4394747.61 N - Depth: 830.6 m		D1b WGS84-UTM34N (m): 324898.36 E 4394747.61 N - Depth: 830.6 m			
					
D2b WGS84-UTM34N (m): 325419.76 E 4394759.63 N - Depth: 839.8 m		D3b WGS84-UTM34N (m): 324913.68 E 4395263.14 N - Depth: 835.0 m			
					
Vast expanses of clayey mud, generally compact, yellowish or bluish-grey in color, relatively cohesive, sparsely populated by tubicolous and burrowing organisms. Presence of several deep-sea fish specimens belonging to the family Macrouridae. At station D1b, a specimen of the decapod <i>Paromola cuvieri</i> was recorded.					

Figure 3-139: Detailed table referring to stations D1b, D2b and D3b; representative screenshots are reported, organised with the corresponding coordinates (WGS84-UTM32N - m) and depths (m). The EUNIS (2022) biocenotic classification is provided, along with a detailed description of the identified habitat type and any associated facies or species recorded.

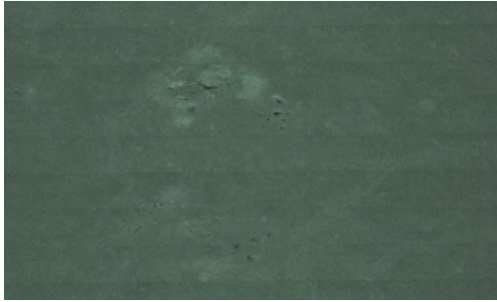
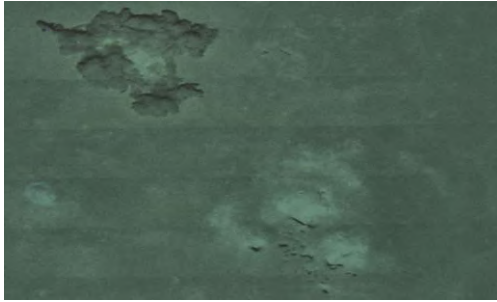
EUNIS code: ME65 - Mediterranean Upper Bathyal Mud			
D4b	WGS84-UTM34N (m): 324401.81 E 4394758.96 N - Depth: 820.5 m	D5b	WGS84-UTM34N (m): 324896.83 E 4394243.34 N - Depth: 825.1 m
			
D6b	WGS84-UTM34N (m): 324814.41 E 4391363.63 N - Depth: 811.0 m	D7b	WGS84-UTM34N (m): 324903.07 E 4398121.82 N - Depth: 833.3 m
			
Vast expanses of clayey mud, generally compact, yellowish or bluish-grey in color, relatively cohesive, sparsely populated by tubicolous and burrowing organisms. Presence of several deep-sea fish specimens belonging to the family Macrouridae.			

Figure 3-140: Detailed table referring to stations D4b, D5b, D6b and D7b; representative screenshots are reported, organised with the corresponding coordinates (WGS84-UTM32N - m) and depths (m). The EUNIS (2022) biocenotic classification is provided, along with a detailed description of the identified habitat type and any associated facies or species recorded

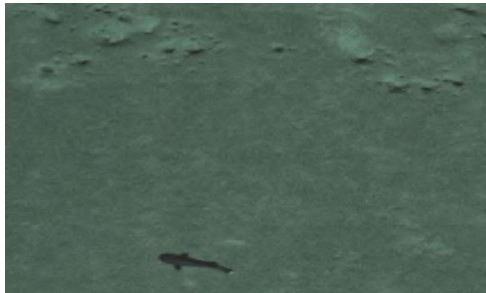
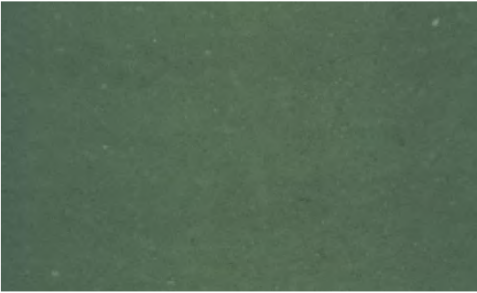
EUNIS code: ME65 - Mediterranean Upper Bathyal Mud		
Othonoi Ref	WGS84-UTM34N (m): 339632.45 E 4400663.55 N - Depth:1065.04 m	WGS84-UTM34N (m): 345716.4 E 4385915.53 N - Depth: 1134.16 m
		
Italy Ref		WGS84-UTM34N (m): 304317 E 4414647 N - Depth: 148.0 m
		
Vast expanses of clayey mud, generally compact, yellowish or bluish-grey in color, relatively cohesive, sparsely populated by tubicolous and burrowing organisms. Presence of several deep-sea fish specimens belonging to the family Macrouridae.		

Figure 3-141: Detailed table referring to Reference stations (Othonoi Ref, Kerkyra Ref and Italy Ref); representative screenshots are reported, organised with the corresponding coordinates (WGS84-UTM32N - m) and depths (m). The EUNIS (2022) biocenotic classification is provided, along with a detailed description of the identified habitat type and any associated facies or species recorded

3.3.2.4 Marine litter (AUV investigation)

The results obtained from the analysis of mosaics acquired via AUV allowed the characterization of the presence and distribution of marine litter across the different study areas, enabling a comparative assessment among the investigated units: the Asopus-1A and Northern station group, the Blank stations, and the Reference stations. The identification and classification of litter items were performed according to the MSFD Joint List, ensuring a standardized and consistent approach for the categorization of the different types of observed items. Item abundances were expressed per km², in accordance with the JRC Technical Report 2023 (“Guidance on the Monitoring of Marine Litter in European Seas”), based on the objects identified within each AUV-surveyed area for each station.

In the area of the Asopus-1A well, most of the analysed stations (D1a, D2a, D3a, and D5a) showed no evidence of marine litter. However, at station D4a a localized presence of litter was recorded, with the identification of a fishing net (J54: plastic nets and fragments of nets > 50 cm) and textile material (J145: other textiles), with abundances of 1190.48 items km⁻² and 2380.95 items km⁻², respectively.

In the vicinity of Northern station group, three stations showed no presence of marine litter (D1b, D3b, and D4b). The remaining stations instead exhibited a limited but diverse contribution of items. Specifically, at station D2b a wooden object was observed (J172: other processed wooden items > 50 cm), while at D4b a

plastic fragment was identified (J241: other identifiable non-foamed plastic items). Station D5b showed the presence of a plastic bag (J4: small plastic bags). Abundances ranged between 333.33 items km⁻² and 357.14 items km⁻².

Regarding the control stations, most stations (D6a and D7b) showed no evidence of marine litter. However, station D6b exhibited a higher typological diversity of items, including a plastic bottle (J8: plastic drink bottles > 0.5 L), metal cans (J175: metal drink cans; J176: metal food cans), and glass bottles (J200: glass bottles), the latter showing the highest recorded abundance (1481.48 items km⁻²). This indicates a localized accumulation of waste mainly associated with consumer-related materials.

Finally, among the Reference stations, Othonoi Ref and Italy Ref showed no evidence of marine litter, whereas at Kerkyra Ref a single cardboard item was detected (J148: cardboard boxes), with an abundance of 357.14 items km⁻².

Overall, the results indicate a highly heterogeneous spatial distribution of marine litter, with a predominance of absence of debris across most stations and the occurrence of localized hotspots, particularly associated with plastic materials and consumer-related items.

Table 3-35 reports the results of the AUV mosaic analysis across the investigated areas (Asopus-1A and Northern station group, Blank stations, and Reference stations), including the surveyed area, presence/absence of marine litter, item categories classified according to the MSFD Joint List, and corresponding abundances (total and items km⁻²).

Figure 3-142 to Figure 3-147 present, for each analysed station, images of individual marine litter items extracted from the AUV mosaics. For each item, a detailed description, its location, and its main identifying characteristics are provided.

Table 3-35: Results of the AUV mosaic analysis across the investigated areas (Asopus-1A and northern station group, Blank stations, and Reference stations), including the surveyed area, presence/absence of marine litter, item categories classified according to the MSFD Joint List, and corresponding abundances (total and items km⁻²)

SITE	STATION	SURVEYED AREA (KM ²)	LITTER CATEGORY ACCORDING TO MSFD JOINT LIST		ABUNDANCE	
			J-CODE	CATEGORY	TOTAL ABUNDANCE	ITEMS KM ⁻²
ASOPUS -1A station group	D1a	0.00140	No evidence of marine litter was detected			
	D2a	0.00270	No evidence of marine litter was detected			
	D3a	0.00270	No evidence of marine litter was detected			
	D4a	0.00084	J54	Plastic nets and pieces of net > 50 cm	1	1190.48
			J145	Other Textiles	2	2380.95
	D5a	0.00270	No evidence of marine litter was detected			
Northern station group	D1b	0.00300	No evidence of marine litter was detected			
	D2b	0.00280	J172	Another processed wooden items > 50 cm	1	357.14
	D3b	0.00240	No evidence of marine litter was detected			

SITE	STATION	SURVEYED AREA (KM ²)	LITTER CATEGORY ACCORDING TO MSFD JOINT LIST		ABUNDANCE	
			J-CODE	CATEGORY	TOTAL ABUNDANCE	ITEMS KM ⁻²
	D4b	0.00300	J241	Other identifiable non-foamed plastic	1.00	333.33
	D5b	0.00280	J4	Small plastic bags	1.00	357.14
Blanks	D6a	0.00280	No evidence of marine litter was detected			
	D6b	0.00270	J8	Plastic drink bottles > 0.5 L	1	370.37
			J175	Metal drink cans	1	370.37
			J176	Metal food cans	1	370.37
			J200	Glass bottles	4	1481.48
	D7b	0.00320	No evidence of marine litter was detected			
Reference stations	Othonoi-Ref	0.00290	No evidence of marine litter was detected			
	Kerkyra-Ref	0.00280	J148	Carboard boxes	1	357.14
	Italy-Ref	0.00280	No evidence of marine litter was detected			

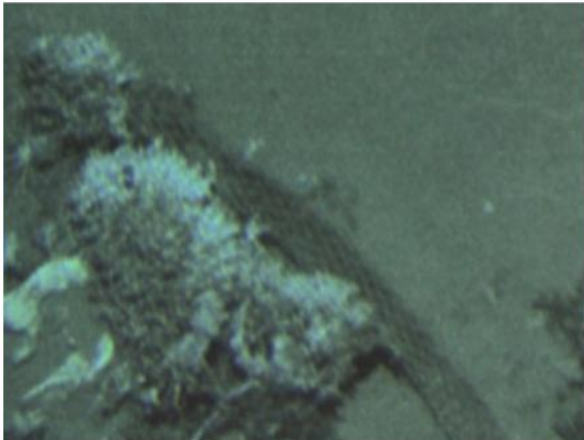
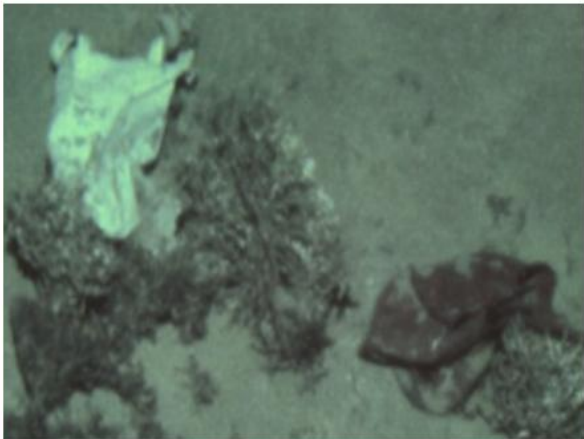
WGS84-UTM34N (m): 324222.3 E 4387989.69 N - Depth: 823.6 m - Surveyed Area (Km ²): 0.00084	
WGS84-UTM34N (m): 324246.83 E 4388027.67 N 	<u>Litter Category according to MSFD Joint List</u> J-code: J54 Category: Plastic nets and pieces of net > 50 cm FG: Fishing Gears <u>Abundance and characteristics of marine litter items</u> Size (cm): 100 x 10 Totale Abundance: 1 Abundance (Km²): 1190.48 items Km⁻²
WGS84-UTM34N (m): 324248.22 E 4388026.28 N 	<u>Litter Category according to MSFD Joint List</u> J-code: J145 Category: Other Textiles <u>Abundance and characteristics of marine litter items</u> Size (cm): 50 x 30 and 40 x 20 Totale Abundance: 2 Abundance (Km²): 2380.95 items Km⁻²
Notes: Interactions between marine litter and benthic fauna were recorded	

Figure 3-142: Asopus-1A - station D4a: images of individual marine litter items extracted from the AUV mosaics. For each item, a detailed description, its location, and its main identifying characteristics are provided

WGS84-UTM34N (m): 324814.41 E 4391363.63 N - Depth: 811.0 m - Surveyed Area (Km ²): 0.0027	
WGS84-UTM34N (m): 324817.11 E 4391377.43 N 	<u>Litter Category according to MSFD Joint List</u> J-code: J8 Category: Plastic drink bottles > 0.5 L SUP: Single Use Plastic <u>Abundance and characteristics of marine litter items</u> Size (cm): 35 Totale Abundance: 1 Abundance (Km²): 370.37 items Km⁻²
WGS84-UTM34N (m): 324248.22 E 4388026.28 N 	<u>Litter Category according to MSFD Joint List</u> J-code: J175 - J176 - J200 Category: Metal drink cans - Metal food cans - Glass bottles <u>Abundance and characteristics of marine litter items</u> Size (cm): < 50 cm Totale Abundance: 1 - 1 - 4 Abundance (Km²): 370.37 - 370.37 - 1481.48 items Km⁻²

Figure 3-143: Asopus-1A and Northern station group - station D6b (Blank): images of individual marine litter items extracted from the AUV mosaics. For each item, a detailed description, its location, and its main identifying characteristics are provided

WGS84-UTM34N (m): 325419.76 E 4394759.63 N - Depth: 839.8 m - Surveyed Area (Km ²): 0.0028	
WGS84-UTM34N (m): 325421.01 E 4394748.90 N 	<u>Litter Category according to MSFD Joint List</u> J-code: J172 Category: Other processed wooden items > 50 cm <u>Abundance and characteristics of marine litter items</u> Size (cm): 150 x 10 Totale Abundance: 1 Abundance (Km²): 357.14 items Km⁻²

Figure 3-144: Northern station group - station D2b: images of individual marine litter items extracted from the AUV mosaics. For each item, a detailed description, its location, and its main identifying characteristics are provided

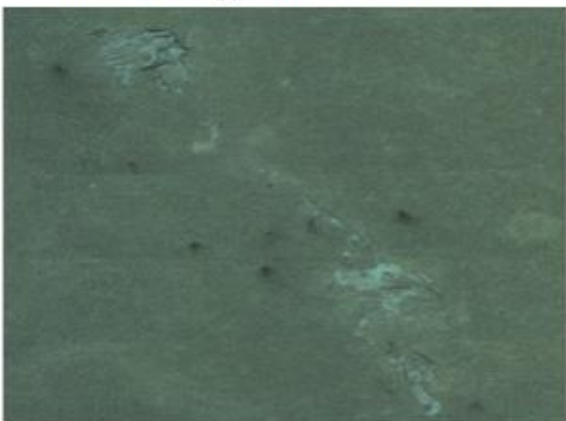
WGS84-UTM34N (m): 324401.81 E 4394758.96 N - Depth: 820.5 m - Surveyed Area (Km ²): 0.0030	
WGS84-UTM34N (m): 324426.27 E 4394768.42 N 	<u>Litter Category according to MSFD Joint List</u> J-code: J241 Category: Other identifiable non-foamed plastic items <u>Abundance and characteristics of marine litter items</u> Size (cm): 260 x 15 Totale Abundance: 1 Abundance (Km²): 333.33 items Km⁻²

Figure 3-145: Northern station group - station D4b: images of individual marine litter items extracted from the AUV mosaics. For each item, a detailed description, its location, and its main identifying characteristics are provided

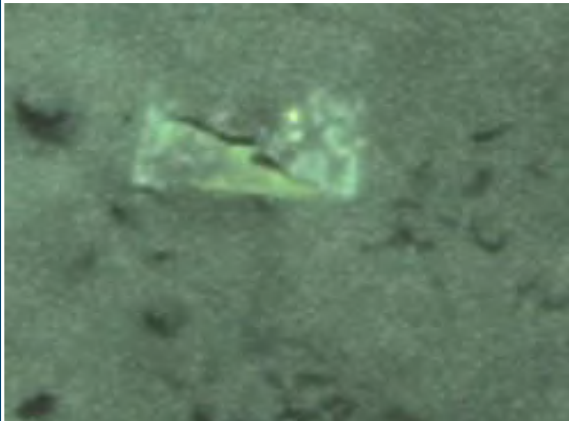
WGS84-UTM34N (m): 324896.83 E 4394243.34 N - Depth: 825.1 m - Surveyed Area (Km ²): 0.0028	
WGS84-UTM34N (m): 324887.39 E 4394292.82 N 	<u>Litter Category according to MSFD Joint List</u> J-code: J4 Category: Small plastic bags SUP: Single Use Plastic <u>Abundance and characteristics of marine litter items</u> Size (cm): 20 x 15 Totale Abundance: 1 Abundance (Km²): 357.14 items Km⁻²

Figure 3-146: Northern station group - station D5b: images of individual marine litter items extracted from the AUV mosaics. For each item, a detailed description, its location, and its main identifying characteristics are provided

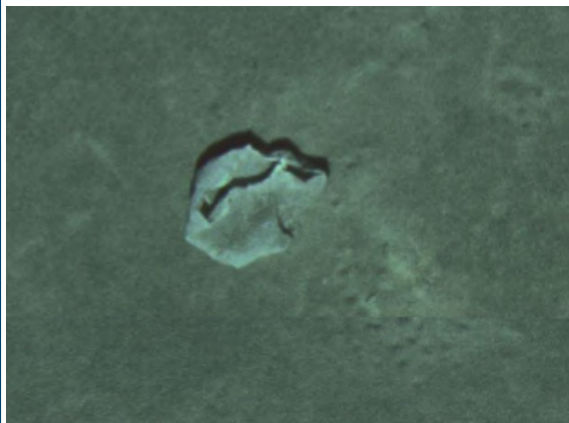
WGS84-UTM34N (m): 345716.4 E 4385915.53 N - Depth: 1134.16 m - Surveyed Area (Km ²): 0.0028	
WGS84-UTM34N (m): 345750.18 E 4385914.47 N 	<u>Litter Category according to MSFD Joint List</u> J-code: J148 Category: Carboard boxes <u>Abundance and characteristics of marine litter items</u> Size (cm): 50 x 50 Totale Abundance: 1 Abundance (Km²): 357.14 items Km⁻²

Figure 3-147: Kerkyra Ref – Reference station: images of individual marine litter items extracted from the AUV mosaics. For each item, a detailed description, its location, and its main identifying characteristics are provided

3.3.2.5 Seawater and plankton discussion

3.3.2.5.1 Seawater discussion

The integrated analysis of the vertical distributions of temperature and salinity revealed a hydrographic setting consistent with the characteristic thermo-haline structure of the Northern Ionian Sea. Despite minor local differences related to bathymetry and sampling period, all investigated stations exhibited a remarkably coherent vertical organization of the water column, indicating the predominance of basin-scale oceanographic processes over local variability.

The upper water column was characterized by a relatively warm and vertically homogeneous surface layer extending to approximately 70 – 100 m depth, with temperatures generally ranging between 16 and 17 °C and salinities below 38.8 PSU. These characteristics appeared consistent with the presence of Modified Atlantic Water (MAW), which enters the Mediterranean through the Strait of Gibraltar and progressively increases in temperature and salinity along its eastward circulation pathway through the Sicily Channel and Ionian Sea (Malanotte-Rizzoli et al., 1997, 1999; Millot & Taupier-Létage, 2005; Fedele et al., 2022). Beneath the MAW, a pronounced thermo-haline transition developed between approximately 100 and 250 m, with salinity reaching or exceeding 39.10 PSU. These values were possibly indicative of the presence of the Levantine Intermediate Water (LIW), one of the dominant intermediate water masses of the Eastern Mediterranean, as reported, among others, by Malanotte-Rizzoli et al. (1997, 1999), Menna et al. (2021), Fedele et al., (2022), Mallil et al. (2022). According to these authors, the Northern Ionian Sea represents one of the principal pathways of LIW propagation from the Levantine Basin towards the Adriatic Sea. Below, temperature and salinity gradually decreased with increasing depth, approaching respectively 13.8 – 14.1 °C and 38.8 – 38.9 PSU, likely suggesting the occurrence of transitional waters resulting from progressive mixing between LIW and deeper Eastern Mediterranean Deep Water (EMDW), rather than a pure EMDW core.

Overall, the vertical distribution of the remaining investigated physic-chemical variables reflected the thermo-haline structure of the water column. pH exhibited a gradual decrease with depth, consistent with increased salinity and reduced oxygenation, reflecting natural acid-base equilibria modulated by salinity, nutrient availability, and organic matter (Carstensen & Duarte, 2019), with values within the expected range for oligotrophic marine environments (Hinga, 2002).

Vertical DO profiles indicated well oxygenated conditions (< 90 %) within the surface layer associated with the presence of the MAW, decreasing to moderate undersaturation at depth, reaching values lower than 70 % in bottom waters. The weak thermo-haline inversions observed below approximately 600 – 700 m, accompanied by slight increases in DO, may reflect the influence of relatively recently ventilated deep waters associated with the Adriatic / Ionian thermohaline circulation. Similar features were interpreted as signatures of deep-water renewal processes involving Adriatic-derived waters contributing to the formation and ventilation of EMDW within the Ionian Basin (Malanotte-Rizzoli et al., 1997; Theocharis et al., 2002). Although bottom DO concentrations and saturation levels were lower than those reported in the literature (e.g., Tomczak & Godfrey, 2005), DO remained above 2.8 mg L⁻¹ (2 mL L⁻¹), the hypoxia threshold proposed by Diaz & Rosenberg (1995) and Wu (2002), and well above 2 mg L⁻¹ (1.4 mL L⁻¹), indicated by Rabalais et al. (1999) and Justić et al. (2003) as the onset level of hypoxic conditions.

Fluorescence profiles showed generally low Chl-a equivalent concentrations, with a Deep Chlorophyll Maximum (DCM) mainly developed between ~70 and 100 m depth and peak values not exceeding 0.33 µg L⁻¹ Chl-a. Such values suggest low phytoplankton biomass, reflecting the oligotrophic character of the area, typical of systems in which nutrient scarcity in surface waters constrains primary production (Barbieux et al., 2019).

The consistently low turbidity recorded across the study area indicated high water transparency and limited suspended particulate input throughout the water column. Although previous studies have emphasized that persistent turbidity and enhanced sedimentation may severely affect benthic ecosystems (Berry et al., 2003), even the highest values recorded at the time of sampling were not suggestive of conditions likely to result in significant adverse effects on benthic communities.

With regard to laboratory analyses of seawater samples, Total Suspended Solids (TSS) showed moderate concentrations and limited spatial variability, with comparable average values across Asopus-1A and Northern station group, Blank stations and Reference Stations. In contrast, Total Organic Carbon (TOC) was consistently below the analytical detection limit at all stations and depths, with an only isolated quantifiable value at Italy Ref. This pattern was consistent with the low organic-carbon availability typical of oligotrophic marine settings (Hansell & Carlson, 2001) and remained well below concentrations commonly reported for more productive marine systems (Deuser, 1971; Hill & Wheeler, 2002; Sempéré et al., 2001).

The Mediterranean Sea is widely recognized as one of the most nutrient-depleted large marine basins (e.g., Redfield et al., 1963; Powley et al., 2017a, 2017b). In this study, nutrient concentrations were generally low, confirming the oligotrophic character of the Ionian Sea and, more broadly, of the Central and Eastern Mediterranean sub-basins, in agreement with previous reports (e.g., Miller et al., 1970; Cescon & Macchi, 1973; Weiss et al., 1983). Total Nitrogen (N-Tot) was consistently below the analytical LoQ, while Nitrite (NO_2^-) and Nitrate (NO_3^-) were mostly unquantifiable, especially around the Asopus-1A well site; Ammonium (NH_4^+) was only sporadically detected. Orthophosphate (PO_4^{3-}) was quantifiable in almost all samples, although generally at low concentrations, whereas Total Phosphorus (P-Tot) was detected in most samples without a coherent vertical pattern.

Overall, these results highlight the oligotrophic nature of the study site, characterized by low concentrations of dissolved inorganic nutrients as well as minimal suspended organic matter. This nutrient scarcity is consistent with limited primary productivity (as indicated by Chlorophyll-a concentrations, suggested by measured fluorescence) and reduced remineralisation processes throughout the water column.

Regarding heavy and trace metals in the water column, most of the investigated elements: Cadmium (Cd), Hexavalent Chromium (Cr VI), Cobalt (Co), Mercury (Hg) and Tin (Sn) were consistently below the analytical LoQ at all Sampling Stations and Depths. Similarly, Total Chromium (Cr-Tot) and Lead (Pb) were only sporadically detected, while Copper (Cu) and Nickel (Ni) were quantifiable in a limited number of samples and generally occurred at low concentrations throughout the study area, although both elements exhibited comparatively higher values at Italy Ref. In contrast, Arsenic (As), Barium (Ba), Iron (Fe) and Zinc (Zn) were detected at all Sampling Stations and Depths. Among these, As and Ba showed limited spatial variability and broadly comparable concentrations across the well-site areas, Blank stations and Reference Stations, whereas Fe and Zn exhibited greater variability, albeit without any consistent depth-related trend. Fe and Zn also showed the highest concentrations among the investigated metals, reflecting their natural abundance in the surveyed waters. Comparison with the applicable Environmental Quality Standards highlighted only limited exceedances. As exceeded the Italian SQA-MA value (D.Lgs. No. 172/2015) in a limited number of samples around both well-site areas; however, comparable concentrations, slightly below the regulatory threshold, were also recorded at Blank stations and at Othonoi Ref, suggesting a diffuse concentration gradient across the study area rather than a discrete enrichment associated with the proposed well locations. Although the measured concentrations were moderately higher than those typically reported for open-ocean seawater (Neff, 1997; 2002), substantially higher natural As levels have been documented in marine environments under specific geochemical and hydrographic conditions (Wang et al., 2023). Exceedances of both the AA-EQS of Directive 2013/39/EU (as applied in Greece) and the Italian SQA-MA were observed only at Italy Ref for Pb and Ni, affecting two and one sampling depths, respectively. Although the measured Pb concentrations exceeded values classically reported for open-ocean seawater (Bruland, 1983), and Ni concentrations were higher than those commonly reported for open Mediterranean waters (Middag et al.,

2022), similar isolated exceedances of these elements have occasionally been reported during environmental monitoring in Italian coastal waters (e.g., ARPA Sicilia, 2020, 2022; ARPA Sardegna, 2023). Overall, the distribution patterns of As, Pb and Ni showed no evidence of a systematic relationship with the proposed well locations. As concentrations exhibited a broadly homogeneous distribution across the study area, whereas the Pb and Ni exceedances were confined to a single offshore Reference Station and occurred against a background of generally low or non-detectable concentrations elsewhere. Taken together, these observations indicate that the recorded exceedances are more likely attributable to natural geochemical variability and background fluctuations than to widespread contamination or influences associated with the proposed well sites.

With regard to organic compounds investigated in the water column, the absence of quantifiable concentrations of petroleum hydrocarbons (i.e., C ≤ 10, C10 – C40 and TPH) and PAHs throughout the study area indicated that hydrocarbon contamination was not evident at the time of sampling. All analysed compounds remained below their analytical LoQs at all stations and depths and, where applicable, below the Environmental Quality Standards established by Directive 2013/39/EU (AA-EQS for other surface waters, as applied in Greece) and by D.Lgs. No. 172/2015 (Annex 1, Tables 1/A and 1/B). Collectively, these findings were consistent with the offshore setting of the investigated area and provided no indication of hydrocarbon-related pressures affecting water-column quality.

3.3.2.5.2 Phytoplankton discussion

Phytoplankton community, in terms of abundance, differed, significantly, between the three sampling depths (surface, middle and bottom). Most stations were characterized by higher phytoplanktonic abundances in the surface sampling depth than those recorded in deeper waters (middle and bottom sampling depth). This significant variability across the water column could be suggested by the role of the light intensity to limit the distribution of many microalgae in the higher depth (Pahlow et al., 2009). Significant variability of the phytoplanktonic abundance was also detected between Asopus-1A, Northern station group and the station Italy Ref, included within Reference area, located far distant from each other, and this could be explained by hydrographic characteristic of water masses and circulation in the northern Ionian Sea (Budillon et al., 2010; Lavigne et al., 2018). Phytoplanktonic community was dominated by the category of the “Other taxa”, mainly constituted by class Cryptophyceae and Microflagellates (cell size < 10 µm). These types of microalgae are indicators of oligotrophic conditions, since they tend to become dominant over greater cells size species in such conditions, as confirmed by previous studies carried out in the Ionian Sea (Caroppo et al., 2016; Casotti et al., 2003). The second most abundant group was constituted by the class of Bacillariophyceae, mainly represented by the species *Pseudo-nitzschia delicatissima* complex (maximum abundance of 1.30 x 10⁵ cells L⁻¹ in the Surface depth of D3a). This complex is known to include cryptic species that cannot be reliably distinguished using inverted light microscopy alone (Giulietti et al., 2021). The presence of dead cells of this species, observed in all sampling depth of that survey area (obviously not counted to estimate the total phytoplanktonic abundance), could suggest sinking of silicious and carbonate matter on the seabed inside area of Ionian Sea across vertical fluxes depending on production processes occurring in the photic layer, such as spring and autumn blooms. Fluxes are characterized by discontinuous and short-time events correlated with the end phase of micro-phytoplankton blooms (Boldrin et al., 2002; Giordani et al., 2002; Stavrakakis et al., 2013). The abundances of the Dinophyceae, mainly represented by indeterminate forms, and Coccolithophyceae, mainly constituted by the species

Gephyrocapsa huxleyi, remained low, but, at the opposite, in terms of taxonomic richness, the higher number of taxa identified are included in the class of Dinophyceae followed by other groups, as already observed in previous studies dealing with phytoplankton communities in other Eastern Mediterranean basins (Ignatiades et al., 2009; Siokou-Frangou et al., 1999).

3.3.2.5.3 Mesozooplankton discussion

The mesozooplankton assemblages observed in the investigated offshore sector of the Ionian Sea were characterized by high taxonomic diversity and a generally homogeneous spatial distribution Asopus-1A, Northern station group and the Reference stations. The absence of marked qualitative and quantitative differences among stations suggests that the structure of the mesozooplankton community is primarily regulated by large-scale hydrological and bathymetric drivers rather than by local environmental variability.

The investigated water column, encompassing the upper epipelagic and intermediate layers, reflects the oligotrophic conditions typical of the eastern Mediterranean basin. In such environments, limited nutrient availability tends to constrain plankton biomass while simultaneously promoting high levels of biodiversity and ecological specialization. The marked predominance of the holoplanktonic component, particularly copepods, represents a typical feature of oceanic mesozooplankton communities associated with stratified pelagic ecosystems, where relatively stable hydrological conditions favour the persistence of taxa adapted to low-productivity environments.

The close correspondence observed between the composition of juvenile and adult copepod fractions suggests the presence of relatively stable populations and indicates that the investigated area represents a suitable habitat for the completion of the life cycle of numerous oceanic species. At the same time, the co-occurrence of epipelagic and mesopelagic taxa reflects the transitional ecological nature of the sampled layer, within which species associated with different vertical domains may overlap as a consequence of migratory processes and interactions among water masses.

The non-copepod holoplanktonic component clearly reflects the oceanic character of the investigated system. The occurrence of hydrozoans, pteropods, chaetognaths, appendicularians, thaliaceans, euphausiids, mysids, and pelagic polychaetes highlights the presence of a structurally complex pelagic trophic network. Many of these groups are known to respond rapidly to hydrological and trophic variability, thus representing important ecological indicators of pelagic ecosystem functioning.

The scarcity of the meroplanktonic component, particularly larvae attributable to coastal benthic taxa, further supports the interpretation of a typically offshore community weakly influenced by neritic inputs. This pattern appears consistent with the bathymetric setting of the area and with the distance from coastal environments.

3.3.2.5.4 Ichthyoplankton discussion

The results concerning the ichthyoplankton component indicate an overall pattern consistent with deep pelagic environments within the investigated sector. In general, the observed structure appears to be influenced by distance from the coast and water column depth, with a marginal contribution from neritic inputs.

From an ecological perspective, the predominance of mesopelagic and bathypelagic species (*Cyclothone braueri*, *Maurollicus muelleri*, *Lampanyctus pusillus*) highlights the central role of deep scattering layer communities as a structural component of the pelagic ecosystem. These organisms represent a key element in vertical trophic fluxes, contributing to energy transfer between deep and surface layers through migratory behaviour and adaptive feeding strategies. The presence of epipelagic taxa (*Sardina pilchardus*) further confirms a degree of vertical and horizontal connectivity among different ecological domains of the water column.

However, it is important to emphasize that the available dataset does not allow for robust statistical analyses or detailed quantitative comparisons among areas or transects. The limited overall abundance and the sporadic distribution of taxa, renders statistical inference unreliable for comparative assessments or for the identification of significant spatial patterns. Consequently, the interpretations provided should be considered strictly qualitative.

Despite these limitations, the collected evidence remains ecologically informative and consistent with the oceanographic characteristics of the deep Ionian sector. The observed taxonomic composition is typical of open, oligotrophic, and deep-water systems, where the occurrence of coastal fish larvae is generally reduced and communities are dominated by taxa adapted to low-productivity conditions.

3.3.2.6 Sediment and infauna discussion

3.3.2.6.1 Sediment discussion

Field measurements performed immediately after sample recovery indicated sediment temperatures broadly reflecting bottom-water conditions at the sediment–water interface, although partially influenced by atmospheric exposure during onboard handling. Sediment pH exhibited very limited variability and remained within the range typically reported for fine-grained bathyal marine sediments. Similarly, ORP values were consistently negative throughout the study area, indicating reducing conditions within the superficial sediment layer. Such conditions are commonly associated with cohesive fine-grained deposits, where limited permeability restricts oxygen penetration into pore waters and promotes the development of reducing micro-environments (e.g., Zaldívar et al., 2008).

Grain-size analyses confirmed the pervasive dominance of pelitic sediments throughout the study area, with Silt and Clay together exceeding 85 % at all stations and approaching 100 % at the Greek Reference Stations. This texture is consistent with the deep offshore setting of the investigated area, where low-energy hydrodynamic conditions favour the deposition and preservation of fine-grained suspended particles (Reading, 1996; Boggs, 2012; Nichols, 2009). Gravel was absent in all samples, while Sand represented only a minor component at most stations, generally remaining below 15 %. Only Italy Ref showed a modest departure from the otherwise uniform sedimentary texture, with relatively higher sand content and lower silt percentages compared with the other stations, likely reflecting its shallower setting and greater proximity to the Italian coast, where local hydrodynamic conditions may favour the retention of somewhat coarser terrigenous particles. The close agreement between the Folk (1954, 1974) and Shepard (1954) classifications and the measured grain-size distributions further supported the predominance of fine cohesive sediments throughout the study area. The widespread occurrence of “Mud” and “Silty clay” facies, together with the limited representation of coarser textural classes, was consistent with sediment

accumulation under the low-energy depositional conditions typical of the bathyal Ionian Sea (Poulos et al., 1999; Perri et al., 2015). The granulometric homogeneity observed throughout the study area was mirrored by the measured physical and chemical characteristics of the sediments. The predominance of pelitic deposits, together with the generally elevated moisture content and remarkably uniform density values, further supported the occurrence of cohesive seabed conditions and an efficient retention of pore water and associated particulate material.

Within this framework, although frequently quantifiable, TOC concentrations remained consistently low throughout the study area, indicating limited accumulation of organic matter within the surface sediment layer. Such values were consistent with the oligotrophic conditions that characterize the Ionian Sea and the broader Eastern Mediterranean, where limited nutrient availability constrains primary productivity and the supply of organic matter to the seafloor (Powley et al., 2017a, 2017b). Consequently, pressures on benthic communities associated with organic enrichment are expected to be negligible (Hyland et al., 2005). The relatively homogeneous distributions of Total Nitrogen (N-Tot) and Total Phosphorus (P-Tot), together with the absence of localized concentration peaks around Asopus 1A area, further supported this interpretation. N-Tot concentrations suggested relatively stable inputs of organic matter and associated remineralisation processes (Gruber, 2008), whereas the widespread occurrence of P-Tot was consistent with P being predominantly retained within particulate and sediment-bound pools rather than occurring in dissolved forms (Schulz & Zabel, 2006). Carbonate contents likewise exhibited limited spatial variability and concentrations typical of carbonate-bearing pelitic sediments. Their relatively uniform distribution, together with the overall consistency observed for TOC, N-Tot and P-Tot, further corroborated the homogeneity of depositional conditions throughout the investigated area. Collectively, these findings indicate the absence of significant organic or nutrient enrichment and are fully consistent with a generally oligotrophic benthic environment.

The distribution of metals and metalloids in surface sediments showed limited spatial variability throughout the study area, with generally comparable concentrations among Asopus-1A, Northern station group, Blank and Reference Stations. Northern station group tended to exhibit slightly higher concentrations for several elements, whereas Italy Ref frequently showed lower values, likely reflecting its relatively coarser sediment texture and lower pelitic content. Cadmium (Cd), Mercury (Hg), Hexavalent Chromium (Cr VI) and Tin (Sn) occurred at very low concentrations, frequently below the analytical LoQ, while Aluminium (Al) and Iron (Fe) were by far the most abundant elements, reflecting their predominantly lithogenic origin and natural abundance within the sediment matrix (Louma, 1990; Loring, 1991). The remaining investigated metals and metalloids generally occurred within the order of magnitude of $10^1 \text{ mg kg}^{-1} \text{ d.s.}$, consistent with the overall granulometric homogeneity of the sediments. Comparison with the applicable sediment quality criteria highlighted exceedances for Arsenic (As), Nickel (Ni) and Total Chromium (Cr-Tot). As exceeded the HCMR ERL value adopted in Greece (Long et al., 1995) at most sampling stations and the Italian SQA-MA threshold (D.Lgs. 172/2015, Table 3/B) at five stations. Ni exceeded the HCMR ERL value throughout the study area, whereas Cr-Tot exceeded the Italian SQA-MA threshold at five stations, including both well-site and Reference Stations. All remaining investigated elements remained below the applicable reference values. The widespread occurrence of As and Ni exceedances, together with the distribution of Cr-Tot exceedances across well-site, Blank and Reference Stations, showed no evidence of localized enrichment associated with the proposed drilling locations. Rather, the absence of clear concentration gradients, the offshore setting of all sampling stations, and the lack of existing offshore infrastructures or major nearby anthropogenic inputs collectively suggest that the observed metal distribution was more consistent with natural geochemical

variability than with contamination. This interpretation was further supported by the predominance of fine-grained pelitic sediments, which normally favour trace-element retention through adsorption processes (Horowitz, 1991; Förstner and Wittman, 1981; Que, et al., 2024). In particular, the quantified As concentrations fell within ranges reported for uncontaminated marine sediments, where natural background levels may reach $\sim 15 \text{ mg kg}^{-1} \text{ d.w.}$ in coastal settings and up to $\sim 40 \text{ mg kg}^{-1} \text{ d.w.}$ in deep-sea environments (e.g., Kalia and Khambholja, 2015), in line with similar Mediterranean cases attributed to environmental background conditions (e.g., Dall’Aglia et al., 2001; Arienzo et al., 2020; Armiento et al., 2022). Similarly, Ni and Cr-Tot concentrations were consistent with values reported for marine sediments from other sectors of the Eastern Mediterranean, indicating that the distribution of these elements is largely controlled by sediment provenance and by their affinity for fine-grained sediment fractions, often resulting in naturally elevated concentrations unrelated to anthropogenic contamination (De Lazzari et al., 2004; Amorosi, 2012; Ilijanić et al., 2014). Comparable concentrations have also been documented in semi-closed East Mediterranean Gulfs, including the Aegean Sea, where naturally elevated Ni and Cr levels have been linked to geological background and sediment composition (Stamatis et al., 2019).

With regard to the investigated sediment hydrocarbons, the complete absence of quantifiable concentrations of the light hydrocarbon fraction ($C \leq 12$) and the uniformly low concentrations of the heavier fraction ($C > 12$) suggested a negligible accumulation of hydrocarbon compounds within the surface sediment layer. Consistently, most investigated PAHs remained below the analytical LoQ, while the few quantifiable concentrations were sporadic, low and showed no coherent spatial distribution. The highest diversity of detected compounds and the highest Σ PAHs concentrations were recorded at Italy Ref and, to a lesser extent, at D6a, with no discernible pattern indicative of localized hydrocarbon enrichment or geochemical anomalies associated with the planned well locations. Although the study area hosts proven natural-gas accumulations within the subsurface geological formations, the absence of anomalous concentration patterns suggests that no measurable geochemical signature related to the underlying gas accumulations was present in the investigated sediments at the time of sampling. Such a result may indicate either that any natural fluid or gas migration processes were absent, episodic or insufficient to generate detectable accumulation within surface sediments, or that potential subsurface fluid and gas migration did not produce a measurable geochemical imprint on the investigated hydrocarbon categories (Judd & Hovland, 2007). No sediment quality criteria are currently provided by either the HCMR guidelines or the Italian Environmental Quality Standards (D.Lgs. No. 172/2015) for the investigated hydrocarbon fractions ($C \leq 12$, $C > 12$) and TPH. Conversely, individual PAHs and Σ PAHs concentrations remained several orders of magnitude below the applicable reference values adopted by HCMR (Long et al., 1995) and the Italian Environmental Quality Standards (D.Lgs. No. 172/2015). Overall, the predominance of non-detects and the low concentrations measured where compounds were quantified were consistent with background conditions typical of offshore oligotrophic environments characterized by limited anthropogenic pressure, indicating that at the time of sampling hydrocarbon-related compounds exerted negligible influence on sediment quality within the investigated area.

Microplastics were not detected in any sediment sample collected throughout the study area, including Asopus-1A, Northern station group, Blank and Reference Stations. Qualitative micro-Raman / FTIR screening did not identify any synthetic polymer particles within the investigated size range ($1 \mu\text{m} - 5 \text{ mm}$). The absence of detectable microplastics throughout the study area provided no evidence of measurable microplastic contamination at the time of sampling and indicated that synthetic polymer particles were not

a significant component of the investigated surface sediments and, consistent with the offshore setting of the investigated area and the apparent absence of significant local sources of plastic debris.

3.3.2.6.2 Infauna discussion

Multivariate analyses did not reveal distinct ecological patterns either among the stations associated with Asopus-1A and Northern station group or between these and the Reference stations (Othonoi Ref, Kerkyra Ref, and Italy Ref). The slight variations observed are primarily attributable to natural spatial heterogeneity and micro-scale substrate variability, rather than to true ecological gradients.

Overall, all investigated stations exhibited low values of abundance, species richness, and diversity, consistent with those typically recorded in Mediterranean bathyal environments. The macrobenthic communities are therefore simplified and taxonomically poor, both within the Block 2 area and at the Reference sites. In particular, the community structure is dominated by the phylum Annelida, with a marked prevalence of the sipunculid *Golfingia* sp., a typical inhabitant of deep muddy sediments.

The entire system can be assigned to the Mediterranean Upper Bathyal Mud biocenosis (EUNIS code: ME65), characterized by fine-grained sediments and strongly limiting environmental conditions in terms of light availability, temperature, and organic matter supply. Furthermore, this biocenosis was characterized by the presence of carbonate oozes composed of skeletal remains of planktonic organisms such as coccolithophores, foraminifera, and pteropod molluscs.

From an ecological perspective, this configuration implies a poorly structured trophic network, with a limited number of functional interactions and a strong dependence on the sedimentation of organic matter from the overlying water column. This pattern is consistent with the literature on Mediterranean bathyal systems, where the reduced input of organic matter, high hydrostatic pressure, low temperatures, and oligotrophic conditions strongly constrain benthic productivity. The fine sediment granulometry and generally reduced redox conditions further contribute to community simplification, limiting the occurrence of more sensitive taxa such as many molluscs and peracarid crustaceans.

Moreover, the results of the statistical analyses performed on sediment physicochemical variables and the studied macrobenthic communities confirm that bathyal benthic community distribution in the investigated areas is controlled by a combination of sedimentological and geochemical factors, with fine-grained sediments and processes linked to the deep sedimentary organic matter cycle playing a key ecological role.

The application of the M-AMBI index generally indicates an ecological status ranging from “Poor” to “Moderate”, whereas the AMBI suggests conditions from “Undisturbed” to “Moderately disturbed”. This discrepancy reflects the limitations of these indices when applied to deep-sea environments, as they were originally developed for coastal systems. In bathyal settings, the naturally low ecological complexity may lead to either underestimation or overestimation of ecological status. Consequently, these results should be considered indicative and not fully representative of the ecological quality of deep-sea ecosystems.

3.3.2.6.3 Seabed habitat discussion

Video Integrated surveys based on AUV mosaics and macrobenthic analyses confirmed an overall homogeneous biocenotic structure across the study area, both within Asopus-1A and northern station group

and at the Reference stations (Othonoi Ref, Kerkyra Ref, and Italy Ref). All investigated settings are dominated by bathyal muddy environments, attributable to the Mediterranean Upper Bathyal Mud biocenosis (EUNIS code: ME65), which represents the main structural component of the studied ecosystem.

From a faunistic perspective, the muddy seafloor is characterized by the recurrent presence of traces of tubicolous and burrowing organisms, typical of low-energy deep-sea sediments, as well as by the occurrence of adapted nektobenthic fauna, including representatives of the family Macrouridae. The localized presence of the burrowing sea anemone *Andresia partenopea* highlights the ability of certain species to exploit specific ecological niches. Similarly, the occasional occurrence of the decapod *Paromola cuvieri* suggests the use of the seafloor as a foraging and/or transit area by mobile nektobenthic organisms.

A particularly relevant ecological feature is the presence of hard substrates within the muddy matrix near station D4a of the Asopus-1A well area. These rocky outcrops are attributable to the Mediterranean Upper Bathyal Rock biocenosis (EUNIS ME15). Although spatially limited, these habitats significantly increase structural complexity and environmental heterogeneity. They host communities typical of deep hard-substrate environments, including deep-sea corals, and contribute to the development of three-dimensional microhabitats that enhance sessile organism colonization and provide shelter for nektobenthic species. In an otherwise low-diversity and highly homogeneous bathyal setting, these structures act as local biodiversity hotspots, with potential positive implications for ecological connectivity and trophic interactions.

Overall, the system can be interpreted as a functionally coherent mosaic of bathyal biocenoses, dominated by low-diversity muddy environments but locally enriched by high-complexity rocky elements. This configuration reflects the typical equilibrium of Mediterranean deep-sea ecosystems, where structural stability is driven by persistent environmental conditions, while ecological resilience depends on the presence of microhabitats that enhance functional diversity and support more complex biological assemblages.

The biocenotic map of the different study areas (Block 2 area and reference stations) is presented in Figure 3-148. This map is based on a final integrated assessment combining macrobenthic analyses and AUV survey data. This integrated approach allowed the delineation of the main benthic biocenoses, habitat types, and facies occurring at the investigated sites. The colour scheme used to represent biocenoses in the maps follows the standards established by the EUNIS classification system (2022).

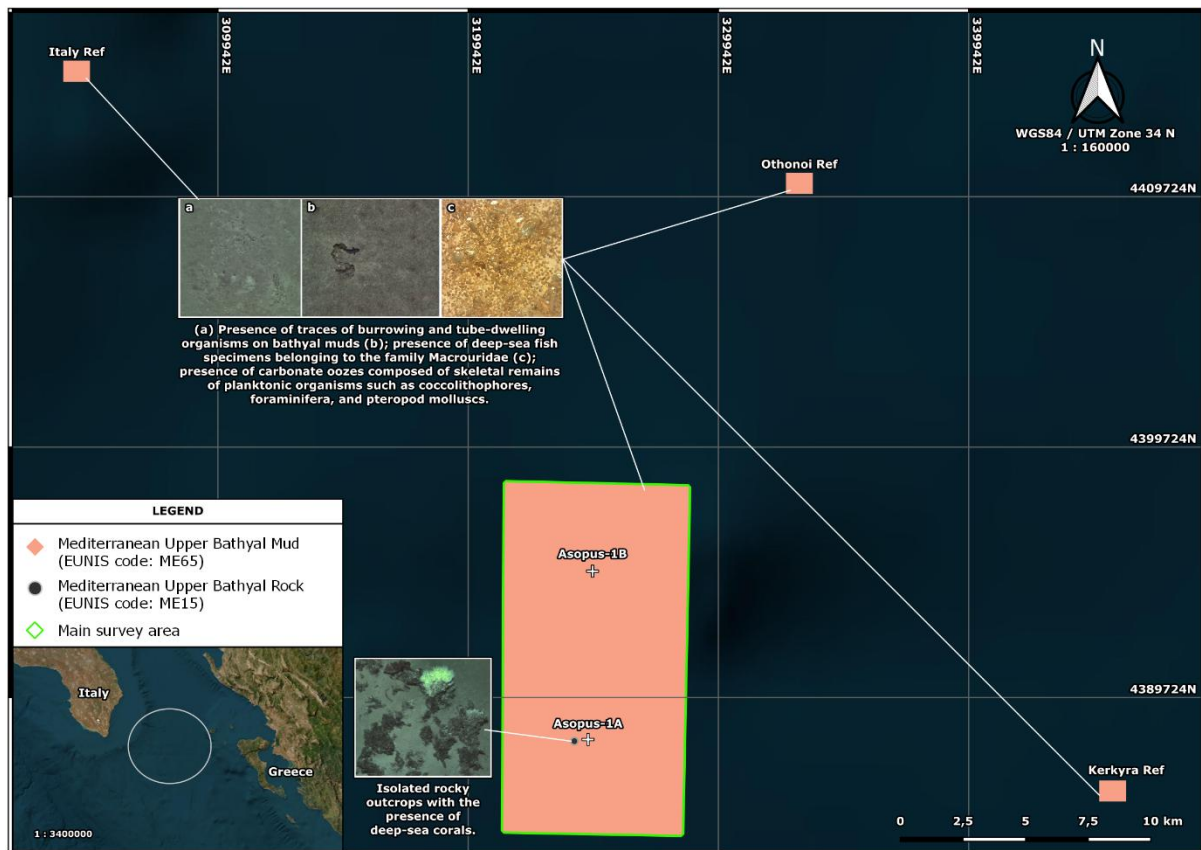


Figure 3-148: Biocenotic Map – Asopus-1A and northern station group and Reference stations (Othonoi Ref, Kerkyra Ref, Italy Ref)

3.3.2.6.4 Marine litter discussion

The analysis of the AUV-derived mosaics revealed a heterogeneous spatial distribution of marine litter across the investigated areas. No evidence of litter was detected at most of the surveyed stations, suggesting a generally low occurrence of litter items on the seafloor within the study area. Nevertheless, the presence of localized accumulations indicates that the deposition and persistence of marine litter on the seabed are influenced by both environmental and anthropogenic factors, which may result in an uneven distribution of materials.

In the Asopus-1A well area, marine litter occurrence was limited and localized, being mainly associated with fishing-related activities and other anthropogenic sources. In the Northern station group, the litter items identified comprised different material categories, suggesting the presence of multiple sources, although no significant accumulation patterns were observed. The Blank stations generally showed an absence of marine litter, with the exception of one station (D6b), where a greater diversity of materials was recorded. This finding is likely related to consumer-derived waste and to local environmental conditions favouring the retention and accumulation of debris. Finally, among the Reference stations, only an occasional litter item was detected at the Kerkyra Ref station.

Overall, the results indicate that marine litter occurrence within the investigated areas is characterized by a patchy spatial distribution. No evidence of widespread accumulations or patterns systematically associated with the well areas emerged when compared with the Blank and Reference stations. Instead, the observed

distribution suggests that marine litter occurrence is primarily controlled by local processes of transport, deposition, and retention of materials on the seafloor.

3.3.2.7 Marine mammal and sea turtle sightings

This section describes the observations of marine mammals and sea turtles during the LOT 02 environmental baseline field survey. It presents data on the spatial distribution of the survey effort, recorded environmental variables, and specific fauna encounters.

The observation team, consisting of two MMOs and two PAMs operators, was deployed onboard the survey vessel during two operational periods: 14.03.2026 – 15.03.2026, and 25.03.2026 – 31.03.2026. Visual monitoring was conducted along the vessel paths during daylight hours, while PAM operations were carried out during the night or in periods of poor visibility. Figure 3-149 maps the total distance covered and the survey tracks completed by the MMOs during the LOT 02 field campaign.

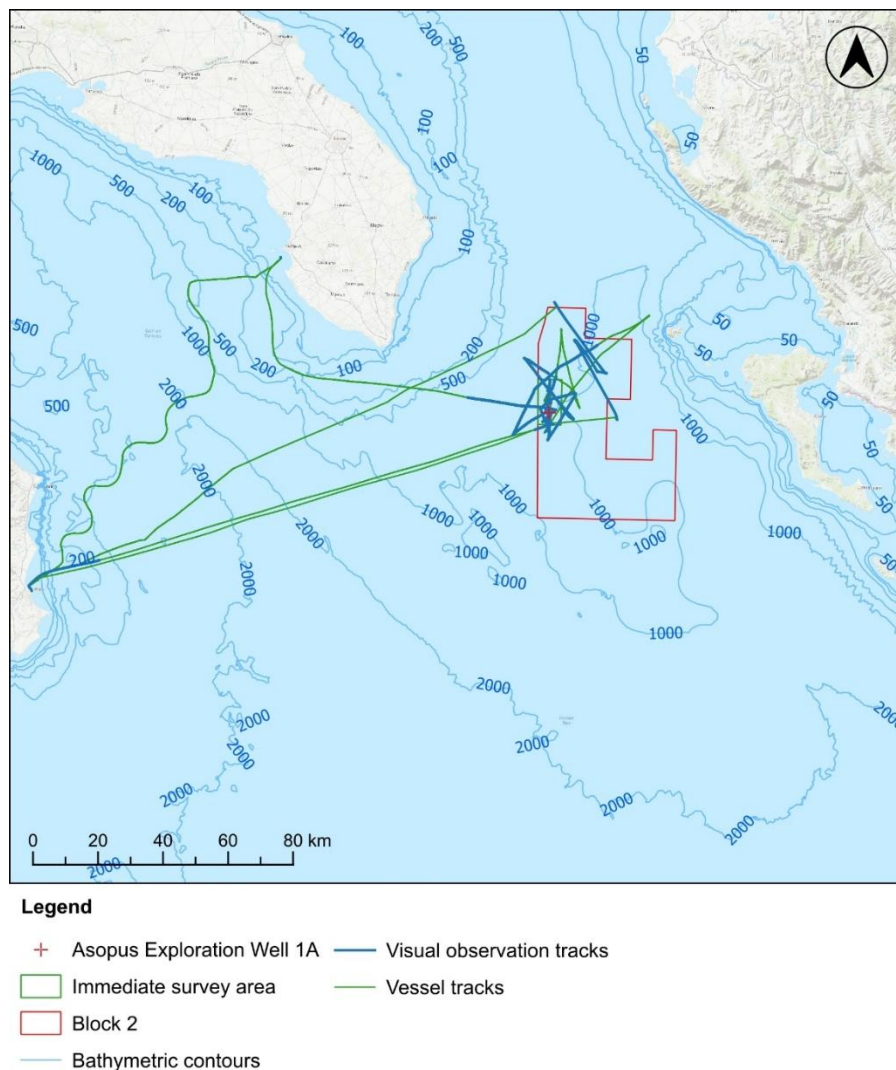
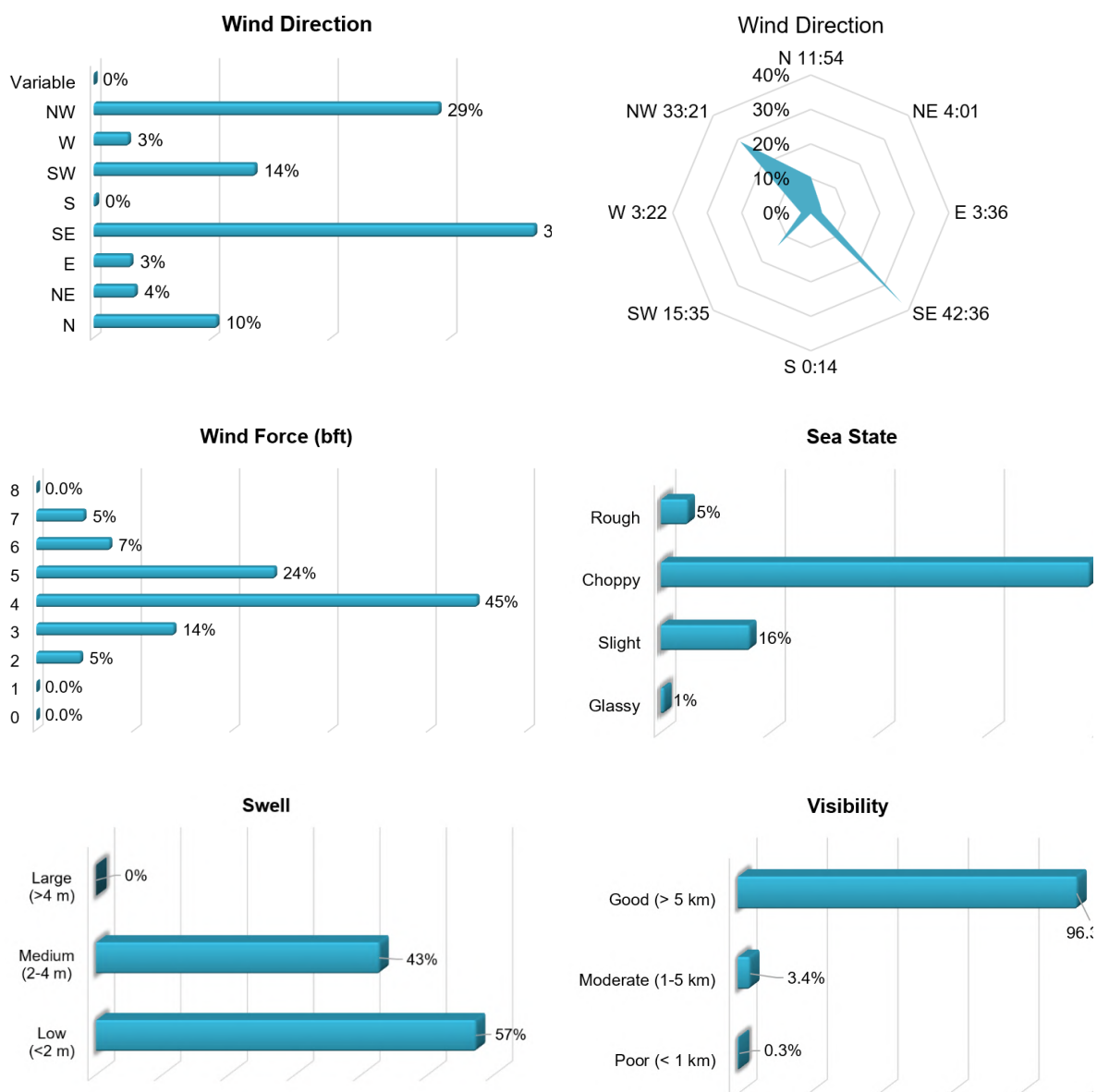


Figure 3-149: Survey vessel tracks conducted by the marine fauna observation team during the LOT 02 field survey

Weather variables were recorded to evaluate factors influencing visibility and target detection. Figure 3-150 presents the weather conditions during the marine fauna monitoring periods.

Horizontal visibility was classified as “Good” (>5 km) for 96% of the survey duration, and precipitation was absent for 87.1% of the time, with light (11.1%) or moderate (1.5%) rain occurring occasionally. Sun glare was absent for 43.6% of the effort, while “strong forward” glare was noted during 29.8% of the observation time. Wind force was most frequently recorded at Beaufort 4 (45%) and Beaufort 5 (24%). The prevailing wind directions were from the Southeast (42%) and the Northwest (33%). The sea state was characterized as “Choppy” for 80% of the time, accompanied by “Low” (<2 m) and “Medium” (2–4 m) swells, which accounted for 57% and 43% of the recorded conditions, respectively.



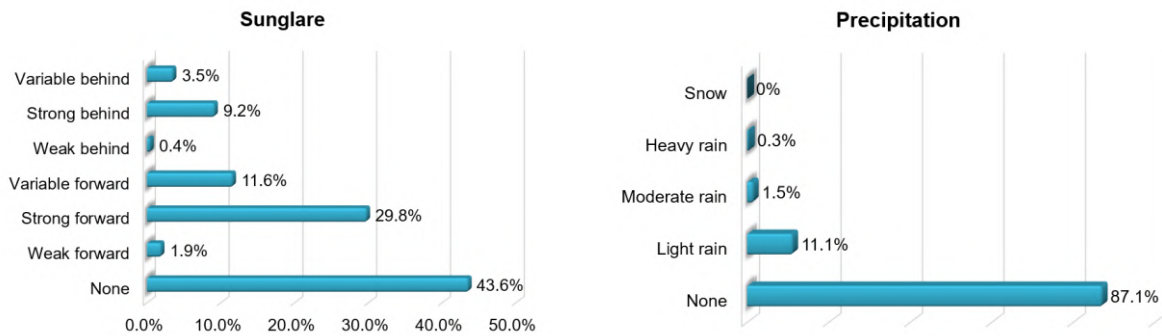


Figure 3-150: Meteorological and environmental conditions (including wind direction and force, sea state, swell, visibility, sun glare, and precipitation) recorded during the LOT 02 marine fauna monitoring effort

A total of nine (9) marine megafauna encounters were recorded during the LOT 02 field survey, comprising six (6) visual sightings and three (3) acoustic detections. Table 3-36 provides a summary of these records, including taxonomic identification, group sizes, observed behaviors, and coordinates. The geographical positioning of each encounter is displayed in Figure 3-105. The breakdown of the encounters is as follows:

Visual sightings (6 encounters):

- Bottlenose dolphins (*Tursiops truncatus*): Two separate encounters occurred. On March 14, two adults were observed swimming fast towards the bow of the vessel in 41 m of water. On March 25, a pod of six adults was sighted at a 50 m depth close to Crotone port, exhibiting feeding behavior with variable movement directions and long dives.
- Risso's dolphin (*Grampus griseus*): On March 27, a single adult was sighted traveling fast in a consistent direction in deep waters (800 m). The individual was identified by its tall falcate dorsal fin, scarred body, and white bulbous head.
- Sperm whale (*Physeter macrocephalus*): A solitary adult was observed on March 28 in 850 m depth. The whale was identified by its brown wrinkled body, small dorsal hump, large melon, and a 45° left-angled blow. It moved parallel to the ship at a range of 700 m before executing a deep dive.
- Loggerhead sea turtle (*Caretta caretta*): On March 30, a large adult loggerhead turtle (identified by a large, bumpy orange carapace) was sighted surfacing parallel to the vessel in 700 m depth. The animal remained at the surface with its head out of the water for approximately three minutes before diving.

Acoustic detections (3 encounters):

- Dolphins (Delphinidae): Two nocturnal acoustic detections occurred on March 15. The first encounter (02:05–02:45 UTC) consisted of clicks and bursts. The second encounter (04:14–04:18 UTC) recorded frequencies between 30 and 48 kHz (clicks).
- Sperm whale (*Physeter macrocephalus*): Following the visual sighting on the morning of March 28, a sperm whale was acoustically tracked (09:00–09:20 UTC). Additionally, faint clicks possibly belonging to a sperm whale were recorded in noisy acoustic conditions during the early hours of March 31 (01:22 UTC).

Table 3-36: Summary of marine mammal and sea turtle encounters (visual sightings and acoustic detections) recorded during the LOT 02 environmental baseline field survey

DATE	TIME AT START OF ENCOUNTER (UTC)	TIME AT END OF ENCOUNTER (UTC)	WERE ANIMALS DETECTED VISUALLY AND/ OR ACOUSTICALLY?	LATITUDE	LONGITUDE	WATER DEPTH (METRES)	SPECIES OR SPECIES GROUP	DESCRIPTION	BEARING TO ANIMAL	RANGE OF ANIMAL (METRES)	TOTAL NUMBER	NUMBER OF ADULTS (VISUAL SIGHTINGS ONLY)	BEHAVIOUR (VISUAL SIGHTINGS ONLY)
2026-03-14	15:54	15:55	v	39°07.84'N	17°10.13'E	41	Bottlenose dolphin	Large grey body		250	2	2	Fast swimming towards the bow of the vessel
2026-03-15	2:05	2:45	a	39°29.92'N	18°36.62'E		Dolphins.	Clicks, bursts.					
2026-03-15	4:14	4:18	a	39°35.59'N	18°57.46'E		Dolphins.	Frequencies 30-48 Khz/clicks					
2026-03-25	10:24	10:30	v	39°07.99'N	17°13.18'E	50	Bottlenose dolphin	Light grey body	30	800	6	6	Feeding, variable movement directions, long dives
2026-03-27	14:14	14:18	v	39°34.58'N	18°51.26'E	800	Risso's dolphin	Tall falcate dorsal fin, body covered with scars, white and bulbous head	45	200	1	1	Travelling, moving fast in one directions
2026-03-28	8:47	8:55	v	39°41.11'N	18°57.12'E	850	Sperm whale	Brown and wrinkled body, small hump on the back, big melon, blow 45° to the left	90	700	1	1	Moving parraler to the ship, and then deep dive after which anim was not seen again
2026-03-28	9:00	9:20	a	39°41.1'N	18°57.48'E		Physeter macrocephalus.	Sperm whale dived around 750 m but could not be seen or heard on Vertical array					
2026-03-30	16:25	16:28	v	39°37.45'N	18°57.47'E	700	Loggerhead turtle (<i>Cretta caretta</i>)	Big orange carapace with bumbs (big adult), head out of water	40	800	1	1	Surfacing parral to the vessel, eafter 3 min animal dove and was not seen again
2026-03-31	1:22		a	39°36.52'N	19°12.16'E	1135	Possible sperm whale clicks but not sure around this time	Faint clicks but too noisy. Faint clicks were for "audible" for long time. Atr 2:12 not so much.					

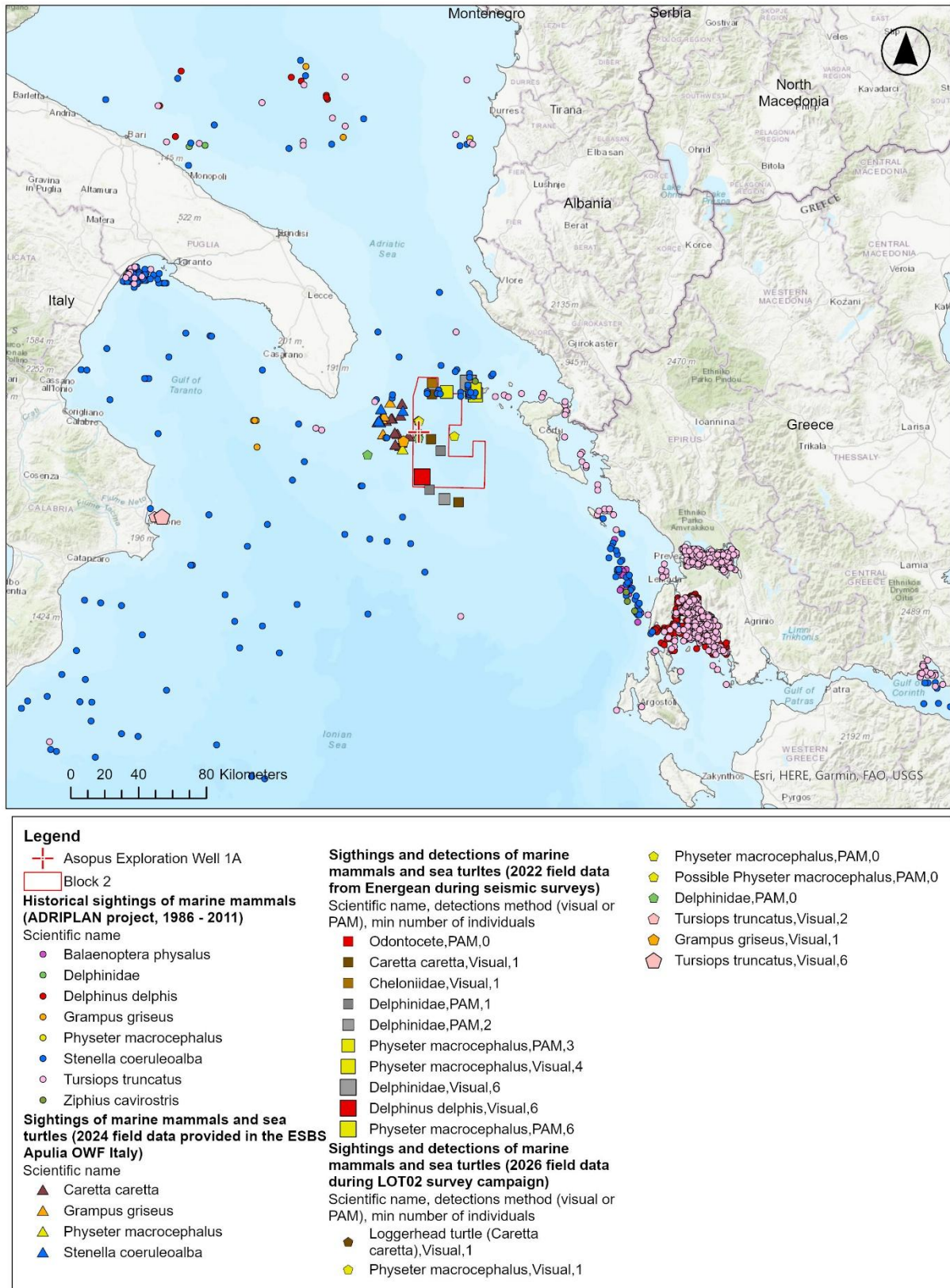


Figure 3-151: Spatial distribution of the marine mammal and sea turtle encounters recorded during the LOT 02 field survey

3.3.2.8 Avifauna observations

3.3.2.8.1 Survey effort

Avifauna surveys were carried out during daytime hours for 10 days, during periods 14.03.2026 – 16.03.2026 and 26.03.2026 – 01.04.2026. The total distance travelled of the survey vessel was 1199 km, out of which the visual observations were carried out along the transects with the total length of 330.5 km. The total duration of avifauna visual observations was 115 hours.

Table 3-37: Summary of distances travelled by the survey vessel and the length of avifauna visual observations transects during LOT02 field survey

SURVEY DATE	DISTANCE TRAVELLED BY THE SURVEY VESSEL [KM]	LENGTH OF AVIFAUNA OBSERVATION TRANSECTS [KM]
14/03/2026	114	25.2
15/03/2026	195	52
16/03/2026	82.3	4.6
25/03/2026	173	0
26/03/2026	100	46.3
27/03/2026	76.1	53
28/03/2026	59.4	11
29/03/2026	86	49.3
30/03/2026	46.9	17.3
31/03/2026	187	71.8
01/04/2026	79.2	0
Total	1198.9	330.5

The majority of surveys were carried out with in a rectangular polygon around the Asopus Exploration Well 1A location with dimensions approx. 7.1 km in the east-west direction and approx. 13.9 km in the north-south direction. Similarly intense survey effort was conducted in the rest of the Block 2 area, particularly in the northern part of Block 2. Limited surveys were carried out in the marine areas outside Block 2 area and in the coastal areas of Gallipoli and Crotona in Italy.

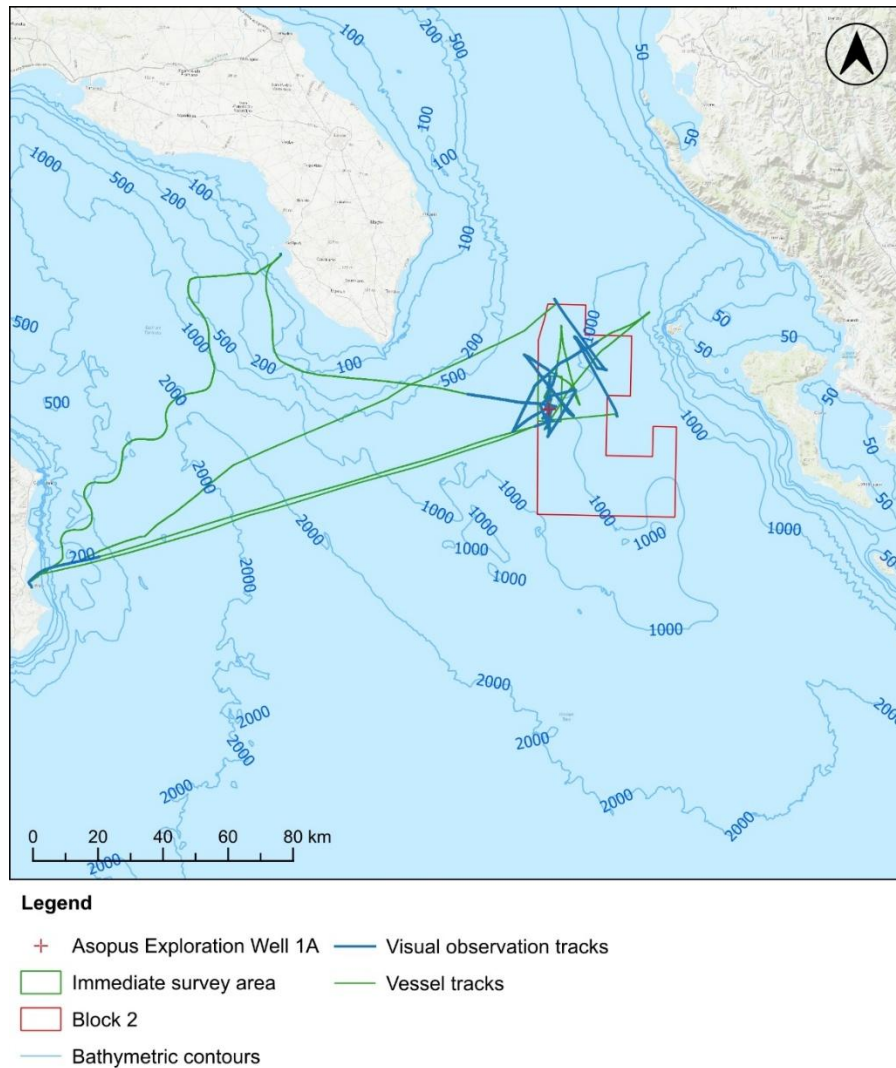


Figure 3-152: Track of the survey vessels and their section associated with visual observations of avifauna during the ESBS ASOPUS 1A Ionian Sea LOT02 field survey

In general, the visual observations were carried out continuously from dawn until dusk, with the exception of short periods of unfavourable weather conditions, i.e. rain or large sea swell, that reduced the visibility to a minimum or made visual observation infeasible.

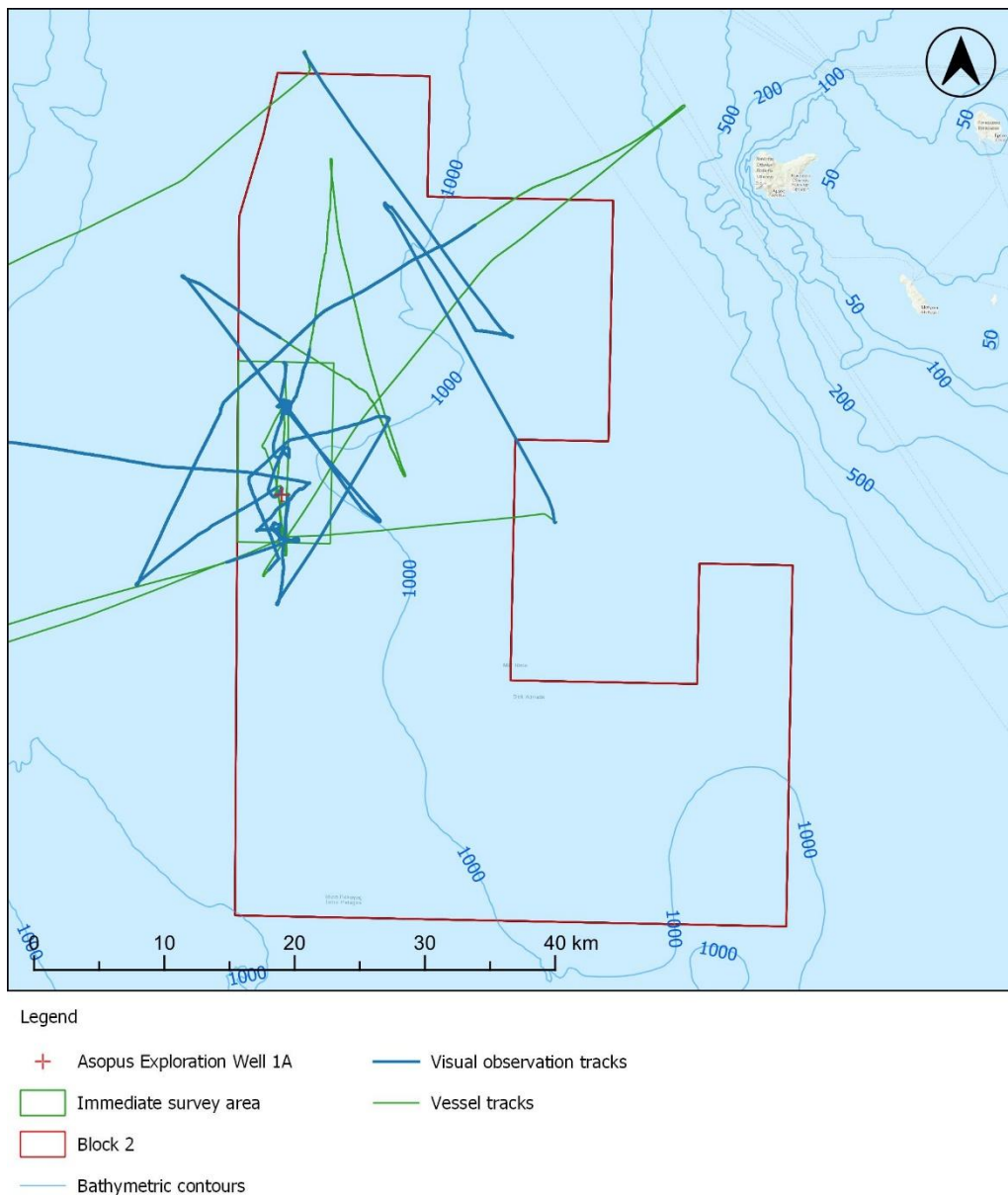


Figure 3-153: Track of the survey vessels and their section associated with visual observations of avifauna during the ESBS ASOPUS 1A Ionian Sea LOT02 field survey with the Block 2 area

Three ornithologists were involved in the implementation of avifauna visual observations: Efstratios Bourdakos (14/03/2026-16/03/2026 and 26/03/2026-01/04/2026), Pietro Leanza (26/03/2026-01/04/2026) and Jakob Fric (14/03/2026-16/03/2026). The three MMOs who joined us on shift supported significantly in spotting several birds.

3.3.2.8.2 Avifauna observations

A total of 43 species or species groups were visually recorded during ESBS ASOPUS 1A Ionian Sea LOT02 field survey.

Table 3-38: Bird species and number of individuals recorded in the survey areas

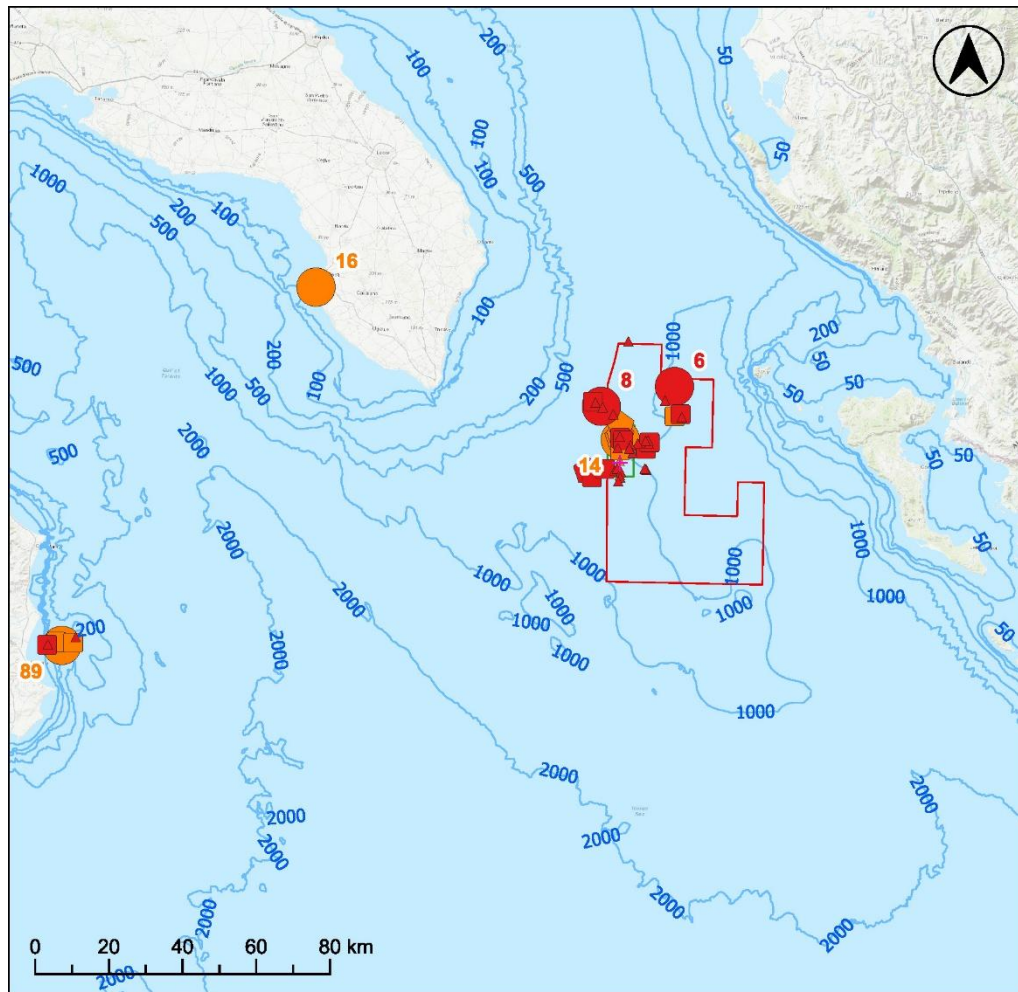
#	SPECIES	IMMEDIATE SURVEY AREA	BLOCK 2 OUTSIDE IMMEDIATE SURVEY AREA	MARINE AREA OUTSIDE BLOCK 2	COASTAL AREA	TOTAL
SEABIRDS						
1	<i>Calonectris diomedea s. str.</i>	53	27	122	16	218
2	<i>Puffinus yelkouan</i>	0	0	6	24	30
3	<i>Larus audouinii</i>	6	2	3	5	16
GULLS AND TERNS						
4	<i>Larus melanocephalus</i>	48	3	34	0	85
5	<i>Larus ridibundus</i>	0	0	7	5	12
6	<i>Hydrocoloeus minutus</i>	1	0	8	0	9
7	<i>Larus fuscus all others</i>	9	1	0	1	11
8	<i>Larus michahellis</i>	20	5	6	93	124
9	<i>Larus sp.</i>	3	2	2	0	7
10	<i>Hydroprogne caspia</i>	0	8	0	0	8
11	<i>Thalasseus sandvicensis</i>	0	0	2	1	3
WATERBIRDS						
12	<i>Cygnus olor</i>	0	0	0	1	1
13	<i>Gallinula chloropus</i>	0	0	1	0	1
14	<i>Podiceps cristatus</i>	0	0	0	4	4
15	<i>Spatula querquedula</i>	45	0	0	0	45
HERONS, EGRETS AND PELECANIFORMES						
16	<i>Phalacrocorax carbo sinensis</i>	0	0	4	1	5
17	<i>Ardea alba</i>	2	2	0	0	4
18	<i>Ardea cinerea</i>	0	3	0	0	3
19	<i>Bubulcus ibis</i>	0	0	1	0	1
20	<i>Egretta garzetta</i>	0	0	0	1	1
21	<i>Nycticorax nycticorax</i>	0	1	0	0	1
WADERS						
22	<i>Calidris alpina</i>	0	0	0	15	15
23	<i>Himantopus himantopus</i>	1	0	0	0	1
24	<i>Numenius arquata</i>	40	0	0	0	40
RAPTORS						
25	<i>Circus aeruginosus</i>	1	0	0	2	3
26	<i>Falco naumanni</i>	3	0	2	0	5
27	<i>Falco sp.</i>	0	0	0	1	1
28	<i>Falco tinnunculus</i>	2	2	1	0	5
29	<i>medium size raptor</i>	0	1	0	0	1
PASSERINES						
30	<i>Coccothraustes coccothraustes</i>	0	1	0	0	1

#	SPECIES	IMMEDIATE SURVEY AREA	BLOCK 2 OUTSIDE IMMEDIATE SURVEY AREA	MARINE AREA OUTSIDE BLOCK 2	COASTAL AREA	TOTAL
31	<i>Delichon urbicum</i>	0	0	1	0	1
32	<i>Emberiza calandra</i>	1	0	0	0	1
33	<i>Erithacus rubecula</i>	0	1	0	0	1
34	<i>Hirundo rustica</i>	19	6	7	0	32
35	<i>Monticola solitarius</i>	3	2	0	0	5
36	<i>Motacilla flava</i>	0	2	0	0	2
37	<i>Phoenicurus ochruros</i>	0	0	1	0	1
38	<i>Phoenicurus phoenicurus</i>	1	2	1	0	4
39	<i>Phylloscopus collybita s. str.</i>	3	2	1	0	6
40	<i>Phylloscopus sibilatrix</i>	0	1	0	0	1
41	<i>Curruca cantillans</i>	2	2	1	0	5
42	<i>Curruca communis</i>	1	0	0	0	1
43	<i>Upupa epops</i>	1	1	2	1	5

Recorded species groups include pelagic seabirds (3 species), other gulls and terns (8 species), which are also considered as seabirds, waterbirds (4 species), herons, egrets and Pelecaniformes (6 species), waders (3 species), raptors (4 species and 2 species groups, where exact species could not be determined) and passerines (14 species). Additionally, non-systematic recording of birds during LOT 1 surveys from 06/04/2026 until 23/04/2026 a total of 29 bird species were recorded by Aleksandra Pierozynska, including seabirds (*Calonectris diomedea*), gulls and terns (*Larus melanocephalus* and *Larus michahellis* [5 ind.]), herons and egrets (*Ardea alba* [10 ind.], *Ardea cinerea*, *Ardeola ralloides* and *Nycticorax nycticorax*), waders (*Galinago* sp.), raptors (*Circus aeruginosus* [8 ind.] and *Falco tinnunculus* [5 ind.]), passerines (*Anthus cervinus*, *Anthus trivialis*, *Hirundo daurica* [5 ind.], *Hirundo rustica* [13 ind.], *Merops apiaster* [9 ind.], *Merops persicus*, *Motacilla flava* [11 ind.], *Phoenicurus ochruros*, *Phoenicurus phoenicurus*, *Phylloscopus collybita*, *Phylloscopus trochilus*, *Saxicola rubetra*, *Curruca cantillans*, *Curruca curruca* and *Upupa epops*), pigeons and doves (*Columba livia domestica*, *Streptopelia decaocto* and *Streptopelia turtur* [6 ind.] and partridges (*Coturnix coturnix*).

3.3.2.8.2.1 Scopoli's shearwater (*Calonectris diomedea*)

Scopoli's Shearwaters was expectedly the most abundant seabird species recorded. Flocks of up to 14 individuals were recorded in Immediate survey area, while flocks of up to 80 individuals were observed in the coastal areas of Italy.



Legend		<i>Calonectris diomedea s. str.</i>	
+	Asopus Exploration Well 1A	Records On Transect	Stationary vessel Records
□	Immediate survey area	▲ 1	▲ 1
□	Block 2	■ 2-3	■ 2-3
—	Bathymetric contours	⬠ 4-5	⬠ 4-5
		● >5	● >5

Figure 3-154: Scopoli's Shearwater: Locations and number of individuals recorded in the wider area

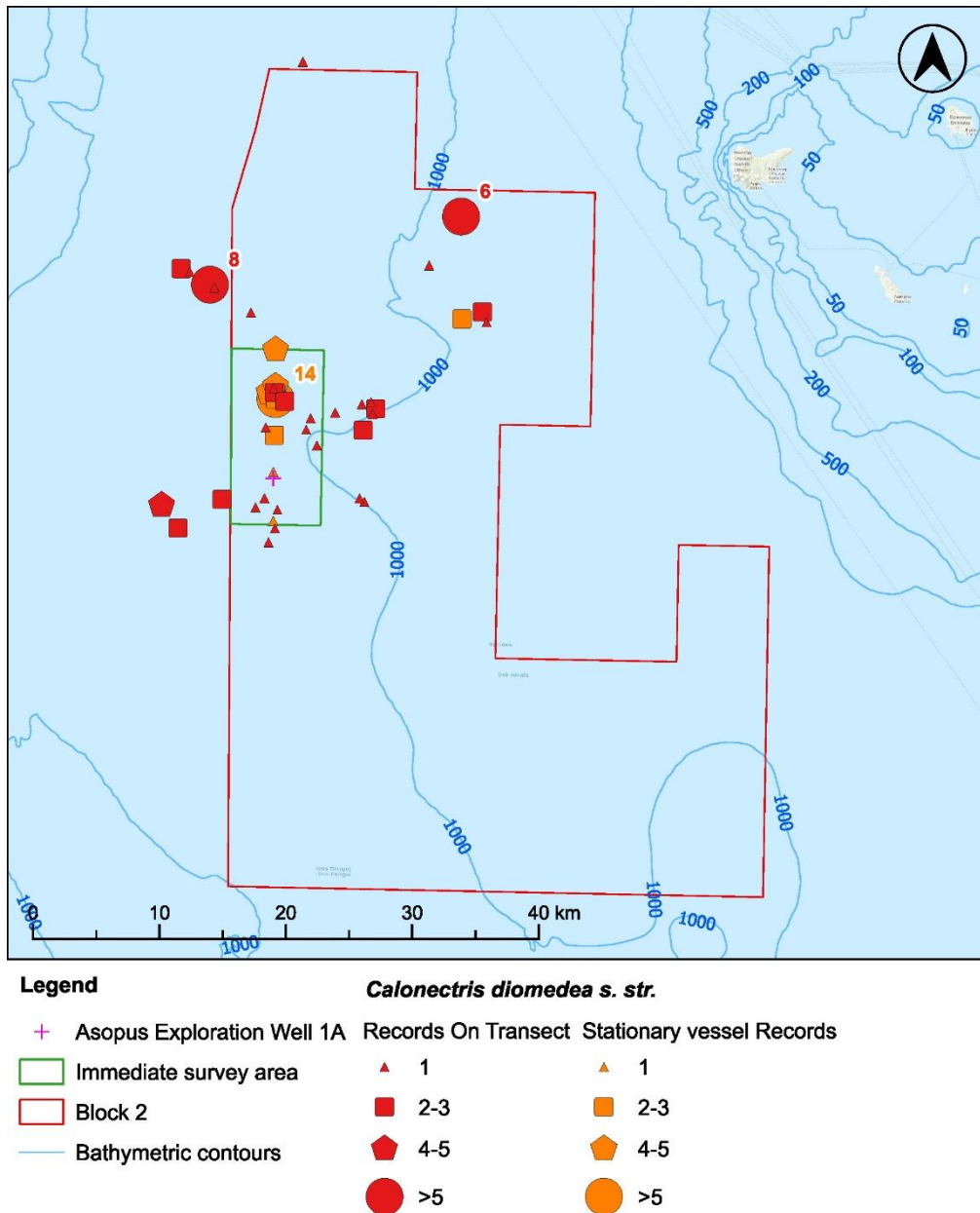


Figure 3-155: Scopoli's Shearwater: Locations and number of individuals recorded in the wider area

While the Scopoli's Shearwaters in the pelagic areas mostly had no apparent flight direction due to their characteristic dynamic soaring which reduces energy expenditure to a minimum, those individuals with distinctive flight direction were travelling primarily towards north and northeast, presumably towards their colony sites on Diapondia islands or towards their foraging areas in the coastal areas of the northeastern Ionian Sea, as suggested by previous studies. Individuals recorded in the pelagic areas of the northwestern Ionian Sea were primarily travelling towards the Ionian coast of Italy, where species important foraging areas are located. Recorded behaviours of Scopoli's Shearwaters indicate that these areas are used primarily for travelling between foraging areas and between foraging areas and breeding sites, rather than foraging. Similar results were produced from telemetry studies in the past.

3.3.2.8.2.2 Yelkouan shearwater (*Puffinus yelkouan*)

No Yelkouan Shearwaters were recorded in the Immediate survey area or Block 2. The greatest abundance of the species was recorded in the coastal area of Gallipoli which flocks of up to 14 individuals were recorded, flying primarily in the southern, eastern and southeastern direction.

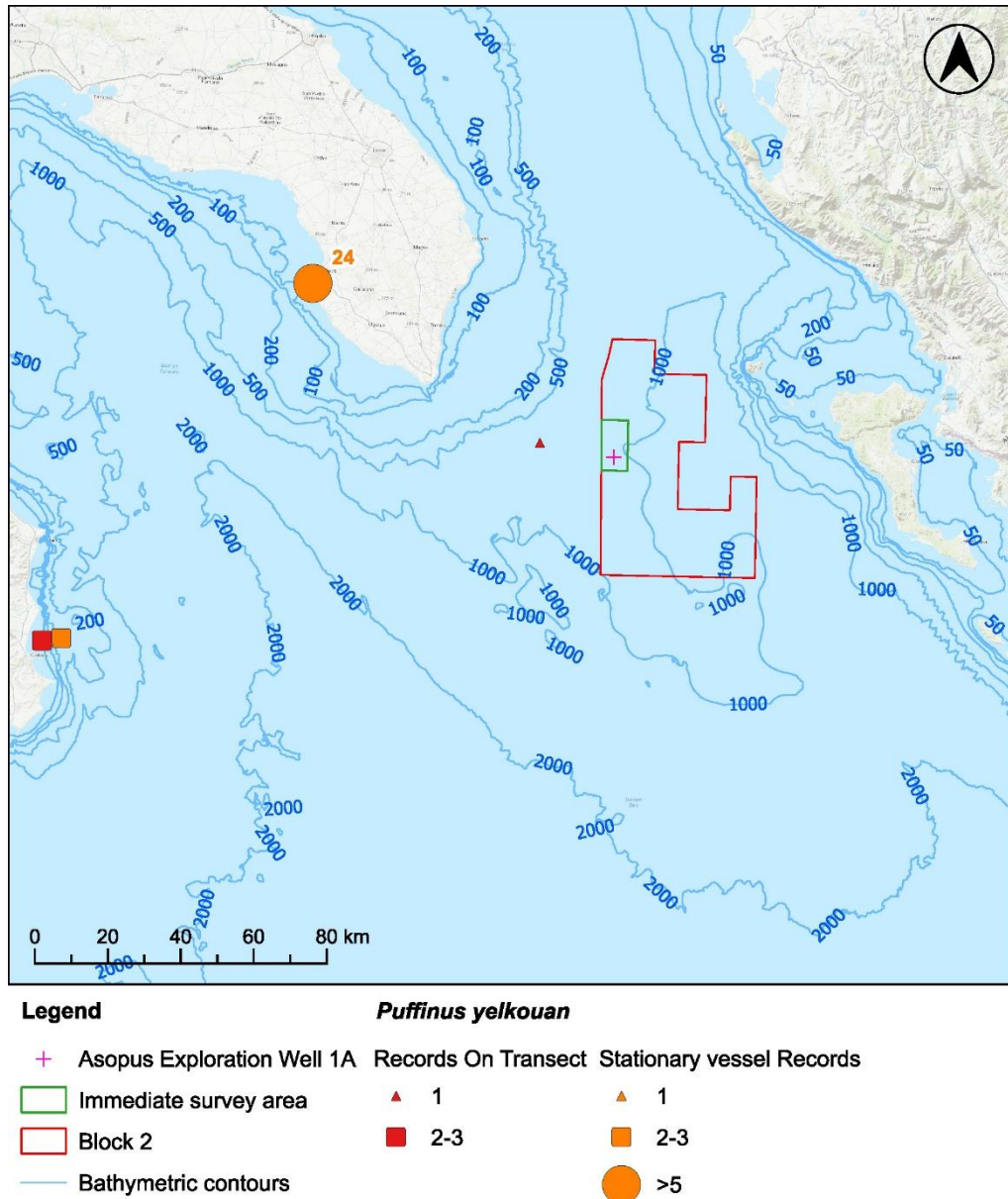


Figure 3-156: Yelkouan Shearwater: Locations and number of individuals recorded in the wider area

3.3.2.8.2.3 Audouin's gull (*Larus audouinii*)

Audouin's Gulls were regularly observed in the pelagic areas of the Immediate survey area and Block 2 area. The individuals recording in the area were primarily immature (5 individuals), as well as adults (3 individuals), suggesting that the area is used primarily by non-breeding individuals. The prevailing recorded flight directions were towards north-northwest and northeast without any apparent foraging activity, suggesting that birds may be travelling towards either coastal areas in the northwestern Ionian (that host the largest species colonies in the area) or coastal areas in the northeastern Ionian Sea.

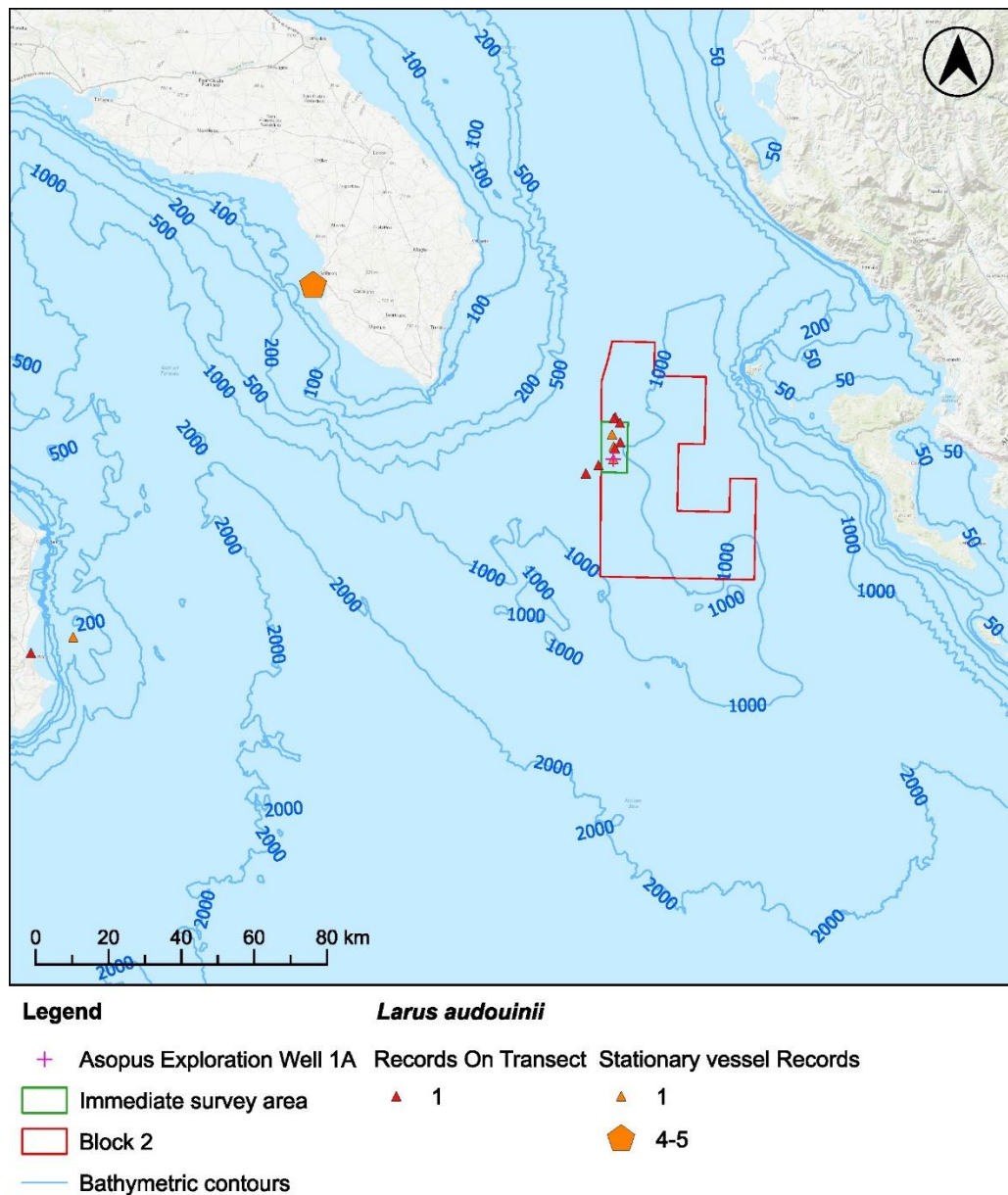


Figure 3-157: Audouin's Gull: Locations and number of individuals recorded in the wider area

The largest concentration of birds was recorded in the vicinity of the colonies on Sant'Andrea and Campo islands in the Gulf of Gallipoli, where species colonies are located. The species was also recorded in the coast area close to Crotona. The surveys coincided with the species pre-breeding period, therefore the recorded distribution of the Audouin's Gull is considered to be associated with the dispersal of non-breeding individuals, as well as, movements towards breeding colonies.

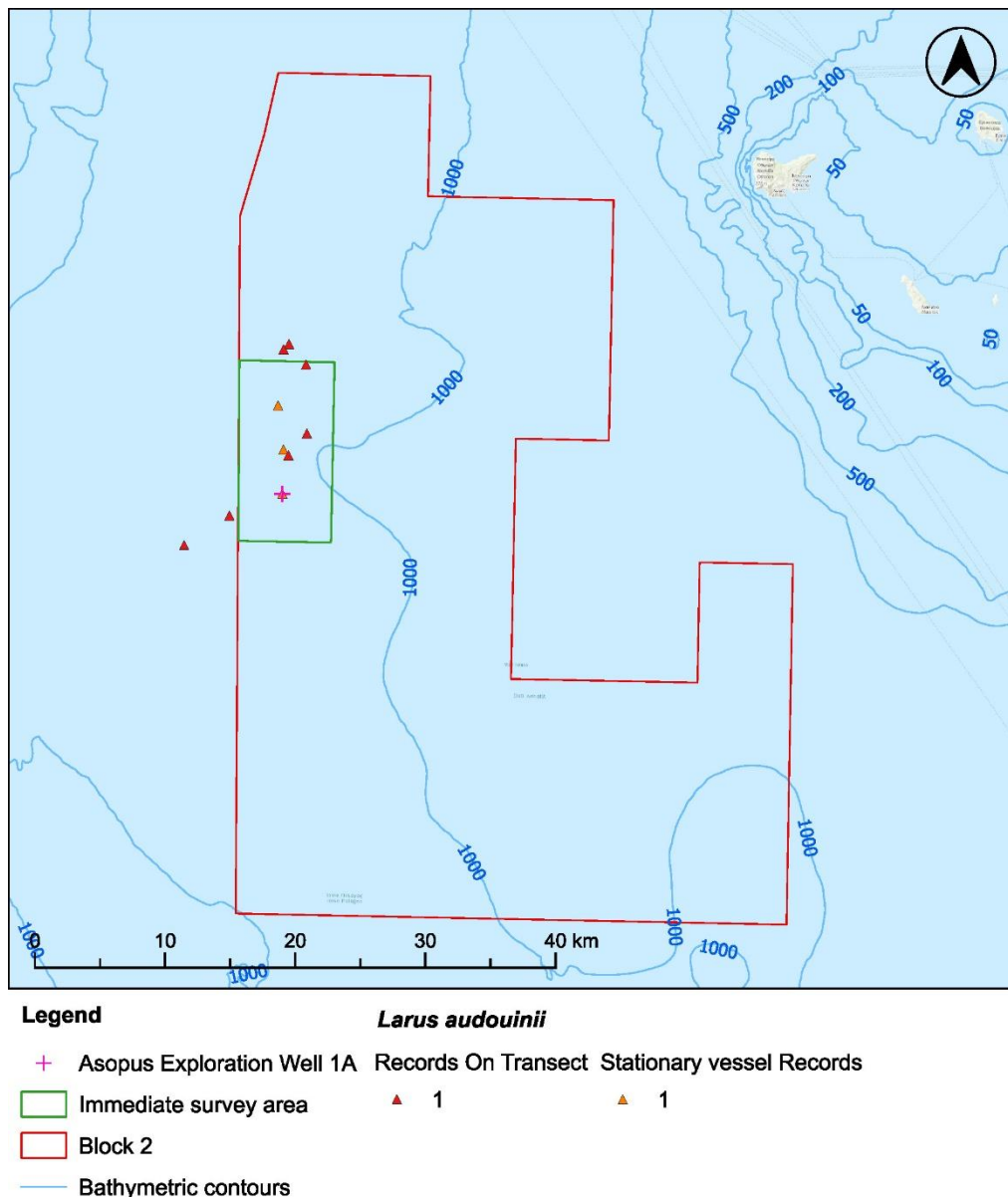


Figure 3-158: Audouin's: Locations and number of individuals recorded in the wider area

3.3.2.8.2.4 Other gulls and terns

Five more gull and tern species, apart from the Audouin's Gull, were recorded, in the Immediate survey area or Block 2 area: Mediterranean Gull (*Larus melanocephalus*), Lesser Black-backed Gull (*Larus fuscus*), Little Gull (*Hydrocoloeus minutus*), Yellow-legged Gull (*Larus michahellis*) and Caspian Tern (*Hydroprogne caspia*). Among gull and tern species, a special attention should be paid to the Mediterranean Gull (*Larus melanocephalus*), a species of conservation concern, because 48 individuals have been recorded in the Immediate survey area.

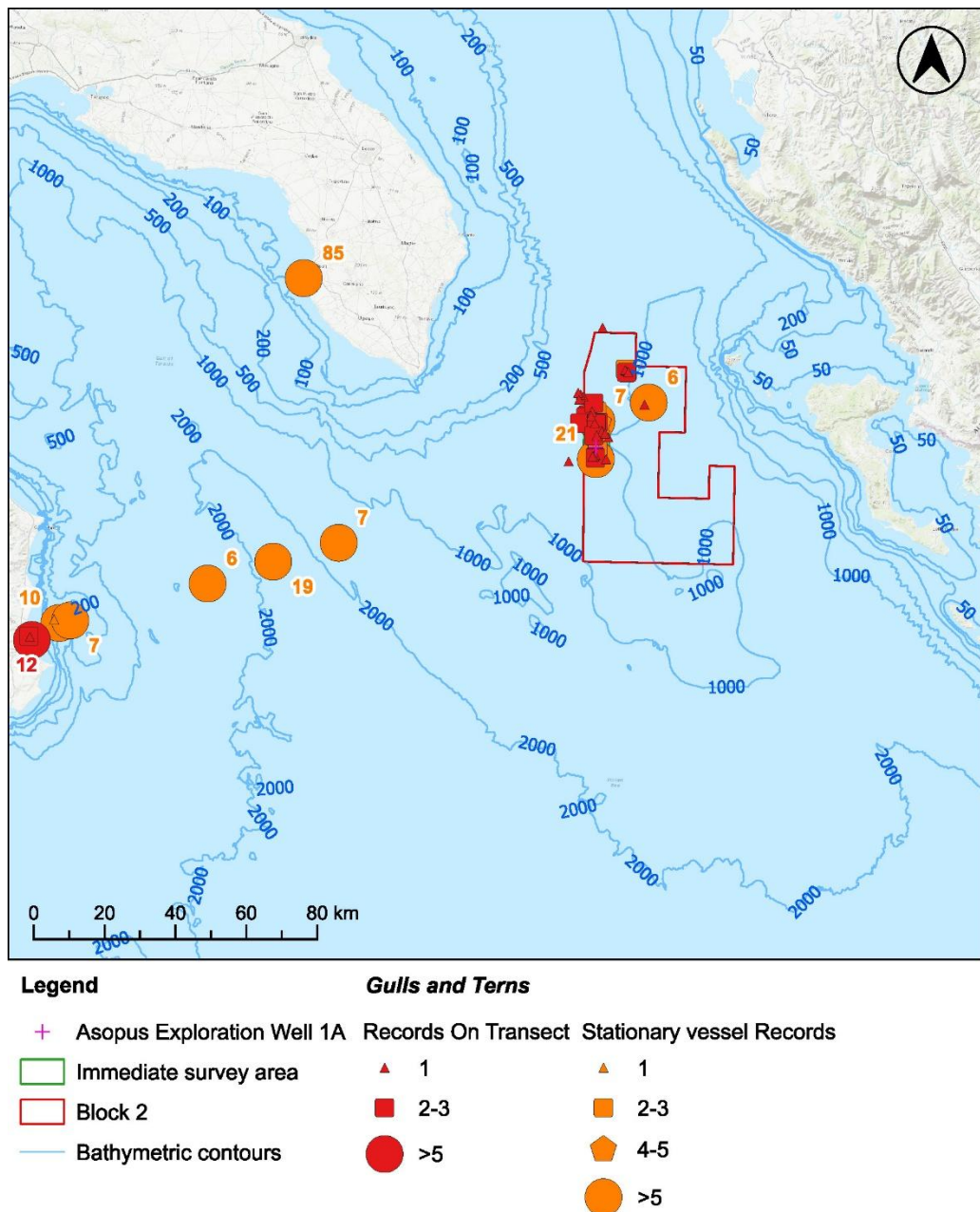


Figure 3-159: Other gull and tern species: Locations and number of individuals recorded in the wider area

Outside Block 2 area Black-headed Gull (*Larus ridibundus*) and Sandwich Tern (*Thalasseus sandvicensis*) were also recorded in the pelagic and coastal marine areas.

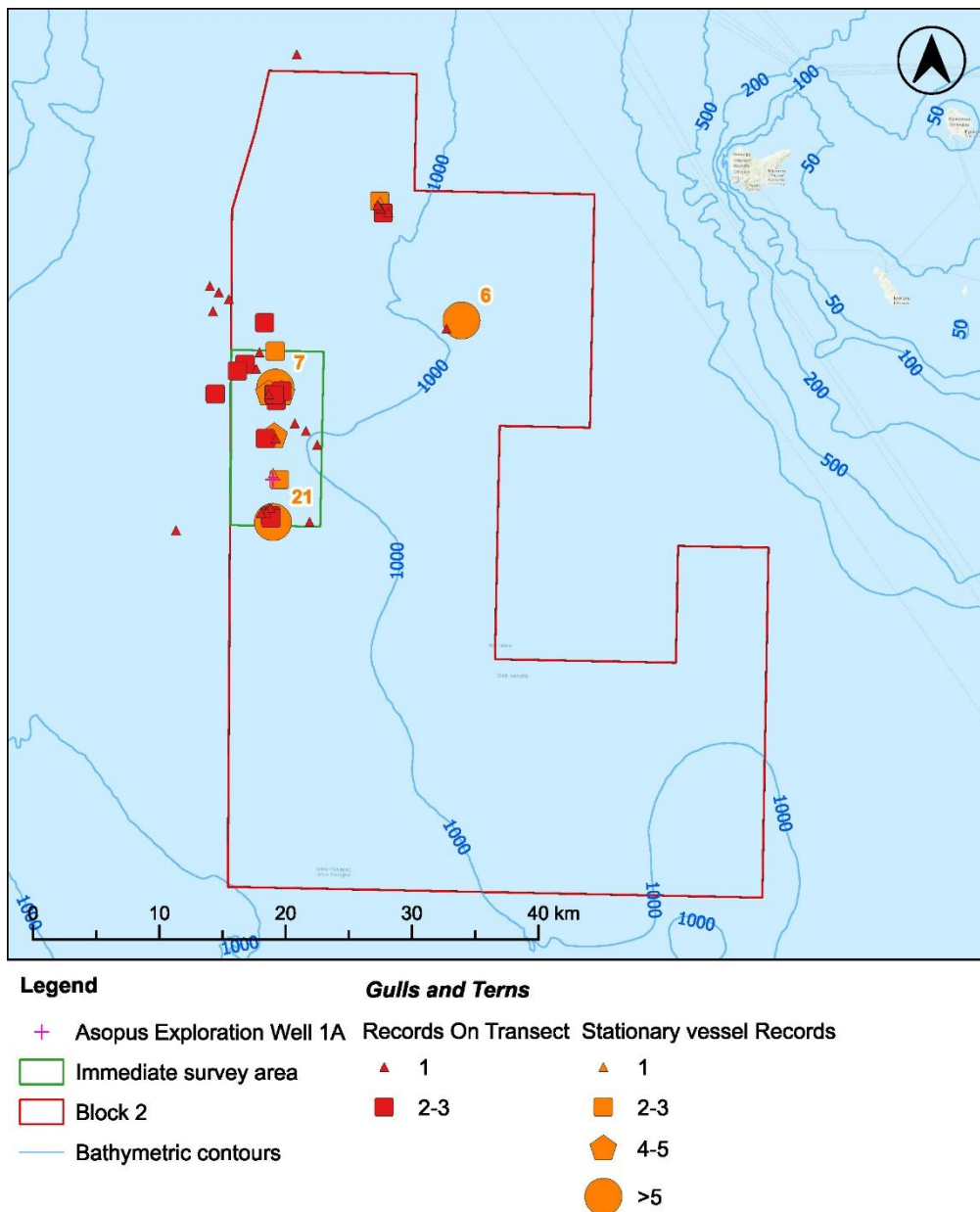


Figure 3-160: Other gull and tern species: Locations and number of individuals recorded in the wider area

The most abundant gull species in the Immediate survey area and Block 2 was Mediterranean Gull where 48 and 51 individuals were recorded, respectively. The prevailing flight directions in the Immediate survey area were, in the order of occurrence, north, northeast and northwest, while several individuals were also flying towards south and south east. In the northwestern part of the Ionian Sea, the birds were flying mostly in the northern and northwestern direction, towards the Italian coast. The species presence in the area is considered to be associated with the migration/passage towards its breeding areas. The presence of the Lesser Black-backed Gull, Little Gull and Caspian Tern in Block 2 is also considered to be associated with the spring migration, while the abundance of a common resident Yellow-legged Gull in Block 2 was low.

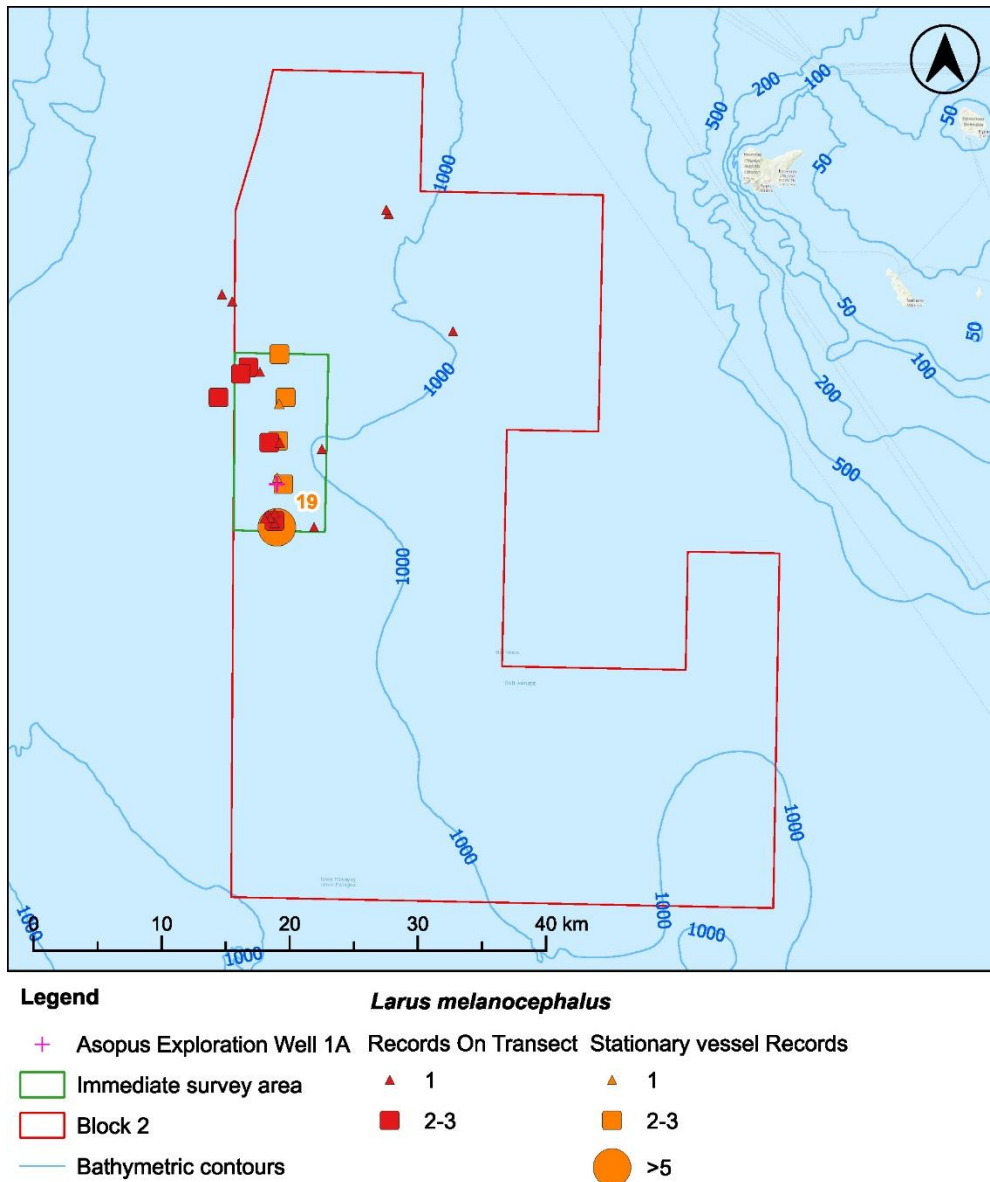


Figure 3-161: Mediterranean Gull: Locations and number of individuals recorded in the wider area

3.3.2.8.2.5 Waterbirds

The only water bird species recorded in the Immediate survey area and Block 2 was Garganey (*Spatula querquedula*). Flocks consisting of 7-15 individuals were recorded. The species was on spring migration, with individuals flying towards north. Other waterbird species, *Cygnus olor*, *Gallinula chloropus* and *Podiceps cristatus* were recorded in the marine area outside Block 2 and the marine coastal area at Crotone.

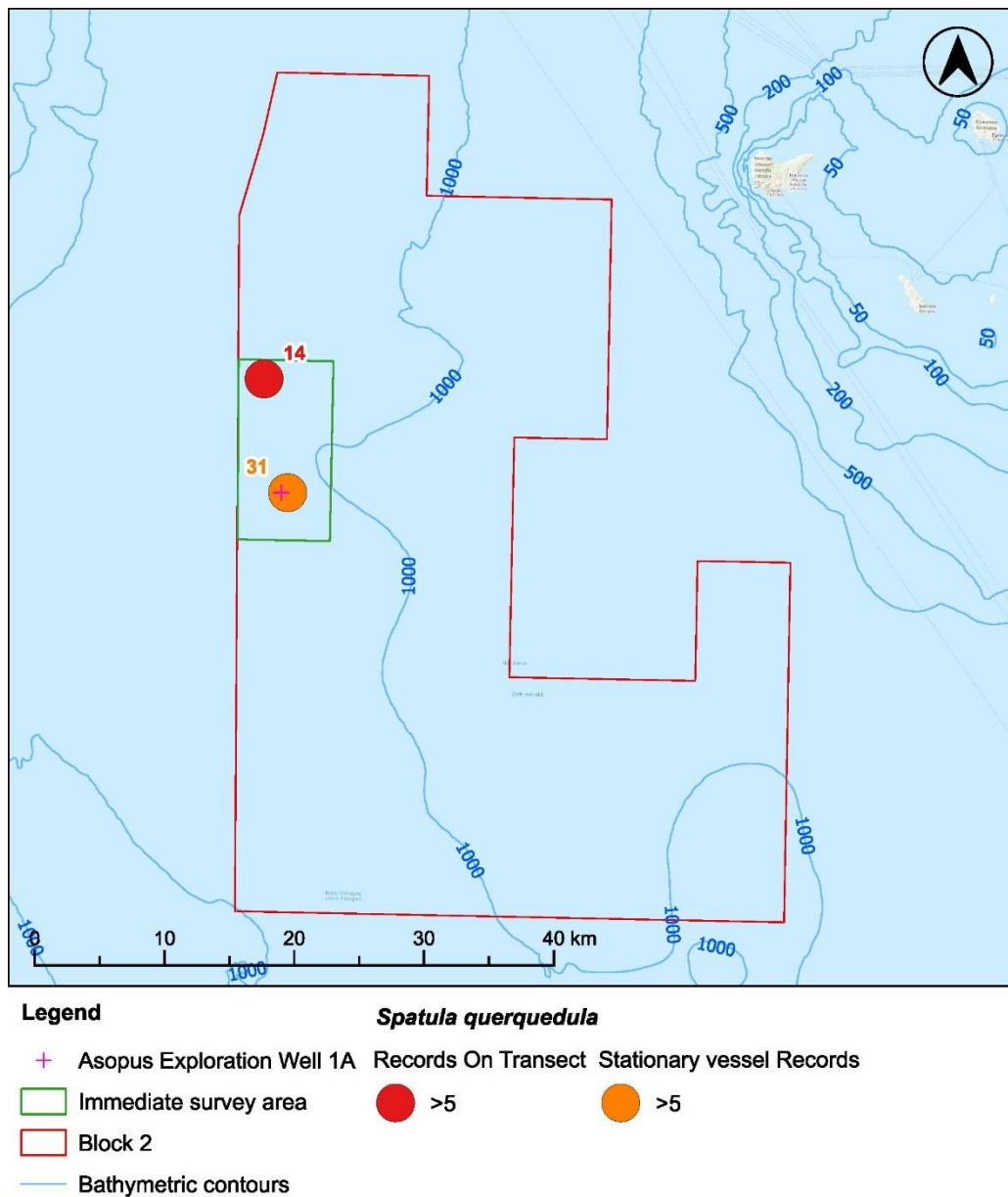


Figure 3-162: Garganey: Locations and number of individuals recorded in the wider area

3.3.2.8.2.6 Herons, egrets and pelecaniformes

In Block 2 area Great Egret (*Ardea alba*), Grey Heron (*Ardea cinerea*) and Black-crowned Night Heron (*Nycticorax nycticorax*) were recorded in low numbers of 1-3 individuals during their spring migration with the flight directions towards northeast, northwest and north, respectively. Great Cormorant (*Phalacrocorax carbo sinensis*), Cattle Egret (*Bubulcus ibis*) and Little Egret (*Egretta garzetta*) were recorded only in the vicinity of Crotone, Italy.

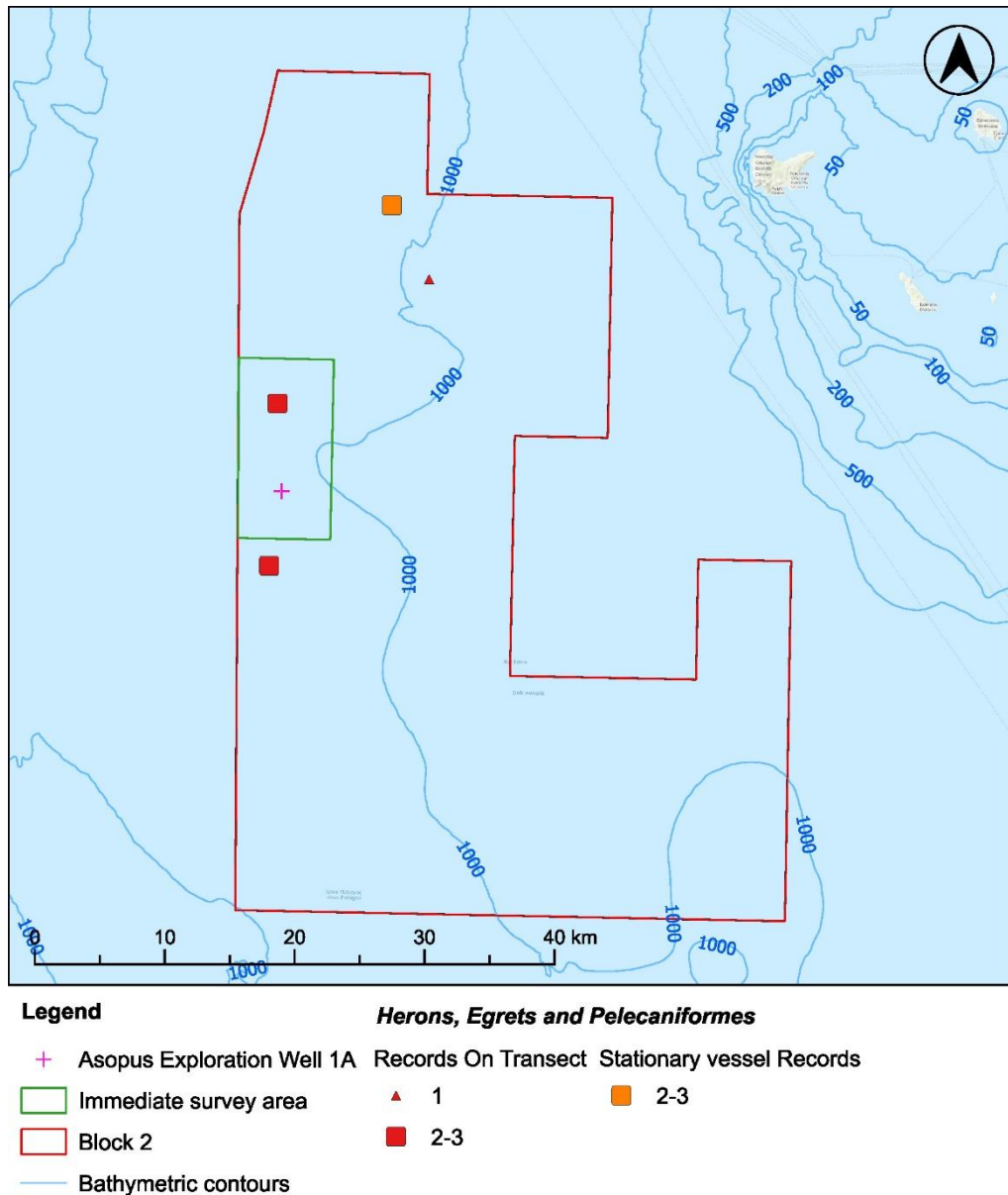


Figure 3-163: Herons and egrets: Locations and number of individuals recorded in the wider area

3.3.2.8.2.7 Waders

Among wader species, only a flock of 40 Eurasian Curlews (*Numenius arquata*) and a single Black-winged Stilt (*Himantopus himantopus*) on spring migration flying north were recorded in Block 2. Dunlin (*Calidris alpina*) was recorded in the coastal area of Crotone.

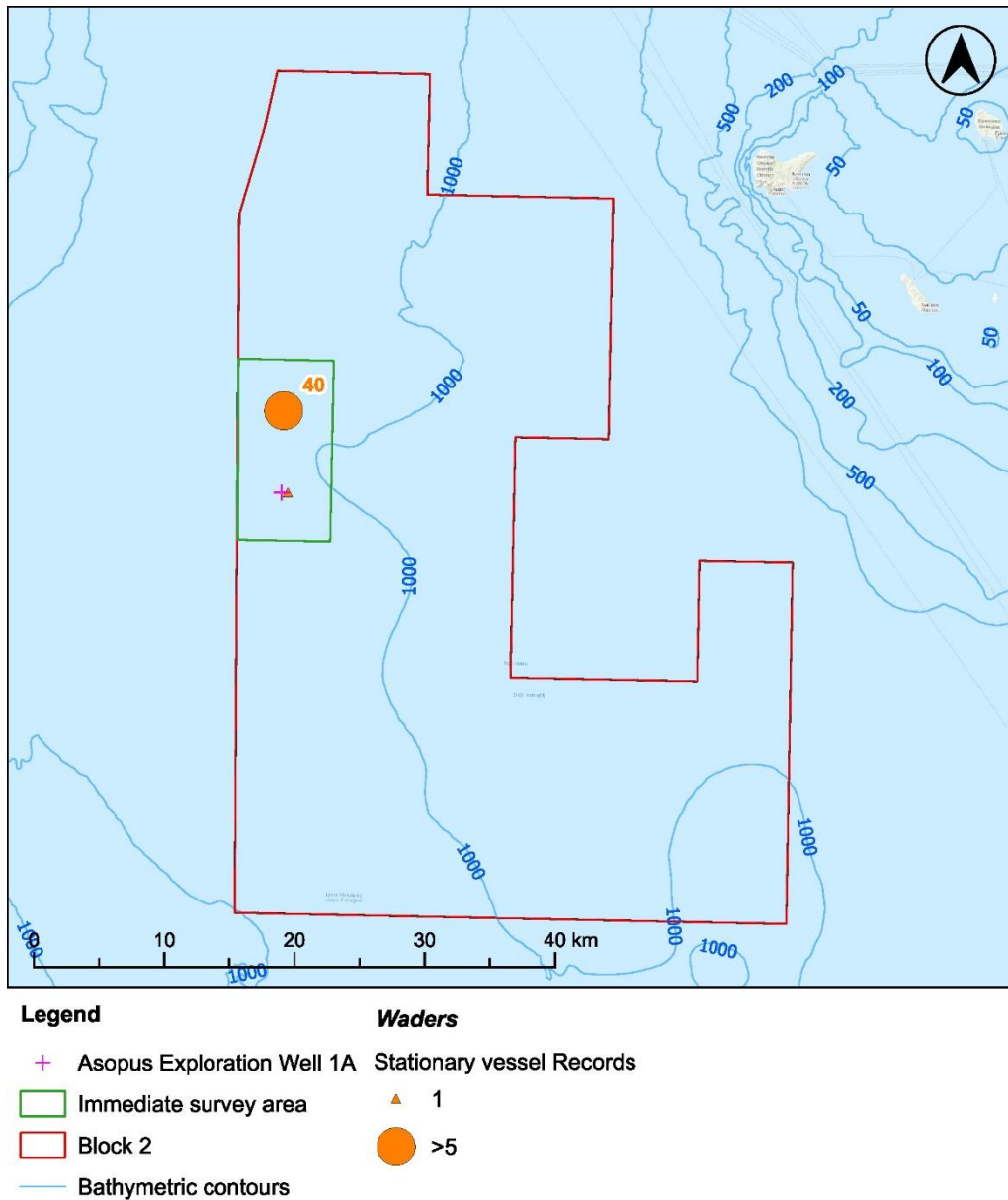


Figure 3-164: Waders: Locations and number of individuals recorded in the wider area

3.3.2.8.2.8 Raptors

Three raptor species were recorded in the Immediate survey area and Block 2 area, namely Western Marsh Harrier (*Circus aeruginosus*), Lesser Kestrel (*Falco naumanni*) and Common Kestrel (*Falco tinnunculus*). They were all recorded as individual birds flying the north, northeastern or northwestern direction during spring migration.

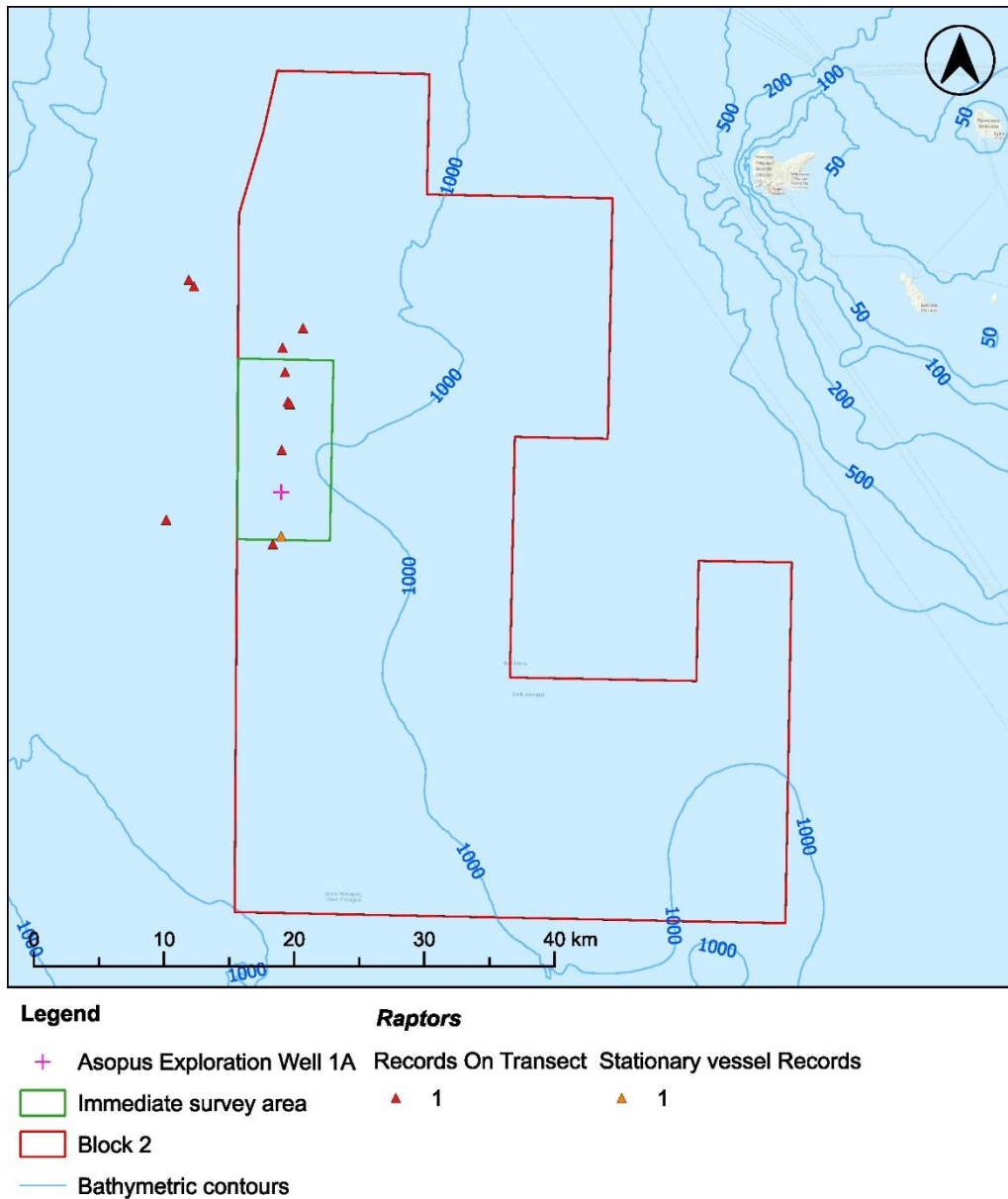


Figure 3-165: Raptors: Locations and number of individuals recorded in the wider area

3.3.2.8.2.9 Passerines

All passerine species recorded in the Immediate survey area and Block 2 are migratory species, flying, in the order of occurrence, towards north, northwest and northeast. The majority of recorded passerines use the survey vessel as a stopover for resting.

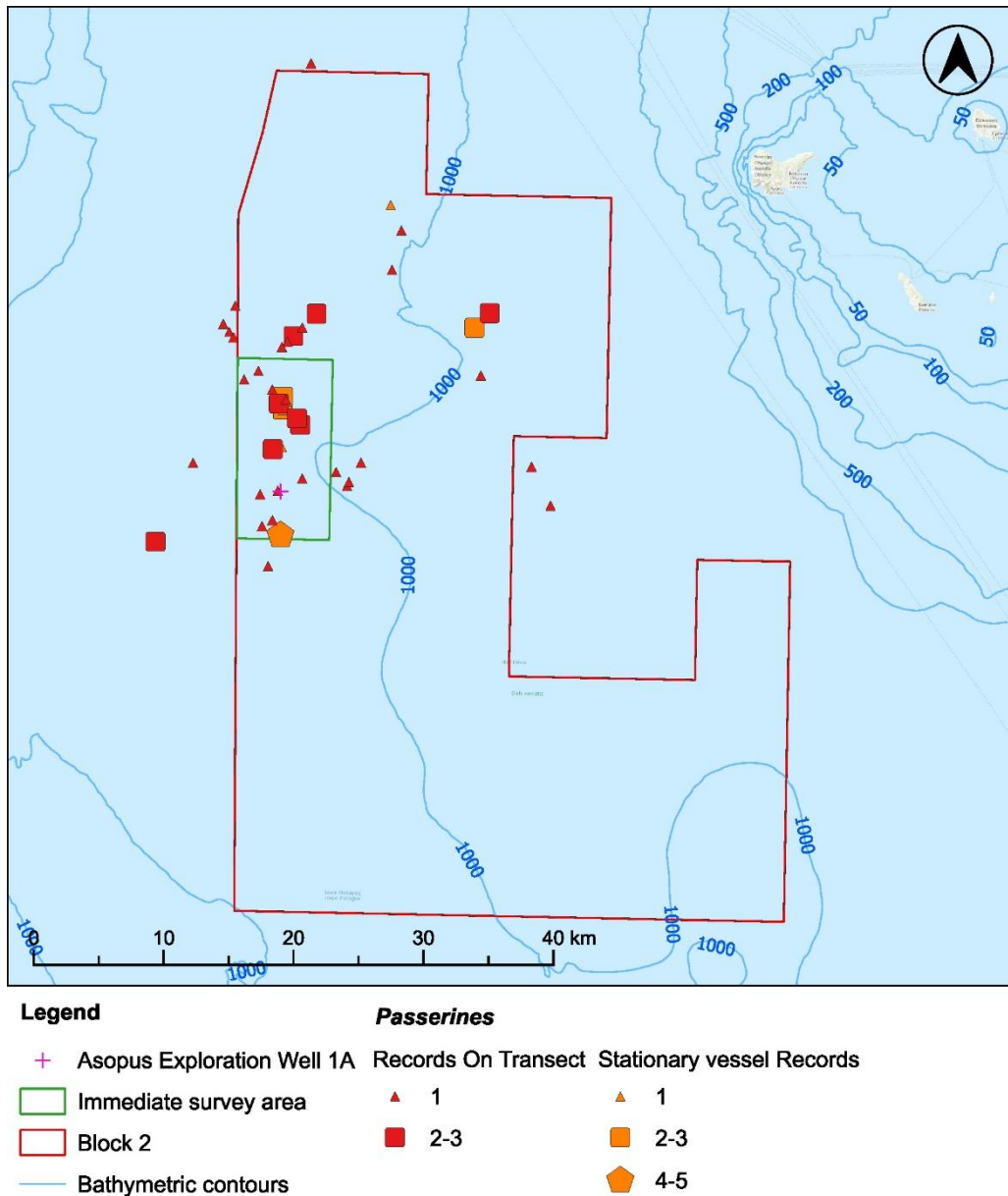


Figure 3-166: Migratory passerines: Locations and number of individuals recorded in the wider area

4 Conclusions

4.1 Bathymetry and seabed morphology

The LOT 01 geophysical campaign was conducted over a 23-day period, from 05.04.2026 to 27.04.2026, utilizing the M/V ECO ONE vessel equipped with a Kongsberg HUGIN 4500+ Autonomous Underwater Vehicle. To map the deep-water morphology, the AUV surveyed a primary area of 100.2 square kilometers. This operation involved a high-altitude geophysical pass flown at approximately 40 meters above the seabed, covering 773 linear kilometers, followed by a targeted low-altitude pass at 5 to 7 meters above the seabed, flying 3-meter spaced grids over 17 specific stations for an additional 14 linear kilometers.

At the exact coordinates of the proposed Asopus-1A exploration well, the data show a water depth of 842.5 meters at Lowest Astronomical Tide and a local, gentle seabed slope of 1.3 degrees. Morphologically, the immediate well site is situated in an area where an underlying Mass Transport Deposit (MTD) is exposed, creating a complex, maze-like seafloor pattern. Specifically, the planned well falls within a groove covered by fine, low-reflectivity sediments, which is surrounded by several harder sediment outcrops (spurs) ranging from 0.2 to 1 meter in height. Within a 500-meter radius of the well, these harder MTD sediments result in localized slope increases along their flanks that may exceed 10°, however, there are no fault scarp morphologies present within the immediate area of the well.

4.2 Shallow stratigraphy and geohazard assessment

Sub-Bottom Profiler data indicate that the shallow stratigraphy within a 500-meter radius of the Asopus-1A well trajectory is primarily characterized by the chaotic material of a MTD, denoted as seismic facies F2. At the exact well location, seismic facies F2 has a specific thickness of 18.62 meters and is delimited at the bottom by a medium-reflectivity horizon (R3) detected at a depth of 19.72 meters below the seabed. While the broader region features a measurable pelagic drape, within the immediate well area, the fine sediment coverage along the grooves is too thin to be clearly detected as a distinct facies (F1) in the seismic data. Within the 500-meter radius, localized acoustic blanking effects (wipe-out zones) are recognized starting at a depth of 8 meters below the seabed. The minimum distance between these acoustic anomalies and the Asopus-1A well location is 243 meters at a bearing of 214 degrees. This acoustic attenuation may relate to the potential presence of fluids from de-watering processes triggered by the high compression, deformation, and fracturing of the MTD material. Surface and sub-surface data reveal a complete absence of active gas seepage, gas chimneys, active pockmarks, acoustic plumes, mud volcanoes, or gas hydrates within the immediate area. Furthermore, no fault displacements or fault scarp morphologies affect the stratigraphy within the 500-meter radius area around the well trajectory.

4.3 Underwater cultural heritage and man-made features

Acoustic data identified four submarine cables and associated trenches. Three of these segments belong to the Asia-Africa-Europe-1 (AAE-1) system, which passes at a minimum distance of 2,692 meters from the Asopus-1A well. An additional cable in the northeastern sector is located 6,700 meters from the planned well. An archaeological target, designated as T057, was identified at a water depth of 880.04 meters, located 8,606 meters north from the proposed well site. Multibeam bathymetric data characterize T057 as an

isolated, elongated mound rising approximately 0.6 meters above the seabed, with dimensions of 23.7 by 8.3 meters. Sub-bottom profiler data indicate the presence of buried material extending 2.20 meters below the seabed. Visual inspection utilizing CathX optical imagery identified a concentration of partially buried amphorae within the central portion of the target. The observed amphorae exhibit elongated ovoid bodies, narrow necks, and pointed bases, which are morphologically consistent with Adriatic production sphere types, such as Lamboglia 2 and Dressel 6A, dating to the late Hellenistic and Early Imperial periods. The target represents an underwater cultural heritage resource.

4.4 Oceanographic and acoustic baseline

To support oceanographic and acoustic baseline characterization, an integrated mooring line was deployed offshore midway between Italy and Corfu for a duration of 23 days, from 05.04.2026 to 27.04.2026. Data retrieved from the deployed single-point current meters showed stable local sea currents with speeds generally below 0.10 meters per second, flowing predominantly towards the south-south-east. The mooring line was also equipped with an autonomous Passive Acoustic Monitoring system to define the baseline ambient soundscape and study the temporal presence of marine mammals. This standalone system utilized a CO.L.MAR. GP1190 broadband hydrophone coupled with an RTSYS Sylence-LP autonomous low-power sound recorder. It was configured with a sampling rate of 256 kHz, a 24-bit depth, a 15 dB gain, and a 3 Hz high-pass filter. Recording continuously with a 100% duty cycle, the system yielded 1,467 files of exactly 1,200 seconds each, accumulating approximately 2 terabytes of raw acoustic data. Excluding the deployment and recovery days to remove operational vessel noise, the system yielded 20 days of clean baseline acoustic data. Analysis of this data revealed an average L90 of 100.5 dB re 1 μ Pa at a 63Hz-centered band, characteristic of a moderately trafficked shipping area punctuated by intermittent noise from commercial shipping, active sonars, and distant seismic activities.

4.5 Seawater results

4.5.1 Physic-chemical characteristics of the water column (CTD profiles)

The investigated water column showed a well-developed thermo-haline stratification throughout the study area, with highly comparable conditions among the Asopus-1A group station, Northern station group, Blank stations and Reference Stations, the latter showing only local differences related to bathymetry, location and sampling period. Surface waters were characterized by temperatures of approximately 16 °C, decreasing to ~14 °C in deeper layers, while salinity increased from < 38.8 PSU in the upper water column to subsurface maxima exceeding 39.1 PSU. This vertical structure was consistent with the presence of Modified Atlantic Water (MAW) in the upper layer, underlain by Levantine Intermediate Water (LIW), while deeper waters likely reflected transitional conditions resulting from mixing between LIW and Eastern Mediterranean Deep Water (EMDW). Conductivity closely mirrored the thermo-haline structure, pH remained weakly variable (generally 8.17 – 8.29), whereas Dissolved Oxygen (DO) exhibited a marked oxycline associated with the thermo-halocline, with concentrations ranging between 3.77 and 4.87 mL L⁻¹ and saturation values consistently below 100 %, indicating slight to moderate undersaturation throughout the investigated water column. Chlorophyll fluorescence was generally low, with a Deep Chlorophyll Maximum (DCM) typically occurring

between ~70 and 100 m depth and peak concentrations around $0.3 \mu\text{g L}^{-1}$ Chl-a. Turbidity remained low across all stations, generally below 0.5 FTU, with only near-surface values occasionally exceeding 1 FTU.

4.5.2 Total Suspended Solids (TSS), Total Organic Carbon (TOC) and nutrients

TSS showed limited spatial variability across all station groups, with average concentrations between $11.01 \pm 2.46 \text{ mg L}^{-1}$ around Asopus-1A (and intermediate average values at the Blank and Reference Stations). TOC was below the analytical LoQ in all samples except Surface and Middle sampling depths at Italy Ref.

Nutrient concentrations were generally low. Ammonium (NH_4^+) reached a maximum of $0.065 \text{ mg L}^{-1} \text{ N}$ at Italy Ref Surface, while Nitrite (NO_2^-) remained below the LoQ in almost all samples and never exceeded $0.003 \text{ mg L}^{-1} \text{ N}$. Nitrate (NO_3^-) was detected only sporadically, with a maximum concentration of $0.510 \text{ mg L}^{-1} \text{ N}$ at Italy Ref Surface. Orthophosphate (PO_4^{3-}) reached a maximum of $0.0167 \text{ mg L}^{-1} \text{ P}$ at D1b Surface, whereas Total Phosphorus (P-Tot) attained $90 \mu\text{g L}^{-1}$ at D5b Surface. Comparison with the reference values adopted within the Greek MSFD implementation framework showed only limited exceedances for NO_3^- and PO_4^{3-} ; the former exceeded the reference value only at D5b Middle and Italy Ref Surface, while the latter exceeded its reference value at D1b Surface, D7b Middle and Bottom, Kerkyra Ref Surface and Middle, and at all Sampling Depths of Italy Ref.

4.5.3 Metals and metalloids

Among metals and metalloids, Cd, Cr VI, Co, Hg and Sn were consistently below the analytical LoQ, while Cr-Tot and Pb were only sporadically detected. Cu and Ni were generally low and detected in a limited number of samples, except at Italy Ref, where maxima of 30.0 and $10.0 \mu\text{g L}^{-1}$ were recorded. As, Ba, Fe and Zn were quantifiable in all samples. As and Ba showed limited variability, ranging from 1.0 to $5.5 \mu\text{g L}^{-1}$ and between 7.0 and $12.0 \mu\text{g L}^{-1}$. Greater variability characterized Fe ($33 - 290 \mu\text{g L}^{-1}$) and Zn ($24 - 160 \mu\text{g L}^{-1}$). Comparison with the AA-EQS of Directive 2013/39/EU (as applied in Greece) and the Italian SQA-MA values (D.Lgs. 172/2015) identified only limited exceedances for As, Pb and Ni. As exceeded the Italian SQA-MA of $5 \mu\text{g L}^{-1}$ in two samples from Asopus-1A group station and five from the northern group station. Pb exceeded the applicable threshold of $1.3 \mu\text{g L}^{-1}$ (reported for both Greek and Italian regulations) only at Italy Ref Middle and Bottom, while Ni exceeded the corresponding reference value of $8.6 \mu\text{g L}^{-1}$ (both considered regulations) only at Italy Ref Bottom. All remaining metals complied with the applicable regulatory standards.

4.5.4 Total Petroleum Hydrocarbons (TPH) and Polycyclic Aromatic Hydrocarbons (PAHs)

TPH, including both light-chain ($\text{C} \leq 10$) and heavy-chain ($\text{C}_{10} - \text{C}_{40}$) fractions, and all investigated Polycyclic PAHs, including their sum, were below the analytical LoQs at all Sampling Depths and Stations. Consequently, all hydrocarbon compounds were also below the applicable regulatory reference values where available.

4.6 Plankton results

4.6.1 Phytoplankton community

The phytoplankton community showed significant differences among the three sampling depths (Surface, Middle and Bottom), suggesting that light availability could have played a major role in shaping its vertical distribution. Significant spatial variability was also observed among the Asopus-1A group station, northern group station, Blank and Reference areas, likely attributable to natural variability. The community was largely dominated by the “Other taxa” category, primarily represented by Cryptophyceae and unidentified microflagellates (< 10 µm cell size), while Bacillariophyceae constituted the second most abundant group, mainly due to the widespread occurrence of *Pseudo-nitzschia delicatissima*. Numerous dead cells of this species were recorded in all samples (although excluded from abundance estimates), suggesting the recent decline of a bloom event in the study area. Dinophyceae and Coccolithophyceae were less abundant and less diverse than the previous groups, a pattern consistent with phytoplankton assemblages typically observed in offshore marine environments.

4.6.2 Zooplankton community

The identified mesozooplankton communities exhibited high taxonomic diversity and a homogeneous spatial distribution across the investigated stations, with no evidence of significant differences among the Asopus-1A group station and northern group station and the Reference stations. Community structure was consistent with the oligotrophic conditions typical of the offshore eastern Mediterranean and appeared to be primarily driven by large-scale hydrological and bathymetric factors. The predominance of copepods and other holoplanktonic organisms confirms the oceanic character of the ecosystem, while the limited occurrence of meroplankton indicates a weak influence from coastal environments. Overall, the results describe a well-structured offshore pelagic community that is representative of the natural environmental conditions of the different study areas.

4.6.3 Ichthyoplankton

The results concerning the ichthyoplankton component revealed a community structure consistent with the deep pelagic environments of the investigated sector. The taxonomic composition was dominated by mesopelagic and bathypelagic species, typical of oligotrophic oceanic ecosystems characterized by great water depths, whereas the occurrence of coastal taxa was limited.

4.7 Sediment Results

4.7.1 Physic-chemical measurements and macroscopic description

Field measurements performed immediately after sample recovery indicated sediment temperatures of 13.5 – 15.6 °C, limited pH variability (7.79 – 7.93) and consistently negative ORP values (–169.4 to –120.9 mV), indicative of reducing conditions typical of fine-grained marine sediments. Macroscopic observations

suggested highly homogeneous sedimentological conditions throughout the study area, with sediments generally described as “Clayey silt”, medium hydrated, odourless and devoid of shell fragments, plant remains or other noteworthy features.

4.7.2 Grain-size and other physic-chemical variables

Grain-size laboratory analyses confirmed the absence of Gravel from all samples, while sand generally represented a minor fraction (< 15 %), except at Italy Ref (23.5 %). Pelitic fractions clearly predominated throughout the study area, with Silt and Clay together accounting for approximately 86 – 100% of the sediment matrix. According to both Folk and Shepard classifications, sediments were predominantly assigned to the “Mud” and “Silty clay” classes, respectively, confirming the granulometric homogeneity of the study area, with Italy Ref exhibiting a slightly coarser texture. Among the other physic-chemical variables investigated in the sediment samples, moisture content showed moderate variability across the study area, with generally higher values at Northern station group, Blank and Reference Stations than around Asopus-1A, whereas sediment density remained remarkably uniform, reflecting the overall homogeneity of the investigated fine-grained deposits.

4.7.3 Total Organic Carbon (TOC) and nutrients

TOC concentrations were generally low and frequently below the analytical LoQ, while carbonate contents exhibited limited spatial variability and consistently moderate concentrations. N-Tot and P-Tot also showed relatively homogeneous distributions across the study area, with no clear differences between well-site, Blank and Reference Stations. Overall, the investigated sediments were characterized by low organic-matter content and relatively uniform nutrient concentrations.

4.7.4 Metals and metalloids

Among metals and metalloids, Cr VI remained consistently below the LoQ, whereas Sn and Hg were only sporadically detected at very low concentrations. Al and Fe were by far the most abundant elements, reflecting their predominantly lithogenic origin, while the remaining investigated metals generally occurred at concentrations within the order of magnitude of 10^1 mg kg^{-1} d.s. Spatial variability was generally limited, although Northern station group tended to exhibit slightly higher concentrations than Asopus-1A station group and the Blank stations, while Italy Ref frequently showed comparatively lower values. Exceedances of the applicable reference values were identified for As, Ni and Cr-Tot. As exceeded both the HCMR ERL values and, at selected stations, the Italian SQA-MA (D.Lgs. 172/2015, Table 3/B), whereas Ni exceeded the HCMR ERL threshold throughout the study area. Cr-Tot exceeded the Italian SQA-MA (D.Lgs. 172/2015, Table 3/B) at a limited number of stations. All remaining investigated metals and metalloids showed concentrations always below the applicable regulatory reference values.

4.7.5 Total Petroleum Hydrocarbons (TPH) and Polycyclic Aromatic Hydrocarbons (PAHs)

Hydrocarbon concentrations in surface sediments were generally low throughout the study area. The light hydrocarbon fraction ($C \leq 12$) remained below the analytical LoQ at all stations, whereas the heavier fraction ($C > 12$) and the corresponding TPH were consistently detected at low concentrations, showing limited spatial variability and no evident differences among well-site, Blank and Reference Stations; the only exception was Italy Ref, where both $C > 12$ hydrocarbons and TPH remained below the LoQ.

Most investigated PAHs were below the analytical LoQ at all stations. Only a limited number of compounds were sporadically detected, mainly Fluoranthene and Pyrene, which represented the most frequently quantified PAHs, occurring at four and five stations, respectively. The highest individual concentrations were recorded for Benzo(b)fluoranthene and Benzo(g,h,i)perylene at Italy Ref, and for Fluoranthene at D6a. Detectable PAHs were confined to a small number of stations, with the highest diversity of quantified compounds and the highest Σ PAHs concentration observed at Italy Ref, followed by the Blank station D6a, where a lower but still comparatively elevated Σ PAHs concentration was recorded. All remaining stations showed either no quantifiable PAHs or only isolated detections, resulting in substantially lower Σ PAHs values and no consistent spatial pattern among well-site, Blank and Reference Stations.

All measured concentrations of petroleum hydrocarbons (including both hydrocarbon fractions and TPH) and PAHs (including Σ PAHs) remained well below the applicable reference values adopted in Greece (ERL, HCMR; Long et al., 1995) and the Italian Environmental Quality Standards (SQA-MA; D.Lgs. 172/2015), providing no evidence of hydrocarbon contamination within the investigated sediments.

4.7.6 Microplastics

Microplastics were not detected in any sediment sample collected at the Asopus-1A station group and Northern station group, the Blank stations, or the Reference Stations. This consistent result across all investigated station groups indicates the absence of detectable microplastic accumulation within the surface sediments and provides no evidence of microplastic contamination at the time of sampling. Although no regulatory threshold values are currently available for microplastics in marine sediments under the Greek or Italian frameworks considered in the present study, the absence of detectable particles at all stations provided no indication of significant microplastic accumulation within the investigated seabed.

4.8 Infauna results

4.8.1 Macrozoobenthos community

Analyses of macrobenthic communities revealed an overall homogeneous ecological structure across the Asopus-1A station group and Northern station group, Blank stations and Reference Stations, with no statistically significant differences among station groups. The observed variability was primarily attributable to natural small-scale heterogeneity of the sedimentary environment.

Benthic communities were characterized by low abundance, reduced species richness and limited diversity, consistent with conditions typically observed in oligotrophic Mediterranean bathyal environments. The

ecosystem was dominated by the Mediterranean Upper Bathyal Mud biocenosis (EUNIS code: ME65). A total of 116 individuals belonging to 19 taxa were recorded, with Annelida overwhelmingly dominating both abundance (94.8 %) and species richness (73.7 %). Community structure was largely dominated by the sipunculan *Golfingia* sp., a taxon commonly associated with fine-grained bathyal sediments.

Ecological-quality indices reflected the naturally low-diversity character of these deep-sea communities. M-AMBI values ranged from “Bad” to “Moderate”, whereas AMBI classified most stations as “Undisturbed”, with only isolated cases of “Slightly” or “Moderately disturbed” conditions. Overall, the results were consistent with a naturally oligotrophic bathyal ecosystem rather than with evidence of ecological disturbance.

4.9 Benthic biocoenoses

4.9.1 AUV-based characterisation of benthic habitats and biocoenoses

Consistent with the macrozoobenthic analyses, AUV surveys revealed a generally homogeneous benthic landscape throughout the study area, dominated by the Mediterranean Upper Bathyal Mud biocenosis (EUNIS code: ME65), characterized by fine-grained sediments and benthic assemblages adapted to deep-sea conditions. The seafloor was commonly associated with traces of burrowing and tubicolous organisms, occasional specimens of deep-sea fishes belonging to the family Macrouridae, and locally with facies attributable to the sea anemone *Andresia partenopea*.

A limited rocky outcrop attributable to the Mediterranean Upper Bathyal Rock biocenosis (EUNIS code: ME15) was identified at station D4a. This habitat hosted deep-water coral assemblages attributable to *Antipathella subpinnata* and/or *Callogorgia verticillata*, representing a localized increase in habitat heterogeneity and ecological complexity within the predominantly muddy bathyal environment.

4.10 Marine litter

4.10.1 AUV-based characterisation of marine litter

The analysis of AUV mosaics revealed a generally limited presence of marine litter in the investigated areas, with most stations showing no evidence of marine debris. The detected items were discontinuously and locally distributed, with no significant accumulation patterns associated with the Asopus 1A station group and Northern station group compared to the Blank and Reference stations. The observed distribution suggests that the occurrence of marine litter on the seafloor is primarily controlled by local processes of transport, deposition, and retention of materials, as well as by point-source anthropogenic inputs.

4.11 Fish fauna

Based on global geographic range data obtained from the IUCN database, exactly 371 marine fish species are identified within the immediate project area, comprising 310 ray-finned fishes, 60 cartilaginous fishes, and 1 lamprey. Field analyses of the immediate area's ichthyoplankton recorded low values of species

diversity and abundance, strictly reflecting an open-ocean, deep pelagic environment that is minimally influenced by neritic inputs. The larval community is dominated by the epipelagic species *Sardina pilchardus* and Scombridae larvae. The remaining larval diversity consists primarily of mesopelagic taxa, including *Cyclothone braueri*, *Maurolicus muelleri*, and representatives of the family Myctophidae (such as *Hygophum benoiti* and *Lampanyctus pusillus*). Taxa typical of the meso- to bathypelagic domains, such as the paralepidids *Arctozenus risso* and *Paralepis coregonoides*, are also present and are characterized by broad vertical distributions in intermediate and deep water layers.

Near the seabed, AUV visual surveys directly confirmed the presence of deep-sea fishes belonging to the family Macrouridae associating with the muddy bathyal seafloor. The deep waters of the immediate area support specific bathyal cartilaginous fish assemblages, including the blackmouth catshark (*Galeus melastomus*), longnose skate (*Dipturus oxyrinchus*), and longnose spurdog (*Squalus blainville*). Obligate deep-water species, such as the rabbitfish chimaera (*Chimaera monstrosa*), velvet belly lanternshark (*Etmopterus spinax*), and the kitefin shark (*Dalatias licha*), are documented occurring exclusively at depths greater than 200 m.

4.12 Marine mammal and sea turtle monitoring effort and encounters

Desktop studies and historical acoustic monitoring indicate that the broader Ionian Sea and the Hellenic Trench margin provide habitat for a diverse assemblage of marine megafauna. Literature and regional datasets document the presence of deep-diving cetaceans, including the sperm whale (*Physeter macrocephalus*), which is assessed as Endangered at the Mediterranean regional level, and Cuvier's beaked whale (*Ziphius cavirostris*), which is classified as Vulnerable. The area also supports several delphinid species, including the striped dolphin (*Stenella coeruleoalba*) and Risso's dolphin (*Grampus griseus*). These cetacean species are afforded protection under Annex IV of the EU Habitats Directive and are addressed through regional and international conservation agreements, including ACCOBAMS, the Bern Convention, CITES, and the Convention on Migratory Species (CMS). The region also serves as a known transit and foraging area for sea turtles, particularly the loggerhead turtle (*Caretta caretta*) and the green turtle (*Chelonia mydas*). The Mediterranean monk seal (*Monachus monachus*) has also been recorded within the broader area.

Observation efforts were conducted across both the LOT 01 and LOT 02 campaigns to monitor marine megafauna and ensure compliance with JNCC and ACCOBAMS mitigation guidelines.

During the LOT 01 geophysical campaign, the dedicated observation team completed a total of 373 hours and 14 minutes of real-time monitoring. This effort comprised 223 hours and 58 minutes of visual daylight observation and 149 hours and 16 minutes of nighttime vessel-based PAM, which utilized a towed hydrophone array and PAMGuard software during periods of poor visibility to mitigate operational impacts. Visual sightings during this period recorded the presence of striped dolphins, unidentified delphinids, and adult loggerhead sea turtles in the immediate vicinity. Concurrently, independent baseline acoustic data were analyzed from the autonomous hydrophone deployed on the mooring line, which logged continuously from 06.04.2026 to 27.04.2026. After discarding the logs from the first and last days (April 6 and April 27) due to acoustic interference from deployment and recovery operations, the remaining 20 days of clean data recorded the presence of sperm whales almost daily, alongside at least 13 distinct encounters with the deep-diving Cuvier's beaked whale.

During the LOT 02 environmental baseline field survey, the observation team conducted monitoring during two operational periods: 14.03.2026 to 15.03.2026, and 25.03.2026 to 31.03.2026. Visual monitoring was conducted along the vessel paths during daylight hours, while passive acoustic monitoring operations were carried out during the night or in periods of poor visibility. Horizontal visibility was classified as greater than 5 kilometers for 96% of the survey duration, and precipitation was absent for 87.1% of the time. The sea state was characterized as choppy for 80% of the time, with wind forces most frequently recorded at Beaufort 4 and 5. A total of nine marine megafauna encounters were recorded, comprising six visual sightings and three acoustic detections. On March 27, a single adult Risso's dolphin was sighted in 800 meters of water. On March 28, a solitary adult sperm whale was visually recorded in 850 meters of water, which was subsequently tracked acoustically diving to approximately 750 meters. On March 30, a single adult loggerhead sea turtle was sighted in 700 meters of water. The acoustic monitoring efforts recorded two additional nocturnal detections of dolphins on March 15, characterized by clicks and bursts between 30 and 48 kHz, and faint clicks potentially belonging to a sperm whale on March 31.

4.13 Avifauna monitoring effort and observations

Desktop data and results of field surveys indicate that the wider Ionian Sea forms part of the Black Sea-Mediterranean Migratory Bird Flyway. The offshore pelagic waters are utilized by pelagic seabird species such as Scopoli's Shearwater (*Calonectris diomedea*), Yelkouan Shearwater (*Puffinus yelkouan*), European Storm-petrel (*Hydrobates pelagicus*), as well as more coastal species including Audouin's Gull (*Larus audouinii*) and Mediterranean Gull (*Larus melanocephalus*) for foraging, post-breeding dispersal returning to breeding sites, , and migratory transit. Telemetry data show that Scopoli's Shearwaters breeding on nearby islands traverse the project area during foraging trips. However, the primary migratory corridors for soaring birds, waterbirds, and passerines are concentrated along the coastal areas and island chains rather than the open sea. It should be noted that the available biographical and field survey data for the survey area is very limited and does not allow to draw concrete conclusions regarding autumn migration and wintering period.

The project area does not overlap with any Special Protection Area (SPA), Important Bird Areas (IBAs) or breeding colonies; the nearest designated SPAs and IBAs, such as the Diapontia Islands, are located approximately 50 km to the east. This however should be considered with caution, as both Greece and Italy are currently in a process filling the knowledge gaps regarding the birds, marine mammals and sea turtles in the offshore marine environment and identifying marine hotspots to be proposed for inclusion in the Natura 2000 network of protected areas (LIFE MareNatura).

Avifauna visual observations were carried out during daylight hours over a 10-day period, spanning from March 14 to March 16, 2026, and from March 26 to April 1, 2026. The total duration of the visual observations was 115 hours. The survey vessel travelled a total distance of 1,198.9 kilometers, out of which the visual observations were conducted along transects with a total length of 330.5 kilometers. A total of 43 bird species or species groups were visually recorded across the surveyed areas. Scopoli's Shearwater was the most abundant seabird species, with 53 individuals recorded in the immediate survey area and 27 in the wider Block 2 area. Recorded Scopoli's Shearwaters were primarily travelling towards the Ionian coast of Italy, where species important foraging areas are located, therefore it is considered that the main species behaviour in the immediate survey area and in the Block 2 area is traversing the areas towards/from their foraging areas. The second most abundant species in the immediate survey area (48 individuals recorded)

and the Block 2 area was the Mediterranean Gull, which is considered to be using the area for migration/passage towards its breeding areas. Yelkouan shearwaters were not recorded in the immediate survey area or Block 2, with sightings restricted mainly to the coastal areas outside Block 2. Audouin's Gulls were recorded in the pelagic areas, including six individuals in the immediate survey area and two in Block 2, primarily consisting of immature individuals in pre-breeding passage. Additional species observed in the immediate survey area and Block 2 on spring migration included waterbirds such as the Garganey, herons such as the Great Egret and Grey Heron, waders such as the Eurasian Curlew, and raptors including the Western Marsh Harrier, Lesser Kestrel, and Common Kestrel. The presence of these species in the pelagic areas indicates the potential importance of the area for their spring migration. Furthermore, 14 migratory passerine species were recorded in the immediate survey area and Block 2. Under the weather conditions during the field surveys the majority of observed passerines utilized the survey vessel as a temporary stopover for resting.

4.14 Environmental designations and regulatory frameworks

The Asopus-1A offshore location is positioned outside the coastal water bodies managed under the WFD. The nearest coastal waters along Epirus, the Ionian Islands, and the Italian Apulia region generally achieve Good ecological and chemical status. Localized status deterioration is restricted to enclosed gulfs, such as the Amvrakikos Gulf, and port areas subject to anthropogenic pressures.

Under MSFD, the well is situated within the "Ionian Sea and the Central Mediterranean Sea" subregion. The closest open-sea MSFD monitoring station to the exploration well is "Othonoi (Ionio)". National assessments indicate that this wider area maintains GES for several descriptors, including eutrophication and contaminants. However, data limitations and uncertainties remain for specific descriptors, such as marine food webs and underwater noise thresholds.

The well location and the northern station group do not overlap with formally designated MPAs, Natura 2000 sites, or KBAs. The closest Natura 2000 sites, MPAs, and KBAs correspond to the Greek Diapontia Islands, located approximately 40 to 43 km from the well, and the Italian Costa Otranto-Santa Maria di Leuca, located approximately 53 to 57 km away. Similarly, the closest IBA is the Diapontia Islands at 42 km. The project footprint does not overlap with any Important Shark and Ray Areas (ISRAs). The nearest designated ISRA is Santa Maria di Leuca, located approximately 20 km away, recognized as a critical reproductive area for the Vulnerable velvet belly lanternshark (*Etmopterus spinax*). Other ISRAs in the broader region include the Otranto Channel (~50 km), a reproductive area for the blackmouth catshark (*Galeus melastomus*), and the Western Apulian Coast (~56 km), a feeding area for the Endangered basking shark (*Cetorhinus maximus*). The nearest established Important Marine Mammal Area (IMMA) is the Ionian Archipelago, located 37 km to the east, formally designated based on the ecological requirements of the short-beaked common dolphin (*Delphinus delphis*) and the Mediterranean monk seal (*Monachus monachus*). The exploration well is situated within the "Southern Adriatic and Northern Ionian Sea" Area of Interest (AoI), a region currently under evaluation by expert panels for potential future IMMA designation. The project area lies outside of all ACCOBAMS CCHs. The closest CCH is the Sazani Island-Karaburun Peninsula in Albania (~72 km north), designated as an area of special importance for the short-beaked common dolphin and other cetaceans. The Southwest Crete and the Hellenic Trench CCH is located significantly further away, at a distance of approximately 187 km from the well. In terms of fisheries management, the site is positioned 9 km from the GFCM Deep Water FRA. This FRA prohibits the use of towed dredges and bottom trawl nets at depths below

1,000 meters to protect deep-sea benthic habitats and VMEs. The exploration location overlaps spatially with the South Adriatic Ionian Strait EBSA. This EBSA designation recognizes the region's steep slopes and deep waters as critical habitats for the Cuvier's beaked whale (*Ziphius cavirostris*) and deep-sea cold-water coral communities, alongside significant densities of other megafauna such as the devil ray (*Mobula mobular*), striped dolphin (*Stenella coeruleoalba*), Mediterranean monk seal, and loggerhead sea turtle (*Caretta caretta*).

4.15 Settlement structure and land use

The overall land use and spatial planning profile of the study area is governed by a regulatory framework operating across national, regional, and local levels. For the Corfu Regional Unit, the GFSPSD, the RSF of the Ionian Islands, and the emerging LUPs under L. 4759/2020 establish the spatial governance context, emphasising the preservation of the agricultural landscape, the sustainable development of tourism, and the avoidance of land use conflicts along the coastal zone. For the Thesprotia Regional Unit and the Municipality of Igoumenitsa, the RSF Epirus and the approved GUP for Igoumenitsa provide the relevant planning framework, recognising the port of Igoumenitsa as a key development pole of the regional unit and driver of its economic identity.

The settlement and land use baseline reveals several features of relevance to the subsequent impact assessment. The Corfu Regional Unit is a densely settled island system (approximately 158 inhabitants/km², 2021 Census) with a total permanent population of 101,600, concentrated primarily in the city of Corfu and a dispersed network of small rural settlements. The dominant land uses are olive cultivation and tourism-related coastal development, two economic activities that are entirely land-based and physically distant from the offshore drilling location. The Municipality of Igoumenitsa, with a permanent population of 25,698 (2021 Census), is characterised by a concentrated urban and port area surrounded by predominantly forested and rural hinterland. Its economic identity is closely tied to its port function, which constitutes the primary concentration of logistics and transport infrastructure in the Thesprotia Regional Unit and the entry point for the Project's PSV supply operations.

Block 2 contains no permanent settlements or land uses, and its human interaction is limited to maritime activities (addressed separately). The Project's onshore footprint is similarly limited to an operational area within the existing port zone of Igoumenitsa, entailing no change of land use, no physical displacement, and no modification of existing infrastructure.

Accordingly, the primary transmission pathways for potential social impacts from the Project are not land use change or physical displacement, but rather potential effects on maritime livelihoods, changes in tourism perception and risk, and community-level concerns related to environmental risk. Localised economic activity that may be generated by the port-based logistics component during the drilling campaign will be examined but are not expected to alter the settlement structure or land use character of the municipality.

4.16 Maritime uses

The maritime use baseline indicates that the wider study area supports a range of established activities, including commercial shipping and navigation, fisheries, aquaculture, maritime tourism, port-related logistics,

submarine cables and military training and exercise activities. These activities differ in their spatial distribution and potential interaction with the Project.

Shipping and navigation represent the maritime use with the greatest spatial overlap with the project area. The area is crossed by international cargo, tanker, passenger ferry and cruise vessel routes linking the Adriatic with western Greece and the Eastern Mediterranean. As vessel traffic is predominantly transitory, navigational safety and vessel management around the drilling installation will be key operational considerations. The Port of Igoumenitsa, which will serve as the Project's primary supply base, is an important transport hub connecting Greece with Italy and the wider Adriatic region.

Fisheries are the activity most likely to interact directly with Project operations. Although fishing effort is concentrated mainly in coastal waters, commercial fishing activity also occurs within and around the Project area. Fisheries therefore represent an important receptor for the impact assessment, particularly with respect to temporary access restrictions, vessel interactions and potential disruption of fishing activities.

Aquaculture and maritime tourism are concentrated in coastal areas around Corfu, Paxos, Antipaxos, the Diapontian Islands, Thesprotia and the Epirus coastline. No aquaculture facilities or designated aquaculture development areas overlap with the study area, and direct interaction with these activities is not anticipated due to their spatial separation from the Project area.

Three international submarine cable systems (Eagle, Jonah and AAE-1) have been identified within the study area. While no cable route has been identified within the proposed drilling footprint, submarine cables constitute important fixed seabed infrastructure and will require verification of their locations and implementation of appropriate avoidance and notification procedures.

According to data provided by the Hellenic Navy Hydrographic Service, there are no permanently established exercise areas, nor are there any temporary restricted or reserved areas currently in force, within the boundaries of Block 2 and the location of the Asopus-1A exploration well.

The National Spatial Strategy for Maritime Space identifies the northern Ionian Sea as a multi-use maritime area supporting shipping, fisheries, aquaculture, tourism, environmental protection and energy-related activities. No maritime spatial planning designation or restriction has been identified that would preclude the proposed exploration activities. Future refinement of maritime spatial planning instruments may provide additional spatial detail regarding the allocation and management of maritime uses within the region.

Overall, the Project is located in an offshore area where maritime uses are present but generally dispersed. Commercial shipping and fisheries constitute the principal receptors requiring detailed assessment, while submarine cables and military exercise areas represent important operational considerations. Interactions with aquaculture and maritime tourism are expected to be limited due to their separation from the Project footprint.

Regarding other offshore infrastructure, desktop data confirm that no offshore oil and gas installations or operational offshore renewable-energy projects are present within the immediate area or within a 100 km radius of the Asopus-1A well. The nearest existing oil and gas installations are located approximately 150 km away along the Italian continental margin. For offshore wind farms, the closest mapped infrastructure consists of the planned "Santa Maria di Leuca" and "Puglia 1" developments, situated in Italian waters approximately 10 to 15 km from the well location.

4.17 Demographics

The demographic profile of the two onshore study areas reveals two territorially and functionally distinct communities. The Corfu Regional Unit is a moderately populated island system whose effective population expands significantly during the summer tourism season, generating an annualised equivalent population increase of at least 20% and substantially higher peak-day pressures during May to October. Its age structure broadly follows the national average, with moderate demographic ageing and a youth share slightly below the national one. The seasonal character of the local economy and the coastal dependence of the dominant tourism sector means that the timing of Project activities during the summer is to be considered.

The Municipality of Igoumenitsa presents a contrasting profile: a port-oriented urban centre of 25,698 permanent residents that has proven demographically resilient relative to its wider regional unit, retaining a younger and more nationally representative age structure than the predominantly rural and ageing Thesprotia Regional Unit. Seasonal population variation driven by tourism is modest, though transit passenger volumes through the port may generate temporary pressure during the summer season. The concentration of nearly all registered accommodation capacity within the municipality, accounting for 99.4% of the regional unit's hotel overnights, confirms Igoumenitsa's dominance as the sole urban service centre of Thesprotia.

Both study areas sit within regions experiencing long-term demographic contraction, the Ionian Islands Region at a relatively contained rate of 1.6% over the intercensal decade, the Epirus Region at a more pronounced 5.0%, against a national backdrop of sustained population decline, low fertility, and structural ageing.

These trends form the demographic context within which the Project's potential socio-economic impacts, including any temporary employment and supply chain effects at Igoumenitsa, will be assessed.

4.18 Economic activities

The Project is situated within a national economy that has largely recovered from the sovereign debt crisis and the COVID-19 pandemic and continues to exhibit stable growth and improving macroeconomic conditions. At the regional level, both the Ionian Islands and Epirus have experienced sustained economic recovery in recent years, although their economic profiles differ considerably. The Regional Unit of Corfu is characterised by a service-based economy that is heavily dependent on tourism and associated activities, making economic performance closely linked to visitor flows and external market conditions. In contrast, the Regional Unit of Thesprotia forms part of a more diversified regional economy, where public services, industry, agriculture, transport and logistics all contribute to economic activity, with the Port of Igoumenitsa serving as a strategic gateway of national and international importance. These structural differences are reflected in the regions' differing responses to economic shocks and recovery patterns. Understanding these characteristics is relevant to the impact assessment, as potential Project-related economic effects are expected to interact differently with the economic structures and key sectors of each area.

4.19 Employment and labour market

The labour market baseline indicates that the study area is situated within a national context of continued recovery following the economic crisis and the COVID-19 pandemic. Employment rates have improved and

unemployment has declined substantially across Greece, although unemployment remains above the EU average and regional disparities persist.

Within the study area, the Ionian Islands Region is characterised by a high concentration of employment in trade, transport, accommodation and food service activities, reflecting the importance of tourism and related services to the regional economy. In contrast, the Epirus Region exhibits a more diversified employment structure, with significant employment in public administration, education and health, agriculture, and industry alongside service-sector activities.

At sub-regional level, both the Corfu and Thesprotia Regional Units have experienced a long-term shift in employment structure, characterised by declining agricultural employment and increasing employment in service-related sectors. Corfu displays a particularly high concentration of employment in trade, transport, accommodation and food service activities, while Thesprotia retains a more balanced sectoral profile.

From a Project perspective, the principal labour market receptors are the local workforce and businesses operating within the dominant service sectors of the study area. The Port of Igoumenitsa constitutes an important employment and logistics hub within the mainland study area, while tourism-related activities represent a significant component of economic activity in the Ionian Islands. These characteristics provide important context for the assessment of potential employment, supply chain and wider socio-economic effects associated with the Project.

4.20 Fisheries and aquaculture

Commercial fisheries are an established maritime use within the wider study area, with activity undertaken by both Greek and Italian fleets reflecting the transboundary nature of fisheries in the northern Ionian Sea. The Greek fleet is dominated by small-scale coastal vessels, while the Italian fleet operating in GSA 19 exhibits a similar structure, with small-scale fisheries accounting for the majority of vessels and fishing activity concentrated in coastal waters.

The principal fisheries receptors are the small-scale fishing communities along the Corfu and Epirus coasts and commercial fishing vessels operating within the wider northern Ionian Sea. Although fisheries represent a relatively limited component of the regional economy, they remain locally important for a number of coastal communities and individual fishing households.

Aquaculture is confined to designated development areas on the north-eastern coast of Corfu and does not overlap with Block 2 or the proposed Asopus-1 well location. Accordingly, no direct interaction between Project activities and aquaculture operations is anticipated.

Overall, the baseline indicates that the Project is located within a wider transboundary fisheries setting, while direct interactions are expected to be limited to commercial fishing activity in the offshore Project area and vessel transit routes.

4.21 Tourism

Tourism is a key component of the socio-economic baseline of the wider study area, although its scale and economic significance differ markedly between the Ionian Islands and Epirus Regions. The Ionian Islands Region, and particularly the Corfu Regional Unit, represents one of Greece's most tourism-dependent

economies, characterised by high visitor numbers, extensive accommodation capacity, strong international accessibility and a tourism product centred on coastal and marine recreation. By contrast, tourism in the Epirus Region forms a smaller, though growing, component of the regional economy, with activity concentrated along the coastal corridor of Preveza and Thesprotia during summer months.

Within the wider study area, the principal tourism receptors are located in the Corfu Regional Unit and the coastal areas of the Thesprotia Regional Unit. In both regions, tourism activity exhibits pronounced seasonality, with accommodation turnover, visitor numbers and tourism-related economic activity concentrated during the summer period (approximately April/May to October) and peaking during the third quarter of the year.

Overall, the baseline indicates that tourism is a receptor of high socio-economic importance, particularly within the Corfu Regional Unit, where the regional economy is highly dependent on international leisure tourism. The strong seasonality of tourism demand, the concentration of tourism assets along the coastline and the economic importance of maintaining the Region's tourism image are key baseline characteristics that should be taken into account in the subsequent impact assessment.

4.22 Social infrastructure

Healthcare infrastructure comprises a combination of primary healthcare facilities, regional hospitals and specialised referral centres. While both regions have relatively limited hospital capacity compared with more populous parts of Greece, they are supported by an extensive primary healthcare network and access to higher-level referral hospitals, including the General Hospital of Corfu and the University Hospital of Ioannina. The Municipality of Igoumenitsa and the Regional Unit of Corfu are also served by local health centres and associated regional clinics providing primary healthcare services.

Social protection services are delivered through regional Social Welfare Centre branches and other public social care units providing residential and community-based services for children, older persons, persons with disabilities and other vulnerable groups. Public social care infrastructure is more extensive in Epirus than in the Ionian Islands, reflecting differences in regional population and service provision.

Educational infrastructure is well established throughout the study area, with comprehensive networks of kindergartens, primary schools and secondary schools across both regions. Higher education is provided by the Ionian University and the University of Ioannina, which together support undergraduate, postgraduate and doctoral education and contribute to the wider educational and research capacity of north-western Greece.

Overall, the social infrastructure baseline indicates that the study area is served by an established network of public health, social protection and educational services operating at national, regional and local levels. The scale and distribution of these services reflect the demographic characteristics and administrative organisation of the Ionian Islands and Epirus.

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6 Photographic documentation

AA	Photo credits	Theme
1	Efstratios Bourdakis	M/V ECO ONE deployed 26/3-1/4/2026 & 6-23/4/2026
2	Efstratios Bourdakis	Onboard coordination
3	Ioanna Koutsomichou	Challenging working conditions
4	Efstratios Bourdakis	Working 24/7 in shifts weather depending
5	Efstratios Bourdakis	Control bridge
6	Efstratios Bourdakis	Control bridge
7	Efstratios Bourdakis	Nautical chart of the Adriatic Sea
8	Efstratios Bourdakis	Marine radar
9	Kalliopi Gkikopoulou	Waterspout at sea
10	Efstratios Bourdakis	Rotating windshield wiper during rainstorm
11	Kalliopi Gkikopoulou	The islands of Othonoi and Corfu, as seen in the distance on a clear day
12	Kalliopi Gkikopoulou	Othonoi Island visible in the distance
13	Efstratios Bourdakis	Othonoi Island (GR2230008 Diapontia Nisia (Othonoi, Ereikousa, Mathraki kai Vrachonisides, Natura 2000) through telephoto lens, with Mount Mali i Çikës of Albania in the background
14	Efstratios Bourdakis	Bulker carrier AL014 in front of Mt Mali i Çikës (AL014 Karaburun-Orikum-Dukat National Park, Emerald Network candidate site)
15	Efstratios Bourdakis	General cargo ship
16	Efstratios Bourdakis	Container ship
17	Efstratios Bourdakis	General cargo ship
18	Efstratios Bourdakis	Ro-Ro Cargo
19	Efstratios Bourdakis	LPG Tanker
20	Efstratios Bourdakis	Crude oil tanker
21	Efstratios Bourdakis	Warship
22	Pietro Leanza	Aircraft carrier
23	Efstratios Bourdakis	Fishing vessel
24	Efstratios Bourdakis	Fishing vessel
25	Efstratios Bourdakis	Sediment sampling with stainless-steel ETS_85A Van Veen grab
26	Efstratios Bourdakis	Sediment sampling
27	Efstratios Bourdakis	Sediment sampling
28	Efstratios Bourdakis	Sediment sampling
29	Efstratios Bourdakis	Water quality sampling with General Oceanics Model 1018 (MWS12) Rosette multisampler
30	Efstratios Bourdakis	Water quality sampling
31	Efstratios Bourdakis	Water quality sampling
32	Efstratios Bourdakis	Seawater sampling for marine fauna eDNA extraction
33	Efstratios Bourdakis	Seawater sampling
34	Ioanna Koutsomichou	Installing hydrophone for Passive Acoustic Monitoring (PAM)
35	Ioanna Koutsomichou	Installing hydrophone for Passive Acoustic Monitoring (PAM)
36	Efstratios Bourdakis	PAM HQ for realtime acoustic detection and data acquisition
37	Jakob Fric	Marine mammal & sea turtle monitoring with reticle binoculars
38	Ioanna Koutsomichou	Avifauna monitoring
39	Efstratios Bourdakis	Bird migration photo documentation
40	Aleksandra Pierozynska	Sperm Whale (Physeter macrocephalus) sighting from 28.03.2026
41	Aleksandra Pierozynska	Sperm Whale (Physeter macrocephalus) sighting from 28.03.2026
42	Aleksandra Pierozynska	Risso's Dolphin (Grampus griseus) sighting from 27.03.2026
43	Aleksandra Pierozynska	Risso's Dolphin (Grampus griseus) sighting from 27.03.2026
44	Aleksandra Pierozynska	Striped Dolphin (Stenella coeruleoalba) sighting from 18.04.2026
45	Aleksandra Pierozynska	Striped Dolphin (Stenella coeruleoalba) sighting from 18.04.2026
46	Aleksandra Pierozynska	Loggerhead Sea Turtle (Caretta caretta) sighting from 12.04.2026
47	Aleksandra Pierozynska	Scopoli's Shearwater (Calonectris diomedea)
48	Efstratios Bourdakis	Scopoli's Shearwater (Calonectris diomedea)
49	Efstratios Bourdakis	Yelkouan Shearwaters (Puffinus yelkouan) off Gallipoli
50	Efstratios Bourdakis	Audouin's Gull (Ichthyaelus audouinii, formerly Larus audouinii)
51	Efstratios Bourdakis	Audouin's Gulls (Ichthyaelus audouinii, formerly Larus audouinii)
52	Aleksandra Pierozynska	Yellow-legged Gull (Larus michahellis) adult
53	Efstratios Bourdakis	Yellow-legged Gull (Larus michahellis) immature
54	Aleksandra Pierozynska	Mediterranean Gull- Ichthyaelus melanocephalus, formerly Larus melanocephalus) adult
55	Aleksandra Pierozynska	Mediterranean Gull- Ichthyaelus melanocephalus, formerly Larus melanocephalus) 2cy

AA	Photo credits	Theme
56	Efstratios Bourdakis	Lesser Black-backed Gull (<i>Larus fuscus</i>)
57	Efstratios Bourdakis	Lesser Black-backed Gull (<i>Larus fuscus</i>) and Scopoli's Shearwater (<i>Calonectris diomedea</i>)
58	Efstratios Bourdakis	Little gull (<i>Hydrocoloeus minutus</i> , formerly <i>Larus minutus</i>)
59	Aleksandra Pierozynska	Caspian Tern (<i>Hydroprogne caspia</i> , formerly <i>Sterna caspia</i>)
60	Pietro Leanza	Eurasian Moorhen (<i>Gallinula chloropus</i>)
61	Efstratios Bourdakis	Garganey (<i>Spatula querquedula</i> , formerly <i>Anas querquedula</i>)
62	Efstratios Bourdakis	Great Cormorant (<i>Phalacrocorax carbo</i>)
63	Aleksandra Pierozynska	Black-crowned Night Heron (<i>Nycticorax nycticorax</i>)
64	Efstratios Bourdakis	Western Cattle-Egret (<i>Ardea ibis</i> , formerly <i>Bubulcus ibis</i>)
65	Pietro Leanza	Great Egret (<i>Ardea alba</i> , formerly <i>Casmerodius albus</i> or <i>Egretta alba</i>)
66	Aleksandra Pierozynska	Gray Heron (<i>Ardea cinerea</i>)
67	Aleksandra Pierozynska	Squacco Heron (<i>Ardeola ralloides</i>)
68	Efstratios Bourdakis	Western Marsh Harrier (<i>Circus aeruginosus</i>)
69	Aleksandra Pierozynska	Eurasian Kestrel (<i>Falco tinnunculus</i>)
70	Aleksandra Pierozynska	Lesser Kestrel (<i>Falco naumanni</i>)
71	Aleksandra Pierozynska	Feral pigeon (<i>Columba livia domestica</i>)
72	Aleksandra Pierozynska	European Turtle-Dove (<i>Streptopelia turtur</i>)
73	Aleksandra Pierozynska	Common Hoopoe (<i>Upupa epops</i>)
74	Aleksandra Pierozynska	European bee-eater (<i>Merops apiaster</i>)
75	Aleksandra Pierozynska	Blue-cheeked Bee-eater (<i>Merops persicus</i>)
76	Aleksandra Pierozynska	Barn Swallow (<i>Hirundo rustica</i>)
77	Aleksandra Pierozynska	European Red-rumped Swallow (<i>Cecropis rufula</i> , formerly <i>Hirundo daurica</i>)
78	Aleksandra Pierozynska	Tree Pipit (<i>Anthus trivialis</i>)
79		Red-throated Pipit (<i>Anthus cervinus</i>)
80	Aleksandra Pierozynska	Western Yellow Wagtail (<i>Motacilla flava</i>)
81	Aleksandra Pierozynska	Western Yellow Wagtail (<i>Motacilla flava</i>)
82	Ioanna Koutsomichou	European robin (<i>Erithacus rubecula</i>)
83	Pietro Leanza	Common Redstart (<i>Phoenicurus phoenicurus</i>)
84	Pietro Leanza	Black Redstart (<i>Phoenicurus ochruros</i>)
85	Aleksandra Pierozynska	Whinchat (<i>Saxicola rubetra</i>)
86	Jakob Fric	Blue Rock-Thrush (<i>Monticola solitarius</i>)
87	Efstratios Bourdakis	Eastern Subalpine Warbler (<i>Curruca cantillans</i> , formerly <i>Sylvia cantillans</i>)
88	Aleksandra Pierozynska	Common Chiffchaff (<i>Phylloscopus collybita</i>)
89	Aleksandra Pierozynska	Willow Warbler (<i>Phylloscopus trochilus</i>)
90	Efstratios Bourdakis	Hawfinch (<i>Coccothraustes coccothraustes</i>) found dead onboard
91	Efstratios Bourdakis	Painted Lady (<i>Vanessa cardui</i>)
92	Kalliopi Gkikopoulou	Plastic piece
93	Efstratios Bourdakis	Plastic bottle



Photo 1: M/V ECO ONE



Photo 2: Onboard coordination

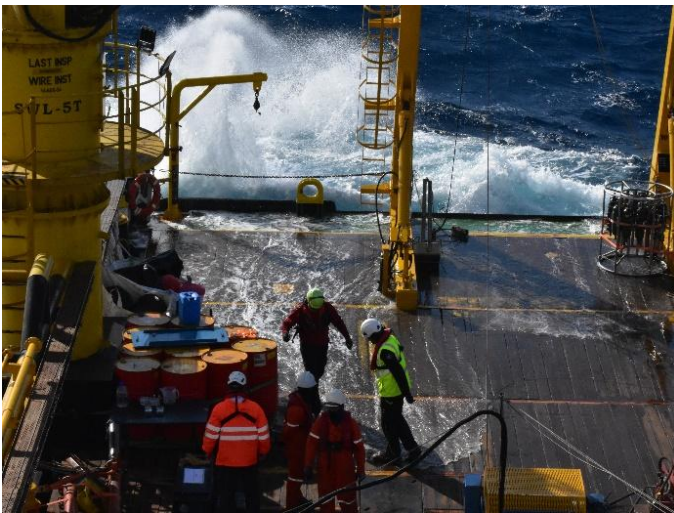


Photo 3: Challenging working conditions

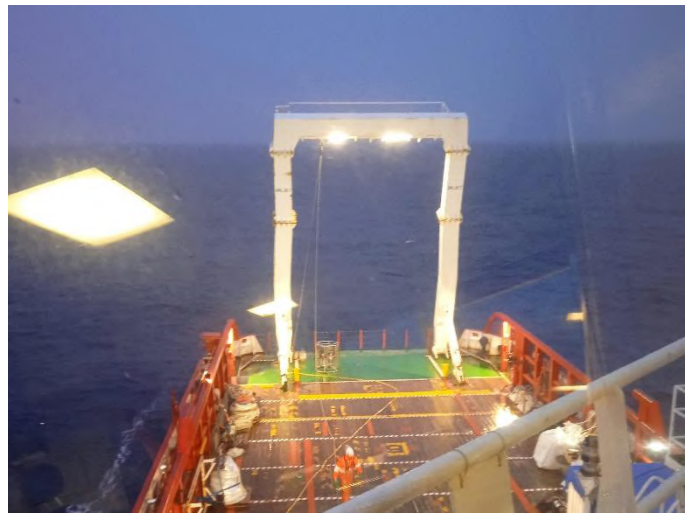


Photo 4: Working 24/7 in shifts weather depending



Photo 5: Control bridge



Photo 6: Control bridge



Photo 7: Nautical chart of the Adriatic Sea



Photo 8: Marine radar



Photo 9: Waterspout at sea



Photo 10: Rotating windshield wiper during rainstorm



Photo 11: The islands of Othonoi and Corfu, as seen in the distance on a clear day



Photo 12: Othonoi Island visible in the distance

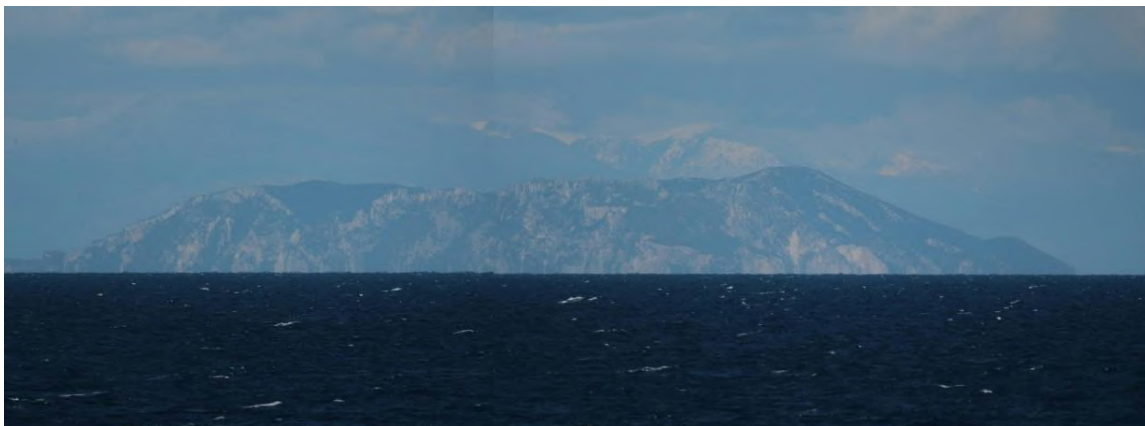


Photo 13: Othonoi Island (GR2230008 Diapontia Nisia (Ohtonoi, Ereikousa, Mathraki kai Vrachonisides, Natura 2000) through telephoto lens, with Mount Mali i Çikës of Albania in the background

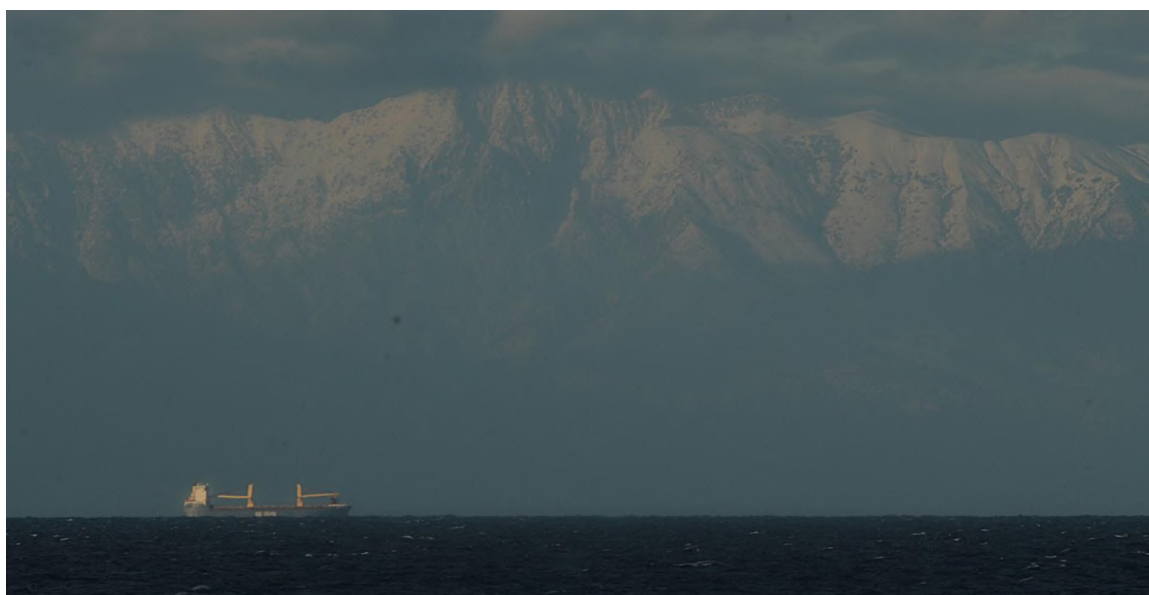


Photo 14: Bulker carrier AL014 in front of Mt Mali i Çikës (AL014 Karaburun-Orikum-Dukat National Park, Emerald Network candidate site)



Photo 15: General cargo ship



Photo 16: Container ship



Photo 17: General cargo ship



Photo 18: Ro-Ro Cargo

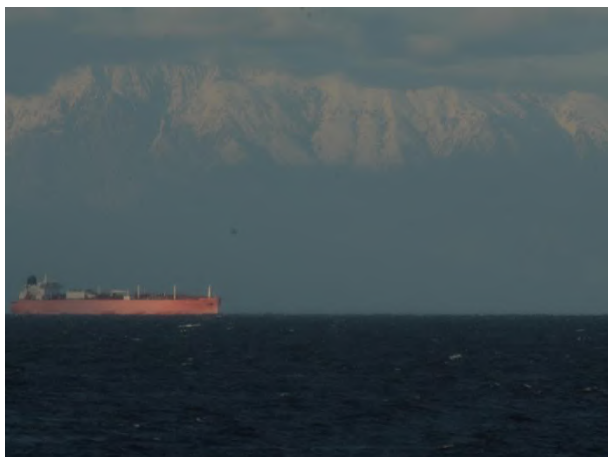


Photo 19: LPG Tanker



Photo 20: Crude oil tanker



Photo 21: Warship



Photo 22: Aircraft carrier



Photo 23: Fishing vessel



Photo 24: Fishing vessel



Photo 25: Sediment sampling with stainless-steel ETS_85A Van Veen grab



Photo 26: Sediment sampling



Photo 27: Sediment sampling



Photo 28: Sediment sampling

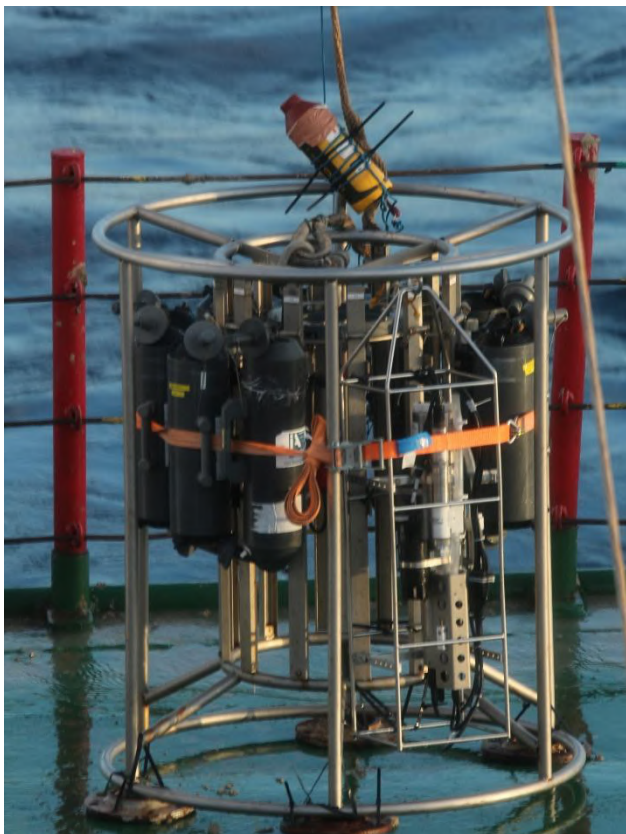


Photo 29: Water quality sampling with General Oceanics Model 1018 (MWS12) Rosette multisampler

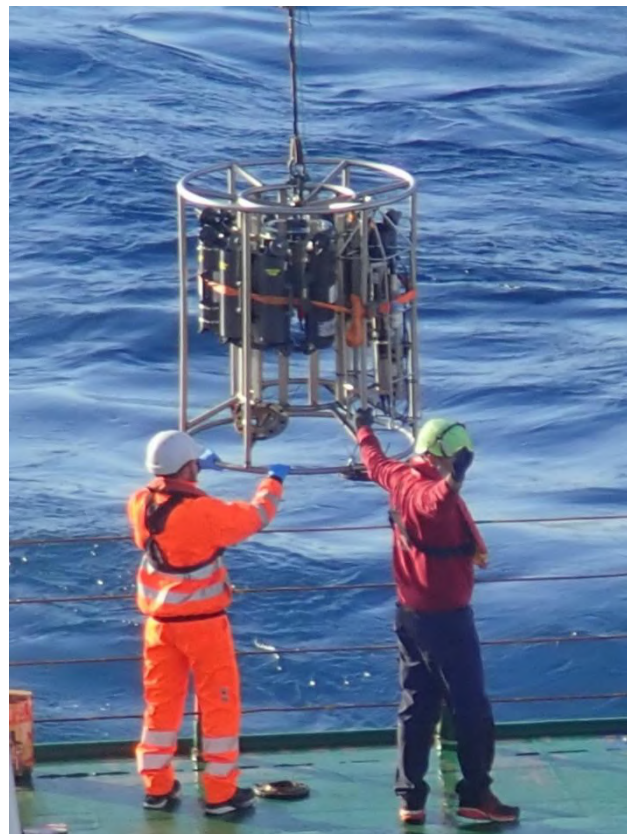


Photo 30: Water quality sampling



Photo 31: Water quality sampling



Photo 32: Seawater sampling for marine fauna eDNA extraction



Photo 33: Seawater sampling



Photo 34: Installing hydrophone for Passive Acoustic Monitoring (PAM)

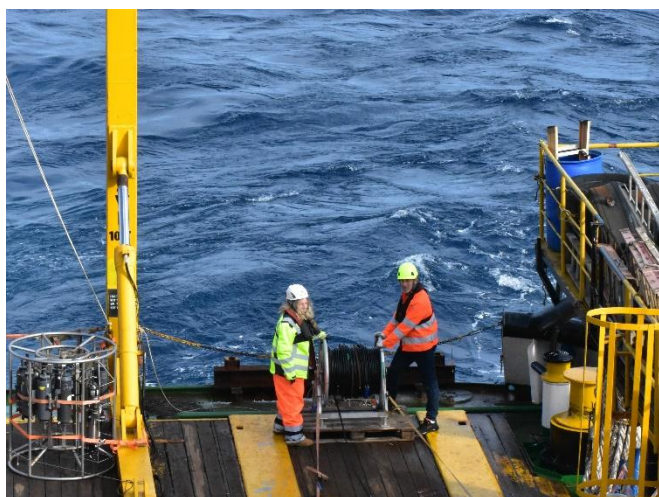


Photo 35: Installing hydrophone for PAM



Photo 36: PAM HQ for realtime acoustic detection and data acquisition



Photo 37: Marine mammal & sea turtle monitoring with reticle binoculars



Photo 38: Avifauna monitoring



Photo 39: Bird migration photo documentation



Photo 40: Sperm Whale (*Physeter macrocephalus*) sighting from 28.03.2026



Photo 41: Sperm Whale (*Physeter macrocephalus*) sighting from 28.03.2026



Photo 42: Risso's Dolphin (*Grampus griseus*) sighting from 27.03.2026



Photo 43: Risso's Dolphin (*Grampus griseus*) sighting from 27.03.2026



Photo 44: Striped Dolphin (*Stenella coeruleoalba*) sighting from 18.04.2026



Photo 45: Striped Dolphin (*Stenella coeruleoalba*) sighting from 18.04.2026

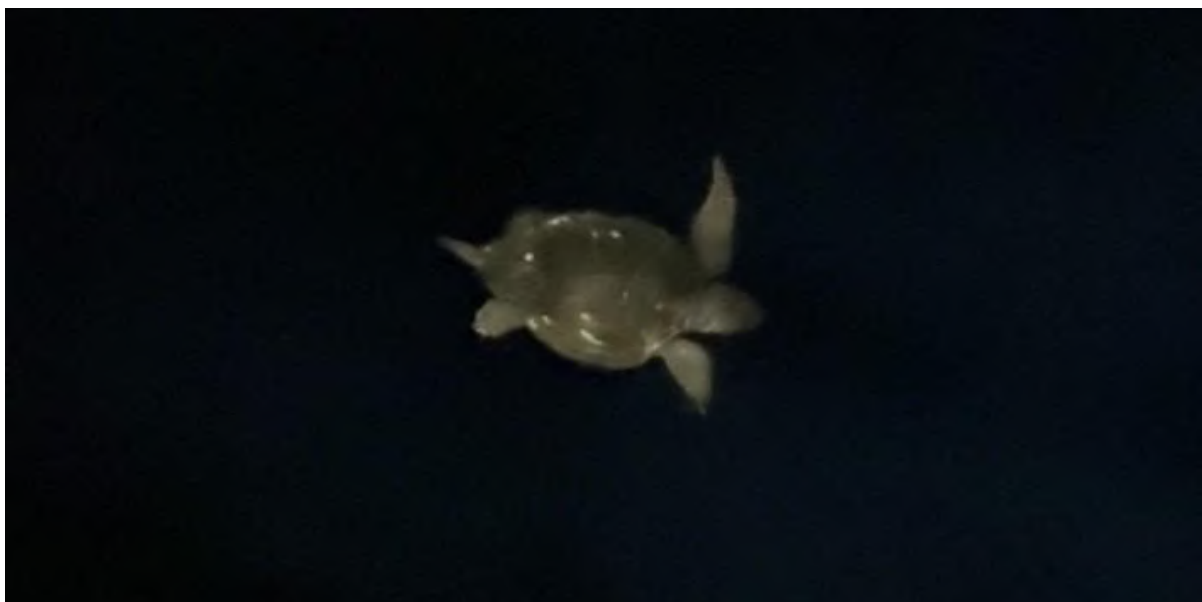


Photo 46: Loggerhead Sea Turtle (*Caretta caretta*) sighting from 12.04.2026



Photo 47: Scopoli's Shearwater (*Calonectris diomedea*)



Photo 48: Scopoli's Shearwater (*Calonectris diomedea*)



Photo 49: Yelkouan Shearwaters (*Puffinus yelkouan*) off Gallipoli



Photo 50: Audouin's Gull (*Ichthyaelus audouinii*, formerly *Larus audouinii*)



Photo 51: Audouin's Gulls (*Ichthyaelus audouinii*, formerly *Larus audouinii*)

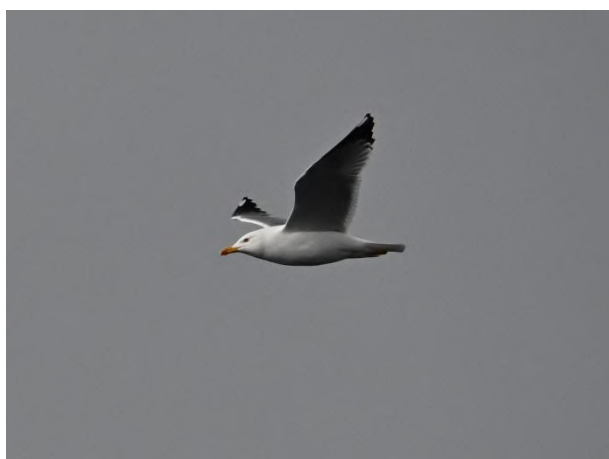


Photo 52: Yellow-legged Gull (*Larus michahellis*) adult



Photo 53: Yellow-legged Gull (*Larus michahellis*) immature



Photo 54: Mediterranean Gull *Ichthyaelus melanocephalus*, formerly *Larus melanocephalus*) adult

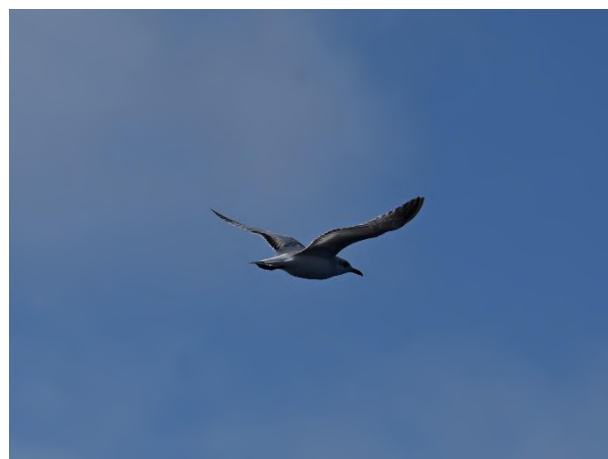


Photo 55: Mediterranean Gull - *Ichthyaelus melanocephalus*, formerly *Larus melanocephalus*) 2cy



Photo 56: Lesser Black-backed Gull (*Larus fuscus*)



Photo 57: Lesser Black-backed Gull (*Larus fuscus*) and Scopoli's Shearwater (*Calonectris diomedea*)



Photo 58: Little gull (*Hydrocoloeus minutus*, formerly *Larus minutus*)



Photo 59: Caspian Tern (*Hydroprogne caspia*, formerly *Sterna caspia*)



Photo 60: Eurasian Moorhen (*Gallinula chloropus*)



Photo 61: Garganey (*Spatula querquedula*, formerly *Anas querquedula*)



Photo 62: Great Cormorant (*Phalacrocorax carbo*)

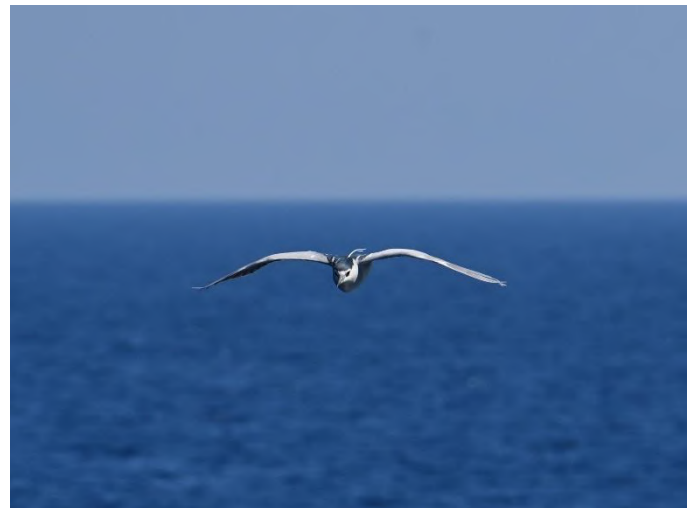


Photo 63: Black-crowned Night Heron (*Nycticorax nycticorax*)



Photo 64: Western Cattle-Egret (*Ardea ibis*, formerly *Bubulcus ibis*)



Photo 65: Great Egret (*Ardea alba*, formerly *Casmerodius albus* or *Egretta alba*)

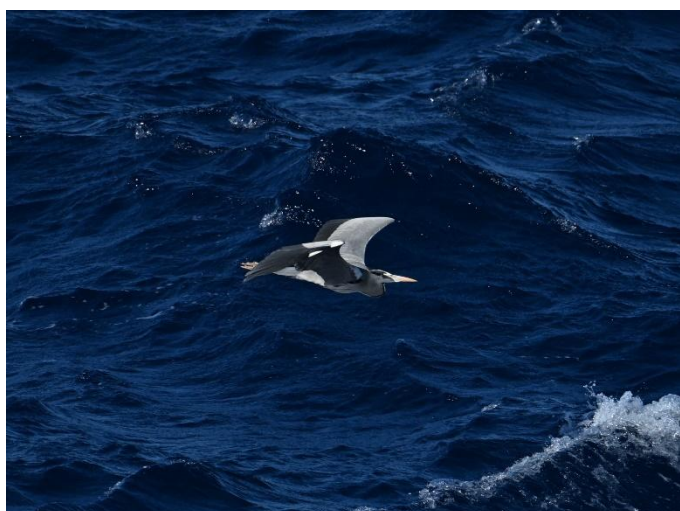


Photo 66: Gray Heron (*Ardea cinerea*)



Photo 67: Squacco Heron (*Ardeola ralloides*)

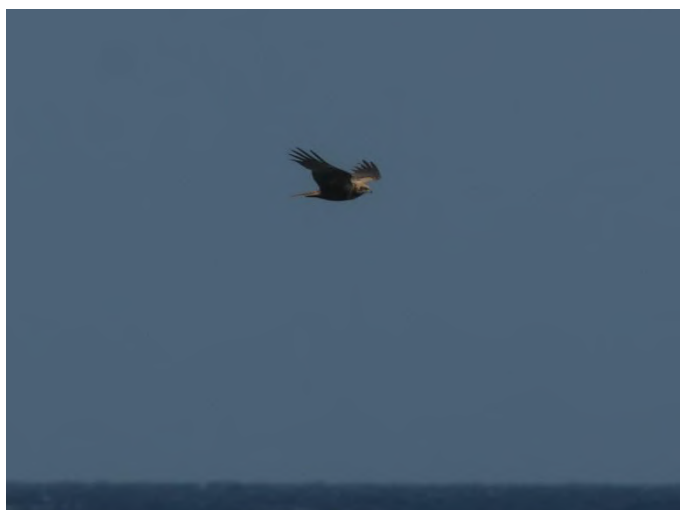


Photo 68: Western Marsh Harrier (*Circus aeruginosus*)

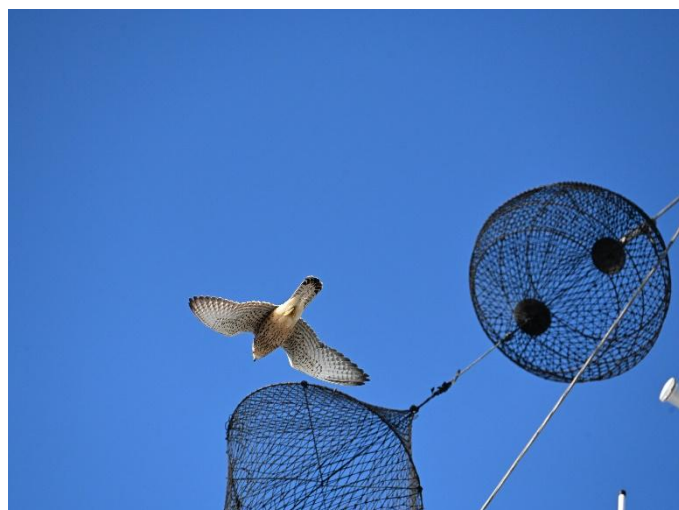


Photo 69: Eurasian Kestrel (*Falco tinnunculus*)



Photo 70: Lesser Kestrel (*Falco naumanni*)



Photo 71: Feral pigeon (*Columba livia domestica*)



Photo 72: European Turtle-Dove (*Streptopelia turtur*)

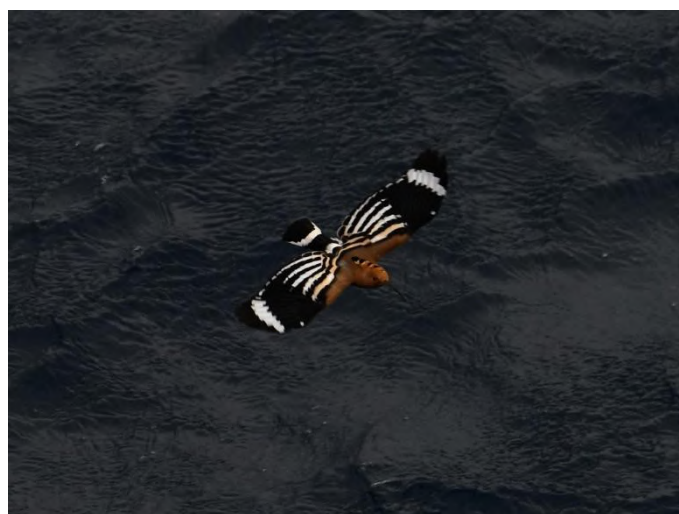


Photo 73: Common Hoopoe (*Upupa epops*)



Photo 74: European bee-eater (*Merops apiaster*)



Photo 75: Blue-cheeked Bee-eater (*Merops persicus*)



Photo 76: Barn Swallow (*Hirundo rustica*)



Photo 77: European Red-rumped Swallow (*Cecropis rufula*, formerly *Hirundo daurica*)



Photo 78: Tree Pipit (*Anthus trivialis*)



Photo 79: Red-throated Pipit (*Anthus cervinus*)

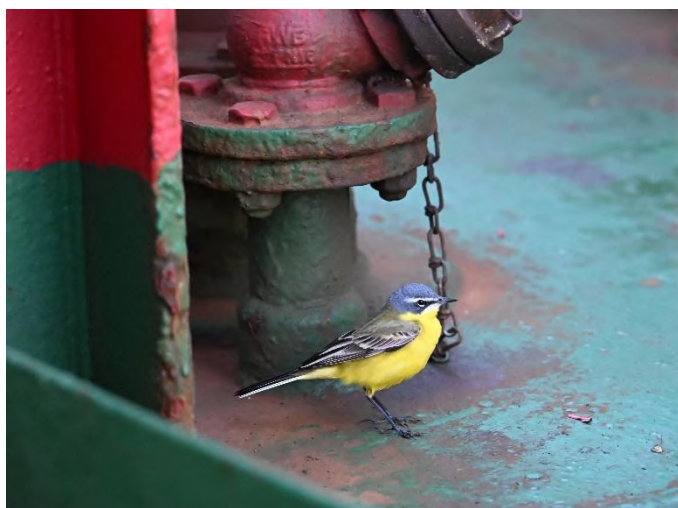


Photo 80: Western Yellow Wagtail (*Motacilla flava*)

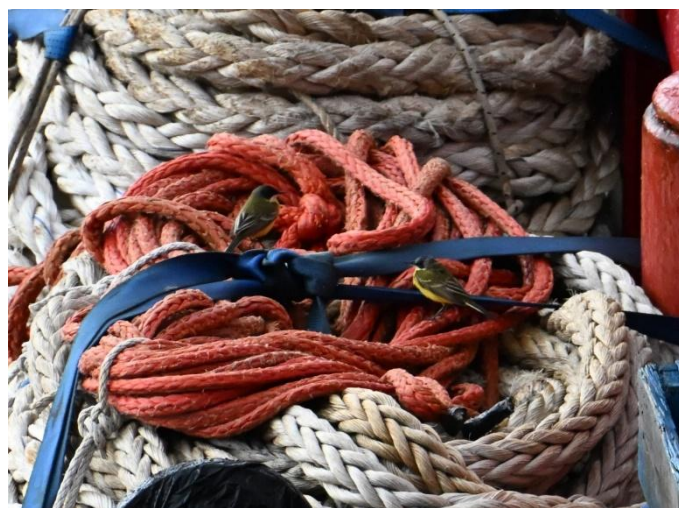


Photo 81: Western Yellow Wagtail (*Motacilla flava*)



Photo 82: European robin (*Erithacus rubecula*)



Photo 83: Common Redstart (*Phoenicurus phoenicurus*)



Photo 84: Black Redstart (*Phoenicurus ochruros*)

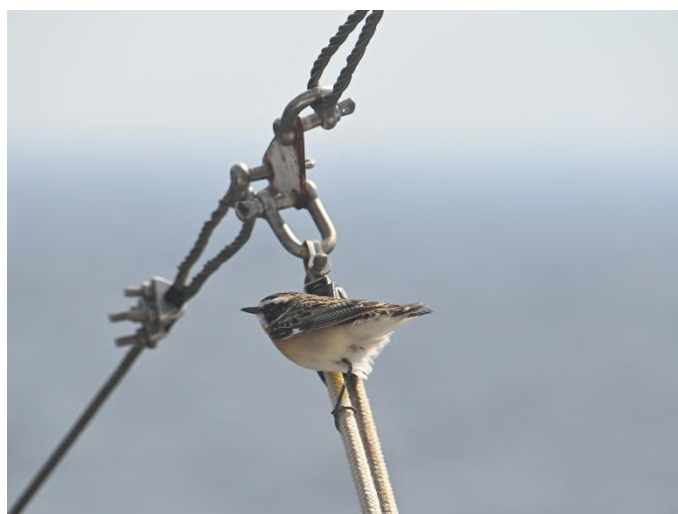


Photo 85: Whinchat (*Saxicola rubetra*)



Photo 86: Blue Rock-Thrush (*Monticola solitarius*)



Photo 87: Eastern Subalpine Warbler (*Curruca cantillans*, formerly *Sylvia cantillans*)



Photo 88: Common Chiffchaff (*Phylloscopus collybita*)



Photo 89: Willow Warbler (*Phylloscopus trochilus*)



Photo 90: Hawfinch (*Coccothraustes coccothraustes*) found dead onboard

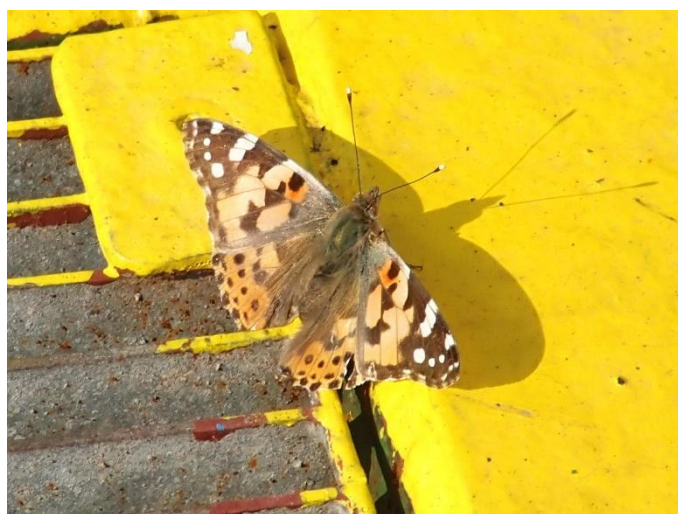


Photo 91: Painted Lady (*Vanessa cardui*)



Photo 92: Plastic piece



Photo 93: Plastic bottle

7 Annexes

7.1 Annex 01 List of marine fish fauna species

Table 7-1: Marine fish species within the project’s vicinity and their IUCN Red List conservation status (based on IUCN spatial range data accessed May 2026).

#	SCIENTIFIC NAME	COMPILE R	YEAR COMPILE D	LEGEND	CLASS	ORDER	FAMILY	GENUS	REDLIST CATEGORY GLOBAL	ASSESSME NT DATE GLOBAL	REDLIST CATEGORY MEDITERRANEA N	ASSESSMENT DATE MEDITERRANEA N	REDLIST CATEGORY EUROPE	ASSESSME NT DATE EUROPE	REDLIST CATEGORY GLOBAL, EUROPE, MEDITERRANNE AN	ASSESSMENT DATE GLOBAL, EUROPE, MEDITERRANNE AN	REDLIST CATEGORY GLOBAL & EUROPE	ASSESSME NT DATE GLOBAL & EUROPE
1	Hexanchus griseus	IUCN SSC Shark Specialist Group	2020	Extant (resident)	CHONDRICHTHY ES	HEXANCHIFORMES	HEXANCHIDAE	Hexanchus	Near Threatene d	2019	Least Concern	2016	Least Concern	2015	-	-	-	-
2	Galeorhinus galeus	IUCN SSC Shark Specialist Group	2019	Extant (resident)	CHONDRICHTHY ES	CARCHARHINIFORME S	TRIAKIDAE	Galeorhinus	Critically Endangere d	2020	Vulnerable	2016	Vulnerable	2014	-	-	-	-
3	Heptranchias perlo	IUCN SSC Shark Specialist Group	2020	Extant (resident)	CHONDRICHTHY ES	HEXANCHIFORMES	HEXANCHIDAE	Heptranchias	Near Threatene d	2019	Data Deficient	2016	Data Deficient	2014	-	-	-	-
4	Coryphaena hippurus	IUCN	2010	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	CORYPHAENIDAE	Coryphaena	Least Concern	2010	Least Concern	2007	Least Concern	2014	-	-	-	-
5	Diaphus rafinesquii	IUCN	2010	Extant (resident)	ACTINOPTERYGII	MYCTOPHIFORMES	MYCTOPHIDAE	Diaphus	Least Concern	2009	Least Concern	2007	Least Concern	2013	-	-	-	-
6	Synodus saurus	IUCN	2010	Extant (resident)	ACTINOPTERYGII	AULOPIFORMES	SYNODONTIDAE	Synodus	Least Concern	2009	Least Concern	2007	Least Concern	2014	-	-	-	-
7	Lithognathus mormyrus	GMSA	2014	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	SPARIDAE	Lithognathus	Least Concern	2009	Least Concern	2007	Least Concern	2013	-	-	-	-
8	Dentex maroccanus	GMSA	2014	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	SPARIDAE	Dentex	Least Concern	2009	Data Deficient	2007	Least Concern	2013	-	-	-	-
9	Dentex gibbosus	GMSA	2014	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	SPARIDAE	Dentex	Least Concern	2009	Data Deficient	2007	Least Concern	2013	-	-	-	-
10	Boops boops	GMSA	2014	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	SPARIDAE	Boops	Least Concern	2009	Least Concern	2007	Least Concern	2013	-	-	-	-
11	Tetrapturus belone	GMSA	2023	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	ISTIOPHORIDAE	Tetrapturus	Least Concern	2021	Least Concern	2010	-	-	-	-	-	-
12	Xyrichtys novacula	IUCN	2009	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	LABRIDAE	Xyrichtys	Least Concern	2008	Least Concern	2007	Least Concern	2013	-	-	-	-
13	Symphodus cinereus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	LABRIDAE	Symphodus	-	-	Least Concern	2007	-	-	-	-	Least Concern	-
14	Seriola fasciata	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	CARANGIDAE	Seriola	Least Concern	2012	-	-	Least Concern	2014	-	-	-	-
15	Pomatomus saltatrix	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	POMATOMIDAE	Pomatomus	Vulnerable	2014	Least Concern	2007	Near Threatene d	2014	-	-	-	-
16	Gobius kolombatovici	IUCN Marine Biodiversit y Unit	2024	Extant (resident)	ACTINOPTERYGII	GOBIIFORMES	GOBIIDAE	Gobius	-	-	-	-	-	-	Least Concern	2024	-	-
17	Gnathophis mystax	IUCN Marine Biodiversit y Unit/GMS A	2018	Extant (resident)	ACTINOPTERYGII	ANGUILLIFORMES	CONGRIDAE	Gnathophis	Least Concern	2011	Least Concern	2007	Least Concern	2013	-	-	-	-
18	Ophisurus serpens	GMSA	2015	Extant (resident)	ACTINOPTERYGII	ANGUILLIFORMES	OPHICHTHIDAE	Ophisurus	Least Concern	2011	Least Concern	2007	Least Concern	2014	-	-	-	-
19	Helicolenus dactylopterus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	SCORPAENIFORMES	SEBASTIDAE	Helicolenus	Least Concern	2013	Least Concern	2007	Least Concern	2013	-	-	-	-
20	Pomatoschistus norvegicus	IUCN Marine Biodiversit y Unit	2024	Extant (resident)	ACTINOPTERYGII	GOBIIFORMES	GOBIIDAE	Pomatoschistus	-	-	Data Deficient	2007	-	-	-	-	Least Concern	-
21	Scorpaena elongata	GMSA	2015	Extant (resident)	ACTINOPTERYGII	SCORPAENIFORMES	SCORPAENIDAE	Scorpaena	Least Concern	2013	Least Concern	2007	Least Concern	2013	-	-	-	-
22	Belone belone	GMSA	2015	Extant (resident)	ACTINOPTERYGII	BELONIFORMES	BELONIDAE	Belone	Least Concern	2012	Least Concern	2007	Least Concern	2015	-	-	-	-

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23	Sprattus sprattus	IUCN Marine Biodiversit y Unit/GMSA	2018	Extant (resident)	ACTINOPTERYGII	CLUPEIFORMES	CLUPEIDAE	Sprattus	Least Concern	2018	Data Deficient	2007	Least Concern	2013	-	-	-	-
24	Nezumia sclerorhynchus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	GADIFORMES	MACROURIDAE	Nezumia	Least Concern	2013	Least Concern	2007	Least Concern	2014	-	-	-	-
25	Trachipterus trachipterus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	LAMPRIFORMES	TRACHIPTERIDAE	Trachipterus	Least Concern	2013	Data Deficient	2007	Least Concern	2014	-	-	-	-
26	Hygophum hygomii	GMSA	2015	Extant (resident)	ACTINOPTERYGII	MYCTOPHIFORMES	MYCTOPHIDAE	Hygophum	Least Concern	2012	Least Concern	2007	Least Concern	2013	-	-	-	-
27	Callionymus risso	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	CALLIONYMIDAE	Callionymus	-	-	Least Concern	2007	-	-	-	-	Least Concern	-
28	Trachurus trachurus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	CARANGIDAE	Trachurus	Vulnerable	2013	Least Concern	2007	Least Concern	2014	-	-	-	-
29	Deltentosteus quadrimaculatus	IUCN Marine Biodiversit y Unit	2024	Extant (resident)	ACTINOPTERYGII	GOBIIFORMES	GOBIIDAE	Deltentosteus	Least Concern	2024	Least Concern	2007	Least Concern	2014	-	-	-	-
30	Lesueurigobius suerii	IUCN Marine Biodiversit y Unit	2024	Extant (resident)	ACTINOPTERYGII	GOBIIFORMES	GOBIIDAE	Lesueurigobius	Least Concern	2024	Least Concern	2007	Least Concern	2014	-	-	-	-
31	Argyrosomus regius	IUCN Marine Biodiversit y Unit/GMSA	2020	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	SCIAENIDAE	Argyrosomus	Least Concern	2020	Least Concern	2007	Least Concern	2014	-	-	-	-
32	Serranus scriba	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	SERRANIDAE	Serranus	Least Concern	2013	Least Concern	2007	Least Concern	2014	-	-	-	-
33	Uranoscopus scaber	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	URANOSCOPIDAE	Uranoscopus	Least Concern	2014	Least Concern	2007	Least Concern	2014	-	-	-	-
34	Lepidorhombus whiffiagonis	IUCN Marine Biodiversit y Unit/GMSA	2020	Extant (resident)	ACTINOPTERYGII	PLEURONECTIFORMES	SCOPHTHALMIDAE	Lepidorhombus	Least Concern	2020	Least Concern	2008	Least Concern	2014	-	-	-	-
35	Synapturichthys kleinii	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PLEURONECTIFORMES	SOLEIDAE	Synapturichthys	Data Deficient	2013	Data Deficient	2008	Least Concern	2013	-	-	-	-
36	Vinciguerria poweriae	GMSA	2015	Extant (resident)	ACTINOPTERYGII	STOMIIFORMES	PHOSICHTHYIDAE	Vinciguerria	Least Concern	2014	Least Concern	2007	Least Concern	2013	-	-	-	-
37	Trigloporus lastoviza	GMSA	2015	Extant (resident)	ACTINOPTERYGII	SCORPAENIFORMES	TRIGLIDAE	Trigloporus	Least Concern	2013	-	-	Data Deficient	2014	-	-	-	-
38	Hippocampus guttulatus	Project Seahorse	2013	Extant (resident)	ACTINOPTERYGII	SYNGNATHIFORMES	SYNGNATHIDAE	Hippocampus	Data Deficient	2016	Near Threatened	2016	Data Deficient	2014	-	-	-	-
39	Sarda sarda	Jonnell Sanciangco	2023	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	SCOMBRIDAE	Sarda	Least Concern	2021	Least Concern	2007	Least Concern	2015	-	-	-	-
40	Pomadasys incisus	IUCN	2010	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	HAEMULIDAE	Pomadasys	Least Concern	2009	Least Concern	2007	Least Concern	2013	-	-	-	-
41	Raja radula	IUCN Marine Biodiversit y Unit/GMSA	2016	Extant (resident)	CHONDRICHTHYES	RAJIFORMES	RAJIDAE	Raja	-	-	-	-	-	-	Endangered	2016	-	-
42	Diplodus annularis	GMSA	2014	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	SPARIDAE	Diplodus	Least Concern	2009	Least Concern	2007	Least Concern	2013	-	-	-	-
43	Spicara maena	GMSA	2014	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	CENTRACANTHIDAE	Spicara	Least Concern	2009	Least Concern	2007	Least Concern	2013	-	-	-	-
44	Blennius ocellaris	GMSA	2014	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	BLENNIIDAE	Blennius	Least Concern	2007	Least Concern	2007	Least Concern	2014	-	-	-	-

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45	Parablennius incognitus	GMSA	2014	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	BLENNIIDAE	Parablennius	Least Concern	2007	Least Concern	2007	Least Concern	2014	-	-	-	-
46	Acantholabrus palloni	IUCN	2009	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	LABRIDAE	Acantholabrus	Least Concern	2008	Least Concern	2007	Least Concern	2013	-	-	-	-
47	Ctenolabrus rupestris	IUCN	2009	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	LABRIDAE	Ctenolabrus	Least Concern	2008	Least Concern	2007	Least Concern	2013	-	-	-	-
48	Symphodus tinca	IUCN	2009	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	LABRIDAE	Symphodus	Least Concern	2008	Least Concern	2007	Least Concern	2013	-	-	-	-
49	Zu cristatus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	LAMPRIFORMES	TRACHTERIDAE	Zu	Least Concern	2013	Data Deficient	2007	Least Concern	2014	-	-	-	-
50	Myctophum punctatum	GMSA	2015	Extant (resident)	ACTINOPTERYGII	MYCTOPHIFORMES	MYCTOPHIDAE	Myctophum	Least Concern	2012	Least Concern	2007	Least Concern	2013	-	-	-	-
51	Lagocephalus lagocephalus	GMSA	2014	Extant (resident)	ACTINOPTERYGII	TETRAODONTIFORMES	TETRAODONTIDAE	Lagocephalus	Least Concern	2011	Least Concern	2007	Least Concern	2013	-	-	-	-
52	Gonostoma denudatum	GMSA	2015	Extant (resident)	ACTINOPTERYGII	STOMIIFORMES	GONOSTOMATIDAE	Gonostoma	Least Concern	2013	Data Deficient	2007	Least Concern	2013	-	-	-	-
53	Sparisoma cretense	Jonnell Sanciangco	2010	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	LABRIDAE	Sparisoma	Least Concern	2009	Least Concern	2007	Least Concern	2013	-	-	-	-
54	Lepidion lepidion	GMSA	2015	Extant (resident)	ACTINOPTERYGII	GADIFORMES	MORIDAE	Lepidion	-	-	-	-	-	-	Least Concern	2014	-	-
55	Chromogobius zebratus	IUCN Marine Biodiversity Unit	2024	Extant (resident)	ACTINOPTERYGII	GOBIIFORMES	GOBIIDAE	Chromogobius	-	-	Least Concern	2014	-	-	-	-	Least Concern	-
56	Speleogobius trigloides	IUCN Marine Biodiversity Unit	2024	Extant (resident)	ACTINOPTERYGII	GOBIIFORMES	GOBIIDAE	Speleogobius	-	-	-	-	-	-	Least Concern	2024	-	-
57	Dysomma brevirostre	GMSA	2015	Extant (resident)	ACTINOPTERYGII	ANGUILLIFORMES	SYNAPHOBRANCHIDAE	Dysomma	Least Concern	2011	Data Deficient	2007	Least Concern	2013	-	-	-	-
58	Halobatrachus didactylus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	BATRACHOIDIFORMES	BATRACHOIDIDAE	Halobatrachus	Least Concern	2012	Data Deficient	2007	Least Concern	2014	-	-	-	-
59	Trachyrincus scabrus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	GADIFORMES	MACROURIDAE	Trachyrincus	Least Concern	2012	Least Concern	2007	Least Concern	2014	-	-	-	-
60	Lophius budegassa	GMSA	2015	Extant (resident)	ACTINOPTERYGII	LOPHIIFORMES	LOPHIIDAE	Lophius	Data Deficient	2014	Least Concern	2007	Least Concern	2013	-	-	-	-
61	Lampanyctus crocodilus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	MYCTOPHIFORMES	MYCTOPHIDAE	Lampanyctus	Least Concern	2012	Least Concern	2007	Least Concern	2013	-	-	-	-
62	Glossanodon leioglossus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	OSMERIFORMES	ARGENTINIDAE	Glossanodon	Least Concern	2012	Least Concern	2007	Least Concern	2014	-	-	-	-
63	Synchiropus phaeton	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	CALLIONYMIDAE	Synchiropus	Least Concern	2013	Least Concern	2007	Least Concern	2014	-	-	-	-
64	Gobius auratus	IUCN Marine Biodiversity Unit	2024	Extant (resident)	ACTINOPTERYGII	GOBIIFORMES	GOBIIDAE	Gobius	-	-	-	-	-	-	Least Concern	2024	-	-
65	Pomatoschistus marmoratus	IUCN Freshwater Biodiversity Unit	2020	Extant (resident)	ACTINOPTERYGII	GOBIIFORMES	GOBIIDAE	Pomatoschistus	Least Concern	2020	Least Concern	2007	Least Concern	2014	-	-	-	-
66	Scophthalmus maximus	IUCN Marine Biodiversity Unit/GMSA	2020	Extant (resident)	ACTINOPTERYGII	PLEURONECTIFORMES	SCOPHTHALMIDAE	Scophthalmus	Least Concern	2020	Near Threatened	2008	Vulnerable	2013	-	-	-	-
67	Chelidonichthys cuculus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	SCORPAENIFORMES	TRIGLIDAE	Chelidonichthys	Least Concern	2013	Least Concern	2007	Least Concern	2013	-	-	-	-
68	Atherinomorus lacunosus	IUCN Marine Biodiversity Unit/GMSA	2021	Extant & Introduced (resident)	ACTINOPTERYGII	ATHERINIFORMES	ATHERINIDAE	Atherinomorus	Least Concern	2020	-	-	-	-	-	-	-	-

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69	Gobius gasteveni	IUCN Marine Biodiversit y Unit	2024	Extant (resident)	ACTINOPTERYGII	GOBIIFORMES	GOBIIDAE	Gobius	-	-	-	-	-	-	-	-	Least Concern	-
70	Maurolicus amethystinopunctatus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	STOMIIFORMES	STERNOPTYCHIDAE	Maurolicus	Least Concern	2014	-	-	Least Concern	2015	-	-	-	-
71	Squalus blainville	IUCN SSC Shark Specialist Group	2020	Extant (resident)	CHONDRICHTHYES	SQUALIFORMES	SQUALIDAE	Squalus	Data Deficient	2020	Data Deficient	2016	Data Deficient	2014	-	-	-	-
72	Gobius bucchichi	IUCN Marine Biodiversit y Unit	2024	Extant (resident)	ACTINOPTERYGII	GOBIIFORMES	GOBIIDAE	Gobius	-	-	-	-	-	-	-	-	Least Concern	-
73	Hippocampus hippocampus	Project Seahorse	2013	Extant (resident)	ACTINOPTERYGII	SYNGNATHIFORMES	SYNGNATHIDAE	Hippocampus	Data Deficient	2017	Near Threatened	2016	Data Deficient	2014	-	-	-	-
74	Carcharhinus longimanus	IUCN SSC Shark Specialist Group	2018	Extant (resident)	CHONDRICHTHYES	CARCHARHINIFORMES	CARCHARHINIDAE	Carcharhinus	Critically Endangered	2018	-	-	Endangered	2014	-	-	-	-
75	Sphyrna mokarran	IUCN SSC Shark Specialist Group	2018	Extant (resident)	CHONDRICHTHYES	CARCHARHINIFORMES	SPHYRNIDAE	Sphyrna	Critically Endangered	2018	-	-	Data Deficient	2015	-	-	-	-
76	Raja clavata	Ryan Charles	2024	Extant (resident)	CHONDRICHTHYES	RAJIFORMES	RAJIDAE	Raja	Near Threatened	2023	Near Threatened	2016	Near Threatened	2014	-	-	-	-
77	Mycteroperca costae	IUCN Marine Biodiversit y Unit/GMSA	2018	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	EPINEPHELIDAE	Mycteroperca	Data Deficient	2016	Data Deficient	2008	Data Deficient	2013	-	-	-	-
78	Mugil cephalus	IUCN	2018	Extant (resident)	ACTINOPTERYGII	MUGILIFORMES	MUGILIDAE	Mugil	Least Concern	2022	Least Concern	2007	Least Concern	2022	-	-	-	-
79	Gobius fallax	IUCN Marine Biodiversit y Unit	2024	Extant (resident)	ACTINOPTERYGII	GOBIIFORMES	GOBIIDAE	Gobius	-	-	-	-	-	-	Least Concern	2024	-	-
80	Pagellus bogaraveo	GMSA	2014	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	SPARIDAE	Pagellus	Near Threatened	2009	Least Concern	2007	Near Threatened	2013	-	-	-	-
81	Diplodus vulgaris	GMSA	2014	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	SPARIDAE	Diplodus	Least Concern	2009	Least Concern	2007	Least Concern	2013	-	-	-	-
82	Euthynnus alletteratus	Jonnell Sanciangco	2023	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	SCOMBRIDAE	Euthynnus	Least Concern	2022	Least Concern	2007	Least Concern	2014	-	-	-	-
83	Scomber scombrus	Jonnell Sanciangco	2023	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	SCOMBRIDAE	Scomber	Least Concern	2022	Least Concern	2007	Least Concern	2015	-	-	-	-
84	Lipophrys trigloides	GMSA	2014	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	BLENNIIDAE	Lipophrys	Least Concern	2007	Least Concern	2007	Least Concern	2014	-	-	-	-
85	Tripterygion delaisi	GMSA	2014	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	TRIPTERYGIIDAE	Tripterygion	Least Concern	2007	Least Concern	2007	Least Concern	2014	-	-	-	-
86	Clinitrachus argentatus	GMSA	2014	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	CLINIDAE	Clinitrachus	Least Concern	2007	Least Concern	2007	Least Concern	2014	-	-	-	-
87	Thalassoma pavo	IUCN	2009	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	LABRIDAE	Thalassoma	Least Concern	2008	Least Concern	2007	Least Concern	2013	-	-	-	-
88	Symphodus roissali	IUCN	2009	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	LABRIDAE	Symphodus	Least Concern	2008	Least Concern	2007	Least Concern	2013	-	-	-	-
89	Coris julis	IUCN	2009	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	LABRIDAE	Coris	Least Concern	2009	Least Concern	2007	Least Concern	2014	-	-	-	-
90	Mola mola	GMSA	2015	Extant (resident)	ACTINOPTERYGII	TETRAODONTIFORMES	MOLIDAE	Mola	Vulnerable	2011	Data Deficient	2007	Data Deficient	2013	-	-	-	-

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91	Nettastoma melanurum	GMSA	2015	Extant (resident)	ACTINOPTERYGII	ANGUILLIFORMES	NETTASTOMATIDAE	Nettastoma	Least Concern	2011	Least Concern	2007	Least Concern	2013	-	-	-	-
92	Corcyrogobius liechtensteini	IUCN Marine Biodiversit y Unit	2024	Extant (resident)	ACTINOPTERYGII	GOBIIFORMES	GOBIIDAE	Corcyrogobius	-	-	-	-	-	-	Least Concern	2024	-	-
93	Gobius vittatus	IUCN Marine Biodiversit y Unit	2024	Extant (resident)	ACTINOPTERYGII	GOBIIFORMES	GOBIIDAE	Gobius	-	-	-	-	-	-	Least Concern	2024	-	-
94	Thorogobius macrolepis	IUCN Marine Biodiversit y Unit	2024	Extant (resident)	ACTINOPTERYGII	GOBIIFORMES	GOBIIDAE	Thorogobius	-	-	-	-	-	-	Least Concern	2024	-	-
95	Cyclothone pygmaea	GMSA	2015	Extant (resident)	ACTINOPTERYGII	STOMIIFORMES	GONOSTOMATIDAE	Cyclothone	-	-	-	-	-	-	Least Concern	2014	-	-
96	Gymnothorax unicolor	GMSA	2015	Extant (resident)	ACTINOPTERYGII	ANGUILLIFORMES	MURAENIDAE	Gymnothorax	Least Concern	2011	Data Deficient	2007	Least Concern	2013	-	-	-	-
97	Pegusa lascaris	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PLEURONECTIFORMES	SOLEIDAE	Pegusa	Least Concern	2013	Data Deficient	2008	Least Concern	2013	-	-	-	-
98	Stomias boa	GMSA	2015	Extant (resident)	ACTINOPTERYGII	STOMIIFORMES	STOMIIDAE	Stomias	Least Concern	2013	Least Concern	2007	Least Concern	2013	-	-	-	-
99	Gadella maraldi	GMSA	2015	Extant (resident)	ACTINOPTERYGII	GADIFORMES	MORIDAE	Gadella	Least Concern	2015	Least Concern	2007	Least Concern	2014	-	-	-	-
100	Lophius piscatorius	GMSA	2015	Extant (resident)	ACTINOPTERYGII	LOPHIIFORMES	LOPHIIDAE	Lophius	Least Concern	2013	Least Concern	2007	Least Concern	2013	-	-	-	-
101	Lampanyctus pusillus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	MYCTOPHIFORMES	MYCTOPHIDAE	Lampanyctus	Least Concern	2012	Least Concern	2007	Least Concern	2013	-	-	-	-
102	Microstoma microstoma	GMSA	2015	Extant (resident)	ACTINOPTERYGII	OSMERIFORMES	MICROSTOMATIDAE	Microstoma	Least Concern	2014	Data Deficient	2007	Least Concern	2014	-	-	-	-
103	Campogramma glaycos	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	CARANGIDAE	Campogramma	Least Concern	2013	Data Deficient	2007	Least Concern	2014	-	-	-	-
104	Cepola macrophthalmia	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	CEPOLIDAE	Cepola	Least Concern	2013	Least Concern	2007	Least Concern	2014	-	-	-	-
105	Gobius cobitis	IUCN Marine Biodiversit y Unit	2024	Extant (resident)	ACTINOPTERYGII	GOBIIFORMES	GOBIIDAE	Gobius	Least Concern	2024	Least Concern	2007	Least Concern	2014	-	-	-	-
106	Sphyraena viridensis	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	SPHYRAENIDAE	Sphyraena	Least Concern	2014	Least Concern	2007	Data Deficient	2014	-	-	-	-
107	Scophthalmus rhombus	IUCN Marine Biodiversit y Unit/GMSA	2020	Extant (resident)	ACTINOPTERYGII	PLEURONECTIFORMES	SCOPHTHALMIDAE	Scophthalmus	Least Concern	2020	Least Concern	2008	Least Concern	2013	-	-	-	-
108	Peristedion cataphractum	GMSA	2015	Extant (resident)	ACTINOPTERYGII	SCORPAENIFORMES	PERISTEDIIDAE	Peristedion	Least Concern	2014	Least Concern	2007	Data Deficient	2014	-	-	-	-
109	Chelidonichthys lastoviza	GMSA	2015	Extant (resident)	ACTINOPTERYGII	SCORPAENIFORMES	TRIGLIDAE	Chelidonichthys	Least Concern	2014	Least Concern	2007	-	-	-	-	-	-
110	Bathophilus nigerrimus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	STOMIIFORMES	STOMIIDAE	Bathophilus	Least Concern	2013	Least Concern	2007	Least Concern	2013	-	-	-	-
111	Caranx fischeri	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	CARANGIDAE	Caranx	Least Concern	2014	-	-	Data Deficient	2014	-	-	-	-
112	Xiphias gladius	IUCN	2021	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	XIPHIIDAE	Xiphias	Near Threatened	2021	Near Threatened	2007	Least Concern	2015	-	-	-	-
113	Alopias vulpinus	IUCN SSC Shark Specialist Group	2018	Extant (resident)	CHONDRICHTHYES	LAMNIFORMES	ALOPIIDAE	Alopias	Vulnerable	2018	Endangered	2016	Endangere d	2014	-	-	-	-
114	Dentex dentex	GMSA	2014	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	SPARIDAE	Dentex	Vulnerable	2009	Vulnerable	2007	Vulnerable	2013	-	-	-	-
115	Sparus aurata	GMSA	2014	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	SPARIDAE	Sparus	Least Concern	2009	Least Concern	2007	Least Concern	2013	-	-	-	-

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116	Diplodus puntazzo	GMSA	2014	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	SPARIDAE	Diplodus	Least Concern	2009	Least Concern	2007	Least Concern	2013	-	-	-	-
117	Microlipophrys canevae	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	BLENNIIDAE	Microlipophrys	-	-	Least Concern	2007	-	-	-	-	Least Concern	-
118	Coryphoblennius galerita	GMSA	2014	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	BLENNIIDAE	Coryphoblennius	Least Concern	2007	Least Concern	2007	Least Concern	2014	-	-	-	-
119	Parablennius sanguinolentus	GMSA	2014	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	BLENNIIDAE	Parablennius	Least Concern	2007	Least Concern	2007	Least Concern	2014	-	-	-	-
120	Labrus viridis	IUCN	2009	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	LABRIDAE	Labrus	Vulnerable	2008	Vulnerable	2008	Vulnerable	2013	-	-	-	-
121	Chromis chromis	GMSA	2015	Extant (resident)	ACTINOPTERYGII	NOT ASSIGNED	POMACENTRIDAE	Chromis	Least Concern	2010	Least Concern	2007	Least Concern	2014	-	-	-	-
122	Ruvettus pretiosus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	GEMPYLIDAE	Ruvettus	Least Concern	2012	Least Concern	2007	Least Concern	2014	-	-	-	-
123	Symbolophorus veranyi	GMSA	2015	Extant (resident)	ACTINOPTERYGII	MYCTOPHIFORMES	MYCTOPHIDAE	Symbolophorus	Least Concern	2012	Least Concern	2007	Least Concern	2013	-	-	-	-
124	Opeatogenys gracilis	GMSA	2015	Extant (resident)	ACTINOPTERYGII	GOBIESOCIFORMES	GOBIESOCIDAE	Opeatogenys	-	-	Least Concern	2014	-	-	-	-	Least Concern	-
125	Microlipophrys nigriceps	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	BLENNIIDAE	Microlipophrys	-	-	-	-	-	-	Least Concern	2014	-	-
126	Millerigobius macrocephalus	IUCN Marine Biodiversity Unit	2024	Extant (resident)	ACTINOPTERYGII	GOBIIFORMES	GOBIIDAE	Millerigobius	-	-	-	-	-	-	-	-	Least Concern	-
127	Zebrus zebrus	IUCN Marine Biodiversity Unit	2024	Extant (resident)	ACTINOPTERYGII	GOBIIFORMES	GOBIIDAE	Zebrus	-	-	-	-	-	-	-	-	Least Concern	-
128	Muraena helena	GMSA	2015	Extant (resident)	ACTINOPTERYGII	ANGUILLIFORMES	MURAENIDAE	Muraena	Least Concern	2011	Least Concern	2007	Least Concern	2013	-	-	-	-
129	Gaidropsarus vulgaris	GMSA	2015	Extant (resident)	ACTINOPTERYGII	GADIFORMES	LOTIDAE	Gaidropsarus	-	-	Least Concern	2007	-	-	-	-	Least Concern	-
130	Benthoosema glaciale	GMSA	2015	Extant (resident)	ACTINOPTERYGII	MYCTOPHIFORMES	MYCTOPHIDAE	Benthoosema	Least Concern	2012	Least Concern	2007	Least Concern	2013	-	-	-	-
131	Lobianchia dofleini	GMSA	2015	Extant (resident)	ACTINOPTERYGII	MYCTOPHIFORMES	MYCTOPHIDAE	Lobianchia	Least Concern	2013	Least Concern	2007	Least Concern	2013	-	-	-	-
132	Gymnammodytes cicereus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	AMMODYTIDAE	Gymnammodytes	Least Concern	2014	Least Concern	2007	Data Deficient	2014	-	-	-	-
133	Gobius couchi	IUCN Marine Biodiversity Unit	2024	Extant (resident)	ACTINOPTERYGII	GOBIIFORMES	GOBIIDAE	Gobius	-	-	Data Deficient	2007	-	-	-	-	Least Concern	-
134	Thorogobius ephippiatus	IUCN Marine Biodiversity Unit	2024	Extant (resident)	ACTINOPTERYGII	GOBIIFORMES	GOBIIDAE	Thorogobius	-	-	Least Concern	2007	-	-	-	-	Least Concern	-
135	Sciaena umbra	IUCN Marine Biodiversity Unit/GMSA	2020	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	SCIAENIDAE	Sciaena	Near Threatened	2020	Vulnerable	2007	Near Threatened	2014	-	-	-	-
136	Stromateus fiatola	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	STROMATEIDAE	Stromateus	Least Concern	2014	Data Deficient	2007	Least Concern	2014	-	-	-	-
137	Arnoglossus laterna	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PLEURONECTIFORMES	BOTHIDAE	Arnoglossus	Least Concern	2014	Least Concern	2008	Least Concern	2014	-	-	-	-
138	Zeugopterus regius	IUCN Marine Biodiversity Unit/GMSA	2020	Extant (resident)	ACTINOPTERYGII	PLEURONECTIFORMES	SCOPHTHALMIDAE	Zeugopterus	Least Concern	2020	Data Deficient	2008	Least Concern	2013	-	-	-	-
139	Chelidonichthys lucerna	GMSA	2015	Extant (resident)	ACTINOPTERYGII	SCORPAENIFORMES	TRIGLIDAE	Chelidonichthys	Least Concern	2012	Least Concern	2007	Least Concern	2013	-	-	-	-
140	Coelorinchus caelorhincus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	GADIFORMES	MACROURIDAE	Coelorinchus	Least Concern	2013	Least Concern	2007	Data Deficient	2014	-	-	-	-

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141	Setarches guentheri	GMSA	2015	Extant (resident)	ACTINOPTERYGII	SCORPAENIFORMES	SETARCHIDAE	Setarches	Least Concern	2014	-	-	Not Applicable	2015	-	-	-	-
142	Arnoglossus grohmanni	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PLEURONECTIFORMES	BOTHIDAE	Arnoglossus	-	-	-	-	-	-	-	-	Data Deficient	-
143	Mobula mobular	IUCN SSC Shark Specialist Group	2025	Extant (resident)	CHONDRICHTHYES	MYLIOBATIFORMES	MOBULIDAE	Mobula	Endangered	2018	Endangered	2016	-	-	-	-	-	-
144	Sphyrna zygaena	IUCN SSC Shark Specialist Group	2018	Extant (resident)	CHONDRICHTHYES	CARCHARHINIFORMES	SPHYRNIDAE	Sphyrna	Vulnerable	2018	Critically Endangered	2016	Data Deficient	2015	-	-	-	-
145	Dipturus oxyrinchus	Ryan Charles	2024	Extant (resident)	CHONDRICHTHYES	RAJIFORMES	RAJIDAE	Dipturus	Vulnerable	2023	Near Threatened	2016	-	-	-	-	-	-
146	Diplodus cervinus	GMSA	2014	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	SPARIDAE	Diplodus	Least Concern	2009	Data Deficient	2007	Least Concern	2013	-	-	-	-
147	Diaphus holti	IUCN	2010	Extant (resident)	ACTINOPTERYGII	MYCTOPHIFORMES	MYCTOPHIDAE	Diaphus	Least Concern	2009	Least Concern	2007	Least Concern	2013	-	-	-	-
148	Buglossidium luteum	IUCN Marine Biodiversity Unit/GMSA	2021	Extant (resident)	ACTINOPTERYGII	PLEURONECTIFORMES	SOLEIDAE	Buglossidium	Least Concern	2021	Least Concern	2008	Least Concern	2014	-	-	-	-
149	Etmopterus spinax	IUCN SSC Shark Specialist Group	2020	Extant (resident)	CHONDRICHTHYES	SQUALIFORMES	ETMOPTERIDAE	Etmopterus	Vulnerable	2020	Least Concern	2016	Near Threatened	2014	-	-	-	-
150	Galeus melastomus	IUCN SSC Shark Specialist Group	2020	Extant (resident)	CHONDRICHTHYES	CARCHARHINIFORMES	PENTANCHIDAE	Galeus	Least Concern	2020	Least Concern	2016	Least Concern	2014	-	-	-	-
151	Alopias superciliosus	IUCN SSC Shark Specialist Group	2018	Possibly Extant (resident)	CHONDRICHTHYES	LAMNIFORMES	ALOPIIDAE	Alopias	Vulnerable	2018	Endangered	2016	Endangered	2014	-	-	-	-
152	Diplodus sargus	GMSA	2014	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	SPARIDAE	Diplodus	Least Concern	2011	-	-	Least Concern	2013	-	-	-	-
153	Pagellus acarne	GMSA	2014	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	SPARIDAE	Pagellus	Least Concern	2009	Least Concern	2007	Least Concern	2013	-	-	-	-
154	Spicara smaris	GMSA	2014	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	CENTRACANTHIDAE	Spicara	Least Concern	2009	Least Concern	2007	Least Concern	2013	-	-	-	-
155	Katsuwonus pelamis	GMSA	2021	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	SCOMBRIDAE	Katsuwonus	Least Concern	2021	Least Concern	2007	Least Concern	2014	-	-	-	-
156	Istiophorus platypterus	IUCN	2021	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	ISTIOPHORIDAE	Istiophorus	Vulnerable	2021	-	-	-	-	-	-	-	-
157	Auxis rochei	Jonnell Sanciangco	2023	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	SCOMBRIDAE	Auxis	Least Concern	2022	Least Concern	2007	Least Concern	2014	-	-	-	-
158	Parablennius gattorugine	GMSA	2014	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	BLENNIIDAE	Parablennius	Least Concern	2007	Least Concern	2007	Least Concern	2014	-	-	-	-
159	Salaria pavo	GMSA	2014	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	BLENNIIDAE	Salaria	Least Concern	2007	Least Concern	2007	Least Concern	2014	-	-	-	-
160	Parablennius tentacularis	GMSA	2014	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	BLENNIIDAE	Parablennius	Least Concern	2007	Least Concern	2007	Least Concern	2014	-	-	-	-
161	Symphodus ocellatus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	LABRIDAE	Symphodus	-	-	Least Concern	2014	-	-	-	-	Least Concern	-
162	Symphodus rostratus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	LABRIDAE	Symphodus	-	-	Least Concern	2014	-	-	-	-	Least Concern	-
163	Trichiurus lepturus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	TRICHIURIDAE	Trichiurus	Least Concern	2013	Least Concern	2007	Data Deficient	2014	-	-	-	-
164	Lophotus lacepede	GMSA	2015	Extant (resident)	ACTINOPTERYGII	LAMPRIIFORMES	LOPHOTIDAE	Lophotus	Least Concern	2014	Data Deficient	2007	Least Concern	2014	-	-	-	-
165	Ichthyococcus ovatus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	STOMIIFORMES	PHOSICHTHYIDAE	Ichthyococcus	Least Concern	2013	Least Concern	2007	Least Concern	2013	-	-	-	-

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166	Parablennius rouxi	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	BLENNIIDAE	Parablennius	-	-	Least Concern	2014	-	-	-	-	Least Concern	-
167	Odondebuenia balearica	IUCN Marine Biodiversity Unit	2024	Extant (resident)	ACTINOPTERYGII	GOBIIFORMES	GOBIIDAE	Odondebuenia	-	-	-	-	-	-	Least Concern	2024	-	-
168	Chlorophthalmus agassizi	GMSA	2015	Extant (resident)	ACTINOPTERYGII	AULOPIFORMES	CHLOROPHTHALMIDAE	Chlorophthalmus	Least Concern	2015	Least Concern	2007	Least Concern	2014	-	-	-	-
169	Sphyaena sphyaena	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	SPHYRAENIDAE	Sphyaena	Least Concern	2014	Least Concern	2007	Data Deficient	2014	-	-	-	-
170	Molva macrophthalma	GMSA	2015	Extant (resident)	ACTINOPTERYGII	GADIFORMES	LOTIDAE	Molva	-	-	Data Deficient	2007	-	-	-	-	Least Concern	-
171	Mora moro	GMSA	2015	Extant (resident)	ACTINOPTERYGII	GADIFORMES	MORIDAE	Mora	Least Concern	2013	Least Concern	2007	Least Concern	2014	-	-	-	-
172	Ceratoscopelus maderensis	GMSA	2015	Extant (resident)	ACTINOPTERYGII	MYCTOPHIFORMES	MYCTOPHIDAE	Ceratoscopelus	Least Concern	2012	Least Concern	2007	Least Concern	2013	-	-	-	-
173	Notoscopelus bolini	GMSA	2015	Extant (resident)	ACTINOPTERYGII	MYCTOPHIFORMES	MYCTOPHIDAE	Notoscopelus	Least Concern	2015	Least Concern	2007	Least Concern	2013	-	-	-	-
174	Scartella cristata	IUCN Marine Biodiversity Unit	2024	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	BLENNIIDAE	Scartella	Least Concern	2007	Least Concern	2007	Least Concern	2014	-	-	-	-
175	Lichia amia	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	CARANGIDAE	Lichia	Least Concern	2014	Data Deficient	2007	Least Concern	2014	-	-	-	-
176	Remora remora	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	ECHENEIDAE	Remora	Least Concern	2012	Least Concern	2007	Least Concern	2014	-	-	-	-
177	Gobius cruentatus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	GOBIIFORMES	GOBIIDAE	Gobius	Least Concern	2014	Least Concern	2007	Least Concern	2014	-	-	-	-
178	Dicentrarchus punctatus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	MORONIDAE	Dicentrarchus	Least Concern	2014	Least Concern	2007	Least Concern	2013	-	-	-	-
179	Bothus podas	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PLEURONECTIFORMES	BOTHIDAE	Bothus	Least Concern	2013	Least Concern	2008	Least Concern	2014	-	-	-	-
180	Scorpaena loppei	GMSA	2015	Extant (resident)	ACTINOPTERYGII	SCORPAENIFORMES	SCORPAENIDAE	Scorpaena	Least Concern	2014	Least Concern	2007	Least Concern	2013	-	-	-	-
181	Chelidonichthys obscurus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	SCORPAENIFORMES	TRIGLIDAE	Chelidonichthys	Least Concern	2013	Least Concern	2007	Least Concern	2013	-	-	-	-
182	Nerophis maculatus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	SYNGNATHIFORMES	SYNGNATHIDAE	Nerophis	-	-	Data Deficient	2016	-	-	-	-	Data Deficient	-
183	Carcharodon carcharias	IUCN SSC Shark Specialist Group	2018	Extant (resident)	CHONDRICHTHYES	LAMNIFORMES	LAMNIDAE	Carcharodon	Vulnerable	2018	Critically Endangered	2016	Critically Endangered	2014	-	-	-	-
184	Mycteroperca marginata	IUCN Marine Biodiversity Unit/GMSA	2018	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	EPINEPHELIDAE	Mycteroperca	Vulnerable	2016	Endangered	2004	Endangered	2015	-	-	-	-
185	Petromyzon marinus	Matthew Ford	2024	Extant (resident)	PETROMYZONTI	PETROMYZONTIFORMES	PETROMYZONTIDAE	Petromyzon	Least Concern	2022	-	-	Least Concern	2022	-	-	-	-
186	Squatina squatina	IUCN SSC Shark Specialist Group	2019	Presence Uncertain	CHONDRICHTHYES	SQUATINIFORMES	SQUATINIDAE	Squatina	-	-	Critically Endangered	2016	-	-	-	-	Critically Endangered	-
187	Centrophorus uyato	IUCN SSC SSG - ISRA	2024	Extant (resident)	CHONDRICHTHYES	SQUALIFORMES	CENTROPHORIDAE	Centrophorus	Endangered	2024	-	-	Vulnerable	2014	-	-	-	-
188	Isurus paucus	IUCN SSC Shark Specialist Group	2018	Extant (resident)	CHONDRICHTHYES	LAMNIFORMES	LAMNIDAE	Isurus	Endangered	2018	Data Deficient	2016	Data Deficient	2014	-	-	-	-
189	Oxynotus centrina	IUCN SSC Shark Specialist Group	2020	Extant (resident)	CHONDRICHTHYES	SQUALIFORMES	OXYNOTIDAE	Oxynotus	Endangered	2020	Critically Endangered	2016	Vulnerable	2014	-	-	-	-

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190	Dipturus nidarosiensis	IUCN	2023	Extant (resident)	CHONDRICHTHYES	RAJIFORMES	RAJIDAE	Dipturus	Endangere d	2023	-	-	Near Threatene d	2014	-	-	-	-
191	Centracanthus cirrus	GMSA	2014	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	CENTRACANTHIDAE	Centracanthus	Least Concern	2009	Least Concern	2007	Least Concern	2013	-	-	-	-
192	Symphodus mediterraneus	IUCN	2009	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	LABRIDAE	Symphodus	Least Concern	2008	Least Concern	2007	Least Concern	2013	-	-	-	-
193	Hygophum benoiti	GMSA	2015	Extant (resident)	ACTINOPTERYGII	MYCTOPHIFORMES	MYCTOPHIDAE	Hygophum	Least Concern	2012	Least Concern	2007	Least Concern	2013	-	-	-	-
194	Chauliodus sloani	GMSA	2015	Extant (resident)	ACTINOPTERYGII	STOMIIFORMES	STOMIIDAE	Chauliodus	Least Concern	2013	Least Concern	2007	Least Concern	2013	-	-	-	-
195	Regalecus glesne	GMSA	2015	Extant (resident)	ACTINOPTERYGII	LAMPRIIFORMES	REGALECIDAE	Regalecus	Least Concern	2013	Data Deficient	2007	Least Concern	2014	-	-	-	-
196	Lobianchia gemellarii	GMSA	2015	Extant (resident)	ACTINOPTERYGII	MYCTOPHIFORMES	MYCTOPHIDAE	Lobianchia	Least Concern	2012	Data Deficient	2007	Least Concern	2013	-	-	-	-
197	Ophichthus rufus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	ANGUILLIFORMES	OPHICHTHIDAE	Ophichthus	-	-	-	-	-	-	Least Concern	2014	-	-
198	Grammonus ater	GMSA	2015	Extant (resident)	ACTINOPTERYGII	OPHIDIIFORMES	BYTHITIDAE	Grammonus	-	-	-	-	-	-	Least Concern	2014	-	-
199	Marcelogobius splechnai	IUCN Marine Biodiversit y Unit	2024	Extant (resident)	ACTINOPTERYGII	GOBIIFORMES	GOBIIDAE	Marcelogobius	-	-	-	-	-	-	Least Concern	2024	-	-
200	Tripterygion melanurus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	TRIPTERYGIIDAE	Tripterygion	-	-	-	-	-	-	-	-	-	-
201	Apterichtus anguiformis	GMSA	2015	Extant (resident)	ACTINOPTERYGII	ANGUILLIFORMES	OPHICHTHIDAE	Apterichtus	Least Concern	2011	Least Concern	2007	Least Concern	2014	-	-	-	-
202	Evermannella balbo	GMSA	2015	Extant (resident)	ACTINOPTERYGII	AULOPIIFORMES	EVERMANNELLIDAE	Evermannella	Least Concern	2013	Least Concern	2007	Least Concern	2014	-	-	-	-
203	Apogon imberbis	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	APOGONIDAE	Apogon	Least Concern	2012	Least Concern	2007	Least Concern	2014	-	-	-	-
204	Arnoglossus thori	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PLEURONECTIFORMES	BOTHIDAE	Arnoglossus	Data Deficient	2013	Least Concern	2008	Least Concern	2014	-	-	-	-
205	Hoplostethus mediterraneus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	BERYCIFORMES	TRACHICHTHYIDAE	Hoplostethus	Least Concern	2013	Least Concern	2007	Least Concern	2014	-	-	-	-
206	Phycis phycis	GMSA	2015	Extant (resident)	ACTINOPTERYGII	GADIFORMES	PHYCIDAE	Phycis	Least Concern	2015	Least Concern	2007	Data Deficient	2014	-	-	-	-
207	Diaphus metopoclampus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	MYCTOPHIFORMES	MYCTOPHIDAE	Diaphus	Least Concern	2012	Least Concern	2007	Least Concern	2013	-	-	-	-
208	Bellottia apoda	GMSA	2019	Extant (resident)	ACTINOPTERYGII	OPHIDIIFORMES	BYTHITIDAE	Bellottia	Least Concern	2018	Least Concern	2008	Least Concern	2014	-	-	-	-
209	Callanthias ruber	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	CALLANTHIIDAE	Callanthias	Least Concern	2013	Least Concern	2007	Least Concern	2014	-	-	-	-
210	Seriola dumerili	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	CARANGIDAE	Seriola	Least Concern	2013	Least Concern	2007	Least Concern	2014	-	-	-	-
211	Gobius paganellus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	GOBIIFORMES	GOBIIDAE	Gobius	Least Concern	2014	Least Concern	2007	Least Concern	2014	-	-	-	-
212	Mullus barbatus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	MULLIDAE	Mullus	Least Concern	2014	Least Concern	2007	Least Concern	2013	-	-	-	-
213	Umbrina cirrosa	IUCN Marine Biodiversit y Unit / GMSA	2019	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	SCIAENIDAE	Umbrina	Vulnerable	2019	Vulnerable	2007	Vulnerable	2014	-	-	-	-
214	Trachinus araneus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	TRACHINIDAE	Trachinus	Least Concern	2015	Least Concern	2007	Least Concern	2014	-	-	-	-
215	Citharus linguatula	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PLEURONECTIFORMES	CITHARIDAE	Citharus	Least Concern	2014	Least Concern	2008	Least Concern	2014	-	-	-	-
216	Microchirus ocellatus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PLEURONECTIFORMES	SOLEIDAE	Microchirus	Data Deficient	2013	Least Concern	2008	Data Deficient	2013	-	-	-	-
217	Scorpaena maderensis	GMSA	2015	Extant (resident)	ACTINOPTERYGII	SCORPAENIFORMES	SCORPAENIDAE	Scorpaena	Least Concern	2014	Least Concern	2007	Least Concern	2013	-	-	-	-
218	Psenes pellucidus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	NOMEIDAE	Psenes	Least Concern	2013	-	-	-	-	-	-	-	-

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219	Microlophichthys microlophus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	LOPHIIFORMES	ONEIRODIDAE	Microlophichthys	Least Concern	2013	-	-	Not Applicable	2015	-	-	-	-
220	Trisopterus capelanus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	GADIFORMES	GADIDAE	Trisopterus	-	-	-	-	-	-	Least Concern	2014	-	-
221	Gobius incognitus	IUCN Marine Biodiversity Unit	2024	Extant (resident)	ACTINOPTERYGII	GOBIIFORMES	GOBIIDAE	Gobius	-	-	-	-	-	-	-	-	Least Concern	-
222	Tripterygion minor	IUCN Marine Biodiversity Unit	2024	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	TRIPTERYGIIDAE	Tripterygion	-	-	-	-	-	-	-	-	Data Deficient	-
223	Pagrus pagrus	GMSA	2014	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	SPARIDAE	Pagrus	Least Concern	2009	Least Concern	2007	Least Concern	2013	-	-	-	-
224	Isurus oxyrinchus	IUCN SSC Shark Specialist Group	2018	Extant (resident)	CHONDRICHTHYES	LAMNIFORMES	LAMNIDAE	Isurus	Endangered	2018	Critically Endangered	2016	Data Deficient	2015	-	-	-	-
225	Echinorhinus brucus	IUCN SSC Shark Specialist Group	2020	Extant (resident)	CHONDRICHTHYES	SQUALIFORMES	ECHINORHINIDAE	Echinorhinus	Endangered	2019	Endangered	2016	Endangered	2014	-	-	-	-
226	Benthocometes robustus	IUCN	2010	Extant (resident)	ACTINOPTERYGII	OPHIDIIFORMES	OPHIDIIDAE	Benthocometes	Least Concern	2009	Data Deficient	2008	Least Concern	2014	-	-	-	-
227	Arnoglossus rueppelii	IUCN Marine Biodiversity Unit/GMSA	2019	Extant (resident)	ACTINOPTERYGII	PLEURONECTIFORMES	BOTHIDAE	Arnoglossus	Least Concern	2019	Least Concern	2008	Data Deficient	2014	-	-	-	-
228	Sarpa salpa	GMSA	2014	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	SPARIDAE	Sarpa	Least Concern	2009	Least Concern	2007	Least Concern	2013	-	-	-	-
229	Oblada melanura	GMSA	2014	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	SPARIDAE	Oblada	Least Concern	2009	Least Concern	2007	Least Concern	2013	-	-	-	-
230	Scomber colias	Jonnell Sanciangco	2023	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	SCOMBRIDAE	Scomber	Least Concern	2022	Near Threatened	2007	Least Concern	2015	-	-	-	-
231	Aidablennius sphynx	GMSA	2014	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	BLENNIIDAE	Aidablennius	Least Concern	2011	Least Concern	2007	Least Concern	2014	-	-	-	-
232	Symphodus melanocercus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	LABRIDAE	Symphodus	-	-	-	-	-	-	Least Concern	2014	-	-
233	Lestidiops jayakari	GMSA	2015	Extant (resident)	ACTINOPTERYGII	AULOPIIFORMES	PARALEPIDIDAE	Lestidiops	Least Concern	2013	Least Concern	2007	Least Concern	2014	-	-	-	-
234	Sudis hyalina	GMSA	2015	Extant (resident)	ACTINOPTERYGII	AULOPIIFORMES	PARALEPIDIDAE	Sudis	Data Deficient	2013	Data Deficient	2007	Data Deficient	2014	-	-	-	-
235	Ranzania laevis	GMSA	2015	Extant (resident)	ACTINOPTERYGII	TETRAODONTIFORMES	MOLIDAE	Ranzania	Least Concern	2011	-	-	Data Deficient	2013	-	-	-	-
236	Bathypterois mediterraneus	IUCN	2010	Extant (resident)	ACTINOPTERYGII	AULOPIIFORMES	IPNOPIDAE	Bathypterois	-	-	-	-	-	-	-	-	-	-
237	Echiodon dentatus	IUCN	2010	Extant (resident)	ACTINOPTERYGII	OPHIDIIFORMES	CARAPIDAE	Echiodon	-	-	-	-	Least Concern	2014	-	-	-	-
238	Callionymus fasciatus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	CALLIONYMIDAE	Callionymus	-	-	-	-	-	-	-	-	Least Concern	-
239	Gammogobius steinitzi	IUCN Marine Biodiversity Unit	2024	Extant (resident)	ACTINOPTERYGII	GOBIIFORMES	GOBIIDAE	Gammogobius	-	-	-	-	-	-	-	-	Least Concern	-
240	Tripterygion triptonotum	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	TRIPTERYGIIDAE	Tripterygion	-	-	-	-	-	-	-	-	Least Concern	-
241	Chlopsis bicolor	GMSA	2015	Extant (resident)	ACTINOPTERYGII	ANGUILLIFORMES	CHLOPSIDAE	Chlopsis	Least Concern	2011	Least Concern	2007	Least Concern	2013	-	-	-	-
242	Arctozenus risso	GMSA	2015	Extant (resident)	ACTINOPTERYGII	AULOPIIFORMES	PARALEPIDIDAE	Arctozenus	Least Concern	2013	Least Concern	2007	Least Concern	2014	-	-	-	-
243	Capros aper	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	CAPROIDAE	Capros	Least Concern	2014	Least Concern	2007	Least Concern	2014	-	-	-	-

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244	Engraulis encrasicolus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	CLUPEIFORMES	ENGRAULIDAE	Engraulis	Least Concern	2013	Least Concern	2007	Least Concern	2013	-	-	-	-
245	Apletodon incognitus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	GOBIESOCIFORMES	GOBIESOCIDAE	Apletodon	-	-	Data Deficient	2007	-	-	-	-	Least Concern	-
246	Callionymus lyra	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	CALLIONYMIDAE	Callionymus	Least Concern	2013	Least Concern	2007	Least Concern	2014	-	-	-	-
247	Trachinotus ovatus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	CARANGIDAE	Trachinotus	Least Concern	2013	Least Concern	2007	Least Concern	2014	-	-	-	-
248	Epigonus telescopus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	EPIGONIDAE	Epigonus	Least Concern	2012	Least Concern	2007	Data Deficient	2014	-	-	-	-
249	Gobius roulei	IUCN Marine Biodiversity Unit	2024	Extant (resident)	ACTINOPTERYGII	GOBIIFORMES	GOBIIDAE	Gobius	-	-	Data Deficient	2007	-	-	-	-	Least Concern	-
250	Mullus surmuletus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	MULLIDAE	Mullus	Least Concern	2014	Least Concern	2007	Data Deficient	2014	-	-	-	-
251	Trachinus draco	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	TRACHINIDAE	Trachinus	Least Concern	2014	Least Concern	2007	Least Concern	2014	-	-	-	-
252	Symphurus ligulatus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PLEURONECTIFORMES	CYNOGLOSSIDAE	Symphurus	Least Concern	2013	Least Concern	2008	Least Concern	2014	-	-	-	-
253	Scorpaena notata	GMSA	2015	Extant (resident)	ACTINOPTERYGII	SCORPAENIFORMES	SCORPAENIDAE	Scorpaena	Least Concern	2014	Least Concern	2007	Least Concern	2013	-	-	-	-
254	Trigla lyra	GMSA	2015	Extant (resident)	ACTINOPTERYGII	SCORPAENIFORMES	TRIGLIDAE	Trigla	Least Concern	2013	Least Concern	2007	Data Deficient	2014	-	-	-	-
255	Bathypterois dubius	GMSA	2015	Extant (resident)	ACTINOPTERYGII	AULOPIIFORMES	IPNOPIDAE	Bathypterois	Least Concern	2013	-	-	Least Concern	2014	-	-	-	-
256	Gephyroberyx darwinii	GMSA	2015	Extant (resident)	ACTINOPTERYGII	BERYCIFORMES	TRACHICHTHYIDAE	Gephyroberyx	Least Concern	2013	-	-	Not Applicable	2015	-	-	-	-
257	Gonostoma elongatum	GMSA	2015	Extant (resident)	ACTINOPTERYGII	STOMIIFORMES	GONOSTOMATIDAE	Gonostoma	Least Concern	2013	-	-	Least Concern	2013	-	-	-	-
258	Valenciennellus tripunctulatus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	STOMIIFORMES	STERNOPTYCHIDAE	Valenciennellus	Least Concern	2014	-	-	Least Concern	2013	-	-	-	-
259	Cetorhinus maximus	IUCN SSC Shark Specialist Group	2018	Extant (resident)	CHONDRICHTHYES	LAMNIFORMES	CETORHINIDAE	Cetorhinus	Endangered	2018	Endangered	2016	Endangered	2014	-	-	-	-
260	Lamna nasus	IUCN SSC Shark Specialist Group	2018	Extant (resident)	CHONDRICHTHYES	LAMNIFORMES	LAMNIDAE	Lamna	Vulnerable	2018	Critically Endangered	2016	Critically Endangered	2015	-	-	-	-
261	Prionace glauca	IUCN SSC Shark Specialist Group	2018	Extant (resident)	CHONDRICHTHYES	CARCHARHINIFORMES	CARCHARHINIDAE	Prionace	Near Threatened	2018	Critically Endangered	2016	Near Threatened	2014	-	-	-	-
262	Odontaspis ferox	IUCN SSC Shark Specialist Group	2023	Extant (resident)	CHONDRICHTHYES	LAMNIFORMES	ODONTASPIDIDAE	Odontaspis	Endangered	2023	Critically Endangered	2016	Critically Endangered	2014	-	-	-	-
263	Squatina aculeata	IUCN SSC Shark Specialist Group	2019	Presence Uncertain	CHONDRICHTHYES	SQUATINIFORMES	SQUATINIDAE	Squatina	Critically Endangered	2017	Critically Endangered	2016	Critically Endangered	2014	-	-	-	-
264	Epinephelus aeneus	IUCN Marine Biodiversity Unit/GMSA	2018	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	EPINEPHELIDAE	Epinephelus	Near Threatened	2016	Near Threatened	2008	Data Deficient	2013	-	-	-	-
265	Macroramphosus scolopax	IUCN	2010	Extant (resident)	ACTINOPTERYGII	SYNGNATHIFORMES	CENTRISCIDAE	Macroramphosus	Least Concern	2009	Least Concern	2016	Least Concern	2014	-	-	-	-
266	Leucoraja circularis	Marine Biodiversity Unit	2024	Extant (resident)	CHONDRICHTHYES	RAJIFORMES	RAJIDAE	Leucoraja	-	-	Critically Endangered	2016	-	-	-	-	Endangered	-
267	Pagellus erythrinus	GMSA	2014	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	SPARIDAE	Pagellus	Least Concern	2009	Least Concern	2007	Least Concern	2013	-	-	-	-

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268	Dentex macrophthalmus	GMSA	2014	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	SPARIDAE	Dentex	Least Concern	2009	Data Deficient	2007	Least Concern	2013	-	-	-	-
269	Symphodus melops	IUCN	2009	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	LABRIDAE	Symphodus	Least Concern	2008	Least Concern	2007	Least Concern	2013	-	-	-	-
270	Symphodus doderleini	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	LABRIDAE	Symphodus	-	-	-	-	-	-	Least Concern	2014	-	-
271	Sphoeroides pachygaster	GMSA	2014	Extant (resident)	ACTINOPTERYGII	TETRAODONTIFORMES	TETRAODONTIDAE	Sphoeroides	Least Concern	2011	-	-	Least Concern	2013	-	-	-	-
272	Aulopus filamentosus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	AULOPIFORMES	AULOPIIDAE	Aulopus	Least Concern	2013	Least Concern	2007	Least Concern	2014	-	-	-	-
273	Paralepis speciosa	GMSA	2015	Extant (resident)	ACTINOPTERYGII	AULOPIFORMES	PARALEPIDIDAE	Paralepis	-	-	-	-	-	-	-	-	Least Concern	-
274	Ophidion rochei	IUCN	2010	Extant (resident)	ACTINOPTERYGII	OPHIDIIFORMES	OPHIDIIDAE	Ophidion	-	-	-	-	Data Deficient	2014	-	-	-	-
275	Gobius ater	IUCN Marine Biodiversity Unit	2024	Extant (resident)	ACTINOPTERYGII	GOBIIFORMES	GOBIIDAE	Gobius	-	-	-	-	-	-	Least Concern	2024	-	-
276	Pomatoschistus quagga	IUCN Marine Biodiversity Unit	2024	Extant (resident)	ACTINOPTERYGII	GOBIIFORMES	GOBIIDAE	Pomatoschistus	-	-	-	-	-	-	-	-	Least Concern	-
277	Arnoglossus kessleri	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PLEURONECTIFORMES	BOTHIDAE	Arnoglossus	-	-	-	-	-	-	-	-	Data Deficient	-
278	Ariosoma balearicum	GMSA	2015	Extant (resident)	ACTINOPTERYGII	ANGUILLIFORMES	CONGRIDAE	Ariosoma	Least Concern	2014	Least Concern	2007	Least Concern	2013	-	-	-	-
279	Dalophis imberbis	IUCN Marine Biodiversity Unit/GMSA	2022	Extant (resident)	ACTINOPTERYGII	ANGUILLIFORMES	OPHICHTHIDAE	Dalophis	Least Concern	2019	Least Concern	2007	Least Concern	2014	-	-	-	-
280	Lestidiops sphyrenoides	GMSA	2015	Extant (resident)	ACTINOPTERYGII	AULOPIFORMES	PARALEPIDIDAE	Lestidiops	Least Concern	2013	Least Concern	2007	Least Concern	2014	-	-	-	-
281	Lampris guttatus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	LAMPRIFORMES	LAMPRIDAE	Lampris	Least Concern	2013	Data Deficient	2007	Least Concern	2014	-	-	-	-
282	Brama brama	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	BRAMIDAE	Brama	Least Concern	2013	Data Deficient	2007	Least Concern	2014	-	-	-	-
283	Priacanthus arenatus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	PRIACANTHIDAE	Priacanthus	Least Concern	2013	Data Deficient	2007	Least Concern	2014	-	-	-	-
284	Gobius niger	GMSA	2015	Extant (resident)	ACTINOPTERYGII	GOBIIFORMES	GOBIIDAE	Gobius	Least Concern	2014	Least Concern	2007	Least Concern	2014	-	-	-	-
285	Sardinella aurita	GMSA	2015	Extant (resident)	ACTINOPTERYGII	CLUPEIFORMES	CLUPEIDAE	Sardinella	Least Concern	2012	Least Concern	2007	Least Concern	2013	-	-	-	-
286	Hymenocephalus italicus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	GADIFORMES	MACROURIDAE	Hymenocephalus	Least Concern	2012	Least Concern	2007	Least Concern	2014	-	-	-	-
287	Diplecogaster bimaculata	GMSA	2015	Extant (resident)	ACTINOPTERYGII	GOBIESOCIFORMES	GOBIESOCIDAE	Diplecogaster	Least Concern	2013	Least Concern	2007	Least Concern	2014	-	-	-	-
288	Electrona risso	GMSA	2015	Extant (resident)	ACTINOPTERYGII	MYCTOPHIFORMES	MYCTOPHIDAE	Electrona	Least Concern	2012	Least Concern	2007	Least Concern	2013	-	-	-	-
289	Carapus acus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	OPHIDIIFORMES	CARAPIDAE	Carapus	Least Concern	2014	Data Deficient	2008	Least Concern	2014	-	-	-	-
290	Callionymus maculatus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	CALLIONYMIDAE	Callionymus	Least Concern	2013	Least Concern	2007	Least Concern	2014	-	-	-	-
291	Trachurus mediterraneus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	CARANGIDAE	Trachurus	Least Concern	2013	Least Concern	2007	Least Concern	2014	-	-	-	-
292	Crystallogobius linearis	IUCN Marine Biodiversity Unit	2024	Extant (resident)	ACTINOPTERYGII	GOBIIFORMES	GOBIIDAE	Crystallogobius	-	-	Least Concern	2007	-	-	-	-	Least Concern	-
293	Lebetus guilleti	IUCN Marine Biodiversity Unit	2024	Extant (resident)	ACTINOPTERYGII	GOBIIFORMES	GOBIIDAE	Lebetus	-	-	Data Deficient	2007	-	-	-	-	Least Concern	-

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294	Anthias anthias	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	ANTHIADIDAE	Anthias	Least Concern	2013	Least Concern	2007	Least Concern	2014	-	-	-	-
295	Trachinus radiatus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	TRACHINIDAE	Trachinus	Least Concern	2014	Least Concern	2007	Least Concern	2014	-	-	-	-
296	Symphurus nigrescens	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PLEURONECTIFORMES	CYNOGLOSSIDAE	Symphurus	Least Concern	2013	Least Concern	2008	Least Concern	2014	-	-	-	-
297	Monochirus hispidus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PLEURONECTIFORMES	SOLEIDAE	Monochirus	-	-	Data Deficient	2007	-	-	-	-	Least Concern	-
298	Scorpaena porcus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	SCORPAENIFORMES	SCORPAENIDAE	Scorpaena	Least Concern	2014	Least Concern	2007	Least Concern	2013	-	-	-	-
299	Cyclothone braueri	GMSA	2015	Extant (resident)	ACTINOPTERYGII	STOMIIFORMES	GONOSTOMATIDAE	Cyclothone	Least Concern	2013	Least Concern	2007	Least Concern	2013	-	-	-	-
300	Syngnathus typhle	GMSA	2015	Extant (resident)	ACTINOPTERYGII	SYNGNATHIFORMES	SYNGNATHIDAE	Syngnathus	-	-	Least Concern	2016	-	-	-	-	Least Concern	-
301	Aphia minuta	IUCN Marine Biodiversity Unit	2024	Extant (resident)	ACTINOPTERYGII	GOBIIFORMES	GOBIIDAE	Aphia	Least Concern	2024	-	-	Least Concern	2014	-	-	-	-
302	Speleogobius llorisi	IUCN Marine Biodiversity Unit	2024	Extant (resident)	ACTINOPTERYGII	GOBIIFORMES	GOBIIDAE	Speleogobius	-	-	-	-	-	-	Least Concern	2024	-	-
303	Thunnus thynnus	GMSA	2021	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	SCOMBRIDAE	Thunnus	Least Concern	2021	Endangered	2009	Near Threatened	2015	-	-	-	-
304	Carcharhinus falciformis	IUCN	2021	Extant (resident)	CHONDRICHTHYES	CARCHARHINIFORMES	CARCHARHINIDAE	Carcharhinus	Vulnerable	2017	-	-	Data Deficient	2015	-	-	-	-
305	Centroscymnus coelolepis	IUCN SSC Shark Specialist Group	2020	Extant (resident)	CHONDRICHTHYES	SQUALIFORMES	SOMNIOSIDAE	Centroscymnus	Near Threatened	2019	Least Concern	2016	Endangered	2014	-	-	-	-
306	Polyprion americanus	IUCN	2010	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	POLYPRIONIDAE	Polyprion	Data Deficient	2003	Data Deficient	2007	Near Threatened	2014	-	-	-	-
307	Squatina oculata	IUCN SSC Shark Specialist Group	2019	Presence Uncertain	CHONDRICHTHYES	SQUATINIFORMES	SQUATINIDAE	Squatina	Critically Endangered	2017	Critically Endangered	2016	Critically Endangered	2014	-	-	-	-
308	Chimaera monstrosa	IUCN SSC Shark Specialist Group	2018	Extant (resident)	CHONDRICHTHYES	CHIMAERIFORMES	CHIMAERIDAE	Chimaera	Vulnerable	2019	Near Threatened	2016	Near Threatened	2014	-	-	-	-
309	Mycteroperca caninus	IUCN Marine Biodiversity Unit/GMSA	2018	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	EPINEPHELIDAE	Mycteroperca	Data Deficient	2016	Data Deficient	2008	Least Concern	2013	-	-	-	-
310	Arnoglossus imperialis	IUCN Marine Biodiversity Unit/GMSA	2019	Extant (resident)	ACTINOPTERYGII	PLEURONECTIFORMES	BOTHIDAE	Arnoglossus	Least Concern	2019	Least Concern	2008	Least Concern	2014	-	-	-	-
311	Caranx crysos	IUCN	2010	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	CARANGIDAE	Caranx	Least Concern	2009	Least Concern	2007	Least Concern	2014	-	-	-	-
312	Parablennius zvonimiri	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	BLENNIIDAE	Parablennius	-	-	-	-	-	-	-	-	Least Concern	-
313	Argyrolepecus hemigymnus	IUCN	2010	Extant (resident)	ACTINOPTERYGII	STOMIIFORMES	STERNOPTYCHIDAE	Argyrolepecus	Least Concern	2009	Least Concern	2007	Least Concern	2013	-	-	-	-
314	Leucoraja naevus	IUCN Shark Specialist Group	2024	Extant (resident)	CHONDRICHTHYES	RAJIFORMES	RAJIDAE	Leucoraja	-	-	Near Threatened	2016	-	-	-	-	Least Concern	-

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315	Pagrus caeruleostictus	GMSA	2014	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	SPARIDAE	Pagrus	Least Concern	2009	Data Deficient	2007	Least Concern	2013	-	-	-	-
316	Spondyliosoma cantharus	GMSA	2014	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	SPARIDAE	Spondyliosoma	Least Concern	2009	Least Concern	2007	Least Concern	2013	-	-	-	-
317	Labrus mixtus	IUCN	2009	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	LABRIDAE	Labrus	Least Concern	2008	Least Concern	2007	Least Concern	2013	-	-	-	-
318	Labrus merula	IUCN	2009	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	LABRIDAE	Labrus	Least Concern	2008	Least Concern	2007	Least Concern	2013	-	-	-	-
319	Tylosurus acus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	BELONIFORMES	BELONIDAE	Tylosurus	Least Concern	2012	Least Concern	2007	Least Concern	2014	-	-	-	-
320	Scomberesox saurus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	BELONIFORMES	SCOMBERESOCIDAE	Scomberesox	Least Concern	2012	Least Concern	2007	Least Concern	2015	-	-	-	-
321	Balistes capriscus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	TETRAODONTIFORMES	BALISTIDAE	Balistes	Vulnerable	2011	-	-	Data Deficient	2013	-	-	-	-
322	Coelorinchus mediterraneus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	GADIFORMES	MACROURIDAE	Coelorinchus	-	-	-	-	-	-	Least Concern	2014	-	-
323	Parophidion vassali	IUCN	2010	Extant (resident)	ACTINOPTERYGII	OPHIDIIFORMES	OPHIDIIDAE	Parophidion	-	-	-	-	Data Deficient	2014	-	-	-	-
324	Gobius geniporus	IUCN Marine Biodiversity Unit	2024	Extant (resident)	ACTINOPTERYGII	GOBIIFORMES	GOBIIDAE	Gobius	-	-	-	-	-	-	Least Concern	2024	-	-
325	Conger conger	GMSA	2015	Extant (resident)	ACTINOPTERYGII	ANGUILLIFORMES	CONGRIDAE	Conger	Least Concern	2011	Least Concern	2007	Least Concern	2014	-	-	-	-
326	Echelus myrus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	ANGUILLIFORMES	OPHICHTHIDAE	Echelus	Least Concern	2011	Least Concern	2007	Least Concern	2013	-	-	-	-
327	Paralepis coregonoides	GMSA	2019	Extant (resident)	ACTINOPTERYGII	AULOPIIFORMES	PARALEPIDIDAE	Paralepis	Least Concern	2018	Least Concern	2007	Least Concern	2014	-	-	-	-
328	Serranus cabrilla	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	SERRANIDAE	Serranus	Least Concern	2013	Least Concern	2007	Least Concern	2014	-	-	-	-
329	Physiculus dalwigki	GMSA	2015	Extant (resident)	ACTINOPTERYGII	GADIFORMES	MORIDAE	Physiculus	Least Concern	2013	Least Concern	2007	Least Concern	2014	-	-	-	-
330	Centrolophus niger	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	CENTROLOPHIDAE	Centrolophus	Least Concern	2013	Least Concern	2007	Least Concern	2014	-	-	-	-
331	Sardinella maderensis	GMSA	2015	Extant (resident)	ACTINOPTERYGII	CLUPEIFORMES	CLUPEIDAE	Sardinella	Vulnerable	2014	Least Concern	2007	Least Concern	2013	-	-	-	-
332	Lepadogaster candolii	IUCN Marine Biodiversity Unit	2024	Extant (resident)	ACTINOPTERYGII	GOBIESOCIFORMES	GOBIESOCIDAE	Lepadogaster	Least Concern	2024	-	-	Least Concern	2014	-	-	-	-
333	Gonichthys cocco	GMSA	2015	Extant (resident)	ACTINOPTERYGII	MYCTOPHIFORMES	MYCTOPHIDAE	Gonichthys	Least Concern	2012	-	-	Least Concern	2013	-	-	-	-
334	Ophidion barbatum	GMSA	2019	Extant (resident)	ACTINOPTERYGII	OPHIDIIFORMES	OPHIDIIDAE	Ophidion	Least Concern	2018	Least Concern	2008	Least Concern	2014	-	-	-	-
335	Callionymus pusillus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	CALLIONYMIDAE	Callionymus	-	-	Least Concern	2007	-	-	-	-	Least Concern	-
336	Trachurus picturatus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	CARANGIDAE	Trachurus	Least Concern	2013	Least Concern	2007	Least Concern	2014	-	-	-	-
337	Deltentosteus collonianus	IUCN Marine Biodiversity Unit	2024	Extant (resident)	ACTINOPTERYGII	GOBIIFORMES	GOBIIDAE	Deltentosteus	-	-	Least Concern	2007	-	-	-	-	Least Concern	-
338	Cubiceps gracilis	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	NOMEIDAE	Cubiceps	Least Concern	2013	Data Deficient	2007	Least Concern	2014	-	-	-	-
339	Serranus hepatus	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PERCIFORMES	SERRANIDAE	Serranus	Least Concern	2013	Least Concern	2007	Least Concern	2014	-	-	-	-
340	Lepidorhombus boscii	IUCN Marine Biodiversity Unit/GMSA	2020	Extant (resident)	ACTINOPTERYGII	PLEURONECTIFORMES	SCOPHTHALMIDAE	Lepidorhombus	Least Concern	2020	Least Concern	2007	Least Concern	2014	-	-	-	-
341	Solea solea	GMSA	2015	Extant (resident)	ACTINOPTERYGII	PLEURONECTIFORMES	SOLEIDAE	Solea	Data Deficient	2014	Least Concern	2008	Least Concern	2013	-	-	-	-

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342	Scorpaena scrofa	GMSA	2015	Extant (resident)	ACTINOPTERYGII	SCORPAENIFORMES	SCORPAENIDAE	Scorpaena	Least Concern	2014	Least Concern	2007	Least Concern	2013	-	-	-	-
343	Vinciguerria attenuata	GMSA	2015	Extant (resident)	ACTINOPTERYGII	STOMIIFORMES	PHOSICHTHYIDAE	Vinciguerria	Least Concern	2014	Least Concern	2007	Least Concern	2013	-	-	-	-
344	Zeus faber	GMSA	2015	Extant (resident)	ACTINOPTERYGII	ZEIFORMES	ZEIDAE	Zeus	Data Deficient	2013	Least Concern	2007	Data Deficient	2014	-	-	-	-
345	Tetronarce nobiliana	IUCN SSC Shark Specialist Group	2020	Extant (resident)	CHONDRICHTHY ES	TORPEDINIFORMES	TORPEDINIDAE	Tetronarce	Least Concern	2020	-	-	-	-	-	-	-	-
346	Scyliorhinus canicula	IUCN SSC Shark Specialist Group	2020	Extant (resident)	CHONDRICHTHY ES	CARCHARHINIFORME S	SCYLIORHINIDAE	Scyliorhinus	Least Concern	2020	-	-	Least Concern	2014	-	-	-	-
347	Gouania hofrichteri	IUCN Marine Biodiversit y Unit	2024	Extant (resident)	ACTINOPTERYGII	GOBIESOCIFORMES	GOBIESOCIDAE	Gouania	-	-	-			-	Least Concern	2024	-	-
348	Aetomylaeus bovinus	IUCN SSC Shark Specialist Group	2015	Extant (resident)	CHONDRICHTHY ES	MYLIOBATIFORMES	MYLIOBATIDAE	Aetomylaeus	Critically Endangere d	2021	Critically Endangered	2021	Critically Endangere d	2014	-	-	-	-
349	Carcharhinus brachyurus	IUCN SSC Shark Specialist Group	2020	Extant (resident)	CHONDRICHTHY ES	CARCHARHINIFORMES	CARCHARHINIDAE	Carcharhinus	Vulnerable	2020	Data Deficient	2016	Data Deficient	2014	-	-	-	-
350	Carcharhinus plumbeus	IUCN SSC Shark Specialist Group	2020	Extant (resident)	CHONDRICHTHY ES	CARCHARHINIFORMES	CARCHARHINIDAE	Carcharhinus	Endangere d	2021	Endangered	2016	Endangere d	2014	-	-	-	-
351	Dasyatis pastinaca	IUCN SSC Shark Specialist Group	2020	Extant (resident)	CHONDRICHTHY ES	MYLIOBATIFORMES	DASYATIDAE	Dasyatis	Vulnerable	2020	Vulnerable	2016	Vulnerable	2014	-	-	-	-
352	Gymnura altavela	IUCN SSC Shark Specialist Group	2021	Extant (resident)	CHONDRICHTHY ES	MYLIOBATIFORMES	GYMNURIDAE	Gymnura	Endangere d	2019	Critically Endangered	2016	Critically Endangere d	2015	-	-	-	-
353	Mustelus asterias	IUCN SSC Shark Specialist Group	2020	Extant (resident)	CHONDRICHTHY ES	CARCHARHINIFORMES	TRIAKIDAE	Mustelus	Near Threatened	2020	Vulnerable	2016	Near Threatened	2014	-	-	-	-
354	Mustelus mustelus	IUCN SSC Shark Specialist Group	2020	Extant (resident)	CHONDRICHTHY ES	CARCHARHINIFORMES	TRIAKIDAE	Mustelus	Endangere d	2020	Vulnerable	2016	Vulnerable	2014	-	-	-	-
355	Mustelus punctulatus	IUCN SSC Shark Specialist Group	2020	Extant (resident)	CHONDRICHTHY ES	CARCHARHINIFORMES	TRIAKIDAE	Mustelus	Vulnerable	2020	Vulnerable	2016	Vulnerable	2014	-	-	-	-
356	Myliobatis aquila	IUCN SSC Shark Specialist Group	2020	Extant (resident)	CHONDRICHTHY ES	MYLIOBATIFORMES	MYLIOBATIDAE	Myliobatis	Critically Endangere d	2020	Vulnerable	2016	Vulnerable	2014	-	-	-	-
357	Pristis pectinata (possibly extinct)	IUCN SSC Shark Specialist Group	2022	Possibly Extint	CHONDRICHTHY ES	RHINOPRISTIFORMES	PRISTIDAE	Pristis	Critically Endangere d	2022	Critically Endangered	2016	Critically Endangere d	2015	-	-	-	-
358	Raja asterias	IUCN Species Specialist Group	2016	Extant (resident)	CHONDRICHTHY ES	RAJIFORMES	RAJIDAE	Raja	-	-	Near Threatened	2016	-	-	-	-	Least Concern	2024

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359	Raja miraletus	IUCN SSC Shark Specialist Group	2018	Extant (resident)	CHONDRICHTHY ES	RAJIFORMES	RAJIDAE	Raja	Least Concern	2019	Least Concern	2016	Least Concern	2015	-	-	-	-
360	Raja montagui	IUCN SSC Shark Specialist Group	2024	Extant (resident)	CHONDRICHTHY ES	RAJIFORMES	RAJIDAE	Raja	Least Concern	2023	Least Concern		Least Concern		-	-	-	-
361	Raja undulata (presence uncertain)	IUCN SSC Shark Specialist Group	2009	presence uncertain	CHONDRICHTHY ES	RAJIFORMES	RAJIDAE	Raja	Near Threatened	2023	Near Threatened	2016	Near Threatened	2015	-	-	-	-
362	Rhinobatos rhinobatos (possibly extinct)	IUCN SSC Shark Specialist Group	2020	Possibly Extint	CHONDRICHTHY ES	RHINOPRISTIFORMES	RHINOBATIDAE	Rhinobatos	Critically Endangere d	2020	Endangered	2016	Endangere d	2020	-	-	-	-
363	Rhinoptera marginata	IUCN SSC Shark Specialist Group	2020	Extant (resident)	CHONDRICHTHY ES	MYLIOBATIFORMES	RHINOPTERIDAE	Rhinoptera	Critically Endangere d	2020	Data Deficient	2016	Data Deficient	2014	-	-	-	-
364	Rostroraja alba	IUCN	2023	Extant (resident)	CHONDRICHTHY ES	RAJIFORMES	RAJIDAE	Rostroraja	Endangere d	2022	Endangered	2016	Critically Endangere d	2014	-	-	-	-
365	Scyliorhinus stellaris	IUCN SSC Shark Specialist Group	2021	Extant (resident)	CHONDRICHTHY ES	CARCHARHINIFORMES	SCYLIORHINIDAE	Scyliorhinus	Vulnerable	2020	Near Threatened	2016	Near Threatened	2014	-	-	-	-
366	Somniosus rostratus	IUCN SSC Shark Specialist Group	2020	Extant (resident)	CHONDRICHTHY ES	SQUALIFORMES	SOMNIOSIDAE	Somniosus	Least Concern	2019	Data Deficient	2016	Data Deficient	2015	-	-	-	-
367	Squalus acanthias	IUCN	2019	Extant (resident)	CHONDRICHTHY ES	SQUALIFORMES	SQUALIDAE	Squalus	Vulnerable	2019	Endangered	2016	Endangere d	2014	-	-	-	-
368	Torpedo marmorata	IUCN SSC Shark Specialist Group	2020	Extant (resident)	CHONDRICHTHY ES	TORPEDINIFORMES	TORPEDINIDAE	Torpedo	Vulnerable	2019	Least Concern	2016	Least Concern	2014	-	-	-	-
369	Torpedo torpedo	IUCN SSC Shark Specialist Group	2020	Extant (resident)	CHONDRICHTHY ES	TORPEDINIFORMES	TORPEDINIDAE	Torpedo	Vulnerable	2020	Least Concern	2016	Least Concern	2014	-	-	-	-
370	Carcharhinus limbatus	IUCN SSC Shark Specialist Group	2020	Extant (resident)	CHONDRICHTHY ES	CARCHARHINIFORMES	CARCHARHINIDAE	Carcharhinus	Vulnerable	2020	Data Deficient	2016	Data Deficient	2014	-	-	-	-
371	Leucoraja fullonica	IUCN SSC Shark Specialist Group	2024	Extant (resident)	CHONDRICHTHY ES	RAJIFORMES	RAJIDAE	Leucoraja	-	-	Critically Endangered	2016	-	-	-	-	Vulnerable	2024

7.2 Annex 02 Geophysical survey report

7.3 Annex 03A Report on possible ruins of an ancient shipwreck

7.4 Annex 03B Archaeological baseline assessment report

7.5 Annex 04 Current meter data analysis report

7.6 Annex 05 Acoustic data analysis report

7.7 Annex 06 Environmental baseline survey report

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