



Survey of the Status of Important Fauna Species in the Kyparissiakos Lease Area

Final Report

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Project Team

Name	Company	Expertise	Role
Tasos Dimalexis	NCC Ltd.	PhD Biologist, Ornithologist	Coordinator, Ornithologist, drone surveys
Jakob Fric	NCC Ltd.	Physicist, Ornithologist	Ornithologist, GIS & Data management
Thanos Kastritis	NCC Ltd.	PhD Oceanographer, Ornithologist	Ornithologist, Field Surveys
Alvaro Bahillo Villarte	NCC Ltd.	Biologist, Ornithologist	Seabird ecologist, field researcher
Marie Fevotte	NCC Ltd.	Marine Biologist, Msc. Oceanographer	Field researcher
Margarita Theodora Tzali	NCC Ltd.	Environmental Engineer, Msc. Oceanographer	Data management, Marine expert
Panagiotis Dendrinis	BIOTOPIA	PhD Biologist	Coordinator, Marine Expert
Styliani Adamantopoulou	MOm	Biologist, Monk Seal Expert	Data Analysis
Kimon Koentzopoulos	MOm	MSc Marine Biologist, Certified Marine Mammal Observer	Field Research & Data Compilation
Panagiotis Batzios	BIOTOPIA	System Engineer/Field Technician	Field Research and technical coordination
Odysseas Paxinos	MOm	Msc, Oceanographer, Seal Specialist	Field Research & Data Compilation
Alexandros Karamanlidis	MOm	PhD Biologist, Monk Seal Expert	Field Research & Data Compilation
Kostantinos Margaris	BIOTOPIA	MSc Marine Resource Management, Certified Marine Mammal Observer, Certified Passive Acoustic Monitoring Operator	Marine Mammal Observer, PAM Operator
Kostas Papakonstantinou	NCC Ltd.	Boat skipper	Boat skipper
Antonios Bourikas	MOm	Boat skipper	Boat skipper

Abbreviations and scientific names

<i>Calonectris diomedea</i>	Scopoli's Shearwater
<i>Caretta caretta</i>	Loggerhead Turtle
<i>Chelonia mydas</i>	Green Turtle
<i>Delphinus delphis</i>	Short-beaked Common Dolphin
<i>Grampus griseus</i>	Risso's Dolphin
<i>Hydrobates pelagicus</i>	European Storm-Petrel
ESAS	European Seabirds At Sea (survey method)
<i>Larus audouinii</i>	Audouin's Gull
<i>Larus michahellis</i>	Yellow-legged Gull
<i>Monachus monachus</i>	Mediterranean Monk Seal
n.m.	nautical mile
<i>Phalacrocorax aristotelis desmarestii</i>	Mediterranean Shag
<i>Physeter macrocephalus</i>	Sperm Whale
<i>Puffinus yelkouan</i>	Yelkouan Shearwater
<i>Stenella coeruleoalba</i>	Striped Dolphin
SAC	Special Area of Conservation (Natura 2000 network)
SPA	Special Protection Area (Natura 2000 network)
SDF	Standard Data Form (Natura 2000 datasheet)
<i>Tursiops truncatus</i>	Common Bottlenose Dolphin
WP	Work Package
<i>Ziphius cavirostris</i>	<i>Cuvier's Beaked Whale</i>

Summary

The present document consists of the **Final Report** of the **Work Packages I-IV** of the project **“Survey of the Status of Important Fauna Species in the Kyparissiakos Lease area” (Block 10)** and incorporates the results of the surveys that were carried out in summer and autumn 2022.

The Work Packages included pelagic and aerial surveys for marine mammals, seabirds and sea turtles, coastal surveys for the Mediterranean monk seal and seabirds and telemetry of Scopoli’s shearwater and Loggerhead turtles movements.

The aim of the project was to provide sufficient and documented data on the status of marine mammals, seabirds and sea turtles in the project area, as well as other sensitive elements and locations that should be prioritized by a future monitoring program.

The present project is a continuation of the ongoing project “Survey of the Status of Important Fauna Species in the Kyparissiakos Lease area”, implemented during the last three years (2020, 2021 and 2022). The main results of the study are:

- The low densities of cetaceans within the Project Area.
- The assessment of the importance, at Mediterranean level, of the breeding colony of Scopoli’s shearwater at Strofadia Islands.
- The documentation of the behaviour, movements and the feeding grounds of the species through telemetry and monitoring with drones and thermal cameras.
- The assessment of the great importance of the Project Area for the migration of the Loggerhead turtles.
- The great importance of the adjacent to the project area (and within the wider project area) island of Zakynthos for the Mediterranean monk seal and the importance of Kyparissiakos bay as a “genetic bridge” for Mediterranean monk seals between the populations of the Ionian and the Aegean Seas.

1 Introduction

In the context of Environmental Monitoring and Recording of Critical Environmental Indicators of Biodiversity, such as marine mammals (cetaceans and monk seals), sea turtles and seabirds, the Hellenic Petroleum Exploration & Production of Hydrocarbons Kyparissiakos Gulf Single Member S.A. company has assigned to Nature Conservation Consultants (NCC) Ltd a contract for conducting the present Project, namely the “Survey of the Status of Important Fauna Species in the Kyparissiakos Lease area” (Block 10).

The Project consists of 4 work packages (WP):

- I. **Pelagic Surveys for marine mammals, seabirds, sea turtles, nearshore and in the open sea**, using an open water RIB vessel, a single engine aircraft, in combination with drone surveys.
- II. **Coastal surveys for monk seals, Scopoli’s shearwater and Mediterranean shag breeding sites in the coastal zones of the adjacent Natura 2000 sites**, , using inflatable RIB boats.
- III. **Sea turtle telemetry** by putting transmitters to record the adult turtle distribution in the lease area, during inter-nesting intervals, as well as their occurrence in the wider region. The action takes place during the spring and summer 2022.
- IV. **Scopoli’s Shearwater telemetry** by tagging 10 breeding individuals with GPS/GSM transmitters to assess their seasonal distribution/occurrence within the Block 10 area, the use of this area as foraging habitat, the interaction with adjacent lease areas and with fisheries activities, as well as the overall sensitivity of the Strofades islets breeding population to the potential impacts of the hydrocarbon research/exploration activities.

The present document consists of the **Final Progress Report** of the **Work Packages WP I-IV**. It presents the field surveys carried out during 2022 and the results in each Work Package of the project “Survey of the Status of Important Fauna Species in the Kyparissiakos Lease area”.

The present project is the 2022 continuation of the ongoing project “Survey of the Status of Important Fauna Species in the Kyparissiakos Lease area”, implemented in 2020 and 2021.

2 Description of the Project Area

The **Project Area** is located in the Ionian Sea, southeast of Zakynthos Island and west of Peloponnese, approximately from the latitude town Zacharo in the north and town Methoni in the south. It extends between latitudes of 36°50'N in the south and 37°30'N in the north and between longitudes of 20°55'E in the west and 21°30'E in the east. Its total surface area is 3,422.5 km² (Figure 2-1).

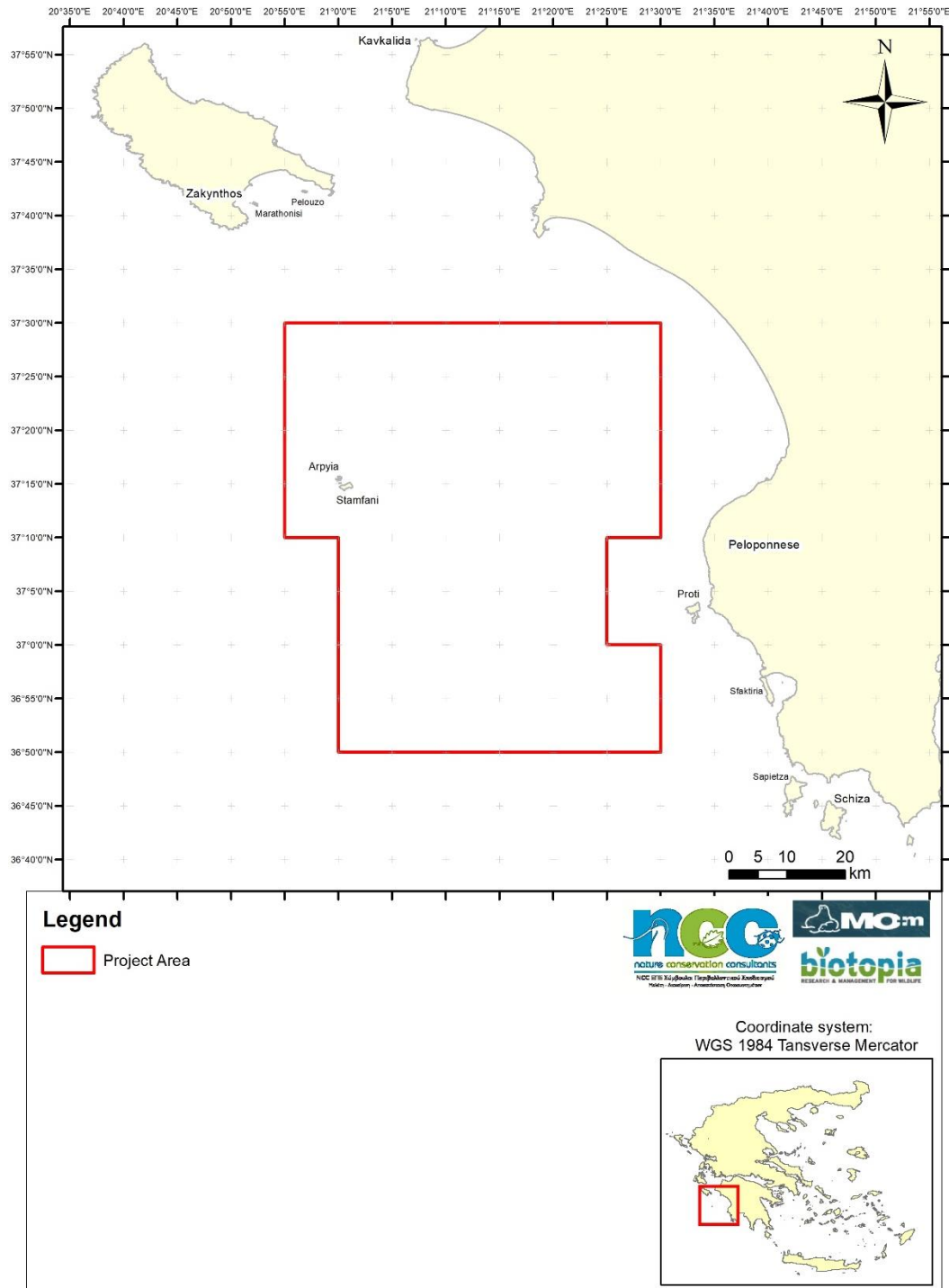


Figure 2-1. Project Area

The **Wider Project Area** envelops the project area and extends further north and east to additionally include the southwestern, south-eastern and eastern coast of Zakynthos, and the western coast of Peloponnese south of Kyllini, together with their neighbouring islets (Figure 2-2). The **Pelagic Survey Area**, where pelagic surveys are carried out includes the primarily the Project Area together with neighbouring waters to the east.

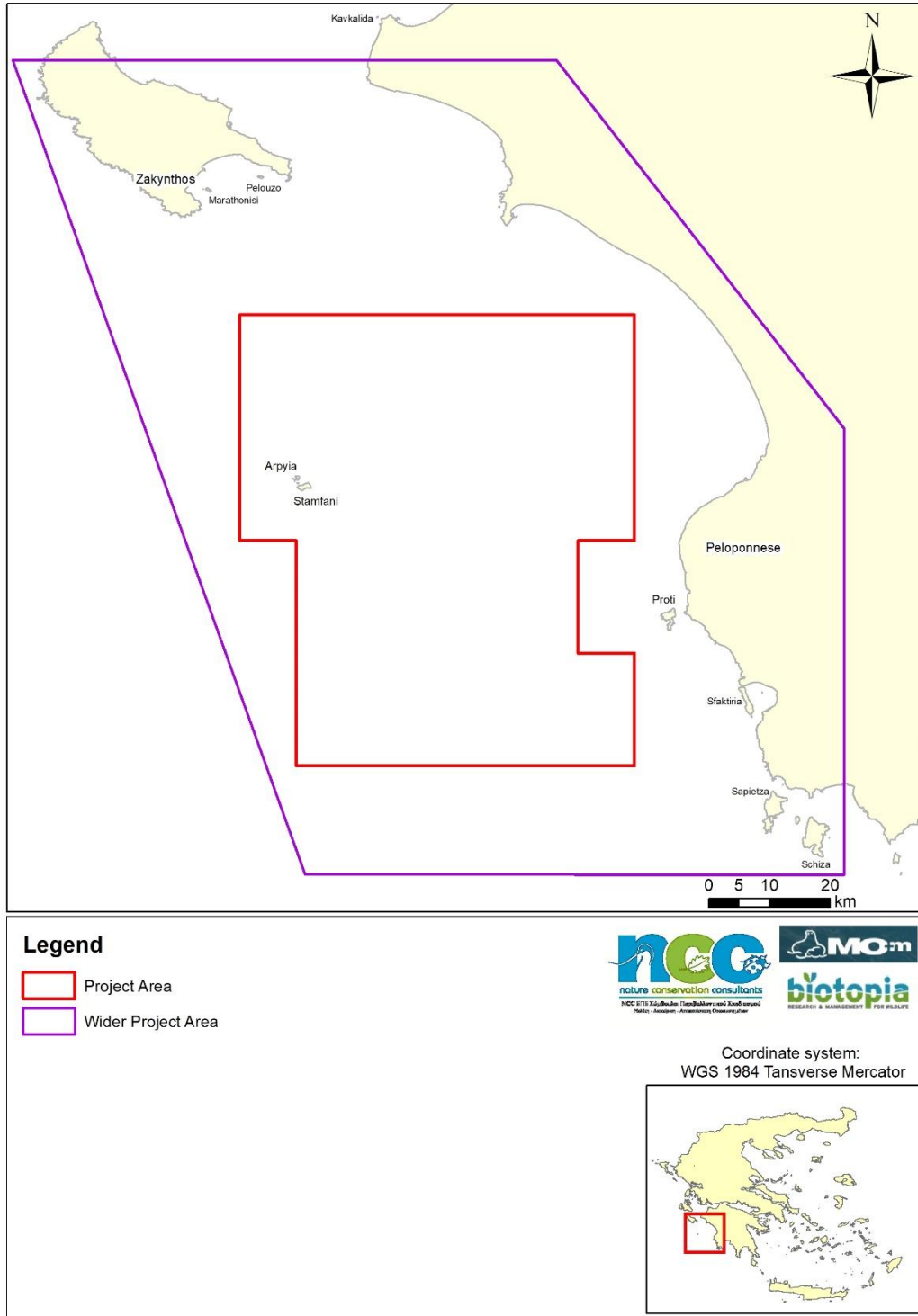


Figure 2-2. Wider Project Area

2.1 Oceanographic characteristics of the Project Area

The sea depth within the Project Area exceeds 500m and reaches more than 3,500m at its southwestern corner. The only exception are the Strofades islets in the west, which are surrounded by a narrow belt of coastal waters (Figure 2-3).

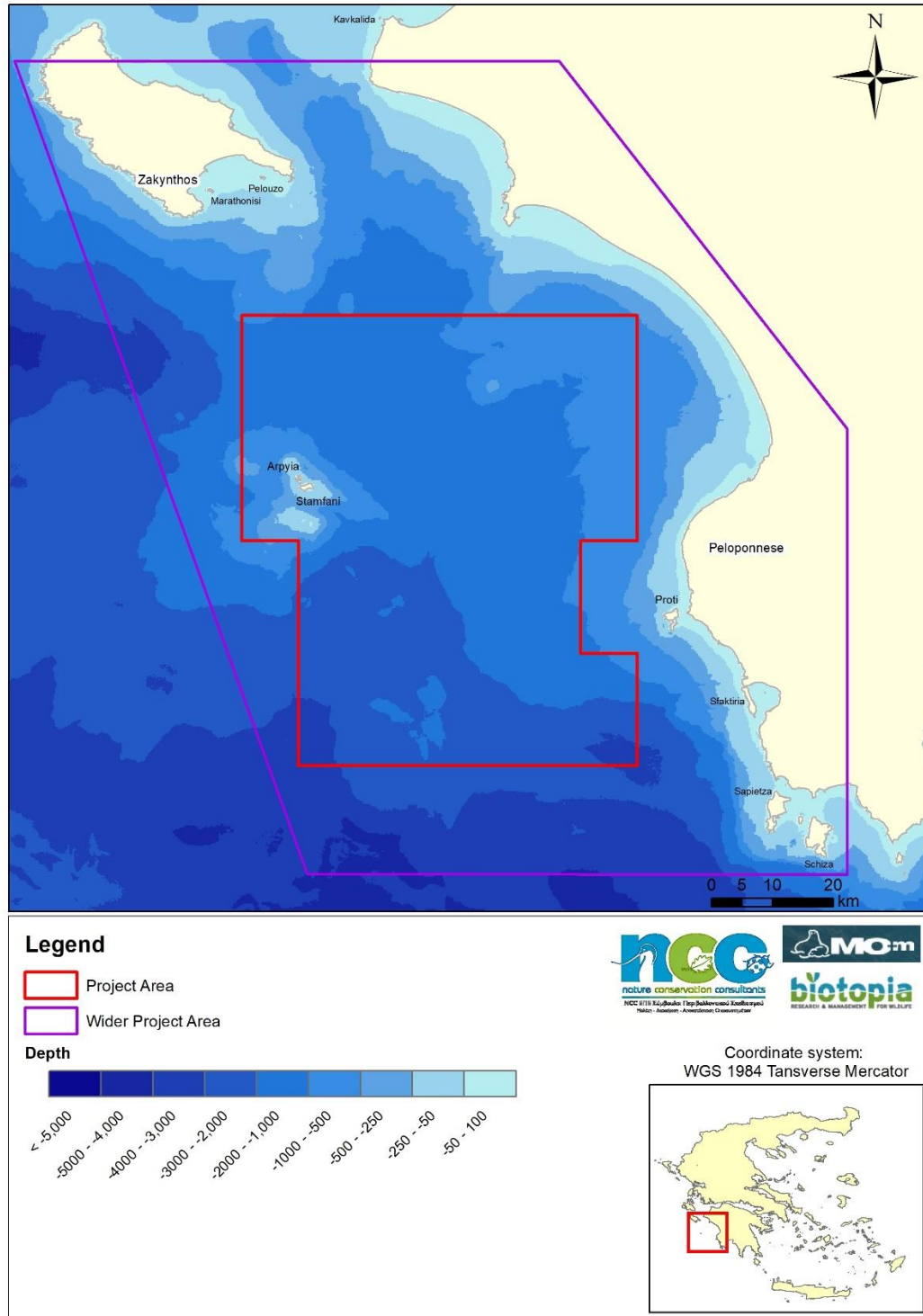


Figure 2-3. Bathymetry in the Project Area

In northern, north-eastern and eastern part of the Wider Project Area the slope of the sea floor descends gradually, without abrupt breaks towards southwest, however the southern and the western part exhibit numerous abrupt descends of the sea floor, accompanied by step slopes of the sea floor reaching up to 53° (Figure 2-4).

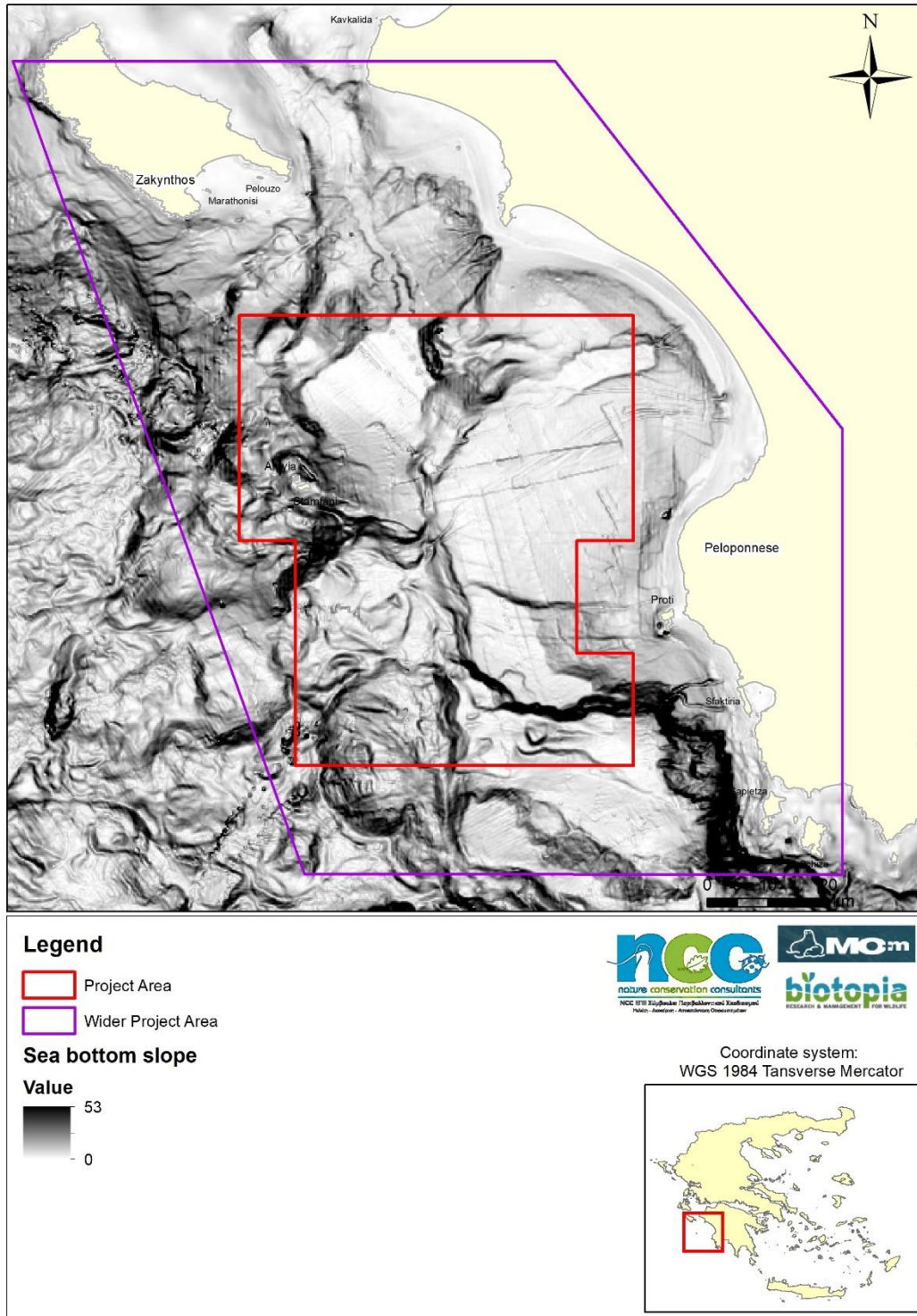


Figure 2-4. Slope of the sea floor in the Wider Project Area

2.2 Natura 2000 sites within the Wider Project Area

There are **twelve (12) Natura 2000 sites with marine or coastal component**, which partly overlap with the wider Project Area. These include two Special Protection Area (SPA): GR2210004 and GR2550008; nine Special Areas of Conservation (SAC): GR2210002, GR2210003, GR2330005, GR2330008, GR2550003, GR2550004, GR2550005, GR2550007 and GR2550010, as well as, one SPA/SAC: GR2210001.

Table 1: Natura 2000 sites in the Wider Project Area

Site code	Site name	Site type
GR2210001	DYTIKES KAI VOREIOANATOLIKES AKTES ZAKYNTHOU	SPA / SAC
GR2210002	KOLPOS LAGANA ZAKYNTHOU (AKR. GERAKE - KERI) KAI NISIDES MARATHONISI KAI PELOUZO	SAC
GR2210003	NISOI STROFADES	SAC
GR2210004	NISIDES STAMFANI KAI ARPYIA (STROFADES) KAI THALASSIA ZONI	SPA
GR2330005	THINES KAI PARALIAKO DASOS ZACHAROS, LIMNI KAIAFA, STROFYLIA, KAKOVATOS	SAC
GR2330008	THALASSIA PERIOCHI KOLPOU KYPARISSIAS: AKR. KATAKOLO - KYPARISSIA	SAC
GR2550003	NISOI SAPIENTZA KAI SCHIZA, AKROTIRIO AKRITAS	SAC
GR2550004	LIMNOTHALASSA PYLOU (DIVARI) KAI NISOS SFAKTIRIA, AGIOS DIMITRIOS	SAC
GR2550005	THINES KYPARISSIAS (NEOCHORI - KYPARISSIA)	SAC
GR2550007	THALASSIA PERIOCHI STENOY METHONIS	SAC
GR2550008	LIMNOTHALASSA GIALOVAS KAI NISOS SFAKTIRIA	SPA
GR2550010	THALASSIA PERIOCHI NOTIAS MESSINIAS	SAC

“Nisoi Strofades” GR2210003 (SAC): The marine area of the site includes coastal waters around Strofades Islets, delineated by the isobath of 50m. The species of interest listed in the sites Standard Data Form (SDF) include the Mediterranean monk seal (*Monachus monachus*) and Common Bottlenose Dolphin (*Tursiops truncatus*).

“Nisides Stamfordi kai Arpyia (Strofades) kai Thalassia Zoni” GR2210004 (SPA): The site includes Strofades Islets and a 2.7 nautical mile marine extension around these two Islets. The islets host one of the largest Scopoli’s Shearwater (*Calonectris diomedea*) colonies in Greece (2,000-3,000bp). The waters surrounding Strofades are used to form large Scopoli’s Shearwater congregations (rafts)(17,000-18,000 individuals). The deep waters of the adjacent Hellenic Trench provide ideal environment conditions for cetaceans, such as the Sperm Whale (*Physeter macrocephalus*), the Curvier’s Beaked Whale (*Ziphius cavirostris*) and all three dolphin species, which are frequently observed in the area i.e. Common bottlenose dolphin (*Tursiops truncatus*), Striped dolphin (*Stenella coeruleoalba*) and Risso’s dolphin (*Grampus griseus*). Other species of interest also present in the area include Yelkouan Shearwater (*Puffinus yelkouan*)

“Thalassia Periochi Notias Messinias” GR2550010 (SAC): The site includes national territorial waters along southwest Peloponnesse including island Proti and small islets Schiza, Sapientza and Venetiko. The marine part of the site consists mainly of pelagic waters over the locally steep continental shelf of the Hellenic Trench, although coastal shallow waters form part of the site as well, especially around the small islands Schiza, Sapientza and Venetiko. The marine area of the site is very important for cetaceans, since at least four species inhabit the area. These are the bottlenose dolphin (*Tursiops truncatus*) along the coastal shallow waters and the sperm whale (*Physeter macrocephalus*), the Cuvier’s beaked whale (*Ziphius cavirostris*) and the striped dolphin (*Stenella coeruleoalba*) in the deep offshore waters. A population of loggerhead turtle (*Caretta caretta*) uses the beaches for nesting -the most important is the beach Zaga/Memi- and the marine area in front of the beaches is used for mating and resting between successive nestings (inter-nesting area). Green turtles (*Chelonia mydas*) are also present in the area.

“Dytikes kai Voreioanatolikes Aktes Zakynthou” GR2210001 (SPA/SAC): The site stretches from Agios Nikolaos Bay, northwest Zakynthos, to Marathias Cape, south Zakynthos. It consists of rocky coast and adjacent coastal waters. The site includes nesting and foraging areas for the Mediterranean Shag (*Phalacrocorax aristotelis desmarestii*). The marine area provides shelter for the Mediterranean monk seal (*Monachus monachus*) and is critically important for the nesting Loggerhead turtles (*Caretta caretta*) (29 subadults). Other species of interest present in the area include Scopoli’s Shearwater (*Calonectris diomedea*), Yelkouan shearwater (*Puffinus yelkouan*), Green turtle (*Chelonia mydas*), Common bottlenose dolphin (*Tursiops truncatus*), Fin Whale (*Balaenoptera physalus*), Risso’s dolphin (*Grampus griseus*) and Short-beaked common dolphin (*Delphinus delphis*) (10 individuals).

“Kolpos Lagona Zakynthou (Akr. Geraki - Keri) kai Nisides Marathonisi kai Pelouzo” GR2210002 (SAC): The site includes the Laganas Bay and the islets Marathonisi and Pelouzo in southeast of the Zakynthos Island. The coastal zone of Laganas is extended for some kilometres inland and 10-15 kilometres in the sea and it is considered as a site with high biological importance exactly because of the presence of biotopes as sandy beaches, sea cliffs, coastal lakes, tidal rivers, etc. The site is among the most important nesting areas for the Loggerhead turtle (*Caretta caretta*) in the Mediterranean (412-1,009 females), therefore of critical importance for the species, including its sandy beaches and the marine area of the bay. The marine area also provides shelter for the Mediterranean monk seal (*Monachus monachus*) (30-50 individuals). Other species of interest present in the area include Mediterranean Shag (*Phalacrocorax aristotelis desmarestii*), Scopoli’s Shearwater (*Calonectris diomedea*), Common bottlenose dolphin (*Tursiops truncates*) and Short-beaked common dolphin (*Delphinus delphis*).

“Thines kai Paraliako Dasos Zacharos, Limni Kaiafa, Strofylia, Kakovatos” GR2330005 (SAC): The site consists of a coastal zone located in the southern part of the Ileia Prefecture and comprises the pine forest of Strofylia, the lake Kaiafa, the dunes extending between the drained lake Agoulinitza and the village Kakovatos, the hill Elliniko (or Stavros), the archaeological site of Kaiafa area, the caves of Anygrides Nymphes, and the curative spring of

Kaiafa. This area includes one of the most important nesting sites of Loggerhead turtle (*Caretta caretta*) in Greece and in the eastern Mediterranean (65 bfemales). The Loggerhead turtle has found a very good nesting beach where a number of 53-99 nests per reproductive season have been counted; this value corresponds to 7 nests/km/season and it exceeds the figure of 5 nests/km/season which is considered the lower limit for the characterization of a sandy beach as important for the nesting of the Loggerhead turtle. Mediterranean monk seal (*Monachus monachus*) is also present in the area.

“Thalassia Periochi Kolpou Kyparissias: Akr. Katakolo – Kyparissia” GR2330008 (SAC): This marine area expands from Cape Katakolo to Kyparissia town in western Peloponnisos. The Loggerhead turtle (*Caretta caretta*) uses the Posidonia meadows for resting and feeding (176 subadults). Studies have shown that the adjacent sandy beaches of the bay are very important nesting areas for the Loggerhead turtle. The other species of interest recorded at the site is the Green turtle (*Chelonia mydas*).

“Nisoi Sapientza kai Schiza, Akrotirio Akritas” GR2550003 (SAC): The site covers Cape Akritas (SW Peloponnisos) and the neighbouring islands of Schiza and Sapientza, as well as the islets of Venetiko, Ag. Mariani, Avgo, etc., of the Oinouses island group. The area hosts Loggerhead turtle (*Caretta caretta*) and Mediterranean monk seal (*Monachus monachus*).

“Limnothalassa Pylou (Divari) kai Nisos Sfaktiria, Agios Dimitrios” GR2550004 (SAC): The site includes the bay of Navarino, Divari lagoon of Pylos (Gialova) and the island Sfaktiria. Loggerhead turtle (*Caretta caretta*) and Mediterranean monk seal (*Monachus monachus*) are present in the site. The "closed" Pylos Gulf is probably used by Loggerhead turtles as a favourable area for the lodging and development of juveniles and young, and for an adult feeding ground (18 subadults). However, the nesting activity in this site is low (2-15 bfemales).

“Thines Kyparissias (Neochori - Kyparissia)” GR2550005 (SAC): This site is a part of the Western Peloponnese coastline, with very favourable ecological conditions for sand-dune development. It is considered one of the most significant nesting beaches for the Loggerhead turtle (*Caretta caretta*) in Greece and in the eastern Mediterranean (163-855 breeding females). In the part of beach lying between the estuaries of the rivers Nedas and Arkadikos (about 10km in length), a significant nest production rate of 228-700 nests per reproductive season has been reported. Mediterranean monk seal (*Monachus monachus*) is also present in the site.

“Thalassia Periochi Stenou Methonis” GR2550007 (SAC): The site is located in southern Peloponnese and includes the coasts from cape Kolyvri to Chondros Kavos, as well as the northern coasts of Sapientza island. Among the species of interest the site hosts Mediterranean monk seal (*Monachus monachus*) and Common bottlenose dolphin (*Tursiops truncatus*).

“Limnothalassa Gialovas kai Nisos Sfaktiria” GR2550008 (SPA): The site is located in the southwestern part of Peloponnisos. The western part of the bay is closed by the elongated island of Sfaktiria which has an orientation parallel to that of the opposite coast. Among numerous species of waterfowl, waders, gulls/terns and raptors, the area also hosts the Mediterranean Shag (*Phalacrocorax aristotelis desmarestii*).

Additionally, an Important Bird Area (IBA) is located within the Project Area, namely GR087 “Nisides Strofades”, while the Project Area is part of the Important Marine Mammal Area (IMMA) “Hellenic Trench”.

GR087 “Nisides Strofades” (IBA): The site covers the two Strofades islands, as well as the adjacent marine area. The site is the most important area for the breeding of Scopoli’s shearwater in Greece, as it hosts the largest breeding colony of the species at national level. It is also an important stop-over site for the migration of birds during spring and autumn.

“Hellenic Trench” (IMMA): The area is the core habitat for the eastern basin distribution of the Endangered Mediterranean sperm whale subpopulation. This eastern Mediterranean distribution includes some 200-250 animals threatened by potentially unsustainable ship-strikes. Additionally, the Hellenic Trench features a sub-area which is the largest among five high-density areas of Mediterranean occurrence for Vulnerable Cuvier’s beaked whales that have suffered repeated mass stranding events in the area.

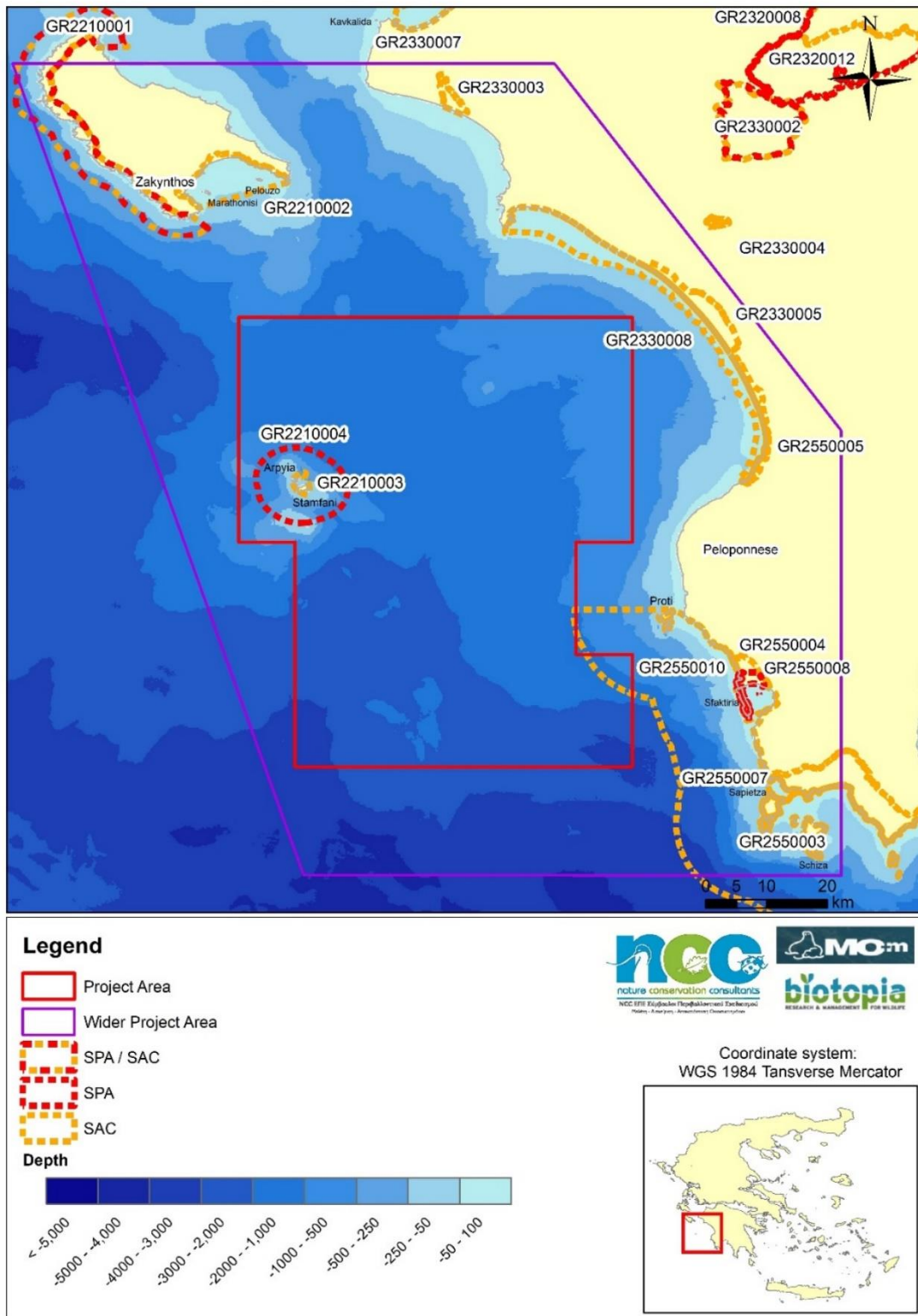


Figure 2-5. Natura 2000 sites in the wider area of the Kyparissiakos Lease area

2.3 General information of the main cetacean, seabird and sea turtle species in the Project Area

2.3.1 Cetaceans

Hellenic seas host an unexpectedly high diversity of cetaceans with eight (8) species that are resident in the area, seven (7) of which belong to the Odontoceti suborder: Sperm Whale (*Physeter macrocephalus*), Cuvier's Beaked Whale (*Ziphius cavirostris*), Risso's Dolphin (*Grampus griseus*), Bottlenose Dolphin (*Tursiops truncatus*), Striped Dolphin (*Stenella coeruleoalba*), Short-beaked Common Dolphin (*Delphinus delphis*) and Harbour Porpoise (*Phocoena phocoena*) along with one representative of the Mysticeti suborder: Fin Whale (*Balaenoptera physalus*). The Harbour Porpoise is restricted to the Thracian Sea and North Aegean Sea, while the others are present one or more seas in Greece (Frantzis et al. 2003).

It is important to note that due to the semi-enclosed nature of the Mediterranean basin, in combination with its very particular oceanographic features and oligotrophic waters especially moving towards the east of the basin, cetacean species populations of the Mediterranean (which occur elsewhere in the world also) are treated separately by the IUCN, when it comes to the designation of their threat status and population trends. In the majority of cases, the Mediterranean subpopulation of cetacean species have at least one level higher in their designated threat status than the global population for the same species or are classified as Data Deficient.

The Wider Project Area is located along the Hellenic Trench, which is one of the most important areas for cetaceans in Greece. With the exception of the Harbour Porpoise (found only locally in the north-eastern Aegean) and the Fin Whale (observed mainly in the Ionian Sea, along the Hellenic Trench, north of Kefallonia), the remaining 6 commonly occurring species of cetaceans inhabiting Greek waters have been sighted or recorded as stranding in the Wider Project Area.

Table 2-1. General types of habitats, bathymetric characteristics and distance from coast of recorded presence in Greek seas of common cetacean species that are present in the Wider Project Area (from Frantzis 2009).

Species	Common name	Habitat		
		Type	Depth	Distance from coast
<i>Physeter macrocephalus</i>	Sperm whale	Slope, secondarily pelagic	1235 m (510-2933 m)	8.1 km (1.6-25.2 km)
<i>Ziphius cavirostris</i>	Cuvier's beaked whale	Slope, probably pelagic as well	1066 m (491-2279 m)	8.6 km (2.1-26.5 km)
<i>Grampus griseus</i>	Risso's dolphin	Slope, probably over its shallower part	737 m (165-1717 m)	8.2 km (0.3-28.3 km)
<i>Tursiops truncatus</i>	Common bottlenose dolphin	Typically, coastal, also over shallow waters "offshore"	121 m (1-1504 m)	3.0 km (0.0-26.0 km)
<i>Stenella coeruleoalba</i>	Striped dolphin	Typically, pelagic and slope	1024 m (75-2920 m)	8.7 km (0.6-37.1 km)
<i>Delphinus delphis</i>	Short-beaked Common dolphin	Coastal and shallow, ("pelagic" and deep only in the Gulf of Corinth)	86 m (11-274 m) Gulf of Corinth: 713 m (275-935)	8.7 km (0.6-37.1 km)

The Wider Project Area includes, coastal areas, continental shelf and slope, as well as pelagic areas. For the purpose of the present study and based on the types of marine habitats typically used by the species present in the Wider Project Area, the focus of pelagic surveys is primarily on the species with regular presence in the Wider Project Area, namely the **Sperm Whale (*Physeter macrocephalus*)**, **Cuvier's Beaked Whale (*Ziphius cavirostris*)**, **Striped Dolphin (*Stenella coeruleoalba*)** and **Risso's dolphin (*Grampus griseus*)** in the pelagic and continental slope areas, and **Short-Beaked Common Dolphin (*Delphinus delphis*)** and **Bottlenose Dolphin (*Tursiops truncatus*)** in coastal areas. Accounts on the biology, ecology, as well as conservation and threat status of the cetacean species of interest are provided below. It should be noted that large data gaps are still present regarding the distribution and abundance of cetaceans in the eastern Mediterranean (Mannocci et al. 2018).

2.3.1.1 Sperm Whale (*Physeter macrocephalus*)



Figure 2-6. Sperm Whale (*Physeter macrocephalus*) (© Massimo Demma/ICRAM)

The second largest cetacean found in Greece and the largest Odontocetus found globally is the Sperm Whale (*Physeter macrocephalus*). The Sperm Whale prefers deep water habitats particularly deep continental slope water where they hunt their preferred prey, large mesopelagic cephalopods (Frantzis 2009, Notarbartolo di Sciara et al. 2012).

The Hellenic Trench is considered to be the species core habitat for the eastern Mediterranean sub-population (Frantzis et al. 2014). The total species population size in the Greek Seas is estimated at 180 – 280 individuals (2013-18 Habitats Directive Article 17 Reporting at <https://nature-art17.eionet.europa.eu/article17/>), the population size in the Hellenic Trench 200 – 250 individuals (Frantzis et al. 2014) and the estimated population size in the Ionian Sea, including international and Italian waters 62 individuals (95% CI: 24-165 individuals, in Lewis et al. 2003), however this is likely to be an underestimation (Frantzis 2009).

2.3.1.2 Cuvier's Beaked Whale (*Ziphius cavirostris*)

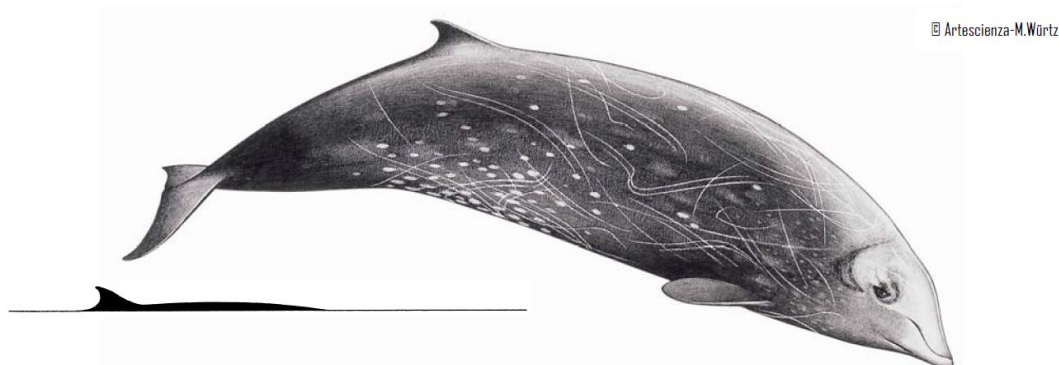


Figure 2-7. Cuvier's Beaked Whale (*Ziphius cavirostris*) (©Artescienza-M.Würtz)

Cuvier's Beaked Whale, a medium sized odontocetus, shares the same habitat and distribution as that described for the Sperm Whale, namely the continental slope. Almost all past species sightings occurred above depths of 500-1,500m (Frantzis et al. 2003). It is the only beaked whale common in the Mediterranean Sea. In Greece, the majority of past sightings are associated with the Hellenic Trench, from eastern Rodos Island to northwest Corfu Island (Frantzis et al. 2003, Frantzis 2009) with the highest number of sightings south of Crete and west of Lefkada (Frantzis et al. 2003, Podestà et al. 2016). Along the Hellenic Trench the species feeds almost exclusively on mesopelagic and bathypelagic cephalopods (Frantzis

2009). Several sightings and numerous strandings have been recorded in the Wider Project Area (based on Frantzis 2009).

The Hellenic Trench is one of the species high-density areas in the Mediterranean. The total species population size in the Greek Seas as well as in the Wider Project Area is unknown (2013-18 Habitats Directive Article 17 Reporting at <https://nature-art17.eionet.europa.eu/article17/>). It is worth noting that Greek seas are considered to host quite a significant portion of the Mediterranean population (Frantzis 2009).

2.3.1.3 Risso's Dolphin (*Grampus griseus*)



Figure 2-8. Risso's dolphin (*Grampus griseus*) (© Massimo Demma)

Risso's dolphin is the largest dolphin that commonly occurs in the Greek Seas. The sightings and strandings records indicate that the species is present in all parts of the Greek Seas, however the only known area where the species is predictably present is the Myrtoon Sea extending south to the north-western Crete. The species is present in the Ionian Sea, as confirmed by strandings which have been recorded from north Corfu Island to south Peloponnese. No sighting records have been made in the Ionian Sea which indicates that either the species is present in low numbers or it is present outside warm period when past surveys have been made. The strandings in the Ionian Sea have been recorded from the end of September until late April. The species is present primarily along the continental slope, preferably deep water and shelf break where the slope is the steepest, but also close to the coast, particularly when the shelf is narrow (Frantzis 2009). The species feeds mainly with squid and occasionally with fish.

The total species population size in the Greek Seas is estimated to be 100 – 600 individuals (2013-18 Habitats Directive Article 17 Reporting at <https://nature-art17.eionet.europa.eu/article17/>). The population size in the in the Wider Project Area is unknown.

2.3.1.4 Bottlenose dolphin (*Tursiops truncatus*)

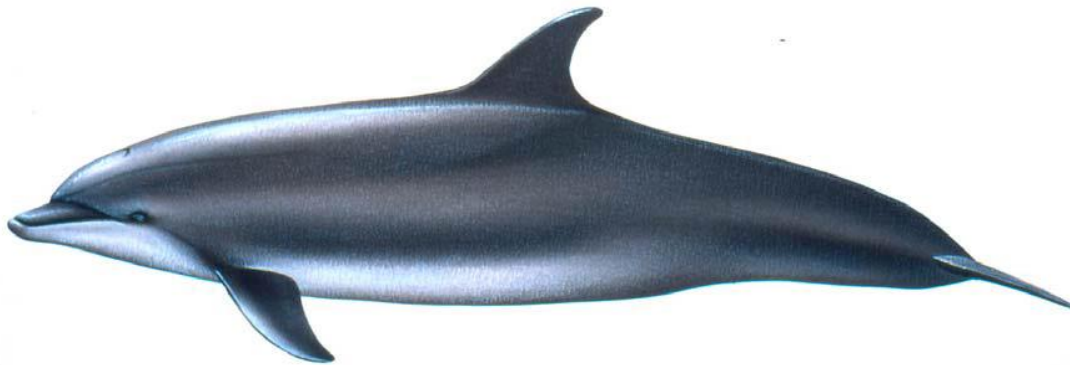


Figure 2-9. Common bottlenose dolphin (*Tursiops truncatus*) (© Artescienza-M. Würtz)

The bottlenose dolphin is the most common species of dolphin found in coastal shallow waters of the Mediterranean (Frantzis 2009). It is homogeneously distributed across all Greek Seas as it has been sighted in most coastal areas, straits and gulfs. (Frantzis 2009). The Bottlenose Dolphin in Greece, similar to Short-beaked Common Dolphin prefers the continental shelf usually staying within a depth of up to 200m (Frantzis 2009). It is known to consume a variety of prey items being quite adaptive.

The total species population size in the Greeks Seas is estimated to be 3,800 – 9,000 individuals (2013-18 Habitats Directive Article 17 Reporting at <https://nature-art17.eionet.europa.eu/article17/>). The population size in the in the Wider Project Area is unknown.

2.3.1.5 Striped dolphin (*Stenella coeruleoalba*)

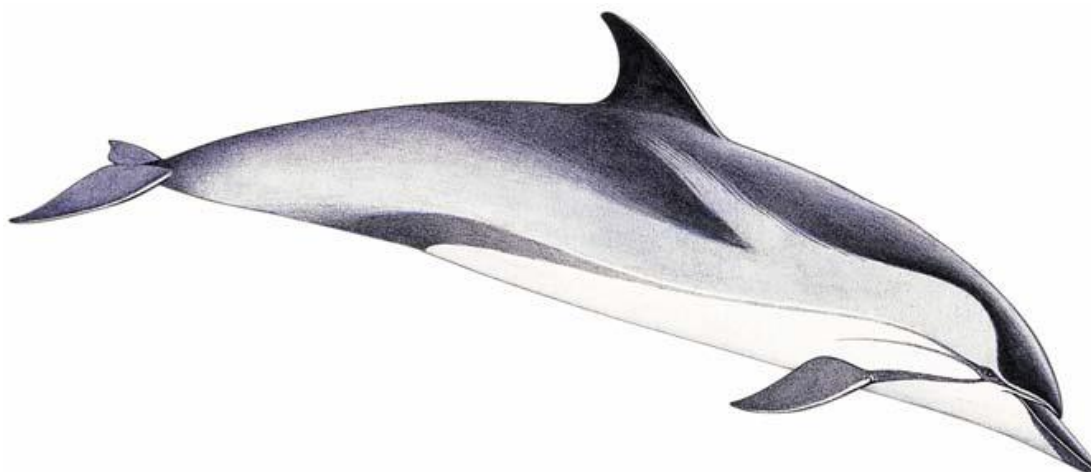


Figure 2-10. Striped dolphin (*Stenella coeruleoalba*) (© Massimo Demma/ICRAM)

The Striped Dolphin, a small delphinid, has a year-round presence in Greek waters. It is the most abundant dolphin species in Greece and the Mediterranean overall (Frantzis 2009). Its distribution in Greece is widespread and it occurs in all deep (>500m), pelagic waters and the continental slope but it can also inhabit intermediate depths of 200-500m (Frantzis 2009). The Striped Dolphin is frequently sighted along the length of the Hellenic Trench. The species diet includes mainly cephalopods, as well as fish and crustaceans.

The total species population size in the Greeks Seas is estimated to be 20,000 – 80,000 individuals (2013-18 Habitats Directive Article 17 Reporting at <https://nature-art17.eionet.europa.eu/article17/>). The population size in the in the Wider Project Area is unknown.

2.3.1.6 Short-beaked common dolphin (*Delphinus delphis*)

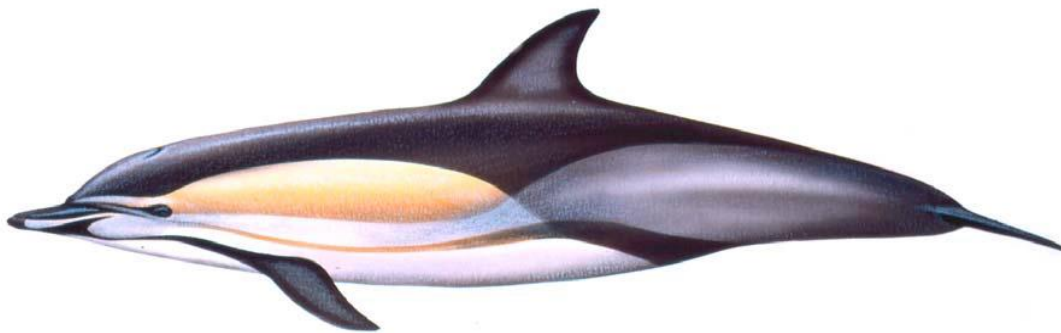


Figure 2-11. Short-beaked common dolphin (*Delphinus delphis*) (© Artescienza-M. Würtz)

The Short Beaked Common Dolphin (or simply Common Dolphin) is a small delphinid with a year-round presence in Greek waters. Its distribution in Greece is patchy and their presence seems to be mostly limited to the central and northern Greek Seas (Frantzis 2009). In general, it prefers shallow (<200m) and coastal waters, with exception of Gulf of Corinth where it exhibits preference to pelagic habitats (Frantzis 2009). It exhibits flexible feeding habits. The distribution of the Common Dolphin in the Ionian Sea the is limited to shallow waters between north Lefkada, Kefallonia and south Zakynthos and the mainland. In the Inner Ionian Sea, the main prey includes shoaling fish e.g., anchovies and sardines.

The total species population size in the Greeks Seas is estimated to be 750 – 4,200 individuals (2013-18 Habitats Directive Article 17 Reporting at <https://nature-art17.eionet.europa.eu/article17/>).

The population of Common Dolphins of the Inner Ionian Sea has been the focus of regular surveys for years and has been well documented (Bearzi et al. 2008B). The local population counted 150 individuals until the mid-90s and their range seemed to cover the entire Inner Ionian. Since then, the population has declined dramatically with only an estimated 15 individuals encountered over the past years mostly sighted in southern Lefkada (Bearzi et al. 2008B).

2.3.2 Seals

2.3.2.1 Mediterranean Monk Seal



©G. Gousis/MOM

Figure 2-12. Striped dolphin (*Stenella coeruleoalba*) (© Massimo Demma/ICRAM)

The Mediterranean Monk Seal is the only pinniped (seal) living in the Mediterranean region, the rarest extant member of the Phocidae family and one of the rarest marine mammals in the world.

Mediterranean monk seals were once widely and continuously distributed in the Mediterranean and Black Seas, and in the North Atlantic waters from Morocco to Cap Blanc, including the Canary, Madeira and the Azores Islands. A few individuals have been recorded in Senegal, the Gambia and the Cape Verde Islands in the southern end, as well as in Portugal and Atlantic France in the northern end of the species' distribution. Today the distribution of the Mediterranean is highly fragmented and consists of three to four isolated subpopulations (Karamanlidis et al. 2016). In the Mediterranean Sea, the stronghold of the species has been on islands in the Ionian and Aegean Seas, and along the coasts of Greece and western and southern Turkey ((Güçlüsoy, Kiraç, Ververi, & Savaş 2004, Gücü, Gücü, & Örek 2004, Anonymous, 2007). In the North Atlantic, two subpopulations exist: one at Cabo Blanco (also known as Cap Blanc) at the border of Mauritania and Western Sahara (González & Fernandez de Larrinoa 2012, Martínez-Jauregui et al. 2012), and one at the Archipelago of Madeira (Pires, Neves, & Karamanlidis, 2008). An unknown number of monk seals might still survive at the Mediterranean coasts of eastern Morocco (and perhaps Algeria) (Mo, Bazairi, Bayed, & Agnesi, 2011), but without on-going systematic conservation actions the fate of this subpopulation is unknown.

The total species population size in the Greece is estimated to be 300 – 400 individuals (2013-18 Habitats Directive Article 17 Reporting at <https://nature-art17.eionet.europa.eu/article17/>).

2.3.3 Sea turtles

There are three species of sea turtles that regularly occur in the Mediterranean: **Loggerhead Turtle (*Caretta caretta*)**, **Green Turtle (*Chelonia mydas*)** and **Leatherback sea turtle (*Dermochelys coriacea*)**. The sea turtles live almost exclusively in the marine environment with females returning to land for dig nests and lay eggs, while males almost never return to

land. The range of all three species extends along the Wider Project Area (Legakis & Maragou 2009, 2013-18 Habitats Directive Article 17 Reporting: species range), however only Loggerhead Turtle and Green Turtle have been recorded in the area (2013-18 Habitats Directive Article 17 Reporting: species distribution). Among these two the Loggerhead Turtle is the species of interest due to its regular presence and nesting in the Wider Project Area of the Kyparissia Bay, while the Green Turtle is regular but rare visitor in the area. The Leatherback sea turtle is only considered in Greece to be a visitor from the Atlantic (Casale & Margaritoulis 2010).

2.3.3.1 Loggerhead turtle (*Caretta caretta*)



Figure 2-13. Loggerhead Turtle (*Caretta caretta*)

The Loggerhead turtle is an oceanic turtle with a global distribution. It is a migratory species and may travel thousands of kilometres to forage and to return to its breeding sites. After hatching, logger-head turtles adopt an oceanic lifestyle in major current systems (Bolten and Witherington 2003). After 4-19 years spent in the oceanic zone, they move to neritic areas where they forage and mature over 10-39 years (Arens and Snover 2013). After attaining sexual maturity, they migrate between neritic foraging grounds and nesting areas. The Mediterranean, where the species is nesting in the eastern basin (Legakis & Maragou 2009), the breeding population of the loggerhead turtle is spread over tens of rookeries which are estimated to produce over 7,200 nests annually (Casale & Margaritoulis 2010) with the majority of nests being found in Greece. The country's two most important nesting beaches are located in the Wider Project Area, namely on Zakynthos (Laganas Bay) and on Peloponnese (Kyparissia Bay), which host 43% and 19% of all nests in Greece, respectively (Legakis & Maragou 2009). The average number of nests per season for the period 1984-2007 at Laganas Bay and at Kyparissia Bay are 1,244 nests/season (range: 833-2,018 nests/season) and 621 nests/season (range: 286-927 nests/season) (Casale & Margaritoulis 2010). Currently, Kyparissia Bay hosts the largest Loggerhead turtle nesting aggregation in the Mediterranean Sea (Rees et al. 2020).

In Greece and in the Central Mediterranean, the turtles after hatching disperse mainly in the Ionian, south-central Mediterranean and Adriatic Seas (Casale & Mariani 2014). Loggerhead turtles, especially juveniles, forage in almost all oceanic areas in the Mediterranean. Water circulation system has the greatest effect on their distribution (Casale et al. 2018). The neritic foraging areas (i.e., those located above continental shelf) are more frequently used by larger turtles, including adults (Casale et al. 2018, Figure 2-14). Loggerhead turtles generally

overwinter within or close to their foraging areas, however some may move from cold areas e.g., Adriatic Sea during winter (Casale et al. 2018).

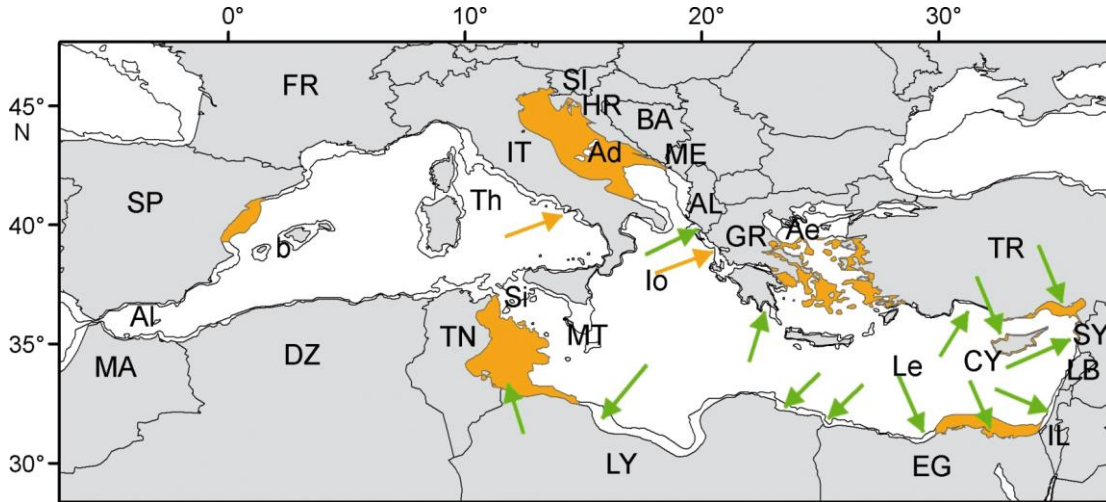


Figure 2-14. Neritic foraging and wintering sites for loggerhead turtles (orange areas and arrows) and green turtle (green arrows) (adopted from Casale et al. 2018).

Migration corridors, are areas which are frequently used by migrating turtles, mainly for adult breeding migration and particularly for post-breeding migration from breeding areas to foraging grounds. Therefore, these migratory corridors are used at the end of the breeding season, in May and June by males, while in July and August, mostly by females (Casale et al. 2018). The main migration corridors are presented in Figure 2-15.

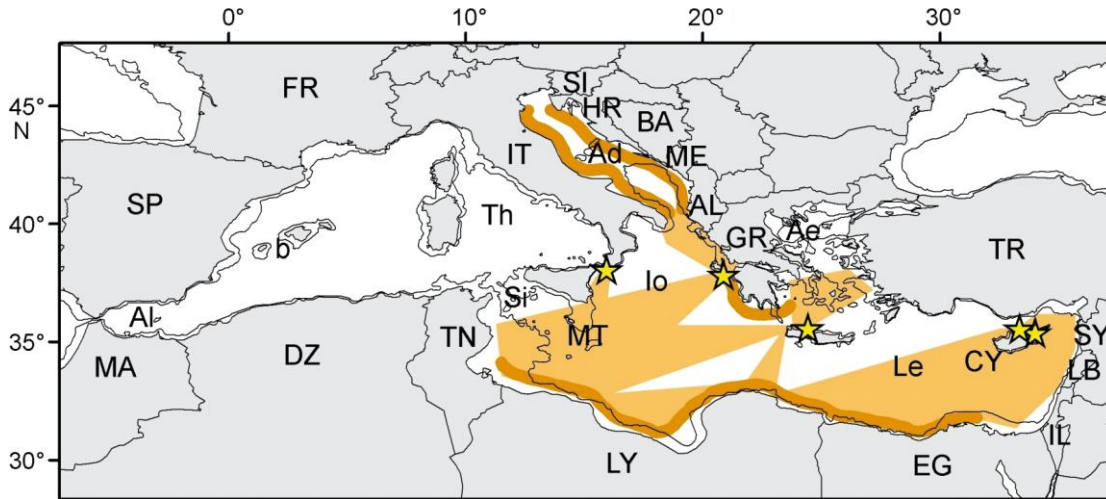


Figure 2-15. Main known migratory corridors for adult loggerhead turtles to and from breeding sites (stars). Light brown areas represent migratory funnels in the open sea while darker strips represent paths along the coasts, typically in shallow waters (adopted from Casale et al. 2018).

The movements of the Loggerhead turtles nesting in the Ionian Sea, particularly those from Zakynthos has been well studied by satellite or GPS telemetry (e.g., Zbinden et al. 2008, Schofield et al. 2010a-c, Schofield et al. 2013, Luschi & Casale 2014). The data from 75 tracked turtles breeding on Zakynthos showed after breeding the turtles migrate to neritic sites with waters shallower than 100m, with the majority of turtles migrate north to the Adriatic Sea and Amvrakikos Gulf (42%) or south-west to Libya and Tunisia (32%), while the remaining either

stay in the Ionian Sea or move to the eastern or western Mediterranean (Zbinden et al. 2008, Schofield et al. 2013). After leaving their foraging areas (in October – November) the tracked turtles move to their overwintering areas further south (Zbinden et al. 2008). The main foraging and overwintering areas are presented in the Map 11, below. The main foraging areas are located over the continental shelves and slopes (Ullmann & Stachowitsch 2015) in the Northern and Southern Adriatic Sea, Ionian Sea, the Strait of Sicily and the Tunisian shelf. A small proportion (~7%) were resident to Zakynthos. Significantly more males than females remain within 100km of Zakynthos (Schofield et al. 2013).

2.3.3.2 Green turtle (*Chelonia mydas*)

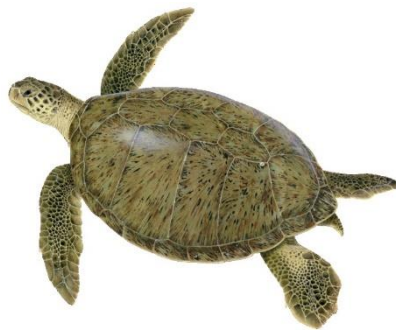


Figure 2-16. Green turtle (*Chelonia mydas*)

The green turtle (*Chelonia mydas*) is an migratory oceanic turtle with a global distribution. Their nesting sites in the Mediterranean are located mostly in Turkey, Cyprus and Syria (Figure 2-14) with an average of 1500 nests per year. No regular nesting areas are located in Greece. They use mostly marine areas in the Levantine basin, but also forage in Greece and Libya, as well as occasionally in the Adriatic Sea and the western Mediterranean basin (Figure 2-17). In Greece local concentration have been found in Lakonikos Bay, southern Peloponnese. Stranding data indicate that there is a more frequent presence of adult green turtles in southern Aegean (Casale & Margaritoulis 2010). The species has been recorded in the Wider Project Area.

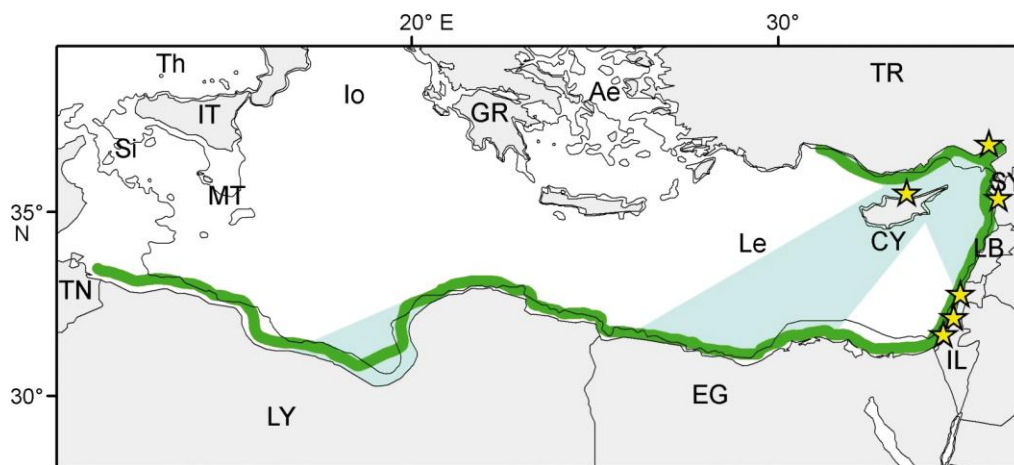


Figure 2-17. Main known migration corridors for adult female green turtles during reproductive migrations from the breeding sites (stars) (adopted from Casale et al. 2018).

2.3.4 Seabirds

For the purpose of the present study, only those seabird species which are exclusively associated with the marine environment and the pelagic area, that have been recorded in the Ionian Sea in the past and their presence in the wider Project area has been either confirmed. These species include pelagic seabird species: **Scopoli's Shearwater (*Calonectris diomedea*)**, **Yelkouan Shearwater (*Puffinus yelkouan*)** and **European Storm-petrel (*Hydrobates pelagicus*)**, as well as, coastal seabird species which could be present in the pelagic areas due to shallow waters in the Project area or due to human activities, i.e. **Yellow-legged Gull (*Larus michahellis*)** and the **Mediterranean Shag (*Phalacrocorax aristotelis desmarestii*)**.

2.3.4.1 Scopoli's's Shearwater (*Calonectris diomedea*)



Figure 2-18. Scopoli's Shearwater (*Calonectris diomedea*) (© Paul Hirst)

Scopoli's Shearwater (*Calonectris diomedea*) breeds across Mediterranean with the majority of the population spending the non-breeding season in the Atlantic. In the past it was considered conspecific with the Cory's Shearwater (*Calonectris borealis*) which breeds in the Atlantic. In Greece the species breeding in the Aegean and Ionian Sea with the largest known colony being located at Strofades Islets (within the Project Area), south of the Zakynthos Island in the Ionian Sea, with an estimated breeding population of 5,550 pairs (Karris et al. 2017). Other large colonies occur mainly in the southern, central and eastern Aegean Sea although breeding has also been confirmed in the northern Aegean Sea (Fric et al. 2012). The only other known breeding area in the Ionian Sea is at Diapontia islands at Kerkyra with much smaller breeding population of 60-100 pairs (Fric et al. 2012).

2.3.4.2 *Yelkouan Shearwater (Puffinus yelkouan)*



Figure 2-19. *Yelkouan Shearwater (Puffinus yelkouan)* (© Paul Hirst)

Yelkouan Shearwater is an endemic species to the Mediterranean and the Black Sea. The known species colonies in Greece are located in the Aegean Sea, while no colonies have been found so far in the Ionian Sea. The main known colonies are located the North, East and Central Aegean Sea (Fric et al. 2012), with the largest being on Gyaros island in the Northern Cyclades (Fric & Portolou 2016). During the non-breeding season Yelkouan Shearwaters disperse widely within the Mediterranean Sea (mainly Adriatic and Aegean Seas) and the Black Sea. Additionally, 4,000-6,000 individuals are estimated to overwinter in the Aegean Sea. The main foraging areas of the Yelkouan Shearwaters are rich coastal and pelagic fishing grounds in the North, Central and East Aegean Sea, while the species is less common in the South Aegean and Ionian Seas (Fric et la. 2012).

The global species population is estimated at 15,337-30,519 pairs with a decreasing population trend (30% in the next 54 year i.e., three generations). Ten colonies in the Mediterranean Sea have disappeared during the last 60 years (Derhe 2012B, BirdLife International 2015, Birdlife International 2018B). The national population is estimated at 4,000-7,000 pairs (without the inclusion of the Gyaros colony which is estimated at 3,090-7,450 pairs), equivalent to 22% percent of the global population (more than 38% with the inclusion of the Gyaros population). The national population trend is estimated to be stable.

2.3.4.3 *European Storm-petrel (Hydrobates pelagicus)*



Figure 2-20. *European Storm-petrel (Hydrobates pelagicus)* (© Paul Hirst)

European Storm-petrel is the smallest seabird species in the Western Palearctic. Its distribution is limited mainly to the Northeast Atlantic Ocean and the West Mediterranean Sea, while the Aegean Sea comprises the easternmost part of its range. The Mediterranean

subspecies *Hydrobates pelagicus melitensis* comprises less than 5% of the overall global population (i.e., 12,000-17,500 breeding pairs) with the main colonies located in Malta, Sicily and the Balearic Islands. The species occurs in all Greek seas mainly in spring and summer during the breeding period. Up to date only two colonies have been located, one in the Central Aegean Sea and another in the Cyclades. Storm-petrels, usually individual birds, or very small groups, are regularly observed in the Cyclades, Dodecanese, Central and southwest Aegean Sea and the Karpathian Sea suggesting potential existence of other breeding colonies (Fric et al. 2012).

2.3.4.4 Mediterranean Shag (*Phalacrocorax aristotelis desmarestii*)



Figure 2-21. Mediterranean Shag (*Phalacrocorax aristotelis desmarestii*) (© Jens Overgaard Christensen)

Mediterranean Shag is a cormorant species, resident and widely spread in Greece which usually occurs in coastal waters. Shags breed colonially, forming small, loose (rarely dense) colonies, on cliff ledges or small caves or even under thick vegetation. Nesting sites are re-used in successive years by the same birds. They often roost in large groups (Fric et al. 2012). It is a good swimmer and a foot-propelled diver which feed on benthic and pelagic fish in waters with depths up to 80 m which are usually located in coastal zones within a 20 km radius around their colony or roosting sites (Wanless *et al.* 1991; Velando and Friere 1999).

The Greek national population size is 1,300 -1,450 pairs (Fric et al. 2012), equivalent to 2% of the species European population (BirdLife International 2015, BirdLife International 2018D). The population in Greece is considered to be stable (Fric et al. 2012). The island of Zakynthos hosts an important population of the Mediterranean Shag (i.e., 44-46 adult and juvenile individuals) (Portolou et al. 2009, Fric et al.2012). The species breeds along the western coast of the Zakynthos and forages in coastal waters along the western and eastern coast, including the Bay of Laganas. Therefore, the major breeding and foraging areas of the Mediterranean Shag around Zakynthos Island are located outside the Project Area and within the Wider Project Area.

2.3.4.5 Yellow-legged Gull (*Larus michahellis*)

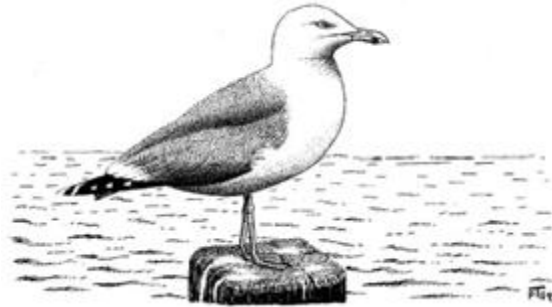


Figure 2-221. Yellow-legged Gull (*Larus michahellis*) (© Paul Hirst)

The Yellow-legged Gull is the most common gull species in Greece. It is widely distributed around the southern regions of the Palaearctic, from the western part of the Black Sea across to the Mediterranean, Iberian Peninsula, and reaching the Macaronesian region. Breeding grounds are centred mainly around the Mediterranean but reach also the Black Sea, Caspian Sea and eastern Atlantic. In Greece, the species is resident and widespread all along the coastline of mainland Greece and of the islands of the Aegean and Ionian Seas.

In Greece, the largest breeding colonies are located on uninhabited islets of the Evvoikos and Saronikos Gulfs that surround Attica, the most urbanised area in the country, although colonies occur on most Greek islets (Fric et al. 2012). Wintering grounds include the coast of southwest Asia, most of the European coast up to Denmark and the coast of Africa from Western Sahara through the eastern Mediterranean (del Hoyo *et al.* 1996).

3 Methodology

3.1 Pelagic surveys

Pelagic boat surveys for cetaceans, sea turtles and seabirds were carried out using i) a 7,5m length RIB boat, ii) a 9m length motorboat and iii) a DJI drone.



Figure 3-1. The two research vessels used for the boat surveys: RIB boat “Ydrobathis II” and motorboat “Saria”.

3.1.1 Boat surveys

The method applied for visual surveying seabirds, cetaceans and sea turtles in the Pelagic surveys area was the **European Seabirds at Sea (ESAS)**, based on Tasker *et.al* 1984 and Champhuysen & Garthe 2004 and adopted to Greek/Mediterranean conditions through the LIFE-Nature project for the Identification of Marine Important Bird Areas (marine IBAs) in Greece, entitled “Concrete Conservation Actions for the Mediterranean Shag and Audouin’s Gull in Greece, including the Inventory of Relevant Marine IBAs”, LIFE07 NAT/GR/000285, (<http://www.ornithologiki.gr/en/seabirds>), as described in Fric & Gaganis 2009.

In summary, the method is aiming at systematically recording seabirds, cetaceans and sea turtles as well as human activities in the survey area, in transects by trained observers, from a boat which is moving at a constant low speed (<15 knots). Swimming seabirds, cetacean, fish and sea turtles are being recorded continuously in a 300m wide strip transect in **5-minute intervals**, while flying birds are recorded with **1-min snapshot**. Scanning angle is 180° (*i.e. in front of the survey vessel*). The perpendicular distance of swimming fauna is recorded relative to the transect line ahead of the ship: **A = 0-50m, B = 50-100m, C = 100-200m, D = 200-300m, E = >300m, W = within 300m, but no distance recorded**. For flying birds, coded with **F**, there is no distance indication. Boat position (**poskey**), namely geographical longitude and latitude, are recorded every 5 min. The marine species are spotted by a naked eye or binoculars and are identified by binoculars.



Figure 3-2. ESAS field work

A method described by Heinemann (1981) is used to determine the distances at sea and more particularly the distance of 300m from the observing platform which determines the width of the line transect by using a calliper or a ruler. During ESAS surveys data is recorded regarding (A) boat route, (B) marine species and (C) human activities in the survey area, which may have an effect on the presence and behaviour of the marine species.

Survey boat data include: start and end location date, time and geographical location of each line transect, sea state, visibility and floating matter (including fishing vessels). Species data recorded include: species, number of individuals, age (if applicable), distance from the observation vessel, location within or outside 300m line transect, flight direction (for birds), behavior and association with human activities or other species. Datasheets for observation vessel data and species data are provided in Annex I.

The **survey design for cetaceans** is similar to the established methodology designs for such surveys, used over the past 4 decades (Buckland et al. 2001, Buckland et al. 2004) and used a grid of parallel line transects, that provided comprehensive coverage of the study area.

The transect lines acted as the basis for the daily track line followed by the vessel providing a roughly uniform coverage of the study area. Attempts were made when selecting the orientation of the transect lines, to have them move across (at an angle to) the depth gradient in the area as opposed to moving along (parallel to) the depth gradient. This was done to allow for the coverage of different depth levels during navigation of each transect, in order to minimize detection bias on individual transect lines when mapping sighting data.

When a group of cetaceans is sighted (group defined 'dolphins observed in apparent association, moving in the same direction and often, but not always, engaged in the same activity' (Bearzi et al. 2005) by any of the on-effort observers, the systematic search effort is interrupted while the vessel diverted from the track line toward the sighted animals in order to achieve more accurate determinations of the species, the group size, group age class composition and group activity of the group sighted. In addition to basic environmental data (e.g., Beaufort sea state, visibility conditions etc.) collected at regular 1 hour intervals as well as at the start and at the end of each transect line, data collected for each sighting includes the time, GPS coordinates, initial bearing and radial distance to the cetacean group (used to calculate the perpendicular distance of the sighting to the track line), species identity, group size, group age class composition (3 age classes: Calf < 1/2 length of adult, Juvenile < 2/3 length of adult and adult) and the general activity in which the group is engaged in at the time of approach (e.g. foraging, travelling, milling). For the purpose of the correct identification of the species as well as the correct recording of group size and group age class composition attempts are made to approach the animals to obtain photographs. Where possible the photographs taken are also used for the photo-identification of individuals. This is done to ensure the same group of animals was not counted twice during the same survey day.

Encounter Rates are calculated as the number of encounters / 100km of "on effort" navigation.

The navigation schedule coincided with the Visual boat-based surveys.

In case a group of cetaceans or seabirds was spotted, a drone was used in order to more accurately identify the species and assess the number of the individuals, record their behaviour and gather the relevant photographic evidence.

The numbers of individuals of each species recorded by ESAS surveys were transformed into species densities per km², taking into account the $2 \times 300m = 600m$ transect survey width and the distance travelled by the survey vessels per 5-minute time interval $distance\ travelled = boat\ speed \times 5\ min$. The locations of number of recorded individuals per species and the density of individuals per species were overlaid 4 geographical minutes (4'x4') reference grid in WGS84 projection coordinate system (Map 5).

Taking into account that more than one may have crossed each 4'x4' reference grid cell, for each cell the following variables were calculated:

- The **average** over all survey trips of the **total number of individuals per species** recorded in a 4'x4' grid cell per trip

- The **maximum** over all survey trips of the **total number of individuals per species** recorded in a 4'x4' grid cell per trip
- The **average** over all survey trips of the **average density of individuals per km² per species** in a 4'x4' grid cell per trip
- The **average** over all survey trips of the **maximum density of individuals per km² per species** in a 4'x4' grid cell per trip
- The **maximum** over all survey trips of the **average density of individuals per km² per species** in a 4'x4' grid cell per trip
- The **maximum** over all survey trips of the **maximum density of individuals per km² per species** in a 4'x4' grid cell per trip

It should be noted that individuals recorded outside transect are excluded from density calculation. The densities of the species per reference grid cell are representative of the **habitat suitability**. The variable “**average over all survey trips of the average density of individuals per km² per species** in a 4'x4' grid cell per trip” was used as a measure of habitat suitability for each species. This variable was classified into 4 classes:

- **Most suitable habitats** – top 5% of positive (i.e., non-zero) densities in grid cells
- **More suitable habitats** – 25-5% top values of positive densities in grid cells
- **Suitable habitats** – 75-25% top values of positive densities in grid cells, and
- **Presence** – remaining grid cells with species presence (bottom 25% values).

To further analyse the **patterns of seabird movements** in the area for each grid cell the **prevailing flight directions** were calculated. Additionally, **locations of interactions of seabirds with fisheries** were identified in association with their abundance in absolute numbers.

Finally, for each grid cell the **number of species of interest recorded** in the grid cell was calculated to identify those areas where the **species richness** is the greatest.

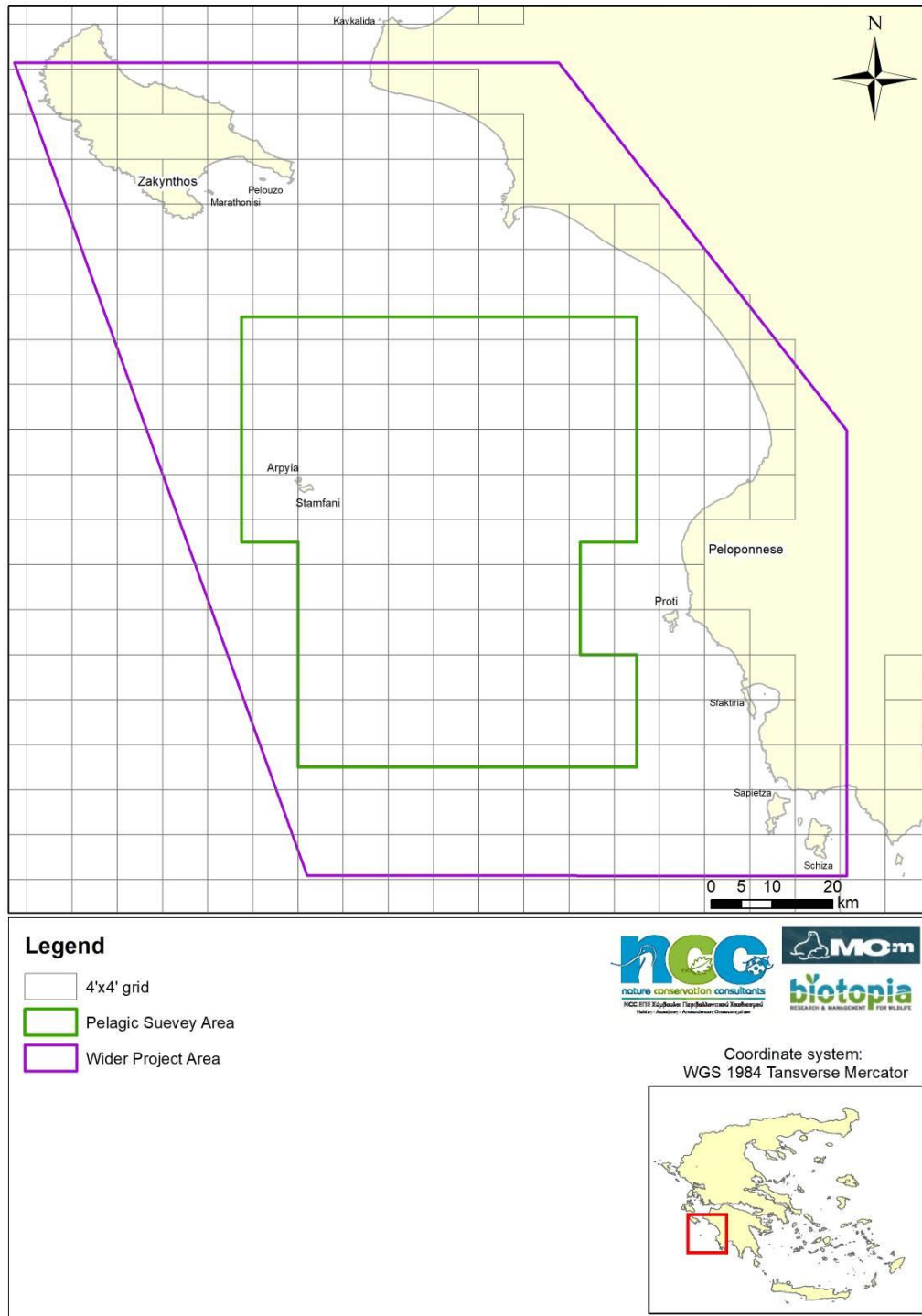


Figure 3-3. Four decimal minute (4'x4') reference grid in WGS84 coordinate system

3.1.2 Acoustic surveys

The acoustics detection team worked in cooperation with the visual observers, detecting cetacean vocalizations by using a hydrophone array towed behind the vessel “Saria”. The hydrophone array system consisting of High Frequency Magrec HP03 hydrophone elements, comprising a HP03 preamp (Low cut filter set at 2kHz) with a nominal sensitivity of 1.5kHz – 150kHz along with a topside Magrec HP/27ST Amplifier along with a Lenovo Thinkpad Laptop using the PAMGUARD acoustic analysis software specifically developed for cetacean monitoring, covering the range of possible vocalizations for species likely to be encountered during our surveys. The towed hydrophone system was submerged and active, and a PAM operator was active on the equipment during all “On Effort” times during the survey. The hydrophone system consists of 2 hydrophones which record in 2 different channels. The visual observers and PAM operator rotated every 1.5 hour to minimize fatigue.

The PAM operator immediately informed the visual observer team of any acoustic detection.

The hydrophone recordings were analysed by PAMGUARD software using “*whistle and moan detector*” module.



Figure 3-4. Acoustic surveys

3.1.3 Aerial surveys

A high wing, ultralight aircraft (Jabiru J160, Figure 3-3) was used, based at Messolonghi airfield (ICAO designator GR-0008). This two-seater aircraft offers an excellent view from its cockpit and thus was considered suitable and cost-effective for such a medium range mission. The flights were performed along the coast of western Peloponnese (namely from Cape Pappas at the north, to Methoni at the south, see MAP1) at an altitude of 800 ft and an average Speed Over Ground of 80 knots. The coastline was inspected twice, once going south and once more going back to the north on two almost parallel tracks at a distance of one nautical mile from each other. The flights were performed under ideal weather conditions (wind speed less than 7 knots, clear sky and visibility more than 10 km).



Figure 3-5. The aircraft used, at Messolonghi airfield

In every case where an “object of interest” was spotted, the airplane left its track and performed one or more circles over the object to visually identify it. Furthermore, the object was photographed so that a proper record of its observation and identification is kept. The photographic operation was performed using a full frame DSLR (Nikon D750) with a 70-200mm F/2.8 Tamron SP lens. All photographs were georeferenced since the camera was equipped with a GPS Unit (Nikon GP-1A).



Figure 3-6. View from the aircraft's cockpit

In the following example, the staged photographic identification process of an initially “object of interest” located on the shore is clearly shown.

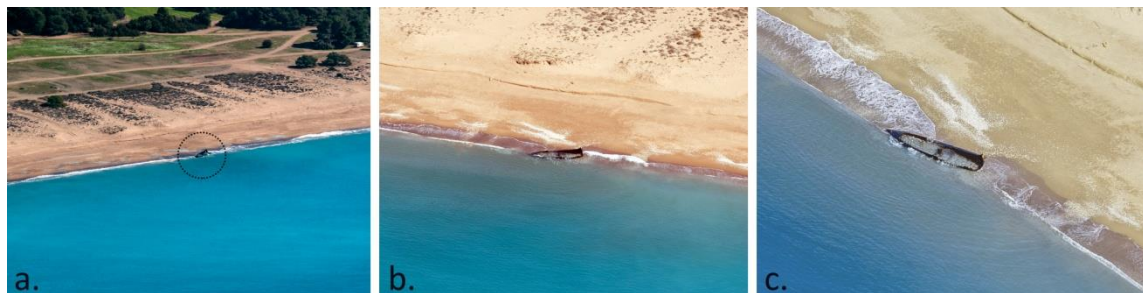


Figure 3-7. A: Recording an “object of interest”, B: Approaching, C: Identifying

3.1.4 Drone surveys

Drones have been deployed from the 7,5 RIB boat, during the ESAS surveys, to improve the spatial coverage of the transects grid in specific areas of interest.

Drone flights were performed only in calm sea conditions (0-2 BF) and the flight altitude varied between 30m and 200m depending on the target species.

Two different deployment protocols were followed:

1. Transects of a total length of 1km each, perpendicular to the main transect lines of the ESAS Surveys, were performed in certain sites, where suitable habitats for marine mammals and sea turtles existed. The flight altitude was determined to 200m and the drone camera was set vertical to the flight direction. Georeferenced 4K video footage was recorded to be further analyzed for the presence of target species.
2. In cases when encounter of the target species was obtained through the ESAS transects or through boat transport movements, the drone was deployed in altitudes of 30-50m, depending on the species, to record the numbers and characteristics of

the animals of interest. This method has been used to record marine mammals, seabirds and sea turtles.

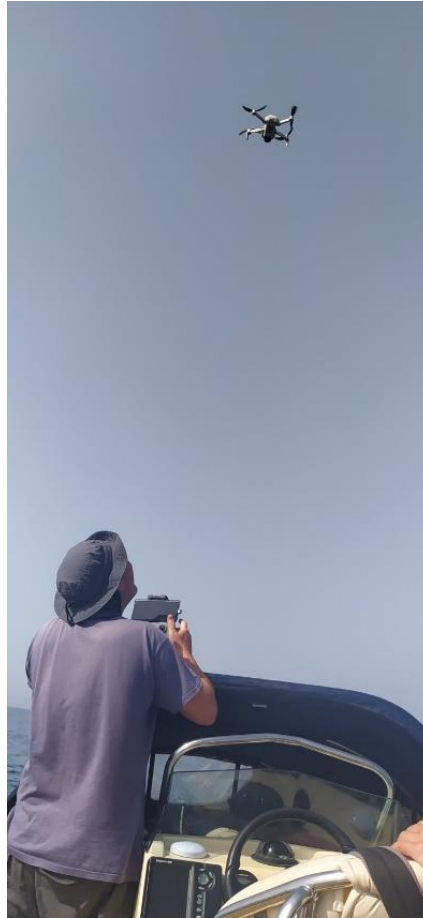


Figure 3-8. A: Drone surveys

3.2 Coastal surveys

3.2.1 Coastal surveys for the Scopoli's Shearwater

Coastal surveys for the Scopoli's shearwater were performed using the RIB boat and three types of drones: i) a high-end, professional drone equipped with thermal camera ii) a waterproof drone, specialized to operate in the marine environment and iii) a DJI "conventional" drone.

At known colonies of the species, such as the one at Strofades islands, an adaptation of the existing raft counting method has been developed, with the RIB boat following the birds gathering in front of the colony before sunset, to create the raft. When a raft was spotted, the number of birds was counted using binoculars and ZOOM cameras. The drones were then deployed flying at 30m above sea level to take photos and 4k video of the raft, in order to provide more accurate estimations.

A First drone mission took place on June 25 and 26. On October 2 and 3, a second drone mission took place, in collaboration with the Drone service provider AERATA, a Dutch firm specialised in aerial drone measurements. A DJI Matrice RTK 300 Drone with Thermal camera was used to survey the Scopoli's shearwater rafts and flight transects to the colony during night, with very promising results.

The raft was further monitored using the hi-end drone, in combination with a hand thermal camera, to assess the movements of birds from the rafts to the colonies, as well as the timeline of the birds entrance and flights to the colony sites. In this respect, breeding birds were distinguished from prospectors to provide more precise estimates of the colony size. To our knowledge it has been the first time in Greece and probably in the Mediterranean that such a method has been used to survey the breeding population of the species.

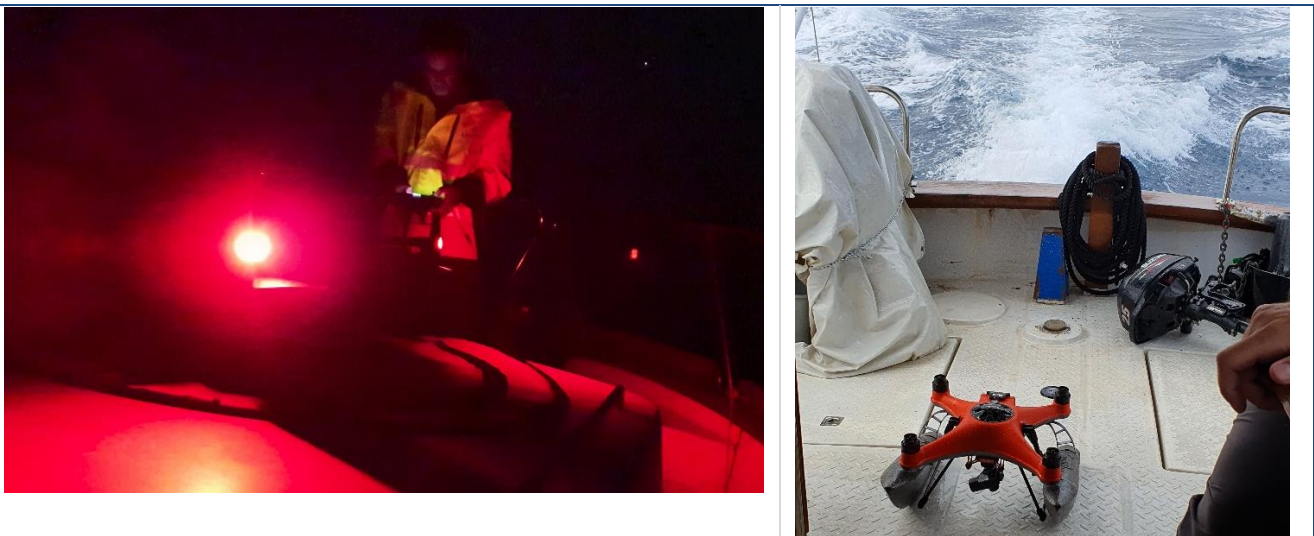


Figure 3-9.: The high-end drone equipped with thermal camera and the waterproof drone during the drone surveys

3.2.2 Coastal surveys for the Mediterranean Shag

Coastal surveys for the Mediterranean Shag involve the recording of the species individuals, age and activity while the survey vessel travels at a low speed along the survey coastline at a distance of 50-100m from the shore. The species are identified by binoculars, data is recorded on field maps and their locations are recorded by a portable GPS unit. Simultaneously, apparently active or suspected nesting sites are recorded.

The data recorded during field surveys included:

- Date / time of the observation
- Location of the observation (GPS waypoint name, latitude, longitude)
- Seabird species
- Number of individuals
- Number of adult and juvenile individuals (for the Mediterranean Shag)
- Identification of colony/nest sites, number of nests, suitable nesting habitat, roosting sites
- Potential localised threats
- Comments

3.2.3 Coastal surveys for the Mediterranean Monk Seal

Evaluating Habitat Availability and Suitability

To evaluate habitat availability and suitability for the Mediterranean monk seal in the project area its entire coastline was circumnavigated with an inflatable boat, at a distance of about 50 m from the shoreline to locate all potentially suitable coastal caves for resting and/or pupping. Once a cave was located, it was approached swimming and its suitability evaluated, based on a set of physical and environmental features (Dendrinis et al., 2007).

If a cave was evaluated as suitable monk seal habitat, geotagged photos was taken and its GPS position was recorded. It should be noted that Mediterranean monk seals tend to be more selective in their choice of caves used for pupping than for resting (Karamanlidis, Pires, Silva, & Neves, 2004).

Previous research has indicated that the physical and environmental features used in this study are the most important predictors of the selection of a coastal cave as a pupping site by monk seals in Greece. Suitable pupping sites tend to have among other, multiple entrances, beaches in their interior with a soft substrate, a low risk of pup washout and are not easily accessible to humans (Dendrinis et al., 2007).

During the aforementioned research efforts the field team of MOM tried also to collect information that could lead to a preliminary assessment of the demographic composition of the Mediterranean monk seal population in the area (Dendrinis, Kotomatas, & Tounta, 1999). During the cave inspections, researchers searched for the presence of recent signs of cave use, such as tracks, scats, pieces of fur or blood. If a seal was encountered, photographs or video were taken in order to enable future individual identification.

Finally, during the circumnavigation of the coastline the research team collected information on human activities and threats to the Mediterranean monk seal in the region, and more specifically information on the overall intensity of human activity and to a lesser extent on fishery – seal interactions in the area.

Collection of reports on Mediterranean monk seal sightings

Apart from performing visits to the seal shelters the researchers MOM collected and evaluated reports of seal sightings conducted by other observers (such as local citizens, tourists, divers, professional and amateur fishermen). Location, date and time of the observation, behaviour of the animal, as well as visible characteristics (size, developmental stage, coloration, external pelage marks or scars, overall status of the animal) were recorded. This method of data collection is based on the methodology of the operation of the National Rescue and Information Network (Adamantopoulou et al., 1999). Although this information originates from non-scientists, it forms a considerable source of relevant data, which, upon careful evaluation and analysis, complements the work conducted directly in the field. In addition, the collection of data by non-scientists in combination with the data collected by researchers allows for the immediate reaction of the field team of MOM in cases of emergency, such as animals needing aid or dead animals.

3.3 Sea turtles telemetry

In addition to the three Argos satellite transmitters, which were deployed in 2021, another 5 transmitters were attached to nesting female loggerhead turtles in June 2022, in order to determine their presence in the Kyparissiakos Lease Area during their breeding and post breeding periods.

Tracking devices were deployed as per manufacturer recommendations, as has been successfully employed in western Greece in recent years (see Rees et al. 2020; Appendix 1 & 2). It is anticipated that each device will provide a year or more of tracking data that will suffice to indicate the seasonal spatial movement patterns of turtles in the subject area.

Tracking data collected to date were processed to ensure higher accuracy location data were retained to provide a single best location per transmitter per day. These locations were then mapped in QGIS (v3.26).

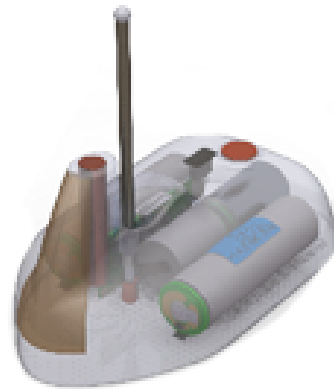


Figure 3-10. Wildlife Computers SPOT-375 satellite transmitter used in the project



Figure 3-11. Detail of the transmitter in place on the turtle's carapace



Figure 3-12. Tagged turtle moving towards the sea

3.4 Scopoli's Shearwater telemetry

In June 2022 a total of 10 transmitters have been mounted on 10 Scopoli's Shearwaters on Strofades. Transmitters were 15-gram waterproof Ornitrack-15 solar powered GPS-GSM/GPRS trackers produced by Ornitela UAB (<https://www.ornitela.com/>), which at regular, user-defined, time intervals record the position (acquired by GPS), temperature, 3D magnetic heading and 3D acceleration and send this data via GSM network at regular time intervals (when GSM network is available). The transmitters have been mounted on breeding Scopoli's Shearwaters during the species incubation period. Incubating birds were trapped at their nesting sites, tagged and then released back to their nests. The recorded and transmitted trackers' data is viewed and downloaded from the Ornitela web interface. Spatial analysis of this data was carried out to determine presence in- and use of the Wider Project Area by the tagged birds.



Figure 3-13. GPS-GSM device used for Scopoli's Shearwater telemetry

4 Results

4.1 Pelagic surveys

4.1.1 Boat surveys

Boat-based visual surveys and cetacean surveys were carried out in early summer (24-26/06/2022) and autumn (07-09/09/2022) in the Pelagic Survey Area as well as, surrounding areas in the Wider Project Area to assess the presence, abundance and distribution of the cetacean, sea turtle and seabird species of interest. Total distances covered by pelagic boat surveys were **540 nautical miles (n.m.)**.

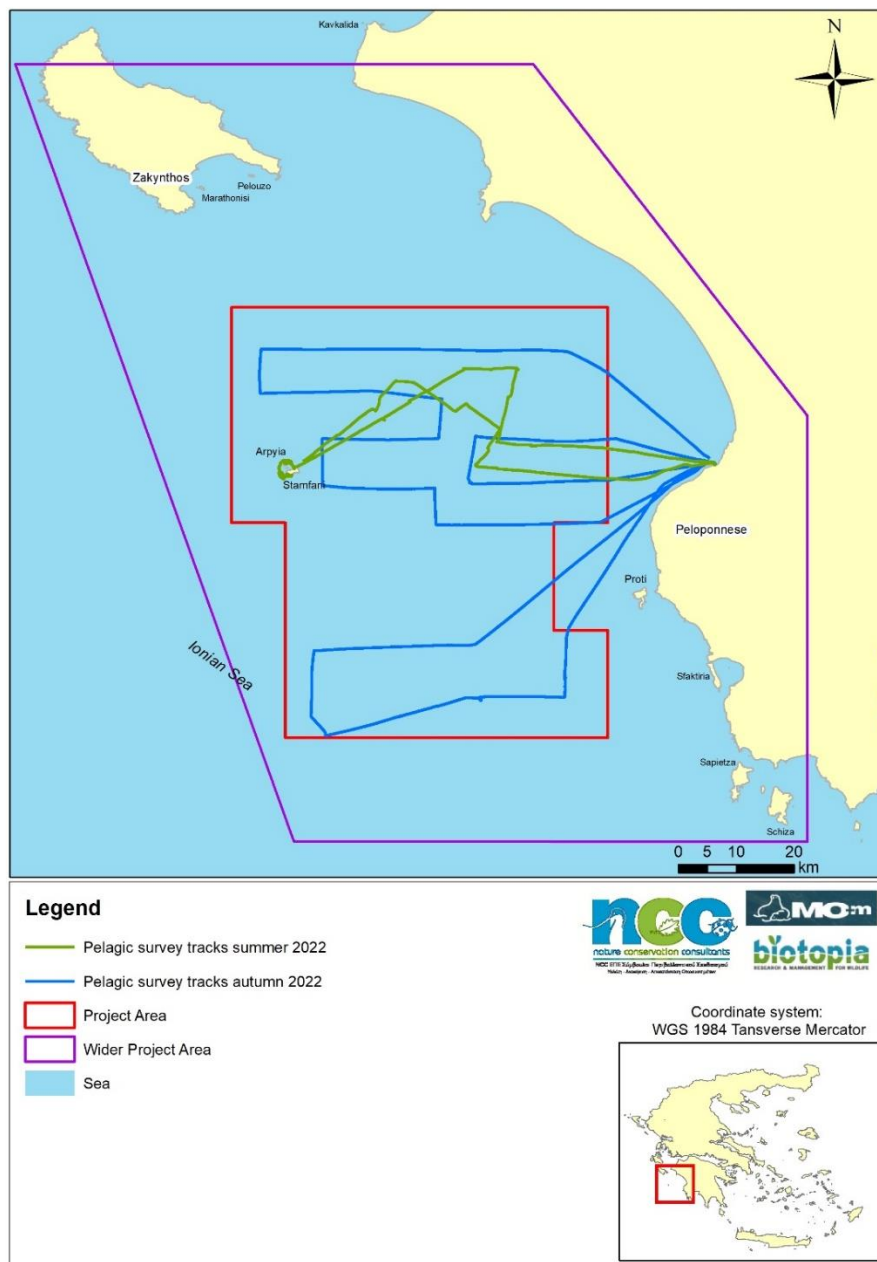


Figure 4-1. Visual boat-based survey tracks

The pelagic surveys covered systematically the entire Pelagic Surveys Area. During these surveys 3 seabird species (**Scopoli's Shearwater** (*Calonectris diomedea*), **Yelkouan Shearwater** (*Puffinus yelkouan*) and **Yellow-legged Gull** (*Larus michahellis*) and 1 sea turtle species (**Loggerhead turtle** (*Caretta caretta*) were recorded.

Table 4-1. Species and number of individuals recorded in the Pelagic surveys area and the project area (species of interest are marked with **bold**).

Species	Common name	# individuals recorded		Project Area	Wider Project Area
		summer	autumn		
Sea turtles					
<i>Caretta caretta</i>	Loggerhead Sea Turtle	1	1	√	√
Birds					
<i>Calonectris diomedea</i>	Scopoli's Shearwater	630	14	√	√
<i>Circus aeruginosus</i>	March Harrier	-	1	√	√
<i>Larus michahellis</i>	Yellow-legged Gull	-	1	√	√
<i>Puffinus yelkouan</i>	Yelkouan Shearwater	8	-	√	√

4.1.1.1 Loggerhead turtle (*Caretta caretta*)

In June 2022 a single Loggerhead turtle was recorded in the central part of the Project Area.



Figure 4-2. Loggerhead turtle during the boat surveys

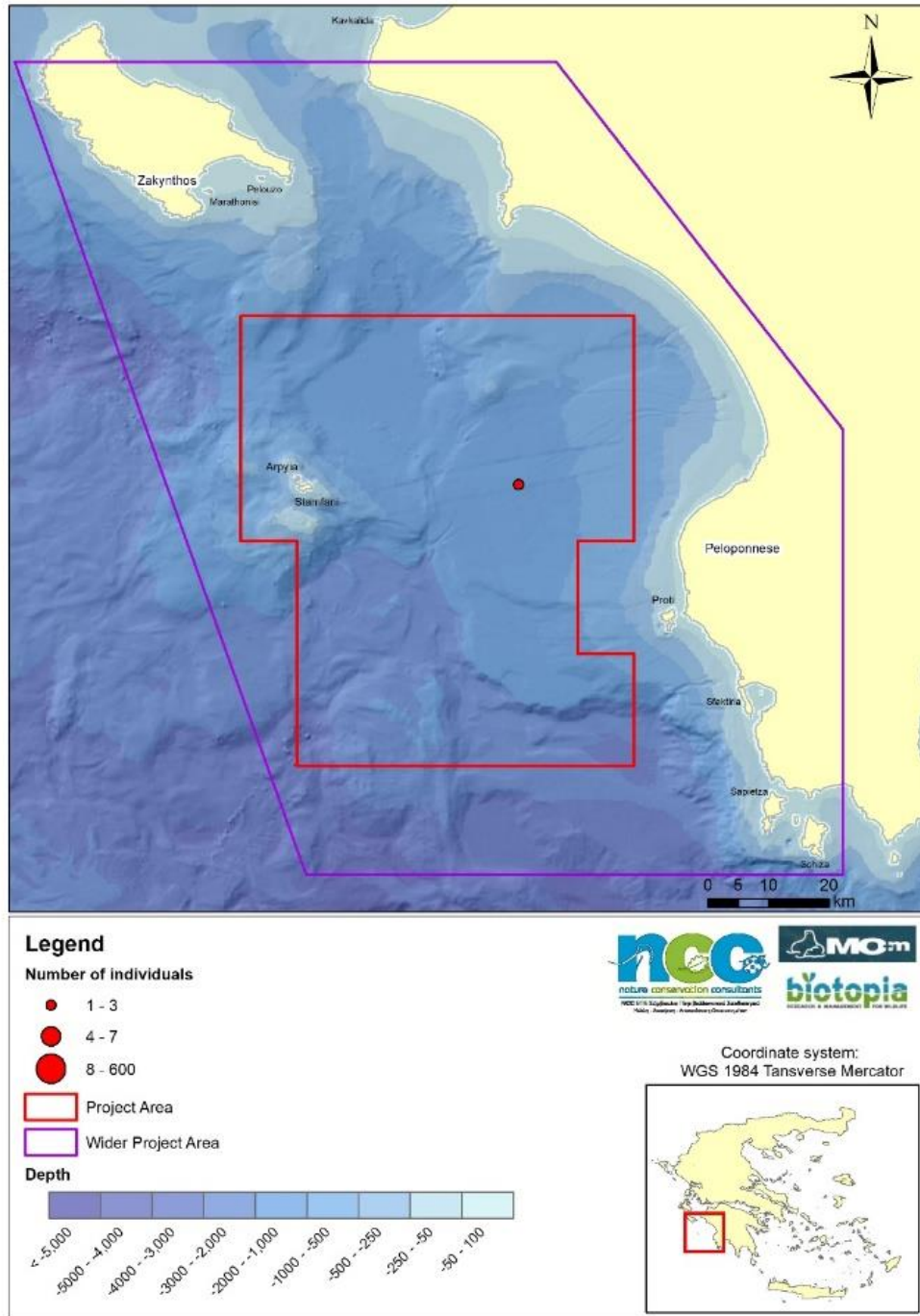


Figure 4-3. Location and number of individuals of the recorded Loggerhead turtle in summer 2022.

In September 2022 a single Loggerhead turtle was recorded in the south-eastern part of the Project Area.

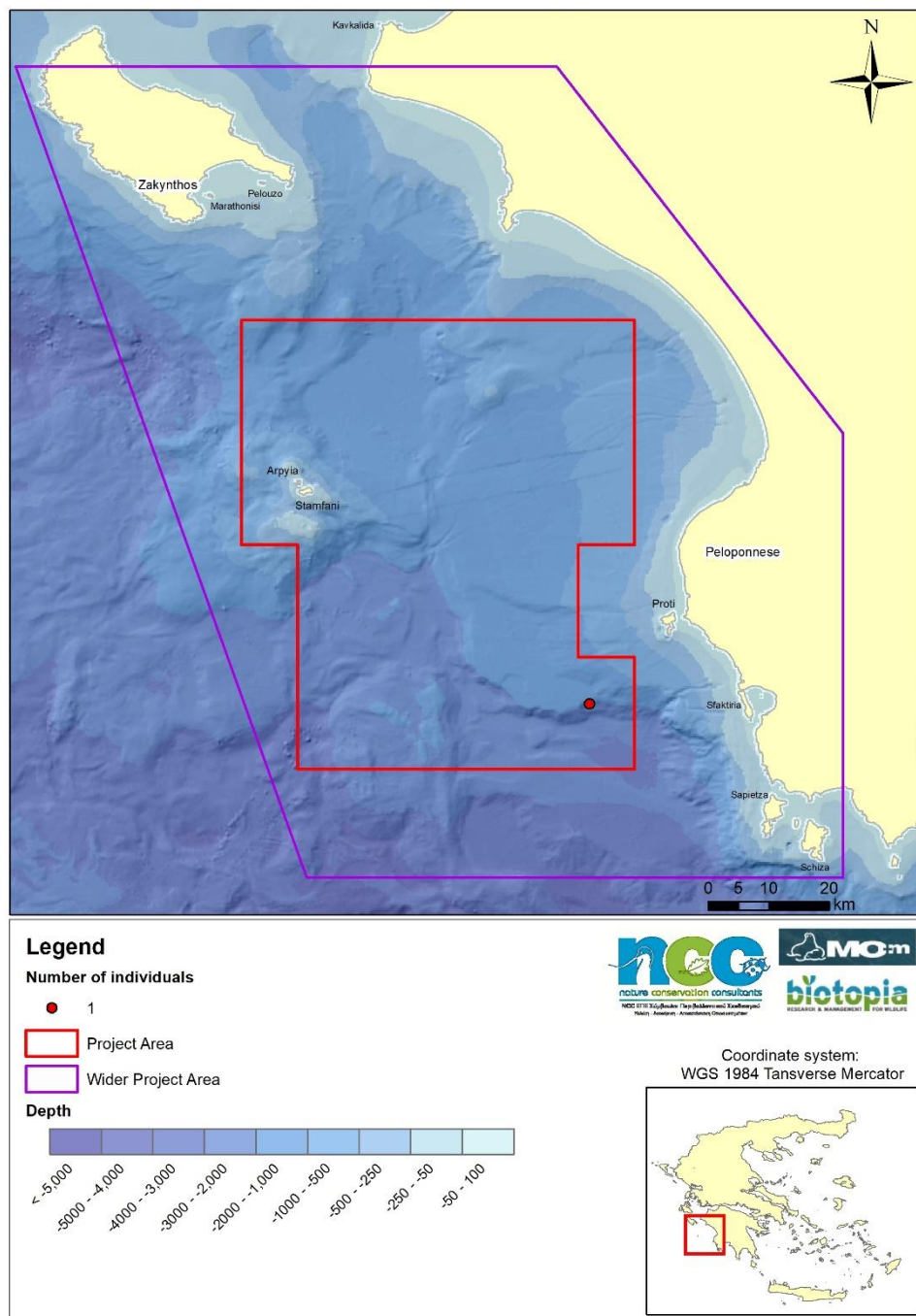


Figure 4-4. Location and number of individuals of the recorded Loggerhead turtle in autumn 2022.

In June 2022 the average density of recorded individuals per grid cell was 0.19 individuals/km².

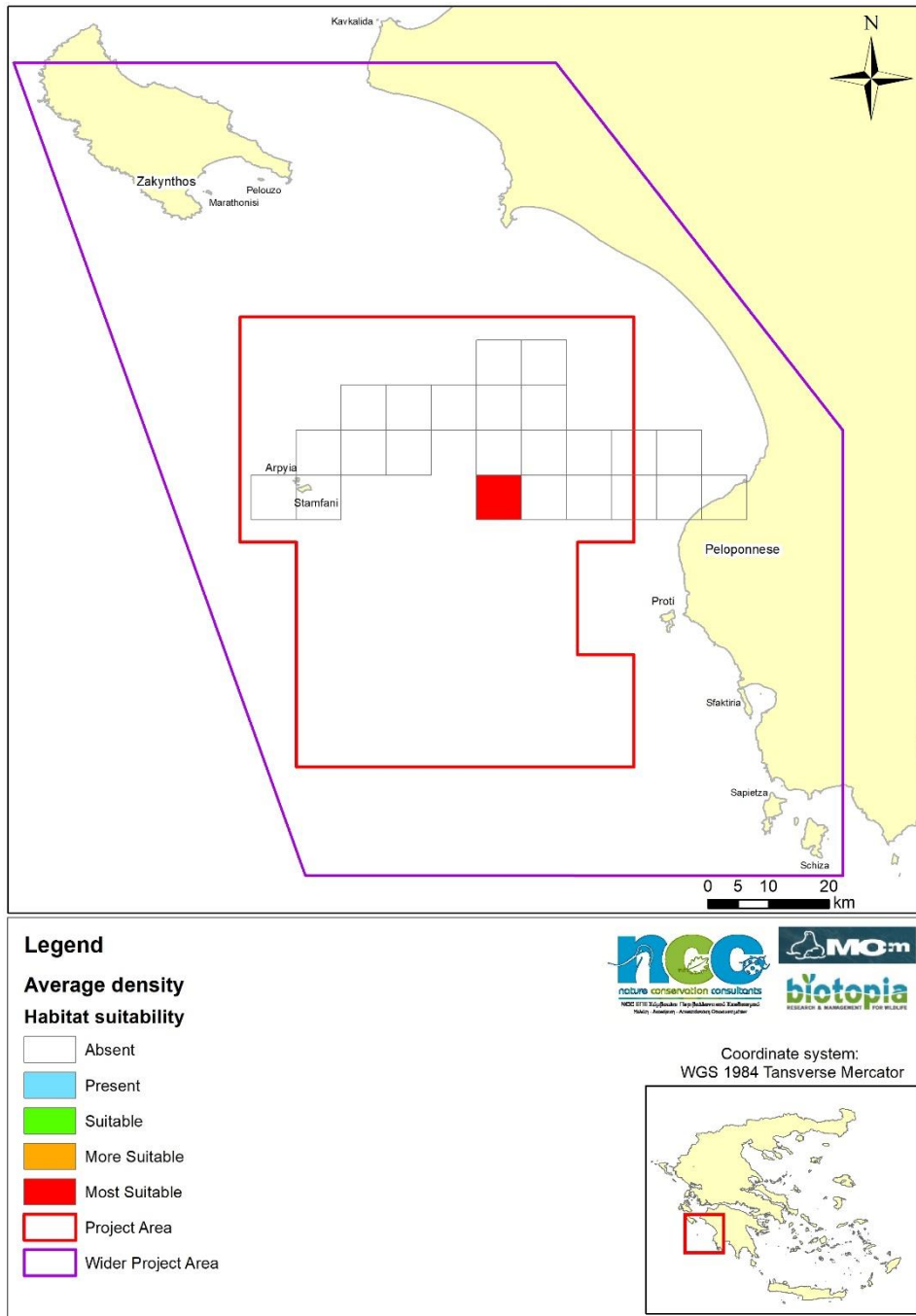


Figure 4-5. Habitat suitability based on the density of the Loggerhead turtle in summer 2022.

In June 2022 the average density of recorded individuals per grid cell was 0.32 individuals/km².

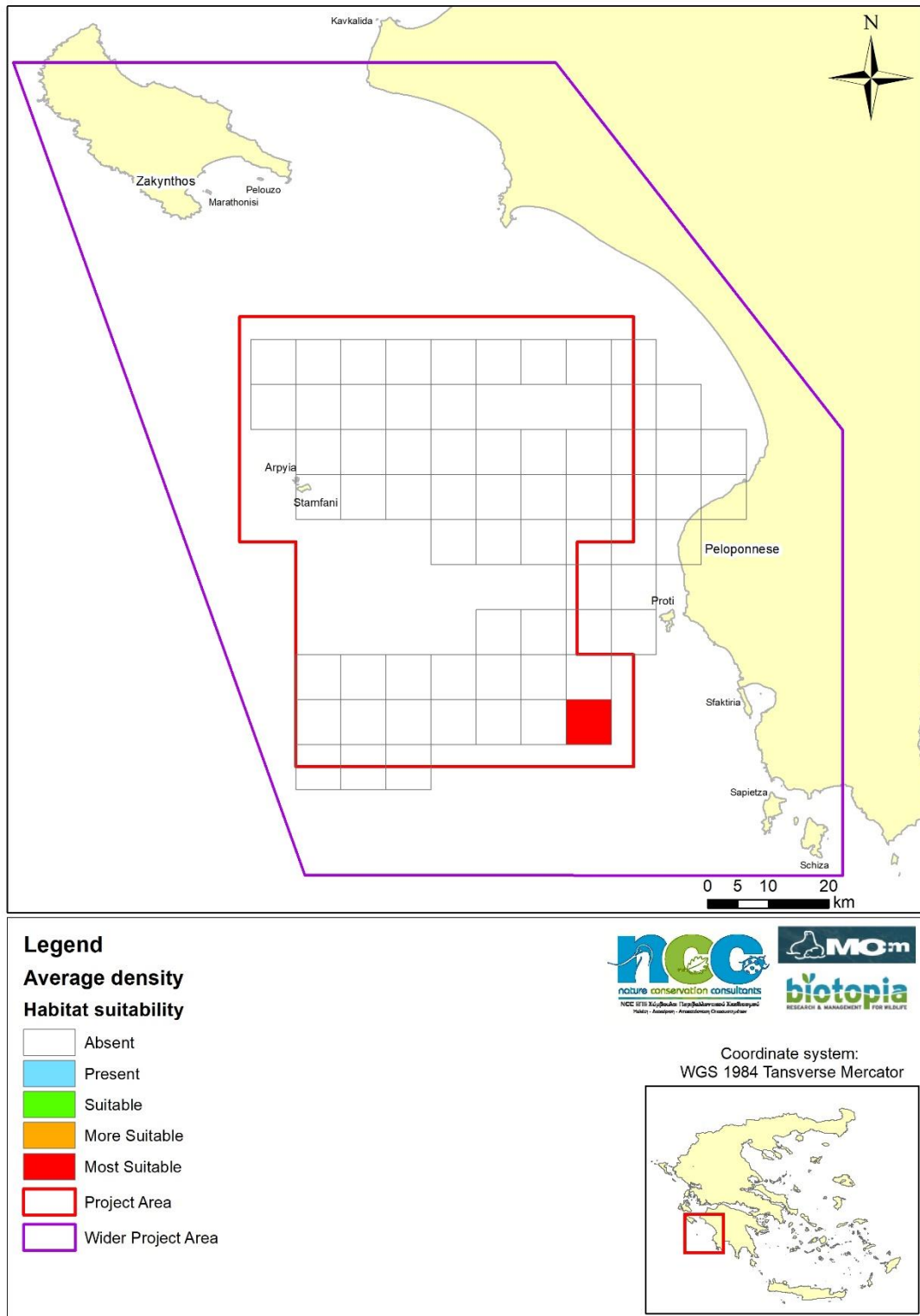


Figure 4-6. Habitat suitability based on the density of the Loggerhead turtle in autumn 2022.

4.1.1.2 Scopoli's Shearwater (*Calonectris diomedea*)

In June 2022 dispersed individual or small groups of birds were recorded in the Project Area, while a raft of 600 individuals was recorded in the vicinity of the species colony on Strofadia.

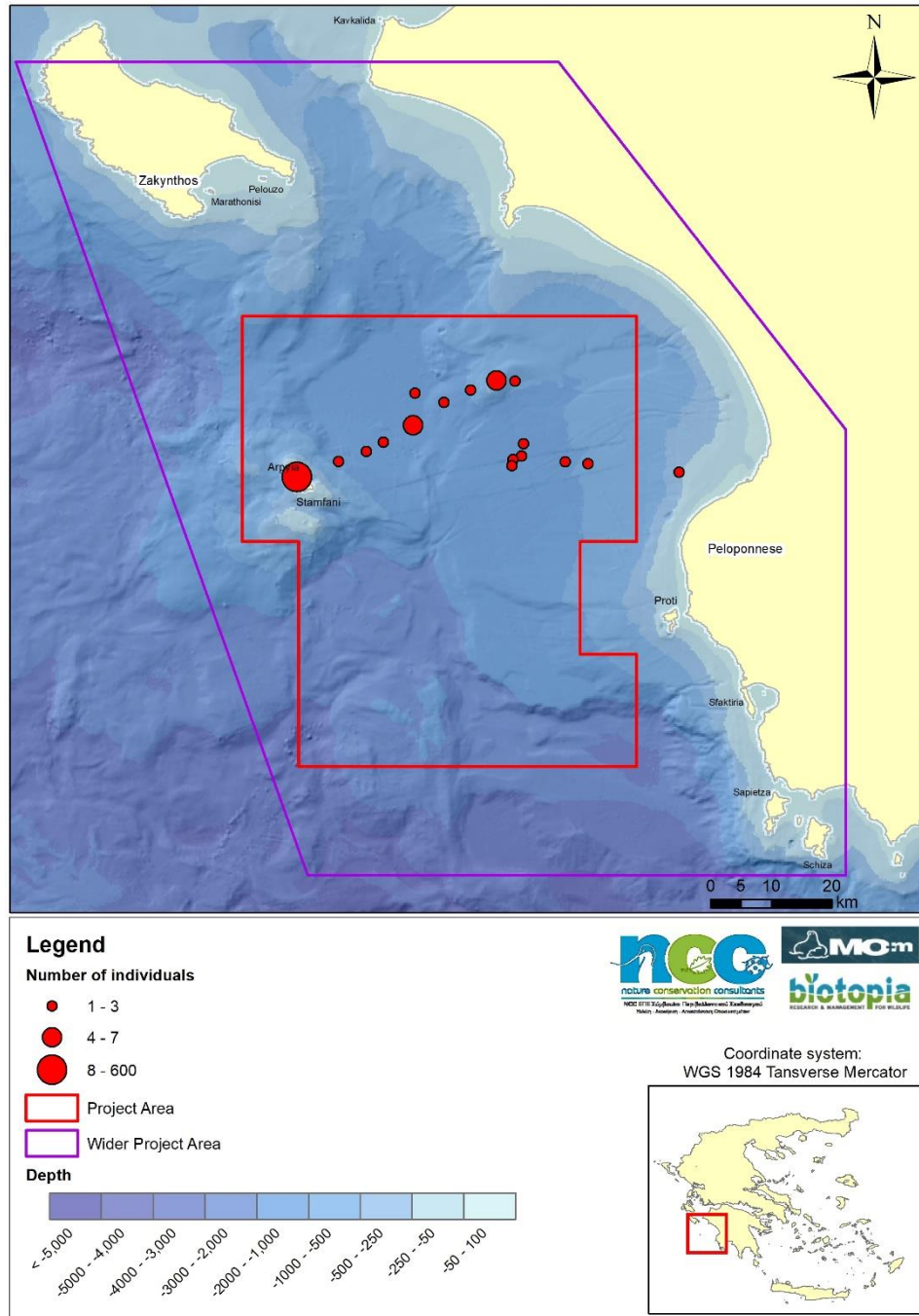


Figure 4-7. Location and number of individuals of the recorded Scopoli's shearwater in summer 2022.

In September 2022 sparsely dispersed individual or small groups of birds were recorded throughout the entire Project Area.

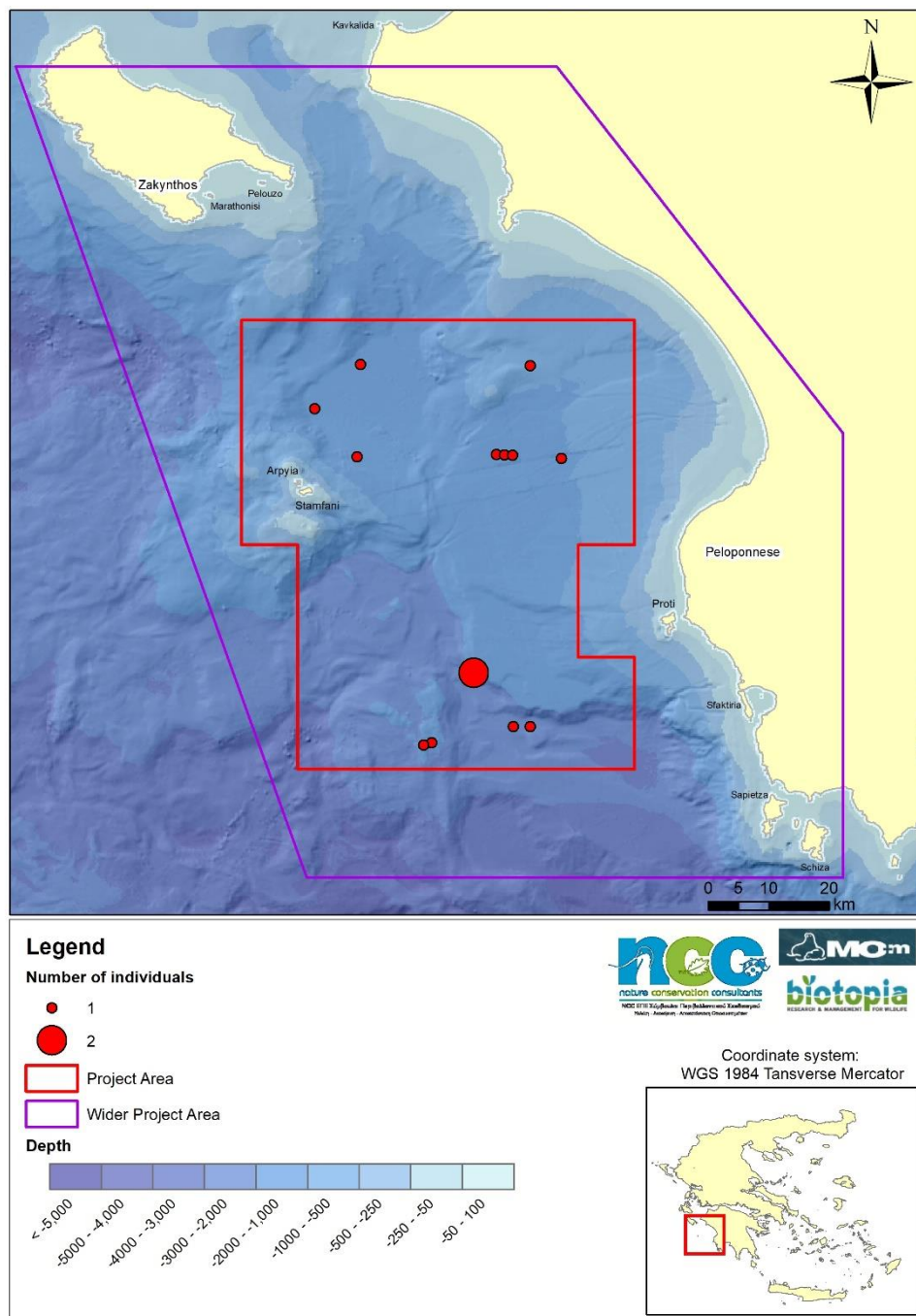


Figure 4-8. Location and number of individuals of the recorded Scopoli's shearwater in autumn 2022.

In June 2022 the average density of recorded individuals per grid cell ranged between 0.21 and 963 individuals/km². Based on the densities, the habitat suitability classes were Suitable: density ≥ 0.28 individuals/km², More Suitable: density ≥ 1.43 individuals/km² and Most Suitable: density ≥ 963 individuals/km².

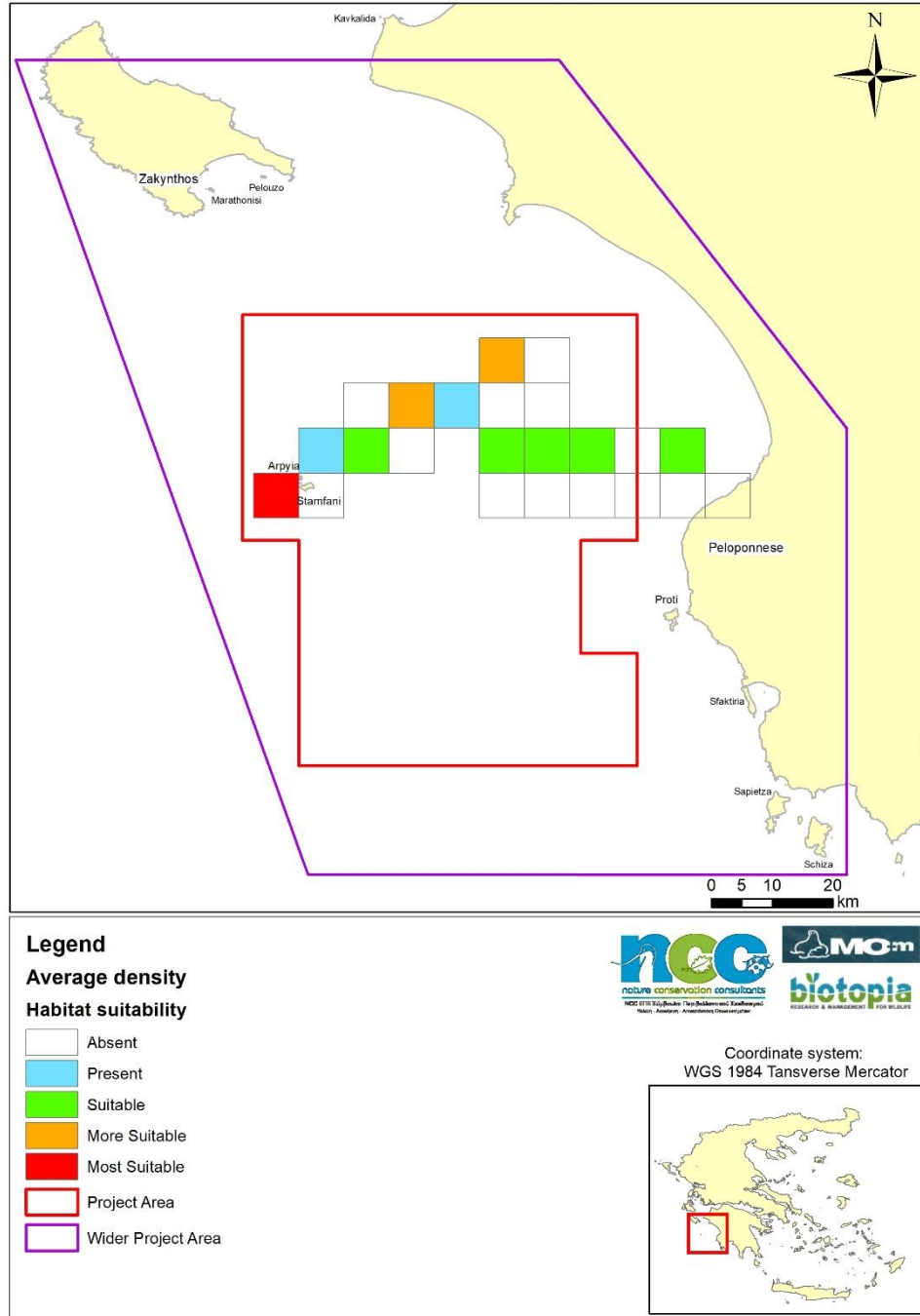


Figure 4-9. Habitat suitability based on the density of the Scopoli's Shearwater in summer 2022.

In September 2022 the average density of recorded individuals per grid cell ranged between 0.21 and 0.99 individuals/km². Based on the densities, the habitat suitability classes were Suitable: density ≥ 0.29 individuals/km², More Suitable: density ≥ 0.31 individuals/km² and Most Suitable: density ≥ 0.99 individuals/km².

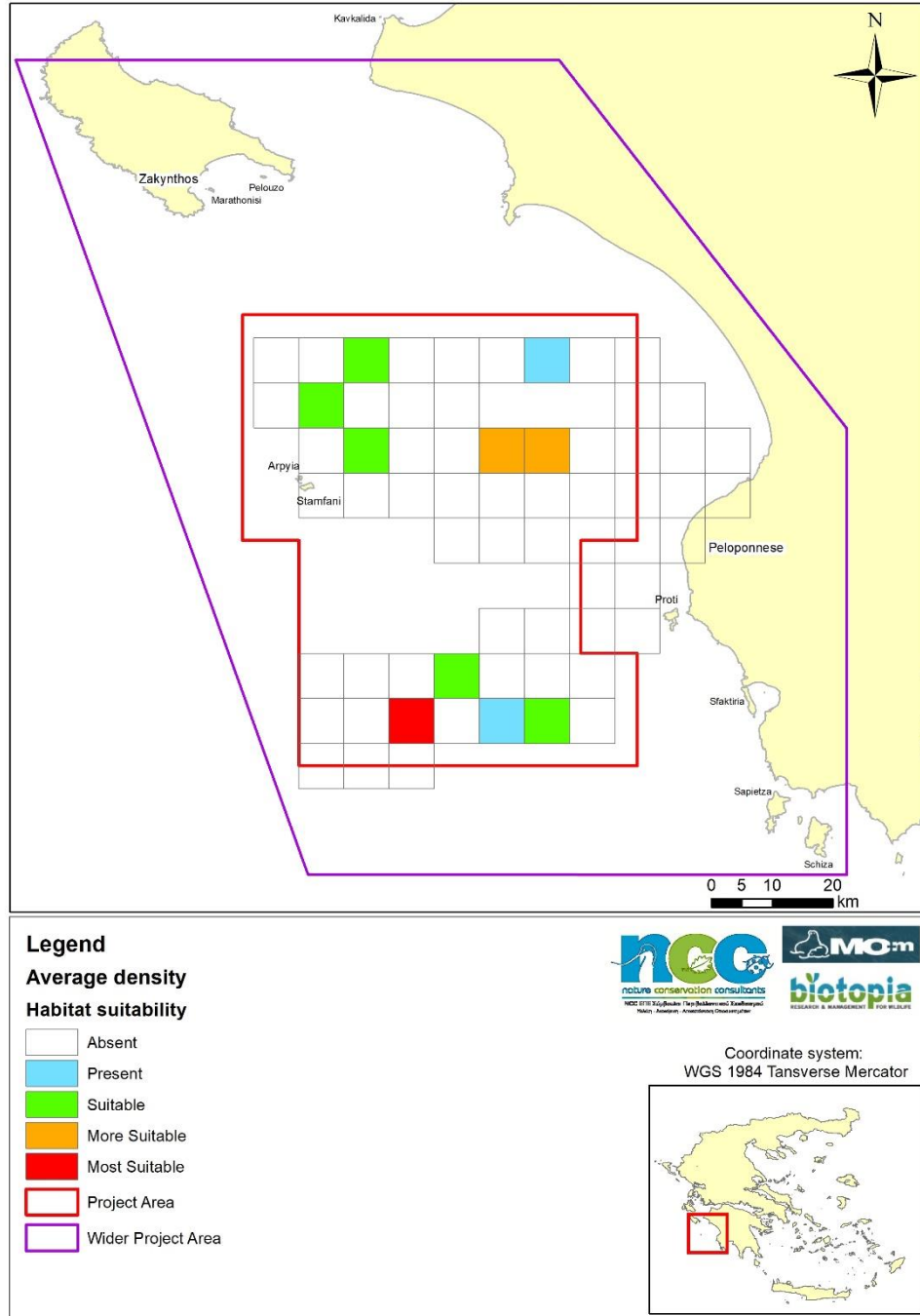


Figure 4-10. Habitat suitability based on the density of the Scopoli's Shearwater in autumn 2022.

4.1.1.3 Yelkouan Shearwater (*Puffinus yelkouan*)

Yelkouan shearwaters were recorded only in June 2022. A small group of 7 individuals was recorded near Kyparissia within the Wider Project Area, while only a single individual was recorded in the northern part of the Project Area.

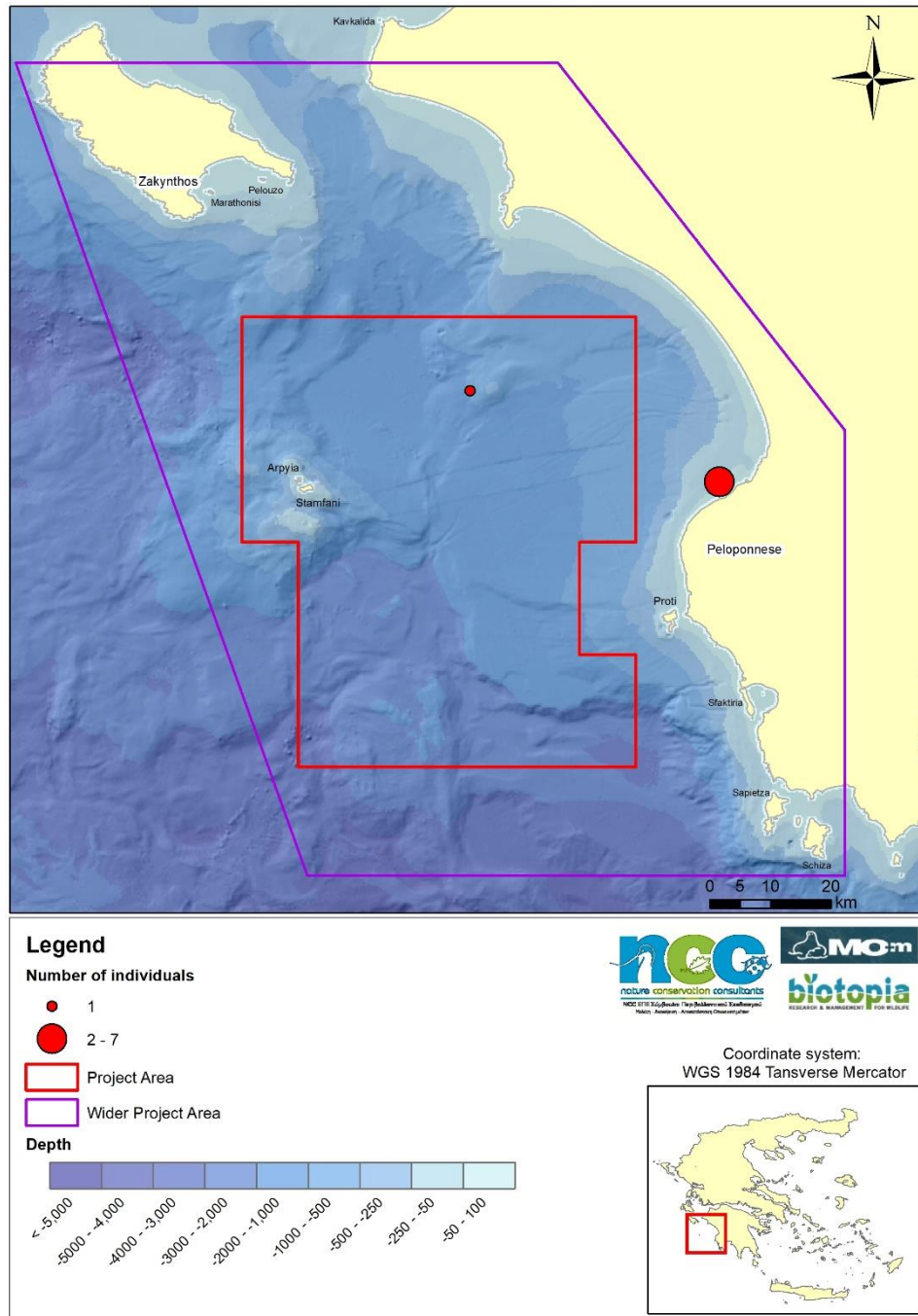


Figure 4-11. Locations and number of individuals of the recorded Yelkouan Shearwater in summer 2022.

In June 2022 the average density of recorded individuals per grid cell ranged between 0.10 and 3.06 individuals/km². Based on the densities, the habitat suitability classes were Suitable: density ≥ 0.10 individuals/km² and Most Suitable: density ≥ 3.06 individuals/km².

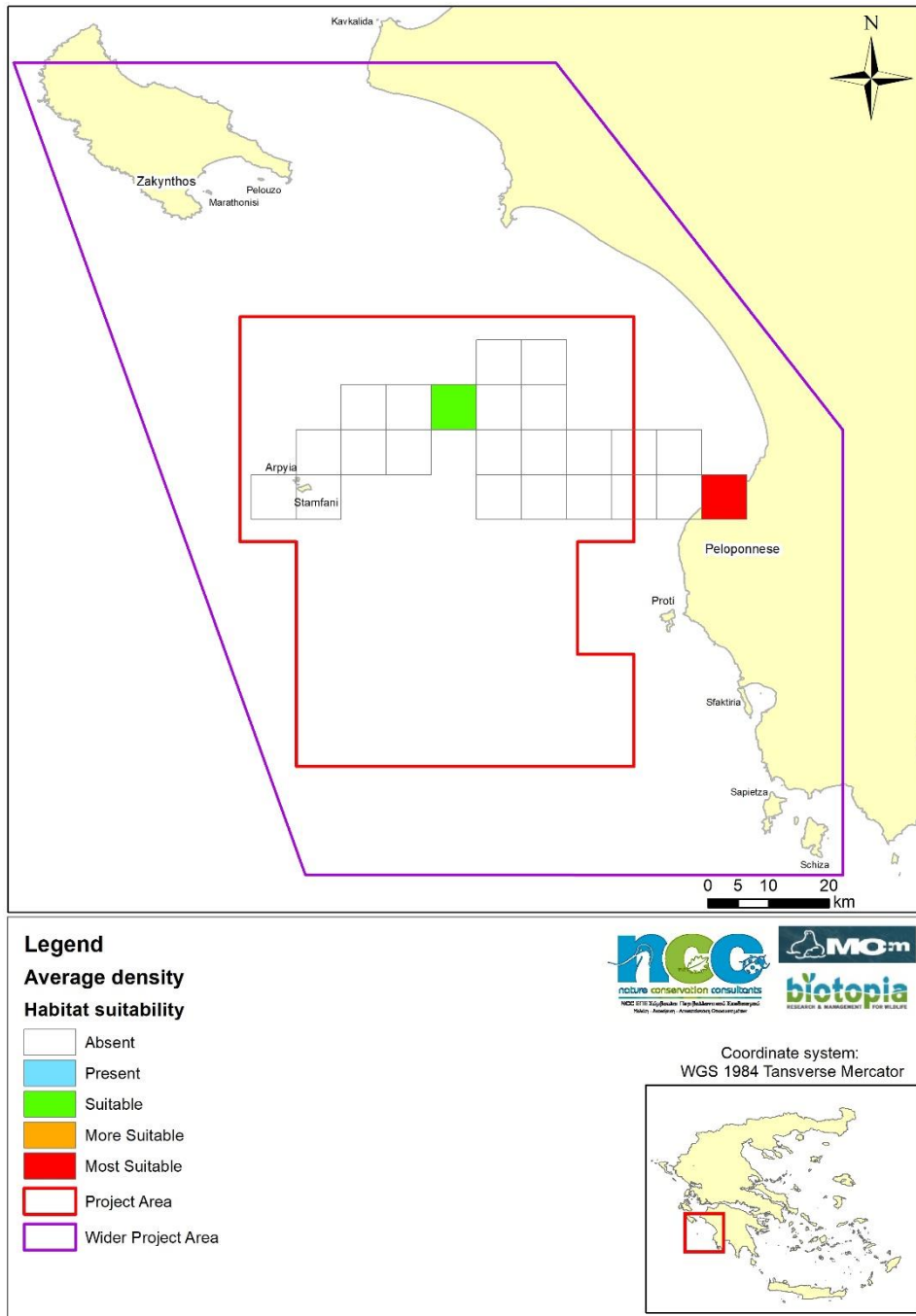


Figure 4-12. Habitat suitability based on the density of the Yelkouan Shearwater in summer 2022.

4.1.1.4 Yellow-legged Gull (*Larus michahellis*)

A single Yellow-legged Gull were recorded only in September 2022 in the eastern part of the Project Area.

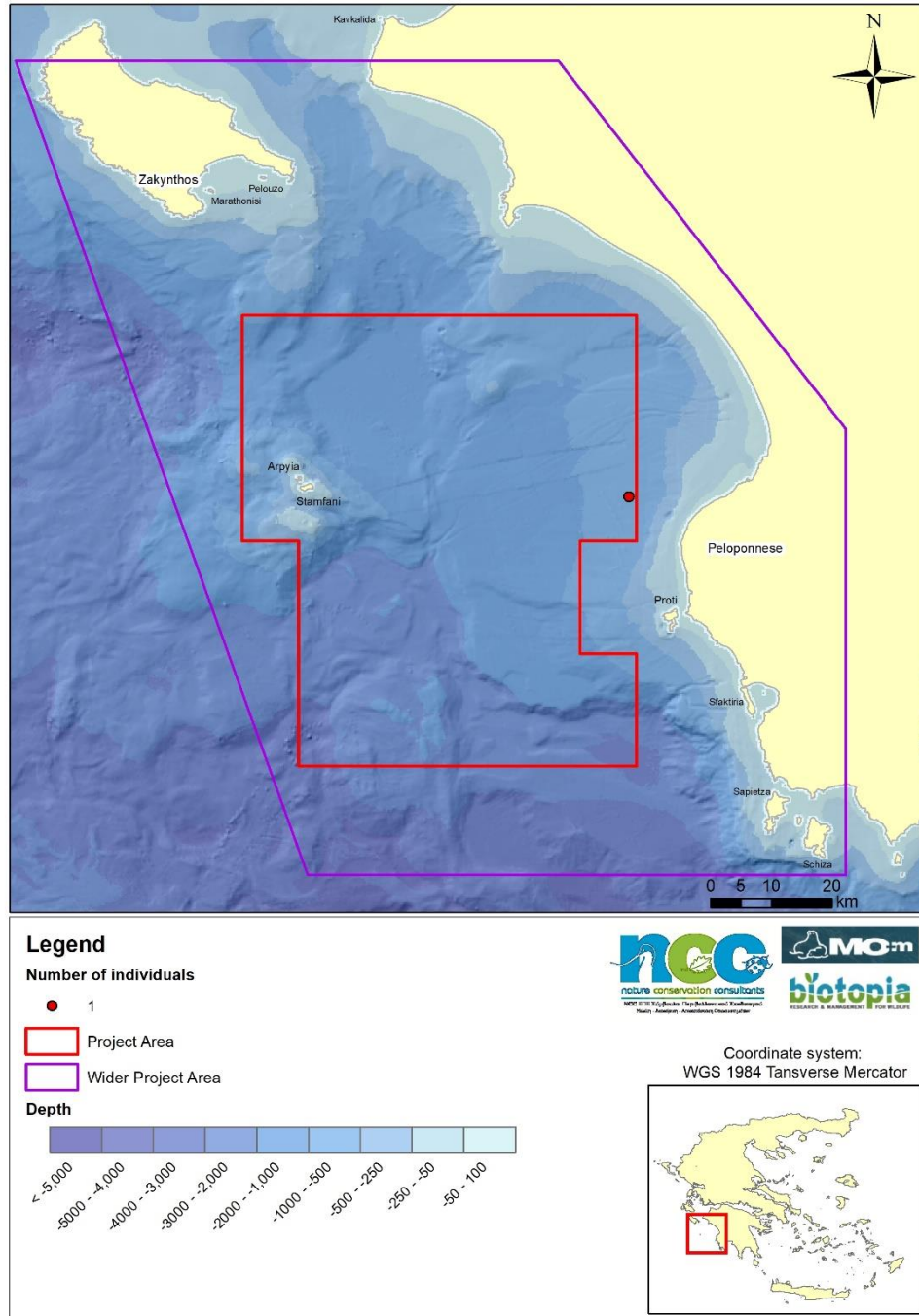


Figure 4-13. Location and number of individuals of the recorded Yellow-legged Gull in autumn 2022.

4.1.2 Cetacean surveys

Visual observations were combined with acoustic surveys for the detection and identification of cetaceans during the pelagic surveys. Effort was measured in km of navigation under the following conditions: (1) daylight and good visibility; (2) sea state <3 Beaufort with little to no swell (including either completely flat sea, flat sea with capillary waves or wavelets with no foam or breaking crests); (3) at least three experienced observers scanning the sea surface in search of dolphins; (4) eye elevation of at least 2m for all observers.

The total effort of cetacean surveys within the Wider Project Area during the present study was 540 nautical miles (n.m.).

No cetaceans were recorded during cetacean surveys, neither in June 2022 nor in September 2022.

4.1.3 Aerial surveys

The aerial investigation was conducted on the 11th of February 2022, on the 13th of April 2022, and on the 30th of October 2022. In February 2022 total of 289 km of coastline were inspected twice, covering a zone of about 2 nautical miles from the shoreline to the open sea. During spring the surveys no cetaceans were recorded (swimming/floating in the marine zone or stranded ashore), as well as no other species of marine megafauna (monk seals, sea turtles) along the entire coastline inspected. In autumn 2022 a single Loggerhead turtle and a group of 20 Striped dolphins were spotted.

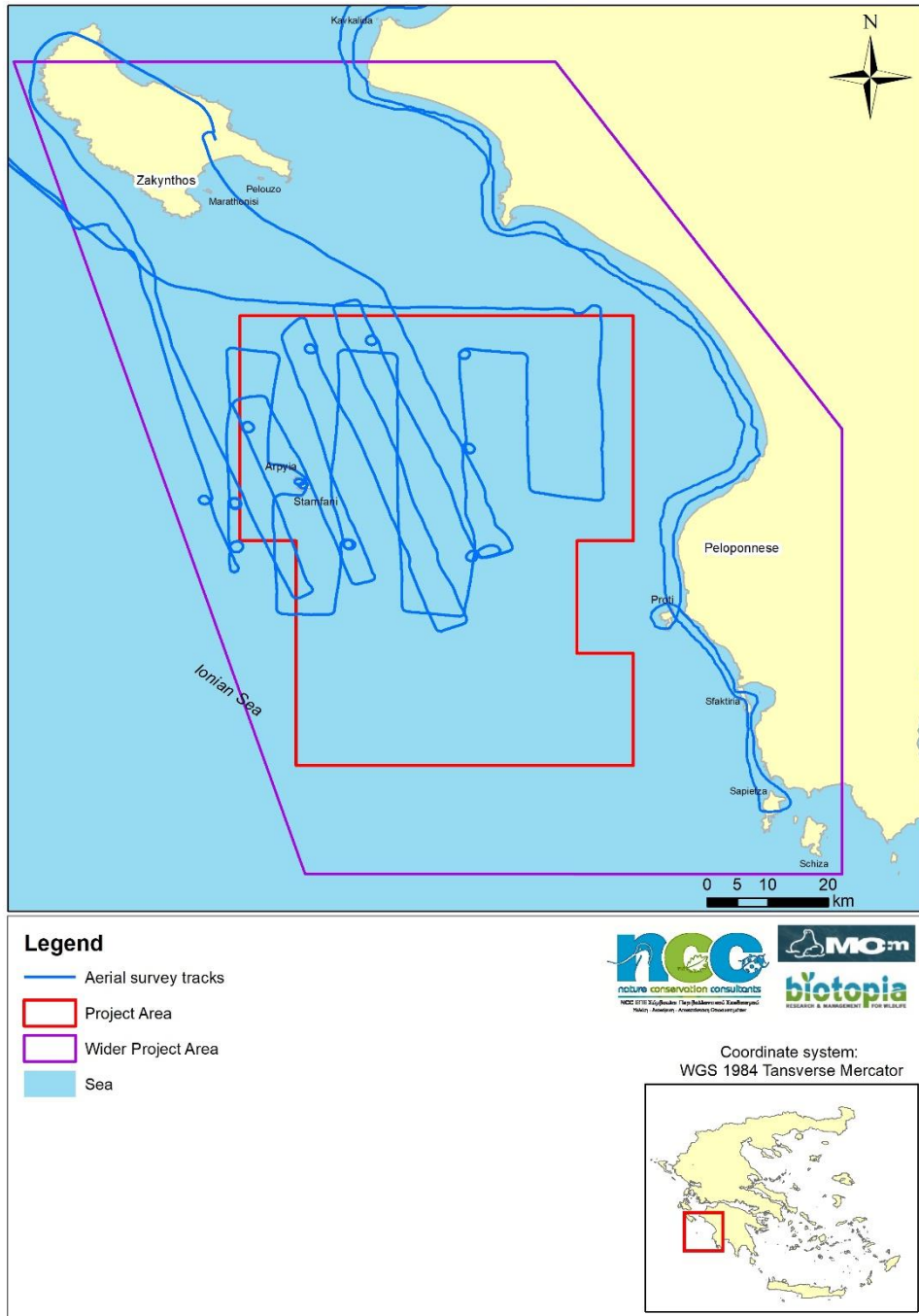


Figure 4-14. Aerial surveys tracks.

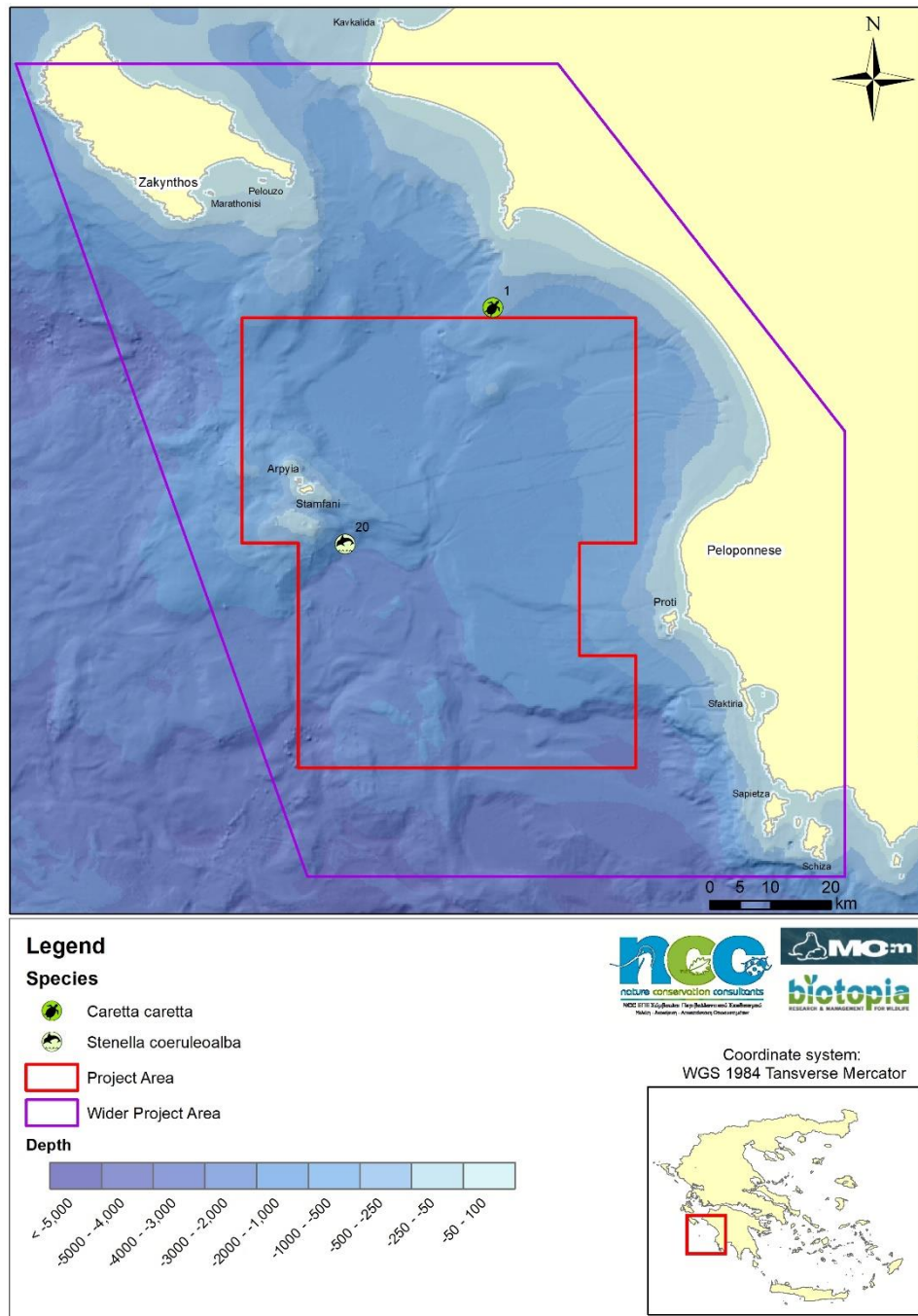


Figure 4-15. Aerial survey records.

4.1.4 Drone surveys

Two drone transect surveys took place during June 24 and 25, one at the coastal zone of Kyparrisia, to record marine turtles (total transect length 6 km), and a second one at the offshore area 10 n.m. east of Strofades, at an area suitable for large marine mammals with water depth exceeding 1.000 m (total transect length 4km).

The first drone survey revealed a number of 5 marine turtles using the transect zones.



Figure 4-16. Drone surveys tracks

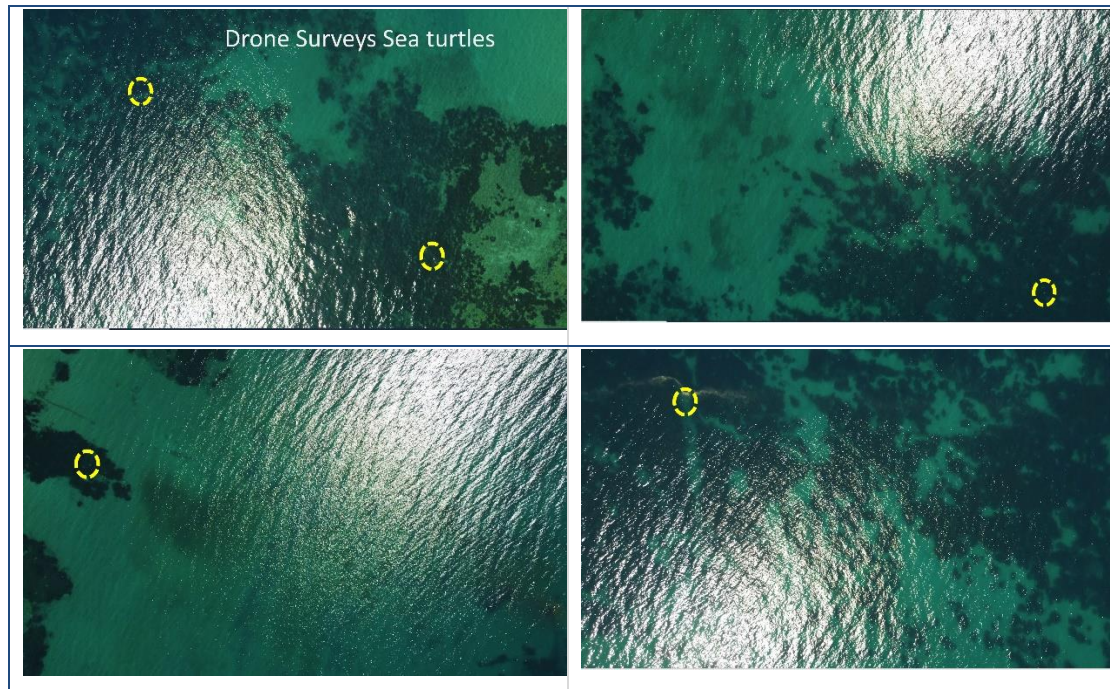


Figure 4-17. 4K drone video snapshots of the coastal area of Kyparissia, (200 m altitude), showing the sea turtle records (yellow cycles)

The second drone survey did not reveal any marine mammals

DRONE AERIAL SURVEYS (200 m)

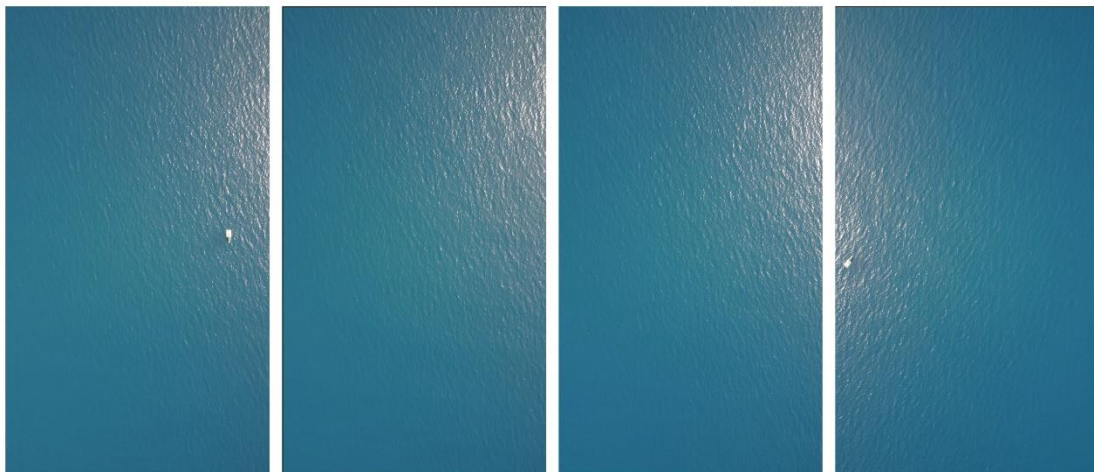


Figure 4-18. 4K drone video snapshots of the offshore project area (200 m altitude)

4.2 Coastal surveys

4.2.1 Coastal surveys for the Scopoli's shearwater

Coastal surveys of Scopoli's shearwaters took place at the colony of Strofades islets. Both drones surveys of rafts and thermal camera monitoring took place.

The raft developed on the afternoon of June 25, consisted of >1.000 individuals.



Figure 4-19. 4K drone video snapshot (30 m altitude), showing part of the Scopoli's raft at Strofades, on 20.30 of June 25.

The raft was formed 0,5 hour before sunset (20.30 and was maintained as a solid group until 1 hour after sunset (22.00), when birds started the movements towards the colony site.



Figure 4-20. Thermal camera video snapshot, showing part of the Scopoli's raft at Strofades, on 21.57 of June 25.

Intensive flights took place from 21.30, starting almost exclusively with breeding individuals, with prospector birds following until 23.00. After that time birds flights decreased.

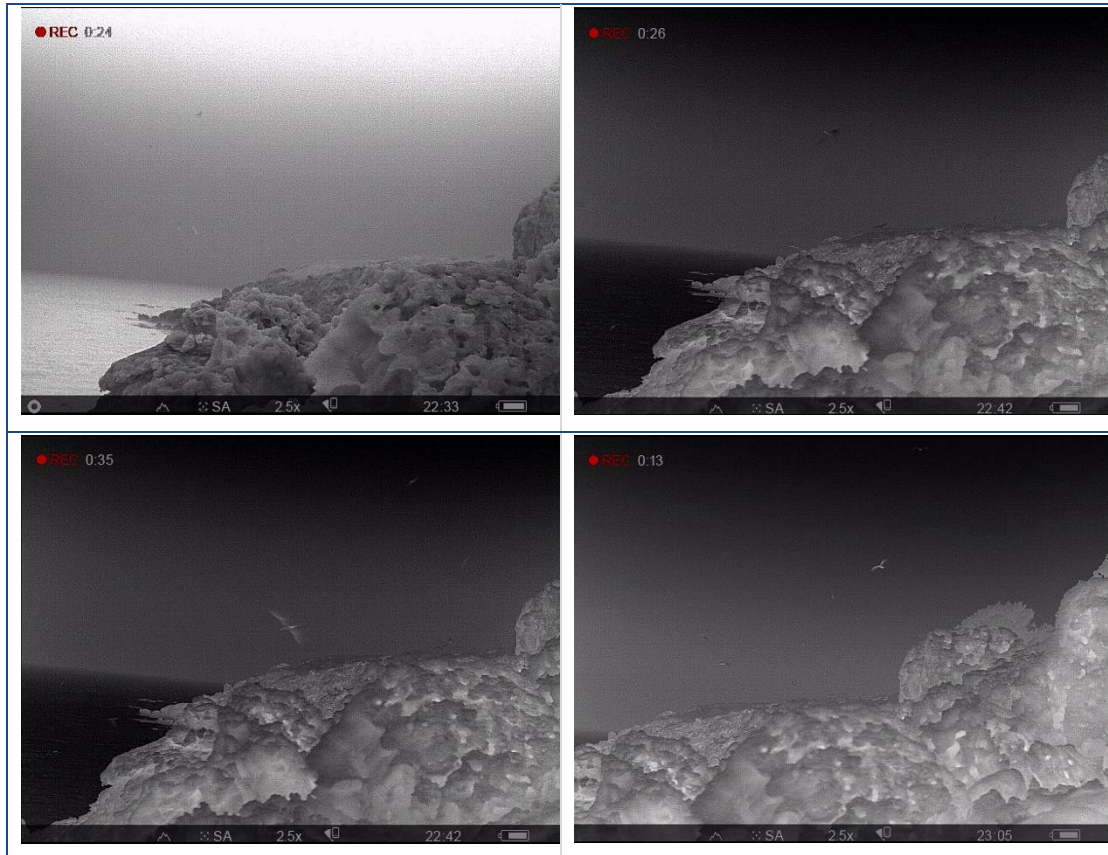


Figure 4-21. Thermal camera video snapshots, showing Scopoli's flights over the Strofades colony site

4.2.2 Coastal surveys for the Mediterranean Shag

Coastal surveys for the Mediterranean shag at the Kyparissia coastline and the Strofades islets revealed no birds. This is attributed to the very low densities of the species in the project area, due to the unsuitable habitat (Kyparissia) or the offshore character of the project sites.

4.2.3 Coastal surveys for the Mediterranean Monk Seal

MOm's researchers collected and evaluated reports of seal sightings conducted by various observers (such as local citizens, tourists, divers, professional and amateur fishermen) throughout the wider project area. Location, date and time of the observation, behaviour of the animal, as well as visible characteristics (size, developmental stage, coloration, external pelage marks or scars, overall status of the animal) were recorded. This method of data collection is based on the methodology of the operation of the National Rescue and Information Network (Adamantopoulou et al., 1999, 2022). Although this information originates from non-scientists, it forms a considerable source of relevant data, which, upon careful evaluation and analysis, complements the work conducted directly in the field. In addition, the collection of data by non-scientists in combination with the data collected by

researchers allows for the immediate reaction of the field team of MOM in cases of emergency, such as animals needing aid or dead animals.

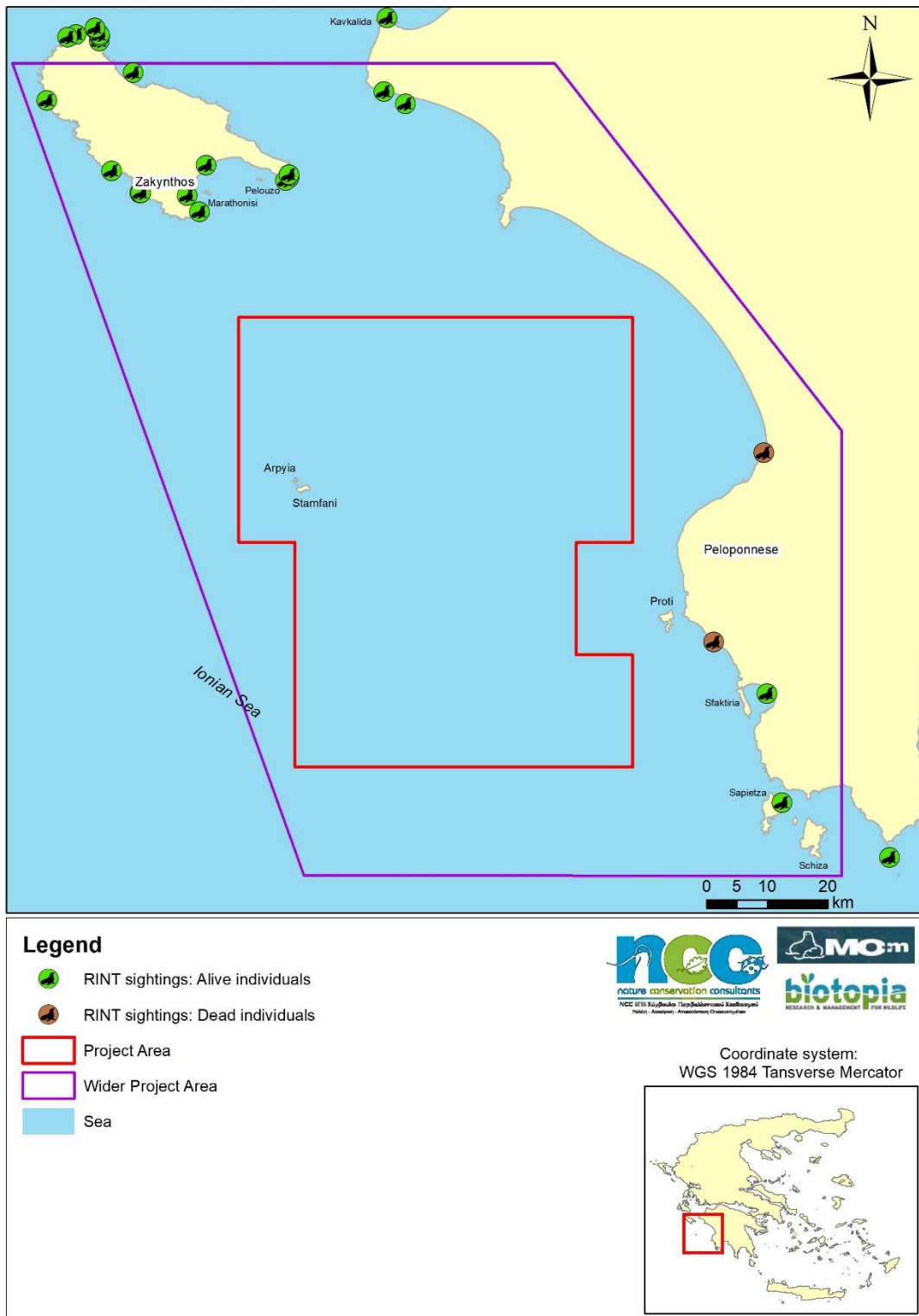


Figure 4-22. Locations of the Mediterranean Monk Seal National Rescue and Information Network (RINT) records between 2020 and 2022.

4.3 Sea turtle telemetry

After the successful deployment of 3 Argos transmitters to sea turtles during 2021, another 5 transmitters have been deployed in 2022. A total of 8 Argos satellite transmitters have now been deployed on nesting loggerhead turtles, with the final 5 deployed in early June 2022, on the beach in southern Kyparissia Bay. A summary of their operation is provided in the Table 4.2.

Table 4-2. Summary of transmitter operations.

Device ID	Transmitter deployment	Departure from Kyparissiakos area	Tracking in Kyparissiakos area	Transmitter status (7/7/2022)
210317	28 June 2021	21 July 2021	22 days	Still active >365 days
210318	2 July 2021	22 July 2021	19 days	Still active >365days
210319	3 July 2021	17 July 2021	13 days	Stopped 211 days
210312	8 June 2022	-	>29	Still active
210313	11 June 2022	-	>26	Still active
210314	11 June 2022	-	>26	Still active
210315	12 June 2022	-	>25	Still active
210316	12 June 2022	-	>25	Still active

The turtles from 2022 have remained in the area to complete their breeding seasons at time of writing for a further 2 nests each following transmitter deployment. None have departed from the nesting beach for over 25 days since receiving their transmitters. All transmitters 2022 transmitters remain active, as do two from 2021.

During the breeding season, turtles have remained close to the mainland coast. The only tracks that lead away from the coast are those from the turtles tagged in 2021, which have been previously reported on.

The full report on sea turtle telemetry could be found in Annex III of the present study.

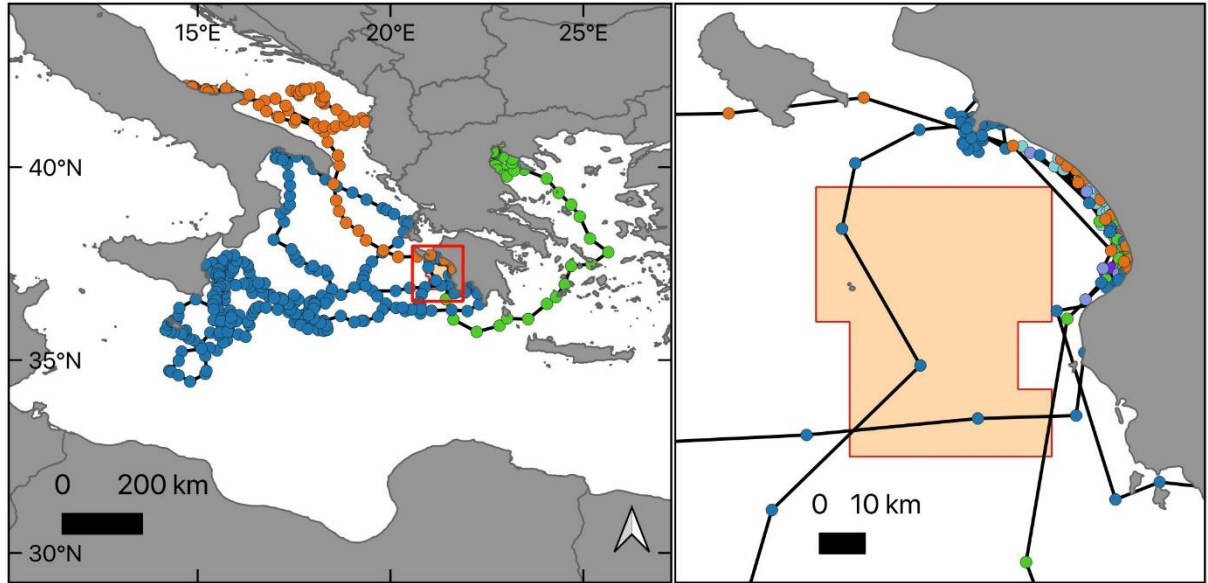


Figure 4-23. Tracks of all the adult female loggerhead sea turtles tracked from southern Kyparissia Bay nesting area. Left Panel: overall movement and migration of the three turtles tracked in 2021. Right Panel: focus on the movements of the turtles in and around the Kyparissiakos Lease area.

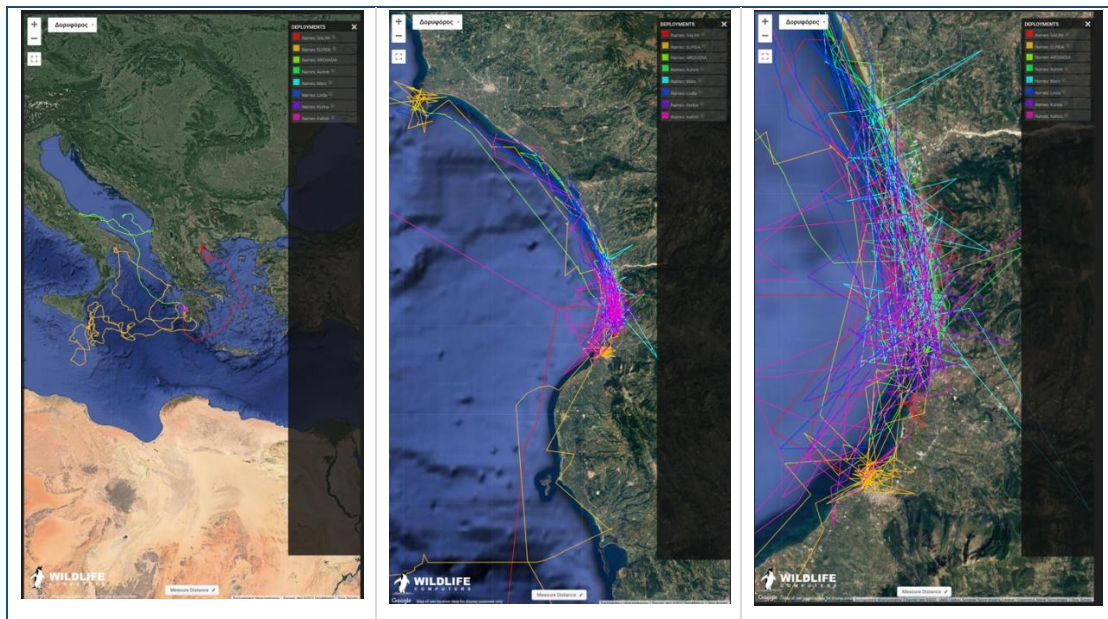


Figure 4-24. Tracks of all the adult female loggerhead sea turtles derived from the Wildlife Acoustics web platform, in 3 different spatial scales. The impressive number of turtle movements near the coast of Kyparissia is presented in the figure at right.

4.4 Scopoli's Shearwater telemetry

Ten GPS/GSP tags (Ornitela 15 gr) were deployed on June 25 on breeding Scopoli's shearwaters (incubation phase) at Strofades islets.



Figure 4-25. Tagging of Scopoli's shearwaters on June 25

After tagging the birds were returned to their nesting sites. Birds started their foraging trips from the following nights, travelling northwards, either to Patraikos area, or even further north.

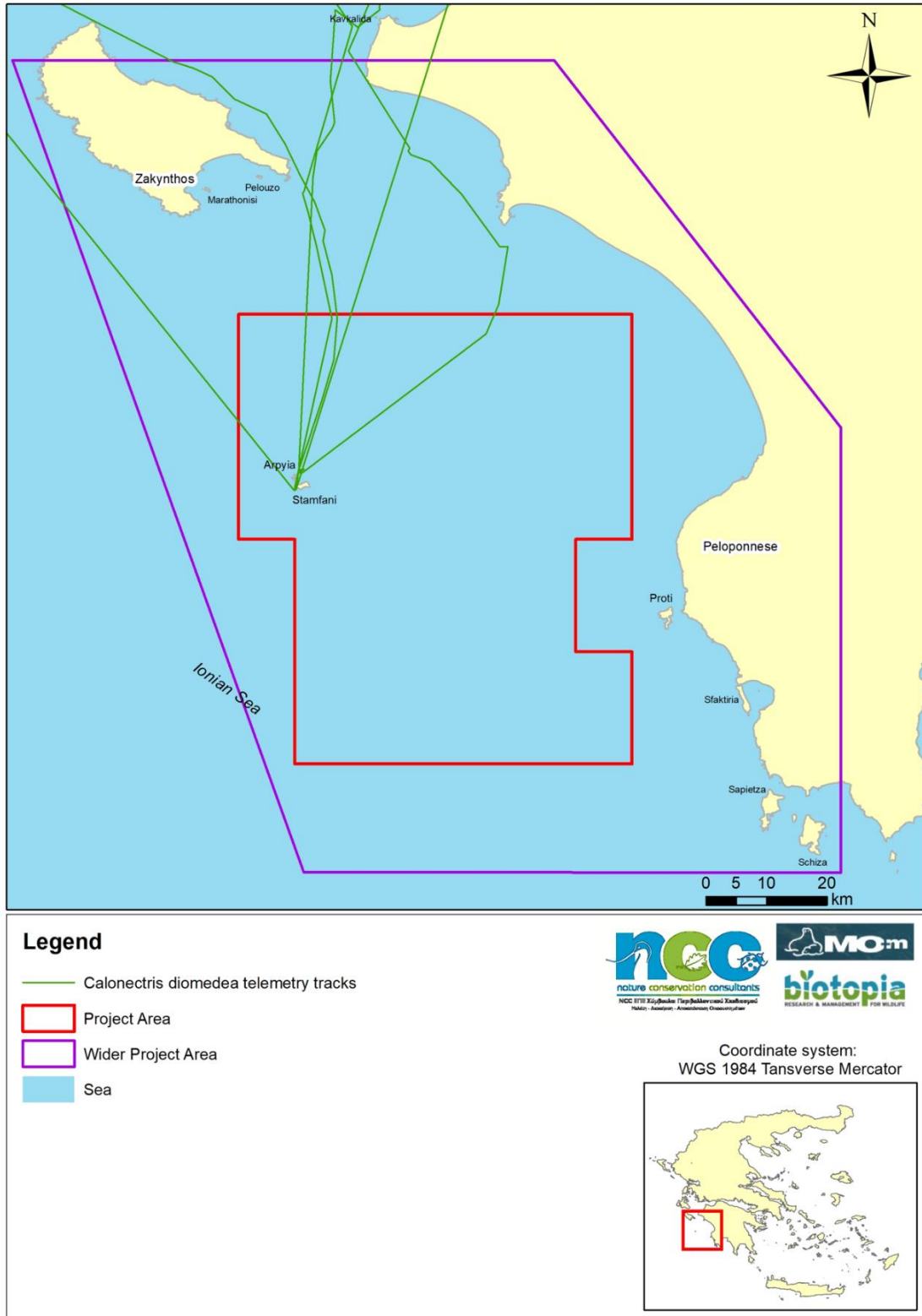


Figure 4-26. Foraging trips of tagged Scopoli's shearwaters in the project area since June 25

5 Conclusions

The current study presents the results of the pelagic and coastal surveys, that took place in 2022 in the Wider Project of the Kyparissiakos Lease Area in the offshore area of South Ionian Sea. The project results include:

- Modern, innovative field methods, such as the use of drones for aerial surveys and the use of thermal cameras to monitor the bird behaviour at seabirds colonies, were tested with very promising results. In combination with telemetry, aerial surveys, bioacoustics surveys and the more conventional boat surveys, the field work methods provide a solid basis to gather meaningful, biodiversity data for the project area.
- The presence of cetaceans in the area seems to be in low densities. During the boat and aerial surveys, a single group of striped dolphins was spotted at a 1000m depth. was confirmed in the area. Although Sperm whales and Cuvier's Beaked Whales have been reported in the area in previous studies, the presence of these species was not detected during the present project.
- The telemetry of Loggerhead turtles suggest that adult female turtles are not long-term residents of the area, but instead specifically migrate to and from Kyparissia Bay for the purpose of reproduction. The Project Area is an important site is for migrating turtles prior to and at the end of the breeding season.
- One important additional finding from this study, not relating to the Wider Project Area was that a turtle was tracked to the northwest of the Aegean Sea. Very few turtles nesting in Greece have been tracked into the Aegean Sea and most of those have not migrated as far as the north. Thus, this project has also highlighted a previously unknown, potentially important, area for adult loggerhead turtles in the northern Aegean Sea.
- The telemetry of Scopoli's shearwaters revealed that the feeding grounds of the species, are located mostly north of the project area, at Patraikos Gulf and Central/Northern Ionian Sea. The most important concentrations of the species within the Project Area, are found at Strofades Islands, where the largest breeding colony of the species in Greece, is located.
- The breeding colony of the Scopoli's shearwaters on Strofades Islands is considered the most important for the species at national level and one of the most important in the Mediterranean.
- The data collected on the monk seal presence/activity in the wider project area confirmed: a) the great importance for the species of the adjacent to the project area (and within the wider project area) island of Zakynthos and b) the scarce presence of the species along the coast of Peloponnese, a fact that is easily explained due to the lack of suitable for the species habitat (marine caves). Despite this fact it should be underlined the importance of Kyparissiakos bay as it acts as a "genetic bridge" for Mediterranean monk seals between the populations of the Ionian and the Aegean Seas.
- Considering all the above, we can easily draw the conclusion that the Project Area hosts significant numbers of marine mammals, seabirds and marine turtles. Further

monitoring of the species seasonal distribution and population trends is needed to provide a more concrete assessment of their status in the Project Area.

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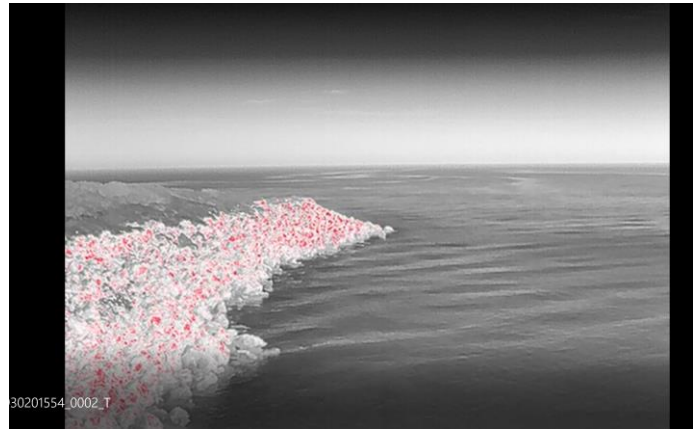
Annexes

Annex I. Photo gallery

Annex II. ESAS datasheets

Annex III. Report on Loggerhead turtles telemetry

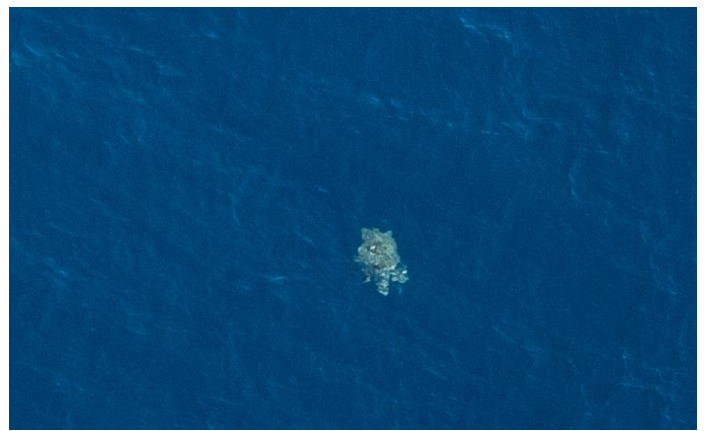
Annex I. Photo gallery



Drone surveys at Strofades by Aerata



Drone surveys by NCC



Aerial surveys



Raft of Scopoli's shearwaters at the Strofadia colony

Scopoli's shearwaters at the Strofadia colony recorded with thermal camera



Boat surveys

Annex II. ESAS datasheets

BASE DATA Ship-based seabird surveys

Hellenic Ornithological Society



Date:		- -		¹ Poskey: 1,2,3,4..... ² Observation angle: 90°, 180° ⁴ Visibility: A = <2km B = 2 – 5km C = 6 – 9km D = ≥ 10km	³ Sea state: 0 = sea like a mirror 1 = small ripples (0- 0,1m) 2 = small wavelets (0,1- 0,6m) 3 = crests break (0,6- 1,25m) 4 = numerous white caps (1,25- 1,5m) 5 = moderate waves, some spray (1,5- 2,5m) 6 = larger waves, more spray (2,5- 4m)						
Shipname:											
Observer(s):											
Use of binocs:		for detection / for identification									
Poskey ¹	Time (GMT)	Latitude	Longitude	Obs ²	Sea state ³	Visib ⁴	Float. matt. ⁵	Notes/ comments			
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<p>⁵Floating matter codes 1 = no trawlers around 3 = angling boat visible 4 = trawler >2km away 5 = trawler 'present' 6= trawler <2km away 7 = trawler 0.5-2km away</p>	<p>8 = active trawler <0.5 km 9 = fishing fleet around ⁵Pollution 10 = long line of foam 11 = much seaweed 12 = oil slick visible 13 = Biodegradable material (wood, paper, etc.)</p>	<p>14 = Plastic litter 15 = Boat rubbish 16 = Remains of fishing activities ⁶ Boat type 17 = Merchant ship/ cargo 18 = Passenger ship</p>	<p>19 = Tourist boat 20 = Other type of vessel ⁶Fishing activities 21 = Purse seine 22 = Trawler 23 = Demersal fishing boat 24 = Other type of fishing</p>	<p>⁵Fishing gear 25 = Longlines 26 = Nets 27 = Fishing lines 28 = Trolling lines 29 = Net for shellfish 30 = Fyke nets</p>
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Annex II. Report on Loggerhead turtles telemetry