

Protection of Formicula island and the Inner Ionian Archipelago

Final Progress Report

January 2024



ENVIRONMENTAL ORGANISATION FOR THE PRESERVATION OF THE AQUATIC ECOSYSTEMS

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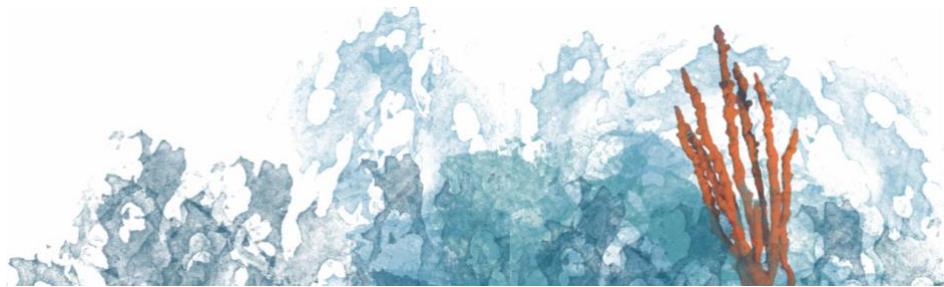
Declaration of conflict of interest:

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this report.

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Baseline information

Formicula is a small island in the Ionian Sea, located west of the island of Kastos and southeast of the island of Kalamos. It is part of the "Inner Ionian Sea Archipelago (Meganisi, Arkoudi, Atokos, Bromonas)" of the Natura2000 network, site code GR2220003 (Figure 1). In 1996 the area was proposed to join the Areas of Community Interest with the final accession taking place in 2006, while in 2011 it was further designated as a Special Area of Conservation (SAC).

The Inner Ionian Sea Archipelago has a great ecological value due to the presence of a significant number of marine megafauna species (dolphins, sea turtles, Mediterranean monk seals *Monachus monachus*, etc.) and the presence of extended *Posidonia oceanica* meadows. Under the Habitats Directive 92/43/EEC the monk seal is listed as a priority species, and *P. oceanica* as a priority habitat. The distinct morphology of the area's marine and coastal parts, characterized by the presence of many submerged caves (also a priority habitat according to the Habitats Directive 92/43/EEC), provides important habitat for the reproduction of the Mediterranean monk seal, a highly threatened marine mammal in the Mediterranean and listed as Endangered in the IUCN Red List of Threatened species for Greece (<https://www.iucnredlist.org/species/13653/117647375>). The site is also part of the wider Ionian Archipelago Important Marine Mammal Area - IMMA, which includes the presence of the Cuvier's beaked whale (*Ziphius cavirostris*), the fin whale (*Balaenoptera physalus*), the common dolphin (*Delphinus delphis*) and the common bottlenose dolphin (*Tursiops truncatus*). In the past, the Inner Ionian Sea Archipelago hosted an important resident population of the endangered common dolphin (Bearzi et al., 2005), but in less than 10 years their population collapsed from 150 to zero because of overfishing of sardines (*Sardina pilchardus*) and the consequent collapse of the stock (Piroddi et al., 2011). Two species of sea turtles are present in the area, the loggerhead (*Caretta caretta*) and the green turtle (*Chelonia mydas*), while the site has been also designated as an "Important Bird Area" (IBA) with code GR084 and is home several marine pelagic species such as the Yelkouan shearwater (*Puffinus yelkouan*) and the Scopoli's shearwater (*Calonectris diomedea*) as well as the European shag (*Gulosus aristotelis*). Finally, the area has historically been important for the Mediterranean monk seal (Panou et al., 1993) with its presence appearing to have increased in recent years (Mpougas et al., 2019). Monk seal monitoring in the Inner Ionian Sea Archipelago, and more specifically around Formicula by the Tethys Research Institute over the last decade has allowed to photo-identify more than 30 seals, some of them showing strong site-fidelity being observed in several consecutive years. The condition of monk seals in the waters around Formicula, is at the same time very exciting (due to the unprecedented and increasing numbers of sightings lately, including pups) but in parallel very worrisome due to disturbance caused by tourism.



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Formicula, although an uninhabited island of just 0.15 km², in the summer months is characterized by heavy traffic of boats, which often stop for leisure purposes. The regular presence of Mediterranean monk seals on the island has made it a destination for their observation which is done in an uncontrolled and often intrusive way. Some of the human activities regularly seen during the summer months include tourists chasing the seals, attempting to swim with them and entering the breeding or resting caves. At the same time, the uncontrolled anchorage within the boundaries of *Posidonia* meadows results in the fragmentation and degradation of the habitat, with characteristic signs of anchorage at the upper (shallow) boundary of the existing meadow while on the main beach of the island, where boats normally concentrate, the meadow has receded completely. Given this, during 2022, iSea mapped the distribution of *P. oceanica* around Formicula island which resulted in 0.63 km² of cohesive meadows extending below 35m of depth (Naasan Aga – Spyridopoulou et al., 2023). In addition, 80 different marine organisms were recorded and identified, belonging in 20 different taxa and providing proof of a very rich biodiversity which apart from fish, between them two non-indigenous species, includes marine phanerogams (other than *Posidonia*), sea algae, sponges, echinoderms, molluscs, and marine mammals. The conservation status of the meadows based on the Conservation Index (CI) was estimated at 0.98 and assessed as “very good state” in the sampled locations. In contrast, the shoot density and the overall appearance of the meadows portraided a different picture, with shoot density ranging from 170-180. Fragmentation due to uncontrolled anchorage was observed at the site, as well as abandoned fishing gear. It was concluded that more research is needed to draw concrete conclusions and link the state of the meadows with possible stressors such as eutrophication and/or pollution.

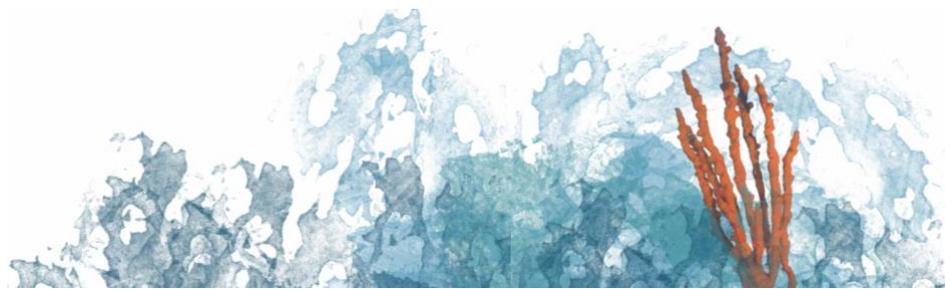
Similarly, to Formicula, Atokos and Arkoudi are uninhabited islands belonging to the Inner Ionian Archipelago where iSea previously detected another priority habitat, less common than *Posidonia* meadows, coralligenous reefs. Given the characteristics and location of the islets Atoko and Arkoudi, as well as their possible connectivity to Formicula, it was deemed important to identify priority habitats (*P. oceanica*, reefs and underwater caves) to ultimately lead to a better understanding of the importance of the whole system and work towards its improved management and protection.

Proposed project

The aim: Increase the knowledge on the biodiversity of the Inner Ionian Sea Archipelago and improve its management and the protection of threatened and protected species by the involvement of all stakeholders.

Actions proposed for 2023.

Preparatory actions:





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A.1 Meetings with all local stakeholders for informing about the project and discuss all current and future actions.

A.1.1. Mapping of all stakeholders in the area (month 1)

During the first month of implementation iSea mapped all the relevant stakeholders (i.e. diving centers, boat rental businesses, daily cruises, recreational fishers associations, professional fishers associations, municipalities, port authorities), using online available resources. During the two fieldwork visits iSea communicated and conducted in person meetings with local stakeholders; tourism businesses; diving centers, fishers (recreational and professional) informing them about the project. In total, 12 meetings were performed (4 with Boat charters companies, 1 fishing supplies store, 3 diving centers, 4 professional fishers' associations (Meganisi; Lefkada; Palairos; Mytikas). In addition, while conducting the Questionnaires (A.3, total number of Questionnaires 71) all respondents were informed about the project.

A.1.2. Conduction of two round tables with the relevant stakeholders to advocate for Formicula and the Inner Ionian Archipelago protection (month 2 and month 11)

iSea conducted the two round tables informally, in a more relaxed setting, during their discussions with the relevant stakeholders, which was deemed best for the target action. Refer to section A3 for overview of interviews that promoted the discussion for advocating the protection of Formicula and Inner Ionian. Further discussions are arranged with in boat rental companies, in collaboration with the [Sustainable Sailing Ionian](#) and further discussions will be organized with the local Harbour Management Organisation of Lefkas and Palairos to discuss the installation of eco-moorings.

A.2 Prepare and submit an official research permit to the Ministry of Environment and Energy (month 1)

A research permit was obtained from the Ministry of Environment for the area of interest (Prot. No: ΥΠΕΝ/ΔΠΔ/44129/2657; ΑΔΑ: 97Μ54653Π8-Γ8Ρ).

Data collection:

A.3 Perform interviews with recreational and professional fishers and operators of the tourism sector for mapping their activities in the target areas and understand the level of pressure spatially and seasonally.

For the preparation of the questionnaires, we had 3 meetings with external collaborators of iSea with expertise in the field of interest for influencing international collaboration and securing the quality of the data collection. 3 Questionnaires were developed; one addressed to recreational fishers; one to professional fishers; one to tourism businesses. All the questionnaires aim to obtain data that will allow us to quantify the pressures of each stakeholder's activity to the marine environment of the study area as well as understanding their perception. Online versions of questionnaires



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were created targeted to the sailing companies that are based in Lefkada, the link to the questionnaire can be found here: <https://forms.gle/tFL6d4taSnhVUqjC9>.

A total of 71 questionnaires from local stakeholders were collected to date (8 tourism businesses, 34 professional fishers, 29 recreational fishers). Regarding the recreational fishers we are also in contact with the local recreational fishing shop of Lefkada and relevant associations. We are in communication with SITESAP ([Hellenic Professional Yacht Owners Bareboat Association](#)) to collect more questionnaires from boat rental businesses and the areas their boats moor. More questionnaires will be collected in collaboration with Sustainable Sailing Ionian and the local diving centres. Due to this, the analysis of the questionnaire data was only undertaken for professional fishers. These results will be submitted to the HydroMedit Congress 2024, an international congress on applied ichthyology, oceanography & aquatic environment in Mytilene, Greece (30 May - 2 June).

Methodology and preliminary results of professional fisher's questionnaire analysis

Data presented here derive from 33 interviews conducted from 9/4/2023 to 21/6/2023, in fishing ports of Mytikas, Lefkada, Kalamos, Meganisi and Palairos. The interviewees provided details on the gear specifications, the target species, the depth, the habitat and the temporal and spatial extent of their effort. Then the data was digitized and organized in a matrix where each record corresponded to a cell of 2,235.00 km² for which all the gathered information were presented as attributes, using ArcMap (version 10.8, Educational Site License of University of the Aegean). The fishing effort was calculated on a seasonal, monthly and annual basis for each gear according to the information provided by the fisher (in days per month for the reported months) in case of spatial overlap of 2 or more values for monthly fishing activity the mean value was calculated. The Optimized Hotspot Analysis of the Spatial Analyst extension of ArcMap 10.8 was used to identify the hotspot and coldspot regions in the area. The combination of the information of the gear used for specific target species during a specific period as coded information has been termed as "métiers" (Mesnil et al., 1990) for the study area the codes were created using the European fishing gear codes and the FAO AFSIS 3a code for the target species. Similar fishing patterns were grouped in the same métier. The depth of each area was also added using raster data from the EMODnet database and mean depth was calculated for each cell.

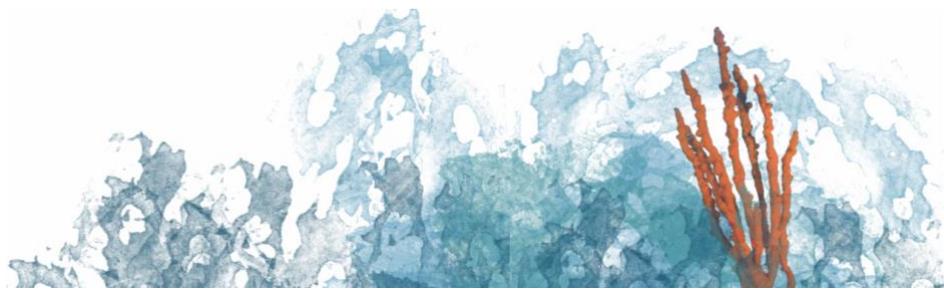
From the 33 questionnaires that were conducted the average age of the questionees was 63 years old and 48.5% of them had a livelihood from fishing. The average boat length was 8 meters long, the average horsepower was 39GT and most of them had a four-stroke engine. After the analysis 7 fishing gears were recorded and 27 different target species, 46 different métiers were determined. The annual fishing effort per spatial unit ranges between 14-305 days per year in the archipelago, the lowest yearly effort seems to be in north of Archipelago lower than 100 days and more than 250 days were recorded in the South East part of the area, also close to Mytikas close to



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Arkoudi and in between Meganisi and Kalamos (Figure 1). During the summer season in the center of the study area encompassing Meganisi, Kalamos, Arkoydi, and Atokos, fishing activity was recorded between 20 and 40 days for the entire season. Higher values were observed in the northern part and southeast near Astakos, where activity reached 40-60 days per season. In winter, the central area experienced fishing activity between 26 and 50 days per season, with higher values recorded in the northern region near Ithaki and Astakos, ranging from 51 to 75 days per season. Conversely, lower values ranging from 21 to 29 days per season were noted in the northern waters close to Lygia and near Varko beach. During the spring activities in the central area ranged from 19 to 54 days per season, while higher values 55-75 days per season were documented in the southeast near Astakos. Autumn recordings indicated activity in the central area between 37 and 75 days per season. In the southern region near Ithaki and Astakos, consistently high activity, between 55 and 75 days per season, was noted. Like summer, low values, specifically 18 days and under per season, were recorded in the same southern area. Although Beach Seines (SB) are banned in Greece, fishers reported 5 species, activity was recorded off the coast of the Lefkada island and in the north of the study area, which apart from the gear ban it is a no trawling zone.

The coastal areas of S. Lefkada were the least fished areas, and the most active areas were around the islands, with Kalamos having the most reported effort followed by Meganisi and the small islands of Atokos and Arkoudi. (Figure 2). The gears that use nets were mostly recorded in the Kalamos island and the area in between of the islands mentioned above is also the deepest waters in the area they seem to have been used the same all year round except for the GNS gear it seems to be more used in the Winter and Spring (Figure 2).



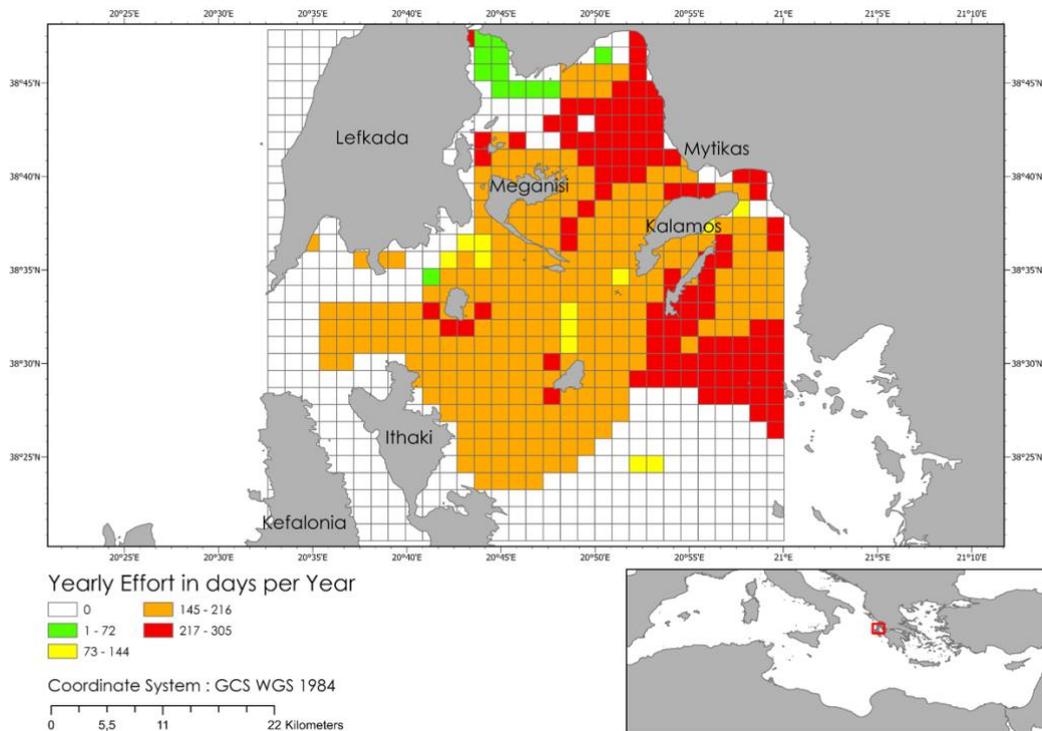
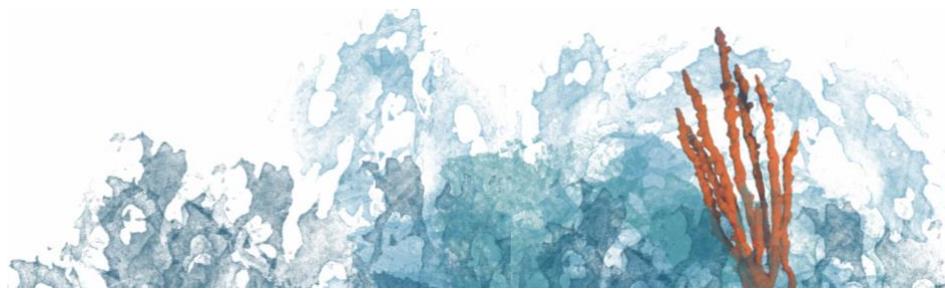


Figure 2: Yearly Fishing Effort in the Archipelago

The LLS gear were reported in area between Kalamos Meganisi Arkoudi and Atokos all year round, the SB gear (illegal fishing) was used more in the Autumn and Winter rather than the Spring and Summer and the LHP tools has very few recordings, but they were also used all year round. The LLD tool was recorded only one time, and the fisher did not provide any information about its temporal use only its spatial. The North part of Lefkada seems to be a cold spot with less fishing activity. Comparing this information with the bathymetry data the professional fishers in the area prefer to fish in deep waters this could also be attributed to the fact that the species *Merluccius merluccius* is a very popular target species due to its economic value.



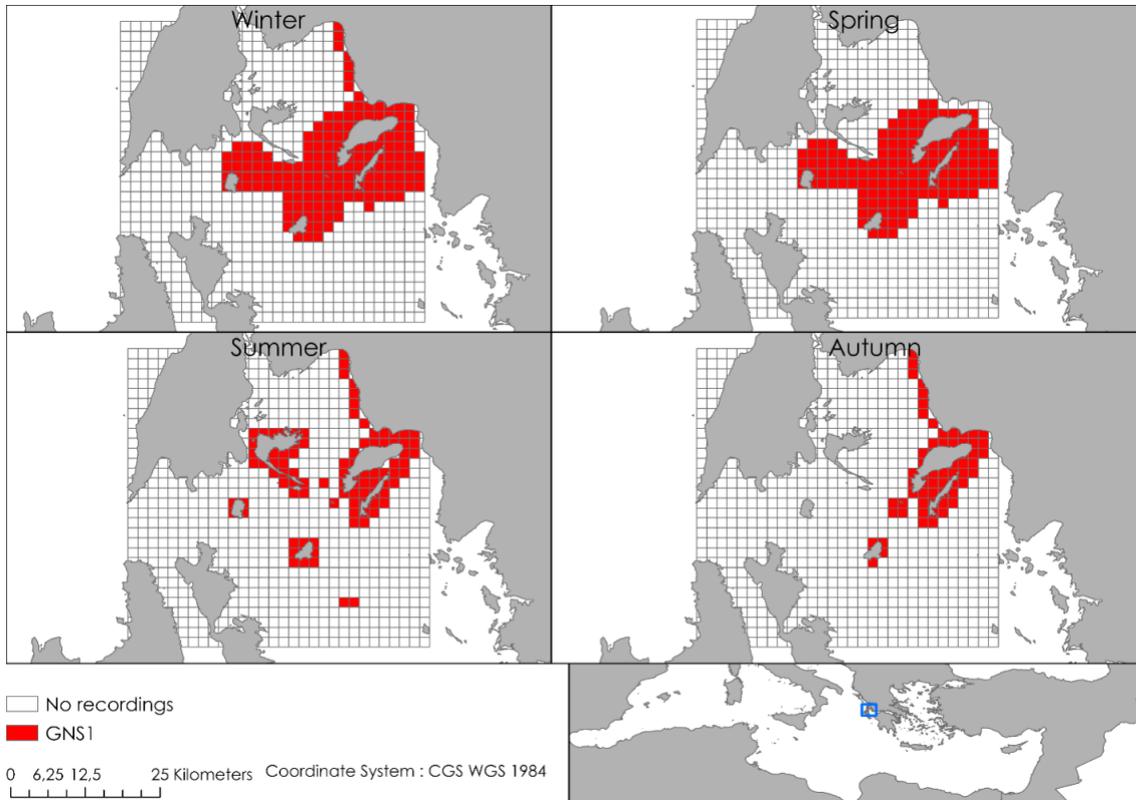
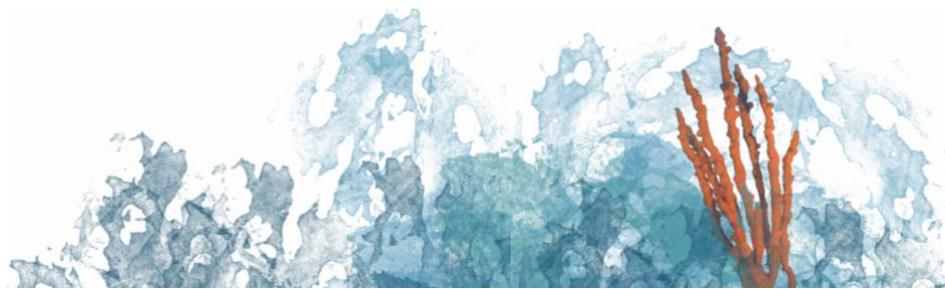


Figure 2: Spatiotemporal changes in one of the métiers identified for gillnets targeting pelagic species.

A.4 Detecting critical habitats in Formicula, Arkoudi and Atokos islets with emphasis on the Coralligenous reefs and Posidonia meadows (months 3-7)

As Posidonia meadows have already been mapped in Formicula in 2022, this is not mentioned in the present action, and only the presence of coralligenous reefs was explored in Formicula. For Posidonia meadows (1120) and Rocky reefs (1170) ground truthing data were collected for Arkoudi and Atokos islands in April 2023 and were used for identifying the habitat around the two islands. An overview of the habitats identified within three different depth zones (0-5m, 10-20m, 25-45m) during the April site visits, along with the specific dates and team members for each island can be seen in Figure 3.





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Islands	Habitat	Depth			Team	Names
		0-5m	10-20m	25-45m		
Atokos	Posidonia	A1,A2	A2, B1	A2	A	ND, IG
	Reef coastal	A1,B2	B2	-	B	RNAS, NS
	Reef Biogenic	-	-	A1, A3, A5		
	Sand	A2,B1	B1	-		
Arkoudi	Posidonia	A2,B2	B2, B3	A2, B4	Day	Date
	Reef coastal	B2	A4, B3	A4	1	09/04/2023
	Sand	A2, B2	-	-	2	10/04/2023
Formicula	Posidonia	A3, B1	A3, B1	A3, B1	3	11/04/2023
	Reef coastal	B3, A1	A1, B3	A1, B3	4	12/04/2023
	Sand	A3, B3, B1	-	-	5	13/04/2023

Figure 3: Overview of the habitats identified within 0-5m, 10-20m and 25-45m for Atokos Arkoudi and Formicula per team, per day, during the five-day fieldwork period in April 2023

Posidonia oceanica habitat:

Regarding *P. oceanica* habitat, mapping was completed for the islets of Atoko and Arkoudi by terraSolutions m.e.r. on the 5/12/2023 using satellite remote sensing.

Specifically, Maxar WorldView III 8-bands (here after WVIII), at 2m pixel size were used. The selection of the imagery was completed using publicly available Maxar Discover tool (<https://discover.maxar.com/>). Through the available imagery from the archive, the selection was based on the 8-band data (<https://worldview3.digitalglobe.com/>) considering a less than 20% cloud coverage within the search area. The filtered imagery was visually inspected prior to order for further analysis. The 8-band WorldView II/III as previously been used for coastal bathymetry and habitat mapping with success at various water types (Mederos-Barrera et al., 2022, Poursanidis et al., 2018, Coffe et al., 2023).

One image, acquired on 21/10/2022 with clear sky conditions was selected. Imagery was ordered in Top of Atmosphere Reflectance (TOAR) and the ACOLITE (Vanhellemont et al., 2018) was used as the proper atmospheric correction for aquatic environments, resulting in a bottom surface reflectance image composite.

For the image classification towards seagrass mapping, a Random Forests Regression-based analysis workflow was employed, adapted from Poursanidis et al., 2021. For this,



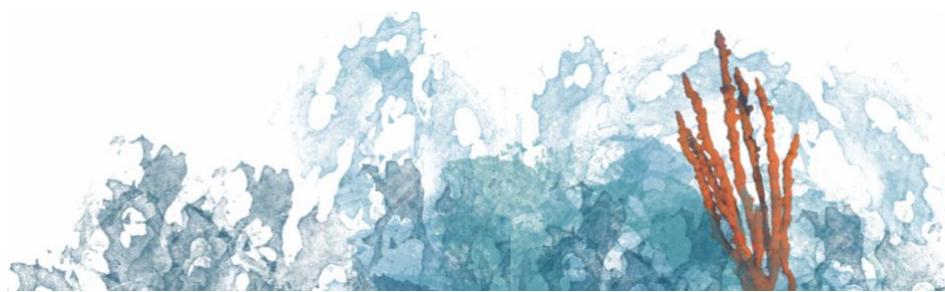


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the open source EnMAP toolbox (Van der Linden et al., 2015, Poursanidis et al., 2019) was used, where all necessary steps for proper creation of training data, image classification and product validation using the collected field data, are in place. The toolbox is a plugin in the open-source GIS software QGIS and can be used by any experienced user.

For the analysis, a series of image-based training data were created that were evenly distributed in each area of work. A binary scheme was designed to separate the target habitat, here the seagrass meadows, from other seabed habitats (namely sandy/soft bottoms, rocky surfaces/reefs and optically deep waters). The areas of the imagery where the motion of speedboats and their wake obscured the area were masked out and turned into a wavy area with no bottom reflectance information. The product validation is based on the independent point-based dataset (ground truthing points), collected by iSea team during April 2023. A radius of 3m was used to compensate for the GPS accuracy. Annex I provides an overview of the developed methodology for the analysis of commercial satellite imagery.

The overall accuracy of the final product for Arkoudi is **90.3%**, based on 33 validation points collected during the fieldwork in April 2023 while Atokos has an accuracy of **83.5%** based on 44 validation points collected during the fieldwork at the same period. According to the current work, the meadows cover an area of **0.22km²** (22,3 hectares) in Arkoudi (Figure 4, left) and **0.18km²** (18.7 hectares) in Atokos (Figure 4, right). In Arkoudi, the meadow is restricted to the protected side of the island from the dominated winds, i.e. is exclusively present in the east side with a few areas distributed in the north and south parts of the island. Despite the somewhat isolation of these islands from the mainland, they appear to attract a high number of boat visits during the summer months. Although the disturbance from boat anchoring cannot be estimated solely from satellite images, the two main bays in both islands are likely impacted from anchoring, however further investigation is need. Patchy distribution of *P. oceanica* could be the result from a number of reasons including geology oceanography, sedimentation and more.



It is worth noting that the oceanographic conditions of the area can limit the accuracy of the analysis of the satellite imagery regarding the lower limit of the meadows (deep limit) however deep limits are confirmed by the dives of the field team.

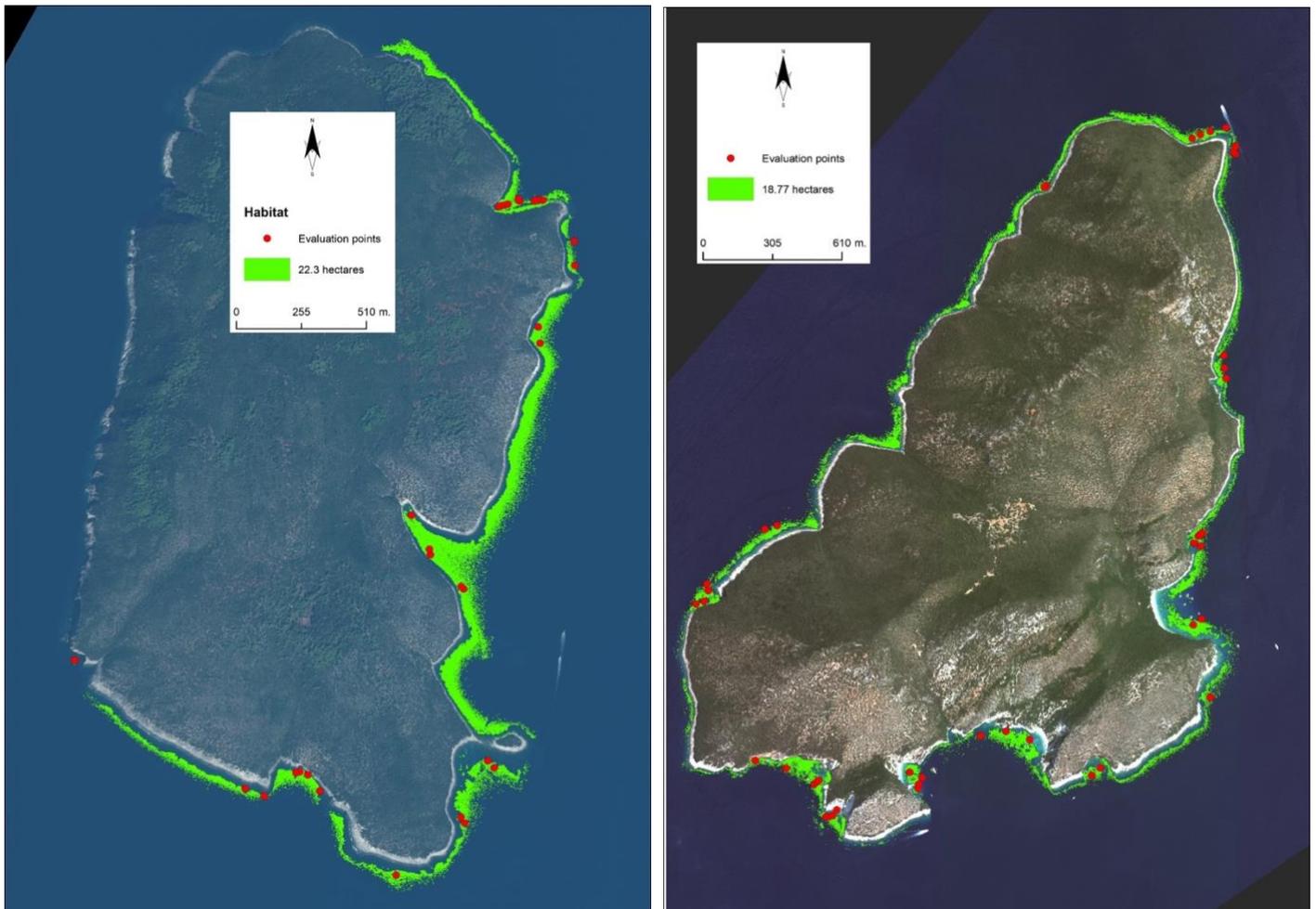
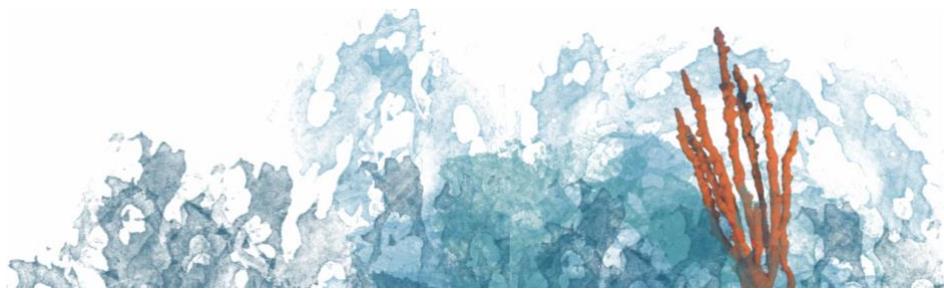


Figure 4. The spatial distribution of *Posidonia oceanica* in Arkoudi (left) and Atokos (right).



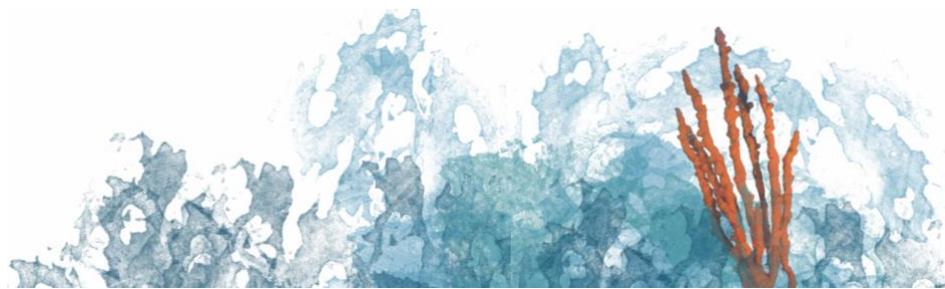
Other habitats

Three underwater caves (Submerged, Partially submerged sea caves: 8330) were located in Formicula island and two in Atokos. Finally, the corraligenous habitat identified during last year in Atokos was revisited. As seen in Figure 1, the team confirmed the existence of a Biogenic reef (Figure 5) in the north-eastern region of Atokos at 25-45m depth, while coastal reefs were observed in all three islands from 0-45m depths (Figure 1). In the next field visit, iSea plans to use an ROV for locating such habitats in deeper waters within the study area. Corraligenous and maerl are also backed from the findings of the questionnaires regarding the metiers as a metier for species known to inhabited such habitat were identified i.e. *Palinurus elephas* (Common spiny lobster), *Pagrus pagrus* (Red porgy) (Figure 4). Finally, according to a recent study of Fakiris et al. (2023), published using side scan sonar and modelling, confirms the maerl within the region (Figure 6). We contacted Dr. Papatheodorou coordinator of this work to collaborate regarding this work for the Inner Ionian Archipelago.

This action is scheduled for the 2024 season and will result in the mapping of these other priority habitats around the three surveyed islands.



Figure 5: Biogenic reef habitat (1170) in the north-eastern region of Atokos (left). An endemic Mediterranean red coral (*Corallium rubrum*) in Atokos (right).



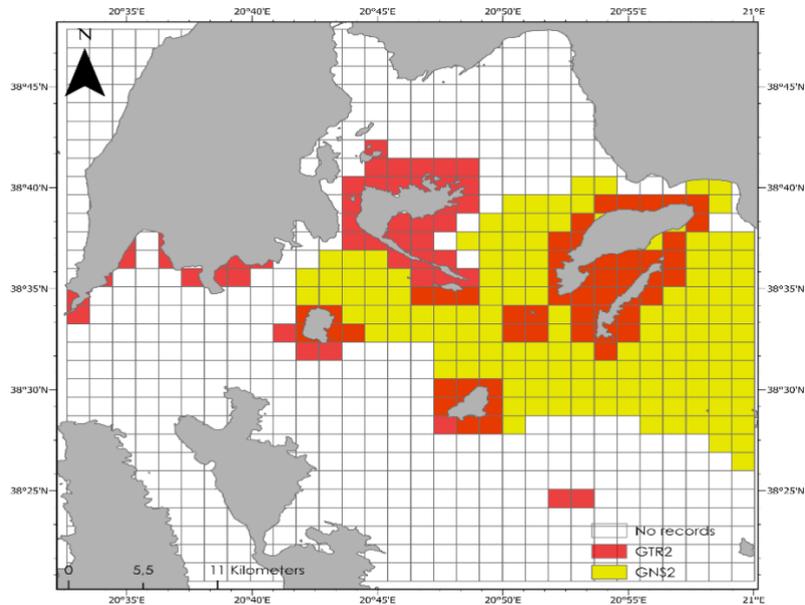


Figure 6. Map of Inner Ionian Archipelago confirming the presence of Maerl habitat in the area using Side Scan Sonar (Fakiris et al., 2023).

A.5 Monitoring biodiversity and fish biomass on a seasonal basis on the different detected habitats of Formicula, Arkoudi and Atokos islets.

Underwater visual census (UVC; Figure 7) was used to assess biodiversity and fish biomass. Initially, the team aimed to visit the sites during spring, summer, and winter to account for variation in species presence due to seasonality. However, only two site visits were conducted in spring and summer 2023, while the planned survey for winter was cancelled due to bad weather conditions and has been rescheduled for winter (February) and autumn 2024.

Figure 7: Graphical description of sampling in transects.



In total 54 transects were completed in 2023, specifically 18 in Arkoudi (in June), 20 in Atokos (in April and June), and 16 in Formicula (in April and June). For each area 3 transects of 25m (5m wide) in selected isobaths (10m-15m-20m) were conducted on



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Posidonia meadows and on Rocky reefs (54 transects). All results collected in 2023, along with the results of the 10 transects in Formicula during 2022, were organised in an excel database for analysis, where parameters were collected per specimen per habitat type.

While estimating the biomass, the use of the length-weight equation ($W = a L^b$) was made linking the total length of the specimen and its weight (in grams) with the specific parameters "a" and "b" determining the variance of the results. These parameters were obtained through publicly available data on the species on [Fishbase](#), an online database (version 10/2023) which estimates the precision of its results by a score. The mean values of density and biomass were calculated using a bootstrap methodology which creates a distribution of random samples based on the collected samples. Also, standard deviation was calculated and confidence intervals of 97.5th and 2.5th percentile were determined.

Regarding the mean density per km², which is the mean number of individuals of each species, this is higher for rocky habitats compared to Posidonia meadows for Arkoudi (960 versus 454 individuals) and Atokos (821 versus 725 individuals), however this is not true for Formicula which shows the highest mean density of fish fauna in Posidonia habitat (1.256 individuals) compared rocky habitat (517 individuals; Figure 8). In terms of biomass per km², this was lowest in Arkoudi and Atokos Posidonia meadows habitats with 2kg/km² and 3kg/km² accordingly. Higher values were observed in rocky habitats (8-11kg/km²) however the value observed in Formicula Posidonia habitat was slightly higher than this, with 11,2kg/km². However, it is important to note that the standard error of this value is significantly high due to the range and amount of data collected for Formicula compared to the other islands. Therefore, these results should be interpreted with caution and might not represent an accurate estimation. This could be resolved with collecting more data of the same nature, which is scheduled for the 2024 season. Although it might appear that the biomass and abundance is lower in Posidonia meadows for Atokos and Arkoudi, given the fact that the meadows act as a nursery area, many of the individuals are most likely too small to be captured in commercial fishing nets such as the ones used for the surveys.

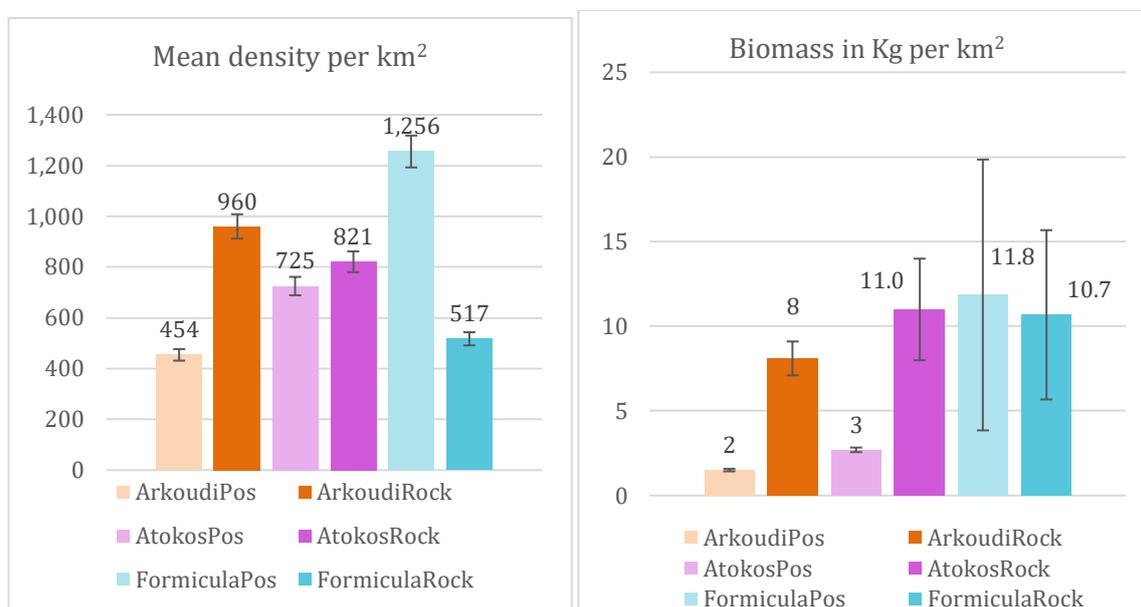


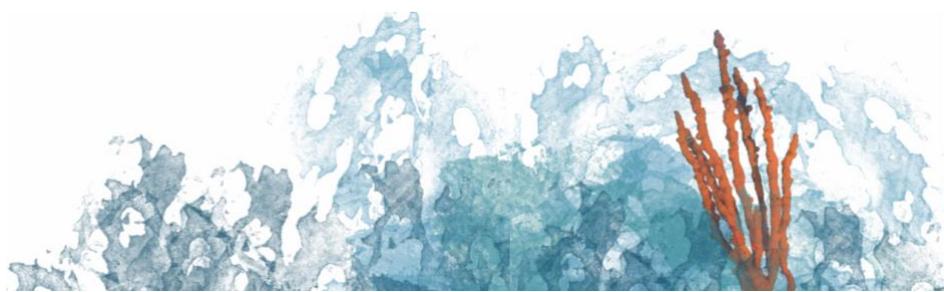
Figure 8. Mean species abundance and biomass of the 3 locations on the different habitats of Posidonia meadows and Rocky reefs of January 2023 survey.

A total of 44 different species were observed, with most of them identified at the species level (n=42). Due to the different seasonal surveys some outcomes are more accurate than others because the results are preliminary. A season of a survey can influence observations cause the observed species might differ in growth and spawning periods, resulting in more or less juveniles than other species. For example, the species of *Sarda sarda* and *Oblada melanura* have a spawning period from spring to summer. Also, *Posidonia* meadows are known as nursery areas for lots of species and so there is a possibility of detecting younger individuals. Once all seasonal sampling is completed, they will be subject to further discussion. This report portraits a good representation of the abundance of the area, although in order exhibit better results in biomass too, the postponed survey must be completed so the outcome can be more reliable and representative for the area.

Conservation actions:

A.6&7 Adding informative signs in the Marinas of the Inner Ionian Archipelago promoting citizen science (iNaturalist) and code of conduct for *Posidonia* meadows and marine megafauna.

A poster was developed in collaboration with Tethys Research Institute and the Ionian Dolphin project to inform sea users on a) the precious habitats and species of the Inner Ionian Archipelago; b) good practices when in the marine environment; and c) how to collect data as a citizen scientist by directing them to iNaturalist platform. The poster can be seen in Annex II. It will become public in the following weeks on social





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media platforms and distributed among identified stakeholders via mailist, while within 2024 it will be printed as signs to be placed in local ports in the Inner Ionian Archipelago and in Paxoi island, while it will be incorporated into the '[Ionian Sailing Guide](#)' and on the iSeas website in the '[Informative Material](#)' page.

Available printed resources have been distributed to over 100 stakeholders in the area and this will be further increased during the summer season of 2024 to ensure a longer-term impact of the materials.

A.8 Removal of abandoned, lost, and discarded fishing gear (ALDFG) from the target area

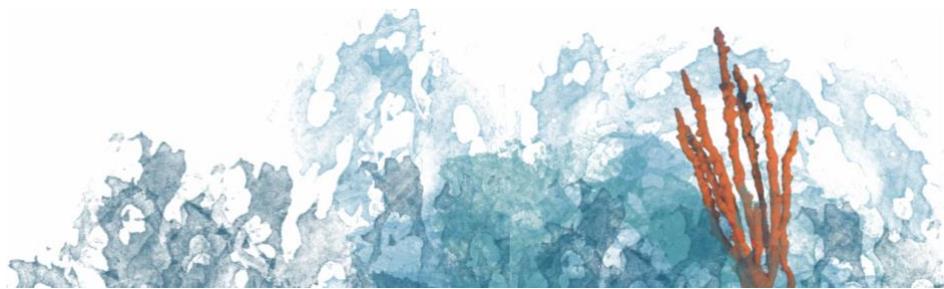
A coastal clean-up was conducted in Formicula during the last field visit. Abandoned Lost and Discarded Fishing Gear (ALDFG) were located during the field visits while others were identified from the Questionnaires (A.3) to be revisited and removed during the 2024 season in collaboration with the Diving Center Lefkas, the Nautilus Diving Center of Patras and the Ionian Pro Dive.

A.9 Mapping the process for installing eco moorings in Formicula.

iSea conducted a literature review for other efforts in installing eco moorings in Greece. The team then contacted other entities from the Mediterranean who have been working in areas where eco moorings have been installed for influencing international collaboration and obtain the know-how from the best. Specifically, a meeting was undertaken with the government body of the Balearics responsible for the management of Posidonia meadows, MPN, [Kyma Sea Conservation & Research](#) who has been working in Sicily. A policy brief was produced with all the technical and practical steps that need to be taken in order to properly install eco moorings in Formicula. Finally, the action was in the agenda of A.1.2. and was discussed with other local stakeholders during meetings. The policy brief is currently under review and will be shared with WWF Greece and NECCA, along with other national stakeholders who will conduct a peer review and collaborate on the matter. Technical guidance on the instalment process will be asked from technical diving centers located in the area. Further efforts of this action will continue throughout 2024.

A.10 Advocacy with the Ministry and all relevant authorities for strictly protecting Formicula based on the common proposal formulated by iSea, Tethys and Blue Marine Foundation in 2022

Given the political situation in Greece (Elections and new government) a new strategy was formulated for reapproaching the new Minister of Environment and for organizing the meetings. See letter to the relevant ministry in Annex III. iSea is still awaiting a response and urges action for protection before the summer season of 2024 in hopes of avoiding further disturbance of the critical habitats and species in Formicula. Therefore, a schedule for discussions has not been made to date. If the





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situation persists, it has been decided that the issue will be shared publicly in hopes to persuade the ministry to take action.

Dissemination actions

A.11 Communication campaign for improving highlighting the importance of the Inner Ionian Sea Archipelago.

A.11.1 Two articles in the national press about the uniqueness the area advocating for the protection of Formicula

One article was published in "K magazine" by the reporter Olga Charami on 17/04/2025 with the title "[An Ionian islet full of seals](#)". The article highlighted Formicula's importance, threats, and the research efforts by the different entities in the region, while highlighting the joint proposal submitted to the Ministry of Environment, the management measures that were included in the Special Environmental Study (SES) and more importantly the urgent need for a Ministerial Degree. Additionally, iSea published an [article](#) in its website with the comments co-signed by Blue Marine Foundation, Ionian Environment Foundation and Tethys Research Institute submitted in the SES. The second article is currently under discussion and will be published within the first trimester of 2024 to push the Ministry to ensure Formicula's protection according to the SES prior touristic season. Additional communication efforts are also discussed focused on increasing visibility on the urgency of the issue.

A.11.2 Develop a page in iSea's website for the project in Greek and English (Month 1 and 11)

iSea developed a subpage in iSea's website for the project in [Greek](#) and [English](#) to refer to in all communications of the project. During the final stage of the project the content of the pages including actions, results and pictures were updated to reflect the final findings and deliverables. An update is foreseen after the completion of fieldwork on February 2024.

A.11.3 Two newsletters for Formicula's protection addressed to the stakeholders identified in A.1 (month 6 and 12)

The newsletter was developed and used during the interviews. Only one newsletter was produced which highlighted the key results of this report as well as the reasons for advocating for protection. The draft version of the newsletter will be included within this report. After making the final adjustments, it will be made public and it'll be shared with the stakeholders.

A.11.4 Social media posts about the area (months 1-12)

Social media posts have been made to familiarise the public with the ecosystems in the area of interest as well as showcase the efforts being made and the urgent need



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of protection. Seven posts have been made in iSea's social media on Facebook, Instagram, Twitter and LinkedIn. There will be two additional posts, one regarding the last fieldwork findings and the other regarding the poster and the newsletter. The efforts for the protection of the Formicula will be pursued as an independent advocacy campaign.

A.12 Project Coordination

A.12.1 Monitoring the project actions, ensure high-quality deliverables and reporting.

A project manager has been assigned to the project who is closely monitoring the projects actions and ensures the timeline, and the actions of the project are being met. While a broader team is involved in the implementation of various actions of the project. The project manager works with the team and coordinates the implementation of the project. It is important to mention that there have been some delays during the implementation of this project specifically these occurred in September and November due to cancelations of fieldwork from bad weather conditions, delays in receiving feedback from the external graphic designer and a change in the implementation team towards the final months of the project.

A.12.2 Financial monitoring

The project manager, the director and the accountant are following the finances of the project ensuring that the expenses follow the budget. The expenditures of the project are listed in table 1, however, this is not the final list of expenditures as the fieldwork has not been completed. All original receipts are kept in iSea's headquarters and copies can be given to the funder upon request.

Table 1: The expenses are presented in chronological order along with the receipt reference number, description and amount.

Date	Ref number	Description	Amount
21/03/2023	48	External partners/Graphic designer	499.99 €
31/03/2023	11	Travel expenses/accommodation	60.50 €
07/04/2023	237	Printed material	72.42 €
07/04/2023	8762	Printed material	6.00 €
08/04/2023	1772362	Travel expenses	9.20 €
08/04/2023	442737	Travel expenses	1.20 €
08/04/2023	751587	Travel expenses	1.40 €
08/04/2023	224761	Travel expenses	1.50 €
08/04/2023	669472	Travel expenses	1.40 €
08/04/2023	278742	Travel expenses	1.20 €
08/04/2023	78844	Travel expenses	40.00 €
08/04/2023	96103	Travel expenses	3.15 €
08/04/2023	889462	Travel expenses	3.00 €
08/04/2023	104387	Travel expenses	460.01 €



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08/04/2023	646930	Travel expenses	74.00 €
08/04/2023	121623	Travel expenses/subsistance	12.50 €
08/04/2023	53057	Travel expenses	32.00 €
09/04/2023	248459	Travel expenses/subsistance	15.62 €
09/04/2023	52228	Travel expenses/subsistance	42.54 €
09/04/2023	248462	Travel expenses/subsistance	4.97 €
10/04/2023	170	Diving equipment maintenance	150.10 €
11/04/2023	96527	Travel expenses/subsistance	4.00 €
12/04/2023	26226	Travel expenses	12.90 €
12/04/2023	128464	Travel expenses	1.70 €
12/04/2023	128465	Travel expenses	1.70 €
12/04/2023	128466	Travel expenses	1.70 €
12/04/2023	26346	Travel expenses	12.90 €
12/04/2023	4673	Travel expenses	2.60 €
12/04/2023	4674	Travel expenses	2.60 €
12/04/2023	4675	Travel expenses	2.60 €
12/04/2023	37	Travel expenses	220.00 €
12/04/2023	121194	Travel expenses/subsistance	18.05 €
13/04/2023	42964	Travel expenses	269.79 €
13/04/2023	468339	Travel expenses	20.00 €
13/04/2023	20250	Travel expenses/subsistance	150.50 €
13/04/2023	30455	Travel expenses	26.00 €
14/04/2023	648870	Travel expenses	3.00 €
14/04/2023	33322	Travel expenses	3.15 €
14/04/2023	709705	Travel expenses	0.50 €
14/04/2023	46909	Travel expenses	1.20 €
14/04/2023	797443	Travel expenses	1.40 €
14/04/2023	776598	Travel expenses	1.20 €
14/04/2023	25528	Travel expenses	1.40 €
14/04/2023	964955	Travel expenses	1.50 €
15/04/2023	11	Travel expenses/accommodation	302.00 €
03/05/2023	RCZTXA58BK	Travel expenses/accommodation	528.78 €
19/06/2023	16898	Travel expenses	6.00 €
19/06/2023	16900	Travel expenses	3.00 €
19/06/2023	16902	Travel expenses	6.00 €
19/06/2023	20151	Travel expenses/subsistance	5.00 €
19/06/2023	537	Tank fillings	20.00 €
19/06/2023	2317	Travel expenses	63.50 €
19/06/2023	4176	Travel expenses	30.00 €
19/06/2023	214144	Travel expenses/subsistance	48.39 €
19/06/2023	24787	Travel expenses	5.00 €
19/06/2023	140775	Travel expenses/subsistance	10.60 €
19/06/2023	173164	Travel expenses	0.50 €



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19/06/2023	385823	Travel expenses	74.00 €
19/06/2023	266581	Travel expenses	1.20 €
19/06/2023	569477	Travel expenses	1.40 €
19/06/2023	335173	Travel expenses	1.50 €
19/06/2023	529359	Travel expenses	1.40 €
19/06/2023	535540	Travel expenses	1.20 €
19/06/2023	89941	Travel expenses/subsistance	10.55 €
19/06/2023	57206	Travel expenses	3.05 €
19/06/2023	102659	Travel expenses	3.15 €
19/06/2023	12991	Travel expenses	57.01 €
20/06/2023	16	Travel expenses/accommodation	135.60 €
20/06/2023	88401	Travel expenses/subsistance	4.78 €
20/06/2023	40167	Travel expenses	243.00 €
20/06/2023	9307	Travel expenses/subsistance	1.50 €
20/06/2023	7544	Travel expenses/subsistance	12.00 €
20/06/2023	7545	Travel expenses/subsistance	22.50 €
20/06/2023	88400	Travel expenses/subsistance	17.57 €
21/06/2023	6508	Travel expenses/subsistance	21.00 €
21/06/2023	256	Travel expenses/subsistance	12.00 €
21/06/2023	127	Travel expenses	44.00 €
21/06/2023	28794	Travel expenses	110.00 €
21/06/2023	88546	Travel expenses/subsistance	30.25 €
21/06/2023	121223	Travel expenses/subsistance	10.00 €
21/06/2023	6509	Travel expenses/subsistance	71.50 €
22/06/2023	108252	Travel expenses	60.00 €
22/06/2023	157253	Travel expenses/subsistance	56.48 €
23/06/2023	9874	Travel expenses/subsistance	12.00 €
23/06/2023	9895	Travel expenses/subsistance	12.00 €
23/06/2023	88828	Travel expenses/subsistance	10.68 €
23/06/2023	5463	Travel expenses/subsistance	5.50 €
24/06/2023	40515	Travel expenses	30.00 €
25/06/2023	91427	Travel expenses/subsistance	6.30 €
25/06/2023	190933	Travel expenses	66.00 €
25/06/2023	315842	Travel expenses/subsistance	14.00 €
25/06/2023	40561	Travel expenses	53.01 €
26/06/2023	25	Tank filings	136.40 €
Project manager compensation (Feb-July)			5,077.48 €
Assistant project manager compensation (Feb-July)			4,553.73 €
Field team compensation (April-June)			1,397.80 €
Accountant (Feb-July)			420.14 €
Administrative staff (Feb-July)			548.37 €
08/09/2023	8333343	Travel expenses/accommodation	540.00 €
10/10/2023	10	Boat maintenance	210.80 €



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18/10/2023	7	Tank filings	49.60 €
23/10/2023	1	Graphic designing	434.00 €
16/11/2023	38976	Consumables	20.00 €
27/11/2023	674128	Travel expenses	1.50 €
27/11/2023	995134	Travel expenses	1.40 €
27/11/2023	420892	Travel expenses	3.15 €
27/11/2023	745113	Travel expenses	1.20 €
27/11/2023	114687	Travel expenses	0.75 €
27/11/2023	258984	Travel expenses/subsistance	74.65 €
27/11/2023	8456	Travel expenses/subsistance	12.00 €
27/11/2023	262824	Travel expenses	1.20 €
27/11/2023	58352	Travel expenses	38.51 €
27/11/2023	186894	Travel expenses/subsistance	17.20 €
28/11/2023	8457	Travel expenses/subsistance	5.00 €
28/11/2023	77774	Travel expenses/subsistance	2.20 €
29/11/2023	143246	Travel expenses	1.20 €
29/11/2023	321138	Travel expenses	1.40 €
29/11/2023	608799	Travel expenses	1.20 €
29/11/2023	881835	Travel expenses	1.50 €
29/11/2023	114010	Travel expenses	0.75 €
29/11/2023	405198	Travel expenses	1.40 €
29/11/2023	443605	Travel expenses	3.15 €
29/11/2023	150744	Travel expenses	38.02 €
29/11/2023	62874	Travel expenses/subsistance	8.40 €
01/12/2023	297	Boat maintenance	94.50 €
17/01/2024	334	Travel expenses (car maintenance)	166.00 €
Mapping external collaborator*			1,000.00 €
Project manager compensation (Aug-Jan)			2,488.70 €
Field team compensation (Aug-Jan)			1,941.05 €
Accountant (Aug-Jan)			527.39 €
Administrative staff (Aug-Jan)			480.39 €
Total expenses			24,800.01€

**pending invoice*

Note: The above expenses do not include the fieldwork of the postponed biodiversity surveys. The cost of these will include travel accommodation, diving equipment, boat fuel as well as the compensation of the subsidies of the team members. The above will be shared with the funder when they have been completed.

Project collaborators



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1. Ionian Dolphin Project, Tethys Research Institute
2. Nautilus Diving Center
3. Palairos Diving Center
4. Municipality of Leukas
5. Fishers' association of Leukada and Astakos
6. University of Patras, Department of Fisheries and Aquaculture

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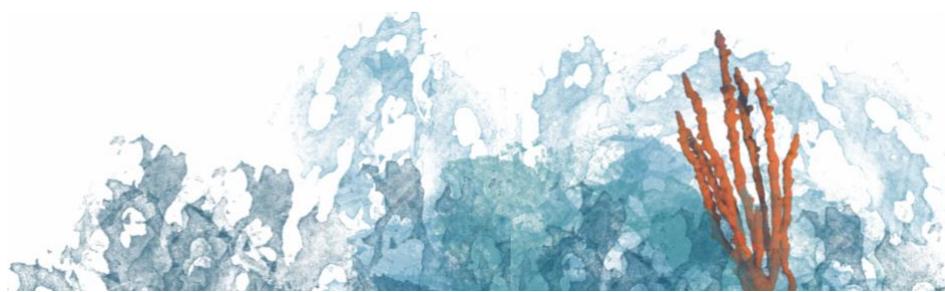
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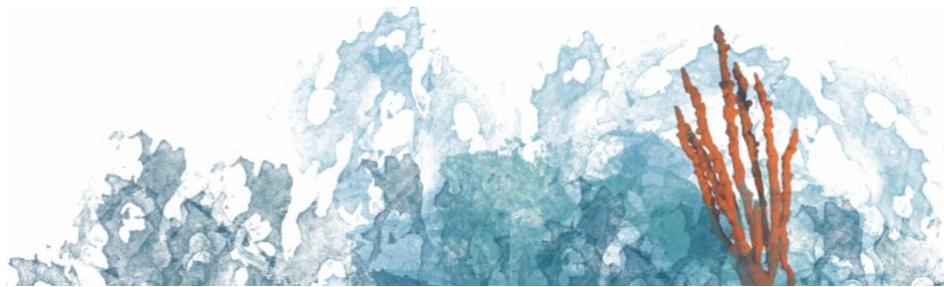


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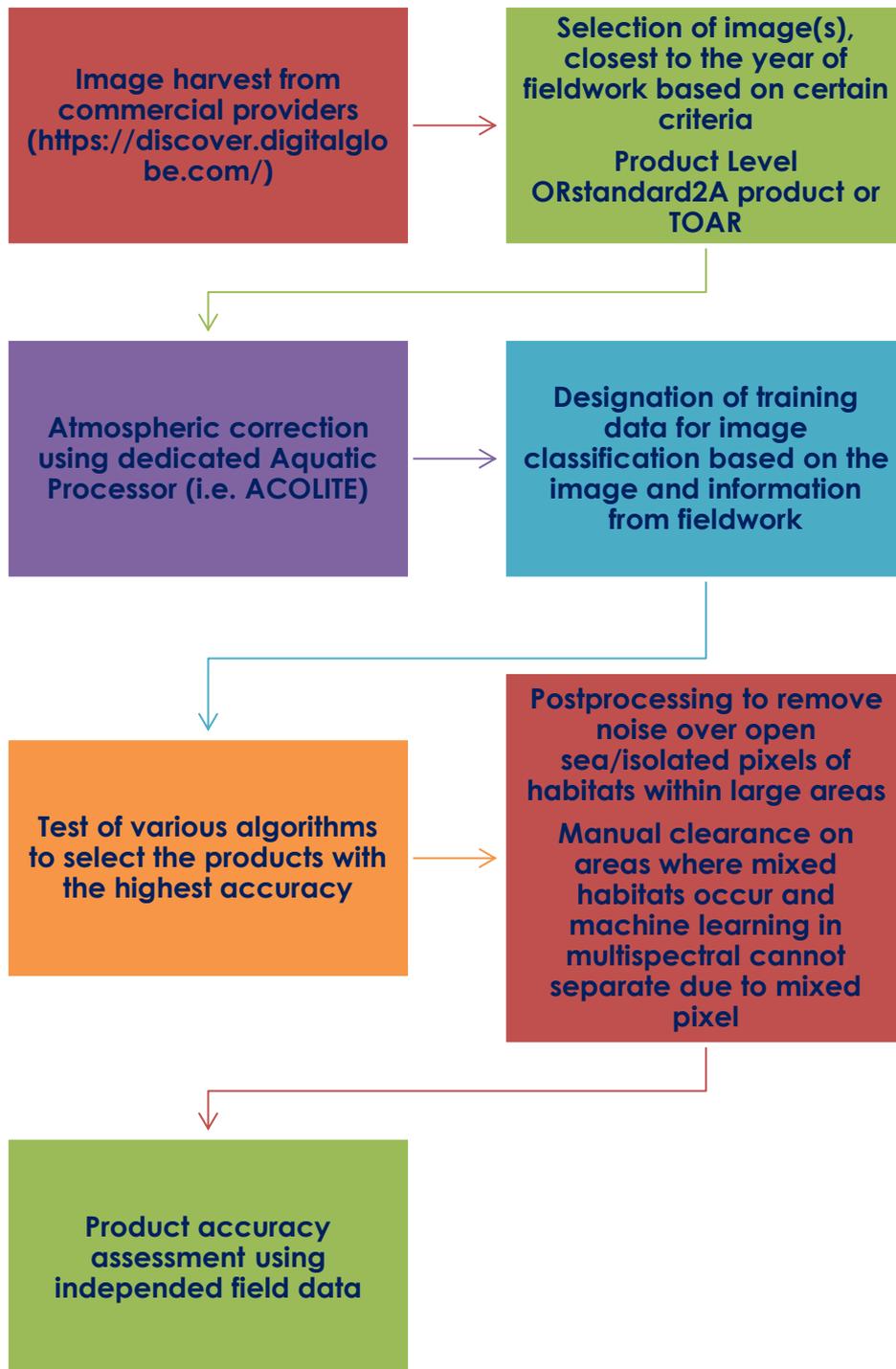
Annexes

Annex I: The logical workflow towards seagrass mapping using Maxar WVIII imagery.

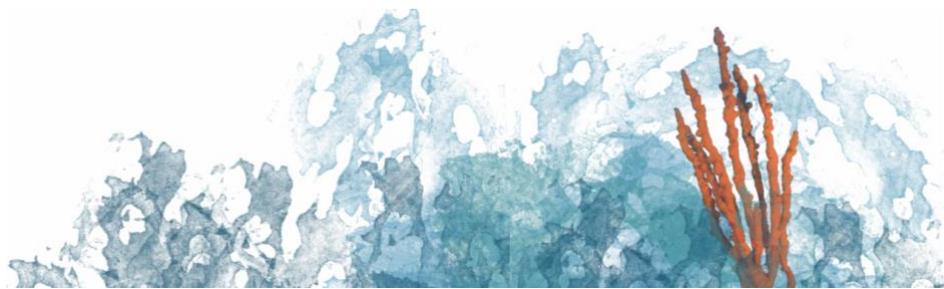




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Annex II: Informative sign for the Marinas of the Inner Ionian Archipelago promoting citizen science (iNaturalist) and code of conduct for Posidonia meadows and marine megafauna.





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Protect the Ionian Sea

Learn how to protect

- Dolphins
- Seals
- Posidonia

Keep 30m distance from seals

Keep 300m distance from dolphins

Do not anchor in Posidonia meadows

RECORD YOUR SIGHTINGS ON INATURALIST

iNaturalistGR



BLUE MARINE FOUNDATION



Appendix III: Letter to the ministry regarding the urgent need to protect Formicula.





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BLUE MARINE
FOUNDATION

To: Deputy Minister of Environment and Energy

Thodoros Skilakakis

Prot. No.: ###

Thessaloniki, 27 November 2023

Subject: Urgent conservation actions needed for Formicula Island

Dear Minister,

On behalf of the environmental organization [iSea](#), [Tethys Research Institute](#), and [Blue Marine Foundation](#), we are reaching out to continue the dialogue initiated in 2022 with the Ministry of Environment and Energy regarding the urgent need for the immediate protection of **Formicula island**, given its ecological significance for the **Mediterranean Monk Seal** population in the Ionian Sea.

Acknowledging your recent acquisition of responsibility for the portfolio of the Ministry of Environment and Energy and considering the particularly challenging past summer period, we are reaching out with the intention to inform and sustain the discussions concerning the unique case of Formicula island, a "droplet" in the Inner Ionian Archipelago, with a size of merely 0.4 sq.km., an important habitat for the Mediterranean Monk Seal, Posidonia seagrass meadows, other marine mammals, seabirds, groupers, and more.

Following our successful collaboration with the Ministry of Environment and Energy, based on our joint proposal (attached) with the Municipality of Lefkada for the area, we noted the incorporation of our recommendations in the draft management measures, that were proposed within the framework of the Special Environmental Study 5a for the area. We hope that these recommendations will be incorporated into the relevant Presidential Decree and Management Plan. However, our deep concern arises from the extended period before the issue of the Presidential Decree, which will finalize the protection status of the area. This time-consuming procedure causes a loss of valuable time, which could in turn, lead to unfavorable outcomes for the Mediterranean Monk Seal population in the region. For more information regarding the significance of Formicula island for the Mediterranean Monk Seal, as well as the escalating issues resulting from the **intense tourist activity** in the area, please refer to our joint proposal.

We are at a tipping point, where if no measures are put in place before the arrival of the first tourists in the area, we will be confronted yet again this summer with harassment incidents of Mediterranean monk Seals that could significantly impact their population.

For this purpose, we would like to invite you to a meeting to discuss in detail the unique case of Formicula island and collaboratively devise strategies to safeguard this vital habitat for the Mediterranean Monk Seal - a species that ranks among the most endangered and iconic in the Greek seas.

We remain at your disposal for further clarifications, and we hope for your positive response.

Yours sincerely,



iSea, 2024



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