Fishing in the Inner Ionian Archipelago

iSea

BLUE MARINE FOUNDATION

Suggested report

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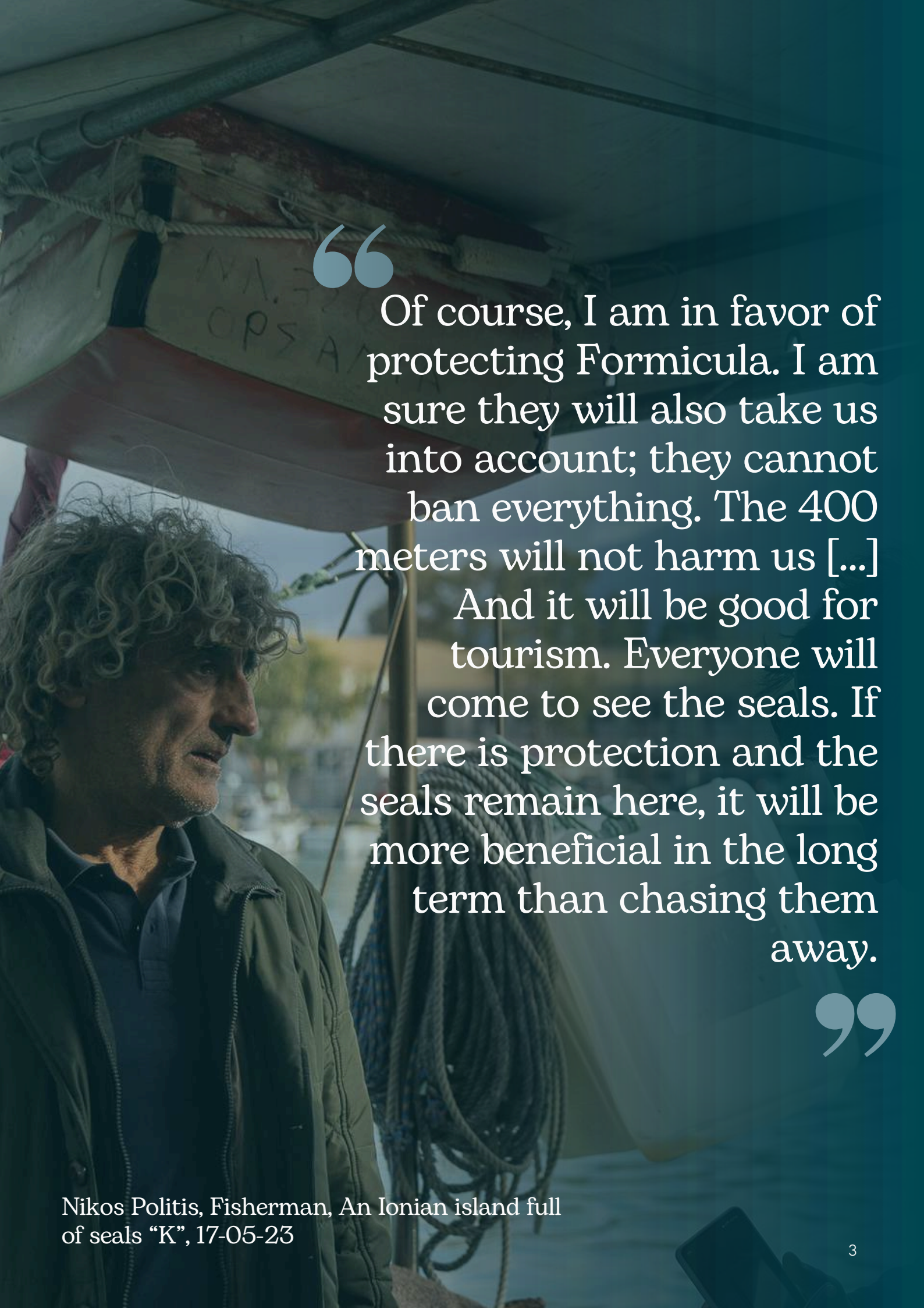


> Of course, I am in favor of protecting Formicula. I am sure they will also take us into account; they cannot ban everything. The 400 meters will not harm us [...] And it will be good for tourism. Everyone will come to see the seals. If there is protection and the seals remain here, it will be more beneficial in the long term than chasing them away.

Nikos Politis, Fisherman, An Ionian island full of seals “K”, 17-05-23

The Inner Ionian Archipelago

and its ecological significance

The Inner Ionian Archipelago was confirmed as a Site of Community Importance (SCI) in 2006 and 2011 and designated as a Special Area of Conservation (SAC). It is included in the European Natura 2000 network, as it is a critical habitat for protected species, namely bottlenose dolphins (Tursiops truncatus), Mediterranean monk seals (Monachus monachus), loggerhead sea turtles (Caretta caretta), and devilfish (Mobula mobular) (Gonzalvo et al. 2015 and references therein).

The area is also part of the "Important Marine Mammal Area" (IMMA) of the wider Ionian Archipelago, "Important Bird Area" (IBA), "Key Biodiversity Area" (KBA) and most recently designated as an "Area of Interest" (AoI) for sharks and rays. The Management Plan for the area has not yet been defined as a presidential decree is pending, while fishing restrictions are limited to fishing with dynamic gear (trawls, gillnets, dredges, etc.).

Commercial fishing

in the Inner Ionian Archipelago

In Greece, small-scale coastal fishing plays an important socio-economic role for local communities, representing over 97% of the total fishing fleet (EU Fisheries Register, 2023). In the Ionian Sea, fishing is characterised by a wide variety of catches and the numerous and diverse fishing gear used. The complexity of the local ecosystem is reflected in the above, with strong seasonality for different areas (Lloret et al. 2018). Given that small-scale fishing vessels (<12 meters) are not required to submit fishing logs (EU REG 404/2011), their impact on stocks remains unknown, which is an obstacle to their protection and management (Grati et al. 2018). In the Inner Ionian Archipelago, it is estimated that fewer than 330 fishing vessels operate from the ports of Lefkada, Meganisi, Kalamos, Mytika, and Palairos, 97% of which are small-scale (EU Fisheries Register, 2023). To understand fishing in the area, as part of the program "Protecting the Inner Ionian Archipelago and Formicula," structured interviews were conducted with professional fishermen to increase knowledge about their activities and impacts and important fishing grounds in the region.

Assessing fisheries in the region

Methodology

1) 33 interviews in Meganisi, Mytika, Kalamos, Lefkada, and Palairos

2) Digitalization of collected data

3) Data analysis

4) Spatio-temporal patterns of specific métiers[1] in the region

The interviews covered approximately **~10%** of the total number of small-scale vessels licensed in the area (EU Fisheries Register, 2023), while **50%** of respondents depend exclusively on fishing for their livelihood. Respondents provided details **on gear specifications, target species, depth, habitat, and the temporal and spatial extent of fishing effort in days per month.**

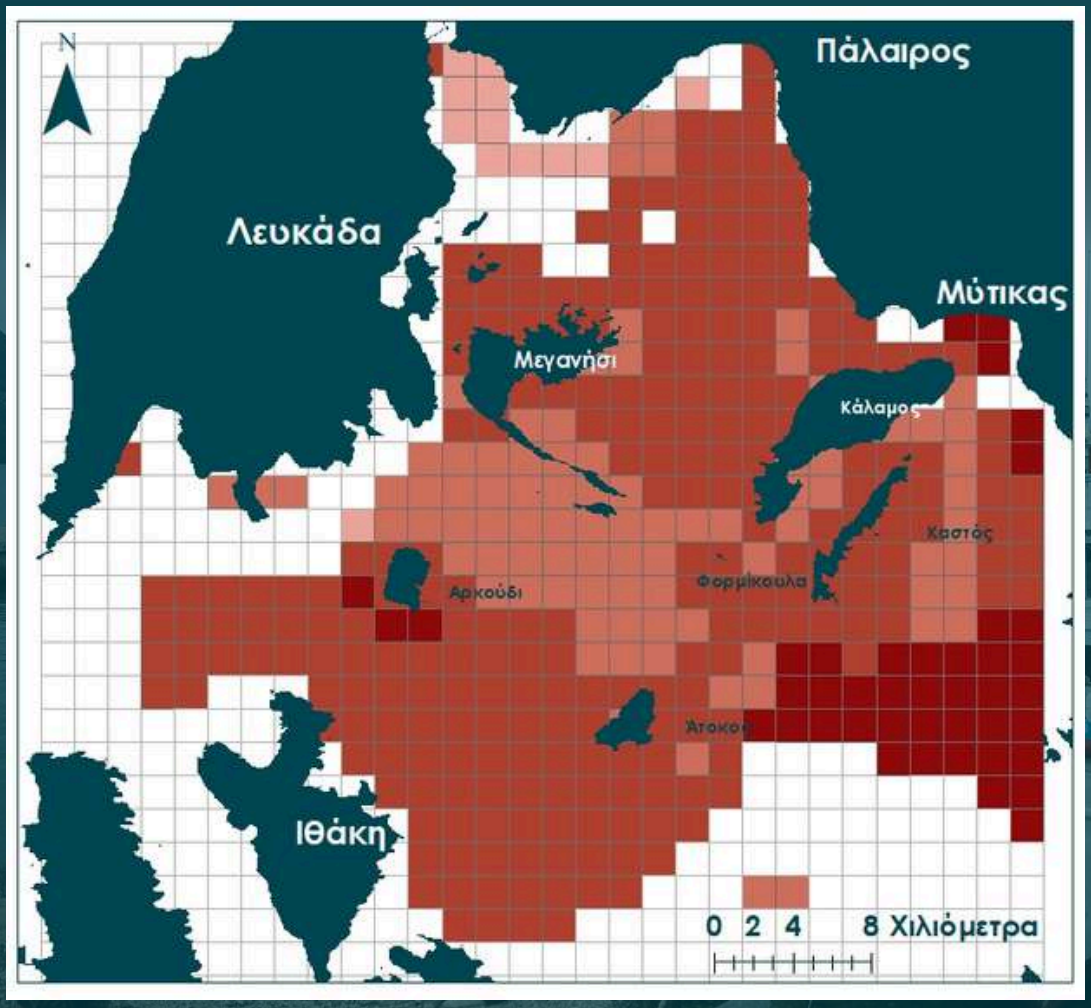
Maps of the area with 2.2 km² grid cells were used to indicate the areas by the respondents. The data were digitalized and organized into cartographic layers, and for each cell, depending on the characteristics of the fishery, **the fishing effort was calculated annually, monthly, and seasonally.**
Finally, the **métiers** of the area were identified based on the respondents' answers.

[1] The combination of information on fishing gear targeting specific species during a specific period of time constitutes a "metier" (Mesnil et al., 1990).

Fishing effort

In days per year

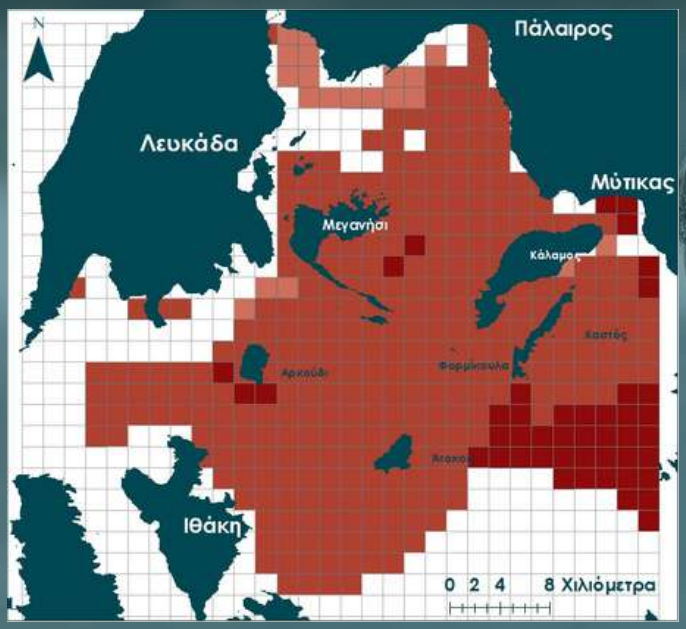
The annual **fishing effort** per cell ranged from **14 to 305 days,** with the lowest values recorded in the northern part of the Archipelago (<100 days) and the highest in the southeast (>250) and also near the **islet of Arkoudhi and between Meganisi and Kalamos**. During the summer season, there appeared to be less fishing effort: 20-40 days for the entire season. In winter, fishing activity ranged from 26-50 days in the central part, 51-75 days near Ithaca and Astakos, and 21-29 days on the southern coast of Lefkada. In spring, fishing activity ranged from 19-54 days in the central part, while higher values (55-75 days) were observed near Astakos. In autumn, fishing activity ranged from 37-75 days in the central part and, as in spring, higher values were observed near Astakos.



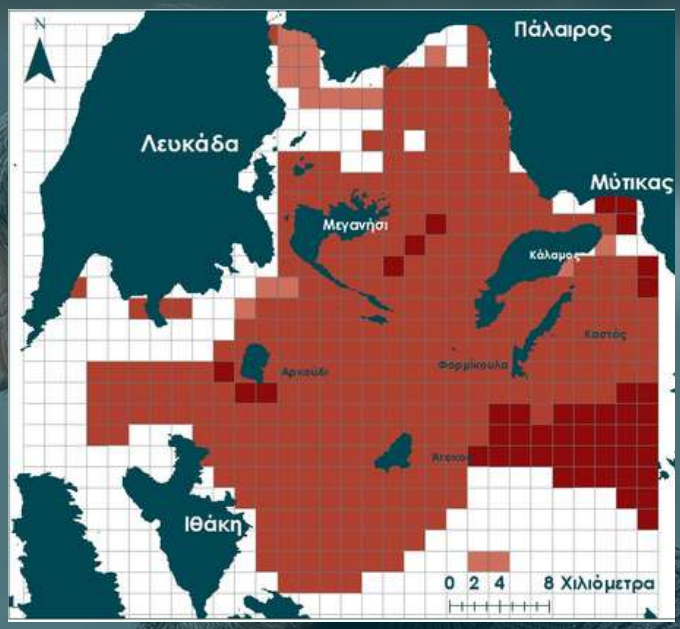
Fishing effort

in fishing days per season

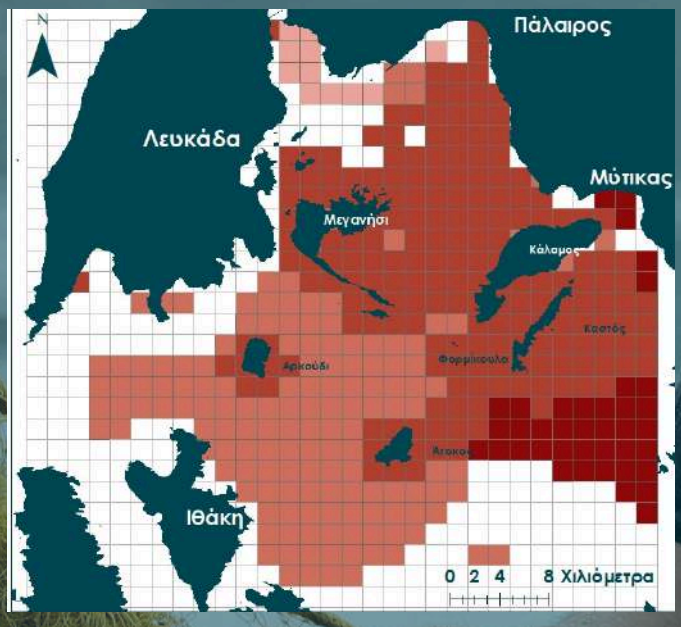
Autumn



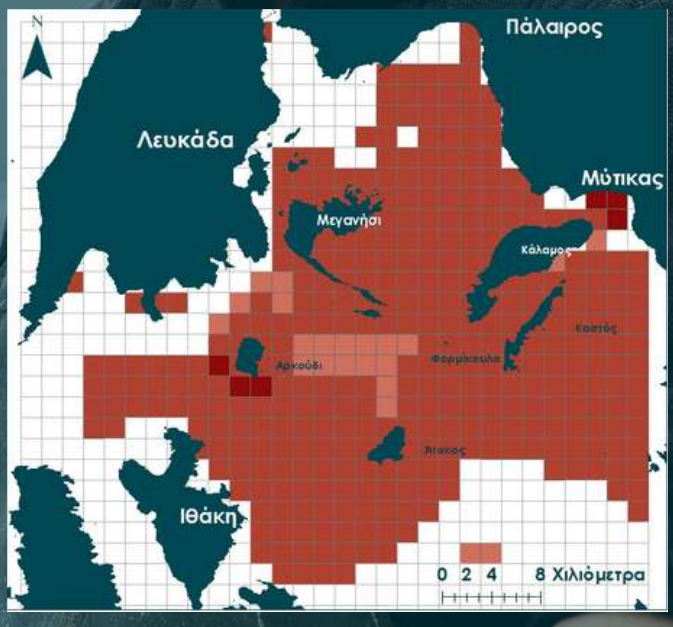
Winter



Spring



Summer



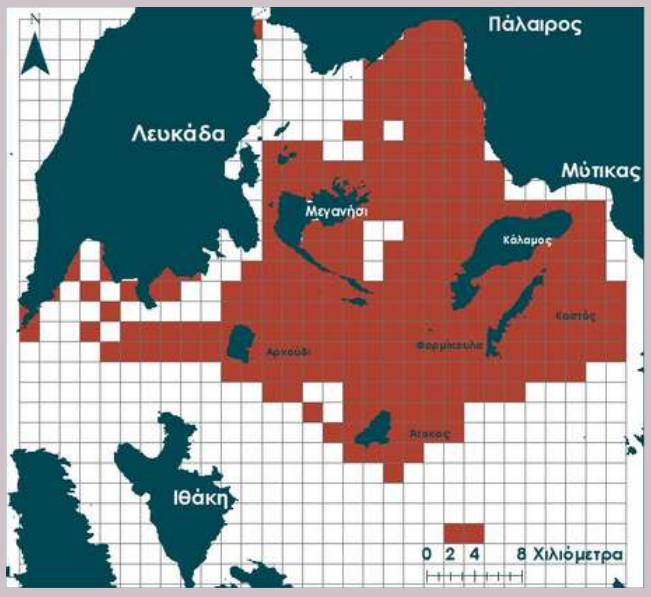
Fishing days

- 0
- <10
- 10-30
- >30 & <60
- >60 & <90

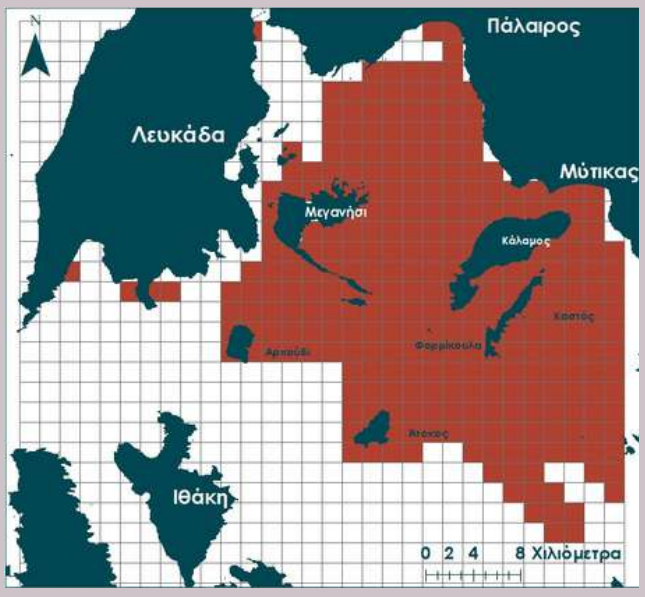
Fishing effort

Areas fished by fishing gear

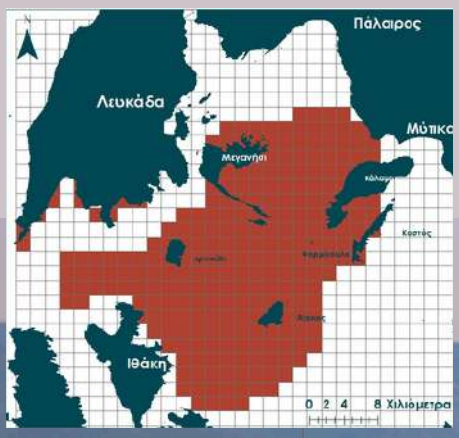
Mesh nets



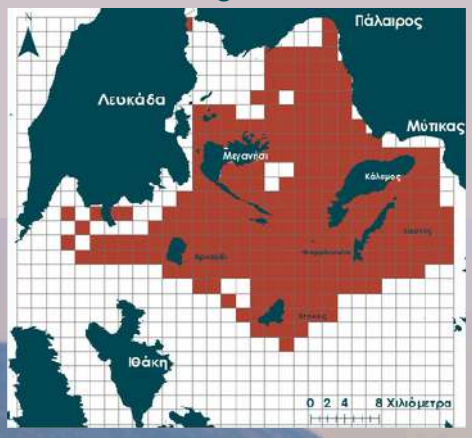
Simple nets



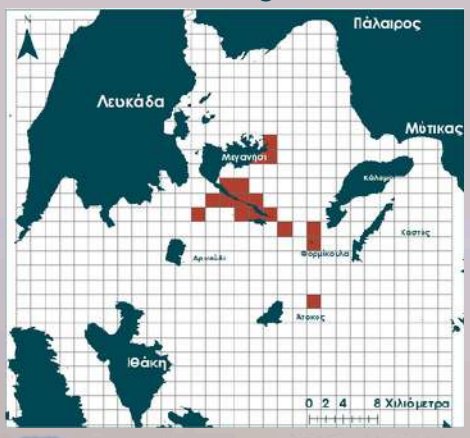
Half-tied nets



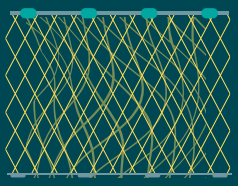
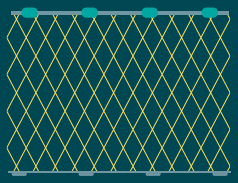
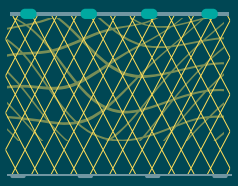
Longlines



Fishing rod



Target species & tools

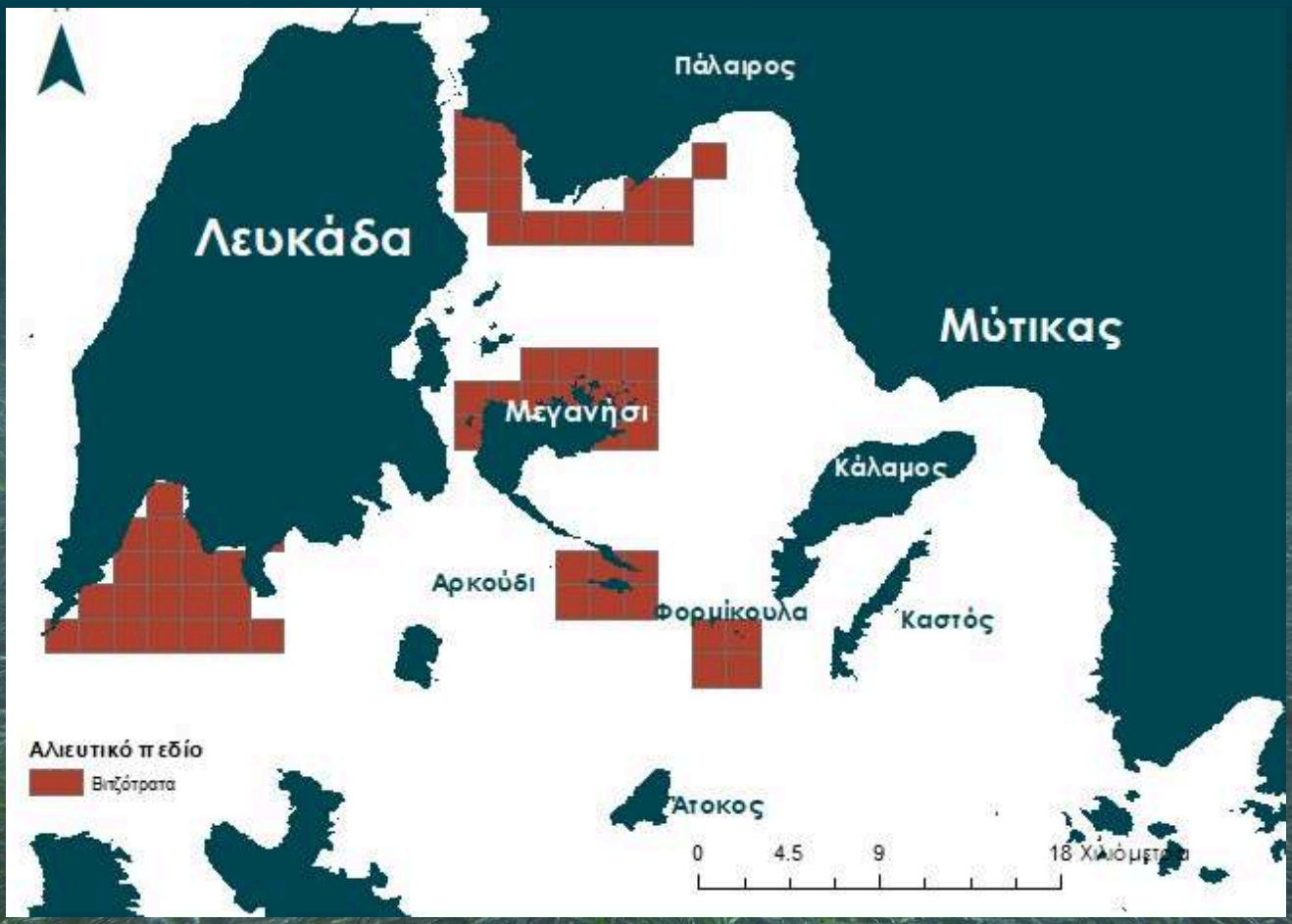
Fishing gear	Fishing days /Seasons	Target species	% of fishermen
 Mesh nets	**Winter: 47** **Spring: 48** **Summer: 50** **Autumn: 46**	• Mullet, bogue bream, red mullet, scorpion fish, black sea bream, and perch • Lobsters, stonefish, beetles, common dentex, and sea bream • Octopus, cuttlefish, and mullet • Cod	**55%** **26%** **5%** **9%**
 Simple nets	**Winter: 48** **Spring: 46** **Summer: 49** **Autumn: 47**	• Lobsters, crabs • Cuttlefish, squid • Cod	**9%** **11%** **35%**
 Half-tied nets	**WInter: 60** **Spring: 40** **Summer: 40** **Autumn: 60**	• Red mullet and bonito • Common dentex, beetles, and sargus	**5%** **5%**
 Longline	**Winter: 17** **Spring: 18** **Summer: 25** **Autumn: 23**	• Swordfish • Ruffe, sea bream, sea bass, mullet, beetles, sea bream, stonefish, and sargus	**3%** **52%**
 Fishing rod	**Winter: 29** **Spring: 29** **Summer: 29** **Autumn: 29**	• White grouper, dusky grouper, sea bass, amberjack and dentex	**3%**

Illegal fishing

Winch trawlers (SB) have been banned in Greece since 2020, whereas previously they were permitted as an exception to the Common Fisheries Policy (Article 19, EC/1967/2006). According to the Meganisi fishing association, there are more than 15 trawlers in the area with active licenses, as they are expected to have their licenses renewed by way of exception.

The most illegal fishing activity is reflected territorially. The activity was reported by three fishermen throughout the year, extending to almost the entire area, with the main target species being sardines, anchovies, mackerel, and bogue.

HIllegal fishing with trawl nets continues to this day in N. Formicula, albeit by individual boats, just a few meters from the seal caves above the rich Posidonia seagrass beds.



Megafauna & fishing

Interaction with vulnerable species

The accidental capture of vulnerable species in fishing gear, often referred to as bycatch, is a threat to both the sustainability of fisheries and the protection and conservation of the marine environment. During the interviews, fishermen were asked about vulnerable species (sharks and rays, turtles, seals, dolphins, and seabirds), frequency of sightings, accidental trapping, and interaction with fishing gear.
Thirty-six percent of fishermen report seeing seals daily, while 17% see them weekly. Similarly, 20% of fishermen see dolphins daily and 27% see them weekly. The corresponding percentage for seabirds is 47% of fishermen who encounter them daily. As for sea turtles, sharks, and rays, the majority of fishermen encounter them sometimes during the year (67% and 46%, respectively).

According to fishermen, accidental trapping is a phenomenon that also occurs in the Inner Ionian Archipelago, with the majority of fishermen reporting that they catch sharks and rays (39%) and sea turtles (33%). However, the greatest negative impact (loss of catch, destruction of fishing equipment, and economic damage) comes from dolphins and seals. It is important to collect data on interactions with vulnerable species and their impact, and to use this as a basis for the conservation of these vulnerable species and the management of fishing activities. The preliminary results are presented in the table below.

	Accidental capture (% of fishermen reporting accidental capture N=33)	**Loss of catch** (average % of catch per interaction)	**Destruction of fishing gear** (average % of catch per year)	**Financial loss** (average % of annual income)
	**39%**	**1%** (N;12)	**1%** (N;14)	**1%** (N;9)
	**33%**	**4%** (N;15)	**10%** (N;18)	**1%** (N;10)
	**15%**	**37%** (N;19)	**38%** (N;19)	**1%** (N;11)
	**6%**	**47%** (N;22)	**42,4%** (N;21)	**26%** (N;13)
	**9%**	**1%** (N;12)	**0%** (N;14)	**0%** (N;10)

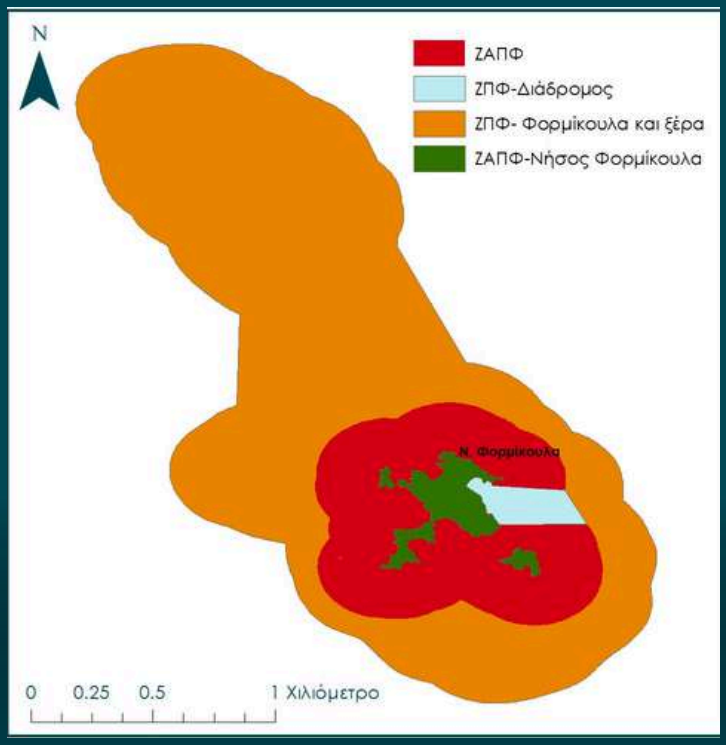
The case of Formicula

The island of Formicula is a "drop" in the Inner Ionian Archipelago, an uninhabited islet of just 400 square meters that is an important habitat for the Mediterranean monk seal, the only species of seal found in the Mediterranean and **one of the most endangered marine mammals in the world!**

In addition to the Mediterranean monk seal, the area is of enormous ecological importance both for Posidonia meadows and other marine species, such as small mammals, birds, and rays.

The Special Environmental Study foresees protection zones in N. Formicula and around the Posidonia meadows surrounding Formicula. The Absolute Nature Protection Zones (ANPZ) aim to protect the Mediterranean monk seal by prohibiting any activity other than research.

Nature Protection Zones (NPZ) restrict certain activities such as recreational and commercial fishing, anchoring, etc. The main threat to Formicula is uncontrolled tourism.



Fishing in the area is not very intense, as less than half of the fishermen (42%) use Formicula as a fishing ground for less than half of their fishing days per season (43 days/season). The majority prefer closer locations due to fuel costs and intense interaction with seals (loss of catch and destruction of equipment).

The fishing ban area covers 2.4 km², which is a very small area of the Formicula fishing ground (~ 8 km²).

Importance of Formicula for fishing

42%

of fishermen said that they use Formicula as a fishing ground.

Average fishing effort

Fishing days

Winter: 41
Spring: 43
Summer: 43
Autumn: 47

Discussion

The diversity of the Inner Ionian Archipelago, both in terms of habitats and species, is reflected in the number of fishing strategies (métiers) both spatially and seasonally. These fishing strategies were adapted to the seasonal migrations and availability of the most important target species in the area. The main catch for most net fishermen is red mullet (Mullus surmuletus), white mullet (Spicara smaris), bogue (Boops boops), and black seabream (Oblada melanura). For longlines, with medium-sized hooks, the main target species are the Sparidae and Epinephelidae families. The various métiers identified in the area have also been reported in other areas of the Mediterranean (longlines: Tzanatos et al. 2006; Roditi et al. 2020; gillnets: Batista et al. 2009; Roditi and Vafidis, 2019), highlighting the link between target species and various environmental characteristics of the area. The presence of megafauna species and high interaction rates are important to study further, as bycatch is one of the main threats to vulnerable species and the sustainability of fisheries.

This preliminary research highlights the potential to increase our knowledge through structured interviews, providing an overview of professional coastal fishing in the Inner Ionian Archipelago, and can be used as a basis for future research efforts and management proposals.

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