Evaluating anchorage pressure on Posidonia meadows in the Inner Ionian Archipelago & Erimitis peninsula using UAV's (drones)

iSea

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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.

Image credits:

Dimitris Tosidis, iSea

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Baseline information

The endemic species *Posidonia oceanica* is characterized as one of the most important and productive marine habitats in the overfished and degraded Mediterranean Sea basin. Posidonia meadows are also highly effective carbon sinks especially due to their large extent; the more extensive and healthier the seagrass meadows, the higher their potential to remove and store carbon from the atmosphere. Moreover, they provide clean and transparent water. Despite the benefits and services that these ecosystems offer, they are some of the most threatened ecosystems globally. The Eastern Ionian Sea is the area with the most extended meadows (~440 km^2) in Greece, after the South Aegean Sea [1]. However, in several areas the habitat is still poorly documented and especially inside the Natura 2000 sites. As a popular tourist spot, the vast number of boats have a dramatic impact on the meadows, through direct removal of shoots from anchoring, while a variety of other anthropogenic activities leave their mark on the distribution and health of the meadows in the area, including fish farming, illegal fishing with beach seines, poor sewage treatment and mining. iSea has distinguished two areas in the Eastern Ionian Sea based on their natural characteristics, namely Erimitis, located in the Northeast of Corfu, and three islets within the Inner Ionian Archipelago (Formicula, Atokos and Arkoudi), for which iSea has already mapped the distribution of *P. oceanica* [2,3], while the islets have been listed under several designations (Natura2000 sites, and Areas of Interest) due to their characteristics and also host a plethora of protected and charismatic species [3,4,5,6,7]. During 2023, iSea mapped the key pressures the meadows face in the Ionian Sea by combining existing data and giving conservation action priority to the meadows according to the threats they face [8]. The anchorage data used in the study was identified as the biggest threat and was compiled by leveraging high-resolution satellite imagery of anchored boats observed in the area during the summer months of 2022. The meadows classed as "Most threatened" included the ones in the Inner Ionian Archipelago, the islands of Paxoi, and the Eastern and Northern Corfu Island [8]. These results align with previous studies identifying these areas as the most impacted Natura 2000 sites in Greece [9], and specifically most impacted by anchoring [10]. Furthermore, both Erimitis and the islets of the Inner Ionian are amongst the most popular destinations for new sailors and attract a high number of boats [11] exceeding the capacity of the port facilities which are constantly expanding to meet the needs of this growing activity [12]. Understanding this pressure in more detail, specifically its locality at a detailed scale, is an important step to try and manage and minimize its negative effect on the meadows. Specifically, identifying this, would assist in advising placement of eco-moorings in the most threatened locations. Moreover, understanding the characteristics of the boats anchoring over Posidonia meadows will help advise on prioritising future actions such as legislation amendment and educating boat users on correct anchoring practices. The use of drones (UAV's; unmanned aerial vehicles) is a promising methodology that can identify the hotspots of anchoring in a specific area, with the ability to record smaller boats (<6m) and a relatively lower costs and effort compared to other approaches available (Satellite imagery, AIS data) that often under-represent the presence of small boats in anchoring studies [13].

2024 Actions

Aim: To identify the Posidonia meadows facing high anchoring pressure in the Ionian Sea, specifically in Erimitis peninsula and islets in the Inner Ionian Sea Archipelago (IIA).

A.1 Mapping the most impacted areas from anchoring in Erimitis and islets of the Inner Ionian Sea Archipelago during the tourist season.

A.1.1 Preparatory actions

To allow the above research, a permit from the ministry of environment has been issued in order to fly a drone over a Natura2000 site for the study of *Posidonia oceanica* in the site of the Inner Ionian islets (Formicula, Atokos and Arkoudi). The drone pilot attained the necessary drone license to comply with certification requirements.

A.1.2 Data collection

<u>UAV imagery</u>

The imagery was collected using the DJI Mavic 2 Zoom drone. Drone surveys were completed in the summer months of July, August and September as these were identified as the busiest tourism periods for the areas of Erimitis and the islets of Formicula, Atokos and Arkoudi. The surveys were completed between the time interval of 10:30am - 13:30pm as this was the identified busiest time slot regarding boat traffic in bays. The planned survey number was four surveys per month. The data variables collected during the surveys included: vessel location, vessel type (sailboat, cruise boat, small rental boats) and anchoring habitat (sand, rock, Posidonia meadows) if visible. The survey area for both study sites can be seen in Figure 1.

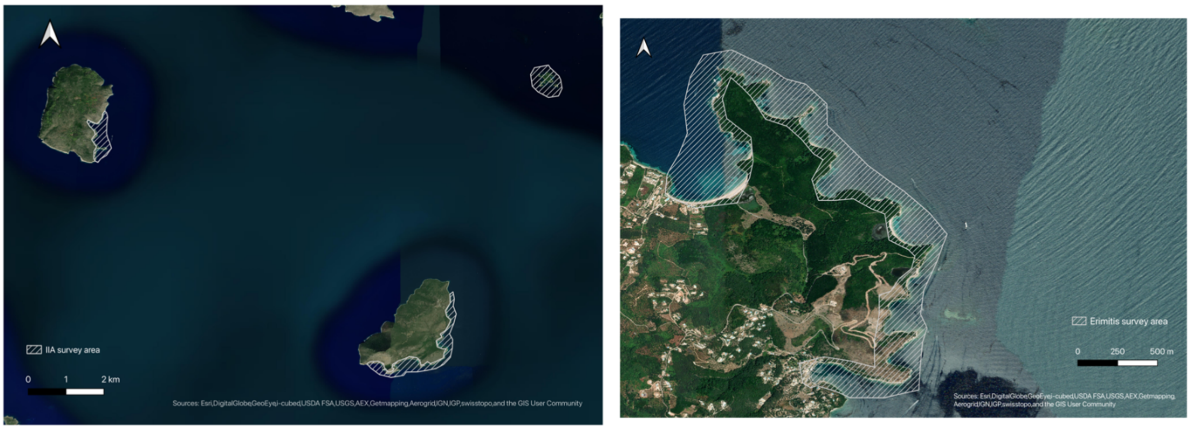

Figure 1: Study area for the drone surveys in the Inner Ionian Archipelago (IIA) sites (left) and Erimitis peninsula (right).

For the study site of Erimitis, surveys were completed between the 04/07/24 - 07/07/24 for July, 27/08/24 - 31/08/24 for August and 01/09/24 - 04/09/24 for September. The surveys were completed both by land and boat. For the IIA site, surveys were completed on the 17/07/24 and between 29/07/24 -30/07/24 for July; 01/08/24 – 04/08/24 for August and 21/09/24 – 29/09/24 for September. All surveys had to be completed by boat given the remoteness of the islands. Due to bad weather conditions (strong winds), surveys were not completed on the 31/07/24 for Formicula, Atokos and Arkoudi, while on the 02/08/24 the survey was not completed for Arkoudi. During September, the surveys were completed alongside fieldwork in the context of the project 'Protecting the IIA and Formicula'. To cover the total area of the study (Figure 1) Erimitis required two flights for each survey, while Atokos required three due to the distances of the bays and obstacle between the operator and the drone (mountains/hills). Arkoudi and Formicula each required one flight of the drone for each survey. In total 70 flights were completed over 25 days. See table below that represents the number of flights per area per day.

Table 1: Drone survey logistics overview (date and number of flights per day).

Area	Date	Flights
Erimitis	04/Sep	2
	03/Sep	2
	02/Sep	2
	01/Sep	2
	31/Aug	2
	30/Aug	2
	29/Aug	3
	28/Aug	3
	07/Jul	2
	06/Jul	2
	05/Jul	2
	04/Jul	2
IIA	04/Aug	4
	03/Aug	4
	02/Aug	3
	01/Aug	5
	31/Jul	0
	30/Jul	5
	29/Jul	5
	28/Jul	0
	17/Jul	4
	22/Sep	1
	24/Sep	3
	25/Sep	1
	26/Sep	2
	27/Sep	4
	28/Sep	3
Total	**25 days**	**70 flights**

Regarding the number of surveys per area per month (see Table 2) all surveys were completed for the study area of Erimitis, while for the islets of IIA, one survey was not completed for Atokos (September), and two surveys were not completed for Arkoudi (July, September). This was mainly attributed to unfavorable weather conditions in late September.

Table 2: Drone surveys completed per area per month.

Location	July	August	September	Total
Erimitis	4	4	4	12
IIA: Formicula	4	4	4	12
IIA: Atokos	4	4	3	11
IIA: Arkoudi	4	3	3	10

<u>Vessel tracks (AIS system)</u>

Regarding the vessel tracking data, charter companies in Lefkada were approached by phone and email and requested to anonymously share the tracks from their sailing boats. A call for data submission was also included in the social media posts which forwarded the user to an online form for expression of interest. Despite efforts and the receival of positive initial stances, no data has been received to date. Given the continued future work in the area iSea will remain in contact with these companies and hope to receive data in 2025. Regarding the study site of Erimitis, the rental companies that exist locally are mainly concerning small boat rentals that are not equipped with vessel tracking; thus, the search should extend to sailing companies in the wider area.

A.1.3 Data analysis

Analysis involved compilation of all data in QGIS, via image georeferencing (when appropriate) while the data parameters included date, vessel category and anchoring habitat (sand, Posidonia, rocks) if observed. The vessel categories were a) small rental boats b) sailboats c) catamaran d) yacht and e) cruise or larger yachts, while for Erimitis data due to the high number of smaller rental boats, these were kept into a separate category [a) rental boats, b) ribs]. The detailed categories are characteristics are discussed below while they differ between the two areas due to the different vessel types and sizes observed. In order to account for the increase in impact of anchoring with increasing anchor size, firstly an estimate of the anchor weight was given by considering information found in sailing company information web sources (such as: www.jimmygreen.com). Then a series of assumptions were made to estimate how much more pressure each category of vessel causes compared to the smallest impact category (category a: small rental boats). The resulting multiplier effect was reflected in the database by multiplying the entries with the estimated impact multiplier value. An overview of the approach and assumptions is discussed further below. The updated layer that considers the impact multiplier along with the raw database were then presented in QGIS using a heatmap approach. Although research directly comparing anchor impact in terms of shoot damage per anchoring event per anchor size is limited, general scaling principles and related studies were used to guide an approximation of the relative pressure per vessel size.

Studies suggest small boats cause localised damage [14,15,16] while larger vessels have been observed to damage hundreds of square meters per anchoring event [17, 18, 19]. Experimental studies showed that a 12 kg anchor removed 33.5 shoots on average, while a 4 kg anchor removed 5.5 shoots on average per anchoring event [14, 15]. Comparing these results show that a 12 kg anchor causes about 2.03 times more damage per kg than a 4 kg anchor. There is a lack of experimental studies that consider larger boats (sail boats) therefore the upscaling in the larger vessel categories in the present project is based on the estimation of the two studies assuming that the estimated pressure increases proportionally with anchor weight, while the calculated value considers the lower limit of the standard deviation reported in the referenced study data.

The key assumptions of the analysis include:

- **i)** Anchor impacts are roughly proportional to anchor weight, assuming a linear relationship between the two.
- **ii)** Larger boats (20 m) produce stronger drag forces due to wind and current resistance.
- **iii)** Larger anchors have larger area of disturbance (due to weight of anchor and increased length and size of chain).
- **iv)** Catamarans typically carry anchors one size larger than those recommended for monohulls (sailboats) of similar length.

The resulting impact multiplier calculated for each vessel category per area is presented in Table 3. For example, a vessel with anchor weight of 55kg has been estimated to cause 11 times the pressure of a vessel with a 5kg anchor in a single anchoring event. It should be noted that, real-world impact varies with sediment type, anchoring technique, anchor type, seabed slope and more.

Table 3: The vessel size factor. Analysis approach representing the categories of vessels and their characteristics observed in each area along with the impact multiplier to reflect the increasing impact from larger vessels for Erimitis (top) and the IIA (bottom).

ERIMITIS ANALYSIS				
Category	**Boat Length**	**Anchor Weight**	**Impact Multiplier**	**Comments**
a) Small rental	5 m	4-6 kg	1x (reference)	Localised small-scale damage, minimal drag affecting a few square meters (Baseline value)
b) Rib	7 m	9 kg	~2x	Slightly heavier anchor, moderate area increase, higher force on retrieval considering a 9 kg anchor ~ 2.25x more damage than a 4 kg anchor (Francour et al., 1999; Milazzo et al., 2004)
c) Small Yacht	12 m	15-20 kg	~4x	Heavier anchor and larger chain sweep radius. Noticeable increase in drag and damage potential.
d) Sailboat	12 m	25 kg	~5x	Higher weight of anchor and drag during collection, broader disturbance.
e) Catamaran	15 m	25-33 kg	~6x	Similar to (d) but slightly heavier anchor
f) Yacht	18 m	40 kg	~8x	Damage increases sharply considering anchor weight alone, while increase area impacted during anchor drop lock-in/ weighting/collection
g) Cruise & Large Yacht	20 - 30m	55 kg	~11x	Larger anchor affecting bigger area. The size and weight of large yacht anchors make their individual scars the most destructive in single events (Pergent-Martini et al., 2022)

IIA ANALYSIS				
Category	**Boat Length**	**Anchor Weight**	**Impact Multiplier**	**Comments**
a) Small rental & ribs	5 -7 m	4-9 kg	1x (reference)	Localised small-scale damage, minimal drag affecting a few square meters (Baseline value)
b) Sailboat	12 m	25 kg	~4x	Heavier anchor and larger chain sweep radius. Noticeable increase in drag and damage potential.
c) Catamaran & small yacht	15 m	25-33 kg	~5x	Similar to (d) but slightly heavier anchor
d) Yacht	18m	40 kg	~6x	Damage increases sharply considering anchor weight alone, while increase area impacted during anchor drop lock-in/ weighting/collection
e) Cruise & large yacht	20 - 30m	55 kg	~8x	Larger anchor affecting bigger area. The size and weight of large yacht anchors make their individual scars the most destructive in single events (Pergent-Martini et al., 2022)

A heatmap representation of the records was formulated for both areas considering 1) the vessel records prior to the impact multiplier effect and 2) the vessel records considering the impact multiplier effect (vessel size factor) in order to identify the bays/areas that are most under pressure from anchoring.

A.1.4 Results

Regarding the study site of Erimitis a total of 490 separate boat observations were made of which 152 in July, 172 (highest) in August and 166 in September (Figure 2). For the IIA, a total of 409 separate boat observations were made, of which 191 (highest) in July, 143 in August and 68 in September (Figure 3).

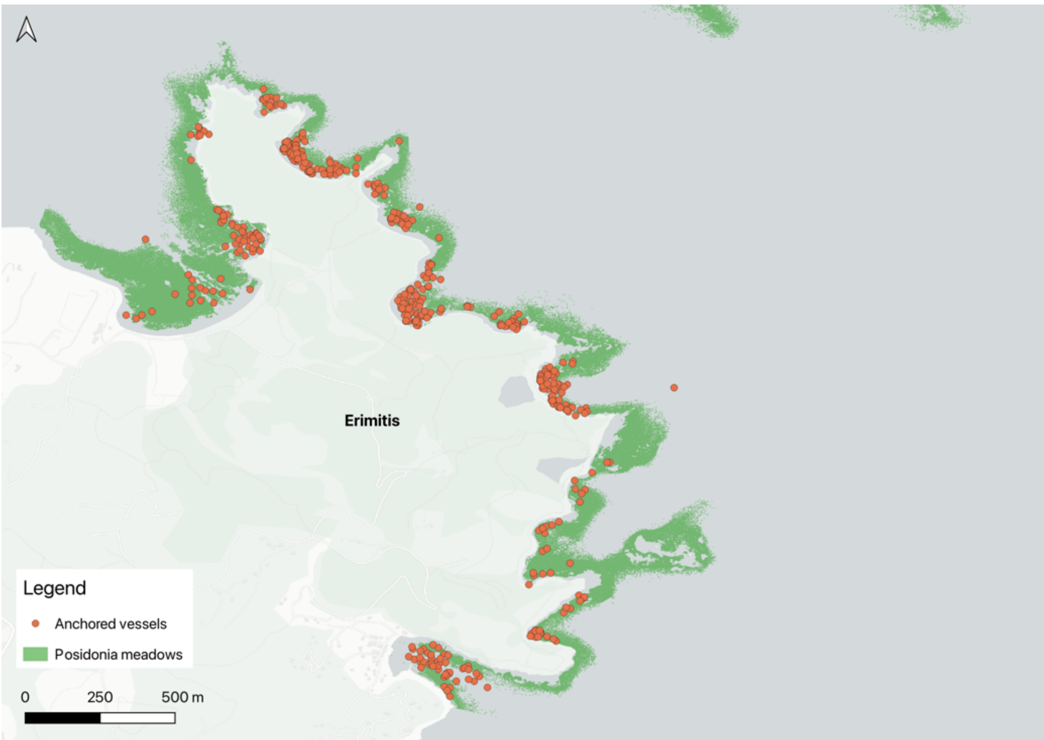

Figure 2: Erimitis records of anchored vessels observed between July and September surveys.

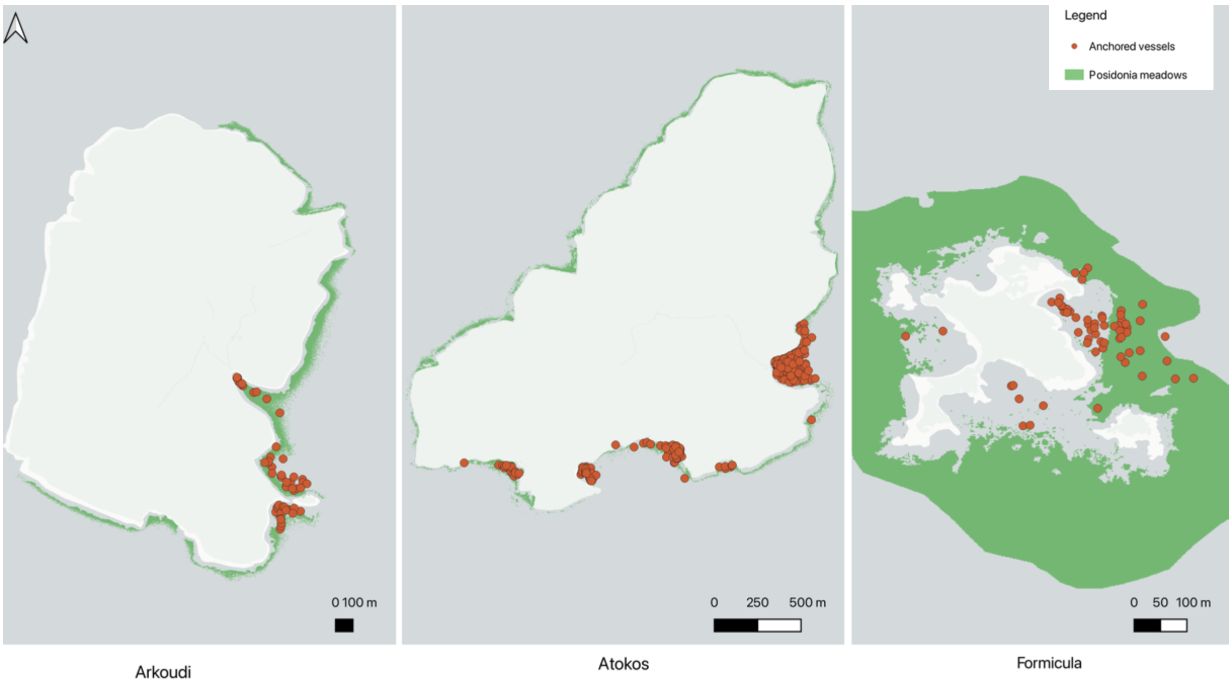

Figure 3: Arkoudi, Atokos and Formicula records of anchored vessels observed between July and September surveys.

Regarding the type of boat recorded, in Erimitis 64% (n=314) of the observations were of small rental boats, while sailboats and cruise boats represented 20% (n=98) and 10,6% (n=52) respectively, with yachts representing the smallest proportion of the records (n=26, 5.3%) (Figure 4). As seen in Figure 4, the majority of the records of sailing boats are found in Vrachli (39.785584N, 19.944688E), Arias (39.779740N, 19.948670E), Akoli (39.776694N, 19.954211E) St Stefanos Harbour (39.766470N, 19.949098E) and Avlaki (39.780403N, 19.940960E), while the records of cruiseboats are mainly found in Vrachli and Akoli. In the IIA site, approximately 70% (n=278) of the observations concerned sailboats (including catamarans) with smaller rentals and yachts representing 22.1% (n=89) and 8% (n=32) respectively (Figure 5). The remaining records concerned cruise boats (n=3). The majority of the rental boats were observed in Atokos shallow parts of the bay (38.483371N, 20.820434E) as well as Formicula island, while the large vessels anchored in the deeper sections of the bay.

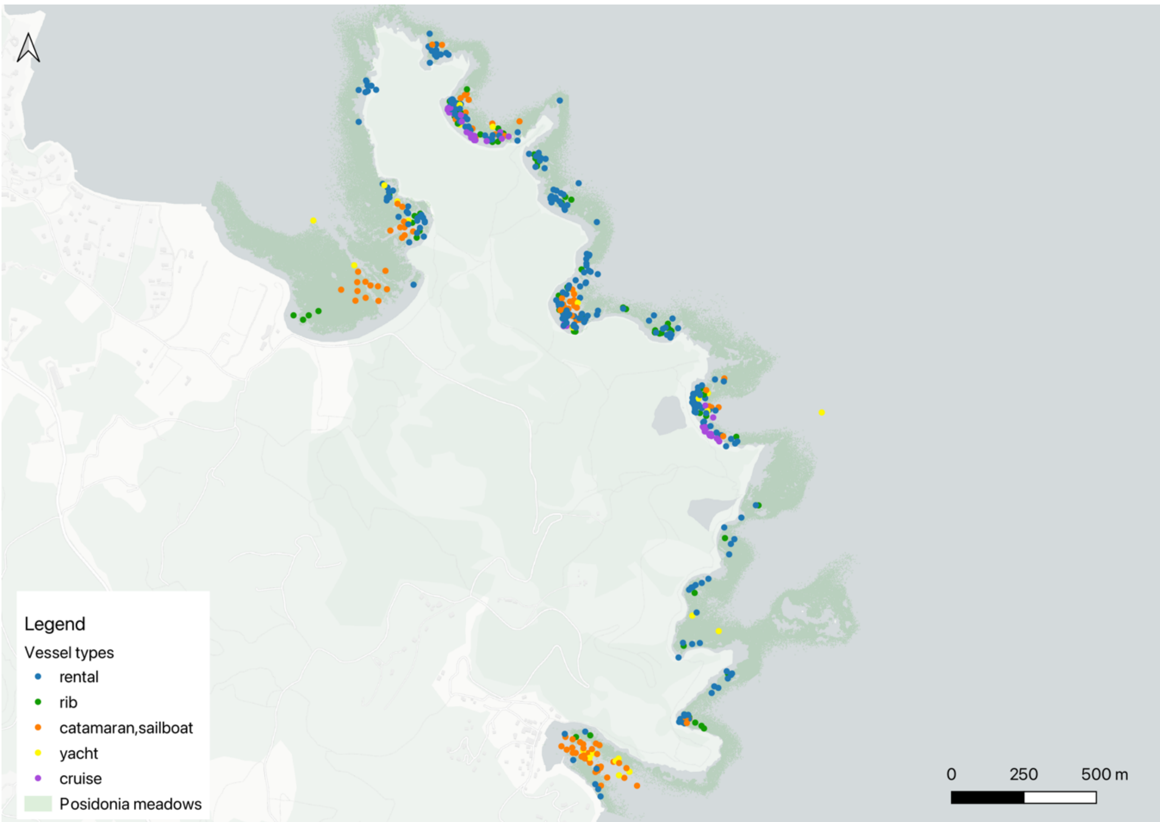

Figure 4: Vessel types observed across Erimitis study site

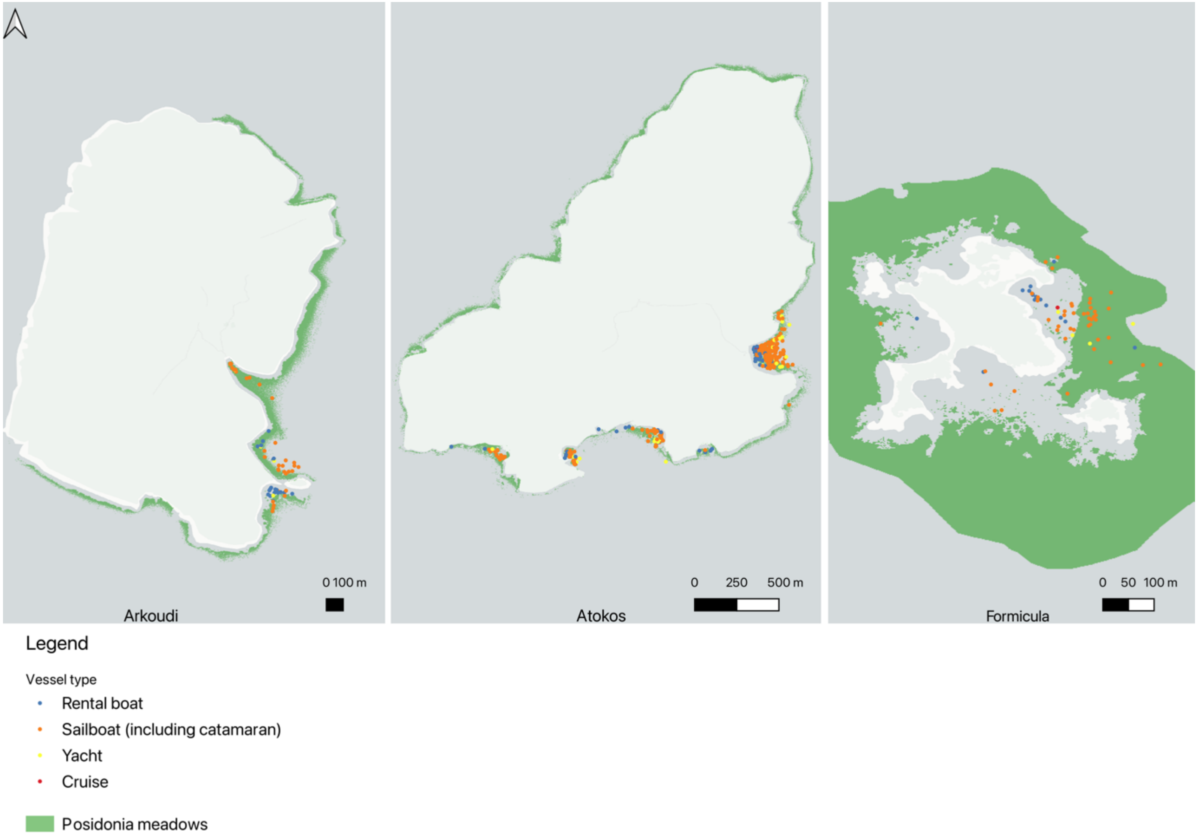

Figure 5: Vessel types observed across IIA study site

During the image processing, an effort to visually identify the anchoring habitat was made (Posidonia, sand, rocks etc), while the records were then compared with the existing seagrass distribution maps to estimate the number of overlapping points. For the site of Erimitis, out of the 490 observations, visual habitat identification showed that 65% (n=319) of the boats were anchored on Posidonia, while 31% (n=150) were anchored on other habitat (sand/mud or rocks). Twenty-one of the records were unclear in terms of the habitat they were anchored in. Considering the existing Posidonia distribution map for Erimitis, 45.3% (n=222) of the boat records overlapped with the seagrass area. For the IIA study site, out of the 402 observations, visual habitat identification showed that 60% (n=241) of the boats were anchored on Posidonia, while 40% were anchored on other habitat (sand/mud or rocks). Specifically for Atokos, 43% of the recorded boats were anchored on Posidonia, while Arkoudi and Formicula showed much lower values of 9.5% and 7.5% respectively. Considering the existing Posidonia distribution map for Formicula, Atokos and Arkoudi, 42% (n=168) of the boat records overlapped with the seagrass area. The difference in reported percentages can be attributed to the lack of detailed mapping for the shallow limits of the Posidonia meadow as well as the fact that the distribution maps were generated using satellite imagery before 2023.

Regarding the site-specific trends, in Erimits, the highest proportion of the records were located in Arias bay (n=105, 21.6%) followed by Vrachli (n=89, 18.3%) and Akoli (n=77, 15.8%), while Vromolimni (39.774057N, 19.956194E) had the fewest observations (n=8, 1.6%). The heatmap visualisation of the number of vessels per area can be seen in Figure 6 (left) where the four high pressure bays were identified as Arias followed by Vrachli, Akoli and Avlaki. When considering the higher impact from larger boats (vessel size factor), where the records were multiplied by the calculated impact multiplier value (see Table 3, top) the high-pressure areas from anchoring were influenced by the cruise boat and yacht observations (in Vrachli and Akoli) showing a slightly different heatmap (see Figure 6, right) with the four high impact bays identified as Vrachli followed by Akoli, Arias and Agios Stefanos.

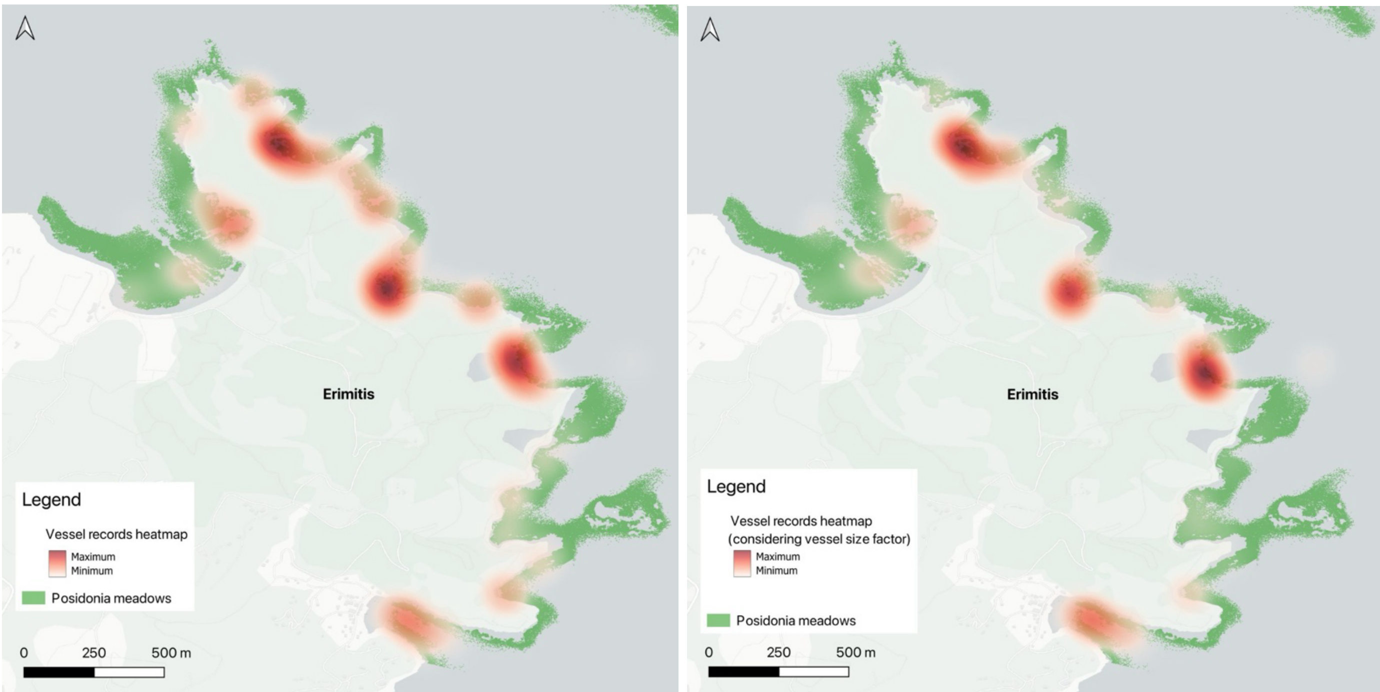

Figure 6: Heatmap visualisation of records considering vessel number (left) and considering vessel size factor (right) in Erimitis.

Regarding the IIA, the islet with the most records was by far Atokos island with 281 records (70% of the records) followed by Formicula island with 65 records (16.2%) and Arkoudi with 56 vessel records (13.9%). Considering the higher impact from larger boats (vessel size factor), where the records were multiplied by the calculated impact multiplier value (see Table 3, bottom) the high-pressure areas from anchoring can be seen in Figure 7 (top) for the whole IIA, while Figure 5 (bottom) shows a detailed area-rendered heatmap. The heatmap considering the vessel number alone showed minor dissimilarities with the heatmap considering the vessel size factor and thus is not presented in the results. The high-pressure bay was unsurprisingly Atokos bay (38.483371N, 20.820434E) that accumulated the 41% of records (n=166), while the second highest pressure site was Formicula bay (38.563937N, 20.854513E) with 13% of the records (n=52). Following this, the third and fourth ranked bays were both located south of Atokos (38.477969N, 20.810632E), while the bay at 38.543895N, 20.717872E in Arkoudi ranked fifth. The areas around Formicula (excluding Formicula sandy bay) ranked eighth in terms of vessel records alone, and tenth when considering the vessel size factor. Finally, Arkoudi bay (38.550044N, 20.714961E) ranked ninth and eighth in terms of vessel records and vessel size factor respectively.

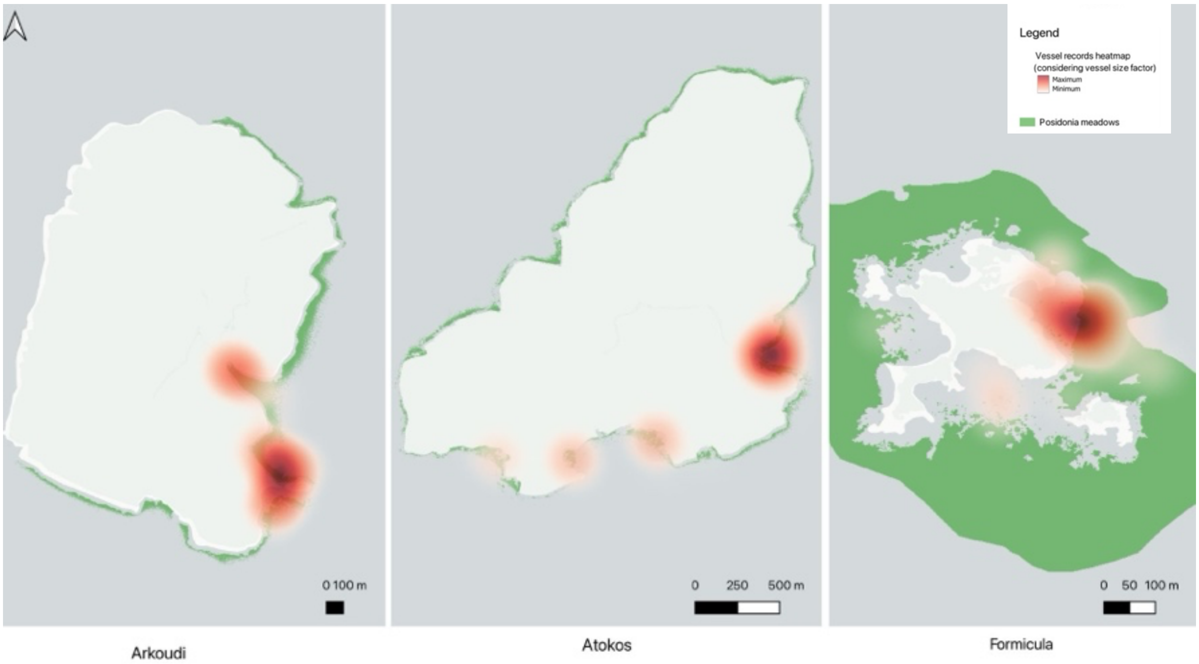

Figure 7: Heatmap visualization of records considering vessel number and vessel size factor in the IIA study site (top) and site-specific rendering visualisation per island (bottom).

An anchoring pressure classification system was generated with values ranging from 1 (lowest) to 5 (highest) to represent the Posidonia meadows with highest and lowest anchoring pressure (see Table 4) with and without considering the vessel size factor.

Table 4: Anchoring pressure classification approach.

Pressure category	% of total records
5	>/=30
4	20-30
3	10-20
2	</=10
1	</=1

As seen in Table 5, in Erimitis the bay of Arias was classed as pressure category 4 considering vessel number alone, while the bays of Vrachli, Akoli and Avlaki fell under category 3 and Vromolimni under category 2. When taking into account that the size of the vessel has a bigger impact on the meadows, Vrachli and Akoli rose to category 4 due to the presence of cruiseboats systematically visiting the bays, while Arias fell within category 3 along with St. Stefanos harbor. Vromolimni was classed at an even lower category when considering vessel size due to the low number of larger anchored vessels recorded. For the IIA site, in both occasions Atokos bay was classed as category 5. For Formicula, the sandy bay (Formicula bay) was classed as category 3 while the surrounding area (Formicula caves) had a lower classification (category 2). Finaly, Arkoudi bay also fell under category 2 and ranked higher than "Formicula caves" area when considering vessel size factor, due to the higher presence of larger boats.

Table 5: Posidonia meadows anchoring pressure classification per bay for Erimitis and IIA, considering vessel number alone or including vessel size factor.

	Considering vessel number		Considering vessel number and vessel size	
	Bay	**Pressure category**	**Bay**	**Pressure category**
Erimitis	Arias Bay	4	Vrachli Beach	4
	Vrachli Beach	3	Akoli Beach	4
	Akoli Beach	3	Arias Bay	3
	Avlaki Bay	3	Agios Stefanos Bay	3
	Vromolimni Beach	2	Vromolimni Beach	1
	Bay	**Pressure category**	**Bay**	**Pressure category**
IIA	Atokos Bay	5	Atokos Bay	5
	Formicula Bay	3	Formicula Bay	3
	Formicula caves	2	Arkoudi Bay	2
	Arkoudi Bay	2	Formicula caves	2

Discussion and Conclusion points

To understand the areas most under threat, it is important to also consider the characteristic of each site and the status of the meadows in these. Studies have reported that plagiotropic rhizomes are more prone to anchoring damage due to their exposed structure compared to orthotropic rhizomes [15] while the thickness of the matte has also been identified as an important factor [14]. Other factors also discussed in the methodology section should be considered when assessing how impactful anchoring events can be. For both study sites, the results are in line with the resulting health status of the Posidonia meadows assessed in 2023 for Erimitis [10] and during 2024 in the IIA [20] where low values of the Conservation Index (CI, a health index indicating the presence of dead matte and healthy meadow) were found for Arias bay in Erimitis as well as in Atokos island, while lowest values of BiPo index (Biological Indicator for *Posidonia oceanica*) were observed in Agios Stefanos and Avlaki beach in Erimitis and in Atokos and Arkoudi island in the IIA.

The results of the present project provide a first estimate of the anchoring pressure on Posidonia meadows by small and large vessels in the sites of the Inner Ionian Archipelago and Erimitis and can be used to identify high pressure sites to focus future efforts of boating activity regulation and management. However, due to the study design and short sampling period the results should be considered preliminary and interpreted with caution. The data collected does not give an indication of the daily use of these bays by boaters as it only accounted for a snapshot during the midday hours to capture the busiest time interval. Reports from locals indicate that on a daily basis each island of the IIA receives hundreds of boats during the high tourism season. Data that would allow for such analysis involve AIS data that can be received by the boat operators or official AIS tracking data providers that are however associated with higher costs. This would be more beneficiary for the site of the IIA given the fact that the majority of the boats are sailing vessels and the distances between the islands along with their remoteness does not allow for systematic monitoring using drones due to high fuel costs. Encouraging data sharing between sailing companies in the Inner Ionian would prove a good approach for future attainment of such data, something that would be achieved through long-term collaboration and building of trust between local stakeholders and active organisations. For the site of Erimitis, the approach of drone surveys seems best fit for the characteristics of the vessel presence, as these are mostly related to small rental boats that are not equipped with AIS tracking systems. Another characteristic of the site that makes drone surveys a good approach is the accessibility of the sites by land which reduced fuel costs and time to complete surveys.

Studies have stressed that in the long term, even anchoring on Posidonia meadows by small boats using low-impact anchors may potentially have detrimental consequences and have suggested that for vulnerable sites, it is preferable to implement an educational program based on information of boaters on correct anchoring practices, rather than adopting strong restrictions to boat anchoring or deploying mooring buoys [14]. Although the use of these management strategies is still recommended in the case of anchorage frequented by bigger vessels using heavier anchors and chains. Experts have stressed that Posidonia meadows can recover from low levels of anchor damage only if all sources of disturbance are removed for at least 5 years [14]. Working towards the protection of the meadows against anchoring remains a high priority for areas such as the Ionian Sea characterised by such high tourism pressure. Awareness raising actions in the IIA should be focused in marina areas in Lefkada and other nearby ports, while for Erimitis, actions should focus on the rental companies and cruiseboats in Kassiopi and

St. Stefanos. Finally, the inclusion of the Posidonia maps in sailing navigation apps is identified as a priority for sites with high presence of sailing boats and yachts.

A.2. Communication of the project in Social Media, iSea's website, etc (June-December).

A.2.1 Communication campaign

This action relates to a communication campaign on the areas threats, with at least 8 posts for both areas discussing the results, trends and discussion points related to the project. The communication campaign will take place over iSea's social media platforms with the aim of increasing public awareness and engagement. To date a total of 5 posts have been completed and are reported below.

Post 1 Exciting Project in the Ionian Sea: Evaluating anchorage pressure on Posidonia Meadows using drones. (10/9/24)

Post 2 Evaluating anchorage pressure on Posidonia Meadows using drones – Preliminary results Erimitis. (19/9/24)

Post 3 Evaluating anchorage pressure on Posidonia Meadows using drones – Preliminary results IIA. (2/10/24)

Post 4 Uncontrolled #anchorage is one of the greatest threats to #Posidonia meadows in #Greece! (8/11/2024)

Post 5 Evaluating #anchorage pressure on #Posidonia Meadows using drones, results and effort in total. (15/11/2024)

Post 6, Post 7, **Post 8** Final results, presenting heatmas and high pressure areas (pending)

A communication insights report include the results of the 5 posts completed has been formulated and attached with the present report. The completed posts reached an astonishing number of approximatelly 75,000 views over the combined social media platforms of iSea. The remaining 3 posts (6-8) will take place in the following week. As an additional action, the results of the present project (for Erimitis) will be included in the update of the Inventory of Knowledge for Erimitis, in the context of iSea's 2024 project in Erimitis funded by Blue Marine Foundation that the IEF has supported over the years.

A.2.2 Press release

A press release presenting the results of the project will take place over the following month. The press release will discuss the project's goals and outcomes as well as recommendations for reducing anchoring pressure on Posidonia meadows. This will be shared to local news outlets in Corfu and Lefkada plus surrounding areas of interest identified.

A.3. Project Coordination

A.3.1 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.

A.3.2 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 6. All original receipts are kept in iSea's headquarters and copies can be given to the funder upon request.

Bibliography

[1] Topouzelis, K., Makri, D., Stoupas, N., Papakonstantinou, A., Katsanevakis, S., 2018. Seagrass mapping in Greek territorial waters using Landsat-8 satellite images, International Journal of Applied Earth Observation and Geoinformation, Volume 67, pp. 98-113, ISSN 1569-8432. https://doi.org/10.1016/j.jag.2017.12.013.

[2] Naasan Aga Spyridopoulou. R.. Gkikas. R.. Giovos. I.. Posidonia oceanica (Linnaeus) Delile. 1813 meadows of northeast Corfu.. iSea 2021. Greece. 14pp.

[3] Athinaiou, I., Pyloridou, K., Poursanidis D., Naasan Aga Spyridopoulou, R. Exploring the ecological importance of Erimitis, NE Corfu, Final Project Report. iSea 2023, Greece, 21pp.

[4] Bearzi, G., Agazzi, S., Gonzalvo, J., Costa, M., Bonizzoni, S., Politi, E., Piroddi, C. and Reeves, R. (2008). Overfishing and the disappearance of short-beaked common dolphins from western Greece. Endangered Species Research, 5, pp.1–12. doi:https://doi.org/10.3354/esr00103.

[5] Piroddi, C., Bearzi, G., Gonzalvo, J. and Christensen, V. (2011). From common to rare: The case of the Mediterranean common dolphin. Biological Conservation, 144(10), pp.2490– 2498. doi:https://doi.org/10.1016/j.biocon.2011.07.003.

[6] Panou, A., Jacobs, J. and Panos, D. (1993). The endangered mediterranean monk seal Monachus monachus in the Ionian sea, Greece. Biological Conservation, 64(2), pp.129–140. doi:https://doi.org/10.1016/0006-3207(93)90649-l

[7] Mpougas, E., Waggitt, J.J., Dendrinos, P., Adamantopoulou, S. and Karamanlidis, A.A. (2019). Mediterranean Monk Seal (Monachus monachus) Behavior at Sea and Interactions with Boat Traffic: Implications for the Conservation of the Species in Greece. Aquatic Mammals, 45(4), pp.419–424. doi:https://doi.org/10.1578/am.45.4.2019.419.

[8] Delioglani, D., Karagiannis, N. A., Poursanidis, D., Doxa, A., Lazou Dean, A., Turner, V., Karythis, S., Bazioti, E., Naasan Aga -Spyridopoulou, R. Prioritising Posidonia oceanica meadows in the Ionian Sea. iSea, Greece, 2023. 21pp.

[9] Di Minin, E., Veach, V., Lehtomäki, J., Montesino Pouzols, F., Moilanen, A. (2014). A quick introduction to Zonation. Digital Geography Lab, Conservation Biology Informatics Group (C-BIG).

[10] Drakopoulou, P., Galiatsatos, I. and Salomidi, M. (2019). Preliminary assessment of anchoring pressure in Greek Natura 2000 sites using satellite observations. In: Biographical Process Network Event. 17.

[11] Soldatou, N., Chatzianastasiadou, P. and Vagiona, D.G. (2022). Assessment of Carbon-Related Scenarios for Tourism Development in the Island of Lefkada in Greece. Tourism and Hospitality, 3(2), pp.345–361. https://doi.org/10.3390/tourhosp3020023.

[12] Sailing Choices. (n.d.). Ionian: Ports. [online] Available at: https://www.sailingchoices.com/sailing-areas/sailing-greece/sailing-ionian/ionian-ports/ [Accessed 13 Nov. 2023].

[13] Bockel, T., Bossut, N., Mouquet, N., Mouillot, D., Fontaine, Q. and Deter, J., 2024. Quantifying the impact of small boats on Posidonia seagrass meadows: Methods and path for future efficient management of anchoring pressure. *Ocean & Coastal Management*, 259, p.107454. Available at: https://doi.org/10.1016/j.ocecoaman.2024.107454

[14] Milazzo, M., Badalamenti, F., Ceccherelli, G., & Chemello, R. (2004). Boat anchoring on *Posidonia oceanica* beds in a marine protected area (Italy, western Mediterranean): effect of anchor types in different anchoring stages. Journal of Experimental Marine Biology and Ecology, 299(1), 51–62. doi:10.1016/j.jembe.2003.09.003

[15] Francour, P., Ganteaume, A., Poulain, M., 1999. Effects of boat anchoring in *Posidonia oceanica* seagrass beds in the Port-Cros National Park (north-western Mediterranean Sea). Aquat. Conserv. 9, 391–400.

[16] Rouanet, E., Astruch, P., Bonhomme, D., Bonhomme, P., Rogeau, E., de Saint Martin, T. and Boudouresque, C.F., 2013. Evidence of anchor effect in a *Posidonia oceanica* seagrass meadow under low anchoring pressure via a multi-criteria grid. *Rapports de la Commission Internationale pour l'Exploration Scientifique de la Mer Méditerranée*, 40, p.676. Available at: https://people.mio.osupytheas.fr/~boudouresque/Publications_pdf/Rouanet_et_al_2013_CIESM_Anchoring.pdf

[17] Pergent-Martini, C., Monnier, B., Lehmann, L., Barralon, E. and Pergent, G., 2022. Major regression of *Posidonia oceanica* meadows in relation with recreational boat anchoring: A case study from Sant'Amanza bay. *Journal of Sea Research*, 188, p.102258. Available at: https://doi.org/10.1016/j.seares.2022.102258.

[18] Boudouresque, C.-F., Bernard, G., Bonhomme, P., Charbonnel, E., Diviacco, G., Meinesz, A., Pergent, G., Pergent-Martini, C., Ruitton, S., Tunesi, L., 2012. Protection and Conservation of *Posidonia oceanica* Meadows. RAMOGE and RAC/SPA Publisher, Tunis.

[19] Deter, J., Lozupone, X., Inacio, A., Boissery, P., and Holon, F., 2017. Boat anchoring

pressure on coastal seabed: Quantification and bias estimation using AIS data. *Marine Pollution Bulletin*, 123(1-2), pp.175-181. Available at: https://doi.org/10.1016/j.marpolbul.2017.08.065

[20] Athinaiou, I., Pyloridou, K., Giatroudaki, I., & Naasan Aga Spyridopoulou, R. 2024. Protecting the Inner Ionian Archipelago & Formicula Island: Final Progress Report. iSea, Thessaloniki, Greece. 31pp


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