

A5.535: *Posidonia* beds in the Mediterranean infralittoral zone

Summary

This habitat is created by the ecosystem engineer species, the seagrass *Posidonia oceanica*. The growth of the rhizomes allows the building of a specific structure called “matte” due to the accumulation of sediment between rhizomes and roots. “Posidonia meadows” or “Posidonia beds”, occur between the sea-surface and 35 to 40 m depth. When the waters are particularly clear, these meadows can go deeper than 45 m deep (e.g. Corsica, Malta). *Posidonia* beds can be present on various substrates (e.g. silt, fine sand, average and coarse, rocks), even if they prefer soft bottoms, rich in organic matter. This endemic species is the most widespread seagrass species throughout the Mediterranean, however, its biological characteristics with rare sexual reproduction and slow horizontal growth of rhizome edges, prevents rapid recolonization of degraded or new forming beds.

Pressures to this habitat include the impacts of trawling, boat anchoring and coastal development including shoreline artificialisation, urban and harbour infrastructure, and sand mining affect also the upper limit distribution of *Posidonia* meadows. Eutrophication and pollution, especially in coastal regions that are heavily populated, are a problem in many coastal areas. Invasive macroalgae such as *Caulerpa taxifolia* and *Lophocladia lamellandii* can threaten the survival and affect the density and complexity of the assemblages in the meadow. Climate change would be an additional threat through the warming of waters, sea level rise and extreme weather events. *Posidonia oceanica* is protected by EU legislation (Habitat Directive), the Bern and Barcelona Conventions and some national legislations. The habitat formed by this seagrass is also in various marine protected areas in the countries along the Mediterranean Sea. Monitoring and implementation of fishing regulations, increased awareness and mapping projects (particularly in areas less well studied) will further help to protect this habitat.

Synthesis

Posidonia oceanica seagrass beds are an endemic habitat to the Mediterranean and represent the most widespread seagrass meadow in the region. A decline in surface area of 34% has been observed over the last 50 years due to mechanical damage from trawling, coastal development, pollution, boat anchoring, discharge of effluents and general decrease of water quality and sedimentation. The known decline trend at country level is on average 12% over the last 2-15 years but information is lacking regarding the trend in different Mediterranean countries.

There is limited information about a reduction in the habitat quality but the few reports at country level indicate a slight decline due to the mechanical alteration of the habitat (e.g. by fishing trawlers) and a decrease of the water quality (e.g. shoreline modification). Based on this information, this habitat has been assessed as Vulnerable under criteria A1 for both the EU 28 and EU 28+.

Overall Category & Criteria			
EU 28		EU 28+	
Red List Category	Red List Criteria	Red List Category	Red List Criteria
Vulnerable	A1	Vulnerable	A1

Sub-habitat types that may require further examination

None.

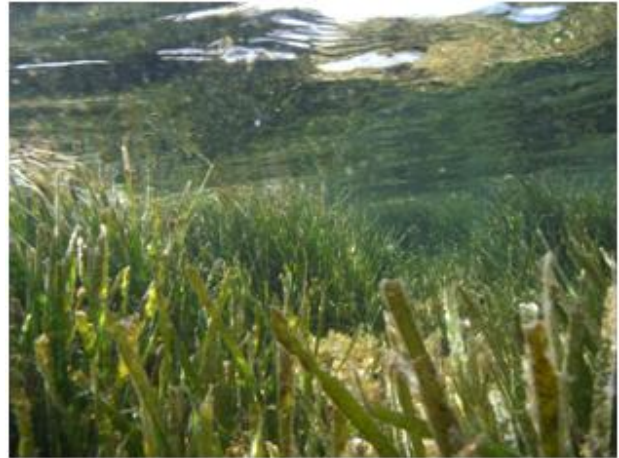
Habitat Type

Code and name

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Posidonia meadows along the Corsican coasts - France (© G. Pergent).



Ecomorphosis of "barrier-reef" *Posidonia oceanica* meadows along the Libyan coasts (© G. Pergent).

Habitat description

This habitat is created by the ecosystem engineer species, the seagrass *Posidonia oceanica*. The plant of this seagrass consists of erected and plagiotropic rhizomes with at the top a 4 -8 leaves bundle, which has 8-11 mm wide and 20 to 80 cm long. The growth of the rhizomes allows the building of a specific structure called "matte" due to the accumulation of sediment between rhizomes and roots. This is a real engineering species, which constitutes characteristic formations called "Posidonia meadows" or "Posidonia beds", between the sea- surface and 35 to 40 m depth. When the waters are particularly clear, these meadows can go deeper than 45 m deep (e.g. Corsica, Malta). They disappear when the salinity is below 33 % (optimum 35 to 39%). However, they support relatively large temperature variations from 9 to 29 ° C (17 optimum at 20 ° C). *Posidonia* beds can be present on various substrates (e.g. silt, fine sand, average and coarse, rocks), even if they prefer soft bottoms, rich in organic matter. This endemic species is the most widespread seagrass species throughout the Mediterranean. It is common on different types of substrate and habitats, from sandy bottoms to rocks. However, its biological characteristics with rare sexual reproduction and slow horizontal growth of rhizome edges, don't allow a rapid recolonization of degraded or new forming beds.

Several sub-habitats have been described:

- Ecomorphosis of striped *Posidonia oceanica* meadows (A5.5351),
- Ecomorphosis of "barrier-reef" *Posidonia oceanica* meadows (A5.5352);
- Facies of dead "mattes" of *Posidonia oceanica* without much epiflora (A5.5353) and
- Association with *Caulerpa prolifera* on *Posidonia* beds (A5.5354).

Indicators of quality:

Posidonia oceanica is considered as good biological indicator of the quality of the marine environment and is considered as a biological quality element in the implementation of the European Framework Water Directive. Several descriptors are available to evaluate the quality of the *Posidonia* meadows habitat and

many indicators of quality, based on combination of these descriptors have been established, particularly to monitor the habitat in the framework of European directives (e.g. Habitat, Fauna and Flora Directive, Water Framework Directive and recently Marine Strategy Framework Directive) or for conservation purposes (national or sub-national initiatives).

Characteristic species:

It is possible to divide the main characteristic species of the *Posidonia* meadows in three compartments and/or in different trophic levels:

- The species living within the thickness of the *matte* (endofauna). This assemblage is rich in polychetes (*Mediomastus capensis*, *Neanthes nubila*, *Lumbrineriopsis paradoxa*, *Pontogenia chrysocoma*), molluscs (*Modiolula phaseolina*, *Hiatella arctica*, *Limaria hians*, *Gourretia denticulata*) and crustacean (*Upogebia deltaura*, *Limnoria mazzellae*).

- The species living under the foliar shoots (sciaphilous strata) as algae (*Halimeda tuna*, *Flabellia petiolata*, *Peyssonnelia squamaria*, *Rhodomenia* sp.), the foraminifer (*Miniacina miniacea*), echinoderms (*Paracentrotus lividus*, *Sphaerechinus granularis*, *Holothuria tubulosa*, *Echinaster (Echinaster) sepositus*, *Marthasterias glacialis*, *Ophiura ophiura* and *Ophioderma longicauda*); crustaceans (*Nototropis guttatus*, *Melita palmata*, *Gammarella fucicola*, *Cleantis prismatica* and *Sirpus zariquieyi*), bivalves (*Pinna nobilis*), ascidians (*Halocynthia papillosa*, *Microcosmus vulgaris*).

- The species living on the leaves (phyllosphere) and the vagile species present in the canopy, as encrusting algae (*Pneophyllum fragile*; *Electra posidoniae*, *Hydrolithon* sp.), hydrozoans (*Plumularia posidoniae*, *Sertularia perpusilla*, bryozoan, crustacean (*Idotea balthica*), cephalopods (*Octopus vulgaris*, *Sepia officinalis*), gastropods (*Synischia hectica*, *Achaeus cranchii*, *Pisa nodipes*, *Bittium reticulatum*, *Calliostoma laugierii*, *Cerithium vulgatum*, *Columbella rustica*, *Gibbula umbilicaris*, *Tricolia speciosa*, *Alvania lineata*, *Rissoa* sp. and *Jujubinus* sp.) and fishes (*Sarpa salpa*, *Hippocampus hippocampus*, *Symphodus* sp., *Coris julis*, *Chromis chromis*, *Diplodus vulgaris*, *Scorpaena porcus*).

Classification

EUNIS (v1405):

Level 4: A subhabitat of 'Sublittoral macrophyte dominated sediment' (A5.5).

Annex 1:

1120 *Posidonia* beds

MAES-2:

Marine - Marine inlets and transitional waters

Marine - Coastal

MSFD:

Shallow sublittoral sediment (coarse, sand, mud, mixed)- *Posidonia oceanica* meadows (Italy)

EUSaMap:

Seagrass meadows

IUCN:

9.9 - Seagrass submerged

Barcelona convention (RAC/SPA):

III. 5. 1. *Posidonia oceanica* meadows (= Association with *Posidonia oceanica*)

III. 5. 1. 1. Ecomorphosis of striped meadows

III. 5. 1. 2. Ecomorphosis of “barrier-reef” meadows

III. 5. 1. 3. Facies of dead “mattes” of *Posidonia oceanica* without much epiflora

III. 5. 1. 4. Association with *Caulerpa prolifera*

Does the habitat type present an outstanding example of typical characteristics of one or more biogeographic regions?

Yes

Regions

Mediterranean

Justification

Posidonia oceanica is an endemic species that form unique habitats along the Mediterranean coast.

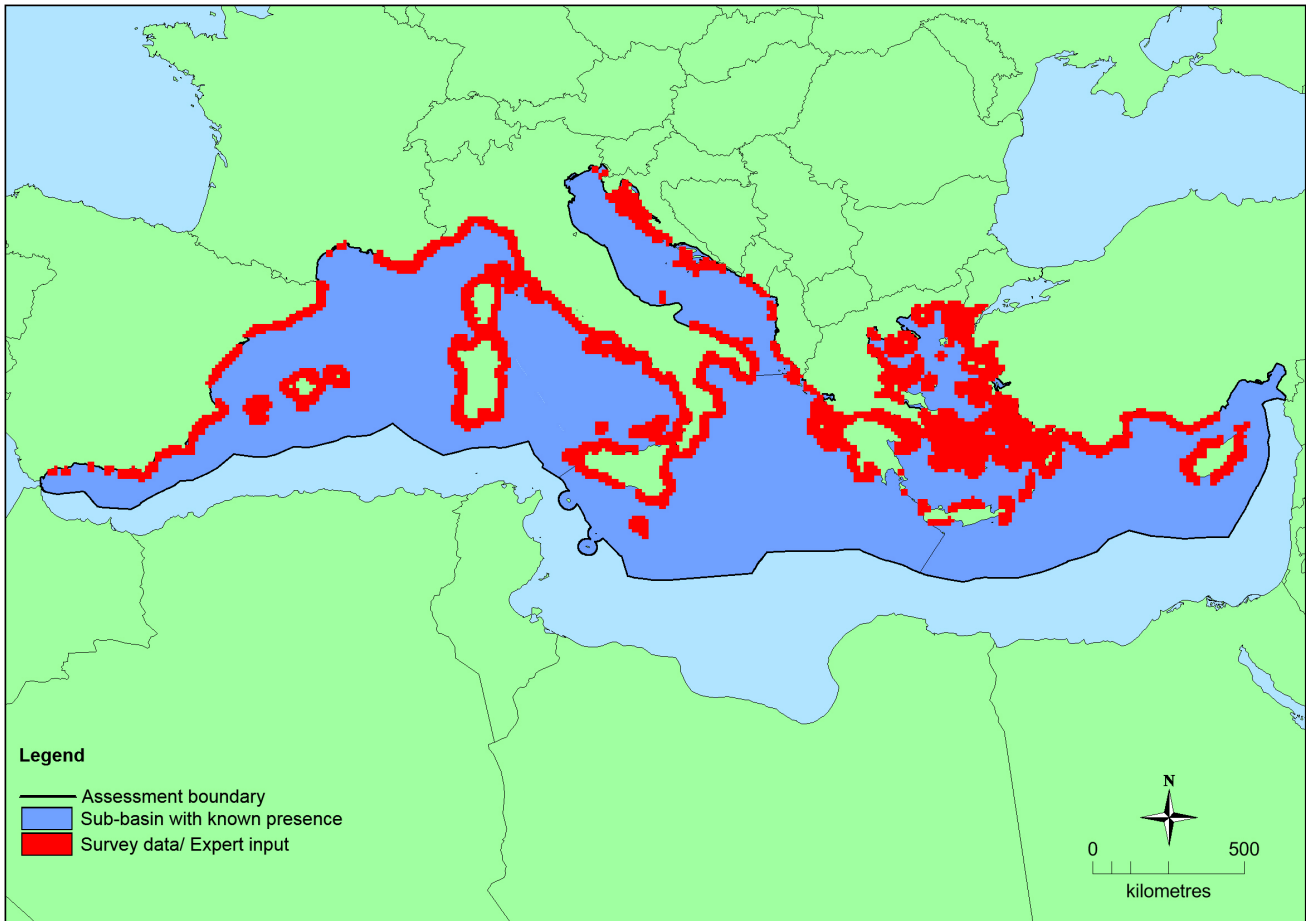
Geographic occurrence and trends

Region	Present or Presence Uncertain	Current area of habitat	Recent trend in quantity (last 50 yrs)	Recent trend in quality (last 50 yrs)
<i>Mediterranean Sea</i>	Adriatic Sea: Present Aegian-Levantine Sea: Present Ionian Sea and the Central Mediterranean Sea: Present Western Mediterranean Sea: Present	12247 Km ²	Decreasing	Decreasing

Extent of Occurrence, Area of Occupancy and habitat area

	Extent of Occurrence (EOO)	Area of Occupancy (AOO)	Current estimated Total Area	Comment
EU 28	2,431,126 Km ²	4,033	6,955 Km ²	Source of current estimated total area: Telesca et al., 2015. EOO and AOO source: IUCN Red list (2015).
EU 28+	2,451,463 Km ²	4,414	12,247 Km ²	Source of current estimated total area: Telesca et al., 2015. EOO and AOO source: IUCN Red list (2015).

Distribution map



This map has been generated based on Telesca *et al.*, 2015 and the IUCN Red list (2015).

How much of the current distribution of the habitat type lies within the EU 28?

More than 56% of the known spatial distribution of this habitat lies within EU countries. The information is quite comprehensive for the Mediterranean sub-basins considered here except for parts of Greece and Croatia.

Trends in quantity

P. oceanica meadows are found to be widely present along the continental coastline and islands of most Mediterranean countries. For those countries where there is monitoring, a 12 % of decline seems to be the average value and could represent the minimal value of decline for the next 10-15 years while other countries report a larger decrease of the meadows. For countries such as Albania, Greece, Turkey, or Croatia, distribution is poorly documented and the current area concerns only less than 15-30% of the coastlines. Few reports reflected an increase in the surface of the *Posidonia* meadows, with the exception of Slovenia, these seems to be due to an important increase of knowledges in relation with the distribution of these *Posidonia* beds. The total known area of *P. oceanica* meadows in the Mediterranean Sea is being estimated to be 12,247 km², with an estimated regression of meadows amounted to 34% in the last 50 years due to cumulative effects of multiple local stressors. For the western Mediterranean, since 1980, however, it has being estimated that 56% of the *Posidonia* meadows whose demographic status has been monitored have suffered a decline in the coverage or its density.

- Average current trend in quantity (extent)
EU 28: Decreasing
EU 28+: Decreasing
- Does the habitat type have a small natural range following regression?
No

Justification

This habitat has a large natural range extending throughout the Mediterranean Sea and an EOO >50,000km².

- Does the habitat have a small natural range by reason of its intrinsically restricted area?

No

Justification

This habitat has a large natural range extending throughout the Mediterranean Sea and an EOO >50,000km².

Trends in quality

Relevant signs of regression in the quality of the meadows were documented in different areas of the Mediterranean, the more severe situations occurring in sites with a medium or high human impact (e.g. proximity to fishing ports, urbanised area), but also in proximity to river mouths which are located along the continental coastline. In Spain, it is estimated a decrease in the quality of the meadows to 49,585 ha over the last twenty years. Wide meadows declined and overall regression of the habitat was documented along the continental coasts of Liguria, Tuscany, Latium, Sardinia and Apulia regions of Italy as well as few sites in Albania as well as in France although in the latter a positive improvement has been observed from conservation efforts.

- Average current trend in quality

EU 28: Decreasing

EU 28+: Decreasing

Pressures and threats

The lower limit of this habitat is threatened by mechanical damage from trawling, boat anchoring and turbidity. Coastal development including shoreline artificialisation, urban and harbour infrastructure, and sand mining affect also the upper limit distribution of *Posidonia* meadows. Eutrophication (originated from the discharges of agriculture nutrients, organic matter, aquaculture and urban waste) and pollution, especially in coastal regions that are heavily populated, are a problem in many coastal areas. Invasive macroalgae such as *Caulerpa taxifolia* can grow on *Posidonia* rhizomes and sand and their proliferation is believed could accelerate the decline of the meadow. The proliferation of other epiphytic invasive species, such as *Lophocladia lamellandii* in the western Mediterranean can also threaten the survival and affect the density and complexity of the assemblages in the meadow. Climate change would be an additional threat through the warming of waters, sea level rise and extreme weather events.

List of pressures and threats

Biological resource use other than agriculture & forestry

Marine and Freshwater Aquaculture

Benthic dredging

Pollution

Pollution to surface waters by industrial plants

Pollution to surface waters by storm overflows

Other point source pollution to surface water

Diffuse pollution to surface waters via storm overflows or urban run-off

Nutrient enrichment (N, P, organic matter)

Toxic chemical discharge from material dumped at sea

Input of litter (solid waste matter)

Invasive, other problematic species and genes

Invasive non-native species

Natural System modifications

Modification of hydrographic functioning, general
Dykes, embankments, artificial beaches, general
Altered water quality due anthropogenic changes in salinity
Other human induced changes in hydraulic conditions

Climate change

Temperature changes (e.g. rise of temperature & extremes)
Flooding and rising precipitations

Conservation and management

Posidonia oceanica is protected by EU legislation (Habitat Directive), the Bern and Barcelona Conventions and some national legislations.

The habitat formed by this seagrass is also protected in various marine protected areas in the countries along the Mediterranean Sea. EU fishing regulations ban trawling activities near the shore (either above 50 m or 3 nm from the coast), giving indirect protection for this habitat (EC Council Regulation No. 1967, 21/12/2006). In some regions, more regulations are in place for fishing, shellfishing and aquaculture activities to be conducted on or above seagrass meadows to avoid negative impacts on the seagrasses. To prevent physical damage caused by trawling on the meadows, different measures should be put in place such as placing artificial reefs along certain stretches of the coast, developing effective surveillance programmes and enforcing the existing regulations to avoid illegal trawling. Awareness programmes with different sectors such as recreational boats and local councils will help to the better management of coastal activities and identifying areas where cost-effective schemes for threats reduction could be implemented. Mapping and monitoring efforts should target the remaining unmapped coastline (21,500 km) located in the southern and eastern regions of the basin and long term monitoring efforts should be in place to detect possible changes in the habitat.

List of conservation and management needs

Measures related to wetland, freshwater and coastal habitats

Restoring/Improving water quality

Measures related to marine habitats

Other marine-related measures
Restoring marine habitats

Measures related to spatial planning

Establish protected areas/sites
Legal protection of habitats and species

Measures related to hunting, taking and fishing and species management

Regulation/Management of fishery in marine and brackish systems
Specific single species or species group management measures

Conservation status

Annex 1:

Species classified as Priority Habitat in the Habitats Directive (Dir 92/43/CEE). It is also included in the Barcelona Convention Annex II, List of endangered or threatened species. It is also included in the Annex I of the Strictly protected Flora species in the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention).

Posidonia oceanica is considered as good biological indicator of the quality of the marine environment and is considered a biological quality element in the implementation of the European Framework Water Directive.

When severely damaged, does the habitat retain the capacity to recover its typical character and functionality?

The accumulation of different pressures and threats with the lack of genetic variability and slow growth, makes *Posidonia oceanica* habitat less resilient to disturbance and slow recovery. The species has a rare sexual reproduction and slow horizontal growth of rhizome edges that do not provide a rapid recolonization of degraded beds or the colonisation of new areas.

Effort required

10 years	20 years	50+ years
Through intervention	Through intervention	Naturally

Red List Assessment

Criterion A: Reduction in quantity

Criterion A	A1	A2a	A2b	A3
EU 28	34 %	unknown %	unknown %	unknown %
EU 28+	34 %	unknown %	unknown %	unknown %

Over the last 50 years, it is thought that there has been a decline in the extent of this habitat by 34%. Whilst expert opinion is that this habitat will continue to decline in quantity, it has not been quantified. Therefore, this habitat has been assessed as Vulnerable under Criterion A1.

Criterion B: Restricted geographic distribution

Criterion B	B1				B2				B3
	EOO	a	b	c	AOO	a	b	c	
EU 28	>50,000 Km ²	Yes	Yes	no	>50	Yes	Yes	no	no
EU 28+	>50,000 Km ²	Yes	Yes	no	>50	Yes	Yes	no	no

The habitat is widespread in the the Mediterranean (reaching to the southern limits of Alboran Sea and Cyprus in the Levantine Sea. The EOO and the AOO exceed thresholds for threatened status. Declines in quantity and quality have been reported but the distribution of the habitat is such that the identified threats are unlikely to affect all localities at once. This habitat has therefore been assessed as Least Concern under criteria B.

Criterion C and D: Reduction in abiotic and/or biotic quality

Criteria C/D	C/D1		C/D2		C/D3	
	Extent affected	Relative severity	Extent affected	Relative severity	Extent affected	Relative severity
EU 28	unknown %	unknown %	30 %	slight %	unknown %	unknown %
EU 28+	unknown %	unknown %	30 %	slight %	unknown %	unknown %

Criterion C	C1		C2		C3	
	Extent affected	Relative severity	Extent affected	Relative severity	Extent affected	Relative severity
EU 28	unknown %	unknown %	unknown %	unknown %	unknown %	unknown %
EU 28+	unknown %	unknown %	unknown %	unknown %	unknown %	unknown %

Criterion D	D1		D2		D3	
	Extent affected	Relative severity	Extent affected	Relative severity	Extent affected	Relative severity
EU 28	unknown %	unknown%	unknown %	unknown%	unknown %	unknown%
EU 28+	unknown %	unknown%	unknown %	unknown%	unknown %	unknown%

Based on the countries that have provided data (Spain, Italy, Albania and France), there has been a slight decline in the overall quality of the meadows. There is a lack of quantitative data to be able to calculate percentage change in abiotic and/or biotic quality however substantial reductions in quality in at least some regions of this habitat are known to have occurred. Potentially damaging activities are known to be occurring across this habitat at the present time and are expected to continue into the future. Expert opinion is that this is at least a slight decline affecting more than 30% of extent of the habitat.

Based on this, the habitat type is assessed as Near Threatened under Criterion C/D2.

Criterion E: Quantitative analysis to evaluate risk of habitat collapse

Criterion E	Probability of collapse
EU 28	unknown
EU 28+	unknown

There is no quantitative analysis available to estimate the probability of collapse of this habitat type. Therefore, the habitat type is assessed as Data Deficient under Criterion E.

Overall assessment "Balance sheet" for EU 28 and EU 28+

	A1	A2a	A2b	A3	B1	B2	B3	C/D1	C/D2	C/D3	C1	C2	C3	D1	D2	D3	E
EU28	VU	DD	DD	DD	LC	LC	LC	DD	NT	DD	DD	DD	DD	DD	DD	DD	DD
EU28+	VU	DD	DD	DD	LC	LC	LC	DD	NT	DD	DD	DD	DD	DD	DD	DD	DD

Overall Category & Criteria			
EU 28		EU 28+	
Red List Category	Red List Criteria	Red List Category	Red List Criteria
Vulnerable	A1	Vulnerable	A1

Confidence in the assessment

Medium (evenly split between quantitative data/literature and uncertain data sources and assured expert

knowledge)

Assessors

Pergent-Martini C., Otero M. M., Numa C.

Contributors

Salomidi M., Borg J., Macic V., Turk R.

Reviewers

Gubbay S., Tunesi, L.

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Date of review

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