A5.24A- Pontic lower infralittoral thalassinid-dominated muddy sands with [Upogebia pusilla] and sparse macrofauna

Summary

The habitat is present in Western, North-Western, Northern (Crimean shelf) and Eastern (Caucasus, Georgia) coast of the Black Sea on non-cohesive to cohesive muddy sand (starting with 5% to 20% silt/clay and up to 80%) in the lower infralittoral and upper circalittoral zones. It is not present in the Sea of Marmara. The current extent of the habitat is reliable, although it may be underestimated as little is known and no data is available for Turkey. No historic data is available. This is not a new habitat but for a long time it was unknown as standard benthic sampling techniques used were not appropriate to detect this habitat type.

Historically the most significant pressure has been eutrophication which is likely to have caused the greatest reductions in quantity and quality. This was most acutely experienced in the north-west Black Sea where there are high riverine inputs. Since the collapse of the Soviet Union improved transboundary pollution measures have been implemented. This has led to a reduction in the pressure. Current pressures on the habitat are trawling disturbance and chemical pollution.

Synthesis

Trends in extent are unknown. Expert opinion states that it is likely to have declined in the last 50 years. The current extent is stable. No quality data is available for this habitat. Previous records of *U. pusilla* biomass and densities are not relevant to this habitat type, due to the use of inappropriate sampling techniques. Trends in quality are unknown.

In the EU 28 the habitat type is assessed as Endangered because of its restricted geographical distribution and threatening process (eutrophication) which is likely to cause a continuining decline in quality and quantity over the next 20 years.

The EOO is 16,835 km^2, based on quantitative data of known localities. The threatening process is based on expert opinion.

In the EU 28+ the habitat type is assessed as Least Concern under Criterion B. The EOO and AOO do not meet the threatened category thresholds, based on quantitative data of known localities. There are data gaps for some countries (e.g. Turkey). If filled these will increase the EOO and AOO figures.

Overall Category & Criteria			
EU 28		EU 28+	
Red List Category	Red List Criteria	Red List Category	Red List Criteria
Endangered	B1b	Least Concern	-

Sub-habitat types that may require further examination

None

Habitat Type

Code and name

A5.24A- Pontic lower infralittoral thalassinid-dominated muddy sands with [Upogebia pusilla] and sparse macrofauna

Lower infralittoral sands with *Upogebia pusilla* out of the burrow, Cape Aurora, Romania (© Dragoș Micu).

Lower infralittoral thalassinid-dominated muddy sands with *Upogebia pusilla* at -15m, Eforie, Romania (© Dragoș Micu).

Habitat description

Non-cohesive to cohesive muddy sand (starting with 5% to 20% silt/clay and up to 80%) in the lower infralittoral and upper circalittoral zones. The habitat forms a more or less continuous belt along the Western, North-Western, Northern (Crimean shelf) and Eastern (Caucasus, Georgia) coast of the Black Sea at depths of 10-36m, on muddy sands and sandy muds, sometimes mixed with shell hash.
The sedimentary bottom is riddled with the burrows of the thalassinid crustacean *Upogebia pusilla*, which are between 0.2-1m deep depending on sediment type. High densities (over 100 ind m-2) of the thalassinids occur over large areas; the biofiltering, bioturbation and sediment resuspension exerted by them have a sizeable influence on the ecosystem. The role of *Upogebia* with respect to biofiltering and benthic-pelagic coupling is highly important for the functioning of the ecosystem. The dominance of filter-feeding molluscs occurring in this habitat is decreased through competition and larval predation by *Upogebia. Upogebia* is clearly dominant in terms of both density and biomass. Other species, especially small commensals which inhabit the burrows of *Upogebia,* are facilitated.

Indicators of quality:

Suitable biotic indicators of quality include:

- Density and biomass of thalassinids (*Upogebia*) ≥ 100 ind m-2 (density); ≥ 70 g m-2 (biomass) respectively; not to be evaluated using standard benthic sampling (grabs)

- It is possible to assume the existence of a direct link between the development of this habitat with the level of eutrophication of the Black Sea basin. The presence of near-bottom hypoxia/anoxia and siltation of habitats especially in the north-western section of the Black Sea shelf during 1970-1989 is correlated with a total absence of *U. pusilla* in samples collected in the shelf zone of Crimea in 1970-1979 and extremely low values during 1980-1989.

Suitable abiotic indictors of quality include:

-low N and P, and high oxygen are required; low chemical pollution

Characteristic species:

The ecosystem engineer creating this habitat is the filter-feeding thalassinid crustacean *Upogebia pusilla*. Other characteristic species include: *Actinothoe clavata, Leiochone leiopygos, Heteromastus filiformis, Nassarius nitidus, Bittium reticulatum, Spisula subtruncata, Chamelea gallina, Anadara kagoshimensis, Pitar rudis, Gouldia minima, Loripes lacteus, Modiola adriatica, Abra alba, Parvicardiumexiguum, Ampelisca diadema.*

Classification

This habitat may be equivalent to, or broader than, or narrower than the habitats or ecosystems in the following typologies.

EUNIS (v1405):

Level 5. A sub-habitat of “Pontic infralittoral muddy sand” (A5.24).

Annex 1:

1110 Sandbanks slightly covered all the time

1160 Large shallow inlets and bays

MAES:

Marine - Marine inlets and transitional waters

Marine - Coastal .

MSFD:

Shallow sublittoral sand

Shallow sublittoral mud

EUSeaMap:

Shallow sands

Shallow muds

IUCN:

9.5 Subtidal sandy -mud

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

Yes

Regions
Black

Justification
Thallasinid dominated sedimentary bottoms also occur in the North Sea. However, the dominant species are not as well defined. Low faunal diversity in the Black Sea allows Thallassinids to become dominant.

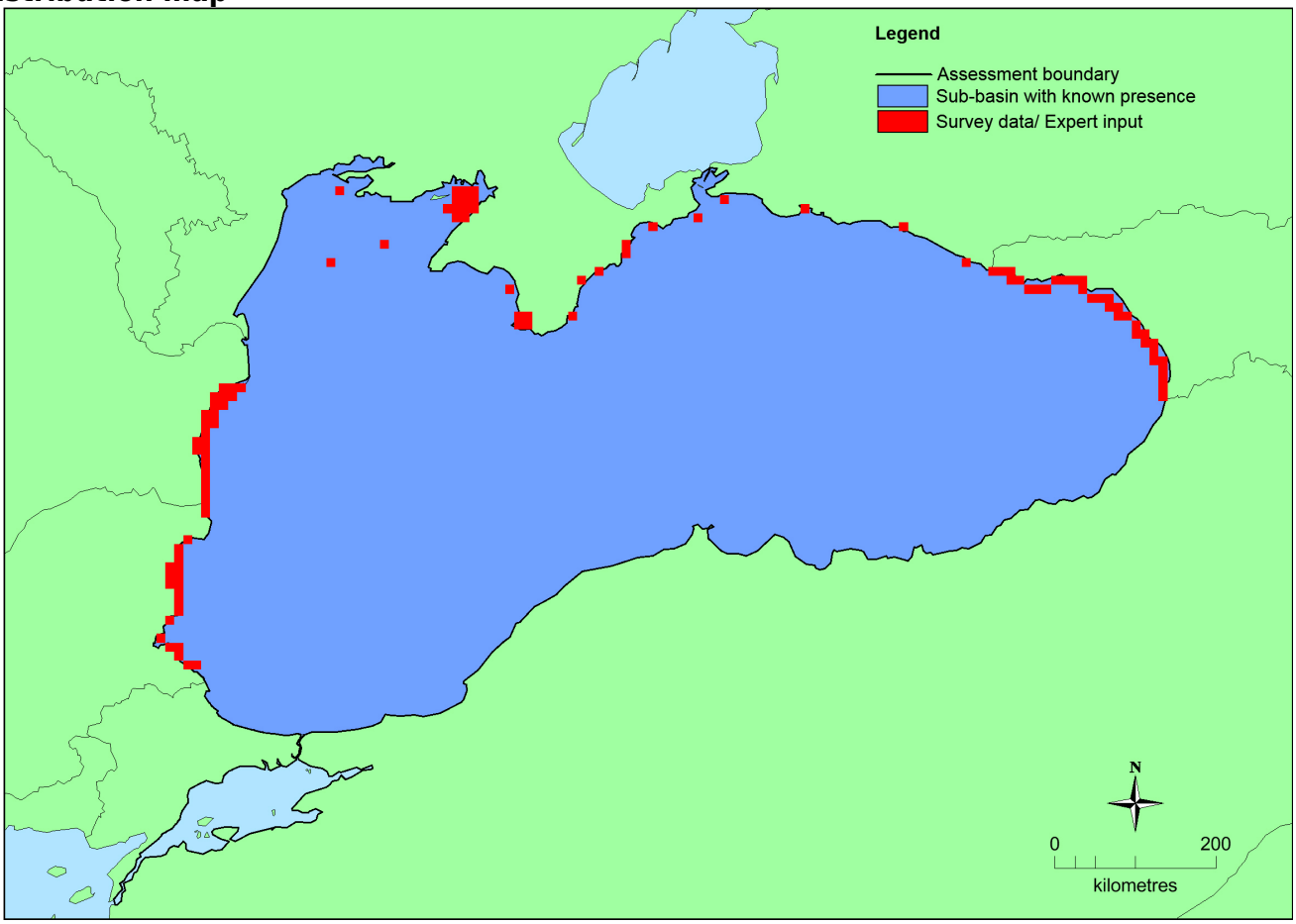
Geographic occurrence and trends

Region	Present or Presence Uncertain	Current area of habitat	Recent trend in quantity (last 50 yrs)	Recent trend in quality (last 50 yrs)
Black Sea	Black Sea: Present	Unknown 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	16835 Km^2	43	Unknown Km^2	Area estimates are available at some localities (e.g. sites in Georgia). However, these are only a small proportion of the total area and cannot be used to estimate the total area.
EU 28+	381135 Km^2	106	Unknown Km^2	Area estimates are available at some localities (e.g. sites in Georgia). However, these are only a small proportion of the total area and cannot be used to estimate the total area.

Distribution map



This map has been generated based on expert opinion. The map has been used to calculate AOO and EOO. The map should be treated with caution as it does not necessarily reflect the full distribution of the habitat.

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

Around 41% of this habitat is estimated to be hosted by EU28 in the Black Sea.

Trends in quantity

There is no historic (pre 1965) data on the extent of this habitat as it was first described in 2007. Expert opinion suggests that before the eutrophication events it is likely to have been very extensive. This is based on records of massive amounts of *U. pusilla* being found on the strandline after storms.

In the current period (1965 to present day) there is no quantitative data on changes in quantity. The previously used methods for data collection (van Veen grab) are not regarded as appropriate. The burrows of *Upogebia* extend below the top layer of sediment, so its real abundance and biomass cannot be properly assessed with the usual van Veen sampling. Therefore only box corer and scientific diving (underwater visual census techniques) are appropriate for estimating the dominance of *U. pusilla* and the presence of this habitat. This method was not used historically in previous studies in the region.

Expert opinion and literature on similar habitats elsewhere states that the habitat is highly sensitive to hypoxia. As a result there is believed to have been a decline in extent due to eutrophication in the last 50 years. During the period up to the 1990s wide spread and severe eutrophication occurred in Black Sea. This was most notable in the western Black Sea. The habitat is now believed to be stable with some signs of recovery. In the future the habitat extent is expected to increase providing the current environmental conditions remain favorable.

- Average current trend in quantity (extent)
  EU 28: Stable
  EU 28+: Stable
- Does the habitat type have a small natural range following regression?
  Yes
  Justification
  The habitat has a small range following regression in the EU countries only. In the EU 28+ the EOO exceeds 50,000 km². Expert opinion is that the habitat has undergone a significant decline in the last 50 years. However, this decline has now halted and the extent of the habitat is considered now to be stable.
- Does the habitat have a small natural range by reason of its intrinsically restricted area?
  No
  Justification
  The habitat requires well compacted muddy sands. This is a common feature in the north-west shelf of the Black Sea.

Trends in quality

This habitat was first described in 2008. In the historic period (pre 1965) the habitat quality is believed to have been high and stable. This is based on expert knowledge of the habitat and the likely response to known pressures during this period.

Quality data regarding the density and biomass of *U. pusilla* during the current period (1965 to present day) is unreliable as previously used methods for data collection (van Veen grab) are not appropriate. The burrows of *Upogebia pusilla* extend far below the top layer of sediment, and so its real abundance and biomass cannot be properly assessed with the usual van Veen sampling. Therefore only box corer and scientific diving techniques are appropriate for estimating the dominance of *U. pusilla* and the presence of this habitat. This method was not used historically in previous studies in the region.

Expert opinion and literature on similar habitats elsewhere states that the habitat is highly sensitive to hypoxia. As a result there is likely to have been a decline in extent due to eutrophication in the last 50 years. During the period up to the 1990s wide spread and severe eutrophication occurred in Black Sea. This caused hypoxic events which are likely to have caused significant quality declines as a result of mortality of *U. pusilla*.

Quality of the habitat is expected to increase as water quality continues to improve.

- Average current trend in quality
  EU 28: Stable
  EU 28+: Stable

Pressures and threats

Eutrophication as a result of nutrient enrichment (N, P and organic matter) is the most significant historic pressure on the habitat. Reduced light penetration due to eutrophication caused declines in extent and quality of the habitat. Since the 1990s this pressure has reduced due to tighter controls on pollution in the catchment of the Danube and other rivers which enter the north-west Black Sea. Whilst this pressure is now reduced it is still a continuing threat in the current and future periods. This is especially true for non EU countries surrounding the Black Sea which are not bound by the agreements such as the Water Framework Directive (WFD).

Direct destruction of burrows and siltation due to trawling is a current and future threat to the habitat. The resettling of suspended sediment can cause smothering. This inhibits the growth of habitat forming species. Siltation is typically caused by dredging, trawling and other activities which disturb bottom sediments .

Chemical pollution is a threat of current and future importance. These can lead to mortality of faunal species. If mortality rate is high this can lead to a reduction in extent. Lower mortality rates will result in a reduction in quality as the species density decreases. This may also affect the size and growth rate of individuals.

Disturbance from dredging and trawling is a threat of current and future importance. This causes habitat destruction and mass mortality of faunal species. This results in a reduction in extent.

List of pressures and threats

Biological resource use other than agriculture & forestry

Professional active fishing

Pollution

Nutrient enrichment (N, P, organic matter)
Input of contaminants (synthetic substances, non-synthetic substances, radionuclides) - diffuse sources, point sources, acute events

Natural System modifications

Human induced changes in hydraulic conditions
Removal of sediments (mud...)
Dredging/ Removal of limnic sediments
Siltation rate changes, dumping, depositing of dredged deposits

Conservation and management

Currently this habitat is contained within MPAs in Romania only. In EU states water quality is now being addressed by the Water Framework Directive (WFD). Future management should include the designation of additional MPAs, improvement of water quality management outside over the whole Black Sea basin, implement legislation to ban dredging and trawling.

List of conservation and management needs

Measures related to marine habitats

Other marine-related measures

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

Measures related to special resouce use

Regulating/Managing exploitation of natural resources on sea

Conservation status

Annex 1:

1160: MBLS U1

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

Recovery through intervention is not appropriate for this habitat. The habitat can recover quickly through natural processes providing the abiotic conditions are suitable.

Effort required

10 years
Naturally

Red List Assessment

Criterion A: Reduction in quantity

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

There is insufficient data to apply Criterion A. The habitat was first described in 2007.

Criterion B: Restricted geographic distribution

Criterion B	B1				B2				B3
	EOO	a	b	c	AOO	a	b	c	
EU 28	16835 Km^2	No	Yes	No	43	No	Yes	No	No
EU 28+	381135 Km^2	No	No	No	106	No	No	No	No

The AOO and EOO are intrinsically small for the EU states. There is no evidence of declines in in spatial extent, abiotic and biotic quality. The habitat was first described in 2007. Trawling is a threatening process likely to cause declines in the next 20 years. This is most severe in Bulgaria. Approximately 40% of the habitats EU distribution is in Bulgaria. The habitat exists at various locations, and there are no plausible human activities or stochastic events that may drive the habitat to be CR or Collapsed within a very short time period.

The threshold values for threatened categories are not met for the EU 28+.

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 %	unknown %	unknown %	unknown %	unknown %
EU 28+	unknown %	unknown %	unknown %	unknown %	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%

There is insufficient data to apply criteria C/D. The habitat was first described in 2007.

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.

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	DD	DD	DD	DD	EN	VU	DD	DD	DD	DD	DD	DD	DD	DD	DD	DD	DD
EU28+	DD	DD	DD	DD	LC	LC	DD	DD	DD	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
Endangered	B1b	Least Concern	-

Confidence in the assessment

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

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