A5.aa Pontic infralittoral sands and muddy sands with stable aggregations of perennial unattached macroalgae

Summary

The habitat is only present in territorial waters of Ukraine in sheltered areas in infralittoral sands and muddy sands. It is most easily identified and defined by the presence of unattached forms of macroalgae, in particular the ball-like form of the red alga *Phyllophora crispa* var. *sphaerica*. From the 1970s, the most significant pressure was eutrophication which probably caused the greatest reductions in quantity and quality. After peaking in the 1980s, eutrophication has since reduced due to tighter controls on pollution in the catchment of the Danube and other rivers which enter the north-west Black Sea as well as industrial decline after the dissolution of the Soviet Union. Historically the habitat also experienced pressure from harvesting *Phylophorra crispa* for agar, which was prohibited in 1996. Currently the harvesting of the *Phylophorra crispa* is prohibtied throughout the Black Sea.

Synthesis

The habitat is not present in the EU. Therefore it has been classified as ‘Not Assessed’ for this region.

In the EU28+ the habitat has been assessed as Endangered under Criteria B1c and B2c due to its restricted distribution along the Ukrainian coast. Despite its restricted distribution the quality and quantity of this habitat has remained relatively stable over the last 50 years, and is expected to remain stable or increase in the near future.

Overall Category & Criteria			
EU 28		EU 28+	
Red List Category	Red List Criteria	Red List Category	Red List Criteria
N/A	-	Endangered	B1c, B2c

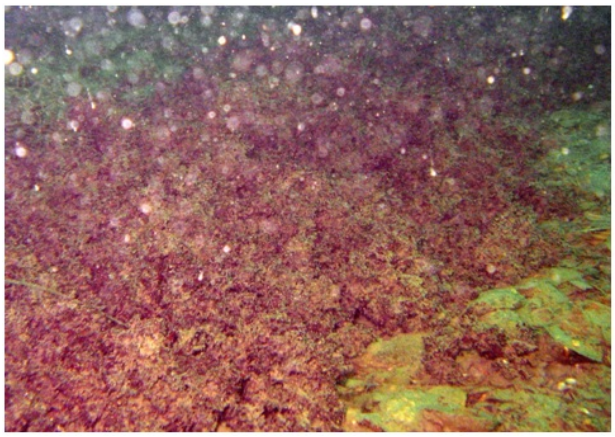
Sub-habitat types that may require further examination

None

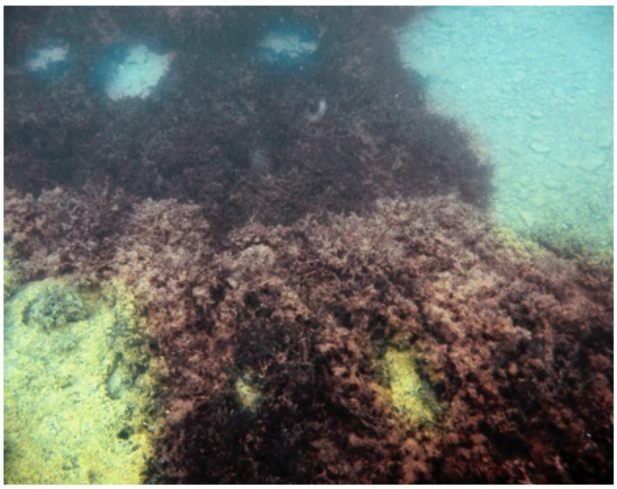
Habitat Type

Code and name

A5.aa Pontic infralittoral sands and muddy sands with stable aggregations of perennial unattached macroalgae



Small Phyllophora Field in Karkinitsky Gulf (2011). (© T. Hetman)



Unattached Phyllophora aggregation near Cape Evpatoriysky (2013) (© T. Hetman)

Habitat description

This habitat occurs in infralittoral sands and muddy sands. It is most easily identified and defined by the presence of unattached forms of macroalgae, in particular the ball-like form of the red alga *Phyllophora crispa* var. *sphaerica*. The classic example of this habitat is the Small Phyllophora field (SPF) National Botanical Reserve, which lies in shallow water (less than 16 m) on sand with shells in Karkinitsky Bay, Ukraine and occupies some 300-400 km2. Smaller *Phyllophora* aggregations occur in shallow water (mostly 3-5 m) in Yagorlytsky, Dzharylgachsky, Tendrovsky and Yarylgachsky Bays, and near Cape Evpatoriysky. Between 1938 and 1994, a shift in communities was observed in the SPF: the *Phyllophora* – oyster *Ostrea edulis* community was replaced by *Mytilus galloprovincialis – Phyllophora*, and the dominant species changed. From the 1970s, the most significant pressure was eutrophication which probably caused the greatest reductions in quantity and quality. After peaking in the 1980s, eutrophication has since reduced due to tighter controls on pollution in the catchment of the Danube and other rivers which enter the north-west Black Sea as well as industrial decline after the dissolution of the Soviet Union.

Indicators of quality:

Several elements of the “quality” of *Phyllophora* beds have been studied, including time series data comparing 3 patches of the SPF with regard to depth of occurrence, thickness of seaweed layers, biomass, and area covered, as well as the species composition of the benthic community.

Characteristic species:

Macrophyte species diversity is not high, comprising about 20 species, chiefly *Zostera noltii* and *P. crispa.* The *Phyllophora* beds support a specialized fauna of more than 110 species of invertebrates and 47 species of fish that use the alga for breeding, food and shelter (many even having a reddish colouration). The main groups of macrozoobenthos recorded from the SPF in 2000 in terms of number of species, abundance and biomass were molluscs, polychaetes and crustaceans, with the most common species (with occurrence >60%) being: *Mytilaster linneatus, Bittium reticulatum, Harmothoe reticulata, Nereis zonata,* and *Synisoma capito*.

Classification

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

EUNIS (v1405):

Level 4. A sub-habitat of 'Shallow infralittoral sand' (A5.2).

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 coarse sediment

EUSeaMap:

Shallow coarse or mixed sediments

IUCN:

9.4 Subtidal sandy

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

Regions
Black

Justification
The habitat only occurs in a few locations in the Black Sea. It fulfils an important ecological role. In terms of biomass, primary production and species associations it is one of the most ecologically rich habitats in the Black Sea. Additionally, the spherical unattatched *Phyllophora crispa* is unique to this habitat.

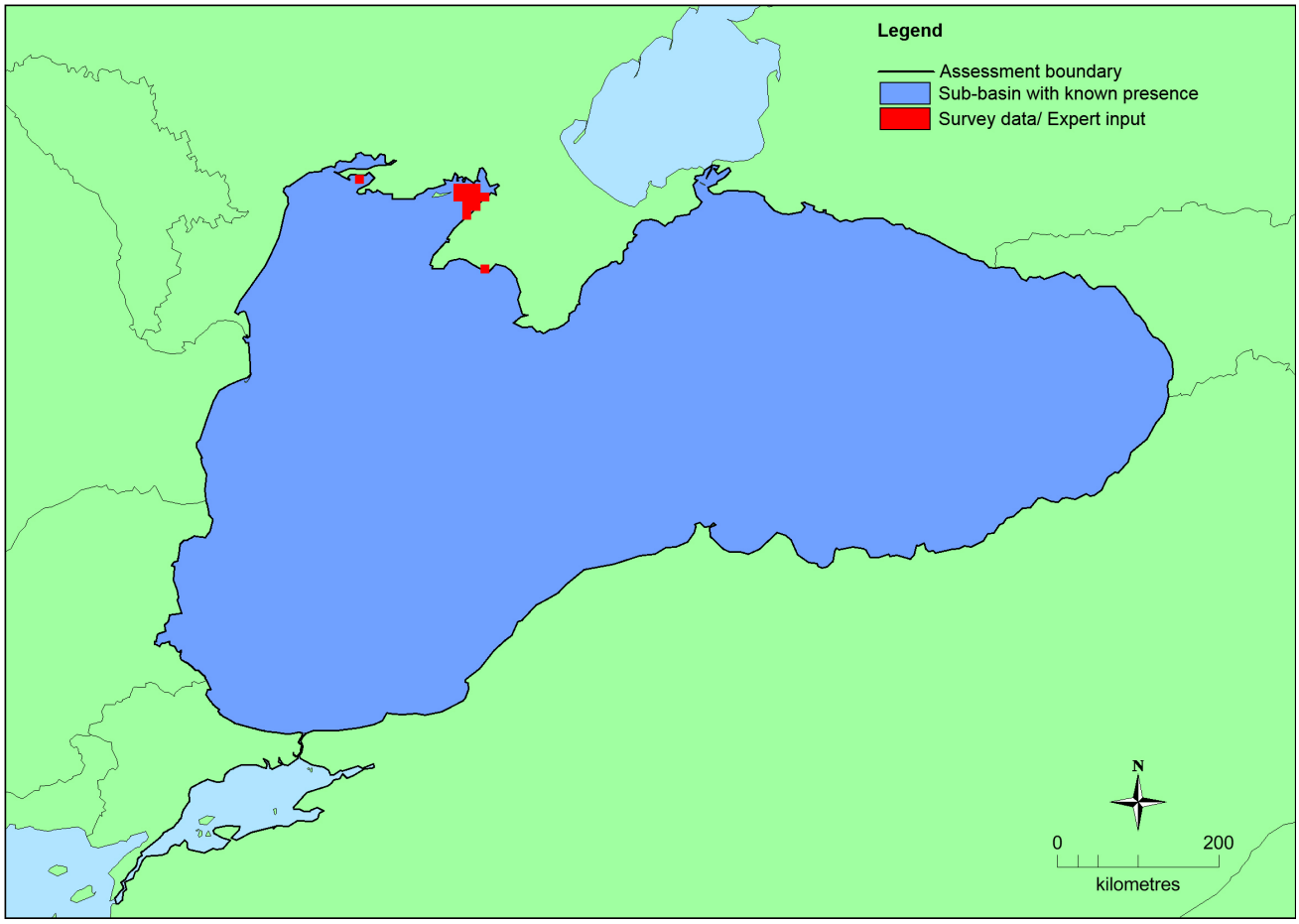
Geographic occurrence and trends

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	~400 Km^2	Stable	Stable

Extent of Occurrence, Area of Occupancy and habitat area

	Extent of Occurrence (EOO)	Area of Occupancy (AOO)	Current estimated Total Area	Comment
EU 28	0 Km^2	0	0 Km^2	This habitat is only present along the coast of Ukraine therefore it does not occur in the EU 28
EU 28+	8,674 Km^2	12	~400 Km^2	The current area of the habitat is approximately 400km^2. Due to fragmentation and difficulties in accurately estimating all patches this figure should be treated with caution.

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?

0%. The habitat is only present in the territorial waters of Ukraine and Crimea

Trends in quantity

In the historic period the habitat quantity is believed to have been stable based on expert opinion of the pressures and threats present during this period. No quantitative data are available to support this opinion. The largest area of the habitat is in Karkinitsky Bay, where it is commonly known as the Small *Phyllophora* Field (SPF) and is considered to have existed since at least 1908.

The most detailed quantitative data on habitat extent in the recent past (1965 to present day) deals specifically with the SPF. In 1965 it consisted of three distinct patches: (a) the inner bay east of Bakalsky bank (total area 165km^2); (b) beside and west of Bakalsky spit (approximately 99 km^2); and (c) to the north of Kamenniy Cape. Surveys conducted in 1986 recorded a decrease in extent. In Patch B the area had decreased by approx. 65%. In Patch C only small and fragmented aggregations were found. By 1994 *Phyllophora* was only present in Patch A .

In 2008 the SPF consisted of two distinct areas: a small area west of Bakalsky spit and a larger area east of Bakalsky spit, equating equate to Patches B and C of 1965.. In 2008, the total area of the SPF was estimated at about 350 km^2, comparable to the area in the 1970s before the eutrophication period.

Other areas where the habitat is known to occur are: Cape Evpatoriysky, Yarylgachskaya Bay, Yagorlitsky Bay, Tendrovsky Bay and Dzharylgachsky Bay.

An area covering 30 km^2 was first discovered at Evpatoriysky Cape in 1965. The current area is unknown

but algal communities in the area are generally in good condition. This is a potential proxy indicator for the condition of this habitat. An area covering 28 km^2 was also discovered at Yarylgachskaya Bay in 1965. In 2008 *Phyllophora* was only found at 2 out of 11 stations surveyed, with a total area estimated at 5 – 6 km^2.

No area estimates are available for Yagorlitsky Bay, Tendrovsky Bay or Dzharylgachsky Bay. However the habitat is no longer known to occur at Tendrovsky Bay or Dzharylgachsky Bay. In the future the habitat is expected to continue showing signs of recovery providing the current conditions remain stable.

- Average current trend in quantity (extent)
  EU 28: -
  EU 28+: Stable
- Does the habitat type have a small natural range following regression?
  Yes
  Justification
  The EOO is <50,000 km^2. The habitat has undergone an important decline in the last 50 years (particularly between 1965 and 1986). However, since 1986 a recovery has occurred in the largest locality (the SPF) and its extent is now believed to be equal to pre-1970s levels. In other localities (e.g. Tendrovsky Bay and Dzharylgachsky Bay) the habitat declined within the last 50 years and is no longer present.
- Does the habitat have a small natural range by reason of its intrinsically restricted area?
  Yes
  Justification
  The habitat can only occur in sheltered, low energy environments (e.g. bays). The key characteristic of the habitat is the unattached, spherical *Phyllophora crispa sphaerica*. High energy environments prevent aggregations of the species from forming.

Trends in quality

In the historic period (pre-1965) there are no quantitative data on habitat quality. However the quality is believed to have been stable, based on expert opinion of the known pressures and threats present during the period.

Quantitative data are available for quality trends in the recent past (1965 to present day) for the SPF and other localities. Between 1938 and 1994 a change in communities was observed in the SPF, where the *Phyllophora - Ostrea edulis* community was replaced by *Mytilus galloprovincialis – Phyllophora*. *Pilumnus hirtellus* and *Upogebia pusilla* also became less common during this period.

Changes in *Phyllophora* biomass have also been observed in the SPF. A significant decrease occurred between 1964 and 1986. In 1964 its biomass varied mostly from 85 to 5,000 g/m^2 and reached a maximum of 14,000 g/m^2. In 1977 it had decreased on average by half to a range of 21 to 3,596 g/m^2 and in 1986 to a range of 14 to 1,984 g/m^2. The most significant measured decline occurred at Kamenniy Cape (Patch C) where the biomass dropped from 4,200 to 25 g/m^2. The decline in Patch B was comparable, dropping from 2,000g/m^2 in 1977 to 108 g/m^2 in 1986. However, in Patch A a different pattern took place: in 1965 the biomass was estimated at 326,500 tons; in 1994 the estimate was a similar 329,000 tons; but by 2008 the total biomass had grown to about 750,000 tons (around 2.1 kg/m^2), indicating there had been significant recovery since the1980s.

At Cape Evpatoriysky the *Phyllophora* biomass recorded in 1964 was 2,500 g/m^2; in 2013 it was 3,800-6,800 g/m^2. No data are available for the intervening years but it appears there has been an increase in quality.

At Yarylgachskaya Bay the *Phyllophora* biomass was recorded at 2,000 g/m^2 in 1964. In 1986, two stations recorded *Phyllophora* biomass as 108 g/m^2, while 9 other stations recorded no biomass. However, in 2008 a positive trend in species composition was observed indicating a possible recovery of the

Phyllophora community.

At Yagorlitsky Bay in the 1960s – 70s the *Phyllophora* cover and biomass was noted to be increasing, the latter reaching a maximum of 115,000 tons. However, in the 1980s a deterioration in the condition of the algal communities was recorded. No data are available after 1995.

In the future period the habitat quality is expected to remain stable providing the current environmental conditions are maintained.

- Average current trend in quality
  EU 28: -
  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 remains a threat in the current and future periods, especially along coastal parts of non-EU countries which are not bound by legislation such as the Water Framework Directive or Marine Strategy Framework Directive.

Trawling is a current and future threat to the habitat. This causes habitat destruction by scraping away the benthic communities. The activity is at present unregulated in Ukraine.

Disturbance from gas exploration activities and offshore wind farm installations are a future threat to this habitat.

Siltation 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 disturbed bottom sediments.

Historically *Phyllophora crispa* was harvested for agar, which contributed to the declines in the past 50 years. However, extraction has been prohibited since 1996.

List of pressures and threats

Mining, extraction of materials and energy production

Exploration and extraction of oil or gas

Biological resource use other than agriculture & forestry

Fishing and harvesting aquatic resources
Professional active fishing
Hunting, fishing or collecting activities not referred to above

Pollution

Nutrient enrichment (N, P, organic matter)

Natural System modifications

Siltation rate changes, dumping, depositing of dredged deposits

Conservation and management

The SPF is listed a protected area Harvesting *Phyllophora crispa* is prohibited *Phylophorra crispa* is listed in

the Ukraine and Black Sea Red Data Books.

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 special resouce use

Regulating/Managing exploitation of natural resources on sea

Conservation status

Annex 1:

1110: MBLS U1

1170: MBLS U1

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

The habitat cannot recover through intervention. It can recover naturally providing pressures are relieved. The amount of time required depends on the availability of source populations. If the habitat has declined in extent but is still present at a locality then it can recover within decades. If it has collapsed and is no longer present at a locality the recovery may take longer. If source populations are not available recovery may not be possible.

Effort required

20 years
Naturally

Red List Assessment

Criterion A: Reduction in quantity

Criterion A	A1	A2a	A2b	A3
EU 28	n/a %	n/a %	n/a %	n/a %
EU 28+	unknown %	unknown %	unknown %	unknown %

There is insufficient data on changes in quantity of this habitat to undertake an assessment using criterion A.

Criterion B: Restricted geographic distribution

Criterion B	B1				B2				B3
	EOO	a	b	c	AOO	a	b	c	
EU 28	n/a Km^2	-	-	n/a	n/a	-	-	n/a	n/a
EU 28+	8,674 Km^2	Unknown	Unknown	Yes	12	Unknown	Unknown	Yes	unknown

This habitat is only known to occur at very few locations along the coast of Ukraine and Crimea. Therefore due to this habitats restricted AOO and EOO this habitat has been assesed as Endangered using criteria B1c and B2c.

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	n/a %	n/a %	n/a %	n/a %	n/a %	n/a %
EU 28+	>80 %	Slight %	unknown %	unknown %	unknown %	unknown %

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

As there has been a slight decline over alarge extent of the quality of this habtiat, it has been assessed as Vulnerable using criteria C/D1.

Criterion E: Quantitative analysis to evaluate risk of habitat collapse

Criterion E	Probability of collapse
EU 28	n/a
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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EU28+	DD	DD	DD	DD	EN	EN	DD	VU	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
N/A	-	Endangered	B1c, B2c

Confidence in the assessment

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

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