

## A5.xx Pontic circalittoral biogenic detritic bottoms with dead or alive mussel beds, shell deposits, with encrusting corallines (*Phymatolithon*, *Lithothamnion*) and attached foliose sciaphilic macroalgae

### Summary

The habitat is present at one location in the north-west Black Sea. It is not present in the Sea of Marmara. Its locality is linked to specific bathymetric and oceanographic conditions. There are quantitative data available regarding habitat extent in the historic and current periods that cover all localities of the habitat. Historically the most significant pressure was eutrophication. Historically the habitat also experienced pressure from harvesting *Phyllophora crispa* for agar (prohibited since 1996). Current pressures on the habitat are disturbance (causing habitat destruction) and siltation.

### Synthesis

In the EU28 the habitat type is assessed as Critical under criteria A1, B1b, B1c and C/D1. For criteria A1 there has been a reduction in extent >80% in the past 50 years. It was previously present over a considerably larger area in Romania. This is based on quantitative data. For criterion B1b, the EOO is 698km<sup>2</sup>. This is based on quantitative data. Gas extraction is likely to cause further declines in the next 20 years. For Criterion B1c the EOO is 698km<sup>2</sup> and habitat exists at only location. This is considered as one location as a single threat may impact the whole location. For criterion C/D1 there has been a severe decline in quality affecting >80% in the past 50 years. This is based on knowledge of the habitats current fragmented state compared to the 1970s.

In the EU28+ the habitat type is assessed as Critical under C/D1. For Criteria C/D1 there has been a severe decline in quality affecting >80% in the past 50 years. This is reflected in reduction in *Phyllophora crispa* biomass. This is based on quantitative data.

Overall Category & Criteria			
EU 28		EU 28+	
Red List Category	Red List Criteria	Red List Category	Red List Criteria
Critically Endangered	A1, B1b, B1c, C/D1	Critically Endangered	C/D1

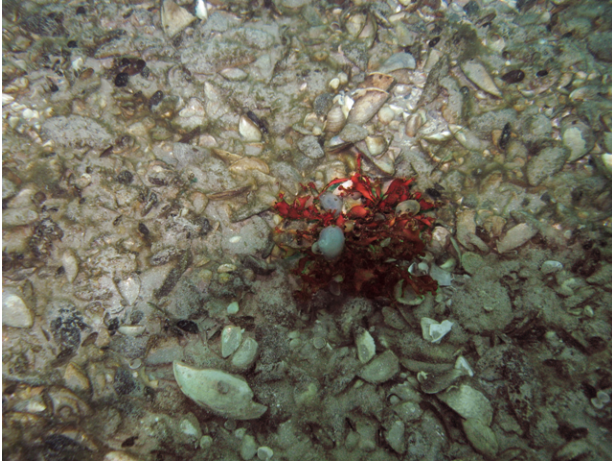
### Sub-habitat types that may require further examination

None

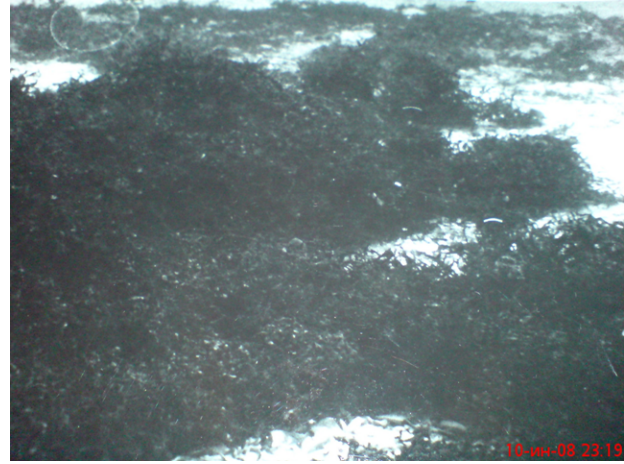
### Habitat Type

#### Code and name

A5.xx Pontic circalittoral biogenic detritic bottoms with dead or alive mussel beds, shell deposits, with encrusting corallines (*Phymatolithon*, *Lithothamnion*) and attached foliose sciaphilic macroalgae



*Coccotylus truncatus*, Zernov's Phyllophora Field, Ukraine. (© T. Hetman)



*Phyllophora* aggregations in 1970-80. Zernov's Phyllophora Field, Ukraine. (©)

## Habitat description

Zernov's *Phyllophora* Field is a bioengineered habitat type unique to the Black Sea, consisting of extensive stands of perennial red algae (genera *Phyllophora*, *Coccotylus*) developing on circalittoral hard substrata and a highly diverse associated fauna. Zernov's *Phyllophora* Field - located on the northwestern shelf of the Black Sea - comprises the world's most abundant stand of Phylloporaceae. They develop on mixed sediments (shelly mud to pure shell hash) covered by dead or alive crustose corallines *Lithothamnion crispatum*, *Lithothamnion propontidis*, *Lithophyllum cystoseirae*, occurring offshore at depths of 30-50m. The crustose corallines are the preferred substrate for attachment of a more or less dense cover of *Phyllophora crispera* and *Coccotylus truncatus*. *Phyllophora crispera* may form extensive canopies here, which harbour a characteristic and diverse fauna.

During the historical period 32 macroalgae species were recorded from the ZPF. The most abundant algae were *Phyllophora crispera* (syn. *P. nervosa*), *Coccotylus truncatus*, *Polysiphonia sanguinea*, *Feldmania irregularis*, *Desmarestia viridis*.

Indicators of quality:

Suitable biotic indicators of quality include:

- Abundance of *Phyllophora crispera*
- Abundance of *Mytilus galloprovincialis*
- Biomass of *Phyllophora crispera*.

Suitable abiotic indicators of quality include:

- Water transparency

Indicator thresholds for monitoring purposes have not been set. Biomass of *Phyllophora crispera* in 1978 was 4-17000 gm<sup>-2</sup>. The habitat was considered to be of good quality during this period. However, due to severe degradation in the subsequent years this can no longer be considered a realistic target.

Characteristic species:

The dominant species which engineer this habitat are all red algae:

- *Phyllophora crispera* and *Coccotylus truncatus*;
- *Lithothamnion crispatum*, *L. propontidis* and *Lithophyllum cystoseirae*

*Phyllophora* fields in the northwest Black Sea have associated specialized faunal communities including more than 110 species of invertebrates and 47 species of fish. The species composition of

the accompanying fauna is variable and depends on the density of the *Phyllophora* canopy.

-cnidarians: *Actinothoe clavata*

-sponges: *Haliclona gracilis*

-molluscs: *Lepidochitona cinerea*, *Abra alba*, *Calyptrea chinensis*, *Retusa truncatella*, *Monophorus perversus*, *Pitar rudis*, *Cerastoderma glaucum*, *Polititapes aureus*

-polychaetes: *Harmothoe reticulata*, *Syllis elegans*, *Spirobranchus triqueter*.

-amphipods: *Gammarus aequicauda*, *Apherusa bispinosa*, *Melita palmata*

-isopods: *Stenosoma capito*

-decapods: *Liocarcinus navigator*, *Crangon crangon*

-tunicates: *Asciadiella aspersa*, *Ciona intestinalis*

-elasmobranchs: *Raja clavata*, *Squalus acanthias*

-fish: *Acipenser gueldenstaedti*, *A. stellatus*, *Huso huso*, *Chelindonichthys lucernus*, *Lepadogaster gouani*, *L. microcephalus*, *Ctenolabrus rupestris*, *Psetta maeotica*.

### **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. A5.6 Circalittoral biogenic habitat.

Annex 1:

1170 Reefs

MAES:

Marine - Shelf

MSFD:

Shelf sublittoral rock and biogenic reef

EUSeaMap:

Shelf rock or biogenic reefs

IUCN:

Not mapped

**Does the habitat type present an outstanding example of typical characteristics of one**

## or more biogeographic regions?

Yes

Regions

Black

Justification

Yes. The habitat only occurs in one location in the Black Sea. It fulfils an important ecological role in the Black Sea. In terms of biomass, primary production, species associations it is one of the most ecologically rich habitats in the Black Sea.

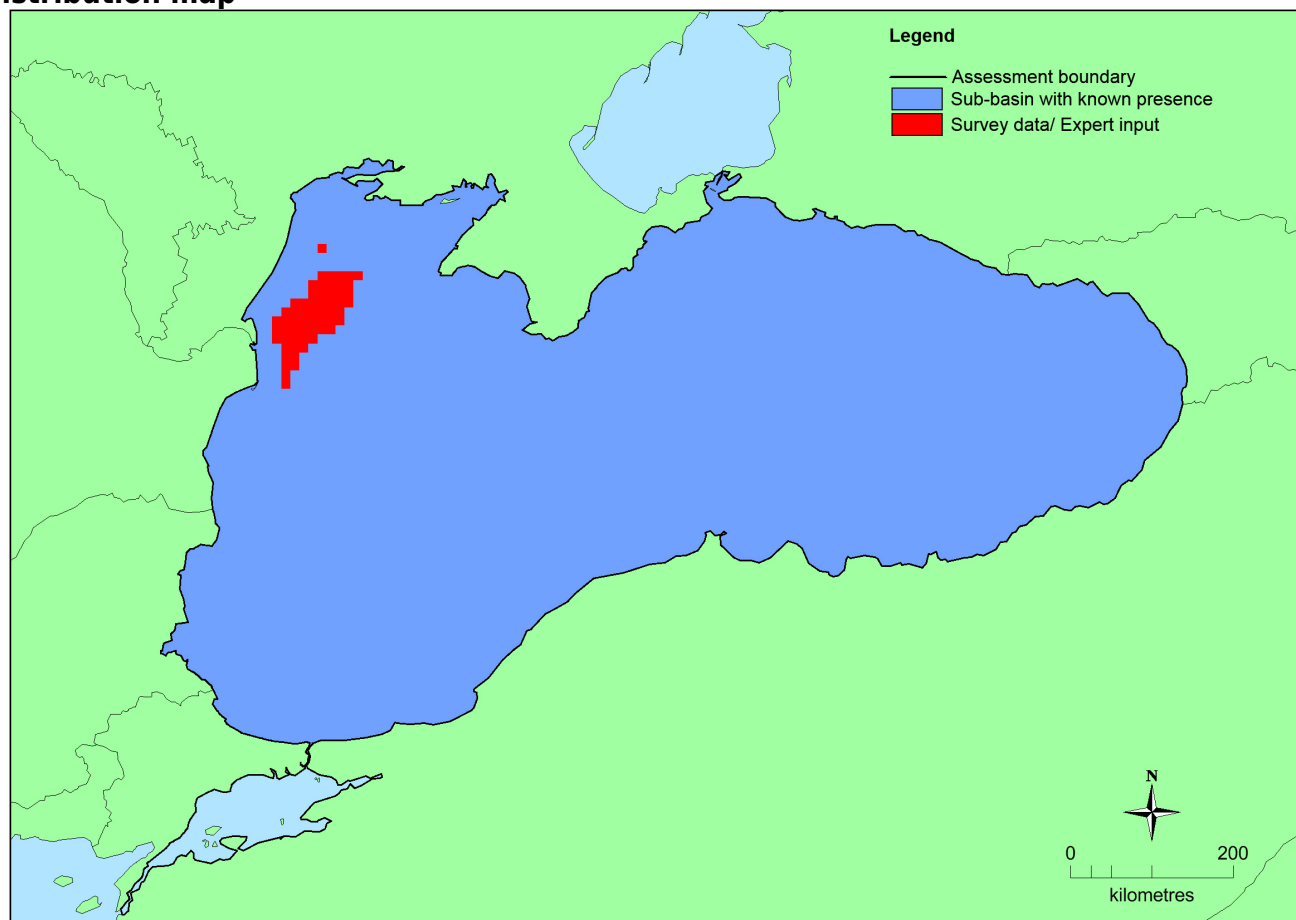
## Geographic occurrence and trends

Region	Present or Presence Uncertain	Current area of habitat	Recent trend in quantity (last 50 yrs)	Recent trend in quality (last 50 yrs)
<i>Black Sea</i>	Black Sea: Present	Unknown Km <sup>2</sup>	Decreasing	Decreasing

## Extent of Occurrence, Area of Occupancy and habitat area

	Extent of Occurrence (EOO)	Area of Occupancy (AOO)	Current estimated Total Area	Comment
<i>EU 28</i>	698 Km <sup>2</sup>	6	Unknown Km <sup>2</sup>	EOO and AOO have been calculated on the available data.
<i>EU 28+</i>	9178 Km <sup>2</sup>	59	5300 Km <sup>2</sup>	This figure is for Ukraine only. It is not possible to estimate the area in Romania due to habitat fragmentation.

## 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 10% of this habitat is estimated to be hosted by the EU28 in the Black Sea.

## Trends in quantity

The habitat was first described by Zernov in 1908. In its pristine state (1950s-1960s) Zernov's *Phyllophora* Field used to have a southern lobe extending into the Romanian Black Sea. The habitat quantity is believed to have remained stable until the 1970s. Quantitative figures estimate the habitat extent to range 10-15,000 km<sup>2</sup> during this time.

During the 1970s and 1980s the Northwestern Black Sea was heavily impacted by eutrophication and this resulted in the reduction of Zernov's *Phyllophora* Field by several orders of magnitude, only a small nucleus surviving on the Ukrainian shelf. Due to fragmentation it is difficult to provide an absolute extent figure. However, by 1977 the extent was estimated as 7,250 km<sup>2</sup>. Between 1969 and 1981 some experts state that the habitat extent declined by 50%. During this time the habitat came close to collapsing in Romania.

In 1992 the extent was thought to be approximately 5,300 km<sup>2</sup>. The current extent is now thought to be stable.

In the future the habitat quantity is expected to recover slowly providing the current environmental conditions remain stable. However, this is likely to be a degraded variation (see Trends in Quality).

- 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. The habitat has undergone an important decline in the last 50 years (see Trends in Quantity). However, this decline has now halted and the extent of the habitat is now stable.

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

Yes

*Justification*

It is only present on the north-west shelf of the Black Sea. Its locality is linked to specific bathymetry and oceanographic conditions. Mixed sediments (shell and mud to pure shell hash) covered by dead or alive crustose corallines are present in this area provide the ideal substrate for *Phyllophora crispa*. The area is also a flat, deep, clear low energy environment. There is also a delicate nutrient balance which provides suitable conditions for the habitat to form.

## Trends in quality

In the historic period (pre-1965) it is believed that additional *Phyllophora* species were present in the area. In 1908-1969 *Phyllophora* stocks were about 10 million tons (in 1969, 9.04 million tons). In 1977 stocks decreased four-fold, to 2.5 million tons. Between 1977 and 1992 *Phyllophora crispa* stocks declined from 2.5 million tons to 0.3 million tons.

In the current period (1965 to present day) there has been a severe decline in habitat quality, based on quantitative data.

The overall coverage of macroalgae on ZPF (including its largest part in Ukrainian waters) does not exceed 5%, key species *Phyllophora crispa* average biomass decreased by almost an order of magnitude, but *Coccotylus truncatus* biomass decreased only slightly. At present, layers of unattached *Phyllophora crispa* are no longer found. The biological factor that limits recovery of ZPF is the almost complete replacement of *Phyllophora crispa* (diploid sporophyte, 2n) by *Coccotylus truncatus* (haploid gametophyte, 1n) and the reduction of the most stable generation of its life cycle. At present, *Coccotylus truncatus* occurs in almost all parts of ZPF. The frequency of this species increased from 52 to 70%. The range of *C. truncatus* distribution shifted to the west and south-west of the former ZPF

The decline is also reflected in *Phyllophora crispa* biomass. From 1908 to 1978 biomass of *Phyllophora crispa* was about 10-17,000 g/m<sup>2</sup>. In 1978 the biomass was 4-17,000 g/m<sup>2</sup>. During 1982-1985 biomass decreased to 8.3-4,835 g/m<sup>2</sup>. During 1986-1991 it decreased again to 0.09-126.1 g/m<sup>2</sup>. In 2011 *Phyllophora crispa* biomass was recorded as 2.22 g/m<sup>2</sup>.

The diversity of the associated fauna and flora was also severely reduced (a 75% decrease in the species richness of macroalgae) The quality of the habitat is now believed to be stable. In the future the quality is expected to remain stable.

- Average current trend in quality

EU 28: Stable

EU 28+: Stable

## **Pressures and threats**

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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 dissolution of the Soviet Union and subsequent economic collapse, industrial effluent discharge into the sea all but ceased (but could resume in future). Also, a reduction of transboundary pollution resulted from implementation of the WFD and DRPC, and extension of EU membership to Central Europe, leading to a reduction in the pressures.

Bottom-trawling is a current and future threat to the habitat. This causes habitat destruction by scraping away the benthic communities. The activity is prohibited in Ukraine but not in Romania.

Disturbance from expanding gas exploration activities are a future threat to this habitat. Expert opinion states that this is a plausible threat in the next 20 years as Romania and Ukraine seek to become independent from Russian energy supplies.

Siltation is a current and future threat to the habitat. The resettling of suspended sediment can cause smothering which 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. This contributed to the declines in the past 50 years. 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**

Professional active fishing

#### **Pollution**

Nutrient enrichment (N, P, organic matter)

### Natural System modifications

Siltation rate changes, dumping, depositing of dredged deposits

## Conservation and management

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The habitat is currently protected by MPAs in Ukraine ("Zernov Phyllophora Field" botanical reserve). However, there is no management plan for the reserve. In EU states water quality is now being managed by the Water Framework Directive (WFD). Extraction of *Phylophorra crispa* has been prohibited since 1996. *Phylophorra crispa* is listed in the Ukraine and Black Sea Red Data Books. Future management should include the designation of additional MPAs for Romanian section, development and establishment of management plan for "Zernov Phyllophora Field" botanical reserve, improvement of water quality management outside EU member states.

### 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 hunting and taking

Regulation/Management of fishery in marine and brackish systems

#### Measures related to special resource use

Regulating/Managing exploitation of natural resources on sea

### Conservation status

Annex 1:

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. However, this will take several decades and a sufficient source population is required.

### Effort required

50+ years
Naturally

## Red List Assessment

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### Criterion A: Reduction in quantity

Criterion A	A1	A2a	A2b	A3
EU 28	>80 %	unknown %	unknown %	unknown %

Criterion A	A1	A2a	A2b	A3
EU 28+	47-65 %	unknown %	unknown %	unknown %

In the EU 28 there has been >80% reduction in habitat extent in the past 50 years. In the EU 28+ the extent has reduced by a minimum of 47% and maximum of 65% between 1970 and 1992.

### Criterion B: Restricted geographic distribution

Criterion B	B1				B2				B3
	EOO	a	b	c	AOO	a	b	c	
EU 28	698 Km <sup>2</sup>	No	Yes	Yes	6	No	Yes	Yes	No
EU 28+	9178 Km <sup>2</sup>	No	Yes	Yes	59	No	Yes	Yes	No

The AOO and EOO are intrinsically small for the EU states.

Declines in in spatial extent, abiotic and biotic quality have halted. There is a threatening process in the form of gas exploitation. This is likely to cause declines in the next 20 years. In the EU the habitat exists at one location.

In the EU28+ the EOO is 9178km<sup>2</sup>. Declines in in spatial extent, abiotic and biotic quality have halted. There is a threatening process in the form of gas exploitation. This is likely to cause declines in the next 20 years. In the EU28+ the habitat exists at one location.

### 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	%	Severe %	unknown %	unknown %	unknown %	unknown %
EU 28+	>80 %	Severe %	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%

In both the EU 28 and EU28+ a severe decline has been experienced over >80% of the locality. This is reflected in a severe reduction in the biomass of *Phylophorra crispa*.

### 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	CR	DD	DD	DD	CR	EN	DD	CR	DD	DD	DD	DD	DD	DD	DD	DD	DD
EU28+	EN	DD	DD	DD	EN	NT	DD	CR	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
Critically Endangered	A1, B1b, B1c, C/D1	Critically Endangered	C/D1

### Confidence in the assessment

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

### Assessors

S. Beal, D. Micu, N. Milchakova, B. Yokes

### Contributors

D. Micu, S. Beal, V.V. Alexandrov, E.B. Chernysheva, N. A. Milchakova, N. V. Mironova

### Reviewers

P. Goriup

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### Date of review

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