A5.61a Biogenic reefs of *Ficopomatus enigmaticus* on sheltered upper infralittoral rock

Summary

The habitat is present throughout the Black Sea in sheltered waters, with low energy and preferably variable salinity. It is found mainly in harbours, marinas, inlets and lagoons. It is not present in the Sea of Marmara. First records of the habitat are present for all Black Sea countries. All first records occurred during the historic period (pre 1965). Quantitative data for current distribution is available for all countries except Turkey. There are no current records of this habitat from Turkey, but the species has been recorded in 1954. This may be due data gaps. The dates of first records and current distribution data show a clear expansion of this bioengineering species in the Black Sea during the historic period.

Synthesis

In the EU 28 the habitat type is assessed as Least Concern under Criterion A1, A2a, A2b, A3, B and C/D1. For criteria A1, A2a, A2b and A3 the habitat has expanded its range. This is based in quantitative data. For criteria B the EOO and AOO meet threatened threshold criteria but there are no continuing declines or threatening processes. For criteria C/D1 there has not been a fairly substantial reduction in quality. This is based on expert opinion.

In the EU 28+ the habitat type is assessed as Least Concern under Criterion A1, A2a, A2b, A3, B and C/D1. For criteria A1, A2a, A2b and A3 the habitat has expanded its range. This is based in quantitative data. For criteria B the EOO and AOO do not meet threatened threshold. For criteria C/D1 there has not been a fairly substantial reduction in quality. This is based on expert opinion.

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

Sub-habitat types that may require further examination

None

Habitat Type

Code and name

A5.61a Biogenic reefs of *Ficopomatus enigmaticus* on sheltered upper infralittoral rock

Ficopomatus reef fragment on deck, Mangalia Romania (© Dragos Micu)

Detail of *Ficopomatus* reef, Agigea Romania (© Dragos Micu)

Habitat description

This habitat is present in sheltered waters, but with a low current, preferably with variable salinity. Found mainly inside harbours, marinas, inlets and lagoons. Hard substratum – natural or artificial. In the presence of suitable habitat *Ficopomatus enigmaticus* may occupy the entire hard substratum with a mass of erect, contiguous and intertwined calcareous tubes (up to 20 cm long) cemented together. Successive generations of worms may raise the thickness of this biogenic reef up to 50 cm. The reef is made of myriad calcareous tubes cemented together. The habitat is somewhat similar to the biogenic reefs built by *Serpula vermicularis* on the Atlantic coasts of Europe. The fauna is extremely diverse, contrasting with the surrounding sedimentary areas. Crabs, blennies, gobies and scorpionfishes increase the complexity of this habitat digging galleries, rooms and embedded channels in the porous material of the reef. Conservation value: High. This is a highly original habitat occurring only locally and with a high biodiversity. A single reef can shelter 50 macrozoobenthic species. The reef has an important ecological functional role, providing diverse microhabitats and food for other species. Also, due to high density (up to 245.250 ind m-2) of the tube- worm and the large surface it covers, it has a large biofiltering capacity and is locally important in nutrient cycling. The *Ficopomatus* reefs are capable of significantly improving the quality of the surrounding waters.

Indicators of quality: Suitable biotic indicators of quality include:

- Thickness of reef (approx. 50cm)

- Age (min 3 years for stability)

- Biomass of *F. engimaticus* (200g/m2 dry weight)

- Spatial structure (complex with faunal burrows)

- Species composition (with many associated fish and crustaceans) Characteristic species:

Ficopomatus enigmaticus. The associated fauna is extremely diverse, contrasting with the surrounding sedimentary areas. A single reef can shelter over 50 macrozoobenthic species: shrimps *Palaemon elegans, P. adspersus, P. macrodactylus, Athanas nitescens,* crabs *Dyspanopeus sayi, Rhitropanopeus harrisii, Pilumnus hirtelus, Xantho poressa, Pachygrapsus marmoratus;* endemic amphipods *Chaetogammarus placidus, Dikerogammarus villosus, D. haemobaphes, Pontogammarus crassus*, isopods, polychaetes, hydrozoans, ascidians. *Ulva rigida* and *Ulva intestinalis* may grow sparsely on the reef.

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

EUNIS:

Level 5. A sub-habitat of 'Polychaete worm reefs in the Pontic infralittoral zone' (A5.61).

Annex 1:

1170 Reefs

MAES:

Marine - Marine inlets and transitional waters

Marine - Coastal.

MSFD:

Sublittoral rock and biogenic reef

EUSeaMap:

Shallow photic rock or biogenic reef

IUCN:

9.2 Subtidal rock and rocky reefs

Does the habitat type present an outstanding example of typical characteristics of one or more biogeographic regions?
No

<u>Justification</u>
The species is widespread globally. It is classified as an alien species although the country of origin is unknown.

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	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	21,223 Km^2	25	Unknown Km^2	
EU 28+	405,370 Km^2	57	Unknown Km^2	

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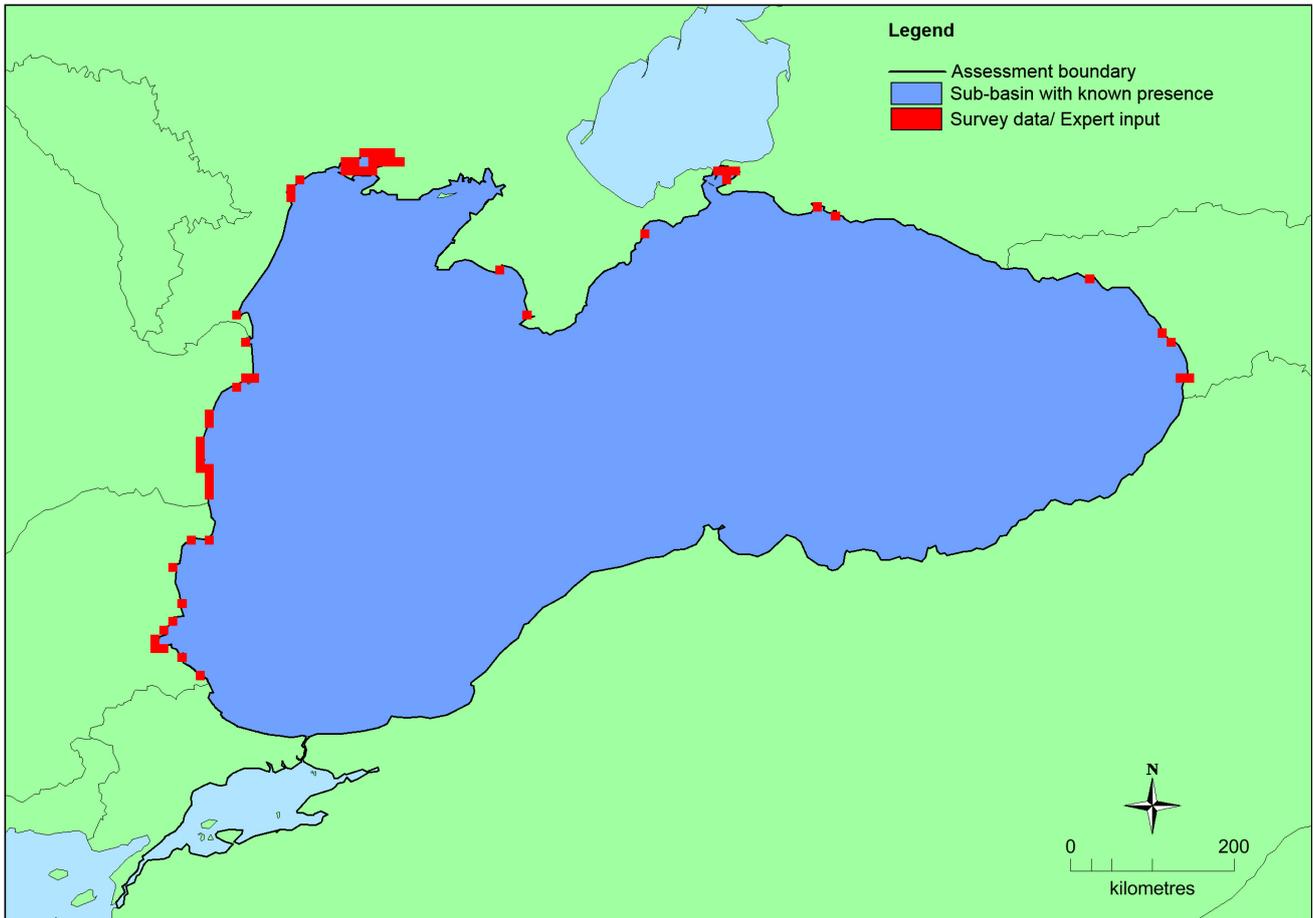
This map has been generated based on expert opinion. The map has been used to calculate AOO and EOO. The map should be treated with caution as it does not necessarily reflect the full distribution of the habitat.

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

Around 44% of this habitat is estimated to be hosted by EU 28 in the Black Sea.

Trends in quantity

In the historic period (pre 1965) the habitat quantity increased in the Black Sea. It was first Black Sea record was in Georgia in 1929. Future records were made in Turkey (1952), Romania (1960s) and Bulgaria (1968). During this period it was also recorded in Odessa Harbour (Ukraine) and Gelendzik Bay (Russia).

In the current period (1965 to present day) the habitat quantity has remained stable. After the initial period of colonising sheltered, brackish situations it could not expand any further. The current distribution of the habitat is well understood in all countries except Turkey. During the eutrophication period (1970s –1990s) the habitat quantity remained stable due to its resilience to polluted waters. This is one of the features that has made it such a successful international coloniser.

The habitat quantity is expected to remain stable in the future.

- Average current trend in quantity (extent)
  EU 28: Stable
  EU 28+: Stable
- Does the habitat type have a small natural range following regression?
  No
  Justification
  The habitat does not have a small natural range following regression. It has not undergone an important decline in the last 50 years.

- Does the habitat have a small natural range by reason of its intrinsically restricted area?
  No
  Justification
  The habitat only forms in sheltered, brackish water situations (i.e. harbours, lagoons, estuaries, etc). These are present throughout the Black Sea.

Trends in quality

In the historic period (1965 to present day) the habitat quality is believed to be stable. Quantitative data from Kirch Bay (Crimea) during this time reported a maximum biomass of 10 kg/m2.

In the current period (1965 to present day) the habitat quality declined due to eutrophication. During the period up to the 1990s widespread and severe eutrophication occurred in Black Sea. This was mostnotable in the western Black Sea. The *F. enigmaticus* reefs have a high degree of resilience to pollution conditions. Therefore they retained their size and structure. However, fauna associated with the reefs declined during this period. This is mostly based in expert judgement of the conditions and the likely response of associated fauna to the conditions during this time. However, studies in Romania (1973) and Bulgaria (1972) support this judgement. Since the late 1990s/2000 signs of recovery in associated fauna have been observed.

In the future the habitat quality is expected to increase and stabilise as faunal associates continue to recover.

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

Pressures and threats

Chemical pollution is a threat of current and future importance. These can lead to mortality of *F. enigmaticus* and associated 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.

Siltation is a current and future threat to the habitat. The resettling of suspended sediment can cause smothering. This inhibits the growth of *F. enigmaticus*. Siltation is typically caused by dredging, trawling and other activities which disturbed bottom sediments.

List of pressures and threats

Pollution

Input of contaminants (synthetic substances, non-synthetic substances, radionuclides) - diffuse sources, point sources, acute events

Natural System modifications

Siltation rate changes, dumping, depositing of dredged deposits

Conservation and management

Currently this habitat is protected in MPAs in Bulgaria, however it is not protected anywhere else. Into the future this habitat should be included in protected areas, but only for lagoons and estuaries (not harbours). The legal protection of the species is also desired. Future management should include the designation of additional MPAs. This should be done where the habitat occurs in lagoons and estuaries, improvement of water quality management outside EU member states, and enhanced legal protection for occurrences of

the habitat and key species (e.g. additions to the EU Habitats Directive).

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

Conservation status

Annex 1:

1170: MBLS U1

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

It is not known if recovery can be achieved by intervention. However, translocation may be possible. Based on knowledge of the *F. enigmaticus* global expansion this is likely to be effective. The habitat can recover from destruction naturally providing there is a source population.

Effort required

10 years
Unknown

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 %

In EU and EU 28+ states the habitat has increased in quantity since the historic period.

Criterion B: Restricted geographic distribution

Criterion B	B1				B2				B3
	EOO	a	b	c	AOO	a	b	c	
EU 28	21223 Km^2	No	No	No	25	No	No	No	No
EU 28+	405370 Km^2	No	No	No	57	No	No	No	No

The AOO and EOO are intrinsically small for the EU states. There have been no declines in in spatial extent, abiotic and biotic quality. There are no threatening processes likely to cause declines in the next 20 years. 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%

In the EU states there has been a fairly substantial reduction in quality. This has occurred within the last 50 years. This has affected both biotic and abiotic factors. It is not possible to decouple these. This is mostly based on expert opinion. The decline in quality has affected associated species only. The reefs and their ecological functionality have remained stable.

In the EU 28+ the decline has been < fairly substantial reduction in quality. This has occurred within the last 50 years. This has affected both biotic and abiotic factors. It is not possible to decouple these. This is mostly based on expert opinion. The decline in quality has affected associated species only. The reefs and their ecological functionality have remained stable.

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	LC	LC	LC	LC	VU	VU	DD	DD	DD	DD	DD	DD	DD	DD	DD	DD	DD
EU28+	LC	LC	LC	LC	LC	DD	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
Least Concern	-	Least Concern	-

Confidence in the assessment
High (mainly based on quantitative data sources and/or scientific literature)

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