



Oceana proposal for a Marine Protected Area Central part of the Bothnian Sea

INTRODUCTION

The Bothnian Sea is the southern part of the Gulf of Bothnia, and connects the northern most part of the Baltic Sea, the Bothnian Bay to the Baltic Proper. The Gulf of Bothnia, which covers an area of approximately 65,000 km², is shared between Sweden and Finland, ending in the waters of the Åland Islands in the south.

Salinity in the Gulf props from around 6 psu in the southern parts, to 5 psu in the north. The stratification is not as strong as in the Baltic Proper and the water masses get mixed during autumn and winter preventing the formation of oxygen poor bottoms. Also the nutrient load is smaller in the Bothnian Sea. The mean depth of the Bothnian Sea is 60 meters, and the basin freezes over annually during the winter months.

The coast is characterized by small archipelagos and rocky shores, at the sea bottom hard bottoms dominate, but there is also some soft sediment in deeper areas¹.

Oceana conducted nine underwater surveys, using an underwater robot (ROV) and scuba divers, in both offshore and coastal areas of the Central part of the Bothnian Sea in 2011.

DESCRIPTION

The fauna and flora in the Bothnian Sea are a mix of marine and fresh water species, the latter of which are more abundant towards the north. The preliminary results of the HELCOM Red list project show that the Bothnian Sea is a home to approximately 420 macroscopic (larger) species, which break down to 157 plants and algae species, 147 invertebrates, 73 types of fish, 42 bird species, and two types of seal².

Some marine creatures, like eel grass (*Zostera marina*), brown shrimp (*Crangon crangon*) and Baltic prawn (*Palaemon adspersus*) reach their limits of distribution in the Bothnian Sea. Blue mussels (*Mytilus* sp.) are scarcer in the northern Baltic Sea, and although bladder wrack (*Fucus vesiculosus*) is found all over, its size and relative importance diminishes in northern parts of the sea. Overall, the occurrence of bladder wrack is decreasing throughout the Baltic Sea, while fast-growing filamentous algae are increasing³. Recently, the presence of the *Fucus radicans* seaweed was reported in the Bothnian Sea⁴. Sandy and muddy seabeds host a number of vascular plants, such as freshwater pondweed (*Potamogeton* spp.).

The benthos of the Bothnian Sea is characterized by a limited number of species, the most common of which is a glacial relict, the Baltic isopod (*Saduria entomon*). Other common species include *Monoporeia affinis*, a small amphipod, and Baltic clam (*Macoma balthica*). These form the main food source for fish, including cod (*Gadus morhua*) and seals^{5,6}. The Bothnian Sea boasts many spawning and nursery areas⁷ for several species of fish, including herring, sprat, flounder, river lamprey and freshwater species, like grayling, vendace and whitefish. Salmon and sea trout used to be more plentiful in this sub-basin, but as is the case elsewhere else, they have declined severely in the last century because of the destruction of hatching rivers by dams and dredging. Many river stocks are now extinct and overfishing has continued to keep the rest down⁸.

Oceana findings from the southern part of the Bothnian Sea, which is also located closest to the coast, indicated more biodiversity compared to the northern, and offshore, sample sites.

Mytilus, or blue mussel beds, were recorded in several areas up to 30 meters deep, especially the southern Bothnian Sea. Beside the species commonly associated with these beds, such as bryozoans (*Electra crustulenta*) and barnacles (*Balanus improvisus*), fish species, including fourhorn sculpins (*Trigloporus quadricornis*), and shorthorn sculpins (*Myoxocephalus scorpius*), were also documented in the areas.

Near the coast of Örskar island, which is located in the most southern part of the Bothnian Sea, where the sandy seabed is scattered with stones at about 25 meters deep, several fish species were documented, including the common goby (*Pomatoschistus microps*) (see photo), sand goby (*Pomatoschistus minutus*), fifteen-spined stickleback (*Spinachia spinachia*), straight-nosed pipefish (*Nerophis ophidion*) and eelpout (*Zoarces viviparus*). Bladder wrack with attached colonies of the sessile bryozoan *Electra crustacea* was also documented, as well as other fauna and flora, including the water milfoil (*Myriophyllum* spp.).

Five surveys were done in the offshore area of the central part of the Bothnian Sea. All indicated the presence of the *Saduria entomon* isopod, which was recorded at depths ranging from seven meters in the Finngrundens offshore bank, to 75 meters deep, where it was the only visible species present. Other species in the offshore banks included Baltic clams (*Macoma balthica*), shorthorn sculpins (*Myoxocephalus scorpius*), and eelpouts (*Zoarces viviparus*) (see entire list in Table 1).

The Bothnian Sea also hosts two species of seals, the grey seal and the Baltic ringed seal. The former can be spotted forming a number of colonies in this sub-basin, while the solitary ringed seal is endangered. Many waterfowl also thrive in these waters, among which are various species of terns, gulls, ducks, divers and waders.

Despite the expedition data and previous studies, the underwater nature of the Bothnian Sea, especially in the offshore banks, is not very well known.



The common goby (*Pomatoschistus microps*) near Örskar, the Bothnian Sea, Sweden. © OCEANA/ Carlos Minguell

THE PROPOSAL

A number of sites in the Bothnian Sea have been designated as protected areas, mainly under the EU Natura 2000 network. There are also some nationally protected areas, like a large marine national park in Finnish waters and seal protection areas. Some of the offshore marine protected areas (MPA) in Swedish waters have also quite recently been protected. These include for instance important fish spawning areas in the *Vänta Litets Grund* and *Finngrund*.

However, the existing MPAs are small, poorly connected and inconsistent in the Bothnian Sea. Furthermore, as is often the case the management of the existing MPAs is poor, leaving some habitats and species unprotected. A larger coverage area would provide better protection for wider range of habitats and species in varying depths securing better maintenance of the entire ecosystem.

Oceana's proposal connects many of the smaller protected areas that host important ecological features (see the map above). These include, spawning areas for fish, areas with high topographic complexity, indicating the potential for high biodiversity,⁹ and offshore banks. Offshore areas identified as especially ecologically valuable, such as the *Eystrasaltsbanken* bank, which is also important to fisheries, should be designated as protected areas, for example in Natura 2000, and be provided with efficient management measures.

POSSIBLE THREATS AND MANAGEMENT PROPOSALS

Eutrophication is a major threat to the macroalgae in the Bothnian Sea, particularly to bladder wrack¹⁰. Other important threats include dredging, blasting, trawling, sand extraction, shipping traffic (which is intense and growing in the area) and oil and chemical spills.

Wind turbine development, if not managed properly, can also threaten the ecosystem in the Bothnian Sea. Currently, there are plans to develop wind power in *Finngrund*, Sweden, but no final decisions have been taken yet¹¹.

When developing management plans for areas, the seabed life should be secured as it provides an important food source for fish. Likewise, essential fish habitats, like spawning grounds, should be protected as they are not only very important for fish populations but also for the ecosystem at large. This is also needed to secure ecologically sustainable commercial fishing. Management actions should ensure preservation of viable herring stocks and other fish species having commercial value.

The management plans should also stress all negative effects to the ecosystem, including destruction of habitats, and the release of toxins and nutrients from seabed.

REFERENCES

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SPECIES LIST FOR CENTRAL PART OF THE BOTHNIAN SEA

Table 2: List of species at Central part of the Bothnian Sea in 2011 and their threat category.

Depth (m)	Species	Depth (m)	Species
75	CRUSTACEA <i>Saduria entomon</i>	27-40	RHODOPHYCEAE <i>Ceramium</i> sp. <i>Hildenbrandia rubra</i>
27-40	CNIDARIA <i>Campanulariidae</i> sp.		PHAEOPHYCEAE <i>Fucus vesiculosus</i>
	ANNELIDA <i>Procerodes littoralis</i>		ANGIOSPERMAE <i>Myriophyllum</i> spp.
	CRUSTACEA <i>Balanus improvisus</i> <i>Neomysis integer</i> <i>Saduria entomon</i>	7-18	CRUSTACEA <i>Balanus improvisus</i> <i>Gammarus</i> sp. <i>Saduria entomon</i>
	MOLLUSCA <i>Macoma balthica</i> <i>Mytilus edulis</i> <i>Mytilus</i> sp. <i>Radix peregra</i>		MOLLUSCA <i>Mytilus</i> sp. <i>Radix peregra</i>
	BRYOZOA <i>Electra crustulenta</i>		BRYOZOA <i>Electra crustulenta</i>
	FISH <i>Myoxocephalus scorpius</i> <i>Nerophis ophidion</i> <i>Pomatoschistus microps</i> <i>Pomatoschistus minutus</i> <i>Pomatoschistus</i> sp. <i>Spinachia spinachia</i> <i>Trigloporus quadricornis</i> <i>Zoarces viviparus</i>		FISH <i>Zoarces viviparus</i>

Table 2: List of communities in the Central part of the Bothnian Sea in 2011 and their threat category.

Habitats and communities	Red list category
<i>Mytilus</i> bed	
<i>Saduria</i> community	<i>Saduria entomon</i> is listed as threatened and/or declining in the Southern Baltic Proper (HELCOM 2007)
Pelagic, offshore (deep) waters	Listed as threatened by HELCOM (HELCOM 2007)
Reef	