

Quo vadis, Baltic Sea?

THE BALTIC SEA is not just water and some fish in it - it is a complex ecosystem consisting of different sea bottom and water column habitats and species living there. If we want to protect the fragile ecosystem of the Baltic Sea, which is the basis for our maritime economy, we need to assess and monitor the state of its health.

Flounder. Photo: Kaire Kaljurand, Estonian Marine Institute, University of Tartu



Blue mussel. Photo: Finnish Environment Institute

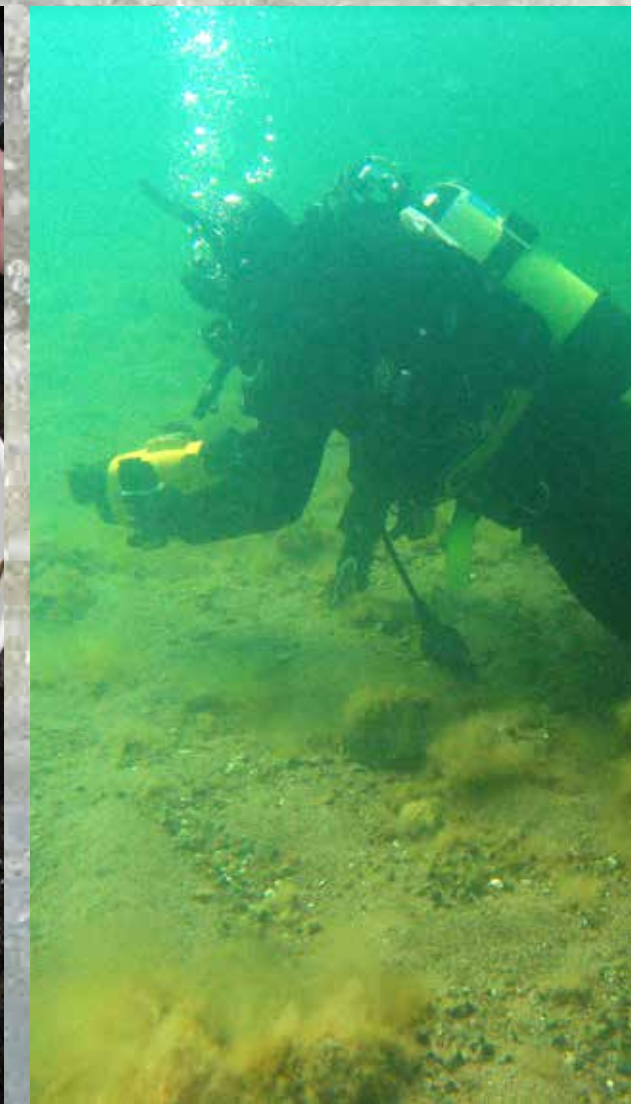


Long-tailed ducks. Photo: Ainārs Aunins, Latvian Fund for Nature

It is not possible to monitor each single component of the marine nature, therefore we need easily measurable **BIODIVERSITY INDICATORS** that give us information about the state and changes of the marine nature.



Sampling of juvenile fish. Photo: Kristina Jürgens, Estonian Marine Institute, University of Tartu



Diver filming the sea bottom. Photo: Estonian Marine Institute, University of Tartu



Sampling of fish larvae. Photo: Taina Pöntinen, Finnish Game and Fisheries Research Institute

Indicators reflecting the state of different biodiversity groups (e.g. birds, fish, the biota of the sea bottom and water column) are combined to get the overall **BIO-DIVERSITY ASSESSMENT**. The more complete set of indicators we have, the more reliable the assessment result will be.

This enables us to understand better if the health of the Baltic Sea is improving, or to take decisions how to get further to that direction.



Great black-backed gull. Photo: Arne Ader



Bladder wrack. Photo: Anja Moller, Estonian Marine Institute, University of Tartu



Grey seal. Photo: Kaido Haagen

In the project **MARMONI** - "Innovative Approaches for Marine Biodiversity Monitoring and Assessment of Conservation Status of Nature Values in the Baltic Sea" (October 2010 - March 2015) - biologists from Latvia, Estonia, Finland and Sweden worked together to develop new marine biodiversity indicators and tools for assessment of the Baltic Sea biodiversity.

For more information visit www.marmoni.balticsea-portal.net



Sampling with bottom grab. Photo: Estonian Marine Institute, University of Tartu



Bird island. Photo: Leho Luigujõe, Estonian University of Life Sciences

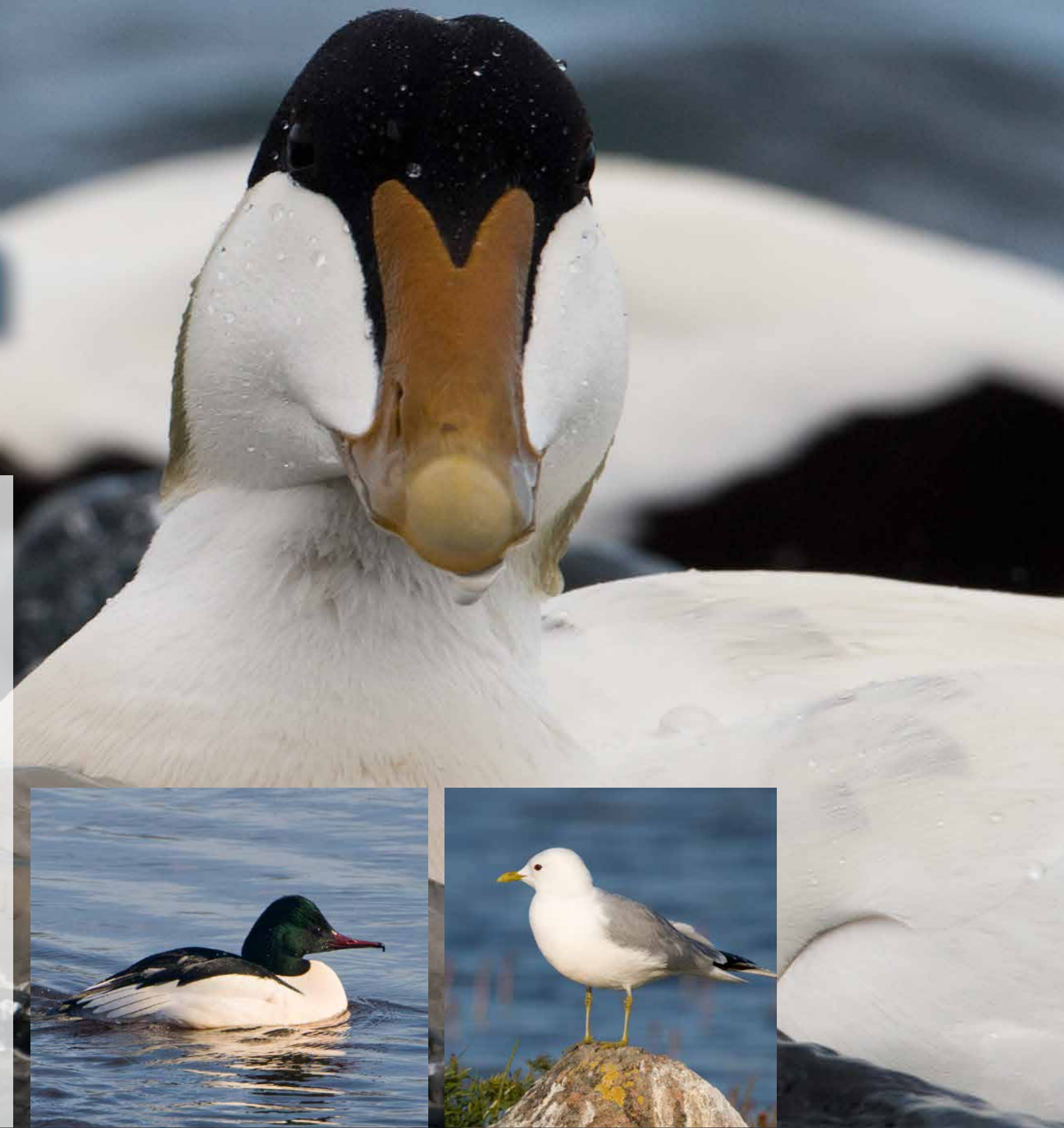


Birds as indicators of the health of the Baltic Sea

The Baltic Sea is a wintering area for millions of waterbirds of different species. Waterbirds are top predators in marine ecosystems and therefore well suited to function as indicators of the state of the marine environment. They are also easier to survey than most other organisms in the sea.

Different seabirds prefer different food; therefore the fate of different bird species reflects also the state of their food sources. Some seabirds, such as long-tailed ducks, scoters and eiders, feed on invertebrates living at the sea bottom, especially on mussels. Others, such as swans, eat plants from the sea bottom. Some birds, such as auks, divers and mergansers, are fish eaters. The fourth group, for example gulls and terns, find their food (e.g. insects, invertebrates, fish) from the surface layer of the sea.

Monitoring of waterbirds that are oiled, found dead on the beach or bycaught in fishing nets helps us to assess the threats endangering the biodiversity of the Baltic Sea.



Common merganser. Photo: Arne Ader

Common gull. Photo: Arne Ader

Fish fauna reflects the water quality



Common bream. Photo: Tiit Hunt



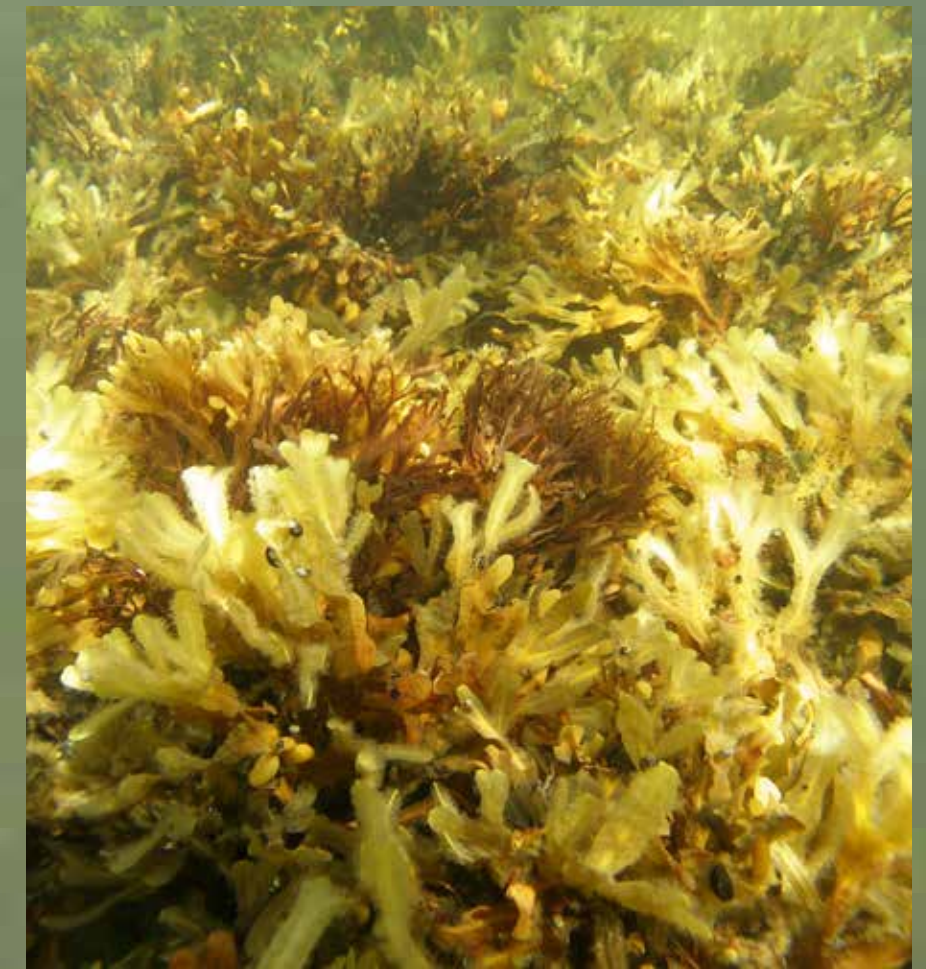
Roach. Photo: Tiit Hunt

There are around 110 fish species regularly occurring in the Baltic Sea. Their requirements for the environmental conditions and water quality are different. Cyprinids are freshwater fish species that are common also in sheltered coastal waters and archipelagos of the Baltic Sea. The increase of Cyprinids, such as bream and roach, reflects eutrophication (increase of nutrient level and production) of the coastal waters.



Beach wrack mirrors the vegetation of the adjacent sea area

Did you know that the very first data on macrophyte species distribution in the Baltic Sea were collected from beach wrack? Beach wrack is formed from detached sea bottom vegetation that is washed ashore and accumulates on the beach. It is possible to use it for assessing the species composition of the adjacent sea area. Higher proportion and species richness of filamentous algae in beach wrack indicates the elevated nutrient level in area. Bladder wrack is a valuable species for forming healthy communities with high species diversity.



Beach wrack dominated by bladder wrack indicates bladder wrack communities in the coastal sea. Photos: Estonian Marine Institute, University of Tartu

The size of tiny food reflects the fish feeding conditions



Copepod *Acartia*. Photo: Solytta Strake, Latvian Institute of Aquatic Ecology



Water fleas from genus *Bosmina*. Photo: Siru Tassila, Finnish Environment Institute

Zooplankton consists of microscopic animals floating in the water column. However, it is important to monitor them because their size and amount give information on the status of the marine ecosystem and foodweb. Zooplankton provides nutrition for almost all fish larvae but planktivorous fish such as herring and sprat feed only on zooplankton throughout the life. Abundant zooplankton with a large mean size indicates good feeding conditions for these fish - which in turn means enough food for fish eaters - predatory fish, fish-eating sea-birds, marine mammals such as seals and also for us, humans.

