



Federal Agency for
Nature Conservation

The Reintroduction of the European Flat Oyster

Active Marine Nature Conservation
in the German North Sea



ALFRED-WEGENER-INSTITUT
HELMHOLTZ-ZENTRUM FÜR POLAR-
UND MEERESFORSCHUNG



Shell of a
European flat oyster.

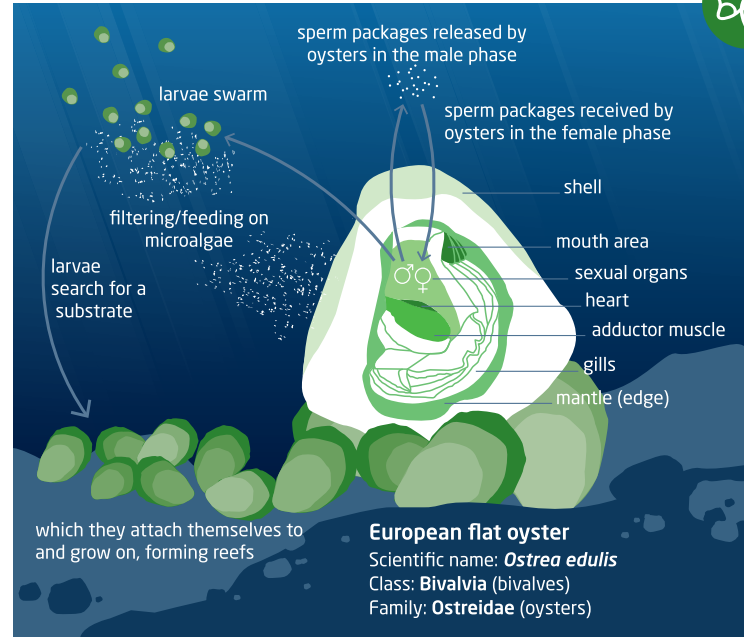
What makes the European flat oyster unique?

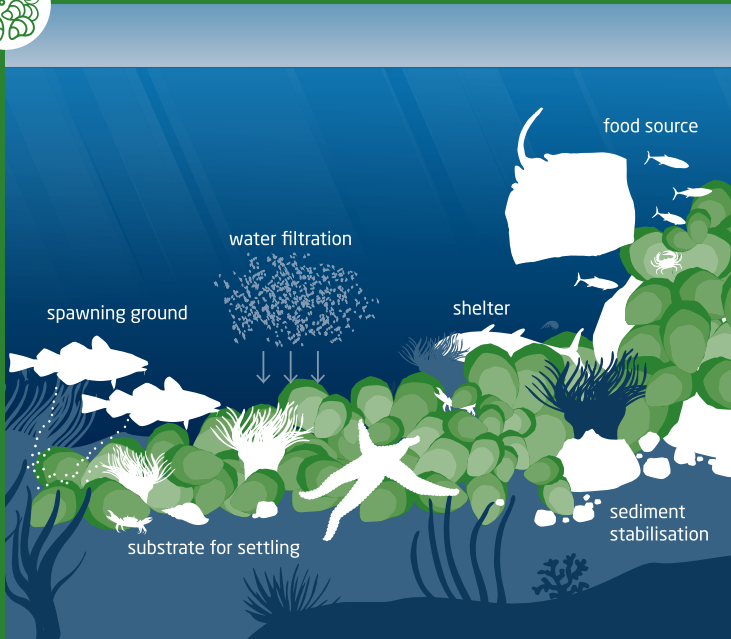
- The reefs it forms are hotspots of biological diversity and provide many valuable ecosystem services. 🐚 🌿 🌊
- It is one of the few keystone species that is also a foundation species and an ecosystem engineer. 🐚 🌊
- As the native oyster species, it was once abundant in European seas including the North Sea - and is now classified as threatened with extinction on Germany's Red List. 🐚 🇪🇺
- Current scientific research actively supports special nature conservation measures to reintroduce it. 🐚 🌿 🌊 🌊 🌊
- The first pilot reef with European flat oysters has already been installed in the German North Sea. 🐚 🌊 🌊
- The European flat oyster is now being bred in a hatchery created especially for its reintroduction. 🐚 🌊
- Europe-wide, a specialised network is committed to its reintroduction. 🐚 🌐
- If the European flat oyster is successfully reintroduced, it can make a unique contribution to nature conservation. 🐚 🌐

How does the European flat oyster live?

European flat oysters live in shallow coastal areas (water depths of up to circa 30 to 50 metres). They can reach lengths of approximately 20 centimetres and are enclosed by two shell valves. The lower valve adheres to a hard substrate, while the flat upper valve seals the lower one. With slightly opened valves, the oysters allow seawater to stream through their gills and filter oxygen and food from it, in particular microscopically small algae. A single European flat oyster can filter up to 240 litres per day – roughly enough to fill a large bathtub. European flat oysters pass through both male and female phases (hermaphrodites). The males release sperm packages into the seawater, fertilising the eggs inside the females. The developing larvae swarm in the sea and search for a suitable substrate to attach themselves to and grow on. As they preferentially settle on the shells of fellow oysters, they gradually form entire reefs.

Structure and lifecycle of the European flat oyster.

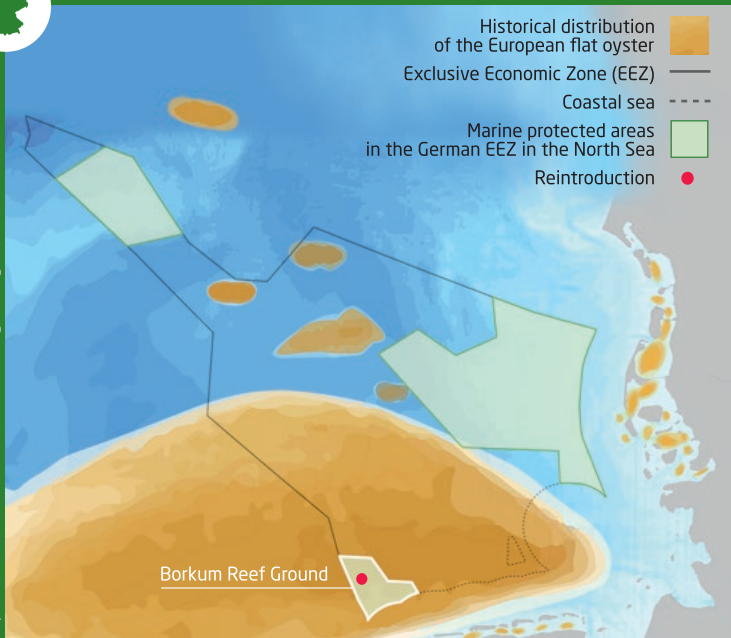




Why are European flat oysters so valuable for the ecosystem as a whole?

The reefs formed by European flat oysters are hotspots of biological diversity: many other sea-dwelling species live on them or gather nearby. Thus, European flat oysters enhance biodiversity by providing food, shelter, spawning grounds and a substrate to settle on, while also serving as a nursery for fish and other marine fauna. In addition, they improve water quality through filtration and stabilise the ground by forming reefs that also serve as sediment traps. In brief, European flat oysters provide a wealth of ecosystem services that benefit us humans directly or indirectly. They are a keystone species, that is, they significantly contribute to the biodiversity, preservation and stability of the ecosystem. Furthermore, the European flat oyster is one of the few keystone species that is also an ecosystem engineer, as it forms three-dimensional ecosystem structures: its reefs. As a foundation species, it provides habitat and food for other species. It is the basis of the biocoenosis (community of organisms) "oyster bed".

Reefs of European flat oysters perform many ecological functions .



Which measures are being pursued to restore the European flat oyster in Germany?

The ecologically valuable, originally native and now threatened European flat oyster is currently in the focus of marine nature conservation. The German Federal Agency for Nature Conservation (BfN) has initiated various measures for the restoration of European flat oyster stocks. Together with researchers from the Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research (AWI), the BfN is committed to the sustainable reintroduction of the native oyster in the North Sea. As one of these measures, a pilot reef with European flat oysters has been installed in the Borkum Reef Ground Nature Conservation Area. This marine protected area, which lies in Germany's Exclusive Economic Zone and thus within the jurisdiction of the BfN, has been chosen as a suitable protected recolonisation site. At the same time, the measures serve to restore the habitat type "reefs" and thus have positive effects on the ecological status of the protected area.

Pilot site for the recolonisation of European flat oysters in the Borkum Reef Ground Nature Conservation Area, within the German EEZ in the North Sea.

Is restoration possible under current conditions?

The nature conservation measure to install reefs with European flat oysters in the Borkum Reef Ground Nature Conservation Area is part of the RESTORE* project, the goal of which is to test and pursue the reintroduction of the European flat oyster. In a preliminary step, a study was conducted to evaluate the plan's basic feasibility (BfN 2014). Since 2016, researchers from the AWI have investigated in more detail the conditions required for the reintroduction of the European flat oyster in the German North Sea. For example, experiments have been conducted to assess how European flat oysters develop under various conditions. The verdict was ultimately positive: reintroducing the European flat oyster in the German North Sea is possible under current conditions.

* More about RESTORE at: www.awi.de, www.heimische-auster.de, www.bfn.de

A researcher from the AWI checks the growth of young oysters.



Photo: Alfred Wegener Institute





How do you install a reef with European flat oysters for restoration?

After successful preliminary investigations, the first reefs with European flat oysters were installed in the Borkum Reef Ground Nature Conservation Area. But before that could happen, a suitable site had to be found: above all, European flat oysters need suitable environmental conditions to thrive. These can be found in broad expanses of the German North Sea. Furthermore, the seafloor has to be protected from activities such as trawling, which could destroy the oysters. In the RESTORE project, a stony foundation and young oysters were deployed on the seafloor at the selected site by diving teams at a depth of roughly 30 metres as a basis for new reefs. Researchers from the AWI regularly survey the reefs' development to evaluate the success of the marine nature conservation measure.

Young seed oysters that - once released - will form new reefs for the recolonisation of the European flat oyster.

What will happen to the oysters in the Borkum Reef Ground Marine Protected Area?

After having installed the first pilot reef with European flat oysters in the Borkum Reef Ground Nature Conservation Area, researchers from the AWI are now analysing the reefs' development, which species of marine fauna use them, and the effects on local biodiversity. Which marine animals settle on the reefs or use them for spawning or as a nursery? How do European flat oysters' effects on the ecosystem become apparent? Under which conditions do they flourish? There are many questions to answer. Overall, a scientific basis for further restoration measures is now being established to rebuild sustainable stocks of the threatened native oyster species and the ecosystem "oyster bed".

A research team from the AWI underway to the selected restoration sites in an inflatable boat.



Photo: Alfred Wegener Institute / Heiner Müller-Eisner





How are European flat oysters being bred for nature conservation?

In order to reintroduce the once native but now extremely rare European flat oyster, young oysters are needed to form new reefs. Accordingly, the AWI has created a breeding facility for European flat oysters on Helgoland (the PROCEED* project) within the framework of the Federal Biological Diversity Programme. This BfN-supported project breeds European flat oysters with the aim of sustainably reintroducing them in the North Sea. At the hatchery, the oysters can reproduce under optimal conditions - and are fed with the microalgae that are also their main food source in the wild. Once released into the sea, they can form new reefs. The project is committed to distributing information on the European flat oyster and to restoring its stocks, Europe-wide.

* More about PROCEED and the European flat oyster at: www.heimische-auster.de, www.awi.de, www.bfn.de.

Cylindrical tanks filled with microalgae: food for European flat oysters at the AWI oyster hatchery on Helgoland.

How can projects for the European oyster be networked Europe-wide?

To improve the stocks of the European flat oyster throughout Europe's seas, the BfN and the AWI launched the European network NORA* in 2017. The network serves as a basis for collaboration between European projects for the reintroduction of the European flat oyster. In this network, plans and standard guidelines are jointly developed. In several European countries, projects to restore reefs of the once native oyster species are already underway. Yet, the pilot reef with European flat oysters that was installed in the Borkum Reef Ground Nature Conservation Area is something special: Europe-wide, it is the first reintroduction measure for the European flat oyster to be implemented in a nature conservation area in the open sea.

* Native Oyster Restoration Alliance, more at: <https://nora europe.eu>.

Across Europe, projects are joining forces in the NORA network, which is committed to the reintroduction of the native European flat oyster.



Map: Native Oyster Restoration Alliance





How can the reintroduction contribute to nature conservation?

- The European flat oyster is a keystone species that significantly contributes to the biodiversity, preservation and stability of the North Sea ecosystem.
- Moreover, it is one of very few keystone species that is also an ecosystem engineer and a foundation species, as it forms ecologically valuable reefs.
- It is the native European oyster species which formed the natural environment before it was affected by human impacts.
- Europe-wide, projects for the reintroduction of the European flat oyster are joining forces and exchanging knowledge.
- After successful reintroduction, European flat oysters will once again be able to provide their many valuable services for the environment.

A tiny crab seeks shelter in the nooks and crannies of a European flat oyster shell.



Sources and further information:



www.bfn.de



www.awi.de



www.heimische-auster.de



www.noraeurope.eu

The RESTORE project, which focuses on testing and development measures for the reintroduction of the European flat oyster, is supported by Germany's Federal Agency for Nature Conservation (BfN) with funding from the Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV), and is being carried out by the Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research (AWI). The PROCEED project, also carried out by the AWI, is supported by the BfN with funding from the BMUV within the framework of Germany's Federal Biological Diversity Programme.



Federal Agency for
Nature Conservation



ALFRED-WEGENER-INSTITUT
HELMHOLTZ-ZENTRUM FÜR POLAR-
UND MEERESFORSCHUNG

Published by:

Federal Agency for Nature Conservation (BfN),
Marine Nature Conservation Department
www.bfn.de

Alfred Wegener Institute, Helmholtz Centre for Polar
and Marine Research (AWI)
www.awi.de

Text and editing: Valérie Schmitt (Report Wissen),
Katrin Prinz (BfN), Bernadette Pogoda (AWI),
Corina Peter (AWI)

Concept and design: CD Werbeagentur GmbH

Cover image and image below: Alfred Wegener
Institute / Solvin Zankl

Translation: Valérie Schmitt (Report Wissen),
Matthew Fentem (gonative language solutions)

Printed on recycled paper
EU Ecolabel

July 2022

