UNDERWATER LIFE IN THE WADDEN SEA

DISCOVERING THE HIDDEN DIVERSITY

Species' profiles for multipliers

WADDEN SEA WORLD HERITAGE

Wadden Sea National Park

IWSS

This compilation of underwater species cards is based on a previously unpublished project by the Schleswig-Holstein Wadden Sea National Park Authority with support from Schutzstation Wattenmeer. The concept, many of the photographs, and the species profile texts were made available to the International Wadden Sea School to develop a World Heritage edition featuring selected species for use in educational activities across the Wadden Sea region.

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EDUCATION & INTERPRETATION FOR THE WADDEN SEA WORLD HERITAGE

UNITED FOR WADDEN SEA WORLD HERITAGE

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www.waddensea-worldheritage.org
www.nationalpark-wattenmeer.de
www.wwf.de/watt
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Species profiles for presenting the underwater world in the Wadden Sea National Park and World Heritage Site

The Wadden Sea is home to a rich and fascinating underwater world: plaice, herring, shrimp, and many other species live hidden within the Wadden Sea and the adjoining open North Sea – yet they play a central role in the functioning of this unique ecosystem. As a nursery ground, feeding area, and refuge, the Wadden Sea is indispensable for many marine animals. This is one of the key reasons why it has been recognised as a UNESCO World Heritage Site.

During sea creature catching tours, aquarium visits, or even when crossing a tidal creek on a mudflat walk, visitors can experience this hidden habitat up close. The species profiles presented here help to vividly and accessibly convey information about typical species. They support educators and nature guides in sparking curiosity, illustrating ecological interconnections, and effectively communicating the significance of the Wadden Sea for the underwater world.

Those who are familiar with this biodiversity are more likely to support its protection – going beyond the existing conservation provided by national parks and other protected areas within the Wadden Sea. The underwater world of the Wadden Sea is also under threat: climate change, microplastics, overfishing, and other human-induced factors are placing increasing pressure on many species. What happens far out at sea often begins in our daily lives – through fish consumption, plastic use, or the choice of sustainable products. When visitors not only marvel during guided tours but also come to understand how everything is interconnected, the willingness to take personal responsibility grows. In this way, a close-up encounter with a shrimp or fish can lead to the realisation that every contribution matters – for the protection of the seas and the preservation of the Wadden Sea's fascinating underwater world.

We wish you great success and enjoyment in using the species profiles,

Anja Szczesinski
WWF Wadden Sea Office

Michael Kruse
Schleswig-Holstein Wadden Sea National Park Authority

Photo: Jasmin Karl

Guidance for using the species cards

- World Heritage key value
- Facts
- Habitat
- Lifestyle
- Use & protection
- Fascinating facts / Good to know
- Did you know?

Guidelines for handling live animals during sea creature tours

Sea creature tours offer a unique glimpse into the fascinating underwater world of the Wadden Sea. Encountering marine life up close can strengthen appreciation of these habitats and inspire more conscious fish consumption.

- The following practical tips support respectful and responsible handling of marine animals on board.

Before the catch – inform your guests:

- Animals are temporarily brought up from the seabed to be observed and experienced.
- Careful handling is required – guests can contribute by listening carefully and passing animals along quickly and gently.

Key principles:

- **Quick and gentle:** View sensitive species briefly and return them swiftly.
- **Keep them in water:** Transparent containers allow natural, stress-free viewing.
- **Limit touching:** Only allow handling of robust species (e.g. shore crabs).
- **Keep cool:** Top up with fresh seawater if temperatures exceed 20 °C.
- **Return gently:** Release animals from the stern with minimal drop height (e.g. in a bucket).

Photo: Martin Stock/LKN.SH

Short & practical

Animal groups – brief, hands-on advice

Fish

- **View first** – they are very delicate.
- **Avoid touching** – their protective slime coat is sensitive.
- **Round-bodied fish** (e.g. smelt, cod, gobies) are pressure-sensitive. Release as soon as possible.
- **Flatfish** are hardier – show them quickly, then release.

Starfish & Echinoderms (e.g. sea urchins)

- Best **kept in water** and shown in a clear dish.
- Gentle underwater **touching** is allowed.

Jellyfish

- **Stinging species** can harm other animals – remove immediately.
- **Harmless species** (e.g. comb jellies) can be shown in a container.

Shrimps

- **Very heat-sensitive** – keep cool, release soon after the fish.

Hermit crabs

- **Hardy**, but may abandon their shell – gently return if possible.

Crabs

- Generally **robust**; small shore crabs are good for children to handle.
- Caution: swimming and edible crabs can **pinch** hard!

EUROPEAEN EEL

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European eel

Anguilla anguilla

The Wadden Sea World Heritage Site plays an important role in the life of the eel as part of its migration route (“Swimway”) between inland waters and the open sea.

Photo: Rainer Borcherding

Europæisk ål

Europäischer Aal

Paling (Europese aal)

Size: Females up to 1.4 m and 6 kg; males max. 0.5 m.

Lifespan: Typically 8–12 years; >60 years possible (females mature at approx. 12–15 years, males at 6–9).

Appearance: Snake-like, elongated, cylindrical body; dorsal, tail, and anal fins form a continuous fin fringe; upturned mouth.

The eel undertakes the longest known spawning migration of any fish – around 5,000 km.

Distribution: Europe, Asia Minor, North Africa.

Occurrence: Coasts of the Atlantic, Mediterranean, Black Sea, North Sea, and Baltic Sea.

Habitat: Migrates upriver, even crosses land at night; older eels are present year-round, especially noticeable in autumn; lives for years/decades in freshwater; typical inhabitant of land-water transitional zones, can occupy even the smallest tidal creeks, channels, or ditches.

Diet: Predatory, feeds on small animals, fish, carrion (its shape and colour change depending on its diet – distinguishing between broad-headed and narrow-headed eels).

Reproduction: Spawns in the Sargasso Sea (Atlantic, near Central America); migrates 5,000 km between spawning grounds and river habitats; mature eels take about one year to migrate, surviving solely on fat reserves; larvae take ~3 years to return; after spawning (females release several million eggs), the adults die.

Use: Edible fish (despite being currently highly endangered).

Protection: Decline since 1970 due to overfishing (including of young “glass eels”) and river barriers; the European eel is “critically endangered” in the North and Baltic Seas; cannot be bred in aquaculture, all stocking measures use glass eels fished in countries like Spain and France; multimillion-Euro black market in glass eels, with a large portion of the European catch “disappearing” to Asia

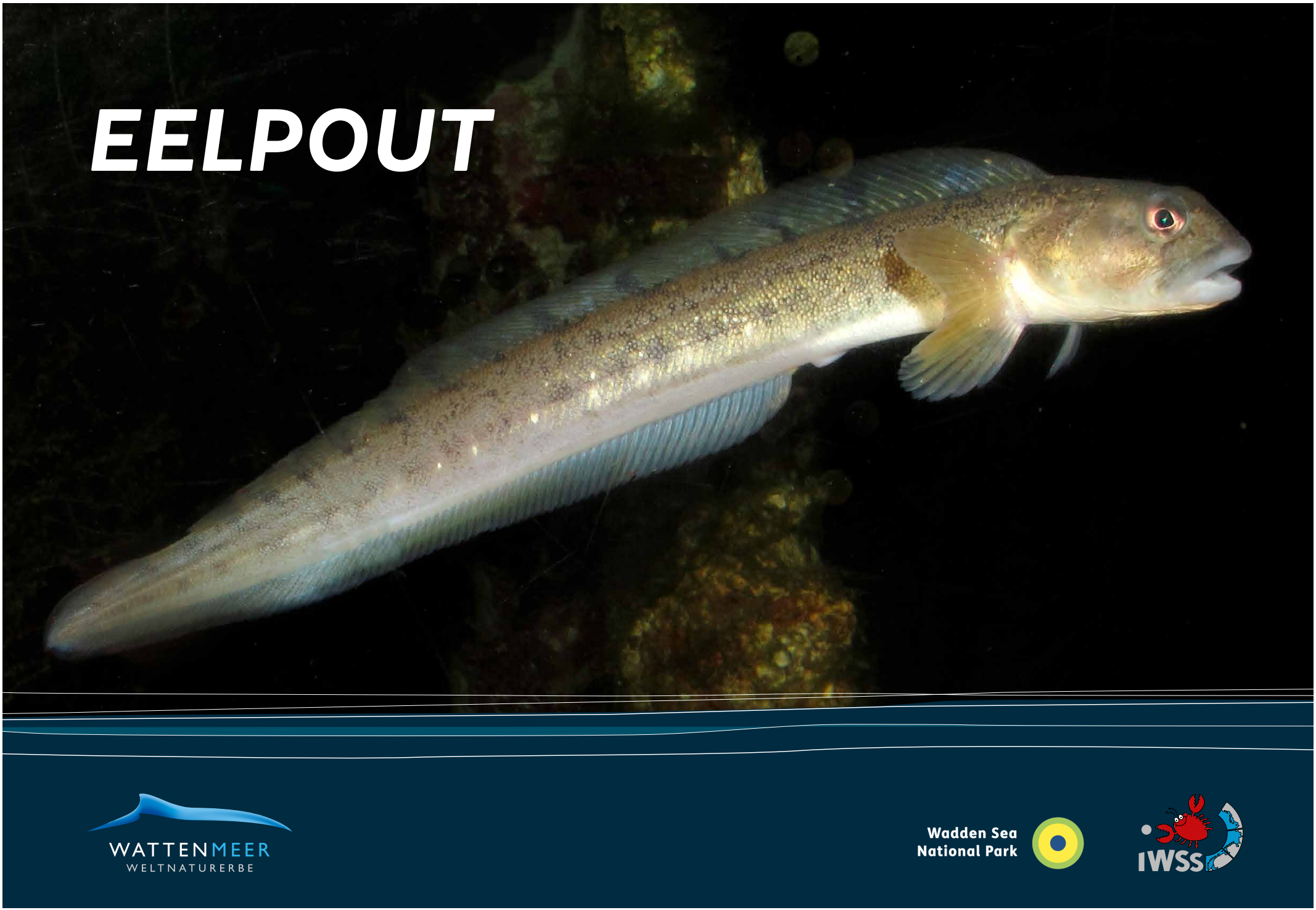
The eel is known by different names at different life stages:

Glass eel: From larval stage in the Sargasso Sea to entry into European freshwater.

Yellow eel: While growing in freshwater.

Silver eel: As a mature adult on its way back to the Sargasso Sea.

EELPOUT



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Eelpout

Zoarces viviparus

In the underwater world of the Wadden Sea World Heritage Site, site-faithful fish like the viviparous eelpout find a permanent habitat – many individuals probably spend their entire lives in this unique ecosystem.

Photo: Rainer Borcherding

Ålekvabbe

Aalmutter

Puitaal

Size: 20–30 cm, up to 45 cm.

Lifespan: Up to 4 years.

Appearance: Similar species is the butterfish (with dorsal spots); front body thicker than an eel or butterfish.

Occurrence: Common year-round resident fish; North Sea; western Baltic Sea (requires at least 5 ‰ salinity); probably the most common fish in the Wadden Sea in winter.

Habitat: Found on various substrates, prefers mussel beds or rocky reefs; bottom-dwelling and site-faithful.

Diet: Predatory; feeds on shrimp and small fish.

Reproduction: Viviparous (gives birth to live young); after 4 months of gestation, gives birth to 30–400 young (~5 cm long) in shallow waters between January and March.

Development: Juveniles are independent immediately; sexually mature after 1 year.

Threats: Not currently endangered, but sensitive to warming and low oxygen. Frequently caught as bycatch in shrimp fisheries.

The name “eelpout” comes from a historical misunderstanding: due to its visual similarity to eels and the long-mysterious origins of eels, it was once believed to be the eel’s mother – hence the misleading name.

Only about 2 % of bony fish species give birth to live young. In the Wadden Sea, the eelpout is the only species to do so.

The eelpout is used in environmental chemistry research.

The viviparous eelpout gives birth to live young.

THREE-SPINED STICKLEBACK

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Three-spined stickleback

Gasterosteus aculeatus

The stickleback is a typical representative of the Wadden Sea's underwater world. It depends on ecological connectivity between the saline waters of the Wadden Sea and the freshwater habitats of nearby marshlands for reproduction.

Photo: Rainer Borcherding

Trepigget hundesteijle

Dreistachliger Stichling

Driedoornige stekelbaars

Size: 4–8 cm, rarely up to 11 cm in the sea.

Lifespan: Usually only 2 years, rarely 3; sexually mature after 1 year.

Appearance: 3 dorsal spines. Males become bright red during the mating season in spring. Similar species: nine-spined stickleback (with 8–12 dorsal spines).

Distribution: Northern hemisphere coasts from Alaska to the Black Sea; found in both sea and freshwater throughout Europe.

Occurrence: North Sea population migrates to rivers and streams in spring, returns to the sea in autumn.

Habitat: Regular winter guest and transient in the Wadden Sea; rarely present in summer.

Diet: Active predator; eats small animals, fish eggs; larger prey torn apart in schools.

Reproduction: Males build a spherical nest from plant material and perform a courtship dance to entice females to lay eggs.

Predators: Fish and birds (despite the spines).

Use: Occasionally kept as aquarium fish.

Threats: Not endangered, but populations are impacted as dykes and sluices block migration routes between the Wadden Sea and freshwater.

The name Gasterosteus aculeatus means “spiny one with bony plates on the belly.”

Sticklebacks migrating to the sea become highly silvery, probably for camouflage.

They may be transported to small waters by ducks’ feet.

A stickleback can find its way back to its nest from over 10 m away.

The stickleback builds nests and performs a courtship dance.

HERRING

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Herring

Clupea harengus

The Wadden Sea World Heritage Site is an important nursery for herring. Juveniles find optimal conditions to grow before migrating into the open North Sea. Thus, the Wadden Sea plays a major role in maintaining herring populations.

Photo: Rainer Borcherding

Sild

Hering

Haring

Size: Up to 40 cm, usually only 10 cm in the Wadden Sea.

Lifespan: Up to 20–25 years.

Appearance: Similar species include sprat (pelvic fin starts under the front edge of the dorsal fin) and sardine (radial stripes on the gill cover).

Distribution: North Atlantic, from Greenland to Brittany; North and Baltic Seas (up to 6‰ salinity); many local races.

Occurrence: Various herring populations across the North Sea with different spawning times and areas.

Habitat: Nursery in the Wadden Sea (many juveniles from various sources year-round); some adults migrate in for spawning.

Behaviour: Schooling fish, plankton feeder; near the surface at night, on the seabed by day; avoids high temperatures.

Reproduction: Up to 50,000 eggs per female, glued to the seabed, often on algae; sexually mature after 5–8 years.

Herring "talk" to each other with bubbles.

Use: Important food fish; various stocks are overfished.

Predators: Key food source for larger fish and marine mammals; essential chick food for terns.

Threats: Very sensitive, never survives being caught in nets.

There are around 200 species in the herring family, including sardines, anchovies, and anchoveta. One-third of all fish caught globally belong to this family.

Young herrings sometimes beach themselves in summer.

Harbour porpoises enjoy eating herring (but also other fish).

After the Dutch IJsselmeer was dammed, the local herring stock died out – and with it, the bottlenose dolphin population in the area.

Herring maintain contact in their schools acoustically by releasing air bubbles from their anuses.

PLAICE

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Plaice

Pleuronectes platessa

The Wadden Sea World Heritage Site is an important nursery area for plaice. After spawning in the open North Sea, the juvenile fish migrate into the shallow Wadden Sea. There, they find abundant food and protection from predators. In this way, the Wadden Sea makes a vital contribution to the preservation of this ecologically important fish species.

Photo: Rainer Borcherding

Rødspætte
Scholle
Schol

Size: Formerly (with little fishing pressure) up to 1 metre. **Lifespan:** Up to 50 years. **Appearance:** Flatfish with orange spots. Similar species include the lemon sole (with a curve in the lateral line near the pectoral fin) and the flounder (with rough skin along the lateral line and fin edges).	**Distribution:** Coasts of the North Atlantic, North Sea, western Baltic Sea. **Habitat:** Spawns in winter in the south-western North Sea; larvae are carried into the Wadden Sea by circular currents in April, where they are common as juveniles in their first (and sometimes second) year.	**Diet:** Eats shrimp, worms, and soft-shelled mussels; an ambush predator but also hunts in very shallow water at night. **Behaviour:** Buries itself in sand during the day and can match its colour to the seabed. **Reproduction:** Females lay 50,000 to 600,000 eggs; larvae are symmetrical, transforming into flatfish through asymmetrical facial growth; from May, 1 cm long juveniles can be found in tidal pools; begin tidal migrations once temperatures exceed 23 °C.	**Use:** Important food fish. **Threats:** Large numbers of juvenile plaice die as bycatch in shrimp fisheries. Bottom trawling by flatfish trawlers causes severe damage to the North Sea seabed.	The name *Pleuronectes platessa* means “flattest side-swimmer”, referring to the sideways transformation of juvenile fish into flatfish. Plaice can migrate up to 30 km per day. Young plaice in the Wadden Sea prefer to eat the tail ends of lugworms and the siphons of mussels. Plaice skin was once used to produce a fine leather. Historically, plaice lived up to 50 years, weighed up to 7 kg, and reached nearly 1 metre; today, due to fishing pressure, they rarely live beyond five years.

Plaice are also known as “golden flounder” because of their orange spots.

SEA SCORPION

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Sea scorpion

Myoxocephalus scorpius

The sea scorpion is a resident fish of the underwater world in the Wadden Sea World Heritage Site and is thought to spend its entire life here and in the adjacent coastal waters of the North Sea.

Photo: Rainer Borcherding

Almindelig ulk

Seeskorpion

Zeedonderpad

Size: Up to 35 cm.

Lifespan: Up to 6 years.

Appearance: Similar species is the shorthorn sculpin (with four rather than two gill spines, and one or two small barbels at the corners of the mouth).

Distribution: Coastal waters of the North Atlantic from northern Spain via Iceland to New York, down to depths of 100 m.

Habitat: Lives among rocks, mussel beds, seaweed; common resident in the Wadden Sea; sensitive to heat, moves to deeper water in summer; baby fish from 1 cm in spring around mussel beds.

Diet: Fish, shrimp, shore and swimming crabs; ambush predator with a large mouth, catches prey as long as itself and swallows them gradually.

Reproduction: Internal fertilisation; eggs laid in winter; male guards the egg mass for one month; larvae live in the plankton and from March settle at mussel beds in the Wadden Sea.

Population: Relatively common.

Threats: Bycatch in shrimp fisheries.

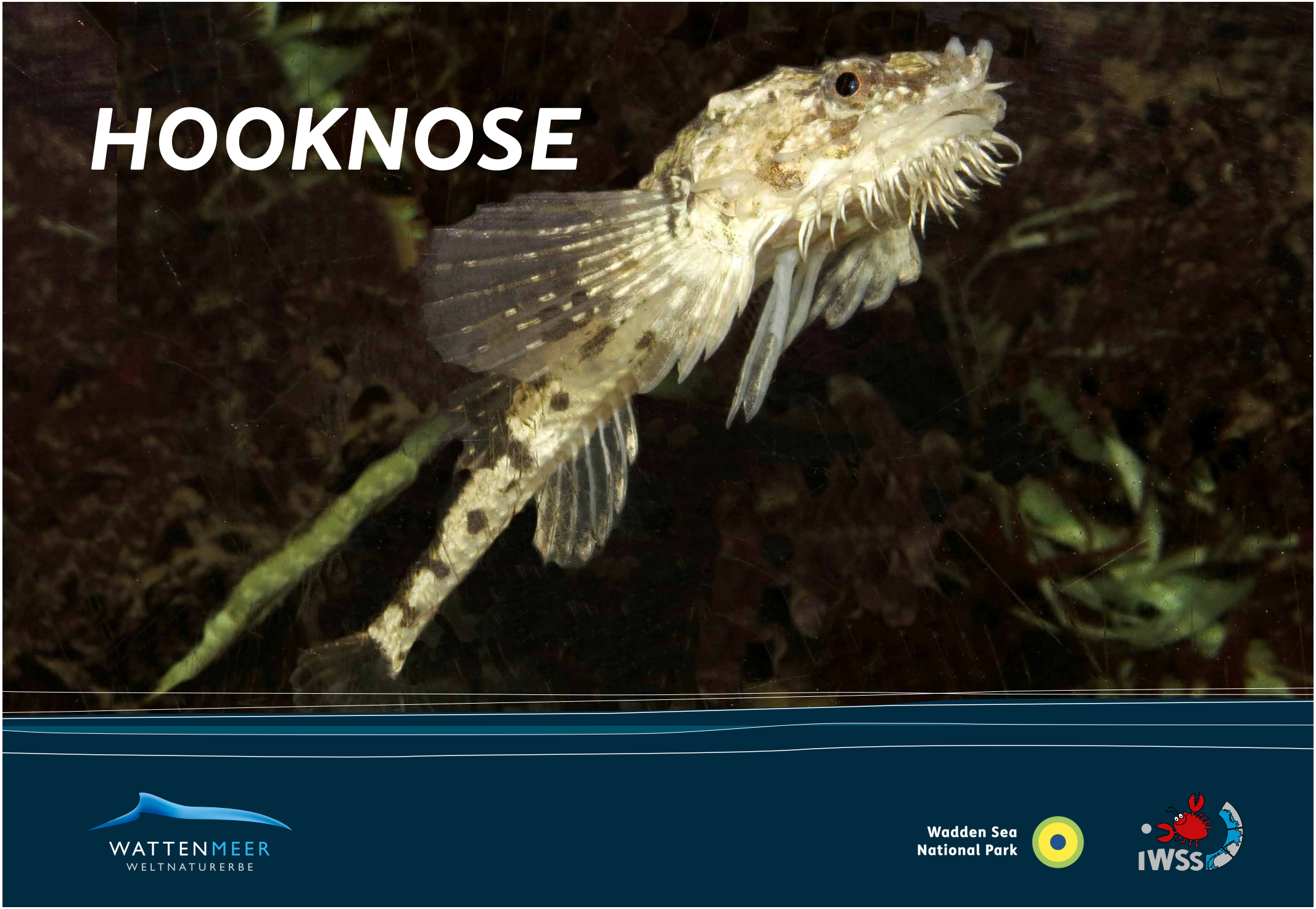
The sea scorpion gets its name from its fearsome appearance. Unlike real scorpions, it has no venom, but its flared gill spines make it a tough meal for predators.

It can lighten or darken its skin tone significantly over several hours to blend in with its surroundings.

When catching large prey, the fish's tail can sometimes stick out of its mouth for hours, until the meal has digested enough to move further down the gut.

The sea scorpion has spines – but is harmless.

HOOKNOSE



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Hooknose

Agonus cataphractus

The hooknose is a sedentary fish in the underwater world of the Wadden Sea World Heritage Site. It spends most of its life in coastal zones, demonstrating how valuable the Wadden Sea is as a permanent habitat for specialised species.

Photo: Rainer Borcherding

Panserulk

Steinpicker

Harnasmannetje

Size: 12–15 cm.

Lifespan: Up to 4 years.

Appearance: Broad front body, large pectoral fins, narrow tail stem; body covered in bony plates – unmistakable.

Distribution: Northern France to the North Cape and Iceland, western Baltic Sea.

Habitat: From the tidal zone down to 300 m depth; prefers sandy and structured seabeds; common resident in the Wadden Sea, leaves the area to spawn.

Diet: Hunts small shrimp, crabs, and fish; uses barbels to detect buried prey.

Movement: Propels itself forward with strong pectoral fins.

Reproduction: Migrates towards Heligoland between December and February; attaches egg clumps with up to 2,000 yellow eggs to seaweed; long egg development; sexually mature at 2 years.

Threats: None currently known; probably survives shrimp fishery bycatch thanks to its bony armour.

Use: Dried specimen known as a "weather fish" used to indicate humidity – tilts more or less when hung by a string depending on moisture.

The name *Agonus cataphractus* roughly means "armoured jointless one", referencing the fish's distinctive, armoured body.

In German, "Steinpicker" refers to its habit of resting among stones.

The Dutch name "Harnasmannetje" (little armoured man) and English name "hooknose" also highlight its notable features.

Its resemblance to the sturgeon is coincidental and not due to "primitive" evolutionary traits.

The hooknose is often found on the seabed among stones.

SMELT

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Smelt

Osmerus eperlanus

The smelt is a migratory fish of the underwater world in the Wadden Sea World Heritage Site. It spawns in river estuaries and thus depends on intact transitional waters between the sea and inland areas.

Photo: Rainer Borcherding

Smelt
Stint
Spiering

Size: Up to 30 cm, rarely 35 cm. **Lifespan:** Occasionally up to 9 years. **Identification:** Unmistakable due to its smell of cucumber ("the smelt smells" – English name comes from "smell").	**Distribution:** Atlantic coast from Spain to Norway. **Occurrence:** Coastal zones of the North and Baltic Seas, into river estuaries. **Habitat:** Common throughout the Wadden Sea year-round; abundant in river mouths in spring.	**Diet:** Hunts shrimp and small fish in the water column near the seabed. **Reproduction:** Up to 40,000 eggs, spawns in April on sandy riverbeds (e.g. Elbe); sexually mature at 2 years; usually spawns only once before dying, otherwise older fish return to the sea in May, juveniles follow in autumn (6–8 cm).	**Predators:** Fatty fish, vital chick food for nesting common terns in the Elbe estuary, where it is the most common species. **Threats:** Often caught as by-catch in shrimp fisheries, does not survive; loss of spawning grounds; sediment disturbance and oxygen-depleted zones due to dredging and river deepening (e.g. Elbe) also harmful. **Use:** Formerly caught in large quantities in the Elbe for consumption, as fertiliser, animal feed, and baitfish.	The cucumber-like smell is caused by the same molecule released by damaged cucumbers: trans-2-cis-6-nonadienal. This substance has antibacterial properties and may form part of the immune system of smelt and related fish.

Freshly caught smelt smell like cucumber.

COMMON GOBY

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Common goby

Pomatoschistus microps

The common goby is a resident and frequently occurring fish species in the underwater world of the Wadden Sea World Heritage Site. It probably spends its entire life in this unique habitat.

Photo: Martin Stock

Lerkutling

Strandgrundel

Brakwatergrondel

Size: Up to 7 cm.

Lifespan: Up to 2 years.

Appearance: Ladder-shaped row of pores beneath the eye; distinguishing between different goby species is difficult. Gobies found in saltmarsh creeks are usually common gobies; gobies in shrimp fishery bycatch are mostly sand gobies (similar species, dorsal fin with 8–9 rays instead of 10–12).

Distribution: North Africa to central Norway, entire Baltic Sea.

Habitat: In very shallow coastal waters, also on muddy substrate and in brackish water; the most common fish in the Wadden Sea (up to 15 individuals per m^2), a year-round resident species; only moves to deeper waters when temperatures fall below 5 °C.

Diet: Tiny crustaceans, juvenile shrimp.

Reproduction: Reaches sexual maturity after 1 year; spawns several times from April to September; eggs are attached under shells, hatching after 9 days.

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Predators: An important food source for coastal birds and larger fish.

Threats: Gobies often end up as bycatch in shrimp fisheries and usually do not survive; however, the population overall is not considered threatened.

Young seals are said to learn how to catch fish by practising on gobies.

Gobies and North Sea shrimp are often seen in tidal pools and creeks – they are easy to confuse at first glance.

Though inconspicuous, gobies are among the most ecologically important fish species in the Wadden Sea.

COMMON COCKLE

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Common cockle

Cerastoderma edule

The common cockle occurs in large numbers in the Wadden Sea World Heritage Site and is emblematic of the high production of animal biomass in this unique ecosystem. As a key food source for many coastal birds, it is a vital link in the short but highly productive food chains of the Wadden Sea.

Photo: Rainer Borcherding

Almindelig hjertemusling

Essbare Herzmuschel

Kokkel

Size: Up to 7 cm.

Appearance: Young specimens are often yellowish or brownish with dark spots; older individuals have a white shell, sometimes with a dark rear end.

Distribution: From the North Atlantic to the Mediterranean.

Occurrence: Shallow Baltic Sea and river estuaries with salinity as low as 3 ‰.

Habitat: buried in the tidal flats, about 1.5 times shell length deep.

Diet: Filters plankton from the water.

Reproduction: Females release up to 50,000 eggs into the water in May; after a three-month larval phase, they develop into juvenile cockles.

Abundance: Probably the most common bivalve species in the Wadden Sea.

Predators: Numerous coastal birds and humans.

Protection: Cockle fishing significantly damages tidal flat habitats and reduces food availability for species such as oystercatchers and eider ducks. It is banned in Germany's national parks but still permitted by hand in the Netherlands.

A 3 cm cockle filters about 2.5 litres of water per hour.

The two closely spaced openings of the siphons can sometimes be seen in the mudflats.

Cockles do not grow in winter and may freeze to death in harsh ice conditions.

Cockles are probably the most abundant mussels in the Wadden Sea and a favourite food for many birds.

BLUE MUSSEL

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Blue mussel

Mytilus edulis

Blåmusling

Miesmuschel

Mossel

The blue mussel is not only an important food source in the Wadden Sea World Heritage Site, but also forms extensive reefs (mussel beds) that provide valuable habitats for numerous other species. In this way, it significantly contributes to the biodiversity and ecological structure of this special marine ecosystem.

Photo: Klaus Janke

Size: 5–10 cm.

Lifespan: 3–5 (up to 10) years.

Appearance: Black-blue-white shell, sometimes brown, occasionally with dark “rays”; interior lined with nacre.

Occurrence: Wadden Sea, Atlantic, Mediterranean

Diet: Plankton filter feeder. Fully grown mussels filter about 2l/h and up to 20l/d

Reproduction: Female mussels produce 5–12 million eggs in spring.

Development: Larvae drift for about a month, then attach to a hard substrate and choose a permanent location after six weeks.

Role: Forms large mussel beds, creating a unique habitat within the Wadden Sea. Different animals and plants settle on this hard substrate than elsewhere in the tidal flats. Blue mussels filter a large portion of plankton from the water. They are consumed by humans and harvested in significant quantities from parts of the Wadden Sea.

Threats: Mussel fishing and aquaculture impact natural populations. In areas where mussel seeding is still allowed, new mussel beds may be damaged. The import of seed mussels can introduce invasive species. Most natural mussel beds in the intertidal zone are now overgrown by the invasive Pacific oyster.

Predators: oystercatchers, gulls, crabs, starfish, and humans.

Blue mussel beds provide a habitat for a wide range of other animals and plants and are thus ecosystem engineers.

They attach themselves to each other or to substrates with byssal threads produced by a gland in their foot.

The inner nacre layer can produce small pearls when sand becomes embedded.

Blue mussels are key shapers of their ecosystems.

BALTIC TELLIN

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Baltic tellin (Baltic macoma)

Macoma baltica

The Baltic tellin is found in large numbers in the Wadden Sea World Heritage Site and, like the common cockle, reflects the high animal biomass and short food chains of this dynamic ecosystem. As a key food source for many coastal birds, it plays a central role in the Wadden Sea's ecological network.

Photo: Hans-Ulrich Rösner

Østersø-musling

Rote Bohne

Nonnetje

Size: Up to 3 cm. **Lifespan:** Up to 7 years in the tidal flats, up to 25 years in the deeper North Sea. **Appearance:** Usually red or yellow inside, often outside as well – the most colourful bivalve in the Wadden Sea; iron compounds can also give green, blue, or black colouring, often in rings.	**Development:** Larvae grow up in muddy tidal flats; in late autumn, juvenile mussels drift on a mucus thread with the ebb tide out into the North Sea, where they are safer from birds.	**Diet:** Feeds on plankton and breathes through a flexible siphon up to 10 cm long; a second siphon expels the filtered water just below the sediment surface, protecting it from predators.	**Predators:** An important prey item for wading birds, especially the red knot, which swallows them whole and crushes them in its muscular gizzard. The inhalant siphon (protruding from the sediment) is frequently attacked by fish and continuously regrows.	The Baltic tellin prefers cold conditions: it only grows and filters at temperatures below 15 °C and can survive frost. Between 200 and 2,000 individuals can be found per square metre of mudflat.

Baltic tellins also come in white and yellow.

AMERICAN RAZOR SHELL

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American razor shell

Ensis leei (E. directus, E. americanus)

In the Wadden Sea World Heritage Site, the main goal is to allow natural processes to proceed as undisturbed as possible and to preserve native biodiversity. The introduction of invasive species such as the American razor shell conflicts with this objective.

Photo: Rainer Borcherding

Amerikansk knivmusling

Amerikanische Schwertmuschel

Amerikaanse zwaardschede

Size: Up to 17 cm .

Lifespan: Up to 5 years.

Appearance: Sword-handle-like shape; outer shell brown to reddish-grey with leathery skin, inner shell pearly.

Occurrence: North and Baltic Seas

Habitat: In the Wadden Sea, mostly near the low tide line; easily freezes in icy winters. In fine sandy North Sea substrate at depths of 3–18 metres.

Diet: Filters plankton

Movement: Lives just beneath the surface; in danger, it quickly retracts into deeper sediment using its long digging foot. This foot also allows it to leap and swim underwater.

Predators: Important food for the common scoter. American razor shells are eaten in some countries, but harvesting them generally damages the seafloor.

Originally from American waters, the species was probably introduced to the North Sea in the 1970s via ballast water from ships. It is now abundant in the Wadden Sea.

Some sea and shorebird species have learned to use it as a food source.

In spring, mass die-offs of the species often occur; the cause remains unknown.

Razor shells can swim and jump underwater.

PACIFIC OYSTER

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Pacific oyster

Magallana/Crassostrea gigas

In the Wadden Sea World Heritage Site, the main goal is to allow natural processes to proceed as undisturbed as possible and to preserve native biodiversity. The introduction of invasive species such as the pacific oyster conflicts with this objective.

Photo: Rainer Borcherding

Stillehavsøsters

Pazifische Auster

Janpanse oester

Size: Up to 40 cm, fast-growing. **Lifespan:** Up to 30 years. **Appearance:** Elongated, banana-shaped curve, sharp-edged, usually grey or brownish-green; shell edge coarsely wavy with usually 5–7 ridges.	**Origin:** East Asia (Japan/China), introduced to Europe for aquaculture **Occurrence:** Intertidal zones of the North Sea, sometimes in deeper waters **Habitat:** Colonizes all kinds of hard substrates (mussel shells, harbour walls, groynes)	**Diet:** Filters plankton from the water (approx. 1 litre per hour) **Reproduction:** Spawns in July–August at water temperatures above 22 °C; eggs and sperm are released into the water and fertilized there – 50–100 million eggs per spawning.	**Use:** Extensively cultivated worldwide (in the Wadden Sea, only around List/Sylt). **Impact:** Probably the most problematic invasive species in the Wadden Sea. Offers little ecological value for birds, strong competitor to blue mussels, which now rarely form beds without Pacific oysters. Their rough shells also spread many other non-native species.	The species name *Crassostrea gigas* translates to “giant thick oyster,” a reference to its thick, irregular shell. Many individuals grow together, forming large reefs. Their sharp-edged shells make mudflat walking hazardous, often harming feet and shoes.

You often need shoes for mudflat hiking also because of Pacific oysters.

EUROPEAN OYSTER

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European oyster

Ostrea edulis

Photo: Hans-Ulrich Rösner

Europæisk østers

Europäische Auster

Platte oester

The European oyster was once a natural part of the underwater world in the area now known as the Wadden Sea World Heritage Site but disappeared long before its designation due to severe overfishing. If reintroduction efforts in the North Sea succeed, and there are sufficiently large fishing-free zones in the Wadden Sea, this ecologically important species could one day return to its original habitat.

Size: 12–18 cm diameter.

Lifespan: Up to 40 years.

Appearance: Almost circular to elliptical, flat; the left valve (attached to the substrate) is more convex than the right (lid). Usually light grey, sometimes light brown or greenish.

Distribution: Eastern Atlantic coast from Norway to the Mediterranean, down to about 80 m depth

Occurrence: Extinct in the North Sea and Wadden Sea, but reintroduction efforts by BfN and AWI have been ongoing for several years

Habitat: Requires at least 15 °C water temperature and a salinity of 19 ‰

Diet: Filters plankton, but without a siphon

Reproduction: Hermaphrodite; changes sex depending on water temperature. Temporary females absorb sperm through gill water, fertilizing eggs internally.

Development: Larvae hatch after two weeks, first living in plankton, then settling on hard substrate.

Threats: Heavily overfished and endangered across Europe (Red List Germany: “critically endangered”).

A parasitic protozoan introduced from California (Bonamia) kills many native oysters. The species is sensitive to water pollution.

The European oyster became extinct in the Wadden Sea around 1930 due to overfishing. Shells found today on tidal flats range from 95 to 10,000 years old.

In 1877, Kiel professor Karl Möbius coined the term biocenosis (community of organisms) based on oyster beds – a foundational ecological concept.

European oyster shells are time capsules from the past.

SHORE CRAB

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Shore crab

Carcinus maenas

The Common shore crab is a frequent resident of the underwater world in the Wadden Sea World Heritage Site and plays a dual ecological role: as a predatory hunter of small animals and as prey for fish and birds, it is an important part of the natural food web in this dynamic ecosystem.

Photo: Hans-Ulrich Rösner

Strandkrabbe

Strandkrabbe

Strandkrab

Size: Males up to 7 cm, females up to 5.5 cm. **Appearance:** Male has three visible triangular segments on the folded abdomen; female has five rounded segments. **Movement:** Mostly walks sideways.	**Distribution:** Along all European coasts, on sandy and rocky shores. **Habitat:** Migrates with the tides in summer onto tidal flats and returns to tidal creeks at low tide; overwinters in deeper waters. One of the most common native large crustaceans in the Wadden Sea, alongside the swimming crab.	**Diet:** Omnivorous; uses claws to crack open prey like mussels. **Defence:** Can shed limbs or claws when threatened; quickly hides from danger, but large males may stand their ground. **Growth:** Regularly moults to grow; can regenerate lost limbs in 2–3 moults.	Key species in the Wadden Sea ecosystem: frequent, a major predator of mussels and other crabs, and important prey for coastal birds. On hard substrates, competes with invasive rock crabs, which are smaller but have larger claws.	Notable for its sideways movement, allowing equal speed in both directions – improving escape chances. The Low German name “Dwarslöper” (“side-runner”) comes from this behaviour. Body colour varies widely and adapts to the environment due to predation pressure: light-coloured individuals are more common on sand, olive-green ones among seaweed. Young crabs (up to 1.5 cm) can also swim using paddle-like legs, like their swimming crab relatives.

The shore crab is the sideways runner of the crab world.

COMMON BROWN SHRIMP

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Common brown shrimp

Crangon crangon

Photo: Rainer Borcherding

Hestereje

Nordseegarnele

Gewone garnaal

The common brown shrimp is a key species in the underwater world of the Wadden Sea World Heritage Site: It plays a central role in the food web – as both a predator of small animals and as prey for fish and coastal birds. However, intensive and widespread fishing of it conflicts with the conservation goals of the Wadden Sea, which seek to maintain natural processes and biodiversity.

Size: Max. 9.5 cm.

Lifespan: 1–5 years.

Appearance: yellowish or brownish but translucent; 10 pairs of legs (5 for walking, 5 for swimming). Females are slightly larger than males.

Distribution: From the White Sea (Russia) to the Atlantic coast of South Africa

Habitat: In summer, it matures in the Wadden Sea (nursery grounds!); in winter, it retreats to deeper waters in the open North Sea

Behaviour: Nocturnal ambush predator – waits for food to approach (e.g., small crustaceans, worms).

Development: Regular moulting needed to grow

Reproduction: From about one year old, up to three times a year.

Defence: Buries itself in sand to avoid predators

"Chameleon of the Wadden Sea": can change colour using pigment cells (red, black, white) to match its surroundings.

Key species in the Wadden Sea ecosystem: frequent, important predator of small animals, and major food source for fish and coastal birds

Threats: Intensive shrimp fishing causes "growth overfishing", meaning individuals are smaller than in the past. Warming seas from climate change may alter species communities, leading to a sharp decline in North Sea shrimp populations.

The North Sea shrimp has many regional names, e.g., Granat or Porren. Most commonly referred to as "Krabbe" when served peeled on a sandwich.

The journey is long – most shrimp are peeled in Morocco.

Shrimp fishing is part of life along the North Sea coast – but since it is still practiced across much of the Wadden Sea, it hinders the goal of undisturbed natural development. A balance between protection and use has yet to be achieved.

Most people know the North Sea shrimp as "Krabbe."

COMMON HERMIT CRAB

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Common hermit crab

Pagurus bernhardus

In the Wadden Sea World Heritage Site, hermit crabs are a characteristic part of the underwater world. They rely on the availability of empty snail shells for protection – an example of the complex interrelationships within this ecosystem.

Photo: Rainer Borcherding

Almindelig eremitkrebs

Gewöhnlicher Einsiedlerkrebs

Gewone heremietkreeft

Appearance: Yellow, brown, or red in colour.

Identification: Right claw significantly larger than the left; inner edge of the right, solid claw part is reddish-brown.

Habitat: Young individuals live in shallow water, older ones in deeper areas, where the common whelk is more frequently found.

Behaviour: Lives in empty snail shells up to the size of a common whelk. When threatened, the crab retreats into the shell. As it grows, it searches for a larger shell and moves into it.

Diet: Filter feeder, scavenger, and predator.

Reproduction: In spring, the female lays 1,000–30,000 eggs, fertilized inside the shell by sperm drawn in with water currents. The larvae live in plankton for several weeks.

Threats: None known.

The scientific name translates to "Bernhard Fat-Tail," referring to both the species' soft abdomen and Saint Bernard of Clairvaux, a hermit monk from the 12th century.

Hermit crabs often live in symbiosis with the sea anemone Calliactis. It can enlarge the shell opening, so the crab doesn't need to relocate as often. The anemone benefits from better access to food through the crab's mobility.

The hermit crab's claws adapt to the shape of the shell opening to seal it optimally.

COMMON STARFISH

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Common starfish

Asterias rubens

The starfish is an important resident of the underwater world in the Wadden Sea World Heritage Site, playing a significant role both as predator and prey.

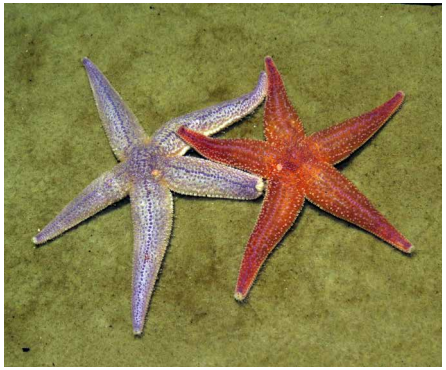


Photo: Rainer Borcherding

Almindelig søstjerne

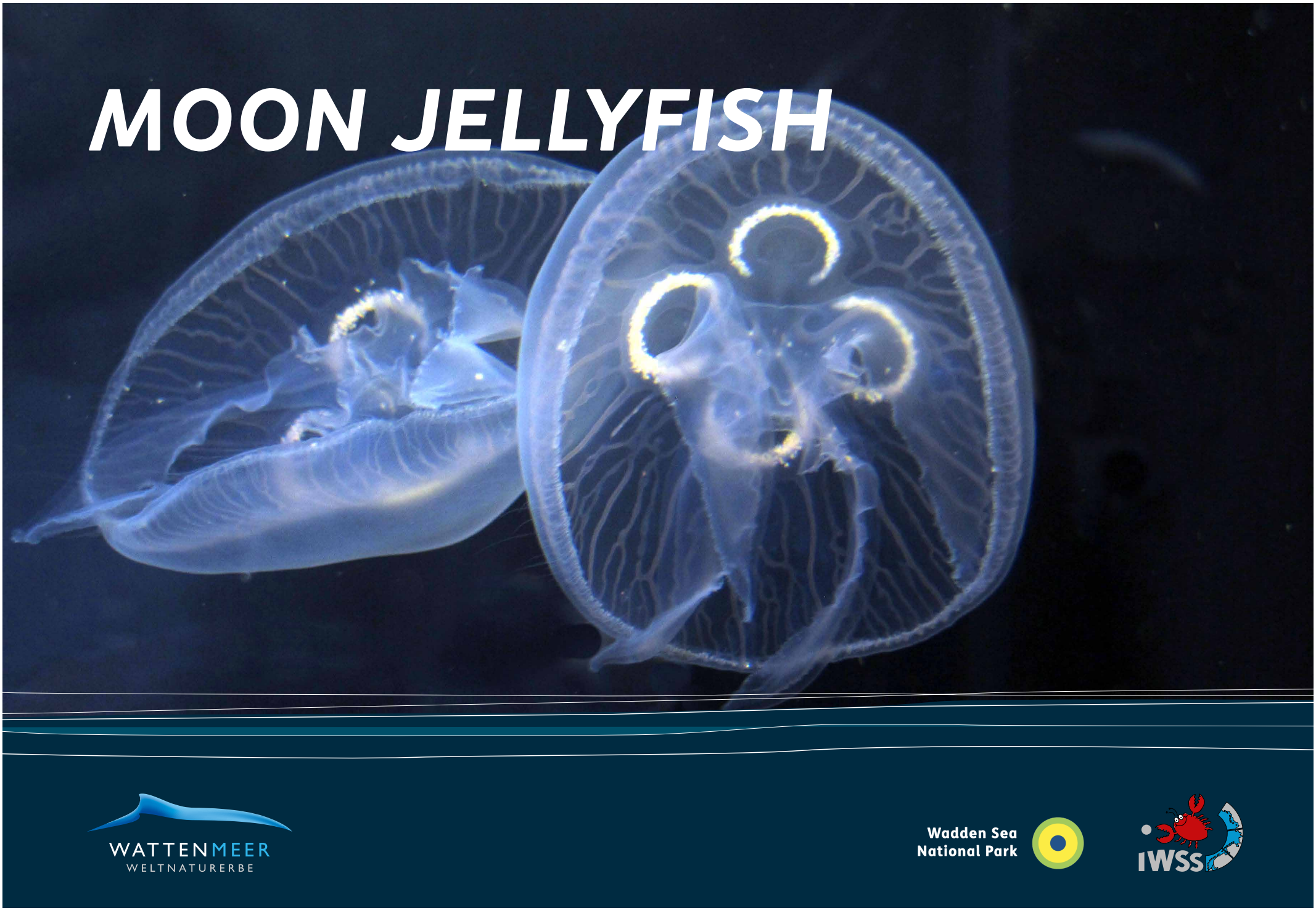
Seestern

Zeester

Size: Up to 50 cm; up to 6 kg. **Lifespan:** Between 5 and 30 years; reaches sexual maturity at around 2–4 years. **Appearance:** Usually 5 arms; coloration typically orange-red, sometimes blue-violet or brownish depending on the region.	**Distribution:** Atlantic coasts of Europe and North America, also in the western Baltic Sea. **Habitat:** In the permanently submerged areas of the Wadden Sea, prefers mussel beds. In exposed tidal flats it hides, for example under mussels or similar.	**Diet:** Predator of mussels, snails, and sometimes careless crabs or fish. Opens shells with a short, powerful pull of its arms or by prying them open for hours. Digests food externally by extending its stomach through its mouth into the opened shell and releasing digestive fluids. **Development:** Separate sexes; gametes released in spring; planktonic larval phase lasts 3 months.	**Predators:** Gulls, eider ducks, larger starfish, and sunstars. **Competition:** Disliked by mussel farmers due to high mussel consumption.	Starfish have no brain; all organs are arranged in rings or radial symmetry, and all arms are equal. At the tip of each arm is a tiny dark eyespot capable of distinguishing light from dark. They can regenerate lost arms but often die from injuries during trawling. Different species have varying numbers of arms (e.g., the crown-of-thorns starfish can have up to 23). In times of food shortage, starfish can exhibit “negative growth” – they shrink.

Starfish can “see” using the tips of their arms.

MOON JELLYFISH



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Moon jellyfish

Aurelia aurita

The moon jellyfish is a resident of the underwater world in the Wadden Sea World Heritage Site and closely connects this unique coastal ecosystem with the open North Sea.

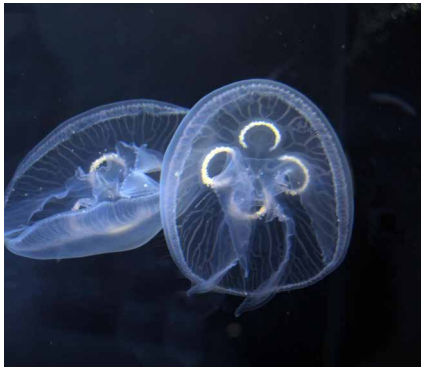

Photo: Rainer Borcherding

Øregople

Ohrenqualle

Oorkwal

Classification: True jellyfish (Scyphozoa).

Size: 20–30 cm.

Lifespan: Up to 1 year.

Appearance: Flat, transparent, colourless bell; four ring-shaped gonads ("ears") – white in males, red in females; four gelatinous oral arms that do not reach the bell margin. Tentacles on the edge contain many stinging cells. Composed of 98 % water.

Distribution: North Sea, Baltic Sea up to the Åland Islands; present mainly during the warmer half of the year, like all true jellyfish.

Development: Larvae develop into 2–3 mm stalked polyps on the seafloor. In spring, each polyp produces 10–20 disk-shaped young jellyfish (ephyrae).

Locomotion: Very slow swimmers, drifting with the current (plankton = "that which drifts"). Elegant pulsating movements with flowing edge tentacles.

Diet: Captures zooplankton.

Threats: None known.

However, mass blooms may indicate eutrophication (due to high plankton levels) and overfishing (due to lack of natural predators like fish).

Moon jellyfish are found worldwide in several species that are only distinguishable genetically.

Along the bell margin there are 8 small sensory structures with eye spots; opposite the mouth is a balance organ.

Moon jellyfish are harmless to humans. But caution is advised with other North Sea jellyfish such as the lion's mane jellyfish and blue jellyfish, whose stinging cells can cause pain on contact.

Jellyfish only appear in summer – in winter, they survive as polyps on the seabed.