The Bycatch Mitigation Research Box

Structure and use in the classroom



CIBBRINA

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General information

The Research Box is an innovative teaching concept designed to bring science closer to students in an engaging, practical, and creative way. Each box addresses a current ecologically and socially relevant topic (including CIBBRiNA), often related to biodiversity, sustainability, or environmental protection. By combining analogous experiments, digital tools, and interactive media, students are guided step by step into authentic scientific work.

A typical unit begins with an introductory film that presents the main problem or research question and sparks curiosity. From there, students work collaboratively on a series of tasks that include experiments, modelling, discussions, role plays, and creative idea generation.

The Research Box can be flexibly integrated into everyday lessons or used for a project week. Each set of tasks is carefully aligned with curriculum requirements while maintaining a high level of creativity and student motivation. Developed in accordance with the principles of Education for Sustainable Development (ESD), it enables learners to reflect on ecological, social, and economic dimensions of sustainability while actively shaping solutions for the future.

Teachers benefit from a ready-to-use, low-preparation resource that fosters teamwork, problem-solving, and critical thinking. The Research Box thus creates a dynamic learning environment that goes far beyond traditional classroom instruction.

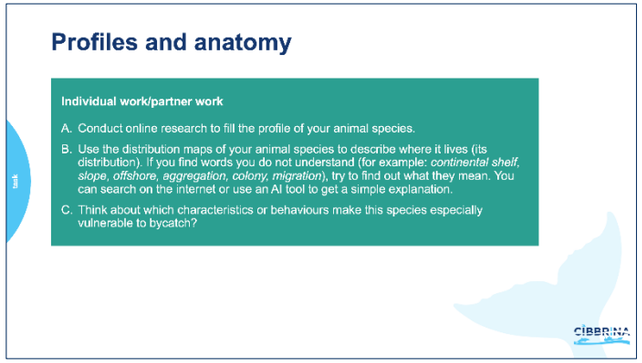
Introductory movie

The research box begins with the introductory film. This should be shown to the students at the beginning of the first sub-unit. The film consists of two parts and can be opened via the following link. First, the research topics and the activities of a scientist are introduced. Then the students are introduced to the topic of the research box and the problem to be addressed.

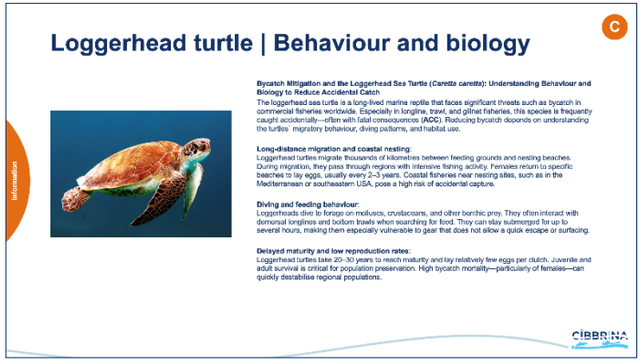
To the apprentices' page

Task block

Groups of between three and four students should be formed before the work begins and should remain together for the entire time the box is being worked on. Each task block shall be solved by these groups in order to keep time with everyone and to ensure that no one is left behind.



Task sheets and slips of paper which the students have to fill are blue-coloured.

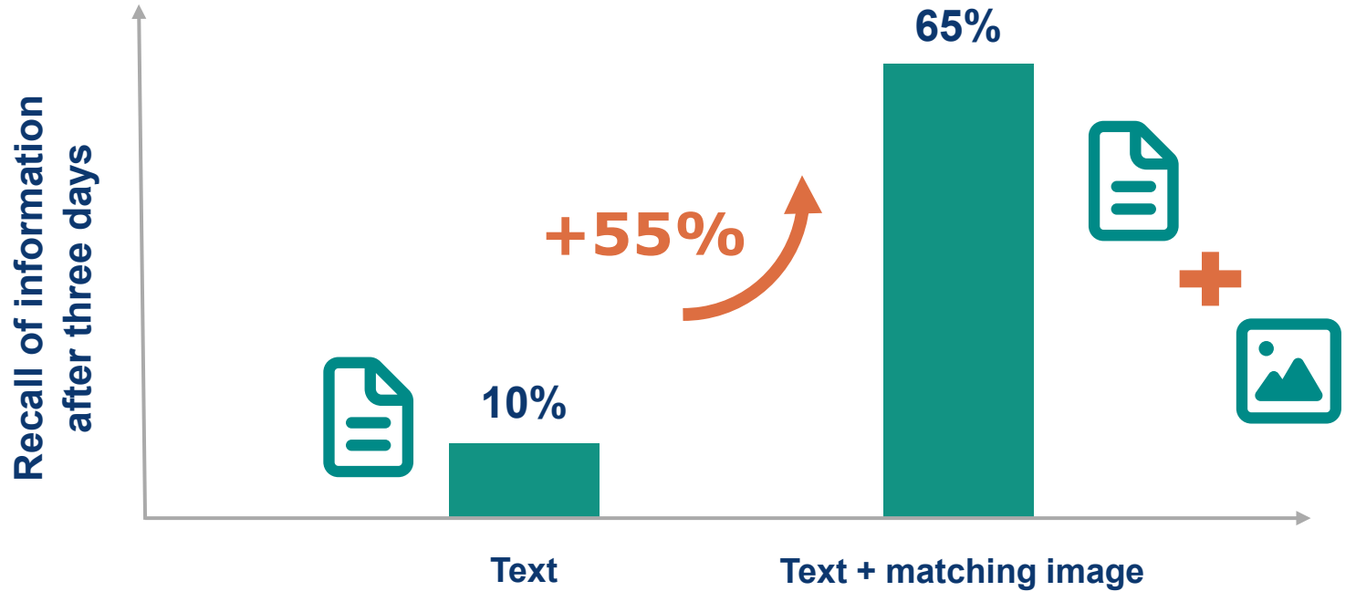


Information sheets are orange-coloured. They do not need to be filled.

Handouts through sketchnoting

"Sketchnoting" is the term used to describe the creation of visual notes. By combining images and words for the students, we want to enhance their understanding and memory of the content and connections discussed in our research boxes.

The idea of sketchnoting is based on "picture superiority effect".



Handouts through sketchnoting

The students develop an "overall diagram" during the project work. We show the following two options to use sketchnoting in the research box:

Option 1

Step 1
When discussing the task in the plenary, students write down the key statements in text form.

Step 2
Students finish the project work by summarising the individual core statements in a large diagram using the sketchnoting method as a retrospective.

OR

Option 2

Step 1
When discussing the task in the plenary, students write down the key messages using the sketchnoting method.

Step 2
Students finish the project work by one of them presenting the “overall diagram” and the other studenta completing theirs.

Introduce your students to the method with the help of the "sketchnoting introductory presentation".

The aim of this research box

In each research box, the students first familiarise themselves with a specific topic and then develop a solution to a problem at the end. The overarching aim is not only to sensitise children and young people to environmental and nature conservation issues, but also to encourage them to see that they can effectively make a difference with their actions, even if the challenges seem very large (see ESD targets).

This research box is a practical and didactic material for education purposes developed within the EU LIFE CIBBRiNA project, one of several projects aiming to minimise and where possible eliminate bycatch (accidental capture in fishing gear) of endangered, threatened and protected (ETP) species in European fisheries.

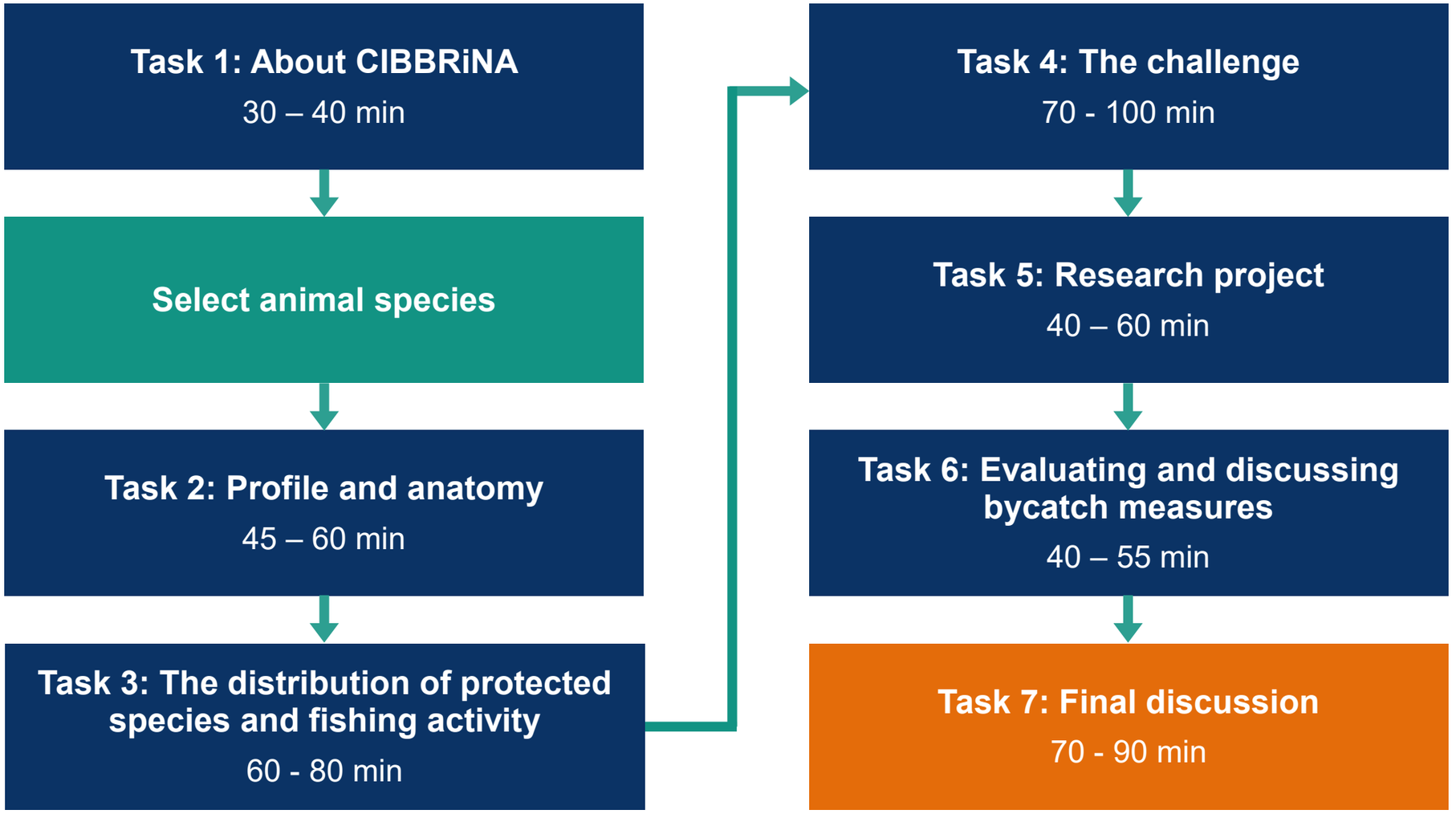
The Coordinated Development and Implementation of Best Practice in Bycatch Reduction in the North Atlantic, Baltic and Mediterranean Regions (CIBBRiNA) project covers the named regions, working collaboratively with fishermen, authorities, scientists, and other relevant stakeholders to achieve efficient bycatch reduction.

The aim of this research box

This research box aims to teach students about **the impact of bycatch of endangered, threatened, and protected (ETP) species** in fisheries and about feasible solutions that may result from collaborative approaches. The students explore at least one animal species in depth, examine the effects of bycatch on this species, and look for suitable solutions to mitigate these effects. They also relate their findings to the marine ecosystem by developing an understanding of the complexity and sensitivity of ecosystems. **It is essential to emphasise that throughout the project work, particularly in the final task, the solutions should be developed in collaboration with fishermen.** Fishermen should not be perceived as a threat, but rather as essential partners helping to address bycatch. The impact on fishing activities and communities will be addressed in order to incorporate social and economic challenges of fishermen into sustainable solutions that respect both their livelihoods and species conservation.

The following diagram explains the research box process in more detail. It is important to note that the students need tablets or laptops to complete the tasks.

Procedure of the research box



Learning objectives and content

Task 1: About CIBBRiNA	This task focuses on understanding what the CIBBRiNA project is, its main objectives, and why reducing bycatch of endangered, threatened, and protected (ETP) species is important. The learning target is to raise awareness of biodiversity conservation, sustainable fisheries, and the ecological importance of protecting vulnerable marine species.
Task 2: Profile and anatomy	This task encourages students to research and describe the biological profile, distribution, and vulnerabilities of a selected animal species. The learning target is to establish research skills, understand ecological terminology, and analyse which traits or behaviours put certain species at risk of bycatch in fisheries.
Task 3: The distribution of protected species and fishing activity	This task asks students to connect fishing methods with the animal species they impact by analysing maps and fact sheets. The learning target is to understand spatial overlaps, assess risks for different species, and practice classifying threats using a colour-coded system for bycatch vulnerability.
Task 4: The challenge	This task guides students to analyse and explain fishing methods, their mechanisms, and their risks for specific species. The learning target is to combine knowledge and creativity by labelling diagrams, summarising processes, creating research prompts, and visualising ecosystems to understand how fishing practices and bycatch impact marine habitats.

Learning objectives and content

Task 5: Research project	This task introduces students to the process of designing and evaluating a research project. The learning target is to develop problem-solving skills by planning a study on bycatch impacts, proposing solutions, and creating a review system. It emphasises teamwork, scientific thinking, and structured approaches in environmental conservation.
Task 6: Evaluating and discussing bycatch measures	This task focuses on critically evaluating different bycatch reduction measures. Students discuss effectiveness, acceptance by fishermen, need for enforcement, and motivation for each option. The learning target is to practise debate, collaborative decision-making, and weighing ecological and social factors when assessing conservation strategies.
Task 7: Final discussion	This task engages students in a role-play debate where they take perspectives of different stakeholders (fishermen, scientists, NGOs, consumers, politicians) to propose and evaluate bycatch solutions. The learning target is to practise critical thinking, debate, and collaboration while balancing ecological, social, and economic viewpoints in conservation decision-making.

Task 1 | About CIBBRiNA

Task definition

A. Watch the interview about CIBBRiNA and answer the questions about the project.

Learning target

Understanding the scientific language of English | Framework and objectives of the CIBBRiNA project | Definition and threats of bycatch | Link between science, fisheries, and bycatch | Challenges in reducing bycatch | Anthropogenic impact on the biosphere | Ecosystem ocean - utilisation and vulnerability

Competencies

- Knowledge competence

Materials

- YouTube video, digital device

Notes

Social form

- Individual work

Time

- 30–40 min

Solution

About CIBBRiNA

What is the CIBBRiNA project and what are its main objectives?

The CIBBRiNA project promotes cooperation between participating parties and countries to reduce bycatch. Its mission is to minimise bycatch of threatened, endangered and protected species (ETP).

Why is it important to reduce bycatch of threatened, endangered and protected (ETP) species?

It is important to reduce bycatch because otherwise the populations of these species could become highly endangered or even extinct. Furthermore, there is little precise data on bycatch rates, which makes it difficult to assess the problem. In addition, bycatch can disrupt ecosystems with knock-on effects on fish stocks, pose risks to fishermen due to safety hazards, cause loss of revenue, and reduce ecosystem functions and services which wider society depends on.

Who are the participants in CIBBRiNA?

Various stakeholders are involved in the CIBBRiNA project, including the fishing industry, scientists and scientific institutes, NGOs, and the authorities, ministries and government representatives of many European countries.

Which role do fishermen play in CIBBRiNA?

Fishermen play a central role in the CIBBRiNA project, as they are significantly involved in the development and implementation of methods to reduce bycatch.

About CIBBRiNA

What are the challenges in implementing measures to reduce bycatch?

The problem is complex and there are a number of challenges. One challenge in implementing measures to reduce bycatch is that decision-makers in fisheries need to be involved in the project to ensure that the solutions are actually implemented. Also, there is no single solution that functions everywhere – different approaches need to be developed to suit the conditions, such as the species, the ecosystem or the season. In addition, the characteristics of fisheries and other human activities must also be considered. Fisheries differ in their fishing methods, the animals they catch, and their economic conditions. These differences have a major influence on measures for bycatch. Solutions must therefore be adapted to each situation so that they both protect the environment and are feasible for fishermen.

Give an example of a successful bycatch reduction measure.

One successful example of bycatch reduction is the so-called excluder panel for seals, which is used in pelagic trawls and enables the animals to escape from the nets.

What long-term effects are expected from the CIBBRiNA project?

In the long term, it is hoped that fishermen in different regions will not only be supported in using general methods to reduce bycatch, but also in cooperating to identify the most suitable technologies. The aim is to strike a balance between technical feasibility, economic viability and ecosystem protection. In addition, enabling and encouraging fishermen to share bycatch data, while addressing challenges such as concerns about potential repercussions, can help to develop a more comprehensive understanding of the issue. Finally, improved collaboration between countries, rather than isolated action, is expected to enhance these efforts.

Task 2 | Profile and anatomy

Task definition

A. Research on the internet to fill in the profile of your animal.

B. Use the respective distribution map of your animal species to describe its distribution.

C. A special feature of the anatomy of each animal species is presented. Answer the questions about the special feature of your animal species.

Learning target

internet research | reading and understanding distribution maps | anatomy of a specific animal species | lifestyle and habitat of a specific animal species | sensory organs and behaviour in vertebrates | adaptation to its habitat | reproductive fitness

Competencies

- Methodological competence
- Knowledge competence
- Spatial orientation

Materials

- Profile, digital device

Notes

Social form

- Individual work

Time

- 30–40 min

Profile and anatomy of the loggerhead turtle

Fact sheet: loggerhead turtle (*Caretta caretta*)

General features

- Family: Cheloniidae
- Size: shell (carapace) usually about 90 cm long
- Weight: between 135 and 160 kg
- Colour: shell is reddish-brown, underside (plastron) is yellowish-white
- Life expectancy: up to 50 years

Distribution and habitat

- In warm and mild oceans around the world (subtropical and temperate waters).
- Habitat: mostly in the open sea, but females come to coastal beaches to lay their eggs.
- Position in the water and diving depth: mostly in the upper 10–30 m, but can dive to about 200 m.
- Distance from shore: young ones live far out in the sea, hundreds of kilometres from the coast. Adults usually stay less than 30 km from the coast when they are not migrating.

Diet

- Mainly molluscs (like snails and clams), crabs, fish, and sometimes jellyfish.
- Feeding behaviour: they hunt alone and use their strong beak to crush hard-shelled animals.

Reproduction

- Pregnancy: after mating, females lay eggs about 2 months later.
- Birth: they bury the eggs in the sand on beaches; the baby turtles hatch after around 60 days.
- Care: the hatchlings are completely independent after birth; there is no parental care.

Special features

- Behaviour: can swim long distances and dive for several hours without coming up to the surface for air.
- Conservation status: vulnerable.
- Threats: overfishing, bycatch (especially from longlines and gillnets), loss of nesting beaches, pollution, boat strikes, illegal hunting (poaching), and climate change.

Explanation of terms

- **Carapace**: the hard upper shell of a turtle.
- **Plastron**: the bottom part of a turtle's shell.
- **Molluscs**: soft-bodied animals, often with a shell (like clams and snails).
- **Longline fishing**: a fishing method using a very long line with many baited hooks.
- **Poaching**: illegal hunting or capture of wild animals.

Profile and anatomy of the loggerhead turtle

The loggerhead turtle is especially vulnerable to bycatch because of a few key traits

- **Size** – A large sea turtle, making it more likely to get caught in nets or on hooks.
- **Feeding behaviour** – Forages near the surface and seabed, often in fishing zones.
- **Movement** – Migrates long distances through areas with heavy fishing activity.
- **Habitat** – Spends time in coastal and open ocean areas where fishing gear is used.

Profile and anatomy of the razorbill

Fact sheet: razorbill *(Alca torda)*

General features

- Family: alcids (Alcidae)
- Size: 38 to 43 cm long
- Weight: 500 to 900 grams
- Colour: black back, white belly, black head with a clear white stripe above the eye
- Life expectancy: 20 to 25 years

Distribution and habitat

- Along the coasts of the North Atlantic, including northern Europe and North America.
- Habitat: coastal cliffs and rocky islands; they nest in large groups (called colonies).
- Position in the water and diving depth: foraging dives typically 10–40 m deep, maximum about 120 m.
- Distance from shore: They are usually found within 50 km of the coast or their breeding colony, hunting near the shallow sea floor (continental shelf) where the water is less than 200 m deep.

Diet

- Mainly fish like herring and sand eels; sometimes also small crabs and other sea animals.
- Feeding behaviour: they dive underwater to catch prey, using their wings to swim; can dive up to 100 m deep.

Reproduction

- Nesting: female lays one egg per year, usually in a rock crevice or shallow burrow.
- Incubation: the egg is kept warm for about 30 days until it hatches.
- Parental care: both parents care for the chick; the chick learns to fly after 30 to 40 days and then leaves the nest.

Special features

- Behaviour: razorbills are strong flyers and excellent underwater hunters.
- Conservation status: least concern (IUCN).
- Threats: loss of nesting areas due to coastal erosion, lack of food due to overfishing, marine pollution, and climate change.

Explanation of terms

- **Alcids**: a family of seabirds that includes puffins, guillemots, and razorbills
- **Colony**: a large group of birds that nest closely together
- **Coastal erosion**: the wearing away of coastlines, often caused by storms or rising sea levels
- **Overfishing**: catching too many fish, leaving too few food for other animals
- **Incubation**: the time a bird keeps its egg warm until it hatches

Profile and anatomy of the razorbill

The razorbill is especially vulnerable to bycatch because of a few key traits

- **Size** – Medium-sized seabird, large enough to get caught in fishing gear.
- **Feeding behaviour** – Dives underwater to catch fish, which can lead it into nets.
- **Movement** – Flies and swims through areas with heavy fishing activity.
- **Habitat** – Coastal waters where fishing boats operate frequently.

Profile and anatomy of the common dolphin

Fact sheet: common dolphin (*Delphinus delphis*)

General features

- Family: dolphins (Delphinidae)
- Size: 1.8 to 2.5 meters long
- Weight: 70 to 135 kg
- Colour: black, yellow and white pattern on the sides, with a light hourglass shape
- Life expectancy: 30 to 35 years

Distribution and habitat

- Tropical and temperate oceans around the world.
- Habitat: mostly in the open sea, but sometimes near the coast.
- Position in the water and diving depth: spends most of the time in the upper 30 m, feeding dives down to 300 m.
- Distance from shore: they usually live at the edge of the continental shelf and in open ocean waters, 20–200 km away from the coast. They are rarely found in shallow bays.

Diet

- Different fish species like mackerel and herring, also squid (cephalopods).
- Hunting behaviour: hunt together in groups and use echolocation to find prey.

Reproduction

- Pregnancy: lasts 10 to 12 months.
- Birth: usually one calf is born.
- Care: the mother looks after the young very closely for 14 to 19 months; the calf often stays with the mother for several years.

Special features

- Behaviour: very social animals that live in groups called schools; they have strong bonds and complex group behaviour.
- Conservation status: not endangered globally (IUCN), but some populations are threatened.
- Threats: overfishing, bycatch, underwater noise, ship collisions, ocean pollution, and climate change.

Explanation of terms

- **Echolocation**: a way animals use sound to locate things around them. Dolphins send out clicks and listen for echoes to find prey.
- **Cephalopods**: a group of sea animals that includes those such as squid and octopus.
- **Temperate seas**: oceans that are not too hot or too cold, between tropical and polar regions.
- **Schools**: groups of dolphins or fish that swim together.

Profile and anatomy of the common dolphin

The common dolphin is especially vulnerable to bycatch because of a few key traits

- **Size** – Medium-sized marine mammal, large enough to get trapped in nets.
- **Feeding behaviour** – Hunts fish near the surface and may follow fishing boats, increasing the risk of entanglement.
- **Movement** – Swims in large, fast-moving groups that often overlap with active fishing areas, which increases the risk of entanglement.
- **Habitat** – Lives in coastal and offshore areas where fishing is common.

Profile and anatomy of the common blue skate

Fact sheet: common blue skate (*Dipturus batis*)

General features

- Family: Rajidae
- Size: up to 2.5 metres long, including the tail
- Weight: up to 45 kg
- Colour: grey-brown with spots on the top side, whitish underneath
- Life expectancy: can live 50 years or more

Distribution and habitat

- North-East Atlantic Ocean – from Norway down to West Africa and also in the Mediterranean Sea.
- Habitat: seafloor (demersal).
- Position in the water and diving depth: demersal, typically 10–600 m deep, most sightings at 100–150 m.
- Distance from shore: on the shallow part of the sea floor (continental shelf) and the beginning of the deeper slope, usually less than 100 km from the coast.

Diet

- Animals that live on or in the seabed, like crabs, mussels, worms, and small fish.
- Feeding behaviour: they stay still, hidden in the sand, and quickly grab prey that comes too close.

Reproduction

- Pregnancy: they lay eggs in strong, leathery cases often called "mermaid's purses" or "skate eggs".
- Birth: the young hatch after about 9 months.
- Care: the young are fully independent after hatching; the parents do not take care of them.

Special features

- Behaviour: they often bury themselves in the sand to hide or wait for prey.
- Conservation status: endangered (IUCN), already extinct in some areas.
- Threats: overfishing, bycatch (especially in gillnets), habitat destruction, pollution, and climate change.

Explanation of terms

- **Bottom-dwelling**: lives on or near the ocean floor.
- **Gillnet**: a fishing net that hangs in the water and trap fish by their gills; other animals can be caught by accident.
- **Mermaid’s purse**: a nickname for the tough egg cases of some sharks, skates, and rays.

Profile and anatomy of the common blue skate

The common blue skate is especially vulnerable to bycatch because of a few key traits

- **Size** – A very large and flat fish, increasing the risk of being trapped in nets or trawls.
- **Feeding behaviour** – Feeds on the seabed, where bottom trawling occurs.
- **Movement** – Slow-moving, so it cannot escape fishing gear easily.
- **Habitat** – Stays close to the seabed in coastal and offshore fishing zones.

Profile and anatomy of the basking shark

Fact sheet: basking shark (*Cetorhinus maximus*)

General features

- Family: Cetorhinidae
- Size: usually 6–8 meters, up to 10 metres
- Weight: up to 4 tons
- Colour: dark grey to brown with lighter spots
- Life expectancy: about 30–50 years

Distribution and habitat

- Temperate oceans around the world; rarely found in tropical or polar regions.
- Habitat: near the coast and in the open ocean; often seen at the surface or in the open water away from the sea floor.
- Position in the water and diving depth: Near the surface (0–10 m) when feeding, but can dive deeper than 1000 m.
- Distance from shore: They are usually found near the coast, in bays and out to the edge of the sea floor, sometimes up to 50 km from land. At certain times of the year, they form groups.

Diet

- Plankton, small fish.
- Feeding behaviour: They are filter feeders and swim with their mouths open, while letting water flow through their gills to catch prey.

Reproduction

- Pregnancy: not exactly known, but they likely give birth to live young after being pregnant for over a year.
- Birth: viviparous.
- Care: young sharks are independent from birth; there is no parental care.

Special features

- Behaviour: slow and calm swimmers; often seen near the surface while feeding.
- Conservation status: endangered (according to IUCN – International Union for Conservation of Nature).
- Threats: fishing, bycatch (accidental capture in nets), ocean pollution, shipping traffic, and climate change.

Explanation of terms

- **Pelagic zone**: the open water part of the ocean, not near the coast or sea floor.
- **Filter feeders**: animals that take in water and filter out small food particles like plankton.
- **Viviparous**: animals that give birth to live young instead of laying eggs.

Profile and anatomy of the basking shark

The basking shark is especially vulnerable to bycatch because of a few key traits

- **Size** – They are large, ranging from 7-10 m (second-largest fish in the world), so they can easily become entangled in fishing nets.
- **Feeding behaviour** – They swim slowly near the surface with their mouths wide open to filter plankton, which makes them less aware of and less able to avoid fishing gear.
- **Movement** – They migrate long distances, often through areas where fishing activity is common.
- **Habitat** – They spend time in coastal waters where fishing boats often operate, increasing the risk of accidental capture.

Task 3 | The distribution of protected species and fishing activity

Task definition

A. Look at the information sheets about the fishing methods. Choose one area of the world where at least two of the ETP species occur and find out which fishing activities take place there. Mark this area on your map.

B. Compare your results with your classmates. Discuss which fishing methods are most likely to cause bycatch in your selected area and why.

C. Using the fact sheets for each species and the information from your research about the fishing activities in your selected area, check if they are found at the same depths in the ocean and at the same distance from the coast. Write your findings in fields 1 and 2 of the table.

D. Decide which animal species is mostly at risk from which fishing method. Create a simple colour code for your results: red = very high risk, yellow = low risk, green = no risk. Colour your results in field 3 of the table and explain why you chose each colour.

Learning target

distribution of a specific animal species | interpreting maps | comparing animal habitats with fishing methods | evaluating risks of fishing for species | using colour codes to present results | transferring information into tables and own words | human impact on marine species

Competencies

- communication
- model competence
- social competence
- knowledge competence

Materials

- animal fact sheets
- maps
- tables

Notes

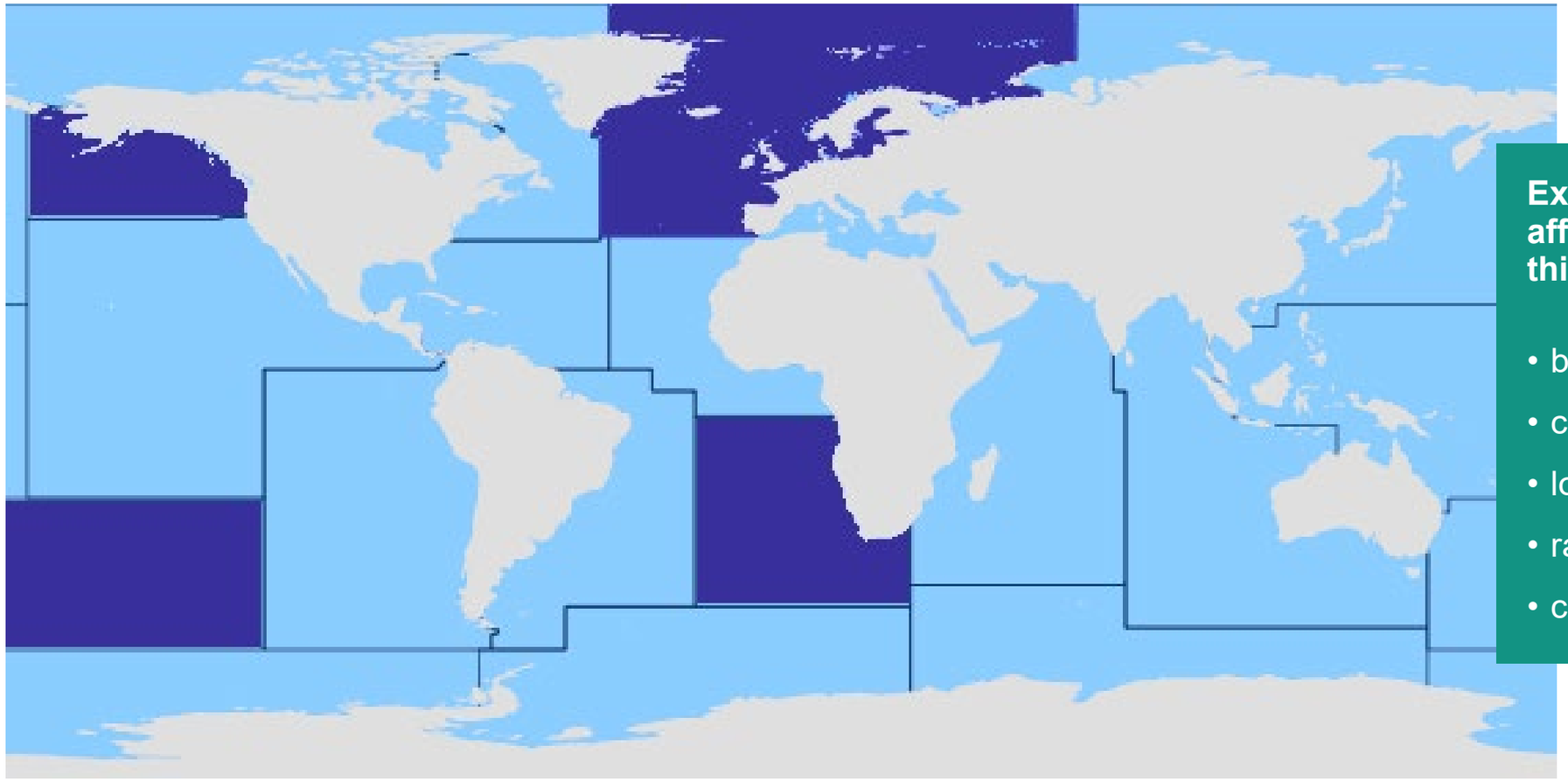
Social form

- individual and group work

Time

- 60–80 min

Pelagic trawling (mid-water trawl)

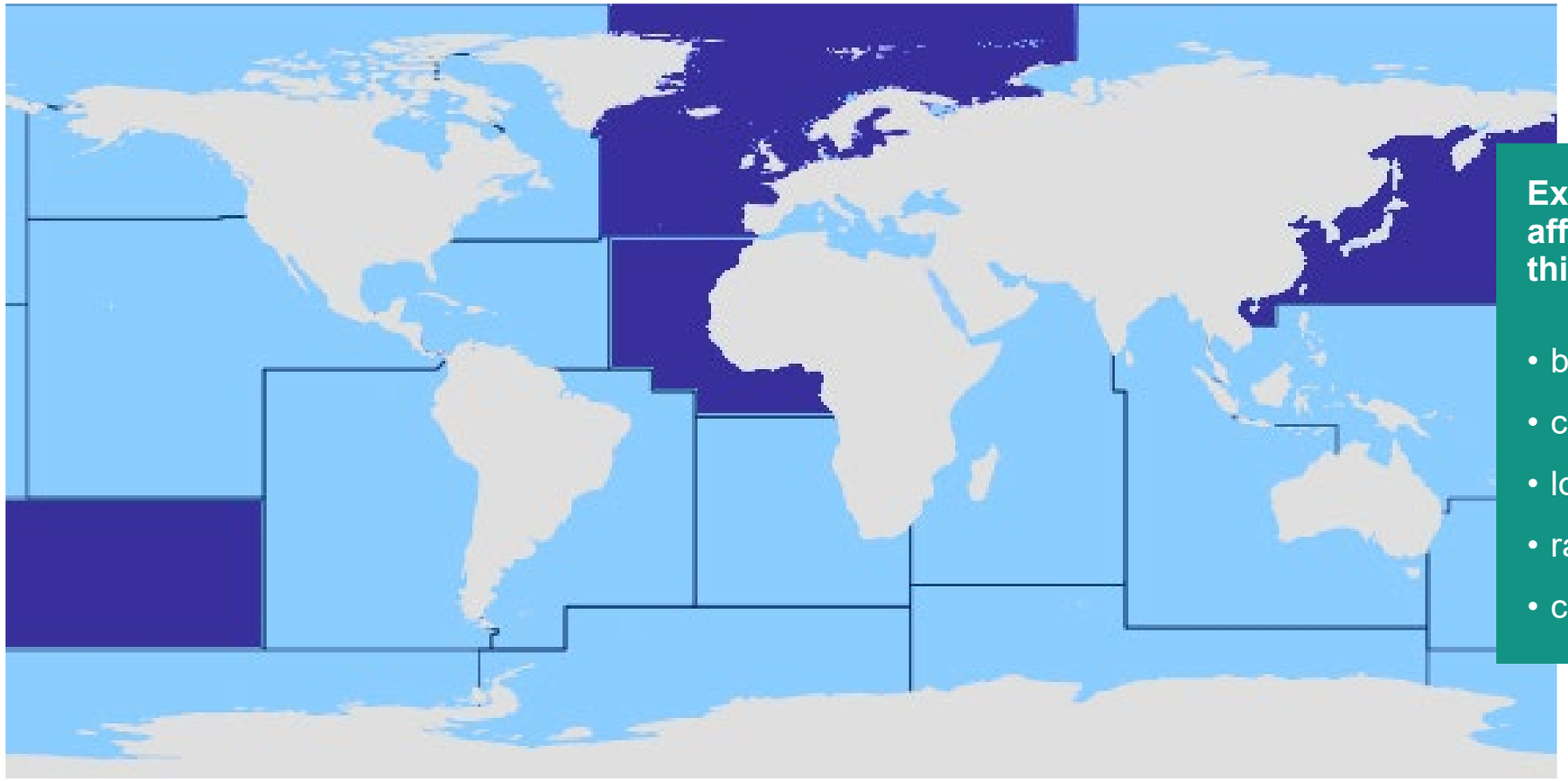


Example species possibly affected in regions where this method is used

- basking shark
- common blue skate
- loggerhead turtle
- razorbill
- common dolphin

This map shows local examples of the occurrence of this fishing method, not the global scale

Bottom trawling (Otter board trawl)

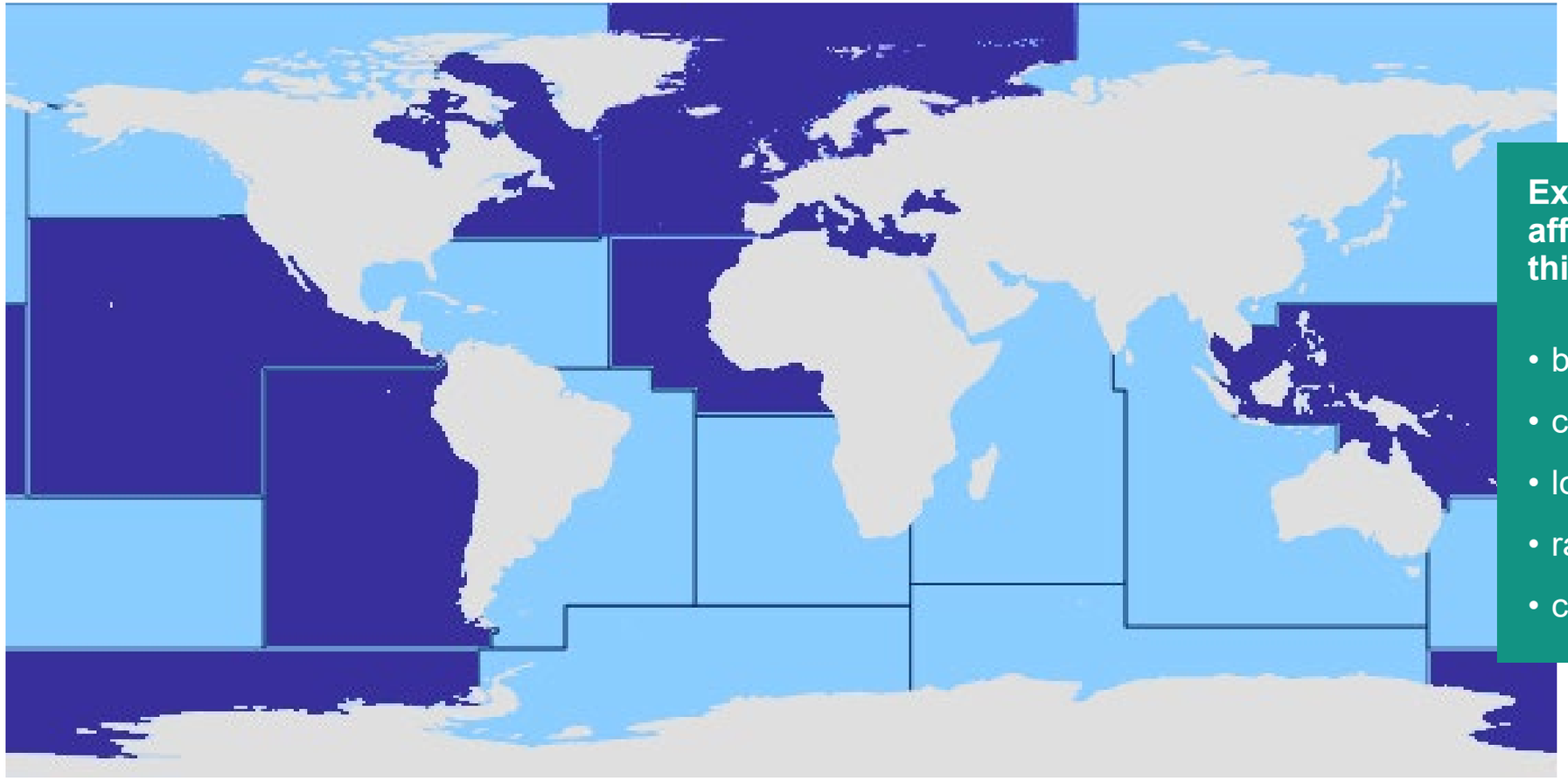


Example species possibly affected in regions where this method is used

- basking shark
- common blue skate
- loggerhead turtle
- razorbill
- common dolphin

This map shows local examples of the occurrence of this fishing method, not the global scale

Longline fishing (surface and bottom)

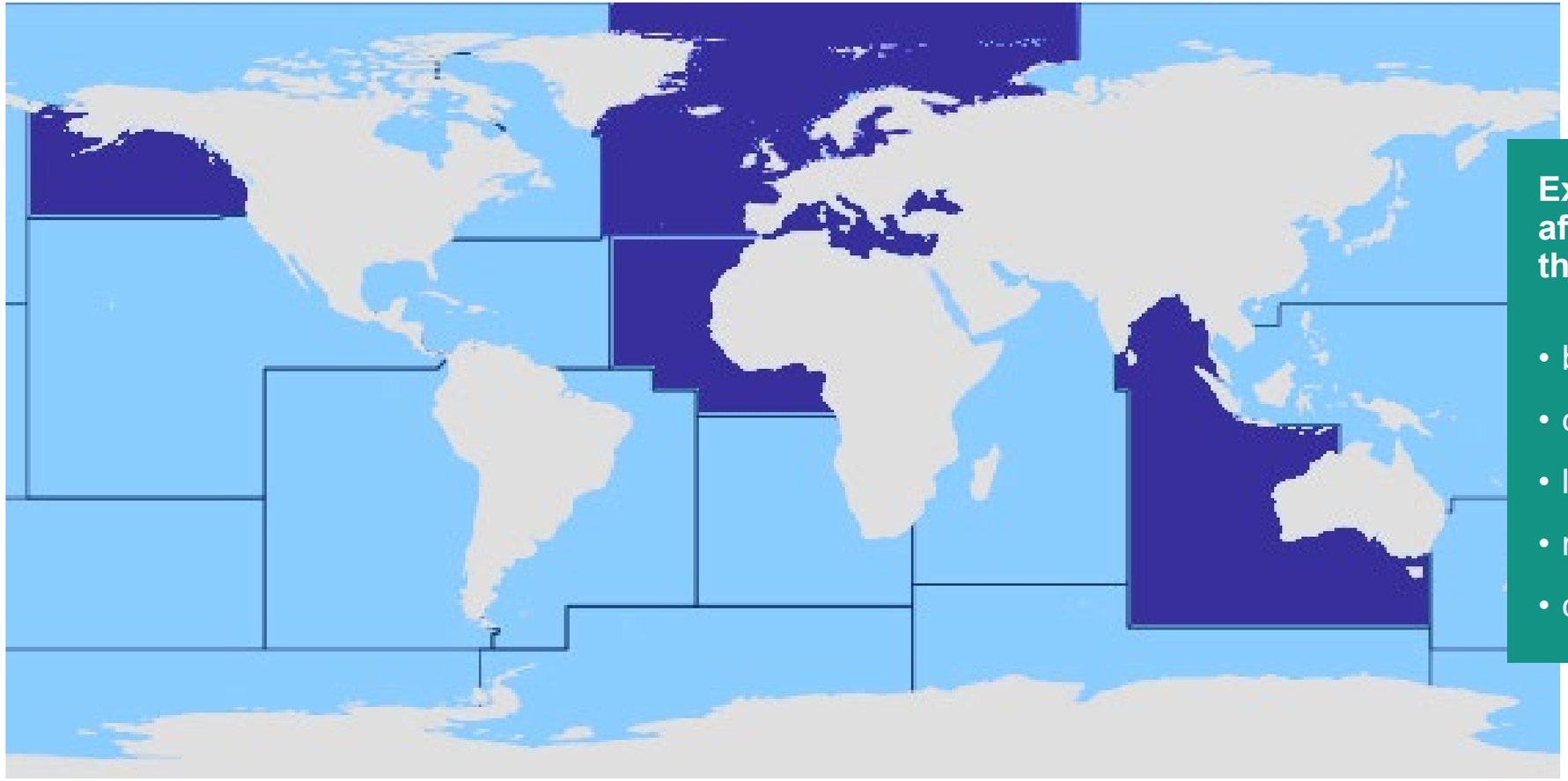


Example species possibly affected in regions where this method is used

- basking shark
- common blue skate
- loggerhead turtle
- razorbill
- common dolphin

This map shows local examples of the occurrence of this fishing method, not the global scale

Gillnet fishing



Example species possibly affected in regions where this method is used

- basking shark
- common blue skate
- loggerhead turtle
- razorbill
- common dolphin

This map shows local examples of the occurrence of this fishing method, not the global scale

Which species affected by which fishing method

	Pelagic trawling (mid-water trawl)		Bottom trawling		Longline fishing (surface and bottom)		Gillnet fishing	
	Depth range	Distance from shore	Depth range	Distance from shore	Depth range	Distance from shore	Depth range	Distance from shore
Razorbill	no	no	no	no	yes	yes	yes	yes
	3:		3:		3:		3:	
Loggerhead turtle	yes	yes	yes	yes	no	no	yes	yes
	3:		3:		3:		3:	
Common dolphin	yes	yes	no	no	no	no	yes	yes
	3:		3:		3:		3:	
Common blue skate	no	no	yes	yes	no	no	yes	yes
	3:		3:		3:		3:	
Basking shark	yes	yes	no	no	yes	yes	yes	yes
	3:		3:		3:		3:	

Task 4 | The challenge

Task definition

A. Read again the reports about each fishing method.

B. Explain how the fishing method works. Use the detailed description you have, but shorten it using your own words. Write your version below the section “How it works”.

C. Choose one fishing method and choose one animal species that can be caught accidentally with this method. Develop your own research prompt to find out how and why this fishing method leads to bycatch of your chosen animal.Then, extend your prompt so that it also suggests possible solutions to reduce this bycatch.

D. Create a picture of the habitat of your chosen animal species. Choose a suitable landscape image and add all typical kinds of flora and fauna that belong to this ecosystem. Finally, include the fishing methods in your diagram that pose a high risk to your chosen species.

Learning target

distinguishing fishing methods | explaining how fishing methods work | understanding bycatch and its causes | linking fishing methods with habitats of animal species | creating visual models of ecosystems (flora and fauna) | evaluating risks of fishing for specific species | human impact on marine ecosystems | transferring scientific information into own words and diagrams

Competencies

- social competence
- judgement competence
- knowledge competence

Materials

- model materials

Notes

The maps are simplified and not always species-specific. The focus is on students making reasoned choices and assessing a consistent habitat, rather than selecting the ‘one correct’ element.

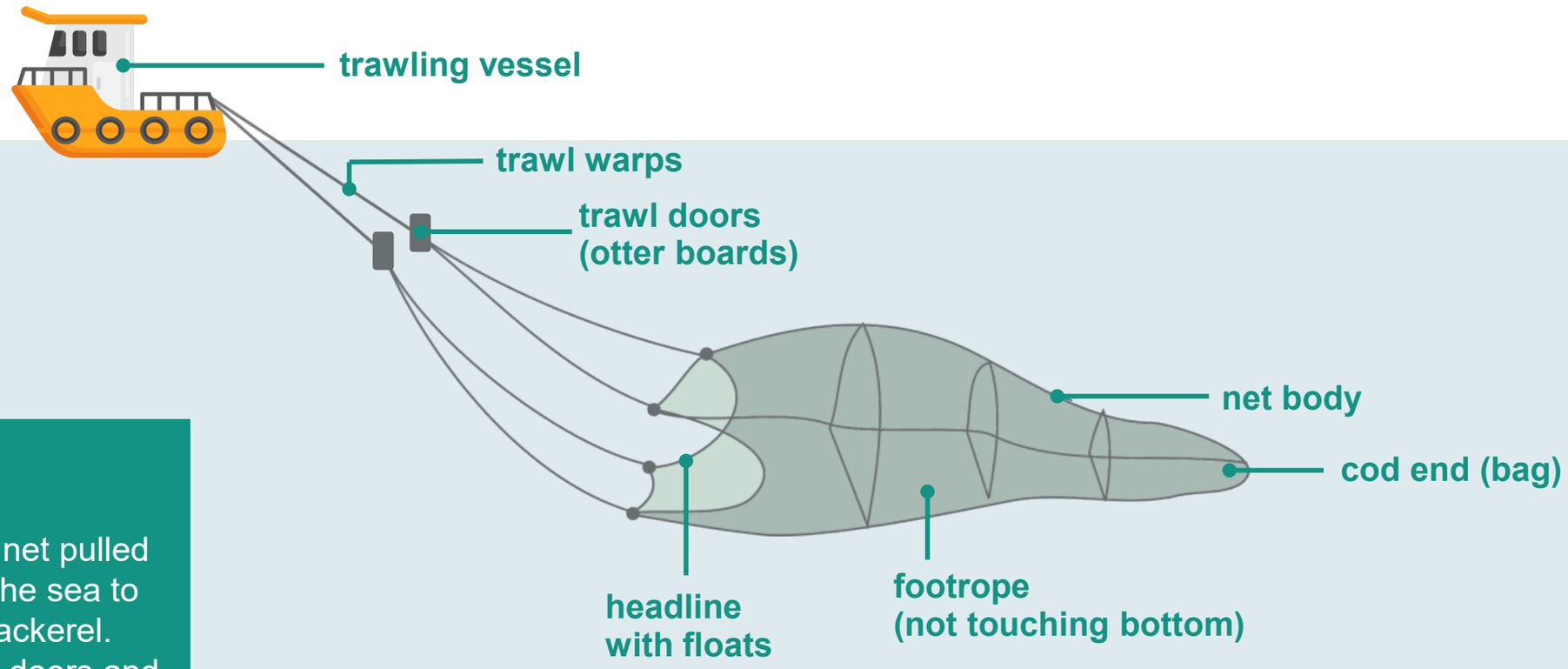
Social form

- individual and partner work

Time

- 70–100 min

Pelagic trawling (mid-water trawl)*

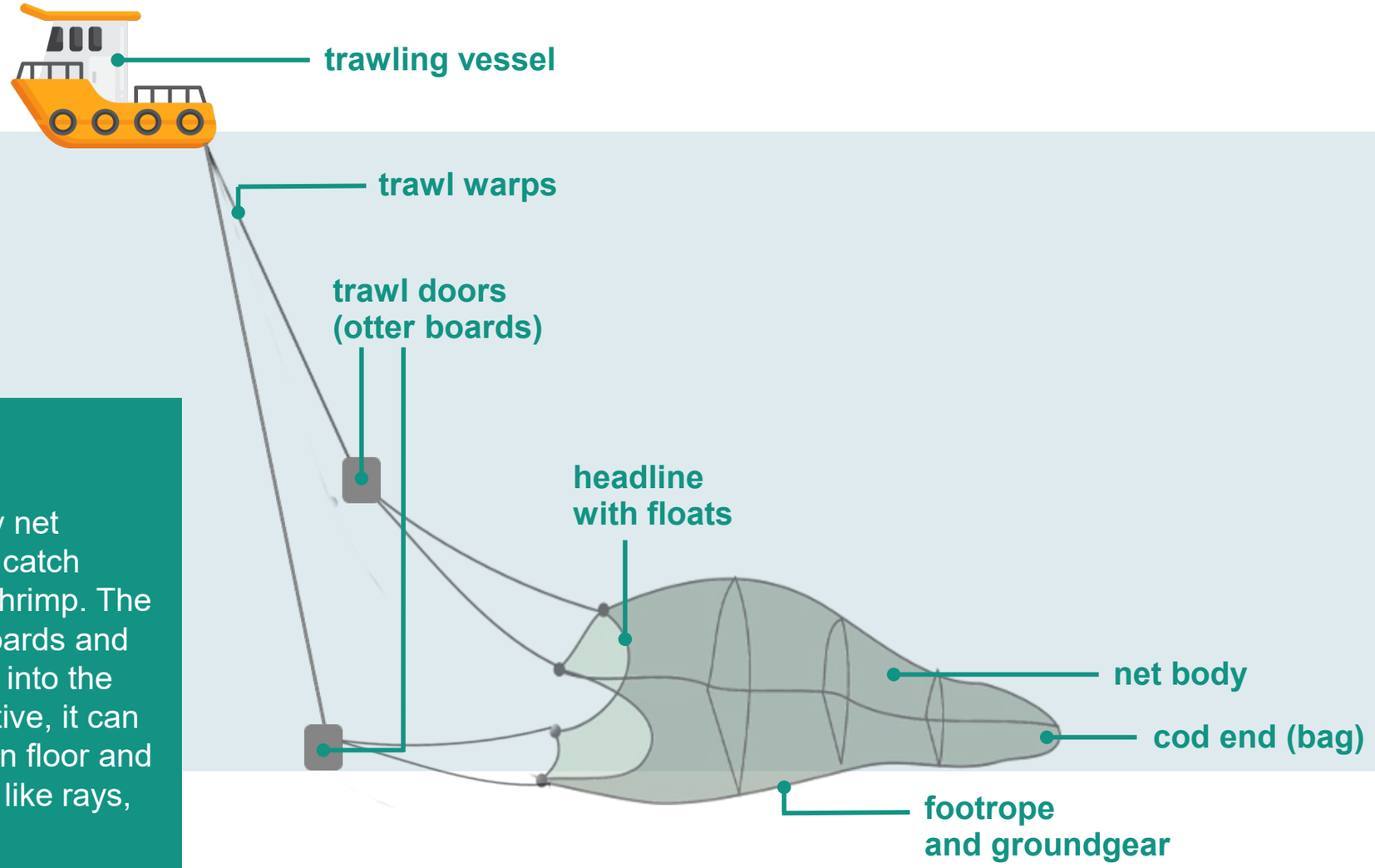


How it works

Pelagic trawling uses a large net pulled through the middle layers of the sea to catch fishes like herring or mackerel. The net is kept open by large doors and guides the fish into the closed end, where they are trapped. Because the nets are so big, they can catch many fish at once but also sometimes other animals by accident.

**The design of the fishing gear and vessels shown in these illustrations has been simplified for educational purposes.*

Otter board trawl (bottom trawling)*

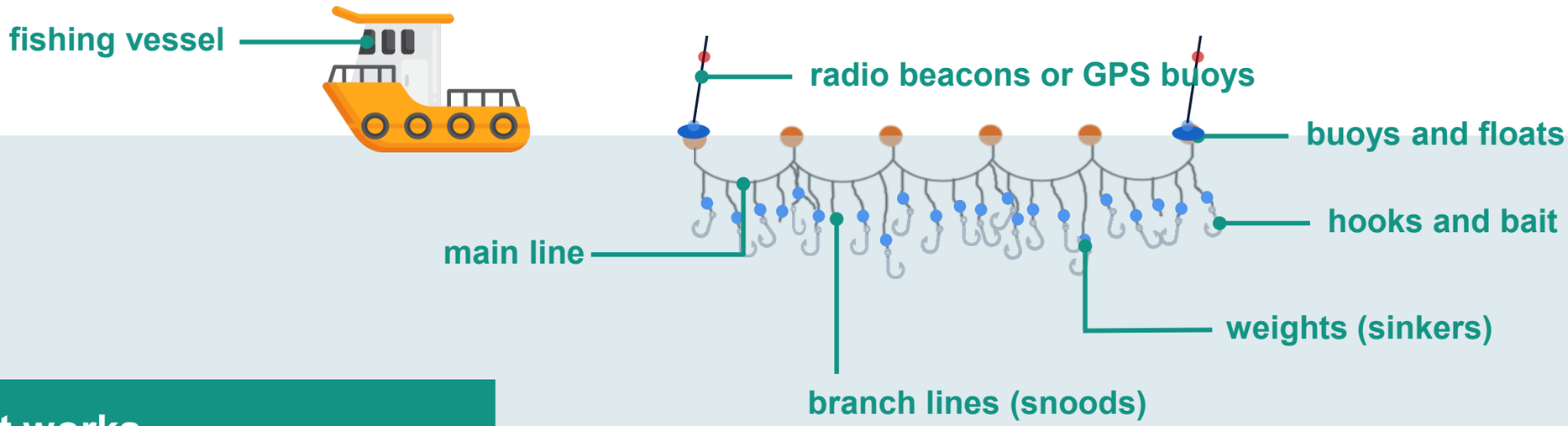


How it works

Bottom trawling uses a heavy net dragged along the seabed to catch fishes like cod, haddock, or shrimp. The net is kept open with large boards and weighted ropes that herd fish into the closed back end. While effective, it can damage habitats on the ocean floor and also catch unwanted species like rays, sharks, or turtles.

**The design of the fishing gear and vessels shown in these illustrations has been simplified for educational purposes.*

Longline fishing (surface)*

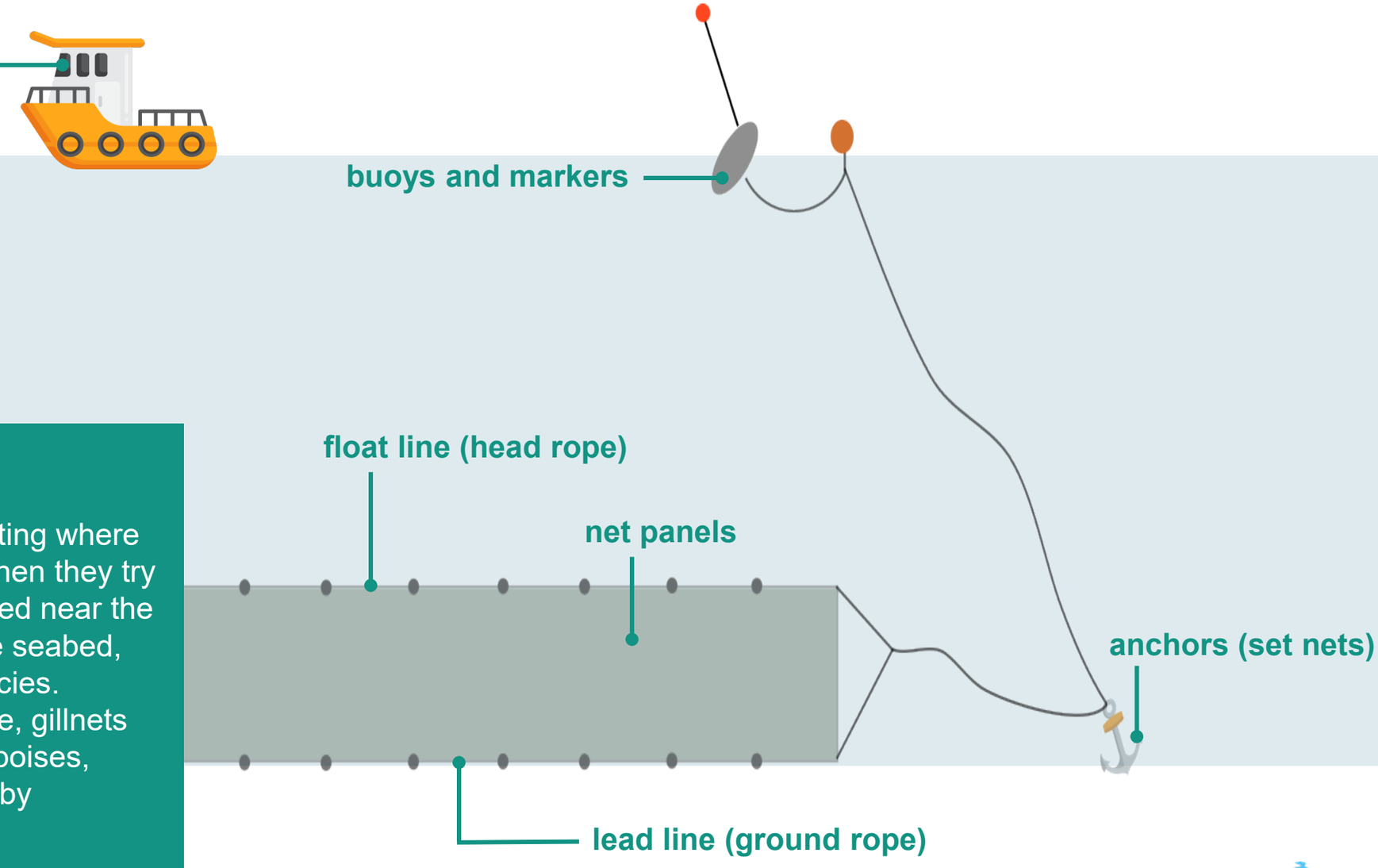


How it works

Longline fishing uses a main line that can stretch for many kilometres with thousands of baited hooks. The gear can float near the surface for tuna and swordfish or rest on the seabed for species like halibut. However, seabirds, turtles, and sharks are often caught by accident, making this method risky for various marine animals (marine mammals, sharks, turtles, seabirds).

**The design of the fishing gear and vessels shown in these illustrations has been simplified for educational purposes.*

Gillnet fishing*



How it works

Gillnets are long walls of netting where fish get stuck by their gills when they try to escape. They can be placed near the surface, mid-water, or on the seabed, depending on the target species. Although simple and effective, gillnets often entangle dolphins, porpoises, whales, seals, and seabirds by accident.

**The design of the fishing gear and vessels shown in these illustrations has been simplified for educational purposes.*

Information

Assembly instructions for your model

Materials



base plate: wood, cardboard, polystyrene (30x30 cm)



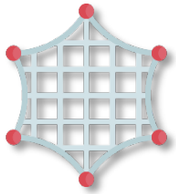
paint and brushes



model boat



modelling mass: plasticine or clay



mesh material



glue



natural materials:
small twigs, stones, sand



cartons for figures or structures

Assembly instructions for your model

1. Prepare the base plate

A. Coat the base plate with paint to simulate the seabed or water surface.
B. Advice: blue and green colours for water, sandy or brown tones for the seabed.

2. Design living space

A. Place the natural materials such as small stones or sand to represent the soil texture.
B. Model landscape elements that symbolise the typical habitat of your animal species such as reefs, seaweed, rocks, or sandbanks.
C. Also pay attention to the specific environment, e.g. shallow water or deep sea.

3. Add flora and fauna

A. Construct plants (algae or seaweed) out of paper or plastic straws which you can paint.
B. You can make small cardboard figures for the animals, but it is easier to draw the animals on the cardboard.

4. Add external factors

A. To make the habitat as real as possible, man-made external factors are also included. Here are two examples of how you can integrate these into your model:
    - Drilling platform: Cut a small platform out of cardboard and glue tubes underneath as supporting pillars.
    - Wind turbine: Use a stick as a tower and attach a small cardboard or plastic cross to the top for the rotor blades.

5. Fishing boat and net

A. In the best case, use a model boat, otherwise you can also make a boat out of cardboard.
B. Attach your mesh material to one side of it.
C. Now make sure that you can recognise which fishing method it is.
D. If you attach the net only lightly to the boat with threads, it "floats" in the model and appears to be three-dimensional, so it becomes the main focus of the model.

6. Conclusion and details

A. Paint and decorate the small details (wave structure, shells or small grains of sand) to bring the model to life.

Task 5 | Research project

Task definition

A. Plan your own research project step by step for your species, focusing on the problem of bycatch.
Imagine you are part of a marine conservation team. Your task is to design a research project that investigates how bycatch affects your species and what could be done to reduce it.

B. Design a simple review process for your bycatch research project by deciding who will review it, what they should focus on, and how the feedback will be given.

Learning target

forming hypotheses | developing a research question | planning a research project | scientific consideration of the topic of bycatch | scientific ways of thinking | academic project process

Competencies

- gaining knowledge
- social competence
- knowledge competence

Materials

- Profile, digital device

Notes

Social form

- individual or group work

Time

- 40 - 60 min

A research project

1 Select topic

- Think about a topic that interests you. It can be from natural sciences, social sciences, technology or another research field.
- Example: "How does music influence the ability to concentrate while learning?"

2 Formulate a research question

- Formulate a specific question that you would like to answer with your project.
- Example: "Does listening to classical music while learning have a positive influence on students' concentration?”

3 Hypothesis

- Formulate a hypothesis that you would like to test through your research.
- Example: "I hypothesise that students who listen to classical music can concentrate better than those who do not listen to music."

4 Planning the method

- Think about how you will collect data. Which experiments, surveys or observations do you want to carry out?
- Example: "I will observe two groups of students learning: one group listens to classical music, the other does not. I will then test their ability to concentrate."

5 Implementation

- Carry out your planned methods and collect data.
- Example: "I let the students study for 30 minutes and then give them a concentration test."

6 Analyse data

- Analyse the collected data and draw conclusions.
- Example: "I compare the results of the concentration tests between the two groups."

7 Present results

- Write a report or create a presentation to present your results. Explain whether your hypothesis was confirmed or not.
- Example: "The students who listened to classical music achieved better results in the concentration test on average."

Task 6 | Evaluating and discussing bycatch measures

Task definition

Discuss the following questions:

- Which of the measures seem the most effective? Why?
- Which measures might be the easiest to accept for fishers? Why?
- Which measures need the strongest control to be successful?
- Which ones do you personally find most convincing?

Collect the results on the board

Learning target

identifying different management measures | evaluating effectiveness of measures | discussing acceptance and feasibility for fishers | understanding the need for control and enforcement | forming and justifying personal opinions | summarising and presenting group results

Competencies

- evaluation competence
- competence to act
- social competence
- knowledge competence

Materials

- role cards

Notes

Social form

- group work

Time

- 40–55 min

Task 7 | Final discussion

Task definition

You have already learned:

- which fishing methods cause bycatch,
- which animal species are affected,
- and which solutions already exist.

Now it is your task to develop and discuss solutions to the bycatch problem – but not as yourselves.
Assume the role of different participants in the project (fishermen, scientists, consumers, NGOs, politicians).

Learning target

understanding the bycatch problem | taking different perspectives | developing and evaluating solutions | preparing arguments for discussion | practicing group discussion and debate | presenting and defending own viewpoints | reflecting on conflicts of interest in fisheries management

Competencies

- evaluation competence
- competence to act
- social competence
- knowledge competence

Materials

- role cards

Notes

Social form

- group work

Time

- 70–90 min

Final discussion

Step 1 – Prepare your role

Read your role card carefully.

Decide: Which bycatch solutions (from the fact sheets) would you **support**? Why?

Which ones would you **reject**? Why?

Prepare **arguments** you can use in the discussion.

Step 2 – Group discussion

In your role, discuss the following questions:

- What are the biggest challenges with bycatch from your perspective?
- Which existing solutions can work best for you? Under which conditions?
- Which new ideas or improvements can you suggest?

Step 3 – Present and debate

Each group presents its main arguments (2–3 minutes).

Afterwards, you will have an **open debate** where you can ask and answer questions from the perspective of your role.