

Pusa the Seal FISH WORKBOOK

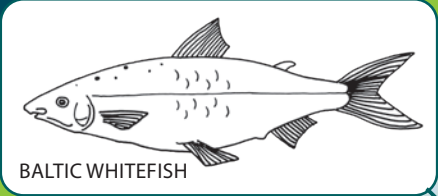


LET'S DISCOVER
BALTIC SEA FISH

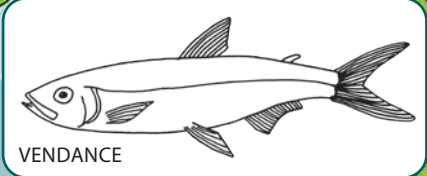
ADRIENNE

2023/ER188

NORTH SEA



BALTIC WHITEFISH

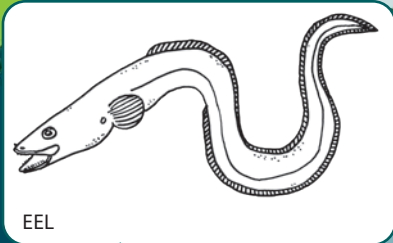


VENDANCE

BOTHNIAN BAY

5
BOTHNIAN SEA

5
GULF OF FINLAND



EEL



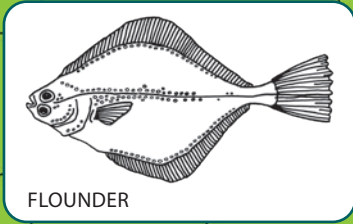
ATLANTIC SALMON

6
BALTIC SEA

7
GULF OF RIGA

30
25
20
DANISH STRAITS

8
BALTIC PROPER



FLOUNDER



BALTIC HERRING

9
8

15
10

AHOY! MY NAME IS PUSA. I AM A RINGED SEAL, AND MY NAME COMES FROM THE LATIN NAME OF MY SPECIES, *Pusa hispida*. LET ME INTRODUCE YOU TO MY FAVORITE FOOD: FISH. DID YOU KNOW THAT SEALS ARE SOMETIMES CALLED "FURRY FISH"?



The Baltic Sea may be 10,000 years old, but it's still the **world's youngest sea**. The Baltic Sea's past is colourful, making its environment unique and distinctive.

Approximately 85 million people live around the Baltic Sea. They all affect the sea in one way or another. Each one of us must take care of the Baltic Sea!

The Baltic Sea is home to nearly 250 species of fish and lamprey.

LAMPREYS ARE WORM-LIKE AQUATIC ANIMALS WITHOUT JAWS, BONY TEETH, SCALES, OR NOSTRIL FLAPS.



THIS IS A RIVER LAMPREY.

BALTIC SEA FISH

Fish has always been an important **food** for the people of the Baltic Sea. Before there was money, you could also pay with fish. For example, the Vikings traded cod a thousand years ago. Processed fish lasted longer, and it could be taken for sale to distant lands.



Task 1. Colour the picture of the medieval market.



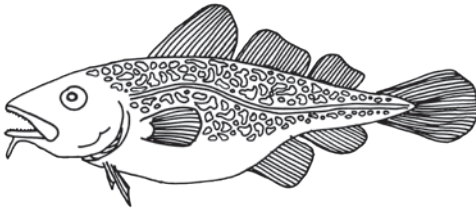
There are fewer fish species in the Baltic Sea than in the ocean, but there are still many individuals of each species!

Why are there fewer different fish species in the Baltic Sea?

Firstly, the Baltic Sea is a young sea. It takes a very long time for fish species to evolve, and fish species in the young Baltic Sea haven't had enough time to develop yet.

Secondly, the Baltic Sea is less salty than the ocean, but saltier than freshwater. This makes it too fresh for ocean fish and too salty for freshwater fish. There are few fish species that can live in both, salty and fresh water.

There are many more species in the **saltier parts of the Baltic Sea** than in the less salty areas. The saltier part of the Baltic Sea is near the Atlantic Ocean and ocean fish, such as cod, herring and mackerel, live here.

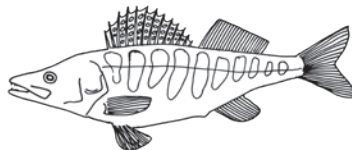


COD (50–80 cm)



BALTIC HERRING (15–25 cm)

On the other hand, true freshwater fish such as burbot, bream and pikeperch like the **fresher parts of the Baltic Sea** more.



PIKEPERCH (40–70 cm)

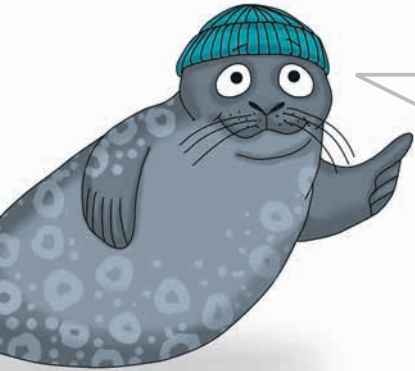
The Baltic Sea is even home to sharks, rays and rabbit fish.

Task 2. Colour the cod, Baltic herring and pikeperch.

Explore the workbook to see what other fish in the Baltic Sea look like.



BALTIC SEA FISH



DID YOU KNOW THAT THE NATIONAL FISH OF ESTONIA IS THE BALTIC HERRING?



BALTIC HERRING
(15–25 cm)

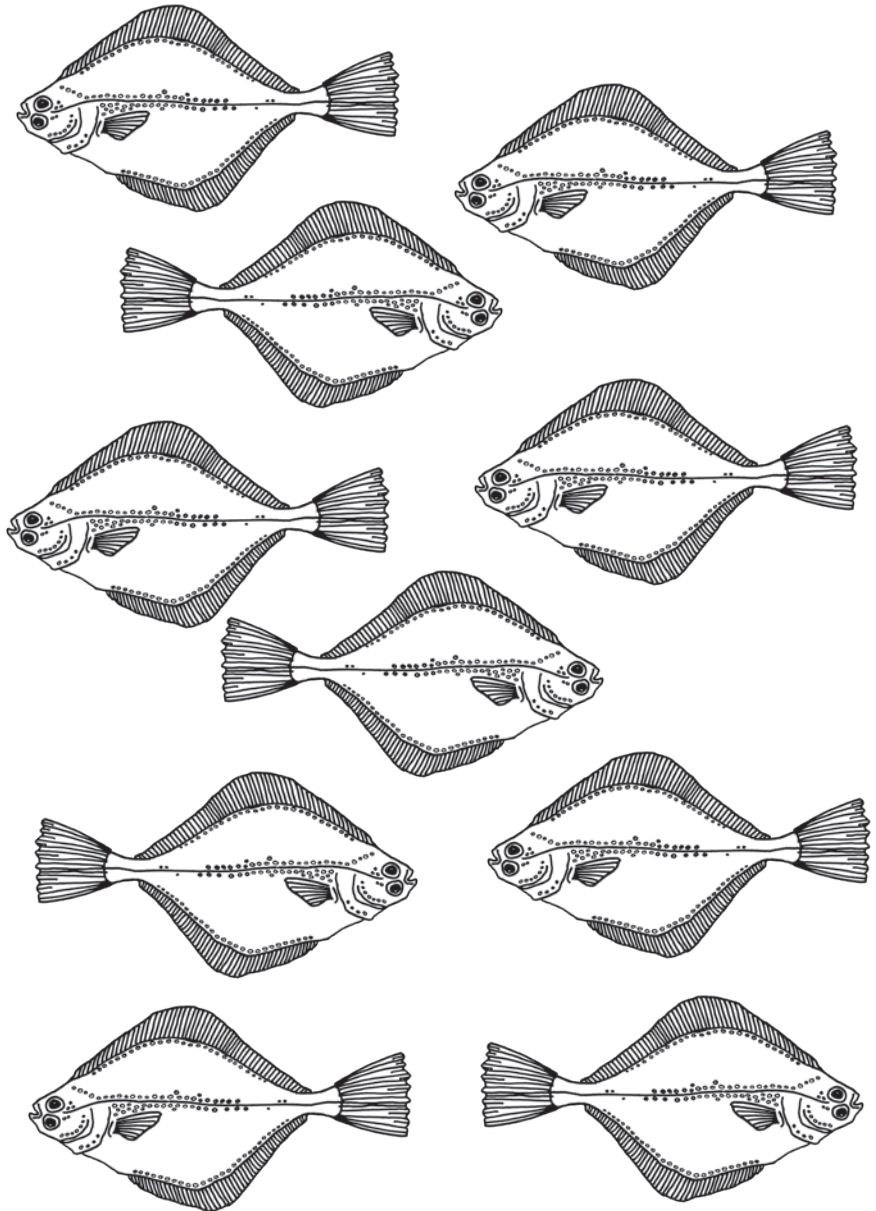
The only fish species that has evolved specifically in the Baltic Sea is the **Baltic flounder**, which lives on the Estonian coast. European flounders also live here, but they are much less common. Along the Estonian coast, nine out of every ten flounders are Baltic flounders.

The Baltic flounder looks exactly like the European flounder. Only a fish scientist can tell them apart by studying the fish's DNA. DNA is a substance that stores genetic information in living beings. It makes us the way we are.



Task 3. Find on the inside cover of the workbook the saltier waters of the Baltic Sea near the Danish Straits and the fresher waters of the eastern Baltic Sea. Salinity is expressed in parts per thousand: the higher the number, the saltier the water.

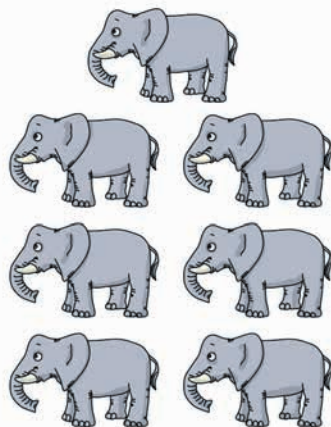
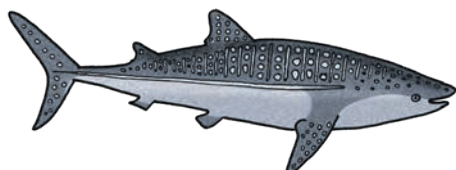
Task 4. Colour the correct number of flounders out of the 10 flounders that live on the Estonian coast as Baltic flounders.



THE BIGGEST AND THE SMALLEST FISH

The **world's biggest fish** is the whale shark. It lives in warm oceans.

A whale shark can weigh up to 34 tons, which is as much as 7 elephants.



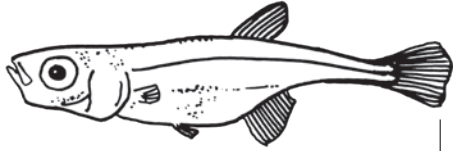
The biggest fish ever **caught in Estonia** is the Atlantic sturgeon. It weighed 136 kilograms and was about 3 meters long.



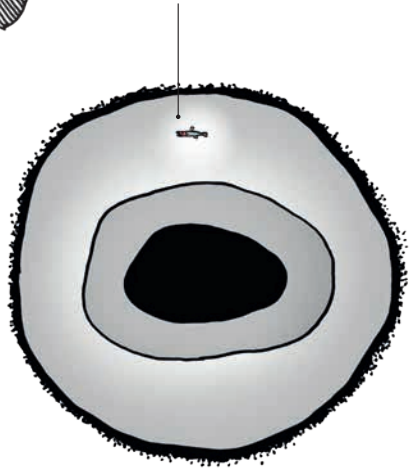
ATLANTIC STURGEON (100–250 cm)

Task 5. How long is 3 meters, which is the length of the biggest fish caught in Estonia, the Atlantic sturgeon? Get your friends or family members to help and see how many people need to stand next to each other to make a line that is 3 meters long, just like the Atlantic sturgeon.

The **world's smallest fish** is the *Paedocypris progenetica*. It's in Latin as the fish does not even have an English name yet. It lives in the freshwater of Sumatra Island in Indonesia and grows to only 1 centimetre in length.



WHALE SHARK EYE AND
PAEDOCYPRIS PROGENETICA



Estonia's smallest fish is the common goby. Compared with the Sumatran *Paedocypris*, it's a giant because it can grow up to 8 centimetres long.



COMMON GOBY (2-4 cm)

Task 6. How much do you weigh? What about your friends? Add up your weights until you reach 136 kilograms, which is the weight of the Atlantic sturgeon. How many friends did you need for this?

FISH HABITATS

The Baltic Sea is a unique sea: its water is too fresh to be an ocean and too salty to be a lake. Such a body of water is **brackish**.

Species that can tolerate brackish water live well in the Baltic Sea.

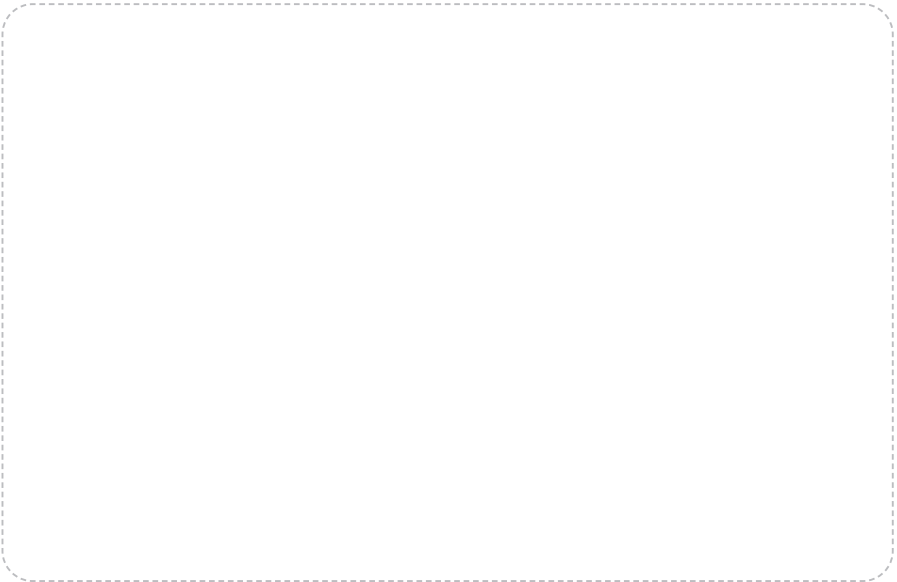
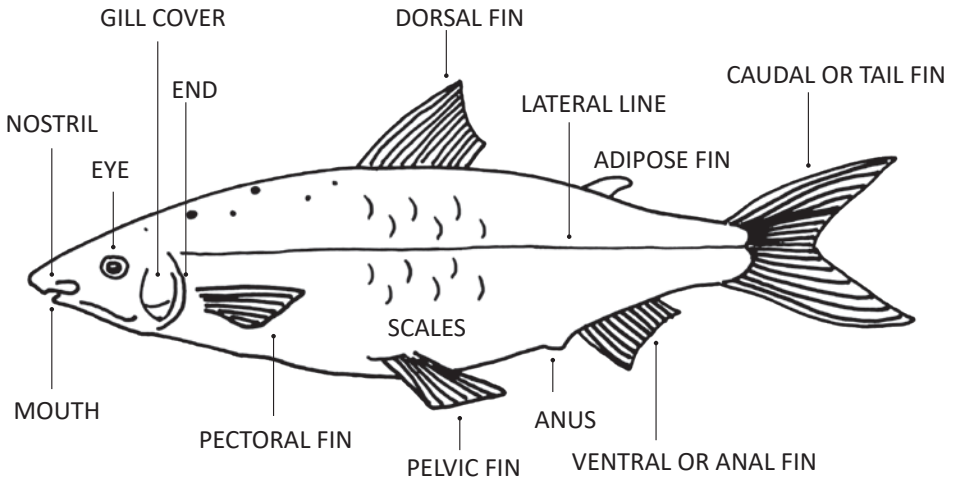
Some Baltic Sea fish species switch between living in the sea and in freshwater:

- **Salmon and sea trout** migrate to rivers to spawn (see fish life cycle drawing on page 11).
- Eel larvae hatch far away in the Sargasso Sea and then migrate to Europe with the help of the warm Gulf Stream. The main part of their life is spent in rivers and lakes, but they swim back to the Atlantic Ocean to spawn with the help of the cold Canary Current.



Task 7. Check the salinity of the Baltic Sea regions from the inside cover.

THE APPEARANCE OF FISH



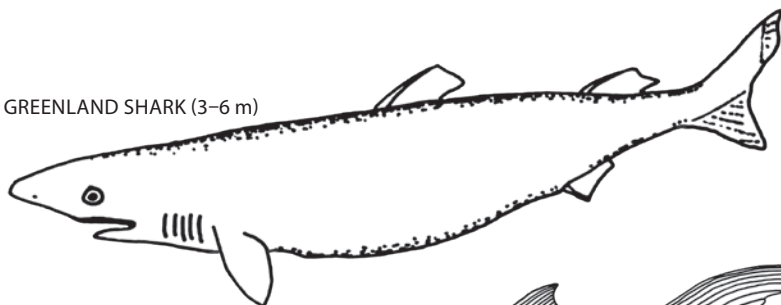
Task 8. Ask an adult to bring you a fresh fish or try to catch one yourself. Examine what you see. Draw a picture of this fish. Afterward, prepare a delicious meal from the fish!

LIFE AND REPRODUCTION OF FISH

In nature, it's generally true that the larger an organism is, the longer it takes to grow and the longer it lives. Small fish tend to grow quickly and have shorter lifespans. Larger fish can live for several decades, as long as they are not eaten by other animals or caught by humans.

The **world's oldest fish** is thought to be the Greenland shark, which can live up to 300 years. Goldfish, a close relative of our crucian carp, have been known to live up to about 80 years. Some of the oldest fish caught in Estonia are ide.

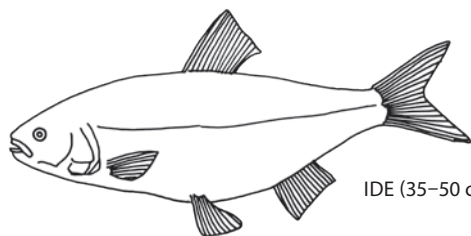
GREENLAND SHARK (3–6 m)



GOLDFISH (15–25 cm)

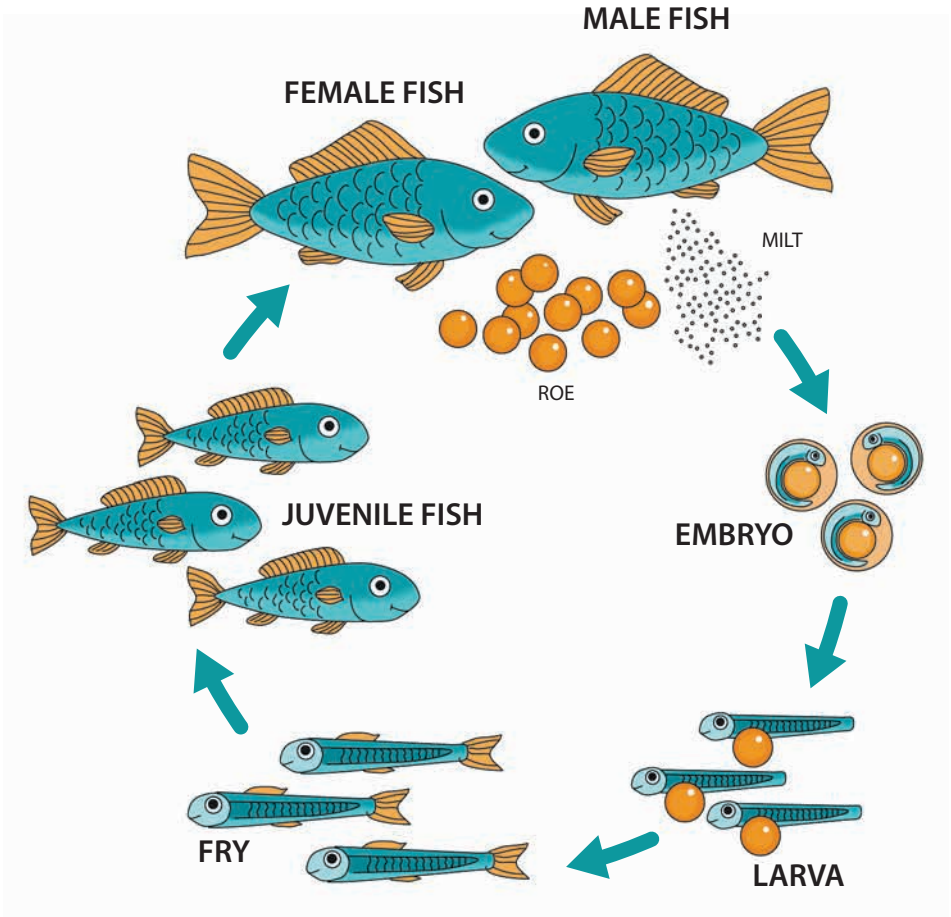


IDE (35–50 cm)



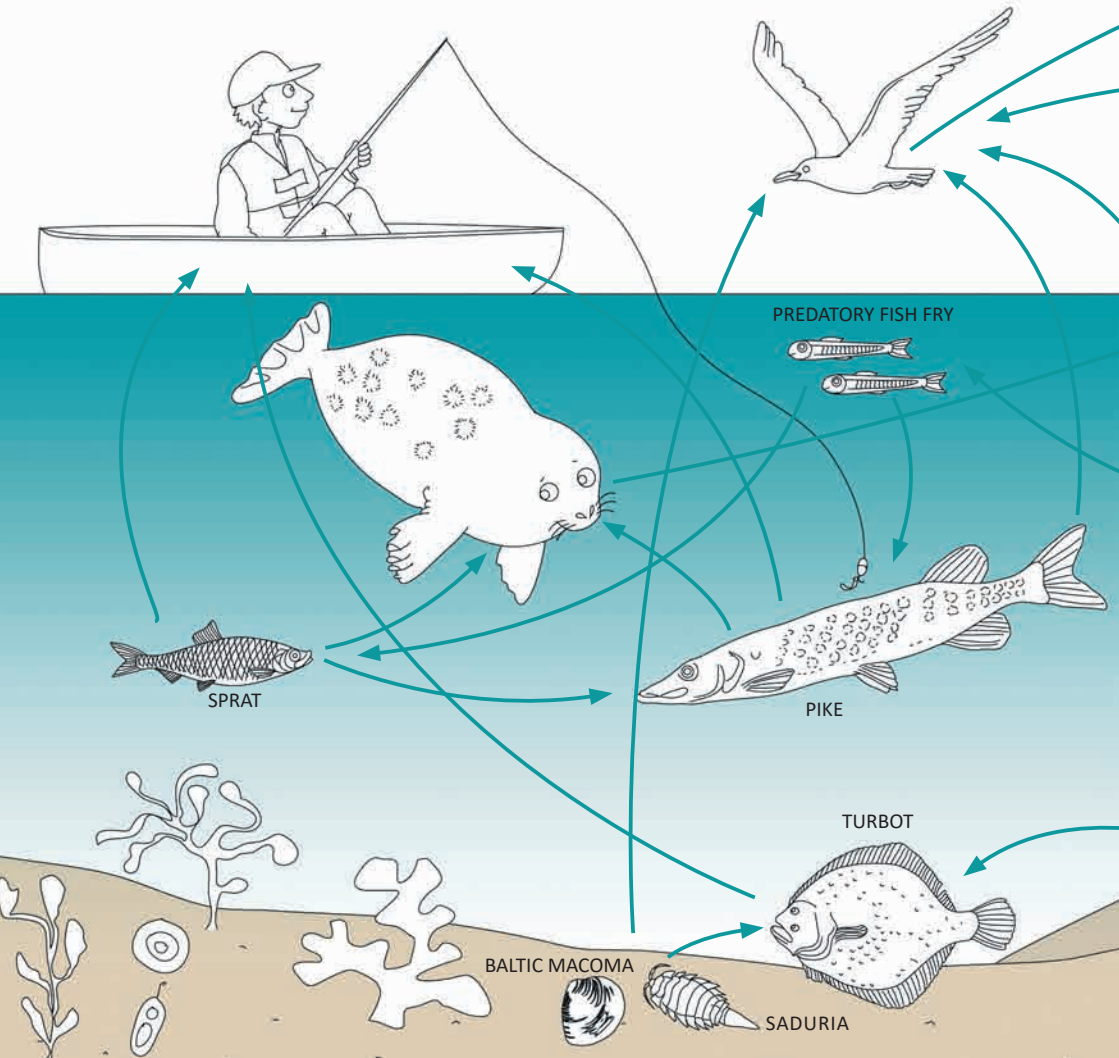
We can find out the age of a fish by counting the growth rings on its scales, somewhat like counting tree rings to find out a tree's age. Fish scientists also have more complex methods to tell a fish's age, such as using length curves.

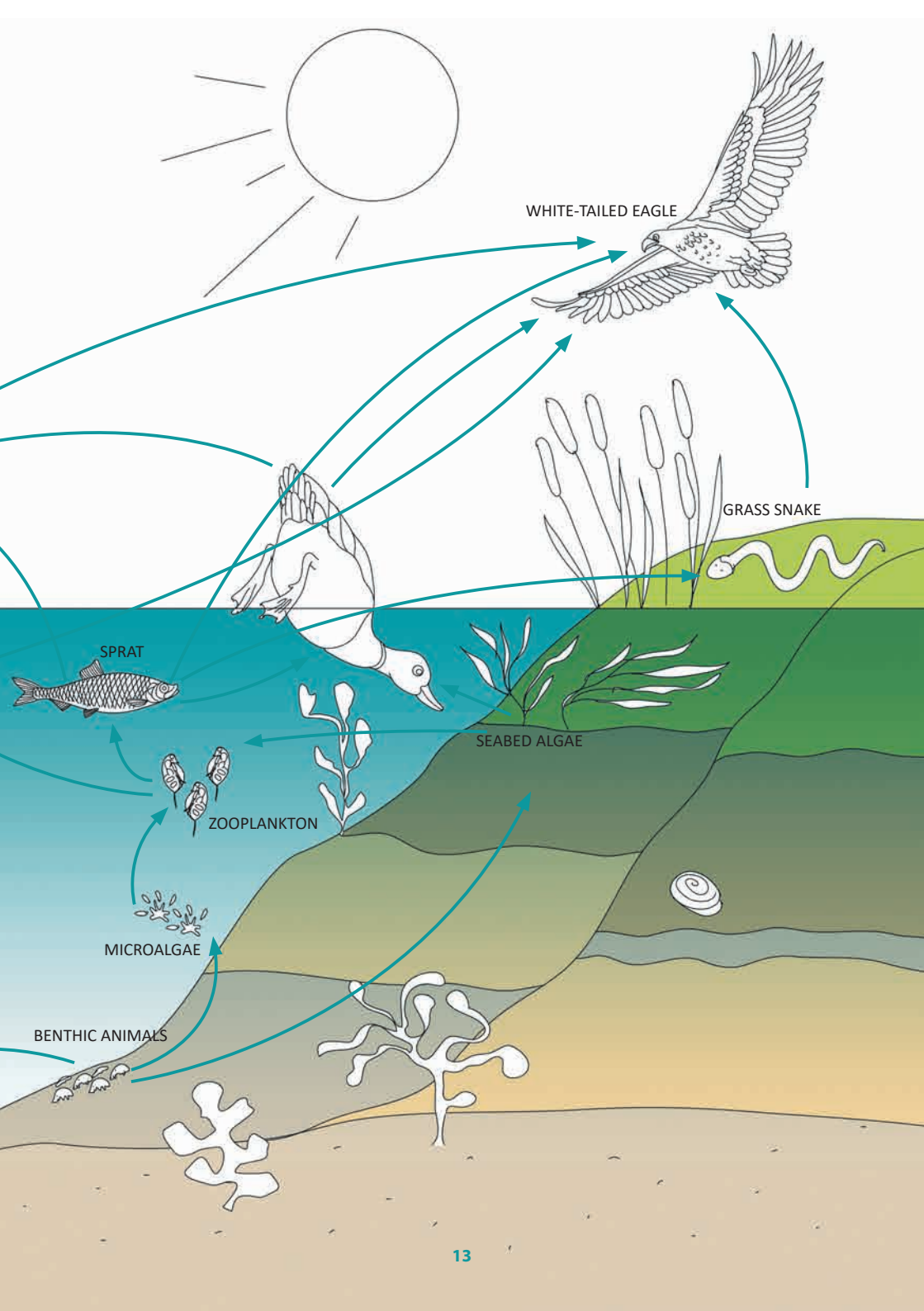
Fish reproduce mostly by **spawning**. During spawning, female fish release eggs (roe) into the water, and males release sperm (milt). The roe and milt meet in the water, and fish larvae grow from them.



FOOD WEB

All species in the Baltic Sea are interconnected. The **food web** shows us who eats whom. Tiny algae need sunlight and dissolved nutrients in the water to grow. Small crustaceans, in turn, feed on these algae and become food for fish fry and small fish. Larger fish, such as salmon and cod, eat the smaller fish. At the top of the Baltic Sea food web are water birds, marine mammals, and humans.





Baltic herring and cod are peculiar “friends”

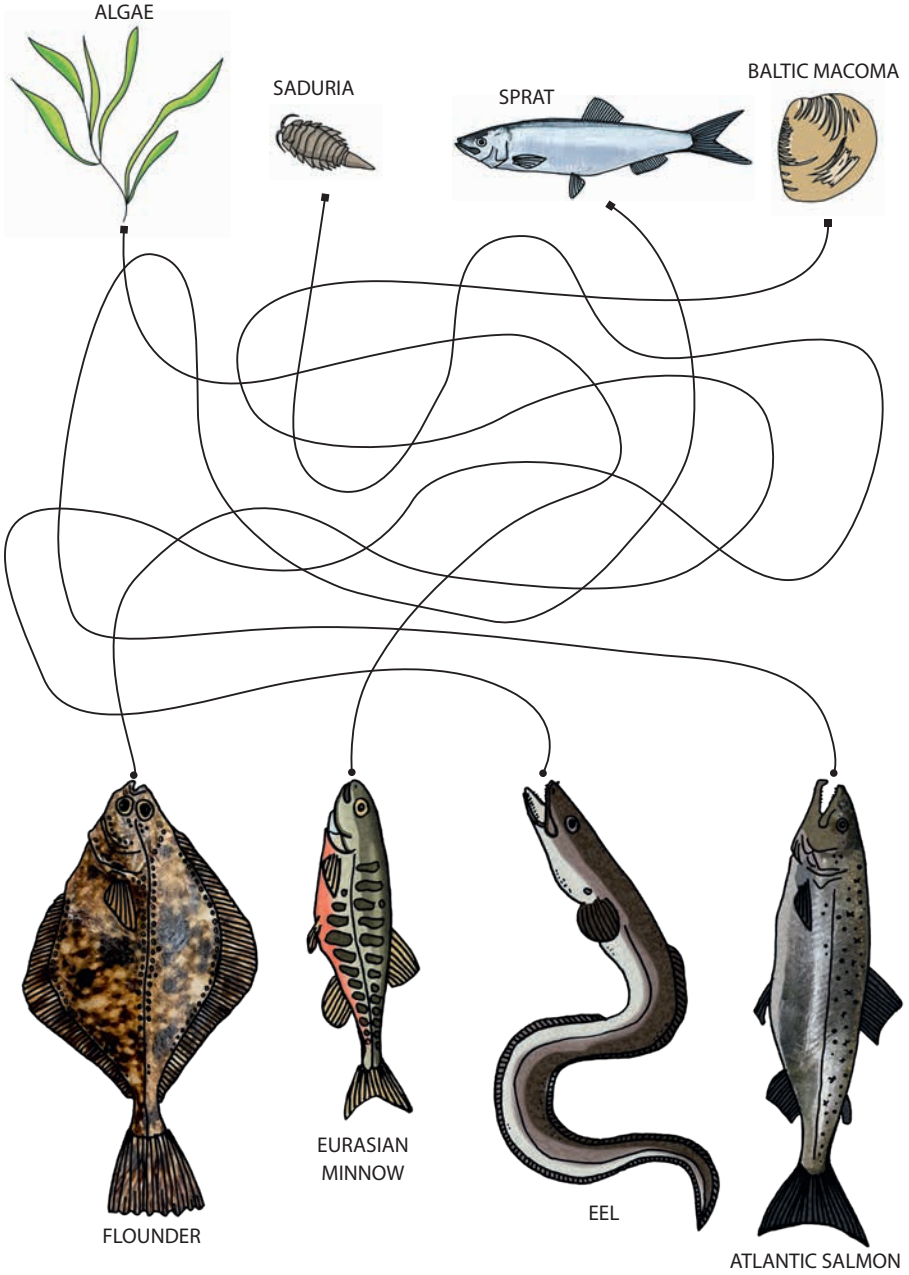
Adult cod eat herring, but adult herring eat cod eggs and juvenile fish (larvae and fry).

When there are many cod in the Baltic Sea, they eat so many herring that the herring population goes down quickly.

Even if a lot of adult cod are caught, enough herring are in the sea to keep the cod population small, because the herring like to eat the fry.



Task 9. Lead the fish to their food.



FISH HEALTH

To stay healthy, fish must eat a **nutritious and varied** diet – just like a person. It's not good if a child eats only pasta or French fries every day.

Small fish eat mainly tiny crustaceans and other small aquatic creatures. People carelessness has caused a lot of tiny pieces of plastic, called **microplastics**, to end up in the sea. These pieces of plastic look a bit like small animals and small fish and aquatic animals cannot tell the difference between plastic particles and food. It's not good if a fish eats microplastics. Their stomachs will be full of stuff they can't digest, but which can poison them.

*I ONLY EAT FISH. I LOVE FAT
THREE-SPINED STICKLEBACK IN
PARTICULAR. I LIKE TO EAT ALL
FISH. BUT WHAT DO YOU EAT?*



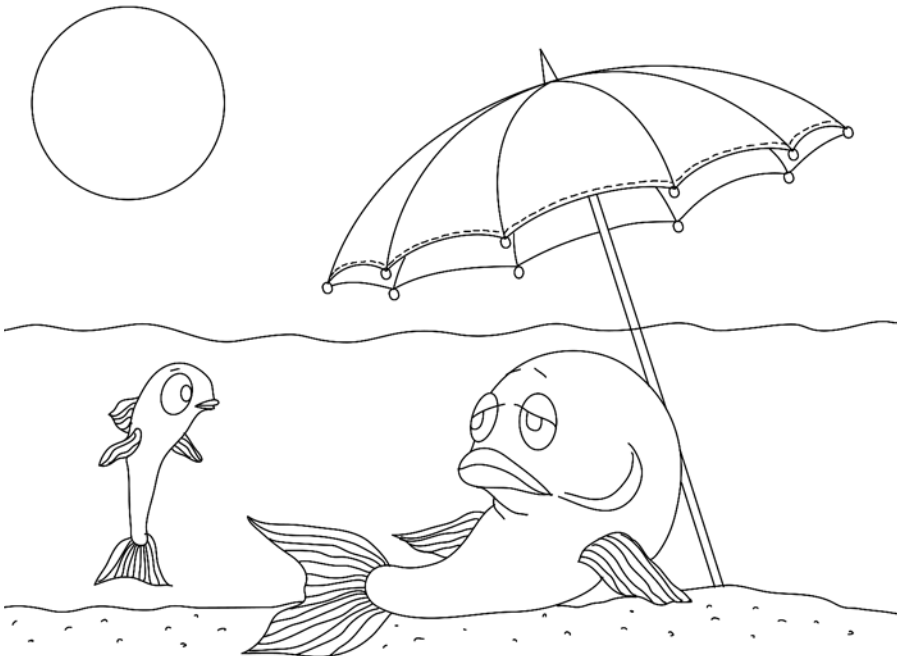
Every living creature can get sick from time to time, including fish. They may be stressed or have parasites such as stomach worms.

Sometimes parasites can really wear a fish out. This is particularly dangerous for young fish (juveniles) or fry. A fry needs a lot of food to grow, but if parasites live inside it, they will use up the nutrients that reach the fish's stomach. This leaves the fry skinny and weak.

Some fish in the ocean clean other fish: they eat parasites that have stuck themselves onto the bodies of other fish.

Fish can also be harmed by too much heat. Warm water loses the oxygen needed to live. Fish can also get sunburnt in shallow warm water.

Water pollution can give fish cancer.

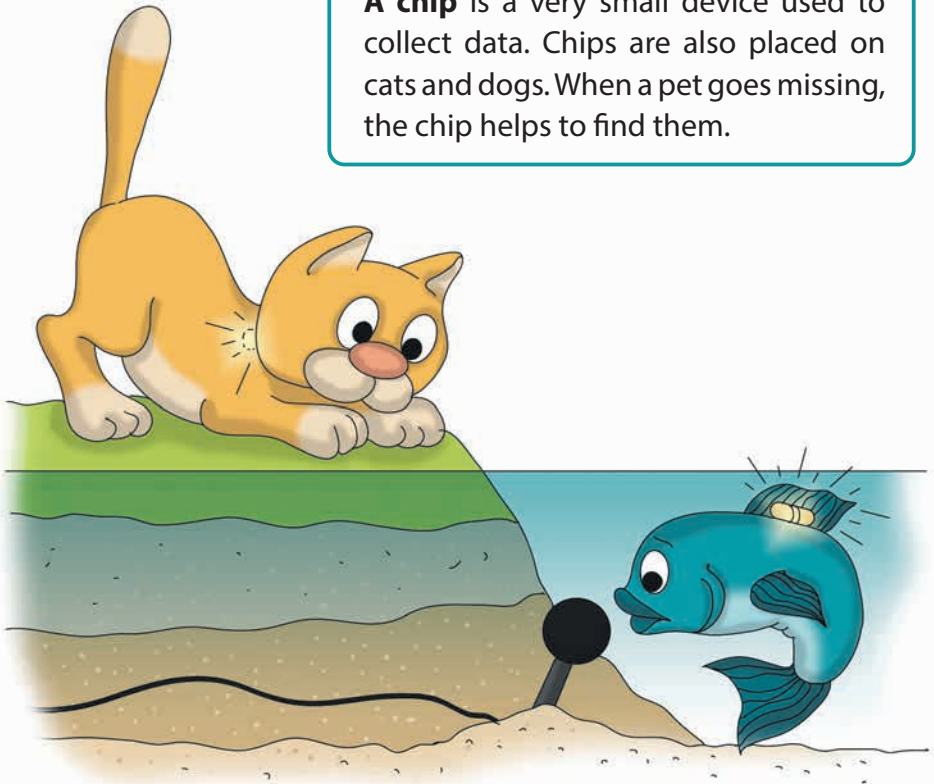


FISH SCIENTISTS

Fish scientists are called **ichthyologists**.

Fish scientists, for example, study the **movement of fish**. To do this, they put a small chip on the fin or tail of a fish and put microphones on the bottom of the waterbody. When the microphone hears a fish with a chip, the scientists can find out where the fish are moving.

A chip is a very small device used to collect data. Chips are also placed on cats and dogs. When a pet goes missing, the chip helps to find them.



For example, the behaviour of one alien species in the Baltic Sea, the round goby, was studied through chipping. It was discovered that it can swim several kilometres a day.

WHAT IS AN ALIEN SPECIES?

AN ALIEN SPECIES IS A PLANT OR ANIMAL THAT HAS ARRIVED IN A NEW PLACE AS A RESULT OF HUMAN ACTIVITY. HUMANS MAY HAVE HELPED THEM REACH A NEW PLACE EITHER ON PURPOSE OR BY ACCIDENT. REMEMBER THAT ALIEN SPECIES CAN CAUSE A LOT OF TROUBLE.



Fish scientists take care of the offspring of fish and work to improve the lives of fish. Some fish larvae or fry are raised in large fish farms and then let loose into natural water bodies.

Fish scientists can learn a lot about the lives of fish by looking at them under a **microscope**.

- By studying the fishes earstone, we can learn where the fish has lived.
- Studying the chemicals in fish allow us to know if the water they live in is polluted.
- Studying what's inside the fish stomach tells us if the fish has eaten microplastic.

Scientists also help fish farmers to create **environmentally friendly fish farms**. This way, they don't have to catch as many fish from the sea, and the marine environment is better protected.

FISHING

There are many tools for catching fish. The fishermen choose the right tool based on:

- The type of fish they want to catch,
- how many of those fish are present, and
- where they want to go fishing.

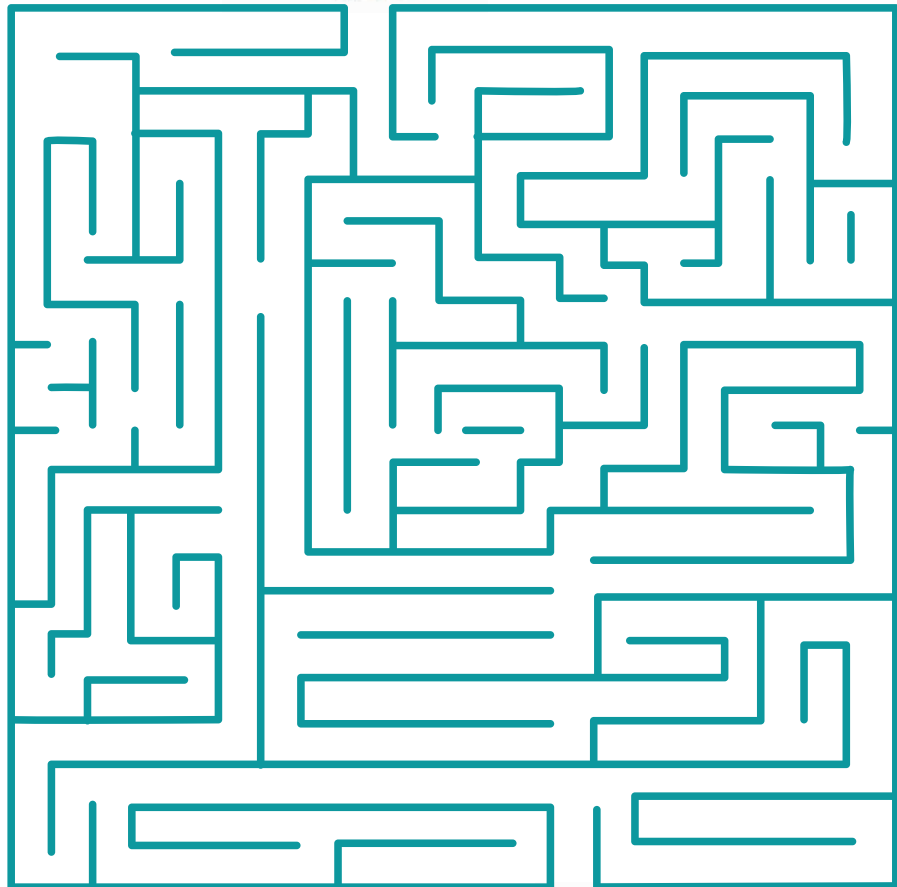
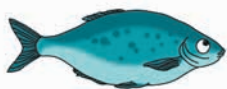
There are rules that say where, when, with what, and which fish can be caught. Every angler must check these rules before going fishing.

With a simple fishing rod, anyone in Estonia can fish for free – it is **everyone's right**.

If you want to use any other fishing gear, you need to purchase a fishing permit from the website **kalaluba.ee**.

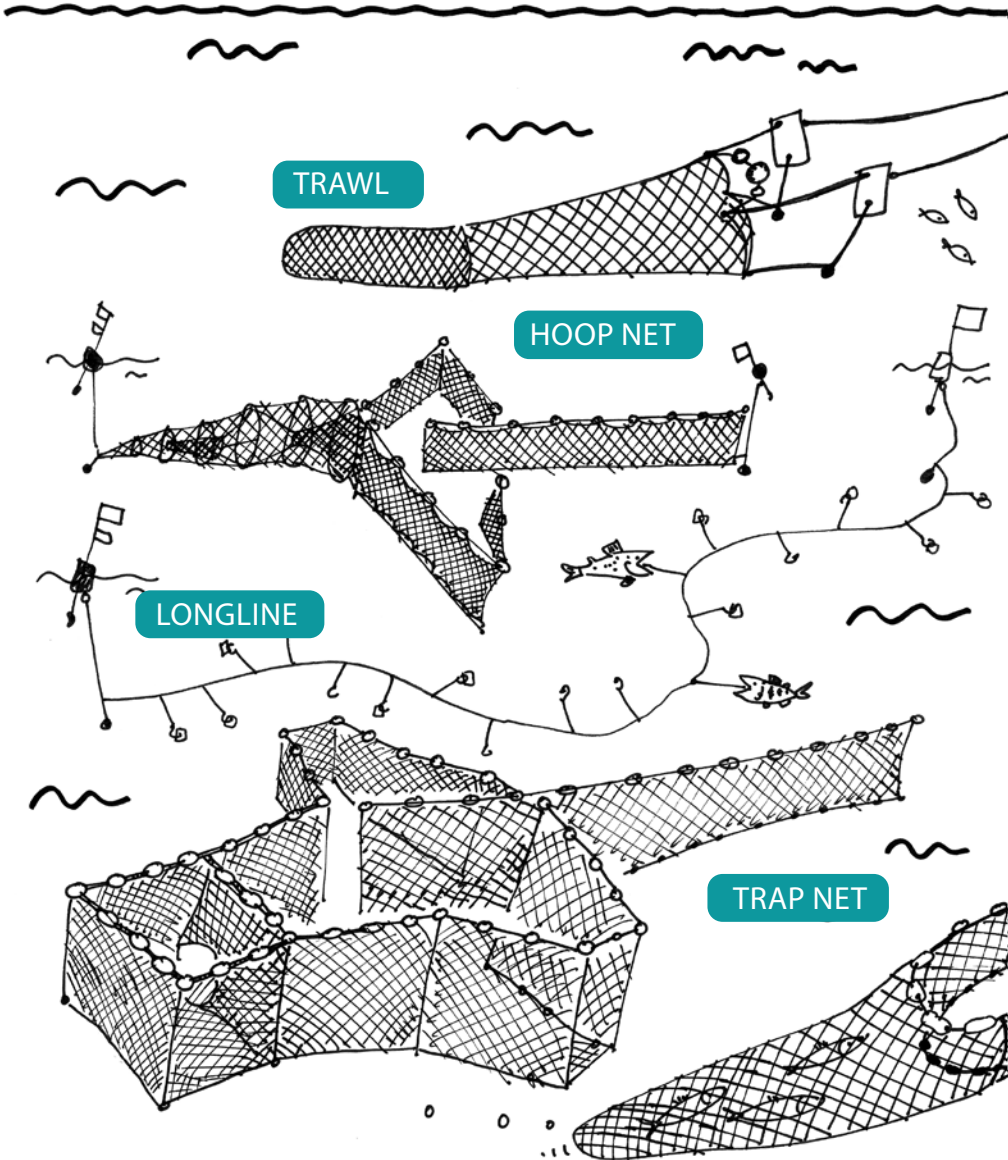


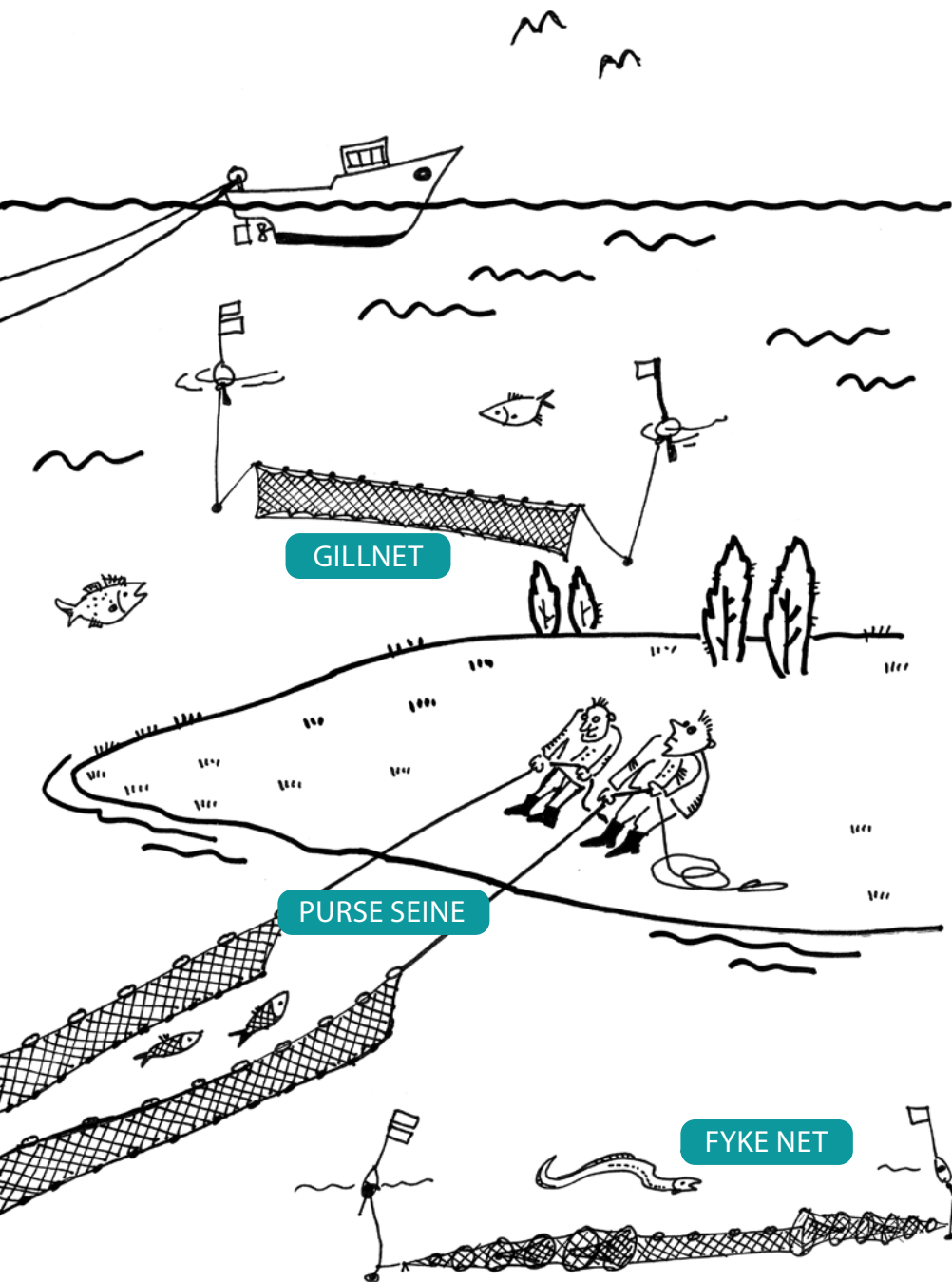
Task 10. Lead Pusa to the fish.



FISHING GEAR

M



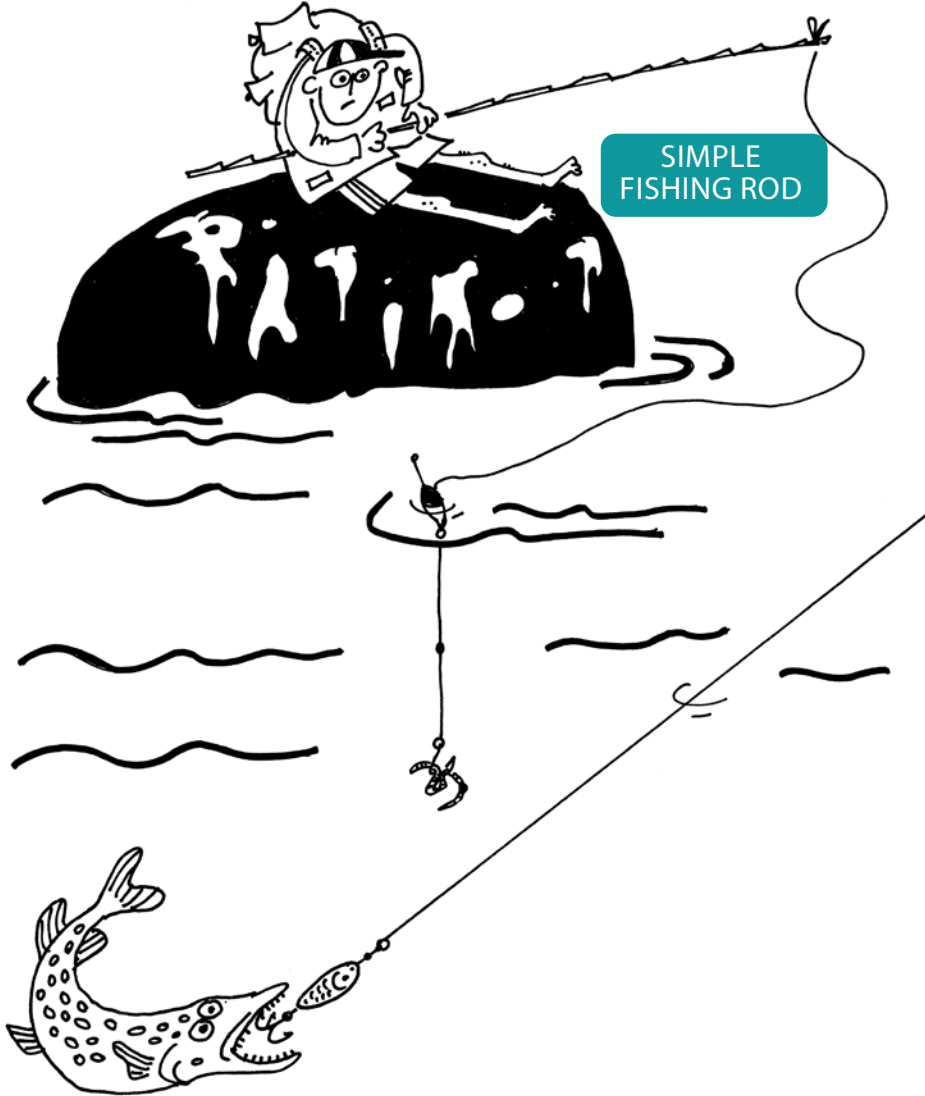


GILLNET

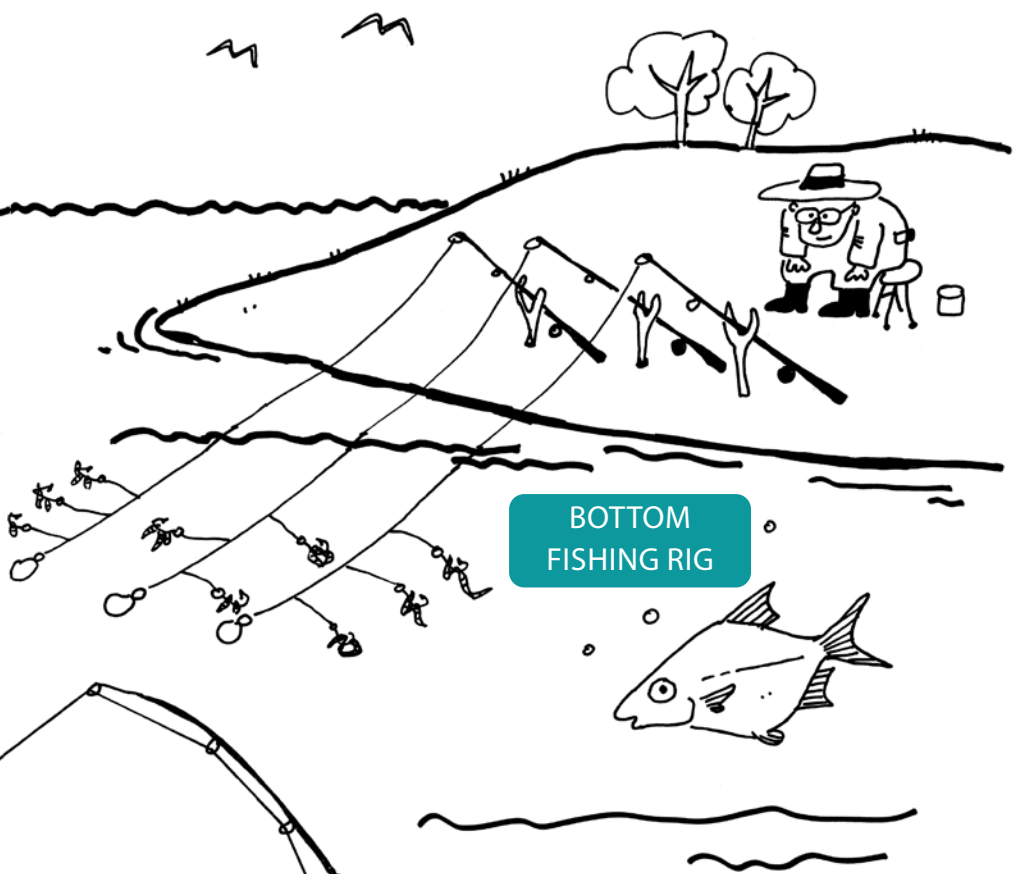
PURSE SEINE

FYKE NET

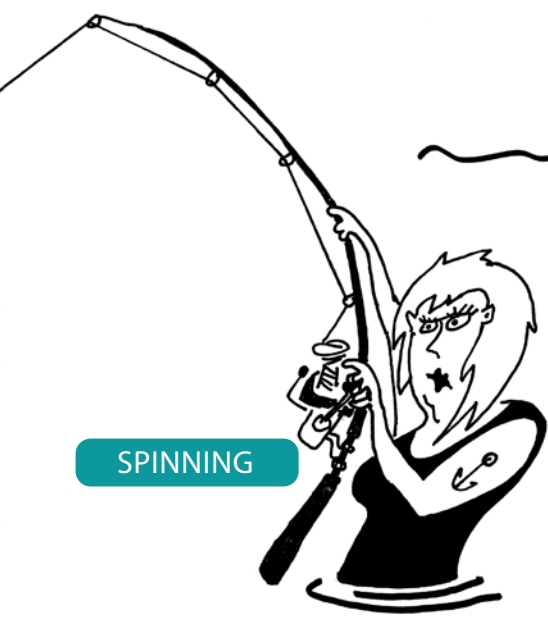
FISHING GEAR



SIMPLE FISHING ROD



BOTTOM FISHING RIG



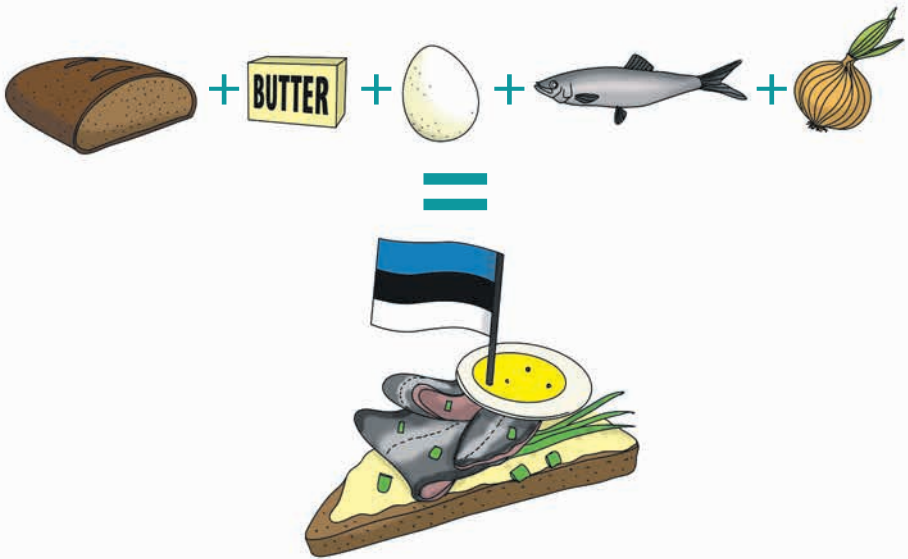
SPINNING

FISH AS FOOD

Fish has always been on Estonians' menu. Fish is a great food that can be prepared in many ways. For example, fish can be fried or even eaten raw. Fish can also be boiled, smoked, marinated, or dried.

HOW TO MAKE "KILUVÕILEIB"- A TRADITIONAL SPRAT SANDWICH?

The traditional sprat sandwich is an integral part of Estonian food culture and is suitable for both on Independence Day and at other times. Be sure to put butter, sprat fillet and eggs on the bread. Each chef can change the recipe as they want. For example, with eggs, you can choose between egg butter, a slice of boiled egg, or a poached egg. Ready-made sprat fillet is available in stores, but if you want to practice filleting a fish, buy tin of spiced sprats ("vürtsikilu"). If you like, put some onion on the bread.



Task 11. Name as many fish dishes as you can think of.

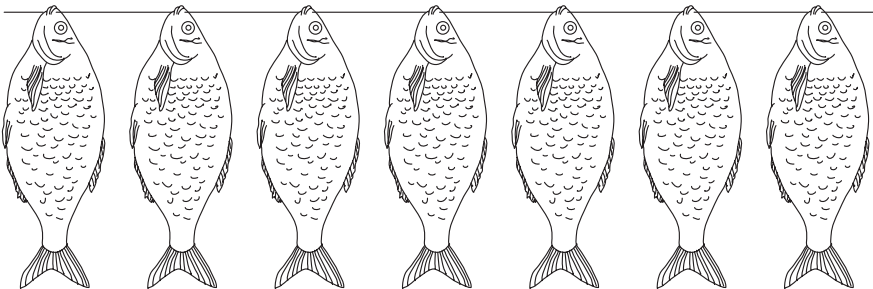
Did you know that fish can be one of the most environmentally friendly foods?

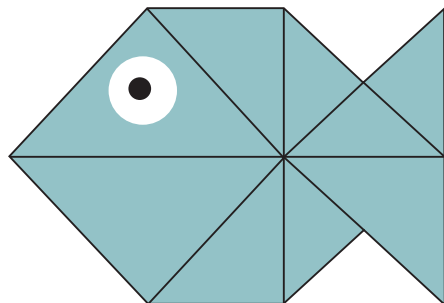
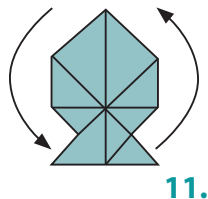
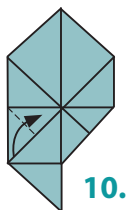
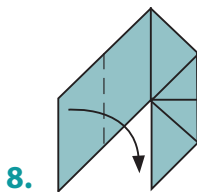
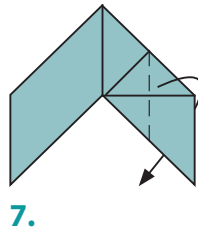
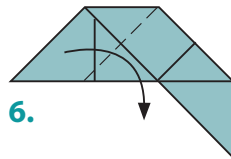
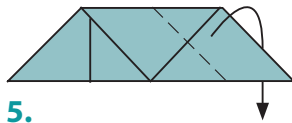
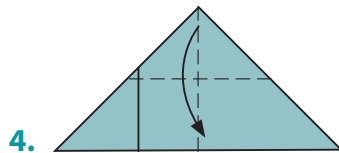
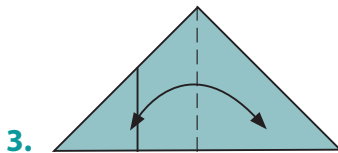
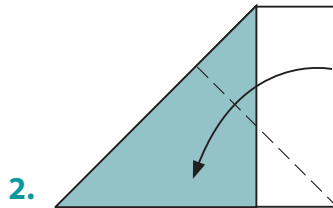
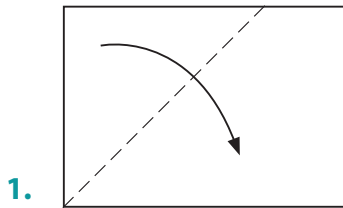
But we need to make the right choices. We do good when we buy fish wisely, for example, by choosing **local fish** and **small fish**. Choose herring or sprat, as they grow faster than bigger fish.

Always check the packaging in the store to find out where the fish comes from. This way we can help protect fish and their habitats. Much depends on our choices!



Drying, or curing, is one of the oldest and most common methods of preserving a fish catch. The fish are salted and left to stand for two to three days. Then they are soaked for 2-3 hours in fresh water and placed in a shaded but well-ventilated area to dry. Depending on the weather, the fish can be dried for a week to a month.





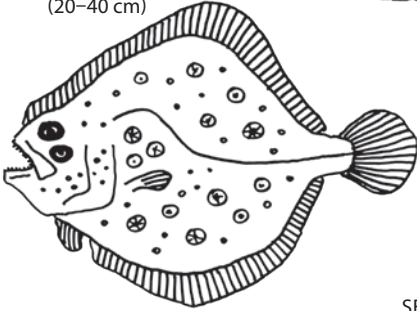
AN EXTRA TASK. Let's make folded paper fish using origami technique.



EELPOUT
(15–30 cm)



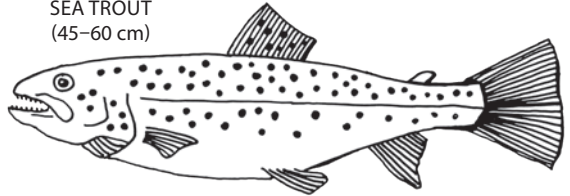
TURBOT
(20–40 cm)



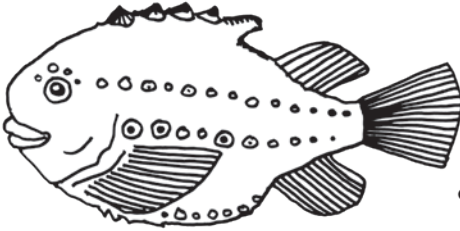
SHORTHORN SCULPIN
(20–30 cm)



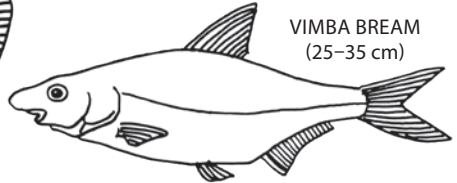
SEA TROUT
(45–60 cm)



LUMPSUCKER
(12–16 cm)



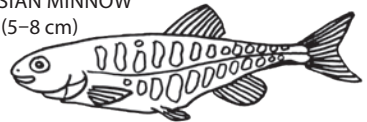
VIMBA BREAM
(25–35 cm)



COMMON GOBY
(2–4 cm)



EURASIAN MINNOW
(5–8 cm)



ROCK GUNNEL
(10–15 cm)



BROADNOSED PIPEFISH
(10–20 cm)



Task. Colour the fish.



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Authors Lauri Saks, Aare Verliin, Eda Andresmaa, Jonne Kotta,
Liisi Lees, Agnes Unnuk
Fish (on the stickers and pages 1, 3–7, 9–10, 14–15) drawn by Aare Verliin
Editor and translator Robert Szava-Kovats
Design and Layout Maite Kotta
University of Tartu
Tallinn 2023



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