Centre
de services scolaire
des Chênes
Québec

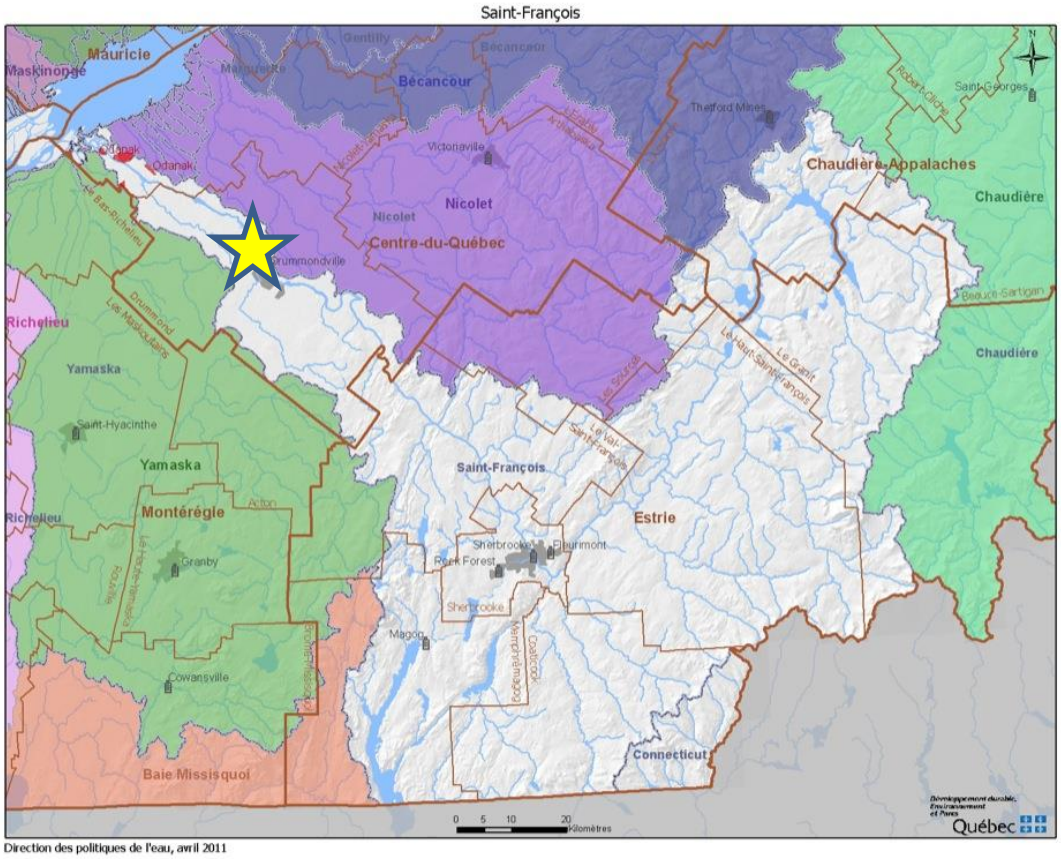
Fondation de la faune du Québec

Aquaculture

Student Booklet

Name: _____ Gr.: _____

My school in it's living environment



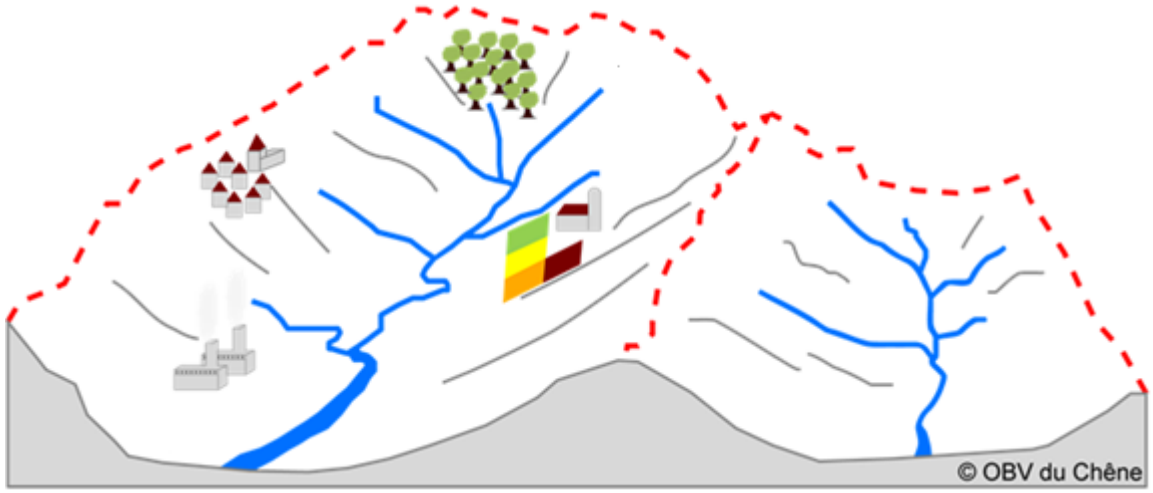
Your school is on a territory in which there are natural environments (forest, river, pond, swamp).

In this project, we will focus on aquatic environments. Some people are interested in these places, such as biologists. Some of them work for groups called Watershed Organizations.

So what is a watershed?

You have the opportunity to meet a biologist who will explain to you what a watershed is, in an online meeting. Unfortunately, he/she does not speak English…

Watershed



On this diagram,

a) write the following three words where they can be found :

Tributary	Upstream	Downstream

b) make a yellow line dividing the two watersheds;

c) colour one of the two watershed using green

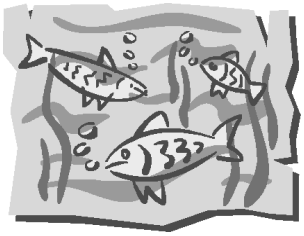
What I remember

A watershed is :

_____

_____

The Aquatic Habitat



Each aquatic habitat has characteristics that determine the type of life that can live in it. For example, the climate, the water temperature, the type of riverbed or streambed influence the types of creatures that will be able to survive. Abiotic factors are these non-living elements of the habitat.

In an aquatic habitat, many life forms (animals and plants) that have basic needs to survive (food, shelter, etc.). All these inhabitants are interrelated and share the available resources. That is what we call an ecosystem.

Let's have a closer look!

There are different types of aquatic ecosystems.

- Lakes
- Wetland (ponds, swamps, bogs, etc.)
- Rivers and streams

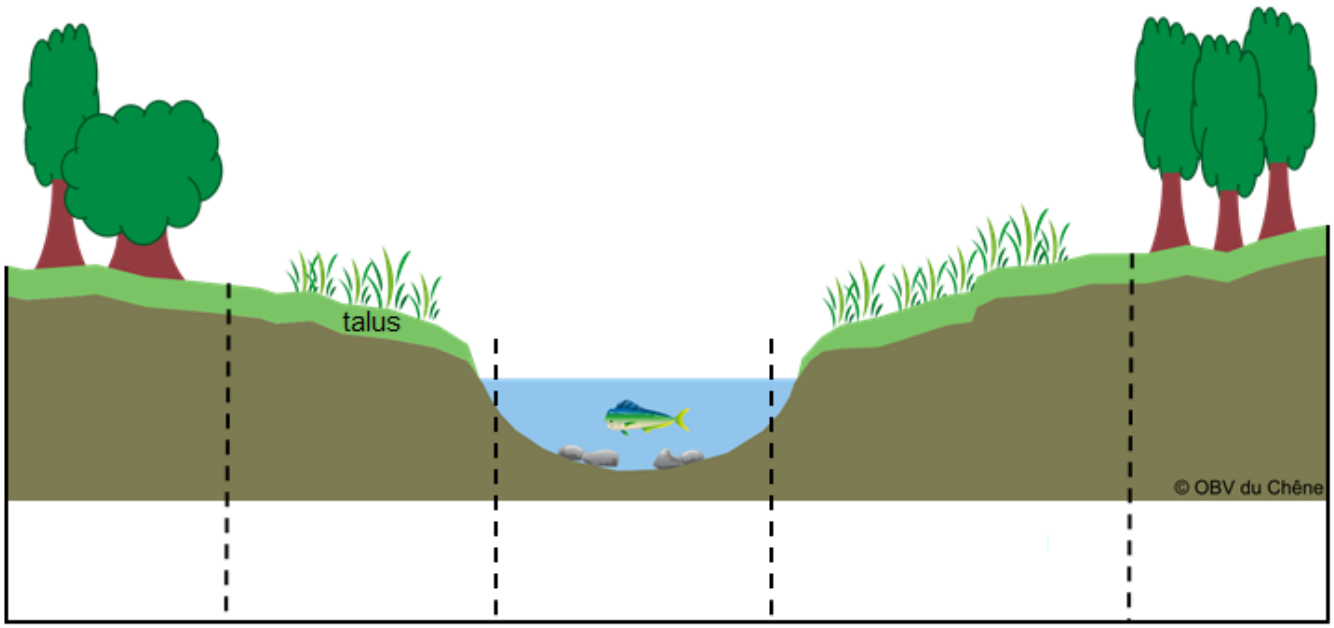
Which animals do we find in these habitats?

_____ _____ _____

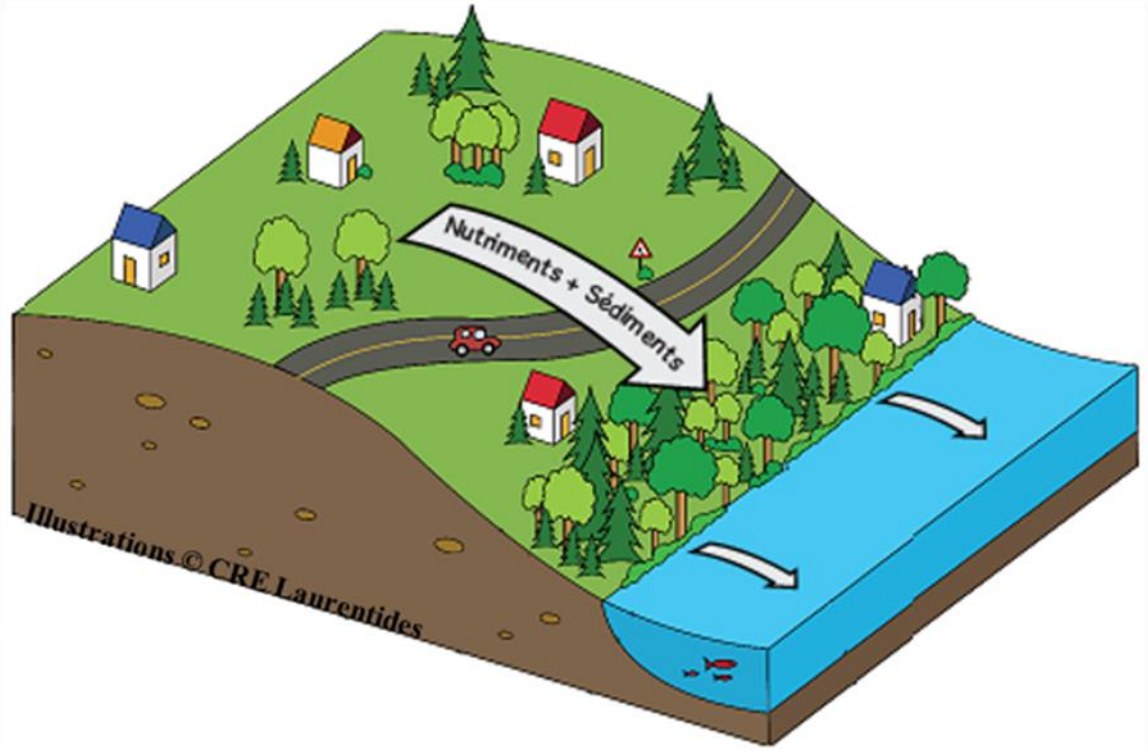
_____ _____ _____

_____ _____ _____

There are different parts in a stream.
Identify each part of the stream in the appropriate blank spaces.



The buffer strip is a protective barrier around the aquatic habitats. It plays many important roles.



Associate the roles of the buffer strip with the appropriate picture.

Filtering

Habitat

Erosion

Shading

Retention

What I remember

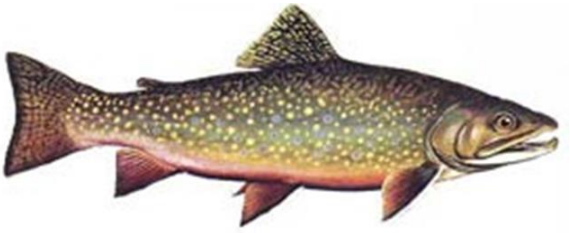
What is an aquatic habitat?

_____

_____

INFORMATION – INFORMATION - INFORMATION – INFORMATION - INFORMATION – INFORM

For our project, the type of fish we will study is the brook trout.



Its official name is : ***Salvelinus fontinalis***

A long time ago, scientists developed a method to classify all the plants and animals on our planet. It is called **Taxonomy**. They used Latin because it was the common language of scientists at the time.

The classification is based on the _____ of animals.

The following pages present you with a simplified identification key.

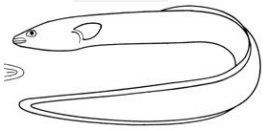
Will you know where to place the brook trout?

Simplified Identification key for Fish

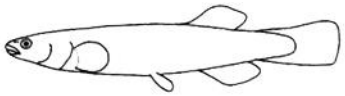
Does the fish have…

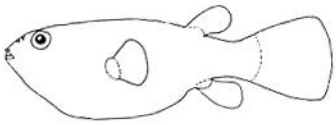
A Serpentine in shape body?

Yes



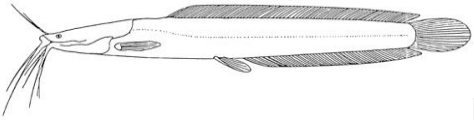
No



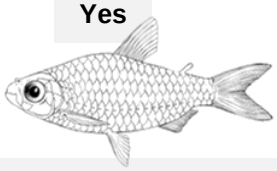


Scales?

No

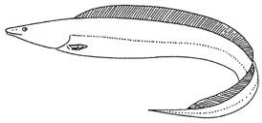


Yes

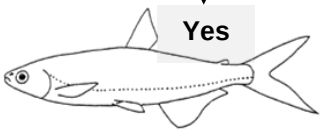


A Ventral fin?

No

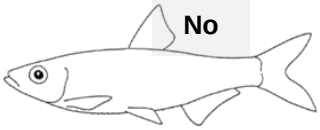


Yes



Many dorsal fins

No

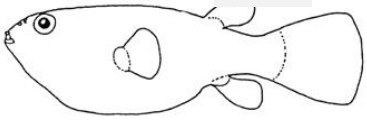


Yes

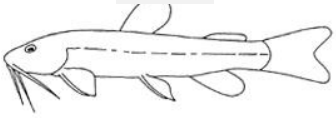
The Northern Pike

Barbels?

No



Yes

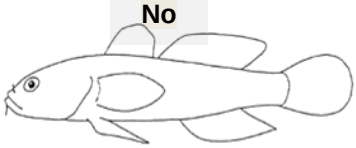


The Bullhead

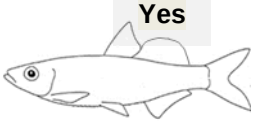
Does the fish have…

Two joined dorsal fins?

No



Yes



The Walleye

The smallmouth bass

The rainbow trout

The rock bass

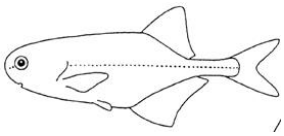
The Atlantic Salmon

Centrarchidae

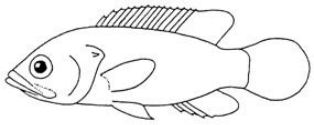
Does the fish have…

Dorsal Spines on the dorsal fin (s)?

No



Yes



The rainbow trout

The Walleye

The Atlantic Salmon

Salmonidae

Percidae

Mark the place where you would put the brook trout with a star. ★

What is the name of its family ? _____

The Brook Trout Natural Habitat

The brook trout needs specific conditions to develop in its habitat:

- **Water that is cold, clear and well-oxygenated**
  - T° between 13°C and 20°C, optimal at 16°C (death at ≈ 22°C)
  - pH > 5,2
  - contains nutrients (phosphorus, nitrates)
- Streambank **vegetation**
- **Sheltering** (pools, dead tree trunks)
- A **shallow rocky riverbed** (especially for the laying the eggs)

Problematic

Below are three human actions that harm the habitat of fish.

1. Garbage that is not handled properly (non-compliant landfill sites)
2. Bad agricultural and lawn maintenance practices
3. Removal of trees less than three metres away from the bank
4. Introducing exotic species

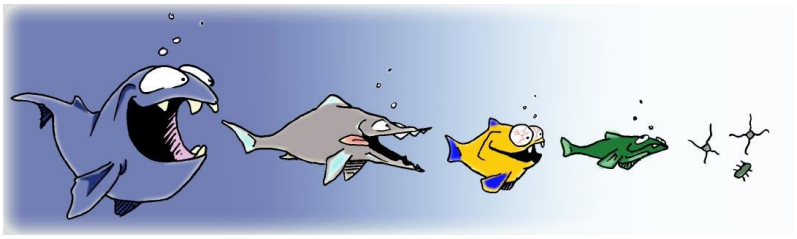
How can we improve water quality?

_____

_____

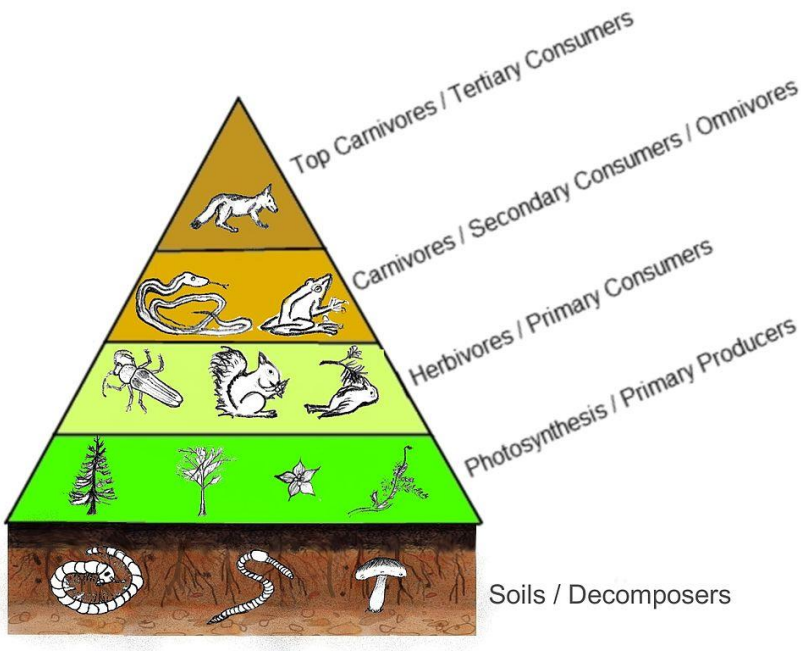
_____

The Food Web
Or « who eats who »

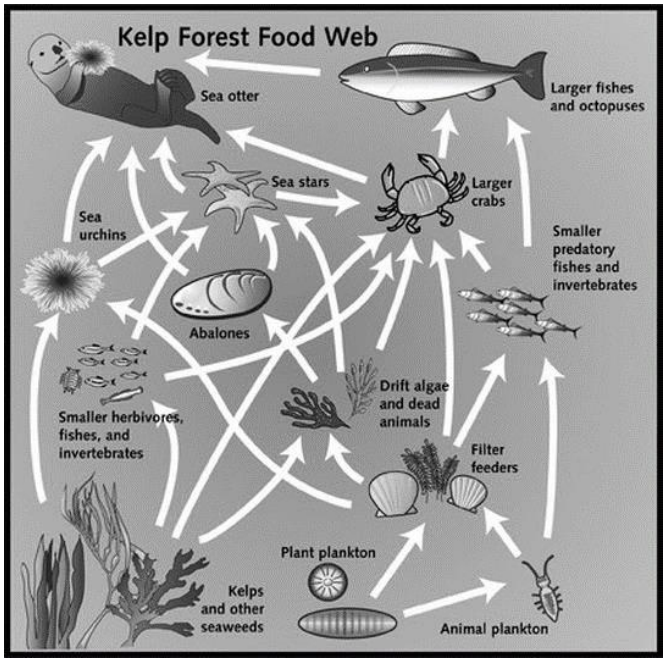


Food relationships between various life forms in a habitat can be illustrated in various ways. For example, by using an arrow network or a pyramid.

Here is an example of a pyramid:

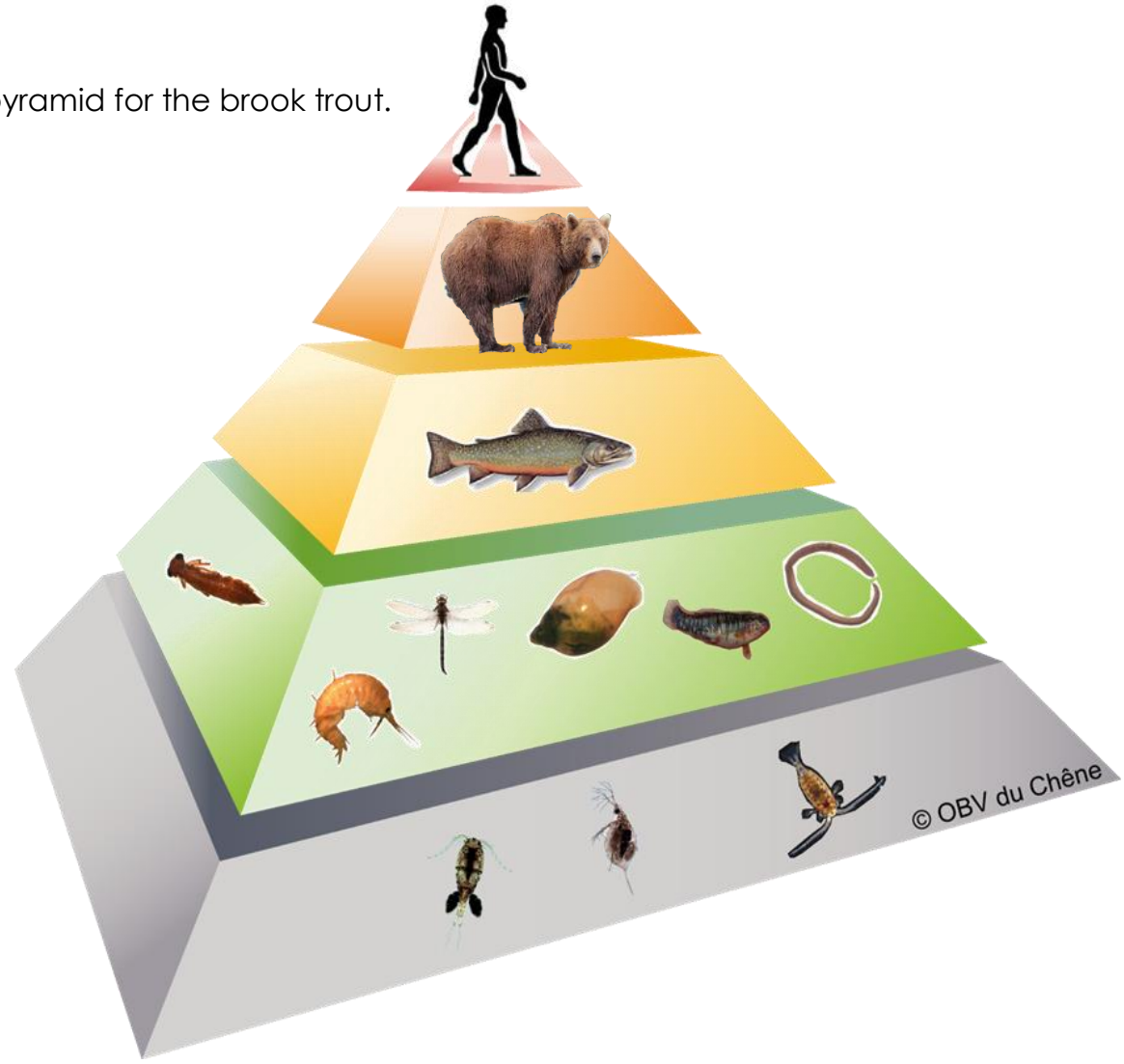


Here is an example of a food network:



Let's look into what the food web looks like for our star: the brook trout.

Here is the food pyramid for the brook trout.



Except the human, who is a predator for a brook trout?

_____

At the last stage, there are mostly micro-organisms, whom are eaten by brook trout's prey.

Could you name 2 of these preys?

_____ _____

The Ecological Niche

The brook trout plays a role in its habitat. It eats, breathes, and rejects wastes. The wastes it produces is food for other live forms (decomposers, plants). The brook trout itself is also food for other animals. So, the brook trout depends on everything that is part of its habitat. Be it the various life forms as well as the non-living elements (temperature, water quality, etc.)

The ecological niche is the global role played by an organism in its habitat.

The Artificial Habitat of the Brook Trout

In our project, we will not observe the development of the brook trout in its natural habitat, but in an aquarium.

In order to make the aquarium look as close to the natural habitat of the brook trout as possible, we have to recreate a number of conditions.

Identify the elements in the aquarium with an arrow and a number while writing how they allow the little trouts to grow well.

① **sponge filter**: to filter and to oxygenate water (like plants would have done in a natural habitat)

② **oxygenation bar**: to add oxygen in water

③ **bowl of rocks**: to shelter the micro-organisms and to reproduce the river bottom

④ **cooler**: to cool down the water, 5°C less than ambient temperature

Here are some instruments that you will need to verify the artificial habitat conditions:

- Thermometer
- pH paper
- your eyes (water color, turbidity, vegetation or other elements)

You have seen what the brook trout eats in its natural habitat. But, in an aquarium, it can not find its food. What can you do to solve this problem?

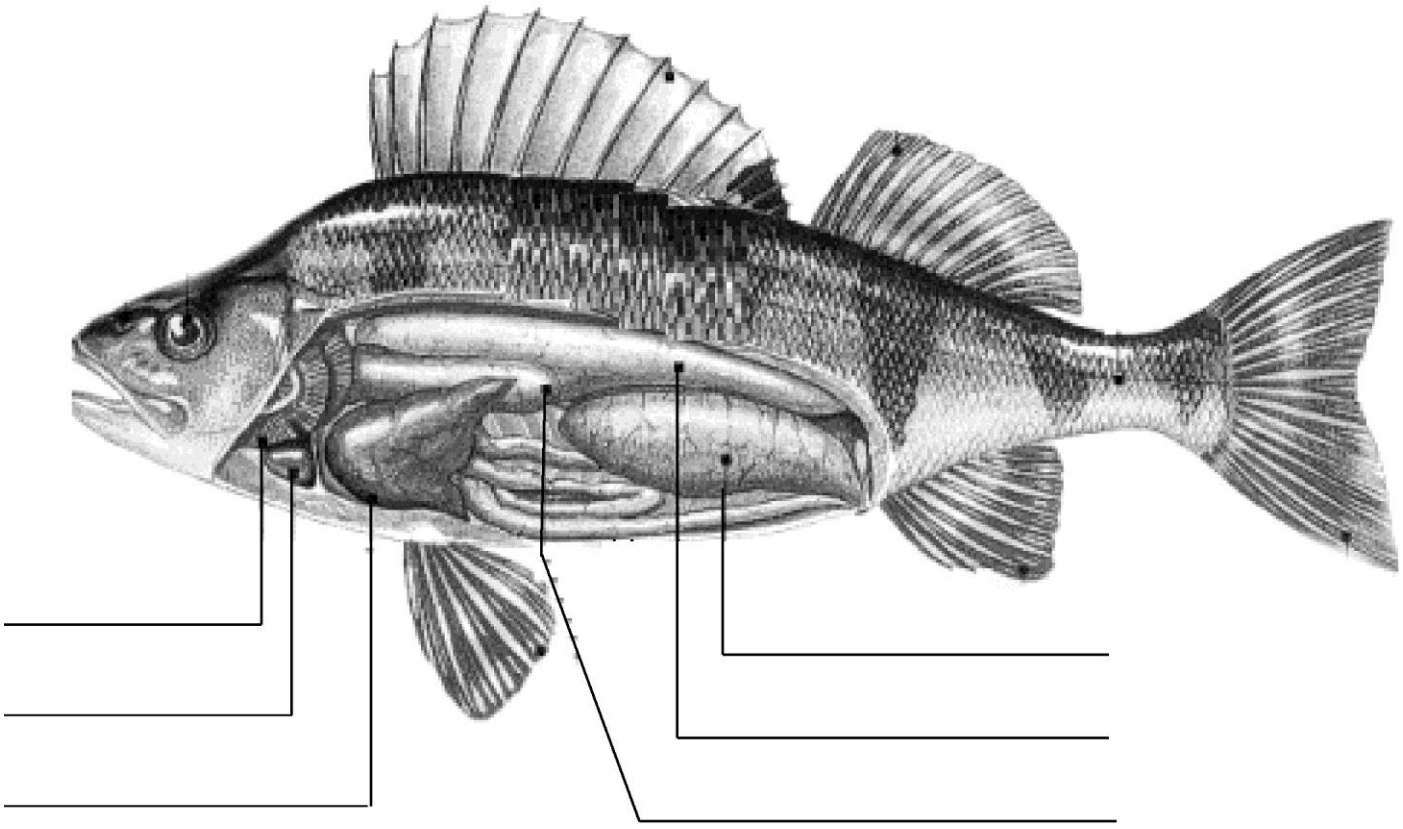
_____

_____

Anatomy of the Fish

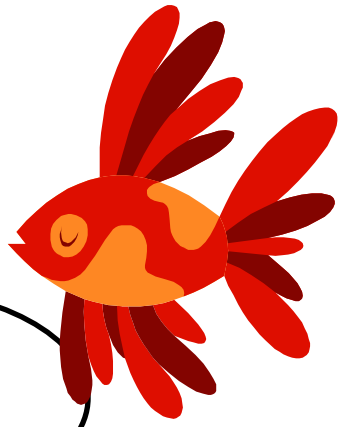
Use the following words to identify the internal organs of this fish.

Gill, heart, stomach, liver, ovary, swim bladder



Organ	Function	Relation with human body
Gill		
Heart		
Liver		
Ovary		
Stomach		
Swim bladder		

The fins



A) Associate the definition to the corresponding type of fin.

Note : The number of fins varies depending on the specie.

Caudal (tail)

Keeps the body in an upright position and allows for movement in all directions.

pectoral

Is used to propel the fish and serves as a rudder. The fish expresses its feelings with it.

Keeps the body in an upright position.

ventral

anal

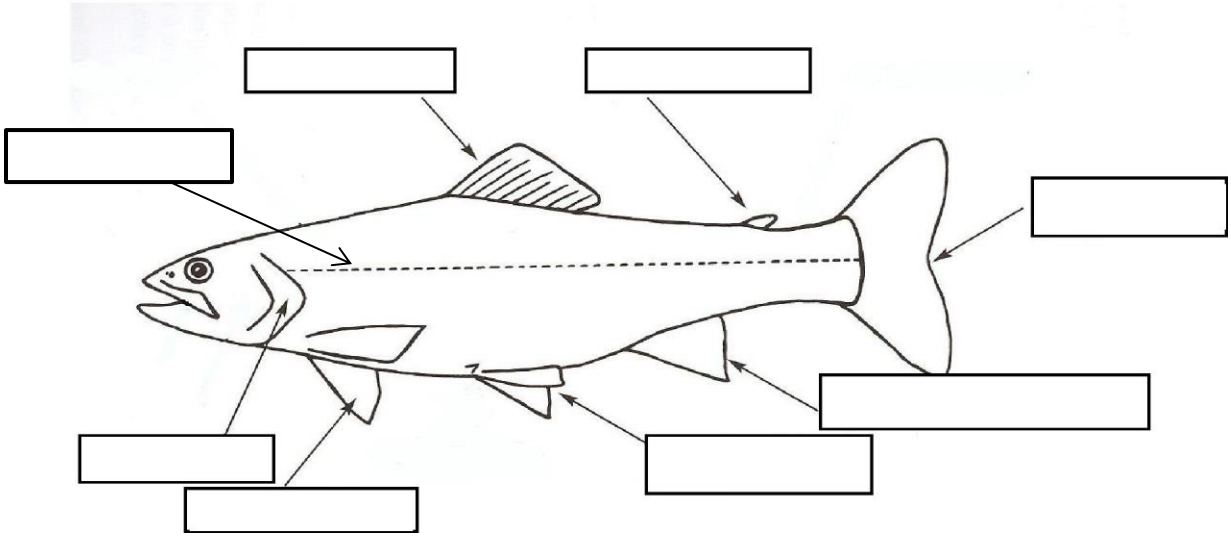
dorsal

Is used to brake and change direction.

Stabilizes and allows to remain at the same spot.

B) Here is our brook trout. Write the body parts in the appropriate squares.

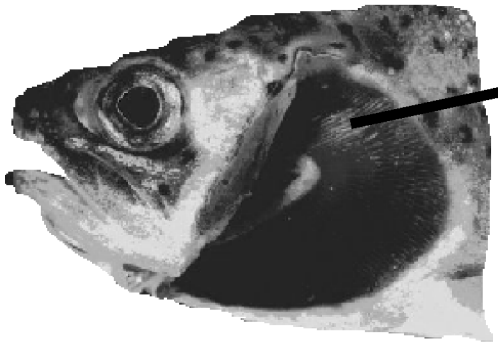
Adipose fin	Anal fin	Tail or caudal fin	Dorsal fin
Pelvic fin	Pectoral fin	Seal	Lateral line



Respiration of the Fish

A fish needs oxygen for its heart, its brain and its muscles.

To breath, a fish closes its mouth and opens its seal. The water goes into the gills*, where the oxygen in the water goes through the blood vessels and is pumped through blood to all of the parts of the body while carbon dioxide is freed.

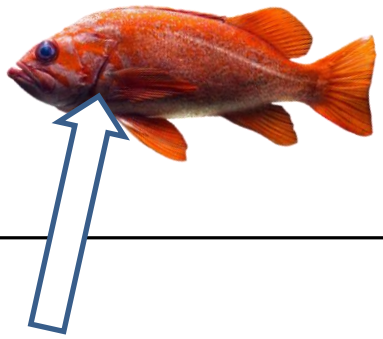


*My **gills** are my respiratory organs. They are red because they are full of blood vessels.

If the water temperature increases, a fish will breathe faster because there is less oxygen in hot water.
On the other hand, we also see that a big fish breaths faster because he needs more oxygen than a small fish.

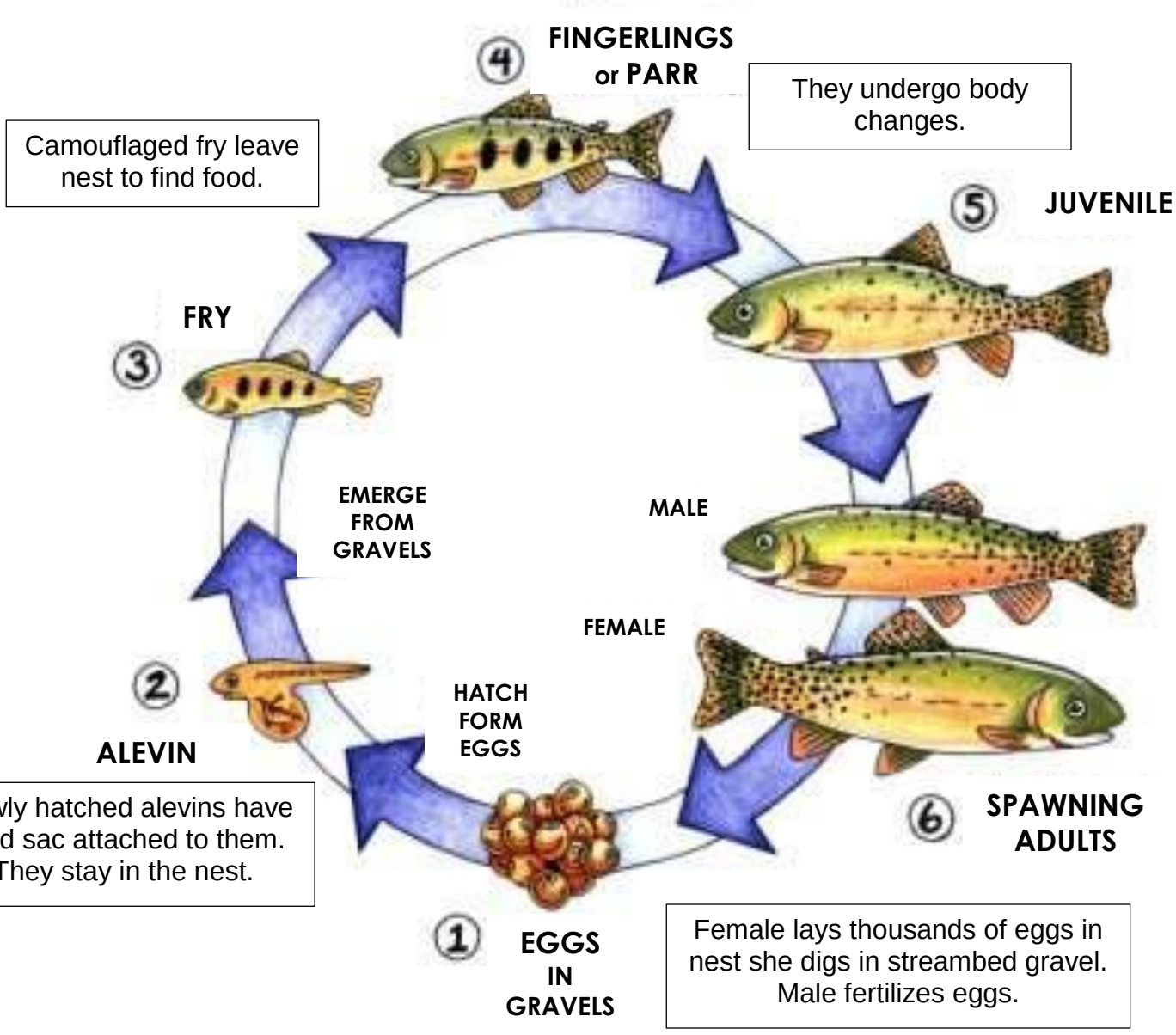
Let's observe...

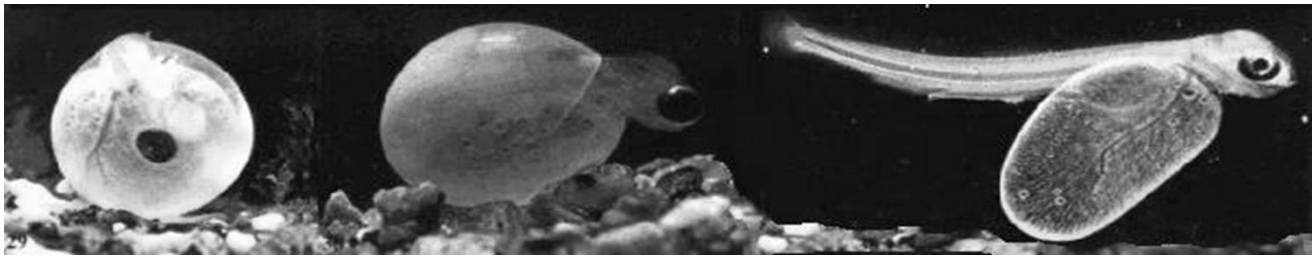
When your will receive four fish, take the time to count how many times the gills open in 10 seconds. Then calculate for 30 and 60 seconds.



10 seconds	_____times the gills open
30 seconds	_____times the gills open
60 seconds	_____times the gills open

Fish growth and Life cycle





Sense organs

	Fish 	Human being 
Sight Where are the eyes ? How is the vision : good or bad ? How does it focus ? How are the pupils ? How is the field of view ?		
Touch Which part of the body can feel a touch ?		
Smell What is the use of this sense in the water ? How many nostrils do they have?		
Taste Do fish have taste buds ? If so, where are they?		
Hearing Which part of the body is used to hear?		

Personal notes

Special thanks to Mrs. Line Lacroix for her knowledge and support.