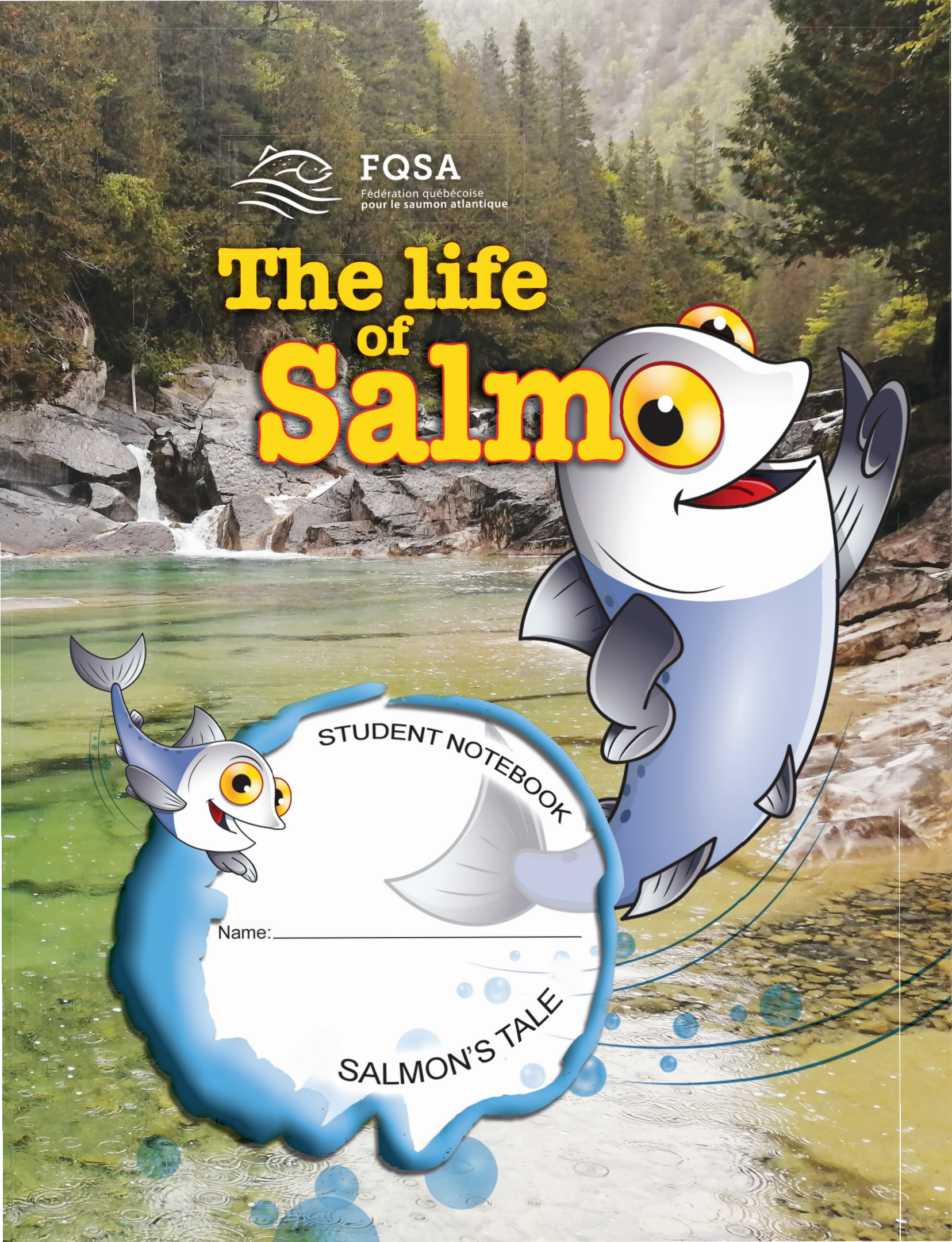
FQSA
Fédération québécoise pour le saumon atlantique

The life of Salmo



STUDENT NOTEBOOK

Name: _____

SALMON'S TALE

THANK YOU TO ALL OF OUR PARTNERS IN THE FIELD WHO MAKE IT POSSIBLE FOR SALMO TO LIVE IN SO MANY RIVERS HERE IN QUEBEC!

Aquamérik

Association de gestion halieutique autochtone Mi'gmaq et Malécite (AGHAMM)

Association forestière de la Gaspésie (AFG)

Conseil de l'Eau du nord de la Gaspésie (CENG)

Contact Nature Rivière-à-Mars

Corporation de gestion de la rivière Jacques-Cartier (CBJC)

Corporation de gestion de le rivière Saint-Jean-Saguenay (CGRSJS)

Corporation de gestion des rivières Matapédia et Patapédia (CGRMP)

Organisme de bassins versants de la Haute-Côte-Nord (OBVHCN)

Organisme de bassins versants du Nord-Est du Bas-St-Laurent (OBVNEBSL)

Organisme de bassins versants Duplessis (OBVD)

Organisme de bassins versants Manicouagan (OBVM)

Organisme des bassins versants de Kamouraska, L'Islet et Rivière-du-Loup (OBAKIR)

Société de gestion de la rivière Matane (SOGERM)

Société de gestion des rivières de Gaspé

Société saumon de la rivière Romaine (SSRR)

Station Piscicole de Tadoussac et de Coaticook (MFFP)

And to all the extraordinary teachers and volunteers that continue to tell the story of salmon.

For all inquiries, you can contact the FQSA at **secretariat@fqsa.ca** or:

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or toll-free 1 888 847-9191

You can follow us on our website **www.saumonquebec.com** and our **Facebook** page to be up to date with the latest news!

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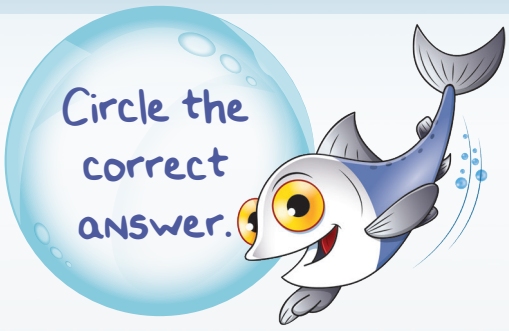
Who am I?



1) 1) What is the language used in science to name species ?

a) Spanish
b) Latin
c) French

What is the specific name given to salmon?

_____

2) I live my life both between fresh and salt water. In fact, I was born and spent my early days in the river, and then I grew up as an adult while I was out in the ocean. The term used to describe fish returning to rivers from the ocean in order to spawn is :

a) catadromous
b) anadromous

3) Which of these fish behaves contrary to salmon, i.e., it lives in fresh water and spawns in salt water ?

a) the American eel
b) the yellow perch
c) the pike

Etymology of words

Words in English often have Latin or Greek roots, which is what we refer to as their etymology. Using a dictionary or by searching online, find the etymology of the following words. Then write down the actual definition of the words.

A) BIOLOGY

Etymology : _____

_____

_____

Definition : _____

_____

_____

B) INSECTIVORE

Etymology : _____

_____

_____

Definition : _____

_____

_____

C) KILOGRAM

Etymology : _____

_____

Definition : _____

D) PISCICULTURE

Etymology : _____

Definition : _____

E) OVIPAROUS

Etymology : _____

Definition : _____

F) POIKILOTHERMIC

Etymology : _____

Definition : _____

_____

_____

G) CENTIMETER

Etymology : _____

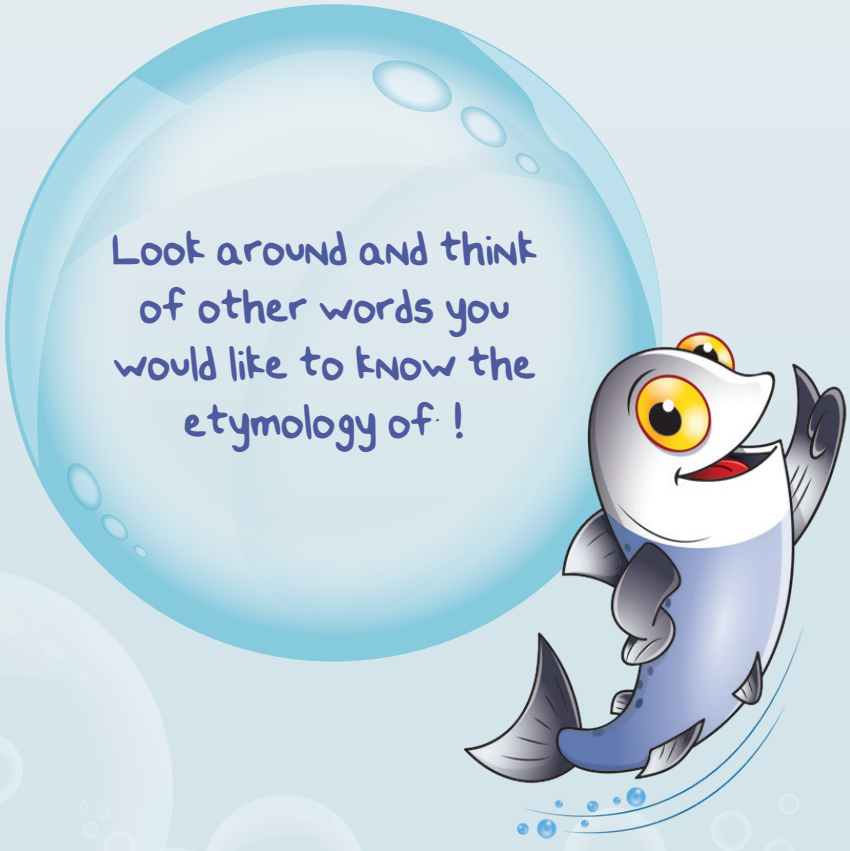
_____

_____

Definition : _____

_____

_____



A few predictions

The female salmon found in spawning areas come in a range of different sizes.

We can produce between 1500 and 1600 eggs per kilogram (kg) of body weight. Can you help us find out how many eggs each of us will produce? Don't forget to write down the steps you used to find your answer.

1) FIND THE AVERAGE NUMBER OF EGGS PER KG THAT I WILL PRODUCE.

Steps :

Answer

2) I WEIGH 7 KG. HOW MANY EGGS DO YOU THINK THAT I WILL PRODUCE?

Steps :

Answer

3) IF A FEMALE WEIGHS 12 KG, HOW MANY EGGS WILL IT PRODUCE ?

Steps :

Answer

4) HOW MANY EGGS WILL A 23,5 KG FEMALE LAY?

Steps :

Answer

5) HOW MANY EGGS WILL THESE THREE FEMALES PRODUCE IN TOTAL?

Steps :

Answer

6) HOW MANY EGGS WILL THEY EACH PRODUCE ON AVERAGE ?

Steps :

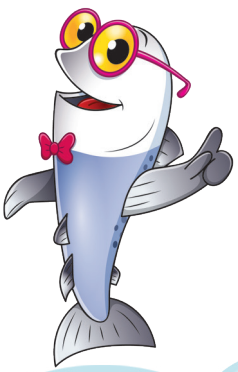
Answer

Hatching of the eggs

The age of the eggs is calculated in degree days, namely the sum of the average temperatures recorded for each day. For this reason, it is important to maintain a constant temperature in the incubator and to record those temperatures.
Salmon spawning takes place in the fall, around the month of October. At the hatchery, the water temperature is recorded every day until the eggs are delivered to your school. That is when you need to step in!

Egg delivery date: _____
Age of eggs in degree days: _____

Here is a calendar showing the degrees per day for the month of April at St-Salmo Salar school.



	SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	Total o C /week
Week of 1st to 7th day	5	5	5	5	5	5	5	
Week of 8th to 14th day	6	6	6	6	6	6	6	
Week of 15th to 21st day	5	6	5	7	4	4	4	
Week of 22nd to 28th day	4	3	5	2	3	4	4	
Week of 29th to 31st day	3	2						

1) HOW MANY DEGREE DAYS DID THE EGGS GET DURING THE MONTH OF APRIL?

Steps:

Answer

2) LES ŒUFS ÉCLOSENT EN MOYENNE À 429 DEGRÉS-JOURS.

A) Can you tell the birth date of the fry from St-Salmo school?

Steps:

Answer

B) Can you tell the birth date of your fry if the temperature of your aquarium remains constant?

Steps:

Answer

3) WHEN DID THE FRY DELIVERED TO YOUR SCHOOL BEGIN TO HATCH? ON WHAT DATE ?

_____

4) WHAT WOULD HAPPENED IF THE TEMPERATURE HAD BEEN 2 DEGREES WARMER?

_____

_____

_____

Alevins

1) Do you know how the eggs get the oxygen they need?

2) Where does this oxygen come from?

3) A salmon egg needs between 70 and 160 days to develop. Why do eggs have different incubation periods in different spawning grounds? Here's a clue... think of what impacts the growth rate of eggs in the river.

4) How do alevins feed?

5) For how long?

6) Where do they hold during this period of their life cycle?

7) Do you know why the alevin don't move around much?

Trout or parr?

Parr can often be confused with brook trout, also known as speckled trout.

Here are some of the characteristics of the PARR:

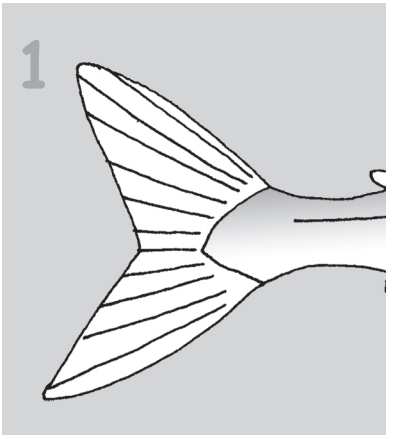
- No marks on the dorsal fin
- Forked tail
- Black spots on the opercula
- Corner of the mouth in line with the center of the eye

Here are some of the characteristics of the TROUT:

- Black marks on dorsal fin
- Tail is nearly flat
- No speckles on the opercula
- Corner of the mouth goes beyond the eye

On the next page, you will find a picture showing the differences between the bodies of brook trout and parr.

From these two pieces, try to recreate a brook trout and a parr according to their relative features. Cut out the pieces, and glue them inside the two boxes below.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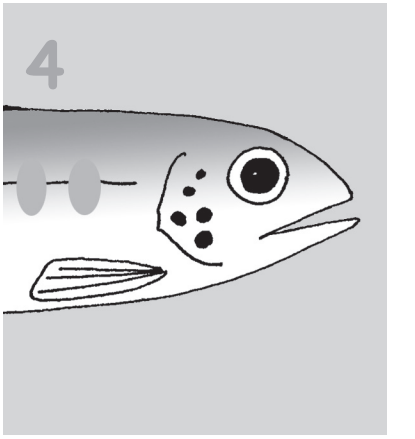
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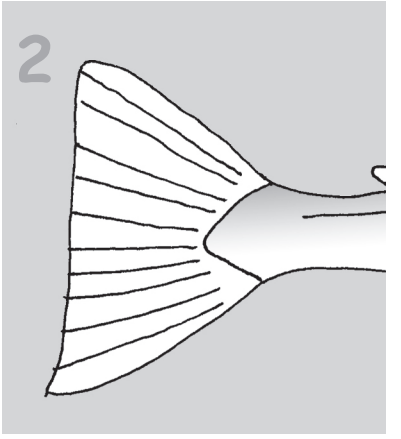
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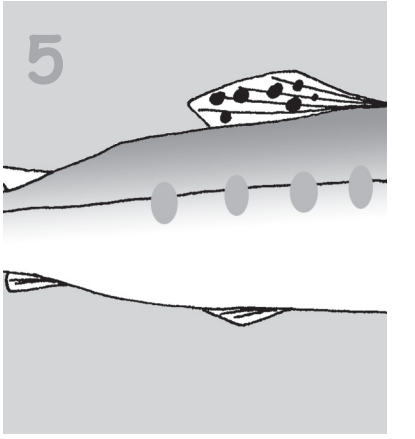
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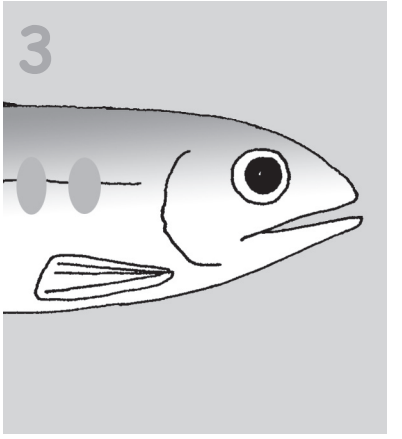
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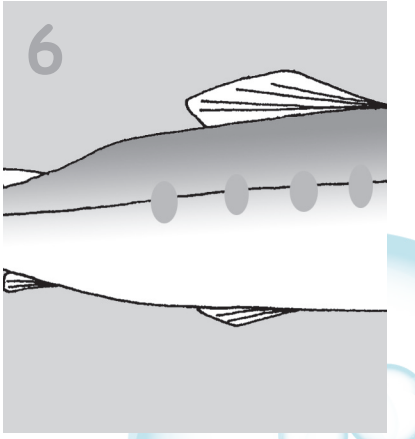
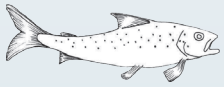

6

Salmo's growth

Place the salmon's life cycle stages in order by numbering each box. Then, match these stages to the corresponding sizes.

A) Order of stages		B) Sizes
	Fry	63 cm and less
	Egg	4 - 12 cm
	Large salmon	5 - 7 mm
	Smolt	more than 2 cm
	Parr	2 - 4 cm
	Grilse	more than 63 cm
	Alevin	12 - 20 cm

1) Which of these stages take place in fresh water?

2) Which of these stages happen in salt water?

Salmo's diet

The salmon's diet changes according to its life stage.

Egg and alevin

Fry

Tacon and smolt

Adult salmon at sea

Adult salmon in the river

It feeds on small microorganisms such as zooplankton

It eats small fish, such as capelin and herring, and small crustaceans

It does not feed

It eats small fish, such as capelin and herring, and small crustaceans

It feeds on the vitellus/yolk (liquid that surrounds it)

The travelling salmon

The map below shows some of the countries where Atlantic salmon can be found around the world.

Using an atlas, can you name some of these countries?

1. _____ 4. _____
2. _____ 5. _____
3. _____ 6. _____

Write down the four cardinal points of the compass, which are north, south, east, and west, in the correct place on the map.
All North American Atlantic salmon are found in the same part of the Atlantic Ocean where they feed before returning to their native rivers to spawn. Can you mark this location on the map? You can search the Internet or at the library!

Atlantic salmon from all countries in the world also migrate to this part of the North Atlantic !

Male ou female?

Their silvery-gray color makes all salmon look alike in the ocean. When they come back to the river to reproduce, however, they take on their most beautiful colors. This is when males and females begin to stand out more, in the hopes of finding a partner.

1) Why do salmon have a silver color when they are in the ocean?

_____

_____

_____

_____

_____

2) What are the main differences between males and females while in the river?

_____

_____

_____

_____

_____

To learn more about all parts of my body and my internal organs, do the anatomy board activity! Once you've filled out the sheet, you can fold it and keep it in your workbook, so you won't forget what you've learned.

The life of Salmo

Using the word bank below, complete the gap sentences on the following pages. Words marked (2) can be used twice.

12	Females	Pebbles
2	Fertilize	Resorbed
5-6	Fry	Return
Adults	Gravel (2)	River
Alevins	Grilse	Rocks
Bodies	Incubate	Silver
Brook trout	Large salmon	Spawning
Downstream	Microorganisms	grounds
migration	Native river	Spring (2)
Eggs (2)	Ocean	Winter
Fall	Odor	Yolk sac
Fat	Orange	
Feed		

UPSTREAM

This is where spawning areas are typically found: these are shallow areas where the riverbed is mainly composed of _____ and _____. It is here that the _____ will deposit their _____ and that the males will come to_____ them.

Life cycle stage: _____

Females can lay between 1,500 and 1,600 eggs per kg of weight. These _____ or amber-colored eggs are laid in the headwaters, more commonly known as the _____. The eggs will begin to develop over the_____, and _____ for a period varying from 70 to 160 days. Salmon deposit their eggs in the_____ (season).

Life cycle stage: _____

These little _____ cm long fish live under the gravel, patiently feeding on the _____, that is still attached to their _____. IThey will stay in this form for about _____ weeks. This phase occurs in the _____ (week).

Life cycle stage: _____

These small fish emerge from the _____; their yolk sac is now _____. They can feed for themselves on _____ living on the surface of rocks, and soon insects.

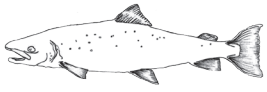
Life cycle stage: _____

Salmon remain in this life stage for 1 to 3 years until they have grown to about _____ cm in size. They spend winter under large _____. In the summer, they are found in faster flowing water and in other smaller neighboring streams, where food is abundant. This is the time when we can easily confuse them with _____ (also called speckled trout).

Life cycle stage: _____

At this point, they are now ready to begin their _____ out into the ocean. We can easily recognize them due to their _____ color. This stage happens in the _____ (season).

Life cycle stage: _____



This stage, which takes place in the _____, allows the salmon to grow enormously and to stock up on _____. When they have spent only 1 year at sea, we call them 1-sea-winter fish or _____. Salmon spending more than one winter at sea are called _____.

DOWNSTREAM

After a year or more at sea, we begin to see salmon _____to the rivers, in an event we refer to as the salmon run. Each salmon finds its _____ using its_____. senses and the Earth's magnetic field. Salmon do not _____during this time.

The tales of my scales

Much like the growth rings of a tree, we can look at the life of a salmon through its scales and learn more about its age and maturity. We can also determine such information from the otoliths, or the tiny bones in the fish's inner ear!

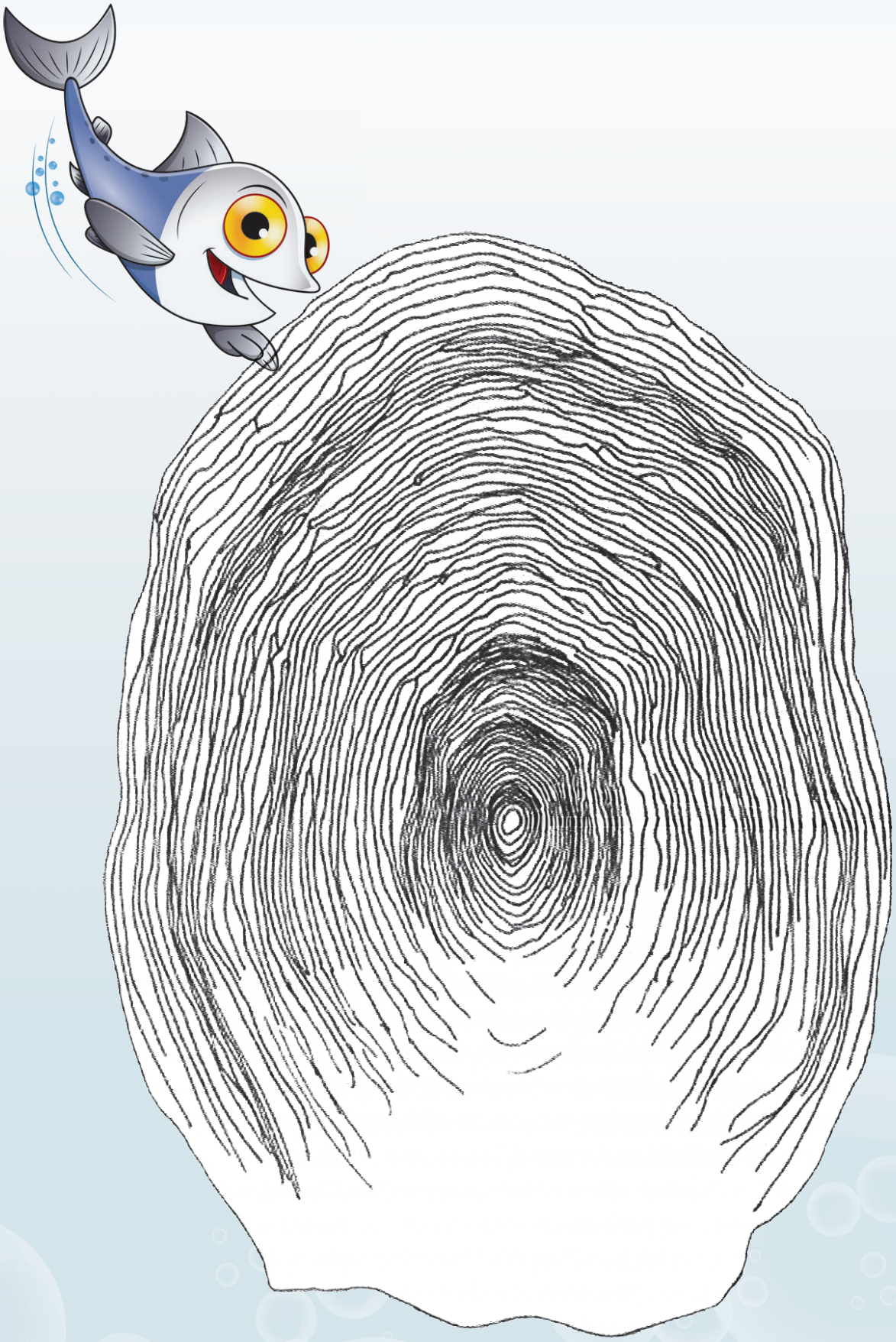
Match the sentences below to the correct stage of the salmon's life on the scale shown on the next page.

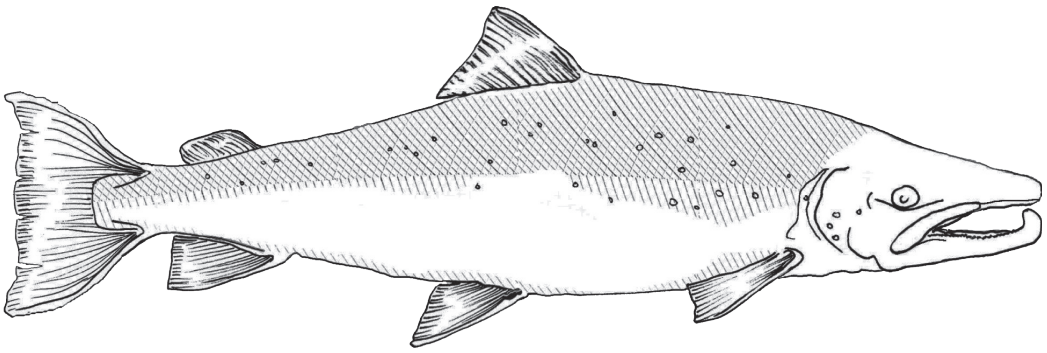
1. I am a little over 4 years old.

2. Water becomes very cold and food becomes scarce in winter. I don't grow much during this season.

3. I am at sea. I feed abundantly and grow rapidly, which is why my growth rings are further apart from each other, especially in the summer.

4. My first growth rings will begin to show from the beginning of my life, but I am growing slower than at sea.





Using the salmon's scales and the descriptions in the previous pages, indicate how many different environments this salmon has lived in.

Name these environments:

_____

_____

_____

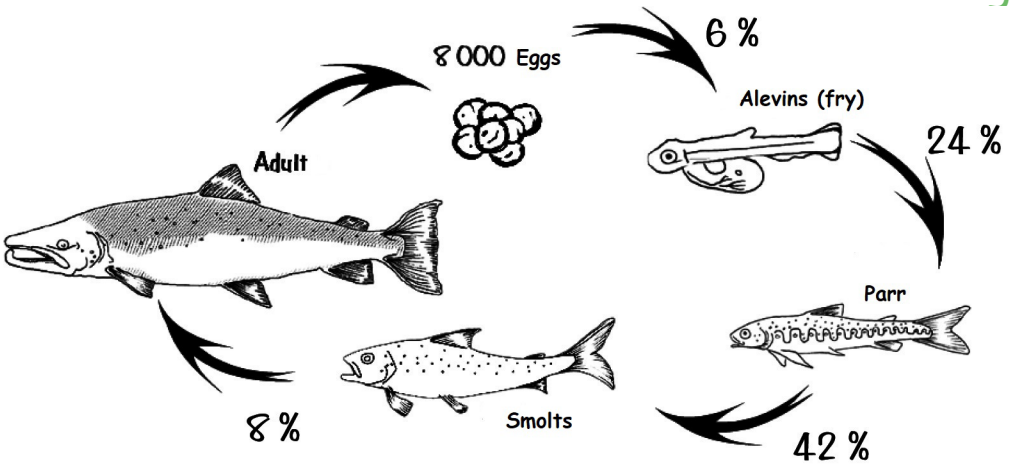
How long did the salmon stay in the river?

How much time did he spend at sea?

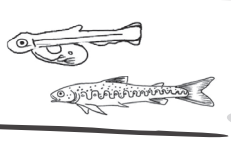
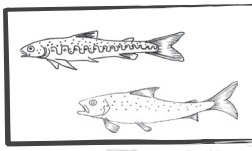
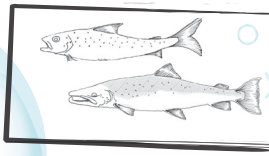
Salmo's survival

To begin, suppose there are 8000 eggs. Of these eggs, 6% become fry. Of these alevins, 24% will become parr. Of these parr, 42% will become smolts and of these smolts, 8% will become returning adult salmon.

Here are the survival rates between each stage:



1) Write the values corresponding to the percentages in the table below in the form of fractions and in decimals:

	Pourcentage / Percentage	Fraction	Nombre à virgule / Decimal
	6%		
	24%		
	42%		
	8%		

2) In your own words, can you explain the meaning of SURVIVAL RATE?

_____

_____

3) What are some of the factors (environmental, biological, human, predation, etc.) that could affect the survival rate of salmon during its life cycle? Provide an explanation.

_____

_____

_____

4) Based on the percentages in the table on the previous page, find the number of individuals at each stage. Write your answers in the spaces below, describing how you went about doing your calculations.

There are 8000 eggs.

How many will go on to become fry?
Here's an example of how to do the first calculation:

If the survival rate from an egg to fry is 6 %, then you have to figure out what 6 % of 8 000 is:

8 000 X 6 = 48 000
48 000 /100 = 480
There will be 480 fry.
How many eggs did not make it?
8 000 x 480 = 7 520 eggs did not survive.
Your turn !

a) How many parr will there be?

Steps:

Answer :

b) How many fry have died?

Steps:

Answer :

c) How many smolts will there be?

Steps:

Answer :

d) How many parr died?

Steps:

Answer :

e) how many adults will return to their home river?

Steps:

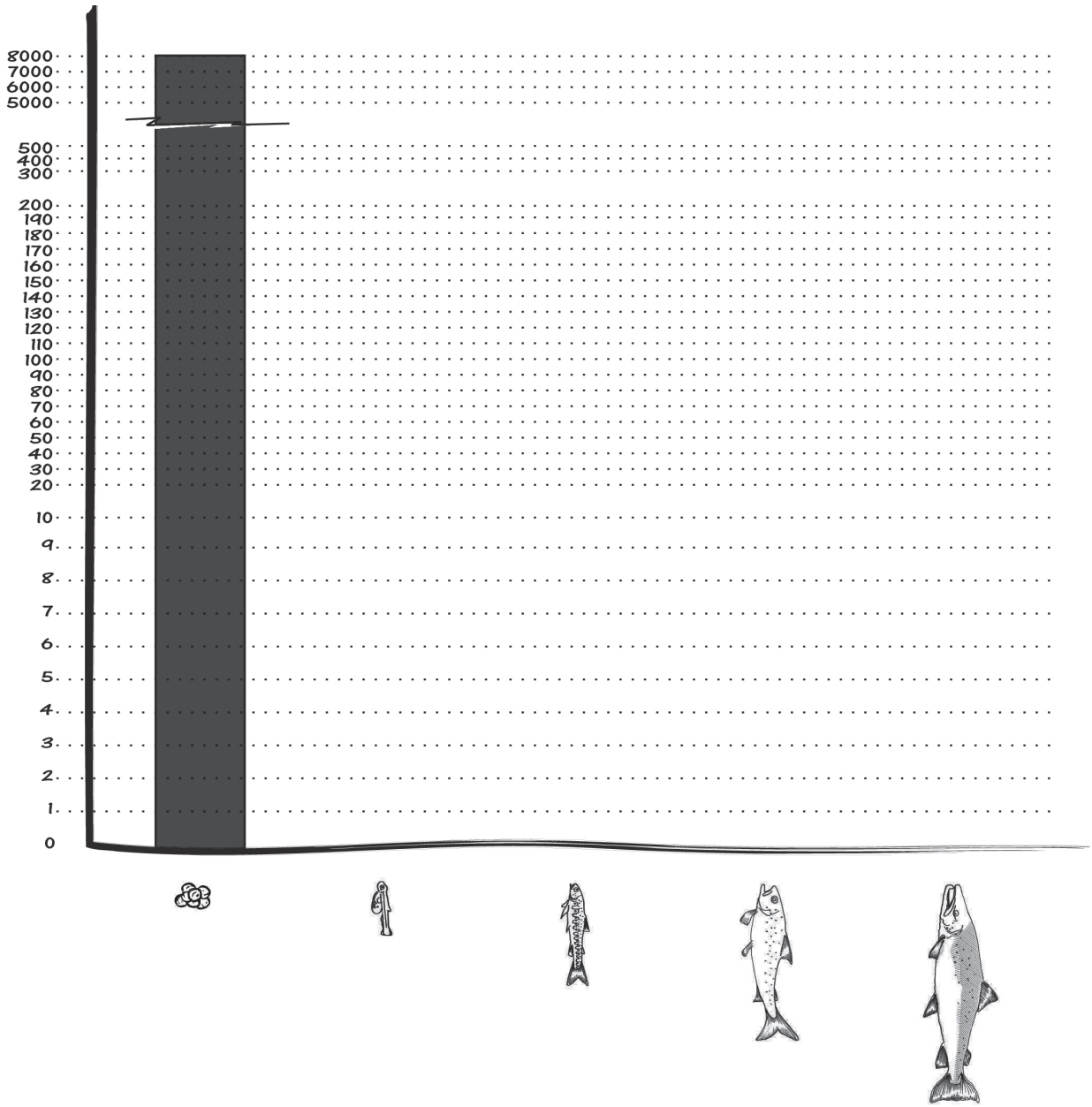
Answer :

f) How many smolts have died?

Steps:

Answer :

5) For this exercise, base yourself on the calculations made previously. Using the number of individuals at each stage of the salmon's life cycle, complete the following bar graph by drawing the columns corresponding to each number of individuals.



A bit of history!

Historically, Atlantic salmon could be found all the way to the Great Lakes. Today, they only inhabit 118 rivers in Quebec, mostly in the eastern part of the province, in the Gaspé Peninsula, and on the North Shore. The westernmost river where Atlantic salmon are still found in Quebec is the Jacques-Cartier River, in the Nation's Capital area. Salar has been in our rivers since long before colonization! In fact, it was an important food source for First Nations. Indigenous people have always had great respect for this resource, and many Native communities still fish for their own livelihood.

The first French settlers came across this resource after the founding of Quebec City in 1608 and established the first fishing stations in the area. Fishing and hunting have always been an important part of the settlers' diet wherever they would go or establish.

In the late 1600s, businessmen began to develop the salmon fishery more seriously and began trade with France and the Natives. Following the British conquest of Nouvelle-France in 1760, commercial fisheries expanded greatly, reaching their height in the mid-19th century.

Salmon harvests began to decline around 1850 and people began to worry. Fishing, logging, the building and use of riverside sawmills were all important factors in the decline of salmon.

In 1855, the government enacted legislation to regulate the salmon fishery. A government department was also created to manage the resource, and for the first time, commercial and sport fishing became two separate entities.

While commercial fishing kept going after the Confederation in 1867, salmon harvests were still in decline. As a result, the governments of Quebec and Canada decided to phase out commercial fisheries from 1972 to 1992.

Meanwhile, sport fishing went on and became even more popular, as its practice was done with respect for nature and allowed anglers to feed for themselves. Several associations, such as the Fédération québécoise pour le saumon atlantique, are working with the government to better manage the resource so that sport fishing can continue while we protect the species.

Wild Atlantic salmon populations are vulnerable, which is why we need to care for them. Today, most anglers practice catch-and-release, which means that instead of eating what they catch, they release the fish back into the river so they can live another day. Anglers and wardens both try to protect the rivers from poaching. We should all do our part in protecting Atlantic salmon populations from human impact such as pollution and climate change.

By working together, we can combine economic development with conservation of the species! Learn more about the environmental conflict through the suggested activity on the next page..

Did you understand the reading? Let's see!

1) In what year did the government create the first law on salmon fishing?

2) Which is the western-most river where Atlantic salmon are still found in Quebec?

3) What are some of the main causes of the decline in salmon populations by 1850?

Environmental issues and the salmon resource

In the fictional community of Salmonar, a hydroelectric developer from the hydroWatt Company is seeking approval from city council to build a dam. The dam would be located on the Wild River.

This is a river that attracts many salmon anglers every year. The fishery provides work for many people and is an important contributor of economic benefits for the community at large. However, many people in the community, and Indigenous people especially, for whom salmon fishing is part of their traditional livelihood, are concerned that this kind of human intervention could jeopardize the salmon resource.

City council now has to assemble and hear the voices of those who will be affected by this project. On the basis of what they've gathered, the council will have to make a decision whether to accept or refuse this project.

This activity is a role-playing game in which you will be asked to discuss the situation. Together with the students in your class, you must form teams that will represent the different actors involved. Depending on the group you represent, you will be able to list the pros and cons of building the hydroWatt dam on the Wild River. Then, each group will speak to the city council to decide whether the construction of the dam should be authorized.

This kind of approach is known as an issue table!

ACTORS INVOLVED

HYDROWATT

The hydroWatt developer is an entrepreneur seeking to meet the energy needs of the population by developing hydroelectric projects. His primary concerns are the profitability of his company and the region's economic development.

CITY COUNCIL

The city council is made up of elected officials who are entrusted with the management of the municipality's public affairs. Members of the council try to serve the interests of as many citizens as possible. They would like to find a solution that is respectful of the environment while enabling economic growth in the region.

THE BIOLOGISTS

A biologist is a scientist who studies the relationships between living beings and their environment. Their role is to provide objective and accurate information about salmon, their behavior, their life cycle, and their needs in relation to their habitat (the river). Biologists are concerned about the effects of changes in the environment that may affect the survival of salmon.

THE CITIZENS

Citizens represent all members of the community, both young and old. They simply want a better quality of life. Citizens want both, jobs, and a sustainable environment.

INDIGENOUS PEOPLE

For Indigenous people, salmon has always been an important food source and part of their way of life. Members of the local community have an inherent right to fish and have priority over recreational anglers (Aboriginal right to fish). They therefore see the construction of the dam as a threat to their traditional livelihood. They are concerned about the conservation of Atlantic salmon and perceive the alteration of the salmon's habitat as a possible impediment to their ancestral rights. However, they are just like all other citizens; they want both jobs and a healthy environment, where they can carry on tradition.

GUIDES AND ANGLERS

The main concern for guides and anglers is the conservation of the species and the development of the sport. They perceive any alteration in the salmon environment as a threat to the sustainability of the fishery. For fishing guides, the decline of this sport means that they could lose their jobs.

Crossword puzzle

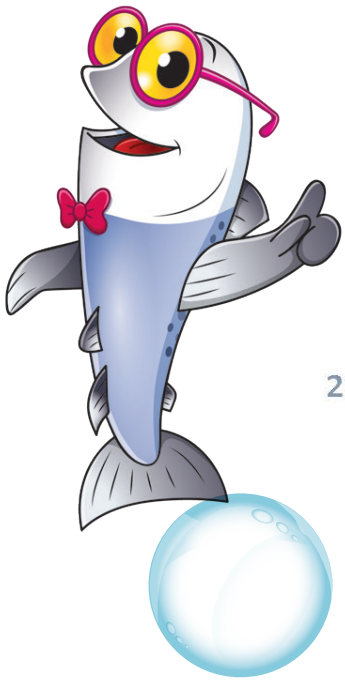
Complete the crossword puzzle on the next page using your answers to these questions.

HORIZONTAL

1) I produce energy using the flow of the river and I often have a fishway.
2) The term used to describe fish that are born and reproduce in fresh water and live in salt water.
3) Where the salmon rest when they are «running» (when they return to the river).
4) I am a fish that lives in the ocean who feeds on salmon, among other things.
5) I look like a parr, but I am NOT a salmon.

VERTICAL

6) They call me the «leaper».
7) I am unique to each river and I am the reason that salmon can find they native river.
8) The time when smolts leave their rivers to go out in the ocean.
9) A shallow part of the river with clear, cool, and well-oxygenated water.
10) The salmon's first habitat.
11) The tearm used to describe an animal that preys on other animals.
12) I am the one who dig the nest.



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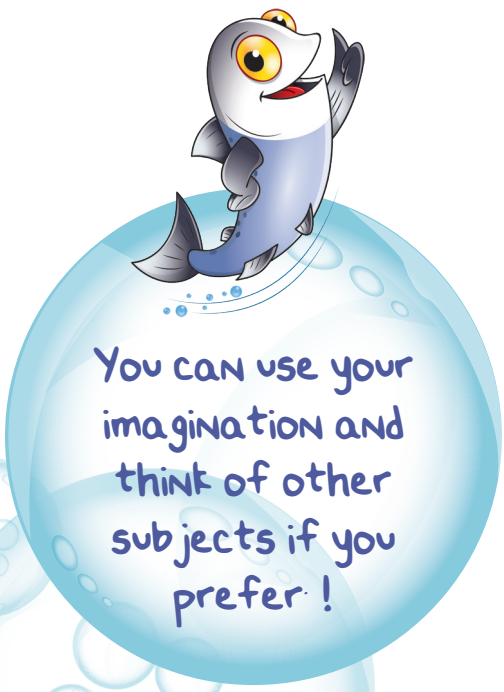
Extra thought...

Would you like to learn more about some of the topics surrounding the life of Salar? What are some of the things that you were most impressed by? Let's do one more activity!

First, choose the topic that interests you the most. Next, look up more information on the subject online, at the library, or at a local environmental organization in your area. You can also talk and ask questions to a fisherman or a specialist, etc. There are many different useful sources of information out there and you are free to look wherever you please.

Now it's time to write a short text on the topic you've explored, and to share what you learned with the rest of the class!



Here are a few topic examples

- The scales of the salmon
- Salmon otoliths
- Spawning
- The life of salmon in the river or at sea
- Salmon migration
- Hydroelectric power plants
- Aquaculture
- Climate change
- Sport fishing/fly fishing
- Fishways
- How salmon find their way home

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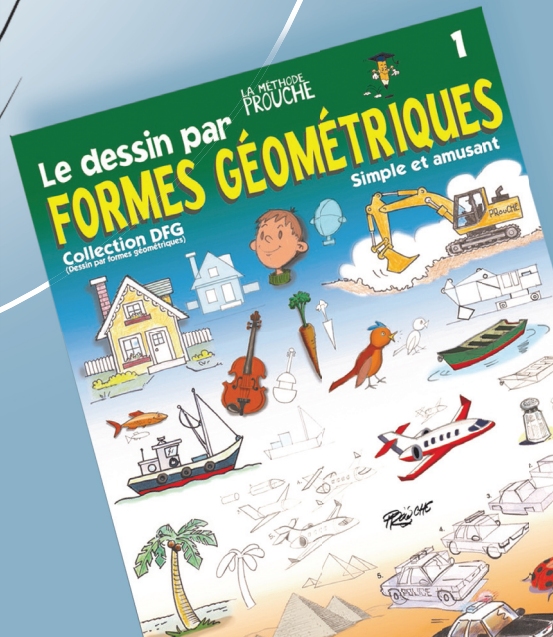

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Reissue – Salmon's Tale

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Thank you to all our supporters!

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The Atlantic Salmon Conservation Foundation · La fondation pour la conservation du saumon atlantique

Hydro Québec

2016 Edition
Reissue – Salmon's Tale

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