



Great Lakes Outreach Program

Life Systems: Grade One & Two

Characteristics and Needs of Living Things

*Lessons for the Ministry of Education and Training
The Ontario Curriculum, Science and Technology*



Featuring 4 local fishes: Atlantic salmon, redbreast dace, eastern sand darter and American eel

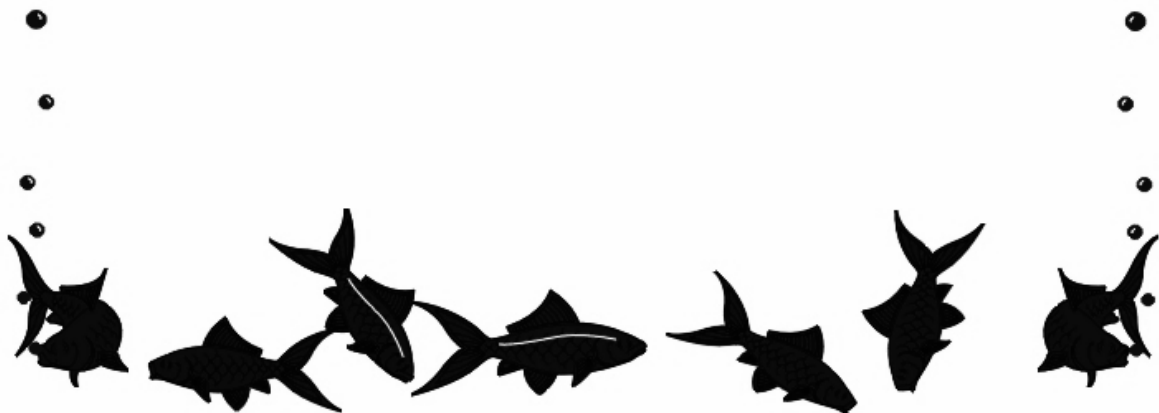


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In partnership with: Department of Fisheries and Oceans, Ontario Streams

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Curriculum Guide

Life Systems: Grade One

| | |
|-----------------|--|
| Grade | 1 & 2 |
| Subjects | Environmental science, language, and art |
| Goals | Understand the basic needs of living things and how their environment enables them to meet these needs. Examine an aquatic ecosystem's requirements for good health. |

Basic Concepts

Students will:

- ❑ Define what a fish is.
- ❑ Identify the basic body parts of a fish.
- ❑ Compare the location and function of different body parts between fish and people.
- ❑ Identify basic needs of all living things, and compare the basic needs of people and fish.
- ❑ Predict how an aquatic environment becomes polluted, how this affects fish and the ecosystem, and how aquatic pollution may be avoided.
- ❑ Use the Redside dace as an example of an “endangered species” from Ontario.

Teacher Guide

Lesson One

What is a Fish?

Class time: 45 min

Basic Concept:

- Define what a fish is and describe its basic body parts.
- Compare the location and function of the body parts on people and fish.
- Predict fish movement based on its body parts.

Keywords:

Barbels, cold-blooded, eye spots, fish, fins, gills, predators, prey, scales

Materials:

Fresh or frozen whole fish from local market, construction paper, glue, pipe cleaners, google eyes, markers, pencils, crayons, glitter, and other creative materials

Student Activity

1. Go to your local fish market and obtain a whole fresh or frozen fish. Perch or trout is recommended.
2. Use the fish in the classroom to illustrate the major body parts to your students. Refer to your **Teacher Resources Sheet (Appendix II)**.
3. As a class, make a list on the blackboard of both a fish's and a human's body parts. Beside each body part, have the students explain what each is used for. Refer to the table on the next page, the **Teacher Resource Sheet** and the **Glossary**.
4. Photocopy and handout the student worksheet "**Fish Shapes**". As a class, match the fish shapes with their descriptions. Photocopy and handout the student worksheet "**Funky Fish Facts**" so students can learn more about these fishes.
5. Using materials listed above, have the students construct a fish. Make sure that they include all of the major body parts in their construction. They can use ideas from the student worksheet "**Fish Shapes**" and "**Funky Fish Facts**".

Teacher

| Humans | Fishes | Function |
|----------------|----------------|--|
| Arms | Fins | Moving and touching |
| Hands | Fins | Moving and touching |
| Feet | Fins | Moving and touching |
| Eyes | Eyes | Seeing |
| Nose | Nostrils | Smelling |
| Nose | Barbels | Smell and Taste |
| Mouth | Mouth | Breathing, Eating, and Talking (humans) |
| Ears | Lateral Line | Hearing |
| Skin | Scales & Skin | Protection |
| Teeth & Tongue | Teeth & Tongue | Eating, Talking (humans) |
| Lungs | Gills | Breathing |

Lesson One: Student Worksheet

Fish Shapes

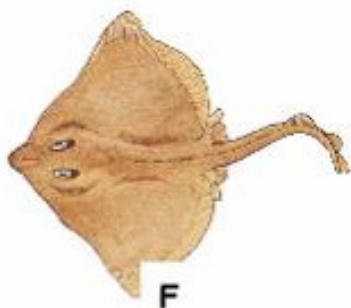
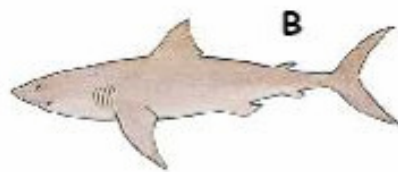
Match each fish from the next page with the descriptions below. Write the letter of the fish in the box next to the description. Note: you will have to use one of these fish twice.

- 1. I puff up so I am too big to eat.
- 2. I do not swim fast. I lie on the bottom and wait for my food (dead plants and animals) to sink down to me.
- 3. Look at my big mouth. I can eat a fish in one bite.
- 4. My mouth points up. I eat at the top of the water. Can you name a fish like me?
- 5. I am two colours. My bottom is a light colour. A fish looking up at the light sky can not see me. My top is dark. A fish looking down at the dark water can not see me.
- 6. I have stripes to look like the plants I live in. I am hard for predators to see.
- 7. My mouth points down. I eat at the bottom.
- 8. I am a hunter. My shape and big tail fin make me swim fast. Can you name me?
- 9. I have an “eyespot” near my tail. How can this help me?
- 10. My mouth is in the middle. I eat in the middle and not at the top or bottom.
- 11. I live on the bottom. It is dark and hard to see. I use my barbells to taste and sniff the water to find my food.
- 12. I do not look like a fish. I do not have a tail fin. My head looks like a horse. Do you know my name?
- 13. I do not need a big mouth. My small mouth is good for eating plants.



Fish Shapes

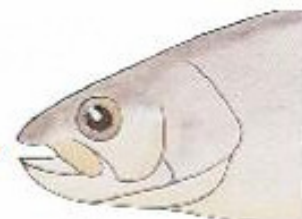
Student Worksheet
Lesson One



Hint:



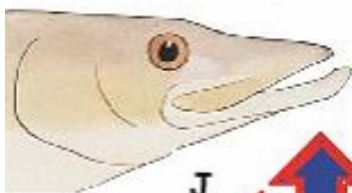
Look at the different positions of their mouths



G



H

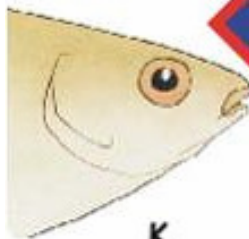


J

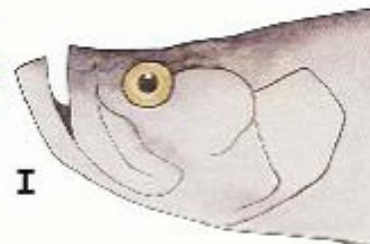
Hint:



Look at mouth size



K



I



L

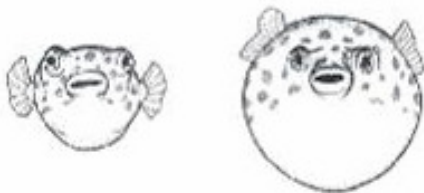
Lesson One: Student Worksheet

Funky Fish Facts



My stripes make me look like the plants I live in. This is called **camouflage**. This helps me hide. I hide from **predators** (fish or animals that want to eat me) and I hide to sneak up on my **prey** (fish I want to eat).

I am a shark. I am a **predator**. I eat fish. My body shape and big tail let me swim fast. I need to be fast to catch my food.



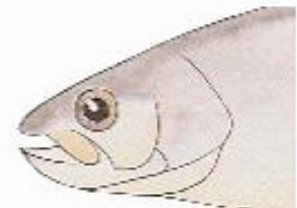
I am a puffer fish. I puff up when a predator comes close. I can puff up because I do not have ribs.

I am called a catfish because my **barbels** look like a cat's whiskers. I live on the bottom. It is dark and hard to see. When hunting I use my barbels to sniff and taste the water for food.



Flat Fishes live on the bottom. My eyes are on the top of my head so I can see. I do not need to swim well. My food floats down to me. It is hard for **predators** to find me because I have good **camouflage**.

My mouth is in the middle of my face. I eat in many places.



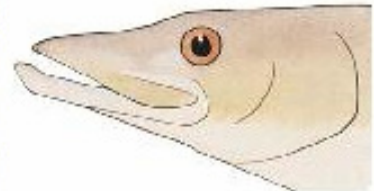
Funky Fish Facts

My mouth points down. I eat plants or animals on the bottom. Fishes like me help keep water clean by eating dead plants and animals that sink to the bottom.



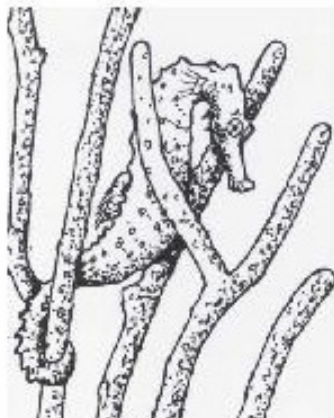
My mouth points up. I eat plants or animals floating on the water. The **redside dace** uses its upturned mouth to catch insects flying above the water.

I am a **predator**. My big mouth lets me eat a fish in one bite. With a small mouth I could only take a small bite out of a fish. The fish would swim away and I would be hungry. My big mouth makes it easy for me to eat.



I eat plants or small animals. I do not need a big mouth, my small mouth works for me.

My stripes make my real eye hard to see. Some fish think my big eyespot is my real eye. They think my front is my back and my back is my front. When one of these fish try to sneak up behind me I can see them coming and swim away.



I am a **seahorse**. I do not have a tail fin. I swim slowly. I have good **camouflage**. It is hard for **predators** to find me. To stay in one place I hold on to plants with my tail. Did you know that **MALE** seahorses are the ones that give birth?

Teacher Guide

Lesson Two

Stream Survivor

Class time: 30 minutes

Basic Concept:

Identify basic needs of all living things, and describe specifically the basic needs of people in land environments and fish in water environments.

Keywords:

Basic needs, environment, fish, habitat, living, non-living.

Materials:

Worksheet "Stream Survivor" (for each student), pens, pencils.

Student Activity

Photocopy and hand out the Student Worksheet, "**Stream Survivor**", and have the students list their own basic needs to survive as well as what a fish needs to survive in its habitat. Refer to table below.

- Show your class that both you and a fish have similar basic needs to survive because you are both living things. Define living things for them. See **Glossary**.

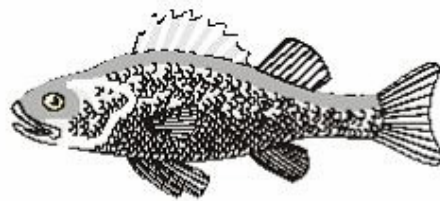
Option: Students fill out their own table or teacher leads with ideas on the blackboard.

| Your Name | Fish |
|-----------------------------------|--------------------------------------|
| Food – apple, hamburger, sandwich | Food – insects, other fish, plants |
| Home – house (space) | Home habitat – stream, river (space) |
| Water | Water |
| Air | Air* |

* Information provided on **Teacher's Resource Sheet Appendix II, "What is a Fish: How do Fish Breathe?"**

Lesson Two: Student Worksheet

Stream Survivor



How are we the same?

| Your Name: _____ | Fish |
|-------------------------|-------------|
| | |
| | |
| | |
| | |

Teacher Guide

Lesson Three:

The Story of the Redside Dace

Class time: 10 min

Basic Concept: Read “The Story of the Redside Dace” to the class. Students learn the basic needs of the Redside dace, how they use the environment to meet these needs, and some of their requirements for good health.

The Story of the Redside Dace

The redside dace is an active little fish. In Canada, the redside dace lives only in southern Ontario. This fish lives in very clean, clear and cool streams and rivers. The redside dace has a silvery body with red, black, and yellow stripes along its sides. The full-grown redside dace is 10 cm long and can live as long as 4 years.

The redside dace lives in pools in the river. This fish likes to eat flying insects. To catch insects flying above the stream, this little fish must jump right out of the water.

Plants that grow beside the river are good for the redside dace. Cutting down plants next to a river make it hard for the redside dace to live. There are three reasons the redside dace need these plants.

1. Plants beside the river bring insects. Do not cut down these plants because there will be no insects and the redside dace will have nothing to eat.
2. When a plant near the river is cut down, soil falls in to the river making the water hard to see through. The redside dace must see through the water to catch insects flying above.
3. The plants give shade and keep the river cool. Without shade, the river becomes too hot for the redside dace to live in.

In the spring, when waters warm up and the days become longer, the male redside dace

changes his colours and becomes very handsome. His red stripe becomes bright to attract all the female redside dace. The males find a part of the stream with fallen trees and a gravel or pebbly bottom. Here the males form schools. The females swim next to the schools. When a female redside dace is ready to lay her eggs, she swims to the nest of a creek chub, another fish living in the river. One or two male redside dace will follow her.

Spawning takes place in the nest of the creek chub. The female redside dace lays between 400 and 1500 eggs. She lays her eggs in a creek chub nest so that when the creek chub protects its own eggs, it is also protecting the smaller eggs of the redside dace.

After several days, black specks can be seen inside the eggs. These are the eyes of the baby redside dace; they are growing fast and already have hearts and tails. How fast the eggs hatch depends on how warm the water is. Once the young hatch, they stay safe by hiding in the gravel.

By the end of the summer, the bright red stripe of the male redside dace becomes dull. Now he looks like a female redside dace. He is now safer from attack than when he had the bright red stripe and predators could easily see him.

Teacher Guide

Lesson Four:

Life in a Stream

Class time: 30 min

Basic Concept:

- With critical thinking, predict what happens to the Redside dace, if the local habitat becomes polluted.
- Understand how habitats become polluted, and ways to maintain a healthy environment for fish.

Keywords:

Basic needs, environment, fish, habitat, pollution

Materials:

Worksheets “**Life in a Stream**” for each student, scissors, glue/tape

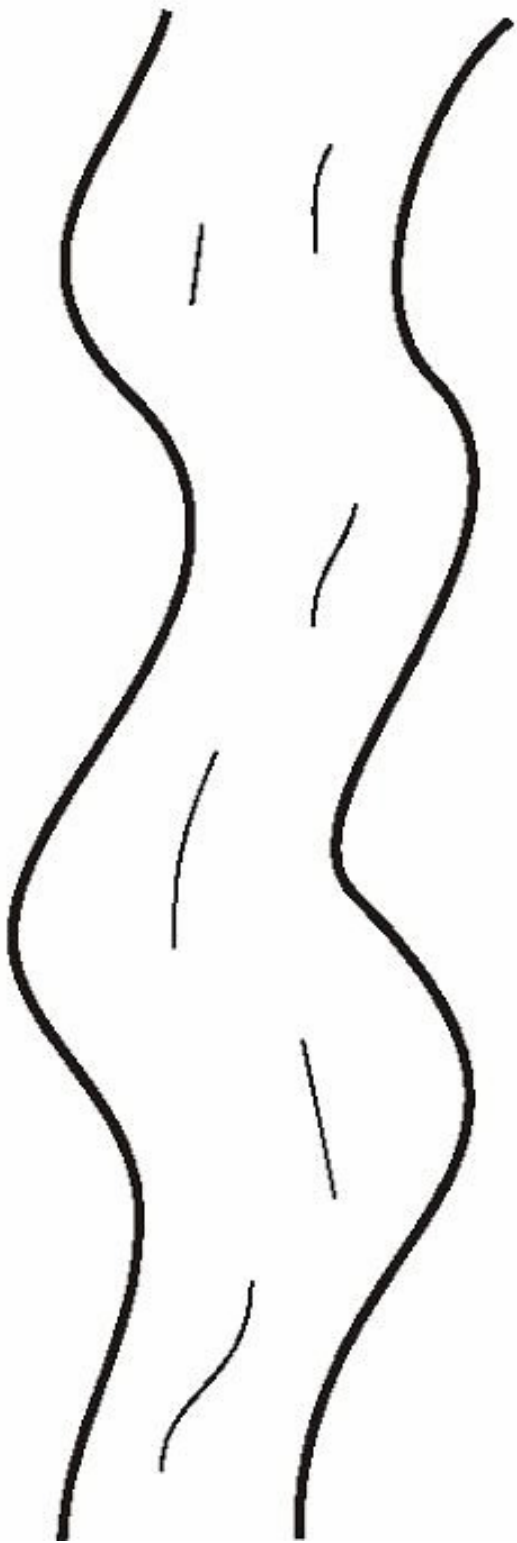
Student Activity

1. Photocopy and hand out the worksheets, “**Life in a Stream**”, and have the students cut and paste together a suitable habitat on the page with a stream for a fish such as the redside dace to emphasize the basic needs of a fish.
 - Explain that some of the items displayed on the sheet (garbage) are not suitable for a fish’s habitat, especially not the redside dace, even though it may be suitable in our habitat (house). NOTE: Ensure that the students place the garbage and the paint around the house and not beside the stream in their design.
2. Explain to your students that sometimes certain activities like throwing garbage or poison, such as paint, into clean rivers and cutting down trees or building houses on top of wild habitats makes the habitat dirty or makes the water disappear completely. Without clean water, some animals, plants and insects stop growing and developing. This is what has happened to many living things like the redside dace, in Ontario.
 - Most people assume that the water that goes down the sewers gets treated. **THIS IS NOT TRUE.** All water (rain and melting snow) flows directly into local streams, rivers, and lakes to become our drinking water. This means that any pollutants the water is carrying (litter, fertilizers, paint, pet wastes, pesticides, gasoline, grass clippings, and toxic materials) pollute our waterways and kill fish such as the redside dace.

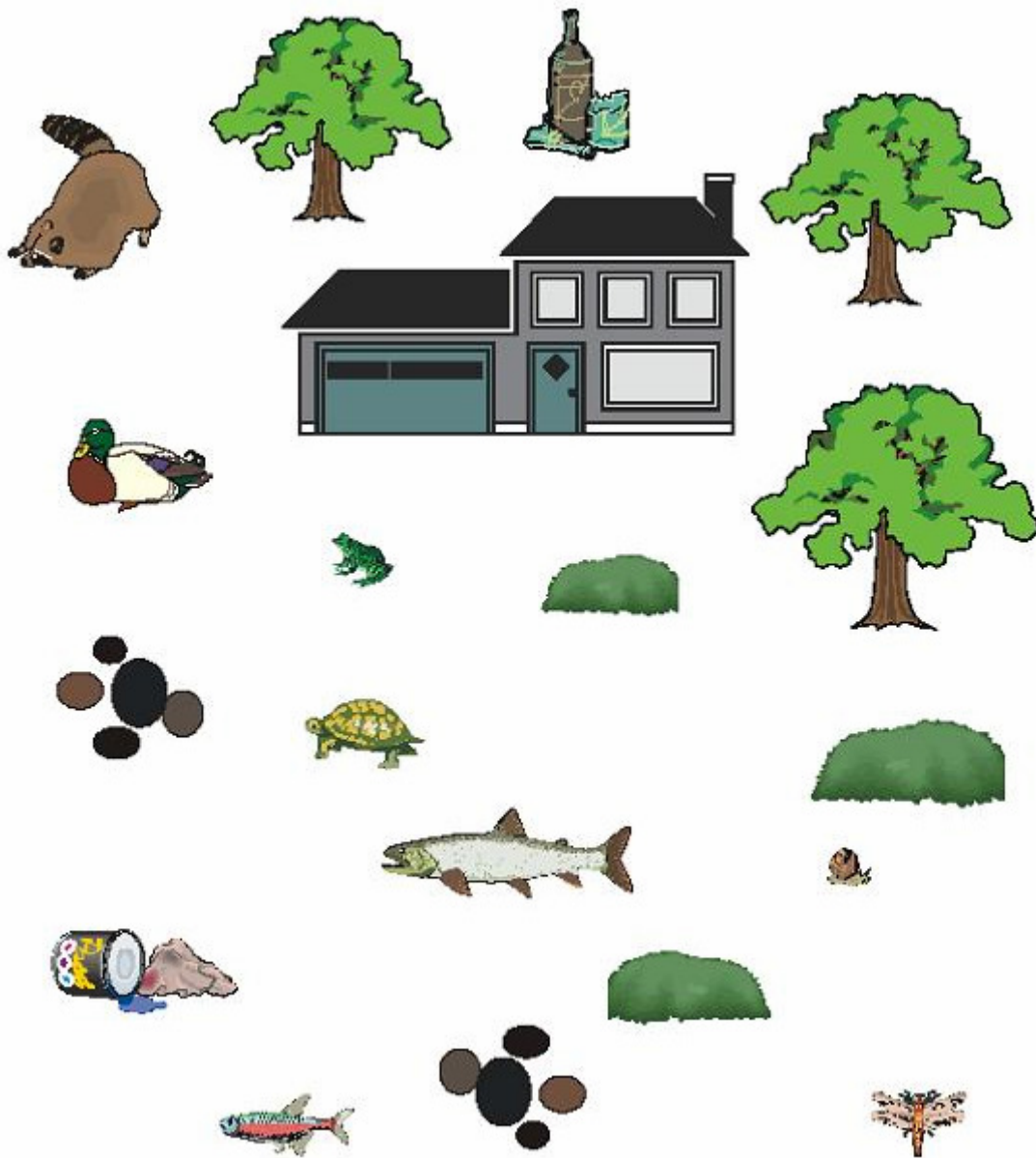
Extension: After a major rain storm, take the students to a local stream to see where it ends up after going down the storm drain.

Life in a Stream

Lesson Four: Student Worksheet



Lesson Four:
Student Worksheet
Life in a Stream



Appendix I

Fish Facts Sheets



Redside Dace (minnow)

Endangered

- This fish lives for about four years; it lives in Southern Ontario.
- The reddsides are easy to spot by their red stripe! When these fish are ready to spawn in May, the red stripe on the male reddsides gets very bright.
- This minnow is a great neighbour to have because it eats flying insects including mosquitoes!! The reddsides are carnivores.
- The reddsides have a mouth that faces up to catch their food. If their mouth faced down like a catfish, they wouldn't be able to catch the insects flying above the water.
- This fish needs cool, clean, moving water with lots of shade from shoreline plants. If plants are taken away, soil runs into the water and the fish can't see, and it will be too warm without any shade!
- The reddsides are very sensitive to pollution. They will get sick before most other animals living in the same stream – we call them indicators because of this.
- This fish is endangered, because people are destroying its habitat. Dams, houses, roads and pollution make it hard for this fish to survive in Ontario.
- You can help protect the reddsides by conserving water, picking up litter, using less electricity and telling your friends and family about this cool fish!



Atlantic Salmon Extirpated

- This fish is born in freshwater, travels out to the ocean, and then returns to freshwater to breed and die.
- This fish has a torpedo-shaped body for moving very fast, and sharp teeth for catching its prey.
- When they are young, these salmon have blue and red spots. Adults are shiny and silvery-blue in colour, with black spots above their lateral line.
- Salmon have to swim upstream to get to their breeding grounds where they were born; they can jump *up* waterfalls!
- When salmon are young, they eat tiny invertebrates. As they grow up, they eat bigger things like insects and small fish. Adult salmon eat things like fish, shrimp and squid!
- The Atlantic salmon is extirpated in Ontario. This means that there are no salmon left in Ontario, but they can still be found in other parts of the world.
- Atlantic salmon disappeared from Lake Ontario more than 100 years ago. People have worked hard to improve habitat for Atlantic Salmon. Work is now underway to reintroduce salmon to Lake Ontario.
- Aquacultures are big fish farms where fish such as salmon are raised in big cages in the water. Sometimes these fish escape their cages and compete or breed with wild salmon. This is harmful to the health of wild salmon populations.
- Overfishing, habitat loss due to dams and pollution, and escaped farmed salmon are harming the Atlantic salmon.



Eastern Sand Darter (minnow) **Threatened**

- The eastern sand darter is white, yellow or silver.
- This minnow burrows into the sand to camouflage itself and then jumps out and surprises its prey.
- This fish has a small, slender, translucent (see-through) body with dark spots along its sides.
- They have small mouths for eating midge and blackfly larvae.
- In Canada, this species is found in Lake Erie, Lake St. Claire, and a few rivers in Quebec and south-western Ontario.
- The eastern sand darter prefers sandy-bottomed water, either clear or murky, still or moving.
- This fish is losing its habitat because of pollution, mining drainage and sandbar removal.
- When the eastern sand darter's streams become "silty" (cloudy from erosion and pollution), there is less oxygen in the water. This makes it hard for the fish's eggs to hatch.



American Eel Special Concern

- Eels can absorb oxygen through their skin which allows them to travel on land for short distances.
- This eel has a long, slender body like a snake, and two fins to help it steer in the water.
- The eel's thick skin secretes thick mucous to protect it. They do not grow scales until they are about 3 years old.
- The American eel is a top predator; no other animals in its habitat eat it. It helps control invasive species like the goby fish by hunting them.
- These fish only breed in ONE place in the world, the Sargasso Sea in the Atlantic Ocean. They are born in the ocean, grow up in freshwater, and return to the ocean to breed and die. Who does the opposite of this?
- We can find American eels from South America all the way to Greenland!
- Once people discovered that eels were good to eat, they were harvested in huge numbers for many years. This, along with dam building, climate change and pollution are decreasing eel populations.

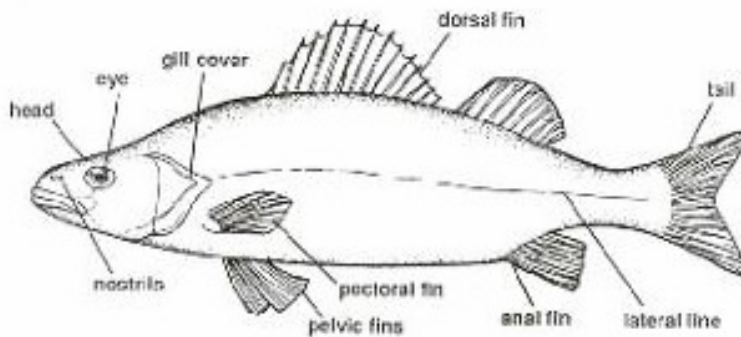
Appendix II

Teacher Resource

What is a Fish?

A *fish's* body has a unique form for life in the water to help it move or swim and protect it from *predators*. Fishes have backbones, and other bones, just like people do. Fishes are also *cold-blooded*.

Body Parts of *Fishes*:



Fins: used for movement

Dorsal fin (top fin): lends stability in swimming

Caudal fin (tail fin): in most fish, the Caudal is the main propelling fin

Anal fin: lends stability in swimming
Pectoral fins (side fins): locomotion and side to side movement

Scales: cover for protection

Nostril: to find food

Mouth: to capture food

Eyes: good vision. No eyelids in fishes

Gills: for breathing

Lateral Line: extremely sensitive tiny holes along sides of fish to detect movements in the water

How do Fish Breathe?

A fish pumps water over its gills (helped by swimming), oxygen is removed from the water and is absorbed by the blood, just like human lungs. If a fish is removed from the water, the gills will collapse and dry out and the fish dies.



(Fish Ways, 1991)

Appendix III

Glossary

Basic Needs: all living things have four basic needs: food, water, shelter and space to survive

Barbel: slender whisker-like organs extending from the head of certain fishes, such as catfishes. Fish use barbells to taste/smell for food in the water.

Cold-blooded: an animal whose body temperature changes with the temperature of its surroundings

Conservation: the wise and intelligent use or protection of natural resources

COSEWIC: Committee on the Status of Endangered Wildlife in Canada

COSSARO: Committee on the Status of Species at Risk in Ontario

Environment: the total of all of the surroundings including air, water, vegetation, human elements, and wildlife

Eye Spots: rounded, eye-like markings, often found on the tail of fishes. Many fishes have eye-spots to startle predators. The eye-spots may confuse predators into thinking that the back is the front of the fish, either allowing the fish to escape, or to have the predator strike away from the head.

Fish: a cold-blooded animal with a backbone. Fish have gills to let them breathe in water and fins to let them move in water. Fish are found in both fresh and salt water.

Fish Ladder: a series of pools arranged like stairs at the side of a stream, enabling migrating fish to swim upstream around a dam or other obstruction

Fishes: a number of fishes of different species

Gills: breathing organ for fishes to transfer dissolved oxygen from water to their blood

Habitat: the place and natural conditions in which a plant or animal lives

Habitat stewardship: voluntary actions that individuals take to care for the environment. Citizen involvement includes monitoring and conserving wildlife species and their habitats, and to protect and improve the quality of all natural resources

Headwaters: the streams that make up the beginnings of a river

Lateral line: extremely sensitive tiny holes along sides of fish to detect movement in water

Living: everything that is alive (including plants, animals, fish, etc.)

Non-Living: non-living (physical, chemical or non-organic) things in the environment; for example: air, water, the climate, and soil

Pollution: a collective term for different types of harmful materials that are released into the environment through human activities

Predator: an animal that lives by hunting and eating other animals

Organism: any type of living creature

Siltation: to choke, fill, cover, or obstruct with silt or mud

Scales: small hard plates forming the covering of a fish

Spawning: depositing eggs or discharging milt (sperm)

Species: a group of similar individuals able to breed with one another

Streamlined: smooth edges to make moving through water easier

Threatened: any species that is at risk of becoming endangered if nothing is done to reverse the factors leading to its extirpation or extinction

Warm-blooded: an animal whose body temperature is not dependant on the temperature of the surroundings

Appendix IV

References

Bond, C.E. 1979. Biology of Fishes. Saunders College Publishing, Philadelphia.

Ontario Ministry of Natural Resources. 1991. Fish Ways. Lesson 7/8 – 13, “A Breath of Fresh Water”. Queen’s Printer for Ontario. *

Parker, Steven. 1990. Eyewitness Books: Fish. Stoddart Publishing Co. Limited, Toronto, Canada.

Snedden, Robert. 1993. What is a Fish? Sierra Club Books for Children, San Francisco.

<http://www.aqua.org/education/teachers/activities/fishanatomy.html>

*If you are interested in the **Fish Ways** education materials, you can contact the Canadian Wildlife Federation at www.cwf-fcf.org or www.wildeducation.org.

Appendix V

Additional Resources

http://www.dfo-mpo.gc.ca/canwaters-eauxcan/bbb-lgb/index_e.asp

<http://www.cloca.com/news/sitenews.htm#The%20Race>

<http://www.cosewic.gc.ca/>

<http://www.dnr.cornell.edu/hydro2/aquagap/fishcode.htm>

<http://www.fishbase.org>

<http://www.redsidedace.ca>

<http://www.speciesatrisk.gc.ca/Species/English/Default.cfm>