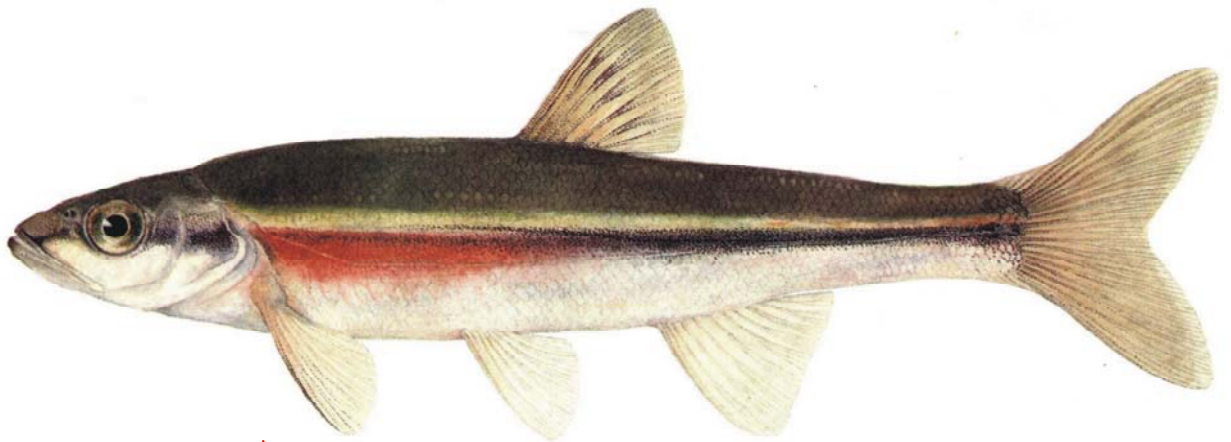


Lessons for Life in a Stream

Life Systems: Grade One
Characteristics and Needs of Living Things
Lessons for the Ministry of Education and Training
The Ontario Curriculum, Science and Technology



Featuring Ontario's Redside Dace



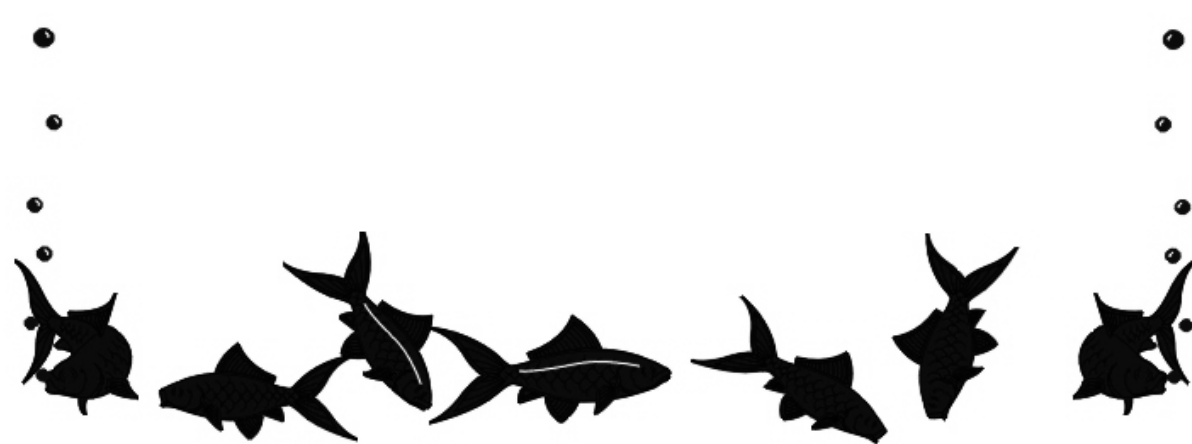
In partnership with: Conservation Authorities of Ontario, Department of Fisheries and Oceans, Environment Canada, Ontario Ministry of Natural Resources, Ontario Streams, Rouge Park Alliance, Royal Ontario Museum



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Life Systems: Grade 1

Characteristics and Needs of Living Things

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Curriculum Guide Fish Ecology

Grade	One
Subjects	Environmental Science, Language & 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 a fish.
- Identify the basic body parts of a fish.
- Using fish and people compare the location and function of different body parts.
- 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 redbreasted sunfish as an example of a "species of special concern" from Ontario.



Teacher Guide

Lesson One

What is a Fish?

Class time: 45 min

Basic Concept:

- Define 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:

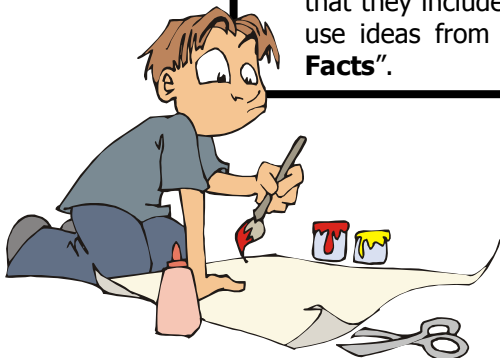
barbels, cold-blooded, eye spots, fish, fins, gills, predators, prey, scales

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. Recommend perch or trout.
2. Use the fish in the classroom to illustrate the major body parts to your students. **Refer to your Teacher Resource Sheet (Appendix II, p. 18).**
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 (p.5), the Teacher Resource Sheet (p.18) and the Glossary (p.19).**
4. Photocopy and handout student worksheet "Fish Shapes" (p. 6 & 7). As a class match the fish shapes with their descriptions. Photocopy and handout student worksheet "Funky Fish Facts" (p. 8 & 9) 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 worksheets "Fish Shapes" and "Funky Fish Facts".





Teacher Guide

Life Systems: Grade 1
Characteristics and Needs of Living Things

Human	Fishes	Function
Arms	Fins	Moving and touching
Legs	"	"
Hands	"	"
Feet	"	"
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

Answers for student worksheet "Fish Shapes"

1=C, 2=F, 3=J, 4=I, 5=D, 6=A, 7=H,
8=B, 9=E, 10=G, 11=D, 12=L, 13=K



Lesson One: Student Worksheet

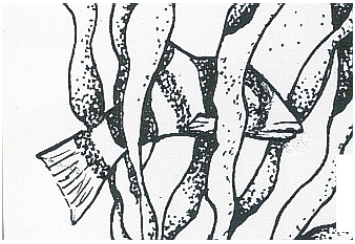


Life Systems: Grade 1
Characteristics and Needs of Living Things

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.

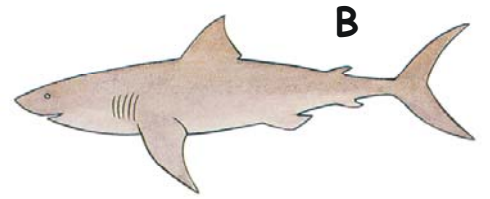
1. I puff up so I am too big to eat.
2. I do not swim fast. I lie on the bottom and wait for my food (dead plants and animals) to sink down to me.
3. Look at my big mouth. I can eat a fish in one bite.
4. My mouth points up. I eat at the top of the water. Can you name a fish like me?
5. I am two colours. 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 barbels 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.



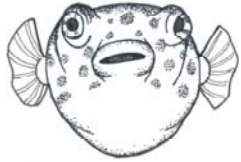
A

Fish Shapes

Student Worksheet
Lesson One



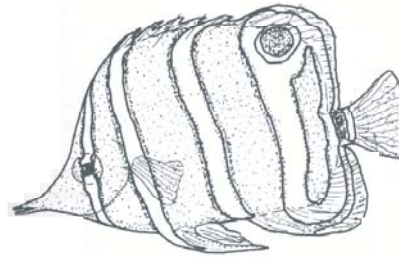
B



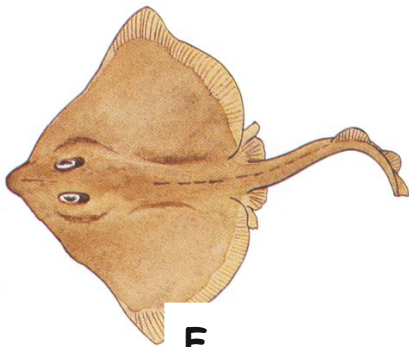
C



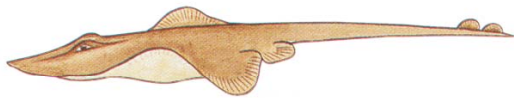
D



E



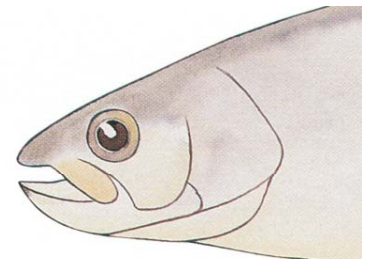
F



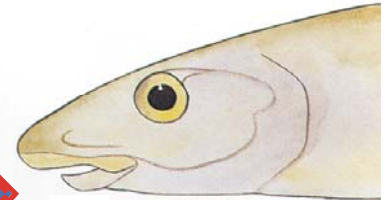
Hint:



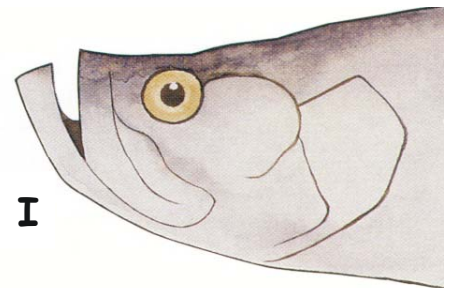
Look at
the
different
positions
of their
mouths



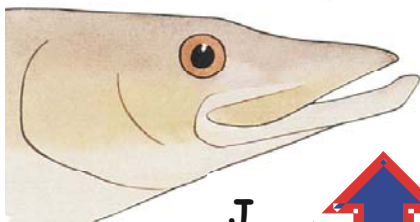
G



H



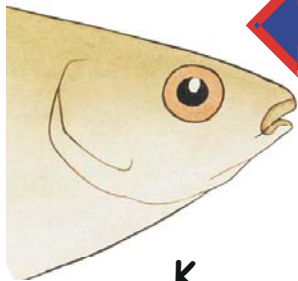
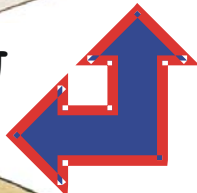
I



J

Hint:

Look at
mouth size



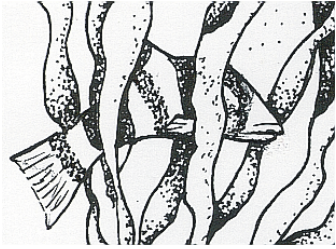
K



L

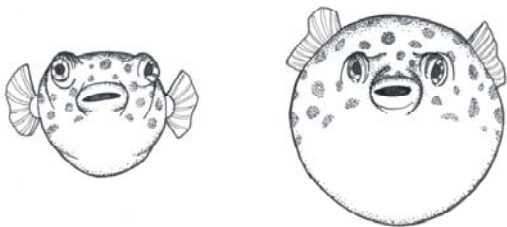
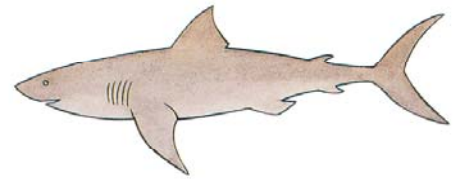
Lesson One: Student Worksheet

Funky Fish Facts



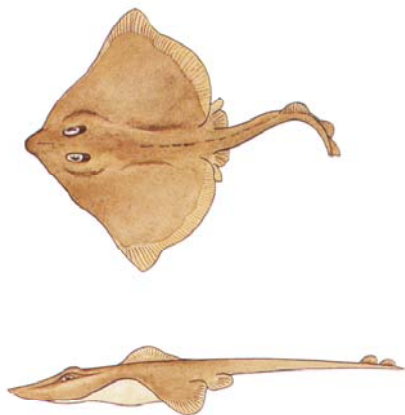
My stripes make me look like the plants I live in. This is called **camouflage**. This helps me hide. I hide from **predators** (fish or animals that want to eat me) and I hide to sneak up on my **prey** (fish I want to eat).

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.



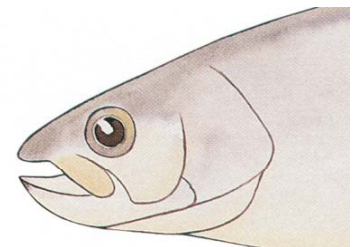
I am a puffer fish. I puff up when a predator comes close. I can puff up because I do not have ribs.

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.



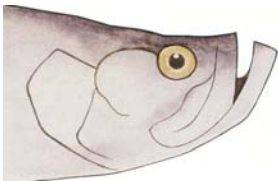
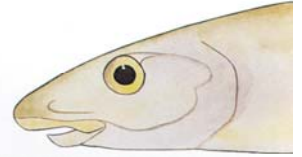
Flat Fishes live on the bottom. My eyes are on the top of my head so I can see. I do not need to swim well. My food floats down to me. It is hard for **predators** to find me because I have good **camouflage**.

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



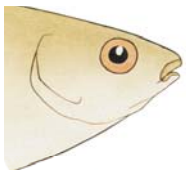
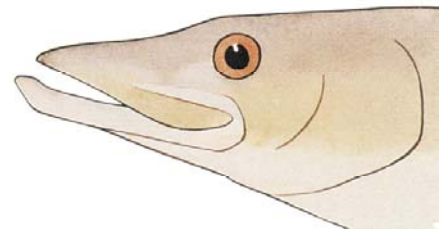
Funky Fish Facts

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.



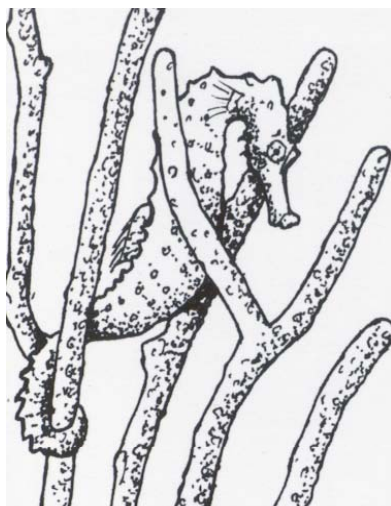
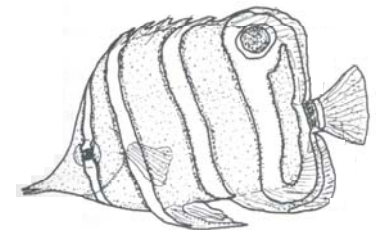
My mouth points up. I eat plants or animals floating on the water. The **reeside dace** uses its upturned mouth to catch insects flying above the water.

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 min

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," (p. 11) 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 (Appendix III, p. 19).**

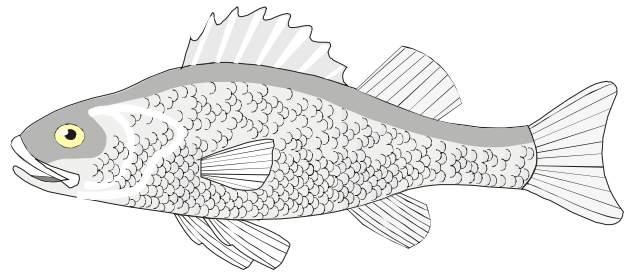
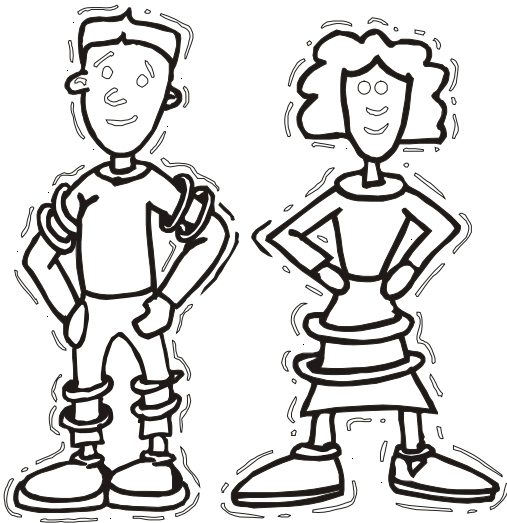
Option: Students fill out their own table or teacher leads with ideas on the blackboard.

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 (p.18), "What is a Fish: How do Fish Breathe?"



Stream Survivor



How are we the same?
Our needs!

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

The redbside 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 redbside dace. Cutting down plants next to a river make it hard for the redbside dace to live. There are three reasons the redbside 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 redbside 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 redbside 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 redbside dace to live in.

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

changes his colours and becomes very handsome. His red stripe becomes bright to attract all the female redbside 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 redbside 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 redbside dace will follow her.

Spawning takes place in the nest of the creek chub. The female redbside dace lays between 400 and 1,500 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 redbside dace.

After several days black specks can be seen inside the eggs. These are the eyes of the baby redbside 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 father redbside dace becomes dull. Now he looks like a female redbside dace. He is now safer from attack than when he had the bright red stripe and trout 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 redbreasted 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" (p. 14 & 15) for each student, scissors, glue/tape.

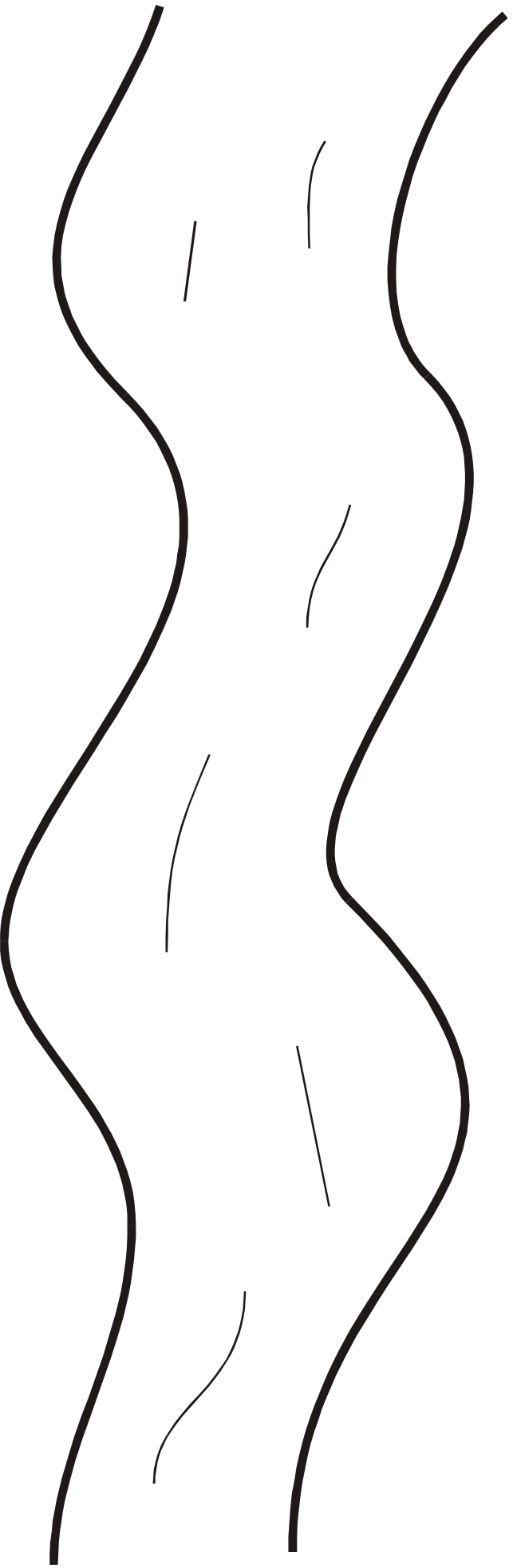
Student Activity

1. Photocopy and hand out the worksheets, "Life in a Stream," (p. 14 & 15) and have the students cut and paste together a suitable habitat on the page with a stream for a fish such as the redbreasted dace to emphasize the basic needs of this fish.
 - Explain that some of the items displayed on the sheet (garbage) are not suitable for a fish's habitat, especially not the redbreasted 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, like paint, into clean water 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 redbreasted dace, in Ontario.
 - Most people assume that the water that goes down the storm 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 redbreasted 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.

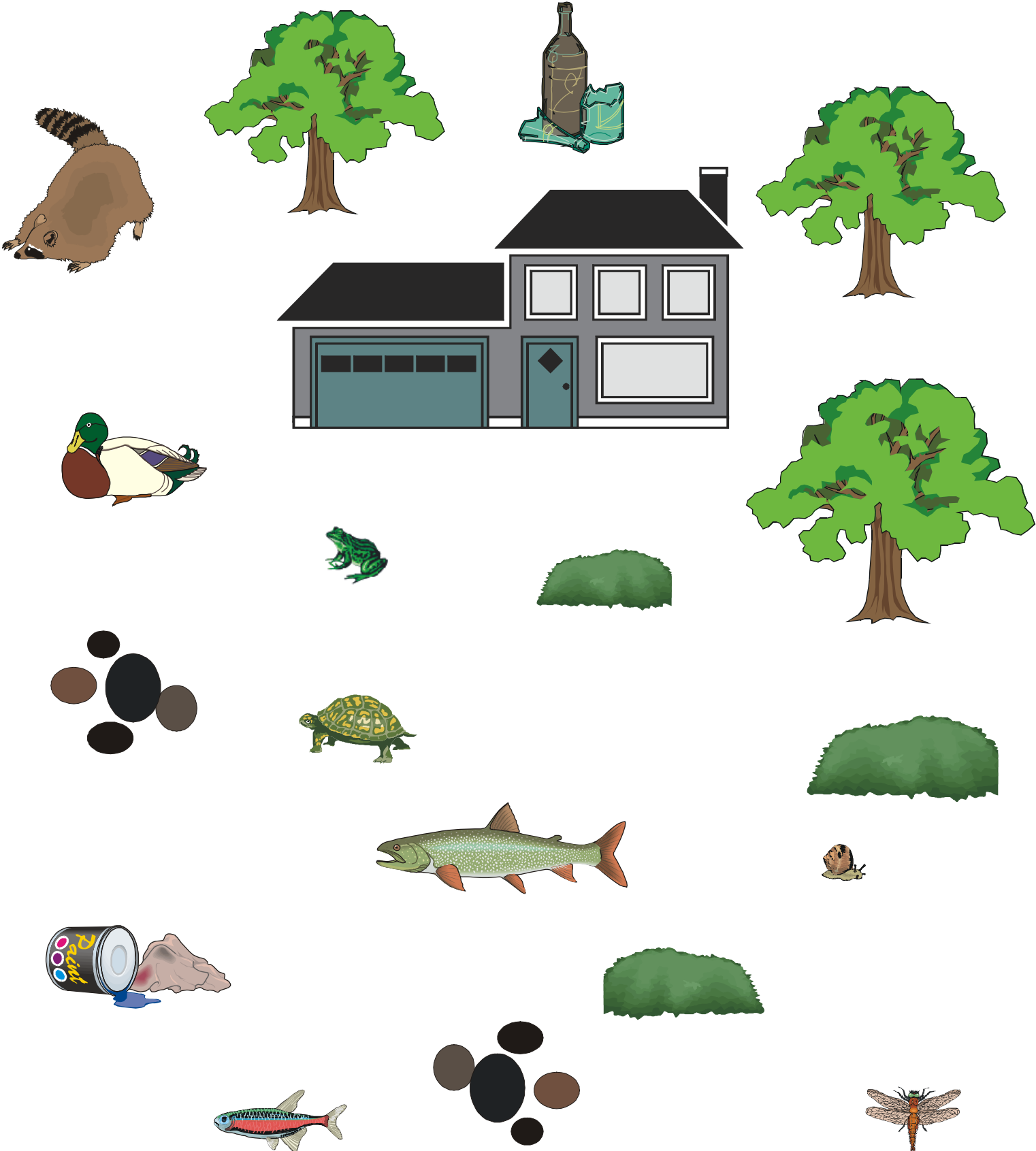
Life in a Stream

Lesson Four: Student Worksheet



Lesson Four: Student Worksheet

Life in a Stream



Appendix I

Redside Dace Fact Sheet



Life Systems: Grade 1
Characteristics and Needs of Living Things

SCIENTIFIC NAME: *Clinostomus elongatus*

DESCRIPTION:

Length of body: On average, 7.6 cm as adults.

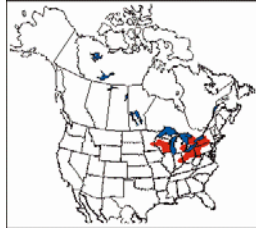
Colour: There are blue, green, purple and violet reflections on the side of the dace; the colour red is brighter in males than on females and intensifies during **spawning**, in May.

Key Characteristics:

- Lifespan: 4 years
- A bright red stripe along the side (WHERE IT GETS ITS NAME!).
- A large upturned mouth to catch flying insects.

DISTRIBUTION:

- In Canada, isolated populations in Southern Ontario.



FOOD:

- Flying insects, dancieflyes, mayflies, and dragonflies that occur in large swarms over the water.
- Redside dace have large, upturned mouths to catch flying insects
- The dace can leap 10 cm out of the water to feed.

Redside Dace Fact Sheet Continued



Life Systems: Grade 1
Characteristics and Needs of Living Things

DACE HABITAT:

- Prefer clear, cool (16⁰-24⁰C), shallow flowing water.
- Gravel or stony bottom.
- In-stream pools of **headwaters**
- Use rocks and fallen woody debris as shelter.
- Dace are very sensitive to cloudy and polluted waters.

CONSERVATION

Toronto Zoo works on the following for conservation of the fish;

- ◆ Member of the redbside dace Recovery Team comprised of aquatic biologists. Partners include: Ontario Streams, ROM, Ontario Ministry of Natural Resources, Fisheries & Oceans and Conservation Authorities of Ontario.
- ◆ Improving local waterways.
- ◆ Research and monitoring of species.
- ◆ Reproductive studies.
- ◆ Construction of fish ladder on zoo property on Morningside Tributary.
- ◆ Public awareness and education programs.

THREATS TO SURVIVAL:

- An estimated 50%-90% decline in their native Canadian range led them to be classified as species of "Special Concern" by **COSEWIC** and "Threatened" by Ontario respectively.
- Redside dace are vulnerable to increases in water temperature and cloudy water, both of which are found with urban development (cities, farms, factories, dams, roads, and pollution).
- The main factors affecting redbside dace populations are destruction and degradation of habitat through **siltation**; removal of shoreline vegetation (like trees); urban development and decreases in water quality.



Life Systems: Grade 1
Characteristics and Needs of Living Things

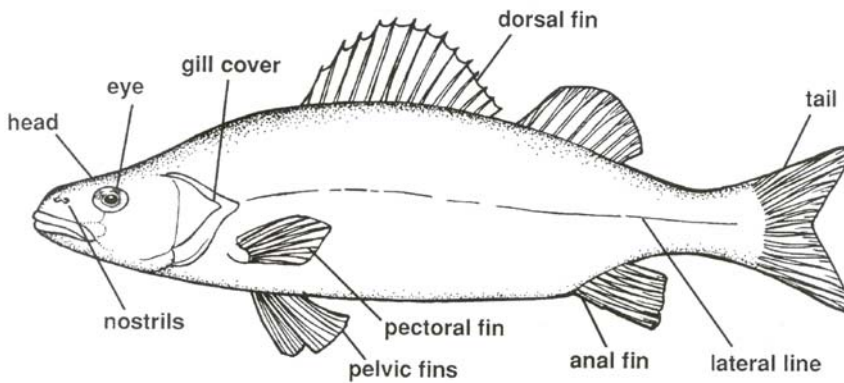
Appendix II

Teacher Resource Sheet

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

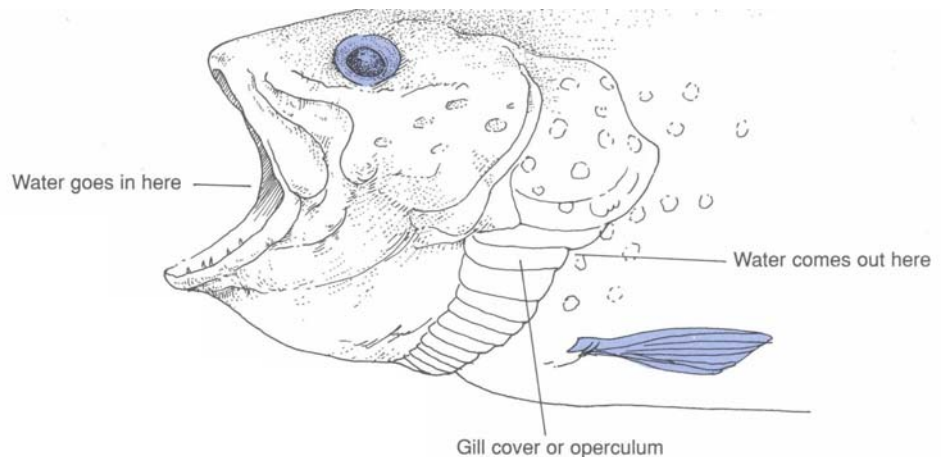
Eyes: good vision. No eyelids in fishes

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

(Keywords, Bold, and Italic Words)

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 barbels 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 fish have eye-spots to startle predators, or animals that are trying to eat them. 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.

Appendix III Glossary Continued



Life Systems: Grade 1
Characteristics and Needs of Living Things

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 native species that is a risk of becoming endangered throughout Ontario or Canada if nothing is done to reverse the factors leading to its extirpation or extinction.

Warm-blooded: Maintaining a relatively constant and warm body temperature; 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.com>

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