HABITAT LAP SIT©

Purpose: *Through a physical demonstration involving the whole group, members will come to understand some of the interrelations among habitat elements and the fish they support.*

Outcomes: *Members should understand the concept of habitat, be able to name the four basic habitat needs of fish, and understand that fish and humans have a lot of needs in common.*

Concepts: *1.1*

Group Size: *12 to 30*

Site: *Outdoors (grassy area) or Indoors (gym or meeting room)*

Time: *15 minutes*

Supplies: *Resource Sheet 1: Habitat Needs Master; mounting paper/ cardboard/tag board; scissors, string, clear contact paper (optional); Resource Sheet 2, Hooray for Habitat! (optional)*

Before the Meeting: *You will need to make enough Habitat Needs cards for the group. Habitat Needs cards are made by copying the master and cutting out the four needs. Mount each need to a piece of stiff paper and cover with clear contact paper. Make a hole in each of the top corners and thread the string through them. Adjust the string and cut it so that the card hangs around the neck and can be slipped over the head.*

A QUICK LOOK:

This activity demonstrates the four basic habitat needs of fish. Group members become cover, food, water, or space and then form a circle, sitting on each other's lap. The leader will remove one of these needs, and watch the circle crumble.

READY, SET, GO!

The game begins by asking the group, "What are the four basic needs of fish?" To help them answer, ask them what they need to survive (answers will range from potato chips to video games). You can prompt them to place their needs into the four broad categories--food, cover, space, and water--in order to arrive at the correct responses. Some answers (such as video games) are not real needs--they're wants. You can

discuss this difference with the group. Once you get the correct responses, point out that all animals (including humans) share basic habitat needs.

Hand out a Habitat Needs card to each person and have them put it on. Try to end up with an equal number of each basic need. Form four groups, one for each need, and let groups discuss briefly why their need is important to fish. Bring the groups back together, and let them share their ideas with the others.

The group now forms one large circle by alternating cover, space, etc. They should stand shoulder to shoulder and face inward. Next, the group should turn to the right and take one large step toward the center. They should be close to one another and be looking at the back of the person in front of them.

Now stand in the middle of the circle. You are a fish in this lake--swim around a bit. (What do you look like? A perch? A walleye?) Tell the group members that they're responsible for keeping you alive! They need to balance the habitat by keeping the circle intact.

Participants should place their hands on the hips of the person in front and listen. At the count of three, everyone should sit on the knees of the person behind them, keeping their own knees together to hold the person in front of them up. Your group might be reluctant to sit on each others laps. If so, try having them make a two tier pyramid or just hold hands and lean sideways. and may need to be modified to meet your Remember, this is a beginner activity groups needs.

Recite "shelter, space, water/oxygen, and food in proper balance are the four basic needs of fish." At this time, if the circle has been disrupted by someone falling, discuss how the balance of the ecosystem is dependent on all of it's parts, big or small!

Try the circle again, this time simulating a disruption. For example, you might say "Pollution has affected the amount of oxygen available in the water. The oxygen available can't support the types of fish present." Remove the water/oxygens, and watch the circle collapse. Try other variations.

FOR DISCUSSION:

Q. If we take lily pads away from the pond, which habitat part are we influencing?
A. Cover--hiding places lost; Water/Oxygen--plants produce oxygen; Food--plants are producers and homes for many insects that fish eat; Space--more open areas and fewer hiding places.

Q. Do you think that a fish's needs are the same in the winter and summer? Why or why not?
A. Yes and no. Food needs change as the water temperature changes--above 80 F or below 50 F fish eat less and don't grow as much. Cover, space, and water (oxygen) needs stay pretty much the same, although they are met differently during these times. In fact, fish (like you) don't always get all their habitat needs from one area. Fish often go to different areas to fill their needs, depending on season, time of day, and weather.

Q. What are the four basic needs of people? Are any of them ever affected by shortages?
A. Food, Water, Shelter and Space. Yes (expand on each basic need--you can use a globe for this. Spin the globe, pick a country, and talk about shortages that the group knows about in that area).

OTHER IDEAS:

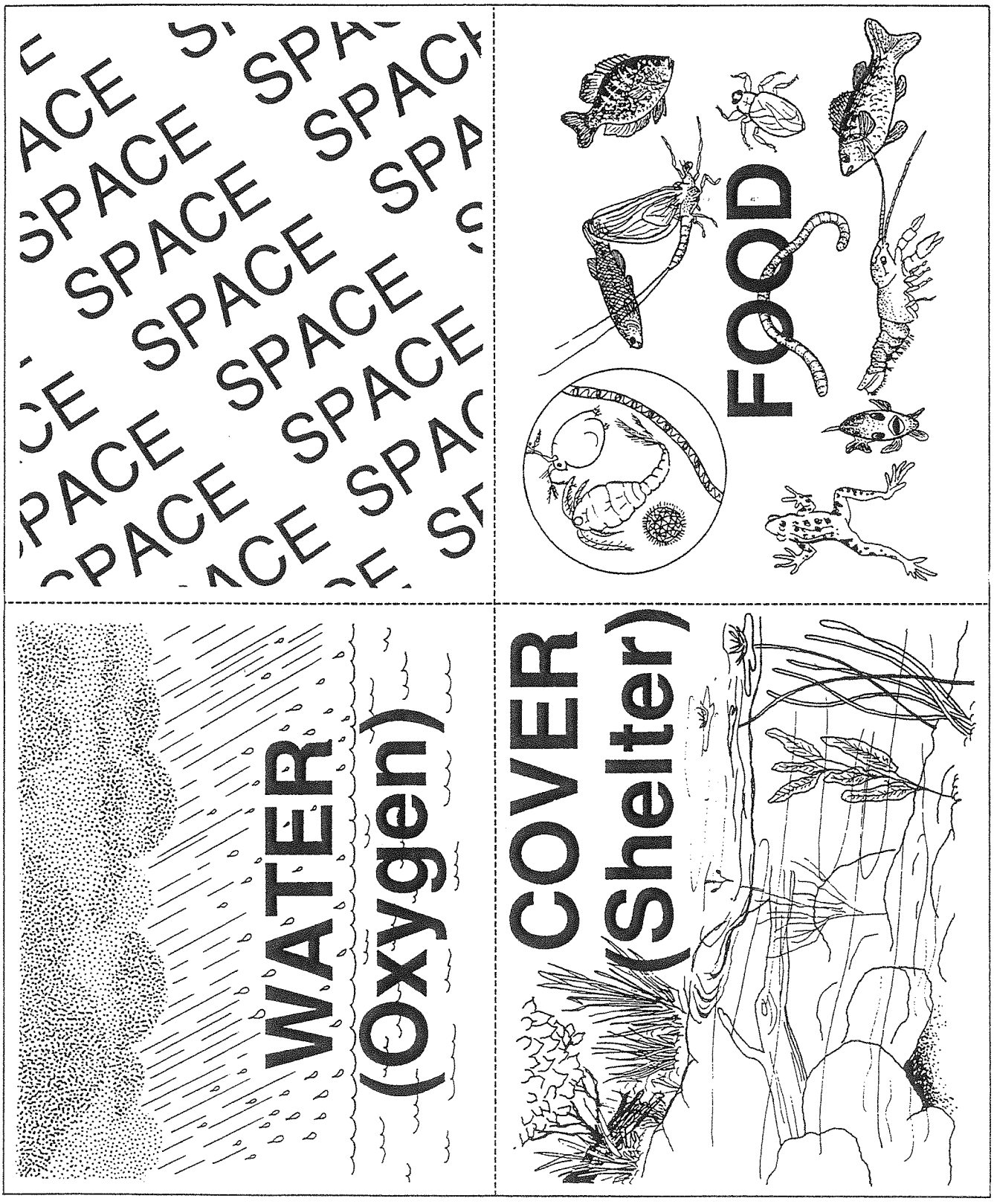
- Complete Resource Sheet 2, *Hooray for Habitat!*.

- Fish strive to meet their needs. So do people! Much of North America was settled with habitat needs in mind. Early immigrants and First Nations settled near water or where game (animals) and other food items were abundant. You might want to discuss this "historical habitat perspective" with your group. Ask them about their ancestors and how they lived and filled their habitat needs. Compare this historic environmental philosophy with that of today. Let them tell stories about their forefathers.

HANDOUT MASTERS:

Resource Sheet 1: *Habitat Needs Master*
Resource Sheet 2: *Hooray for Habitat!*
Resource Sheet 3: *Hooray for Habitat!* cut-outs

RESOURCE SHEET 1 Habitat Needs



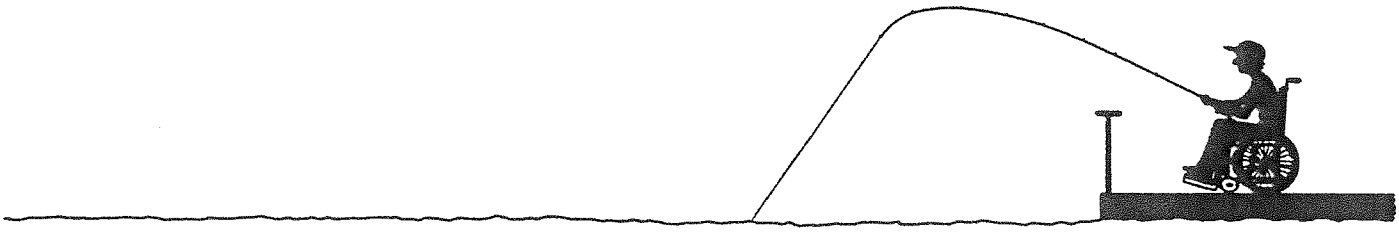
Hooray for Habitat!

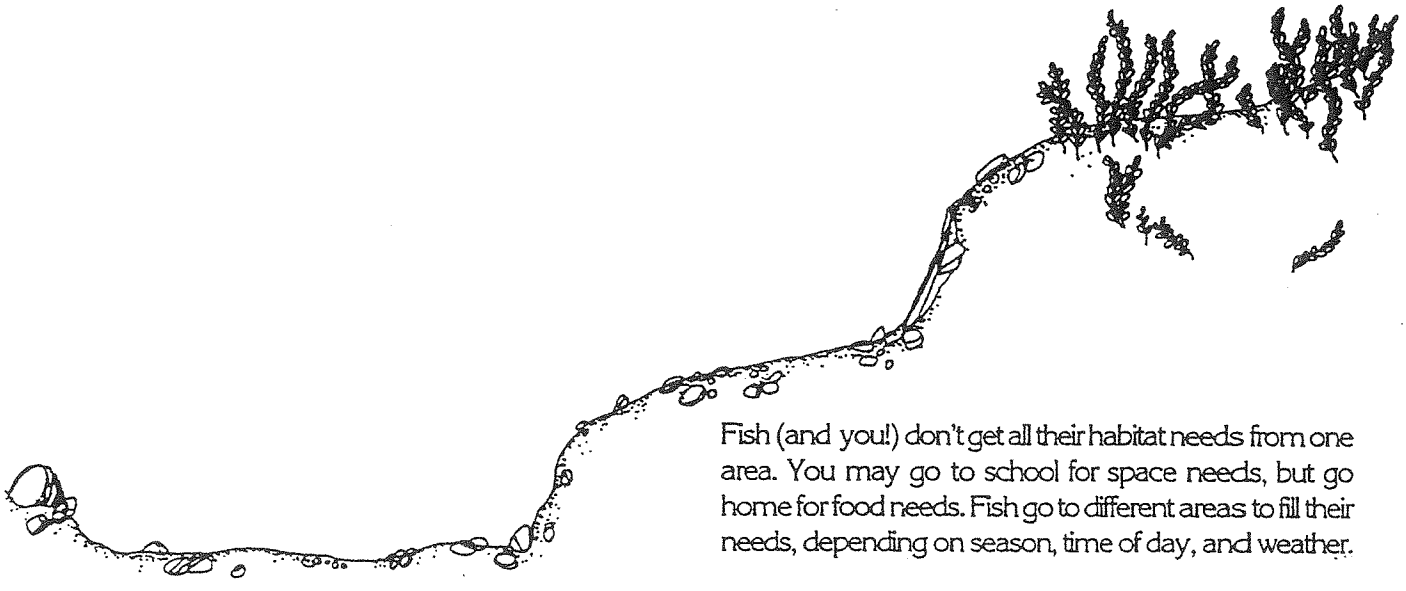
All animals (including you!) need four basic items to live. These are: **water**, **shelter**, **food**, and **space**. Together they make up your **habitat**—the place where you live. If a habitat is missing one of these four things, then the animal who lives there is in trouble! A bass couldn't live in a lake without food. A worm couldn't live without drops of moisture from the soil. You couldn't do your best without a home for shelter.

Here are some basic habitat needs of four common Ontario Fish. On the next page you will find pictures of these fish. Cut the fish out and paste them on the picture below. Be sure to match the fish to its summer habitat!

SUMMER HABITAT NEEDS

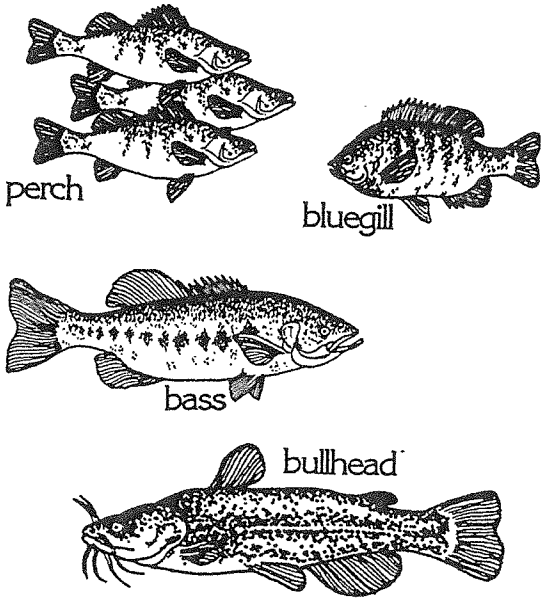
	PERCH	BLUEGILL	BULLHEAD	BASS
WATER	cool	warm	warm/cool	warm
SHELTER	open water schools	plants	holes	ledges
FOOD	minnow	insect/worm	worm	frog
SPACE	middle/deep water	shallow, near bank	bottom	shallow/middle water



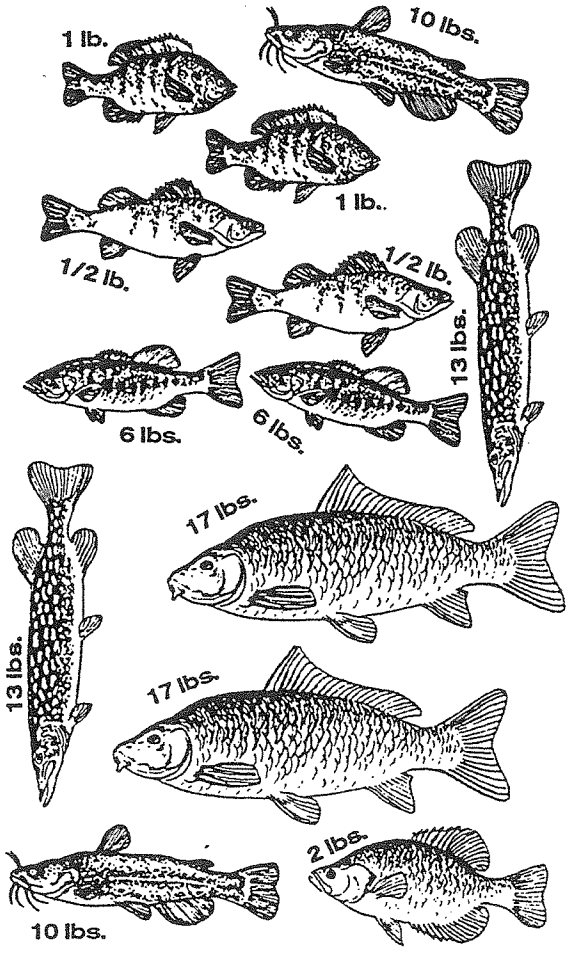


Fish (and you!) don't get all their habitat needs from one area. You may go to school for space needs, but go home for food needs. Fish go to different areas to fill their needs, depending on season, time of day, and weather.

Hooray For Habitat cutouts (Activity 2.1):



Living Room cutouts (Activity 2.4):



WATER HABITATS SITE STUDY

Purpose: *Through a hands-on exploration of a local water habitat, members will better understand the support system for the fish that they catch.*

Outcomes: *Members should be able to identify common aquatic plants, invertebrates, and fish from one habitat; identify the four basic needs of fish (and people); construct a food web; and understand the concepts of food webs.*

Concepts: *1.1, 3.5, 6.1, 7.5*

Group size: *5 to 25*

Site: *Outdoors (lake, stream, etc.) or Indoors (classroom)*

Time: *45 minutes*

Supplies: *Resource sheet 1, Water Habitats ID Sheets; paper, pencils; a hard surface to write on study plates (coffee can lids or the bottom of the gallon jugs); pantyhose (one leg for each net); coat hangers (one for each net); plastic gallon jugs (one for every net; use white jugs if bottoms are used for study plates); waterproof glue, duct tape, garden rake, large shovel, simple 10X magnifier; fishing license and/or MNR permit*[1]*.*

Before the Meeting: *Choose your site carefully, based on safety, space, amount of structure, vegetation and variety of bottom types. Scout the shoreline to see if there are good spots for fish observation by small groups. If possible, secure 1 leader/group. Consider having the members gather the net supplies and construct the nets at home* ***prior to*** *this meeting.*

A QUICK LOOK:

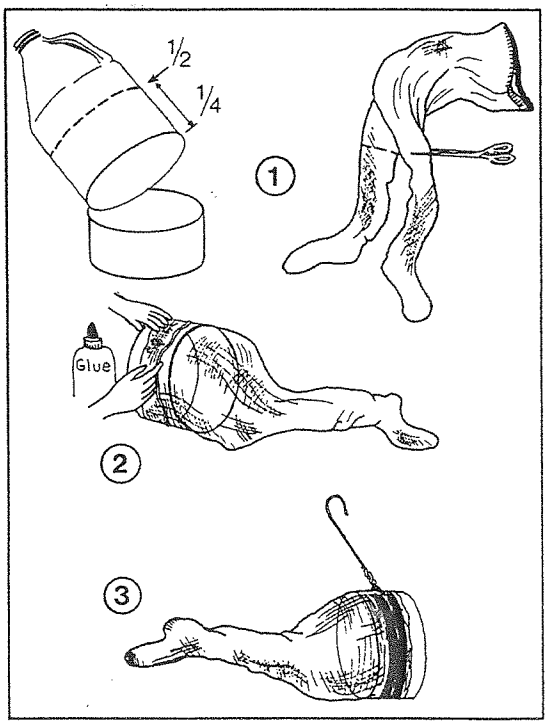
This activity allows individuals to explore a local water habitat and its inhabitants. Each individual will make a dip net and use it to collect aquatic animals. Participants will also select samples of plants and other animals to sketch by sorting through muck (dug by you from the bottom of the lake) and vegetation (harvested by you with a garden rake). Using the identification sheets, the group will try to identify the specimens and make a large food web using their sketches. This activity can be done indoors; however, you will need to collect the specimens a few hours prior to the event. For proper **transportation collection, and disposal procedures and regulations** check with your local Conservation Officer or MNR resource biologist.

[1] You can obtain a free "Licence to Collect Fish for Scientific Purposes" from your MNR District or Area Office. Discuss your location, sampling needs and limitations with staff biologists.

Background on good fish habitat is available on the Leader's Resource Information Sheet.

READY, SET, GO!

Collect enough materials for the program and to make the dip nets. Encourage members to bring what they can find from home. A simple dip net can be made indoors (before going to the site), outdoors in a sheltered location, or at home prior to the meeting by following these instructions.



Step 1. Collect enough coat hangers, pantyhose, and plastic bottles for each net you plan to make. Prepare the bottles and pantyhose as shown. The bottoms of the bottles can be saved and used as study plates (use white bottles; rinse bleach bottles well).

Step 2. Insert the middle section of the plastic bottle into the top of the pantyhose and attach with waterproof glue.

Step 3. Make a handle by bending the wire coat hanger to fit around the bottle. Secure the hanger to the bottle by wrapping duct tape around it a few times.

After your group has constructed the nets, you're ready to go explore. Divide them into three working groups and assign an adult instructor and/or helper to each group. Give the instructors/helpers copies of the *Water Habitats ID Sheets*. Give each youth a pencil, paper, and a hard surface to write on.

> Note: If you did not do the waterside option of Activity 1.1, *Up Close and Personal,* consider doing it before you begin collecting.

Group number one will use the dip nets to collect three animals on or below the water's surface. This should be done from a gentle sloping bank or off a fishing pier. Areas with or near aquatic plants work best. Have them put their specimens on the available study plates while they study and draw them on their paper.

Group number two will sift (with bare hands) through the mud and muck that you have brought up with your shovel. There will be lots of "YUCK'S", but they should be able to find a dragonfly nymph or a worm. They should find three "mucky" insects or

invertebrates (organisms without a backbone, like a worm). Have them place their specimens on the available study plates while they study and draw them.

Group number three will sort through the plant samples you have collected with the rake. Let them select three different plants to draw. Have them place only a small piece of each plant on the available study plates while they draw them.

Rotate the groups until everyone has collected and drawn three animals, three plants, and three bottom critters. (Indoors, they will identify the items collected.) Alternatively, have each group collect and draw only one type of organism, and share their results with the other groups.

Work with the group to minimize your impact on the sample area by taking small amounts of what you need, and cleaning up the site after the activity. In areas of known exotic plants, be careful not to fragment any of these nuisance plants during harvest or leave them spread them along the shore. When transporting and disposing of your samples, make sure that you follow the current regulations and obtain any other required permits. Contact your local Conservation Officer or MNR resource biologist.

Now bring your budding biologists back together to share their discoveries. Using the Water Habitats ID Sheet, or through group processing, help them identify the animals and plants. Make sure that all items are correctly identified--if you can't agree on the specific species of plant, insect, or animal, agree on the type--for example, an amphibian or fish, a tree or bush, etc.

Let everyone help create a food web by arranging the drawings in the centre of the group's circle so that the various forms of life are connected by touching corners. Explain the food web and discuss the four basic needs that these organisms need to survive.

FOR DISCUSSION:

Q. What are the four basic needs of aquatic animals? Can you name some examples that you found?
A. Food, water, cover, and space (expand on each need). Examples might include: food--worms; cover--lily pads; water--lake; space--frogs not found in groups together, but spaced apart in their habitat.

Q. Do any fish use the items you collected for cover? If so, name the item and the fish that uses it for cover.
A. Pondweed (or almost any plant in the water) is used by bluegill and crappie for cover. Bass and trout use trees for cover (no, they don't hide on shore--they use overhanging roots and limbs).

Q. How could biologists or other people use your findings to help this lake, pond, or stream?
A. They could determine the quality of the water from the type of aquatic life that is present. Some organisms can survive in polluted waters while others can't. Other people, like anglers, can use the data to better understand where to fish.

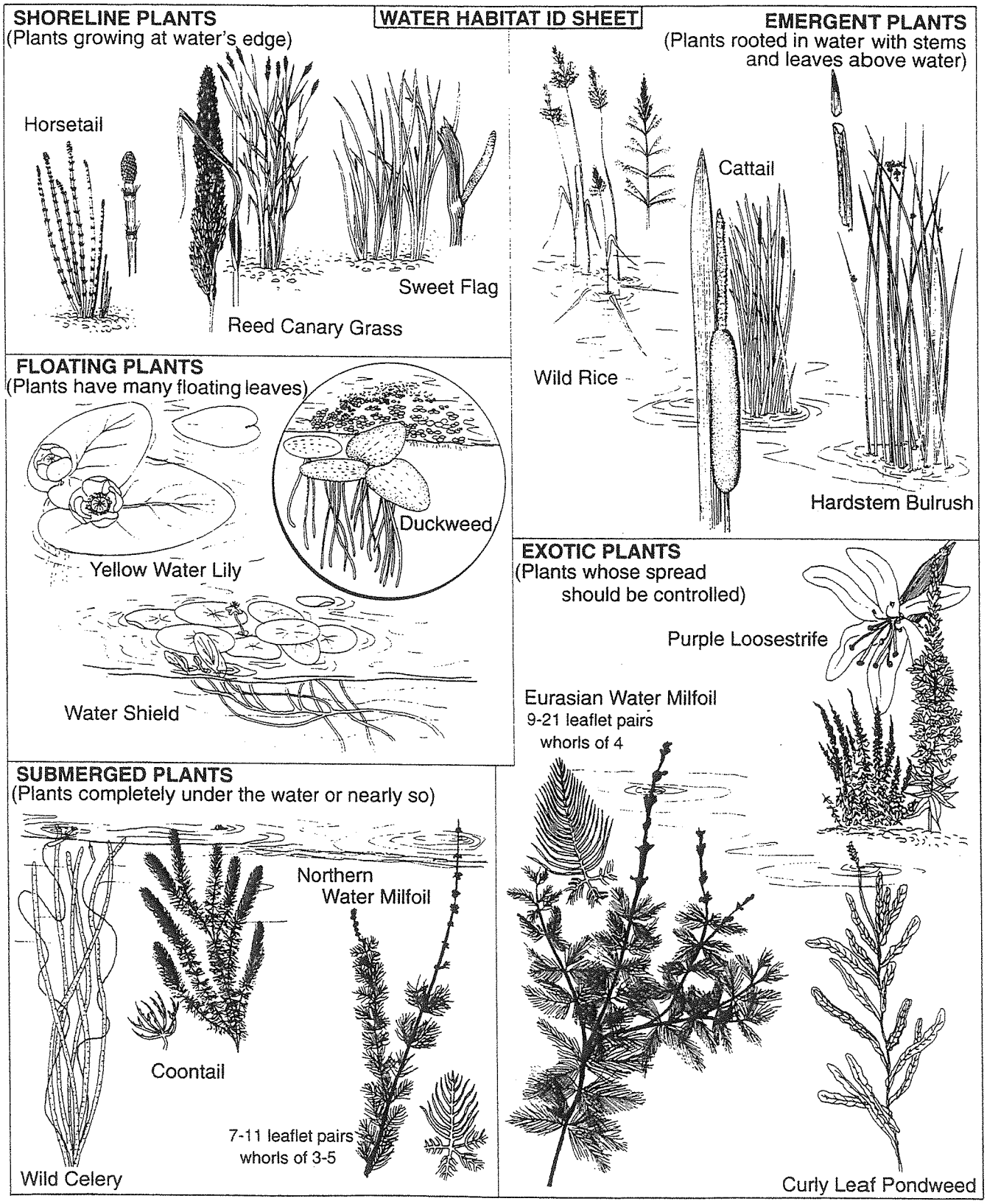
OTHER IDEAS:

- "Step back" from this activity and view either this or another water body through the eyes of a seasoned angler. Use a group leader, or bring in another angler willing to share their habitat assessment abilities with your group. Have the angler check the site for good fishing spots, and relate the features, characteristics and reasons for their selections. Review the basic habitat needs of fish, and make the connection between good fish habitat and good fishing spots. Note: could be done as either a lead-in or conclusion to this activity.
- A comparison could be made between good and poor fishing spots as to amount of vegetation, available cover, variety and density of food (invertebrates and small fish), etc.

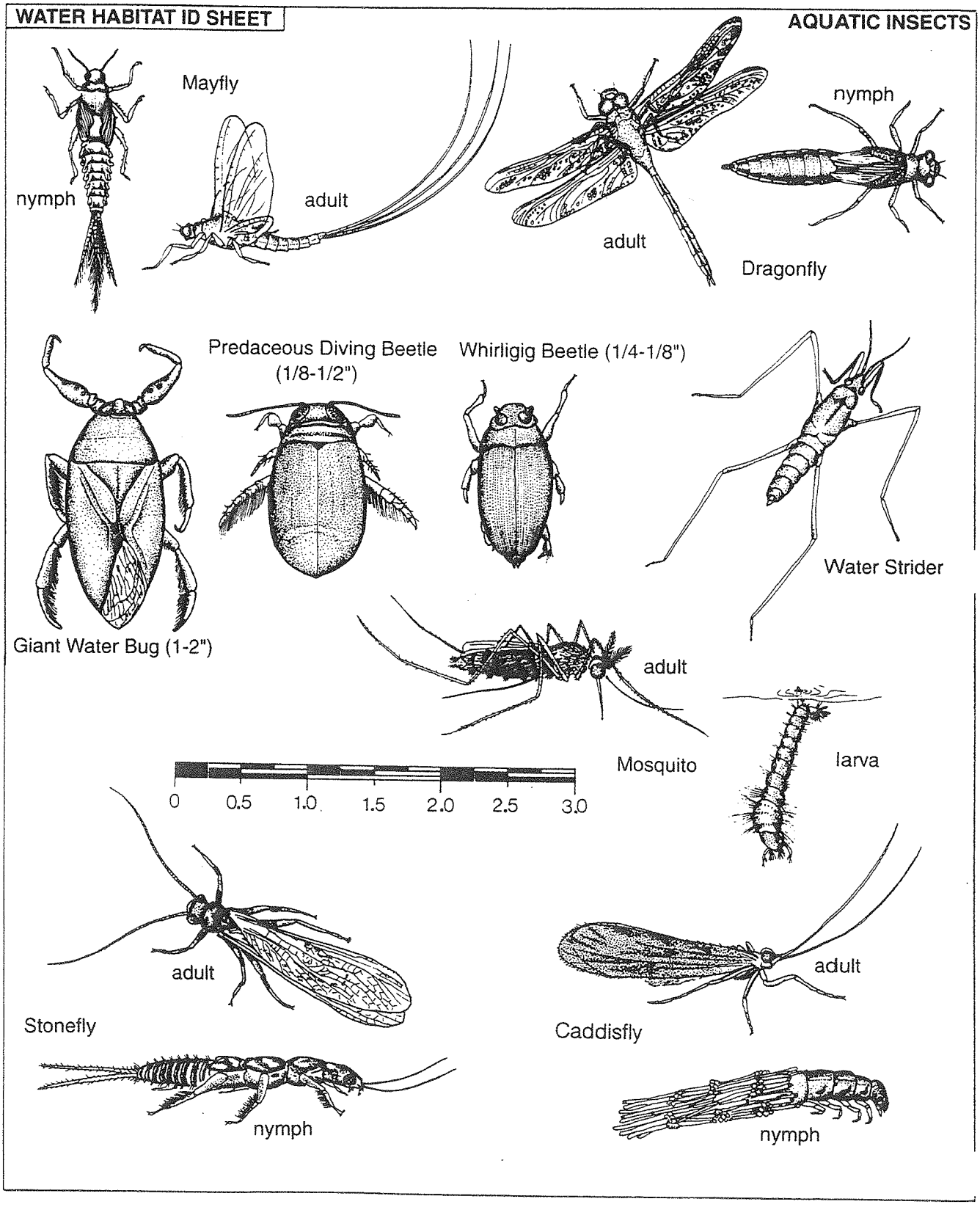
HANDOUT MASTERS:

Resource Sheet 1: Water Habitats ID Sheets
Leader Resource Sheet: Habitat Site Study

RESOURCE SHEET 1 Water Habitat ID



RESOURCE SHEET 1 Water Habitat ID

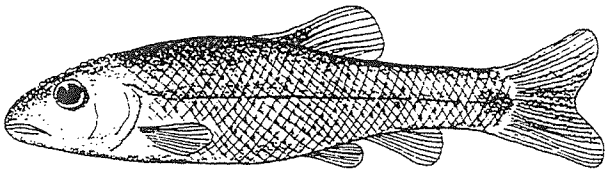


RESOURCE SHEET 1 Water Habitat ID

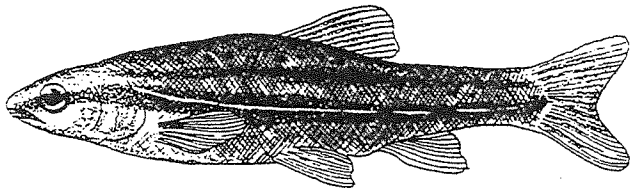
WATER HABITAT ID SHEET

MINNOWS

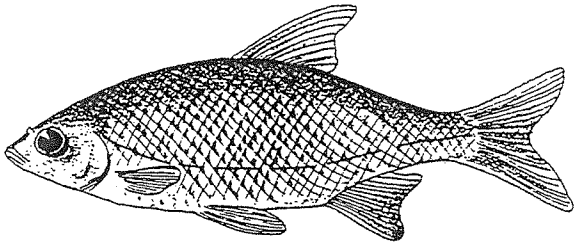
Creek Chub (10")



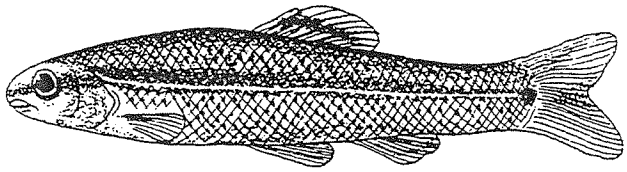
Northern Redbelly Dace (3")



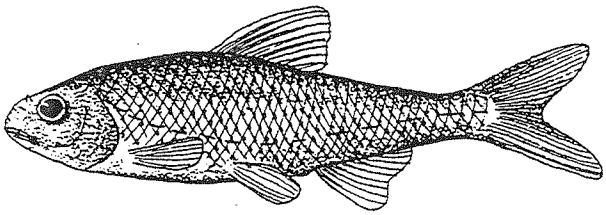
Golden Shiner (8")



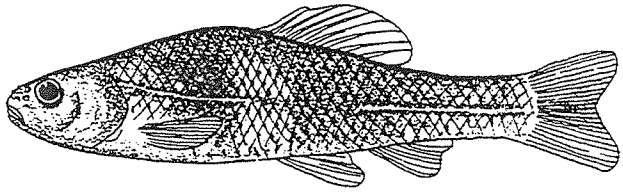
Bluntnose Minnow (3")



Common Shiner (4-12")

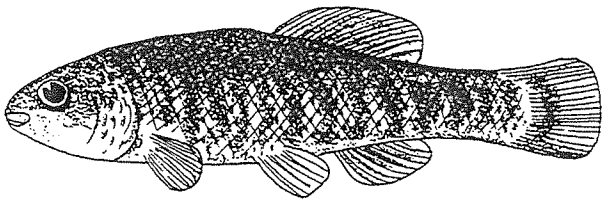


Fathead Minnow (2-3")

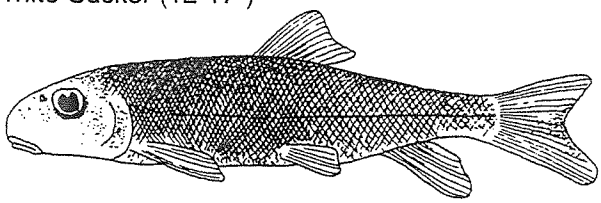


OTHER SMALL FISH

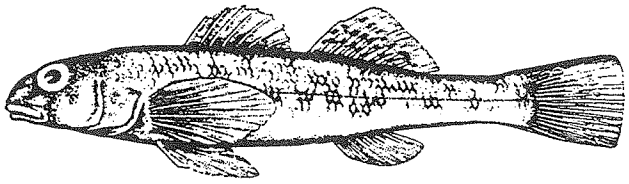
Mudminnow (4-7")



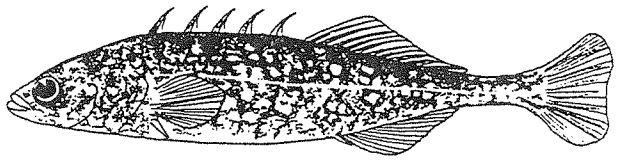
White Sucker (12-17")



Johnny Darter (2.5")



Brook Stickleback (3")



NOTES:

LEADER RESOURCE INFO Habitat Site Study

One good way to increase members' awareness and understanding of the lives and value of fishes is to visit and examine the environment in which fishes live. The practical knowledge of local experts can be combined with the student's own assessment of the habitat to produce a habitat profile for locally important sport fish. Field trips should be well planned in advance.

Important physical characteristics of ***coldwater streams*** include patterns in stream velocity and topography. These factors affect where plant and animal species live in the water.

The velocity of a stream is an indicator of its ability to carry particulate material. The faster the flow, the more materials will be carried in the current. As water slows, particularly around curves or against obstructions, the water cannot carry heavy particles and so they are deposited on the bottom; this explains sand bars and materials deposited on the bottom of pools in streams. Students can test to see in what parts of a stream the water moves fastest. In any section of a stream, the water at the edges is slower than at the centre and water at the surface is faster than at the bottom.

Pools, shallow riffles, runs or flats are important in combination, and can be discovered by observing the depth and general shape of a stream. A riffle is a shallow, swift-flowing section of stream where the water surface is broken by gravel, rubble or boulders. Water depths range from less than 1 cm to 20 cm. A pool is a deep, slow-moving body of water. Runs are deep and swift-flowing and floats are shallow, slow-moving sections. These areas are important for certain species of fishes for shelter, food and nursery habitat.

The most typical native fish in these streams is the brook trout, but their lower reaches have also been colonized by rainbow and brown trout. Migratory spawners such as coho and chinook salmon will come to reproduce and spend the early stages of their life cycle. Abundant aquatic and terrestrial invertebrates are eaten directly by even the larger trout, or form food for sculpins and other smaller fish which, in turn, are consumed by trout and other large fish predators.

Good-quality ***warmwater lakes, rivers and streams*** usually have extensive areas of shallow water which warm quickly in the spring and stay consistently warm throughout the summer and early fall. These waterbodies are rich in nutrients and highly productive, with dense populations of both phyto- and zooplankton supporting large and sometimes diverse fish communities.

High rates of organic production and decomposition lead to an abundance of soft bottom deposits. Rooted aquatic vegetation is plentiful in these deposits, and provide food and other habitat requirements for aquatic invertebrates. These invertebrates in turn serve as food for fish. Stumps, logs, docks and other structures also supply shelter in the shallows and are colonized by invertebrates, thereby providing fish with both food and protection.

Although not essential to a warmwater fish community, rock rubble areas add diversity, attract their own invertebrate populations, and will be used, when food is available, by species such as rock bass and smallmouth bass. These fish may also spawn among the rocks, which can also provide protection for young smallmouth bass. These rocky areas are, however, essential spawning grounds for walleye, a cooler-water fish that has been introduced into many warmwater fish communities.

Along the shore, good warmwater fish habitats commonly have a significant buffer strip of natural shoreline vegetation, including semi-submerged, marshy areas. These areas contribute to natural river productivity, and at the same time keep excess nutrients and silt from washing into the water and increasing the nutrient load beyond its natural capacity.

Basses, sunfishes, rock basses and crappies are adapted to live around cover such as vegetation, stumps and logs, and are often abundant in warmwater habitats. Bottom-feeding fishes such as catfishes and suckers may also be plentiful. Numerous species of minnows usually form an important part of the food base. In some areas of Ontario, pike, perch, and walleye are also found.

Would You Drink This Water?

Purpose: *To demonstrate the limited nature of the freshwater component of fish habitat, and how that water may be impacted by pollution.*

Outcomes: *members should know how much fresh water is on the earth, be able to define renewable and non-renewable resources, understand that pollutants are often invisible, and know how to use all their senses before labelling a substance polluted.*

Concepts: *2.1, 2.2, 2.3*

Group Size: *4 to 30*

Site: *Outdoors (no wind; near drinking water) or Indoors (classroom)*

Time: *20 minutes*

Supplies: *ice cream pail with 1 gallon (4 l) of water; clear plastic cups (a set of six for each group and one extra); eyedropper, water, green food colour, powdered coffee creamer, peppermint extract (or other easily smelled but clear substance), onion extract, salt, blindfolds (separate set of two for each group), Would You Drink This Water Log (Resource Sheet 1)*

Before the Meeting: *Just prior to the lesson fill your bucket with 1 gal. (4 l) of water and mark a cup with a 1/2 cup (250 ml) line. Next, prepare your "polluted" water samples for each group. Fill six glasses 3/4 full of water and label them one to six. Pollute five individual glasses with one of these substances: green food colouring, onion extract, coffee creamer, salt, and peppermint extract). One glass should be left as water only. The plain water, onion, salt, and peppermint extract should appear clear. The food colouring and coffee creamer will be cloudy. Place these six glasses out of sight for use later in the activity.* ***Make sure to use clean, unused blindfolds and sterilized cups for each group.***

A QUICK LOOK:

In this activity, you will describe the water cycle, demonstrate how much fresh water is available for use, and define renewable and non-renewable resources. In the second part, the group(s) will use their senses of sight, smell, and taste to examine six water samples (five "polluted") and decide which they would drink.

READY, SET, GO!

Water is an obvious, but absolutely vital, component of fish habitat. Explain that earth is a "water planet": 75% is covered with water (or someone can volunteer this figure). This amount is simulated by a one(U.S.)-gallon bucket (3.8 l) of water.

Ask everyone how much of the water in the bucket they think is freshwater. Measure 1/2 cup (250 ml) of water from the bucket. This represents all the freshwater on the earth--the rest is salt water in oceans. Less than 3% of all water on earth is freshwater--found in lakes, rivers, underground, frozen in ice, etc.

Ask the group how much of the water in the cup they think is available for animal, plants, and human use. Remove one drop of water from the 1/2 cup. This is ALL the freshwater available for use! The rest of it is frozen in icebergs and at the poles.

Review the water cycle illustration (pg. 70) with your group. Explain that the water on earth today is the same water that has been here for aeons. Dinosaurs slurped the same water that comes out of the kitchen tap! No new water is ever made. Water circles in the hydrologic cycle--precipitation to transportation to storage to evaporation. Discuss ways that water could become polluted in this cycle (runoff, air pollution) and how it is cleaned (infiltration, humans).

Explain to the group that wise conservation (including recycling) of non-renewable resources, such as oil, minerals, and water, needs to be stressed and practiced by all of us. Once these items are used, they do not regenerate. Renewable resources, like fish and humans, can replenish themselves as long as their habitat needs are meet. But just because a resource is renewable doesn't mean it will never be used up or that misuse won't occur--point out some examples of extinct or endangered species. Misuse and natural disasters have often required that we manage our limited resources. For example, droughts world-wide have caused us to manage the crop supply through rationing. Sometimes it is only through management that we can guarantee that we will have something left for future needs.

Polluting our Waters

Now you're ready to demonstrate pollution. As a large group or in smaller groups of four or five, assign someone to record responses (one for each group) and give them the "Would You Drink This Water?" log. Next, select two volunteers to be the "samplers" and give them each a new, clean blindfold (don't reuse blindfolds for additional groups).

From a distance, let the group(s) visually decide which water they would drink and record it on their log. Now, you should blindfold the volunteers. Explain that the water won't make them sick. One will taste (small sips only!) and the other will smell the samples. (If doing this activity with more than one group, use a clean glass each time for tasting the substances.) Remind the audience and volunteers to keep their

reactions secret until each of them has had a chance to try the liquid and they are asked to respond by the recorder. Mix the order of the glasses up so that the blindfolded volunteers won't know which one they are sampling.

Bring the groups back together. Have them compare the differences between the sight, smell, and taste preferences and which ones they thought were fit to drink. Share with them the contents in each of the samples and share how these could represent real situations: For example, green food colouring as algae, onion the smell of an oil spill, coffee creamer as turbid water, and the peppermint a substance that can be tasted but not seen or smelled.

FOR DISCUSSION:

Q. Are all pollutants visible?
A. No, for example, the onion and peppermint extract weren't visible. Likewise, pollutants such as mercury and PCB's may not be visible in our water supply.

Q. Are substances that we see or taste in the water always unhealthy?
A. No, some just look bad, like the green food colour. Algae tastes bad and can be unsightly, but it is not always unhealthy.

Q. Name three types of pollution that you have seen in or near water.
A. This will vary greatly, but includes--litter, fertiliser/pesticides, oil from cars, soil from erosion, etc.

Q. What effects might pollutants have on fish and their habitat?
A. This question is developed further in the next activity. Accept and list answers, and come back to this issue then. Possible answers: Pollutants can accumulate in fish to make them unhealthy to eat. Pollutants can cause components of habitat to be destroyed which causes stress on the fish which leads to diseased and eventually dead fish.

Q. What if there are pollutants that you can't see, smell or taste?
A. These might be the worst, because it is harder to tell that they are there, and that they might be causing problems. Sometimes you can't see, smell or taste them because they have dissolved into lots and lots of water. This leads to the phrase, "the solution to pollution is dilution." But just because something disappears into the water doesn't mean it goes "away". The next activity will demonstrate what sometimes happens to it.

OTHER IDEAS:

- Ask group members where in their neighbourhood or city have they seen pollution problems. Discuss what might be the source of these pollutants, what effect they have on the habitat, and what effect they have on the fish that we catch and eat.

- Make a list of the "good" and "bad" sites or facilities and select a few of each to visit. Contact the owner or Public Relations Department to get permission to visit the site or set up a tour of the facility. Have the tour guide explain where they collect the water, what they use it for, if they clean it, how it is disposed, and what other programs they do to help protect our resources. After the tour, ask group members what they, the owner, or the company might do to help make the process less polluting or expand their good efforts to other areas.

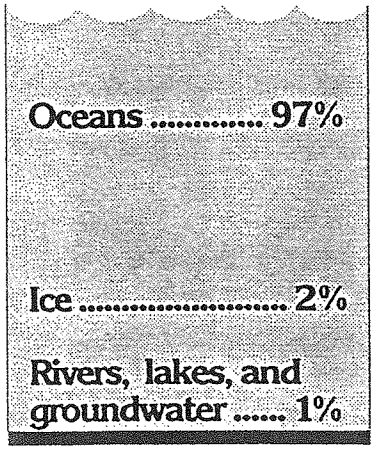
HANDOUT MASTERS:

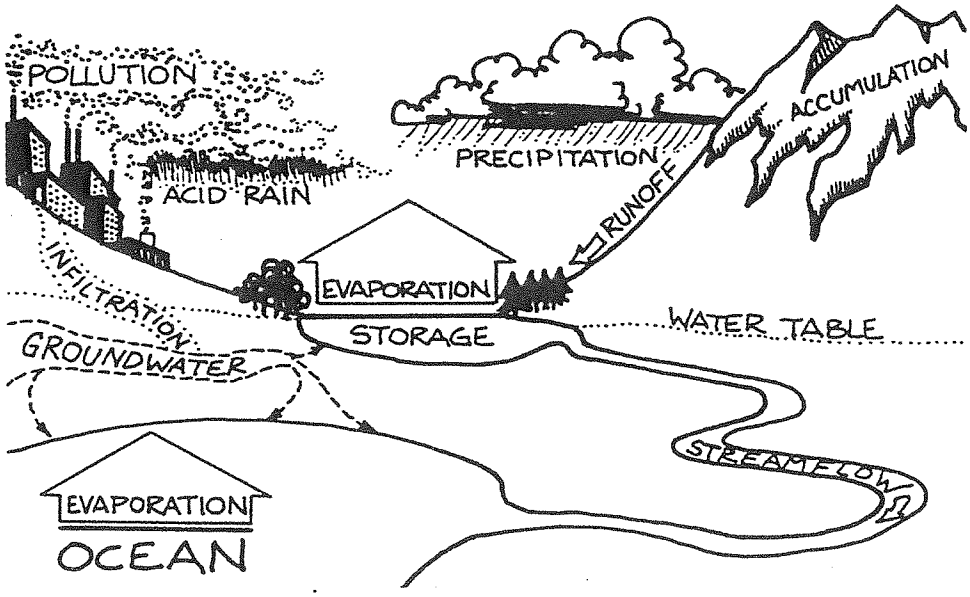
Resource Sheet 1: *Would You Drink This Water?* Log

The Hydrologic Cycle

The water you drink today is the same water that dinosaurs slurped. It's also the same water that your great-great-great grandchildren will drink! Water goes round and round in the **hydrologic** (hi-dro-LAH-jik), or water cycle. If we pollute our water, then we have to make it clean again. We can't make new water.

Earth's Water Supply





RESOURCE SHEET 1

Would You Drink this Water?

WOULD YOU DRINK THIS WATER?

Which glass of water would you drink based on your senses of sight, smell, and taste? Place an "X" in each column if you would drink this water sample.

	Sight	Smell	Taste
Glass 1			
Glass 2			
Glass 3			
Glass 4			
Glass 5			
Glass 6			

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Which glass of water would you drink based on your senses of sight, smell, and taste? Place an "X" in each column if you would drink this water sample.

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Glass 3			
Glass 4			
Glass 5			
Glass 6			

NOTES:

Food Web Tag

Purpose: *In this active simulation/role play, members become elements of the food web in order to illustrate both population dynamics and the biomagnification of pollutants in top predators and, potentially, anglers.*

Outcomes: *Members will understand the carrying capacity of water bodies, predator/prey relationships, food webs, and the transfer of energy, and pollutants, through the web.*

Concepts: *1.1, 2.1, 2.2, 4.4, 4.7, 4.13, 6.1*

Group Size: *8 to 30*

Site: *Outdoors (lots of open space) or Indoors (gym)*

Time: *30 minutes*

Supplies: *3 - 4 gallons (10 – 15 l) of popcorn[1], Food Web Critter Tags Master (Resource Sheet 1), sandwich bags, permanent marker, masking tape, hula hoops or rope loops (2 or more)*

Before the Meeting: *Copy the Food Web Critter Tags Master and make enough of the tags to do each of the fish population scenarios you want to demonstrate.*

Identify the boundaries of the "lake" where the game will be played (about the size of a basketball court). Spread "plankton" (popcorn) randomly about the surface of the lake. Mix different coloured popcorn in with the regular popcorn to simulate pollution in the lake. One colour can signify mercury, another PCBs (polychlorinated biphenyls), etc. Let the fish feed on all colours of popcorn – don't tell them that some is "polluted".

*Mark the sandwich bags (fish stomachs) with a permanent marker to indicate fill levels: the fill level of a minnow will be 1/3 of the bag; the perch will be 2/3; and the nor*thern pike will be a full bag. *Note: Other fish can be substituted to match the common species in your area. Make sure that you have the food web order right--a bluegill won't eat an adult largemouth bass, but t*hat bass will eat the bluegill.

[1] Alternatives to popcorn include different varieties of pasta, bread bag tags, marbles, coloured beads.

A QUICK LOOK:

In this activity, people act out and observe a food web in action by becoming minnows, perch, and walleye. The primary energy source driving the lake is plankton, represented by popcorn! Each species feeds on the popcorn and/or each other to fill their stomachs (sandwich bags) with food. Different population ratios or combinations are tried in an effort to balance this lake.

READY, SET, GO!

Explain that food webs are the basic building block of all life. The sun and nutrients are the beginning of all food webs. They fuel the production of plant life and plankton, which in turn are food for other animals. This process continues up the food web and eventually reaches humans. All these organisms are interrelated by their habitat needs and their dependence on each other's role in the food web. The maximum number of animals that can be supported by a habitat without causing harm is called the carrying capacity. Carrying capacity can vary from season to season or year to year. It is also affected by other things like weather and nutrients.

Put two hula hoops or rope loops into the "lake". Tell the youth that these items simulate cover and act as safe places for the prey (minnows and perch) to hide in from predators (perch and northern pike). Instruct the youth who are prey that they may stay in the hoops/loops for only 5-10 seconds at a time.

Start with a lake containing only minnows. Tape a picture of a minnow on everyone's back. Then, let the minnows "feed" on the "plankton" by filling their bags (stomachs) with popcorn. Let the feeding occur for 1 year (about 5 minutes). How many of them fill their bags to the necessary line? How long could they feed before they ate all of the food? Are we at the lake's carrying capacity for minnows? Does the lake need something to help balance it--like a predator?

Introduce predators: let some people now become perch to feed on the minnows and plankton. Other predators will be northern pike that feed on minnows and perch. Make sure that the youth change the signs on their backs to reflect their new roles. (An approximate ratio of 6 minnows/3 perch/1 northern pike make a balanced lake.)

Predators need to tag their food source. If tagged, the captured fish must empty their stomach contents into the stomach of the predator. (No one else can tag a fish while transferring food until that process is done.) The tagged fish is now dead and must sit down and wait for the bacteria (decomposers) to recycle them back into nutrients.

Select a few participants to become bacteria. They are responsible for removing the dead fish. They must escort the dead fish to the bottom of the lake (north end of your lake) where they recycle the fish into nutrients for fuel to grow new plankton. Use this

stock of dead fish to periodically add to the population of minnows, perch and pike (e.g., any fish that gets a full stomach is successful, and can "reproduce").

For more advanced youth, select a few dead fish to become reborn as anglers (there is a certain justice here, isn't there?). Anglers must first get their fish bait, by tagging a minnow. While holding hands, the minnow and angler can catch a perch or pike, one at a time, by having the minnow tag that fish (perch and minnows can use the hula hoops as safe spots from the anglers; pike are too big). The angler will then escort this fish to the shore. If your lake is experiencing over-fishing, enforce regulations. For example, make anglers hop on one foot to catch fish, or limit their catch.

Near the end of the game, stop the action and assess the level of contamination in each type of fish and in the anglers. Which type of fish have large amounts of coloured popcorn and why (the *amount* is important here, not the proportion – fish will keep and accumulate pollutants over time)? Fish with a "significant amount" of coloured popcorn (successful pike) are unhealthy and are now demonstrating unusual behaviours. Assign these youth a different means of movement (skip, walk, crawl) to finish the game.

Now look at the survivors of the lake. Depending upon how balanced your lake is, you might have a good mix of perch, minnows, and northern pike. Are the numbers of fish left representative of the lake's carrying capacity for each of these species? Or is the lake headed for trouble? For example, if you had more northern pike than the carrying capacity would allow, they might be the only fish left or on their way to eating themselves out of "house and home". How long could they last without a food supply?

Point out that some fish in certain lakes and streams live with high levels of mercury, PCB, and other contaminants in the fatty portions of their bodies. These fish can be harmful for human consumption, especially if they are eaten on a regular basis (note coloured popcorn in angler's bags). People who eat a lot of fish can reduce their risks of contamination by following the various guidelines outlined in the *Guide to Eating Ontario Sportfish* (see next lesson).

If time permits, try different populations of fish to try and balance the lake, or start with a different combination of the same fish.

FOR DISCUSSION:

Q. What would happen if the plankton supply was reduced in a lake or pond?
A. A basic link in the food web would be lost. The web would unravel since there would be no basic source of food (energy) for the fish.

Q. What would happen if all the northern pike and most of the perch were overfished by anglers from the lake?
A. If the northern pike were overfished, there would be few predators left to eat the perch. The perch population would increase until they depleted the minnows. If the

perch were overfished, the northern pike would be affected because their food source would diminish. The northern pike population in this case might start to decline, fish could become very skinny, or they might not grow any larger than a hammer's handle.

Q. Can you name any needs that aren't met in your life? (Think of the four parts of habitat). Are there any needs in your life that are met every time?
A. Answers will vary greatly. Examples--food might be limited, if the family is large or the economy is tight. Space might be limited, if personal needs for privacy are not met.

Q. High levels of pollutants can occur in some fish, even when the levels of those pollutants in the water are very low. Why is that?
A. Some pollutants are taken in by members of the food chain, but they do not get rid of them very quickly (a lot are stored in fat cells). These members slowly accumulate the chemicals over time. When these members are eaten, much of their accumulated chemicals are then stored in the predator, which accumulates the chemical more quickly with each prey eaten. Each step up the chain increases the amount and rate of accumulation.

Q. If each water flea contains one bit of pollution, and a pike eats ten walleye which ate ten perch which ate ten minnows which ate ten water fleas, how many bits of pollution are transferred to the pike?
A. 10,000, if no pollution is lost.

OTHER IDEAS:

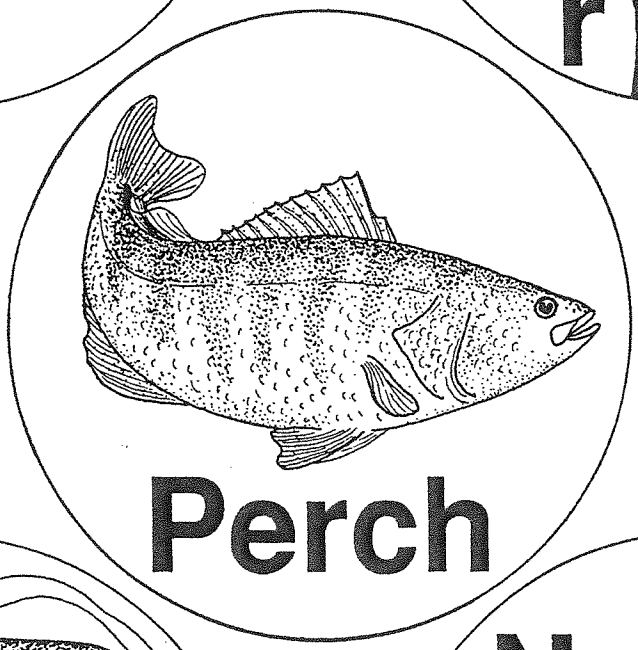
- Do **Resource Sheet 2**: *Living Room*

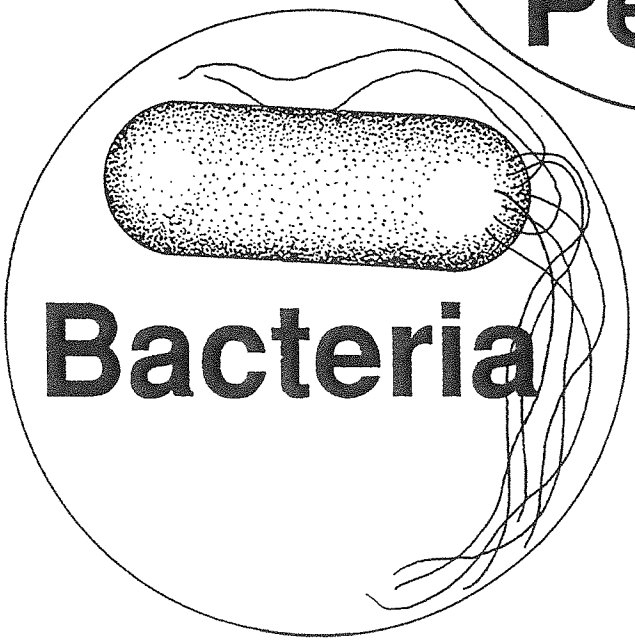
HANDOUT MASTERS:

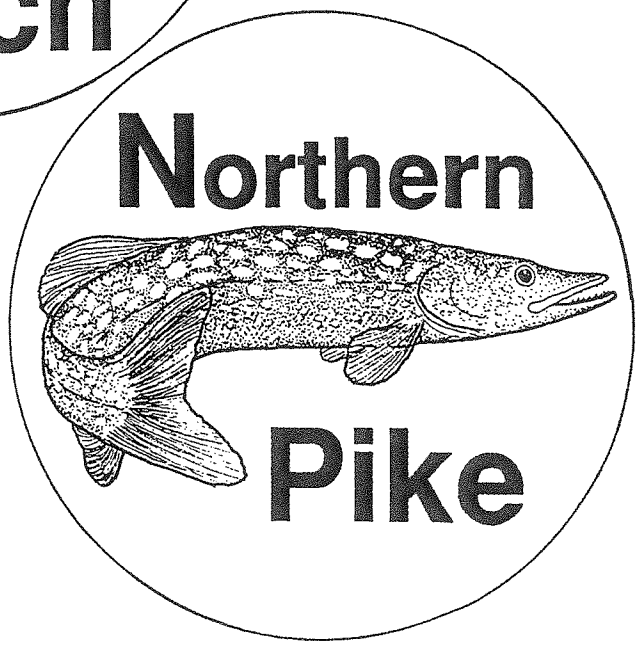
Resource Sheet 1: Food Web Critters
Resource Sheet 2: Living Room

RESOURCE SHEET 1

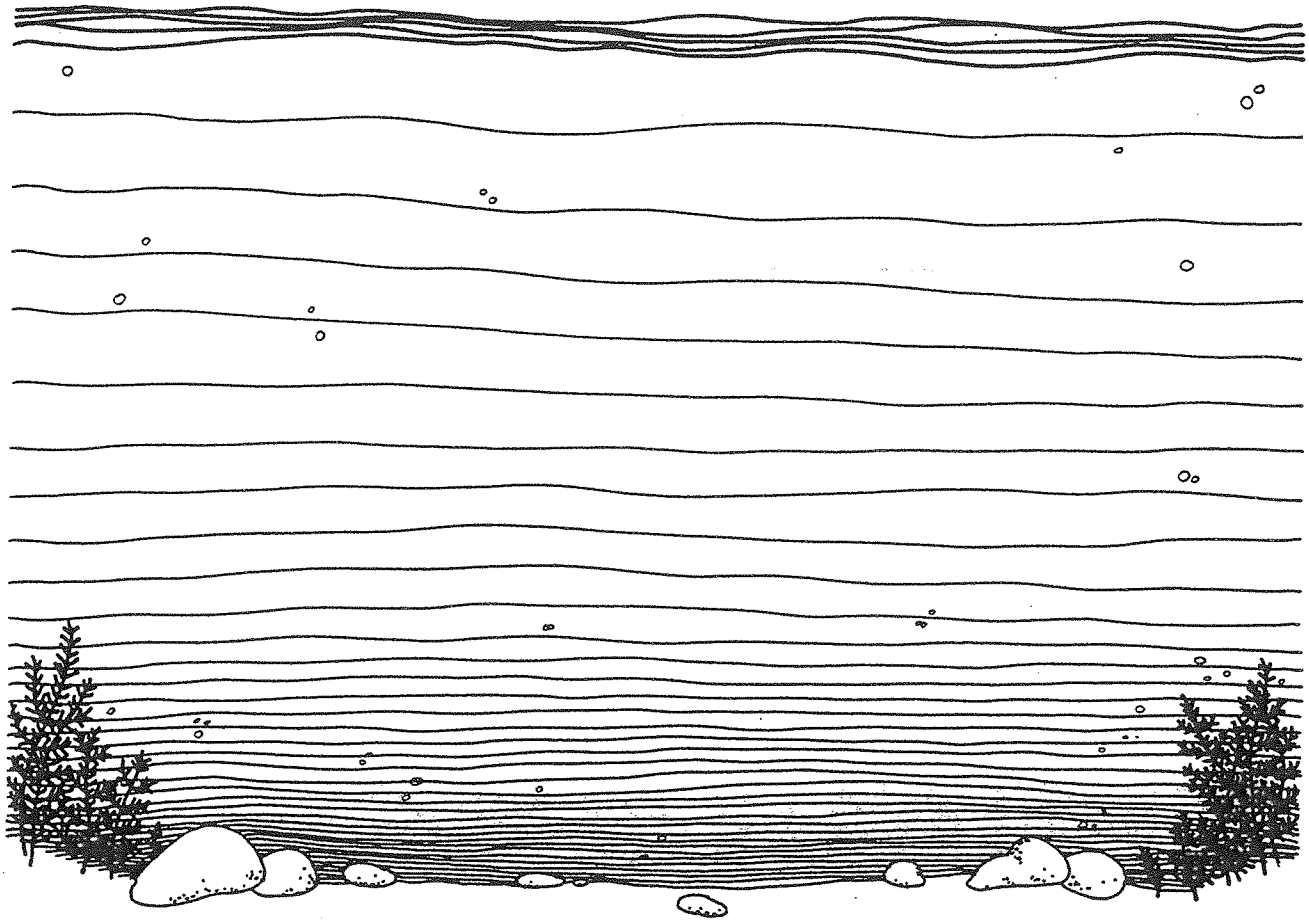
Food Web Critters







RESOURCE SHEET 2 LIVING ROOM



This 1/5 acre (.08 ha) pond has enough food, oxygen, shelter and space to support 60 pounds (27 kg.) of fish. Cut out the fish found at the end of *Activity 2.1.* Choose the ones you would like to catch if you went fishing and glue them into this pond. If you put less than 60 pounds in the pond, draw some small fish and mark their weight. Don't put in more than 60 pounds of fish or some will not survive.

The weight of fish that a pond will support is called its **carrying capacity**. If the carrying capacity of a pond is exceeded (if too many eggs hatch and too many fish live in too small an area), then the pond may suffer.

The earth has a carrying capacity for people. Many experts think that the earth can support about 12 or 13 billion people without destroying the environment. Right now, there are about 6 billion people.

Estimate the carrying capacity of your meeting room. This is the number of people that can easily be seated or work in the room without crowding or harming the people in it.

My meeting room's carrying capacity: _____

"To Eat or Not to Eat"

Purpose: *To introduce the group to the* ***Guide to Eating Ontario Sport Fish*** *through active, guided exploration and fact finding.*

Outcomes: *Group members will be able to determine how many meals/month of a particular fish from a particular waterbody are safe to eat.*

Concepts: *2.2, 2.6 (ext.), 4.13*

Group size: *6 - 30*

Site: *Outdoors (picnic tables or grassy area) or indoors (class- or meeting room)*

Time: *20 minutes*

Supplies: *Guide to Eating Ontario Sport Fish (1 each or per small group);*
Resource Sheet 1: Using your Guide to Eating Ontario Sport Fish

A QUICK LOOK:

This activity addresses the basic question coming out of the previous activity: "How do I know if a fish is safe to eat?" Fortunately, Ontario has an easily available resource for answering that question, the *Guide to Eating Ontario Sport Fish*. Unfortunately, however, with more than one quarter million lakes, untold kilometers of streams and many edible fish, coverage is limited to the more popular species and locations, or locations with known concerns. If you cannot find your fishing spot, a nearby lake or stream will be covered. Base your inquiry there. If for some reason you think your location might differ significantly from surrounding ones, call the Ministry of the Environment at 1-800-820-2716.

All the information required for this activity can be found either in the *Guide* or Resource Sheet 1. The front of the *Guide* contains considerable background information on common contaminants, their sources, and their effects on fish, as well as tips on how to use the tables. It also reviews changes in contaminant levels (and in some cases virtual elimination) over the years. Use the *Guide* as leader background. Older members may wish to read it as well. Resource Sheet 1 provides similar direction in a step-by-step format that each individual or group can follow for themselves.

READY, SET, GO!

Refer the group to the substances that were added to the water in Activity 2.3. Ask if all were visible in the water. Remind them that some pollutants are not only invisible, but cannot be smelled or tasted, either.

Review the results of Activity 2.4. Ask if all the contaminated fish acted strangely. If they didn't, and if the fish did not smell or show visible signs of contamination, how did they know what was safe to eat? What if they could buy glasses that made contaminated fish glow – would they buy them?

Indicate that there are no such glasses, but there is something they can use that is almost as good, and its *free.* If you haven't established groups of 3-5, do so now. Make sure that younger members have older ones to help them. Pass out a copy or copies of the *Guide* and *Resource Sheet 1.* Have each group work through the Sheet on their own, answering the questions as best they can. Work with each group individually, responding to questions they may have. Go over the Sheet as a large group to ensure that each small group got the right answers.

Encourage them to share their copy with their families, show them how it works, and use it whenever they fish.

OTHER IDEAS:

- Instead of just sitting back and responding to the problem of contaminants in fish, encourage your group to get out and *do* something about it. Trout Unlimited and the Canadian Department of Fisheries and Oceans are partners in *The Yellow Fish Road,* a neighbourhood awareness program that encourages people not to dump waste down storm drains, which are most often directly connected to local rivers and streams. Your group would mark drains with a yellow fish as a visual symbol, and distribute information on what it means and how people should respond. Contact Trout Unlimited at 1-800-909-6040 for more information and materials.
- Some people are now concerned that lead sinkers can cause lead poisoning in some waterfowl. These birds pick up old sinkers when they get small stones for their crop. These stones help grind up food before the birds digest it. Other birds such as loons may swallow lead when they eat fish with hooks, sinkers or jigs attached. Even if only small amounts of lead are absorbed, birds may get ill or even die. Other people feel that lead poisoning from this source is of limited or no concern. Research this question. Find out more on both sides of the issue, what alternatives are available to anglers, and whether you think those alternatives should be used.

HANDOUT MASTERS:

Resource Sheet 1: Using Your *Guide to Eating Ontario Sport Fish*

RESOURCE SHEET 1

USING YOUR GUIDE TO EATING ONTARIO SPORT FISH

Introduction. Fish is a nutritious, low-fat alternative to chicken, beef and other meat. And it tastes good, too! Most Ontario sport fish are also safe to eat. However, fish live in water, and if that water gets polluted, then the chemicals or metals from that pollution can end up in the fish. Since sport fish are often at or near the top of the food chain, even low levels in the water may be concentrated as they are passed up the chain, until the amounts in sport fish may be a problem for us.

In Ontario, the Ministries of Environment and Natural Resources cooperate to sample and test fish for chemicals and metals that are harmful to people. The good news is that levels of most of these harmful things are decreasing, and some no longer are a problem. The bad news is that some hang around in the environment a very long time, and we still need to watch out for them. In addition mercury, a very poisonous metal, occurs naturally in many areas of Ontario, and will always be a concern. In fact, natural mercury is the *only* problem in most inland lakes and streams.

The results of this testing can be found in the *Guide to Eating Ontario Sport Fish.* This book is produced every two years, and anglers should get and keep the current copy around so they can make sure that the type and amount of fish they eat are safe.

How to use.

Step 1. Find your lake or stream. Look under **Contents** for the *Location Index.* Go to the *Index* and see if your lake or stream is there. If it is, put the name and page # here: _____. If it is not (Ontario has just too many waterbodies to sample every one), search for a lake or stream nearby that is in the book. Results for that waterbody will probably be similar to yours. Put the name and page # here: _____.[1]

Step 2. Go to the page you have found in the tables. A full explanation of these tables can be found under *Key to using the guide tables* which is towards the front of the book.

Step 3. Check the location, which is underneath the name. Some lakes and steams have the same name, so make sure this one is yours. The numbers give you latitude and longitude, which can be found on many maps, including the *Ontario Official Road Map*, or you can tell from the township, district or county names. If the lake or stream is yours, go on to Step 4. If it isn't, go back to Step 1 and find a nearby waterbody.

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[1] If for some reason you think your lake might differ significantly from surrounding lakes, call MOE at 1-800-820-2716.

Step 4. Find the fish you caught, or will likely catch. If it isn't there, compare it with a similar fish that is (pumpkinseed with rock bass or bluegill; perch with walleye). Place the name of the fish here: _____.

Step 5. Find the size of the fish you caught, or will likely catch. Sizes run across the top of the table and represent total length. Look at the symbol in the box for your fish at that size, and place it here: _____.

Step 6. The symbol above will tell you how many meals/month you can have of that fish. Use this key:

fish outline	8 meals
④	4 meals
②	2 meals
①	1 meal*
black fish	no meals

*children under 15 and women involved in childbearing should not eat any

How many meals/month can you have of that fish? _____.

Eating different fish. You may want to eat different kinds and sizes of fish. Following the *Key to using the guide tables* in your Guide is a section called *Consuming fish from several locations or consumption categories.* Read the description and example, and then answer the following questions:

If you eat one fish from ②, how many fish from ④ can you eat? _____ .
If you eat three fish from ④, how many "fish outline" fish can you eat? _____.

MEETING THREE: WHAT WILL I CATCH IT WITH?

What will the group learn? The participants will be able to link food chains and live bait, and discover bait sources in their own back yards. They will learn to tie knots, make fishing rigs from pop cans or rig and cast a closed face (spin-casting) rod and reel, be able to select fishing locations and use the baits they have found to catch fish.

Objectives

1. To create an understanding of common Ontario food chains leading to major Ontario sport fish, and how commonly found live bait represent or mimic chain members.
2. To develop skills in casting with either pop can or spin-casting gear, and in rigging that gear with terminal tackle.
3. To apply the above understandings and skills to a real fishing experience.

In a nutshell

Guess Who's Coming to Dinner?	20 minutes
Live Bait Hunt	40 minutes
Pop Can or Spin-cast Option	30 minutes
Try it Out!	30 minutes
Total Time:	**120 minutes**

Food for fish, food for thought

In the previous lesson, members were introduced to the concept of food webs. Here, further exploration of this concept focuses on food for sport fish, which often represent at least middle and often top predators in local food webs or chains. Food chains are simply a single series of links, from producer to top predator. Focusing in on "fish food" enhances the value and importance of smaller aquatic critters, directly identifies some potential bait, and suggests other possibilities (e.g. earthworms) that may be easier to find and maintain. Collecting some of these baits is the first step toward assembling the basic equipment required to actually go out and catch fish.

Fishing fundamentals

Fishing is a way of bringing people into their natural environment. Youth who are exposed to fishing as a skill can learn patience, build self-esteem, gain time for reflection, and problem-solving. Fishing is also a way to build family bonds and friendships. To be a good angler, one must utilize the concepts taught in the previous

chapters: habitat, observation, measurements, water quality, stewardship, and fish identification.

In Ontario, there are over 250,000 fishing lakes, countless kilometers of fishing streams and more than 150 fish species. There is a lot of opportunity to explore fishing. Angling doesn't have to be expensive and sophisticated to be enjoyable. Equipment can be made from pop cans and bait can be found in your own backyards. Part of the adventure of fishing is understanding how truly simple it can be. This lesson teaches people the very basic skills in needed to venture out to their ponds, lakes, and streams for either a day of adventure or fishing. Or both.

Note: *Activity 3* offers two options, Pop Can or Spin-cast, depending on the availability of equipment. Lack of equipment should be no deterrent to beginning anglers!

Guess Who's Coming to Dinner?

Purpose: *An active tag game will introduce members to the importance of food chains, and some of the things eaten by up to three common Ontario sportfish.*

Outcomes: *Members will be able to explain the concept of food chains, including the sun as source of all food energy; name at least one member of a food chain related to an Ontario sportfish; and place that fish in its correct habitat.*

Concepts: *1.1, 6.1, 7.3*

Group size: *5 to 36*

Site: *Open field or large indoor space.*

Time: *20 minutes*

Supplies: *Resource Sheets 1 and 2 (optional); Leader Resource Sheets 1, 2 and 3; Leader Resource Information Sheet; clear plastic for lamination (optional).*

Advance Preparation:

1. *Copy Resource Sheets 1a-1e so that the same images, when cut out, appear on both sides. Use a different colour of paper for members of each food chain (see Leader Resource Information Sheet). Cut out each food chain card. Optional: laminate pictures or put in freezer bags to ensure multiple use.*
2. *Copy Resource Sheet 2, and cut into individual strips. Each strip should refer to only one animal. (optional)*
3. *Adjust the chains to match numbers of students by repeating some or all of the chains. If necessary, balance the chains by removing the top predator or another food chain member (see "Adjusting the Chains" in Leader Resource Information) or by having two of one animal, already linked together (try to pick an animal that swarms or schools, e.g. minnows).*

A QUICK LOOK:

Students will role-play members of up to three aquatic food chains in an active tag game, simulating how energy gets passed through three different aquatic environments. The emphasis in this case is on the types of food that sportfish depend on. Members should understand that these food types are important to them for at least three reasons:

1. Without this food, or other parts of the food chain, there would be no fish to catch.
2. Knowing what a fish eats can help them decide what to use for bait (i.e. the same or similar things).
3. Knowing what a fish eats can help them find lures that mimic that food.

READY, SET, GO!

Introduce or review the concept of basic needs: food, water, shelter/space and others of its kind. Try introducing a visual focus such as an apple (representing food - a need) and a doll (representing a plaything - a want), to stimulate discussion of the differences between needs and wants.

Indicate that you're going to look at one of those needs more closely; the need to eat.

a) with younger members, go over each food chain, and what each animal is. Then go on to b).
b) with older members, begin by passing out individual food chain cards to each member, and have them become that animal. Ask them to figure out, from what it looks like, how it might move, and have them move that way. Where might it live?

Introduce the game.

a) Tell the members that they are getting very hungry, and have them look at what they eat on the bottom of the card. But ... something also eats them. Have them look at the top of the card to discover their predator. Indicate that those without predators are too big and aggressive for anything else in the water to eat them. They only have to worry about finding food (and avoiding humans). Pair members, and have each explain to their partner who they are, what they eat and who eats them.
b) explain that when the game starts, each member must run and find their food by looking at all the other cards, which are held up in front by all the animals. To make things a bit easier, their food will have the same colour of card. But ... they must avoid being eaten by their predator if they can.
c) each animal must tag (not tackle!) their food above the waist.
d) when one animal tags another, they join together, with the animal tagged in front, and the "tag-er's" hand on his or her shoulder. They then continue to hunt for the food of the front animal, and avoid being caught by the predator of the rear animal. When the pair catches its prey, or is caught, a chain of three forms, and so on until all chains are complete. Demonstrate chain formation with an actual chain of three students. Random pairs could also practice running in tandem.

Play the game.

e) scatter members at random across the playing area (gym, outdoor play area or field). Be sure to define the boundaries so that the game is contained within a reasonable space.
f) demonstrate again how to hold up their cards, and start the game.
g) allow the game to proceed until all chains have formed.
h) at this point, the beginning animals in each chain will still be looking for plants. When the chains are complete, stand in the middle of the area with your hand in the air and announce, "I am a plant!". Each chain should then run and grab onto you. Point at the sun with your raised hand, and explain that its the sun that gives you energy, which then gets passed on, through the chain, all the way to the top predators at every end. Do a roll call with one or two chains, to make sure everyone's in the right order.

i) switch cards and play again.

Display the chains (Leader Resource Sheets 1, 2 and 3) on a bulletin board or spot where everyone can see, and explain the type of habitat each chain lives in. Have the children draw pictures of lakes, warm-water streams and cold-water streams, and post them around the chains.

OTHER IDEAS:

- Have students create a "weird water environment" and develop a food chain that fits it.

- Play a number of "team quiz" games to assess how well students remember their chains:
  1. Name the habitat that each animal belongs in.
  2. Name the animal from the clues used to discover it's habitat.
  3. Given an animal, name what it eats and/or what eats it.

- Pass out the clue strips to each animal (Resource Sheet 2). Have them read what their animal likes and needs. Together with the rest of their chain, have them try to figure out where they all live.

HANDOUT MASTERS:

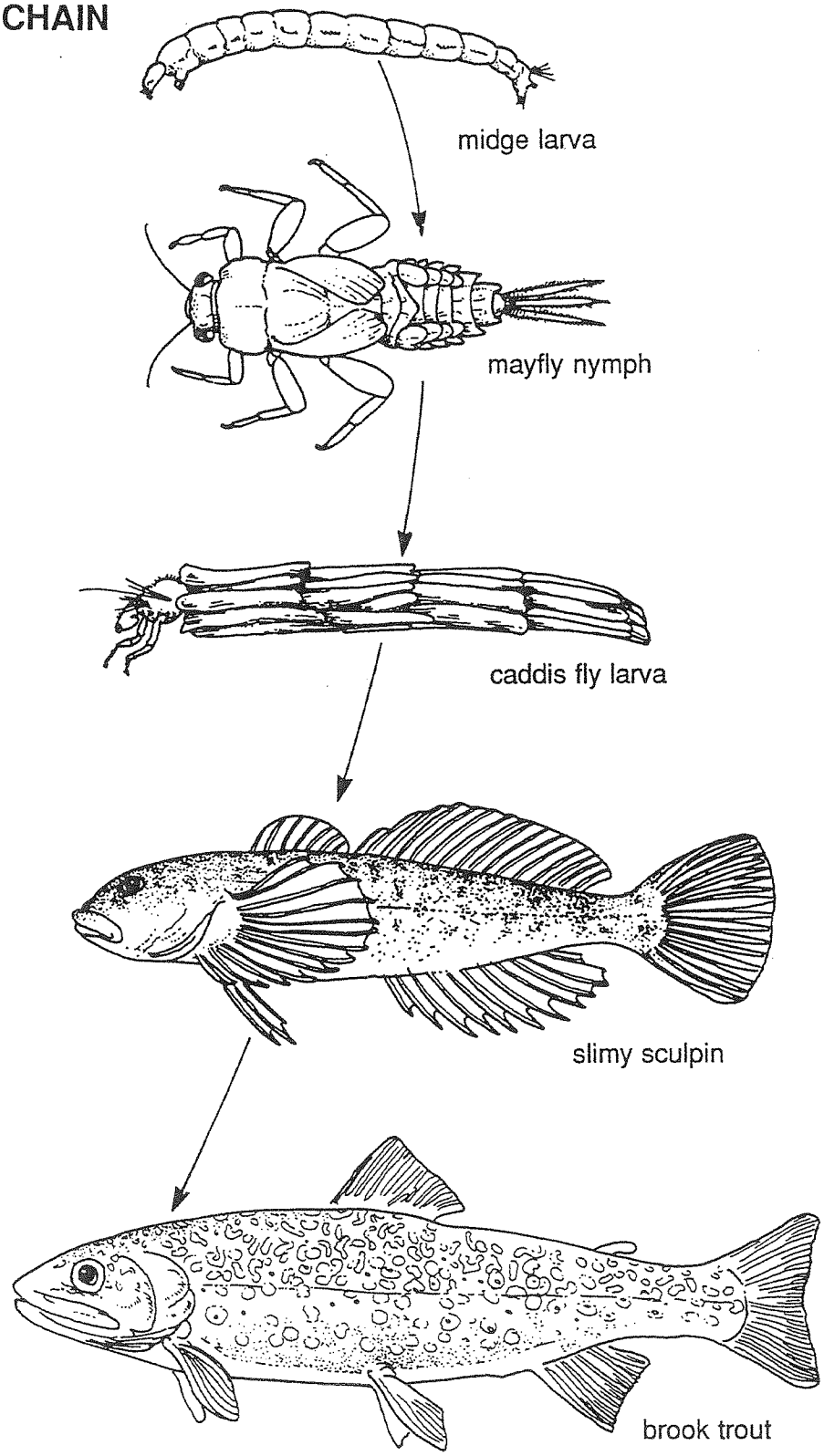
Resource Sheets 1a-1e: Food Chain Cards
Resource Sheet 2 (optional)**:** Habitat Clue Cards

Leader Resource Sheet 1: Coldwater Food Chain
Leader Resource Sheet 2: Warmwater Food Chain
Leader Resource Sheet 3: Deepwater Food Chain

TEACHER RESOURCE SHEET 1

Guess Who's Coming to Dinner?

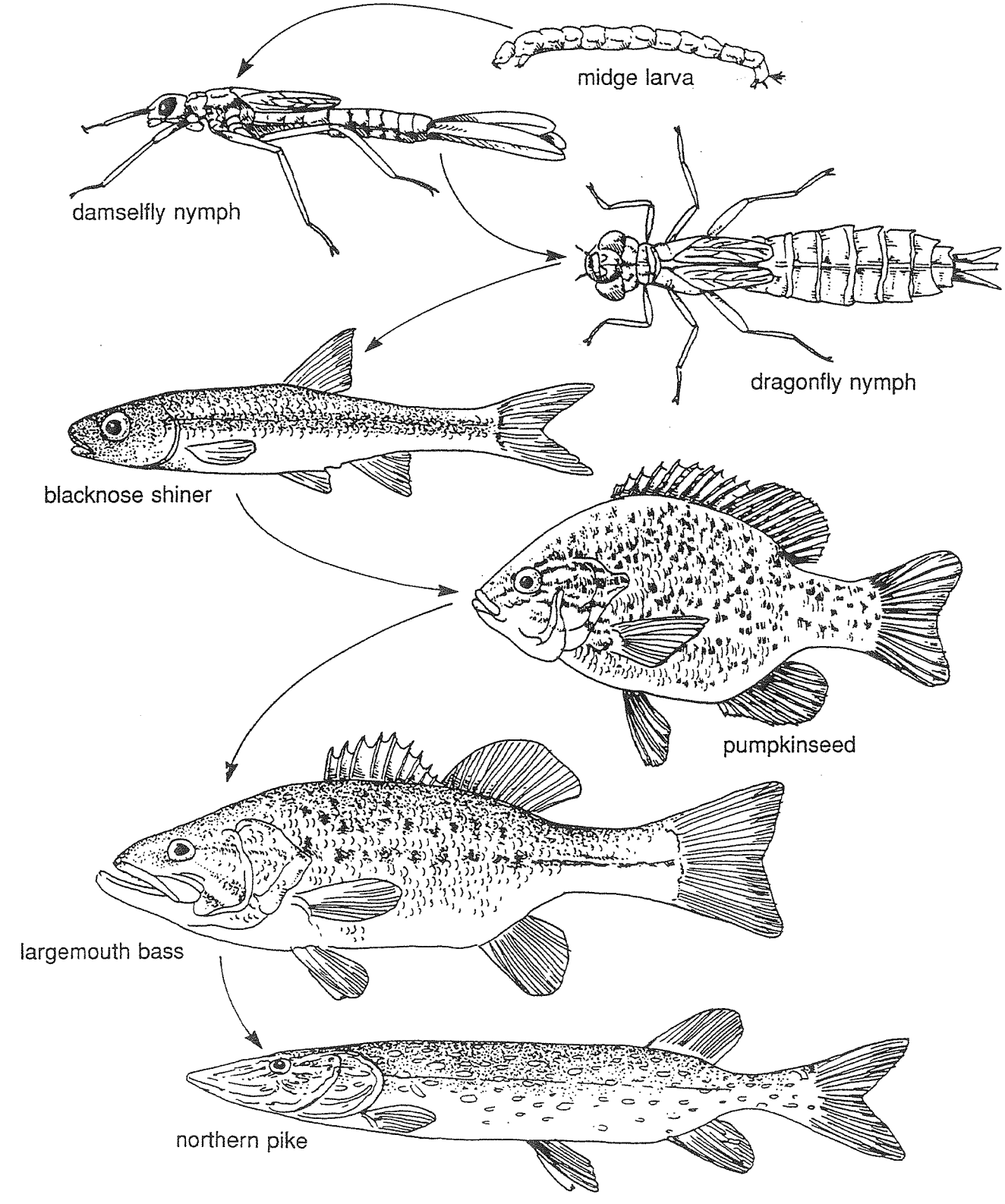
COLD-WATER FOOD CHAIN



TEACHER RESOURCE SHEET 2

Guess Who's Coming to Dinner?

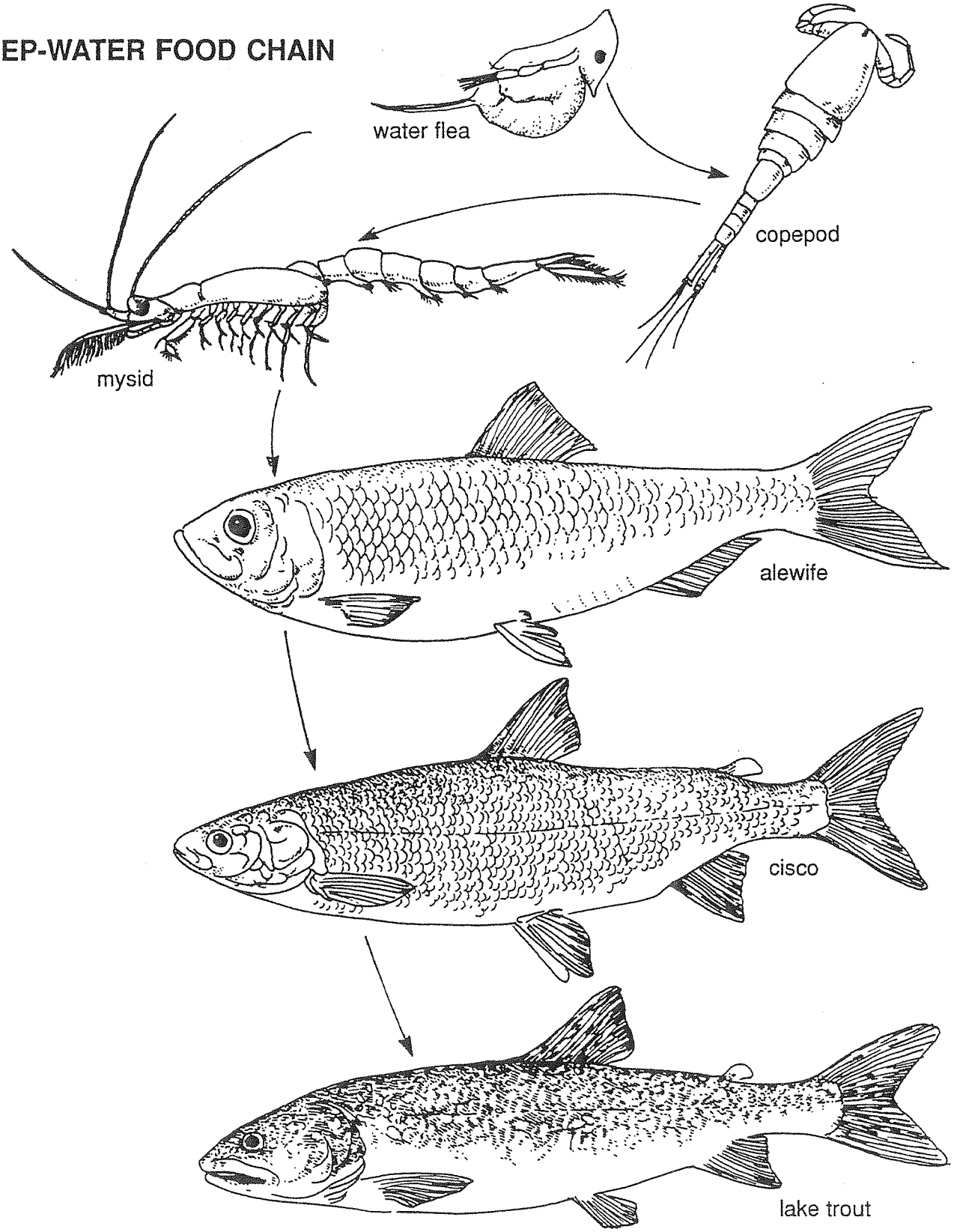
WARM-WATER FOOD CHAIN



TEACHER RESOURCE SHEET 3

Guess Who's Coming to Dinner?

DEEP-WATER FOOD CHAIN

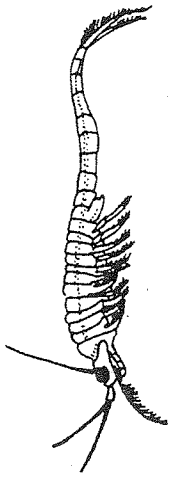


STUDENT WORKSHEET 1A-1

Guess Who's Coming to Dinner?

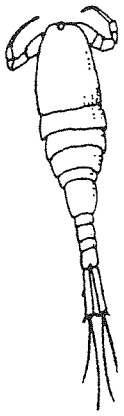
DEEP-WATER FOOD CHAIN CARDS

Mysid



Watch out for:

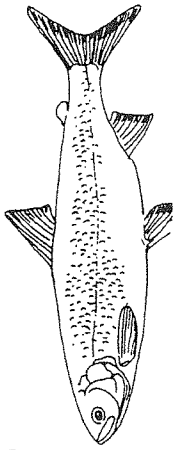
I am: Copepod



I eat:

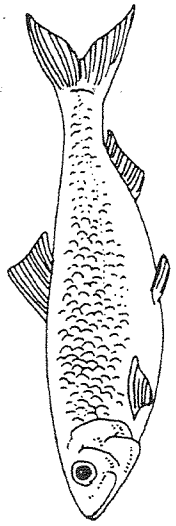
Water flea

Cisco



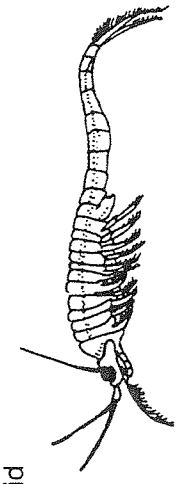
Watch out for:

I am: Alewife

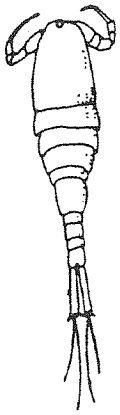


I eat:

Mysid



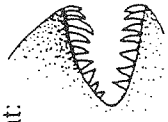
Copepod



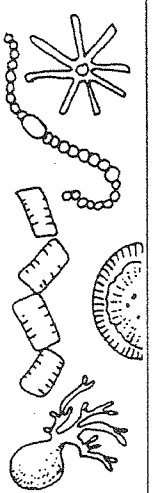
Watch out for:

I am: Water flea

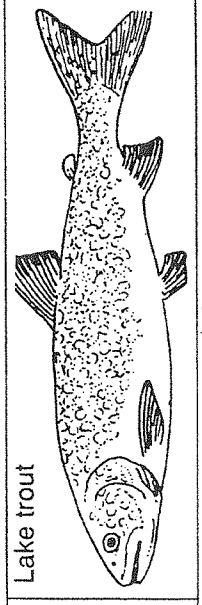
I eat:



Phytoplankton

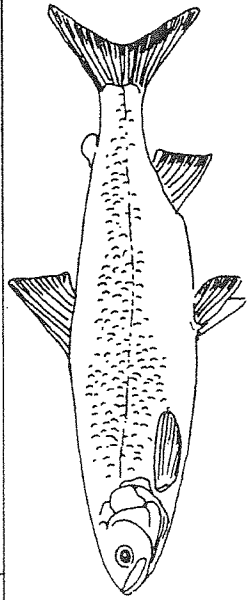


Lake trout

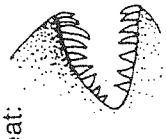


Watch out for:

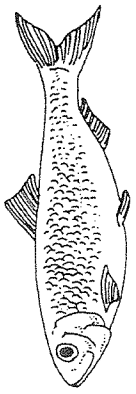
I am: Cisco



I eat:



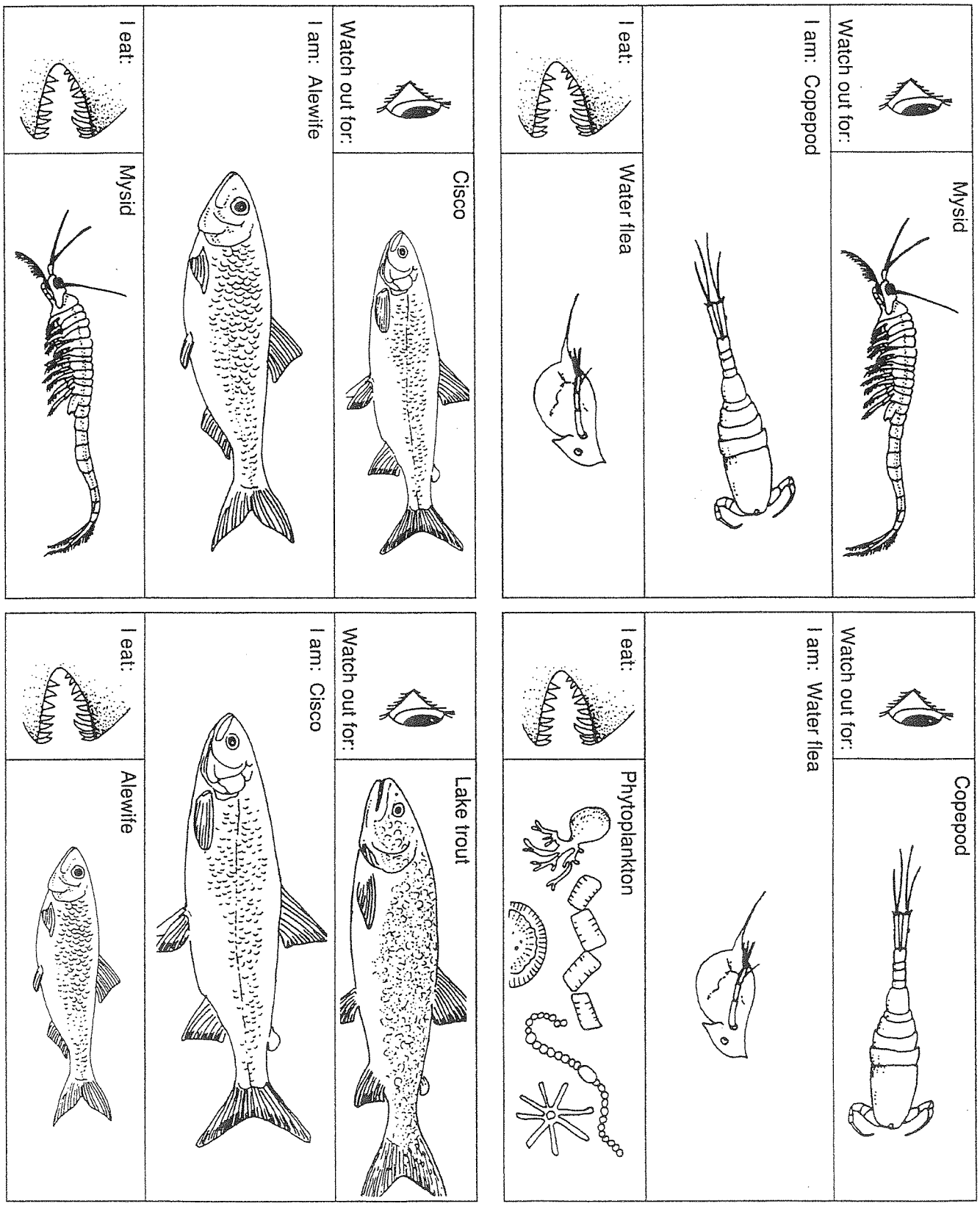
Alewife



STUDENT WORKSHEET 1A-2

Guess Who's Coming to Dinner?

DEEP-WATER FOOD CHAIN CARDS



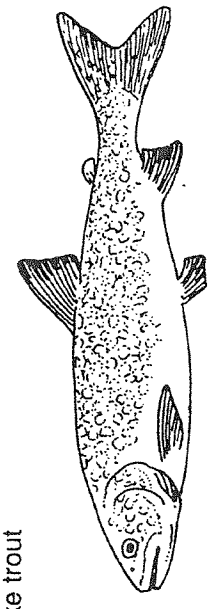
STUDENT WORKSHEET 1B-1

Guess Who's Coming to Dinner?

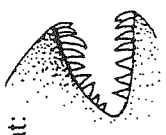
DEEP-WATER/COLD-WATER FOOD CHAIN CARDS

Watch out for:

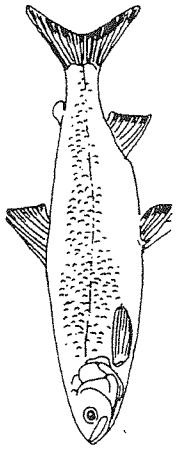
I am: Lake trout



I eat:



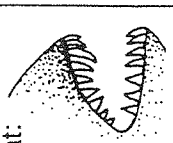
Cisco



Watch out for:

I am: Midge larva

I eat:

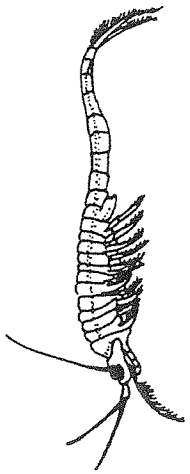


Plants

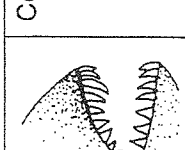
Mayfly nymph

Watch out for:

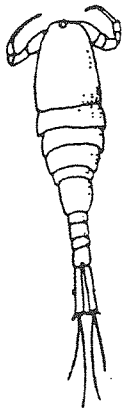
I am: Mysid



I eat:

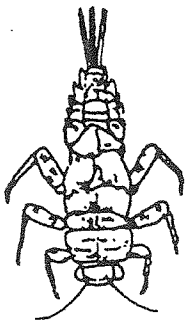


Copepod

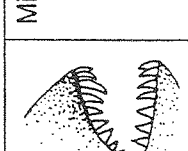


Watch out for:

I am: Mayfly nymph



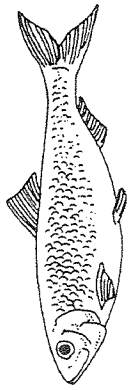
I eat:



Midge larva

Caddis fly larva

Alewife

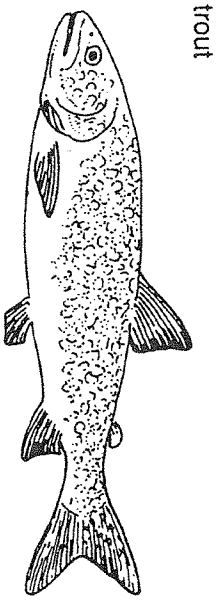


STUDENT WORKSHEET 1B-2

Guess Who's Coming to Dinner?

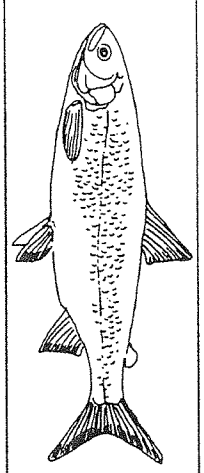
DEEP-WATER/COLD-WATER FOOD CHAIN CARDS

I am: Lake trout



Watch out for:

I eat:



Cisco

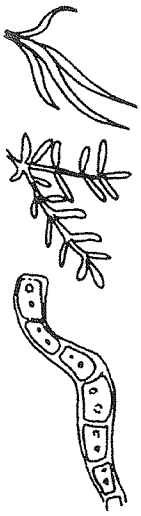
I am: Midge larva

Watch out for:

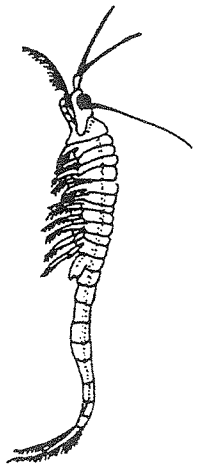
Mayfly nymph

I eat:

Plants

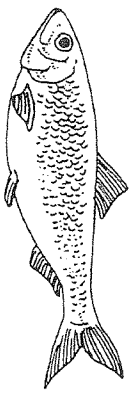


I am: Mysid

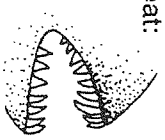


Watch out for:

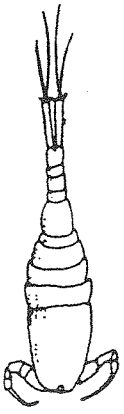
Alewife



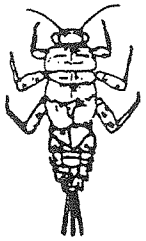
I eat:



Copepod



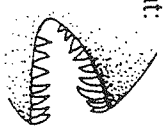
I am: Mayfly nymph



Watch out for:

Caddis fly larva

I eat:



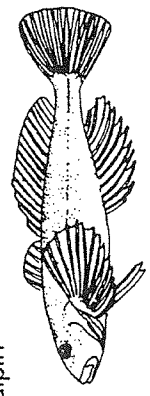
Midge larva

STUDENT WORKSHEET 1C-1

Guess Who's Coming to Dinner?

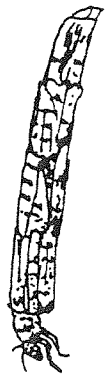
COLD-WATER/WARM-WATER FOOD CHAIN CARDS

Slimy sculpin

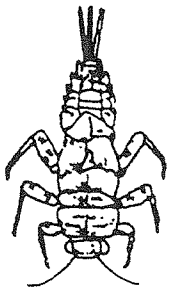


Watch out for:

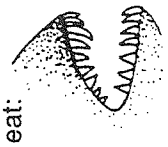
I am: Caddis fly larva



Mayfly nymph

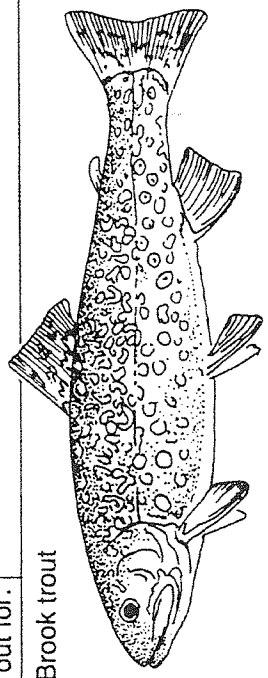


I eat:

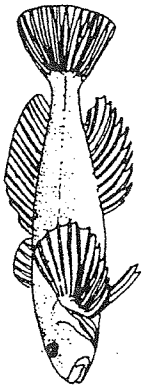


Watch out for:

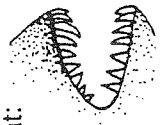
I am: Brook trout



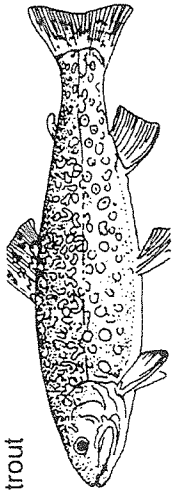
Slimy sculpin



I eat:

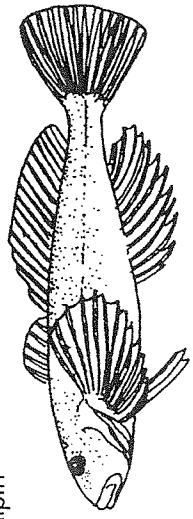


Brook trout



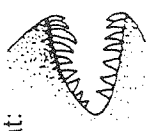
Watch out for:

I am: Slimy sculpin

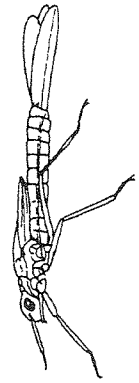


Caddis fly larva

I eat:



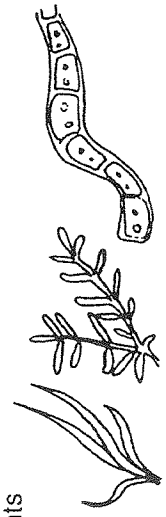
Damselfly nymph



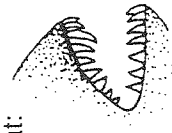
Watch out for:

I am: Midge larva

Plants



I eat:



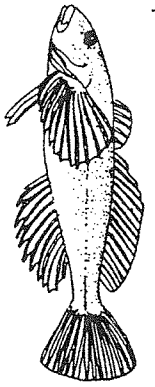
STUDENT WORKSHEET 1C-2

Guess Who's Coming to Dinner?

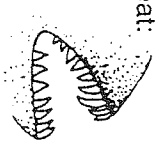
COLD-WATER/WARM-WATER FOOD CHAIN CARDS

Watch out for:

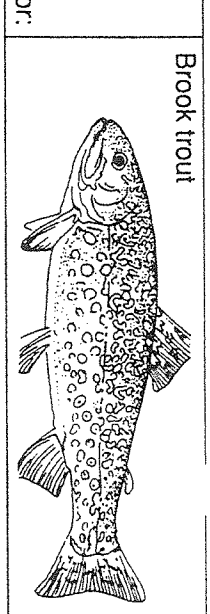
I am: Slimy sculpin



I eat:

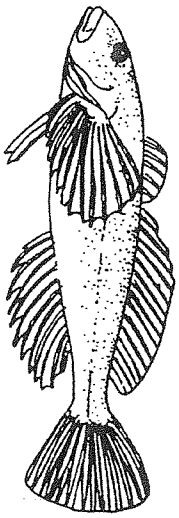


Brook trout

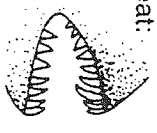


Watch out for:

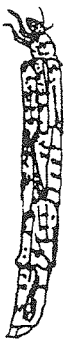
I am: Slimy sculpin



I eat:



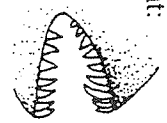
Caddis fly larva



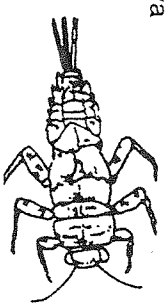
Watch out for:

I am: Caddis fly larva

I eat:

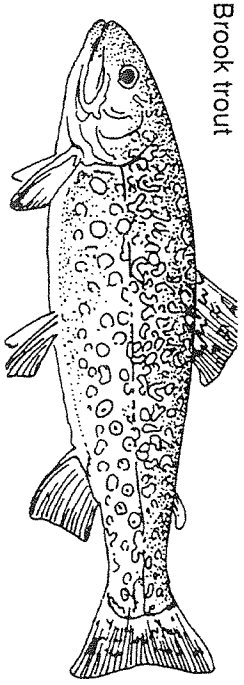


Mayfly larva



Watch out for:

I am: Brook trout



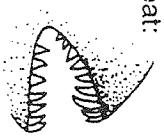
I eat:

Slimy sculpin

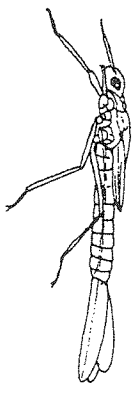
Watch out for:

I am: Midge larva

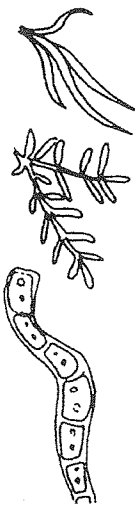
I eat:



Nymph larva



Plants

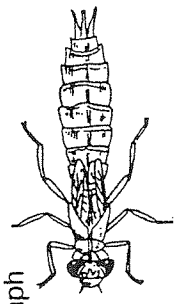


STUDENT WORKSHEET 1D-1

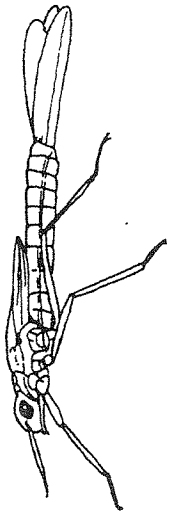
Guess Who's Coming to Dinner?

WARM-WATER FOOD CHAIN CARDS

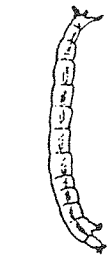
Watch out for: Dragonfly nymph

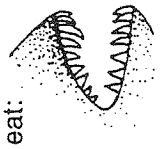


I am: Damselfly nymph

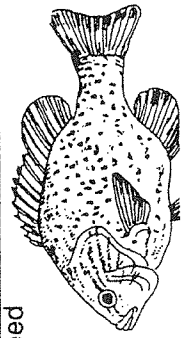


I eat: Midge larva

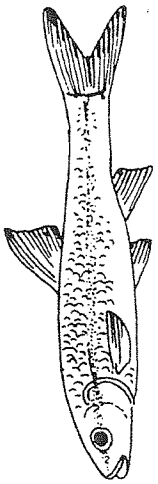




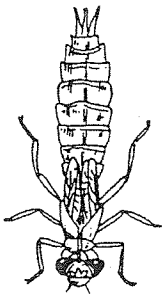
Watch out for: Pumpkinseed

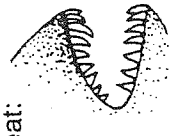


I am: Blacknose shiner

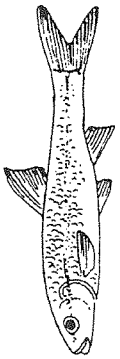


I eat: Dragonfly nymph

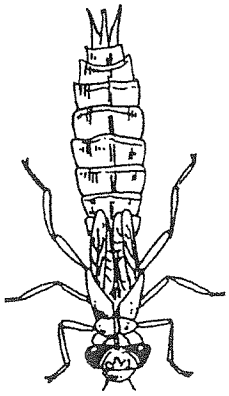




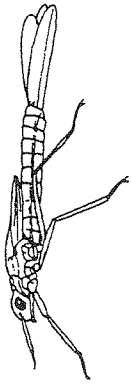
Watch out for: Blacknose shiner

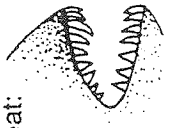


I am: Dragonfly nymph

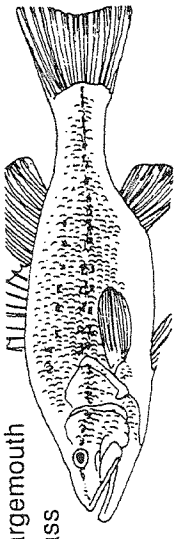


I eat: Damselfly nymph

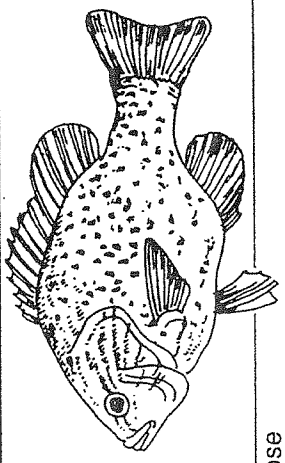




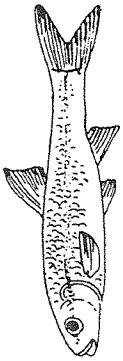
Watch out for: Largemouth bass

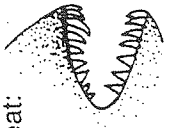


I am: Pumpkinseed



I eat: Blacknose shiner



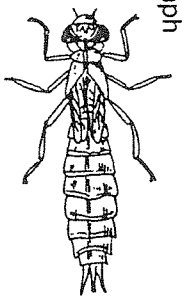


STUDENT WORKSHEET 1D-2

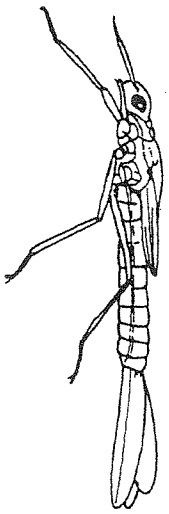
Guess Who's Coming to Dinner?

WARM-WATER FOOD CHAIN CARDS

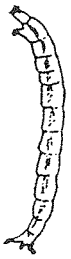
Watch out for: Dragonfly nymph



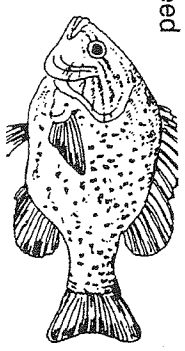
I am: Damselfly nymph



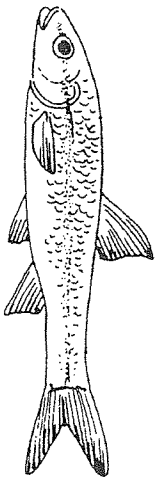
I eat: Midge larva



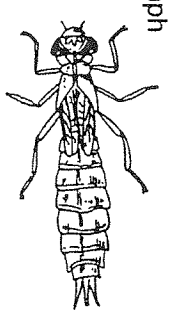
Watch out for: Pumpkinseed



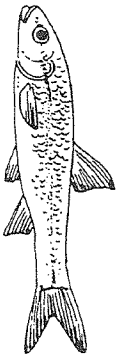
I am: Blacknose shiner



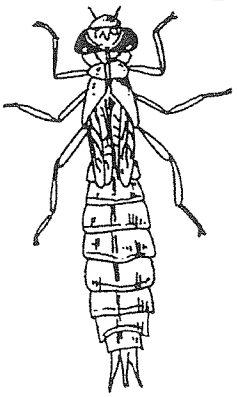
I eat: Dragonfly nymph



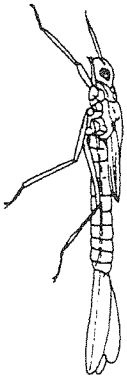
Watch out for: Blacknose shiner



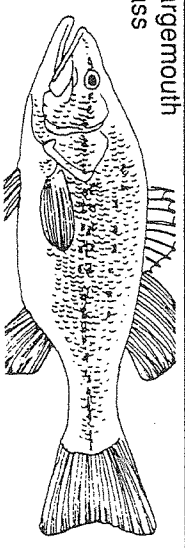
I am: Dragonfly nymph



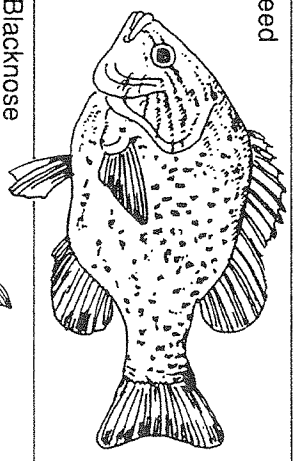
I eat: Damselfly nymph



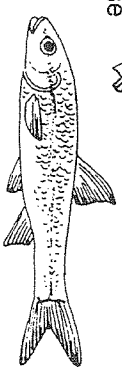
Watch out for: Largemouth bass



I am: Pumpkinseed



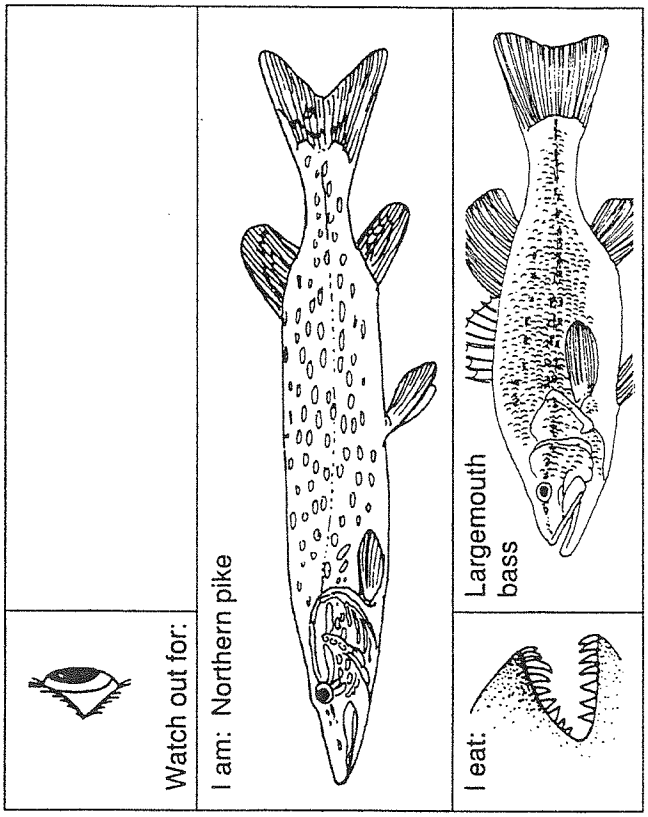
I eat: Blacknose shiner

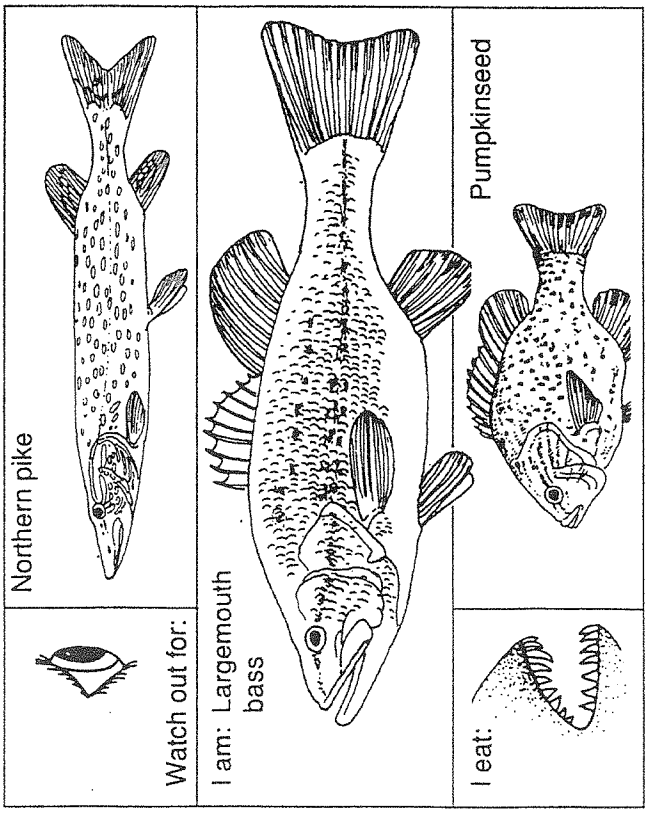


STUDENT WORKSHEET 1E-1

Guess Who's Coming to Dinner?

WARM-WATER FOOD CHAIN CARDS



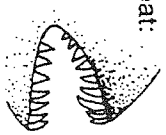


STUDENT WORKSHEET 1E-2

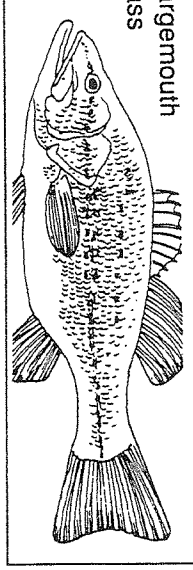
Guess Who's Coming to Dinner?

WARM-WATER FOOD CHAIN CARDS

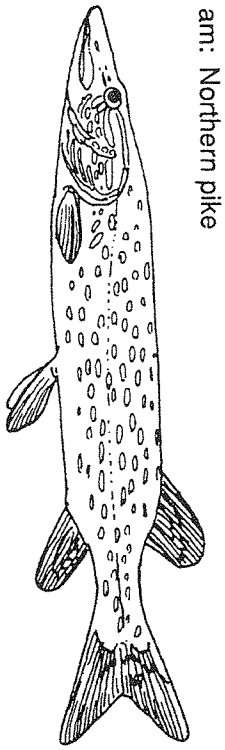
I eat:



Largemouth bass

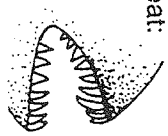


I am: Northern pike

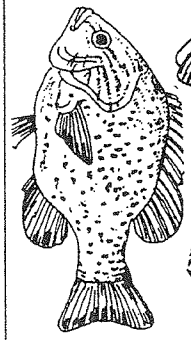


Watch out for:

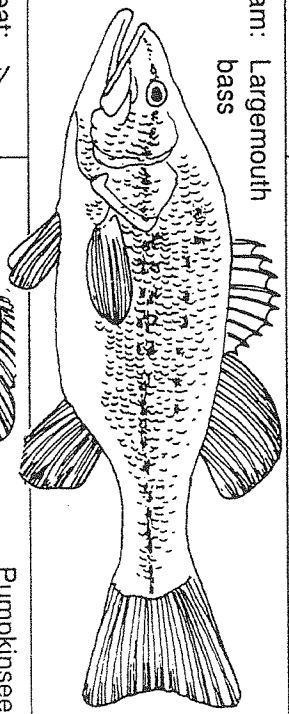
I eat:



Pumpkinseed

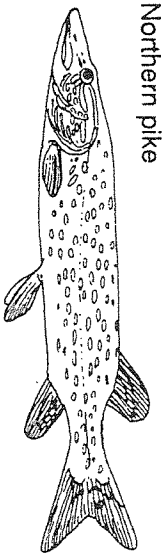


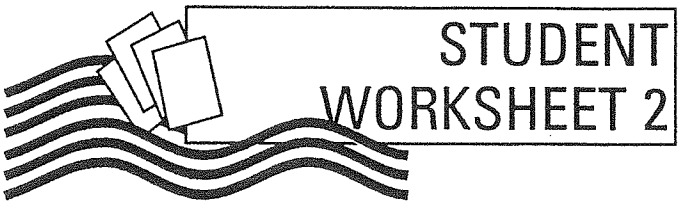
I am: Largemouth bass



Watch out for:

Northern pike





STUDENT WORKSHEET 2

Guess Who's Coming to Dinner?

HABITAT CLUE CARDS

Deep-water:

Lake trout:	I like to stay in cold water (below 10°C).
Ciscoe:	I stay pretty deep most of the time.
Alewife:	I need lots of room for my large schools.
Mysid:	I go deep during the day and come up near the surface at night.
Copepod:	I can swim, but I'm so tiny I get pushed around when the wind and sun make the water move.
Water flea:	I eat tiny floating plants that can grow far from shore.

Cold-water:

Speckled (brook) trout: I like clear, cool water (24°C and below).

Slimy sculpin:	I slither along the bottom over pebbles and rocks.
Caddis fly larva:	I crawl around and catch insects for food. Some of my cousins spin nets, and catch bits of food that float by in the strong current.
Mayfly nymph:	My strong, hooked legs let me hang on tight to rocks and plants.
Midge larva:	I can even be found in splashing, bubbly water, down in the cracks between rocks.

Warm-water:

Northern pike:	I like to hide and then dash out quickly to catch my food.
Largemouth bass:	I like to be pretty close to the surface.
Pumpkinseed:	Like you, I don't like to be cold in the summer.
Blacknose shiner:	I like clear, quiet water and get pretty nervous out in the open.
Dragonfly nymph:	I don't like strong currents.
Damselfly nymph:	I'll crawl around on plants to catch my food.
Midge larva:	I eat plants and will eat my way into them to hide.