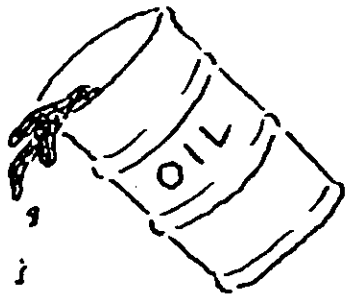
Oil Spill!!

Grades 4-5



Overview

The students will observe the effect bubble gum has on oil floating on water. They will do an experiment with water and oil to see what technique works best for cleaning up oil spills.

Objectives

- To help students understand the impact oil spills have on the environment.
- To help students understand what methods work best in cleaning up oil spills.
- To help students understand different methods for cleaning up oil spills.

Materials

For the presenter:

- chalkboard
- water
- chunk style bubble gum
- aluminum pie pan
- household machine oil (3-in-1 oil)
- toothpicks
- freezer
- a fine cheese grater

For each group of 4 students:

- an aluminum pie pan
- 10 inches of twine
- a handful of sand
- paper towel
- liquid detergent
- an eye dropper
- newspaper
- water
- a few drops of oil
- a tub to hold material for the group

Getting Ready

Activity 1

Fill a pie plate half full of water. Grate one piece of frozen bubble gum on to a paper plate. Place the water, oil, gum and the tooth picks on a table where everyone will be able to stand around.

Activity 2

Write the word ***Oil Spill*** on the chalkboard. Put the materials for each group in a tub. Have water ready in a pitcher for filling pans and a dropper for the oil.

Background Information

Oil, a major source of energy, is a very important natural resource. Oil is used as fuel for transportation, industry and heating. Petroleum or oil is also used in the manufacturing of different materials like plastic, detergents, paints, insecticides and even some medicines.

Land and water are both affected by oil spills. Fish, aquatic plants and other animals that live by water can be harmed by oil spilled on water. Ground water, lakes and streams, that are used as a source of drinking water, can be contaminated by an oil spill on land.

The largest oil spill in the United States was on March 24, 1989, the oil tanker ***Exxon Valdez*** struck a reef and spilled over a quarter of a million barrels of crude oil in Valdez, Alaska.

Nature will begin to clean up the moment an oil spill occurs. The oil separates into heavier and lighter parts which are then spread by winds and currents. Some of it evaporates and some of it is consumed by bacteria. People can help speed the natural processes and help reduce the environmental impact on wildlife. Success in cleaning up oil spills depends on quick action and being prepared.

There are a number of techniques used to clean up oil spills. One involves surrounding the spill with a boom. This is like a floating fence that surrounds the spill, and then uses pumps to remove the oil from the surface of the water. Another technique is using a special detergent called a dispersant. Oil breaks up into tiny droplets that mix with water when it is sprayed with a dispersant. Burning the oil on the surface of the water and soaking the oil up with oil-absorbing materials are two other techniques that are used to clean up oil spills. Avoiding an oil spill, of course, is best for the environment.

Activity 1

Explain to the student that you are going to do an experiment and you would like them to observe what happens. Have the students stand around the table where everyone will be able to see.

1. Begin by showing the students a can of oil and the pie plate of water, tell them a large truck just dumped a load of oil into the river.
2. Carefully drip 10 drops of household machine oil on the surface of the water.
3. If necessary, use the toothpick to move the oil into one big drop.
4. Take the frozen grated gum and sprinkle it over the oil.
5. Ask: "What do you think the gum will do to the oil?"
6. Use the toothpick to move around the gum covered oil.
7. Ask: "Does the grated gum dissolve in the water?"
8. Try and pick up the oil covered gum with 2 tooth picks.
9. Ask: "Was I able to clean up the oil using gum?"

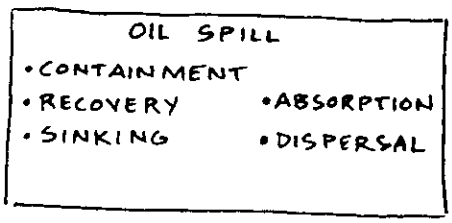
Use the information below to explain why the gum absorbed the oil. You should notice that the gum mixes with and soaks up the oil. A material containing an ingredient similar to the gum in bubble gum has been developed for soaking up oil spills in the ocean. When it is spread over an oil spill, the fine powder quickly dissolves in the oil and makes the oil stick together. It can then be removed from the surface of the water by a pump.

After this discussion have students return to their desks.

Activity 2

Questions

"What is an oil spill?" Refer to the words ***Oil Spill*** on the chalk board "Have you ever heard of the ***Exxon Valdez***? What happened? How did it affect the plants and fish in the ocean? Do you think it could also affect animals that live near the water? Do you know how oil spills are cleaned up?" Write the students' ideas on the chalkboard. Share with them other methods that are used to clean up oil spills: ***Containment*** (using a boom to encircle it); ***recovery*** (using a pump to remove the oil;, ***removal by sinking*** (using sand or another substance to make the oil sink to the bottom), ***removal by absorption*** (using oil-absorbing material to soak up the oil) and ***dispersal*** (using a detergent that breaks up the oil into tiny droplets that mix with water). List the techniques for cleaning up oil spills on the board.



Tell the students that they are going to do an experiment to see which technique works the best for cleaning up an oil spill. Explain that an oil tanker has just sprung an oil leak in the Pacific Ocean. Their group's responsibility is to clean up the pollution with as little damage as possible to the environment. Show them the ocean - a pie pan with water and two drops of oil. Show the students the twine, eye dropper, paper towel and sand. Describe for them the various techniques that are available to clean up the oil spill: eye dropper ***(recovery)***, sand ***(sinking)***, paper towel ***(absorption)***, detergent ***(dispersa)l,*** & twine ***(containment)***

Have the students cover their desks with the newspaper Hand each group a tub of material. Fill their pie plates about 1/2 full of water and add 2 drops of oil. As the students experiment with different methods of cleaning up the oil, walk around the classroom and ask the students what they are observing.

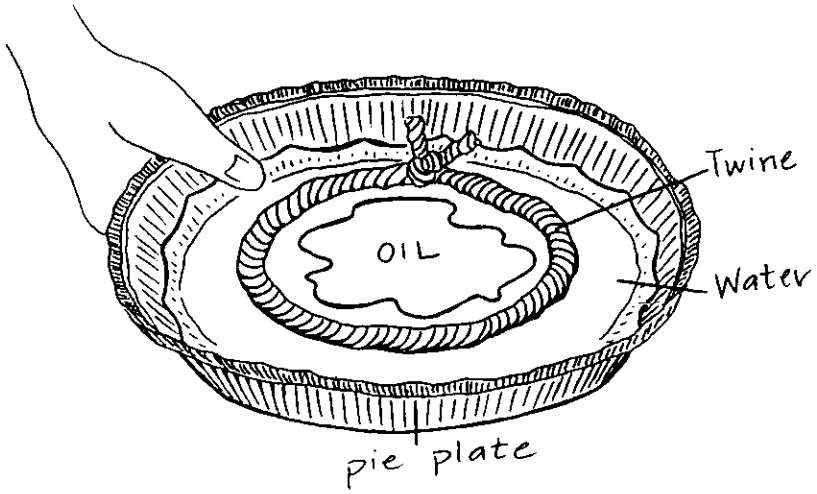
When all the groups have had a chance to experiment with the different techniques, discuss the advantages and disadvantages of each method. Ask: "Do all the methods actually remove the oil from the environment or do some just remove it from sight?"

Closure

Tell the groups to discuss oil spills and come up with three reasons why it is important to prevent them. When the groups are ready, have them share their ideas with the class.

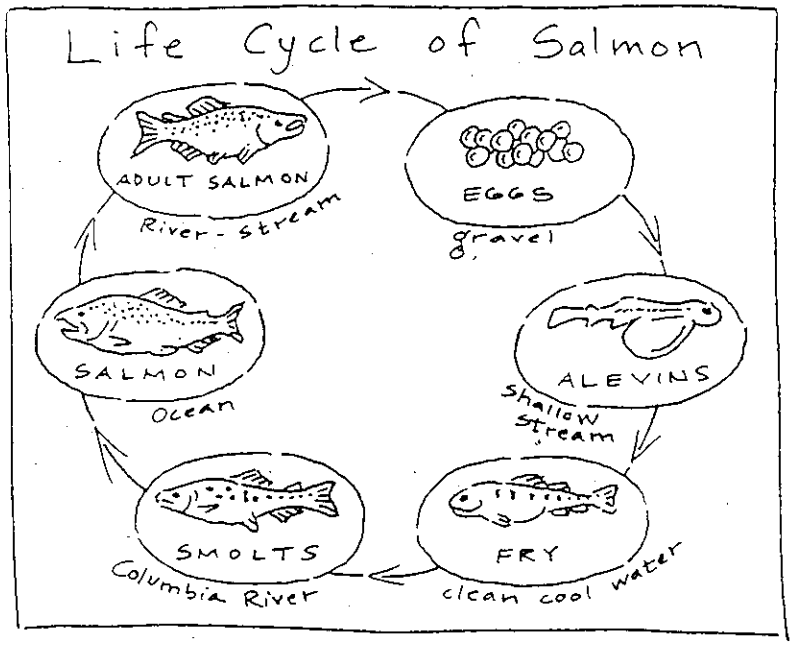
Clean up

Have students put all their materials back in the tub. They should pour the water and oil in a bucket and not down the sink. Tell them how you plan to dispose of the liquid in the bucket.



SALMON LIFE CYCLE

Grades 4-6



Overview

The students read a handout on the salmon's life cycle; they discuss the characteristics of the salmon and its habitat for each stage. The class plays a "salmon cycle game." Each group of students has a set of salmon pictures representing each cycle stage. The teacher will read a description of one stage without giving the name of the salmon at that stage. The teacher asks every student to quietly point to the picture that represents that stage. There is time for quiet clarification should students disagree in their group. When the teacher signals, each group holds up only one picture. The students discuss what the correct stage is, and the teacher awards points to the groups with the correct picture. The class ends with the students creating a salmon cycle booklet.

Objectives

- Students will be able to identify the salmon's appearance, needs and habitat for each stage of the salmon's cycle.
- Students will be able to identify five to seven things they can do to save salmon.
- Students will be able to name the five types of salmon.

Materials

For the presenter:

- an overhead projector
- a transparency of the ***Life Cycle of Chinook Salmon***
- an information handout of the Salmon Life Cycle which describes each stage
- a set of salmon pictures (8 pictures total)
- directions for making the booklet
- a sample booklet
- the poster: ***A Salmon's Story: The Journey of the Oncorhynchus***, available from BPA Public Information Center
- a copy of the handout *"Seven Ways to Save the Pacific Northwest Salmon"*

For the students:

- an information handout of the Salmon Life Cycle which describes each stage
- a set of salmon pictures for each group
- a booklet page for each student (attached)
- the booklet directions (attached)
- a copy of the handout *"Seven Ways to Save the Pacific NorthwestSalmon"* (attached)
- dictionaries

Vocabulary

Anadromous: to migrate from seawater to fresh water to spawn
Migrate: to move seasonally from one region to another
Spawn: to deposit eggs directly into water

Getting Ready

Make copies of salmon pictures, booklet page and directions, and two handouts. Set out all the materials on a table for easy assess for both the teacher and the students. Make overhead transparencies of the salmonids diagram and ***The Life Cycle of Salmon***.

Procedures

1. ***Focus:*** Explain as human beings grow and change in appearance and age, we are given different names. Ask the class: "What a human being is called when it is first born? ***(Baby)*** What common term is given to a child when they are first learning to walk? ***(Toddler)*** What are individuals called who are in between the ages of thirteen to nineteen? ***(Teenager)*** What is a person called who is twenty-one years old or older?" ***(Adult)*** Just as the human being's form and name changes in its life cycle from a baby to an adult, so too the salmon's appearance and names change in its life cycle.

2. Share the objectives with the class.

3. Give the handout of ***The Salmon Life Cycle*** to the students. (See attached)

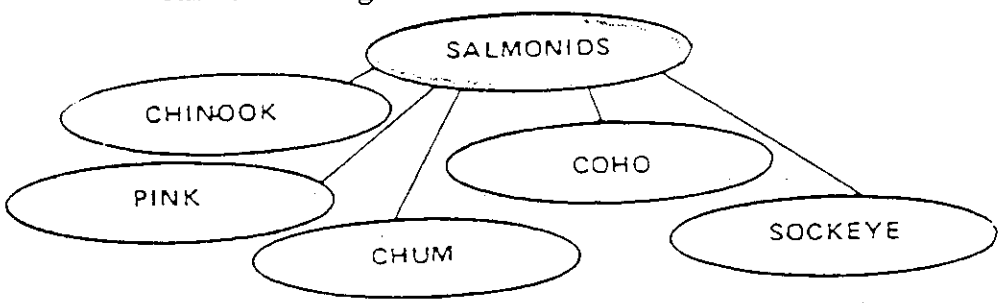
4. The teacher shows the salmon life cycle transparency to the class while giving the following directions. "All of us are going to take an imaginary journey with the salmon to learn about each stage of their life cycle. You will want to listen carefully to the description of each stage because later you are going to be playing a game which challenges your memory of each stage. Also, you will to be illustrate a booklet in which you will draw the salmon, its habitat, and events for each stage; so visualize each stage, see the salmon and its surroundings in clear detail. We are going to stop at the end of each stage and discuss what is characteristic about the salmon and its habitat, but before we do this we need to look up some terms in the dictionary."

5. The students look up the vocabulary words: ***anadromous, migrate,*** and ***spawn.*** Write the words and their definitions on the blackboard or a transparency as the students agree on them.

6. The teacher and the students take turns reading and discussing each stage.

The teacher explains that the term salmon is a name given to a group of fish within a large group of fish called "salmonidae", or salmonids. The teacher draws the *salmonids diagram* (see attached diagram) on the overhead or makes *salmonids diagram* into an overhead transparency.

Salmonids Diagram



7. For extra credit a few students can look up the five salmon and research them giving an illustrated report to the class. They should explain why they are/aren't anadromous.

8. The students play the Salmon Cycle Game. The teacher passes out the pictures to each group, and then explains how the game is played to the students using the following instructions. "Each one of you in your groups has a number, and I am going to give you your numbers right now. (If there are four students to a group, the teacher gives each student a number 1-4.) I will describe one stage in the salmon's life. Each group will quietly discuss which picture they should hold up. Speak quietly with your heads together so the other groups will not hear you. When I say, *"number,"* I will pause and all of you must be quiet. If a group talks about anything, after I call out, *"number"* then that group can't get any points even if the student holds up the correct picture. After my pause, I will call a number out, and the student at each group with that number, without help from their group, stands and holds up the picture of the salmon that matches the stage. If the group helps the student select a picture after I call out the number, the group will not receive any points. When you stand, hold the picture facing your chest so other groups can't see it. (The teacher demonstrates how to hold the picture.) Once students select a picture, they can't change their minds. After I call the number, I will count to five out loud; if a student isn't standing with a picture by the time I say five, that group will not get any points. Next, I will say ***"show,"*** and all standing students turn their pictures so the whole class can see them. I then give points to each group with the correct picture, and the class politely discusses why a picture is or isn't correct.

9. We will have a couple of practices before we actually begin the game with "points." The teacher then runs through the procedure a couple of times so the students know how to play. The class plays the game.

Closure

The teacher passes out the booklet page and the booklet directions to each student. (See attached booklet directions) He explains how to fold each booklet page and waits for each child to follow the directions step by step. The students draw a picture and write one to three short sentences for each stage on each page.

Vocabulary

Anadromous: to migrate from seawater to fresh water to spawn
Migrate: to move seasonally from one region to another
Spawn: to deposit eggs directly into water

The Salmon Life Cycle

The Pacific salmon begin their lives in freshwater, later they migrate to the ocean, and eventually they return to freshwater to spawn and die. We are going to use our imagination to travel along with the salmon. Picture a 12 inch deep, cool, clear pool at the edge of a stream on Mount Hood. It is December and here is where the salmon life-cycle begins when eggs are deposited and fertilized in gravel bottom. Until they hatch, the cold (40° to 65° F) water flows through the gravel delivering oxygen and carrying away wastes. Hundreds of fertile eggs are protected from predators in their fish nests called ***redds***. The redds are made up of rocks arranged in a circle about two feet in diameter with gravel bottoms.

In late winter or spring, the eggs hatch. The young fish, about one inch long, are called **alevins.** They depend on the cold, well-oxygenated water for their survival and remain in the gravel for shelter. The alevins are fed from a yolk sac, an orange pouch on their bellies. When they are about three months old and their yolk sac is used up, the fish, now called ***fry***, are hungry as they emerge from the gravel in late spring or summer.

The fry of some species head directly for the ocean, but others stay in freshwater for a few months to a few years. Fry depend on stream side vegetation and the turbulent water at the head of their pool for cover. Their sides have dark bands or parr marks to camouflage them so their predators won't see them. They dart over the stream's rocks to snatch the small insects that live here. But as they swim into the stream looking for their food, they are open for attack from trout and other large fish. Out in the open stream, the young Chinook become prey for the wading blue heron and the beautiful blue birds called kingfishers.

One year later, the fish are about the length of a human finger and so are called ***fingerlings.*** Their parr marks have faded as they swim into Hood River's swift current. Once in the current they do not swim; they float downstream mainly at night to avoid predators. Their diet consists of flies, larger insects and worms.

Hood River flows into the Columbia River, and soon the salmon are in the reservoir created by Bonneville Dam. The electricity that light and heats many homes in Portland is made by the dam, but the fish don't like the reservoir. They are confused and uncomfortable for there isn't any current to indicate which direction to travel in and the water is warm. Chinook like cold water. They are watch out for the large warm water fish like bass and walleye, but they are not aware of the greater danger ahead. Dams produce power by shooting water past turbines, and even though the blades will most likely not hurt them, the fish fall about nine stories from the top of the dam to the bottom in a second's time. Some of the Chinook are seriously hurt, while others are just stunned yet become easy prey for the gulls and other birds ready to swoop down and snatch them.

When they are ready to migrate to the sea, they go through a physiological change, ***smoltification,*** which prepares them for their life in the salty sea. Now they are known as ***smolts.***

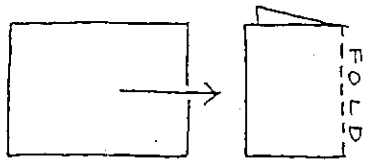
Some salmon never make it to the sea, for in their hunger they snatch at an insect only to be reeled in by a fisherman. Others swim on and where the river widens and has a salty taste, the salmon are in the Columbia River where it meets the Pacific Ocean. This area where the fresh water mixes with the salty sea is called an estuary.

Out in the sea, the fish the first year are small enough to swim through the fishing boat's net, but next year they might find themselves on the fishing boat's deck. Depending on the species, the salmon will spend up to five years in the sea feeding and growing before they are ready to make the return trip back to fresh water. There is the bright red *sockeye salmon*, the humpbacked *pink* salmon and *chum*, or dog, salmon. They show the wear and tear of their rugged journey; some even bear the wounds of the sea lion.

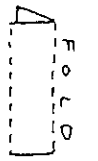
Now the salmon head for home. They return to spawn in the same stream where they hatched. It is not known for certain how they find their way back to the same stream; one theory is that they can smell or taste the water chemistry of their home stream. As soon as they enter fresh water, salmon stop feeding. The stored energy from living in the ocean carries them through their upriver journey. As they swim home, they avoid the warm water released by factories.

Now adult salmon up to four feet long, they return to their birth stream where they hatched. The female chooses a shallow spot in the shade where the water runs fresh, but not too rapid.

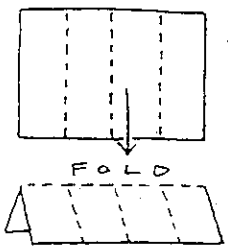
Booklet Directions:

1. 

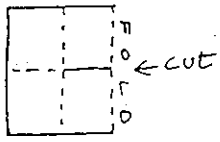
fold in half.

2. 

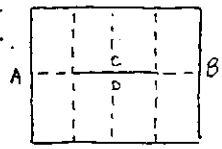
fold in half again.

3. 

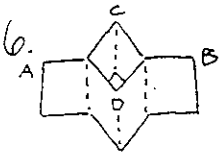
open up and fold.

4. 

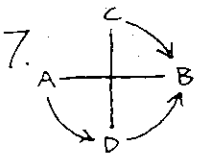
open, fold in half, and cut.

5. 

open up.

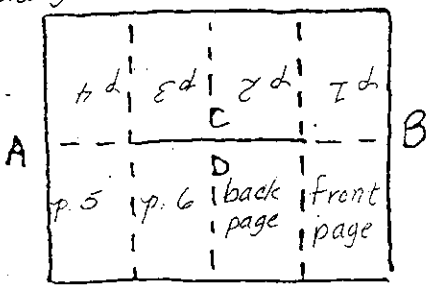
6. 

hold paper at A + B, fold paper down, push in.

7. 

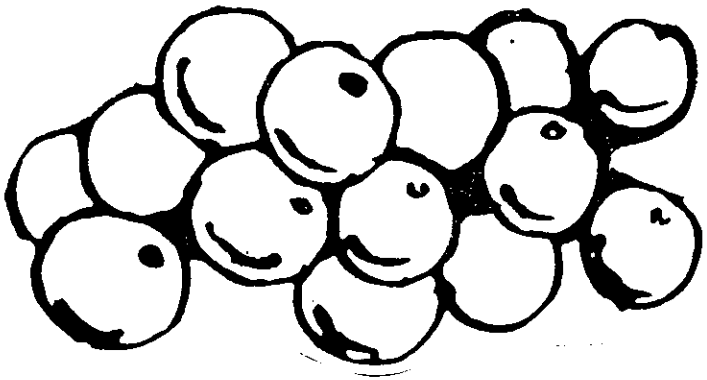
push in and fold.

Enlarged to see page #s

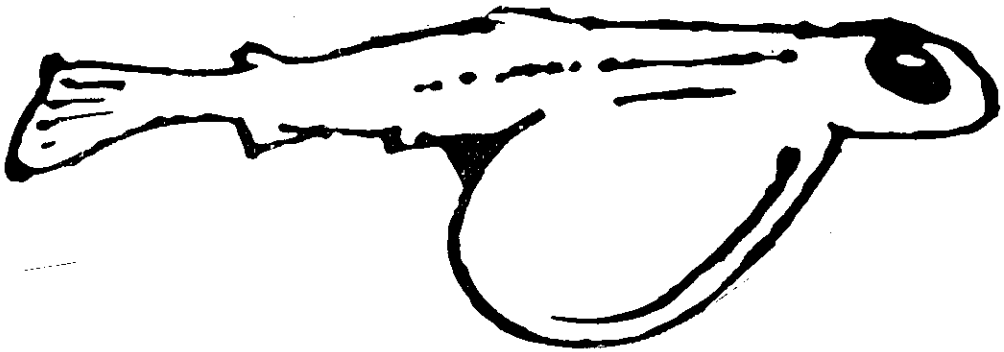
5. 

8. 

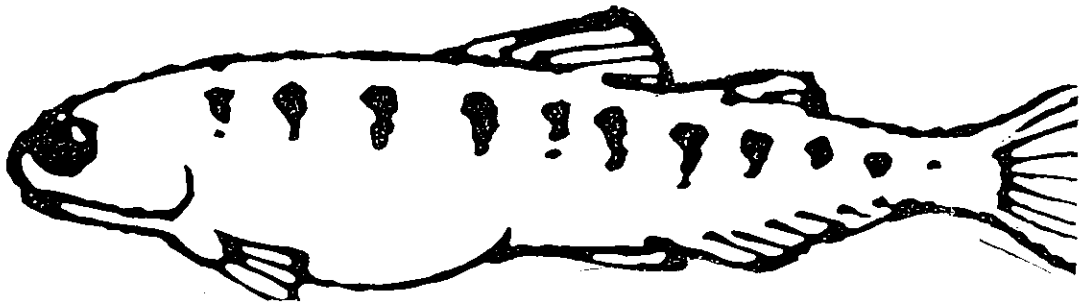
close page.



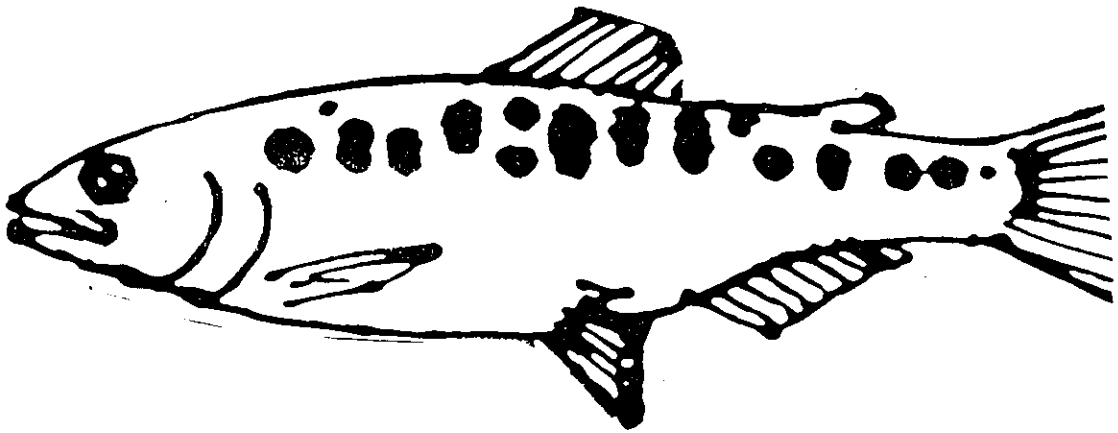
Eggs



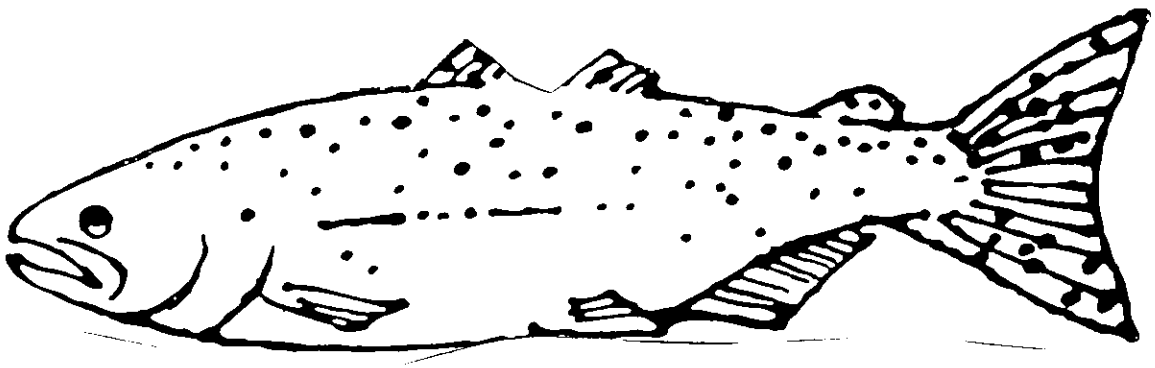
Alevin



Fry

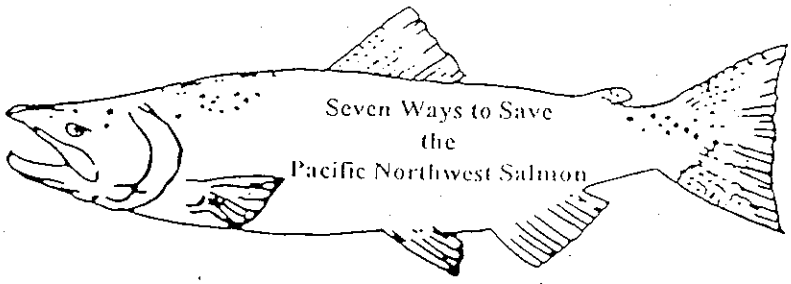


Smolt



Salmon

Adult Salmon



Following are seven examples of what each of us can do to help salmon.

1. **Conserve Water.**
   Use less at home to save more for fish!

2. **Do NOT dump any waste in streams or ditches.**
   Lawn grass, pet droppings, or trash in streams hurts fish and may spread disease.

3. **Do NOT pour anything into storm drains.**
   Storm drains lead to streams. Oil, gasoline and chemicals will kill fish.

4. **Use less chemicals.**
   Fertilizers, bug and weed killers, detergents and drain cleaners are all poisonous to fish and other wildlife.

5. **Use less electricity.**
   The Northwest uses rivers to make hydroelectric power which is our main source of electricity. Using less electricity leaves more water for fish in the rivers.

6. **Plant trees beside streams.**
   Salmon and trout need cool shady water to survive. Trees also stop erosion and provide more food for fish.

7. **Ask others to help.**
   Talk to other people about how to help streams and fish.

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June 1994
5M

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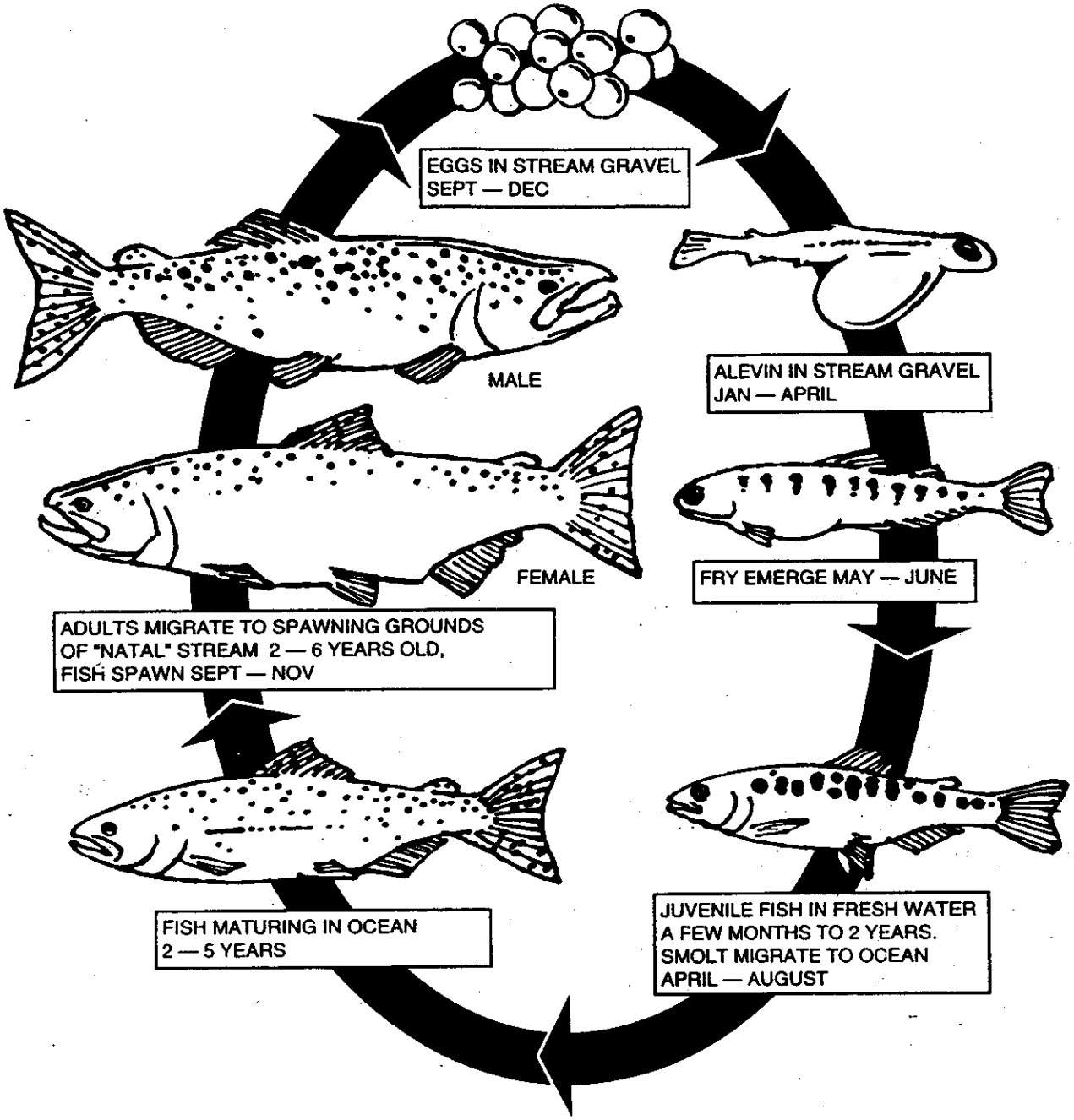


LIFE CYCLE OF CHINOOK SALMON

TERRARIUM

Grades 4-6

Note: The BPA volunteer needs to contact the teacher at least one week in advance so the teacher will have time to gather materials and to cut the two-liter bottles before the lesson.

Overview

Students identify their own basic needs in their habitat ***(home)***, food, water, shelter, and space. They then generalize that these needs or components of habitats are needed by all humans, animals, and even plants. They study the water cycle. Keeping these factors in mind, the students build a habitat for plants and insects in a terrarium that they make out of a two liter bottle. Using a science journal, they observe, take notes and draw the changes in the terrarium once a week.

Objectives

- The students will be able to identify the components of habitat: food, water, shelter and space.
- The students will be able to generalize that the components of habitat are needed by humans, animals, and plants.
- The students will be able to identify the key elements in the water cycle.
- The students will be able to identify and give at least one function for each of a plant's parts: leaves, roots, and stems.

Vocabulary

Photosynthesis: The process by which chlorophyll-containing cells in green plants convert light to chemical energy and release oxygen.

Terrarium: an enclosure where small plants or animals are kept.

Materials

For each group of 4 students:

- Science Journal for notes and art work
- clear plastic two-liter pop bottles or have one terrarium to a group, if the students sit in groups
- 4 scissors
- 4 plastic spoons
- 8 plants, 2 for each student or 2 per group (strawberry and mint plants work well)
- small rocks and pebbles
- bark pieces for decor
- potting soil, peat moss (and garden soil for the students who have earthworms)
- water
- 1 spray bottle (for students to share)
- 4 small earthworms: one per student (optional)
- leaves and grass clippings
- small slices of apples for the earthworms
- a small tub or container for distributing materials
- celery and food coloring for the plant experiment
- spring things (optional)
    - several stems and leaves containing aphids
    - ladybugs

Getting Ready

Have all materials on a table for students' easy assess. Cut the tops off the 2 liter bottles. Separate the dark colored bottom from the rest of the bottle. You may want to make a transparency of the background materials.

Procedures

Activity 1

Begin this lesson with the focus question below:

1. "If you had to stay inside your home for the rest of your life, think about 3 other things besides your shelter you must have to stay alive? Now some of you might be tempted to say my TV, or my computer game, etc., but realize long before these things were invented people were living in homes. "Assume that your home has sufficient air, heat and furnishings like dishes furniture, etc." "List 3 things you must have to stay alive." Give the students enough time to accomplish this. "Now share your list with your group." Each group needs to agree upon and make a list of the four most important things they need to stay alive.

2. Call on students for their answers and finally limit the list to food, water, shelter, and space. The students will probably not come up with space, but once you have the other three you can ask them if they could live in a three by three home.

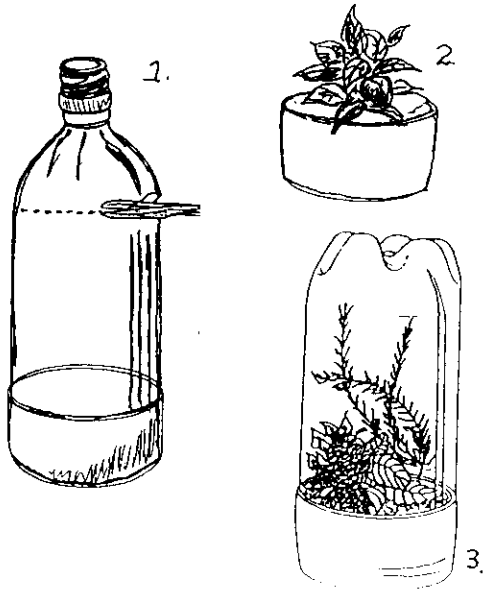
3. Tell the students that they are going to be making a terrarium. Observing this habitat, they will decide if plants and insects have the same basic needs as we do. But before they build their terrarium, they need some background knowledge. "We have listed our basic human needs. As I give you this background information be thinking about what are the plants' basic needs and how do these needs compare to ours? "Be ready to name the main parts of a plant and describe one function for each part."

Background

A well-established terrarium will require little maintenance because it sets up its own water cycle and climate. When the temperature in a terrarium increases, the ***water*** evaporates, and when the temperature decreases, the water condenses. The plants and insects continue to use the same water that was originally sprayed into the terrarium before it was sealed. The plants' green ***leaves*** contain chlorophyll, which help the leaves manufacture plant food in a process called photosynthesis. The plants' green leaves take in carbon dioxide from the air and absorb light from the sun, which aid in this process. The plants ***roots*** secure the plant in the ground and absorb minerals and water from the soil for plant growth. Certain plants' roots store food for the plant. ***Stems*** support and hold the leaves up so the leaves take in light and air. Some stems are used for storing food and water, and they contain numerous small tubes which carry water, food, and minerals to the plant's different parts. The plant needs ***space*** to either grow up or out to the sides.

Questions

"According to this information what are plants' basic needs?" Plants require space, sunlight, air, water, and some minerals to survive. Ask the students to name the main parts of a plant and give at least one function each part provides.



Steps for building the terrarium:

1. Hand out materials to the groups. They each will need a container of each of the materials. All the materials needed for 4 students go in a tub.
2. Place a layer of small rocks or pebbles in the bottom of the hard plastic base.
3. Add potting soil on top of the rock layer almost to the top of the base.
4. Using a plastic spoon, demonstrate for the students how to make small holes in the soil and carefully place the plants in the hole. Then gently, yet firmly they are to press the soil over the plants roots. (Two different plants make an interesting terrarium. If there are not enough plants for each child to have two plants, then have only one plant apiece.)
5. Have each student gently water his or her plants with the spray bottle.
6. Add some grass clipping, dried leaves, and one small earthworm.
7. They can add a few small interesting rocks and bark pieces.
8. Add the leaves with aphids and the ladybugs.
9. Turn the clear plastic bottle upside down and secure it inside the dark plastic base.
10. Add additional water to the terrariums if needed, but students are to strive for the correct amount so that the atmosphere is in balance.

Explain to the students that their plants need light, but they should not be placed in direct sunlight.

Activity 2 Plant Experiment

Place some celery in colored water. Ask the students to predict what they think will happen. Using their science journals, have them draw and color the celery as it appears when it is first placed in the colored water; and then draw and color a picture of it again at the end of the day or the next day. Ask the students what happened to the celery, and why did this happen? (The plant's inner tubes carry the colored water up through the stem to the leaves. The leaves take on the color of the colored water.)

Closure

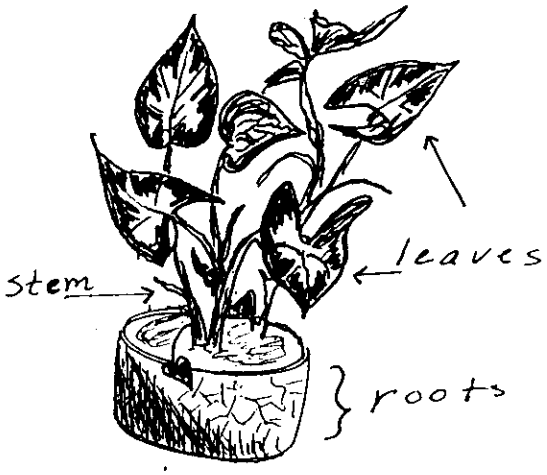
The students fill out the worksheet on terrariums. (see attached)

Clean Up

The classroom needs to be left just as it was.

Supplementary Activities

1. Have students journal daily or at least three times a week.
2. Show a film on photosynthesis and plants.
3. Have them draw a picture of their terrarium from the viewpoint of an earthworm.
4. Have a few students set up a habitat just for earthworms; this could be in a large plastic jar with alternating layers of garden soil or peat moss and sand. Potting soil is not recommended. The layers should be thick enough to be obvious and easy to observe. Having magnifying lenses nearby is important. Add grass, dead leaves, and some small slices of apple. Students can research and give a report on earthworms including a detailed drawing.
5. Some students could set up a ladybug habitat in a large clear plastic container. The students would place several leaves and stems covered with aphids inside it, add the ladybugs and cover the jar with a nylon stocking held in place with a rubber band. Mist the leaves daily with a gently spray bottle. Students can research and give a report to the class. Their report should include the following information: the female ladybug lays yellow or orange eggs on the stems or under the leaves of plants infested with aphids. In about two days, the eggs hatch into larvae that are 1/3 of an inch long, and the larvae eat the aphids. The larva eventually attaches itself to a leaf and becomes a pupa in five to seven days.



Terrariums **Name** _____ **Date** _____

Today on this date _____, I created a terrarium.

The plant or plants in my terrarium are

_____

_____

Other living things in my terrarium are

_____

_____

_____

The non living items in my terrarium are

_____

_____

Plants require the following to live:

_____

_____

Plant food is manufactured by a plant's green leaves, which contain chlorophyll and oxygen is given off in a process called

_____

Each part of a plant has important functions, and I will name one function for each part.

The plant's leaves

_____

_____

The plant's stem

_____

_____

The plant's roots

_____

_____

Challenge: After researching terrariums, I learned:

_____

_____

_____