Trout Life Cycle

Grade Level
3-12

Subject Areas
Language Arts, Science

Time
15-20 minutes

Vocabulary
adult, alevin, camouflage, egg, eyed egg, fingerling, fry, incubation, life cycle, milt, parr, parr marks, redd, sac fry, spawn, yolk sac

Summary

Students learn about the life cycle and development of trout.

Objectives

Students will...

- describe the life cycle of trout
- explain and write about the life cycle stages of trout
- identify the current life cycle stage of the class's trout

Materials

- copies of the *Wild Trout Life Cycle*
- copies of the *Hatchery Trout Life Cycle*, if desired
- copies of the *Trout Life Cycle* worksheet and/or the *Trout Life Cycle Maze*, one per student
- writing materials

Background

The typical life of a trout begins when eggs are deposited and fertilized in the gravel of a stream. Once fertilized, the eggs are covered by gravel which protects them from direct sunlight, strong river currents, and potential predators. After seven to 10 days, the head and body regions of the fish begin to form. The eggs are very fragile at this stage and any movement may prove fatal. About 30 to 90 days after fertilization, eyes begin to appear. This "eyed" stage means that the embryo is developing normally and is now able to withstand considerable movement. This is the stage at which you received your eggs. During incubation, the eggs are subject to many hazards such as disease, drought and flooding; many eggs do not make it through this vulnerable period.

As the fish continue to develop within their shells, it is believed that eventually the shells become limiting – the embryos cannot extract enough oxygen from surrounding water. The wiggling embryos then release enzymes to dissolve the eggshell, and eventually the trout break through the shell. The alevin, or sac fry, emerge when they are between $^3/_4$" to 1" long. The alevin discard their shell membranes, but the yolk sacs remain attached to their stomachs. Oxygen is now absorbed from water flowing over their gills.

Alevin will move up to the surface of the streambed but still remain hidden within the gravel. They are completely dependent upon the yolk sac's store of protein, minerals, salts and fats for nourishment. This fixed food supply must last for a few weeks up to four months. If sediment has not built up in the gravel and around the alevin (limiting the oxygen supply) their growth rate will be determined by the temperature of the water. High water temperatures will make the alevin develop faster. In warmer water, metabolic processes (digestion and respiration) occur more quickly.

Once the yolk sac has been absorbed, the incubation period finally ends. The trout, now called fry, must leave the gravel in search of new food sources. At this point, the young fry are still heavier than water and must reach the surface of the water to inflate their swim bladders. The fry tunnel out of the gravel and travel up through the water. When fry make it to the surface of the water, they snatch air with a sideways, snapping motion of the head. They then drop back, keeping their mouth and gill covers tightly closed to swallow the air. Some young fry (depending on the species) begin a migration from their natal (home) stream to a habitat richer in food resources, such as a lake or river. The fry migrate inconspicuously in the dark, usually when stream levels are high and waters are turbid in the spring.

When young fish reach the size of a human finger, they are called fingerlings. Vertical marks (parr marks) along their sides help camouflage them from predators. At this time, the trout may also be called parr. The fish tend to live in gentle water near the stream bank. It is only when they get bigger and stronger that they move to the faster current.

Trout reach full maturity after about two years. Adults eat insects as well as other fish, even smaller trout. At this time, trout tend to reside in the main current of the stream. The age at which a trout reaches sexual maturity varies due to many different factors, such as genetics or availability of food. Trout may spawn when as young as three, but most trout do not spawn until they are six or seven. Trout are cued by changes in day length and temperature to reproduce. The fish swim upstream, spurred by the flow of the clear, cold snow melt, until they find the spot where they hatched.

Males will fight for spawning rights to the female. The most dominant male will win and spawn. The process of courtship and nest building will last for hours. Only when the female is ready will the spawning commence. The female finds an area with adequate gravel and water flow and creates a redd. A redd is a nest for the eggs. She fans her caudal (tail) fin to rearrange and clean the gravel. Redds can be up to a foot deep to protect the eggs. The female will signify to the male that she is ready to release her eggs by arching her back and quivering over the redd. The male will join her, and they both open their mouths. The female releases her eggs, and the male releases milt, which contains sperm. An average female rainbow trout will deposit roughly 2,000 eggs and will immediately begin to bury these eggs. Trout can spawn more than once, unlike most salmon, and may spawn every one to three years. Once the adult dies, its body will decompose in the water, giving nutrients back to the water and helping the cycle of life continue.

Procedure

Review the life cycle of trout with the *Wild Trout Life Cycle*. Compare the wild trout life cycle to that of a hatchery fish by reviewing the *Hatchery Trout Life Cycle*, if desired.

Evaluation

- Students complete the *Trout Life Cycle* worksheet and/or the *Trout Life Cycle Maze*.
- Have students write an informative text explaining the different life stages of trout and identifying the current life stages of the class's trout. Check for accuracy in the life stages, correct use of vocabulary and correct use of conventions.

Wild Trout Life Cycle

EGGS

Eggs are buried in the gravel of small streams and absorb oxygen through their shells. About 30 to 90 days after fertilization, eyes begin to appear. This "eyed" stage means that the embryo is developing normally. This is the stage at which you received your eggs.

SPAWNING ADULTS

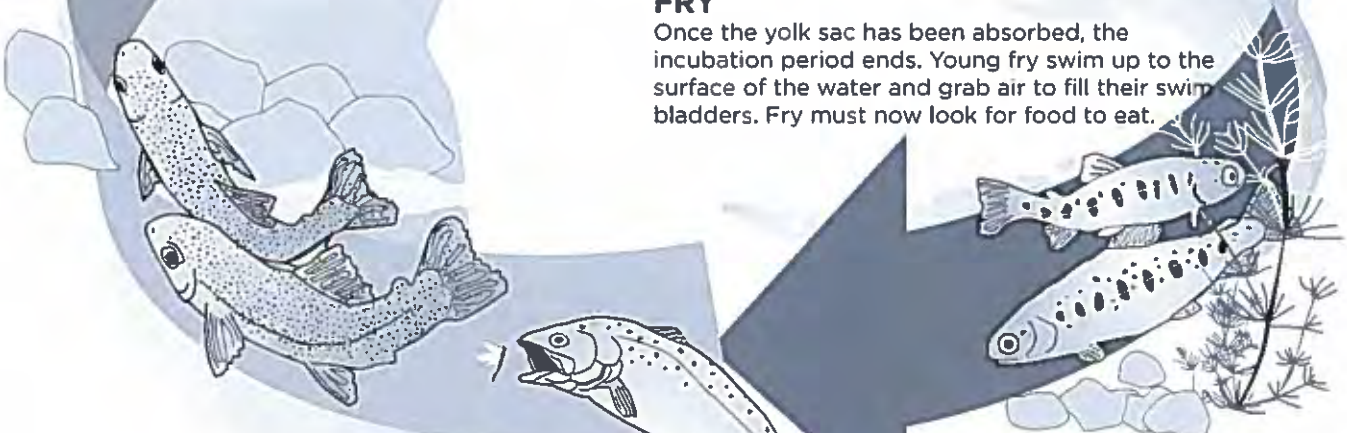
Most wild trout spawn, or lay and fertilize eggs, when they are six or seven years old. Spawning adults swim back to their home streams to lay eggs in gravel nests, called redds. Females dig redds with their caudal, or tail, fins. Females lay around 2,000 eggs in the redd, and the male sprays milt on the eggs to fertilize them. Trout often spawn several times in their lives.

ALEVINS

Newly hatched trout can breathe with their gills and get all the food they need from a yolk sac attached to their bellies. They stay safely hidden in the gravel nest.

FRY

Once the yolk sac has been absorbed, the incubation period ends. Young fry swim up to the surface of the water and grab air to fill their swim bladders. Fry must now look for food to eat.



ADULT TROUT

Trout reach full maturity after about two years. They tend to live in the main current of the stream and eat insects, crustaceans and other fish.

FINGERLINGS OR PARR

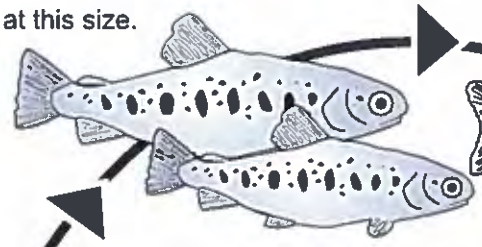
Young fish about the size of a human finger are called fingerlings or parr. Vertical marks, called parr marks, help hide or camouflage them from predators. They live in gentle water along the stream bank and focus on finding food to grow and build up their strength.

Adapted from original artwork by Gary Bloomfield, California Department of Fish and Game, and American Fisheries Society Humbolt Chapter, 1996

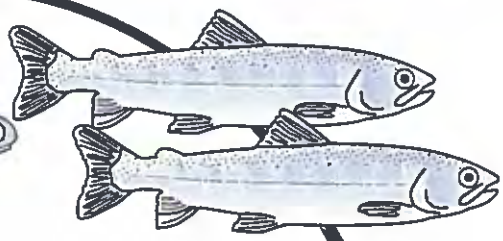
Renaí C. Brogdon
IDFG 7/2007

Hatchery Trout Life Cycle

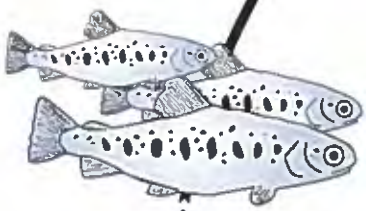
FINGERLINGS
are from 2 - 5 inches. Most hatchery trout are stocked into lakes at this size.



One-year-old hatchery trout are usually 8 - 10 inch "legals." Wild trout are usually several inches smaller.

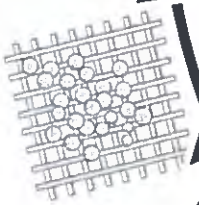


Some hatchery trout are stocked as 10-inch legal-sized fish. These fish contribute little to future generations.

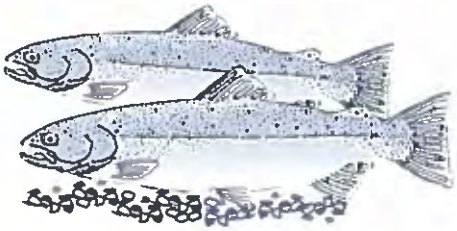


FRY
begin to feed after the egg sac is absorbed.

SAC FRY
receive their food from the attached egg sac for 1 to 6 weeks after hatching. The yolk sac is absorbed into the belly providing nourishment until the young trout can feed.

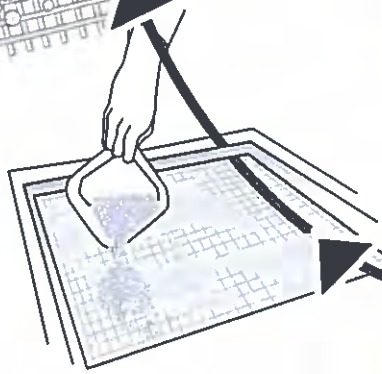


Growth begins in a hatchery tray.



Spawning for most trout begins at three years of age.

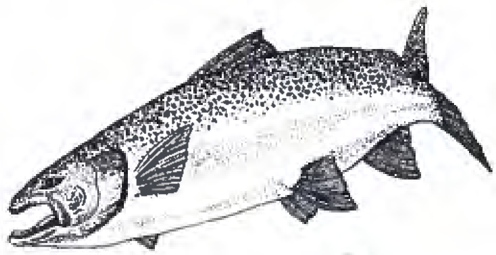
A few hatchery trout are held for future egg production. Relatively few fish are needed to support hatchery production compared to the numbers required to sustain wild populations.



Fertilized eggs are placed in hatchery or streamside incubator trays.

Eggs are taken from a brood trout reared in a hatchery or from wild fish trapped from a lake or stream.

Trout Life Cycle



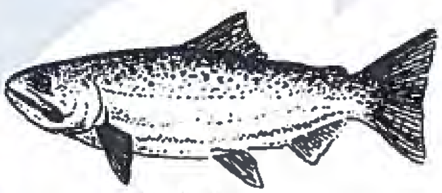
At this stage, trout swim back to their home stream to lay eggs in nests, or redds, on the bottom of the stream.

___ ___ ___ ___ ___ ___ ___ ___

26 12 15 8 12 10 12 1

___ ___ ___ ___ ___

15 21 5 17 22



At this stage, trout live in rivers, streams or lakes and eat insects, crustaceans or other fish.

___ ___ ___ ___ ___

15 21 5 17 22

At this stage, vertical marks camouflage the trout from predators. They live in gentle water along the stream bank.

___ ___ ___ ___

12 15 3 3

At this stage, trout are buried in the gravel of small streams and absorb oxygen through their shells.

___ ___ ___

6 1 1

At this stage, trout can breathe with their gills and get all the food they need from a yolk sac attached to their bellies.

___ ___ ___ ___ ___ ___

15 17 6 16 10 12

At this stage, trout swim up to the water surface to fill the swim bladder. They must now look for food to eat.

___ ___ ___

24 3 17

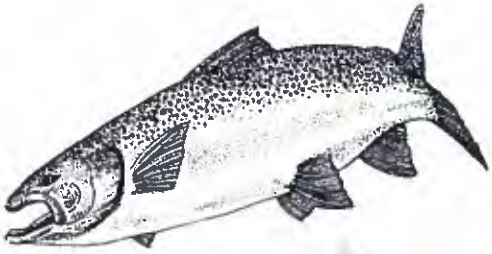
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
							4							20											

_ H _ _   H O _ _ _   _ _   _ _ _ _ _ _ ' _   _ O O _ .

22 4 10 26   4 20 17 21 26   15 12   15 17 6 16 10 12   26   24 20 20 21

Answer: ______________________________

Trout Life Cycle – Answer Key



At this stage, trout swim back to their home stream to lay eggs in nests, or redds, on the bottom of the stream.

s	p	a	w	n	i	n	g
26	12	15	8	12	10	12	1

a	d	u	l	t
15	21	5	17	22

At this stage, trout live in rivers, streams or lakes and eat insects, crustaceans or other fish.

a	d	u	l	t
15	21	5	17	22

At this stage, vertical marks camouflage the trout from predators. They live in gentle water along the stream bank.

p	a	r	r
12	15	3	3

At this stage, trout are buried in the gravel of small streams and absorb oxygen through their shells.

e	g	g
6	1	1

At this stage, trout can breathe with their gills and get all the food they need from a yolk sac attached to their bellies.

a	l	e	v	i	n
15	17	6	16	10	12

At this stage, trout swim up to the water surface to fill the swim bladder. They must now look for food to eat.

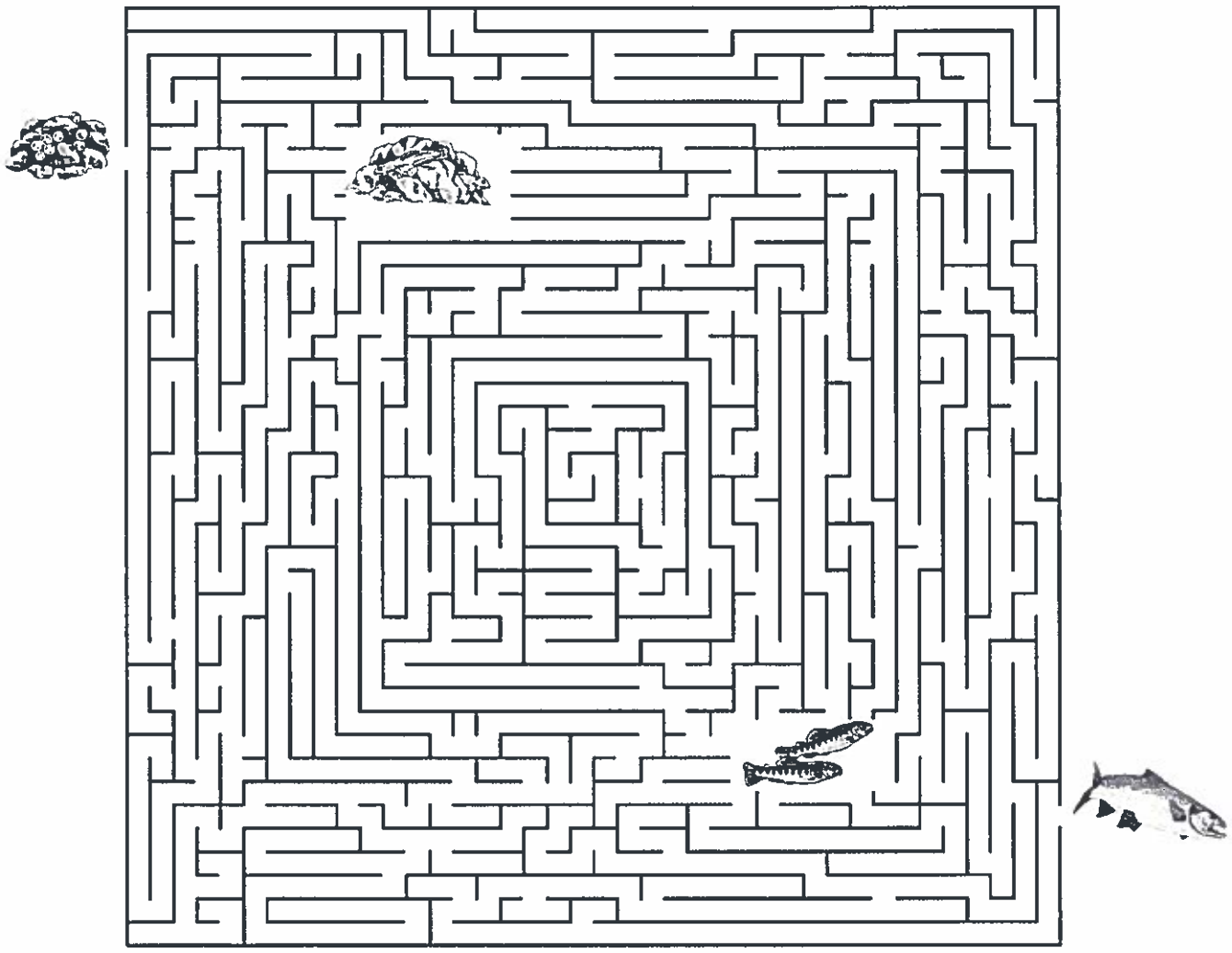
f	r	y
24	3	17

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
15			21	6	24	1	4	10			17		12	20	12		3	26	22	5	16	8		17	

T	H	I	S		H	O	L	D	S		A	N		A	L	E	V	I	N	'	S		F	O	O	D	.
22	4	10	26		4	20	17	21	26		15	12		15	17	6	16	10	12		26		24	20	20	21	

Answer: Yolk Sac

Trout Life Cycle Maze



List the order of a trout's development:

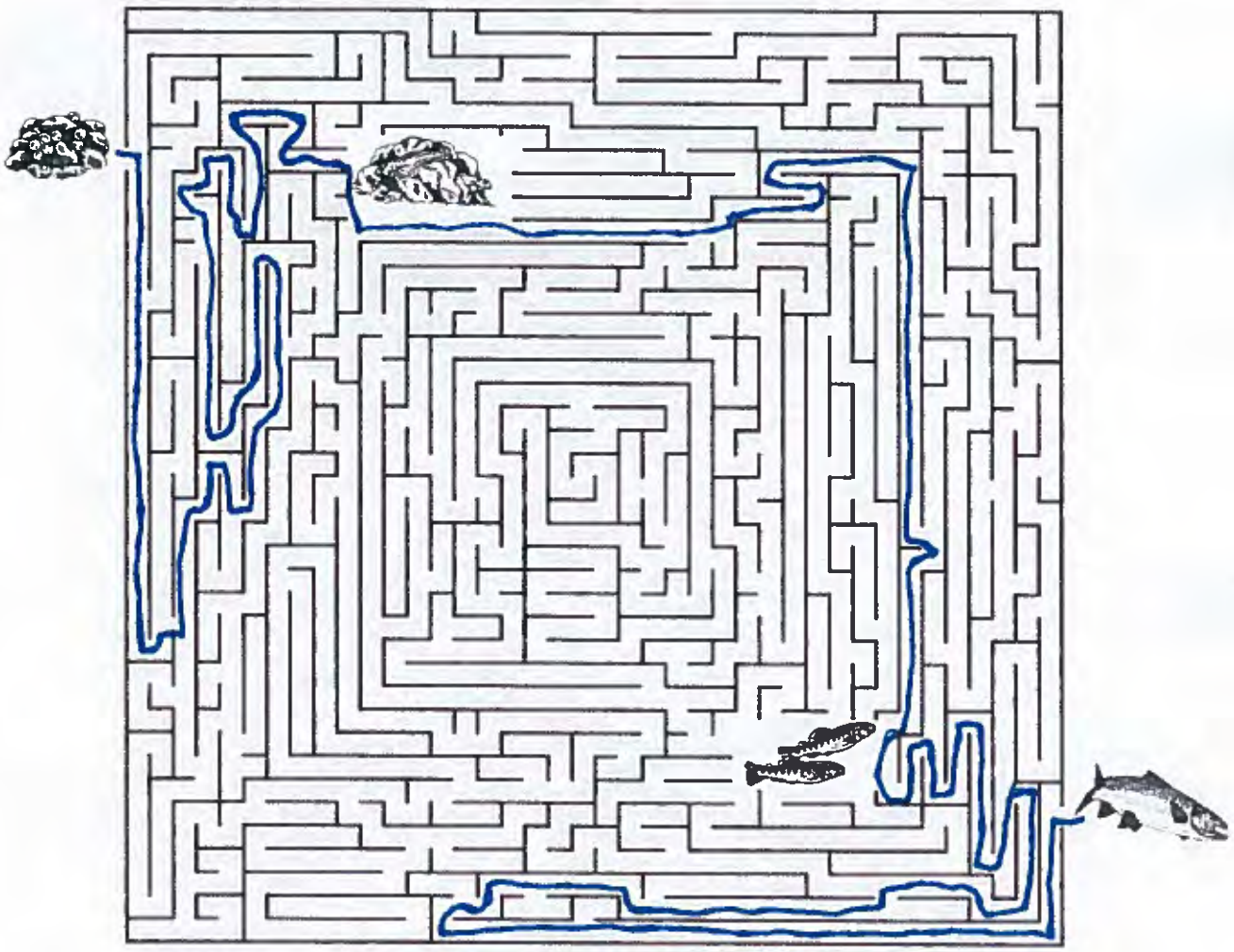
1. _____

2. _____

3. _____

4. _____

Trout Life Cycle Maze



List the order of a trout's development.

1. egg
2. alevin
3. fry
4. adult

Fashion a Fish

Grade Level
3-12

Subject Areas
Science, Visual Arts

Time
30-45 minutes

Vocabulary
adapt, adaptation, behavioral adaptation, camouflage, characteristic, coloration, habitat, species, structural adaptation

Summary

Students design fish with unique forms, shapes and behaviors to discover the benefits of these adaptations.

Objectives

Students will...

- describe adaptations fish have to their environments
- describe how adaptations can help fish survive in their habitats
- interpret the importance of adaptations in animals

Materials

- one copy of adaptation cards (additional copies with a class of more than 30); cut and separate the cards into groups of four cards each: one coloration, one mouth type, one body shape, and one reproduction in each group
- paper or poster board
- markers, colored pencils or paint

Background

All animals are the product of countless adaptations that occurred over time. Adaptations are features that increase the animals' likelihood of surviving in their habitat. When a habitat changes, either slowly or catastrophically, animals must adapt to those habitat changes to survive. As those adaptations become part of the fish's design, the fish becomes better suited to the habitat in which it lives. Because of the variety of conditions within each habitat, many different fish can live together and flourish. Some species have adapted to such a narrow range of habitat conditions that they are extremely vulnerable to change. These species are usually more susceptible than other animals to death or extinction. In this activity, students design a fish based upon certain adaptations.

Procedure

1. Begin a discussion by asking the class to define what the word adaptation means. An adaptation is a special feature of an organism that increases its chance of survival in its habitat. How do species adapt? Those individuals that are best equipped for life in a specific habitat are more likely to survive to the age where they can reproduce. Therefore, their genes and characteristics are more likely to be carried on to the next generation.

2. Assign students to find a picture or make a drawing of a species of animal that has a special adaptation. For example: a picture of a giraffe with a long neck for reaching vegetation in tall trees, or an owl with large eyes that gather light to aid with night vision.

3. Conduct a class discussion on the value of different kinds of animal adaptations. As part of the discussion, ask the students to identify different kinds of adaptations in humans.

4. Collect the students' pictures or drawings of adaptations. Categorize them into the following groups:
   - protective coloration and camouflage
   - body shape or form
   - mouth type or feeding behavior
   - reproduction or behavior
   - other (one or more categories the students establish, in addition to the four above that will be needed for the rest of the activity)

5. Break up the classroom into five groups. Pass one complete set of cards to each group of students. There might be five groups with four to six students in each group.

6. Review the adaptations by asking each group what they think the advantages are to the adaptations they were given. Record a list of the advantages to each adaptation on the board.

7. Ask the students to "fashion a fish" from the characteristics on the cards they received. The fish will be fictitious and may not look like a "real" fish. Each group should:
   - create an art form that represents their fish
   - name the fish
   - describe and draw the habitat for their fish

8. Ask each group to report on the attributes of the fish they have designed, including identifying and describing its adaptations. Ask the students to describe how this kind of fish is adapted for survival.

9. Ask the students to make inferences about the importance of adaptations in fish and other animals.

Evaluation

1. Grade the students on their presentations of their drawings to the class and their explanations of the adaptions they incorporated. Is the habitat they drew their fish in realistic for the adaptations they were asked to incorporate in the fish?

2. Have the students invent an animal that would be adapted to live in their community or a different and exotic habitat of their choice. Consider mouth, shape, coloration, reproduction, food, shelter, and other characteristics. Draw and describe the animal. Older grades may write a natural history of the animal – also describing social interactions, life cycle, and general life style.

Extension

1. Take an adaptation card from any category and find a real fish with that adaptation.

2. Look at examples of actual fish. Describe the fish and speculate on its habitat by examining its coloration, body shape and mouth.

Adapted from Project WILD Aquatic Activity Guide copyright by the Council for Environmental Education.

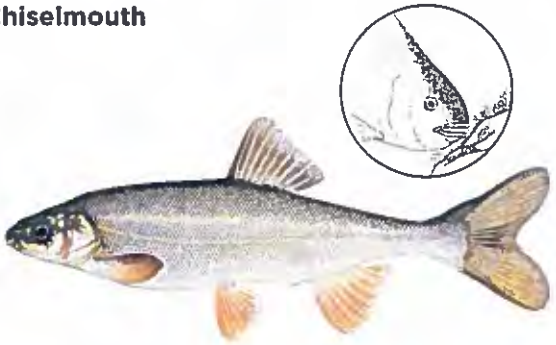
Adaptation	Advantage	Examples
Mouth		
Sucker-shaped mouth	Helps to feed on very small plants and animals on bottom	Sturgeon, sucker, carp
Elongated upper jaw	Helps to feed on prey it looks down on	Channel catfish
Hard plate on lower jaw	Helps to scrape algae off of rocks and the bottom	Chiselmouth
Duckbill jaws	Helps to firmly grasp prey	Northern pike, muskellunge
Extremely large jaws	Helps to completely surround prey	Largemouth bass, grouper
Body Shape		
Torpedo shaped	Increases the speed of the fish	Muskellunge, trout, salmon, tuna
Flat bellied	Allows fish to lay on bottom	Sculpin, catfish, sucker
Snake-like	Streamlines the fish for long distances	Pacific lamprey
Vertical disk	Allows the fish to move easily between vertical plants and feed above or below	Pumpkinseed, crappie, bluegill
Large, spiny dorsal fin	Makes fish look larger, prevents predator attack from behind	Yellow perch
Coloration		
Light-colored belly	Camouflages so that predators have difficulty seeing it from below	Sockeye salmon, perch, stugeon
Dark upper side	Camouflages so that predators have difficulty seeing it from above	Bluegill, crappie, flounder
Vertical stripes	Allows the fish to hide in vegetation	Tiger muskellunge, pickerel, bluegill
Spotted	Helps the fish hide in rocks and on the bottom	Rainbow trout, cutthroat trout
Mottled coloration	Helps the fish hide in rocks and on the bottom	Black crappie, sculpin, burbot
Reproduction		
Eggs deposited in nest on bottom	Hides eggs from predators, keeps them oxygenated	Bull trout, salmon, most minnows
Defends spawning territory	Eggs are protected by adults	Longnose dace, bass
Cavity spawners	Eggs are hidden from predators	Bullhead catfish
Eggs attached to vegetation	Eggs remain stable until hatching	Carp, perch, northern pike
Migrate to spawn in groups	Helps mix genes to maintain diversity in population	Burbot, grouper

Fish Adaptation Cards

Mouth/Feeding:
sucker shaped mouth
Sturgeon

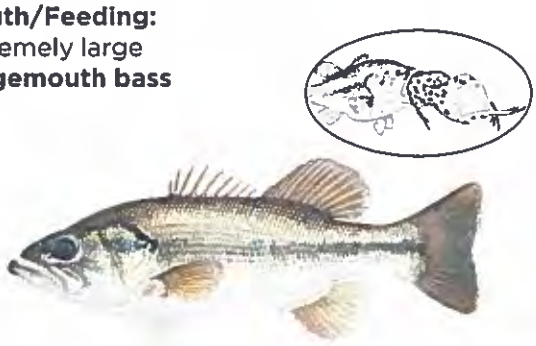
Mouth/Feeding:
elongated upper jaw
Channel catfish

Mouth/Feeding: hard plate on lower jaw
Chiselmouth



Mouth/Feeding:
duck-billed jaws
Northern pike

Mouth/Feeding:
extremely large
Largemouth bass



Body shape:
torpedo shaped
Rainbow trout

Body shape:
flat bellied
Sculpin

Body shape:
snake-like
Pacific Lamprey

Fish Adaptation Cards

Body shape:
vertical disk
Bluegill

Body shape:
spiny dorsal fin
Yellow perch

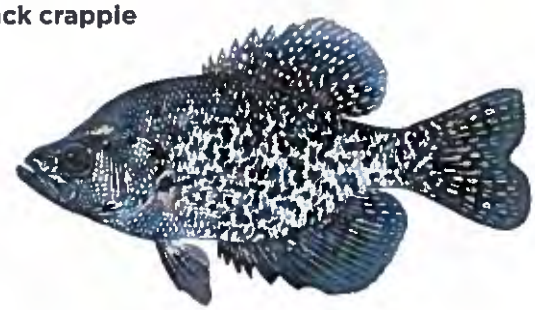
Coloration:
light-colored belly
Salmon

Coloration:
Darker on top
Bluegill

Coloration:
vertical stripes
Tiger muskellunge

Reproduction: eggs deposited in bottom nests
Bull trout

Coloration:
mottled
Black crappie

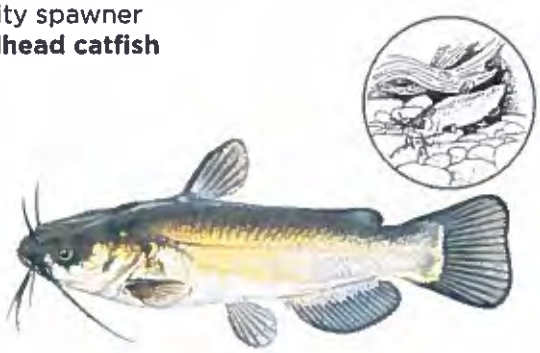


Coloration:
spotted
Rainbow trout

Fish Adaptation Cards

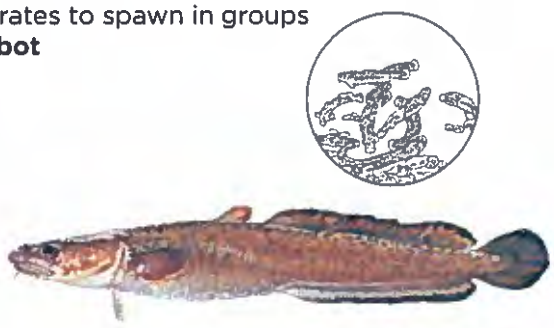
Reproduction:
defends spawning territory
Longnose dace

Reproduction:
cavity spawner
Bullhead catfish



Reproduction:
eggs deposited on vegetation
Northern pike

Reproduction:
migrates to spawn in groups
Burbot



Dichotomous Keys

Summary

Students learn about order and classification by creating their own dichotomous key and navigate a dichotomous key of fish found in Idaho.

Objectives

Students will...

- build a flow chart classification key for six pieces of candy (or shoes)
- translate the flow chart to write a dichotomous key
- review fish anatomy
- follow a dichotomous key for fish in Idaho
- differentiate between similar fish species
- hypothesize the functions of certain forms and adaptations

Materials

Part One: Creating a Dichotomous Key

- six different types of candy to key, such as Twizzlers, jelly beans, Raisinettes, caramels, Reese's peanut butter cups, and Andes mints
- one additional type of candy to try to key out with the created dichotomous key

OR

- one shoe from six different students
- scales and rulers to measure the size and weight of different candies, optional

Part Two: Using a Dichotomous Key

- copies of the *Dichotomous Key for Common Fishes of Idaho*, one per student
- color copies of the fish to identify, cut along lines keeping the letter associated with the fish picture; enough sets for each group of 2 to 4 students
- enlarged pictures of fish to display in front of class, optional

Background

Scientific classification is a method by which scientists group and categorize species of organisms. Modern classification has its roots in the work of Carl Linnaeus, who grouped species according to shared physical characteristics. A hierarchal system with eight divisions is used to classify all of the organisms on Earth. From broadest to narrowest, the levels of classification are: domain, kingdom, phylum, class, order, family, genus, and species.

Grade Level
6-12

Subject Areas
Science

Time
Part One: 30 minutes

Part Two: 45 minutes

Vocabulary
adipose fin, anal fin, barbel, binomial nomenclature, caudal fin, classification, dichotomous, dorsal fin, dorsal spines, pectoral fin, pelvic fin, species, taxonomy

With millions of species on our planet, scientists rely on a type of identification key, called a dichotomous key, to identify items in the natural world. From reptiles to rocks, flowers to fish, the format of a dichotomous key is always the same.

The word dichotomous originates from Greek. The prefix 'di' means two; the root word originates from 'temnein' which means to cut. Two choices are given at each step in the form of a couplet, eventually leading to the correct answer. For example:

1. a. Flower has 3 petals.....Go to 2
   b. Flower has 4 petals.....Go to 4

2. a. Petals' edges are smooth .....Trillium
   b. Petals' edges are fringed .....Go to 3

By reading the two statements of each couplet, you progress through the key from typically broad characteristics to narrower characteristics until only a single choice remains.

Part One

Creating a Dichotomous Key

Procedure

1. Begin by asking your students how botanists identify different types of trees, especially similar trees, like pine trees. Explain that they use dichotomous keys and explain how dichotomous keys work. Scientists use dichotomous keys to identify different items in the natural world – from rocks, to insects and flowers. Tell your students they will build a dichotomous key together.

2. Have your students imagine that they are visitors to a foreign land or country. The local people offer the students different candies that they have never seen before. How can they identify and compare the candy, so they have a better understanding of what the candy is like? They could use a key to help them identify and compare the different candies.

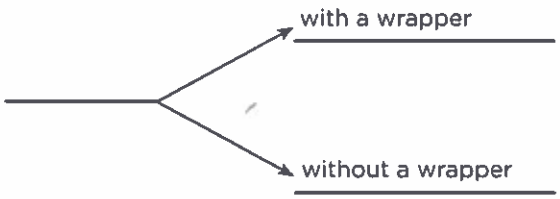
3. Pass out an example of each candy type to the students or groups of students for their observation. If using shoes, ask students to volunteer a shoe for you to display in the front of the classroom.

4. Tell the students they are to divide all the candy into two separate groups. The groups don't have to have an equal number of candy pieces. The students have to agree on some obvious characteristic that will distinguish them. Example characteristics:

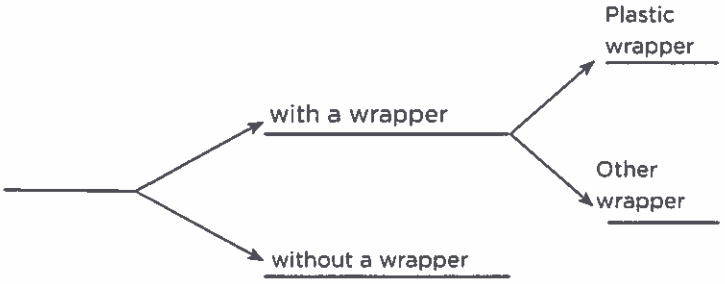
   - Group 1 is with a wrapper, Group 2 is without a wrapper
   - Group 1 is chocolate coated, Group 2 is without chocolate coating
   - Group 1 weighs less than 2 ounces, Group 2 weighs more than 2 ounces

5. After an agreement is reached, record the agreement on the board and have a student from each group keep track of the agreements on a sheet of paper.

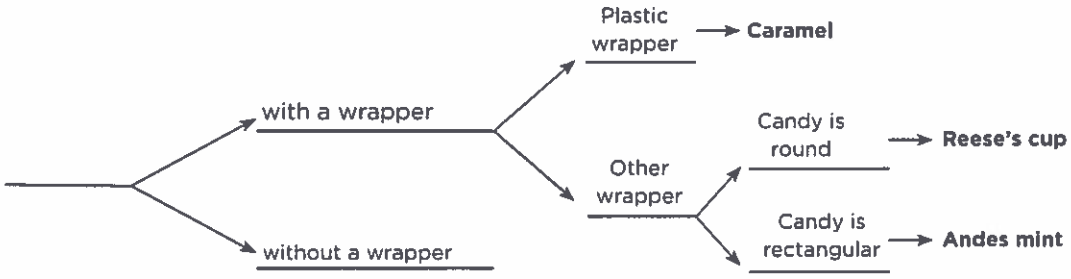
6. Draw two parallel, horizontal lines some distance apart on the board. Label the lines with the agreed upon characteristics.



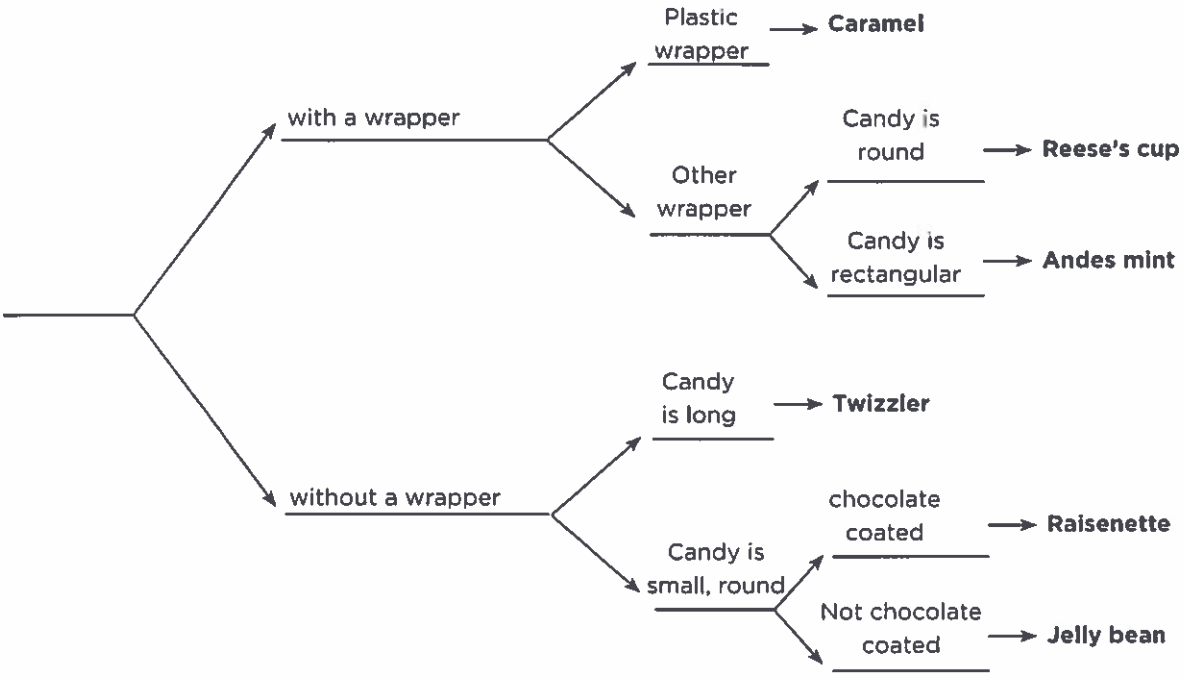
7. Push aside Group 2 for the moment to focus on keying Group 1. Students must again divide Group 1 into two distinct categories. After agreement is reached, add this information to the chalkboard sketch.



8. Continue the process of dividing the candy into two distinct groups and adding the information to the sketch until each candy has been identified.

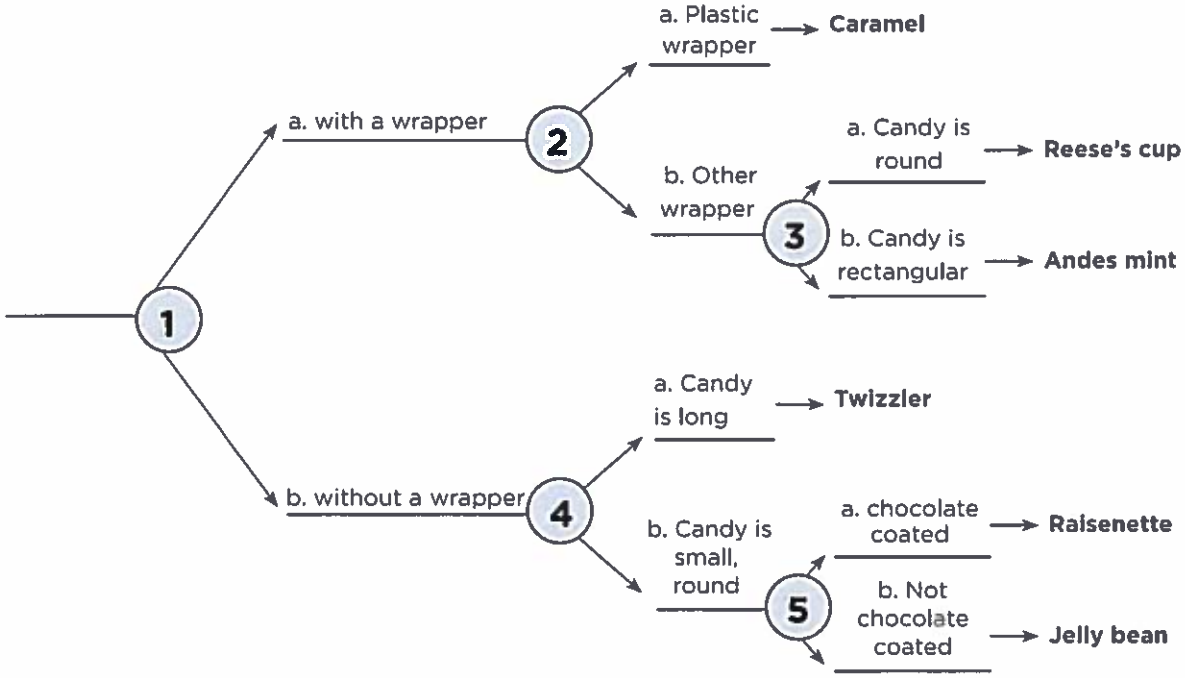


9. Do the same for the second group that was initially pushed aside.



10. The students have successfully created a dichotomous key! Most scientific keys, however, are written down as a compact list of statements. You must now translate this flow chart to a formal key. At each point where two arrows divide, place a number. In front of the two statements at each number, label the choices a. and b.

11. Now write down those numbers and letters followed by the description in a listed format. Add the directions to



the next step and label it *Dichotomous Key for Candy.* Have the students use the key they just made.

Dichotomous Key for Candy

1. a. Candy has a wrapper ..... Go to 2
   b. Candy is without a wrapper..... Go to 4

2. a. Candy has a plastic wrapper ..... Caramel
   b. Candy has other wrapper..... Go to 3

3. a. Candy is round..... Reese's cup
   b. Candy is rectangular..... Andes mint

4. a. Candy is long..... Twizzler
   b. Candy is small and round ..... Go to 5

5. a. Candy is chocolate coated..... Raisinette
   b. Candy is not chocolate coated.. Jelly bean

12. Add an additional candy to the key you have made. Can the students identify the new candy? The students should discover that the key works only for identification of those items used in its' original construction.

13. Can only scientists use dichotomous keys? No! Lots of people interested in the natural world use dichotomous keys to identify items they encounter while enjoying the outdoors.

Part Two Use a Dichotomous Key

Procedure

1. Students should be familiar with a fish's anatomy, especially fin names, before beginning part two of the lesson. Review the anatomy of a fish as needed.

2. Break the class up into groups of two to four students per group. Pass out dichotomous keys and fish cards to each group. Have the students work through the key to identify the fish on the cards. Students write the corresponding letter on the fish card next to the name of the fish species on the key. Switch cards if needed so every group identifies all the fish.

3. To use this activity for a grade, collect the fish keys with answers from each student.

4. Regroup and review the fish and their identities. Go through the steps of identifying any tricky fish. What fish were difficult to key? Why? What fish were easy to key? Why?

Evaluation

Collect and grade the *Dichotomous Key for Common Fishes of Idaho.*

Key to Fish Cards

A	channel catfish
B	northern pike
C	white sturgeon
D	Chinook salmon
E	bull trout
F	rainbow trout
G	largemouth bass
H	cutthroat trout
J	Pacific lamprey
K	mottled sculpin
L	bluegill

Extension

1. Have students create their own dichotomous keys for five different items of their choice. Encourage students to become creative with the items they key.

2. Have a discussion about the different adaptations on the fish that were keyed. Why do the fish all look so different? As the fish have evolved, each species has developed unique structures and body shapes suited for survival in a particular microhabitat.

   - Compare the mouth of the sturgeon to the mouth of the northern pike. What does this tell us about what/where it eats? (Sturgeon eat along the bottom, northern pike eat prey along the surface of the water.)
   - Compare the body shape and skin of a trout to that of a sturgeon. What clue does this offer about the speed of the fish? (Trout are known for their speed – often necessary for survival. Sturgeon have a thick skin offering protection.)
   - Look at the barbels on the catfish. What purpose might these serve? What might this tell us about where it lives? (Barbels are sensors – catfish are often found in dark, murky water where sight is impaired.)
   - Why would a fish like the bluegill need a spiny dorsal fin? (If a predator comes up behind the bluegill to swallow it, the bluegill can extend its spines to prevent the predator from swallowing it.)
   - Is the salmon always that color? (No, male salmon can become red when spawning. It is believed this helps attract a mate.) This is why colors aren't always the best clue to identifying a species.
   - Encourage any other thoughts on differences/adaptations.

Name:

Dichotomous Key for Common Fishes of Idaho

1. a. Species has barbels (feelers around mouth) ..... Go to 2
   b. Species does not have barbels ..... Go to 3

2. a. Species has spikey plates along its back ..... **White sturgeon** _____
   b. Species does not have spikey plates along back ..... **Channel catfish** _____

3. a. Species has spiny dorsal and/or anal fins ..... Go to 9
   b. Species does not have spiny dorsal and/or anal fins ..... Go to 4

4. a. Species has pectoral and pelvic fins ..... Go to 5
   b. Species does not have pectoral and pelvic fins ..... **Pacific lamprey** _____

5. a. Species has black spots ..... Go to 6
   b. Species has lightly colored spots ..... Go to 8

6. a. Species' caudal fin is black-tipped ..... **Chinook salmon** _____
   b. Species' caudal fin is yellow with black spots ..... Go to 7

7. a. Species has red on lower jaw ..... **Cutthroat trout** _____
   b. Species has does not have red on lower jaw ..... **Rainbow trout** _____

8. a. Species has oblong, oval-shaped spots on body; spots on fins ..... **Northern pike** _____
   b. Species has circular spots on body; no spots on fins ..... **Bull trout** _____

9. a. Species has an obvious stripe(s) ..... Go to 10
   b. Species is blotchy; no obvious stripe(s) ..... **Mottled sculpin** _____

10. a. Species has horizontal stripe ..... **Largemouth bass** _____
    b. Species has vertical stripes ..... **Bluegill** _____

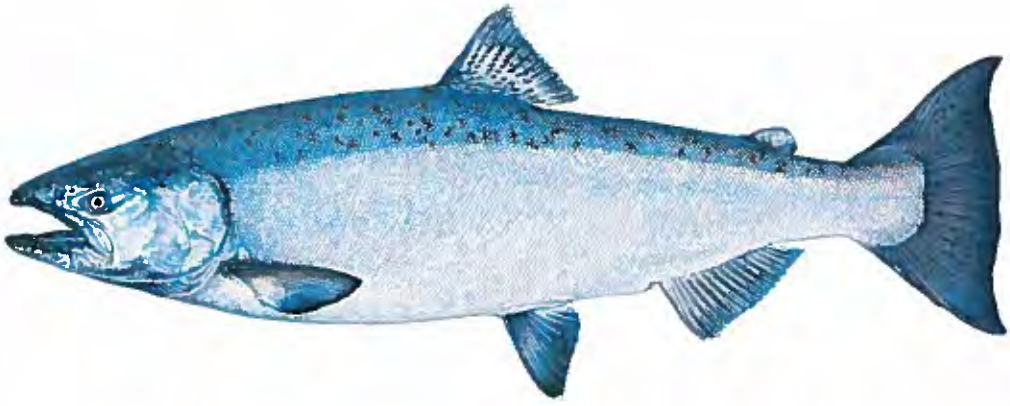
Fish Identification Cards

Illustrations by Joseph Tomelleri

A

B

C

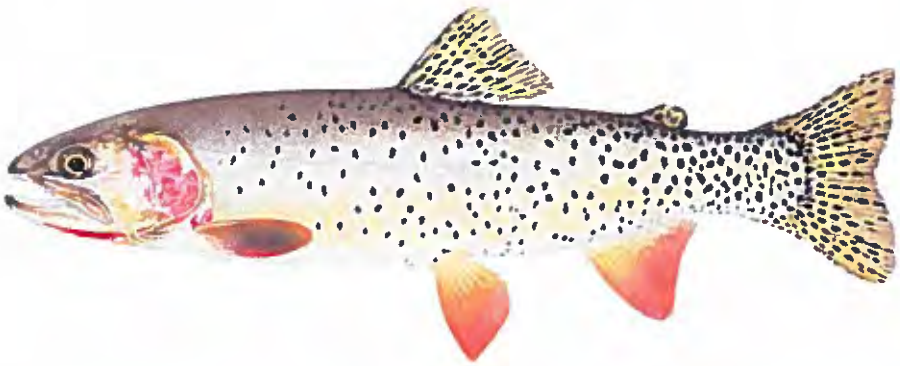


D

E

F

G



H

J

K

L

Activity One

Idaho Rivers

Subject: Social Studies

Objectives: Students will label major rivers and towns of Idaho on a map.

Materials:
- ☐ *Wildlife Worksheet* (Idaho)
- ☐ colored pencils
- ☐ map of Idaho

Procedure:

1. Ask students to brainstorm names of rivers in Idaho. They should come up with a pretty extensive list. If you have an overhead projector, draw an outline map of Idaho and ask the students to come to the front and draw in the location of some of the rivers. You might have a few students who can easily do this. It is my guess, though, that a lot of students will know the names of the rivers, but could not tell you where the rivers are on a map.
2. Tell the students they will be learning where major rivers of Idaho are by looking at a map and labeling them on an outline map.*
3. Handout the Wildlife Worksheet (Idaho Map). Use text books and maps from the library to help students locate and label the following rivers and towns (Add some of your own too!):

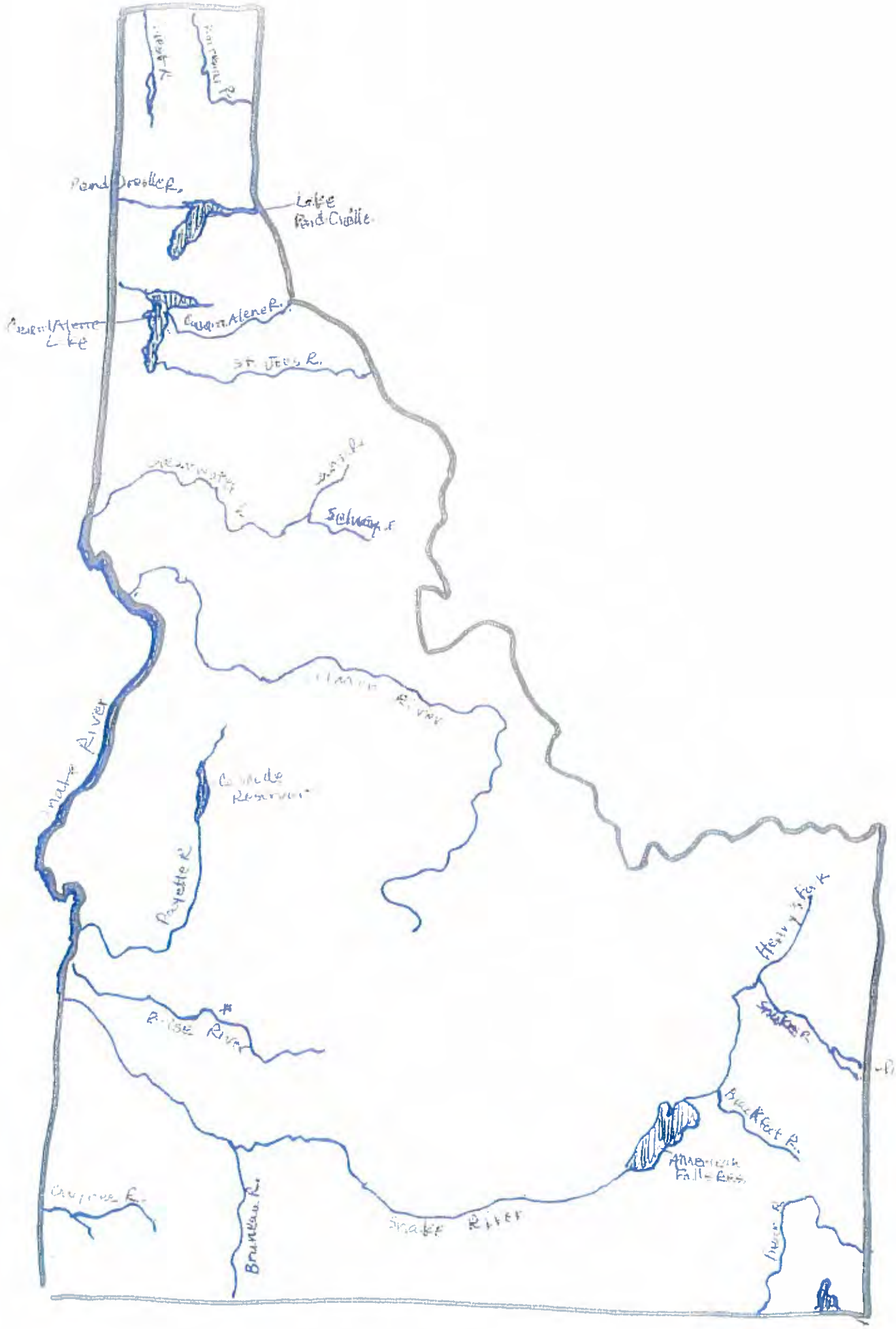
Rivers:	**Cities:**	**Also Label:**
Henry's Fork	Twin Falls	Continental Divide
Bear River	McCall	45th Parallel
Snake River	Stanley	Bordering States
Boise River	Salmon	Coeur d'Alene Lake
Big Wood River	Grangeville	Lake Pend Oreille
Bruneau River	Coeur d'Alene	
Payette River		

4. Have the students keep the maps in their binders for reference!

*Many of the rivers have forks. Depending on level of students, you might want to have them draw them in and label them.

Wildlife Worksheet

Using maps of Idaho, label rivers and other waterways of Idaho on this map.
Add towns and places of special interest too! Color!


Pend Oreille R.
Lake Pend Oreille
Coeur d'Alene R.
St. Joe R.
Salmon R.
Snake River
Payette R.
Boise River
Bruneau R.
Snake River