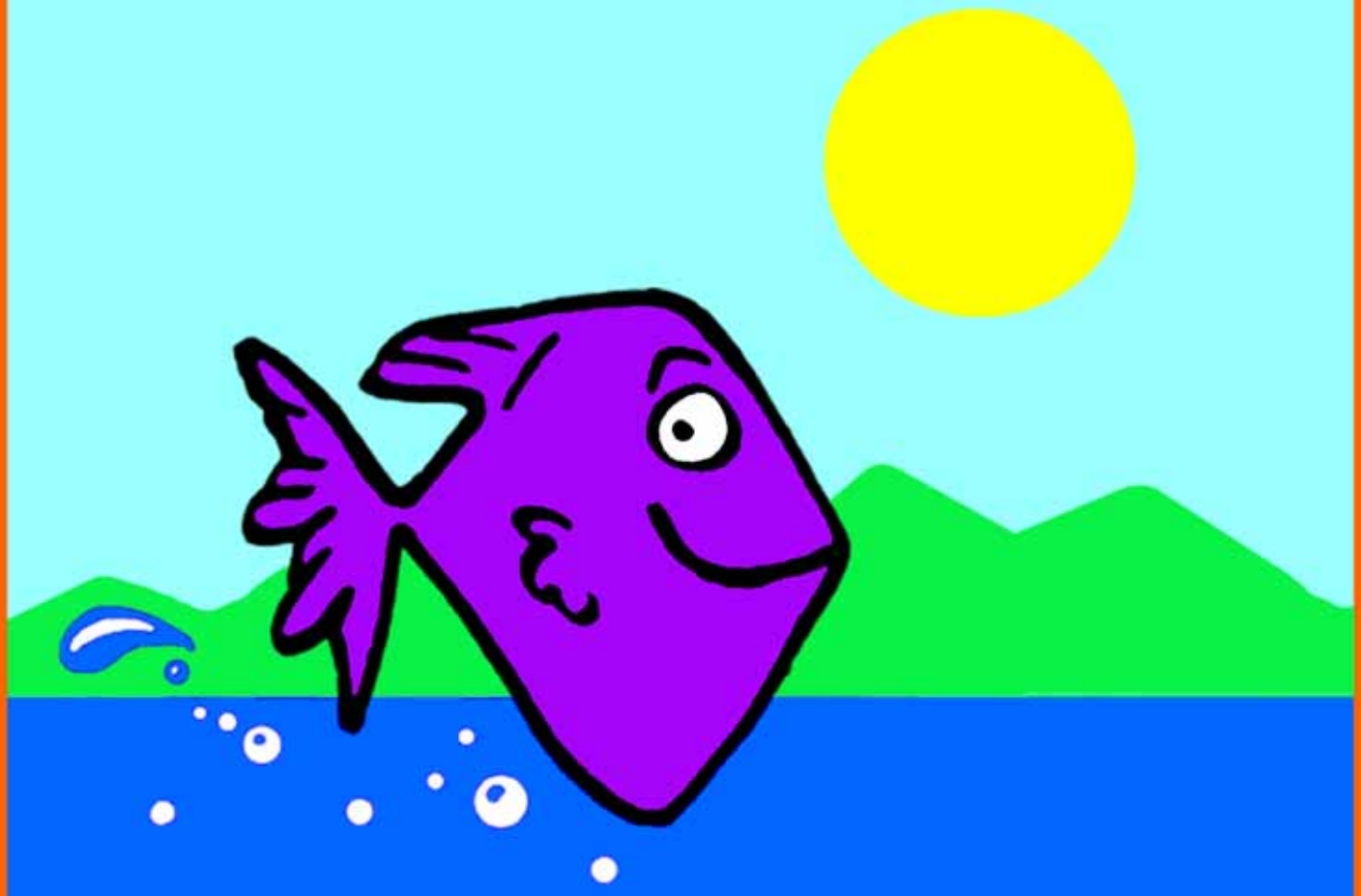
Name:

U.S. Fish & Wildlife Service

Biologist-in-Training

A guide to exploring and understanding fish and their habitats



Have fun learning while you earn an official certificate and sticker or patch!

(see page 15 for details)

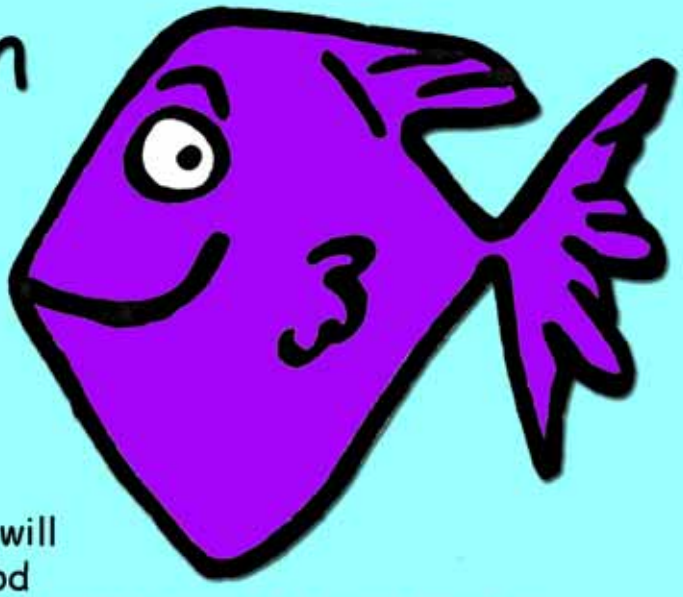
National Fish Hatcheries of the Southeast

There are 14 National Fish Hatcheries in the Southeast Region, and they are all part of the U.S. Fish & Wildlife Service. Each one is a little different and special in its own way. But all of them work with others to protect, conserve and enhance fisheries for the benefit of you and all Americans.

The southeastern U.S. is home to some of the world's greatest **diversity** of fish and other **aquatic species**. But this wonderful diversity is being threatened as more and more aquatic species and their habitats begin to disappear. You can help by becoming involved.

For more information about each of these **National Fish Hatcheries** and also **Fisheries Resource Offices**, please visit this website: **www.fws.gov/southeast/fisheries**. Here you can learn more about where they are located, what they do, and how you can help!

BiT Introduction



Hello there and welcome to the Biologist-in-Training Program!

My name is Little BiT, and I'll be your guide as you begin this super fun journey of learning all about fish and their habitats!

This booklet contains five activities that will help you gain the skills needed to be a good **biologist**. You'll also discover why it's important to care for our precious **aquatic resources**. Each activity will bring you up close and personal with fish and their **habitats**. As good biologists, we must remember not to harm plants, fish or wildlife during our studies, and to leave nature better than we found it. Let's be safe and courteous out there!

How do you begin? You may complete this booklet during a visit to any National Fish Hatchery in the southeastern U.S.! You can also complete it anywhere you like with your class or other youth group, or on your own with an adult. Once you have completed all five activities, go to page 15 to find out how to become a certified Biologist-in-Training!

I'll be your guide along each page, following as you go! There is a glossary in the back if you have questions along the way, or you can send me an email and I will help. You can do this by visiting my website at:

www.fws.gov/southeast/fisheries/BiT

On this website, teachers can also find out about supplemental materials and extension activities available to groups through all National Fish Hatcheries and Fisheries Resource Offices in the southeast.

Best of luck on your journey!

Little BiT

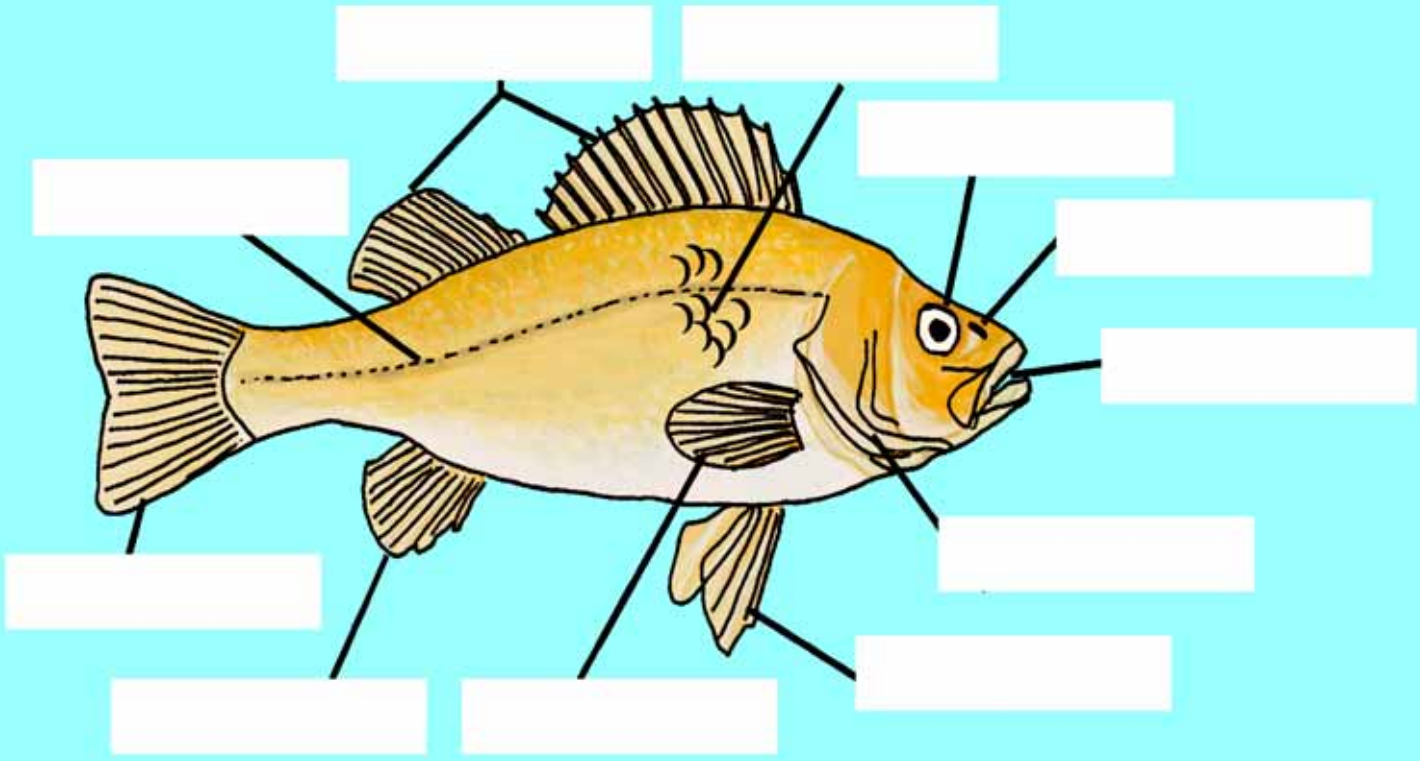
Fantastic Fishes

Biologists use their skills of **observation** every day to perform their jobs. Looking closely and noticing details will help you learn more about fish and where they live.

For your first activity, you will need to find at least two different fish to observe. Your observations will help you understand what makes fish fantastic!

Use this diagram to label each part on this fish and the fishes you are observing. Remember to use the glossary if you need help.

Mouth, Eye, Gill, Lateral Line, Anal Fin, Caudal Fin, Nares, Dorsal Fins, Pectoral Fin, Pelvic Fins, Scales



There are more than 24,000 known fish species in the world, and many of them look very different from one another. The fishes you observe will probably not look exactly like the fish in the diagram, and may not have all the fins described.

1

Here are some other things to think about when you make your observations:

- Do you know what **species** of fish it is?
- Does it have a long, slim body, or a short, fat one?
- What is the shape of its tail? What about its other fins?
- Can you see the fish's scales? How small are they?
- Is the fish's mouth at the bottom, middle or top of its head?

Some good places to observe fish:

Fish hatchery
Fishing trip
Aquarium
Pet store
Seafood market

Use this space to draw and color a picture of the fishes you are observing.

Write down some of your observations. What do these and other observations tell you about these fishes and where they live? Why do you think these **adaptations** are important in helping these fishes to survive?

Aquatic Adaptations

As a fish biologist, you'll not only spend time observing fish, but you'll also closely study their **habitats**. Fish living in different **aquatic habitats** have special **adaptations** to survive there.

In this activity, you'll need to visit one **lentic habitat** and one **lotic habitat** to discover the important differences and record your observations.

Use these questions to guide your explorations, and write your observations in spaces provided.

Is the water flowing or still?

Feel the water. Is it warm or cold?

Describe the bottom, or **substrate**, of the habitat. Is it sandy or rocky? Can you even see it?

Look under rocks, and use a net if you have one to see if there are any **macroinvertebrates** in the water. Describe the ones you see in or nearby this habitat, and draw a small picture of the macroinvertebrate you found the most of at each habitat.

Where in each habitat did you find the most macroinvertebrates? Are they mostly on or near the substrate, or swimming or floating in the water?

Look at the plants in this habitat. Are many of them growing in the water?

Do you see fish? Do you know the **species**? Do you think **warmwater fish** or **coldwater fish** would live here?

List some ways fish have adapted to each habitat. (Hint: What would they eat? How might they hide? Do they survive best in warm or cold water? Do they swim best in moving or still water? Where might they go to **spawn**?)

2

Lentic Habitat

Examples include warmwater fish hatcheries, ponds, lakes, marshes, swamps and ditches

Lotic Habitat

Examples include coldwater fish hatcheries, creeks, streams, rivers, springs, channels and brooks

Healthy Habitats

Now let's find out how healthy a habitat is by making some key observations.

Healthy fish habitats include **pollution** free water, **dissolved oxygen** to breathe, good places to **spawn**, **shelter** in which to hide, and plenty of food to eat.

Visit a section of stream and spend some time noticing details about the habitat it provides. Use the scale on the next page to determine how healthy the habitat is for fish and other creatures.

Then add up all the numbers you've circled. Use the key to estimate how healthy this stream habitat is based on your observations.

KEY

If your total is between

6 - 12: This habitat is extremely poor. Most fish and other aquatic species would struggle to survive here.

13 - 18: This habitat is fair, and needs a lot of improvement.

19 - 24: This habitat is in good shape, but it could be better.

25 - 30: This habitat is excellent, and is ideal for fish and other aquatic species that live in stream habitats.

Remember, each waterway is unique. This scale only gives basic guidelines of what makes a stream habitat healthy. A more in depth study would be needed to make a truly accurate, scientific judgment. What other ways could you and scientists study the health of this stream?

How healthy was the habitat in the section of stream you studied?
Did this surprise you?

Name three things you could do to improve this section of stream.

1.

2.

3.

3

Circle the number that best describes what you find.

As you approach the stream, notice what you find within the **watershed**.

1	2	3	4	5
Very few plants or trees, many buildings, roads bridges, culverts, or parking lots				Lots of plants and trees, no roads or buildings

Look for signs of **pollution** at the stream site.

1	2	3	4	5
Lots of litter, foam on the water, pipes draining into the stream, bad or unusual odors, lots of **erosion**				No signs of pollution, little or no **erosion**

Look at the water in the stream.

1	2	3	4	5
Very cloudy or dirty				Completely clear

Notice the **substrate**, or stream bottom.

1	2	3	4	5
Silty or sandy bottom, lots of algae or aquatic plants growing				Mostly rocky with very little plant growth, little or no silt or sand

Check for signs of wildlife around the stream.

1	2	3	4	5
No animal tracks, no birds or other visible wildlife				Lots of animal tracks and birds along with other visible wildlife

Look in the water to examine what lives there.

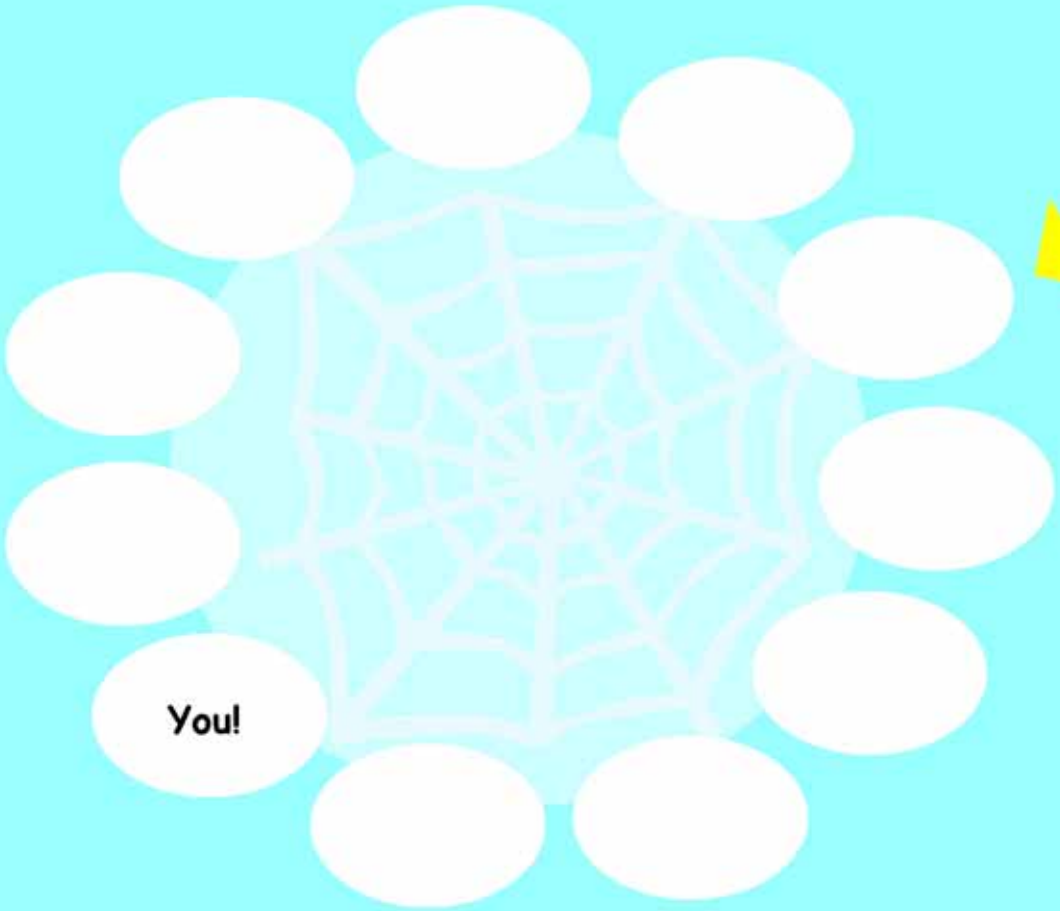
1	2	3	4	5
No fish, salamanders, turtles, few types of **macroinvertebrates** like aquatic insects, crayfish				Lots of fish and other **vertebrates** and many different types of **macroinvertebrates**

Water Webs

Do you realize that you're connected to the tiniest of insects in any body of water? You are! To prove this point, take a timer or watch and visit any body of **fresh water**. Find a comfortable spot, be as quiet as you can, and time yourself for 10 minutes.

Using your observational skills, write down everything (no matter how small) that you see in and around the water's edge, or **riparian zone**. Classify these things on the chart below. Observe what might have been in the area before you by looking for clues like animal tracks, **scat**, fur, bones, or feathers. Be sure to look everywhere: up in the trees, in the water, and down at your feet. Use the entire time to observe what is around you.

List of living things	List of once-living things	List of non-living things
You!		



4

The sun supplies the earth with **energy**

Now use your list of living things to draw the **web of life** that exists in this place. Fill in the ovals above with living things you observed, and then draw lines to connect all the ones that depend on each other for survival. You may use as many lines as you need to show all the connections.

What do you think would happen if one of the living things in your **food web** were to become **extinct**? How would that affect the overall strength of the web?

What changes would you see if one of the living things in your web became **overpopulated** instead of extinct?

How could these changes affect you?

Why are once-living things and non-living things important to the web of life?

Mentor Moments

Now that you've worked hard and developed your skills as a biologist-in-training, let's talk with someone who lives everyday doing what you have been studying. Let's talk to a real live **biologist**!

For this activity, you will need to find a biologist and interview him or her. Be sure and ask the following questions:

- What training/education did you pursue to become a biologist?
- Where do you work?
- What are your responsibilities? (What do you do?)
- What is your favorite part of being a biologist?
- What made you decide to become a biologist?
- After interviewing a biologist, ask yourself this question: Do I want to become a biologist? Why?

Some places you can find a biologist in which to interview:

National Fish Hatcheries, Fisheries Resource Offices, National Wildlife Refuges, other U.S. Fish & Wildlife Service offices, other federal, state and nonprofit natural resource conservation offices, zoos, aquariums, nature centers, and colleges and universities.

For a list of U.S. Fish & Wildlife Service places to visit or contact, go to www.fws.gov/offices. There's always an office near you!

Other helpful websites you may want to visit have descriptions of what a biologist does in many different fields and areas of work.

www.fws.gov/hr/hr/careers_fws.htm

www.aibs.org/careers

www.sicb.org/careers

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Write about your interview and share your findings here.

Glossary

Adaptation
A characteristic body part, shape or behavior that helps a plant or animal survive in its environment.

Adipose Fin
Rayless fin on the midline of the fish's back, between the **dorsal** and **caudal fins**.

Anal Fin
The fin on the underside of a fish, nearest to the tail.

Annulus
Ringlike markings on the **scales** (or spines and vertebrae) of a fish that are used to determine age.

Anterior
Placed on or near the head or front of an animal, the opposite of **posterior**.

Aquatic
Living in, near, or frequenting water.

Barbel
A slender, flexible projection near the mouth of certain fish. It is used for smell and taste.

Biologist
Someone who studies living things.

Caudal Fin
The tail fin.

Caudal Peduncle
The part of a fish's body located between the **anal fin** and the beginning of the **caudal fin**.

Coldwater fish
Fish that survive best in water temperatures below 60 degrees Fahrenheit.

Crustaceans
A group of mostly **aquatic** animals that have an exterior skeleton and antennae; some examples of crustaceans include shrimp, lobsters, crabs, and water fleas.

Dissolved oxygen
Oxygen dissolved in water.

Diversity
Number and variety of different **organisms** in the environment in which they naturally occur.

Dorsal
Placed on or near the back of an animal, especially on the backbone. It is the opposite of **ventral**.

Dorsal Fin
The fin or fins on the top (**dorsal**) side of a fish. Some fish (like trout) have only one dorsal fin. Others (like sculpin) have two dorsal fins.

Ecosystem
A system formed by the interaction of a community of **organisms** with their environment.

Energy
The capacity for doing work. Forms of energy include thermal, mechanical, electrical, and chemical. Energy may be transformed from one form into another.

Erosion
The physical removal of soil or soil particles by a transport agent such as moving water or wind.

Extinct
A species that no longer exists.

Fish Hatchery
A place where fish are reared from eggs. National Fish Hatcheries rear fish for conservation purposes.

Food Chain
An arrangement of **organisms** in an **ecosystem** whereby the "bottom" level of organisms are eaten by the next higher level, which themselves are eaten by the next higher level, and so on.

Food Web
The connections among everything **organisms** in a location eat and are in turn eaten by.

Fresh water
Water other than seawater; covers only about 2 percent of the earth's surface, including streams, rivers, lakes, ponds, and water associated with several kinds of wetlands.

Fry
Newly-hatched young fish.

Gills
The breathing organs of a water living animal. Gills exchange gases between body fluids and the surrounding water. They are protected by a **gill cover** called an opercle or operculum.

Gill Cover
The bones of the fish's head that cover the **gills**. Also called an opercle or operculum.

Habitat
The place where an **organism** lives and grows (an organism's home). All habitats include four important parts: food, water, shelter and space.

Invertebrate
Organisms that lack an internal skeleton.

Lateral Line
A row of pores on the side of a fish's body that open into tubes containing organs that are sensitive to low vibrations.

Lentic
Still water systems such as lakes and ponds.

Lotic
Moving water systems such as streams and rivers.

Macroinvertebrate
Organisms that lack an internal skeleton and are large enough to be seen with the naked eye.

Nares
A fish's nostrils where the sense of smell, or olfactory sense, is located.

Observation
The use of one's senses to learn something new. Discovery through observation may include seeing, hearing, touching, smelling or tasting.

Organism
A living thing, such as an animal, a plant, a bacterium, or a fungus.

Otolith
An ear stone (or calcareous concretion) in the inner ear of a bony fish. Each year, a new concretion (layer of bone) is added, which can be used to measure age.

Overpopulated
Condition whereby the number of individuals in a given population is too great to be sustained by available natural **resources**, such as food and water.

Glossary continued

Pectoral Fins
Fins located directly behind the head of the fish. They come in pairs.

Pelvic Fin
A set of fins on the underside (belly) of a fish that are usually placed between the **pectoral fins** and **anal fin**.

Pollution
Contamination of air, soil, or water with harmful substances that don't belong.

Posterior
Placed near or on the tail or end of an animal, opposite of **anterior**.

Rays
Flexible supports for a fin.

Resources
Matter and energy available for use by **organisms**.

Riparian Zone
The land area along either side of a waterway. Many plants and animals are **adapted** for life in this zone and depend on it for their food, shelter, and ultimate survival.

Scales
Small, flat plates that fit together to form the external body covering of a fish.

Scat
Animal poop. Many scats can be identified by their shape, size, and color.

Shelter
A place where an animal lives and is protected. Shelter is one of four parts (along with food, water, and space) that make up an animal's **habitat**.

Spawn
The act of reproduction of fish, which includes depositing eggs and fertilization of eggs, and sometimes nest building.

Species
A group of **organisms** that share similar characteristics and can interbreed with one another to produce fertile offspring.

Stocking
Adding fish to a body of water, such as a lake, pond, or stream.

Substrate
The material that forms the bed of the stream.

Swim Bladder
A sac containing gas and air, present in the upper part of the body cavity, that aids in creating buoyancy and in the respiration of some fishes. (Also called an "air bladder.")

Tributary
A stream or river that flows into a larger stream or river or into a lake.

Ventral
Placed near or on the belly or lower surface of an animal, opposite of **dorsal**.

Warmwater Fish
Fish that survive best in water temperatures between 65 to 80 degrees Fahrenheit.

Watershed
The land that water flows across or under on its way to a stream, river, lake or ocean; all of the land area with a common drainage.

Web of Life
Interactions and connections between all living things.

To become an official Biologist-in-Training,
you must have completed each of the following activities:

- ☐ #1 - Fantastic Fishes
- ☐ #2 - Aquatic Adaptations
- ☐ #3 - Healthy Habitats
- ☐ #4 - Water Webs
- ☐ #5 - Mentor Moments

Once you have checked off each activity on the list, ask a parent, guardian, teacher, or National Fish Hatchery staff person to sign here:

To receive your official Fish Biologist-in-Training certificate and patch or sticker, take this completed booklet to any National Fish Hatchery in the southeastern U.S., or cut-out and mail this page to the address below.

Cut-out and send this page to:
U.S. Fish and Wildlife Service
Biologist-in-Training
1875 Century Blvd., Ste. 250
Atlanta, GA 30345

Look at the map in the front of this book to find a fish hatchery near you, or visit www.fws.gov/southeast/fisheries

Your name:

Street address:

City, State, and Zip:

Would you like a STICKER or PATCH? (circle one)

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You can use this space to send a message to
the U.S. Fish & Wildlife Service.

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For Eli and Jasper, and all of "the little keepers."

Thanks for exploring with me! I hope you will share with others all that you have learned about fish and their habitats. I think you would make a terrific biologist!

Your friend,

Little BiT

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CONSERVING AMERICA'S *fisheries*
U.S. Fish & Wildlife Service