

Big Fish in a Small Pool:



Meet Dr. Michael Young:

I like being a scientist because I am fascinated by the natural world. I enjoy the process of discovery, and I want to make sure we *conserve* wild creatures and wild places.



Thinking About Science

For natural resource scientists to be fairly certain about something, they often do many similar research studies. If they get



Dr. Michael Young

similar results in different settings or with different kinds of *species*, they are more confident about their results. The scientists in this study wanted to know where cutthroat trout would prefer to live in a stream, if more *dominant* trout were not present. They removed the largest cutthroat trout from a stream to see what would happen. They expected remaining trout to move into the same locations that larger, more dominant trout had occupied. This study was similar to other studies with other species of trout and

other stream fish. In those studies, scientists found that when more dominant fish were removed from a river, other fish moved into their locations. In this way, the scientists thought they could identify the trout's favorite places. What do you think Dr. Young and his colleagues found out about cutthroat trout?



Thinking About the Environment

In the natural world, you might find that two different bird species would like to build their nest in the same place, perhaps a place that is safe from predators. You might also find that members of the same species would like to occupy the same place, such as one that provides a lot of their favorite kind of food. Since there is a limit to the number of individuals one place can support, usually the largest or most dominant individuals of a species get to live in the best

places. By studying the preferred location of the dominant individuals, scientists can learn about the best *habitats* for certain species.

Introduction

Cutthroat trout are a type of salmon (Figure 1). Do you know why they are called cutthroat trout? They all have what looks like a “cut,” or a patch of orange or red on their throats! Cutthroat trout live in the Western United States, from southeastern Alaska to northern California. The scientists in this study wanted to find out if cutthroat trout behave like other *salmonids*. Other salmonids had been found to swim into preferred locations once more dominant fish had been removed. This helps scientists learn about the favorite locations of these fish. Dr. Young and his colleagues guessed that when they removed the most dominant cutthroat trout from a mountain river, other trout would quickly move into the locations the more dominant fish had occupied.



Figure 1. Cutthroat trout

Glossary

conserve (kän sŭrv): To avoid wasteful or destructive use of something.

species (spe sez): Group of organisms that resemble one another in appearance, behavior, chemical processes, and genetic structure.

dominant (dä muh nent): Being able to control all others, or being in the majority.

habitat (ha buh tat): The environment where a plant or animal naturally grows and lives.

salmonids (sa muh nidz): Long, bony fishes such as salmon or trout.

vacant (va kunt): Not occupied.

pool (pool): A quiet, deep place in a stream.

riffle (ri fül): A shallow place in a stream with fast water and small waves.

fish biologist (fish bi ä l uh jist): A person who studies fish and the processes that support fish.

Pronunciation Guide

a	as in ape	ô	as in for
ä	as in car	u	as in use
e	as in me	ü	as in fur
i	as in ice	oo	as in tool
o	as in go	ng	as in sing



Reflection Section

- Do people, like some fish, move into a preferred location

when one becomes *vacant*? Can you think of an example of when people do or don't do this?

- What would be one problem for scientists trying to study fish in a free-flowing river?

Methods

Because natural rivers are free flowing, scientists cannot be sure fish will remain in an area while the scientists are studying them. To solve this problem, Dr. Young and his colleagues placed wire fences at various places in the North Fork of the Little Snake River (Figures 2, 3, and 4). They created eight sections to study. They identified the kind of habitat in all of the fenced sec-



Figure 2. The North Fork of the Little Snake River.

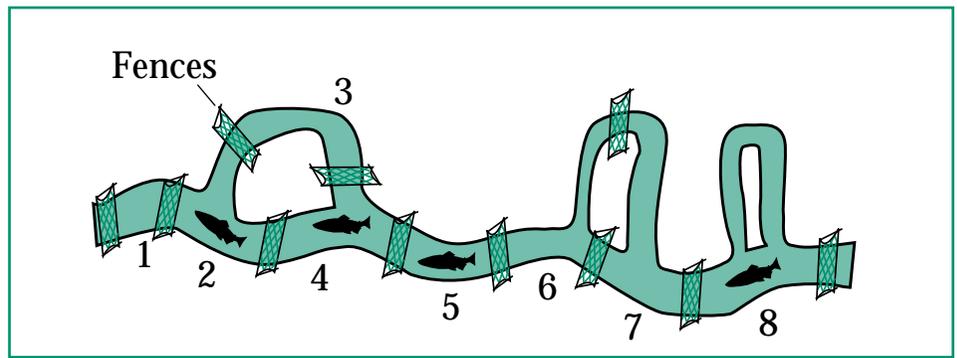


Figure 3. Diagram of stream with fences installed creating eight study sections.

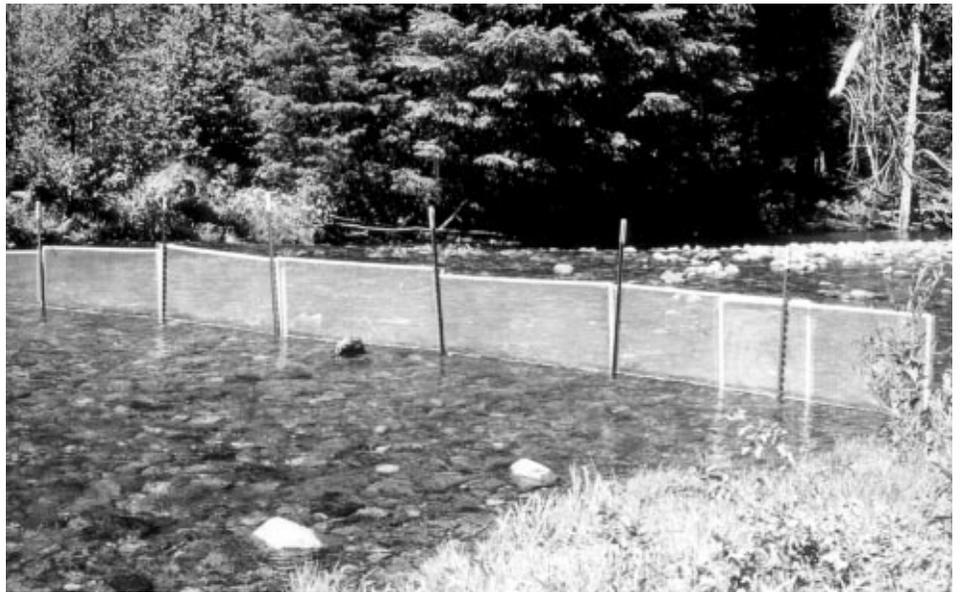


Figure 4. Fence installed in the river.

tions as either *pools* or *riffles*. They removed the largest and most dominant fish from the areas between the fences. Then, they placed one new large cutthroat trout into each fenced section of the river. By creating eight sections, the scientists were able to study the favorite locations of eight new trout.

Fish can be hard to distinguish from one another, and may be especially hard to locate in a mountain river. To keep track of the new trout, the scientists surgically implanted radio transmitters into the trout before releasing

them into the fenced sections of the river. They recorded each trout's location and movement for 1 week. They identified whether the new trout preferred pools or riffles, and whether the new trout preferred the same locations as the trout that had been removed (Figure 5).



Reflection Section

- Why do you think it was a good idea to create eight sections to study, instead of just one?



Figure 5. Marking locations in the river.

- The scientists expected the new trout to prefer the same locations as the trout that had been removed. What do you think they found?

Results

Right after they were placed into the river, the new cutthroat trout swam around much more than normal. The scientists think that was because the trout had just been handled by humans. Once the trout became accustomed to their new home, the scientists discovered that most of the trout preferred to swim in pools rather than riffles (Figure 6). This did not surprise the scientists, for they already knew that trout prefer to swim in pools. However, the new trout did not always select the same pools that were selected by the trout that had been removed from the stream sections. This was a surprise to the scientists. It surprised them because other

studies had shown something different. Other studies had found that salmonids consistently selected the same pools as their favorite place to swim.



Reflection Section

- What might be some of the reasons the new cutthroat trout did not swim in the same

locations as the old cutthroat trout?

- If you were the scientist, what would you conclude from this research?

Implications

The scientists offered three possible explanations for this surprising finding. First, they guessed that new trout did not occupy the same locations as the old trout because they were not familiar with the river and did not know where those preferred locations were. Second, they guessed that cutthroat trout may need more than 1 week to thoroughly explore the advantages and disadvantages of various locations in a river. Third, they guessed that many locations within a river may be equally preferred by trout and not necessarily just those locations preferred by old (removed) trout.

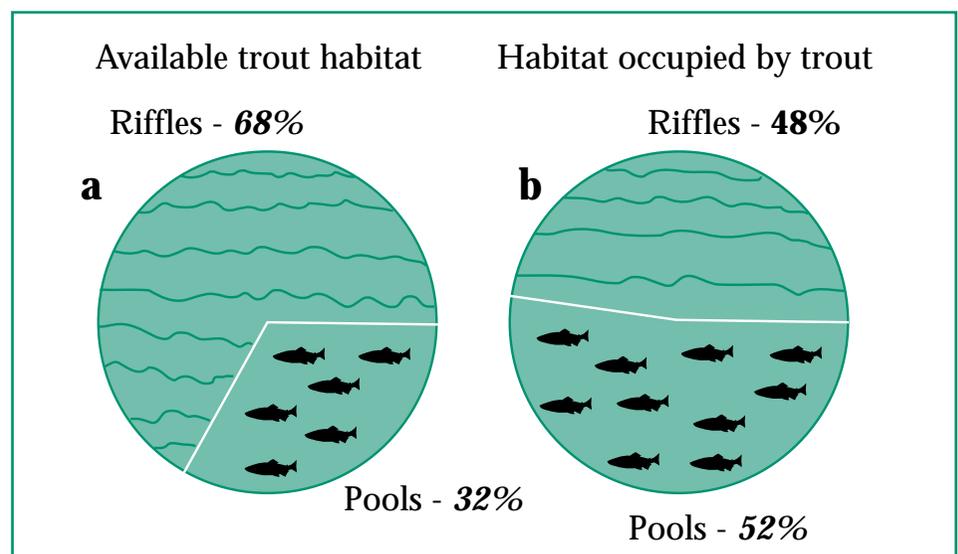


Figure 6. Pie charts showing (a) percentage of available pools and riffles and (b) percentage of trout that occupied pools and riffles.

Fin Trading Is In

The Bonneville cutthroat trout is the State fish of Utah. The trout's habitat is threatened by many disturbances. Many of the locations that would have been perfect to hold the biathlon and nordic combined ski events for the 2002 Games were also areas where streams contained

Bonneville cutthroat trout. If these natural areas were developed for the ski events, the trout's habitat would be further disturbed. What do you think might happen to some of Utah's State fish? What do you think the 2002 Games planners decided to do? They did the best thing for the trout

and found a site that was great for skiing and wasn't home to any sensitive animal species! By doing it this way, even the trout can win!



The scientists concluded that natural resource scientists should be careful when they identify some locations as the most preferred habitat for fish. This is especially true when they base that identification on the location of the most dominant fish.



Reflection Section

- Often, natural resource managers change natural

resources to create better habitat for a species. What might happen if natural resource scientists incorrectly identify a favorite type of habitat?

- Once this research was finished, what should the scientists have done with the fences they put in the river?



FACTivity

In order to learn about trout habitat, the scientists in this study had

to learn how to carefully observe and record their observations. In this FACTivity, you will learn how to improve your observation skills. Bring a natural object for observation, such as a stick, rock, or a leaf to class. Place the item on your desk in front of you. Just sit and observe the item. What color is it? Is it the same color all over? What shape is it? What else can you observe about the item? Write down everything you observe about the item. Use the chart below as a sample. You may have many more than five observations! After you have finished observing your own item, choose another student as a partner to exchange your item with.

Repeat your observation using your partner's item.

Compare your observations with those of your partner. How are they similar? How are they different? What does this tell you about observation? Have a class discussion about how observations of the same item can be similar and different. Why do you think observations of the same item may be different for different people?

From Young, Michael K.; Meyer, Kevin A.; Isaak, Daniel J.; and Wilkison, Richard A. (1998). Habitat selection and movement by individual cutthroat trout in the absence of competitors. *Journal of Freshwater Ecology*, 13(4): 371-378.

Website:

<http://www.fs.fed.us/rm/main/labs/laramie/rmrs4352.html>

Sample chart for recording observations.

Name of object:	
Observation 1:	
Observation 2:	
Observation 3:	
Observation 4:	
Observation 5:	