

Goldfinch and the Three Scales:



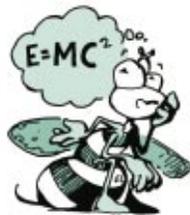
Investigating Songbird Habitats Near Rivers

Meet Dr. Vicki Saab:

I like being a scientist because it is exciting to discover new information about our natural world and to solve problems that will help save animals and plants from *extinction*.



Dr. Vicki Saab



Thinking About Science

Scientists who study *ecology* are called ecologists. Ecologists study the natural environment at different *habitat scales*, often focusing on studying a large area so that they can better understand how plants, animals, and the land interact. Scientists may also focus on a small scale, as when they study the habitat in the immediate natural area where an animal lives. In this study, the scientist was interested in comparing different sizes, or

Glossary

extinction (ek **sting**k shen): No longer existing.

ecology (e **käl** uh je): The study of the interactions of living things with one another and with their environment.

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

scale (sca(uh)l): When you observe something close up or far away, you are observing at different scales.

species diversity (spe sez duh **vür** suh te): Number of different types of plants or animals in an area.

biodiversity (bi o duh **vür** suh te): A measure of the differences between the types and numbers of living things in a natural area.

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

native (na tiv): Naturally occurring in an area.

nonnative (nän **na** tiv): Not naturally occurring in an area.

dependent (de pen dunt): Relying on.

cottonwood (kä ten wood): A type of poplar tree that has seeds with cottony hairs.

hectare (hek täär): A metric measure of land area equal to .405 acre.

landscape (land scap): All of the land forms of a region.

relationship (re **la** shen ship): When two or more things are connected in some fashion.

wetland (wet land): Area of land with lots of soil moisture.

Pronunciation Guide

a	as in ape	ô	as in for
ä	as in car	ü	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

scales, of songbird habitat, so that she could better understand which kinds of natural places songbirds prefer to live.



Thinking About the Environment

Species diversity is a particular kind of

biodiversity. Species diversity is a measure of how many different kinds of *species* live in an area and the numbers of each species. For a natural area to be healthy, it should have many different forms of life. It is best when those species are *native* to the area. When *nonnative* species move into an area, they sometimes compete with the native species for food and homes. An example of a nonnative bird is the brown-headed cowbird. The scientist in this study was interested in the diversity of native songbird species living in riparian forests. Riparian forests are forests located on or near the banks of waterways. Dr. Saab wondered whether nonnative bird species were moving into the forests. If they were moving into the forests, they might be pushing native songbirds out. This would reduce the songbird species diversity. She thought that agriculture and home building on the land surrounding the forests might be creating habitats more favorable for nonnative bird species.

Introduction

Some scientists think that wildlife is mostly *dependent* on the immediate natural area in which it lives. Dr. Saab was interested in exploring this idea, because she thought that native songbirds might also be affected by the larger environment surrounding their immediate forest home. She decided to study areas of land on either side of the South Fork of the Snake River in southeastern Idaho (Figure 1). In the past, large riparian *cottonwood* forests grew along the river (Figure 2). Now only

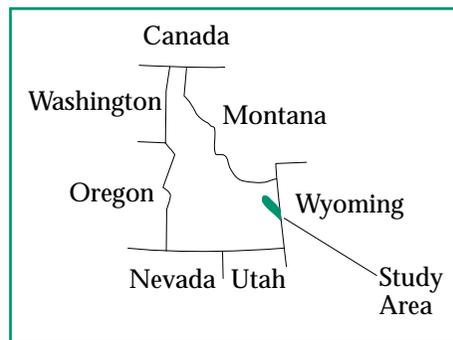


Figure 1. Location of the study area—The South Fork of the Snake River, Idaho.



Figure 2. Cottonwood tree.

small patches of forest remain. In addition to more natural areas, agricultural land and houses and yards are now found beside the forests (Figure 3). Dr. Saab wanted to know whether the types of songbird species were different in forests with different surroundings. If the type of bird species was the same regardless of the type of land outside of the forest, she would conclude that bird species are mostly dependent on their immediate natural environment, and not on the larger environment outside of their immediate forest home.



Reflection Section

- If Dr. Saab finds that different types of songbird species are nesting in forest areas with different types of surroundings, what should she conclude about songbirds' dependency on natural environments?
- If you were the scientist, how would you find out what kinds of songbirds live in the riparian cottonwood forests along the South Fork of the Snake River?

Methods

Dr. Saab divided the natural areas into three categories of songbird habitat. She called the smallest area a *microhabitat* (as in microcomputer, meaning small computer). The microhabitat included the

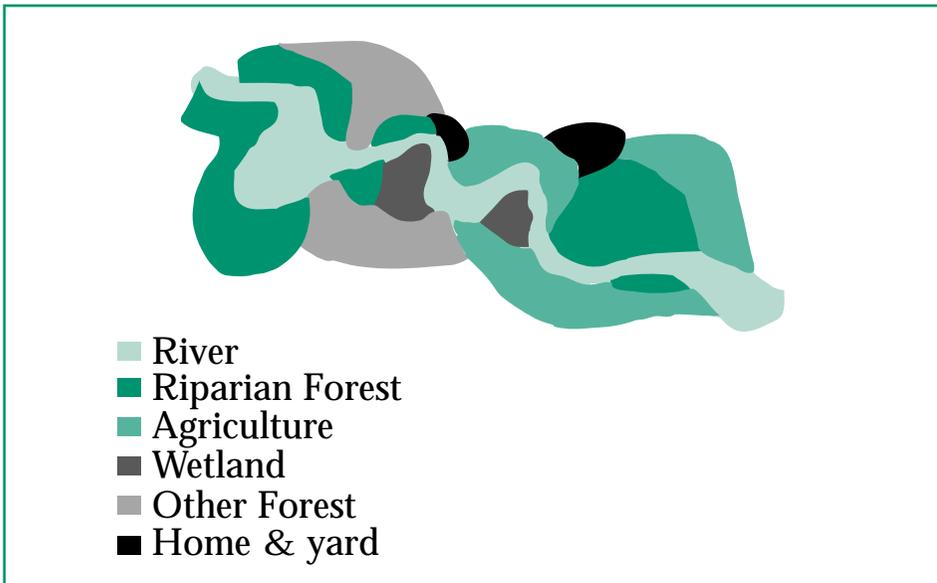


Figure 3. Types of land around the South Fork of the Snake River.

trees, shrubs, and other plants within a small area of cottonwood forest. She called the cottonwood forests macrohabitats, and measured their size (in *hectares*). Dr. Saab called the microhabitat, the macrohabitat, and the land beside it a *landscape* (Figure 4). The landscape might have

included houses and yards, croplands, wetlands, and different kinds of forests that were found beside the cottonwood forests, as well as the cottonwood forest itself. Dr. Saab identified the type of songbirds in each of the microhabitats of the cottonwood forests. (Remember that

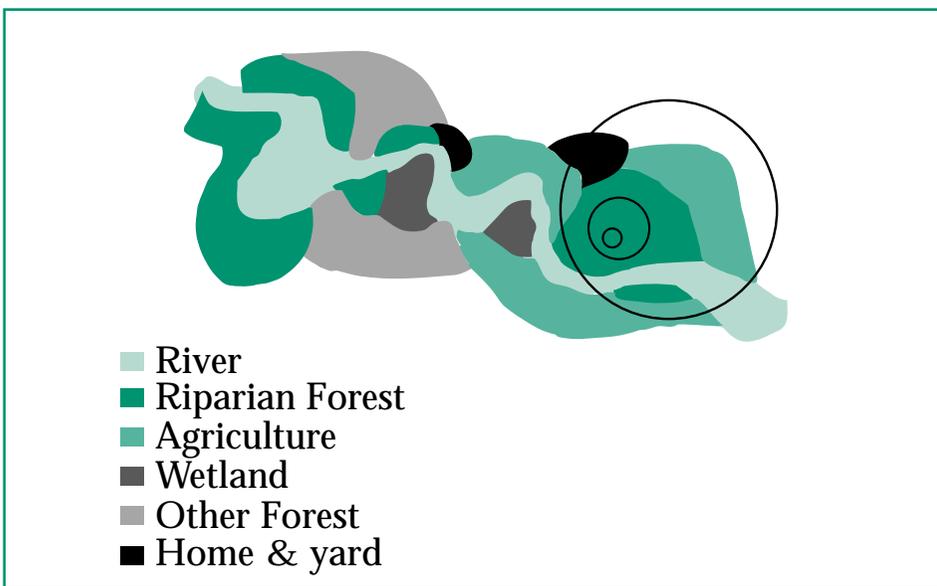


Figure 4. Microhabitat (small circle), macrohabitat (middle circle), and landscape (large circle). Notice that the microhabitat and macrohabitat are completely contained within the riparian forest. Dr. Saab studied many of these sites along the river.

a microhabitat is also a part of a macrohabitat and a landscape.) She identified and counted birds by standing at different places within each area, and identifying and counting the birds she saw through a pair of binoculars (Figure 5). She then compared the type of songbird counted in each of the microhabitats with its relationship to the macrohabitat and the landscape.



Figure 5. Dr. Saab using a pair of binoculars to look for birds.



Dr. Saab holds a Lazuli bunting after she placed a band on its leg. The band will help her to identify the bird in the future. After placing the band on the bird's leg, Dr. Saab released it back into its habitat along the Snake River.



Reflection Section

- Since all of the bird identification was done in cottonwood

forests, do you think that all of the songbird species Dr. Saab identified in each of the microhabitats were the same? Why or why not?

- Why is it important to know whether songbird species are affected by the lands outside of their immediate forest home?

Results

Dr. Saab found that nonnative songbirds were mostly living in cottonwood forests near agricultural and residential lands. These nonnative birds sometimes compete with native songbirds for habitat needs, such as nest sites and food. She found that the greatest diversity of native birds live in cottonwood forests next to natural areas, such as wetlands or other forest areas (not agriculture or residential). Thus, Dr. Saab concluded that landscapes were just as important as microhabitat or macrohabitat for native and nonnative songbirds, meaning that birds of cottonwood forests are dependent on a larger scale of natural area than just their immediate forest home. Dr. Saab found that cottonwood forests cannot support native bird species very well if areas around them are developed into agriculture

and residential areas. When homes and farms are introduced, nonnative birds are more likely to move into the forest. Then fewer native songbird species can live in these forests, meaning that overall, native *species diversity* is reduced.



Reflection Section

- Should we be concerned about the loss of native song-

birds in natural areas? Why or why not?

- Should we be concerned about the loss of species diversity in natural areas? Why or why not?

Implications

Dr. Saab was interested in looking at different scales when studying the natural environment. In this study, she wanted to know whether the type of land outside the riparian cottonwood forest was important to songbirds living in these forests. If we want to preserve species diversity of songbirds, we should consider natural areas larger than just the forest that is the birds' immediate home.



Reflection Section

- Do you think that the landscape around small forested

environments might impact other animals (such as rac-

coons or snakes) that are found in forested environments? Why or why not?

- What is one thing humans can do to protect the habitat of native animal species in small forested environments?

FACTivity

To better understand songbird habitat, Dr. Saab wanted to look at the big pic-



ture. In this FACTivity, we are going to make observations at different scales, just like Dr. Saab. To do this FACTivity, your class will become a spaceship full of Martian scientists. Your spaceship has just landed on Earth. The Martian leader (your teacher!) has asked for a report about the Earth's environment. Some of your class will be "small-scale Martian scientists," some will be "medium-scale Martian scientists," and others will be "large-scale Martian scientists."

The Martian leader should divide your class into three groups, each representing a different scale. The small-scale Martian group should have only two students (remember – small scale!). The medium-scale Martian group should not have more than six students. The large-scale Martian group should include the rest of the students, and should work in teams of six Martian scientists each.

This Is for the Birds!

Salt Lake Games planners needed to find an area to hold the cross-country ski competitions. Many of the places that would be great for the competitions were also perfect for the birds—songbirds, that is! Instead of using the songbirds' home, they found an area that

had been used for cattle grazing. They planted *native* trees in the area, and even created a *wetland!* This area became the perfect spot for the cross-country ski competition. Not only that, it is now becoming more and more like a natural area in Utah, and eventually

will even become the home for more songbirds.



Using a large ball of string or twine, the Martian leader should cut one string 36 inches and one 50 feet. Tie the ends of each string together to make two circles with the two strings. After you go outside, place the two string circles on different areas of the ground—the smaller circle should be placed inside the larger circle. The larger circle should include an “edge.” An edge defines a change in the environment, such as from a grassy area to a wooded area. It might include the edge of a stream, the edge of a parking lot, a sidewalk, or any other kind of change in the environment. If you are a small-scale Martian scientist, you will explore the small circle. If you are a medium-scale Martian scientist, you will explore the large circle. If you are a large-scale Martian scientist, you will explore the whole schoolyard.

Spend 15 minutes exploring your area and record what you find. You may use the chart below as an example. With other Martians in your group, compare what you

Sample chart

Which scale?	<input type="checkbox"/> Small	<input type="checkbox"/> Medium	<input type="checkbox"/> Large
Observations: Record number and description of plants, colors, textures, ground features, insects and other animals, surfaces, etc. You may draw illustrations, record movements. You may record how things feel to the touch. Observe carefully and completely!			

found and prepare an oral report to present to the Martian leader and the rest of the class. In this report, you must explain what the schoolyard environment on Earth is like, based on your explorations within your study area.

After the presentations, discuss what each Martian group discovered with the rest of the class. How were the observations similar? How were they different? If the observations were different, why? Which area had the greatest variety

of things? Which was the most accurate description of the schoolyard environment? Which was the most difficult to describe? Why? What does this exercise tell you about making observations at different scales?

From: Saab, Victoria. (1999). Importance of spatial scale to habitat use by breeding birds in riparian forests: A hierarchical analysis. *Ecological Applications* 9(1): 135-151.

Website:

<http://www.fs.fed.us/rm/boise/riparian/riparian.htm>