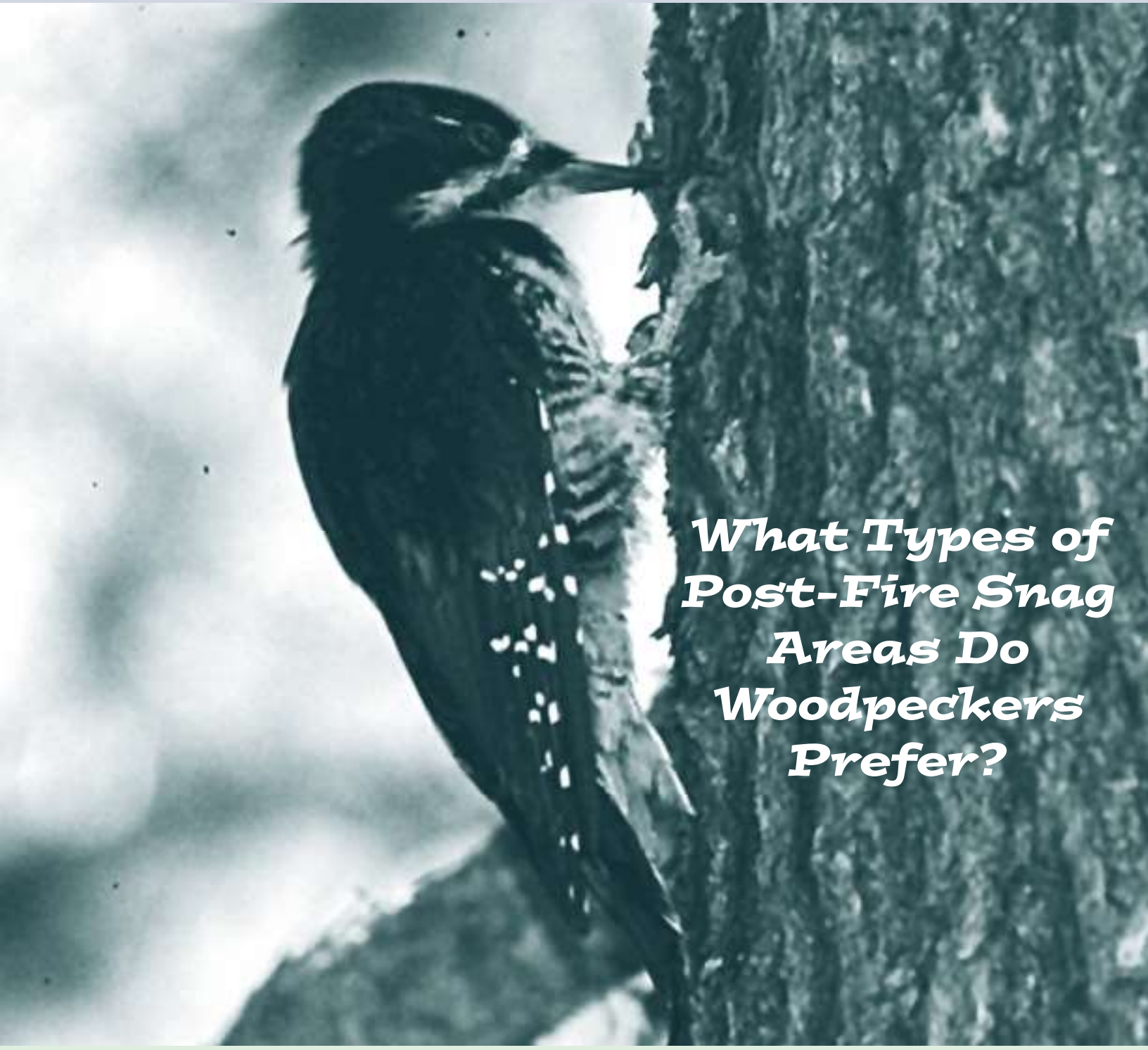
Pecking Order:



What Types of Post-Fire Snag Areas Do Woodpeckers Prefer?

Photo by Terry Spivey, Forest Service, http://Bugwood.org.

Meet the Scientists

Dr. Chad Hanson, Forest and Fire Ecologist: My favorite experiences as a scientist are when I'm doing field work in burned forest habitat. I like working in fire areas where most of the trees were killed by fire. Many people assume that these areas are somehow damaged. In reality, the sights and sounds of native wildlife species, especially birds, are more evident in these types of forests than in others. ▼

▲ Dr. Malcolm North, Forest Ecologist: My favorite science experience was climbing into the top of a 175-foot-tall red fir to collect **lichen samples** during a wind storm.

Thinking About Science

As scientists continue to do research, they learn new things. In the past, for example, scientists believed the best thing to do after a severe wildfire was to cut down and remove most of the snags. Snags are dying or dead trees that are left standing after a fire, flood, wind, disease, or insect damage. More recent research, however, has shown that snags may provide **ecological** benefits to an area.

When science is used to solve a problem or make something better, it is called applied science. In this study, the scientists were doing applied science. This is because their research could be used to help forest managers take better care of the forest after a wildfire occurred.

Thinking About the Environment

Think about your friends at school. They may seem similar to each other, but none of them are alike. This is true, even though they may like the same activities and laugh at the same jokes. Like your friends at school, all wildfires may seem alike, but they can actually be very different. One of the ways that wildfires are different from each other is that they burn at different **severity levels.** Wildfires are classified as low-, moderate-, or high-severity fires. High-severity fires are where most or all of the trees are killed by the fire **(figure 1)**. Low-severity fires still have trees that are living **(figure 2)**.

Because wildfires do not burn evenly, a patch of forest that has experienced a high-severity burn may be almost surrounded by areas that have experienced low or medium severity wildfire.

Figure 1. A high-severity wildfire burned this area. You can see that most or all of the trees are dead. Photo by Randall Whitehall, Forest Service.

Figure 2. A low-severity wildfire burned this area. Although some of the trees' needles or leaves may be brown, few trees have been damaged by the wildfire. Photo by Randall Whitehall, Forest Service.

Introduction

Trees that are dead but still standing are called snags. Even though snags are dead, they are still are important parts of the forest. Snags provide benefits to the environment, especially to the animals that live nearby. Some of the benefits include providing a home for birds, mammals, reptiles, and amphibians. Snags also are used as hunting perches by birds and perches for songbirds. Snags are a good source of food for some animals because snags provide **habitat** for insects, mosses, lichens, and fungi. Some woodpeckers use snags for food. The Black-backed woodpecker is one of the animals that needs snags to survive **(figure 3)**.

Figure 3. Black-backed woodpecker. Photo by Terry Spivey, Forest Service, courtesy http://Bugwood.org.

The Black-backed woodpecker is considered a keystone species. A keystone species is one that can indicate problems in the environment. This is because these species are sensitive to environmental changes. If their population numbers fall, for example, this might mean that other species needing that same environment are in danger also. For example, in the 1870s there were a lot of Black-backed woodpeckers in the Sierra Nevada **(figure 4)**. By the 1920s, however, there were relatively few of these woodpeckers. This drop in woodpecker population indicated that there was something changing in the environment that was causing problems for the woodpecker. There were probably problems for other **species** living there as well.

Forest managers usually leave between three to six large snags per acre after a wildfire. The rest are cut down and removed. Past records had showed that the Black-backed woodpecker seemed to live in forest areas with a lot of snags. Because the population of Black-backed woodpeckers had fallen in the Sierra Nevada, scientists wanted to study what types of **post-fire** habitats this woodpecker liked best. In this study, the scientists wanted to know what types of post-fire snag forests were best for the Black-backed woodpecker's **foraging**.

Figure 4. The Sierra Nevada is located in the Western United States.

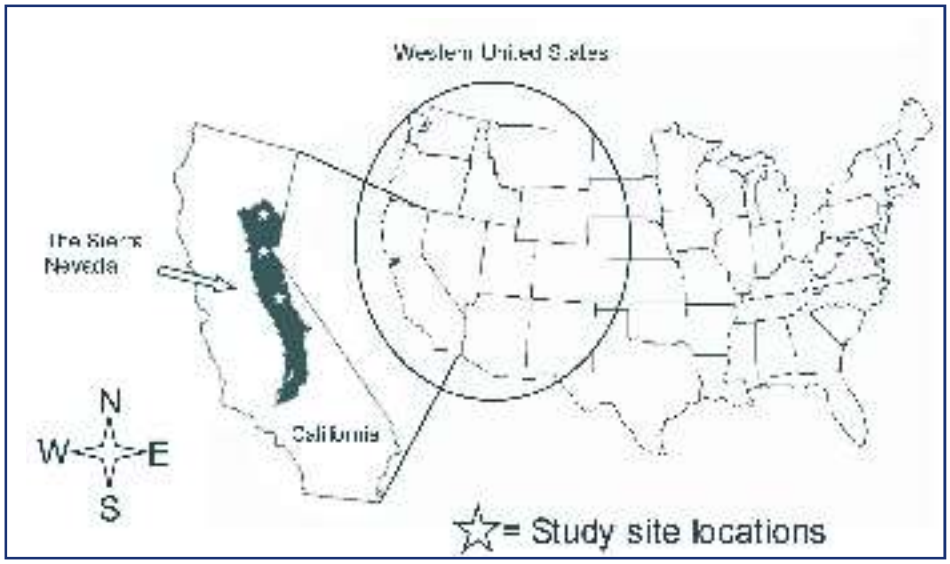


Figure 5. The location of the study sites in the Sierra Nevada.

Reflection Section

- In the form of a question, state what the scientists wanted to learn in this study.
- In your own words, describe why a keystone species is important.
- Do you think it is important to improve the habitat for keystone species? Why or why not?

Methods

The scientists studied several different patches of forest in the Sierra Nevada **(figure 5)**. Each patch was at least 12 hectares in size. The study took place from 2004 through 2006. Each patch was labeled as having experienced a moderate-severity or high-severity wildfire. The scientists also noted whether or not the area had any of its snags removed and how many snags were in each hectare **(figure 6)**.

The scientists walked through all of the patches and recorded the presence or absence of the Black-backed woodpecker. The scientists started their observations 100 meters from the edge of the patch and moved toward the center **(figure 7)**. Every 200 meters the scientists stopped and recorded the presence or absence of the woodpecker during an 8-minute time period. The same method was used in each patch.

Number Crunches

- Each patch was at least how large in acres? Multiply 12 by 2.47 to find out.
- How many total forest patches were studied by the scientists?

Habitat condition	Number of patches studied
Unburned	9
Moderate-severity and all snags left standing	8
High-severity and all snags left standing	10
High-severity and only 8-15 large snags left standing per hectare	9

Figure 6. The scientists studied four different post-fire conditions.

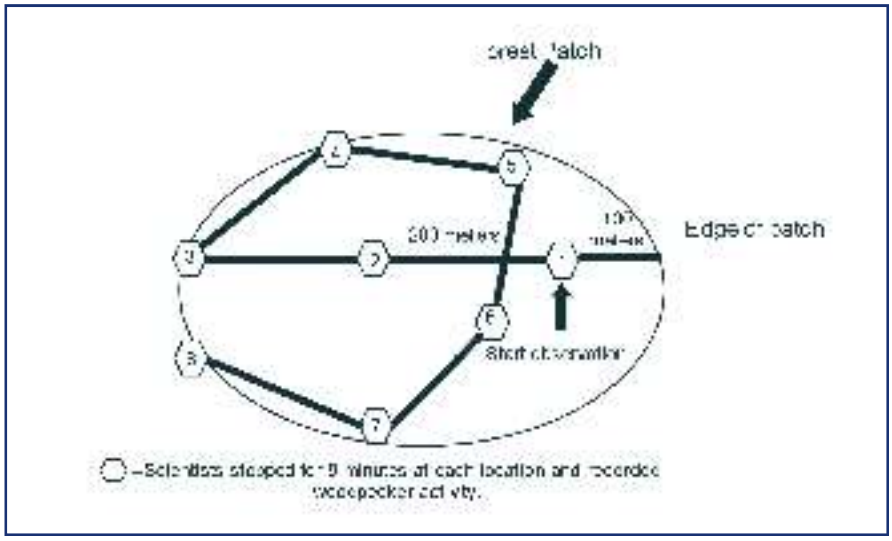


Figure 7. Each patch was surveyed in the same way for the presence or absence of the Black-backed woodpecker.

Reflection Section

- Why do you think the scientists noted how many snags were in the patches?
- Do you think it is important that the scientists used the same method in each patch to record the presence of the Black-backed woodpecker? Why or why not?

Findings

The scientists reviewed all the information they collected. They put their observations into a computer program to help them **analyze** the data. When they analyzed their observations, the scientists found that Black-backed woodpeckers were found in only one type of patch. The woodpeckers were found only in patches that had experienced high-severity wildfires and where all of the snags were left standing.

The scientists found that there was a difference between the number and size of snags in each type of patch **(figure 8).**

Reflection Section

- Do you think that the number of large snags in each patch was related to the number of woodpeckers found there? Why or why not?
- Why do you think the woodpeckers preferred patches with large snags left standing?

Habitat condition	Number of patches studied	Average number of medium size snags per hectare	Average number of large snags per hectare
Unburned	9	13.9	7.4
Moderate-severity and all snags left standing	8	110.8	53.4
High-severity and all snags left standing	10	127.5	124.2
High-severity and only 8-15 large snags left standing per hectare	9	169	18.5

Figure 8. The average number of snags per hectare in each of the patch types.

Discussion

The Black-backed woodpecker clearly prefers one type of habitat for foraging. Patches that experienced high-severity burns with snags left standing were the favorite areas for the woodpecker. This research suggests that, if forest managers want to support the population of Black-backed woodpeckers, they should not remove snags from patches that had experienced high-severity burns.

Reflection Section

- In your own words, describe the habitat the Black-backed woodpecker prefers for foraging.
- Why is this research useful for forest managers?

Adapted from Hanson, C.T. and North, M.P. (2008). Postfire woodpecker foraging in salvage-logged and unlogged forests of the Sierra Nevada. *The Condor.* 110 (4): 777-782. http://www.treesearch.fs.fed.us/pubs/33988.

Glossary

Analyze ('a-nə-ˌlīz): To separate something into its parts in order to examine them.

Ecological (ˌē-kə-'lä-ji-kəl): Having to do with ecology, the study of organisms and their relationship with their environment.

Forage ('fȯr-ij): Food for animals usually taken by browsing or grazing; the act of taking such food.

Habitat ('ha-bə-ˌtat): Environment where a plant or animal naturally grows and lives.

Lichen ('lī-kən): Plant-like organisms that are made up of an alga and a fungus. They are found on rocks, on branches, and in many other places.

Post-fire ('pōst 'fi(-ə)r): After a fire.

Sample ('sam-pəl): A part or piece that shows what the whole group or thing is like.

Severity level: (sə-'ver-ə-tē 'le-vəl): A measure of the amount of trees that are killed due to a fire.

Species ('spē-(ˌ)shēz): Groups of organisms that resemble one another in appearance, behavior, chemical processes, and genetic structure.

Accented syllables are in **bold.** Marks taken from Merriam-Webster Pronunciation Guide.

FACTivity

Time Needed

One class period

Materials needed

pencils, notebooks

The question you will answer in this FACTivity is: What attracts Black-backed woodpeckers to their habitat?

Procedure:

Before beginning, you may download the following *Natural Inquirer* article from the *Natural Inquirer* Web site: "Wood Roaches for Dinner Again?" (http://www.naturalinquirer.org/Fall-98-Edition-i-6.html). You may use this article as part of your research about the habitat of various species of woodpeckers.

Using the media center, Internet, and other sources, you should become familiar with the nesting and eating preferences of woodpeckers in general. Then, you should focus your research on the Black-backed woodpecker. Answer questions such as "What do Black-backed woodpeckers eat? Where do Black-backed woodpeckers make their nests?"

Once you have learned about the habitat preferences of Black-backed woodpeckers, imagine what it might be like to be a Black-backed woodpecker. Pretending to be a Black-backed woodpecker, write a letter to another species of woodpecker. In the letter, describe your life as a Black-backed woodpecker in post-fire forests of the Sierra Nevada. Include information about where Black-backed woodpeckers live and why, what they eat, and where they find their food. Use information from this article to describe, from a woodpecker's perspective, the research that was done. Imagine and describe how Black-backed woodpeckers responded to the research being done between 2004 and 2006.

Share your letter with the class. In a class discussion, compare and contrast the letters. What was similar and different about the lives of the woodpeckers? What kind of responses did the woodpeckers have to the research being done by the scientists? Your teacher will have you explain why you wrote your letter as you did. Your teacher will then have you answer the question posed at the beginning of this FACTivity.

FACTivity Extension

Students may compose pictures of Black-backed woodpeckers in their Sierra Nevada post-fire habitat. These may be paired with the letters and posted on the wall or in the school hallway.

National Science Education Standards addressed in the article:

Science as Inquiry:
Abilities To Do Scientific Inquiry;
Understandings About Scientific Inquiry

Life Science:
Structure and Function in Living Systems;
Regulation and Behavior;
Populations and Ecosystems;
Diversity and Adaptation of Organisms

Science in Personal and Social Perspectives:
Populations, Resources, and Environments;
Natural Hazards;
Risks and Benefits

History and Nature of Science:
Science as a Human Endeavor;
Nature of Science

Additional Web Resources

Snag and Den Tree Habitat for Wildlife
http://gf.state.wy.us/downloads/pdf/habitat/Bulletin%20No.%2046.pdf

Cornell University's Black-backed Woodpecker information
http://www.allaboutbirds.org/guide/Black-backed_Woodpecker/lifehistory

Wildfire Burn Severity Classification
http://www.mt.nrcs.usda.gov/technical/fires/severity.html

Teachers: If you are a PLT-trained educator, you may use Activity #81, "Living With Fire," and #22, "Trees as Habitats," as additional resources.