Science Application and Integration Program

National Fire Plan Research Highlight
October 2011

Providing scientific knowledge and technology to sustain our nation's forests, rangelands, and grasslands

For additional information, contact:

G. Sam Foster
RMRS Director

970-498-1353
gfoster@fs.fed.us

Compiled by USDA Forest Service, EMC Publishing Arts.

Rocky Mountain Research Station

240 W. Prospect Rd. | Fort Collins, CO 80526 | (970) 498-1100 | www.fs.fed.us/rmrs

Birds and Fire

Since the mid-1990s, scientists from the USDA Forest Service, Rocky Mountain Research Station, have been studying the effects of fire on birds in ponderosa pine forests of the Interior West. This research aims to assist land managers as they consider options for forest restoration, fuels and fire management, and bird habitat creation and maintenance.

"This research has helped us assess project impacts to fire-associated woodpeckers and design projects based on their needs."

—Kim Mellen-McLean, Pacific Northwest Regional Wildlife Ecologist

Are Fuels Reduction, Prescribed Fire, and Bird Habitat Compatible?

Although birds' responses to fire vary from tolerant to intolerant to neutral, many birds are dependent on fire landscape characteristics.

Fire affects forest bird habitat in three major ways:

- Fire alters understory and overstory structure.
- Fire creates and destroys downed woody debris.
- Fire creates and destroys standing dead trees (snags).

Stand Structure

Stand structure largely determines the availability of roosting habitat, foraging habitat and food sources, and nesting habitat and nest sites for forest birds.

Fire severity depends on habitat conditions preceding the fire—vegetation types, crown closure, and climate. Habitats are affected by the conditions following fire—especially newly created snags, downed wood, and understory vegetation composition.

Surface fire in ponderosa pine forest.

Downed Wood

Many insect foragers and ground nesters depend on downed wood for food sources and nesting habitat.

Even low-severity fires can consume downed wood when fuel moisture is low. With fuel moistures less than 15 percent, fire generally consumes about half of the large downed wood. If maintenance of downed wood is an objective, it is important to burn while fuel moistures are high and fire severity projections are low.

Standing Dead Wood

Snags, especially those of large diameter, are very important as nest sites for cavity-nesting birds. They also provide roosting, nesting, and foraging habitat for a variety of wildlife.

Fire can destroy snags, and many prescribed fire plans call for snag protection by removing combustible fuel near the snag base. However, this process is very labor intensive and should be used only if large snags are rare or you are required to protect them. Instead, prescribed fire can be an effective tool to create new areas of high snag density and snags of various sizes.

Science Application and Integration Program

Rocky Mountain Research Station

240 W. Prospect Rd. | Fort Collins, CO 80526 | (970) 498-1100 | www.fs.fed.us/rmrs

Fire Landscape Habitat Timeline

The relationship between bird habitat and fire is extremely complex, but some generalizations help to advise management strategies for forest bird guilds – groups of species that use resources in similar ways.

- Immediately following fire, bark foragers, aerial insectivores, and cavity-nesters move in. Low-severity prescribed fire can reduce ladder fuels and increase occupancy rates of several woodpecker species of management interest.
- Regrowth of understory vegetation within a few years after a fire often brings in aerial and ground insectivores, nectarivores, and seed eaters because of increases in nest sites and food supplies.
- Shrub nesters and omnivores prefer young forests several years after a burn, when snags start to fall and the understory shrub layer develops.
- Aerial insectivores such as Lewis's woodpecker and mountain and western bluebirds are abundant in both recent burns (2–4 years old) and older burns (10–25 years old).
- Foliage gleaners and closed-canopy nesters prefer mature or old growth forests. In these studies, occupancy rates decreased within 2 years of prescribed fire, but evidence suggests that these negative responses are short-term. Monitoring is needed to determine the long-term effects of prescribed fire.

Lewis's woodpecker.

Management Implications

Efforts to achieve the "natural" fire regime on a unit or across a landscape may be unrealistic. Rather, we suggest using experimentally imposed fire regimes to measure the response of organisms, populations, and communities, then setting goals based on your results. Without specific management requirements, our research results suggest using a mix of approaches diverse in time and space, from thinning and prescribed fire to managed wildfire. These practices can achieve a range of fire severities and burn patch sizes, thus creating a mosaic of suitable habitats for forest birds.

For more information, see these recent publications:

Saab, V.A., and H. Powell (eds.). 2005. Fire and avian ecology in North America. Studies in Avian Biology No. 30.

Saab, V.A., L. Bate, J. Lehmkuhl, B. Dickson, S. Story, S. Jentsch, and W. Block. 2006. Changes in downed wood and forest structure after prescribed fire in ponderosa pine forests. pages 477–487 In: Andrews, P.L.; Butler, B.W., comps. Fuels Management – How to Measure Success: Conference Proceedings. 2006. Proceedings RMRS-P-41. USDA, Forest Service, Rocky Mountain Research Station. Pages 28-30.

Saab, V., W. Block, R. Russell, J. Lehmkuhl, L. Bate, and R. White. 2007. Birds and Burns of the Interior West. General Technical Rep. PNW-GTR-712. USDA Forest Service, Pacific Northwest Research Station. 24 pages. Available at (http://www.rmrs.nau.edu/publications/saab_et_al_2007/saab_et_al_2007.pdf).

Russell, R.E., A. Royle, V. Saab, J. Lehmkuhl, W. Block, and J. Sauer. 2009. Modeling the effects of environmental disturbance on wildlife communities: avian responses to prescribed fire. Ecological Applications, 19:1253–1263.

Saab, V., R. Russell, J. Rotella, and J. Dudley. 2011. Modeling nest survival of cavity-nesting birds in relation to postfire salvage logging. Journal of Wildlife Management 75(4): 794–804.

Lead Scientist:
Vicki Saab
Rocky Mountain Research Station,
Bozeman, MT
vsaab@fs.fed.us
www.rmrs.nau.edu/wildlife/birdsandburns