Stand-Replacement Fire: For the Birds?

Richard Hutto

In the Northern Rockies, forests that have escaped fire are rare. For mid- to high-elevation forest types (the vast majority within the region), the predominant fire regime is one of infrequent, intense, stand-replacement fires—not one of frequent, low-intensity, understory burns.

Remarkably, many plant and animal species have evolved to depend on the early postfire conditions created by severe fires. During the two breeding seasons immediately following the numerous and widespread fires of 1988, for example, I estimated bird-community composition in each of 34 burned-forest sites in western Montana and northern Wyoming. Contrary to what one might expect to find immediately after a major disturbance event like a wildfire, I detected a surprisingly large number of species in forests that had undergone stand-replacement fires.

My studies detected an average of 45 bird species per site, and a total of 87 species in the sites combined. Since then, I have conducted studies in an additional 20 fires that burned in 2003, and the results are much the same. Some of the most commonly detected species in burned forests are Hairy Woodpecker, American Robin, Mountain Bluebird, and Dark-eyed Junco. The most important finding, however, has been that no fewer than 15 bird species are more abundant in early postfire communities than they are in any other major cover type occurring in the northern Rockies.

In fact, one bird species, Black-backed Woodpecker, seems to be nearly restricted in its habitat distribution to standing dead forests created by stand-replacement fires. No other forest-bird species is as specialized on postfire conditions as this woodpecker species. Even more astounding is the fact that this and several other bird species, including American Three-toed Woodpecker, Hairy Woodpecker, and Mountain Bluebird become more common as fire severity increases.

Bird communities in recently burned forests are different in composition from those that characterize other Rocky Mountain cover types (including early-successional clearcuts) primarily because members of three groups are especially abundant in such forests: woodpeckers, which feed on the abundant beetle larvae beneath the bark of standing, fire-killed trees; flycatchers, which take advantage of the open conditions for sallying after flying insects; and seedeaters, which capitalize on the increased availability of seeds, both from cones and from early-successional forbs and grasses.

Standing, fire-killed trees provide nest sites for a large majority of species that nest in the burned areas, and broken-top snags and standing dead aspens seem to be preferred as nest sites for cavity-nesting species. Moreover, because nearly all of the broken-top snags that are used were present before the fire event, forest conditions *prior* to a fire (especially the presence of snags) may be important to cavity-nesting birds *after* a fire. Any burned forest is not good enough for the fire specialists; they need burned forests with plenty of standing trees and plenty of already existing snags. Thus, for bird species that are relatively abundant in, or relatively restricted to, burned forests, stand-replacement fires may be necessary for long-term maintenance of their populations.

Even though recently burned forests are clearly biologically unique, several observations suggest that we may not be managing our public lands with an eye toward maintaining the kind of early successional stages that follow stand-replacement fires and, hence, toward maintaining critical habitat for many fire-dependent plant and animal species.

First, because the composition and structure of the dry forests dominated by ponderosa pine has changed due to fire suppression, excessive harvesting, and overgrazing, the fires that burn in those forests are also said to be unnaturally intense. Consequently, forest "restoration" projects are becoming more and more common. While some might argue that all forest types have been subjected to fire suppression for too long, and that unnaturally dense understory buildups are leading to unnaturally severe fires, the stand-replacement fires that currently consume forests that evolved under that regime (e.g., the 1988 Yellowstone fires) are not at all unusual in intensity or extent. In fact, as mentioned above, most of the forested landscape in the northern Rockies evolved under a regime of infrequent, large, high-severity fires, not under a regime of low-severity, frequent understory fires. Therefore, forest restoration projects are not really justified on the basis of "unnatural" structure and composition for the majority of forest types in Wyoming.

Second, one could argue that the loss of burned forest acreage due to fire control has been compensated for, at least in part, by timber-harvesting activities. As evidenced by letters submitted to the editors of local newspapers after any major fire event, many people believe that the conditions present after a clearcut or one of the newer green-tree retention cuts are basically the same as those present after a severe fire. Nothing could be further from the truth. Conditions created by a stand-replacement forest fire are biologically unique, at the very least, in terms of the biomass of standing dead trees that remain, and, to a much greater extent, in terms of ecosystem structure and function. While we do disturb forests through our cutting practices, we are not cutting trees in ways that mimic natural disturbance processes. Most cutting practices are, in general, poor substitutes for fire because they do not retain some of the most important elements (e.g., standing dead trees) that are integral components of the postfire ecosystem and that probably contribute to the production of unique successional pathways and unique wildlife communities.

Finally, both on public and on private lands, we often move rapidly to "salvage" burned trees after fires—the very elements that contribute to the biological uniqueness of burned forests, We should be more careful to leave an adequate amount of standing dead trees after a fire because many species depend on that forest element. If some bird species require burned forests for the maintenance of viable populations (a possibility strongly suggested, but not confirmed, by various studies), then postfire salvage cutting may be conducted far too frequently to be justified on the basis of sound ecosystem management.

Fire (and its aftermath) should be seen for what it is: a natural process that creates and maintains much of the variety and biological diversity that we see in the Northern Rockies. Without stand-replacing burns, we run the risk of adding even more creatures—like the Black-backed Woodpecker—to the ever-growing list of endangered species.

Unfortunately, Smokey the Bear's educational message still leads the public to believe that all wildfires are bad, which is simply untrue. It is time to set the record straight.

Further Reading

Brawn, J. D., S. K. Robinson, and F. R. Thompson. 2001. The role of disturbance in the ecology and conservation of birds. *Annual Review of Ecology and Systematics* 32:251–276.

George, T. L., and D. S. Dobkin. 2002. Effects of habitat fragmentation on birds in western landscapes. *Studies in Avian Biology* No. 25.

Hutto, R. L. 2006. Toward meaningful snag-management guidelines for postfire salvage logging in North American conifer forests. *Conservation Biology* 20:984–993.

Kotliar, N. B., S. Hejl, R. L. Hutto, V. A. Saab, C. P. Melcher, and M. E. McFadzen. 2002. Effects of wildfire and postfire salvage logging on avian communities in conifer-dominated forests of the western United States. *Studies in Avian Biology* 25:49–64.

Knight, R. L., F. W. Smith, S. W. Buskirk, W. H. Romme, and W. L. Baker, eds. 2000. *Forest Fragmentation in the Southern Rocky Mountains.* University Press of Colorado, Boulder.

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

Saab, V. A., W. Block, R. E. Russell, J. Lehmkuhl, L. Bate, and R. White, 2007. *Birds and Burns of the Interior West: Descriptions, Habitats, and Management in Western Forests.* USDA Forest Service, Pacific Northwest Research Station. General Technical Report PNW-GTR-712. Portland, OR.

Smucker, K. M., R. L. Hutto, and B. M. Steele. 2005. Changes in bird abundance after wildfire: importance of fire severity and time since fire. *Ecological Applications* 15:1535–1549.