The Ecological Importance of Severe Fire

Site visits to Lolo Creek and Blue Mountain Burned Areas

NORTHERN ROCKIES FIRE SCIENCE NETWORK

Field Trip Summary 3 | May 2014

Dr. Dick Hutto, professor of Organismal Biology and Ecology at The University of Montana, took participants of the May 2014 Large Wildland Fires Conference to recently burned sites to discuss fire effects. Hutto was enthused and excited about "the magical biology" occurring on recently burned sites. Magical biology includes regeneration and decay that are critical to ecosystem maintenance and health in dry conifer forests such as those surrounding the Missoula, Montana, area. The first stop was six miles east of Lolo, Montana, in a ponderosa pine-Douglas fir (*Pinus ponderosa-Pseudotsuga menziesii*) forest that burned in the August 2013 Lolo Complex fire. The next stop was in the same forest type in the Blue Mountain Recreation Area, which burned 11 years earlier in the 2003 Black Mountain fire. Both fires burned with mixed severity, producing mosaics of lightly to severely burned patches, which produced a diversity of postfire plant regeneration and wildlife use.

Figure 1. A single year of ponderosa pine needle buildup. Photo courtesy of the Northern Rockies Fire Science Network (NRFSN).

At each burned site, Hutto pointed to a variety of evidence, which indicates that vegetation and wildlife in this area are prepared for, adapted to, and even thriving with fire. Comparisons of the two sites showed how plant and animal associations change as time passes after the fire and that maintenance of ecosystem diversity is dependent on repeated fires and regeneration. Hutto's historical knowledge of the area also allowed for discussions of different pre-and postfire management actions and their effects on vegetation and wildlife recovery.

Fire-Adapted Vegetation

- Bicknell's geranium produces long-lived seeds that germinate after exposure to high soil temperatures.
- Viable seeds often remain in the cones in canopies of blackened ponderosa pine and western larch (*Larix occidentalis*) trees. Seeds fall or are cached by birds or other animals in the burned area where seedling and sapling growth will be relatively unrestricted.
- Nearly all shrubs that grow in western Montana sprout new growth from belowground structures that are protected from lethal fire temperatures.
- Dry ponderosa pine needles, which are extremely flammable and increase in abundance each year, suggest that the forest will be able to support another fire soon (Figure 1).

Fire-Adapted Birds

Much of Hutto's research has focused on bird species that are most abundant on severely burned portions of conifer forests. Using his own vocalizations and a bird call App and a microphone, Hutto identified a diversity of birds at both sites (Figure 2).

Bird species and fire-related ecology on the one-year-old burned site near Lolo -

- Clark's nutcrackers (*Nucifraga columbiana*) harvest and cache not only whitebark pine (*Pinus albicaulis*) but also ponderosa pine seeds; they can transport up to 150 seeds in their sublingual pouch.
- Black-backed woodpeckers (*Picoides arcticus*) forage for beetles that have attacked wounded, blackened trees.
- Mountain bluebirds (*Sialia currucoides*) increase in abundance where more trees were killed by fire; surprisingly, they use openings created by downed trees for nesting.

Bird species and fire-related ecology on the 11-year-old burned Blue Mountain site (Figure 3) -

- A diversity of bird species, which included tree swallows (*Tachycineta bicolor*), mountain bluebirds, yellow-rump warblers (*Setophaga coronate*), white-

breasted nuthatches (*Sitta carolinensis*), red-breasted nuthatches (*S. canadensis*), and woodpeckers (*Melanerpes* spp.).

- White-breasted nuthatches were more abundant in the 11th postfire year than in any earlier postfire year.
- Williamson's sapsuckers (*Sphyrapicus thyroideus*) favored edges between severely burned and unburned or surface-burned forest sites.
- Townsend solitaires (*Myadestes townsendi*) chose nest sites in holes in the forest floor created by fallen trees.

Management Affects Recovery

Figure 2. Hutto (left) with field trip attendees at the one-year -old burned site. Photo courtesy of NRFSN.

Land adjacent to the Lolo National Forest at the one-year-old burned site was salvage logged and only small diameter standing black trees remained after logging. The Lolo National Forest did not salvage log. At a glance, the salvage-logged area was much more homogenous and exposed than the unlogged National Forest lands. Removal of the seed source remaining in the canopies of the large-diameter standing timber in salvage logged areas will likely impact succession and make for recovery that looks very different from that in unlogged burned areas.

At the 11-year-old burned site, a private inholding was clearcut by the land owner prior to its sale to the Lolo National Forest and prior to the Black Mountain fire. Forest regeneration in the clearcut looked very different from that of the adjacent forest. In the clearcut area, shrubs, especially willows (Salix spp.), dominated and formed a nearly impenetrable mass of stems. In the adjacent forest, there were standing charred trees, trees seedlings, and many shrub and forb species. Functional diversity and species diversity of the recovering clearcut was much lower than the forest.

Heterogeneity is important to forest function and diversity. Natural events, including mixed-severity fires, produce and preserve diversity and heterogeneity. Hutto emphasizes that severe fires in forested areas away from human developments should be celebrated for enhancing forest heterogeneity and plant and animal diversity.

Figure 3. Well utilized snag on the 10-year-old burned site. Photo courtesy of the NRFSN.

Additional Reading & Information

Hutto, R.L. 2008. The importance of severe wildfires: some like it hot. Ecological Applications. 18(8): 1827-1834.

Hutto, R.L. and S.M. Gallo. 2006. The effects of postfire salvage logging on cavity-nesting birds. Condor. 108: 817-831.

Hutto, R.L. 1995. The composition of bird communities following stand-replacement fires in northern Rocky Mountain (U.S.A.) conifer forests. Conservation Biology 9: 1041-1058.

Lolo National Forest. 2004. Blue mountain nature trail: a fire story.

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The Northern Rockies Fire Science Network (NRFSN) aims to be a go-to resource for managers and scientists involved in fire and fuels management in the Northern Rockies. The NRFSN facilitates knowledge exchange by bringing people together to strengthen collaborations, synthesize science, and enhance science application around critical management issues.