Wildlife Habitat Considerations

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Abstract—Fire, insects, disease, harvesting, and precommercial thinning all create mosaics on Northern Rocky Mountain landscapes. These mosaics are important for faunal habitat. Consequently, changes such as created openings or an increase in heavily stocked areas affect the water, cover, and food of forest habitats. The "no action" alternative in ecosystem management of low elevation ponderosa pine/Douglas-fir (*Pinus ponderosa*/ *Pseudotsuga menziesii*) forests needs the same careful consideration as other alternatives because the consequences may be detrimental to some wildlife habitats. Suitable management should provide habitat heterogeneity necessary for a diversity of wildlife. A database of helpful information for managers in discussed.

Water, cover, and food are basic needs for wildlife. The availability of these resources changes with the seasons, especially in areas where winters can be severe such as the Northern Rocky Mountains. The physiological demands of wildlife also change with the seasons. It is in the low elevation, ponderosa pine/Douglas-fir (*Pinus ponderosa*/*Pseudotsuga menziesii*) forests that many animals seek winter habitat because snow depths tend to be low to moderate, both forage and cover are generally available, and temperatures and winds are moderated by the forest. Ample food and water are often the most important needs for wildlife survival. Generally, habitat quality for different animal species is based on vegetative composition and structure (Thomas and others 1979). The structure and composition of the forest affects food availability and cover. For example, herbivores are generally aided by openings in the forest where forage tends to be more abundant, yet they need adequate cover in fairly close proximity. The herbivores, in turn, provide prey for carnivores. Bird habitat is very diverse; different bird species are nectivorous, frugivorous, herbivorous, insectivorous, carnivorous, or omnivorous. Within these diet groupings, there is further separation according to how birds obtain their food (Ehrlich and others 1988).

Sources of water generally remain in the same place on the landscape, but the availability of food and cover is more obviously affected by management actions in our forests. Forest structure and potential wildlife habitat can be thought of in terms of landscape mosaics—patches composed of different vegetation types or the same vegetation type in different stages of succession or development. Mosaics do not necessarily have distinct edges. Another way of looking at wildlife habitat quality is the concept of habitat heterogeneity, which Morrison and others (1998) define as "the degree of discontinuity in environmental conditions across a landscape for a particular species." They go on to say that "environmental conditions can include vegetation structure and composition, as well as more dynamic flows of energy, nutrients, resources, and fluids (water and air)." Some degree of discontinuity is generally positive, but at some level (which is different for each species), heterogeneity becomes habitat fragmentation.

Forces of nature such as fire, forest insect and disease outbreaks, and wind help to create vegetational mosaics on the landscape, which are important for maintaining faunal diversity. Silvicultural activities, including commercial harvesting, precommercial thinning and the use of fire, also create vegetational mosaics. As with any management action, ecosystem-based management (EM) treatments may have contrasting effects on different wildlife species. Habitat improvements for some species may lead to a decrease in habitat quality for others. This paradox is just one example of the many issues surrounding land management decisions today. Any type of action, from precommercial thinning to fire suppression, affects vegetative structure and composition. Likewise, "no action" alternatives also have effects on wildlife habitat.

Effects of management activities on wildlife habitat need to be anticipated and recognized. For example, a more open understory tends to attract more ground feeding birds such as northern flickers (*Colaptes auratus*), dark-eyed juncos (*Junco hyemalis*) or birds that favor open woodlands such as western bluebirds (*Sialia mexicana*), mountain bluebirds (*S. currucoides*), or blue grouse (*Dendragapus obscurus*) while displacing some canopy-feeders such as ruby-crowned kinglets (*Regulus calendula*) and solitary vireos (*Vireo solitarius*) (Gruell and others 1982). Standing snags are important for a variety of wildlife species. One species of interest is the flammulated owl (*Otus flammeolus*), which has quite diverse habitat needs. In western Montana, they require large ponderosa pine trees and snags, understory tree thickets, and grassy openings to meet their nesting, roosting, and feeding needs (Wright 1996). These diverse requirements are an example of the complicated landscape mosaic or habitat heterogeneity needed by one species. Most silvicultural activities will reduce cover of standing trees to some degree, but may increase coarse woody debris in the form of downed logs or standing snags. Coarse woody debris, once largely unrecognized, is now recognized as a valuable component of healthy functioning ecosystems (Harmon and others 1986).

Much research has been conducted regarding how management activities will affect plant composition. One source of information is the Fire Effects Information System (**http://www.fs.fed.us/database/feis/**), which has writeups on many different species of plants and animals with regard to fire ecology. For example, one can look up grizzly bears (*Ursus arctos*) and read a synopsis of published information regarding how fire affects bear habitat. A database of this kind is very useful, but managers must realize that the

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writeups may lag behind current literature a bit because they are updated on a revolving schedule. Other sources of information are decision-pathway models that have been developed to predict effects of land management actions on vegetational composition. Other types of models look at habitat effectiveness. An example is the habitat effectiveness model that has been developed for winter habitat for Rocky Mountain elk (*Cervus elaphus nelsonii*) in the Blue Mountains of Oregon (Thomas and others 1988). The creators of this model identified the following four key attributes affecting habitat quality: (1) size and spacing of cover and forage areas, (2) density of roads traveled by vehicles, (3) quantity and quality of forage, and (4) cover quality (Thomas and others 1988). By comparing current with estimated conditions after treatment, an indication of effects on habitat quality can be assessed. Caution must be used when working with models developed or information gained from outside the management area of interest.

The task of juggling the needs of cover with food production is often a major challenge of wildlife habitat management. McConnell and Smith (1970) found that as canopy closes, the amount of grass, forb and shrub vegetation decreased in an eastern Washington ponderosa pine stand. As seen in EM treatments that combined partial overstory removal followed by burning at Lick Creek (Bitterroot National Forest, MT) there was a small decline in the number of willow (*Salix scouleriana*) plants and a greater decline in the number of bitterbrush (*Purshia tridentata*) plants, but overall vigor of the remaining plants increased (Bedunah and others 1999). These shrub species as well as other important browse species for herbivores such as serviceberry (*Amelanchier alnifolia*), elderberry (*Sambucus* spp.), mountain ash (*Sorbus* spp.), and buffaloberry (*Shepherdia canadensis*) often respond well to opening the overstory and broadcast burning (Hillis 1986). Huckleberry (*Vaccinium* spp.) shrubs also tend to be more productive in burned versus unburned sites (Zager 1980).

An important consideration regarding EM treatments and increased food availability is that treated areas tend to attract large numbers of ungulates, especially to improved winter range. This, in turn, can be detrimental to the food resource due to over-browsing. This type of impact was observed at the Lick Creek research study area (Arno 1999). One possible solution is to have more or larger areas treated to help disperse the animals across the landscape.

Our upland ponderosa pine/Douglas-fir forests are generally more contiguous with less variability in vegetative structure and composition across the landscape than occurred historically (Arno 1988). The "no-action" alternative in forest management (which usually attempts to suppress all fires) does nothing to mitigate these conditions and has the potential to set the stage for more widespread events like large wildfires or insect and disease outbreaks. These, in turn, can be detrimental for some wildlife habitat needs. The application of EM treatments can help reduce wildfire hazards and recycle nutrients, while retaining some cover and diversifying wildlife habitat. It is impossible to manage each parcel of land for every plant and animal species, but with careful management we can help to provide landscape mosaics and suitable habitat heterogeneity necessary for a great diversity of wildlife.

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