Wildlife Assessments at the Bartlett Experimental Forest

Mariko Yamasaki

USDA Forest Service Northeastern Research Station, Durham, NH

The Bartlett Experimental Forest, in the heart of the White Mountains of New Hampshire, has since 1931 been the site of numerous studies on northern hardwoods silviculture. The current grid system of 441 0.25-acre cruise plots was remeasured in 1939-40, 1991-92, and 2000-03 (Jensen 1941; Filip et al. 1960; Leak 1961; and Leak and Smith 1996). Woody stems larger than 1.5 inches dbh have been remeasured by 1-inch diameter class. This work provides a 70-year span of descriptive detail on changes in the forest as a whole. This paper describes many of the longer term wildlife-habitat relationship studies that have been conducted on the 1,052 ha Bartlett Experimental Forest, and in the surrounding White Mountain National Forest landscape.

Wildlife Habitat Studies

Experimental forests possess three key elements that make them valuable places to study small-scale wildlife habitat elements in an interdisciplinary manner. Researchers can ask specific habitat management questions (e.g., terrestrial salamanders' response to the types of edges created by even-aged management), because studies can capitalize on existing long-term vegetative, climate, soils, and management data sets (DeGraaf and Yamasaki 2002). Breeding bird surveys and small mammal sampling within long-term study compartments now provide a better picture of vertebrate diversity on managed forest lands (BEF, unpublished data).

The availability and longevity of various wildlife habitat elements (e.g., snags and cavity trees in managed forest stands) can be studied in compartments under long-term management objectives, especially where individual tree growth and mortality have been remeasured over time (Solomon 1977; Yamasaki and Leak in press). The presence and distribution of coarse woody debris in managed and unmanaged stands can be characterized, because of the stable management objectives that experimental forests maintain for demonstration and research (Yamasaki 2001).

Experimental forests often have acreage that has not yet been dedicated to particular studies. Thus opportunities always exist to try new silvicultural strategies for meeting the changing needs of public and private resource managers. At the Bartlett Experimental Forest, space has been made to study deferred shelterwood systems more thoroughly, and to install a series of larger patch cuts to better study various effects of opening size. Deferred shelterwoods provide some even-aged management opportunities where aesthetic and visual concerns exist. Low-density shelterwood cuts retain more of the intolerant species composition than high-density cuts (DeGraaf et al. 1992). The effects of deferred shelterwood composition and structure on breeding bird communities in northern hardwoods are currently being observed (BEF, unpublished data).

Patch cut size influences the composition of intolerant woody regeneration (Leak et al. 1987); breeding bird composition in regenerating patches (Costello et al. 2000); and bat activity (Krusic et al. 1996). Patch size and the frequency of cut within management areas influence the availability of early-successional habitat management opportunities, on both experimental forests and larger landscapes (DeGraaf and Yamasaki 2003; DeGraaf et al. 2005).

Experimental forests also provide opportunities to examine larger scale wildlife-habitat relationships, as case studies. For example, BEF personnel observe relationships between fall beech mast crops and the following year's small mammal abundance (BEF, unpublished data); as well as use of the experimental forest by black bears.

The limited cutting activity on the BEF provides the majority of regeneration acreage in the larger watershed in which Bartlett is located. Accordingly, there are always several moose to be found on the forest; and usually one individual is taken out of this watershed each moose hunting season.

Maintaining long-term records of small mammal abundance studies, and breeding bird, nesting barred owl and northern goshawk surveys at Bartlett allow case study comparisons of prey abundance and nesting raptor activity (Yamasaki 2000, BEF unpublished data). Doyle and Smith's work (1994) in northwestern Canada describes correlations between late winter prey bases and the likelihood of raptors, particularly northern goshawks, to initiate nesting activity. Red squirrel and chipmunk activity is monitored during breeding bird surveys, thus giving avian researchers more information on the broader mammalian predator and prey bases, that small mammal sampling alone does not provide.

Other Long-term Avian Examples

Several other long-term avian studies deserve mentioning. Holmes and Sherry's work (2001) at the Hubbard Brook Experimental Forest in Campton, NH document 30-year avian population trends in an unfragmented, undisturbed, and relatively mature deciduous forest. Maturating forest vegetation and structure over time accounted for the changes in species composition observed on their plots. Long-term breeding bird survey transects across the White Mountain National Forest were established after the 1985 Forest Plan was signed, to document the wildlife habitat management strategy the Forest proposed to follow in providing habitats for all native vertebrates, and selected non-native vertebrates (MacFaden and Capen 2002).

Multiple scales of habitat elements and their distribution, occurring both naturally and through management, play a role in avian occurrence and abundance across forested landscapes. So, obviously there are limits to the types of wildlife habitat research work that is suited to experimental forests. Studies of resident vertebrate species with small or medium-sized home ranges, and of migratory species with small home ranges, are probably the most profitable aspects to work with on experimental forests. Habitat elements that are related to site or forest structure are definitely suitable for study within experimental forest boundaries.

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