

Minnesota's Forest Habitats: Managing Across the Forest Continuum

Presentation Abstracts

The State of Minnesota Forest Habitats – Mark Nelson, U.S. Forest Service, Forest Inventory and Assessment Program and Brian Tavernia, U.S. Geological Survey, Patuxent Wildlife Research Center

Minnesota forests provide habitats for numerous species of amphibians, reptiles, birds, and mammals. Quantity and quality of habitat is affected by extent, composition, and structure of forests. These characteristics are quantified by Forest Inventory and Analysis (FIA), a research program within the USDA Forest Service. A wealth of habitat-related forest data and information are available in the FIA database, online estimation and mapping tools such as FIDO, and EVALIDator, FIA state reports, and special studies. We present an overview of Minnesota forest extent, composition, and structure, with emphasis on both early and late successional stages, and from historical, current, and future perspectives.

The State of Forest Breeding Birds in Minnesota – Results from Minnesota's first Breeding Bird Atlas – Jerry Niemi, University of Minnesota –Duluth, Natural Resources Research Institute

The state of Minnesota recently completed gathering data for its first breeding bird atlas. These data were gathered by volunteers and included the systematic gathering of point counts for over 99% of the 2300 plus townships in the state from 2009-2013. These data along with those from the Chippewa and Superior National Forest monitoring program gathered from 1991-2014 and several other studies collectively represent data from 8,376 count locations in Minnesota. I will review these data, summarize recent breeding bird trends in Minnesota, and describe plans and context for these data with respect to forest management issues.

Current and Future Stressors on Minnesota's Forest Ecosystems – Mark White and Meredith Cornett, The Nature Conservancy

Northern Great Lakes forests are in period of transition that began with dramatic shifts in composition and structure dating from Euro-American settlement and subsequent land use change. In northern Minnesota, dominance shifted from long-lived conifers to shorter-lived sprouting hardwood species. A variety of abiotic (climate change, CO₂ enrichment, N deposition, wildfire, windstorms, forest management, land-use change) and biotic factors (native and non-native pests and pathogens, invasive plant species, earthworms, white-tailed deer) will interact and have a strong influence on forest distribution, composition, and structure over the next century and beyond. Because of the high degree of uncertainty inherent in projecting future ecosystem conditions in a changing climate, we examine a range of possible climate and forest futures. Despite the high uncertainty associated with climate change, we expect a decrease in boreal hardwoods and conifers, and an increase in temperate hardwoods. We may also see a loss of forest structure and corresponding shift to savanna conditions in some areas. However we expect that these shifts will be either mediated or amplified by biotic-abiotic interactions (climate-management-earthworms-deer).

Full-season Habitat Associations of Forest Nesting Songbirds – Henry Streby, National Science Foundation Postdoctoral Research Fellow, University of California – Berkeley ; David Andersen, Minnesota Cooperative Fish and Wildlife Research Unit; Sean Petersen and Gunnar Kramer, University of Minnesota

Songbird habitat associations are traditionally defined as areas used during the nesting period, and habitat quality is often measured using density of singing birds and nest productivity. However, territorial singing and nesting last only a few weeks in a breeding season that lasts 4-5 months. We will discuss full-season habitat associations including cover-type selection from spring arrival to fall departure for two migratory songbirds, Ovenbirds and Golden-winged Warblers. Based on traditional monitoring methods, Ovenbirds are described as mature-forest specialists and Golden-winged Warblers as early-successional specialists. Our research over the past decade in northern Minnesota demonstrates that both of these species are better described as diverse-forest species. During the post-fledging period, Ovenbirds select sapling dominated clearcuts and forested wetlands over mature forest, and Golden-winged Warblers select sapling dominated clearcuts and mature forest over the shrublands in which they usually nest. Sapling dominated clearcuts, with moderately dense vegetation and canopies ranging from 3 – 15 meters tall, can be overlooked in debates about the relative importance of early-successional shrublands vs. mature forest. Our results demonstrate that stands in these middle seral stages play an important role for Ovenbirds, Golden-winged Warblers, and many other migratory and resident birds. This may be why Minnesota, with its natural and human induced diverse forest landscape hosts thriving populations of many forest associated songbirds.

Marten and Fisher Use of Forest Habitat in Minnesota – John Erb, Minnesota Department of Natural Resources, Forest Wildlife Research Group

As part of a larger project on *Martes* ecology in Minnesota, we began monitoring various aspects of habitat use by radio-collared fishers (*Martes pennanti*) and martens (*Martes americana*) during spring 2009. Distribution of these species in North America, and within Minnesota, illustrates that both are clearly forest-dependent. However, fine-scale forest attributes likely determine the suitability of a forest stand or landscape to these species. In particular, structure that provides den and rest sites, protection from predators, prey habitat or cues for locating prey, and thermal protection appears critical. All but 2 of the 56 fisher natal or maternal dens we have located have been in elevated cavities of large diameter (ave. dbh = 20.5") live trees or snags, predominantly in aspen (66%) and oak (14%). The remaining 2 fisher maternal dens were in hollow logs either on or suspended above the ground. Elevated tree cavities (ave. dbh = 20.1") are also the most common structures used by fishers as resting sites, though in summer more 'open' structures in trees ('witches brooms', leaf and stick nests, large branches, etc) are commonly used as well. Of 45 marten natal or maternal dens identified, 36% have been in underground burrows, commonly in rock-laden and lacustrine soils, while 64% have been in elevated tree cavities (ave. dbh = 18.6"). Most tree cavity marten dens have been in aspen (38%) and white cedar (34%) trees. Data on winter rest sites shows that marten use of underground or subnivean sites is highest during fall and winter, and often associated with lowland conifer stands. In summer, marten use of elevated tree structures (tree cavities, branches, leaf/stick nests, and 'witches brooms') increases and is correlated with more use of mixed-wood stands. Compared to random sites, den and rest structures used by martens occur in sites with higher amounts of coarse woody debris, higher average tree diameter, higher snag density, and greater stem densities. Preliminary data indicates that both species spend ~ 75% of their time in den structures during winter, suggesting that such structures are likely critical to survival. Predation has been the dominant non-human cause of mortality for both species, further suggesting that structural complexity (escape cover and structures) may be critical.

Human activities or forest management strategies that reduce or fragment forest cover, or that do not produce or maintain structural complexity in forest stands will be detrimental to fishers and martens.

Beaver Management in Forested Landscapes: Opportunities for Co-existence – Steve Windels, National Park Service, Voyagers National Park

Beavers are an important component of forested ecosystems in Minnesota. Their damming activities create ponds that store water, slow downstream transport of sediment and nutrients, and serve as important habitat for many plants, fish, and wildlife species. They also can alter forest successional pathways through their tree cutting for food and construction materials. Conversely, these same activities can have negative impacts for forest or land management agencies and businesses by flooding of roads and property and through the loss of merchantable timber. Considerable time and money is often spent by private, county, state, and federal organizations to manage beaver issues at local scales. The goal of my talk is to present an overview of the ecological benefits of beavers for ecosystem health and wildlife conservation in the context of managing beavers at local and population scales to minimize conflicts with forest and land management.

Moose and Deer Habitat use in Northeast Minnesota – Amanda McGraw and Ron Moen, University of Minnesota – Duluth, Natural Resources Research Institute

Moose and deer overlap across much of northeast Minnesota and thus rely on a similar matrix of habitat types to meet life history requirements. Both species rely on early successional forests to provide forage opportunities. Each also use mature conifer forests, largely for thermal cover. However, moose typically use mature cover types as an escape from heat, while deer use conifer cover as refuge from cold temperatures in winter. We collared 64 moose across northeast Minnesota in 2011. GPS collars on moose recorded locations every 20 minutes and activity counts every 5 minutes for 2 years. With this dataset we have been able to assess habitat use and response to environmental conditions at a finer temporal scale than has been possible elsewhere. Additionally, we collared 32 deer within moose range in winter 2014. Deer GPS collars are recording locations at 2 hour intervals and activity counts at 5 minute intervals for 2 years. These data will allow us to determine deer habitat use and to estimate the level of interaction between moose and deer with respect to similarities in resource use. Evidence of either overlap or of resource partitioning would inform management decisions with regard to forest and deer management.

Natural Models for Ecological Forestry – Brian Palik, U.S. Forest Service, Northern Research Station

Changing societal expectations, and an uncertain climate future, call for an ecological approach for restoring and sustaining resilient forests. A natural models approach based on a deep understanding of natural disturbance and forest dynamics can address this need. A natural models approach has three foundational principles: 1) natural disturbances leave a rich legacy of structures, organisms, and patterns in the new forest that are important ecologically, but often managed against; 2) stand development processes, particularly tree decline and mortality, generate structural and compositional heterogeneity that is seldom seen in managed forests; and 3) recovery periods between natural disturbances are long enough to allow complexity to develop; these periods are greatly shortened in managed forests. I and my colleagues have synthesized the scientific underpinnings of natural models forestry into guidelines that are applicable to a wide variety of forests conditions in Minnesota and beyond. In this presentation, I highlight some of the research results from Minnesota forests that validate a natural models approach and I provide examples of implementation in managed forests.

Minnesota GAP Project: Habitat-wildlife Modeling for Forest Species – Gary Drotts, Minnesota

Department of Natural Resources (retired)

In 2007, the Minnesota DNR completed a statewide vertebrate wildlife assessment project framed and sponsored by U.S. Geological Survey's Gap Analysis Project (GAP). While this project basically served to benchmark range extent, habitat distribution and land protection status for breeding vertebrate wildlife in Minnesota as of 2007, a range and wildlife habitat relationship database created from that project can still provide useful information for current and future wildlife habitat assessment and management needs at a species, habitat, and/or landscape scale. A brief summary of the MN-GAP project followed by various forest wildlife and land cover/habitat type examples will be presented for review and comment within the workshop theme of *Minnesota's Forest Habitats: Managing across the Forest Continuum*.

Young Forest Bird Habitat Initiatives in Minnesota – Tom Cooper, U.S. Fish and Wildlife Service and Kevin Sheppard, American Bird Conservancy

American Woodcock and Golden-winged Warblers have both experienced range-wide population declines caused in part by the decline of young forest habitat across their historic range. Although these species have experienced declines throughout their range, both are doing well in Minnesota. In response to long-term declines, stakeholders have developed conservation plans for both of these species with the goal of stabilizing current populations and ultimately reversing the long-term declines. Regional "young forest initiatives" have been created to implement the plans and best management practices have been developed for putting habitat on the ground. Currently, many partners are working in Minnesota to maintain and create young forest habitat benefitting woodcock, golden-winged warblers, and many other species requiring periodic forest disturbance. We will talk about this work and how it fits into Minnesota's forested landscape.

Beyond the Big Trees: Restoring the Function of Old Growth Forests – Becky Marty and Harvey Tjader , Minnesota Department of Natural Resources, Division of Forestry

Sometimes it is hard to know which way to turn to resolve issues about old growth forests and old-forest dependent species. During this presentation, we will share some agency foundation materials and official responses and then expand to creative applications outside the current norms. We will focus on what officially defines Old Growth forest, what values that has and to whom, and end our presentation looking at management considerations for the forests and their buffer lands.

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