National Wildlife Research Center Scientists Develop Methods to Reduce Timber Damage

Wildlife Services’ (WS) National Wildlife Research Center (NWRC) is the only Federal research facility devoted exclusively to resolving conflicts between people and wildlife through the development of effective, selective, and socially responsible methods, tools, and techniques. NWRC's expertise in Corvallis, Oregon, focuses primarily on wildlife damage to forest resources.

Wildlife impacts on regenerating forests following wildfire or harvesting can be extensive. Cutting and gnawing on seedlings by deer, elk, mice, mountain beavers, pocket gophers, rabbits, and voles during the first 5 years of tree growth greatly hinder reforestation efforts. Other mammals such as bears and porcupines damage mature trees. North American beaver and nutria alter riparian vegetation, which limits streamside restoration efforts, erodes roads and railways and can endanger human health and safety. NWRC scientists are developing nonlethal tools and methods (e.g., repellents and habitat and behavior modification) to manage wildlife damage to forest resources.

Applying Science and Expertise to Wildlife Challenges

Testing Tools to Protect Forest Resources—Use of commercial repellents and frightening devices are of interest to land managers as non-lethal options to reduce browse damage by deer. However, research has shown that repellents can be cost prohibitive and often provide little to only short-term protection. Deer also habituate quickly to frightening devices. Cost-effective and longer lasting tools are needed for application in forest management. NWRC scientists recently evaluated the effects of two commercial products used to repel deer in western Oregon. When used during the spring to protect young Douglas fir seedlings during leader growth, individuals treated with Seadust Shield® Pro, in repelling black-tailed deer from residential urban areas. Results suggest that preexisting habituation to humans limits the effect of the device; however, new studies are underway to evaluate Deer Shield Pro in early successional forest patches where deer cause damage to seedlings. Future research will address the cost-benefits of utilizing commercial products such as these in forest operations.

Understanding Tree Chemistry and Dietary Behaviors—Many human-wildlife conflicts are the result of animal foraging behavior and activity. NWRC researchers are discovering how wildlife species respond to select chemicals in the plants they eat. Initial results suggested that when given a choice, black-tailed deer prefer to eat conifer seedlings with low terpene levels. Terpenes are found in the essential oils of plants. They have a strong smell and may thus protect the plant from browsing animals. Further research demonstrated that seedling age also can influence animal foraging behavior. Current studies are evaluating the efficacy of selecting for these traits and deploying them in an integrated management design to reduce deer browse in reforestation efforts.

Mountain Beaver Genetics—Mountain beaver are endemic to the Pacific Coast of California, Oregon, Washington, and British Columbia, Canada, and to the Sierra Nevada Mountains of California, and Nevada. There are seven subspecies of mountain beaver. The U.S. Department of the Interior’s Fish and Wildlife Service has classified one of these subspecies, Aplodontia rufa nigra, as endangered and several other mountain beaver subspecies as populations of concern under the Endangered Species Act. However, in some portions of its range (Washington and Oregon), mountain beaver cause significant
damage to forest resources and are managed as a “pest” species. Studies of mountain beaver populations are critical for understanding their status and informing wildlife damage management practices. Molecular genetics techniques are particularly useful for explaining taxonomic relationships and population demographics. NWRC scientists have recently completed a molecular taxonomic study of this species and discovered that mountain beaver found in Washington are a single subspecies when it was previously considered two distinct subspecies. Furthermore, scientists confirmed the uniqueness of the coastal California subspecies including the endangered A. r. nigra and the species of concern, A. r. phaea. To aid research efforts related to mountain beavers, NWRC scientists developed DNA markers from the A. r. rufa genome. These markers provide a new and powerful tool for studying A. r. rufa populations. A current study is using these DNA markers to test whether mountain beaver move across forested landscapes to new areas where forest harvesting operations create optimal habitat.

Better Understanding of Beaver Ecology—North American beaver are found throughout the continent and are commonly referred to as ecosystem engineers because they modify habitat through dam building. Research has shown that beaver dams increase local biodiversity; however, dams also cause flooding and alterations to stream flow that result in crop damage, flooded timber, and habitat destruction. More research is needed to better understand the impacts of beaver ecology. In the Pacific Northwest, beaver dams provide important habitat for threatened and endangered anadromous fishes such as Mid-Columbia River steelhead and coho salmon. Collaborative efforts with researchers at Oregon State University are using spatial analyses to evaluate how beaver respond to anthropogenic activities used to improve fish habitat. At Mississippi State University, another collaborative study is evaluating beaver movement on a military installation that has experienced high beaver damage to forest resources. Study results suggest that beaver home range sizes increased with increasing plant biomass and proportions of woody plant cover. Additionally, the speed of beaver movements increases as they move further away from the safety of their lodges, particularly during the breeding season.

Selected Publications:


Major Research Accomplishments:
- WS is evaluating the effectiveness of commercial products, such as repellents and scare devices, to reduce deer damage.
- WS is working to determine if conifer seedlings selected for heritable traits such as known monoterpene profiles can be used to reduce browsing by deer.
- WS used molecular genetic techniques to redefine the taxonomic profiles of mountain beaver subspecies where they cause damage to forest resources.
- WS is using spatial analyses to reduce negative and increase positive impacts of beaver damming behavior.