Wildlife Services

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Reducing Mammalian Damage in Forested and Riparian Ecosystems

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Groups Affected By These Problems:

- Commercial timber producers
- Gardeners/Landscapers
- Homeowners
- Natural resource managers
- Noncommercial forest landowners
- Orchard managers
- State departments of transportation

Major Cooperators:

- British Columbia Ministry of Forests and Range
- Mississippi State University
- National Council for Air and Stream Improvement
- Oregon Department of Fisheries and Wildlife
- Oregon Department of Forestry
- Oregon Forest Industries Council
- Oregon State University
- Portland State University
- The Jack Berryman Institute
- USDA Forest Service
- U.S. Department of Defense
- Washington Department of Fisheries and Wildlife
- Washington Department of Natural Resources
- Washington Forest Protection Association

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 five years of tree growth greatly hinder reforestation efforts. Other mammals such as bears and porcupines damage mature trees. North American beavers and invasive 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 & Expertise to Wildlife Challenges

The Evolution of Flow Devices Used to Reduce Flooding by Beavers. — Following centuries of over-harvest, the American beaver has made an amazing comeback and now occupies much of its historical range in North America. But with this successful recovery comes a variety of challenges for managing beaver damage due to flooding from beaver dams and plugged culverts. Resolving conflicts with beaver flooding requires an integrated approach that includes both lethal and nonlethal techniques. In a recent review, NWRC researchers highlight the evolution of modern nonlethal approaches to control water levels at beaver dams. Traditional nonlethal methods for dealing with beaver flooding involve either exclusion or deception. Fence systems exclude beaver from certain areas while pipe systems attempt to modify beaver behavior by reducing water sound and movement. Although there is no scientific evidence to back it up, some believe that beavers are attracted to the sound and movement of water, which cues their damming behavior. Not until the 1980-1990s were exclusion and deception combined to create flow devices, such as the Clemson pond leveler or flexible pipe and fence systems, which allow managers to maintain desired water levels and reduce flooding. In some instances, flow devices may be an effective nonlethal tool for maintaining beaver ponds; however, researchers note that most device failures are due to beaver moving their activities up- or down-stream and managers not properly maintaining devices.

Impacts of Resource Availability on Beaver Movement and Behavior. — To learn more about the impact of food abundance and availability on beaver ecology, NWRC and Mississippi State University researchers tagged and radio-tracked 26 beaver in wetlands on a military installation managed for biological diversity in Alabama. Home range size of 23 beavers increased as the number and types of plants within the area increased. However, home range sizes for all beavers decreased with increasing seasonal changes in vegetation. Researchers note that beavers adjusted their movements and behavior based on the seasonal availability of food. Beavers likely increased their movements and size of their home range in response to the amount of available woody plants and to avoid overexploitation of those resources. Results suggest that the amount, distribution and seasonal variation of food combine to influence beaver movements.

In a related study, researchers determined that radio-tracked beavers moved faster in wetland habitats as the distance from their main lodge increased, likely in an effort to reduce predation risks. In comparison, beaver in upland habitats moved relatively slower and less deliberately (i.e., larger turning angles), likely due to the presence of multiple refuges within the beavers' home ranges and/or low risks of predation. During the breeding season, beaver behavior alternated between longer foraging trips and staying close to lodges to nurse and protect newborns. Researchers also observed that annual home ranges and distances moved from lodges by subadult beavers (approximately two years old) were greater than those of adults and yearlings, likely due to pre-dispersal behavior. Taken together, these results support the idea that landscape complexity shapes the movement ecology of beavers.

Efficacy of Plastic Mesh Tubes to Reduce Nutria Damage to Trees. — The nutria is an invasive,

semiaquatic rodent native to South America that harms riparian and wetland habitats worldwide. Management tools and techniques are needed to reduce the damage that nutria foraging and burrowing causes--particularly in the course of wetland restoration projects, when tree seedlings are most vulnerable. In collaboration with Portland State University and the U.S. Geological Survey, NWRC researchers evaluated the effectiveness of standard Vexar plastic mesh tubes in reducing nutria damage to newly planted woody vegetation. All of the plantings protected with tubes survived, compared to only 17 percent of plantings without tubes. Vexar plastic mesh tubing can be an effective short-term mitigation tool in habitats that do not have large nutria populations.

Comparing Capture Methods for Urban Nutria. — Trapping is the most widely used and cost-effective method for controlling nutria. In collaboration with Portland State University and the U.S. Geological Survey, NWRC researchers compared the efficacy of a new nutria multiple-capture cage trap (MCT), which uses a one-way funnel, to that of a standard two-door cage trap. Nutria captured in the MCTs were 55 percent larger than nutria captured in the standard traps, weighing an average of 14 pounds and 9 pounds respectively. The MCTs did not capture any nutria weighing less than 8 pounds. MCTs were also more selective whereas 50 percent of the animals captured in the standard traps were non-target animals. As designed, the MCTs may allow smaller animals to escape. However, simple design modifications, such as changing the trap door size or the addition of a rotating paddle door or hinged door, could improve the MCT's performance.

Selected Publications:

McClintic, L.F., G. Wang, J.D. Taylor, and J.C. Jones. 2014. Movement characteristics of American beavers (Castor canadensis). Behaviour 151:1249-1265. doi: 10.1163 / 1568539X-00003183.

McClintic, L.F., J.D. Taylor, J.C. Jones, R.D. Singleton, and G. Wang. 2014. Effects of spatiotemporal resource heterogeneity on home range size of American beaver. Journal of Zoology 293(2):134-141. doi: 10.1111 / jzo.12128.

Sheffels, T.R., M.D. Sytsma, J. Carter, and J.D. Taylor. 2014. Efficacy of plastic mesh tubes in reducing herbivory damage by the invasive nutria (Myocastor coypus) in an urban restoration site. Northwest Science 88(4):269-279. doi: 10.3955/046.088.0403.

Taylor, J.D. and R.D. Singleton. 2014. The evolution of flow devices used to reduce flooding by beavers: A review. Wildlife Society Bulletin 38(1):127-133. doi:10.1002 / wsb.363.

Taylor, J.D. 2013. Wildlife in managed forests: An overview of perspectives from the Pacific Northwest. Forest Ecology and Management 310:1027-1028. doi: 10.1016 / j.foreco.2013.10.024.

Taylor, J. 2013. Effects of black-tailed deer and Roosevelt elk herbivory in intensively managed Douglas-fir plantations. Western Forester 58(2):4-5.

Major Research Accomplishments:

- WS research notes flow devices, such as the Clemson pond leveler or flexible pipe and fence systems, which allow managers to maintain desired water levels and reduce flooding, may be an effective nonlethal tool for maintaining beaver ponds.
- WS and Mississippi State University research indicates beaver movement ecology is influenced by landscape complexity.
- WS research with Portland State University and the U.S. Geological Survey determined standard Vexar plastic mesh tubes are effective in reducing nutria damage to newly planted woody vegetation in areas with limited nutria populations.
- WS research with Portland State University and the U.S. Geological Survey showed a new nutria multiple-capture cage trap to be more effective in capturing nutria versus the standard two-door cage trap.

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