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## Reducing Wildlife Damage to Timber, Forest Resources and Forest Management

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### National Wildlife Research Center Scientists Define Solutions to Wildlife, Timber, and Forest Dynamics

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 acceptable methods, tools, and techniques. NWRC's field station in Olympia, WA, has the capacity to conduct research on most animals associated with forest resource damage.

Wildlife impacts on forest resources can be extensive. For example, attempts to replace trees after a harvest or a fire can be complete failures because of foraging wildlife. Reforestation efforts are greatly hindered by bears, beavers, deer, elk, mice, mountain beavers, pocket gophers, porcupines, and voles cutting and gnawing on seedlings. Developing nonlethal methods to manage wildlife damage is a priority in the ongoing research conducted at NWRC's Washington field station. Alternatives to lethal control, including physical deterrents, repellents, frightening devices, habitat and behavior modification, and capture methods are currently being researched and developed.

NWRC scientists are working with timber, forest, and wildlife conservationists to identify the most significant wildlife damage problems in



**Major Research Accomplishments:**

- WS evaluated efficacy of frightening devices to deter beaver.
- WS demonstrated the nutritional, behavioral, and territorial impacts of feeding black bears supplements to reduce girdling of douglas-fir trees.
- WS assessed the role of secondary metabolites in the foraging behavior of deer.
- WS developed methodology to assess beaver populations in the southeast United States.
- WS demonstrated the relative merits of the active ingredients and delivery systems used in deer repellents.
- WS determined the demographics and territorial behaviors of mountain beaver.
- WS evaluated the use of chlorophacinone as a new tool to control mountain beaver populations.
- WS evaluated the potential for zinc phosphide baiting to control nutria on Louisiana marshes.



forested areas. The goal is to develop methods to reduce this wildlife damage. The research that NWRC is conducting is specifically targeted to find solutions to problems found in the Northwestern and Southeastern forests of the United States.

### Applying Science and Expertise to Wildlife Challenges

**A Potential New Tool for Mountain Beaver Control**—The mountain beaver (*Aplodontia rufa*) is a rodent species endemic to the Pacific Northwest and northern coastal California. Unlike a true beaver, it has a short tail and is not well adapted to aquatic life but lives underground and is seldom seen. This herbivore is managed as a pest species because of the impact it has on newly planted Douglas-fir (*Pseudotsuga menziesii*) seedlings. Attempts to manage mountain beaver through repellents, barriers, and trapping are costly and not always productive. At present no toxicants are registered to control mountain beavers. We assessed four toxicants registered for underground use for potential to reduce mountain beaver populations. Efficacy varied among treatments. Zinc phosphide and strychnine were avoided by mountain beaver. Pre-baiting marginally increased acceptance of strychnine, but did not alter mountain beaver

ver acceptance of zinc phosphide. Diphacinone and chlorophacinone were both readily consumed, but only chlorophacinone was 100% effective after a 14-day baiting regime. We then conducted subsequent studies to further assess chlorophacinone as a potential tool for mountain beaver. Mountain beaver readily cached bags of chlorophacinone within their artificial burrows, and efficacy of a one-time and two-time dose was 100%. If efficacy is shown through a field trial, we intend to present a new tool for operational use for mountain beaver.

**Deer Fence Efficacy**—NWRC scientists assessed the effectiveness of several electric fence designs for impeding black-tailed deer movement. Fences were constructed across pastures and deer responses were assessed under three motivational test regimes: 1) escaping human presence; 2) joining conspecifics; and 3) obtaining desirable food. Responses varied among test regimes. Fences were more effective when motivational pressures were less. Deer more frequently went through wires rather than jumping over fences. Although they did jump 4-foot fences, they rarely attempted to jump 6 and 8 foot fences during trials. Slanted fence designs added depth, but were the least effective design to retard deer movements. Reducing wire spacing improved efficacy. NWRC concluded that although electric fences reduced construction costs and 6 foot fences prevented most penetrations, they were not as effective as 8 foot woven wire fences.

**Dietary Behaviors**—Most problems associated with wildlife occur because of their foraging activities. NWRC researchers are working to determine how select wildlife species respond to chemical components in foods. We have determined that bears select for trees high in carbohydrates and try to avoid high terpene concentrations. Forestry practices, such as thinning or fertilizing, increase the sugar to terpene ratio making trees more desirable to bears. Conversely, pruning trees decrease their likelihood of being targeted as food. Ungulates also appear to avoid high terpene concentrations. Ongoing collaborative efforts will determine whether this trait can be selected to produce less palatable trees. Concurrently, ongoing studies suggest that a deer's nutritional status impacts its willingness to ingest foods containing high terpene levels. Understanding these and other mechanisms that control dietary behaviors may enable NWRC to suggest resource management strategies for decreasing damage or at least create models predicting where damage is most likely to occur.

#### Groups Affected by This Problem:

- Timber producers
- Orchard managers
- Natural resource managers
- Landscapers
- Homeowners
- Americans who enjoy forests

#### Major Cooperators:

- Oregon Forest Industry Council
- Oregon Department of Forestry
- Washington Forest Protection Association
- Washington Department of Natural Resources
- U.S. Forest Service

#### Selected Publications:

- Arjo, W. M.; Nolte, D. L. 2004. Assessing the efficacy of registered underground baiting products on mountain beaver (*Aplodontia rufa*) control. *Crop Protection* 23:425-430.
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- Nolte, D. L.; VerCauteren, K. C.; Perry, K. R.; Adams, S. E. 2003. Training deer to avoid sites through negative reinforcement. In: Fagerstone, K. A.; Witmer, G. W., eds. *Proceedings of the 10th wildlife damage management conference*; 6-9 April 2003; Hot Springs, AR. Fort Collins, CO: The Wildlife Damage Management Working Group of The Wildlife Society: 95-104.
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- Swafford, S. R.; Nolte, D. L.; Godwin, K.; Sloan, C. A.; Jones, J. 2003. Beaver population size estimation in Mississippi. In: Fagerstone, K. A.; Witmer, G. W., eds. *Proceedings of the 10th wildlife damage management conference*; 6-9 April 2003; Hot Springs, AR. Fort Collins, CO: The Wildlife Damage Management Working Group of The Wildlife Society: 398-407.