

Wildlife Services

Protecting People
Protecting Agriculture
Protecting Wildlife

National Wildlife Research Center

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Developing Control Methods, Evaluating Impacts, and Applying Ecology to Manage Carnivores



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Groups Affected:

- Environmental organizations
- Land management agencies
- Livestock producers
- U.S. citizens, urban and rural residents
- Wildlife managers

Major Cooperators:

- Colorado Parks and Wildlife
- Montana Fish, Wildlife and Parks
- U.S. Army
- U.S. Forest Service
- Utah Division of Wildlife Resources
- Utah State University
- Welder Wildlife Foundation
- Wyoming Department of Game and Fish

National Wildlife Research Center Scientists Study Carnivores and New Ways to Protect Livestock and People

Wildlife Services' (WS) National Wildlife Research Center (NWRC) is the only Federal research organization devoted exclusively to resolving conflicts between people and wildlife through the development of effective, selective, and socially responsible methods, tools, and techniques.

Data on carnivore population dynamics, ecology, and behavior are necessary to understand their predation patterns on livestock, game species, threatened and endangered species, and conflict with humans in urban and rural areas. These data are needed for effective depredation management, but significant knowledge gaps exist with regard to predator-prey, predator-livestock, and predator-predator relationships. NWRC uses a multi-disciplinary approach to study carnivores, their impacts, and effects of their removal on ecosystems, wildlife population dynamics, and livestock depredation.

Livestock depredation costs producers approximately \$138 million each year. For the sheep and lamb industry alone, predators account for 36 percent of all sheep and lamb losses. Concerns for public health and safety, as well as animal welfare, cause wildlife managers to seek methods that reduce the risk of predator conflicts. Research conducted by scientists at NWRC's field station in Logan, Utah, focuses on finding new tools and techniques to reduce livestock and human conflicts with carnivores. In addition, NWRC researchers improve methods for capturing carnivores and learn more about possible methods for reducing conflicts by monitoring carnivore behavior and movements.

Applying Science and Expertise to Wildlife Challenges

Livestock Protection Dogs in Areas with Wolves and Grizzly Bears. — Livestock protection dogs have been used in the U.S. for decades as a non-lethal tool to protect livestock from coyote depredation. NWRC researchers are completing an investigation on whether select breeds of livestock protection dogs, such as larger breeds used in Europe, are effective at reducing livestock losses from wolves and grizzly bears. Preliminary results from the research look promising. All of the imported dog breeds (kangals, karakachans, transmontanos) exhibit high fidelity to their sheep — meaning they stay close to their herds — and sheep survived equally with the different breeds. The dogs distinguish between experimental wolf and deer decoys and respond differently towards the wolf decoys. While all responses were appropriate (e.g., barking, moving towards decoy, grouping sheep), some breeds bark more and remain closer to the sheep, while others are more likely to approach the wolf decoy to position themselves between it and the sheep herd. Trail cameras and space-use data also confirm that the dogs, sheep, wolves and grizzly bears share the same habitat during the grazing season, but more analysis is needed to determine if the presence of livestock protection dogs reduces predator-dog overlap and interactions. Fieldwork was completed in late 2016 and ongoing data analysis will help determine whether certain dog breeds are better at deterring grizzlies versus wolves, or whether some are more effective in different environments such as forested-, open- or fenced-landscapes.

Using Fladry to Reduce Predation. — Fladry consists of a line of brightly-colored flags hung at regular intervals to protect livestock from mammalian carnivores, such as wolves, in smaller areas like calving and lambing grounds. For extra protection, the line carrying the flags can be electrified (called turbofladry). Because wolves and coyotes are neophobic (afraid of new things like fluttering flags), they are cautious about crossing the fladry barrier— at least for about 60-90 days. That added time of protection may be enough to protect calves and lambs in their first months of life, when they are most vulnerable to predation. NWRC has played a large role in developing and testing both fladry and turbofladry and continues this research by addressing technical problems associated with its use. One concern is that hanging flags can coil around the line when it is windy. This creates gaps through which carnivores can pass. NWRC researchers tested seven fladry designs made from rip-stop nylon and marine vinyl to identify one or two designs that not only resist coiling, but also are economically feasible alternatives to traditional fladry. Flags made from marine vinyl held up better and coiled less often than rip-stop nylon. Although marine vinyl out performed rip-stop nylon, it also cost and weighed more. Its cost is likely offset by its ability to last longer, but its additional weight may cause a problem for



United States Department of Agriculture
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producers carrying it to remote areas using pack animals or backpacks. A shower-curtain design, where the flags are attached via circular links, and a top knot design, where a knot is tied in the flag below its point of attachment, experienced the least amount of coiling. Researchers note the top knot flags did not move as much as the other flag designs and caution that decreases in flag movement may impact the effectiveness of the fladry. Tests on captive coyotes were recently completed and show both designs are effective. Turbofladry is currently being placed and evaluated at cattle ranches during calving season in several states throughout the U.S. by WS in collaboration with the Natural Resources Defense Council and Defenders of Wildlife.

Wildlife Predation Workshops. — WS partners with state agencies, universities, and producer associations to host training courses and workshops highlighting new and existing predation damage management tools and techniques. Over the last few years, nonlethal predation damage management workshops have been held in California, Colorado, Idaho, Minnesota, Montana, Nevada, North/South Dakota, Ohio, Oklahoma, Oregon, Texas, Utah, and Wisconsin. As the research arm for WS, NWRC supports these workshops by providing experts and information on the latest predation damage management research. About 2,000 participants have attended the workshops, with an estimated 75 percent being livestock producers.

Urban Coyote Management. — Human-coyote conflicts are a growing issue in cities throughout the United States with some coyotes becoming overly bold and aggressive with people and pets. Little research has focused on the effectiveness of lethal and non-lethal options for managing urban coyote conflicts. Over a period of several years, NWRC researchers documented that the removal of problem urban coyotes in the Denver Metro Area of Colorado often eliminated severe conflicts for long periods of time and did not impact the overall coyote population. Research on the effectiveness of nonlethal hazing of coyotes showed the method can be useful for short-term relief, but the term “hazing” is often confusing for residents. Researchers recommend that instead of the term “hazing” other terms such as “scare away” be used in proactive coyote conflict management strategies and educational materials. For exceptionally bold and aggressive coyotes, hazing is not an effective strategy over the long term, and researchers recommend the humane removal of those animals.

Monitoring Cougar Survival and Abundance. — Given their large home ranges, low population densities, and overall elusiveness, estimating the abundance and other demographics of cougar populations is challenging. Because of this, state wildlife agencies often make cougar management decisions based on information gathered from harvested animals. NWRC and Utah State University researchers evaluated whether cougar harvest statistics collected by wildlife managers correlated with changes in cougar survival rates and abundance gathered as part of a 17 year study in Utah involving 235 radio-collared cougars. Results showed that using harvest statistics to determine harvest quotas for cougars was justified. Specifically, the total number of females harvested were negatively correlated with annual survival, meaning as harvest rates for female cougars increased, survival rates decreased. In a management area where cougar mortality from hunting was high, the percentage of permits filled was also a good proxy to changes in overall annual survival, as well as annual female and male survival. The highest correlation

was between the number of cougars treed per day and the annual abundance of cougars. This suggests that pursuit indices may be useful for determining cougar population trends in intensely harvested areas.

Selected Publications:

Gese, E.M., B.M. Roberts, and F.F. Knowlton. 2016. Nutritional effects on reproductive performance of captive adult female coyotes (*Canis latrans*). *Animal Reproduction Science* 165:69-75. doi: 10.1016/j.anireprosci.2015.12.009.

Johnson, H.E., S.W. Breck, S. Baruch-Mordo, D.L. Lewis, C.W. Lackey, K.R. Wilson, J. Broderick, J.S. Mao, and J.P. Beckmann. 2015. Shifting perceptions of risk and reward: Dynamic selection for human development by black bears in the western United States. *Biological Conservation* 187:164-172. doi: 10.1016/j.biocon.2015.04.014.

Kluever, B.M. and E.M. Gese. 2016. Spatial response of coyotes to removal of water availability at anthropogenic water sites. *Journal of Arid Environments* 130:68-75. doi: 10.1016/j.jaridenv.2016.03.009.

Poessel, S.A., E.M. Gese, and J.K. Young. 2017. Environmental factors influencing the occurrence of coyotes and conflicts in urban areas. *Landscape and Urban Planning* 157:259-269. doi: 10.1016/j.landurbplan.2016.05.022.

Wolfe, M. L., E. M. Gese, P. Terletzky, D. C. Stoner, and L. M. Aubry. 2016. Evaluation of harvest indices for monitoring cougar survival and abundance. *Journal of Wildlife Management* 80(1):27-36.

Young, J.K., E. Miller, and A. Essex. 2015. Evaluating fladry designs to improve utility as a nonlethal management tool to reduce livestock depredation. *Wildlife Society Bulletin* 39(2):429-433. doi: 10.1002/wsb.531.

Major Research Accomplishments:

- WS researchers conducted a multi-year study to identify larger European breeds of livestock protection dogs to guard herds from grizzly bears and wolves.
- WS researchers tested seven fladry designs made from rip-stop nylon and marine vinyl and identified two designs (shower-curtain and top knot) that not only resisted coiling, but also were economically feasible alternatives to traditional fladry.
- WS field specialists and researchers hosted training workshops on predation damage management tools and techniques for producers, conservationists and others in more than a dozen western states.
- WS research with urban coyotes found the removal of problem coyotes is an important management strategy and that non-lethal strategies should be employed proactively.
- An analysis conducted by WS and Utah State University researchers involving data from a 17-year cougar study showed that using harvest statistics to determine harvest quotas for cougars is justified.