

Monitoring for Wolves

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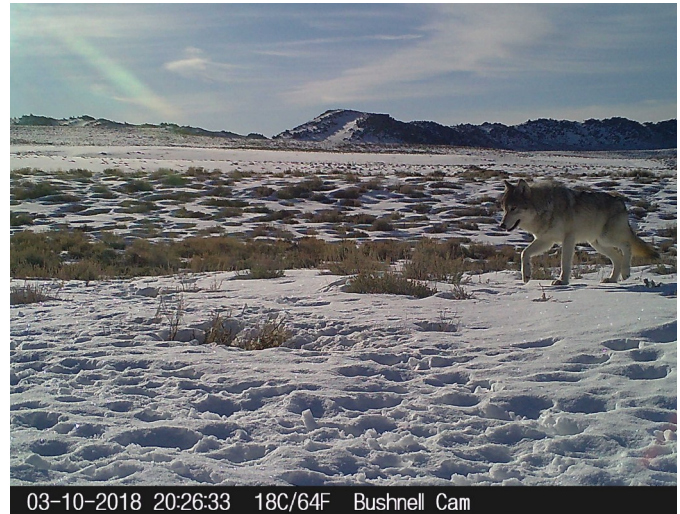


Figure 1. Documenting the presence of wolves in Wyoming through the use of a camera trap (above). These and other simple methods provide information that can be used to help prevent or minimize wolf depredations.

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Human-Wildlife Conflicts

Gray wolves (*Canis lupus*) and Mexican wolves (*Canis lupus baileyi*) once again roam across landscapes where they have been absent for decades (Figure 1). With wolf range expansion comes increased opportunities for conflicts when wolves harass or prey on domestic livestock or other animals.

Wolves have relatively high reproductive and dispersal rates but detecting individual animals in low-density populations is difficult without a concerted monitoring effort. In fact, wolf presence in an area often is not known until there is a confirmed livestock depredation.

Ranchers and wildlife damage management experts need not wait for livestock depredations to occur before wolves are detected in an area.

There are a variety of simple and inexpensive tools and techniques for monitoring for wolf presence (Figure 2). This publication provides information on the benefits of monitoring and monitoring techniques. For additional information on wolf damage management, please see the Wildlife Damage Management Technical Series publication on gray wolves.

Benefits of Wolf Monitoring

Monitoring for the presence of wolves can pose difficulties but there are numerous reasons for ranchers, wildlife damage management professionals, and others to undertake such efforts. Documenting the presence of wolves provides information that livestock owners can use in making decisions about managing livestock to help prevent or minimize wolf depredations. Wildlife damage management professionals may be able to use monitoring information when assessing livestock depredation events and verifying wolf depredations in cases involving damage payments. The information may also help determine whether the presence of wolves is responsible for changing behaviors and movements of livestock, game species, or other wildlife sharing the landscape with wolves.

In addition to determining wolf presence, monitoring for wolves can involve more structured surveillance (i.e., reporting, data collection, data analysis, and subsequent action). Once wolves are detected, monitoring can shift to collecting information about the number of wolves in the area, as well as their status (e.g., breeding or nonbreeding, presence/absence of young, resident [territorial] or transient [nomadic] animals). Monitoring can reveal important wolf activity patterns, such as movement rates and patterns (e.g., day versus night, frequency), use of travel corridors, seasonal habitat shifts, and denning or rendezvous sites.

Monitoring systems for wolves also allows for the detection of other wild predators that use the same landscape and may present a risk to livestock.

Monitoring Methods

Livestock owners should review the history of livestock depredations on their property to identify potential monitoring locations. Initial efforts should focus on detecting predator signs (i.e., scat, hair, tracks) in areas with landscape features that influence predator movement. The goal is to identify frequent wolf travel ways



Figure 2. Materials needed for a simple wolf monitoring kit include a dirt sifter, broom, marking tape, ruler, tape measure, notebook, pen, game/trail cameras, camera cards, batteries, Plaster of Paris, bottle of water, plastic cup, and spatula.

or corridors, as well as any territorial markers (i.e., feces and ground scratching) made by wolves. Establishing camera traps at these locations can provide confirmation of wolf presence and other useful information, such as the number, sex and age of animals, and movement patterns. (See Camera Traps).

Initial field surveys for signs of wolves can be conducted on foot, horseback, all-terrain vehicle or other vehicle. Search along fence lines, fence crossings, soft spots or sandy areas, game trails, creek crossings and other topographical features that serve to direct animal movement. Wolves tend to use roads for travel and will follow terrain lines (saddles and ridges) and livestock/game trails in their movements.

Livestock producers, wildlife damage management professionals, and others may use the monitoring methods described below either alone or in combination and may need to try several locations where wolves are suspected. It is important to note that detecting wolf presence can be difficult and finding locations that wolves visit will take time and effort. Pack size, density and territory size can affect the efficiency of detection.

Track Traps

It is said that “wolves live by their feet,” and often the most visible sign they leave is tracks on the ground. Learn to identify and distinguish the difference between wolf tracks and other predators or large farm/ranch dogs that may use the area. Search for wolf tracks on dusty, sandy, muddy, or snow-covered roads and trails.

Wolves leave large oval-shaped tracks measuring about 3 to 4 inches wide by 4 to 5 inches in length from toe to end of double-lobed heel pad. Wolf tracks are often in a single narrow line, with the track of the hind foot placed within or in front of the forefoot (Figure 3). The front foot is larger than its hind foot. A wolf's stride (the distance between hind and front foot tracks) ranges from 24 to 38 inches for a wolf at a walking or trotting pace.

Track “traps” can be made by clearing a section of dusty/sandy ground of all existing tracks and debris using a broom, rake, or sifter (Figure 4). Conduct regular checks for fresh tracks on that section of ground. Examine and document any fresh tracks before clearing the area again to present an untracked surface. Use this technique along fence lines where it

appears animals are entering and exiting a pasture, and on roads or trails.

Identifying tracks may be difficult on hard ground, but finding wolf tracks in fresh snow is an easy way to determine the number of animals present, as well as their travel routes.

Making Plaster Casts

Plaster of Paris can be used to make simple plaster casts of wolf tracks which aid in identification of individual animals (Figure 5). On one ranch in Wyoming, the smallest wolf track observed was from an adult female with a 4-inch long track, while the largest track (nearly 6 inches long) was from an adult male.

To prepare the plaster mixture, fill a plastic cup about half full of water, and while stirring, add the plaster (about 2 parts plaster to 1-part water), mixing well. The mixture will start to thicken and should be fluid, but not runny, when poured carefully into and over the track. Protect the track while the plaster sets; place a bucket over the track and leave it for a few hours before carefully removing it from the ground with a spatula or shovel and leave it in a safe place to dry for a day or two.



Figure 3. Wolf tracks are often in a single narrow line, with the track of the hind foot placed within or in front of the forefoot.



Figure 4. Track “traps” are made by clearing a section of dusty/sandy ground of all tracks using a broom, rake, or sifter.

When making casts in fine soils or snow, gently spray the track with a layer of hair spray to firm up the surface prior to pouring the plaster mixture.

Scat

Wolves will leave scat (feces) deposits on their travel routes but finding wolf scat can be difficult when wolf population densities are low. Look for scat during field surveys for signs of wolf presence. Wolf scat often contains hair and bone fragments, and is identifiable by its size [at least 1 inch (2.54 centimeters (cm)) in diameter], corded form, and tapered end (Figure 6). If the wolf has recently consumed meat, the scat deposit may consist of loose, dark-colored piles with little form. An accumulation of wolf scats in a confined area indicates the presence of a den or rendezvous site.

Scent Marks

Wolf territoriality is expressed via scent marks that include scat, urine, and ground scratching (Figure 7). Mature, dominant wolves exhibit scent-marking behavior, primarily at the edge of their territories and near rendezvous sites. Setting up track traps or camera traps at these locations provides an additional opportunity for monitoring for wolf presence.



Figure 5. Plaster of Paris can be used to make simple plaster casts of wolf tracks which aid in identification of individual animals.



Figure 6. Gray wolf scat.

Domestic dogs will naturally seek out and urinate in spots previously marked by wild predators. If the situation allows, bring along a dog and allow it to find canine scent marks along ranch roads or trails. If the dog shows an interest and urinates in an area, mark that location and monitor it for wolf sign.

Fence Line Hair

Like coyotes (*Canis latrans*), wolves will crawl under some fences. But more often, wolves will crawl between wire fence strands (as do many livestock guardian dogs), snagging hair on the barbs in the process. As secondary roads along fence lines are surveyed for wolf sign, check for hair snagged on wire fences. If tracks indicate wild canines are entering and exiting a pasture via a spot in the fence line, clear off any hair stuck to the barbs (scorching the hair off the wire with a lighter works well) and recheck those fence segments during future visits, examining any hair samples that remain. Visual inspection of hair length and color can provide clues to species, but genetic analysis is needed for a conclusive determination. Some agencies may be able to provide genetic analysis of hair and scat to determine the species.

Carcass Investigations

Examine any fresh carcasses (livestock or wild ungulates) immediately after being discovered in the field to



Figure 7. “Scratch-up” or scratches on the ground may indicate an area where a gray wolf left a scent mark.

determine whether the animal was killed by a predator or scavenged. Assistance with or guidance on how best to conduct a carcass investigation may be available from state fish and game agencies or the U.S. Department of Agriculture’s Wildlife Services program.

Smaller predators tend to chew or gnaw on bones, while larger predators often break bones of a carcass when feeding.

Signs of a struggle, such as sprayed blood, torn-up ground, and trampling indicates a possible depredation, so check



Figure 8. Peeling back the hide on a carcass can reveal the presence of canine bite marks. Measuring the distance between the puncture wounds can aid in identification of the species responsible.

around the carcass for predator tracks. A lack of evidence may suggest that the animal died from other causes and was subsequently scavenged by wolves or other predators.

A field necropsy on the carcass may help determine its cause of death. A timely response to the site is critical for an accurate determination. Skinning the animal and peeling the hide back can reveal the presence of bite marks that should be measured (Figure 8; See Table 1

Species	Bite Mark Measurements <i>(in centimeters (cm))</i>
WOLF	
Upper canine width	4.5 to 5.5 cm
Lower canine width	3.0 to 4.0 cm
Canine diameter	1.0 to 1.6 cm
COYOTE	
Upper canine width	2.0 to 3.5 cm
Lower canine width	2.3 to 2.8 cm
Canine diameter	0.4 to 0.7 cm
MOUNTAIN LION	
Upper canine width	3.8 to 5.7 cm
Lower canine width	2.6 to 4.5 cm
Canine diameter	1.1 to 1.3 cm
BLACK BEAR	
Upper canine width	5.5 to 6.5 cm
Lower canine width	4.5 to 5.5 cm
Canine diameter	1.5 to 1.9 cm

Table 1. Tooth size and bite mark measurements vary by predator species. Bite mark measurements can help identify the predator species involved in a livestock depredation. *Credit: Investigation and Evaluations of Predator Kills and Attacks, British Columbia Conservation Officer Service.*



Figure 9. A field necropsy on dead livestock can help determine the cause of death. The collection of blood around bite marks indicates the prey was alive at the time of the bite.

for predator bite mark measurements). The collection of blood around the bite marks (i.e., hemorrhaging) indicates the prey was alive at the time of the bite (Figure 9). Search for other signs by walking in expanding circles around the depredation site looking for tracks, scat, carcass parts, feeding location, and other clues. Multiple species may visit and scavenge the carcass, so confusing signs of more than one predator species is possible.

Consider setting up a trail/game camera aimed at the depredation site to capture images of predators that may return to try to feed on the carcass.

Howl Surveys

Wolves may be more vocal during the summer when their young are located at rendezvous sites. Conducting howl surveys in remote areas can be used to detect the presence of adults and young in a wolf pack.

Draw Stations

A draw station is a place for traveling predators to visit. Some may come to eat, smell identifiers (like urine or scat) left by other predators or leave scat or urine of their own. The longer a draw station is in place, the more activity it receives. Check state regulations regarding the use of draw stations and certain baits.



Figure 10. Camera traps at draw stations can confirm the presence of gray wolves in an area.

Draw stations may include locations that already exist (e.g., carcass sites) or are created by adding lure or bait to increase animal interest and activity. It could include something as simple as lure placed on a piece of hide hung in a tree, or a road-killed animal (legally possessed). Please note that moving dead livestock is generally restricted by state law, and landowner permission is required if wild animal carcasses are brought onto a property.

Draw stations are created to attract wolves to a location where track traps and/or camera traps can be installed (Figure 10). Common wolf draw stations include:

- Altering natural scent-marking stations with the addition of an attractant;
- Adding an additional attractant at a location where a large animal carcass is discovered; or
- Adding an attractant at a location likely used by predators, such as a road, fence, or trail junction.

Recommended attractants for use at draw stations vary and can be used alone or in combination. Common attractants include:

- Placing a sheep hide, pig hide, or a dead animal.

- Bringing a domestic dog to the site, and allowing it to naturally “mark” the spot.
- Using a bar or shovel to dig a hole where a lure can be poured into the ground. Commercial lures can be used, or make a simple homemade lure of hard-boiled, peeled eggs mixed in a blender with a little water until the mixture is pourable.

Predators other than wolves are often detected at draw stations, and some of these animals will also mark or roll on the ground, leaving their own scent and sign, providing further attractants for wolves to investigate.

Camera Traps

Camera “traps” are locations where motion-activated game or trail cameras are installed to capture images or video of animals. Installation of camera traps along suspected travel routes of wolves and at draw stations allows for photographic documentation of wolves. Both camera traps and track traps may provide details of sex and individual animal identification, as well as provide an indication of the number of animals in a pack (although it is rare that all members of a pack are captured in a single camera image).

There are numerous game/trail cameras on the market, with prices ranging from \$50 up to several hundred dollars, including models that send images directly to a cell phone. The more special features incorporated into a camera, the higher its cost. Many of the cameras in the \$100 to \$140 range are ideal for monitoring predators. Initial detection efforts focus on capturing still images of wolves rather than videos, since recording videos quickly drains the camera’s battery power, takes up more space on camera memory cards, and is usually not fruitful until wolf travel patterns are determined.

There are three types of lighting or flash included with game cameras: 1) no glow (no visible light, generally more expensive); 2) low glow or infrared (emits a dim light; mid-range price); and 3) white or incandescent flash (bright flash that allows full-color images even at night; but which often startles the animals being photographed; lower cost). Both the no-glow and low-glow cameras work well for

detecting predators and use limited battery power. Night-time photos are taken in black and white, while daytime images are taken in color.

The two most important features to look for in a remote trail camera are trigger speed and recovery time. Trigger speed is how fast the image is taken once motion is detected. It should be less than half a second. A fast trigger speed can be the difference between entirely missing an animal and recording the presence of an elusive carnivore. The recovery time is how fast the camera resets before taking the next image. It should be less than a second.



Figure 11. Motion-activated trail/game camera set up to capture images of animals at a scent mark.

data may provide insights into what is happening on the landscape.

Working with Cooperators

Monitoring for wolves can be a cooperative venture involving ranchers, wildlife damage management specialists, wildlife agency personnel, and adjacent landowners. In a coordinated effort, neighboring landowners are alerted to the presence of wolves in the immediate area and can be included in an expanding wolf monitoring network. State and federal wildlife managers may provide their expertise in trapping and placing radio telemetry collars on wolves to further aid in monitoring and preventing wolf depredation. State and federal agencies may also be able to analyze predator DNA in saliva from wounds of recently found livestock carcasses, feces or hair samples to aid in species identification.

livestock owners may be able to alter grazing rotations to avoid conflicts with wolves in certain seasons or may be able to graze larger classes of livestock in areas where wolves are detected. Monitoring may also reveal areas that require extra livestock protection, such as adding range riders, increasing the number of livestock guardian dogs, or implementing other protective measures.

Radio Collaring

Monitoring data can be used by federal or state agency personnel to select appropriate locations for live trapping and radio collaring wolves (Figure 13). Capturing and collaring a wolf not only allows that animal to be tracked, but also reveals whether the wolf is associated with other wolves or an entire pack. This allows for the monitoring of larger groups and can help determine wolf pack territories, seasonal distribution changes, and important denning and rendezvous sites. It also helps producers determine if and where livestock depredation is occurring.

Potential Management Actions

One of the main benefits of monitoring data is that it can be used to guide future livestock protection and wildlife damage management plans and actions. For example,



Figure 13. Monitoring data can be used by federal or state agency personnel to select appropriate locations for live trapping and radio collaring wolves.

Legal Status

The legal status of wolves varies from state to state. Wolf populations are managed by a variety of federal, state, tribal and local agencies dependent on the conservation status of the population. In some areas, wolves are listed as a federally protected species, while in other areas wolves may be treated as a trophy game animal subject to regulated harvest, or as an unprotected species with no limits on take. Check local and state regulations before implementing any wolf management actions.

Acknowledgements

Figure 1-5, 7-13. Photos by Cat Urbigit

Figure 6. Photo by California Department of Fish and Wildlife

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Glossary

Depredation: The act of consuming agricultural resources (crops, livestock).

Monitoring: The regular observation and recording of activities.

Necropsy: A surgical examination of a dead animal to learn why it died.

Surveillance: Activity involving the collection, analysis, and interpretation of large volumes of data originating from a variety of sources.

Key Words

Depredation, Gray Wolf, *Canis lupus*, Monitoring, Surveillance

Disclaimer

Wildlife can threaten the health and safety of you and others in the area. Use of damage prevention and control methods also may pose risks to humans, pets, livestock, other non-target animals, and the environment. Be aware of the risks and take steps to reduce or eliminate those risks.

Some methods mentioned in this document may not be legal, permitted, or appropriate in your area. Read and follow all pesticide label recommendations and local requirements. Check with personnel from your state wildlife agency and local officials to determine if methods are acceptable and allowed.

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