

How to Use Trail Cameras

FOR WOLF-LIVESTOCK CONFLICT MONITORING





DEFENDERS OF WILDLIFE

Defenders of Wildlife is a national, nonprofit membership organization dedicated to the protection of all native wild animals and plants in their natural communities.

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Introduction

Trail cameras are your eyes when you're not around. These weatherproof and compact cameras take photos or videos of anything that passes in front of them, day or night. You may already use trail cameras to keep an eye on livestock, fences, water sources or wildlife. They are also a valuable tool for monitoring carnivore activity and understanding the risk of wolf-livestock conflict.

This guide is for livestock producers, ranch hands, herders, range riders and anyone interested in helping mitigate wolf-livestock conflict. Whether you've never touched a trail camera or already use them regularly, this guide walks through how to set them up, where to place them and how to use the information gathered to stay ahead of conflict.

While trail cameras alone won't prevent conflict, the detection of wolves or their wild prey may help you better understand when and where wolves are likely to be near your livestock. This awareness can help you plan and be proactive about protecting livestock, whether that means adjusting herd movement, utilizing a range rider, using scare devices or simply continuing to monitor the area. Using trail cameras provides information that helps make timely, informed decisions that work for you and your operation.

At Defenders of Wildlife, we provide practical support to ranchers and rangeland staff across the West who live and work alongside carnivores. We hope you find this guide helpful and welcome your feedback. Please contact any of Defenders' field offices to share your thoughts and experiences. Your input is valuable and may help other livestock producers and practitioners.



Planning Your Monitoring Strategy

Start with setting your goals

If you are considering using cameras as part of your approach to protect livestock, take a moment to think about what insight you hope to learn. Are you trying to monitor carnivore activity in a remote area of your operation? Do you want to keep an eye on your calving pasture in the spring? Maybe you want to see if a scare device is working effectively or saw an animal recently that you couldn't identify. Your goals will shape how many cameras you need, where to place them, and how often they need to be checked. If you're not sure what your goals should be, start by asking yourself the following questions:

- What are my biggest concerns regarding carnivore activity?
- Where do I feel “blind” on my operation?
- What information would help me make better decisions?

Establishing clear goals maximizes the time and effort spent on managing trail cameras or determines if trail cameras are the best approach to meet your needs. If your goal is to mitigate or prevent wolf-livestock conflict broadly, camera monitoring can help you assess two key components: wolf behavior in your area and potential livestock vulnerability.

How many cameras are needed

The number of trail cameras needed depends on your goals, the size of the area to be monitored and how often they will be checked. For most ranch operations, two to five cameras may be enough to cover specific high-risk areas like calving pastures, remote corners of your range or known travel routes used by wildlife. If you're monitoring a large area or multiple pastures, more cameras may be necessary to get the coverage you desire.

There is no magic number, so start with what you can manage. Make sure you can access and maintain your cameras regularly, especially during critical seasons like calving and lambing. If you're unsure where to begin, reach out to a wildlife biologist or your local Defenders representative who can help you decide where to place cameras and how many you might need. Starting small and scaling up based on what you learn is a good approach.



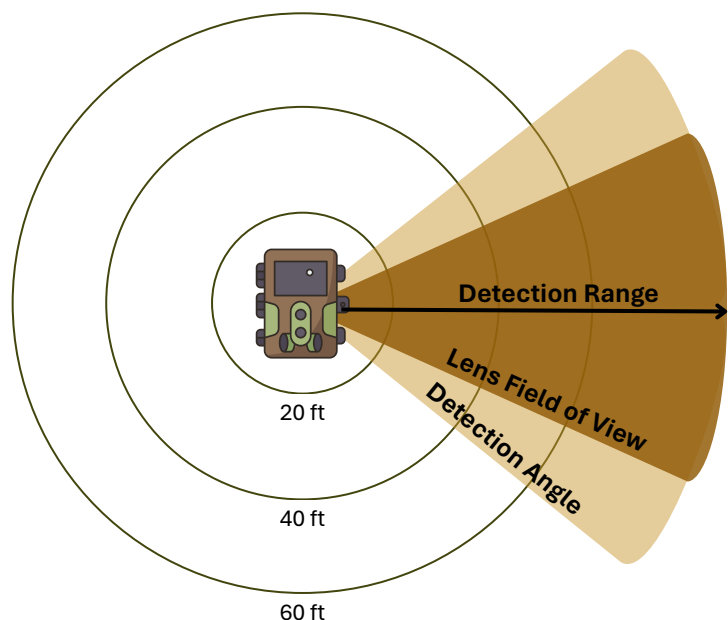
How to choose a trail camera

Not all trail cameras are built the same and choosing the right one can make a big difference when you're trying to capture images of wide-roaming animals like wolves. Most trail cameras use motion and/or heat sensors to trigger a photo or video when something passes in front of them. Ideally, you'll want a camera that is reliable, fast and can handle tough weather. There are also useful cameras available for every budget. Look for cameras with the following features to improve your chances of getting clear images:

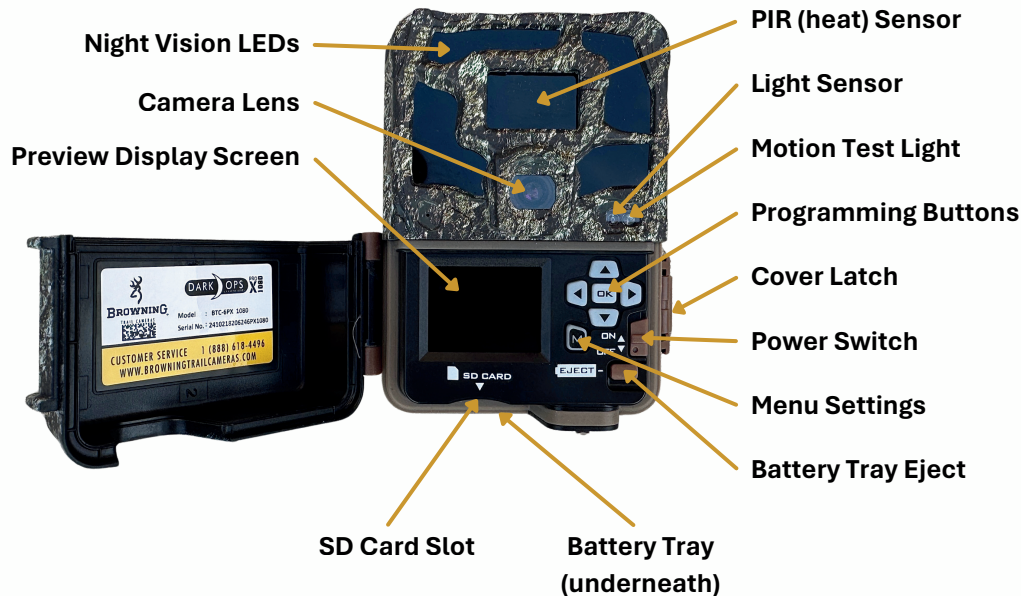
- **Night vision (infrared or no-glow flash):** Wolves are most active at dawn, dusk and night. Most modern trail cameras have infrared, no-glow flash technology that's ideal for capturing carnivores in low-light. Conversely, cameras that rely on a standard white or incandescent flash may scare animals away, including wolves.
- **Fast trigger speed:** This feature quickly captures movement before the animal passes out of frame. A trigger speed of 0.5 seconds or faster is recommended. If a camera does not provide trigger speed specifications, that may indicate that the camera is lower quality.
- **Photo bursts:** This feature allows the camera to take multiple photos in quick succession.
- **Long detection range and wide detection angle:** Useful for open areas or travel corridors.
- **Strong battery life:** Battery life is important for remote areas or when checking cameras less often. Some trail cameras include a built-in solar panel, which can substantially increase battery life. External solar panels and rechargeable batteries can also be purchased separately.
- **Weather resistance and durability:** Cameras must be able to perform well in rough conditions and extreme temperatures.
- **Playback preview screen:** Having the ability to check photos or videos on the camera's built-in screen can be very helpful to make adjustments in the field. Camera models with a screen in the front can save time because they offer the ability to see what is in the camera's field of view while positioning and mounting the camera.

What can a Trail Camera Detect?

Each trail camera model has a different detection range, detection angle, and field of view. These details are good to consider when choosing and installing a trail camera. A long detection range (60-100 ft) helps ensure you capture a photo of the animal even if they do not get very close to the camera.

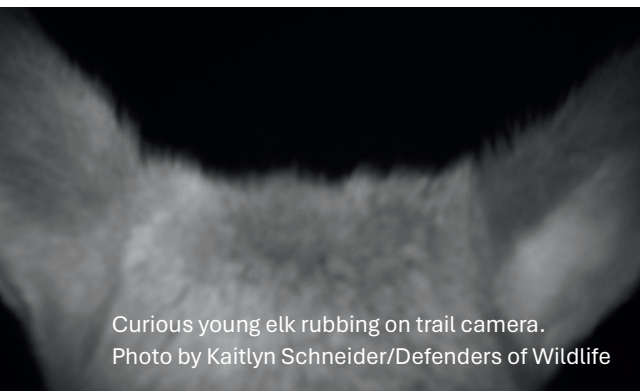


Anatomy of a Trail Camera



You will have the option to choose from standard and cellular models. With standard cameras, you must manually check the camera and batteries. These cameras are usually cheaper, and the only ongoing cost after purchase is buying new batteries and memory cards. On the other hand, cellular cameras can send images straight to your phone or email in real time or with a short delay (e.g., a few seconds to 30 minutes), which is helpful when you want to use cameras for real-time management actions, hard-to-reach areas or when checking cameras regularly isn't practical. Keep in mind that cellular cameras are typically more expensive upfront, rely on cell service and come with additional subscription fees.

You will also need a memory card for your camera to start taking pictures. Check the manufacturer's instructions for the type of memory card that is compatible with the camera model before purchasing. You may think that a bigger memory card is always better, but some have limits. Generally, a 64GB high-speed memory card is compatible and stores thousands of photos. It can also be convenient to have at least two memory cards per camera, so you always have a backup or empty memory card to swap out when it's time to check your camera.



Curious young elk rubbing on trail camera.
Photo by Kaitlyn Schneider/Defenders of Wildlife

When purchasing your cameras, we recommend ordering a compatible lock box and cable lock. This helps prevent theft or tampering if you are placing cameras on public land. Even on private land, a lock box protects your camera from curious livestock or wildlife, which tend to rub, bump or chew on unprotected equipment. It's a small extra step that can help protect your investment and extend the life of your camera.

Setting Yourself Up for Success

How to program a trail camera

Before placing your trail camera in the field, take time to go through the settings menu and make sure it's programmed for your specific needs. The list below includes common settings you'll find on most trail cameras, along with recommendations for capturing clear images of wolves. Each brand and model is a little different, and your ideal settings may vary depending on your location, season and goals.

Setting	What This Setting Means	Common Options	Recommendation
Mode	Determines what the camera captures — still photos, videos, or both	Trail/Video/Trail+ Video/Timelapse	Photo or photo + video depending on your goals
Capture Delay	When photo is taken after motion is detected	1 second - 1 hour	Shortest delay possible
Picture Quality	Image size (higher = better detail, but uses more memory)	Low/Medium/High or 5-30 megapixels (MP)	High (16MP–20MP)
Multishot	Number of photos taken per trigger event	1-10 shots	3 shot burst - this will balance memory card space and giving you multiple photos to see what's going on
Capture Start/End	Start and end of day when the camera is active	Night only, day only, or any time of day	24-hour (12am–12am)
Video Quality	Resolution of video clips (higher = better detail, but uses more memory)	Ultra/High	High (1080p or higher)
Video Length	Duration of each video clip	5s - 60s	10s if using video mode
SmartIR	Depending on brand and model, allows camera to extend video length if motion is still detected, up to 5 mins.	On/Off	On



Setting	What This Setting Means	Common Options	Recommendation
Timelapse Period	This mode takes photos at a pre-determined schedule rather than when motion-triggered. When selected, you can choose the hours per day the camera captures timelapse videos.	All day or 2/3/4 hours after sunrise or before sunset	Timelapse OFF
Timelapse Frequency	How often photos are taken to form a timelapse	5 second – 1 hour	Only needed for the timelapse feature, which we do not recommend using.
Info Strip	Adds time, date, temperature, camera name, moon phase, etc. to image	On/Off	On
SD Management	Allows camera to overwrite oldest photos when memory is full	On/Off	<p>On if you would like to prioritize more recent events.</p> <p>Off if you want to prioritize events that happened when you first set up the camera.</p> <p>Regardless, we recommend checking the camera before the card is likely to fill up.</p>
Camera Name	Name assigned to each camera that will appear on the info strip of your photos.	---	Assign a unique name or number to your cameras for easy identification. It helps to also mark this on the camera.
Format SD	Formatting prepares the memory card for use by clearing all data to ensure compatibility and performance by the camera.	Yes/No	Select this every time you replace a memory card in the camera to make sure your SD card is formatted correctly
Delete All	Erases photos currently on memory card	Yes/No	Select this every time you replace a memory card in the camera to make sure your SD card is completely empty and ready to store new photos

How to decide where to place cameras

Wolves cover a lot of ground, and where they travel can change with the seasons, depending on where their prey moves, how deep the snow is and what people are doing in the area. In just one day, a wolf can travel up to 30 miles. In spring and early summer, wolves in a pack stay closer to their dens while raising pups, making their travels a little easier to predict. But in winter, wolves may move more widely, especially once their pups are big enough to travel. Even then, deep snow and prey movement often guide where wolves go. Lone wolves that are in search of a new mate and territory may roam hundreds of miles before settling down in a new area. These wolves may pass through a spot just once and never come back. Because of this, it can be hard to predict where wolves will be, even if signs or sightings pop up in an area.

Still, the way wolves travel and mark their territory gives us chances to spot them. Wolves often travel along paths of least resistance such as trails, ridgelines, roads and fence lines. These features act as natural funnels that guide animals through narrow areas, making them ideal spots for placing trail cameras. Set cameras at trail junctions, gates or places where terrain narrows like saddles or creek crossings to increase the chance of detecting wolves. Look for tracks, scat or other signs to identify potential routes, as wolves will often return to scent-marked locations. Wolves and other carnivores can smell attractants like carcasses from over a mile away. If you come across a dead deer or have a carcass pit on your property, placing a camera there can help you determine if carnivores or scavengers are being drawn to your operation by the scent.



Where the Landscape Funnels Wolf Movement



Roads



Game Trails



Hiking Trails



Fencelines



How to mount a trail camera

Once you've picked a good spot, the way you install your camera makes all the difference. A poorly placed camera can miss animals, fill up your SD card with grass moving in the wind or be damaged by wildlife. Taking a few extra minutes to set it up correctly can save time and frustration. It will also help get clearer photos of the animals you're trying to monitor.

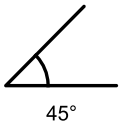
Here are some tips for mounting your trail camera to best capture wolves:



Mounting surface: Use a sturdy tree, fence post or T-post. The camera should be stable and not wobble or tilt in the wind. Use straps, bungee cords or mounting brackets to secure it tightly. If you expect the camera to be in the same place for a long time, you can screw or bolt the security box to the mounting surface. This can be particularly helpful in areas where livestock or bears may rub on the camera, or in areas where there is public access.



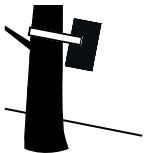
Height: Mount your camera between knee and hip height, or roughly 2-3 feet off the ground. This is a good height to catch most wildlife, including wolves, especially along game trails, fence lines or roads. Adjust the height as needed based on sloped terrain, snowy conditions and other context-dependent factors.



Focal Point: Point the camera in the direction you expect animals to travel from or lightly angled (45 degrees) to catch them as they move through the frame, not just as they pass by. If an animal could be coming from any direction (e.g. the middle of an open field), consider a more strategic location and/or place multiple cameras for more coverage.



Direction: You want to face the camera north, if possible. Direct sunlight shining on the lens during sunrise and sunset may cause false triggers, so positioning the camera to avoid direct light at those times of day is ideal. This helps avoid sun glare and harsh light changes that can wash out images. If the camera is in a forest, shaded by structures or hills, or otherwise protected from direct sun exposure, you don't need to worry about the direction it faces.



Angle: Try to aim the camera parallel to the ground. If the camera and game trail are on a slope, angle the camera such that it is parallel to the slope. You can wedge sticks behind the camera to help achieve your desired angle.



Avoid false triggers: Clear any tall grass, branches or moving vegetation within 10 feet of the camera's sensor. Wind-blown grass or changing shadows are common causes of empty or blurry shots and quickly fill up SD cards. Be sure to tuck in the loose ends of any straps and remove tall grass directly in front of the camera so it doesn't trigger it.



Concealment and protection: Choose a spot that blends with the surroundings but still gives the camera a clear view. On public lands, use a lock box and cable lock to prevent theft or tampering. Even on private land, elk, cattle and other curious animals may rub or chew on trail cameras, so lock boxes are a good idea to protect your gear.

Before you leave, walk in front of the camera to test its angle, height and trigger range. Many cameras have a motion test mode that will flash or blink when motion is detected. Use this feature to make sure it's working properly and determine your camera's range of detection. Alternatively, if the camera has a built-in preview screen, you can turn the camera on, walk in front of it and check to see how the images turn out. With this method, keep in mind that most cameras have a 10-30 second delay after being turned on. By taking a few extra minutes to test this now, you can help ensure your camera captures what you need later.

Take good note of where you placed your camera so you can easily find it later. Take a photo of where it is mounted and record the coordinates of the location. Additionally, you can mark its location on mobile mapping apps, such as OnX, Gaia, MapItFast, Google Maps or Apple Maps.



Final Checklist

Ask yourself the following questions before leaving the camera:

- ☐ Are the camera settings (including date and time) updated?
- ☐ Is the memory card formatted?
- ☐ Is the memory card inserted all the way?
- ☐ Does the memory card have space for photos?
- ☐ Are battery levels sufficiently charged?
- ☐ Is the battery pack inserted all the way?
- ☐ Is the camera turned on?
- ☐ Is the camera secure and at the appropriate angle and height?
- ☐ If using a lockbox, is it secure with a cable lock?
- ☐ Is there anything in front of the camera that may result in a lot of blank images?
- ☐ Are the camera's location coordinates recorded?

Managing Your Data

How to check a trail camera

When checking the trail camera, bring an empty memory card and extra batteries. You can also purchase a memory card reader to review photos in the field with your phone, but this is optional. Ideally, the trail camera model you choose will have a built-in screen to view photos and videos in the field. You only need to replace the batteries if they are running low, which may be yearly or weekly depending on the level of activity. You can typically find the battery level on the main screen. Note that for many cameras, the date and time will need to be re-selected every time the batteries are removed.

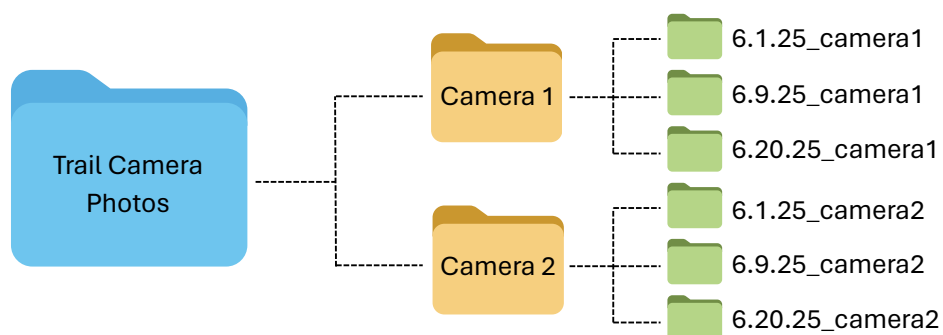
Use your memory card reader or the camera's preview screen to quickly look through recent photos and see if the camera is capturing what you need or if the placement needs to be adjusted. Then, swap in your new memory card, re-check the settings to make sure nothing has changed, format and clear existing photos from the memory card in the setup menu even if you have used the card before. Run through the installation checklist above before leaving your camera.

How often to check cameras

How often the cameras should be checked depends on your goals, but every one to four weeks is generally a good range. Check frequently to catch timely activity to inform decisions about managing carnivore presence or potential conflicts. If you have your camera set in an area with livestock, consider checking the camera weekly, as the memory card may fill up more quickly with images of livestock.

How to manage the photos

Organizing your photos makes it easier to track patterns over time. One simple system is to create a folder for each camera location, and within that, create sub-folders by the date of each check. Put all the photos from the checks into the corresponding dated sub-folders so you can easily find what you're looking for later. You can skim through images manually, or use apps and software to help sort, tag and identify species. This can be especially useful for managing many cameras or large numbers of photos. If you choose to use third-party software to manage photos, read the terms of service closely to understand if or how they assume any usage rights of the photos you submit. Once you have reviewed the photos or videos, delete empty photos not worth keeping, such as false triggers resulting from vegetation movement. This will prevent unnecessarily filling your hard drive.



Using This Information to Protect Your Livestock

What to do when cameras are not capturing wolf activity

If your cameras aren't picking up any wolf activity, that still gives you useful information. It could mean wolves aren't currently in that area, or it might be time to adjust your setup. We recommend leaving a camera in place for four to six weeks before deciding whether to move it. This timeframe allows enough opportunity to detect transient or resident wolves, especially given their large home ranges and unpredictable movement. Make sure your camera is aimed at a good travel route like a game trail, road or fence line and that the sensor is clear of brush or grass that could block its view. You can also try adjusting the height, angle or settings like trigger speed and sensitivity. Adding another camera in a nearby area may also help you cover more ground and improve your chances of detection. If you are detecting other types of wildlife, just not wolves, you have likely found a good spot for your camera.

What to do when cameras are capturing wolf activity

When your cameras start capturing images of wolves, it is important to pay attention to the details. Record the dates, times and locations where wolves appear. This information can help you understand how often wolves are present, how they behave and which parts of your land may have a greater likelihood of carnivore interactions. Remember, the real value of camera monitoring lies in what you do with the information the cameras provide. If you begin seeing wolves or other carnivores more frequently, you can reduce your risk of conflict by making informed decisions, such as moving or checking livestock more often, placing more cameras nearby, managing attractants, adding scare devices or specialized electric fencing or increasing human activity in those areas. Which of these next steps is appropriate, if any, will depend on the specific timing, needs and layout of your operation. If you are unsure what to do next, reach out to local wildlife agencies or nonprofit partners who can help you assess your options. Consider sharing your photos with wildlife biologists so you can help each other better understand the level of wolf activity in your area, especially in areas where wolves are a protected species.



Photos by Karin Vardaman/Working Circle



Tips to identify gray wolves and wolf sign

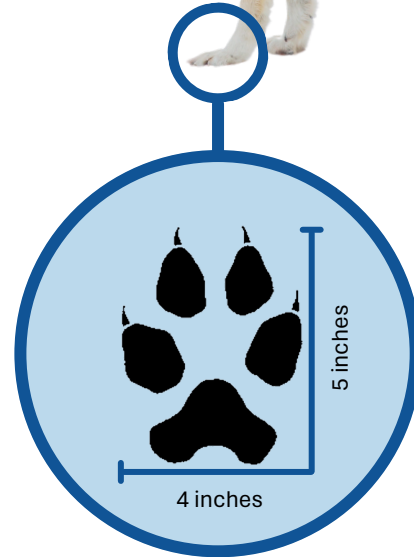
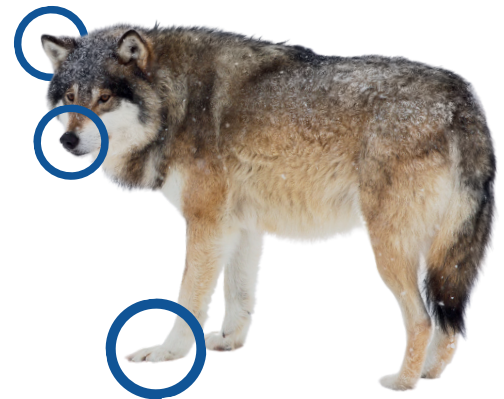
Identifying Features

- Short, round ears
- Broad snout
- Fur color can include blends of white, grey, red, brown and black

Prints and Tracks

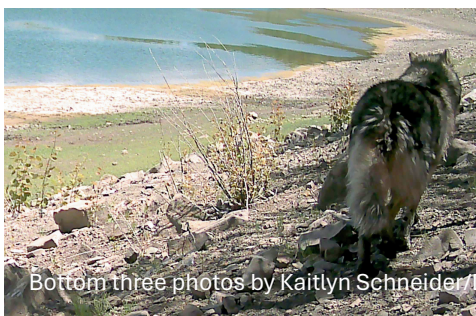
- Scat is segmented, tubular, 6-17" long, 0.5-1.5" wide
- Scat often contains fur and/or bone
- Prints show symmetrical toes and evident claws
- Hind tracks are slightly smaller than the front tracks
- Paths take a direct, energy efficient or purposeful route

Trail Camera Photos of Gray Wolves



Don't be fooled by other animals you may catch on your trail camera!

Domestic Dog



Coyote



Black Bear

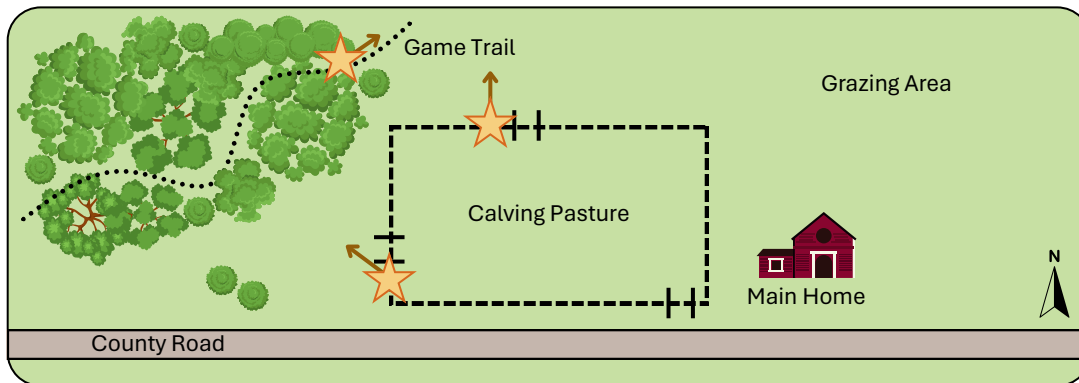


Bottom three photos by Kaitlyn Schneider/Defenders of Wildlife

Case Studies

Case Study #1

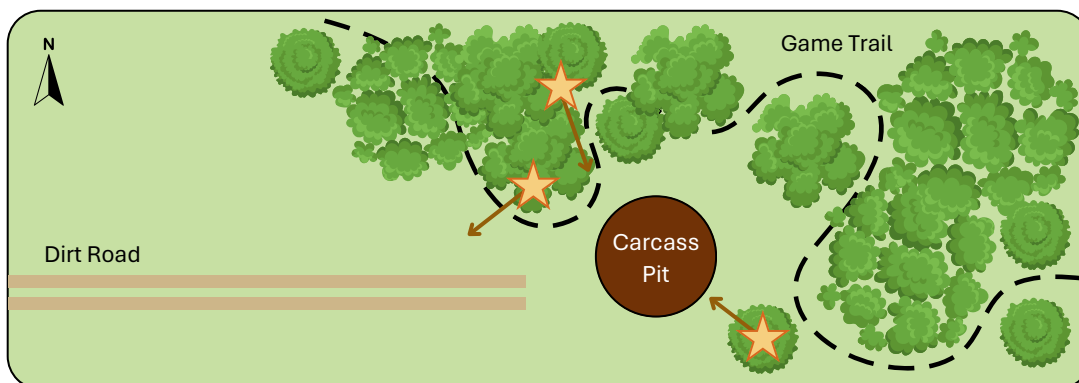
A cattle rancher calves in a pasture near a new wolf pack that is likely to den this year. The rancher proactively installs turbo-fladry around his pasture during calving season, when his livestock are most vulnerable. He owns three trail cameras, and his goal is to understand how often wolves are coming near the pasture and whether they test or avoid these deterrents.



Placement strategy: Two cameras are placed along the turbo-fladry at the northern and western gates to see how often wolves approach the pasture and how they react to the turbo-fladry. The third camera covers the mouth of the game trail to measure wolf and ungulate activity.

Case Study #2

A cow-calf operation has a historic carcass pit along the property edge, and the rancher is concerned it may be attracting predators. Coyotes and eagles visit regularly, but it's unclear whether wolves visit. While no resident pack occupies the area, transient wolves pass through. Her goal is to record all scavenger activity, including wolf visits, and track timing and frequency.



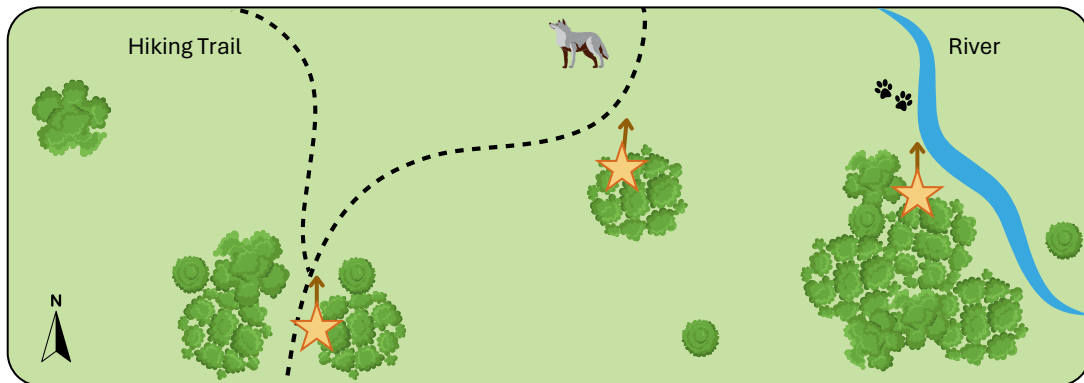
Placement strategy: Cameras are positioned to capture multiple views of the carcass pit and the likely entry points for carnivores, including the game trail and dirt road. Nearby trees provide shade that reduces sun glare, opening up options for camera positioning.



Note: These case studies are fictional, simplified examples with sample answers. They illustrate possible approaches, but many effective strategies exist depending on more detailed context.

Case Study #3

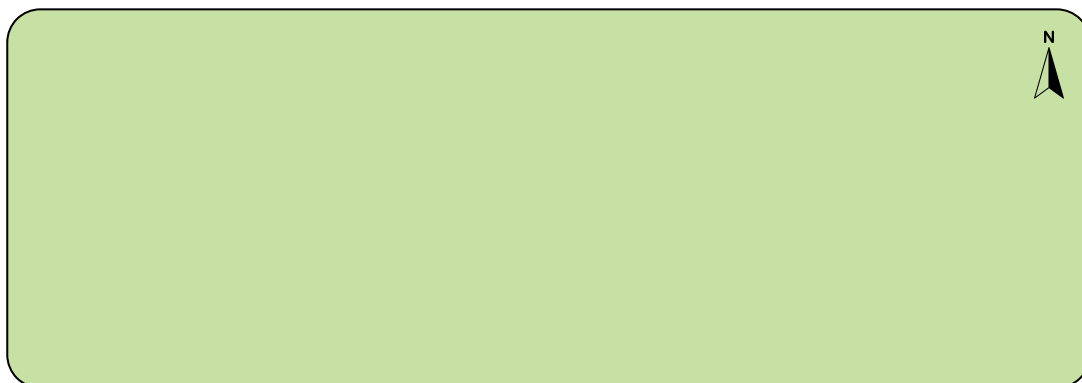
A range rider monitors a 20,000-acre public grazing allotment. While checking the flock of sheep, he finds fresh dog-like tracks in the mud and briefly spots an animal moving through thick sage brush. He is unsure whether the animal was a wolf, coyote, or domestic dog. His goal is to use three of his cellular cameras to identify the animal and determine whether it returns to this area or was just passing through.



Placement strategy: Focusing on the area where the sighting occurred, one camera is placed in the tree stand near where the wolf was spotted in the brush. Another camera is placed at a fork in the hiking trail. The third is near the river, where the tracks were seen and where animals are likely to return for water.

Try It Yourself!

Get down your context - How big is the area? What type of livestock do you have? Where do you need eyes? Then, sketch a layout of your operation or monitoring area, noting trails, attractants, roads and buildings.



Placement strategy: If you have 3-5 cameras, where would you place them in your diagram and why?

Notes





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