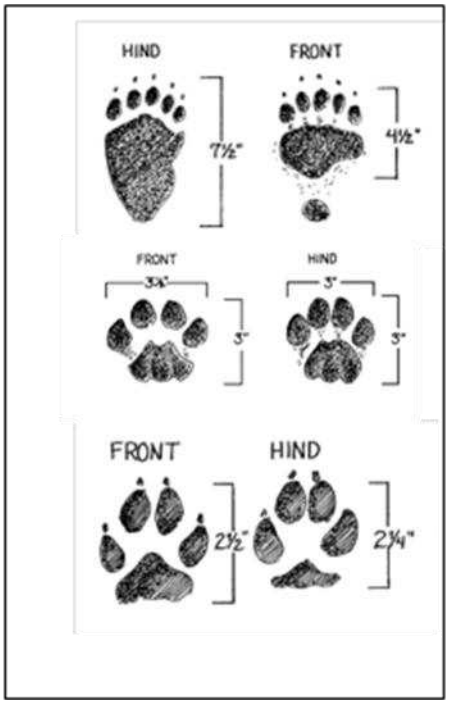
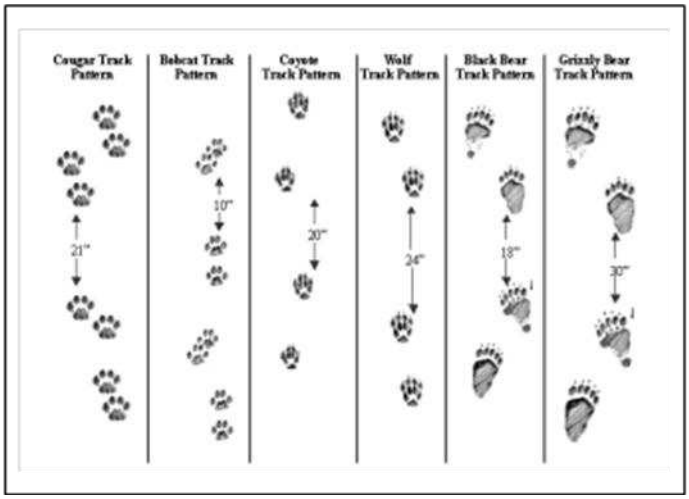
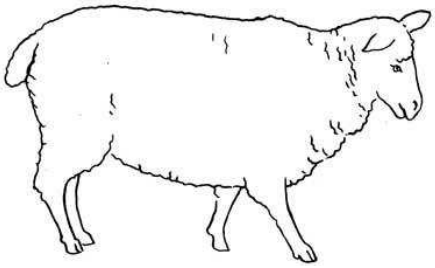
Washington Department of FISH and WILDLIFE

LIVESTOCK INJURY AND MORTALITY INVESTIGATIONS

A REFERENCE GUIDE FOR WDFW FIELD PERSONNEL







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Washington Department of FISH and WILDLIFE

LIVESTOCK INJURY AND MORTALITY INVESTIGATIONS

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LIVESTOCK INJURY AND MORTALITY INVESTIGATIONS

INTRODUCTION

This guide is intended to be used for general reference only. In no way does it attempt to describe every possible piece of evidence, every situation, the condition of every carcass, the amount of carcass that remains to examine, or the variability of injuries that an investigator may encounter during a livestock injury or mortality investigation.

The reference guide does not provide step by step instructions on how to perform an investigation because it is expected that, over time, each investigator will develop techniques that work best for them. However, this guide follows the same general layout of the livestock injury and mortality investigation form. The investigation form was designed in sections that pertain to the order an investigation should progress, from general to more specific. These sections include the initial report, the incident location, the type of animals affected, site description and physical evidence present, description and location of injuries, source of injuries, and the injury/mortality classifications. If the form is completed in order, no steps will be missed during a livestock injury and mortality investigation.

This guide has many pictures of injured and dead livestock. These photos were selected because they primarily represent the "classic" characteristics of a predator attack and, in some cases, the associated damage they caused. Please remember that every livestock injury and mortality investigation is unique due to a whole host of variables, and what you may observe during an actual investigation may be very different than what is illustrated in the photos.

LIVESTOCK INJURY AND MORTALITY INVESTIGATIONS
INITIAL REPORT

Sample questions to ask reporting party (RP) once initial report is received. Feel free to ask more questions based on the information you are receiving.

1) Is the animal injured or dead?

2) When and where was the animal found?

3) When was the animal last observed uninjured or alive?

4) Are there any witness accounts to the incident? *Use caution here, oftentimes the RP will already "know" what happened even if no witnesses observed the incident. Please remember to keep an open-mind and let the investigation lead you to your conclusion.*

5) Are injuries visible and, if so, describe the location of the injuries?

6) If the animal is dead, how much of the carcass is left?

7) If the animal is dead, did you notice sign of any other animals near the carcass?

8) If the animal is dead, did you cover the remains with a tarp to preserve evidence? *If not, there is no need to go back and do this unless you are unable to respond in a reasonable amount of time.*

Before hanging up the phone, remind the RP to minimize disturbance to the area to preserve any possible evidence at the incident site prior to your arrival.

Most important items to include in your necropsy kit *(an equipment list put together by District 1 can be found in Appendix 3 of this guide)*

- Livestock injury/mortality investigation form*
- Knife*
- Blade sharpener*
- Digital camera*
- GPS unit*
- Measuring tape*
- Thick skin*

References used for this manual:

(1) AgriLife Communications. 2010. Procedures for evaluating predation on livestock and wildlife. Texas A&M University, Texas, USA.
(2) Government of Alberta. 2010. A rancher's guide to predatory attacks on livestock. ISBN: 978-0-77895-9053-8.
(3) The Internet Center for Wildlife Damage Management. 2011. Livestock and animal predation identification. http://icwdm.org/inspection/livestock.asp
(4) Mackay, A. 2005. Mitigating cattle losses caused by wild predators in British Columbia: A field guide for ranchers. British Columbia Cattleman's Association, British Columbia, Canada.
(5) Niemeyer, C. 2010. Wolfer. Bottlefly Press, Boise, Idaho, USA.
(6) Severidt, J.A., D.J. Madden, G. Mason, F. Garry, and D. Gould. 2001. Dairy cattle necropsy manual. Colorado State University, Integrated Livestock Management. Fort Collins, Colorado. Pg. 102.

LIVESTOCK INJURY AND MORTALITY INVESTIGATIONS

SITE DESCRIPTION AND PHYSICAL EVIDENCE PRESENT

IF POSSIBLE, CONDUCT A COMPLETE SITE INVESTIGATION PRIOR TO EXAMINING THE INJURED ANIMAL OR PERFORMING A NECROPSY

Things to document and take note of might include:


Grizzly bear bed site near depredation

- Tracks
- Hair
- Scat
- Blood
- Bed sites
- Sign of struggle
  - trampled vegetation
  - broken branches on nearby trees or shrubs
  - spilled or sprayed blood on ground or nearby vegetation
- Was animal moved from site of incident?
  - by humans (likely if animal was injured)
  - evidence animal was moved or carried from site of incident
- Evidence of caching behavior
  - scrape marks
  - covered with debris

At times, there may be no or very little site evidence to assist the investigator in determining what happened, but it remains a very important step during the investigation process whether any additional evidence is found or not.

Understanding the behaviors and habits of large predators as well as knowledge of any recently confirmed sightings and/or other information that may indicate a large predator might have been in the area may also assist the investigator during a livestock injury/mortality investigation even when site evidence is lacking.

PHOTOGRAPHS: If evidence is found, photographs should be taken for documentation. If possible, take photos of the entire scene and where any evidence may be located in relation to the carcass. If close-ups are necessary, take a wide angle view for reference before taking that close-up photograph. When photographing tracks, remember to place something of known size next to the track so a lay person can have some reference to size.

LIVESTOCK INJURY AND MORTALITY INVESTIGATIONS
SITE DESCRIPTION AND PHYSICAL EVIDENCE PRESENT

TRACKS, HAIR, AND SCAT

During the initial site investigation, search the area surrounding the incident location for evidence of predator presence. Creek banks, puddles, muddy ground, cow pies, fences, and nearby trees and/or shrubs are a few good places to search for tracks and hair. Please remember, even if predator sign is found, this does not necessarily mean that predators were responsible for the injury or mortality.

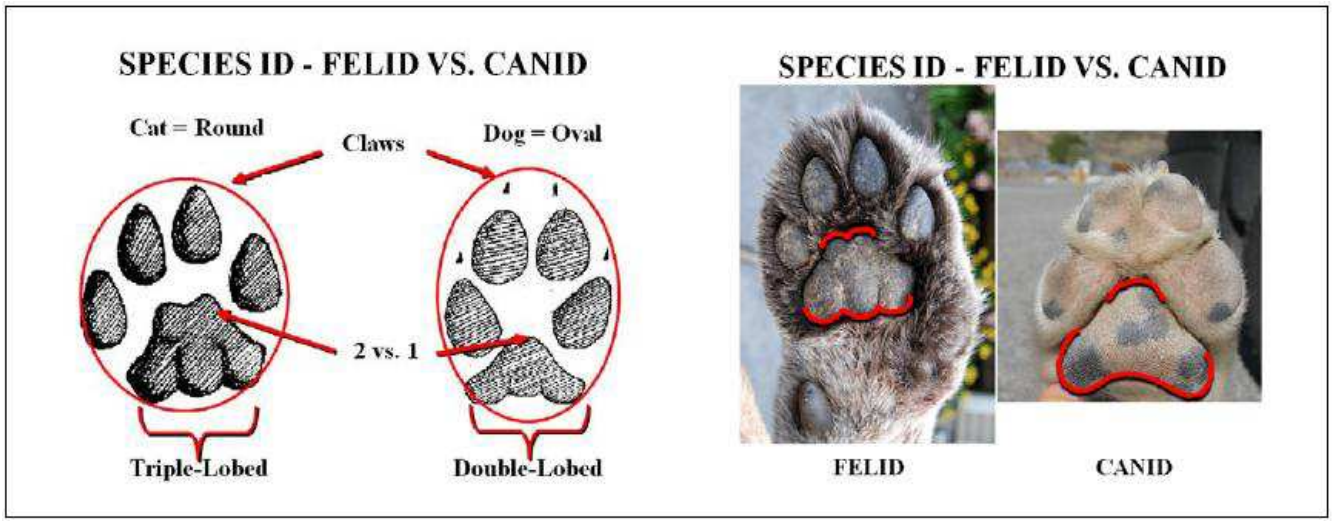
Scat may also be present, but unless additional sign is found in the area, it may be difficult to determine which predator species the scat came from. Below are general scat characteristics of predator species (color and size were not included due to the amount of variation both within and among species). **NOTE:** *If the predator recently consumed meat (from scavenging or something it may have killed), the scat will appear very dark brown or black and will most likely have no or very little form.*

Bears: Scats are highly variable and often contain partially undigested parts of a single food source. Scats may be large and tubular in shape with relatively blunt ends or they may be relatively small and round/oval or any variation in between. Bears often deposit scats in large piles and seldom, if ever, cover them with debris.

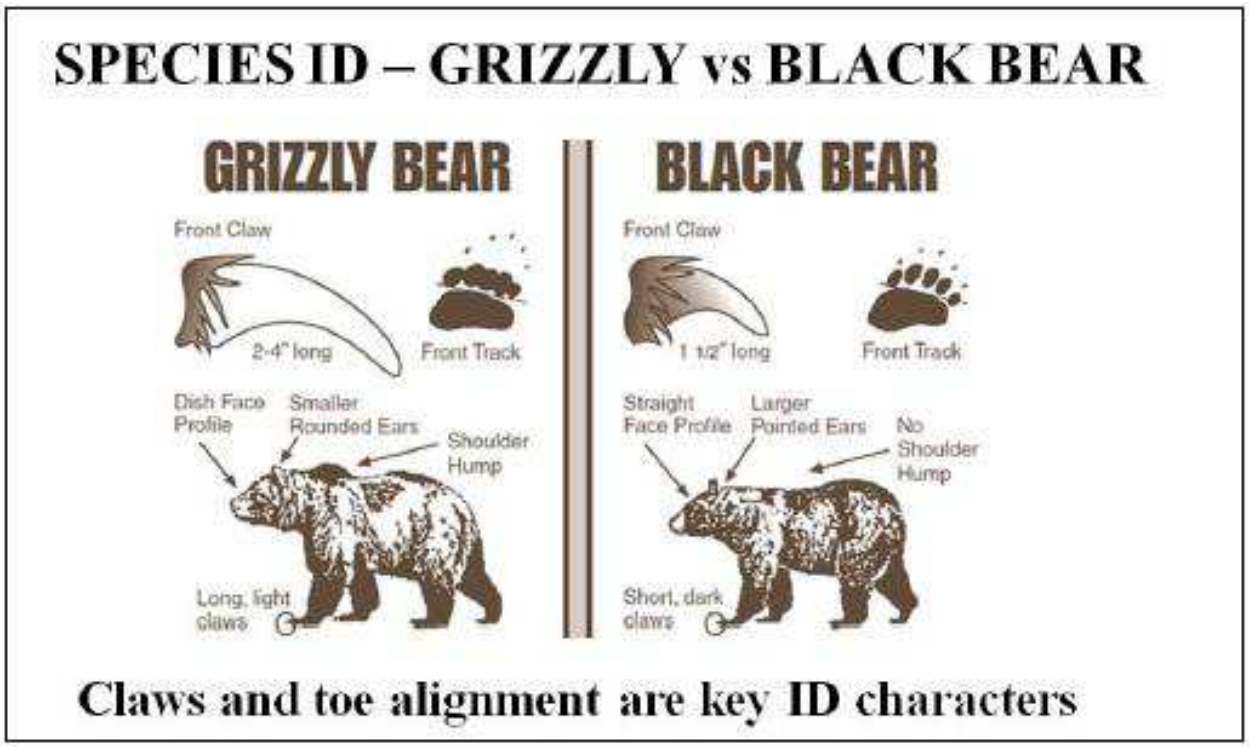
Cats: Highly variable, but scats often appear segmented with blunt ends. Cats often scratch out areas and deposit scat in this spot then they may or may not cover scats with ground debris. Scats may contain large amounts of hair and/or bone. Cougar scats will often be larger than bobcat.

Dogs: Highly variable, but scats often have a tapered end. May or may not appear segmented or twisted like rope. Scats may contain large amounts of hair and/or bone. Scrapes may be evident, but these are generally due to vigorous, random movements of the hind legs after defecation. Scats will seldom, if ever, be covered with debris.

TRACK IDENTIFICATION



Another identifying characteristic, seen in the set of images on the left (above), is that the two middle toe pads on cat tracks are slightly offset (one slightly in front of the other) while the two middle toe pads on dog tracks are nearly straight.



WOLF OR DOG TRACKS?

Determining whether a dog or a wolf left a set of tracks can be a very challenging task. Dogs can overlap wolf tracks in size and, because they are closely related, there are no morphological features one can use to separate the two. Gaits and track patterns around kills and carcasses are often confusing and not diagnostic.

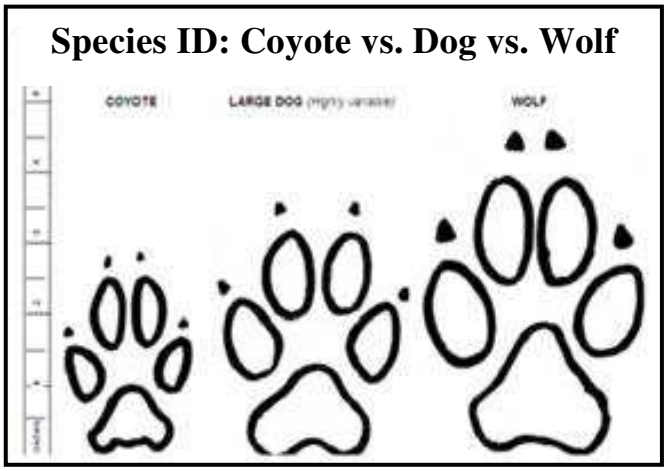
That said, accurate measurements are extremely helpful in separating out these two closely related canids. Tracks were likely made by wolves if either of the following is true (82% of dogs have feet smaller than this):

- Hind foot length 3 ½“ or longer without claws
- Front foot length 4” or longer without claws

Some dog breeds that commonly have tracks in the wolf size range: Irish Wolfhounds, Akitas, Saint Bernards, Newfoundlands, Great Danes, and Mastiffs.

Tips on Measuring Tracks

- Try to identify front and hind prints. The dog and cat families both have front feet that are slightly larger than the rear.
- Try to measure from the floor (bottom) of the track, not the top edge (minimum outline).
- Measure several footprints and average the size if possible.
- It is best not to measure claws, as they sometimes register well, other times not at all, and every variation in between. Measuring claws introduces more variation into a process that is oftentimes difficult to begin with.



- *Length*: Measure from the tip of the furthest forward toe pad to the back of the heel pad (interdigital pad). Measure parallel to foot axis.
- *Width*: Measure from the farthest point on the outside toe pad to the farthest point on the inner toe pad. Measure perpendicular to the foot axis.

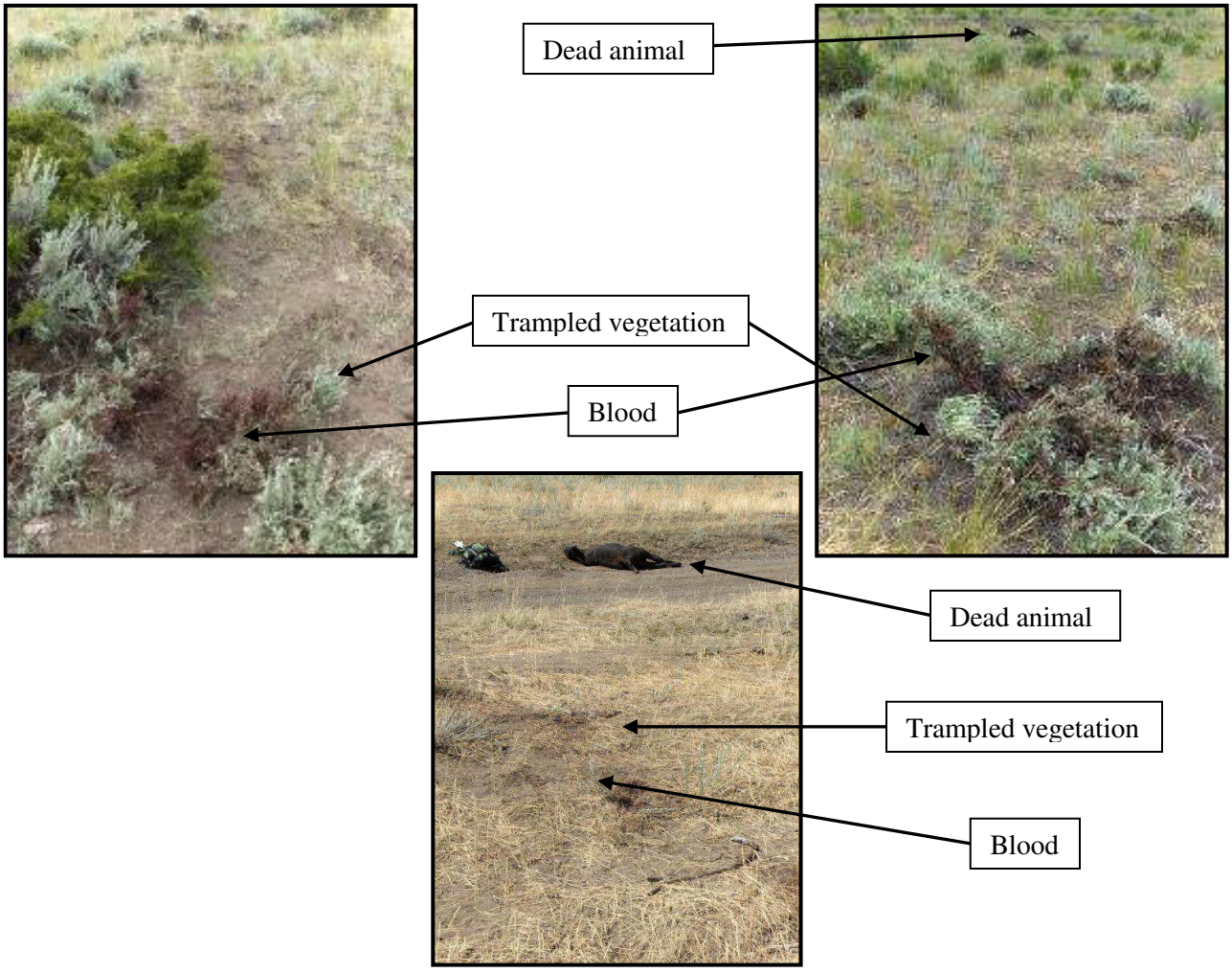
Reference used for this page:

1) Halfpenny, J., and T. Furman. 2010. Tracking wolves, the basics. CreateSpace Independent Publishing Platform. Gardiner, Montana, USA.

BLOOD AND SIGN OF STRUGGLE

Due to differences in how predators attack, there may or may not be evidence that a struggle occurred near the location of the incident. Cougars tend to use stealth when attacking prey thus attacks are over relatively quickly so there may be little evidence to indicate a struggle occurred. Bears may chase prey for short distances then use size and strength to their advantage which may result in a struggle of relatively short duration. Wolves tend to chase and bite prey to slow it down and bring it to the ground so there may be some indication at the scene that an extended attack and/or struggle occurred, but not always.

Below are some examples which indicate that a struggle occurred. The top two photos show evidence of a struggle found during a wolf depredation investigation and the bottom photo shows evidence of a struggle found during a grizzly bear depredation investigation.



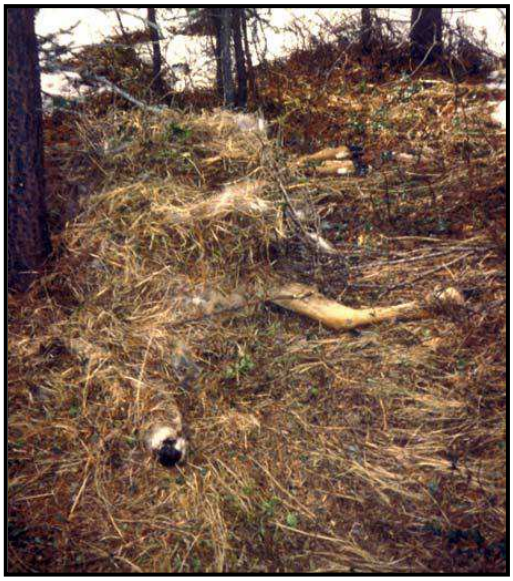
EVIDENCE ANIMAL WAS MOVED FROM INCIDENT SITE AND CACHING BEHAVIOR

Cats: Usually carry or drag prey item away from kill site, often to an area of dense cover. May then cache prey by carefully scraping the surrounding area and covering the prey item with ground debris.

Bears: More variable than cougars with this behavior. May or may not carry or drag prey item away from kill site. May or may not cache prey. If prey is cached, bears will use ground debris as well as dirt and ground may appear as if it was "roto-tilled" around the prey item.

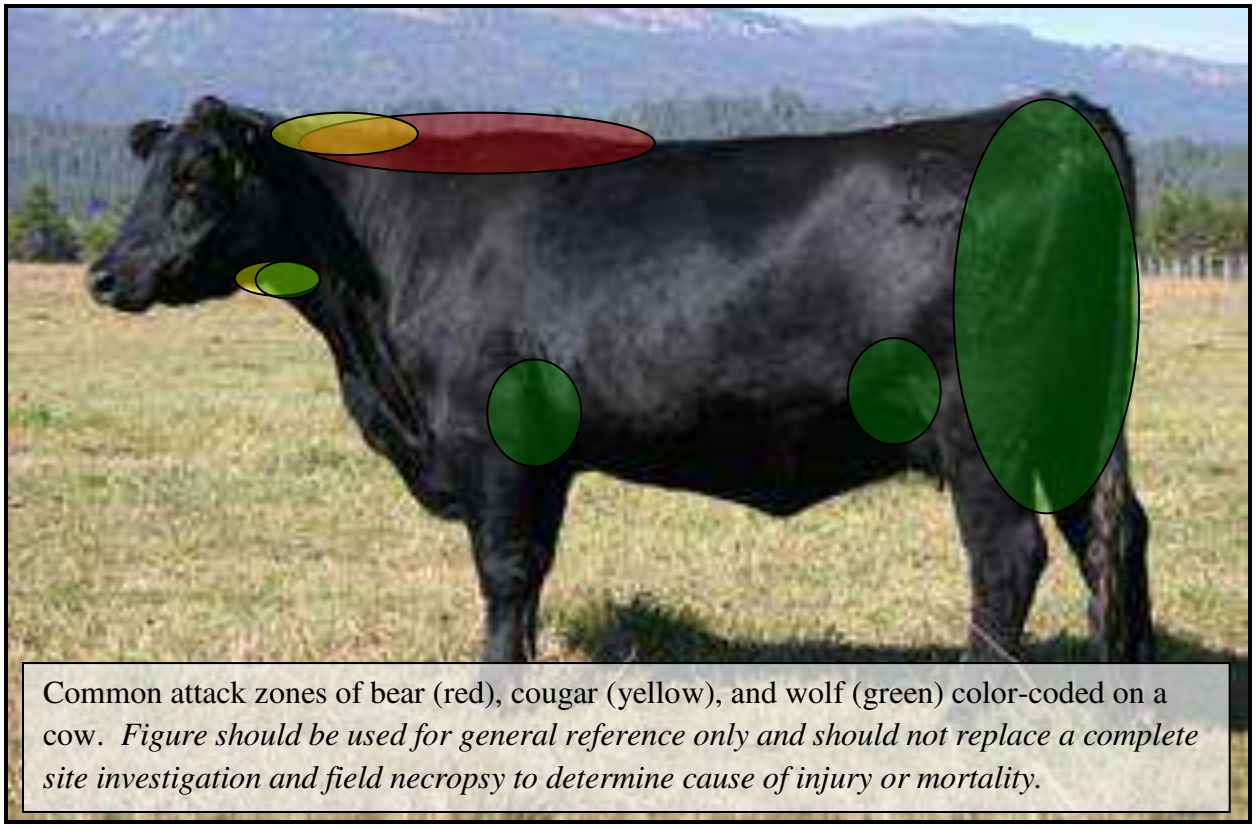
Dogs: Seldom, if ever, will carry or drag prey item away from location of kill or cache prey.

In the photo to the left, the prey item was killed relatively quickly (blood in single location), then dragged away to heavier cover; characteristics of a cougar kill. Photos below represent caching behavior of cougars.



CHARACTERISTICS OF PREDATOR ATTACKS

Large predator species have a unique method of attacking and securing prey throughout their range. Some variation and overlap among species is likely, but the general characteristics of each predator are common no matter the species or age of species attacked.



Common attack zones of bear (red), cougar (yellow), and wolf (green) color-coded on a cow. *Figure should be used for general reference only and should not replace a complete site investigation and field necropsy to determine cause of injury or mortality.*

The investigator should also have an understanding of the behaviors and general habits of large predators as well as knowledge of any recent, confirmed sightings and/or other information that may indicate a large predator might have been in the area (especially if it is in an area not typical for that particular species). This information may be used in combination with a site investigation and examination of the injured or dead animal to determine, to the best of their ability, the cause of the injury or mortality.

Note: Although predators can and do injure and/or kill large animals (i.e., adult cows, horses, etc.), the majority of livestock injured and/or killed by predators are smaller in size (i.e., calves, sheep, foals, etc.).

LIVESTOCK INJURY AND MORTALITY INVESTIGATIONS
DESCRIPTION AND LOCATION OF INJURIES

EXTERNAL EXAMINATION

When combined with a site investigation, the external examination can provide further evidence as to which predator, if any, was responsible for the observed injuries or mortality. Prior to performing a necropsy, complete an external examination of the animal and take note of the location of any:

- Puncture marks
- Lacerations
- Scrapes on hide
- Feeding patterns

In the above photos, external examinations suggested: (1) feeding pattern characteristic of wolves, but site investigation and necropsy suggested no predator involvement in mortality; (2) scrape marks and puncture marks by wolves in left armpit; (3) scrape marks and puncture marks by wolves in groin area; (4) puncture marks to skull by grizzly bear; and (5) puncture marks to back of neck by cougar.

Washington Department of FISH and WILDLIFE

LIVESTOCK INJURY AND MORTALITY INVESTIGATIONS
DESCRIPTION AND LOCATION OF INJURIES

NECROPSY

The purpose of the necropsy is to examine the hide and underlying tissues of a carcass for damage that may or may not have been inflicted when the animal was still alive. Large predators can bite with a tremendous amount of force so damage and trauma associated with each bite can be quite severe. If the animal was still alive when an attack occurred, there will most likely be evidence on the hide itself, hemorrhaging (or bruising) underneath the hide, and damage to underlying muscle and tissue.

When conducting a necropsy, **please remember to skin the entire carcass** rather than those specific areas where predators are most likely to have attacked the animal. Although large predator species have similar methods of attack, there can be, and often is, considerable variation in the location of injuries. Also, it is possible that damage may be missed if the entire carcass is not skinned because injuries are not always apparent on the outside of the hide, but become very apparent once the hide is peeled back.




PHOTOGRAPHING TIP: When photographing injuries/damage to livestock, close-up images are not necessarily the best since they give little reference as to where the injury/damage was located on the animal. Photos should be taken far enough away where a lay person could have some idea of where the injuries occurred. If close-ups are necessary, take a wide angle view for reference before taking that close-up photograph.

LIVESTOCK INJURY AND MORTALITY INVESTIGATIONS
DESCRIPTION AND LOCATION OF INJURIES

SCAVENGING VERSUS PREDATION

Did the feeding occur before or after? Wolves, coyotes, dogs, cougars, bobcats, and bears all take advantage of scavenging opportunities	
Evidence of Scavenging	**Evidence of Predation**
There may be no blood on the ground around the carcass or blood may have drained onto the ground from body openings such as the mouth, nose, anus, or areas where feeding has already occurred. After skinning the carcass, no hemorrhaging or corresponding tissue damage was apparent.	There may be blood on the ground around the carcass or in the area surrounding the incident site suggesting the animal bled and was alive when attacked. A blood trail and/or sign of a struggle may also be present. After skinning the carcass, hemorrhaging and tissue damage was apparent.
Lacerations and puncture marks found on the exterior of the hide do not show corresponding hemorrhaging and/or tissue damage when the hide was peeled back.	Lacerations and puncture marks found on the exterior of the hide show corresponding hemorrhaging and/or tissue damage when the hide was peeled back.
Evidence of predators may be found around the carcass (i.e., tracks, scat, hair), but these alone cannot be used to make a determination.	Evidence of predators may be found around the carcass (i.e., tracks, scat, hair), but these alone cannot be used to make a determination.

BEWARE OF LIVIDITY!

What is lividity? Lividity is the process by which the body's blood supply stops circulating once the heart stops beating. As a result of gravity, blood will settle to a low point depending on how the carcass is situated.

How to tell the difference between lividity and hemorrhaging? Note which side is down, complete an external examination on both sides of the carcass, then perform a necropsy by skinning the entire carcass. If you notice an area that looks similar to a hemorrhage, examine the corresponding portion of hide once again and make several cuts into the underlying muscle. If it is lividity, there may be no marks on the hide and the underlying muscle may not be damaged. If it is hemorrhaging, you may notice bite marks or scrapes that you missed previously and the underlying muscle may also show corresponding damage.

In these photos, the carcass was lying on the left side. No puncture marks or scrapes were evident on the hide. After the necropsy, a dark red spot was evident in a location typical of a wolf attack. After re-examining the hide and cutting into the muscle, there were no marks on the hide and the muscle was undamaged. Although evidence suggested wolves visited this carcass, it was determined they were not responsible for its death and the red spot was most likely caused by lividity.

Washington Department of FISH and WILDLIFE

LIVESTOCK INJURY AND MORTALITY INVESTIGATIONS

DESCRIPTION AND LOCATION OF INJURIES

WHAT TO DO IF YOU INVESTIGATE SOMETHING LIKE THIS?

Although most livestock producers keep a watchful eye on their livestock, some injuries and mortalities may not be found for quite some time. In these situations, there often may not be much an investigator can do because of the condition of the carcass. However, because attack patterns and feeding characteristics oftentimes differ, there may be a few things an investigator can do if the hide appears to be relatively intact.

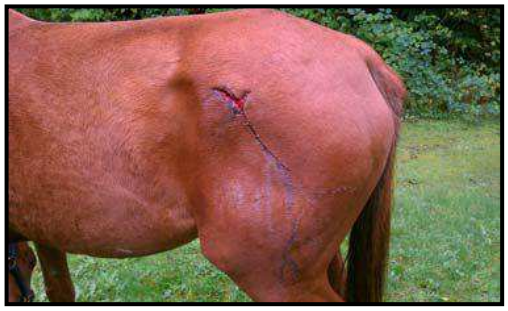
- Complete a full site investigation
- If the hide is pliable, stretch it out and examine it for puncture marks and/or lacerations in locations typical of a predator attack
- If the hide is dried out, the investigator might consider soaking the hide in water overnight and examining it the following day

Sometimes, even after a thorough investigation, there may not be enough evidence present to make a determination. In these cases, the term “I don’t know” is a perfectly acceptable response.

LIVESTOCK INJURY AND MORTALITY INVESTIGATIONS
DESCRIPTION AND LOCATION OF INJURIES

OTHER INJURY CONSIDERATIONS

In any given year, livestock die for a variety of reasons unrelated to predation. Nationwide, cattle and calf losses from predators represented 5.5% of the total deaths from all causes in 2010 (U.S. Department of Agriculture [USDA] 2011a). When the states of Idaho, Montana, Oregon, Washington, and Wyoming were examined separately, predation accounted for approximately 6.7% of total cattle and calf losses in 2010 (USDA 2011a). Although certain producers can experience significant losses due to predators, these results underscore the importance of taking into consideration a multitude of other possible factors that may have contributed to the injury or mortality when conducting a livestock depredation investigation.



Use caution: generally predators do not inflict injuries in an area like this on a horse because the risk of injury is high; this was a structural injury from an enclosure.

Although these injuries appear to have been made by a predator, birds fed on this lamb after it died.

Use caution: this lamb died as a result of being trampled in an enclosure.

Please remember, as the investigator, we are called to a site to investigate a possible livestock injury or mortality because the reporting party suspected that a large predator may have been involved. If it was determined that no large predators were involved, **use extreme caution** when drawing inferences about what happened beyond predator involvement unless the full investigation leads you to an obvious conclusion.

References used for this page and suggested references for further information on this topic:

1) U.S. Department of Agriculture. 2011a. Cattle death loss. U.S. Department of Agriculture, Animal Plant Health Inspection Service, Veterinary Services. Fort Collins, Colorado, USA. http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1625.
2) U.S. Department of Agriculture. 2011b. Cattle and calves nonpredator death loss in the United States, 2010. USDA–APHIS–VS–CEAH. Fort Collins, Colorado, USA. #631.1111.
3) U.S. Fish and Wildlife Service, Idaho Department of Fish and Game, Montana Fish, Wildlife & Parks, Nez Perce Tribe, National Park Service, Blackfeet Nation, Confederated Salish and Kootenai Tribes, Wind River Tribes, Washington Department of Fish and Wildlife, Oregon Department of Fish and Wildlife, Utah Department of Natural Resources, and USDA Wildlife Services. 2012. Northern Rocky Mountain Wolf Recovery Program 2011 Interagency Annual Report. M.D. Jimenez and S.A. Becker, eds. USFWS, Ecological Services, Helena, Montana, USA. http://westerngraywolf.fws.gov.

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LIVESTOCK INJURY AND MORTALITY INVESTIGATIONS

SOURCE OF INJURIES

WOUNDS PRIMARILY ON UPPER FRONT HALF OF CARCASS

- Little to no evidence of chase
- Evidence carcass may have been dragged or carried some distance from kill site
- Carcass may be covered with debris
- Carcass remains concentrated in single location or very small area

BEARS

- Bites along spine between shoulder blades and/or to the head or neck
- Possible lacerations from claws to chest and shoulders
- Hide inverted and may be pulled over skull (older carcass)

GRIZZLY BEAR

- Generally more open habitats
- Tracks and hair found in area

BLACK BEAR

- Generally denser habitats
- Tracks and hair found in area

CATS

- Bite to the head, neck, throat, or skull
- Knife-like lacerations to sides, back, and/or shoulders
- Hair removed by sheering or plucking
- "Clean-cut" edges where feeding
- Rumen removed intact

COUGAR

- Long scrape marks (≥ 24")
- Tracks and other sign in area

BOBCAT

- Short scrape marks (≤ 16")
- Tracks and other sign in area

WOUNDS PRIMARILY ON BACK HALF OF CARCASS

- Most obvious severe wounds may be concentrated around the hindquarters
- Wounds may also be observed on front half of carcass (i.e., armpit, throat)
- Evidence of chase and struggle
- Ragged or frayed wounds and lacerations
- Consumption of carcass at or very near kill site; rumen often busted open
- Carcass remains scattered around kill site (older carcass)

WOLF

- Damaged or missing tail
- Large bones cracked open and marrow consumed (older)
- Calves and sheep more than larger livestock
- Tracks and other sign in area

COYOTE

- Often reposition bite to throat (multiple bites)
- Smaller bones broken and chewed (older)
- Small prey and calves shortly after birth
- Tracks and other sign in area

DOG

- Relatively indiscriminate in attack location
- Bites may be repositioned multiple times (inefficient killers)
- Seldom feed on carcass
- Tracks and other sign in area

Predation chart to assist investigators in the assessment of possible predator involvement during a livestock depredation investigation. *This figure should be used for general reference only and should not replace a complete site investigation and field necropsy to determine cause of injury or mortality.*

LIVESTOCK INJURY AND MORTALITY INVESTIGATIONS

INJURY/MORTALITY CLASSIFICATION

WDFW Criteria for Classification of Reported Wolf Depredation Incidents

1) **Confirmed Wolf Depredation:** There is reasonable physical evidence that the dead or injured animal was actually attacked or killed by a wolf. Primary confirmation would ordinarily be the presence of bite marks and associated subcutaneous hemorrhaging and tissue damage, indicating that the attack occurred while the victim was alive, as opposed to simply feeding on an already dead animal. Spacing between canine tooth punctures, feeding pattern on the carcass, fresh tracks, scat, hairs rubbed off on fences or brush, and/or eyewitness accounts of the attack may help identify the specific species or individual responsible for the depredation. Predation might also be confirmed in the absence of bite marks and associated hemorrhaging (i.e., if much of the carcass has already been consumed by the predator or scavengers) if there is other physical evidence to confirm predation on the live animal. This might include evidence of an attack or struggle. There may also be nearby remains of other victims for which there is still sufficient evidence to confirm predation, allowing reasonable inference of confirmed predation on an animal that has been largely consumed.

2) **Probable Wolf Depredation:** There is sufficient evidence to suggest that the cause of death was depredation, but not enough to clearly confirm that the depredation was caused by a wolf. A number of other factors will help in reaching a conclusion, such as (1) any recently confirmed predation by wolves in the same or nearby area, and (2) any evidence (e.g., telemetry monitoring data, sightings, howling, fresh tracks, etc.) to suggest that wolves may have been in the area when the depredation occurred. All of these factors and possibly others would be considered in the investigator's best professional judgment.

3) **Confirmed Non-Wild Wolf Depredation:** There is clear evidence that the depredation was caused by another species (coyote, black bear, cougar, bobcat, domestic dog), a wolf-dog hybrid, or a pet wolf.

4) **Unconfirmed Depredation:** Any depredation where the predator responsible cannot be determined.

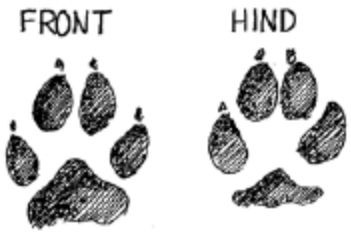
5) **Non-Depredation:** There is clear evidence that the animal died from or was injured by something other than a predator (e.g., disease, inclement weather, or poisonous plants). This determination may be made even in instances where the carcass was subsequently scavenged by wolves.

6) **Unconfirmed Cause of Death:** There is no clear evidence as to what caused the death of the animal.

LIVESTOCK INJURY AND MORTALITY INVESTIGATIONS

PREDATOR "SIGNATURES"

WOLF



Track Dimensions
Approx. 4" wide by 4.5" long
(length = toe to heel pad)

Most common domestic prey

- Cattle (primarily calves and yearlings)
- Sheep
- Domestic dogs

Hunting strategy – coursing predator

- Individual or group hunter
- Hunts across a wide variety of habitats
- Potential for prolonged chase and attack
- Kills rarely moved from attack location

Common attack zones

- Hindquarters
- Groin region
- Tail
- Front armpits
- Throat

Severe hemorrhaging and damage with associated punctures and scrape marks to throat.

Notice the stripped tail, hemorrhaging in the hind quarters, and the damage under and behind the front legs

Attack characteristics – maiming

- May be extensive biting and trauma
- Most severe damage may be concentrated around the hindquarters
- Bites and damage may also be found in the armpits and throat
- May be damaged or missing tail
- Ragged or frayed wounds and lacerations

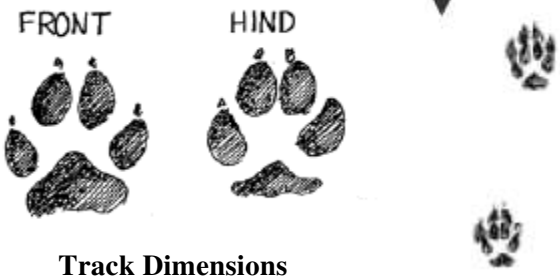
Feeding characteristics – messy

- Internal organs consumed first, then generally progresses from rear to head
- Rumen often busted open
- Consume carcass at or very near kill site
- Large bones cracked open and marrow consumed (older carcass)
- Prey remains spread across site (older carcass)

LIVESTOCK INJURY AND MORTALITY INVESTIGATIONS

PREDATOR "SIGNATURES"

COYOTE



Track Dimensions
Approx. 2.5" wide by 2.5" long
(length = toe to heel pad)

Most common domestic prey

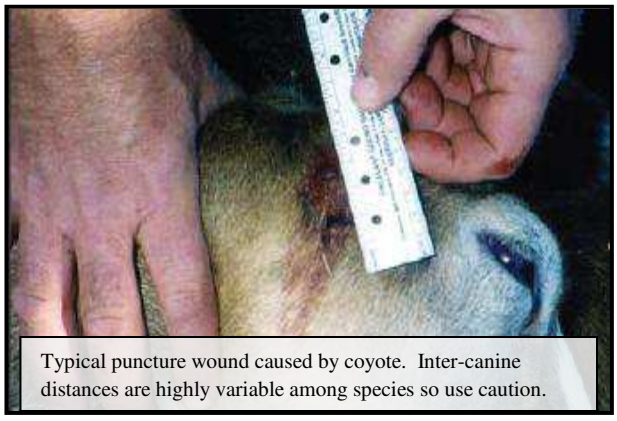
- Sheep
- Goats
- Fowl
- Domestic pets
- Newborn calves

Hunting strategy – coursing predator

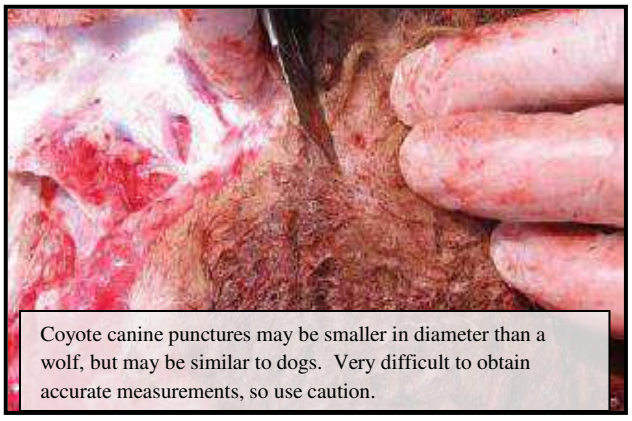
- Individual or group hunter
- Hunts across a wide variety of habitats
- Potential for prolonged chase and attack
- Kills rarely moved from attack location

Common attack zones

- Throat/neck
- Hindquarter/groin
- Flank
- Tail



Typical puncture wound caused by coyote. Inter-canine distances are highly variable among species so use caution.



Coyote canine punctures may be smaller in diameter than a wolf, but may be similar to dogs. Very difficult to obtain accurate measurements, so use caution.

Attack characteristics – maiming

- Typically attack at or near the throat
- May also be extensive biting and trauma to other parts of body including hindquarters and groin
- Crushed windpipe may be present
- Ragged or frayed wounds and lacerations

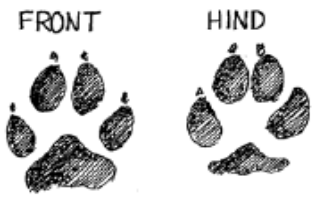
Feeding characteristics – messy

- Internal organs consumed first
- Rumen often busted open
- Consume carcass at or very near kill site
- Smaller bones broken and chewed
- Prey remains spread across site (older carcass)

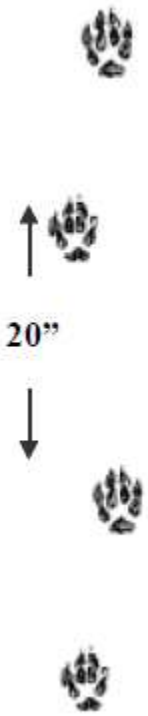
LIVESTOCK INJURY AND MORTALITY INVESTIGATIONS

PREDATOR "SIGNATURES"

FERAL OR DOMESTIC CANINE



Track Dimensions (variable)
Approx. 3" wide by 3" long
(length = toe to heel pad)



Most common domestic prey

- Sheep
- Goats
- Fowl
- Domestic pets
- Newborn calves

Hunting strategy – coursing predator

- Individual or group hunter
- Hunts across a wide variety of habitats
- Potential for prolonged chase and attack
- Kills rarely moved from attack location

Common attack zones

- Face/nose
- Hindquarter/groin
- Throat/neck
- Flank
- Tail

Typical dog attack showing multiple injuries, but little feeding.

Dogs are rarely experienced enough to kill efficiently.

Attack characteristics – maiming

- Relatively indiscriminate in attack location
- Bites may be repositioned multiple times (inefficient killers)
- Widespread trauma due to multiple bites
- Ragged or frayed wounds and lacerations

Feeding characteristics – messy

- Seldom feed on carcass
- If feeding occurred, carcass may be at or very near kill site
- Feeding on carcass may leave ragged tissue or splintered bone

LIVESTOCK INJURY AND MORTALITY INVESTIGATIONS

PREDATOR "SIGNATURES"

COUGAR

FRONT HIND

Track Dimensions
Approx. 3.5" wide by 3.5" long
(length = toe pad to heel pad)

Most common domestic prey

- Goats
- Sheep
- Llamas and alpacas
- Fowl
- Domestic pets

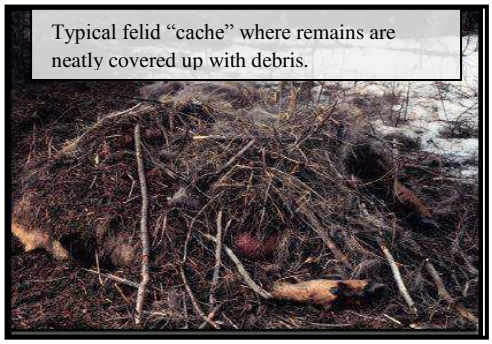
Hunting strategy – stalking predator

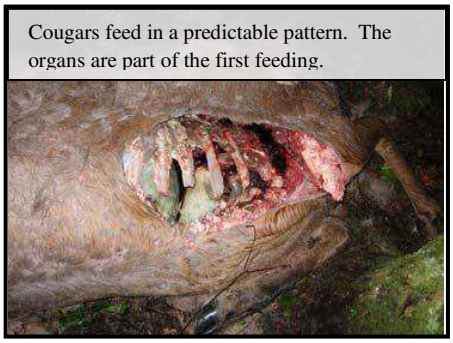
- Individual hunter (except a female with yearlings)
- Requires cover (e.g., understory vegetation, topography, trees)
- Attacks occur over limited distance with little or no chase
- Kills may be drug or carried considerable distance to an area of cover

Common attack zones

- Neck
- Throat
- Head
- Shoulder


Canine punctures on throat (may not be this obvious)


Typical felid "cache" where remains are neatly covered up with debris.


Cougars feed in a predictable pattern. The organs are part of the first feeding.

Attack characteristics – clean, efficient

- Crushed neck, windpipe, skull (occasionally the rostrum)
- Punctures and lacerations to neck and head
- Knife-like wounds and lacerations with very clean edges (all claws may not register)
- Limited repositioning during attack
- Caching of kill

Feeding characteristics – efficient, tidy

- Hair removed by sheering or plucking
- Entry behind shoulder or just behind ribs
- Internal organs consumed first (heart, liver, lungs)
- Muscle tissue consumed secondarily
- Feeding activity and prey remains concentrated at a single location

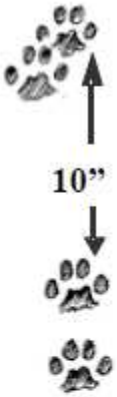
Washington Department of FISH and WILDLIFE

LIVESTOCK INJURY AND MORTALITY INVESTIGATIONS

PREDATOR "SIGNATURES"

BOBCAT

Track Dimensions
Approx. 2" wide by 2" long
(length = toe pad to heel pad)



Most common domestic prey
- Goats
- Sheep
- Fowl
- Domestic pets

Hunting strategy – stalking predator
- Individual hunter (except female with yearlings)
- Requires cover (e.g., understory vegetation, topography, trees)
- Attacks occur over limited distance with little or no chase
- Small prey may be drug or carried away from attack location

Common attack zones
- Neck
- Throat
- Head
- Shoulder

The scratching below to cover up a carcass (cache behavior) is typical of bobcats and cougars. Size will dictate which feline it is.

Bobcat (and cougar) feeding pattern; chest is opened cleanly, hair is plucked clean from hide, and organs are exposed and eaten first.

Attack characteristics – clean, efficient
- Crushed neck, windpipe, skull, or rostrum with associated trauma
- Knife-like wounds and lacerations with very clean edges (all claws may not register)
- Limited repositioning during attack
- Caching of kill

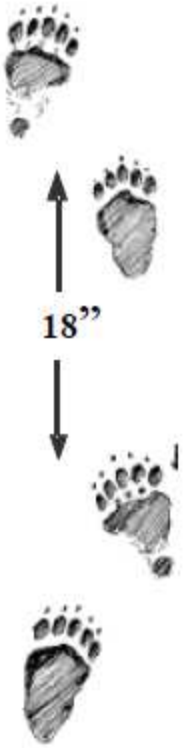
Feeding characteristics – efficient, tidy
- Hair removed by sheering or plucking
- Entry behind shoulder or just behind ribs
- Internal organs consumed first (heart, liver, lungs)
- Muscle tissue consumed secondarily
- Feeding activity and prey remains concentrated at a single location

LIVESTOCK INJURY AND MORTALITY INVESTIGATIONS

PREDATOR "SIGNATURES"

BLACK BEAR

Track Dimensions (variable)
Front: 4" wide by 4.5" long
Hind: 3.5" wide by 7" long



Most common domestic prey

- Goats
- Sheep
- Calves

Hunting strategy – ambush predator

- Individual hunter
- Hunts across a variety of habitats, but generally prefers habitats with greater cover
- Chases typically occur over short distances
- Kills may be moved or carried away from attack location (especially if kill was made in open, it may be carried to area with more cover)

Common attack zones

- Back/spine
- Neck
- Skull

Severe hemorrhaging and tissue damage along spine.

Severe hemorrhaging and tissue damage along spine.

Attack characteristics – blunt force

- Bites to top of prey along spine
- Possible lacerations from claws to the chest and shoulder
- Skull or rostrum may have punctures or may be crushed
- Ragged or frayed wounds and lacerations

Feeding characteristics – messy

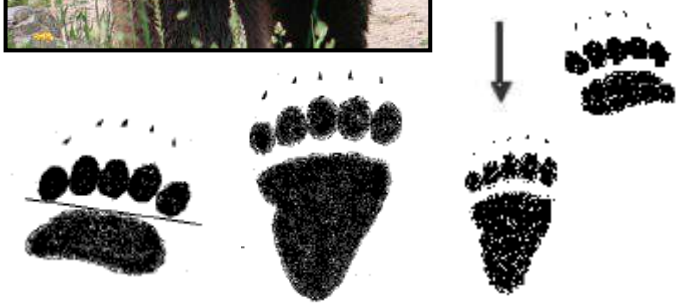
- Internal organs and soft tissues generally consumed first
- Rumen often busted open
- Hide inverted and may be pulled over skull (older carcass)
- Carcass may be covered with debris

Washington Department of FISH and WILDLIFE

LIVESTOCK INJURY AND MORTALITY INVESTIGATIONS

PREDATOR "SIGNATURES"

GRIZZLY BEAR



Track Dimensions (variable)
Front: 5" wide by 5.5" long
Hind: 6" wide by 10" long

Most common domestic prey

- Goats
- Sheep
- Calves

Hunting strategy – ambush predator

- Individual hunter
- Hunts across a variety of habitats, but generally prefers more open habitats
- Chases typically occur over short distances
- Kills may or may not be moved or carried away from attack location

Common attack zones

- Back/spine
- Neck
- Skull

Severe hemorrhaging and tissue damage along spine.

Punctures and skull fractures caused by bite to head.

Attack characteristics – blunt force

- Bites to top of prey along spine
- Possible lacerations from claws to the chest and shoulder
- Skull or rostrum may have punctures or may be crushed
- Ragged or frayed wounds and lacerations

Feeding characteristics – messy

- Internal organs and soft tissues generally consumed first
- Rumen often busted open
- Hide inverted and may be pulled over skull (older carcass)
- Carcass may be covered with debris

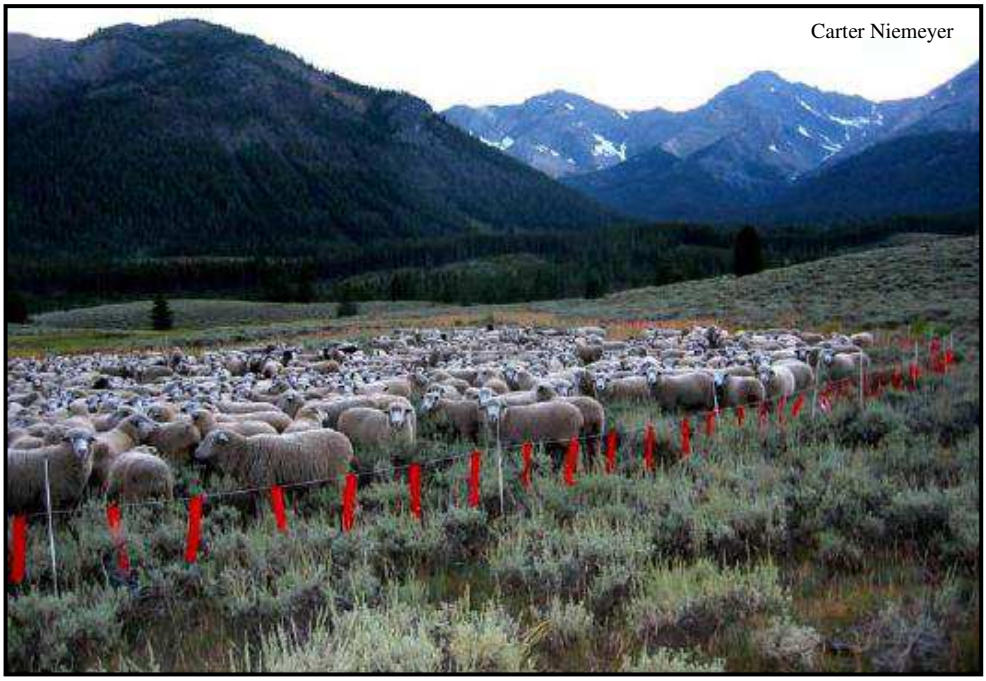
Tethering goats and sheep and/or not boarding them at night may make them more vulnerable to predation.

Cleaning up bone piles and removing dead livestock is an easy technique to reduce possible predator attractants on the landscape.

Intentionally or unintentionally feeding ungulates has the potential to draw in large predators closer to developed areas and humans.

Human presence, in the form of range riders or a general increased monitoring of livestock, may deter predators from frequently using an area.


Carter Niemeyer


Carter Niemeyer

Fladry (above) and turbo-fladry (electrified fladry; below) may reduce the probability of livestock being attacked by predators. These techniques tend to work best during calving season and for night penning range livestock; however, they are not very useful in open range situations. A single person can carry and install ½ mile of fencing in less than 2 hours.

APPENDIX 1
WDFW LIVESTOCK INJURY/MORTALITY INVESTIGATION FORM

Database record #: _____

CODY reference #: _____ Date report received: _____ Date investigated: _____

WDFW personnel (include detachment/unit #): _____

Witnesses present (other agency personnel, public): _____

_____

Livestock owner/Ranch name: _____

Contact information (address, phone #): _____

Summarize initial report (witness accounts, when livestock was found, when livestock last seen uninjured/alive, etc.): _____

_____

_____

Location of incident (physical land description, drainage, nearby features, etc.): _____

_____

Incident GPS coordinates (Circle one: Lat/Long or UTM with zone): _____

Datum: _____ GPS coordinates are (check one): ☐ Actual ☐ Approximate

Land status (check one): ☐ USFS ☐ BLM ☐ State ☐ Private ☐ Other _____

Type of pasture/enclosure incident occurred in (i.e., est. size, fence type used, etc.) and estimated distance to nearest occupied structure (i.e., house, barn, other)? Please describe: _____

_____

_____

General cover classification: ☐ Open/Rangeland ☐ Brush ☐ Lightly forested ☐ Heavily forested

Are attractants present near location of incident (i.e., bones, other carcasses, trash, fruit trees, grain/feed, etc.)? Please describe: __

_____

_____

Affected animals: _____ Adult sheep _____ Cattle & yrlgs _____ Horse _____ Dog
(# and sex) _____ Lambs _____ Calves _____ Foal/Pony _____ Other (_____)

Status of animal (# and sex): _____ Injured _____ Dead

Site description/physical evidence present (i.e., describe scene, tracks, scat, hair, blood, sign of struggle, scrapes, moved from incident site, etc.): _____

_____

_____

_____

_____

WDFW LIVESTOCK INJURY/MORTALITY INVESTIGATION FORM

Description and location of injuries (i.e., puncture marks, lacerations, feeding patterns, evidence of hemorrhaging, tissue damage, estimated age of injuries, etc.): _____

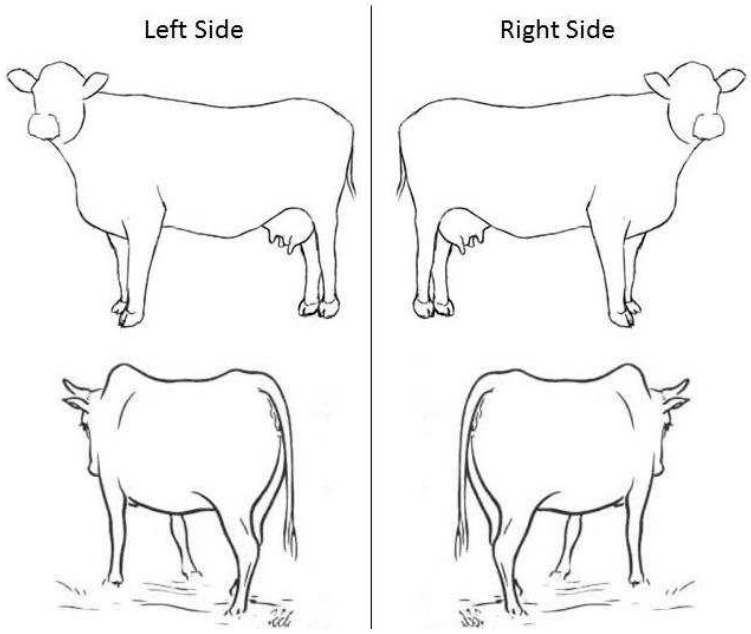
_____

_____

_____

_____

_____



On the above figure, please note the general location of observed injuries described in the "Description and location of injuries" section above. Detailed sketches are not necessary.

Source of injuries: ☐ Black bear ☐ Cougar ☐ Wolf ☐ Dom canine ☐ Structural ☐ Unknown
(check one) ☐ Grizzly bear ☐ Bobcat ☐ Coyote ☐ Unk predator ☐ Other _____

Injury/mortality classification (circle one; refer to manual for description of each): 1 2 3 4 5 6

Classification justification: _____

_____

_____

_____

Additional comments or notes (other information to support determination, telemetry, confirmed sightings, previous history, etc.): _____

_____

_____

_____

If this is a potential wolf depredation then complete and attach the Livestock-Wolf Preventative Measures Checklist

APPENDIX 2
SAMPLE WDFW LIVESTOCK INJURY/MORTALITY INVESTIGATION FORM

Database record #: _(will be filled out later)_____

CODY reference #: _WA-13-123456__ Date report received: _6/13/13___ Date investigated: 6/13/13 _____

WDFW personnel (include detachment/unit #): Officer John Doe (W123), Biologist Jane Doe (W456) _____

Witnesses present (other agency personnel, public): Cty Sheriff Billy Bob; Jim and Jane Dow _____

_____

Livestock owner/Ranch name: Jim and Jane Dow / Spotted X Ranch_____

Contact information (address, phone #): 123 Pine Street, Moses Lake, WA 99988; 509-123-4567 _____

Summarize initial report (witness accounts, when livestock was found, when livestock last seen uninjured/alive, etc.): RP reported they found 4 dead calves and 2 injured calves this morning (6/13/13). Animals last observed 2 days ago and were in good health. Could not discern injuries, but animals were partially consumed. RP reported he observed wolf and bear tracks near remains. _____

Location of incident (physical land description, drainage, nearby features, etc.): Big Creek, Wenatchee National Forest _____

_____

Incident GPS coordinates (Circle one: Lat/Long or UTM with zone): 123456 x 1234567 z11 _____

Datum: NAD83 GPS coordinates are (check one): ☐ Actual ☐ Approximate

Land status (check one): ☐ USFS ☐ BLM ☐ State ☐ Private ☐ Other _____

Type of pasture/enclosure incident occurred in (i.e., est. size, fence type used, etc.) and estimated distance to nearest occupied structure (i.e., house, barn, other)? Please describe: grazing allotment; no nearby structures_____

_____

General cover classification: ☐ Open/Rangeland ☐ Brush ☐ Lightly forested ☐ Heavily forested

Are attractants present near location of incident (i.e., bones, other carcasses, trash, fruit trees, grain/feed, etc.)? Please describe: __

Uncovered bone pile approx 2 miles north of incident site; apple trees very common throughout allotment _____

_____

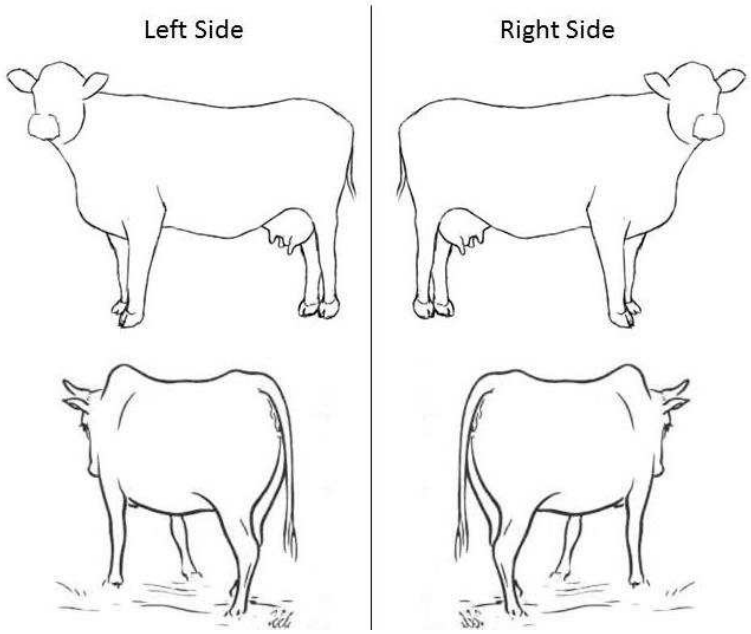
Affected animals: _____ Adult sheep _____ Cattle & yrlgs _____ Horse _____ Dog
(# and sex) _____ Lambs _2f/4m_ Calves _____ Foal/Pony _____ Other (_____)

Status of animal (# and sex): _2m____ Injured _2f/2m____ Dead

Site description/physical evidence present (i.e., describe scene, tracks, scat, hair, blood, sign of struggle, scrapes, moved from incident site, etc.): a clear struggle was evident with spilled blood on ground and sprayed blood on nearby trees, some tree branches were broken and the ground was torn up; carcasses appear to have been drug under a tree approx 150 yds south of where blood was found and were partially covered with ground debris, wolf tracks and black bear tracks were observed; numerous large hominid tracks measuring approximately 18" in length also located near remains; black bear hair found on trees; numerous scats located, but few have any form _____

SAMPLE WDFW LIVESTOCK INJURY/MORTALITY INVESTIGATION FORM

Description and location of injuries (i.e., puncture marks, lacerations, feeding patterns, evidence of hemorrhaging, tissue damage, estimated age of injuries, etc.): Estimated time of death was approx 6/12/13; all remains exhibited similar injuries; internal organs and some muscle tissue on hind legs consumed; puncture marks along spine between shoulder blades with associated hemorrhaging and severe tissue damage; some scrapes marks and associated minor hemorrhaging on left shoulder_



On the above figure, please note the general location of observed injuries described in the "Description and location of injuries" section above. Detailed sketches are not necessary.

Source of injuries: ☐ Black bear ☐ Cougar ☐ Wolf ☐ Dom canine ☐ Structural ☐ Unknown
(check one) ☐ Grizzly bear ☐ Bobcat ☐ Coyote ☐ Unk predator ☐ Other _____

Injury/mortality classification (circle one; refer to manual for description of each): 1 2 3 4 5 6

Classification justification: Physical evidence present on carcasses and surrounding area are consistent with predation by a black bear _____

Additional comments or notes (other information to support determination, telemetry, confirmed sightings, previous history, etc.): RP stated he observed a large black bear chasing cattle on the allotment on 6/9/13; black bears are observed in area nearly every day, most feed on the numerous apple trees in area; RP stated he has lost calves to black bears on several occasions in the past _____

If this is a potential wolf depredation then complete and attach the Livestock-Wolf Preventative Measures Checklist

APPENDIX 3

DISTRICT 1 NECROPSY EQUIPMENT LIST

Inside a sealed 5 gallon bucket and/or tool bag:

- Procedures for Investigation of Livestock Injuries and Depredation Form in zip lock
- Wyoming skinning knife w/ extra blade
- Ruler/tape measurer
- Electric clippers
- Rite in Rain note pad/pencils
- Fladry: either commercial or wire/flagging to encircle carcasses
- 6 by 8 ft. grommeted tarp
- Twine or -p-cord with lead weights to hold tarp down, make fladry
- Smaller bucket for covering tracks, scat in bad weather
- Disposable exam gloves and anti-bacterial wipes/liquid hand sanitizer
- LE evidence envelopes
- Coin envelopes for DNA (hair)
- 1 gallon zip locks for bones, scat, etc…
- Plastic tubes such as used for lymph nodes for other evidence
- Small plastic tubes with alcohol for tissue samples (such as used for cougar DNA)
- Flagging
- Rope
- Extra mechanical pencils/clipboard

Other equipment to bring that may not stay in kits:

- Digital camera (w/batteries)
- GPS (w/batteries)
- Flashlight and/or headlamp (w/batteries)