

Mexican Wolf Blue Range Reintroduction Project Adaptive Management Oversight Committee Standard Operating Procedure

Title: Intensive Winter Wolf Monitoring and Ungulate Mortality Collection

Number: 19.0

File Name: MW SOP 19.Winter Mortality Study.Final.20050430.doc

Purpose: This SOP provides guidance on intensive winter wolf monitoring and to describe data collection methods for ungulate kill sites during systematic searches in winter, or alternatively, ungulates that are opportunistically found through normal monitoring of wolves. It supersedes relevant sections of the 1998 Mexican Wolf Interagency Management Plan (USFWS 1998), and therefore represents, in part, the “Service Approved Management Plan” referenced in the Mexican Wolf Final Rule (50 CFR 17.84(k)).

Exceptions: None. Per SOP 2.0, AMOC must approve any exceptions to this SOP.

Background: “Winter study” of ungulate mortalities was conceived by biologists investigating wolf predation on Isle Royale, Lake Superior, in 1958. That study consisted of an annual intensive investigation period during which wolves were closely monitored to determine wolf/moose interactions. This concept remains the standard for wolf predation studies, and is a key component of wolf/ungulate studies in Yellowstone National Park (YNP). In YNP, biologists use intensive aerial and ground telemetry to document wolf predation patterns, movements, behavior, interactions with other species, and characteristics of their prey. The objectives are to document the frequency at which wolves kill, the kinds of prey killed, and factors that influenced prey selection and kill rate. The primary factors the Project will investigate are winterkill rate, age of and type of ungulate killed, and the condition of the ungulates selected by wolves.

A kill series is defined by monitoring on successive days. A break in daily monitoring ends one series; the next monitoring day begins a new series if a kill is located. Several kill series for a single pack of wolves are needed to determine kill rates, thus, each successive kill documented becomes more important than the previous one. Therefore, if a monitoring flight cannot be flown on a particular day, ground-monitoring priority should be placed on packs that have an active kill series. For example, assume that the Bluestem pack has been flown daily, and a kill was found on 3/12 and 3/16, but the weather is too bad to fly on 3/19. It would be vital to get a ground location for the pack that day to ensure that the kill series continues.

Intensive winter monitoring should occur on as many days (up to 60) as possible, in early winter (preferably December-January) and again in late winter (preferably March to April 15).

Procedures:

1. Aerial Telemetry

- a. During an Intensive winter study period:
 - i. Flights should be conducted on a daily basis (weather permitting) in accordance with SOP 18.0: Aerial Telemetry. If aerial telemetry cannot be accomplished on a given day, then efforts should be made to ground track each of the packs involved in monitoring (see SOP 17.0: Ground Telemetry).
 - ii. Circle packs many times (5-10) to determine if a kill is present and to observe the wolves from the air.
 - iii. If a kill is observed from the air, or the ground prior to intensive investigation, record the following information (see Appendix A):
 - (1) Wolves or wolf present.
 - (2) UTM datum (i.e. Zone 12, NAD 27) and coordinates.
 - (3) Other predators present.
 - (4) Type of ungulate killed (Estimate Age, Sex, and Species, if possible).
 - (5) Any evidence of a chase scene observed from the air (e.g. blood trails, etc.).
 - (6) Percent snow cover on the ground in the area of the kill.
 - (7) Cover type on the ground.
 - (8) Proportion of the carcass remaining.
 - iv. A follow up ground investigation should be performed based on the location provided by the aerial investigator (see below).
- b. During a normal aerial flight that occurs as part of routine monitoring (see SOP 18.0).
 - i. Record the same information as presented above.
 - ii. A follow-up ground investigation may be performed, depending on IFT priorities.

2. Ungulate Kills.

- a. All kills will be assigned a kill number associated with the kill file located at the Alpine field office. This is the number that links particular kills to their samples and relevant information. It is important to ensure that numbers are not repeated.
 - i. Initially a temporary kill number can be assigned to a kill by simply using the observer initials and then a number. For example if John Doe found three kills in the field he may assign a temporary kill number of JD1, JD2, and JD3 until he could return to the office to determine the next kill number.
 - ii. Each ungulate kill has a related random direction to make comparison measures between the kill site and the random site (see Appendix A). The random direction associated with each kill number is located in the kill file on the wall of the field office.
 - iii. Enter relevant data on the kill form next to the kill number and then enter the data into the kill database.
 - (1) Necropsies of the kill should be performed *after* the wolves have left the area of the kill. Although some evidence might be lost by waiting until the wolves are through using the carcass, this step is vital since one of the primary goals is to determine kill rates. Thus, if we disturbed the wolves prior to completion of the natural consumption process, they might kill another prey item sooner,

resulting in unnaturally high kill rates due to our disturbance. Thus, it is vital to avoid any disturbance to the wolves. Investigations can be performed while the wolves are in the area, but at least 0.5 miles away from the carcass.

3. Examination of the kill site.
 - a. Necropsies are designed to determine the cause of death and distinguish between various causes of death. In the case of this Project, there are several possible causes of ungulate mortality, including: wolves, mountain lions, coyotes, malnutrition, disease, bobcats, black bears, accidents, dogs, unknown, and humans.
 - b. If a Mexican wolf prey carcass sheet has been initiated during an aerial telemetry flight, continue using the corresponding form that should be available from the flight crew. Alternatively, initiate a new carcass sheet (Appendix A).
 - c. Upon arrival at the kill site, follow established guidelines to determine the cause of death (Roy and Dorrance 1976, Fritts 1982). Appendix B should be completed to assist the investigators in determining the cause of death.
 - d. Personnel should determine cause of death (predation [wolf, coyote, lion, bear, other], non-predatory, or unknown) based on the preponderance of evidence, and classify the kill as either a confirmed, probable, or possible wolf kill, or not a wolf kill.
 - e. Determination of predation should consider the following criteria (see Roy and Dorrance 1976 for complete guidelines).
 - i. Subcutaneous hemorrhaging associated with wounds on the carcass.
 - ii. The size of the canine spread on the hide.
 - iii. Attack points on the animal (e.g. wolves and coyotes typically attack the hamstring and armpit area of animals, whereas lions generally attack the back of the neck).
 - iv. The size and extent of bones chewed by the predator.
 - v. Tracks/scat/hair in the area.
 - vi. Disturbed vegetation, snow, and terrain in the area, with areas of blood on the ground.
 - vii. Any additional evidence around the site.
4. Collection of data.
 - a. Initially, take a GPS reading at the site and record the elevation and UTM datum (i.e. Zone 12, NAD 27) and coordinates of the location.
 - b. Use the random compass bearing associated with each carcass to do a comparison site 200 meters in the random bearing direction for that specific kill.
 - c. Take the same environmental measurements that were recorded at the kill site (See Appendix A).
 - d. Collect the femur and bottom jaw of the animal for further analysis.
 - i. Upon returning to the office:
 - (1) Write the kill number on the femur and jaw. Keep both samples until analysis is complete for both bone marrow fat and age of the ungulate (see below).
 - (2) Saw a 2-3 inch section out of the femur with a bone saw.
 - (3) Remove the marrow from the interior of the section of femur bone.
 - (4) Place the marrow in a whirl pack and mark the outside of the bag with the kill number. Place the whirl pack in the freezer.

- (5) When there are a few samples of bone marrow, weigh each individual sample on the scale in the office. Then place the samples in the oven drier for 2 days (drier is set at approximately 100 degrees Fahrenheit). Weigh each sample. Percent fat of the sample then is calculated by the formula: Dry Weight / Wet Weight x 100. Write this number on the corresponding form for that kill.
 - (6) Estimate the age of the ungulate based upon the jaw using the chart in the office or the reference guide (AGFD 1997).
 - (7) Remove an incisor tooth from the jaw and place it in a whirl pack to be sent out to the lab for ageing (do not do this process for young ungulates that are easily aged using the chart in the office [e.g. calves and yearlings]). Make sure the bag is marked with the kill number.
 - (8) When a sample of approximately ten teeth have been collected, have AGFD send the samples to Matson Lab in Montana for ageing. When the results return, write the age of the animal on the corresponding form for that kill.
- e. Examine the vertebrae, pelvis, sacroiliac joint, head of femur, acetabulum, and other leg joints, especially near the hooves, for any evidence of injury or arthritis (indicated by wear, swelling or absence of or deterioration of cartilage in the joints).
 - f. Look at the jaw for any evidence of jaw necrosis (indicated by infection in the jaw by a missing or impacted tooth).
 - g. Investigate any internal organs and the hide for any disease or parasitism that may be present.
 - h. Take photos throughout the examination of any abnormalities that you find.

5. Entering Data

- a. Prior to entering data into the file, become familiar with the process by entering data several times under supervision of someone knowledgeable about the database.
- b. Open the Mex Wolf database file under the Start button on the main computer in the office.
- c. Under the open existing database button, click on C:\Alldata\zip disk from old pc\ \db1
- d. Then click on the data entry button.
- e. Click on the carcass data sheet button.
- f. Enter the appropriate data from your data sheet (Ask questions if you do not understand anything in this process).
- g. Place the sheet in the folder in the filing cabinet marked "Carcass Data/Completed."

Approvals:

The Mexican Wolf Blue Range Reintroduction Project Adaptive Management Oversight Committee approved this SOP on November 24, 2004.

References:

- Arizona Game and Fish Department. 1997. Age criteria for Arizona game species. Arizona Game and Fish Department. Phoenix, Arizona. 40 pp.
- Fritts, S.H. 1982. Wolf depredation on livestock in Minnesota. U.S. Fish and Wildlife Service Resource Publication 145.
- Roy, L.D., and M.J. Dorrance. 1976. Methods of investigating predation of domestic livestock: a manual for investigating officers. Alberta Agriculture, Edmonton, Alberta, Canada.
- U.S. Fish and Wildlife Service. 1998. 1998 Mexican Wolf Interagency Management Plan. U.S. Fish and Wildlife Service, Albuquerque, New Mexico.

Appendix A.

Mexican Wolf Prey Carcass Investigation Form

Examined by: _____ Date: ____/____/____

Carcass #: _____ - _____ - _____ - _____

Sex: M F Unk.

Date Carcass Found: ____/____/____

Length of Time Dead : _____

Species: _____

Estimated Age: (1)calf/fawn (2)yearling (3)adult

(4)unknown

Actual Age: _____ years

Kill/ Point of Chase Site Description

General

Location: _____

Kill: UTM: _____ E _____ N Elev. _____ Slope _____

Aspect _____

- or -

Cache: UTM: _____ E _____ N Elev. _____ Slope _____

Aspect _____

Distance from kill (m): _____

Physiography: 1) ridgetop 2) upper 1/3 3) midslope 4) lower 1/3 5) bottom/riparian 6) bench

Rock: 1) outcrops 2) talus 3) cliff 4) boulder field 5) none

Vegetation: _____

Describe area of

Kill/Cache: _____

Snow Depth (cm) - _____

Canopy Closure – Open (0 – 33%) Moderate (34 – 66%) Dense (67 – 100%)

200 m. comparison site - Slope: _____ Aspect _____

Physiography: (1 2 3 4 5 6)

Rock: (1 2 3 4 5)

Snow Depth (cm) - _____

Canopy Closure – Open (0 – 33%) Moderate (34 – 66%) Dense (67 – 100%)

Snow conditions at kill and comparison (crusted, patchy, etc.):

Site Evidence and Assessment of Carnivore Involvement

Carcass detected?: 1) bird activity 2) tracks / sign 3) telemetry 4)

Other: _____

Carnivore tracks present: 1) wolf 2) cougar 3) coyote 4) bobcat 5) bear 6) none 7)

other: _____

Carnivore present?: _____

Beds: Y N Scats: Y N Tree Scratching: Y N Scrapes: Y N #: _____ Urine marking: Y N

Carcass located: 1) among or under tree / shrub or 2) in open

Carcass covered: Y N Cover Material: _____ Carcass moved: Y N

#: _____

Drags marks: Y N Distance dragged (m): _____ No. of burial sites: _____

Signs of Struggle or

chase: _____

Scavengers present?: Y N 1) coyote 2) raven 3) golden eagle 4) bald eagle 5) magpie 6)

bobcat 7) wolf 8) cougar 9) bear 10) other: _____

Cause of death (see carcass evaluation form):

1) Possible a) carnivore (list species): _____

2) Probable b) malnutrition/winter kill c) unknown d) other (specify): _____

3) Positive Wolf or cougar ID's if known: _____

Wolf Pack: _____

Type: 1) ground telemetry 2) aerial telemetry

No. and color observed: _____

Carcass Description, Utilization, and Condition

Signs of carnivore damage: Tooth marks present? Y N

Location: _____

Apparent point of first feeding: _____

Subcutaneous/internal hemorrhaging: _____

Probable kill method: 1) choked 2) bite to skull 3) broken neck 4) unknown

5) other: _____

Utilization

No. days btwn. carcass abandonment and carcass examination: _____ (known) (estimated)

Utilization: 1 = 76 – 100% no soft tissue; hide usually present; generally disarticulated

2 = 51 – 75% all organs consumed, all or most of quarters consumed; some head/neck present;

partial/slight disarticulation

3 = 26 – 50% organs usually consumed, major portions of hind quarters consumed; front quarters,

head/neck largely intact; usually articulated

4 = 0 – 25% some organs consumed; most soft tissue intact; skeleton articulated

Condition

Bone Marrow: 1) Solid 2) Gelatinous Color: _____ Percent Marrow

Fat: _____

Body Fat: Subcutaneous: Y N Unk. Omentum: Y N Unk. Kidney: Y N Unk. Heart: Y N Unk.

Arthritis: vertebrae: Y N; If yes circle type: cervical/thoracic/lumbar, and # of each: _____

pelvis: Y N; which acetabulum: right/left/both Severity: slight/moderate/severe

Femur ball examined?: Y N arth.?: Y N (R or L)

other arthritic joints: Y N specify: _____ severity:

slight/moderate/severe

Jaw Necrosis: Y N uppers: slight/moderate/severe lowers: slight/moderate/severe

Disease and Parasitism: (when possible inspect for ticks, lung worm, liver fluke, tapeworm, muscle cysts)

Specify parasite: _____ Infection: slight/moderate/severe

Abnormal organs/tissue

present: _____

Samples Collected

Carnivore: Scats Hair Photos of kill site?: _____

Prey (bones): Femur Jaw Metatarsus other: _____

Comments: _____

Appendix B: Mexican Wolf Determination of Cause of Ungulate Death Form

	Possible	Probable	Positive
Wolf	<input type="checkbox"/> Old wolf tracks <input type="checkbox"/> Competing predator: could go either way <input type="checkbox"/> Hide with hair attached or hide attached to bone	<input type="checkbox"/> Wolf tracks (may or may not be present due to weather, scavengers obscuring tracks, etc.) <input type="checkbox"/> Torn or shredded hide or mostly consumed <input type="checkbox"/> Carcass scattered <input type="checkbox"/> Bones crushed or gnawed (esp. femur, femur ball) <input type="checkbox"/> Feeding pattern indicates entry through the hind quarters/soft tissue. <input type="checkbox"/> Collared wolves in area Frequencies:	<input type="checkbox"/> Definite chase scene <input type="checkbox"/> Hemorrhaging on back of thighs, lower legs, neck (generally all present). <input type="checkbox"/> If no chase scene, all “probable” indications.
Cougar	<input type="checkbox"/> Old cougar tracks <input type="checkbox"/> Old scats, bedsites <input type="checkbox"/> Hide with plucked or sheared hair	<input type="checkbox"/> Cougar tracks (may or may not be present due to weather, scavengers obscuring tracks, etc.) <input type="checkbox"/> Remains concealed near or under low hanging vegetation <input type="checkbox"/> Carcass buried/cached – duff, hair, snow, etc. <input type="checkbox"/> Cougar scats, scrapes <input type="checkbox"/> Feeding pattern indicates entry through the ribs. <input type="checkbox"/> Tree scratching at site <input type="checkbox"/> Collared cougar in area Frequencies:	<input type="checkbox"/> Chase, struggle, kill site evident <input type="checkbox"/> Canine punctures to back of neck, throat, or head; neck broken <input type="checkbox"/> Claw marks and rakes along back of shoulders <input type="checkbox"/> Drag marks to cache

(Possible: evidence at site limited or too old to ascertain cause of death; some evidence suggesting possible predator)

(Probable: multiple indications of predator; may be indications of other predator, but evidence is overwhelmingly in favor of one over the other)

(Positive: chase scene with tracks of predator; all other evidence at the scene indicative of the predator)