Montana Fish, Wildlife & Parks

EQC Wolf Update

May 15, 2014

2013 Annual Report

- The minimum count of Montana wolves generally stayed stable from 2012 to 2013.
- The minimum count showed an insignificant increase of 2 from 2012 (625) to 2013 (627)
- A total of 152 verified packs (Fig. 1) of 2 or more wolves yielded a minimum count of 627 wolves in Montana for 2013 (Fig. 2).
- Twenty-eight packs qualified as a breeding pair according to the federal recovery definition (an adult male and female with two surviving pups on December 31).
- In northwest Montana, we verified 412 wolves in 104 packs, 16 of which were breeding pairs.
- In western Montana, we verified 123 wolves in 26 packs, 7 of which were breeding pairs.
- In southwest Montana, we verified 92 wolves in 22 packs, 5 of which were breeding pairs.
- USDA Montana Wildlife Services (WS) confirmed that 50 cattle, 24 sheep, three horses, and one goat were killed by wolves in calendar year 2013 compared to 108 confirmed losses in 2012.
- Livestock depredation complaints peaked in 2009 at 233 complaints and declined to 129 in 2013. About 50% of the complaints received by WS are verified as wolf-caused (Fig. 3).
- Seventy-five wolves were killed to reduce the potential for further depredations. Of the 75, eight were killed by private citizens either by kill permit or under state regulations that allowed citizens to kill wolves seen chasing, killing, or threatening to kill livestock.

2013-14 Hunting Season Statistics

- See attached handout

SB200

- Passed by the 2013 Legislature
- Directed the Commission to adopt rules to allow a landowner or the landowner's agent to take a wolf on the landowner's property at any time without the purchase of a wolf license when the wolf is a potential threat to human safety, livestock, or dogs.
- New ARM language defines wolves that are a potential threat to be those wolves in immediate proximity to human dwellings, livestock or domestic dogs.

- Must be consistent with the Montana gray wolf conservation and management plan and the adaptive management principles of the commission and the department for the Montana gray wolf population;
- Requires a quota each year for the total number of wolves that may be taken pursuant to this subsection; this quota is in addition to hunting/trapping season harvest.
- ARM amendments approved by Commission in Feb. 2014; awaiting final posting by Sec of State office.
- Quota will be before Commission at their May 22 meeting; proposed annual statewide quota (in addition to harvest season) is 100 wolves. Final adoption after public comment and potential adjustment will be at July 10 commission meeting
- Authorization for this landowner take of wolves representing potential threat under SB 200 fully available after final commission adoption of quota in July.

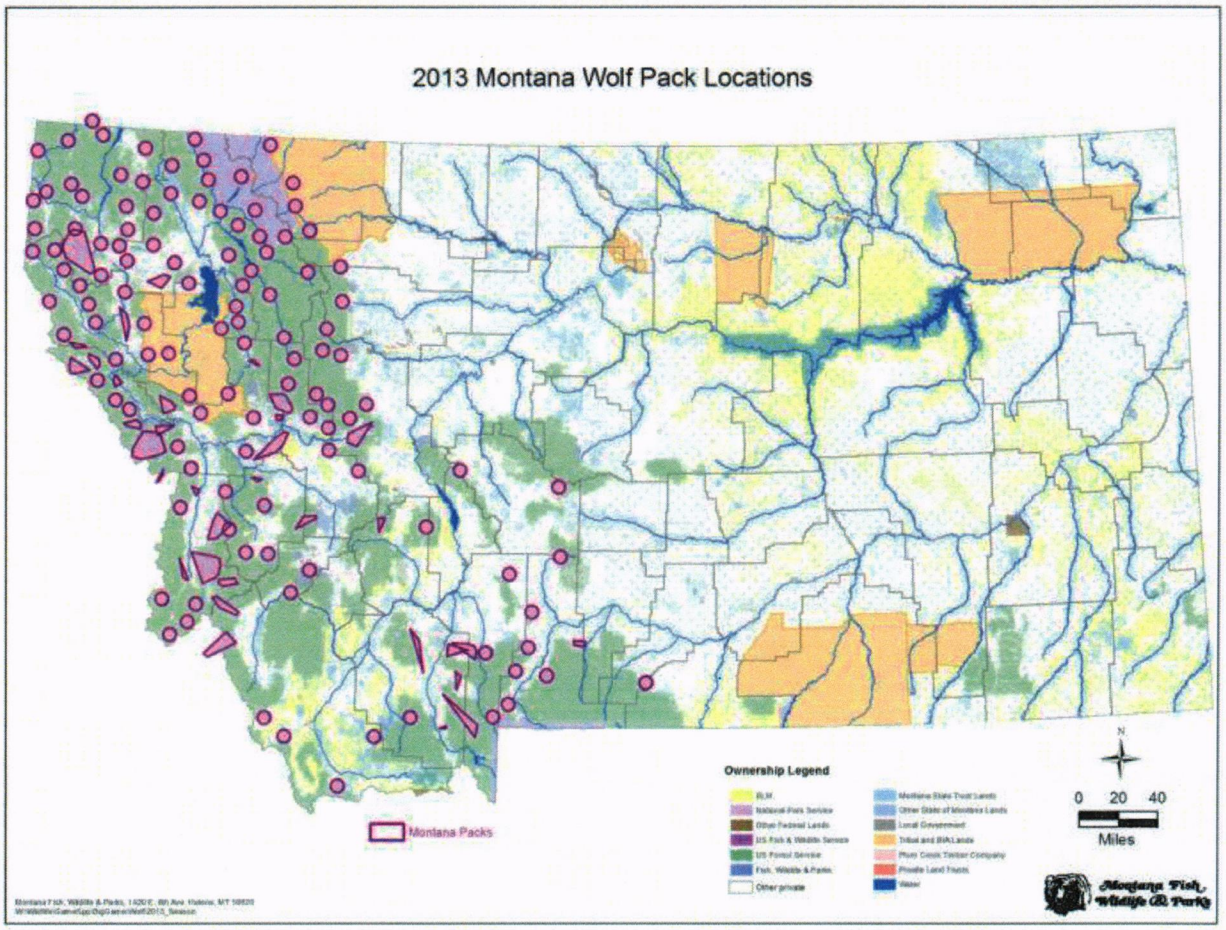


Fig. 1. Verified wolf pack distribution in the State of Montana, as of December 31, 2013.

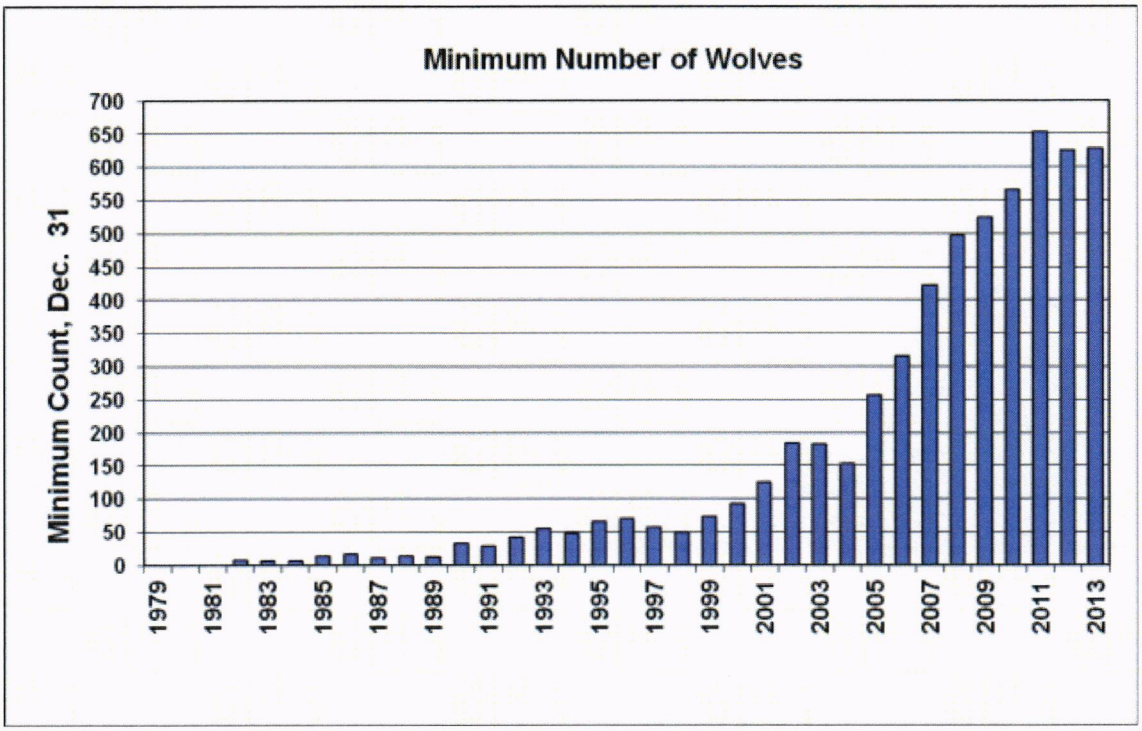


Fig. 2. Estimated minimum number of wolves in Montana (1979-2013).

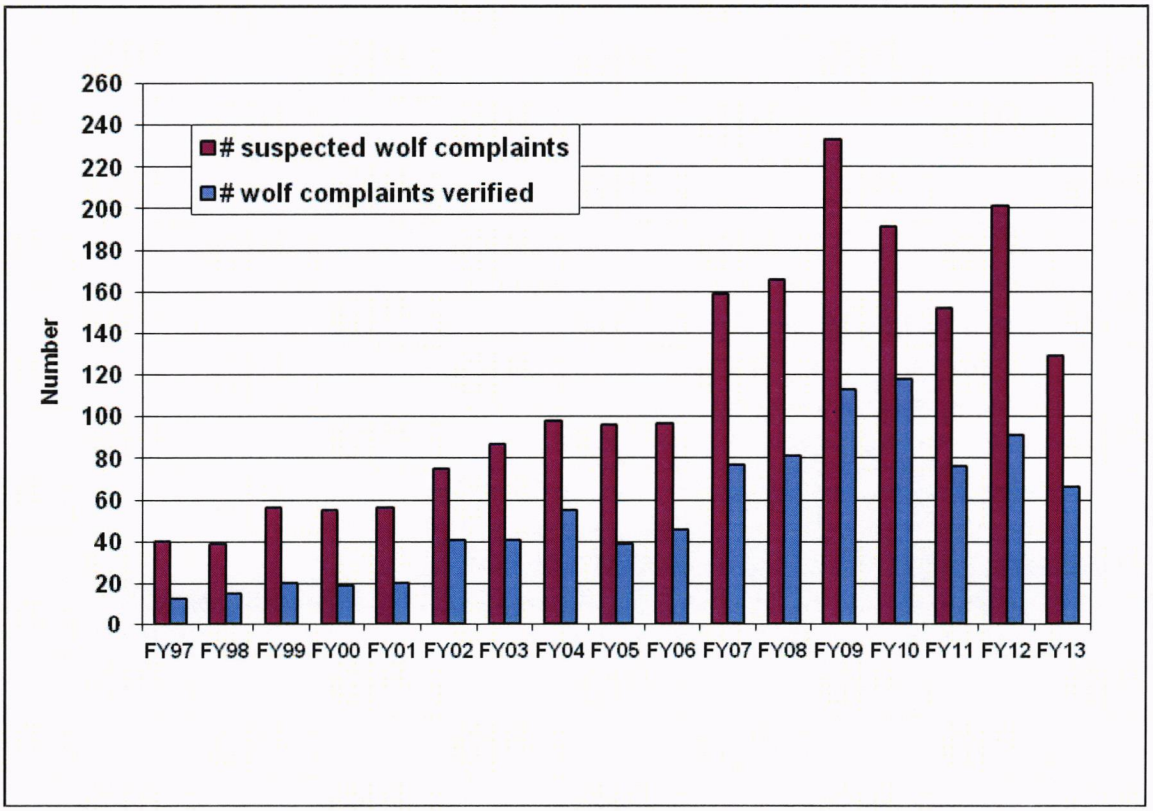


Fig 3. Number of complaints received by USDA Wildlife Services as suspected wolf damage and the percent of complaints verified as wolf damage, FFY 1997 – 2013.

2013 Montana Wolf Hunting Season Report

Montana Fish, Wildlife & Parks

About the Wolf Season

- Season closed Mar. 15, 230 total wolves harvested; 143 hunted and 87 trapped.
- Season modifications
  - General Season extended to March 15th.
  - An increased bag limit of 5 in any total combination of general or trap.
  - Regions 1-5 require a minimum pan tension of 10 pounds to reduce incidental captures of lynx, wolverines, and other non-target species.

- Wolf Management Unit harvests:

WMU	Hunter	Trapper	Total
100	17	11	28
101	19	19	38
110	1	-	1
121	11	5	16
130	8	10	18
200	5	10	15
210	13	4	17
250	10	10	20
280	2	-	2
290	9	7	16
310	11	2	13
313	4	-	4
316	2	-	2
320	3	-	3
330	8	1	9
390	14	2	16
400	6	6	12
Grand Total	**143**	**87**	**230**

Wolf Hunting

- 180 resident and 8 nonresident hunters harvested wolves.
  - 51 of 58 wolves (88%) during Archery/General season were taken opportunistically.
- 9 of percent of hunters used calls (13 hunters).
- Avg. Distance Shot: 181 yards (68 hunters).
- Number harvested:
  - 157 hunters took 1 wolf.
  - 9 hunters took 2 wolves.
  - 1 hunter took 3 wolves.
- Three hunters harvested a wolf with archery equipment.
- 24,479 wolf licenses were issued (22,169 resident; 2,310 nonresident).

Wolf Trapping

- 37 trappers took one wolf.
- 13 trappers took 2 wolves.
- 3 trappers took 3 wolves.
- 2 trappers took 4 wolves.

Harvested Wolves

- 43% on federal land; 13% on state land; 40% on private land (4% unknown).
- Wolves were harvested from approximately 46 different packs.

Sex

- 119 Females
- 111 Males

Color

- Gray 147
- Black 56
- White 7
- Unknown 20

Reported Health

- 24 with one or combination of mange, worn or broken teeth, fleas, worms, gashes, injuries to paws or legs, and one with a bobbed tail.

Please see fwp.mt.gov for more information
http://fwp.mt.gov/hunting/planahunt/huntingGuides/wolf/

2013 Montana Wolf Hunting Season Report

Montana Fish, Wildlife & Parks

2013 Gray Wolf Hunting Season Harvest Locations

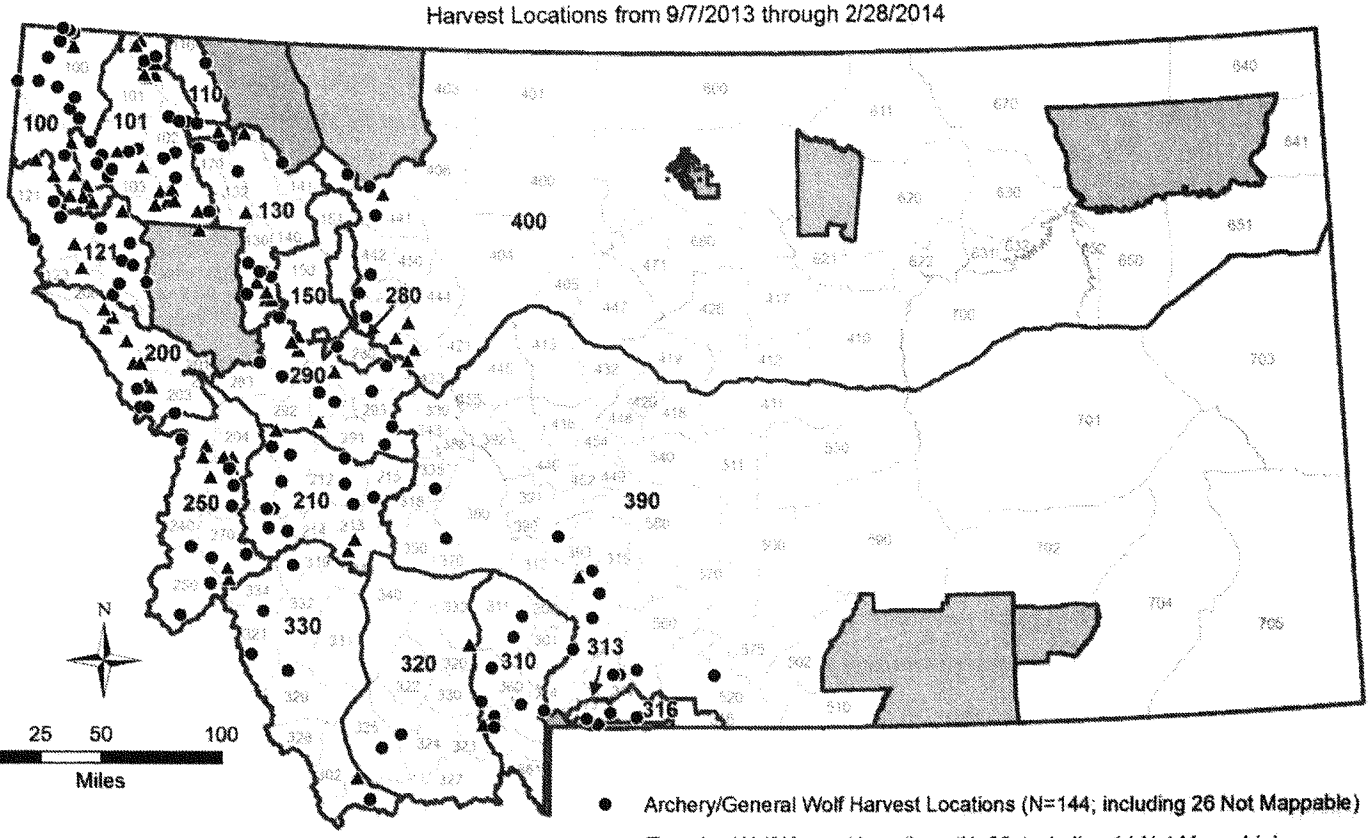
Of the statewide harvest, 84 percent came from:

County	Hunter	Trapper	Total
Lincoln	25	21	46
Flathead	15	10	25
Ravalli	10	10	20
Sanders	11	6	17
Park	15	1	16
Powell	8	6	14
Mineral	4	9	13
Missoula	5	7	12
Granite	10	1	11
L & C	6	5	11

The other counties include:

County	Hunter	Trapper	Total
Beaverhead	9	1	10
Gallatin	7	1	8
Madison	6	2	8
Lake	4	3	7
Teton	2	1	3
Silver Bow	-	3	3
Jefferson	2	-	2
Pondera	2	-	2
Deer Lodge	1	-	1
Stillwater	1	-	1

Harvest Locations from 9/7/2013 through 2/28/2014



- Some points have been moved up to 5 miles from actual harvest location for display purposes

● Archery/General Wolf Harvest Locations (N=144; including 26 Not Mappable)

▲ Trapping Wolf Harvest Locations (N=86; including 14 Not Mappable)

2013 Gray Wolf Management Units (WMU)

2012/2013 Deer/Elk Hunting Districts

Montana Fish, Wildlife & Parks

\\Wildlife\GameSpp\BigGame\Wolf\HarvestMaps\2013
MTFWP - DS - MAM 4/8/2014

Please see fwp.mt.gov for more information
http://fwp.mt.gov/hunting/planahunt/huntingGuides/wolf/

Montana Gray Wolf Conservation and Management 2013 Annual Report

A cooperative effort by Montana Fish, Wildlife & Parks, USDA Wildlife Services, Glacier National Park, Yellowstone National Park, Blackfeet Nation, and The Confederated Salish and Kootenai Tribes

This report presents information on the status, distribution, and management of wolves in the State of Montana, from January 1, 2013 to December 31, 2013.

It is also available at: http://fwp.mt.gov/wolf

This report may be copied in its original form and distributed as needed.

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MONTANA EXECUTIVE SUMMARY

Wolf recovery in Montana began in the early 1980's. Gray wolves increased in number and expanded their distribution in Montana because of natural emigration from Canada and a successful federal effort that reintroduced wolves into Yellowstone National Park and the wilderness areas of central Idaho. The U.S. Fish and Wildlife Service (USFWS) approved the Montana Gray Wolf Conservation and Management Plan in early 2004.

In April of 2011, a congressional budget bill directed the Secretary of the Interior to reissue the final delisting rule for Northern Rocky Mountain wolves originally published in April of 2009. On May 5, 2011 the USFWS published the final delisting rule designating wolves throughout the Distinct Population Segment, except Wyoming, as a delisted species. Wolves in Montana became a species in need of management statewide under Montana law; state rules and the state management plan took full effect. Using a combination of federal funds and license dollars, Montana Fish, Wildlife and Parks (FWP) implemented the state management plan by monitoring the wolf population, directing problem wolf control and take under certain circumstances, coordinating and authorizing research, regulating sport harvest, and leading wolf information and education programs.

The minimum count of Montana wolves generally stayed stable from 2012 to 2013. The minimum count showed an insignificant increase of 2 from 2012 (625) to 2013 (627). A total of 152 verified packs of 2 or more wolves yielded a minimum count of 627 wolves in Montana for 2013. Twenty-eight packs qualified as a breeding pair according to the federal recovery definition (an adult male and female with two surviving pups on December 31). In northwest Montana, we verified 412 wolves in 104 packs, 16 of which were breeding pairs. In western Montana, we verified 123 wolves in 26 packs, 7 of which were breeding pairs. In southwest Montana, we verified 92 wolves in 22 packs, 5 of which were breeding pairs.

USDA Montana Wildlife Services (WS) confirmed that 50 cattle, 24 sheep, three horses, and one goat were killed by wolves in calendar year 2013 compared to 108 confirmed losses in 2012. Additional losses (both injured and dead livestock) most certainly occurred, but could not be confirmed. Most depredations occurred on private property. The Montana Livestock Loss Board paid $86,740 for 93 head of livestock that were verified by WS as either confirmed or probable death loss due to wolves in 2013. Seventy-five wolves were killed to reduce the potential for further depredations. Of the 75, 8 were killed by private citizens either by kill permit or under state regulations that allowed citizens to kill wolves seen chasing, killing, or threatening to kill livestock.

Wolf hunting was recommended as a management tool in the final wolf conservation and management plan (FWP 2004) but can only be implemented when wolves are delisted and if more than 15 breeding pairs of wolves existed in Montana the previous year. During 2013, 95 wolves were harvested during the 2012-13 season and 136 wolves were harvested during the 2013-14 season, for a total harvest of 231 wolves.

The total number of known wolf mortalities during 2013 was 335. Of these 335 mortalities, the cause of death was human-related for 329 wolves [231 legal harvest, 10 illegal harvest, 75 due to control actions (67 agency control and 8 under defense of property statute or under shoot-on-sight permits), 3 killed incidentally, and 10 due to vehicle collisions]. In addition, one wolf died of natural causes, three were euthanized, and two died of unknown causes.

This annual report presents information on the status, distribution, and management of wolves in the State of Montana from January 1 to December 31, 2013. The report and other information about wolves and their management in Montana are available at http://fwp.mt.gov/wolf/.

INTRODUCTION AND BACKGROUND

Wolf recovery in Montana began in the early 1980's. Gray wolves increased in number and expanded their distribution in Montana because of natural emigration from Canada and a successful federal effort that reintroduced wolves into Yellowstone National Park (YNP) and the wilderness areas of central Idaho. Montana contains portions of all three federal recovery areas: the Northwest Montana Recovery Area (NWMT), the Central Idaho Recovery Area (CID), and the Greater Yellowstone RecoveryArea (GYA) (Figure 1).

The biological and temporal requirements for wolf recovery in the northern Rocky Mountains of Montana, Idaho, and Wyoming were met in December 2002 and in 2003, all three states submitted wolf management plans to the USFWS for review. The USFWS accepted Montana's state plan and it is the document guiding wolf management in the state today.

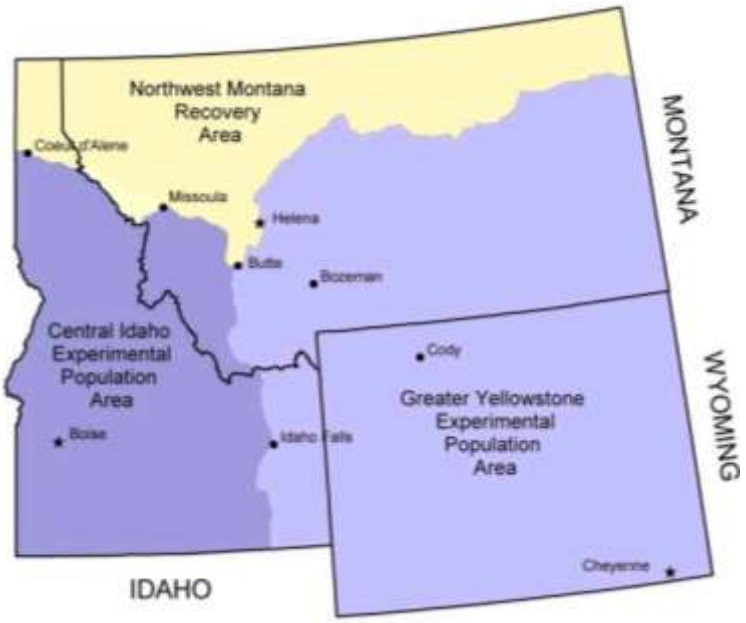

Figure 1. Northern Rockies gray wolf federal recovery area comprised of the states of Montana, Idaho, and Wyoming.

STATEWIDE PROGRAM OVERVIEW

The Montana Wolf Conservation and Management Plan is based on the work of a citizen's advisory council. Completed in 2003, the foundations of the plan are to recognize gray wolves as a native species and a part of Montana's wildlife heritage, to approach wolf management similar to other wildlife species such as mountain lions, to manage adaptively, and to address and resolve conflicts.

Prior to delisting in May 2011, the legal classification and federal regulations put wolves into two separate categories in Montana – endangered in northern Montana and experimental non-essential across southern Montana. Wolf-livestock conflicts were addressed and resolved using a combination of the statewide adaptive management triggers identified in the Montana plan and the federal regulations. In northwest Montana, the 1999 Interim Control Plan provided less flexibility to agencies and livestock owners. In contrast, more flexibility was provided through the revised 10(j) regulations (revised in February 2008).

Beginning with delisting in May 2011, the wolf was reclassified as a species in need of management statewide. Montana's laws, administrative rules, and state plan replaced the federal framework.

In the early stages of implementation, a core team of experienced individuals led wolf monitoring efforts and worked directly with private landowners. FWP's wolf team also worked closely with and increasingly involved other FWP personnel in program activities. Montana wolf conservation and management has transitioned to a more fully integrated program since delisting, led and implemented at the FWP Regional level. WS continues to investigate injured and dead livestock, and FWP works closely with them to resolve conflicts.

Overview of Wolf Ecology in Montana

Wolves are distributed primarily in western Montana east to the Beartooth face near Red Lodge inhabiting various habitats on both private and public lands (Figure 7). Montana wolf pack territory size estimates are naturally variable and heavily influenced by FWP's ability to collect location data on pack members throughout the year. Our confidence in estimating home territories for all packs has decreased as wolf numbers, conflict management, and staff workloads increase.

The size of the average wolf pack with good documentation in Montana is currently around 5 wolves. Pre-harvest, wolf packs tended to be slightly larger on average (6-7 wolves). The largest wolf pack documented in Montana in recent years has been 22 animals but packs this large are very rare. There is no significant difference in the average size of wolf packs across the state.

Monitoring Methods

Montana wolf packs are monitored year round. Common wolf monitoring techniques include direct observational counts, howling and track surveys, use of trail cameras, and public wolf reports. FWP seeks to document pack size and breeding pair status of known packs; determine pack territories and identify potentially affected private landowners; document dispersal to the extent possible and assess connectivity; and verify wolf activity in new areas that can result in new packs forming.

FWP conducts ground tracking and flies one to two times per month to locate collared animals and determine localized use throughout the year and the number of wolves traveling together. Den sites and rendezvous sites are visited to determine if reproduction has taken place. Additional information is collected, such as identification of private lands used by wolves, identification of public land grazing allotments where conflicts could occur, and common travel patterns. At the end of the year, FWP compiles information gathered through field surveys, telemetry, and public reporting.

FWP estimates the number of individual wolves in each pack when possible. Lone dispersing animals are accounted for when reliable information is available. Through its monitoring program, FWP is required to also tally and report the number of "breeding pairs" according to the federal recovery definition of "an adult male and a female wolf that have produced at least 2 pups that survived until December 31." Montana is required by USFWS to maintain at least 10 breeding pairs as an absolute minimum to maintain the delisted status of wolves. The state plan calls for the maintenance of at least 15 breeding pairs. Packs of two or more wolves that meet the recovery definition are considered "breeding pairs" and noted as such in the summary tables. Not all packs in Montana satisfy the breeding pair criteria.

The total number of packs is determined by counting the number of animal groups with two or more individuals holding a territory that existed on the Montana landscape on December 31. If a pack was removed because of livestock conflicts or otherwise did not exist at the end of the calendar year (e.g. disease, natural/illegal mortality or dispersal), it is not included in the year-end total or displayed on the Montana wolf pack distribution map for that calendar year.

The statewide minimum wolf population is estimated by adding up the number of observed wolves in verified packs + known lone animals as of December 31 each year. This is a minimum count, not a population estimate, and has been reported as such since wolves first began re-colonizing northwestern Montana in the mid 1980's. Suspected wolf packs are those that could not be verified with confidence. They are not included in the final minimum estimated count.

FWP wolf monitoring data, while not a precise accounting of the number of wolves in Montana, are used to make decisions to address wolf-livestock conflicts, to set wolf hunting and trapping regulations, and to set harvest quotas. These minimum data are also adequate to demonstrate maintenance of a recovered population, such that relisting is not warranted.

In anticipation of an increased work load and declining federal funding, FWP first began considering alternative approaches to monitoring the wolf population in 2007. The capacity for

FWP personnel to monitor a growing wolf population is complicated by the robust wolf population growth since about 2006. The traditional field-based methods yield minimum counts that are increasingly conservative and inevitably below actual abundance. Preliminary work focused on developing a more reliable method to estimate the number of breeding pairs based on the size of a wolf pack using logistic regression models (Mitchell et al. 2008). Subsequent work focused on finding ways to use wolf observations by hunters in a more systematic way. A collaborative research effort with the University of Montana Wildlife Cooperative Research Unit was initiated in 2008. The primary objectives were to find alternative approaches to wolf monitoring that would yield statistically reliable estimates of the number of wolves, the number of wolf packs, and the number of breeding pairs (see ***Predicting abundance of gray wolves in Montana using hunter observations and field monitoring*** below).

Minimum Statewide Wolf Population and Distribution

As the wolf population has increased in size and distribution it has become increasingly difficult to obtain pack counts and to determine the breeding pair status of known packs. FWP increased the amount of field monitoring effort with the hiring of a new full time specialist in the Livingston area in late 2010. FWP also hired a new full time specialist to work in the Great Falls area beginning in 2012. FWP hired two experienced seasonal field technicians and brought on additional volunteers to help with 2012 monitoring efforts. Recent increases in the wolf population over the last few years have meant that FWP has to verify more new packs, the status of previously verified packs, and determine breeding pair status for as many packs as possible. Inevitably, some packs are suspected, but not verified and FWP conservatively notes those packs in the narrative. Those suspected packs are not included in the minimum estimate. Similarly, if the breeding pair status is not known with confidence, it is recorded as "not" a breeding pair or "breeding status unknown." Thus, the number of breeding pairs is a minimum known and others certainly exist, but could not be verified with existing effort. The Montana wolf population is secure well above the 10 breeding pair minimum.

The Montana minimum wolf count increased by 2 wolves, from a minimum count of 625 in 2012 to a minimum count of 627 in 2013.

The minimum number of breeding pairs in Montana decreased from 37 in 2012 to 28 at the end of 2013. The minimum number of packs statewide increased from 147 in 2012 to 152 at the end of 2013. The number of packs in Montana have steadily increased since the minimum count of 46 in 2005. The number of verified breeding pairs generally increased, stabilized, and recently decreased, in part due to increasing time commitments of verifying a growing number of wolves and packs.

In northwest Montana, the minimum wolf count increased slightly from 400 in 2012 to 412 in 2013. Sixteen of 104 packs were documented to have met the breeding pair criteria. Four wolf packs occurred on the Blackfeet Indian Reservation and 7 packs occurred on the Flathead Indian reservation, for a total of 11 packs on reservation lands.

In western Montana, the minimum wolf count increased from 93 in 2012 to 123 in 2013. Seven of 26 packs were documented to have met the breeding pair criteria. There continues to be high

turnover in the population in parts of western Montana (e.g. Big Hole Valley) due to livestock conflicts and agency control. Yet, wolves recolonize some areas quite rapidly along the Montana-Idaho border.

In southwest Montana, the minimum wolf count decreased from 132 in 2012 to 92 in 2013. Five of 22 packs were documented to have met the breeding pair criteria.

Predicting abundance of gray wolves in Montana using hunter observations and field monitoring
Principal Investigator: Kevin Podruzny

Since the early 1980's, as wolf populations began recovering in Montana, the numbers of packs, breeding pairs, and total wolves have been documented by attempting to locate and count all individuals. It was assumed that these minimum counts provided an index to the true populations when wolf numbers were small. In the early years, most wolf packs had radio-collared individuals, and intensive monitoring was possible to identify new packs and most individuals within packs. Only verified observations were used, thus these counts represented minimums. In 1995, when the US Fish and Wildlife Service reintroduced wolves into Yellowstone National Park and central Idaho, the end-of-year count for wolves residing in Montana was only 66. By 2012 the minimum count had reached 625. The capacity for MFWP personnel to monitor the wolf population has been declining given robust wolf population growth and range expansion since about 2006. The traditional field-based methods yield minimum counts that are conservative and inevitably (and probably increasingly) below the true population sizes. The degree of this undercounting is unknown. Consequently, MFWP explored other, cost-effective methods that could more accurately be described as population estimates that account for uncertainty, as opposed to minimum counts.

In anticipation of an increased work load and declining federal funding, MFWP first began considering alternative approaches to monitoring the wolf population in 2006. Preliminary work focused on developing a more reliable and cost-effective method to estimate the number of breeding pairs based on the size of a wolf pack using logistic regression models (Mitchell et al. 2008). Subsequent work focused on finding ways to utilize wolf observations by hunters in a more systematic way. A collaborative research effort with the University of Montana Cooperative Wildlife Research Unit was initiated in 2007. The primary objective was to find an alternative approach to wolf monitoring that would yield statistically reliable estimates of the number of wolves, the number of wolf packs, and the number of breeding pairs (Glenn et al. 2011). Ultimately, a method applicable to a sparsely distributed and elusive carnivore population was developed that used hunter observations as a cost effective means of gathering biological data to estimate the area occupied by wolves in Montana, and additional information gathered from field monitoring by biologists to estimate the number of packs (Rich et al. 2013).

This transitioning from labor intensive minimum counts that are biased low to an unknown degree to obtaining population estimates can be fine tuned and modified as new data and methodologies become available, new techniques are developed, and new research answers key uncertainties. This technique bypasses the need to count every individual in every pack, and

instead relies on public reported wolf observations, field-documented territory size, and a small number of monitored packs and pack sizes.

Methods

The general method we used to estimate the number of gray wolves in Montana was to 1) estimate the area occupied by wolves in packs, 2) estimate the numbers of wolf packs by dividing area occupied by average territory size and correcting for overlapping territories, and 3) estimate the numbers of wolves by multiplying the number of estimated packs by average annual pack size (Figure 2).

Estimating Area Occupied by Wolves in Packs

To estimate the area occupied by wolf packs from 2007 to 2012, we used a multi-season false-positives occupancy model (Miller et al. 2013) using program PRESENCE (Hines 2006). First, we created an observation grid for Montana (Figure 2A) with a cell size large enough to ensure observations of packs across sample periods, yet small enough to minimize the occurrences of multiple packs in the same cell on average (cell size = 600 km^2). We used locations of wolves in packs (2-25 wolves) reported by a random sample of unique deer and elk hunters during MFWP annual Hunter Harvest Surveys (Figure 2B) and assigned the locations to cells (Figure 2C). We modeled detection probability, initial occupancy, and local colonization and local extinction from 5, 1-week encounter periods and verified locations (Figure 2D) using covariates that were summarized at the grid level (Figure 2E). We estimated patch-specific estimates of occupancy (Figure 2F) and estimated the total area occupied by wolf packs by multiplying patch-specific estimates of occupancy by their respective patch size and then summing these values across all patches (Figure 2G). Our final estimates of the total area occupied by wolf packs were adjusted for partial cells on the border of Montana and included model projections for reservations and national parks where no hunter survey data were available.

Model covariates for detection included hunter days per hunting district per year (an index to spatial effort), low use forested and non-forested road densities (indices of spatial accessibility), a spatial autocovariate (the proportion of neighboring cells with wolves seen out to a mean dispersal distance of 100 km), and patch area sampled (because smaller cells on the border of Montana, parks, and Indian Reservations have less hunting activity and therefore less opportunity for hunters to see wolves). Model covariates for occupancy, colonization, and local extinction included a principal component constructed from several autocorrelated environmental covariates (percent forest cover, slope, elevation, latitude, percent low use forest roads, and human population density), and recency (the number of years with verified locations in the previous 5 years).

To estimate area occupied in each year, we calculated unconditional estimates of occupancy probabilities which provided probabilities for sites that were not sampled by Montana hunters (such as National Parks and Reservations). We accounted for uncertainty in occupancy estimates using a parametric bootstrap procedure on logit distributions of occupancy probabilities. For each set of bootstrapped estimates we calculated area occupied. The 95% confidence intervals

(C.I.s) for these values were obtained from the distribution of estimates calculated from the bootstrapping procedure.

Estimating Numbers of Wolf Packs

To predict the total number of wolf packs in Montana from 2007 to 2012, we first established an average territory size for wolf packs in Montana (Figure 2H). Rich et al. (2012) calculated 90% kernel home ranges from radio telemetry locations of wolves collared and tracked by wolf MFWP biologists for research and/or management from 2008 to 2009. We assumed the mean estimate of territory size from these data was constant during 2007-2012. For each year, we estimated the number of wolf packs by dividing our estimates of total area occupied by the mean territory size (Figure 2I). We then accounted for annual changes in the proportion of territories that were overlapping (non-exclusive) using the number of observed cells occupied by verified pack centers.

We accounted for uncertainty in territory areas using a parametric bootstrap procedure and a log-normal distribution of territory sizes, and for each set of bootstrapped estimates we calculated mean territory size. The 95% C.I.s for these values were obtained from the distribution of estimates calculated from the bootstrapping procedure.

Estimating Numbers of Wolves

To predict the total number of wolves in Montana from 2007 to 2012, we first calculated average pack size from the distribution of packs of known size (Figure 2J). Pack sizes were established by MFWP biologists for packs monitored for research and/or management. We used end-of-year pack counts for wolves documented in Montana from 2007 to 2012. We only used pack counts MFWP biologists considered complete. Typically, intensively monitored packs with radio-collars provided good counts more often than packs that were not radio-marked. For each year, we estimated total numbers of wolves in packs by multiplying the estimate of mean pack size by the annual predictions of number of packs (Figure 2K).

We accounted for uncertainty in pack sizes using a parametric bootstrap procedure and a Poisson distribution of pack sizes, and for each set of bootstrapped estimates we calculated mean pack size. The 95% C.I.s for these values were obtained from the distribution of estimates calculated from the bootstrapping procedure. We allowed pack sizes to vary by year but not spatially.

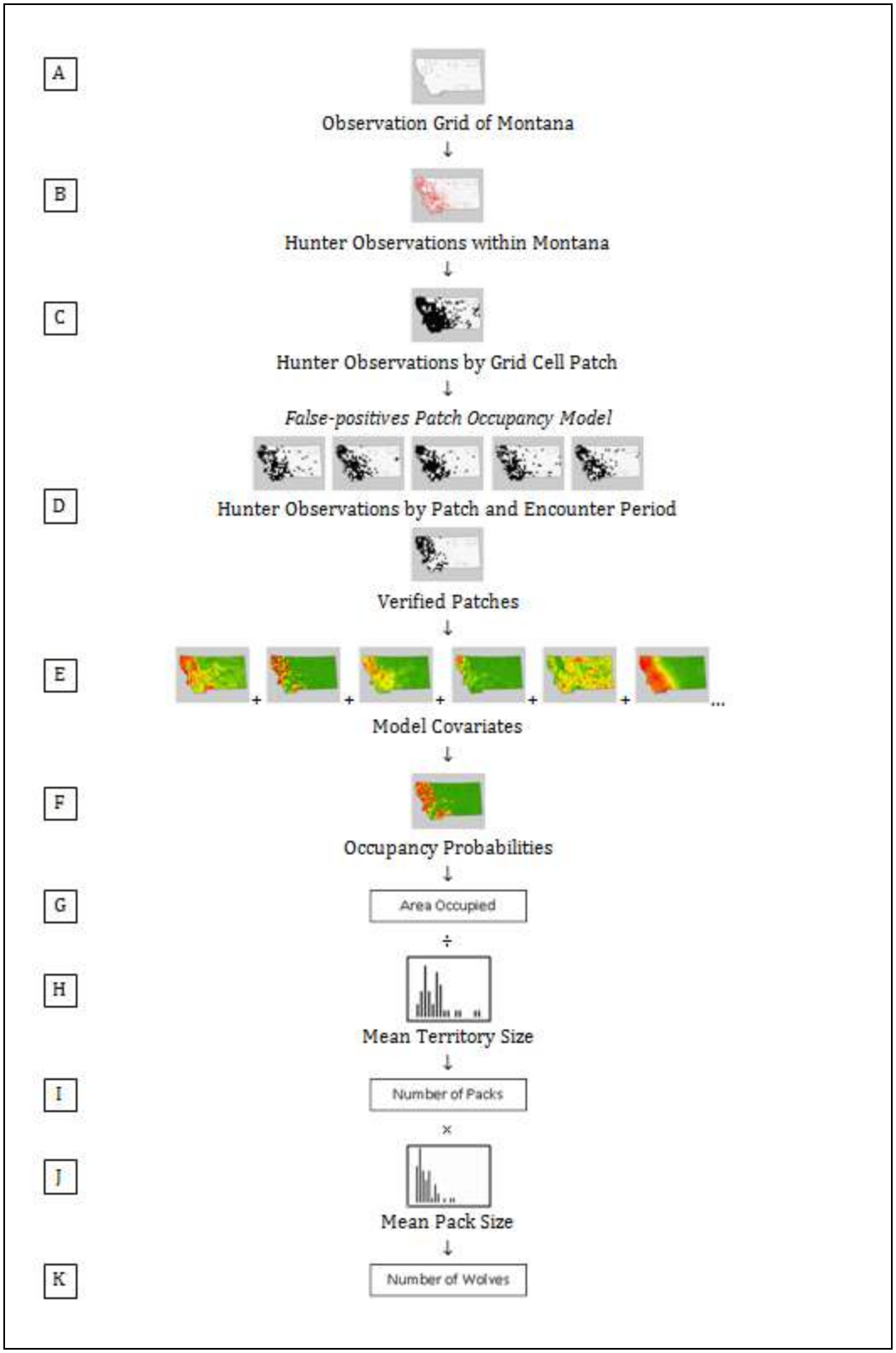

Figure 2. Schematic for method of estimating the area occupied by wolves, number of wolf packs and number of wolves in Montana, 2007-2012.

Results

Estimating Area Occupied by Wolves in Packs

From 2007 to 2012, 50,039; 81,475; 80,486; 82,386; 81,532 and 76,996 hunters responded to the wolf sighting surveys. From their reported sightings, 1,202; 2,859; 3,056; 3,469; 3,320, and 2,391, locations of 2 to 25 wolves could be determined during the 5, 1-week sampling periods.

The top model of wolf occupancy showed positive associations between the initial probability that wolves occupied an area and an environmental principal component and recency. The probability that an unoccupied patch became occupied in subsequent years was positively related to an environmental principal component and recency. The probability that an occupied patch became unoccupied in the following year was constant. The probability that wolves were detected by a hunter during a 1-week sampling occasion was positively related to hunter days per hunting district per year, low use forest road density, low use non-forest road density, a spatial autocovariate, and area sampled. The probability that wolves were falsely detected by a hunter during a 1-week sampling occasion was positively related to hunter days per hunting district per year, low use forest road density, low use non-forest road density, and a spatial autocovariate

From 2007 to 2012, estimated area occupied by wolf packs in Montana increased from 39,521 km^2 (95% CI = 39,144 to 40,562) to 79,275 km^2 (95% CI = 78,696 to 79,944; Table 1). The predicted distribution of wolves from the occupancy model closely matched the distribution of field-confirmed wolf locations (verified pack locations and harvested wolves; Figure 3).

Table 1. Estimated area occupied by wolves, number of wolf packs, and number of wolves in Montana, 2007-2012.

	2007	2008	2009	2010	2011	2012
Estimated Area Occupied (km^2)	39,521	49,831	59,067	64,810	72,134	79,275
(95% C.I.)	(39,144 - 40,562)	(49,298 - 50,593)	(58,542 - 59,814)	(64,277 - 65,476)	(71,606 - 72,871)	(78,696 - 79,944)
Territory Size (km^2)	599.83	599.83	599.83	599.83	599.83	599.83
(95% C.I.)	(493.35 - 740.34)	(493.35 - 740.34)	(493.35 - 740.34)	(493.35 - 740.34)	(493.35 - 740.34)	(493.35 - 740.34)
Estimated Packs (600 km^2 territories)	66	83	98	108	120	132
(95% C.I.)	(54 - 81)	(67 - 101)	(80 - 120)	(87 - 131)	(97 - 146)	(107 - 160)
Territory Overlap Index	1.17	1.11	1.13	1.16	1.24	1.25
Estimated Packs (600 km^2 territories w/overlap)	77	93	112	126	149	165
(95% C.I.)	(63 - 95)	(75 - 113)	(90 - 136)	(102 - 153)	(121 - 181)	(134 - 201)
Average Pack Size (complete counts)	7.03	6.82	6.39	6.16	5.67	4.86
(95% C.I.)	(6.06 - 7.97)	(6.18 -7.65)	(5.75 - 7.10)	(5.46 - 6.86)	(5.05 - 6.28)	(4.27 - 5.51)
Estimated Wolves	542	631	713	774	843	804
(95% C.I.)	(422 - 688)	(503 - 796)	(570 - 888)	(612 - 965)	(664 - 1,056)	(636 - 1,019)

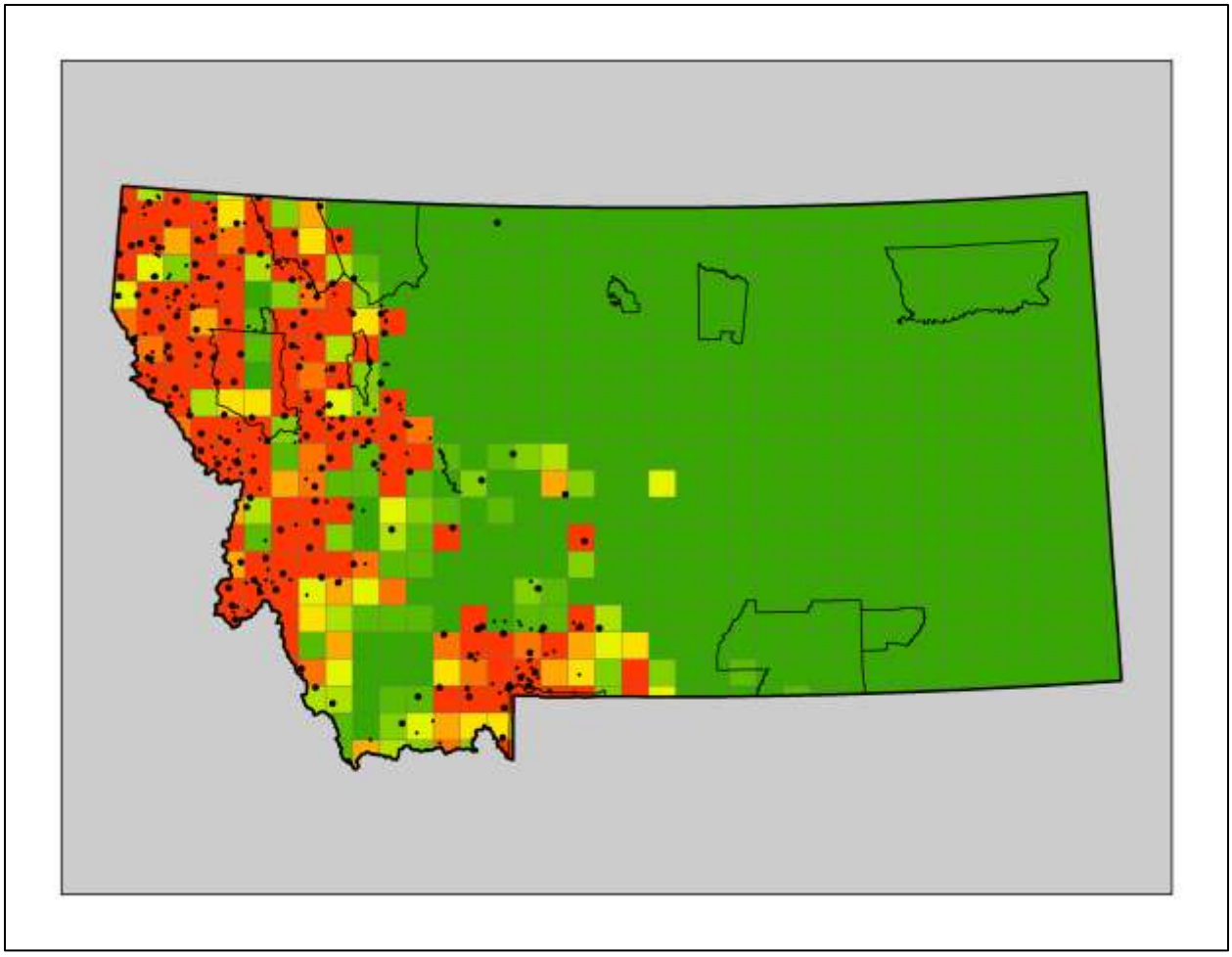

Figure 3. Model predicted probabilities of occupancy (ranging from low to high [green to red]), verified pack centers (large dots), and harvest locations (small dots) in Montana, 2012.

Estimating Numbers of Wolf Packs

In 2008 and 2009, territory sizes from 38 monitored packs ranged from 104.70 km^2 to 1771.24 km^2. Mean territory size was 599.83 km^2 (95% C.I. = 478.81 to 720.86; Rich et al. 2012). Dividing the estimated area occupied by mean territory size resulted in an estimated number of packs that increased from 66 (95% C.I. = 54 to 81) to 132 (95% C.I. = 107 to 160) from 2007 to 2012 (Table 1). We adjusted these estimates to account for annual changes in the number of verified pack centers per grid from 2007 to 2012 (1.17, 1.11, 1.13, 1.16, 1.24, and 1.25 for each respective year during 2007-2012) as an index of territory overlap. Accounting for territory overlap, estimated numbers of packs increased from 77 (95% C.I. = 63 to 95) to 165 (95% C.I. = 134 to 201) from 2007 to 2012 (Table 1). The estimated number of wolf packs ranged from 6% larger than the minimum verified number of packs residing in Montana in 2007 to 16% larger in 2010 (Figure 4).

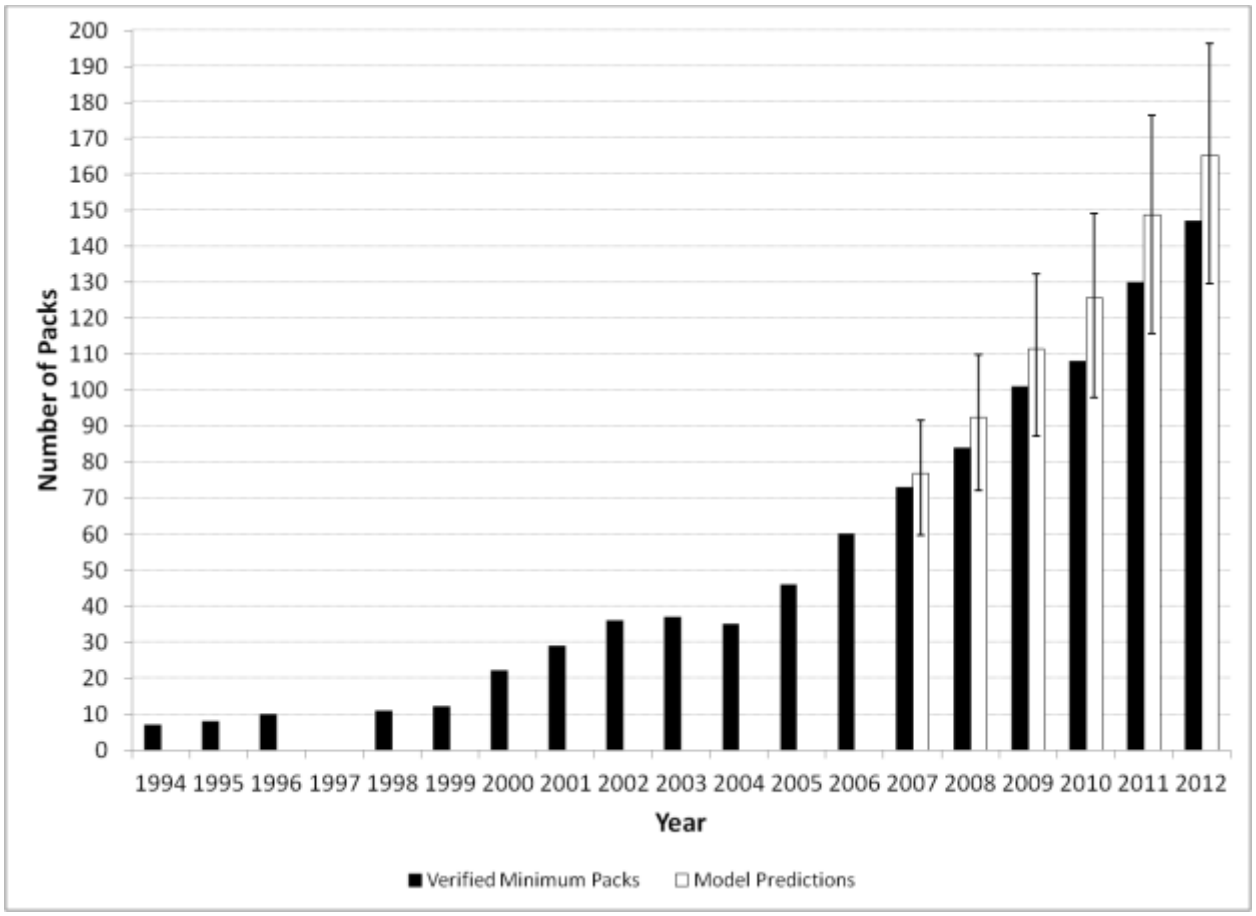

Figure 4. Estimated number of wolf packs in Montana compared to the verified minimum number of packs residing in Montana, 2007-2012.

Estimating Numbers of Wolves

From 2007 to 2012, complete counts were obtained from 314 packs within or bordering Montana. Pack sizes ranged from 2 to 22 and from 2007 to 2012 mean pack sizes decreased from 7.03 (95% C.I. = 6.06 to 7.97) to 4.86 (95% C.I. = 4.27 to 5.51). Multiplying estimated packs by mean pack size resulted in an increase of estimated wolves from 542 (95% C.I. = 422 to 688) to 804 from (95% C.I. = 636 to 1,019) 2007 to 2012 (Table 1). The estimated number of wolves ranged from 27% larger than the minimum verified number of wolves in Montana packs in 2008 to 37% larger in 2010 (Figure 5).

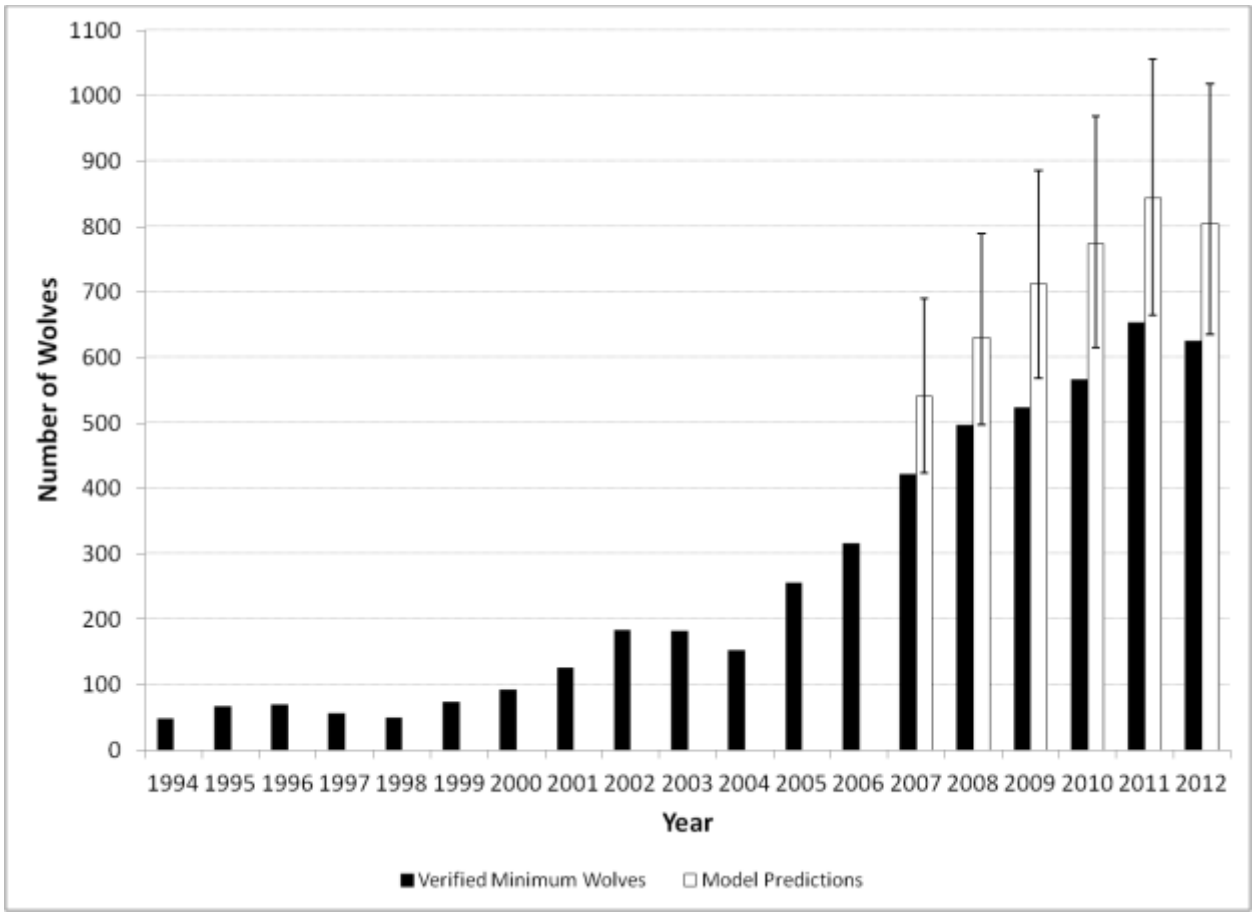

Figure 5. Estimated number of wolves in Montana compared to the verified minimum number of wolves residing in Montana, 2007-2012.

Discussion

Estimated Area Occupied by Wolves in Packs

Although the estimated area occupied has doubled between 2007 and 2012, the rate of growth for the area occupied has been declining. The extent to which this declining rate of increase represents a population responding to density dependent factors as available habitats become filled, versus a response to hunting and trapping harvest, is unknown.

Estimated Numbers of Wolf Packs

Our estimate for total numbers of wolf packs exceeded the minimum count by 6 to 16% between 2007 and 2012. Such a level of undercount is not unreasonable for elusive carnivores and is within the range of imperfect detection recorded for many other wildlife species and population estimation methods. For example, detection rates of elk during aerial surveys can be less than 20% (e.g., Vander Wal et al 2011), and detection rates of elk during winter surveys on the open winter ranges in southwestern Montana have been estimated at 44-89% (Hamlin and Ross 2002). Becker et al. (1998) produced a population estimate 48% higher than the number of individual

wolves they observed, even though they assumed that they detected all wolf tracks in the area they surveyed.

Our estimate of the number of wolf packs assumes that territory size is constant and equal across space. If territory sizes were actually larger in some years or some areas, then the estimated number of packs in those years or areas would have been biased high, and if territory sizes were actually smaller in some years or some areas, then the pack estimates would have been biased low in those years or areas. Similarly, our estimates of territory overlap were indirect indices rather than field-based observations based on high-quality telemetry data. In future applications of this technique, the assumption of constant territory sizes could be relaxed by modeling territory size as a flexible parameter, incorporating estimates of inter-pack buffer space or territory overlap into estimates of exclusive territory size, and incorporating spatially and temporally variable territory size predictions into estimates of pack numbers.

The estimated number of packs exceeded the minimum number of verified packs to some degree because verified packs did not include border packs attributed to other states or Canada that spent time in Montana and could have been recorded by hunters. We only included verified border packs included in the Montana summaries in comparing our estimates to minimum counts. Also, the minimum number of packs verified was for the end of the year, and wolf population estimates derived from hunter observations represented the deer and elk hunting season in October- November, a period of time before some natural and human-caused wolf mortalities occurred.

Estimated Numbers of Wolves

Our estimate for total numbers of wolves exceeded the minimum count by to 37% between 2007 and 2012. The degree of difference exceeds that of packs because in addition to undocumented packs, it incorporates undocumented individuals within known packs. This degree of difference between minimum counts and our population estimate remains within that observed in other studies of wolves (Becker et al. 1998) or more common ungulate species (Hamlin and Ross 2002, Vander Wal et al. 2011).

Our estimate of the number of wolves is dependent on several assumptions that need to be examined further. First, our population estimate assumes that missed packs are the same size as verified packs. If missed packs are smaller (e.g., recently established packs or packs interspersed among known packs), then our estimated number of wolves would be biased high. Also, our estimate assumes that pack size is constant and equal across space. Pack sizes that were actually larger in some years or some areas would induce a negative bias in our estimates of wolves in those years or areas, and pack sizes that were actually smaller in some years or some areas would induce a positive bias in our estimates of wolves in those years or areas. Finally, our population estimate is for wolves in groups of 2 or more and does not factor lone or dispersing wolves into the population estimate. Various studies have documented that on average 10-15% of wolf populations are composed of lone or dispersing wolves (Fuller et al. 2003). The state of Idaho inflates their estimates by 12.5% to account for lone wolves (Idaho Department of Fish and Game and Nez Perce Tribe 2012) and Minnesota inflates their estimate by 15% (Erb 2008). In

the future, lone or dispersing wolves could be incorporated into the Montana population estimate in various manners.

The estimated number of wolves exceeded the minimum number of verified wolves to some degree because verified wolves did not include individuals associated with border packs attributed to other states or Canada that spent time in Montana and could have been observed by hunters. As with packs, the minimum number of wolves verified was for the end of the year, and wolf population estimates derived from hunter observations represented a period of time before some natural and human-caused mortalities occurred.

Future applications of this modeling and population estimation technique will include incorporation of harvest (locations and number of harvested wolves) effects on wolf occupancy, territory sizes and overlap, and pack sizes. Incorporation of harvest as a model covariate for each of these aspects of wolf population size will enable a formal assessment of the effects of harvest on wolf populations in Montana. This strategy will also allow for predictions of the effects of different seasons or harvest quotas on wolf populations, to provide information to decision makers as they set wolf hunting and trapping seasons in coming years. Therefore, in addition to its use for monitoring and wolf population estimation, the technique described here also will provide utility for directly informing decisions about public harvest of wolves.

Border Packs

Northern Rocky Mountain wolf program cooperators have agreed that packs will be tallied in the population of the administrative area where the pack denned or spent most of their time. This assures that all packs are accounted for, but none are double-counted in population estimates. Transboundary packs are reported in the administrative region in which the animals were counted.

During 2013, 22 packs occupied areas along the Montana-Idaho Border. Of those, 11 were counted as Montana packs. Six packs occupied the Montana-Yellowstone National Park boundary. Of those, two were counted as Montana packs. One pack variously occupied Montana, Yellowstone National Park, and Idaho. That pack (Madison) was counted as an Idaho pack. Five packs occupied the Montana-Canada border and three of those were counted as Montana packs.

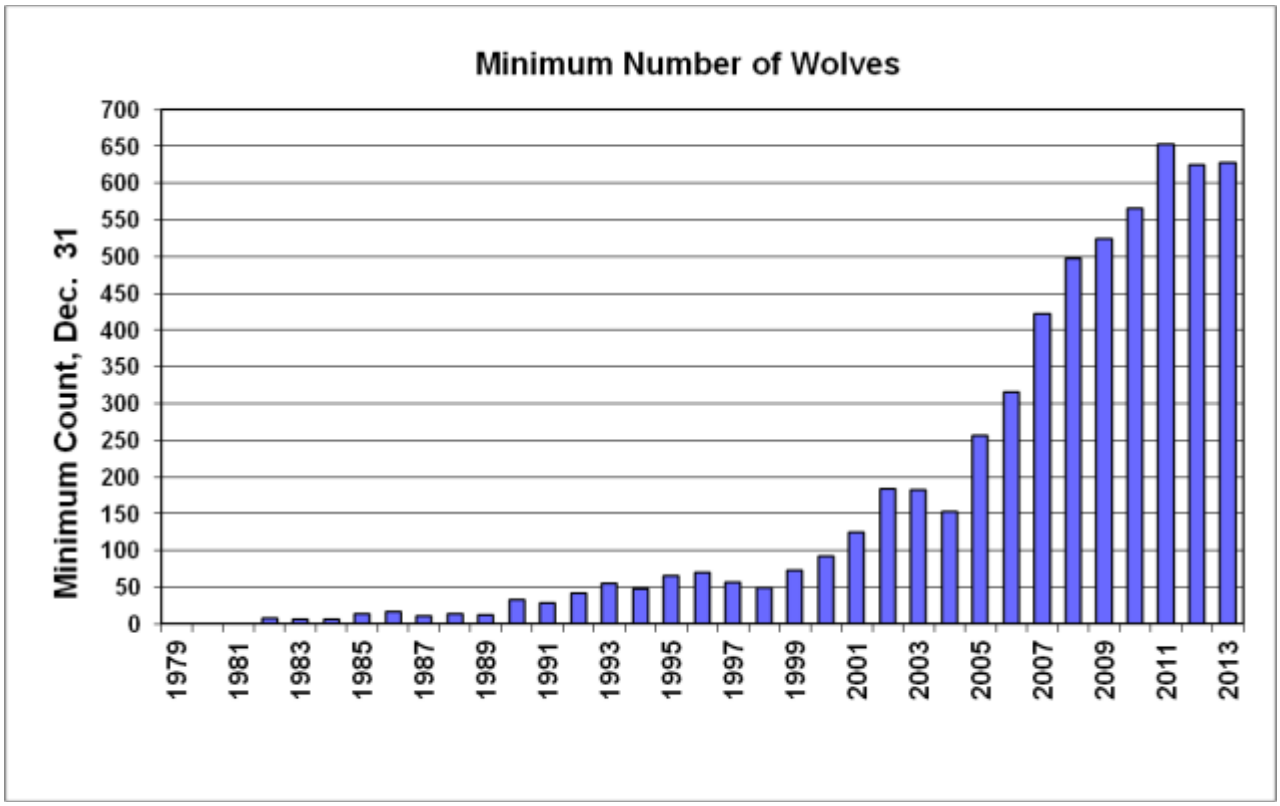

Figure 6: Estimated minimum number of wolves in Montana (1979-2013).

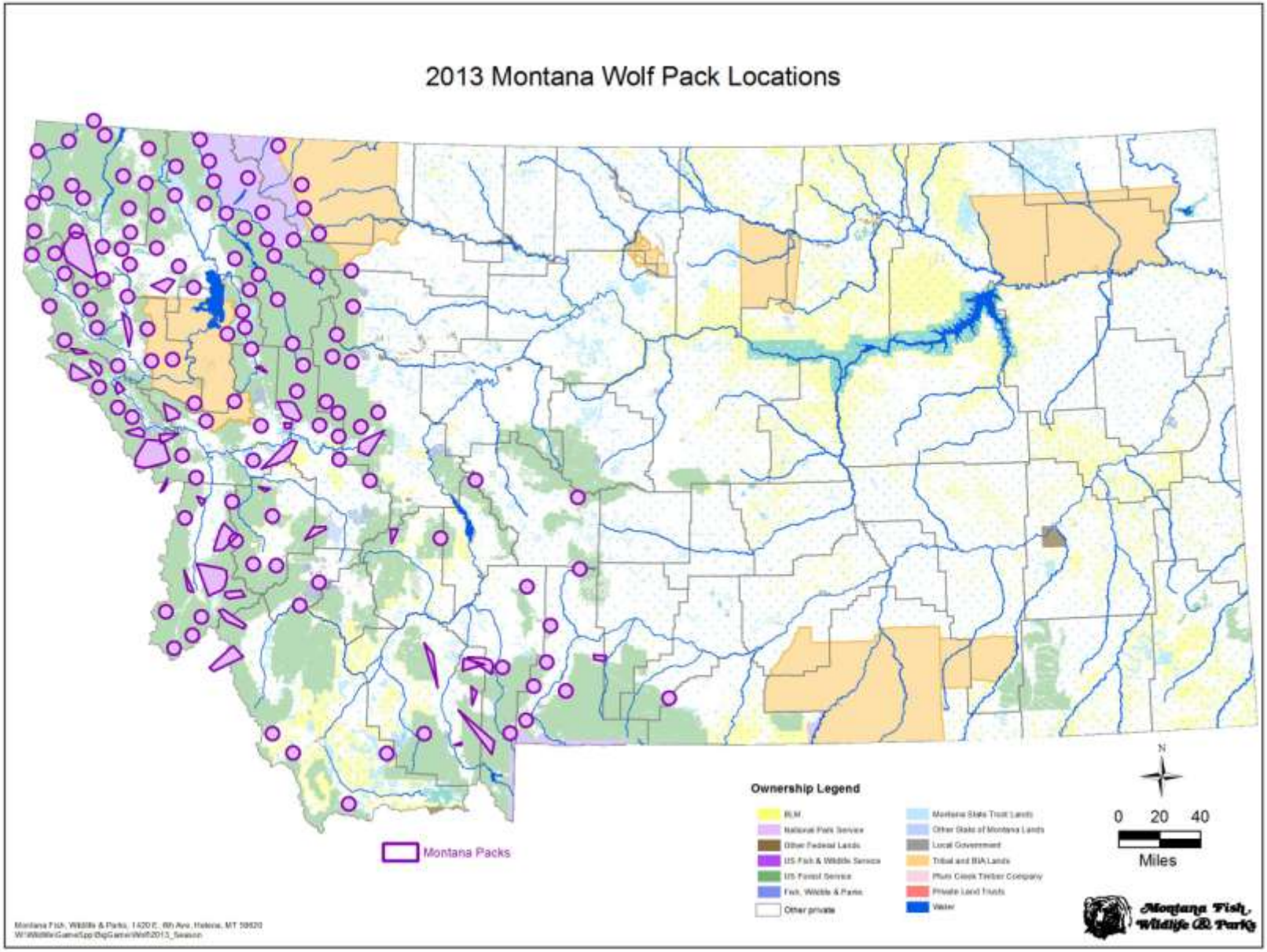

Figure 7. Verified wolf pack distribution in the State of Montana, as of December 31, 2013.

Regulated Public Hunting and Trapping

Regulated public harvest of wolves, recommended by the Governor's Wolf Advisory Council in 2000, was included in Montana's final wolf conservation and management plan. In 2001, the Montana Legislature authorized the FWP Commission to reclassify wolves under state law from an endangered species to a species in need of management upon federal delisting. In anticipation of delisting, FWP first began exploring the idea of how to design regulated public hunting and trapping for wolves early in 2007. The 2007 Legislature created a wolf hunting license for residents and nonresidents (SB 372). The 2013 Legislature modified that statute to allow the sale of multiple wolf licenses, allowing the FWP Commission to set hunting bag limits higher than 1 wolf per hunter (HB 73). Other statutes within MCA enable the FWP Commission to adopt rules and regulations pertaining to wolf hunting and trapping as a species in need of management upon delisting. FWP developed and implemented wolf harvest strategies that maintain a recovered and connected wolf population, minimize wolf-livestock conflicts, reduce wolf impacts on low or declining ungulate populations and ungulate hunting opportunities, and effectively communicate to all parties the relevance and credibility of the harvest while acknowledging the diversity of values among those parties. The Montana public has the opportunity for continuous and iterative input into specific decisions about wolf harvest throughout the public season-setting process. Finally, hunting can only be implemented when wolves are successfully delisted and if more than 15 breeding pairs of wolves existed in Montana the previous year.

Following the delisting of wolves in Montana in May 2011, a statewide wolf quota of 220, partitioned into fourteen individual wolf management units (WMU's) was proposed at the May FWP Commission meeting. FWP proposed quotas or subquotas in WMU 150 and in deer/elk hunting districts (HD's) 280 and 313/316 where an early back country rifle wolf season would coincide with the existing early elk back country hunting season. An archery-only wolf season in all WMUs with an allocated harvest potential not to exceed 20% of the WMU quota or subquota was also proposed to coincide with the existing deer and elk archery only season. Any harvest over-run at the WMU scale was proposed to be reduced from adjacent WMU quotas, other WMUs in the region or at the statewide scale to eliminate potential for any harvest over-run. Additional mechanisms to regulate take included rigorous tracking of harvest in each WMU through mandatory harvest reporting and a 24-hour closure notice process. Harvest quotas were proposed to tally only legal hunting harvest. In addition to other forms of wolf mortality (including cattle depredation removal), a harvest equal to the proposed quota level was predicted to reduce the year-end minimum total wolf numbers 25% from 566 in 2010 to approximately 425 in 2011. By December 31, 121 wolves had been harvested during the legal take season and quotas had been met in only 2 of the 14 WMUs. At the November FWP Commission meeting a season extension was proposed in order to increase wolf harvest closer to the statewide quota of 220. That specific proposal extended the 2011 wolf hunting season through January 31, 2012 or until specific WMU quotas were met. The commission adjusted the season extension end date to February 15, 2012 at the December commission meeting and then adopted that extension. From January 1 through February 15, 2012, 45 wolves were harvested by hunters.

On July 12, 2012, the FWP Commission adopted the framework for the 2012-13 wolf season. Significant changes included a hunting closing date of February 28; no statewide quota with WMU quotas remaining only in WMU's 110 (two) and 316 (three); trapping authorized from December 15

through February 28; overall bag limit of three, with up to three taken via trapping and up to one taken via hunting; and up to three taken via hunting with the passage of necessary legislation. On February 19, 2013, Governor Bullock signed House Bill 73 which, among other elements, authorized electronic calls and the sale of multiple wolf hunting licenses. Given the prior commission authorization on July 12, the hunting bag limit was increased to three and electronic calls were allowed immediately. At the close of the season on February 28th, the harvest included 128 wolves taken by hunters and 97 wolves taken by trappers, for a total of 225 wolves harvested during the 2012-13 season. The total, calendar year 2012 wolf harvest in Montana was 175, including 45 wolves harvested during the 2011-12 season and 130 wolves harvested during the 2012-13 season.

On July 10, 2013, the Fish and Wildlife (FW) Commission adopted the framework for the 2013-14 wolf season. Significant changes included a longer general season extending from Septermber 15, 2013 through March 15, 2014; bag limit of five wolves per person; and creation of WMU 313 with a quota of four wolves. At the close of the season on March 15th, the harvest included 144 wolves taken by hunters and 86 wolves taken by trappers, for a total of 230 wolves harvested during the 2013-14 season. The total, calendar-year 2013 wolf harvest in Montana was 231, including 95 wolves harvested during the 2012-13 season and 136 wolves harvested during the 2013-14 season.

Fish, Wildlife & Parks Wildlife Lab Surveillance of Wolf Mortality and Disease, 2007-2013

Biologists collected genetic samples (gene cards, hair, tissue samples) and blood from live wolves captured in the field during 2013. Genetic samples are being banked at the wildlife lab in Bozeman. Blood was used to conduct serological testing for exposure to *Brucella abortus*, *Brucella canis*, Canine Parvovirus (CPV), Canine Adenovirus (CAV), Canine Distemper Virus (CDV), Canine Herpes Virus (CHV), *Neospora caninum*, and Leptospirosis.

Serology results are currently available for 27 wolves captured in calendar year 2013. None of the wolves tested had titers suggesting serologic evidence for exposure to *Brucella abortus* or *Brucella canis*. None of the wolves tested had an antibody titer for any serovars of Leptospirosis which were included in serology panel. However, 16 wolves did have an antibody titer for *Neospora caninum*. Relatively high proportions of wolves tested did have titers for CPV (24/27), CHV (21/27), CAV (21/27), and CDV (19/27). Most of the titers for these viruses were quite low. However, some animals had relatively high titers for CAV and CPV, which may indicate recent exposure to the virus or active infection. Although sample sizes are small and not likely statistically significant, higher proportions of wolves demonstrated antibody titers to these viruses in 2013 than in 2012. It is not uncommon to find high proportions of animals with antibody titers to such viruses in areas in which the viruses are enzootic in the wild population. Almberg et al. (2009) found evidence of constant high exposure to CPV, CAV, and CHV in canids in Yellowstone National Park.

A small number of wolf carcasses were brought to the wildlife health lab in Bozeman for evaluation in 2013. Most of these carcasses were examined upon request of Montana FWP biologists or game wardens as part of an enforcement case or to attempt to determine cause of death.

A more thorough discussion of wolf diseases and previous serology and parasitology sampling results can be found in the 2010 annual report.

2013 Documented Statewide Wolf Mortalities

FWP detected a total of 335 mortalities in 2013 statewide due to all causes (Figure 8). Undoubtedly, additional mortalities occurred but were not detected. Because mortality counts and total population counts are incomplete, actual mortality rates cannot be determined.

The majority of wolf mortality overall in Montana is related to humans to include; livestock conflict removals, regulated public harvest, car strikes, train strikes, illegal killings, and incidental to other activities (e.g. trapping/snaring). That pattern is similar across time and all of the northern Rocky Mountains, except inside national parks where the majority of wolf mortality is due to intraspecific strife (wolf on wolf aggression) or other natural causes.

Documented total wolf mortality in 2013 (335) was slightly higher than in 2012 (324). Mortalities in 2013 included 231 public harvests compared to 175 harvests in 2012. There were fewer lethal control removals in 2013 (75) than in 2012 (108). Of the 75 wolves removed in 2013 for livestock depredations, 8 were killed by private citizens under kill permits or under the Montana state law known as the Defense of Property statute. Other mortalities included: 10 illegal kills, 10 vehicle collisions, three euthanizations, and three incidental mortalities. In addition, one wolf died of natural causes and two wolves died of unknown causes.

Mange continues to be documented in southwest Montana. It does not appear to have a detrimental effect on Montana's wolf population as a whole (see Jimenez et al. 2010).

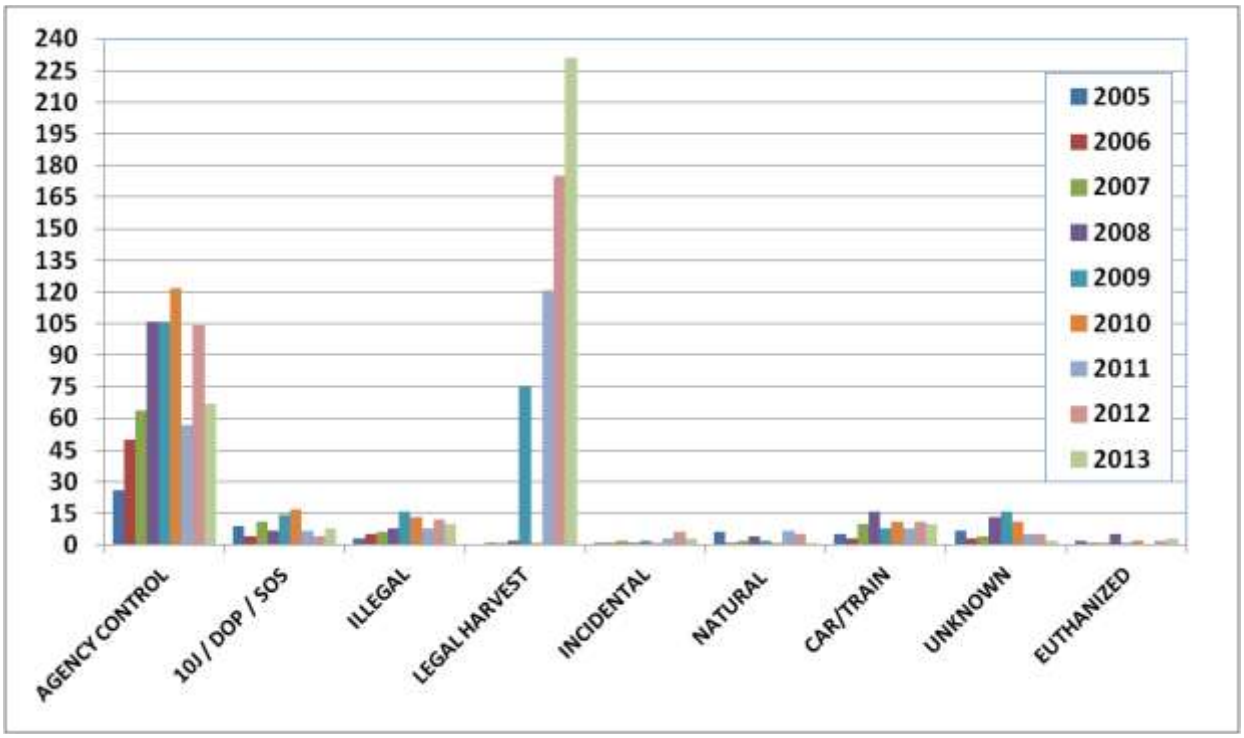

Figure 8. Minimum number of wolf mortalities documented by cause for gray wolves (2005-2013). Total number of documented wolf mortalities in 2013 was 335.

Wolf – Livestock Interactions in Montana

Montana wolves routinely encounter livestock on both public grazing allotments and private land. Wolves are opportunistic predators, most often seeking wild prey. However, some wolves "learn" to prey on livestock and teach this behavior to other wolves. Wolf depredations are very difficult to predict in space and time. The majority of cattle and sheep wolf depredation incidents confirmed by WS occurred on private lands. The likelihood of detecting injured or dead livestock is probably higher on private lands where there is greater human presence than on remote public land grazing allotments. The magnitude of under-detection of loss on public allotments is unknown. Nonetheless, most cattle depredations occurred in the spring or fall months while sheep depredations occurred more sporadically throughout the year.

USDA Wildlife Service's workload increased through 2009 as the wolf population increased and distribution expanded. The number of suspected wolf complaints received by WS increased steadily from federal fiscal year 1997 to 2009 (Figure 9). The number of complaints received since those years declined from 233 complaints in 2009 to 129 in 2013. About 50% of the complaints received by WS are verified as wolf-caused.

In 2013 wolves were under full management authority of the state and wolf-livestock conflict resolution was guided by a combination of Montana's approved state plan and the administrative rules of Montana. Federal and state regulations since 2009 have allowed private citizens to kill wolves seen in the act of attacking, killing, or threatening to kill livestock. In 2009, 14 wolves

were taken by private citizens, 17 were taken in 2010, 7 in 2011, 5 in 2012, and 8 in 2013. The remainder of wolves killed in control situations were removed by federal agency personnel.

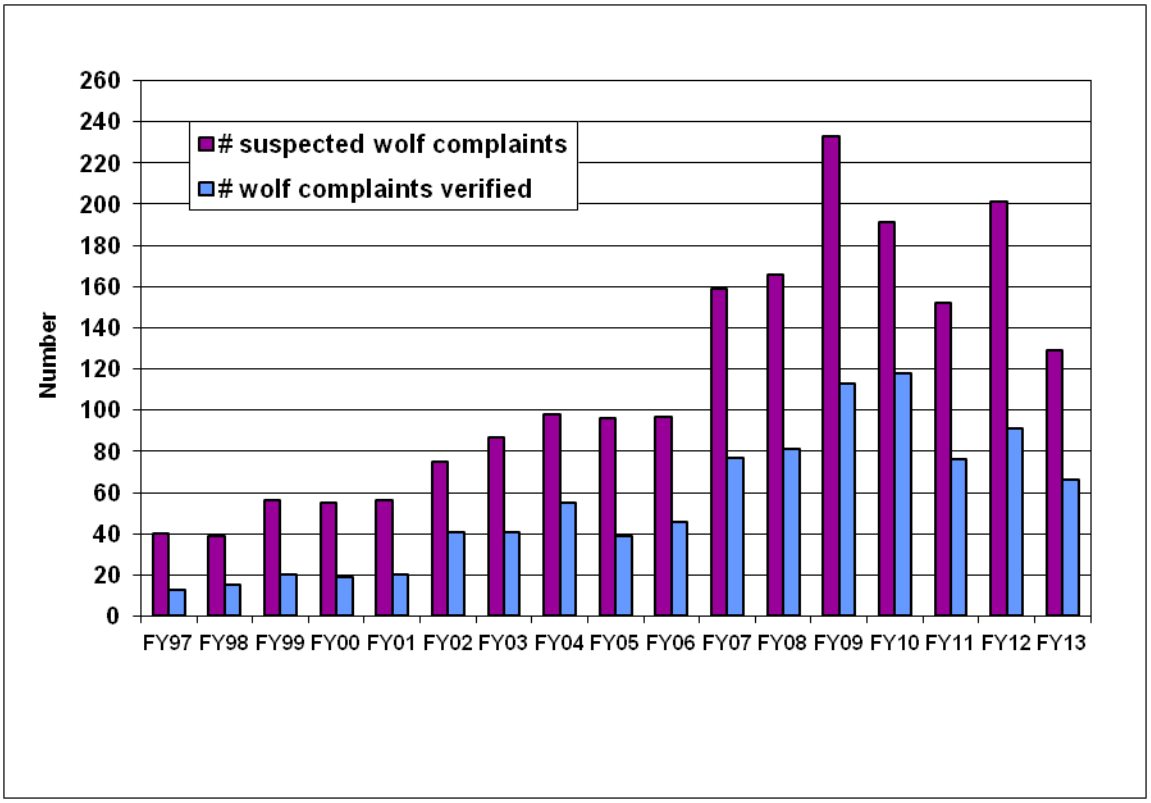

Figure 9. Number of complaints received by USDA Wildlife Services as suspected wolf damage and the percent of complaints verified as wolf damage, FFY 1997 – 2013.

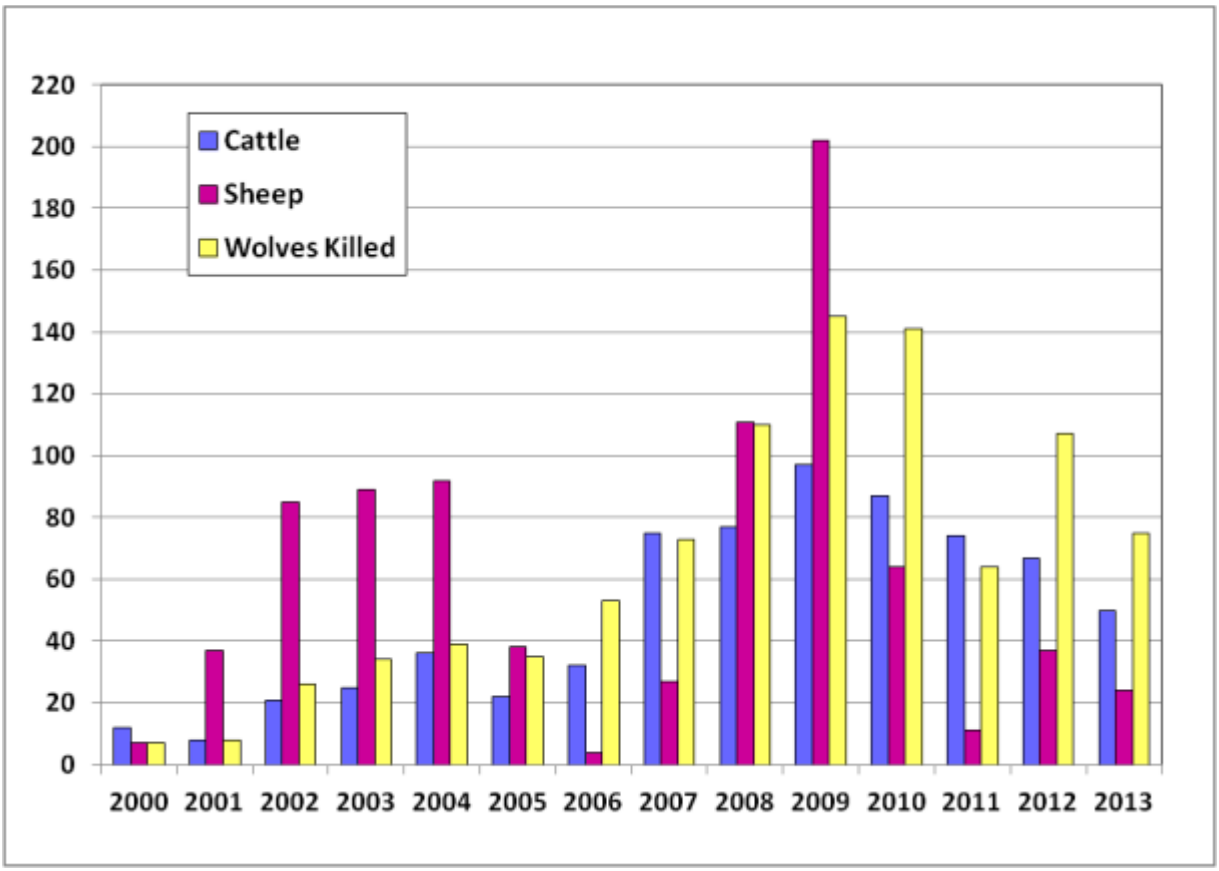

Figure 10. Number of wolves removed through agency control and take by private citizens, number of cattle and sheep killed annually (2000-2013).

Depredation Incidents in 2013

WS confirmed that, statewide, 50 cattle, 24 sheep, one goat, and three horses (Shetland ponies) were killed by wolves in 2013. Total confirmed cattle losses are down from 2012 levels and are the lowest recorded in the last seven years. Sheep depredations were also down from 2012. Agency control was lower in 2013 than 2012. The overall decrease in livestock depredations since 2009 may be a result of several factors including a trend toward more aggressive wolf control in response to depredations and effects of wolf harvest.

In 2013 WS also confirmed eight cattle, eight sheep, and two dogs injured by wolves. Probable wolf depredations included 16 cattle and seven sheep. Furthermore, many livestock producers reported "missing" livestock and suspected wolf predation. Others reported indirect losses including poor weight gain and reduced productivity. There is no doubt that there are undocumented losses.

To address livestock conflicts and to reduce the potential for further depredations, 75 wolves were killed in 2013. Eight of the 75 were killed by private citizens when the wolf was seen chasing, killing, or threatening to kill livestock or via kill permits issued by FWP. The others were taken by WS using either ground or aerial based methods. Seven packs were removed

entirely due to chronic livestock conflicts. Sixteen packs that were present at some point during 2013 were confirmed to have killed livestock.

Montana Livestock Loss Board: A Montana-Based Reimbursement Program

The Montana Wolf Conservation and Management Plan called for creation of this Montana-based program to address the economic impacts of verified wolf caused livestock losses. The plan identified the need for an entity independent from FWP to administer the program.

The purposes of the Montana Livestock Loss Board are to provide financial reimbursements to producers for losses caused by wolves based on the program criteria and to proactively apply prevention tools and incentives to decrease the risk of wolf-caused losses and to minimize the number of livestock killed by wolves through proactive livestock management strategies.

The loss mitigation element implements a reimbursement payment system for confirmed and probable losses that are verified by USDA WS. Indirect losses and costs are not directly covered, but eventually could be addressed through application of a multiplier for confirmed losses and a system of bonus or incentive payments. Eligible livestock losses are cattle, calves, hogs, pigs, horses, mules, sheep, lambs, goats, llamas, and guarding animals. Confirmed and probable death losses are reimbursed at 100% of fair market value. Veterinary bills for injured livestock that are confirmed due to wolves may be covered up to 100% of fair market value of the animal when funding becomes available.

Preliminary reimbursement totals for 2013 are $86,740 paid to livestock owners on 93 head of livestock. Overall, 2013 livestock losses decreased from 2012 totals. Both cattle and sheep losses decreased in 2013. Individual animal values continue to be higher than animal values in prior years.

Livestock loss statistics are available for 2008 to the present on the board's website http://liv.mt.gov/LLB/lossdata_2013.mcpx. The board began accepting claims in the spring of 2008. Total numbers for 2009 to 2013 are for a full calendar year.

The Livestock Loss Board has a Facebook page where the number of livestock killed and the county where the loss occurred is listed. This page is updated on the same day the livestock loss claim is received. To view the page, go to https://www.facebook.com/pages/Livestock-Loss-Board/208087235878971.

See the Livestock Loss Board page for detailed information http://liv.mt.gov/LLB/default.mcpx .

AREA SUMMARIES

Northwest Montana Summary
Montana Portion of the Northwest Montana Recovery Area (NWMT)

Overview

In 2013, we verified a minimum count of 412 wolves in 104 packs and 16 breeding pairs in the Montana portion of the NWMT recovery area. There were 13 newly identified packs in 2013. New packs include: Cataract, Cedar, Conger Point, Deer Creek, Echo, Kerr, Keystone, Looking Glass, Moore, Olson Peak, Ophir Creek, Pretty Prairie, and Sunrise Mountain. Some of these packs are believed to be first-year packs, and some are likely to have existed the previous year. Five packs were removed from the population as a consequence of chronic livestock depredation. Another five packs could no longer be counted due to lack of evidence. One Idaho border pack has shifted its homerange and is counted toward the Idaho population. This is a net increase of four packs in NWMT area in 2013.

Fifty-three radio collared wolves in 39 packs, (38%) of the 104 total known packs, were monitored in northwest Montana during at least some portion of 2013. This is down from 43% of 100 total packs in 2012. Radio collared wolves were located from aircraft approximately 1–2 times per month. Twenty-six collared wolves from 20 packs (19% of the 104 total packs) were monitored by the end of the year. Two collars were ARGOS GPS used for research in conjunction with a moose research project east of the Cabinet Mountains. Twenty-five collars were lost throughout the year from a variety of factors: five control actions, four missing, four shed, four harvested, three illegal mortality, one dispersal (Canada), one vehicle collision, one unknown mortality, one euthanized, and one natural cause.

MFWP traplines were set in 21 pack territories, and 20 wolves were captured and collared in 2013. USDA Wildlife Services (WS) trapped in six additional areas and collared three wolves. One of the WS traplines was conducted with the cooperation of the Confederated Salish Kootenai Tribes, resulting in one wolf collared.

MFWP surveyed a total of 91 areas for wolf presence and pack status. Eleven of those areas resulted in the verification of new packs. Wolf activity was verified in eight other areas, but it was unclear whether it is a discrete pack or an area used by an adjacent pack. Sixty-two of those surveys were conducted to determine pack status in known pack territories that do not have functioning radio collars. Four new packs were verified by USDA Wildlife Services.

The 104 packs included in the Montana portion of the NWMT recovery area as of December 2013 are listed in Table 1a. There are 13 packs within the Montana/Idaho transboundary area within the NWMT Recovery area. Ten (Cache Creek, DeBorgia, Lost, Lost Peak, Preacher, Quartz Creek, Silver Lake, Solomon Mountain, Twilight, Wiggletail) of those den and spend most of their time in Montana and therefore are counted toward the Montana population. Three (Copper Falls, Cedars, and Fish Creek) den and spend most of their time in Idaho and therefore are counted toward the Idaho wolf population. There are five packs within the US/Canada transboundary. Three (Kintla, Kootenai North, Kootenai South) of those den and spend most of

their time in Montana and therefore are counted toward the Montana population. Two (Spruce Creek, Belly River) of those den and spend most of their time in Canada and therefore are not counted in the NWMT population.

We were able to confirm reproduction in 30 of the 104 packs (Table 1a). Sixteen of those packs met the criterion as breeding pairs. Breeding pair status could not be documented in some packs because we were unable to confirm a minimum of two adults and two pups at the end of the year.

Two hundred and thirteen wolf mortalities were documented in the Montana portion of the NWMT recovery area population in 2013. All but two were attributed to some form of human cause including 147 total harvest (up from 106 in 2012), 47 lethally removed in control actions (down from 76 in 2012), 8 illegally killed (up from 6), 4 vehicle collisions (down from 6), 1 train collision (up from 0), 1 incidental mortality related to CSKT capture and collaring efforts, 1 legal take, 2 euthanized (poor health). One wolf died of natural causes. One wolf died of unknown causes. All control action and legally harvested mortalities are precise numbers, while the number of mortalities from all other causes is a minimum observed. Because mortality counts and total population counts are incomplete, actual mortality rates cannot be determined

A total of one radio-collared wolf was missing by the end of the year. Missing collars are due to long-range dispersal, collar failure, or other unknown fate.

Six dispersals were recorded. NW1041M dispersed from the Lydia pack to the Weigel territory about 21 miles to the south. In 2012 we reported that NW1039F had dispersed as a pup from the Chippy pack northwest about 12 miles by the end of the year. By April she had further dispersed from south of McGregor Lake to Emerson Creek (45 miles south of Calgary, Alberta) about 169 miles to the northeast. NW1047M dispersed from the Weigel pack territory to Gold Creek area about 117 miles to the southeast where he shed his collar. NW1049F dispersed as a pup from the Tallulah pack territory to the Corona pack territory about 35 miles to the south where she was found dead likely of illegal activity. SK004 dispersed from the Cottonwood pack to the Valley pack area about 24 miles to the southeast. SK007M dispersed from the Pistol Creek pack to the Chamberlain pack about 35 miles to the southeast.

Fifteen of 104 (14%) packs were involved in varying levels of livestock depredations. We documented 35 confirmed livestock kills. There were 24 cattle, 7 sheep, 3 horses, and 1 goat confirmed killed by wolves. An additional eight calves and two cows were ranked as probable kills. Two cattle were confirmed injured. The number of wolves lethally controlled decreased from 78 in 2012 to 47 in 2013. None of those were legally killed by affected livestock producers that were issued kill permits. Three of those were legally killed by livestock producers that caught wolves in the act of killing livestock. Five packs: Granite Butte, Benchmark, Sleeping Woman, White Earth, and Deer Lodge no longer exist due entirely or in large part to control actions. These figures only account for verified losses. It is not possible to document unverified losses due to wolves. Unverified losses are losses where the cause of dead or missing livestock is not known. Nonlethal measures ranging from range riders to aversive tools such as Radio Activated Guard Boxes and fladry are routinely deployed where applicable and as available.

A range rider was employed in the Blackfoot Valley on Arrastra Creek, Morrell Mountain and Ovando Mountain packs. Fladry was also used in the Blackfoot Valley, Ninemile, Alberton, and St Regis areas.

Miscellaneous / Lone Individuals in Northwest Montana

Albert Creek: This was a suspected new pack in 2012 and two wolves were confirmed in the area at the end of 2013 but FWP has still not found enough evidence that these wolves are established and holding a territory.

Nemote Creek: FWP has received reports of wolves in the Nemote Creek area in the Lower Clark Fork in 2012 and again in 2013. An adult female was hit and killed on I-90 in early 2013 in this area. At the end of 2013 there were two wolves confirmed in the area but it is still unknown whether they are holding a territory.

An adult male wolf (unknown pack) was hit and killed by a vehicle east of Clearwater Junction in January.

An adult male wolf (unknown pack) was hit and killed by a vehicle west of St Regis in May.

An adult male was illegally killed in the Gold Creek area of the Blackfoot Valley in September.

An adult female from Idaho's Deception Point pack (B488) was caught in a coyote trap in November and was in very poor condition (from age and previous injuries) and was euthanized.

Verified Border Packs Counting in Idaho Population Estimate

Copper Falls, Fish Creek, and Cedars packs are believed to den and spend most of their time in Idaho.

Verified Border Packs Counting in Canada Population Estimate

The Spruce Creek pack spends most or all of their time in Canada.

Suspected Packs in Northwest Montana

Albert Creek and Nemote Creek: see above.

Cottonwood Creek/Hoodoos: FWP received reports in early 2013 of three to five wolves in the Cottonwood Creek area south of Helmville. FWP received similar reports in early 2014 but it is still unknown if this is the Dalton Mountain pack using this area or a new pack.

Garver Mountain: There is wolf activity in this area, but we are so far unable to determine if it is a discrete pack or the Candy Mountain pack.

Sweetgrass Hills: FWP received reports in early 2013 of one to three wolves in the Sweetgrass Hills. However, FWP has not found enough evidence to conclude that wolves are established and holding a territory in the area.

Western Montana
Montana portion of the Central Idaho Recovery Area

Overview

At the end 2013, we documented a minimum of 123 wolves, 26 packs, and seven breeding pairs in the Montana portion of the Central Idaho Experimental Area. This is an increase from the 2012 estimate of 93 wolves and 23 packs. There were four newly identified packs in 2013. Some of these packs are believed to be first year packs and some are likely to have existed the previous year.

Previously verified packs that still existed in 2013 were the Alta, Anaconda, Big Hole, Black Pine, Bloody Dick, Divide Creek, Flint, Gash Creek, Gird Point, Jeff Davis, Mt. Haggin, One Horse, Ross' Fork, Sliderock Mountain, Sula, Teepee Point, Trail Creek, Trapper Peak, and Watchtower packs. Two packs previously verified in other areas that still existed in 2013 but were counted in CID, were Price Creek and Pyramid. Newly documented packs in 2013 included Ambrose, Burnt Fork, Lolo, and Overwhich. Pintler and Harvey Creek packs were removed in 2013 due to livestock depredations. The East Fork Rock Creek was believed gone in 2012 but was found again in 2013. The Painted Rocks pack was removed by harvest. The Shook Mountain pack may also have been removed by harvest.

During 2013, 12 of 30 (40%) Montana CID verified packs were monitored using ground and aerial telemetry at some point during the year. At the end of 2013, 8 (31%) of 26 Montana CID verified packs were being monitored using ground and aerial telemetry. Eight wolves in six packs were captured and radio collared in the Montana portion of the CID in 2013. Radio collared wolves were located one to two times per month by fixed-wing aircraft when possible. During 2013, 13 of 30 packs monitored in the MT portion of the CID occupied the Montana/ Idaho border: Alta, Big Hole, Bloody Dick, Gash Creek, Jeff Davis, One Horse, Overwhich, Painted Rocks, Price Creek, Pyramid, Sula, Trail Creek, and Watchtower. Three packs were verified to spend time in Idaho in 2013. The others may spend time in Idaho, based on proximity of sightings or telemetry locations near the Montana/Idaho border. Because these packs denned in Montana, or were known to have spent most of their time in Montana, they were counted as Montana packs for 2013. MFWP conducts most of the monitoring of these packs in close coordination with IDFG and the NPT.

The Battle Ridge, Four Eyes, Hughes Creek, Indian Creek, and Pleasant Valley (Idaho/Montana border packs) denned and spent time in Idaho in 2013 and therefore count in the Idaho population estimate.

Reproduction was confirmed in 16 packs: Anaconda, Big Hole, Burnt Fork, Divide Creek, Flint, Gash Creek, One Horse, Price, Pintler, Pyramid, Ross' Fork, Sliderock Mtn, Sula, Tepee Point,

Trail Creek and Trapper Peak packs. At the end of 2013 seven packs met the breeding pair requirement: Anaconda, Big Hole, Divide Creek, Flint, One Horse, Pyramid, and Teepee Point. Reproductive status of the Alta, Ambrose, Black Pine, Bloody Dick, East Fork Rock Creek, Gird Point, Lolo, Overwhich, Jeff Davis, Mt Haggin, and Watchtower packs was unknown. One dispersal was documented in the CID in 2013.

Five packs were confirmed to have killed livestock: Harvey, Jeff Davis, One Horse, Pintler, and Trail Creek. Single or unknown wolves were responsible for killing two calves and one sheep. This is up from three packs and down from 12 total livestock killed by lone or unknown wolves in 2012. In total, 16 cattle and one sheep were confirmed killed in 2013. This is up from 11 cattle and down from 12 sheep in 2012. Two cattle and two guard dogs were confirmed injured and two calves were probable kills. Fifty-one wolf mortalities were documented in 2013, down from fifty-nine in 2012. Eleven wolves were killed in response to depredations. Ten were killed by WS in management actions. One was killed by WS incidentally, and one was killed by a landowner legally defending property. Two wolves were killed illegally and one was killed in a vehicle collision. Thirty-six wolves were harvested legally during the 2013 hunting season, up from thirty in 2012.

FWP was involved in two collaborative, proactive risk management projects in the CID in 2013. A range rider project in the upper Big Hole near Jackson completed its third year and will continue into 2014. Also in the upper Big Hole, near Wisdom, a collaborative project using livestock guard dogs to protect cattle was in its second year and will continue into 2014 as well.

Verified Border Packs Counting in Idaho Population Estimate

Four Eyes: See 2013 Idaho Annual Report. This pack uses the area near Big Sheep Creek.

Hughes Creek: See 2013 Idaho Annual Report. Historically this pack has spent time in Montana but is predominantly in Idaho.

Pleasant Valley: See 2013 Idaho Annual Report. This pack uses the Monida area.

Battle Ridge: See 2013 Idaho Annual Report.

Indian Creek: See 2013 Idaho Annual Report.

Miscellaneous / Lone Individuals in Montana CID

Two wolves were confirmed using the west side of the Deer Lodge valley near Dempsey Creek. One of the wolves was harvested but the other wolf was still in the area at the end of the year.

A collared female pup (SW2064F) from the Painted Rocks pack dispersed after the alpha pair were harvested. She traveled extensively up and down the west side of the main Bitterroot Valley and still appeared to be alone at the end of the year.

Suspected Packs in Montana CID

East Pioneers area: FWP received reports of wolves in several areas of the East Pioneers. Further work is needed to determine whether a new pack is establishing in the area or if dispersers were passing through.

West Pioneers area: FWP received some reports of wolves in the West Pioneers. Further work is needed to determine whether a new pack is establishing in the area or if dispersers were passing through.

Quigg Peak area: Hunters reported around four wolves using the Rock Creek area nw of Philipsburg around Quigg Peak. No known packs have been documented using this area but further work is needed to help determine if this is indeed a new pack or a neighboring pack using the area.

Foster Creek/Lost Creek: There were many hunter reports in this area but further work is needed to determine if this is a new pack or the East Fork Rock Creek pack using the area.

Other Miscellaneous Information in Montana CID

Upper Big Hole: Two calves were killed by unknown wolves in separate incidents.

Dell Area: One ewe was killed by the Four Eyes pack that is counted in Idaho.

Southwest Montana
Montana Portion of the Greater Yellowstone Recovery Area (GYA)

Overview

Packs in the Montana portion of the GYA were documented from the Roscoe/ Red Lodge area, north to the Little Belts and West to Dillon, south to the Idaho and WY borders. Agencies (YNP, MFWP), primarily monitor these packs through flights and ground tracking. The location of the den site and the percent area / time in an area determines where that pack will be tallied in each state's population estimates.

In 2013, we documented a minimum estimate of 92 wolves in 22 verified packs, five of which qualified as a breeding pair. This represents a 30% decline in the minimum count compared with 2012 (132 wolves). This year's number of breeding pairs (five) declined from eight breeding pairs last year and the number of packs (22) was an 8% decrease from 24 packs in 2012. Four new packs were documented in 2013, including: Davey Butte, Horsethief Mountain, Rosebud and Mill Creek. There were 18 packs that were verified in 2012 and still existed in 2013: Avalanche, Baker Mountain, Beartrap, Brackett Creek, Cedar Creek, Cougar 2, Elephant Rock, Elkhorn, Fridley, Hayden, Hogback, Jack Creek, Meadow Creek, Romy Lake, Steamboat Peak, Tanner Pass, Toadflax, and Wilson Creek packs. Efforts to document the Boone Mountain,

Dixon Creek, Lebo Peak, Slip n' Slide, and Mount Vesuvius packs indicated there was not enough evidence to confirm the packs were still intact and maintaining territories at the end of the calendar year. The Price Creek pack, counted toward the GYA population in 2012, has now shifted its territory and counts toward the CID population in 2013.

One border pack was shared between Montana, Idaho and Yellowstone National Park (the Madison pack), and although it counted in the 2011 MT population, this year it counted toward the ID population. Two other pack territories spanned across the border with YNP (Cougar 2 and Hayden) and were counted toward the MT population in 2013. Four border packs (Eightmile, Blacktail, Junction Butte, 755M group) spent some time in MT, but were counted toward the WY (YNP) population. The Eightmile pack denned in MT and occupied some territory north of the YNP boundary, but spent most of its time in YNP. The Blacktail, Junction Butte, and 755M group were all border packs and were documented using habitat north of the YNP boundary at least once each during 2013.

The number of collared wolves and the number of wolf packs with at least one member fitted with a radio collar varies throughout the year as new wolves are collared. Additionally, the total number changes as collared wolves die, radio collars malfunction, or collared wolves disperse and are not relocated. At the end of 2013, 7 of 22 (32%) verified packs were being monitored using ground and aerial telemetry. Radio-collared wolves were located one to two times per month by fixed-wing aircraft and ground telemetry.

In the GYA in 2013, 6 of 32 packs (40%) that existed at one time during the year were confirmed to have killed livestock (Table 1b). This resulted in agency lethal removal of a total of 13 wolves, with four wolves removed by citizens using shoot on sight permits or under the defense of property law. A total of 10 cattle were confirmed as wolf kills, two of which were killed by lone/miscellaneous wolves. Of the total sheep death loss confirmed statewide in 2013 (24 total sheep), about 67% of the death loss was attributed to wolves in the GYA (16 sheep), while 20% of the cattle death loss statewide occurred in the GYA (10 of 50). In the GYA, three calves, one yearling cow and seven sheep were determined to be probable wolf kills. Three calves, one yearling cow and eight sheep were determined as injured by wolves but survived. No packs were eliminated due to chronic livestock conflicts, whereas two, one, four and three packs were eliminated during 2012, 2011, 2010 and 2009, respectively.

Seventy-one total wolf mortalities were documented in the GYA in 2013, a slight increase from the 61 wolf mortalities recorded in 2012. All of the documented mortalities except for one were human-caused. In 2013, 48 total wolves were harvested – 40 by hunters and eight by trappers. Harvested wolves that were not clearly accounted for by a particular pack, or were harvested in MT but belonged to a pack accounted for by another state, were included as misc/lone (Table 1b). One wolf was found to have died of unknown causes (possibly illegal, wolf 590M). Other human-related mortalities included four killed by vehicles; one euthanized due to advanced stages of distemper; and one killed by a hay swather. All wolves killed in agency control actions or legally harvested are precise numbers, while the number of mortalities from all other causes is a minimum that MFWP documented. The actual number is unknown. Further, these numbers can only be applied to an overall population count because they are known numbers, not comparable to the minimum count which is a portion of the total population (minimum verified).

One dispersal was documented for the MT GYA population in 2013. SW377M was originally from the Toadflax pack, and was located after being removed while in the act of killing sheep in the upper Shields river area.

Miscellaneous/ Lone individuals:

We did not document any lone individuals separate from known packs.

Suspected Packs

Bull Mountains: FWP received a small number of reports of wolves in the Bull Mountains near Whitehall. Field efforts are ongoing to determine whether a pack is establishing or if dispersers were passing through.

Highlands: FWP received a small number of reports of wolves in the Highland Mountains. The Table Mountain pack was no longer present. Field efforts are ongoing to determine whether a pack is establishing or if dispersers were passing through.

East side of the Crazy mountains: FWP received a few of reports during 2013, but was unable to confirm a pack holding a territory.

Western Little Belt Mountains: FWP received a small number of reports of wolves in the Western Little Belt Mountains and Adel Mountains. Field efforts are ongoing to determine whether a pack is establishing or if dispersers were passing through.

Absaroka Beartooth Wilderness: FWP received reliable reports of wolves in the Buffalo Fork area. Efforts to confirm whether or not a pack is holding a territory will continue in 2014.

OUTREACH AND EDUCATION

FWP's wolf program outreach and education efforts are varied, but significant. Outreach activities take a variety of forms including; field site visits, phone and email conversations to share information and answer questions, media interviews, formal and informal presentations. FWP also prepared and distributed a variety of printed outreach materials and media releases to help Montanans become more familiar with the Montana wolf population and the state plan.

An increasingly important aspect of outreach is the Internet. During 2013, the FWP website hosted 100 pages with wolf program content, and those pages had over 300,000 page views.

The "Report a Wolf" application continued to generate valuable information from the public in monitoring efforts for existing packs and documenting wolf activity in new areas. Several hundred reports were received through the website. Countless more were received via postal mail and over the phone.

Most wolf program staff spent some time at hunter check stations in FWP Regions 1-5 to talk with hunters about wolves, wolf management, and their hunting experiences.

LAW ENFORCEMENT

All wolf mortalities that are not the result of an authorized agency lethal control, a shoot on sight permit, a legal sport harvest, a vehicle/train strike or apparent natural causes, are reported to law enforcement personnel. These mortalities are under investigation until a full determination is made regarding cause of death and any potential criminal activity.

The USFWS Office of Law Enforcement was the lead agency to investigate wolf deaths until delisting in May 2011. Upon delisting, FWP personnel led law enforcement efforts for state-based laws, rules, and FW Commission regulations.

There are two cases of illegal take during the 2013 hunting season. One is currently under investigation and the other is awaiting trial.

FUNDING

Montana Fish, Wildlife & Parks
A new five-year funding agreement between the USFWS and FWP was signed in 2011, and $390,908 was obligated for Federal Fiscal Year 2013 (includes indirect costs). In the 2011 Montana Legislative session, House Bill 363 became law. This law requires that a wolf management account be set up and that all wolf license revenue be deposited into this account for wolf collaring and control. Specifically, it states that subject to appropriation by the legislature, money deposited in the account must be used exclusively for the management of wolves and must be equally divided and allocated for the following purposes:

(a) wolf-collaring activities conducted pursuant to 87-5-132; and

(b) lethal action conducted pursuant to 87-1-217 to take problem wolves that attack livestock.

Senate Bill 348 also passed during the 2011 Montana Legislative session. SB 348 requires FWP to allocate $900,000 toward wolf management. "Management" includes the entire range of activities that constitute a modern scientific resource program, including but not limited to research, census, law enforcement, habitat improvement, control, and education. The term also includes the periodic protection of species or populations as well as regulated taking.

In summary, wolf management funding for state fiscal year 2014 consists of the $390,908 of federal money from the USFWS cooperative agreement, $153,102 of federal PR funds, and $390,075 of state license dollars.

Funding is and will primarily be used to pay for FWP's field presence to implement population monitoring, collaring, outreach, hunting, trapping, and livestock depredation response. In addition to the ongoing efforts by Montana FWP wolf specialists, additional efforts to meet the intent of SB 348 and HB 363 include:

- The wolf program increased to a total of 5.5+ FTE in fiscal year 2012 (wolf specialists dedicated to wolf management plus seasonal technicians and volunteers). Those staffing levels continued in 2013.
- FTE's were added for technicians in Region 1 and Region 2, during fiscal year 2012, to increase collaring efforts in wolf packs associated with livestock. Those staffing levels were continued during 2013
- Funding was dedicated for aerial darting and collaring of wolves in the Madison, Gallatin, and Yellowstone drainages where conflicts with grizzly bears limit trapping and collaring efforts.
- Renewed agreement with Wildlife Services and commitment of $110,000 toward wolf management efforts.

Other management services provided by FWP include law enforcement, harvest/quota monitoring, legal support, public outreach, and overall program administration. Exact cost figures have not been quantified for the value of these services.

USDA Wildlife Services

Wildlife Services is the federal agency which assists FWP with wolf damage management. WS personnel conduct investigations of injured or dead livestock to determine if it was a predation event and, if so, what predator species was responsible for the damage. Based on WS determination, livestock owners may be eligible to receive reimbursement through the Montana Livestock Loss Program. If WS determines that the livestock depredation was a confirmed wolf kill or was a probable wolf kill, the livestock owner is eligible for 100% reimbursement on the value of the livestock killed based on USDA market value at the time of the investigation.

Under an MOU with FWP, the Blackfeet Nation (BN), and the Confederated Salish and Kootenai Tribes (CSKT); WS conducts the control actions on wolves as authorized by FWP, BN, and CSKT. Control actions may include radio-collaring and/or lethal removal of wolves implicated in livestock depredation events. FWP, BN, and CSKT also authorizes WS to opportunistically radio-collar wolf packs that do not have an operational radio-collar attached to a member of the pack.

As a federal agency, WS receives federal appropriated funds for predator damage management activities but no funding directed specifically for wolf damage management. Prior to Federal Fiscal Year (FFY) 2011, the WS Program in Montana received approximately $250,000 through the Tri-State Predator Control Earmark, some of which was used for wolf damage management operations. However, that earmark was completely removed from the federal budget for FFY 2011 and not replaced in FFY 2012-2014.

In FFY 2014, WS spent $285,198 conducting wolf damage management in Montana (not including administrative costs), a $92,034 decrease from the total spent in FFY 2012. The FFY 2013 expenditure included $138,548 Federal appropriations, $110,000 from FWP, $25,000 from the Rocky Mountain Elk Foundation, and $11,650 from Montana livestock producers.

PERSONNEL AND ACKNOWLEDGEMENTS

The 2013 FWP wolf team was comprised of Liz Bradley, Nathan Lance, Kent Laudon, Abigail Nelson, Mike Ross, and Ty Smucker. Wolf specialists work closely with regional wildlife managers including Howard Burt, Ray Mule, Mark Sullivan, Graham Taylor, Mike Thompson, John Ensign, and Jim Williams, as well as Wildlife Management Bureau Chief, George Pauley. The wolf team is part of a much bigger team of agency professionals that make up Montana Fish, Wildlife & Parks including regional supervisors, biologists, game wardens, information officers, front desk staff, and many others who contribute their time and expertise. FWP Helena and Wildlife Health Lab staff contributed time and expertise including Ron Aasheim, Neil Anderson, Keri Carson, Justin Gude, Quentin Kujala, Ken McDonald, Adam Messer, Tom Palmer, Kevin Podruzny, and Jennifer Ramsey.

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Confederated Salish and Kootenai Tribal biologists Stacey Courville and Shannon Clairmont, and Blackfeet Tribal biologist Dan Carney and wildlife technicians Dustin Weatherwax and Lauren Monroe captured and monitored wolves in and around their respective tribal reservations.

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We thank Mike Jimenez (USFWS) for his coordination and oversight of state wolf management in the Northern Rockies.

USDA APHIS WS investigates all suspected wolf depredations on livestock and under the authority of FWP, carries out all livestock depredation-related wolf damage management

activities in Montana. We thank them for contributing their expertise to the state's wolf program and for their willingness to complete investigations and carry out lethal control and radio-collaring activities in a timely fashion. We also thank WS for assisting with monitoring wolves in Montana. WS personnel involved in wolf management in Montana in 2013 included the state director John Steuber, western district supervisor Kraig Glazier, eastern district supervisor Mike Foster, western assistant district supervisor Chad Hoover, eastern assistant district supervisor Alan Brown, wildlife disease biologist Jerry Wiscomb, helicopter pilots Tim Graff and Eric Waldorf, helicopter/airplane pilot Stan Colton, wildlife specialists Denny Biggs, John Bouchard, Joe Carpenter, Steve DeMers, Mike Hoggan, John Maetzold, Graeme McDougal, John Miedtke, Brian Noftsker, Ted North, Jim Rost, Bart Smith, Pat Sinclair, Mike Thomas, and Dan Thomason.

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APPENDIX 1

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TO REPORT A DEAD WOLF OR POSSIBLE ILLEGAL ACTIVITY:

Montana Fish, Wildlife & Parks

- Dial 1-800-TIP-MONT (1-800-847-6668) or local game warden

TO SUBMIT WOLF REPORTS ELECTRONICALLY AND TO LEARN MORE ABOUT THE MONTANA WOLF PROGRAM, SEE:

- http://fwp.mt.gov/wolf/

MONTANA FISH WILDLIFE & PARKS ADMINISTRATIVE REGIONS

STATE HEADQUARTERS
MT Fish, Wildlife & Parks
1420 E 6th Avenue
PO Box 200701
Helena, MT 59620-0701
(406) 444-2535

REGION 1
490 N Meridian Rd
Kalispell, MT 59901
(406) 752-5501

REGION 2
3201 Spurgin Rd
Missoula, MT 59804
(406) 542-5500

REGION 3
1400 South 19th
Bozeman, MT 59718
(406) 994-4042

HELENA Area Res Office (HARO)
930 Custer Ave W
Helena, MT 59620
(406) 495-3260

BUTTE Area Res Office (BARO)
1820 Meadowlark Ln
Butte, MT 59701
(406) 494-1953

REGION 4
4600 Giant Springs Rd
Great Falls, MT 59405
(406) 454-5840

LEWISTOWN Area Res Office (LARO)
215 W Aztec Dr
PO Box 938
Lewistown, MT 59457
(406) 538-4658

REGION 5
2300 Lake Elmo Dr
Billings, MT 59105
(406) 247-2940

APPENDIX 2

Gray Wolf Chronology in Montana

2011

- In April, President Obama signed the Department of Defense and Full-Year Appropriations Act, 2011. A section of that Appropriations Act directed the Secretary of the Interior to reissue within 60 days of enactment the final rule published on April 2, 2009, that identified the Northern Rocky Mountain (NRM) population of gray wolf (*Canis lupus*) as a distinct population segment (DPS) and to revise the List of Endangered and Threatened Wildlife by removing most of the gray wolves in the DPS.
- May 5, the USFWS published the final delisting rule which designates the NRM distinct population segment and delisted the gray wolf throughout the DPS except WY. Wolves in MT are classified as a species in need of management statewide under Montana law; state rules and the state management plan take full effect. The Service and the states will monitor wolf populations in the Northern Rocky Mountain DPS and gather population data for at least five years.
- In May, the FWP Commission proposed regulations for a 2011 take season. Public comment was taken during June.
- In June, Alliance for the Wild Rockies, Friends of the Clearwater, Wildearth Guardians, Center for Biological Diversity, Cascadia Wildlands, and Western Watersheds Project filed a lawsuit challenging the constitutionality of the Congressional rider under the Separation of Powers clause of the U.S. Constitution. The lawsuit was filed in the Missoula Federal District Court. FWP submitted amicus curiae briefs.
- Commission adopted the 2011 wolf quotas in July. The statewide quota was 220.
- August 3, Judge Molloy upheld the constitutionality of the Congressional rider delisting wolves throughout the DPS except WY.
- August 8, the group of plaintiffs composed of the Alliance for the Wild Rockies, Friends of the Clearwater, and Wildearth Guardians filed a notice of appeal to the 9th Circuit.
- August 12, the second group of plaintiffs, Center for Biological Diversity, Cascadia Wildlands, and Western Watersheds Project, filed a notice of appeal to the 9th Circuit challenging Judge Molloy's decision.
- In August, Secretary of the Interior Ken Salazar and U.S. Fish and Wildlife Service Director Dan Ashe announced that the Service had reached an agreement that if implemented would promote the management of a stable, sustainable population of wolves and pave the way for the Service to return wolf management to Wyoming.
- August 8, wolf license sales began in Montana.
- In August, The Alliance for the Wild Rockies group of plaintiffs made an emergency motion for an injunction in the 9th Circuit to stop the wolf hunt.
- In August, The State of Montana and the FWP filed an amicus curiae brief in support of the federal Defendants and Appellees, Ken Salazar, Dan Ashe, and the United States Fish and Wildlife Service (Federal Defendants) opposition to the emergency motion to stop the planned wolf hunting season in Montana and Idaho.
- September 3, archery hunting opens in all of the 14 wolf management units in Montana. Archery and general season hunts scheduled to end December 31 in all 14 units.
- In December, the Montana Fish, Wildlife and Parks Commission extends the wolf season in any units with unmet quotas to February 15, 2012
- December 31, 121 wolves legally harvested in Montana during the 2011 season. Season remains open until February 15, 2012 in all but 2 of the 14 units.

- An estimated minimum of 653 wolves with 39 breeding pairs are counted in Montana. Distribution continues to be primarily in the western one-third of Montana.

2012

- May 10, the FWP Commission proposed regulations for a 2012 take season. Public comment was taken during June.
- July 12, the Commission adopted the 2012 wolf general season framework (no statewide quota) that included a trapping season; bag limit of 3 wolves (up to 3 via trapping and 1 via hunting); and included authorization of a 3 wolf hunting bag limit and electronic calls with legislation.
- September 8, FWP instructs the first wolf trapper education course in Montana.
- October 11, the FWP Commission proposed a trap pan tension rule for wolf trappers to minimize non-target captures.
- November 8, the FWP Commission adopted the final trap pan tension rule for wolf trappers to minimize non-target captures.
- December 8, wolf trapper education is completed for the year in Montana, with 2,414 students completing the course.
- December 15, the first Montana trapping season opens.
- An estimated minimum of 625 wolves and 37 breeding pairs are counted in Montana.

2013

- May 9, the FWP Commission proposed regulations for a 2013-14 take season. Public comment was taken during June.
- July 10, the Commission adopted the 2013-14 wolf general season framework that included a trapping season and a bag limit of 5 wolves per person.
- An estimated minimum of 627 wolves and 28 breeding pairs are counted in Montana.

APPENDIX 3

RESEARCH, FIELD STUDIES, AND PROJECT PUBLICATIONS

Each year in Montana, there are a variety of wolf-related research projects and field studies in varying degrees of development, implementation, or completion. These efforts range from wolf ecology, predator-prey relationships, wolf-livestock relationships, policy, or wolf management. Additionally, the findings of some completed projects get published. The 2013 efforts are summarized below, with updates or project abstracts.

Survival rates in Rocky Mountain wolves

Graduate Student: Jack Massey, Imperial College of London

Collaborators: Imperial College of London, Northern Rocky Mountains wolf team

Mark-recapture based survival analyses were completed based on monitoring of radio-collared wolves in Idaho, Wyoming, Montana, and Yellowstone National Park, for 2005-10. Initial analyses were revised in December 2013, and results have been distributed to the research team for consideration and review. Plans are being made for a group meeting to consider these results and decide next steps including whether a report or manuscript will be produced.

Efficacy of wolf removal in reducing recurrence of depredation on livestock in Montana, Wyoming and Idaho

Investigators: Kyran Kunkel (University of Montana), Liz Bradley and Justin Gude (Montana Fish, Wildlife & Parks), Hugh Robinson (Panthera), Carolyn Sime (University of Montana), Ed Bangs and Mike Jimenez (US Fish & Wildlife Service), Todd Grimm (USDA Wildlife Services), Jim Holyan (Nez Perce Tribe), and Val Asher (Turner Endangered Species Fund).

Depredation on livestock has put wolves in conflict with humans for centuries and continues to be a major issue facing their persistence and recovery in agricultural areas around the world. Therefore, we compared the efficacy of 3 management responses to wolf depredation on livestock; no lethal action, partial pack removal, and full pack removal. We examined the effectiveness in reducing further depredations of the 3 treatments using a conditional recurrent event model. From 1989 to 2010 we documented 967 depredations by 156 packs, 228 on sheep and 739 on cattle and other stock. Mean time between recurrent depredations was 115 days following no action, 170 days following partial pack removal, and 753 days following full pack removal. Compared to no action, full pack removal reduced the occurrence of subsequent depredations by 79% (Haz. Ratio = 0.21, $P<0.001$) over a span of 1850 days (5 years), while partial pack removal reduced the occurrence of subsequent depredations by 29% (Haz. Ratio = 0.71, $P<0.001$) over the same period. Within partial pack removal we found no effect of which individual was removed (i.e. alpha female removed Haz. Ratio = 0.5862, $P=0.11$, and adult male removed Haz. Ratio 0.9896, $P = 0.95$). Partial pack removal was only effective if conducted within the first 7 days following depredation; after which time there was only a marginally

significant difference between partial pack removal and no action (Haz. Ratio = 0.86, P=0.07), and no difference after 14 days (Haz. Ratio = 0.99, P=0.93). The relative effect of all treatments was generally consistent across season and type of livestock. Ultimately, pack size alone may be the best predictor of a recurrent depredation with the probability of depredation occurring within 5 years increasing by 6-8% for each animal left in the pack following management action.

Bitterroot elk project

Investigators: Dr. Kelly Proffitt, Craig Jourdonnais(retired), Ben Jimenez, Liz Bradley, Mike Thompson, and Justin Gude (Montana Fish, Wildlife and Parks), Dr. Mark Hebblewhite (University of Montana)

Year 3 Adult Survival Update: During the winter of 2012-2013, we captured and collared 41 adult female elk. To date, three of these elk have died. One West Fork elk was killed by a mountain lion in March, one West Fork elk was killed by an unknown predator during April, and one West Fork elk died of natural causes just after giving birth in early June.

Year 3 Calf Survival Update (as of January 2014): Similar to the cause specific mortality data from year 1 and year 2, lion predation continues to be an important mortality source.

	West Fork	East Fork/ Big Hole
CALF FATE		
Live	23	16
Dead	14	15
Unknown Fate	5	11
TOTAL	42	42
CAUSE OF MORTALITY		
Bear	2	1
Lion	5	5
Wolf	0	0
Human-related	0	1
Natural, non-predation	2	1
Unknown predator	3	3
Unknown cause	2	4

Livestock guard dog project

Graduate Student: Daniel Kinka, Utah State University
Principal Investigator: Julie Young, Ph.D., USDA APHIS/ Utah State University
Collaborators: Nathan Lance and Mike Ross, Montana Fish, Wildlife & Parks

In 2013 the USDA National Wildlife Research Center in collaboration with Utah State University began a project to investigate the effectiveness of certain breeds of livestock guard dogs (LGDs) as management tools for reducing domestic sheep depredations. In the spring of 2013, nine kangal-breed LGDs were placed with sheep producers in Montana through collaboration with Montana Fish, Wildlife and Parks (MT-FWP). The dogs were divided into trios and each trio was assigned to a band of sheep. In addition to the nine new LGDs, six existing LGDs were monitored. These existing dogs represented a number of LGD breeds and breed- crosses including Akbash, Great Pyrenees, and Maremma.

Monitoring of LGDs lasted from May 15 – October 1, 2013. During that time data were collected on sheep mortalities and LGD behavior as well as spatial information on LGDs, sheep, wolf, and grizzly bears (see project statistics below). Sheep mortalities were investigated opportunistically with the assistance of shepherds and USDA Wildlife Services (USDA-WS) officials. Data was collected on cause of death for every identified sheep carcass. Information on LGD behavior was collected from shepherds. Location information for LGDs and sheep were collected via GPS collars and tags. Wolf locations were collected by project staff through triangulation of VHF signals from collared wolves and data sharing with MT-FWP officials. Grizzly bear locations were also obtained through opportunistic VHF detection. Grizzly bear locations collected by MT-FWP officials are pending. Location and occupancy data were also collected for LGDs, sheep, wolves, and grizzly bears via remote cameras. Remote camera data are currently being processed.

Five of the new kangal-breed LGDs had to be removed from the study during the 2013 season. Although there were a number of reasons for LGD removal, generally animals were removed because of failure to bond with the sheep. All of the removed animals were sourced from breeders who do not cater to the livestock industry. In the future, all new LGDs will be sourced from reputable sources in their countries of origin and reputable breeders of guard animals in the United States.

Some of the new LGDs deterred large predators from attacking sheep. For example, at the Rockport colony near Pendroy, MT, where despite a sustained presence of grizzly bears very near their sheep barn, no sheep were lost to grizzly bears. Further, members of the Rockport colony claim that the three Kangal-breed LGDs placed there actively chase off grizzly bears, although no direct interactions have been documented. Considering the large number of lambs killed by grizzly bears at the Rockport colony in 2012, these observations are encouraging.
In the 2014 field season at least two new Montana sheep producers will be included in the project in addition to four sheep producers in Idaho. More kangal-breed LGDs are being imported from Turkey to place with these producers as well as karakachan-breed LGDs from Bulgaria and transmontano-breed LGDs from Portugal. Field procedures and methodologies utilized in the 2013 field season will be carried forward in the 2014 field season. Additionally,

project staff will begin explicit testing of LGD behavior on summer grazing allotments and human surveys to poll attitudes and perceptions of LGDs will be distributed. A field technician will be hired to collect data, monitor project operations, and coordinate with producers, MT-FWP, and USDA-WS in Montana. Daniel Kinka (PhD student/technician, USU) will be based in Idaho working with new producers, Idaho Fish and Game, and USDA-WS.

LGD collar frequencies for the 2014 field season will be provided to state and federal wildlife managers in Spring before LGDs go to summer grazing allotments. Brief project updates will be sent to state and federal wildlife officials involved in the study every 2-4 weeks during the 2014 field season. Please contact Julie Young at julie.k.young@aphis.usda.gov about receiving these updates.

Project Statistics (June 1 – November 15, 2013)
Number of LGDs monitored: 15
Number of sheep bands monitored: 5
Total number of sheep monitored: 5,629
Confirmed predator kills: 25
Confirmed mortality (non-predator): 5
Unaccounted for: 97
Number of remote camera pictures (unsorted): 87,086
Number of LGD locations (GPS): 6,519
Number of sheep herd locations (GPS): 580
Number of wolf locations (GPS/VHF): 15
Number of grizzly bear locations (GPS/VHF; pending MT-FWP data): 2

Blackfoot Range Rider Program Update

Investigators: Seth M. Wilson, Liz Bradley, and Eric Graham

Collaborators: Blackfoot Challenge; People and Carnivores; Blackfoot area ranchers, landowners and managers; Montana Fish, Wildlife & Parks; U.S. Fish and Wildlife Service; U.S. Forest Service; Bureau of Land Management; Montana Department of Natural Resources and Conservation; The Nature Conservancy, and The University of Montana.

The Blackfoot Challenge has been actively working to reduce the risk of livestock losses to wolves in the Blackfoot watershed since 2007. In addition to livestock carcass removal and electric fencing of calving areas, the Blackfoot Challenge has hired several seasonal range riders to help monitor wolf and livestock activity and to provide non-lethal tools to help reduce the potential for livestock depredations by wolves. These efforts have been carried out in close partnership with Fish, Wildlife and Parks.

The 2013 range rider season in the Blackfoot watershed focused on continuing to increase human presence around livestock herds that were adjacent to concentrations of wolf activity. Eric Graham was hired as the new full-time range rider for the 2013 field season, while Molly Brown worked part-time and Lyle Pocha was hired as an assistant range rider. Several livestock producers also devoted considerable time and effort toward increasing herd monitoring efforts on

grazing allotments in the valley. This was the fifth official year of livestock and wolf monitoring efforts carried out by the Blackfoot Challenge and People and Carnivores.

Increased livestock monitoring efforts in 2013 helped producers track overall herd health, behavior, and use of grazing allotments. Range riders regularly communicated with producers about the status of their herds and any concerns about cattle. Wolf monitoring efforts focused mainly on the Arrastra Creek, Morrell Mountain, Humbug, and Union Peak packs whose territories overlap extensively with summer livestock grazing areas. There was less wolf activity observed on the BCCA (Ovando Mtn. pack area) in 2013 and therefore there was less focus on this area than in prior years.

2013 Field Season Statistics:

- Completed 6 month field season monitoring livestock and wolves.
- Monitored 650-800 cow/calf pairs per week across 45,000 acres.
- Herd health and behavior were monitored and any issues were reported to producers.
- Range riders and cooperating producers logged over 2100 hours of livestock monitoring.
- Radio telemetry monitoring of three wolf packs documented presence of wolves regularly in the vicinity of livestock during the grazing season.
- Thirteen wolf packs confirmed in the watershed.
- Zero confirmed livestock losses, 2 probable cattle during the 2013 season.
- Zero wolves removed for livestock depredations during 2013.

Social Tolerance / Communication Statistics:

- Worked to maintain trust and credibility with over a dozen local landowners and livestock producers whose herds were at greatest risk.
- Maintained regular communication with an additional 40-50 landowners and producers who were at moderate risk of depredations by wolves.
- Maintained regular communication through list-serve and BC website with 150 people.
- Produced 11 *Wolf Activity Reports* for community and project partners.
- Produced 1 *Blackfoot Range Rider End-of-Year Final Report*
- Maintained weekly contact with Fish, Wildlife and Parks and partners.
- Made 2 public presentations on wolf issues to approximately 100 people.
- Made 1 public presentation to 80 local school children

Timeline of wolf abundance and livestock interactions for the Blackfoot watershed:

2008:

- 3 confirmed wolf packs (est. 18 wolves)
- 4 confirmed calf losses
- 4 wolves removed

2009:

- 5 confirmed wolf packs (est. 24 wolves including pups)
- 2 confirmed calf losses
- 2 wolves removed

2010:

- 7 confirmed wolf packs (est. 45 wolves including pups)
- 4 confirmed livestock losses (2 calves, 1 cow, 1 horse)
- 8 wolves removed

2011:

- 10 confirmed wolf packs (est. 55 animals including pups)
- 3 confirmed livestock losses (2 calves and 1 ewe)
- No wolves removed by W.S.
- 2 wolves killed illegally

2012:

- 12 confirmed wolf packs (est. 52 animals including pups)
- 5 confirmed livestock losses (5 calves)
- 5 wolves removed by W.S.

2013:

- 13 confirmed wolf packs (est. 54 animals including pups)
- Zero confirmed livestock losses
- Two probable livestock losses to wolves
- Zero removed by W.S.

Discussion: The use of intensive herd monitoring or range riding is an important tool that may be helping to decrease the risk of livestock depredation by wolves in the project area. Regular monitoring of wolves and extensive communication networks that have been developed in the project area with the help of ranchers, residents, and our agency partners has been of great benefit. Cultivating trust within the ranching community is essential for documenting actual estimated wolf numbers/packs, understanding wolf pack behavior, and ultimately for developing the willingness by landowners to engage in proactive efforts that reduce livestock depredation risk to both grizzly bears and wolves.

We are hopeful that the combination of livestock carcass removal, electric fences that serve as safe havens for livestock from both bears and wolves, and our range rider project are having a cumulative, positive effect that helps people and wolves coexist in an agricultural landscape.

APPENDIX 4

MONTANA MINIMUM COUNTS BY AREA

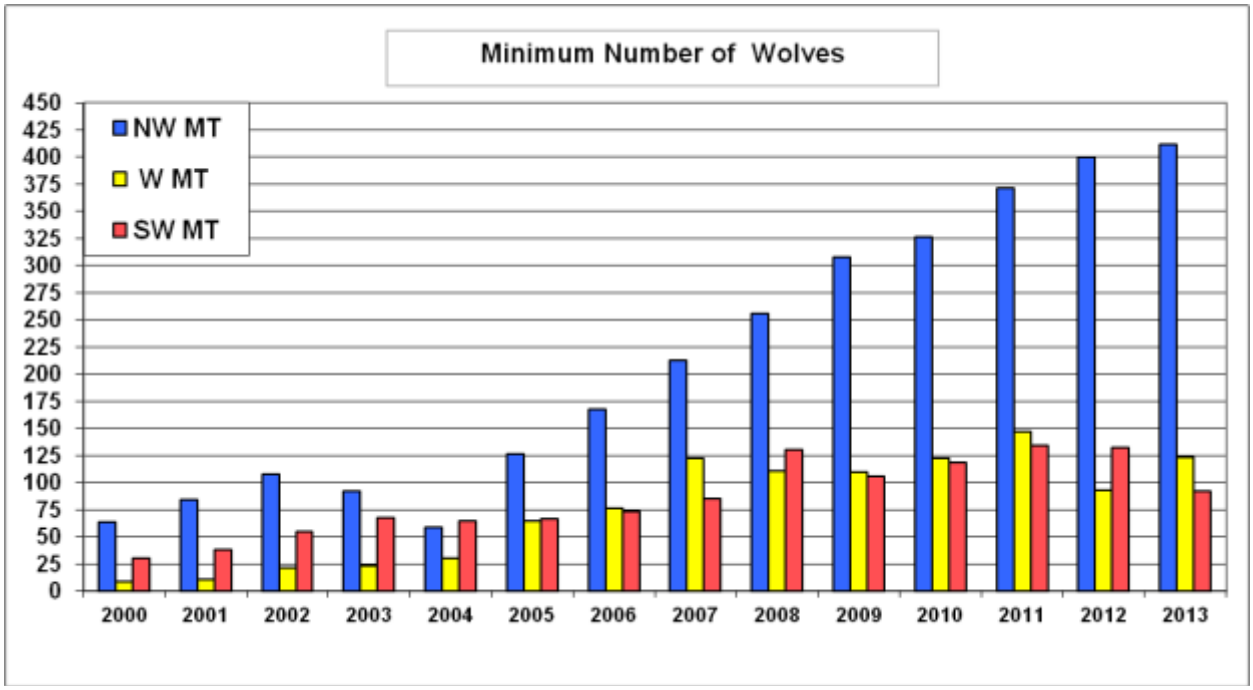

Figure 1. Minimum estimated number of wolves in Montana by recovery area (2000-2013).

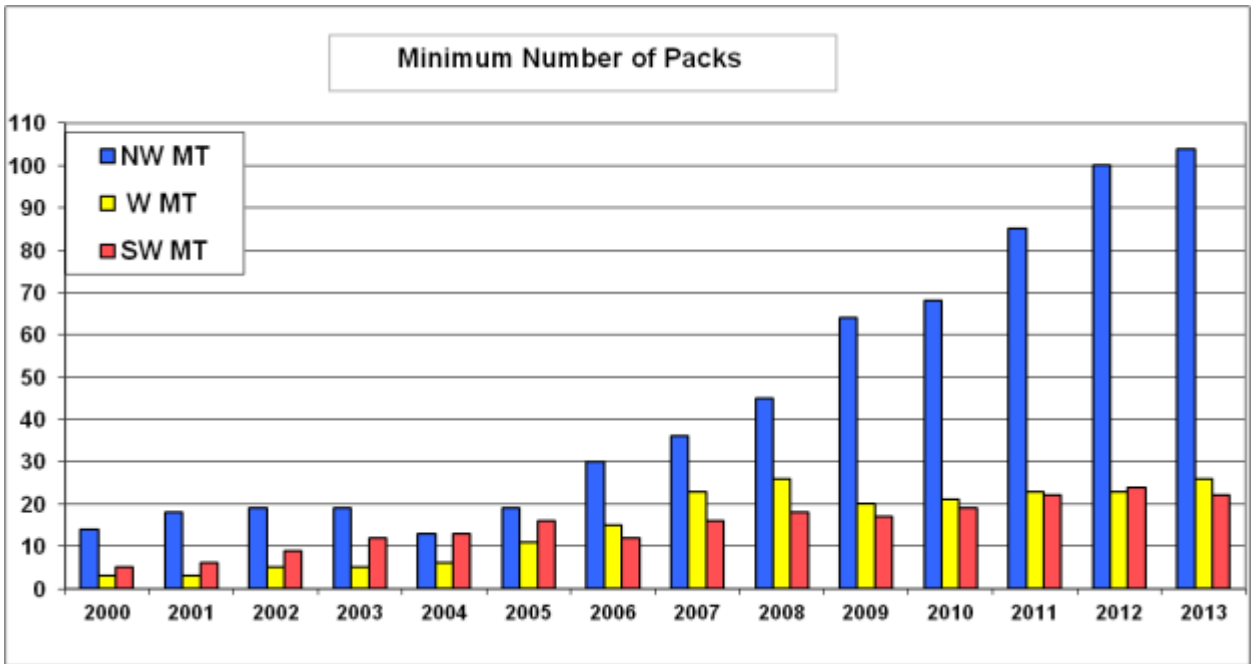

Figure 2. Minimum estimated number of packs in Montana by recovery area (2000–2013).

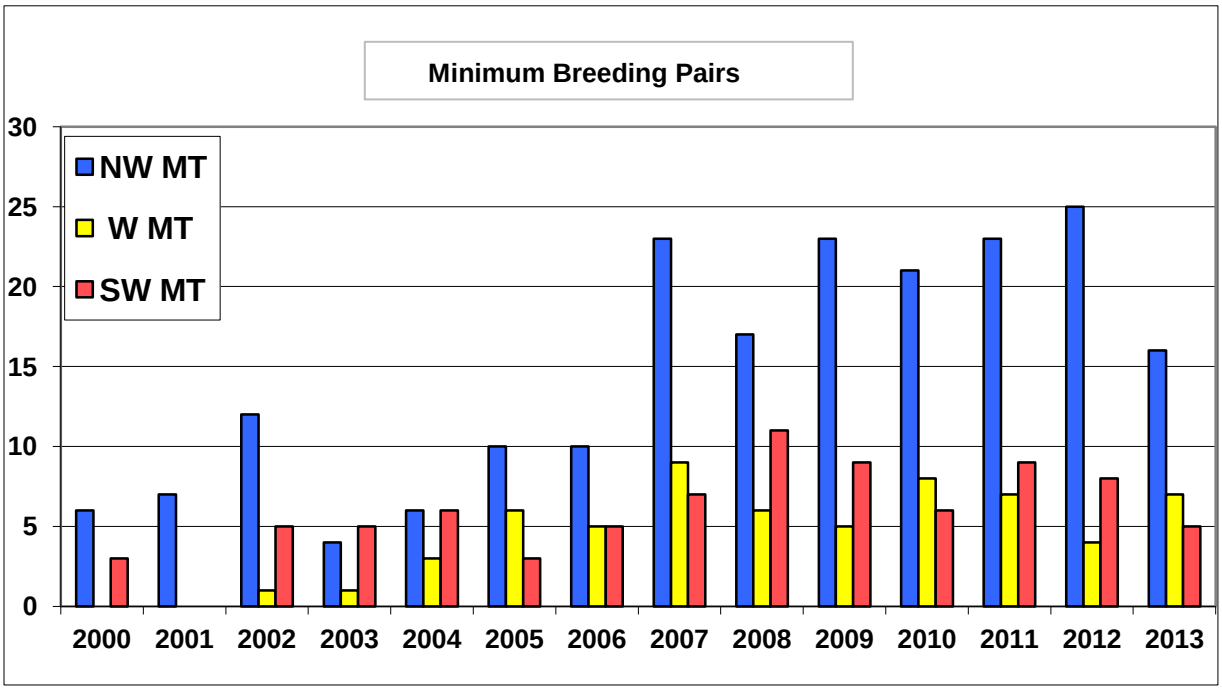

Figure 3. Minimum estimated number of breeding pairs in Montana by recovery area (2000–2013).

APPENDIX 5

NORTHERN ROCKIES WOLF PACK TABLES

Table 1a. Montana wolf packs and population data for Montana's portion of the Northwest Montana Recovery Area, 2011.

Table 1b. Montana wolf packs and population data for Montana's portion of the Greater Yellowstone Experimental Recovery Area, 2011.

Table 1c. Montana wolf packs and population data for Montanan's portion of the Central Idaho Experimental Recovery Area and Montana statewide totals 2011.

Table 1a: Montana Wolf Packs and Population Data for Montana's Portion of the Northwest Montana Recovery Area, 2013.

REF #	WOLF PACK[1]	RECOV AREA	STATE	MIN. ESTIMATED PACK SIZE DEC 2013	DOCUMENTED MORTALITIES NATURAL	HUMAN[2]	UNKN[3]	HARVEST[4]	CONTROL[5]	KNOWN DISPERSED	MISSING[6]	CONFIRMED LOSSES[7] CATTLE	SHEEP	DOGS	OTHER
1	Akokala	NWMT	MT	2				1							
2	Arrastra Creek	NWMT	MT	8				1							
3	Ashley	NWMT	MT	3				3				1			
4	Baptiste	NWMT	MT	2											
5	Bearfite	NWMT	MT	2				1							
6	Belmont	NWMT	MT	3				1							
	~~Benchmark~~	NWMT	MT	0					7						
7	Bennie	NWMT	MT	2	1	1		5							
8	Bisson (CSKT)	NWMT	MT	4											
	~~Bitterroot Range #~~	NWMT	MT	0				1							
9	Blowout Mountain	NWMT	MT	6				6			1				
	~~Blue Mountain~~	NWMT	MT	0											
10	Bugle Mountain	NWMT	MT	2											
11	Cabinet	NWMT	MT	8				4							
12	Cache Creek #	NWMT	MT	11				4							
13	Candy Mountain	NWMT	MT	2				5							
14	Cataract	NWMT	MT	3				1							
15	Cedar	NWMT	MT	2				1							
16	Chamberlain	NWMT	MT	3				2							
17	Chief Mountain	NWMT	MT	13		1			1						
18	Chippy	NWMT	MT	2				1							
19	Cilly	NWMT	MT	8				2							
20	Condon	NWMT	MT	4			1	5							
21	Conger Point	NWMT	MT	6				1							
22	Corona	NWMT	MT	2		4		2							
23	Cottonwood (CSKT)	NWMT	MT	4											
24	Dalton Mountain	NWMT	MT	3											
25	DeBorgia#	NWMT	MT	3											
26	Deer Creek	NWMT	MT	2					6			1			
	~~Deer Lodge~~	NWMT	MT	0					4			1			
27	Dirtyface	NWMT	MT	2											
28	Dog Gun	NWMT	MT	6				1							
29	Dry Forks (CSKT)	NWMT	MT	2				3	7			6			
30	Dutch	NWMT	MT	4		1									
31	Echo	NWMT	MT	2				1							
32	Evaro	NWMT	MT	2											
33	Ferry Basin (CSKT)	NWMT	MT	5											

Table 1a: Montana Wolf Packs and Population Data for Montana's Portion of the Northwest Montana Recovery Area, 2013.

REF #	WOLF PACK[1]	RECOV AREA	STATE	MIN. ESTIMATED PACK SIZE DEC 2013	DOCUMENTED MORTALITIES NATURAL	HUMAN[2]	UNKN[3]	HARVEST[4]	CONTROL[5]	KNOWN DISPERSED	MISSING[6]	CONFIRMED LOSSES[7] CATTLE	SHEEP	DOGS	OTHER
34	Firefighter	NWMT	MT	8											
35	Flathead Alps	NWMT	MT	2											
36	Garden (CSKT)	NWMT	MT	5		1		1							
37	Good	NWMT	MT	2				2							
	~~Granite Butte~~	NWMT	MT	0					2				7		
38	Great Bear	NWMT	MT	2											
39	Great Northern	NWMT	MT	2				3							
40	Halfmoon	NWMT	MT	2				1							
41	Humbug	NWMT	MT	3				1							
42	Inez	NWMT	MT	4				1							
43	Kerr	NWMT	MT	4				5							
44	Keystone	NWMT	MT	2		1									
45	Kintla	NWMT	MT	5											
46	Kootenai North	NWMT	MT	2											
47	Kootenai South	NWMT	MT	3											
48	Ksanka	NWMT	MT	2				8							
49	Lamoose	NWMT	MT	2											
50	Landers Fork	NWMT	MT	6				1							
51	Leota	NWMT	MT	2											
52	Livermore	NWMT	MT	7					1						3
53	Looking Glass	NWMT	MT	5					6			4			1
54	Lost#	NWMT	MT	2				4							
55	Lost Girl	NWMT	MT	2				2							
56	Lost Peak #	NWMT	MT	4				1							
57	Lydia	NWMT	MT	6											
58	Marias	NWMT	MT	2											
59	McDonald	NWMT	MT	2											
60	McGinnis	NWMT	MT	2				1							
61	McKay	NWMT	MT	9		1									
62	Mineral Mountain	NWMT	MT	3				1							
	~~Monture~~	NWMT	MT	0				1							
63	Moore	NWMT	MT	2				2				1			
64	Morrell Mountain	NWMT	MT	3		1		2							
65	Mullan	NWMT	MT	2				4							
66	Murphy Lake	NWMT	MT	2				2	1			1			
67	Nasu'kin	NWMT	MT	2											
68	Ninemile	NWMT	MT	6				1	4			2			

Table 1a: Montana Wolf Packs and Population Data for Montana's Portion of the Northwest Montana Recovery Area, 2013.

REF #	WOLF PACK[1]	RECOV AREA	STATE	MIN. ESTIMATED PACK SIZE DEC 2013	DOCUMENTED MORTALITIES NATURAL	HUMAN[2]	UNKN[3]	HARVEST[4]	CONTROL[5]	KNOWN DISPERSED	MISSING[6]	CONFIRMED LOSSES[8] CATTLE	SHEEP	DOGS	OTHER
69	No	NWMT	MT	4				2							
70	Noisy	NWMT	MT	3				3							
71	Nyack	NWMT	MT	2		1		1							
72	O'Brien	NWMT	MT	6				2							
73	Olson Peak	NWMT	MT	5				4							
74	Ophir Creek	NWMT	MT	4				3							
75	Ovando Mountain	NWMT	MT	3											
76	Petty Creek	NWMT	MT	3				1							
77	Pierce	NWMT	MT	6				1							
78	Pistol Creek (CSKT)	NWMT	MT	6								1			
79	Preacher #	NWMT	MT	2											
80	Pretty Prairie	NWMT	MT	8				1							
	~~Pulpit Mountain~~	NWMT	MT	0											
81	Quartz Creek	NWMT	MT	6											
82	Quintonkon	NWMT	MT	2											
83	Red Shale	NWMT	MT	15											
84	Satire	NWMT	MT	6				6							
85	Savenac	NWMT	MT	11											
86	Silcox	NWMT	MT	2								1			
87	Silver Lake #	NWMT	MT	7				1							
	~~Sleeping Woman (CSKT)~~	NWMT	MT	0					3						
88	Smoky	NWMT	MT	7				3							
89	Solomon Mountain #	NWMT	MT	2				1							
90	Spotted Bear	NWMT	MT	2											
91	Sugarloaf	NWMT	MT	6				3							
92	Sundance	NWMT	MT	3					1						
93	Sunrise Mountain	NWMT	MT	4											
	~~Sweetgrass Hills~~	NWMT	MT	0											
94	Tallulah	NWMT	MT	2											
95	Telephone Butte	NWMT	MT	5				2				1			
96	Teton	NWMT	MT	3								1			
	~~Thirsty~~	NWMT	MT	0											
97	Tom Meier	NWMT	MT	2				4							
98	Twilight #	NWMT	MT	2											
99	Union Peak	NWMT	MT	4											
100	Valley Creek (CSKT)	NWMT	MT	5											
101	Vermillion	NWMT	MT	2											

Table 1a: Montana Wolf Packs and Population Data for Montana's Portion of the Northwest Montana Recovery Area, 2013.

REF #	WOLF PACK[1]	RECOV AREA	STATE	MIN. ESTIMATED PACK SIZE DEC 2013	DOCUMENTED MORTALITIES NATURAL	HUMAN[2]	UNKN[3]	HARVEST[8]	CONTROL[5]	KNOWN DISPERSED	MISSING[4]	CONFIRMED LOSSES[6] CATTLE	SHEEP	DOGS	OTHER
102	Weigel	NWMT	MT	2											
	~~White Earth (CSKT)~~	NWMT	MT	0					4						
103	Wiggletail #	NWMT	MT	2				1				1			
104	Wolf Prairie	NWMT	MT	2				4							
	Misc/Lone	NWMT	MT	4		5		8				2			
	MT in NWMT (Table 1a)	NWMT	MT	412	1	17	1	147	47	0	1	24	7	0	4
	ID in NWNMT (Table 3b)	NWMT	ID	64	0	1	2	68	4	0	0	0	1	0	0
	NWMT RECOVERY AREA	NWMT	MT/ID	476	1	18	3	215	51	0	1	24	8	0	4

1 Underlined packs are counted as breeding pairs toward recovery goals. CSKT = Flathead Indian Reservation; BFN = Blackfeet Indian Reservation.

2 Excludes wolves killed in control actions to address livestock depredation and lawful public harvest.

3 Does not include pups that disappeared before winter.

4 Collared wolves that became missing in 2013.

5 Agency lethal control whether under state or federal regulations. Includes wolves killed by private citizens to defend livestock or under terms of a kill permit.

6 Includes only domestic animals confirmed killed by wolves.

7 Pack did not exist on Dec. 31 2013 and is not displayed on the map.

8 Number legally harvested by humans in 2013.

Border pack shared with the State of Idaho; dens in Montana.

Table 1b: Wolf Packs and Population Data for Montana's Portion of the Greater Yellowstone Recovery Area, 2013.

REF #	WOLF PACK[1]	RECOV AREA	STATE	MIN. ESTIMATED PACK SIZE DEC 2013	DOCUMENTED MORTALITIES					KNOWN DISPERSED	MISSING[4]	CONFIRMED LOSSES[6]			
					NATURAL	HUMAN[2]	UNKN[3]	HARVEST[5]	CONTROL[5]			CATTLE	SHEEP	DOGS	OTHER
105	Avalanche	GYA	MT	3											
106	Baker Mountain	GYA	MT	5				1							
107	Beartrap	GYA	MT	15				2							
	~~Boone Mountain~~[7]	GYA	MT	0											
108	Brackett Creek	GYA	MT	2				3							
109	Cedar Creek	GYA	MT	4		1		2	4			4			
110	Cougar 2*	GYA	MT	3		1		5							
111	Davey Butte	GYA	MT	2					1				3		
	~~Dixon Creek~~[7]	GYA	MT	0				1							
112	Elephant Rock	GYA	MT	3											
113	Elkhorn	GYA	MT	4				1				1			
114	Fridley	GYA	MT	3				3							
115	Hayden*	GYA	MT	3				1	1			1			
116	Hogback	GYA	MT	3				5							
117	Horsethief Mountain	GYA	MT	4				1							
118	Jack Creek	GYA	MT	2				1	3						
	~~Lebo Peak~~[7]	GYA	MT	0											
119	Meadow Creek	GYA	MT	2					3			1			
120	Mill Creek	GYA	MT	2				2							
	~~Mount Vesuvius~~[7]	GYA	MT	0											
121	Romy Lake	GYA	MT	4											
122	Rosebud	GYA	MT	3		1		2							
	~~Slip n' Slide~~[7]	GYA	MT	0				2							
123	Steamboat Peak	GYA	MT	5								1			
124	Tanner Pass	GYA	MT	7											
125	Toadflax	GYA	MT	10				4	2	1					
126	Wilson Creek	GYA	MT	3				2							
	~~929F Group~~[7]	GYA	MT	0				1	1						
	Misc/Lone	GYA	MT			2	1	9	2			2	13		
MT in GYA (Table 1b)		GYA	MT	92	0	5	1	48	17	1	0	10	16	0	0

1 Underlined packs are counted as breeding pairs toward recovery goals.
2 Excludes wolves killed in control actions to address livestock depredation and lawful public harvest.
3 Does not include pups that disappeared before winter.
4 Collared wolves that became missing in 2013.
5 Agency lethal control whether under state or federal regulations. Includes wolves killed by private citizens to defend livestock or under terms of a kill permit.
6 Includes only domestic animals confirmed killed by wolves.
7 Pack did not exist on Dec. 31 2013 and is not displayed on the map; see pack narrative.
8 Number legally harvested by humans in 2013.
* Border pack shared with Yellowstone National Park; more time in Montana.

Table 1c: Wolf Packs and Population Data for Montana's Portion of the Central Idaho Recovery Area and Montana Statewide Totals, 2013.

REF. #	WOLF PACK[1]	RECOV AREA	STATE	MIN. ESTIMATED PACK SIZE DEC 2013	DOCUMENTED MORTALITIES NATURAL	HUMAN[2]	UNKN[3]	HARVEST[4]	CONTROL[5]	KNOWN DISPERSED	MISSING[6]	CONFIRMED LOSSES[8] CATTLE	SHEEP	DOGS	OTHER
127	Alta #	CID	MT	3											
128	Ambrose	CID	MT	3				5							
129	Anaconda	CID	MT	7				1							
130	Big Hole #	CID	MT	9											
131	Black Pine	CID	MT	5											
132	Bloody Dick #	CID	MT	5				1							
133	Burnt Fork	CID	MT	3				1							
134	Divide Creek	CID	MT	4		3									
135	East Fork Rock Creek	CID	MT	4											
136	Flint	CID	MT	6				1							
137	Gash Creek #	CID	MT	4											
138	Gird Point	CID	MT	8				2							
	~~Harvey Creek~~[7]	CID	MT	0					5			2			
139	Jeff Davis #	CID	MT	5					1			4			
140	Lolo	CID	MT	4											
141	Mt. Haggin	CID	MT	2											
142	One Horse	CID	MT	11		1						1			
143	Overwhich #	CID	MT	4											
	~~Painted Rocks~~[7] #	CID	MT	0				1		1					
	~~Pintler~~[7]	CID	MT	0					5			5			
144	Price Creek #	CID	MT	4				3							
145	Pyramid #	CID	MT	5				1							
146	Ross' Fork	CID	MT	5				4							
	~~Shook Mountain~~[7]	CID	MT	0				1							
147	Silderock Mtn	CID	MT	3				2							
148	Sula #	CID	MT	4				2							
149	Teepee Point	CID	MT	6											
150	Trail Creek #	CID	MT	2				1				2			
151	Trapper Peak	CID	MT	3				1							
152	Watchtower #	CID	MT	2											
	Misc/Lone	CID	MT	2				9				2	1		
	MT Total In CID	CID	MT	123	0	4	0	36	11	1	0	16	1	0	0
	MT In NWMT total (Table 1a)	NWMT	MT	412	1	17	1	147	47	0	1	24	7	0	4
	MT In GYA total (Table 1b)	GYA	MT	92	0	5	1	48	17	1	0	10	16	0	0
	MT In CID total (Table 1c)	CID	MT	123	0	4	0	36	11	1	0	16	1	0	0
	MT STATE TOTAL		**MT**	**627**	**1**	**26**	**2**	**231**	**75**	**2**	**1**	**50**	**24**	**0**	**4**

1 Underlined packs are counted as breeding pairs toward recovery goals.
2 Excludes wolves killed in control actions.
3 Does not include pups that disappeared before winter.
4 Collared wolves that ceased transmitting in 2013.
5 Includes agency lethal control and take by private citizens under state regulations.
6 Includes only domestic animals confirmed killed by wolves.
7 Pack did not exist on December 31, 2013 and is not displayed on the map.
8 Number legally harvested by humans in 2013.
Border pack shared with State of Idaho; dens in Montana and majority of time in Montana.