



**This report presents information on the status, distribution, and management of wolves in the State of Montana, from January 1, 2023 to December 31, 2023.**

This report is also available at: <https://fwp.mt.gov/conservation/wildlife-management/wolf>

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# Montana Gray Wolf Program 2023 Annual Report

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## EXECUTIVE SUMMARY

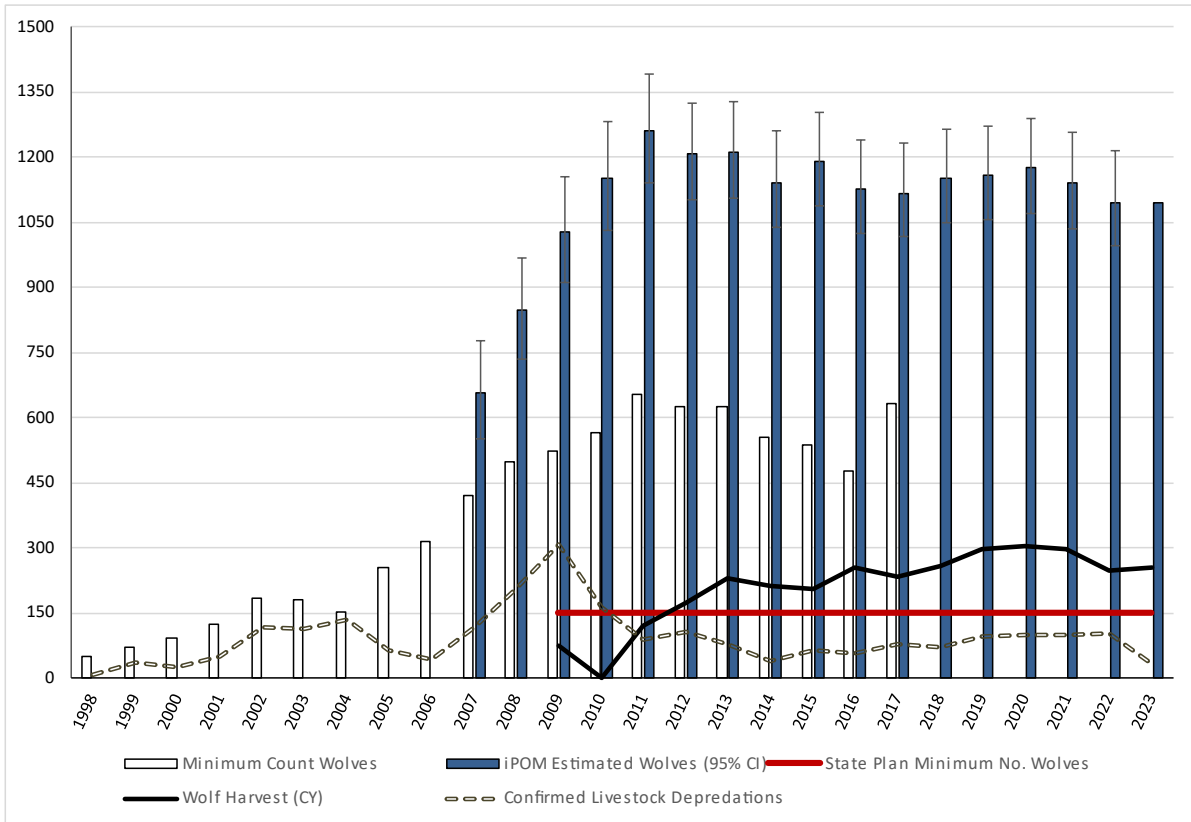
Though extirpated from Montana in the early 1900s, wolves are now fully recovered in Montana. Wolf recovery efforts began in the early 1980s, and by 2002, the northern Rockies wolf population met the biological recovery criteria of 30 breeding pairs for 3 consecutive years in the Northern Rocky Mountains (NRM) of Montana, Idaho and Wyoming. In preparation for delisting, Montana developed its initial Wolf Conservation and Management Plan based on the work of a citizen's advisory council, which was approved by the United States Fish and Wildlife Service (USFWS) in 2004. Delisting was not immediate, however, and the wolf population in the NRM tripled between the time recovery goals were met and when wolves were ultimately delisted by congressional action in 2011. At present, Montana Fish, Wildlife and Parks (FWP) implements wolf management using a combination of sportsman license dollars and federal Pittman-Robertson funds (excise tax on firearms, ammunition, and hunting equipment) to monitor the wolf population, regulate harvest, collar packs in livestock areas, coordinate and authorize research, and direct problem wolf control under certain circumstances.

The primary means of monitoring wolf distribution, numbers, and trend in Montana is Integrated Patch Occupancy Modeling, or "iPOM." The iPOM method uses annual hunter effort surveys, known wolf locations, habitat covariates, and estimates of wolf territory size and pack size to estimate wolf distribution and population size across the state. iPOM estimates of wolf population size are the preferred monitoring method due to accuracy, confidence intervals, and cost efficiency. The 2023 iPOM estimate of wolf population size was 1096 wolves (95% C.I. = 993 – 1,210; Fig. 1).

Wolf hunting was recommended as a management tool in the 2004 Montana Wolf Conservation and Management Plan and wolf harvest seasons have been implemented each year since delisting. Calendar year 2023 included parts of two hunting/trapping seasons for wolves. During calendar year 2023, 144 wolves were harvested during the spring, and 110 wolves were harvested during the fall for a total of 254 (Fig. 1). Sales of license year 2023 (2023-2024 season) wolf hunting licenses generated \$285,282.00 for wolf monitoring and management in Montana.

Wildlife Services (WS) confirmed the loss of 32 livestock to wolves during 2023, including 23 cattle and 8 sheep; and 1 livestock guard dog was also killed by wolves (Fig. 1). This total was significantly lower than numbers of confirmed losses from 2012-2022. During 2023 the Montana Livestock Loss Board paid \$42,842.22 for livestock that were confirmed by WS as killed by wolves or probable wolf kills. 31 wolves were killed in response to depredation or to reduce the potential for further depredation. Of the 31 wolves, 27 were killed by WS and 4 were lawfully taken by private citizens. FWP's Wolf Specialists radio-collared 27 wolves during 2023 to meet the legislative requirement for collaring livestock packs and to aid in population monitoring and research efforts.

Montana's wolf population grew steadily from the early 1980s when there were less than 10 in the state. After wolf numbers approached 1,270 in 2011 and wolves were delisted, the wolf population has decreased slightly and may be stabilizing with a 10-year average around 1,140 wolves (Fig. 1). Stabilization of population size may be related to the onset of wolf hunting and trapping seasons, whereas reduced livestock depredation in recent years is likely related to more aggressive depredation control actions (DeCesare et al. 2018). Montana's wolf population remains well above delisting thresholds (7 – 8x). Wolf license sales have generated nearly \$5.4 million for wolf management and monitoring since 2009.



**Figure 1.** Integrated Patch Occupancy Modeling (iPOM) estimated number of wolves in Montana (including 95% confidence intervals) and verified minimum number of wolves residing in Montana in relation to state wolf plan requirements along with trends in wolf harvest and confirmed livestock losses due to wolves, 1998 – 2023.

# 1. BACKGROUND

Wolf recovery in Montana began in the early 1980s. Wolves increased in number and distribution because of natural emigration from Canada and successful federal and tribal efforts that reintroduced wolves into Yellowstone National Park and the wilderness areas of central Idaho. When the federal wolf recovery goal of 30 breeding pairs for 3 consecutive years in Montana, Idaho and Wyoming was met in 2002, U.S. Fish and Wildlife Service (USFWS) declared wolves had reached biological recovery. During 2002 there were a minimum of 663 wolves and 43 breeding pairs in the Northern Rocky Mountains (NRM).

To prepare for delisting, the Montana Gray Wolf Conservation and Management Plan was developed, achieving USFWS approval in 2004. However, delisting was not immediate. In April 2011, nine years after meeting recovery criteria, Congress directed the Secretary of the Interior to reissue the final delisting rule for NRM wolves. By this point, the minimum wolf population in the NRM consisted of more than 1,600 wolves and 100 breeding pairs. On May 5, 2011, the USFWS published the final delisting rule designating wolves throughout the Distinct Population Segment (DPS), except Wyoming, as a delisted species.

Beginning with delisting in May 2011, the wolf was reclassified as a Species in Need of Management in Montana. Montana's laws, administrative rules, and state wolf plan replaced the federal framework. Because much has changed in the 20 years since the initial wolf plan was adopted, FWP recently drafted a new wolf plan. Though not yet adopted, the new wolf plan incorporates updates in wolf-related research, more than 20 years of management experience, evolution in conflict management, new laws, social perspectives, and public input.

At present, Montana Fish, Wildlife and Parks (FWP) implements wolf management using a combination of sportsman license dollars and federal Pittman-Robertson funds (excise tax on firearms, ammunition, and hunting equipment) to monitor the wolf population, regulate hunter harvest, coordinate and authorize research, and address wolf-livestock conflicts. USDA Wildlife Services (WS) continues to investigate injured and dead livestock, and FWP works closely with them to resolve conflicts. While depredation response efforts are still a critical role of WS, their nonlethal initiative also delivers proactive wolf-livestock conflict prevention tools to livestock producers throughout Montana. Montana's Livestock Loss Board compensates producers for losses to wolves and other large carnivores, and further provides grant funding to support conflict prevention tools where carnivore-livestock conflicts occur.

Montana wolf conservation and management has transitioned to a more fully integrated program since delisting. With wolf population level securely above requirements for over a decade, FWP continues to adapt the wolf program to match resources and needs. For years, when the population was small and wolves were listed, a "wolf weekly" report was issued, detailing all depredations, collaring, control and known mortalities. That level of detail and its associated expense is no longer warranted, and the information is now reported annually. This allows limited personnel time and conservation dollars to be allocated more effectively.

Population monitoring techniques have also changed. Wolf packs were intensively monitored year-round beginning with their return to the northwestern part of Montana in the 1980s. Objectives for monitoring during the period of recovery were driven by the USFWS's recovery criteria – 30 breeding pairs for 3 consecutive years in Montana, Idaho, and Wyoming. Similar metrics of population status were used from the time recovery criteria were met in 2002, through delisting in 2011, and for the 5 years when the USFWS retained oversight after delisting. These population monitoring criteria and methods were appropriate and achievable when the wolf population was small and recovering. For instance, in 1995, when wolves were reintroduced into Yellowstone National Park and central Idaho, the end-of-year count for wolves residing in Montana was 66. 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. However, in later years, the minimum count of wolves approached or exceeded 500 individuals distributed across more than 25,000 square miles of mostly rugged and remote terrain in western Montana. Therefore, the ability to count every pack, every wolf, and every breeding pair has become expensive and unrealistic. Consequently, FWP has moved to more cost-effective methods for monitoring wolves. These methods can be more accurately described as population estimates that account for uncertainty (confidence intervals), as opposed to a minimum count where the end result, at this time when populations are large, reflects total effort (and dollars spent) more than population numbers.

FWP first began considering alternative approaches to monitoring the wolf population in 2006 through a collaborative effort with the University of Montana Cooperative Wildlife Research Unit. 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 - "Patch occupancy modelling" (POM; Rich et al. 2013a) and most recently "Integrated Patch Occupancy Modeling" (iPOM; Sells et al. 2022).

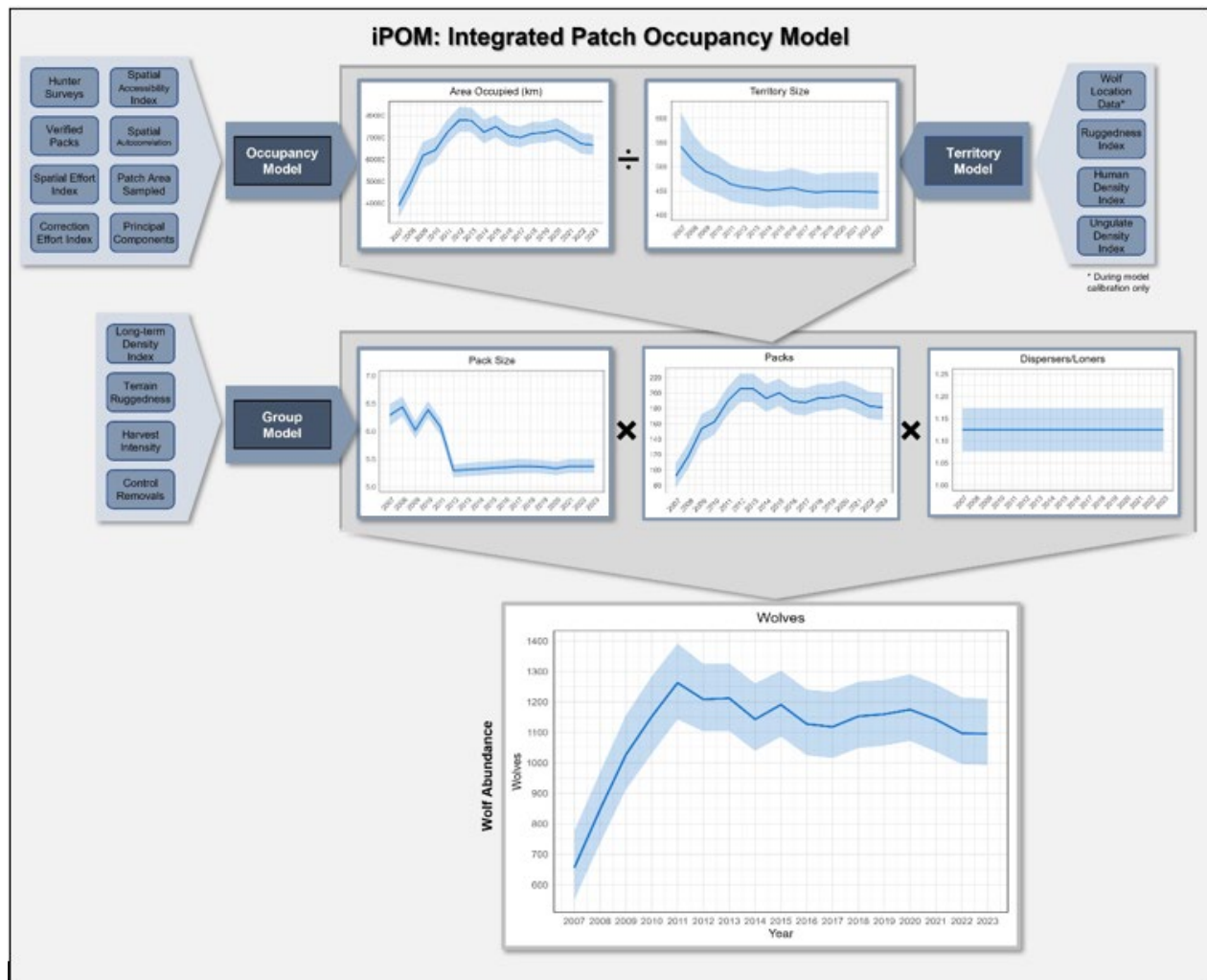
iPOM is a modern, scientifically valid, and financially efficient means of monitoring wolves. iPOM is currently the best and most efficient method to document wolf population numbers and trend in Montana. FWP is confident that the wolf population estimate and trend that iPOM provides is sufficient and scientifically valid evidence that can be used to assess wolf status relative to the criteria outlined in Montana's Wolf Conservation and Management Plan. While minimum counts and pack tables were reported through 2017, FWP stopped publishing this data starting in 2018 and instead focused reporting on iPOM estimates for consistency with population monitoring techniques. However, pack tables including minimum counts were still developed each year with continued field monitoring efforts. Pack tables 2018 - 2023 can be found in Appendix 5.



## 2. WOLF POPULATION MONITORING

### 2.1 Wolf Distribution and Numbers via Integrated Patch Occupancy Modeling

We used an Integrated Patch Occupancy Model (iPOM) to estimate the distribution and number of wolves in Montana (Sells et al. 2020). With iPOM, an occupancy model estimates the extent of wolf distribution in Montana, and a territory model predicts territory sizes; together, these models predict the number of packs in a given area (Fig. 2). A group size model predicts pack sizes. Total abundance estimates are derived by combining the estimated number of packs and pack sizes, while also accounting for lone and dispersing wolves.



**Figure 2.** Schematic for method of estimating the area occupied by wolves, number of wolf packs and number of wolves in Montana, 2007 – 2023 using an Integrated Patch Model. Graphs show statewide estimates over time. Ribbons indicate 95% credible intervals.

## **Integrated Patch Occupancy Modeling Methods**

### ***Occupancy Model***

To predict where wolves occurred in Montana each year from 2007 – 2023, we fit a multi-season false-positives occupancy model in a Bayesian context (Bassing et al. 2019). This work built on an earlier occupancy model (Miller et al. 2013, Rich et al. 2013, Inman et al. 2020). Following those authors, we created an observation “iPOM grid” for Montana as 600 km<sup>2</sup> cells. We assigned locations of wolves in packs to grid cells, based on monitoring effort by MFWP Wolf Specialists and wolf sightings reported by hunters each fall. Wolf Specialists monitored packs each year to verify presence using trail cameras, visual observations, and telemetry collars, and used these data to demarcate approximate territory centroids for packs. MFWP conducted annual Hunter Harvest Surveys of a random sample of 50,000 – 80,000 resident deer and elk hunters annually to obtain wolf sighting reports. Hunters spent 1.8 – 2.2 million hunter days each fall pursuing deer and elk ([fwp.mt.gov](http://fwp.mt.gov)), providing many observers across Montana. Hunters were queried about dates and locations of any sightings of groups of 2 – 25 wolves.

To develop encounter histories, we divided the 5-week general rifle season (occurring each year around late Oct through Nov or early Dec) into one-week encounter periods and mapped locations of pack centroids and hunter observations for each week. Based on past work (Miller et al. 2013, Rich et al. 2013, Inman et al. 2020), we included model covariates for detection as: 1) hunter days per km<sup>2</sup> in each hunting district (an index to spatial effort), 2) proportion of mapped wolf observations (a correction for effort, accounting for number of hunter observations with coordinates versus total reported, including any sightings with vague location descriptions), 3) densities of low-use forested and non-forested roads (indices of spatial accessibility), 4) a spatial autocovariate (proportion of neighboring cells with wolves seen out to a mean dispersal distance of 100 km), and 5) patch area sampled (because smaller cells on the border of Montana, parks, and tribal lands have less hunting activity and therefore less opportunity for hunters to see wolves). We also included cell size as a nuisance parameter to account for varying cell sizes. 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 (number of years with verified pack locations in the previous 5 years).

Using these pack locations and model covariates, we fit the multi-season false-positives occupancy model to estimate  $\psi$ , the probability of occupancy ( $\psi$ ). We used pack centroids to estimate probabilities of false positives, true positives, and false negatives (Miller et al. 2013). We estimated  $\psi$  for tribal lands and national parks, where no hunter survey data were available, via modeled covariates.

We used Markov chain Monte Carlo (MCMC; Brooks 2003) methods in a Bayesian framework to fit the occupancy model using program R 3.4.1 (R Core Team 2020) and package rjags (Plummer et al. 2019) that calls on program JAGS 4.2.0 (Plummer 2003). We ran 3 chains for 10,000

iterations, after an adaptation phase of 10,000 iterations and a burn-in of 10,000 iterations. We did not thin the MCMC chains.

### ***Territory Model***

We used a recently developed mechanistic territory model to predict territory size. Full details are available in Sells and Mitchell 2020 and Sells et al. 2020, 2021. The territory model was a spatially-explicit, agent-based model representing the hypothesis that wolves are adapted to select economical territories that maximize food benefits and minimize costs of travel, competition, and mortality risk. After calibrating the model using wolf location data collected from 2014 – 2018 (Sells et al. 2020), the model provided territory size predictions through simulations in NetLogo 6.1.1 (Wilensky 1999).

The model demonstrated the strong effect of competition on resulting space use (Sells and Mitchell 2020; Sells et al. 2020, 2021). Accordingly, we applied the model to predict territory sizes at a wide range of possible pack densities and resulting levels of competition. We used a density identifier model (Sells et al. 2020) to predict levels of competition in each area of Montana for each year. We then used the territory sizes predicted at the given level of competition as estimates of territory size in each area of the state.

### ***Group Model***

We used a recently-developed group size model (Sells et al. 2020) to predict pack sizes in each 600 km<sup>2</sup> iPOM grid cell. The model was based on mechanisms hypothesized to influence wolf pack size and developed using 14 years of wolf pack data. The generalized linear mixed effects model included effects of pack density, terrain ruggedness, harvest intensity, and control removals. Pack density was the long-term (2005 – 2018) mean pack density in the iPOM grid cell, which served as an index to density trends (Sells et al. 2020). Ruggedness was terrain ruggedness in the iPOM grid cell. Harvest intensity was categorized as “none” when no harvest was allowed, “restricted” if 2009 and 2011 rules were followed (statewide harvest was limited by a quota, seasons were shorter, bag limits were low, and trapping was prohibited), and “liberal” if 2012 – 2022 rules were followed (statewide harvest quotas were removed, seasons were longer, bag limits were higher, and trapping was allowed; fwp.mt.gov). Control removals were reported numbers of wolves removed for depredations in the iPOM grid cell that year. Ecoregion defined in which ecoregion the iPOM grid cell fell (epa.gov). The unique identifier for the iPOM grid cell was included as a random effect to account for repeated observations among years. We applied the model to each iPOM grid cell, each year, to predict local pack size.

### ***Model Integration***

We estimated numbers of packs and wolves for each year, 2007 – 2023, by combining predictions from the 3 models (Fig. 2) using an integrated approach (Sells et al. 2022). We first calculated mean estimated occupancy ( $\bar{\psi}$ ) across iPOM grid cells, then calculated area occupied ( $area_{occupied}$ ) as:

$$area_{occupied} = \bar{\psi} \times \sum grid_{area}$$

where  $\sum grid_{area}$  was the sum of grid cell areas. We calculated number of estimated packs as:

$$N_{packs} = area_{occupied} \div territory_{size}$$

where values for  $territory_{size}$  were drawn with replacement for each iteration of the MCMC chain from the distribution of territory sizes predicted by the territory model at the specific grid cell. Values for  $territory_{size}$  were therefore spatially explicit and biologically appropriate to local conditions each year and accounted for uncertainty. We then calculated number of wolves as:

$$N_{wolves} = N_{packs} \times pack_{size} \times lone_{rate}$$

where  $lone_{rate}$  accounted for lone and dispersing wolves. For  $pack_{size}$  we drew for each iteration of the MCMC chain a value from the distribution of group sizes predicted at the specific grid cell. This provided spatially explicit and biologically appropriate values for local conditions each year while incorporating model uncertainty about pack size. We modeled  $lone_{rate}$  by drawing for each iteration of the MCMC chain values from a normal distribution assuming a mean of 1.125 and standard deviation of 0.025. This yielded a loner/disperser rate of 12.5% and incorporated variation and uncertainty around this rate, as 95% of values drawn were 7.6 – 17.4%. We selected these values based on studies documenting that 10 – 15% of wolf populations are comprised of lone or dispersing wolves (Fuller et al. 2003). This is consistent with Idaho's calculations for lone wolves (Holyan et al. 2013) and slightly more conservative than Minnesota's calculations, which add 15% (Erb et al. 2018).

To account for uncertainty and calculate credible intervals (CI's) for all parameters, we retained posterior estimates of 10,000 values for each and calculated the median value and 2.5% and 97.5% values (creating 95% CI's) for  $area_{occupied}$ ,  $territory_{size}$ ,  $pack_{size}$ ,  $N_{packs}$ , and  $N_{wolves}$ . We calculated density of packs per 1,000 km<sup>2</sup>, wolves per 1,000 km<sup>2</sup>, and population growth (lambda,  $\lambda$ ).

We repeated these calculations for MFWP management regions by completing each step described above at each subsetted group of grid cells by region. Grid cells were categorized by the region in which the majority of their areas fell.

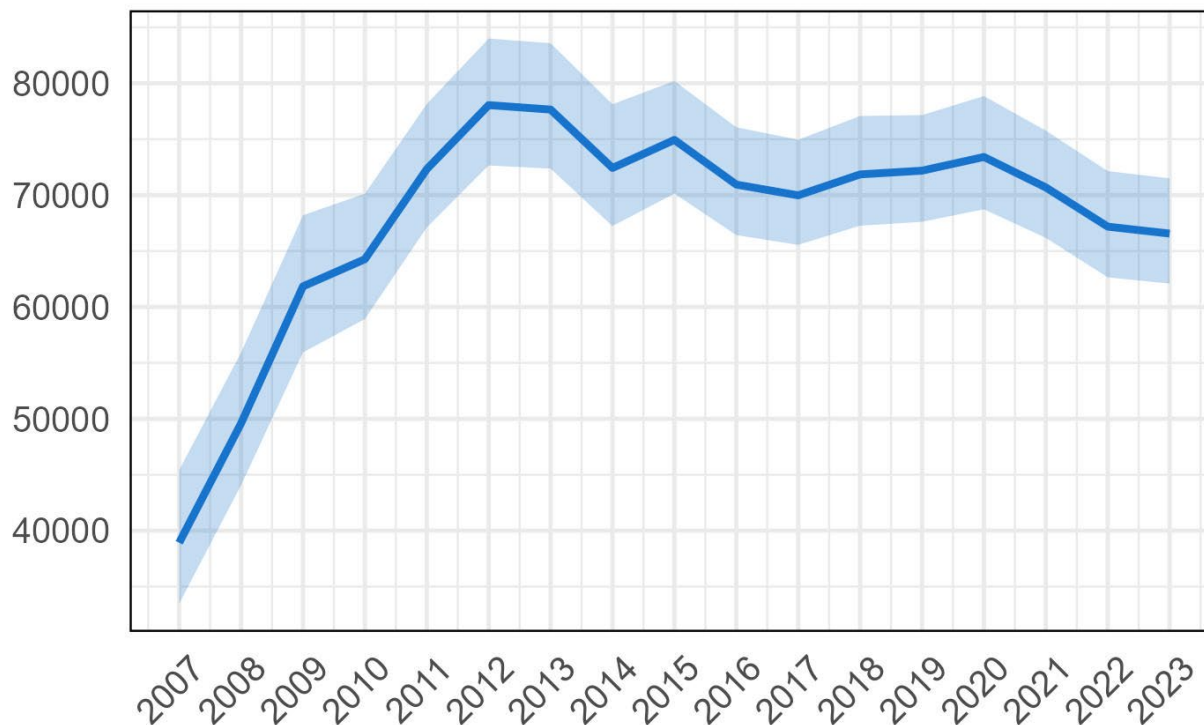
## **Integrated Patch Occupancy Modeling Results**

### ***Area Occupied***

Each year (2007 – 2023), 44,690 – 82,375 hunters responded annually to the wolf sighting surveys. From their reported sightings, 669 – 3,469 locations of 2 – 25 wolves were mapped each year. Percent of hunters reporting a wolf sighting ranged from 3.8% (2022) to 7.5% (2011).

From 2007 – 2023, estimated area occupied by wolf packs in Montana ranged from 39,200 km<sup>2</sup> (95% CI = 33,464 – 45,682) in 2007 to 79,111 km<sup>2</sup> (95% CI = 73,495 – 85,690) in 2012 (Fig. 3).

## Area Occupied (km)

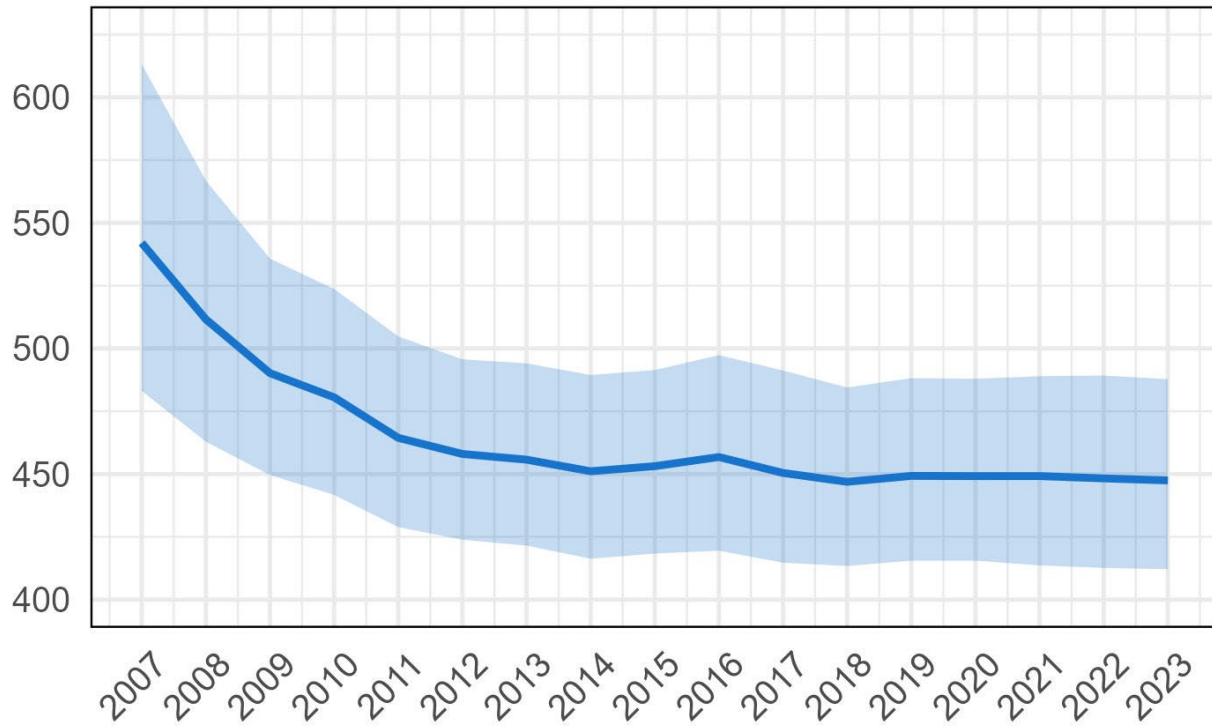


**Figure 3.** Estimated total area occupied (km<sup>2</sup>) by wolves in Montana, 2007 – 2023. Ribbon indicates 95% credible interval.

### ***Territory Size***

Estimated territory size varied across time and space (Fig. 4). Overall, territory size was estimated to be largest in southwest MT and second largest in areas in and around Glacier National Park and the Bob Marshall Wilderness. Territories were estimated to be smaller in northwest MT and the Bitterroot. Territory size was greatest in 2007 and dropped thereafter, and has remained largely stable in the past decade.

## Territory Size

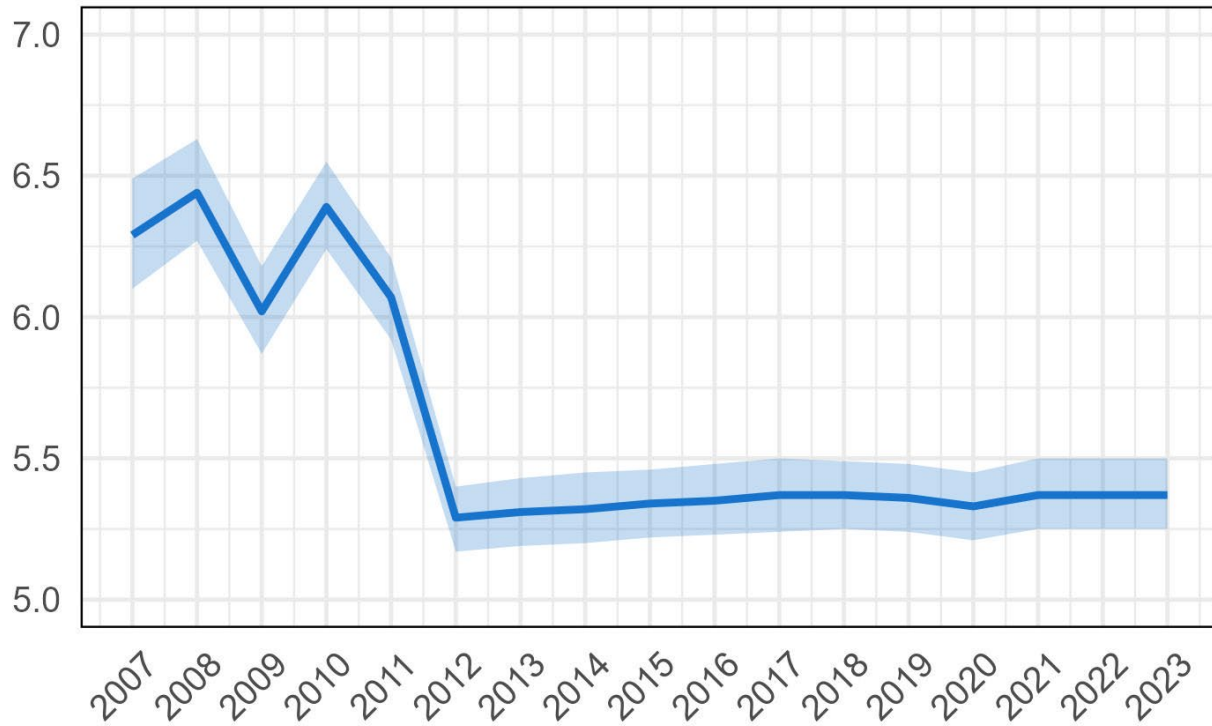


**Figure 4.** Estimated mean territory size (km<sup>2</sup>) of wolves in Montana, 2007 – 2023. Ribbon indicates 95% credible interval.

### ***Group Size***

Estimated pack size also varied (Fig. 5). Mean pack sizes were larger in earlier years (prior to harvest) and have since declined by approximately 1 wolf per pack, on average. Mean pack size was estimated to be similar across Montana (an approximate difference of < 1 wolf per pack in most years).

## Pack Size



**Figure 5.** Estimated mean pack size of wolves in Montana, 2007 – 2023. Ribbon indicates 95% credible interval.

### ***Estimated Number of Packs and Wolves***

Estimated numbers of packs and wolves varied through time (Fig. 6; Table 1). The population was estimated to have been smallest in the first year of our analysis (2007), with 92 packs (95% CI = 77 – 109) and 656 wolves (95% CI = 551 – 776). Population growth was positive through 2011 (Fig. 6). Total wolf numbers peaked in 2011 with 189 packs (95% CI = 171 – 208) and 1,263 wolves (95% CI = 1,143 – 1,392). This peak coincided with the first years of harvest management in Montana, after which the population declined by 13% in total wolf abundance between 2011 and 2023.

Population growth rate alternated from slightly positive and slightly negative each year, though incorporation of 2023 estimates may indicate a return to a stable population after a slight population decline 2020-2022. (Fig. 7). From 2019 – 2023, the population consisted of a 5-year average of 189 packs and 1,134 wolves per year.

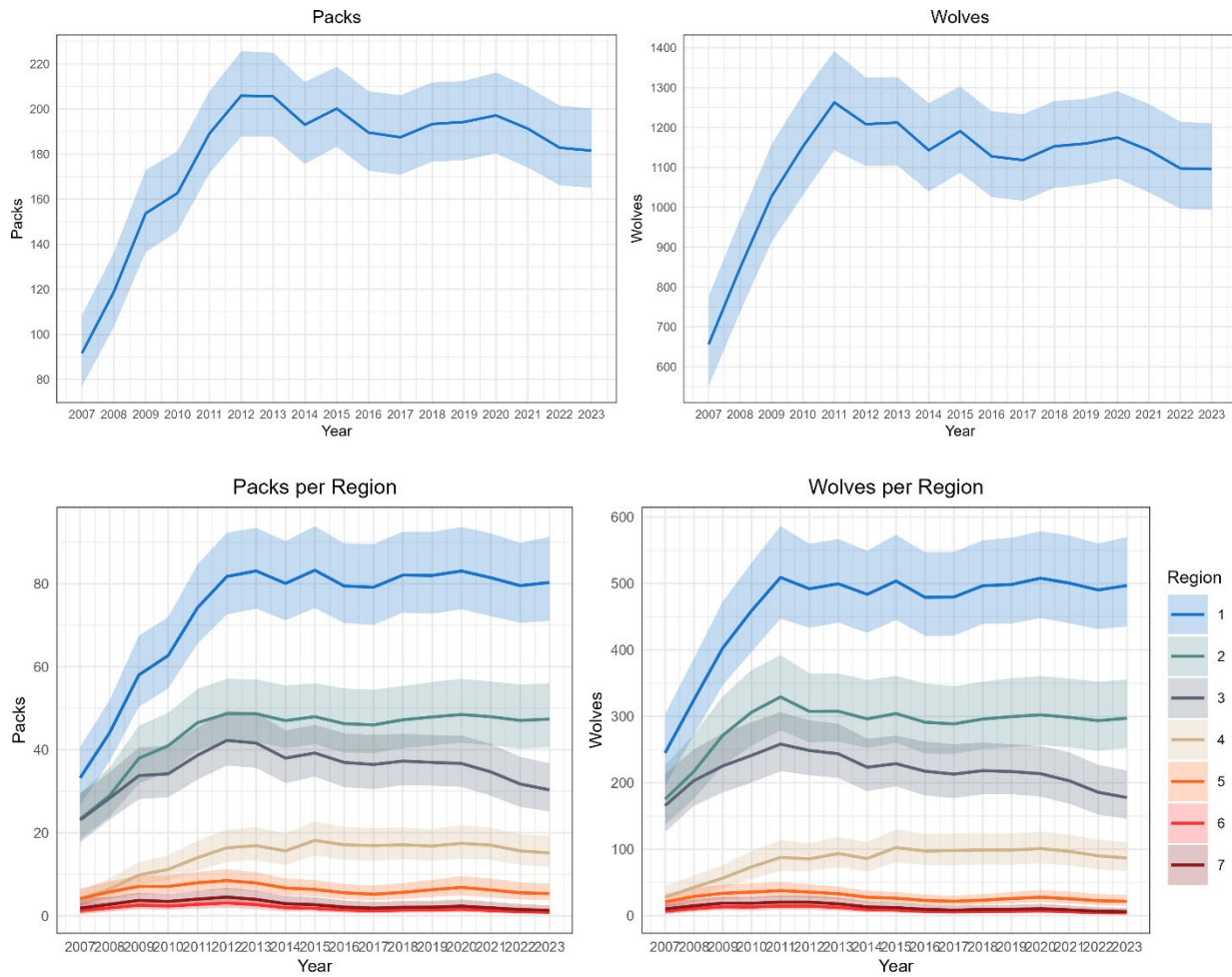
Estimated numbers of packs and wolves varied spatially (Fig. 6). Pack and wolf abundances were consistently greater in MFWP Region 1, followed by Regions 2 and 3. Regions 4 – 7 each contained only  $\leq 0.5\%$  –  $8\%$  of packs and  $0.4\%$  –  $8\%$  of wolves.

Wolf densities varied over space and time (Fig. 8). Densities were estimated to be greatest in MFWP Region 1 (ranging 6.4 – 13.39 wolves per 1,000 km<sup>2</sup> from 2007 – 2023), followed by Region 2 (6.67 – 12.45) and Region 3 (3.31 – 5.14). Regions 4 – 7 had ≤ 1.45 wolves per 1,000 km<sup>2</sup>. Maps of pack and wolf densities demonstrate close alignment between known packs, locations of wolf harvests, and predictions from iPOM (Fig. 8).

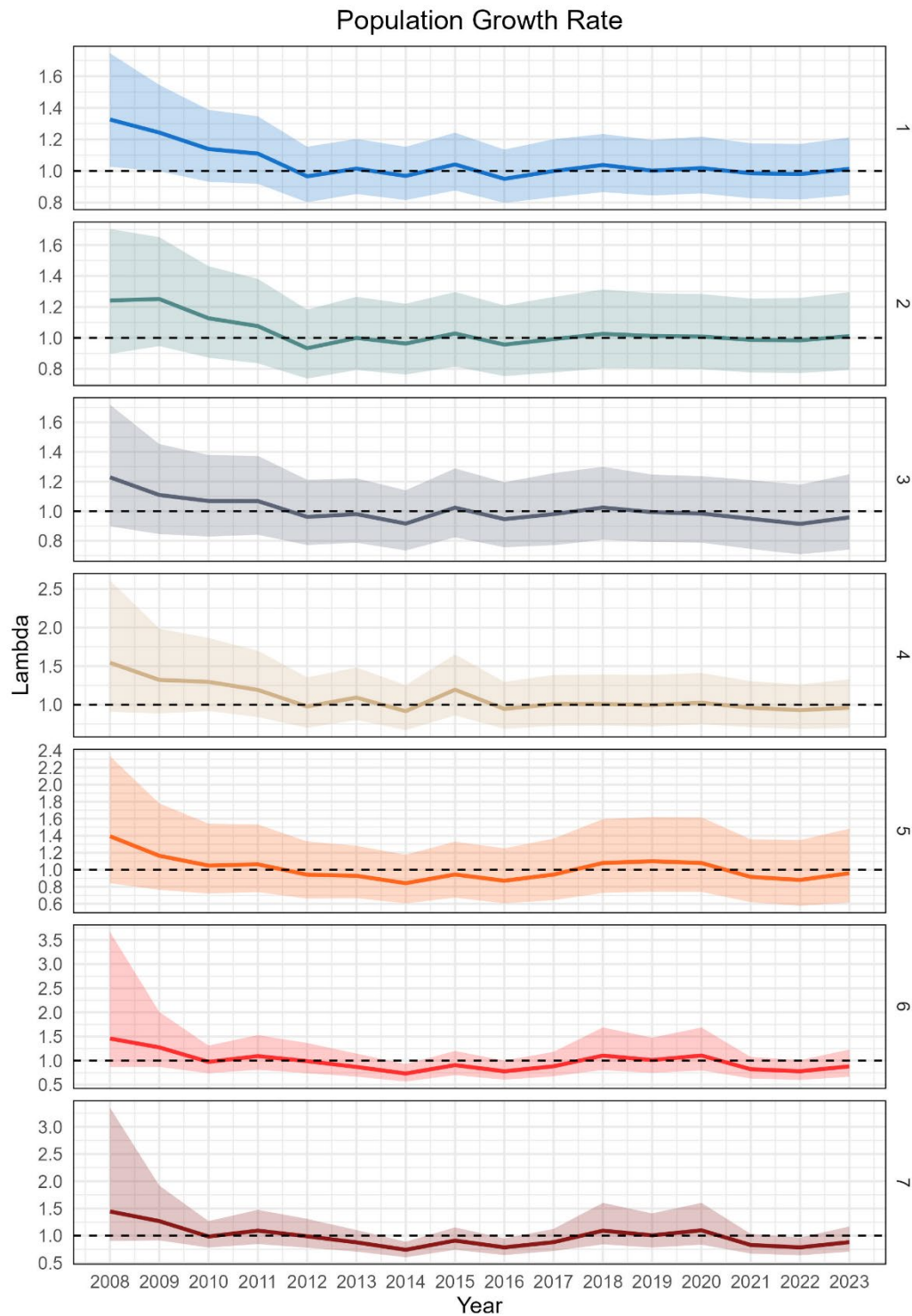
**Table 1.** Estimated area occupied by wolves (km<sup>2</sup>), number of wolf packs, and number of wolves in Montana, 2007 – 2023. Annual numbers were based on best available information and were retroactively updated as integrated patch occupancy modeling incorporated more information each year.

<b>Year</b>	<b>Area occupied</b>	<b>LCI area occupied</b>	<b>UCI area occupied</b>	<b>Packs</b>	<b>LCI packs</b>	<b>UCI packs</b>	<b>Wolves</b>	<b>LCI wolves</b>	<b>UCI wolves</b>
2007	38919	33474	45419	92	77	109	656	551	776
2008	49594	44065	55929	119	103	136	847	737	969
2009	61840	55933	68200	154	136	173	1027	913	1157
2010	64266	58922	70128	163	146	181	1152	1031	1284
2011	72323	67101	78149	189	171	208	1263	1143	1392
2012	78047	72653	84003	206	188	226	1208	1104	1325
2013	77649	72368	83583	206	188	225	1212	1105	1327
2014	72428	67231	78127	193	176	212	1143	1039	1261
2015	74938	70136	80209	200	183	219	1191	1087	1303
2016	70942	66423	76065	190	173	208	1128	1025	1241
2017	69979	65550	74950	187	171	206	1118	1016	1233
2018	71850	67268	77077	193	177	212	1153	1049	1266
2019	72186	67613	77155	194	177	212	1160	1057	1272
2020	73408	68731	78859	197	180	216	1175	1072	1291
2021	70686	66172	75763	191	174	210	1143	1037	1259
2022	67181	62650	72148	183	166	201	1097	996	1215
2023	66560	62084	71501	181	165	200	1096	993	1210

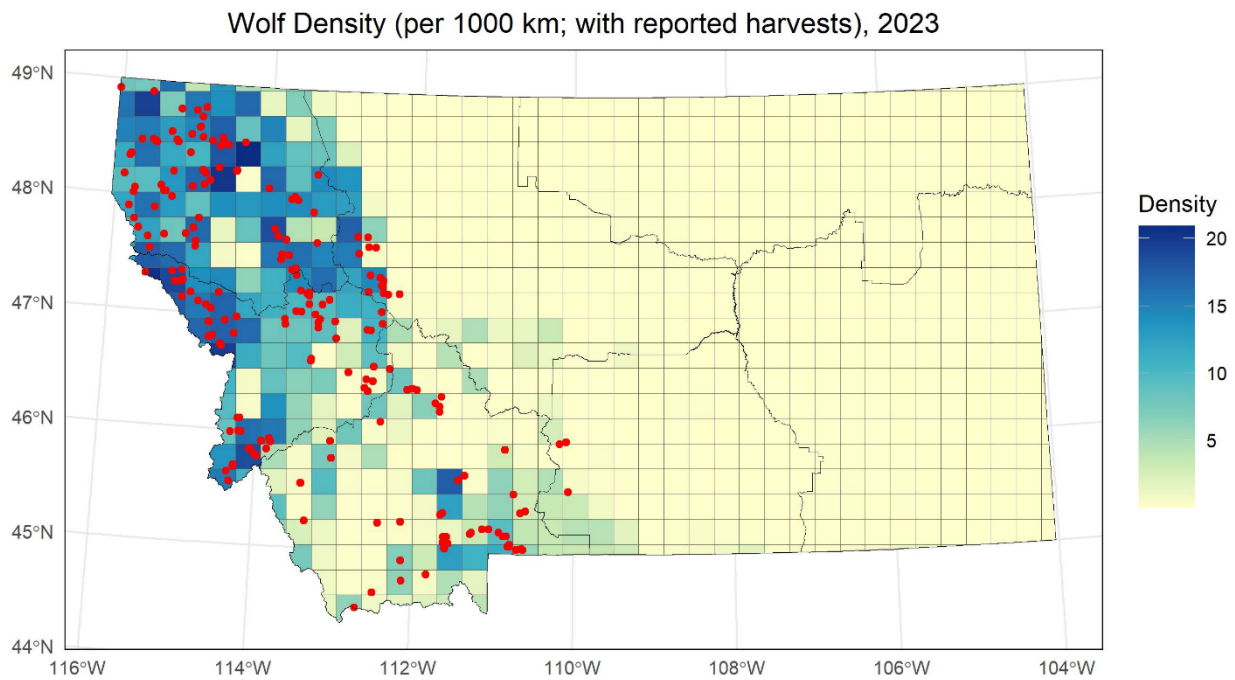
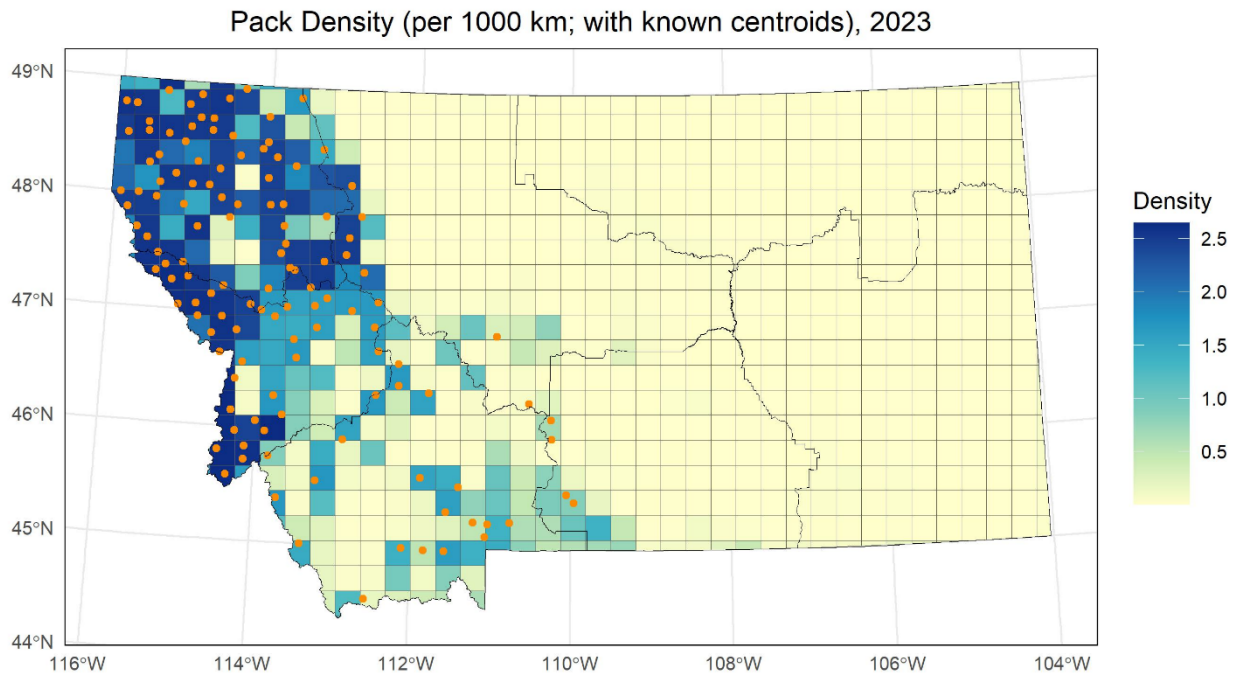




**Figure 6.** Estimated number of packs and wolves in Montana and by MFWP Administrative Region, 2007 – 2023. Ribbons indicate 95% credible intervals.



**Figure 7.** Population growth rate for wolves in MFWP Administrative Regions 1 – 7, 2008 – 2023. Values <1 indicate a declining population, whereas values >1 indicate a growing population. Ribbons indicate 95% credible intervals.



**Figure 8.** Estimated pack and wolf densities in Montana, 2023, per 1,000 km<sup>2</sup>. Orange points demarcate territory centroids identified through monitoring in 2023 (pack density map), whereas red points demarcate reported harvest locations in 2023 (wolf density map).

### 3. WOLF MANAGEMENT

#### 3.1 Regulated Public Hunting and Trapping

Regulated public harvest of wolves was recommended by the Governor's Wolf Advisory Council and is included in both Montana's Wolf Conservation and Management Plan that was approved by the USFWS during 2004 and the upcoming 2024 Wolf Plan. FWP has developed and implemented wolf harvest strategies that maintain a recovered and connected wolf population, reduce 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. Wolf seasons are to be reviewed no less frequently than every other year by the Fish and Wildlife Commission, but in practice get reviewed annually.

Because wolf conservation and management in Montana are governed by laws enacted by the state legislature, state laws provide detailed guidance on some wolf management activities. The Montana Code Annotated (MCA) is the current law, and specific sections can be viewed at <http://leg.mt.gov/bills/mca/index.html>. Legislative bill language and history that has created or amended MCA sections can be accessed at <http://leg.mt.gov/css/bills/Default.asp>.

Several changes to wolf harvest seasons resulted from the 2021 Montana Legislative Session, providing legislative intent to increase individual harvest opportunity and to reduce the state wolf population to a lower, sustainable level. Three sections of the MCA are of primary significance to recent changes in wolf harvest and season structure.

These are:

MCA 87-1-304 Fixing of Seasons and Bag and Possession Limits

MCA 87-1-901 Gray Wolf Management – Rule Making -- Reporting

MCA 87-6-214 Unlawful Contest or Prize

MCA 87-1-304 was amended in the 2021 Montana Legislative Session in response to HB 225 to adjust the trapping wolf trapping season dates. This law now provides the Montana Fish and Wildlife Commission the authority to adjust the start of the trapping season for specific wolf management units based on regional recommendations.

MCA-87-901 was amended in response to HB 224 and SB 314. Montana statute now states trapping seasons must allow for use of snares by holders of a trapping license. This statute also provides legislative intent to reduce Montana's wolf population to a lower, sustainable level, but no lower than the number of wolves needed to maintain 15 breeding pairs. This statute further provides Commission authority to apply different management techniques depending on conditions in each administrative region to include: allowing unlimited take of wolves on a single wolf hunting or trapping license, allowing use of bait while hunting or trapping wolves, and allowing hunting of wolves on private lands outside daylight hours with use of artificial light or night vision scopes.

MCA-87-6-214 was amended in response to SB 267 to allow for reimbursements of costs incurred related to the hunting or trapping of wolves for individuals licensed to hunt or trap wolves.

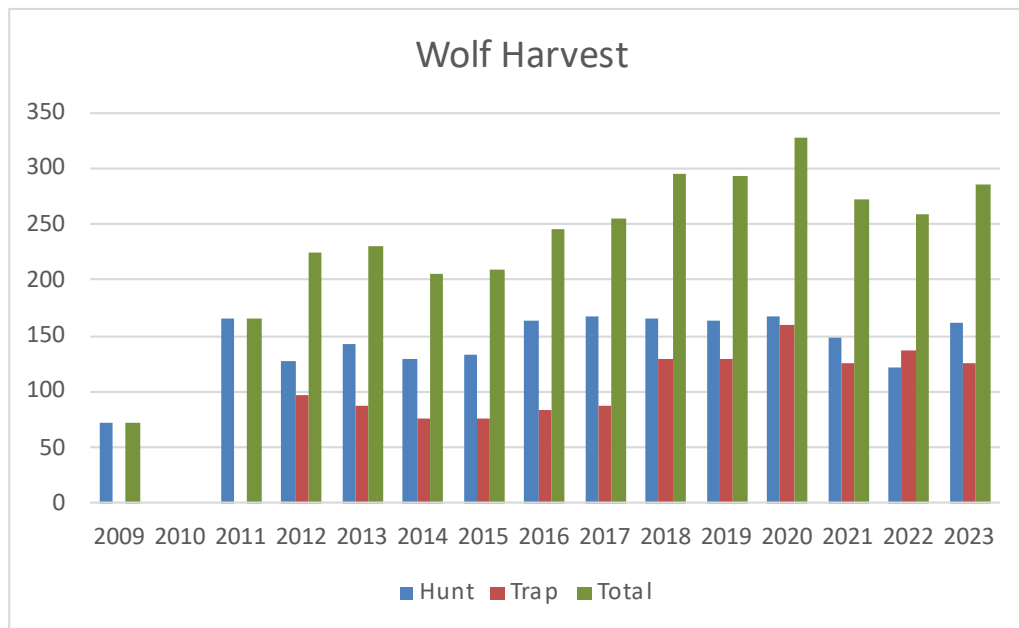
In response to these new laws, the Commission adopted changes to the 2021-2022 wolf hunting and trapping regulations. Changes included eliminating quotas for specific areas, increasing the number of wolf hunting licenses allowed for individual hunters (10 per hunter), increasing the number of wolves allowed to be legally harvested on one trapping license (10 per trapper), extending the wolf trapping season and implementing a floating start date within grizzly bear occupied areas, and adding new harvest tools to include snaring, night hunting on private property, and baiting. The Commission also adopted a set of regulatory components to reduce human safety concerns, reduce risk of overharvest, and reduce probability for take of federally protected lynx and grizzly bears. Under these new regulatory components, meeting any of the following criteria would initiate a Commission review with potential for rapid in-season adjustments to hunting and trapping regulations:

1. Incidental capture of a single lynx or grizzly bear in a trap or snare and each time a lynx or grizzly bear is captured thereafter
2. Statewide harvest of 450 wolves and after every additional 50 wolves harvested thereafter
3. Meeting the following thresholds for regional wolf harvest
  - Region 1 – 195 wolves
  - Region 2 – 116 wolves
  - Region 3 – 82 wolves
  - Region 4 – 39 wolves
  - Region 5 – 11 wolves
  - Region 6 – 3 wolves
  - Region 7 – 4 wolves

During their August 2022 meeting, the Commission adopted further modifications to these new regulatory components for the 2022-2023 wolf season. Wolf Management Units (WMUs) were mostly eliminated, though WMUs 313 and 316 north of Yellowstone National Park were retained and combined into the new WMU 313. After considering substantial public input, the Commission established a quota of 6 wolves for this unit. In addition, regional thresholds were transitioned to quotas (if a quota is reached, harvest is closed for the specified area), and specific areas referenced as “Regions” were renamed “Trapping Districts” to match the language in the furbearer regulations, which improved consistency in the newly combined wolf furbearer trapping and hunting regulations. These changes were maintained for the 2023-2024 season, with only slight modifications. Trapping Districts were renamed “Regions” for improved clarity for the public regarding harvest and quota tracking, and wolf harvest quotas were reduced across the state.

At the close of the 2023-24 wolf season (2023 License Year) on March 15, 2024, the harvest totaled 286 wolves, including 161 taken by hunters (56%) and 125 taken by trappers (44%). The 2023-24 season harvest was slightly higher than the previous two seasons (Fig. 9). Statewide wolf population appears to have peaked in 2011 and has declined slightly since then, with a 10-year average around 1140 wolves (Fig. 10). The total calendar-year 2023 wolf harvest in Montana was 254, including 144

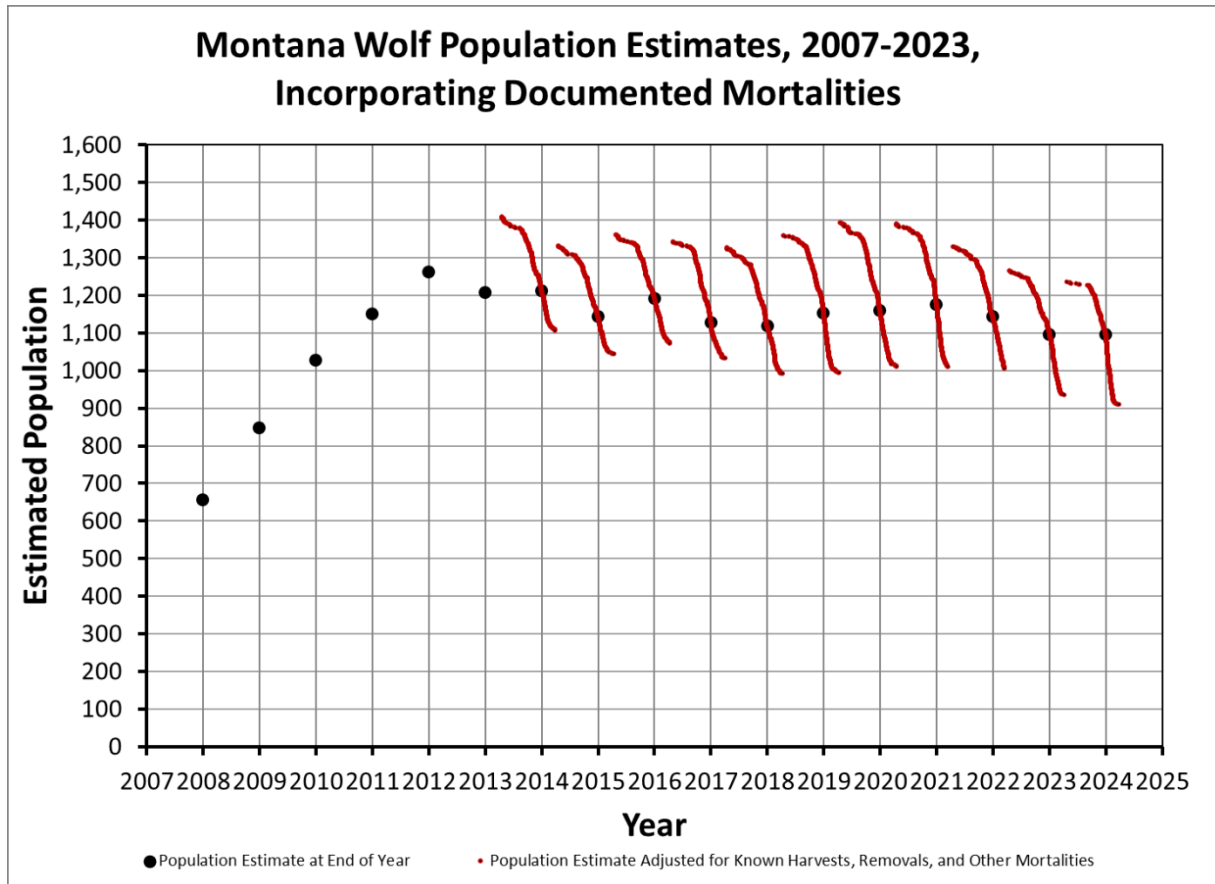
wolves harvested during spring of the 2022-23 season and 110 wolves harvested during fall of the 2023-24 season.



**Figure 9.** Number of wolves harvested in Montana by license year, separated by hunting and trapping, 2009–2023. Values drop to 0 in 2010 because wolves were briefly relisted under the Endangered Species Act.

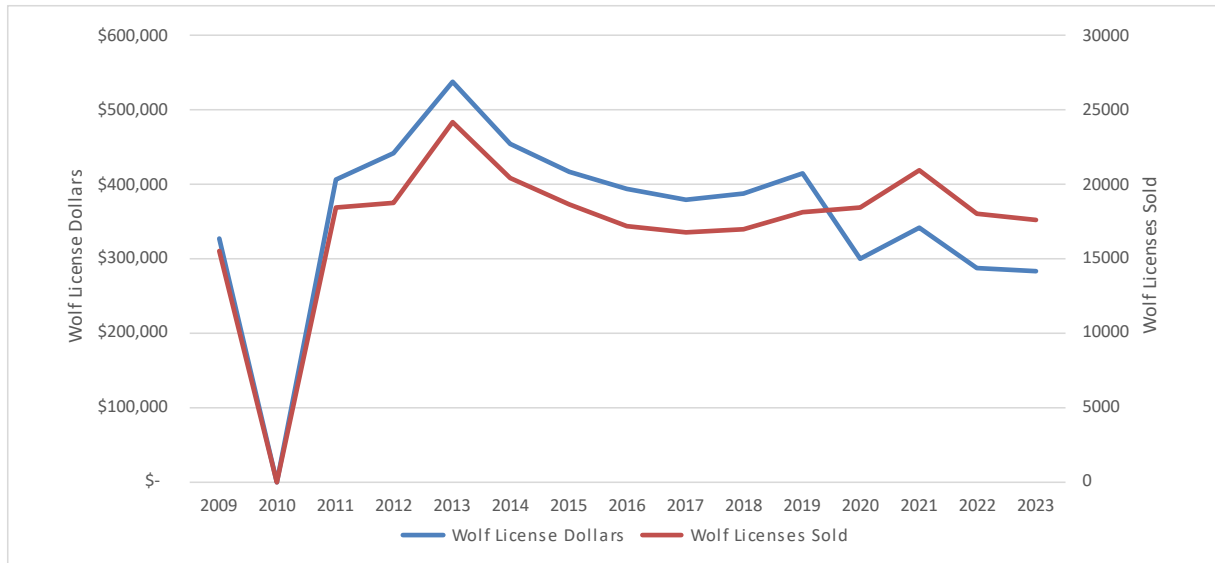
### Preliminary Injunction on Wolf Trapping

While Montana’s wolf trapping and snaring season dates are adopted each year by the Fish and Wildlife commission, a preliminary injunction issued by a federal court on November 21, 2023 limited the season due to concerns for incidental take of grizzly bears. The wolf trapping and snaring season in FWP regions 1, 2, 3, 4, and 5, as well as Hill, Blaine, and Phillips counties was limited to the time when grizzly bears are most likely to be in dens: January 1 through February 15. The State of Montana appealed the initial ruling, and on April 23, 2024, the 9<sup>th</sup> circuit court affirmed the temporal scope of the injunction, but ruled the injunction was geographically too broad, and remanded for the district court to reconsider the geographic scope. The updated geographic scope of the preliminary injunction and the final ruling on the overall case have yet to be determined.



**Figure 10.** Estimated wolf population size based on known mortalities anchored to December 31 Integrated Patch Occupancy Modelling estimates, 2007 – 2023.

During calendar year 2023, Montana sold 15,091 resident wolf hunting licenses (\$10 or \$12/each) and 2,539 non-resident wolf hunting licenses (\$25 or \$50/each). In calendar year 2020 the price of a resident wolf hunting license dropped from \$19 to \$12 and a discounted \$10 wolf hunting license was offered with the purchase of a sportsman’s tag. A discounted nonresident wolf hunting license was offered for \$25 with the purchase of a sportsman’s tag. Sale of these wolf licenses generated \$283,957 for wolf management and monitoring in Montana (Fig. 11). Total funding generated for wolf monitoring and management by the sale of wolf hunting licenses from 2009-2023 is nearly \$5.4 million. Because trapping licenses for both residents and non-residents are not wolf-specific, FWP cannot accurately quantify the financial contribution that wolf trapping generates.



**Figure 11.** Annual number of wolf hunting licenses sold and dollars generated for wolf conservation and management through sales of wolf hunting licenses in Montana 2009-2023.

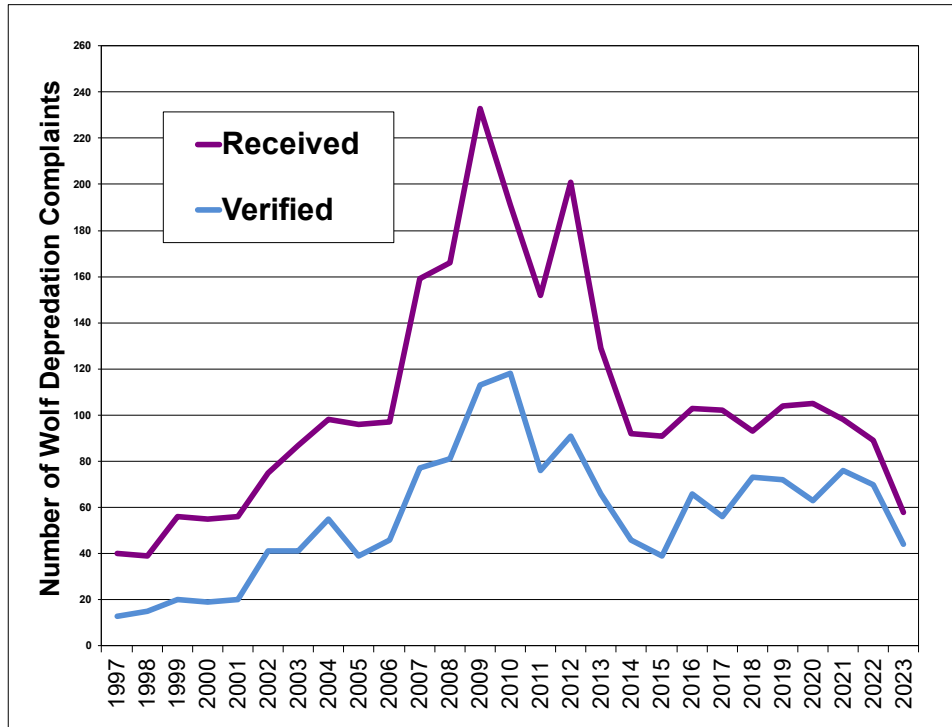
### 3.2 Wolf – Livestock Interactions in Montana

Montana wolves routinely encounter livestock on both private land and public grazing allotments. Wolves are opportunistic predators, most often seeking wild prey. However, some wolves learn to prey on livestock and teach this behavior to other wolves. The majority of cattle and sheep wolf depredation incidents confirmed by USDA Wildlife Services (WS) occur 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. Most cattle depredations occur during the spring or fall months while sheep depredations occur more sporadically throughout the year.

#### Wolf Depredation Reports

Wildlife Service’s workload increased through 2009 as the wolf population increased and distribution expanded (Fig. 6). The number of wolf depredation complaints received since those years has declined from 233 in FFY 2009 to approximately 100 or less from FFY14-FFY23. The number of depredation complaints dropped significantly in FFY 2023, when only 58 reports were received and 14 of those reports were determined to be unrelated to wolves (Fig. 12). Since 1997, about 54% of wolf depredation reports received by WS have been verified as wolf-caused. During FFY 2023, there were fewer depredation reports, but 76% of those reports were verified as wolf depredation.





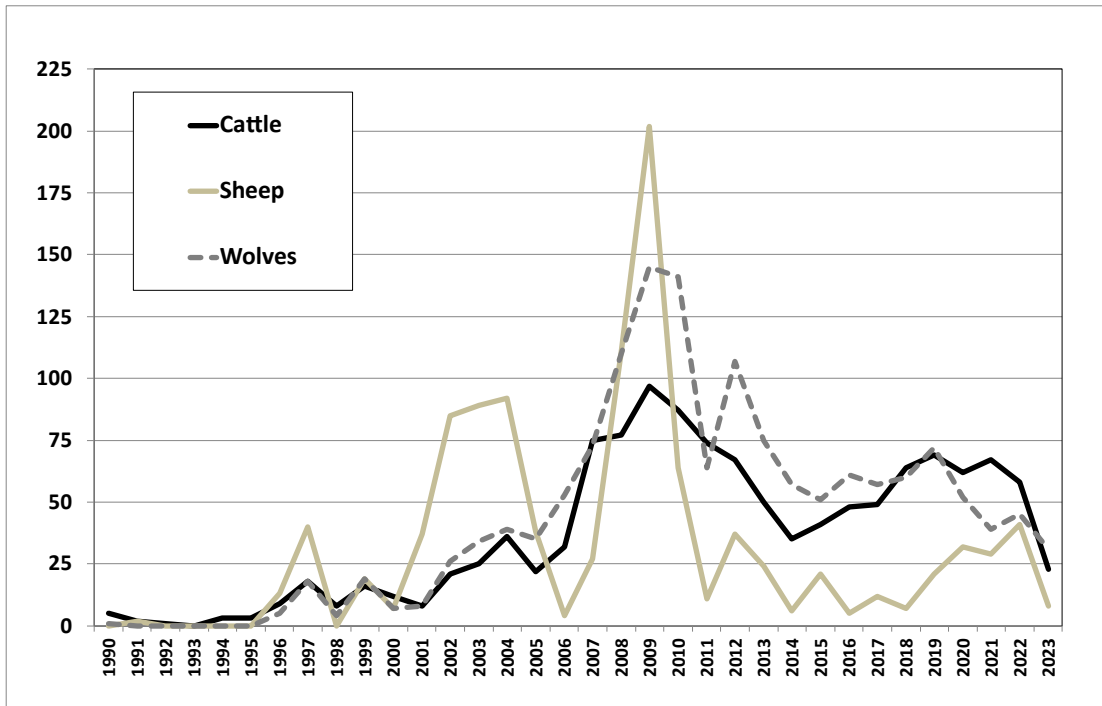
**Figure 12.** Number of complaints received by USDA Wildlife Services as suspected wolf damage and number of complaints verified as wolf damage, Federal Fiscal Year 1997-2023.

### **Wolf Depredation Incidents and Responses During 2023**

Wildlife Services confirmed that in 2023, wolves killed 23 cattle, 8 sheep, and 1 livestock guard statewide. Wildlife Services also determined that an additional 6 cattle, 1 sheep and 1 horse were probable wolf kills. Total confirmed cattle losses for 2023 were substantially lower than confirmed losses 2011-2022. Confirmed sheep losses were low in 2023 as well, despite a trend of increasing sheep depredations in recent years (Fig. 13). While these documented losses help provide valuable information on trends in livestock depredations, it's important to note that not all livestock mortalities are found. In some cases, the livestock go missing and their fate is unknown. In other cases, the carcass is found too late and has been scavenged too heavily for a depredation investigation to be conducted. Therefore, some livestock producers reported "missing" livestock and suspected wolf depredation. Others reported indirect losses including poor weight gain and reduced productivity of livestock in areas with wolf activity. While these reports are hard to confirm, there is no doubt that there are undocumented losses.

To address livestock conflicts and to reduce the potential for further depredations, 31 wolves were killed during 2023 (Fig. 13). This was lower than the average number of wolves removed due to depredation since meeting biological recovery goals in 2002 (Avg. = 67/year) and since delisting in 2011 (Avg. = 60/year). 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; from 2009-2023 an average of 10 wolves have been taken by private citizens each year. Twenty-seven wolves were removed in control actions by USDA Wildlife Services during 2023 and four wolves were killed by private citizens when wolves were seen chasing, killing, or threatening to kill livestock. The general decrease in livestock depredations since 2009 (Fig. 13) may be a result of

several factors, primarily more aggressive wolf control in response to depredations (DeCesare et al. 2018).



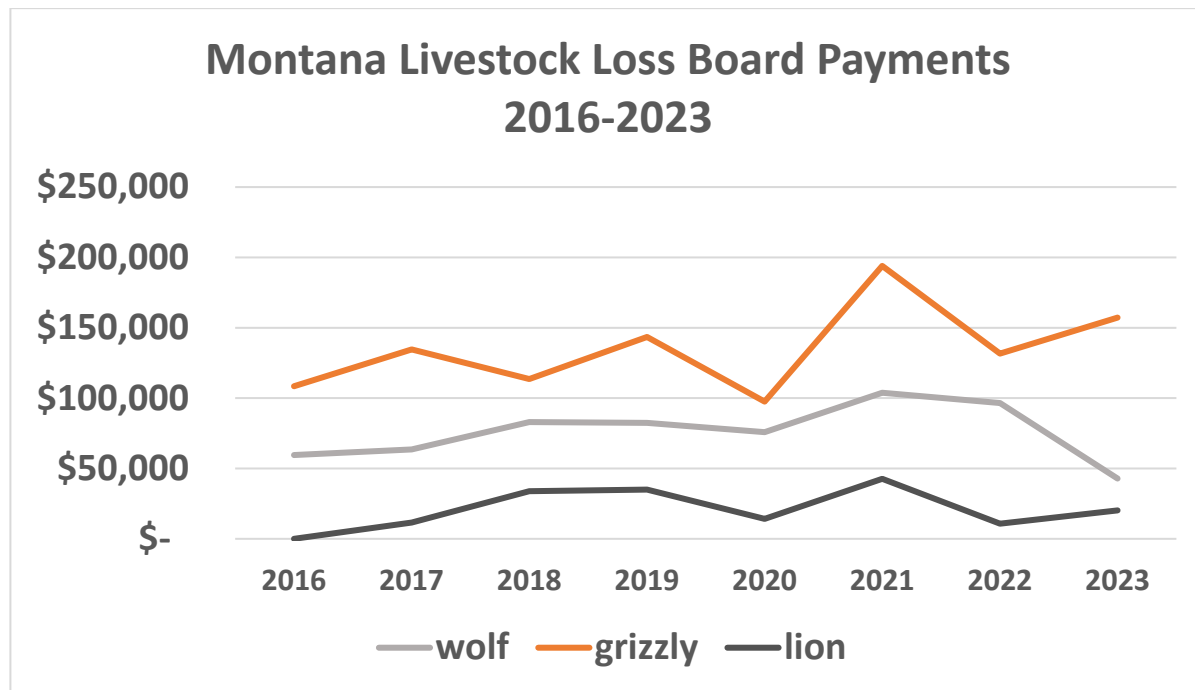
**Figure 13.** Number of cattle and sheep killed by wolves and number of wolves removed through agency control and legal depredation-related take by private citizens, 2000-2023.

### Montana Livestock Loss Board Payments

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 MLLB are 1) to provide financial reimbursements to producers for losses caused by wolves based on the program criteria, and 2) to proactively apply prevention tools and incentives to decrease the risk of wolf-caused losses and 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 Wildlife Services. Indirect losses and costs are not directly covered. 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.

Reimbursement totals for CY2023 wolf depredations were \$42,842.22 paid to 17 livestock owners on 26 head of livestock and 2 dogs. These numbers differ slightly from the WS confirmed losses due to wolves because reimbursements are also made for probable wolf depredations and tallied by calendar year rather than federal fiscal year. By comparison, confirmed and probable

losses totaled \$157,281.22 from grizzly bears and \$20,214.97 from mountain lions during 2023 (Figure 14).



**Figure 14.** Dollars paid to livestock producers in Montana Livestock Loss Board payments by calendar year, 2016–2023

### FWP Collaring of Livestock Packs

State Statute 87-1-623 requires Montana Fish, Wildlife and Parks to allocate wolf license dollars toward collaring wolf packs in livestock areas. The purpose of these efforts is to be able to more readily understand which wolf pack may have been involved in a livestock depredation. FWP employs five wolf specialists covering all FWP Regions (Appendix 1) along with seasonal technicians in Regions 1 and 2. Wolf specialists and technicians capture wolves and deploy collars during winter helicopter capture efforts and summer/fall trapping efforts. During 2023, FWP wolf specialists captured and collared 27 wolves (Table 2). USDA Wildlife Services also captured and collared 9 additional wolves for a total of 36 statewide by both agencies.

**Table 2.** Wolves captured and radio-collared by FWP Wolf Specialists during 2023.

	Helicopter	Summer/Fall	Total
Region 1	0	1	1
Region 2	0	15	15
Region 3	8	2	10
Region 4	0	1	1
<b>Total</b>	<b>8</b>	<b>19</b>	<b>27</b>

## **Proactive Prevention of Wolf Depredation**

FWP works cooperatively with livestock producers, NGOs, and WS to reduce risk of wolf-livestock conflicts by implementing a variety of conflict prevention tools. Wolf specialists actively engage by sharing information, technical expertise, equipment, materials, and hands-on field assistance on a variety of efforts around the state. Furthermore, FWP continues to collaborate on research designed to improve our understanding of current and developing proactive non-lethal tools. With increasing need for funding and technical assistance to make proactive conflict prevention tools available to livestock producers, FWP encourages coordination of all stakeholders striving to reduce wolf-livestock conflicts and support working lands and wildlife. Examples of continued partnerships and new proactive conflict prevention efforts are described below.

Proactive depredation prevention work continued in Northwest Montana with a 6th season of the range rider program in Region 1, this year with Josh Senecal in the Niarada area. The range rider travelled allotments on private land, Flathead Reservation, and Lolo National Forest land, and received support from the Natural Resources Defense Council; Defenders of Wildlife; Vital Ground; USDA AHPIS Wildlife Services; Montana Fish, Wildlife & Parks; U.S. Forest Service; and 7 livestock producers. The desired outcomes were to mitigate producer-predator conflicts, reduce cattle losses, reduce wolf and grizzly bear mortalities, find livestock carcasses and remove them, document presence of predators, and alert producers of predators among the herds. Chrissy Lambert also continued in her role as the Wildlife Services conflict prevention specialist for Northwest Montana, where she coordinated with several groups of non-profit and FWP employees installing preventative turbo fladry to protect calving areas on private ranch land.

In West-Central Montana, FWP continued partnering on two collaborative proactive risk management projects in the Blackfoot Valley: the Blackfoot Challenge range rider program and carcass pickup program. 2023 marked the 16th year of the range rider program, which employed four seasonal range riders and one permanent wildlife technician to monitor livestock and predators in areas occupied by the Arrastra Creek, Belmont, Chamberlain, Morrell Mountain, Inez, and Union Peak wolf packs. The carcass pickup program removed livestock carcasses from Blackfoot Valley ranches and transported them to the carcass compost site to reduce attractants in livestock grazing and calving areas. FWP and the Blackfoot Challenge also partnered with Wildlife Services for a seventh year to deploy fladry in the Blackfoot Valley to deter wolves from livestock calving yards.

FWP was also involved in two collaborative, proactive risk management projects in the Big Hole Valley. The first of these projects, a range rider program, completed its thirteenth season in 2022. The second project, a carcass pickup and composting program, completed its ninth year of operation.

In north-central Montana, the Rocky Mountain Front Conflict Reduction Project continued their range rider program for the seventh summer grazing season on private lands and USFS grazing allotments in the Augusta area. The program used 1-3 riders on private lands to monitor three ranches, Skunk Creek and a neighboring ranch (21,000 acres), and a new ranch in the southern

Little Belts (20,000 acres). The range riders rode to daily from July – October in Skunk Creek and July – August in the Little Belts. The program also kept riders “on call” to ride when conflicts or potential for conflicts might develop. Despite advertising this availability widely, the program received no calls. In 2023, the program area had no grizzly or wolf removals and no livestock losses, despite documented grizzly bear and wolf activity.

The USDA Wildlife Services Nonlethal Initiative also continued to grow and provided needed assistance with electric fencing and fladry across Montana in 2023. Dedicated nonlethal personnel include a full-time year-round Conflict Prevention Specialist position covering northwest Montana based in Kalispell, a full-time seasonal Conflict Prevention Specialist on the Rocky Mountain Front located in Browning, a full-time seasonal Conflict Prevention Specialist serving west-central Montana based in Victor, and a hybrid Conflict Prevention Specialist/Range Rider position that helps construct fences along the Rocky Mountain Front prior to, and following, the range season.

WS-Montana expanded range riding efforts in 2023 by adding a program to the Salish Mountain Range, creating an additional position to monitor Tribal, State, and private grazing allotments where historical predator conflicts have persisted. The previous programs on the Kootenai National Forest, Beaverhead-Deerlodge National Forest, and Blackfoot Nation Tribal lands continued from previous years. Across the 4 project areas, WS-Montana range riders monitor hundreds of thousands of acres of rangeland and nearly 14,000 cattle and 8,000 sheep on the allotments as part of their official duties. WS-Montana has identified several areas of interest for potential range riding programs and hopes to add more positions in 2024.

WS-Montana staff were present and spoke at a variety of events in FY23. Presentations on electric fencing, deterrents, and range riding were given at workshops. Personnel also provided information and assistance with electric fencing at multiple 4H meetings and demonstrated the value of nonlethal methods. WS-Montana facilitated meetings with stakeholders and agency partners to discuss seasonal expectations for the range rider programs.

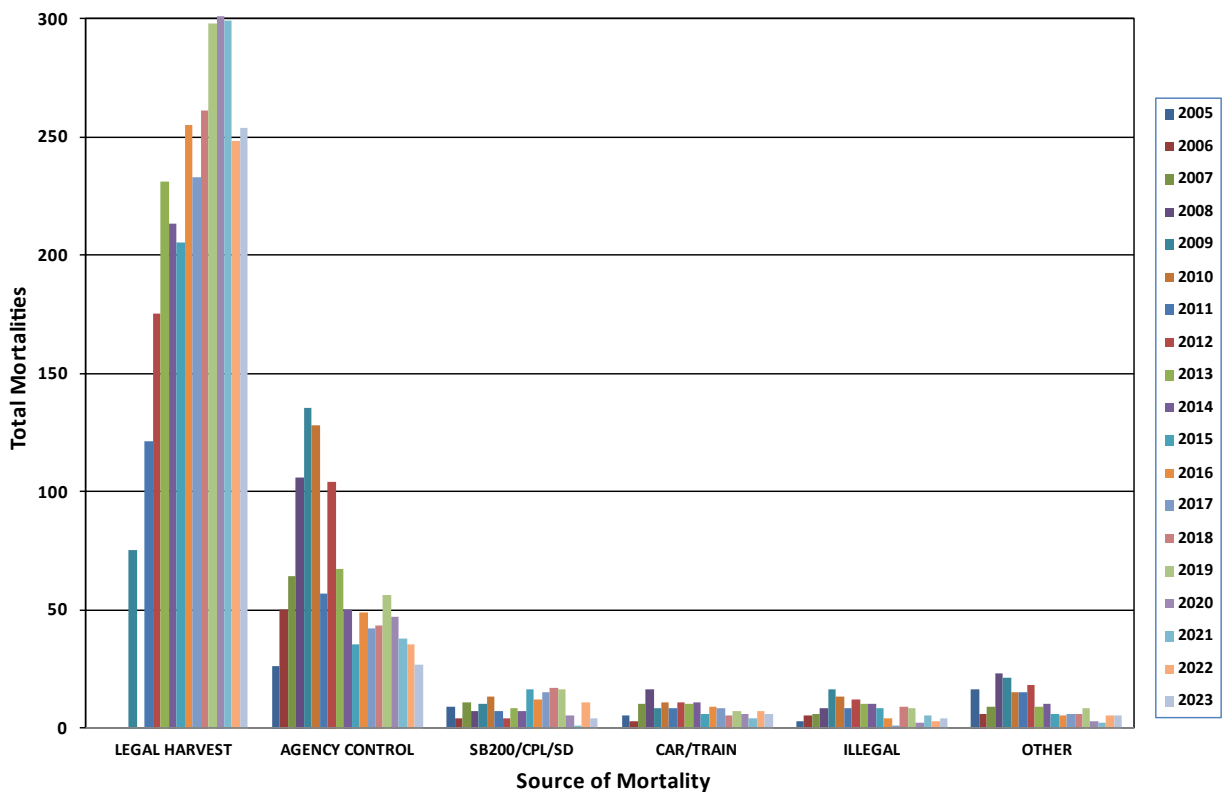
In June 2023, FWP worked closely with partner NGOs, agencies, and Tribes to plan and deliver a carnivore conflict prevention workshop, where over 100 participants gathered in Missoula. The workshop was convened to bring together diverse voices to learn from the group’s experiences and challenges living and working in landscapes shared with carnivores, and to explore a shared vision of opportunities and solutions that support working lands and large carnivores. As a result of this workshop, momentum is building to further align state and Tribal agency capacities with federal technical and financial assistance to support coordinated landowner, agricultural producer, and agency-implemented conflict prevention practices that reduce conflicts between agricultural operations and wildlife for the long term.

Another exciting development in carnivore-livestock conflict prevention came in November of 2023. The importance of working lands for large carnivores was recognized with two Regional Conservation Partnership Program grants awarded to Heart of the Rockies Initiative and Western Landowners Alliance. These awards will provide more than \$22 million to agricultural producers

in five western states (MT, OR, CO, NM, AZ) to support the adoption of conflict prevention tools like electric fencing (including turbo fladry), carcass pickup, and range riding over the next five years. Additionally, NRCS is exploring options to make virtual fencing available in the next few years, potentially adding a tool that can enhance the effectiveness of other prevention practices.

### 3.3 Total 2023 Documented Statewide Wolf Mortalities

FWP detected a total of 300 wolf mortalities during 2023 statewide due to all causes (Fig. 8). Undoubtedly, additional mortalities occurred but were not detected. Documented total wolf mortality in 2023 was 8% lower than 10-year average since 2013 (10-yr avg. = 328). The majority of the decrease was due to a reduced number of conflict removals with 31 occurring during calendar year 2023. Control actions were substantially lower than to 2018-2022, and approximately one-quarter of peak years. Of the 31 wolves removed in 2023 to protect livestock, 27 were removed by WS and 3 were legally killed by private citizens under Senate Bill 200 (87-1-901, MCA). One wolf was legally killed by a private citizen in self-defense under the Montana state law known as the Lawful Taking To Protect Livestock Or Person statute (87-6-106, MCA). Four wolves were documented as being killed illegally, and 6 wolves were documented as being killed by vehicle or train collision. Five wolves were documented as being killed by incidental take, natural, other, or unknown causes.



**Figure 15.** Minimum number of wolf mortalities documented by cause for gray wolves (2005-2022). Total number of documented wolf mortalities during 2023 was 300.

## 4. 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, presentations to school groups and other agency personnel, media interviews, and formal and informal presentations. In addition to these efforts, FWP prepared and distributed a variety of media releases to help Montanans become more familiar changes to Montana's wolf management.

As new needs to enhance public understanding of Montana's wolf monitoring and management strategies are identified, FWP continues to seeking solutions to improve transparency and provide information to the public. For example, in 2021 FWP developed a Wolf Harvest Dashboard website to provide real-time information on the status of wolf harvest in Montana for the current wolf hunting and trapping seasons

(<https://experience.arcgis.com/experience/34fbb4c9509e45959f6291965388c345/page/Summary/>). The dashboard provides information on the number of wolves harvested in each region or WMU, the quota and quota status for each region or WMU, and detailed information for each harvest record. FWP also identified public confusion surrounding the floating start dates for wolf trapping in areas of occupied grizzly habitat. In response, FWP developed the Wolf Trapping Season Status Map, which provides weekly updates in November and December on trapping season start dates based on FWP evaluation of grizzly bear denning activity.

## 5. FUNDING

### 5.1 Montana Fish, Wildlife & Parks Funding

Funding for wolf conservation and management in Montana is controlled by laws enacted by the state legislature. State laws also provide detailed guidance on some wolf management activities. The Montana Code Annotated (MCA) is the current law, and specific sections can be viewed at <http://leg.mt.gov/bills/mca/index.html>. Legislative bill language and history that has created or amended MCA sections can be accessed at <http://leg.mt.gov/css/bills/Default.asp>. Three sections of the MCA are of primary significance to wolf management and funding.

These are:

MCA 87-5-132 Use of Radio-tracking Collars for Monitoring Wolf Packs

MCA 87-1-623 Wolf Management Account

MCA 87-1-625 Funding for Wolf Management

MCA 87-5-132 was created during the 2005 legislative session by Senate Bill 461. It has been amended twice, both times during the 2011 legislative session, by House Bill 363 and Senate Bill 348. This law requires capturing and radio-collaring an individual within a wolf pack that is active in an area where livestock depredations are chronic or likely.

MCA 87-1-623 was created during the 2011 Legislative Session by House Bill 363. 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.

MCA 87-1-625 was created during the 2011 Legislative Session by Senate Bill 348. This law required FWP to allocate \$900,000 annually toward wolf management. "Management" in MCA 87-1-625 is defined as in MCA 87-5-102, which 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. During the 2015 legislative session, Senate Bill 418 reduced this amount to \$500,000 of spending authority.

The wolf management budget for state fiscal year 2023 (July 1, 2022 – June 30, 2023) was \$734,878.35 and consisted of \$477,140.00 of federal PR funds and \$257,738.35 of Montana wolf and general license dollars.

Funding was used to pay for FWP's field presence to implement population monitoring, collaring, outreach, hunting, trapping, and livestock depredation response. During state fiscal year 2023, the wolf program had 5 base wolf specialists/FTE dedicated to wolf management, and 1 total FTE for two 6-month technicians to increase collaring efforts in wolf packs associated with livestock. FWP also renewed the financial agreement with Wildlife Services for their role in wolf depredation management efforts. Other wolf 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.

## **5.2 USDA Wildlife Services Funding**

Wildlife Services is the federal agency that 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, WS conducts the control actions on wolves as authorized by FWP. Control actions may include radio-collaring and/or lethal removal of wolves implicated in livestock depredation events. FWP also authorizes WS to opportunistically radio-collar wolf packs



that do not have an operational radio-collar attached to a member of the pack in order to fulfill the requirements of Montana State Statute 87-5-132.

As a federal agency, WS receives federal appropriated funds for predator damage management activities, but no federal 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 2012-2023.

In FFY 2023, WS budget for conducting wolf damage management in Montana was \$654,515. The FFY 2023 funding included \$363,000 from Federal appropriations, including non-lethal initiative funds, \$135,000 from FWP, \$113,958 from the Montana Department of Livestock wolf mitigation fund, \$25,250 from NGOs, and \$17,308 from the Montana Livestock Loss Board.

## **6. PERSONNEL AND ACKNOWLEDGEMENTS**

The 2023 FWP wolf specialist team included Wendy Cole, Tyler Parks, Nathan Lance, Subhadeep Bhattacharjee, and Sarah Zielke.

Wolf specialists worked closely with regional wildlife managers in FWP regions 1-5, including Neil Anderson, Liz Bradley, Warren Hansen, Cory Loeker, and Matt Ladd, as well as Carnivore Coordinator, Molly Parks. Wolf technicians provided seasonal assistance monitoring and trapping with the specialists in regions 1 and 2. FWP Helena and Wildlife Health Lab staff contributed time and expertise including Missy Erving, Justin Gude, Anne Howes, Xander Kennedy, Quentin Kujala, Greg Lemon, Ken McDonald, Pam Benson, Morgan Creamer, Adam Messer, Kevin Podruzny, Jennifer Ramsey, Brian Wakeling, Adam Petersen, and Cara Whalen. 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 to wolf management and administration of the program.

FWP thanks Sarah Sells with the Montana Cooperative Wildlife Research Unit at the University of Montana for her assistance developing 2023 iPOM wolf estimates.

FWP thanks The Blackfoot Challenge and their range riders: Eric Graham, Vicki Pocha, and Sigrid Olson. The Blackfoot Challenge worked with ranchers and landowners to reduce wildlife conflict in the Blackfoot watershed using range riders, fladry, and carcass pick-up.

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 and non-lethal damage management and radio-collaring activities in a timely fashion. We also thank WS for assisting

with monitoring wolves and for delivering conflict prevention tools throughout Montana. WS personnel involved in wolf management in Montana during 2023 included; assistant regional director John Steuber, western district supervisor Kraig Glazier; state director Dalin Tidwell; western assistant district supervisor Chad Hoover; eastern district supervisor Doug Ekberg eastern assistant district supervisor Alan Brown; wildlife disease biologist Jerry Wiscomb; wildlife biologist Zack May; helicopter pilot Eric Waldorf and Keith Olsen; helicopter/airplane pilot John Martin; airplane pilots Guy Terrill, Justin Ferguson, and Scott Snider; wildlife specialists, Charlie Tailfeathers, Glenn Hall, Micheal “Finny” Helske, John Maetzold, Graeme McDougal, John Miedtke, Kurt Miedtke, Brian Noftsker, Ted North, Scott Olson, Christine Lambert, Luke Peebles, Cody Richardson, Jim Rost, Kirk “Skippy” Sims, Bart Smith, Brian Smith, Logan Sinclair, Pat Sinclair, Peter Tatsey, Danny Thomason, and Dane Williams.

We acknowledge the work of the citizen-based Montana Livestock Loss Board which oversees implementation of Montana’s reimbursement program and the conflict prevention grant money, and we thank the LLB’s coordinator, George Edwards.

We thank Kyran Kunkel of Conservation Science Collaborative, Inc. for his continued coordination of a range rider program on private and public land along the Southern Rocky Mountain Front. We also thank the range riders on these efforts and were instrumental in working with local producers to monitor livestock and predator activity in the area.

We thank Confederated Salish and Kootenai Tribal biologists Payton Adams and Paden Alexander for monitoring wolves in and around their respective tribal reservation.

The Montana Wolf Management program field operations also benefited in a multitude of ways from the continued cooperation and collaboration of other state and federal agencies and private interests such as the USDA Forest Service, Montana Department of Natural Resources and Conservation (“State Lands”), U.S. Bureau of Land Management, Weyerhaeuser Company, Stimpson Lumber Company, Southern Pines Plantation, Glacier National Park, Yellowstone National Park, Idaho Fish and Game, Wyoming Game and Fish, Nez Perce Tribe, Canadian Provincial wildlife professionals, Turner Endangered Species Fund, People and Carnivores, Wildlife Conservation Society, Keystone Conservation, Boulder Watershed Group, Big Hole Watershed Working Group, the Madison Valley Ranchlands Group, the upper Yellowstone Watershed Group, the Blackfoot Challenge, Tom Miner Basin Association, the Granite County Headwaters Working Group, and Avista.

We deeply appreciate and thank our pilots whose unique and specialized skills, help us find wolves, get counts, assist with helicopter captures, and keep us safe in highly challenging, low altitude mountain flying situations. They include Joe Rahn (FWP Chief Pilot), Neil Cadwell (FWP Pilot and Lowell Hansen/ Piedmont Aviation. We also thank Quicksilver Aviation for their safe and efficient helicopter capture efforts.

## 7. LITERATURE CITED

- Bassing, S. B., D. E. Ausband, M. S. Mitchell, P. Lukacs, A. Keever, G. Hale, and L. Waits. 2019. Stable pack abundance and distribution in a harvested wolf population. *Journal of Wildlife Management* 83:577–590.
- Brooks, S. P. 2003. Bayesian computation: a statistical revolution. *The Royal Society* 361:2681–2697.
- DeCesare, N. J., S. M. Wilson, E. H. Bradley, J. A. Gude, R. M. Inman, N. J. Lance, K. Laudon, A. A. Nelson, M. S. Ross, and T. D. Smucker. 2018. Wolf-livestock conflict and the effects of wolf management. *Journal of Wildlife Management* 82(4):711-722.
- Erb, J., C. Humpal, and B. Sampson. 2018. Distribution and abundance of wolves in Minnesota, 2017-18. Volume 1. St. Paul, USA.  
<<https://files.dnr.state.mn.us/wildlife/wolves/2018/survey-wolf.pdf>>.
- Fuller, T. K., L. D. Mech, and J. Fitts-Cochran. 2003. Wolf population dynamics. Pages 161–191 *in* L. D. Mech and L. Boitani, editors. *Wolves: Behavior, Ecology and Conservation*. University of Chicago Press, Chicago, Illinois.
- Glenn, E.S., L.N. Rich, and M.S. Mitchell. 2011. Estimating numbers of wolves, wolf packs, and breeding pairs in Montana using hunter survey data in a patch occupancy model framework: final report. Technical report, Montana Fish, Wildlife and Parks, Helena Montana.
- Holyan, J., J. Husseman, J. Struthers, B. Thomas, J. Rachael, C. White, and C. Mack. 2013. 2012 Idaho Wolf Monitoring Progress Report.
- Inman, B., K. Podruzny, A. Nelson, D. Boyd, T. Parks, T. Smucker, M. Ross, N. Lance, W. Cole, M. Parks, and S. Wells. 2020. Montana Gray Wolf Conservation and Management 2019 Annual Report. Helena, Montana.
- Miller, D. A. W., J. D. Nichols, J. A. Gude, L. N. Rich, K. M. Podruzny, J. E. Hines, and M. S. Mitchell. 2013. Determining occurrence dynamics when false positives occur: estimating the range dynamics of wolves from public survey data. *PLoS ONE* 8:1–9.
- Plummer, M. 2003. JAGS: A program for analysis of Bayesian graphical models using Gibbs sampling. *Proceedings of the 3rd International Workshop on Distributed Statistical Computing (DSC 2003)* 20–22.
- Plummer, M., A. Stukalov, and M. Denwood. 2019. rjags: Bayesian Graphical Models using MCMC. <<http://mcmc-jags.sourceforge.net>>.
- R Core Team. 2020. R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria, Austria. <<https://www.r-project.org/>>.
- Rich, L. N., R. E. Russell, E. M. Glenn, M. S. Mitchell, J. A. Gude, K. M. Podruzny, C. A. Sime, K. Laudon, D. E. Ausband, and J. D. Nichols. 2013. Estimating occupancy and predicting

numbers of gray wolf packs in Montana using hunter surveys. *Journal of Wildlife Management* 77:1280–1289.

Sells, S. N., A. C. Keever, M. S. Mitchell, J. A. Gude, K. M. Podruzny, and B. Inman. 2020. Improving estimation of wolf recruitment and abundance, and development of an adaptive harvest management program for wolves in Montana. Final Report for Federal Aid in Wildlife Restoration Grant W-161-R-1. Helena, Montana.

Sells, S. N., and M. S. Mitchell. 2020. The economics of territory selection. *Ecological Modelling* 15.

Sells, S. N., M. S. Mitchell, K. M. Podruzny, J. A. Gude, A. C. Keever, D. K. Boyd, T. D. Smucker, A. A. Nelson, T. W. Parks, N. J. Lance, M. S. Ross, and R. M. Inman. 2021. Evidence of economical territory selection in a cooperative carnivore. *Proceedings of the Royal Society B: Biological Sciences* 288:20210108.

Sells, S. N., K. M. Podruzny, J. J. Nowak, T. D. Smucker, T. W. Parks, D. K. Boyd, A. A. Nelson, N. J. Lance, R. M. Inman, J. A. Gude, S. B. Bassing, K. E. Loonam, and M. S. Mitchell. 2022. Integrating basic and applied research to estimate carnivore abundance. *Ecological Applications*.

Wilensky, U. 1999. NetLogo. Center for Connected Learning and Computer-Based Modeling, Northwestern University, Evanston, IL. <<http://ccl.northwestern.edu/netlogo/>>.

# APPENDICES

## APPENDIX 1

### MONTANA CONTACT INFORMATION

#### **Montana Fish, Wildlife & Parks**

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406-751-4586  
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#### **USDA Wildlife Services**

**(to request investigations of injured or dead livestock):**

Dalin Tidwell  
USDA WS State Director, Billings  
(406) 657-6464 (w)

Kraig Glazier  
USDA WS West District Supervisor, Helena  
(406) 439-5943 (c)

Doug Eckberg  
USDA WS East District Supervisor, Columbus  
(406) 657-6464 (w)  
(406) 601-9213 (c)

#### **TO REPORT A DEAD WOLF OR POSSIBLE ILLEGAL ACTIVITY:**

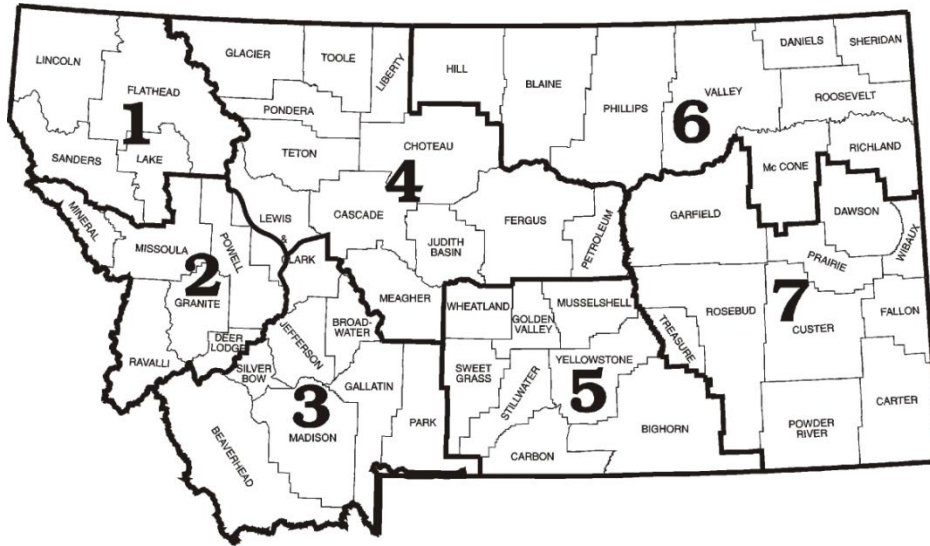
##### **Montana Fish, Wildlife & Parks**

- 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/fishAndWildlife/management/wolf/>

# MONTANA FISH WILDLIFE & PARKS ADMINISTRATIVE REGIONS



**STATE HEADQUARTERS**  
 MT Fish, Wildlife & Parks  
 1420 E 6<sup>th</sup> 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 19<sup>th</sup>  
 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

**REGION 6**  
 54078 US Hwy 2 W  
 Glasgow, MT 59230  
 (406) 228-3700

**HAVRE Area Res Office (HvARO)**  
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 Havre, MT 59501  
 (406) 265-6177

**REGION 7**  
 Industrial Site West  
 PO Box 1630  
 Miles City, MT 59301  
 (406)234-0900

## APPENDIX 2

### 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 and predator-prey relationships to wolf-livestock relationships, policy, or wolf management. In addition, the findings of some completed projects get published in the peer-reviewed literature. The recent efforts are summarized below, with updates or project abstracts.

#### 1. WOLF MANAGEMENT STRATEGY EVALUATION

Investigators: Hannah A. Sipe, Sarah N. Sells, Justin A. Gude, Kevin M. Podruzny, Molly Parks, Michael S. Lewis, Alexander L. Metcalf, and Elizabeth C. Metcalf

Status: Research in progress

This project aims to develop a decision-relevant modeling tool to inform decisions about wolf management in Montana. Management strategy evaluation (MSE) is a modeling framework that uses simulation to test how potential management strategies perform in terms of management objectives. MSE uses current understanding and available information to simulate ‘truth’ under different management scenarios. It also enables simulating data collection and estimation methods to evaluate how different monitoring designs impact management decisions. For wolf management in Montana, MSE will provide decision makers with an opportunity to consider both short- and long-term tradeoffs between management objectives. Ultimately, this work seeks to assist decision makers and managers in making decisions about management, including harvest, and monitoring activities.

#### 2. CONSERVATION INNOVATION TO REDUCE PREDATOR CONFLICTS ON WORKING LANDS

Investigators: Dr. Stewart Breck, Dr. Julie Young, Dr. Jared Beaver, Dr. Kyran Kunkel, Rae Nickerson, and Matthew Hyde.

Status: Research in progress, anticipated completion 2025

The Conflict on Workinglands Conservation Innovation Grant (CoW-CIG) is an initiative funded by the Natural Resources Conservation Service and is composed of Heart of the Rockies, Western Landowners Alliance, Utah State University, Colorado State University, USDA-Wildlife Services, Montana State University and others. The objective of the project is to reduce the financial burden of living with large carnivores by reducing the direct and indirect impacts that wolves and grizzly bears can have on livestock production systems. The CoW-CIG research is focused on three commonly employed but understudied non-lethal tools: fencing, range riding, and livestock carcass management. Together with livestock producers, conservation organizations and others, the CoW-CIG co-produces research by collectively identifying research gaps, data collection techniques, and analyzing and interpreting results.



By using existing data from state wildlife agencies (including MFWP, producers, and NGOs) and targeted field trials, the team aims to fill existing knowledge gaps to better address conflict.

Current research in Montana: The CoW-CIG is working with MFWP to evaluate the effectiveness of carcass management and range riding. Using GPS collar data for grizzly bears and wolves, the team is investigating to what degree these carnivores are attracted to livestock carcass sites and how these sites impact the time they spend on ranchlands, leading to indirect impacts to livestock and possibly depredations. For range riding, the team is working with producers across the state to collect data on predator activity, cattle stress responses and rider activity to evaluate rider potential to reduce conflict. Both efforts also include interviews and surveys with producers and riders to help improve the application of NRCS programming. The results will be shared through the project at designated producer workshops, and through peer-reviewed publications.

### **3. EVALUATIONG HABITAT, CARNIVORE ABUNDANCE AND ELK VITAL RATES IN PILGRIM CREEK, MONTANA**

Investigators: Kelly Proffitt, Chad Bishop, Paul Lukacs, and Joshua Millspaugh

The primary goal of this project is to create analytical tools to support an adaptive management program of elk in northwest Montana. Adaptive management plans aim to increase knowledge and decrease uncertainty through a data driven decision-making process that incorporates new information as it becomes available. We aim to develop predictive models for elk based on past, current, and future research findings to understand better what factors are influencing their population dynamics. The goal of these models is to assess how carnivore management and other factors are impacting elk population vital rates such as survival, recruitment, and fecundity, and use this information to achieve elk population objectives.

## APPENDIX 3

# 2024-2028 Wolf population forecasting report

Alixandra Godar, David Messmer, and Justin Gude

### Summary

The FWP commission was directed by the 2021 Montana legislature (SB 314) to reduce wolf populations to a sustainable level that is not less than the number needed to support 15 breeding pairs. The draft 2023 Montana Gray Wolf Conservation and Management Plan establishes 450 wolves as a conservative minimum number that will ensure 15 breeding pairs exist. The legislation emphasized and expanded the commission's authority to implement additional hunting and trapping regulations to accomplish this, including extended seasons, increased bag limits, and expanded hunting and trapping options such as snares, night-hunting, and the use of bait. To support the commission's decision-making process, the FWP Research Unit made projections of the impacts of 8 human-caused mortality scenarios (annual totals of 301, 333, 356, 366, 403, 453, 503, and 553) on wolf population sizes. These human-caused mortality scenarios represent the recent 10-year annual mean of 53 depredation removals added to public harvest levels of 248 (the recent 5-year minimum public harvest), 280 (the recent 5-year mean public harvest), 303 (the recent 5-year maximum public harvest), 313 (the 2023-2024 License Year quota), 350, 400, 450, and 500. The latter 5 projected harvest levels represented increases from the recent public harvest, consistent with the intent to reduce the statewide wolf population size. For example, a public harvest of 350 would be 96 more wolves than the 2023 Calendar Year (254) and 70 more than the 2019-2023 average (280). The simulation scenarios are therefore intended to represent a range of elevated public harvest levels that may be possible with the liberalized regulations to compare with maintaining current harvest trends. In each simulation scenario, we held total human-caused mortalities constant each future year. We generated projections with simulations from a population growth model that used past estimates of statewide wolf population size and an index of human-caused mortality rate (harvest and depredation removals during Jan 1–Dec 31 year  $t$  / population estimate for Dec year  $t-1$ ) to forecast population sizes 5 years into the future. This human-caused mortality rate is an index to facilitate forecasting based on the empirical relationship with estimated growth rates. With the below average public harvest and depredation removals in Calendar Year 2023 (harvest=254, removals=31), statewide wolf population estimates remained stable from the previous year, consistent with the empirical relationship between human caused mortality rates and wolf population growth. Forecasting results indicate that when combined with the 10-year mean (2014-2023) number of depredation removals, continued public harvest at the recent 5-year minimum (2019-2023) would result in a relatively stable population. In comparison, a continued public harvest at the recent 5-year mean (2019-2023) would result in a slightly declining statewide population while public harvest levels of 303, 313, 350, 400, 450, and 500 would result in population declines of increasing magnitude. If the latter 4 harvest levels were to continue for more than two or three years, wolf population size would approach levels that could not support 15 breeding pairs within the 5-year projection period in each case, and this would occur faster at the higher projected harvest levels.

## Methods

### Annual wolf population sizes –

We used mid-winter (Dec) wolf population size estimates from an integrated patch occupancy model (iPOM) (Sells et al. 2022). With iPOM, an occupancy model estimates the extent of wolf distribution in Montana, and a territory model predicts territory sizes; together, these models predict the number of packs. A group size model predicts pack sizes. Total abundance estimates are derived by combining the estimated number of packs and pack sizes, while also accounting for lone and dispersing wolves. Further detail can be found in Sells et al. (2022) and the 2023 wolf annual report (Parks et al. 2024).

### Modeling wolf population dynamics–

We used the mid-winter iPOM population estimates ( $Y_t$ , Dec of year  $t$ ; Figure 1A,B) and their associated measures of uncertainty ( $\sigma_{t\text{observation}}$ ) as the input for a model of annual population dynamics which estimated the effect of the human-caused mortality rate index. Human-caused mortality (Jan 1 – Dec 31 of year  $t$ ; Figure 1C) was estimated as mandatory reported hunter harvest and lethal removal of wolves involved in livestock depredation by USDA Wildlife Services and private landowners (under applicable Montana statute). For this analysis, a year is defined as the Calendar Year (Jan 1 – Dec 31) and harvest and lethal removal numbers will differ from the 2023 License Year. Our model took an empirical approach, modeling past annual growth rates ( $\lambda_t$ ; Figure 1B) as a function of the annual index of human-caused mortality rate ( $H_t = \text{human caused mortality}_t / Y_{t-1}$ ; Figure 1D). This is similar to previous work by Gude et al. (2012), except here we use iPOM population estimates rather than minimum population counts, and our approach includes an observation model that accounts for uncertainty in the iPOM population estimates. It is important to note that that  $H_t$  should not be misconstrued as the actual percentage of the Dec  $t-1$  population ( $Y_{t-1}$ ) that is removed. Harvest and removals occur throughout the Calendar Year, which encompasses a birth pulse in early spring. Those young of the year are available for harvest in the 2<sup>nd</sup> half of the Calendar Year, thus the true percent of the  $Y_{t-1}$  removed is lower than  $H_t$ . Similarly, a dispersal pulse occurs in early winter with an unknown number of wolves entering and leaving the Montana population. The population model is as follows:

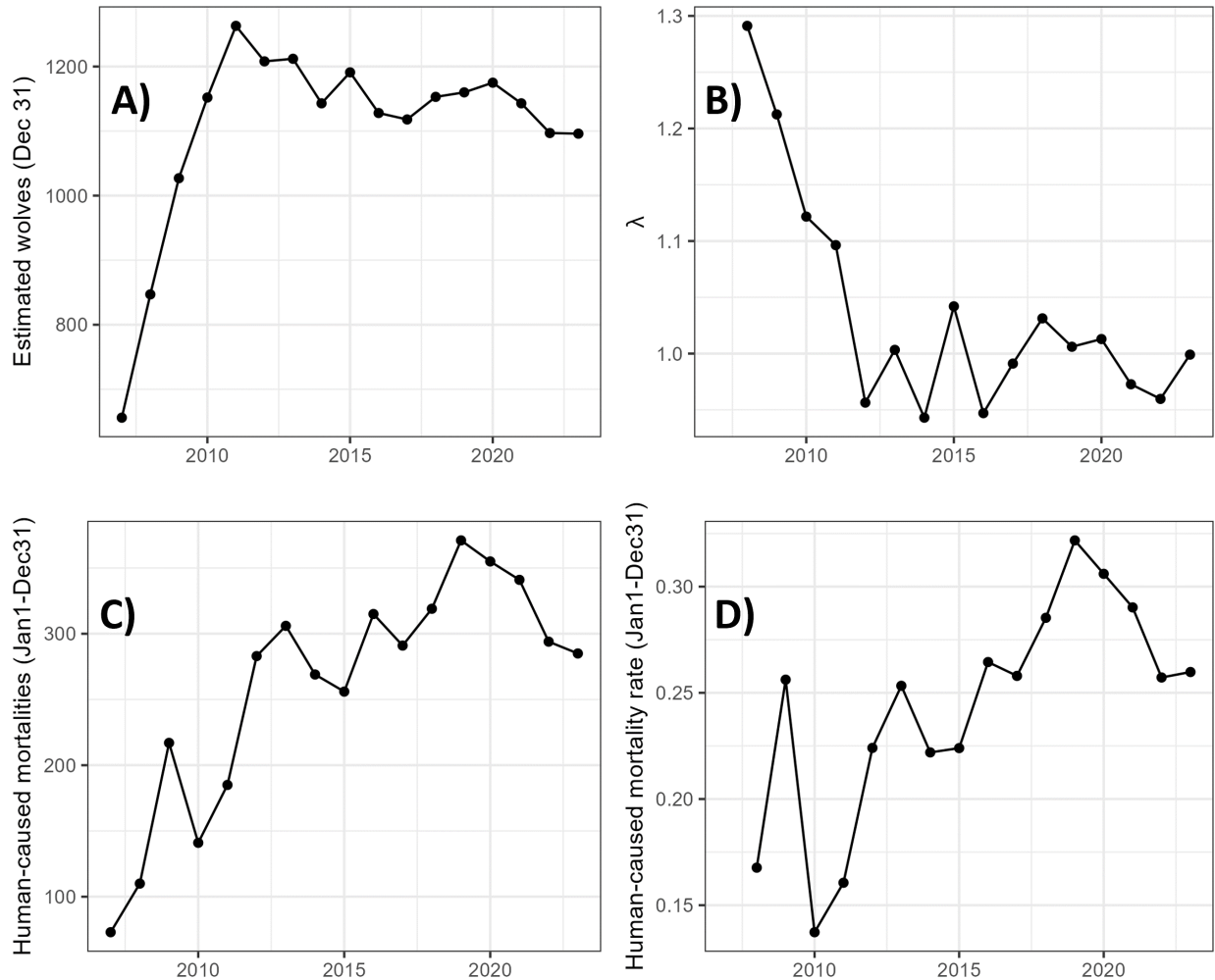
$$\lambda_t = \text{Normal}(\alpha + \beta_1 \times H_t, \sigma_{process})$$

$$N_t = N_{t-1} \times \lambda_t$$

$$Y_t \sim \text{Normal}(N_t, \sigma_{t\text{observation}})$$

where  $\alpha$  is the regression intercept,  $\beta_1$  is the slope of the relationship between annual human-caused mortality rate index and growth rate.  $N_t$  is the true, but unobserved population size, and  $\sigma_{process}$  describes the variation in annual growth rates unaccounted for by the human-caused mortality rate index and driven by environmental and demographic stochasticity. While there may be some level of density dependent regulation in Montana's wolf populations, we were unable to estimate this effect because human-caused mortality and  $N$  are confounded in our 2007-2023 dataset (they both increase over the time period) and therefore these parameters were not separately identifiable in our model. Given our charge to forecast the effect of future human-caused mortality, we included that effect and not a density dependence effect. Therefore, our projections assume that human-caused mortality rate is the primary driver of population dynamics and do not account for declining recruitment associated with a saturated population, nor increases in wolf recruitment that may occur if the population is in fact reduced in the coming years.

We fit the model in a Bayesian statistical estimation framework using JAGS software (4.3.0; Plummer 2003) executed from R via the package jagsUI (Kellner 2019), a wrapper to the package rjags (Plummer 2019). The Bayesian framework simplifies the inclusion of uncertainty in past population estimates and appropriate propagation of uncertainty into future forecasts. We generated 3 chains with 500,000 iterations, a burn-in of 50,000, and a thinning rate of 10. We assessed convergence by ensuring Gelman-Rubin convergence statistic for each parameter was  $<1.1$  (Brooks and Gelman 1998) and that chains were well-mixed. Estimated parameters were given uninformative priors. Code for the model is given in appendix A.



**Figure 1. Statewide estimates for 2007-2023 of A) iPOM-estimated wolf population size for December each year, B) estimated wolf population growth rate, C) reported human-caused mortalities (between Jan 1–Dec 31), and D) estimated human-caused mortality rate index ( $H_t = \text{human-caused mortalities}_t / \text{iPOM wolves}_{t-1}$ ).**

## Results

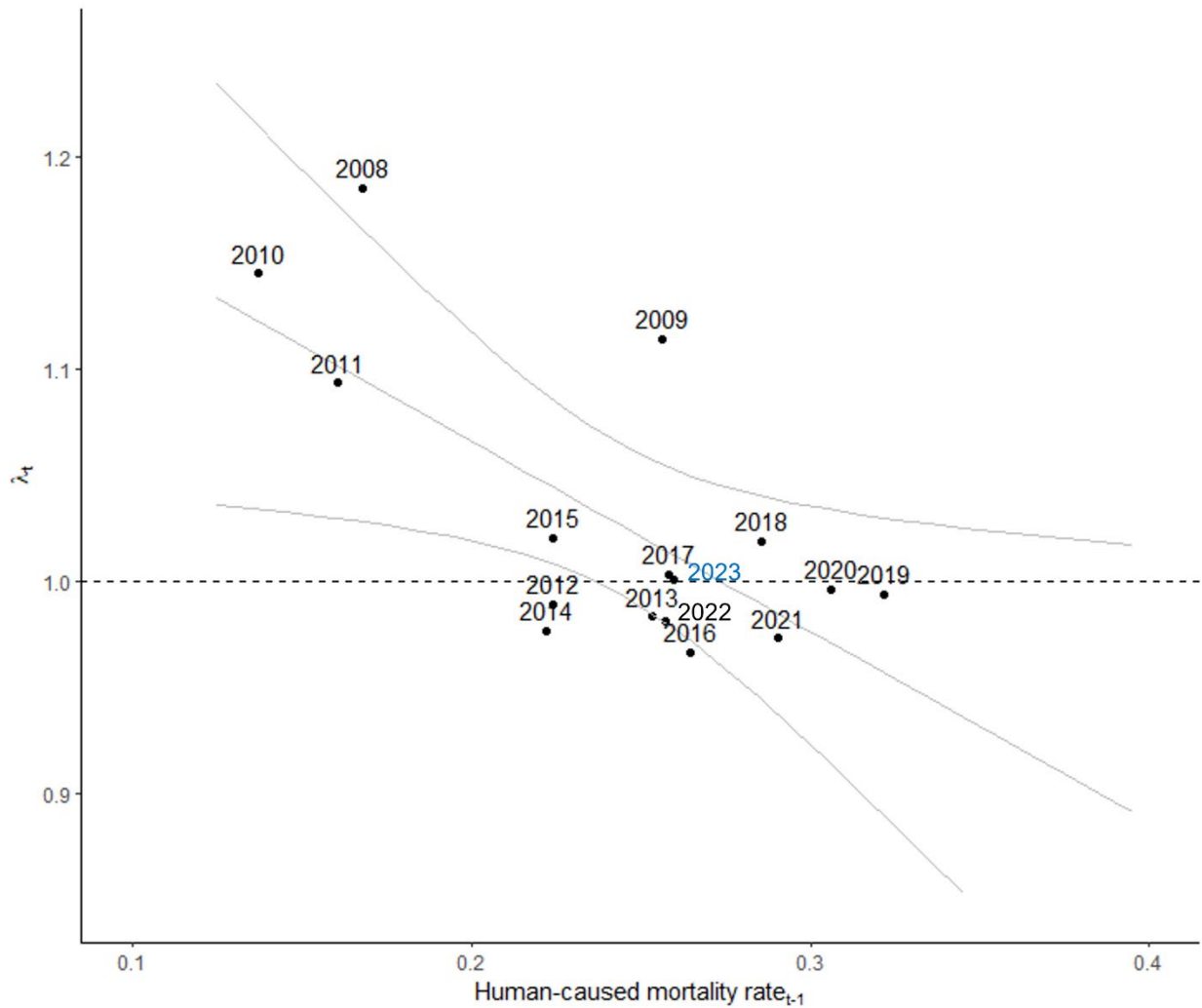
The human-caused mortality rate index was negatively related to annual growth rates (Figure 2) as in previous studies (Gude et al. 2012). Our model estimated that a human-caused mortality rate index of

approximately 27.3% would result in stable annual population growth ( $\lambda = 1.00$ ; 90% credible interval = 0.962, 1.045). The 2023 Calendar Year human-caused mortality rate index was 26% and the population was stable from 2022. In studies from other locations with human-caused mortality,  $\lambda$  values ranging from 0.95–1.05 were observed when human-caused mortality rates ranged from 24–40% (Fuller et al. 2003). However, the human-caused mortality rates reported by Fuller et al. (2003) are not directly comparable to our index values. Fuller et al. (2003) reported the proportion of each population removed annually, whereas our estimate is based on the proportion of the previous population estimate harvested in the subsequent year, to facilitate forecasting, as described above.

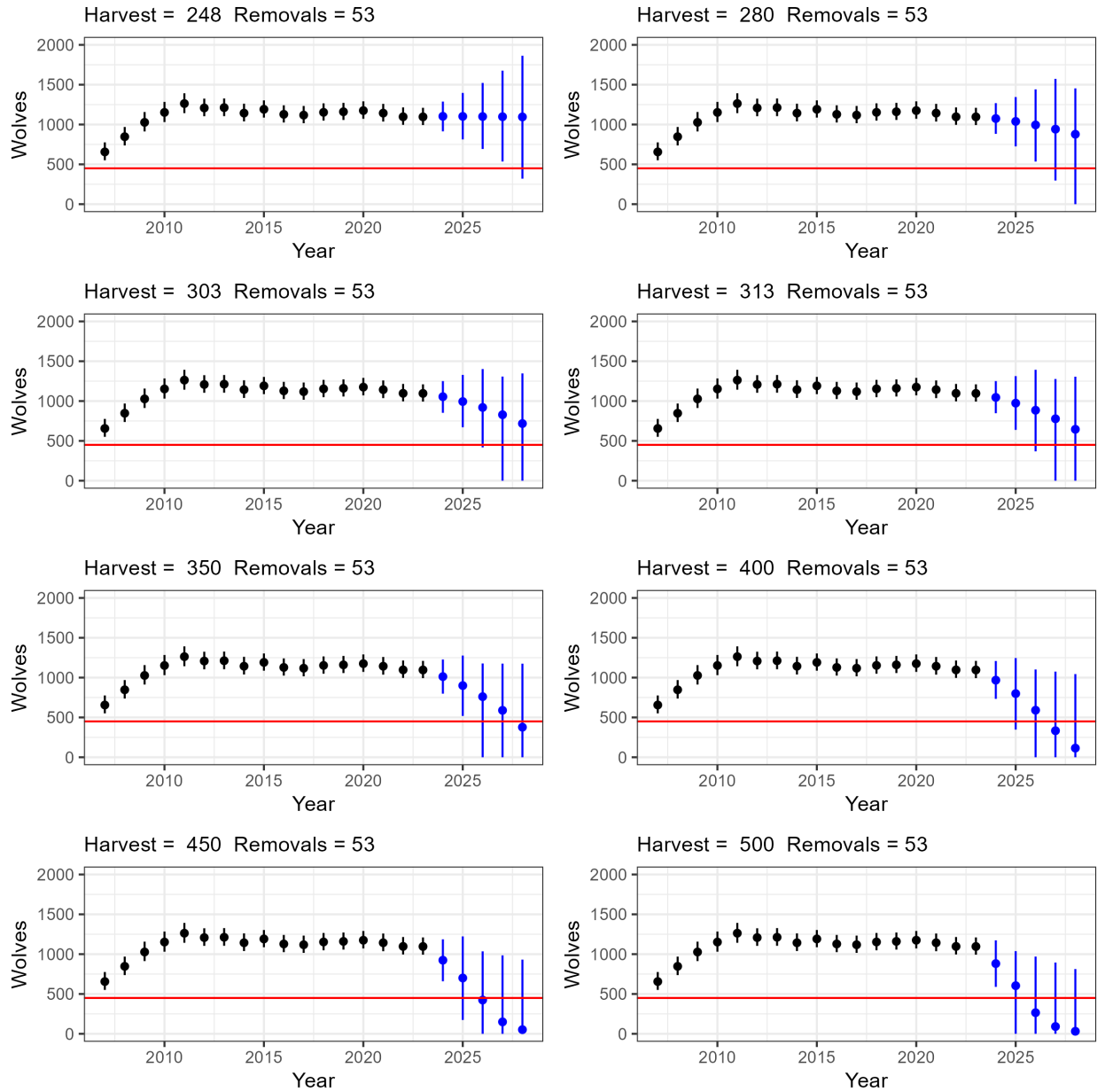
The 2021 Montana legislature (SB 314) directed the FWP commission to reduce wolf populations to a sustainable level that is not less than the number needed to support 15 breeding pairs. Though not yet adopted, the draft 2023 Montana Gray Wolf Conservation and Management Plan establishes 450 wolves as a conservative minimum number that will ensure 15 breeding pairs exist (Montana Fish, Wildlife & Parks 2023). Starting with the 2022 season, the Montana Fish & Wildlife Commission changed numerous harvest regulations to promote higher harvests that were in effect during the 2<sup>nd</sup> half of the 2022 Calendar Year (i.e., during the 2022 License Year that spans fall 2022- spring 2023). For many reasons, including weather-related challenges and lower effort in many regions (Parks et al. 2023), the more liberal regulations in the 2022 License Year did not result in higher harvest. The public harvest of wolves was below average for the 2022 Calendar Year (harvest = 248). The more liberal regulations remained in place for 2023 but trapping and snaring faced a delay during the 2<sup>nd</sup> half of the Calendar Year. On November 21, 2023, a federal court issued a preliminary injunction that postponed the start of wolf trapping and snaring to limit incidental take of grizzly bears (Parks et al. 2024). The preliminary injunction altered the wolf trapping and snaring season in Hill, Blaine, and Phillips counties and FWP regions 1, 2, 3, 4, and 5. The season was limited to January 1 through February 15<sup>th</sup>, when grizzly bears are likely to be in dens. As a result, trapping and snaring harvest during the 2023 Calendar Year included wolves from the second part of the 2022 License Year (1 January 2023 – 15 March 2023) but no wolves from the first part of the 2023 License Year. Wolf hunting during the first part of the 2023 License Year was not impacted by the court decision and 110 wolves were harvested during the second part of the 2023 Calendar Year (15 September 2023 to 31 December 2023), down from the previous fall combined hunting and trapping effort (124 wolves). However, harvest from 1 January 2024 to 15 March 2024 (the second part of the 2023 License Year and the first part of the 2024 Calendar Year) was higher than the previous year (176 in the first half of 2024 Calendar Year compared to 133 in the first half of 2023 Calendar Year). This higher harvest will be reflected in the 2024 wolf population estimate and is not considered in this report.

All forecast scenarios with 280 or more wolves harvested resulted in predicted population declines. The magnitude of the decline increases as simulated harvest increases. The 303 (the recent 5-year maximum public harvest) and 313 (2023-2024 License Year quota) wolf harvests show there is a potential for the population to drop below 450 wolves within a 3-year period (based on error bars representing uncertainty) but point predictions remain above 450 wolves for up to a 5-year period of stable human-caused mortality at this level (Figure 3). As harvest increases to 350 wolves, the population will most likely fall below 450 wolves within five years. These predictions assume that the absolute levels of human-caused mortality would remain at the same high level for each simulated year regardless of population response, so this result was not surprising. Constant total harvest would lead to an exponentially increasing human-caused mortality rate as wolf numbers declined, but in reality, greater

human-caused mortality rates would be increasingly difficult to achieve as the population declined. Our scenarios do not represent harvest prescriptions or predictions of what the future harvest will be; rather they are intended to represent the possible consequences of continued public harvest at the recent harvest levels and increases that may result from more liberal regulations enacted by the Commission. If any of the elevated human-caused mortality levels could be achieved, harvest levels would likely need to be reduced after 1-3 years to prevent the population from decreasing below the 450 wolf level.



**Figure 2. Estimated linear relationship and 90% credible intervals (grey lines) between annual wolf population growth rate ( $\lambda_t$ ) and human-caused mortality rate (human-caused mortalities<sub>t</sub> / iPOM wolves<sub>t-1</sub>). The human-caused mortality rate resulting in an expected stable population ( $\lambda = 1$ ) is approximately 27.3%.**



**Figure 3. Wolf population model predictions under human-caused harvest and removal scenarios. The “Harvest=248” scenario represents the recent 5-year minimum hunting and trapping harvest (from 2022), the “Harvest=280” scenario represents the recent 5-year mean hunting and trapping harvest from 2019-2023, and the “Harvest=303” scenario represents the recent 5-year maximum hunting and trapping harvest (from 2020). The “Harvest=313” scenario represents the quota from the 2023-2024 License Year. The other 4 scenarios represent higher harvests to decrease the wolf population size. Black points and error bars are iPOM estimates with 95% credible intervals; blue points and error bars are simulation results for future years with 90% prediction intervals. Red horizontal line is the minimum number of wolves (450 wolves) estimated to support 15 breeding pairs. Panel titles reflect the human-caused mortality scenario each year into the future.**

## References

- Fuller, T.K., Mech, L.D., Cochrane, J.F., 2003. Wolf population dynamics. In: Mech, L.D., Boitani, L., eds. *Wolves: Behavior, Ecology and Conservation*. University of Chicago Press, Chicago.
- Gude, J.A., Mitchell, M.S., Russell, R.E., Sime, C.A., Bangs, E.E., Mech, L.D. and Ream, R.R., 2012. Wolf population dynamics in the US Northern Rocky Mountains are affected by recruitment and human-caused mortality. *Journal of Wildlife Management* 76:108-118.
- Parks, M., K. Podruzny, S. Sells, T. Parks, N. Lance, W. Cole, T. Smucker, and S. Bhattacharjee 2023. *Montana Gray Wolf Conservation and Management 2022 Annual Report*. Montana Fish, Wildlife & Parks. Helena, Montana. 52 pages.
- Parks, M., K. Podruzny, W. Cole, T. Parks, N. Lance, S. Zielke, and S. Bhattacharjee. 2024. *Montana Gray Wolf Conservation and Management 2023 Annual Report*. Montana Fish, Wildlife & Parks. Helena, Montana. 88 pages.
- Kellner, K., Meredith, M. and Kellner, M.K., 2019. Package 'jagsUI'. A Wrapper Around 'rjags' to Streamline 'JAGS' Analyses. R Package Version, 1(1).
- Montana Fish, Wildlife & Parks. 2023. *Montana Gray Wolf Conservation and Management Plan*. Montana Fish, Wildlife & Parks. Helena, Montana. 110 pages.  
<<https://fwp.mt.gov/binaries/content/assets/fwp/aboutfwp/public-comments/draft-wolf-plan/wmp2023.pdf>>.
- Plummer, M., 2003. JAGS: A program for analysis of Bayesian graphical models using Gibbs sampling. *Proceedings of the 3rd international workshop on distributed statistical computing* 124:1-10).
- Plummer, M., Stukalov, A., Denwood, M. and Plummer, M.M., 2019. Package 'rjags'.
- Sells, S. N., A. C. Keever, M. S. Mitchell, J. A. Gude, K. M. Podruzny, and B. Inman. 2020. Improving estimation of wolf recruitment and abundance, and development of an adaptive harvest management program for wolves in Montana. Final Report for Federal Aid in Wildlife Restoration Grant W-161-R-1. Helena, Montana.
- Sells, S. N, K. M. Podruzny, J. J. Nowak, T. D. Smucker, T. W. Parks, D. K. Boyd, A. A. Nelson, N. J. Lance, R. M. Inman, J. A. Gude, S. B. Bassing, K. E. Loonam, and M. S. Mitchell. 2022. Integrating basic and applied research to estimate carnivore abundance. *Ecological Applications* 32:e2714.

## Appendix A. Model code

```
model {  
  #population model  
  for(t in 1:(nyears-1)){  
  
    # Human-caused (HC) mortality rate index calculated in simulations to allow uncertainty
```



```

# min() prevents harvest larger than N; 1 is added to N to prevent division by 0
HC_mort_rate[t+1]<- min(HC_mortality[t+1], N.est[t]+1) / (N.est[t] +1)

N.est[t+1]<- max(0, N.est[t] * lambda[t+1])

# lambda distribution is truncated to prevent values <0 in simulations where regression
parameters would allow
lambda[t+1] ~ dnorm(alpha+beta1*HC_mort_rate[t+1], sigma.proc^-2)T(0,)
}

sigma.proc ~ dunif(0,10)

N.est[1] ~ dnorm(650, 57.14^-2) # 2007 iPOM estimate
alpha ~ dnorm(0, 0.001) # intercept: predicted lambda when HC mortality rate index = 0
beta1 ~ dnorm(0, 0.001) # slope: relationship between HC mortality rate index and lambda

# # # #observation model - describes uncertainty in annual iPOM estimates
for(t in 2:(nyears-5)){
  ipom[t]~ dnorm(N.est[t], se[t]^2)
}
}

```

## APPENDIX 4

### Wolf Hunting and Trapping Effort

All successful wolf hunters and trappers in Montana must personally report their wolf kill within 24 hours so that FWP can monitor harvest. Additionally, successful hunters and trappers that wish to retain possession of the hide and skull must present the hide and skull for inspection and registration within 10 days of kill. This information relative to harvest is gathered and maintained within a mandatory reporting database and harvest numbers are available on an online dashboard. However, not all data specific to hunter and trapper effort are collected from those successful hunters and trappers, and no effort information is gathered from unsuccessful individuals. Therefore, FWP conducts annual Hunter and Harvest Surveys to gather that additional information. Beginning in 2009 (for hunters) and 2012 (for trappers) statistical samples of wolf hunting and trapping licenses were selected, and individuals holding those licenses were contacted via telephone. To assess wolf hunting effort, hunters were asked which hunting district(s) they hunted the most and how many days they hunted in each. To assess wolf trapping effort, trappers were asked which district(s) they trapped the most, how many days they trapped in each, and how many traps/snares they set per day.

The number of wolf hunting licenses issued annually ranged from 15,520 (2009) to 24,478 (2013) (Table 1; Figure 1). The number of licenses sampled ranged from 7,953 (2020) to 13,721 (2013) and response rates varied from 47% (2021) to 68 % (2013) (Table 1).

Statewide, the number of active wolf hunters ranged from 7,457 (2022) to 15,570 (2014) (Figure 1; Table 2) and hunter days ranged from 85,882 (2022) to 228,181 (2013) (Table 3). Whereas issued hunting licenses have shown an increase in most recent years, active hunters have shown a decline. Wolf hunter numbers and hunter days were greatest in FWP Region 3 (Table 2; Table 3).

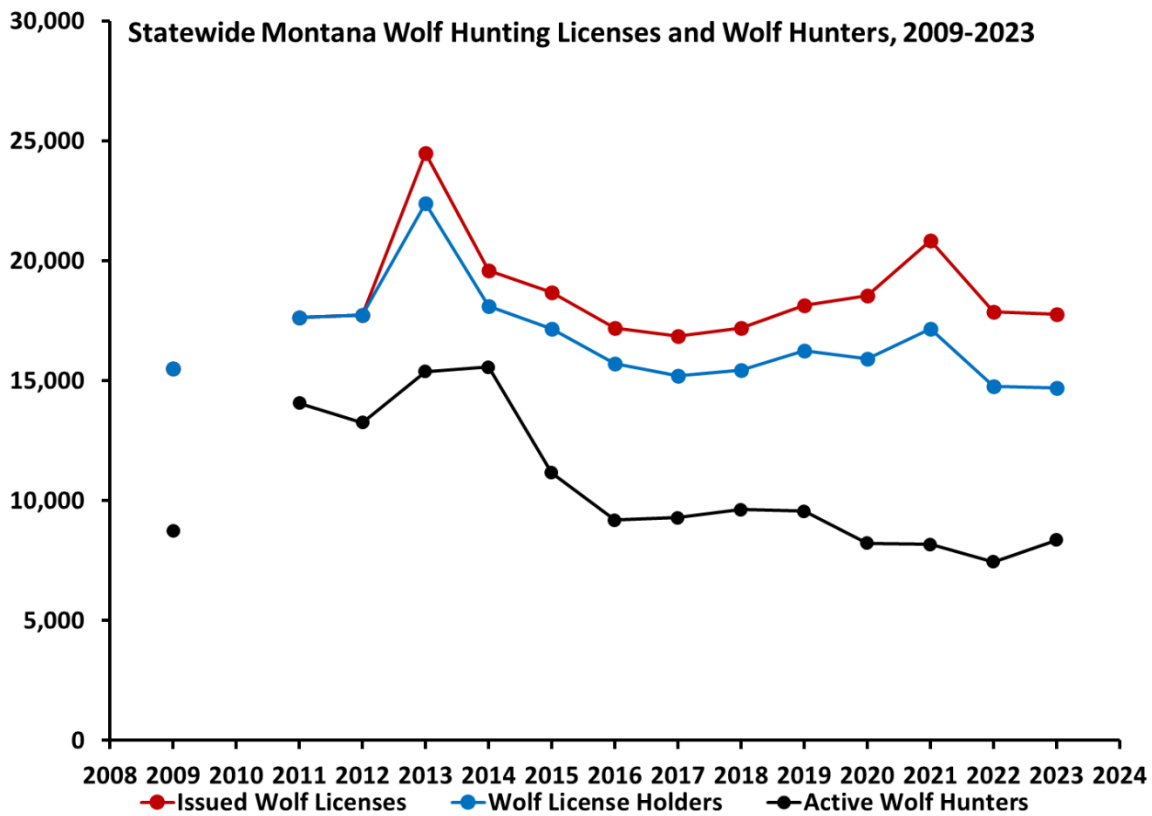
The number of trapping licenses issued to trappers with a required wolf trapping certification ranged from 1,508 (2012) to 3,124 (2013) (Table 4; Figure 2). The number of licenses sampled ranged from 1,455 (2012) to 2,113 (2013) and response rates varied from 43% (2012) to 68% (2013) (Table 4).

Statewide, the number of active wolf trappers ranged from 228 (2022) to 572 (2012) (Figure 2; Table 5) and wolf trapper days ranged from 6,647 (2022) to 21,653 (2012) (Table 6). Traps set ranged from 2,340 (2022) to 4,528 (2020) (Table 7) and trap days ranged from 59,062 (2022) to 174,135 (2012) (Table 8). Wolf trapper numbers were greatest in FWP Region 1 (Table 5), though wolf trapper days were greatest in Region 2 (Table 6). Traps set and trap days were also greatest in FWP Region 1 (Table 7; Table 8).

More detailed hunting and trapping effort results including estimates at the deer/elk hunting district level, estimates by hunter/trapper residency, and confidence intervals on the estimates can be found at <https://myfwp.mt.gov/fwpPub/harvestReports> under 'WOLF'.

**Table 1.** Number of issued wolf hunting licenses, number of sampled licenses, number of responses, and response rates from telephone surveys of wolf hunters in Montana, 2009 - 2023.

License Year	Number Issued	Number Sampled	Responses	Response Rate
2009	15,520	8,710	5,338	0.61
2010				
2011	17,632	9,910	6,169	0.62
2012	17,746	10,006	6,325	0.63
2013	24,478	13,721	9,334	0.68
2014	19,584	10,973	7,022	0.64
2015	18,676	10,457	6,206	0.59
2016	17,182	9,074	5,250	0.58
2017	16,847	8,848	5,743	0.65
2018	17,182	8,946	5,238	0.59
2019	18,134	9,488	5,776	0.61
2020	18,557	7,953	4,275	0.54
2021	20,847	10,200	4,816	0.47
2022	17,859	8,767	5,206	0.59
2023	17,786	8,821	5,650	0.64



**Figure 1.** Number of wolf hunting licenses issued, number of hunters issued  $\geq 1$  wolf hunting license, and number of active wolf hunters estimated from Hunter Surveys in Montana, 2009 – 2023.

**Table 2. Estimated number of active wolf hunters in Montana and by FWP Region, 2009 - 2023**

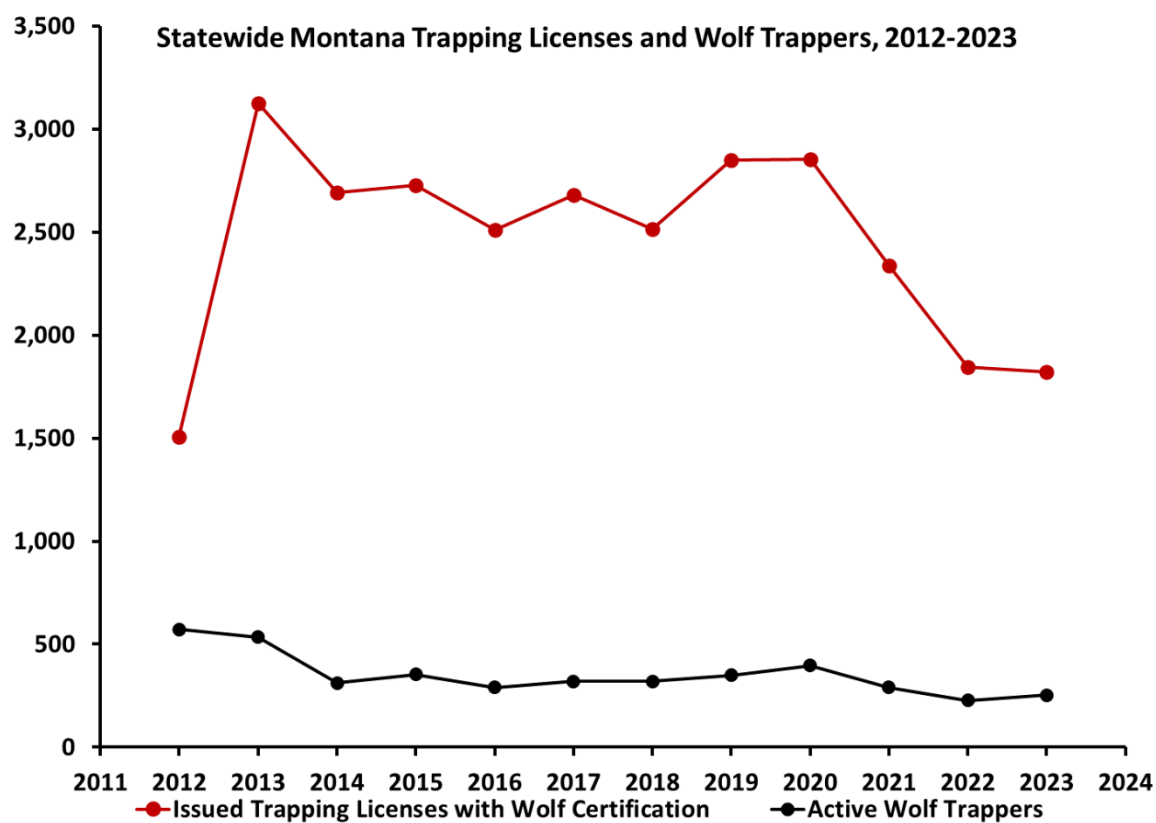
Year	State	FWP Region 1	FWP Region 2	FWP Region 3	FWP Region 4	FWP Region 5	FWP Region 6	FWP Region 7	FWP Region Unk
2009	8,734	2,487	3,169	2,635	984	308	236	158	3
2010									
2011	14,066								
2012	13,253	2,869	3,588	5,498	2,199	784	284	290	0
2013	15,386	3,324	4,128	6,377	2,177	914	279	361	2
2014	15,570	3,317	3,930	6,992	2,254	934	239	350	11
2015	11,165	2,182	2,459	5,173	1,601	689	196	213	9
2016	9,194	2,022	2,113	4,049	1,275	446	104	141	3
2017	9,289	1,876	2,237	3,993	1,180	545	120	132	8
2018	9,629	2,085	2,343	4,072	1,410	557	145	199	3
2019	9,553	2,070	2,177	3,995	1,368	479	146	177	0
2020	8,218	1,765	1,944	3,494	1,211	398	149	217	4
2021	8,175	1,594	1,779	3,690	1,032	477	163	142	14
2022	7,457	1,501	1,764	3,166	981	424	101	138	6
2023	8,366	1,691	1,859	3,629	1,075	499	150	154	11

**Table 3. Estimated number of wolf hunter days in Montana and by FWP Region, 2009 - 2023**

Year	State	FWP Region 1	FWP Region 2	FWP Region 3	FWP Region 4	FWP Region 5	FWP Region 6	FWP Region 7	FWP Region Unk
2009	107,777	33,646	38,695	24,839	7,804	3,221	1,350	974	3
2010									
2011	178,067								
2012	181,793	41,328	43,813	63,778	20,601	7,760	2,103	2,501	0
2013	228,181	48,061	57,238	84,125	25,238	9,231	2,121	3,534	7
2014	216,620	43,320	52,512	83,145	24,045	8,443	2,363	3,502	46
2015	140,921	25,944	30,163	57,476	15,820	7,224	2,360	1,893	43
2016	121,422	24,787	27,860	49,947	13,201	4,172	1,235	1,244	19
2017	116,599	23,237	27,289	45,154	12,983	5,570	1,117	1,216	73
2018	120,168	24,217	27,193	46,272	14,041	6,082	1,215	1,672	6
2019	126,065	27,771	28,478	48,682	14,557	4,710	1,371	1,777	0
2020	104,893	20,285	22,208	42,813	11,521	4,642	1,413	1,966	44
2021	106,067	17,438	23,246	45,421	11,515	5,263	1,140	1,900	166
2022	85,882	17,329	19,289	34,187	8,066	4,465	918	1,620	8
2023	108,241	20,906	23,939	43,829	10,699	5,670	1,610	1,792	61

**Table 4.** Number of issued wolf trapping licenses, number of sampled licenses, number of responses, and response rates from telephone surveys of wolf trappers in Montana, 2012 - 2023.

License Year	Number Issued	Number Sampled	Responses	Response Rate
2012	1,508	1,455	620	0.43
2013	3,124	2,113	1,439	0.68
2014	2,693	1,734	1,099	0.63
2015	2,725	1,748	1,011	0.58
2016	2,509	1,484	853	0.57
2017	2,681	1,588	1,027	0.65
2018	2,516	1,497	905	0.6
2019	2,848	1,690	1,129	0.67
2020	2,851	1,576	869	0.55
2021	2,338	1,482	681	0.46
2022	1,846	1,159	647	0.56
2023	1,821	1,178	717	0.61



**Figure 2.** Number of trapping licenses issued to trappers with wolf trapping certification and number of active wolf trappers estimated from Harvest Surveys in Montana, 2012 – 2023.

**Table 5. Estimated number of active wolf trappers in Montana and by FWP Region, 2012 - 2023**

Year	State	FWP Region 1	FWP Region 2	FWP Region 3	FWP Region 4	FWP Region 5	FWP Region 6	FWP Region 7	FWP Region Unk
2012	572	195	173	141	34	34	0	2	0
2013	534	201	137	140	52	19	4	7	0
2014	311	123	52	91	27	15	0	3	0
2015	352	97	93	90	38	38	3	0	0
2016	291	104	96	56	30	3	0	3	0
2017	319	94	118	60	29	11	5	5	0
2018	320	101	103	67	28	21	3	3	0
2019	349	120	101	79	28	18	3	3	0
2020	397	147	105	106	27	13	0	0	0
2021	289	81	92	84	18	14	0	4	0
2022	228	88	66	57	9	9	0	0	0
2023	254	104	87	50	10	10	0	0	0

**Table 6. Estimated number of wolf trapper days in Montana and by FWP Region, 2012 - 2023**

Year	State	FWP Region 1	FWP Region 2	FWP Region 3	FWP Region 4	FWP Region 5	FWP Region 6	FWP Region 7	FWP Region Unk
2012	21,653	6,948	7,194	4,886	1,354	1,125	0	146	0
2013	21,039	8,183	5,950	4,436	1,728	706	38	13	0
2014	9,966	4,011	1,390	3,180	808	414	0	163	0
2015	10,675	2,981	2,725	2,501	1,552	721	195	0	0
2016	9,489	3,164	3,802	1,492	810	133	0	89	0
2017	9,901	2,851	4,053	1,916	680	170	175	55	0
2018	12,116	2,830	4,239	3,231	1,046	423	174	174	0
2019	12,009	3,372	3,769	3,373	661	501	167	167	0
2020	15,878	4,305	4,815	5,523	796	439	0	0	0
2021	7,524	1,762	2,016	3,044	319	170	0	213	0
2022	6,647	2,758	1,786	1,624	362	116	0	0	0
2023	7,444	2,471	2,776	1,888	170	138	0	0	0

**Table 7. Estimated number of wolf traps in Montana and by FWP Region, 2012 - 2023**

Year	State	FWP Region 1	FWP Region 2	FWP Region 3	FWP Region 4	FWP Region 5	FWP Region 6	FWP Region 7	FWP Region Unk
2012	4,300	1,415	1,573	845	241	207	0	20	0
2013									
2014	2,828	1,134	507	764	206	150	0	68	0
2015	3,041	647	840	866	365	277	46	0	0
2016	2,607	701	952	533	351	35	0	36	0
2017	2,754	769	1,119	518	220	63	39	26	0
2018	3,361	778	1,294	640	235	172	104	139	0
2019	3,598	1,025	1,308	863	256	146	0	0	0
2020	4,528	1,351	1,211	1,539	263	164	0	0	0
2021	3,436	615	1,037	1,363	220	152	0	50	0
2022	2,340	886	708	586	91	68	0	0	0
2323	3,764	1,659	1,167	671	159	108	0	0	0

**Table 8.** Estimated number of wolf trap days in Montana and by FWP Region, 2012 - 2023

Year	State	FWP Region 1	FWP Region 2	FWP Region 3	FWP Region 4	FWP Region 5	FWP Region 6	FWP Region 7	FWP Region Unk
2012	174,135	52,894	72,526	30,194	11,012	6,926	0	584	0
2013									
2014	96,626	36,358	16,042	27,156	7,158	5,846	0	4,066	0
2015	98,368	21,808	31,303	23,456	16,233	4,204	1,364	0	0
2016	97,262	26,895	39,818	16,250	11,636	1,591	0	1,073	0
2017	96,935	25,064	45,239	17,930	5,161	1,328	1,937	275	0
2018	133,353	24,045	53,187	28,417	9,560	3,555	6,252	8,336	0
2019	133,301	37,857	51,011	36,536	3,289	4,609	0	0	0
2020	158,921	36,149	40,962	66,941	9,396	5,473	0	0	0
2021	87,194	14,931	22,691	41,589	3,028	1,979	0	2,975	0
2022	59,062	24,342	16,144	15,677	2,038	861	0	0	0
2023	110,725	45,694	39,788	21,765	1,214	2,265	0	0	0

## APPENDIX 5

### Wolf Pack Tables 2018 – 2023

#### **Pack Table Information:**

##### Wolf Pack Column

List of all packs identified during the calendar year

##### Min Pack Size Dec 31 Column

Minimum confirmed or estimated pack size as of December 31

##### Pack Count Type & Quality Columns

Confirmed = Verified after Dec. 31 with Snow Tracks, Camera, Reliable Report, Known Mortalities.

Confirmed Good = Reliable information after Dec. 31 thought to represent entire pack.

Confirmed Moderate = Reliable information after Dec 31 but may not represent entire pack.

Confirmed Poor = Some information after Dec. 31 but not likely to represent entire pack.

Confirmed packs get a centroid and those with good or moderate counts are used to estimate pack size.

Unconfirmed/Estimated = Some information from Snow Tracks, Camera, Reliable Report, Known Mortalities, but not verified after Dec. 31.

Estimated Good = Reliable information thought to represent entire pack, but not confirmed after Dec. 31.

Estimated Moderate = Reliable information but may not represent entire pack and not confirmed after Dec. 31.

Estimated Poor/Present = Some information but not likely to represent entire pack and not confirmed after Dec. 31.

All Estimated packs get a centroid. Estimated packs with a good or moderate count are used to estimate pack size.

No Data = No information to suggest previously known pack is either present or eliminated.

No Data packs do not get a centroid lat/long. Pack count = ?. Count Type = No Data. Count Quality = No Data.

##### Mortalities Columns (2018 -2019)

Counts based on mandatory mortality reporting records

Human includes roadkill, illegal but NOT Wildlife Services, SB200, CPL

Control is all agency or other approved take including Wildlife Services, SB200, CPL

##### Pack Size Data Type (2020-2023)

Notes on most significant pieces of information.

##### Centroid

Pack centroid (center of territory) coordinates identified for all confirmed and estimated packs.

Centroids are used in iPOM as a known wolf pack location within an iPOM grid cell.

##### Centroid Type (2020-2023)

Data used to determine centroid location

##### Centroid Quality Code (2022-2023)

**Certain** = 100% confidence the pack is present in territory with noted centroid (confirmed on the ground by specialist using variety of monitoring tools/techniques including visual observations, track surveys, howl surveys, depredation locations, wolf mortality location (conflict response or harvest) and telemetry collars.

**Fairly Certain** = Data combined from various sources (reliable hunter/trapper reports, previous year's knowledge combined with mortality data) suggest pack persistence is likely but not verified on ground by specialist

**Uncertain** = Some data indicates wolf activity in known territory, but not confident pack persisted through Dec. 31 or unclear if activity is from resident pack vs dispersing wolves - pack not verified on ground by specialist



## Wolf Pack Tables 2018 – 2023

**Table 1: Wolf Packs and Population Data for Montana, 2018.**

REF #	WOLF PACK	FWP REGION	MIN. ESTIMATED PACK SIZE DEC 2018	BREEDING PAIR?	COUNT QUALITY	DOCUMENTED MORTALITIES					CONFIRMED LOSSES				2018
						NATURAL	HUMAN	UNKN	HARVEST	CONTROL	CATTLE	SHEEP	DOGS	OTHER	CENTROID
1	Akokala	1	7	Y	G										X
2	Apgar	1	2	N	G										X
3	Ashley	1	2	N	P		1		1						X
4	Bearfite	1	4	N	G										X
5	Browns Meadow	1	2	N	P				2						X
6	Bull River	1	2	N	G										X
7	Cabinet	1	6	Y	G				3						X
8	Camas Prairie	1	2	N	P				1						X
9	Candy Mountain	1	4	Y	G		1		3						X
10	Cilly	1	10	Y	G				2						X
11	Condon	1	6	N	G	1	2		1						X
	Corona	1	?	N	.				1						.
	Cowell	1	1	N	M										.
	Crane Mtn	1	1	N	P										.
12	Dutch	1	6	N	G										X
13	Echo	1	9	Y	G										X
14	Firefighter	1	2	N	G										X
15	Fisher Mountain	1	4	N	G		1		3						X
16	Fishtrap	1	3	N	M				4						X
17	Flathead Alps	1	2	N	P				1						X
	Garden	1	?	N	.										.
18	Good Creek	1	2	N	P		1		1						X
	Grave Creek	1	?	N	.										.

REF #	WOLF PACK	FWP	MIN. ESTIMATED PACK SIZE DEC 2018	BREEDING	COUNT	DOCUMENTED MORTALITIES					CONFIRMED LOSSES				2018
		REGION		PAIR?	QUALITY	NATURAL	HUMAN	UNKN	HARVEST	CONTROL	CATTLE	SHEEP	DOGS	OTHER	CENTROID
19	Great Bear	1	2	N	P				1						X
20	Great Northern	1	2	N	P				2						X
21	Half Moon	1	2	N	P										X
22	Hog Heaven	1	2	N	M				7						X
23	Irvine	1	4	Y	G					4	1				X
24	Kerr	1	2	N	M					1	1				X
25	Kintla	1	8	Y	G										X
26	Kootenai	1	6	Y	G										X
	Ksanka	1	?	N	.				1						.
27	Lazy Crk	1	8	Y	G				1						X
	Lost Soul	1	?	N	.				1						.
28	Lydia	1	4	Y	G										X
29	McGregor	1	3	N	G										X
30	Moore	1	5	Y	G				2	4	2				X
	Mullan	1	?	N	.		1		1						.
31	Murphy Lake	1	4	Y	G				4						X
	No	1	?	N	.				4						.
32	Noisy	1	3	N	G				1						X
33	O'Brien	1	2	N	M				1						X
34	Pierce	1	2	N	P				1						X
35	Piper	1	2	N	P		1		2						X
36	Pistol Creek	1	2	N	G						1				X
37	Pleasant Valley	1	3	N	M				7						X
38	Quintonkon	1	3	N	G										X
39	Satire	1	5	N	G				2						X
40	Schafer	1	7	Y	G										X
41	Sleeping Woman	1	6	Y	G										X
42	Spotted Bear	1	2	N	P				1						X

REF #	WOLF PACK	FWP REGION	MIN. ESTIMATED PACK SIZE DEC 2018	BREEDING PAIR?	COUNT QUALITY	DOCUMENTED MORTALITIES					CONFIRMED LOSSES				2018 CENTROID
						NATURAL	HUMAN	UNKN	HARVEST	CONTROL	CATTLE	SHEEP	DOGS	OTHER	
43	Summit Creek	1	6	Y	G		1		2						X
44	Tallulah	1	3	N	G				3						X
45	Thirsty	1	8	Y	G				1						X
46	Thompson Peak	1	2	N	P				6						X
47	Weigel	1	2	N	P				3						X
48	Whale Creek	1	4	Y	G										X
49	Whitefish	1	2	N	M				2						X
50	Yaak	1	2	N	P				1						X
51	Alta	2	4	?	G										X
52	Ambrose	2	5	Y	G				2						X
53	Arrastra Creek	2	7	Y	M				2	1	1				X
54	Avon	2	5	?	G				2	1	1				X
55	Belmont	2	5	?	M				1						X
56	Black Pine	2	3	N	M										X
57	Bugle Mountain	2	2	?	P										X
58	Cache Creek #	2	6	Y	G				3						X
59	Chamberlain	2	5	Y	M				1	2	2				X
60	Conger Point	2	2	?	P										X
61	DeBorgia #	2	12	Y	G				1						X
62	Divide Creek	2	5	Y	M				5						X
63	East Fork Rock Creek	2	4	?	M										X
	El Capitan	2	?	?	.										.
64	Evaro	2	2	N	G										X
65	Flint	2	4	?	M										X
66	Gash Creek #	2	5	?	M										X
67	Gird Point	2	3	N	M					2	1				X
68	Humbug	2	2	?	P				3						X
69	Inez	2	7	Y	G				1	1	1				X

REF #	WOLF PACK	FWP	MIN. ESTIMATED PACK SIZE DEC 2018	BREEDING	COUNT	DOCUMENTED MORTALITIES					CONFIRMED LOSSES				2018
		REGION		PAIR?	QUALITY	NATURAL	HUMAN	UNKN	HARVEST	CONTROL	CATTLE	SHEEP	DOGS	OTHER	CENTROID
70	Landers Fork	2	2	N	P				1						X
71	Miller Peak	2	2	N	G										X
72	Mineral Mountain	2	8	Y	G				4						X
73	Morrell Mountain	2	8	Y	G				2						X
74	Ninemile	2	8	Y	G										X
75	Olson Peak	2	4	?	M										X
76	One Horse	2	2	N	M				2		1				X
77	Overwhich #	2	5	Y	M										X
78	Petty Creek	2	2	?	P				2						X
79	Quartz Creek	2	7	Y	G										X
80	Ross' Fork	2	7	Y	G				2						X
81	Savenac	2	5	Y	M			1	3						X
82	Seeley Lake	2	8	Y	G				2						X
83	Siegel Mountain	2	5	?	M										X
84	Silver Lake #	2	5	?	M										X
85	Sliderock Mountain	2	9	Y	G				1						X
86	Stonewall Mountain	2	5	Y	G					3		1			X
87	Sula	2	6	Y	G				6	3				2	X
88	Sunflower Mountain	2	5	Y	M				1						X
89	Sunrise Mountain	2	4	Y	M										X
90	Taft	2	2	?	P										X
91	Telephone Butte	2	4	?	M				2						X
92	Tepee Point	2	5	?	M				1						X
93	Trapper Peak	2	4	Y	G										X
94	Union Peak	2	4	?	M				3						X
95	Watchtower #	2	3	?	M										X
	4110M group	3	0	N	G			1	2						
96	Anaconda	3	4	N	G				2						X

REF #	WOLF PACK	FWP REGION	MIN. ESTIMATED PACK SIZE DEC 2018	BREEDING PAIR?	COUNT QUALITY	DOCUMENTED MORTALITIES					CONFIRMED LOSSES				2018 CENTROID	
						NATURAL	HUMAN	UNKN	HARVEST	CONTROL	CATTLE	SHEEP	DOGS	OTHER		
97	Anteolpe Basin	3	3	?	P				1			1				X
98	Battle Ridge	3	2	N	G				1							X
99	Beartrap	3	22	Y	G			1	3							X
100	Cedar Creek	3	4	Y	M				1	1		1				X
101	Centennial	3	5	Y	M				2							X
102	Cinnabar*	3	2	N	M			1	3							X
103	Cougar 2*	3	3	?	P				1							X
104	Dyce	3	3	N	G		1		2	1						X
	Elbow Creek	3	?	N	.											.
105	Four Eyes #	3	4	N	M								7			X
106	Fox Creek	3	6	N	P				1	5						X
	Grizzly Creek	3	0	N	G											.
107	Hayden*	3	8	Y	M				4			1				X
108	Hogback	3	3	N	M				8							X
109	Humbug II	3	5	Y	M		1									X
110	Lost Creek	3	2	N	P											X
	Meadow Creek	3	?	N	.				2	3		3				.
	Porcupine Creek	3	0	N	P											.
	Price Creek	3	?	N	.				11				2			.
111	Pyramid #	3	5	N	G				3	2		1				X
	Shinglemill	3	1	N	M				4							.
112	Slip n' Slide	3	3	N	G				1							X
	Steamboat Peak	3	1	N	G				6							.
113	Sweetwater	3	2	N	M											X
114	Thunderbolt	3	4	N	P				1							X
115	Toadflax	3	5	?	M		1		2			1				X
116	Trapper Creek	3	5	N	M				2			1				X
117	Warm Springs	3	6	N	M				8			1				X

REF #	WOLF PACK	FWP REGION	MIN. ESTIMATED PACK SIZE DEC 2018	BREEDING PAIR?	COUNT QUALITY	DOCUMENTED MORTALITIES					CONFIRMED LOSSES				2018 CENTROID
						NATURAL	HUMAN	UNKN	HARVEST	CONTROL	CATTLE	SHEEP	DOGS	OTHER	
118	Avalanche	4	6	?	M				1						X
119	Bennie	4	2	N	G						1				X
	Birdtail Hills	4	0	N	G					2	1				
120	Blowout Mountain	4	4	N	G			1	1						X
	Chief Mtn	4	?	?	.										
121	Crown Mtn	4	7	Y	G				5	4	5				X
122	Deep Creek	4	4	N	G				3	2	2				X
	Dog Gun	4	?	?	.										
123	Flesher Pass	4	2	N	M		1		2	2		2			X
	Livermore	4	?	?	.										
	Looking Glass	4	?	?	.										
124	Marias	4	5	?	M				2						X
125	Pretty Prairie	4	8	Y	M				2						X
126	Red Shale	4	7	Y	G				9						X
127	Teton	4	4	?	P										X
128	Baker Mountain	5	5	Y	M				3						X
	Cayuse Hills	5	?	N	.										
	Meatrack Creek	5	?	?	.				1						
129	Rosebud	5	2	N	P				1		7				X
	Misc/Lone	1	.	.	.				8		2				
	Misc/Lone	2	.	.	.		2		7	1	1				
	Misc/Lone	3	.	.	.				7	2	3	2	2		
	Misc/Lone	4	.	.	.				3	1	5	1			
	<b>Montana Totals</b>		<b>576</b>				<b>1</b>	<b>16</b>	<b>4</b>	<b>259</b>	<b>48</b>	<b>49</b>	<b>15</b>	<b>2</b>	<b>2</b>

**Table 2: Wolf Packs and Population Data for Montana, 2019.**

REF #	WOLF PACK	FWP REGION	MIN. ESTIMATED PACK SIZE DEC 2019	BREEDING PAIR?	COUNT QUALITY	DOCUMENTED MORTALITIES					CONFIRMED LOSSES				2019 CENTROID
						NATURAL	HUMAN	UNKN	HARVEST	CONTROL	CATTLE	SHEEP	DOGS	OTHER	
1	Akokala	1	2	?	M										X
2	Apgar	1	2	Y	M										X
3	Ashley	1	12	Y	M				6						X
4	Bearfite	1	4	Y	G				1						X
5	Browns Meadow	1	2	Y	M						2				X
6	Bull River	1	4	Y	M				2						X
7	Cabinet	1	3	Y	G										X
	Camas Prairie	1	1	?	M				4						.
8	Candy Mountain	1	3	?	M				2						X
9	Cilly	1	7	Y	G				4						X
10	Condon	1	5	N	G				3						X
11	Corona	1	4	Y	G				7						X
12	Cowell	1	?	?	.										X
	Crane Mtn	1	1	?	P										.
13	Dutch	1	6	Y	G										X
14	Echo	1	4	?	M				1						X
15	Firefighter	1	?	?	.										X
16	Fisher Mountain	1	2	?	G	1			2						X
17	Fishtrap	1	2	?	M				1						X
18	Flathead Alps	1	3	Y	G				1						X
19	Good Creek	1	3	?	P										X
20	Grave Creek	1	2	Y	M										X
21	Great Bear	1	?	?	.										X
	Great Northern	1	1	?	P				1						.
22	Half Moon	1	3	?	M										X
	Hog Heaven	1	0	N	G					7		5			.

REF #	WOLF PACK	FWP REGION	MIN. ESTIMATED PACK SIZE DEC 2019	BREEDING PAIR?	COUNT QUALITY	DOCUMENTED MORTALITIES					CONFIRMED LOSSES				2019 CENTROID
						NATURAL	HUMAN	UNKN	HARVEST	CONTROL	CATTLE	SHEEP	DOGS	OTHER	
23	Irvine	1	2	?	M					4					X
24	Kerr	1	2	?	P										X
25	Kintla	1	2	?	G										X
26	Kootenai	1	?	?	.				2						X
27	Ksanka	1	3	Y	M		1		2			1			X
28	Lazy Crk	1	3	N	G										.
	Lost		1	?	M				6						.
29	Lost Soul	1	?	?	.				1						X
30	Lydia	1	6	Y	G				3						X
	McGregor	1	1	Y	M				2						.
31	Moore	1	2	Y	M				3						X
32	Mullan	1	4	Y	G				4						X
33	Murphy Lake	1	7	Y	G				1						X
	No	1	0	?	.										.
34	Noisy	1	2	?	M				2						X
35	O'Brien	1	2	?	P										X
36	Pierce	1	3	?	G										X
37	Piper	1	5	?	G				3						X
38	Pistol Creek	1	7	Y	M										X
39	Pleasant Valley	1	11	Y	M				1						X
40	Quintonkon	1	2	?	M				2						X
41	Satire	1	4	Y	G				5						X
42	Schafer	1	10	Y	G										X
43	Sleeping Woman	1	2	?	M						1				X
44	Spotted Bear	1	2	?	M				2						X
45	Summit Creek	1	5	?	M	1			3						X
	Tallulah	1	1	?	P										.
46	Thirsty	1	7	Y	G				4						X



REF #	WOLF PACK	FWP	MIN. ESTIMATED PACK SIZE DEC 2019	BREEDING	COUNT	DOCUMENTED MORTALITIES					CONFIRMED LOSSES				2019
		REGION		PAIR?	QUALITY	NATURAL	HUMAN	UNKN	HARVEST	CONTROL	CATTLE	SHEEP	DOGS	OTHER	CENTROID
47	Thompson Peak	1	3	Y	M				7						X
	Weigel	1	1	?	P				1						.
48	Whale Creek	1	10	Y	G										X
49	Whitefish	1	4	Y	G				1						X
50	Yaak	1	5	?	G				1						X
51	Alta	2	6	Y	G				3						X
52	Ambrose	2	2	?	P				2						X
53	Arrastra Creek	2	4	?	G				3						X
54	Avon	2	4	Y	G				3		1				X
55	Belmont	2	7	Y	G										X
56	Black Pine	2	2	?	P										X
57	Bugle Mountain	2	2	?	P										X
58	Cache Creek #	2	6	Y	G				1						X
59	Chamberlain	2	2	N	G				2	11	3				X
60	Conger Point	2	2	?	P										X
61	DeBorgia #	2	11	Y	G				2						X
62	Divide Creek	2	2	?	P				1						X
63	East Fork Rock Creek	2	2	?	P				1						X
64	El Capitan	2	4	?	M										X
65	Evaro	2	5	?	M				2						X
66	Flint	2	3	N	M				2						X
67	Gash Creek #	2	2	?	P										X
68	Gird Point	2	2	?	P										X
69	Hardscrabble	2	4	Y	G		1		3						X
70	Humbug	2	3	?	P				3						X
71	Inez	2	4	?	G		1		7						X
72	Landers Fork	2	2	N	P										X

REF #	WOLF PACK	FWP	MIN. ESTIMATED PACK SIZE DEC 2019	BREEDING	COUNT	DOCUMENTED MORTALITIES					CONFIRMED LOSSES				2019
		REGION		PAIR?	QUALITY	NATURAL	HUMAN	UNKN	HARVEST	CONTROL	CATTLE	SHEEP	DOGS	OTHER	CENTROID
73	Miller Peak	2	5	Y	G										X
74	Mineral Mountain	2	6	Y	G		1		2						X
75	Morrell Mountain	2	7	Y	G		2		1						X
76	Ninemile	2	4	?	M				2						X
77	Olson Peak	2	2	?	P										X
78	One Horse	2	3	N	M				2						X
79	Overwhich #	2	4	Y	P				2						X
80	Petty Creek	2	5	Y	G				1						X
81	Quartz Creek	2	5	Y	G				2						X
82	Ross' Fork	2	6	Y	G		1		3						X
83	Savenac	2	4	Y	P				1						X
84	Seeley Lake	2	6	Y	G				8						X
85	Siegel Mountain	2	3	?	M										X
86	Silver Lake #	2	4	Y	M		1		2						X
87	Sliderock Mountain	2	5	Y	G				4		4				X
88	Stonewall Mountain	2	4	Y	G				1	3		4			X
89	Sula	2	3	N	G				4						X
90	Sunflower Mountain	2	7	Y	G				1						X
91	Sunrise Mountain	2	2	N	P										X
92	Taft	2	2	?	P										X
93	Telephone Butte	2	3	?	M				4						X
94	Tepee Point	2	2	?	P				1						X
95	Trapper Peak	2	4	Y	G				1						X
96	Union Peak	2	5	Y	M		1		4						X
97	Watchtower #	2	3	?	P										X
98	Anaconda	3	5	?	G										X
99	Dyce	3	2	N	P										X
100	Four Eyes #	3	4	?	G										X

REF #	WOLF PACK	FWP REGION	MIN. ESTIMATED PACK SIZE DEC 2019	BREEDING PAIR?	COUNT QUALITY	DOCUMENTED MORTALITIES					CONFIRMED LOSSES				2019	
						NATURAL	HUMAN	UNKN	HARVEST	CONTROL	CATTLE	SHEEP	DOGS	OTHER	CENTROID	
	Fox Creek	3	0	N	G											
101	Pyramid #	3	3	N	G											X
102	Spires	3	3	?	G											X
103	Thunderbolt	3	5	?	M											X
104	Mudd Creek	3	2	N	M											X
105	Stine	3	4	?	P											X
	Trapper Creek	3	0	N	G											
106	Warm Springs	3	3	?	M											X
107	Lava Mountain	3	2	N	G											X
	Battle Ridge	3	1	?	G				2							
108	Cinnabar*	3	2	?	G				1							X
109	Elbow Creek	3	?	?	P				1							X
110	Hogback	3	7	Y	M				5							X
111	Lost Creek	3	?	?	P											X
	Shinglemill	3	1	?	P				2							
112	Slip n' Slide	3	4	Y	M				7							X
	Steamboat Peak	3	0	?	G											
113	Anteolpe Basin	3	?	N	P						2					X
114	Beartrap	3	14	Y	G				12							X
115	Cedar Creek	3	4	N	P		1		2		3					X
116	Centennial	3	6	N	P				1	7	3					X
117	Cougar 2*	3	6	Y	G				2							X
118	Hayden*	3	4	Y	M				4							X
119	Meadow Creek	3	3	N	P				1	3	4			2		X
120	Price Creek	3	5	Y	G				1	2		7				X
121	Sweetwater	3	?	N	P											X
122	Toadflax	3	2	N	M		1									X
123	Avalanche	4	5	Yes	M				4							X

REF #	WOLF PACK	FWP	MIN. ESTIMATED PACK SIZE DEC 2019	BREEDING	COUNT	DOCUMENTED MORTALITIES					CONFIRMED LOSSES				2019
		REGION		PAIR?	QUALITY	NATURAL	HUMAN	UNKN	HARVEST	CONTROL	CATTLE	SHEEP	DOGS	OTHER	CENTROID
124	Bennie	4	5	Yes	M				4						X
125	Black Butte	4	5	?	M										X
126	Blowout Mountain	4	7	Yes	G				5						X
127	Chief Mtn	4	29	Yes	G										X
128	Crown Mtn	4	8	Yes	G		1	1	2		4				X
129	Deep Creek	4	6	No	M					3	5				X
130	Dog Gun	4	4	?	P										X
131	Flesher Pass	4	5	?	G										X
132	Livermore	4	6	Yes	G										X
133	Looking Glass	4	17	Yes	G					2	1				X
134	Marias	4	6	?	P										X
135	Mount Vesuvius	4	6	Yes	M				1						X
136	Pretty Prairie	4	8	Yes	G										X
137	Red Shale	4	10	Yes	M	1			1						X
138	Shellrock	4	5	?	M						2				X
139	Teton	4	4	?	M				3						X
140	Yogo Peak	4	2	?	P										X
141	Baker Mountain	5	?	N	P		1		5						X
	Cayuse Hills	5	?	?	P										
142	Meatrack Creek	5	?	?	P										X
143	Rosebud	5	?	?	P		1								X
144	Rapeljie area	5	?	?	P										X
145	Meyer Mountain	5	?	?	P		1		3						X
	Misc/Lone	1							2						
	Misc/Lone	2					2		10	1	2				
	Misc/Lone	3	5	N	P		1		2						
	Misc/Lone	3	6												

REF #	WOLF PACK	FWP	MIN. ESTIMATED PACK SIZE DEC 2019	BREEDING	COUNT	DOCUMENTED MORTALITIES					CONFIRMED LOSSES				2019
		REGION		PAIR?	QUALITY	NATURAL	HUMAN	UNKN	HARVEST	CONTROL	CATTLE	SHEEP	DOGS	OTHER	CENTROID
	Misc/Lone	4							1	1	1				
	Misc/Lone	5	1												
	Montana Totals		621			3	18	1	256	44	43	12	0	2	

**Table 3: Wolf Packs and Population Data for Montana, 2020.**

REF #	WOLF PACK	FWP	MINIMUM	PACK COUNT TYPE	PACK	PACK SIZE	2020	CENTROID
		REGION	PACK SIZE DEC 31, 2020	Confirmed/Estimated/ No Data	COUNT		BREEDING	
					QUALITY	DATA TYPE	PAIR?	
1	Akokala	1	3	Estimated	M	NPS tracks; public	Y	Prior year knowledge
2	Apgar	1	3	Estimated	M	John Waller camera August: black adult, gray adult, black pup	Y	Prior year knowledge
3	Ashley	1	4	Estimated	G	report from trappers	Y	General Knowledge
4	Bearfite	1	5	Confirmed	G	helicopter visual 2/17/21	Y	Prior year telemetry
5	Browns Meadow	1	11	Estimated	M	report from trappers	Y	General Knowledge
6	Bull River	1	?	No Data	No Data	No Data	?	.
7	Cabinet	1	5	Confirmed	G	cameras	Y	Current year collar
8	Camas Prairie	1	2	Estimated	P	harvest, and report from trappers of some tracks after trapping ended spring 2021	?	Prior year centroid
9	Candy Mountain	1	2	Estimated	P	harvest	?	General Knowledge
10	Chief Mtn (Glacier NP)	1	2	Estimated	M	tracks seen by NPS	?	General Knowledge
11	Cilly	1	6	Confirmed	G	DNRC cameras	Y	Prior year telemetry
12	Condon	1	4	Confirmed	G	SVC sightings	Y	Den estimation
13	Corona	1	2	Estimated	M	report from trappers	Y	General Knowledge
14	Cowell	1	4	Estimated	M	FS found a den	Y	Den estimation
15	Crane Mtn	1	4	Estimated	M	cameras	Y	General Knowledge
16	Dutch (Glacier NP)	1	4	Estimated	G	NPS camera, sightings	Y	Prior year telemetry
17	Echo	1	7	Estimated	G	public sightings, harvest	?	General Knowledge
18	Elk Creek (Swan Valley)	1	6	Estimated	G	Oct. camera, FWP tracks	Y	General Knowledge
19	Firefighter	1	4	Estimated	M	camera	?	General Knowledge
20	Fisher Mountain	1	4	Confirmed	G	collar of old female detached January 15, 2020, 4 sets of tracks seen when picking up collar	?	Prior collar locations
21	Fishtrap	1	4	Estimated	M	report from trappers	?	General Knowledge
22	Flathead Alps	1	2	Estimated	P	harvest; camera stolen	?	Prior year telemetry
23	Garden	1	6	Estimated	M	report from trappers	Y	General Knowledge
24	Good Creek	1	6	Confirmed	G	remote camera video	Y	General Knowledge
25	Grave Creek	1	4	Estimated	M	FWP camera	?	General Knowledge
26	Great Bear	1	?	No Data	No Data	No Data	?	.

REF #	WOLF PACK	FWP	MINIMUM	PACK COUNT TYPE	PACK	PACK SIZE	2020	CENTROID
		REGION	PACK SIZE DEC 31, 2020	Confirmed/Estimated/ No Data	COUNT	DATA TYPE	BREEDING	TYPE
27	Half Moon	1	3	Estimated	M	report from trappers		Prior year centroid
28	Irvine	1	4	Estimated	M	estimate from WS	?	Prior year centroid
29	Kerr	1	3	Confirmed	G	visual from WS	N	WS estimate
30	Kintla	1	4	Estimated	M	estimate from NPS	?	Prior year telemetry
31	Kootenai	1	6	Confirmed	G	seen by public Mar2021	?	General Knowledge
32	Ksanka	1	2	Estimated	M	howling heard by public	Y	Prior year centroid
33	Lazy Crk	1	4	Confirmed	G	cameras	?	General Knowledge
34	Lost	1	4	Estimated	G	report from trappers	?	General Knowledge
	Lost Soul	1	0	Estimated	G	camera, public comment	N	.
35	Lydia	1	4	Confirmed	G	cameras	?	General Knowledge
36	McGregor	1	8	Estimated	M	report from trappers	Y	Prior year centroid
37	Moore	1	8	Estimated	M	report from trappers	Y	General Knowledge
38	Mullan	1	4	Estimated	M	camera	?	General Knowledge
39	Murphy Lake	1	6	Confirmed	G	camera, howls	Y	Den estimation
40	Noisy	1	3	Estimated	G	howling heard by public	?	General Knowledge
41	Nyack (Glacier NP)	1	6	Confirmed	G	NPS camera	?	General Knowledge
42	O'Brien	1	2	Estimated	P	harvest, no other data	?	Prior year centroid
43	Pierce	1	?	No Data	No Data	No Data		.
44	Piper	1	2	Estimated	M	SVC camera report	?	Prior year centroid
46	Pleasant Valley	1	8	Estimated	M	report from trappers	Y	Prior year centroid
47	Quintonkon	1	5	Estimated	G	public cameras	?	Prior year centroid
48	Satire	1	3	Estimated	M	report from trappers	?	General Knowledge
49	Schafer	1	?	No Data	No Data	No Data	?	.
50	Silcox	1	2	Estimated	M	FWP sighting May20	?	General Knowledge
52	Solomon Mountain	1	5	Confirmed	M	USFWS report	?	General Knowledge
53	Spotted Bear	1	7	Confirmed	G	cameras Aug2020	Y	Prior year centroid
54	Summit Creek	1	?	No Data	No Data	No Data	?	.

REF #	WOLF PACK	FWP	MINIMUM	PACK COUNT TYPE	PACK	2020		CENTROID
		REGION	PACK SIZE DEC 31, 2020	Confirmed/Estimated/ No Data	COUNT	PACK SIZE	BREEDING	
					QUALITY	DATA TYPE	PAIR?	TYPE
55	Sunday Mountain	1	3	Confirmed	M	cameras	Y	General Knowledge
56	Swamp Creek	1	11	Confirmed	G	cameras, pups on rd	Y	Den estimation
57	Tallulah	1	7	Estimated	M	report from trappers	?	Prior year centroid
58	Thirsty	1	2	Confirmed	G	Sept. cameras	Y	Prior year centroid
59	Thompson Peak	1	5	Estimated	M	cameras, trapper reports	Y	General Knowledge
60	Whale Creek	1	3	Estimated	M	tracks, local sightings	Y	Prior year centroid
	<del>Whitefish</del>	1	0	Confirmed	G	1 on cam May2021	N	.
61	Wolf Prairie	1	2	Confirmed	G	trapper report; 5 pups May2021	Y	General Knowledge
62	Yaak	1	4	Confirmed	M	camera, tracks, public	?	Prior year centroid
63	Alta	2	6	Confirmed	G	Jan, Report	Y	GPS Data
64	Ambrose	2	4	Estimated	P	Feb, Report	?	Estimated
65	Arrastra Creek	2	4	Confirmed	G	Jan, Multiple Reports	?	GPS Data
66	Avon	2	4	Estimated	M	Fall, Report	?	Estimated
67	Belmont	2	4	Estimated	P	Dec-Jan, Report	Y	GPS Data
68	Big Hole #	2	6	Confirmed	G	January, Report	Y	GPS Data
	<del>Black Pine</del>	2	?	No Data	No Data	No Data	?	.
69	Bonner Mtn	2	3	Confirmed	P	2021 Spring Tracks	?	Scouting & tracking
70	Bugle Mountain	2	?	No Data	No Data	No Data	?	.
71	Cache Creek #	2	6	Confirmed	G	Jan & Feb, Report/tracks	Y	GPS Data
72	Chamberlain	2	7	Confirmed	G	Jan, Report , Spring 2021 Camera	Y	VHF Data
73	Conger Point	2	?	No Data	No Data	No Data	?	.
74	DeBorgia #	2	11	Confirmed	G	Jan & Feb, Report/tracks	Y	GPS Data
75	Divide Creek	2	2	Confirmed	P	Jan Track Survey	?	GPS Data
76	East Fork Rock Creek	2	?	No Data	No Data	No Data	?	.
77	El Capitan	2	2	Confirmed	G	Jan Camera	N	Camera Data
78	Evaro	2	2	Confirmed	P	Summer Tracks, report, camera	N	Scouting & tracking
79	Flint	2	2	Estimated	P	Reports	N	GPS Data



REF #	WOLF PACK	FWP	MINIMUM	PACK COUNT TYPE	PACK	2020		CENTROID
		REGION	PACK SIZE DEC 31, 2020	Confirmed/Estimated/ No Data	COUNT	PACK SIZE	BREEDING	
					QUALITY	DATA TYPE	PAIR?	TYPE
80	Gash Creek #	2	2	Estimated	P	Jan, Report	?	Scouting & tracking
81	Gird Point	2	2	Estimated	P	September tracks	?	Scouting & tracking
82	Hardscrabble	2	4	Estimated	M	December, Report	Y	GPS Data
83	Hoodoo	2	5	Confirmed	G	Spring 2021 Camera & Reports	N	Scouting & tracking
84	Humbug	2	6	Confirmed	M	Spring 2021 Tracks	Y	GPS Data
85	Inez	2	4	Confirmed	G	January, Report	Y	GPS Data
86	Landers Fork	2	2	Estimated	P	Summer tracks	N	Scouting, tracking, & some GPS data
87	Lost Peak #	2	6	Confirmed	G	Jan & Feb, Reports Lion Crew	Y	Estimated
88	Miller Peak	2	3	Estimated	M	??,Reports	N	Scouting & tracking
89	Mineral Mountain	2	6	Confirmed	G	December, January tracks lion crew	Y	Scouting & tracking
90	Morrell Mountain	2	3	Estimated	P	Spring 2021 Camera & Reports	N	GPS Data
91	Ninemile	2	4	Confirmed	M	April 2021 Trapping	Y	GPS data
92	Olson Peak	2	2	Estimated	P	Summer tracks & scats	?	Scouting & tracking
93	One Horse	2	4	Estimated	P	Fall & Spring 2021, Reports	N	GPS Data
94	Overwhich #	2	4	Confirmed	M	Jan & Feb, Report	Y	GPS Data
95	Petty Creek	2	5	Confirmed	G	Jan & Feb, Reports Lion Crew	Y	GPS data
96	Quartz Creek	2	7	Confirmed	G	Jan & Feb, Reports Lion Crew	Y	VHF data, scouting & tracking
97	Ross' Fork	2	8	Confirmed	G	Jan & Feb, Reports & Picture	Y	GPS Data
98	Savenac	2	4	Confirmed	P	Jan & Feb, Report	?	Scouting & tracking
99	Seeley Lake	2	3	Estimated	M	Dec & Jan Reports	Y	Scouting & tracking
100	Siegel Mountain	2	4	Confirmed	M	Jan & Feb, Reports Lion Crew	?	GPS data
101	Silver Lake #	2	4	Confirmed	M	January, Report	?	Past scouting & tracking
102	Sliderock Mountain	2	4	Confirmed	M	Fall & Spring 2021, Reports	Y	VHF data & Summer tracking
	Stonewall Mountain	2	0	No Data	No Data	No Data	N	.
103	Sula	2	4	Estimated	M	Dec, Report	N	GPS Data
104	Sunflower Mountain	2	7	Confirmed	G	Jan & Feb, Reports Lion Crew	Y	GPS Data
105	Sunrise Mountain	2	4	Confirmed	G	Jan & Feb, Reports Lion Crew	N	Scouting & tracking

REF #	WOLF PACK	FWP	MINIMUM	PACK COUNT TYPE	PACK	PACK SIZE	2020	CENTROID
		REGION	PACK SIZE DEC 31, 2020	Confirmed/Estimated/ No Data	COUNT	DATA TYPE	BREEDING	TYPE
106	Taft	2	?	No Data	No Data	No Data	?	.
107	Tarkio	2	10	Confirmed	G	Jan & Feb, Reports & Track survey	Y	GPS Data
108	Telephone Butte	2	3	Confirmed	G	Fall & Spring 2021, Reports	N	Scouting & tracking
109	Tepee Point	2	4	Confirmed	M	Jan & Feb, Reports, 2021 summer trapping	Y	Scouting & tracking
110	Trapper Peak	2	4	Confirmed	M	Jan & Feb, Reports	Y	GPS Data
111	Union Peak	2	4	Estimated	M	Jan & Feb, Reports	Y	GPS Data
112	Watchtower #	2	3	Confirmed	G	January, Report	N	Estimated
113	Anaconda	3	2	Confirmed	P	Harvest, sightings	?	General Knowledge
114	Black Canyon 2	3	4	Confirmed	M	Wolf/Livestock	?	General Knowledge
115	Dyce	3	?	No Data	No Data	No Data	?	.
116	Elkhorn 2	3	2	Confirmed	P	Harvest	N	General Knowledge
	Four Eyes #	3	0	Confirmed	G	Wolf/Livestock	N	General Knowledge
117	Lava Mountain	3	4	Confirmed	M	Harvest, sightings	?	General Knowledge
118	Mudd Creek	3	?	No Data	No Data	No Data	?	.
119	Pyramid #	3	6	Confirmed	G	Sightings, Harvest	Y	General Knowledge
	Spires	3	0	Confirmed	G	Harvest, sightings	N	General Knowledge
120	Stine	3	2	Confirmed	P	Harvest, sightings	?	General Knowledge
121	Thunderbolt	3	5	Confirmed	P	Harvest, sightings	?	General Knowledge
122	Warm Springs	3	5	Confirmed	P	Harvest, sightings	?	General Knowledge
123	Antelope Basin	3	?	No Data	No Data	No Data	?	.
124	Beartrap	3	16	Confirmed	G	Dec Sightings	Y	Previous Telemetry
125	Cedar Creek	3	6	Estimated	M	Nov Sightings	?	General Knowledge
126	Centennial	3	6	Estimated	M	Sept Sighting	?	General Knowledge
127	Cougar 2*	3	2	Estimated	M	Dec Sightings	?	General Knowledge
128	Hayden*	3	5	Estimated	M	Dec snow track	?	General Knowledge
129	Meadow Creek	3	3	Estimated	M	Reports	N	General Knowledge
130	Price Creek	3	5	Estimated	M	Dec Reports	?	General Knowledge

REF #	WOLF PACK	FWP	MINIMUM	PACK COUNT TYPE	PACK	2020		CENTROID
		REGION	PACK SIZE DEC 31, 2020	Confirmed/Estimated/ No Data	COUNT	PACK SIZE	BREEDING	
					QUALITY	DATA TYPE	PAIR?	
131	Sweetwater	3	?	No Data	No Data	No Data	?	.
132	Toadflax	3	5	Estimated	G	Nov Sightings	Y	Den
133	Cinnabar*	3	?	No Data	No Data	No Data	?	.
134	Elbow Creek	3	?	No Data	No Data	No Data	?	.
135	Fridley	3	?	No Data	No Data	No Data	?	.
136	Hogback	3	?	No Data	No Data	No Data	?	.
137	Lost Creek	3	?	No Data	No Data	No Data	?	.
138	Slip n' Slide	3	?	No Data	No Data	No Data	?	.
139	Steamboat Peak	3	?	No Data	No Data	No Data	?	.
140	Avalanche	4	?	No Data	No Data	No Data	?	.
141	Bennie	4	4	Confirmed	M	Jan-Mar Reports	Y	Historic Collar data
142	Black Butte	4	4	Estimated	M	Fall 2020 Reports/Photos	?	General Knowledge
143	Blowout Mountain	4	5	Confirmed	G	Jan/Feb Reports	Y	Historic Collar data
145	Crown Mtn	4	3	Confirmed	G	Jan Harvests	N	Historic Collar data
146	Deep Creek	4	5	Confirmed	G	Jan-Mar Reports	Y	Historic Collar data
147	Dog Gun	4	4	Confirmed	M	Jan-Mar Reports	Y	GPS Collar Data
148	Flesher Pass	4	4	Estimated	P	Wolves near livestock Fall 2020	?	VHF Collar Data
151	Marias	4	?	No Data	No Data	No Data	?	.
152	Mount Vesuvius	4	3	Confirmed	M	FWP Winter Tracks	?	General Knowledge
153	Pretty Prairie	4	6	Confirmed	M	USFS Winter Tracks	Y	General Knowledge
154	Red Shale	4	8	Confirmed	M	Dec/Jan Reports	Y	Historic Collar data
155	Shellrock	4	?	No Data	No Data	No Data	?	.
156	Teton	4	3	Confirmed	M	FWP Winter Tracks/Photos	?	General Knowledge
157	Yogo Peak	4	2	Estimated	P	Tracks /Scat Fall 2020	?	Scouting and Reports
158	Baker Mountain	5	?	No Data	No Data	No Data	?	.
159	Loco Mountain	5	5	Confirmed	G	Jan-March Reports/Photos	Y	Scouting and Reports
160	Meatrack Creek	5	?	No Data	No Data	No Data	?	.

REF #	WOLF PACK	FWP	MINIMUM	PACK COUNT TYPE	PACK	2020		CENTROID
		REGION	PACK SIZE DEC 31, 2020	Confirmed/Estimated/ No Data	COUNT	PACK SIZE	BREEDING	
					QUALITY	DATA TYPE	PAIR?	TYPE
161	Meyer Mountain	5	?	No Data	No Data	No Data	?	.
162	Rapeljie area	5	?	No Data	No Data	No Data	?	.
163	Rosebud	5	3	Confirmed	P	Jan Harvest/WS tracks/photos	?	Scouting and Reports
	<b>Montana Totals</b>		<b>583</b>					

**Table 4: Wolf Packs and Population Data for Montana, 2021.**

REF #	WOLF PACK	FWP REGION	MINIMUM PACK SIZE DEC 31, 2021	PACK COUNT TYPE Confirmed/Estimated/No Data	PACK COUNT QUALITY	PACK SIZE DATA TYPE	2021 BREEDING PAIR?	CENTROID TYPE
	Akokala	1	0	Estimated	M	none seen by NPS	?	.
1	Apgar	1	2	Estimated	M	tracks seen by NPS	?	Prior year knowledge
2	Ashley	1	3	Confirmed	G	camera surveys	Y	General Knowledge
3	Bearfite	1	3	Confirmed	G	camera surveys	Y	Prior year telemetry
4	Browns Meadow	1	11	Estimated	M	report from trappers	Y	General Knowledge
	Bull River	1	?	No Data	No Data	No Data - Will attempt to verify or eliminate in 2022	?	.
5	Cabinet	1	5	Confirmed	G	collar, cam, tracks	Y	Collar locations
6	Camas Prairie	1	3	Estimated	P	harvest	?	Prior year centroid
7	Candy Mountain	1	2	Estimated	P	harvest	?	General Knowledge
8	Cilly	1	4	Confirmed	G	cameras; SVC tracks	?	Prior year telemetry
9	Condon	1	7	Confirmed	G	SVC tracking	Y	Den estimation
10	Corona	1	2	Estimated	M	report from trappers	Y	General Knowledge
11	Cowell	1	4	Estimated	M	FS found a den	Y	Den estimation
12	Crane Mtn	1	2	Estimated	M	cameras	?	General Knowledge
13	Dutch (Glacier NP)	1	4	Confirmed	G	NPS camera, sightings	Y	Prior year telemetry
14	Echo	1	2	Estimated	P	public sightings, harvest	?	General Knowledge
15	Elk Creek (Swan Valley)	1	7	Estimated	G	camera, SVC tracks	?	General Knowledge
16	Firefighter	1	4	Estimated	M	camera	?	General Knowledge
17	Fisher Mountain	1	4	Confirmed	M	female capture 10/1/21	Y	Collar locations
18	Fishtrap	1	4	Estimated	M	report from trappers	?	General Knowledge
19	Flathead Alps	1	1	Unconfirmed	P	harvest; camera stolen	?	Prior year telemetry
20	Garden	1	7	Estimated	G	report from trappers	Y	General Knowledge
21	Good Creek	1	3	Estimated	M	cameras	?	General Knowledge
22	Grave Creek	1	6	Estimated	M	FS reports, cam	Y	General Knowledge
23	Great Bear	1	2	Estimated	P	harvest	?	Prior year centroid
	Great Northern	1	?	No Data	No Data	No Data - Will attempt to verify or eliminate in 2022	?	.

REF #	WOLF PACK	FWP REGION	MINIMUM PACK SIZE DEC 31, 2021	PACK COUNT TYPE Confirmed/Estimated/No Data	PACK COUNT QUALITY	PACK SIZE DATA TYPE	2021 BREEDING PAIR?	CENTROID TYPE
24	Half Moon	1	3	Estimated	M	report from public	?	Prior year centroid
25	Irvine	1	4	Estimated	M	estimate from WS	?	Prior year centroid
26	Kerr	1	2	Confirmed	G	visual from WS	?	WS estimate
27	Kintla	1	4	Estimated	M	estimate from NPS	?	Prior year telemetry
28	Kootenai	1	5	Estimated	G	seen by public Mar2021	?	General Knowledge
29	Ksanka	1	2	Estimated	M	howling heard by public	?	Prior year centroid
30	Lazy Crk	1	5	Confirmed	M	cameras	Y	General Knowledge
31	Lost	1	7	Confirmed	G	trappers info; scouting	Y	Updated knowledge
32	Lost Soul	1	2	Estimated	M	cameras; harvest	?	Prior year centroid
33	Lydia	1	3	Confirmed	G	cameras; harvest	Y	General Knowledge
34	McGregor	1	8	Estimated	M	report from trappers	Y	Updated knowledge
35	Moore	1	8	Estimated	M	report from trappers	Y	General Knowledge
36	Mullan	1	8	Estimated	M	camera	Y	General Knowledge
37	Murphy Lake	1	3	Confirmed	G	camera, howls	Y	Prior year centroid
38	Noisy	1	13	Estimated	G	seen & heard by public	Y	General Knowledge
39	Nyack (Glacier NP)	1	6	Confirmed	G	NPS camera	?	Prior year centroid
	O'Brien	1	0	No Data	No Data	No Data - Will attempt to verify or eliminate in 2022	?	.
40	Piper	1	7	Confirmed	G	SVC tracking; FWP flight	?	Prior year centroid
41	Pleasant Valley	1	7	Estimated	M	report from trappers	Y	Prior year centroid
42	Quintonkon	1	4	Confirmed	G	public cams; hunters	Y	Prior year centroid
43	Satire	1	7	Estimated	G	trappers info; pups pic	Y	Prior year centroid
	Schafer	1	?	No Data	No Data	No Data - Will attempt to verify or eliminate in 2022	?	.
44	Silcox	1	2	Estimated	P	harvest data	?	General Knowledge
45	Solomon Mountain	1	5	Confirmed	G	USFWS report	?	General Knowledge
46	Spotted Bear	1	8	Estimated	M	FS cameras	?	Prior year centroid
	Summit Creek	1	?	No Data	No Data	No Data - Will attempt to verify or eliminate in 2022	?	.
47	Sunday Mountain	1	3	Confirmed	M	cameras	?	General Knowledge

REF #	WOLF PACK	FWP REGION	MINIMUM PACK SIZE DEC 31, 2021	PACK COUNT TYPE Confirmed/Estimated/No Data	PACK COUNT QUALITY	PACK SIZE DATA TYPE	2021 BREEDING PAIR?	CENTROID TYPE
48	Swamp Creek	1	5	Confirmed	G	cams; 3 pups seen July	Y	Prior year centroid
49	Tallulah	1	10	Estimated	M	report from trappers	?	Prior year centroid
50	Thirsty	1	2	Estimated	M	Sept. cameras	Y	Prior year centroid
51	Thompson Peak	1	5	Estimated	M	cameras, trapper reports	Y	General Knowledge
52	Twilight	1	6	Estimated	M	trapper report	?	General Knowledge
53	Weigel	1	6	Confirmed	M	camera, tracks	Y	General Knowledge
54	Whale Creek	1	3	Confirmed	M	tracks, local sightings	Y	Prior year centroid
55	Whitefish	1	3	Estimated	M	howling heard by public	?	General Knowledge
56	Wolf Prairie	1	2	Estimated	M	trapper report	Y	General Knowledge
57	Yaak	1	4	Confirmed	M	camera, tracks, public	?	General Knowledge
58	Alta	2	6	Confirmed	G	Jan, Report	Y	GPS Data
59	Ambrose	2	4	Estimated	P	Spring 2022, Report	?	Estimated
60	Arrastra Creek	2	5	Confirmed	G	Jan, Lion crew Multiple Reports	?	GPS Data
61	Avon	2	4	Confirmed	G	Winter lion crew Report	?	Estimated
62	Belmont	2	4	Estimated	M	Dec-Jan, Report	Y	GPS Data
63	Big Hole #	2	6	Confirmed	G	January, tracks	Y	GPS Data
64	Bonner Mtn	2	5	Estimated	M	Summer Tracks and Sightings (8) Minus Harvest	Y	Scouting & tracking
	Bugle Mountain	2	?	No Data	No Data	No Data - Will attempt to verify or eliminate in 2022	?	.
65	Cache Creek #	2	4	Estimated	M	Spring 2022 tracks	?	GPS Data
66	Chamberlain	2	6	Confirmed	G	Jan, Multiple Reports	Y	VHF Data
	Conger Point	2	?	No Data	No Data	No Data - Will attempt to verify or eliminate in 2022	?	.
67	DeBorgia #	2	8	Confirmed	G	Jan & Feb, Report/tracks	Y	GPS Data
68	Divide Creek	2	2	Confirmed	P	Track Survey	?	GPS Data
	East Fork Rock Creek	2	?	No Data	No Data	No Data - Will attempt to verify or eliminate in 2022	?	.
69	El Capitan	2	4	Confirmed	G	October Tracks, Trail Camera	Y	Camera Data
70	Evaro	2	2	Estimated	P	Fall report, Trail camera	N	Scouting & tracking
	Flint	2	?	No Data	No Data	No Data - Will attempt to verify or eliminate in 2022	?	.

REF #	WOLF PACK	FWP REGION	MINIMUM PACK SIZE DEC 31, 2021	PACK COUNT TYPE Confirmed/Estimated/No Data	PACK COUNT QUALITY	PACK SIZE DATA TYPE	2021 BREEDING PAIR?	CENTROID TYPE
71	Gash Creek #	2	3	Estimated	P	Jan, March 2022, Report, Summer 2022 wolverine camera	?	Scouting & tracking
72	Gird Point	2	6	Confirmed	M	Jan Report	?	Sounting & tracking
73	Hardscrabble	2	2	Estimated	M	Summer & winer sightings & reports	?	GPS Data
74	Hoodoo	2	3	Confirmed	G	Summer 2021 Camera & WS Spring 2022 Reports	N	Scouting & tracking
75	Humbug	2	4	Confirmed	M	WS Summer report & winter lion crew sightings	N	GPS Data
76	Inez	2	8	Confirmed	G	January, Report/sighting	Y	GPS Data
77	Landers Fork	2	4	Confirmed	P	Winter Tracks, Hunter report & Lion crew	?	Scouting, tracking, & some GPS data
78	Lost Peak #	2	11	Confirmed	G	Trail Camera	Y	Estimated
79	Miller Peak	2	2	Estimated	P	MPG trail camera	N	Scouting & tracking
80	Mineral Mountain	2	6	Confirmed	G	Winter Trapper Reports	Y	Scouting & tracking
81	Morrell Mountain	2	7	Estimated	G	Spring 2022 Report, tracks, and harvest after Jan 1st	N	GPS Data
82	Ninemile	2	4	Confirmed	M	2022 Spring Scouting	Y	GPS data
83	Olson Peak	2	2	Estimated	P	Summer tracks & scats	?	Scouting & tracking
84	One Horse	2	4	Estimated	P	Fall & Spring 2022, Reports	?	GPS Data
85	Overwhich #	2	5	Confirmed	M	Jan & Feb, Report	Y	GPS Data
86	Petty Creek	2	8	Confirmed	G	Jan & Feb trail camera and reports	Y	GPS data
87	Pierce	2	10	Confirmed	G	confirmed, winter flight observation on a frozen lake	Y	prior year centroid
88	Quartz Creek	2	6	Confirmed	G	Jan & Feb, Track survey and trail camera	Y	VHF data, scouting & tracking
89	Ross' Fork	2	5	Confirmed	G	Jan, Feb, and Summer Reports	N	GPS Data
90	Savenac	2	6	Confirmed	P	Jan & Feb, Report	?	Scouting & tracking
91	Seeley Lake	2	3	Estimated	P	Dec & Jan Reports	?	Scouting & tracking
92	Siegel Mountain	2	4	Confirmed	M	Jan Report	?	GPS data
93	Silver Lake #	2	5	Confirmed	M	Winter track Survey	?	Past scouting & tracking
94	Sliderock Mountain	2	4	Confirmed	M	Fall & Spring 2022, Reports	?	VHF data & Summer tracking
95	Sula	2	4	Estimated	M	Dec, Report	?	GPS Data
96	Sunflower Mountain	2	4	Confirmed	G	Jan & Feb, Reports	?	GPS Data
97	Sunrise Mountain	2	4	Confirmed	G	Summer Tracks, Winter Report	?	Scouting & tracking



REF #	WOLF PACK	FWP REGION	MINIMUM PACK SIZE DEC 31, 2021	PACK COUNT TYPE Confirmed/Estimated/No Data	PACK COUNT QUALITY	PACK SIZE DATA TYPE	2021 BREEDING PAIR?	CENTROID TYPE
	Taft	2	?	No Data	No Data	No Data - Will attempt to verify or eliminate in 2022	?	.
98	Tarkio	2	8	Confirmed	G	Jan & Feb, Reports & Track survey	Y	GPS Data
99	Telephone Butte	2	3	Confirmed	G	Fall & Spring 2022, Reports	N	Scouting & tracking
100	Tepee Point	2	8	Confirmed	M	2021 summer trapping, saw 7 pups -two harvested & at least 3 adults	Y	Scouting & tracking
101	Trapper Peak	2	4	Confirmed	M	Jan & Feb, Reports, and summer sightings	Y	GPS Data
	Union Peak	2	0	Confirmed	G	WS Removed	N	.
102	Watchtower #	2	4	Confirmed	G	January, Report	N	Estimated
103	Bull Mtn	3	3	Confirmed	G	Sightings	N	General Knowledge
104	Anaconda	3	4	Confirmed	P	Sightings/Harvest	?	General Knowledge
105	Black Canyon 2 #	3	4	Confirmed	G	Wolf/Livestock	?	General Knowledge
106	Dyce	3	2	Unconfirmed/Estimated	P	Sightings	?	General Knowledge
107	Elkhorn 2	3	4	Confirmed	P	Sightings/Harvest	N	General Knowledge
108	Lava Mountain	3	4	Confirmed	P	Sightings/Harvest	?	General Knowledge
109	Pyramid #	3	3	Confirmed	G	Sightings, Harvest, Wolf/livestock	N	General Knowledge
110	Stine	3	5	Confirmed	G	Harvest, sightings, wolf/livestock	?	General Knowledge
111	Thunderbolt	3	3	Confirmed	P	Harvest, sightings	?	General Knowledge
112	Warm Springs	3	11	Confirmed	G	Harvest, sightings	?	General Knowledge
113	Beartrap	3	12	Confirmed	G	Dec/Jan Sightings	Y	General Knowledge
114	Cedar Creek	3	6	Confirmed	G	Winter capture/harvest	N	General Knowledge
	Cougar 2*	3	?	?	?	No Data - Will attempt to verify or eliminate in 2022	?	.
	Hayden*	3	?	?	?	No Data - Will attempt to verify or eliminate in 2022	?	.
115	Meadow Creek	3	5	Confirmed	M	Reports, harvest, wolf/livestock	?	General Knowledge
116	Antone	3	5	Confirmed	G	Winter capture		General Knowledge
117	Toadflax	3	10	Confirmed	G	Winter capture	Y	General Knowledge
118	Hogback	3	6	Confirmed	G	Sightings, Harvest	?	General Knowledge
	Slip n' slide	3	0	Confirmed	G	pack eliminated - harvest	N	General Knowledge
	Cinnabar*	3	?	No Data	No Data	No Data - Will attempt to verify or eliminate in 2022	?	.

REF #	WOLF PACK	FWP REGION	MINIMUM PACK SIZE DEC 31, 2021	PACK COUNT TYPE Confirmed/Estimated/No Data	PACK COUNT QUALITY	PACK SIZE DATA TYPE	2021 BREEDING PAIR?	CENTROID TYPE
	Elbow Creek	3	?	No Data	No Data	No Data - Will attempt to verify or eliminate in 2022	?	.
	Fridley	3	?	No Data	No Data	No Data - Will attempt to verify or eliminate in 2022	?	.
	Lost Creek	3	?	No Data	No Data	No Data - Will attempt to verify or eliminate in 2022	?	.
	Steamboat Peak	3	?	No Data	No Data	No Data - Will attempt to verify or eliminate in 2022	?	.
	Avalanche	4	?	No Data	No Data	No Data - Will attempt to verify or eliminate in 2022	?	.
119	Bennie	4	4	Confirmed	M	Jan-Mar Reports	Y	Historic Collar data
120	Black Butte	4	2	Estimated	P	Fall 2021 Reports, FWP Winter Tracks	?	General Knowledge
121	Blowout Mountain	4	3	Confirmed	G	Jan/Feb Reports	?	Historic Collar data
122	Chief Mtn (Glacier NP)	1	3	Estimated	G	tracks seen by NPS	?	General Knowledge
123	Crown Mtn	4	3	Confirmed	G	Jan Harvests	N	Historic Collar data
124	Deep Creek	4	5	Confirmed	G	Jan-Mar Reports	?	Historic Collar data
125	Dog Gun	4	6	Confirmed	G	Fall 2021 Harvest/Observations, Radio-collared wolf	Y	2021 Collar Data visual center
	Flesher Pass	4	?	No Data	No Data	No Data - Will attempt to verify or eliminate in 2022	?	.
	Marias	4	?	No Data	No Data	No Data - Will attempt to verify or eliminate in 2022	?	.
126	Mount Vesuvius	4	3	Estimated	P	Jan-Mar Reports	?	General Knowledge
127	Pretty Prairie	4	6	Confirmed	M	USFS Winter Tracks	Y	General Knowledge
128	Red Shale	4	8	Confirmed	M	USFS Winter Tracks	Y	Historic Collar data
129	Shellrock	4	2	Estimated	P	Fall 2021 Reports, FWP Winter Tracks	?	General Knowledge
130	Teton	4	7	Confirmed	G	FWP Winter Tracks/Photos	Y	General Knowledge
131	Yogo Peak	4	2	Estimated	P	Tracks /Scat Fall 2021-Spring 2022	?	Scouting and Reports
132	Baker Mountain	5	4	Estimated	P	Hunter Reports Fall 2021	?	Historic Collar Data
	Loco Mountain	5	?	No Data	No Data	No Data - Will attempt to verify or eliminate in 2022	?	.
	Meatrick Creek	5	0	Estimated	M	No Reports From Hunters, No Biologist Detections	?	.
	Rosebud	5	?	No Data	No Data	No Data - Will attempt to verify or eliminate in 2022	?	.
	Rapeljie area	5	0	Estimated	M	No Reports From Hunters, No Biologist Detections	?	.
	Meyer Mountain	5	0	Estimated	M	No Reports From Hunters, No Biologist Detections	?	.
	<b>Montana Totals</b>		<b>632</b>					

**Table 5: Wolf Packs and Population Data for Montana, 2022.**

REF #	WOLF PACK	FWP REGION	MINIMUM PACK SIZE DEC 31, 2022	PACK COUNT TYPE Confirmed/Estimated/No Data	PACK COUNT QUALITY	PACK SIZE	2022 BREEDING PAIR?	CENTROID	CENTROID
						DATA TYPE		TYPE	QUALITY CODE
1	Akokala	1	2	Estimated	M	track survey 2/13/23 on skis from Polebridge	?	Prior year knowledge	FAIRLY CERTAIN
	Apgar	1	?	No Data	No Data	no information from Glacier Park	?	.	.
2	Ashley	1	5	Confirmed	G	camera surveys; public sighting 5-6 wolves on 11/18/22; 2 black pups 8/27	Y	General Knowledge	CERTAIN
3	Bearfite	1	3	Confirmed	G	camera surveys	Y	Prior year telemetry	CERTAIN
	Browns Meadow	1	?	No Data	No Data	no survey or harvest information	?	.	.
4	Bull River	1	1	Confirmed	P	camera from USFWS, 1 adult wolf at griz DNA sites	?	Prior year knowledge	FAIRLY CERTAIN
5	Cabinet	1	3	Confirmed	G	4P 3A 6/4-8/5; 2P USFWS cam 8/8/22; 9/17; 2A 1P on cam 10/11	Y	Collar locations	CERTAIN
	Camas Prairie	1	?	No Data	No Data	no survey or harvest information	?	.	.
	Candy Mountain	1	?	No Data	No Data	no survey or harvest information	?	.	.
6	Cilly	1	7	Confirmed	G	6 on camera on 8/10/2022; 7 on camera 10/11 (1P)	Y	Prior year telemetry	CERTAIN
7	Condon	1	6	Confirmed	G	8 (5A 3P) on 9/27; 7 on camera 10/23; 5 on cam from SVC on 3/1/2023; Female collar	Y	Den estimation	CERTAIN
8	Corona	1	2	Estimated	M	harvest	?	General Knowledge	FAIRLY CERTAIN
9	Cowell	1	5	Estimated	M	harvest; 2 yearlings	Y	Den estimation	FAIRLY CERTAIN
	Crane Mtn	1	1	Estimated	P	public sighting in Ferndale; cam survey didn't show wolves, no harvest, unlikely pack persisted past 12/31	?	.	.
	Dutch (Glacier NP)	1	?	No Data	No Data	no information from Glacier Park	?	.	.
10	Echo	1	5	Estimated	G	3 black wolves seen by 2 people 1/8/23; 5 seen 2/16/23	?	General Knowledge	CERTAIN
11	Elk Creek (Swan Valley)	1	2	Confirmed	G	2 wolves (1 gray, 1 black female) summer thru 10/24/22	?	General Knowledge	CERTAIN
12	Firefighter	1	2	Estimated	M	1 black 1 gray in August cam survey	?	General Knowledge	CERTAIN
	Fisher Mountain	1	1	Confirmed	P	4 harvested including 2 black pups- collared female not reported harvested, unlikely pack persisted past 12/31	Y	.	.
13	Fishtrap	1	8	Confirmed	G	8 fresh bedded areas and scat seen by FWP bio Ethan Lula on 11/9/22	?	General Knowledge	CERTAIN
14	Flathead Alps	1	8	Confirmed	G	FWP biologist observed from plane, took photos 1/8/2023	?	Prior year telemetry	FAIRLY CERTAIN
15	Good Creek	1	5	Confirmed	G	photos from landowner of 7 wolves on 9/23/22; 4 on Crane cam Miller Ck 10/7	?	General Knowledge	CERTAIN
16	Grave Creek	1	4	Confirmed	G	cam surveys from FS in Williams and Deep Ck in December and March	?	General Knowledge	FAIRLY CERTAIN
	Great Bear	1	?	No Data	No Data	no harvest or surveys	?	.	.
17	Great Northern	1	1	Estimated	P	Harvest; no other data	?	Prior year centroid	UNCERTAIN
18	Half Moon	1	1	Estimated	P	Harvest, 1 yearling; cam survey didn't show wolves	Y	Prior year centroid	FAIRLY CERTAIN

REF #	WOLF PACK	FWP REGION	MINIMUM PACK SIZE DEC 31, 2022	PACK COUNT TYPE Confirmed/Estimated/No Data	PACK COUNT QUALITY	PACK SIZE DATA TYPE	2022 BREEDING PAIR?	CENTROID TYPE	CENTROID QUALITY CODE
	Irvine	1	?	No Data	No Data	no harvest or surveys		.	.
	<del>Kerr</del>	1	?	No Data	No Data	no harvest or surveys		.	.
19	Kintla	1	8	Confirmed	G	video from seasonal wolf volunteer technician of 6 gray 2 black wolves 2/25/2023	?	Prior year telemetry	CERTAIN
20	Kootenai	1	5	Confirmed	G	USFWS report of pup at culvert; she howled and at least 3 pups howled back	Y	General Knowledge	CERTAIN
21	Ksanka	1	3	Confirmed	G	3 on camera by landowners 12/16/22	?	Prior year centroid	CERTAIN
22	Lazy Crk	1	3	Confirmed	M	1 white, 1 white w/black marks, 1 tan/orangish; 1 gray yearling hunted, 1 gray adult in 2023	Y	General Knowledge	CERTAIN
23	Lost Gem	1	3	Confirmed	G	2A, 2P cam surveys Oct; 1 black pup trapped illegally; collared gray pup alive 3/31/23	Y	Collar locations	CERTAIN
24	Lost Soul	1	2	Estimated	M	2 seen by Forest Service Biologist on 2/24/23 with spotting scope; harvest in March 2023	?	Prior year centroid	FAIRLY CERTAIN
25	Lydia	1	2	Estimated	M	cams w/ "Lydia" detections are in Thirsty collar territory; Lydia shifted south; not sure of #	Y	Knowledge from neighboring GPS	CERTAIN
26	Marias	1	1	Estimated	P	Harvest only, from 2 seasons- no surveys; new pack on table with historical map info as well	?	Estimated	UNCERTAIN
27	McGregor	1	3	Estimated	M	1 pup detected on cam surveys	Y	General Knowledge	FAIRLY CERTAIN
28	McKay	1	5	Estimated	M	Harvest and sighting of 4 other wolves by trapper at time of harvest	?	Updated knowledge	FAIRLY CERTAIN
29	Minton	1	5	Confirmed	G	6 on camera on 9/27/2022 near Minton Lookout	Y	Updated knowledge	CERTAIN
30	Moore	1	8	Confirmed	G	FWP area biologist found 8 fresh wolf beds & tracks on 11/9/22; earlier harvest was pup	Y	General Knowledge	CERTAIN
31	Mullan	1	1	Estimated	P	Harvest	?	General Knowledge	CERTAIN
32	Murphy Lake	1	3	Confirmed	G	4 sets tracks seen by WS, 7/15/22; 3 sets tracks seen by FWP bio Ethan Lula on 2/12/23	Y	Prior year centroid	CERTAIN
33	Noisy	1	4	Estimated	G	Biologist saw tracks of 4 in February, Harvest in March	?	General Knowledge	FAIRLY CERTAIN
34	Nyack (Glacier NP)	1	2	Confirmed	M	tracks seen by NPS	?	Prior year centroid	FAIRLY CERTAIN
	<del>O'Brien</del>	1	?	No Data	No Data	No Data for 2nd year- eliminate	?	.	.
35	Piper	1	1	Estimated	P	Harvest	?	Prior year centroid	FAIRLY CERTAIN
36	Pleasant Valley	1	7	Confirmed	M	5 Adult distinct color coats on camera surveys; harvests	Y	Prior year centroid	CERTAIN
37	Quintonkon	1	3	Confirmed	M	3 on landowner camera	?	Prior year centroid	FAIRLY CERTAIN
38	Satire	1	3	Estimated	G	black pup on cam surveys July 2022; gray pup trapped Nov 2022	Y	Prior year centroid	CERTAIN
39	Schafer	1	2	Estimated	M	tracks seen by griz crew	?	Prior Year Knowledge	FAIRLY CERTAIN
	Silcox	1	?	No Data	No Data	No Data	?	.	.
40	Solomon Mountain	1	3	Confirmed	G	USFWS report of scat and tracks	?	General Knowledge	FAIRLY CERTAIN
41	Spotted Bear	1	6	Confirmed	M	wolverine cams, 3-day scouting trip in August; trapper saw "11" (5 black 1 gray rest unk, 1/25)	?	Prior year centroid	FAIRLY CERTAIN

REF #	WOLF PACK	FWP REGION	MINIMUM PACK SIZE DEC 31, 2022	PACK COUNT TYPE Confirmed/Estimated/No Data	PACK COUNT QUALITY	PACK SIZE DATA TYPE	2022 BREEDING PAIR?	CENTROID TYPE	CENTROID QUALITY CODE
	Summit Creek	1	?	No Data	No Data	No Data for 2nd year- eliminate	?	.	.
42	Sunday Mountain	1	3	Confirmed	M	3 on survey cams 6/25 and 9/7	?	Updated Knowledge	FAIRLY CERTAIN
43	Swamp Creek	1	5	Confirmed	G	2A gray, 1A white, 1-2 pups on cam surveys, 1 A carrying provisioning meat for pups	Y	Prior year centroid	CERTAIN
44	Tallulah	1	4	Estimated	G	2022-Trapper saw 5 pups born, 1 died natural causes, 3 hunted	Y	Prior year centroid	CERTAIN
45	Thirsty	1	5	Confirmed	G	camera survey 10/5/2022 of 7 wolves; 7-8 on 10/18; minus harvest; never saw pups	?	Current GPS Collar	CERTAIN
46	Thompson Peak	1	2	Estimated	M	Harvest	?	Prior year centroid	CERTAIN
	Twilight	1	?	No Data	No Data	No Data - Will attempt to verify or eliminate	?	.	.
47	Weigel	1	4	Confirmed	G	3 pups seen by retired FWP&FS biologists on 7/20/22; 3A 1P cam survey 8/14	Y	General Knowledge	CERTAIN
48	Whale Creek	1	4	Confirmed	M	3A (2g, 1b), 1P 7/14; local citizens sightings and howling, and lone injured wolf	Y	Prior year centroid	CERTAIN
49	Whitefish	1	4	Estimated	M	4 wolves reported by public in Feb2023, no photos though	?	General Knowledge	FAIRLY CERTAIN
50	Wolf Prairie	1	2	Confirmed	P	Harvest, including pup in Oct2022	Y	General Knowledge	UNCERTAIN
51	Yaak	1	3	Confirmed	M	scat and tracks observed by USFWS bear tech, +cam 1A, 1P (former wolf tech); Harvest	Y	General Knowledge	CERTAIN
52	Alta	2	5	Unconfirmed/Estimated	M	September Tracks, Reliable Dec & Jan Reports	Y	Prior GPS Data	Certain
	Ambrose	2	?	No Data	No Data	No Data	?	.	.
53	Arrastra Creek	2	6	Confirmed	G	Summer, Dec & Jan Tracks, Spring 2023 Tracks	Y	General Knowledge	Certain
54	Avon	2	4	Confirmed	G	Jan Tracks	N	GPS Data	Certain
55	Belmont	2	6	Confirmed	G	Summer tracks, Dec Tracks, & Dec & Jan Reliable Reports	Y	General Knowledge	Certain
56	Big Hole #	2	5	Confirmed	G	Jan Tracks, & Reliable Reports	Y	General Knowledge	Certain
57	Bonner Mtn	2	4	Unconfirmed/Estimated	P	Summer Tracks & WS Reports	?	General Knowledge	Certain
	Bugle Mountain	2	?	No Data	No Data	No Data	?	.	.
58	Cache Creek #	2	5	Confirmed	M	Summer tracks, Winter Harvest & Jan/Feb Tracks	Y	General Knowledge	Certain
59	Chamberlain	2	4	Confirmed	G	Summer tracks, Winter Reports & Jan/Feb Tracks	?	General Knowledge	Certain
	Conger Point	2	?	No Data	No Data	No Data	?	.	.
60	DeBorgia #	2	6	Confirmed	G	Summer Tracks, Nov Tracks, Dec Camera, Harvest & Reports	Y	General Knowledge	Certain
	Divide Creek	2	?	No Data	No Data	No Data	?	.	.
	East Fork Rock Creek	2	?	No Data	No Data	No Data	?	.	.
61	El Capitan	2	4	Unconfirmed/Estimated	M	Summer Tracks, Jan/Feb Reports, & Harvest	N	General Knowledge	Certain

REF #	WOLF PACK	FWP REGION	MINIMUM PACK SIZE DEC 31, 2022	PACK COUNT TYPE Confirmed/Estimated/No Data	PACK COUNT QUALITY	PACK SIZE DATA TYPE	2022 BREEDING PAIR?	CENTROID TYPE	CENTROID QUALITY CODE
62	Evvaro	2	3	Confirmed	G	Jan/Feb Tracks	N	General Knowledge	Certain
	Flint	2	?	No Data	No Data	No Data	?		
63	Gash Creek #	2	2	Unconfirmed/Estimated	P	Summer & March Reports	?	General Knowledge	Certain
64	Gird Point	2	7	Confirmed	G	Summer tracks & multiple Dec/Jan Reliable Reports	Y	General Knowledge	Certain
65	Hardscrabble	2	6	Unconfirmed/Estimated	M	Multiple Reliable Dec Reports	Y	General Knowledge	Certain
	Hoodoo	2	?	No Data	No Data	No Data	?		
66	Humbug	2	3	Unconfirmed/Estimated	P	Summer WS Reports & Reliable Dec/Jan Reports	N	General Knowledge	Certain
67	Inez	2	4	Confirmed	G	Summer Trail Camera, Mar Tracks,& Harvest	Y	General Knowledge	Certain
	Landers Fork	2	?	No Data	No Data	No Data	?		
68	Lost Peak #	2	7	Unconfirmed/Estimated	P	Summer Tracks & Reliable Nov Reports	Y	General Knowledge	Certain
	Miller Peak	2	?	No Data	No Data	No Data	?		
69	Mineral Mountain	2	4	Unconfirmed/Estimated	M	Summer Tracks, Reliable Dec-Mar Reports	?	General Knowledge	Certain
70	Morrell Mountain	2	3	Confirmed	G	Summer Tracks & Sighting, Harvest, Dec-Jan Reliable Reports	N	General Knowledge	Certain
71	Ninemile	2	2	Unconfirmed/Estimated	P	Summer Tracks, Scat	?	General Knowledge	Certain
72	Olson Peak	2	5	Unconfirmed/Estimated	P	Summer Tracks, Dec-Mar Reports	Y	General Knowledge	Certain
73	One Horse	2	5	Unconfirmed/Estimated	M	Reliable Winter Reports	Y	General Knowledge	Certain
74	Overwhich #	2	4	Unconfirmed/Estimated	M	Summer tracks & Reliable Dec-Mar Reports	Y	General Knowledge	Certain
75	Petty Creek	2	3	Confirmed	G	Winter Tracks, Dec-Mar Reliable Reports	N	GPS Data	Certain
	Pierce	2	?	No Data	No Data	No Data	?		
76	Quartz Creek	2	4	Confirmed	M	Jan Tracks	?	General Knowledge	Certain
77	Ross' Fork	2	3	Unconfirmed/Estimated	M	Reliable Winter Reports	N	General Knowledge	Certain
78	Savenac	2	4	Unconfirmed/Estimated	P	Fall Tracks	?	General Knowledge	Certain
79	Seeley Lake	2	7	Unconfirmed/Estimated	M	Reliable Dec/Jan Reports	Y	General Knowledge	Certain
80	Siegel Mountain	2	3	Unconfirmed/Estimated	P	Summer tracks	N	Prior GPS data	Certain
81	Silver Lake #	2	5	Confirmed	G	Feb Tracks	?	General Knowledge	Certain
82	Sliderock Mountain	2	4	Unconfirmed/Estimated	P	Summer and Fall Reliable Reports	N	General Knowledge	Certain
83	Sula	2	7	Unconfirmed/Estimated	M	Reliable Dec-Mar Reports	Y	Prior GPS data	Certain

REF #	WOLF PACK	FWP REGION	MINIMUM PACK SIZE DEC 31, 2022	PACK COUNT TYPE Confirmed/Estimated/No Data	PACK COUNT QUALITY	PACK SIZE DATA TYPE	2022 BREEDING PAIR?	CENTROID TYPE	CENTROID QUALITY CODE
84	Sunflower Mountain	2	4	Confirmed	G	Summer Trail camera, Winter tracks, & Reliable Dec-Feb Reports	Y	Prior GPS data	Certain
85	Sunrise Mountain	2	2	Unconfirmed/Estimated	P	Summer Tracks	?	General Knowledge	Certain
	Taft	2	?	No Data	No Data	No Data	?	.	.
86	Tarkio	2	6	Unconfirmed/Estimated	M	Summer Tracks, Jan Tracks, & Dec-Jan Reports	Y	Prior GPS data	Certain
87	Telephone Butte	2	2	Unconfirmed/Estimated	P	Summer Tracks & Nov Reports	?	General Knowledge	Certain
88	Tepee Point	2	6	Unconfirmed/Estimated	P	Summer Tracks & Sightings	Y	GPS Data	Certain
89	Trapper Peak	2	3	Unconfirmed/Estimated	M	Summer Tracks, Dec-Mar Reports	N	Prior GPS data	Certain
90	Watchtower #	2	5	Unconfirmed/Estimated	M	Reliable Dec & Jan Reports	?	General Knowledge	Certain
	<del>Bull Mtn</del>	3	0	Confirmed	G	WS removal	N	.	.
91	Anaconda	3	5	Confirmed	P	tracking	?	General Knowledge	Certain
92	Black Canyon 2 #	3	7	Confirmed	G	tracking	Y	General Knowledge	Certain
93	Elkhorn 2	3	6	Confirmed	G	tracking, harvest, removal	Y	General Knowledge	Certain
94	Lava Mountain	3	5	Confirmed	P	tracking, harvest	?	General Knowledge	Certain
95	Pyramid #	3	3	Confirmed	P	tracking	?	General Knowledge	Certain
	<del>Stine</del>	3	0	Confirmed	G	WS removals	N	.	.
96	Thunderbolt	3	5	Confirmed	M	tracking, harvest	?	General Knowledge	Certain
97	Warm Springs	3	8	Confirmed	M	tracking, harvest	?	General Knowledge	Certain
98	Beartrap	3	16	Confirmed	G	tracking, capture	Y	General Knowledge	Certain
99	Cedar Creek	3	7	Confirmed	G	capture, tracking, harvest, WS removal	Y	General Knowledge	Certain
100	Meadow Creek	3	3	Confirmed	P	tracking	?	General Knowledge	Certain
101	Antone	3	6	Confirmed	M	WS removal, tracking, capture	?	General Knowledge	Certain
	<del>Sweatwater</del>	3	0	Confirmed	G	WS removal, harvest, tracking	N	.	.
102	Toadflax	3	9	Confirmed	G	capture, tracking, harvest	Y	General Knowledge	Certain
	<del>Hogback</del>	3	0	Estimated	M	scouted repeatedly, No sign or reports from local hunter/trappers or any camera trapped pictures obtained	N	.	.
	<del>Slip n' slide</del>	3	0	Estimated	M	scouted repeatedly, No sign or reports from local hunter/trappers or any camera trapped pictures obtained	N	.	.
	<del>Cinnabar*</del>	3	0	Estimated	M	scouted repeatedly, No sign or reports from local hunter/trappers or any camera trapped pictures obtained	N	.	.
	<del>Elbow Creek</del>	3	0	Estimated	M	scouted repeatedly, No sign or reports from local hunter/trappers or any camera trapped pictures obtained	N	.	.

REF #	WOLF PACK	FWP REGION	MINIMUM PACK SIZE DEC 31, 2022	PACK COUNT TYPE Confirmed/Estimated/No Data	PACK COUNT QUALITY	PACK SIZE	2022 BREEDING	CENTROID	CENTROID
						DATA TYPE	PAIR?	TYPE	QUALITY CODE
	Fridley	3	0	Estimated	M	scouted repeatedly, No sign or reports from local hunter/trappers or any camera trapped pictures obtained	N	.	.
	Lost Creek	3	0	Estimated	M	scouted repeatedly, No sign or reports from local hunter/trappers or any camera trapped pictures obtained	N	.	.
	Steamboat Peak	3	0	Estimated	M	scouted repeatedly, No sign or reports from local hunter/trappers or any camera trapped pictures obtained	N	.	.
103	Rock Creek	3	6	Confirmed	Good	Snow Tracks and Known Mortalities Jan-Feb-March 2023	N	Scouting and mortality reports	Certain
104	Fort Harrison Helena	3	4	Confirmed	Good	Camera Trapped pictures December 2022	N	General knowledge	Certain
105	Cinnamon Peak	5	6	Confirmed	Good	Camera Trapped pictures and known mortalities December 2022	N	Scouting and mortality reports	Certain
	Avalanche	4	?	No Data	No Data	No Data for 2nd year- eliminate	?	.	.
106	Bennie	4	2	Estimated	P	Hunter Reports Fall 2022	?	Historic Collar data	FAIRLY CERTAIN
	Black Butte	4	?	No Data	No Data	No Data	?	.	.
107	Blowout Mountain	4	6	Confirmed	G	Jan/Feb Harvest/Reports	Y	Historic Collar data	FAIRLY CERTAIN
	Chief Mtn (Glacier NP)	4	?	No Data	No Data	No Data	?	.	.
	Crown Mtn	4	?	No Data	No Data	No Data other than Jan Harvests	N	.	.
	Deep Creek	4	?	No Data	No Data	No Data	?	.	.
108	Dog Gun	4	6	Confirmed	G	FWP/WS Observations, Radio-collared wolf in Winter/Spring 2022	Y	2021 Collar Data visual center	FAIRLY CERTAIN
	Fletcher Pass	4	?	No Data	No Data	No Data for 2nd year- eliminate	?	.	.
109	Livermore	4	4	Confirmed	G	Blackfeet/WS Collar/Observations	Y	2022 Collar Data visual center	CERTAIN
	Marias	4	?	No Data	No Data	No Data for 2nd year- eliminate	?	.	.
	Mount Vesuvius	4	?	No Data	No Data	No Data	?	.	.
110	Pretty Prairie	4	6	Estimated	M	Hunter Reports Fall 2022	Y	General Knowledge	FAIRLY CERTAIN
111	Red Shale	4	6	Confirmed	G	Hunter Reports Fall 2022	Y	Historic Collar data	FAIRLY CERTAIN
	Shellrock	4	?	No Data	No Data	No Data	?	.	.
112	Teton	4	4	Confirmed	G	FWP Fall/Winter Tracks/Photos	?	General Knowledge	FAIRLY CERTAIN
	Yogo Peak	4	?	No Data	No Data	No Data	?	.	.
	Baker Mountain	5	?	No Data	No Data	No Data	?	.	.
	Loce Mountain	5	?	No Data	No Data	No Data for 2nd year- eliminate	?	.	.
	Rosebud	5	?	No Data	No Data	No Data for 2nd year- eliminate	?	.	.
	<b>Montana Totals</b>		<b>493</b>						



**Table 6: Wolf Packs and Population Data for Montana, 2023.**

REF #	WOLF PACK	FWP REGION	MINIMUM PACK SIZE DEC 31, 2023	PACK COUNT TYPE Confirmed/Estimated/No Data	PACK COUNT QUALITY	PACK SIZE	2023 BREEDING PAIR?	CENTROID	CENTROID
						DATA TYPE		TYPE	QUALITY CODE
	Akokala	1	No Data	No Data	No Data	No Data	?	.	.
1	Apgar	1	4	Confirmed	G	Tracks in late December - 3 adults, 1 pup	Y	Prior year knowledge	FAIRLY CERTAIN
2	Ashley	1	2	Confirmed	G	cameras, 3 adults; 1 hunted 10/1/23; no pups seen on camera	?	Prior year knowledge	CERTAIN
3	Bearfite	1	3	Confirmed	G	cameras, 3 adults	?	Prior year knowledge	CERTAIN
	Bull River	1	No Data	No Data	No Data	No Data	?	.	.
4	Cabinet	1	4	Confirmed	G	2 adults, 2 pups	Y	Prior Year Telemetry	CERTAIN
5	Cilly	1	3	Confirmed	G	3 adults; might have pups, 1 photo looked like adult carrying meat in mouth for provisioning; 1 "yearling" trapped 1/13/24	Y	General knowledge	CERTAIN
6	Condon	1	3	Confirmed	G	4 adults, cameras and tracks, no sign of pups (1 hunted 11/17/23)	N	General knowledge	CERTAIN
	Corona	1	0	Confirmed	G	survey camera, 3 adults (1 older light gray adult, 2 darker gray&tan yearlings)(4 hunted Nov & Dec)	N	.	.
7	Cowell	1	8	Confirmed	G	survey cameras, 3 adults (2G 1B) 5 pups (3G 2B) in late Sept (were 8 pups in June, 5G 3B); 8 trapped	Y	General knowledge	CERTAIN
8	Crane Mtn	1	5	Confirmed	M	survey cameras - 3 adults (1B 2G) including female with obvious signs of nursing; 1 black adult trapped 2/14/24	Y	General Knowledge	FAIRLY CERTAIN
9	Dutch (Glacier NP)	1	2	Estimated	M	tracks sighting from Park employees	?	Prior year telemetry	FAIRLY CERTAIN
10	Echo	1	4	Estimated	M	sightings and photos at edge of territory in valley (1 hunted 12/10/23)	?	General knowledge	FAIRLY CERTAIN
11	Elk Creek (Swan Valley)	1	4	Confirmed	G	4 adults (2 black), 3 pups in fall (3 wolves hunted in 2023, 1 in 2024)	Y	General knowledge	CERTAIN
12	Firefighter	1	7	Confirmed	G	survey cameras, howls, 3 adults (2G males, 1B female) 5 pups (2G 3B). 1 black pup limping heavily in early August	Y	General knowledge	CERTAIN
13	Fisher Mountain	1	2	Confirmed	G	2 adults (1 with wound on front leg), certain they are only ones in that area	?	Prior year telemetry	CERTAIN
14	Fishtrap	1	8	Estimated	M	tracks of 2, survey cam confirmed 1; 8 killed in 2024 including 1 pup trapped 1/27/24 (reproduction confirmation)	Y	General knowledge	FAIRLY CERTAIN
15	Flathead Alps	1	3	Confirmed	P	harvest data only (3 trapped on 1/8/24, 1 hunted 11/21/23), no surveys	?	General knowledge	UNCERTAIN
16	Garden	1	4	Confirmed	G	tracked by Wildlife Services, collared male adult: 5 adults, 1 hunted 12/16/23, no evidence of pups; 1 trapped 2/13/24	N	Current Year Telemetry	CERTAIN
	Good Creek	1	1	Confirmed	G	survey cameras, 3 adults, 2 pups 10/13 (4 killed in November & December)	.	.	.
	Grave Creek	1	No Data	No Data	No Data	No Data - suspect still active but no surveys there this year or FS info	?	.	.
17	Great Northern	1	5	Estimated	M	Harvest data locations only (5 hunted 2024); no surveys	?	General knowledge	UNCERTAIN
18	Half Moon	1	2	Confirmed	M	survey cameras, 2 adults	?	General knowledge	CERTAIN
19	Kerr	1	7	Confirmed	G	tracked by Wildlife Services: 4 adults, 3 pups (collared gray 2-3 year old; hunted in February); 1 trapped 2/15/24	Y	Current Year Telemetry	CERTAIN
20	Kintla	1	8	Estimated	M	tracks, scat; 2/25/23 video of 8 wolves (2 black, 6 gray)	?	Prior year knowledge	FAIRLY CERTAIN
21	Kootenai	1	4	Confirmed	G	4 adults on survey camera; 1 harvested 2/10/24	?	General knowledge	CERTAIN

REF #	WOLF PACK	FWP REGION	MINIMUM PACK SIZE DEC 31, 2023	PACK COUNT TYPE Confirmed/Estimated/No Data	PACK COUNT QUALITY	PACK SIZE DATA TYPE	2023 BREEDING PAIR?	CENTROID TYPE	CENTROID QUALITY CODE
22	Ksanka	1	2	Confirmed	G	camera, 2 gray adults	?	General knowledge	FAIRLY CERTAIN
23	Lazy Crk	1	2	Confirmed	G	survey camera, 2 adults (1 light gray/white, 1 dark gray)	?	General knowledge	CERTAIN
24	Lost Gem	1	2	Confirmed	G	survey camera, 2 adults after collared wolf left in April, vacant in May; territory more north than last year	?	General knowledge	CERTAIN
25	Lost Soul	1	5	Confirmed	G	survey cameras, 2 adults including female with obvious signs of nursing; 5 trapped in 2024, 1 pup on 2/6/24	Y	General knowledge	CERTAIN
	Lydia	1	No Data	No Data	No Data	Not sure how this territory fits between Thirsty and Swamp, didn't get cameras in that area this year	?	.	.
	Marias	1	1	Estimated	P	sightings only, past harvest seasons- no camera surveys; new pack on table with historical map info as well	?	.	.
26	McGregor	1	3	Confirmed	M	camera surveys, 2 adults seen but likely more based on scat; 1 pup trapped 1/9/2024	Y	General Knowledge	FAIRLY CERTAIN
27	Minton	1	2	Confirmed	G	2 adults, 1 old white female and a black adult; zero evidence of pups; territory shifted north since last year	N	General Knowledge	CERTAIN
28	Moore	1	10	Confirmed	G	collared and tracked by Wildlife Services: 6 adults, 4 pups (collared female pup)	Y	Current Year Telemetry	CERTAIN
29	Mullan	1	4	Confirmed	M	Harvest information only, 4 adults trapped 2024, no surveys in that area this year	?	Prior year knowledge	FAIRLY CERTAIN
30	Murphy Lake	1	4	Confirmed	G	Forest Service survey cameras, multiple pups, found old den as well; "yearling" (pup) hit by car 1/2/24	Y	Prior year den	CERTAIN
31	Noisy	1	4	Estimated	M	Tracks (3) in February; adult trapped 1/22/24	?	Prior year knowledge	CERTAIN
	Nyack (Glacier NP)	1	No Data	No Data	No Data	No Data - suspect still active since no hunting in park	?	.	.
32	O'Brien	1	2	Estimated	M	2 adults trapped 2/15/24; no other survey data	?	Prior year centroid	FAIRLY CERTAIN
33	Piper	1	3	Estimated	M	3 harvested in 2024 (pup hunted 1/5/24, reproduction confirmation); no camera survey data this year	?	Prior year knowledge	FAIRLY CERTAIN
34	Pistol Creek	1	3	Estimated	M	yearling adult NW1130M collared by WS on tribal land, thought at least 2 others in pack	?	Prior year knowledge	UNCERTAIN
35	Pleasant Valley	1	2	Confirmed	M	Survey cameras- 2 adults in August; 2 harvested in 2024 including pup 1/9/24	Y	General Knowledge	CERTAIN
36	Quintonkon	1	7	Confirmed	G	Survey cameras, 4 adults, 3 pups (2 pups hunted 9/19/23, before camera data)	Y	General Knowledge	CERTAIN
37	Satire	1	2	Confirmed	M	survey cameras, 2 adults seen on camera but probably more; no evidence of pups, denned different than previous	?	General Knowledge	CERTAIN
	Schafer	1	1	Confirmed	M	survey camera from bear crew, 1 adult	?	.	.
38	Sex Peak	1	4	Confirmed	G	survey cameras, 3 adults, heard pups howling far away in June, 1 on camera in October; 3 trapped in 2023	Y	General Knowledge	CERTAIN
39	Silcox	1	2	Estimated	M	sightings from FS, harvest data, 1 trapped 2/1/24	?	General Knowledge	UNCERTAIN
40	Solomon Mountain	1	2	Confirmed	G	camera from USFWS, also howling	?	Prior year knowledge	FAIRLY CERTAIN
41	Spotted Bear	1	8	Confirmed	G	biologist on flight saw 8 in December; 1 collared lone wolf adult in Pentagon & Spotted Bear area	?	Current Knowledge	CERTAIN
42	Summit Creek	1	3	Estimated	M	sighting from biologists	?	Prior year knowledge	FAIRLY CERTAIN
43	Sunday Mountain	1	6	Confirmed	G	survey camera, 2 adults 5 pups, all typical gray (1 hunted 11/2/23)	Y	General Knowledge	CERTAIN
44	Swamp Creek	1	7	Confirmed	G	3 adults (1 white, 1 gray, 1 gray limping heavily); carrying meat multiple times for provisioning pups; sighting	Y	General Knowledge	FAIRLY CERTAIN

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45	Tallulah	1	2	Estimated	M	harvest 10/3/23; sightings from deer crew in helicopter of 2 on elk carcass	?	General Knowledge	FAIRLY CERTAIN
46	Thirsty	1	7	Confirmed	G	Survey cameras; GPS collar in pack; 1 hunted 10/25/23; den cameras of 4 pups; pup hunted 1/7/24	Y	Current Year Telemetry	CERTAIN
47	Thompson Peak	1	2	Confirmed	M	scat; cameras only got tons of coyotes; 1 wolf hunted 11/19/23, 2 trapped 1/16/24	?	Prior year knowledge	FAIRLY CERTAIN
48	Weigel	1	6	Confirmed	M	survey cameras, 4 adults, no photos of pups; 2 wolves trapped in 2024	?	General Knowledge	CERTAIN
49	Whale Creek	1	4	Confirmed	M	Survey camera; 2 pups seen with 2 adults on cam in October	Y	Prior year telemetry	FAIRLY CERTAIN
50	Whitefish	1	3	Estimated	M	sightings in several locations	?	Prior year knowledge	FAIRLY CERTAIN
51	Wolf Prairie	1	6	Estimated	G	late fall tracks (6 sets) in same area of wolf incidental capture last April; 3 trapped in January	?	Prior year knowledge	FAIRLY CERTAIN
52	Yaak	1	2	Confirmed	M	2 adults, gray, suspect more but no evidence of pups; 1 adult hunted 2/9/24	?	General Knowledge	FAIRLY CERTAIN
53	Alta	2	4	Unconfirmed/Estimated	M	September Tracks, Reliable Dec & Jan Reports	N	Prior GPS Data	Certain
54	Arrastra Creek	2	7	Confirmed	G	Dec & Jan Tracks, Winter Jamie Jonkel Report (7)	Y	General Knowledge	Certain
55	Avon	2	3	Unconfirmed/Estimated	M	Jan Tracks, & Harvest	?	GPS Data	Certain
56	Belmont	2	7	Unconfirmed/Estimated	G	Summer tracks, & Dec & Jan Reliable Reports	Y	General Knowledge	Certain
57	Big Hole #	2	6	Confirmed	G	Fall & Dec Tracks	Y	General Knowledge	Certain
58	Bonner Mtn	2	4	Unconfirmed/Estimated	P	Fall Tracks	?	General Knowledge	Certain
59	Cache Creek #	2	6	Confirmed	G	September tracks, Harvest, & Jan/Feb Trail camera	Y	General Knowledge	Certain
60	Chamberlain	2	2	Unconfirmed/Estimated	P	Summer tracks, Winter Reports & Jan/Feb Tracks	N	General Knowledge	Certain
61	DeBorgia #	2	9	Confirmed	G	Summer Tracks & Camera, Feb Tracks & Harvest	Y	General Knowledge	Certain
62	Divide Creek	2	2	Unconfirmed/Estimated	P	Summer Tracks	N	General Knowledge	Certain
63	El Capitan	2	4	Unconfirmed/Estimated	P	Summer Tracks, Jan/Feb Reports	?	General Knowledge	Certain
64	Evaro	2	4	Confirmed	G	Jan/Feb Tracks & harvest	?	General Knowledge	Certain
65	Gash Creek #	2	3	Unconfirmed/Estimated	M	Jan Tracks, & Jan Reports	?	General Knowledge	Certain
66	Gird Point	2	6	Unconfirmed/Estimated	M	Summer tracks & multiple Dec/Jan Reliable Reports	Y	General Knowledge	Certain
	Hardscrabble	2	No Data	No Data	No Data	No Data	?	.	.
67	Humbug	2	2	Unconfirmed/Estimated	P	Summer WS Reports & Reliable Dec/Jan Reports	N	General Knowledge	Certain
68	Inez	2	7	Confirmed	G	Jan & March tracks and reliable reports	Y	General Knowledge	Certain
69	Lost Peak #	2	2	Unconfirmed/Estimated	P	Summer Tracks	?	General Knowledge	Certain
70	Mineral Mountain	2	3	Unconfirmed/Estimated	M	Reliable Dec-Mar Reports	?	General Knowledge	Certain
71	Morrell Mountain	2	10	Confirmed	G	Summer public trail camera, Harvest, Dec-Jan Reliable Reports, Harvest, & March elk flight observation (4)	Y	General Knowledge	Certain

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72	Ninemile	2	5	Confirmed	G	Jan Tracks	Y	General Knowledge	Certain
73	Olson Peak	2	2	Unconfirmed/Estimated	P	Summer Tracks	?	General Knowledge	Certain
74	One Horse	2	5	Confirmed	M	March Trail camera & harvest	Y	General Knowledge	Certain
75	Overwhich #	2	5	Unconfirmed/Estimated	M	Summer tracks & Reliable Dec-Mar Reports	?	General Knowledge	Certain
76	Petty Creek	2	6	Confirmed	G	Winter Tracks, Dec-Mar Reliable Reports, & Harvest	Y	GPS Data	Certain
77	Pierce	2	5	Confirmed	G	Winter tracks, Dec & Jan Reliable Reports	?	General Knowledge	Certain
78	Quartz Creek	2	6	Confirmed	G	Dec & Jan Reliable Reports	Y	General Knowledge	Certain
79	Ross' Fork	2	7	Unconfirmed/Estimated	G	Nov Tracks & Harvest	Y	General Knowledge	Certain
80	Savenac	2	3	Unconfirmed/Estimated	P	Fall Reports	?	General Knowledge	Certain
81	Seeley Lake	2	7	Confirmed	G	Reliable Dec, Jan, & March Reports, Harvest	Y	General Knowledge	Certain
82	Snow Bowl	2	2	Confirmed	G	Jan, March Tracks	N	General Knowledge	Certain
83	Siegel Mountain	2	2	Unconfirmed/Estimated	P	Winter Reports	N	Prior GPS data	Certain
84	Silver Lake #	2	5	Confirmed	G	Feb Tracks	?	General Knowledge	Certain
85	Sliderock Mountain	2	4	Unconfirmed/Estimated	P	Summer and Fall Reliable Reports	?	General Knowledge	Certain
86	Sula	2	3	Unconfirmed/Estimated	P	Reliable Dec-Feb Reports	N	Prior GPS data	Certain
87	Sunflower Mountain	2	4	Confirmed	G	Summer tracks & Reliable Dec-Feb Reports	N	Prior GPS data	Certain
88	Sunrise Mountain	2	2	Unconfirmed/Estimated	P	Summer Tracks	N	General Knowledge	Certain
89	Tarkio	2	2	Confirmed	P	Summer Tracks & Harvest	?	Prior GPS data	Certain
90	Trail Creek	2	4	Confirmed	M	Reliable Dec-Mar Reports	?	General Knowledge	Certain
91	Telephone Butte	2	5	Confirmed	G	Nov Tracks, No harvest	Y	General Knowledge	Certain
92	Tepee Point	2	4	Unconfirmed/Estimated	P	Summer tracks, sighting & Harvest	Y	GPS Data	Certain
93	Trapper Peak	2	4	Unconfirmed/Estimated	M	Summer Tracks, Dec-Mar Reports	?	Prior GPS data	Certain
94	Watchtower #	2	4	Unconfirmed/Estimated	M	Reliable Dec & Jan Reports	?	General Knowledge	Certain
95	Anaconda	3	4	Confirmed	M	reports, cameras, tracking	N	General Knowledge	CERATIN
96	Black Canyon 2 #	3	4	Confirmed	G	reports, cameras, harvest, tracking	Y	Collars, general knowledge	CERATIN
97	Snowline #	3	4	Confirmed	G	reports, flights, harvest, tracking	N	collar, general knowledge	CERATIN
98	Elkhorn 2	3	6	Confirmed	G	reports, cameras, harvest, tracking	N	General Knowledge	CERATIN

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99	Lava Mountain	3	8	Confirmed	G	reports, harvest, cameras, tracking	Y	General Knowledge	CERATIN
100	Pyramid #	3	3	Confirmed	G	cameras, reports, tracking	N	General Knowledge	CERATIN
101	Thunderbolt	3	5	Confirmed	G	reports, harvest, cameras, tracking	N	General Knowledge	CERATIN
102	Warmsprings	3	3	Confirmed	G	cameras, harvest, reports, tracking	N	General Knowledge	CERATIN
103	Beartrap	3	18	Confirmed	G	Flights, harvest, cameras, tracking	Y	Collars, general knowledge	CERATIN
104	Snowcrest	3	2	Confirmed	M	flights	N	General Knowledge	CERATIN
105	Cedar Creek	3	2	Confirmed	G	Flights, harvest, cameras, reports, tracking	N	Collars, general knowledge	CERATIN
106	Meadow Creek	3	2	Confirmed	G	cameras, harvest, reports, tracking	N	Collars, general knowledge	CERATIN
107	Antone	3	5	Confirmed	G	cameras, flights, harvest, control, reports, tracking	Y	Collars, general knowledge	CERATIN
108	Toadflax	3	4	Confirmed	G	Flights, harvest, cameras, reports, tracking	N	Collars, general knowledge	CERATIN
109	Rock Creek 2022	3	5	Confirmed	G	Snow tracks, camera pictures and mortality report	N	General Knowledge	CERTAIN
110	Fort Harrison Helena	3	5	Confirmed	G	Radiotelemetry, snow tracks and USDA WS reports	N	Collars, general knowledge	CERTAIN
111	Cinnamon Peak	5	10	Confirmed	G	Camera pictures and direct observations	Y	General Knowledge	CERTAIN
112	Pocupine Creek	3	3	Confirmed	G	Snow tracks, camera pictures and mortality report	Y	General Knowledge	CERTAIN
113	Dome Mountain	3	5	Confirmed	G	Direct observations, snow tracks and camera pictures	N	General Knowledge	CERTAIN
114	Tom Miners Basin	3	4	Confirmed	G	Direct observations, snow tracks and camera pictures	N	General Knowledge	CERTAIN
115	North-west Shields Crazies	5	5	Confirmed	G	Snow tracks, camera pictures and mortality report	N	General Knowledge	CERTAIN
116	Big Timber Creek	5	5	Confirmed	G	Hunter's harvest, direct observations and snow tracks	N	General Knowledge	CERTAIN
117	East Boulder	5	6	Confirmed	G	Snow tracks, camera pictures and mortality report	Y	General Knowledge	CERTAIN
118	Picket Pin	5	3	Confirmed	G	Snow tracks, camera pictures and mortality report	N	General Knowledge	CERTAIN
119	Chief Mtn (GNP)	4	20	Estimated	M	Reports	?	General Knowledge	FAIRLY CERTAIN
120	Looking Glass (GNP/R4)	4	5	Confirmed	M	FWP Track Observations, WS collared wolf in Spring 2023	Y	GPS Collar Data	CERTAIN
121	Bennie	4	3	Confirmed	M	FWP Camera Observations, FWP Aerial Observations, FWP Confirmed Rendezvous Site	Y	Historic Collar data	FAIRLY CERTAIN
122	Teton	4	2	Confirmed	M	FWP Camera Observation	?	FWP General Knowledge	FAIRLY CERTAIN
123	Red Shale	4	6	Confirmed	M	FWP Track Observation, FWP Howl Observation	?	Historic Collar data	FAIRLY CERTAIN
124	Pretty Prairie	4	3	Confirmed	M	FWP Aerial Observation, Forest Service Observation	Y	FWP General Knowledge	UNCERTAIN
125	Crown Mtn	4	6	Confirmed	M	FWP Track Observations, FWP Camera Observations, WS collared wolf in Spring 2023	?	Historic Collar data	FAIRLY CERTAIN

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126	Blowout Mountain	4	11	Confirmed	M	FWP Camera Observations, FWP collared wolf in Spring/Fall 2023, Reports	Y	GPS Collar Data	CERTAIN
127	Iron Mtn	4	3	Confirmed	M	FWP Track Observations, Forest Service Reports	?	FWP General Knowledge	UNCERTAIN
	Misc/Lone	4	1	Confirmed	M	WS Confirmed Single Track, FWP Lion Biologist Confirmed Track in Area (Black Butte Pack?)	?	.	.
	Misc/Lone	4	1	Confirmed	M	FWP Biologist Confirmed (Shellrock Pack?)	?	.	.
	<b>Montana Totals</b>		<b>585</b>						