Montana Gray Wolf
Conservation and Management
2008 Annual Report

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

USDA Wildlife Services Photo by Jim Rost

This report presents information on the status, distribution, and management of wolves in the State of Montana, from January 1, 2008 to December 31, 2008.

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

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MONTANA EXECUTIVE SUMMARY

Wolf recovery in Montana began in the early 1980's. Gray wolves increased in number and expanded their distribution in Montana because of natural emigration from Canada and a successful federal effort that reintroduced wolves into Yellowstone National Park (YNP) and the wilderness areas of central Idaho. The U.S. Fish and Wildlife Service (USFWS) approved the Montana Gray Wolf Conservation and Management Plan in early 2004, but delisting in the northern Rockies (NRM) was delayed. When federal funding became available later in 2004, Montana Fish, Wildlife & Parks (MFWP) began managing wolves in northwestern Montana under a cooperative agreement with USFWS. In 2005, Montana expanded its responsibility statewide under an interagency cooperative agreement. The agreement allowed Montana to implement its federally-approved state plan to the extent possible and within the guidelines of federal regulations.

Using federal funds, MFWP monitors the wolf population, directs problem wolf control and take under certain circumstances, coordinates and authorizes research, and leads wolf information and education programs. MFWP wolf management specialists were hired in 2004 and are based throughout western and central Montana. A program coordinator is based in Helena.

The Montana wolf population increased from 2007 to 2008, although the rate of growth was about half of previous years. The increase is due to a real increase in actual wolf numbers primarily in northwest Montana (NWMT) and in southwest Montana in the Greater Yellowstone Area (GYA). Wolf numbers in the Montana portion of the Central Idaho Experimental Area (MT-CID) declined from 2007 to 2008. Twenty-three packs exist along the Montana – Idaho border. Of those, 14 are counted in minimum Montana population estimate (Table 1) and 9 are counted in the minimum Idaho population estimate (Table 3).

A total of 84 verified packs of 2 or more wolves yielded a minimum estimate of 497 wolves in Montana. Thirty-four packs qualified as a Breeding Pair according to the federal recovery definition (an adult male and female with two surviving pups on December 31). Across the southern Montana experimental area (CID and GYA combined), there were 39 packs, 17 of which met the Breeding Pair criteria. A minimum of 241 wolves were estimated (130 in the GYA and 111 in the CID). Across the NWMT endangered area, there were 45 packs, 17 of which met the breeding pair criteria. A minimum of 256 wolves was estimated in the NWMT endangered area.

Montana Wildlife Services (WS) confirmed that 77 cattle, 111 sheep, 2 dogs, 8 llamas, 2 horses, and 7 domestic goats were killed by wolves in calendar year 2008. Additional losses (both injured and dead livestock) most certainly occurred, but could not be confirmed. Most depredations occurred on private property. One hundred ten wolves were killed to reduce the potential for further depredations. Of the 110, 105 were killed by USDA Wildlife Services, 5 were killed by private citizens under the 2008 10j regulations and 4 were killed by private citizens who had been issued a permit in the experimental area of southern Montana.

Wolves in Montana prey primarily on elk, deer, and moose. Numerous research projects are investigating wolf-ungulate relationships. Montana Fish, Wildlife & Parks recently compiled research results of wolf-ungulate interactions in southwest Montana.

The February 2008 USFWS decision to delist the gray wolf in the northern Rocky Mountain Distinct Population Segment was challenged in Court by April. In July, a preliminary injunction was granted and wolves were back under the federal regulations and considered endangered or experimental in Montana. For about four months, wolves were officially delisted and wolves were managed wholly under Montana's regulatory framework. The USFWS was granted permission to re-evaluate its delisting decision in the fall and gathered public comment about issued raised in the preliminary injunction. USFWS was expected to make a decision about delisting early in 2009.

This report and other information about wolves and the Montana program are available at www.fwp.mt.gov/wildthings/wolf.

INTRODUCTION AND BACKGROUND

Wolf recovery in Montana began in the early 1980's. Gray wolves increased in number and expanded their distribution in Montana because of natural emigration from Canada and a successful federal effort that reintroduced wolves into Yellowstone National Park (YNP) and the wilderness areas of central Idaho. Montana contains portions of all 3 federal recovery areas: the Northwest Montana Endangered Area (NWMT), the Central Idaho Experimental Area (CID), and the Greater Yellowstone Experimental Area (GYA) (Figure 1).

The biological requirements for wolf recovery in the northern Rocky Mountains of Montana, Idaho, and Wyoming were met in December 2002. Before the U.S. Fish and Wildlife Service (USFWS) can propose to delist gray wolves, federal managers must be confident that a secure, viable population of gray wolves will persist if protections of the Endangered Species Act (ESA) were removed. To provide that assurance, the states of Montana, Idaho, and Wyoming developed wolf conservation and management plans and adopted other regulatory mechanisms in state law.

In late 2003, all 3 states submitted wolf management plans to USFWS for review. Based on the USFWS's independent review of the state management plans and state law, analysis of the comments of independent peer reviewers and the states' responses to those reviews, USFWS approved the Montana and Idaho management plans as being adequate to assure maintenance of their state's share of the recovered tri-state wolf population. Wyoming's plan, however, was not approved. USFWS will not propose delisting until the Wyoming plan and associated state laws can be approved.

After amending its Record of Decision to comply with the Montana Environmental Policy Act, MFWP increased its role in day-to-day wolf recovery and management in northwest Montana under an interim interagency cooperative agreement even though wolves remain protected under the federal Endangered Species Act. USFWS provided direct funding.

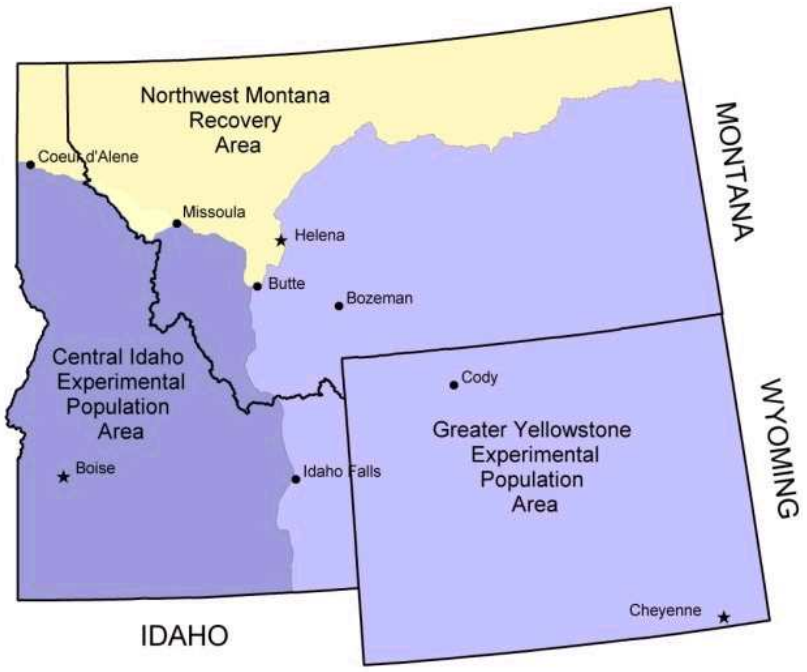


Figure 1. Northern Rockies gray wolf recovery area comprised of the states of Montana, Idaho, and Wyoming

In 2005, MFWP expanded its responsibility for wolf conservation and management statewide. Additional federal funding became available through Congress, beginning in federal fiscal year 2004. A new MFWP-USFWS interagency cooperative agreement was finalized in June 2005. With a clear agreement in place and federal funding to support the work, MFWP became the lead agency for wolf conservation and management statewide in June 2005, though its role and participation gradually increased from spring 2004 to June 2005. The agreement is effective through June 2010, or until the wolf population in Montana is removed from the federal list of threatened or endangered species, or until amended by either party.

The cooperative agreement allows Montana to implement its approved state plan to the extent possible and within the guidelines of federal regulations. The cooperative agreement authorizes Montana to conduct traditional wolf management such as population monitoring, direct problem wolf control, take wolves under certain circumstances, coordinate and authorize research, and coordinate and lead wolf information and education programs. Montana is committed to maintaining the recovered status of its share of the NRM wolf population.

In July 2007, USFWS proposed changes to the federal regulation pertaining to the 10j experimental area across southern Montana. USFWS proposed that the 2005 10(j) nonessential experimental population regulation be modified (72 FR 36942) to modify the standard by which states and tribes with USFWS-approved plans to develop science-based proposals to lethally remove wolves shown to be negatively affecting ungulate herds. The modification from 'primary cause' to 'one of the major causes' allowed a high but reasonable standard. In addition it would allow anyone on private land or public land to shoot a wolf that was attacking their dog

or stock animals. The proposed rule change received over 262,000 public comments. The rule was published on January 28, 2008 (73 FR 4720) and became effective 30 days later on February 27, 2008.

Delisting Efforts and Litigation in 2007 / 2008

On February 8, 2007, USFWS proposed to identify the Distinct Population Segment (DPS) of the gray wolf in the NRM and to delist it. Two options were presented, depending on whether the regulatory framework in Wyoming (WY) could be approved. The USFWS proposed to delist wolves in Montana, Idaho, and Wyoming, and parts of Washington, Oregon, and Utah. The proposal noted that the ESA's protections would be retained in significant portions of the range in Wyoming if adequate regulatory mechanisms were not developed to conserve Wyoming's portion of a recovered wolf population into the foreseeable future. Under this alternative scenario, wolves in portions of Wyoming would stay listed under ESA as a non-essential, experimental populations and managed according to the 1994 federal regulations.

On July 6, 2007, the USFWS extended the comment period on the February 8, 2007 proposal in order to consider a 2007 revised Wyoming wolf management plan and state law. The delisting proposal was open for public comment for a total of 90 days and 8 public hearings were held. The proposed delisting rule received over 283,000 public comments. In December of 2007, the USFWS Director determined Wyoming's regulatory mechanisms met the requirements of the ESA, contingent on some final steps to be taken by Wyoming. On February 27, 2008, USFWS issued a final rule recognizing the NRM DPS and removing all of this DPS from the List of Endangered and Threatened Wildlife (73 FR 10514) and stated that Wyoming's 2007 regulatory mechanisms were adequate.

On March 28, 2008, wolves in Montana and throughout the NRM were officially delisted. The Montana state plan and state laws took full effect. On April 28, 2008, 12 parties filed a lawsuit challenging the identification and delisting of the NRM DPS. The plaintiffs also requested a preliminarily injunction to block the delisting decision from taking effect. The State of Montana sought and was granted intervener status to participate fully during the litigation. Many other interveners were permitted to participate in the litigation in support of the USFWS delisting decision, including the states of Idaho and Wyoming. In May, during a court hearing on the injunction request, MFWP argued that Montana's regulatory framework was adequate and that the court had the flexibility to enjoin some states, but not others – essentially suggesting that the federal judge could split Montana out from Idaho and Wyoming at the injunction state and put Montana under the court's supervision.

The NRM DPS wolf population was officially delisted from March 28 to July 18, 2008. During that time, the Montana regulatory framework was in effect. Wolves were protected under Montana state law and by MFWP Commission rule as a species in need of management statewide. Montana's defense of property law allowed private citizens to haze, harass or kill wolves that were seen killing or threatening to livestock. One wolf was killed in that circumstance during the four month period in MFWP Administrative Region 2 where wolf-livestock conflicts have occurred in the past. The incident was reported and investigated by MFWP law enforcement. It was determined to be lawful and fulfilled the requirements of

Montana law. MFWP's use of lethal control was guided by Interim Depredation Guidelines previously adopted by the MFWP Commission. The Interim Guidelines were applied statewide as the formal administrative rulemaking process was not yet completed. The Guidelines and the rules formally adopted by the MFWP Commission in September mirror the federal 2008 10j regulations. Thus, MFWP was not more aggressive in its application of lethal control, nor was there an accelerated rate of killings by non-agency personnel. Other aspects of the program (e.g. monitoring, outreach, research) also transitioned smoothly as MFWP has been managing the wolf population since 2004.

On July 18, 2008, the U.S. District Court for the District of Montana granted the plaintiffs' motion for a preliminary injunction and enjoined the USFWS implementation of the final delisting rule for the NRM DPS of the gray wolf. The three main issues identified were the regulatory framework in Wyoming, connectivity, and defense of property laws. The Court's preliminary injunction order concluded that the Plaintiffs were likely to prevail on the merits of their claims. The judge stated that he was inclined to rule against the federal government on two of the three issues during the main part of the lawsuit.

The NRM DPS wolf population was officially delisted from March 28 to July 18, 2008. This corresponded to the time lag between when the delisting decision took effect and when a federal district judge granted a request for a preliminary injunction (see below). During this period of time, state and Tribal management plans and state laws were fully in effect. The Court's preliminary injunction reinstated ESA protections for the gray wolf and reinstituted federal regulations throughout the NRM DPS, effective July 18.

On September 22, 2008, USFWS asked the Court to vacate the final rule and remand it back to the agency. This would allow the agency to withdraw the rule for further consideration and review. On October 14, 2008, the Court vacated the final delisting rule and remanded it back to the USFWS.

On October 28, 2008, USFWS reopened the comment period on the February 2007, proposed delisting rule that presented two different scenarios for delisting the NRM DPS. Specifically, USFWS sought information, data, and comments from the public regarding the 2007 proposal, with an emphasis on new information relevant to this action, the issues raised by the Montana District Court, and the issues raised by the September 29, 2008, ruling of the U.S. District Court for the District of Columbia with respect to the Western Great Lakes gray wolf DPS. The notice also asked for public comment on the WY regulatory framework. About 240,000 comments were received during that public comment period.

Based on the Court's ruling and a more thorough review, the USFWS determined and notified Wyoming in early January 2009 that its state plan and regulatory framework were not adequate and no longer "approved." Wolf management in all of Wyoming [except the Wind River Tribal Lands because the Tribe had a Service-approved plan] transitioned immediately to the 1994 experimental rules, which are less flexible and more restrictive than the 2005 or 2008 regulations.

In December 2008, USFWS revised the NRM delisting rule originally proposed in February 2007. On January 14, 2009, USFWS announced its decision to delist wolves throughout the NRM except the State of Wyoming, due to the lack of an accepted plan. The publication of the decision (final rule) in the Federal Register (official record of federal government's decisions) was delayed by an Executive Order on January 20, 2009. This is a standard practice as new federal administrations take office. The outcome of review by the administration could be: 1) publish as they were drafted; 2) revise through additional work and public comment and then modify/publish, or 3) not publish and withdraw to develop a different approach.

In February 2009, the Court awarded Earthjustice (the law firm representing 12 groups which filed the lawsuit challenging delisting) about $263,000 in legal fees as reimbursement for their efforts at litigating the final delisting rule.

This annual report presents information on the status, distribution, and management of wolves in the State of Montana from January 1 to December 31, 2008.

STATEWIDE PROGRAM OVERVIEW

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

However, because wolves are still listed, some elements of Montana's plan cannot be implemented. The legal classification and federal regulations place wolves into 2 separate categories in Montana – endangered in northern Montana and experimental non-essential across southern Montana (Figure 2). Wolf-livestock conflicts are addressed and resolved using a combination of the statewide adaptive management triggers identified in the Montana plan and the federal regulations. In northwest Montana, the 1999 Interim Control Plan provides less flexibility to agencies and livestock owners. In contrast, more flexibility is provided through the revised 10(j) regulations (finalized in February 2008).

In the early stages of implementation, a core team of experienced individuals led wolf monitoring efforts and worked directly with private landowners. MFWP's wolf team also worked closely with and increasingly involved other MFWP personnel in program activities. As time goes by, Montana wolf conservation and management will transition to a more fully integrated program, led and implemented at the MFWP Regional level. USDA Wildlife Services (WS) investigates injured and dead livestock, and MFWP works closely with them to resolve conflicts.

During 2008, MFWP and the MFWP Commission (Commission) finalized administrative rules that will take effect on the date the gray wolf is no longer subject to federal jurisdiction under the Endangered Species and MFWP and the Commission have sole jurisdiction over gray wolf management. The new rules regarding the management of the gray wolf became effective late

fall 2008 but will not be applied until federal delisting takes effect. In early January 2009, the Montana Secretary of State will publish the rules in final format.

The rules affirm Montana's commitment to preservation of the gray wolf as resident wildlife in need of management. The rules also affirm Montana's commitment to assure that recovery criteria are met or exceeded. The rules state that Montana will ensure maintenance of at least 15 breeding pairs and facilitate natural dispersal and connectivity within the NRM and with Canada. By formally adopting the breeding pair definition used by the U.S. Fish and Wildlife Service, Montana has taken the more conservative path, as not all packs meet the more stringent definition of breeding pair used as the benchmark by which recovery was measured. Upon delisting, the rules will also guide the Department's decision making on wolf-livestock conflict resolution and will provide criteria for how the Department will exercise its discretion for lethal control. Those guidelines will apply statewide and will be similar as the federal regulations that currently apply to the southern Montana experimental area (the 10j regulation). \

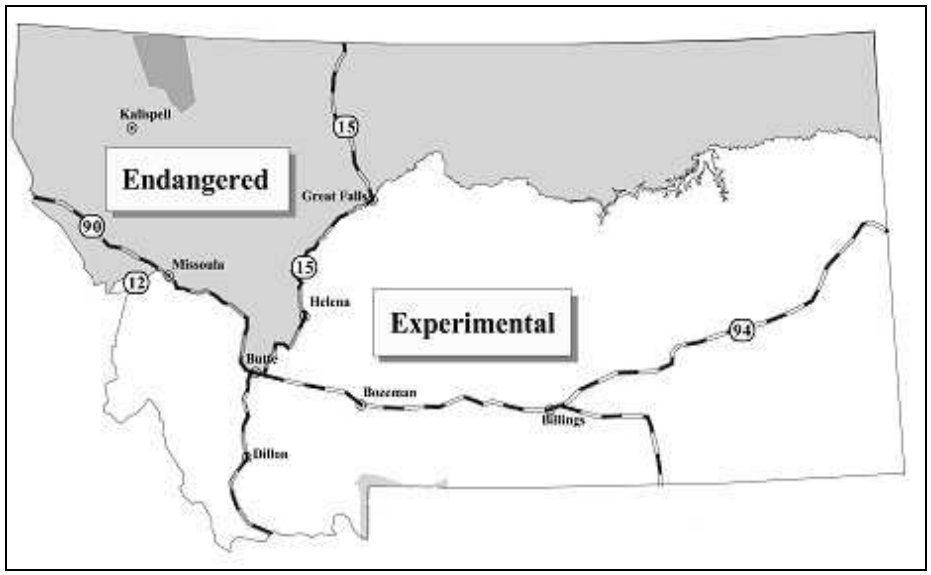


Figure 2. Map of the interim federal wolf management areas showing the endangered area where the 1999 Interim Wolf Control Plan applies and the experimental area where the 10(j) regulations apply. The central Idaho and Greater Yellowstone experimental areas are shown as one since the approved status of Montana's state wolf plan allows the special 10(j) regulations to apply equally in each area.

Overview of Wolf Ecology in Montana

Wolves were distributed primarily in the NRM region of western Montana east to the Beartooth face near Red Lodge. Montana wolf pack territories average around 200 square miles in size but can be 300 square miles or larger. Montana packs include a combination of public and private lands. The average pack territory in Montana is comprised of about 30% private land. Most Montana packs do not live strictly in back country wilderness areas or solely on public lands. Of

the 84 packs in Montana, 13 (about 15% of all Montana packs) reside most of the year in remote backcountry or wilderness areas or Glacier National Park. Many others live in public land areas with more public access and habitat fragmentation than wilderness areas or Glacier National Park. However, the majority of Montana wolf packs live in areas where mountainous terrain, intermountain valleys, and public / private lands are intermixed.

Dispersal distances in the northern Rockies average about 60 miles, but dispersals over 500 linear miles have been documented. A 500-mile radius from any wolf pack in YNP, Glacier National Park (GNP), or any pack in western Montana would plausibly reach all the way to Montana's eastern border. Montanans should be aware that wolves are established well enough in the northern Rockies now that a wolf could appear where none has been seen for decades. Wolves are capable of covering long distances in relatively short periods of time and often travel separately or in smaller groups. The travel ability of wolves, combined with the fact that packs split, with sub-groups traveling separately, can give an impression that there are more wolf packs and territories than is actually the case. Pack monitoring efforts, especially when combined with public / agency wolf reports, eventually leads to a conclusion about how many packs exist.

Wolf packs are family groups that consist of a breeding pair and their offspring of the current year and/or previous years and occasionally unrelated wolves. Offspring usually disperse from the natal pack at 1, 2 or 3 years of age. From, 1995 to 2006, the average pack in Montana was approximately 5.5 animals. In 2007, the average pack size in Montana was 5.7 animals. In 2008, the average pack size was 6.0 wolves. There was no significant difference in average size of wolf packs in the northern endangered area and the southern experimental area.

Montana wolves can be black, gray, or nearly white. Wild wolves are sometimes mistaken for coyotes or domestic dogs. But a wolf's large size, long legs, narrow chest, large feet, and wide / blocky head and snout distinguish it from the other canid species. Adult male wolves average about 100 pounds, but can weigh as much as 130 pounds. Females weigh slightly less.

Population Estimation and Monitoring Methods

The statewide Montana wolf population was estimated on a calendar year basis (January to December). A mid-year estimate is completed and made available, usually in September. It was based on preliminary denning and litter information for packs that carried over from the previous calendar year and any "new" packs that were verified by mid-year. A year-end estimate was made on December 31, based upon the best available information.

There can be considerable changes between September and December estimates. Some packs may appear in the mid-year estimate but drop out between the September and the December estimate if it was not verified during the second half of the year. Some "new" packs were verified for the first time between the mid-year and year-end estimates. The mid-year estimate and the final year-end estimate were both considered minimum counts because of the significant logistical challenges associated with monitoring a wide-ranging species with large home ranges. It was not possible to count every wolf in Montana, but MFWP did use all available information that could be verified.

Wolf monitoring is conducted using a variety of tools and techniques in combination, as is the case for other wildlife species. Common wolf monitoring techniques include: radio telemetry, howling and track surveys, reports from the public and other natural resource agency professionals, and reports from private landowners. MFWP made a concerted effort in 2005 to invite the public to help monitor wolves in Montana by sharing information about wolves or wolf sign they observed while afield. The MFWP website now offers a way for the public to report their information electronically (see www.fwp.mt.gov/wildthings/wolf). Public reports were a tremendous help in prioritizing MFWP's field efforts. A wolf pack must be verified by agency personnel to be included in the final statewide population estimate.

A typical sequence is as follows. MFWP and other agency cooperators receive a report of a wolf observation, wolf sign, or injured/dead livestock from the public or an agency colleague. Because it is very difficult to gauge the reliability and validity of the report and it is even more difficult to verify given how much wolves travel and environmental conditions which obliterate tracks or degrade scats, these reports are logged into a database with as much spatially explicit information as is provided. Reports of lone animals or wolf sign must eventually be linked to other reports to build a pattern or cluster, which in turn helps direct and prioritize field efforts. If MFWP receives reports of multiple individuals (group of wolves or multiple sets of tracks), pair bonding and pack territory establishment are highly likely. These eventually can form a pattern as well.

MFWP has and will continue to use volunteers who systematically search areas of current wolf reports, areas of past wolf activity, or noted "gaps" in wolf activity despite adequate prey base. MFWP personnel also conduct systematic searches. Track logs are taken during these "routes" and waypoints recorded when wolf sign is found.

The next step occurs when patterns and field reconnaissance yield enough information to validate wolves were in the area. A decision was made about whether to try and capture a wolf or not. Many factors were considered when prioritizing field efforts across the state. Not all packs needed to have radio collars, while others should have had one or more collars. Regardless, radio telemetry has been the standard technique with other protocols developed and validated based on a sample of collared packs. Project staff spent much of their time throughout the year conducting ground-based trapping operations and helicopter darting in winter. Reliable information about specific packs and the overall statewide population was essential to implement the approved state plan and adhere to the federal regulations.

If a pack was trapped and a radio collar is deployed, on average MFWP flew 1 to 2 times per month to locate the collared animal. In addition, wolves were ground tracked to determine where they localized throughout the year and the number of wolves traveling together. Den sites and rendezvous sites were visited to determine if reproduction had taken place. Additional information may be collected, such as ungulates killed, identification of private lands used by wolves, identification of public land grazing allotments where conflicts could occur, or common travel patterns.

At the end of the year, MFWP compiled information gathered through field surveys, telemetry, and public reporting. This results in a greater understanding of wolf pack distribution, individual pack sizes, pelage colors, mortality, pup production, home range sizes and patterns of use within

the territory, dispersal events, and disease. The information also guided decision-making when livestock depredations were confirmed. MFWP also gained insight into the large area wolves inhabit, the dynamics of pack size, and territory shifts within and between years.

MFWP estimated the number of individual wolves (adults and pups of the year) in each pack having a radio-collared member. Reliable estimates were made for packs without collars, based on public and other agency reports. The number of wolves in radio-collared packs was added to the number of wolves in verified, uncollared packs, resulting in the minimum statewide population total. If lone dispersing animals were accounted for reliably, they are also included.

Through it's monitoring program, MFWP was required to also tally and report the number of "breeding pairs" according the federal recovery definition of "an adult male and a female wolf that have produced at least 2 pups that survived until December 31." Montana is required to maintain at least 10 breeding pairs as an absolute minimum. Packs of 2 or more wolves that met the recovery definition are considered "breeding pairs" and noted as such in the summary tables. Not all packs in Montana satisfy the breeding pair criteria. This can be caused by the loss of 1 or both adults because of mortality or dispersal, lack of denning activity, or the loss of pups to the extent the surviving litter consists of less than 2 pups.

The total number of packs was determined by counting the number of packs with 2 or more individual animals that existed on the Montana landscape on December 31. If a pack was removed because of livestock conflicts or otherwise did not exist at the end of the calendar year (e.g. disease, natural/illegal mortality or dispersal), it was not included in the year-end total or displayed on the Montana wolf pack distribution map for that calendar year.

Such comprehensive information allowed Montana to document the maintenance of its share of the recovered NRM tri-state population and that the Montana population was secure in 2005. The Montana wolf population was more intensively monitored on a consistent, year-round basis than any other wildlife species in the state.

NRM wolf program cooperators have agreed that packs will be tallied in the population in the administrative area where the den site was located. If the den site was not known with certainty, amount of time, percent of territory, or the number of wolf reports were the next criteria considered for determining pack residency. In rare cases, a pack may have a densite on one side of an administrative boundary, but spend the majority of its time on the other side. In such cases, a discretionary decision is made as to where the pack will be tallied. One of the project partners generally had the lead for wolf monitoring, but the information was shared equally. This assures that all packs were accounted for, but none were double-counted in population estimates. Transboundary packs were included in Tables 1, 2, 3, and 4 for the administrative region in which the animals were counted. The pack will also be displayed on the appropriate map.

In 2008, a total of 23 packs straddled the Montana / Idaho border. Two additional packs straddled the Montana / Canada border but they were not included in the Montana estimate or reflected on maps. In western Montana, 14 packs shared with Idaho counted in the Montana minimum population estimate. Eight of 14 were in the Bitterroot (Montana portion of the Central Idaho Experimental Area, Table 1c, Appendix 3) and 5 ranged from the lower Clark

Fork north to the Montana/Idaho/Canada border (Montana portion of the Northwest Montana Endangered Area, Table 1a, Appendix 3). One pack in southwest Montana also traveled in Idaho (MT-GYA, Table 1b, Appendix 3).

In eastern Idaho, 9 packs straddled the Montana / Idaho state line and were tallied in the Idaho population estimate. Four packs were in the Bitterroot on the Idaho side (ID-CID, Table 3a, Appendix 3). Five packs were in the NWMT Recovery Area (Table 3b, Appendix 3).

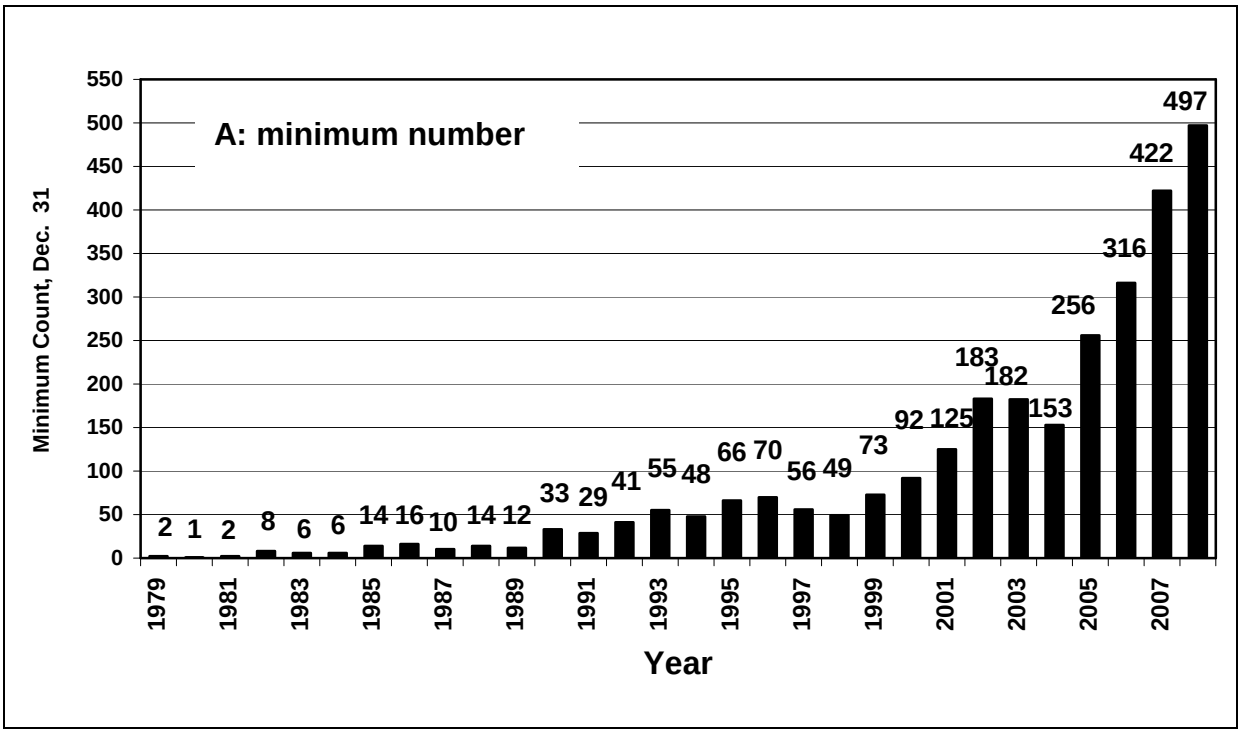
Montana Statewide Wolf Population and Distribution

The Montana wolf population is secure above the 10 Breeding Pair minimum. Wolves and wolf packs themselves, however, are very dynamic on the Montana landscape. Some packs do not persist from year to year for a variety of reasons. The loss of packs in the Montana population could be due to a variety of factors, including mortalities and poor pup production / survival due to parasites and disease, and lethal control to address conflicts with livestock. In some cases, some packs that were either verified or suspected in 2007 no longer existed by the end of 2008.

A total of 22 new packs formed between 2007 and 2008. The Montana minimum wolf population estimate increased about 18% from 422 wolves in 2007 to 497 in 2008 (minimum increase of 75 wolves) (Figure 3A). The rate of increase is about half the 34% rate of increase observed for the previous year and in years past. The rate of population growth appears to be slowing down as the best of suitable habitats are already occupied. Ares where new packs have established or recolonized previously occupied territories are more prone to conflicts with livestock and lethal control. The number of Breeding Pairs (by the federal recovery definition) in Montana at the end of 2008 was 34 (Figure 3B). The number of packs statewide (2 or more wolves) increased from 46 in 2005, to 60 to 2006, to 73 in 2007 and to 84 in 2008. Packs for which size was known with confidence at the end of the year averaged 6.0 wolves (range 2-27). The larger packs tended to live in remote backcountry areas, wilderness, or Glacier National Park (GNP).

The vast majority of the total statewide increase of 75 wolves (or 11 packs of 2 or more wolves) occurred in northwest Montana (NWMT recovery area) and southwest Montana (MT-GYA recovery area). The increase appeared to be influenced by the geographic proximity of the ID wolf population which is a much larger “source” population than YNP. Dispersal from within Montana also accounts for a portion of the increase given most wolves disperse about 60 miles. The increase in total minimum wolf numbers was about evenly split between NWMT and MT-GYA. See Figures 4(A) and 4(B).

In NWMT, the minimum estimate increased from 167 wolves at the end of 2006 to 213 at the end of 2007 (increase of about 28%). From 2007 to 2008, the minimum estimate increased to 256 (about 20% increase). Overall wolf distribution in NWMT expanded with the increase in the number of packs. Seventeen of 45 packs met the Breeding Pair criteria, an apparent “decline” from 2007. However, Breeding pair status could not be confirmed in many packs due to the increasing workload as the NWMT wolf population has increased in number and expanded its distribution in the last three years. The minimum number of verified packs in NWMT increased



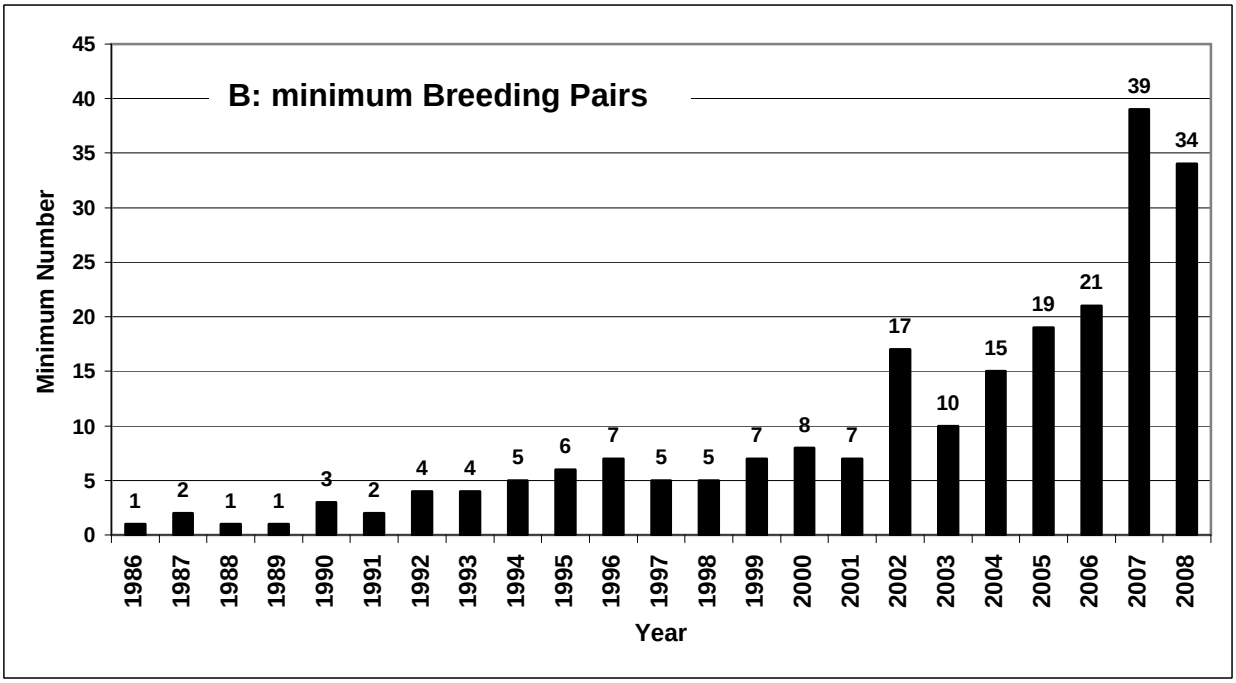
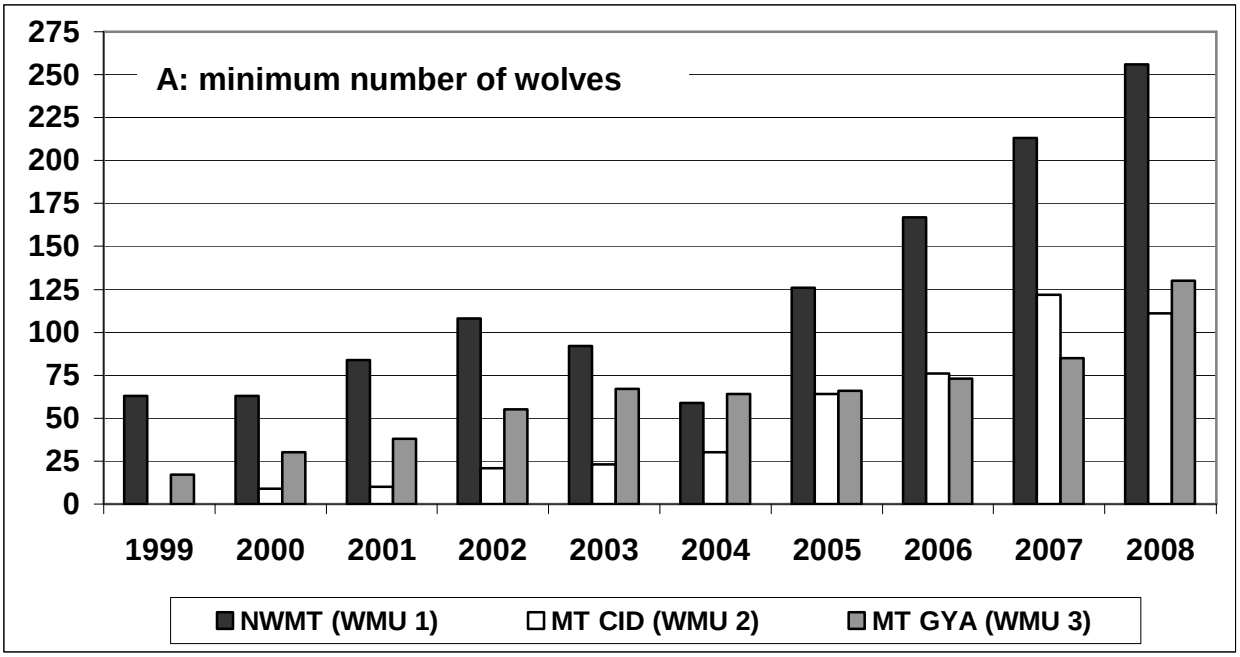


Figure 3. Minimum estimated number of wolves in the State of Montana on December 31, 1979-2008 (A) and (B) minimum estimated number of Breeding Pairs in the State of Montana December 31, 1979 – 2008



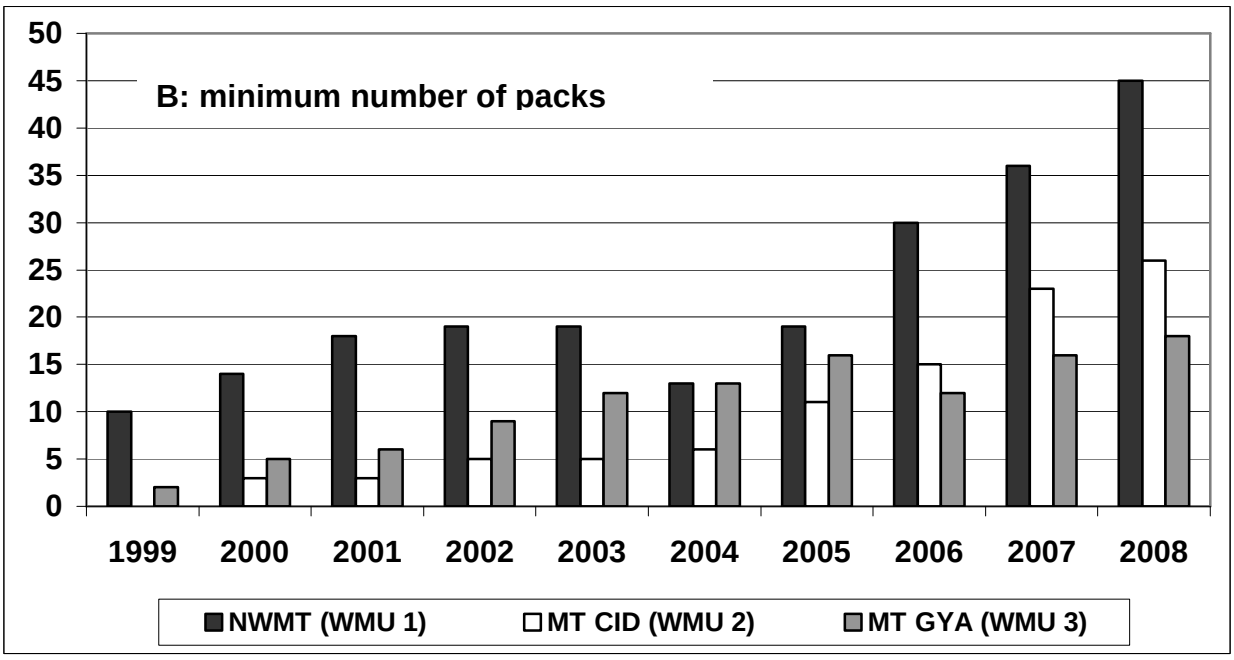


Figure 4. Number trends in the number of wolves (A) and (B) the number of wolf packs (defined as 2 or more wolves traveling together on Dec. 31) in each of the three geographic sub-units of the Montana wolf population: Montana portion of the Northwest Montana Recovery Area (Montana Wolf Management Unit 1); endangered), the Montana portion of the Central Idaho Recovery Area (Montana Wolf Management Unit 2), and the Montana portion of the Greater Yellowstone Recovery (Montana Wolf Management Unit 3), 1999-2008.

from 19 in 2005, to 31 in 2006, to 36 in 2007, to 45 in 2008. Several new packs started from dispersal from within the NWMT area over the last 1-3 years.

In the experimental area across southern Montana at the end of 2008, there were 39 packs, 17 of which met the Breeding Pair criteria. In the Montana portion of the GYA, there was an estimated minimum of 130 wolves in 18 packs, and 11 of the packs met the Breeding Pair criteria. In MT-GYA, the population increased by a minimum of 43 wolves from 2007 to 2008. In the Montana portion of CID at the end of 2008, there was an estimated minimum of 111 wolves in 21 packs, and 6 of the packs met the Breeding Pair criteria. This represents an approximate 9% decline from 2007 to 2008 after a 61% increase from 2006 to 2007.

Of notable interest for the southern Montana experimental areas was that wolf pack distribution expanded primarily within the area of western Montana already expected to have wolves (Figure 5). The minimum number of verified packs in the southern Montana experimental area increased from 27 packs in both 2005 and 2006 to 39 packs in 2007. The number of packs stayed at 39 in 2008.

The number of wolf packs in the Montana portion of CID increased from 2005 – 2007. However, there was a slight decline from 2007 to 21 at the end of 2008. In contrast, the Montana portion of the GYA decreased by 3 packs from 2005 to 2006, but increased by 4 packs to 14 between 2006 and 2007. The number of GYA packs increased to 18 in 2008. These differences are probably due to more numerous successful wolf dispersal events into Montana from Idaho than from the YNP over the last few years and successful dispersal within the Montana population. Whereas the wolf population in YNP will always be secure and a source of dispersing wolves into Montana, the YNP wolf population is smaller and nearly all available space within park boundaries has been claimed by a pack. This is in contrast to the larger ID population that continues to increase in both number and geographic distribution in an easterly direction from the original reintroduction sites. Thus the western Montana and the Idaho wolf populations appearing to be merging as new packs form in formerly unoccupied habitats.

The statewide increase from 2007 to 2008 was due to a variety of factors. Some was attributed to a real increase in wolf numbers in 2008, since many new packs formed and produced pups in 2008. MFWP has been documenting dispersal events within Montana's state borders that result in new pairs / packs forming. A total of 22 new packs were verified in 2008; however, some packs that existed on January 1, 2008 did not make it through the year for a variety of reasons, including human-caused mortality and/or disease. By the end of 2008, the dynamic nature of wolf packs was such that the number of packs increased by a net total of 19 from 2006 to 2007 and from 73 in 2007 to 84 in 2008.

MFWP maintained a similar amount of field effort in 2008, but increased wolf numbers increased the workload. MFWP re-hired two seasonal conservation technicians and brought on additional volunteers to help with 2007 and 2008 monitoring efforts. However, recent increases in the wolf population over the last few years is such that efforts are made to verify new packs and the continuation of known packs, in addition to determining breeding pair status. Inevitably, some packs are suspected, but not verified and MFWP conservatively notes those packs in the narrative, but those suspected packs are not included in the minimum estimate. Similarly, if the

breeding pair status is not known with confidence, it is recorded as "not" a breeding pair. Thus the number of breeding pairs is a minimum known and others are likely, but could not be verified.

MFWP's field staff monitored the population year round, using a variety of techniques. In addition, MFWP made a concerted effort to gather wolf reports from the public and other agency professionals. In conclusion, the Montana wolf population is split roughly equally between the northern Montana endangered area (NWMT 256 wolves) and the southern Montana experimental area (241 wolves). Packs are also roughly distributed equally between northern and southern Montana (Figure 5).

Several dispersal events were documented in 2008 and described in the Overview sections of the Interim Management Areas below. Of particular note is the southward dispersal of a female wolf wearing a global positioning satellite collar. It left its natal pack in September 2008 and moved south through YNP and into WY, southeast Idaho, and Utah. At the end of 2008, she was still alive. Several collared wolves went "missing." These animals either experienced collar failure, were killed and the collar disabled or destroyed, or dispersed from their pack and could turn up elsewhere.

Development of a Public Wolf Hunting / Trapping Season

MFWP first began exploring the idea of how to design regulated public hunting and trapping for wolves early in 2007, in anticipation of delisting in 2008. MFWP decided to move forward with developing the proposal so that adequate time could be devoted to the technical work as well as public comment prior to delisting.

Hunting could only be implemented when wolves are successfully delisted and if there are more than 15 Breeding Pairs of wolves in Montana. Regulated public harvest was first endorsed by the Governor's Wolf Advisory Council in 2000 and included in Montana's final wolf conservation and management plan. The 2001 Legislature passed SB 163, reclassifying the wolf as a species in need of management upon federal and state delisting (MCA 87-5-131). The 2007 Legislature created a wolf hunting license for residents and nonresidents (SB 372). Other statutes within MCA enable the MFWP Commission to adopt rules and general regulations and specific regulations pertaining to wolf hunting and trapping as a species in need of management upon delisting.

Incorporating public hunting and trapping into the overall wolf management program will enable the Department to more fully incorporate wolves into Montana's wildlife heritage by enabling sportsmen and women to participate in wolf conservation and management similar to other wildlife species. This will help develop an additional constituency to advocate for its conservation, as has been the case for mountain lions. Wolves would be managed more proactively and in conjunction with natural prey populations and other carnivores in a more ecological manner.

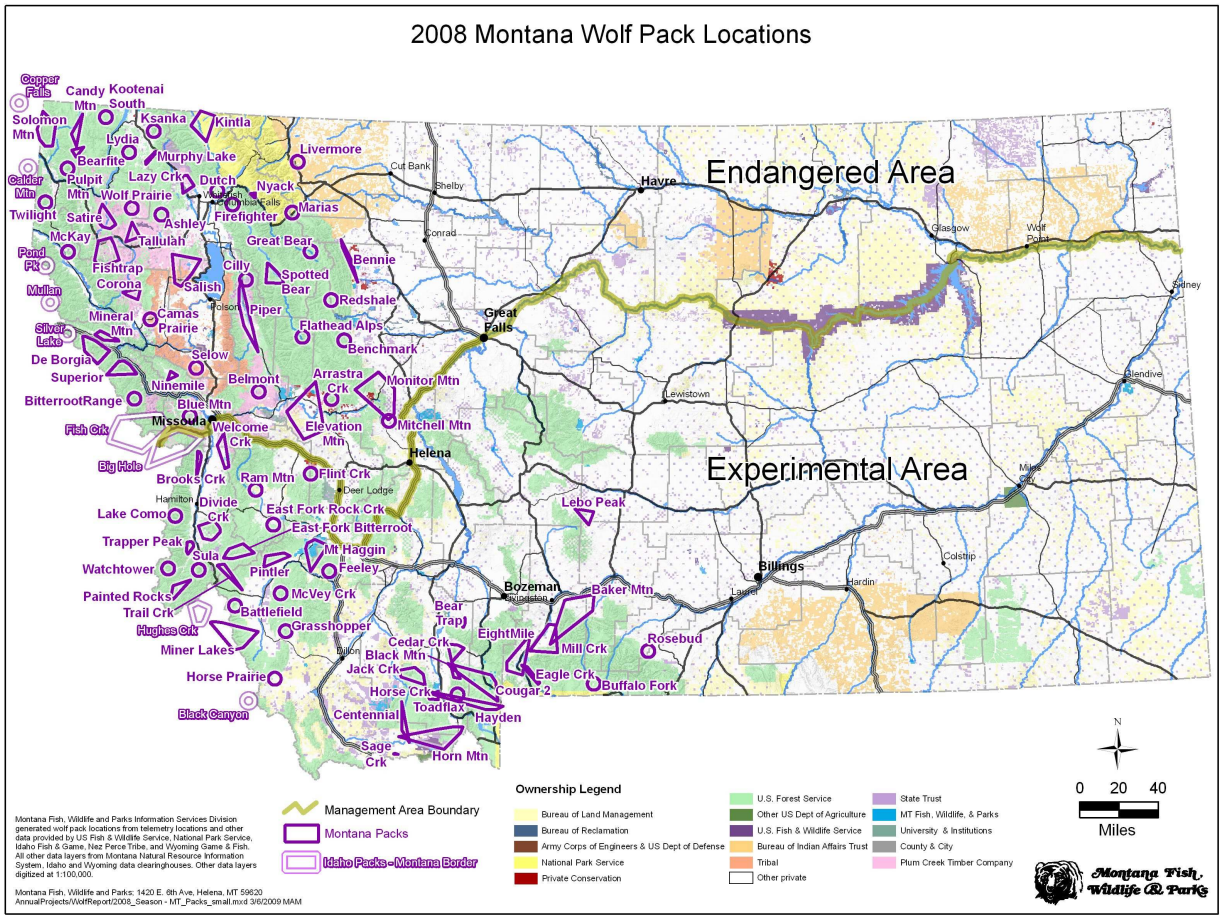


Figure 5. Verified wolf pack distribution in the State of Montana, as of December 31, 2008.

Wolf hunting and trapping seasons are established in two steps. First, the basic components, such as season dates, management units, bag limit, means of take etc. would be determined through the regular biennial season setting timeline and process. Hunting / trapping season frameworks are adopted in Montana on a two year (biennial) cycle, with the process beginning with presentation of tentative proposals in December every other odd numbered year. The public has an opportunity to comment during the month of January. MFWP reviews public comment and may modify the proposal prior to making a final recommendation to the Commission at the first meeting in February of next calendar year. The Commission would then make a final decision, thereby creating rules and regulations for the next two years.

The second step is to determine the actual number of wolves that could be harvested in a separate decision process. Total wolf harvest will be finite and regulated through a quota system. MFWP uses a quota system to biologically tailor harvest of animals. Quotas allow MFWP to direct or alleviate hunting harvest pressure and distribute hunter kills geographically so that animals are not over harvested or under harvested in critical areas. Establishment of subquotas within smaller areas allows MFWP to more proactively manage wolf numbers and packs and to

facilitate connectivity. This also allows MFWP to consider special conservation needs or conflict areas uniquely. Within that quota system, general licenses would be available but all harvest counts towards the total allowable harvest quota. The actual quota would be determined through the regular quota-setting process. MFWP proposes and the MFWP Commission approves tentative and final total statewide quota, quotas within each wolf management unit, and any subquotas in a smaller area within a wolf management unit. The three management unit quotas sum to the total statewide quota. MFWP establishes quotas annually for species managed on a quota system.

After meeting with the Montana Wolf Advisory Council, MFWP presented a wolf hunting / trapping season framework to the MFWP Commission in December 2007. The MFWP Commission modified MFWP's tentative proposal and requested public comment during January 2008. In late February 2008, the MFWP Commission established the framework for a regulated wolf hunting season for the fall of 2008 and 2009. It did not adopt a framework for trapping in either year.

The general wolf hunting season would coincide with the general firearms season for deer and elk and run for 5 weeks. Three wolf management units and one subunit was established (Figure 6). Four backcountry wilderness area hunting districts open for general deer / elk hunting in mid-September and wolf hunting would also be allowed during the early backcountry season. In lieu of a trapping season, wolves may be hunted from December 1 – 31, although no more than 10% of the management unit quota may be taken in December. Three wolf management units were established and a smaller North Fork Flathead subunit was established in the North Fork Flathead River drainage. A hunter may harvest only one wolf in a season.

Within the season framework, safety nets are imbedded to make sure that wolves would not be over harvested. Successful wolf hunters are required to report their kill within 12 hours and present the hide and skull to MFWP for inspection within 10 days. MFWP and the Commission would close the wolf hunting season when the quota was reached. MFWP also has authority to initiate a season closure prior to reaching a quota when conditions or circumstances indicate the quota may be reached within the 24-hour closure notice period.

In June 2008, the Commission considered a tentative MFWP quota recommendation. MFWP had initiated the public comment process. But on July 18, the U.S. Federal District Court in Missoula, Montana, issued a preliminary injunction that immediately reinstated temporary Endangered Species Act protections. The injunction preempted and made moot adoption of a final 2008 wolf quota by the MFWP Commission.

While developing tentative quotas, MFWP had considered wolf population status and trend, wolf pack distribution, pup production and mortality, and previous management activities including lethal control to resolve wolf-livestock conflicts. A modeling exercise provided an assessment of risk of a quota level resulting in a wolf population decline below 15 breeding pairs. It also provided cursory estimates of what the population could be 1 year later if 100% of the quota was filled and the previous year's trends held. Many assumptions were necessary, but were made conservatively.

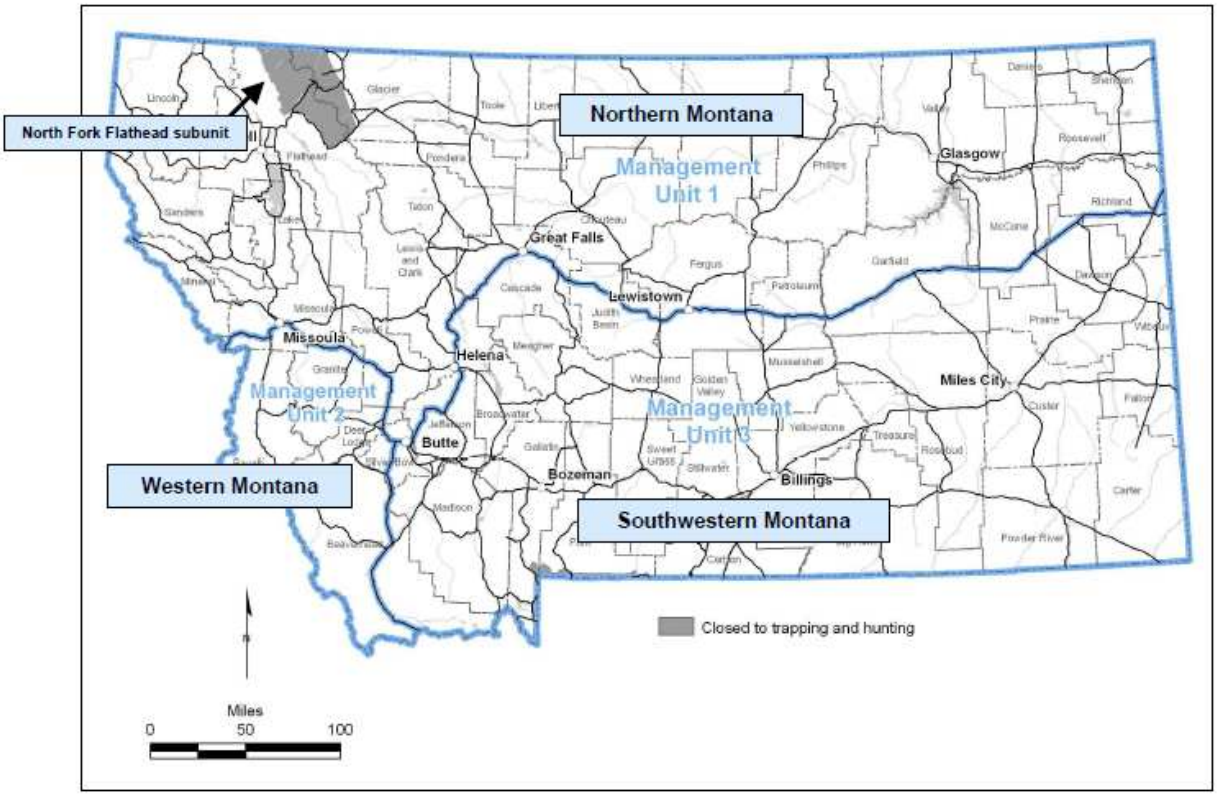


Figure 6. Montana Wolf Management Units 1 (Northern Montana), 2 (Western Montana), and 3 (Southwestern Montana).

The model exercise suggested that the proposed quota posed zero risk of the population dropping below 15 breeding pairs. It predicted that the population 1 year later would be about 497 wolves living in packs, 52 Breeding Pairs (range 44-61) and 98 packs (range 93-100). This is greater than the minimum of 400 Montana has committed to maintain into the future. This approach is consistent with an adaptive harvest management framework within the overall wolf program adaptive management foundation.

MFWP had recommended a conservative total statewide hunting quota of 75 wolves. Wolf Management 1 (northern Montana had a recommended quota of 38, with a subunit North Fork Flathead subquota of 2 (i.e. only 2 of 38 wolves may be taken in the subunit which is adjacent and west of Glacier National Park). In Western Montana Wolf Management Unit 2, MFWP recommended a quota of 22. In Southwest Montana Wolf Management Unit 3, MFWP recommended a quota of 15. This equated to an annual harvest rate of about 15% averaged statewide. A quota of 75 is approximately one-half of the harvest that the model predicted would maintain the current wolf population.

In consideration of a future quota-setting process for a potential 2009 wolf hunting season, MFWP expects to further refine its modeling approach and would use the 2008 minimum population estimates in each of the three WMUs (Table 1).

Table 1. Minimum number of wolves in each hunting Wolf Management Unit (and the North Fork Flathead Subunit) and the tentative 2008 quota approved by the MFWP Commission, as of December 31, 2008.

2008 Minimum Estimates	WMU 1 Northern Montana (North Fork Subunit)	WMU 2 Western Montana	WMU 3 Southwest Montana
Number of wolves	250 (29)	111	130
Number of Packs Verified	45 (2)	21	18
Number of Breeding Pairs Verified	17 (2)	6	11
Tentative 2008 Quota	38(2)	22	15

Wolf Mortality and Disease Surveillance

MFWP's Wildlife Research Laboratory (Lab) in Bozeman played an important role in Montana's wolf monitoring program. In 2005, MFWP's wildlife veterinarian drafted a biomedical protocol that guides all wolf capture, physical or chemical immobilization procedures, and animal care and handling procedures. Supplementary training was provided in 2006, and routine consultation assured adherence to the protocol. Additionally, lab personnel carried out routine wolf health and disease surveillance by collecting information from both live and dead wolves submitted in 2007.

Blood samples collected by MFWP and WS from live-captured wolves were sent to the Lab. Blood was screened for exposure to various diseases, and some was archived in a DNA repository. Usable samples were forwarded for hematology, biochemistry, and serology screening. All of the hematology and biochemistry results were within normal limits expected for wolves. However, serology results indicated that most of those individuals had been exposed to some common canid viral and bacterial diseases: canine parvovirus, canine distemper, canine adenovirus, and leptospirosis. The presence of these antibodies in blood collected from live wolves indicated exposure at some time in the animal's life, but that it survived the exposure. While there has been much speculation about the cause of low pup counts in southwest Montana and inside YNP in recent years, clinical evidence to confirm the cause/s was very difficult to obtain. The 2006 Montana Wolf Conservation and Management Annual Report (Sime et al. 2007) provided an in-depth summary of results to date regarding diseases in Montana wolves.

MFWP has been cooperating in a University of Illinois study examining contaminants and toxins in western gray wolf kidneys. Samples were also submitted from the Canadian provinces. Results are not yet available, but see the Research section for an abstract for more information.

Additionally, MFWP developed a protocol that called for all dead wolves found in Montana to be retrieved from the field for examination by an MFWP representative. Some carcasses are sent to the lab for more detailed analysis.

Typical information collected includes cause of death, body weight, evidence of ectoparasites, etc. Various biological data were also collected. The veterinarian had discretion to complete a more in-depth necropsy if preliminary findings warranted additional examination. Abnormal or

suspect tissues were submitted to the Montana State Diagnostic Laboratory (or occasionally elsewhere) for further evaluation. Lab personnel may also assist and consult during USFWS law enforcement investigations to determine cause of death and examine physical evidence. The 2006 Montana Wolf Conservation and Management Annual Report (Sime et al. 2007) provided an in-depth summary of results to date for the years 2003 to 2006. Some of the salvageable hides were retained and processed for educational purposes.

Causes of documented wolf mortality in 2008 are shown and compared with 2007 in Figure 7. The majority of wolf mortality overall in Montana is related to humans: livestock conflicts, car strikes, train strikes, illegal killing, legal harvest in Canada, and incidental to other activities (e.g. trapping/snaring). Of the 161 mortalities of wolves originally captured in Montana, 155 died in Montana. Three wolves died in Canada (2 legal harvest, 1 unknown) and three wolves died in Idaho (1 lethal control and 2 unknown). Agency lethal control accounts for the highest number and percentage by cause of wolf deaths in Montana compared to other causes of death.

Of 161 mortalities documented in 2008, 68% (n=110) were killed to address livestock related conflicts. The wolf mortality rate due to livestock-related conflict is similar in MT-CID and MT-GYA. The remaining 31% (n=51) died due to illegal killing, legal harvest in Canada, incidental trapping / snaring, unknown, care/train strikes, and incidental to management activities or euthanasia for poor health (e.g. mange).

In 2008, field monitoring confirmed the presence of mange (an ectoparasite) in several packs in southwest Montana. The Cedar Creek pack (Madison Valley) had mange, but no mortalities were documented and none were euthanized. In the Paradise and Boulder (south of Big Timber) valleys, the Eight Mile and Baker Mountain packs had manage. Individual wolves that were remnants of the Chief Joseph and Swam Lakes also had mange (which led to the dissolving of those packs in 2007). A total of 4 wolves were eunthanized by project personnel due to advanced stages of mange and the secondary effects and health complications associated with it. Four additional wolves that died (i.e. were not euthanized) had confirmed cases of mange when examined by project personnel. Mange has not been documented in northwest Montana (MT-NWMT) or western Montana (MT-CID).

Wolf – Ungulate Relationships
(source: Hamlin and Cunningham, 2009; see:http://fwp.mt.gov/wildthings/wolf/game.html)

The impacts of wolves on elk and other ungulates is perhaps one of the most controversial wildlife-related issues faced by people that co-inhabit landscapes with these species. This is certainly true in Montana, where the issue often involves widely disparate opinions and values. In the Greater Yellowstone Area (GYA) and southwest Montana in particular, public interest is heightened in this issue.

The GYA and southwest Montana generate approximately half of the Montana statewide elk hunter days afield and elk harvest annually. The impacts of wolves on elk populations are front and center in the minds of many elk hunters and elk enthusiasts in the region. The region is also close to Yellowstone National Park, where wolf conservation efforts were bolstered in 1995-96

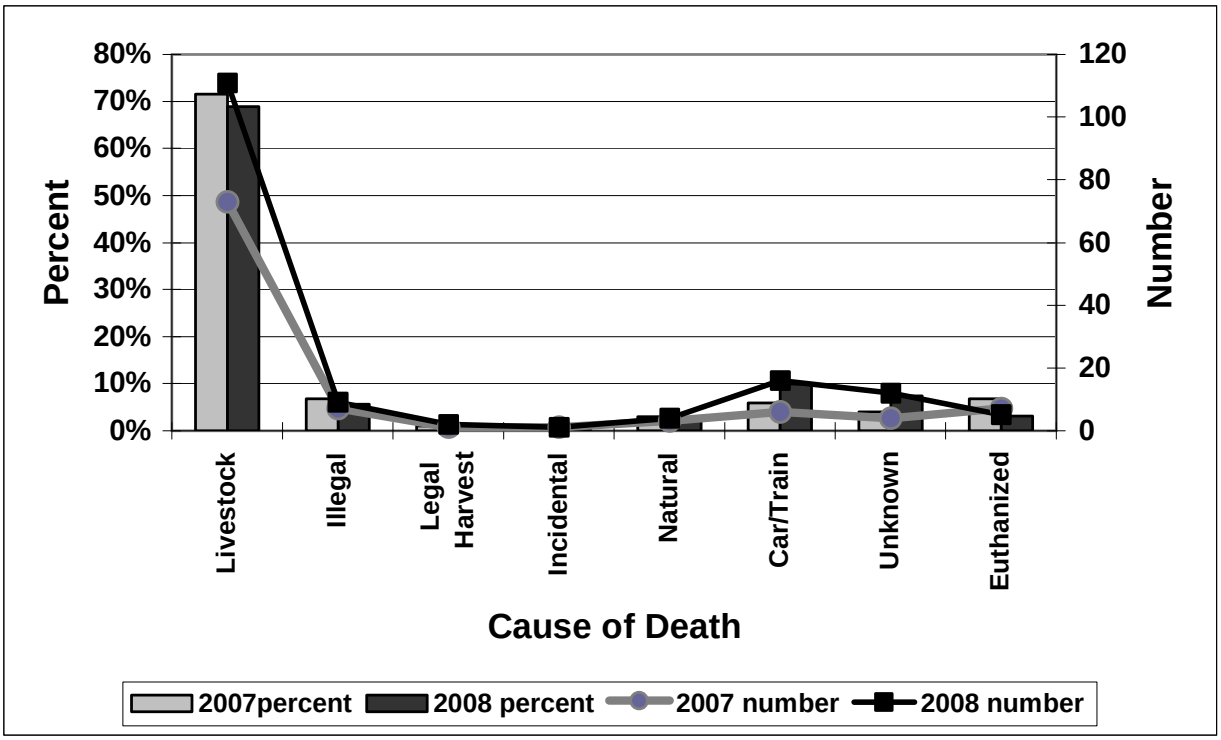


Figure 7. Causes of documented gray wolf mortality for Montana wolves in 2007 compared to 2008, expressed as total number by cause and percent of total number by cause. Total number of documented wolf mortalities in 2007 was 102 compared to 161 in 2008 (which includes 3 wolves which died in Idaho and 3 wolves which died in Canada).

with the experimental restoration of wolves to an ecosystem that had been without wolves for much of the previous century. The region holds particular significance for wolf conservation enthusiasts, and the impacts of wolves on elk are fresh in their minds as well.

Montana Fish, Wildlife, and Parks (MFWP) is entrusted to conserve and manage wildlife in the GYA and in southwest Montana. The state of Montana has been successful in efforts toward this endeavor since statehood was enacted in 1889. With the reestablishment of wolves in the region around the turn of the 21st century, however, wildlife managers were faced with a new challenge. Before this occurred, wildlife conservation and management programs were implemented without a thought given to wolves or their impacts on the ungulate populations the agency managed. Facts and data about the impacts of wolves on elk in the region were sorely needed for wildlife conservation and management programs to adapt and remain successful.

With the intense public interest and the data needs of wildlife managers in mind, MFWP began a wolf-ungulate research project in 2001 to fill some large gaps in our knowledge base. This was a collaborative project with the Ecology Department at Montana State University. The project was designed to incorporate both intensive and extensive data collection efforts. Intensive study sites were identified, and individual project cooperators ran efforts at these sites. Data collection at the

intensive study sites was intended to provide the detailed comparisons needed to understand the range of effects that wolves can have on elk population dynamics and behavior. Additionally, as a part of this overall effort, MFWP agreed to bolster ungulate monitoring efforts in a more extensive region in southwest Montana, as well as to continue monitoring programs elsewhere in the state to provide insights regarding the effects of wolves on ungulate populations over a larger area.

The major, overriding result from this research effort has been that one-size-fits all explanations of wolf-elk interactions across large areas do not exist. However, we have learned that elk populations tend to become limited by predators when high ratios of predators to elk are reached, and this typically has occurred when multiple predator species are numerous within the range of one elk population. This limitation of elk populations in areas with numerous predators appears to become manifest through direct impacts on elk calf survival and recruitment.

Intensive Study Sites in the Greater Yellowstone Area and Southwestern Montana, 2001-2008

Wolf numbers have increased rapidly in all of western Montana since wolf restoration began in 1995, at rates of approximately 10% to 34% annually. In the range of the Northern Yellowstone elk herd, wolf numbers increased by an average of approximately 13% annually during 1995-2007.

Elk are the primary prey species for wolves in southwest Montana and the GYA, though there is limited evidence that the portion of elk in wolf diets may decline during summer months. Most data indicate that wolves preferentially select for elk calves and against adult female elk. Some data indicate that wolves preferentially select for adult male elk, and the degree to which this happens appears to be influenced by the number of adult male elk that reside within the territory of a particular pack or population of wolves.

Winter elk kill rates of wolves have varied widely across southwest Montana and the GYA, from approximately 7 to 23 elk killed per wolf during November through April. There are few data on summer elk kill rates of wolves, but it appears that wolves kill fewer elk during summer than during winter.

The number of grizzly bears in southwest Montana and the GYA has increased more than -fold since 1987, concurrently with the increase in wolf numbers, affecting the total elk predation rate.

Most data that have directly measured elk pregnancy rates since wolf restoration began indicate that elk pregnancy rates are unaffected by wolves, in contrast to some indirect evidence from average hormone concentrations in elk feces. Indirect evidence from hunter-collected samples also indicates that elk pregnancy rates have been unaffected by wolves.

In most of southwest Montana and the GYA, calf survival rates following wolf restoration have been similar to rates prior to wolf restoration. Declines in calf per 100 cow ratios have occurred in the Northern Yellowstone, Gallatin- Madison, and Madison- Firehole elk herds, where both wolf and grizzly bear densities have been high. In the northern Yellowstone and Gallatin-

Madison elk herds, calf per 100 cow ratios have recently been approximately half or less than levels recorded prior to wolf restoration.

Adult female elk survival rates have remained high in most areas during the wolf population increase. In the Northern Yellowstone elk herd, adult female survival has ranged from approximately 75% to 85% since the mid-1980s. In earlier years, most adult female mortality in this herd was due to hunting. During 2000-2004, major mortality sources included hunting and predation. Since 2005, hunter harvest has been minimal and adult female survival rates appear to have remained in the low 80% range.

In areas with high predator (grizzly bear and wolf) to prey ratios, including the Northern Yellowstone, Gallatin Canyon, and Madison-Firehole winter ranges, elk numbers have declined substantially since wolf reintroduction. In most areas with lower predator to prey ratios, elk numbers have remained stable or have increased since wolf restoration began.

In the Northern Yellowstone elk herd, we estimate that since 2004 wolves have killed more elk than hunters, since 2005 wolves have killed more adult female elk than hunters, and in all but one year since 2002 wolves have killed more bull elk than hunters.

Our analyses of elk vital rates in the Northern Yellowstone elk herd indicate that a continued decline in elk numbers in coming years is likely until predator to prey ratios decline, even if hunting pressure remains low or is decreased further.

Most data collected during winter indicate that wolves have small-scale effects on elk distribution (displacement of up to approximately 1 km upon contact) and movement rates (increased movement rates of approximately 1.23 km per every 4 hours). Wolves may also affect elk habitat selection and group sizes, but the magnitude and direction of these effects is widely variable among wintering areas and even among habitats in the same wintering area. Where the impacts of hunting, hunter access, and wolves have been studied simultaneously, the impacts of hunting and hunter access on elk distribution, movements, group sizes, and habitat selection have been larger than the effects of wolves.

Data concerning the effect of wolves on large-scale elk distribution are equivocal. Based on research data collected during this project, there is little or no indication that wolves affect larger-scale elk seasonal distribution or the timing of migration in some areas in southwest Montana. Anecdotal information suggests that this may occur in some other areas in southwest Montana, however. Additionally, research data from the Madison- Firehole elk herd suggest that wolf predation pressure affects large-scale migration patterns or seasonal range selection for some elk.

In the areas of southwest Montana and the GYA that have shown declines in elk calf survival, recruitment, and population size since the wolf reintroduction, mule deer recruitment and numbers have increased.

Little data exist on moose populations in southwest Montana and the GYA due to inconsistent monitoring. Recruitment and population sizes appear to have declined in some areas, while

numbers have increased in other areas. We can currently provide little insight into the causes of these disparities, and increased monitoring efforts or research efforts might provide more insight.

Extensive Study Sites and Montana Statewide

The second section of this report provides summaries of data from routine MFWP statewide monitoring programs, including aerial survey, harvest survey, and species management programs, which have been absent from previous publications and reports. Conclusions in this section are more general and can be characterized as follows.

Elk populations in MFWP Administrative Region 1 appear to be stable or increasing, and all areas with consistent, long-term aerial counts have few wolves at present.

Moose numbers appear to be stable in the sole hunting district of Region 1 that has consistent, long-term data on moose population trend.

In most of northwestern Montana, including Administrative Region 1 and the northern portion of Administrative Region 2, white-tailed deer are likely the major prey of wolves, rather than elk.

Using buck harvest as an index of population trend for white-tailed deer, in most hunting districts numbers appeared to increase steadily until 2006 following the large decline in 1996-97. Recent highs were slightly lower than previous highs despite relatively smaller anterless harvests, and the entire increase occurred during a phase of increasing wolf numbers.

Since 2006, and beginning as early as 2004 in some areas of Region 1, white-tailed deer population sizes, indexed by buck harvest, have been decreasing. The decrease has coincided with record high antlerless deer harvests in most hunting districts.

It appears that factors other than predation have played major roles in recent white-tailed deer population declines in Administrative Region 1. However, predation may have played a role in initiating the declines, prolonging the recovery periods, and/ or limiting total deer numbers below the previous highs. In much of Region 1, it appears to be possible that predator and prey fluctuations or cycles may develop, rather than more consistent, low numbers of white-tailed deer in the presence of wolves, because whitetailed deer numbers were able to increase following major declines in 1996-97.

In MFWP Administrative Region 2, white-tailed deer numbers, as indexed by buck harvest, increased through 2006 following the major declines in 1996-97. However, in HDs 201 and 202 where wolves have been present longest, buck harvest has remained below historic pre-wolf levels.

Since 2006, white-tailed deer numbers have decreased concurrently with record or near record high antlerless harvest, following a pattern very similar to the pattern in Administrative Region 1. The declines in Region 2 have been also influenced by factors other than predation, and most populations recovered following the major declines in 1996-97. This again leads to the

possibility that predator and white-tailed numbers will fluctuate in Region 2, rather than white-tailed deer persisting at continually low numbers in the presence of wolves.

In some areas of Region 2, there have been some elk population declines with limited evidence that wolves may have played a role in limiting numbers or affecting elk distribution. In other areas aerial counts of elk have increased while harvest has decreased, with little apparent influence of wolves.

Consistent, long-term survey data indicate that elk in the Bitterroot Valley increased steadily until 2006, when planned reductions in elk numbers resulted from increases in harvest. The environment and conditions in the western portion of this valley suggest that wolves may affect elk numbers at some point, so close monitoring of this elk herd should continue.

At this time, there is little wolf presence in Administrative Regions 4 and 5, so chances of wolf impacts on ungulate populations in these areas are minimal at present.

It appears that some areas in Montana are unsuitable to wolves because livestock depredations continually lead to wolf removals, preventing wolves from increasing to densities that are seen in protected areas. In these areas, wolves are probably less likely to limit ungulate populations than in areas where depredation removals do not limit wolf survival and population growth.

Routine ungulate monitoring programs in Montana may only be powerful enough to detect large changes in ungulate numbers over a series of years, and power will be even lower in areas where harvest indices are used to monitor populations instead of aerial surveys. No routine surveys of ungulates in Montana are likely to be powerful enough to assign causes to declines in every case. This is apparently not always possible even in areas with intensive monitoring and research projects, because substantial debates concerning causes of declines and the role that predation plays in declines still persist in many of these areas.

Wolf – Livestock Interactions in Montana: General Overview

Montana wolves routinely encounter livestock on both public grazing allotments and private land. Wolves are opportunistic predators, most often seeking wild prey. However, some wolves "learn" to prey on livestock and teach this behavior to other wolves. Wolf depredations are very difficult to predict in space and time. Between 1987 and 2008, the vast majority of cattle and sheep wolf depredation incidents confirmed by WS occurred on private lands. The likelihood of detecting injured or dead livestock is probably higher on private lands where there was greater human presence than on remote public land grazing allotments. The magnitude of under-detection of loss on public allotments was not known. Nonetheless, most cattle depredations occurred in the spring or fall months while sheep depredations occurred more sporadically throughout the year.

Most wolves in Montana routinely encounter livestock, but do not kill livestock at each encounter. On average through the last 10 years, 10-25% of Montana wolf packs were confirmed to have predated on livestock in any given year. One pack has been on the landscape

for 19 years and was confirmed to have killed livestock a total of 5-6 times even though livestock occurred within its territory and within 2 miles of the den site. Other packs depredate once or twice a year, every other year, or at more widely spaced intervals. Still others depredate more frequently, some demonstrating an escalating behavior pattern of actively hunting livestock in the span of a few weeks or months. Packs that have killed livestock repeatedly and within short periods of time, particularly adult-sized livestock, eventually became sources of chronic conflict. In these situations, lethal control occurred more regularly within and across years. In some cases, incremental removal in a stepwise fashion after repeated losses resulted in full pack removal.

Occasionally, livestock were confirmed killed by lone dispersing wolves or a pair of wolves passing through, as evidenced by the lack of a resident pack or subsequent instances of injured or dead livestock or wolf sign in the area. In these situations, the wolf usually does not return to the original depredation site. In other instances, livestock are killed by remnants of packs that became fragmented due to lethal control, dispersal or disease-related mortality.

USDA Wildlife Services workload has increased over the last 10 years as the wolf population increased and distribution expanded. The number of suspected wolf complaints received by WS increased steadily from federal fiscal year 1997 to 2008 (Figure 8). About 50% of the complaints received by WS are verified as wolf-caused.

A total of 438 wolves were killed to help resolve conflicts with livestock from 1987-2008 in Montana (Figure 9). Despite this level of lethal removal, particularly in the early years, the Montana population still increased in number and distribution, due to immigration from central Idaho, Yellowstone National Park, and to growth from within the Montana population via dispersal and new pack formation. From 2004-2008, an average of 15.8% of the wolf population per year was killed due to conflicts with livestock (Figure 10). The percent killed in the most recent 3 years has increased as the size of the wolf population has increased and wolf pack distribution has expended into areas where conflicts with livestock are more likely. Similar trends are evident in the NRM and the Western Great Lakes States. Despite this level of removal due to livestock conflicts, the Montana wolf population continued to increase through the years.

Under the more flexible special federal regulations in the southern Montana experimental area, a total of 10 wolves were legally killed by private citizens when discovered in the act of chasing or attacking livestock and 13 wolves were killed under shoot-on-sight permits from 2001-2006. In 2007, 7 wolves were killed while actively chasing livestock (1 of which was unlawful) and 4 wolves were killed on a special permit. In 2008, 5 wolves were killed while seen actively chasing or attacking livestock in the experimental area under the 10j regulation. An additional wolf was killed by a private citizen under Montana's defense of property, which is similar to the 10j federal regulations. Shoot-on-sight permits were also issued in the experimental area after confirmed livestock depredations and MFWP had authorized lethal control. No wolves were killed, though about 21 permits were either issued or renewed in 2008. WS and MFWP received numerous other reports of non-injurious hazing and harassing, but records are not complete enough to report accurately.

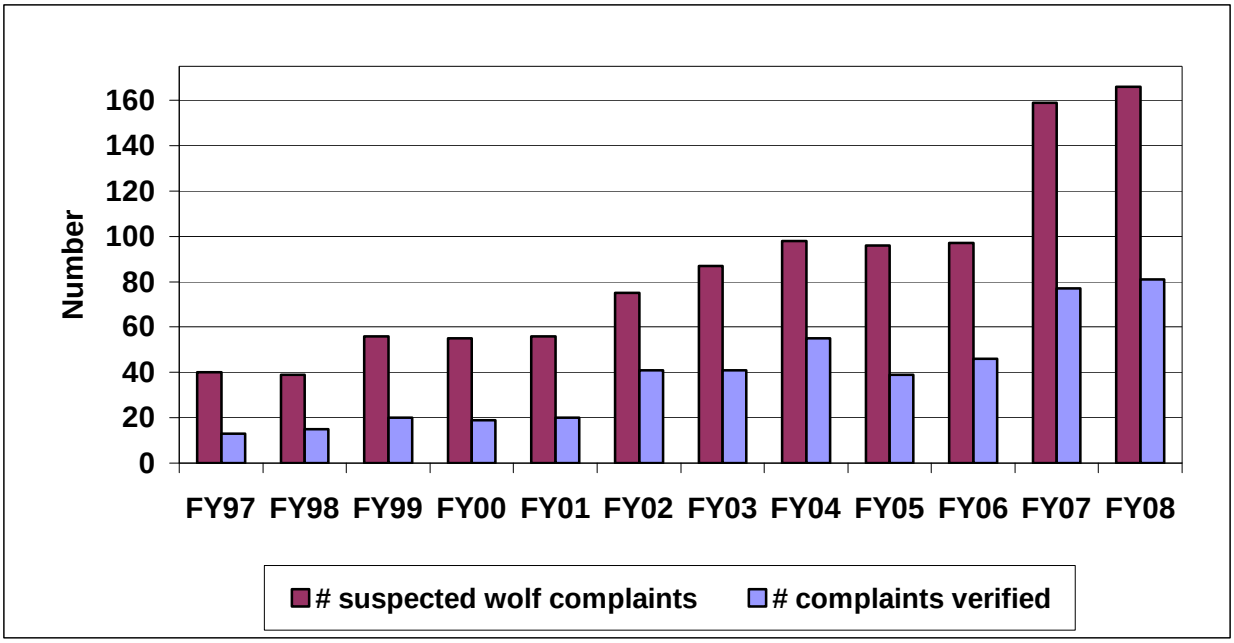


Figure 8. Number of complaints received by USDA Wildlife Services as suspected wolf damage and the percent of complaints verified as wolf damage, federal fiscal years 1992 – 2008. Federal fiscal years from October 1 to September 30.

Because wolves are still listed under ESA, wolf-livestock conflicts were addressed using a combination of the approved state plan and federal regulations. Among other things, MFWP considered the number of breeding pairs statewide and in the respective interim management areas (endangered area or experimental area), where the incident occurred, potential for additional losses, and a pack's previous history with livestock when deciding what to do. MFWP and WS tried to connect the management response and the damage closely in space and time, targeting the offending animal/s. WS personnel carried out the lethal control work. MFWP strove to assure the security of the overall wolf population, while addressing depredation losses and control in an incremental fashion responsively and as directed by the state plan.

Because most confirmed incidents of injured or dead livestock in Montana involve livestock producers who were affected 2 or more times and that most incidents occurred on private lands, we believe the combination of proactive non-lethal deterrents combined with strategic incremental lethal control of problem wolves is the best way to resolve wolf-livestock conflicts.

Both MFWP and WS also provided advice and technical information to individual livestock producers about proactive strategies that may decrease their risk of wolf depredations. Project personnel also worked collaboratively with interested private organizations and local-level community groups (e.g. watershed groups) to provide technical advice and to investigate non-lethal methods of deterring livestock conflicts.

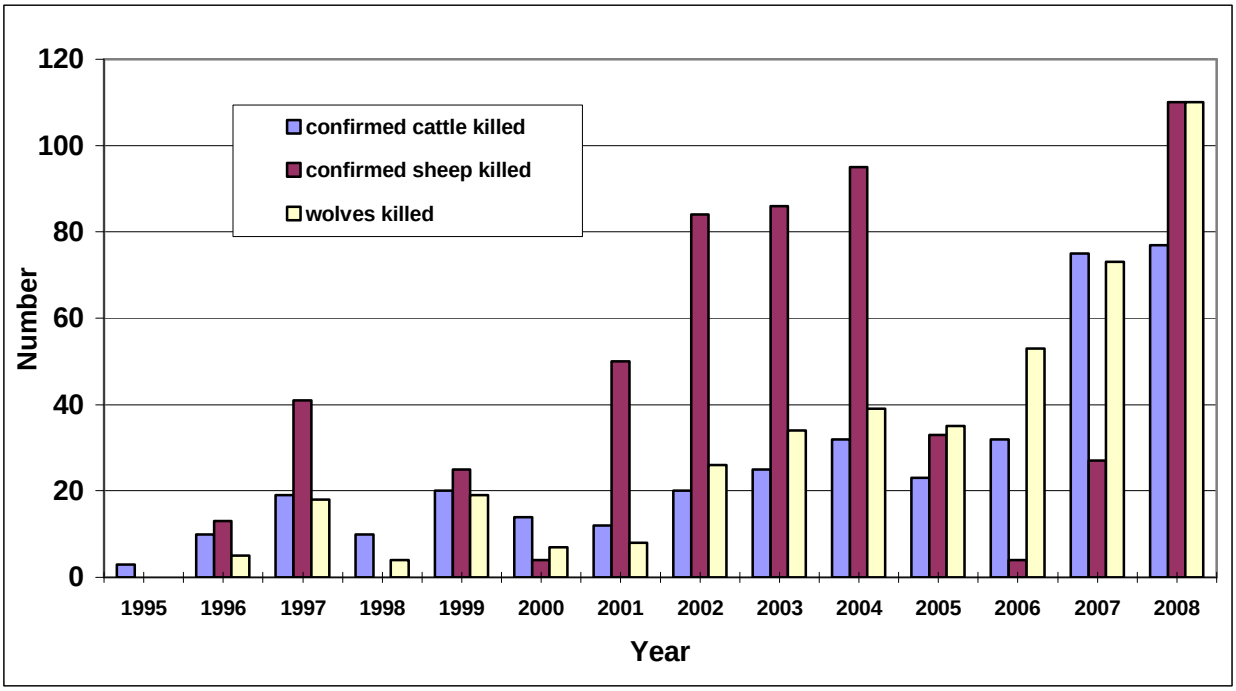


Figure 9. Confirmed cattle and sheep killed by wolves and the number of wolves lethally controlled in the State of Montana based on investigations by USDA Wildlife Services, 1995-2008.

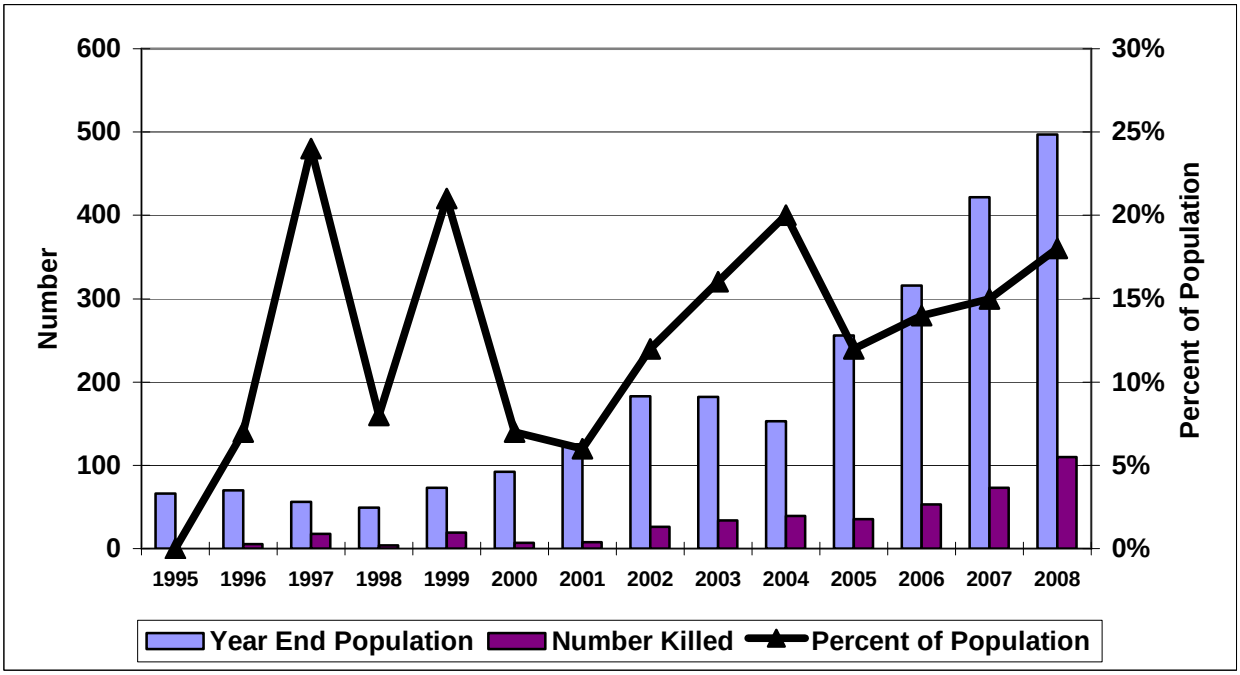


Figure 10. Minimum estimated wolf population (left axis), number of wolves killed to resolve livestock conflicts (left axis), and percent of the population removed (right axis) during calendar years 1995 - 2008.

While wolves remain listed under ESA, there are two different classifications and legal frameworks for addressing wolf-livestock conflicts (Figure 2). Wolves across northern Montana are classified as endangered, which offered both livestock producers and MFWP less flexibility. The 1999 Interim Control Plan ultimately guided decisions about lethal control. Citizens cannot harass or kill wolves on private lands, state leases, or federal lands. State and federal agency personnel were responsible for all harassment activity and lethal control of all wolves in the endangered area.

Wolves across southern Montana are classified as experimental, nonessential. Because Montana has a federally-approved management plan, additional flexibility became available to both MFWP and livestock producers in February 2008. Known as the 10(j) regulations, members of the public in the experimental area had the ability to non-injuriously harass wolves that were too close to livestock any time. If wolves were seen actively chasing or attacking livestock on private or federally permitted lands during the active permit, livestock owners, their immediate family members or employees could legally take the wolf. Physical evidence that demonstrated that an attack was imminent was required. All cases of harassment or lethal take had to be reported to MFWP within 24 hours. The 10(j) regulation was patterned after the Montana "defense of property" statutes that will take effect upon delisting allowing take "in the act" of attacking domestic livestock. In 2005, 7 wolves were killed by private citizens under the 10(j) rule compared to 2 in 2006. In 2007, a total of 7 wolves were killed under the 10j regulation compared to 5 in 2008.

Depredation Incidents in 2008

The majority of wolf-livestock interactions took place in the experimental area across southern Montana. Livestock densities (number of cattle and sheep per square mile) in south central Montana counties are some of the highest of any in Montana. Habitat, ungulate distribution, and landscape features placed wolves and livestock in closer proximity in space and time than other parts of the state.

WS confirmed that, statewide, 77 cattle, 111 sheep, 2 domestic dogs, 7 goats, and 8 llamas were killed by wolves in calendar year 2008 (Figure 9). Approximately 32% of Montana packs had confirmed livestock kills at some point during 2007. In 2008, the percentage increased to 36%. Additional investigations were determined to be probable wolf depredations or confirmed injured livestock. Furthermore, some livestock producers reported "missing" livestock and suspected wolf predation. Other reported indirect losses include poor weight gain and aborted pregnancies. There is no doubt that there are undocumented losses. It is difficult to quantify direct and indirect economic losses in totality.

Most depredations occurred on private property. To address livestock conflicts and to further reduce the potential for further depredations, 110 wolves were killed. Five of the 110 were killed by private citizens on private land under the 2008 10(j) regulations and the remainder were taken by WS using either ground or aerial based methods. Eight packs were removed entirely due to chronic livestock conflicts (Hewolf, Hog Heaven, Moccasin Lake, N. Gravelly, Freezeout, Willow, Skalkaho, Musigbrod).

Hewolf had been slated for complete removal at the end of 2007, but the work was completed in 2008. Lethal control was initiated incrementally in 2008, consistent with federal regulations. All had confirmed depredations in 2007, however, and had already undergone some level of lethal control. These 8 packs accounted for 62% of the total number of wolves killed to resolve livestock conflicts. All combined, these packs accounted for 23% of the total confirmed cattle killed and 36% of the total confirmed sheep killed. In some cases, these packs occupied primarily private lands and/or also had some level of failure of nonlethal tools.

In 2008, in the endangered area across northern Montana, the number of livestock and dogs confirmed killed increased from 2006 and 2007 levels, as did the number of wolves killed. WS confirmed a total of 36 cattle, 0 sheep, 2 dogs, 2 horses, 3 goats, and 5 llamas as having been killed by wolves in 2008. A total of 50 wolves were killed in NWMT. The increase in livestock loss and lethal wolf control was due primarily to continued and chronic depredations and subsequent removal of the Hog Heaven and Hewolf packs. Hog Heaven pack members began killing livestock in 2007 and the pattern continued in the fall of 2008. A total of 27 wolves were removed when this pack was eliminated (54% of the total number of wolves killed in NWMT in 2007). A total of 14 of 45 (31%) packs had confirmed depredations. See pack narratives below.

In the Montana portion of the GYA, the total number of confirmed livestock killed increased in 2008 from 2007. Incidents in 2008 occurred primarily in 3 counties where livestock conflicts have occurred in the past (Park, Madison, and Beaverhead). WS confirmed a total of 15 cattle, 85 sheep, and 4 goats were killed. A total of 27 wolves were killed (4 of which were killed by private citizens). The increase in sheep livestock loss and lethal control was apparently due to two packs that repeatedly killed sheep. In 2006, 3 of 15 (20%) packs killed livestock whereas in 2007, 9 of 18 packs (50%) killed livestock. In 2008, 39% of packs (7 of 18) had confirmed livestock kills. Of the 21 packs that existed at some point in 2008, only 18 existed at the end of the year due to the effects of mange and lethal control to resolve conflicts with livestock. Lethal control in three of the 18 packs was implemented to remove the entire pack due to chronic depredations on private land (Moccasin Lake, N. Gravelly, and Freezeout).

In the Montana portion of the CID, the number of confirmed livestock losses decreased in 2008 compared to 2007. WS confirmed a total of 26 cattle and 26 sheep, and 3 llamas lost to wolves. A total of 34 wolves were killed (1 of which was killed by a private citizen when wolves were seen actively chasing or attacking livestock). In 2006, 6 of 17 (35%) packs killed livestock. Of the 25 packs that existed at some point in 2007, 10 (40%) killed livestock. In 2008, 43% (7 of 21 packs) had confirmed depredations. Three packs were completely removed (Willow, Sapphire, Skalkaho) due to chronic livestock conflicts and did not exist at the end of the year.

Private citizens killed 6 of the 61 (8% of total) wolves removed in the Montana portion of the GYA and CID experimental areas combined in 2008. Five wolves were killed under the 10(j) regulations and none were killed by permit in 2008. All of the wolves killed in Montana by private citizens under the 10j regulation or as authorized by a shoot-on-sight permit were killed on private land.

Between 1987 and 2006, most confirmed cattle depredation events in Montana occurred in spring (March, April, May) when calves were small and most vulnerable. A smaller spike occurred in the fall (September and October), presumably as food demands of the pack increased and pups are traveling with the pack. In addition, wild ungulates were still well dispersed on summer range and young-of-the-year ungulates were more mobile. Most confirmed sheep depredation events in Montana occurred in July, September, and October. Because of their smaller size relative to cattle or other classes of livestock, sheep are vulnerable to wolf predation year round. Similar patterns of peak depredation activity were observed in 2008.

Proactive Non-lethal Efforts

From 1987 – 2006 there was a total of about 314 confirmed incidents of wolf-livestock conflicts (injured or dead livestock confirmed by WS). A total of 162 livestock owners were affected. Previous work has shown that proactive, nonlethal tools have the potential to decrease risk because about half of the total incidents occur twice or more on the same piece of land (Sime et al. 2007). Losses peak in the spring and fall. However, it is difficult to prevent wolves from injuring or killing livestock as most livestock owners have only one confirmed loss. Some however, did have multiple losses during that span of years. Other work has shown that lethal control can provide some relieve, but is not a permanent solution as wolf pack territories were recolonized by other, "new" wolves about 280 days on average after the previous pack was eliminated (Bradley 2004). Thus a combination of proactive nonlethal tools in combination with incremental lethal control offers a variety of management tools to minimize wolf-caused livestock losses and lethal wolf control to the extent possible, recognizing that some livestock will be lost to wolves in the future and some wolves will be killed to address conflicts.

During 2008, MFWP and WS assisted with several efforts to employ proactive non-lethal tools, including fladry, electric fladry, increased human presence, and non-lethal munitions. Other efforts occurred without much MFWP involvement. Additionally, most livestock owners who submitted a claim to the Montana Livestock Loss Reduction and Mitigation Board to get reimbursed for a verified wolf loss reported already using some husbandry tools to decrease the risk of wolf depredation.

Fladry

MFWP received a Conservation Innovation Grant from the USDA Natural Resource Conservation Service in 2006 to study the field application of electrified (turbo) fladry. Field work was completed in 2007 and the final report was completed in 2008. See the Research and Field Studies Section. In 2008, fladry or was used in at least three known pack territories where conflicts have occurred in the past to discourage wolves from areas of domestic livestock or homesites with dogs. The intention of fladry is to behaviorally discourage wolves from entering a pasture. While it does not represent a physical barrier like some styles of fencing, it does present a behavioral barrier as wolves both in captivity and field settings are reluctant to cross it or go under it.

In the Lydia pack territory (NWMT), fladry was used around a calving pasture on private land after depredations on the adjacent timbered public grazing allotment in summer 2007. No depredations were reported on this ranch or were attributed to the Lydia pack in 2008.

Two landowners along the urban – wildland interface in the Superior pack territory used fladary around their homesites to discourage wolves from interacting with domestic dogs and horses. This has been the case for several years in a row. In one case, the fladry is kept up year round and MFWP replaced it in 2008. Fladry is used at the other location primarily in the winter when the pack is at lower elevations and closer to the property. There was one confirmed cattle loss in this pack's territory, but it was not associated with either of these two landowners.

MFWP provided electric fladry to a livestock producer who is located within the Satire pack's territory in NWMT for the second year in 2008. Regular wolf presence is reported by this landowner, but no losses were reported on this property. One calf was confirmed killed in the pack territory at a different location.

In the Blackfoot Valley, regular fladry was put up around a pasture having cow:calf pair after wolf activity was reported in the area and close the pasture. The fladry was up for about 2 months. No conflicts were reported within the pasture. The cattle operation has since been sold.

Regular fladry was also deployed in the Willow Creek pack territory near Hall, where wolves were frequenting and had been reported harassing cattle.

Discourage Denning

On two occasions, MFWP personnel attempted to prevent two different packs from re-using a traditional densite (Willow Creek and Brooks Creek) due to conflicts in the past. Wolf activiy and depredations are most concentrated around denning areas and rendezvous sites. Increasing the distance between a den and vulnerable livestock may decrease the risk of loss, but it can also displace wolves to area equally prone to conflicts with livestock. The Willow Creek pack was not sufficiently discouraged and reused its traditional den on private land near cattle operations. The Brooks Creek did establish a different den site, but was still in close proximity to livestock. Both packs had confirmed depredations in 2008.

Increased Human Presence

The primary goal of these range rider efforts is to reduce livestock/predator interactions. Secondary goals and objectives are to reduce livestock depredation from predators, to detect injured or dead livestock more rapidly, to preserve the evidence and increase the likelihood that an investigation would yield a definitive conclusion about whether or not it was a predation event and the species responsible, to improve livestock management and range conditions, to increase knowledge about livestock/predator interactions in space and time, and to build relationships among project partners.

Although the rider protocols varied from place to place, the underlying premise is similar: increased and continual human presence and immediate response to wolves that are seen

interacting with livestock. The rider response towards wolves when they are interacting with livestock ranges from non-lethal harassment to a lethal bullet. By responding as closely as possible in space and time to the inappropriate behavior (e.g.,chasing livestock), the wolves are more likely to associate that behavior with something negative than if they had not been harassed while behaving inappropriately. Due to the incredible number of variables from place to place, there is no clear evidence that these efforts have actually prevented depredations. However, when surveyed, many participating producers said they thought it was helpful and indicated an interest in continuing their participation.

Over the years, MFWP has collaborated livestock produers, many orgainizations and watershed groups, including: Madison Valley Ranchlands Group, Blackfoot Challenge, Boulder Watershed Association, Granite County Headwaters Watershed Group, Turner Endangered Species Fund, USDA Forest Service, Keystone Conservation, USDA Wildlife Services, USDA Natural Resources and Conservation Service, Sweet Grass County Conservation District, and MSU Extension Service

In the Helmville area, the Blackfoot Challenge initiated a pilot range rider program during August and September 2008 in the Elevation Mountain pack territory using funds obtained in a grant. MFWP provided technical support. No conflicts were reported. Much was learned and plans are underway for the 2009 grazing season.

A range rider program, for the Antelope Basin grazing allotment in the Madison continued in 2008. This was the fifth season in a row in which riders spent time on a combination of public allotments and private lands south of Ennis between June 15 and October 15. Over the years, different wolf packs have lived in the area. Currently, the Horn Mountain pack territory includes Antelope Basin. In 2008, two calves were killed in July and 1 calf was killed in October. Most of the cattle were brought off the allotment 1-2 weeks early. Incremental lethal control resulted in the removal of 3 wolves. Five wolves remain in the pack and plans for the 2009 grazing season are underway.

In the Boulder River watershed south of Big Timber, range riders were funded for 2005, 2006, and 2007. In 2008, the rider effort was discontinued due to lack of funding, although there is still interest by the watershed group.

In the East Fork of Rock Creek, MFWP collaborated on another Ranger Rider project with Defenders of Wildlife and a livestock producer. This producer experienced missing livestock in 2006. The rider started in May 2007 and spent time both on private land and the affiliated public grazing allotment through September. In 2007, two calves were killed on the ranch and eventually 5 wolves were removed from the Sapphire pack after the wolves repeatedly frequented areas with livestock. No 10j hazing or take in the act was reported by the rider, but wolf presence around livestock was frequent. The project continued in 2008, but wolf pack dynamics in the area. The Sapphire territory was usurped by the Skalkaho pack. Late in the grazing season, the Skalkaho pack keyed into livestock despite repeated hazing attempts by the rider. Two calves were confirmed killed and a third dead calf was a probable. The pack was removed as nonlethal tools were not effective.

In 2008 near Hall, a rider program was developed with four livestock producers within the Willow Creek pack's territory to increase monitoring efforts for wolves and livestock after many livestock were lost in the prior 2 years. This pack lived almost entirely on private land and in close proximity to livestock yearlong. In 2008, multiple nonlethal tools were implemented in addition to the rider – carcass removal, fladry, and discouragement from using the traditional den. The combination of nonlethal tools and incremental control did not improve the situation and the entire pack was removed in 2008.

Defenders of Wildlife and a local ranch in the Rosebud pack territory participated in a range rider agreement. No reports of riders hazing or harassing wolves were received and no conflicts were reported.

Defenders of Wildlife: Bailey Wildlife Foundation Wolf Compensation Trust
(Summary contributed by Defenders of Wildlife; see also http://www.defenders.org/wolfcomp.html)

In 1987, Defenders of Wildlife (Defenders) created a private fund to compensate livestock producers in the NRM for verified livestock losses due to wolves. The fund's goal is to reduce economic losses for livestock producers due to the restoration of wolves. In the fall of 2000, the fund was renamed The Bailey Wildlife Foundation Wolf Compensation Trust. Until April 15, 2008, Defenders provided the only wolf compensation program available in Montana. From 1987 through April 15, 2008, Defenders of Wildlife paid a total of approximately $343,143 in compensation claims in the State of Montana (Figure 11). From 2000 to 2005 (inclusive), the total amount paid was $176,384.57, averaging about $29,397 per year. The amount paid in any one year ranged from $7,935 to $54,757. Beginning April 15, 2008 the Montana Department of Livestock's state sponsored program replaced Defenders' wolf compensation program in Montana, though payments are still primarily privately funded by Defenders through a donation to the State of Montana. In 2009, all Montana compensation claims should be sent directly to the Montana Livestock Loss Reduction and Mitigation Board (see below).

Since 1987, Defenders has compensated more than $1.2 million dollars to livestock producers in the NRM. The program pays for 100% of the fall market value for a WS-confirmed wolf-caused loss up to $3000 per animal and 50% of the market value for probable losses. Livestock losses covered include: sheep, cattle, horses, mules, goats, llamas, donkeys, pigs, chickens, geese, turkeys, herding dogs and livestock guarding dogs. Defenders is still providing direct compensation in other states within the region. See www.defenders.org/wolfcompensation for additional information.

While turning over administration of the wolf compensation program to Montana, Defenders has increased its efforts through The Bailey Wildlife Foundation Proactive Carnivore Conservation Fund initiated in 1988 to reduce livestock losses to wolves through the use of nonlethal deterrents. Over the last decade, Defenders has collaborated with ranchers and wolf managers to pioneer a range of methods and strategies including use of multiple livestock-guarding dogs, fladry, range riders, livestock night penning, and more. Both wolf and livestock mortalities have

been reduced as a result of these measures and more ranching operations and agency managers are utilizing these techniques as word of their effectiveness spreads.

In 2008, Defenders published a proactive guide for livestock producers. "Livestock and Wolves: A Guide to Nonlethal Tools and Methods to Reduce Conflict" which summarizes information provided by ranchers, wildlife managers, conservationists and scientists on these deterrents. A free copy is available online or by contacting Suzanne Stone, Defenders of Wildlife, P.O. Box 773, Boise, Idaho 83701 or calling 208-424-9385. Additionally, in 2008, Defenders funded numerous non-lethal wolf control projects totaling $85,000 throughout the tri-state region to help increase the use of these methods. For more information, please visit www.defenders.org/proactive.

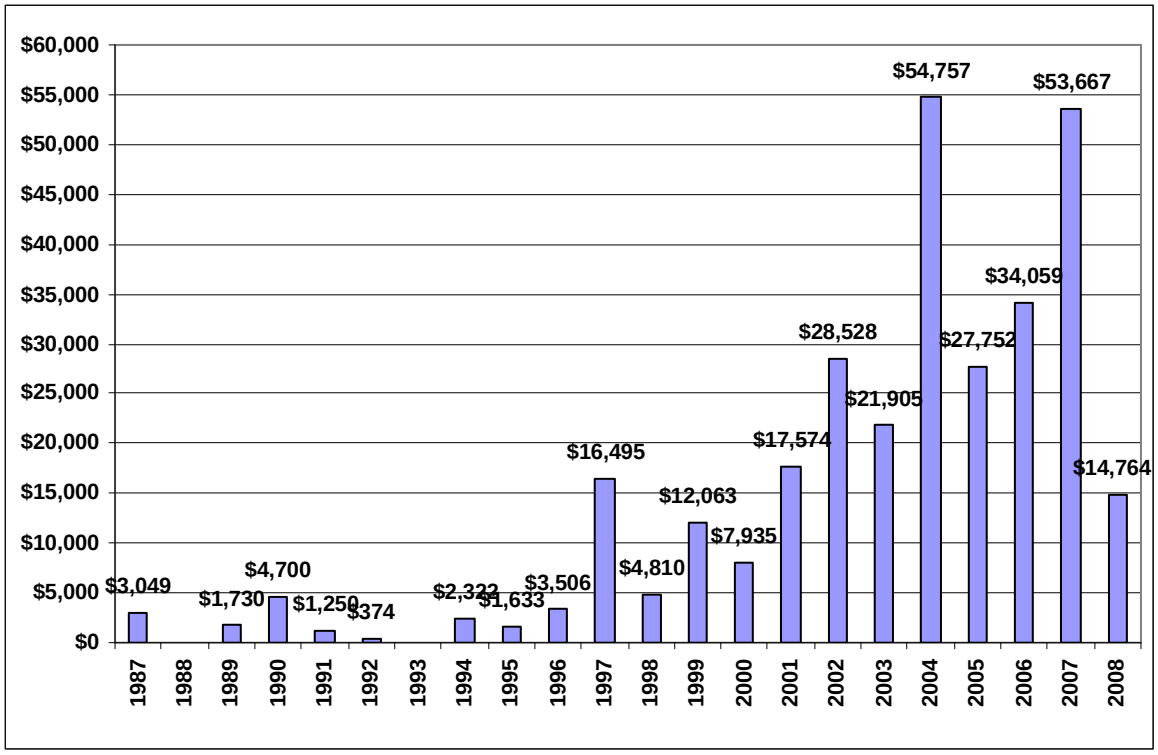


Figure 11. Compensation payments paid in Montana by Defenders of Wildlife, 1987 through April 15, 2008, when the State of Montana initiated its program. Payments are shown according to the calendar year of payment and parameters set forth by Defenders of Wildlife. Actual loss may have occurred in the previous year in some cases. Source: http://www.defenders.org/wolfcomp.html.

Montana Livestock Loss Reduction and Mitigation Program: a Montana-based Reimbursement Program

The Montana Wolf Conservation and Management Plan called for creation of a Montana-based program to address the economic impacts of verified wolf-caused livestock losses. The plan identified the need for an entity independent from MFWP to administer the program. The plan also identified that the reimbursement program would be funded through sources independent from MFWP's wolf management dollars and other MFWP funds intended for fish and wildlife management.

The creation of an adequately funded loss reduction and damage mitigation program will help determine the degree to which people will share the land with wolves, to which the success of wolf recovery can be assured into the future, and the degree to which individual livestock operators who are adversely affected economically by wolf recovery are able to remain viable. Maintaining private lands in agricultural production provides habitat for a wide variety of wildlife in Montana and is vital to wolf conservation in the long run.

In keeping with Montana's tradition of broad-based citizen participation in wolf conservation and management, a diverse, 30-member working group met 4 times in 2005. The working group was comprised of private citizens, representatives from non –governmental organizations, and representatives from state and federal agencies. A smaller subcommittee continued to meet in 2006. This group finalized a framework which then became the basis for legislation in the 2007 Montana Legislature.

As a part of the comprehensive wolf program implemented by MFWP and its cooperators, the Montana Livestock Loss Reduction and Mitigation Program (MLLRMP) addresses economic losses due to wolf predation and creates incentives for producers to take proactive, preventive steps to decrease the risk of loss. The large working group agreed that both government and livestock producers want to take reasonable and cost-effective measures to reduce losses, that it is not possible to prevent all losses, and that livestock producers should not incur disproportionate impacts as a result of recovery of Montana's wolf population.

There are three basic components: a loss reduction element, a loss mitigation element, and the state wolf management plan. MFWP and USDA WS would fulfill their responsibilities and roles outlined in the state management plan. The loss reduction and loss mitigation elements are administered by an independent quasi-judicial board that is administratively attached to the Montana Department of Livestock

Of particular concern to all participants was the need to secure funding for <u>both</u> the proactive work and the loss reimbursement components of the Montana wolf program. The working group explored a variety of funding mechanisms. Both the Montana Wolf Advisory Council and the second working group concluded that the MLLRMP would be funded through special state or federal appropriations or private donations. Both groups agreed that MFWP's wolf management dollars, and other MFWP funds (license revenue and federal matching Pittman-Robertson or Dingle Johnson dollars) would not be used to reimburse wolf-caused losses. Private donations will also be sought.

During the 2007 Montana Legislative session, a bill to establish the framework of the working group was introduced and passed (HB364). The legislation created the Livestock Loss Reduction and Mitigation Board to administer programs for the mitigation and reimbursement of livestock losses by wolves. It also established the quasi-judicial board, its purpose, membership, powers and duties, and reporting requirements. The Board is administratively attached to the Montana Department of Livestock, but its role and duties are wholly independent from the Department and the Montana Board of Livestock and vice versa. Late in 2007, the Governor appointed the first Board.

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

The Loss Reduction element is intended to minimize losses proactively by reducing risk of loss through prevention tools such as night pens, guarding animals, or increasing human presence with range riders and herders. Active management of the wolf population by MFWP under the approved Montana Wolf Plan (and the applicable federal regulations for now) should also help decrease the risk of loss.

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

The legislation also codified much of the actual draft framework in state law. It directed the Board to establish a program to cost-share with livestock producers who are interested in implementing measures to decrease the risk of wolf predation on livestock. It also directed the Board to establish and administer a program to reimburse livestock producers for losses caused by wolves. While some details of the grant program (loss reduction) and the reimbursement program (loss mitigation) are established in statute, the Board will still need to establish additional details through a rule-making process, which will include public comment opportunities. Rulemaking is expected in 2009 to finalize and establish other program implementation details in the Administrative Rules of Montana.

HB364 also established special state and federal revenue accounts, respectively. The funds may only be used for the purposes of implementing the loss reduction grants program and reimbursing wolf-caused losses. HB 364 also established a trust fund with an intended principal of $5 million dollars. The earned interest from the trust fund pays for the program. The Legislature did not, however, appropriate dollars for either of the special revenue accounts or the trust fund.

The 2007 Montana Legislature appropriated "start up" funds in the amount of $60,000 in each year of the biennium to pay for initial operating expenses of the Board. The appropriation also included 1.0 FTE who works for the Board and conducts the day to day business of the program. This individual was hired late in 2007 and the initial orientation and coordination got underway. Fundraising efforts began in 2008.

The Montana Livestock Loss Reduction and Mitigation Board met twice in 2008. With the 2008 funding available, the Livestock Loss Reduction and Mitigation Board prioritized payments for animals that were attacked by wolves and died, as verified (probable or confirmed) by USDA Wildlife Services. Claims were paid on a first-come, first-served basis. Private organizations provided most of LLRMP's available funding for 2008, including a $50,000 donation from Defenders of Wildlife. Donations were also received from the Greater Yellowstone Coalition and the Montana Cattemen's Association. No grant applications submitted in 2008 were funded. A total of $83,000 was available and paid to livestock owners for dead animals between April 15 and December 31,2008. Additional claims for dead livestock were received, but could not be paid because all available funds were exhausted.

Payments for injured animals or funds for cost-share grants to implement proactive tools intended to decrease risk were unavailable due to a lack of funds. This board and program are primarily funded via private donations. Donations are fully tax deductible and can be made via the internet at www.liv.mt.gov .

If a livestock producer suspects a wolf-related livestock injury or death, USDA WS should be contacted to request an investigation. If the loss is related to wolves, USDA WS will mail a copy of the WS investigation report and a claim form for the MLLRMP to the livestock owner. The livestock owner should complete the claim form and mail it (along with the copy of the USDA WS investigation report) to the Coordinator. The Coordinator will determine the market value of the loss based on USDA market reports from Billings each week. Claims for unique or higher value livestock should be accompanied by documentation of value. Claims are typically submitted about one month after the WS investigation is completed. If forms are complete and no unusual circumstances present themselves, claims are processed and payment is made within 2-3 weeks.

PACK SUMMARIES

Northwest Montana Endangered Area

Overview

In 2008, we documented a minimum estimate of 256 wolves in 45 packs in the Montana portion of the NWMT recovery area. This is an increase from 213 wolves in 36 packs at the end of the year in 2007. There were 12 newly identified packs in 2008. Some of these packs are believed to be first year packs, and some are likely to have existed the previous year. There are 2 Montana/Idaho transboundary packs that either denned or spent the majority of their time in

Montana this year and therefore are counted as a Montana pack in 2008. Last year they were counted as Idaho packs for the same reason. There is 1 pack that the inverse is true where unlike last year they either denned or spent the majority of their time in Idaho this year and therefore are counted as an Idaho pack. Two packs have been removed from the population as a consequence of chronic livestock depredation. One pack is not counted in 2008 solely because there is no information to indicate that it exists.

Forty radio collared wolves in 27 packs, or 60% of the 45 total packs, were monitored in northwest Montana during at least some portion of 2008. This is down from 80% of 36 total packs in 2007. One additional radio collared pack, Kootenai North (west of Koocanusa Reservoir) was also monitored, but appeared to spend most, or all, of it's time in Canada. Radio collared wolves were located from aircraft approximately 1–2 times per month. Radio collared wolves in and around Glacier National Park (GNP) were located more frequently from the ground by GNP staff and personnel from an Oregon State University research project. Twenty-nine collared wolves from 24 packs (53% of the 45 total packs and dispersers) were monitored by the end of the year. An additional 4 radio collared wolves that had dispersed were monitored through the end of the year.

MFWP traplines were set in 15 pack territories, and 16 wolves were captured in 2008. Fifteen were radio collared and 1 was too small to collar. USDA Wildlife Services trapped in 5 additional areas and collared 4 wolves. Two of these areas were trapped with the cooperation of both the Blackfeet Tribe and the Confederated Salish and Kootenai Tribes on their respective reservations. About 6 packs in NWMT have territories all or partially within 2 Tribal Reservations: Blackfeet and Flathead.

MFWP surveyed a total of 28 areas for wolf presence and pack status. Eight of those areas resulted in the verification of new packs. Wolf activity was verified in 1 other area, but it was unclear whether it is a discrete pack or an area used by an adjacent pack. Fifteen of those surveys were conducted to determine pack status in areas of known packs that do not have functioning radio collars. There were 3 areas where definitive wolf sign could not be determined and will be scheduled for survey again in 2009. Three more new packs were verified by, one each, the Blackfoot Tribe, the Confederated Salish and Kootenai Tribes, and USDA Wildlife Services.

Packs included in the Montana portion of the NWMT recovery area as of December 2008 were: Arrastra Creek, Ashley, Bearfite, Belmont, Benchmark, Bennie, Bitterroot Range, Blue Mountain, Camas Prairie, Candy Mountain, Cilly, Corona, DeBorgia, Dutch, Elevation Mountain, Fishtrap, Firefighter, Flathead Alps, Great Bear, Heart Butte, Kintla, Kootenai South, Ksanka, Lazy Creek, Livermore, Lydia, Marias, McKay, Mineral Mountain, Mitchell Mountain, Monitor Mountain, Murphy Lake, Ninemile, Nyack, Piper, Pulpit Mountain, Red Shale, Salish, Satire, Selow, Solomon Mountain, Spotted Bear, Superior, Tallulah, Twilight, and Wolf Prairie (Table 1a). Names of several packs have been changed to better characterize geographic home place. Meadow Peak is now Satire. Squeezer is now Piper. Thompson Peak is now Corona. Whitefish is now Dutch.

Along the Montana/Idaho transboundary area within the NWMT Recovery area, the Calder Mountain and Silver Lake are believed to den and spend most of their time in Idaho and therefore are counted towards the Idaho wolf population. Along the transboundary area between the NWMT and CID recovery areas, the Fish Creek pack dens and spends most of it's time in Idaho and are therefore counted towards the Idaho population. Along the US/Canada Border, the Kootenai North and Spruce Creek packs spend most or all of their time in Canada and are not counted towards the NWMT population.

We were able to confirm reproduction in 23 of the 45 packs (Table 1a). Seventeen of those packs known to have reproduced met the criterion as breeding pairs. Breeding pair status could not be documented in some packs either because they were uncollared and therefore more difficult to obtain data, or we were unable to confirm a minimum pup survivorship of 2 at the end of the year.

Seventy-three wolf mortalities were documented in the Montana portion of the NWMT recovery area population in 2008. All but 7 were attributed to some form of human cause including 49 lethally removed in control actions, 7 illegally killed, 6 vehicle collisions, 3 train collisions, and 1 was reported killed in self defense. Seven other wolves died of unknown causes.

A total of 5 radio-collared wolves were missing by the end of the year. Missing collars are due to long-range dispersal, collar failure, or other unknown fate.

Five dispersals were recorded (see "Miscellaneous / Lone" and Verified Packs sections). NW243 F dispersed from the Ashley pack, and was found dead 175 miles SE of the Ashley pack and 16 miles SE of Grangeville, ID. NW351F dispersed from the Cilly pack, and she and another wolf are occupying an area 40 miles to the south between Beaver Creek and Seeley Lake. NW368M dispersed from the Lazy Creek pack, and was occupying an area 47 miles to the south in portions of the old Hog Heaven (see Hog Heaven) territory at the end of the year. NW346M dispersed from the Piper pack (formerly Squeezer), and he and 2 other wolves are occupying an area 50 miles to the southeast near Ovando. NW111F dispersed from the Spotted Bear pack, and she and another wolf are occupying an area 16 miles west of the Spotted Bear homerange and east of Swan Lake. NW367F began extraterritorial movements from the Red Shale pack in the fall. Her movements included movements from the North Fork Sun River, to the Swan Valley, back to the North Fork Sun, to an area near Seeley Lake, back to the North Fork Sun and out of the Bob Marshall Wilderness to the Eastern Front.

In NWMT, the number of confirmed livestock and dogs killed was up from 2007. Increased depredations were a result of the increased number of wolf packs residing in livestock areas. While the number of confirmed packs in 2008 increased 30%, the number of packs involved in livestock depredations increased 133%. The number of packs involved in livestock depredations more than doubled in 2008, from 6 in 2007 to 14 in 2008. A second year decline in the whitetail deer population is also believed to be a possible contributing factor.

We documented 49 confirmed livestock and dog kills. There were 36 cattle, 2 dogs, 3 goats, 2 horses, and 5 llamas. An additional 2 calves were ranked as probable kills, 6 calves were confirmed injured, 1 llama probable killed, and 1 horse was confirmed injured and euthanized

due to its injuries. Consequently the number of wolves lethally controlled increased from 19 in 2007 to 49 in 2008.

The 2008 number is skewed high due to the large size of the Hog Heaven pack that was removed after chronic livestock conflict problems. Twenty-seven wolves were removed from the Hog Heaven pack, which included 2 breeding females and 15 pups. This is the largest recorded pack in the history of NWMT, and it is only the third time that a double liter has been documented in the recovery area in 23 years. Fourteen – fifteen (we were unsure which pack was involved in 1 confirmed killed calf) of 47 packs were involved in confirmed killed or injured livestock, and a total of 49 were lethally removed as a result. Two packs were removed during the year (Hewolf and Hog Heaven). These figures only account for verified losses. It is unavoidably impossible to account for the proportion of unverified losses due to wolves. Unverified losses are losses where the cause of dead or missing livestock is not known. Turbo Fladry (electrified fladry) was used as a preventative measure in the Lydia pack territory. Regular fladry was used as a preventative measure in 3 different instances across 3different packs. Fladry was used on a small ranch in the Satire pack territory.

Verified Packs (Table 1a in Appendix 3)

Arrastra Creek

- at least 5 wolves; not a breeding pair
- no depredations reported

History: New pack in 2008. Its home range is at the east end of the Blackfoot River Valley.

2008 Activities: During 2008 there were several reports of wolf activity in the Arrastra Creek and Marcum Mountain areas of the Blackfoot Valley. This pack was confirmed during a tracking survey in January 2009 and is believed to consist of at least 5 wolves.

Ashley

- ? wolves; not a breeding pair
- no depredations reported

History: Discovered in 2006. Its home range is NW of Kalispell.

2008 Activities: NW243F was missing in the beginning of the year. She was found dead 175 miles SE of the Ashley pack and 16 miles SE of Grangeville, ID in November. It is not known if she had joined that local Idaho pack. The cause of death is under investigation. Because of increased workloads, we were not able to conduct more than a few days of field work in this area. Reports of wolves continue in this area, but numbers and reproduction remain unknown at the end of the year. This pack has not been collared since 2007.

Bearfite

- 5 wolves; breeding pair
- no depredations reported

History: New pack in 2008. Its home range is in the Turner Mountain area north of Libby.

2008 Activities: This pack was actually discovered in 2007 but was very close to the Pulpit pack which, and assumed to be the Pulpit pack. Neither pack was collared. In 2008 field reconnaissance results indicated that they are two discrete packs. A 2 year old wolf was captured and collared on 9/15. This pack has 1 radio collar.

Belmont

- at least 10 wolves; breeding pair
- no depredations reported

History: New pack in 2008. Its territory is southwest of Seeley Lake.

2008 Activities: During 2008 there were numerous reports of wolf activity in the Belmont Creek, Blanchard Creek, and Placid Lake areas. This pack was confirmed during a tracking survey in January 2009 and is believed to consist of at least 10 wolves.

Benchmark

- 7 wolves; not a breeding pair
- no depredations reported

History: New Pack in 2008, though likely present in 2007. This pack occupies a territory west of Augusta.

2008 Activities: Hunters and ranchers reported seeing wolves in the Benchmark and Fairview Plateau areas during the summer and fall 2008. Forest Service personnel reported seeing tracks near Renshaw Mountain. Wolves have also been seen on the Sun River Game Management Area. Forest Service personnel and MFWP biologist verified wolf presence and numbers in the fall. This pack was uncollared at the end of 2008.

Bennie

- 4 wolves; breeding pair
- no depredations reported

History: New Pack in 2008, lone wolf in 2007. Its territory is west of Choteau near the Blackleaf Wildlife Management Area

2008 Activities: At the end of 2007, wolf NW191 dispersed from the Elevation Mountain pack and was located near the Blackleaf WMA. Denning activity and pups were documented during the denning season in 2008. It has one collar.

Bitterroot Range

- at least 4 wolves; not a breeding pair
- no depredations reported

History: First documented in 2007. Its territory is in the North Fork of Fish Creek west of Missoula.

2008 Activities: In early 2008 there were believed to be at least 5 wolves in the Bitterroot Range pack. A Forest Service crew reported hearing howling and seeing tracks up the North

Fork of Fish Creek during the summer and in early August they found a dead wolf pup. MFWP personnel retrieved the pup but cause of death was unknown. This pack was difficult to obtain an accurate count on during the summer because they seemed to spend most of their time in the backcountry in heavily timbered areas. In the winter four wolves were documented using the Quartz Creek and Meadow Creek areas and these are believed to be the same pack because of close proximity to the North Fork drainage.

Blue Mountain

- at least 3 wolves; not a breeding pair
- no depredations reported

History: First documented in 2007. Its territory is southwest of Missoula.

2008 Activities: In early 2008 four wolves were believed to be in the Blue Mountain pack. There were few public reports of wolves during the summer and fall and little sign was turned up during MFWP scouting efforts. Thus no trapping attempts were initiated in 2008. In the winter MFWP confirmed at least 3 wolves using the Albert Creek area in December.

Camas Prairie

- 4 wolves; not a breeding pair
- 3 calves confirmed killed, 1 calf confirmed injured, 1 horse confirmed killed, 1 horse confirmed injured and euthanized, 1 horse confirmed injured

History: First documented in 2007. Its territory is between Perma and Hot Springs on the Flathead Indian Reservation.

2008 Activities: The Confederated Salish and Kootenai Tribe documented 4 wolves in this pack. Reproduction is unknown. Efforts by WS to locate to capture and collar a wolf were unsuccessful by the end of the year. This pack was not collared in 2008.

Candy Mountain

- 8 wolves; breeding pair
- no depredations reported

History: The Candy Mountain pack was first discovered as a new pair and an adult female (351) was radio collared in 2003. The Candy Mountain territory is in the Yaak River drainage.

2008 Activities: This pack was not collared in the beginning of the year. On 9/2 a 3 year old female was captured and fitted with a gps ARGOS collar for patch occupancy modeling research in cooperation with the University of Montana (see research section). Reproduction was confirmed and this pack denned in a new location this year. There is 1 collar in this pack at the end of the year.

Cilly

- 10 wolves; breeding pair
- no depredations reported

History: New in 2008. Its territory is in the southeastern portion of the Swan Valley.

2008 Activities: Last year it was believed that our cluster of reports indicated one pack, the Piper pack (formerly Squeezer pack) existed in the Swan Valley. After 2 wolves from the Piper pack were radio collared in 2007, location data indicated that there may be an additional pack in the valley. The Cilly pack was verified in June of 2008 and a 2 year old female wolf from the Cilly pack was captured and collared. We could only obtain 1 radio location before she dispersed. She, and another wolf, are now occupying an area between Beaver Creek and Seeley Lake. This is a dispersal distance of about 40 miles. A dead wolf was discovered in the Cilly pack's territory in November and is under investigation. The Cilly pack is no longer collared.

Corona (formerly Thompson Peak)

- 14 wolves; breeding pair
- no depredations reported

History: This pack was first documented in 2006. Its territory is north of Plains.

2008 Activities: Two wolves were found dead in this pack early in the year. One was hit by a car. One is under investigation. In October we surveyed areas adjacent to the Corona pack to determine if reports of wolves in these areas were of the Corona pack or a new pack. We determined through radio telemetry that these adjacent areas were indeed occupied by the Corona pack. Since we only locate collars approximately once per month, it generally takes 2 years of data to develop an adequate sample size to estimate the home range of packs. This pack has only been collared for one year. This pack has one radio collar at the end of the year.

DeBorgia

- at least 4 wolves; not a breeding pair
- no depredations reported

History: First suspected in 2005 and confirmed in 2006. Its territory is south of the town of DeBorgia in the lower Clark Fork.

2008 Activities: In early 2008, four wolves were believed to be in the DeBorgia Pack. Collared alpha female NW85F continued to be monitored during 2008. She localized in Montana during April and was believed to have denned. In June, four pups were seen during a monitoring flight. However at the end of 2008 only 4 wolves were documented in this pack, at least one of which was believed to be a pup. The fate of the other pups is unknown. DeBorgia is a Montana/Idaho border pack but is counted as a Montana pack for 2008 because they denned in Montana and all 2008 aerial telemetry locations were in Montana.

Dutch (formerly Whitefish)

- 20 wolves; breeding pair
- no depredations reported

History: The Whitefish pack was first documented in 1996 and formerly occupied a territory north of Whitefish Lake. In 2001, the Whitefish pack crossed the Whitefish Range to the

east and established a new territory in the North Fork Flathead River drainage, displacing the former South Camas pack. The Whitefish pack's home range is in the North Fork Flathead River drainage, and it spends most of its time within GNP.

2008 Activities: On 5/13, a breeding female was captured and fitted with a gps collar for a trophic cascades research project in cooperation with Oregon State University and GNP (see research section). Unfortunately this collar, which was programmed to shed the collar in two years, malfunctioned and shed the collar the next month. On 11/3, 2 additional wolves were captured. One was fitted with the refurbished gps collar for research, and the other was fit with a traditional vhf collar. Twenty wolves is the 2nd largest pack ever recorded in Northwest Montana (Hog Heaven, 27 wolves this year, is the largest recorded ever). This pack has 3 collars.

Elevation Mountain

- 3 wolves; not a breeding pair
- 3 calves confirmed killed, 1 calf probable; 4 wolves removed by WS

History: First documented in 2006. Its territory is in the Garnett Mountains.

2008 Activities: In early 2008, six wolves were believed to be in the Elevation Mountain pack. In April two calves were confirmed killed and 1 calf was probable. In May, a third calf was confirmed killed. WS collared one wolf (yearling female) and killed four in response. No pups were ever documented. MFWP and the Blackfoot Challenge initiated a pilot range rider program in the Helmville area in August and September to help reduce conflicts. The project is planned to expand in 2009. The collared female was monitored for the remainder of 2008 and was regularly seen with 2 other adult wolves.

Fishtrap

- 8 wolves; not a breeding pair
- 1 calf confirmed killed

History: First documented in 2000. Its territory is in and around the Thompson River, McGuiness Creek, and Fishtrap Creek drainages.

2008 Activities: On 8/12, wolf 266 was found dead of unknown causes. She had been the breeding female and reproduction in the Fishtrap pack is unknown in 2008. There are 2 collars in this pack.

Firefighter

- ? wolves; not a breeding pair
- no depredations reported

History: First documented in 2008. Its home range is on the east side of Hungry Horse Reservoir.

2008 Activities: Because of increased workloads, we were not able to conduct more than a few days of field work in this area. Reports of wolves continue in this area, but numbers and reproduction remain unknown at the end of the year. This pack is not collared.

Flathead Alps

- 5 wolves; not a breeding pair
- no depredations reported

History: Discovered in 2006. The home range is located in the Bob Marshall Wilderness Area in the White and South Fork Flathead River drainages.

2008 Activities: A minimum of 5 wolves was documented this spring. Wolves occupied the den area during that time and reproduction is suspected, but pup survival at the end of the year is unknown. This pack is not collared.

Great Bear

- ? wolves; not breeding pair
- no depredations reported

History: The Great Bear pack was first discovered as a new pair in 2003 after wolf 271 dispersed from the Spotted Bear pack and paired with another wolf of unknown origin. This pack's territory is along the Middle Fork of the Flathead River and tributaries within the Great Bear Wilderness. The radio collar is suspected to have failed in March 2004.

2008 Activities: Wolf presence is verified in this area, but levels of reported activity seemed to be down in the traditional denning area compared to 2007. The number of wolves or reproductive status in this pack is unknown. This pack is not collared.

Hewolf Mountain

- 0 wolves; not a breeding pair
- 1 cow confirmed killed

History: First suspected in 2005 and confirmed in 2006. Its territory was near Dixon on the Flathead Indian Reservation.

2008 Activities: Efforts to remove the remainder of this pack that were initiated late in 2007 continued into 2008. In January, WS removed a female pup. In February, WS removed another female pup. In March a male pup was removed. WS removed the last known collared animal from the helicopter.

Hog Heaven

- 0 wolves, not a breeding pair
- 5 calves confirmed killed, 1 adult bull confirmed killed, 4 llamas confirmed killed, 1 llama probable killed; 27 wolves (entire pack) killed by WS

History: The Hog Heaven pack was first documented as a new pair in 2001, after wolves 278 and 286 from the Parsnip group (a group of wolves translocated in 2001 from the Boulder Creek pack as a management response to cattle depredations), traveled separately to the Hog Heaven/Browns Meadow area west of Kalispell and paired.

2008 Activities: This pack was lethally removed in 2008 after chronic livestock depredations that began in 2007. This year the pack began killing in llamas in July and August.

Confirmed cattle calves killed by wolves began to turn up in regular intervals from September through November. Discovering and confirming livestock losses is exceedingly difficult in large forested mountain areas and the aggregate of these kills were over a 23 linear mile area across the furthest extents of the pack's territory. Landownership across this area is complex including private, corporate timber company, tribal lands, Forest Service, across both tribal reservation and non-reservation. In November it was decided to remove the entire pack after 8 depredation (some included multiple kills) incidents. During those removal efforts, it was learned that the Hog Heaven pack was an uncharacteristically large pack that included 2 breeding females that produced a total of 15 pups. The pack consisted of a total of 27 wolves (including pups) in 2008, and all 27 wolves were removed. It is theorized that the large pack size, the large number of pups, and a region wide second year decline in the whitetail deer population, were all contributing factors in the accelerated depredations. It was projected that the future compatibility of both this pack and livestock on the landscape would be difficult given those combined factors, and apparent prey switching (livestock). Because the wolf population in Northwest Montana is now strong and dispersal of individual wolves occurs on a regular basis, it is expected that this area will be reoccupied rapidly. By the end of the year, sign of two wolves was already reported in this area. We also knew that a dispersing wolf from the Lazy Creek pack spent a considerable period in this area before moving on (see Lazy Creek pack description).

Kintla

- 9 wolves; breeding pair
- no depredations reported

History: The Kintla pack was first documented as a pack in 2000 in the old North Camas territory. The North Camas pack had previously existed from 1990 to 1996 and then fell apart as the neighboring South Camas pack grew to 18 animals in 1997. From 1997 to 1999, South Camas appeared to be the only pack in the area until 2000, when the Kintla pack established itself in the old North Camas territory (see Dutch pack summary for additional information). The Kintla pack's home range is in the North Fork Flathead River drainage, and spends most of its time within GNP.

2008 Activities: On 5/18, a female wolf was captured and fitted with a gps collar for a trophic cascades research project in cooperation with Oregon State University and GNP (see research section). Wolf 255's collar ceased to function in July after 7 years of operation. A collared wolf, assumed to be her, was observed with the newly collared female. There is one radio collar in this pack.

Kootenai South

- 4 wolves; breeding pair
- no depredations reported

History: Since 2005 the former Kootenai pack now consists of the Kootenai North and Kootenai South packs through either the mechanisms of dispersal or pack splitting. The Kootenai South pack occupies a territory mainly south of the U.S./Canadian border and west of Koocanusa Reservoir, while the Kootenai North pack (collared wolf 329) occupies a territory mainly north of the border and west of Koocanusa Reservoir.

2008 Activities: Forest Service personnel discovered a new den location for this pack in 2008. Because of increased workloads, we were not able to conduct more than a few days of field work in this area. This pack is not collared.

Ksanka

- 4 wolves; not breeding pair
- no depredations reported

History: Ksanka was first documented in 2006 with the discovery of dispersing wolf 263 from the Kintla pack. This pack is east and southeast of Eureka.

2008 Activities: We conducted a few days of field work in this area. The Ksanka pack was localized at their traditional den, but reproduction and pup survival could not be verified. A dead wolf was found in the pack's territory. Cause of death is not known. Wolf 263's collar was found in 2008 and is therefore assumed dead. Wolf 263 has been missing since 12/6/06. There was a report of this pack chasing cattle in August. This pack is not collared.

Lazy Creek

- 6 wolves; not a breeding pair
- 1 llama confirmed killed

History: The Lazy Creek pack was first discovered as a newly formed pair in 2001. This pack filled the vacant territory left by the Whitefish pack when it crossed the Whitefish range to the east and displaced the South Camas pack in 2001. Its territory is north of Whitefish Lake.

2008 Activities: In May, an individual shot a wolf claiming self defense. The wolf did not exhibit aggressive behavior, but approached a bear hunter closer than he was comfortable. FWO law enforcement investigated the incident. A male wolf, NW365M, was captured and fitted with a gps ARGOS collar for patch occupancy modeling research in cooperation with the University of Montana (see research section). During this trapping operation a pup was also captured and released. NW365M had dispersed from the pack this fall. By the end of the year he was within the old Hog Heaven (see Hog Heaven) territory. This is a dispersal of 47 miles. We could only document a single pup in this pack. This pack has 1 radio collar.

Livermore

- 5 wolves; not a breeding pair
- 3 confirmed calves killed

History: Livermore was first documented in 2005 and its home range is within the Blackfeet Reservation.

2008 Activities: The radio collared wolf in this pack was missing during 2008. This pack does not have a radio collar.

Lydia

- 6 wolves; breeding pair
- no depredations reported

History: This pack was first documented in 2006. Its territory is south of Eureka.

2008 Activities: We documented a minimum of 3 adults and 3 pups during the denning season. The Lydia pack had depredated on the adjacent Forest Service grazing allotment in the summer of 2007. The producer calves in March on private land adjacent to those areas and within the Lydia pack territory. MFWP deployed turbo fladry on that ranch as a preventative measure. No losses to calves were observed. Because of increased workloads, we were not able to conduct more than a few days of field work in this area. This pack is no longer collared.

Marias

- ? wolves; not a breeding pair
- no depredations reported

History: This pack was first documented in 2005 and occupies an area around the Marias Pass area.

2008 Activities: Because of increased workloads, we were not able to conduct more than a few days of field work in this area. Reports of wolves continue in this area, but numbers and reproduction remain unknown at the end of the year. This pack has never been collared.

McKay

- 3 wolves; not a breeding pair
- no depredations reported

History: New in 2008. This pack occupies an area east of Noxon.

2008 Activities: There have been reports in this area over the last several years that have been ephemeral in nature. A minimum of 3 wolves were verified this year. This pack does not have a collar.

Mineral Mountain

- 9 wolves; breeding pair
- no depredations reported

History: First documented in 2007. Its territory is northwest of St. Regis in the lower Clark Fork.

2008 Activities: In early 2008 there were believed to be six wolves in the Mineral Mountain pack. Both collared wolves NW233F and 326F were alive and with the pack at the end of 2008. However, NW233F was missing from April through September but then was found with the pack again in October. In June three black pups were documented during a monitoring flight. At the end of the year, nine wolves including the three pups were believed to be in the pack.

Mitchell Mountain

- 4 wolves; not a breeding pair

- 2 confirmed guard dogs killed, 1 confirmed guard dog injured, 3 confirmed goats killed, 1 confirmed goat injured; 1 wolf killed by WS

History: New Pack in 2008. Its territory is northwest of Helena.

Activities: This pack was uncollared at the start of the year. In early 2008 it was thought that two wolves had possibly denned. In June, WS confirmed that wolves killed a guard dog. WS attempted to collar and release a wolf in the area, but was unsuccessful. In October, 2 goats were confirmed killed, 1 goat was confirmed injured, 1 guard dog was confirmed injured, and 1 guard dog was confirmed killed. WS removed the alpha female and collared a pup in late October. Hunters continued to verify wolf activity throughout the fall.

Monitor Mountain

- 3 wolves; not a breeding pair
- 5 confirmed calves killed, 1 heifer probable killed; 3 wolves killed by WS

History: This pack was first documented in 2007. Its home range is northeast of Lincoln on the East Front and the Scapegoat Wilderness.

2008 Activities: At the end of 2007, this pack consisted of 1 adult and 3 pups. In early 2008 MFWP documented denning activity and verified a single wolf pup. On November 11 WS confirmed that wolves killed 3 calves on private land. Three calves were reported as injured but could not be located for investigation by WS. WS killed 2 adult wolves and 1 wolf pup in response to the November depredations. At the end of 2008 one collar was in the pack.

Murphy Lake

- 4 wolves; not a breeding pair
- 6 calves confirmed killed, 3 calves confirmed injured; 3 wolves killed by WS.

History: The Murphy Lake pack was first documented 16 years ago in 1991. This pack had confirmed depredations in only 2 of the last 16 years. Its territory is between Whitefish and Eureka.

2008 Activities: Two wolves were captured and collared in 2008. A male wolf was captured and fitted with a traditional vhf collar. He was missing at the end of the year. A female was captured and fitted with a gps ARGOS collar for patch occupancy modeling research in cooperation with the University of Montana (see research section). She was shot illegally shot with a bow and arrow during the archery season. The shooter was discovered, confessed to the crime, and was fined. After not depredating on livestock for 10 years, the pack began habitually depredating in 2008. Three wolves, including the alpha female were consequently lethally removed from the pack during incremental control. A region wide second year decline in the whitetail deer population may have been a contributing factor in the pack's apparent switch to livestock. The last time, and only time, the Murphy Lake pack was involved in depredations was after a drop in the whitetail deer population caused by the winter of 1996-1997. There are no radio collars in the pack at the end of the year.

Ninemile

- 5 wolves; breeding pair
- no depredations reported

History: The Ninemile pack has inhabited the Ninemile drainage, northwest of Missoula, since 1990.

2008 Activities: In early 2008 at least six wolves were believed to be in the Ninemile pack: 4 adults, and at least 2 pups. No radio-collars were present in this pack early in the year. In August, MFWP collared a gray male pup and was able to begin monitoring the pack again. The pack was believed to consist of at least 3 adults and 2 pups at the end of 2008.

Nyack

- 2 wolves; not a breeding pair
- no depredations reported

History: This pack was first documented after discovering a dispersing collared wolf from the Halfway pack in 2006. Its territory is along the Middle Fork Flathead River and the southern boundary of GNP and spends most of its time in GNP.

2008 Activities: This pack appeared to be localized during the denning season and therefore reproduction was suspected. In August, radio collared wolf 505 was hit and killed by a train. Examination of the carcass showed that she had reproduced in 2008. This pack does not meet breeding pair criteria due to both the loss of the breeding female and the unknown status of pups at the end of the year. This pack is no longer radio collared.

Piper (formerly Squeezer)

- 12 wolves; breeding pair
- no depredations reported

History: This pack was first documented in 2006. Its territory is in the Swan Valley.

2008 Activities: The collared breeding female has been missing since the end of May. She was missing at a time when pups should have been dependent upon her. It was not known then if she had reproduced or if pups would survive. In June, 8 pups were documented. Her status remains unknown, but collar failure is believed possible. One of the pups was hit and killed by a vehicle on a forest road during the summer. An adult male wolf was captured and fitted with a gps ARGOS collar for patch occupancy modeling research in cooperation with the University of Montana (see research section). He has since dispersed to an area near Ovando and is traveling with two other wolves (see NW346M under Lone, Miscellaneous). This is a dispersal of about 50 miles. There is a minimum of 12 wolves verified in this pack at the end of the year and there are reports of 16-18. There is 1 radio collar in this pack.

Pulpit Mountain

- 3 wolves; not a breeding pair
- no depredations reported

History: This pack was first documented in 2006. Its territory is east of Troy and northwest of Libby.

2008 Activity: Trapping operations to capture and collar were unsuccessful. This pack remains uncollared.

Red Shale

- 4 wolves; not a breeding pair
- no depredations reported

History: The Red Shale pack (historically referred to as Gates Park or Sun River) was first documented as a pair in 2000 and was believed to have had continuous tenure in the North Fork of the Sun River (east side of the Bob Marshall wilderness) ever since. This pack was radio collared in 2002, but has not had a functioning collar since March 2004.

2008 Activities: At the end of 2007 there was no radio collar and 7 wolves were documented. In August 2008, MFWP captured a yearling female, NW367F, in the North Fork of the Sun River in the Bob Marshall Wilderness and fitted her with a GPS collar. She began extraterritorial movements from the Red Shale pack in the fall. Her movements included movements from the North Fork Sun River, to the Swan Valley, back to the North Fork Sun, to an area near Seeley Lake, back to the North Fork Sun and out of the Bob Marshall Wilderness to the Eastern Front. The collar from a wolf previously collared from the Red Shale pack was found chewed off in the Danaher area (headwaters of the South Fork of the Flathead River on the west side of the Bob Marshall Wilderness) this summer. Backcountry travelers continued submitting reports of wolf sightings and sign throughout the summer into the fall.

Salish

- 9 wolves; breeding pair
- 1 calf confirmed killed, 1 calf confirmed injured; 1 wolf lethally removed

History: New in 2007. Its territory is in the Salish Mountains west of Flathead Lake.

2008 Activities: This pack began depredating in 2007. This year a confirmed calf was killed and another injured by wolves. Two wolves were lethally removed as a result. These occurrences took place along the northern boundary of the Flathead Indian Reservation. There is 1 collar in this pack.

Satire (formerly Meadow Peak)

- 3 wolves; not a breeding pair
- 1 calf confirmed killed

History: This pack was first documented in 2006. Its territory is in the Fisher River drainage southeast of Libby.

2008 Activity: This trio has not reproduced pups in the last 2 years and has held at 3 wolves during that time. One calf was confirmed killed. Ranch owners deployed and maintained fladry on a small ranch within the pack territory as a preventative measure for the second

year. The owners document regular wolf presence at or near the ranch, but have not had any problems to date. This pack has one collar.

Selow

- 4 wolves; not a breeding pair
- no depredations reported

History: New in 2008. This pack occupies an area similar to the now defunct Hewolf pack near Dixon on the Flathead Reservation.

2008 Activities: Reports of 4 wolves in this area began coming in this summer and tracks confirm that 4 wolves are using this territory. Efforts to place a collar in this pack are ongoing.

Solomon Mountain

- 4 wolves; not a breeding pair
- no depredations reported

History: This pack was documented in 2007 after radio collared Idaho wolf B296 dispersed from the Boundary pack (Idaho panhandle) into this area. Its territory is in Montana and Idaho between the Moyie and Yaak Rivers.

2008 Activities: Since this pack was believed to have denned or otherwise spent most of its time in Idaho in 2007, they counted towards the Idaho population. This year the pack spent most of it's time in Montana and will count towards the Montana population. This pack is regularly monitored by both IDFG and USFWS bear biologists during radio collared bear flights. At the end of the year in 2007, it was incorrectly believed that the collared animal had shed it's collar. In 2008 it was observed that the wolf was still wearing the collar and was alive. There was no indication of localization during the denning season and therefore no evidence of reproduction observed. There is one radio collar in this pack.

Spotted Bear

- 5 wolves; not a breeding pair
- no depredations reported

History: A Murphy Lake female wolf dispersed to the Bitterroot Valley and mated with a male wolf of unknown origin forming the Bass Creek pack in 1998. The Bass Creek pack was involved in cattle depredations in June 1999. The entire pack (2 adults and 8 pups) was removed from the wild and held at a facility in McCall, Idaho. The alpha male died in a handling accident while in captivity. Three pups died of canine parvovirus in captivity. The alpha female and surviving pups were translocated to a holding pen in the Spotted Bear area in December 1999. The pen was intended to hold the pack for several days to allow acclimation to the new area, and prevent the pack from splitting and dispersing from the area. The first night in the pen, male wolf 117 from the Pleasant Valley Pack, translocated to the same area almost a year previous, was hanging around the pen. The Bass Creek pack was released the next day and joined with the former Pleasant Valley male wolf. The new group established a territory in the South Fork of the Flathead and became the Spotted Bear pack.

2008 Activities: The pack appeared to be localized at a new den during the denning season and reproduction was suspected. However, reproduction could not be verified by the end of the year. It is unknown whether or not pups were produced or survived through 2008. Female wolf NW111F dispersed in the summer to an area west of the Spotted Bear home range and east of Swan Lake. She has been seen with another wolf. This is a dispersal of 16 miles. There is 1 radio collar in this pack.

Superior

- 7 wolves; breeding pair
- 1 yearling heifer killed; 1 wolf killed by WS

History: First documented in 2005. Its territory is south of the town of Superior, in the lower Clark Fork.

2008 Activities: In early 2008, eight wolves (4 adults, 4 pups) were believed to be in the Superior pack. In April a gray male yearling was hit and killed by a train. In July five black pups were documented during a flight, confirming reproduction. A yearling heifer was killed in July and one wolf, a yearling gray female, was removed at that time. MFWP initiated a trapping effort in August and caught and put a GPS collar on a breeding female as part of a University of Montana study (see research section). Adult male NW224M, who was collared in 2007, remained with the pack and was monitored for the duration of 2008. In October a landowner reported that one of their dogs was killed on their property but the incident was not investigated. The landowner has had consistent wolf activity on the property in the past and had lost another dog several years ago. Fladry was used around 2 different yards in the Superior area in 2008 to try to reduce conflicts with dogs. In late October one of the black pups was hit by a car and killed on the Dry Creek road. This pack is a Montana/Idaho border pack but is counted as a Montana pack for 2008 because they denned in Montana and the majority of 2008 aerial locations were in Montana. Seven wolves (3 adults, 4 pups) were seen together at the end of 2008.

Tallulah

- 6 wolves; breeding pair
- 1 calf confirmed killed, 1 cow confirmed injured, 2 calves confirmed injured, 2 calves probable killed; 2 wolves killed by WS.

History: New in 2008. This pack occupies an area north of HWY 2 and around Lost Prairie and Pleasant Valley, west of Kalispell.

2008 Activities: This pack was discovered after depredations in the Lost Prairie area and was suspected to be a new pack. Subsequent radio telemetry verified that it would be a newly documented pack and the presence of yearlings indicated that this pack existed since at least 2007. The breeding female was captured and radio collared in response to the depredations and 2 other wolves were lethally removed. There is one collar in this pack at the end of the year.

Twilight

- 8 wolves; breeding pair
- no depredations reported

History: New in 2008. This pack is a transboundary pack with Idaho and occupies an area south of Troy.

2008 Activities: This pack was suspected in 2007, but it could not be determined if it was discrete from the Calder Mountain pack to the north. In 2008, it was determined from field reconnaissance and information sharing with IDFG and this pack is likely separate from Calder Mountain. In the spring, a bear hunter reported observing 5 pups. Trapping operations were unsuccessful this year. This pack has never been collared.

Wolf Prairie

- ? wolves; not a breeding pair
- unknown depredations

History: The Wolf Prairie pack was first documented in 2004, after receiving livestock depredation complaints. Its territory is northwest of Pleasant Valley west of Kalispell.

2008 Activities: Wolf NW114M was missing in the beginning of 2008. Reports of wolves continue in this area, but numbers and reproduction remain unknown at the end of the year. There was a confirmed calf killed in an area that could not be determined if it was the Wolf Prairie pack or adjacent Tellulah pack. This pack is not collared.

Verified Border Packs Counting in the Idaho Population Estimate (Table 3 in Appendix 3)

Fish Creek

- 16 wolves; breeding pair
- no depredations reported

History: The Fish Creek pack was first documented in 2001 and is believed to have had a continuous tenure in the Fish Creek area west of Missoula since then.

2008 Activities: The Fish Creek pack has increasingly shifted its territory into Idaho but still uses parts of the Fish Creek drainage in Montana. Two radio-collared wolves, B235F and B236M continued to be monitored in 2008. However B236M turned up on mortality during the fall and B235F seemed to be traveling alone in the South Fork of Fish Creek at the end of the year. The Fish Creek pack denned in Idaho and therefore counts in Idaho estimates for 2008. There were 16 wolves in this pack, including B235F, at the end of the year.

Mullan

- 3 wolves; not a breeding pair
- no depredations reported

History: New pack in 2008.

2008 Activities: The Mullan pack is thought to have denned in Idaho and therefore counts in Idaho estimates for 2008. Estimated size of this pack is at least 3 wolves and reproductive status is unknown. This pack inhabits the ID/MT border north of I-90 around the Lookout Pass area.

Silver Lake

- 3 wolves; not a breeding pair
- no depredations reported

History: First documented in 2007.

2008 Activities: The Silver Lake pack is thought to have denned in Idaho and therefore counts in Idaho estimates for 2008. Estimated size of this pack is at least 3 wolves and reproductive status is unknown. This pack inhabits the ID/MT border south of I-90 and Saltese.

Verified Border Packs in Canada that Do Not Count in the Montana Population Estimate

Kootenai North

- ? wolves
- no depredations reported on the U.S. side of the border

History: Kootenai North was formed from the former Kootenai pack and is a product of either splitting (into Kootenai North and Kootenai South) or is a product of dispersal. The former Kootenai pack was a transboundary pack that has denned both in Canada and the US. The Kootenai North pack occupies a territory mainly north of the U.S./Canadian border and west of Koocanusa Reservoir, while the Kootenai South pack (collared wolf 329) occupies a territory mainly south of the border and west of Koocanusa Reservoir.

2008 Activities: The breeding female was captured and collared on 9/8 in the East Fork Yaak River drainage 4.5 miles south of the US border. She could not be located from the ground the following days. Seventeen days later, on 9/25 she and an adult male were legally harvested in Canada 12 miles north of the US/Canada border (17 miles from the capture site). The hunters reported other wolves present at the time appeared to be young of the year. Wolf 329 was also discovered dead during this time 15 miles north of the border. However, since the Kootenai North pack spends most of it's time in Canada we do not regularly monitor in Canada. It was evident that 329 had been dead since likely spring. Cause of death is unknown because of the old age of the carcass. This pack is no longer collared.

Spruce Creek

- ? wolves
- no depredations reported on the U.S. side of the border

History: This pack was first documented in 1990 and spends most if it's time in the North Fork Flathead River drainage, Canada. This pack has been monitored irregularly and opportunistically since then because it spends most of its time in Canada.

2008 Activities: Because this pack spends most of its time in Canada and is no longer collared, we do not monitor this pack. MFWP personnel, conducting aerial monitoring for fish transmitters observed pups at the traditional den site in the summer.

Miscellaneous / Lone Individuals in Northwest Montana

Lost Soul: First documented as a pair in 2006 following the dispersal of NW036F from the Kootenai South pack. In 2007 the pair was localized in the denning season and reproduction was suspected at that time. The radio collared female has been missing since that time, and reproduction could not be verified after an extensive search of the suspected den area. Because of increased workloads, we were not able to conduct more than a few days of field work in this area. We did verify wolf presence, but it is unknown whether or not this pair ever reproduced forming a pack. Additionally the heart of this packs territory is in an area with difficult access due to rugged country, with thick vegetation, and low open road densities that combined influence the number of people recreationally visiting this area and subsequently reporting wolf sign. Status of this pack is completely unknown.

NW111F pair: Adult female NW111F was collared in the Spotted Bear pack in 2006. She dispersed this summer to an area west of the Spotted Bear home range and east of Swan Lake. She has been observed with another wolf. This is a dispersal of 16 miles. We will be monitoring this pair in 2009 to see if they breed and establish a territory.

NW346M trio: Adult male NW346M was collared in the Squeezer pack in July 2008. He dispersed from the pack and was found with 2 other wolves in the Blackfoot Valley north of Ovando at the end of the year. We will be monitoring this trio in 2009 to see if they breed and establish a territory. NW346M is a GPS collared wolf and is part of a University of Montana wolf study (see research section).

NW351F pair: Adult female NW351F was collared in the Cilly pack in July 2008. She dispersed from the pack and was found paired with a male in the upper Clearwater drainage northwest of Seeley Lake at the end of the year. We will be monitoring this pair in 2009 to see if they breed and establish a territory.

NW365M: Adult male NW35M, from the Lazy Creek pack, was captured and fitted with a gps ARGOS collar for patch occupancy modeling research in cooperation with the University of Montana (see research section). He dispersed from the pack this fall. By the end of the year he was within the old Hog Heaven (see Hog Heaven) territory. This is a dispersal of 47 miles.

NW420M: A wolf was radio collared in the Heart Butte area when it was incidentally caught by a coyote trapper on the Blackfeet Reservation. It is unknown how many wolves are associated with the collared animal, but so far it is believed to be by itself. The Blackfeet Tribe is monitoring wolves in this area.

An uncollared pair of wolves was documented in the Keep Cool Creek area north of Lincoln at the end of 2008.

An uncollared pair of wolves was documented in the Elk Creek area south of Lubrecht Experimental Forest in the Blackfoot Valley at the end of 2008.

In July an adult gray female wolf was hit and killed by a vehicle near Lookout Pass. The wolf may have been a member of the uncollared Mullan pack.

In December 2008, a calf was confirmed killed by an unknown wolf or wolves near Mission Lake on the Blackfeet Reservation.

In December 2008, a calf was confirmed killed by an unknown wolf or wolves near Wolf Creek, north of Helena.

West of Kalispell, a calf was confirmed killed in an area that could not be determined if it was the Wolf Prairie pack or adjacent Tellulah pack.

Suspected Packs in Northwest Montana

Rimini: Hunters submitted reports of wolves and wolf sign in the Rimini area southwest of Helena. Poor tracking conditions prohibited the verification of wolf activity before the end of 2008.

There are several other areas of interest in Northwest Montana where we get reports or have documented sign, but information may not be significant enough to suspect actual pack activity. These areas remain of interest and will be scheduled for survey in the 2009 field season. Some of these areas include: the lower Cark Fork River, Bull River, Libby Creek, upper Little Bitterroot River, Good Creek, Wigwam River, the old Hog Heaven territory, Danaher Creek, areas around Hungry Horse Reservoir, and portions of the Middle Fork Flathead River in GNP.

Other Miscellaneous Information in Northwest Montana

Nothing to report.

Southern Montana Experimental Area

Montana Portion of the Greater Yellowstone Experimental Area

Overview

Packs in the MT portion of the GYA have been documented from Red Lodge to Dillon. Several packs live on the borders of YNP and WY. Agencies (YNP, MFWP, TESF and WY USFWS) monitor these packs through flights and ground tracking. The location of the den site and the percent area / time in an area determines where that pack will be tallied in the population estimates. See the respective pack summaries below.

In 2008, a minimum estimate of 130 wolves in 18 verified packs existed in the Montana portion of the Greater Yellowstone Experimental Area at the end of the year. Packs that were verified in 2007 and still existed in 2008 are Rosebud, Moccasin Lake, Cedar Creek, Buffalo Fork, Mill Creek, Eagle Creek, Eightmile, Cougar II, Horn Mountain, and Beartrap. The 4 packs that no longer existed by the end of the calendar year were: Mission Creek, Moccasin Lake, Chief Joseph, N. Gravelly, and Freezeout. Mange and livestock conflicts were the primary reasons these packs no longer exist. Mange was documented in several packs and several individual wolves died of mange or were euthanized. Packs with mange (or had mortalities due to mange) were Eightmile, Baker Mountain, Swan Lake remnants, and Chief Joe remnants.

Of the 18 packs left at the end of the year, 11 met the breeding pair criteria. This is an increase over 2007 levels. The wolf population increase is due to formation of several new packs in 2008, particularly in the Gravelly Mountain range and the Gallatin / Madison range. Average pack size was 7.1 wolves/pack.

New packs formed in the GYA for 2008 are Lebo Peak, Horse Creek, Sage Creek (a border pack with Idaho that counts in the MT population in 2008), Jack Creek, Centennial, Toadflax, Heyden (formerly a YNP pack that shifted its territory outside of YNP into MT), and Black Mountain. MFWP documented transient wolf activity in several locations throughout the MT portion of the GYA.

Project staff documented the dispersal of several wolves. Two wolves dispersed from the Mill Creek pack in the Paradise Valley. One appeared to join the Baker Mountain pack south of Big Timber. Another wolf (equipped with a gps ARGOS satellite collar) dispersed from the Mill Creek pack and traveled southward through YNP and into the southern parts of WY by the end of the year. Seven other dispersals were documented, but the wolves died in most cases (euthanized due to mange, unknown, or natural causes). Four collared animals are considered missing.

A total of 11 wolves were caught in 2008, one of which was too small to collar. At the end of 2008, 15 of 18 (83%) verified packs were being monitored using ground and aerial telemetry. Six wolves were collared by MFWP and 4 were collared by WS. Radio-collared wolves were located 1-2 times per month by fixed-wing aircraft and ground telemetry.

In 2008**,** 9 of the total 21 packs that did exist at one time during the year (43%) were confirmed to have killed livestock (Table 1b), resulting in the lethal removal of 27 total wolves (4 of which were killed by private citizens under the 10j regulation). Two packs (Freezeout and N. Gravelly) were removed in their entirely due to chronic conflicts. Three of the 27 wolves controlled were lone wolves with no pack affiliation. No wolves were killed under shoot on sight permits issued to livestock producers.

A total of 42 mortalities were documented. A total of 27 wolves were killed to resolve livestock conflicts, 1 wolf died of unknown causes, 10 wolves died due to other human-related reasons (5 euthanized due to severe mange, 1 removed due to close proximity to people and bold behavior, 4 were hit by vehicles), and 4 died of natural causes (some also related to mange).

Verified Packs (Table 1b in Appendix 3)

Rosebud

- 2 wolves; not a breeding pair
- no depredations reported

History: Pack formed late in 2005. Its territory is between Red Lodge and Roscoe.

2008 Activities: Lack of sign and reports in the area could not confirm a breeding pair in the area. FWP biologists reported two wolves earlier in the summer and it is assumed the pair continues to maintain a territory. Defenders of Wildlife and a local ranch in the Rosebud pack territory participated in a range rider agreement. No reports of riders hazing or harassing wolves were received in 2008.

Moccasin Lake

- 4 wolves removed
- 1 calf and 2 sheep confirmed killed
- pack no longer exists

History: This pack formed in 2004, and its territory is south-southeast of Big Timber. There was no breeding activity in 2005, but in October the Moccasin female 242F was joined by an adult male (473M) that had left the Swan Lake pack in YNP.

2008 Activities: After a history of depredations, the Moccasin Lake pack was removed during the month of March. Reports of three to six wolves during the fall hunts in the Moccasin Lake territory may be from the neighboring Baker Mountain pack exploring the vacant area or a new group moving in. Reports of several wolves have been received from the wilderness area to the southeast of the Moccasin Lake territory this summer. The Boulder range rider project was discontinued in 2008 after its third year due to lack of funding.

Baker Mountain

- 5 wolves; not a breeding pair
- 2 calves confirmed injured, one of which was euthanized; 1 wolf killed by permit, 1 wolf killed under the 10j regulation
- 2 wolves collared

History: This group was documented in fall 2005 shortly after SW57F was caught and collared near a depredation site. Its territory is in the West Boulder area, south of Big Timber.

2008 Activities: A dispersed male wolf from Yellowstone National Park Hellroaring pack was shot in a cattle pasture in the Baker Mountain territory in February under the 10-j regulations. The radio collar was not working and it is unknown how long this animal had been in the Baker Mountain territory. Two female wolves were collared in April, one of

which had mange. Two calves were injured by wolves in May, one of which was euthanized. A shoot on site permit was issued to the landowner.

The second collared wolf was found dead three weeks after capture. Cause of death was undetermined, but we speculate the combination of the capture, her advanced age and having moderate to severe mange could have been the cause. The remaining collared female had been located with the Mill Creek pack on several occasions during the fall, but localized back with Baker Mountain throughout the winter. In addition, a yearling male from the Mill Creek pack dispersed from the Mill Creek pack and has consistently been with the Baker Mountain pack since fall. One adult gray male was found hit by a vehicle in December.

Buffalo Fork

- 10 wolves; breeding status unknown
- no depredations reported

History: The Buffalo Fork pack formed in 2003, north of Yellowstone National Park in Montana in the Buffalo Fork drainage. In June 2003, the only radio-collared member of the pack died and contact was lost. At the end of the year, 3 wolves were believed to be left in the pack. In 2005, numerous public reports were received from backcountry recreationists. In July 2005, project personnel backpacked through the historic Buffalo Fork territory in the Absaroka-Beartooth Wilderness and found sign of wolf activity.

2008 Activities: YNP wolf personnel documented at least ten wolves in the Buffalo Fork territory while visiting outfitter camps in the fall of 2007. Park personnel speculate they are still maintaining the territory in 2008. No radio collars exist in the pack.

Mill Creek

- 7 wolves; breeding pair
- no depredations reported
- 1 wolf collared; 1 missing; 2 dispersed

History: The Mill Creek pack formed in 2000. It spent a fair amount of time on or near private property on the east side of Paradise Valley and the Yellowstone River, near Emigrant.

2008 Activities: Four radio collars were being tracked in the pack during most of the year. One yearling female was fitted with a GPS collar in July. By mid September she had dispersed into Wyoming. One of the radio collared yearlings dispersed to the Baker Mountain pack by late fall, and one collared male has been missing since early fall. A collared black yearling female remains in the pack of seven.

8-Mile

- 5 wolves; not a breeding pair
- 2 calves unconfirmed

History: New pack formed in early 2007 and occupies a territory on the west side of Paradise Valley, south of Livingston.

2008 Activities: Project personnel issued cracker shells and strung fladry around an active calving pasture in January. Wolf tracks were seen near the perimeter but did not cross the flags. The adult male had sign of mange throughout the year and the adult female was found dead in the spring. Cause of death was assumed natural, as she had mange as well. No breeding activity was determined. A yearling female was euthanized due to mange in December. Two calves were thought to be killed by wolves in the 8-Mile territory in July, but the carcasses had been consumed by bears and coyotes. WS could not verify wolf predation.

Eagle Creek

- 10 wolves; breeding pair
- 1 bull confirmed injured

History: This pack replaced the Casey Lake pack and comprised of a pair of adults and two pups by the end of 2006. Its territory is on the east side of the Yellowstone River north of Gardiner.

2008 Activities: Two pups were hit by a vehicle in July. In September, two wolves were caught. One pup too small to collar and a yearling female was collared. A bull was injured and castrated due to his injuries in October. No action was taken as the cattle were being pulled off allotment.

Beartrap

- 19 wolves; breeding pair
- no depredations reported

History: The Beartrap pack formed in 2002. It occupied a territory at the north end of the Gallatin Mountain range near the Spanish Peaks consistently since then.

2008 Activities: A total of 19 animals were documented at the end of 2008, at least 6 of these are pups of the year. A GPS collar was deployed in July. This pack seems to spend the majority of its time on private land.

Lebo Peak

- 6 wolves; breeding pair
- 8 sheep confirmed killed, 2 confirmed injured

History: New pack in 2008. Its territory is on the northeast end of the Crazy Mountains.

2008 Activities: Eight sheep were confirmed killed and 2 injured by a black wolf in March. Attempts to trap and collar were unsuccessful. Project personnel confirmed six wolves occupying an area from the north end of the Crazy Mountains and southeast to Big Timber Creek.

Freezeout Pack:

- 0 wolves (pack removed due to chronic depredation); not a breeding pair
- 37 sheep confirmed killed, 22 sheep confirmed injured, 32 probable killed; 4 wolves killed by WS

History: The Freezeout pack first formed in 2001 in the Gravelly Range east of Dillon. It has been one of the larger-sized packs in the Montana portion of the GYA outside YNP.

2008 Activities: In May, WS confirmed 20 sheep were killed and 22 sheep were injured. Two more sheep were probable kills in two separate incidents south of Dillon (East Fork of the Blacktail and Rock Creek near Blacktail Wildlife Management Area). WS, as authorized, killed 2 wolves on private land in close proximity to the sheep. In June, WS confirmed 17 dead sheep and 30 more were probable kills. The remaining two wolves were killed on July 22.

Cougar Creek II:

- border pack with YNP; counted in MT
- 10+wolves; 1 radio; not a breeding pair
- no depredations reported; 1 wolf killed under the 10j rule

History: The Cougar Creek II pack first formed in 2001 inside YNP. Its home range was mostly inside YNP, and NPS personnel did all the monitoring. The last couple of years it has spent most of the winter outside of YNP and MFWP does most of the monitoring.

2008 Activities: During the months of January and February the Cougar II pack was observed and monitored in the Upper Madison Valley. It is suspected that they followed migrating elk from the Upper Gallatin Valley into the Madison Valley. They were observed in and around cattle during this period. On April 5th an adult female gray wolf (SW300F) was shot by a ranch hand under the 10j rule south of Ennis in the Madison Valley. It was a lone wolf that was in a group of cattle and had a newborn calf separated from the group. It was investigated by MFWP wardens and cleared as a justified action under the current 10J rules. On April 24th another rancher in the Bear Creek area reported a depredation of a newborn calf. It was investigated by WS who concluded that is was a probable wolf kill. On April 28th MFWP wardens picked up an adult gray wolf (SW313U) that was hit on HWY 191 near the Daily Creek area, which has been historically Cougar II territory. The pack then followed migrating elk back into the Upper Gallatin where it was assumed they denned. No pups were observed through the summer / fall period so they are not being considered a breeding pair. SW187M stayed in the Bear Creek area and dispersed from the pack and formed a new pack in that area of the Madison Valley called the Black Mountain pack, see write up below.

Black Mountain:

- 5 wolves; 1 radio collar; breeding pair
- no depredations reported

History: New pack in 2008. It occupied a territory in the Madison Range from Bear Creek to Indian Creek.

2008 Activities: This is a new pack that includes a male wolf (SW187M) that dispersed from the Cougar II pack that resides in the Gallatin Canyon. SW187M hooked up with another gray female and denned in the Bear Creek area of the upper Madison River. During the

summer three pups were observed with this new pair. No depredations were reported in this new territory in 2008.

Hayden:

- border pack with YNP
- 6 wolves; 2 radio collars; not a breeding pair
- no depredations reported

History: Has historically been an YNP pack; see YNP section of the Wyoming report.

*2008 Activities***:** During a radio monitoring flight on May 5th, the Hayden pack was located in the Warmsprings Creek area of the upper Ruby River Valley. All four wolves including the two radio collars were seen from the airplane. The Hayden pack traveled around during the month of May and settled into the West Yellowstone area and the upper Gallatin Canyon and are now considered a Montana pack.

North Gravelly:

- 0 wolves (pack removed due to chronic depredation); not a breeding pair
- 3 calves confirmed killed; 8 wolves removed by WS

History: New pack in 2007. It occupied a territory at the north end of the Gravelly Range from Wigwam Creek to Ruby Creek.

*2008 Activities***:** On March 17th, while doing coyote control work in the north end of the Gravelly Mountains, WS darted and collared a yearling female wolf (SW295F). It was later determined to be a member of the North Gravelly pack. On April 16th, WS confirmed 2 calves as being killed by wolves in the North end of the Gravelly Mountains. This recent depredation coupled with confirmed depredations in 2007, MFWP decided to remove the entire pack, which was estimated to be six animals. WS removed the following wolves: April 23rd 2 yearling wolves (SW310M & SW311M), April 28th a yearling (SW312M), May 3rd an adult female (SW320F). On May 6th WS was working on removing the rest of the pack, which included the radioed member, and discovered four wolves traveling together and immediately phoned MFWP and asked how to proceed. MFWP advised them to remove all four (SW295F, SW317M, SW318M & SW319F) that would be the remainder of the pack that totaled eight animals.

Jack Creek:

- 3+ wolves; 2 radio collars; not a breeding pair
- 2 calves confirmed killed

*History***:** New pack in 2008. It occupied a territory in the North end of the Gravelly and the Greenhorn mountains.

2008 Activities: On January 30th, while doing coyote control work in the north end of the Gravelly Mountains, WS darted and collared an adult male wolf (SW287M) that was traveling alone. In late February during a radio monitoring flight this was seen with an uncollared gray in the upper Ruby valley. This new pair denned in the Ruby Valley south of the Ruby Reservoir. May 6th WS investigated a calf in the lower Ruby that had bite marks on

them. They concluded that the injuries were from a wolf attack, tracks of a wolf were in the area and the radio-collared wolf (SW287M) was heard nearby. The decision was for no control action at this time and the new pair wolves were monitored. On May 25th WS confirmed a dead calf as being killed by wolves in the Greenhorns south of the Ruby Reservoir near the den site. The decision was to continue to monitor the situation and not to do a control action. This decision was based on being the first confirmed depredation by these wolves and because it was only a pair with young pups in the den. Later in the summer SW287M moved back to the North end of the Gravelly Mountains and was seen with two pups but no other adults. On October 22nd while traveling back from a control action in the Centennial WS darted and collared one of the pups SW405F.No other depredations were reported and this pack did not qualify as a breeding pair.

Cedar Creek:

- 5 wolves; 1 radio; breeding pair
- no depredations reported

*History***:** New pack in 2007. It occupied a territory at the North end of the Madison range from Jack Creek to Cedar Creek.

2008 Activities: In the spring of 2007 all of the Cedar Creek pack members, with the exception of SW166F, were removed due to chronic livestock depredations. In late 2007 reports and radio monitoring flights indicated that SW166F was traveling with an uncollared black wolf. This new pair denned in the Cedar Creek area of the Madison valley and had 3 gray pups. The pups were seen numerous times during the fall hunting season and all three have advanced stages of mange.

Toadflax:

- 8 wolves; 2 radio collars; breeding pair
- no depredations reported

*History***:** New pack in 2008. It occupied a territory at the south end of the Madison Range from Beaver Creek to Indian Creek.

2008 Activities: This is a new pack that back filled this territory after the Wedge pack was removed in 2007. Three wolves showed up in the area during the early part of 2008 based on reports from area landowners. This new group of wolves used the same den area and rendezvous sites as the previous Wedge pack. Wolves were seen routinely around the den. When the wolves moved from the den they were not observed until early September when they were observed at an old rendezvous site of the Wedge pack. MFWP personnel set traps in this area, to put out a radio collar for monitoring purposes, on September 6th. Two pups were caught on September 7th and two more pups were caught on September 8th. All of the pups were processed. Two were pit tagged (SW378M & SW385M) and two were radio collared (SW377M & SW386M) with full size padded collars. No depredations were reported in this territory during 2008.

Horn Mountain:

- 5 wolves; 2 radios; breeding pair
- 3 calves confirmed killed; 3 wolves removed by WS

History: New pack in 2008. It occupied a territory at the south end of the Madison range in the Antelope Basin area.

2008 Activities: On July 29th WS confirmed a calf as being killed by wolves. MFWP initiated a control action to remove two uncollared adults. WS took a wolf (SW358M) on July 30th and another (SW359F) on July 31st finishing the control action. On July 30th a calf was found with injuries to the hindquarters and was confirmed as done by wolves. The calf died of its injuries the following day. On October1st WS investigated and confirmed a calf as being killed by wolves. There were three producers on the allotment; two of them moved cows home the week of September 29th and the third remained for another week. MFWP decided to initiate a control action for one wolf. On October 2nd WS finished the control action on the Horn Mountain Pack by removing a black yearling female (SW339F). Cattle were moved off of the allotment and no other depredations were reported. The Madison Valley Ranchlands Group, in collaboration with Keystone Conservation and other financial supporters, hires a range rider during the period when cattle are on the allotment. 2008 was the fifth field season of the Range Rider project in the Antelope Basin area.

Centennial:

- 6 wolves; 2 radio collars; breeding pair.
- 1 calf confirmed killed; 1 wolf removed by WS

History: New pack in 2008. It occupied Freezeout's old territory of the Ruby River drainage in the Gravelly / Snowcrest Mountain range.

2008 Activities: On March 18th while doing coyote control work in the Upper Ruby WS saw a pair of wolves traveling together. They darted and collared an adult gray male wolf (SW296M). This pair of wolves denned in the Freezeout Pack's old den territory thus pushing Freezeout out of the Upper Ruby into the Blacktail drainage. On October 18th WS got a call from a producer on the NE end of the Centennial Valley that a calf had been injured. On October 21st WS looked at the calf that had died from its injuries and confirmed it as a wolf kill. I was determined that this was the territory of the new Centennial Pack and that the cattle would be in this area until approximately October 24th. MFWP authorized a control action for one, preferably, uncollared wolf. The producer was also been issued a SOS permit. On October 23rd WS removed a male pup (SW404M) from the Centennial pack and the SOS permit was cancelled and no other depredations were reported.

Sage Creek:

- border pack shared with Idaho
- 8 wolves; 1 radio collar; breeding pair
- 1 calf confirmed killed; 3 wolves removed by WS

History: A collared Madison Valley disperser SW072F was located around the Blacktail / Sage Creek areas in 2007 and hooked up with two other wolves forming a new pack. Its territory is from Sage Creek south to Peet Creek and the Idaho border. Idaho has had

numerous reports of wolves that may be this pack based on the number of individuals and colors so it being called a border pack with Idaho but the radio collar has never been found in Idaho.

*2008 Activities***:** On March 23, WS confirmed one calf as killed by wolves and one calf as a probable wolf kill near the town of Dell. While on site radio frequencies were monitored and SW072F, a dispersing wolf from the Madison Valley, was heard in the area. Based on past depredations it was decided to remove 3 wolves from the Sage Creek pack. On April 8 three wolves were removed from the pack, 2 grays SW302F / SW303U and a black 304U. Due to weather conditions and topography two of the wolves were not retrieved. The Sage Creek pack spent the summer on the south side of the Centennial Valley near Pete Creek and no more depredations were reported.

Verified Border Packs Counting in Wyoming Population Estimate (Table 2 in Appendix 3)
None.

Miscellaneous / Lone Individuals in Montana GYA

West Yellowstone Area: A collared male wolf from YNP Bechler pack was found dead in Montana outside of West Yellowstone in early March. Cause of death was unknown.

Pray (Paradise Valley): One lone gray was seen coming out of a sheep pasture where two sheep were confirmed wolf killed.

SW113M (Paradise Valley): was the last documented Chief Joseph wolf. He had severe mange and had been frequenting sheep and calving operations outside of the original territory. Project personnel euthanized SW113M in mid-March. The 8-Mile pack now occupies the old Chief Joseph territory.

Yankee Jim Canyon area (north of Gardiner): One uncollared black wolf with mange was hit by a vehicle on Hwy 89 in January.

Melville area (north of Big Timber): One calf was confirmed injured by an unknown wolf and euthanized. No other damage was reported and the wolf did not return to the area.

Reed Point area: A total of 25 sheep and 4 goats were killed by two wolves in the fall. Shoot on site permits were issued to two landowners. One uncollared female was killed and a second wolf remains in the area and is slated for removal. Herders and guard dogs wearing spike collars were brought into the area of one of the bands. The landowner documented a conflict between the wolves and guard dogs. The owner endorsed the spike collar, believing that it deterred the potential of serious injury inflicted by wolves to the guard dogs. Both dogs survived their injuries and continued to work the band of sheep.

Southeastern Montana (near Ismay): Two black wolves were reported in the fall of 2008 in southeast Montana. Dead cattle had been investigated but not confirmed as wolf killed. Project staff will continue to monitor the area.

Horse Butte: On May 7th MFWP started getting reports of a lone wolf exhibiting odd behavior in a campground north of West Yellowstone. A report from the campground host, "A wolf was following their golf cart around in the campground, and that a bison carcass was in the campground. She hauled the carcass off to the dump. The wolf had no fear of the people, and approached rather closely." On May 15th MFWP got a call from a resident in a subdivision on Horse Butte near West Yellowstone of a wolf getting into a fight with a dog and biting it, chasing it onto the porch then circling the house looking for it, the dog was a Lab. MFWP Wardens responded and made an on site visit and stated that bison were calving in the area that could have drawn in the wolf and causing it to have dog encounters. MFWP then decided to remove the wolf because of safety concerns to area residents. The wolf (SW328M) was removed on May 27th and no more reports were received from this area.

Suspected Packs in Montana GYA

Bullis Creek area (south of Livingston, west side of Yellowstone River): A female collared wolf from the Leopold pack was euthanized due to mange in early January on the north end of Paradise Valley. Reports of up to three wolves have been received periodically throughout the year. No collars are known in the group.

South of Reed Point: Reports and pictures of tracks of wolves were received from the Bridger Creek area south of I-90 and south of Reed Point. MFWP will continue to scout and follow up on reports in the area.

North Gravelly's (west of Cameron): On August 9th, a rider on the north end of the Gravelly's (public land) saw, from a long distance, 5 large gray wolves attacking a calf. When the rider reached the calf it was still alive and was euthanized. WS confirmed it as being attacked by wolves. This is the first sighting of a group of 5 grays in this area and there are no known packs or radios in this area. MFWP conducted a wolf monitoring flight on August 12th and no known or missing radios were heard. It is unknown if this is a new forming pack or if part of a neighboring pack moving through the area. MFWP will continue to monitor and compile wolf observation reports in this area.

Northwest of White Sulpher Springs area: One wolf was shot by a landowner in June. Hunters and ranchers continued to submit reports of wolf sightings and tracks from nearby areas. Wolf activity could not be verified by the end of 2008.

Other Miscellaneous Information in Montana GYA

Early in the year, a pilot picked out wolf tracks in the snow and followed them approximately 30-35 miles north across Island Park to the Centennial Mountains. The pilot eventually observed

7 wolves on a kill. IDFG personnel captured 2 wolves, one of which was an old alpha male, wearing a MMFWP radio collar which had gone undetected by IDFG personnel. The male was originally collared in the Wedge pack in 2006 (a pack that used to live in the southern end of the Madison Valley). This wolf was legally killed in April, during the brief period of time during which wolves were delisted.

Two packs were thought to have existed at the end of 2007, but they did not persist very long into 2008. Mange is suspected as the cause.

Mission Creek

- did not exist in 2008

History: The Mission Creek pack first formed in 2002. Its territory is southeast of Livingston. Pack dynamics appeared to be greatly affected by mange. In October 2005, the alpha male succumbed to mange and died and SW28M (formerly of the Moccasin Lake pack) joined the pack.

2008 Activities: The one wolf missing from 2007, wolf SW28M, was found dead on the north end of Paradise Valley and assumed to have died from mange.

Swan Lake

- did not exist in 2008

History: The Swan Lake pack was originally a YNP group, but by winter of 2006 spent their time outside of the park.

2008 Activities: Wolf 205M was euthanized due to mange in January after continuing to use a barn in Paradise Valley to get warm. The collar was not working. Another Swan Lake wolf, 345M, was found dead outside of Jardine. This wolf had also been documented with severe mange. This collar was not working either.

Montana portion of the Central Idaho Experimental Area

Overview

In 2008, we documented a minimum estimate of 111 wolves in 21 packs in the Montana portion of the Central Idaho Experimental Area. This is a slight decrease from 122 wolves in 23 packs at the end of 2007. There were 4 newly identified packs in 2008. Some of these packs are believed to be first year packs and some are likely to have existed the previous year.

Previously verified packs that still existed in 2008 were the Battlefield, Brooks Creek, Divide Creek, East Fork Bitterroot, East Fork Rock Creek, Flint Creek, Grasshopper, Lake Como, Pintler, Miner Lakes, Mt Haggin, Painted Rocks, Ram Mountain, Sula, Trail Creek, Trapper Peak, and Welcome Creek packs. Newly documented packs in 2008 included the Watchtower, Feeley, Horse Prairie, and McVey Creek packs. The Mussigbrod, Skalkaho, and Willow Creek packs were removed in 2008 due to livestock depredations. The Sapphire pack appeared to disband and were believed to no longer exist by the end of the year.

The Big Hole, Black Canyon, and Hughes Creek packs (Idaho/Montana border packs) denned and spent the majority of their time in Idaho in 2008 and will therefore count in the Idaho population estimate.

During 2008, 12 (57%) of 21 verified packs were monitored using ground and aerial telemetry at some point during the year. At the end of 2008, 8 (38%) of 21 verified packs were being monitored using ground and aerial telemetry. Eight wolves in 7 packs were captured and radio collared in the Montana portion of the CID in 2008. Six wolves were radio collared during MFWP trapping efforts and 2 were radio collared by WS. Radio collared wolves were located 1-2 times per month by fixed-wing aircraft.

Eight of 21 packs monitored in the MT portion of the CID occupied the Montana/ Idaho border: Battlefield, Brooks Creek, Lake Como, Miner Lakes, Painted Rocks, Sula, Trapper Peak, and Watchtower packs. The Battlefield, Brooks Creek, and Miner Lakes packs have been verified to spend time in Idaho. The others were only suspected to spend time in Idaho, based on proximity of sightings or telemetry locations. Because these 8 packs denned in Montana, or were known to have spent most of their time in Montana, they were counted as Montana packs for 2008. MFWP conducts most of the monitoring of these packs in close coordination with IDFG and the NPT, with the exception of the Miner Lakes pack, which was monitored by both agencies in both states. The Hughes Creek pack spent most of its time in Idaho and was monitored primarily by IDFG.

Reproduction was confirmed in 10 packs: Brooks Creek, Divide Creek, East Fork Bitterroot, Grasshopper, McVey Creek, Miner Lakes, Painted Rocks, Pintler, Trapper Peak, and Welcome Creek packs. Although pups were documented in the Brooks Creek, East Fork Bitterroot, and Trapper Peak packs their survival either could not be confirmed at the end of 2008 or pups were known to have died for various reasons. For the remaining 7 packs, a minimum of 26 pups were produced and 7 packs (Divide Creek, Grasshopper, McVey Creek, Miner Lakes, Painted Rocks, Pintler, and Welcome Creek) met the breeding pair requirement. Reproductive status of the Battlefield, East Fork Rock Creek, Feeley, Flint Creek, Horse Prairie, Lake Como, Mt Haggin, Ram Mtn, Sula, Trail Creek, and Watchtower packs was unknown.

One dispersal was documented in 2008. SW20M dispersed from the Sula pack in the spring and joined the Painted Rocks pack up the West Fork of the Bitterroot. Several wolves were missing at the end of the year and it is unknown whether they dispersed, the collar failed, or they were killed illegally: SW218F (Welcome Creek pack), SW184F (Sapphire pack), and SW83M (Sapphire pack).

Nine packs were confirmed to have killed livestock: Battlefield, Brooks Creek, Flint Creek, Grasshopper, McVey Creek, Mussigbrod, Pintler, Skalkaho, and Willow Creek. Single or unknown wolves were responsible for killing 1 calf and 19 sheep. Another two packs, Feeley and Trapper Peak, were involved in cattle injury and probable incidents respectively, although no confirmed losses were documented. In total, 26 cattle, 26 sheep and 3 llamas were confirmed killed. Two cows and 2 calves were confirmed injured. One dead cow, 2 dead calves, and 1 injured cow were documented as probable wolf. Forty wolf mortalities were documented in

2008. Thirty-four wolves were killed in response to depredations: 2 were shot by private citizens [1 under the 10(j) rule and 1 under state statutes when wolves were delisted] and 32 were killed by WS. One wolf was killed illegally, 2 were hit by vehicles, 1 was killed in self defense, 1 was an incidental mortality related to a coyote snare, and 1 mortality cause was unknown.

Verified Packs (Table 1c in Appendix 3)

Battlefield

- 2 wolves; not a breeding pair
- 6 calves confirmed killed, 1 calf confirmed injured; 2 wolves removed by WS

History: First documented in 2002. Its territory is west of Wisdom.

2008 Activities: Three wolves were thought to be in the Battlefield pack in early 2008. SW47F, who had previously been a member of this pack, dispersed to the Pioneer Mountains in 2007, leaving no collars in the Battlefield pack territory. In early May, 4 calves were killed in 3 separate depredation incidents. Two wolves were killed in response. In September, WS confirmed a calf was injured by wolves and attempted to place a radio collar in the pack. In November, WS confirmed wolves killed 2 more calves. WS made additional collaring attempts for the Battlefield pack and was authorized to lethally remove 1 wolf from the pack. At that time, WS verified there were at least 2 wolves in the Battlefield pack. No wolves ended up being removed. At the end of 2008 the Battlefield pack remained uncollared and occupied a territory west of Wisdom.

Brooks Creek

- 3 adults; not a breeding pair
- 2 calves confirmed killed, 3 llamas confirmed killed; 4 wolves removed by WS

History: The Bass Creek pack initially established in this area in 1998. After repeated conflicts with livestock on private property, the entire pack was translocated to the Spotted Bear area of the South Fork of the Flathead River where they established the Spotted Bear pack. The Brooks Creek pack was first documented to recolonize this area west of Florence in 2005.

2008 Activities: The Brooks Creek pack denned in Montana in 2005, in Idaho in 2006, and back in Montana in 2007 and 2008. MFWP made a concerted effort in the spring to keep the pack from re-denning behind several ranches in the Bitterroot Valley where there had been conflicts in the past. The pack did not den there but ended up denning a couple drainages away. In July, this pack was confirmed to have killed 2 calves and 3 llamas. WS removed 4 wolves in response including collared male SW17M who was known to be involved in the llama depredations. Several attempts were made to collar another individual in this pack but none were successful. A dead subadult wolf was found in the Brooks Creek pack territory by MFWP personnel in April and was confirmed to be an illegal mortality. The incident is still under investigation. The pack was known to have denned in the Bitterroot Valley, but no pups were ever documented. Three adults were confirmed in this area at the end of the year.

Divide Creek

- 5 adults, 2 pups; breeding pair
- no depredations reported

History: First confirmed in 2006. Its territory is northeast of Darby.

2008 Activities: Seven wolves were believed to be in the Divide Creek pack in early 2008 (4 adults and 3 pups). MFWP attempted to place a GPS collar in this pack as part of a University of Montana study but no adult wolves were caught. A pup was caught in August but was released without being collared. In the fall, an outfitter documented a dead female pup in the backcountry but the wolf was difficult to get to and was not retrieved so cause of death was unknown. Seven wolves were seen from the air in December, at least 2 of which were pups.

East Fork Bitterroot

- 3 wolves; not a breeding pair
- no depredations confirmed

History: First confirmed in 2006. Its territory is east of Sula.

2008 Activities: In early 2008 there were thought to be at least 4 wolves in the East Fork Bitterroot pack. In January, a gray male pup got its right front leg caught in a coyote snare. MFWP collared and released the pup. The pup was found dead two days later not far from the capture location. A cold front had moved in later that night after the pup was released and temperatures plummeted to 15 to 20 degrees below zero, which may have contributed additional stress to the capture event. Female SW115F denned in April and had 3 gray pups. SW115F and a large light colored male and the 3 pups were seen traveling together in August. In June a black male (SW336M) was collared adjacent to the East Fork pack's territory in Cameron Creek and was paired up with a gray female. At the end of the year SW115F was found with SW336M and 1 other uncollared gray adult (possibly the gray female SW336M was found with earlier in the year). It is unknown what happened to SW115F's previous mate and the 3 pups.

East Fork Rock Creek

- at least 8 wolves; not a breeding pair
- no depredations reported

History: First documented in 2007. Its territory is in the upper East Fork of Rock Creek drainage near Georgetown Lake.

2008 Activities: Wolf activity in the East Fork of Rock Creek drainage continued to be reported during 2008. There were several credible reports of 8 wolves traveling together. In the fall MFWP initiated a trapping effort, but bad weather hampered the effort and no wolves were caught. Eight wolves were still believed to be in the pack at the end of the year.

Feeley

- 2 wolves; not a breeding pair
- 1 calf confirmed injured

History: New Pack in 2008. Its territory is northwest of Divide.

2008 Activities: A new group of at least 2 wolves was documented in the Fleecer Mountain area in 2008. The Fleecer Mountain pack previously occupied this territory and was removed for livestock conflicts in 2007. One of the 4 members of that pack was believed to have been killed, along with the other 3, but was never recovered. It is unknown whether this wolf survived and is part of this new group. In the fall WS confirmed a calf was injured on private land. The landowner moved the cattle to a different pasture and no more conflicts occurred. Hunters reported seeing two wolves and tracks during the fall hunting season, and WS personnel verified tracks of at least 2 wolves. The Feeley pack remained uncollared at the end of 2008 and occupied a territory including the Fleecer WMA.

Flint Creek

- 2 wolves; not a breeding pair
- 1 calf, 6 sheep confirmed killed; 2 wolves removed by WS

History: First documented in 2007. Its territory is the northern half of the Flint Range.

2008 Activities: In early January 2008, 4 wolves were documented in the Flint Creek pack. They killed a calf and 2 sheep in January and WS removed 2 adult wolves in response. In October 4 more sheep were confirmed killed on the same property where the incidents had occurred in January. A collaring effort was initiated but no wolves were caught. At least 2 wolves were still believed to be present at the end of the year.

Grasshopper

- 6 wolves; not a breeding pair
- 1 calf confirmed killed, 1 calf probable killed

History: First documented in 2007. Its territory is at the south end of the Pioneer Mountains.

2008 Activities: There were believed to be at least 3 uncollared wolves in the Grasshopper pack in early 2008. In March, WS investigated a dead calf and called it a probable wolf kill. Attempts were made at that time to put a collar in the pack, but no wolves were caught. Little was known about this pack through the summer but in the fall MFWP received numerous wolf sighting and track reports from hunters and ranchers in the Grasshopper Valley. In December, a calf was confirmed killed near Polaris. WS made efforts to lethally remove one wolf and collar one wolf. At the end of 2008, the Grasshopper pack remained uncollared and occupied the Grasshopper Valley area near Polaris.

Horse Prairie

- 7 wolves; not a breeding pair
- no depredations reported

History: First documented in 2008. Its territory is southwest of Dillon.

2008 Activities: Very little is known about this pack through 2008. Sightings from the summer and fall indicated activity east of the Big Hole Divide near Bloody Dick Peak. At the end of 2008, 7 wolves were verified in this pack on the west end of Horse Prairie.

Lake Como

- at least 3 wolves; not a breeding pair
- no depredations reported

History: This pack initially produced pups and was documented as a breeding pair with 5 members at the end of 2002. This pack has never been radio-collared. Its territory is southwest of Hamilton.

2008 Activities: Very little was known about this pack through 2008. There continued to be reports of sightings in the Lake Como, Roaring Lion, and Sawtooth drainages. At the end of the year there were believed to be at least 3 wolves in this pack.

McVey Creek

- 6 wolves; breeding pair
- 6 cows confirmed killed, 2 cows confirmed injured, 1 probable cow injured

History: New Pack in 2008. Its territory is east of Wisdom.

2008 Activities: SW47F dispersed into the West Pioneers at the end of 2007 and was located in early 2008 with a second wolf, presumably a male. Telemetry locations indicated denning activity in the spring. SW47F was last located in June and has been missing since. It is unknown whether she died, dispersed, or the collar failed. In early October the pack started killing cattle. On October 9 WS confirmed wolves killed a cow on public land. No radio collars were heard and WS attempted to collar and release 1 wolf. On October 14 WS confirmed wolves killed 2 cows. MFWP authorized one wolf to be lethally removed by WS or through a SOS permit authorized to landowner. On October 20 WS confirmed that wolves killed one cow. A second injured cow was documented as probable. A third cow was reported as injured but could not be located for the WS investigation. WS efforts and the SOS permit were increased to lethally remove a total of 2 wolves while continuing efforts to collar. On October 27, WS confirmed wolves killed 1 cow. WS indicated that this was most likely the injured cow that was not investigated from October 20. On October 30 WS confirmed that wolves had injured a cow. On November 1, WS confirmed that the cow from October 30 was dead. On November 26 WS confirmed a cow as injured by wolves. WS concluded that the injury occurred several weeks prior to the investigation. No further depredations occurred in 2008 and no wolves were lethally removed in 2008. At the end of 2008, the McVey Creek pack remained uncollared and occupied a territory to the east of Wisdom.

Miner Lakes

- 5 adults, 6 pups; breeding pair
- no depredations reported

History: First documented in 2006 with dispersal of B191F from Idaho into the Big Hole Valley. It is a border pack shared with ID, and its territory is west of Jackson.

2008 Activities: At the end of 2007 the Miner Lakes pack consisted of collared alpha female B191F and 3 pups. The alpha male had been killed in a control action the previous year but a new male apparently dispersed into the pack in early 2008. The pair reproduced and had 6 pups. At the end of the year MFWP and IDFG documented 11 black wolves in this pack. The Miner Lakes pack is a Montana/Idaho border pack but is counted as a Montana pack for 2008 because they are thought to have denned and spent more of their time in Montana.

Mt. Haggin

- 3 wolves; not a breeding pair
- no depredations reported

History: First documented in 2007 with dispersal of SW67M from the Black Canyon pack. Its territory is south of Anaconda.

2008 Activities: In early 2008 there were 2 wolves in the Mt Haggin pack. They showed no signs of having successfully reproduced the previous year. SW67M remained with the Mt. Haggin pack in 2008 but again no pups could be verified during the course of the year. Hunting reports in the fall were consistently visuals or tracks of at least 3 wolves. The Mt. Haggin pack occupied a territory south of Anaconda mainly on the Mt. Haggin WMA.

Mussigbrod

- pack removed; not a breeding pair
- 2 calves confirmed killed; 2 wolves removed by WS

History: First confirmed in 2006.

2008 Activities: In December 2007 the Mussigbrod pack killed 3 calves and 3 wolves were removed at that time. Depredations continued into January 2008. Two more calves were confirmed killed and WS was authorized to remove the rest of pack, which was believed to consist of 3 remaining wolves. Two wolves were killed shortly thereafter and the third wolf escaped and was not seen or reported by area landowners since. Therefore the Mussigbrod pack was considered removed in 2008. No other depredations were reported in this area for the remainder of the year.

Painted Rocks

- 9 wolves; breeding pair
- no depredations reported

History: Wolf activity was initially documented in the Painted Rocks area (West Fork of the Bitterroot River near the Montana/Idaho border) with the location of dispersing Idaho female B67 in this area in 2001. B67 was monitored until she died in 2002. Its territory is in the upper West Fork of the Bitterroot near Alta.

2008 Activities: In the spring, wolf SW20M from the Sula pack disappeared and in early May was found further down the West Fork of the Bitterroot with a group of wolves believed to be the Painted Rocks pack. The pack was monitored for the remainder of the year and was found to have denned and produced at least 4 pups. MFWP initiated a trapping effort, but

was unsuccessful. At least 9 wolves (5 adults, 4 pups) were thought to comprise the Painted Rocks pack at the end of the year. A MFWP biologist sighted 13 wolves further up the West Fork later in the summer and it is unknown whether this was the Painted Rocks or a different pack.

Pintler

- 5 adults, 5 pups; breeding pair
- 2 calves confirmed killed, 1 calf probable killed; 2 wolves removed by WS

History: First documented in 2007. Its territory is on the south side of the Anaconda-Pintler Wilderness Area.

2008 Activities: In early 2008 there were thought to be at least 6 wolves in the Pintler pack including collared female SW217F. The pack denned in April in the Big Hole Valley and 5-6 pups were seen during a monitoring flight in May. Later in the year on December 3, WS verified 1 calf confirmed killed by wolves and verified 1 probable calf killed. On December 4th, WS killed 1 adult wolf from the Pintler pack. On December 7th, WS confirmed another calf killed by the pack. WS was authorized to lethally remove 2 wolves. On December 16th WS killed one wolf. No other wolves were killed and no further conflicts were reported. Ten wolves including SW217F were believed to be in the Pintler pack at the end of the year.

Ram Mountain

- at least 4 wolves; not a breeding pair
- no depredations reported

History: First documented in 2007, though likely present in 2006. Its territory is west of Phillipsburg.

2008 Activities: In early 2008 there were believed to be 5 gray wolves in the Ram Mountain pack. MFWP scouted the area during the early fall but no wolf sign was found and therefore no trapping efforts were initiated. Later in the fall more wolf reports were received from the area and at the end of the year there were believed to be a minimum of 4 wolves in the pack.

Sapphire

- pack disbanded; not a breeding pair
- no depredations reported

History: First documented in 2001. Its territory was southwest of Philipsburg.

2008 Activities: The Sapphire pack, having been a large pack of 14 wolves for several years, were down to 4 members in early 2008. The decline of numbers may have been the result of restructuring within the pack after a livestock control action in 2007 resulted in the removal of 5 pack members. Collared male SW83M and female SW184F were still being tracked with the group early in the year. In early July, the Skalkaho pack moved over from the west side of the Sapphire Mountains and usurped the Sapphire pack's territory. This appeared to result in the final disbanding of the Sapphire pack. SW184F was found with the Skalkaho pack on several occasions, as was an uncollared black wolf thought to be a different female from the Sapphire pack. However neither female were found with the Skalkaho pack at the

same time. SW184F was last found traveling alone in Copper Creek in August and was known to have been around the Ross' Fork area in the early fall but has not been found since. SW83M was last located alone several miles from where the Skalkaho pack was first found in the area in early July. In June, Sapphire wolf SW45F (collared as a pup in 2005 and had not been located for many months) turned up on mortality near the East Fork Reservoir in the East Fork Rock Creek pack's territory. Upon investigation her collar was found chewed off. Although no remains were found, the collar smelled as though it had come off a carcass so it's possible she was killed by the East Fork Rock Creek pack. Defenders of Wildlife funded a range rider program in the Middle Fork of Rock Creek again in 2008, but the Sapphire wolves were never implicated in any depredations in the area (see Skalkaho write-up for depredation history in this area for 2008).

Skalkaho

- pack removed; not a breeding pair
- 2 calves confirmed killed, 1 cow probable killed; 7 wolves removed by WS

History: First documented in 2005 but likely present in 2004. Its territory was east of Hamilton for the first part of the year then they usurped the Sapphire pack's territory southwest of Philipsburg during the summer.

2008 Activities: In early 2008 there were 9 wolves (4 adults, 5 pups) in the Skalkaho pack. The alpha female had died the previous year and the pack made large movements during the winter, possibly in search of a new female. They showed no signs of denning up in the spring and in July moved entirely out of their historical territory and into the Middle Fork of Rock Creek to the east, where they appeared to usurp the Sapphire pack's territory. The Sapphire pack had dwindled (see Sapphire pack write-up) and the Skalkaho pack's incursion seemed to result in the final disbanding of this pack. The Skalkaho pack was found at different times with Sapphire female SW184F or a presumed uncollared black female from the Sapphire pack through the summer and early fall. However the Skalkaho pack started harassing and killing cattle in September. Two calves were injured in separate incidents and had to be euthanized. Two wolves, including the alpha male, were killed. Problems escalated in late September and October. The pack chased cattle through fences on multiple occasions and an adult cow was found and documented as a probable wolf kill. A range rider program was in place on the ranch and the wolves were being closely monitored and hazed on multiple occasions. The wolves would return within 24 hours and be back in the cattle. Because the Skalkaho pack appeared to be increasingly keying into livestock and due to the failure of non-lethal efforts, MFWP decided to remove the remainder of the pack. Five more wolves were removed in October. Interestingly, of the 7 total wolves that were killed, 6 of them were males and the 7th was not retrieved so sex could not be determined. Three of the wolves killed were collared adult male SW196M and collared yearling males SW269M and SW270M. Sapphire wolves were not included as part of this control action since they were only found intermittently with the pack and could not be linked directly to any depredations. A single wolf from the Skalkaho pack was known to have remained and its fate is unknown.

Sula

- 5 wolves; not a breeding pair
- no depredations reported

History: First documented in 2005 but likely present in 2004. Its territory is west of Sula.

2008 Activities: The Sula pack was believed to comprise at least 10 wolves in early 2008. SW20M, who had been a member of the Sula pack for several years, dispersed from the pack in the spring and joined the Painted Rocks pack (see Painted Rocks write-up). As such, radio contact was lost with the Sula pack, and little was known about them throughout much of the rest of the year. However there were multiple reports of sightings and tracks in the Sula pack territory during hunting season. There were believed to be a minimum of 5 wolves in this pack at the end of the year.

Trail Creek

- 5 wolves; not a breeding pair
- no depredations reported; 1 wolf killed "in the act" under state statutes

History: First documented in 2007 though likely present in 2006. Its territory is near Chief Joseph Pass west of Wisdom.

2008 Activities: In early 2008 the Trail Creek pack was believed to comprise at least 6 wolves. MFWP initiated a trapping effort in May and June and collared a 2-year-old gray female. In early July, wolves were seen chasing cattle and the owner shot and killed an adult male under state statutes (wolves were delisted at the time). No other conflicts were reported during the year and no depredations were ever confirmed. At the end of the year there were believed to be at least 5 wolves in the Trail Creek pack.

Trapper Peak

- 3 wolves; not a breeding pair
- 1 domestic dog probable killed; 1 injured cow probable

History: Wolf activity was documented in this area in 2006 but was not verified as distinct from the Lake Como pack until 2007. Its territory is southwest of Darby.

2008 Activities: Female SW170F and an uncollared gray wolf were documented traveling together in early 2008. They denned in the spring and had a minimum of 3 pups. In March a domestic dog was killed on private land west of Darby and was considered a probable wolf depredation. In late July a cow was found with her tail bit off and the incident was documented as a probable wolf attack. Not enough evidence existed in either incident to confirm wolf involvement. MFWP initiated a trapping effort in August and caught both adults in the Trapper Peak pack and 1 of the pups. SW170F was re-collared with a University of Montana GPS collar and the adult gray male was collared with a standard VHF collar. The pup was too small to collar and was released. The pack continued to maintain a small territory southwest of Darby for the remainder of the year. But at the end of the year only 3 wolves were documented to still exist in the pack: the 2 collared adults and an uncollared gray wolf, possibly one of the pups.

Watchtower

- at least 2 adults; not a breeding pair
- no depredations reported

History: Suspected in 2007, confirmed in 2008. Its territory is in the upper Nez Perce drainage up the West Fork of the Bitterroot.

2008 Activities: The Watchtower pack was suspected in 2007 but was difficult to confirm because the neighboring Painted Rocks pack was uncollared. Wolf activity was confirmed in the Watchtower Creek area but territory boundaries were uncertain. However in 2008 a collared member of the Sula pack (SW20M) dispersed into the Painted Rocks pack and through monitoring MFWP was able to determine the Watchtower pack was separate. However MFWP was never able to determine an accurate count on the pack. There were thought to be a minimum of 2 wolves in the pack at the end of the year. The pack is likely an Idaho/Montana border pack but counts in Montana estimates for 2008 because most activity was found on the Montana side.

Welcome Creek

- 3 adults, 3 pups; breeding pair
- no depredations reported

History: First documented in 2006. Its territory is east of Florence.

2008 Activities: In early 2008, 4 wolves were thought to exist in the Welcome Creek pack. The pack denned in April and had a minimum of 3 pups. MFWP attempted to trap and but efforts were unsuccessful. One pup was captured but was too small to collar and was released. Collared female SW218F disappeared in the fall and is thought to have possibly dispersed. Six wolves (3 adults, 3 pups) were believed present at the end of the year.

Willow Creek

- pack removed; not a breeding pair
- 3 cattle, 1 sheep confirmed killed; 12 wolves killed

History: First confirmed in 2005 with the dispersal of B142M from the Buffalo Ridge pack near Challis, Idaho.

2008 Activities: In early 2008 there were 10 wolves in the Willow Creek pack. Due to the larger size of the pack, livestock producers in the area worked with the Blackfoot Challenge to initiate a carcass pick-up program in the area in the spring to help reduce attractants during calving time. MFWP also hung fladry around a large pasture in the spring where wolves were frequenting and had been reported harassing cattle prior. Some efforts were also made to keep the pack from denning on private land again but were not successful. The pack denned in early April in the same area as the 2 previous years and had a litter of 3 pups. In mid-April a calf was confirmed killed on the ranch where the fladry was hung, although the depredation occurred outside the fladry lines. WS killed 2 wolves in response. An ewe was killed shortly thereafter by a single wolf. Due its large size and the fact the pack had shifted its territory and had started to spend most of their time on private lands around livestock MFWP decided to remove 6 more wolves from the pack while leaving the alpha pair and litter of 3 pups. WS removed 3 wolves, one of which was the alpha male (B142M), which was killed by accident. MFWP then asked WS to place another collar on a member of the pack who would remain to help care for the litter. WS collared a yearling female shortly

thereafter. In the summer MFWP worked with the 4 ranches most potentially affected by the pack and developed a range rider program to help increase monitoring of wolves and cattle in the area. Also sometime during the early summer two uncollared black wolves joined the pack from unknown origin. In mid-August a calf was confirmed killed and WS killed 2 more wolves in response. Shortly thereafter another calf was killed and MFWP authorized the removal of the rest of the pack. Five more wolves were removed including collared alpha female SW82F. One of the 3 pups was unaccounted for at the end of the control action but had not been seen for several weeks and may have died of other causes.

Verified Border Packs Counting in Idaho Population Estimate (Table 3 in Appendix 3)

Big Hole

- at least 5 wolves; breeding pair
- no depredations reported

History: The Big Hole pack formed when B7 and B11 (released in 1995 as part of the original reintroduction efforts) pair bonded in 1996. B7 and B11 were translocated out of the Big Hole Valley, Montana twice, in 1996 and 1997, before settling and establishing a territory near Lolo Pass, west of Missoula. The Big Hole pack has had a continuous tenure in its home range since 1997.

2008 Activities: Ten wolves were in the Big Hole pack in early 2008. Adult female B151F, whose collar failed in 2007, was hit by a car and killed on highway 12 in November. A gray female pup was also killed in November, by a hunter claiming self-defense. Collared wolves B347F and B348M were usually found apart at the end of 2008, but both were still within the territory of the Big Hole pack. In March, B348M showed extraterritorial movements and was found once near Superior, MT. However, B348M was back in the Big Hole pack territory at the end of the year. The pack denned in Idaho and so counts in Idaho population estimates for 2008. There were believed to be at least 3 adults and 2 pups in the pack at the end of the year.

* The two Big Hole pack mortalities occurred in Montana and count as Montana mortalities for 2008.

Black Canyon (south of Jackson, MT)

- status unknown; suspect 3 adults, 1 pup
- 5 cattle confirmed killed; 5 wolves removed by WS

History: First documented by IDFG in 2005.

2008 Activities: See 2008 Idaho Annual Report.

Hughes Creek (northwest of Salmon):

- ? adults, 5 pups; breeding pair
- no depredations reported

History: First documented by IDFG in 2005.

2008 Activities: See 2008 Idaho Annual Report

Miscellaneous / Lone Individuals in Montana CID

SW64M: SW64M, who originally dispersed from the Sage Creek pack east of Dillon, paired up with a second female in the Big Sheep Creek area early in 2008. (The first female he paired with in 2007 was killed in Idaho because of livestock conflicts). The pair was implicated in the depredation of 2 lambs early in the year. A third lamb was documented as probable. In January the uncollared female was killed and in May SW64M was killed by Idaho WS due to conflicts in Idaho.

Vacant Willow Creek territory (west of Phillipsburg): Three wolves of unknown origin were documented in the old Willow pack territory near Phillipsburg at the end of the year. Reports of black wolves in the area suggest these wolves are not related to the Willow Creek pack, which was removed from the area in August.

Ross' Fork of Rock Creek (west of Phillipsburg): A single gray wolf from the Skalkaho pack is believed to still inhabit the Ross' Fork of Rock Creek.

Jackson: A wolf was hit by a car east of Jackson on November 6th. Is this the one that was reported by the landowner as dead in the field??

Grant area: On October 17th, an unknown wolf killed sixteen sheep. A single wolf was shot by a rancher under the 10j rule shortly thereafter.

Northeast of Florence: A lamb was confirmed killed by an unknown single wolf northeast of Florence in the Bitterroot Valley in August.

Northeast of Hamilton: In July an unknown wolf or wolves injured a calf in the Willoughby Creek area of the Bitterroot.

Suspected Packs in Montana CID

There are several areas where MFWP suspected or verified wolf activity, but did not have enough information to verify whether new packs were present. Areas to potentially be explored in 2009 include:

Big Sheep Creek (Tendoy Mountains west of Dell): Landowners and hunters in the areas west of Dell submitted reports of wolf sightings and tracks. Poor tracking conditions made detection difficult for pack verification.

Roaring Lion (on the MT/ID border west of Hamilton): IDFG documented a wolf pack around the Moose Lake area just across the Montana border in Idaho. But it is unknown whether this pack is distinct from Lake Como.

Medicine Lodge Creek (Tendoy Mountains northwest of Dell): Numerous reports were submitted of wolf sightings in the Medicine Lodge area near Dell.. Attempts to verify wolf activity were unsuccessful due to poor tracking conditions.

Red Conglomerate Peaks (west of Monida Pass on the MT/ID border): Numerous reports from hunters indicated wolf activity in the area west of Monida Pass. Poor tracking conditions prohibited verification of wolf activity

Other Miscellaneous Information in Montana CID
Nothing to report.

OUTREACH AND EDUCATION

MFWP's wolf program outreach and education efforts are varied, but significant. Outreach activities take a variety of forms and include: meeting people in the field, visiting landowners on their ranches, phone conversations and email to share information and answer questions, and granting interviews with the media, writers, and others. MFWP wolf staff also gave presentations at organized functions. MFWP also prepared and distributed a variety of printed outreach materials and media releases to help Montanans become more familiar with the Montana wolf population, the state's plan, and the current federal regulations. During the course of the year, MFWP staff note most their outreach efforts and activities in the Montana Wolf Weekly Report.

Other MFWP staff and volunteers are instrumental in accomplishing MFWP's outreach efforts. These include area game wardens, area wildlife biologists, block management personnel, information officers and front desk staff, staff of the Education Bureau, State Parks employees, the Helena staff (who work closely with the MFWP Commission, the legislature, and a variety of other elected or appointed officials), hunter education instructors, etc.

An increasingly important aspect of outreach has become the Internet. The MFWP website hosts many, many pages related to the wolf program. The wolf pages were redesigned in 2008 to help the public navigate and find information more easily. New information and documents are published as they become available. MFWP went to extra efforts to keep the public informed about the legal status of wolves and wolf management through the wolf pages. See www.fwp.mt.gov/wildthings/wolf.

The "Report a Wolf" application continued to bring valuable information so the public can help MFWP with monitoring efforts for existing packs and documenting wolf activity in new areas. Several hundred reports were received through the website. Countless more were received via postal mail on a pre-printed card and over the phone.

Beginning in mid-April 2008, MFWP began collating the frequency with which the public accessed the MFWP wolf web pages. From April 15 to December 31, about 50,000 total visits

were counted. The wolf web pages are visited between 150 and 400 times per day. According to diagnostic statistics, the two most popular wolf pages are the opening page (e.g. information about listing status) and the wolf weekly.

Diagnostic statistics also suggest that the public visitors spend more time on the wolf pages than the average of all other MFWP web pages visited. Additionally, visitors to the wolf-specific pages have a higher bounce rate (48%) than the average for all other MFWP web pages (33%). This suggests that visitors may have the MFWP wolf pages bookmarked and visit them directly for specific information periodically (e.g. visitors go to a wolf page directly and then exit the MFWP website without visiting any other MFWP web pages).

Additionally, the MFWP website receives email comments and questions from a wide variety of interested publics. Efforts are made to respond to as many as possible. A wide variety of media requests are also received, ranging from daily newspapers, magazines, documentary filmmakers, and authors.

Most wolf program staff spend 2-15 days at hunter check stations each hunting season in MFWP Regions 1-4 to talk with hunters about wolves, wolf management, and their hunting experiences. Hundreds of conversations are held. MFWP wolf staff also receive invitations for presentations from a wide variety of groups every year. Staff try to accommodate as many as possible given other work priorities and the time of year.

Presentation Outreach Categories:
Civic: Kiwanis Club, Rotary Club, Lions Club, etc.
Teacher/school: K-12, teachers
College/Professional: colleges, conferences, and adult education
Hunting: hunting, check stations, outfitting, rod and gun, etc.
Landowner / Livestock: livestock groups, permittees, watershed groups, etc.
Agency/government: Forest Service, BLM, NPS, county, Montana Legislative Committees, etc.
Wildlife Advocacy / Conservation

Outreach Categories	# of Programs	Number of public
Civic	8 (16%)	720 (23%)
Teacher/school	5 (10%)	272 (9%)
College/professional	7 (15%)	345 (11%)
Hunting	2 (5%)	105 (3%)
Landowners / Livestock	16 (33%)	950 (30%)
Agency/government	6 (13%)	297 (10%)
Wildlife Advocacy	4 (8%)	455 (14%)
Total:	48 (100%)	3144 (100%)

RESEARCH, FIELD STUDIES, AND PROJECT PUBLICATIONS

Each year in Montana, there are a variety of research projects and field studies in varying degrees of development, implementation, or completion related. These efforts range from wolf ecology, predator-prey relationships, wolf-livestock relationships, policy, or wolf management. Additionally, the findings of some completed projects get published. The 2008 efforts are summarized below.

Trophic Cascades Involving Humans, Wolves, Elk, and Aspen in the Crown of the Continent Ecosystem.

Graduate Student: Cristina Eisenberg, Boone and Crockett Club Fellow
Committee Chair: Dr. William J. Ripple, Oregon State University, Corvallis

Project Summary: Predation by wolves may be critical for maintaining biodiversity and sustaining aspen communities. Currently in decline in portions of the West, aspen provides key habitat for songbirds and beaver, among other species. One of the major controversies in ecology in the past century concerns whether food has a stronger influence on herbivore population regulation than predation. Predation can drive strong lethal and non-lethal effects throughout food webs, referred to as trophic cascades. We are studying trophic cascades involving human land use, wolves, elk, and aspen in the Crown of the Continent Ecosystem. Our objective is to investigate how an apex predator affects aspen communities by influencing abundance and behavior of large herbivore prey. This work will contribute to our knowledge of food webs, via a gradient analysis of the magnitude of trophic cascades in areas of high, medium, and low wolf density, and investigation of temporal and spatial trophic interactions in a geographic location where they have not been studied previously. It is part of the *Southern Alberta Montane Elk Study*, an interagency, transboundary collaboration in which we are working with 98 elk fitted with GPS collars, and 8 radio-collared wolf packs. Project partners include Shell Canada, Alberta Fish and Wildlife Division, Montana Fish Wildlife and Parks, Waterton Lakes National Park, Glacier National Park, the University of Alberta, the University of Calgary, Oregon State University, and the Boone and Crockett Club.

Project Activity in 2008: During this second year of field research, we radio-collared 4 wolves in Glacier National Park, with assistance from Montana Fish, Wildlife, and Parks, deploying 3 GPS collars and one VHF collar, and put GPS collars on another cohort of 35 elk in Waterton Lakes National Park. By stratifying the study area into high, medium, and low wolf density sites, we measured the effect these three densities of wolves are having on prey species behavior. This behavioral response to predation risk was measured doing focal animal observations on elk and by putting in 220 kilometers of track transects to quantify wolf, other large carnivore, and ungulate (elk, moose, and deer) relative density and resource selection. Additionally, we completed a biodiversity survey in areas of high medium and low wolf density, using songbirds as an indicator species.

Preliminary Results: Preliminary results of this ecosystem-scale project suggest wolf presence affects multiple levels of the food web, within a classic three-part trophic cascades framework (predators-prey-vegetation). These effects may include a behavioral trophic cascade, which involves prey avoidance of areas of high predation risk, with elk vigilance related to wolf density. Changes in elk herbivory due to wolf predation may be creating richer songbird habitat,

increasing biodiversity. In our third year of research we may determine whether a moderate wolf population may be sufficient to trigger the ecological benefits attributable to wolf presence in a landscape, via trophic cascades.
Anticipated Completion Date: 2010

Seroprevelance of Canine Parvovirus and Canine Distemper in wolves (Canis lupus) in relation to human activity in the Canadian Rocky Mountains

Student: Brynn Nelson, Wildlife Biology Program, University of Montana, Missoula, Montana
Advisors and Collaborators: Mark Hebblewhite Wildlife Biology Program, University of Montana, Missoula; Todd Shury, Parks Canada, Department of Veterinary Pathology, Western College of Veterinary Medicine, Saskatoon, Saskatchewan, Evelyn Merrill, Department of Biological Sciences, University of Alberta, Edmonton, Dale Seip, BC Ministry of Forests, Prince George, British Columbia, Nathan Webb, Department of Biological Sciences, University of Alberta, Edmonton, Fiona Schmiegelow, Department of Renewable Resources, University of Alberta, Edmonton, and Paul C. Paquet, World Wildlife Fund, Canada.

Project Summary: Diseases affect social carnivores that occur in high density areas, like wolves (*Canis lupus*). Carrier species (feral dogs, coyotes, foxes) travel between the urban/wildlife interface; thus, transmitting diseases to wolves. We sampled 99 wolves from the years 2000 to 2008 for canine parvovirus (CPV) and canine distemper virus (CDV) in Banff and Jasper National Parks and surrounding areas of the Canadian Rockies. Of the 99 wolves, 92 tested positive for CPV, 22 tested positive for CDV and 22 tested positive for both diseases. We tested whether seroprevelence of CPV and CDV was higher closer to human activity (roads, town sites, campgrounds, federally designated Indian reserves) and as a function of sex, age class, and different wolf packs using mixed-effects logistic regression models. CPV and CDV seroprevalence was found to be higher in areas closer to human activity and was higher in younger age classes of wolves. Understanding disease transmission between urban areas and wildlife areas with high wolf densities, like the Canadian Rockies, could yield pertinent information about disease profiles. Disease profiles from the Canadian Rockies could help conserve the recently delisted wolf species in areas like Yellowstone National Park where human activity is high relative to wolf activity.

Gray Wolf Diets in Northwestern Montana

Graduates Student: Jonathan Derbridge
Committee Chair: Dr. Paul R. Krausman, University of Montana, Missoula

Project Summary: Gray wolves are distributed throughout northwestern Montana and understanding their diets can be used to better understand their role within the ecosystem. A variety of methods can be used to derive this information but none has been used in northwestern Montana. Scat analysis and stable isotope analysis are 2 distinct methods that can be used simultaneously to determine diets. We tested the feasibility of field data collection for both these methods. It is possible to locate home sites of wolves and collect scats from them. We have also successfully tested a non-invasive hair-snagging device that will provide hair samples for stable isotope analysis. By using temporally and spatially matched samples for these diet analysis methods we will describe the diets of wolves in northwestern Montana and report the relative merits of each method. Our results will provide useful information to wildlife managers on an

important life history characteristic of a top predator in the ecosystem, and serve as a reference for future research.

Project Activity in 2008: coursework, development of research ideas and proposal, field research.

Anticipated Completion Date: 2010

Winter Distribution, Habitat Use, and Browse Utilization Patterns of the Shiras Moose on the Mount Haggin Wildlife Management Area

Investigators: Braden Burkholder and Robert Garrott, Department of Ecology, Montana State University, Bozeman; Vanna Boccadori, and Kurt Alt, Montana Fish Wildlife & Parks.
Collaborators: Montana Fish, Wildlife & Parks; Montana State University.

Project Overview: Moose populations across Montana have expanded in the last century, both in geographic range and in population size. This expansion has had a negative impact on moose winter range in some locations where moose have overutilized key browse species such as aspen and willow. Excessive and unsustainable browsing has the potential to reduce local biodiversity and carrying capacity of moose and other ungulates. The browse species of interest in this study are willow (*Salix* spp.), a highly palatable and abundant browse source for moose on many winter ranges, including our study area in southwestern Montana. Knowledge of spatial and temporal patterns of moose willow community use and willow utilization patterns is limited in Montana and would be helpful in moose population management. The objectives of this study are to determine patterns of willow community use by selected female moose during winter and to quantify willow utilization across the study area to examine population scale habitat use through browse patterns. To accomplish these objectives, we deployed GPS collars on 12 cow moose in the winters of 2007 and 2008 and completed large scale, systematic browse surveys in the spring of 2008. Preliminary results indicate cow moose spend the majority of the winter in or adjacent to willow communities, but overall willow utilization across the study area is low. Our data suggest that while moose have the potential to significantly impact willow communities, this does not appear to be the case on the Mount Haggin WMA at current moose densities. As part of this research focused on moose-willow habitat relationships, we are also collecting baseline moose movement and demographic data. These data will be available for comparison to any wolf movement data collected from this study area. Additionally, wolf-moose interaction data are being collected opportunistically, such as observations of wolves, field necropsies of moose for cause of mortality, and adult moose and calf survival rates.

Organochlorine and Heavy Metal Contaminants in North American Grey Wolves

Supervisors: R. Given Harper, Stephen Hoffmann and Jeff Frick, Illinois Wesleyan University, Bloomington, IL
Undergraduate students: Susan Blunck, Patrick Chess, Stacy Hynes, Emily Jones, Jason Koval, Ryan Misek, Sarah Rueth, Patricia Troxell
Collaborators: Mark Atkinson, Montana Fish, Wildlife and Parks; Kimberlee Beckmen, Alaska Department of Fish and Game; Dean Cluff, Environmental and Natural Resources, Government of the Northwest Territories; Mark Collinge, APHIS Wildlife Services, Idaho; Mark Drew, Idaho Department of Fish and Game; Carolyn Sime, Montana Fish, Wildlife and Parks

Project Description: Due to its location at the top of terrestrial food chains, the grey wolf (*Canis lupus*) may contain high levels of organochlorine (OC) pesticides and metabolites, and heavy metals. However, few studies have documented these compounds in wolves throughout much of their North American range, which is the purpose of this study. The wolves were either found dead, collected via lethal control methods or harvested legally in Alaska, Idaho, Montana and the Northwest Territories. Wolf kidneys were removed from carcasses by personnel from state and Canadian wildlife agencies from 2005-2007. The kidneys were then frozen and shipped to Illinois Wesleyan University for analysis. The presence and concentration of 17 OC compounds (Aldrin, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, Dieldrin, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin aldehyde, alpha-HCH, beta-HCH, delta-HCH, gamma-HCH, Heptachlor, Heptachlor epoxide and Methoxychlor) in wolves is being determined via electron-capture gas chromatography; sampled verification of high concentration OC compounds is accomplished via gas chromatography-mass spectrometry (GC-MS). OC contamination patterns will be analyzed in relation to sex, age and latitude. The concentration of heavy metals (aluminum, cadmium, copper, iron, lead and zinc) in wolf kidneys was determined via inductively coupled plasma emission spectroscopy at the University of Wisconsin-Madison. Differences in concentration levels due to sex, age class and location are being evaluated, and a regression analysis will be used to assess possible relationships among heavy metals.

Anticipated Completion Date: 2009

Application of Electrified Fladry to Decrease Risk of Livestock Depredation by Wolves (Canis lupus)

Graduate Student: Nathan J. Lance; *Committee Chair*: Dr. John A. Shivik, USDA/National Wildlife Research Center/ Utah State University, Logan
Collaborators: USDA/National Wildlife Research Center, Wildlife Science Center, Montana Fish, Wildlife & Parks, Utah State University, Montana Wildlife Services, Confederated Salish and Kootenai Tribes of the Flathead Reservation

Thesis Abstract: Wolf (*Canis lupus*) predation on livestock can cause economic and emotional hardships for livestock producers, complicating the balance of wolf conservation with other human interests. New management tools that decrease risk of predation may offer additional flexibility or efficiency for both livestock producers and management agencies. We examined 1) the efficacy of electrified fladry compared to fladry at protecting a food source from wolves in captivity, 2) the efficacy of electrified fladry for reducing wolf use of pastures and preventing depredations, and 3) the applicability of electrified-fladry. In captivity we tested the reaction from 15 groups (46 wolves) to the presence of fladry, electrified fladry or no barrier within their enclosures. During trials, a deer carcass was provided in one corner of the pen, and a strand of fladry (n = 5 pens), or electrified fladry (n = 5 pens), was strung across the pen to protect the food resource. Failure of the barriers was defined by at least one animal in a group moving across the barrier. Both fladry and electrified fladry effectively excluded wolves from a food resource for short durations of time (1-14 days), but electrified fladry was more effective. Our research indicated that although electrified fladry has the potential to reduce wolf depredations, animal learning, motivation, and personality play critical roles in the effectiveness of fladry systems. In Montana, we assigned 9 livestock operations to randomly receive a treatment (electrified fladry, n=6 pastures) or control (not receiving electrified fladry, n=6 pastures). We

measured cost per kilometer for purchasing materials, number of people and hours required for installing and maintaining, as well as recording observations of potential difficulties with electrified fladry. We formed and distributed exit-surveys to each rancher who participated in the study to assess opinions about the use of the technique. Wolf activity at the ranches was insufficient and we were not able to determine if electrified fladry was successful or unsuccessful for preventing livestock depredations. We found, however, that electrified fladry may be limited by costs associated with its purchase and that the application and effectiveness of electrified fladry may limit it's usefulness for addressing wolf-livestock conflict. The understanding of human perceptions of management tools is critical to determining the success of implementing management techniques and fostering participation and cooperation among stakeholders.

Project completion date: 2009

Developing wolf population monitoring techniques

Principle Investigators: David Ausband and Dr. Michael Mitchell, Montana Cooperative Wildlife Research Unit, Missoula
Cooperators: Nez Perce Tribe, Idaho Department of Fish and Game, Montana Fish, Wildlife, and Parks, University of Idaho, and U.S. Fish and Wildlife Service

Funders: Nez Perce Tribe, Idaho Department of Fish and Game, Safari Club International Spokane Chapter, NSF EPScOR at The University of Montana, Five Valleys Audubon, Idaho Cooperative Wildlife Research Unit, Environmental Sciences Program at The University of Idaho, MILES Program at UM, Irene Evers' Competitive Undergraduate Research Scholarship, Defenders of Wildlife, The Mountaineers Foundation, Oregon Zoo Future for Wildlife Grants, Montana Fish, Wildlife, and Parks, Montana Department of Natural Resources and Conservation, Wilburforce Foundation, Regina B. Frankenberg Foundation for Animal Welfare, and The Wolf Recovery Foundation.

Project Summary: Before the early 20th century the gray wolf (*Canis lupus*) was common throughout the northern Rocky Mountains (NRM), but was extirpated by the 1930s as a result of poisoning, unregulated trapping, and bounty campaigns. The gray wolf was listed as an endangered species in 1974. After the reintroduction of 66 individuals in 1995 and 1996 the wolf population expanded and an estimated 1,500 wolves now live in the NRM. Throughout reintroduction and recovery, wolves in the NRM have been monitored intensively through capturing, radio-collaring, and aerial surveys, supported almost entirely with USFWS funding. Federal funding for intensive monitoring will be eliminated following delisting and agencies will have to rely on scarce resources to obtain the information needed to document wolf numbers. Realizing the need for less invasive, but effective monitoring techniques, the Nez Perce Tribe obtained a Tribal Wildlife Grant to research alternative ways to monitor the wolf population that do not necessarily rely on radiocollaring wolves. Collaborating with the Montana Cooperative Wildlife Research Unit and Idaho Department of Fish and Game, research began in earnest in 2006.

We have devised, and are in the process of testing, a proposed population monitoring program based on patch occupancy modeling, a statistical technique that can integrate observations from multiple sampling methods into population-level inferences on broad spatial scales. We

demonstrate that a patch occupancy model can provide reasonably accurate estimates of abundance of wolf packs using only on-line public sightings. To populate a patch occupancy model and develop a statewide population monitoring framework useful for Idaho, we are evaluating a variety of survey methods that have varied levels of inference and have demonstrated strong relationships to wolf abundance and distribution. We are developing these methods to 1) enable the reliable detection of reproductively active wolf packs, and 2) be more cost-effective than traditional radiotelemetry. The suite of methods we are developing and testing are hunter surveys, rendezvous site surveys, howlboxes, and rub pads.

We surveyed 2,000 hunters annually and found that hunters are largely accurate when reporting wolf observations because there was a strong correlation between the number of wolves detected by hunters and the density of wolves in each of 4 study areas. To develop survey methods that can provide more detailed data on wolves in a given area than hunter surveys, we developed a habitat model that predicted the locations of wolf rendezvous sites. In 2007 and 2008, we conducted surveys at approximately 475 predicted rendezvous sites annually resulting in the detection of 12 of 17 accessible litters of pups and all 25 study packs. Genetic samples collected during rendezvous site surveys provided accurate population estimates via DNA analyses. The howlbox, an automated wolf detection tool, can detect wolves remotely, distinguish adults from pups, and obtain minimum pack size counts using spectrograms. Finally, we were able to consistently elicit roll responses from wolves onto barbed rub pads. Nearly 390 rub pad trap nights resulted in 39 roll events and ongoing DNA extractions indicate rub pads can obtain hair samples non-invasively from wolves. The data gathered from each of these survey methods can provide the detection/non-detection data needed to populate a patch occupancy model; further, some of the methods can provide highly detailed data on wolves in area providing biologists with unprecedented tools for understanding wolves occupying areas of high management interest. Because some of our survey methods can provide estimates of pack size they can be coupled with the Mitchell et al. (2008) equations to estimate the number of Breeding Pairs in the state and help meet federal requirements during the 5-year post delisting phase of wolf recovery.

During 2009-2011 we will continue to test the validity of our survey methods and refine and improve them where necessary. We will also estimate the number of individual wolves and Breeding Pairs from the patch occupancy model and perform simulations of patch occupancy models that employ varying levels of each survey method to determine which combination provides the highest level of accuracy and precision for use in future wolf conservation. Lastly, we will explore the use of spatially-explicit colonization and extinction probabilities generated by the patch occupancy model to assess their usefulness and reliability at predicting both the abundance and distribution of wolves. As wolves move from an endangered species to a big-game species, agencies in the NRM can use a patch occupancy framework to couple harvest results and annual monitoring efforts and enable continuous feedback and improvement of harvest predictions and population conservation strategies. Our goal at the end of 2011 is to have a less expensive population monitoring framework that has been soundly tested, is rooted in wolf ecology and can provide population estimates with an associated measure of precision that managers can use with confidence.

Project Activity in 2008: Continued testing and refinement of new survey methods, prepare manuscript(s) for publication.

Anticipated Completion Date: 2011

Using hunter surveys and an understanding of territory size to monitor wolves in Montana

Graduate Student: Lindsey Rich

Committee Chair: Dr. Mike Mitchell, Montana Cooperative Wildlife Research Unit, University of Montana, Missoula

Project Summary: The goal of my masters research is to help create a new long-term population monitoring technique for wolves that is accurate and both time and cost-effective for MFWP to employ. I will determine if hunter surveys can be used to populate a Patch Occupancy Model (POM) which accurately estimates the number of wolf packs in Montana and their distribution. To do this, a grid of patches will be placed over Montana where patch size is equal in area to territory size. I will use GPS collars to accurately estimate territory size throughout the state. The patches are then surveyed to determine which are occupied (the species is detected) and unoccupied (the species is not detected). One time- and cost-effective approach to collect this detection/nondetection data may be to use sightings of wolves by hunters. Several questions pertaining to hunter's sighting of wolves were added to the annual phone surveys that MFWP conducts of a sample of resident deer and elk license holders. Of the 50,039 license holders that were successfully surveyed about the 2007 hunting season, 2,824 saw wolves. The large number of locations collected with GPS telemetry will also be used to understand what ecological factors drive the territory sizes of wolf packs. If territory size can be linked to specific ecological factors such as prey density or landscape variables, then a POM will be developed with patch sizes that vary spatially and temporally corresponding with the spatial and temporal variation of these ecological factors (i.e. territory size will not have to be estimated directly).
Project Activity in 2008: Coursework, developing and writing research proposal, purchase of 15 GPS collars, deployment of 9 GPS collars by MFWP wolf specialists (4 collared wolves remain in the territories they were collared in, 3 wolves have dispersed, 1 wolf was hit by a car while dispersing, 1 wolf was illegally shot)

Anticipated Completion Date: 2010

Understanding Patterns of Distribution and Abundance to Monitor and Manage Wolves

Graduate Student: Alison Mynsberge
Committee Chair: Dr. Michael S. Mitchell, Montana Cooperative Wildlife Research Unit, University of Montana, Missoula

Project Summary: Monitoring the wolf population in the Northern Rocky Mountains (NRM) will become increasingly difficult as the population increases in size and distribution and when funding is affected by delisting. States in the NRM need a time- and cost-effective method to monitor the numbers of wolves and breeding pairs in compliance with delisting. The goal of my research is to develop this new long-term monitoring method. I will use data from a variety of sources, including public sightings, howl boxes, track counts, and rendezvous site surveys, to populate a patch occupancy model that will estimate the abundance of wolves and their distribution in Idaho and Montana. Estimates of pack size will then be used to predict the number of breeding pairs in each state using published methods. My research will build upon the work of researchers from the University of Idaho and from the Montana Cooperative Wildlife

Research Unit at the University of Montana. Supporters of this research include Montana Fish, Wildlife and Parks, Idaho Fish and Game, and the Nez Perce Tribe.

Project Activity in 2008: Coursework, development of research questions.

Anticipated Completion Date: 2012

Biological and Sociological Efficacy and Applicability of Electrified Fladry for Protecting Free-ranging Cattle from Gray Wolves, Canis lupus, in Montana

Investigators: Carolyn A. Sime, Montana Fish, Wildlife & Parks; Nathan J. Lance, Utah State University; Dr. John Shivik and Dr. Stewart Breck, USDA Wildlife Services Research Center; John Steuber, USDA Wildlife Services Montana State Office; Stacy Courville, Confederated Salish and Kootenai Tribes.

Abstract: Wolves living near livestock increase risks of depredations, which increase economic losses, animosity, and conflict among stakeholders. Although wolves may not have drastic economic effects on the livestock industry as a whole, they can substantially affect individual ranchers when depredations become chronic. Lethal control is often controversial because some stakeholders want wolves removed and others do not, but both lethal and non-lethal methods require evaluation for their effectiveness in mitigating predator-livestock conflicts. Thus, we examined the use of electrified fladry for managing wolf conflicts on 9 ranches in Montana. Wolf activity at the ranches was insufficient during the period of study and we were not able to determine if electrified fladry was successful or unsuccessful for preventing livestock depredations. We found, however, that electrified fladry may be limited by costs associated with purchasing and that the application of electrified fladry may limit it's usefulness for addressing wolf-livestock conflict. Biological, economical, and sociological goals of management can be met through lethal and non-lethal methods, but no one method is without limitations. The understanding of human perceptions of management tools is critical for successfully implementing management techniques and fostering participation and cooperation among stakeholders. With this understanding, education and training can change human perceptions and may render non-lethal tools more effective.

Other Project Collaborators and Principals: U.S. Forest Service, Gallatin National Forest, Big Timber; Boulder Watershed Group; participating landowners in both project areas; Mike Lewis and Joe Weigand, Montana Fish, Wildlife & Parks, and field specialists from both USDA Wildlife Services and Montana Fish, Wildlife & Parks.

Note: The field portion of this study was funded through a Conservation Innovation Grant provided by the Montana Office of the USDA Natural Resources Conservation Services

LAW ENFORCEMENT

The USFWS Office of Law Enforcement remained the lead agency investigating wolf deaths in Montana for most of 2008, with the exception of the 4-month period when the gray wolf was delisted. MFWP representatives collaborated and provided assistance to federal law enforcement on request. All wolf mortalities that are not the result of authorized agency lethal control, of a

shoot on sight permit, or obviously related to a vehicle / train strike, are reported to law enforcement personnel. All other wolf mortalities are under investigation until a full determination is made regarding cause of death. Federal or state law enforcement investigated 5 incidents of wolves being killed while seen actively chasing livestock. No citations were issued. Approximately 8 other wolf mortalities are suspected or confirmed as illegal activity and investigations are ongoing. In one case, the individual was cited and paid a fine.

MFWP Game Wardens, by nature of their positions make valuable contributions with respect to outreach about wolves, their management, and the Montana program. In addition, wardens have assisted with various field activities such as retrieving road-killed wolves or responding to wolves caught incidentally by recreational trappers. Wardens have also passed along wolf reports to project personnel and contributed to monitoring efforts.

FUNDING

Montana Fish, Wildlife & Parks

MFWP's core wolf program is funded through 2 separate federal sources. Approximately half is obtained through a direct annual Congressional line-item appropriation and half is obtained directly from USFWS as a part of the agency base budget. These sources are identified in the state-federal wolf cooperative agreement and are transferred on a federal fiscal year cycle which is offset from the state fiscal year cycle by six months. Federal funds can be spent anywhere in Montana for the wolf management and conservation activities specified in the cooperative agreement through June 30, 2010 (independent of the listed status). Any of the unspent funds will revert back to the Federal Treasury 90 days after the extermination date of the 5-year agreement.

Although the agreement states that a total of $637,000 is to be available to Montana annually, federal budget constraints have sometimes resulted in Congressional recessions (across the board percentage cuts). Therefore, Montana received about $607,000 in federal fiscal year (FFY) 2005. In 2006, Montana received about $641,000. In FFY 2007, Montana again received about $641,000 in federal funds.

In FFY 2008, USFWS transferred $396,000 (President's budget language and $323,000 from USFWS base funding) to MFWP. In addition, FY08 Congressional earmark language included $243,000 in additional funding for wolf monitoring to be distributed by USFWS to Montana, Idaho, and Wyoming. That funding was split evenly between the 3 States.

Funding levels in FFY 2009 appear to be similar to FFY 2008, except that in FY09 USFWS base funding was not provided to Montana because of the apparent surplus in the cooperative agreement that has to be 100% spent by June 30, 2010 when the agreement expires. MFWP and USFWS will begin work to develop a new cooperative agreement outlining responsibilities and funding for the next 5-year period later in 2009.

USDA Wildlife Services

USDA WS is the federal agency assisting MFWP with wolf depredation 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. Verification (either as confirmed or probable) by WS that damage is due to a wolf is an important aspect of the managing the wolf-livestock interface. Livestock owners may be eligible to receive reimbursement through the Montana Livestock Loss Reduction and Mitigation Program. MFWP determines what, if any, is an appropriate response of wolves were responsible for the damage.

As a federal agency, USDA WS is funded through the regular Congressional al budgeting process, particularly with respect to wolf-related work due to the wolf's federally listed status. WS also receives money from other sources in Montana for other agency activities, including the state per capita fee and county livestock assessments.

In FFY 2005 and 2006, Montana USDA WS was funded through the regular Congressional budgeting process for federal agencies and did not receive USFWS-direct funding. Historically and beginning in the early 1990s, USFWS provided funding to USDA WS western region to assist in wolf recovery and management in the tri-state area. By 2001, about $100,000 per year was being transferred from USFWS to USDA WS across the tri state area for field assistance. At that same time, USDA WS also began receiving direct annual appropriations through the USDA Congressional budget process in recognition of the increased workload in the northern Rockies. USFWS continued to fund USDA WS until 2005 through a direct Congressional appropriation and USDA WS western region continued to receive special Congressional directives.

However, in FFY 2005, Congress deleted the federal appropriation that had been given to USFWS and subsequently transferred to USDA WS for their work in the tri state area. In it's place, other special Congressional directives had been incorporated into the USDA WS western region budgets to address funding needs as a result of increased workloads beginning in FFY 2001. These special directives have been maintained each year since. Both MFWP and MT WS have concerns that Congressional earmarks and/or special directives will be cut or eliminated at the Congressional level. That would have important implications for the two agencies and their ability to fulfill their respective agency responsibilities and the commitments made in the Montana Wolf Plan.

There has been confusion over the coincidental timing of elimination of USFWS funding received by MT WS and MFWP taking on wolf management responsibilities. In FFY 2005, the USFWS Congressional appropriation that had been provided to the western region of USDA WS was eliminated. In the same FFY, an interagency cooperative agreement was completed between MFWP and USFWS. As a condition of MFWP signing the agreement, USFWS agency base funding was transferred to MFWP since MFWP was now doing the field program with state personnel. The loss of USFWS funding for tri-state USDA WS gray wolf field activities had nothing to do with a different, independent Congressional earmark appropriation and USFWS base funding for to MFWP to implement work outlined in an MFWP-USFWS interagency cooperative agreement to manage wolves in Montana.

In FFY 2008, WS maintained a $100,000 Congressional directive for responding to complaints of wolf damage as well as a $1,000,000 directive (reduced from $1,300,000 in FFY 2007) for Montana, Idaho, and Wyoming to investigate and address predator damage, including that by wolves.

In FFY 2007, WS spent an estimated $183,924 responding to wolf complaints and assisting MFWP with depredation management responses such as radio collaring or killing problem wolves. This is an increase above the estimated $152,000 spent in federal fiscal year 2006. In FFY 2008, Montana WS expended approximately $227,437. This is an increase of about $43,500 over the previous year. The increase is due in part to increases in fixed costs (e.g. fuel or personnel) and working in new areas. Administrative time is not reflected in the total.

In calendar year 2008, MFWP and WS modified the Cooperative Agreement and the work plan to redirect $110,000 of funding toward assistance with wolf depredation management. WS management activities include capture and incremental control of wolves, reporting, as well as proactive preventative actions to help reduce or minimize potential for wolf predation on livestock

PERSONNEL AND ACKNOWLEDGEMENTS

By now, literally hundreds of people have assisted with wolf recovery efforts in a wide variety of ways, and we are indebted to them all. Since 2000, countless more have assisted with the development of the Montana wolf plan and many more continue to assist during the transition from federal management to state management. We especially want to acknowledge the support and understanding of our families and friends.

The MFWP wolf team is comprised of Kent Laudon in Kalispell, Carolyn Sime in Helena, Mike Ross and Val Asher in Bozeman, Liz Bradley in Dillon/Missoula, and Nathan Lance in Butte. But the wolf team is part of a much bigger team of tremendously dedicated agency professionals that make up Montana Fish, Wildlife & Parks. In particular, Dr. Mark Atkinson (MFWP's former wildlife veterinarian) over saw our animal handling protocols welfare guidelines, in addition to being the MFWP lead for wolf disease surveillance and necropsy work. Additional staff at the MFWP Wildlife Research Laboratory also provide significant logistical support and services for the wolf program, including Neil Anderson (Lab Supervisor). Salish Kootenai Confederated Tribes biologist Stacey Courville and Blackfeet Tribe biologist Dan Carney captured and monitored wolves in and around their respective tribal reservations. We thank them for sharing information contained in this report and the close coordination throughout the year.

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USDA WS investigates suspected wolf damage and carries out wolf control activities in Montana. We thank them for contributing their expertise to the state's wolf program and for their willingness to complete investigations and carryout lethal control work in a timely fashion, 7 days a week. WS personnel involved in wolf management in Montana in 2008 included State Director John Steuber, eastern district supervisor Paul J. Hoover, western district supervisor Kraig Glazier, wildlife specialists Dennis Biggs, John Bouchard, Owen Murnion, Rick Glover, Steve Demers, Michael Hoggan, Dan Thomason, Alan Brown, Brian Noftsker, Mike Thomas, Chad Hoover, R.R. Martin, Graeme McDougal, Theodore North, James Rost, Pat Sinclair, John

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The citizens of Montana deserve special recognition for their cautious willingness to craft a balanced plan that recognizes that wolves are a native species now back on the landscape where people live, work and recreate, to accept the responsibility for wolf conservation and management, and their willingness to move forward knowing that it will continue to be controversial, challenging, and that hard decisions have to be made. We also appreciate the time they take to send us wolf report postcards, on-line wolf reports, or to call us on the phone with their information.

And lastly, the countless private landowners in Montana whose property is used by wolves, sometimes at great cost to the owner, deserve our respect, our understanding and attention to their new challenges, and our gratitude.

LITERATURE CITED AND NORTHERN ROCKY MOUNTAIN WOLF BIBLIOGRAPHY: 2001-2008

(publications listed for the first time are in bold)

Aidnell, Linda. 2006. Corridor for movement of gray wolf (*Canis lupus*) across rural land between two protected parks in Southwestern Manitoba. MSc. Thesis, University of Manitoba, Winnipeg, MB.

Akenson, J., H. Akenson, and H. Quigley. 2005. Effects of wolf reintroduction on a cougar population in the central Idaho wilderness. Mountain lion workshop 8:177-187.

Alexander, S. M., Waters, N. M. and Paquet, P. C. 2005. Traffic volume and highway permeability for a mammalian community in the Canadian Rocky Mountains. Canadian Geographer / Le Géographe Canadien 49: 321-331.

Alexander, S. M., P. C. Paquet, T. B. Logan. 2006. Spatio-temporal co-occurrence of cougar (*Felis concolor*), wolves (*Canis lupus*) and their prey during winter: A comparison of two analytical methods. Journal of Biogeography 33: 2001-2012.

Almberg, E., R. McIntyre, D.R. Stahler, D.W. Smith, B. Chan, M. Ross, J. Knuth Folts, D. Chalfant, B Suderman. 2004. Managing wolves and humans in Lamar Valley. Final Report on Druid Road Management Project 2004. YNP Report. 9 pp.

Anderson, T.M., B.M. VonHoldt, S.I. Candille, M. Musiani, C. Greco, D.R. Stahler, D.W. Smith, B. Padhukasahasram, E. Randi, J.A. Leonard, C.D. Bustamante, E.A. Ostrander, H. Tang, R.K. Wayne, and G.S. Barsh. 2009. Molecular and evolutionary history of melanisn in North American gray wolves. Science

Arjo, W.M., D.H. Pletscher, and R.R. Ream, 2002. Dietary overlap between wolves and coyotes in northwestern Montana. Journal of Mammalogy 83(3): 754-766.

Asher, V., J.A. Shivik, K. Kunkel, M. Phillips, and E. Bangs. 2001. Evaluation of electronic aversive conditioning for managing wolf predation. Proceedings of the International Theriological Congress People and Predators Conference, South Africa.

Atkinson, M.W. 2006. Disease surveillance in gray wolves in Montana: 2003-2006. Unpublished Montana FWP Report. 7pp.

Atwood, T. C. 2006. Wolves, coyotes, elk and mule deer: Predator-prey behavioral interactions in southwestern Montana. PhD Dissertation Utah State University, Logan.

Atwood, T.C., E.M. Gese, and K.E. Kunkel. 2007. Comparative patterns of predation by cougars and recolonizing wolves in Montana's Madison range. Journal of Wildlife Management 71:1098-1106.

Atwood, T.C., E.M. Gese, and K.E. Kunkel. 2009. Spatial Partitioning of Predation Risk in a Multiple Predator- Multiple Prey System. Journal of Wildlife Management. In Press.

Ausband, D., M. Mitchell, A. Mynsberge, C. Mack, J. Stenglein, and L. Waits. 2009. Developing Wolf Population Monitoring Techniques. A cooperative research effort between University of Montana, Nez Perce Tribe, University of Idaho, Idaho Department of Fish and Game, Montana Fish, Wildlife, & Parks, and U.S. Fish & Wildlife Service. TWG Funding Final Report. Univ. Montana, Missoula, MT. 71pp.

Ballard, W.B., D. Lutz, T.W. Keegan, L.H. Carpenter, and J.C. Devos Jr. 2001. Deer-predator relationships: a review of recent North American studies with emphasis on mule and black-tailed deer. Wildlife Society Bulletin 29(1): 99-115.

Ballard, W.B., L.N. Carbyn, and D.W. Smith. 2003. Wolf interactions with non-prey. Pp. 259-271 *in* Wolves: Behavior, Ecology, and Conservation (L. D. Mech and L. Boitani, eds.). University of Chicago Press, Chicago IL.

Bangs, E. 2001. Wolf management by zoning. International Wolf 11(3): 21.

Bangs, E. 2002. Wolf predation and elk in the Greater Yellowstone Area. International Wolf. 12(4): 28.

Bangs, E. 2003. Wolves have reached recovery levels in the northern Rocky Mountains: How does delisting happen? International Wolf 13: 21-22.

Bangs, E.E. 2004. Book review of Mech, L.D. and L. Boitani [eds]. 2003. Wolves: Behavior, Ecology, and Conservation, University of Chicago Press. Journal of Mammalogy 85(4): 814-815.

Bangs, E. 2007. Future conservation of northern Rockies wolves will benefit from State-led management. International Wolf 17:5,7.

Bangs, E. 2008. Restoration of gray wolves in the northern Rocky Mountains. Fair Chase. Vol 23:32-37.

Bangs, E., and J. Shivik. 2001. Managing wolf conflict with livestock in the northwestern United States. Carnivore Damage Prevention News No. 3: 2-5.

Bangs E.E. and D.W. Smith. 2008. Re-introduction of the gray wolf to Yellowstone National Park and central Idaho, USA. Pages 167-171 in Soorae, P.S. (ed) Global re-introduction perspectives: re-introduction case studies from around the globe. IUCN/SSC Re-introduction specialists group, Abu Dhabi, UAE. Viii + 284pp. Downloadable from http://www.iucnsscrsg.org.

Bangs, E.E., B. Barbee, and R.O. Peterson. 2005. Perspectives on Wolf Restoration. Yellowstone Science 13(1): 4-6.

Bangs, E., J. Fontaine, M. Jimenez, T. Meier, C. Niemeyer, D. Smith, K. Murphy, D. Guernsey, L. Handegard, M. Collinge, R. Krischke, J. Shivik, C. Mack, I. Babcock, V. Asher, D. Domenici. 2001. Gray wolf restoration in the northwestern United States. Endangered Species Update 18(4): 147-152.

Bangs, E., M. Jimenez, C. Niemeyer, T. Meier, V. Asher, J. Fontaine, M. Collinge, L. Handegard, R. Krischke, D. Smith, and C. Mack. 2005. Livestock guarding dogs and wolves in the northern Rocky Mountains of the United States. Carnivore Damage Prevention News No. 8/January 2005: 32-39.

Bangs, E., J. Fontaine, T. Meier, C. Niemeyer, M. Jimenez, D. Smith, C. Mack, V. Asher, L. Handegard, M. Collinge, R. Krischke, C. Sime, S. Nadeau, D. Moody. 2005. Restoration and conflict management of the gray wolf in Montana, Idaho, and Wyoming. Trans. N. American Wildlife and Natural Resources Conference Vol 69:89-105.

Bangs, E.E., J.A. Fontaine, M.D. Jimenez, T.J. Meier, E.H. Bradley, C.C. Niemeyer, D.W. Smith, C.M. Mack, V. Asher, J.K. Oakleaf. 2005. Managing wolf/human conflict in the northwestern United States. Pages 340-356, i*n* R. Woodroffe, S. Thirgood, and A. Rabinowitz, eds. People and wildlife: coexistence or conflict? Cambridge University Press, Cambridge, United Kingdom.

Bangs, E., M. Jimenez, C. Niemeyer, J. Fontaine, M. Collinge, R. Krischke, L. Handegard, J. Shivik, C. Sime, S. Nadeau, C. Mack, D. Smith, V. Asher, and S. Stone. 2006. Non-lethal and lethal tools to manage wolf-livestock conflict in the northwestern United States. Proceedings of the Vertebrate Pest Conference 22:7-16.

Bangs, E., M. Jimenez, C. Niemeyer, J. Fontaine, C. Sime, S. Nadeau, and C. Mack. In press. The art of wolf restoration in the northwestern United States: Where do we go now? Pages 000-000 in 'The World of Wolves', eds. M. Musiano, P. Paquet, and L. Boitani. University of Calgary Press. Calgary, AB.

Barber, S., L. D. Mech, and P. J. White. 2005. Yellowstone elk calf mortality following wolf restoration: bears remain top predator. Yellowstone Science 13(3):37-44.

Barber-Meyer, S. M., C. R. Johnson, M. P. Murtaugh, L. David Mech, and P. J. White. 2007. Interleukin-6 and tumor necrosis factor-alpha values in elk neonates. Journal of Mammalogy 88:421-426.

Barber-Meyer, .S. M., P. J. White, and L. D. Mech. 2007. Survey of selected pathogens and blood profiles in Yellowstone elk. American Midland Naturalist 158:369-381.

Barber-Meyer, S. M., and L. D. Mech. 2008. The role of predation of juvenile ungulates in natural selection. Wildlife Biology in Practice 4(1): 2-89.

Barber-Meyer, S. M., L. D. Mech, and P. J. White. 2008. Survival and cause-specific elk-calf mortality following wolf restoration to Yellowstone National Park. Wildlife Monographs 169:1-30.

Berger, J., P.B. Stacey, L. Bellis, and M.P. Johnson. 2001. A mammalian predator-prey imbalance: grizzly and wolf extinction affect avian neotropical migrants. Ecological Applications 11: 947-960.

Berger, J., Swenson, J.E., and I.L. Persson. 2001. Recolonizing carnivores and naïve prey: conservation lessons from Pleistocene extinctions. Science 291:1036-1039.

Berger, J. and D.W. Smith. 2005. Restoring functionality in Yellowstone with recovering carnivores: Gains and uncertainties. Pgs. 100-109 in Large carnivores and biodiversity conservation. Editors, J.C. Ray, K.H. Redford, R.S. Steneck and J. Berger. Island Press, Washington D.C.

Bergman, E., B. Garrott, S. Creel, J.J. Borkowski, R. Jaffe, F.G.R. Watson. 2006. Assessment of prey vulnerability through analysis of wolf movements and kill sites. Ecological Applications 16(1): 273-284.

Beschta, R.L. 2003. Cottonwoods, elk, and wolves in the Lamar Valley of Yellowstone National Park. Ecological Applications 13: 1295-1309.

Beyer, H.L., E.H. Merrill, N. Varley, and M.S. Boyce. 2007. Willow on Yellowstone's northern Range: Evidence for a trophic cascade? Ecological Applications 17:1563-1571.

Biel Wondrak, A. and D. W. Smith. 2006. Diseases investigated as possible cause of wolf decline. Yellowstone Discovery. 21: 6-7.

Bishop, N.A. and D.W. Smith. 2003. The survivors. International Wolf 13(1): 4-7.

Boyce, M.S., J.S. Mao, E.H. Merrill, D. Fortine, M.G. Turner, J. Fryxell, and P. Turchin. 2003. Scale and heterogeneity in habitat selection by elk in Yellowstone National Park. Ecoscience 10:421-431.

Boyce, M.S. 2005. Wolves are consummate predators. A review of Wolves: behavior, ecology, and conservation. Eds L.D. Mech and L. Boitani. The Quarterly Review of Biology 80:87-92.

Boyce, M. S., and R. L. Byrne. 2007. Managing predator-prey systems: summary discussion. Trans. N. Am. Wildl. Nat. Resour. Conf. 72: (in press). There will be several other wolf papers in this volume.

Boyd, D.K., S.H. Forbes, D.H. Pletscher, and F.W. Allendorf. 2001. Identification of Rocky Mountain gray wolves. Wildlife Society Bulletin 29(1): 78-85.

Bradley, E.H. 2004. An evaluation of wolf-livestock conflicts and management in the northwestern United States. M.S. thesis, University of Montana. Missoula, MT.

Bradley, E. H., D. H. Pletscher, E. E. Bangs, K. E. Kunkel, D. W. Smith, C. M. Mack, T.J. Meier, J. A. Fontaine, C. C. Niemeyer, and M. D. Jimenez. 2005. Evaluating wolf translocation as a non-lethal method to reduce livestock conflicts in the northwestern United States. Conservation Biology 19:1498-1508.

Bradley, E. H., and D. H. Pletscher. 2005. Assessing factors related to wolf depredation of cattle in fenced pastures in Montana and Idaho. Wildlife Society Bulletin 33:1256-1265.

Bradley, E. H., D. H. Pletscher, E. E. Bangs, K. E. Kunkel, D. W. Smith, C. M. Mack, J.A. Fontaine, C. C. Niemeyer, T. J. Meier, and M. D. Jimenez. In Prep. Effects of wolf removal on livestock depredation in Montana, Idaho, and Wyoming.

Brainerd, S.M., H. Andren, H., E.E. Bangs, E. Bradley, J. Fontaine, W. Hall, Y. Iliopoulos, M. Jiminez, E. Jozwiak, O. Liberg, C. Mack, T. Meier, C. Niemeyer, H.C. Pedersen, H. Sand, R. Schultz, D.W. Smith, P.Wabakken, and A.Wydeven. 2008. The effects of breeder loss on wolves. Journal of Wildlife Management 72:89-98.

Breck, S.W., R. Williamson, C. Niemeyer, and J.A. Shivik. 2002. Non-lethal radio activated guard for deterring wolf depredation in Idaho: summary and call for research. Proceedings of the Vertebrate Pest Conference 20: 223-226.

Breck, S.W. and T. Meier. 2004. Managing wolf depredation in United States: past, present and future. Sheep and Goat Research Journal 9: 41-46.

Bryan, H., C.T. Darimont, T.E. Reimchen, and P.C. Paquet. 2006. Early ontogenetic diet of wolves. Canadian Field-Naturalist.

Campbell, B.H., B. Altman. E.E. Bangs, D.W. Smith, B. Csuti, D.W. Hays, F. Slavens, K. Slavens, C. Schultz, and R.W. Butler. 2006. "Wildlife Populations." Pages 726-779 in 'Restoring the Pacific NW: the art and science of Ecological Restoration in Cascadia'. D. Apostal and M. Sinclair eds. Island Press. Washington D.C.

Carroll, C., M.K. Phillips, N.H. Schumaker, and D.W. Smith. 2003. Impacts of landscape change on wolf restoration success: Planning a reintroduction program based on static and dynamic spatial models. Conservation Biology 17(2): 536-548.

Carroll, C., M.K. Phillips, C.A. Lopez-Gonzales, and N.H. Schumaker. 2006. Defining Recovery goals and Strategies for Endangered Species: The wolf as a case study. Bioscience 56:25-37.

Chavez, A. and E. Giese. 2006. Landscape use and movements of wolves in relation to livestock in a wildland-agriculture matrix. Journal of Wildlife Management 70:1079-1086.

Christianson D. and S. Creel. 2007. A review of environmental factors affecting winter elk diets. Journal of Wildlife Management. 71(1):

Collinge, Mark. 2008. Relative risks of predation on livestock posed by individual wolves, black bears, mountain lions and coyotes in Idaho. Proceedings of the Vertebrate Pest Conference 23:129-133.

Colorado Wolf Management Working Group. 2005. Findings and recommendations for managing wolves that migrate into Colorado. Colorado Division of Wildlife, Denver, CO. 67 pp. It's available on the web at: http://wildlife.state.co.us/NR/rdonlyres/619DF3FC-A0DE-4AB1-A606-8334764466E2/0/recomendations.pdf

Cook, R. C., J. G. Cook, and L. D. Mech. 2004. Nutritional condition of Northern Yellowstone elk. Journal of Mammalogy 85(4):714-722.

Creel S., G. Spong, J.L. Sands, J. Rotella, J.L. Ziegle, K.M. Murphy, and D.W. Smith. 2004. Population size estimation in Yellowstone wolves with error-prone noninvasive microsatellite genotypes. Molecular Ecology 12: 2003-2009.

Creel, S., J.E. Fox, A. Hardy, J. Sands, B. Garrott, and R.O. Peterson. 2002. Snowmobile activity and glucocorticoid stress responses in wolves and elk. Conservation Biology 13(3): 809-814.

Creel S, J.A Winnie, B. Maxwell, K. Hamlin and M. Creel. 2005. Elk alter habitat selection as an antipredator response to wolves. Ecology 86:3387-3397.

Creel, S., and J. Winnie. 2005 Responses of elk herd size to fine-scale spatial and temporal variation in the risk of predation by wolves. Animal Behaviour 69: 1181-1189

Creel S, D. Christianson, S. Liley and J. Winnie. 2007. Effects of predation risk on reproductive physiology and demography in elk. Science 315:960.

Christianson D. and S. Creel. 2008. Risk effects in elk: sex-specific response in grazing and browsing due to predation risk from wolves. Behavioral Ecology 19: 1258 - 1266.

Creel S., and D. Christianson. 2008. Relationships between direct predation and risk effects. Trends in Ecology & Evolution 23: 194-201.

Creel S., J.A. Winnie, D. Christianson and S. Liley. 2008. Time and space in general models of antipredator response: tests with wolves and elk. Animal Behavior 76: 1139-1146

Creel S. and D. Christianson. (in press). Wolf presence and increased willow consumption by Yellowstone elk: implications for trophic cascades. Ecology.

Darimont, C. T., P. C. Paquet, and T. E. Reimchen. 2006. Stable isotopic niche predicts fitness in a wolf-deer system. Biological Journal of the Linnaean Society 90: 125-137.

Defenders of Wildlife. 2008. Livestock and Wolves: A guide to nonlethal tools and methods to reduce conflicts. Defenders of Wildlife, 1130 17th St. NW, Washington D.C. 20036. 23pp.

Duffield, J., C. Neher, and D. Patterson. 2006. Wolves and people in Yellowstone: Impacts on the regional economy. Missoula, MT, The University of Montana: 1-67.

Duffield, J.W., C.J. Neher, and D.A. Patterson. 2008. Wolf recovery in Yellowstone: Park visitor attitudes, expenditures, and economic impacts. Yellowstone Science 16:2025.

Duncan, R., and A. Mahle. 2004. Wolves are still in need of federal protection. International Wolf 14(1): 5-7

Eberhardt, L.L., R.A. Garrott, D.W. Smith, P.J. White, and R O. Peterson. 2003. Assessing the impact of wolves on ungulate prey. Ecological Applications 13(3): 776-783.

Evans, S. B., D. L. Mech, P.J. White, and G.A. Sargeant. 2006. Survival of adult female elk in Yellowstone following wolf restoration. Journal of Wildlife Management 70(5): 1372-1378.

Ferguson, G. and D.W. Smith. 2005. A decade of wolves in Yellowstone. Montana Magazine (May-June):16-22.

Forester, J.D., A.R. Ives, M.G. Turner, D.P. Anderson, D. Fortin, H.L. Beyer, D.W. Smith, and M.S. Boyce. 2007. State-space models link elk movement patterns to landscape characteristics in Yellowstone National Park. Ecological Monographs 77:285-299.

Fortin, D., H.L. Beyer, M.S. Boyce, D.W. Smith, T. Duchesne, and J.S. Mao. 2005. Wolves influence elk movements: Behavior shapes a trophic cascade in Yellowstone National Park. Ecology 86:1320-1330.

Frame, P.F., H.D. Cluff, and D.S. Hik. 2007. Response of wolves to experimental disturbance at homesites. J. Wildlife Management 71:316320. (1)

Frame, P.F., and T.J. Meier. 2007. Field-assessed injury to wolves captured in rubber-padded traps. J. Wildlife Management 71(6):2074–2076.

Fritts, S.H., C.M. Mack, D.W. Smith, K.M. Murphy, M.K. Phillips, M.D. Jimenez, E.E. Bangs, J.A. Fontaine, C.C. Niemeyer, W.G. Brewster, and T.J. Kaminski. 2001. Outcomes of hard and soft releases of reintroduced wolves in Central Idaho and the Greater Yellowstone area. Pages 125-147 *in* Large Mammal Restoration: Ecological and Sociological Challenges in the 21st Century, D.S. Maehr, R.F. Noss and J.L. Larkin, eds. Island Press, Washington, D.C.

Fritts, S.H., R.O. Stephenson, R.D. Hayes, and L. Boitani. 2003. Wolves and Humans. Pages 289-316 *in* L.D. Mech and L. Boitani, editors Wolves: Behavior, Ecology, and Conservation. University of Chicago Press. Illinois, USA.

Garrott, R. A., J. A.Gude, E.J. Bergman, C. Gower, P. J. White, and K. L. Hamlin. 2005. Generalizing wolf effects across the Greater Yellowstone area: a cautionary note. Wildlife Society Bulletin 33:1245-1255.

Garrott, R., S. Creel, and K. Hamlin. 2006. Monitoring and assessment of wolf-ungulate interactions and population trends within the Greater Yellowstone Area, SW Montana and Montana Statewide. Unpublished report at http://www.homepage.montana.edu/~rgarrott/wolfungulate/index.htm .

Garrott, P.J. White, and F.G.R. Watson (editors), The ecology of large mammals in central Yellowstone:sixteen years of integrated field studies. Academic Press, Terrestrial Ecology Series, Elsevier, London, UK.

-Book Chapters

-Garrott, R.A., P.J. White, and J.J. Rotella, J.J. 2008. The Madison headwaters elk herd: stability in an inherently variable environment. Pages 189-214, in R.A. Garrott, P.J. White, and F.G.R. Watson (editors), The ecology of large mammals in central Yellowstone:sixteen years of integrated field studies. Academic Press, Terrestrial Ecology Series, Elsevier, London, UK.

-Becker, M.S., R.A. Garrott, P.J. White, C.N. Gower, E.J. Bergman, and R. Jaffe. 2008. Wolf prey selection in an elk-bison system: choice or circumstance? Pages 303-336, in R.A. Garrott, P.J. White, and F.G.R. Watson (editors), The ecology of large mammals in central Yellowstone: sixteen years of integrated field studies. Academic Press, Terrestrial Ecology Series, Elsevier, London, UK.

-Becker, M.S., R.A. Garrott, P.J. White, R. Jaffe, C.N. Gower, J.J. Borkowski, and E.J. Bergman. 2008. Wolf kill rates: predictably variable? Pages 337-368, in R.A. Garrott, P.J. White, and F.G.R. Watson (editors), The ecology of large mammals in central Yellowstone: sixteen years of integrated field studies. Academic Press, Terrestrial Ecology Series, Elsevier, London, UK.

-Gower, C.N., R.A. Garrott, P.J. White, F.G.R. Watson, S.S. Cornish, and M.S. Becker. 2008. Spatial responses of elk to winter wolf predation risk: using the landscape to balance multiple demands. Pages 371-398, in R.A. Garrott, P.J. White, and F.G.R. Watson (editors), The ecology of large mammals in central Yellowstone: sixteen years of integrated field studies. Academic Press, Terrestrial Ecology Series, Elsevier, London, UK.

-Gower, C.N., R.A. Garrott, P.J. White, S. Cherry, and N.G. Yoccoz. 2008. Elk group size and wolf predation: a flexible strategy when faced with variable risk. Pages 399-420, in R.A. Garrott, P.J. White, and F.G.R. Watson (editors), The ecology of large mammals in central Yellowstone: sixteen years of integrated field studies. Academic Press, Terrestrial Ecology Series, Elsevier, London, UK.

-Gower, C.N., R.A. Garrott, and P.J. White. 2008. Elk foraging behavior: does predation risk reduce time for food acquisition? Pages 421-448, in R.A. Garrott, P.J. White, and F.G.R. Watson (editors), The ecology of large mammals in central Yellowstone: sixteen years of integrated field studies. Academic Press, Terrestrial Ecology Series, Elsevier, London, UK.

-White, P.J., R.A. Garrott, S. Cherry, F.G.R. Watson, C.N. Gower, M.S. Becker, and E. Meredith. 2008. Changes in elk resource selection and distribution with the reestablishment of wolf predation risk. Pages 449-474, in R.A. Garrott, P.J. White, and F.G.R. Watson (editors), The ecology of large mammals in central Yellowstone: sixteen years of integrated field studies. Academic Press, Terrestrial Ecology Series, Elsevier, London, UK.

-White, P.J., R.A. Garrott, J.J. Borkowski, K.L. Hamlin, and J.G. Berardinelli. 2008. Elk nutrition after wolf recolonization of central Yellowstone. Pages 475-486, in R.A. Garrott, P.J. White, and F.G.R. Watson (editors), The ecology of large mammals in central Yellowstone: sixteen years of integrated field studies. Academic Press, Terrestrial Ecology Series, Elsevier, London, UK.

-Garrott, R.A., P.J. White, and J.J. Rotella. 2008. The Madison headwaters elk herd: transitioning from bottom-up regulation to top-down limitation. Pages 487-516, in R.A. Garrott, P.J. White, and F.G.R. Watson (editors), The ecology of large mammals in central Yellowstone: sixteen years of integrated field studies. Academic Press, Terrestrial Ecology Series, Elsevier, London, UK.

-Garrott, R.A., P.J. White, C.N. Gower, and M.S. Becker. 2008. Regulation of the Madison headwaters wolf-ungulate system: an alternate equilibrium state or elk extirpation? Pages 517-538, in R.A. Garrott, P.J. White, and F.G.R. Watson (editors), The ecology of large mammals in central Yellowstone: sixteen years of integrated field studies. Academic Press, Terrestrial Ecology Series, Elsevier, London, UK.

-Hamlin, K.L., P.J. White, R.A. Garrott, and J.A. Cunningham. 2008. Contrasting wolf-ungulates interactions in the Greater Yellowstone Ecosystem. Pages 539-576, in R.A. Garrott, P.J. White, and F.G.R. Watson (editors), The ecology of large mammals in central Yellowstone: sixteen years of integrated field studies. Academic Press, Terrestrial Ecology Series, Elsevier, London, UK.

-Smith, D.W., D.R. Stahler, and M.S. Becker. 2009. Wolf recolonization of the Madison headwaters area in Yellowstone. Pages 283-303 in R.A. Garrott, P.J. White and F. Watson editors. The Ecology of Large Mammals in Central Yellowstone. Elsevier Academic Press-Terrestrial Ecology Series.

Gipson, P.S., E.E. Bangs, T.N. Bailey, D.K. Boyd, H. D. Cluff, D.W. Smith, and M.D. Jimenez. 2002. Color patterns among wolves in western North America. Wildlife Society Bulletin 30(3): 821-830.

Grigg, J. L. 2007. Gradients of predation risk affect distribution and migration of a large herbivore. M.S. thesis, Montana State University, Bozeman.

Groen, C., J. Maurier, S. Guertin. 2008. Memorandum of understanding: protection of genetic diversity of NRM gray wolves. 4 pp

Gude, J.A., M. S. Mitchell, D. E. Ausband, C. A. Sime, and E. E. Bangs. In review. Internal validation of predictive logistic models for decision making in wildlife management. J. Wildlife Management.

Gude, J. A. 2004. Applying risk allocation theory in a large mammal predator-prey system: elk-wolf behavioral interactions. M.S. Thesis, Montana State University, Bozeman, MT USA.

Gude, J. A., B. Garrott, J.J. Borkowski, F. King. 2006. Prey risk allocation in a grazing ecosystem. Ecological Applications 16(1): 285-298.

Gunther, K. A. and D. W. Smith. 2004. Interactions between wolves and female grizzly bears with cubs in Yellowstone National Park. Ursus 15(2): 232-238.

Hebblewhite, M. and D. H. Pletscher. 2002. Effects of elk groups size on predation by wolves. Canadian Journal of Zoology 80:800-809.

Hebblewhite, M., D. H. Pletscher, P.C. Paquet. 2002. Elk population dynamics in areas with and without predation by recolonizing wolves in Banff National Park, Alberta. Canadian Journal of Zoology 80: 789-799.

Hebblewhite, M., P.C. Paquet, D.H. Pletscher, R.B. Lessard, and C.J. Callaghan. 2003. Development and application of a ratio estimator to estimate wolf kill rates and variance in a multi-prey system. Wildlife Society Bulletin 31(4): 933-946.

Hebblewhite, M., D.H. Pletscher, and P. Paquet. 2003. Elk population dynamics following wolf recolonization of the Bow Valley of Banff National Park. Research Links 11(1):10-12.

Hebblewhite, M., C. White, C. Nietvelt, J. Mckenzie, T. Hurd, J. Fryxell, S. Bayley, and P. C. Paquet. 2005. Human activity mediates a trophic cascade caused by wolves. Ecology 86: 1320–1330.

Hebblewhite, M, E.H. Merrill, T.L. McDonald. 2005. Spatial decomposition of predation risk using resource selection functions: an example in a wolf-elk predator prey system. Oikos 111:101-111.

Hebblewhite, M., Merrill, E. H., Morgantini, L. E., White, C. A., Allen, J. R., Bruns, E., Thurston, L. and Hurd, T. E. 2006. Is the migratory behavior of montane elk herds in peril? The case of Alberta's Ya Ha Tinda elk herd. Wildlife Society Bulletin, In Press.

Hebblewhite, M. 2007. Predator-prey management in the National Park context: lessons from a transboundary wolf-elk, moose and caribou system. In press in Transactions of the 72nd North American Wildlife Conference, Portland, 2007.

Hebblewhite, M., E.H. Merrill, and G. McDermid. 2007 . A mutli-scale test of the Forage maturation hypothesis for a partially migratory montane elk population. Ecological Monographs, In Press.

Hebblewhite, M. and E.H. Merrill. 2007. Multiscale wolf predation risk for elk: Does migration reduce risk? Oecologia, 152: 377-387.

Hebblewhite, M., J. Whittington, M. Bradley, G. Skinner, A. Dibb, and C.A. White. 2007. Conditions for caribou persistence in the wolf-elk-caribou systems of the Canadian Rockies. Rangifer, 17: 79 – 91.

Hebblewhite, M., Percy, M. and Merrill, E. H. 2007. Are all GPS collars created equal? Correcting habitat-induced bias using three brands in the Central Canadian Rockies. Journal of Wildlife Management 71: 2026-2033.

Hebblewhite, M. and D.W. Smith. In press. Wolf community ecology: Ecosystem effects of recovering wolves in Banff and Yellowstone National Parks. Pages 000-000 *in* M. Musiani, L. Boitani, and P. Paquet, editors. The world of wolves: new perspectives on ecology, behavior and policy. University of Calgary Press.

M. Hebblewhite, R.H. Munro, E.H. Merrill. 2009. Trophic consequences of postfire logging in a wolf–ungulate system. Forest Ecology and Management. Vol 257:1053-1062.

Henry, T. 2006. Yellowstone's Trophic Cascade: Evidence of an Ecosystem on the Mend? Yellowstone Discovery. 21: 1-5.

Hirsey, F. 2008. Creating more problems than it solved. Fair Chase. Vol 23:44-45.

Holland, J. S. 2004. The wolf effect. National Geographic, October.

Holyan, J., D. Boyd, C. Mack, and D. Pletscher. 2005. Longevity and productivity of three wolves, Canis lupus, in the wild. Canadian Field-Naturalist. 119:446-447.

Hurford, A., M. Hebblewhite, M.A. Lewis. 2006. A spatially explicit model for an Allee effect: Why wolves recolonize so slowly in Greater Yellowstone. Theoretical Population Biology 70: 244-254.

Husseman, J.S. 2002. Prey selection patterns of wolves and cougars in East-central Idaho. Unpublished thesis, University of Idaho, Moscow.

Husseman, J.S., D.L. Murray, G. Power, and C. Mack. 2003. Correlation patterns of marrow fat in Rocky Mountain elk bones. Journal of Wildlife Management 67(4): 742-746.

Husseman, J.S., D.L. Murray, G. Power, C. Mack, C.R. Wenger, and H. Quigley. 2003. Assessing differential prey selection patterns between two sympatric large carnivores. Oikos 101: 591-601.

Jaffe, R. 2001. Winter wolf predation in an elk-bison system in Yellowstone National Park, Wyoming. Unpublished thesis, Montana State University.

Jimenez, M. D., and J. Stevenson. 2003. Wolf-elk interactions on state-managed feed grounds in Wyoming. 2002 progress report. USFWS, 190 N First St., Lander WY 82520. 11 pp.

Jimenez, M. D., and J. Stevenson. 2004. Wolf-elk interactions on state-managed feed grounds in Wyoming. 2003 progress report. USFWS, PO Box 2645, Jackson, WY 83001. 13 pp

Jimenez, M.D., S.P.Woodruff, S. Cain, and S. Dewey. 2005. Wolf-elk interactions on winter range and state-managed feed grounds in Wyoming. 2005 progress report. USFWS, P.O. Box 2645, Jackson, WY 83001. 12 pp.

Jimenez, M.D., S.P.Woodruff, S. Cain, and S. Dewey. 2006. Wolf-elk interactions on winter range and state-managed feed grounds in Wyoming. 2006 progress report. USFWS, P.O. Box 2645, Jackson, WY 83001. XX pp.

Jimenez, M.D., S.P. Woodruff, S. Dewey, and S. Cain. 2007. Monitoring wolf distribution and annual predation patterns of wolves near Jackson, WY. 2007 Progress Report. USFWS, P.O. Box 2645, Jackson, WY 83001. 10 pp.

Jimenez, M.D., V.J. Asher, C. Bargman, E.E. Bangs, and S. Woodruff. In press. Wolves killed by cougars and a grizzly bear in western United States and Canada. Canadian Field Naturalist.

Jimenez, M.D., E. E. Bangs, Carolyn Sime, and V. Asher. Submitted. Sarcoptic mange found in wolves in the Rocky Mountains in western United States. J. Wildlife Disease.

Jimenez, M.D., E.E. Bangs, S. Nadeau, V.J. Asher, C. Sime. Submitted. Dog lice (Trichodectes canis) on wolves in Montana and Idaho. J. Wildlife Disease.

Jimenez, M.D., S.P.Woodruff, Sarah Dewey, and E.E. Bangs. In prep. Prey selection by wolves (Canis lupus) and wolf-elk interactions on state-managed feed grounds and traditional winter range in Wyoming.

Jimenez, M.D., D.K. Boyd, E.E. Bangs, D.W. Smith, C.M. Mack, C.A. Sime, and S.Nadeau. In prep. Wolf Dispersal in the Rocky Mountains in western United States from 1993-2005.

Kaufmann, M.J., N. Varley, D.W. Smith, D.R. Stahler, D.R. MacNulty, and M. Boyce. 2007. Landscape heterogeneity shapes predation in a newly restored predator-prey system. Ecology letters 10:690-700.

Kostel, K. 2004. Leftovers Again? Science News. March.

Kunkel, K.E. 2003. Ecology, conservation, and restoration of large carnivores in western North America. Pages 250-295 in C.J. Zabel and R.G. Anthony editors. Mammal community dynamics in western coniferous forests of North America: management and conservation issues. Cambridge University Press, UK.

Kunkel, K.E., and D.H. Pletscher. 2001. Winter hunting patterns and success of wolves in Glacier National Park, Montana. Journal of Wildlife Management 65: 520-530.

Kunkel, K.E., D.H. Pletscher, D.K. Boyd, R.R. Ream, and M.W. Fairchild. 2004. Factors correlated with foraging behavior of wolves in and near Glacier National Park, Montana. Journal of Wildlife Management 68(1): 167-178.

Kunkel, K.E., C. Mack, and W. Melquist. 2005. An assessment of methods for monitoring wolves after delisting in the northern Rockies. Report to Nez Perce Tribe, Lapwai, Idaho,USA.

Larsen, T. 2004. Modeling gray wolf habitat in Oregon using a geographic information system. M.S. Thesis, University of Oregon. Corvallis, Oregon. 120pp.

Leonard, J.A., C. Vila, and R.R. Wayne. 2005. Legacy lost: genetic variability and population size of extirpated U.S. Grey Wolves (*Canis lupus*). Molecular Ecology 14:9-17.

Liley S. and S. Creel. 2008. What best explains vigilance in elk: characteristics of prey, predators, or the environment? Behavioral Ecology 19: 245-254.

Mack, C.M., I. Babcock, and J. Holyan. 2002. Idaho Wolf Recovery Program: Restoration and management of gray wolves in Idaho. Progress report 1999-2001. Nez Perce Tribe, Department of Wildlife Management, Lapwai, ID. 34 pp.

Mack, C.M., and J. Holyan. 2003. Idaho wolf recovery program: Restoration and management of gray wolves in central Idaho. Progress report 2002. Nez Perce Tribe, Department of Wildlife Management, Lapwai, ID. 34 pp.

MacNulty, D.R. 2002. The predatory sequence and the influence of injury risk on hunting behavior in the wolf. Unpublished thesis. Department of Fisheries, Wildlife, and Conservation Biology. Minneapolis, MN, University of Minnesota. 71pp.

MacNulty, D.R., N. Varley, and D.W. Smith. 2001. Grizzly bear, *Ursus arctos*, usurps bison, *Bison bison*, captured by wolves, *Canis lupus*, in Yellowstone National Park, Wyoming. Canadian Field-Naturalist 115: 495-498.

MacNulty, D.R., L.D. Mech, D.W. Smith. 2007. A proposed ethogram of large-carnivore predatory behavior, exemplified by the wolf. Journal of Mammalogy 88:595-605

MacNulty, D.R., D.W. Smith, L.D. Mech, and L.E. Eberly. 2009. Body size and predatory performance in wolves: is bigger better? Journal of Animal Ecology

MacNulty, D.R., G.E. Plumb, and D.W. Smith. 2008. Validation of a new video and telemetry system for remotely monitoring wildlife. Journal of Wildlife Management 72:1834-1844.

McNay, M.E. 2002. Wolf-human interactions in Alaska and Canada: a review of the case history. Wildlife Society Bulletin 30(3): 831-843.

Mao, J.S., M.S. Boyce, D.W. Smith, F.J. Singer, D.J. Vales, J.M. Vore and E.M. Merrill. 2005. Habitat selection by elk before and after wolf reintroduction in Yellowstone National Park. Journal of Wildlife Management 69(4):1691-1707.

Mech, L.D. and Boitani, eds. 2003. Wolves: behavior, ecology, and conservation. Univ. Chicago Press, Chicago, IL.

Mech, L.D. 2004. Why I support federal wolf delisting. International Wolf 14(1):5-7.

Mech, L.D. 2006. Estimated age structure of wolves in northeastern Minnesota. Journal Wildlife Management 70:1481-1483.

Mech, L.D., R. T. McIntyre, D. W. Smith. 2004. Unusual behavior by bison, Bison bison, toward elk, Cervus elaphus, and wolves, Canis lupus. Canadian Field Naturalist 118: 115-118.

Mech, L.D., D.W. Smith, K.M. Murphy, and D.R. MacNulty. 2001. Winter severity and wolf predation on a formerly wolf-free elk herd. J. of Wildlife Management 65(4): 998-1003.

Meier, T. 2001. Wolf depredation in the United States. International Wolf 11(3): 4-5.

Merkle, J.A., D.R. Stahler, and D.W. Smith. 2009. Interference competition between gray wolves and coyotes in Yellowstone National Park. Can. J. Zool. 87:56-63.

Messer, M. A. 2003. Identifying large herbivore distribution mechanisms through application of fine scale snow modeling. M.S. Thesis, Montana State University Bozeman. 46 pp.

Miller, B.,B. Dugelby, D. Foreman, C. Martinez del Rio, R. Noss, M. Phillips, R. Reading, M. Soule, J. Terborgh, and L. Wilcox. 2001. The importance of large carnivores to healthy Ecosystems. Endangered Species Update 18:202-210.

Mitchell, M. S., D. E. Ausband, C. A. Sime, E. E. Bangs, J. A. Gude, M. D. Jiminez, C. M. Mack, T. J. Meier, M. S. Nadeau, and D. W. Smith. 2008. Estimation of self-sustaining packs of wolves in the U.S. northern Rocky Mountains. J. Wildlife Management 72:881-891.

Montag, Jessica M. 2004. Lions, Wolves, and Bears, Oh My! Predator Compensation Programs in the West. Fair Chase, Summer: 52-54.

Montag, J. 2003. Compensation and predator conservation: limitations of Compensation. Carnivore Damage Prevention News 6:2-6.

Montag, J.M., M.E. Patterson, and W.A. Freimund. 2005. The wolf viewing experience in the Lamar Valley of Yellowstone National Park. Human Dimensions of Wildlife 10:273-284.

Montag, J.M., M.E. Patterson, and B. Sutton. 2003. Political and Social Viability of Predator Compensation Programs in the West. Final Project Report. Wildlife Biology Program, School of Forestry, University of Montana, Missoula, MT 59812. 136pp.

Montana Wolf Management Advisory Council, 2003. Montana gray wolf conservation and management plan. Final environmental impact statement C. Sime, ed. Montana Fish, Wildlife and Parks, Helena. 420 pp.

Murray, D., D.W. Smith, E. E. Bangs, C. Mack, J.Oakleaf, J. Fontaine, D. Boyd, M. Jimenez, D. Pletscher, C. Niemeter, T. Meier, D. Stahler. In prep. 2009. Mortality patterns in recovering wolf populations: Is death from anthropogenic causes additive or compensatory to natural mortality? 30pp.

Musiani, M. and P. Paquet. 2004. The practices of wolf persecution, protection, and restoration in Canada and the United States. BioScience 54: 50-60.

Musiani, M., C. Mamo, L. Boitani, C. Callaghan, C. Cormack Gates, L. Mattei, E. Visalberghi, S. Breck, and G. Volpi. 2003. Wolf depredation trends and the use of fladry barriers to protect livestock in western North America. Conservation Biology 17: 1538-1547.

Musiani, M., Muhly, T., Callaghan, C., Gates, C.C., Smith, M., Stone, S. and Tosoni, E. 2004. Recovery, conservation, conflicts and legal status of wolves in western North America. Pages 51-75 in N. Fascione, A. Delach and M. Smith, (eds.). Predators and People: from conflict to conservation. Island Press, Washington, D.C., USA.

National Research Council. 2002. Ecological dynamics on Yellowstone's Northern Range. Committee on ungulate management in Yellowstone National Park. National Academy Press, Washington, DC. 198 pp.

Niemeyer, C. 2004. Crying Wolf in Central Asia. International Wolf Vol 14 (2): 7-9.

Niemeyer, C. 2004. Education goes both ways with wolf depredations. International Wolf Vol. 14 (3): 14-15.

Niemeyer, C. 2007. The Good, the Bad and the Ugly, Depending on Your Perspective, PP 287-296. Transactions of the Seventy-second North American Wildlife and Natural Resources Conference (Portland).

Nietvelt C.G. 2001. Herbivory interactions between beaver (Castor canadensis) and elk (Cervus elphus) on willow (Salix spp.) In Banff National Park, Alberta. M.S. Thesis, University of Alberta, Edmonton, Alberta.

Oakleaf, J. K. 2002. Wolf-cattle interactions and habitat selection by recolonizing wolves in the northwestern United States. M.S. Thesis, University of Idaho, Moscow, Idaho.

Oakleaf, J.K., C. Mack, and D.L. Murray. 2003. Effects of wolves on livestock calf survival and movements in central Idaho. Journal of Wildlife Management 67: 299-306.

Oakleaf, J.K., D.L. Murray, J.R. Oakleaf, E.E. Bangs, C.M. Mack, D.W. Smith, J.A. Fontaine, M.D. Jimenez, T.J. Meier, and C.C. Niemeyer. 2006. Habitat selection by recolonizing wolves in the Northern Rocky Mountains of the United States. Journal of Wildlife Management 70:554-565.

Oregon Dept. of Fish and Wildlife. 2005. Oregon Wolf Conservation and Management Plan. Salem, OR. The plan is posted at www.dfw.state.or.us under wolves.

Paquet, P.C. and L.N. Carbyn. 2003. Gray Wolf, pp. 482-510, *in* Wild Mammals of North America. G Fledhamer, B.C. Thompson, and J.A. Chapman, eds. John Hopkins Press.

Paquet, P. C., S. M. Alexander, P. L. Swan, and C. T. Darimont. 2006. Pages 130-156 in Connectivity Conservation, eds K. R. Crooks and M. Sanjayan. Influence of natural landscape fragmentation and resource availability on distribution and connectivity of marine gray wolf (*Canis lupus*) populations on Central Coast, British Columbia, Canada. Cambridge University Press. N.Y. & England.

Patterson, M.E., J.M. Montag, and D.R. Williams. 2003. The urbanization of wildlife management: Social science, conflict, and decision making. Urban Forestry and Urban Greening 1:171-183.

Peterson, R.O., A.K. Jacobs, T.D. Drummer, L.D. Mech, and D.W. Smith. 2002. Leadership behavior in relation to dominance and reproductive status in gray wolves, *Canis lupus*. Canadian Journal of Zoology 80: 1405-1412.

Phillips, M.K., E.E. Bangs, L.D. Mech, B.T. Kelly, and B. Fazio. 2005. Living alongside canids: lessons from the extermination and recovery of red and grey wolves in the contiguous United States. Pages 297-309 in D. MacDonald and C. Sillero, (eds.). The biology and conservation of wild canids. Oxford University Press, New York, Oxford.

Phillips, M.K, B. Miller, K.E. Kunkel, P.C. Paquet, W.W. Martin, and D.W. Smith. 2009. Implications of Wolf Restoration in the Southern Rocky Mountains. Pages (in press) in Reading, R.P.,B. J. Miller, A. Masching, R. Edward, and M. Phillips, editors. Wolf Restoration in the Southern Rocky Mountains. Fulcrum Publishing, Golden, CO.

Pyare, S., and J. Berger. 2003. Beyond demography and delisting: ecological recovery for Yellowstone's grizzly bears and wolves. Biological Conservation 113:63-73.
Raikkonen, J. J. Vucetich, and R.O. Peterson. In review. Congenital bone deformities and the inbred wolves of Isle Royale. Biological Conservation.

Riley, S. J., G. M. Nesslage, and B. A. Maurer. 2004. Dynamics of early wolf and cougar eradication efforts in Montana: implications for conservation. Biological Conservation 119:575-579.

Ripple, W.J., and R.L. Beschta. 2003. Wolf reintroduction, predation risk, and cottonwood recovery in Yellowstone National Park. Forest Ecology and Management 184: 299-313.

Ripple, W.J. and R.L. Beschta. 2004. Wolves and the ecology of fear: Can predation risk structure ecosystems? Bioscience 54(8): 755-766.

Ripple, W.J., E.J. Larsen, R.A. Renkin, and D.W. Smith. 2001. Trophic cascades among wolves, elk and aspen on Yellowstone National Park's Northern Range. Biological Conservation 102: 227-234.

Robbins, J. 2004. Lessons from the WOLF. Scientific American. Vol. 290 (6): 76-81.

Ruth, T. K., D. W. Smith, M. A. Haroldson, P. C. Buotte, C. Schwartz, H. Quigley, S. Cherry, K. M. Murphy, D. B. Tyers, and K. Frey. 2003. Large-carnivore response to recreational big-game hunting along the Yellowstone National Park and Absaroka-Beartooth Wilderness boundary. Wildlife Society Bulletin 31: 1150-1161.

Sands, J. 2001. Stress hormones and social behavior of wolves in Yellowstone National Park. Unpublished thesis. Biological Sciences. Bozeman, MT, Montana State University. 51pp.

Sands J. L. and S. Creel 2004. Social dominance, aggression and fecal glucocorticoid levels in a wild population of wolves, Canis lupus. Animal Behaviour 67: 387-396

Shivik, J. A. 2006. Tools for the Edge: What's New for Conserving Carnivores. Bioscience 56:253-259.

Shivik, J. A. 2004. Nonlethal alternatives for predation management. Sheep and Goat Research Journal. 19:64-71.

Shivik, J. 2001. The other tools for wolf management. WOLF! Vol 11 (2): 3-7.

Shivik, J.A., A. Treves, and P. Callahan. 2003. Nonlethal techniques for managing predation: primary and secondary repellents. Conservation Biology 17: 1531-1538.

Shivik, J.A., V. Asher, L. Bradley, K. Kunkel, M. Phillips, S. W. Breck, and E. Bangs. 2002. Electronic aversive conditioning for managing wolf depredation. Proceedings of the Vertebrate Pest Conference 20: 227-231.

Sime, C.A., E. E. Bangs, L. Bradley, J.E. Steuber, K. Glazier, P.J. Hoover, V. Asher, K. Laudon, M. Ross, and J. Trapp. 2007. Gray wolves and livestock in Montana: a recent history of damage management: 1987-2006. pages 16-35 in Proceedings of 12th, The Wildlife Society Wildlife Damage Management Working Group Conference, Corpus Christi TX. D.L. Nolte, W.M. Arjo, and D.H. Stalman, eds.

Sime, C. A., J. Shivik, S. Breck, N. Lance, J. Steuber, J. Trapp, L. Bradley, M. Ross, V. Asher, M. Lewis, S. Courville, J. Weigand. 2008. NRCS Conservation Innovation Grant Final Report: Application of Electrified Fladry to Protect Cattle from Wolves in Montana. Montana, Fish, Wildlife & Parks, Helena. 27pp.

Smith, BL., E.S. Williams, K.C. McFarland, T.L. McDonald, G. Wang, and T.D. Moore. 2006. Neonatal mortality of elk in Wyoming: environmental, population, and predator effects. U.S. Department of the Interior, U.S. Fish and wildlife Service, Biological Technical Publication, BTP-R0007, Washington D.C.

Smith, C. A. and C. A. Sime. 2007. Policy Issues Related to Wolves in the Northern Rocky Mountains. In Press. Transactions of the 72nd North American Wildlife and Natural Resources Conference.

Smith, D.W. 2001. Wildlife Art: Does it make a difference for wolves? Wildlife Art 20 (6): 102-105.

Smith, D.W. 2002. Wolf #7: The passing of a matriarch. Yellowstone Science 10: 18-19.

Smith, D.W. 2002. Book review -- Wolves and Human Communities: Biology, Politics, and Ethics. Journal of Mammalogy 83: 915-918.

Smith, D.W. 2002. Wolf Pack Leadership: Doug Smith explores the issue in Yellowstone and Isle Royale. Howlings: The Central Rockies Wolf Project 11(2): 10-12.

Smith, D.W. 2004. Wolf behavior: Learning to live in life or death situations. Pages 1181-1185 in Encyclopedia of Animal Behavior, Marc Bekoff (ed.), Greenwood Press, Westport, CT.

Smith, D.W. 2004. The wolf in fairy tales. Pages 39-40 in: Encyclopedia of Animal Behavior, ed., Marc Bekoff, Greenwood Press, Westport, CT.

Smith, D.W. 2005. Mixed messages about opportunistic carnivores. Conservation Biology 19:1676-1678.

Smith, D.W. 2005. Ten years of Yellowstone wolves, 1995-2005. Yellowstone Science 13(1): 7-33.

Smith, D.W. 2005. Ten years of Yellowstone wolves 1995-2005. Points West Magazine, Buffalo Bill Historical Center, Spring:3-6.

Smith, D.W. 2005. The predator and prey battle. Points West Magazine, Buffalo Bill Historical Center, Spring:7.

Smith, D.W. 2005. Ten Years of Yellowstone Wolves, 1995-2005. Yellowstone Science 13 (1): 7-33.

Smith, D. W. 2006. Coexisting with large carnivores: Lessons from Greater Yellowstone (book review). BioScience 56(10): 848-849.

Smith, D.W. 2006. Re-introduction of gray wolves to Yellowstone National Park, USA. Re-Introduction News 25: 29-31.

Smith, D.W. 2007. Wolf and human conflicts: A long, bad history. Pages 402-409 in M. Bekoff, editor. Encyclopedia of human-animal relationships. Greenwood Press, Westport, CT.

Smith, D.W. 2008. Look a wild wolf in the eye: Review of The Last Wild Wolves. BBC Wildlife (26):80.

Smith, D.W., and D.S. Guernsey. 2001. Yellowstone Wolf Project: Annual Report, 2000. National Park Service, Yellowstone Center for Resources, Yellowstone National Park, Wyoming, YCR-NR-2001-01. 14 pp.

Smith, D.W., and D.S. Guernsey. 2002. Yellowstone Wolf Project: Annual report, 2001. National Park Service, Yellowstone Center for Resources, Yellowstone National Park, Wyoming, YCR-NR-2002-04.

Smith, D.W. and R. McIntyre. 2002. Wolf pack size: How did the Druid Peak Pack get to be so big? International Wolf 12(1): 4-7.

Smith, D.W. and D.R. Stahler. 2003. Management of habituated wolves in Yellowstone National Park. Yellowstone National Park: Yellowstone Center for Resources, National Park Service.

Smith, D.W. and G. Ferguson. 2005. Decade of the wolf: Returning the wild to Yellowstone. Lyons Press, Guilford, CT, 212 pp.

Smith, D.W. and E Almberg. 2007. Wolf Diseases in Yellowstone National Park. Yellowstone Science 15: 17-19.

Smith, D.W. and E.E. Bangs. In press. Reintroduction of wolves to Yellowstone National Park: History, values and ecosystem restoration. Pgs 000-000 *in* M. Hayward and M. Somers, editors. Reintroduction of Top-order Predators. Blackwell Scientific.

Smith, D.W., R. McIntyre, E. Cleere, G. Plumb, B. Phillips, B. Chan, M. Ross, J. Knuth Folts, D. Chalfant, and B. Suderman. 2001. Managing wolves and humans in Lamar Valley: A final report on the Druid road project 2001. YNP report. 7pp.

Smith, D.W., K.M. Murphy, and S. Monger. 2001. Killing of Bison *(Bison bison)* calf, by a wolf *(Canis lupus)*, and four coyotes *(Canis latrans)*, in Yellowstone National Park. Canadian Field-Naturalist 115 (2): 343-345.

Smith, D.W., D. R. Stahler, R. McIntyre, D. Graf, E. West, G. Plumb, B. Phillips, B. Chan, M. Ross, J. Knuth Folts, D. Chalfant, and B. Suderman. 2002. Managing wolves and humans in Lamar Valley: A final report on the Druid road project 2002. YNP report. 9pp.

Smith, D.W., R.O. Peterson, and D. Houston. 2003. Yellowstone after wolves. BioScience 53(4): 330-340.

Smith, D.W., D.R. Stahler, and D.S. Guernsey. 2003. Yellowstone Wolf Project: Annual Report 2002. National Park Service, Yellowstone Center for Resources, Yellowstone National Park, Wyoming, YCR-NR-2003, 1-14.

Smith, D. W., D. R. Stahler, and D. S. Guernsey. 2003. Yellowstone Wolf Project Winter Study Handbook. Yellowstone Center for Resources.

Smith, D. W., D. R. Stahler and D. S. Guernsey. 2004. Yellowstone Wolf Project: Annual Report 2003. National Park Service, Yellowstone Center for Resources, Yellowstone National Park, Wyoming. YCR-NR-2004-04. pp. 1-18.

Smith, D.W., T.D. Drummer, K.M. Murphy, D.S. Guernsey, and S.B. Evans. 2004. Winter prey selection and estimation of wolf kill rates in Yellowstone National Park. Journal of Wildlife Management 68: 153-166.

Smith, D. W., D. Stahler, D. Guernsey, and E. Bangs, 2006. Wolf Restoration in Yellowstone National Park. Pages 242-254 in D. R. McCullough, K. Kaji and M.Yamanaka (eds.), Wildlife in Shiretoko and Yellowstone National Parks:Lessons in Wildlife Conservation from Two World Heritage Sites. Shiretoko Nature Foundation, Hokkaido, Japan.

Smith, D.W., D.R. Stahler, D.S. Guernsey, M. Metz, A. Nelson, E. Albers, and R. McIntyre. 2007. Yellowstone Wolf Project: Annual Report 2006. National Park Service, Yellowstone Center for Resources, Yellowstone National Park, Wyoming, YCR-2007-01.

Smith, D.W., D.R Stahler, D.S. Guernsey, M. Metz, E. Albers, L. Williamson, N. Legere, E. Almberg, and R. McIntyre. 2008. Yellowstone Wolf Project: Annual Report, 2007. National Park Service, Yellowstone Center for Resources, Yellowstone National Park, Wyoming, YCR-2008-01.

Smith, D.W., D.R. Stahler, K.M. Murphy, D.S. Guernsey, R.T. McIntyre, E.E. Bangs, and M.K. Phillips. In preparation. Colonization and population expansion of reintroduced wolves in Yellowstone National park. Journal of Mammalogy.

Smith, D.W., D. Murray, E. Bangs, J. Oakleaf, C. Mack, J. Fontaine, D. Boyd, M. Jimenez, D. Pletscher, C. Niemeyer, T. Meier, D. Stahler, D. Guernsey, J. Holyan. Submitted. Survival of colonizing wolves in the northern Rocky Mountains of the United States, 1982-2004. J. Wildlife Management.

Stahler, D.R. 2000. Interspecific interactions between the common raven (*Corvus corax*) and the gray wolf (*Canis lupus*) in Yellowstone National Park, Wyoming: Investigations of a predator and scavenger relationship. Unpublished thesis, University of Vermont. 105pp.

Stahler, D.R., B. Heinrich, and D.W. Smith. 2002. Common ravens, *Corvus corax*, preferentially associate with gray wolves, *Canis lupus*, as a foraging strategy in winter. Animal Behavior 64: 283-290.

Stahler, D.R., D.W. Smith, and R. Landis. 2002. The acceptance of a new breeding male into a wild wolf pack. Canadian Journal of Zoology 80: 360-365.

Stahler, D.R., D.W. Smith, R. McIntyre, E. West, B. Phillips, B. Chan, M. Ross, J. Knuth Folts, D. Chalfant, and B. Suderman. 2003. Managing wolves and humans in Lamar Valley: A final report on the Druid road project 2003. YNP Report. 9 pp.

Stahler, D. R., D. W. Smith, D.S. Guernsey. 2006. Foraging and feeding ecology of the gray wolf (Canis lupus): Lessons from Yellowstone National Park, Wyoming, USA. Journal of Nutrition 136: 1923-1926.

Stronen, A. V. 2006. Genetic Variation, Dispersal, and Disease in Wolves *(Canis lupus)* in the Riding Mountain National Park Region, Manitoba. Final Report. 46 pp.

Stronen, A. V, Brooks, R. K., Paquet, P. C., and S. Mclachlan. 2007. Farmer attitudes toward wolves: Implications for the role of predators in managing disease. Biological Conservation 135: 1-10.

Switalski, T.A., T. Simmons, S.L. Duncan, A.S. Chavez, and R.H. Schmidt. 2002. Wolves in Utah. An analysis of potential impact and recommendations for management. Utah Cooperative Fish and Wildlife Research Unit, Utah State University. Natural Resource and Environmental Issues, Vol. X.

Taper, M.L., and P.J.P. Gogan. 2002. The northern Yellowstone elk: Density dependence and climatic conditions. Journal of Wildlife Management 66(1): 106-122.

Theberge, J. B., M. T. Theberge, J. A. Vucetich, and P. C. Paquet. 2006. Pitfalls of applying adaptive management to a wolf population in Algonquin Provincial Park, Ontario. Environmental Management 37: 451-460.

Thiessen, C. 2006. Population structure and dispersal of wolves in the Canadian Rocky Mountains. MSc. Thesis. University of Alberta, Edmonton, AB. 158pp.

Thurston, L.M. 2002. Homesite attendance as a measure of alloparental and parental care by gray wolves (*Canis lupus*) in northern Yellowstone National Park. Unpublished thesis, Texas A and M University. 175pp.

Towell, D. 2008. Wolf management: one state's view. Fair Chase. Vol 23:38-43.

Trapp, J. R. 2004. Wolf den site selection in the Northern Rocky Mountains. Thesis, Prescott College, Prescott, Arizona, USA.

USDA./APHIS/Idaho Wildlife Services. 2001. Wolf Activity Report, Fiscal Year 2000. USDA/APHIS/Wildlife Services, 9134 West Black Eagle Drive, Boise ID 83709. 14pp.

USDA./APHIS/Idaho Wildlife Services. 2002. Wolf Activity Report, Fiscal Year 2001. USDA/APHIS/Wildlife Services, 9134 West Black Eagle Drive, Boise ID 83709. 13pp.

USDA/APHIS/Idaho Wildlife Services. 2003. Wolf Activity Report, Fiscal Year 2002. USDA/APHIS/Wildlife Services, 9134 West Black Eagle Drive, Boise ID 83709. 13pp.

USDA./APHIS/Idaho Wildlife Services. 2004. Wolf Activity Report, Fiscal Year 2003. USDA/APHIS/Wildlife Services, 9134 West Black Eagle Drive, Boise ID 83709. 15pp.

USDA./APHIS/Idaho Wildlife Services. 2005. Wolf Activity Report, Fiscal Year 2004. USDA/APHIS/Wildlife Services, 9134 West Black Eagle Drive, Boise ID 83709. 14pp.

USDA./APHIS/Idaho Wildlife Services. 2006. Wolf Activity Report, Fiscal Year 2005. USDA/APHIS/Wildlife Services, 9134 West Black Eagle Drive, Boise ID 83709. 14pp.

USDA./APHIS/Idaho Wildlife Services. 2007. Wolf Activity Report, Fiscal Year 2006. USDA/APHIS/Wildlife Services, 9134 West Black Eagle Drive, Boise ID 83709. 14pp.

USDA./APHIS/Idaho Wildlife Services. 2008. Wolf Activity Report, Fiscal Year 2007. USDA/APHIS/Wildlife Services, 9134 West Black Eagle Drive, Boise ID 83709. 14pp.

U.S. Fish and Wildlife Service. 2003. Endangered and threatened wildlife and plants; final rule to reclassify and remove the gray wolf from the list of endangered and threatened wildlife in portions of the conterminous United States; establishment of two special regulations for threatened gray wolves; final and proposed rules. Federal Register 68: 15803-15875.

U.S. Fish and Wildlife Service. 2005. Endangered and threatened wildlife and plants; Regulation for nonessential experimental populations of the western distinct population segment of the gray wolf; final rule. Federal Register 70(4): 1286-1311.

U.S. Fish and Wildlife Service. August 1, 2006. Endangered and threatened wildlife and plants; 12-month finding on a petition [Wyoming's] to establish a Rocky Mountain Gray Wolf Population [Canis lupus] as a Distinct Population Segment. To Remove the NRM wolf population from the list of endangered and threatened wildlife. Federal Register 71(147):43410-43432.

U.S. Fish and Wildlife Service. February 8, 2007. Endangered and threatened wildlife and plants; Designating the northern Rocky Mountain population of Gray Wolf as a Distinct Population Segment and removing this distinct population segment from the federal list of endangered and threatened wildlife; Proposed Rule. Federal Register 72(72):6106-6139.

U.S. Fish and Wildlife Service. July 6, 2007. Endangered and Threatened Wildlife and Plants; Proposed revision of special regulation for the central Idaho and Yellowstone area nonessential experimental populations of gray wolves in the northern Rocky Mountains; Proposed rule. Federal Register 72: 36942-36949.

U.S. Fish and Wildlife Service. January 28, 2008. Endangered and Threatened Wildlife and Plants; Proposed revision of special regulation for the central Idaho and Yellowstone area nonessential experimental populations of gray wolves in the northern Rocky Mountains; Final rule. Federal Register 73: 4720-4736.

U.S. Fish and Wildlife Service, Nez Perce Tribe, National Park Service, and USDA Wildlife Services. 2001. Rocky Mountain Wolf Recovery 2000 Annual Report. USFWS, Ecological Services, 100 N Park, Suite 320, Helena MT. 35pp. http://westerngraywolf.fws.gov/annualreports.htm

U.S. Fish and Wildlife Service, Nez Perce Tribe, National Park Service, and USDA Wildlife Services. 2002. Rocky Mountain Wolf Recovery 2001 Annual Report. T. Meier, ed. USFWS, Ecological Services, 100 N Park, Suite 320, Helena MT. 41pp. http://westerngraywolf.fws.gov/annualreports.htm

U.S. Fish and Wildlife Service, Nez Perce Tribe, National Park Service, and USDA Wildlife Services. 2003. Rocky Mountain Wolf Recovery 2002 Annual Report. T. Meier, ed. USFWS, Ecological Services, 100 N Park, Suite 320, Helena MT. 64pp. http://westerngraywolf.fws.gov/annualreports.htm

U.S. Fish and Wildlife Service, Nez Perce Tribe, National Park Service, and USDA Wildlife Services. 2004. Rocky Mountain Wolf Recovery 2003 Annual Report. T. Meier, ed. USFWS, Ecological Services, 100 N Park, Suite 320, Helena MT. 65pp. http://westerngraywolf.fws.gov/annualreports.htm

U.S. Fish and Wildlife Service, Nez Perce Tribe, National Park Service, and USDA Wildlife Services. 2005. Rocky Mountain Wolf Recovery 2004 Annual Report. D. Boyd, editor. USFWS, Ecological Services, 100 N. Park, Suite 320, Helena, MT. 72pp. http://westerngraywolf.fws.gov

U.S. Fish and Wildlife Service, Nez Perce Tribe, National Park Service, and USDA Wildlife Services. 2006. Rocky Mountain Wolf Recovery 2005 Annual Report. C. Sime and E. Bangs, editors. USFWS, Ecological Services, 585 Shepard Way, Helena, MT. 149 pp. http://westerngraywolf.fws.gov

U.S. Fish and Wildlife Service, Nez Perce Tribe, National Park Service, Montana Fish, Wildlife & Parks, Idaho Fish and Game, and USDA Wildlife Services. 2007. Rocky Mountain Wolf Recovery 2006 Annual Report. C.A. Sime and E.E. Bangs, eds. USFWS, Ecological Services, 585 Shepard Way, Helena, Montana. 59601. http://westerngraywolf.fws.gov

U.S. Fish and Wildlife Service, Nez Perce Tribe, National Park Service, Montana Fish, Wildlife & Parks, Idaho Fish and Game, and USDA Wildlife Services. 2008. Rocky Mountain Wolf Recovery 2007 Annual Report. C.A. Sime and E.E. Bangs, eds. USFWS, Ecological Services, 585 Shepard Way, Helena, Montana. 59601. http://westerngraywolf.fws.gov

Vander Wal, E., Paquet, P.C., Messier, F. November 2006. Interaction among disease, habitat, and predation in the elk population of Riding Mountain National park. Interim Report. University of Saskatchewan. 32 pp.

Varley, N. and M. S. Boyce. 2006. Adaptive management for reintroductions; Updating a wolf recovery model for Yellowstone National Park. Ecological Modelling 193: 315-339.

vonHoldt, B.V., D.R. Stahler, D.W. Smith, D.A. Earl, J.P. Pollinger, R.K. Wayne. 2008. The genealogy and genetic viability of reintroduced Yellowstone grey wolves. Molecular Ecology, 17(1), 252-274.

Vucetich, J.A., D.W. Smith, and D.R. Stahler. 2005. Influence of Harvest, climate, and wolf predation of Yellowstone elk, 1961-2004. Oikos 111:259-270.

Weise, A. 2007. Removing endangered species protections would jeopardize northern Rockies wolf recovery. International Wolf 17:4, 6.

White, P.J. and R.A. Garrott. 2005. Yellowstone's ungulates after wolves- expectations, realizations, and predictions. Biological Conservation. 125:141-152.

White, P.J. and R.A. Garrott. 2006. Northern Yellowstone elk after wolf restoration. Wildlife Society Bulletin 33:942-955.

White, P.J., D.W. Smith, J.W. Duffield, M.D. Jimenez, T. McEneaney, and G. Plumb. 2005. Wolf EIS Predictions and Ten-Year Appraisals. Yellowstone Science13(1):34-41.

Whittington, J., C.C. St. Clair, and G. Mercer. 2004. Path tortuosity and the permeability of roads and trails to wolf movement. Ecology and Society 9(1): 4.

Wilmers, C. C. and W. M. Getz. 2004. Simulating the effects of wolf-elk population dynamics on resource flow to scavengers. Elsevier 177: 193-208.

Wilmers, C.C., and D.R. Stahler. 2002. Constraints on active-consumption rates in gray wolves, coyotes, and grizzly bears. Canadian Journal of Zoology. 80: 1256-1261.

Wilmers, C.C., D.R. Stahler, R.L. Crabtree, D.W. Smith, and W.M. Getz. 2003. Resource dispersion and consumer dominance: scavenging at wolf- and hunter-killed carcasses in Greater Yellowstone, USA. Ecology Letters 6: 996-1003.

Wilmers, C.C., R.L. Crabtree, D.W. Smith, K.M. Murphy, and W.M. Getz. 2003. Trophic facilitation by introduced top predators: gray wolf subsidies to scavengers in Yellowstone National Park. Journal of Animal Ecology 72: 909-916.

Wilmers, C. C. and W.M. Getz. 2005 Gray wolves as climate change buffers in Yellowstone. PLoS Biology 3:571-576.

Wilmers, C. C. and E. Post. 2006. Predicting the influence of wolf-provided carrion on scavenger community dynamics under climate change scenarios. Global Change Biology 12: 403-409.

Winnie, J. and S. Creel. 2007. Sex-specific behavioral responses of elk to spatial and temporal variation in the threat of wolf predation. Animal Behaviour. 71: 215 - 225.

Winnie, J, Christianson D, Maxwell B and Creel, S 2006. Elk decision-making rules are simplified in the presence of wolves. Behavioral Ecology and Sociobiology 61: 277 - 289.

Wondrak Biel, A. and D.W. Smith. 2005. Yellowstone wolf found near Denver. NPS Natural Resource Year in Review – 2004. National Park Service, U.S Department of the Interior, Washington D.C., ISSN 1544-5429.

Woodroffe, R., S. Thirgood, and A. Rabinowitz, eds. People and wildlife: coexistence or conflict? Cambridge University Press, Cambridge, United Kingdom. 497 pp.

Woodruff, Susannah. 2006. Characteristics of wolf and cougar kill sites in the southern Yellowstone ecosystem. M.A. Thesis, Prescott College, Prescott, Arizona. 49pp.

Wright, G.J. 2003. An analysis of the northern Yellowstone elk herd: population reconstruction and selection of elk by wolves and hunters. Unpublished thesis, Michigan Technological University 124pp.

Wright, Gregory J., R. O. Peterson, D.W. Smith, T.O. Lemke. 2006. Selection of northern Yellowstone elk by gray wolves and hunters. Journal of Wildlife Management 70(4): 1070-1078.

APPENDIX 1

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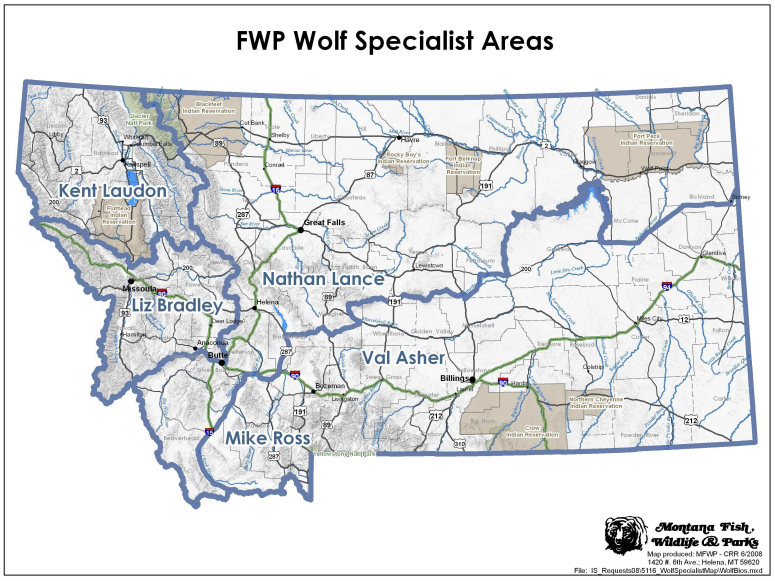
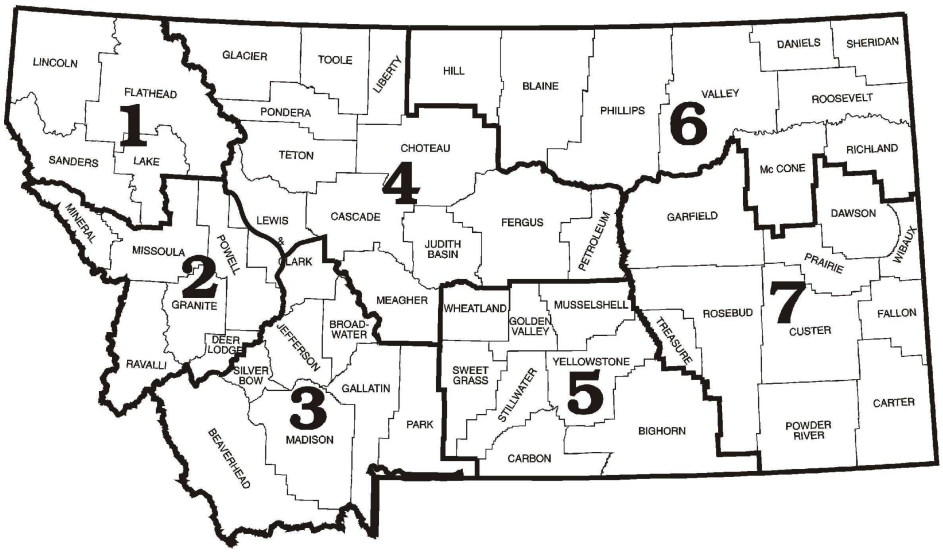


MONTANA FISH WILDLIFE & PARKS ADMINISTRATIVE REGIONS



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TO REPORT A DEAD WOLF OR POSSIBLE ILLEGAL ACTIVITY:

U.S.Fish and Wildlife Service

- Special Agent, Missoula MT: (406) 329-3000
- Special Agent, Casper, WY: (307) 261-6365

Montana Fish, Wildlife & Parks

- Dial 1-800-TIP-MONT

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

- www.fwp.mt.gov/wildthings/wolf

APPENDIX 2

Gray Wolf Chronology in Montana

1800

- Wolves are common throughout Montana.

1884

- Wolf-bounty law initiates Montanas official eradication effort.

1915

- Federal authorities begin wolf control in the West.

1925

- Wolf populations eliminated from most of the West.

1936

- Gray wolf believed extinct in Montana although wolves and wolf sign still occasionally observed.

1950

- Wolves still seen in Wyoming, Montana, and Idaho occasionally but no self-sustaining breeding documented; wolves, likely dispersing from Canada, are killed in Montana and Idaho in every decade through 2000.

1973

- Montana protects wolves as state endangered species.

1974

- Wolves protected under federal Endangered Species Act of 1973.

1979

- A wolf is monitored in British Columbia, just north of Glacier National Park.

1980

- A lone wolf kills livestock near Big Sandy, Montana and is killed by the U.S. Fish and Wildlife Service. This is Montana's first documented wolf depredation in more than 50 years.

1986

- A wolf den is confirmed in Glacier National Park. The Magic Pack establishes a territory in the North Fork Flathead River valley, in the western portion of Glacier National Park.
- A pack denned on the Blackfeet Reservation, but was not discovered until 1987 when they began to depredate on livestock.

1987

- Camas Pack established in the North Fork of the Flathead River valley in Glacier National Park.
- First livestock depredation occurs on the Blackfeet Reservation.

1990

- The U.S. Congress establishes a Wolf Management Committee to recommend wolf recovery strategies for Yellowstone National Park and central Idaho.

1991

- Congress directs the US Fish and Wildlife Service to prepare a Draft Environmental Impact Statement on wolf recovery in Yellowstone National Park and central Idaho.

1993

- An estimated 45 wolves in five packs occupy the federal Northwestern Montana Recovery Area. One pack establishes west of Helena, founded by a female wolf which disperesed from Canada.

1994

- Federal EIS on the reintroduction of wolves into Yellowstone National Park and central Idaho completed. Wolves to be reintroduced into Yellowstone National Park and central Idaho for three to five years under the Endangered Species Acts experimental, non-essential rules that grant additional management flexibility. Wolf recovery is defined as 30 breeding pairs--an adult male and an adult female raising two or more pups to Dec. 31--in Montana, Idaho, and Wyoming for three successive years.

1995

- Fifteen wolves from four packs captured in Canada are relocated to Yellowstone National Park and 17 individual wolves are released in central Idaho.

1996

- Yellowstone National Park receives 17 more wolves from Canada and 10 wolf pups from a depredating pack in northwestern Montana. Twenty wolves are released in central Idaho; 1st pups are born in the wild.

1999

- Governors of Montana, Idaho, and Wyoming renew a 1997 Memorandum of Understanding to coordinate public involvement to pursue plans to manage a recovered wolf population in the northern Rockies and to assure a timely delisting.

2000

- Montana Governor Marc Racicot appoints 12 Montana citizens to the Montana Wolf Management Advisory Council. The council, chaired by rancher Chase Hibbard of Helena, is charged to advise Montana Fish, Wildlife & Parks on wolf management in anticipation of the wolf's delisting.
- US Fish and Wildlife Service determines there are 30 breeding pair in the tri-state Rocky Mountain Recovery Area, marking 2000 as the first year of the three-year countdown to meet wolf population recovery goals.
- An estimated 97 wolves in 8 breeding pairs are counted in Montana.

2001

- Montana Wolf Management Advisory Council presents its Report to the Governor to Governor Judy Martz, who directs MFWP to draft wolf conservation and management planning document.
- Montana Legislature removes the gray wolf from Montana's list of predatory species once the wolf is delisted. Upon delisting, wolves will be legally reclassified in Montana as species in need of management. New law includes provisions for the defense of life and private property when a wolf is attacking, killing, or threatening to kill a person, or livestock.
- Montana Fish, Wildlife & Park's draft of the Montana Wolf Conservation and Management Planning Document is reviewed, amended and approved by the Montana Wolf Management Advisory Council.
- An estimated 35 breeding pair, in 51 packs, are counted in the tri-state Rocky Mountain Recovery Area, totaling about 550 wolves. The US Fish and Wildlife Service determines 2001 is second year of the three-year countdown to trigger an official proposal to delist the wolf.
- An estimated 123 wolves in 7 breeding pairs are counted in Montana.

2002

- Montana Wolf Conservation and Management Planning Document is released in January. Montana Fish, Wildlife & Parks begins to develop an environemntal impact statement (EIS) on the state management of wolves. The public is invited to participate at community work sessions around the state and asked to identify issues and help develop management alternatives.
- Montana Fish, Wildlife & Parks develops draft EIS with five alternatives.
- An estimated 43 breeding pairs are counted in the tri-state Rocky Mountain Wolf Recovery Area, totaling about 663 wolves. The US Fish and Wildlife Service determines 2002 is the third year of the three-year countdown to trigger official proposal to delist the wolves.

- U.S. Fish and Wildlife Service announces that the northern Rockies gray wolf population has achieved biological recovery under the federal Endangered Species Act.
- An estimated 183 wolves in 17 breeding pairs are counted in Montana.

2003

- Montana's EIS process includes a 60-day public comment period and statewide community work sessions. The final EIS recommends the adoption of the "updated council" alternative. The Montana Fish, Wildlife & Parks Commission approves the adoption of the preferred alternative – the Council's Update.
- State conservation and management plans completed by MT, ID, and WY and submitted to USFWS.
- States of Montana, Idaho, and Wyoming request funding from Congress.
- U.S. Fish and Wildlife Service expected to begin the official administrative process of delisting gray wolves in the northern Rockies.
- An estimated 761 wolves in 51 breeding pairs are counted in the tri-state Rocky Mountain Wolf Recovery Area at the end of the year.
- An estimated 182 wolves in 10 breeding pairs are counted in Montana.

2004

- U.S. Fish and Wildlife Service approves state management plans from Montana and Idaho and rejects Wyoming's plan. Delisting is officially delayed until the impasse is resolved.
- Montana Fish, Wildlife & Parks and the Montana Fish, Wildlife & Parks Commission approve amending the Record of Decision to pave the way for interim state participation in northwest Montana through a limited cooperative agreement.
- In February, Montana Fish, Wildlife & Parks and U.S. Fish and Wildlife Service complete a cooperative agreement covering northwest Montana.
- Montana Fish, Wildlife & Parks receives federal funding and hires staff who begin implementing the state plan prior to delisting and in consultation with U.S. Fish and Wildlife Service.
- Montana Fish, Wildlife & Parks begins close coordination with USDA Wildlife Services to investigate and resolve wolf-livestock conflicts.
- An estimated 835 wolves in 66 breeding pairs are counted in the tri-state Rocky Mountain Wolf Recovery Area at the end of the year.
- An estimated 153 wolves in 15 breeding pairs are counted in Montana.

2005

- Wolves in northwest Montana recoveyr area reclassified as "endangered" by court order.
- U.S. Fish and Wildlife Service adopts more flexibile regulations [known as 10(j) regulations] for the experimental population areas of Montana and Idaho.
- Montana Fish, Wildlife & Parks and U.S. Fish and Wildlife Service complete a cooperative agreement paving the way for Montana to assume independent and full reponsibility for wolf management and conservation statewide. Montana begins implementing the state plan to the extent allowed by federal regulations throughout the state. Funding from U.S. Fish and Wildlife Service and through special Congressional appropriations fund Montana Fish, Wildlife & Park's wolf team.
- Montanans form a diverse working group of private citizens, non-governmental organizations, and state and federal agencies to begin developing the Montana Livestock Loss Reduction and Mitigation Program. Work is ongoing.
- An estimated 256 wolves in 19 breeding pairs are counted in Montana.

2006

- Montana implements as much of approved state plan as possible and within federal guidelines.
- Funding from U.S. Fish and Widllfie Service and special Congressional appropriations continue.
- Montana Fish, Wildlife & Parks and USDA Montana Wildlife Services update an existing interagency cooperative agreement to include gray wolves
- Montana Livestock Loss Reduction and Mititgation Program draft framework completed and draft legislation is prepared for the 2007 Montana Legislature.
- An estimated 316 wolves in 21 breeding pairs are counted in Montana. Distribution continues to be the western one-third of Montana.

2007

- Montana implements as much of approved state plan as possible and within federal guidelines.
- Funding from U.S. Fish and Wildlife Service and sepcial Congressional appropriations continue.
- HB 364 passed the 2007 Montana Legislature, creating the Montana Livestock Loss Reduction and Mitigation Program; Oversight Board is appointed by the Governor and administrative officer of the Board is hired. First Board meeting, fundraising, and rule-making to begin early in 2008.
- MFWP proposes a tentative wolf hunting/trapping season structure proposal which is approved by the MFWP Commission, enabling the agency to gather public comment. (decision timeline is occurs in 2008).
- U.S. Fish and Wildlife Service proposes modification of the Experimental Rules (10j) to provide additional flexibility to northern Rockies states with approved plans that applies to the experimental areas of those states, respectively.
- U.S. Fish and Wildlife Service approves Wyoming's wolf management plan and state laws.
- U.S. Fish and Wildlife Service proposes a Northern Rockies Distinct Population Segment and to delist wolves in the northern Rockies in states with approved plans in February. Two options are presented.
- An estimated minimum of 422 wolves in 39 breeding pairs are counted in Montana. Distribution continues to be the western one-third of Montana

2008

- Montana implements as much of approved state plan as possible and within federal guidelines.
- Funding from U.S. Fish and Wildlife Service and sepcial Congressional appropriations continue.
- The proposed U.S. Fish and Wildlife Service modification of the Experimental Rules (10j) to provide additional flexibility to northern Rockies states with approved plans that applies to the experimental areas of those states, respectively is published in the Federal Register in January and took effect late February. Became moot from March to July when wolves officially delisted. Took effect again in mid-July when the delisting decision was enjoined. This federal regulation is challenged in court and litigation was still ongoing at the end of the year.
- MFWP proposes a tentative wolf hunting/trapping season structure proposal (in December 2007), gathers public comment. MFWP Commission approves 2008/2009 biennial wolf hunting season in February.
- In June, MFWP proposed a tentative wolf quota for the possible 2008 wolf season and received public comment in July.
- In June, MFWP also initiated formal rulemaking to adopt rules relating to how the agency will implement lethal control under Montana's owlf plan and ot reclassify the gray wolf as a species in need of management upon delisting. Formal rules adopted by the MFWP Commission in September. New rules are effective as of October, but will not be applied (i.e. take effect) until the wolf is delisted.
- Montana Livestock Loss Reduction and Mitigation Board met twice. The program receivesd a $50,000 grant from Defenders of Wildlife and donations from the Greater Yellowstone Coalition, the Montana Cattlemen's Association, and others. Combined runding allows payments to begin in April with the first claim. Approximately $83,000 are paid in claims for livestock that are verified by USDA Wildlife Services as having been killed by wolves.
- In February, USFWS publishes the final delisting rule, recognizing the NRM DPS and removing it from the List of Endangered and Threatened Wildlife; Wyoming's 2007 regulatory mechanisms were adequate.
- Delisting decision took effect March 28.
- Twelve parties filed a lawsuit challenging the identification and delisting of the NRM DPS on April 28. The plaintiffs also moved to preliminarily enjoin the delisting.
- Oral arguments are heard in May. On July 18, the U.S. District Court granted the plaintiff's motion for a preliminary injunction. The ruling placed the gray wolf back under the ESA. The NRM DPS wolf population was officially delisted from March 28 to July 18 and preparations for a 2008 wolf hunting season were suspended.
- In September, USFWS asked the Court to vacate the delisting rule and remand it back to the agency for further consideration. The Court agreed on October 14. USFWS re-opens a 30-day public comment period on the February 2007 delisting proposal specific to issues raised in the preliminary injunction.
- USFWS analyzes public comments and expected to make a decision by the end of 2008.
- An estimated minimum of 497 wolves in 34 breeding pairs are counted in Montana. Distribution continues to be the western one-third of Montana.

APPENDIX 3

NORTHERN ROCKIES WOLF PACK TABLES

Table 1a: Montana Wolf Packs and Population Data for Montana's Portion of the Northwest Montana Recovery Area, 2008.

REF #	WOLF PACK [1]	RECOV AREA	STATE	MINIMUM ESTIMATED PACK SIZE DEC 2008			DOCUMENTED MORTALITIES			KNOWN DISPERSED	KNOWN MISSING [4]	KNOWN CONTROL [5]	CONFIRMED LOSSES [6]			
				ADULT	PUP	TOT	NATURAL	HUMAN [2]	UNKN [3]				CATTLE	SHEEP	DOGS	OTHER
1	Arrastra Creek	NWMT	MT	5	?	5										
2	Ashley	NWMT	MT	?	?	?			1	1						
3	Bearfite	NWMT	MT	3	2	5			1							
4	Belmont	NWMT	MT	2	8	10										
5	Benchmark	NWMT	MT	?	?	7										
6	Bennie	NWMT	MT	2	2	4										
7	Bitterroot Range#	NWMT	MT	4	?	4			1							
8	Blue Mountain	NWMT	MT	3	?	3										
9	Camas Prairie	NWMT	MT	?	?	4							3			2
10	Candy Mountain	NWMT	MT	5	3	8										
11	Cilly	NWMT	MT	2	8	10		1		1						
12	Corona ^	NWMT	MT	11	3	14		2								
13	DeBorgia #	NWMT	MT	3	1	4										
14	Dutch ^	NWMT	MT	14	6	20										
15	Elevation Mountain	NWMT	MT	3	0	3						4	3			
16	Fishtrap	NWMT	MT	?	?	8		3	1				1			
17	Firefighter	NWMT	MT	?	?	?										
18	Flathead Alps	NWMT	MT	5	?	5										
19	Great Bear	NWMT	MT	?	?	?										
–	~~Hewolf~~[7]	NWMT	MT	0	0	0	–	–	–	–	–	4	1	–	–	–
	~~Hog Heaven~~[7]	NWMT	MT	0	0	0						27	6			4
20	Kintla	NWMT	MT	7	2	9					1					
21	Kootenai South	NWMT	MT	2	2	4										
22	Ksanka	NWMT	MT	4	?	4			2							
23	Lazy Creek	NWMT	MT	5	1	6		1		1						1
24	Livermore	NWMT	MT	5	0	5					1		3			
25	Lydia	NWMT	MT	3	3	6										
26	Marias	NWMT	MT	?	?	?										
27	McKay	NWMT	MT	?	?	3										
28	Mineral Mountain	NWMT	MT	6	3	9										

Table 1a: Montana Wolf Packs and Population Data for Montana's Portion of the Northwest Montana Recovery Area, 2008.

REF #	WOLF PACK [1]	RECOV AREA	STATE	MINIMUM ESTIMATED PACK SIZE DEC 2008			DOCUMENTED MORTALITIES			KNOWN			CONFIRMED LOSSES [6]			
				ADULT	PUP	TOT	NATURAL	HUMAN [2]	UNKN [3]	DISPERSED	MISSING [4]	CONTROL [5]	CATTLE	SHEEP	DOGS	OTHER
29	Mitchell Mountain	NWMT	MT	1	3	4						1			2	3
30	Monitor Mountain	NWMT	MT	3	0	3						5	6			
31	Murphy Lake	NWMT	MT	1	3	4		1			1	3	6			
32	Ninemile	NWMT	MT	3	2	5										
33	Nyack	NWMT	MT	2	?	2		1								
34	Piper ^	NWMT	MT	5	7	12		1		1	1					
35	Pulpit Mountain	NWMT	MT	2	1	3										
36	Red Shale	NWMT	MT	3	1	4										
37	Salish	NWMT	MT	2	7	9						2	1			
38	Satire ^	NWMT	MT	3	0	3							1			
39	Selow	NWMT	MT	?	?	4										
40	Solomon Mountain#	NWMT	MT	4	?	4										
41	Spotted Bear	NWMT	MT	5	?	5				1						
42	Superior#	NWMT	MT	3	4	7		2				1	1			
43	Tallulah	NWMT	MT	4	2	6						2	1			
44	Twilight#	NWMT	MT	3	5	8										
45	Wolf Prairie	NWMT	MT	?	?	?					1					
	Misc/Lone			13	0	13		5	1				3			
MT in NWMT (Table 1a)		NWMT	MT	151	79	256	0	17	7	5	5	49	36	0	2	10
ID in NWMT (Table 3b)		NWMT	ID	18	8	26	0	1	1	0	0	1	0	0	0	0
NWMT RECOVERY AREA		NWMT	MT/ID	169	87	282	0	18	8	5	5	50	36	0	2	10

1 Underlined packs are counted as breeding pairs toward recovery goals.

2 Excludes wolves killed in control actions.

3 Does not include pups that disappeared before winter.

4 Collared wolves that became missing in 2008.

5 Agency lethal control (10j regulation does not apply to the endangered area).

6 Includes only domestic animals confirmed killed by wolves.

7 Pack did not exist on Dec. 31 2008 and is not displayed on the map; see pack narrative.

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

^ Pack names were changed to better characterize geographic home place. Whitefish is Dutch; Squeezer is Piper; Meadow Peak is Satire; Thompson Peak is Corona

FINAL_Table_1a_NWMT_3-15-09.xls

Table 1b: Montana Wolf Packs and Population Data for Montana's Portion of the Greater Yellowstone Experimental Area, 2008.

REF #	WOLF PACK 1	RECOV AREA	STATE	MINIMUM ESTIMATED PACK SIZE DEC 2008 ADULT	PUP	TOT	DOCUMENTED MORTALITIES NATURAL	HUMAN 2	UNKN 3	KNOWN DISPERSED	MISSING 4	CONTROL 5	CONFIRMED LOSSES 6 CATTLE	SHEEP	DOGS	OTHER
46	Rosebud	GYA	MT	2	0	2										
	~~Moccasin Lake~~	GYA	MT	0	0	0						4	1	2		
47	Baker Mountain	GYA	MT	5	0	5	1	1					1			
48	Buffalo Fork	GYA	MT	?	?	8										
49	Mill Creek	GYA	MT	5	2	7				2	1					
50	Eightmile	GYA	MT	5	0	5	1	1								
51	Eagle Creek	GYA	MT	8	2	10		2								
52	Beartrap	GYA	MT	13	6	19										
53	Lebo Peak	GYA	MT	2	4	6								8		
54	Cedar Creek	GYA	MT	2	3	5										
55	Horse Creek	GYA	MT	3	5	8										
56	Sage Creek#	GYA	MT	3	5	8						3	1			
57	Jack Creek	GYA	MT	1	2	3					1		2			
58	Centennial	GYA	MT	4	2	6						1	1			
59	Toadflax	GYA	MT	3	5	8										
60	Cougar 2	GYA	MT	10	?	10		1				1				
61	Hayden #	GYA	MT	6	?	6										
62	Black Mtn	GYA	MT	2	3	5										
63	Horn Mtn	GYA	MT	2	3	5						3	3			
	~~N. Gravelly~~	GYA	MT	0	0	0						8	3			
	~~Freezeout~~	GYA	MT	0	0	0						4		37		
	Misc/Lone	GYA	MT	4	0	4	2	5	1	5	2	3	3	38	0	4
	MT Total in GYA	GYA	MT	80	42	130	4	10	1	7	4	27	15	85	0	4

1 Underlined packs are counted as breeding pairs toward recovery goals.

2 Excludes wolves killed in control actions.

3 Does not include pups that disappeared before winter.

4 Collared wolves that became missing in 2008.

5 Includes agency lethal control and take by private citizens under 10j regulation.

6 Includes only domestic animals confirmed killed by wolves.

7 Pack did not exist on December 31, 2008 and is not displayed on the map; see pack narrative.

Border packs: Sage Creek shared with ID - dens in MT and the majority of time in MT; Heyden shared with WY - dens in MT and majority of time in MT.

FINAL_Table_1b_SWMT_GYA_3-15-09.xls

Table 1c: Montana Portion of the Central Idaho Experimental Area (Montana statewide totals): wolf packs and population data, 2008.

Montana portion of Central Idaho Experimental Area

REF.		RECOV		PACK SIZE DEC 2008			MORTALITIES			KNOWN		CONTROL	CONFIRMED LOSSES6			
#	WOLF PACK1	AREA	STATE	ADULT	PUP	TOT	NAT	HUMAN2	UNKN3	DISPERSED	MISSING4	KILLED 5	CATTLE	SHEEP	DOGS	OTHER
64	Brooks Creek #	CID	MT	3	?	3		1				4	2			3
65	Lake Como #	CID	MT	3	?	3										
66	Trapper Peak #	CID	MT	2	1	3										
67	Watchtower #	CID	MT	2	?	2										
68	Painted Rocks #	CID	MT	5	4	9										
69	Sula #	CID	MT	?	?	5				1						
70	East Fork Bitterroot	CID	MT	3	0	3		1								
71	Trail Creek	CID	MT	5	?	5						1				
72	Divide Creek	CID	MT	5	2	7			1							
	~~Skalkaho~~	CID	MT	0	0	0						7	2			
73	Welcome Creek	CID	MT	3	3	6					1					
74	Ram Mtn	CID	MT	?	?	4										
75	East Fork Rock Creek	CID	MT	?	?	8										
	~~Sapphire~~	CID	MT	0	0	0					2					
	~~Willow Creek~~	CID	MT	0	0	0						12	3	1		
76	Flint Creek	CID	MT	2	0	2						2	1	6		
77	Feeley	CID	MT	2	0	2										
78	Mt Haggin	CID	MT	3	0	3										
79	Pintler	CID	MT	5	5	10						2	2			
80	McVey Creek	CID	MT	2	4	6							6			
81	Battlefield #	CID	MT	2	0	2						2	6			
82	Miner Lakes #	CID	MT	5	6	11										
	~~Mussigbrod~~	CID	MT	0	0	0						2	2			
83	Grasshopper	CID	MT	5	1	6							1			
84	Horse Prairie	CID	MT	?	?	7										
	Misc/Lone	CID	MT	4	0	4		3				2	1	19		
	MT Total in CID	CID	MT	61	26	111	0	5	1	1	3	34	26	26	0	3

Table 1c: Montana Portion of the Central Idaho Experimental Area (Montana statewide totals): wolf packs and population data, 2008.

Montana portion of Central Idaho Experimental Area

REF.		RECOV		PACK SIZE DEC 2008			MORTALITIES			KNOWN		CONTROL	CONFIRMED LOSSES6			
#	WOLF PACK1	AREA	STATE	ADULT	PUP	TOT	NAT	HUMAN2	UNKN3	DISPERSED	MISSING4	KILLED 5	CATTLE	SHEEP	DOGS	OTHER
MT in NWMT (Table 1a)		NWMT	MT	151	79	256	0	17	7	5	5	49	36	0	2	10
MT in GYA (Table 1b)		GYA	MT	80	42	130	4	10	1	7	4	27	15	85	0	4
MT in CID (Table 1c)		CID	MT	61	26	111	0	5	1	1	3	34	26	26	0	3
	MT STATE TOTAL			**292**	**147**	**497**	**4**	**32**	**9**	**13**	**12**	**110**	**77**	**111**	**2**	**17**

1 Underlined packs are counted as breeding pairs toward recovery goals.

2 Excludes wolves killed in control actions.

3 Does not include pups that disappeared before winter.

4 Collared wolves that ceased transmitting in 2008.

5 Includes agency lethal control and take by private citizens under 10j regulation.

6 Includes only domestic animals confirmed killed by wolves.

7 Pack did not exist on December 31, 2008 and is not displayed on the map; see pack narrative.

Border pack shared with State of Idaho; dens in Montana and majority of time in Montana.

FINAL_Table_1c_SWMT_CID_3-15-09.xls

Table 2a: Wyoming Wolf Packs (Outside of Yellowstone National Park) and Population Data for Wyoming's Portion of the Greater Yellowstone Recovery Area, 2008.

REF #	WOLF PACK 1	RECOV AREA	STATE	MINIMUM ESTIMATED PACK SIZE DEC 2008 ADULT	PUP	TOT	DOCUMENTED MORTALITIES NATURAL	HUMAN 2	UNKN 3	KNOWN DISPERSED	MISSING 4	CONTROL 5	CONFIRMED LOSSES 6 CATTLE	SHEEP	DOGS	OTHER
	Wyoming Outside Yellowstone National Park															
85	Buffalo	GYA	WY	7	2	9		1	1			0	0	0		
86	Pinnacle Peak	GYA	WY	4	6	10			1	2		0	0	0		
87	Washakie	GYA	WY	6	4	10					2	0	1	0		
88	Carter Mtn.	GYA	WY	2	6	8						2	2	0		
89	Absaroka	GYA	WY	3	2	5						2	2	0		
90	Beartooth	GYA	WY	4	4	8	1	1				0	1	0		
91	Butte Creek	GYA	WY	5	4	9						0	0	0		
92	Pahaska	GYA	WY	5	4	9				1		0	0	0		
93	Antelope	GYA	WY	4	4	8		1				0	0	0		
94	Snake River	GYA	WY	4	?	4						0	0	0		
95	Chagrin River	GYA	WY	3	2	5						0	0	0		
96	Phantom Springs	GYA	WY	5	4	9						0	0	0		
97	East Fork	GYA	WY	4	4	8					1	3	2	0		
98	Dog Creek	GYA	WY	4	2	6						1	0	12		
99	Rim	GYA	WY	4	2	6			1			0	0	0		
100	Sunlight	GYA	WY	2	2	4					2	7	6	0		
101	Greybull River	GYA	WY	0	3	3			1			2	1	0		
102	Elk Fork Creek	GYA	WY	3	0	3						0	0	0		
103	Pacific Creek	GYA	WY	9	4	13			1			0	0	0		
104	Green River	GYA	WY	3	0	3						0	11	14		
105	Whiskey Basin	GYA	WY	3	0	3						0	0	0		
106	Huckleberry	GYA	WY	3	0	3	1			1	1	0	0	0		
107	Black Butte	GYA	WY	2	0	2						1	0	0		
108	South Fork	GYA	WY	3	1	4						8	4	0		
109	Bold Mtn	GYA	WY	2	0	2						0	0	0		
110	Big Piney	GYA	WY	7	?	7						0	0	0		
111	Lava Mtn	GYA	WY	2	1	3			1			0	0	0		
112	Prospect	GYA	WY	2	?	2		2				0	0	0		

Table 2a: Wyoming Wolf Packs (Outside of Yellowstone National Park) and Population Data for Wyoming's Portion of the Greater Yellowstone Recovery Area, 2008.

REF #	WOLF PACK 1	RECOV AREA	STATE	MINIMUM ESTIMATED PACK SIZE DEC 2008 ADULT	PUP	TOT	DOCUMENTED MORTALITIES NATURAL	HUMAN 2	UNKN 3	KNOWN DISPERSED	MISSING 4	CONTROL 5	CONFIRMED LOSSES 6 CATTLE	SHEEP	DOGS	OTHER
113	Popo Agie	GYA	WY	2	0	2						0	0	0		
114	Deer Creek	GYA	WY	2	0	2						0	0	0		
	Sub-total			109	61	170	2	5	6	4	6	26	30	26	0	0
	Misc. wolves															
	~~Crandall~~	GYA	WY	0	0	0		1	2			6	4	0		
	~~Soda Lake~~	GYA	WY	0	0	0						4	0	0		
	~~Daniel~~	GYA	WY	0	0	0		5				0	0	0		
	~~Gooseberry~~	GYA	WY	0	0	0			1			6	3	0		
	Misc./Lone wolves	GYA	WY	8	0	8	1	4	4			4	4	0		
	WY Total (outside YNP)		WY	117	61	178	3	15	13	4	6	46	41	26	0	0

1 Underlined packs are counted as breeding pairs toward recovery goals.

2 Excludes wolves killed in control actions.

3 Does not include pups that disappeared before winter.

4 Collared wolves that became missing in 2008.

5 Includes agency lethal control and take by private citizens under 10j regulation.

6 Includes only domestic animals confirmed killed by wolves.

7 Pack did not exist on December 31, 2008 and is not displayed on the map; see pack narrative.

8 See narrative text for explanation

FINAL_Table_2a_2b_2c_GYA_3-15-09.xls

Table 2b: Yellowstone National Park (YNP) Wolf Packs and Population Data for YNP's Portion of the Greater Yellowstone Experimental Area, 2008.

REF #	WOLF PACK 1	RECOV AREA	STATE	MINIMUM ESTIMATED PACK SIZE DEC 2008 ADULT	PUP	TOT	DOCUMENTED MORTALITIES NATURAL	HUMAN 2	UNKN 3	KNOWN DISPERSED	MISSING 4	CONTROL 5	CONFIRMED LOSSES 6 CATTLE	SHEEP	DOGS	OTHER
	Yellowstone National Park Northern Range															
115	Quadrant Mountain	GYA	WY	4	0	4										
116	Everts (470F)	GYA	WY	5	3	8										
117	527F Group	GYA	WY	3	0	3										
118	471F Group	GYA	WY	3	0	3										
119	Blacktail Deer Plateau	GYA	WY	8	0	8										
120	Agate	GYA	WY	4	0	4	2			3						
121	Slough	GYA	WY	7	0	7	5			1	1					
122	Druid	GYA	WY	8	5	13				1						
	Misc/Lone wolves	GYA	WY	6	0	6	8			3	3					
	Northern Range Total			48	8	56	15	0	0	8	4	0	0	0	0	
	Yellowstone National Park Non-Northern Range															
123	Mollie's	GYA	WY	10	3	13				1						
124	Yellowstone Delta	GYA	WY	7	2	9	1				1					
125	Ylwstne Dlta Sub Gp	GYA	WY	4	0	4										
126	Bechler	GYA	WY	6	3	9										
127	Cougar Creek	GYA	WY	4	0	4	1									
128	Gibbon Meadows	GYA	WY	19	6	25					1					
129	Canyon (587M)	GYA	WY	4	0	4										
	Non-Northern Range Total		WY	54	14	68	2	0	0	1	2	0	0	0	0	0
	YNP Total in WY	GYA	WY	102	22	124	17	0	0	9	6	0	0	0	0	0
	WY Total (outside YNP)			117	61	178	3	15	13	4	6	46	41	26	0	0
	WY STATE TOTAL		**WY**	**219**	**83**	**302**	**20**	**15**	**13**	**13**	**12**	**46**	**41**	**26**	**0**	**0**

1 Underlined packs are counted as breeding pairs toward recovery goals.

2 Excludes wolves killed in control actions.

3 Does not include pups that disappeared before winter.

4 Collared wolves that became missing in 2008.

5 Includes agency lethal control and take by private citizens under 10j regulation.

6 Includes only domestic animals confirmed killed by wolves.

7 Pack did not exist on December 31, 2008 and is not displayed on the map; see pack narrative.

8 See narrative text for explanation

FINAL_Table_2a_2b_2c_GYA_3-15-09.xls

Table 2c: Wolf Population Data for the Greater Yellowstone Recovery Area, 2008.

WOLF PACK 1	RECOV AREA	STATE	MINIMUM ESTIMATED PACK SIZE DEC 2008 ADULT	PUP	TOT	DOCUMENTED MORTALITIES NATURAL	HUMAN 2	UNKN 3	KNOWN DISPERSED	MISSING 4	CONTROL 5	CONFIRMED LOSSES 6 CATTLE	SHEEP	DOGS	OTHER
WY in GYA (Table 2b)	GYA	WY	219	83	302	20	15	13	13	12	46	41	26	0	0
MT in GYA (Table 1b)	GYA	MT	80	42	130	4	10	1	7	4	27	15	85	0	4
ID in GYA (Table 3c)	GYA	ID	5	5	17	0	1	1	0	0	10	5	0	1	1
GYA RECOVERY AREA	**GYA**	**WY/MT/ID**	**304**	**130**	**449**	**24**	**26**	**15**	**20**	**16**	**83**	**61**	**111**	**1**	**5**

1 Underlined packs are counted as breeding pairs toward recovery goals.

2 Excludes wolves killed in control actions.

3 Does not include pups that disappeared before winter.

4 Collared wolves that became missing in 2008.

5 Includes agency lethal control and take by private citizens under 10j regulation.

6 Includes only domestic animals confirmed killed by wolves.

7 Pack did not exist on December 31, 2008 and is not displayed on the map; see pack narrative.

8 See narrative text for explanation.

FINAL_Table_2a_2b_2c_GYA_3-15-09.xls

Table 3a: Idaho Wolf Packs and Population Data for Idaho's Portion of the Central Idaho Recovery Area, 2008.

REF #	WOLF PACK 1	RECOV AREA	STATE	MINIMUM ESTIMATED PACK SIZE DEC 2008 % ADULT	PUP	TOT	DOCUMENTED MORTALITIES NATURAL	HUMAN 2	UNKN 3	KNOWN DISPERSED	MISSING 4	CONTROL 5	CONFIRMED LOSSES 6 CATTLE	SHEEP	DOGS	OTHER
130	Aparejo	CID	ID	?	?	13										
131	Applejack	CID	ID	2	2	4						3	1	5	1	
132	Archie Mountain	CID	ID	9	2	11		2							1	
133	Avery	CID	ID	2	1	3					1					
134	Basin Butte	CID	ID	?	2	13		1				7	8	36		
135	Battle Ridge	CID	ID	?	?	?										
136	Bear Pete	CID	ID	4	4	8						4		14		
137	Bear Valley	CID	ID	8	5	13				1						
138	Big Buck	CID	ID	?	?	?										
139	Big Hole #	CID	ID	4	2	6		2			1					
140	Bimerick Meadow	CID	ID	2	1	3										
141	Black Canyon #	CID	ID	3	0	3						5	3			
142	Blue Bunch	CID	ID	4	4	8							2			
143	Buffalo Ridge	CID	ID	?	?	?					1	6	4			
144	Calderwood	CID	ID	7	2	9										
	~~Carey Dome~~[7]	CID	ID	0	0	0		1								
145	Casner Creek	CID	ID	3	4	7										
146	Chamberlain Basin	CID	ID	?	?	?										
147	Chesimia	CID	ID	3	?	3			1							
148	Cold Springs	CID	ID	?	?	?										
149	Coolwater Ridge	CID	ID	?	?	?				1						
	~~Copper Basin~~[7]	CID	ID	0	0	0						3	1			
150	Deception	CID	ID	?	?	?		1								
151	Doublespring	CID	ID	?	?	?						6	9	3		
152	Eagle Mountain	CID	ID	2	1	3					2					
153	Earthquake Basin	CID	ID	5	4	9					1					
154	Eldorado Creek	CID	ID	4	4	8										
155	Fish Creek #	CID	ID	11	5	16			1							
156	Fishhook	CID	ID	3	4	7										
157	Five Lakes Butte	CID	ID	?	?	?										

Table 3a: Idaho Wolf Packs and Population Data for Idaho's Portion of the Central Idaho Recovery Area, 2008.

REF #	WOLF PACK 1	RECOV AREA	STATE	MINIMUM ESTIMATED PACK SIZE DEC 2008 % ADULT	PUP	TOT	DOCUMENTED MORTALITIES NATURAL	HUMAN 2	UNKN 3	KNOWN DISPERSED	MISSING 4	CONTROL 5	CONFIRMED LOSSES 6 CATTLE	SHEEP	DOGS	OTHER
158	Florence	CID	ID	?	?	?		2			1					
159	Galena	CID	ID	2	1	3						6	5			
160	Giant Cedar	CID	ID	5	2	7	1	1		1						
161	Golden Creek	CID	ID	3	2	5	1		1							
162	Gospel Hump	CID	ID	?	?	?										
163	Grandad	CID	ID	2	1	3										
164	Hard Butte	CID	ID	?	?	?						3		17	1	
165	Hemlock Ridge	CID	ID	4	0	4					3					
	~~High Prairie~~[7]	CID	ID	0	0	0					1	1	3	4		
166	Hoodoo	CID	ID	8	3	11		2		1						
167	Hornet Creek	CID	ID	2	3	5						1	1			
168	Hughes Creek #	CID	ID	2	5	7					1					
169	Hyndman	CID	ID	2	0	2										
170	Indian Creek	CID	ID	?	?	?										
171	Jungle Creek	CID	ID	?	?	?								11		
172	Jureano Mountain	CID	ID	2	6	8				1		1	4			
173	Kelly Creek	CID	ID	3	4	7			1							
174	Kootenai Peak	CID	ID	?	?	?										
175	Landmark	CID	ID	?	?	?										
176	Lemhi	CID	ID	3	6	9						1	4	5		
177	Lick Creek	CID	ID	6	4	10								3		
178	Lochsa	CID	ID	10	5	15										
179	Magruder	CID	ID	3	?	3										
180	Marble Mountain	CID	ID	2	1	3			2	1						
181	Monumental Creek	CID	ID	?	?	?		1			1					
	~~Moores Flat~~[7]	CID	ID	0	0	0						4	4	1		
182	Morgan Creek	CID	ID	?	?	?										
183	Moyer Basin	CID	ID	3	5	8						4	2			
184	O'Hara Point	CID	ID	?	?	?										
	~~Orphan~~[7]	CID	ID	0	0	0										

Table 3a: Idaho Wolf Packs and Population Data for Idaho's Portion of the Central Idaho Recovery Area, 2008.

REF #	WOLF PACK 1	RECOV AREA	STATE	MINIMUM ESTIMATED PACK SIZE DEC 2008 % ADULT	PUP	TOT	DOCUMENTED MORTALITIES NATURAL	HUMAN 2	UNKN 3	KNOWN DISPERSED	MISSING 4	CONTROL 5	CONFIRMED LOSSES 6 CATTLE	SHEEP	DOGS	OTHER
185	Owl Creek	CID	ID	?	?	?										
	~~Packer John~~[7]	CID	ID	0	0	0						7	1	10	1	
	~~Pass Creek~~[7]	CID	ID	0	0	0			1			6	7			
186	Pettibone Creek	CID	ID	?	?	2										
187	Phantom Hill	CID	ID	5	4	9		1						1		
188	Pilot Rock	CID	ID	2	6	8									1	
189	Pot Mountain	CID	ID	?	2	11		1								
190	Red River	CID	ID	?	?	3					1	1				
191	Scott Mountain	CID	ID	2	3	5										
192	Selway	CID	ID	?	?	?			1							
193	Sleepy Hollow	CID	ID	3	5	8										
194	Snake River	CID	ID	2	6	8										
195	Soldier Mountain	CID	ID	4	1	5					1					
196	Spirit Ridge	CID	ID	2	8	10			2							
197	Steel Mountain	CID	ID	6	1	7						6		23		
198	Stolle Meadows	CID	ID	3	3	6		1				3	3			
199	Tangle Creek	CID	ID	?	?	?				1						
200	Thorn Creek	CID	ID	2	2	4										
201	Thunder Mountain	CID	ID	?	?	?										
202	Timberline	CID	ID	7	4	11				1				5		
203	Wapiti	CID	ID	6	6	12										
	~~Warm Springs~~[7]	CID	ID	0	0	0	1	1			1					
204	White Bird Creek	CID	ID	3	4	7						2	2			
205	Wolf Fang	CID	ID	3	1	4										
206	Yankee Fork	CID	ID	2	2	4		1	1		1					
	Lone/Paired	CID	ID	22	0	22		2	2			5	13	40		
	Idaho minimum count	CID	ID	212	153	403										
	Unknown wolves [8]	CID	ID	?	?	400		4	3			12	14	40	6	
	ID Total in CID	CID	ID	212	153	803	3	24	16	8	17	97	91	218	11	0

Table 3b: Idaho Wolf Packs and Population Data for Idaho's Portion of the Northwest Montana Recovery Area, 2008.

REF #	WOLF PACK 1	RECOV AREA	STATE	MINIMUM ESTIMATED PACK SIZE DEC 2008 ADULT	PUP	TOT	DOCUMENTED MORTALITIES NATURAL	HUMAN 2	UNKN 3	KNOWN DISPERSED	MISSING 4	CONTROL 5	CONFIRMED LOSSES 6 CATTLE	SHEEP	DOGS	OTHER
207	Boundary #	NWMT	ID	?	?	?										
208	Calder Mountain #	NWMT	ID	?	?	?										
209	Copper Falls #	NWMT	ID	2	1	3										
210	Cutoff Peak #	NWMT	ID	5	4	9										
211	Mullan #	NWMT	ID	3	?	3		1				1				
212	Pond Peak #	NWMT	ID	2	1	3										
213	Silver Lake #	NWMT	ID	2	1	3										
214	Snowy Top #	NWMT	ID	2	1	3			1							
	Lone/Paired	NWMT	ID	2	0	2										
	ID in NWMT	NWMT	ID	18	8	26	0	1	1	0	0	1	0	0	0	0

Table 3c: Idaho Wolf Packs and Population Data for Idaho's Portion of Greater Yellowstone Experimental Area and Idaho Statewide totals, 2008.

REF #	WOLF PACK 1	RECOV AREA	STATE	MINIMUM ESTIMATED PACK SIZE DEC 2008 ADULT	PUP	TOT	DOCUMENTED MORTALITIES NATURAL	HUMAN 2	UNKN 3	KNOWN DISPERSED	MISSING 4	CONTROL 5	CONFIRMED LOSSES 6 CATTLE	SHEEP	DOGS	OTHER
215	Biscuit Basin	GYA	ID	?	?	7							1			
216	Bishop Mountain #	GYA	ID	2	3	5						3	1			
217	Bitch Creek	GYA	ID	3	2	5		1				1	1			
	~~Fall Creek~~[7]	GYA	ID	0	0	0						6	2			1
	Unknown wolves	GYA	ID	?	?	?			1						1	
	ID Total in GYA	GYA	ID	5	5	17	0	1	1	0	0	10	5	0	1	1
	ID Total in NWMT	NWMT	ID	18	8	26	0	1	1	0	0	1	0	0	0	0
	ID Total in CID	CID	ID	212	153	803	3	24	16	8	17	97	91	218	11	0
	ID STATE TOTAL	GYA/NWMT/CID	ID	**235**	**166**	**846**	**3**	**26**	**18**	**8**	**17**	**108**	**96**	**218**	**12**	**1**

Table 3d: Wolf Population Data for the Central Idaho Experimental Area, 2008.

			MINIMUM ESTIMATED PACK SIZE DEC 2008			DOCUMENTED MORTALITIES						CONFIRMED LOSSES 6			
WOLF PACK 1	RECOV AREA	STATE	ADULT	PUP	TOT	NATURAL	HUMAN 2	UNKN 3	KNOWN DISPERSED	MISSING 4	CONTROL 5	CATTLE	SHEEP	DOGS	OTHER
MT in CID (Table 1c)	CID	MT	61	26	111	0	5	1	1	3	34	26	26	0	3
ID in CID (Table 3a)	CID	ID	212	153	803	3	24	16	8	17	97	91	218	11	0
CID RECOVERY AREA	**CID**	**ID/MT**	**273**	**179**	**914**	**3**	**29**	**17**	**9**	**20**	**131**	**117**	**244**	**11**	**3**

1 Underlined packs are counted as breeding pairs toward recovery goals.

2 Excludes wolves killed in control actions.

3 Does not include pups that disappeared before winter.

4 Collared wolves that became missing in 2008.

5 Includes agency lethal control and take by private citizens under 10j regulation.

6 Includes only domestic animals confirmed killed by wolves.

7 Pack did not exist on December 31, 2008 and is not displayed on the map; see pack narrative.

8 See narrative for more information.

Border pack shared with adjacent state or province; dens in Idaho and majority of time in Idaho.

% Pack composition figures are extrapoplations of data collected during summer, where number of adults is calcuated by subtracting verified pup production from year-end pack size estimates; estimates do not account for undocumented pup mortalities, and therefore may underestimate the # of adults in a pack.

FINAL_ID_Table_3a_3b_3c_3d_3-15-09.xls

Table 4a: Northern Rocky Mountain minimum fall wolf population and breeding pairs* 1979-2008, by Federal Recovery Area.

Minimum Fall Wolf Population by Recovery Area:

Year	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08
Recovery Area																														
NWMT	2	1	2	8	6	6	13	15	10	14	12	33	29	41	55	48	66	70	56	49	63	64	84	108	92	59	126	171	230	282
GYA																	21	40	86	112	118	177	218	271	301	335	325	390	453	449
CID																	14	42	71	114	156	196	261	284	368	452	565	739	830	914
TOTAL	2	1	2	8	6	6	13	15	10	14	12	33	29	41	55	48	101	152	213	275	337	437	563	663	761	846	1016	1300	1513	1645

Breeding Pairs by Recovery Area:

Year	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08
Recovery Area																														
NWMT								1	2	1	1	3	2	4	4	5	6	7	5	5	6	6	7	12	4	6	11	12	23	18
GYA																	2	4	9	6	8	14	13	23	21	31	20	31	33	35
CID																		3	6	10	10	10	14	14	26	29	40	43	51	42
TOTAL								1	2	1	1	3	2	4	4	5	8	14	20	21	24	30	34	49	51	66	71	86	107	95

* By the standards of the Rocky Mountain Gray Wolf Recovery Plan and wolf reintroduction environmental impact statement, a breeding pair is defined as an adult male and an adult female wolf, accompanied by 2 pups that survived at least until Dec 31. Recovery goals call for 10 breeding pairs per area, or a total of 30 breeding pairs distributed through the 3 areas, for 3 years.

NOTE: Each year, wolf packs discovered in the current year that contain $\geq$ 2 yearlings and $\geq$ 2 adults are added to the previous year's breeding pair and population totals; similarly, if evidence in the current year indicates that < 2 pups or < 2 adults survived on December 31 of the previous year, that wolf pack is deleted from the previous year's breeding pair counts and population totals. Therefore, breeding pair counts and population totals are updated in current annual reports.

FINAL_2008_BP_by_REC_AREA_Table_4a_&_Figure_5.xls

Table 4b: Northern Rocky Mountain minimum fall wolf population and breeding pairs* 1979-2008, by State.

Minimum Fall Wolf Population by State:

Year	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08
State																														
MT	2	1	2	8	6	6	13	15	10	14	12	33	29	41	55	48	66	70	56	49	74	97	123	183	182	152	256	316	422	497
WY																	21	40	86	112	107	153	189	217	234	272	252	311	359	302
ID																	14	42	71	114	156	187	251	263	345	422	512	673	732	846
TOTAL	2	1	2	8	6	6	13	15	10	14	12	33	29	41	55	48	101	152	213	275	337	437	563	663	761	846	1020	1300	1513	1645

Breeding Pairs by State:

Year	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08
State																														
MT								1	2	1	1	3	2	4	4	5	6	7	5	5	7	8	7	17	10	15	19	21	39	34
WY																	2	4	9	6	7	12	13	18	16	25	16	25	25	22
ID																		3	6	10	10	10	14	14	25	26	36	40	43	39
TOTAL								1	2	1	1	3	2	4	4	5	8	14	20	21	24	30	34	49	51	66	71	86	107	95

* By the standards of the Rocky Mountain Gray Wolf Recovery Plan and wolf reintroduction environmental impact statement, a breeding pair is defined as an adult male and an adult female wolf, accompanied by 2 pups that survived at least until Dec 31. Recovery goals call for 10 breeding pairs per area, or a total of 30 breeding pairs distributed through the 3 areas, for 3 years.

NOTE: Each year, wolf packs discovered in the current year that contain $\geq$ 2 yearlings and $\geq$ 2 adults are added to the previous year's breeding pair and population totals; similarly, if evidence in the current year indicates that < 2 pups or <2 adults survived on December 31 of the previous year, that wolf pack is deleted from the previous year's breeding pair counts and population totals. Therefore, breeding pair counts and population totals are updated in current annual reports.

Table 5a: Northern Rocky Mountain States Confirmed Wolf Depredation[1], 1987-2008, by Recovery Area.

YEAR	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	TOTAL
Northwest Montana Recovery Area:																							
cattle	6	0	3	5	2	1	0	6	3	9	16	9	13	10	8	9	6	6	9	6	26	37	190
sheep	10	0	0	0	2	0	0	0	0	0	30	0	19	2	5	13	3	1	1	1	5	0	92
other 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	5	0	1	0	2	1	10	23
dogs	0	0	0	1	0	0	0	0	3	1	0	0	2	3	1	4	0	0	0	1	3	2	21
wolves moved	0	0	4	0	3	0	0	2	2	10	7	0	4	0	5	0	0	0	0	0	0	0	37
wolves killed	4	0	1	1	0	0	0	0	0	4	14	4	9	4	3	9	14	1	2	15	19	50	154
Greater Yellowstone Recovery Area:																							
cattle									0	0	5	3	4	7	22	33	45	100	61	135	79	60	554
sheep									0	13	67	7	13	39	117	71	90	99	53	41	35	111	756
other 3									0	0	0	0	1	0	0	0	10	4	0	1	13	5	34
dogs									1	0	0	4	7	8	4	1	0	6	2	0	3	1	37
wolves moved									6	8	14	0	0	6	8	0	0	0	0	0	0	0	42
wolves killed									0	1	6	3	9	6	9	23	38	55	60	56	87	83	436
Central Idaho Recovery Area:																							
cattle									0	2	1	9	16	15	10	10	13	24	27	43	78	117	365
sheep									0	24	29	5	57	39	16	15	118	170	190	205	173	244	1285
other 3									0	0	0	0	0	0	0	0	0	0	2	0	0	3	5
dogs									0	1	4	1	6	0	1	4	6	3	9	7	7	11	60
wolves moved									0	5	0	3	15	10	5	0	0	0	0	0	0	0	38
wolves killed									0	1	1	0	5	10	7	14	7	30	41	71	80	131	398
Total, 3 Recovery Areas:																							
cattle	6	0	3	5	2	1	0	6	3	11	22	21	33	32	40	52	64	130	97	184	183	214	1109
sheep	10	0	0	0	2	0	0	0	0	37	126	12	89	80	138	99	211	270	244	247	213	355	2133
other 3	0	0	0	0	0	0	0	0	0	0	0	0	1	0	4	5	10	5	2	3	14	18	62
dogs	0	0	0	1	0	0	0	0	4	2	4	5	15	11	6	9	6	9	11	8	13	14	118
wolves moved	0	0	4	0	3	0	0	2	8	23	21	3	19	16	18	0	0	0	0	0	0	0	117
wolves killed2	4	0	1	1	0	0	0	0	0	6	21	7	23	20	19	46	59	86	103	142	186	264	988

1 Numbers of animals confirmed killed by wolves in calendar year.

2 Includes wolves legally shot by livestock owners. Others killed in government control efforts.

3 Total livestock other than cattle and sheep confirmed killed by wolves between 1987 and 2008 are 21 llamas, 28 goats and 10 horses.

From 1987 to December 2008, Defenders of Wildlife has paid $1,167,474 for wolf damage to livestock and guard dogs. An additional $50,000 was donated directly to Montana towards state reimbursement efforts. Information is available at http://defenders.org/wolfcomp/html.

Table 5b: Northern Rocky Mountain Confirmed Wolf Depredation[1], 1987-2008, by State.

YEAR	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	TOTAL
Montana																							
cattle	6	0	3	5	2	1	0	6	3	10	19	10	20	14	12	20	24	36	23	32	75	77	398
sheep	10	0	0	0	2	0	0	0	0	13	41	0	25	7	50	84	86	91	33	4	27	111	584
other 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	5	0	3	2	2	14	17	47
dogs	0	0	0	1	0	0	0	0	4	1	0	1	2	5	2	5	1	4	1	4	3	2	36
wolves moved	0	0	4	0	3	0	0	2	8	22	20	0	14	6	17	0	0	0	0	0	0	0	96
wolves killed	4	0	1	1	0	0	0	0	0	5	18	4	19	7	8	26	34	40	35	53	73	110	438
Wyoming																							
cattle									0	0	2	2	2	3	18	23	34	75	54	123	55	41	432
sheep									0	0	56	7	0	25	34	0	7	18	27	38	16	26	254
other 3									0	0	0	0	1	0	0	0	10	2	0	1	0	0	14
dogs									0	0	0	3	6	6	2	0	0	2	1	0	2	0	22
wolves moved									0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
wolves killed									0	0	2	3	1	2	4	6	18	29	41	44	63	46	259
Idaho																							
cattle									0	1	1	9	11	15	10	9	6	19	20	29	53	96	279
sheep									0	24	29	5	64	48	54	15	118	161	184	205	170	218	1295
other 3									0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
dogs									0	1	4	1	7	0	2	4	5	3	9	4	8	12	60
wolves moved									0	1	0	3	5	10	1	0	0	0	0	0	0	0	20
wolves killed									0	1	1	0	3	11	7	14	7	17	27	45	50	108	291
Total, 3 States																							
cattle	6	0	3	5	2	1	0	6	3	11	22	21	33	32	40	52	64	130	97	184	183	214	1109
sheep	10	0	0	0	2	0	0	0	0	37	126	12	89	80	138	99	211	270	244	247	213	355	2133
other 3	0	0	0	0	0	0	0	0	0	0	0	0	1	0	4	5	10	5	2	3	14	18	62
dogs	0	0	0	1	0	0	0	0	4	2	4	5	15	11	6	9	6	9	11	8	10	14	115
wolves moved	0	0	4	0	3	0	0	2	8	23	21	3	19	16	18	0	0	0	0	0	0	0	117
wolves killed2	4	0	1	1	0	0	0	0	0	6	21	7	23	20	19	46	59	86	103	142	186	264	988

1 Numbers of animals confirmed killed by wolves in calendar year.

2 Includes wolves legally shot by livestock owners. Others killed in government control efforts.

3 Total livestock other than cattle and sheep confirmed killed by wolves between 1987 and 2008 are 21 llamas, 28 goats and 10 horses.

From 1987 to December 2008, Defenders of Wildlife has paid $1,167,474 for wolf damage to livestock and guard dogs. An additional $50,000 was donated directly to Montana towards state reimbursement efforts.Information on the compensation program is available at http://www.defenders.org/wolfcomp.html.

APPENDIX 4

NORTHERN ROCKIES PACK DISTRIBUTION MAPS 2008

Figure 1. (map) Central Idaho, Northwest Montana and Greater Yellowstone wolf recovery areas (Key: Tables 1 - 3).

Figure 2. (map) Northwest Montana Wolf Recovery Area (Key: Table 1a).

Figure 3. (map) Greater Yellowstone Wolf Recovery Area (Key: Tables 1b, 2).

Figure 4. (map) Central Idaho Wolf Recovery Area (Key: Tables 1c, 3 a, b, c, d).

Figure 1. Central Idaho, Northwest Montana and Greater Yellowstone Wolf Recovery Areas

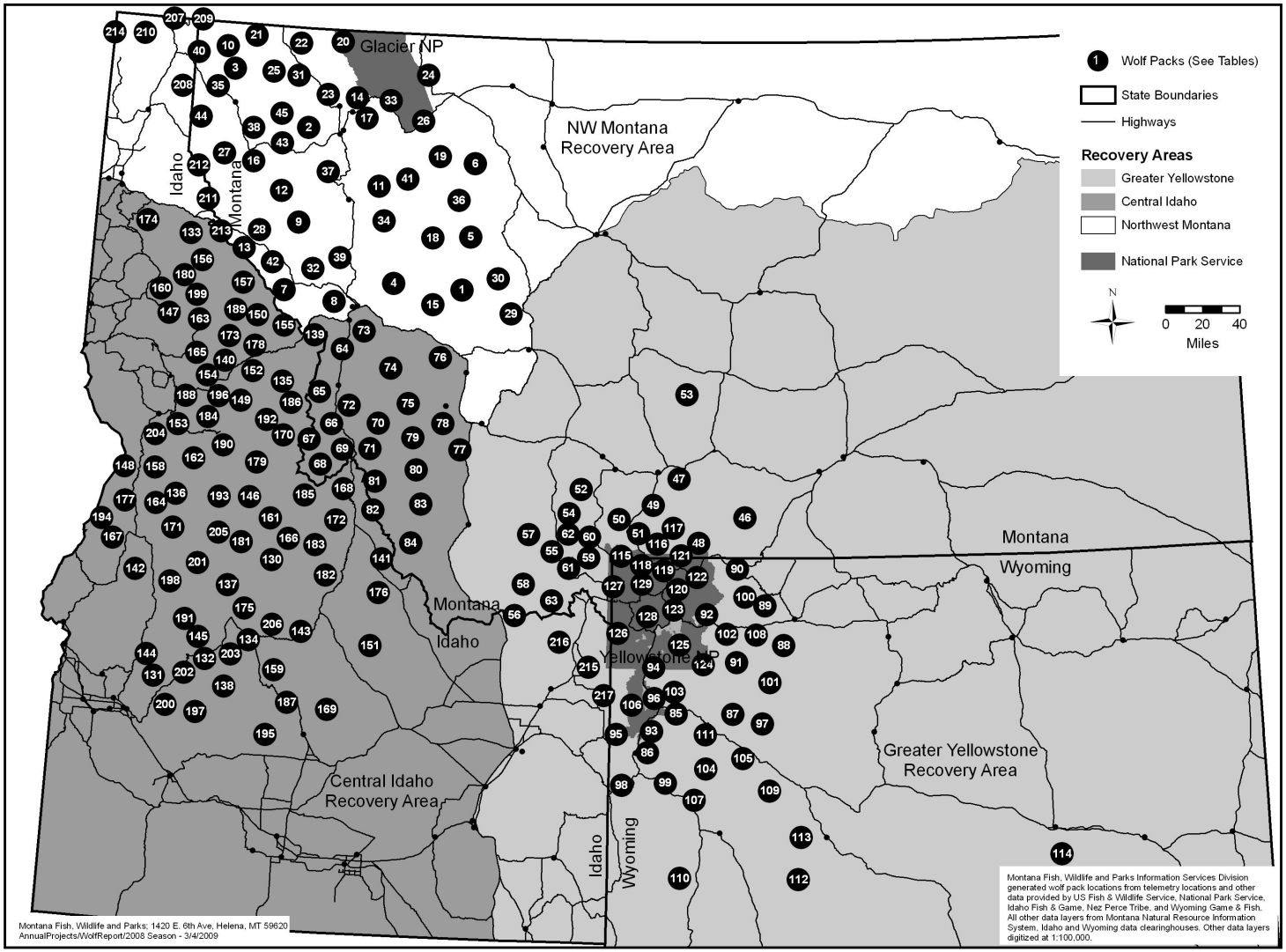


Figure 2. Northwest Montana Wolf Recovery Area

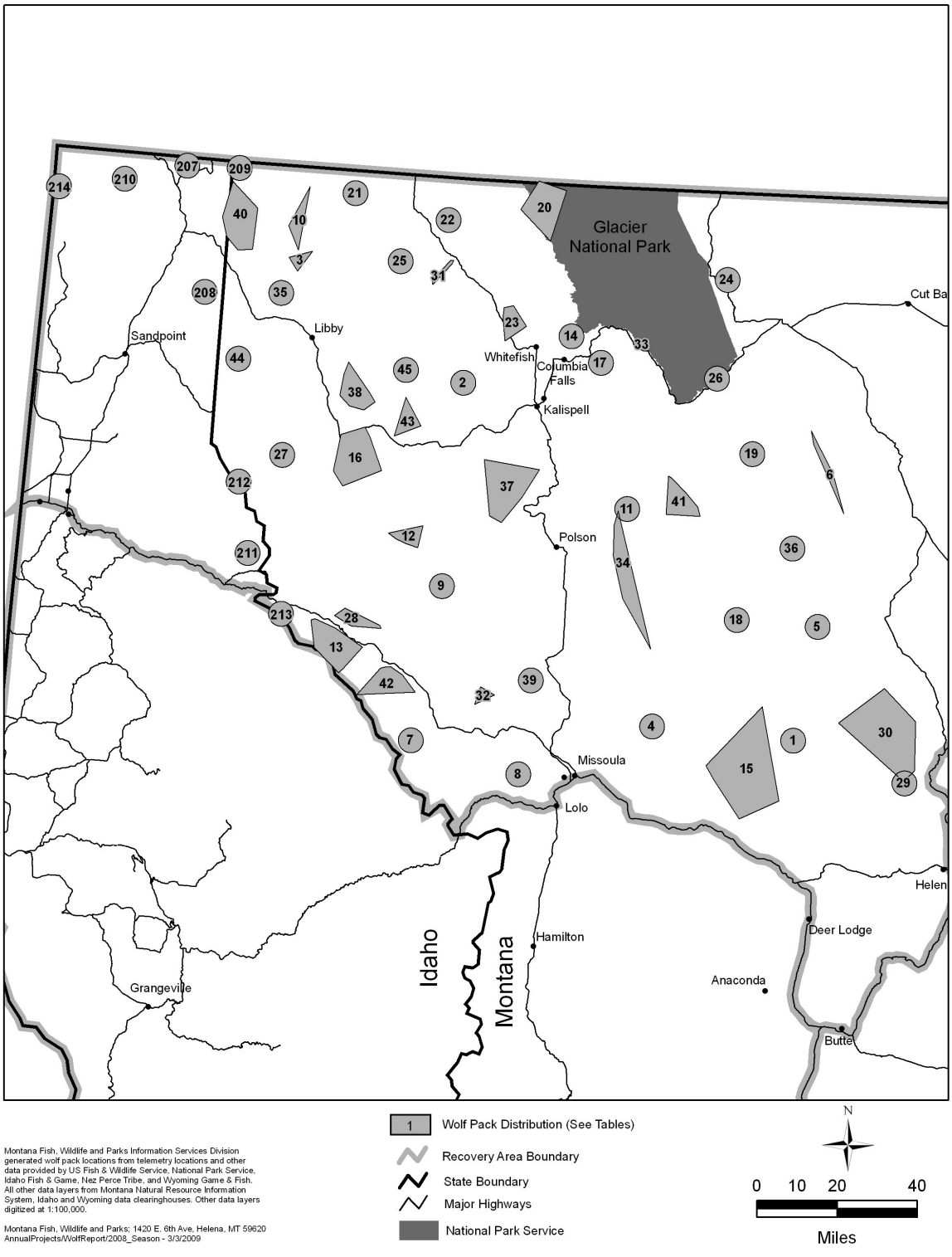
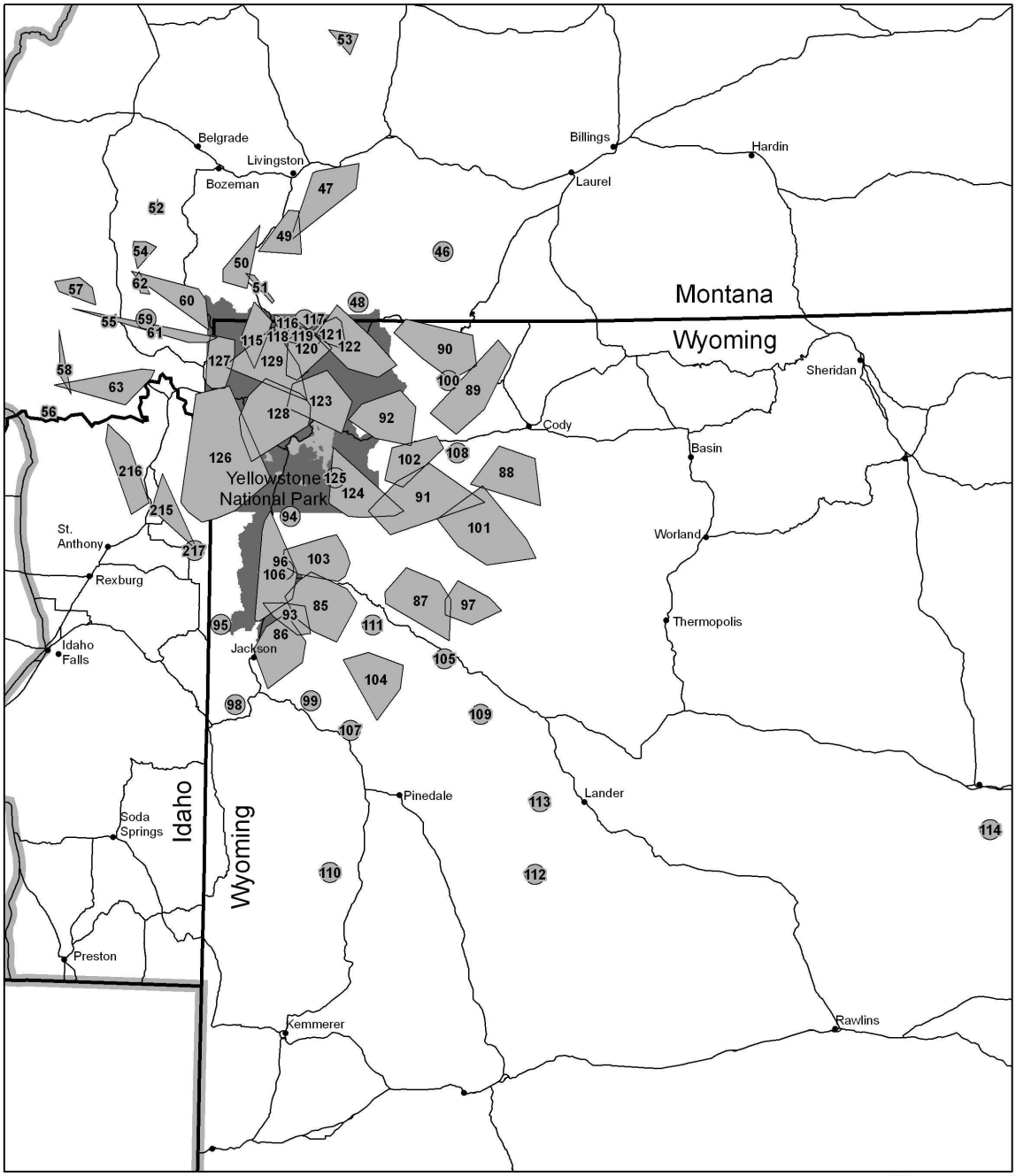


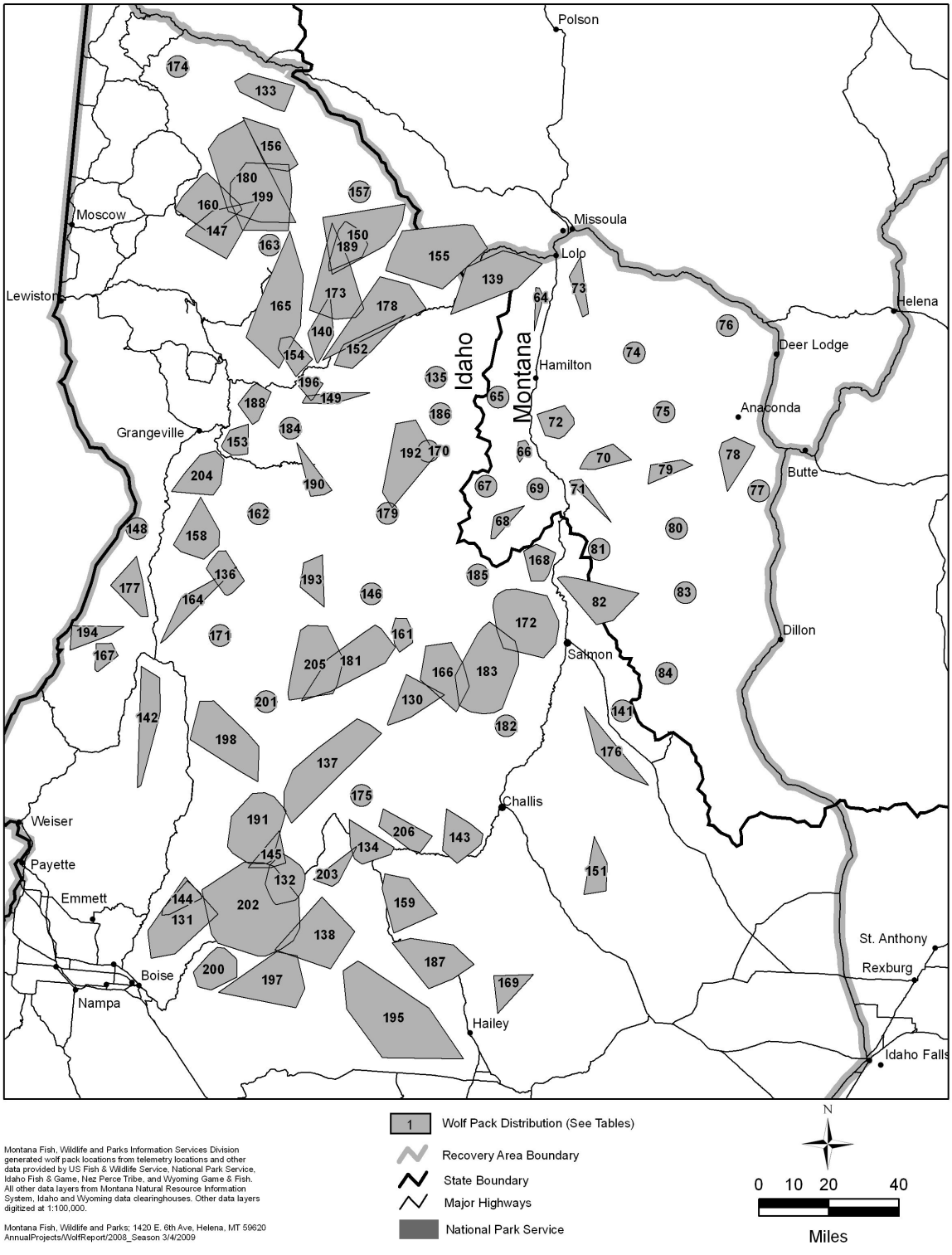
Figure 3. Greater Yellowstone Wolf Recovery Area



Montana Fish, Wildlife and Parks Information Services Division generated wolf pack locations from telemetry locations and other data provided by US Fish & Wildlife Service, National Park Service, Idaho Fish & Game, Nez Perce Tribe, and Wyoming Game & Fish. All other data layers from Montana Natural Resource Information System, Idaho and Wyoming data clearinghouses. Other data layers digitized at 1:100,000.

Montana Fish, Wildlife and Parks; 1420 E. 6th Ave, Helena, MT 59620
AnnualProjects/WolfReport/2008_Season 3/4/2009

Figure 4. Central Idaho Wolf Recovery Area



APPENDIX 5

NORTHERN ROCKIES WOLF POPULATION GRAPHS

Figure 5. Northern Rocky Mountain wolf population trends 1979-2008, by recovery area.

Figure 6.Northern Rocky Mountain wolf population trends 1979-2008, by state.

Figure 5. Northern Rocky Mountain Wolf Breeding Pair Trends, by Recovery Area, 1979-2008

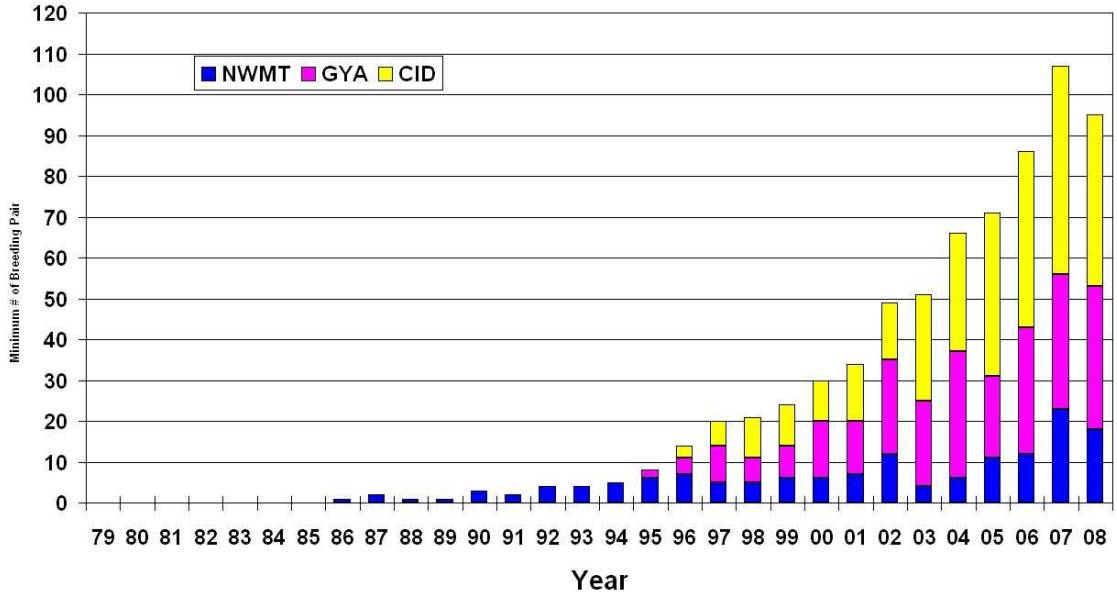


Figure 6. Northern Rocky Mountain Breeding Pair Trends by State, 1979-2008