

Rocky Mountain Wolf Recovery 2008 Interagency Annual Report

A cooperative effort by the U.S. Fish and Wildlife Service, Nez Perce Tribe, National Park Service, Montana Fish, Wildlife & Parks, Idaho Fish and Game, Blackfeet Nation, Confederated Salish and Kootenai Tribes, and USDA Wildlife Services

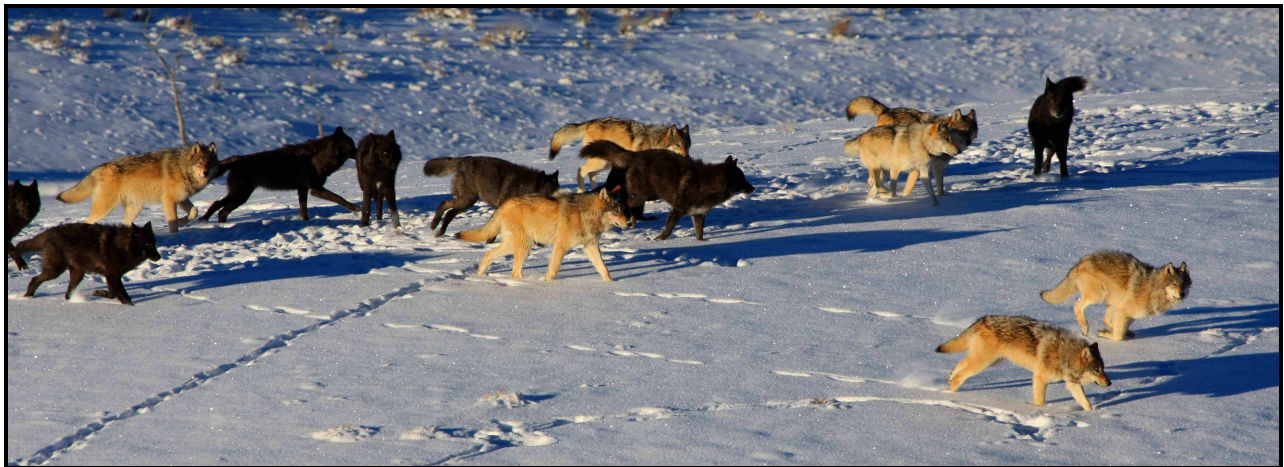


photo by Dan Stahler, NPS

*This cooperative annual report presents information on the status, distribution and management of the Northern Rocky Mountain wolf population from January 1, 2008 to December 31, 2008.
It is also available at:*

<http://westerngraywolf.fws.gov/annualreports.htm>

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Note to Readers:

Because of the transition to state-led wolf management in Montana and Idaho in 2005, the 2008 Interagency Annual Report is comprised of separate sections, one each for the individual annual reports from the states of Montana and Idaho, federal agencies for Wyoming and Yellowstone National Park combined, and the overall U.S. Fish and Wildlife Service Northern Rockies Recovery Program. This makes for some degree of overlap and duplication between sections. However, U.S. Fish and Wildlife Service requires Montana and Idaho to submit an annual report each year. By incorporating their state annual reports in this modified structure, the public can still access information about gray wolves in the northern Rocky Mountains in a single, comprehensive report or by individual state.

You can download the Interagency Report in its entirety and cite the Interagency Report as suggested on the cover. Alternatively, you may download a state report or section of the Interagency Report and cite it individually. I hope you find this format useful.

Thank you,

Ed Bangs

U.S. Fish and Wildlife Service Northern Rockies Wolf Recovery Program Coordinator

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NORTHERN ROCKIES SUMMARY

The gray wolf (*Canis lupus*) population in the Northern Rocky Mountain (NRM) states (Idaho, Montana, and Wyoming) continued to increase [8% growth in 2008] but overall distribution remained similar to past years (Figure 1, Tables 4a, 4b). Estimates of wolf numbers at the end of 2008 were 914 wolves in the Central Idaho Recovery Area (CID), 449 in the Greater Yellowstone Recovery Area (GYA), and 282 in the Northwest Montana Recovery Area (NWMT) for a total minimum estimate of 1,645 wolves (Figure 1, Table 4a). By state boundaries, there were an estimated 846 wolves in the state of Idaho, 302 in Wyoming and 497 in Montana (Table 4b). Of approximately 217 packs (groups of 2 or more wolves with territories), 95 packs met the definition of “breeding pair,” [an adult male and adult female raising 2 or more pups until December 31] (Tables 4a, 4b). This made 2008 the eighth year in which 30 or more breeding pairs were documented and well distributed within the 3-state area. Biological recovery criteria have been met for removing NRM wolves from the list of Endangered and Threatened Species. By the end of 2008, no confirmed wolves or wolf packs were documented within the NRM DPS in states adjacent to Montana, Idaho and Wyoming. But lone wolves occasionally disperse long distances throughout the NRM as exemplified by one lone GYA wolf that moved through Wyoming, Idaho, Utah, Colorado, and back to Wyoming between October 2008 to March 2009. A new wolf pack with 6 pups formed in north central Washington by wolves that dispersed from south central British Columbia.

Wolves in the NRM subsisted mainly on elk, white-tailed deer, mule deer, moose, and bison but livestock are also attacked. Livestock depredations in 2008 included 184 cattle, 355 sheep, 14 dogs, and 18 other (llamas, horses, and goats) that were confirmed as killed by wolves (Tables 5a, 5b). Approximately of 77 out of 238 NRM wolf packs that existed in 2008 (32%) were involved in confirmed livestock or pet depredations, 21 of those packs no longer existed by the end of 2008. In response to depredations, 264 wolves were lethally removed within the 3-state area (about 14% of the 2008 wolf population). No wolves have been relocated since 2001. In Montana, about 34% of packs were confirmed to have killed livestock. Nine of these packs were removed by the end of 2008. In Wyoming outside of Yellowstone National Park, about 38% of wolf packs had confirmed livestock kills. Four entire had to be removed. In Idaho, 32% of wolf packs had confirmed livestock kills and 8 entire packs were removed. As new packs form within the original core recovery areas and individual animals routinely disperse, the 3 subpopulations function as a single, large meta-population (Figure 1). Numerous research projects are underway, examining wolf population dynamics, predator-prey interactions and livestock depredation.

NORTHERN ROCKIES BACKGROUND

Gray wolf populations were extirpated from the western U.S. by the 1930s. Subsequently, wolves from Canada occasionally dispersed south into Montana and Idaho but failed to survive long enough to reproduce. Eventually, public attitudes toward predators changed and wolves received legal protection with the passage of the Endangered Species Act (ESA) in 1973. Wolves began to successfully recolonize northwest Montana in the early 1980s. By 1995, there were 6 wolf packs in northwest Montana. In 1995 and 1996, 66 wolves from southwestern Canada were reintroduced to Yellowstone National Park (YNP) (31 wolves) and CID (35 wolves). From 1989-2001, we also relocated wolves 117 times to reduce conflicts with livestock, including moving wolves among different recovery areas. This included 10 wolf pups from northwestern Montana whose pack was involved in chronic livestock depredation were relocated to Yellowstone National Park. They were released from their holding pen in spring 1997.

The NRM wolf population contains 3 core recovery areas: the NWMT (Figs. 1, 2) includes northern Montana and the northern Idaho panhandle; the GYA (Figs. 1, 3) includes Wyoming and adjacent parts of Idaho and Montana; the CID (Figs. 1, 4) includes central Idaho and adjacent parts of southwest Montana. Wolves in the 3 recovery areas are managed under different guidelines, depending upon their designated status under the ESA.

The wolf population in northwestern Montana and the Idaho panhandle began from wolves that naturally dispersed from Canada in the early 1980's. They remain listed as endangered. The GYA and CID wolves are classified as nonessential experimental populations (as allowed by section 10(j) of ESA) and managed with more flexibility than an endangered population. In 2005 a new 10(j) experimental population regulation allowed even more management flexibility for wolves in the experimental population areas in states with approved wolf management plans (Montana and Idaho). That 2005 rule was liberalized again in early 2008. The states of Montana and Idaho have managed wolves in their entire states since 2005, with federal funding and according to federal guidelines.

The U.S. Fish and Wildlife Service (USFWS) is responsible for administering the ESA for terrestrial and freshwater species and some marine mammals. It determined that at a wolf metapopulation of least 30 or more breeding pairs composed of at least 300 wolves, with an equitable distribution among the 3 states for at least 3 successive years, constituted a viable and recovered wolf population. Those criteria (including the temporal element) were met at the end of 2002 and at that time 663 wolves in 49 breeding pairs were present. Because the wolf population has been recovered and all future threats to it have been resolved, the USFWS is obligated to delist wolves throughout the NRM DPS (Montana, Idaho, Wyoming, eastern one-third of Washington and Oregon and a small part of north central Utah]. However, in Wyoming the state law did not adequately protect wolves and ESA protections will remain in place. The final delisting rule should become effective in late April 2009.

U.S. Fish and Wildlife Service

Northern Rocky Mountain

Recovery Program Update

2009

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DISPERSAL AND OTHER POSSIBLE WOLF ACTIVITY ADJACENT TO MT, ID, AND WY

Although individual wolves can disperse over 680 miles from their natal pack, with actual travel distances exceeding 6,000 miles, the average dispersal distance of northern Rocky Mountain [NRM] wolves is about 60 miles. Only a dozen or so confirmed NRM wolf dispersal events from 1992 through 2009 have been over 190 miles and resulted in wolves going beyond the core NRM wolf population in MT, ID, or WY. Undoubtedly many other dispersal events have occurred but have not been detected because <30% of the NRM wolf population has been radio-collared and it is difficult to locate lone wolves that have dispersed. Nearly all dispersing wolves remained within the NRM DPS (eastern one-third of WA & OR, a small part of northcentral UT, and all of MT, ID, and WY).

Until 2008, no wolf packs had been confirmed in WA or OR. However, in July 2008, a wolf pack (Lookout Pack) with 3 adults and 6 pups was discovered near Twisp, WA, on the east slope of the North Cascades just west of the DPS boundary. Genetic testing of the breeding male indicates a possible coastal/southern British Columbia origin; and the breeding female is similar to animals in northeastern British Columbia/northwestern Alberta. Both breeding adults were radio-collared in 2008 and continue to be monitored via radio telemetry by the U.S. Forest Service and WA Department of Fish and Wildlife. Home range size is approximately 350 square miles. The pack spends most of the year at lower elevations in response to the wintering distribution of deer and den site location. In 2009, the pack moved to higher elevations (where prey are more abundant in summer and fall) from mid-August to early November after the pups become more mobile. The pack consisted of 2 breeding adults and a yearling in spring 2009. A maximum of 4 pups was confirmed in September. These 7 individuals remained in the pack through December. Confirmed food items during the year included deer, a wild turkey, and salmon (in November). This pack's territory is in the area of Washington that remains listed as endangered under the ESA.

In July 2009, a second pack (Diamond Pack) was confirmed along the border of WA and northern ID about 140 miles east of the Lookout Pack. An ARGOS/GPS collar was placed on the breeding male, which was captured near a rendezvous site in July. Telemetry data collected to date indicate that roughly 90% of the pack's home range occurs in WA, with the remainder in ID. Home range size for the 6-month period monitored in 2009 was about 220 square miles. DNA analyses indicate that the male is linked genetically to the wolf population in southern Alberta, northwestern MT, and northern ID. Two adults and at least 3 pups were present in July 2009, and pack size remained at five in December. This pack's territory is within the NRM DPS that was delisted from the ESA in 2009.

OR confirmed its first breeding pair of wolves in 2009. The Imnaha pack [15 miles east of Joseph, OR] was also certainly a successful breeding pair in 2008 because it contained 5 adult-sized wolves in 2009. The breeding female of the pack is the radio-collared B300, originally collared in ID. In July 2009 she was recaptured by ODFW and fitted with a new radio collar.

She had recently had pups. ODFW confirmed the Imnaha Pack has 10 members in Fall 2009, 5 of them pups. Wolves also continue to inhabit the Wenaha Unit of northeast OR (20 mi west of Troy, OR), though no pack members have been radio-collared yet. The minimum estimate for the Wenaha pack is four wolves; pups were not confirmed in 2009. ODFW will attempt to radio-collar members of this pack. In April 2009 a pair of wolves was confirmed to have depredated livestock in the Keating Valley of Baker County, OR. One was captured and radio-collared. After significant agency efforts to stop the ongoing depredations (eventually totaling 1 calf, 28 sheep, and a goat) through non-lethal means, ODOW authorized WS to lethally remove both wolves in September 2009. That incident marked the first confirmed wolf depredation of livestock in modern OR history. All Oregon packs were within the NRM DPS that was delisted from the ESA in 2009.

Two notable wolf dispersal events were documented in 2009. A radio-collared male wolf from central ID (whose father had dispersed to central ID from YNP) bred with a female just east of YNP and had pups in early 2009. As part of a cooperative research project with the University of MT, several wolves were fitted with GPS radio-collars in 2008/09. The collars provide satellite downloads of locations every two weeks. In fall 2008, a yearling grey female from this study dispersed from the Mill Creek pack on the east side of the Yellowstone River between Gardiner and Livingston in southwest MT. She traveled south through western WY, southeastern ID, and northern UT. By late April 2009, she was near Vail, CO (about 450 miles southeast of Mill Creek) but in early March had moved north to south central WY. She came back to CO and was found dead in the northwestern part of that state in spring 2009. Her death remains under LE investigation. Any wolves in Colorado remain listed as endangered under the ESA.

Wolf activity was also reported, investigated, but not confirmed in areas beyond the core occupied NRM wolf range in 2009. Reports of suspected lone wolves and some packs were received from all states adjacent to the NRM DPS, as well as other states in the U.S. Packs were only confirmed in WA and OR. The suspected presence of long distance dispersing wolves or new packs outside of the core NRM wolf population are typically reported in the Service's weekly wolf report for WY and can be viewed at <http://westerngraywolf.fws.gov>.

NORTHERN ROCKIES FUNDING

Federal Funding for Wolf Management in both Federal Fiscal Years (FY) 2009 (Oct. 1, 2008-Sept. 30, 2009) and FY 2010 (Oct. 1, 2009-Sept. 30, 2010 * estimated).

Total Federal Funding- Wolf recovery has been almost entirely funded by federal appropriations and some private donations. In FY09 about \$3,763,000 in federal taxpayer funding was spent on wolf recovery and management in the NRM. Wolf recovery and management in the NRM from 1974, when wolves became listed, through 2009 cost approximately \$35,731,000 in federal funding (rounded to nearest \$1,000, with no adjustments for inflation and not including USDA Wildlife Services (WS) costs for investigating reports of suspected wolf damage and problem wolf control beyond the \$100,000/year provided by the USFWS to WS from 1992-2004). Wolf

management in the NRM in FY 2010 will cost federal taxpayers an estimated \$4,206,000. These annual cost estimates do not include the substantial resources provided from the Department of the Interior Solicitors Office nor the Department of Justice for legal assistance and defense during litigation.

USFWS Funding- In FY09, funding for wolf management in the NRM was up slightly from FY08 levels due to increased funding for wolf monitoring. Region 6 of the USFWS administers programs in MT and WY and is the USFWS lead Region for wolf recovery in the entire NRM. R-6 spent about \$2,214,000 in FY09. Included in that figure is the \$125,000 spent by USFWS R-6 Regional Office to help analyze public comments, prepare various regulations, and provide additional administrative support in FY09. The R-6 RO will likely spend a similar amount in FY10. Most of the USFWS funding in R-6 was transferred to MT, ID, and the Nez Perce Tribe (NPT). The USFWS R-6 also spent \$240,000 to conduct wolf management in WY in FY09, including \$40,000/yr. to assist WY WS wolf management efforts in WY. R-6 funding (\$180,000) also supported overall program coordination, rulemaking, assisting the Department of Justice, and administrative support out of Helena, MT. Estimated funding for FY10 (\$2,777k) for the USFWS is higher than FY09 levels (\$2,313k). Funding for R-1 of the USFWS in Boise, ID was stable at \$98,000 for administrative support.

Not included in the USFWS NRM wolf FY 2010 funding estimate is a new federal grant program for states and tribes that have documented damage caused by wolves. That program is being administered by the USFWS, with assistance for USDA WS, and will enact the 2009 Wolf Loss Demonstration Project Bill, Public Law 111-11. That law provides up to \$1,000,000/yr for 5 years (FY 2010-FY 2014) to states and tribes in the lower 48 states experiencing agricultural damage caused by wolves. Those funds should become available to states and tribes in 2010.

State and Tribal Funding. In FY09, Congress intended that the USFWS transfer \$396,000 to MT Fish, Wildlife & Parks for wolf monitoring, management, control, and outreach. In FY09 Congress intended ID receive \$720,000 and the NPT \$295,000 to fund wolf management in ID. The ID Governor's Office of Species Conservation and IDFG used \$100,000 of that funding to compensate livestock producers in ID for missing livestock and to make up part of the remaining 50% for probable livestock depredations that are only reimbursed at a 50% value by the private DOW compensation program in ID. In addition, FY09 Congress provided \$243,000 in additional funding for wolf monitoring in MT, ID, and WY. The USFWS divided that funding evenly between the 3 management programs in each state. Funding levels in FY10 appear to be similar to FY09, except that in tri-state wolf monitoring funds were increased to \$696,000 by Congress which will again be split evenly. In FY 2010 USFWS R-1 and R-6 will provide the states of WA and OR with about \$10k each to assist them with their wolf monitoring and management efforts.

In 2008 the USFWS R-6 spent about \$39,000 assisting the Wind River Tribes to develop a wolf management plan and Tribal wolf management capabilities but no funds were transferred in FY09. Other than the Nez Perce and Wind River Tribes, financial support has not been provided to other tribes for their wolf management activities. However the USFWS will transfer about \$10k each in FY10 funding to the Blackfeet, Salish and Kootenai, and Wind River Tribes, that

have confirmed pack activity on their tribal lands, to assist them with their wolf management activities.

National Park Service Funding. Yellowstone National Park maintained their NPS-funded wolf monitoring and research program at the \$167,000 level in FY09 and FY2010. All their field research projects remain funded by private donations (\$250,000/yr). In FY09 Grand Teton National Park spent \$52,000 in Park funding for salaries and travel and another \$70,000 in private donations for cooperative wolf-related research in and near GTNP. In 2009 GTNP hired a biologist to assist with wolf monitoring and costs in 2010 will be about \$31,000/year in federal funding and another \$125,000 from private donations. The USFWS in WY funded and conducted the wolf capture associated with NPS and other WGFD and University of WY research projects.

USDA Wildlife Services Funding. In FY09, WS maintained a \$100,000 Congressional directive for responding to complaints of wolf damage and nearly \$1,000,000 to investigate and resolve conflicts with predators in the NRM, including wolves. In FY 2010 Congress again provided \$926,000 to WS in MT, ID, and WY to investigate and address predator damage, including wolf damage. In FY09, WS in ID spent approximately \$517,000 of appropriated and cooperative funds responding to complaints of reported wolf damage, conducting control and management actions (salary and benefits, vehicles, and travel) and for other wolf-related costs (equipment and supply purchases, coordination and meeting attendance, etc.). MT WS expended approximately \$414,567 for field operations not including administrative costs of wolf damage management. WS in WY spent about \$299,765 (\$36,000 of that was provided by the USFWS in an ongoing cooperative agreement for field work and an additional \$4,000 of USFWS funding was used for WS administration) for wolf-related field activities. Most reported WS expenses do not include attending meetings and routine administrative costs associated with wolf damage management. In addition, \$3,000 was spent by OR WS to investigate and control 2 problem wolves in OR. In total, USDA WS in MT, ID, WY, and OR spent at least \$1,231,335 in FY09 on field wolf-related issues in the NRM.

Non-federal Funding For Wolves. Only the salary of one YNP biologist and administrative support is provided by the NPS. Starting in 2008, the YNP Foundation secured commitments for private donations at \$250,000/year for 10 years for wolf and wolf-related research in YNP. GTNP was given \$70,000 in private funding in FY09 for wolf-related research and another \$125,000 in FY10. The private TESH funded the salary and benefits of an experienced wolf field biologist in Bozeman, MT (valued at \$60,000/yr) in FY09. That biologist was a MT Fish, Wildlife and Parks (MFWP) volunteer, and logistic and field support and direct supervision were provided by MFWP (costing about \$20,000/yr). That employee helped MFWP to monitor wolves and resolve conflicts between wolves and private landowners in southwest MT. Due to delisting in 2009 that volunteer position was withdrawn by TESH in January 2010, although that biologist will still occasionally help MFWP with wolf issues in southwestern MT.

Defenders of Wildlife (DOW) continued to provide a private compensation program for livestock confirmed (100%) or probably (50%) killed by wolves. In 2009, DOW paid \$194,742 in compensation payments to livestock producers throughout the NRM. Included in that amount

was \$50,000 DOW contributed to the MT State wolf damage compensation program in 2009. Since 1987, DOW has contributed more than \$1,400,000 for wolf related livestock loss compensation through The Bailey Wildlife Foundation Wolf Compensation Trust www.defenders.org/wolfcompensation.

Additionally, DOW funded numerous non-lethal wolf control projects throughout the region totaling \$85,500. This included their largest project to date, the Wood River Valley Proactive project in ID, which involved a team of five seasonal field technicians working from June through October with three livestock producers to utilize electrified fladry, corrals, night corrals, spotlights, noise devices, radio-telemetry monitoring, and multiple livestock guard dogs. The project area covered 200,000 acres in the Sawtooth National Forest. This area has one of the highest concentrations of sheep grazing in ID. Over 13,000 sheep pass through this valley every year and it has a history of chronic wolf depredations. This project likely reduced the number of depredations that wolves would otherwise have been involved in, but the Phantom Hill pack there still depredated on 6 occasions between July and September, 2009. ID WS determined that there were 14 sheep and 2 dogs confirmed killed, and another 8 sheep were probably killed by the Phantom Hill pack. However, local producers asked that no wolves be killed by agency control. The project, funded primarily through DOW Proactive Carnivore Conservation Fund, cost \$30,000. Agency partners, including ID USDA Wildlife Services, National USDA Wildlife Research Center, Sawtooth National Forest, ID Department of Fish and Game, and the Blaine County Commission, provided substantial additional resources.

State compensation for wolf damage in addition to the DOW program was paid in 2009:
MT. The State of MT has a wolf damage compensation program that is a separate quasi-judicial board administratively attached to the MT Department of Livestock. The Livestock Loss Reduction & Mitigation Board and Program was created by the 2007 MT Legislature. The program is designed to reduce risk of livestock losses through application of proactive tools and to reimburse wolf-caused losses verified by USDA WS. Animals covered by MT's program are cattle, swine, horses, mules, sheep, goats, llamas, and livestock guarding animals. Board members were appointed in 2007. In 2007, the MT Legislature appropriated \$30,000 from the state's general fund and \$150,000 was appropriated in 2009. In addition, DOW donated \$50,000 in 2008 to help start the program. Additional donations were received from others, including the Greater Yellowstone Coalition, Western Wolf Coalition, Keystone Conservation, and the MT Cattlemen's Association. In 2009 DOW donated another \$50,000 to MT's compensation program.

With the funding available, the MT Governor-appointed Board overseeing the program prioritized payments for animals that were attacked by wolves and died, as verified (confirmed or probable) by USDA WS. Payments for injured animals or funds for cost-share grants to implement proactive tools intended to decrease risk were lower priorities and all available funding was exhausted by confirmed damage alone. Claims were paid on a first-come, first-served basis. A total of \$141,462 in claims was paid in MT for dead livestock in 2009.

ID. The State of ID pays claims for some of the wolf damage not covered by the DOW compensation program. ID's program has been in effect since 2001. It is administered by the ID

Office of Species Conservation and compensates for probable and missing wolf damage up to \$100,000/ year using federal funding. Payments are overseen by a board of County Commissioners whose counties have had wolf depredations. Representatives from USDA WS, IDFG, and DOW are advisors. Payments are made for the 50% of probable depredations not covered by the DOW program as well as claims of higher than historic losses due to missing livestock in occupied wolf habitat. In 2009 the Board recognized about \$208,300 in claims, but as usual, only had \$100,000 to pay out so each claim was pro-rated a percentage of the available \$100,000 (roughly 48 cents was paid per \$1 claimed in 2009). In addition, in 2009 DOW paid \$133,271 for confirmed and probable wolf damage in ID. In total \$233,271 was paid for wolf damage in ID in 2009.

WY. In 2008, the WY Legislature established and, from WY General Funds, funded a State compensation program for livestock damage caused by wolves. The WGFD paid \$67,581 for wolf damage that occurred in the Trophy Game Area of northwestern WY during 2009. WY's state program has a multiplier for each confirmed wolf depredation on calves and sheep since only a fraction of all wolf-caused losses are discovered or confirmed. Calves and any sheep are compensated up to 7 times the number confirmed but only up to the total number of calves or sheep reported as missing for that producer. Compensation for other types of livestock losses (adult cattle, horses, etc.) are paid on the actual value of each confirmed loss. State compensation is not paid in the Predatory Animal Area of WY, but DOW compensated \$10,771 for confirmed and probable livestock losses there in 2009.

NRM. In MT a total of \$141,462 was paid in 2009. This includes much of the \$50,000 given to the State of MT by DOW in 2009 for the state wolf damage compensation program, however some of that 2009 funding had to be used to pay outstanding claims from 2008. In ID a total of \$233,271 was paid in 2009. \$100,000 was paid from a federal funding earmark for state-approved claims of probable wolf damage. In addition, DOW paid an additional \$133,271 for losses confirmed by USDA WS in ID. In WY a total of \$78,352 was paid for wolf damage in 2009. The state of WY paid \$67,581 for wolf damage [including up to a 7 fold multiplier effect for confirmed sheep and calf losses] in the trophy game area of WY. DOW paid \$10,771 for wolf-caused losses confirmed by USDA WS in the predatory animal area of WY. In addition \$4,700 was paid by DOW for confirmed wolf depredations in OR. In 2009 DOW paid \$198,742 and \$259,043 was paid by the States of Montana, Idaho and Wyoming. Total compensation paid for wolf damage to livestock in the NRM in 2009 was \$457,785.

In addition, some livestock producers on both private land and public land grazing allotments have absorbed the increased losses, expenses, and costs related to grazing livestock near wolves. Those costs are not quantifiable but are likely several times higher than annual compensation payments. They include some proportion of livestock damage from causes that couldn't be verified and for missing livestock (Oakleaf et al. 2003).

FY09 and FY10 Budgets. In FY09, \$3,763,000 in federal funding was provided for wolf monitoring and management in MT, ID, WY. In FY2010, an estimated \$4,206,000 will be spent and it includes some funding (\$10k each) that will be provided by the USFWS to the Blackfeet, Salish & Kootenia, and Wind River Tribes and to the states of WA and OR for wolf management and monitoring.

Federal Funding for Wolf Management FY2009 and FY2010 (*estimated) [\$1,000's]

FISCAL YEAR	FY 2009	FY 2010*
USFWS Region 6 (Helena, MT)		
State of MT	\$ 396	\$394
USFWS in WY	\$ 240	\$240
ID Office of Species Conservation	\$ 720	\$704
Nez Perce Tribe	\$ 285	\$290
USFWS Administration & Coordination R-6	\$ 180	\$180
Additional Congressional Earmark [Tri-State]	\$ 243	\$696
R-6, Regional Office Support	\$ 150	\$ 125
Assist Tribes & WA & OR [R-1 \$10k]	\$ 0	\$ 50
(Region 6 SUBTOTAL)	(\$2,214)	\$2,679
USFWS Region 1 (Boise, ID)	\$ 99	\$ 98
USFWS Total	\$2,313	\$2,777
USDA Wildlife Services	\$ 1,231k	\$1,231
National Park Service: Yellowstone	\$ 167	\$ 167
National Park Service: Grand Teton	\$ 52	\$ 31
TOTAL Federal Funding	\$3,763	\$4,206 *estimated

NORTHERN ROCKIES DELISTING, LITIGATION, and FEDERAL PERSONNEL

Delisting of the Gray Wolf

Wolves, once common throughout North America, became protected under the Endangered Species Act (ESA) in 1974, because human persecution nearly eliminated them from the contiguous United States. After the 1930's there were virtually no wolves left in the NRM. The ESA prohibited people from harming wolves and mandated that all federal actions seek to conserve and not jeopardize wolves. Ultimately, 3 distinct wolf recovery programs, Midwest, NRM, and Southwest, were initiated. The Midwest wolf population (Western Great Lakes DPS containing >4,000 wolves) was delisted on February 8, 2007 (72 FR 6052) but the U.S. District Court of Columbia vacated and remanded the delisting rule back to the USFWS on September 29, 2008. Efforts to recover wolves (~50 wolves) in the Southwest continue. On April 2, 2009, the NRM DPS except WY, was delisted. In the NRM, 2009 marked the ninth consecutive year that the minimum recovery goal of at least 30 or more breeding pairs and at least over 300 wolves were documented in MT, ID and WY. The current NRM wolf population of at least 1,650 wolves in over 100 breeding pairs has fully achieved its biological recovery objectives.

Wildlife mortality is typically regulated by state and tribal fish and wildlife management agencies. The USFWS requested that MT, ID, and WY develop state wolf management plans to

show how their states would conserve wolves. In addition, the USFWS believed that state wolf plans would clarify how human-caused mortality would be regulated and the wolf population conserved by the states and tribes without the protections of the ESA. These plans also were to provide a solid administrative foundation for the Service's final decision about delisting. The USFWS provided various degrees of funding and assistance to the states while they developed their wolf management plans. State laws, as well as state management plans, must be consistent with long-term conservation of the wolf population. USFWS determined that MT and ID's plans were adequate in 2004 but determined WY's regulatory framework was not adequate. On April 13, 2007, the Wind River Tribe approved a wolf management plan for their tribal lands in northwestern WY. The USFWS determined it adequately addressed the ESA criteria shortly thereafter. The links for the state wolf plans for MT, ID and WY, and the Wind River and Blackfeet Tribes are available at <http://westerngraywolf.fws.gov>.

On February 8, 2007, USFWS proposed to identify the NRM DPS of the gray wolf and to delist all or most portions of the NRM DPS (72 FR 6106). Specifically, USFWS proposed to delist wolves in MT, ID, and WY, and parts of WA, OR, and UT. The proposal noted that the ESA's protections would be retained in significant portions of the range in WY in the final rule if adequate regulatory mechanisms were not developed to conserve WY's portion of a recovered wolf population into the foreseeable future. Under this alternative scenario, wolves in portions of WY would continue to be regulated under ESA as a non-essential, experimental populations per the 1994 rules and on Wind River Tribal lands, under the 2005 experimental population regulations [50 CFR § 17.84 (i) and (n)].

On July 6, 2007, the USFWS extended the comment period on the February 8, 2007 proposal in order to consider a 2007 revised WY wolf management plan and State law that USFWS believed, if implemented, could allow the wolves in all of WY to be removed from the List of Endangered and Threatened Wildlife (72 FR 36939). 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. On November 16, 2007, the WY Game and Fish Commission (WGFC) unanimously approved the 2007 WY Plan. USFWS then determined this plan provided adequate regulatory protections to conserve WY's portion of a recovered wolf population into the foreseeable future. On December 15, 2007, the USFWS Director determined WY's regulatory mechanisms met the requirements of the ESA, contingent on the sunset provisions of the WY law being satisfied so that WY's plan could be fully implemented. 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 WY's 2007 regulatory mechanisms were believed adequate.

The NRM DPS wolf population was delisted from March 28 to July 18, 2008. This corresponded to when the delisting decision took effect and to when a federal district judge granted a request for a preliminary injunction and relisted NRM wolves (see below). The court expressed serious reservations about USFWS approval of Wyoming's regulatory framework. During this period of time, state and tribal management plans and state laws were fully in effect.

Given the court rulings, on October 28, 2008 (73 FR 63926), USFWS reopened the comment period on the February 8, 2007 proposed rule that presented two different scenarios for delisting the NRM DPS (72 FR 6106). 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 MT 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 WGL gray wolf DPS. The notice also asked for public comment on what portions of WY need to be managed as a trophy game area and what portions of WY constitute a significant portion of the NRM DPS's range. 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 that WY's 2007 law, wolf management plan, and regulatory framework were not adequate to meet the purposes of the ESA. On January 15, 2009 WY's Governor was notified that WY no longer had a USFWS-approved wolf management plan and state regulatory framework. Wolf management in all of WY, except the Wind River Tribal lands because the Tribe had a Service-approved plan] again became immediately under the less flexible provisions of the 1994 experimental rules. New final delisting rules were produced for both the NRM and the WGL DPSs in December 2008. These rules were released for public inspection on January 15, 2009 and were sent to the Federal Register for publication. However, on January 20, 2009 they were withdrawn from publication by Executive Order, a standard practice when a new administration takes office. Both rules were carefully reviewed by the U.S. Department of Interior. The NRM rule was published in April 2, 2009 (74 FR 15123-15188) but the WGL rule has not been published.

The 2009 final rule became effective May 4, 2009. It established the NRM DPS and, except for in WY, delisted gray wolves within it. Because WY does not have an approved state post-delisting wolf management plan wolves there remain protected under the 1994 experimental population regulations. This action was again litigated in MT District Court by a coalition of environmental and animal rights groups (represented by Earthjustice) who argued that wolves should remain protected by the ESA. In addition, Earthjustice requested that the court enjoin the planned fall 2009 wolf hunting seasons in MT and ID because they were likely to prevail in court over the legal merits of the case and hunting could irreparably harm the NRM wolf population. The court declined to grant the injunction because there was unlikely to be harm to the NRM wolf population but indicated that the plaintiffs were likely to win the case on its merits. The MT case has been fully briefed. WY initiated litigation in the WY District court and argued the USFWS should have approved WY's wolf management plan and delisted WY too. The WY case was fully briefed and oral arguments were held on January 29, 2010. It is unknown when the MT or WY courts may issue their opinions.

MT and ID had fair chase wolf hunting seasons in fall/winter 2009. A total of 72 wolves were legally harvested in MT out of a total quota of 75. In ID about 135 were harvested in 2009 of a total quota of 220. Hunters in MT and ID paid nearly \$700,000 to buy a wolf tag for the opportunity to hunt wolves. While controversial among some segments of the public, the hunts were very successful biologically (hunter compliance was good and wolf harvest was widely dispersed and within quota limits) and did not harm the NRM wolf population.

When a species is delisted, the ESA requires a mandatory, minimum 5-year post-delisting federal oversight period. That period, during which the USFWS reviews the implementation of state management plans and wolf population status, provides a safety-net to ensure that the species is able to sustain itself without ESA protection. If wolves became threatened again, the USFWS could relist them by emergency order.

The Experimental Population Rules

Gray wolves were reintroduced in parts of the NRM as nonessential experimental populations under the ESA in January 1995 and 1996. In 1994, just prior to wolves being reintroduced to central ID and YNP, special nonessential experimental population regulations under 17.84 (i) ESA Sec. 10(j) were promulgated (59 FR 60252). Those regulations allowed extra management flexibility to Federal agencies, states, tribes, and private individuals to manage wolves to protect private property and other wildlife populations.

The USFWS's updated January 6, 2005 10(j) (70 FR 1286) regulation expanded the authority of states and Native American tribes with USFWS-approved post-delisting wolf management plans to manage gray wolves in the experimental population areas of CID and GYA. This designation allowed federal, state and tribal agencies and private citizens more flexibility in managing wolves and to protect domestic animals than the 1994 regulations. The rule also intended to allow the states and tribes with USFWS-approved post-delisting wolf management plans to lethally remove wolves that were the 'primary' cause of significant negative impacts to big game herds and for states and tribes to lead wolf management in their state or reservation. Analysis of a March 2006 proposal by the state of ID to remove up to 43 wolves in a small area of central ID to reduce the rate of wolf predation on ungulates for up to 5 years revealed that the 'primary' requirement in the 2005 rule was an unobtainable standard, as wolf predation is never the 'primary' cause of ungulate herd status.

On July 6, 2007 the USFWS proposed that the 2005 10(j) nonessential experimental population regulation be modified (72 FR 36942). The modification from 'primary cause' to 'one of the major causes' allowed a high but reasonable standard for states and tribes with USFWS-approved post-delisting wolf management plans to develop science-based proposals to lethally remove wolves shown to be negatively affecting ungulate herds. In addition it would allow anyone on private or public land to shoot a wolf that was attacking his or her 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. A couple of wolves that were seen attacking domestic dogs or horses were legally shot by private citizens, but no wolves were removed to address concerns about wild ungulate populations.

Litigation

Litigation initiated by both wolf proponents and opponents, over wolf reintroduction and subsequent management has almost been continuous since the USFWS published the final rules for wolf reintroduction into YNP and central ID in November 1994.

State of WY, et al. vs. United States Department of the Interior, et al., United States District Court for the District of WY, Civil Action No. 04CV01123J. This case involved the USFWS not approving the WY state wolf management plan in 2004. The case was expanded by interveners to include alleged failure to properly manage wolves in WY and failure to conduct additional NEPA compliance. The WY District Court ruled in the USFWS's favor based on procedural grounds in 2005. WY appealed that case to the 10th Circuit Court of Appeals in Denver CO, but the Appeals Court upheld the lower court decision. As a result of those court decisions WY formally petitioned the USFWS to establish and delist a NRM DPS for the gray wolf. The USFWS rejected that petition.

State of WY et al. v. United States Department of the Interior et al., United States District Court for the District of WY, Civil Action No 06-245J. This case involves the USFWS's rejection of WY's petition to establish a NRM DPS for wolves and delist them (71 FR 43410). That case was dismissed after the February 29, 2008 final NRM DPS delisting rule was published in the Federal Register.

Defenders of Wildlife et al vs H. Dale Hall et al., CV 08-56-M-DWM, U.S. District Court for the District of MT, Missoula Division. 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). This rule also determined that WY's regulatory mechanisms were adequate. On April 28, 2008, 12 parties filed a lawsuit challenging the identification and delisting of the NRM DPS. The plaintiffs also moved to preliminarily enjoin the delisting. On July 18, 2008, the U.S. District Court for the District of MT 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. This ruling placed the gray wolf throughout the NRM DPS back under the ESA and federal regulations. The court stated that USFWS acted arbitrarily in delisting a wolf population that lacked evidence of genetic exchange between subpopulations. The court also stated that USFWS acted arbitrarily and capriciously when approving WY's 2007 statute and wolf management plan because WY failed to commit to managing for at least 15 breeding pairs and WY's 2007 statute allowed the WGFC to diminish the trophy game area if it "determines the diminution does not impede the delisting of gray wolves and will facilitate WY's management of wolves." The Court's preliminary injunction order concluded that the Plaintiffs were likely to prevail on the merits of their claims. On September 22, 2008, USFWS asked the Court to vacate the final rule and remand it back to the agency. On October 14, 2008, the Court vacated the final delisting rule and remanded it back to the USFWS for further consideration. In February 2009, the Court awarded/reimbursed Earthjustice (the law firm representing 12 groups which filed the lawsuit challenging delisting) about \$263,000 in legal fees for their efforts at litigating the final delisting rule.

Humane Society of the United States v. Kempthorne, Civil Action No. 07-0677 (PLF) (D.D.C.). Similarly, on February 8, 2007, USFWS recognized a Western Great Lakes (WGL) DPS and removed it from the list of the List of Endangered and Threatened Wildlife (72 FR 6052). Several groups challenged this rule in court, arguing that the USFWS may not identify a DPS within a broader pre-existing listed entity for the purpose of delisting the DPS. On September 29, 2008, the court vacated the WGL DPS final rule and remanded it to the USFWS. The court

found that the USFWS had made that decision based on its interpretation that the plain meaning of the ESA authorizes the USFWS to create and delist a DPS within an already-listed entity. The court disagreed, and concluded that the ESA is ambiguous as to whether the USFWS has this authority. The court accordingly remanded the final rule so that the USFWS can provide a reasoned explanation of how its interpretation is consistent with the text, structure, legislative history, judicial interpretations, and policy objectives of ESA. The revised 2009 delisting rule that was submitted to the Federal Register responded to the court decision but was withdrawn by Executive Order on January 20, 2009.

Defenders of Wildlife, et al. vs. H. Dale Hall, et al. U.S. District Court for MT, Missoula CV 08-14-M-DWM. The January 28, 2008 modification to the 2005 10(j) nonessential experimental population rule is currently being litigated by a coalition of an individual and seven environmental/animal rights groups. That rule allowed anyone to legally shoot a wolf that was attacking his or her dog or his or her stock animal [horses, mules, donkeys, llamas, and goats]. It also provided a science-based process for the states and tribes to propose that the Service approve localized reductions in wolves where wolf predation was proven to be a major cause of ungulate herds being below state and tribal management objectives. That rule remains in effect while the case is being litigated. The case is stayed until there is a decision regarding the 2009 delisting. A few wolves that were attacking domestic dogs or horses were legally shot by private citizens, but no wolves were removed to address concerns about wild ungulate populations.

Defenders of Wildlife et al. and Greater Yellowstone Coalition vs Ken Slazar et al. [Case No. CV-09-77-M-DWM and CV-09-82-M-DWM consolidated]. The 2009 delisting was litigated in MT District Court in Missoula, MT by a coalition of environmental groups represented by Earthjustice. They assert, among many other arguments, that delisting without WY is unlawful.

State of WY and a coalition of WY sportsmen and livestock groups vs. USDOJ, USFWS, Ken Salazar et al. [CV-09-118-ABJ and CV-09-138-ABJ consolidated]. Litigation over the April 2, 2009 delisting was also initiated in WY Federal District court in Cheyenne WY. They asserted that the USFWS unlawfully did not approve WY's wolf management regulatory framework and the USFWS should have also delisted wolves in WY along with the remainder of the NRM DPS.

USFWS Wolf Personnel

MFWP began managing wolves in northwestern MT in early 2004, under a cooperative agreement with the Service, after the USFWS wolf biologist (Tom Meier) for that area left to take a job in Alaska. In June 2005, the USFWS and MFWP signed a cooperative agreement transferring the decision-making authority for all wolf management activities in MT, including the experimental populations in southern MT, and the remaining USFWS wolf biologist position for MT (Joe Fontaine) was eliminated to transfer that federal funding to MFWP.

In January 2006, the Governor of ID signed a Memorandum of Agreement with the Secretary of the Interior giving ID Department of Fish and Game the decision making authority for all wolf management activities in ID. The USFWS biologist that had been conducting that work retired (Carter Niemeyer). Since that time all wolf management in MT and ID has been conducted with

federal funding but by the state wildlife agencies who hired staff to assume those duties. The Nez Perce Tribe continues to assist with wolf monitoring in ID under a cooperative agreement with ID. From March 28, 2008 until July 18, 2008 wolves were delisted and managed solely by the states and tribes.

During the time they were delisted wolves in 88% of WY were managed as predatory animals (virtually no regulation of human-caused mortality) by the WY Department of Agriculture. Outside the National Parks, WY Game and Fish Department (WGFD) was the lead agency for wolf management where wolves were designated trophy game animals. During that period, USFWS employee Mike Jimenez was detailed to WGFD to lead wolf management in WY as a WGFD employee. However, after the Court's July 18, 2008 injunction, WGFD ended its involvement and the USFWS re-assumed the lead for all wolf management in WY. Project Leader Jimenez returned as a USFWS employee and will continue to lead wolf management in WY until it can be again transferred to WGFD. Field biologist Susannah Woodruff continued working as a seasonal USFWS employee in WY.

Amelia Orton-Palmer was designated as the USFWS assistant wolf recovery coordinator to help analyze public comments and prepare and finalize the federal wolf rules proposed in 2007. She left that position in late 2008 to resume other duties in the USFWS Regional Office in Denver, CO. The USFWS wolf program staff are currently just Ed Bangs, the Wolf Recovery Coordinator in Helena, MT and Mike Jimenez the Project Leader for Wolf Recovery in WY and seasonal biologist Susannah Woodruff who are both stationed in Jackson, WY. In addition, Seth Willey (ESA Recovery Coordinator) with the USFWS Regional Office in Denver, CO made huge contributions in 2009 to complete and defend the 2009 delisting proposal and by working on other USFWS projects related to wolf conservation.

Steve Nadeau, left his position as ID Department of Fish and Game Large Carnivore Manager (including wolves) in 2009. His wolf duties were assumed by Jon Rachael, the Big Game Manager for IDFG, who had previously worked on NRM wolf issues in MT and ID. Dominic Domenici, the USFWS Senior Law Enforcement Agent for MT and WY retired in Casper, WY at the end of 2009. Jim Claar the USDA Forest Service Large Carnivore Specialist retired in Missoula, MT at the end of 2009. Jim Hoover, the Eastern MT District Supervisor for USDA Wildlife Services retired in Columbus, MT in April 2009. Jim was replaced by Mike Foster. Mike started with WS in WA state where he spent a field season before working in ID for 8 years as a Wildlife Specialist and acting District Supervisor. He then went to Western OR as a District Supervisor for 2 years before coming to MT in Aug 2009. Joe Fontaine, who was with the NRM recovery program from 1988-2006 retired as the Deputy Manager for the Theodore Roosevelt National Wildlife Refuge Complex in Mississippi and returned to MT to live in early 2010. All these people and many others made huge contributions to wolf restoration and management. We wish them all the best but they will be sorely missed.

ABBREVIATIONS AND ACRONYMS

Central ID wolf recovery area	CID
Defenders of Wildlife	DOW
Distinct Population Segment	DPS
Endangered Species Act	ESA
Glacier National Park	GNP
Grand Teton National Park	GTNP
Greater Yellowstone wolf recovery area	GYA
ID Department of Fish and Game	IDFG
MT Fish, Wildlife and Parks	MFWP
MT State University	MSU
Nez Perce Tribe	NPT
Northwest MT Wolf Recovery Area	NWMT
Northern Rocky Mountains	NRM
Predator Conservation Alliance	PCA
Turner Endangered Species Fund	TESF
University of MT	UM
USDA/APHIS/Wildlife Services	WS
U.S. Fish and Wildlife Service	USFWS
U.S. Forest Service	USFS
U.S. National Park Service	NPS
WY Game and Fish Department	WGFD
Yellowstone Center for Resources	YCR
Yellowstone National Park	YNP

CONTACTS

For further information or to report wolf sightings, please contact:

Please remember wolf management in MT and ID is conducted by MFWP and IDFG and they should be the first point of contact in each state for everything as long as wolves are delisted:

MT Fish, Wildlife & Parks, Helena, MT:	(406) 444-3242
MT Fish, Wildlife & Parks, Kalispell, MT:	(406) 751-4586
MT Fish, Wildlife & Parks, Missoula, MT:	(406) 542-5523
MT Fish, Wildlife & Parks, Bozeman, MT:	(406) 994-6371
MT Fish, Wildlife & Parks, Butte, MT:	(406) 425-3355
Nez Perce Tribal Wolf Program, McCall ID:	(208) 634-1061
ID Fish and Game, Boise, ID	(208) 334-2920
ID Fish and Game, Salmon, ID	(208) 756-2271
ID Fish and Game, Nampa, ID	(208) 465-8465
U.S. Fish and Wildlife Service, Helena MT:	(406) 449-5225
U.S. Fish and Wildlife Service, Jackson, WY:	(307) 330-5631
U.S. Fish and Wildlife Service, Boise ID:	(208) 378-5639
Yellowstone Center for Resources, YNP WY:	(307) 344-2243

To report livestock depredations:

USDA/APHIS/Wildlife Services, MT:	(406) 657-6464
USDA/APHIS/Wildlife Services, WY:	(307) 261-5336
USDA/APHIS/Wildlife Services, ID:	(208) 378-5077
USDA/APHIS/Wildlife Services toll free:	(866) 487-3297

To report discovery of a dead wolf or information regarding the illegal killing of a wolf:

U.S. Fish and Wildlife Service Special Agent, Missoula, MT:	(406) 329-3000
U.S. Fish and Wildlife Service Special Agent, Great Falls, MT:	(406) 761-2286
U.S. Fish and Wildlife Service Special Agent, Lander, WY:	(307) 332-7607
U.S. Fish and Wildlife Service Special Agent, Cody, WY:	(307) 527-7604
U.S. Fish and Wildlife Service Special Agent, Boise, ID:	(208) 378-5333
U.S. Fish and Wildlife Service Special Agent, ID Falls, ID	(208) 523-0855
U.S. Fish and Wildlife Service Special Agent, Spokane, WA	(509) 928-6050

WEBSITES

USFWS Rocky Mountain weekly and annual wolf updates:
<http://westerngraywolf.fws.gov/>

USFWS Midwestern gray wolf recovery, national wolf reclassification proposal:
<http://midwest.fws.gov/wolf/>

USFWS Endangered Species Program:
<http://endangered.fws.gov/>

USDA/APHIS/Wildlife Services:
<http://www.aphis.usda.gov/ws/>

National Wildlife Research Center:
<http://www.aphis.usda.gov/ws/nwrc/>

Nez Perce Tribe Wildlife Program and 2001 progress report:
http://www.nezperce.org/Programs/wildlife_program.htm

Turner Endangered Species Fund:
<http://www.tesf.org/>

Yellowstone Park Foundation:
<http://www.ypf.org/>

Yellowstone Wolf Tracker:
<http://www.wolftracker.com/>

Wolf Restoration to Yellowstone:
<http://www.nps.gov/yell/nature/animals/wolf/wolfrest.html>

MT Fish, Wildlife and Parks wolf management:
<http://fwp.mt.gov/wolf>

MT State University wolf-ungulate research:
<http://www.homepage.MT.edu/~rgarrott/wolfungulate/index.htm>

ID Fish and Game:
<http://www.state.id.us/fishgame/>

ID Office of Species Conservation:
<http://www.state.id.us/species/>

WY Game and Fish Department:
<http://gf.state.wy.us/>

WY agricultural statistics:
<http://www.nass.usda.gov/wy/>

ID agricultural statistics:
<http://www.nass.usda.gov/id/>

MT agricultural statistics:
<http://www.nass.usda.gov/mt/>

National agricultural statistics:
<http://usda.mannlib.cornell.edu/reports/nassr/livestock/>

Defenders of Wildlife wolf compensation trust:
<http://www.defenders.org/wolfcomp.html>

International Wolf Center:
<http://www.wolf.org/>

Wolf Recovery Foundation:
<http://forwolves.org/>

National Wildlife Federation wolf information:
<http://www.nwf.org/wildlife/graywolf/>

MT Stockgrowers' Association
<http://www.mtbeef.org/index.htm>

National Geographic wolf information:
<http://www.nationalgeographic.com/tv/specials/wolf/intro.html>

Wolf Education and Research Center:
<http://www.wolfcenter.org/>

People Against Wolves:
<http://home.centurytel.net/PAW/home.htm>

Western Wolf Coalition:
www.westernwolves.org

Lobo Watch:
wolfkill@lobowatch.com

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U.S. Fish and Wildlife Service

Northern Rocky Mountain

Recovery Program Update

2010

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DISPERSAL AND WOLF ACTIVITY OUTSIDE OF MT, ID, AND WY

Individual wolves can disperse over 680 miles from their natal pack, with actual travel distances exceeding 6,000 miles. A wolf that dispersed from Gardiner, MT to western Colorado where she was illegally killed by 1080 Compound poison in March 2009 travelled a straight line distance of 400 miles in 6 months but daily GPS locations showed she actually walked over 3,000 miles. The average dispersal distance of northern Rocky Mountain (NRM) wolves is about 60 miles. About 20 confirmed NRM wolf dispersal events from 1992 through 2010 have been over 190 miles and only 4 wolves travelled beyond the northern Rocky Mountain (NRM) Distinct Population Segment (DPS) border. Undoubtedly many other dispersal events have occurred but have not been detected because <25% of the NRM wolf population has been radio-collared and it is difficult to locate lone dispersing wolves.

Washington Pack Summaries

Inside Northern Rocky Mountain DPS

Northeast Washington - Wolves continue to re-colonize northeast Washington from northwest Idaho and southeast British Columbia (Table 7). During 2010 Washington Department of Wildlife (WDFW) confirmed 1 new pack, bringing the number of packs in eastern Washington from the Northwest Montana Recovery area/British Columbia to 2. A third pack known as Cutoff Peak, divides its time between Idaho, British Columbia, and Washington. Based on information from summer monitoring, Cutoff Peak probably dens in northern Idaho. The 2 confirmed Washington packs in the NRM DPS (Diamond and Salmo) contained a total of 16 wolves at the end of 2010.

Diamond Pack - In late July 2009 the breeding male of the Diamond Pack was captured and radio-collared (WA-398M) making this the second confirmed Washington pack since the 1930s. During summer 2010 WA DOW caught and marked four yearling wolves (WA-376F, WA-378M, WA-380F, WA-382F) and caught and released a pup of the year. WDFW documented 6 pups on several occasions during the summer and counted 12 wolves in this pack at the end of the year making this pack a breeding pair. Approximately 24% of Diamond pack's territory is in Idaho.

Salmo Pack - In late August 2010, WDFW caught and collared a 50-lb pup of the year with a standard VHF collar. This is a newly documented pack that is spending most of their time in far northern Washington with occasional forays into British Columbia. WDFW observed four adult-sized animals on several occasions this winter. It is unknown whether this pack dens in Washington. Because only 1 pup was confirmed, the pack was not considered a breeding pair in 2010.

Southeast Washington - Sightings of wolves and their sign have been reported in the Mill Creek watershed area of southeast Washington and the adjacent portion of northeast Oregon, consistently since 2008. There were multiple credible reports of three wolves using this area

during 2010. WDFW considers this a probable pack which likely re-colonized SE Washington/NE Oregon from the Central Idaho Recovery Area.

Outside Northern Rocky Mountains DPS

Lookout Pack - In July 2008 a breeding male and female were captured and radio-collared near Twisp, WA, representing the first confirmed wolf pack in Washington since the 1930s. Genetic testing indicated the breeding male might have originated from a coastal/southern British Columbia and the breeding female came from northern British Columbia/Alberta border or wolves reintroduced into central Idaho and Yellowstone National Park from that area of Canada. They were the first confirmed wolf pack in Washington since the 1930s. The pair produced 6 pups in summer 2008 and 4 in 2009. During spring 2010, the female was observed to be pregnant and was using a den. Several weeks after the estimated date of parturition her signal was lost and she was no longer observed in the vicinity of the den. The pack did not use any of its previous rendezvous sites and the radio-collared male ranged widely. Based on tracks and observations he appeared to be alone most of the summer. At the end of calendar year 2010, observations by WDFW indicate there are still 2-3 wolves occupying Lookout pack's territory.

Oregon Pack Summaries

Inside Northern Rocky Mountain DPS

Oregon Department of Fish and Wildlife (ORFW) confirmed 2 breeding pairs of wolves in 2010. The Imnaha pack (15 miles east of Joseph, OR) produced a minimum of 6 pups in 2010. In February, 2010 three radio collars were deployed within the pack including a GPS collar. The pack was involved in livestock depredations from May through December and 8 calves confirmed killed in 2010. One member of the pack dispersed in December and the Imnaha Pack had 15 members at year-end; 6 of them pups.

Wolves also continue to inhabit the Wenaha Unit of northeast OR (20 mi west of Troy, OR). In August 2010 a Wenaha pack member was radio-collared by ODFW. In September, the newly collared wolf was found shot, leaving the pack again without a radio-collared member. A minimum of 3 pups was confirmed in 2010 and the minimum estimate for the Wenaha pack is 6 wolves. Both confirmed OR packs are within the NRM DPS that was delisted from the ESA in 2009 but relisted in August 2010.

Wolf activity was also reported and investigated, but not confirmed in many areas beyond the core occupied NRM wolf range in 2010. Reports of suspected lone wolves and some packs were received from all states adjacent to the NRM DPS, as well as other states in the U.S. While wolves were delisted in 2010 a lone wolf that had depredated on livestock in the UT portion of the NRM DPS was killed in an agency control action. The suspected presence of long distance dispersing wolves or new packs outside of the core NRM wolf population are typically reported in the Service's weekly wolf report for WY and can be viewed at <http://westerngraywolf.fws.gov>.

NORTHERN ROCKIES FUNDING

Federal Funding for Wolf Management in both Federal Fiscal Years (FY) 2010 (Oct. 1, 2009-Sept. 30, 2010) and FY 2011 (Oct. 1, 2010-Sept. 30, 2011 * estimated).

Total Federal Funding- Wolf recovery has been almost entirely funded by federal appropriations and some private donations. In FY10 about \$4,565,000 in federal taxpayer funding was spent on wolf recovery and management in the NRM. Wolf recovery and management in the NRM from 1974, when wolves became listed, through 2010 cost approximately \$40,296,000 in federal funding (rounded to nearest \$1,000, with no adjustments for inflation and not including USDA Wildlife Services (WS) costs for investigating reports of suspected wolf damage and problem wolf control beyond the \$100,000/year provided by the USFWS to WS from 1992-2004). Wolf management in the NRM in FY11 will cost federal taxpayers an estimated \$4,765,000. These annual cost estimates do not include the substantial resources provided from the Department of the Interior Solicitors Office nor the Department of Justice for legal assistance and defense during litigation.

USFWS Funding- In FY10, funding for wolf management in the NRM was up slightly from FY09 levels due to increased funding for wolf monitoring. Region 6 (R-6) of the USFWS administers programs in MT, ID, and WY and is the USFWS lead Region for wolf recovery in the entire NRM. R-6 spent about \$2,706,000 in FY10. Included in that figure is the \$150,000 spent by USFWS R-6 Regional Office (RO) to help analyze public comments, prepare various regulations, and provide additional administrative support in FY10. The R-6 RO will likely spend a similar amount in FY11. Most of the USFWS funding in R-6 was transferred to MT, ID, and the Nez Perce Tribe (NPT). In late FY10 ID withdrew as the lead for wolf management in ID and funding in FY11 will be re-allocated between the USFWS, NPT and ID. The USFWS R-6 also spent \$240,000 to conduct wolf management in WY in FY10, including \$32,000/yr. to assist WY WS wolf management efforts in WY. In FY11, a field biologist position out of Cody, WY (Scott Becker) was added to the USFWS field program to assist Project Leader Jimenez with wolf management issues in Wyoming. In addition, the WY program is now conducting all monitoring/management of GYA wolves in ID that IDFG had conducted. These additional services will increase WY wolf management costs by about \$100,000/yr. R-6 funding (\$180,000) also supported overall program coordination, rulemaking, assisting the Department of Justice, and administrative support out of Helena, MT.

Estimated funding for FY11 (\$3,276,000) for the USFWS is slightly lower than FY10 levels (\$3,476,000). Funding for R-1 of the USFWS in Boise, ID will be substantially increased from \$99,000/yr to \$1,193,000/yr (**the allocation among partners is underdetermined at this time) because IDFG no longer is involved in wolf management and monitoring in ID and that work will now be conducted by USFWS R-1 and R-6, USDA WS in ID, and the NPT. In FY11 the USFWS will continue to support IDFG research on wolf/ungulate interactions and for monitoring wolf packs associated with that research: the estimated cost is being determined.

In FY10 a new federal grant program for states and tribes with resident wolf packs was funded. That program is administered by the USFWS, with assistance from USDA WS, to enact the 2009 Wolf Loss Demonstration Project Bill, Public Law 111-11. That law provides up to

\$1,000,000/yr for 5 years (FY10-FY14) to states and tribes in the lower 48 states that have resident wolf packs and documented livestock damage caused by wolves. The funding was allocated in the NRM as follows: MT, ID, and WY \$140,000 each and WA and OR \$15,000 each. In FY10 a total of \$25,000 was also allocated to tribes in the U.S. NRM tribes received most of that national compensation/prevention funding: Salish and Kootenai \$11,000, Blackfeet \$7,000, and Wind River \$4,000.

State and Tribal Funding. In FY10, Congress intended that the USFWS transfer \$396,000 to MFWP for wolf monitoring, management, control, and outreach. In FY10 Congress intended ID receive \$704,000 and the NPT \$290,000 to fund wolf management in ID. The ID Governor's Office of Species Conservation and IDFG used \$100,000 of that funding to compensate livestock producers in ID for missing livestock and to make up part of the remaining 50% for probable livestock depredations that were only reimbursed at a 50% value by the private Defenders of Wildlife (DOW) compensation program in ID. Congress provided \$696,000 in additional funding for wolf monitoring in MT, ID, and WY in FY10. The USFWS divided that funding evenly between the 3 management programs in each state. Funding levels in FY11 appear to be similar to FY10. In FY10, USFWS R-1 and R-6 provided the states of WA and OR with about \$10,000 each to assist them with their wolf monitoring and management efforts. The USFWS also transferred \$10,000 each in FY10 funding to the Blackfeet, Salish and Kootenai, and Wind River Tribes, that have confirmed pack activity on their tribal lands, to assist them with their wolf management activities. Funding for those Tribes should also be available in FY11.

In early FY11, the state of ID withdrew from all wolf management activities, except for wolf/ungulate research. FY11 funding will be used by the NPT and USFWS Boise, ID and USFWS Jackson, WY offices to monitor and manage wolves in ID.

National Park Service Funding. Yellowstone National Park (YNP) maintained their funding for wolf monitoring and research at the \$155,000 level in FY10 and FY11. All of their field research projects remain funded by private donations (\$250,000/yr). In FY10 Grand Teton National Park (GTNP) spent \$52,000 in federal funding for salaries and travel and another \$70,000 in private donations for cooperative wolf-related research in and near GTNP. In 2010 GTNP hired a biologist to assist with wolf monitoring and costs in 2011 will be about \$31,000/year in federal funding and another \$125,000 from private donations. The USFWS in WY funded and conducted the wolf capture associated with NPS and other WGFD (Wyoming Game and Fish Department) and University of WY research projects.

USDA Wildlife Services Funding. In FY10 Congress again provided \$926,000 to WS in MT, ID, and WY to investigate and address all predator damage, including wolf damage, because the presence of wolves increased other predator control costs (eg. M-44 devices can not be used for coyote control in occupied wolf range leading to extra efforts by WS personnel). In FY10, ID WS spent approximately \$451,000 of appropriated and cooperative funds responding to complaints of reported wolf damage, conducting control and management actions (salary and benefits, vehicles, and travel) and for other wolf-related costs (equipment and supply purchases, coordination and meeting attendance, etc.). MT WS expended approximately \$442,283 for field operations not including administrative costs of wolf damage management. WY WS spent about \$203,358 (\$23,852 for administrative costs), with \$32,000 of the total provided by the USFWS

in an ongoing cooperative agreement for field work for wolf-related field activities. Most reported WS expenses do not include routine administrative costs associated with wolf damage management. In addition, \$3,000 was spent by OR WS to investigate depredations and an unsuccessful attempt to control problem wolves in OR. About \$3,500 was spent in Utah to investigate depredations and to remove one wolf. In total, USDA WS in MT, ID, WY, OR and UT spent at least \$1,102,641 in FY10 on field wolf-related issues in the NRM.

Non-federal Funding For Wolves. Only the salary of one YNP biologist and administrative support is provided by the NPS. In 2008, the YNP Foundation secured commitments for private donations at \$250,000/year for 10 yrs for wolf and wolf-related research in YNP. GTNP was given \$125,000 in private funding in FY10 for wolf-related research and another \$31,000 in FY11. The private Turner Endangered Species Fund (TESF) that had funded the salary and benefits of an experienced wolf field biologist in Bozeman, MT (valued at \$60,000/yr) in FY09 ended that position in January 2010. However, that biologist still monitors wolves on Turner Ranches and occasionally helps MFWP with wolf issues and data analysis in southwestern MT at no cost to MFWP. In Fall 2010 MFWP hired a biologist in Livingston, MT to replace the TESF position and to monitor wolves and resolve conflicts in southwest MT.

On September 1, 2010 DOW concluded its wolf compensation program in the all western states except Oregon. DOW is providing additional compensation support in Oregon until September 1, 2011 to allow the state to develop a wolf compensation program. . The implementation of new federal legislation that provides funds to initiate state-run compensation programs will allow DOW to focus on promoting coexistence by partnering with ranchers to prevent conflict between livestock and wolves. Since 1987, DOW has contributed more than \$1,600,000 for wolf related livestock loss compensation through The Bailey Wildlife Foundation Wolf Compensation Trust www.defenders.org/wolfcompensation. Additionally, DOW has funded non-lethal wolf and livestock coexistence projects for many years throughout the NRM DPS totaling \$376,000. Numerous agency partners also provided substantial additional resources.

State and DOW compensation for wolf damage paid in 2010

Montana: The Montana Livestock Loss Reduction and Mitigation Board (LLRMB; llrmb.mt.gov) met 3 times in 2010. With the 2010 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 WS. Claims were paid on a first-come, first-served basis. Federal appropriations provided some of LLRMB's available funding for 2010. Donations were received from the Montana Cattlemen's Association and Montana Farmers Union for a logo/license plate contest. The LLRMB received 80 logo's and awarded a \$750 prize to the winner. Natural Resource Defense Council and DOW provided \$3,000 of the \$4,000 needed to begin a process for a specialty license plate. A specialty license plate will be issued by the board in 2011 for fundraising purposes. A total of \$87,318 was paid to livestock owners for 238 dead animals between April 15 and December 31, 2008. A total of \$144,996 was paid to livestock owners for 370 dead animals in 2009. The LLRMB continues to receive claims for livestock losses in 2010. Preliminary totals for 2010 are \$96,076 paid to livestock owners on 163 head of livestock (Table 1). Cattle losses for 2010 are comparable to 2009. Sheep losses have decreased and horse losses have increased. Individual animal values have increased for both

cattle and sheep. Federal legislation introduced by MT Senator Jon Tester was enacted into law in 2009. It provided \$1,000,000 for wolf loss prevention efforts and loss payments in all states with wolf populations. MT, ID, and WY each received \$140,000 of this appropriation in July 2010. Future federal funding to continue supporting LLRMB is uncertain pending additional federal appropriations within the federal budget.

Payments for injured animals or funds for cost-share grants to implement proactive tools intended to decrease risk were unavailable in 2010. The LLRMB intends to begin a grant process for prevention in 2011. Lack of sufficient funding has limited the board's ability to expand loss and prevention activities. The LLRMB and programs are primarily funded via private donations and governmental appropriations. Donations are fully tax deductible

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 the LLRMB's livestock loss claim form 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 LLRMP Coordinator (George Edwards, PO Box 202005, Helena, MT 59620, gedwards@mt.gov). 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 1 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.

Idaho: The State of ID pays claims for some of the wolf damage not covered by the DOW compensation program. ID's program was established in 2001. It is administered by the ID Office of Species Conservation and compensates for probable and missing wolf-caused damage up to \$100,000/yr. using federal funding. Payments are overseen by a board of County Commissioners whose counties have had wolf depredations. Representatives from USDA WS, IDFG, and DOW are advisors. Payments are made for the 50% of probable depredations not covered by the DOW program as well as claims of higher than historic losses due to missing livestock in occupied wolf habitat. For 2010 losses the Board recognized about \$280,000 in claims, but only had \$100,000 to pay out so each claim was pro-rated a percentage of the available \$100,000 (roughly 35 cents was paid per \$1 claimed for losses in 2010). In addition, ID received a \$140,000 grant as part of the Tester Wolf Damage and Prevention Law. Furthermore DOW paid \$170,263 for confirmed and probable wolf damage in ID in 2010. In total \$270,263 was paid for wolf damage in ID in 2010.

Wyoming: In 2008, the WY Legislature established and, from WY General Funds, funded a state compensation program for livestock damage caused by wolves. The WGFD paid \$73,849 for wolf damage that occurred in the Trophy Game Area of northwestern WY during 2010. WY's state program has a multiplier for each confirmed wolf depredation on calves and sheep since only a fraction of all wolf-caused losses are discovered or confirmed. Calves and any sheep are compensated up to 7 times the number confirmed but only up to the total number of calves or sheep reported as missing for that producer. Compensation for other types of livestock losses (adult cattle, horses, etc.) are paid on the actual value of each confirmed loss. State

compensation is not paid in the Predatory Animal Area of WY, but DOW compensated \$8,337 for confirmed and probable livestock losses there in 2010. Total compensation paid in WY in 2010 was \$82,186.

Northern Rocky Mountains: Total compensation paid for wolf damage to livestock in the NRM DPS in 2010 was \$453,741. In MT a total of \$96,097 was paid in 2010. In ID a total of \$270,263 was paid in 2010. In WY a total of \$82,186 was paid for wolf damage in 2010. In addition \$4,335 was paid by DOW for confirmed wolf depredations in OR and \$463 (for a loss occurring in 2009) in WA. Utah Department of Wildlife Resources (UDWR) paid \$397 for depredations in UT in 2010 but some claims are still pending.

In addition, some livestock producers on both private land and public land grazing allotments have absorbed the increased losses, expenses, and costs related to grazing livestock near wolves. Those costs are not quantifiable but are likely several times higher than annual compensation payments. They include some proportion of livestock damage from causes that couldn't be verified and for missing livestock (Oakleaf et al. 2003; Sommers et al. 2010; Breck et al. 2010).

Table 1. Payments for confirmed and probable livestock death losses by the Montana Livestock Loss Reduction and Mitigation Board, 2010. (Note: 2010 loss claims will continue to be received by the board beyond the date this report is written.)

County	Cattle	Sheep	Goat	Horse	Guard Dog	Llama	Total	Payments
<u>Beaverhead</u>	<u>29</u>	<u>15</u>					<u>44</u>	<u>\$22,725.74</u>
<u>Carbon</u>	<u>1</u>						<u>1</u>	<u>\$696.95</u>
<u>Cascade</u>		<u>18</u>					<u>18</u>	<u>\$5,550.00</u>
<u>Deer Lodge</u>	<u>1</u>						<u>1</u>	<u>\$754.00</u>
<u>Jefferson</u>	<u>2</u>						<u>2</u>	<u>\$1,390.59</u>
<u>Lake</u>	<u>1</u>						<u>1</u>	<u>\$704.00</u>
<u>Lewis & Clark</u>	<u>3</u>	<u>12</u>	<u>2</u>				<u>17</u>	<u>\$5,145.31</u>
<u>Lincoln</u>	<u>8</u>						<u>8</u>	<u>\$8,459.07</u>
<u>Madison</u>	<u>25</u>	<u>10</u>					<u>35</u>	<u>\$20,633.40</u>
<u>Mineral</u>				<u>4</u>			<u>4</u>	<u>\$5,250.00</u>
<u>Missoula</u>	<u>3</u>	<u>1</u>					<u>4</u>	<u>\$2,324.03</u>
<u>Park</u>	<u>5</u>	<u>2</u>					<u>7</u>	<u>\$4,106.05</u>
<u>Powell</u>	<u>5</u>			<u>1</u>			<u>6</u>	<u>\$6,339.78</u>
<u>Ravalli</u>	<u>2</u>						<u>2</u>	<u>\$1,509.63</u>
<u>Sanders</u>	<u>11</u>						<u>11</u>	<u>\$9,144.43</u>
<u>Silver Bow</u>	<u>2</u>						<u>2</u>	<u>\$1,344.00</u>
<u>Total</u>	<u>98</u>	<u>58</u>	<u>2</u>	<u>5</u>	<u>0</u>	<u>0</u>	<u>163</u>	<u>\$96,076.98</u>

FY10 and FY11 Budgets: In FY10, \$4,565,000 in federal funding was provided for wolf monitoring and management in the NRM DPS and \$4,765,000 is estimated to be spent in FY11. (Table 2).

Table 2. Federal Funding for Wolf Management FY2010 and FY2011 (*estimated) [\$1,000's]

FISCAL YEAR	FY 2010	FY 2011*
USFWS Region 6 (Helena, MT)		
State of MT	\$ 396	\$396
USFWS in WY	\$ 240	\$340
ID Office of Species Conservation **	\$ 704	\$**
Idaho Fish and Game **	-	\$**
Nez Perce Tribe	\$ 290	\$**
USFWS Administration & Coordination R-6	\$ 180	\$180
Additional Congressional Earmark [Tri-State]	\$ 696	\$696
R-6, Regional Office Support	\$ 150	\$150
Assist Tribes & WA & OR [R-1 \$10k]	\$ 50	\$ 50
(Region 6 SUBTOTAL)	(\$2,706)	\$1,812
USFWS Region 1 (Boise, ID)	\$ 99	\$**1,193
USFWS Wolf Damage/Prevention Grant Bill (for NRM funded out of DC)	\$ 471	\$ 471
USDA Wildlife Services	\$1,103	\$1,103
National Park Service: Yellowstone	\$ 155	\$ 155
National Park Service: Grand Teton	\$ 31	\$ 31
TOTAL Federal Funding	\$4,565	\$4,765*estimated

**Distribution of Federal Wolf Management funding for Idaho in FY 2011 not finalized among partners at this time.

NORTHERN ROCKIES DELISTING, LITIGATION, and PERSONNEL

Delisting of the Gray Wolf

Wolves, once common throughout North America, became protected under the Endangered Species Act (ESA) in 1974, because human persecution nearly eliminated them from the contiguous United States. After the 1930s there were virtually no wolves left in the NRM. The ESA prohibited people from harming wolves and mandated that all federal actions seek to conserve and not jeopardize wolves. Ultimately, 3 distinct wolf recovery programs, Midwest, NRM, and Southwest (Mexican wolf), were initiated. The Midwest wolf population (Western Great Lakes DPS now containing >4,000 wolves) was delisted on February 8, 2007 (72 FR

6052), but the U.S. District Court of Columbia vacated and remanded the delisting rule back to the USFWS on September 29, 2008. Efforts to recover wolves (~50 in 2010) in the Southwest continue. On April 2, 2009, the NRM DPS except WY, was delisted. However on August 5, 2010 the Federal District Court in Missoula, MT ruled that delisting could not proceed without including WY and vacated the delisting rule. December 2010 marked the tenth consecutive year that the minimum recovery goal of at least 30 or more breeding pairs and at least 300 wolves were documented in the NRM DPS. The 2010 NRM DPS wolf population of at least 1,651 wolves in 244 packs, 111 of which met the criteria for breeding pair status, continued to far exceed the biological recovery objectives for the NRM DPS.

Wildlife mortality is typically regulated by state and tribal fish and wildlife management agencies. The USFWS requested that MT, ID, and WY develop state wolf management plans to show how their states would conserve wolves. In addition, the USFWS believed that state wolf plans would clarify how human-caused mortality would be regulated and the wolf population conserved by the states and tribes without the protections of the ESA. These plans also were to provide a solid administrative foundation for the USFWS final decision about delisting. The USFWS provided various degrees of funding and assistance to the states while they developed their wolf management plans. State laws, as well as state management plans, must be consistent with long-term conservation of the wolf population. The USFWS approved MT and ID plans in 2004 but determined WY's regulatory framework was not adequate. On April 13, 2007, the Wind River Tribe approved a wolf management plan for their tribal lands in northwestern WY. The USFWS determined it adequately addressed the ESA criteria shortly thereafter. In late 2010 the wolf management plan for the Salish and Kootenai Tribe in western-central MT was approved by the USFWS. The links for the state wolf plans for MT, ID and WY, and the Wind River, Salish and Kootenai, and Blackfeet Tribes are available at <http://westerngraywolf.fws.gov>.

On February 8, 2007, USFWS proposed to identify the NRM DPS of the gray wolf and to delist all or most portions of the NRM DPS (72 FR 6106). Specifically, USFWS proposed to delist wolves in MT, ID, and WY, and parts of WA, OR, and UT. The proposal noted that the ESA's protections would be retained in significant portions of the range in WY in the final rule if adequate regulatory mechanisms were not developed to conserve WY's portion of a recovered wolf population into the foreseeable future. Under this alternative scenario, wolves in portions of WY would continue to be regulated under the ESA as a non-essential, experimental populations per the 1994 rule and on Wind River Tribal lands, under the 2005 experimental population regulations [50 CFR § 17.84 (i) and (n)].

On July 6, 2007, the USFWS extended the comment period on the February 8, 2007 proposal in order to consider a 2007-revised WY wolf management plan and State law that USFWS believed, if implemented, could allow the wolves in all of WY to be removed from the List of Endangered and Threatened Wildlife (72 FR 36939). 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. On November 16, 2007, the WY Game and Fish Commission (WGFC) unanimously approved the 2007 WY Plan. USFWS then determined this plan provided adequate regulatory protections to conserve WY's portion of a recovered wolf population into the foreseeable future. On December 15, 2007, the USFWS Director determined WY's regulatory mechanisms met the requirements of the ESA, contingent on the sunset

provisions of the WY law being satisfied so that WY's plan could be fully implemented. 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 WY's 2007 regulatory mechanisms were believed adequate.

The NRM DPS wolf population was delisted from March 28 to July 18, 2008. This corresponded to when the delisting decision took effect and to the date when a federal district judge granted a request for a preliminary injunction and relisted NRM wolves (see below). The court expressed serious reservations about USFWS approval of WY's regulatory framework. During this period of time, state and tribal management plans and state laws were fully in effect.

Given the court rulings, on October 28, 2008 (73 FR 63926), USFWS reopened the comment period on the February 8, 2007 proposed rule that presented 2 different scenarios for delisting the NRM DPS (72 FR 6106). 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 MT 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 WGL gray wolf DPS. The notice also asked for public comment on what portions of WY needed to be managed as a trophy game area and what portions of WY constitute a significant portion of the NRM DPS's range. 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 that WY's 2007 law, wolf management plan, and regulatory framework were not adequate to meet the purposes of the ESA. On January 15, 2009 WY's Governor was notified that WY no longer had a USFWS-approved wolf management plan and state regulatory framework. Wolf management in all of WY, except the Wind River Tribal lands (because the Tribe had a Service-approved plan) again became immediately under the less flexible 1994 experimental rule. New final delisting rules were produced for both the NRM and the WGL DPS in December 2008. These rules were released for public inspection on January 15, 2009 and were sent to the Federal Register for publication. However, on January 20, 2009, they were withdrawn from publication by Executive Order, a standard practice when a new administration takes office. Both rules were carefully reviewed by the U.S. Department of Interior. The NRM rule was published in April 2, 2009 (74 FR 15123-15188), but the WGL rule was not

The 2009 final NRM delisting rule became effective May 4, 2009. It established the NRM DPS and, except for WY, delisted gray wolves within it. Because WY does not have an approved state post-delisting wolf management plan wolves there remained protected under the 1994 experimental population regulations. This action was litigated in MT District Court by a coalition of environmental and animal rights groups (represented by Earthjustice) who argued that wolves should remain protected by the ESA. In addition, Earthjustice requested that the court enjoin the planned fall 2009 wolf hunting seasons in MT and ID, arguing they were likely to prevail in court over the legal merits of the case and hunting could irreparably harm the NRM wolf population. The court declined to grant the injunction because there was unlikely to be harm to the NRM wolf population, but indicated that the plaintiffs were likely to win the case on its merits.

MT and ID had fair chase wolf hunting seasons in fall/winter 2009/2010. A total of 72 wolves were legally harvested in MT out of a total quota of 75. In ID 188 wolves were harvested in 2009/2010 of a total quota of 220 wolves. Hunters in MT and ID paid over \$750,000 to purchase a wolf tag for the opportunity to individually harvest one wolf. While controversial among some segments of the public, the hunts were very successful biologically (hunter compliance was good and wolf harvest was widely dispersed and within quota limits) and did not harm the NRM wolf population. The wolf population in 2009 increased about 4% from 2008 levels despite record levels of control of problem wolves (270) and harvest 205 wolves in 2009.

On August 5, 2010 the MT court ruled delisting within the NRM DPS could not occur without WY and vacated the delisting of the entire NRM DPS. The USFWS filed notice it would appeal that decision to the 9th Circuit Court of Appeals but the appeal process has not been finalized. Wolves throughout the NRM DPS, except WY, were relisted under the ESA by the MT Court order and the planned 2010 fall hunts in MT and ID were cancelled.

WY initiated litigation in the WY Federal District Court in 2009. WY argued the USFWS should have approved WY's wolf management plan and delisted wolves in WY in 2009. The WY case (No. 09-CV-118J) was fully briefed and final oral arguments were held on January 29, 2010. On November 18, 2010 the WY court ruled that the administrative record did not show that WY must have a trophy game area state-wide as it believed the USFWS had required when it did not approve WY's regulatory framework in 2009. Therefore, the WY Court remanded the 2009 delisting rule back to the USFWS (that delisting rule had already been vacated in August 2010 by the MT Court ruling but was under appeal) for further consideration. The WY Court did not approve WY's approach but it did require the USFWS to reevaluate if WY's regulatory framework might be adequate to maintain recovery levels and promote genetic connectivity. Since the USFWS did not reject WY's plan solely because trophy game status was not state-wide, it is unlikely WY's approach could be approved. But, since delisting was vacated no further action has been taken to reevaluate WY's regulatory framework.

The Nonessential Experimental Population Rules

Gray wolves were reintroduced in parts of the NRM as nonessential experimental populations under the ESA in January 1995 and 1996. In 1994, just prior to wolves being reintroduced to central ID and YNP, special nonessential experimental population regulations under 17.84 (i) ESA Sec. 10(j) were promulgated (59 FR 60252). Those regulations allowed extra flexibility to Federal agencies, states, tribes, and private individuals to manage wolves to protect private property and other wildlife populations.

The USFWS' updated January 6, 2005 10(j) (70 FR 1286) regulation expanded the authority of states and Native American tribes with USFWS-approved post-delisting wolf management plans to manage gray wolves in the experimental population areas of CID and GYA. This designation allowed federal, state and tribal agencies and private citizens more flexibility in managing wolves and to protect domestic animals than the 1994 regulations. The rule also intended to allow the states and tribes with USFWS-approved post-delisting wolf management plans to lethally remove wolves that were the 'primary' cause of significant negative impacts to big game herds and for states and tribes to lead wolf management in their state or reservation. Analysis of

a March 2006 proposal by the state of ID to remove up to 43 wolves in a small area of central ID to reduce the rate of wolf predation on ungulates for up to 5 years revealed that the ‘primary’ requirement in the 2005 rule was an unobtainable standard, as wolf predation is never the ‘primary’ cause of ungulate herd status.

On July 6, 2007 the USFWS proposed that the 2005 10(j) nonessential experimental population regulation be modified (72 FR 36942). The modification from ‘primary cause’ to ‘one of the major causes’ allowed a high, but reasonable standard for states and tribes with USFWS-approved post-delisting wolf management plans to develop science-based proposals to lethally remove wolves shown to be negatively affecting ungulate herds. In addition, it would allow anyone on private or public land to shoot a wolf that was attacking his or her 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. A couple of wolves that were seen attacking domestic dogs or horses have been legally shot by private citizens, but no wolves have been removed to address concerns about wild ungulate populations. In 2010, ID and MT gave the USFWS proposals to reduce wolves for 5 yrs. in 2 small areas. Idaho would remove about 40-60 in the Lolo/Clearwater area of ID and MT would remove about 12 wolves from the Bitterroot area of MT. Both of those proposals are under evaluation by the USFWS. Environmental Assessments, as legally required by the National Environmental Policy Act (NEPA), are being prepared for public review and comment. No wolves can be removed before the legal process in the 2008 rule has been completed and the USFWS has determined such removals are science-based and would not jeopardize wolf recovery. The 2008 experimental population rule is currently being litigated in MT Federal District Court (Defenders of Wildlife vs Rowan Gould No. CV-08-14-M-DWN).

Litigation

Litigation initiated by both wolf proponents and opponents over wolf reintroduction and subsequent management has almost been continuous since the USFWS published the final rules for wolf reintroduction into YNP and central ID in November 1994.

State of WY, et al. vs. United States Department of the Interior, et al., U.S. District Court for the District of WY, Civil Action No. 04CV01123J. This case involved the USFWS’s decision not to approve the WY state wolf management plan in 2004. The case was expanded by interveners to include claims that USFWS allegedly failed to properly manage wolves in WY and conduct additional NEPA compliance. The WY District Court ruled in the USFWS’s favor on procedural grounds in 2005. WY appealed that case to the Tenth Circuit Court of Appeals in Denver, CO, and the Appeals Court upheld the lower court decision. As a result of those court decisions, WY formally petitioned the USFWS to establish and delist a NRM DPS for the gray wolf. The USFWS rejected that petition (71 FR 43410).

State of WY et al. v. United States Department of the Interior et al., U.S. District Court for the District of WY, Civil Action No. 06CV245J. This case involved the USFWS’s finding that WY’s petition to establish a NRM DPS for wolves and delist them was not warranted (71 FR 43410). This case was dismissed after the February 29, 2008 final NRM DPS delisting rule (73 FR 10514) was published in the Federal Register.

Humane Society of the United States v. Kempthorne, U.S. District Court for the District of Columbia, Civil Action No. 07CV0677PLF. On February 8, 2007, USFWS recognized a Western Great Lakes (WGL) DPS and removed it from the list of the List of Endangered and Threatened Wildlife (72 FR 6052). Several groups challenged this rule in court, arguing that the USFWS may not identify a DPS within a broader pre-existing listed entity for the purpose of delisting the DPS. On September 29, 2008, the court vacated the WGL DPS final rule and remanded it to the USFWS. The court found that the ESA is ambiguous as to whether the USFWS has the authority to identify a DPS within a broader, pre-existing listed entity, and the court remanded the final rule so that the USFWS can provide a reasoned explanation of how its actions are consistent with the text, structure, legislative history, judicial interpretations, and policy objectives of ESA. The revised 2009 delisting rule that was submitted to the Federal Register (74 FR 15070) was later vacated and remanded by the Court on July 2, 2009 (*Humane Society et al. v. Kempthorne, et al.*, 09CV1092PLF (D.D.C.)).

Defenders of Wildlife, et al. v. H. Dale Hall, et al., U.S. District Court for the District of MT, Civil Action No. 08CV14DWM. The January 28, 2008 modification to the 2005 10(j) nonessential experimental population rule is currently being litigated by in the District of MT. The modified 10(j) rule allowed anyone to legally shoot a wolf that was attacking his or her dog or his or her stock animal [horses, mules, donkeys, llamas, and goats]. It also provided a science-based process for the states and tribes to propose that the Service approve localized reductions in wolves where wolf predation was proven to be a major cause of ungulate herds being below state and tribal management objectives. That rule remains in effect while the case is being litigated. The case was stayed until there is a decision regarding the 2009 delisting. A few wolves that were attacking domestic dogs or horses were legally shot by private citizens, but no wolves were removed to address concerns about wild ungulate populations. The case became active again when wolves were relisted in 2010 and the claims have now been fully briefed. A hearing on a portion of that case (whether the 10(j) litigation is moot) is scheduled for March 24, 2011.

Defenders of Wildlife et al. and Greater Yellowstone Coalition v. Ken Salazar et al., U.S. District Court for the District of MT, Civil Action No. 09CV77DWM, 09CV82DWM. On April 2, 2009, the USFWS published a final rule (74 FR 15123) identifying the NRM DPS and removing ESA protections for the wolves throughout the DPS, except in WY. The 2009 delisting was litigated in the District of MT by a coalition of environmental groups represented by Earthjustice. They asserted, among many other things, that a delisting that retained ESA protections for wolves in WY was unlawful. On August 5, 2010, the court ruled that the USFWS's 2009 rule was contrary to the plain language of the ESA, and the Court set aside and vacated the 2009 rule. The USFWS has appealed the decision to the Ninth Circuit Court of Appeals. As a result of the District of MT's ruling, wolves throughout the NRM DPS are again protected under the ESA.

State of WY, et al. v. United States Department of the Interior, et al., U.S. District Court for the District of WY, Civil Action No. 09CV118J, 09CV138J. Litigation over the April 2, 2009 delisting was also initiated in the U.S. District Court for the District of WY. The State of Wyoming and others asserted that the USFWS unlawfully failed to approve WY's regulatory

framework and that the USFWS should have delisted wolves in WY along with the remainder of the NRM DPS. . On November 18, 2010, the court ruled that the USFWS failed to adequately explain why WY's predator and trophy game areas were inadequate and the court remanded the 2009 delisting rule back to the USFWS for further consideration.

Wolf Personnel & Staffing

MFWP began managing wolves in northwestern MT in early 2004, under a cooperative agreement with the USFWS. In June 2005, the USFWS and MFWP signed a cooperative agreement transferring the decision-making authority for all wolf management activities in MT. Carolyn Sime officially became the MFWP Wolf Management Coordinator at that time, but she had been working on wolf issues for MT beginning in 2000 with the writing of MT's wolf plan. In late 2010, that MFWP position was eliminated. Carolyn is continuing to assist with various reports and publications among her other new duties but her skill and dedication will be sorely missed. Carolyn's duties were reassigned and distributed to other personnel within MFWP staff, with Lauri Hanauska-Brown now as the primary contact. MFWP hired a new field biologist in 2010 and Abigail Nelson is stationed in Livingston.

In January 2006, the Governor of ID signed a Memorandum of Agreement with the Secretary of the Interior giving IDFG the decision making authority for all wolf management activities in ID. The USFWS biologist that had been conducting that work retired (Carter 'Wolfer' Niemeyer). All wolf management in ID was then conducted with federal funding by IDFG. The NPT continued to assist with wolf monitoring in ID under a cooperative agreement with IDFG. However, on October 18, 2010, due to frustration over the court relisting of wolves ID withdrew from its designated agent status. The USFWS Snake River Field Office (Brian Kelly is its new supervisor) in Boise, ID re-assumed all wolf management duties in ID. USFWS is in discussions with the NPT about wolf monitoring in ID and is hiring a new ID USFWS Wolf Coordinator. The USFWS WY wolf office assumed lead for all wolf monitoring and management in the GYA portion of ID. ID WS State Supervisor Mark Collinge retired in late 2010.

The USFWS wolf program staff are currently Ed Bangs, the NRM DPS Wolf Recovery Coordinator in Helena, MT, Mike Jimenez the Project Leader for Wolf Recovery in WY and Scott Becker, a field biologist hired in Fall 2010, stationed in Cody, WY. In addition, Seth Willey (ESA Recovery Coordinator) with the USFWS Regional Office in Denver, CO made huge contributions in 2010 to complete and defend the 2009 delisting proposal and by working on other USFWS projects related to wolf conservation.

Terry Thibeault is the new USFWS Resident Agent-in-Charge for MT & WY and he is stationed in Billings, MT. Special Agent Roy Brown is stationed in Lander, WY and Special Agent Scott Darrah is stationed in Casper, WY. USFWS Special Agents Domenic Domenici (Casper, WY) and Tim Eicher (Cody, WY) retired in 2010. Scott Jackson became the USDA Forest Service National Large Carnivore Specialist in Missoula, MT in 2010. These people and many others made huge contributions to wolf restoration and management.

ABBREVIATIONS AND ACRONYMS

Central ID wolf recovery area	CID
Defenders of Wildlife	DOW
Distinct Population Segment	DPS
Endangered Species Act	ESA
Glacier National Park	GNP
Grand Teton National Park	GTNP
Greater Yellowstone wolf recovery area	GYA
ID Department of Fish and Game	IDFG
MT Fish, Wildlife and Parks	MFWP
MT State University	MSU
Nez Perce Tribe	NPT
Northwest MT Wolf Recovery Area	NWMT
Northern Rocky Mountains	NRM
Oregon Dept. of Fish and Wildlife	ODFW
Predator Conservation Alliance	PCA
Turner Endangered Species Fund	TESF
Utah Depart. Wildlife Resources	UDWR
University of MT	UM
USDA/APHIS/Wildlife Services	WS
U.S. Fish and Wildlife Service	USFWS
U.S. Forest Service	USFS
U.S. National Park Service	NPS
WY Game and Fish Department	WGFD
Yellowstone Center for Resources	YCR
Yellowstone National Park	YNP
Washington Dept. of Fish and Wildlife	WDFW

CONTACTS

For further information or to report wolf sightings, please contact:

Please remember wolf management in MT is conducted by MFWP and they should be the first point of contact in MT for everything as long as wolves are delisted:

MT Fish, Wildlife & Parks, Helena, MT:	(406) 444-5209
MT Fish, Wildlife & Parks, Kalispell, MT:	(406) 751-4586
MT Fish, Wildlife & Parks, Missoula, MT:	(406) 542-5523
MT Fish, Wildlife & Parks, Bozeman, MT:	(406) 994-6371
MT Fish, Wildlife & Parks, Butte, MT:	(406) 425-3355
MT Fish, Wildlife & Parks, Livingston, MT:	(406) 600-5150
Nez Perce Tribal Wolf Program, McCall ID:	(208) 634-1061
U.S. Fish and Wildlife Service, Helena MT:	(406) 449-5225
U.S. Fish and Wildlife Service, Jackson, WY:	(307) 330-5631
U.S. Fish and Wildlife Service, Cody, WY:	(307) 699-3411
U.S. Fish and Wildlife Service, Boise ID:	(208) 378-5639
U.S. Fish and Wildlife Service, Wenatchee, WA:	(509) 665-3508 ext 22
Yellowstone Center for Resources, YNP WY:	(307) 344-2243

To report livestock depredations:

USDA/APHIS/Wildlife Services, MT:	(406) 657-6464
USDA/APHIS/Wildlife Services, WY:	(307) 261-5336
USDA/APHIS/Wildlife Services, ID:	(208) 378-5077
USDA/APHIS/Wildlife Services, WA:	(509) 765-7962
USDA/APHIS/Wildlife Services toll free:	(866) 487-3297

To report discovery of a dead wolf or information regarding the illegal killing of a wolf:

U.S. Fish and Wildlife Service Special Agent, Missoula, MT:	(406) 329-3000
U.S. Fish and Wildlife Service Special Agent, Great Falls, MT:	(406) 761-2286
U.S. Fish and Wildlife Service, Senior Agent, Billings, MT:	(406) 247-7355
U.S. Fish and Wildlife Service Special Agent, Lander, WY:	(307) 332-7607
U.S. Fish and Wildlife Service Special Agent, Casper, WY:	(307) 261-6365
U.S. Fish and Wildlife Service Special Agent, Boise, ID:	(208) 378-5333
U.S. Fish and Wildlife Service Special Agent, ID Falls, ID	(208) 523-0855
U.S. Fish and Wildlife Service Special Agent, Spokane, WA	(509) 928-6050

WEBSITES

USFWS Rocky Mountain weekly and annual wolf updates and NRM regulations:

<http://westerngraywolf.fws.gov/>

USFWS Midwestern gray wolf recovery, national wolf reclassification proposal:

<http://midwest.fws.gov/wolf/>

USFWS Endangered Species Program:

<http://endangered.fws.gov/>

USDA/APHIS/Wildlife Services:
<http://www.aphis.usda.gov/ws/>
 National Wildlife Research Center:
<http://www.aphis.usda.gov/ws/nwrc/>
 Nez Perce Tribe Wildlife Program:
http://www.nezperce.org/Programs/wildlife_program.htm
 Turner Endangered Species Fund:
<http://www.tesf.org/>
 Yellowstone Park Foundation:
<http://www.ypf.org/>
 Yellowstone Wolf Tracker:
<http://www.wolftracker.com/>
 Yellowstone National Park wolf pack data:
<http://www.nps.gov/yell/nature/animals/wolf/wolfup.html>
 Wolf Restoration to Yellowstone:
<http://www.nps.gov/yell/nature/animals/wolf/wolfrest.html>
 MT Livestock Loss Reduction and Mitigation Board:
llrmb.mt.gov
 MT Fish, Wildlife and Parks:
<http://www.fwp.mt.gov/wildthings/tande/wolf/wolf.html>
 MT State University wolf-ungulate research:
<http://www.homepage.MT.edu/~rgarrott/wolfungulate/index.htm>
 University of Montana:
<http://www.cfc.umt.edu/Heblab/>
 ID Fish and Game:
<http://fishandgame.idaho.gov/>
 ID Office of Species Conservation:
<http://species.idaho.gov/>
 WA Department of Fish and Wildlife
http://wdfw.wa.gov/conservation/gray_wolf/
 WY Game and Fish Department:
<http://gf.state.wy.us/>
 WY agricultural statistics:
<http://www.nass.usda.gov/wy/>
 ID agricultural statistics:
<http://www.nass.usda.gov/id/>
 MT agricultural statistics:
<http://www.nass.usda.gov/mt/>
 National agricultural statistics:
<http://usda.mannlib.cornell.edu/reports/nassr/livestock/>
 Defenders of Wildlife wolf compensation trust:
<http://www.defenders.org/wolfcomp.html>
 International Wolf Center:
<http://www.wolf.org/>
 Wolf Recovery Foundation:
<http://forwolves.org/>
 National Wildlife Federation wolf information:
<http://www.nwf.org/wildlife/graywolf/>
 MT Stockgrowers' Association
<http://www.mtbeef.org/index.htm>
 National Geographic wolf information:
<http://www.nationalgeographic.com/tv/specials/wolf/intro.html>
 Wolf Education and Research Center:
<http://www.wolfcenter.org/>
 People Against Wolves:
<http://home.centurytel.net/PAW/home.htm>
 Western Wolf Coalition:
www.westernwolves.org
 Lobo Watch:
wolfkill@lobowatch.com
 Wolf Watch:
www.pinedaleonline.com/wolf

Montana Natural Resource Information System:

<http://nris.state.mt.us/>

Turner Endangered Species Fund:

<http://www.tesf.org/>

Yellowstone Park Foundation:

<http://www.ypf.org/>

Montana Natural Heritage Program:

<http://mtnhp.org/>

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ROCKY MOUNTAIN WOLF PUBLICATIONS 2003-2010
(publications listed for the first time are in bold)

- Adams, L. G., R. O. Stephenson, B. W. Dale, R. T Ahgook, and D. J. Demma. 2008. Population dynamics and harvest characteristics of wolves in the central Brooks Range, Alaska. *Wildlife Monographs* 170.
- 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.
- Almberg, E.S., P.C. Cross, and D.W. Smith. 2010. Persistence of canine distemper virus in the Greater Yellowstone Ecosystem's carnivore community. *Ecological Applications* 20:2058-2074.**
- Almberg, E.S., L.D. Mech, J.W. Sheldon, and R.L. Crabtree. 2009. A Serological Survey of Infectious Disease in Yellowstone National Park's Canid Community. *PLoS ONE* 4(9): e7042.

Almberg, E.S., L. D. Mech, P. C. Cross, D. W. Smith, J. W. Sheldon, and R.L. Crabtree. 2010. Infectious Disease in Yellowstone Park's Canid Community. Yellowstone Science.

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 melanism in North American gray wolves. *Science* 323:1339-1343.

Anwar, M. S., Musiani, M., McDermid, G., Hebblewhite, M. & Marceau, D. J. 2010. How humans shape wolf behavior in Banff and Kootenay National Parks, Canada. *Ecological Modeling* 221: 2374 – 2387.

Ashcroft, N. K., C. P. Mathis, S. T. Smallidge, J. M. Fowler, and T. T. Baker. 2009. Reestablishment of the Mexican gray wolf: The economics of depredation. Range Improvement Task Force Report 80. Las Cruces, NM: New Mexico State University.

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* 73:876-884

Ausband, D.E., J. Hoylan, C. Mack. 2009. Longevity and adaptability of a reintroduced gray wolf. *Northwestern Naturalist* 90:44-47.

Ausband, D., M. Mitchell, C. Mack, P. Zager, and L. Waits. 2009 Progress Report for Developing Wolf Population Monitoring Techniques A Cooperative research effort between The Montana Cooperative Wildlife Research Unit, The Nez Perce Tribe, Idaho Department of Fish and Game, University of Idaho, Montana Fish, Wildlife, & Parks, U.S. Fish & Wildlife Service. Univ. Montana, Missoula, MT. 12pp.

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.

Ausband, D.E., M.S. Mitchell, K., Doherty, P. Zager, C.M. Mack, and J. Holyan. 2010. Surveying predicted rendezvous sites to monitor gray wolf populations. Journal of Wildlife Management 74:1043-1049.

Ausband, D.E., J. Young, B. Fannin, M.S. Mitchell, J.L. Stenglein, L.P. Waits, and J.A. Shivik. In Review. Hair of the dog: obtaining samples from coyotes and wolves noninvasively. J. Wildl. Manage.

Ausband, D.E., J. Skrivseth, and M.S. Mitchell. In Review. An automated device for provoking and capturing wildlife calls. Wildl. Soc. Bull.

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. 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. 2009. A chat with Ed Bangs. *International Wolf*. 19:8-13.

Bangs, E. 2009. Dancing with Wolves: Natural Resources Alum seeks balance. *Utah State Today Online News*. October 1, 2009. 3pp.

Bangs, E. 2009. Wolves, elk, science, and human values. It's time for reason to replace rhetoric. *Bugle*: 26(5): 79-82.

Bangs, E. 2010. The MSJ Interview with Ed Bangs. Montana Sporting Journal. Fall/Winter 2010. Pp. 56-59.

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

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, in 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.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., M. Jimenez, C. Niemeyer, J. Fontaine, C. Sime, S. Nadeau, and C. Mack. 2009. The art of wolf restoration in the northwestern United States: Where do we go now? Pages 95-114 in 'A New Era for Wolves and People: Wolf Recovery, Human Attitudes, and Policy', eds. M. Musiano, L. Boitani, and P. Paquet . University of Calgary Press. Calgary, AB. 282 pp.
- Bangs, E.E., C.A. Sime, J. Gude, Adam Messer, J.D. Jimenez, D.W. Smith, Curt Mack, J. Rachel. In prep. Differences in characteristics and parameters of wolf packs classified as breeding pairs or non-breeding pairs in the northern Rocky Mountains U.S. J. Wildlife Management.**
- 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.
- Barnowe-Meyer, K.K., P.J. White, T.L. Davis, D.W. Smith, R.L. Crabtree, and J.A. Byers. 2010. Influences of wolves and high-elevation dispersion on reproductive success of pronghorn (*Antilocapra americana*). *J. Mammalogy* 91:712-721.**
- 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.
- Bergstrom, J.B., S.Vignieri, S.R. Sheffield, W. Sechrest, and A.A. Carlson. 2010. The Northern Rocky Mountain Gray Wolf Is Not Yet Recovered. *BioScience* 59:991-999.
- 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.
- Beschta, R.L. and Ripple, W.J. 2007. Increased willow heights along northern Yellowstone's Blacktail Deer Creek following wolf reintroduction. *Western North American Naturalist* 67:613-617.
- Beschta, R.L. and Ripple W.J. 2007. Wolves, elk, and aspen in the winter range of Jasper National Park, Canada. *Canadian Journal of Forest Research*. 37(10): 1873-1885.
- Beschta, R. L., and Ripple, W.J. 2009. Large predators and trophic cascades in terrestrial ecosystems of the western United States. *Biological Conservation* 142, 2009: 2401-2414.
- Beschta, R.L. and W.J. Ripple. 2010. Restoring northern Yellowstone's Riparian Plant Communities with Wolves. *Restoration Ecology*. 18:380-389.**
- 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: There are several other wolf papers in this volume.
- Boyce, M. S., and R. L. Byrne. 2009. Managing predator-prey systems: an update. *Transactions of the North American Wildlife and Natural Resources Conference* 74:122–124.
- Boertje, R.D., M.A. Keech, T.F. Paragi. 2010. Science and Values Influencing Predator Control for Alaska Moose Management. *J. Wildl. Manage.* 74:917-928.**
- 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.
- Brainerd, S.M., H. Andren, H., E.E. Bangs, E. Bradley, J. Fontaine, W. Hall, Y. Iliopoulos, M. Jimenez, 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. and T. Meier. 2004. Managing wolf depredation in United States: past, present and future. *Sheep and Goat Research Journal* 9: 41-46.
- Breck, S.W., B.M. Kluever, M. Panasci, J. Oakleaf, D.L. Bergman, W. Ballard and L. Howery. (2011). Factors affecting predation on calves and producer detection rates in the Mexican wolf recovery area. *Biological Conservation*.**
- Bryan, H., C.T. Darimont, T.E. Reimchen, and P.C. Paquet. 2006. Early ontogenetic diet of wolves. *Canadian Field-Naturalist*.
- Bruskotter JT, Schmidt RH, Teel TL. 2007. Are attitudes toward wolves changing? A case study in Utah. *Biological Conservation* 139: 211–218.**

Bruskotter, J. T., J. J. Vaske, and R. H. Schmidt. 2009. Social and Cognitive Correlates of Utah Residents' Acceptance of the Lethal Control of Wolves. *Human Dimensions of Wildlife* 14:119-132.

Bruskotter, J.T., E. Toman, S.A.ENZLER, and R.H. Schmidt. 2010. Are Gray Wolves Endangered in the Northern Rocky Mountains? A Role for Social Science in Listing Determinations. *BioScience* 60:941-948.

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. Apostol and M. Sinclair eds. Island Press. Washington D.C.

Cariappa, C.A., J. Oakleaf, W.B. Ballard, S.W. Breck 2011. A reappraisal of the evidence for regulation of wolf populations. *Journal of Wildlife Management*. In Press.

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.

Carroll, C., J.A. Vucetich, M.P. Nelson, D.J. Rohls, and M.K. Phillips. 2010. Geography and Recovery under the U.S. Endangered Species Act. *Conservation Biology* 24:395-403.

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.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 & Christianson D 2009. Wolf presence and increased willow consumption by Yellowstone elk: implications for trophic cascades. *Ecology*. 90: 2454- 2466.**
- Creel S., and J. J. Rotella. 2010. Meta-analysis of relationships between human offtake, total mortality and population dynamics of gray wolves (*Canis lupus*). *PLoS One* 5(9): e12918.**
- Creel S. 2010. Interactions between wolves and elk in the Yellowstone Ecosystem, pp 65 - 80 In: Knowing Yellowstone: Science in America's First National Park. J. Johnson (ed). Taylor Trade Publishing, Boulder, CO**
- Creel, S., JA Winnie & D. Christianson. 2009. Glucocorticoid stress hormones and the effect of predation risk on elk reproduction. *Proceedings of the National Academy of Sciences* 106(30):12388–12393**
- Christianson D & Creel S 2010. A nutritionally mediated risk effect of wolves on elk. *Ecology* 91:1184-1191**
- 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 Linnean 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.

Derbridge, Jonathan J. 2010. Summer wolf diet in northwestern Montana. MS. Thesis. University of Montana, Missoula MT. 42pp.

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.

Eggeman, S., Hebblewhite, M., Cunningham, J., and Hamlin, K. 2009. Fluctuating asymmetry in elk antlers is unrelated to environmental conditions in the Greater Yellowstone Ecosystem. *Wildlife Biology*, 15: 299-309.

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.

Fannin, B. and D. Ausband. 2010. Soliciting hair samples from wolves noninvasively using lures and rub stations. Montana Cooperative Wildlife Research Unit, Missoula, MT 7pp.

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.

Foreyt, W.J., M.L. Drew, M. Atkinson, and D. McCauley. 2009. *Echinococcus granulosus* in Gray Wolves and Ungulates in Idaho and Montana, USA. *J. Wildlife Disease* 45:1208-1212.

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.

Frair, J. L., E. H. Merrill, J. R. Allen, and M. S. Boyce. 2007. Know thy enemy: experience affects translocation success in risky landscapes. *J. Wildl. Manage.* 71:541–554.

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.
- Fredrickson, R., P. Siminiski, M. Woolf, and P.W. Hedrick. 2007. Genetic rescue and inbreeding depression in Mexican wolves. *Pro. Royal Soc. of Biol. Sci.* 274:2365-2371.
- 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.
- Galle, A., M. Collinge, and R. Engeman. In Press. Trends in summer-time coyote and wolf predation on sheep in Idaho during a period of wolf recovery. *Proceedings of the 13th Wildlife Damage Management Conference*.
- 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), 2008. *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.

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. 4pp.

Gude, J.A., M.S. Mitchell, R.E. Russell, C.A. Sime, E.E. Bangs, L.D. Mech, R.R. Ream. Submitted. Wolf Population dynamics in the northern Rocky Mountains are affected by recruitment and human-caused mortality. J. Wildl. Manage.

Gude, J.A., M. S. Mitchell, D. E. Ausband, C. A. Sime, and E. E. Bangs. 2009. Internal validation of predictive logistic models for decision making in wildlife management. *Wildlife Biology*. 15:352-369.

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.

Guthrie, Margaret. 2009. Wolf Whistle. *The Scientist*. 23:21.

Halofsky, J.S. and Ripple W.J. 2008. Linkages between wolf presence and aspen recruitment in the Gallatin elk winter range of southwestern Montana, USA. *Forestry*. 81:195-207.

Halofsky, J.S. and Ripple W.J. 2008. Fine-scale predation risk on elk after wolf-reintroduction in Yellowstone National Park, USA. *Oecologia*. 155:869–877.

Halofsky, J.S. Ripple W.J. and Beschta, R.L. 2008. Recoupling fire and aspen recruitment after wolf reintroduction in Yellowstone National Park, USA. *Forest Ecology and Management*. 256: 1004–1008.

Hayes, R. 2011. Wolves of the Yukon. Available at Amazon.com or Mac's Fireweed Book Store, Yukon, Canada.

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 multi-scale test of the Forage maturation hypothesis for a partially migratory montane elk population. *Ecological Monographs*.
- 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. 2010. Wolf community ecology: Ecosystem effects of recovering wolves in Banff and Yellowstone National Parks. Pages 69-120 in M. Musiani, L. Boitani, and P. Paquet, editors. *The world of wolves: new perspectives on ecology, behavior and policy*. University of Calgary Press.
- Hebblewhite, M., 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.
- Hebblewhite, M., White, C.A., and Musiani, M. 2009. Revisiting extinction in National Parks: Mountain caribou in Banff. *Conservation Biology*, Published Online Early, Nov 2009.
- Hebblewhite, M., and Merrill, E.H. 2009. Trade-offs between wolf predation risk and forage at multiple spatial scales in a partially migratory ungulate. *Ecology*, 90:3445-3454.
- M. Hebblewhite, M. Musiani & L. S. Mills. 2010. Restoration of genetic connectivity among Northern Rockies wolf populations. *Molecular Ecology* 19:4382-4385.**

Hedrick, P.W. and R. Fredrickson. 2010. Genetic rescue guidelines with examples from Mexican wolves and Florida panthers. *Conserv. Genet.* 11:615-626.

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.

Hoffmann, S.R., S.A. Blunck, K. N. Petersen, E. M. Jones, J. C. Koval, R. Misek, J. A. Frick, H. D. Cluff, C. A. Sime, M. McNay, K. B. Beckman, M. W. Atkinson, M. Drew, M. D. Collinge, E. E. Bangs, R. G. Harper. 2010. Cadmium, Copper, Iron, and Zinc Concentrations in Kidneys of Grey Wolves, *Canis lupus*, from Alaska, Idaho, Montana (USA) and the Northwest Territories (Canada). *Bull. Envir. Contamination and Toxicolgy*. 85:481-485.

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

Hollenbeck, J. P., and Ripple W.J. 2008. Aspen snag dynamics, cavity-nesting birds, and trophic cascades in Yellowstone's northern range. *Forest Ecology and Management*. 255:1095-1103

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., 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.

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. Bergman, E.E. Bangs, and S. Woodruff. 2009. Wolves killed by cougars and a grizzly bear in western United States and Canada. *Canadian Field Naturalist*. 122: 76-78.
- Jimenez, M.D., E. E. Bangs, Carolyn Sime, and V. Asher. 2010. Sarcoptic mange found in wolves in the Rocky Mountains in western United States. *J. Wildlife Disease* 46:1120-1125.**
- Jimenez, M.D., E.E. Bangs, M. Drew, S. Nadeau, V.J. Asher, and C. Sime. 2010. Dog lice (*Trichodectes canis*) found on wolves (*Canis lupus*) in Montana and Idaho. *Northwestern Naturalist* 91:331-333.**
- 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 1993-2009. *J. Wildl. Manage.*
- Karlson, J. and O. Johanasson. 2010. Predictability of repeated carnivore attacks on livestock favours reactive use of mitigation measures. *J. Applied Ecology* 47:166-171.
- 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.
- Kaufmann, M.J., J.F. Brodie, and E.S. Jules. 2010. Are wolves saving Yellowstone's aspen? A landscape-level test of a behaviorally mediated trophic cascade. *Ecology*, 91:2742-2755.**
- 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., 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.
- Lance, N.J. 2009. Application of electrified fladry to decrease risk of livestock depredation by wolves (*Canis lupus*). M.S. thesis, Utah State University. Logan, UT.**
- Lance, N.J., S.W. Breck, C. Sime, P. Callahan, and J.A. Shivik. 2010. Biological, technical, and social aspects of applying electrified fladry for livestock protection from wolves (*Canis lupus*). *Wildlife Research* 37: 708-714.**
- Larsen, T. 2004. Modeling gray wolf habitat in Oregon using a geographic information system. M.S. Thesis, University of Oregon. Corvallis, Oregon. 120pp.
- Larsen, T. and W.J. Ripple. 2006. Modeling gray wolf (*Canis lupus*) habitat in the Pacific Northwest, USA. *J. Conserv. Planning* 2:30-61.
- Laundré, J.W. Hernández, L. and Ripple, W.J. 2010. The Landscape of Fear: Ecological implications of being afraid. *Open Ecology Journal*. 3:1-7.**
- 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.
- Licht, D.S., J.J. Millsaugh, K.E. Kunkel, C.O. Kochanny, and R.O. Peterson. 2010. Using Small Populations of Wolves for Ecosystem Restoration and Stewardship. *BioScience* 60:147-153.
- 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., 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., 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.
- MacNulty, D.R., D.W. Smith, J.A. Vucetich, L.D. Mech, D.R. Stahler, and C. Packer. 2009. Predatory Senescence in Ageing Wolves. 2009. *Ecology Letters* 12:1-10

- 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. 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. 2010. What is the taxonomic status of Minnesota wolves? *Can. J. of Zool.* 88:129-138.**
- Mech, L. D. 2010. Considerations for developing wolf harvesting regulations in the contiguous United States. *J. Wildl. Mgmt.* 74(7):1421-1424.**
- Mech, L.D., W. Ballard, E. Bangs, and R. Ream. 2010. Restricting wolves risks escape. *BioScience* 60:485-486.**
- Mech, L.D. and M.A. Cronin. 2010. Isle Royale study affirms ability of wolves to persist. *Biological Conservation.* XXX.**
- Mech, L.D. and Boitani, eds. 2003. *Wolves: behavior, ecology, and conservation.* Univ. Chicago Press, Chicago, IL. 448 pp.
- 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.
- Meier, T. J., 2009. Vital signs monitoring of wolf (*Canis lupus*) distribution and abundance in Denali National Park and Preserve, Central Alaska Network. 2009 report. Natural Resource Data Series NPS/CAKN /NRDS 2009/009. National Park Service, Fort Collins, Colorado.**
- Meier, T. J., Burch, J. W., Wilder, D., Cook, M. 2009. Wolf monitoring protocol for Denali National Park and Preserve, Yukon-Charley Rivers National Preserve and Wrangell-St. Elias National Park and Preserve, Alaska. Natural Resource Report NPS/CAKN/NRRR—2009/168. National Park Service, Fort Collins, Colorado.**
- 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.
- Merrill, E. H., Sand, H., Zimmerman, B., McPhee, H., Hebblewhite, M., Webb, N., Wabakkan, P. & J.L. Frair. 2010. Opportunities and challenges for using predator movements to assess kill sites and attack rates. *Phil. Trans. R. Soc.* 365:2279-2288.**

- 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.
- Mitchell, M. S., J. A. Gude, D. E. Ausband, C. A. Sime, E. E. Bangs, M. D. Jimenez, C. M. Mack, T. J. Meier, M. S. Nadeau and D.W. Smith. 2010. Temporal validation of an estimator for successful breeding pairs of wolves (*Canis lupus*) in the U.S. northern Rocky Mountains. *Wildlife Biology* 16:101-106.**
- Mitchell, M. S., D. E. Ausband, C. A. Sime, E. E. Bangs, J. A. Gude, M. D. Jimenez, 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.
- Morehouse, A., and M. S. Boyce. 2009. Wolves eat cattle and we pay the compensation. *Alberta Outdoorsmen* 11(3):10-12.
- Muhly, T.B. M. Alexander, M.S. Boyce, R. Creasy, M. Hebblewhite, and M. Musiani. 2010. Differential risk effects of wolves on elk and cattle: implications for conservation. *Oikos* 119, 1243-1254.**
- Munoz-Fuentes. V., C.T. Darimont, P.C. Paquet, J.A. Leonard. 2010. The genetic legacy of extirpation and re-colonization in Vancouver Island wolves. *Conserv. Genet.* 11:547-556.**
- Murray, D.L., D.W. Smith, E.E. Bangs, C. Mack, J.K. Oakleaf, J. Fontaine, D. Boyd, M. Jimenez, C. Niemeyer, T.J. Meier, D. Stahler, J. Holyan, V.J. Asher. 2010. Death from anthropogenic causes is partially compensatory in recovering wolf populations. *Biological Conservation* 143:2514-2524.**

- 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.
- M. Musiano, L. Boitani, and P. Paquet. 2009. A New Era for Wolves and People: Wolf Recovery, Human Attitudes, and Policy', eds. University of Calgary Press. Calgary, AB. 282 pp.
- M. Musiano, L. Boitani, and P. Paquet. 2010. The World of wolves: New Perspectives on Ecology, behavior, and management. University of Calgary Press. Calgary, AB. 352 pp.**
- Musiani, M. Anwar, S.M., G. McDemid, M. Hebblewhite, D. Marceau. 2010. How humans shape wolf behavior in Banff and Kootenay National Parks, Canada. Ecological Modelling 221:2374-2387.**
- 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).
- Niemeyer, C. 2010. *Wolfer*. Bottletfly Press, Boise, Idaho. 355pp.**
- Nadeau, M. S., C. Mack, J. Holyan, J. Husseman, M. Lucid, B. Thomas. 2006. Wolf conservation and management in Idaho; progress report 2005. Idaho Department of Fish and Game, 600 South Walnut, Boise, Idaho; Nez Perce Tribe, P.O. Box 365, Lapwai, Idaho. 61 pp.**
- Nadeau, M. S., C. Mack, J. Holyan, J. Husseman, M. Lucid, P. Frame, B. Thomas. 2007. Wolf conservation and management in Idaho; progress report 2006. Idaho Department of Fish and Game, 600 South Walnut, Boise, Idaho; Nez Perce Tribe, P.O. Box 365, Lapwai, Idaho. 73 pp.**
- Nadeau, M. S., C. Mack, J. Holyan, J. Husseman, M. Lucid, B. Thomas, D. Spicer. 2008. Wolf conservation and management in Idaho; progress report 2007. Idaho Department**

of Fish and Game, 600 South Walnut, Boise, Idaho; Nez Perce Tribe, P.O. Box 365, Lapwai, Idaho. 72 pp.

Nadeau, M. S., C. Mack, J. Holyan, J. Husseman, M. Lucid, D. Spicer, B. Thomas. 2009. Wolf conservation and management in Idaho; progress report 2008. Idaho Department of Fish and Game, 600 South Walnut, Boise, Idaho; Nez Perce Tribe, P.O. Box 365, Lapwai, Idaho. 106 pp.

Mack, C., J. Rachael, J. Holyan, J. Husseman, M. Lucid, B. Thomas. 2010. Wolf conservation and management in Idaho; progress report 2009. Nez Perce Tribe Wolf Recovery Project, P.O. Box 365, Lapwai, Idaho; Idaho Department of Fish and Game, 600 South Walnut, Boise, Idaho. 67 pp.

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.

Peek, J. 2010. We are going to have to manage wolves. IDFG, St. Joe Bugle. Edition 14, April 2010: 2-6.

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. 2009. Congenital bone deformities and the inbred wolves of Isle Royale. *Biological Conservation* 142: 1025-1031.
- Randi, E. 2010 Wolves in the Great Lakes region: a phylogeographic puzzle. *Molecular Ecology* 19:4386-4388.**
- Rich, L.N. 2010. An assessment of territory size and the use of hunter surveys for monitoring wolves in Montana. MS Thesis. University of Montana, Missoula, MT. 80pp.**
- Riley, S. J., G. M. Nessler, 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., Beschta R.L. 2004. Wolves, elk, willows, and trophic cascades in the upper Gallatin Range of Southwestern Montana, USA. *Forest Ecology and Management* 200:755-766.
- Ripple W.J., Beschta R.L. 2005. Willow thickets protect young aspen from elk browsing after wolf reintroduction. *Western North American Naturalist*. 65:118-122.
- Ripple W.J., Beschta R.L. 2006. Linking Wolves to willows via risk sensitive foraging by ungulates in the northern Yellowstone ecosystem. *Forest Ecology and Management*. 230, 96-106.
- Ripple, W.J. and Beschta, R.L. 2007. Restoring Yellowstone's aspen with wolves. *Biological Conservation* 138: 514-519.
- Ripple, W.J. , Painter, L.E., Beschta, R.L., and Gates, C.C. 2011. Wolves, Elk, Bison, and Secondary Trophic Cascades in Yellowstone National Park. *Open Ecology Journal*. in press.**

- Robbins, J. 2004. Lessons from the WOLF. *Scientific American*. Vol. 290 (6): 76-81.
- Robinson, B. G., M. Hebblewhite, and E. Merrill. 2010. Are migrant and resident elk (*Cervus elaphus*) exposed to similar forage and predation risk on their sympatric winter range? *Oecologia* 164: 265-275.**
- Robinson, H., L. Bradley, M. Mitchell, E. Bangs, C. Sime, and J. Jimenez. 2011. Efficacy of partial and full pack removal in reducing recurrence of wolf depredation on Livestock. *J. Wildlife Management*. In prep.**
- Robichard, C. and M.S. Boyce. 2009. Wolf control to protect Woodland Caribou. *Alberta Outdoorsmen*. 11(1):26-27.**
- Robichaud, C. B., and M. S. Boyce. 2010. Spatial and temporal patterns of wolf harvest on registered traplines in Alberta, Canada. *Journal of Wildlife Management* 74:635-643.
- Russell D. 2010. DRAFT. A review of wolf management programs in Alaska, Yukon, British Columbia, Alberta and Northwest Territories for Department of Environment, Government of Yukon. Shawdow Lake Environmental consulting. 55 pp.**
- 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.
- Sand, H., P. Wabakken, B. Zimmermann, O. Johansson, H.C. Pedersen, and O. Liberg. 2008. Summer kill rates and predation pattern in a wolf-moose system: can we rely on winter estimates? *Oecologia*, 156: 53-64
- 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.A., A. Treves, and P. Callahan. 2003. Nonlethal techniques for managing predation: primary and secondary repellents. *Conservation Biology* 17: 1531-1538.
- Sime, Carolyn A., V. Asher, L. Bradley, K. Laudon, M. Ross, J. Trapp, and L. Handegard. 2006. Montana gray wolf conservation and management 2005 annual report. Montana Fish, Wildlife & Parks. Helena, Montana. 95pp.**

- Sime, C.A., V. Asher, L. Bradley, K. Laudon, M. Ross, J. Trapp, M. Atkinson, L. Handegard, and J. Steuber. 2007. Montana gray wolf conservation and management 2006 annual report. Montana Fish, Wildlife & Parks. Helena, Montana 173 pp.**
- 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., V. Asher, L. Bradley, K. Laudon, M. Ross, and J. Steuber. 2008. Montana gray wolf conservation and management 2007 annual report. Montana Fish, Wildlife & Parks. Helena, Montana 173 pp.**
- Sime, C.A., V. Asher, L. Bradley, K. Laudon, N. Lance, M. Ross, and J. Steuber. 2009. Montana gray wolf conservation and management 2008 annual report. Montana Fish, Wildlife & Parks. Helena, Montana 173 pp.**
- Sime, C.A., V. Asher, L. Bradley, K. Laudon, N. Lance, M. Ross, and J. Steuber. 2010. Montana gray wolf conservation and management 2009 annual report. Montana Fish, Wildlife & Parks. Helena, Montana. 173 pp.**
- Smith, B.L., 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. Transactions of the 72nd North American Wildlife and Natural Resources Conference: 391-401.
- 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.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. 2009. Reintroduction of wolves to Yellowstone National Park: History, values and ecosystem restoration. Pages 92-125 in M. Hayward and M. Somers, editors. Reintroduction of Top-order Predators. Blackwell Scientific. 459pp.
- 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., E.E. Bangs, J.K. Oakleaf, C. Mack, J. Fontaine, D. Boyd, M. Jimenez, D.H. Pletscher, C.C. Niemeyer, T.J. Meier, D.R. Stahler, J. Holyan, V.J. Asher, D. Murray. 2010. Survival of colonizing wolves in the northern Rocky Mountains of the United States, 1982-2004. *Journal of Wildlife Management* 74:620-634.**
- Sommers, A.P., C.C. Price, C.D. Urbigket, and E.M. Peterson. 2010. Quantifying Economic Impacts of Large-Carnivore Depredation on Bovine Calves. *J. Wildl. Manage.* 74:1425-1434.**
- 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.
- Stenglein, J.L., L.P. Waits, D.E. Ausband, P. Zager, and C.M. Mack. 2010. Efficient noninvasive genetic sampling for monitoring reintroduced wolves. *Journal of Wildlife Management* 74:1050-1058.**
- Stenglein, J.L., M. De Barba, D.E. Ausband, and L.P. Waits. 2010. Impacts of sampling location within a faeces on DNA quality in two carnivore species. *Molecular Ecology Resources*. 10:109-114.**

Stenglein J.L., L.P. Waits, D.E. Ausband, P. Zager, and C. Mack. In Press. Estimating gray wolf pack size and family relationships from DNA obtained from scat and hair collected at predicted rendezvous sites. Journal of Mammalogy.

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.

Stronen, A.V., G.J. Forbes, T. Sallows, G. Goulet, M. Musiani, and P. Paquet. 2010. Wolf body mass, skull morphology and mitochondrial DNA haplotypes in the Riding Mountain National Park region of Manitoba, Canada. Can. J. Zool. 88:496-507.

Treves, A. 2009. Hunting for large carnivore conservation. *J. Applied Ecology* 46:1350-1356.

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. MS. Thesis. University of Alberta, Edmonton, AB. 158pp.

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.

Trapp, Jon R., Paul Beier, Curt Mack, David R. Parsons, and Paul C. Paquet. 2008. Wolf, *Canis lupus*, den site selection in the Rocky Mountains. Canadian Field-Naturalist 122(1): 49-56.

USDA/APHIS/Idaho Wildlife Services. 2003. Wolf Activity Report, Fiscal Year 2002. USDA/APHIS/Wildlife Services, 9134 West Blackeagle Drive, Boise ID 83709. 13pp.

USDA./APHIS/Idaho Wildlife Services. 2004. Wolf Activity Report, Fiscal Year 2003. USDA/APHIS/Wildlife Services, 9134 West Blackeagle Drive, Boise ID 83709. 15pp.

USDA./APHIS/Idaho Wildlife Services. 2005. Wolf Activity Report, Fiscal Year 2004. USDA/APHIS/Wildlife Services, 9134 West Blackeagle Drive, Boise ID 83709. 14pp.

USDA./APHIS/Idaho Wildlife Services. 2006. Wolf Activity Report, Fiscal Year 2005. USDA/APHIS/Wildlife Services, 9134 West Blackeagle Drive, Boise ID 83709. 14pp.

- USDA./APHIS/Idaho Wildlife Services. 2007. Wolf Activity Report, Fiscal Year 2006.
USDA/APHIS/Wildlife Services, 9134 West Blackeagle Drive, Boise ID 83709. 14pp.
- USDA./APHIS/Idaho Wildlife Services. 2008. Wolf Activity Report, Fiscal Year 2007.
USDA/APHIS/Wildlife Services, 9134 West Blackeagle Drive, Boise ID 83709. 14pp.
- USDA/APHIS/Idaho Wildlife Services. 2009. Wolf Activity Report, Fiscal Year 2008.
USDA/APHIS/Wildlife Services, 9134 West Blackeagle Drive, Boise ID 83709. 14pp.
- USDA/APHIS/Idaho Wildlife Services. 2010. Wolf Activity Report, Fiscal Year 2009.
USDA/APHIS/Wildlife Services, 9134 West Blackeagle Drive, Boise ID 83709. 16pp.
- 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. April 2, 2009. Endangered and Threatened Wildlife and Plants; Final Rule to identify the northern Rocky Mountain Distinct Population of the gray wolf as a distinct population segment and to revise the list of Endangered and Threatened Wildlife. Federal Register 74: 15123-15188.

- 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>
- U.S. Fish and Wildlife Service, Nez Perce Tribe, National Park Service, Montana Fish, Wildlife & Parks, Idaho Fish and Game, and USDA Wildlife Services. 2009. Rocky Mountain Wolf Recovery 2008 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. 2010. Rocky Mountain Wolf Recovery 2009 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.M., D.R. Stahler, D.W. Smith, D.A. Earl, J.P. Pollinger, R.K. Wayne The genealogy and genetic viability of reintroduced Yellowstone grey wolves. *Molecular Ecology*, 17(1), 252-274.
- vonHoldt, B. M., D.R. Stahler, E. E. Bangs, J. P. Pollinger, D.W. Smith, M.D. Jimenez, C. M. Mack, C. C. Niemeyer, and R. K. Wayne. 2010. Genetic analysis of population structure and migration in a recovering endangered species. *Molecular Ecology* 4412-4427.**
- Vors, L. S., and M. S. Boyce. 2009. Global declines of caribou and reindeer. *Global Change Biology* 15:2626–2633.
- Vors, L. S., and M. S. Boyce. 2009. Severe population declines for caribou. *Alberta Outdoorsmen* 11(7):10–12.
- 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.
- Wayne, R. and P. Hedrick. 2010. Genetics and wolf conservation in the American West: lessons and challenges. *Heredity* XX: 1-4pp.**
- Webb, N., Hebblewhite, M., and Merrill. 2008. Statistical methods for identifying wolf kill sites from GPS locations. *Journal of Wildlife Management* 72, 798-806.
- Webb, S. M., D. J. Davidson, and M. S. Boyce. 2008. Trapper attitudes and industrial development on registered traplines in west-central Alberta. *Human Dimensions of Wildlife* 13: 115-126
- Webb, N. 2009. Density, demography, and functional response of a harvested wolf population in west-central Alberta, Canada. PhD thesis, University of Alberta, Edmonton, Canada.
- Weckworth, B.V., S.L. Talbot, and J.A. Cook. 2010. Phylogeography of wolves (*Canis lupus*) in the Pacific Northwest. *J. Mammalogy* 91:712-721.**
- Wheeldon, T.J., B. R. Patterson & B. N. White. 2010. Sympatric wolf and coyote populations of the western Great Lakes region are reproductively isolated. *Molecular ecology* 19: 4428-4440.**
- Wilson, R. S., and J. T. Bruskotter. 2009. Assessing the Impact of Decision Frame and Existing Attitudes on Support for Wolf Restoration in the United States. *Human Dimensions of Wildlife* 14:353-365.**

- 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 Science* 13(1):34-41.
- White, P. J., L. D. Mech, S. B. Evans, and C. Geremia. 2010. Migratory behavior of northern Yellowstone Elk. *J.Mammalogy* 91(4): 827-837.**
- 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., 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.
- Wirsing, A. J. and Ripple, W.J. 2011. Cross-pollination of shark and wolf research reveals similar behavioral responses by prey. *Frontiers in Ecology and Environment*. In press.**

- 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. 2005. 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.