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Rocky Mountain Wolf Recovery 2003 Annual Report

*A cooperative effort by U.S. Fish and Wildlife Service, Nez Perce Tribe,
National Park Service, and USDA Wildlife Services. T. Meier, editor.*



NPS photo by D. Smith

This cooperative annual report presents information on the status, distribution and management of the recovering Rocky Mountain wolf population from January 1, 2003 through December 31, 2003. It is also available at <http://westerngraywolf.fws.gov/annualreports.htm>

This report may be copied and distributed as needed.

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SUMMARY

Wolves (*Canis lupus*) in the Northern Rocky Mountain states (Idaho, Montana and Wyoming) continue to increase in distribution and numbers (Figures 1, 5). Estimates of wolf numbers at the end of 2003 were 368 wolves in the Central Idaho Recovery Area, 301 in the Greater Yellowstone Recovery Area, and 92 in the Northwest Montana Recovery Area for a total of 761 (Figure 1, Table 4a). By state boundaries, there were an estimated 345 wolves in the state of Idaho, 234 in Wyoming and 182 in Montana (Table 4b). Of approximately 94 groups of two or more wolves, 51 met the definition of “breeding pair,” an adult male and female raising two or more pups until December 31. This made 2003 the fourth year in which 30 or more breeding pairs were documented within the three-state area. Recovery criteria have been met for removing Northern Rockies wolves from the Endangered Species List (Table 4a). In Fall 2003, Montana finished its state wolf management plan and the U. S. Fish and Wildlife Service (USFWS) sent the completed state wolf management plans of Montana, Idaho, and Wyoming out for independent scientific peer review. The process to determine whether USFWS can proceed with a delisting proposal in 2004 is ongoing.

Wolves in the area subsist mainly on elk (*Cervus elaphus*), white-tailed deer (*Odocoileus virginianus*), mule deer (*Odocoileus hemionus*), moose (*Alces alces*), and bison (*Bison bison*). Livestock depredations in 2003 included 64 cattle (*Bos taurus*), 211 sheep (*Ovis aries*), six dogs (*Canis familiaris*) and ten goats (*Capra hircus*) confirmed lost to wolves (Table 5a, 5b). Approximately 31 of 94 known wolf packs were involved in livestock depredations. In response, 59 wolves were killed within the 3-state area. No wolves were translocated in 2003. As new packs are formed between the original core recovery/release areas, the three populations increasingly resemble and function as a single, large population (Figure 1). Numerous research projects are underway, examining wolf population dynamics, predator-prey interactions and livestock depredation.

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. 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 six wolf packs in northwestern Montana. In 1995 and 1996, 66 wolves from southwestern Canada were reintroduced to Yellowstone National Park (YNP) (31 wolves) and central Idaho (35 wolves).

The Northern Rocky Mountain (NRM) wolf population contains three recovery areas: The Northwest Montana recovery area (NWMT, Figs. 1, 2) includes northern Montana and the northern Idaho panhandle. The Greater Yellowstone recovery area (GYA, figs. 1, 3) includes Wyoming and adjacent parts of Idaho and Montana. The Central Idaho recovery area (CID, Figs. 1, 4) includes central Idaho and adjacent parts of southwest Montana. Wolves in the three recovery areas are managed under different guidelines, depending upon their designated status under the ESA. In 2003, NWMT wolves were reclassified from endangered, the most protected

classification under the ESA, to threatened, a less restrictive classification. GYA and CID wolves are classified as nonessential experimental populations and managed with more flexible options than an endangered population. With the reclassification of NWMT wolves, all three populations are managed under very similar guidelines. The USFWS, responsible for administering the ESA, believes that 30 or more breeding pairs of wolves, with an equitable distribution among the three states for three successive years, would constitute a viable and recovered wolf population. That criterion was met at the end of 2002. If other provisions required for delisting are met, primarily adequate regulatory mechanisms in the form of state wolf management plans that would reasonably assure that the gray wolf would not become threatened or endangered again, the USFWS will propose delisting (removal from protection under the ESA).

NORTHWEST MONTANA WOLF RECOVERY AREA

Personnel

Wolves in Montana (including the NWMT recovery area and parts of the GYA and CID recovery areas) were monitored in 2003 by USFWS biologists Joe Fontaine in Helena and Tom Meier in Kalispell, and Turner Endangered Species Fund (TESF) biologist Val Asher in Bozeman. They were assisted by Mike Ross of Montana Fish, Wildlife & Parks (FWP), Paul Frame (seasonal USFWS employee) and Therese Hartman (USFWS volunteer). Other USFWS personnel in Montana included wolf recovery coordinator Ed Bangs (Helena), and law enforcement agents Roger Parker (Agent-In-Charge, Billings), Rick Branzell (Special Agent, Missoula), and Doug Goessman (Special Agent, Bozeman). In the parts of Montana that lie within the GYA and CID recovery areas, wolves were monitored cooperatively with the National Park Service (NPS) and Nez Perce Tribe (NPT) respectively. Many other individuals, organizations and agencies contribute toward wolf monitoring and management (see *Acknowledgments*).

Wolf control activities in all recovery areas were carried out by USDA/APHIS/Wildlife Services (WS). WS personnel involved in wolf management in Montana in 2002 included state director Larry Handegard, eastern district supervisor Paul J. Hoover, western district supervisor Kraig Glazier, wildlife specialists Dennis Biggs, John Bouchard, Steve Demers, Michael Hoggan, Chad Hoover, R.R. Martin, Graeme McDougal, Theodore North, James Rost, Bart Smith, and James Stevens, and pilots Stan Colton, Tim Graff and Eric Waldorf. The Montana WS operation covers parts of the NWMT, GYA, and CID wolf recovery areas.

Monitoring

Eight wolves were captured and radio-collared in NWMT in 2003. Seven were caught in USFWS trapping efforts, and one was caught by a fur trapper and collared by USFWS. At the end of 2003, 15 radio-collared wolves (16 % of the population) from 10 different packs or pairs were being monitored in NWMT. These packs, together with uncollared packs that have been documented, totaled about 92 wolves (Figs 1, 2; Tables 1a, 4a). Radio-collared wolves were

located from aircraft approximately twice per month. Collared wolves in and around Glacier National Park (GNP) were located more frequently from the ground by GNP staff.

Packs included in NWMT as of December 2003 were Kintla, Murphy Lake, Ninemile, Castle Rock, Whitefish, Spotted Bear, Great Bear, Fishtrap, Red Shale, Fish Creek, Candy Mountain, Lonesome, Lazy Creek, Hog Heaven, Great Divide, Blanchard Creek, Chief Mountain and Holland Lake. The Lupine Pack began restricting its activities to Idaho and is now counted in the Central Idaho population. The last remaining member of the Yaak "pack," a partial family of wolves translocated from SW Montana to the Yaak area in 2001, was apparently killed in 2003. A new pair of wolves, the Candy Mountain Pair, has been identified and radio-collared in the Yaak valley. Other new pairs or packs have been identified in the Middle Fork of the Flathead River (Great Bear Pair), and the Swan Valley (Holland Lake Pack). The Halfway Pack was virtually eliminated in control actions early in the year, and only one wolf is known to remain in the area. Sightings from the Green Mountain area (near Noxon) also suggest that only a single wolf remains there. There have been no recent reports of wolves in the Potomac and Ural areas, and those packs are no longer counted. The Grave Creek Pack seemed to disappear in 2003, with the few reports of wolves in fall 2003 probably coming from the Murphy Lake and Wigwam Packs' forays into the former Grave Creek territory. Packs of wolves in the Yaak, Kootenai, Wigwam, Spruce Creek and Belly River drainages of Canada may stray into Montana, but den and spend most of their time in Canada and are not counted in the NWMT population. The Murphy Lake and Kintla Packs spend a significant part of their time in British Columbia, but are considered part of the NWMT population. Along the border between the NWMT and CID recovery areas, the Fish Creek Pack is counted in the NWMT population, while the Bighole and Lupine Packs are counted in the CID population.

Reproduction was confirmed in the Whitefish, Spotted Bear, Fishtrap, Lazy Creek, and Hog Heaven Packs. Several packs that had bred in previous years, including the Red Shale, Murphy Lake, Kintla and Fish Creek Packs, did not localize at a den, but moved widely throughout the summer, outside even their normal winter territories. The Castle Rock, Halfway, and Ninemile Packs were probably too severely affected by lethal control actions to breed in 2003. For two packs, Grave Creek and Green Mountain, there was no evidence that they even existed in 2003. In order to count as a breeding pair toward recovery goals, an adult male and female and at least two pups must be present in the pack at year's end. The Spotted Bear Pack was thought to have had only one pup in 2003. The remaining four packs were counted as breeding pairs. Track observations in the Chief Mountain area suggest that a pack of wolves there may have grown from five to eight wolves, and thus may have reproduced in 2003, but too little is known about their numbers or territory to count them as a breeding pair.

At least 21 wolves from the NWMT population died in 2002. All known mortalities were human-caused, with 14 wolves being killed by depredation control (one by a rancher, 13 by WS), four by vehicle strikes, and two by illegal shooting. The collar of Yaak wolf 230 was found in the Yaak River, and she is also believed to have been illegally killed. Two wolves that dispersed away from NWMT packs (Whitefish male 260 and Grave Creek female 257) were legally killed in Alberta and British Columbia, respectively. Four radio collars, on breeding wolves from the Spotted Bear, Murphy Lake, and Grave Creek Packs, were thought to have failed in 2003. One wolf, a yearling female from the Red Shale Pack, slipped her collar. Two

wolves dispersed within the recovery area, Whitefish male 263 to the Kintla Pack and Spotted Bear female 271 to the new Great Bear Pair. Two other wolves, Ninemile female 268 and Yaak male 232, are missing and may have dispersed or been killed.

Research

Assessing management and factors related to wolf depredation on livestock in Montana, Idaho, and Wyoming

Investigators: Elizabeth H. Bradley and Daniel H. Pletscher, Wildlife Biology Program, Department of Ecosystem and Conservation Sciences, University of Montana, Missoula.
Cooperators: USFWS, Turner Endangered Species Fund, Yellowstone National Park, Nez Perce Tribe, Defenders of Wildlife, National Fish and Wildlife Foundation

Effects of wolf removal on livestock depredation in Montana, Idaho, and Wyoming. Elizabeth H. Bradley, Daniel H. Pletscher, Edward E. Bangs, Kyran E. Kunkel, Douglas W. Smith, Curt M. Mack, Joseph A. Fontaine, Carter C. Niemeyer, Thomas J. Meier, and Michael D. Jimenez

Abstract: Methods used to mitigate wolf predation on livestock in Montana, Idaho, and Wyoming have largely consisted of removing individuals from depredating packs, either by lethal or non-lethal (translocation) means. We examined the effects of partial and complete removal of wolf packs on the persistence of livestock depredations. From 1987-2002, an average of 30% of all packs with livestock in their territory (22% of all packs with or without livestock) were confirmed to have depredated per year; of these, 63% underwent removal of ≥ 1 individual. Most packs (68%) depredated again within a year of undergoing partial pack removal, though intervals between livestock depredations increased by an average of 270 days after removal actions. Removing alpha individuals appeared no more effective than removing non-alphas in reducing depredations within the year. Packs that underwent partial removal contributed similar numbers of breeding pairs (defined as an adult male and female raising ≥ 2 pups through 31 December) toward recovery goals as depredating packs that did not undergo removal, but fewer breeding pairs than non-depredating packs. Rate of recolonization of territories where entire packs were removed ($n = 10$) was high (70%) and most recolonizations (86%) occurred within a year of the previous pack's removal. Most recolonized packs depredated (86%); intervals between the last depredation of the removed pack and first depredation of the recolonized pack averaged 276 days. All depredations involved ≥ 1 previously affected livestock producer. We suggest that chronic depredations result more from factors inherent in locality than from individual pack behavior. Our findings may be useful for managers seeking to balance objectives of wolf recovery and depredation mitigation.

Evaluating wolf translocation as a non-lethal method to reduce livestock conflicts in the northwestern United States. Elizabeth H. Bradley, Daniel H. Pletscher, Edward E. Bangs, Kyran E. Kunkel, Douglas W. Smith, Curt M. Mack, Thomas J. Meier, Joseph A. Fontaine, Carter C. Niemeyer, and Michael D. Jimenez.

Abstract: Translocation of carnivores that depredate livestock is commonly used as a non-lethal method to mitigate conflicts, especially when conservation of rare or endangered individuals is

of interest. In the northwestern United States, wolves have sometimes been translocated with the objective of non-lethally reducing livestock conflicts while promoting wolf recovery. We assessed survival, depredation behavior, establishment, and movements of wolves post-translocation to determine the effectiveness of translocation in our region and to consider how it may be improved. We found that translocated wolves had lower annual survival (0.6) than other radio-collared wolves (0.73) with government control composing the largest source of mortality. Survival of translocated wolves was lowest in northwest Montana (0.41), where most of the wolf population has settled outside of protected areas. Over one-quarter of translocated individuals and cohesive groups depredated again after release and few established or joined a non-depredating pack that contributed to recovery goals for ≥ 1 year. Translocated wolves showed a strong homing trend; those that failed to home still showed directional movement back toward capture sites. Wolves that successfully homed were more likely to be adults, hard-released rather than soft-released, and moved shorter distances than other wolves. We conclude that translocation was ineffective at meeting management objectives in that few relocated wolves significantly contributed to recovery and failed to depredate again. We suggest managers choosing to translocate wolves or other applicable carnivores consider soft-releasing individuals (preferably in family groups, if social) when feasible as this may decrease wide post-release movements and homing behavior. When selecting release sites, we recommend that the adequacy of habitat between the capture and release sites be considered.

Assessing factors related to wolf depredation of cattle ranches in Montana and Idaho. Elizabeth H. Bradley, and Daniel H. Pletscher.

Preliminary Results: Managing wolf depredation on livestock is expensive and controversial. Therefore, managers seek to improve and develop new methods to mitigate conflicts. Determining what factors put ranches at higher risk to wolf depredation will help improve knowledge that could benefit management decisions. We sampled cattle ranches in Montana and Idaho that had experienced confirmed wolf depredations in confined pastures and compared landscape and husbandry factors with nearby matched non-depredated ranches. We found that depredated ranches had a higher presence of elk, were larger in size, had more cattle, and grazed cattle further from residences than non-depredated ranches. Classification tree analysis revealed that higher vegetation cover was also associated with depredated ranches in combination with other variables. We found no relationship between depredated ranches and husbandry practices (carcass disposal, calving locations, calving times), breed of cattle, or the closest distance cattle were grazed from the forest edge. Four of six ranches that experienced depredations during the wolf denning season (April 15 – June 15) were located closer to dens than nearby non-depredated ranches.

Outreach

Program personnel presented informational talks and status reports throughout the year to various federal and state agencies, public and private institutions, special interest groups, and rural communities. During 2003, USFWS project personnel gave approximately 35 public presentations to audiences totaling more than 2000 people. Additionally, scores of informal presentations to small groups or individuals were conducted during this time. Numerous radio

and television interviews and news spots featuring project personnel were broadcast locally and nationally.

Livestock Depredation and Management

With the reclassification of wolves in NWMT from endangered to threatened in April of 2003, the rules governing wolf management across the Northern Rocky Mountain States became nearly uniform across the three recovery areas. In NWMT, the use of nonlethal ammunition (by permit) and hazing by private citizens is now allowed, and livestock owners may legally kill wolves caught in the act of attacking livestock on private lands. In chronic depredation situations, livestock owners may obtain permits to shoot wolves on sight, on public or private lands. Although some feared that liberalized rules would result in excessive lethal control of wolves in NWMT, in fact no wolves have been killed in depredation control activities since reclassification took effect.

All reports of wolf depredation on livestock are investigated by WS, who implement control after consultation with USFWS. Six of the 21 known wolf packs in NWMT were involved in livestock depredations in 2003. Confirmed losses in 2003 included six cattle and three sheep killed by wolves. Another four cattle were classified as probable wolf kills. Other damage attributed to wolves included the escape of 11 bison from a pasture near Trout Creek, and the chasing of sheep in the same area. In wooded and/or mountainous country, livestock carcasses may not be found promptly, if ever. It can be difficult or impossible to confirm wolf depredation when livestock carcasses are eaten or decomposed. Therefore, confirmed losses represent only a portion of actual losses. Whether this is a large or small portion of such losses is the subject of much controversy and research. Depredation control efforts in NWMT resulted in the death of 14 wolves. Nonlethal control methods included trapping and hazing of packs to move them away from livestock, nonlethal ammunition, fladry, guard animals and Radio Activated Guard (RAG) boxes.

Ninemile Pack: The Ninemile Pack had repeatedly killed livestock in recent years, and continued to do so in 2003, with confirmed losses of three sheep and the possible killing of six goats. One wolf, collared male 6468, was shot by WS on April 6. Three wolves were seen in the area later in the summer, and no further depredations have occurred.

Castle Rock Pack and Halfway Pack: The long-lived Castle Rock (formerly Boulder) Pack and the newer Halfway Pack, both located in the Avon area, were involved in chronic depredations in 2002 and early 2003. On January 28, a bull was confirmed killed by the Castle Rock Pack, and the rancher shot one wolf at the carcass. The next day, an adult cow was confirmed killed by the Halfway Pack. Twelve wolves were killed in the area by WS in February and March. Movement of wolves between the two packs prevented an exact identification of their pack status, but it was thought that seven of the wolves killed were from the Castle Rock Pack, and five from the Halfway Pack. In addition, one Halfway Pack pup was killed by a vehicle in February and an adult male wolf was illegally shot in the Halfway Pack territory in November.

In spite of these losses, there were still estimated to be four wolves in the Castle Rock Pack and one in the Halfway Pack at the end of 2003.

Murphy Lake Pack: The Murphy Lake wolves did not den in 2003, but moved widely outside of their historic territory, spending a great deal of time in the Pleasant Valley area, well south of where they had been found previously. In the summer, one calf was confirmed killed by the pack in Pleasant Valley, and another calf was probably killed by the pack, though the carcass was lost before it could be examined. The Murphy Lake Pack is the fourth pack of wolves to kill livestock in the Pleasant Valley area. Previously, the Marion, Pleasant Valley, and Little Wolf Packs were all removed in response to depredations there. The Murphy Lake Pack left the area, traveling as far north as the Elk River in British Columbia, so no control action was taken.

Lonepine Pack: Two cows, on separate ranches, were confirmed killed by wolves west of Ronan in January 2003. The hills between Ronan and Hot Springs were searched by aircraft in hopes of finding and collaring the three wolves thought to live there, but they were not found. Reports of wolves in the area continued into fall 2003. The area lies within the Confederated Salish-Kootenay (CSKT) Reservation, and USFWS, WS, and CSKT personnel cooperate on wolf monitoring and depredation investigations.

Hog Heaven Pack: One calf was confirmed killed by wolves north of Niarada in May 2003. The depredation was discovered when USFWS personnel radio-tracked the Hog Heaven Pack. This depredation also occurred on CSKT lands. The rancher was given telemetry equipment, and monitoring of the pack was intensified, but no control was carried out because the pack had not depredated previously. The area represents the southern edge of the Hog Heaven Pack territory, and they appeared to stay farther north, and to avoid killing livestock, for the remainder of the year.

GREATER YELLOWSTONE WOLF RECOVERY AREA

Personnel

Three full-time employees worked for the Yellowstone Wolf Project in 2003: Project Leader Douglas Smith, Biological Science Technician Debra Guernsey and Biologist Dan Stahler. Rick McIntyre worked as a seasonal employee on the Druid Peak Pack Road Management Project. Elena West also worked on the Road Management Project, through the Yellowstone Park Foundation (YPF). Matt Metz worked the summer months and in October and November, and Janice Stroud worked October and November as a biological technician through YPF. Other Volunteers (see *Acknowledgments*) staffed the two early (Nov-Dec) and late (March) winter study periods.

Wolves in Wyoming outside Yellowstone National Park (YNP) were monitored by Project Leader Mike Jimenez (USFWS), seasonal biologist John Stephenson (USFS), and volunteers Keysha Fontaine, Tom Dempsey, Stacy Biebel, Nancy Nolan, and Nancy Bockino. USFWS law enforcement agents in Wyoming were Dominic Domenici (Agent-In-Charge, Casper), Tim Eicher (Special Agent, Cody), and Roy Brown (Special Agent, Lander).

Wyoming employees of Wildlife Services who were involved with wolf control or management in 2003 included state director Rod Krischke, district supervisors Sam Crowe and Merrill Nelson, specialists Marshall Robin, Jack Clucas, Arnold DeBock, Casey Hunter, Michael Peterson, Jed Edwards, Rod Merrell, William Ross, Tracy Frye, Stephen Moyles, James Peringer, and pilot Ted Jensen.

Monitoring of wolves in the Montana portion of the GYA was conducted by Joe Fontaine (USFWS), Val Asher (TESF), and Mike Ross (FWP), along with other TESF, USFWS, FWP, WS, and NPS personnel and volunteers.

Monitoring

Yellowstone National Park

Population status: At the end of December 2003, at least 174 wolves in 14 packs occupied Yellowstone National Park. This represents a population increase of about 17% from 2002, when 148 wolves in 14 packs lived in the park. Thirteen packs counted toward the breeding pair objective for the Yellowstone Recovery Area. One more pack that was present in May 2003 (Buffalo Fork Pack), but lost its only radio-collared wolf (#105F), is of unknown status but held at least 4 wolves and denned in spring 2003. Field work in the area where they resided revealed tracks, but it could not be determined if the tracks were from the remnant Buffalo Fork Pack, or the neighboring Rose Creek Pack.

Eight of these packs (96 wolves) reside on the northern range and seven packs (78 wolves) live throughout the rest of the park. Pack sizes ranged from 5 (Gibbon group) to 20 (Swan Lake Pack) and averaged 11.3. Pack size was not significantly different between the northern range and the rest of the park.

One new pack formed and one was lost in 2003. The Gibbon group formed late in 2003, probably from wolves dispersing out of the Nez Perce and Cougar Creek Packs, and was not considered a breeding pair. The Tower Pack was lost when male #208 died from natural causes (exact cause is unknown). The pack had consisted of two individuals and the fate of his uncollared mate is unknown.

With only one new pack, wolf distribution and movements in 2003 were largely the same as in 2002. Most packs on the northern range showed typical movements: low elevation in winter and for denning and high elevation for foraging in summer. Wolf packs elsewhere in the park (packs that do not live on the northern range), except for the Cougar Creek Pack, made extraterritorial forays outside the park in search of prey. The Nez Perce Pack, for example, visited the National Elk Refuge in January, and the Yellowstone Delta Pack spent significant periods of time in the Teton Wilderness. Mollie's Pack moved for short periods of time into the North Fork of the Shoshone River. The Bechler Pack used Targhee National forest and the Bechler area through the winter. They were probably able to use this deep-snow area of the park

because it was a mild winter. We do not expect this pattern of use to continue when more normal winters for that area return.

Reproduction: At least 75 pups were born and 59 survived in 15 wolf packs in 2003. At least 16 and possibly 17 total litters were born; the Druid Peak Pack had at least two and possibly three litters of pups. The number of pups born per pack averaged 5 and ranged from 2 to 13 (at least 2 litters). Pup survival varied by pack. The Geode Creek Pack had eight pups but only two survived to fall, while the Leopold Pack's eight pups all survived. Other packs with good pup survival were Druid Peak, Slough Creek, Swan Lake and Yellowstone Delta. Other packs with poor survival were 302's group (gone at the end of 2003) and Agate Creek. The remaining packs either had moderate or unknown levels of pup survival.

Twelve wolf dens were visited in summer 2003 to measure den characteristics and collect scats for summer food habit studies. Among packs that were not denning for the first time, seven (64%) of 11 packs re-used old densites.

Mortalities: Fifteen wolves (12 adults and three pups) were known to have died in YNP during 2003. Seven were females, six were males and two were of unknown sex (partially decayed pups that could not be sexed). All the wolves that died within YNP died from natural causes.

A prey-caused death was observed in Pelican Valley in March. A battle with a bull bison killed one of Mollie's Pack wolves, and injured two others. The bison kicked one wolf, throwing it 10-15 m in the air, and hooked another with its horn, also launching the wolf airborne for several meters. The wolves eventually killed the bison, taking all of one day to do it.

One wolf from the Agate Creek Pack died from apparent disease. Although we were able to retrieve the carcass from the field the day after discovering the mortality, disease analysis on the carcass was inconclusive because of slight decay of the tissues. Disease experts at Montana Fish, Wildlife & Parks lab in Bozeman, Montana had excluded other causes of death and other evidence from the necropsy was suggestive of death due to unknown disease. Prior to necropsy in Bozeman, a field trip of visiting veterinarians inspected the carcass externally, and also corroborated a disease cause of death, based on bleeding from the anus and mouth.

Mange (*Sarcoptes scabiei*), an infestation of a mite that burrows under the animal's skin leading to hair loss, has been reported for wolves living around YNP. Wolves both east, west, and north of YNP have been documented with mange. Mange in wolves has not been documented within YNP.

Survival: A park-led effort to determine annual survival of wolves in all three recovery areas of the northern Rocky Mountains is nearing completion. Average annual survival for a radio-collared wolf in the Yellowstone ecosystem is 80%. Pups had the lowest annual survival rate at 74%, followed by adults (> 1 year old) at 80%, and yearlings at 83%. Annual survival for males and females for all age classes was 81% and 78%, respectively. Since reintroduction in 1995, annual survival has ranged from a low of 62% in 1997 to a high of 90% in 1999.

Survival of wolves in the Idaho recovery area (79%) was approximately equal to the Yellowstone recovery area, whereas the northwest Montana recovery area had a significantly lower annual survival (56%).

Status of Original Reintroduced Wolves: Only two wolves from the original 31 reintroduced are still alive, both reintroduced in 1996. The last 1995 wolf to die was #2M on December 31, 2002. He was killed by wolves in the Geode Creek Pack after he lost his dominant (alpha) status in the Leopold Pack and was traveling alone or with a few other wolves between other wolf territories, always a risky lifestyle. He was eight years old when he died. Wolf #41F and #42F, both originally of the Druid Peak Pack, are the two wolves released in 1996 that are still alive. Number 41 dispersed from the park and lives in Sunlight Basin, Wyoming. Number 42 is alpha female of the famous Druid Peak Pack and is observed by thousands of adoring wolf watchers each year in Lamar Valley. She is also eight years of age. Formerly black, she is now completely gray.

Monitoring: Wyoming outside YNP

Population status: We combined three census techniques to estimate the total number of wolves in Wyoming outside YNP: 1) direct observations of wolves, 2) winter track counts of wolves traveling in snow, and 3) reports of repetitive wolf sightings from other agencies and the general public. We counted the number of wolves in known packs containing radio collared wolves using visual observations from the ground and aerial telemetry flights. We maintained 22 collars in nine packs (27 % of the population). Collared wolves were located, on average, twice a month by airplane and more often by ground crews. We tracked wolves in winter and counted the different sets of wolf tracks in snow. In packs where local residents repeatedly saw and counted wolves, we incorporated those observations into our estimates. We averaged the high and low population estimates to calculate other statistics used to describe the wolf population in Wyoming.

We estimated that at least 76-88 wolves inhabited western Wyoming outside YNP in 2003. Eight packs, totaling 63-70 wolves, produced pups. Pack size ranged from 3 to 17 and averaged 9.1 wolves. Another 13-18 wolves were located in five new groups that did not produce pups. In 2003, the wolf population increased 19% from 2002 levels (from 69 to 82 wolves).

Established Packs:

Washakie Pack – The Washakie Pack was one of the earliest packs to form outside of YNP in 1998. The pack's home range includes the Dunoir Valley near the town of Dubois, Wyoming. The Washakie Pack has consistently produced pups over the years. In 2003, the pack consisted of 8-9 wolves (4-5 adults, 4-5 pups).

Teton Pack – The Teton Pack first denned in Grand Teton National Park in 1999. Pack size has ranged from 2 to 23 wolves. In 2001 and 2002, the pack produced double litters totaling 9 and 11 pups respectively. In 2003, the pack consisted of 12-14 wolves (4-5 adults, 2-3 yearlings, 6

pups). Their traditional home range includes a small corner of Teton Park and the GrosVentre River drainage.

Green River Pack – In 1999, wolf #237f was born in the Gros Ventre Pack near Jackson, Wyoming. In 2001, she left the Gros Ventre drainage and paired with wolf #162m, which had dispersed from the Rose Creek Pack in YNP. The two wolves dened and produced pups in the upper Green River Basin in 2002. After killing at least eight cattle in summer 2003, the male wolf #162m was removed in a control action. Within three weeks, a new male wolf #267m from the Teton Pack joined the Green River Pack. Wolf #267m was also removed when the Green River Pack continued killing livestock. Again, within a few weeks, another male wolf #72m from the Nez Perce Pack in YNP joined the Green River Pack. In December 2003, the pack contained three wolves (two adults, one pup).

Daniel Pack – The Daniel Pack was first discovered in 2003 in the foothills of the Wyoming Range, near Daniel, Wyoming. In 2003, the pack contained 16-17 wolves, having produced a double litter of pups (4-6 adults, 11-12 pups). By December 2003, it appeared that the pack may be splitting into two different groups.

Greybull River Pack – In 2002, a male radio-collared wolf #B58 from central Idaho was trapped and re-collared in the Greybull River drainage near Meeteetse, Wyoming. Wolf B58 (now renumbered as wolf #274m) along with eight other wolves formed the Greybull River Pack. In fall of 2003, wolf #274m was found dead and the cause of death is still under investigation. In December 2003, the Greybull River Pack had 7-8 wolves (3-4 adults, 4-5 pups).

Absaroka Pack – In December 2003, we estimated that the Absaroka Pack contained 4-5 wolves (2-3 adults, 2-3 pups) despite a serious mange problem that appeared to be affecting the pack's survival. Two radio-collared wolves in the pack died from mange in 2003. Another radio-collared Absaroka wolf with mange was killed in a control action. The collar from the alpha female stopped functioning in summer 2003. One collar remained in the Absaroka Pack, but the young collared wolf may have dispersed. Due to numerous reports describing other Absaroka wolves appearing underweight and missing hair over large portions of their bodies, it is not certain if the Absaroka Pack will persist.

Sunlight Pack – Dispersing wolves #41f and #52m from YNP recolonized the Sunlight Basin area in 1999 to form the Sunlight Pack. The pack has consistently produced pups each year and contained eight wolves (five adults, three pups) in December 2003. Five Sunlight wolves were radio collared in winter 2003 and four of them had mange. Wolf #52 died of natural causes (other than mange) in November 2003.

Beartooth Pack – For the last three years, wolf # 77f from YNP and an uncollared male wolf produced pups in the Beartooth Pack. The pack's home range extends into the Absaroka Mountains south of the Wyoming/Montana border and east of YNP. In December 2003, the pack had 7-9 wolves (4-5 adults, 3-5 pups).

Carter Mountain Pack – Wolf #275m dispersed from the Greybull River Pack and paired with an adult female wolf (now number #359f). Both wolves were radio collared in December 2003 and reside in the Carter Mountain area between Cody and Meeteetse, Wyoming.

Gros Ventre Pack – The Gros Ventre Pack produced small litters in 1999 and 2000. However, after two adult Gros Ventre wolves were killed in control actions in summer 2000, the pack no longer produced pups. Over the last several years, the Gros Ventre Pack had only 2-3 wolves. Based on the lack of visual observations, winter track counts, and reported sightings, we concluded that the Gros Ventre Pack no longer existed after 2002.

Reproduction: Eight packs containing 63-70 wolves produced nine litters with at least 34 pups. Mean litter size was 4.1 pups. In 2002, six packs produced a minimum of 29 pups with a mean litter size of 4.8 pups. Breeding pairs counting toward wolf recovery goals are defined as one adult male and one adult female and at least two pups surviving to the end of the calendar year. Five of the eight packs producing pups in 2003 met this criteria: Washakie, Teton, Daniel, Absaroka, and Beartooth Packs. The Green River Pack did not count as a breeding pair because even though it whelped at least five pups, only one pup survived. Both the Greybull River and Sunlight Packs lost alpha males and therefore (at the time of this report) did not count as breeding packs. The Daniel Pack produced a double litter totaling 12 pups. However, two females breeding within the same pack were counted as a single breeding unit. In 2001 and 2002, the Teton Pack produced double litters totaling 9 and 11 pups respectively. In 2003, after one of the breeding females died of natural causes, the pack produced a single litter of 6 pups.

Mortalities: A total of 27 wolves were known to have died in Wyoming outside of YNP. Humans caused 85 % of all mortalities (control = 66 % [n = 18; 12 males and 6 females] and illegal killing or deaths under investigation = 19 % [n = 5; three males, one female, and one undetermined]). Natural causes accounted for 11 % of mortalities (n = 3; two males and one female) and unknown causes 4 % (n = 1; 1male). These mortalities did not include missing wolves whose fates were unknown, including pups that may have perished from unknown causes. Of the 46 pups seen around den or rendezvous sites, 34 pups survived until December 31, 2003, for a survival rate of 74 % to the age of eight months. This is only an estimate of maximum survival rate because pups are not usually seen until mid-summer, when some pup mortality has already occurred.

Population movement and dispersals in Wyoming: Wolves have dispersed south and east of YNP and recolonized new areas in western Wyoming. The former alpha male (wolf # 072m) of the Nez Perce Pack in YNP dispersed south to the Upper Green River drainage and paired with wolf #237f of the Green River Pack. Three dispersing wolves have been consistently seen in the Owl Creek drainage west of Meeteetse, Wyoming. One wolf (#318m) was radio collared in summer 2003. We will continue to monitor these wolves and determine if a pack actually forms in 2004.

Further east near the town of Ten Sleep, Wyoming, 2-3 dispersing wolves have been seen in the Big Horn Mountains. Wolves in Wyoming have also dispersed north back to YNP. Wolf #

276m was born in the Washakie Pack near Dubois, Wyoming and dispersed north to join the Delta Pack in YNP.

Several young wolves (including two radio collared wolves) from the Teton Pack dispersed south from their natal home range. Three Teton dispersers recolonized an area near Cora. Another 2-3 Teton wolves have remained near Big Piney. Neither of these groups of wolves produced pups in 2003.

Monitoring: Montana portion of GYA

Monitoring continued on twelve packs living partly or entirely within the Montana portion of the GYA: Sheep Mountain, Mill Creek, Lone Bear, Taylor Peak, Sentinel, Freezeout, Bear Trap, Mission/Moccasin, Whitehall, Red Lodge, Chief Joseph, and Rose Creek II. The Chief Joseph pack, though classified as a Yellowstone National Park pack, spends considerable time outside of the park and has expanded its home range into the Taylor Fork and Madison drainages. The Rose Creek II pack also travels outside of the Park into Montana. In 2003, 19 wolves were captured, of which 15 were radio-collared. One wolf was a recapture, one pup was ear-tagged and released, and two pups were euthanized due to emaciation and severe mange. Packs were monitored throughout the year by TESP, NPS, WS, FWP, MSU and USFWS personnel via radio telemetry, visual observation and snow tracking. Nine of the twelve known packs showed signs of denning activity but only five could be confirmed as breeding pairs by the end of 2003. Eight of the twelve packs were involved in confirmed depredations on livestock. Of the 28 known wolf mortalities, three died of natural causes, three were legally shot by landowners with control permits, two were euthanized because of severe mange, 16 were shot by WS in control actions and four are under investigation as illegal kills.

Research

Research in Yellowstone National Park

Wolf-prey relationships: Wolf-prey relationships were documented by observing wolf predation directly and by recording the characteristics of wolf prey at kill sites. Wolf packs were monitored during two winter-study sessions, 30-day periods in March and November-December during which wolves were intensively radio-tracked. The Leopold, Geode Creek, and Druid Peak Packs were monitored by two-person teams from the ground and from aircraft. The Swan Lake, Agate Creek, Rose Creek II, Slough Creek, Mollie's, Nez Perce, Cougar Creek, Bechler, Yellowstone Delta, Chief Joseph, and Sheep Mountain Packs were monitored from aircraft only. YNP staff recorded and entered into a data base behavioral interactions between wolves and prey, predation rates, the total time wolves fed on their kills, percent consumption of kills by wolves and scavengers, characteristics of wolf prey (e.g., nutritional condition), and characteristics of kill sites. In addition, similar data were collected opportunistically throughout the year during weekly monitoring flights and ground observations. The abundance and sex-age

composition of elk within wolf pack territories were also estimated from the ground and from fixed-wing aircraft.

Composition of Wolf Kills: Project staff detected 99 definite, 239 probable, and 37 possible kills made by wolves in 2003, including 313 elk (83 % of total), 22 bison, (6 %), 7 moose (2 %), 3 deer (1 %), 1 cougar (*Felis concolor*) (< 1 %), 4 coyotes (*Canis latrans*) (1 %), 4 wolves (1 %), 1 porcupine (*Erethizon dorsatum*) (<1 %), 1 sandhill crane (*Grus canadensis*) (<1 %), and 19 unknown prey (5 %). The composition of elk kills was 27 % calves (0-12 months), 21 % cows (1-9 years old), 8 % old cows (= 10 years old), 26 % bulls, and 17 % elk of unknown sex and/or age. Bison kills included five calves (unknown sex), 11 cows, five bulls, and one unknown sex and age. During winter, wolves residing on the northern range killed an average of 1.8 elk per wolf during the 30-day study period.

Winter Studies: During the 2003 March winter study (30 days), wolves were observed for 425 hours from the ground. The number of days wolf packs were located from the air ranged from none (Chief Joseph, Yellowstone Delta, and Bechler) to 11 (Leopold, Geode, and Druid Peak). Sixty-three definite or probable wolf kills were detected, including 57 elk, four bison, one mule deer, and one moose. Among elk, 10 (18 %) were calves, 15 (26 %) were cows, 25 (44 %) were bulls, three (5 %) were of unknown sex adult, and four (7 %) were of unknown sex and age. During the 2003 November-December winter study (30 days), wolves were observed for 317 hours from the ground. The number of days wolf packs were located from the air ranged from 0 (Yellowstone Delta and Rose Creek) to 10 (Leopold, Druid Peak, Geode Creek, Slough Creek, Agate Creek, and 302M's group). Fifty-seven definite, probable or possible wolf kills were detected during the November-December 2003 Winter Study, including 50 elk, one coyote, one moose, one mule deer, two wolves and two unknown prey. Among elk, 22 (44 %) of the kills were calves, six (12 %) were cows, four (8 %) were old cows (10+ years), 12 (24 %) were bulls, one (2 %) was an adult elk of unknown sex, and five (10 %) elk kills were of unknown sex or age.

Summer Studies: Beginning in the summer of 2003, project staff began efforts to document summer predation patterns by wolves. Documenting the predatory habits of wolves in summer is problematic due to the lack of snow for tracking, increased nighttime activity of wolves, lack of pack cohesiveness, and smaller prey packages leading to quick consumption and loss of evidence. Traditionally, the best data concerning wolf summer food habits have come from analysis of scat contents collected at den and rendezvous sites. In the summer of 2003, project staff collected a record of 530 wolf scats from the Bechler, Druid Peak, Leopold, Geode, Nez Perce, Cougar Creek, Swan Lake, and Slough Creek wolf packs at their den and rendezvous areas. When analyzed, these samples will give relative indices of prey selection and consumption patterns during the summer.

In addition, the Wolf Project deployed four GPS (Global Positioning System) collars in January of 2003 to enhance our understanding of 1) seasonal predation patterns; 2) spatial and temporal interactions with other wolf packs and other carnivores; 3) movements with respect to dens during pup-rearing season; and 4) territory size, use, and overlap. Some of these collars have the technology allowing for GPS location data to be remotely downloaded from the collar on a

regular basis while it is still on the animal. Using spatial and temporal location analysis, probable kill sites can be identified from clustered points, which can then be investigated to determine if a wolf kill is present and what the species, age, and sex of the prey animal was. For example, through the use of summer field observations of wolf predation and downloadable GPS location data, we documented seven kills made by the Druid Peak Pack for the month of June (two adult bull elk, two elk calves, and three unknown elk). Two of the four GPS collars failed due to wolf chewing, but it is hoped that collar modifications will prevent this in the future. We believe that our approach of combining GPS collar technology with ground effort will yield significant advances in our understanding of summer predation. This work will continue in 2004 with improved GPS collar technology and field protocols.

Wolf-Carnivore Interactions: Studies of wolves, grizzlies, and cougars are ongoing. Phase II of the project is scheduled to begin this summer when several wolves, grizzly bears, black bears, and cougars will be fitted with GPS collars operating on the same duty cycle. Programming the collars in such a coordinated fashion will allow better understanding of large carnivore interactions, landscape use, and predation rates. In late 2003, a Wildlife Society Bulletin article described the results from Phase I of the project.

Wolf-Scavenger Research: Research on the relationship between wolves and animals that scavenge wolf kills is continuing. In addition to wintertime work, a major effort is underway in summer to document the difference between winter and summer scavenging. Wolf kills in summer seem not to attract as many scavengers as those in winter. Preliminary research indicates that this may be due to differences in food abundance available to the scavenger guild in summer relative to winter. Work will continue this summer (2004).

Collaborative Research

The Yellowstone Wolf Project and the Yellowstone Park Foundation provided direct and indirect support for collaborative research with scientists at other institutions, primarily universities. Most of the studies represent pioneering work on wolves within the topic of interest.

Wolf Project Students - Direct Assistance:

Graduate Student: Shaney Evans (Master of Science candidate).

Committee Chair: Dr. L. David Mech, University of Minnesota, St. Paul.

Title: Adult cow elk (*Cervus elaphus*) seasonal distribution and mortality post-wolf (*Canis lupus*) reintroduction in Yellowstone National Park, Wyoming.

Project Narrative: As part of a three-tiered study, "Multi-trophic level ecology of wolves (*Canis lupus*), elk (*Cervus elaphus*), and vegetation in Yellowstone National Park, Wyoming," seasonal distributions and movements of elk will be examined to evaluate the behavioral effects of wolves on elk and establish baseline data for future analyses. Individual elk radio-locations will be paired with wolf radio-locations to establish the proximity of elk to wolves. Comparisons of individual differences in cow elk distribution will be investigated with respect to several variables including: age, presence of calf, pregnancy status, nutritional condition, group size,

spatial and temporal factors, and wolf density. In addition, a survival analysis will provide information on relative factors influencing mortality of cow elk in Yellowstone's Northern Range herd.

Project Activity in 2003: Completed fieldwork and started data analysis and writing.

Anticipated Completion Date: May 2004.

Graduate Student: Julie Mao (Master of Science candidate).

Committee Chair: Dr. Mark S. Boyce, University of Alberta.

Title: Habitat selection by elk before and after wolf reintroduction in Yellowstone National Park, Wyoming.

Project Narrative: Habitat associations of radio collared cow elk locations were compared between the periods of 1985-1990 (before wolf reintroduction) and 2000-2002 (after wolf reintroduction) to examine whether large scale changes in elk distribution and habitat selection occurred following the 1995 restoration of wolves into Yellowstone. In summer, elk now select for areas of higher elevation, steeper slopes, and more burned forest. These shifts in summertime habitat selection may be a combination of responses to predation risk by wolves and long-term vegetation succession following the 1988 fires. In winter, elk select for more open habitats now compared to pre-wolf times, a response that could aid in vigilance and group formation as anti-predator strategies.

Project Activity in 2003: Julie completed analysis and successfully defended her thesis.

Completion Date: August 2003.

Graduate Student: Daniel MacNulty (Ph.D. Candidate).

Committee Chair: Dr. Craig Packer, University of Minnesota.

Title: A behavioral analysis of the effect of predator and prey densities on wolf predation.

Project Narrative: The mathematical expression for a predator's "kill rate" (i.e. kills per predator per time) is fundamental to analyses of predator-prey dynamics. Predictions of dynamics vary widely according to how kill rate models assume that kill rate changes with predator and prey densities. Little is known, however, about the behavioral processes generating the relationship between kill rate and predator-prey densities, especially in natural environments. This is an important knowledge gap because it hinders progress in predator-prey theory and confounds predictions of predator-prey dynamics. This study will examine the behavioral mechanisms that cause wolf kill rate to vary with elk, bison and wolf densities in Yellowstone National Park. The analyses will be based on direct observations of wolves and ungulates recorded during eight intensive 30-day study periods from 1995 to 2003. Individual-level analyses of wolf kill rate and its behavioral parameters (i.e. attack rate, handling time, search time) will be completed with general linear and non-linear mixed models to account for correlation among repeated measurements of individual wolves. The results are expected to clarify the basic biology underlying models of wolf kill rate, and thereby strengthen attempts to anticipate the effects of wolf predation on ungulate populations.

Project Activity in 2003: Completed field work, initiated data entry and analysis.

Anticipated Completion Date: December 2004.

Other Research -- Indirect Assistance or Collaborative Work with the Wolf Project

Topic: Wolf-cougar interactions.
Collaborator: Toni Ruth, Howard Quigley.
Institution: Wildlife Conservation Society.

Topic: Wolf-coyote interactions.
Collaborator: Robert Crabtree, Jennifer Sheldon.
Institution: Yellowstone Ecological Research Center.

Topic: Wolf-bear interactions.
Collaborator: Charles Schwartz, Mark Haroldson.
Institution: Interagency Grizzly Bear Study Team.

Topic: Wolf-scavenger relationships.
Collaborator: Chris Wilmers, Wayne Getz, Robert Crabtree.
Institution: University of California at Berkely; Yellowstone Ecological Research Center

Topic: Wolf-elk relationships, Firehole watershed.
Collaborator: Robert Garrott, Eric Bergman.
Institution: Montana State University.

Topic: Wolf-elk calf mortality.
Collaborator: L. David Mech, Shannon Barber.
Institution: USGS; University of Minnesota.

Topic: Wolf-pronghorn.
Collaborator: John Byers.
Institution: University of Idaho.

Topic: Wolf-willow.
Collaborator: Francis Singer.
Institution: USGS.

Topic: Wolf-aspen.
Collaborator: William Ripple.
Institution: Oregon State University.

Topic: Wolf -- trophic cascades.
Collaborator: L. David Mech, Mark Boyce, Nathan Varley, Rolf Peterson.
Institution: USGS; University of Alberta; Michigan Technological University.

Topic: Wolf predation.
Collaborator: Tom Drummer.
Institution: Michigan Technological University.

Topic: Wolf survival.

Collaborator: Dennis Murray.

Institution: University of Idaho; Trent University.

Research in Wyoming outside Yellowstone National Park

Wolf/elk interactions on state-managed feed grounds and adjacent national forests in Wyoming

Investigators: Michael Jimenez (USFWS), John Stevenson (USFS).

Cooperators: USFWS, USFS, National Elk Refuge, Grand Teton National Park, and the Wyoming Game and Fish Department.

We monitored wolves during winters 1999-2003 to determine the distribution of wolf packs, describe prey selection of wolves, and document the behavioral response of elk to the presence of wolves on three elk feed grounds and adjacent national forest in Wyoming. We used radio telemetry to locate wolves and estimate home ranges. We back-tracked wolves to locate carcass remains of elk killed or scavenged by wolves. Radio-collared elk were followed to describe how elk responded to wolves hunting on feed grounds. In 1999 and 2000, two wolf packs recolonized the area and their home ranges overlapped in two feed grounds. From 2001 to 2003, only one wolf pack inhabited the drainage. We located 152 kills made by wolves on the three feed grounds and the adjacent national forest. Forty-nine percent of the elk killed were cows, 4 % bulls, and 47 % calves. The mean age of adult elk killed was 9.5 years and the oldest elk killed was 23 years old. Mean consumption of elk carcasses by wolves was 82%. In 2001, calf/cow ratios dropped from a 10-year average of 27.6 calves/100 cows to 17.5 calves/100 cows. Calf/cow ratios increased in 2002 to 21.8 calves/100 cows. However, state game officials remain concerned about low calf/cow ratios and calf recruitment. During winter 2002, 3,583 elk were counted in the Gros Ventre, compared to a 10-year average of 3,485 elk. Elk responded to wolves hunting on feed grounds by: 1) remaining on the feed grounds even when wolves killed elk; 2) leaving the area but returning within days; and 3) leaving the feed ground where wolves killed elk and gathering in larger herds on adjacent feed grounds absent of wolves. Displaced elk gathering on private property and elk crowding on specific feed grounds became very controversial as state game managers were forced to adjust winter feeding programs.

Interspecific competition between recolonizing wolves and coyotes: Implications for pronghorn persistence in Grand Teton National Park

Investigator: Kim Berger (Wildlife Conservation Society & Utah State University)

Cooperators: Wildlife Conservation Society, Utah State University, USFWS, USDA/APHIS/WS, Wyoming Game and Fish, Grand Teton National Park, Bridger-Teton National Forest.

The purpose of this study is to investigate the effects of recolonizing wolves on pronghorn (*Antilocapra americana*) population persistence, as mediated by changes in the distribution and abundance of coyotes, a major predator of neonate pronghorn. Specific questions to be addressed

are: 1) Are coyotes limited by competition with wolves? 2) If so, by what mechanism(s) do wolves alter coyote densities? And 3) What effects do changes in coyote density have on pronghorn fawn survival? Coyote densities, spatial dynamics, mortality rates, and causes of mortality will be contrasted at sites with high, moderate, and low levels of wolf activity to look for evidence of interference competition and mesopredator release. Pronghorn fawn mortality rates and causes will be compared across sites to determine how differences in coyote density affects neonate survival. Factors that may be influencing fawn recruitment, such as fecundity, birth weight, sex, timing of birth, and habitat availability, will also be explored among sites. The results of this study will be evaluated using sensitivity analysis to address implications for conservation of pronghorn in Grand Teton National Park.

Research in the Montana portion of the Greater Yellowstone Recovery Area

Factors affecting wolf-elk interactions in the Greater Yellowstone Area:

Investigators: Scott Creel, John Winnie, David Christianson (Department of Ecology, Montana State University, Bozeman MT 59717), Mike Ross, Ken Hamlin (Montana Fish Wildlife & Parks, 1400 S. 19th, Bozeman MT 59715).

This project focuses on measuring behavioral responses of elk to the risk of predation by wolves, and determining the consequences of behavioral responses for elk physiology, demography and population dynamics.

Using custom-built GPS collars, we have collected 18,317 unbiased locations for adult elk in four drainages of the Greater Yellowstone Ecosystem. These data reveal significant changes in use of the landscape on days that wolves are present within a drainage, relative to days when wolves are absent. Changes in landscape use are driven primarily by changes in the behavior of bulls, while cows show less response. This sex-difference is as predicted, because analysis of 51 wolf kills on our site reveals that bulls and calves are taken significantly more often than predicted if prey were selected at random, while cows are taken less often than expected ($\chi^2 = 39.21$, $df = 2$, $P < 0.001$).

Herd sizes also shift on days that wolves are in a drainage, dropping significantly ($F = 33.48$, $P < 0.0001$) from a 95 % CI of 18.8 – 23.2 elk/herd in the absence of wolves to 7.9 – 13.4 elk/herd in the presence of wolves. This suggests that grouping in response to predation risk does not benefit elk (for example via the ‘many eyes’ effect). Instead, the bulk of our data suggest that behavioral responses by elk are aimed at reducing the likelihood of being detected by wolves, rather than altering the outcome following detection. This interpretation is reinforced by data on herd size in relation to distance to obstructive cover. In general, herd size increases as distance to cover increases (ANOVA, $F = 13.22$, $P < 0.0001$). However, there is a significant interaction between the distance to cover and the presence of wolves in their effects on herd size.

Aggregation far from cover occurs only when wolves are absent. When wolves are present, elk remain in small herds at all distances to cover (interaction from ANOVA $F = 4.73$ $P = 0.0028$). This pattern strongly suggests that aggregation on open (grass) plant communities is a foraging response during periods of low predation risk, rather than an antipredator response during periods of high risk.

The behavior of individual elk also responds to the presence of wolves within a drainage. Using scan sampling to record 10,642 observations, contingency tables reveal that the presence of wolves within a drainage on the day of observation is associated with an increase in vigilance ($\chi^2 = 113.78$, $df = 1$, $P < 0.001$), with a decrease in foraging ($\chi^2 = 16.64$, $df = 1$, $P < 0.001$) and a decrease in movement ($\chi^2 = 29.46$, $df = 1$, $P < 0.001$). The proportion of time bedded did not change significantly ($\chi^2 = 0.10$, $df = 1$, NS), probably in part because this was not a common behavior.

These data show that elk behave differently on days that wolves are present within their drainage, but they do not demonstrate that behavioral responses carry costs. We are less advanced in analyses of the costs of antipredator responses, but we have recorded reduced rates of pregnancy (61-85% for a low predation site and 21% for a high predation site) for herds exposed to wolf predation, while pregnancy rates remained high (84-100%) on two nearby sites with little wolf activity. Data from more years are needed. Trends in population size (by aerial total count) and recruitment (from ground and aerial classification counts) suggest that predation (both direct and indirect effects) may be altering elk demography and dynamics. Recruitment in early winter has been at or below 20 calves:100cows on 5 of 6 winters with data since colonization by wolves, compared to 1 of 13 winters prior to wolf colonization (Fisher's exact test, $P = 0.12$). Similarly, population size has been below 1500 elk in 6 of 7 winters since wolf colonization, compared to 16 of 41 winters prior to wolves (Fisher's exact test, $P = 0.17$). Recall that factors other than wolves contribute to these patterns.

Outreach

YNP wolf staff gave approximately 50 formal presentations to approximately 2500 people and an untallied number of informal talks both within and outside YNP. USFWS staff gave numerous presentations and status reports to federal and state agencies, conservation groups, rural communities, guide/outfitters organizations, livestock associations, schools, and various private institutions. These included 13 formal talks to approximately 1700 people. Wolf recovery personnel also participated in television interviews and newspaper feature stories.

Livestock Depredation and Management

Wyoming portion of GYA

Potential livestock depredations in Wyoming were investigated by WS and USFWS. Depredations were classified as either confirmed, probable, or other, based on specific criteria agreed upon by the USFWS and WS. If wolf depredation was confirmed, nonlethal or lethal control, or a combination thereof, was implemented under the direction of the USFWS.

Seven of the eight wolf packs in Wyoming outside YNP were involved in at least one depredation and were responsible for at least 86 livestock lost to wolves (51 confirmed and 35 probable depredations) including 40 cattle, 36 sheep, and 10 goats. Two horses were injured by wolves, but survived the attacks. Depredations in 2003 more than doubled from the 27 depredations (23 confirmed and 4 probable) reported in 2002. WS documented 66% ($n = 57$) of

all depredations on public grazing allotments and 34% (n = 29) on private property. Defenders of Wildlife paid compensation for confirmed and probable livestock losses from wolves. Control actions in response to livestock depredations included: trapping and radio-collaring four wolves; intensive monitoring; increasing riders on grazing allotments; harassing wolves with rubber bullets, cracker shells, and lights; moving livestock to different pastures; and issuing four shoot-on-sight permits. When nonlethal control methods were not effective, wolves were killed in an attempt to prevent further livestock depredations. In 2003, 18 wolves were killed in control actions, three times the number of wolves killed in 2002. The following is a brief summary of wolf depredations that occurred in 2003 and the lethal control responses:

Washakie Pack: Over the last several years, the Washakie Pack has repeatedly killed livestock on public and private land. In 2003, at least four cattle were killed by wolves. One wolf was killed in a control action.

Teton Pack: The Teton Pack killed one cow in the Gros Ventre drainage in summer 2003, but no wolves were removed from the pack. In separate instances, at least eight or nine young Teton wolves dispersed south to the Pinedale/Cora/Big Piney area and repeatedly killed numerous livestock. Five wolves were killed in different control actions.

Green River Pack: At least nine cattle and one sheep were confirmed to have been killed by wolves from the Green River Pack in summer 2003. Several other livestock losses were considered probable wolf kills. Three wolves were killed in control actions.

Sunlight Pack: Sunlight wolves killed numerous livestock in 2001 and 2002. In 2003, at least three cattle were killed on private land. Other livestock losses were reported as probable wolf kills. Three wolves were killed in control actions.

Absaroka Pack: Wolves from the Absaroka Pack killed at least five cattle on public land in 2003. One wolf was killed in a control action.

Daniel Pack: At least three cattle and two sheep were killed by wolves and reported as confirmed wolf kills. An additional 20 sheep were recorded as probable wolf kills. Two wolves were killed in capture-related deaths during control actions.

Greybull River Pack: Wolves from the Greybull River Pack killed at least three cattle on private land. Control actions were attempted but no wolves were killed.

Ten Sleep: A single wolf in the Big Horn Mountains, near the town of Ten Sleep, Wyoming killed one cow and two sheep. One wolf was shot feeding on recently killed sheep.

Cokeville: On several occasions, two wolves were reported traveling in the midst of sheep on private property in Southwest Wyoming near the town of Cokeville. When wolves killed several sheep, two wolves were removed.

Depredation and Management: Montana portion of GYA

In the Montana portion of the Yellowstone Wolf Recovery Area (Figures 1, 3), eight of 12 known wolf packs were involved in livestock depredation in 2003 (Table 1b). Cattle and sheep depredations continue to be a significant problem in this area. A variety of nonlethal techniques have been used to help reduce depredation, in addition to the lethal removal of 19 wolves in 2003. Confirmed losses in 2003 included 10 cattle and 83 sheep killed by wolves, with an additional 15 cattle, 17 sheep and one horse classified as probable wolf depredation.

Taylor Peak Pack: A mule was injured in February and reported as a probable wolf attack. The mule was later euthanized due to a tendon that had been cut. Denning was confirmed and five pups were observed during early summer. A landowner trained in less-than-lethal munitions hit wolf #198F with a cracker shell while hazing her out of his cattle. In July, project personnel worked closely with the Madison Valley Ranch Lands group who were using sheep as weed control on a ranch in the Taylor Peak territory. The sheep producer provided a herder and guard dog. The Service trained the herder in less-than-lethal munitions and a portable electric night fence was provided. On July 18, two ewes and two lambs were confirmed as wolf kills by WS and an additional lamb was confirmed on the 24. Wolf #198F was reported near the sheep on several occasions and was lethally controlled on July 26. Investigation of the fence showed it was not producing electricity nor sturdy enough to contain the sheep and therefore was not being used. The producer found another electric fence, improvements were made and fladry was added along with a RAG box. A telemetry receiver was also provided to the herder. Wolves near the night bedding area were reported multiple times by the herder but no depredations occurred during the duration of the project. Trapping and collaring efforts continued throughout the summer. One 30lb male pup was caught but was too small to collar. He was eartagged and released on site. Wolf #281M was recaptured and released on site. In October WS darted and collared a yearling male #335 who showed signs of mange. Two 30lb pups were trapped by FWP and TESF on October 21-22 and were euthanized. Both wolves were very emaciated and had severe cases of mange. The pups were sent to the Bozeman lab and both tested positive for sarcoptic mange. The two yearlings, wolf #281M and #335M are both showing signs of hair loss and probably have mange as well.

Sentinel Pack: No depredations were confirmed in this pack. However, there were reports of the wolves harassing cattle, and two cows from the same herd died and were scavenged by the pack in the Madison drainage. Trapping and darting efforts by WS, MTFW&P and TESF placed four new collars in this pack. Five collared wolves were on mortality by December. One died from natural causes, and the other four are under investigation. There are now no radio-collars in the pack which is believed to consist of four to five wolves. Three pups were observed in June but both adults were killed so this will not be counted as a breeding pair.

Freezeout pack: Thirteen pregnant ewes were confirmed as wolf kills by WS in April, and more sheep were injured. Four wolves, including wolf #235M, were lethally removed. The breeding female is still collared but the male, #161, has been missing since September.

Mill Creek Pack: No depredations were reported for this pack in 2003. Shoot-on-sight permits were issued to landowners for both sheep and cattle depredations that occurred in December 2002. Two wolves, a 2-year old male and a female pup, were shot by a landowner with the

shoot-on-sight permit. A permanent, predator-proof fence for night pasturing sheep was provided by Defenders of Wildlife to the landowner who lost the sheep. On January 17, a yearling female wolf (#297F) was collared and released. She was found in mortality on January 29 and was found to have been killed by a cougar.

Sheep Mountain Pack: Reports were received that the wolves were chasing cattle in September and horses in November. Telemetry flights were increased to acquire more information on the pack. On October 15, one calf was confirmed killed by wolves, and on November 14 two more calves were confirmed as wolf kills. WS successfully trapped and collared three wolves, one adult male and two yearling females (#332F, #333F, #334M). The decision was made to remove a third of the pack and a shoot-on-sight permit was issued to the livestock owner. WS removed one mangy-looking adult female on December 4 and the livestock owner shot one adult breeding female on December 5. On December 21, three additional wolves, two gray yearling females and one adult black male, were removed by WS. Final calf counts by producers bringing in their stock noted one injured calf and 17 missing calves. These were documented as missing/probable.

Red Lodge Pack: During the months of January and February, WS confirmed that two calves were killed by wolves and that nine calves were missing. Two additional calves were unconfirmed due to the lack of evidence, and one calf was reported as a probable wolf kill. On January 23, WS net-gunned and collared a black adult female. On February 24, four wolves were lethally removed including the collared adult female. Four wolves are suspected to remain in this pack.

Lone Bear Pack: The Lone Bear Pack was seen scavenging a calf carcass on April 20, and on April 21, another dead calf was investigated by WS but unconfirmed due to a lack of evidence. On April 23, WS confirmed a calf killed by the pack, and one gray yearling female was lethally removed. The Lone Bear wolves killed seven sheep on December 17, and nine more sheep the next day. A control action removed two wolves, male #285 and one un-collared gray yearling female. A shoot-on-sight permit was issued to the landowners for two wolves, but no additional wolves were killed. A proposal was drafted by the sheep owner and submitted to Defenders of Wildlife for modification of the existing woven wire fence to include electric wire on the outside and additional height, to create a predator-resistant fence. Two collared wolves remain in this pack.

Mission/Moccasin Pack: On August 24, in the Boulder River area, one calf was confirmed as having been killed by wolves and another calf was wounded and died later. One cow was reported killed but was unconfirmed. Two wolves were collared by WS in September, a gray yearling female (#326F) and wolf #242F, originally collared as a pup in the Sheep Mountain Pack in 2001. We have yet to confirm if there are two packs between the Mission and Moccasin areas, hence the double name.

Chief Joseph Pack: A calf was killed by the Chief Joseph wolves in the Taylor Fork drainage on August 13. In September, one calf was killed in Tom Miner Basin and a second calf was not

verified. Trapping efforts occurred throughout the summer, and in September a breeding female, #327, was trapped, collared and released.

Bear Trap: No livestock depredations were reported in 2003. On July 18, a gray adult female (#323F) was collared and released on site on the Flying D ranch in the Gallatin Range. This wolf traveled back and forth from the ranch to Paradise valley and is now with Sheep Mountain male #334, spending time in Sheep Mountain Pack territory and up and down the Paradise Valley. A group of five wolves have been consistently sighted on the Flying D Ranch throughout 2003. No collars are in this pack.

Rose Creek II Pack: Although categorized as a YNP pack, the Rose Creek II Pack occasionally leaves the park. Between July 23 and August 8, seven lambs and one ewe were confirmed as wolf kills in the Beartooth/Absaroka wilderness. The sheep were lawfully present on a USFS grazing allotment that had been in place before designation of the area as wilderness. No control action was taken. On October 23, wolf #207 was on mortality and confirmed to have been killed by other wolves.

Miscellaneous and Lone Wolves: An Idaho wolf from the Moyer Basin Pack, B-144M, was caught by a coyote trapper on December 19 in the Eightmile drainage of Paradise Valley. The trapper contacted wolf project personnel and the wolf was re-collared and released. B-144M continues to travel up and down both sides of Paradise Valley.

On January 14, five ewes were reported by WS as probable wolf kills near Harlowtown. On May 24, 22 lambs were confirmed as wolf kills near Fishtail, Montana. Control efforts by WS were unsuccessful and the producer was issued a shoot-on-sight permit. On October 15, three ewes were confirmed killed near Nye, Montana, but aerial control was unsuccessful.

Depredation and Management: Idaho portion of GYA

There are no known wolf packs in the Idaho portion of the Yellowstone recovery area (Idaho east of Interstate 15). One calf was confirmed killed by wolves near Kilgore, Idaho in late August. The owner of the calf shot a wolf at the carcass. Two weeks later, a lamb was killed nearby, and was classified as a probable wolf kill. Herders reported seeing two wolves in the area. No further depredations were reported. A pair of wolves that appeared in the area of Big Sheep Creek, Montana, some 50 miles to the west, (Grassy Top Pack) may be the same wolves.

CENTRAL IDAHO WOLF RECOVERY AREA

Personnel

The Nez Perce Tribe Wolf Recovery Program, headed in 2003 by Project Leader Curt Mack and biologists Isaac Babcock, Adam Gall, Jim Holyan, Jason Husseman, Kent Laudon, and Anthony Novack, conducted management and monitoring of the Central Idaho wolf population. Volunteers Emily Babcock, Barry Braden, Teresa DeBlicck, Tyler Hollow, Denise Jantzer,

Anastacia Kampe, Casey King, Rob LaBuda, Rob Lonsinger, Karen Loveless, Susannah Phillips, Jennifer Rykowski, Erin Simmons, and Barbara Trapp assisted during the field season. Consuelo Blake, office assistant, joined the Recovery Program in June. Jon Trapp, a graduate student affiliated with Prescott College, initiated his field work on den-site characteristics. Mike Schlegel helped during helicopter capture.

The USFWS was represented in Idaho by recovery coordinator Carter Niemeyer, and in Montana by biologist Joseph Fontaine. Law enforcement agents in the Boise USFWS field office included Senior Agent Craig Tabor and Special Agent Scott Kabasa. Special Agent Scott Bragonier is headquartered in Twin Falls. USFWS Special Agent Rick Branzell covers that portion of southwestern Montana that is part of the central Idaho recovery area.

The Idaho Department of Fish and Game joined in wolf management and coordination during 2003. Personnel involved included State Coordinator Steve Nadeau in Boise, and Regional Supervisors, District Biologists, and Conservation Officers throughout the state.

Wildlife Services personnel involved in wolf control or management in 2003 included State Director Mark Collinge, Assistant State Director George Graves, District Supervisors Charles Carpenter, Craig Maycock and Todd Grimm, Wildlife Specialists Jeff Ashmead, Lee Czapenski, Jon Farr, Doug Hansen, Doug Hunsaker, Gary Looney, Justin Mann, Kelly Parker, Shane Robinson, Eric Simonson, Dave Thomas, and Rick Williamson, and Pilot Sam Kocherhans.

Monitoring

Forty-six individual wolves were captured (50 total captures) during the 2003 field season, 14 by helicopter darting and/or helicopter net-gunning, and 32 by leg-hold trapping. Additionally, one wolf was ground-darted, the first known instance that method has been successfully employed on wolves. Of that total, 33 new wolves were collared, eight wolves were recollared, two were not collared, and three were lethally controlled at the time of capture. At the end of 2003, approximately 43 wolves (12% of the estimated population) were being monitored in 37 documented groups or as lone/dispersing wolves. These packs, along with 16 areas of suspected wolf activity, accounted for about 368 wolves in the central Idaho recovery area. Approximately 345 of these live in the state of Idaho (Table 3) and 23 in the state of Montana (Table 1b). Radio-collared wolves were located approximately twice per month by airplane, more frequently during the spring denning and fall hunting seasons. Packs in Idaho as of December 2003 included Big Hole, Buffalo Ridge, Castle Peak, Chamberlain Basin (extant but not monitored due to loss of radio-collars), Cook, Eagle Mountain, Eldorado (no radio-collars), Five Lakes Butte (no radio-collars), Florence (no radio-collars), Galena, Gold Fork, Gospel Hump, Hazard Lake, Hemlock Ridge (no radio-collars), Jureano Mountain, Kelly Creek, Landmark, Lupine, Magruder, Monumental (no radio-collars), Morgan Creek, Moyer Basin, O'Hara Point, Orphan, Red River, Scott Mountain, Selway, Soldier Mountain, Steel Mountain, Thunder Mountain (no radio-collars), Timberline, and Twin Peaks (no radio-collars) Packs (Table 3, Figures 1, 4). Also, there are 15 areas of suspected wolf activity in Idaho, that have not been confirmed: Avery; Bovill/Deary; Bennett Mountain; Carey/Craters of the Moon; Copper Basin; Lemhi; Lower Mores Creek; Lower North Fork of the Clearwater; Lower Selway/Lochsa; Marble

Mountain; Newsome Creek; North Fork of the Salmon; Upper Selway; Upper South Fork of the Payette/Bear Valley; and Wolf Fang. The Marble Mountain and Wolf Fang Packs were confirmed in 2002, but the loss of radio-collars has since precluded the ability to monitor them in 2003.

In addition, at least five packs are thought to live in the Montana portion of the recovery area; in the East Fork of the Bitterroot River drainage (Sapphire Pack), the West Fork of the Bitterroot River drainage (Painted Rocks Pack), in the Flint Creek drainage (Willow Pack), in the southern Big Hole valley (Fox Creek Pack), and in the Big Sheep Creek drainage (Grassy Top Pair) (Table 1b, Figure 4). An area of suspected wolf activity in the Montana portion of the Idaho recovery area is Como Lake. Pack activity was confirmed here in 2002, but none of the wolves are radio-collared and this area was not monitored in 2003.

Reproduction was confirmed in 30 packs, producing a minimum of 102 pups. Twenty-six of the 30 reproductive packs met the recovery standards of a breeding pair (Tables 1b, 3). Eighteen wolves were known to have died in 2003; 16 of human-related causes (including seven removed in control actions), and two of unknown causes. The fates of nine collared wolves that dispersed away from their territories in 2003 or before were determined. Six wolves went missing in 2003 and may have dispersed.

Sixteen new Idaho wolf packs were documented in 2003: Castle Peak (with alphas B2 [formerly of Wildhorse Pack] and an unknown female); Cook (unknown origin); Eagle Mountain (dispersed male B136 from the Marble Mountain Pack and an unknown female); Eldorado (unknown origin); Florence (unknown origin); Galena (female B107 from the Moyer Basin Pack and an unknown male); Hazard Lake (male B105 from Stanley Basin Pack and a female of unknown origin); Hemlock Ridge (unknown origin); Magruder (male B110 from the Moyer Basin Pack and a female of unknown origin); Monumental (unknown origin); Morgan Creek (unknown origin); O'Hara Point (male B111 from Jureano Mountain and a female of unknown origin); Red River (unknown origin); Soldier Mountain (origin suspected from previous Big Smoky Pack [2000]); Steel Mountain (male R241 from Yellowstone National Park and a female of unknown origin); and Timberline (unknown origin). This represents the largest single-year increase in newly documented packs for Idaho. In addition, two new packs (Fox Creek and Sapphire) and one pair (Grassy Top) of wolves were documented in southwest Montana by USFWS personnel.

As noted above, several packs were documented that contain no functioning radio-collars. Field biologists verified these packs through follow-up investigations of reports of wolves or wolf sign received from other agencies or the public, or based on previous project knowledge. For most of these groups, capture efforts were undertaken to equip wolves with radio-collars, but were not successful. Collars were in place in the Florence, Hemlock Ridge, and Thunder Mountain Packs, but were lost due to chewing, illegal take, and dispersal, respectively.

Of the five packs known to live in the Montana portion of the CID recovery area, only one, the Willow Pack, is currently radio-collared. Collared wolves from the Painted Rocks and Battlefield Packs were illegally killed in 2002, leaving no radio-collars in those packs. A wolf

was fitted with a radio-collar in the Big Hole area in the fall of 2003, but it is not known at this time if it is associated with any other wolves. The Battlefield and Como Lake Packs are no longer considered to be verified packs because no reports of wolf activity have come from those areas recently. A pack of wolves appeared in the southern Big Hole valley late in the year (Fox Creek Pack), and killed four calves in December 2003. The pack was eliminated by wolf control actions in early 2004. The Sapphire Pack and Grassy Top pair were known only from sightings.

Research

The Recovery Program continued to support research that will provide sound scientific data leading to wolf conservation and management. A Master's of Science research study was initiated in 2003 that is designed to characterize the physical attributes and habitat characteristics of wolf den-site selection in the Northern Rocky Mountains.

Winter Predation and Interactions of Cougars and Wolves in the Central Idaho Wilderness.

Investigators: Holly Akenson, James Akenson, and Howard Quigley.

Cooperators: University of Idaho, Hornocker Wildlife Institute - Wildlife Conservation Society, DeVlieg Foundation, Nez Perce Tribe, Idaho Department of Fish and Game.

Fieldwork was concluded in 2002. The data is being analyzed and will be presented in articles published in scientific journals.

Wolf Den-Site Selection in the Northern Rockies

Investigators: Jon R. Trapp (Prescott College), David Parsons, Paul Beier (Northern Arizona University), Curt Mack (Nez Perce Tribe), Paul Paquet, Edward O. Garton (University of Idaho).

Cooperators: Nez Perce Tribe, USFWS, USFS, Glacier National Park, Banff National Park, Wolf Education and Research Center, Sun Ranch, Plum Creek Timber Company, Yellowstone National Park, and the Geographic Data Service Center.

The key to the expansion and survival of any species is successful reproduction. Wolves most commonly give birth to their young in hillside excavations, or dens. This Master's of Science research study was initiated to examine wolf dens in the Northern Rockies to determine which, if any, variables are significant in den-site selection. Data was collected at over 30 wolf dens in Idaho, Montana, and Canada in the summer of 2003.

Data collection was focused at two levels: micro- and macrohabitat. Microhabitat variables included vegetative composition and structure, canopy cover, hiding cover, slope, aspect, soil analysis, habitat type, den measurements, and distance to water, roads, and human disturbance. Macrohabitat data was further broken down into two levels: the den-site and the den-area. The den-area consisted of four collection plots 50 meters away from the den on the cardinal directions. For each den-site found, a randomly generated contrast site was created within the

home range of the selected wolf pack. The same data, with the exception of the den measurements, were collected at the contrast site. The contrast site allowed for a comparison between presence (the den-site) and absence (another location within the wolves' home range without a den).

Macrohabitat will be analyzed using Geographic Information Systems (GIS). By utilizing the computer mapping abilities of GIS, many questions can be answered at the landscape level. GIS layers can supplement some of the data collected in the field such as slope, aspect, and habitat type. Digital Elevation Models with 30-meter resolution allow for slope, aspect, and solar radiation analysis. Roads, trails, and hydrology layers can be used with den coordinates to figure out precise distances from dens to these features. Satellite and aerial imagery can be examined to calculate distance to openings and canopy closure. Ultimately, GIS modeling has the potential to predict potential wolf den-sites across the Northern Rockies.

In Idaho, den-sites were primarily hillside excavations under trees, with an average slope of 28%. Most dens were in forested areas with a young-mature age structure composed of mixed conifers, mainly Douglas fir (*Pseudotsuga menziesii*). Dens were characterized with greater canopy, hiding, and herbaceous cover, and also significant amounts of downed woody material (2-6 inches in diameter). Most dens were located within 100 meters of water. Four dens were within 100 meters of a four-wheel drive or hiking trail. Further analyses of distances to roads, trails, and water will be completed using GIS.

Literature Review of Worldwide Wolf Monitoring Techniques

Principal Investigators: Curt Mack (Nez Perce Tribe), Kyran Kunkel (Montana State University), and Wayne Melquist (University of Idaho).

Cooperators: Idaho Department of Fish and Game and USFWS.

The Nez Perce Tribe is initiating an effort to summarize the current worldwide state of knowledge regarding wolf counting/survey/and monitoring techniques. This effort will include a complete published and grey literature search, as well as a questionnaire survey designed to collect unpublished information from current wolf managers. This is the initial stage of, and will provide the foundation for, a proposed research study to develop post-delisting monitoring protocols for wolves in Idaho. Results of this study will also be useful to other states developing wolf survey and monitoring protocols.

The Nez Perce Tribe received a grant from the USFWS Tribal Wildlife Grants Program to fund the following proposed research, which will be an extension of the literature review described above.

Developing Monitoring Protocols for the Long Term Conservation and Management of Gray Wolves in Idaho

As part of USFWS efforts to restore endangered populations of gray wolves, an imperiled species, to the northern Rocky Mountains of the conterminous United States, 35 wolves were reintroduced into Idaho between 1995 and 1996. The Nez Perce Tribe (Tribe), has supported wolf recovery efforts, in part, because of the cultural and religious significance of this species. The Tribe, working through a cooperative agreement with USFWS, has been charged with the responsibility of monitoring and documenting the status of the recovering wolf population in Idaho. Wolves in the northern Rocky Mountains have recovered more rapidly than anticipated and USFWS is intending to initiate the delisting process as soon as 2004.

To date, wolf population estimation has relied on time-intensive and expensive radio telemetry techniques. Although this approach worked well with initial small population sizes, these techniques are no longer appropriate or cost-effective given the current, much larger recovered population size and near-statewide distribution. The Tribe, USFWS, and the State of Idaho are interested in a collaborative partnership effort to develop a less intensive and more cost-effective approach for estimating wolf population numbers across the varied landscapes of Idaho. We are proposing to initiate a 3.5-year research effort to develop standardized protocols for estimating wolf population parameters appropriate for meeting post-delisting monitoring and management needs.

Standardized monitoring protocols will be important in satisfying the USFWS' 5-year post-delisting monitoring requirements and is crucial to insure sustainability of the population through effective post-delisting conservation and management of wolves. Results of this effort will also be useful to other states, particularly Montana and Wyoming, developing monitoring protocols for wolves across the Northern Rocky Mountains.

Outreach

Program personnel presented informational talks and status reports throughout the year to various federal and state agencies, public and private institutions, special interest groups, and rural communities. Additionally, scores of informal presentations to small groups or individuals were conducted during this time.

Livestock Depredation and Management

Of the 37 documented packs of wolves in the Central Idaho Recovery Area, nine packs were involved in confirmed or probable livestock depredations in 2003. WS investigates all reports of livestock depredation and then takes appropriate actions in consultation with USFWS. WS determined that a total of 13 calves, 118 sheep, and six dogs were confirmed killed by wolves in the CID recovery area in 2003. Another six calves and 27 sheep were classed as probable wolf kills. Seven wolves were killed in depredation control (two by ranchers, five in government actions), and none were translocated. Another six wolves were captured and released on-site in these operations, although two died as a result of their captures within a week. The number of investigations conducted in 2003 was similar to 2002, although the numbers of livestock killed was higher because larger numbers of sheep were killed. The Cook Pack (82 confirmed kills plus 10 sheep injured) and what was suspected to be the Hazard Lake Pack (15 confirmed kills

plus three probable kills) were responsible for the majority of this increase. These two groups of wolves were responsible for 91% (107 of the 118 sheep confirmed killed or injured) of the total domestic sheep loss in the Idaho portion of the recovery area. Subsequent capture efforts revealed a neighboring group of wolves adjacent to the Hazard Lake Pack, which may have been responsible for some of the depredations attributed to the Hazard Lake Pack. The number of wolves lethally controlled in 2003 (seven) was less than the number killed in 2002 (14). One wolf was legally killed while in the act of depredating on a domestic calf (in addition to a wolf shot under similar circumstances in the Idaho portion of the GYA). The year-to-year similarity in depredation investigations and losses may be related to the continued presence of wolf packs, despite prior wolf control, in areas that overlap livestock grazing allotments.

Buffalo Ridge Pack: Three calves were classified as probable wolf depredations in early spring, but no control action was initiated and no further depredations were reported. The Recovery Program and Defenders of Wildlife worked with livestock producers to alleviate potential conflicts in this pack's territory.

Cook Pack: Two wolves, an adult female and a subadult male, were lethally controlled in this pack that was involved in several depredation incidents, killing or injuring 92 sheep. In addition, two pups were captured (one was radio-collared and released). Sheep losses attributed to this pack represented a minimum of 78% of total sheep losses in the recovery area.

Florence Pack: At least three confirmed wolf depredation events on sheep in the Allison Creek drainage, where three sheep were confirmed killed and 12 others probably killed, led to the discovery of this pack. One livestock guarding dog was also killed by wolves. A trapping operation by WS commenced in conjunction with the second depredation, but no wolves were captured and the control action was discontinued. A follow-up capture operation by the Nez Perce Tribal crew, unrelated to the depredations, was later successful in radio-collaring a pup, but its collar was chewed off by pack mates and recovered nine days later.

Gold Fork Pack: In July, one calf was confirmed killed and one probably killed on private land within the pack territory. The latter calf was discovered alive and had probably been attacked and injured by wolves in this pack's home range. WS initiated a control action, but the radio-collared wolves moved well away from the area where the calf was found and did not return while traps were in the ground.

Hazard Lake Pack/Partridge Group: In May, B105 was implicated in an attack on sheep penned near a private residence near Pinehurst, Idaho (seven sheep killed, five injured, and two missing). Fladry was placed on the fence, and no further incidents occurred. A gray male subadult/adult wolf was lethally controlled in this pack's territory in August, following confirmed wolf depredations on three sheep grazing on a public allotment. In September another male wolf, B172, was trapped, radio-collared, and released following a confirmed depredation on five sheep on a public grazing allotment. It was not certain whether these two individuals were part of the Hazard Lake Pack. B172 was aerially located with known Hazard Lake Pack member B105 on one occasion. Subsequent monitoring indicated that B172 is associated with wolves, the Partridge group, apparently not affiliated with the Hazard Lake Pack. Three confirmed

depredation incidents and one probable incident were attributed to these wolf groups in 2003. In addition, three instances of wolves harassing horses and dogs in the Hazard Lake Pack's territory were reported.

Jureano Mountain Pack: The Jureano Mountain Pack was involved in only a single confirmed depredation incident in 2003. B137 was shot by a landowner while feeding on a freshly-killed domestic calf. Investigation of the calf's carcass by WS indicated that wolves killed it, so the shooting of B137 was legal.

Morgan Creek Pack: The Morgan Creek Pack was verified after they depredated on one domestic calf in their namesake drainage. Two wolves were trapped, but one broke the chain on the trap and escaped with the trap on its foot. It was recaptured six days later, treated, radio-collared, and released. Unfortunately this wolf perished one week later. The other animal, male B161, was radio-collared and released.

Miscellaneous and Lone Wolves: Two wolves, a male and a female, were lethally controlled near Willow Creek Summit, Idaho, in separate incidents. The male was implicated in the deaths of one confirmed and two probable wolf-killed calves in February, and the female in one confirmed wolf-killed calf in June. Female B156 and male B157 were trapped in the Pearl Creek drainage north of McCall, Idaho in conjunction with confirmed depredations on sheep. The female died of handling-related complications the day after her capture. B157 was radio-collared and released. Following the death of B156, subsequent investigations suggested the presence of at least one other wolf besides B157, but further monitoring of B157 indicated that he was alone.

Depredation and Management: Montana Portion of CID

Willow Creek Pack: Two calves were confirmed killed by wolves in the Willow Creek Pack territory near Philipsburg, Montana in August 2003, and another in October. An adult wolf was shot by WS at the carcass of the third calf.

Fox Creek Pack: Four calves were confirmed killed by wolves in the southern Big Hole Valley in December 2003. The newly formed Fox Creek Pack (two adults and five pups) was removed in control actions in early 2004.

Other depredations in the Montana portion of the CID included a lion hound killed by the Sapphire Pack in February 2003, a calf fatally injured by a lone, dispersing wolf southwest of Dillon, MT in January 2003, and five calves (two killed, three injured) that were classified as probable wolf depredations.

PLANNING AND LEGAL ISSUES

Reclassification and Delisting of the Gray Wolf

Wolves, once common throughout North America, are protected under the ESA because human persecution nearly eliminated them from the contiguous United States. By 1974, there were none left in the northern Rocky Mountain states (NRM). The ESA prohibited people from harming wolves and mandated that all federal actions seek to conserve and not jeopardize wolves. Ultimately, three distinct wolf recovery programs in the Midwest, NRM, and Southwest were initiated. In the NRM, 2003 marked the fourth consecutive year that 30 or more breeding pairs of wolves were documented. The population of 761 wolves has achieved biological recovery objectives.

USFWS can propose delisting of the NRM wolf population when it determines that the population has recovered and it is reasonably assured that wolves would not become threatened again if the ESA protections were removed. The ESA contains several checks and balances, and protections to ensure that any decision to delist a species is scientifically sound and will not result in it becoming listed again. The ESA requires that all decisions be based on the best scientific data available. USFWS is mandated to examine all of the factors that may have caused a species to become threatened and to determine that they are not likely to cause the species to become threatened again. Regulating the level of human-caused mortality is the primary factor that must be resolved before delisting could be proposed. The ESA requires that USFWS must determine that regulations, other than the ESA, will prevent unchecked human-caused mortality from once again driving wolves toward extinction. Wildlife mortality is typically regulated by state fish and wildlife management agencies. USFWS requested that Montana, Idaho, and Wyoming develop state wolf management plans so that wolves would be adequately conserved under state management. In addition, USFWS believed that state wolf plans would help the public to understand the consequences of delisting and would provide a solid administrative foundation for the final decision. 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 links for the state wolf plans for Montana, Idaho and Wyoming are available at <http://midwest.fws.gov/wolf>.

Montana, Idaho and Wyoming had all completed their respective state wolf plans by September 2003. USFWS immediately sent the three state plans for independent peer review. Peer reviewers were asked, "In combination, would the three state plans assure conservation of the wolf population at or above recovery levels." Twelve North American wolf management and research experts were asked to review those plans. Eleven reviews were received. They were then reviewed by the state wildlife management agencies, to allow each state to provide their perspectives on the reviewers' comments. On December 10, 2003 the three states provided their responses back to the USFWS, completing the peer review process. After further internal and legal review at the Regional Office and Washington D.C. level, recommendations were provided to the USFWS Director.

In early January 2004, the Director determined that: Montana's state wolf management plan was an outstanding professional effort and deserved special recognition. Montana's wolf management plan was clearly adequate as a regulatory mechanism to maintain and conserve a recovered wolf population. Idaho's state wolf management plan, when examined by itself,

appeared to contain some conflicting and confusing statements regarding whether adequate regulatory mechanisms would be in place to protect gray wolves. However, passage of Idaho House Bill 294 in 2003 resolved those concerns. Idaho's wolf management plan was adequate as a regulatory mechanism to maintain a recovered wolf population, assuming step-down planning followed through on their plan's overall policy commitments. The Wyoming state wolf plan called for wolves to be considered "trophy game" in the national park and wilderness areas of the state and considered as "predators" throughout the remainder of the state (and as trophy game in a larger area of Northwest Wyoming if less than eight packs were outside the National Parks). The combination of large areas and the uncertainty of monitoring wolf mortality under predatory animal status, the changing between "predatory animal" and "trophy game" status in certain areas and the potentially limited area in which human-caused mortality of wolves could be regulated were major concerns. Wyoming's unique and complex proposed regulatory framework, and the vague direction provided by Wyoming law did not assure the Service that Wyoming's plan will conserve wolves at or above a recovered level in Wyoming. The Director determined that Wyoming must designate wolves as trophy game state-wide so the Wyoming Game and Fish Department has legal authority to manage them, and Wyoming must clearly commit to managing for 15 or more well distributed packs. These changes will require changes in Wyoming state law that cannot be made until early 2004. The Service will not propose that the wolf population be delisted until Wyoming state laws and their state plan can assure that Wyoming's portion of the NRM wolf population will remain secure without the ESA protections.

A delisting proposal would include relevant data and a thorough analysis of USFWS's rationale. It would be published, and extensive public and professional peer review would be requested. After public comment and any new information were analyzed, USFWS could withdraw the proposal, modify it, or finalize it. The NRM wolf population could be delisted as early as 2005. Upon delisting, each state would be responsible for the conservation and management of wolves within their respective borders. Coordination among the three states is expected, and already established through a memorandum of understanding signed by the respective governors, and cooperation between state wildlife agencies. After the wolf population is delisted, the ESA requires a mandatory, minimum 5-year post-delisting oversight period. That period, during which USFWS reviews the implementation of state management plans, provides a safety-net to ensure that the species is able to sustain itself without ESA protection. If wolves became threatened again, USFWS could re-list them by emergency order.

Nationwide wolf reclassification:

The reclassification of wolves nationwide was completed on April 1, 2003. The rule created a new Western Distinct Population Segment (DPS) for wolves, consisting of Wyoming, Montana, Idaho, Washington, Oregon, California, Nevada and the northern half of Utah and Colorado. This proposal did not change the status of wolves in the experimental nonessential populations (Central Idaho and Yellowstone) but changed the status of wolves in the rest of the Western DPS from endangered to threatened. Wolves were also reclassified to threatened in 22 north-central and northeastern states (Eastern DPS), and delisted in all or part of 14 southeastern states. The reclassification and accompanying special rule [4d] allows wolves to be managed under virtually

the same rules throughout the northwestern U.S. Activities that are allowed under threatened status include the use of nonlethal munitions to haze wolves away from livestock and the ability for livestock owners to legally kill a wolf caught in the act of attacking livestock, herding or guarding animals, or dogs on private property. The activities of government agencies in managing depredating wolves are not significantly different under the threatened status. Although wolf reclassification is being litigated, it is a separate administrative procedure from delisting, and is not expected to affect the timetable for proposing the delisting of wolves in the Western DPS (see *Litigation*).

Litigation

Reclassification Litigation: On April 1, 2003, the USFWS finalized a reclassification rule that delisted wolves in the southeastern U.S., established three distinct population segments [Western, Eastern and Southwestern] and changed the status of wolves from endangered to threatened in the Western and Eastern DPS's. Wolves in the Southwestern DPS remained listed as endangered. A number of advocacy groups filed a 60 day notice of intent to sue. In late 2003, about 20 groups filed a lawsuit claiming that the reclassification was illegal for a wide variety of reasons. Another suit was filed by other groups over similar issues in Vermont in December 2003. These litigation efforts will be ongoing for some time.

The United States District Court for the District of Idaho. Western Watersheds Project and Idaho Conservation League vs. Sawtooth National Forest, Bill Levere, Sawtooth National Forest Supervisor, and USFS, Case No. CIV 01-389-E-BIW.

This case was initiated in Summer 2002 and revolves around the establishing legislation for the Sawtooth National Recreation Area (SNRA). That legislation suggests preferential use by wildlife in the SNRA. The SNRA has been historically used for livestock grazing under federal grazing permits. Since the USFWS's reintroduction efforts in 1995, the wolf population in Idaho has expanded, with at least one wolf pack using part of the SNRA. Because of chronic livestock depredations by wolves on private land adjacent to the SNRA and within it, agency wolf control ultimately resulted in the removal of all 10 members of the Whitehawk Pack. Environmental groups filed suit, and the Judges' preliminary ruling directed the USFS to give preference to wildlife but also to balance out wildlife with permitted livestock grazing. The Court ruled that the USFS needed to do a more thorough environmental assessment of the conflict between livestock grazing and predators, primarily wolves, in the SNRA.

The Court further issued an injunction on the USFWS that prohibited lethal control of wolves that depredated on livestock within the SNRA during the summers of 2002 and 2003. The USFWS requested the Judge reconsider that position since the USFWS was not part of the original litigation and that control of wolves that attack livestock is a necessary part of wolf restoration in the northern Rocky Mountains of Montana, Idaho, and Wyoming. The FWS/DOI worked with DOJ and filed an appeal of the court's decision. The appeals court suspended its consideration of the appeal, until a closely related case, now before the Supreme Court, is ruled upon. The USFWS stands ready to continue to assist in reducing livestock depredations by non-lethal methods in the SNRA, as this case is being decided. The Court's 2003 injunction

expired in November 2003, but the plaintiffs are expected to ask the court for another injunction this spring just as they have for the last two grazing seasons.

Funding of Wolf Recovery

Wolf recovery in the northern Rocky Mountains from 1973 through 2003 cost about \$16,785,000 (with no adjustments for inflation). If recovery continues at the current rate and management costs remain within predictions, wolf delisting should be completed in 2005 at an additional cost to taxpayers of \$1,500,000 annually for 2004 and 2005. The total cost for the restoration, management, recovery, and delisting of wolves between 1973 and 2005 should be less than \$20,000,000.

FY 2003 (Oct 1, 2003 to Sept 30, 2003): total USFWS funding \$1,567,000. In FY 2003, funding for wolf recovery was increased by Congress over FY 2002 levels. Region 6 (which includes Montana and Wyoming) received nearly \$776,000. \$100,000 was used to fund WS control programs, and \$30,000 to help with state of Montana wolf planning. The remainder was used to conduct the usual monitoring, management, control, and information program, complete the National Wolf Reclassification, and coordinate preparation of a delisting proposal. Region 6 is also the lead on litigation issues related to wolf recovery. Funding also included \$100,000 in recovery funding to intensify efforts to assist the states to complete their state wolf management plans, obtain professional peer review in late 2003, help the states to prepare for post-delisting monitoring, and begin preparation of a delisting proposal.

Funding levels for Region 1 also increased. Region 1 (which includes Idaho) received \$867,000, which it used to fund \$455,000 to the Nez Perce Tribe, \$248,000 to the Idaho Governor's Office of Species Conservation (\$90,000 of that funding was distributed to livestock producers for missing livestock in central Idaho), and nearly \$174,000 to the USFWS Idaho wolf recovery program. Region 1 received an additional \$40,000 to assist Region 6 to prepare the delisting proposal and to assist Idaho to prepare for post-delisting monitoring.

In addition, WS maintained a \$1,300,00 addition to their budget in MT, ID, and WY for predator control related to endangered and threatened species (primarily wolves). Yellowstone National Park maintained their NPS-funded wolf monitoring and research program at about \$210,000 per year.

In addition to federal funding, the private Turner Endangered Species Fund is funding the salary of an experienced wolf biologist in Bozeman, Montana. Val Asher is directly supervised by the USFWS to monitor wolves and to assist in resolving conflicts between wolves and private landowners in southwestern Montana. Defenders of Wildlife provides a compensation program for livestock killed by wolves, with expenditures of more than \$308,000 from 1987 through December 2003. Universities in Idaho, Montana and Wyoming have also provided substantial funding and support for their graduate students conducting wolf research.

Law Enforcement

USFWS Law Enforcement--Montana

In 2003, wolf incidents involving the USFWS Office of Law Enforcement (OLE) in the District of Montana were comparatively fewer than in past years. During calendar year 2003 there were two wolf mortality investigations opened by the OLE in Montana. One of these investigations involved the discovery of a dead female pup that was radio-collared. The other dead wolf was an uncollared male. Both cases are currently under investigation by Montana-based USFWS Special Agents, and further details of these investigations cannot be divulged at this time. Special Agents are continuing work on wolf mortality investigations that were opened in calendar year 2002. These investigations remain active with some referrals made to the Office of the Solicitor.

USFWS Law Enforcement--Wyoming

USFWS enforcement personnel investigated seven wolf mortalities in Wyoming in 2003. One (Sunlight male 52) was determined to have died of natural causes (disease). The other six, all suspected to have been killed illegally, are under investigation.

USFWS Law Enforcement--Idaho

What follows is a list of known wolf mortalities occurring in Idaho during calendar year 2003 that were investigated by USFWS Special Agents:

The collar of Wolf B133 was found by USFWS agents in the South Fork Boise River near Pine, Idaho, on 01/08/2003. Agents had been notified the previous day that a monitoring flight that day had detected the collar transmitting a mortality signal. The collar had obviously been cut, and it appeared it had been thrown from a bridge into the water, and had been there for some time. It is presumed that this wolf was killed, and the investigation remains open.

An uncollared wolf was shot by a coyote hunter near the Idaho/Utah state line in Oneida County. The shooter, upon determining that the animal was likely a wolf, promptly contacted Idaho Fish and Game, who notified USFWS LE. The shooter reported that he was unaware of wolves being in the area, and that he thought the wolf was a coyote. The case was declined for criminal prosecution by the Boise US Attorney's office, and the case has been closed.

Buffalo Ridge Pack Wolf B143 was found dead near Clayton, Idaho in May after his collar began emitting a mortality signal. A Forensics Lab has determined that the cause of death was Compound 1080. This investigation remains open.

Wolf B131, a dispersing male from the Wolf Fang Pack, was found dead in May near Idaho City after its collar emitted a mortality signal. Forensics Lab examination determined that the wolf had been shot with a load of BB shot. Observation reports indicate this wolf was frequently seen near roads. This investigation remains open.

Wolf B158 was found dead in October near Idaho City after the collar emitted a mortality signal. The wolf had been shot with a high-powered rifle. This investigation is ongoing.

Two wolves, B152 and an uncollared wolf, were found dead and reported by a citizen to an Idaho Fish and Game officer in November. The wolves were found in separate locations, both near Pierce, Idaho. The state officer conducted initial crime scene investigations and turned the carcasses over to USFWS agents.

USFWS LE agents collected an uncollared gray wolf of unknown sex in February 2004 near the town of Elk River. The agents estimated that the wolf had been dead since the fall of 2003. This is an open investigation.

USFWS agents continued, when able, to conduct pro-active wolf protective patrols in areas where there were documented concentrations of illegal mortalities. USFWS agents in Idaho are currently coordinating with Idaho Fish and Game to assist them in preparing wolf delisting and the transition from federal to state management of wolves.

Idaho Wolf Management Planning

The Idaho State Legislature passed, and the Governor signed, HB294 in April 2003. The bill allows the Department of Fish and Game to become reinvolved in wolf management, coordinate with all entities involved to assist in delisting wolves, and then to implement the State Wolf Plan. The Idaho Fish and Game Commission also passed a wolf policy that allows the Department to do what is necessary to begin managing wolves. The Department, along with the Governor's Office of Species Conservation, has been deliberating with the Nez Perce Tribe to develop an MOA that defines a role for the Tribe once wolves are delisted, and a process to coordinate monitoring and management efforts between the State and the Tribe prior to delisting. The Department of Fish and Game is planning training sessions, hiring personnel, defining roles and responsibilities, purchasing equipment, enhancing ungulate monitoring efforts, coordinating among agencies, and otherwise preparing to begin managing wolves. The State will be prepared to be the primary wolf manager in Idaho as soon as it is feasible, logical, and legal. The USFWS has determined that the State Wolf Plan is adequate to fulfill state requirements for delisting. The Department is defining and developing many of the management strategies that will be used for managing wolves under the Plan.

Additionally, Idaho is working with Montana and Wyoming to develop a monitoring and coordination plan that will be included in the delisting package. A tri-state and Tribal proposal was developed in cooperation with representatives from Montana and Wyoming, to present to the Congressional Sportsmen Caucus to try to secure long term funding for wolf and grizzly bear management in the three states.

Montana Wolf Management Planning

The Montana Wolf Management Advisory council was appointed in April 2000 to advise Montana Fish, Wildlife & Parks (FWP) as it prepared a management plan. The Wolf Council

was a diverse group, representing the interests of conservationists, hunters, landowners, livestock producers, outfitters, educators, and others. The Council completed their work in 2001, and FWP released the "Montana Wolf Conservation and Management Planning Document" in January 2002. While the planning document reflected what a state wolf plan could resemble if it were based on the council's work and recommendations, FWP still needed to hear from others and explore various alternatives before adopting a management plan in full compliance with the legal requirements of the Montana Environmental Policy Act.

FWP initiated its Wolf Conservation and Management Plan Environmental Impact Statement (EIS) in the spring of 2002 with a 60-day public comment opportunity in which people identified the issues and concerns to be addressed in the EIS. FWP released a Draft EIS in March 2003. The Draft EIS considered five alternatives, one of which was the work of Montana's Wolf Council. FWP identified this as the preferred alternative. After a second 60-day public comment period, FWP completed the EIS process by selecting the Council's alternative to become the Montana Wolf Conservation and Management Plan. The final plan was approved by FWP's director and the FWP Commission in September 2003. More information can be found at <http://www.fwp.state.mt.us/wildthings/wolf/wolfmanagement.asp>

Wyoming Wolf Management Planning

The Wyoming Game and Fish Department completed a final management plan in August 2003. The plan, for the most part, conformed to HB 229, which the Wyoming Legislature passed in February 2003. It call for dual status of trophy game in a portion of Northwest Wyoming and predator status in the remaining portion of the state. The plan committed to managing for 15 packs statewide, including National Park Service (NPS) lands, with at least seven packs outside NPS lands. The state plan was reviewed by a professional peer review committee who, for the most part, thought the plan would provide for a long-term, viable population in Wyoming. Following peer review, the U.S. Fish and Wildlife Service responded to Wyoming that the plan was not satisfactory to proceed with delisting. The state is working with other agencies to resolve the issue.

ABBREVIATIONS AND ACRONYMS

U. S. Fish and Wildlife Service	USFWS
U. S. Forest Service	USFS
U. S. Geological Survey	USGS
U. S. National Park Service	NPS
Nez Perce Tribe	NPT
USDA/APHIS/Wildlife Services	WS
Endangered Species Act	ESA
Northern Rocky Mountains	NRM
Northwest Montana wolf recovery area	NWMT
Central Idaho wolf recovery area	CID
Greater Yellowstone wolf recovery area	GYA
Yellowstone National Park	YNP

Glacier National Park	GNP
Grand Teton National Park	GTNP
Montana State University	MSU
Montana Fish, Wildlife & Parks	FWP
Turner Endangered Species Fund	TESF
Distinct Population Segment	DPS
Confederated Salish-Kootenay Tribes	CSKT

CONTACTS

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

U. S. Fish and Wildlife Service, Helena MT: (406) 449-5225
U. S. Fish and Wildlife Service, Kalispell MT: (406) 751-4581
U. S. Fish and Wildlife Service, Lander WY: (307) 332-7789
U. S. Fish and Wildlife Service, Boise ID: (208) 378-5639
Yellowstone Center for Resources, YNP WY: (307) 344-2243
Nez Perce Tribal Wolf Program, McCall ID: (208) 634-1061

To report livestock depredations:

USDA/APHIS/Wildlife Services, Montana: (406) 657-6464
USDA/APHIS/Wildlife Services, Wyoming: (307) 261-5336
USDA/APHIS/Wildlife Services, Idaho: (208) 378-5077

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

U.S. Fish and Wildlife Service Special Agent, Billings, MT: (406) 247-7355
U.S. Fish and Wildlife Service Special Agent, Missoula, MT: (406) 329-3000
U.S. Fish and Wildlife Service Special Agent, Bozeman, MT: (406) 582-0336
U.S. Fish and Wildlife Service Special Agent, Casper, WY: (307) 261-6365
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, Idaho Falls, ID: (208) 523-0855
U.S. Fish and Wildlife Service Special Agent, Spokane, WA: (509) 928-6050

WEBSITES:

USFWS Rocky Mountain weekly & 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/>

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>

Montana Fish, Wildlife & Parks wolf management planning:
<http://www.fwp.state.mt.us/wildthings/wolf/wolfmanagement.asp>

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

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

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

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

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

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

Montana 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/>

Wolf news reports:
<http://www.forwolves.org/ralph/wolfrpt.html>

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

Montana 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>

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