# YELLOWSTONE WOLF PROJECT

## ANNUAL REPORT
## 2008

# Yellowstone Wolf Project

## Annual Report
## 2008

Douglas W. Smith, Daniel R. Stahler, Erin Albers, Matthew Metz, Libby Williamson, Nick Ehlers, Kira Cassidy, Joshua Irving, Rebecca Raymond, Emily Almberg, and Richard McIntyre

National Park Service
Yellowstone Center for Resources
Yellowstone National Park, Wyoming

YCR-2009-03


Suggested citation: Smith, D.W., D.R. Stahler, E. Albers, M. Metz, L. Williamson, N. Ehlers, K. Cassidy, J. Irving, R. Raymond, E. Almberg, and R. McIntyre. 2008. Yellowstone Wolf Project: Annual Report, 2008. National Park Service, Yellowstone Center for Resources, Yellowstone National Park, Wyoming, YCR-2009-03.

*Wolf logo on cover and title page: Original illustration of wolf pup #47, born to #27, of the Nez Perce pack in 1996, by Melissa Saunders. Treatment and design by Renée Evanoff.*

*All photos not otherwise marked are NPS photos.*

# Table of Contents

# Background

Although wolf packs once roamed from the Arctic tundra to Mexico, they were regarded as dangerous predators, and gradual loss of habitat and deliberate extermination programs led to their demise throughout most of the United States. By 1926, when the National Park Service (NPS) ended its predator control efforts, there were no gray wolf (*Canis lupus*) packs left in Yellowstone National Park (YNP).

In the decades that followed, the importance of the wolf as part of a naturally functioning ecosystem came to be better understood, and the gray wolf was eventually listed as an endangered species in all of its traditional range except Alaska. NPS policy calls for restoring, where possible, native species that have been eliminated as a result of human activity. Because of its large size and the abundant prey, the Greater Yellowstone Area (GYA) was identified in the recovery plan as one of three areas where the recovery of wolf populations had a good chance of succeeding.

The U.S. Fish and Wildlife Service (USFWS) has the primary responsibility for ensuring compliance with the Endangered Species Act (ESA) and oversees the multi-state wolf recovery program. The USFWS had proposed that 30 breeding wolf pairs with an equitable and uniform distribution throughout the three Rocky Mountain recovery areas (Greater Yellowstone, central Idaho, and northwest Montana) for three successive years would constitute a viable and recovered wolf population. Recovery goals were met in 2002, and the gray wolf is expected to be removed from the endangered species list in Idaho and Montana in 2009; the USFWS has not yet accepted the wolf management plan proposed by the state of Wyoming.

Following an extended period of public planning and input, wolf restoration to the GYA began in 1995, when 14 wolves were brought to the park from Alberta, Canada, held in acclimation pens for 10 weeks, and then released. Initial founder wolves, named for the geographic locales at which they were acclimated, were the Crystal Creek, Rose Creek, and Soda Butte packs on Yellowstone's northern range. In 1996, an additional 17 wolves were transplanted from British Columbia and released in more widespread locations throughout the park. In 1995–96, a companion effort to restore wolves to central Idaho occurred, using a simpler technique without acclimation. Although the original plan, outlined in *The Reintroduction of Gray Wolves to Yellowstone and Central Idaho, Final Environmental Impact Statement* (1994), called for annual translocations from Canada for up to five years, additional transplants were deemed unnecessary by 1997 because the founder wolves had higher reproduction, lower mortality, and less movement from the GYA than was originally expected.

Three full-time employees worked for the Yellowstone Wolf Project in 2008: Project Leader Douglas Smith, and Biological Science Technicians Erin Albers and Rick McIntyre. Dan Stahler split time between graduate work at the University of California at Los Angeles, and working in the park as a project biologist. After 13 years on the Wolf Project, Debra Guernsey left in April. Other paid and volunteer staff were Sarah Bassing, Colin Benell, Kira Cassidy, Nicholas Ehlers, Sarah Hardee, Joshua Irving, Laura Kelly, Ky Koitzsch, Lisa Koitzsch, Nicole Legere, Jon Linch, Sarah Lykens, Dan MacNulty, Mike Peterson, Rebecca Raymond, Jessie Walton, and Libby Williamson. Some of these staff members were paid technicians with funding provided by the Yellowstone Park Foundation and Yellowstone Association.

Wolves reintroduced into Yellowstone were classified by the USFWS as "nonessential experimental" under section 10(j) of the Endangered Species Act and are managed outside the park under special rules that permit flexibility in addressing wolf conflicts with livestock and other wildlife management goals. It was anticipated that as the wolf packs established their territories, some would hunt and/or reside outside the park on other public or private land, and that some of the 412,000 livestock in the GYA would be preyed upon. The special rules contained provisions for addressing the possibility of conflicts with livestock.

To facilitate monitoring and research, all of the wolves brought from Canada were radio-collared before release, and YNP maintains radio collars in all wolf packs within the park. Wolf Project staff monitor population dispersal, distribution, reproduction, mortality, and predation on ungulates. Monitoring and management activities for the first two years of the project are documented in *The Yellowstone Wolf Project, Biennial Report 1995–96*. Subsequent project activities are presented in annual reports.

# 2008 Summary

At the end of 2008, at least 124 wolves in 12 packs and various groups occupied Yellowstone National Park. This is one more pack than in 2007, but several long-term, stable packs were replaced by smaller, newly formed packs. This represents a 27% decline from 171 wolves in 2007, similar to the decline in 2005 (from 171 to 118 wolves). Six packs counted toward the breeding pair objective for the Greater Yellowstone Wolf Recovery Area, the fewest since wolves first reached the minimum requirement for delisting in 2000 (30 breeding pairs in Idaho, Montana, and Wyoming). High mortality of both pups and adults caused by disease and intraspecific mortality were the primary factors in the population decline and low breeding pair count.

Both the Leopold pack, one of the most stable in the park since 1996, and the Oxbow Creek pack, an offshoot of Leopold that formed in 2005, dissolved in 2008, and the Hayden Valley pack dispersed as a pack from the park. The status of two other previously stable packs, Agate Creek and Slough Creek, was in question at year end. Both packs had lost members and neither pack had radio collars. The Druid Peak pack remained relatively intact. Interior packs were more stable than northern range packs. The radio-collared wolf that had immigrated from Idaho into the park in 2007 and continues to be vitally important for genetic connectivity between recovery areas, left the park in mid-2008 and settled to the east in the Crandall Creek area.

Pack size ranged from 4 to 25 and averaged 9.3 wolves, which was smaller than the long-term average of 10. Average number of pups per pack in early winter was 1.8. Reproduction was poor in 2008 and only 29% of the pups survived the summer. Quadrant Mountain and Cougar Creek packs had no evidence of pups; most other packs had pups but few or none survived. As in 1999 and 2005, the probable cause of poor pup survival was disease, likely distemper, although definitive evidence will not be available until blood samples from 2009 are analyzed.

As in previous years, the leading cause of mortality (59%) among collared wolves was intraspecific strife (10 out of 17 deaths). Two of the other deaths were the second and third known malnutrition fatalities since reintroduction. The deaths included 12 females and 5 males: 5 yearlings, 10 wolves age 2–5, and 2 wolves over age 5.

Twenty-eight wolves from 10 packs were captured: 17 females and 11 males, 16 pups, 5 wolves age 2–5, and 1 wolf over age 5. At year end, 32 of 124 (26%) wolves were collared with either VHF or Global Positioning System (GPS) radio collars. Placement of collars was dependent on monitoring objectives, but VHF radio collars are still the most commonly used in the park.

Wolf Project staff detected 576 definite, probable, or possible kills by wolves in 2008: 463 elk (80%), 23 bison (4%), 19 deer (3%), 13 coyotes (2%), 11 wolves (2%), 5 pronghorn (<1%), 3 moose (<1%), 3 grouse (<1%), 2 bighorn sheep (<1%), 2 ravens (<1%), and one each of beaver, golden eagle, grizzly bear, cougar, red fox, and otter, and 26 unknown prey (5%). The composition of elk kills was 32% bulls, 27% calves (0–12 months), 16% cows age 1–9, 15% cows over age 10, and 10% elk of unknown sex and/or age. Bison kills included 4 calves, 3 cows, 7 bulls, and 9 adults of unknown sex.

Preliminary examination of winter predation rates during 30-day study periods showed that the number of elk killed per wolf on the northern range declined from an average of 1.8 elk in 1995–2000 to 0.9 elk in 2008. The decrease has been attributed to changes in prey selection (shift to bull elk), an increase in scavenging on winter-killed ungulates, and a suspected decrease in the vulnerable prey available to wolves. Consumption rates (kg of biomass eaten per wolf per day), however, have not declined, probably because of the increase in the number of bull elk killed.

Research on summer predation continued with downloadable GPS collars deployed on four wolves in two packs, Oxbow Creek and Leopold. Preliminary data indicate different wolf–prey interactions in summer than in winter. Graduate students conducting research in 2008 included Emily Almberg studying wolf diseases with L. David Mech at the University of Minnesota; Daniel Stahler studying social behavior and genetics with Robert Wayne at the University of California, Los Angeles; and Matthew Metz studying summer predation with John Vucetich at Michigan Technological University.

Wolf management activities included den closures and hazing of habituated wolves. Public outreach to park visitors continued as 8,660 contacts were made in the field where visitors were watching wolves. Project staff counted 35,000 people who saw wolves during the summer season, and gave 156 public presentations and 78 interviews to all forms of media. On visits to backcountry hunters along the park boundary in Gallatin National Forest, project staff were accompanied by staff from Gallatin National Forest, including Gardiner District Wildlife Biologist Dan Tyers, retiring District Ranger Ken Britton, and new Forest Supervisor Mary Erickson.

# Yellowstone Wolf Pack Territories, 2008

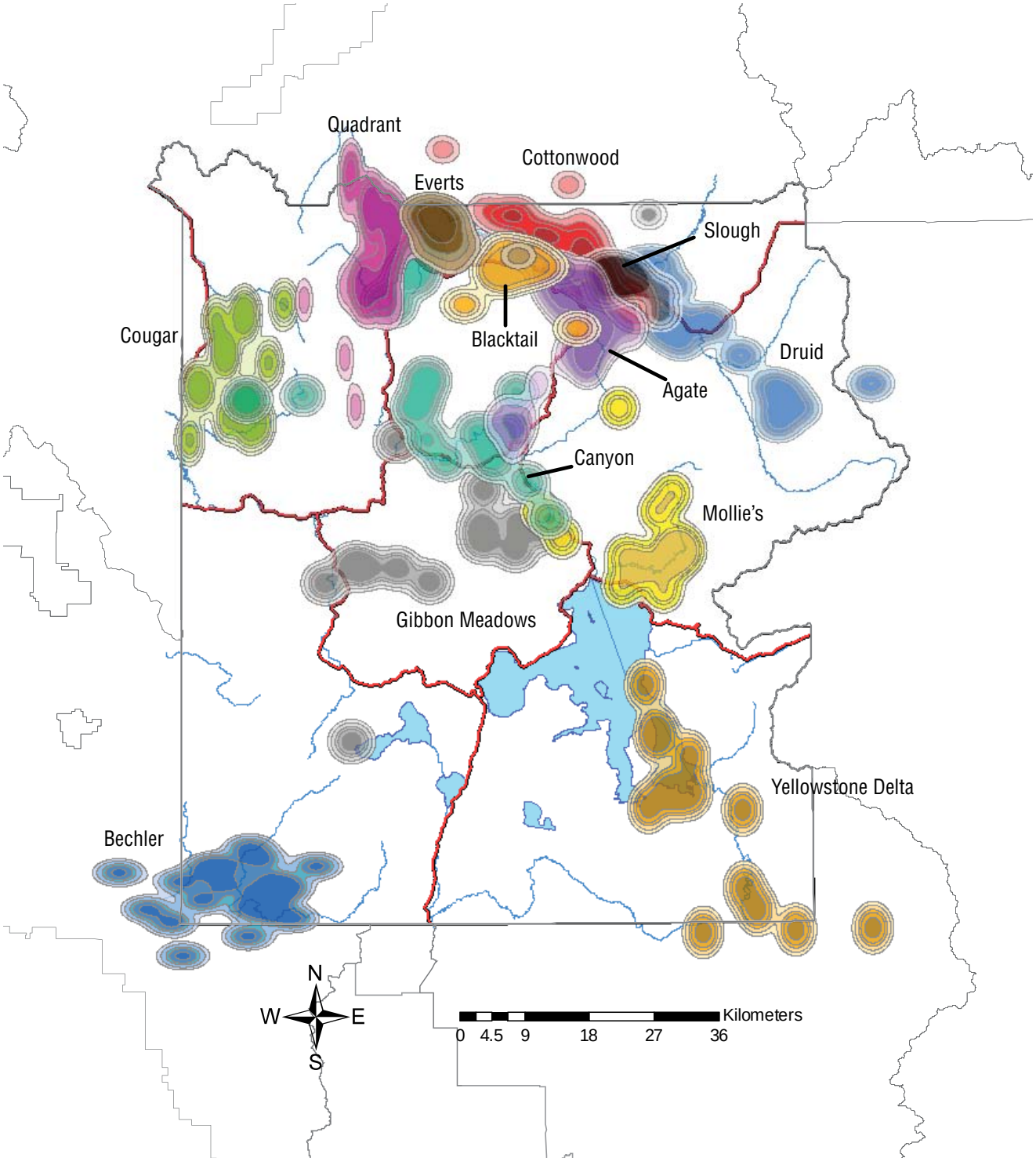


*Figure 1. Wolf pack territories in Yellowstone National Park in 2008, plotted as kernel estimates. Darker colors depict higher use, or core, territories.*

*Wolves from the Druid Peak pack testing elk. The elk are standing their ground, often a very effective strategy against wolves.*

## The Yellowstone Wolf Population

### *Population and Territory Status*

At the end of 2008, at least 124 wolves in 12 packs (6 breeding pairs), 2 non-pack groupings, and 6 loners occupied Yellowstone National Park (YNP; Fig. 1, Table 1). This represents a 27% decline from 171 in 2007 (Fig. 2) and is the lowest breeding pair count since the minimum of 30 breeding pairs in the northern Rocky Mountains was achieved in 2000. Both the northern range and interior wolf population declined, and for the first time in several years the interior wolf population was larger than the northern range population. Intraspecific strife and disease were the likely causes of the decline.

Four new packs formed in 2008, three on the northern range. An unnamed group in 2007 became the Quadrant Mountain pack in 2008 when they attempted to den and had a defined territory in the old Swan Lake/Gardner's Hole pack territories (Fig. 3). The Mount Everts pack carved out a section of Leopold territory and had at least three pups. The Blacktail Deer Plateau pack formed via partial splitting of the Druid Peak and Agate Creek packs and ranged widely, slightly favoring Blacktail Deer Plateau. The Canyon pack, dispersers from Mollie's and the Hayden Valley packs, formed in the interior. A radio-collared lone wolf from the Steele Mountain pack in Idaho (#B271) left YNP during the summer and settled east of the park in late 2008.

Two packs dissolved (Leopold, Oxbow Creek), and a third dispersed from the park (Hayden Valley). The future of the Slough Creek and Agate Creek packs, whose numbers declined, is in question.

Despite pack additions and losses, wolf range and distribution was mostly unchanged in 2008, a pattern similar to the last several years (Fig. 3). Overall pack size ranged from 4 (Quadrant Mountain, Agate Creek, Cougar Creek) to 25 (Gibbon Meadows) and averaged 9.3, compared to the long-term average of 10 wolves. The average number of pups per pack in early winter was 1.8.

| Pack | Adults | Pups | Total |
|---|---|---|---|
| **Northern Range** | | | |
| Quadrant Mountain | 4 | 0 | 4 |
| Everts | 5 | 3 | 8 |
| 527F Group | 3 | 0 | 3 |
| 471F Group | 3 | 0 | 3 |
| Blacktail Deer Plateau | 8 | 0 | 8 |
| Agate | 4 | 0 | 4 |
| Slough | 7 | 0 | 7 |
| Druid | 8 | 5 | 13 |
| Loners/Non-pack Wolves | 6 | 0 | 6 |
| **Northern Range Totals** | **48** | **8** | **56** |
| **Non-Northern Range** | | | |
| Mollie's | 10 | 3 | 13 |
| Yellowstone Delta | 7 | 2 | 9 |
| Yellowstone Delta Subgroup | 4 | 0 | 4 |
| Bechler | 6 | 3 | 9 |
| Cougar Creek | 4 | 0 | 4 |
| Gibbon Meadows | 19 | 6 | 25 |
| Canyon | 4 | 0 | 4 |
| **Non-Northern Range Totals** | **54** | **14** | **68** |
| **Total** | **102** | **22** | **124** |

Underline denotes breeding pair.

*Table 1. Yellowstone National Park wolf population, December 2008.*

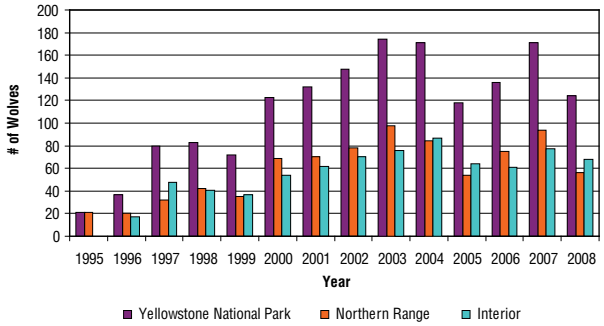


*Figure 2. Yellowstone National Park early winter wolf population, 1995–2008.*

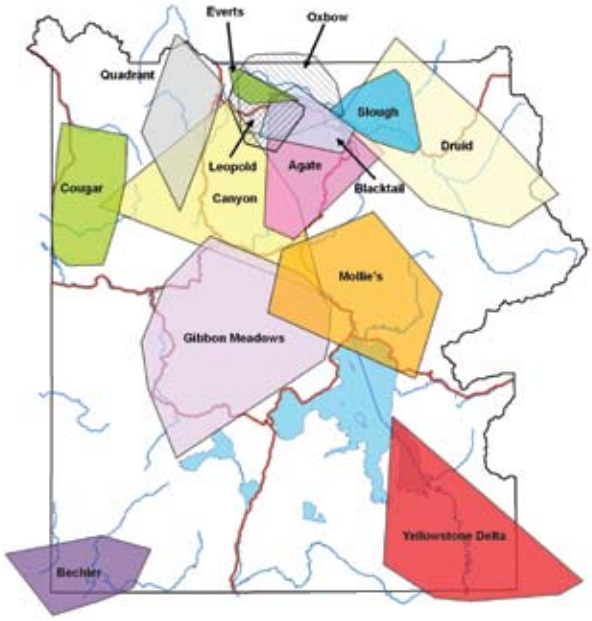


*Figure 3. Yellowstone National Park wolf pack territories, 2008. Cross hatching indicates two packs that dissolved (Leopold and Oxbow Creek).*

Two notably old wolves survived through 2008: #126F, the probable breeding female in the Yellowstone Delta pack, and #192M, the longtime white alpha male of the Bechler pack, both reached 11 years of age. Wolf #302M, a visible and well-known wolf on the northern range reached 8 years of age. Other old wolves still alive at the end of the year were #472F of Agate Creek (7–8 years), #586M of Mollie's (6–8 years), #587M of Canyon (7–8 years), #482M of Gibbon Meadows (7–8 years), and #538M of Gibbon Meadows (7–9 years).

*Northern range:* An almost complete reorganization of northern range packs and wolves occurred in 2008 due to dispersal, high mortality, and packs splitting. The Leopold pack, which formed in 1996 and occupied Blacktail Deer Plateau, dissolved in 2008 (see inset story, page 6), and the Blacktail pack filled their vacancy. The Oxbow Creek pack disappeared with no known surviving members, and a new unnamed group led by old Slough Creek #527F filled in behind Oxbow Creek. The Agate Creek pack was reduced to probably four wolves but could not be tracked without functioning radio collars. The Slough Creek pack, last observed in 2008 with seven wolves, was similarly reduced, and without radio collars their status was unknown. Movements in late 2008 suggest that they may have dispersed from the park. The Druid Peak pack remained intact, despite losing wolves through dispersal and suffering high pup mortality (as did all packs on the northern range). Despite the overturn, six packs occupied the northern range at the end of the year, an increase of one since last year, but the population declined 40%, from 94 in 2007 to 56 in 2008.

Several smaller "groups" (#527F Group, #471F Group, Druid trio) that could potentially become packs were present late in the year. Groups are temporary associations of wolves that may or may not coalesce as a pack. The presence of numerous groups on the northern range was more common in the early days of wolf recovery when pairs of wolves or small groups could more easily establish territories and become packs. Since then small groups and packs have been at a competitive disadvantage against larger packs and unable to maintain themselves on the landscape.

*Interior:* There was more stability in the interior than on the northern range in 2008, with six packs (no change from 2007). The population declined by 11%, from 77 to 68 wolves. The Hayden Valley pack dispersed to a new location west of the park but was replaced by the Canyon pack, which produced two pups (neither survived). All other interior packs survived the year but declined in number except Gibbon Meadows, which increased to 25 wolves, the largest in the park; Mollie's decreased from 14 to 13, while the Yellowstone Delta pack saw the largest decrease since 2007, from 22 to 9. In September, the Cougar Creek pack lost its longtime alpha female at 10 years of age, but a loose pack of four continued to occupy their traditional territory. The Bechler pack declined from 11 to 9 wolves but remained intact despite occupying a territory thought to be marginal due to low numbers of wintertime ungulates.

## *Reproduction*

Of the 77 known births in 2008, 22 pups survived the summer (29%), one of the poorer survival rates on

*Leopold wolf carrying a pup.*

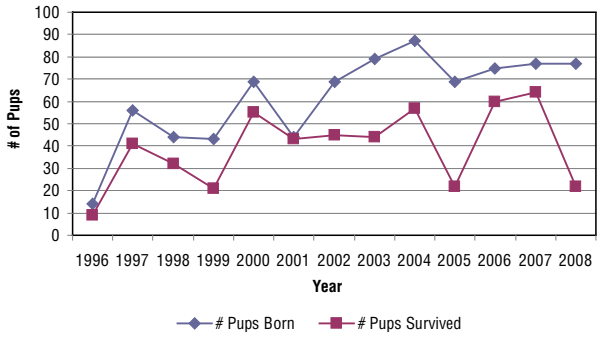


*Figure 4. Yellowstone National Park pups born and survived, 1995–2008.*

record in the park (Fig. 4). Disease was the probable cause and canine distemper virus (CDV) was again suspected. At year end, pups comprised 17% of the population, a much lower percentage than usual. Two of the 11 packs that were present in spring appeared to have no pups (Quadrant Mountain and Cougar Creek); Quadrant Mountain localized briefly around a partially dug den but no evidence of pups was found. Cougar Creek did not localize. The Blacktail Deer Plateau pack, which was newly formed in 2008, had no pups. The Leopold, Oxbow Creek, Agate Creek, Slough Creek, and Canyon packs all had pups but none survived. Mount Everts, Druid Peak, Mollie's, Yellowstone Delta, Bechler, and Gibbon Meadows packs each had some surviving pups. Gibbon Meadows had the most surviving pups (6), followed by Druid (5 out of 18 pups born). The average number of surviving pups was 1.8. Two northern range packs, Leopold and Druid Peak, had more than one litter. Wolf Project staff were able to visit every den site except Yellowstone Delta, Bechler, and Gibbon Meadows.

## Mortalities

Seventeen collared wolves died in 2008, the most of any year since reintroduction (Table 2). These included 2 old adults (>5 years), 10 adults (2–5 years), and 5 yearlings. Five males and 12 females died. Ten wolves died of intraspecific strife (59%), a single-year high; other causes of mortality were malnutrition (only the second and third recorded cases), disease, and unknown.

| # of Deaths | Wolf #/Sex | Age Class | Pack | Date of Death | Cause of Death |
|---|---|---|---|---|---|
| 1 | 544M | Adult | Bechler | 1/2/2008 | Unknown |
| 2 | 592F | Adult | Disperser from Leopold | 4/14/2008 | Intraspecific |
| 3 | 629M | Adult | Slough Creek | 7/28/2008 | Natural Unknown |
| 4 | 643F | Adult | Agate Creek | 8/4/2008 | Intraspecific |
| 5 | 591F | Adult | Leopold | 8/12/2008 | Intraspecific |
| 6 | 526F | Adult | Slough Creek | 9/3/2008 | Intraspecific |
| 7 | 380F | Adult | Slough Creek | 9/6/2008 | Intraspecific |
| 8 | 534M | Old adult | Leopold | 9/13/2008 | Intraspecific |
| 9 | 589F | Adult | Oxbow Creek | 9/19/2008 | Intraspecific |
| 10 | 626F | Yearling | Oxbow Creek | 9/24/2008 | Natural Unknown |
| 11 | 151F | Old adult | Cougar Creek | 10/2/2008 | Natural Unknown |
| 12 | 628M | Adult | Oxbow Creek | 10/9/2008 | Disease |
| 13 | 644F | Yearling | Agate Creek | 10/26/2008 | Intraspecific |
| 14 | 631F | Yearling | Slough Creek | 10/27/2008 | Intraspecific |
| 15 | 623M | Yearling | Leopold | 11/14/2008 | Natural Unknown, Disease, Malnutrition |
| 16 | 630F | Yearling | Slough Creek | 11/18/2008 | Intraspecific |
| 17 | 588F | Adult | Leopold | 12/5/2008 | Malnutrition |

*Table 2. Confirmed mortalities of collared Yellowstone National Park wolves, 2008.*

*Mount Everts pack sifting through elk looking for a vulnerable target.*

*This elk, cornered on a cliff, stood its ground and survived.*

## Pack Summaries

### *Quadrant Mountain Pack (4 wolves: 4 adults, 0 pups)*

Formerly known as the #469F group for its lead female, formerly of the Leopold pack, this pack was officially named the Quadrant Mountain Pack during early winter 2008. During the 2008 breeding season, #469F dispersed from Leopold territory and joined three other wolves in the Gardner's Hole/Rainbow Lake area, formerly Swan Lake and Gardner's Hole wolf pack territories. The core of their territory then stabilized in Gardner's Hole but the pack's movements often stretched toward Sepulcher Mountain and Reese Creek. This territory exists at the western edge of the northern wolf range with no packs immediately to the west and territorial overlap with other packs was limited. No clashes with other wolves were recorded during early winter 2008. Led by #469F and #695M, a black male of unknown origin, this pack had only four wolves at year end. The pack localized around a shallow den for several weeks, but there was no evidence of pups. Their isolation may have protected them from both canine distemper virus (CDV) and mange as they showed no signs of either.

### *Mount Everts Pack (8 wolves: 5 adults, 3 pups)*

Related to the Leopold pack, the Mount Everts pack formed in 2008. They were one of the few northern range packs to successfully raise pups in 2008, with three surviving to the end of the year. It is likely that they contributed to the demise of the Leopold pack when they killed the alpha male and possibly others. Their movements were centered on Mount Everts and radiated toward the Yellowstone River, Rescue Creek, and Turkey Pen. The limited data suggest that, similar to the Oxbow Creek pack, Everts has colonized a portion of former Leopold territory. Interestingly, #470F, originally in the Leopold pack, has continued to reside within the territorial boundaries of her natal pack despite two dispersals to other packs.

### *Leopold Pack (0 wolves at year end)*

Following the dispersal of a few wolves during the 2008 breeding season, the Leopold pack numbered 12 wolves in March. They were able to maintain their core traditional territory on Blacktail Deer Plateau. In the spring, a minimum of three wolves produced litters (alpha #209F, GPS-collared #625F, and an uncollared black female) with 25 pups alive in early June; none of the pups survived. Neighboring pack intrusions occurred throughout the summer. The Oxbow Creek pack was observed

*Leopold pups of varying size obviously represent different litters and birth dates. None of the pups survived.*

foraging in Leopold territory on multiple occasions in late summer. Trespasses by both the Oxbow Creek and Mount Everts packs likely resulted in the death of at least two Leopold wolves: subordinate #591F in August and alpha #534M in September. Pack clashes, along with disease, probably led to the demise of this long-time Yellowstone pack once considered the most stable in the park (see inset story, page 6). Their territory was split between the Mount Everts and Blacktail Deer Plateau packs, both containing wolves of Leopold origin.

### ***Blacktail Deer Plateau Pack*** *(8 wolves: 8 adults, 0 pups)*

A new pack was formed when six Druid Peak males and four Agate Creek females joined in November 2008. Eight-year-old Druid #302M and a two-year-old uncollared gray female from Agate Creek led another two-year-old female and seven yearlings, including #642F from Agate Creek. They traveled widely from Little America to Blacktail Deer Plateau. One female disappeared after an interaction with the Druid Peak pack in late November. A gray male dispersed from the pack in December.

### ***Oxbow Creek Pack*** *(1 loner)*

In early 2008, the Oxbow Creek pack was stable with 15 adult wolves. The pack produced at least six pups at a new den site near Little Cottonwood Creek. However, an uncollared adult wolf and one pup were found dead in mid-summer. None of the other pups survived the summer and by fall the pack had dissolved. In September, during a routine wolf tracking flight, Wolf Project staff observed the Agate Creek pack chasing the Oxbow Creek pack and killing #589F. Soon after, both

*The Oxbow Creek pack chase a subordinate.*

*The Oxbow Creek pack traveling before the pack dissolved.*

#626F and #628M died of unknown causes, possibly disease. Only one wolf, the old alpha #536F, was still being tracked by early winter, and she was thin and appeared to have mange. The data from two GPS collars (on alpha #627M and subordinate adult #626F) were used in the summer predation study.

### ***527 Group*** *(3 wolves: 3 adults, 0 pups)*

Because of frequent changes in composition, this group was not considered an established pack. Aging Slough Creek #527F led this group comprised of former Slough Creek wolves and an uncollared gray alpha male of unknown origin. During the breeding season, #527F localized in the Trough area and was only seen with the alpha male. No pups were ever observed. The group's territory included Little Cottonwood Creek and other areas north of the Yellowstone River and Hellroaring Creek. The group count ranged from three to five, with wolves apparently moving back and forth from the Slough Creek pack.

### ***Agate Creek Pack*** *(4 wolves: 4 adults, 0 pups)*

The Agate Creek pack declined from 17 wolves in 2007 to 4 wolves at the end of 2008; tracking was difficult

# The Leopold Pack: Yellowstone's "Most Stable Pack"?

*by Matthew Metz and Doug Smith*

*The Leopold pack near their traditional den. No pups survived from this pack in 2008, contributing to their decline. Distemper was the likely cause of the pup mortality.*

With the reintroduction of wolves to Yellowstone National Park in 1995, managers expected lone wolves to pair and start new packs in the age-old fashion of wolves. What was not predicted was that the first pack to form would come to be known as "our most stable pack." The pairing of #2M from the Crystal Creek pack and #7F from the Rose Creek pack in January 1996 created the Leopold pack, named to commemorate Aldo Leopold's 1944 suggestion to reintroduce wolves to Yellowstone. The pack was located on the Blacktail Deer Plateau, an area with plentiful elk—especially bulls in winter—and rolling hills that offer natural barriers from humans and other wolf packs. This was their core territory for 12 years and they became adept at preying on bull elk, at least to the degree that bulls are vulnerable, usually in late winter.

Not only was their diet stable, their leadership was too. Founding alpha wolves #2M and #7F guided the pack until May 2002 when #7F was killed by neighboring wolves believed to be from the Geode Creek pack. Having bred together seven times, which is remarkable considering the average life span of a wolf in Yellowstone is approximately four years, this pair has had the longest partnership of any alpha pair in the brief post-reintroduction history of Yellowstone wolves. While wolves #2M and #7F were the alphas, the Leopold pack often numbered around 10–12 wolves and never had more than 15.

Following the death of #7F, wolf #2M was still with the pack as winter arrived in November 2002. We assumed that wolf #7F would be replaced by an outside wolf dispersing in, but this is not what happened. Around Thanksgiving, wolf #2M left Leopold territory with six pack mates. Later we realized that an uncollared male from the Nez Perce pack (later numbered 534M) had joined the pack while #2M was still present, and that his arrival had probably forced #2M out. Number 534M became the new alpha male, and when #2M returned to the Leopold pack one more time, he was not welcomed back by #534M and another male, and he left, tail tucked. Wolf #2M met the same fate as his former mate when he was killed by the Geode Creek pack on the final day of 2002.

As #534M's reign as alpha male began in late November 2002, wolf #259F (offspring of #2M and #7F) became alpha female. Unlike other Leopold alphas, her time was short-lived; she and #534M produced one litter of pups before she died in April 2003. Her pups likely died too; however, a second litter of eight pups was also produced that year, beginning a trend of multiple litters that would continue in future years.

After #259F, #209F, of Leopold descent, became the third alpha female for the Leopold pack. She had left the pack with #2M in late 2002, but only stayed with him briefly before disappearing for several months. Surprisingly, she was found back with the Leopold pack in late March 2003, with an injured hind right leg (likely a healed break) that made her a poor hunter for the rest of her life. However, what she lacked in hunting ability she made up for with leadership skills and remained

alpha female for the rest of the pack's history. She bred with #534M five times, and the pack's size peaked at 25 adult wolves in the winter of 2004–05. The last time the pair produced pups was in 2008, when the pack had at least three litters totaling 25 pups. With the possible addition of a new army of young wolves to a pack that then had 13 adults, it looked as if the Leopold pack would continue to be a force on the northern range.

By summer's end, however, most of the 25 pups had died, probably due to the third outbreak of distemper in ten years. In September 2008, the pack received another blow when #534M was killed by other wolves, likely the newly formed Mount Everts pack. Following #534M's death, the pack was often fractured and most of the remaining collared wolves died before the end of the year. Alpha female #209F's collar no longer worked, so her fate is unknown, but she was not seen again. The Leopold pack was no more.

Despite their abrupt and unforeseen end, the Leopold pack was the constant picture of stability throughout their tenure. Many packs in Yellowstone have traditional areas, but none seemed to be used in the way Leopold used theirs—a seamlessness suggestive of wisdom and ease (perhaps not unlike their human namesake). This was especially remarkable due to frequent interpack clashes resulting in numerous territory transfers among Yellowstone's northern range wolf packs. To the end the Leopold wolves held onto their territory on the Blacktail Deer Plateau despite disease and attacks from other packs. As always with wolves, the future is unclear, but wolf #302M, who was born to Leopold and dispersed years ago, now leads a different pack that visits the Blacktail area in the absence of that first great pack.

*Wolf Project staff investigate the cause of death of Leopold alpha male #534. He was likely killed by Mount Everts wolves.*

*Deep snow generally increases wolf kill rates as seen here in what was a successful hunt by Slough Creek on an elk cow.*

because none had functional radio collars. Two pups were observed at the pack's den site but no pups survived. Interpack clashes resulted in the death of #643F and #644F during separate encounters with the Druid Peak pack. In November four Agate females (#642F, an uncollared wolf known as "Half-tail," an uncollared black, and an uncollared gray) dispersed and joined six Druid males, including #302M, forming the Blacktail Deer Plateau pack. The remaining Agate Creek pack members were the two alphas, #472F and #383M, and two other adults.

### ***Slough Creek Pack*** *(7 wolves: 7 adults, 0 pups)*

Formed in 2002, the Slough Creek pack had 16 members at the end of 2007. In 2008, all three adult females appeared pregnant but only two pups were observed at their Slough Creek den site, which was visible from the road and monitored during all daylight hours. Wolf Project staff investigated the den area in late summer and found the remains of one pup. Adult #629M separated from the pack in July, appeared to be ill, and spent two weeks alone before dying. The cause of death was unknown but disease was suspected. Five wolves (beta #526F, alpha #380F, yearling #631F, yearling #630F, and an uncollared female yearling) were later killed by other wolves. This left the pack with only one collared wolf, alpha #590M, who ultimately dispersed and became a lone wolf. Because so many of the wolves

*Relegated to bystander status, a wolf from Mollie's pack looks for an opening to steal a tidbit.*

*Mollie's pack wolves in Pelican Valley in a standoff with bison, who tend not to flee as much as elk.*

*An adult bison killed by the Gibbon Meadows pack. Ravens move in to feed as well.*

had died, including all of the pups, and none of the remaining wolves were collared, the pack's status at year end was uncertain. In December, seven wolves were spotted near Hellroaring Creek, but no other locations were known; some pack movements may have occurred outside of the park.

### ***Druid Peak Pack*** *(13 wolves: 8 adults, 5 pups)*

Compared to other northern range packs, Druid Peak fared well in 2008, led by alphas #480M and #569F. After denning in the backcountry the previous three seasons, they returned to their traditional den site near Soda Butte Creek. Differing sizes among pups indicated at least three litters were produced. Although 18 pups were observed, only five survived to year end. In November, eight-year-old #302M and five yearling males dispersed and joined four Agate females, creating the Blacktail Deer Plateau pack. Two other wolves, both two-year-old females, dispersed in late 2008. The pack greatly expanded their territory into Slough Creek, Little America, and Tower, killing several Slough Creek and Agate Creek wolves in the process. The alpha #480M is the only adult male known to remain in the pack, along with seven adult females (including #569F, #571F, #645F) and five pups.

### ***Mollie's Pack*** *(13 wolves: 10 adults, 3 pups)*

Mollie's pack continued to anchor their movements in Pelican Valley and prey on bison in winter. Wolf-bison-grizzly bear studies continued in late March for the eleventh year. At least one litter was produced but only three pups survived to year end. The pack abruptly moved to the southeast side of the valley during mid-summer coincident with a forest fire that broke out in the LeHardy Rapids area and quickly spread to the Sulfur Hills where the pack had previously denned. Several wolves were observed with hair loss indicating an increase in the incidence of mange.

### ***Canyon Pack*** *(4 wolves: 4 adults, 0 pups)*

This pack formed in spring 2008 and was likely comprised of dispersing wolves from the Hayden Valley (one female) and Mollie's (two males) packs. The pack produced two pups, which were temporarily stashed in a road culvert below the main highway near Canyon when the pack moved between homesites; neither pup survived. One pup lived into September but was not seen after that. Although filling in behind the Hayden Valley pack, which moved to a territory outside the park, these wolves occasionally spent time on the northern range, especially around Mammoth Hot Springs.

*The nearly 11-year-old white wolf of the Bechler pack, presumed to be alpha, is shown here with his mate.*

*Affectionately known as "Tripod" because she only has three legs, this wolf nonetheless survives seemingly without difficulty in the Cougar Creek pack.*

### ***Yellowstone Delta Pack*** *(9 wolves: 7 adults, 2 pups)*

Pack size declined from 22 wolves in 2007 to 9 at the end of 2008. The pack continued to roam the remote southeast corner of the park. Eleven-year-old alpha #126F, the oldest known female wolf in the park, was presumably still reproductively active in 2008. During a brief trip outside the east park boundary in March, some pack members were responsible for livestock depredation leading to the lethal removal of four wolves, the first known occasion of depredation in this pack's history. As in most years, the Wolf Project staff's ability to monitor this pack was impeded by collar malfunction and individual wolves dying or disappearing.

### ***Bechler Pack*** *(9 wolves: 6 adults, 3 pups)*

Since its formation in 2002, the Bechler pack has remained relatively stable in its territory in the southwest corner of Yellowstone. While an ample supply of elk, deer, moose, and beaver are available to Bechler wolves in the summer and fall, deep snows require the pack to venture outside of YNP into Idaho and Wyoming in search of prey in winter. In 2008, this pack was still led by its founding alpha pair—the distinctly white #192M and an uncollared silver-black female. Born in the Rose Creek pack in 1997, #192M was nearing 12 years of age, Yellowstone's oldest known wolf. The pack remained difficult to collar because of their infrequent presence within YNP during the winter.

### ***Cougar Creek Pack*** *(4 wolves: 4 adults, 0 pups)*

This pack did not produce pups in 2008, possibly because the long-time alpha female appeared to have been badly injured in March by an elk or bison. Observed on numerous occasions, she was able to get around on her three good legs for several months but was unable to keep up with the pack and had to survive by scavenging on carcasses. The hard winter, resulting in an increase in carcasses, probably aided her for a while, but she died in September at 10 years of age. No subordinate females had pups and no wolves localized around a den site. During the summer, pack movements were less cohesive than those of other packs, possibly due to the absence of pups, but by winter the four remaining wolves were traveling together again. One of these wolves, #632F, had only three legs, possibly having lost one in a snare along the park boundary, but despite falling behind at times, she was able to keep up with the pack.

### ***Gibbon Meadows Pack*** *(25 wolves: 19 adults, 6 pups)*

At the end of 2008, the Gibbon Meadows pack had the most pups and was the largest pack in the park. Usurping former Nez Perce pack territory, expanding into Hayden Valley, and preying on both bison and elk, this pack thrived while others declined. This bison-killing pack has some very large males, especially alpha #482M, who, when captured for re-collaring, was too big for staff to weigh in deep snow.

## Wolf Capture and Collaring

In 2008, twenty-eight wolves in ten packs were captured and collared (Table 3), 11 males and 17 females: one old adult, 5 adults, 6 yearlings, and 16 pups. At year end, 32 (26%) of the 124 known wolves were collared. Three types of radio collars were deployed: 1) VHF, 2) downloadable GPS, 3) and ARGOS (a satellite/GPS hybrid system). Placement of collars was dependent on monitoring objectives, but VHF radio collars were still the most commonly used collar by the program.

*A GPS collar is placed on a Druid wolf during capture operations. The data provided by these collars help Wolf Project staff to understand movement patterns of wolf packs, especially along the park boundary.*

| Capture Date | Wolf #/ Sex | Age | Color | Pack |
|---|---|---|---|---|
| 1/16/2008 | 623M | Pup | Gray | Leopold |
| | 624F | Pup | Black | Leopold |
| | 625F | Yearling | Gray | Leopold |
| 1/23/2008 | 626F | Pup | Gray | Oxbow Creek |
| | 627M | Adult | Gray | Oxbow Creek |
| | 628M | Yearling | Gray | Oxbow Creek |
| | 629M | Yearling | Black | Slough Creek |
| | 630F | Pup | Gray | Slough Creek |
| | 631F | Pup | Black | Slough Creek |
| 1/24/2008 | 126F | Old adult | Black | Yellowstone Delta |
| | 633F | Pup | Black | Yellowstone Delta |
| | 634F | Yearling | Black | Yellowstone Delta |
| | 635F | Yearling | Gray | Yellowstone Delta |
| | 632F | Adult | Gray | Cougar Creek |
| | 636M | Pup | Gray | Cougar Creek |
| 2/14/2008 | 638M | Pup | Black | Hayden Valley |
| | 639M | Yearling | Gray | Hayden Valley |
| | 640F | Pup | Gray | Mollie's |
| | 641M | Pup | Gray | Mollie's |
| 2/15/2008 | 642F | Pup | Black | Agate Creek |
| | 643F | Pup | Gray | Agate Creek |
| | 644F | Pup | Gray | Agate Creek |
| | 645F | Pup | Gray | Druid Peak |
| | 482M | Adult | Black | Gibbon Meadows |
| | 537F | Adult | Gray | Gibbon Meadows |
| | 646F | Pup | Gray | Gibbon Meadows |
| | 647M | Pup | Gray | Gibbon Meadows |
| 4/16/2008 | 663M | Adult | Gray | Unknown |

*Table 3. Yellowstone Wolf Project collaring operations, 2008 calendar year.*

## Wolf Predation

### *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 for two winter-study sessions in 2008 during which wolves were intensively radio-tracked for 30-day periods in March and from mid-November to mid-December. The Blacktail and Quadrant Mountain (November–December), Druid Peak (March and November–December), and Leopold and Oxbow Creek packs (March) were the main study packs monitored by three-person ground teams. All packs in the park were monitored from aircraft. In addition, ground crews opportunistically monitored the Slough Creek, Agate Creek, Hayden Valley, and Mollie's packs, and two newly formed groups of wolves. The Cougar Creek and Gibbon Meadows packs were monitored from aircraft only. The Yellowstone Delta and Bechler packs were rarely located from the ground or air due in part to their absence from the park or poor conditions for aerial monitoring in southern YNP. Wolf Project staff recorded behavioral interactions between wolves and prey, predation rates, total time wolves fed on carcasses, percent consumption of kills by scavengers, characteristics of wolf prey (e.g., sex, species, nutritional condition), and characteristics of kill sites. In addition, similar data were collected opportunistically throughout the year during weekly monitoring flights and ground observations.

*Bull elk in winter.*

## *Composition of Wolf Kills*

Wolf Project staff detected 576 kills (definite, probable, and possible combined) made by wolves in 2008, including 463 elk (80%), 23 bison (4%), 19 deer (3%), 13 coyotes (2%), 11 wolves (2%), 5 pronghorn (<1%), 3 moose (<1%), 3 grouse (<1%), 2 bighorn sheep (<1%), 2 ravens (<1%), and one each of beaver, golden eagle, grizzly bear, cougar, red fox, and otter, and 26 unknown prey (5%). The composition of elk kills was 27% calves (0–12 months), 16% cows 1–9 years old, 15% cows ≥10 years old, 32% bulls, and 10% elk of unknown sex and/or age. Bison kills included 7 bulls, 4 calves, 3 cows, and 9 adults of unknown sex.

Preliminary examination of winter predation rates in 2008 showed a decrease in kill rate compared to earlier years. Winter predation rates for 1995–2000 showed that wolves residing on the northern range killed an average of 1.8 elk/wolf/30-day study period. In recent years, this rate has decreased by 50% to approximately 0.9 elk/wolf/30-day study period. Changes in prey selection (shift to bull elk), an increase in scavenging on winter-killed ungulates, and a suspected decrease in the vulnerable prey available to wolves factor into this decrease in kill rates. However, when examined as biomass consumed (kg/wolf/day), kill rates have been stable since 1995. The wolf–elk interaction continues to be a primary focus of predation studies in YNP. Since wolf reintroduction the elk population has declined approximately 50% (Fig. 5) as a result of factors including wolf predation, other predators, management of elk outside YNP, and long-term drought.

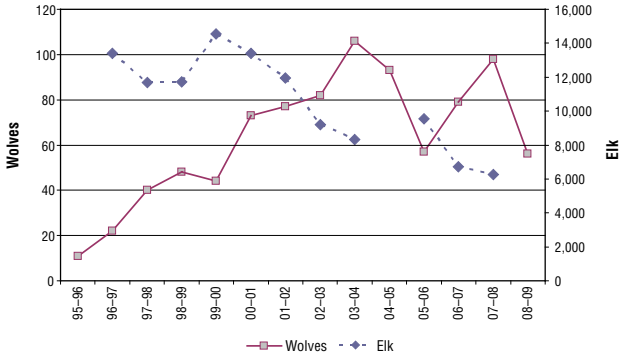


*Figure 5. Yellowstone National Park northern range elk–wolf population, 1995–2008.*

## *Winter Studies*

**March.** During the 30-day March winter study, packs were observed for 472 hours from the ground. The number of days wolf packs were located from the air ranged from 15 (Cougar Creek) to 18 (Druid, Leopold, Oxbow, Agate, Slough, and several sub-groups). Air and ground teams recorded a total of 113 carcasses utilized by wolves, mostly wolf kills, with some winter-killed ungulates scavenged upon. These carcasses included 90 elk, 17 bison, 1 bighorn sheep, and 4 unknown species. The elk included 43 (48%) cows, 33 (37%) bulls, 9 (10%) calves, and 5 (5%) adults of unknown sex. Of these utilized carcasses, 79 elk, 8 bison and one bighorn sheep were killed by wolves, while 17 carcasses (11 elk, 5 bison, 1 unknown species) were winter-killed and scavenged by wolf packs. Documenting the consumption of biomass

*Looking directly at the camera, this Mollie's wolf in Pelican Valley has been feeding on a freshly killed bison.*

from ungulates not killed by wolves is important in understanding the variation in kill rates over time. Lower than expected kill rates, particularly for larger wolf packs, can sometimes be explained by increased scavenging of winter-killed ungulates in the spring.

**November–December.** During the 30-day November–December winter study, wolves were observed for 292 hours from the ground. The number of days wolf packs were located from the air ranged from 2 (Bechler) to 14 (Mollie's, Druid Peak, 471F's group). Aerial monitoring was affected by poor weather conditions. Air and ground teams recorded a total of 38 ungulate carcasses utilized by wolves, mostly wolf kills and some ungulates that died of natural causes. Wolf Project staff documented 33 wolf kills: 28 elk (50% bulls, 36% cows, 7% calves, and 7% unknown sex adult), 3 bison (1 bull, 1 cow, 1 calf), and 2 moose killed by wolves. This was fewer wolf kills than during the same period in 2007. Five carcasses (3 bull elk, 2 bull bison) were scavenged by wolf packs.

*Research conditions in the winter are often brutal as Josh Irving demonstrates here.*

The significance of bull elk in the early winter prey selection continued to be of interest as Wolf Project staff sought to understand the changing patterns in the availability of vulnerable prey. With good 2008 summer and fall forage for ungulates, it may be that post-rut bull elk have been more vulnerable to predation than cow and calf groups.

## *Summer Predation*

In collaboration with Michigan Technological University, Wolf Project staff continued to document summer predation patterns of wolves. Documenting the predatory habits of wolves in summer is problematic due to the lack of snow for tracking, lessened pack cohesiveness, grizzly bear kleptoparasitism (usurpation) of carcasses, 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 scats collected at den and rendezvous sites. However, this technique does not provide information on whether wolves were feeding upon freshly killed prey or scavenging on older carcasses and offers a very incomplete record. Although scats were again collected in 2008, GPS collar technology was used to facilitate a greater understanding of summer predation patterns.

During the 2008 capture season, Wolf Project staff deployed four downloadable GPS collars on wolves on the northern range to enhance 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. The goal was to obtain weekly data downloads from May 1 to July 31 on collars programmed to collect location data every 30 minutes. This approach has proven successful in prior years for summer predation studies by yielding high-resolution wolf movement data revealing composition of prey killed by wolves, including neonate elk calves.

The 2008 summer predation study proved to be the Wolf Project's most successful to date. The GPS collars placed on Leopold wolves #624F (pup) and #625F (yearling) and Oxbow wolves #626F (pup) and #627M (alpha male) (Fig. 6) all obtained more than 99% of possible locations, except when #625F was in the den after giving birth. Summer predation staff worked intensively to search

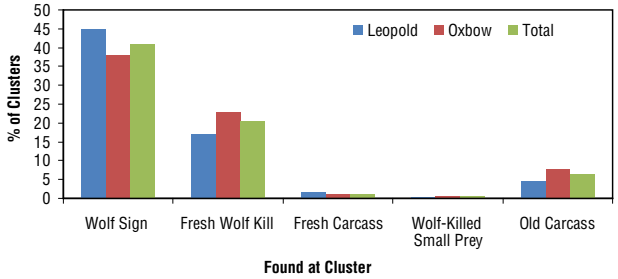


*Figure 6. Wolf sign, wolf-killed prey, and scavenged carcasses found where GPS locations were clustered.*

clusters of GPS locations, hiking more than 1,600 miles during the 3-plus month field season. While searching, staff recorded the presence of wolf sign, wolf-killed prey, carcasses scavenged by wolves (classified as either fresh or old), and small prey killed by wolves (for example, blue grouse; Fig. 6). During this effort, a minimum of 150 suspected kills were found at identified clusters.

Wolf Project staff hope to incorporate genetic analyses into investigations of bone shards at neonate kill sites, which can be difficult to identify. Of the kills detected, almost 90% were elk, with deer making up most of the other kills. The two packs differed in their prey composition, with more neonate elk and deer killed by Oxbow, while Leopold focused mostly on bull elk outside of the June elk calving period. These differences in prey composition were likely influenced by differences in prey availability in the packs' territories. However, because winter weather extended into late spring in 2008, both packs had elevated May predation rates. Elk killed by wolves revealed poor bone marrow into June. Analysis of the collected data collected is ongoing in preparation for publication. Another intensive field season is scheduled for 2009.

## *Population Genetics*

Collaborative efforts between the Yellowstone Wolf Project and the University of California at Los Angeles continued in 2008. Dan Stahler attended UCLA for the spring quarter and continued data collection in the YNP population throughout 2008. Having completed the 2008 field season and advancing to candidacy in September, Stahler will begin analyzing 14 years of data on reproduction, breeding behavior, and territoriality. Incorporating genetic data and pedigrees, Stahler will test hypotheses on the role of kinship in behavioral and life history strategies associated with reproductive success and territoriality.

JOSH ALBERS

*Many miles were logged during summer 2008 while studying wolf predation.*

The larger scale analyses of genetic diversity and gene flow among the three Rocky Mountain recovery areas was ongoing throughout 2008. Of critical biological and political importance to the delisting of wolves in the northern Rocky Mountains in 2008 was the ability to detect true migrants between recovery areas and their resulting genetic contribution through offspring within a recovery area. This has been difficult because both the Yellowstone and central Idaho populations are descendants of the same genetic stock in Canada. The need for extra analyses with additional markers has delayed the anticipated completion of this project. Preliminary results show high genetic diversity within all three recovery areas, as well as ample genetic exchange between central Idaho and northwest Montana. However, low levels of gene flow between the Greater Yellowstone Area (GYA) and the other recovery areas highlight the importance of accurately identifying migrant (or offspring of migrant) GYA wolves as agents of gene flow. These analyses will address issues of

*Several bears and a wolf vie for access to an elk carcass in Pelican Creek, autumn 2008.*

*A detached GPS collar from wolf #593 of the Leopold pack.*

population connectivity and migratory exchange among recovery areas and how they contribute to genetic diversity and long-term population sustainability. Completion of this project is expected in early 2009.

### *Disease*

In 2008, Wolf Project staff expanded a serological survey of canid pathogens to include canine parvovirus (CPV), canine adenovirus-1 (CAV-1), canine distemper virus (CDV), canine herpesvirus (CHV), and *Neospora caninum*. Except for *N. caninum*, all of these pathogens are capable of causing sickness and death among wild and domestic canids. The analysis of serum samples collected during the early 2008 capture season suggested that wolf exposure to CPV, CAV-1, and CHV was very high in 2007. There were no cases of exposure to CDV among wolves born since the last 2005 epidemic, suggesting that CDV did not circulate among wolves in 2007. *N. caninum* is a protozoan parasite whose life cycle includes canids, the definitive hosts where sexual reproduction takes place, and ungulates, the intermediate hosts, in which the parasite can cause abortions. Although samples from previous captures suggest that wolves are occasionally exposed to *N. caninum*, it was not found in any of the wolves handled in early 2008.

Wolf Project staff observed extremely low pup survival in 2008, similar to previous years when CDV swept through the wolf population. Although staff did not yet have the serological results reflecting pathogen exposure in 2008, they did find genetic material from CDV on three dead adult wolves collected in the fall, which strongly suggested that CDV swept through the wolf population in 2008. Computer simulation modeling suggests that CDV is likely maintained among multiple host species over a wide geographic scale, and that domestic dogs probably do not play an appreciable role in local CDV dynamics. Spillover of CDV to wolves from another wild host species will likely continue to be periodic but highly unpredictable.

Sarcoptic mange, a skin infection resulting in hair loss caused by the mite, *Sarcoptes scabiei*, became increasingly prevalent within the park in 2008. Although quite common among wolves outside the park, the disease was not detected in the park until two years ago. At the end of 2008, at least one member in seven packs/groups appeared to be infected. Wolf Project staff saw evidence of recovery in several infected wolves and no evidence of mortality from mange, although it may have been a contributing factor in some deaths.

## Wolf Management

### *Area Closures*

To prevent human disturbance of denning wolves during the sensitive period of pup rearing, visitor entry was closed to some of the areas surrounding dens in the park. An area surrounding the Druid Peak pack's den in the eastern end of Lamar Valley was closed until July 1. Thousands of visitors were still able to observe adults and pups from a safe distance, providing both protection to the pack and enjoyment to visitors. Den sites for the Leopold, Mollie's, and Agate Creek packs were protected from disturbance coincidental to closures for bear management in the park. The areas around the remaining packs' den sites were not closed because of historically low visitor use.

### *Habituated Wolves*

In June, a ranger used rubber bullets to haze two Druid Peak wolves that were considered habituated because they had exhibited fearless behavior around people in Lamar Valley. The wolves were not seen near people again so the action was considered a success.

In the interior, the Canyon pack showed fearlessness of vehicles along the road, usually when people drove up alongside them. The Hayden Valley pack had previously exhibited similar behavior in the same area, where blowdown and regenerating lodgepole pine off the road may funnel wolves into the road corridor. (This is unlike the situation along the northern road in YNP where the many off-road travel options for wolves help keep people and wolves apart.) Attempts to haze the Canyon wolves

were unsuccessful because the wolves were not located by park staff carrying hazing equipment when they were showing habituated behavior.

## *Wolf Road Management Project*

In its ninth year, the Wolf Road Management Project (formerly known as the Druid Road Management Project) season started on May 27 and ended on September 27, a period of 124 days (Table 4). The 2008 season differed from recent years. The Druid Peak pack, after denning in the backcountry the previous three seasons, denned at a site used from 1997 to 2004. This site is in a forested area, a half mile north of the road and two large pullouts. There was also evidence of a den on the opposite side of the road occupied by one or more other female Druid wolves who later relocated to the main den area. Most sightings of the 16 Druid adult wolves occurred when they crossed the road as they traveled to the main den or left the den on a hunt. Pups were first seen at the main den on June 13. On July 9 and 10, the adults moved at least 18 pups across the road to the south. Those pups later followed the adults south to a rendezvous site at Cache Creek. Sightings decreased drastically until August 19 when Druid adults and pups traveled back to Lamar Valley and rendezvoused at Chalcedony Creek, an area highly visible to visitors.

*Kira Cassidy holds traffic to allow for the Canyon wolves to sucessfully cross the road.*

After using a different site in 2007, the Slough Creek pack returned to their 2005 and 2006 den site. This site, on an open slope west of Slough Creek, is highly visible to visitors and wolves were seen in the area almost daily in the early part of the season. Two pups were first seen in late May coming out of their natal den, but soon one of those pups disappeared. The adults and one surviving pup were seen almost daily in the den area through mid-July. When the other pup died in mid-July, the adults did

| Year | Visitor Contacts | Informal Talks | # of People at Informal Talks | Total Contacts | # of People Seeing Wolves | Time Wolves Visible | Days Wolves Visible |
|---|---|---|---|---|---|---|---|
| 2000 | 6,760 | 83 | 1,833 | 8,593 | 8,145 | 283.2 hrs | 77/82 (94%) |
| 2001 | 9,375 | 288 | 1,552 | 10,927 | 11,210 | 368 hrs | 125/125 (100%) |
| 2002 | 9,450 | 244 | 1,952 | 11,402 | 12,414 | 460 hrs | 126/126 (100%) |
| 2003 | 9,375 | 258 | 2,064 | 11,439 | 9,827 | 415 hrs | 124/124 (100%) |
| 2004 | 9,450 | 226 | 2,260 | 11,710 | 8,721 | 395 hrs | 126/126 (100%) |
| 2005 | 6,200 | 125 | 1,250 | 7,450 | 11,695 | 790 hrs | 124/124 (100%) |
| 2006 | 6,500 | 200 | 2,000 | 8,500 | 13,640 | 620 hrs | 124/124 (100%) |
| 2007 | 8,775 | 230 | 2,300 | 11,075 | 32,600 | 750 hrs | 117/117 (100%) |
| 2008 | 8.660 | 358 | 3,925 | 12,585 | 35,000 | 830 hrs | 124/124 (100%) |

*Table 4. Visitor contacts while working on the road management project during summer.*

*Possibly the best place in the world to observe wild wolves.*

not spend as much time in the den area, but still were often seen in the general area.

The Agate Creek pack exhibited very different behavior from past seasons. Possibly due to high Yellowstone River levels, the pack began the denning season on the east side of the river rather than at previously used den sites. The pack was rarely seen at their traditional Antelope Creek rendezvous site, an indication that none of their pups survived. The pack was seldom seen from the ground the entire summer.

The Hayden Valley pack, the most visible pack in 2007, was no longer seen in the park after losing both alphas in a conflict with Mollie's pack in October 2007. Two males from Mollie's pack and a light gray Hayden female formed the Canyon pack and were seen in the area formerly used by the Hayden pack.

## Collaborative Research

The Wolf Project and the Yellowstone Park Foundation provided financial and in-kind support for collaborative research with scientists at other institutions, including universities, interagency divisions, and non-government research organizations. These investigations required Wolf Project staff to assist graduate students and outside researchers in their efforts to better understand wolf ecology, ecosystem function, and conservation work, much of which is pioneering research.

### *Wolf Project Students: Direct Assistance*

Three graduate students worked in collaboration with the Wolf Project in 2008: Daniel Stahler, Emily Almberg, and Matt Metz. All three are long-time participants in the project who have moved on to work in new capacities in which they are partially supported by project funding. Stahler's project focuses on combining behavioral data gathered in the field with genetic data gleaned from DNA samples and overlaying the two techniques to better understand wolf social behavior. Stahler works with Dr. Robert Wayne at the University of California at Los Angeles. Almberg's project focuses on wolf diseases from both a current and historical perspective. With severe mortality caused by disease in 1999, 2005, and 2008, Almberg plans to elucidate the role of diseases for wolf population ecology in the Northern Rockies. Almberg works with Dr. L. David Mech and the University of Minnesota. Metz's project focuses on summer predation patterns in wolves by incorporating downloadable GPS collar technology and modeling techniques. Metz works with Dr. John Vucetich and Michigan Technological University.

*Matt Metz, Jon Linch, and Josh Irving ponder their next move.*

*Graduate Student:* Daniel Stahler, doctoral student
*Committee Chair:* Dr. Robert Wayne, University of California, Los Angeles
*Title:* Behavioral, ecological, and genetic influences on life-history strategies and social dynamics of gray wolves
*Project Summary:* The evolution of complex societies, such as seen in wolves, is greatly influenced by how ecological and social constraints impact population structure and mating systems. In combination with the underlying genetic structure of wolf packs, aspects of wolf ecology such as reproduction, dispersal, pack formation, and territoriality are predicted to vary with the abundance and distribution of resources. This research will investigate the link between socioecological conditions and these aspects of wolf ecology in Yellowstone. This project will take advantage of datasets that have been compiled since the 1995 reintroduction: 1) a complete population pedigree of marked individuals resulting from the integration of molecular and field-based behavioral data; and 2) predator–prey and wolf population

*A sow grizzly bear with two cubs stand guard while an Oxbow wolf looks on. Three grizzly cubs have been killed by wolves since 1995.*

## *Indirect Assistance or Collaborative Work with the Wolf Project*

| ***Topic*** | ***Collaborator*** | ***Institution*** |
|---|---|---|
| Wolf–cougar interactions | Toni Ruth | Wildlife Conservation Society |
| Wolf–coyote interactions | Robert Crabtree, Jennifer Sheldon | Yellowstone Ecological Research Center |
| Wolf–bear interactions | Charles Schwartz, Mark Haroldson, Kerry Gunther | Interagency Grizzly Bear Study Team, YCR Bear Management Office |
| Wolf–carnivore interactions | Howard Quigley | Beringia South |
| Wolf population genetics | Robert Wayne, Bridgett vonHoldt, John Pollinger | University of California at Los Angeles |
| Wolf–elk relationships, Madison-Firehole Watershed | Bob Garrott, Matt Becker, Claire Gower, Shana Dunkley | Montana State University |
| Wolf–pronghorn | P.J. White, John Byers | Yellowstone Center for Resources (YCR), University of Idaho |
| Wolf–willow | Evelyn Merrill, Francis Singer, Roy Renkin, Bill Ripple, David Cooper, Tom Hobbs, Don Despain, Nathan Varley | University of Alberta, U.S. Geological Survey (USGS), YCR, Colorado State University |
| Wolf–aspen | William Ripple, Eric Larsen, Roy Renkin, Matt Kauffman | Oregon State University, University of Wisconsin at Stevens Point, YCR, University of Montana |
| Wolf–trophic cascades | L. David Mech, Mark Boyce, Nathan Varley, Rolf Peterson, Dan MacNulty, John Vucetich | USGS, University of Alberta, Michigan Technological University, University of Minnesota |
| Wolf predation | Tom Drummer, John Vucetich, Rolf Peterson | Michigan Technological University |
| Wolf survival | Dennis Murray | Trent University |

JOSH ALBERS

*Hiking up Slough Creek in search of a dead wolf that turned out to be one from the Thorofare region.*

dynamics. By combining field and laboratory-based data, this study will ask questions concerning breeding strategies, reproductive success, territoriality, and pack interactions and how they are associated with kinship and ecological conditions. By combining long-term ecological, behavioral, and molecular datasets, this study will enhance our understanding of the evolution of complex, kin-structured societies, as well as provide a better understanding of how social and ecological conditions are related to wolf population dynamics and conservation.
*Project Activity in 2008:* Coursework, wrote research proposal, conducted field work, published paper on Yellowstone genealogy and genetic diversity, defended proposal and advanced to PhD candidate.
*Anticipated Completion Date:* 2010

*Graduate Student:* Emily Almberg, doctoral student
*Committee Chair:* Dr. L. David Mech, University of Minnesota, St. Paul
*Title:* A comprehensive survey of the infectious diseases and parasites of Yellowstone wolves: Implications for population dynamics and management
*Project Summary:* In 1999 and 2005, the Yellowstone wolf population experienced significantly lower pup recruitment suggestive of a disease outbreak. Despite fueling abundant speculation, these two suspected outbreaks have highlighted how little is known about the presence and role of disease in the Yellowstone wolf population. The present study seeks to 1) identify and describe the spatial and temporal patterns of select pathogens and parasites in YNP and the GYE wolf populations, 2) understand the impacts of disease on population parameters such as adult wolf mortality and pup survival, 3) track the distribution, prevalence, and population-level effects of sarcoptic mange among wolves in YNP and the GYE, and 4) address the potential role of domestic dogs and sympatric carnivores in pathogen/parasite invasion and persistence in YNP.
*Project Activity in 2008:* Completion of coursework, data collection, and thesis preparation.
*Anticipated Completion Date:* May 2009

*Graduate Student:* Matt Metz, Master of Science candidate
*Committee Chair:* Dr. John Vucetich, Michigan Technological University
*Title:* Summer patterns of prey selection and kill rates for gray wolves
*Project Summary:* The summer predation patterns of wolves are mostly unknown, which creates an important gap of knowledge regarding wolf kill rates. Because a lack of snow and increased foliage makes finding kills in summer more difficult, wolf kill rates from winter are often projected throughout

*The Oxbow Creek pack.*

the year in order to estimate a wolf's impact on the prey population. This likely overestimates kill rates (at least in kg/wolf/day, not necessarily in ungulates/wolf/day) because adult prey become increasingly vulnerable during the winter. Additionally, the need to provide for pups and the utilization of small prey items change the foraging strategy of wolves in the summer. Finally, the presence of both grizzly and black bears may cause wolves to spend only a short time at a kill during the summer. Due to these challenges, GPS collars deployed on wolves will help to identify clusters in an attempt to find summer kills and examine their characteristics. Ecological modeling will be used to incorporate variables of the wolf, pack, landscape, prey, and time of year to improve accuracy of predation rate estimates.
*Project Activity in 2008:* Data collection, coursework, and grant writing.
*Anticipated Completion Date:* May 2010

## Staff and Public Involvement

### *Staff and Volunteers*

Three full-time employees worked for the Yellowstone Wolf Project in 2008: Project Leader Douglas Smith and Biological Science technicians Erin Albers and Rick McIntyre. Daniel Stahler split time between graduate work at UCLA and working in the park as the project biologist. After 13 years on the Wolf Project, Debra Guernsey left in April. Other paid and volunteer staff: Sarah Bassing, Colin Benell, Kira Cassidy, Nicholas Ehlers, Sarah Hardee, Joshua Irving, Laura Kelly, Ky Koitzsch, Lisa Koitzsch, Nicole Legere, Jon Linch, Sarah Lykens, Dan MacNulty, Mike Peterson, Rebecca Raymond, Jessie Walton, and Libby Williamson. Some of these staff members were paid technicians with funding provided by the Yellowstone Park Foundation and Yellowstone Association.

*Jon Linch and Sarah Bassing make a summertime stream crossing.*

*A butterfly investigates a wolf kill.*

### *Outreach*

Yellowstone Wolf Project staff gave 156 talks and 78 interviews (see table). Talks were at both scientific conferences and to general audiences. Interviews were to all forms of media.

For the eighth straight year Wolf Project staff rode horseback into outfitter camps near YNP to discuss wolf

*Summer predation crew, 2008.*

issues. Accompanying Doug Smith and Yellowstone Center for Resources Chief Tom Olliff were Gallatin National Forest Wildlife Biologist Dan Tyers, Gallatin National Forest Gardiner District Ranger Ken Britton, and Gallatin National Forest Supervisor Mary Erickson.

## Acknowledgements

We thank all of the Wolf Project field technician volunteers, especially winter study volunteers, without whom we could not carry on the vital research and management of wolves. We also thank six major institutions and organizations for their donations and support: an anonymous donor, the Tapeats Foundation, the Perkins-Prothro Foundation, Canon U.S.A., Inc., Yvon and Malinda Chouinard, and the National Science Foundation grant DEB-0613730. We recognize the above because our work would not be possible without their support and involvement. We are also supported by numerous smaller donors, especially through the collar sponsorship program, whose contributions are necessary for our research, management, outreach, education, and publications. We know that a successful program needs a strong base of support and to all of the above we are indebted.

*Deb Guernsey with wolf #4M during the early days of the Wolf Project.*

Finally it is with both great sadness and gratitude that we say goodbye to Debra S. Guernsey, who after 13 years served the wolves of Yellowstone with unparalleled passion and care. She was a good friend and colleague as well. She will be sorely missed, especially by the project leader for whom she has done so much and helped ever so kindly.

*Early winter study crew, 2008. Front, left to right: Erin Albers, Kira Cassidy, Rebecca Raymond, Sarah Lykens, Lisa Koitzsch. Back, left to right: Josh Irving, Dan Stahler, Doug Smith, Sarah Hardee, Mike Peterson, Libby Williamson, (dog: Koya), Nick Ehlers.*

# Appendices

## *Appendix I. Wolf Project Volunteer Roster, 2008*

| Name | Period of Involvement | Hours Worked |
|---|---|---|
| Sarah Bassing | 5/15–8/23/2008 | 800 |
| Colin Benell | 2/25–3/31/2008 | 280 |
| Kira Cassidy | 2/25–4/10/2008 | 360 |
| Nick Ehlers | 2/25–3/31/2008 | 280 |
| Sarah Hardee | 11/12–12/15/2008 | 264 |
| Josh Irving | 2/25–4/10/2008 & 5/15–8/23/2008 | 1,160 |
| Laura Kelly | 2/25–3/31/2008 | 280 |
| Ky Koitzsch | 2/25–3/31/2008 | 280 |
| Lisa Koitzsch | 2/25–3/31/2008 & 11/12–12/15/2008 | 544 |
| Nicole Legere | 1/1–2/21/2008 | 416 |
| Jonathan Linch | 5/15–8/23/2008 | 800 |
| Sarah Lykens | 5/15–8/23/2008 | 800 |
| Mike Peterson | 11/12–12/15/2008 | 264 |
| Rebecca Raymond | 9/1–11/11/2008 & 12/19–12/31/2008 | 664 |
| Emily Stone | 2/25–3/31/2008 | 280 |
| **Total Volunteer Hours*** | | **7,472** |

* Volunteer hours = approx. 4 full-time field technician positions

## *Appendix II. Publications in 2008*


Bangs, E.E., and D.W. Smith. 2008. Re-introduction of the gray wolf into Yellowstone National Park and central Idaho, USA. Pages 167–171 *in* P.S. Soorae, editor. Global re-introduction perspectives: Re-introduction case studies from around the globe. IUCN/SSC Re-introduction Specialist Group, Abu Dhabi, UAE, 284pp.

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

MacNulty, D.R., G.E. Plumb, and D.W. Smith. 2008. Validation of a new video and telemetry system for remotely monitoring wildlife. *Journal of Wildlife Management* 72:1834–1844.

Smith, D.W. 2008. Look a wild wolf in the eye: Review of *The Last Wild Wolves*. *BBC Wildlife* 26:80.

Smith, D.W., D.R. Stahler, D.S. Guernsey, M. Metz, E. Albers, L. Williamson, N. Legere, E. Almberg, and R. McIntyre. 2008. Yellowstone Wolf Project: Annual Report, 2007. National Park Service, Yellowstone Center for Resources, Yellowstone National Park, Wyoming, YCR-2008-01.

Vonholdt, B.M, D.R. Stahler, D.W. Smith, D.A. Earl, J.P. Pollinger, R.K. Wayne. 2008. The genealogy and genetic viability of reintroduced Yellowstone grey wolves. *Molecular Ecology* 17:252–274.


## *Appendix III. Interviews Given by Wolf Project Staff, 2008*

| Date | Interviewer |
|---|---|
| ***Doug Smith:*** | |
| January | Cory Hatch, *Jackson Hole News & Guide* |
| | Andrew Savagian, *The Wildlife Professional* |
| | Ilona Popper, freelance journalist |
| | Wes Smalling, *Casper Star Tribune* |
| | Martin Clune, ITV Television, England |
| | Clara Sthlmann-Roder, student at Twin Cities Academy, MN |
| | Bob Landis, National Geographic |
| | Virginia Morell, *Science Magazine* |
| February | Andrew Murray, BBC |
| | Lewis Matson, interactive internet interview with students from Charlotte High School, Punta Gorda, FL |
| | David Dawson, Slippery Rock University, PA |
| | LaRue Seitz, college student, ID |
| | Fernando Palacios, Madrid, Spain |
| | Matt Jaffe, Sunset Magazine |
| March | Aaron Pohly, Southern State Community College, OH |
| | Kristy Peake, UK Wolf Conservation Trust |
| | Eric Prioleau, Bellgro, South Carolina Elementary School EC-1, London, England |
| | John Flesher, Associated Press |
| | Cory Hatch, *Jackson Hole News & Guide* |

| Date | Interviewer |
|---|---|
| ***Doug Smith (cont.):*** | |
| | Peter Metcalf, Newwest.net |
| | Ilona Popper, freelance journalist |
| | Darius Panahpour, writer |
| | Anderson Cooper, CNN |
| April | Ralph Maughn, Wolf Recovery Foundation |
| | SLC News, TV |
| | Molly Absalom, *Yellowstone Journal* |
| | Bill Kronholm, Associated Press |
| | Patty Henetz, *Salt Lake Tribune* |
| | Cory Hatch, *Jackson Hole News & Guide* |
| | Wolf Quest Video Game |
| | Tom LeCompte, *Pilot Magazine* |
| | Ely Brown, ABC Nightline |
| | Todd Beuke, 7th grade history teacher |
| | Shawn Phillips, West Illinois University |
| May | Elizabeth Kwak-Hefferan, *Backpacker Magazine* |
| | History Channel |
| | Frank Clifford, *Smithsonian Magazine* |
| | Fazal Azeem Mujadadi, Chairman of Commission for International Affairs, National Security |
| June | Martin O'Brian, Mo Films |
| | Frank Clifford, *Smithsonian Magazine* |
| | Elizabeth Kwak-Hefferan, *Backpacker Magazine* |
| | Joe Roman, Harvard University Press |
| | *Ranger Rick Magazine* |
| | Pere Estupinya, Knight Science Journalism Fellowship at MIT |
| | Finlay Productions for Yellowstone Association |
| July | Kurt Bell, *Boise State Arbiter* (student newspaper) |
| | *Daily Mining Gazette*, Houghton, MI |
| August | Brent French, *Billings Gazette* |
| September | Joel Achenbach, *Washington Post* |
| | BBC Yellowstone Special (1st interview) |

| Date | Interviewer |
|---|---|
| ***Doug Smith (cont.):*** | |
| | The Wildlife Society, *The Wildlife Professional* |
| | BBC Yellowstone Special (2nd interview) |
| | Green Fire Productions |
| | Frank Clifford, *Smithsonian Magazine* |
| October | BBC Yellowstone Special (3rd interview) |
| | Molly Absalom, *Yellowstone Journal* |
| | Bill Lowry, Washington University |
| | Joy Ufford, *Sublette Examiner*, Pinedale, WY |
| | Brett French, *Billings Gazette* |
| | Chris Merril, *Casper Star Tribune* |
| | Neil Daniel, BBC |
| November | Cristina Eisenberg, Island Press, Oregon State University (two interviews) |
| | Cardigan Mountain School, NH |
| | Ina Fischer-Anderson, freelance journalist |
| | Christina Mckenna, Clarkson University, Potsdam, NY |
| December | Ilona Popper, *High Country News* |
| | Christina Weinheimer, Yellowstone Park Foundation |

| Date | Interviewer |
|---|---|
| ***Rick McIntyre:*** | |
| March | BBC Films |
| | Jim Castel and Chuck Afflerbach, CNN |
| June | Martin O' Brian, Mo Films |
| | Joe Roman, Harvard University Press |
| | Pere Estupinya, Knight Science Journalism Fellowship at MIT |
| | Peter Metcalf, *New West* |
| August | Brent French, *Billings Gazette* |
| September | Joel Achenbach, *Washington Post* |
| November | Shannon Mullen, NPR radio |

*Gibbon Meadows pack in Hayden Valley.*

## *Appendix IV. Talks Given by Wolf Project Staff, 2008*

| Date | Group | Location |
|---|---|---|
| ***Doug Smith:*** | | |
| January | Yellowstone Association Institute class | YNP |
| | Greater Yellowstone Coalition | YNP |
| February | Greater Yellowstone Coalition | YNP |
| | YNP law enforcement and maintenance staff (Lake) | YNP |
| | Panel Discussion | Livingston, MT |
| | Winter Study Training | YNP |
| March | Yellowstone Association | YNP |
| | Gardiner School 9th-grade career class | Gardiner, MT |
| | Yellowstone Association | YNP |
| | University of Idaho wildlife class | YNP |
| | Antioch College class | Keene, NH |
| | University of Minnesota class | YNP |
| | US Senator Jon Tester | MT |
| | University of Washington, Advanced Wildlife Ecology class | YNP |
| April | North American Wolf Conference | Pray, MT |
| | Smith Fellows Panel, Society of Conservation Biology | Pray, MT |
| | Smith Fellows, Society of Conservation Biology field trip | YNP |
| | Montana State University ecology class, field trip | YNP |
| | College of Southern Idaho class, field trip | YNP |
| May | Xanterra bus drivers | YNP |
| | Idaho National Laboratory, 32nd Actinide Separations Conference (Nuclear Chemistry) | Park City, UT |
| | Yellowstone Safari | YNP |
| | Michigan Technological University wildlife class | YNP |
| | YNP interpretative ranger training | YNP |
| June | Leonardo Corrales, Gobierno de Chile Minnisteria de Agricultura | YNP |
| | 15th Wildland Shrub Symposium | Bozeman, MT |
| | US Forest Service seasonal training | Gardiner, MT |

| Date | Group | Location |
|---|---|---|
| ***Doug Smith (cont.):*** | | |
| June (cont.) | Yellowstone Association Institute class | YNP |
| | Capstone Lecture, American Society of Mammalogy | YNP |
| July | Youth Conservation Corp program | YNP |
| | Wildside | Gardiner, MT |
| | Isle Royale National Park, *Ranger III* Ferry | Isle Royale, MI |
| | 50th Anniversary Wolf–Moose Research | Isle Royale, MI |
| August | Isle Royale National Park, *Ranger III* Ferry | Isle Royale, MI |
| | Defenders of Wildlife | YNP |
| September | Montana Fish, Wildlife & Parks meeting | Bozeman, MT |
| | University of Montana, Population Ecology class | YNP |
| October | University of Montana, Western Wildlife class | YNP |
| | Defenders of Wildlife Wolf Awareness Week | Boise, ID |
| | National Parks Conservation Association Annual Meeting | YNP |
| November | Winter study training | YNP |
| | Portsmouth High School | Portsmouth, NH |
| | Yellowstone Park Foundation event | Portsmouth, NH |
| December | Xanterra snow coach drivers | YNP |
| | YNP interpretive ranger training | YNP |
| | Snowmobile outfitters and guide training | YNP |
| ***Dan Stahler:*** | | |
| January | The Wild Side, LLC | Gardiner, MT |
| February | YNP Canyon/Lake staff | YNP |
| | The Wild Side, LLC | Gardiner, MT |
| April | Life Sciences Department, University of California, Los Angeles | Los Angeles, CA |
| May | Wayne Lab, Ecology and Evolutionary Biology Department, University of California, Los Angeles | Los Angeles, CA |
| June | Indiana State University | YNP |
| | Yellowstone Association Institute class | YNP |
| July | Yellowstone Association Institute class | YNP |
| | Science Educators Organization | YNP |
| August | Yellowstone Association Institute Class | YNP |
| | Canon U.S.A., Inc. | YNP |
| September | Ecology and Evolutionary Biology Department University of California, Los Angeles | Los Angeles, CA |
| October | The Wild Side, LLC | Gardiner, MT |
| November | Yellowstone Association Institute class | YNP |
| December | Yellowstone Association Institute class | YNP |
| ***Erin Albers*** | | |
| February | University of Montana | YNP |
| | University of Montana | YNP |
| May | Blackfeet Indian Reservation School Group | YNP |
| | Yellowstone Park Foundation field trip | YNP |
| | Xanterra employees | YNP |
| September | Michelin Tire executives | YNP |

| Date | Group | Location |
|---|---|---|
| ***Matt Metz:*** | | |
| March | Poster presentation on summer predation | Houghton, MI |
| May | Summer predation training | YNP |
| June | Xanterra summer employees | YNP |
| August | Japanese National Park Service interpretive rangers | YNP |
| November | Michigan Technological University Wildlife Ecology class | Houghton, MI |
| ***Kira Cassidy*** | | |
| May | Gallatin National Forest summer employees | YNP |
| | Xanterra summer employees | YNP |
| June | Xanterra summer employees | YNP |
| | Xanterra summer employees | YNP |
| | Lake Lodge guests | YNP |
| July | Mammoth Youth Christian group | YNP |
| | LaMotte Elementary School, 6th grade | YNP |
| ***Josh Irving*** | | |
| October | Canterbury Avenue School | Arleta, CA |
| ***Rick McIntyre:*** | | |
| March | Yellowstone Association Institute class, Mike Nelson | YNP |
| | Yellowstone Association Institute class, Rolf Peterson | YNP |
| | International Wolf Center group, Dr. Dave Mech | YNP |
| April | Trevor Elementary School (New York City) class, Yellowstone Institute | YNP |
| | Roundup Elementary School, Yellowstone Institute | YNP |
| | Future Leaders Institute (Harlem, NY), Yellowstone Institute | YNP |
| | Chico Wolf Conference field trip | YNP |
| | Montana State University wildlife field trip | YNP |
| | Thermopolis Elementary School, Yellowstone Institute | YNP |
| | West Yellowstone Elementary School field trip | YNP |
| | Pray Elementary School field trip | YNP |
| | Central Billings High School field trip | YNP |
| | College of Southern Idaho field trip | YNP |
| | Winston High School (Oregon) field trip | YNP |
| May | Natural Resources Defense Council field trip | YNP |
| | South Summit Middle School (Utah) field trip | YNP |
| | Butte/Great Falls Science Fair trip | YNP |
| | Billings West High School field trip | YNP |
| | International Workshop on Models of Visitor Management field trip | YNP |
| | Cody High School field trip | YNP |
| | Greater Yellowstone Coalition field trip | YNP |
| | Hall College field trip | YNP |
| | Basin Elementary School field trip | YNP |
| | Longfellow Elementary School field trip | YNP |
| | Bozeman Middle School field trip | YNP |
| | Big Timber Community Youth Group field trip | YNP |
| June | Smithfield (Utah) Advanced Boy Scouts field trip | YNP |
| | Yellowstone Association Institute class, Diane Boyd field trip | YNP |

| Date | Group | Location |
|---|---|---|
| ***Rick McIntyre (cont.):*** | | |
| | Prince George's Community College (MD) field trip | YNP |
| | Roosevelt Lodge employees | YNP |
| | North Carolina Museum of Natural History field trip | YNP |
| | Shoshone Elders field trip | YNP |
| | Gannon College field trip | YNP |
| | Eastern Washington College field trip | YNP |
| | Boulder Science Discovery School (CO) field trip | YNP |
| | Polish National Park officials field trip | YNP |
| | Ecology Project International field trip | YNP |
| | Abby Nelson's field crew talk | YNP |
| July | Jupiter High School (Florida) field trip | YNP |
| | Camptown, Inc., field trip | YNP |
| | High school field ecology | YNP |
| | Beyond Natural Regulation class at Yellowstone Institute | YNP |
| | Montana Outdoor School field trip | YNP |
| August | No Child Left Behind training class at Yellowstone Institute | YNP |
| | Ecology Project International High School field trip | YNP |
| | Defenders of Wildlife meeting at Yellowstone Institute | YNP |
| | Yellowstone Park Foundation field trip | YNP |
| | Tacoma (Washington) Boys and Girls Club field trip | YNP |
| | William Penn Mott's family field trip | YNP |
| | University of North Dakota field trip | YNP |
| | Yellowstone Park Foundation field trip | YNP |
| | Yellowstone Association Institute class | YNP |
| October | Dubois Elementary School (Wyoming) class at Yellowstone Institute | YNP |
| | University of Montana–Western, Wildlife Ecology field trip | YNP |
| | Gardiner Elementary School at Yellowstone Institute | YNP |
| | Nathan Varley's wolf class field trip | YNP |
| | Flathead High School field trip | YNP |
| | MSU Field Basic Science Class field trip | YNP |
| | Grace Lutheran Elementary School (Pocatello, ID) field trip, YNP | |
| November | Yellowstone Park Foundation field trip | YNP |
| | Capital High School (Helena, MT) Science Seminar field trip | YNP |
| | Jefferson High School (Boulder, MT) class at Yellowstone Institute | YNP |
| | Hunters/Hunted: Teachers Workshop at Yellowstone Institute | YNP |
| | Food for the Masses (Class I) at Yellowstone Institute | YNP |
| | Food for the Masses (Class II) at Yellowstone Institute | YNP |
| December | Food for the Masses (Class III) at Yellowstone Institute | YNP |
| | Food for the Masses (Class IV) at Yellowstone Institute | YNP |
| | Billings West High School Ecology Club | YNP |
| ***Libby Williamson:*** | | |
| May | Xanterra summer employees | YNP |
| | Xanterra summer employees | YNP |
| | Yellowstone Park Foundation donor field trip | YNP |
| | Youth Conservation Corp trail crew | YNP |
| June | Crow Reservation students | YNP |
| | National Geographic "Off the Beaten Path" | YNP |