The Reintroduction of Gray Wolves to Yellowstone National Park and Central Idaho

Final

Environmental

Impact

Statement

U.S. Department of the Interior
Fish and Wildlife Service

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Abstract

The U.S. Fish and Wildlife Service (FWS) has selected Alternative 1, as modified by public comment, and proposes to establish an experimental population rule and reintroduce gray wolves to Yellowstone National Park and central Idaho, if two naturally occurring wolf packs cannot be located in either area before October 1994 or before experimental animals are released. The rule would allow management of wolves by government agencies and the public to minimize conflicts on public lands, effects on livestock, and impacts on ungulate (deer, elk, etc.) populations. There will be no land use restrictions for wolves after six packs are established. State and tribal wildlife agencies are encouraged to lead wolf management outside national parks and national wildlife refuges. Reintroduction would result in wolf population recovery (ten breeding pairs, about 100 wolves/area for three successive years) in and around Yellowstone National Park and in central Idaho by 2002. Only the establishment of wolves in these two areas is the subject of this proposal.

The Yellowstone area is about 25,000 mi² and 76% federal land. This area has over 95,000 ungulates and a hunter harvest of 14,314 ungulates, is grazed by about 412,000 livestock, has $4.2 billion local economy, and receives abut 14,500,000 recreational visits annually. The central Idaho area is about 20,7000 mi² (nearly all USDA Forest Service land), has about 241,4000 ungulates and a hunter harvest of 33,358 ungulates, is grazed by about 306,525 livestock, has a $1.43 billion local economy, and receives about 8,000,000 recreational visits annually.

A recovered wolf population in the Yellowstone area would kill about 19 cattle (1-32), 68 sheep (17-110), and up to 1,200 ungulates each year. A recovered wolf population would not effect hunter harvest of male ungulates by may reduce hunter harvest of female elk, deer, and moose for some herds. Hunter harvest or populations of bighorn sheep, mountain goats, or antelope would not be affected. A recovered wolf population may reduce populations of elk 5%-30% (30% in some small herds), deer 3%-19%, moose 7%-13%, and bison up to 15%. The presence of wolves would not change uses of public or private land except for potential use of M-44 cyanide devices where wolf populations occur. Visitor use would increase (+5% for out of area residents and +10% for local residents). At recovery, losses are estimated to be $187,000-$465,000 in hunter benefits, $207,000-$414,000 in potential reduced hunter expenditures, and $1,888-$30,470 in livestock losses. Increased visitor expenditures in the recovery area are estimated at $23,000 and the existence value of wolves is estimated at $8,300,000 a year.

A recovered wolf population in the central Idaho area would kill about ten cattle (1-17), 57 sheep (32-92), and up to 1,650 ungulates each year. A recovered wolf population will not affect hunter harvest of male elk but may reduce harvest of female elk 10%-15% and will not measurably impact hunter harvest of deer, moose, bighorn sheep, or mountain goats. A recovery wolf population will not measurably impact ungulate populations in central Idaho. Wolf presence will not change uses of public or private land (except for use of M-44 devices where wolf population occur). Visitor use would likely increase (+8% of our of area residents and +2% for area residents). At recovery, losses are estimated to be $757,000-$1,135,000 in hunter benefits, $572,000-$857,000 in potential reduced hunter expenditures, and $2,923-$18,503 in potential livestock losses. Visitation in central Idaho is expected to increase and the existence value of wolves is estimated at $8,400,000 a year.

The following alternatives are examined in this final Environmental Impact Statement (FEIS).

Alternative 1: Reintroduction of Experimental Populations Alternative (The Proposal).
Alternative 2: Natural Recovery Alternative (No Action). Encourage wolf populations to naturally expand into Idaho and Yellowstone.
Alternative 3: No Wolf Alternative. Change laws and prevent wolf recovery.
Alternative 4: Wolf Management Committee Alternative. Establish legislation so the states could implement wolf recovery and liberal management without federal oversight.
Alternative 5: Reintroduction of Non-experimental Wolves Alternative. Reintroduction and high level of protection for wolves without establishing an experimental population rule to address local concerns.

The FEIS will be forwarded to decision makers in the FWS and Department of Interior for a decision in May 1994. The FEIS is being provided for public information. A Record of Decision can be approved 30 days after publication of release of the FEIS in the Federal Register by the Environmental Protection Agency. Any decision regarding wolf recovery in the Yellowstone and central Idaho areas as well as opportunities for future public involvement will be well publicized. A Notice of Availability of the FWSI will be published in the Federal Register. Send information requests to: Ed Bangs, U.S. Fish and Wildlife Service Project Leader, Gray Wolf EIS, P.O. Box 8017, Helena, Montana 59601.

Ralph O. Morgenweck
Regional Director, Region 6
U.S. Fish and Wildlife Service

Approved Ralph O. Morgenweck
Date April 14, 1994

Final
Environmental Impact Statement

The Reintroduction of Gray Wolves to Yellowstone National Park and Central Idaho

U.S. Fish and Wildlife Service
Gray Wolf EIS
P.O. Box 8017
Helena, Montana 59601

May 1994

Summary

This summary of the final Environmental Impact Statement (FEIS) describes five alternative ways that gray wolves could be reintroduced into Yellowstone National Park and central Idaho, the process used to develop the alternatives, and the environmental consequences of implementing each alternative. Three alternatives (Reintroduction of Experimental Populations [the FWS's proposal], Wolf Management Committee, and Reintroduction of Non-experimental Wolves) involve capturing and releasing wolves. One alternative (Natural Recovery or No Action) simple encourages natural wolf recovery. One alternative (No Wolf) prevents wolf recovery. All issues and concerns identified by the public were considered and the most significant analyzed in detail. The potential effects of each alternative on livestock, land use, ungulate (deer, elk, etc.) populations, hunter harvest, visitor use, and regional economies are also described. Public comments and concerns were addressed and incorporated into the FEIS.

Important

Public comments on the draft Environmental Impact Statement (DEIS) are available for public review in FWS, Ecological Service Offices in Cheyenne, Wyoming; Helena, Montana; and Boise, Idaho. Copies of the FEIS were sent to public libraries in Montana, Wyoming, Idaho and those cities where open houses were held. In addition, several hundred copies of the FEIS were sent to organizations or individuals who represent people who may be significantly impacted by any decision. Those wishing to receive copies of the FEIS or needing further information should contact:

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Purpose and Need for the Action

The purpose of this action is to reintroduce a population of gray wolves (*Canis lupus*) into Yellowstone National Park and central Idaho.

The gray wolf was common in the northern Rocky Mountain states prior to 1870. After bison, deer, elk, and other ungulates were decimated by unregulated hunting and human settlement, people tried to exterminate all remaining large predators, primarily because of conflicts with livestock. Wolf populations disappeared from the western United States (U.S.) by 1930. In 1973, the Endangered Species Act (ESA) listed wolves as endangered.

The U.S. Fish and Wildlife Service (FWS) is the primary agency responsible for the recovery and conservation of endangered species in the U.S., including the gray wolf. Recovery of wolves in the northern Rocky Mountains requires that ten breeding pairs of wolves (about 100 wolves), become established in each of three recovery areas (northwest Montana, central Idaho, and the area in and near Yellowstone National Park) for three consecutive years. After that has occurred wolves would be removed from the list of threatened and endangered species and managed solely by the respective states and tribes in areas outside of national parks and national wildlife refuges. Currently, as a result of natural dispersal of wolves from Canada over the past 15 years, about five wolf pack (65 wolves) live in northwest Montana. While lone wolves are occasionally seen or killed in the Yellowstone or central Idaho areas, wolf packs still do not exist in these areas. In 1991, congress directed the FWS to prepare a DEIS on wolf reintroduction in Yellowstone National park and central Idaho and required that it cover a broad range of alternatives. In 1992, congress directed the FWS to complete the EIS by January 1994 and stated that it expected the preferred alternative to conform to existing law.

Location of the Proposed Action

The two areas analyzed for wolf recovery are in and around Yellowstone National Park and USDA Forest Services lands in central Idaho (Figure S-1). The center of these areas are large contiguous blocks (about 12 million acres each) of land managed by the federal government, primarily as national parks or national forests. Not all wolves will remain on federal or other public lands, so the analysis areas include adjacent lands, including those privately owned, where wolves may occur and potentially cause some impacts.

The Following is a list of counties or portions of counties included in the Yellowstone and central Idaho primary analysis areas in Idaho, Montana, and Wyoming:

Yellowstone Area	*Montana*	*Central Idaho Area*
Idaho		*Idaho*
Bonneville	Beaverhead	Blaine
Fremont	Carbon	Boise
Madison	Gallatin	Camas
Teton	Madison	Clearwater
	Park	Custer
Wyoming	Stillwater	Elmore
Fremont	Sweetgrass	Idaho
Hot Springs		Lemhi
Lincoln		Shoshone
Park		Valley
Sublette		
Teton		

Figure S-1
Shaded portions indicate the approximate location of the
Yellowstone National Park and central Idaho
primary analysis areas for the FEIS.

Table S-1 presents basic information about the Yellowstone and central Idaho primary analysis areas. It helps describe those areas and may be useful in understanding the potential impact of wolf reintroduction. This information represents the situation that currently exists without wolf populations in these areas.

The Planning Process

One of the first steps in the planning process was to design a public participation and interagency coordination program to assist in identifying issues that needed to be addressed in the plan. Natural resource and public use information was gathered. Previous plans and reports dealing with wolf recovery were reviewed. The FWS was solely responsible for the FEIS, although representatives from the National Park Service, USDA Forest Service, USDA Animal Damage Control (ADC), Idaho Department of Fish and Game, Wyoming Game and Fish Department, Montana Department of Fish, Wildlife and Parks, Wind River Tribes, Nez Perce, Tribe, and University of Montana assisted in its preparation. Participation and review by representatives of other agencies does not imply concurrence, endorsement, or agreement to any recommendations, conclusions, or statements in the FEIS.

Issue Scoping

Thirty-four open houses were held in April 1992 throughout Wyoming, Montana, and Idaho and at seven other locations in the U.S. to identify issues that the public wanted considered in the DEIS. More than 1,730 people attended these meetings, and nearly 4,000 comments were received. All issues were considered, organized into 39 separate headings, and were addressed in the following way:

Eighteen issues were addressed as part of one or more wolf management alternatives

* Amending the ESA
* Missing component of the ecosystem
* Humane treatment of wolves
* Enjoying wolves
* Regulated public take
* Cost of program
* State, tribal, federal authority
* Viable population
* Travel corridors
* Range requirements
* Control strategies
* Illegal killing
* Compensation
* Delisting
* Need for education
* Spiritual and cultural
* Social and cultural environment
* Recovery areas

Six issues were analyzed in detail in the FEIS because they are potentially impacted by wolves or wolf recovery strategies

* Big game
* Hunting harvest
* domestic animal depredation
* Land-use restrictions
* Visitor use
* Local economies

Fifteen issues and impacts were not evaluated further in the FEIS because they were not significant to the decision being made

* Wolves not native to Yellowstone National Park
* Wolf rights
* Federal “subsidies”
* Human safety and health
* Other predators and scavengers
* Endangered species
* Plants, invertebrates, fish, reptiles, amphibians, birds, and mammals
* Diseases and parasites
* Private property rights
* Wolf recovery in other areas
* Existing wolves in central Idaho and Yellowstone
* Existing wolves in northwestern Montana
* Wolf subspecies
* Wolf and dog and coyote hybridization
* Need for research

Alternative Scoping

Twenty-seven open houses and six formal public hearings were held in Wyoming, Montana, and Idaho and three other locations in the U.S. in August and September 1992 to ask the public to help identify different ways (alternatives) that wolf populations could be managed. In addition, an alternative scoping brochure was inserted into 230,000 Sunday newspapers in Wyoming, Montana, and Idaho. Nearly 2,000 citizens attended the meetings, and about 5,000 comments were received. All the alternatives and issues that were identified by the public were considered, organized into separate and distinct alternatives, and addressed.

Table S-1
A summary of the key characteristics of the primary analysis area (PAA) that were analyzed as potentially being impacted by wolf recovery in and around Yellowstone National Park (includes parts of 17 adjacent counties) and in central Idaho (includes parts of 10 adjacent counties)

	Yellowstone	Central Idaho
People/Land		
Acres	16,000,000	13,300,00
% Federal ownership	76%	99%
% Private ownership	21%	trace
% National Park, Wilderness, or Wildlife Refuge	41%	30%
Regional Population (including surrounding communities)	288,000 5.2 people/mi.^{2}	92,400 2.6 people/mi.^{2}
Recreational visits to federal land/year	14,5000,000	8,600,000
Public Land Uses[a]		
Open to grazing (acres)	4,000,000	4,365,383
Suitable for timber harvest (acres)	1,500,000	4,970,423
Timber harvested or planned for harvest/year (acres)	28,000	44,138
Total miles of system trails and roads on public land	13,4457	20,346
Roads and trails open to motor vehicles (mi.)	8,057	9,541
National Forest area not open to motorized use (includes wilderness and roadless areas)	44%	44%
Estimated miles of hiking trails	4,643	13,383
Current actives sites for M-44 use (coyote cyanide devices)	185 ranches	31 ranches
People/Land Economy (including surrounding counties)		
Total income	$4.2 billion	$1.43 billion
Per capita income	$14,676	$15,552
Farm	6.4% (55% by livestock)	8.0% (65% by livestock)
Services	39.5%	34.6%
Other Industry	19.8%	24.8%
Other non-earned[b]	34.3%	32.6%
Livestock		
Peak numbers of livestock of PAA including the surrounding counties -	354,000	384,990
(spring) cattle	117,000	100,713
(spring) sheep		
On USDA Forest Service in PAA (May through October)	145,658	81,893
Adult cattle and calves	265,152	223,523
Adult sheep and lambs	1,270	1.109
Horses	412,080	306,525
Total livestock grazed on national forests		
Estimated current livestock mortality in the PAA and surrounding counties from all causes per year based upon spring cattle and sheep numbers: cattle	8,340 2.36% loss (67% calf)	12,314 3.2% loss (69% calf)
sheep	12,993 11.1% loss (74% lambs)	9,366 9.3% loss (72% lambs)
horses	unknown, very low	unknown, very low
Ungulates (after hunting season)		
Elk	56,100	76,300
Deer (mule & white-tailed)	29,500	159,600
Moose	5,800	1,700
Bighorn sheep	3,900	1,800
Bison	3,600	0
Mountain goat	few	2,000

Pronghorn antelope	400	0
Total	99,300[c]	241,400
Hunter harvest/year	14,314	33,358
Estimated ungulates dying/year (all causes)[d]	48,599	153,539
Other Animals		
Black bear	3,000	abundant
Grizzly bears	228	none
Mountain lions	some	abundant
Coyotes	abundant	common

[a] A wide variety of land-use restrictions (seasonal and permanent) are employed on public lands throughout the Yellowstone and central Idaho areas for protection of natural resources and public safety including: on motorized vehicles, construction of structures, Animal Damage Control activities, big game winter range, calving areas, security and migration habitat, raptor nest sites, endangered species (including grizzly bears), erosion control, wetland protection, to provide a variety of outdoor experiences (motorized or non-motorized, wilderness or developed, etc.).
[b] Non-earned income represents investments, entitlements, and retirement income that often does not depend on where a person lives. The growth of this segment of the economy from 25% to 34% over the last two decades results from people with this type of income moving into the central Idaho or Yellowstone area because these areas are perceived to have a lifestyle that people want to participate in (wild spaces, abundant wildlife, less crowding, low crime, clean air, etc.).
[c] Including only ungulate herds at least partly associated with Yellowstone National Park. Estimated over twice that number using public and private lands is overall Yellowstone area.
[d] Including hunting, crippling loss, poaching, road kill, predation, disease, starvation, drowning, winter kill, accidents, fighting, etc. (Appendix 10).

Review of the DEIS

The public comment period began July 1, 1993, with a press conference in Washington, D.C. Additionally, a news release, requesting comment on the DEIS, was provided to over 500 media contacts (newspaper, radio, and television). About 1,700 copies of the complete DEIS were mailed to all potentially affected government agencies, public libraries in the 3-state region, many special interest groups, and to anyone requesting the complete DEIS. About 42,000 summaries of the DEIS were mailed to people and organizations on the Gray Wolf EIS mailing list and to anyone requesting them. In addition, the DEIS summary, a schedule of public hearings, and a request to report wolf sightings was printed in the form of a newspaper flyer and was inserted into the Sunday (July 18th and 25th) editions of six major newspapers in Montana, Idaho, and Wyoming. These newspapers have a combined circulation of about 280,000. Upon request, the comment period was extended from the original deadline of October 15, 1993, to November 26, 1993. Written public comments on all or part of the DEIS were obtained in the form of letters, postcards, resolutions, and petitions.

Twelve formal hearings were held in Idaho, Montana, and Wyoming; and four more hearings were held at other locations in the U.S. Hearings were conducted during the months of August and September 1993 and comments were accepted from 2 p.m. to 10 p.m. At these hearings, verbal testimony (treated the same as written responses) was recorded and any written comments were accepted.

Throughout the comment period (July1-November 26) presentations were given to interested groups in Montana, Wyoming, and Idaho. Over 160,000 comments were received by the public and analyzed in October 1993 through December 1993. A summary of the public comments and request to report any sightings of wolves was mailed to nearly 43,000 people on the Gray Wolf EIS mailing list in March 1994. The FEIS was prepared during January through April 1994 to respond to the issues, alternatives, and comments identified by the public.

Alternatives Considered But Not Analyzed Further in the FEIS

Seven basis wolf management alternatives were identified but were not evaluated further in the FEIS. These alternatives were:

1. *Immediately delist wolves and let the states manage and recover wolves*. – No wolf reintroduction would occur. States would manage the gray wolf the same as other resident wildlife species without federal oversight. Wolves are listed as state endangered species in Montana and Idaho but other Idaho law prohibits wolf management, including law enforcement, by the Idaho Fish and Game Department, except for assisting with control of nuisance wolves and participation on any wolf recovery team without the expressed permission of the state legislature. Wolves are listed as predators by state law in Wyoming, and cannot be managed by the Wyoming Game and Fish Department. Wolves can be killed at any time without limit. This alternative is not being considered further because of the conflicting intent and uncertain direction of state law.

2. *State management of nonessential experimental populations.* – wolves would be reintroduced into Yellowstone National Park and central Idaho. In areas without resident wolf packs, liberal management would be allowed to address local concerns about livestock, land-use restrictions, and ungulate populations. The respective states would develop wolf management plans that conform to federal law and would lead wolf recovery and management. Federal funding would support state management, compensation for livestock losses caused by wolves, and enhancement of ungulate habitat. Except for the provision calling for federal compensation for livestock losses and ungulate enhancement, this alternative was incorporated into the FEIS as the FWS's proposed action.

3. *No cow or bison-based, sustained subsistence economy.* – Livestock growing would be eliminated, fencing removed, control of predators stopped, and wolves and bison reintroduced throughout the wolf recovery area. This alternative is not being considered further in the FEIS because it is far beyond any reasonable use of federal authority and is not practical.

4. *Recovery of existing wolves.* – This alternative would recover the existing population of wolves that some people believe were never totally extirpated from the Yellowstone area. No reintroduction would occur and other wolves would be prevented from affecting these wolves alleged to be genetically unique. This alternative is not being considered further in the FEIS because all wolves, regardless of potential sub-specific classification, were listed in 1978. Current information indicated wolves that once inhabited the Yellowstone area were more widely distributed and less distinct than previously believed. Scientific evidence does not indicate that any population of wolves persisted or currently exists in the Yellowstone or central Idaho areas. Wolf monitoring programs in Idaho, Wyoming, and Yellowstone National Park have detected the presence of occasional lone wolves, but efforts have not confirmed the presence of packs or breeding pairs of wolves in the Yellowstone or central Idaho areas.

5. *1987 Wolf Recovery Plan.* – The plan recommended preparation of an EIS, wolves be reintroduced as a nonessential experimental population into Yellowstone National Park, and natural recovery be monitored in central Idaho. If two breeding pairs of wolves had not been documented in Idaho within five years (i.e., by 1992) other wolf conservation measure would be considered. No EIS was prepared as a result of this plan, no reintroduction occurred, and no breeding wolves have been documented in the Yellowstone or Idaho areas. Therefore, this alternative is not being considered as a separate alternative in the FEIS.

6. *Accelerated Wolf Recovery.* – wolves would be immediately reintroduced into the Yellowstone and central Idaho areas until wolf population recovery was achieved. A wide variety of land-use restrictions would be used to enhance habitat for wolves over a very broad area, including: reducing the number of roads on public lands that are used by motorized vehicles, not permitting livestock or people in areas used by denning wolves, not controlling wolves that attacked livestock, and increasing the number of ungulates by improving or purchasing important habitat.

This alternative was unduly restrictive and more severe than was reasonably required to achieve wolf recovery and is not being considered further.

7. *The Indian Plan Alternative* – From public review of the DEIS, several alternatives or modification of alternatives already considered in the DEIS were suggested to be considered again in the FEIS. Only one new alternative was proposed in the FEIS. That alternative and the reason it is not evaluated further is as follows. “At one time native Americans armed with bows and arrows and spears were part of the natural ecosystem. I propose having a small Indian village with tepees, etc. in a place like the Lamar Valley during as much of the year as suited them. During the tourist season, tourists could stay in the tepees and learn Indian crafts such as tanning leather, beadwork, making moccasins, making arrowheads, etc. They could also learn Indian dancing, stalking wild game, spearing fish, beating drums, etc.

   Tame wolves would be kept by the Indians so they could be seen by tourists. WILD ones will seldom, if ever, be seen by tourists. During a hunting season, directed by Park Rangers, Indians…would be allowed to harvest a number of wild game animals. The meat would be distributed to needy Native Americans. This “Indian Plan” offers advantages over the proposed “wolf plan”.”

   The Indian Plan alternative is not being evaluated further because it does not address the issue of recovery or reintroduction of wild wolf populations. This alternative also does not restore wolves as functioning components of the natural ecosystem in the Yellowstone and central Idaho areas and its potential impact on the environment would be similar to the No Wolf alternative.

Alternatives Analyzed in Detail in the FEIS

Based upon 160,284 public comment during review of the DEIS, five alternatives were developed and are considered in depth in the FEIS because they represent a broad range of alternatives and respond to the public’s concerns expressed about the potential issues and impacts involved in wolf reintroduction. Those alternatives are:

1. Reintroduction of Experimental Populations (FWS proposal)
2. Natural Recovery (No action or current management strategy)
3. No Wolf
4. Wolf Management Committee
5. Reintroduction of Non-experimental Wolves

Description and Impacts of the Proposed Action and Alternatives

Alternative 1. Reintroduction of Experimental Populations (Proposed action)
Summary – Two nonessential experimental populations areas (Figure S-2) would be established through regulations by the FWS under Section 10(j) of the ESA. The ongoing wolf monitoring efforts would continue. Prior to any reintroduction, the FWS would determine the status of any naturally occurring wolf population in those two areas. Wolves would be reintroduced into either or both Yellowstone National Park and central Idaho unless a wolf population (two wild breeding pair, raising at least two young for the previous two years in an area) have been documented. Wolves outside national parks and wildlife refuges would be managed by the states and tribes under special federal regulations. If the states and tribes did not assume wolf management, the FWS would. Management would allow wolves to be killed or moved under some conditions by federal, state, and tribal agencies for domestic animal depredations and excessive predation on ungulate populations. Under some conditions, the public could harass and kill wolves attacking livestock (cattle, sheep, horses, and

mules only). There would be no federal compensation program, but compensation from existing private funding sources would be encouraged. There would be no land-use restrictions applied when ≥6 wolf packs occupied as experimental population area. No critical habitat will be designated. Use of toxicants lethal to wolves in areas occupied by wolves would still be prohibited by existing ADC policy and EPA labeling restrictions but other ADC activities would not be affected. Wolf populations would recovery by 2002.

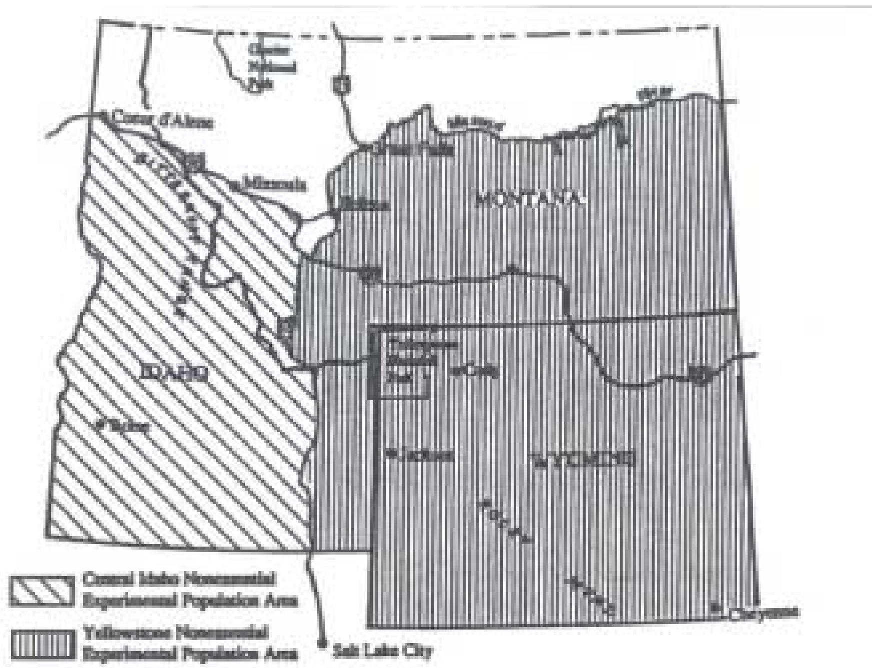

Figure S-2
The proposed experimental population areas in central Idaho (south of Interstate 90 and west of Interstate 15) and the Yellowstone area (south of the Missouri River from the Montana-North Dakota border to Great Falls and east of Interstate 15) where nonessential experimental population rules will apply.

Management Actions. – If a wolf population is not discovered in either the Yellowstone or central Idaho areas before October 1994, or before a release of wolves after that date (agency efforts to locate wolf packs in these areas have already been intensified but no packs have been found at the present time), the following would occur in each area not having a wolf population:

Note. – If a wolf population was discovered in either the Yellowstone and/or central Idaho areas, reintroduction under the experimental population rule would not occur and any wolf population would be managed as a naturally recovering population (see Alternative 2) in that area.

Note. – The proposed boundaries of the experimental population areas were established by considering the combination of the current southern expansion of naturally formed wolf packs in Montana, location of high quality wolf habitat and potential wolf release sites, and the likelihood of any wolf packs documented inside the experimental area resulting from reintroduction into central Idaho or Yellowstone National Park rather than from natural dispersal from Canada or northwestern Montana. Therefore, the boundaries of the proposed experimental population areas could be affected by formation of new wolf packs before any decision or implementation of a nonessential experimental population rule and wolf reintroduction is made (at the earliest mid-year 1994).

Note. – In response to agency and public comment on the FWS DEIS proposal, several changes were made in the FWS FEIS proposal. None of those changes were significant enough to effect the potential impact of the proposed action on big game, hunting harvest, domestic animal depredation, land-use restrictions, visitor use, or local economies. Changes to the FWS FEIS proposal include the following:

1. The northern boundary of the nonessential experimental population area for the Yellowstone area was moved north from Highway 12, to include the area south of the Missouri River from the eastern Montana border to Great Falls.

2. Increased emphasis was placed on the aggressive but balanced public information and education program and on law enforcement.

3. The reporting requirement for harassing wolves, in an opportunistic, non-injurious manner, for landowners on private land and for individuals holding grazing permits on public land was shortened from 14 days to no longer than 7 days and is restricted to only adult (greater than 6 months old) wolves. The ability of individuals holding grazing permits on public land to harass adult wolves in an opportunistic, non-injurious manner will become part of their permit conditions so it is clearly understood exactly what can occur.

4. Only after six or more breeding pairs of wolves are established in a recovery area and after designated authorities have confirmed livestock losses have been caused by wolves and have been unable to stop further losses, can individuals holding grazing permits on public lands receive a permit to take wolves in the act of killing or wounding livestock (cattle, sheep, horses, and mules).

5. The intent of the experimental rule is that land-use restrictions not be routinely used solely to enhance wolf recovery. However, land-use restrictions may be temporarily used by land or resource managers to control intrusive human disturbance, primarily around active den sites between April 1 and June 30, when there are five or few breeding pairs of wolves in a recovery area. After six or more breeding pairs become established in a recovery area land-use restrictions would not be needed.

6. Several of the general guidelines for Determining Problem Wolf Status (Interim Wolf Control Plan, FWS, 1988, pages 7 to 9) were incorporated into the wolf control procedures as part of the experimental population rule. Those guidelines are as follows:

   (1) Wounded livestock or some remains of a livestock carcass much be present with clear evidence (Roy and Dorrance 1976, Fritts 1982) that wolves were responsible for the damage and there must be reason to believe that additional losses would occur if the problem wolf or wolves were not controlled. Such evidence is essential since wolves may simple feed on carrion they have found while not being responsible for the kill.

   (2) Artificial or intentional feeding of wolves must not have occurred. Livestock carcasses not properly disposed of in an area where depredations have occurred will be considered attractants. On federal lands, removal or resolution of such attractants much accompany any control actions. Livestock carrion or carcasses on federal land, not being used as bait in an authorized control action (by agencies), must be removed, buried, burned, or otherwise disposed of such that the carcass(es) will not attract wolves.

   (3) On federal lands, animal husbandry practice previously identified in existing approved allotment plans and annual operating plans for allotments must have been followed.

7. Wolves that attack other domestic animals and pets on private land two times in a calendar year (instead of three times as recommended in the DEIS) would be removed.

8. The states and tribes can move wolves having unacceptable impacts on ungulates, if those impacts would inhibit wolf recovery or would effectively reduce the prey base for wolves in a specific area (extraordinary population pressures). The states and tribe will develop wolf

management plans that will define such unacceptable impacts, how they would be measured, and identify other possible mitigation in their state or tribal management plans. These plans must be within the provisions and intent of the nonessential experimental population rule and must be approved by the FWS through cooperative agreement before such control could be conducted.

9. The FWS, ADC, or state or tribal agencies authorized by the FWS would promptly remove from the wild any wolf FWS< ADC, or authorized agency determined was a threat to human life or safety. Two nonessential experimental population areas and special rules for each of those areas would be established. These rule wold permit the following in the experimental areas:

    - Beginning in October 1994, 30 wild wolves would be captured in Canada and released in the experimental population areas, until a wild wolf population was established in each area (estimated 3-5 years). Breeding adults and their pups (15/year) wold be held 6-8 weeks at three sites in Yellowstone National Park and released in December. Yearlings and non-breeding adults (15/year) would be immediately released in central Idaho to simulate natural dispersal and pack formation. Reintroduced wolves would be monitored with radio telemetry and moved as necessary to enhance wolf population recovery.

    - Designate all wolves in the experimental areas as experimental animals once wolves were released.

    - The states and tribes would implement and lead wolf management outside national parks and national wildlife refuges within federal guidelines. The FWS would implement wolf management otherwise.

    - Wolves severely impacting wild ungulate populations (state and tribes would define) or potentially affecting other listed species would be moved as necessary.

    - There wold be no land-use restrictions implemented for wolves when ≥6 packs occupy an experimental population area. Land-use restrictions around active dens may be used on an as needed basis when ≤5 packs are present.

    - If additional livestock depredations were likely, proper animal husbandry practices were employed (proper disposal of livestock carcasses, etc.), artificial feeding did not take place, and federal grazing allotment plans were followed, agencies would harass, capture, move, or kill wolves that attacked livestock (defined as cattle, sheep, horses, or mules only) on public or private land. Females with pups on public land would be released on site before October 1.

    - Compensation for livestock killed by wolves would be paid from an already established private fund.

    - Wolves that attack domestic animals, other than livestock, on private land two times in a calendar year would be moved.

    - Land owners could, in an opportunistic, non-injurious manner, harass adult wolves on private land at any time (7 days reporting).

    - Public land grazing permittees could, in an opportunistic, non-injurious manner, harass adult wolves near their livestock at any time (7 day reporting).

    - Wolves in the act of wounding or killing livestock on private land could be killed by livestock owners-managers (maximum 24 hour reporting and evidence of livestock freshly wounded by wolves must be evident).

- If agencies could not resolve wolf depredations on livestock on public land, grazing permittees would receive permits to kill wolves in the act of attacking livestock one $\geq$6 packs occupy an experimental population area (24 hour reporting and evidence of livestock freshly wounded by wolves must be evident).

- After thorough investigation, take (killing or injuring) of wolves in an experimental population area by unavoidable and unintentional actions during otherwise legal activities would not be considered a take.

- Any wolf presenting a threat to human life or safety would be promptly removed from the wild.

See Tables S-2 through S-5 for a comparison of the expected actions and effects of this alternative.

Alternative 2. Natural Recovery (No action or current management strategy)

Summary. – No wolf reintroductions would occur. Enhanced wolf management program similar to the one currently used in Montana would be established in Idaho and Wyoming. Wolves would be encouraged to naturally expand their ranges into any area they choose, eventually into the central Idaho and Yellowstone areas. Wolves would eventually recolonize the recovery areas, but would also recolonize other areas throughout the northern Rocky Mountains and would be allowed to remain there if few conflict occurred and wolf recovery was not precluded by moving those wolves. Because wolves would settle in some areas where their presence was undesirable, there would be occasional conflicts, particularly with livestock. Depredating wolves would be controlled by agencies as long as control did not preclude wolf population recovery. There would be no federal compensation program, although a private fund does exist and its use by livestock producers would be encouraged. Wolves would not be controlled there were conflicts with pets or state or tribal big game management objectives. There would be some land-use restrictions primarily around active den sites and on some ADC activities in occupied wolf habitat. Illegal killing, at a level that precluded or severely inhibited recovery, would result in additional land-use restrictions, primarily a reduction in the number of roads open to motorized vehicles. Excessive wolf conflict with livestock would affect the location and duration of livestock grazing on public land. This alternative would likely result in recovered wolf populations in central Idaho about 2012 and in the Yellowstone area about 2025.

Management Actions. – An enhanced FWS wolf recovery program would be established in Idaho and Wyoming. FWS biologists and other agency cooperators would conduct the following activities:

- Wolf monitoring efforts would continue but would be enhanced to solicit more reports form the public and agency personnel, increase efforts to conduct more field surveys in all areas of suspected wolf activity, and increase attempts to place radio collars on members of any wolf packs that were located.

- As ADC wolf management specialist position would be established once wolf packs formed in Idaho or Wyoming. All reports of wolf depredations on legally present livestock would be investigated. Wolves that depredated on livestock (but not pets) and were likely to do so again, would be moved after the first depredation and killed or placed in captivity after subsequent depredations. Females and their young would be released on site prior to August 1. Wolves would not be controlled in areas critical to wolves (dens or ungulate calving areas) or if wolves were attracted to the area by poor livestock husbandry practices (improper carrion disposal). After six packs became established in each recovery area, depredating wolves would be killed. Wolf control is permitted only so long as wolf recovery is not prevented by such management. The public may not attempt to harm or harass any wolf unless it is necessary for the immediate protection of human life or safety, which is highly unlikely.

- Compensation for livestock losses would be paid by an already established private fund.

- Wolves would not be controlled to reduce predation on wild ungulate populations.

- FWS would encourage and support research on wolves and their prey.

- FWS would encourage land management agencies to maintain or enhance ungulate populations to ensure adequate wolf prey.

- FWS would lead an aggressive public information and education program that would provide accurate information about wolves and wolf recovery under the ESA.

- There wold be very few land-use restrictions implemented unless illegal killing began to inhibit wolf recovery. Currently, it is recommended that land management agencies restrict obtrusive human activity within one mile of active wolf dens from March 1 to July 1 and that ADC not conduct predator control activities (primarily use of toxic devices – M-44s) in a manner that may accidently kill a wolf. Land-use restrictions, such as reducing the amount of roads or area open to motorized vehicles, seasonal closures on coyote hunting, reducing livestock grazing on public land, and closing areas near den or rendezvous sites to human activity have been applied in a few areas and, although unlikely, are possible in the northern Rocky Mountains.

See Table S-2 through S-5 for a comparison of the expected actions and effects of this alternative.

Alternative 3. No Wolf

Summary. – Congress would pass legislation to remove wolves in Montana, Wyoming, and Idaho from the list of Endangered Species. The FWS wold stop all funding and management activity towards wolf monitoring, education, research, and control in the northern Rocky Mountains of the U.S. Furthermore, the states of Montana and Idaho would remove wolves from the protection of state law. Except within Glacier National Park, unregulated killing by the public would prevent further wolf recovery in these areas. ADC activity would remove any wolves that threaten livestock. Wolf populations would not recover in the Yellowstone or central Idaho areas.

Management Actions

- Federal legislation wold be passed that removed wolves in the northern Rocky Mountains from federal protection.

- Montana and Idaho state legislation would be passed that removed protection for wolves.

- People would be allowed to kill wolves at any time without restriction which would by itself prevent wolf population recovery.

- ADC would kill any wolves causing potential conflicts with livestock.

See Tables S-2 through S-5 for a comparison of the expected actions and effects of this alternative.

Alternative 4. Wolf Management Committee

Summary. – Congress would be requested to immediately either amend the ESA or pass special legislation to designate wolves in Wyoming, Montana, and Idaho (except in and immediately west of Glacier National Park and in Yellowstone National Park) as a special state-managed nonessential experimental population. The states would develop plans to recover wolves in northwestern Montana, central Idaho, and Yellowstone National Park. Wolves would be recovered through natural dispersal in northwestern Montana and central Idaho and would be reintroduced in Yellowstone National Park. Wolves attacking or harassing livestock, working animals, or pets could be killed or moved by the public and by sate, tribal, and federal agencies. Compensation for domestic animal losses, increased ungulate monitoring, and habitat enhancement would be paid from a federal trust fund. There would be few land-use restrictions. Wolves would be moved to address state big game management goals. Wolf populations would recover in the Yellowstone area about 2010 and in central Idaho about 2015.

Management Actions

- Congress wold amend the ESA and designate wolves, outside National Parks and National Wildlife Refuges, in Wyoming and Idaho and nearly all of Montana as a special nonessential experimental population and establish an interagency committee and federal trust fund.
- States would develop wolf management plans and assume management authority within two years.
- Wolves would be reintroduced into Yellowstone National Park and after five years possibly central Idaho.
- Agencies would move (if less than six packs were present) or kill (if six or more packs were present) wolves that attacked livestock, working animals, or pets.
- Owners of livestock, working animals, and pets could kill any wolves they believed were harassing or attacking their animals. Incidents must be reported within 48 hours on private land and 14 days on public land. Any wolves killed would be replaced. The alternative requires an education program for livestock producers.
- Wolves affecting state big game management objectives would be moved.
- Compensation for domestic animal losses from a federal trust.
- Establish public land-use restrictions around active den sites between April1 and June 15 and restrict toxicants lethal to wolves in areas where wolf occupancy was desired.
- Conduct an active information and education program.
- Monitor and enhance ungulate populations.

See Tables S-2 through S-5 for a comparison of the expected actions and effects of this alternative.

Alternative 5. Reintroduction of Non-experimental Wolves

Summary. – Wolves would be reintroduced into areas in and near central Idaho and Yellowstone National Park until ten breeding pairs are established. They would not be designated an experimental population. Wolf recovery would be a high priority on all surrounding federal lands. If required, land-use restrictions such as road and tail closures, redistribution of grazing allotments, and protection of key wolf habitats would be promoted. If wolves depredated on livestock on public land or impacted state big game management objectives, no control would occur. If repeated chronic wolf depredation on livestock occurred on private lands, wolves would be moved. Compensation for livestock losses would be available only from existing private programs. Habitat for ungulates and wolf security would be enhanced to provide abundant prey. Wolf populations would likely recover rapidly and by 2000.

Management Actions

- The FWS would establish enhanced wolf recovery programs in Wyoming and Idaho (see Alternative 2) to conduct monitoring, research, and education programs.
- The FWS wold reintroduce wolves into the Yellowstone and central Idaho areas until ten breeding pairs were established, regardless if other wolves were documented in those areas.
- The USDA Forest Service and BLM, within the primary analysis areas, would us road closures and habitat enhancement on at least 35 square miles of lands they administer outside of wilderness.
- Wolves would not be controlled for livestock conflicts, except in chronic problem areas on private land, or for conflicts with ungulate populations.
- Land management agencies would spend about $3,000,000/year to purchase or enhance important ungulate-wolf habitat.
- Law enforcement programs would be significantly enhanced.

See Tables S-2 through S-5 for a comparison of the expected actions and effects of this alternative.

Alternatives	Control of livestock losses	Compensation for losses	Control of big game predation	Management of wolves	Land-use restrictions for wolves	Where wolves would be recovered	Date of wolf recovery	Wolf mgmt. cost until recovery	Legislation needed to implement
Reintroduction of Experimental Population (proposal)	Agencies move/kill wolves for killing livestock/pets. Public harass and control under some conditions	Probably private funds	Wolves moved if problem documented Encourage land agencies to enhance ungulate habitat	By states and tribes with federal oversight of state plans	Up to 16 mi.[2] for 5 or fewer packs, none after 6 packs are established	YNP 17,600 mi.[2] ID 20,700 mi.[2]	YNP & ID 2002	$6,757,750	Publish experimental rule in federal register. Some state laws would have to be change to allow state management.
Natural Recovery	Agencies move wolves for livestock depredations	Probably private funds	None	Federal	1 mi. around dens 35 mi.[2] affected. More possible	YNP 23,300 mi.[2] ID 23,900 mi.[2]	YNP 2025 ID 2012	$10,000,000 - $15,000,000	None
No wolf	All wolves killed	None	All wolves killed	None for recovery by agencies	None for wolves	Nowhere	Never	$100,000	Modify state (MT & ID) and federal laws
Wolf Management Committee	Agencies move/kill wolves. Public kill wolves for harassing and attacking livestock/pets/ working animals	Compensation by federal trust	Wolves moved, habitat enhanced, increased ungulate monitoring	By states. No federal oversight	1 mi. around dens 35 mi.[2] affected	YNP 12,070 mi.[2] ID 9,450 mi.[2]	YNP 201 ID 2015	$100,000,000 $129,000,000	Modify state and federal laws
Reintroduction of Nonexperimental Wolves	Agencies move wolves only in chronic problem areas on public land.	Probably private funds	Habitat enhanced	Federal	1 mi. around dens 35 mi.[2] affected. Some roads may be closed	YNP 29,120 mi.[2] ID 29,530 mi.[2]	YNP & ID 2000	$28,209,750	None

[2] See Appendix 5 on how costs estimates were determined

Table S-2
Alternative and expected actions associated with them.

Table S-3
Expected impacts of recovery wolf populations (100 wolves) by alternative
Yellowstone area.

Alternatives Impact	Reintroduction of Experimental Population (proposal)	Natural Recovery (no action)	No Wolf	Wolf Management Committee	Reintroduction of Nonexperimental Population
Impact to big game population	Elk 5%-20% reduction, mule deer 10% reduction, bison 5%-10% reduction, others no effect. Effects over Yellowstone area.	Same as Experimental but will occur several decades later. Short term negative effect to 30% possible.	None in Yellowstone area	Similar to Experimental population with effects confined mostly to YNP and wilderness areas.	Slightly higher than Experimental but wolves recover sooner
Effects on hunter harvest	Reduced antlerless harvest 8% (range 2%-30%), no effect on antlered harvest over Yellowstone area.	Same as Experimental but will occur several decades later. Short term 30% possible.	None in Yellowstone area	Similar to Experimental population with effects confined mostly to YNP and wilderness areas.	Slightly greater than Experimental (15%) but wolves recover by 2000.
Livestock depredation	Annual average 19 (range 3-33) cattle, average 68 (range 38-110) sheep.	A few (10%) more over a longer period (30 years). Losses on private land more likely.	None in Yellowstone area	Losses likely toward lower range (3 cattle, 38 sheep) of the projected for experimental population.	Losses likely from upper range (32 cattle, 110 sheep) of projected to several times that level.
Land-use restrictions	Up to 16 mi.^{2} for 5 or fewer packs, none after 6 or more packs established	Reduce human activity 1 mi. around active wolf dens. 35 mi^2 more possible road closures, etc.	None in Yellowstone area	Reduce human activity 1 mi. around active wolf dens. 35 mi^2 more possible road closures, etc.	1 mi. around active wolf dens. If wolves illegally killed may include road closures, removal of livestock, and limits on activities on public lands.
Visitor use	Probable 5% increase in nonresident and 10% increase in local visitation	Probable 5%-10% increase by 2025, after wolves become established.	None in Yellowstone area	Probably increase (5%-10%) in visitation	Probable increase (5%-10%) in visitation
Economic effects	Decreased hunter benefits $187,000-$465,000/year. Decreased hunter expenditures $207,000-$414,000/year Livestock losses $1,888-$30,470/year Visitor expenditures increase $23,000,000/year. Wolf existence value positive $8,300,000/year. Wolf management cost $480,000/year	Decreased hunter benefits $59,000-$147,000/year. Livestock losses $600-$9,700/year. Visitor expenditures increase $1.73-$2.56 billion/year Wolf management cost $250,000/year.	Total costs of about $50,000 to change federal and some state laws	Costs to hunters and livestock losses slightly lower and benefits similar to experimental population alternative Wolf management cost $3.22 million/year	Costs to hunters and livestock losses slightly higher and benefits similar to experimental population alternative. Wolf management costs $2.7 million/year.

Table S-4
Expected impacts of recovered wolf populations (100 wolves) by alternative – central Idaho area.

Alternatives Impact	Reintroduction of Experimental Population (proposal)	Natural Recovery (no action)	No Wolf	Wolf Management Committee	Reintroduction of Nonexperimental Population
Impact to big game population	Elk 5%-10% reduction, others no effect in central Idaho area by 2002.	Same as Experimental but will occur over a decade later. Bighorn sheep could decrease temporarily.	No new in central Idaho	Similar to Experimental population with effects confined mostly to wilderness areas and later (2015)	Slightly higher than Experimental but wolves recover sooner. Bighorn sheep may be temporarily decreased.
Effects on hunter harvest	Reduced antlerless harvest (elk only) 10%-15%, no effect on antlered harvest in central Idaho area.	Same as Experimental but will occur over a decade later. Bighorn sheep could be affected.	No new in central Idaho	Similar to Experimental population with effects confined mostly to wilderness areas and later	Slightly greater than Experimental (15%) during recovery but wolves recover by 2000.
Livestock depredation	Annual average 10 (range 1-19) cattle, average 57 (range 32-92) sheep.	A few more (12 cattle, 60 sheep) over a longer period (30 years). Losses on private land more likely.	No new in central Idaho	Losses likely toward lower range (8 cattle, 40 sheep) of the projected for experimental population.	Losses likely from upper range (14 cattle, 70 sheep) of projected to several times that level.
Land-use restrictions	Up to 16 $mi.^2$ for 5 or fewer packs, none after 6 or more packs established	1 mi. around active wolf dens. 35 $mi.^2$ impacted. More possible road closures, etc.	No new in central Idaho	1 mi. around active wolf dens. 35 mi^2 impacted.	1 mi. around active wolf dens. If wolves illegally killed may include road closures, removal of livestock, and limits on activities on public lands.
Visitor use	Probable 2% increase likely	Probable 2% increase likely by 2012	No new in central Idaho	Probably 2% increase	Probably 2% increase
Economic effects	Decreased hunter benefits \$757,000-\$1,135,000/year. Decreased hunter expenditures \$572,000-\$857,000/year Livestock losses \$2,923-\$18,503/year Visitor expenditures increase \$23,000,000/year. Wolf existence value positive \$8,400,000/year. Wolf management cost \$480,000/year	Decreased hunter benefits \$504,000-\$756,000/year. Livestock losses \$1,900-\$12,300/year. Wolf existence value positive \$4.26-\$6.44 million/year. Wolf management cost \$250,000/year.	Total costs of about \$50,000 to change federal and Idaho laws	Costs to hunters and livestock losses slightly lower and benefits similar to experimental population alternative Wolf management cost \$3.22 million/year	Costs to hunters and livestock losses slightly higher and benefits similar to experimental population alternative. Wolf management costs \$2.7 million/year.

Table S-5
Expected impacts of alternatives –
northwestern Montana[2].

Alternatives Impact	Reintroduction of Experimental Population (proposal)	Natural Recovery (no action)	No Wolf	Wolf Management Committee	Reintroduction of Nonexperimental Population
Impact to big game population	Wolves would not cause any new impacts in northwestern Montana under this alternative	Wolves would not cause any new impacts in northwestern Montana under this alternative	No new in central Idaho	Slightly less chance that wolves could impact hunting of female ungulates compared to experimental population alternative	Wolves would not cause any new impacts in northwestern Montana under this alternative
Effects on hunter harvest	Wolves would not cause any new impacts in northwestern Montana under this alternative	Wolves would not cause any new impacts in northwestern Montana under this alternative	Hunter harvest of female ungulates increases slightly	Slightly less chance that wolves could impact hunting of female ungulates compared to experimental population alternative	Wolves would not cause any new impacts in northwestern Montana under this alternative
Livestock depredation	Wolves would not cause any new impacts in northwestern Montana under this alternative	Wolves would not cause any new impacts in northwestern Montana under this alternative	Fewer cattle and fewer sheep killed or maimed by wolves.	Slightly few livestock (average 3 cattle and 2 sheep/year) would be killed by wolves	Wolves would not cause any new impacts in northwestern Montana under this alternative
Land-use restrictions	Wolves would not cause any new impacts in northwestern Montana under this alternative	Wolves would not cause any new impacts in northwestern Montana under this alternative	Up to 35 mi.2 of habitat in public land would be potentially affected by season restrictions to protect active wolf dens.	Wolves would not cause any new impacts in northwestern Montana under this alternative	Wolves would not cause any new impacts in northwestern Montana under this alternative
Visitor use	Wolves would not cause any new impacts in northwestern Montana under this alternative	Wolves would not cause any new impacts in northwestern Montana under this alternative	Visitation to northwestern Montana may decease from current projections	Slight potential decrease in visitation	Wolves would not cause any new impacts in northwestern Montana under this alternative
Economic effects	Wolves would not cause any new impacts in northwestern Montana under this alternative	Wolves would not cause any new impacts in northwestern Montana under this alternative	Few livestock would be lost to wolf depredation. More hunter dollars wold be spent hunting female ungulates. Fewer visitor dollars will be spent.	Slightly fewer livestock losses. Slightly less change of reduced hunter expenditures. Slight decrease in visitor expenditures.	Wolves would not cause any new impacts in northwestern Montana under this alternative

[2] Two of the alternatives (No Wolf and Wolf Management Committee) might impact the naturally occurring wolf population in northwestern Montana. Three alternatives (Reintroduction of Experimental Populations, Natural Recovery, and Reintroduction of Nonexperimental Population) will have no significant effect on the naturally recolonizing wolf populations in northwestern Montana.

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Introduction

Wolves, once common in the northern Rocky Mountains of the United States, were exterminated by the late 1930s. Except for Minnesota (where wolves have been listed as threatened since 1978), wolves were listed as an endangered species in 1973 in the contiguous 48 states. In 1987, the “Northern Rocky Mountain Wolf Recovery Plan” (USFWS 1987) recommended wolf populations be recovered by establish three populations; one each in northwestern Montana, central Idaho, and the area in and around Yellowstone National Park. Wolves have naturally dispersed from Canada and established a population in northwestern Montana, but packs and breeding pairs are still not known to exist in Yellowstone and central Idaho.

The document describes five alternative ways that wolves can be recovered in Yellowstone National Park and central Idaho. The proposed action is to establish wolf populations, designated as nonessential, experimental populations, by reintroducing wolves into Yellowstone National Park and central Idaho. Two other alternatives also involve capturing and releasing wolves. One alternative encourages natural wolf recovery with no reintroductions. One alternative does not all wolf recovery. All issues and concerns identified by the pubis were considered and the most significant analyzed in detail. The probable effects of each alternative on ungulate populations, hunter harvest, livestock, land use, visitor use, and regional economies are also described.

The draft EIS was distributed for public review and comment on July 1, 1993. The comment period was extended from the original October 15 deadline to November 26, 1993. All comments (including responses) from federal, state, and local government agencies having regulatory authorities, and native American tribes are printed in this document, the final EIS (FEIS). Due to the volume of response, most letters and verbal testimony from individuals and non-governmental agencies are not printed in the FEIS. However, issues identified through the analysis of public comments, and the responses are presented in Chapter 5.

Chapter I

Purpose of and Need for Action

Introduction

This section of the final Environmental Impact Statement (FEIS) discusses the purpose and need for this action, background of why the FEIS is being developed, the project location, the legal constraints of any decision, how the planning process was developed, the scoping of the draft Environmental Impact Statement (DEIS), and the major issues and concerns that were considered in detail in the DEIS.

Purpose of the Action

The U.S. Fish and Wildlife Service (FWS) proposes to recovery, and then delist (remove from federal protection), the gray wolf (*Canis lupus*) in the northern Rocky Mountains by establishing a minimum of ten breeding pairs of gray wolves, for three consecutive years, in (1) central Idaho and (2) the greater Yellowstone area. Wolves have been dispersing naturally into northwestern Montana and have established a population that should reach recovery levels about 2002. The Yellowstone and central Idaho areas represent two of three wolf recovery areas in the northern Rocky Mountains of the United States (U.W.) that were identified in the 1987 Northern Rocky Mountain Wolf Recovery Plan as being necessary for the recovery and conservation of endangered gray wolves, but wolf populations do not currently exist in these areas. This proposal covers only the Yellowstone and central Idaho areas.

Need for the Action

The FWS is the primary agency responsible for the recovery and conservation of endangered species, including the gray wolf in the U.S. In 1991, Congress directed the FWS to prepare a DEIS on reintroduction of wolves into Yellowstone National Park and central Idaho.

Background

Gray wolves were common in the northern Rocky Mountain states prior to 1870. After bison (*Bison bison*), elk (*Cervus elaphus*), deer (*Odocoileus* spp.), and other ungulates were decimated by unregulated hunting and settlement, wolves and other large predators threatened the expanding livestock industry. By 1930, government predator control programs severely reduced predators and eliminated wolves from the western U.S.

The northern Rocky Mountain wolf subspecies (Canis lupus irremotus) was listed as an endangered species in 1973 (38 Federal Register 14678, June 4, 1973). However, because modern taxonomists recognized fewer subspecies, the entire species (Canis lupus) was listed as an endangered species throughout the contiguous U.S., except in Minnesota where wolves were listed as threatened in 1978 (43 Federal Register 9612, March 178). As enacted by Congress, the purposes of the Endangered Species Act (ESA) are “to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved, to provide a program for the conservation of such endangered species and threatened species, and to take steps as many be appropriated to achieve the purposes of the treaties and conventions set forth…” The ESA “further declared to be the policy of Congress that all Federal Departments and agencies shall seek to conserve endangered species and threatened species and shall use their authorities in furtherance of this Act.” The ESA also stated “The Secretary shall develop and implement plans (herein, referred to as ‘recovery plans’) for the conservation and survival of endangered species…”

The Northern Rocky Mountain Wolf Recovery Plan was first approved by the FWS in 1980. The plan was “intended to provide direction and coordination for efforts toward recovery of at least two viable Northern Rocky Mountain Wolf (Canis Lupus Irremotus) populations in the lower 48 states.” The plan recommended among other things that wolf status and distribution be determined, management programs for any existing wolves be established, and wolf populations in unoccupied habitat be established through dispersal and introduction.

The Northern Rocky Mountain Wolf Recovery Plan was revised and approved by the FWS in 1987. The primary goal of the revised plan was “to remove the Northern Rocky Mountain wolf from the endangered and threatened species list by securing and maintaining a minimum of ten breeding pairs of wolves in each of three recovery areas for a minimum of three successive years.” That plan recommended wolf population recovery through natural colonization in the northwest Montana and central Idaho areas. If monitoring efforts in those recovery areas did not indicate satisfactory progress (two breeding pairs) toward recovery through natural recolonization with five years, other conservation measures would be identified and implemented. Due to Yellowstone National Park’s geographic isolation from areas with established wolf populations, the recovery plan recommended the reintroduction of wolves there, designated as a nonessential experimental population. However, before any reintroduction effort was initiated, the appropriate National Environmental Policy Act documents (Environmental Impact Statement) were to be prepared with full public involvement.

In the 1990 Department of Interior Appropriations Bill (PL 101-512 enacted on November 5, 1990), Congress direct the Secretary of Interior to appoint a 10-member committee, composed of representatives of the National Park Service (NPS), FWS, U.S. Department of Agriculture (USDA) Forest Service, representatives from fish and game agencies from Idaho, Montana, and Wyoming, conservation groups, and livestock and hunting communities. The committee’s task was to develop a gray wolf reintroduction and management plan for Yellowstone National Park and the central Idaho Wilderness Area. The Committee was further charged with making its completed plan and its recommendations available to the Secretary and the Congress by May 15, 1991. The Committee’s plan was to represent a consensus agreement with at least six members supporting the plan. Seven members (FWS, USDA Forest Service, three state agencies, hunting and livestock representatives) voted for the plan, one abstained (NPS), and two voted against it (conservation group representatives). The report was presented to Congress on schedule, but, to date, no action has been taken on the Committee’s recommendation.

On November 13, 1991, Congress directed the FWS, in consultation with the NPS and USDA Forest Service, to prepare a DEIS on wolf reintroduction into Yellowstone National Park and central Idaho. Congress further directed the DEIS be completed by May 13, 1993, and that it cover a broad range of alternatives about wolf reintroduction (PL 102-154). In October 1992, Congress directed the FWS to complete the final EIS by January 1994, and stated that it expected the preferred alternative be consistent with existing law.

Project Location and Description

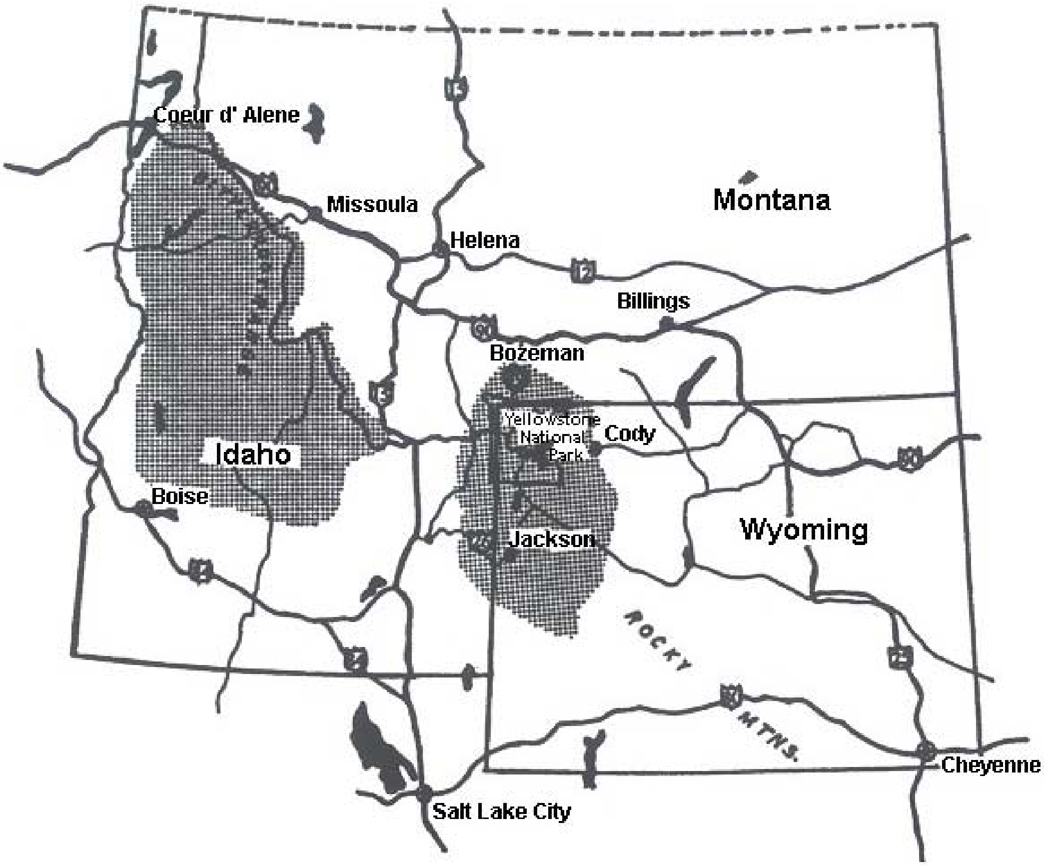
This project involves the northern Rocky Mountains of the U.S., and specifically refers to the states of Montana, Idaho, and Wyoming. Congress directed the FWS to evaluate wolf reintroduction into Yellowstone National Park and central Idaho (Figure 1-1).

Legal Context

Endangered Species Act (ESA)

The purposes of the ESA are “to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved, to provide a program for the conservation of endangered species and threatened species, and to take such steps as may be appropriate to achieve the purposes of the treaties and conventions set forth in subsection (a) of this section.”

Figure 1-1
Shaded portions indicate the approximate location of the Yellowstone National Park
and central Idaho primary analysis areas for the FEIS



FWS Policy

The mission of the FWS is “to provide the federal leadership in the conservation, protection, and enhancement of fish and wildlife populations and their habitats for the continuing benefit of people.”

National Refuge System Administration Act of 1966

The act provided fundamental polices for administration and management of all units of the National Wildlife Refuge System including the National Elk Refuge and Red Rock Lakes National Wildlife Refuge. This act also established the concept of “compatibility” whereby proposed used refuge lands must first be determined to be compatible with the purposes for which individual refuges were established.

USDA Forest Service Creative Act of 1891

National forests are established under the Creative Act of March 3, 1891, which allows the President to set aside and reserve national forest from the public domain. Management of national forest by the USDA Forest Service was established under the Organic Act of June 4, 1897, stating “No National Forest shall be established, except to improve and protect the Forest within the boundaries, or for the purpose of securing favorable conditions of water flows, and to furnish a continuous supply of timber for the use and necessities of citizens of the U.S. " (16 USD 551).

USDA Forest Service Policy

The National Forest Management Act of 1976 (16 USC 472) directs the management of national forest. Plans are prepared for each forest as required by the Forest and Rangeland Renewable Resources Planning Act of 1974 (16 USC 1600-164). These forest plans guide natural resource management activities on the national forest, and along with the associated laws and regulations, are the basis for management of the national forests, production of outputs, use by the public, and protection is not only the natural and cultural resources located there but the protection of the millions of people visiting the national forests.

The National Park Service Organic Act of 1916

The Organic Act of 1916 (16 USC 1 et seq.) established the NPS to "promote and regulate the use of the Federal areas known as national parks, monuments, and reservations…by such means and measures as conform to the fundamental purpose of said parks,…, which purpose is to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."

National Park Service Policy

The NPS will manage the natural resources of the national park system to maintain, rehabilitate, and perpetuate their inherent integrity. The NPS will strive to restore native species to parks whenever all the following criteria can be met: (1) Adequate habitat exists and a natural population can be self-perpetuating, (2) The species does not pose a serious threat to safety of park visitors, park resources, or persons or property outside park boundaries, (3) The species used in restoration most nearly approximates the extirpated subspecies or race, and (4) The species disappeared, or was substantially diminished, as a direct or indirect result of human-induced change to the species or the ecosystem.

Yellowstone National Park Act of 1872

The world's first National Park – Yellowstone – was established in 1872, at which time Congress set aside more than 2 million acres (8,100 km^2) as "a public park or pleasuring ground for the benefits and enjoyment of the people." The legislation assigned the new park to the control of the Secretary of the Interior, who would be responsible for issuing regulations to provide for the "preservation, from injury or spoilation, of all timber, mineral deposits, natural curiosities, or wonders, within said park, and their retention in their natural condition." Other park management functions were to include the development of visitor accommodations, the construction of roads and bridle trails, the removal of trespassers from the park, and protection "against the wanton destruction of fish and game" (16 USC 21-22).

Animal Damage Control Act of 1931

The USDA, Animal and Plant Health Inspection Service, Animal Damage Control (ADC) program is conducted pursuant to the Animal Damage Control Act of March 2, 1931 (46 Stat. 1468; 7 U.S.C. 426-426b), as amended, which states, in part:

> "The Secretary…is authorized and directed to conduct such investigations, experiments, and tests as he may deem necessary…on public domain, State, …privately owned lands of…animals injurious to agriculture,…forestry,…wild game animals,…and for the protection of stock…' and to conduct…control…of such animals…and may cooperate with States, individual and public and private agencies, organizations and institutions."

The overall mission of the ADC Program is to: "Assist in protecting the wildlife resource by providing national leadership in the control of conflicts between wildlife and man."

Wilderness Act of 1964

This act provides the framework for designation by Congress of units of the National Wilderness Preservation System and prescribes policy for their management. "A wilderness…is recognized as an area where the earth and its community of life are untrammeled by man…Wilderness areas shall be administered for the use and enjoyment of the American people in such manner as will leave them unimpaired for future use and enjoyment as wilderness and the preservation of their wilderness character" (16 USC 1131 et seq.).

National Environmental Policy Act of 1969 (NEPA)

This act requires that the responsible official submit a detailed report on "major federal actions significantly affecting the quality of the human environment" prior to taking major federal actions (42 USC 4321 et seq.). Implementation of any one of the alternative plans for reintroduction of wolves into Yellowstone National Park and central Idaho is considered such a major action and this planning effort is, therefore, subject to NEPA requirements.

Treaty with the Nez Perce, 1855

The Nez Perce Treaty of 1855, signed by Territorial Governor Isaac I. Stevens, ceded to the U.S., title to lands occupied or claimed by the Nez Perce Tribe. Treaty rights reserved by the Nez Perce Tribe in the ceded lands as described in the 1855 Treaty include "the right of taking fish at all usual and accustomed places in common with the citizens of the Territory," "together with the privilege of hunting, gathering roots and berries, and pasturing their horses and cattle upon open and unclaimed land."

Indian Self Determination Act

"The Congress declares its commitment to the maintenance of the Federal Government's unique and continuing relationship with, and responsibility to, individual Indian tribes and to the Indian people as a whole through the establishment of a meaningful self-determination policy which will permit an orderly transition from the Federal domination of programs for, and services to, Indians to effective and meaningful participation by the Indian people in planning, conduct, and administration of those programs and services."

Montana State Law

The wolf is listed as a state endangered species in Montana. Under the Nongame and Endangered Species Conservation Act (87-8-109), taking of wolves is authorized for scientific, zoological, or education purposes, for propagation in captivity, or for other special purposes by permit issued by the Director, Montana Department of Fish, Wildlife, and Parks (MDFWP). Where necessary to alleviate property damage, state endangered species may be taken under permit issued by the Director, MDFWP, and where possible under the supervision of Department personnel. They may also be taken without permit in emergency situations involving immediate threat to human life.

Idaho State Law

The wolf is listed as an endangered species in Idaho, and state statutes and regulations allow taking of wildlife, including wolves, to protect human life and property. Reporting the taking of animals under these situations is required. However, certain restrictions currently exist as described under Idaho Code, Section 36-715(2), which reads, “The Department of Fish and Game (IDFG) shall not be authorized to expend funds, transfer assets or enter into a cooperative agreement with any agency, department, or entity of the U.S. government concerning wolves unless expressly authorized by state statute except that the department is authorized to provide a representative to participate on the northern Rocky Mountain Wolf Recovery Team and to participate in activities regarding nuisance wolves.” In 1992 and 1993, the legislature authorized the IDFG to participate in preparation of the Gray Wolf EIS. In April 1994, the Idaho legislature amended existing legislation and authorized the IDFG in conjunction with the wolf oversight committee to develop and implement a wolf management plan for the state of Idaho (Idaho Code, Section 36-715[4]).

Wyoming State Law

The wolf is listed as a predator in Wyoming (23-1-101 VIII) and, under state statute (23-3-103), may be taken at any time without limit. There is no reporting requirement for killing a wolf. The Wyoming Game and Fish Department (WGFD) has no authority to manage wolves.

International Treaties

Several treaties affect how the federal government manages federal land and wildlife (including endangered species) under federal authorities, including the Convention of Nature Protection and Wildlife Preservation in the Western hemisphere and Convention on International Trade in Endangered Species (CITES). These treaties differ in emphasis and species of primary concern, but collectively provide clear mandates for identifying and protecting important habitats and ecosystems, and protecting and managing individual species.

Planning and EIS Process

The process used to develop alternatives for wolf reintroduction into Yellowstone National Park and central Idaho was designed to fulfill the legal mandates cited above. Four alternatives in this FEIS represent a long-range strategy that achieves wolf recovery. One alternative prevents wolf recovery. When alternatives require changes in existing law to be implemented, those changes are clearly identified.

Scoping Process and Public Participation

To identify issues and alternatives to be considered, a public participation and interagency coordination program was developed. This effort, called “scoping,” included reviewing previously developed plans and documents regarding wolf recovery in Yellowstone National Park and central Idaho (Weaver 1978, USFWS 1980, 1987, and 1988, Kaminski and Hansen 1984, YNP et al. 1990, Peek et al. 1991, Wise et al. 1991, Varley and Brewster 1992, Wolf Management Committee 1991).

The next step was to contact nearly 2,500 groups or individuals previously expressing interest in wolf recovery to solicit their input. A series of 34 informational meetings was held in April 1992 to obtain comments on issues of concern to the public about wolf reintroduction and its impacts. A series of 27 meetings and 6 formal hearings was held in August 1992 to report on the issues identified and solicit input on the range of alternatives to be considered in the EIS. Brochures detailing the results of the issue identification and alternatives formulation were sent to nearly 32,000 individuals and groups that requested to receive information. The mailing list included individuals representing all 50 states and 40 foreign countries. Nearly 4,000 comments on issues and about 5,000 comments on alternatives were received from the public. See Chapter 5, Consultation and Coordination for further information.

On July 1, 1993, the DEIS was presented for public review and written comments on the DEIS were accepted from July 1, 993, through November 26, 1993. Oral testimony, treated the same as written comments, was accepted during 12 formal hearings held in Idaho, Montana, and Wyoming (4 in each state) and 4 hearings held in Salt Lake City; Seattle, Washington; Denver, Colorado; and Washington, D.C. Over 160,000 comments were received. Review and analysis of comments was completed by December 10, 1993. A report on the analysis of public comments (USFWS 1993) was completed and in March 1994 a summary of the analysis of public comments was mailed to about 42,000 individuals and organizations on the Gray Wolf EIS mailing list. Public comment resulted in modifications to the proposed action presented in the DEIS. All comments from federal, state, and local government agencies having regulatory authorities, and native American tribes were printed in the FEIS. Responses to those comments are presented in this document (see Chapter 5, Consultation and Coordination for more information). Due to the volume of response, specific letters from individuals and non-governmental organizations were not printed in the FEIS. However, issues identified through analysis of all public comments (USFWS 1993), and the responses are presented in Chapter 5.

Scoping of Issues

Introduction

During scoping, 39 wolf recovery issues were identified by the public. These issues were either not analyzed further and the reasons why explained, or included in an alternative, or analyzed in detail as an issue or potential impact of wolf recovery. The decision to classify an issue as a major issue or concern that was analyzed in detail in the DEIS was made solely on it s relevance to the decision that is being made or based on the best scientific judgement that the issue is significant to the decision being made. For instance, some people were concerned about the impact of wolves on a variety of rodents or fish. Because wolves are not documented to have impacts on populations of these types of animals, the issue is not significantly impacted by wolf recovery and therefore not analyzed further. In contrast, the decision about how wolves are recovered and managed will have an impact on the extent of livestock losses. Consequently, this issue was classified under a major issue and concern heading, “How will depredations on domestic animals be controlled?” and is addressed as an impact of wolf recovery in the EIS. All issues raised were considered but not all were analyzed because they were not significant, as explained later.

The issues and alternatives identified and their resulting impacts were divided into two categories: those analyzed in detail and those eliminated from detailed consideration. Issues and alternatives analyzed in the EIS are divided into two additional categories: those incorporated into alternatives, and those evaluated as impact topics. The following list represents those issues. Descriptions of the reasons for evaluating or eliminating issues ad alternatives and their impacts from consideration follow each list.

Issues and Impacts Evaluated in the EIS

Issues Addressed as Part of Alternatives

Amending the Endangered Species Act
Wolves as a missing component of the ecosystem
Range requirements
Control strategies

Humane treatment of wolves	Illegal killing
Enjoying wolves	Compensation
Regulated public take of wolves	Delisting
Cost of program	Need for education
State, tribal, and federal authority	Spiritual and culture
Viable population	Social and cultural environment
Travel corridors	Recovery areas

These issues and impacts are addressed as part of one or more alternatives in the plan.

Impact of wolf recovery on amending the Endangered Species Act. – Wolf recovery will not impact federal authority or the legal processes already identified to change the ESA if congress so desired. In the 1993 federal appropriations bill, Congress states that it "expects…that the preferred alternative will be consistent with existing law." However, this issue is addressed in one or more alternatives to present a broad range of alternatives, including some that would require changes in legislation.

Impact of wolf recovery on ecosystem completeness. – Wolf recovery in Yellowstone National Park and central Idaho will be addressed as part of one or more of the alternatives. The wolf is the only member of the mammalian biotic community of Yellowstone National Park that was present in historic times that is missing. Wolf recovery in the Yellowstone and central Idaho areas will restore a large predator to the food chain in those systems, making predator-prey relationships more complete. Prey populations will likely fluctuate slightly less, because of reduced winterkill, and fewer injured or unhealthy individuals will be present in the general prey population.

Impact of wolf recovery on humane treatment of wolves. – It is the policy of the FWS to conduct wildlife research, control, and management humanely. Humane treatment of wolves would be part of every management alternative that includes capturing, transporting, holding, controlling, and monitoring wolves, and is FWS policy.

Impact of wolf recovery on public enjoyment of wolves. – The ability of people to enjoy either the presence or absence of wolves is reflected in the various alternatives.

Impact of wolf recovery on regulated take by the general public. – Some alternatives permit regulated take of wolves by the public. The decision on how to manage wolves after delisting will be made by the respective states and tribes, and will likely include harvest by the public. All alternatives that result in wolf population recovery will ultimately result in state or tribal management programs that can potentially include regulated take by the public.

The FWS recognizes that regulated public harvest is a valuable wildlife management tool. Public harvest can be one of the most efficient, least expensive, and locally acceptable methods of managing wolf populations and minimizing wolf-human conflicts after wolf populations are recovered and delisted.

Impact of wolf recovery on program cost. – Costs of the wolf recovery program will vary between alternatives and are displayed for each alternative.

Impact of wolf recovery on state, tribal, and federal authority. – Wolf recovery will not change the authority of local, state, tribal, or federal government as defined by law. However, the various alternatives do place different emphasis on the level of state or tribal involvement and responsibility in implementing various wolf recovery strategies. Public comment during issue and alternative scoping indicated that people believed that wolf management should be addressed differently on private property than on public property. This concern is reflected in one or more of the alternatives that allow more management flexibility on private property.

Impact of wolf recovery on wolf population viability. – Wolf recovery will not impact the number, distribution, or persistence of wolves that, in combination, define the basis of a determination of whether a population is viable. The current definition for a viable wolf population in Montana, Wyoming and Idaho is ten breeding pairs, in each of three recovery areas (with some level of wolf exchange between them) for three consecutive years. This definition may change based upon future scientific or biological information, but would not vary between alternatives that result in wolf recovery. A recent scientific investigation into the question of population viability indicates that the definition of a viable wolf population outlined in the 1987 Wolf Recovery Plan (ten breeding pairs, in each of three recovery areas for three successive years with some level of interchange between areas) is still an appropriate measure for determining if gray wolves require federal protection under ESA (S. H. Fritts pers. commun., USFWS, Helena, Mont.). This analysis also emphasized the importance of increasing the number of population "founders," and establishing expanding wolf population in all three areas simultaneously, arguing for reintroduction rather than natural dispersal, particularly in the Yellowstone area, to enhance wolf population viability and genetic diversity (Appendix 9).

Impact of wolf recovery on wolf travel corridors. – Wolf recovery will not result in wolf travel corridors or linkage zones being established. The Yellowstone and central Idaho areas are separated from northwestern Montana by enough human settlement (a social rather than physical obstacle that results in some level of increased wolf mortality) that it could take decades for population recovery to begin. However, one established in each of the recovery areas, enough wolves from each area would disperse that some would successfully travel through or live in areas other than those in Yellowstone National Park and central Idaho. The size and proximity of three areas where wolves will be managed for recovery are large enough, close enough, and have enough public land between them that additional areas (travel corridors) are not required in the foreseeable future to maintain a viable wolf population after the three sub-populations become established.

Impact of wolf recovery on the range requirements of wolves. - This issue relates to the areas that wolves require and the fact that, by their nature, all wolves will not be confined to a specific area. This issue is addressed by identifying management strategies for wolves in specific areas in the various alternatives. Certain types of management will restrict the range of wolf populations.

Wolf control strategies. – Various methods of control wolf depredations on livestock and reduce the potential effect on big game populations are addressed in the alternatives. In 1991 Congress appropriated additional funding (%291,000) to fund wolf control programs by ADC so that funding for other ADC control programs would not be reduced to fund wolf control activities.

Impact of wolf recovery on illegal killing of wolves. – The federal penalties for killing an endangered species can be up to $100,000 fine, 1 year imprisonment, loss of federal permits (grazing and guide-outfitting), loss of hunting, fishing, and trapping privileges, and loss of personal property used in the crime. Substantial anonymous rewards (thousands of dollars) are available for information leading to the arrest and conviction of offenders. Montana and Idaho state laws also have penalties for illegally killing wolves.

Wolves have been illegally killed in Montana, Idaho, Wyoming, and in Canada adjacent to Glacier National Park. At least five wolves have been illegally killed in Montana within the past five years. Two were mistaken for dogs and were killed by livestock producers who reported they were harassing livestock. Neither of those producers has been prosecuted. Three other wolves were found illegally killed. In 1978 a wolf was shot in central Idaho. In 1991, one wolf, and possible others, were illegally poisoned in central Idaho. In 1992, a man near Yellowstone National Park shot a wolf after mistaking it for a coyote. He has not been prosecuted. If wolves become present in an area, some will be illegally killed by people. The level of illegal killing is a function of attitudes about wolves, local public confidence in the government to legally address conflicts, public education, law enforcement, and land-management strategies to reduce human-wolf conflicts. Illegal killing is addressed in various alternatives by establishing when wolves may or may not be legally harassed or killed and setting different levels of land-use restrictions and enforcement.

Compensation for livestock killed by wolves. – The issue of compensation is addressed in one or more of the alternatives.

Impact of wolf recovery on delisting of wolves. – Wolf recovery will result in a viable wolf population that will be delisted according to the provisions of the ESA. Wolf reintroduction will not affect those criteria. The federal role is limited to wolf recovery. Delisting wolves will ultimate management by states and tribes is part of all alternatives. Some alternatives result in wolf populations reaching recovery in all three areas at about the same time, accelerating delisting. Others result in recovery in one area long before others, greatly prolonging delisting. These differences are pointed out among the various alternatives.

Because wolves are so symbolic to many people, delisting wolves, even after populations reach recovery levels and no longer require federal protection, will be controversial. Recent events in Alaska and Canada (where the wildlife departments recommended shooting some wolves in a few areas from airplanes to increase big game populations) and in Minnesota (where recommendations were made to initiate public harvest of wolves before they were removed from the list of threatened species) indicated many people became angered when they perceived that wolves were about to be harmed or treated unfairly. While the large number of people, big game species, and roads in the northern Rocky Mountains makes it highly unlikely that any wildlife manager would ever need to recommend shooting wolves from aircraft, regulated public harvest (hunting) will, at some time, become part of state or tribal management of recovered wolf populations. May people will strongly oppose any attempts to delist wolves for this reason. The FWS will continue to follow the procedures established in the ESA to fully recover and then delist populations of threatened and endangered species, including controversial species such as wolves (Appendix 11).

The FWS recognized that regulated public harvest is a valuable wildlife management tool. Public harvest can be one of the most efficient, inexpensive, and locally acceptable methods of managing wolf populations and minimizing wolf-human conflicts once wolf populations are recovered and delisted.

Impact of wolf recovery on the need for education. – Many of the issues dealing with wolf recovery can be addressed by providing accurate information to the public so they can make informed choices about wolves and wolf management. Education is part of one or more of the alternatives.

Impact of wolf recovery on spiritual and cultural values that people place on wolves. – Wolf recovery will not have a major impact on the cultural and spiritual values that people associate with wolves. However, the presence or absence of wolves and how they are managed are affected by various alternatives, which in turn impacts the intensity of those spiritual and cultural values. The FWS recognized that wolves have a special or sacred values to some Native American tribes.

Impact of wolf recovery on the cultural and social environment. – The presence or absence of wolves will influence perceptions of people about the Yellowstone and central Idaho areas. The area occupied by wolf populations is reflected in various alternatives in the FEIS.

Impact of wolf recovery on wolf recovery areas. – Wolf recovery alternatives will result in difference in the sizes of the areas that are managed for wolf population recovery.

The 1987 Northern Rocky Mountain Wolf Recovery Plan recommended that wolf recovery areas be better defined. A zone management concept was recommended whereby recovery would be most strongly encouraged in areas with few people and livestock (parks and wilderness), tolerated in areas with minor conflicts (public land) and discouraged in areas with likely conflicts (private land). The 1988 wolf control plan (USDWS 1988) incorporated that concept as one factor in determining when and how wolves that had or were likely to attack livestock would be controlled. The concept of wolf management zones was discussed in detail by Fritts (1990). The concept of managing wolves differently in various areas depending upon the level of potential conflicts is reflected in various ways in all alternatives. Allowing wolves to be harassed at any time on private land but not on public land under an experimental population rule is one example. Trying to actively confine all wolves only to a specific area is unrealistic because wolves can disperse long distances, and lone animals are difficult to document. However, by varying management strategies in different areas, wolves will in fact be passively manages so that wolf population recovery is restricted to specific “zones.”

Issues and Impacts Analyzed in the EIS
Impact of wolf recovery on ungulate populations
Impact of wolf recovery on hunter harvest
Impact of wolf recovery on domestic livestock
Impact of wolf recovery on land use
Impact of wolf recovery on visitor use
Impact of wolf recovery on economics

Potential impacts of wolf recovery on each of the following issues and impacts will be analyzed under each alternative.

Impact on wolf recovery on ungulate populations. – Wolf recovery is predicted to have an impact on big game populations. White-tailed deer (*Odocoileus virginianus*), mule deer (*Odocoileus hemionus*), elk (*Cervus elaphus*), moose (*Alces alces*), bison (*Bison bison*), bighorn sheep (*Ovis canadensis*), mountain goats (*Oreamnos americanus*), and antelope (*Antilocapra americana*) will be killed by wolves. Effects of wolf recovery on populations of these species will vary and will be analyzed to the extent possible for each alternative.

Impact of wolf recovery on hunter harvest. – Wolf recovery is predicted to have an impact on the hunter harvest of big game (primarily female ungulates). The impact of wolf recovery on the harvest of big game by human hunters will be an area of impact analysis. Other types of hunter opportunity and harvest (small game, game birds, waterfowl, and varmint) will not be measurably impacted.

Impact of wolf recovery on domestic livestock. – Wolf recovery is predicted to have an impact on domestic animal losses. Livestock depredations is a subject of impact analysis in the FEIS as part of one or more alternatives. Non-livestock domestic animal losses (primarily dogs) are expected to be uncommon but were addressed under some alternatives in the FEIS. The issue of wolf control strategies and compensation to address domestic animal depredations will directly affect the level of depredations and local human tolerance of wolf recovery.

Impact of wolf recovery on land use. – Wolf recovery can have an impact on the types of land-use restrictions used on public lands. Restrictions affecting open road density, ADC activities, motor vehicle use, and hiking have been used in some limited areas to enhance wolf recovery where illegal killing or disturbance near den sites by humans was a major factor affecting wolf survival. In some areas habitat manipulation (logging or fire) was used to enhance the prey base for wolves. Various alternatives reflect different levels of land-use restrictions and/or prey enhancement.

Impact of wolf recovery on visitor use. – Wolf recovery is predicted to have an effect on visitor use in Yellowstone National Park and central Idaho.

Impact on wolf recovery on economics. – Wolf recovery will have an impact on the economics of the affected areas.

Significant Issues and Impacts and Concerns

The specific issues and impacts (listed and discussed above) that were identified by the public and incorporated into the FEIS, as either parts of the alternatives (18) or as areas potentially impacted by wolves (6), share a common set of wolf management concerns. All of these issues and impact can be summarized into an examination of the who, what, when, where, and how of wolf recovery and management. To clarify how various alternatives address the issues and impacts and concerns of the public, they were grouped into 9 general wolf management questions (concerns) the FWS considers most significant. An example of how the issues and impacts were groups is portrayed in the question, “Where will wolf populations be recovered?” which involves parts of the issues of: wolves as a missing component of the ecosystem, enjoying wolves, travel corridors, range requirements, and recovery areas and will affect the potential impact of wolf populations on all 6 impact analysis areas. The other 8 questions address a variety of these and other issues and impacts that were also important to the public. These 9 questions form a basis to consistently describe and compare each alternative being analyzed in the FEIS and who each addresses all significant public issues and impacts and concerns.

Those 9 major issues and impacts and concerns that are used to describe the alternatives are:

1. How will depredations on domestic animals be controlled?
2. How will livestock producers be compensated for losses?
3. How will potential impacts to big game populations be managed?
4. Who will manage wolves?
5. What kind of land-use restrictions will occur?
6. Where will wolf populations be recovered?
7. When will wolf populations recover?
8. How much will wolf recovery cost?
9. Are changes in current state or federal law required?

Issues and Impacts Not Evaluated in the EIS

Impact of wolf recovery on wolves because wolves were not native to Yellowstone National Park
Impact of wolf recovery on wolf rights
Impact of wolf recovery on federal "subsidies"
Impact of wolf recovery on human safety and health
Impact of wolf recovery on other predators and scavengers
Impact of wolf recovery on other endangered species
Impact of wolf recovery on plants, invertebrates, fish, reptiles, amphibians, birds, and mammals
Impact of wolf recovery on diseases and parasites
Impact of wolf recovery on private property rights
Impact of wolf recovery in the northern Rocky Mountains on wolf recovery in other areas
Impact of wolf recovery on existing wolves in Yellowstone or central Idaho areas
Impact of wolf recovery on existing wolves in northwestern Montana
Impact of wolf recovery on wolf subspecies
Impact of wolf recovery on wolf and dog and coyote hybridization
Impact of wolf recovery on the need for research

Issues and impacts that are not within the scope of the decision to be made in the FEIS or will not be significantly impacted by the alternatives were not analyzed further in the FEIS. Issues not analyzed in detail and the reasons why they were not chosen for detailed analysis in the FEIS are explained in the following section.

Impact of wolf recovery on wolves because wolves were not native to Yellowstone National Park. – Wolves were native to the Yellowstone National park Area, although their historic numbers cannot be determined. In recent times, wolves were the most widely distributed land mammal in the world next to humans. Wolves occupied nearly all habitats in the northern hemisphere that contained large ungulates. In the 1700s, wolves occupied most of North America north of what is now Mexico City. Recent investigations indicated that wolves were part of the original fauna of the area now containing Yellowstone National Park from historic times until they were extirpated by humans around 1926. For references see Koth et al. 1990, Cannon 1992, Laundre' 1992, Schullery and Whittlesey 1992, and Kay 1993.

Impact on wolf recovery on wolf rights. – alternatives will not change the status of animal rights in local, state, or federal law.

Impact of wolf recovery on federal "subsidies". – Some people believe that extraction of natural resources on public lands and/or government expenditures for "non-consumptive" natural resource programs were government "subsidies" to various special interest groups. Wolf recovery will not change allocation of federal funding for other agency programs. Wolf reintroduction will also not change rights of private citizens and organizations to promote their own viewpoints about wolves, the

Endangered Species Act, or wolf reintroduction or to raise funds based upon the public's strong emotional response to these issues.

Impact of wolf recovery on human safety and health. – Wolf recovery will not significantly affect the risk to human safety or health. As with all wild animals, wolves are capable of posing a threat to human safety, but such occurrences are rare and unlikely. There are many historical and some recent reports of wolves in Europe and Asia attacking people, but documentation is limited. There are a few historical reports of wolves in North America killing or seriously injuring people, but these reported incidents were poorly documented and can never be scientifically confirmed or denied. During the past 100 years, millions of people in North America have lived, worked, and recreated in areas inhabited by wolves. However, since about 1890, when reliable scientific records of the causes of human injury and death began to be recorded in North America, no one has been documented to have been killed or seriously injured by a healthy wild wolf. However, if wolves did threaten human safety, the Act allows protection of human health and safety to be a defense against prosecution for the take of a listed species. Current FWS wolf control policy in the region states that any wolf that presents a human health hazard would be promptly removed from the wild, quarantined, and killed (USFWS 1988). For reference see Mech 1990 (Appendix 15).

Impact of wolf recovery on other predators and scavengers. – Wolves live in the same habitats as a variety of other predators and scavengers in North America and are not documented to have major impacts on any predator or scavenger population. Nonetheless, wolf recovery may have some limited effects on other predators. Wolves will kill some coyotes (*Canis latrans*, Paquet 1992) and possible mountain lions (*Felis concolor*, White and Boyd 1989), lynx (*Lynx lynx*, Bangs pers. obs.), black bears (*Ursus americanus*, Paquet and Carbyn 1986), and wolverine (*Gulo gulo*, Hatler 1989). Wolves may compete for ungulates with these and other predators or scavengers (Servheen and Knight 1990, Mattson and Knight 1992, Hornocker pers. commun.). Wolves will probably reduce the abundance of coyotes in a few localized areas but these impacts are unlikely to affect the overall distribution or abundance of coyotes in the recovery areas (Paquet 1992). Changes in coyote distribution may improve habitat for other small predators such as red fox (*Vulpes vulpes*). Wolves may cause slight but unpredictable changes in overall wildlife community structure in the core recovery areas as a result of ungulate carcass distribution and availability, competition or predation on other predators or scavengers, and changes in long-term plant/ungulate/predator/scavenger relationships related to the presence of a large predator at the top of the food chain. However, it is unlikely that wolf recovery will have major adverse impacts on the numbers, distribution and habits of other predators and scavengers.

Impact of wolf recovery on other endangered species. – The following threatened or endangered species may occur in or near central Idaho: gray wolf, bald eagle, peregrine falcon, whooping crane, grizzly bear, woodland caribou, Snake River sockeye, chinook salmon, one place species (Macfarlane's four-o'clock), and five species of freshwater mollusks along the Snake River (see Appendix 7).

The following threatened or endangered species may occur in or near Yellowstone National Park (including Montana): gray wolf, grizzly bear, peregrine falcon, bald eagle, whooping crane, Wyoming toad, least tern, piping plover, pallid sturgeon, Kendall Warm Springs dace, and black-footed ferret.

Several plant and animal species are currently listed by the FWS as potential candidate species for listing as endangered or threatened. These are called Category 2 species (see Appendix 7 for complete list). Data are insufficient to support listing of these species at this time. Wolves are not expected to adversely impact populations of any of these species.

Wolves will provide and compete for ungulate carcasses with grizzly bears and bald eagles. Grizzly bears and wolves have been recorded to kill one another, but such instances are rare. Wolves have been documented to eat spawning salmon. Wolf predator, in combination with other factors, has contributed to the decline of some woodland caribou populations. If this situation was to occur in northern Idaho where about 50 endangered woodland caribou live, wolves could be moved to reduce predation pressure if such action was necessary for the survival of that caribou population. The ESA (Section 10) allows for the Secretary of the Interior to permit acts to enhance the survival of the affected species and such actions would also be permitted as part of any experimental population rule. However, wolf recovery is not likely to have a measurable adverse impact on the numbers, distribution, and habits of any endangered species of mammal, bird, amphibian, fish, or plant within the Yellowstone or central Idaho areas. For reference see Koth et al. 1990, Servheen and Knight 1990, Mattson and Knight 1992, and USFWS biological evaluation 1993 (Appendix 7).

Impact of wolf recovery on plants, invertebrates, fish, reptiles, amphibians, birds, and mammals. – Wolf recovery will have minimal impacts on other plants and animal species. However, it is unlikely that wolf recovery will have a major adverse impact on the numbers and distribution of plants and animals other than some types of large ungulates under certain circumstances. In some areas, beaver, if abundant, were an important food for wolves but wolves have not been documented to affect beaver populations. Restoration of a primary mammalian predator will cause some changes in the interrelationships within the biotic community. The relative magnitude and direction of any such changes would be extremely speculative other than to suggest that such changes will likely evolve over an extended period of time and be difficult to measure and attribute solely to wolf recolonization.

Impact of wolf recovery on diseases and parasites. – Wolf recovery is unlikely to have a measurable impact on disease or parasite transmission. However, wolves may have a slight impact on disease and parasite transmission because they can be affected by or transmit diseases or parasites that are already common among coyotes, foxes, and domestic dogs. Canine rabies is not expected to occur in Yellowstone or central Idaho. For reference see Johnson 1992a and Johnson 1992b.

Impact of wolf recovery on private property rights. – Wolf recovery will not impact or change individual private property rights as defined by law. See summary of proposed action related to Executive Order 12630 (Appendix 6).

Impact of wolf recovery in the northern Rocky Mountains of wolf recovery in other areas. – As directed by Congress, this EIS specifically addresses wolf recovery in Yellowstone National Park and central Idaho. While the outcome of wolf recovery in the northern Rocky Mountains may impact the perceptions of people about the potential for wolf recovery in other areas or the effectiveness of the ESA, this document will not address wolf recovery in other areas or other applications of the ESA.

Impact of wolf recovery on existing wolves in the Yellowstone or central Idaho areas. – Wolf populations were extirpated from Yellowstone National park and central Idaho around 1930. No evidence exists that wolf populations persisted in the northern Rocky Mountains of the U.S. to the present time or that the lone wild wolves occasionally reported in these areas are other than dispersing wolves from Canadian populations. (Brewster and Fritts 1992, Nowak 1993). The likelihood of wolf populations persisting at a low level without evidence of pack formation in either the Yellowstone or central Idaho areas for the past 60 years is extremely remote. Although several instances have been documented or reported where wolves or wolf-dog hybrids have escaped or been release from captivity, these types of animals have not successfully survived or reproduced in the wild. However, the FWS and its cooperators continue to actively search for and monitor wolf activity throughout the northern Rocky Mountains. Any wolves located would be examined to determine, among other things, characteristics that would indicate they were different from the wolves recolonizing northwestern Montana. Recent investigations indicate there is little genetic difference among North American wolves (see Brewster and Fritts 1992), but any wild wolf population that was discovered and believed to represent a unique genetic subspecies would be thoroughly investigated and would be managed to recovery without competition from wolves reintroduced from elsewhere. Prior to implementation of any alternative requiring reintroduction, the FWS wolf monitoring program would likely have detected any existing wolf population (Appendix 12).

Impact of wolf recovery on existing wolves in northwestern Montana. – Wolf recovery in Yellowstone National Park and central Idaho will not have an adverse impact on the natural recolonization of wolves in northwestern Montana. Dispersing wolves from the Yellowstone and central Idaho areas may eventually supplement natural recovery and add to the genetic diversity of wolves throughout the northern Rocky Mountains, including northwestern Montana. However, such movements into Montana would not be significant to establishing ten breeding pairs there. By the time any decision on wolf recovery in the Yellowstone or central Idaho areas is made and significantly implemented, the Montana wolf population may be approaching ten breeding pairs. The dispersal of wolves from Canada and Montana could impact wolf management strategies related to any experimental area designation in the Yellowstone and central Idaho areas and might assist population recovery in those areas.

Impact of wolf recovery on wolf subspecies. – Early taxonomists, often utilizing few specimens, named 24 subspecies of gray wolf (*Canis lupus*) in North America based upon skull characteristics, body size, and color. Recent taxonomic investigations indicate fewer subspecies of wolves originally occupied North America than was formerly believed. The wolf populations that inhabited the Yellowstone and central Idaho areas were eliminated by about 1930. Recent taxonomic work based upon statistical analysis of skull measurements and pelt characteristics indicates that those wolves were slightly smaller and contained fewer black color phase individuals than the more northern Canadian wolves that are now dispersing southward and occupying Montana. Whether these size and pelt differences were due to local geographical or climatic conditions, or very distinct genetic differences is being discussed in the scientific arena. Some recent molecular investigations suggest that gray wolves throughout northern North America are all one subspecies of *Canis lupus*. This work indicates only red wolves and Mexican wolves are genetically different a the molecular level. Both these methods of analysis are subject to further confirmations and study.

Impact of wolf recovery on wolf and dog and coyote hybridization. – Wolf recovery will not result in a major impact to the number of wild wolf-dog hybrids or wolf-coyote hybrids living in the northern Rocky Mountains of the U.S. Although documented occasionally in Europe (Ciucci and Boitaini 1991), hybridization apparently rarely occurs between wild wolves and domestic dogs and is apparently rare in North America. Wolf-dog hybrids apparently rarely survive to reproduce in the wild. There are an estimated 300,000 wolf-dog hybrids in captivity in North America and there is no documentation that these or other domestic dogs live and reproduce entirely in the wild in northern latitudes. Information suggest some feral dogs have successfully lived in the wild in the southeastern U.S.

Instances of potential coyote-wolf hybridization have been documented in the northeastern U.S. and southeastern Canada, but have not been documented in the western U.W., elsewhere in Canada or Alaska and have not affected gray wolf populations anywhere.

Wolf hybridization is not a major factor in gray wolf (Canis lupus) survival or population viability in North America where the range of wild gray wolves, coyotes, and domestic dogs overlaps. Despite the annual harvest of thousands of coyotes and hundreds of wolves and the examination of hundreds of wolves and coyotes over the past twenty years during wildlife research from areas where these two species overlap, few, if any, specimens with hybrid physical characteristics have been documented. This suggests that such hybridization rarely occur and do not affect either coyote or wolf populations. See Lehman et al. 1991, and Wayne et al. 1992.

Impact of wolf recovery on the need for research. – Wolves are one of the most intensively studied predators in North America, and any wolf reintroduction would be evaluated and improved using modern scientific techniques. In addition, a 3-phase interagency wolf monitoring program has already been implemented in Montana, Idaho, and Wyoming to document wolf activity and recovery. Wolves have been investigated in Glacier National Park since recovery began there in 1979 (Ream et al. 1991) and recovering wolf populations have been studied elsewhere. The issue of more research is not an impact of wolf recovery, and it is not specifically dealt with as a major issue in any alternative. See Wolf Studies Task Force 1987, Tucker 1988, and Ream et al. 1991.

Alternative Scoping

Resource Inventory and Analysis

Information on various issues had to be compiled to objectively address the potential impact of wolf recovery. During and after scoping, efforts were made to identify and collect the types of information needed for planning wolf recovery strategies and analyzing the potential impacts of wolves on the environment. Information on wolf biology, livestock numbers and losses, land ownership, status, and management, ungulate (mule deer, white-tailed deer, elk, moose, bison, bighorn sheep, mountain goats, and pronghorn antelope) biology and management, other wildlife (grizzly bears, mountains lions, small mammals), economics, and use of public land was gathered from resource agency files, standard technical references, and current scientific literature. This information was used to classify and describe resources and uses so the potential impacts of wolf recovery on those resources could be identified and analyzed systematically. This information was also used to help formulate wolf management alternatives.

Development and Evaluation of Alternatives

After the resource information was analyzed, and the public participation process identified a range of various issues and alternatives, it became necessary to describe wolf management strategies (alternatives, including a proposed action). As a first step toward developing wolf reintroduction alternatives, the issues of concern to the public were compared to the wolf management alternatives already identified by the public or other groups that had already examined this subject. Those alternatives included an option where wolves would no be allowed to recover (No Wolf), another where special legislation would be passed by Congress (Wolf Management Committee recommendation), the management strategy being implemented in northwestern Montana (Natural Recovery), and a reintroduction of wolves under an experimental population rule into Yellowstone National Park (1987 Northern Rocky Mountain Wolf Recovery Plan). Each of the various issues identified by the public during issue scoping were addressed in different ways in these alternatives. To address other public concerns about maximum wolf protection, another alternative (Accelerated Wolf Recovery) was developed. The basic concepts behind these five alternatives were then summarized in an alternative scoping brochure that requested other ideas and comments from the public. Based upon the nearly 5,000 public comments received during alternative scoping, at least 28 different combinations of those alternatives were recommended, and four alternatives addressing new concepts were identified. Based upon the issues and concerns raised by the public, and comments offered during alternative scoping, five alternatives, including one proposed by the FWS, were developed and are described in detail in the FEIS. (See Chapter 5, Development of the Proposal, for additional information). Those alternatives represent a broad range of distinct approaches to wolf reintroduction in Yellowstone National Park and central Idaho.

The effects of implementing each of the alternatives upon the physical, biological, and human environments were then assessed. The alternatives were also evaluated on their potential to achieve wolf recovery and resolve the concerns and issues expressed by the public. Bases upon this evaluation, a proposed action, Reintroduction of Experimental Populations was identified.

After review of the DEIS by government agencies, tribes, tribal agencies, special interest groups, and the general public, the FWS revised the alternatives where necessary and in the FEIS recommended Reintroduction of Experimental Populations be implemented. This alternative will become the management plan for wolf recovery into Yellowstone National Park and central Idaho.

Alternatives Identified During Scoping, but not Evaluated Further

Seven alternatives were either beyond the legal authority of the DEIS or were incorporated into the five alternatives chosen for analysis in the FEIS. Those were the (1) No Cow, (2) Delisting With State

Management, (3) 1987 Wolf Recovery Plan, (4) State Management of Nonessential Experimental Populations, (5) Recovery of Existing Wolves, (6) Accelerated Wolf Recovery Alternatives, and (7) The Indian Plan Alternative. An explanation of how the concerns they represented were addressed and why they are not being considered further are listed below.

1. The No Cow or Bison-based Sustained-Subsistence Economy Alternative recommended that livestock growing be eliminated throughout the region, all fencing be removed, animal damage control activity stopped, and bison and wolves be reintroduced. Implementing this alternative requires actions that are far beyond the scope of the FEIS and federal and state law. Implementation of this alternative would dramatically affect private property and management practices as dictated by federal and state law and agency policy on public lands. This alternative was not a reasonable option for further consideration because such drastic measures are not required for the recovery of a viable wolf population in the northern Rocky Mountains of the U.S., and it would not be reasonably consistent with the current federal and state law.

2. The Delisting with State Management Alternative would require that wolves be immediately removed from the protection of the ESA and that any recovery would be managed by the respective states solely under state laws. There would be no reintroductions. In Montana wolves are currently protected by state law. If wolves were removed from federal protection and state law remained unchanged, they would likely be managed as other resident wildlife (in much the same manner as a combination of the Wolf Management Committee and Natural Recovery Alternatives). Wolf populations in northwestern Montana would probably recovery through natural dispersal. In Idaho wolves are also protected by state law, but other state law prohibits the IDFG from any management, except control, without the expressed permission of the state legislature. If wolves were removed from federal protection and state law did not change, wolves would not be actively managed. Wolf populations might eventually recover through natural dispersal. In Wyoming, wolves are listed as predators and are not under the legal authority of WGFD so take would not be restricted. Because Yellowstone National Park is partially in Idaho and Montana and would be the portion of Wyoming nearest to wolf populations in Montana and Idaho, wolves would probably eventually live in Yellowstone National Park and the surrounding wilderness areas, but would not persist elsewhere in Wyoming because of a high level of human persecution. If wolves were removed from federal protection and state laws remained unchanged, this alternative would be similar to natural recovery in Montana and Idaho and the no wolf option in Wyoming. Under this alternative there would be not federal oversight of recovery or the direction of changes in state law, but it is likely that wolf populations would eventually recover in all three wolf recovery areas. This alternative was not considered further because: (1) the management concerns it resolved are also addressed through the Wolf Management Committee and Natural Recovery Alternatives, (2) it would not be consistent with existing federal and some state laws and Congressional direction, (3) the conflicting intent of current state laws and, (4) the uncertain direction, future authorization, and/or implementation of state laws.

3. The 1987 Wolf Recovery Plan alternative recommended reintroduction of a nonessential experimental population of wolves into Yellowstone National Park and monitoring of natural of wolf recovery for five years in central Idaho. If two breeding pairs had not been documented in central Idaho within five years, other conservation measures were to be considered. Breeding wolves have not been documented in Idaho, and consequently other conservation measures were considered in the DEIS. The 1987 Wolf Recovery Plan represented a combination of an experimental population reintroduction in Yellowstone National Park, and natural recovery in central Idaho. In the FEIS, the five different approaches to wolf recovery are being equally considered in both the Yellowstone and central Idaho areas to comply with directions from Congress that “a broad range alternatives be considered.” Also there is no evidence of wolf populations in either the Yellowstone or central Idaho areas. This mix of natural recovery and alternative because of the absence of natural recovery in Idaho, and because the concerns

expressed in the 1987 Wolf Recovery Plan are fully but separately addressed by the Reintroduction of Experimental Populations and Natural Recovery Alternatives.

4. The State Management of Nonessential Experimental Populations Alternative recommended a state implemented nonessential experimental population rule, with wolf reintroduction into Yellowstone National Park and central Idaho. This alternative, except for the provision establishing a one-time federal trust to fund a wolf compensation and depredation program, was incorporated into the Reintroduction of Nonessential Experimental Populations Alternatives. The recommendation that a federal trust be established is addressed in the Wolf Management Committee Alternative. This alternative also mandated enhancement of prey populations. That concept is addressed in the Wolf Management Committee and Reintroduction of Non-experimental Wolves Alternatives. This alternative is not being considered further as a separate alternative because all the other issues and concerns it expressed are being fully addressed in the Reintroduction of Experimental Populations Alternative.

5. The Recovery of Existing Wolves Alternative is based upon a belief by some people that wolves were never extirpated from the Yellowstone ecosystem and that remaining wolves are genetically unique wolves that should be recovered without their gene pool being diluted by reintroduction of wolves from other areas. The general concerns expressed in this alternative are being addressed by continuation of an intensive monitoring effort that should detect the presence of a wolf population before any reintroduction might be conducted. Furthermore, recent scientific investigation into the taxonomic status of wolves in North America indicates that the wolves that once occupied the Yellowstone or central Idaho areas were not a separate subspecies and had a much wider distribution than was previously believed. Also, with the listing of all wolves (Canis lupus) in 1978, regardless of subspecies, any past or potential future subspecies designation is not relevant to wolf recovery in the western U.S. at this time. Although it is extremely unlikely that a distinct population of wolves has persisted since 1926 (when the last wolf pack was documented in the Yellowstone area), if wild reproducing unique wolves had initiated population recovery (two breeding pairs successfully raising two young for two consecutive years in a recovery area), they would be encouraged to increase and recover through natural processes. Reintroduction would not occur. This alternative will not be considered further because scientific evidence does not suggest that a population of distinct wolves persisted or currently exists in the Yellowstone or central Idaho areas.

6. The Accelerated Wolf Recovery Alternative recommended rapid wolf recovery through reintroductions and a wide variety of land-use restrictions over a broad area to accomplish wolf recovery as soon as possible. However, several of the recommended land-use restrictions and their broad application and the recommendation for no private compensation were in conflict with private property and free speech rights and were beyond any reasonable extension of federal authority and land management agency policy. These recommendations are believed to be excessively restrictive and included a large land area than was reasonable so they were not considered further. In addition many of the land-use restrictions conflicted with various laws, agency policies, and enabling legislation and were far more severe than reasonably needed for the recovery of wolf populations. While this alternative is not being evaluated further, the general philosophy of fully protecting and quickly recovering wolves was incorporated into the Reintroduction of Non-experimental Wolves Alternative.

7. While several alternatives or modifications of alternatives already considered in the DEIS were suggested to be considered again during review of the DEIS, only one new alternative was proposed in the FEIS. That alternative and the reason it is not evaluated further is as follows.

   The Indian Plan Alternative. – “At one time native Americans armed with bows and arrows and spears were part of the natural ecosystem. I propose having a small Indian village with tepees, etc. in a place like the Lamar Valley during as much of the year as suited them. During the tourist season, tourists could stay in the tepees and learn Indian crafts such as tanning leather, beadwork, making moccasins, making arrowheads, etc. They could also learn Indian dancing, stalking wild game, spearing fish, beating drums, etc.

Tame wolves would be kept by the Indians so they could be seen by tourists. WILD one will seldom, if ever, be seen by tourists. During a hunting season, directed by Park Rangers, Indians...would be allowed to harvest a number of wild game animals. The meat would be distributed to needy Native Americans. This 'Indian Plan' offers advantages over the proposed 'wolf plan'."

The Indian Plan alternative is not being evaluated further because it does not address the issue of recovery or reintroduction of wild wolf populations. This alternative also does not restore wolves as functioning components of the natural ecosystem in the Yellowstone and central Idaho areas and its potential impact on the environment would be similar to the No Wolf alternative.

Alternatives Addressed in the FEIS

Five alternatives that represented different approaches to wolf recovery were chosen for analysis in the FEIS because they encompassed most of the concerns raised during scoping. These alternatives reflect public comments and suggestions identified through issue and alternative scoping. These alternatives are discussed in detail in Chapter 2.

These alternatives are:

1. Reintroduction of Experimental Populations (incorporating most of the state implemented nonessential reintroduction alternative with parts of the 1987 Recovery Plan).

2. Natural Recovery (with limited land-use restrictions in anticipation of some illegal killing of wolves).

3. No Wolf (as proposed in alternative scoping).

4. Wolf Management Committee (as proposed by Congress).

5. Reintroduction of Non-experimental Wolves (incorporating the accelerated wolf recovery alternative but with fewer land-use restrictions).

Public Review of DEIS

The purpose of public review of the DEIS was to obtain additional information and ideas from the public on reintroduction of wolves into Yellowstone National Park and central Idaho. The public comment period began July 1, 1993, with a press conference in Washington, D.C. Additionally, a news release, requesting comment on the DEIS, was provided to over 500 media contacts (newspaper, radio, and television). About 1,700 copies of the complete DEIS were nailed to all potentially affected government agencies, public libraries in the 3-state region, many special interest groups, and to anyone requesting the complete DEIS. About 42,00 summaries of the DEIS were mailed to people and organizations on the Gray Wolf EIS mailing list and to anyone requesting them. In addition, the DEIS summary, a schedule of public hearings, and a request to report wolf sightings was printed in the form of a newspaper flyer and was inserted into the Sunday (July 18 and 25) editions of six major newspapers in Montana(*Bozeman Chronicle* and *Billings Gazette*), Idaho (*Lewiston Tribune and Boise Statesman*), and Wyoming (*Casper Star Tribune* and *Cheyenne Eagle Tribune*). These newspapers have a combined circulation of about 280,000. The comment period was extended from the original deadline of October 15, 1993 to November 26, 1993.

Written public comments on all or part of DEIS were obtained in the form of letters, postcards, resolutions, and petitions. To provide an opportunity for people to voice their concerns, 12 formal hearings were held in Coeur d' Alene, Lewiston, Idaho Falls, and Boise, Idaho; Bozeman, Missoula, Dillon, and Helena, Montana; and Cody, Riverton, Jackson Hole, and Cheyenne, Wyoming; and four more hearings were held in Salt Lake City, Utah; Seattle, Washington; Denver, Colorado; and Washington, D.C. Hearings were conducted during the months of August and September 1993 and comments were accepted from 2 p.m. to 10 p.m. At these hearings, verbal testimony (treated the same as written responses) was recorded and any written comments were accepted.

A total of 160,254 agencies, organizations, and individuals commented on the DEIS, making it one of the largest responses to any federal action. The majority of responses were in written form. About 700 people testified.

Review and analysis of comments began October 18, 1993, and because of the comment period extension, ended December 10, 1993. Every comment was given an individual identification number and was coded according to the demographic nature of the response. Substantive comments (positive and negative) on issues or alternatives were coded and entered into a database. A respondents exact words were used when entering responses into the database. A report (USFWS 1993) detailing the analysis of public comments on the DEIS was produced and a summary of that report was made available to the public and mailed to individuals on the Gray Wolf EIS mailing list in March 1994.

All comments from federal, state, and local governments having regulatory authorities, and comments from native American tribes are printed in the FEIS. Responses to those comments are also provided in Chapter 5. Due to the volume of response, most letters from individuals and non-government agencies are not printed in the FEIS, but 14 letters from the most prominent or most vocal large private organizations, representing the diverse points of view about the proposal, are included and responded to in detail. Issues identified through the analysis of public comments (USFWS 1993) and the responses are present in Chapter 5.

Chapter II
Alternatives
Including the Proposed Action

Introduction

This chapter describe the alternatives developed to respond to the issues and impacts previously identified. The proposed action is identified. Summary tables of the alternatives and impacts and a comparison of the alternatives are also included.

Alternatives Considered in Detail in the Environmental Analysis

Introduction

During early planning, the FWS developed an array of alternatives to respond to direction from Congress "to provide a broad range of alternatives related to wolf reintroduction in Yellowstone National Park and central Idaho." Five alternatives were also selected to respond to the public's concerns expressed about issues and were presented in the DEIS for public review and comment. Those issues, impacts, and concerns were discussed in Chapter 1.

Based upon information and comments on the DEIS provided by agencies, organizations, and private citizens, changes were made in the proposed action. The proposed action (Alternative 1) and other alternatives for wolf reintroduction in Yellowstone National Park and central Idaho considered in detail in the FEIS are:

1. Reintroduction of Nonessential Experimental Populations Alternative (Proposed Action)
2. Natural Recovery (No Action) Alternative
3. No Wolf Alternative
4. Wolf Management Committee Alternative
5. Reintroduction of Non-experimental Wolves Alternative

Alternative 1
Reintroduction of Experimental Populations Alternative
(The Proposal)

Background

The designation “experimental population” had its origin in a 1982 amendment to the ESA, which created Section 10(j). Section 10(j) provide for reintroduction of experimental populations under special regulations. Before that, the FWS could introduce threatened and endangered species into unoccupied historic range, but attempts to do so were often met with fervent resistance. One reason was that the FWS could not promise private landowners, other federal agencies, and state and local governments that the transplanted population would not disrupt future land management options. The “experimental population” designation gives the FWS more flexibility because such populations can be treated as “a species proposed to be listed” or “threatened” rather than “endangered.” Congress provided the amendment to make more reintroductions possible, by allowing more management flexibility, if necessary, where such management is consistent with conservation of the experimental population. If a reintroduced population of wolves is designated “experimental” and “nonessential” (not necessary for the survival of the species in the wild) under the ESA amendment, other federal agencies are required only to confer with the FWS on federal activities that are likely to jeopardize the species. Exceptions would be in national parks and national wildlife refuges, where formal consultations with the FWS would still have to occur. Management of nonessential experimental population can thus be tailored to specific areas and specific local conditions, including local opposition. The experimental population rule has been successfully used to reintroduce red wolves to Alligator River National Wildlife Refuge in North Carolina and Great Smoky Mountains National Park and black-footed ferrets to Wyoming. “The 1987 Northern Rocky Mountain Wolf Recovery Plan” recommended using the experimental population rule provision to achieve wolf recovery in the Yellowstone recovery area.

Reintroduction of Experimental Populations Alternative. – The purpose of this alternative is to accomplish wolf recovery by reintroducing wolves designated as nonessential experimental populations to Yellowstone National Park and central Idaho and by implementing provisions within Section 10(j) of the ESA to conduct special management to address local concerns. The states and tribes would be encouraged to implement the special rules for wolf management outside national parks and national wildlife refuges under cooperative agreement with the FWS.

Summary

Two experimental population areas would be established through regulation by the FWS under Section 10(j) of the ESA, as amended. One would include all of Wyoming and parts of Montana and Idaho (south of the Missouri River from the eastern Montana border to Great Falls and east of Interstate 15) around Yellowstone National Park. Another would include most of central Idaho and part of Montana (south of Interstate 90 and west of Interstate 15).

The ongoing wolf monitoring efforts would continue. Prior to any reintroduction, the FWS would make a determination of the status of any naturally occurring wolf population in each of those two areas. Wolves would be reintroduced into either or both Yellowstone National Park and central Idaho unless a wolf population (defined as two breeding pairs, each successfully raising two or more young for two consecutive years in a recovery area) had been documented. Wolves outside national parks and national wildlife refuges would be managed by the states and tribes under special federal regulations for each population. If the states and tribes did not assume wolf management, the FWS would do so. If radio-collared experimental wolves moved out of a primary analysis area, they could be captured and placed back in the primary analysis area. Management would allow wolves to be killed or moved under some conditions by federal, state, and tribal agencies for domestic animal depredations and excessive predation (see Unacceptable Impacts on Ungulate Populations in Glossary of Terms) on big game populations. Under some conditions, the public could harass or kill wolves attacking livestock (cattle, sheep, horses, and mules). There would be no federal compensation program but compensation from existing private funding sources would be encouraged. There would be no land-use restrictions applied when six or more wolf packs were documented in a recovery area because sufficient wolf numbers would be available and no restrictions around den sites or other critical areas would be necessary to promote wolf recovery. Wolves have a relatively high reproductive rate and with six packs of wolves present in a population, about 2-25 pups could be born each year. Accounting for a possible 10% loss of wolves to control actions and an additional 10% loss from other mortality sources, the reproductive output of six packs of wolves provides for a wolf population increasing at or near 22% per year (see Table 2-1 and Appendix 6). No critical habitat would be designated. Enhancement of pry populations would be encourages. Use of toxicants lethal to wolves in areas occupied by wolves would still be prohibited by existing ADC policy and EPA labeling restrictions.

Note. – If a wolf population (see above definition) was discovered in either Yellowstone or central Idaho areas, reintroduction under an experimental population rule would not occur into that area and any wolf population would be managed as a natural recovering population in that area (see Alternative 2).

Note. – If the preferred alternative (the proposal) is selected for implementation, the FWS intends that the proposed rule will contain all the elements described in the preferred alternative (Alternative 1). The proposed rule will be prepared and published in the Federal Register and appropriate NEPA compliance and public review will occur.

Note. – The proposed boundaries of the experimental population areas were established by considering the combination of the current southern expansion of naturally formed wolf packs in Montana, location of high quality wolf habitat and potential wolf release sites, and the likelihood of any wolf pack documented inside the experimental area resulting from reintroduction into Yellowstone National Park or central Idaho rather than from natural dispersal from Canada or northwestern Montana. Therefore, the boundaries of the proposed experimental population areas could be affected by formation of new wolf packs by naturally dispersing wolves from Canada or Montana before any nonessential experimental population rule is established and wolf reintroduction is made.

Note. – In response to agency and public comment on the FWS DESI proposal, several changes were made in the FWS FESI proposal. None of those changes were significant enough to effect the potential impact of the proposed action on big game, hunting harvest, domestic animal depredation, land-use restrictions, visitor use, or local economies. Changes to the FWS FESI proposal include the following:

1. The northern boundary of the nonessential experimental population area for the Yellowstone area was moved northward from Highway 12, to include the are south of the Missouri River from the eastern Montana border to Great Falls.

2. Increased emphasis was placed on a aggressive but balanced public information and education program and on law enforcement.

3. The reporting requirement for harassing wolves, in an opportunistic, non-injurious manner for landowners on private land and for individuals holding grazing permits on public land was shortened from 14 days to no longer than 7 days and is restricted to only adult (greater than 6 months old) wolves. The ability of individuals holding grazing permits on public land to harass wolves in an opportunistic, non-injurious manner will become part of their permit conditions so it is clearly understood exactly what can occur.

4. Only after six or more breeding pairs of wolves are established in a recovery area and after designated authorities have confirmed livestock losses have been caused by wolves and have been unable to stop further losses, can individuals holding grazing permits on public lands receive a permit to take wolves in the act of killing or wounding livestock (cattle, sheep, horses, and mules).

5. The intent of the experimental rule is that land-use restrictions not be routinely used solely to enhance wolf recovery. However, land-use restrictions may be temporarily used by land or resource managers to control intrusive human disturbance, primarily around active den sites between April 1 and June 30, when there are five or fewer breeding pairs of wolves in a recovery area. After six or more breeding pairs become established in a recovery area land-use restrictions would not be needed.

6. Several of the general guidelines for Determining Problem Wolf Status (Interim Wolf Control Plan, FWS, 1988, pages 7 to 9) were incorporated into the wolf control procedures as part of the experimental population rule. Those guidelines are as follows:

   The following conditions and criteria will apply in determining the problem status of wolves within the nonessential experimental population areas:

   (1) Wounded livestock or some remains of a livestock carcass must be present with clear evidence (Roy and Dorrance 1976, Fritts 1982) that wolves were responsible for the damage and there must be reason to believe that additional losses would occur if the problem wolf or wolves were not controlled. Such evidence is essential since wolves may simply feed on carrion they have found while not being responsible for the kill.

   (2) Artificial or intentional feeding of wolves must not have occurred. Livestock carcasses not properly disposed of in an area where depredations have occurred will be considered attractants. On federal lands, removal or resolution of such attractants must accompany any control action. Livestock carrion or carcasses on federal land, not being used as bait in an authorized control action (by agencies), must be removed, buried, burned, or otherwise disposed of such that the carcass(es) will not attract wolves.

   (3) On federal lands, animal husbandry practices previously identified in existing approved allotment plans and annual operating plans for allotments must have been followed.

7. Wolves that attack pets or domestic animals other than livestock on private land two times in a calendar year (instead of three times as recommended in the DEIS) would be moved.

8. If wolves are having unacceptable impacts on ungulates, and if those impacts would inhibit wolf recovery or would substantially reduce the prey base for wolves in a specific area (extraordinary population pressures), the states and tribes could move wolves to other places within the experimental area except on private land. The states and tribes are to develop wolf management plans that will define such unacceptable impacts, how they would be measured, and identify other possible mitigation in their state or tribal management plans. These plans must be within the provisions and intent of the nonessential experimental population rule and must be approved by the FWS through cooperative agreement before such control could be conducted.

9. The FWS, ADC, or state or tribal agencies authorized by the FWS would promptly remove any wolf the FWS, ADC, or authorized agency determined was a threat to human life or safety.

Implementing this alternative would involve:

The FWS would develop and publish two nonessential experimental population rules, under Section 10(j) of the ESA, in the Federal Register:

- One rule would designate a small portion of Idaho (east of Interstate 15) and Montana (east of Interstate 15 and south of the Missouri River from the North Dakota-Montana border to Great Falls) and all of Wyoming an experimental population area for wolf reintroduction into Yellowstone National Park (Figure 2-1).

- Another rule would designate much of Idaho and part of Montana (south of Interstate 90 and west of Interstate 15) an experimental area for a wolf reintroduction into central Idaho (Figure 2-1).

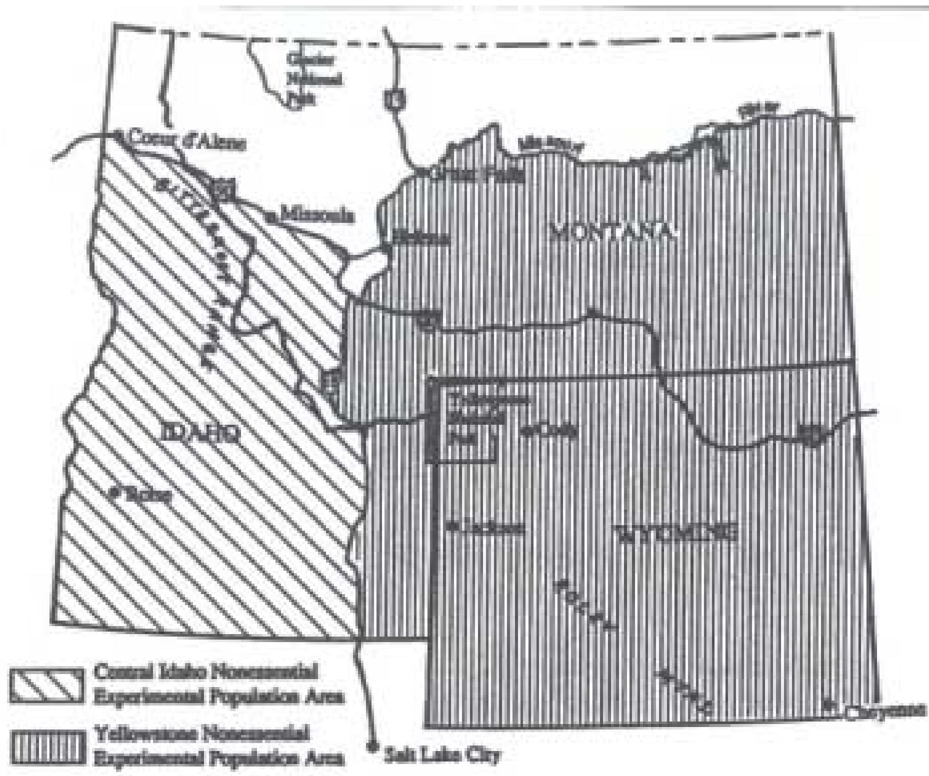


Figure 2-1
The proposed experimental population areas in central Idaho (south of Interstate 90 and west of Interstate 15) and the Yellowstone area (south of the Missouri River from the Montana-North Dakota border to Great Falls and east of Interstate 15) where experimental population rules would apply.

Each rule would:

- Define the minimum criteria for a “wolf population” for purposes of each experimental rule as two breeding pairs of wild wolves successfully raising at least two young each year (until December 31 of the year of their birth), for two consecutive years in an experimental area.

  If a wolf population was documented, reintroduction and implementation of an experimental rule in that area would not occur. That wolf population would then be managed as a naturally recovering population.

- Establish the experimental population area(s) and designate all wolves in such area(s) as members of the experimental population. These areas do not currently include any known wolf populations (see Glossary of Terms and Appendix 8 and 12) and are geographically separate from existing wolf populations in northwestern Montana. Wolves would be moved as required to enhance population recovery.

- Encourage and, if they choose, designate the states and tribes to be the primary agencies to implement the experimental rule with federal assistance, through cooperative agreements and management plans that are within the parameters of the experimental rule.

- Establish an aggressive, balanced, public information and education program about wolf ecology and management.

- Allow landowners on their private land and livestock (cattle, sheep, horses, and mules) producers on their public land grazing leases, as part of their permit condition, to harass adult wolves in an opportunistic non-injurious manner at any time. Such incidents must be reported as soon as possible but within 7 days.

- Allow livestock producers on their private land to take wolves in the act of killing livestock. Such incidents must be reported immediately but no later than within 24 hours and livestock freshly wounded or killed by wolves must be evident. FWS, ADC, or other FWS authorized agency will confirm if livestock were wounded or killed by wolves.

- After six or more breeding pairs of wolves become established in an experimental area, allow livestock producers with allotments on public land to receive a permit to take a specific number of depredating wolves after ADC, or other authorized agency, has confirmed livestock losses have been caused by wolves and has unsuccessfully attempted to resolve the problem and other losses are documented. Such incidents must be reported immediately but no later than 24 hours and livestock freshly wounded or killed by wolves must be evident.

- Allow the states and tribes to move wolves that are having unacceptable impacts on ungulate populations if those impacts would inhibit wolf recovery. Wolves could be moved to other places within the experimental population area. Two examples, although unlikely, are where wolf predation is dramatically affecting prey availability because of unusual habitat or weather conditions (i.e., bighorn sheep in areas with marginal escape habitat) or where wolves cause prey to move onto private property and mix with livestock, increasing potential conflicts. The states and tribes will define such unacceptable impacts, how they would be measured, and identify other possible mitigation in their state or tribal management plans. These plans must be approved by the FWS through cooperative agreement before such control could be conducted. Wolves would not be deliberately killed to address ungulate-wolf conflicts. These unacceptable impacts must be identified in state wolf-management plans and developed in consultation with the FWS. If such control by the states or tribes is likely to be significant or beyond the provisions of the experimental rule as determined by the FWS, then they must be specifically incorporated as part of an amendment to the experimental rule, which would include national public comment and review.

- Assure that no private or public land-use restrictions are developed solely for wolf recovery (except at release sites during reintroduction) after six breeding pairs of wolves are established in an experimental area. When five or fewer breeding pairs are in an experimental area, land-use restrictions may be employed at the discretion of land management and natural resources agencies to control intrusive human disturbance. Temporary restrictions of human access, when five or fewer breeding pairs are established, may be required between April 1 and June 30 around active wolf den sites.

- Allow the FWS, ADC, or state or tribal agencies authorized by FWS to promptly remove any wolf the FWS, ADC, or authorized agency determined was presenting a threat to human life or safety.

- Allow ADC, FWS, states, and tribes to control wolves that attack livestock (cattle, sheep, horses, and mules) by measure including aversive conditioning, non-lethal control, and/or moving wolves when five or fewer breeding pairs are established, and by previously described measures but also including moving or killing wolves or placing them in captivity after six or more breeding pairs are established in a given experimental population area. For depredation occurring on public land and prior to six breeding pairs becoming established, depredating females and their pups would be released on site prior to October 1. Wolves on private land under these circumstances would be removed. Wolves that attack other domestic animals and pets on private land two times in a calendar year would be moved. Chronic problem wolves (wolves that depredate after being moved) would be removed from the wild.

The following conditions and criteria will apply in determining the problem status of wolves within the nonessential experimental population areas:

(1) Wounded livestock or some remains of a livestock carcass must be present with clear evidence (Roy and Dorrance 1976, Fritts 1982) that wolves were responsible for the damage and there must be reason to believe that additional losses would occur if the problem wolf or wolves were not controlled. Such evidence is essential since wolves may simply feed on carrion they have found while not being responsible for the kill.

(2) Artificial or intentional feeding of wolves must not have occurred. Livestock carcasses not properly disposed of in an area where depredations have occurred will be considered attractants. On federal land, removal or resolution of such attractants much accompany any control action. Livestock carrion or carcasses on federal land, not being used as bait in an authorized control action (by agencies), must be removed, buried, burned, or otherwise disposed of such that the carcass(es) will not attract wolves.

(3) On federal lands, animal husbandry practices previously identified in existing approved allotment plans and annual operating plans for allotments must have been followed.

The FWS in cooperation with state, federal, tribal agencies, and appropriate Canadian governments, would reintroduce wolves into Yellowstone National park (soft release) and central Idaho (hard release – see Glossary of Terms) for four consecutive years (possibly 3-5 depending upon program progress). Procedures would include:

- Obtaining any permits, agreements, and cultural site clearances and conducting activities for a scientifically based wolf reintroduction program.

- Locating wolf packs suitable for capture in Canada (possibly Alberta or British Columbia) to provide pack members for reintroduction. Wolves would likely be captured in October by darting from helicopters, trapping, or by using capture collars so they could be moved to the release sites within a short time span.

- Constructing up to three temporary holding facilities (each 1-2 acre; 0.4-0.8 ha) and nearby temporary housing (tent or trailer) at up to three release sites in Yellowstone National Park. These sites would be on previously disturbed lands, if possible, and would be secured from visitation by the general public while wolves are being held (October – December).

- Obtaining up to 8,000 pounds of ungulate carrion (roughly 40 deer or 10 elk from road kills, law enforcement seizures, etc.), to feed these wolves (six adults and an estimated 12 pups) from October through January in the Yellowstone area. An additional 2,400 pounds of ungulates (16 deer or 4 elk) could be placed near the release sites if the adults were not successful immediately at killing ungulates or caring for their pups.

- Obtaining, caring for, and transporting about 30 wolves (15 wolves to each area, equal sex ratio, if possible) from areas in Canada in October-November each year for 3-5 years. This would include transporting three or more adult wolves and/or their pups to as many as three separate release sites in Yellowstone National Park for 3-5 years and transporting and releasing 15 young adult wolves in central Idaho for 3-5 years.

For specific information on how a wolf reintroduction program would be conducted, please Appendix 4, “Scientific techniques for the reintroduction of wild wolves.”

"How would wolf populations respond to this alternative?"

The following scenario and Table 2-1 portrays how wolf population growth might respond to implementation of the Reintroduction of Nonessential Experimental Populations Alternatives in each area. It incorporates the key components of this alternative, including reintroduction of wolves in Yellowstone National Park and central Idaho for 3-5 consecutive years, beginning in 1994, moderate mortality of wolves in areas with livestock, and very few (when $\leq$5 packs are present) or no (when $\geq$6 packs are present) land-use restrictions. Moving wolves to protect critical ungulate populations appears unlikely to be necessary, particularly early in recovery. Small losses to the wolf populations are unlikely to affect population growth in the later stages of recovery. This scenario is intended to be representative of wolf population growth under this alternative rather than a predication of the exact impact of its implementation.

About 15 wolves would be reintroduced annually in both Yellowstone National Park and central Idaho beginning in 1994. Approximately 1/3 of these individuals would not be expected to contribute to wolf population growth because of mortality, dispersal, disappearance, unexpected events, etc. Techniques for wolf reintroduction are the same under all alternatives, and about ten individuals would be successfully established in the wild in each area (out of 15 released annually in each area) for 3-5 consecutive years (about 30 individuals annually). Approximately 10% of the wolves could possibly be killed or removed annually because of conflicts with livestock. Another 10% could disappear, or die from natural causes, accidents, or illegal killing. Wolf population growth would occur relatively quickly (42% overall annual increase) because of low to moderate wolf mortality and reintroduction of 40 wolves that survive and contribute to wolf recovery in two areas. All three recovery areas would likely reach wolf population recovery levels (ten breeding pairs for three consecutive years) at about the same time, around 2002. Recovered wolf populations would be delisted (removed from protection of the ESA) according to procedures outlined in the ESA (see Appendix 11), and managed solely by the states or tribal authorities. The ESA also requires that wolf populations be monitored for five years after delisting to ensure that populations remain viable without federal protection.

Table 2-1
Estimated wolf population growth in each area under implementation of the
Reintroduction of Experimental Population Alternative

	1994	1995	1996	1997	1998	1999	2000	2001	2002
No. reintroduced [a]	10	10	10	10	0	0	0	0	0
Surviving	0	8	14	27	45	56	68	83	101
Pups born	0	0	10[b]	20	25	35	40	50	60
10% control loss	1	2	3	6	7	9	11	12	16
10% mortality loss	1	2	4	6	7	9	11	13	16
Total wolves	8	14	27	45	56	68[c]	83	101	129
Packs	0	0	2-4	5-7	6-8	7-10	8-12	10-14	13-18
Area occupied 100 mi^2	0	0	9	18	21	24	30	36	45

[a] Number actually contributing to wolf population growth. Fifteen annually released.
[b] Average five pups per pack.
[c] Beginning of population growth at 22% per year.

"How does this alternative address the major issues and concerns of the public?"

1. *How will depredations on domestic animals be controlled?*
   In 1983 Congress amended the ESA to include provisions for reintroduction of experimental populations, know as Section 10(j), as a means to provide management flexibility to address local concerns and extreme opposition which was preventing reintroduction of endangered or threatened species. Designation of these populations as experimental nonessential, establishment of special regulations for these populations, and implementation of management program as

outlined will address the significant issues identified by agencies and the public and will result in establishment of wolf populations in Yellowstone and central Idaho (see Table 2-1).

Effe3cts of wolf recovery on domestic livestock was one of the major issues identified during scoping. It has been shown in other areas (Minnesota and northwestern Montana) that a responsive program to address conflicts between wolves and domestic livestock reduces the degree of livestock depredation by wolves, increases public acceptance of wolf populations which likely reduces illegal wolf mortality, and allows growth of wolf populations toward recovery levels. While the incidence of wolf depredations on livestock is expected to be comparatively low, some level of depredation is probably inevitable where wolves and livestock exist in close proximity. Removal of problem wolves does more than stop the depredation; it relieves the pressures and antagonisms direct toward the total wolf population by those incurring losses and other members of the public. Timely response to actual depredations will alleviate the perception of government inaction that too often results in the indiscriminate killing of wolves. By responding quickly to resolve depredation problems, the overall wolf population will be in less danger from potential nonselective and illegal attempts to damage control. While some wolves will be removed from the population through control measures, removal of wolves demonstrating this undesirable behavior will promote public acceptance of wolves, will reduce overall impacts, and will allow population growth to recovery levels (see Table 2-1).

Reports of wolves attacking domestic animals would be investigated by ADC, FWS, or the appropriate state or tribal wildlife agency under guidelines of special regulations. The overriding goal of the wolf control program is to minimize wolf depredations on livestock by using a wide variety of techniques including preventative livestock husbandry or wildlife management involving aversive conditioning, supplemental feeding, non-lethal control, moving, or removing wolves from the wild. Wolves that attack livestock (cattle, sheep, horses, and mule) could be live-captured and translocated when there were five or fewer packs, and could be killed or placed in captivity when six or more packs were present in a recovery area. Prior to October 1, females with young would be released on site if depredations occurred on public land, but translocated if depredations occurred on private land. Chronic problem wolves (depredating once after relocation) would be removed from the wild.

Although a remote possibility, wolves that repeatedly (two times in a calendar year) attacked pets, working animals, or other types of domestic animals (fowl, hogs, goats, etc.) on private land would be moved by management agencies. Chronic problem wolves (one depredation after relocation) would be removed from the wild.

Private landowners or their designated agents could harass adult wolves in a opportunistic, non-injurious manner (wolves would not be searched out then harassed) on their private land at any time. Livestock producers and their designated agents with grazing allotments on public land could receive, as part of their grazing permit, authorization to harass any adult wolves near their livestock, in an opportunistic, non-injurious manner. Such harassment may “teach” wolves to avoid areas where conflicts with livestock or people may be highest. Any harassment must be reported to authorizing agencies within 7 days.

Livestock producers or their designated agents on private land could attempt to take (kill) any wolf in the act of wounding or killing livestock (only cattle, sheep, horses, or mules). Such acts must be reported to authorities as soon as possible but no later than 24 hours after the action. Physical evidence of livestock that have been freshly wounded or killed by wolves must be present. Such take may be the most effective method to removed individual problem wolves in areas where potential conflicts are highest. The FWS, ADC, or authorized agency will confirm if livestock were wounded or killed by wolves.

After six or more wolf packs were established in an experimental area, livestock producers or their designated agents with livestock on grazing allotments on public land could be issued a 30 day permit to take (kill) a specific number of wolves in the act of wounding or killing livestock. This could occur after ADC or designated state or tribal authorities had confirmed that wolves were responsible for previous attacks and agency wolf control efforts were unsuccessful at resolving the problem (defined as livestock being attacked again by wolves within 30 days of control actions ending). Physical evidence of livestock freshly killed or wounded by wolves must be evident to agency investigators. Any killing of wolves under this authority must be reported within 24 hours.

2. *"How will livestock producers be compensated for losses?"*

   There would be no federal compensation program for wolf-caused losses to domestic animals. The federal government would encourage livestock producers incurring losses caused by wolves to seek compensation from programs that have been established by private groups. Wyoming currently compensates for livestock losses caused by trophy and game animals, but the current classification of the wolf as a "predator" by Wyoming law does not provide for compensation for wolf-related losses. Idaho currently compensates for livestock losses from mountain lions and bears that exceed $1,000 dollars per individual operator, Montana does not compensate for game damage. It is unknown whether the states or tribes would compensate for wolf-related damage.

3. "*How will potential impacts on big game populations be managed?"*

   If the FWS determined wolves were causing unacceptable impacts on other listed species, or on specific ungulate populations and those impacts might have a negative effect on wolf recovery outside national parks and national wildlife refuges, the FWS, ADC, or FWS authorized agencies could capture and move wolves from localized areas to resolve those conflicts.

   Land management agencies would be encouraged to voluntarily implement land-use guidelines that enhance ungulate habitat. Ungulate management by state, tribal, and federal agencies would otherwise be unaffected. The FWS would not implement additional special programs to monitor or enhance ungulate populations to promote wolf recovery. State, tribal, and federal land management agencies would be encouraged and may elect to monitor or enhance ungulate populations to assist wolf recovery and minimize potential impacts.

4. *"Who will manage wolves?"*

   The states and tribes, through cooperative agreements with the FWS, would be primarily responsible for implementing wolf recovery, monitoring, and management on lands where they have authority to manage wildlife within the framework established for the experimental population through the federal regulation process. The states and tribes would be encouraged to develop state and tribal wolf management plans with local public involvement. If such state and tribal management is within the guidelines of the experimental rule the management plans will be authorized through cooperative agreements. If significant modifications to the experimental rule are proposed, such state and tribal plans would be incorporate into modifications of the experimental rule and would be subject to national public review and comment. The FWS would retain ultimate management responsibility for program oversight and achievement of wolf recovery. Control of wolves would primarily be the responsibility of ADC, FWS, the states, or tribes pursuant to the experimental population rule constraints. Wolf reintroduction to Yellowstone National Park and central Idaho would be the cooperative responsibility of the respective states, FWS, National Park Service, USDA Forest Service, tribes, and Canadian agencies.

5. *"What kind of land-use restrictions will occur?"*

   Although unlikely to be necessary, when five or fewer wolf packs are present in an experimental area, land management and natural resource agencies may utilize land-use restrictions between April 1 and June 30 around active den sites to control intrusive human disturbance. Land-use restrictions would not be required to implement this alternative when six or more wolf packs are present in an experimental population area.

Some predator control activities (almost exclusively M-44 use for coyote control) by ADC would be affected by wolf recolonization. The current EPA registration restricts use of predator toxicants in areas occupied by listed species. Toxicants are already precluded from most areas where wolf recovery would be encouraged because of existing conditions. Other predator control activities (aerial and ground shooting, foot-hold trapping, snaring with modified snares, and denning) would not be affected. Wolves taken in the course of these activities must be immediately reported to authorities. If wolves are killed through the course of these activities such incidents would be thoroughly investigated, and unavoidable or unintentional take of wolves (killing or injuring) during legal activities (trapping, vehicle collisions, etc.) would not be considered take. Other take of wolves would be referred to the appropriate authorities for investigation and possible prosecution.

6. *"Where will wolf populations be recovered?"*

   Wolves would primarily occur in mountainous portions of western Montana, northwestern Wyoming, and central and northern Idaho. The majority of wolf pack territories would occur on public land in and around national parks, national wildlife refuges, and forest service lands around Yellowstone National Park (17,270 mi.^{2}, 44,731 km^2). Wolf packs in central Idaho would primarily occur on contiguous national forest (20,310 mi.^{2}, 52,600 km^2). Some wolves may also utilize private lands near these areas. Lone wolves could occasionally occur throughout Idaho, Montana, and Wyoming but rarely beyond.

7. *"When will wolf populations recovery?"*

   The standard FWS-led wolf monitoring program would continue to assess the status of any suspected naturally occurring wolf packs. The earliest a reintroduction of an experimental population could occur would be the fall of 1994. If wolves were introduced into each area as outlines for four years, recovery (ten breeding pairs in three areas for three consecutive years) could be achieved by about 2002.

8. *"How much will wolf recovery cost?"*

   Implementing this alternative in both experimental areas would cost about $667,600 per year. The total cost of this alternative through the year 2002, when wolves are expected to be recovered and delisted, is expected to be $6,757,750 (1992 dollars, see Appendix 5 for description for cost estimates).

9. *"Are changes in current state or federal law required?"*

   Wolves would remain under protection of the ESA until recovered but would be managed under special regulations as provided by Section 10(j). Wolves in all of Wyoming and much of Idaho and Montana (except in parks and refuges) would be managed as species proposed for listing under the WSA only for Section 7 purposes [excluding Section 7(a)(1)] but for any other purpose wolves would be managed as a threatened species. Wolves outside of the experimental area(s) would be managed as a naturally recovering, fully endangered population. States and tribes would be the primary agencies implementing the management programs in the experimental population areas, if they chose to do so. Idaho and Wyoming state laws would need to allow state resource agencies to assume management, or resource agencies could establish cooperative agreements with the FWS. Montana state law already allows its wildlife management agency to assume management of wolves or enter into cooperative agreements with the FWS. There would be FWS oversight of state or tribal management until recovery.

   The states and tribes would be encouraged to develop specific state or tribal wolf management plans, utilizing local public participation, that ensure state and tribal management addressed the needs of local residents while following the general conditions set forth by federal laws and these nonessential experimental population rules. If such plans were beyond the intent of or if they proposed significant modifications to the experimental population rule, they would be incorporated as modifications of the experimental rule and as such wold be subject to widespread national public review and comments.

Alternative 2
Natural Recovery Alternative
(The No Action Alternative)

Background

Currently about 65 wolves (excluding 1993 pups) are known to occupy northwestern Montana (Figure 2-2). The only persistent packs are those in and adjacent to Glacier National park. In 1988, a formal interagency program was funded and staffed to enhance recovery of these naturally recolonizing wolves. The program monitors wolves to determine their distribution and numbers, promotes and provides funding for research to obtain accurate information about wolves and their prey, controls (moves or kills) wolves that depredate on livestock, and conducts an aggressive education and information program to provide scientifically based current information about wolves and wolf recovery.

Natural Recovery Alternative (No Action Alternative). – The purpose of this alternative is to encourage the natural recovery of wolves from Canada and Montana to expand to other areas, eventually reaching central Idaho and Yellowstone National Park.

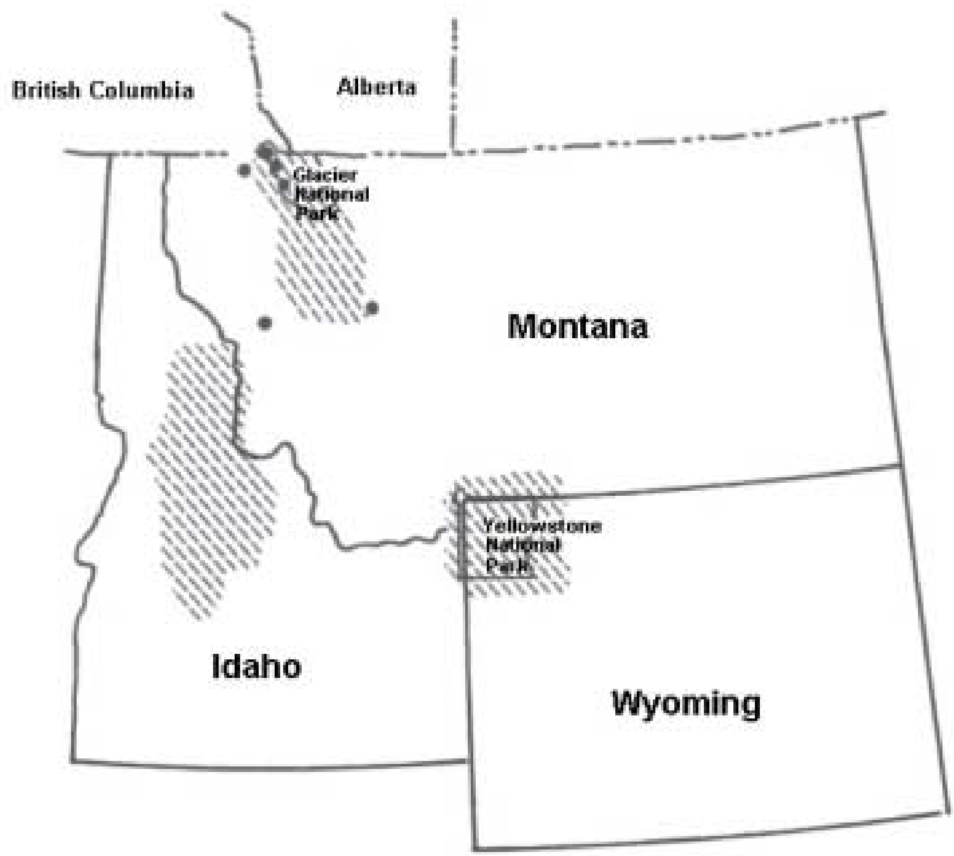


Figure 2-2
Northwestern U.S. showing three wolf recovery areas that are identified in the Northern Rocky Mountain Wolf Recovery Plan (crosshatching). Locations where wolf packs lived in 1993 indicated by dots.

Summary

Wolves would remain listed as endangered under the ESA throughout the northern Rocky Mountains and no reintroductions would occur. Management programs similar to the one in Montana would be established in Idaho and Wyoming. Wolves would be encouraged to naturally expand their ranges into any area they choose, eventually into the central Idaho and Yellowstone areas. Wolves would eventually recolonize the recovery areas, but would also recolonize other areas throughout the northern Rocky Mountains and would be allowed to remain there if few conflicts occurred. Because wolves would settle in some areas where their presence was not desirable, there would be occasional conflicts, particularly with livestock. Depredating wolves would be controlled by agencies as long as control did not preclude wolf population recovery. There would be no federal compensation program, although a private fund does exist and its use by livestock producers would be encouraged. Whether this private compensation program would continue is unknown. Wolves would not be controlled if there were conflicts with pets or state big game management objectives. There would be some land-use restrictions primarily around active den sites and on some ADC activities where wolves occurred. Illegal killing or control at a level that precludes or severely inhibits recovery would result in additional land-use restrictions, primarily a reduction in the number of roads open to motorized vehicles and locations of livestock grazing on public land. Wolf recovery is unpredictable but would likely take several decades.

Implementing this alternative would involve:

The FWS would fund wolf recovery programs in Idaho and Wyoming similar to the one currently being conducted in northwestern Montana. The FWS would:

- Search for wolves by (1) asking the public and agencies to report wolf sightings, (2) conducting surveys to search for wolf pack activity in areas identified through public and agency reports, and (3) capturing, radio collaring, and monitoring wolf packs.

- Conduct an extensive and objective public education and information program to inform the public about wolves and wolf management under the ESA.

- Fund scientific research to obtain current information on wolf biology and the relationship of wolves to their prey and land-use practices.

- Permit ADC to control wolves that attack livestock by moving wolves when less than six packs are in the recovery area, removing wolves that repeatedly attack livestock, and releasing females and their young on site prior to August 1. Wolves would be controlled within recovery areas only if they were not attracted to the area by inappropriate livestock husbandry practices (inappropriate carcass disposal) or were not in areas critical to wolves (ungulate wintering areas, den sites). Wolf control would be permitted only if it occurred at a level that would not preclude wolf recovery.

- Implement land-use restrictions when necessary if illegal killing threatens wolf recovery. Active den sites would continue to be protected from high levels of human disturbance within one mile (1.6 km) of the den between March 15 and July 1.

How would wolf populations respond to this alternative?

The following scenario and Table 2-2 portrays how wolf population growth may respond to implementation of the National Recovery Alternative. The key components of this alternative includes no reintroduction and wolves preying on livestock could be controlled as long as control did not prevent wolf population recovery. Wolves would be allowed to naturally expand their ranges southward as they have done in southern Alberta, British Columbia, and northwestern Montana over the past 40 years. The rate of population growth and distribution of wolves would be unpredictable but may proceed at the same average rate observed in Montana since 1985 (about 22% annually). However, if wolf populations increased at an overall rate similar to that of the naturally recovering wolf population in Minnesota (3% annual increase) then recovery would take much longer. As in the past, it is likely that some of the initial wolves or packs that try to establish will be removed by control actions to protect livestock or by illegal killing, so wolves, even breeding pairs, may show up and then die out multiple times before a population becomes established. However, eventually wolves would become more firmly established and recolonize central Idaho and the Yellowstone area. It is estimated that about 20% of the wolf population would not survive each year, either through control actions to resolve conflicts with livestock, illegal killing, vehicle strikes, or natural mortality. Natural recovery would occur in stages, with Montana reaching recovery levels about 2002, Idaho about 2015, and Yellowstone about 2025. This scenario is intended to be a general representation of this alternative rather than an exact predication of the impact of its implementation because of main element of this alternative is unpredictability.

Under this alternative it is likely that wolf populations in Montana will have reached ten breeding pairs prior to reaching ten breeding pairs in Idaho and prior to any wolf pack establishment in the Yellowstone area. If wolves could not be delisted by individual recovery areas at ten breeding pairs, Montana would have wolf populations above recovery levels before delisting could occur, as has happened in Minnesota with delisting of the eastern timber wolf. For the purposes of this alternative, it is assumed that state management, if it occurred before all three areas reached recovery levels, would not affect the rate of wolf dispersal into the Idaho and Yellowstone areas. This alternative is highly unpredictable because wolves interacting with several variables, including illegal killing and level of conflict with livestock, would determine the actual rate of recovery. Several parts of the management strategy are allowed (control for livestock conflict, minimal land-use restrictions) only if they do not preclude wolf recovery.

How does this alternative address the major issues and concerns of the public?

1. *How will depredations on domestic animals be controlled?*

Since 1988, wolf control in Montana, Wyoming, and Idaho has been conducted by ADC and the FWS under the Interim Wolf Control Plan. Reports of livestock depredations are investigated by ADC. Special funding from Congress in 1991 established an ADC wolf management specialist position to effectively and professionally address wolf-livestock conflicts. Wolves that have attacked livestock and are likely to do so again (except females and young before August 1 which are released on site) are moved after the first depredation, and after being removed, are killed or removed from the wild on the second offense. Control of wolves is not conducted because of depredations on pets or in situations where wolves were attracted to the area by inappropriate livestock husbandry practices or in times and areas critical to wolves.

2. *How will livestock producers be compensated for losses?*

There is no federal or state compensation program to reimburse livestock producers for property damage caused by wolves. A private group has established a program that provides 100% fair market compensation to producers for livestock losses confirmed caused by wolves and 50% compensation for livestock losses possibly caused by wolves. The program does not compensate for pet losses. ADC examination of evidence at the depredation site determines if control should be initiated, and the private group uses that information to decide if compensation is warranted. It is unknown if this program would continue if this alternative is selected.

3. *How will potential impacts on big game populations be managed?*

Wolves are not controlled to address potential conflicts with state big game objectives. Such control, only by moving wolves in very limited circumstances, could occur through state or tribal/federal cooperative agreements, but such agreements would have to be developed.

The USDA Forest Service and BLM are encouraged, but not required, to implement good ungulate management policy to foster wolf recovery. No specific programs are being implemented to improve ungulate habitat solely for wolves or to monitor ungulates because of the potential effect of wolf predation.

Wolf and ungulate research funded by the Montana Wolf Recovery Program has let to a greater understanding of ungulate ecology and habitat use and how other predators, in addition to wolves, might affect ungulate populations and hunter harvest. Such research would continue and be encouraged elsewhere.

4. *Who will manage wolves?*

Wolves in the northern Rocky Mountains are being managed by the federal government using funding appropriated by Congress with cooperation from the other agencies and tribes. While all federal agencies have the responsibility to “utilize their authorities in furtherance of the purposes of the Act (ESA) by carrying out programs for the conservation of endangered species and threatened species listed pursuant to section 4 of this Act,” the FWS has primary authority for endangered species recovery.

ADC is authorized by permit from the FWS to control depredating wolves. ADC has established a wolf management specialist position to investigate reports of wolf damage, control problem wolves, and provide objective information to livestock producers and the public about wolf-livestock conflict and management.

Montana Department of Fish, Wildlife and Parks is involved in wolf recovery in Montana. Idaho Department of Fish and Game is not authorized “to expend funds, transfer assets, or enter into a cooperative agreement with any agency, department, or entity of the United States government concerning wolves unless expressly authorized by State status, except that the department is authorized to provide a representative to participate on the northern Rocky Mountain wolf recovery team and to participate in activities regarding nuisance wolves.” In 1992 and 1993 the Idaho legislature permitted the department to participate in development of this Gray Wolf EIS. Wyoming Game and Fish Department has no authority to regulate take or manage wolves while they are listed as predators in Wyoming. All three agencies are formally participating in the EIS process.

The public can not attempt to harass, harm, take, or kill wolves except in defense of human life or safety. Wolves may not be legally harassed or harmed to protect personal property.

5. *What kind of land-use restrictions will occur?*

To date only two land-use restrictions are recommended to enhance wolf recovery in the northern Rocky Mountains: (1) Between March 15 and July 1, it is recommended that land management agencies limit high levels of human activity that may result in den abandonment or pup mortality within one mile (1.6 km) of active wolf dens; (2) ADC may not sue toxicants (M-44 for coyotes) or other non-selective predator control tools that may accidently kill wolves (snares without breakaway locks or large foot hold traps near den sites).

If illegal killing or legal taking (control) of wolves appears to be preventing recovery, other land-use restrictions would be contemplated. To protect wolves and enhance recovery on public lands in other areas of the U.S., motorized transportation on open roads has been restricted to levels below one mile of open road per one square mile (0.6 km/km^2) of habitat in a few areas in Wisconsin, Minnesota, and Michigan. Some den areas have been temporarily closed to hiking in Denali National Park, Alaska. Coyote hunting in some areas has been closed during the big game hunting season in Wisconsin and Washington. Control of wolves depredating on livestock is not allowed in extreme northeastern Minnesota. Also, on some national forests in Minnesota, Michigan, and Wisconsin, timber harvest or other management practices have been used to enhance habitat for wolf prey populations. At this time it doesn't not appear these types of restrictions or habitat improvements are necessary in the northern Rocky Mountains, but such management practices could become necessary if illegal killing begins to prevent wolf recovery or if prey populations decline dramatically. Illegal killing could result in restrictions affecting more than 35 mi^2 (91 km^2) (<0.1%) of national forests lands not designated as wilderness in each recovery area.

6. *Where will wolf populations be recovered?*

   Wolves could show up anywhere in the northern Rocky Mountains, including private lands, and would be allowed to stay if repeated conflicts with livestock did not occur. Wolf packs wold likely establish primarily on national forests, national parks, and national wildlife refuges in the 17 county area surrounding Yellowstone National Park (22,900 mi^2; 59,200 km^2). Wolf packs would likely become established primarily on national forests in central and northern Idaho (23,4000 mi^2; 60,700 km^2).

7. *When will wolf populations recover?*

   Because wolf colonization under natural recovery would likely start with a single pair, recovery would be tenuous and prolonged. It is possible that isolated packs could form and then disappear in both the Yellowstone and Idaho areas any number of times before a wolf population would become established and grow to recovery levels.

   Wolves would slowly disperse into the recovery areas. After several packs began to successfully produce pups in a recovery area, recovery could be achieved in that area within 15 years. The rate of natural dispersal in Idaho and Yellowstone is unpredictable, but the initiation of a wolf population appears unlikely (particularly in Yellowstone) in the next five years. Recovery in all three areas may not occur for 30 years.

8. *How much will wolf recovery cost?*

   The Montana wolf recovery program was designed to cost an average of about $250,000 per year (including control). It is likely that similar costs will be required to fully implement similar programs to enhance natural wolf recovery in Idaho and Wyoming. These costs fund salary, travel, research, education and information, administration, control, translocation, and monitoring. ADC funding of the wolf management specialist position for the northern Rocky Mountains costs are $50,000/year. Total program costs to gray wolf population recovery and control (up to 30 years) in the central Idaho and Yellowstone areas under this alternative would be about $15,000,000 (1992 dollars). If natural recovery programs were not funded until wolf pairs became established and were discontinued in each recovery area as each wolf population reached recovery levels, total costs would be about $10,000,000 (Appendix 5).

9. *Are changes in current state and federal law required?*

   No. Wolves would continue to be fully protected (the only exception is for protection of human health and safety) as endangered species by the federal ESA and managed by the FWS. Wolves in Montana and Idaho are also listed as state endangered species and are protected except to protect human life, livestock, or property. In Wyoming, wolves are listed as predators by state law and may be taken at any time without limit. However, federal law still fully protects wolves in Wyoming. States and tribes could implement management of wolves under cooperative agreements with the FWS, if they so chose but management would need to be within the provisions of the EIS.

Table 2-2
Estimated wolf population growth under implementation of the Natural Recovery Alternative
The No Action Alternative (22% increase per year)

	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Mont.	40	49	60	73	89	108	132	161	196	239	292	------ > ?																		
						Montana State Management																								
Idaho[a]	| - pair start and fail - |				pair start --- |							40	49	60	73	89	108	132	161	196	239	292	------- > ?							
																			Idaho State Management											
Wyo.				| -- one or more pair start and fail? --- |										pair start --										40	49	60	73	89	108

[a] Montana wolf population took 1986 – 1993 to reach 40 wolves after first den (8 years)
[b] Assume pairs form in next recovery area when nearest recovery area reaches 100 wolves. Natural recovery is unpredictable because wolf population establishment and persistence are highly variable.

Alternative 3
No Wolf Alternative

Background

In fiscal year 1993, Congress provided funding to complete the EIS and requested that the final EIS be completed by January 1994. Congress further “expects that the preferred alternative be consistent with existing law.” The No Wolf Alternative is not consistent with existing law and would require changes in both the ESA and state law in Montana and Idaho. Changes in state law are beyond the scope of federal authority. Base upon the guidance given by Congress and the scope of federal authority, this alternative is not a reasonable or viable option to the proposed action. However, because Congressional direction at the start of the EIS process in December 1991 stated “… the EIS should consider a broad range of alternatives” and because many people have expressed support for the No Wolf Alternative during scoping, it was included for detailed analysis in the DEIS so the impacts of wolf recovery could be accurately compared to the situation of not having wolf populations in either the Yellowstone or central Idaho areas.

No Wolf Alternative. – The purpose of this alternative is to prevent wolf recovery in Yellowstone National Park and central Idaho.

Summary

Congress would need to pass legislation to remove wolves in Montana, Wyoming, and Idaho from the list of Endangered Species. The FWS would stop all funding and management activity towards wolf monitoring, education, research, and control in the Rocky Mountains in the northern U.S. Furthermore, the states of Montana and Idaho would remove wolves from the protection of state law. Unregulated killing by the public would likely prevent wolf recovery in Idaho and Wyoming and restrict wolf pack activity in Montana to Glacier National Park. ADC activity would remove any wolves threatening livestock.

Implementing this alternative would involve:

- Passing federal legislation to remove wolves from the list of endangered species.
- Passing state legislation to remove wolves from the protection of Montana and Idaho state law.
- Allowing people to kill all wolves at any time, without restriction which would prevent wolf population recovery.
- Allowing ADC to kill any wolves posing potential conflicts with livestock. Only a few wolf packs would persist in Glacier National Park in Montana.

How would wolf populations respond to this alternative?

Without legal protection from human persecution, lone wolves would continue to occasionally be documented and killed throughout the Rocky Mountains in the northern U.S. However, wolf population recovery would not occur in these areas and wolves would be rare or absent for the foreseeable future. A few wold packs wold continue to occupy Glacier National Park in Montana. Wolf populations in the Rocky Mountains in southern Canada would be less viable as a result of this alternative because few, if any, wolves would move from the U.S. to southern Alberta and British Columbia.

How does this alternative address the major issues and concerns of the public?

1. *How will depredations on domestic animals be controlled?*

   The public and all agencies could harass and kill wolves at any time so there would be few if any wolves at any one time. Furthermore, ADC would kill any wolves that threatened livestock.

2. How will livestock producers be compensated for losses?

   There would be no government program to compensate livestock producers for losses. The current private compensation program would likely be discontinued under this alternative.

3. How will potential impacts on big game populations be managed?

   The public and all agencies could harass or kill wolves at any time so there would be few if any wolves preying on big game populations except in Glacier National Park.

4. *Who will manage wolves?*

   Wolves wold not be managed for recovery by any agency except the National Park Service and perhaps some tribes. The public and all agencies could kill wolves at any time for any reason. ADC would kill wolves that attacked or threatened livestock.

5. *What kind of land-use restrictions would occur?*

   There would be no land-use restrictions because of wolves.

6. *Where will wolf populations be recovered?*

   Wolf populations would not recover in the central Idaho or Yellowstone areas. Other than a few wolf packs in Glacier National Park and occasional lone wolves, wolves would not occur in Montana, Wyoming, or Idaho.

7. *When will wolf populations recover?*

   Wolf populations would not be allowed to recover in these states.

8. *How much will this alternative cost?*

   It would cost at least $100,000 to change laws and regulations so that this alternative could be implemented. (Appendix 5 for description of cost estimates). Wolves would be so uncommon that additional ADC expenditures would not be significant.

9. *Are changes in current state or federal law required?*

   Yes. The ESA would be amended or special legislation would need to be passed by Congress to remove any wolves from the list of endangered species in the northern Rocky Mountains. The state legislatures of Montana and Idaho would have to change state laws to implement this alternative.

Alternative 4
Wolf Management Committee Alternative

Background

The Wolf Management Committee Alternative resulted from a 1991 Congressionally established Committee that represented a diversity of federal, state, and special interest group views about wolf recovery in central Idaho and Yellowstone National Park. The Committee's recommendation proposed that current federal law be amended and a nonessential experimental population under state management be established in Yellowstone and natural recovery in Idaho be monitored for additional five years. This recommendation, supported by a majority of committee members, was provided by Congress in May 1991, but Congress has not enacted any of its recommendations to date. Instead Congress directed that work on an EIS begin. This alternative is presented a proposed to Congress in the Wolf Management Committee's report.

Wolf Management Committee. – The purpose of this alternative is to let the states of Wyoming, Montana, and Idaho manage and accomplish wolf recovery as a nonessential experimental population under state law and special regulations that are more liberal than currently allowed under ESA.

Summary

Congress would be requested to immediately either amend the ESA or pass special legislation to designate wolves throughout Wyoming, Montana, and Idaho (except in or near Glacier National Park) as a special State-managed nonessential experimental population. The states would develop plans to recover wolves in northwestern Montana, central Idaho, and Yellowstone National Park. Wolves would be recovered through natural dispersal in northwestern Montana and central Idaho and would be reintroduced in Yellowstone National Park. Wolves attacking or harassing livestock, working animals, or pets could be controlled by the public and state, tribal, and federal agencies. Compensation would be paid from a federal trust fund (federal appropriated funds, assessment on selected national park entrance fees, and other sources). There would be few land-use restrictions. Wolves would be moved to address state big game management goals.

Implementing this alternative would involve:

- The FWS would continue to manage wolves in and adjacent to Glacier National Park (see Natural Recovery Alternative for details of management, Figure 2-3).
- Congress would amend the ESA or pass special legislation to designate wolves in all of Wyoming, and Idaho and most of Montana as a nonessential experimental population managed by the states of Wyoming, Idaho, and Montana (Figure 2-3).
- Congress would establish an interagency committee and a federal trust to fund all wolf recovery, livestock compensation, and ungulate enhancement.
- States would develop wolf management plans and state regulations within two years to achieve wolf recovery and management, including:
    - Reintroducing wolves into Yellowstone National Park (see techniques for reintroduction under experimental population reintroduction alternative).

- Possibly reintroducing wolves into central Idaho if two breeding pairs are not documented by 2000.

- Allowing owners of livestock, working animals, and pets to kill wolves in the act of harassing or attacking their animals. Such incidents must be reported within 48 hours on private land and 14 days on public land. This program requires that any wolves killed be replaced and an education program for livestock operators be implemented.

- Moving wolves if predation affected state big game management objectives.

- Permitting ADC, state, or tribal agencies to move wolves that attack livestock, working animals, or pets when five or fewer packs are in a recovery area, and to kill problem wolves when six or more packs are present.

- Compensating for domestic animal losses from a federal trust fund.

- Establishing public land-use restrictions around active den sites between April 1 and June 15 and restricting use of toxicants lethal to wolves in areas where wolf occupancy was desired.

- Conduct an active information and education program.

- Monitor and enhance ungulate populations.

Figure 2-3
The Wolf Management Committee experimental population area. Shaded areas include the northwest Montana wolf population and Yellowstone National Park and are not included in the state managed experimental population area.

How would wolf populations respond to this alternative?

The following scenario and Table 2-3 portrays how wolf populations may respond to implementation of the Wolf Management Committee Alternative. This scenario incorporates the key components of that alternative including: two years of state planning; reintroduction of wolves in Yellowstone National Park and, after a 5-year waiting period, possibly central Idaho; replacement of wolves killed in control actions or illegally; and high mortality of wolves in areas with livestock. This scenario is intended to be a representation of this alternative rather than an exact prediction of the impact of its implementation.

After a 2-year planning period wolves would be reintroduced into Yellowstone National Park in 1996. Techniques for wolf reintroduction are the same under all alternatives and ten individuals would be released and successfully established in the wild (out of 15 total that were annually released) for four consecutive years (40 individuals). Reproduction by reintroduced wolves would likely not occur until two years after release. Approximately 30% of the wolves would be killed near livestock or be removed in livestock or ungulate control actions per year. Another 10% would die from natural causes or illegal killing. Approximately 50% of those removed in response to livestock protection would be replaced the following year. The number is 50% because some wolves injured or killed would not be discovered, some mortality would result in dispersal, loss of pups, or pack disintegration, etc. Not all losses would be effectively replaced through subsequent reintroductions. Because of the constant removals and subsequently reintroductions, and delays in having the subsequent reintroduced wolves contribute to breeding, overall wolf population growth would likely be slow and similar to the rate of natural recovery (starting at two wolves through recovery levels, about 16 years). High human-caused mortality would confine wolf recovery in areas with few livestock and low human occupancy. Wolf recovery would occur in the Yellowstone area a few years before central Idaho because of the delay of reintroduction into central Idaho. Wolf populations would reach recovery levels in each recovery area (ten breeding pairs for three consecutive years) at different times, prolonging the delisting of gray wolves in the northern Rocky Mountains. All three recovery areas would meet wolf population delisting criteria about 2015. If wolf deaths are lower than predicted, recovery would occur sooner.

How does this alternative address the major issues and concerns of the public?

1. *How will depredations on domestic animals be controlled?*

   Any wolves harassing or attacking livestock, working animals, or pets could be killed by the public on private and public lands. All wolves killed by the public or agencies would be replaced through reintroductions. Such incidents would have to be reported within 48 hours on private land and 14 days on public land.

   All wolves that attacked livestock, working animals, or pets would be controlled by the agencies. Prior to six wolf packs being established in a recovery area, wolves wold be translocated on the first depredation and removed on the second offense. After six wolf packs become established in a recovery area, problem wolves would be removed on the first offense in that recovery area.

2. *How will livestock producers be compensated for losses?*

   Compensation for livestock losses would be administered by ADC and funding made available through the federal trust fund as identified for wolf management. An interagency committee (one representative each from the following: NPS, FWS, FS, ADC, IDFG, MDFWP, WGFD) would oversee fund collections and disbursements.

3. *How will potential impacts on big game populations be managed?*

   If wolf predation were affecting state big game management objectives in a specific area, those wolves could be moved elsewhere.

A special federal trust would be established that the states would use (1) to enhance ungulate populations and their habitat to compensate for any potential losses from wolf populations and (2) to closely monitor ungulate populations.

4. *Who will manage wolves?*

Outside the nonessential experimental populations area and on national wildlife refuges, the FWS would manage wolf recovery. The National Park Service would manage wolves inside national parks.

Inside the experimental population area, the states and respective tribes would manage wolf recovery. Owners of livestock, working animals, and pets could kill any wolf they believed was harassing or attacking such animals.

5. *What kind of land-use restrictions will occur?*

There would be seasonal closures of up to one mile (1.6 km) around active den sites from April 1 to June 15 in the early stages of population establishment to preclude harassment or illegal killing. Normal wildlife standards and guidelines being applied by state agencies and federal land managers would apply. No toxicants lethal to wolves would be used in areas where wolf occupancy is a management objective.

6. *Where will wolf populations be recovered?*

The nonessential experimental populations area would include all of Wyoming, all of Idaho, and all of Montana except that area bounded by Glacier National Park on the north and east highway 93 on the west and highway 2 on the south. In the experimental population area, wolf distribution would be determined by state processes but would most likely occur in areas in and near Yellowstone National Park and central Idaho no grazed by livestock (18,400 mi^2; 47,700 km^2).

Based upon previous plans, the core wolf populations would likely be confined to areas recommended in the 1987 Wolf Recovery Plan, with minimal potential for conflicts with livestock growers or with hunters in heavily harvested big game populations. Such areas would likely be Glacier National Park and the Bob Marshall Wilderness complex in Montana; Wilderness and non-livestock areas in central Idaho (9,300 mi^2; 24,000 km^2); and Yellowstone National Park and associated Wilderness areas in northwestern Wyoming (approx. 11,800 mi^2; 30660 km^2). Lone wolves would occur outside these areas, but it is likely packs would not. Wolf packs would continue to persist in the area managed by the FWS, in and near Glacier National Park, Montana.

7. *When will wolf populations recovery?*

The states would develop their wolf management programs by 1996. Recovery in northwestern Montana would proceed at a slower rate than present with recovery achieved by about 2005. Natural dispersal into Idaho or reintroduction in 2000 would result in recovery by 2015. With a reintroduction, recovery in the Yellowstone area would occur by 2010. Gray wolf populations would likely be recovered (three area, ten breeding pairs, for three consecutive years) by abut 2015.

8. *How much would wolf recovery cost?*

This alternative would cost about $39,044,000 ($5,577,714 dollars per year) during the first seven years of implementation. In addition, annual costs beyond the first seven years were inferred to be about $6,000,000. This would result in total program costs for gray wolf population recovery (by year 20015) of about $129,000,000. Costs are high because of the intensive level of management and monitoring of wolves and ungulates, and habitat enhancement (Appendix 5).

9. *Are changes in current state or federal law required?*

Congress would need to pass legislation and declare the wolf population “nonessential experimental” in all of Idaho, Montana, and Wyoming except in Yellowstone National Park, national wildlife refuges, and the existing breeding wolf population located in the area west of the eastern boundary of Glacier National Park, north of Highway 2 and east of Highway 93 north to the Canada-U.S. border. Wolves there would remain under FWS management as an endangered species. This experimental classification would remain in effect form the date of congressional action for two years.

Individual state legislative and commission action would be initiated to ensure classification of the wolf in each state is consistent with wold recovery, and ensure the ability of involved states to manage wolves and their unacceptable impacts on livestock, big game resources, multiple land uses, and responsibility to pursue wolf recovery. Wolves in Montana would be classified under the State Nongame and Endangered Species conservation Act (87-5-109) and would require no changes. Wolves in Idaho are listed as a state endangered species but the Idaho Department of Fish and Game would have to be permitted to participate in wolf recovery by the legislature. Wolves in Wyoming are now listed as predators but would have to be classified as a state trophy game animal or similar classification.

The FWS would conduct the rule-making on this plan while the states were developing their management plans that would include all necessary actions to implement this alternative, and for reintroduction of wolves into Yellowstone National Park and, if needed for five years, possibly central Idaho.

Table 2-3
Estimated wolf population growth under implementation of the
Wolf Management Committee Alternative.

	1996[a]	1997	1998	1999	2000[b]	2001	2002[d]	2003	2004	2005	2006	2007	2008	2009	2010	2011
No. replaced	0	1	3	5	6	6	7	7	9	9	10	13	15	16	18	22
No. reintroduced	10	10	10	10	0	0	0	0	0	0	0	0	0	0	0	0
Surviving	0	6	11	16	25	25	29	31	35	40	46	53	58	65	83	93
Pups born	0	0	5	10	10	15	15	20	20	25	30	30	35	40	50	50
30% loss control[c]	3	6	9	12	12	13	15	18	18	21	25	29	33	36	45	48
10% loss mortality	1	2	3	4	4	4	5	5	6	7	8	9	10	12	15	16
Total wolves	6	11	16	25	25	29	31	35	40	46	53	58	65	83	83	101
Packs	0	0	1	2	3	3	4	4	5	6	6	7	8	10	10	10
Area occupied 100 mi^2	0	0	3	6	9	9	12	12	15	18	18	21	24	30	30	30

[a] Start Yellowstone reintroduction – recovery 2010.
[b] Start Idaho reintroduction – recovery 2015.
[c] If control losses were only 20% / year wolf population recovery in Yellowstone and Idaho would occur three years earlier, 2007 and 2012.
[d] The wolf population in northwestern Montana is currently estimated to reach recovery levels (ten breeding pair for three consecutive years) about 2002. In the Wolf Management Committee Alternative, wolf recovery in northwestern Montana would take several years longer to occur because of increased wolf mortality outside of Glacier National Park.

Alternative 5
Reintroduction of Non-experimental Wolves Alternative

Background

Wolves would be reintroduced into the central Idaho and Yellowstone areas without an experimental population rule and would be fully protected by all provisions of the ESA until recovery was achieved. The experimental population provisions of Section 10(j) of the ESA would not be used. Wolves would be quickly restored and recovered in the northern Rocky Mountains under the most protective measures in the ESA. Wolf recovery would be the responsibility of the FWS, with active participation of other federal agencies and possibly tribes and states. Wolves would be reintroduced to central Idaho and the Yellowstone areas, and possibly even to some areas already occupied by wolves. All management decisions on federal lands would emphasize rapid wolf recovery. Land-use restrictions, including reducing the number of open roads, spring, summer, and fall restrictions near important den and rendezvous sites, and on livestock grazing when in conflict with wolf recovery wold be applied to about 35 mi^2 (91 km^2) of natural forest lands not designated as wilderness. Habitat for wolves would be enhanced by purchase or easement. Wolves that attack livestock would not be controlled, and on public land livestock would be removed to resolve conflicts. Wolves would not be controlled if they affected state big game management objectives. No federal or sate compensation would be available. Private compensation could be obtained, if that program continues.

Reintroduction of Non-experimental Wolves Alternative. - The purpose of the Reintroduction of Non-experimental Wolves Alternatives is to achieve wolf recovery quickly using extensive reintroductions and habitat enhancement to assist natural recovery.

Summary

Wolves would be reintroduced into areas in and near central Idaho and Yellowstone National Park until ten breeding pairs were established. They would not be designated an experimental population. Wolf recovery would be a high priority on all surrounding federal lands. If required, land management restrictions such as road and trail closures, redistribution of grazing allotments and protection of key wolf habitats would be promoted. Wolf populations would likely recovery rapidly. If wolves depredated on livestock on public land or impacted ungulate populations, no control would occur. Livestock would either be removed from the area or losses absorbed by the grazing allotment permittee. If repeated chronic losses occurred on nearby private lands, wolves would be moved. Habitat for ungulates and wolf security would be enhanced to provide abundant prey.

Implementing this alternative would involve:

- The FWS would establish proactive wolf recovery programs in Wyoming and Idaho (see Alternative 2 for specifics) to conduct monitoring, research, and education and information programs.

- The FWS would reintroduce wolves into three suitable sites in and near each of the central Idaho and Yellowstone areas regardless if other wolves were documented (see Alternative 1 for specifics) until the recovery goal of ten breeding pairs was achieved.

- The FWS, in cooperation with the states, tribes, and private groups would use federal funding to aggressively enhance ungulate and wolf habitat through acquisitions and easements.

- Within the primary wolf recovery analysis area (Figure 1-1), the USDA Forest Service and BLM would use road closures and habitat management to further enhance ungulate and wolf habitat - 28 -on at least 35 mi^2 (91 km^2) of lands they administer outside of wilderness areas.

- Wolves would not be controlled for conflicts with domestic animals except in chronic problem areas, and then only by moving wolves. Wolves would not be controlled for conflicts with ungulate populations.

How would wolf populations respond to this alternative?

The following scenario and Table 2-4 portrays how wolf population growth may respond to implementation of the Reintroduction of Non-experimental Wolves Alternative. It incorporates the key components of this alternative including: wolves would be reintroduced into areas in and near Yellowstone National Park and central Idaho in 1994. Techniques for wolf reintroduction are the same under all alternatives and ten individuals (out of 15 released annually) would be successfully established in the wild, but in this alternative wolves would continue to be released until ten breeding pair were documented (estimated 50-60 individuals) in a recovery area. Approximately 15% of the wolves would be removed annually because of illegal killing, natural mortality, and occasional relocation of wolves to resolve chronic livestock conflicts. Recovery would proceed rapidly (average about 52% annually), because of low wolf mortality and persistent reintroduction in a variety of high quality habitats including some outside of Yellowstone National Park and Wilderness areas in central Idaho. Recovery in central Idaho and the Yellowstone areas would be achieved by about 2000, and would likely accelerate recovery in Montana so that wolf recovery populations goals for all three recovery areas would be reached by about 2000. This scenario is intended to be a representation of this alternative rather than a prediction of the exact impact of its implementation.

Table 2-4
Estimated wolf population growth under implementation of the
Reintroduction Non-experimental Wolf Alternative. [a]

	1994	1995	1996	1997	1998	1999	2000
No. reintroduced	10	10	10	10	10	0	0
Surviving wolves	0	9	17	31	47	70	94
Pups born	0	0	10	15	25	40	60
15% mortality	1	2	6	9	12	16	23
Total	9	17	31	47	70	94	131
Packs	0	0	2-4	5-7	7-10	10-14	14-18
Area occupied 100 mi^2	0	0	9	18	30	36	44

[a] Virtually no control for livestock damage.

How does this alternative address the major issues and concerns of the public?

1. *How will depredations on domestic animals be controlled?*

   Wolves would not be controlled unless they presented a clear danger to human life or safety. In rare instances where wolves were repeatedly depredating on domestic animals or caused other conflicts with people on private land, wolves would be moved if other methods to resolve the problem were unsuccessful.

2. *How will livestock producers be compensated for losses?*

   There would be no federal or state compensation program. A private fund may continue to compensate for livestock losses caused by wolves.

3. *How will potential impacts on big game populations be managed?*

   Wolves would not be killed or moved if they were affecting state ungulate management goals. Important ungulate habitat would be acquired through purchase and easement agreements using federal funds and through cooperation with state and other federal agencies. Conflicts with wolves would be minimized by emphasizing protection of important ungulate winter ranges on private land. These areas wold be identified, prioritized, and purchased with federal funds from willing sellers. State ungulate management guidelines (road density, cover requirements, restrictions in important seasonal habitats, calving areas, winter ranges, etc.) would be encouraged to be fully incorporated into USDA Forest Service and BLM land management plans.

4. *Who will manage wolves?*

   The FWS would be solely responsible for implementing this alternative, but other federal agencies would be expected to aggressively pursue their Section 7(a)(1) responsibilities to use their authorities by carrying out programs for the conservation of listed species. States or tribes could participate under cooperative agreements with the FWS.

   Wolves could not be harassed or harmed by the public, except to protect human life or safety. Federal law enforcement capabilities would be increased in Montana, Wyoming, and Idaho to encourage compliance with the ESA and these guidelines.

5. *What kind of land-use restrictions will occur?*

   A wide variety of land-use restrictions would be employed over 35 mi^2 (91 km^2) to protect active wolf dens. Those include: seasonal closures near wolf dens and rendezvous sites, restrictions on livestock grazing in areas frequented by wolves unless the livestock producer-permittee clearly understood that no control would be allowed in the event of depredations, and some year round road closures. The ADC would not use any techniques that could accidently take wolves where they occur or their presence was desirable.

   Improvement of ungulate habitat through increased forage, cover, and security would be pursued to create high quality ungulate habitat. It is estimated that these restrictions would effect up to 35 mi^2 (91 km^2) of USDA Forest Service and BLM lands not currently in Wilderness designation.

6. *Where will wolf populations be recovered?*

   Wolves would be distributed over a broad area in the northern Rocky Mountains. The core wolf population would still probably be centered around the Yellowstone and central Idaho areas. Wolf packs wold likely form on USDA Forest Service, National Park Service, national wildlife refuges, 50% of BLM, and high elevation tribal lands in the 17 counties surrounding Yellowstone National Park (28,600 mi^2; 74,000 km^2). Wolf packs could form on USDA Forest Service and BLM lands in the 10 county area in central Idaho (29,000 mi^2; 75,000 km^2). Wolf packs would also be occasionally located on private lands in the vicinity.

7. *When will wolf populations recover?*

   Wolves would reach ten breeding pairs in the central Idaho and Yellowstone areas within five years. Recovery of wolves (ten breeding pair, for three consecutive years, in all three recovery areas) would likely occur by the year 2000 because this level of wolf reintroduction in Idaho and Yellowstone would also speed up recovery in northwestern Montana.

8. *How much will wolf recovery cost?*

   Implementing this alternative would cost about $1,030,000 per year for reintroductions, increased enforcement, and management, and $3,000,000 per year for ungulate and wolf habitat enhancement. Total program cost to reach gray wolf population recovery (estimated seven years) would be $28,209,750 (Appendix 5).

9. *Are changes in current state and federal law required?*

No. Wolves would remain classified as endangered species under the federal Endangered Species Act. It is unknown if the states' classification of wolves would change, but because federal law supersedes state law, wolves would remain fully protected.

A Summary and Comparison of the Impacts of These Alternatives and Identification of the Fish and Wildlife Service Proposed Alternative

This section briefly describes the five alternatives that were considered in detail and compares them in terms of how well each one meets the FWS's recovery goal and public concerns. Tables 2-5 through 2-8 summarize the general impact of a recovered wolf population (100 wolves), under each alternative on big game, hunter harvest, domestic animals, land-use restrictions, visitor use, and economics. Fore a more detailed analysis of the alternatives and associated effects, please see Chapter 4, Environmental Consequences.

Table 2-5
Alternatives and expected actions associated with them.

Alternatives	Control of livestock losses	Compensation for losses	Control of big game predation	Management of wolves	Land-use restrictions for wolves	Where wolves would be recovered	Date of wolf recovery	Wolf mgmt. cost until recovery [a]	Legislation needed to implement
Reintroduction of Experimental Population (Proposal)	Agencies move/kill wolves for killing livestock/pets. Public harass and control under some conditions	Probably private funds	Wolves moved if problem documented. Encourage land agencies to enhance ungulate habitat	By states and tribes with federal oversight of state plans	Up to 16 $mi.^2$ for 4 or fewer packs, none after 6 packs are established	YNP 17,6000 $mi.^2$ ID 20,7000 $mi.^2$	YNP & ID 2002	$6,757,750	Publish experimental rule in federal register. Some states laws would have to be changed to allow state management
Natural Recovery	Agencies move wolves for livestock depredations	Probably private funds	None	Federal	1 mi. around dens 35 $mi.^2$ affected. More possible	YNP 23,300 $mi.^2$ ID 23,900 $mi.^2$	YNP 2025 ID 2012	$10,000,000-$15,000,000	None
No Wolf	All wolves killed	None	All wolves killed	None for recovery by agencies	None for wolves	Nowhere	Never	$100,000	Modify state (MT & ID) and federal laws
Wolf Management Committee	Agencies move/kill wolves. Public kill wolves for harassing and attacking livestock/pets/working animals	Compensation by federal trust	Wolves moved, habitat enhanced, increased ungulate monitoring	By states. No federal oversight	1 mi. around dens 35 $mi.^2$ affected	YNP 12,070 $mi.^2$ ID 9,450 $mi.^2$	YNP 2010 ID 2015	$100,000,000-$129,000,000	Modify state and federal laws
Reintroduction of Nonexperimental Wolves	Agencies move wolves only in chronic problem areas on private land	Probably private funds	Habitat enhanced	Federal	1 mi. around dens 35 $mi.^2$ affected. Some roads may be closed	YNP 29,130 $mi.^2$ ID 29,530 $mi.^2$	YNP & ID 2000	$28,209,750	None

[a] See Appendix 5 on how cost estimates were determined

Table 2-6
Expected impacts of recovered wolf population (100 wolves) by alternative
Yellowstone area

Alternatives Impacts	Reintroduction of Experimental Population (Proposal)	Natural Recovery (No Action)	No Wolf	Wolf Management Committee	Reintroduction of Nonexperimental Population
Impact on big game populations	Elk 5%-20% reduction, mule deer 10% reduction, bison 5%-10% reduction, others no effect. Effects over Yellowstone area	Same as Experimental but will occur several decades later. Short term negative effect to 30% possible	None in Yellowstone area	Similar to Experimental population with effects confined mostly to YNP and wilderness areas	Slightly higher than Experimental but wolves recover sooner
Effects on hunter harvest	Reduced antlerless harvest 8% (range 2%-30%), no effect on antlered harvest over Yellowstone area	Same as Experimental but will occur several decades later. Short term 30% possible	None in Yellowstone area	Similar to Experimental population with effects confined mostly to YNP and wilderness areas	Slightly greater than Experimental (15%) but wolves recovery by 2000
Livestock depredations	Annual average 19 (range 3-32) cattle, average 68 (range 38-110) sheep	A few (10%) more over longer period (20 years). Losses on private land more likely	None in Yellowstone area	Losses likely toward lower range (3 cattle & 38 sheep) of that projected for experimental population	Losses likely from upper range (32 cattle & 100 sheep) of projected to several times that level
Land-use restrictions	Up to 16 mi.^{2} for 5 or fewer packs, none after 6 or more packs established	Reduce human activity one mile around active wolf dens. 35 mi.^{2} more possible road closures, etc.	None in Yellowstone area	Reduce human activity one mile around active wolf dens. 35 mi.^{2} more possible road closures, etc	One mile around active wolf dens. If wolves illegally killed may include road closures, removal of livestock, and limits on activities on public lands
Visitor use	Probable 5% increase in nonresident and 10% increase in local visitation	Probably 5%-10% increase by 2025, after wolves become established	None in Yellowstone area	Probable increase (5%-10%) in visitation	Probable increase (5%-105) in visitation
Economic effects	Decreased hunter benefits $187,000-$465,000/year. Decreased hunter expenditures $207,000-$414,000/year. Livestock losses $1,888-$30,470/year Visitor expenditures increase $23,000,000/year Wolf existence value positive $8,3000,000/year Wolf management cost $480,000/year	Decreased hunter benefits $59,000-$147,000/year. Livestock losses $600-$9,700/year. Visitor expenditures increase $1.73-$2.56 million/year. Wolf management costs $250,000/year	Total cost of about $50,000 to change federal and some state laws	Costs to hunters and livestock losses slightly higher and benefits similar to experimental population alternative. wolf management cost $2.7 million/year	Costs to hunters and livestock losses slightly higher and benefits similar to experimental population alternative. wolf management cost $2.7 million/year

Table 2-7
Expected impacts of recovered wolf population (100 wolves) by alternative
central Idaho area

Alternatives Impacts	Reintroduction of Experimental Population (Proposal)	Natural Recovery (No Action)	No Wolf	Wolf Management Committee	Reintroduction of Nonexperimental Population
Impact on big game populations	Elk 5%-10% reduction, others no effect in central Idaho area by 2002	Same as Experimental but will occur a decade later. Bighorn sheep could decrease temporarily	No new in central Idaho	Similar to experimental population with effects confined mostly in wilderness areas and later (2015)	Slightly higher than Experimental but wolves recovery sooner. Bighorn sheep may be temporarily decreased
Effects on hunter harvest	Reduced antlerless harvest (elk only) 10%-15%, no effect on antlered harvest in central Idaho area.	Same as Experimental but will occur a decade later. Some bighorn sheep could be affected	No new in central Idaho	Similar to experimental population with effects confined mostly to wilderness areas and later	Slightly greater than Experimental (15%) during recovery but wolves recover by 2000
Livestock depredations	Annual average 10 (range 1-19) cattle, average 57 (range 32-92) sheep	A few more (12 cattle, 60 sheep) over a longer period (30 years). Losses on private land more likely	No new in central Idaho	Losses likely toward lower range (8 cattle, 40 sheep) of that projected for experimental population	Losses likely from upper range (14 cattle, 70 sheep) of projected to several times that level
Land-use restrictions	Up to 16 $mi.^2$ for 5 or fewer packs, none after 6 or more packs established	One mile around active wolf dens. 35 $mi.^2$ impacted. More possible road closures, etc	No new in central Idaho	One mile around active wolf dens 35 $mi.^2$ impacted	One mile around active wolf dens. If wolves illegally killed may include road closures, removal of livestock, and limits on activities on public lands
Visitor use	Probable 2% increase likely	Probable 2% increase likely by 2012	No new in central Idaho	Probable 2% increase	Probable 2% increase
Economic effects	Decreased hunter benefits $757,000-$1,135,000/year. Decreased hunter expenditures $572,000-$857,000/year. Livestock losses $2,923-$18,503/year Increased Visitor expenditures likely Wolf existence value positive $8,400,000/year Wolf management cost $480,000/year	Decreased hunter benefits $504,000-$756,000/year. Livestock losses $1,900-$12,300/year. Visitor expenditures increase $4.26-$6.32 million/year. Wolf management costs $250,000/year	Total cost of about $50,000 to change federal and some state laws	Costs to hunters and livestock losses slightly higher and benefits similar to experimental population alternative. wolf management cost $3.22 million/year	Costs to hunters and livestock losses slightly higher and benefits similar to experimental population alternative. wolf management cost $2.7 million/year

Table 2-8
Expected impacts of alternatives
northwestern Montana

Alternative Impact	Reintroduction of Experimental Population (Proposal)	Natural Recovery (No Action)	No Wolf	Wolf Management Committee	Reintroduction of Nonexperimental Population
Impact on big game population	Wolves would not cause any new impacts in northwestern Montana under this alternative	Wolves would not cause any new impacts in northwestern Montana under this alternative	Fewer ungulates, primarily white-tailed deer, killed annually by wolves	Slightly less chance of wolves could significantly impact ungulate populations compared to experimental population alternative	Wolves would not cause any new impacts in northwestern Montana under this alternative
Effects on hunter harvest	Wolves would not cause any new impacts in northwestern Montana under this alternative	Wolves would not cause any new impacts in northwestern Montana under this alternative	Hunter harvest of female ungulates increased slightly	Slightly less chance that wolves could impact hunting of female ungulates compared to experimental population alternative	Wolves would not cause any new impacts in northwestern Montana under this alternative
Livestock depredation	Wolves would not cause any new impacts in northwestern Montana under this alternative	Wolves would not cause any new impacts in northwestern Montana under this alternative	Fewer cattle and fewer sheep killed or maimed by wolves	Slightly fewer livestock (average 3 cattle, 2 sheep/year) would be killed by wolves	Wolves would not cause any new impacts in northwestern Montana under this alternative
Land-use restrictions	Wolves would not cause any new impacts in northwestern Montana under this alternative	Wolves would not cause any new impacts in northwestern Montana under this alternative	Up to 35 mi2 of habitat in public land would not be potentially affected by seasonal restrictions to protect active wolf dens	Wolves would not cause any new impacts in northwestern Montana under this alternative	Wolves would not cause any new impacts in northwestern Montana under this alternative
Visitor use	Wolves would not cause any new impacts in northwestern Montana under this alternative	Wolves would not cause any new impacts in northwestern Montana under this alternative	Visitations to northwestern Montana may decrease from current projections	Slight potential decrease in visitation	Wolves would not cause any new impacts in northwestern Montana under this alternative
Economic effect	Wolves would not cause any new impacts in northwestern Montana under this alternative	Wolves would not cause any new impacts in northwestern Montana under this alternative	Fewer livestock would be lost to wolf depredation. More hunter dollars would be spent hunting female ungulates. Fewer visitor dollars will be spend	Slightly fewer livestock loses. Slightly less chance of reduced hunter expenditures. Slightly decrease in visitor expenditures	Wolves would not cause any new impacts in northwestern Montana under this alternative

[a] Two of the alternatives (No Wolf and Wolf Management Committee) might impact the naturally occurring wolf population in northwestern Montana. Three alternatives (Reintroduction of Experimental Populations, Natural Recovery, and Reintroduction of Nonexperimental Populations) will have no significant effect on the naturally recolonizing wolf populations in northwestern Montana

Chapter III
Affected Environment

Yellowstone: The Region

The areas is centered around Yellowstone and Grand Teton National Parks, in northwestern Wyoming, southwestern Montana, and eastern Idaho. The area is often described generally as the Greater Yellowstone Area (GYA), which include all or parts of six national forests. Gallatin to the west and north of Yellowstone National Park, Custer to the northeast, Shoshone to the east and southeast, Bridger-Teton to the south, Targhee to the southwest and west, and Beaverhead to the west. Portions of the Caribou National Forest, administered by the Targhee to the southwest, are also sometimes included in deliberations relating to management of Greater Yellowstone. Table 3-59 summarizes the Yellowstone area information.

Access

The region is served by a wide variety of federal, state, and local road systems. Five main travel corridors approach Yellowstone National Park, from the north, northeast, east, south, and west. The six national forest, two national parks, and two national wildlife refuges have a total of 4,384 miles (7,054 km) of existing open roads, 2,313 miles (3,722 km) of motorized trails, and 4,644 miles (7,472 km) of horse and foot trails (GYCC 1987).

Human Population

The broadest definition of the GYA currently in use (Glick et al. 1991), which includes about 18 million acres (72,900 km^2) of federal, state, Native American, and private lands, contains a population of 220,000 people in all or parts of 20 counties. Population growth is rapid, estimated at an additional 150,000 people by the year 2010. Besides permanent residents, an additional 10 million recreational visits are recorded in the area annually.

Major Communities

The GYA contains many small communities – villages, crossroads, and limited developments – throughout, and a few larger communities on the edge. Yellowstone National Park contains developments of several sizes, ranging from the Old Faithful area, with more than 400 structures, to small outlying campgrounds (such as Pebble Creek or Lewis Lake) that contain a small number of campsites and other permanent facilities. Grand Teton National Park similarly contains several developments related to visitor use of the park, including Moose, Moran Junction, Colter Bay, and Jackson Lake.

Yellowstone National Park is immediately bordered by small communities – Gardiner, Montana at the North Entrance, Silver Gate and Cooke City, Montana, at the Northeast Entrance, and West Yellowstone, Montana at the West Entrance – and is also served by smaller developments, Pahaska and Flagg Ranch (Wyoming), near the east and south entrances, respectively.

Large communities are located on the edges of the GYA: including Bozeman, Montana (30,000 residents) to the northwest of Yellowstone National Park; Livingston, Montana (7,000) to the north; Red Lodge, Montana (2,000) to the northeast; Cody, Wyoming (8,000) to the east; Lander, Wyoming (8,000) to the southeast; and Jackson, Wyoming (6,000) to the south.

Landscape

The Yellowstone Plateau is a geologically young region sitting astride the Continental Divide. Because of repeated eruptions of its 40-by-25-mile caldera, as well as countless smaller volcanic events and extended periods of glaciation, the landscape is characterized by steep, rapidly eroding mountain ranges, most of which trend north and south.

The Gallatin and Absaroka Mountain Ranges dominate the north central portion of the GYA on the west and east sides of the Yellowstone River Valley, respectively. The Gallatin Range, a combination of volcanic and sedimentary formations, extends southward from near Bozeman, Montana, through Gallatin National Forest and into the northwestern portion of Yellowstone National Park, while the Absaroka Range, a result of numerous widespread volcanic episodes, extends southward along the eastern side of Yellowstone.

East of the Absaroka Range, and northeast of Yellowstone, the Beartooth Plateau in Custer National Forest, contains some of the west's most spectacular scenery. West of Yellowstone Park, the Madison Range parallels the Gallatin Range, while the Centennial Range, partly in Beaverhead National Forest, forms an east-west portion of the Idaho-Montana border.

Southeast of Yellowstone National Park, the Wind River Range extends from Shoshone National Forest into the Wind River Indian Reservation. Directly south of Yellowstone, the dramatic fault-block formation of the Teton Range forms the western side of Grand Teton National Park.

Watersheds

The Continental Divide crosses Yellowstone National Park diagonally, from a few miles south of West Yellowstone, Montana to the southeast corner of the park near the Thorofare region. North and east of the Divide, numerous streams flow from the park areas into the Missouri River drainage. Preeminent among these is the Yellowstone River, which heads just southeast of the pack, then flows north and northwest through the park, then north into Montana and northeast in the North Dakota border, where it joins the Missouri River.

The Madison River, formed by the geothermal influenced currents of the Gibbon and Firehole Rivers, flows west from the park, then north to Three Forks, Montana, where it meets the Jefferson, coming in from the west, and the Gallatin, which rises in the Gallatin Mountain Range in northwestern Yellowstone National Park. The three form the Missouri River.

Streams flowing from the south and west parts of the park eventually join the snake River, which begins just south of Yellowstone National Park in Bridger-Teton National Forest, flows into the park, and trends generally south through Grand Teton National Park. The Snake River eventually flows west and north to join the Columbia.

Climate

The climate of Yellowstone National Park, and most of the mountainous national forests, features long, cold winters, and short, cool summers. Mean monthly temperatures at Lake Station, near the center of Yellowstone, average 32.3^{o}F (0^{o}C). Mean monthly temperatures at Jackson, near the southern end of Grand Teton National Park, average 36.8^{o}F (2.5^{o}C). Record high temperatures near Yellowstone and Grand Teton National Parks are 103^{o}F (39.5^{o}C) at Gardiner, Montana, in 1960 and 101^{o}F (38.2^{o}C) at Jackson, Wyoming, in 1934. Record lows for the parks are –66^{o}F (-54^{o}C) at West Yellowstone, Montana, and –63^{o}F (-52.8^{o}C) at Moran, Wyoming, both in 1933 (Dirks and Martner 1982).

Precipitation is least near the North Entrance of Yellowstone National Park (10 to 12 inches; 25 to 30 cm) (Despain 1987, Dirks and Martner 1982). Between 75% and 85% of precipitation in the mountainous regions of Yellowstone National Park falls as snow. In the interior plateau regions of Yellowstone National Park, 35% to 55% of precipitation falls as rain (Despain 1987).

Vegetation

Because of its great variations in elevation, soils, and climate, the region in and around Yellowstone is something of a botanical crossroads, with at least seven “distinct floras” present (Despain 19990, Glick et al. 1991), ranging from desert to alpine. About 1,700 species of plants have been identified in the region, but most of the landscape is dominated by only a few species.

Roughly 60% of the federal lands in Greater Yellowstone is covered by forest, and the majority of that area, especially in the elevations between 7,500 fee (2,300 m) and 9,000 feet (2,700 m), is dominated by lodgepole pine. Most lower elevation forests are dominated by Douglas-fir, juniper, or aspen, while whitebark pin, Englemann spruce, and subalpine fir are the most common species about 9,000 feet (2,700 m), and the upper timberline occurs around 9,500 feet (2,900 m).

Below lower timberline, between 6,000 feet (1,800m) and 7,000 feet (2,100 m) depending upon conditions, grasslands and shrub steppes were the native vegetation communities in river valleys, floodplains, and terraces, though many plants’ distributions have been changed by cultivation.

A much smaller set of vegetation communities occur in riparian areas bordering both moving and still waters. These communities are of extreme importance in the ecological setting because they provide high productivity, high biomass, diversity of life forms, and essential cover and erosion protection. Because of its unusual geological character, Yellowstone supports some extremely rare plant communities, perhaps most notably those in and near the park’s thermal areas.

Wildlife

The Yellowstone area hosts the largest aggregation of ungulates and other large mammals in the lower 48 states. In the primary analysis area for this EIS, there are an estimated 56,100 elk, 29,500 deer, 5,800 moose, 3,900 bighorn sheep, and 3,600 bison (see Chapter 3, Ungulate Populations and Hunter Harvest). This includes herds immediately adjacent to, or associated with, summer and winter ranges in Yellowstone National Park. The Greater Yellowstone Coordinating Committee (1987), providing total wildlife numbers for the large GYA, reported more than 93,000 elk, 87,000 mule deer, 7,000 bighorn sheep, 6,000 moose, 3,000 bison, and smaller numbers of mountain goats and white-tailed deer for this larger area (GYCC 1987). The park is summer range for 8 elk herds with a population of 37,800 (Singer 1991b).

Large predators include more than 3,00 black bears, a minimum of 282 grizzly bears, and a smaller number of mountain lions (GYCC 1987). Coyotes are abundant, and fox are common in some areas. Wolverines, bobcats, and lynx are uncommon.

Although ungulates, especially elk, are expected to comprise most of the diet of wolves if they are reintroduced in the Yellowstone area, small mammals can play a key role in wolf survival. Yellowstone’s Northern Range hosts large populations of marmots, ground squirrels, voles, and pocket gophers (Crabtree 1992). The availability of these prey can be especially important to wolves during pup-rearing, when adult wolves are more restricted in their movements.

Fishery Resources

Though other fish species have been introduced into a few waters in the region, about 22 species are now common in Greater Yellowstone waters. Of these, 15 are native (Glick et al. 1991, Varley and Schullery 1983). The most common sportfish is the cutthroat trout, including Yellowstone cutthroat trout, the westslope cutthroat trout, and the fine-spotted Snake River cutthroat trout. The Kendall Warm Springs dace is the only endangered fish species in Greater Yellowstone, through several other fish, including the fluvial Arctic grayling, are of special concern regionally or locally.

Wolf

Historical Distribution, Extirpation, and Sightings. – Wolves are native to Yellowstone and central Idaho (Young 1944, Schullery and Whittlesey 1992). From about 1860 to the mid-1930s, a series of events resulted in the eradication of wolves from the western United States (U.S.) and southern Canadian Provinces. These events included trapping of wolves for their pelts, elimination of bison, trapping and poisoning of wolves by “wolfers,” drastic reduction of native ungulate populations by settlers and market hunters, introduction of domestic livestock, and finally, predator control by the federal government (Young and Goldman 1944, Curnow 1969, Lopez 1978, Weaver 1978). By 1925, it was unlikely that a viable population of wolves existed anywhere in Montana (Day 1981). A similar progression of events occurred in states adjacent to Montana. The last known wolf control actions in Wyoming were near Lusk (in eastern Wyoming) and in the Upper Gros Ventre River (near the western Wyoming border) in 1923 (Aulerich 1964).

In the 1950s, wolves were drastically controlled over most of Albert, which virtually eliminated wolf immigration into Montana or Idaho. In western states, carcasses were poisoned for predators using strychnine until the mid-1950s or Compound 1080 until 1972. During this period in Idaho, Montana, and Wyoming, wolf reports were rare and scattered, with sightings comprising only one or two wolves and occasional reports of howls or tracks.

In the 1960s, the Canadian government allowed wolf populations to increase in southeastern British Columbia by temporarily reducing wolf hunting and trapping seasons. Wolf reports in Idaho, Montana, and Yellowstone National Park increased, especially in the late 1960s and early 1970s. This increase was probably due to both an increase in wolves as federal pressures on wolves decreased and an increase in backcountry use by the public (Kaminski and Hansen 1984).

Montana – Between 1968 and 1973 sporadic wolf sightings, tracks, and howls were reported primarily in southwestern Montana in the Beaverhead-Madison area, suggesting groups of one or two animals were present (Flath 1979). In 1973, Montana changed the wolf’s status from predator to endangered species.

From 1974 to 1977, wolf observations were analyzed and field surveys conducted in western Montana (Day 1981, Ream and Mattson 1982). During this period, patterns of increase observations centered around the Beaverhead National Forest of southwestern Montana and in northern Montana adjacent to British Columbia and Alberta. In both regions, observations, tracks, and howling generally indicated single wolves or occasional pairs. Based upon these reports, Day (1991) estimated that wolves occurred in portions of northwestern Montana (one or two in northeast Glacier area, one in northwest Glacier area, one or two in the Kootenai area, one in the Thompson River area, three or four in the Highway 2-Badger Creek area, four or five in the Bob Marshall Scapegoat area) and southwestern Montana (one in the Bighole-Pioneer area, four or five in the Sheep Creek area, and two in the Gravelly area).

Possible dens were reported in both the Beaverhead National Forest (with three pups) in 1974, and in the Gravelly Range south of Ennis in 1975. However, wolf reports in subsequent years in southwestern Montana became increasingly scattered and group size steadily declined. Most sightings (90%) became limited to single animals or pairs (Day 1981).

In northwestern Montana, from the Rocky Mountain from to the Kootenai area, reports of sightings, tracks and howling suggested mostly lone wolves. These reports included a wolf killed in the Sun River drainage in 1974 and a wolf trapped in the Kootenai area in 1972 (Day 1981).

In 1976 and 1977, frequent reports came from the Badger Creek area along Highway 2, near Glacier National Park. Although production of pups was suspected by several observers (Day 1981), the frequency of reports in this area and along the Rocky Mountain front dropped precipitously through 1979.

In 1979, a lone wolf was discovered in the North Fork of the Flathead River in Canada, immediately north of Glacier National Park. That wolf was radio collared and closely monitored until June 1980 but no sign of other wolves was located. However, in 1982 a pack was located.

In the early 1980s, wolves began to recolonize the Flathead River drainage in British Columbia, adjoining Glacier National park (Ream et al. 1991). The first denning of wolves documented in the western U.S. in over 50 years occurred when this group, the “Magic pack,” denned in Glacier National park in the spring of 1986. By 1988, the recolonizing population expanded to four packs in northwestern Montana.

From 1986 to 1992, or seven years after the first litter was produced in Montana, the wolf population had increase to approximately 44 wolves (average rate of increase of 1.22 annually) in and adjacent to Montana. In fall 1993, about 65 wolves were living in Montana. The average pack contained about ten wolves and occupied an average territory of 300 mi^2 (777 km^2). Each pack normally produced a single litter averaging about five pups. Of 44 wolves known to have died, at least 77% were killed by people. A minimum of 20% of the population was lost annually. Wolves that naturally dispersed into Montana tended to select lower elevation habitats, and consequently, some conflicts with people have occurred. Of four wolf packs that established territories outside the Glacier National Park area, three depredated on livestock. Two of these packs were eliminated by control actions. Control caused 52% of known losses to the wolf population in Montana or 6% of the population annually. Disease was suspected as the greatest cause of natural mortality (primarily pups). Fifteen marked wolves dispersed, primarily northward, toward existing wolf populations in Canada. Another 40 unmarked wolves are unaccounted for; some probably dispersed and others were likely killed by people but not reported.

Idaho – From the late 1920s through the early 1970s, wolf reports persisted. These consisted mostly of single animals or small groups in the central Idaho area. Occasionally individual wolves were killed (Kaminski and Hansen 1984). From 1972 to 1979, reported centered in the Boise National Forest in south central Idaho and the Clearwater National Forest in north central Idaho. Increased field study in Idaho during 1983 and 1984 produced evidence of only one to four lone wolves. These were believed to be dispersing animals from Canada (Kaminski and Hansen 1984, Hansen 1986).

Wyoming – Prior to the 1880s, wolves were present throughout the GYS (Schullery and Whittlesey 1992). Poisoning of ungulate carcasses in the Yellowstone area began as early as 1877. Single wolves and small groups of wolves were recorded between 1881 and 1908, and apparently increased about 1912. During 1914-1926 a minimum of 136 wolves were killed in the park. The last known den was destroyed in 1923 near Tower Fall (Weaver 1978).

Reports of wolves, or wolf-like canids continued in the park after the period of intensive control. From 1927 to 1966, reports were few in numbers, scattered over time and area, and consisted of lone individuals or small groups. Cole (1971) suggested that from 1969 to 1971, possibly two pairs of wolves produced young. During this period, observations of wolves, tracks, and howling increased. However, reports after this period decrease significantly; bait stations with compound 1080 for coyotes were maintained outside the park in Wyoming and Idaho and the wolf was not protected in these states.

Reports of single wolves and pairs persisted sporadically through the 1970s. During extensive field surveys conducted from 1975 to 1977, only two sets of tracks and one howl, all east of the park, were recorded that may have been wolves (Weaver 1978). From 1977 to 1986, 11 (of 106 total) wolf observations considered reliable were reported from widely separated areas of the park. These observations consisted of scattered sightings, tracks, or howls involving individuals, and in one observation, of two animals. No breeding, indication of persistent use, or pack formation was noted during this period (Meagher 1986).

Present Status – Wolf observation reports from state and federal employees in the field and from the public play a major role in detecting wolves within an area, and determining if pack formation and breeding activity is likely. Although wolves are often elusive, they are also highly social and depend strongly on pack cohesion and territoriality (Mech 1970). Therefore, as breeding pairs form and territories are developed, observations of wolves, tracks, and howling increase significantly within the pair's territory. Initially, observations may be of small groups, but as packs become established the groups observed will noticeably increase. Because wolves repeatedly use areas within their territory, it is extremely likely that sightings of groups, tracks, scats, howls, and other sign will be reported repeatedly within the local area and throughout the year. This is especially true because public interest in wolves has increased and a reporting system has been developed by the FWS (USFWS 1991 Annual Report). When a number of public reports are received from a given area, field surveys are conducted in the area to determine if a pack or breeding activity is present (see Appendix 12).

Montana – The wolf population in Montana has continued to expand. Six packs or breeding pairs currently exist, including one pack on the eastern Rocky Mountain front. An estimated population of 65 wolves lives in northwestern Montana (USFWS 1992).

At least four litters (minimum of 21 pups) were produced in northwestern Montana in 1990 (USFWS 1991); and at least two litters with about ten pups were born in 1991. Dispersal of wolves from northwestern Montana to areas near Banff National Park, Alberta, and vice versa, has been documented.

Idaho – Sightings of wolves have been repeatedly reported in Idaho, but breeding has not been confirmed. In 1991, the presence of at least two wolves was confirmed at an elk kill in March in northern Idaho, and a black wolf was found poisoned in the Boise National Forest near the Bear Valley area north of Boise. Although previous evidence suggested possible pack activity in the Bear Valley area, no further evidence has been confirmed (USFWS, unpubl. data). Dispersal of radio-collared wolves from Glacier National Park and Banff National Park into north central Idaho was documented in 1992093. At this time these animals have not formed pairs.

Wyoming – In Yellowstone National Park, reports of wolves, howling, and tracks have been scattered throughout the pack and adjacent areas in the past several years. Almost all reported observations have been of single individuals. There are no known wolf packs or breeding pairs in the GYA. August 8, 1992, a black wolf-like canid was filmed for several minutes in the Hayden Valley. This filming coincided with several reports of a black wolf observed in the areas over the next several weeks.

On September 30, 1992, a male wolf as shot three miles (5 km) south of the park boundary in the Fox Park area of the Teton Wilderness. This was the first wolf killed close to the park since 1926. Although several coyotes were reported running with the wolf prior to its death, extensive field investigations did not reveal evidence of additional wolves. Genetic investigations verified this animals was genetically related to wolves in northwestern Montana.

Social and Cultural Environment and Economy

Population – In 1990 the combined population of Idaho, Montana, and Wyoming was 2.26 million people. (The primary source of data in the population and economy sections is the Bureau of Economic Analysis, Regional Economic Information System, 1991). While the population in the region grew at a rate of about 2.5% in the 1970s, it was nearly constant in the 1980s partly as a result of a decrease in demand for domestic oil and coal (Table 3-1). This region is sparsely populated. There was an average of 6.96 people per square mile (2.69/km^2) in 1990 – compared to 70.3 people per square mile (27.1/km^2) in the U.S. as a whole. About 18% of the population in the three states is age 55 or older, slightly less than in the U.S. as a whole. This component of the population is expected to grow dramatically relative to other age groups in the U.S. as a result of relatively low fertility rates and longer life expectancies (U.S. Department of Commerce, Bureau of Census 1984).

Table 3-1
Population trends in the 3-state region and primary analysis areas: 1970-1990

Area	1970 population	1980 population	1990 population	1990 population per sq. mile	Land area (million acres)
3-state region (Idaho, Mont., Wyo.)	1,748,000	2,212,000	2,260,000	6.96	207.9
17 county Yellowstone area	219,000	270,000	288,000	5.12	36.0
10 county central Idaho area	81,800	96,700	92,400	2.60	22.5

Idaho, Montana, and Wyoming are rich in outdoor recreations opportunities; the region boasts national and international recognition for its national parks, extensive wilderness areas, and high quality hunting, fishing, and wildlife viewing opportunities. Not surprisingly, residents of the region value outdoor recreation highly. In a 1992 study, Duffield et al. (in 1992) found that 79% of Yellowstone area residents (people who live in the 20 counties immediately surrounding Yellowstone National Park) participated in outdoor recreation activities, compared to 69% of people nationwide. Yellowstone area residents had higher rates of participation in fishing (73%, compared to 25%). Percentages reflect the proportion of respondents who said they occasionally or frequently participate in the activity. Not surprisingly, Yellowstone area residents were more likely to have hunted deer, elk, or moose, and were much more likely to have hunted these species in Idaho, Montana, or Wyoming that were residents of the U.S. as a whole. Additionally, Yellowstone area residents also had higher visitation rates to national parks; 84% said they had visited a National Park in the previous two years, compared to 49% of the national sample. Most of this difference was due to frequent trips Yellowstone area residents made to Yellowstone National Park.

Economy – Per capita personal income was $15,475 in 1990. In remained approximately constant in real dollars from the mid-1970s through the 1980s but showed some growth (nearly 55 per year) in 1989 and 1990.

Total personal income in the region was $35 billion in 1990. Farm income and agricultural services accounted for 6% of the total, declining from about 10% in the early 1970s. Livestock accounted for 52% of the value of farm products sold in the region in 1987 (U.S. Department of Commerce, Bureau of the Census, 1992). Local services have consistently generated about 40% of total personal income over the past two decades. Local services include local transportation and utilities, retail trade, finance, insurance, real estate, services, and state, local, and federal civilian government. Other industry accounted for about 24% in 1990, declining from about 30% in the 1970s. (other industry includes forestry, fisheries, mining, construction, manufacturing, other transportation and freight, wholesale trade, and federal government military enterprises). The remaining 30% is income other than earnings. This category, which includes dividends, interest, rent, transfer payments (primarily from retirement programs and medical payments), and an adjustment to wealth from changes in the value of residential housing, has steadily increased in importance over the past two decades from about 20% in the early 1970s to 30% in 1990. This trend reflects the increasing relative importance of “footloose income” (Power 1991) in the regional economy. This income follows people who choose where they want to live based on the perceived “quality of life” and may be positively correlated with such amenity values as the existence of healthy wildlife populations, lack of crime, clean air, etc. Because the age group to whom this income is primarily attached – 55 years of age and older – is expected to grow in relative importance in the population as a whole, this trend should continue.

Tourism is an important "industry" to all three of the states in the region. Visitors from outside the region visit Montana, Idaho, and Wyoming in large numbers, in all season, in order to parks and wilderness areas, ski, float rivers, fish, hunt, and simply enjoy scenery. These visitors spend large amounts of money when they visit the region, and these expenditures, in turn, have a large impact on incomes and employment in the region. As an example, Duffield (1992) found that visitors to Yellowstone National Park who came from outside the 3-state region spent an average of $840 in the region during their trips.

Yellowstone: Ungulate Populations and Hunter Harvest

An Overview of Yellowstone Ungulate Populations and Hunter Harvest

Wild ungulates living in or near Yellowstone National Park during summer and winter occupy about 38,800 mi^2 (100,500 km^2) (Figure 3-1) in the primary analysis area. Elk, deer (primarily mule deer), moose, and bison are predicted to be the primary prey for wolves inhabiting the Yellowstone area (Koth et al. 1990, Vales and Peek 1990, Singer 1991b, Boyce and Gaillard 1992). Bighorn sheep are not predicted to be affected by wolves because of their use of escape terrain (Koth et al. 1990, Boyce and Gaillard 1992). However, some bighorn sheep populations east of Yellowstone National Park may be more vulnerable to wolves where those sheep do not inhabit steep cliffy escape terrain (J. Talbott, pers. commun., Wyoming Game and Fish Dep., Cheyenne). Wolves are not expected to significantly affect pronghorns because pronghorns have a relative low availability compared to other ungulates, they live in close proximity to human habitation near Gardiner, Montana, and they tend to winter in areas with shallow snow depths (Koth et al. 1990, Boyce and Gaillard 1992, Singer 1991b).

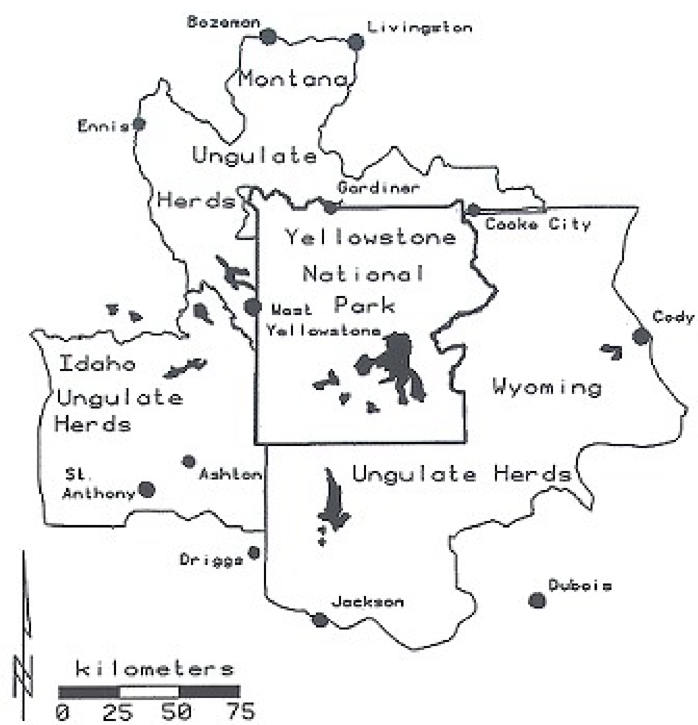


Figure 3-1
Analysis area for wild ungulates living in or near Yellowstone National Park

Ungulate Numbers – approximately 56,100 elk from about ten elk populations, 29,500 deer from about 13 populations, 5,800 moose from 13 populations, 3,600 bison from Yellowstone and Grand Teton National Parks (M.M. Meagher, pers. commun., B. Smith, pers. commun., Natl. Elk Refuge, Jackson, Wyoming), and 3,900 sheep from about 12 populations are estimated to be living in the Yellowstone area (Table 3-2). Singer (1991b) estimated at least 37,800 ungulates summered in Yellowstone National Park, but it is likely many more ungulates summered in the park because mule deer, moose, and bighorn numbers summering in the park may have been significantly underestimated.

Table 3-2
Estimated population numbers and average harvests for big game species in the Yellowstone area[a]

	Elk		Deer		Moose		Bighorn	
State	Population	Mean harvest	Population	Mean harvest	Population	Mean harvest	Population	Mean harvest
Montana	24,800	3,044	12,200	2,564	1,400	93	400	22
Wyoming	26,300	4,281	15,700	1,702	3,600	400	3,500	108
Eastern Idaho	4,200	1,009	1,600	10,21	800	58[b]	0	0
Totals	56,100[c]	8,334	29,500	5,287	5,800	551	3,900	130

[a] Adapted from Mack et al. 1990 and Montana Dept. of Fish, Wildlife and Parks, unpublished data. Bison are not harvested and number about 3,600 in Yellowstone and Grand Teton National Parks.
[b] Average moose harvest from 1983 to 1988
[c] Includes population estimates of 800 elk from the Madison-Firehole herd inside Yellowstone National Park

Hunting Seasons – Hunters have a wide range of opportunities and long time periods to hunt big game in the Yellowstone area. Hunting seasons primarily occur during the fall and early winter. No hunting is allowed in Yellowstone National Park. For detailed descriptions of hunting seasons in Montana, Wyoming, and Idaho within the Yellowstone area, see Mack et al. (1990) or each state's current hunting season regulations.

Archery Seasons – Montana, Wyoming, and Idaho all offered special archery seasons to hunt elk and deer. In Montana, archery season lasted about 1.5 months, beginning the first week in September and closing mid-October. During this time, either-sex elk or deer could be harvested. Wyoming's archery season generally lasted 2-4 weeks, beginning the end of August and closing the end of September. Depending on the hunt area, antlered elk, antlered deer, or either sex deer could be harvested during the archery season. Idaho's archery season lasted 3-4 weeks during the month of September for both elk and deer and either-sex elk or deer could be harvested.

General Rifle Season – The general rifle season for elk and deer in Montana is five weeks long beginning the fourth week in October and ending the fourth week in November. Only antlered elk or deer could be harvested during the general season. East of Yellowstone National Park in Wyoming, the general elk season was about 3-4 weeks long, occurring during October, and antlered elk could be harvested. South of Yellowstone National Park, the general elk season was slightly longer, beginning the second week in September and ending the third or fourth week of October. Primarily, antlered elk could be harvested south of Yellowstone National Park, but some areas had general antlerless or either-sex seasons. Wyoming's general deer season east of Yellowstone National Park was bout 1.5 months long, beginning the first of October and ending mid-November. Primarily, antlered bucks could be harvested east of Yellowstone National Park. South of Yellowstone National Park, either-sex deer could be harvested from mid-September through October. In Idaho, the general elk season was only five days long and usually began during the second week in October. Only antlered elk could be harvested during the general season. Idaho's general deer season was longer than the elk season, beginning in mid-October and ending mid-November. Antlered deer or either-sex deer could be harvested during the general season.

Special Permits – In all three states, special permits were offered to harvest antlerless elk or deer during general season hunts. Special permits also provided for hunting opportunities after the general season. During the 1980s, Montana offered an average of about 1,300 special elk permits (allowing harvest of antlerless or either-sex elk) and an average of 800 special deer permits for antlerless deer harvest during the general season. About 4,00 special permits (primarily for harvesting antlerless elk) were also offered for late season elk hunts lasting from mid-December through January. No late season permits were offered for deer. In Wyoming, special permits for areas east of Yellowstone National Park provide for antlerless elk hunting in November and December (after the general season). South of Yellowstone National Park in Wyoming, an average of nearly 3,000 special either-sex permits were offered with opening dates ranging from 10 September to 25 October and closing dates ranging from 31 October to 15 December. No special deer permits were issued for deer east or south of Yellowstone National Park. In Idaho, between 800 and 1,700 special either-sex or antlerless elk permits (for controlled hunts) were issued for areas southwest of Yellowstone National Park. Seasons lasted from mid-October through December. During the 1980s, no special permits were issued for deer.

A special permit, obtained through a random drawing, was required to hunt moose in Montana, Wyoming, and Idaho. In all three states, permits allowed harvest of antlered moose; however, a smaller number of permits allowed the harvest of antlerless moose. No special archery season was set for hunting moose in Montana or Idaho. Wyoming has a special archery season for moose lasting 2-4 weeks with opening dates as early as mid-august and closing dates the end of September. A general rifle season was set for moose in all three states. Montana's season lasted from mid-September through November. Wyoming's seasons lasted from mid-September to mid-November and Idaho's moose season began around the end of August and ended in mid-November.

Hunters in Montana and Wyoming must also have a special permit, primarily obtained through a random drawing, to kill bighorn sheep. In Montana, all sheep hunting districts bordering Yellowstone National Park had an unlimited number of permits (no drawing), and quotas regulated the harvest. When quotas were reached, the season closed. Seasons opened the first or second week in September and closed the first or last week in November if quotas were not reached. Some additional permits, obtained through a drawing, were also offered primarily in one Montana hunting district with season opening dates during the first week in November and closing dates between the end of November and mid-December.

In Wyoming, season for bighorn sheep east of Yellowstone National Park included a special archery season opening mid-August and closing August 31st. The rifle season during the 1980s opened September 1st and closed October 31st. South of Yellowstone National Park, only one archery season was open for bighorns in 1988 and the season was open during the last two weeks of August. Between 1980 and 1988, rifle season for sheep south of Yellowstone National Park opened September 1st and closed the end of October or mid-November. In Idaho, sheep populations do not exist southwest of Yellowstone National Park within hunting districts 60, 60A, 61, 62, and 62A.

Hunter Harvest – During the 1980s, hunters harvested an average of 8,334 elk/year in the Yellowstone area. An average of 5,287 deer, 551 moose, and 130 bighorn sheep were harvested each year in the Yellowstone area during the 1980s (Table 3-2). Most elk, deer, and moose harvested were males, but in almost every hunting area some females were harvested (Mack et al. 1990). For bighorn sheep, only adult males with a ¾ curl horn were harvested (Mack et al. 1990).

Montana Ungulate Populations

Elk

Distribution – In Montana, three elk management units (EMUs) border the north and northwestern portions of Yellowstone National Park. The Gallatin EMU includes hunting districts 301, 310, and 314 (Figure 3-2). The northern Yellowstone elk herd occupies winter and summer range within Yellowstone

National Park, and is associated with hunting districts 313 and 316 which is part of Montana's Emigrant EMU (Figure 3-2). Elk wintering near the northwestern corner of Yellowstone National Park are associated with the Madison EMU and are found in hunting districts 360, 361, 362, and portions of 310.

It is likely two sub-populations of elk occupy the Gallatin EMU. One sub-population, is know as the Gallatin herd, summers in the northwestern Yellowstone National Park and winters in hunting district 310 and possibly the southern portion of hunting district 301, primarily along the Gallatin River drainage at elevations below 7,000-8,000 feet (2,100-2,450 m).

The second elk sub-population summers in hunting district 314 in the higher elevations of this hunting district along the Gallatin Mountain Range or in the northwestern corner of Yellowstone National Park. These elk winter in the mountainous areas of hunting district 314, west of the Yellowstone River, at elevations between 5,000-7,000 feet (1,500-2,100 m; MDFWP unpubl. data).

Figure 3-2
Montana hunting districts associated with elk and deer populations living in or near Yellowstone National Park

In hunting district 301, most elk winter range is located along the Gallatin Face in the northern portion of the district, south of Bozeman, Montana. Small areas of winter range are also found east of Highway 191 and the Gallatin River along the southwestern portion of the hunting district. It is unknown if elk wintering in this area summer in Yellowstone National Park (MDFWS unpubl. data).

Some elk in the Madison EMU summer in Yellowstone National Park and winter in portions of hunting districts 360, 361, and 362. In hunting district 360, elk primarily winter east of the Madison River in the foothill areas of the Madison Range, generally about 6,000 feet (1,800 m). In hunting district 361, small areas of winter range exist along the western boundary of the district near Yellowstone National Park.

Additional winter range exists along the mountain foothills within one mile (1.6 km) east of state Highway 87. Elk winter range in hunting district 362 is primarily located in the northwestern portion of the hunting district between Highway 287 (east of the Madison River) and the mountain foothills to the east. Additional smaller portions of winter range are found along the southern boundary of hunting district 362 in steep mountainous areas just north of Highway 287 (MDFWP unpubl. data).

The northern Yellowstone elk herd summers in the northern and eastern portions of Yellowstone National park, as far south as Yellowstone Lake, and in high elevation mountain areas north of the park boundary (Houston 1982). These elk winter in what is described as the northern Yellowstone elk winter range which includes about 400 mi^2 (1,000 km^2) from the Lamar Valley in the park west and north to the Dome Mountain Wildlife Management Area outside Yellowstone National Park in hunting district 313 (Figure 3-3). Hunting district 316 is primarily high elevation summer and fall range with most elk likely migrating to the northern winter range in Yellowstone National Park.

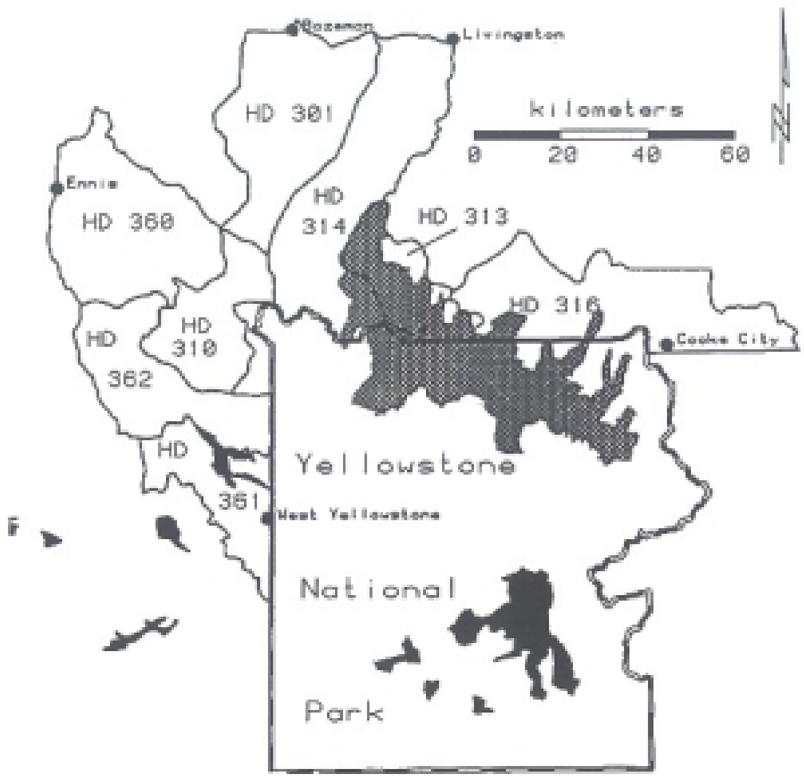


Figure 3-3
The northern Yellowstone elk winter range in portions of Montana and Yellowstone National Park

Populations Numbers – Trend counts have been conducted sporadically for each of the hunting districts within the Gallatin EMU during the 1980s with trend counts notably absent during the late 1980s (Figure 3-4). Trend count totals have increased during the 1980s for hunting district 314 (2,912 elk in 1990) and if early 1980s averages for hunting districts 310 (1,667) and 301 (157) are presumed to reflect minimum population numbers, then the total elk population for the Gallatin EMU is about 4,700 elk (MDFWP unpubl. data).

For the portion of the Madison EMU in our analysis area (hunting districts 360, 361, and 362), trend counts are more complete (Table 3-3). Average elk numbers from 1980 to 1988 were 2,538. The trend since the early 1980s has been stable to slightly increasing in all but hunting district 361.

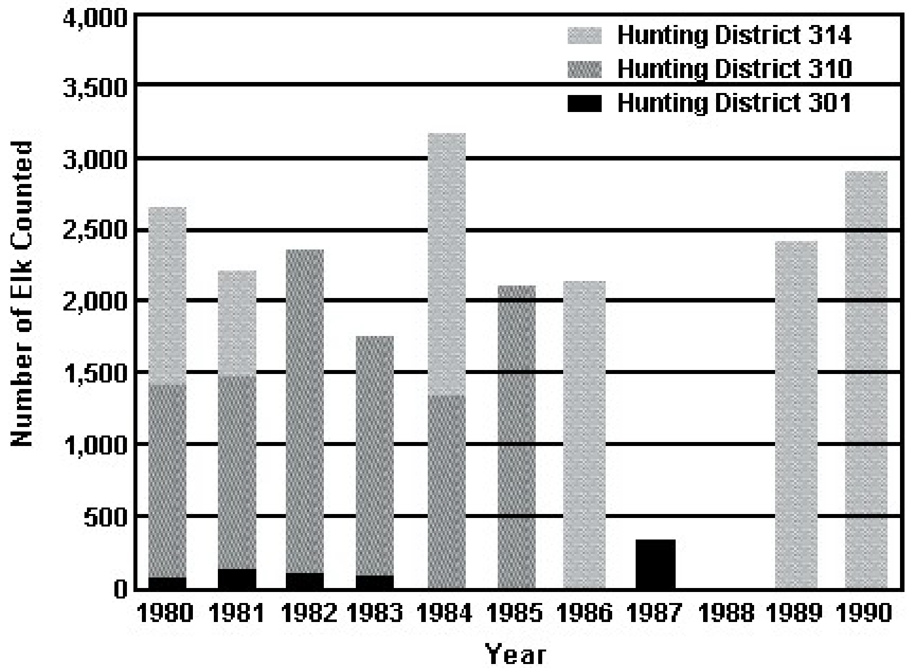


Figure 3-4
Elk trend counts during the 1980s for Montana hunting districts 301, 310, and 314

Table 3-3
Population trend counts for the Madison elk management unit (hunting districts 360, 361, and 362)[a]

	Hunting districts			
Year	360	361[b]	362	Total
1980	624	76	485	1,185
1981	836	129	666	1,631
1982	1,181	155	1,013	2,349
1983	1,559	273	1,481	3,313
1984	1,095	83	1,548	2,726
1985	1,434	425	1,330	3,189
1986	1,447		1,251	2,698
1987	1,287	87	1,157	2,531
1988	1,394	106	1,723	3,223
Mean	1,206	167	1,184	2,538

From 1980 to 1990, trend counts for the northern elk herd have been variable and averaged 15,299 (Mack and singer 1992a, J.A. Mack unpubl. data). POP-II population estimates were developed for this herd and the post-hunting season estimate was about 17,3000 animals in later winter 1990 (Mack and Singer 1992a). Recent trend count data indicates the population has grown, with the 1992-1993 trend count of 17,585 elk (MDFWP and National Park Service unpubl. data) being larger than the POP-II estimate for 1990.

Age-Sex Composition – Age-sex composition data is most complete for hunting district 310 in the Gallatin EMU. From 1980 to 1987, ratios averaged 46 calves/100 cows (range 32-59 calves/100 cows) and 28 bulls/100 cows (range 9-56 bulls/100 cows) prior to the hunting season (1980 data was post-hunting season). Only four years of winter compositions were obtained for hunting district 314 between 1980 and 1990. Winter ratios in hunting district 314 have ranged from 8 bulls/100 cows in 1986 to 16 bulls/100 cows in 1990-1991 and averaged 10 bules/100 cows (MDFWP unpubl. data). Calf/cow ratios have ranged from 28 to 39 claves/100 and averaged 36 claves/100 cows. Composition data were not obtained for hunting district 301.

Composition data were mostly absent in hunting districts 360, 361, and 362 for the Madison EMU. Age-sex compositions were only obtained for all three districts in 1980 and averaged 61 calves/100 cows and 26 bulls/100 cows (MDFWP unpubl. data). Additional composition data for hunting district 361 were obtained in 1983 and 1984. Bull/cow and calf/cow ratios averaged 30% to 40% lower than the 1980 average (MDFWP unpubl. data). Early winter ratios for the northern elk herd (hunting districts 313 and 316) averaged 34 calves/100 cows between 1982-1983 and 1990-1991 and 23 bulls/cows between 1985-1986 and 1990-1991 (Mack and Singer 1992a, F.J. Singer, unpubl. data).

Harvest – From 1980 to 1990, elk harvests for the Gallatin EMU (hunting districts 301, 310, and 314) averaged 573 bulls and 315 antlerless elk during the general season (Table 3-4). Late season hunts occurred in hunting district 310 and averaged 42 bulls and 176 antlerless elk between 1980 and 1990 (MDFWP unpubl. data).

For the Madison EMU, general and late season elk harvest were combined in the yearly statistics for hunting districts 360 and 362. No late season harvest occurred in hunting district 361. Hunters harvested an average of 290 bulls and 347 antlerless elk (excluding 1982 data, Table 3-4).

During the general season from 1980 to 1990, an average 321 bulls and 144 antlerless elk were harvested from the northern elk herd in hunting districts 313 and 316 (Table 3-4). For the Gardiner late hunt, an average of 177 bulls and 815 antlerless elk were harvested (Table 3-4).

Table 3-4
Elk harvest during the general and late season for areas north and northwest of Yellowstone National Park, 1980-1990 [a]

	Gallatin EMU[b]		Madison EMU[c]		Northern Range Herd[d]			
					General Season		Late Hunt	
Year	Antlered[e]	Antlerless	Antlered	Antlerless	Antlered	Antlerless	Antlered	Antlerless
1980	553	224	276	74	200	43	75	58
1981	455	218	328	95	281	63	491	522
1982	698	78			404	43	462	213
1983	638	132	291	202	338	66	396	1,211
1984	550	200	270	301	281	79	173	1,033
1985	524	400	215	345	352	104	126	933
1986	565	587	214	417	494	400	71	772
1987	390	280	274	364	224	135	11	204
1988	788	433	448	671	376	111	48	2,304
1989	603	339	326	366	341	474	39	384
1990	543	573	272	634	240	61	50	634
Mean[f]	573	315	291	347	321	144	177	815

[a] From Montana Dept. of Fish, Wildlife and Parks, unpubl data; and Mack and Singer 1992a.
[b] Gallatin EMU includes hunting districts 301, 310, and 314.
[c] Madison EMU includes hunting districts 360, 361, and 362.
[d] Northern range herd includes hunting districts 313 and 316.
[e] Antlered are antlered males, antlerless are females and young (calves).
[f] Mean for the Madison EMU excludes 1982 harvest because harvest data were absent for hunting district 362 in 1982.

Deer

Distribution – In Montana, mule deer are the primary deer species found in habitat adjacent to Yellowstone. Few white-tails summer in Yellowstone and they rarely winter in the park. White-tail numbers increase with increasing distance from the park boundary and become more numerous along major riparian and river drainages north and northwest of Yellowstone National Park. The primary analysis areas are found north and northwest of Yellowstone National Park (figure 3-2) and include Montana hunting districts 301, 310, 313, 314, 316, 361, and 362. The specific seasonal habitat ranges of deer are not well known for the most of Montana's hunting districts. Foothills and lowland valleys are primarily winter range. Deer likely migrate into higher elevation mountainous terrain as spring and summer progress. It is likely, although not well documented (except for northern range mule deer), that some deer wintering in many of the hunting districts near Yellowstone probably migrate and summer in the high elevation mountains in Yellowstone National Park.

Deer winter ranges in hunting district 301 are generally along the Gallatin River and foothills in the northern portion of the hunting district (Figure 3-5). Very few deer winter in hunting district 310 with deer winter range primarily near U.S. Highway 191 (Figure 3-5). In hunting district 360, mule deer winter on the edge of mountain slopes in the Madison Valley. White-tails primarily winter along the Madison River and a mixture of both species can be found between the river and mountain foothills (Figure 3-5). Winter range distribution of deer in hunting district 362 is similar to that of hunting district 360 with mule deer wintering along the mountain foothills and white-tails wintering along the Madison River (figure 3-5). Hunting district 361 provides very little winter range for mule deer (about 25, MDFWP unpubl. data) and few white-tails winter in the Hebgen Basin area. This area is described as good summer range (MDFWP unpubl. data).

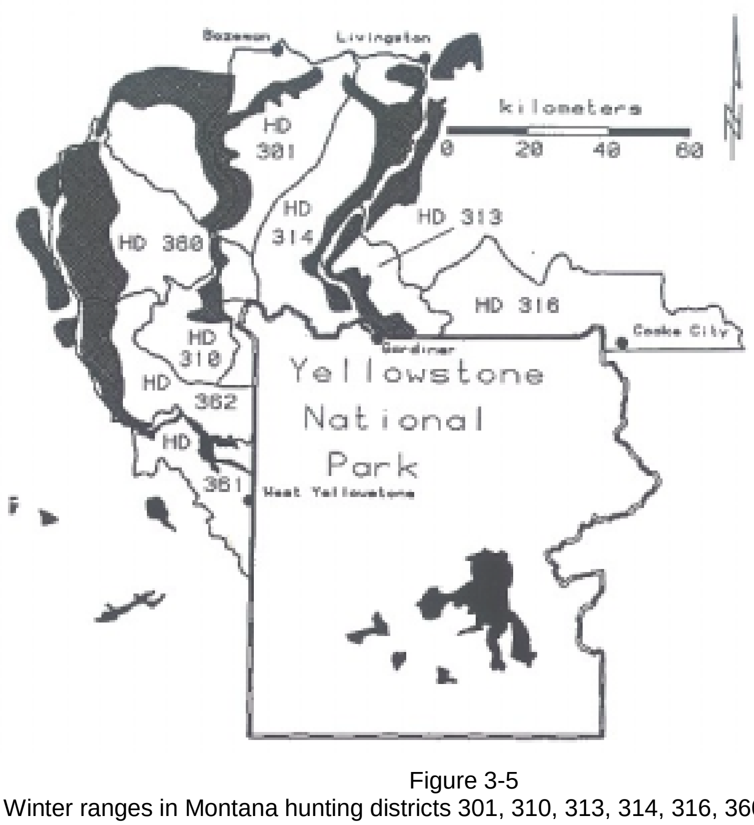


Figure 3-5
Winter ranges in Montana hunting districts 301, 310, 313, 314, 316, 360, 361, and 362.
Shaded areas are winter range.

Hunting districts 313 and 316 contain mostly mule deer and they winter on Yellowstone's northern winter range outside Yellowstone National Park in hunting district 313 (Figure 3-5).

It is unknown if winter range exists in hunting district 316 (MDFWP unpubl. data). Summer and fall ranges include mountains in both hunting districts, and mule deer do migrate and summer throughout the northern Yellowstone National Park area.

It is likely that some of the deer summering in Yellowstone National Park winter in hunting district 314 (probably the southern portion of the district). Winter range is predominantly between the Yellowstone River to the east and mountain foothills to the west (Figure 3-5). Mule deer primarily inhabit this hunting district; some white-tails winter along the Yellowstone River and lower creek bottoms.

Population Numbers – The northern range mule deer population has been increasing and has a 1991-1992 count of 2,544 animals (T. Lemke, MDFWP, unpubl. data, Livingston, Montana). This herd was modeled at about 2,600 deer in 1990 (Mack and Singer 1992a). When using aircraft in mountainous terrain, only 54% to 66% of the mule deer in a population are counted (Mackie et al. 1980, Ackerman 1988), so as many as 4,700 mule deer may have been present in late winter 1991-1992. Complete trend counts have not been conducted for other districts in Montana, north or northwest of Yellowstone National Park (Mack et al. 1990, MDFWP unpubl. data).

Age-Sex Composition – Spring fawn/100 adult ratios for hunting district 314 averaged 46 faws/100 adults from 1979-1980 to 1988-1989 (Mack et al. 1990). Buck/doe ratios have been low for this hunting district. In the mid-1980s, three surveys ranged from 14 bucks/100 does in 1983 to 4 bucks/100 does in 1985 (Mack et al. 1990).

Spring fawn/adult ratios for hunting district 313 averaged 41 fawns/100 adults from 1981-1982 to 1990-1991 (Mack and Singer 1992a, MDFWP unpubl. data). Bucks/100 does data were collected for only seven years between 1979-1980 and 1990-1991 and averaged 11 bucks/100 does (Mack and Singer 1992a, MDFWP unpubl. data). These data also apply to hunting district 316 because deer from this area are considered a part of the population that winters in hunting district 313 (T. Lemke, MDFWP Biologist, pers. commun.).

From 1979-1980 to 1983-1983, the late winter fawn/adult ratio averaged 74 fawns/100 adults in hunting district 360 (MDFWP unpubl. data). Comparisons with other areas are not warranted because the sample size is small and the population status of this herd could have changed considerably since the early 1980s.

Table 3-5
Deer harvest statistics for Montana hunting districts north and northwest of Yellowstone National Park (1980-1988) [a]

		Mean Annual Percent of Harvest[b]		
Hunting district	Mean annual harvest[c]	Antlered	Antlerless	Mean annual % of mule deer in harvest[d]
301	397	83	17	69 (60-78)[e]
310	89	96	4	86 (80-94)
313, 316	554	76	24	91
314	906	74	26	88 (89-100)
360	468	69	31	77 (70-85) [e]
361	46	97	3	90 (81-100)
361[f]	104	63	37	93 (89-100)

[a] From Montana Dept. Fish, Wildlife and Parks, unpubl. data, Mack and Singer 1992a, Mack et al. 1990.
[b] Animals of unknown sex were not included in these numbers.
[c] Harvest statistics are for mule deer and white-tail deer. Data from 1980 to 1988.
[d] Range is in parenthesis.
[e] Data from 1985 to 1991.
[f] New hunting district created in 1982 so data are from 1982 to 1988.

Harvests – Hunters harvest between 46 and 906 deer per year for seven hunting districts north and northwest of Yellowstone National Park (Table 3-5). Males comprise most (63%-97%) of the deer harvest in all hunting districts. Mule deer are the primary species harvested, averaging from 69% to 93% of the harvest (Table 3-5). For hunting districts found closest to Yellowstone National Park, mule deer comprise more than 86% of the harvest.

Moose

Distribution – Several Montana moose hunting districts border northern Yellowstone National Park (Figure 3-6). As with elk and mule deer, we grouped hunting districts according to moose populations and major drainages or geographic areas. Montana's northern range moose herd occupies hunting districts 316, 317, 318, 322, and 328 (Mack and Singer 1992a). The Gallatin River area includes hunting districts 306, 307, and 310. The Madison River drainage minimally includes hunting districts 309 and 361 (Figure 3-6). Hunting district 314 borders Yellowstone National Park and is identified as the Gallatin-northern range area.

Moose associated with the northern range herd primarily winter in drainages associated with the hunting districts such as Pine-Bear Creek, Slough Creek, Soda Butte, Buffalo Creek, and Hellroaring Creek. Moose in the Gallatin River area winter along the Gallatin River and Taylor Fork, Sage, Porcupine, and Buffalo Horn Creeds (MDFPW unpubl. data). For the Madison area, moose winter throughout the Hebgen Lake Valley and Madison River area.

Figure 3-6
Montana hunting districts associated with moose populations living in or near Yellowstone National Park

Population Numbers – From a POP-II population model, Mack and Singer (1992a) estimated the northern range moose population to be about 430 animals. Aerial trend count data are not collected for Montana moose herds bordering Yellowstone National Park (Mack et al. 1990). Surveying moose in timbered habitats can be difficult (Houston 1982) and can greatly underestimate population numbers (Mack and Singer 1992a), so surveys are probably not accurate for this part of Montana.

Age-Sex Composition – Age-sex composition data are not collected for moose in Montana but an index of moose population parameters can be obtained from Montana moose hunter survey reports. In these reports, unduplicated moose sightings are used to determine bull/cow and calf/cow ratios. For the northern range, hunter survey reports averaged 64 bulls/100 cows and 27 claves/100 cows (Mack and Singer 1992a). Swenson (1982) indicated hunter classifications may underestimate calf/cow ratios, so the data presented probably represent minimum productivity.

Harvests – For the northern range moose population, hunter harvest averaged 21 bulls/year, 8 cow/year and 2 calves/year between 1980 and 1989. Total harvest averaged 31 moose/year. Bulls averaged 68% of the total harvest, cow 25% and calves 7% (Table 3-6). From 1980 to 1989, average harvest for the Gallatin population was 31 moose/year. Between 1980 and 1989, bulls averaged 76% of the harvest, cows averaged 17%, and calves averaged 6% (Table 3-6). From 1980 to 1989, moose harvests for the Madison area averaged 36 moose/year. Bulls averaged 80% of the harvest, cows 13% and calves 7% (Table 3-6). Moose harvest averaged 8 moose/year for the Gallatin/Northern Range area. Bulls averaged 89% of the harvest, cows 6%, and calves 5% (Table 3-6).

Table 3-6
Moose harvest from 1980 to 1989 for the Northern Range herd (hunting districts 316, 317, 318, 322, and 328), the Gallatin herd (hunting districts 306, 307, and 310), the Madison herd (hunting districts 309 and 361), and the Gallatin/Northern Range (hunting districts 314). [a]

	Mean annual harvest				Mean annual % of harvest		
Herd	Bulls	Cows	Calves	Total	Bulls	Cows	Calves
Northern Range[b]	21	8	2	31	68	25	7
Gallatin[c]	24	5	2	31	76	17	6
Madison	29	5	2	36	80	13	7
Gallatin/Northern Range	7	1	1	8	89	6	5

[a] Adapted from Mack et al. 1990 and Montana Dept Fish, Wildlife, and Park, unpubl. data.
[b] Data for hunting district 328 was unavailable in 1980 and 1981.
[c] Data for hunting district 307 was unavailable from 1980 through 1983.

Wyoming Ungulate Populations

Elk

Distribution – In Wyoming east of Yellowstone National Park, the analysis area includes hunting areas associated with the Clarks Fork, North Fork Shoshone, and Carter Mountain herds. This area includes hunting areas 50-61 and 121 (Figure 3-7).

All elk from these herd migrate to winter ranges outside the park and as many as 80% migrate into the park during summer (Rudd 1982, Rudd et al. 1983, Mack et al. 1990). The Clarks Fork herd winters along the Clarks Fork River drainage about 25 miles (40 km) northwest of Cody, Wyoming (Figure 3-8). The North Fork Shoshone herd winters along much of the North Fork Shoshone River drainage 12-37 miles (20-60 km) west of Cody, Wyoming. As the name implies, the Carter Mountain herd winters in the Carter Mountain area and along the South Fork Shoshone River 12-37 miles (20-60 km) southwest of Cody, Wyoming (Figure 3-8).

South of Yellowstone National Park, the analysis area includes hunt areas 70-83 (Figure 3-7) which are associated with the relatively small Targhee herd and the larger Jackson herd. Elk from the Targhee herd primarily summer outside Yellowstone National Park and winter along the Idaho-

Wyoming border south of Yellowstone National Park (Mack et al. 1990). About 40% of the Jackson herd summers in and near Yellowstone National Park. During fall these elk migrate south and winter on the National Elk Refuge near Jackson, Wyoming, and in the Gros Ventre River Valley (Mack et al. 1990, Figure 3-8).

Figure 3-7
Wyoming elk hunting areas associated with elk populations living in or near
Yellowstone National Park

Figure 3-8
Winter ranges for several Wyoming elk populations living in or near
Yellowstone National Park

Population Numbers – During the 1980s, elk populations have generally increased for all herds surrounding Yellowstone National Park. Populations east of Yellowstone totaled about 9,700 elk in 1988. South of the park the Jackson herd totaled about 16,000 animals in 1988, while the Targhee herd west of the park was nearly 500 animals (Table 3-7).

Age-Sex Composition – Age-sex composition data was collected from 1980 to 1988 for every elk herd except the Targhee herd (only two years). Calf/cow ratios averaged 40, 42, and 40 calves/100 cows for the Carter Mountain, Clarks Fork and North Fork Shoshone herds, respectively (Mack et al. 1990). The Jackson herd calf/cow ratios averaged 20 calves/100 cows on the National Elk Refuge and Gros Ventre winter ranges during the 1980s. Bull ratios for nearly all the Wyoming herds (except for a portion of the Jackson herd wintering on the National Elk Refuge) were in the low teens or single digits (Mack et al. 1990).

Harvests – From 1980 to 1988, elk harvests east of Yellowstone National Park averaged 661, 509, and 586 for the Clarks Fork, North Fork Shoshone, and Carter Mountain herds, respectively (Table 3-8). The sex of the harvest averaged between 51% and 62% bulls and 38% and 49% antlerless for the three herds (Table 3-8).

For the Jackson herd the annual harvest averaged 2,499 with an average of 58% being bulls and 42% antlerless. Harvests for the Targhee herd were nearly all bulls and averaged 55/year during the 1980s (Table 3-8).

Table 3-7
POP-II winter population estimates for five Wyoming elk herds adjacent to Yellowstone National Park [a]

Population Estimate					
Year	Clarks Fork	North Fork Shoshone	Carter Mountain [b]	Jackson	Targhee
1980-1981	2,500				170
1981-1982	2,600	1,800	2,000	15,533	170
1982-1983	2,600	1,700	2,225	13,980	200
1983-1984	2,550	1,700	2,400	13,293	215
1984-1985	3,000	2,400	2,400	13,504	205
1985-1986	3,000	2,400	2,050	14,431	215
1986-1987[c]	2,900	2,000	2,100	15,478	205
1987-1988	3,334	3,131	3,047	16,509	440
1988-1989	3,666	2,945	3,101	16,093	490

[a] Adapted from Mack et al. 1990.
[b] In 1981, the Carter Mountain herd was newly created and included hunt areas 58, 59, and 60S (known in 1980 as the South Fork Shoshone elk herd) and 61.
[c] Winter population estimates were not tabulated in 1986 so the values listed were estimated from graphs.

Table 3-8
Average annual harvest (between 1980 and 1988) and average annual composition of the elk harvest in Wyoming for elk herds east and south of Yellowstone National Park [a]

		Average Harvest			Average % of Total [b]	
Herd	Hunt Areas	Antlered [c]	Anterless [d]	Total [e]	Antlered	Antlerless
Clark Fork	50-54, 121	329	332	661	51	49
North Fork Shoshone [f]	55-57, 60N	317	192	509	62	38
Carter Mountain [g]	50-60S, 61	302	284	586	54	46
Jackson	70-72,74-83	1,332	1,166	2,499	58	42
Targhee	73	46	8	55	84	15

[a] Adapted from Mack et al. 1990.
[b] Average % of total data calculated from yearly data and may not exactly equate with average harvest data because of rounding.
[c] Includes yearling and adult males
[d] Includes adult females and young
[e] Average total harvest may not equal sum of average antlered and antlerless harvest due to rounding.
[f] In 1981 hunt area 57 was added to the North Fork Shoshone herd, therefor, harvest data from 1980 are not comparable to later years and are not included in the averages.
[g] In 1981, the Carter Mountain herd was newly created and included hunt areas 58, 59, and 60S (known in 1980 as the South Fork Shoshone herd) and 61. Data are from 1981 to 1988.

Mule Deer

Distribution – East of Yellowstone National Park, mule deer are managed in three herd units, The Clarks Fork, North Fork Shoshone, and South Fork Shoshone. The analysis area includes hunt areas 105-115 (Figure 3-9). Winter ranges for these herds are associated with the Clarks Fork, North Fork Shoshone, and South Fork Shoshone River drainages and overlap to a large extent with the elk winter ranges (Figure 3-10). Prior to 1989, radio-telemetry studies had not been conducted to determine if mule deer from any of these herds summered within Yellowstone.

Two relatively small mule deer populations inhabit winter ranges south of Yellowstone National Park. The Jackson mule deer herd is associated with hunt unit 150 (Figure 3-9) and deer from this area likely migrate and summer in Yellowstone (Lockman et al. 1989) and winter just northeast of Jackson, Wyoming (Figure 3-10). Mule deer from the Targhee herd are found in hunt area 149 (figure 3-9), but as many as 84% winter in Idaho or along the Wyoming-Idaho border (Figure 3-10). Some mule deer summer in the Teton Wilderness Area in hunt units areas 148, 155, and 156 (Figure 3-9) but they winter with very large deer herds (Sublette and Dubois) south and southeast of Yellowstone National Park and outside the analysis area.

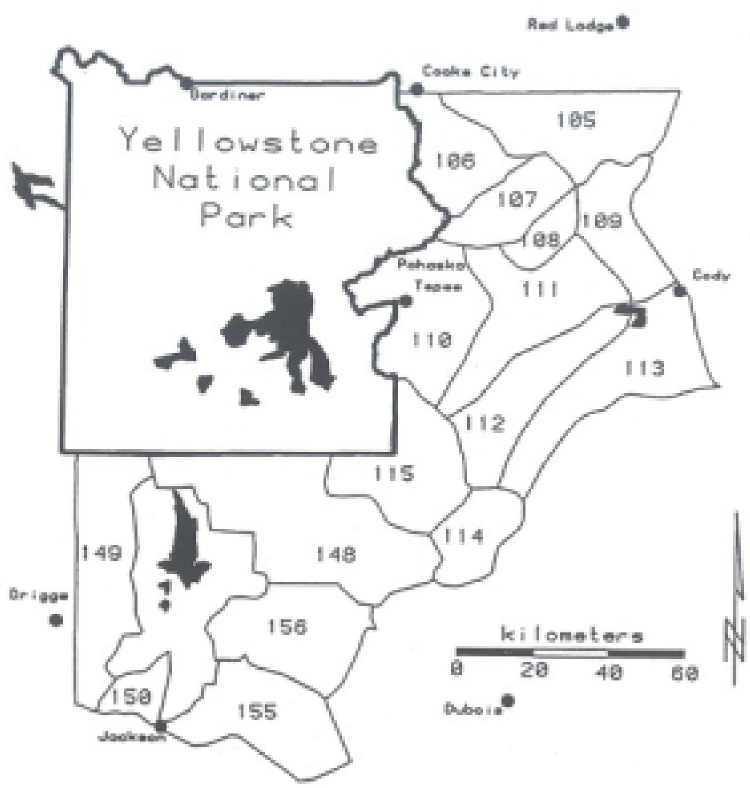


Figure 3-9
Wyoming mule deer hunting areas associated with mule deer populations living on or near Yellowstone National Park

Population Numbers – Through the 1980s, mule deer populations east of Yellowstone National Park have been stable or increasing (Table 3-9). Total deer numbers east of Yellowstone were about 14,000 in 1988. Mule deer populations wintering south of Yellowstone near Jackson, Wyoming, also generally increased (Table 3-9). Total deer numbers south of Yellowstone National Park were estimated at about 1,700 in winter 1988 (Table 3-9).

Table 3-9
Winter population estimated for Wyoming mule deer herds east and south of Yellowstone National Park [a]

	Herd Unit Population Estimate				
Year	Clarks Fork	North Fork Shoshone	South Fork Shoshone	Jackson [b]	Targhee
1980	3,000	950	4,125		550
1981	1,900	1,200	3,600	200	500
1982	5,000	2,675	6,150	230	550
1983	3,000	1,200	3,600	270	485
1984	4,000	1,400	4,800	275	510
1985	3,200	1,500	3,800	300	675
1986 [c]	3,900	1,600	4,300	325	770
1987	4,000	2,500	4,312	340	880
1988 [d]	6,699	2,500	4,800	700	1,000

[a] Based on POP-II computer models generating post-hunting season population estimates. Adapted from Mack et al. 1990.
[b] From 1981 to 1984, the Jackson herd unit trend counts included hunting areas 148, 150, 155, and 156. The boundaries for this herd unit were changed in 1985 and only mule deer herd statistics from hunting area 150 were considered and recalculated back to 1981.
[c] Values for Clarks Fork, North Fork Shoshone, and South Fork Shoshone were estimated from a graph.
[d] Values for Jackson and Targhee herds were from hand calculations using the classification data to estimate the population

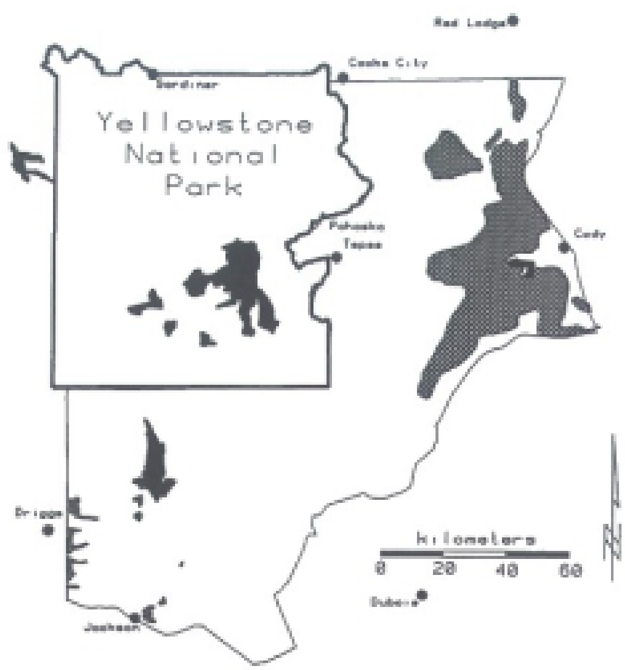


Figure 3-10
Winter ranges for Wyoming mule deer populations living in or near Yellowstone National Park

Age-Sex Compositions – From 1980 to 1988, fawns/100 does ratios averaged 66, 70, and 59 for the Clarks Fork, North Fork Shoshone, and South Fork Shoshone deer herds, respectively (Mack et al. 1990). Buck/doe ratios after the hunting season averaged between 17 and 18 buck/100 does for mule deer herds east of Yellowstone (Mack et al. 1990). Fawn/doe and buck/doe ratios for the Jackson herd south of the park were generally higher than east of the park and averaged 82 fawns/100 does and 39 buck/100 does (Mack et al. 1990). Higher buck/doe ratios may be reflective of low harvest, limited hunter access, and more restrictive hunting seasons for the Jackson herd (Mack et al. 1990). Age-sex composition data were collected only 2 years for the Targhee mule deer herd. Averages were not warranted because of the small sample size.

Harvests – Annual hunter harvest average 564, 242, and 792 mule deer for the Clarks Fork, North Fork Shoshone, and South Fork Shoshone herds, respectively (Table 3-10). For these three herds, bucks dominated the harvest and averaged between 78% and 82% of the total harvest (Table 3-10).

Hunter harvest from the Jackson herd (hunt area 150) averaged 31 deer/year (Table 3-10). Since 1982, harvests have ranged from 7 to 15 deer/year (Mack et al. 1990). The low harvests in the late 1980s were likely a result of limited hunting access, restrictive hunting seasons, and reduced rifle hunting opportunities (Moody et al. 1988, Lockman et al. 1989). Bucks dominated the harvest (68%, Table 3-10), and in the late 1980s, they accounted for 100% of the total (Mack et al. 1990).

Harvests for the Targhee herd averaged 73 deer/year from 1980 to 1988 (Table 3-10). From 1980 to 1988, buck averaged 84% of the harvest (Table 3-10).

Table 3-10
Average annual harvest and average annual sex composition of the harvest between 1980 and 1988 for mule deer east and south of Yellowstone National Park [a]

	Average Harvest			Average % of Total [b]	
Herd	Antlered [c]	Antlerless [d]	Total [e]	Antlered	Antlerless
Clarks Fork	450	114	564	78	22
North Fork Shoshone	250	37	272	82	18
South Fork Shoshone	621	172	792	78	22
Jackson	21	10	31	68	32
Targhee	58	15	73	84	16

[a] Adapted from Mack et al. 1990
[b] Average % of total data are calculated from yearly data and may not be exactly equate with average harvest data because of rounding
[c] Includes yearling and adult males
[d] Included young and females
[e] Average total harvest may not equal sum of average antlered and antlerless harvest due to rounding

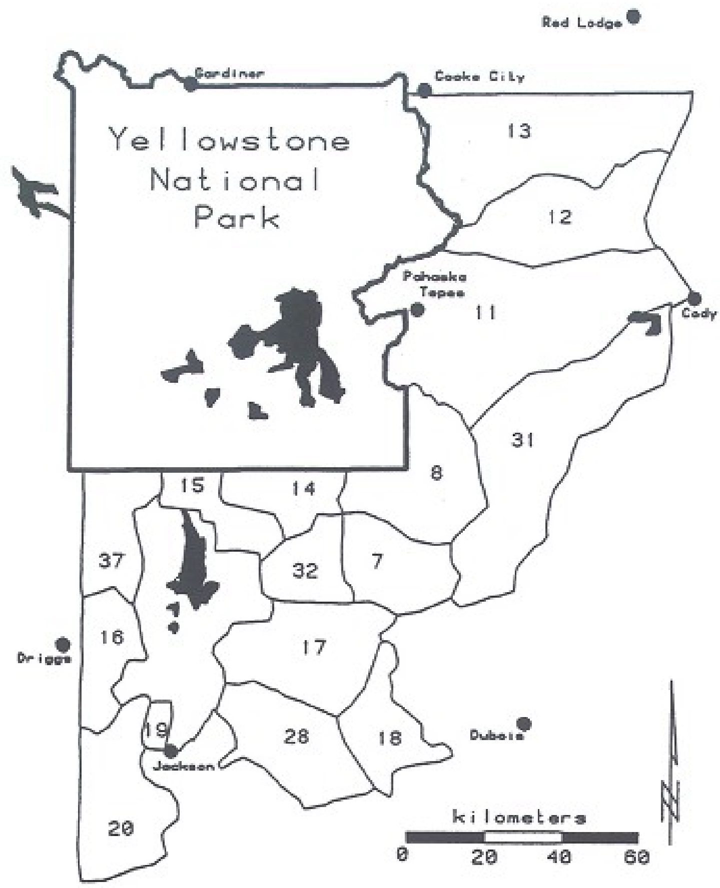


Figure 3-11
Wyoming moose hunt areas associated with moose populations living in or near Yellowstone National Park

Moose

Distribution – Moose east of Yellowstone National Park are managed in five herds (Crandall, Sunlight Basin, North Fork Shoshone, South Fork Shoshone, and Thorofare), and are found in hunt areas 8, 11-13, and 31 (Figure 3-11). Winter ranges are better defined for the Crandall and Thorofare herds than for the other three herds (Figure 3-12). Moose mi8gration to and from Yellowstone is speculative for the Sunlight, North Fork Shoshone, and South Fork Shoshone herds because radio-telemetry studies have not been conducted on these moose herds.

South of Yellowstone, moose are managed in the Jackson and Targhee herds and are found in hunt areas 7, 14, 15, 17-20N, 28, and 32 for the Jackson herd and 16 and 37 for the Targhee herd (Figure 3-11). Winter ranges of the Jackson herd are found north and east of Jackson, Wyoming, (Figure 3-12) with critical winter ranges being restricted to drainages and the associated riparian habitat (i.e., willow flats along the Buffalo River area).

Few moose from the Targhee herd winter in Wyoming. Most winter in drainages in Idaho within ten miles (16 km) west of the Wyoming-Idaho border. In summer, these moose move northeast and 39% summer in Yellowstone (Mack et al. 1990).

Population Numbers – Of the five moose herds east of Yellowstone National Park, the Thorofare herd is probably located in the best moose habitat and likely has more moose than the Crandall, Sunlight, North

Fork Shoshone, and South Fork Shoshone herds combined (Mack et al. 1990). Some rough approximations have been offered for moose populations east of the park (Table 3-11), but population models have not been developed for any of the moose herds.

Figure 3-12
Winter ranges for Wyoming moose herds living in or near Yellowstone National Park

Population estimates were computed for the Jackson herd and it has generally increased from 1,800 in 1982 to about 2,300 in 1988 (Mack et al. 1990). Population estimates for the Targhee herd have increased from 130 in 1981 to about 300 in 1989 (Mack et al. 1990).

Table 3-11
Moose population estimates in 1988 for the Clarks Fork (primarily Crandall and Sunlight), North Fork Shoshone, South Fork Shoshone, and Thorofare herds in Wyoming east of Yellowstone National Park [a]

	Moose Herd Unit			
	Clarks Fork	North Fork Shoshone	South Fork Shoshone	Thorofare
Population estimate	150	55	55	255

a From Wyoming Game and Fish Department, Cheyenne, unpubl. data.

Age-Sex Composition – Age-sex composition data was not collected for moose herds east of Yellowstone National Park between 1980 and 1988. Age-sex composition data for the Jackson herd averaged 47 bull/100 cows and 48 calves/100 cows between 1980 and 1988 (Mack et al. 1990). For the Targhee moose herd, age/sex composition data from hunter surveys ranged from 39 bulls/100 cows to 69 bulls/100 cows between 1980 and 1985. During the same period, cow/calf ratios ranged from 3 to 59 calves/100 cows (Mack et al. 1990). Only three years of aircraft composition data were collected for this herd and ratios averaged 60 bulls/10 cows and 51 calves/100 cows (Mack et al. 1990).

Harvests – Only bulls were harvested east of the park, with the exception of one calf that was harvested in 1980 in the Thorofare area. Moose harvest in the Thorofare area averaged 23 bulls/year which was 2-7 times higher than the average yearly harvest in other areas east of Yellowstone National Park (Table 3-12). Moose harvests south of the park averaged 323/year for the Jack herd and 34/year for the Targhee herd (Table 3-12).

Table 3-12
Average annual moose harvest from 1980 to 1988 for Wyoming moose herds east and south of Yellowstone National Park [a]

	Average Harvest [b]			
Herd	Bulls	Cows	Calves	Total
Crandall	9	0	0	9
Sunlight	5	0	0	5
North Fork Shoshone	3	0	0	3
South Fork Shoshone	3	0	0	3
Thorofare	23 [c]	0	0	23
Jackson	243	68	10	323 [d]
Targhee	25	5	1	34

[a] Adapted from Mack et al. 1990.
[b] Bulls are yearling and adult males, cows are yearling and adult females and calves are young
[c] Includes one calf harvest in 1980
[d] Includes average harvest of one unclassified moose/year

Bighorn Sheep

Distribution – Four bighorn sheep herds lives east of Yellowstone National Park and are associated with hunt areas 1-4 (Figure 3-13). The Clarks Fork (hunt area 1), Trout Peak (hunt area 2), and Younts Peak (hunt area 4) herds primarily live outside Yellowstone National Park (Hurley 1985, K. Hurley pers. commun., Wyoming Game and Fish Dept., Thermopolis) but within potential wolf activity (Mack et al. 1990). The Wapiti Ridge herd (hunt area 3) has summer and winter ranges both inside and outside the southeastern corner of Yellowstone National Park (Hurley 1985, T. Fagan, pers. commun., Wyoming Game and Fish Dept., Cody).

Population Numbers – Bighorn sheep populations east of the park have increased slightly through the 1980s (Mack et al. 1990). Population estimates in 1988 were 500 for the Clarks Fork herd, 497 for the Trout Peak herd, 967 for the Wapiti Ridge herd, and 770 for the Younts Peak herd (Mack et al. 1990).

Age-Sex Composition – Between 19881 and 1988, age-sex composition ratios annually averaged 41 lambs/100 ewes and 47 rams/100 ewes for the Wapiti Ridge herd and 39 lambs/100 ewes and 31 rams/100 ewes for the Younts Peak herd (Mack et al. 1990).

Only six years of data between 1981 and 1988 area available for the Clarks Fork and Trout Peak herds. Lamb/ewe ratios annually averaged 42 lambs/100 ewes for the Clarks Fork herd and 38 lambs/100 ewes for the Trout Peak herd. Ram/ewe ratios annually averaged 74 rams/100 ewes for the Clarks Fork herd and 51 rams/100 ewes for the Trout Peak herd (Mack et al. 1990).

Harvests – All sheep harvested east of Yellowstone National Park were adult rams (males) having ¾ curl horn or larger. Except for the exceptionally low harvest of three rams from the Clarks Fork herd in 1988 (due to forest fires in that area), hunter harvest of bighorn sheep have been relatively stable to slightly increasing for all four herds east of Yellowstone during the 1980s (Mack et al. 1990). Average harvests from 1980 to 1988 were 13 rams/year (Clarks Fork herd), 19 rams/year (Trout Peak herd), 28 rams/year (Wapiti Ridge herd), and 31 rams/year (Younts Peak herd, Mack et al. 1990).

Figure 3-13
Wyoming bighorn sheep hunt areas associated with bighorn sheep populations east of Yellowstone National Park

Eastern Idaho Ungulate Populations

Elk

Distribution – In eastern Idaho, the Sand Creek elk herd is associated with five hunt units (60, 60A, 61, 62, and 62A) located west and southwest of Yellowstone National Park (Figure 3-14). About 76% of the herd summers east of Highway 20 near or in Yellowstone (Brown 1985, Vales 1989). During fall, most elk migrate southwest to the Sand Creek winter range located northwest of Rexburg and southeast of Dubois, Idaho, between Highway 20 and Interstate 90 (Brown 1985, also see Figure 3-20).

Population Numbers – Population trend counts for the Sand Creek elk herd have ranged from 1,803 to 2,959 between 1980 and 1988 (Mack et al. 1990). Brown (1985) estimated the elk population was 4,900 in 1982-1983 while Vales (198) calculated that the actual herd size must be 4,200 in spring (post-harvest) to support observed hunter harvests. The difference between the trend counts and population estimates might be due to some elk living near southwestern Yellowstone during summer but not wintering on the Sand Creek winter range and not being counted in the trend counts (J. Naderman, Idaho Dept. of Fish and Game, per. commun. in Mack et al. 1990).

Figure 3-14
Idaho hunt units associated with elk, deer, and moose populations living in or near Yellowstone National Park

Age-Sex Composition – Age-sex composition data for the Sand Creek herd was collected between 1980-1981 and 1987-1988. Age-sex compositions averaged 53 calves/100 cows and 22 bulls/100 cows (Mack et al. 1990).

Harvests – From 1980 to 1988, the general season elk harvests were all bulls and averaged 546/year (Mack et al. 1990). From 1980 to 1988, elk harvests during controlled hunts averaged 108 bulls/year and 355 cows/year (Mack et al. 1990). Bulls comprised an average of 65% and cows an average of 35% of the total harvest (J. A. Mack unpubl. data, Natl. Park Serv., Yellowstone National Park, Wyoming).

Mule Deer

Distribution – Mule deer living in areas adjacent to the southwestern portion of Yellowstone National Park are found in hunt areas 60, 60A, 61, 62, and 62A, the same hunt units as for Idaho elk (Figure 3-14). Mule deer from this area summer in the Island Park area, portions of Wyoming hear the Idaho border, and in southwestern Yellowstone National Park (Mack et al. 1990). These mule deer winter in the Junipers-Sand Creek winter range in hunt area 60A (Figure 3-14).

Population Numbers – Mule deer trend counts were conducted five out of nine years between 1980-1981 and 1988-1989 and averaged 1,599 (Mack et al. 1990). The population objective for this area is 1,200 (Mack et al. 1990). The trend for this herd, either increasing or decreasing, cannot be described because few counts were conducted during the 1980s.

Age-Sex Composition – Fawn/doe ratios were relatively high for this herd and averaged 98 fawns/100 does during the 1980s (Mack et al. 1990). Buck/doe ratios generally decreased during the 1980s from a high of 65 bucks/100 does in 1980-1981 to 23 bucks/100 does in 1986-1987 and averaged 41 bucks/100 does (Mack et al. 1990).

Harvests- Deer harvests averaged 1,021 deer/year. Bucks averaged 73% of the annual harvest and does averaged 27% (Mack et al. 1990). White-tailed deer are rarely harvested and averaged 4% of the total deer harvest from 1983 to 1988.

Moose

Distribution – Near southwestern Yellowstone National Park, eastern Idaho moose use the same five hunt units as elk and mule deer (Figure 3-14), an winter on the Junipers, Big Bend, Fall River, Island Park, and Shotgun Valley ranges near and southwest of Ashton, Island Park and Henrys Lake areas (Ritchie 1978). A small number of moose also winter in the Bechler area in Yellowstone (Mack et al. 1990). In summer, moose from the Big Bend, Junipers, and Fall River winter ranges summer in Idaho near Yellowstone, in Yellowstone, and south of Yellowstone in Wyoming. Moose from the Island Park winter range remain in the Island Park area during summer an average of eight miles (13 km) from the winter range (Ritchie 1978). Shotgun Valley moose primarily summer in the Centennial Mountains (Ritchie 1978).

Population Numbers – Moose trend counts declined between the 1950s and 1970s. Trend counts increased in the 1980s to a high of 813 in 1988-1989 (Table 3-13).

Age-Sex Composition – Calf/cow ratios were collected for six years during the 1980s and averaged 69 calves/100 cows; bull/cow ratios averaged 103 bulls/100 cows (Mack et al. 1990). Twinning rates were not collected during the 1980s but during the 1970s, twinning rates averaged 12% (Ritchie 1978).

Harvests – From 1980 to 1982, moose harvests were allowed only in hunt unit 61. During these years the moose harvest averaged 6 bulls/year (Mack et al. 1990). After 1983, all hunt units (60, 60A, 61, 62, and 62A) had moose hunting. Harvests increased from 42 bulls in 1983 to 68 bulls in 1988 and averaged 58 bulls/year between that period (Mack et al. 1990).

Table 3-13
Moose trend counts in three wintering areas in eastern Idaho, southwest of Yellowstone National Park, 1951-1951 to 1988-1989 [a]

	Wintering Area			
Year	Junipers and Big Bend	Fall River Ridge	Island Park	Total
1951-1952	400	153	124	677
1952-1953	241	135	133	509
1955-1956	270	152	177	599
1957-1958	173	922	65	330
1962-1963	148	66	68	282
1968-169	126	40	66	232
1972-1973	86	69	22	177
1975-1976	90	109	74	273
1980-1981	172	151	65	388
1981-1982	136	159	66	361
1982-1983	353	138	61	552
1988-1989	372	217	224	813

[a] Adapted from Mack et al. 1990

Bison in the Yellowstone Area

Within the Yellowstone area, two separate, wild, free ranging bison populations exist. The largest population lives in Yellowstone National Park. Except for extreme winter weather conditions, these bison remain within Yellowstone National Park's boundaries year round. The Northern Range (Lamar), Pelican, and Mary Mountain subunits generally describe bison wintering areas in Yellowstone (Meagher 1973, M. M. Meagher pers. commun.). The Northern Range wintering area approximates most of the northern elk winter range (Houston 1982, M.M. Meagher pers common.). The Pelican wintering area is located in Pelican Valley in east-central Yellowstone and the Mary Mountain wintering area extends from Hayden Valley to the Madison-Firehole River area in the west-central portion of the park.

The Yellowstone bison population steadily increased during the 1980s and numbered about 3,400 in winter 199201993 (M.M. Meagher, Yellowstone National Park, Wyo., pers. common.). Numbers of bison residing in the three wintering areas are highly variable both between years and within a winter because bison groups can move from one wintering area to another. Minimum bison numbers in the three wintering areas likely are 400-500 in the Northern Range, 300-400 in Pelican, and 1,200 to 2,000 in Mary Mountain (M.M. Meagher pers. commun.).

The extent of human caused mortality of bison in the Yellowstone National Park population is highly variable according to bison movements and resulting conflicts outside the park. Between the winters of 1984-1985 and 1991-1992 bison removals outside the park in Montana averaged 131 bison/year and ranged from six in 1986-1987 to 569 in 1988-1989 (M.M. Meagher unpubl. data). Currently, sport hunting of bison leaving Yellowstone is not allowed in Montana. If a landowner requests it, state game wardens and National Park Service rangers can kill bison that leave the park and move onto private land. A few bison (3) have also been killed for research purposes inside Yellowstone National Park (M.M. Meagher pers. commun.). Road-killed bison in Yellowstone averaged 7 bison/year between 1990 and 1992 (K. Gunther, unpubl. data, Natl. Park Serv., Yellowstone Natl. Park, Wyoming).

The second small bison population summers in Grand Teton National Park and winters on the National Elk Refuge feeding grounds near Jackson, Wyoming (Peterson et al. 1991). This population has increased from nine in 1970 (Peterson et al. 1991) to about 170 in the winter 1992-1992 (B. Smith, pers. commun., National Elk Refuge, Jackson Wyoming). These bison are supplementally fed during winter on the National Elk Refuge. Government agency reductions and controlled public hunts occurred during four years between 1983-1984 and 1990-1991 and removals averaged 11 bison/year (R. Wallen, pers. commun., Grand Teton Natl. Park, Wyoming). Future management plans for this herd are being developed under the NEPA process.

Yellowstone: Domestic Livestock

Land Ownership

The general area involves portions of 17 counties in east-central Idaho, southwestern Montana, and northwestern Wyoming (Figure 3-15). Land ownership in these counties is mixed with about 60% federal, 4% state and other local government, 5% Native American, and 31% private ownership (Table 3-14). These counties include a total of approximately 36 million acres, (145,800 km^2) with national forests, Bureau of Land Management, and private land totaling almost 30 million acres (121,500 km^2).

Not all of the area in these 17 counties will be affected by the presence of wolves in the Yellowstone area, and the effects of wolf reintroduction will likely decrease the farther an area is from Yellowstone National Park. Consequently, a primary analysis area was identified (Table 3-15, Figure 3-15).

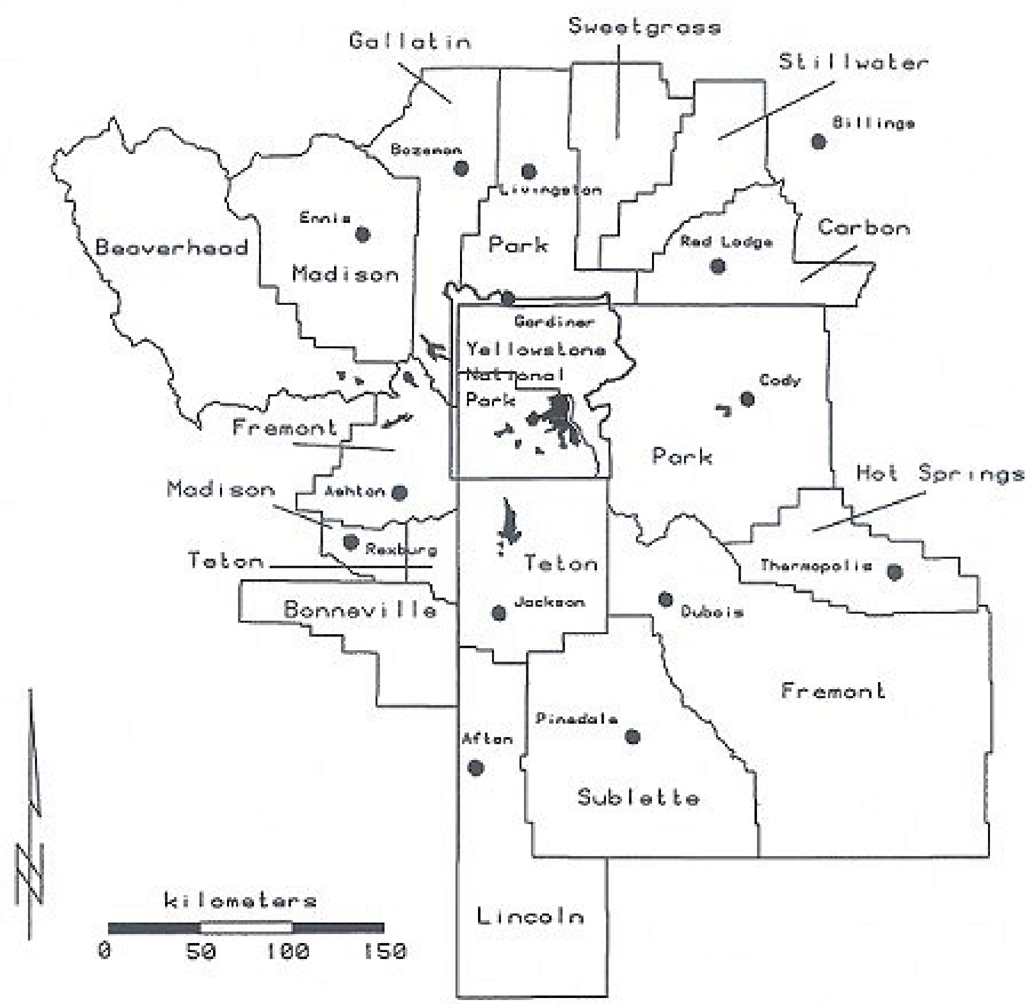


Figure 3-15
Idaho, Montana, and Wyoming counties adjacent to
Yellowstone National Park and primary analysis area.

Table 3-14
Percent of lands in major categories in the 17 county area around
Yellowstone National Park

	Idaho	Montana	Wyoming	17 County Average [a]
National Forest	38	34	31	33
National Parks	1	2	12	7
Wildlife Refuges	1	0	T [b]	T [b]
BLM Lands	8	9	27	19
Federal Total	50	45	71	60
State Total	7	5	4	4
Tribal	0	0	9	5
Private	43	50	16	31

[a] Weighted average
[b] Indicates a values less than 1%

Table 3-15
Lands in major categories in the primary analysis area

	Idaho	Montana	Wyoming	Total Analysis Area
National Forests	1,025,900	2,476,400	5,118,400	8,620,700
National Parks	31,500	167,700	2,350,900	2,550,100
Wildlife Refuges	0	44,200	24,800	69,000
BLM Lands	173,800	216,500	596,400	986,700
Other Federal	33,500	600	27,500	61,600
Federal Total	1,264,700	2,905,400	8,118,000	12,288,100
State Total	142,400	120,700	72,700	335,800
Tribal	0	0	117,700	117,700
Private	891,800	1,880,800	552,500	3,325,100
Grand Total	2,298,900	4,906,900	8,860,900	16,006,700

The primary analysis area includes about 16 million acres (64,800 km2) in these 17 counties, 2.3 million acres (9,300 km^2) in Idaho, 4.9 million acres (19,800 km^2) in Montana, and 8.9 million acres (36,000 km^2) in Wyoming (Table 3-15). The proportion of land ownership includes about 76% federal ownership, 2% other government ownership, 1% Native American ownership, and 21% private ownership (Table 3-15, Figure 3-16).

In the center is Yellowstone National Park, 2,219,773 acres (8,900 km^2). Other lands under National Park Service management include Grand Teton National Park and John D. Rockefeller Memorial Parkway south of Yellowstone, totaling 330,282 acres (1,338 km^2).

Southeast of Grand Teton National Park is the 24,760 acre (100 km^2) National Elk Refuge, managed by the FWS as winter range and an artificial winter feed ground for elk. Red Rock Lakes National Wildlife Refuge (44,159 acres; 179 km^2) in Beaverhead County, Montana, west of Yellowstone National Park is the only other area managed by the FWS in the primary analysis area.

Surrounding Yellowstone National Park is a complex of national forests including large areas of federally designated wilderness (about 4 million acres; 16,200 km^2) as well as land managed for a broader spectrum of multiple use objectives. Within the 17 country area there are all or portions of 10 national forests comprising over 11 million acres (44,600 km^2). Within the primary analysis area are portions of six national forests including Beaverhead, Bridger-Teton, Custer, Gallatin, Shoshone, and Targhee National Forests. Total area of national forest within the primary analysis area is about 8.6 million acres (34,800 km^2) or about 50% of the primary analysis area (Table 3-15).

The Bureau of Land Management (BLM) is the third largest federal land management ownership in the primary analysis area with about 987,000 acres (4,000 km^2) (Table 3-15, Figure 3-16). Most BLM land lies west of Yellowstone National Park in Montana and Idaho and south and east of Yellowstone National Park in Wyoming generally outside of the perimeter formed by national forests adjacent to Yellowstone National Park.

The Wind River Indian Reservation is located southeast of Yellowstone National Park and the Bridger-Teton National Forest in Fremont and Hot Springs counties, Wyoming, and includes a total of approximately 1.9 million acres (7,700 km^2), of which 95% is in tribal ownership, less than 1% in federal ownership, and 5% in private ownership. About 117,700 acres (480 km^2) are included in the primary analysis area.

Private land comprises about 3.3 million acres (13,400 km^2) or about 21% of the analysis area (Table 3-15, Figure 3-16). The amount of private land in the analysis area varies among states from an estimate of about 0.9 million acres (3,600 km^2) in Idaho, and 1.9 million acres (7,700 km^2) in Montana, to about 0.5

million acres (2,000 km2) in Wyoming. The vast majority of private land is located at lower elevations, primarily beyond the perimeter of federal lands or in the major river valleys that head at higher elevations on public land.

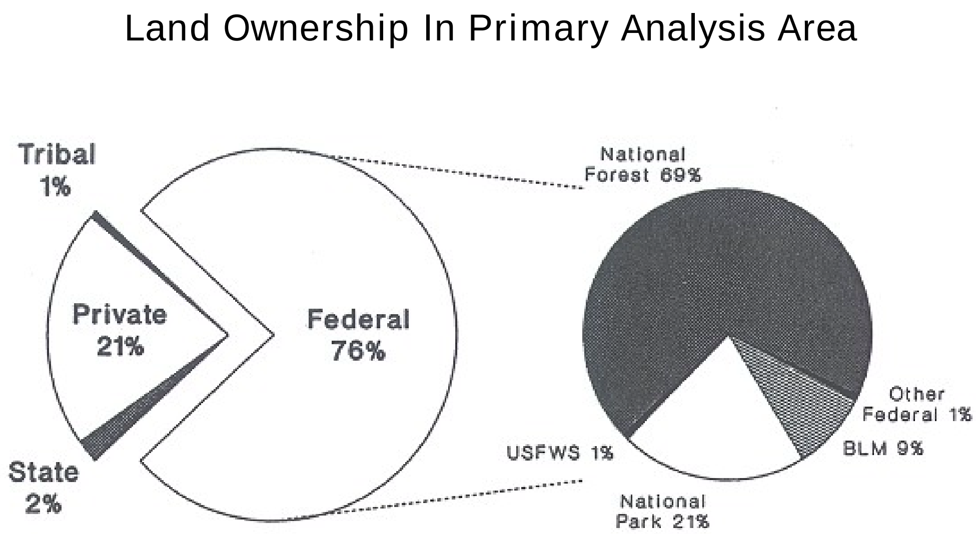


Figure 3-16
Land ownership in primary analysis area

Livestock Abundance and Distribution

Domestic livestock in the primary analysis area are mainly cattle and sheep. During winter (October to June) cattle and sheep are moved to lower elevation, often to farm and ranch headquarters on private lands. Bases on county livestock densities from the Census of Agriculture (U.S. Department of Commerce 1989a,b,c) mid-winter livestock numbers in the analysis area are estimated to be about 230,000 cattle and 60,000 sheep with fewer numbers of other livestock classes (Table 3-16). Annual production of calves and lambs, based on state wide averages, are estimated to about 124,000 and 57,000 respectively (Table 3-16).

Table 3-16
Numbers of livestock (in winter) by class in primary analysis area [a]

State	County	Cattle [b]	Calves [b]	Sheep [b]	Lambs [b]	Swine [c]	Chicken [c]	Horses [c]	Turkeys [c]
Idaho	Bonneville	18,100	10,100	1,200	900	2,179	572	860	22
	Fremont	13,000	7,300	13,400	10,900	514	666	785	35
	Madison	17,600	9,900	2,600	2,100	829	0	605	24
	Teton	12,500	7,000	300	200	33	306	1,055	0
	Sub Total	61,200	34,300	17,500	14,200	3,555	1,544	3,304	82
Montana	Beaverhead	7,600	4,200	1,200	1,000	31	34	92	0
	Carbon	22,300	12,300	7,100	6,000	1,773	619	860	26
	Gallatin	15,800	8,700	2,600	2,200	1,447	0	804	12
	Madison	26,100	14,300	5,300	4,500	989	530	626	6
	Park	20,200	11,100	2,000	1,700	274	889	865	28
	Stillwater	15,400	8,500	5,400	4,600	2,832	0	410	166
	Sweetgrass	11,000	6,000	6,800	5,700	1,307	241	285	15
	Sub Total	118,400	65,100	30,300	25,800	8,654	2,313	3,942	253
Wyoming	Fremont	3,800	1,900	1,700	1,300	95	93	250	9
	Hot Springs	700	300	200	100	3	9	30	0
	Lincoln	700	400	500	400	29	41	46	0

	Park	24,200	11,800	7,000	5,300	429	1,017	1,553	36
	Sublette	11,700	5,700	1,600	1,200	0	107	454	0
	Teton	9,600	4,700	1,100	8,600	11	0	1,170	0
	Sub Total	50,600	24,800	12,000	16,900	866	1,268	3,502	45
Total		230,200	124,200	59,900	56,900	12,773	5,125	10,748	380

[a] Livestock numbers in each class were prorated based on livestock density in entire county and area of county in primary analysis area; totals may not add because of rounding
[b] Rounded to the nearest 100
[c] Rounding to the whole numbers due to the smaller values compared to cattle, calves, sheep, and lambs

Seasonal livestock grazing occurs on portions of all six national forests. Livestock grazing is permitted on approximately 4 million acres (16,200 km2) (Figure 3-17). Percentages of each forest that are grazed range from 14% on the Custer National Forest to 71% on the Beaverhead National Forest (Table 3-17). The number of livestock in each class varies between forests with the most livestock permitted on the Bridger-Teton and Targhee National Forests (Table 3-18). Over 146,000 cattle and calves, about 265,000 sheep and lambs, and about 1,300 horses are grazed seasonally on national forests in the primary analysis area.

Livestock (primarily cattle, sheep, and horses) area grazed, both within and outside wilderness areas, under permit to livestock operators for a specified period and number and class of livestock. In general, on national forest grazing allotments, livestock are permitted on allotments during late spring or early summer and taken off in the fall with no over-wintering grazing. The mean date livestock are permitted on the national forests varies but livestock generally are allowed on during middle to late June and taken off in middle to late October (Table 3-19).

Livestock grazing is also managed on BLM lands under a permit system. Various situations include summer grazing at higher elevations similar to that on national forest, grazing during specified season usually associated with lower elevation areas, and year round grazing on isolated parcels in conjunction with private lands.

With the exception of pack and riding stock, livestock grazing is not permitted in Yellowstone National Park or John D. Rockefeller Memorial Parkway. Within Grand Teton National Park, 27,400 acres (110 km^2), or 8% of the total park area, is open to livestock grazing (table 3-17). Permitted grazing includes 1,368 cattle and 75 horses (table 3-18) from late June through late October, for an average 93 days (Table 3-19).

Livestock are not grazed on National Elk Refuge, but grazing of domestic livestock is allowed under permit on Red Rock Lakes National Wildlife Refuge.

Table 3-17
Total allotments, number of active allotments, total permits, permits per allotment, total and mean allotment area, and percent of total forest and national park in active allotments for each of six national forests and Grand Teton National Park (GTNP) surrounding Yellowstone National Park during 1991. [a]

	Allotments			Active Allotment Area				
National Park or Forest	Total	Active	%	Total Permits	Permits per allotment	Total	Mean	% of park or forest areas with active allotments
Gallatin	88	77	87.5	107	1.4	1,970	25.6	28
Custer	19	17	89.5	26	1.5	86	16.8	14
Shoshone	63	56	88.9	69	12	3,473	62.0	39
Bridger-Teton	104	104	100.0	173	1.7	6,079	58.5	55
GTNP	5	5	100.0	10	2.0	111	22.5	8
Targhee	116	99	85.3	144	1.5	3,507	35.4	59
Beaverhead	45	34	75.6	48	1.4	1,215	35.7	71
Totals	440	392		577		16,642		

[a] Mack et al. 1992a

Table 3-18
Number of cattle, sheep, and horses grazed on active allotments in six national forests and Grand Teton National Park (GTNP) within the primary analysis area, summer 1991. [a]

National park or forest	Cattle	Calves	Sheep	Lambs	Horses	Total
Gallatin	7,002	6,302	4,351	5,221	243	23,119
Custer	2,064	1,858	0	0	25	3,947
Shoshone	15,047	13,542	5,900	9,440	204	44,133
Bridger-Teton	32,111	28,900	42,747	68,395	524	172,677
GTNP	1,368	1,231	0	0	75	2,674
Targhee	11,497	10,347	49,486	79,178	164	150,672
Beaverhead	7,573	6,816	167	267	35	147,858
Total	76,662	68,996	102,651	162,501	1,270	412,080

[a] Mack et al. 1992a

Table 3-19
Average total days all livestock graze on six national forests and Grand Teton National Park (GTNP) in the primary study area and the median dates livestock are allowed on and taken off active grazing allotments. [a]

		Median date [b]	
National park or forest	Average total days on allotments	On allotment	Off allotment
Gallatin	95	07/01	10/15
Custer	129	06/26	10/18
Shoshone	98	06/26	10/10
Bridger-Teton	90	06/18	09/30
GTNP	93	05/28	10/25
Targhee	84	06/26	09/15
Beaverhead	94	06/26	10/05

[a] Mack et al. 1992 a
[b] Median date is expressed as month and day (mm/dd)

Within the analysis area, at least 7.5 million acres (30,400 km^2) of public land (national forest and national park lands) have no livestock grazing anytime of the year. Areas without livestock grazing lie between Yellowstone National Park and livestock allotments on national forests. Grazing allotments border Yellowstone National Park only on the southwestern and northwestern corners of the park. The largest areas with no commercial livestock grazing are found north, east, and south of Yellowstone National Park and include large areas of designated wilderness. The average distance between Yellowstone National Park and active grazing allotments on national forests range from about 11 miles (18 km) on the west side of 22 miles (35 km) on the east side (Table 3-20). Livestock grazing is generally permitted from June to October and is not permitted on these allotments during the remainder of the year. Consequently, there is approximately 11.5 million acres (46,600 km^2) of public land with no livestock grazing for approximately eight months.

Private land used for livestock production is generally located at lower elevations and often along the major river valleys. Most of the livestock in the analysis area are wintered on private land, usually at lower elevations and along major river valleys. Few livestock remain on the public land grazing allotments during winter. In the spring, many of the cattle are moved to public land grazing allotments during the middle to late June. Sheep are usually moved to higher elevation allotments slightly later, usually after lamb docking.

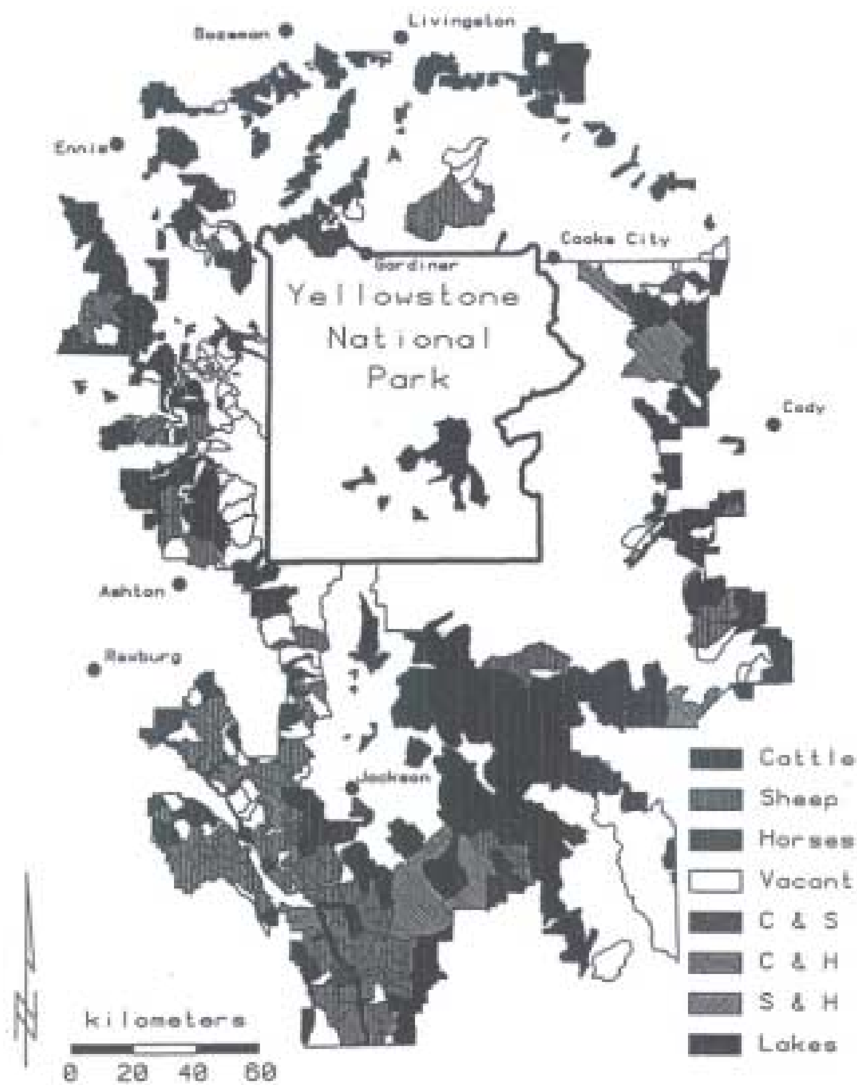


Figure 3-17
Location and type of livestock on grazing allotments on national forests and national parks within the primary analysis area during June through October. C & S = cattle and sheep, C & H = cattle and horses, S & H = sheep and horses.

Table 3-20
Average minimum distance (km) between Yellowstone National Park (YNP) and active grazing allotments and minimum and maximum distance of grazing allotments closest to YNP according to four compass directions. [a]

	Distance (km)				
Direction from YNP boundary	Minimum	Maximum	Mean	SD [b]	*N*
North	0	59.7	23.4	19.96	373
East	9.1	58.5	36.2	12.65	134
South	0.6	33.8	21.1	9.26	38
West	1.6	32.5	16.6	9.14	100

[a] Mack et al. 1992 a.
[b] SD = Standard Deviation

Yellowstone: Land-Use Restrictions

National Parks

National parks are managed under authority of the acts that established each park and the National Park Service Organic Act, which established the National Park Service to “promote and regulate the use of…parks…” and defined the purpose of national parks “to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.”

In addition to these basic pieces of legislation, subsequent legislation, either specific to a particular park or addressing some aspect of park management, directs such diverse park issues as concessions, water rights, school facilities, park protections, lease of lands, and wild life management (Yellowstone National Park, 1991).

These laws and regulations are the basis for management of the parks and protection of not only the natural and cultural resources located there but the protection of over 3 million people while they are visiting Yellowstone and Grand Teton National Parks. Some regulations restrict types of activities just as ordinances in cities limit people’s activities for the common good. Others limit the season an activity can occur (such as fishing regulations). Still others limit or preclude certain activities in particular areas or during particular times of the year, such as no off-road vehicle use or no off-trail travel in areas with high risk of grizzly bear encounters.

A number of concessionaires operate within the parks providing a variety of services ranging from hotel accommodations and stores to small guide services. These businesses operate under a variety of different concession contracts and agreements. Portions of these agreements may limit activities and seasons of operations to protect natural and cultural resources. Backcountry outfitters using stock generally do not operate prior to July 1 (unless a specific exemption is authorized) to protect trails during spring thaw.

Both Yellowstone and Grand Teton National Parks are classified as natural area parks with primary emphasis on preservation and maintenance of natural values. Within this overall management objective, zones are established with varying management objectives (Table 3-21). These zones include a natural zone and a developed zone. Over 98% of Yellowstone and 89% of Grand Teton are classified as natural values and areas recommended for wilderness, essentially the backcountry.

Table 3-21
Management zones in Yellowstone and Grand Teton National Parks (acres)

	Natural Zone			
Unit	Wilderness recommendation	Natural environment subzone	Special use, historic, and development zones	Total
Grand Teton NP	122,600	167,700	40,000	330,300
Yellowstone NP	2,016,200	163,600	40,000	2,219,800
Total	2,138,800	331,300	80,000	2,550,100

Source: Yellowstone and Grand Teton National Park Statements for Management and Yellowstone National Park Planning Office

The development zones contain most of the “built” infrastructure. Approximately 2% of Yellowstone and about 12% of Grand Teton are in developed areas. Development include some roads and trails, visitor service facilities, developed campgrounds, visitor lodging facilities, employee housing, and administrative headquarters found in various areas throughout the parks (Figure 3-18).

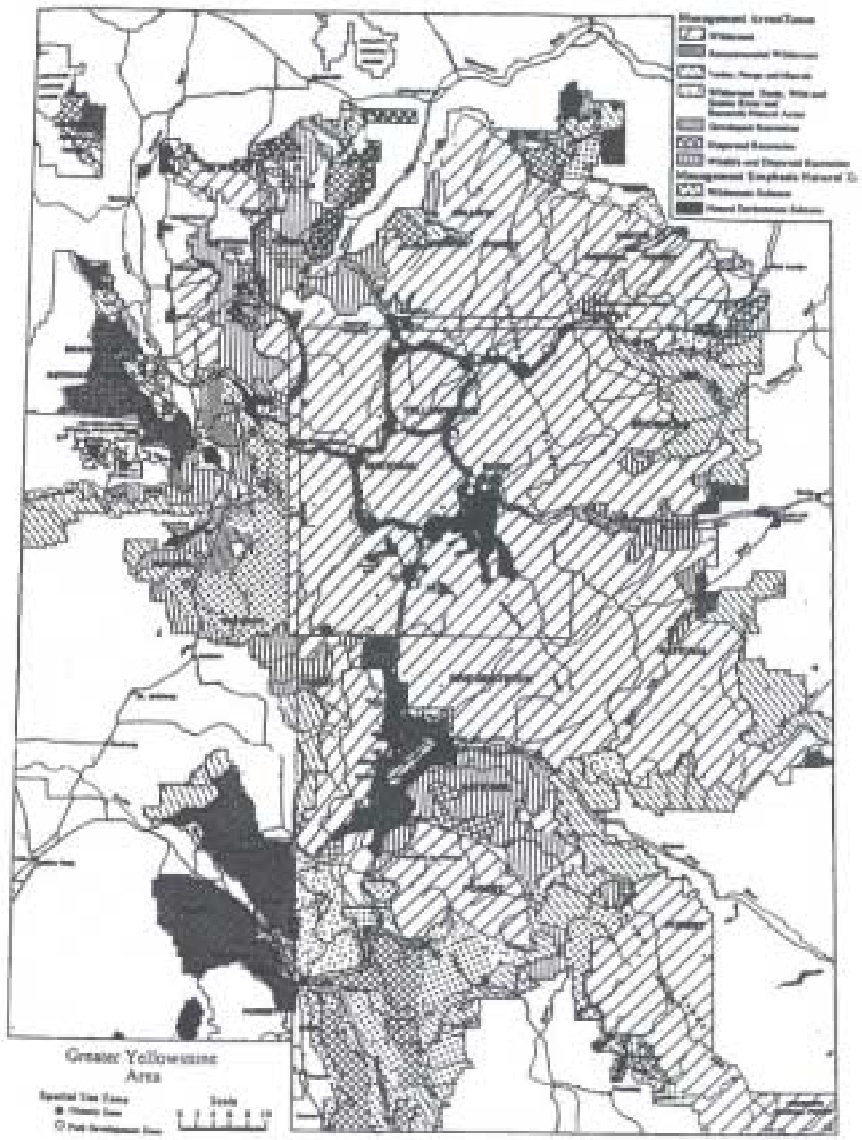


Figure 3-18
Management areas/zones on national park and national forests in Yellowstone area.
Adapted from Greater Yellowstone Coordinating Committee (1987).

Visitor facilities in the two parks are located within the developed zones. Typical seasonal opening and closing dates of facilities are in Table 3-22. Peak visitor use season occurs from early July through mid-August. For example, during 1990, July was the peak month and averaged about 24,000 visitors per day; the peak day was August 6, with 29,737 visitors. Most backcountry use is recorded July through September. Winter use has increased dramatically since the mid 1960s; 30 years ago there was virtually no winter use within the parks. During the winter of 1990-1991 over 98,000 visitors came to Yellowstone; 72% for snowmobiling and 24% for cross-country skiing (Yellowstone National Park 1991).

Yellowstone has about 523 miles (842 km) of public roads with no off-road use of vehicles authorized. During summer, primary roads are open to the public. The main road from the north entrance (Gardiner, Montana) to the northeast entrance (Silvergate-Cooke City, Montana) is maintained for wheeled vehicle use year-round. During the fall and spring other roads (about 371 miles; 597 km) are closed temporarily to wheeled vehicles when they become impassible because of weather and prior to being suitable for over-snow machine use. During winter all interior roads are open to over-snow machine use except a segment between Tower and Canyon over Mount Washburn because of heavy snow accumulation, avalanche, and other hazards. No off-road use of over-snow machines is authorized.

The two national parks contain about 1,200 miles (1,900 km) of trail available during the summer season and about 250 miles (400km) of tail maintained during winter months (Table 3-23). Visitor use of these trails is outlined in the visitor use section. Some of these trails have travel restrictions regarding season of use, party size, or limits on stock to protect resources and visitors.

There is no federally designated wilderness in either park. However, about 2.1 million acres (8,500 km^2) were recommended for wilderness designation (Table 3-21). Management is directed at maintaining wilderness characteristics that allows dispersed recreation but limits the use of motorized equipment or mechanized transport and prohibits new development that would diminish wilderness suitability.

National parks, for the most part, are withdrawn from mineral development, and timber harvest is not permitted. Hunting is not allowed in Yellowstone, and there is a limited elk hunt allowed in portions of Grand Teton National Park and John D. Rockefeller Memorial Parkway. Livestock grazing is not permitted in Yellowstone. Limited grazing is allowed on about 8% of Grand Teton (see Livestock Section).

Superintendents are authorized to place limits on visitor use of certain areas for protection of resources or for public safety. Restrictions for public safety often involve limits on use in thermal areas, climbing in hazardous areas such as Grand Canyon of the Yellowstone, swimming in hazardous river sections, and limits on boats and motors on lakes and rivers. A complete listing of these are available in 36 CFR 1-7 (Office of the Federal Register 1992) and Yellowstone Compendium 36 CFR 1.7(B).

Limits on human activity to protect resources may involve limits on numbers, care and handling of stock, limits on activities in areas which are key habitats for sensitive species, and limits on the duration of certain activities. A major component of bear management is limiting human entry into very important seasonal habitats for bears or where there is a history of high potential of bear-human confrontation. Bear management areas have seasonal closures or human-use restrictions such as no off-trail travel or party size limitations (Table 3-24). Other areas may have temporary restrictions for specific emergency situations (Yellowstone National Park 1992f). Unless activities are specifically restricted to protect natural or cultural resources or for human safety, off-trail travel is authorized throughout the park. Consequently, during July through September, the principal summer use season (47,973 acres, 194 km^2; about 2% of the backcountry) is closed to human entry for grizzly bear conservation and human safety.

Table 3-22
Seasonal operating periods for visitor facilities in Yellowstone and
Grand Teton National Parks, 1992-1993.

	Summer Season		Winter Season	
Area	Opening Dates [a]	Closing Dates [b]	Opening Dates [a]	Closing Dates [b]
Yellowstone				March 14-March 21
Old Faithful	April 24-May 23	August 30-October 25	Dec 12-Dec 16	
Lake Area/Bridge Bay	May 16-June 15	September 7-September 27		
Grant Village	May 8-June 7	September 12-October 12		
Canyon	April 23-June 13	August 30-November 1	Dec 12-Dec 16	March 10-March 15
Tower	May 23-June 7	August 30-September 20		
Mammoth [c]	May 9-May 28	September 7-October 11	Dec 12-Dec 19	March 7-March 14
Grand Teton				
Flagg Ranch	May 15-June 1	September 1-October 15	Dec 1-Dec15	March 1-March 15
Colter Bay	May 2-June 5	September 7-October 11		
Jackson Lake Lodge	May 27-June 5	September 20-October 11		
Signal Mountain	May 9-May 29	October 1-October 13		
Jenny Lake	May 31-June 1	September 27-September 28		
Moose [d]	Open year-round			

[a] Dates include the opening of the first facility in an area until all facilities are open. Day use and support facilities usually open earliest with full service facilities and major lodging facilities opening later as visitor use increases.
[b] Dates include the closing of the first facilities in an area until all facilities are closed. Major facilities usually close earliest as visitor levels decline with smaller support facilities closing last.
[c] Some facilities are open year-round including visitor center, Mammoth campground, and Hamilton General Store.
[d] Visitor center remains open year-round

Table 3-23
Miles of trails in national parks, national forests, and national wildlife refuges in the Yellowstone area.

	Miles		
Unit	Motorized	Horse and Foot	Winter
Beaverhead N.F.	86	110	120
Bridger-Teton N.F.	800	1,304	128
Custer N.F.	126	178	27
Gallatin N.F.	434	850	159
Shoshone N.F.	205	687	125
Targhee N.F.	662	351	518
National Forest Total	2,313	3,480	1,077
Grand Teton N.P.	0	163	0
Yellowstone N.P.	0	1,000	247
National Park Total	0	1,163	247
National Elk Refuge	0	0.5	0
Red Rock Lake Wildlife Refuge	0	0	0
National Wildlife Refuge Total	0	0.5	0
Grand Total	2,313	4,643.13	1,324

Source: The Greater Yellowstone Coordinating Committee. 1987. The Greater Yellowstone Area, An Aggregation of National Park and National Forest Management Plans.

Table 3-24
Human-use restrictions in bear management areas in Yellowstone National Park, 1992

Area Name	Use Limit	Duration	Reason for Restriction	Acres
Firehole	Closed	Mar. 10-MDW[a]	Concentrated grizzly feeding area	20,670
Richard's Pond	Closed	Mar. 10-MDW	Frequent grizzly encounters	6,107
Gneiss Creek	Closed	Mar 10-June 30	Frequent grizzly encounters	9,333
Gallatin	No off trail travel	May 1-Nov 10	Frequent grizzly encounters	78,460
Blacktail	Closed	Mar 10-June 30	Concentrated grizzly spring feeding area	10,300
Washburn	Closed	Aug 1-Nov 10	Concentrated grizzly use area	32,613
Antelope	Closed (roads and turnouts open)	Mar 10-Nov 10	Concentrated grizzly use area	15,260
Mirror Plateau	Day use only	May 15-Nov 10	Grizzly security area, no trials or designated campsites	63,867
Pelican Valley	Closed Day use only	Apr 1-July 3 July 4-Nov 10	Cutthroat trout spawning Concentrated grizzly use area	33,460
Clear Creek	Trail limits – No off trail travel	Apr 1-Aug 10	Concentrated grizzly feeding area	28,560
Lake Spawn	No off trail travel	May 15-July 14	Concentrated grizzly feeding area	34,040
Two Ocean	No off trail travel	Mar 10-July 14, Aug 22-Nov 10	Grizzly bear security area	65,004
Riddle / Solution	Closed	Apr 30-July 14	Concentrated grizzly feeding area	12,060
Grant Village	Campground closed	To June 20	Concentrated grizzly feeding area	168
Heart Lake	Closed	Apr 1-June 30	Concentrated grizzly use area	54,600

[a] MDW = Through Friday of Memorial Day weekend.
Source: National Park Service unpubl. data.

National Forests

National forests are established under the Creation Act and managed under the Organic Act. In addition to these basic pieces of legislation, subsequent legislation, either specific to a particular forest or addressing some aspect of forest management direct such diverse issues as timber management, range management, recreation, wilderness management, air and water quality, natural and cultural resources, water and water rights, soil conservation, and minerals management.

The Forest and Rangeland Renewable Resources Planning Act of 1974, as amended by the National Forest Management Act (NFMA) of 1976 specifies that land and resource management plans shall be developed for units of the National Forest System. These plans guide natural resource management activities on the nation forests and consistent with other laws and regulations, are the basis for management of the national forests.

Within each plan, goals and objectives are established and standards and guidelines are described for the conduct of activities to achieve multiple use objectives. These plans are available for all national forests in the Yellowstone area. A detailed display of their content is beyond the scope of this document. Within each management area a priority is given to certain management objectives (Table 3-25). Management area specific objectives are identified, and standards and guidelines direct how each activity is to be coordinated with other multiple objectives.

Three general types of activities involve large areas of national forest land; livestock grazing, timber harvest, and recreation. The areas on national forests utilized for livestock grazing are described in the livestock section (see Table 3-18, Figure 3-17). Each livestock allotment has specifications and stipulations regarding conduct of that activity. In general, grazing is permitted from late June through late October (see Table 3-19).

Timber harvest occurs within areas determined to be suitable for timber production, which includes about 1.5 million acres (6,100 km^2) (Table 3-26). The level of timber harvest activity varies by year and by national forest. From 1986 to 1996, an annual average of about 28,000 acres (113 km^2) are planned or have been active timber harvest (Table 3-27 and Figure 3-19). The majority of future timber harvest (about 55%) will occur on the Targhee National Forest (Greater Yellowstone Coordinating Committee, 1987).

Table 3-25
Management direction by acres on each national forest in the Yellowstone area.

	National Forest						
Management areas/zones	Beaverhead	Bridger-Teton	Custer	Gallatin	Shoshone	Targhee	Total
Wilderness	101,400	1,190,300	339,800	713,700	1,277,100	133,800	3,754,100
Recommended wilderness	4,500		5,700	21,900		16,400	48,500
Wilderness study, W&S River		127,900		3,300	14,700	91,400	237,300
Developed recreation	3,400	47,700	2,600	38,700	6,000	76,300	174,700
Dispersed recreation	23,900	408,400	19,600	100,800	24,700		577,400
Range, minerals, wildlife, dispersed recreation	197,300		25,000	77,300	49,400	296,600	645,600
Timber, range, minerals				83,900			118,100
Timber, range, minerals, wildlife, dispersed recreation	47,800	166,200		53,000	682,200	354,100	1,303,300
Timber, wildlife, dispersed recreation	26,400	433,600	53,600	182,700	13,700	199,600	909,600
Wildlife, dispersed recreation	18,400	366,700	20,000	460,100	156,100	320,700	1,342,000
Others			17,000				17,000

Source: The Greater Yellowstone Coordinating Committee, 1987. The Greater Yellowstone Area, An Aggregation of National Park and National Forest Management Plans.

Table 3-26
Forested land (acres) determined suitable for timber production on national forests in the Yellowstone area.

National Forest	Suited	Not Suited
Beaverhead	54,600	240,100
Bridger-Teton	97,900	1,817,200
Custer	33,900	50,100
Gallatin	263,700	857,500
Shoshone	144,700	1,156,400
Targhee	910,600	377,500
Total	1,505,400	4,462,800

Source: The Greater Yellowstone Coordinating Committee, 1987. The Greater Yellowstone Area, An Aggregation of National Park and National Forest Management Plans.

Table 3-27
Acres of timber harvest planned annually on national forests in the Yellowstone area.

Year	Beaverhead [a]	Bridger-Teton [b]	Custer [c]	Gallatin [d]	Shoshone [e]	Targhee
1996		3,620	425	2,130		2,430 [f]
1995	1,972	2,830	400	2,130	2,313	2,757 [f]
1994	1,491	2,830	675	2,130	2,076	2,191 [f]
1993	1,781	2,830	375	2,130	2,304	12,900 [g]
1992	2,796	2,830	300	2,130	2,077	12,900 [g]
1991	2,326	2,830	450	2,130	1,947	12,900 [g]
1990	2,467	2,830	600	1,910	2,459	15,491 [g]
1989	2,265	2,830	650	1,718	2,065	17,257 [g]
1988	2,514	2,830	450	1,891	1,641	15,741 [g]
1987	3,250	2,830	400	1,509	3,205	15,445 [g]
1986	386	2,830	690		1,812	18,377 [g]
Annual Average	2,125	2,902	492	1,981	2,190	11,451

[a] Doesn't include thinning: data from Beaverhead National Forest, Management Plan, 1985
[b] Average for 1985-1994 for all harvest types (pole, posts and other products, commercial fuel wood, dead sawtimber, firewood and green sawtimber); data from Bridger-Teton National Forest, Management Plan, 1985
[c] Includes small sales; data from Custer National Forest, Management Plan, 1986
[d] Includes posts and poles; data from Gallatin National Forest, Management Plan, 1986
[e] Includes thinning but not small sales (posts, poles, etc.); data from Shoshone National Forest, Management Plan, 1986
[f] Does not include firewood (with the exception of the Ashton District firewood sales having 500 planned acres in 1994, 350 planned acres in 1995, and 350 planned acres in 1996) or district-wide deadwood sales which average 2.5 million board/feet cut; data from Targhee National Forest Five-Year Action Plan, Feb 17, 1994
[g] Includes firewood, posts and poles; data from Targhee National Forest, Management Plan, 1986

A substantial portion of the national forests are within designated wilderness, areas recommended for wilderness, or other roadless or undeveloped situations (Table 3-28). Wilderness is manage to maintain the primitive characteristics of an area, and activities such as road construction, timber harvest, and motorized use or mechanical transportation are generally prohibited. Activities such as camping, hiking, hunting, horseback riding, fishing, and livestock grazing are allowed. When an area is designated as wilderness, it is normally withdrawn from mineral entry.

Areas recommended for wilderness are managed with the objective of maintaining wilderness values, and no new development that wold diminish wilderness suitability is permitted. Areas managed as wilderness or recommended as wilderness in the Yellowstone area are mostly adjacent to Yellowstone National Park and at higher elevations. Consequently the majority of public use is limited by terrain and weather. Primary use occurs from middle to late June through October or early November.

In national forests in the Yellowstone area there are about 6,600 miles (10.600 km) of roads (Table 3-29). About 58% are open to unrestricted use, about 21% are closed to general public use, and about 21% have some form of seasonal restriction. There are also about 2,300 miles (3,700 km) of motorized trails and about 3,480 miles (5,600 km) of horse and foot trails primarily used during summer and about 1,077 miles (1,700 km) of winter trails that are used primarily for over-snow machines or cross-country skiing (Table 3-23).

Roads provide access to national forest lands for a variety of purposes including recreations, timber harvest, grazing, mining, oil and gas development, and access to camp grounds and trail heads. Management of roads on national forests are described in the transportation plans for each forest. Access to national forest land by various classes of road management is displayed in Table 3-30. About 28% is open to all motorized use, about 44% is closed to all motorized use (primarily wilderness and recommended wilderness), and about 8% is closed to all except snowmobiles. About 6% has some seasonal or other restriction and about 14% includes areas where travel is restricted to designated routes. On average, a mile of open road provides access to about 1 square mile (0.62 km/km^2) of national forest.

Seasonal restrictions on public access generally result from several main causes. Snow closes most roads in national forests, except for those plowed by private or public groups who require business access. Reasons for seasonal restrictions include human safety, protection of the road bed itself during spring thaw and break-up, protection of seasonally important wildlife habitats such as elk winter range or calving areas, or for conservation of threatened or endangered species such as grizzly bears and bald eagles.

Table 3-28
Acres of wilderness and other undeveloped areas on national forests in the Yellowstone area.

National Forest	Wilderness	Recommended wilderness, wilderness study	Undeveloped areas	Other
Beaverhead	101,400	4,500	211,600	3,700
Bridger-Teton	1,190,300	127,900	1,004,500	
Custer	339,800			
Gallatin	713,700	25,200	379,000	43,300
Shoshone	1,277,100	14,700	432,500	28,800
Targhee	131,800	101,800	474,100	
Total	3,754,100	274,100	2,501,700	75,800

Source: The Greater Yellowstone Coordinating Committee, 1987. The Greater Yellowstone Area, An Aggregation of National Park and National Forest Management Plans.

Elk winter range (Figure 3-20) and elk calving areas in the Yellowstone area are distributed at middle to lower elevation. There areas comprise about 1.3 million acres (5,300 km^2) of winter range and about 500,000 acres (2,000 km^2) of calving area (Table 3-31). Seasonal restrictions on access in these areas are usually a combination of road closures, open road density standards or restricting vehicle access to certain designated routes to achieve cover-security objectives. Restrictions for big game winter range generally include the period from middle to late November through April or May (Table 3-32). Seasonal restrictions for big game birthing (elk calving, bighorn sheep lambing) areas generally include the period from middle to late May through June.

Table 3-29
Miles of roads in national forests in the Yellowstone area.

National Forest	Open	%	Closed	%	Seasonal Restrictions	%	Total
Beaverhead	223	57	56	14	115	29	394
Bridger-Teton	720	40	552	30	540	30	1,812
Custer	131						
Gallatin	162	20	21	3	624	77	807
Shoshone	1,250	77	326	20	50	3	1,626
Targhee	1,350	74	420	23	56	3	1,826
Total	3,836	58	1,375	21	1,385	21	6,596

Source: The Greater Yellowstone Coordinating Committee, 1987. The Greater Yellowstone Area, An Aggregation of National Park and National Forest Management Plans.

Table 3-30
Acres accessed under various classes of road-management restrictions on national forests in the Yellowstone area.

National Forest	Open to all motorized use	Closed to all motorized use	Closed to all except snowmobiles	Seasonal or other restrictions to motorized use	Travel restricted to designated routes
Beaverhead		138,800		288,000	
Bridger-Teton	966,300	1,066,000	699,300	6,300	2,900
Custer	159,500	346,200	1,000		10,800
Gallatin	555,100	834,700		187,100	158,500
Shoshone		1,350,300		39,300	834,300
Targhee	844,300	254,500	39,200	44,800	294,400
Total	2,525,200	3,990,500	739,500	565,500	1,300,900

Source: The Greater Yellowstone Coordinating Committee, 1987. The Greater Yellowstone Area, An Aggregation of National Park and National Forest Management Plans.

Table 3-31
Acres of elk seasonal ranges in national forests in the Yellowstone area.

National Forest	Summer	Winter	Calving
Beaverhead	425,000	45,000	31,800
Bridger-Teton	345,900	212,100	229,900
Custer	31,900	33,500	4,100
Gallatin	1,057,300	513,200	[a]
Shoshone	1,180,200	421,300	41,100
Targhee	757,500	103,800	236,500
Total	3,797,800	1,328,900	543,400

[a] Information is not available
Source: The Greater Yellowstone Coordinating Committee, 1987. The Greater Yellowstone Area, An Aggregation of National Park and National Forest Management Plans.

Important habitats for threatened and endangered as well as sensitive species also receive consideration. Grizzly bear habitat has been stratified into management situations base on importance of habitat in an area to seasonal needs of grizzly bears and grizzly-human conflict potential (Figure 3-21). These include about 1.8 million acres (7,300 km^2) in situation I, about 1.6 million acres (6,500 km^2) in situation II, and about 79,600 acres (330 km^2) in situation III (Table 3-33). In general, situation I is important bear habitat year-round, situation II is important seasonally, and situation III areas are areas of high conflict potential, such as developments and campgrounds, where grizzly presence is not desirable.

In some situations, human activity is limited to allow use by bears of important seasonal ranges. Limits on human activity such as use of roads or other access usually involve the spring from March through June to allow use of key spring ranges while bears are stressed after den emergence. Many of these areas include ungulate winter ranges or ungulate calving and fawning areas where winter killed carrion is available. Many of the seasonal restrictions for the various reasons including road be protection, big game seasonal ranges, and threatened or endangered species occur at the same time and in the same area, and are not necessarily additive.

Table 3-32
Examples of seasonal restricts to protect wildlife seasonal ranges on national forests in the Yellowstone area[a].

Restrictions	Shoshone	Gallatin	Beaverhead	Targhee	Custer	Bridger-Teton
Big game - winter	Nov 15-Apr 15 (crucial range)	Oct 15-Jun 30; Yearlong	Dec 15-May 15; Oct 15-May 15; Yearlong	Dec-Mar; Nov-Apr	Nov 1-Jun 1; Nov 30-Jun 15	Nov 15-Apr 30; Dec 1-Apr 30
Big game - calving	May 1-Jun 15	May 1-Jun 15	Yearlong; Apr 1-Jul 1	May-June	Jun 1-Jun 15; May 1-Jul 10; Jun 1-Jul 1	May 15-Jun 30
Wildlife security		Oct 15-Jun 30; Sept 1-Nov 30; Jan 1-May 15; Yearlong (limited)	May 15-Dec 1; Oct 15-May 15; Oct 1-Jul 1; Apr 1-Dec 1; Sept 1-Dec 1; May 15-Dec 1; Yearlong	Mar-July		May 1-Nov 30 (open to motorized use on designated routes, open to foot and horse travel)
Erosion control		Oct 15-Jun 30; Jan 1-May 31; Jan 1-Jun 30; Yearlong	Apr 1-Jul 1; Apr 1-Dec 1; Oct 1-Jul 1; Dec 1-May 15; Oct 15-Jul 15; May 15-Dec 1; Yearlong			Yearlong in designated areas
Migration route	Oct 15-Nov 15					
Nest sites	Feb 1-Jul 31 (peregrine falcon and bald eagle		Yearlong (swan); Dec 1-May 15 (waterfowl); Feb 15-Aug 1 (Bald Eagle)	Feb 15-Jul 15 (Eagles, Falcons, Merlins, & Prairie Grouse)	Mar-Jul; May-Jul; Apr-Jul; Mar-July; Feb 15-Jul 15	

[a] Targhee National Forest – Management Plan; Custer National Forest – Management Plan; Dave Henry, pers. commun. and maps of the Shoshone, Gallatin, Beaverhead, Targhee, Custer, and Brigder-Teton National Forests.

Table 3-33
Acres of grizzly bear management situations in national forest and national parks in the Yellowstone area.

Unit	Situation I	Situation II	Situation III
Beaverhead N.F.		68,500	
Bridger-Teton N.F.	665,500	61,500	7,100
Custer N.F.	5,500	105,000	
Gallatin N.F.	493,400	324,000	1,100
Shoshone N.F.	412,000	819,600	17,400
Targhee N.F.	180,500	266,500	54,000
National Forest Total	1,756,900	1,645,100	79,600
Grand Teton N.P.	118,400	212,700	2,600
Yellowstone N.P.	2,219,400	2,300	100
National Park Total	2,337,800	215,000	2,700
Grand Total	4,094,700	1,860,100	82,300

Source: The Greater Yellowstone Coordinating Committee, 1987. The Greater Yellowstone Area, An Aggregation of National Park and National Forest Management Plans

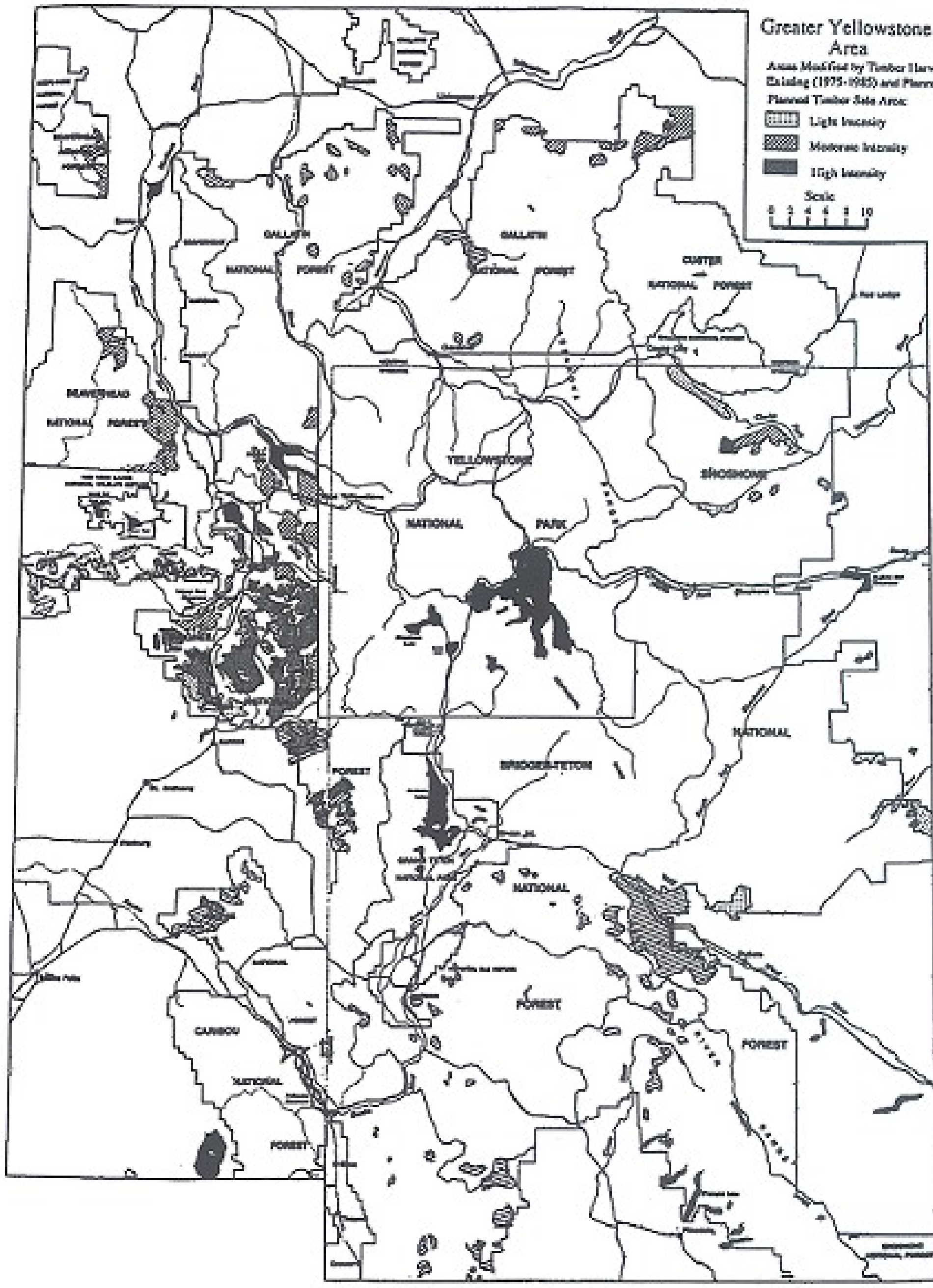


Figure 3-19
Areas modified by timber harvest from 1975 to 1985, and planned areas of timber harvest.
Adapted from Greater Yellowstone Coordinating Committee (1987)

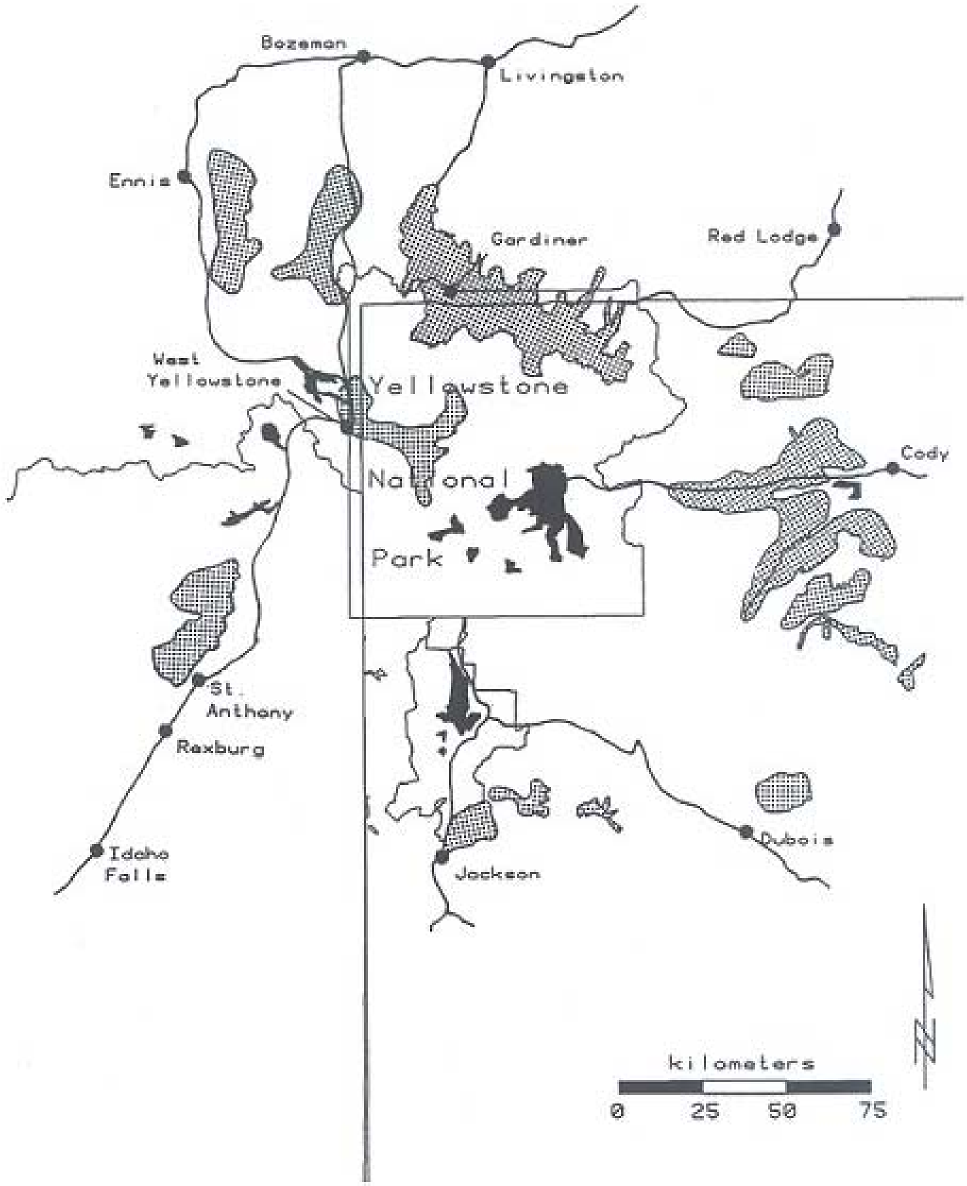


Figure 3-20
Elk winter range in the Yellowstone area

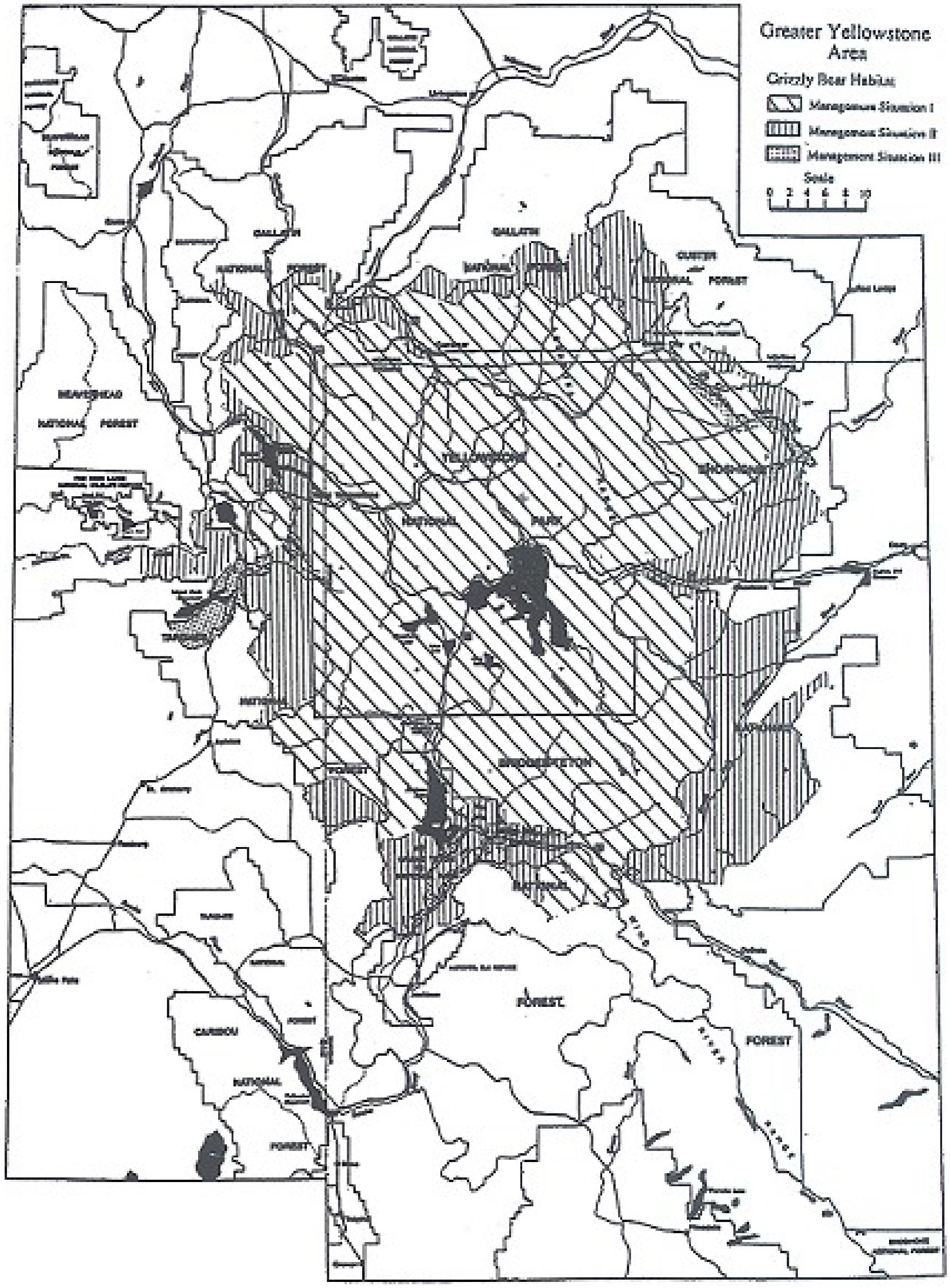


Figure 3-21
Grizzly bear management situations on national forests and national parks in the Yellowstone area. Adapted from Greater Yellowstone Coordinating Committee (1987)

Effect of Open Road Density of Wolves

Human-caused mortality, as indexed by road density (two-wheel drive accessible roads per given amount of area) and thus human access, seems to limit wolf distribution and numbers in the Great Lakes are (Thiel 1985, Jensen et al. 1986, Mech et al. 1988, Fuller 1989, Mech 1989, Fuller et al. 1992). Data from Wisconsin, Michigan, and Minnesota suggest that under recent and current circumstances, wolf population persistence is normally unlikely in areas with open road densities greater than about 1 mile of open road per square mile (0.62 km/km^2) of habitat. However, wolf populations can persist in areas with open road density higher than 1 mile of open road/mi^2 (0.62 km/km^2), if such areas are near large areas of occupied wolf habitat with few or no roads (such as National Parks or Wilderness areas) (Mech 1989).

The relationships between roads, wolf survival, and wolf habitat use is far more complicated than simply road density alone. Wolf vulnerability is influenced by terrain, topography, cover, traffic, and road distribution in the landscape as well as the ability, opportunity, and desire of people to kill wolves. Because of differences in topography and vegetative cover, it is unknown if the information form the Great Lakes area can be directly applied to the northern Rocky Mountains. Wolves may be less susceptible to human persecution in the Great Lakes area than they would be in the northern Rocky Mountains because in the western U.S., vegetation is less dense, mountainous terrain concentrates wolf movements, and there is more topographical relief. In contrast, wolves in the western U.S. may be less vulnerable to human persecution because of lower overall human densities, different patterns of seasonal road use, and different patterns of human settlement. Hence, road densities necessary to provide security for wolves in the West may be different than reported elsewhere. Two wolf packs in Montana have survived for at least three years in areas with apparently high road density, but in contrast, most documented wolf mortalities have been associated with road access. We examined the issued of road density in the Yellowstone and central Idaho areas to determine if open road density exceeded the threshold recommended in the Great Lakes area.

Determining open road density depends upon the definition of an open road, how much area is analyzed, and how seasonal or temporary roads are measured as well as the methodology used (“precise” road densities using a GIS “roving window” technique versus averaging road densities over a broad geographical area). For simplicity, the miles of open road in the Yellowstone and central Idaho areas were divided by the square miles in each area. The area managed by the federal government in the Yellowstone primary analysis area and the Idaho primary analysis area that was no in national parks or designated wilderness was 8,966 mi^2 (23,200 km^2) and 14,723 mi^2 (38,100 km^2) respectively. The USDA Forest Service provided estimates of the miles of roads or trails where motorized vehicles could be used in both areas. Inventories of open, seasonally opened, and closed roads were difficult to obtain, however, an estimate of miles of open roads (including seasonally open roads) was obtained for both the Yellowstone (up to 8,057 miles, or 13,000 km of open road) and central Idaho (up to 14,470 miles, or 23,300 km of open road) areas. Open road densities outside of national parks and USDA Forest Service wilderness areas in the Yellowstone (up to 0.90 miles open road/mi^2; 0.56 km/km^2) and central Idaho (up to 0.98 miles open road/mi^2; 0.62 km/km^2) of habitat. Bases upon (1) current open road information, (2) the success of wolf packs in highly roaded habitats in Montana, and (3) that these roaded areas of public land being proposed for wolf recovery are adjacent to large (about 4-5 million acres; 16,200-20,300 km^2) roadless area, it appears unlikely that road density guidelines must be employed as a wide-spread land-management strategy to support wolf recovery. However, it should be emphasized that besides being important to wolves, wolf prey, particularly elk, also benefit if there is less than one mile of open road per square mile (0.62 km/km^2) of habitat. (See Coordinating Elk and Timber Management, Lyon et al. 1985 for further references).

Animal Damage Control Techniques

Activities to control damage by wildlife to livestock or property are conducted primarily by private individuals or USDA, Animal and Plant Health Inspection Service (APHIS), Animal Damage Control (ADC). Capture or control of game animals that are predators, such as bears or mountain lions, may be conducted by state wildlife agencies or tribal wildlife authorities. Bears are normally captured by leg-hold snares or culvert traps. Lion are normally treed with dogs and shot or tranquilized.

USDA, Animal and Plant Health Inspection Service, Animal Damage Control (ADC) initiated a programmatic consultation in 1990 on the effects of the ADC program on threatened and endangered species. The FWS concluded that the use of snares, steel traps, and aerial shooting in the ADC program would not likely jeopardize the continues existence of the gray wolf. Under Section 7 of the ESA, the FWS authorized the incidental take of one wolf annually in each occupied state during legitimate ADC control actions. Terms and conditions in the Biological Opinion included the following: (1) an incidental take in excess of one wolf in any state (in a given calendar year) will result in cessation of the activity causing take and reinitiation of consultation, (2) all leghold traps shall be checked at least daily in areas known to be occupied by gray wolves, (3) neck snares shall not be used in areas known to be occupied by gray wolves except for areas where wolves may be a target species, (4) number three or smaller traps may pose a threat to juvenile wolves and therefore should not be used in proximity to occupied dens and rendezvous sites, (5) the FWS's Ecological Services Office, in the Regions of the species' occurrence, shall be notified within five days of the finding of any dead or injured gray wolf, (6) ADC personnel shall participate fully in interagency wolf monitoring programs, and (7) ADC personnel shall informally consult on an annual basis with the FWS on the current status of the wolf in areas where recolonization is occurring. The Draft Environmental Impact Statement on the ADC program concluded that the above-ground use of strychnine to control rodents and rabbits, the use of compound 1080 toxic collars to control coyotes, and the use of M-44s to control coyotes, could adversely affect the gray wolf.

In accordance with the existing label, strychnine baits should not be used in the geographic range of the gray wolf except under programs and procedures approved by the Environmental Protection Agency (EPA). EPA label restrictions also do not allow the 1080 toxic livestock collar to be used in areas where gray wolves may occur. M-44s are also prohibited in occupied gray wolf range.

The vast majority of these efforts are directed at reducing or controlling coyote depredation on cattle and sheep. These are conducted using a variety of techniques. Aerial shooting is used, but has limitations because of weather, terrain, and cost. Aerial shooting by private parties on federal land can be permitted. Other techniques include leg-hold traps and neck snares. These are primarily used at lower elevations on private land.

Over two toxicants are registered by the Environmental Protection Agency (EPA) for control of coyotes. These include toxic collars and M-44s. Toxic collars are placed on the necks of sheep and when bitten by a coyote expel compound 1080 (Sodium fluoroacetate). These devices are registered for operational use, and receive extremely limited application.

M-44s contain capsules of sodium cyanide and are lethal to most mammals that activate them. Their use around Yellowstone is generally on areas of private land at lower elevations away from any area occupied by grizzly bears.

M-44s are primarily used by ADC personnel to control coyotes on private land in response to landowner requests. Use of M-44s by ADC on private lands in the Montana park of the primary analysis area may involve up to 160 ranches. The devices are not used on every ranch every year or in any ranch all year, but may be used based on the particular situation (ADC personnel, pers. commun.). There are an estimated 3,470 farms in the seven Montana counties around Yellowstone, with an estimated 2,266 farms large than 160 acres (0.65 km^2) (U.S. Department of Commerce 1989b). Within the Montana portion of the primary analysis area there are an estimated 717 farms larger than 160 acres (0.65 km^2) and an estimated total of 1,100.

Use of M-44s by ADC on private lands in the Idaho part of the primary analysis area may involve 10 to 15 ranches. As in Montana, the devices are not used on every ranch every year or on any ranch all year, but may be used some time during the year based on the particular situation (ADC personnel, pers. commun.). There are an estimated 2,229 farms in the four Idaho counties around Yellowstone, with an estimated 1.061 larger than 160 acres (0.65 km^2) (U.S. Department of Commerce 1989b). Within the

Idaho portion of the primary analysis area there are an estimated 858 farms larger than 160 acres (0.65 km^2) and an estimated total of 1,802.

M-44 use in the Wyoming portion of the primary analysis area is very limited and may involve 10 to 15 ranches in the area southwest of Pinedale, Wyoming, generally south of the primary analysis area. There are an estimated 2,575 farms in the six Wyoming counties around Yellowstone, with an estimated 1,346 larger than 160 acres (0.65 km^2) (U.S. Department of Commerce 1989b). Within the Wyoming portion of the primary analysis area there are an estimated 252 farms larger than 160 acres (0.65 km^2) and an estimated total o 482.

M-44s may also be used by private owners on private land after the operator receives certification. However, there are no certified operators in the primary analysis area now (ADC pers. commun.). There is now no authorized use of M-44s on any public land around Yellowstone.

Yellowstone: Visitor Use

An Overview of Visitor Use

U.S. citizens and people from all over the world spend 9 million visitor days of recreation in developed sites of the Yellowstone area each year. In the national parks, more than 95% of all recreation takes place at developed sites. In national forests, developed sites account for only about 25% of recreational use, and the rest is dispersed. Federal, state, and county public sites, and boat launching facilities (GYCC 1987).

In national parks, recreational activities are constrained by the responsibility to conserve the scenery and the natural and historic objects and the wildlife of the enjoyment of future generations (P.L. 64-235, 16 U.S.C. ss 1, 2-4). Therefore, motor vehicles are confined to roads, camping is confined to specified sites, hunting is prohibited except as an elk reduction measure in Grand Teton National Park, and fishing regulations are designed to protect native species.

National forests place fewer restrictions on recreation. Therefore, forests have fewer motor vehicle restrictions, camping is allowed in most areas, hunting is allowed, and state fish and game agencies administer harvest of fish and game.

Yellowstone National Park

Recreational visitation to Yellowstone National Park has grown by more than 23% in the last ten years, from 2,404,862 in 1982 to 3,144,405 in 1992 (Yellowstone National Park 1992a and 1993).

Yellowstone National Park visitors in 1990 (Littlejohn et al. 1990) who stayed in the park more than one day reported their activities included viewing wildlife (93%), seeing thermal features (85%), photography (83%), walking for pleasure (75%), and visiting visitor centers (73%).

Of overnight visitors, 84% stayed in the park’s developed campgrounds, usually for one night. Of those who stayed outside the park, 59% stayed in hotels or cabins, commonly for three nights (Littlejohn et al. 1990).

The University of Wyoming (Atkinson et al. 1986) questioned Yellowstone campers about how they spent portions of their time in the park. Sightseeing (vehicle touring) was the most frequent response (77%) (Table 3-34).

Of the 2.9 million April-September visitors to Yellowstone National Park in 1991, 17,618 registered to use park backcountry campsites, for a total of 38,447 visitor-use nights (Yellowstone National Park 1992b).

Table 3-34
Activity of visitors to Yellowstone National Park

Activity	% of Time
Sightseeing (vehicle touring)	77.32
Hiking, backpacking	7.79
Other (cycling, photos, etc.)	5.06
Stream fishing	4.26
Lake fishing	4.17
Swimming, boating, etc.	1.40

Several of the alternatives identify a period from April through June as a time when human activity near active wolf dens may be restricted. Consequently recreation visitation and backcountry use in Yellowstone National Park during that period is specifically summarized. Table 3-35 lists monthly visitation to Yellowstone as percentages of annual visitation.

Table 3-35
Monthly visitation to Yellowstone National Park as % of annual visitation, 1981-1991 [a]

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
%	1.0	1.3	0.7	1.0	6.8	18	28	25	13	4.4	0.5	0.8
				Subtotal Apr., May, and June 26 [b]								

[a] Source: Yellowstone National Park, 1992a
[b] Subtotal of April, May, and June percentages as a percent of April-October totals.

Both private groups and commercially outfitted parties, the latter mainly on horseback, use backcountry trails and campsites overnight during wolf denning months (Table 3-36). Because fully half of a recovered wolf population is projected to live on the northern Yellowstone elk winter range (Garton et al. 1990 and Koth et al. 1990), backcountry use in Yellowstone is broken out by north and south, and by month, to better allow evaluation of possible effects of wolf presence (Table 3-37).

Table 3-36
Backcountry use in Yellowstone National Park, April-October 1992 [a]

1992	Visitor-use nights	% Apr-Oct	# of people	# of permits	# of stock	Stock-use nights	% Apr-Oct
April	199		92	36	0	0	
May	1,602	19.2 [b]	968	380	0	0	1.4 [b]
June	5,876		3,391	1,131	58	96	
July	14,729		9,671	2,036	788	2,800	
August	12,035		5,613	1,821	859	3,100	
September	4,368		2,018	814	310	840	
October	1,153		562	211	45	101	
Totals	39,962		22,315	6,429	2,060	6,937	

[a] Source: Yellowstone National Park, 1992b
[b] Sum of April-June visitor-use nights (2 visitors staying 3 nights = 6 visitor-use nights) and stock-use nights as a % of April-October totals

Table 3-38 shows that 215 (3.5%) of visitor-use nights and 90 (1.5%) of stock use nights of commercial outfitter use were counted in April-June 1992.

Day users of trails do not usually get as far from trailheads as overnight users, although there are exceptions. Commercial outfitters registered 582 day trips with 2,089 guests using 12,043 stock days in Yellowstone National Park in 1991 (Yellowstone National Park 1992c).

Table 3-37
Backcountry use by month, April-October, by area in Yellowstone National Park, 1992. North is defined as areas north of the park road from West Yellowstone, Montana, to Madison, Norris, Canyon, Fishing Bridge, and East Entrance. Areas south of the road are labeled south. [a]

Area of Yellowstone	Visitor-use nights	# People	Permits	Stock	Stock-use nights
North					
April	164	83	32	0 [b]	0
May	895	576	248	0 [b]	0
June	2,437	1,676	603	52 [b]	90
July	14,729	9,671	2,039	780	2,784
August	12,035	5,613	1,821	859	3,100
September	1,539	818	336	143	564
October	358	186	41	8	16
South					
April	35	9	4	0 [b]	0
May	707	392	132	0 [b]	0
June	3,439	1,715	528	6 [b]	6
July	9,758	6,774	1,021	308	1,119
August	7,524	3,154	965	328	1,074
September	2,829	1,200	478	167	568
October	795	376	140	37	85

[a] Source: Yellowstone National Park 1992b
[b] Muddy trails normally preclude horseback use of park trails until July. Backcountry permits are issued before July to stock users in exceptional cases, such as periods of dry spring weather that allow drying of low elevation trails (Yellowstone National Park 1992b).

Table 3-38
Backcountry use in Yellowstone National Park by commercial outfitters, April-October 1992. [a]

1992	Visitor-use nights	% Apr-Oct	# of people	# of permits	# of stock	Stock-use nights	% Apr-Oct
April	0		0	0	0	0	
May	0		0	0	0	0	
June	215	3.5 [b]	62	9	52	90	1.5 [b]
July	2,733		703	100	675	2,527	
August	2,408		586	82	766	2,845	
September	663		149	21	219	662	
October	132		37	4	26	70	
Totals	6,151		1,537	216	1,758	6,194	

A Source: Yellowstone National Park, 1992e.
B Sum of April-June visitor-use nights and stock-use nights as a % of April-October totals

Trailhead data provided an index of day use of park trails. Assuming reintroduced or recolonizing wolves might use dens in the vicinity of those recorded in the park 1916-1923 (Weaver 1978, Figure 3-10), some trails of importance in relations to potential wolf dens by trail users could be those listed in Table 3-39.

Table 3-39
Trail use in Yellowstone National Park recorded at trailhead registers, summer 1992

	Total	April-June use	Percent of Total
Lamar River	861	256	29.7
Slough Creek	1,604	340	21.2
Specimen Ridge	508	124	24.4
Hellroaring	1,038	234	22.5
Pelican Valley [a]	1,018	closed	0.0

Backcountry use is regulated during seasons, times of day, and under other conditions to allow threatened grizzly bears to feed, rest, and rear their young free of human disturbance. Bear Management Areas will offer refuge for denning wolves in, for example, the Blacktail Area and the Antelope Area, and will offer them, along with grizzly bears, undisturbed access to elk as prey in the Washburn Area, Pelican Valley, on the Mirror Plateau, Two Ocean, and Heart Lake Area (Table 3-24). Spring, when wolves are rearing pups, coincides with maximum numbers of elk and bison available as carrion or vulnerable prey, because the height of winter die-offs is March through May (Cole 1972, Houston 1978, Mattson and Henry, 1987). Historical data (Weaver 1978), the opinions of 15 North American wolf experts (Koth et al. 1990), and several projections based on computer simulation models such as those of Boyce (1990), Garton et al. (1990), Boyce and Gaillard (1992) suggest where recovered wolves might live in Yellowstone. More than half of the projected 501-50 wolves may live on the winter range of the northern Yellowstone elk herd in the park.

Grand Teton National Park

Grand Teton National Park records more visits than Yellowstone National Park in some years (Table 3-40), but, because visitors spend much more time seeing Yellowstone, the larger park records roughly six times the number of recreation visitor days (RVD's – 1 visitor spending 12 hours) than does Grand Teton National Park. Of 9 million RVD's recorded annually in the Yellowstone area, Yellowstone National Park provided about 6.5 million, and Grand Teton National Park about 1.1 million. Six national forests provided the remaining 1.4 million RVDs (GYCC 1987).

Table 3-40
Recreation travel to Yellowstone National Park and Grand Teton National Park, 1982-1991 compared. [a]

	Grand Teton	Yellowstone
1982	3,446,260	2,404,862
1983	2,571,204	2,405,653
1984	2,239,513	2,262,969
1985	2,130,210	2,262,455
1986	2,180,361	2,405,063
1987	2,428,640	2,618,249
1988	2,076,698	2,21,128
1989	2,348,131	2,680,376
1990	2,680,777	2,857,096
1991	2,862,158	2,957,856
Ten-year Average	2,505,400	2,510,700

[a] Source: Yellowstone National Park 1992a, Grand Teton National Park 1992a

Of the approximately 2.5 million visitors to Grand Teton National Park annually, about 26,800 (1%) use the backcountry overnight. Table 3-41 shows that 13.6% of April-October overnight visitors use Grand Teton National Park during April-June. In John D. Rockefeller memorial Parkway, April-June backcountry use is 7.8% of the April-October total.

Table 3-41
Grand Teton National Park (GTNP)and John D. Rockefeller Memorial Parkway (JDRMP) backcountry use, April-June, and April-October 1991 [a]

1991	April	May	June	April-October
GTNP visitor-use nights [b]	57	452	3,143	26,842
% of April-October total	0.2 +	1.7 +	11.7 =	(13.6%)
JDRMP visitor-use nights	48	.6	11	322
% of April-October total	2.5 +	1.9 +	3.4 =	(7.8%)

[a] Source: Grand Teton National Park 1992b
[b] V.U. nights; 2 visitors staying 3 nights = 6 visitor-use nights

Grand Teton National Park permits 31 concessionaires to offer cabins, camping, mountaineering, lake tours, fishing, river floating, boat rentals, local or day use horse rides, and backcountry backpacking or horsepacking trips. These serviced reached 607,995 visitors in 1992. Six of 31 concessionaires offered backcountry horsepacking or backpack trips that served 2,458 visitors, or 0.4% of the 1992 total served by concessionaires (Grand Teton National Park 1992c). Table 3-42 lists numbers of parties and visitors taken into the Grand Teton National Park backcountry April to October 199; 17 parties totaling 93 visitors by horse, and 94 parties totaling 2,365 visitors by backpack.

Table 3-42
Grand Teton National Park concessionaire backcountry trips April to October 1992 [a]

1992	June [b]	July	August	September	Totals
Horsepacking					
Parties	0	3	11	3	17
Visitors	0	16	57	20	93
Backpacking					
Parties	12	58	22	2	94
Visitors	141	1,653	499	72	2,365

[a] Source: Grand Teton National Park 1992c
[b] No backcountry trips by concessionaires were recorded in April, May, or October, and they do not operate in the winter months.

National Forests

The six national forests surrounding Yellowstone National Park and Grand Teton National Park provide a total of 9,176,800 Recreation Visitors Days in 1992 (Table 3-43).

In 1991, Beaverhead National Forest recorded 19 outfitters providing 2,806 use days (2 visitor x 2 days = 4 use days). Custer National Forest, Beartooth District recorded 17 outfitters providing 3,710 use days. Gallatin National Forest recorded 83 outfitters providing 15,532 service days, including the part of the forest north of I-90. Shoshone National Forest recorded 99 outfitters providing 13,677 service days. In 1992, five ranger districts on the Bridger-Teton National Forest (Big Piney, Buffalo, Greys River, Jackson, and Pinedale) reported a total of 240 outfitters providing 75,247 service days. Those five districts reported 111 outfitters provided 41,902 service days in summer using pack stock, 32 outfitters provided 16,677 service days in summer on foot (backpacking), and 97 outfitters provided 16,565 service days in fall, hunting (BNF 1992b, BTNF 1992b, CNF 1992b, GNF 1992b, SNF 1992b, TNF 1992b).

Table 3-43
Beaverhead, Bridger-Teton, Custer, Gallatin, Shoshone, and Targhee National Forests recreation sue, by Recreation Inventory Management (RIM) Activity Group, FY 1992, in thousands of Recreation Visitor Days (RVDs). [a]
Percentages of grand total of recreation activities are in parentheses.

RIM Activity Grouping	Beaverhead	Bridger-Teton	Custer [b]	Gallatin	Shoshone	Targhee
Camping, picnicking, swimming	1109.1 (30)	663.2 (25)	157.1 (31)	425.9 (15)	332.3 (27)	462.6 (28)
Mechanized travel and viewing scenery	73.5 (20)	753.1 (28)	91.6 (18)	858.5 (31)	396.0 (32)	329.1 (20)
Hiking, horseback, and water travel	41.0 (11)	728.9 (27)	75.6 (15)	453.7 (16)	97.8 (8)	99.6 (6)
Winter sports	11.5 (3)	129.7 (5)	60.6 (12)	192.7 (7)	16.3 (1)	116.2 (7)
Resorts, cabins, organization camps	12.8 (3)	67.1 (2)	27.1 (6)	113.6 (4)	157.8 (13)	210.6 (13)
Hunting	82.7 (22)	160.8 (6)	21.3 (4)	210.6 (7)	84.7 (7)	119.0 (7)
Fishing	26.6 (7)	95.8 (4)	46.6 (9)	243.3 (9)	78.6 (7)	90.0 (6)
Non-consumptive wildlife use	2.0 (1)	0.5 (00	10.5 (2)	16.0 (1)	18.9 (2)	10.8 (1)
Other recreational activities	10.5 (3)	67.6 (3)	14.7 (3)	283.6 (10)	31.0 (3)	189.1 (12)
Grand Total	369.7 (100)	2,667.7 (100)	505.1 (100)	2,797.9 (100)	1,210.1 (100)	1,627.0 (100)
Wilderness total use (included above)	39.0 (11)	543.3 (20)	141.5 (20)	291.8 (10)	173.6 914)	45.1 (3)
Total number of recreational value (1000s) [c]	485	87,800	680	3,968	2,714	1,781
% of forest area within the primary analysis area	19	79	100 b	90	97	83

[a] Recreation visitor Day (RVD); one visitor spending 12 hours recreating on a national forest. Sources: Beaverhead National Forest 1992a; Bridger-Teton National Forest 1992a; Custer National Forest 1992a; Gallatin National Forest 1992a; Shoshone National Forest 1992a; Targhee National Forest 1992a

[b] Beartooth Ranger District only

[c] A recreation visit is an entry of one person upon a national forest to participate in one or more recreation activities for an unspecified period of time

National Wildlife Refuges

Red Rock Lakes National Wildlife Refuge, occupying 69 mi2 of the Centennial Valley 45 miles west of Yellowstone National Park, received an estimated 10,000-13,000 recreation visits annually. About 85% of the refuge visits are for wildlife observations (Red Rock Lakes National Wildlife Refuge 1990).

The National Elk Refuge, northeast of Jackson, Wyoming, received 704,929 visits in calendar year 1991. Most (355,746) were engaged in non-consumptive wildlife recreation, 1,445 were hunters, and 1,838 were fishers (National Elk Refuge 1992).

Yellowstone: Economics

The 17 counties that constitute the Yellowstone area have a combined population of 288,000. Population growth has followed the same trend as the population in the region. The population of these 17 counties accounts for about 13% of the population of the 3-state region. About 17% of the people in the counties are aged 55 or older, slightly younger than the national average.

Per capita income was $14,676 in 1990 (Table 3-44). Real per capita income feel in the mid-1970s relative to the regional total to about 95%. Otherwise it followed the same trend as the regional real per capita income (remained relatively constant through the 1980s and showed some growth in 1989 and 1990).

Table 3-44
Per capita personal income trends in 3-state region and primary analysis areas: 1970-1990

Area	1970 per cap income [a]	1980 per cap income [a]	1990 per cap income [a]
3-state region (Idaho, Montana, Wyoming)	11,554	14,218	15,475
17 county Yellowstone area	11,520	13,514	14,676
10 county central Idaho area	11,712	13,839	15,552

[a] Dollar figures are adjusted to 1990 price levels

Total personal income in the 17 county Yellowstone area was $4.2 billion in 1990, about 12% of the 3-state regional total – reflecting the slightly lower per capita income. The allocation of total personal income across sources is similar to the regional economy (Table 3-45). Farming and agricultural services account for about 6% and ahas fallen from about 11% in the early 1970s. Livestock accounted for about 56% of the value of farm products sold in 1987 – a slightly higher percentage than in the region. Local services have consistently generated slightly less than 40% of total personal income. Other industry, however, is relatively less important – falling from about 27% in the early 1970s to 20% in 1990. In contrast, income other than earnings is relatively more important and has grown more rapidly than in the regional economy during the past two decades from 23% to 34% (Table 3-45). This reflects the relatively high amenity value of living in the area associated with the proximity of Yellowstone and Grand Teton National Parks and their various programs for protecting wildlife populations, ecosystem health, and access to outdoor recreation.

Table 3-45
Major economic sectors as a percentage of total personal income: 3-state region and primary analysis areas.

Area	1970 % of total personal income	1980 % of total personal income	1990 % of total personal income
3 state region			
Farm income Livestock income (1987)	10.9	4.8	5.6 2.9
Local services	40.0	38.1	39.9
Other industry	29.0	33.2	24.2
Non-earnings income	20.1	23.9	30.3
Yellowstone area (17 counties)			
Farm income Livestock income (1987)	11.3	5.7	6.4 3.6
Local services	38.9	38.2	39.5
Other industry	26.6	28.7	19.8
Non-earnings income	23.2	27.4	34.3
Central Idaho (10 counties)			
Farm income Livestock income (1987)	8.0	6.5	8.0 5.2
Local services	31.1	30.9	34.6
Other industry	41.4	36.9	24.8
Non-earnings income	19.4	25.7	32.6

Central Idaho: The Region

The state of Idaho covers nearly 53 million acres (214,700 km^2) in the northwestern U.S. Almost 64% of Idaho is federal land. The USDA Forest Service and U.S. Bureau of Land Management manage over 20 million (81,000 km^2) and 11 million acres (44,600 km2), respectively. Table 3-59 summarized the central Idaho area information.

The state population grew from 713,015 people in 1970 (8.7 people/mi^2; 3.4/km^2) to 1,006,749 people (12.2 people/mi^2; 4.7/km^2) in 1990. About 43% of the population is rural. Most of the population occurs in the southern, more developed part of the state. Boise, the state capital, is the largest city with a 1990 population of 125,738 people, followed by Pocatello (46,062 people) and Idaho Falls (43,929 people).

Ten counties, encompassing 22,678,424 acres (91,852 km^2), are included in central Idaho (Figure 3-22). Within the ten county area, 15,103,951 acres (61,150 km^2; 67%) are managed by the USDA Forest Service and 3,405,107 acres (13,786 km^2; 15%) are privately owned (Table 3-46). Part of the ten county affected area identified lies within the Nez Perce Reservation (figure 3-22). The army land is managed by a variety of federal and state agencies and tribes.

The ten counties, support a population of 92,353 people at a density of 2.6 people/mi^2 (1.0/km^2; Table 3-47). With the exception of Elmore County, populations in all counties are > 50% rural. Boise, Valley, Camas, and Custer County populations are all considered 100% rural. The ten county area supports 2,527 farms covering 2,252,929 acres (9,121 km^2; Table 3-47).

The primary analysis area in central Idaho for the gray wolf EIS includes about 13,300,000 acres (53,900 km^2) of contiguous national forest in central Idaho (Figure 3-23). These include the Bitterroot, Boise, Challis, Clearwater, Nez Perce, Payette, Sawtooth, Salmon, and Panhandle National Forests. A few scattered parcels of private and state land are interspersed throughout this area, but the total acreage is minor.

Table 3-46
Land ownership in acres by county in the general central Idaho area.

County	USDA Forest Service	U.S. Bureau of Land Management	Tribal	Private	State	Other [a]	Total
Shoshone	1,191,727	70,100	0	346,421	74,357	3,155	1,685,760
Clearwater	789,158	12,677	7,325	492,728	234,146	39,390	1,575,424
Idaho	4,428,680	93,319	5,101	822,978	78,798	1,652	5,430,528
Boise	872,055	31,744	0	197,234	85,132	31,435	1,217,600
Elmore	783,145	530,313	0	415,536	124,253	116,545	1,969,792
Valley	2,029,738	5,093	0	204,015	74,314	40,888	2,354,048
Blaine	489,636	796,272	0	320,949	60,321	26,013	1,692,736
Camas	323,546	120,490	0	216,426	25,075	2,463	688,000
Custer	2,123,047	813,041	0	160,775	53,194	2,327	3,152,384
Lemhi	2,073,219	579,405	0	228,500	38,152	1,876	2,921,152
Totals	15,103,951	3,052,454	12,426	3,405,107	847,742	265,744	22,687,424

[a] Includes: Bureau of Reclamation, United States Air Force, National Park Service, U.S. Army Corp of Engineers, FWS , and municipal lands.

Table 3-47
Number and density of people and farms in 10 counties covering central Idaho. [a]

Counties	Area (mi2)	Population	Density/mi^2	% Rural	Total Farms	Total Acres in Farms
Shoshone	2,634	13,931	5.3	81.4	46	5,148
Clearwater	2,461	8,505	3.5	66.3	216	134,891
Idaho	8,485	13,783	1.6	76.6	774	802,746
Boise	1,903	3,509	1.8	100.0	73	66,811
Elmore	3,078	21,205	6.9	34.7	341	401,677
Valley	3,678	6,109	1.7	100.0	113	81,819
Blaine	2,645	13,552	5.1	54.2	221	246,774
Camas	1,075	727	0.7	100.0	117	174,842
Custer	4,926	4,133	0.8	100.0	61	137,022
Lemhi	4,564	6,899	1.5	57.4	365	201,199
Totals	33,449	92,353	2.6		2,527	2,252,929

[a] Idaho Department of Commerce (1992)

A large proportion of the “primary analysis area” lies within the ”ceded area” of the Nez Perce Tribe (Figure 3-23). The Nez Perce Tribe is a sovereign nation with special legal and political ties to the U.S. government defined by history, treaties, court decisions, and the U.S. Constitution. Through the signing of the Treaties of 1855 and 1863, along with subsequent court cases, it has been established that the U.S. government has a clear obligation to protect and maintain Treaty Reserved lands and resources, self-government and traditional-use areas. This trust responsibility is passed on to all federal agencies through various statutory enactments.

The original area under exclusive control by the Nez Perce Tribe covered about 13,200,00 acres, in north-central Idaho, northeast Oregon, and southeast Washington. Most of the original land base was subsequently ceded to the U.S. government through treaties but while doing this, the tribe retained treaty rights to all the resources that sustained the cultural, spiritual, and subsistence life style of the Nez Perce people.

Access to resources through such activities as fishing, hunting, gathering roots and berries, and the pasturing of livestock were retained by the tribe through treaties and were deemed vital to the survival of the tribe, both then and now. Most of the pre-treaty (pre-settlement) resources still available to the tribe are only available on USDA Forest Service or BLM lands within the Tribe’s ceded area.

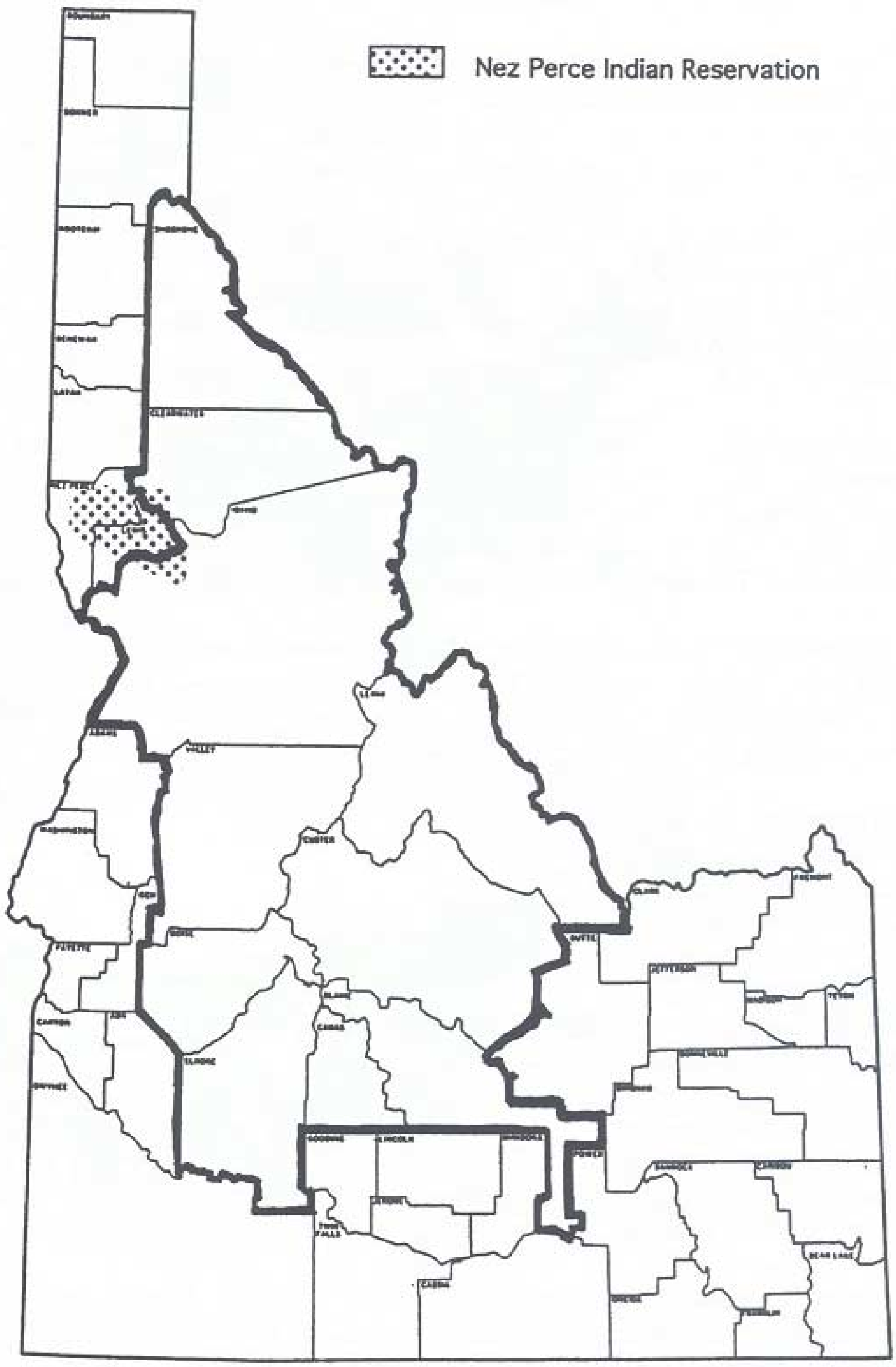


Figure 3-22
Affected ten county central Idaho area

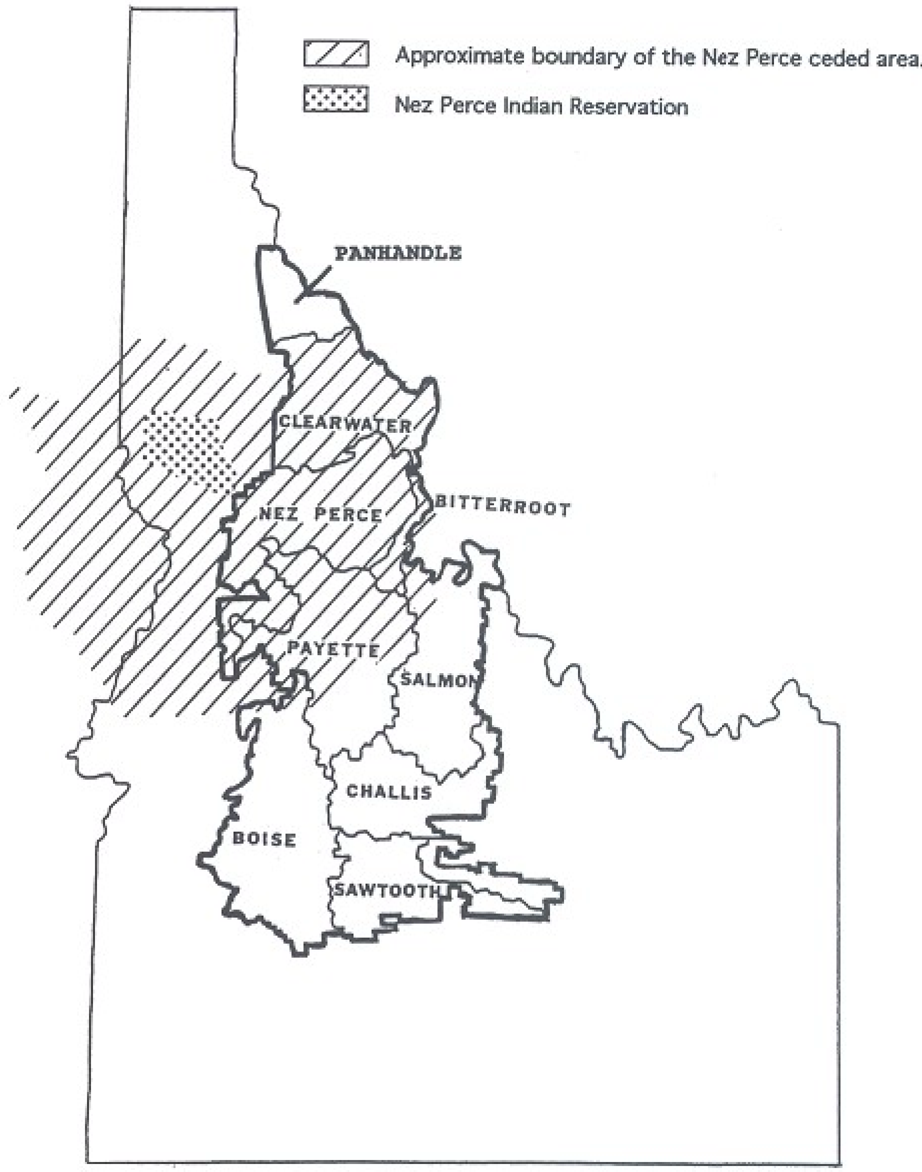


Figure 3-23
Nine contiguous national forests comprising the central Idaho primary analysis area.

Tribal member actively exercise their treaty rights to hunting, fishing, and the gathering of roots and berries throughout the extent of their ceded lands. The Nez Perce Tribal population, who have access to these treaty rights, is about 3,500. Much of the treaty resource assets still available to tribal members sustain their culture and lifestyle.

The center of the central Idaho primary analysis area is characterized by three wilderness areas covering a contiguous area of almost 4 million acres (16,200 km^2). These include the Frank Church River-of-No-Return (2,361,767 acres; 9,562 km^2), the Selway-Bitterroot (1,340,6861 acres; 5,428 km^2), and the Gospel-Hump (206,053 acres; 835 km^2) wilderness areas.

The River-of-No-Return Wilderness Area covers parts of Custer, Idaho, Lemhi, and Valley Counties and is administered by six national forests, including the Bitterroot, Nez Perce, Boise, Challis, Payette, and Salmon. The Selway-Bitterroot Wilderness Area covers parts of Idaho and Clearwater Counties and is administered by the Nez Perce, Clearwater, and Bitterroot National Forests. The Gospel-Hump Wilderness Area is contained entirely within Idaho County and the Nez Perce National Forest.

Landscape

The Northern Rocky Mountain physiographic province includes the mountain ranges of central Idaho. The central Idaho primary analysis area contains three major mountain ranges – the Salmon River Mountains (south of the Salmon River), the Clearwater Mountains which extend from the Salmon River north to the upper Clearwater River drainage, and the Bitterroot Mountains which form the eastern border of the central Idaho recovery area along the Idaho-Montana border.

Most of central Idaho is characterized by rugged terrain and steep slopes. Elevations range from about 1,500 feet (460 m) along the Clearwater River in the northern portion of the central Idaho area to 12,662 feet (3,859 m) on Borah Peak in the Challis National Forest near the southeastern portion of the central Idaho area.

The area varies from deeply incised canyons formed by rivers cutting through rock to rolling basin lands at higher elevations. Soils throughout the area are characterized predominantly by the Idaho batholith, a highly erosive and course-grained granite.

Water Resources

The southern half of the central Idaho area provides water to the Salmon and Snake Rivers. The northern half of the central Idaho area drains primarily into the Clearwater River. Both the Salmon and Clearwater Rivers empty into the Snake river along the western border of Idaho before the Snake empties into the Columbia River near Pasco, Washington. In total, the central Idaho area provides over 19 million acre feet of water to the Columbia River system annually.

Climate

Topography is the major modifying influence on climate throughout the central Idaho area. Climate varies from the warm, dry Salmon River breaks to cool, moist subalpine areas. Annual precipitation varies from less than eight inches at lower elevations to nearly 100 inches at high elevations. Most precipitation occurs during late fall through early spring. Precipitation at higher elevations is mostly in the form of snow.

Summers are dry with temperatures often exceeding 100^{o}F, and winters are long with sub-zero temperatures common. Extremes of –50^{o}F are occasionally reached.

Mean annual precipitation increase from the southern to the northern portions of central Idaho. Higher annual precipitation (about 100 inches) is found on the Bitterroot divide along the Idaho-Montana border in the Clearwater National Forest.

Vegetation

Mountains in the central Idaho primary analysis area are covered by three major vegetation community types. The wide elevational range and accompanying climatic variations result in diverse flora. The grand fir-Douglas-fir, Engelmann spruce, subalpine fir habitat type is the most common, and occurs throughout central Idaho (IDPR 1989). The western red cedar-western hemlock type is more frequent in the northern portions of the area, and the ponderosa pine type exists intermittently throughout the central Idaho primary analysis area.

Vegetation varies by terrain, soils, aspect, elevation, and other factors. Below 4,000 feet (1,200 m), open slopes with brome, bluebunch wheatgrass, and Idaho fescue are common. Near 4,000 feet (1,200 m), grass types begin to give way to open ponderosa pine types. Subalpine fir and several types of lodgepole pine begin to appear at 5,000 feet (1,500 m) to 6,000 feet (1,800 m). Near-alpine habitat is found in the highest elevational areas.

Wildlife

Central Idaho contains a wide variety of habitats and wildlife species. Approximately 400 species of mammals, birds, amphibians, and reptiles inhabit the primary analysis area. The Idaho Department of Fish and Game (IDFG) is responsible for managing wildlife populations within the state. Major big game species in the primary analysis area include post harvest populations of approximately 76,300 elk, 129,700 mule deer, 29,900 white-tailed deer, 1,700 moose, 2,000 mountain goats, and 1,800 bighorn sheep (241,400 total ungulates). Black bears and mountain lions are also abundant throughout central Idaho. Coyotes, bobcats, lynx, fishers, martens, wolverines, and river otters are other predators present. Small numbers of grizzly bears and mountain caribou occur in the Idaho panhandle just north of the primary analysis area.

Figure 3-24
Idaho Department of Fish and Game big game management units (27,348 mi^2; 70,861 km^2) considered in analysis of ungulates in the central Idaho primary analysis area.

Numerous reports of wolves have been received throughout the state in recent years, but few have been confirmed, and there is no evidence that successful reproduction has occurred.

Hunting is a major influence on dynamics of ungulate populations. In 1991, hunters harvested about 33,000 ungulates in 36 big game management units (27,348 mi^2; 70,861 km^2) in the central Idaho primary analysis area (Figure 3-24). The 1991 total harvest represents about 13% of the central Idaho pre-harvest ungulate population. The Nez Perce tribe is guaranteed by the Treaty of 1855 the privilege of hunting on open and unclaimed federal land within their ceded area.

Gray Wolf

By the late 1930s, wolves have been virtually eliminated from Idaho and the rest of the western continental U.S. USDA Forest Service records estimated 48 wolves remained on national forest lands in Idaho in 1939 (Young and Goldman 1944). The gray wolf is currently listed as endangered.

Kaminski and Hansen (1984) suggested that no more than 15 wolves occurred in Idaho in the early 1980s. No reproduction or pack activity has been documented. The IDFG's Conservation Data Center maintains a database on Idaho wolf reports (tracks, sightings, howls, and scats). Almost 80% of the over 600 reports recorded since 1971 have been of single animals.

Reports of wolves in Idaho continue. A lone radio-collared male wolf is inhabiting the Clearwater National Forest. This wolf was radio-collard during field research in the North Fork of the Flathead River drainage in Montana and has dispersed into Idaho. A lone radio-collard female wolf traveled into the Idaho Panhandle National Forest for a short time in 1991, but soon returned to Canada. A wolf died from poisoning in the Bear Valley area in the Boise National Forest in August 1991. A large canid that appears to be a wolf was photographed near the Salmon National Forest in 1992. Throughout the last decade, the largest concentration of wolf reports have occurred in the Kelly Creek area in the Clearwater National Forest and the Bear Valley area in the Boise National Forest.

Central Idaho: Ungulate Populations and Hunter Harvest

Ungulate Population

Elk

Population distribution and statistics – Elk winter along river bottoms of most major drainages in central Idaho and are distributed throughout the primary analysis area in summer. IDFG wildlife managers estimate that elk populations in Idaho's core backcountry and wilderness areas are probably stable, while populations in the southern portion of the central Idaho primary analysis area appear to be increasing. Corrected sightability estimates from post-harvest survey flights indicated approximately 76,300 elk were present in the 36 Management Units included in the primary analysis area in mid-winter 1992. Current estimates of population size are considered to be the most reliable estimates ever available for elk in Idaho. Population structure was estimated at 25 bulls:100 cows:35 calves (Table 3-48).

Management objectives - The IDFG manages elk under a 5-year plan (Unsworth 1991) structured to provide for a number of quality objectives and hunting opportunities in central Idaho. An integral part of Idaho's elk management program is to maintain the current post-season ratio of bulls:cows and the proportion of branch-antlered bulls:yearlings in the harvest. The IDFG believes these ratios are desired by the majority of sportsmen who hunt in Idaho.

The IDFG shifted to a bulls-only harvest strategy with a conservation cow harvest in the 1970s, and populations increased. This shift to bulls-only harvest has helped meet the goal of increasing elk populations, but in areas with high hunter density, heavy bull harvest has resulted in low bull:cow ratios.

Table 3-48
Estimated population parameters and 1991 harvest numbers of elk, mule deer, white-tailed deer, bighorn sheep, mountain goats, and moose (by Idaho Department of Fish and Game hunting unit) in central Idaho gray wolf recovery area.

		Population numbers (post harvest)				Classification ratio	Estimated harvest		
Species	Hunt units	Male	Female	Young	Total	Male:Female:Young	Male	Female	Total
Elk [a]	6-49[b]	11,877	47,673	16,750	76,300	25:100:35	8,137	3,957	12,094
Mule deer [c]	6-49[b]				129,667				15,774
White-tailed deer [d]	6-39[b]				29,908		3,517	1,709	5,226
Bighorn sheep [f]	17-37A[g]	442	1,187	141	1,780	37:100:12			66
Mountain goats [h]	9-49[i]		1,285	306	2,017	100:22 [j]			35
Moose	6-29[k]				1,700		149	0	149

[a] Elk population estimates are for 1992 (Kuck and Nelson 1992a), except for hunting units 43,44, 48, and 49 which are projected population estimates in Toweill (1985). Harvest estimates from Kuck and Nelson (1992a).
[b] Includes hunting units 6,7,9,10,10A,12,15,16,16A,17,19,19A,20,20A,21,25,26,27,28,29,30,30A,33,34,35,36,36A,36B,37,37A,39, 43,44,48, and 49.
[c] Estimated mule deer population is based on 1990 projected population size as reported in Trent (1985), but includes estimates from Kuck and Nelson (1992b). Harvest estimates from Kuck and Nelson (1992b), except that mule deer harvest estimates for units 6,7,9,10, and 10A were based on calculations of average proportion of harvest from each unit Region 1, Group 1 and Region 2, Group 1 units (Scott 1991:43).
[d] Estimated white-tailed deer population is based on 1990 projected population size (Hanna 1985). Harvest estimates from Kuck and Nelson (1992c).
[e] Includes hunting units 6,7,9,10,10A,12,15,16,16A,17,19,19A,20,20A,21,21A,29,30,33,35, and 39.
[f] Bighorn sheep population numbers from 1991 and 1992 (Oldenburg 1992b). Harvest data for 1991 (Oldenburg 1992b).
[g] Includes hunting units 17,19,20,20A,21,26,27,28,30,36A,37, and 37A.
[h] Mountain goat population estimates reflect actual number of goats counted during 1988, 1990, 1991, and 1992 surveys, including 56 unknowns, plus 370 from 1990 population estimates (Hayden 1990). Harvest estimates from Oldenburg (1992c).
[i] Includes hunting units 9,9A,10,12,17,19,20,20A,21A,25,26,27,29,30,35,36,36A,36B,37A,39,43,48,and 49.
[i] Ratio of adults:kids.
[k] Includes hunting units 6,7,9,10,12,15,16,16A,17,19,20,20A,21, and 29

Human access into elk habitat is the primary problem associated with roads and timber harvest. With increasing access and numbers of hunters, continued bulls-only hunting will inevitably result in low bull:cow ratios. Even with comprehensive access management, the number of hunters may eventually be so great that remaining security cover will be inadequate to ensure survival and maintain the age structure of the bull population. IDFG has been limiting total numbers of hunts, and is trying to achieve greater dispersal of elk hunters. A statewide limit on number of elk hunters would help prevent a further decline in the proportion of mature bulls in Idaho's elk herds. However, many changes in season dates, season lengths, weapon restrictions, etc., can also be implemented to allow the IDFG to achieve its biological goals.

Current annual sales of more than 106,000 elk tags have resulted in significant increases in the elk harvest throughout the state. IDFG has developed a strategy to increase or maintain the proportion of mature bulls in the elk population by limiting numbers of hunters in some portions of the state and limiting the type of elk harvested in other areas. General elk seasons are also being shifted out of the breeding period in areas with moderate to high access. Controlled hunts are offered to regulate herd size within management units when desired levels cannot be achieved with general hunts.

Although management objectives vary by hunting units, wildlife managers would like to increase bull:cow ratios and stabilize or increase elk populations in most units. The current estimate of 25 bulls:100 cows in the primary analysis area exceeds the overall goal for central Idaho management units.

Hunting seasons and harvest – General hunting seasons for elk vary by management unit, but generally run from about mid-October to the end of the first week in November. Seasons in some mountain units run mid-September through mid-November. Archery seasons run from the end of August through the third week of September, and muzzleloader season is held during the last week of November. IDFG estimates that hunters harvested 8,137 bulls and 3,957 cows in central Idaho during 1991 (Table 3-48). Approximately 13.7% of the pre-hunt elk population was harvested by hunters during 1991, including an estimated 40.7% of the bulls (>1 year old), and 7.7% of the cows (>1 year old).

Mule Deer

Population distribution and statistics – Mule deer winter along river bottoms of most major drainages in central Idaho, and are distributed throughout the primary analysis area in summer. Mule deer are the most abundant wild ungulate in the primary analysis area. Approximately 129,700 mule deer inhabit central Idaho hunting units (Table 3-48), but little information is available on population structure. Increases are expected in some herds, but many populations appear to be at or near carrying capacity (Scott 1991), and some may be declining.

Management objectives – Hunting is a primary factor influencing the size, growth rate, and structure of mule deer populations. Buck-only hunting has been successful in increasing many herds, but some other herds have experienced little growth despite of ten years of antlered-only regulations.

IDFG's mule deer management goals for 1991-1995 include: (1) maintain present population size in most units and allow increases in some units; (2) maintain or increase buck:doe ratios in all units; and (3) maintain or increase the mature buck portion of the mule deer population in most units (Scott 1991).

Hunting seasons and harvest – IDFG's strategy for the general mule deer seasons in central Idaho during 1991-1995 will be to maintain standard 15 or 25 day season opening on October 5. Antlerless seasons will vary in length from 0-25 days to meet management objectives for total deer numbers in each hunting unit. Sixty-five day seasons in remote central Idaho units open September 15 and are concurrent with elk seasons. Mule deer are legal game for archers in most units for four weeks beginning August 30, and hunters using muzzleloaders may harvest deer during two weeks between the middle of November and the middle of December, depending on the management unit.

From 1985 to 1988, statewide harvest of mule deer increased 68% from 30,786 to 51,706. Harvest of female mule deer increased 93%, and harvest of males increased 50%. Hunters harvested an estimated 15,774 mule (10.7% of pre-hunt population) in central Idaho management units in 1991 (Table 3-48), of which approximately 63% (approximately 9,938) were bucks.

White-tailed Deer

Population distribution and statistics – White-tailed deer are the most abundant big game species in northern Idaho, but because of development of habitat, it is unlikely that white-tails will ever again reach peak population levels of the 1940s and 1950s. White-tails are abundant only in the northern management units in the primary analysis area, or roughly, the portion of the state north of the Salmon river (Rybarczyk 1991). White-tails were historically more widespread in Idaho, but were apparently extirpated from other areas by over-hunting and changes in land use during the early 1900s.

IDFG wildlife managers estimate approximately 29,900 white-tails are present in the primary analysis area (Table 3-48), and populations are stable or increasing. In those portions of their range where they are found on large tracts of public land, white-tailed deer are expected to flourish indefinitely. Information on population size and structure is difficult to collect for white-tailed deer, and may vary greatly among herds and between years. Consequently, reliable information is available only for a few well-studied herds.

Management objectives – IDFG intends to maintain hunting opportunities by general, either-sex seasons beginning on the same day as general elk season whenever possible, and maintain availability of mature (4-point-lus) bucks. The IDFG's 5-year goals (Rybarczyk 1991) for 1991-1995 include: (1) Maintain white-tailed deer populations in north and north-central Idaho at current levels; (2) maintain harvest and increase recreational hunting opportunity in the major white-tailed deer management units; (3) manage all units north of the Salmon river, except Unit 14, with a season framework designed primarily for white-tailed deer; (4) manage all units south of the Salmon River, and Unit 14, with a season framework designed primarily for mule deer; and, (5) maintain at least 40% of the buck harvest in the 4-point-plus category.

Hunting seasons and harvest – Most deer seasons north of the Salmon river are directed toward harvesting white-tailed deer and open on October 10, the same day as the general elk season. South of the Salmon river, deer seasons are directed toward harvesting mule deer, and many open October 5. Seasons in the Clearwater Region units are either-sex until November 10 when they become antlered-only and continue through November 20. November seasons south of the Salmon River are controlled 15-day "quality" hunt opportunities that begin November 10. Thirty-day archery seasons begins August 24, and muzzleloader seasons begin November 10 or 25 and are 20 or 15 days in length, respectively. Idaho's statewide white-tailed deer harvest has increased more than 90% in the past 15 years (Rybarczyk 1991), and in 1991, hunters harvested an estimated 3,517 bucks and 1,709 does (total = 5,226 white-tails) in the primary analysis area (Table 3-48). Approximately 14.9% of the white-tailed deer population was harvested. Data on white-tail population size are difficult to collect, but most populations in Idaho are probably not being harvested as heavily as possible, in spite of liberal either-sex seasons that have been in place in some units for many years (Rybarczyk 1991).

Moose

Population distribution and statistics – Dense cover, low moose densities, and the solitary habits of moose render population surveys ineffective in central Idaho. No herd composition or population trend work is currently being conducted specifically for moose. IDFG estimated moose would number about 1,700 in 1990 in management units in the central Idaho primary analysis area (Hayden 1985).

Management objectives – Emphasis has been placed on providing hunters an opportunity to harvest an older bull. As a result, the number of permits offered annually is low, and hunter success is high.

Hunting seasons and harvest – Moose permits are in great demand in central Idaho. To allow a fairer distribution of available permits, any person who kills a moose is prohibited from applying for a moose permit again. Anyone who draws a permit but is unsuccessful at killing a moose may not apply for another permit during the next two years. Presently, only Idaho residents and non-resident lifetime licensees may apply for a moose permit. Moose hunting season opens August 30 and extends through Thanksgiving weekend in central and northern Idaho.

Table 3-49
Harvest and known mortalities of moose in central Idaho hunting units in central Idaho gray wolf recovery area, 1991. [a]

		1991 Harvest					
Unit	Permits	Bulls	Cows	Total	Indian Treaty Harvest	Illegal Kill	Other
6	2	2	0	2			
7	4	4	0	4			
9	2	2	0	2			
10	25	18	0	18	0	4	1
12	44	38	0	38	2	2	1
15	35	32	0	32	11	4	1
16	8	8	0	8	0	1	0
16A	4	4	0	4	0	0	0
17	31	15	0	15	0	6	0
19	12	9	0	9	1	1	0
20	10	9	0	9	0	0	0
20A	2	2	0	2			
21	3	3	0	3	0	0	0
29	3	3	0	3	0	0	0
	185	149	0	149	14	18	3

[a] Data from 1992 Moose PR Report (Oldenburg 1992a).

In 1991, 149 of 185 permittees in central Idaho management units killed a bull moose (Table 3-49). About 8.1% of the pre-hunting season moose population was harvested by controlled-hunt permittees. In addition to moose taken by permittees, Indian hunters legally harvested at least 14 moose in central Idaho under treaty hunting rights, 18 moose were known to be killed illegally, and three moose were killed by automobiles (Table 3-49).

Illegal killing of moose is a major problem. Statewide data indicate that about 50% of all known moose mortality is from causes other than legal harvest (Leege 1990). Poaching accounts for a high percentage of these mortalities.

Bighorn Sheep

Population distribution and statistics – Idaho historically had two subspecies of bighorn sheep – the Rocky Mountain bighorn sheep (*Ovis canadensis*) and the California bighorn sheep (*Ovis canadensis californiana*). California bighorn sheep occupy canyon and mountain habitats in the Owyhee River and Bruneau River drainages in southwest Idaho outside the primary analysis area, and are not considered in this EIS. Rocky Mountain bighorns were, at one time, widespread throughout central Idaho. Reports by early explorers, settlers, and trappers suggest that bighorn sheep were one of the most abundant large mammals in the state (Hanna 1990).

In 1991 and 1992, IDFG biologist counted 1,780 Rocky Mountain bighorn sheep in central Idaho, including 442 rams, 1,187 ewes, and 141 lambs (Table 3-48). Then animals could not be classified during the survey. The Rocky Mountain bighorn sheep population in the primary analysis area is estimated to be static (Hanna 1990), but disease outbreaks have resulted in recent population declines in some units (Oldenburg 1992b).

Management objectives – IDFG's management goals for the 1991-1995 period (Hanna 1990) include: (1) Increase Idaho's current bighorn sheep population and allow a corresponding increase in harvest and recreational opportunity; (2) establish new herds by transplanting bighorn sheep; (3) recognize and promote the non-consumptive values of bighorn sheep; (4) survey all bighorn sheep populations with a helicopter at least every five years; (5) establish special hunts in areas where female bighorn sheep can be harvested; and (6) restructure the season framework for Rocky Mountain bighorn sheep. IDFG would like to see the statewide Rocky Mountain bighorn sheep population increase 10% about its 1990 estimated level by 1995.

Hunting seasons and harvest – IDFG has restricted bighorn sheep harvest to limited entry hunts for ¾ curl and large rams since 1970. Regulations were modified in 1984 to allow harvest of older rams with broomed horns by including ¾ curl and larger horns and/or rams over four years of age (Hanna 1990). Permit holders that are successful in killing either a Rocky Mountain or a California bighorn ram are prohibited from drawing for that sub-species again. Unsuccessful permittees may reapply after a two year waiting period.

Seasons in 1991 and 1992 opened on August 30 and remained open through October 13. Late hunts, which extended from October 21 through November 5, were also held (2 permits each) in units 19, 20, 21, 26, 27, 36A, 36B, and 50.

The IDFG offered 180 permits for Rocky Mountain bighorn sheep in central Idaho management units in 1991. Sixty-six hunters harvest an adult ram (approx. 3.6% of the pre-hunt population, Table 3-48). In addition to rams killed by controlled hunt permit holders during the 1991-1992 season, at least one ram was harvested by and Indian under treaty rights, and 55 sheep were known to die of other causes in Region 7 management units (Units: 21, 21A, 27, 28, 29, 30, 30a, 36, 36A, 36B, 37, 37A, 50, and 51, Oldenburg 1992b:67). Permits for Rocky Mountain bighorn sheep were decreased from 198 statewide in 1992 to 106 permits in 1993.

Mountain goats

Population distribution and statistic – Mountain goats exist in a harsh environment. Soils are typically thin and rocky, terrain is steep, and growing seasons are short. Although some goats winter on high elevation ridgelines, most herds winter at low elevations on south-facing cliffs (Oldenburg 1992c). Goats move to higher elevations during summer where they prefer alpine, subalpine, and north slope habitats.

Thirty-nine mountain goat populations have been identified in Idaho. Most populations contain fewer than 100 animals, and even the larger populations are fragmented into small sub-populations (Hayden 1990). Surveys conducted from helicopters during winter can provide useful information on minimum population size and distribution. Mountain goat surveys are scheduled at 5-year intervals, but goats may also be counted during annual elk sightability surveys. The most recent surveys indicate that about 2,000 mountain goats inhabit the central Idaho primary analysis area. (Table 3-48).

Management objectives – In areas with suitable habitat, mountain goat hers will continue to be managed with a conservation harvest strategy and an active transplant program. IDFG intends to maintain or increase the current level of recreational opportunity that mountain goats provide both consumptive and non-consumptive users.

Hunting seasons and harvest – Mountain goat hunting is offered in Idaho as a controlled hunt. Hunters must draw a permit and can kill only one Idaho mountain goat in their lifetime. Mountain goat season opens August 30 and usually remains open for 75 days. IDFG restricts mountain goat hunting to herds that exceed 50 animals. Permit holders are encouraged to that billies, but they may take a goat of either sex. Nannies with kids may not be killed.

IDFG offered 41 permits in management units within the central Idaho primary analysis area in 1991. Hunters killed 35 goats (approx. 1.7% of pre-hunt population) in these units (Table 3-48).

Small home range size and their high fidelity to specific areas makes goats vulnerable to hunting, especially in easily accessible areas. Illegal harvest may have a heavier impact than legal harvest in these areas.

Central Idaho: Domestic Livestock

The ten central Idaho counties cover a total of 22,687,424 acres (91,852 km^2). The area is dominated by 13,331,296 acres (53,973 km^2) of contiguous USDA Forest Service lands in the center of the ten counties. The Frank Church River-of-No-Return, the Selway-Bitterroot, and Gospel-Hump Wilderness Areas covers 3,908,501 acres (15,824 km^2). In the heart of central Idaho area.

During winter, most livestock are maintained on 3,405,107 acres (13,786 km^2) of private land surrounding the block of public land. During the summer grazing season, a portion of the cattle and most of the sheep are moved to public land. In addition, several thousand sheep are moved in from out-of-state areas to be grazed on central Idaho National Forest during the summer grazing season.

A total of 304,100 cattle and 51,500 sheep were distributed across the ten central Idaho counties in January 1992 (Idaho Agriculture Stat. Serv. 1992c) (Table 3-50). With the addition of calves and lambs, and taking into consideration some slaughter during January through April, livestock numbers were estimated to grow to about 384,990 cattle and 100,713 sheep on private land in April.

In addition to cattle and sheep, 1,698 hogs and 14,999 chickens were present in the ten central Idaho counties in 1987 (Table 3-50).

During summer 1992, approximately 43,101 adult cattle and 101,552 adult sheep were distributed across six National Forests in the Idaho primary analysis area (Table 3-51). It was assumed that 90% of the cows have calves (90 calves:100 cows), and sheep have an average of 1.2 lambs per ewe (120 lambs:100 ewes). The proportion of lambs to adult sheep was assumed higher than the proportion of calves to cows because sheep produce more sets of twins, offsetting adults who have not produced or have lost offspring. Total calves and lambs on allotments are estimated at 38,792 calves and 121,971 lambs (Table 3-51). Calves and lambs are born in late winter or early spring, before adults are turned onto allotments on national forest lands.

Table 3-50
Number of livestock (cattle, sheep, hogs, and chickens) in ten counties comprising the general central Idaho area, January 1992. [a]

Counties	No. cattle	No. sheep	No. hogs	No. chickens
Shoshone	500	100	0	124
Clearwater	4,600	100	0	628
Idaho	53,000	8,400	798	10,051
Boise	5,000	0	233	132
Elmore	116,000	12,500	220	699
Valley	5,500	700	15	1,596
Blaine	23,000	21,500	306	184
Camas	6,500	0	0	210
Custer	38,000	1,700	0	326
Lemhi	52,000	6,500	16	1,049

Table 3-51
Number of cattle, sheep, and horses on livestock allotments on national forests in the central Idaho primary analysis area (1992)

National Forest	Adult cattle	Calves [a]	Adult sheep	Lambs [b]	Horses
Boise	9,400	8,460	23,094	27,713	193
Challis	15,492	13,943	4,780	5,844	93
Sawtooth	7,875	7,088	49,005	58,806	3
Salmon	4,962	4,466	0	0	52
Payette	1,431	1,288	22,220	26,664	310
Nez Perce	3,634	3,271	2,453	2,944	448
Clearwater	0	0	0	0	0
Panhandle	307	276	0	0	10
Totals	43,101	38,792	101,552	121,971	1,109

[a] Assume 90 calves per 100 cows
[b] Assume 120 lambs per 100 cows

seventy-six percent of all cattle and sheep graze seasonally on the three southern national forest, including the Boise, Sawtooth, and Challis (table 3-51). No active cattle or sheep allotments were located in the Clearwater National Forest, and only 583 cattle were present on Panhandle National Forest allotments (Table 3-51) in the primary analysis area (Figure 3-25).

Cattle and sheep are present on most allotments in the primary analysis area some time between May 1 to October 31. Livestock grazing on all allotments on the Sawtooth, Salmon, Challis, and Payette National Forests falls into this period. About 700 head of cattle are on the Boise National Forest as early as April, and over 1,000 head graze in November, and 350 head remain until December 15. On the Nez Perce National Forest, about 3,000 sheep graze one allotment from October 20 to January 15. Another 1,500 sheep begin grazing in the same allotment on April 1. About 500 cattle are present on Nez Perce National Forest allotments in November and ten cattle are on one allotment throughout the year.

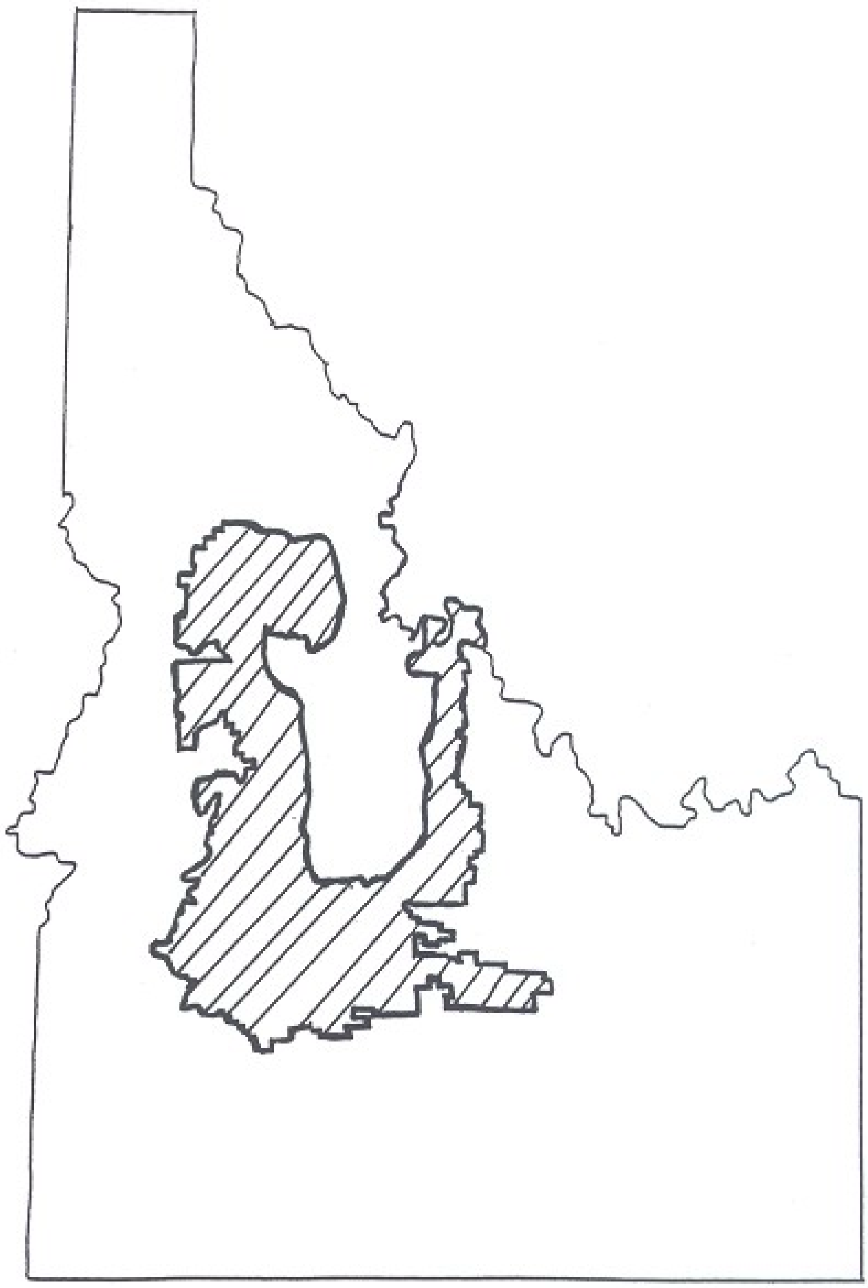


Figure 3-25
General area of livestock grazing allotments in the central Idaho primary analysis area.

Central Idaho: Land-use Restrictions

Wilderness Areas

Most of the Frank Church River-of-No-Return and the Selway-Bitterroot Wilderness areas were managed as primitive areas beginning in the 1930s. The Wilderness Act of 1964 created the National Wilderness Preservation System and gave statutory wilderness designation to the Selway-Bitterroot area and required that other primitive areas and adjacent lands be studied regarding their suitability for wilderness designation.

The Endangered American Wilderness Act of 1978 created the 200,464 acres (812 km^2) Gospel-Hump Wilderness Area. The Central Idaho Wilderness Act of 1980 established the 2,361,767 acres (9,565 km^2) River-of-No-Return Wilderness and added approximately 105,600 acres (430 km^2) to the Selway-Bitterroot Wilderness (bring the total Selway-Bitterroot Wilderness acreage to 1,340,681 acres; 5,430 km^2). The name "Frank Church" was legislatively added to the River-of-No-Return Wilderness Area in 1984.

The Multiple Use-Sustained Yield Act of 1960 directed the management of national forests under the principles of multiple use, specifically endorsing wilderness as a proper use.

The Wilderness Act of 1964 states that wilderness areas shall be administered "for the use and enjoyment of the American people in such a manner as will leave them unimpaired for future use and enjoyment as wilderness, and so as to provide for the protection of these areas, the preservation of their wilderness character…"

The U.S. Department of Agriculture wilderness regulations (Title 36, Code of Federal Regulations, Part 293) specify that "National Forest Wilderness resources shall be managed to promote, perpetuate, and, where necessary, restore the wilderness character of the land and its specific values to solitude, physical and mental challenge, scientific study, inspiration, and primitive recreation. To that end, (a) natural ecological succession will be allowed to operate freely to the extent feasible; (b) wilderness will be made available for human use to the optimum extent consistent with the maintenance of primitive conditions; (c) in resolving conflicts in resource use, wilderness values will be dominant to the extent not limited by the Wilderness Act subsequent establishing legislation, or the regulations" (36 CFR 293.2).

Section 4(c) of the Wilderness Act prohibits certain uses in wilderness, including "no commercial enterprise and no permanent road within any wilderness area…except as necessary to meet minimum requirements for the administration of the area…there shall be no temporary road, no use of motor vehicles, motorized equipment or motorboats, no landing of aircraft, no other form of mechanical transport, and no structure or installation within any such area". Special provisions of the Act permit the use of aircraft or motorboats where the uses were already established. Measures may also be taken as may be necessary to control fire, insects, and disease.

Mining activities were allowed in wilderness areas to the same extent as in non-wilderness until January 1, 1984. At this time, minerals in wilderness areas (excluding valid existing mineral rights) were withdrawn from all forms of appropriations under existing mining laws and amendments. The Wilderness Act also gives private property owners the right of access and mining claim owners the right of ingress and egress. Livestock grazing, where established prior to the date of the Wilderness Act, was permitted to continue in wilderness areas.

The 1980 Central Idaho Wilderness Act contained several key provision, including: (1) restrictions on closure of public airfields; (2) requirements for annual maintenance of the wilderness trails; (3) prohibition of dredge and placer mining in the Salmon River, the Middle Fork of the Salmon River, and tributaries of the Middle Fork of the Salmon River; (4) identification of the 40,000 acres (162 km2) special Mining Management Zone (southeastern portion of the Frank Church River-of-No-Return Wilderness Area), where wilderness constraints are not applicable relative to mining activities for cobalt and associated minerals; (5) requirements for the cultural resources management program in the wilderness, including inventory and management recommendations for historic cabins and other structures; and (6) requirements for a comprehensive management plan for wilderness.

Management plans have been completed for the Frank Church River-of-No-Return, Selway-Bitterroot, and Gospel-Hump Wilderness Areas, and incorporated into forest plans of administrating forests. The "Limits of Acceptable Change" process was used to provide objectives for management. The Limits of Acceptable Change process gives primary attention to the wilderness conditions that exist and are judged acceptable.

Management plans provide guidelines for managing recreation, trails, airfields, fire, and other components of the wilderness ecosystem. Wilderness management has provided a shift from an emphasis on fire suppression to an emphasis on preserving natural processes and managing recreation.

National Forests

The Forest and Rangeland Renewable Resources Planning Act of 1974, as amended by the National Forest Management Act (NFMA) of 1976, specifies that land and resource management plans shall be developed for units of the National Forest System. Forest plans and accompanying environmental impact statements have been finalized for every national forest in the central Idaho primary analysis area. These plans provide for multiple use and sustained yield of goods and services from the National Forest System in a way that maximized long-term net public benefits in an environmentally sound manner.

Forest Plans occur within a hierarchical framework of planning. The national assessment and program for forests and rangelands, as required by the Forest and Rangeland Renewable Resources Planning Act, set broad strategic guidance for national forest lands. Forest Supervisors consider key elements of the program during forest plan implementation, monitoring, and evaluation. Regional Guides address regional issues and concerns and establish regional management standards and guidelines.

Livestock grazing is permitted on approximately 4,365,383 acres (17,666 km2) across the central Idaho area (Table 3-52). Permits restrict type of livestock, stocking rate, and season of use. Outfitter and guide permits also allow seasonal grazing of horses. Grazing of recreational horses is allowed on National Forest lands throughout the central Idaho area. Restrictions on livestock grazing sometimes occur near riparian areas. Livestock are usually restricted from grazing for about five years in areas with newly planted trees.

Table 3-52
Land-use activities in central Idaho national forests. Information comes from forest 10 year plans. Projections cover the period from the middle 1980s to the middle to late 1990s.

	Number of Acres			
National Forests	Livestock Grazing	Suitable for Timber	Proj. mean annual harvest	Proj. mean annual harvest (MBF) [a]
Boise	843,000	656,114	10,527	85.0
Challis	1,162,300	340,608	550	3.0
Clearwater	180,000	987,700	11,309	173.0
Payette	757,848	821,021	6,869	80.9
Nez Perce	316,000	911,669	4,540	60.0
Salmon	188,000	744,900	4,012	21.1
Sawtooth	910,674	99,211	1,392	10.5
Panhandle [b]	7,561	409,200	4,939	74.0
Bitterroot	0	0	0	0
Totals	4,365,383	4,970,423	44,138	507.5

[a] MBF = Million Board Feet
[b] St. Joe portion only

The central Idaho area contains about 4,970,423 acres (20,115 km^2) of forested land classified as suitable for timber production (Table 3-52). Timber will be harvested on about 44,138 acres (179 km^2) annually in the central Idaho area during the first decade of implementation of the national forest plans (Table 3-52). Expected volume of timber to be harvested in the central Idaho area ranges from 507.5 million board feet during the first decade of the forest plan to 890.2 million board feet during the fifth decade of the forest plan (Table 3-53).

Table 3-53
Projected annual timber harvest (million board feet) in central Idaho national forests over the next five decades from ten year national forest plans. [a]

	Timber Harvest (million board feet)				
National Forests	Decade 1	Decade 2	Decade 3	Decade 4	Decade 5
Boise	85.0	81.0	81.7	82.0	82.4
Challis	3.0	4.0	5.0	6.0	7.0
Clearwater	173.0	212.0	273.9	356.3	440.4
Payette	80.9	82.6	85.1	83.2	81.4
Nez Perce	60.0	60.0	60.0	60.0	60.0
Salmon	21.1	21.1	25.7	25.7	25.7
Sawtooth	10.5	11.2	11.5	11.5	11.5
Panhandle [b]	74.0	95.8	124.9	113.4	181.8
Bitterroot	0	0	0	0	0
Total	507.5	567.7	667.8	738.1	890.2

[a] Sources: USDA 1976, 1983a, 1983b, 1984, 1986, 1987a, 1987b, and 1992
[b] Projected data not available for Avery Ranger District, Panhandle National Forest, decades 3 through 5

Timber harvests have a significant effect on the physical and biological environment. The extent of these impacts depends on the specific methods of harvest, the area where the timber is harvested, and the rate at which it is harvested. Timber harvest activities may be restricted or modified because of standards designed to achieve specified fishery or wildlife objectives on the forest.

The central Idaho area contains about 20,346 miles (32,757 km) of system roads on national forests (Table 3-54). Most roads have been developed as the direct result of timber harvest. Besides serving timber harvest, roads are used for general forest administration, mineral exploration, fire protection, and recreation.

Approximately 9,541 miles (15,361 km) of these roads are open to unrestricted motorized travel year-round. The other 53% are subject to a variety of seasonal or yearly closures to motorized travel. Most restrictions and closures are for the protection of wildlife habitat and water quality. Other closures are for the prevention of road and trail damage during spring runoff, protection of administrative sites and other public facilities from vandalism, protection of the public from unsafe conditions, and for the reduction in cost of road maintenance.

Table 3-54
Miles of open, open with restrictions, and closed system roads on central Idaho national forests.

	Miles of Roads		
National Forests	Open System	Closed or restricted access	Totals
Boise	898	4,156	5,054
Challis [a]	915	60	975
Clearwater	2,492	2,519	5,011
Payette	700 [b]	250	950
Nez Perce	776	1,980	2,756
Salmon	1,156	985	2,141
Sawtooth	1,836	67	1,903
Panhandle [c]	693	788	1,481
Bitterroot	75	0	75

Totals	9,541	10,805	20,346

[a] Includes estimated system roads on west side of forest
[b] Some seasonally closed
[c] Includes Avery Range District only

Section 7 Consultations and Requirements

Under Section 7 of the ESA, federal agencies are to use their authority to conserve threatened and endangered species and to take necessary steps to “insure that actions authorized, funded, or carried out by” an agency are “not likely to jeopardize the continued existence of any [listed] species or result in the destruction or adverse modification” of the species’ critical habitat. No critical habitat for wolves has been designated under the ESA in the northern Rocky Mountain region (Wise et al. 1991).

The ESA requires that all federal agencies consider the effects of their proposals on listed species before acting. The agency proposing an action must first determine whether a listed species “may be present” in the area. If present in the area, the agency must determine whether the species “is likely to be affected” by the action. If the species is likely to be affected, the action agency must consult with the FWS. The FWS then prepares a biological opinion on whether or not the proposal will jeopardize the listed species. Any federal activity or other activity that requires a federal permit or federal funding is subject to the Section 7 consultation procedure.

Because of numerous wolf reports across central Idaho, the USDA Forest Service has consulted with the FWS on may proposed land-use activities. In 1985, the FWS issued a jeopardy opinion on the USDA Forest Service proposal to plow and open the South Fork Salmon River Road to uncontrolled winter access. The area was considered a critical big game winter range and a potentially important wintering area for wolves.

The jeopardy opinion was the only one issued on proposed USDA Forest Service activities in central Idaho. The FWS later issued a non-jeopardy opinion on a revised USDA Forest Service road management and access plan. A federal judge later enjoined the USDA Forest Service from closing the road. Several informational signs along the South Fork Road, monitoring, and winter patrol activities by the USDA Forest Service are in place to protect wolves that may occur in the area in the future.

Wolf management and Section 7 consultations in central Idaho have evolved from more access-related requirements in the 1980s to information and education activities in the 1990s. The FWS believes that if implemented “management actions prescribed by the USDA Forest Service, such as timber harvest and road restrictions to protect ungulates and their habitat, adequately protect wolves” (USFWS 1992).

The view of the FWS in central Idaho is that few restrictions on land use are necessary to promote wolf recovery, and that restrictions do not apply until wolves occupy an area (USFWS 1992). Restrictions include limiting activities within one mile (1.6 km) of active wolf dens or rendezvous sites from March 15 to July 1, and placing some restrictions on non-selective control methods of animal damage control within occupied wolf range (USFWS 1992).

Animal Damage Control Activities

USDA, Animal and Plant Health Inspection Service, Animal Damage Control (ADC) initiated a programmatic consultation in 1990 on the effects of the ADC program on threatened and endangered species. The FWS concluded that the use of snares, steel traps, and aerial shooting in the ADC program would not likely jeopardize the continued existence of the gray wolf. Under Section 7 of the ESA, the FWS authorized the incidental take of one wolf annually in each occupied state during legitimate ADC control actions. Terms and conditions in the Biological Opinion included the following: (1) an incidental take in excess of one wolf in any state (in a given calendar year) will result in cessation of the activity causing take and reinitiation of consultation; (2) all leghold traps shall be checked at least daily in areas known to be occupied by gray wolves; (3) neck snares shall not be used in areas known to be occupied by gray wolves except for areas where wolves may be a target species; (4) number 3 or smaller traps may pose a threat to juvenile wolves and therefore should not be used in proximity of occupied dens and rendezvous sites; (5) the FWS's Fish and Wildlife Enhancement Office, in the Regions of the species' occurrence, shall be notified within five days of the finding of any dead or injured gray wolf; (6) ADC personnel shall participate fully in interagency wolf monitoring programs; and (7) ADC personnel shall informally consult on an annual basis with the FWS on the current status of the wolf in areas where recolonization is occurring. The Draft Environmental Impact Statement on the ADC program concluded that the above-ground use of strychnine to control rodents and rabbits, the use of compound 1080 toxic collars to control coyotes, and the use of M-44s to control coyotes, could adversely affect the gray wolf. In accordance with the existing label, strychnine baits should not be sued in the geographic range of the gray wolf except under programs and procedures approved by the Environmental Protection Agency (EPA). EPA label restrictions also do not allow the 1080 toxic livestock collar to be used in areas where gray wolves may occur. Use of 1080 toxic collars is not licensed in Idaho at this time. M-44s are prohibited in occupied gray wolf range due to EPA label restrictions. In the ten county central Idaho area, M-44s were only used on private land and on one Bureau of Land Management (BLM) site in 1992. A breakdown of M-44 use in central Idaho counties includes Shoshone (2 private premises), Clearwater (5 private premises), Idaho (12 private premises), Boise (2 private premises), Valley (3 private premises), Custer (4 private premises), and Lemhi (2 private and 1 BLM premises). No M-44s were set in Elmore, Blaine, or Camas counties.

During an informal consultation on March 23, 1993, the USFWS identified three areas of "occupied gray wolf range" (subject to revision) in central Idaho where ADC activities should be conducted in accordance with the July 1992 biological opinion. In the biological opinion, "occupied gray wolf range" id defined as (1) an areas in which gray wolf presence has been confirmed by state or federal biologists through interagency wolf monitoring programs, and the USFWS has concurred with the conclusion of the wolf presence; or (2) an area from which multiple reports judged likely to be valid by the USFWS have been received, but adequate interagency surveys have not yet been conducted to confirm presence or absence of wolves. The three areas include (1) all lands east of State Highway 28 in the Salmon BLM district; (2) all lands within the North Fork drainage of the Clearwater River east of the confluence of the North Fork and Little North Fork Rivers; and (3) all lands in Valley county, south of Big Creek and east of the road between Deadwood Reservoir and Big Creek.

Since the 1992 Biological Opinion and informal consultation on march 23, 1993, this FEIS redefines "occupied wolf range" for the central Idaho and Yellowstone experimental areas as an "Area of confirmed presence of resident breeding packs or pairs of wolves or area consistently used by $\geq$1 resident wolf or wolves over a period of at least one month. Confirmation of wolf presence is to be made or corroborated by the U.S. Fish and Wildlife Service. Exact delineation of area will be described by (1) 5-mile radius around all locations of wolves and wolf sign confirmed as described above (non radio monitored); (2) 5-mile radius around radio locations of resident wolves when <20 radio locations are available (for radio-monitored wolves only); or (3) 3-mile radius around the convex polygon developed from $\geq$20 radio locations of a pack, pair, or single wolf taken over a period of $\geq$6 months (for radio-monitored wolves). This definition applies only within the Yellowstone and central Idaho experimental population areas." This new definition would, in the experimental population areas, supersede the previous 1992 definition of "occupied wolf range," therefore, "occupied wolf range" might be less expansive than the three areas described above.

Central Idaho: Visitor Use

Idaho provides a diversity of high quality outdoor recreation resources enjoyed by both residents and non-residents. The 1986/87 Pacific Northwest Outdoor Recreation survey provided estimates of annual "activity occasions" by Idaho residents for a variety of recreational activities (IDPR 1989). Nature study, hiking, walking, and camping activities were all projected to experience moderate to high growth to the year 2010. Hunting activities were projected to experience low growth to the year 2010 (IDPR 1989).

In 1991, an estimated 232,000 residents and 133,000 non-residents fished in Idaho. An estimated 158,000 residents and 35,000 non-residents hunted in Idaho. In addition, 194,000 residents and 188,000 non-residents participated in primary non-urban (non-residential non-consumptive) activities in Idaho (USFWS 1992, Table 3-55).

In 1991, residents spend an estimated 2,417,000 days fishing in Idaho and non-residents spent 439,000 days fishing (Table 3-55). Residents of Idaho also spent 1,941,000 days hunting and non-residents hunted 226,000 days. Residents spent 1,722,000 days participating in non-urban activities in Idaho while non-residents spent 1,717,000 participating in non-urban activities (USFWS 1992, Table 3-55).

Table 3-55
Number of days and number of participants in fishing, hunting, and non-residential non-consumptive activities in Idaho in 1991. A

Activity	Resident Participants	Resident Days	Nonresident Participants	Nonresident Days	Total Participants	Total Days
Fishing	232,000	2,417,000	133,000	439,000	365,000	2,856,000
Hunting	158,000	1,941,000	35,000	226,000	193,000	2,167,000
Nonresidential Nonconsumptive	194,000	1,722,000	188,000	1,717,000	382,000	3,439,000
Totals	584,000	6,080,000	356,000	2,382,000	940,000	8,462,000

[a] Source: USFWS 1992

The central Idaho primary analysis area contains about 13,838 miles (22,270 km) of trails (Table 3-56). Trails provide for a variety of activities, including hiking, bicycling, motorcycling, horseback riding, nature study, backpacking, and four-wheeling. Trails exist on national forests both in wilderness and non-wilderness. Those in wilderness areas are restricted to non-motorized, non-mechanized travel.

Table 3-56
Miles of recreational trails on national forests in central Idaho

	Miles of Trails		
National Forests	Open	Closed to motorized vehicles	Total
Boise	1,222 [b]	296	1,518
Challis	484	919	1,403
Clearwater	890	639	1,529 [a]
Payette			2,125
Nez Perce	1,207	1,804	3,011
Salmon	680	460	1,140
Sawtooth	917	851	1,768
Panhandle [d]	655	99	754
Bitterroot	0	590 [c]	590
Totals			13,838

[a] About 23% of trails are in wilderness
[b] Includes 150 miles of cross-country ski trails and 400 miles of snowmobile trails
[c] All trails are in wilderness area
[d] St Joe portion only

National forests in central Idaho contain 491 developed recreation sites and provide over 8,600,000 Recreation Visitor Days (RVDs) annually (Table 3-57). Based on figures for the Boise, Clearwater, Payette, Salmon, Nez Perce, and Bitterroot National Forests, about 23% of the RVDs are associated with developed areas while about 72% of the RVDs are associated with dispersed (non-developed) and wilderness settings. RVDs are expected to continue to grow annually across the central Idaho primary analysis area. In 1992, 10,000 people floated the Main and Middle Forks of the Salmon River through central Idaho wilderness area. A total of 9,171 people signed in at trail heads in the Frank Church

Wilderness Area. USDA Forest Service personnel met 21,230 visitors in the Frank Church Wilderness Area. Use in the Frank Church Wilderness Area has increased rapidly in recent years.

Table 3-57
Recreation Visitor Days (RVDs) and number of developed recreation sites on national forests in central Idaho.

	RVDs				
National Forests	Developed	Dispersed	Wilderness	Total	# of Developed Recreation Sites
Boise	494,900	1,598,100	0	2,093,000	72
Challis			234,600	648,400	55
Clearwater	293,600	459,100	30,700	783,400	23
Payette	47,100	677,200	173,100	897,400	36
Nez Perce	241,900	411,100	95,100	748,100	38
Salmon	120,080	439,922	114,100	674,102	53
Sawtooth				2,291,100	193
Panhandle [a]				426,800	17
Bitterroot	12,000	10,000	45,900	67,900	4
Totals				8,630,202	491

[a] Includes St. Joe portion only

In the 36 big game management units covering the central Idaho primary analysis area (figure 3-24), 91,959 hunters spent 688,175 days in the field in 1991. One hundred-two outfitters and guides operate in 36 big game management units in the central Idaho primary analysis area. In 1991, those 102 outfitters and guides provided big game tags to 4,614 non-residents and 465 residents (Table 3-58). Most tag sales were for non-resident deer and elk hunters.

Table 3-58
Number of big game tags provided by 102 outfitters and guides in 36 big game management units in the central Idaho primary analysis area. Numbers from 1991 license year.

Species Tags	Idaho Residents	Non-residents	Total Tags
Deer	198	1,763	1,961
Elk	219	2,202	2,421
Bear	46	637	683
Mountain Lion	2	12	14
Totals	465	4,614	5,079

Central Idaho: Economics

The ten central Idaho counties that constitute the central Idaho area have a combined population of 92,400 and are very sparsely populated with an average of 2.6 people per square mile (1.0/km^2). This average is compared to an average of 12.3 people per square mile (4.75/km^2) for Idaho, and 6.96 people per square mile (2.69/km^2) for the 3-state region. The population of the ten county recovery area grew at a rate of approximately 1.8% per year in the 1970s and then declined at an average rate of –0.5% per year throughout the 1980s. Overall population growth for these counties between 1970 and 1990 was approximately 1.3% per year.

The sparse population in the Central Idaho recovery area is largely due to two factors: the ruggedness and inaccessibility of much of the land in the area, and the large percentage of land in the area administered by federal or state agencies. The ten counties which constitute the central Idaho are consist of approximately 22.5 million acres (91,100 km^2). This area represents 43% of Idaho's total land area. Federal and state agencies manage approximately 84% of the total land in these ten counties.

Per capita income in the ten county area for 1990 was $15,552, or roughly equal to the regional average (Table 3-44). Total personal income was $1.43 billion in 1990. This represents approximately 4% of the 3-state regional total personal income. In 1990 income from farming sources and agricultural services accounted for approximately 8% of the total personal income in the ten county area. This 1990 percentage is approximately equal to the sector's share of total personal income in the early 1970s. Livestock accounted for about 65% of the value of farm products sold in these counties in 1987. This percentage is somewhat higher than the 52% livestock share for the 3-state region. This greater reliance on livestock in the farming sector is likely due to the rough topography and high altitude of central Idaho which makes cropping impractical in much of this area. Sources of personal income that showed growth in the period 1970-1990 were services (which increased from approximately 7.6% to 10.8% of total income) and income other than earnings (which increased from approximately 19% in 1970 to 33% in 1990). Other industry, in general, has become relatively less important as a component of personal income in the last two decades, falling from 41% to 25% of total personal income. Mining, manufacturing, and construction have all decreased as a percentage of total personal income during this time period.

Table 3-59
A summary of the key characteristics of the primary analysis area (PAA) that were analyzed as potentially being impacted by wolf recovery in and around Yellowstone National Park (includes parts of 17 adjacent counties) and in central Idaho (includes parts of 10 adjacent counties)

	Yellowstone	Central Idaho
People/Land		
Acres	16,000,000	13,300,000
% Federal Ownership	76%	99%
% Private Ownership	21%	trace
% National Park, Wilderness, or Wildlife Refuge	41%	30%
Regional Population (including surrounding communities)	288,000 5.2 people/$mi.^2$	92,400 2.6 people/$mi.^2$
Recreational Visits to Federal Land/Year	14,500,000	8,600,000
Public Land Uses [a]		
Open to grazing (acres)	4,000,000	4,365,383
Suitable for timber harvest (acres)	1,500,000	4,970,423
Timber harvested or planned for harvest/year (acres)	28,000	44,138
Total miles of system trails and roads on public land	13,457	20,346
Roads and trails open to motor vehicles (mi.)	8,057	9,541
National Forest area not open to motorized use(includes wilderness and roadless areas)	44%	44%
Estimated miles of hiking trails	4,643	13,838
Current active sites for M-44 use (coyote cyanide devices)	185 ranches	31 ranches
People/Land Economy (including surrounding counties)		
Total income	$4.2 billion	$1.43 billion
Per capita income	$14,676	$15,552
Farm	6.4% (55% by livestock)	8.0% (65% by livestock)
Services	39.5%	34.6%
Other Industry	19.8%	24.8%
Other non-earned [b]	34.3%	32.6%
Livestock		
Peak numbers of livestock on PAA		
Including the surrounding counties - (spring) cattle	354,000	384,990
- (spring) sheep	117,000	100,713
On USDA Forest Service in PAA (May through October)		
Adult cattle and calves	145,658	81,893
Adult sheep and lambs	265,152	223,523
Horses	1,270	1,109
Total livestock grazed on national forests	412,080	306,525
Estimated current livestock mortality in the PAA and surrounding		

counties from all causes per year based upon spring cattle and sheep numbers:		
cattle	8,340 2.36% loss (67% calf)	12,314 3.2% loss (69% calf)
sheep	12,993 11.1% loss (74% lambs)	9,366 9.3% loss (72% lambs)
horses	unknown, very low	unknown, very low
Ungulates (after hunting season)		
Elk	56,100	76,300
Deer (mule and white-tailed)	29,500	159,600
Moose	5,800	1,700
Bighorn sheep	3,900	1,800
Bison	3,600	0
Mountain goat	few	2,000
Pronghorn antelope	400	0
Total	99,300 [c]	241,400
Hunter harvest/year	14,314	33,358
Estimated ungulates dying/year (all causes) [d]	48,559	153,539
Other Animals		
Black bears	3,000	abundant
Grizzly bears	228	none
Mountain lions	some	abundant
Coyotes	abundant	common

[a] A wide variety of land-use restrictions (seasonal and permanent) are employed on public lands throughout the Yellowstone and central Idaho areas for protection of natural resources and public safety including: on motorized vehicles, construction of structures, Animal Damage Control activities, big game winter range, calving areas, security and migration habitat, raptor nest sites, endangered species (including grizzly bears), erosion control, wetland protection, to provide a variety of outdoor experiences (motorized or non-motorized, wilderness or developed, etc.).

[b] Non-earned income represents investments, entitlements, and retirement income that often does not depend on where a person lives. The growth of this segment of the economy from 25% to 34% over the last 2 decades results from people with this type of income moving into the central Idaho or Yellowstone area because these areas are perceived to have a lifestyle that people want to participate in (wild spaces, abundant wildlife, less crowding, low crime, clean air, etc.).

[c] Including only ungulate herds at least partly associated with Yellowstone National Park. Estimated over twice that number using public and private lands in overall Yellowstone area.

[d] Including hunting, crippling loss, poaching, road kill, predation, disease, starvation, drowning, winter kill, accidents, fighting, etc. (Appendix 10).

Chapter IV
Environmental Consequences

Introduction

In the analysis of environmental consequences, the impacts of each alternative are presented for each area (Yellowstone and central Idaho) separately. The environmental consequences for each alternative are discussed first for the Yellowstone area and then for the central Idaho area within each alternative. Thus, total impacts for each alternative area the sum of the impacts of the two areas.

Environmental Consequences
Alternative 1
Reintroduction of Experimental Populations

Yellowstone

Impacts on Ungulate Populations

Background Information for Analysis – The Yellowstone area is a multiprey system and wolves will likely prey on several different wild ungulate species. Elk are the most abundant wild ungulate in the Yellowstone area, and they will likely be the primary prey for wolves (Garton et al. 1990, Koth et al. 1990, Vales and Peek 1990, Singer 1991a, Boyce and Gaillard 1992, Mack and Singer 1992b). Based on prey availability and vulnerability, wolves may take fewer deer, moose, and bios compared to elk (Mack and Singer 1992b). Bighorn sheep, pronghorn, and mountain goats were not predicted to be significant prey for wolves because of their low numbers relative to other wild ungulates, their use of escape terrain to avoid predators, and their use of areas close to human habitation (Boyce and Gaillard 1992, Mack and Singer 1992b, Boyce 1990, Koth et al. 1990, Mack et al. 1990). Because of the above factors, analyses of wolf predation on wild ungulates were limited to species that might be most affected: elk, deer, moose, and bison. Wolf predation on bighorn sheep living east of Yellowstone National Park was examined because some of these sheep herds may be more vulnerable to wolf predation than sheep in other portions of the Yellowstone area (J. Talbott, Wyoming Game and Fish Department, Cheyenne, pers. commun.). Wolves may kill about 11 bighorn/year or about 0.4% of the bighorn sheep population east of the park (Mack 1993).

The Yellowstone Area – The following analysis focuses on the effects a recovered wolf population (10 packs, about 100 wolves) might have on ungulate populations and hunter harvests in the Yellowstone area. Under this alternative, wolf recovery would be attained in about 8 years (2002), much sooner than the Wolf Management Committee Alternative (2010) or the Natural Recovery (No Action) Alternative (2025). Two computer models examined the effects a recovered wolf population might have on wild ungulates in three different areas, Yellowstone National Park, the Jackson, Wyoming area, and the North Fork Shoshone River area in Wyoming. Mack and Singer (1992b) estimated that 78 to 100 wolves (about 10 packs) living on Yellowstone's northern range might reduce the northern range elk herd 5% - 30# (from abut 17,300 in 1990 to between 12,00 and 16,400 elk) if antlerless elk harvests were reduced 27%. They also estimated northern range mule deer would increase in the presence of wolf predation if the antlerless deer harvest of 122 antlerless deer/year was eliminated. Moose numbers were 13% smaller to 12% large if moose harvests were reduced in the presence of wolf predation.

Boyce and Gaillard (1992) modeled the effects of wolves on ungulates in the Yellowstone area (Yellowstone National Park, Jackson, Wyoming area, and North Fork Shoshone River area) and found wolves would reduce elk numbers 5%-20% from an estimate of 36,726 to between 29,381 and 34,890 elk. From their model, they did not find any circumstances in which wolves would have a devastating effect on elk populations in the Yellowstone area.

Boyce and Gaillard (1992) estimated wolves would reduce the mean population sizes of mule deer 3%-19% from about 10,3000 to between 8,343 and 9,991. They estimated moose might decline less than 7% from about 5,900 to 5,487 (although local effects may be higher in Montana where moose are heavily harvested), and the bison population might decline less than 15% from about 2,700 to 2,295.

A total of about 95,000 elk, deer, moose, and bison live in the Yellowstone area in and near Yellowstone National park. A recovered wolf population of 100 wolves (10 packs) would kill about 1,200 wild ungulates at a predation rate of 12 ungulate/wolf/year (Mack and Singer 1992b). If elk, deer, moose, and bison were preyed upon according to the abundance and vulnerability predicted in Mack and Singer (1992b), 100 wolves might kill about 913 elk, 219 deer, 19 moose, and 16 bison/year, representing about 1% of the total elk, deer, moose, and bison living in the Yellowstone area. The remaining 33 ungulates in the wolf kill would depend upon the availability and vulnerability of wild ungulates available to wolves and might be any combination of elk, deer, moose, bison, bighorn sheep, or pronghorn.

Under this alternative, some protection would be provided for wolves outside national parks and wildlife refuges so wolves and their effects on ungulate populations might be more dispersed throughout suitable habitats in the Yellowstone area and not concentrated in national parks or wildlife refuges (for example Yellowstone National Park or the National Elk Refuge). This alternative also provides for translocation of wolves if wolves severely impact ungulate populations. Because of this provision, wolf effects on some ungulate populations may be less than presented in these analyses. Throughout the Yellowstone area, ungulate populations can be quite different from one another in terms of population numbers, hunter harvests, and other physical and biological characteristics. These differences might result individual populations reacting differently to wolf predation. Because it cannot be predicted exactly where wolves might establish territories within the Yellowstone area, additional analyses examined what effects wolves might have on wild ungulate populations (primarily elk, deer, and moose) living in more localized areas within the Yellowstone area. These additional analyses predicted effects similar to those previously mentioned (Mack 1993).

The analyses were limited to ungulate herds associated with Yellowstone National Park which represents only a fraction of the ungulates available in the entire Yellowstone area. Because wolves could prey on wild ungulates from other herds living within the Yellowstone are, the overall effects of wolves on ungulate herds could be less than presented in these analyses. This alternative also provides for wolf translocation in the rare event wolf predation severely impacts ungulate populations or causes movements of ungulates to increase conflicts with private property. Because of the wild translocation provision, wolf effects on some ungulate populations may be less than presented in the analyses.

Conclusions – A recovered wolf population (about 100 wolves) is predicted to kill about 1,200 wild ungulates (primarily elk, deer, moose and bison) each year, representing about 1% of the estimated 95,00 elk, deer, moose, and bison in the Yellowstone area. Bighorn sheep, pronghorn antelope, and mountain goats are not predicted to be significant prey for wolves. Using computer models, a recovered population was predicted to reduce wild ungulate population numbers from current high population numbers. A recovered wolf population was predicted to reduce elk numbers at least 5% and possibly as much as 20%-20% for elk herds in some areas. Boyce and Gaillard's (1992) models did not predict any conditions in which wolf predation had devastating effects on elk populations. Three deer populations were predicted to decline 3%-19%. Moose populations were predicted to decline about 7%-13% for heavily harvested herds. Bison populations were predicted to decline no more than 15% from about 2,700 to about 2,300 animals.

Impacts on Hunter Harvest

In reference to the background information presented under Impacts on Ungulate Populations, this analysis focuses on the effects a recovered wolf population could have on hunter harvests of elk, deer, and moose. Computer models predicted 78 to 100 wolves would reduce the northern range elk herd 5%-30% provided antlerless elk (females and young) harvests were reduced 27% from an average 994 antlerless elk/year to 714 antlerless elk/year (Mack and Singer 1992b). Mack and Singer (1992b) also found the northern range mule deer herd could increase under wolf predation if the antlerless portion of the deer harvest (122 antlerless deer/year) was eliminated. Antlered (male) harvests of elk and deer were not predicted to be affected. For the relatively small but heavily hunted northern range moose herd, hunter harvest may need to be reduced ½ (from an average of 31 moose/year to 16 moose/year) in the presence of a recovered wolf population.

Boyce and Gaillard (1992) did not expect a recovered wolf population to affect the hunter harvests of elk in Montana, but they did predict hunter harvests to decline 5%-10% (from about 3,300 elk/year to between 2,970 and 3,135 elk/year) for the Jackson herd in Wyoming. They also predicted hunter harvests would decline 1%-2% (from about 640 elk/year to between 627 and 634 elk/year) for the North Fork Shoshone elk herd.

Boyce (1990) and Boyce and Gaillard (1992) concluded wolf predation would not reduce hunting opportunities for deer and some moose herds in the Yellowstone area. However, moose hunting may be reduced for smaller heavily hunted herds such as the northern range moose herd in Montana (Boyce and Gaillard 1992, Mack and Singer 1992b).

In the Yellowstone area, hunters annually harvested an average of 14,172 elk, deer, and moose during the 1980s (see Chapter 3, Ungulate Populations and Hunter Harvest). Bison removals, although more sporadic, averaged 142 bison/year (see Chapter 3). A recovered wolf population would kill about 1,200 ungulates/year which represents 8% of the total average hunter harvest of elk, deer, moose, and bison in the Yellowstone area during the 1980s.

These analyses examined the effects a recovered wolf population would have on a portion of the wild ungulates available in the Yellowstone area. If wolf predation were distributed across a larger portion of the ungulate herds available in the Yellowstone area, wolf effects on hunter harvests may be lower than predicted in these analyses. This alternative provides for wolf translocation if ungulate populations were being severely impacted. Under the wolf removal prevision, hunter harvest may not be affected to the degree predicted in the previous analyses.

Conclusions – A recovered wolf population (about 100 wolves) in the Yellowstone area may reduce hunter harvests of antlerless ungulates (female and young) for some ungulate herds. Computer models predicted the high antlerless harvest for the northern range elk herd may be reduced as much as 27% from about 994 antlerless elk/year to 714 antlerless elk/year. The antlered (male) elk harvest would likely be unaffected. Elk harvests for the Jackson herd may be reduced 5%-10% from about 3,300 elk/year to between 2,970 and 3,135 elk/year. Elk harvests for the North Fork Shoshone herd may be reduced 1%-2% (from about 640 elk/year to between 627 and 634 elk/year) in the presence of a recovered wolf population. Wolf predation will likely not effect deer and moose harvests in many herds.

In the Yellowstone area, hunters annually harvested 14,314 elk, deer, moose, and bison. A recovered wolf population would kill about 1,200 wild ungulates/year, representing 8% of the average hunter harvest during the 1980s.

Impacts on Domestic Livestock

Summary of Wolf Depredation on Domestic Livestock in Other Areas of North America

Alberta – In Alberta, estimates of cattle (including adults and calves) within wolf range varied from 300,000 from 1974 to 1979 (Gunson 1983) to about 235,000 from 1980 to 1991 (M.J. Dorrance, Alberta, Agriculture, pers. commun.). Published estimates of the total number of sheep within wolf range in Alberta are not available, but are substantially fewer than cattle, perhaps in the range of 10,000 herd (M.J. Dorrance, Alberta, Agriculture, pers. commun.). An estimated 1,500 wolves live in the area in which livestock range. Alberta has a wolf control program in which wolves that kill livestock are controlled by provincial personnel. Landowners also may kill wolves on their property at any time.

Losses of livestock to wolves were highly variable among years, between areas, and among operators. Cattle killed or injured annually by wolves in Alberta ranged from 22 adults and 34 calves to 217 adults and 296 calves for an average of 76 adults and 159 calves per year from 1974 to 1990 (Table 4-1). These levels represent 0.29-1.65 cattle killed/1,000 available or 0.029%-0.165% with an annual average of 0.089% of the cattle living within wolf range (Mack et al. 1992b). Wolves apparently selected calves and yearlings over adults. Calves represented 49%-87% of cattle killed by wolves in Alberta.

Table 4-1
Number of livestock (cattle and/or sheep) killed or injured by wolves and the number of livestock in Alberta and British Columbia within wolf range. [a]

		Cattle				Sheep			
		Killed or injured				Killed or injured			
Province	Year	Adults	Calves	Available	Killed/1,000 available	Lambs	Adults	Available	Killed/1,000 available
Alberta [b]	1974	32	109	300,000	0.47	12 [c]			
	1975	217	269	300,000	1.62	67			
	1976	120	200	300,000	1.07	56			
	1977	166	199	300,000	1.22	2			
	1978	65	198	300,000	088	19			
	1979	73	296	300,000	1.23	43			
Alberta [d]	1980	22	150	235,000	0.73	1			
	1981	57	225	235,000	1.20	45			
	1982	135	252	235,000	1.65	80			
	1983	63	181	235,000	1.04	127			
	1984	106	160	235,000	1.13	27			
	1985	66	64	235,000	0.55	20			
	1986	44	167	235,000	0.90	18			
	1987	29	71	235,000	0.43	5			
	1988	35	34	235,000	0.29	8			
	1989	30	46	235,000	0.32	4			
	1990	27	80	235,000	0.46	0			
Mean		76	159		0.89	31			
Simonette River, Alberta [e]	1976	7 [f]		2,288	3.06				
	1977	6		2,023	2.97				
	1978	16		1,784	8.97				
	1979	27		1,558	17.33				
	1980	11		1,772	6.21				
	1981	1		1,804	0.55				
Mean		11		1,872	5.88				
British Columbia [g]	1978	47	81	587,750 [h]	0.22	6	27	48,000	0.69
	1979	53	98		0.26	3	21	48,000	0.50
	1980	32	101	587,750	0.23	15	5	48,000	0.42
				587,750					
Mean		44	93	587,750	0.23	8	18		0.54

[a] Adapted from Mack et al. 1992b.
[b] Cattle and sheep depredation data (1974-1979) are from J. Gunson, Alberta Environmental Protection, Edmonton, pers. commum., cattle availability are from Gunson 91983).
[c] Include lambs and adults.
[d] Data are from M.J. Dorrance (Alberta Agriculture, Plant Industry Division, unpubl. data) and M.J. Dorrance pers. commun. Cattle availability is from 1986 estimate of cattle numbers in wolf range.
[e] Data are from Bjorge and Gunson (1983, 1985). Cattle were the only livestock available and killed.
[f] Numbers of calves and adult cattle lost to wolves were not given, but 54% of all cattle killed or injured between 1976 and 1980 were calves (Bjorge and Gunson 1983).
[g] Data are modified from Tompa (1983).
[h] Cattle numbers include 209,500 calves and 378,250 adults. Numbers are from average stock populations between July 1980 and January 1981. Minn. Dep. Of Agri., B.C. Cattlemen's Assoc. (Tompa 1983).

All major predators selected calves over adults. However, unlike bear depredation which peaked in early spring (coinciding with bear emergence from dens) or coyote depredation which peaked coincident with calving, wolf depredation peaked in August and September. This coincides with wild ungulate calves and fawns maturing and increased food demands from growing pups before they are completely mobile and can hunt with the pack (Dorrance 1982).

Wolf depredation on livestock other than cattle is extremely low in Alberta, primarily because other types of livestock are not exposed to depredation within wolf range (M.J. Dorrance, Alberta Agriculture, pers. commun.). Sheep (including adults and lambs) killed or injured by wolves in Alberta ranged from 1 to 127, or an average of 31 per year from 1974 to 1990. Numbers of sheep in wolf range are not available but are roughly estimated at around 10,000 head (see above).

From 1974 to 1980, swine, goats, and poultry comprised 4% of the total livestock killed by wolves for which farmers are compensated (J.R. Gunson unpubl. data) and 1% of total livestock killed by wolves from 1982 to 1990 (M.J. Dorrance unpubl. data). Coyotes were responsible for 99.98% of the losses of these classes of livestock (primarily poultry) during 1990-1991 (M.J. Dorrance, Alberta Agriculture, pers. commun.). In Alberta, density of swine, poultry, and other classes of livestock are more similar to those in the Yellowstone area than those in Minnesota, and Alberta husbandry practices, terrain, and weather are also more similar to those around Yellowstone.

In Alberta, livestock operators are compensated for livestock (food producing livestock classes) killed by wild predators. Losses are compensated up to 100% of commercial value for confirmed kills and up to 50% of commercial value for probable kills. From 1972 through 1989 the number of approved claims ranged from 22 in 1972 to 79 in 1975 with an annual average of 53 claims. Compensation paid under this program during the same period ranged from $14,993 in 1972 to $115,296 in 1982 with an annual average of $46,227 (Alberta Forestry, Land and Wildlife 1991).

The Simonette River experimental area involve remote wooded grazing leases on provincial lands west-central Alberta. Moose, elk, white-tailed and mule deer were common, as were coyotes, black bears and wolves. Pastures were small and isolated and were in, or adjacent to, territories of four wolf packs. The evaluation was conducted from 1975 through 1980. There was no wolf control during the first four years and livestock operators were compensated for 100% of value for livestock killed by predators and 80% for missing cattle. Government wolf control was resumed in the winter of 197901980. Estimated wolf numbers were 14-15 in 1975 and 39-40 wolves in 1979-1980; wolves were reduced to 12-13 in the winter of 1979-1980.

Total cattle deaths from all causes (including missing animals), from an average of about 2,000 cattle present, increased from 2.9% in 1976 to 3.7% in 1979; total cattle mortality was 2.5% in 1980 following wolf control. Of 38 cases where cause of death was known, 42% was due to wolf depredation, 11% from black bear depredation, and 47% from non-predator causes. Losses due to wolf depredation ranged from 1 to 27 cattle per year with an annual average of 11. Loss rates due to wolf depredation ranged from 0.55 to 17.33/1,000 head of livestock available with an average of 0.59% (Table 4-1). These rates may be representative of loss rates in remote wooded situations with high wolf densities where cattle are unattended and no wolf control is conducted on wolves that depredate on livestock.

British Columbia – British Columbia administers a wolf control program. Depredation complaints are investigated and wolf control is conducted on a reactive site-specific basis. Wolf control is not initiated if faulty husbandry practices result in wolf conflicts (Tompa 1983). British Columbia has no monetary compensation program for wolf depredation on livestock. Approximately 6,300 wolves inhabited British Columbia in the early 1980s (Mack et al. 1992b). However, livestock do not occur throughout the entire province so the number is wolves in livestock range is unknown but is likely to be substantially less than the provincial population estimate.

In British Columbia from 1978 to 1980, confirmed losses ranged from 32 to 53 adult cattle and 81 to 101 calves annually from an estimated cattle population of 587,750 or an overall loss rat of 0.023%. Province wide, an average of 93 calves and 44 adult cattle were killed or injured each year by wolves from 1978 to 1980 (Table 4-1). Of those killed by wolves, 68% were calves and 32% were adults. Wolf depredations on cattle averaged 0.12/1,000 adults or 0.012% and 0.44/1,000 calves or 0.044% of those in wolf range (Tompa 1983). As in Alberta, calves constituted a majority of cattle killed by wolves. During the same period (1978-1980) the British Columbia Cattlemen's Association reported an average of 158 calves (73%) and 59 adult cattle (27%) lost to wolves. From these statistics, the average depredation rate was 0.37/1,000 or 0.037% of those available (Tompa 1983).

Sheep reported killed or injured by wolves averaged 8 lambs (31%) and 18 adult sheep (69%) annually from 1978 to 1980 (Table 4-1). Depredation rates ranged from 0.42/1,000 to 0.69/1,000 or an annual average of 0.054%. As with other predators and other areas, depredation rates for sheep were typically higher than cattle.

Minnesota – Wolves frequently encounter livestock in Minnesota without depredations occurring (Fritts and Mech 1981). In Minnesota, the USDA, (ADC) administers a wolf control program in response to complaints of wolf depredation on domestic livestock. Wolves are controlled on a reactive site-specific bases where complains of livestock depredation by wolves are verified (Fritts 1982). The estimated population of wolves in Minnesota was bout 1,500-1,750 in 1988 (Fuller et al. 1992) and appears to have increased further since then.

From 1979 to 1991, of cattle taken by wolves an average of 23 calves and 4 adult cattle were lost each year (Mack et al. 1992b, Table 4-2). Calves comprised 85% and adults 15%. Depredation rates for cattle ranged from 0.04/1,000 to 0.18/1,000 with an annual average of 0.12/1,000 or 0.012% of those available.

Table 4-2
Number of cattle and sheep lost to wolves, and cattle and sheep available in wolf range in northern Minnesota, 1979-1991 [a]

	Cattle				Sheep		
	Killed or Injured						
Year	Adults	Calves	Available [b]	Killed/1,000 Available	Killed or Injured [c]	Available	Killed/1,000 Available
1979	5	12	220,970	0.08	1	30,839	0.03
1980	4	12	225,224	0.07	56	32,950	1.70
1981	6	24	241,291	0.12	110	39,569	2.78
1982 [d]	1	23	241,724	0.10	12	34,698	0.35
1983	3	32	242,156	0.15	29	29,827	0.97
1984	2	8	242,589	0.04	92	24,956	3.69
1985	4	19	243,021	0.10	75	20,085	3.73
1986	7	19	220,141	0.12	13	15,904	0.82
1987	5	19	220,141	0.11	9	15,904	0.57
1988	3	28	220,141	0.14	68	15,904	4.2
1989	9	31	220,141	0.18	47	15,904	2.96
1990	2	35	220,141	0.17	112	15,904	7.04
1991	5	30	220,141	0.16	31	15,904	1.95
mean	4	23	229,065	0.12	50	23,719	2.11

[a] Losses are verified wolf caused kills and maulings, and include verified "probable" wolf losses. Data are from S.H. Fritts (unpubl. data), and W.J. Paul (1991) unpubl. annual prog. report. Adapted from Mack et al. 1992b.
[b] Available livestock are based on Minnesota agricultural statistics for 1979, 1980, 1981, 1985, and 1986 (S.H. Fritts unpubl. data)
[c] Includes only total sheep. Lambs and adult sheep lost to wolves ere not tabulated in the available datasets.
[d] Interpolation was used between 1981 and 1985 to estimate cattle and sheep available.

Sheep losses from 1979 to 1991 ranged from 1 to 112/year and averaged 50/year in Minnesota. The rate of sheep killed or injured ranged from 0.03/1,000 to 7.04/1,000 with an annual average of 2.11/1,000 or 0.211% of those available (Table 4-2). A higher proportion of lambs than adults were killed. Compensation payments averaged 22.5/year for adult sheep versus 51.5/year for lambs or a 1:2:3 adult to lamb ratio (Fritts et al. 1992).

Depredations varied widely among years. Annual variation in verified livestock losses in Minnesota ranged from 1 to 9 adult cattle and 8-35 calves with an average of 4 adults and 23 calves. Annual variation for sheep was greater. High annual variation was also shown for losses in Alberta and British Columbia (Tables 4-1 and 4-2).

Average number of animals killed or wounded per verified complaint was 1.2 for cattle and 4.4 for sheep. Annual variation in the number of cattle reported killed by wolves ranged from 1 to 17 adults and 12 to 98 calves with an annual average of 27 cattle killed or wounded per year. Reported sheep losses ranged from 1 to 242 with an annual average of 50 sheep verified as killed by wolves. On average, 55% of the complaints of depredation on livestock could be verified (Fritts et al. 1992).

Verified complaints of depredations averaged 30 per year and affected an average of 21 farms (0.33% of producers) annually. Conflicts were highly seasonal and involved primarily cattle (mainly calves), sheep and turkeys. Number of operators affected also varied considerably from year to year. In Minnesota from 1976 to 1980, 10-35 farms also reported wolf depredations. This represented less than 1% of the farms with livestock within wolf range (Fritts 1982).

Livestock producers in Minnesota are compensated for verified complains of wolf depredation on livestock by the Minnesota Department of Agriculture. From 1977 through 1989, compensation payments have ranged from a low of $8,668 in 1977 (the first year of the program) to a high of $43,664 in 1989 with an annual average of $23,715 (Fritts et al. 1992). During 1990, 1991, and 1992, $42,739, $32,206, and $17,992 ($11,340 pending) were paid in compensation, respectively. During 1989, 1990, and 1991, turkeys comprised a large portion of the losses (as discussed above) with 1,866, 1,170, and 1,075 turkeys confirmed deaths as a result of wolves in those years (often turkeys mass in corners of pens where they suffocate, W.J. Paul, ADC, Annual Report).

Northwestern Montana – A small population of wolves has been recolonizing northwestern Montana since the early 1980s. The first reproduction was documented in 1986 within Glacier National Park, Montana. From 1987 to 1992 wolves killed an average of 3 cattle and 2 sheep per year (Table 4-3). Depredation rates on cattle ranged from 0 to 0.08/1,000 with an average of 0.04/1,000 or 0.004% of those available. Depredation rate on sheep ranged from 0 to 0.88/1,000 with an average of 0.18/1,000 or 0.018% of those available (Mack et al. 1992b).

Table 4-3
Wolf depredation on cattle and sheep in northwestern Montana, 1987-1992. [a]

	Numbers of Livestock							
	Available [b]		Confirmed Killed		Possible Additional Killed [c]		Losses/1,000 Available	
Year	Cattle	Sheep	Cattle	Sheep	Cattle	Sheep	Cattle	Sheep
1987	75,000	11,000	6	10	0	0	0.08	0.88
1988	75,000	11,000	0	0	0	0	0	0
1989	75,000	11,000	3	0	7	0	0.04	0
1990	75,000	11,000	4	0	0	0	0.07	0
1991	75,000	11,000	2	2	0	2	0.03	0.18
1992	75,000	11,000	1	0	0	0	0.01	0
mean	75,000	11,000	2.8	2.0	1.2	0.3	0.04	0.18

[a] Data are from S.H. Fritts, unpubl. data. Adapted from Mack et al. 1992b.
[b] Livestock available as based on 1989 Montana agricultural for portions of 9 northwestern Montana counties. A correction factor was used for each county to estimate numbers of livestock available to wolves within possible wolf range. If more livestock were available, the depredation rate would be lower. Numbers rounded to the nearest 1,000.
[c] Suspected wolf involvement, no physical evidence of wolf depredation.

Summary – A review of wolf depredation in states and provinces in North America (Mack et al. 1992b) indicates that wolf depredation is highly variable among years and within areas. Overall, the rate of wolf depredation on domestic livestock across large geographic areas is very low, averaging usually less than 0.01% of livestock within wolf range.

Cattle and sheep are the species most affected in Alberta, British Columbia, and Minnesota (with the exception of turkeys in Minnesota). Recent development of large free ranging turkey producing operations within wolf range in Minnesota has resulted in turkeys constituting about 75% of the livestock losses to wolves in some recent years and accounting for most of the increase in losses (Fritts et al. 1992). In all cases, losses of adult cattle are much lower than that of calves. The loss of adult sheep versus lambs varies by area and by year, and ranged from 31% lambs in B.C. (Tompa 1983) and 42% lambs in Alberta (Gunson 1983) to 70% lambs in Minnesota (Fritts et al. 1992). Losses of sheep per capita available are higher than for cattle.

On average, wolf depredation affects a small number of available livestock and a small percentage of livestock operators, usually less than 1% of the livestock operators in an area each year. In most areas where livestock live with wolves, few operators experience loss of livestock to wolves; the vast majority do not. However, this means that, while on an industry-wide basis the loss of livestock to wolf depredation is very small, a few individual operators may be quiet adversely affected in any one year because these few operators may sustain a large portion of the annual loss within a large geographic area.

Wolf Depredation on Domestic Dogs – Wolves occasionally kill domestic dogs. Tompa (1983) indicated that in British Columbia from 1978 to 1980 there were 13 wolf/dog related complaints with 29 dogs killed or injured by wolves. During the three years, all 29 dogs killed or injured were attacked between October and March.

Fritts and Paul (1989) reported on wolf/domestic dog interactions in Minnesota. Generally, rural residence and those at the edge of small communities in areas of high wolf populations seemed most likely to experience problems. No seasonal pattern was evident in Minnesota. In an area with about 68,000 households with dogs that may be exposed to wolves, 47 complaints of wolf-dog interaction were received from 1979 through 1987. In 60% of the reports, wolf killing or wounding dogs were verified. In all other incidents it was verified that either no damage resulted or wolves were not involved. Verified complaints ranged from 1 to 6 reports per year with an annual average of 3.1. This would be an incident rate of 0.0004 incidents per 1,000 households or 1 per 22,000 households per year.

Impacts on Domestic Livestock in the Yellowstone Area

Elements of this alternative that will likely influence impacts on domestic livestock include reintroduction of wolves into Yellowstone National Park and management as an nonessential experimental population under Section 10(j) of the ESA; intensive monitoring and then capture and return of dispersing animals to Yellowstone National Park as needed; immediate control by public agency personnel of any wolves depredating on livestock; and ability of private landowners to kill wolves that are attacking or killing domestic livestock on private land and allowing harassment of wolves near livestock on both public and private land.

During the first 5 years, few wolves will be outside of Yellowstone National Park or in areas that contain livestock. Approximately 7.5 million acres (30,400 km^2) surrounding the reintroduction area have no livestock grazing. Wolf populations would be recovered in the Yellowstone area, probably within about 10 years, and would be removed from protection under the ESA. States and tribes would assume management outside of national parks and national wildlife refuges.

Because of the low numbers of other classes of livestock in the primary analysis area, and experience in other areas, cattle and sheep will likely constitute 95%-100% of livestock killed or injured by wolves.

Projections of depredation rates from other areas should be done with great caution, because terrain, vegetation, weather, size of farms, husbandry practices, and prey populations differ between areas (Fritts et al. 1992). However, to provide some estimate of potential impacts of a recovered wolf population on livestock, the following equation was developed to standardize depredation rates from other areas in relation to total livestock in wolf range and wolf numbers:

$$\frac{\text{No. of livestock in Analysis Area}}{\text{No. of livestock in Other Area}} \times \frac{\text{No. wolves in Analysis Area}}{\text{No. wolves in Other Area}} \times \text{Mean annual depredations (other study area)} = \text{Estimated annual depredations in Analysis Area}$$

Application of this equation to comparable data from Alberta, Minnesota, and northwestern Montana results in estimates of about 19 cattle (range 3-32) and 30 sheep (range 17-48) killed or injured by (100) wolves per year in the Yellowstone primary analysis area. Calves will likely constitute the majority of cattle losses. Depredation rates on sheep are expected to be higher and more variable than depredation rates on cattle. Losses of lambs and adult sheep will vary widely, but on average, will be nearly the same.

Depredations will be highly variable between years and within areas. Most livestock operators will incur no losses, others may incur small sporadic losses, and a few could sustain chronic losses. Although the loss of livestock to wolf depredation will be very small on an industry wide basis, annual losses to wolf depredation likely will not be evenly divided among operators. A few individual operators may be quite adversely affected in any one year because these few operators may sustain a large portion of the annual loss within any large geographic area.

Over 146,000 cattle and calves and about 265,000 sheep and lambs are grazed on the six national forests in the Yellowstone analysis area during summer. Comparison with winter livestock numbers in the primary analysis area indicates that a substantial number of cattle remain on private or other public land during this season whereas a substantial number of sheep are brought in from other areas to graze on national forests. Consequently, the number of cattle and calves grazed in national forests are lower than the overall number of cattle and calves which occur during the remainder of the year in the primary analysis area. However, the number of sheep grazed in national forests during the summer is much greater than the number available during the remainder of the year in the primary analysis area. Application of the above formula to livestock grazed seasonally on national forests results in estimates of average annual livestock depredation by wolves of about 8 cattle (range 1-13) and 68 sheep (range 38-110). In some allotments that were very remote, were within the home range of several wolf packs, and where livestock were not tended or checked for longer periods of time, depredation rates may approach those observed in the Simonette River experimental area in Alberta for short periods of time.

Evidence from the other areas of North America indicate that most of the wolf depredation occurs during the summer and early fall. Most of the depredations are likely to occur on public lands which have the higher density of livestock during this period and where most wolves are projected to occur.

All areas show a wide variation in rates of depredation among years and within particular areas, but a relative consistency in the general overall rates. A similar situation should be expected in the Yellowstone area with wolves present. Some years will have no or few depredations; others will have substantially increased depredations and concern will rise dramatically. Consequently, not only wide variation in depredation rates should be expected, but also wide variation in public perception, expectations, and tolerance of wolf depredation on livestock.

Expected depredations on pets (dogs) – Wolves occasionally kill pets, particularly dogs. Although this is a fairly uncommon event, it is often a very emotional impact because it often happens at or near the home and results in the death or serious injury to a family pet. Typically, rural residents and those at the edge of small rural communities in areas of high wolf populations seem most likely to experience these problems.

In Minnesota, wolves attack dogs at a rate of about one incident per 22,000 households per year and incidents range from one to sex per year. Possibly, several incidents are not reported in both areas. British Columbia has about four reported incidents per year. Both of these areas have over 1,500 wolves in areas occupied by people and an area of over 20,000 mi^2 (51,800 km^2). In the primary analysis area there are an estimated 1,700 farms or rural residences in about 25,000 mi^2 (64,700 km^2). Wolf depredation on domestic dogs is expected to be very infrequent but will be emotionally disturbing to people who lose pets.

Conclusions – During the first 5 years after reintroduction, livestock losses to wolves would likely be very few, if any. During the next 5 years or so, loss rates may be similar to those in northwestern Montana. Depredation rates, long term, are expected to be within the range of those experienced in other areas of North America and are estimated to average 19 cattle and calves (range 1-32) per year with the majority (85%) being calves. Depredations on sheep are estimated to average 68 sheep and lambs (range 17-110). Wolf depredation on domestic dogs is expected to be very infrequent, but will be emotionally disturbing to some of the owners.

Impacts on Land Use

Elements on this alternative that will likely impact land use include reintroduction of wolves into Yellowstone National Park and management as an nonessential experimental population; agency control of wolves that are involved in livestock, working animals, or pet depredation; allowing livestock operators to kill wolves that are attacking or killing livestock on private land; and allowing harassment of wolves near livestock on both public and private land. The proposal calls for restricted public access to facilities where wolves are confirmed during the release phase. Land management agencies may restrict intrusive public access around active wolf den sites from April 1 to June 30 when there are five or fewer breeding pairs. No public land-use restrictions solely to facilitate wolf recovery will be employed after six breeding pairs of wolves are established in the experimental population area.

Wolves wold be placed in 1-3 temporary confinement facilities for “soft release”. After an acclimation period they would be released and monitored. Confinement facilities would require the construction of pens suitable to contain wolves, likely 10 foot (3.0 m) high chain link fence with a ground apron. These would be 1 acre or larger (0.4 ha) with variation of topography, some forested area for cover and security, and a water supply. Archeological clearances would be completed prior to construction; previously disturbed sites would be used if available. During the confinement, some trampling of ground vegetation and digging is expected, however, no long-term changes to the vegetation community are expected after removal and rehabilitation.

Public access to the confinement and release sites would be restricted to prevent harm to the confined animals and to avoid habituation to humans. This would likely involve an area about 1 mile (1.6 km) around the facilities. The facilities would be located in semi-remote areas away from visitor facilities and wold not be expected to result in changes in normal visitor use of park areas.

Great amounts of public attention will be focused on reintroduced wolves during initial establishment of wild populations. Members of the pubic will aggressively seek opportunities to view wolves and photograph them, especially during the early population establishment. These opportunities most readily present themselves at den sites and rendezvous areas early in the spring (mid-April to mid-June) when wolves are less mobile. During the first several days of life wolf pups cannot regulate their own body temperature and are very vulnerable if disturbance results in adults moving the pups to more secure areas during this period. However, some recent observations indicate that young pups may be more tolerant to exposure than previously thought (Mech 1993).

Therefore, during the first several years of reintroduction, active den sites within Yellowstone National Park would be closely monitored. Human activity in the vicinity of the dens is likely to disrupt successful denning would be precluded within up to one mile of the den sites, based on the type of activity and the physical features of the terrain, from initiation of denning activity (usually mid to late April at these latitudes) until up to June 30.

The focus of population establishment would be in Yellowstone National Park and previous studies indicate that most wolves would live in the northern third of the park. Effects would be more focused there. Estimates indicate that 7 to 11 packs could live in this area. Consequently, if all of the first 5 breeding pairs denned in the park in areas where restrictions on human use were required, restrictions may affect a total of 16 mi2. It is likely that some denning areas will be located in areas already under visitor limitations for grizzly bear management or other reasons (see Chapter III, Land Use) so the total area affected is unlikely to be completely additive.

Within the park, snowmobile activity is restricted to the established routes (main roads that are closed to wheeled vehicles during winter). The road to Gardiner, Montana, to Cooke City, Montana, remains open year-round. Wolves would be exposed to vehicle and snowmobile traffic and noise and would likely select denning areas to avoid traffic and noise. Snowmobile activity ceases during March because of poor snow conditions at the lower elevations and road plowing which begins in early March and continues through April. Most roads are open to wheeled vehicle traffic by the end of April. Visitor activity during May and June is low, mostly confined to the main roads and the few open visitor facilities. (see Chapter III, Land Use and Visitor Use sections). Because of snow and poor trail conditions at higher elevations, little backcountry activity occurs until late June with commercial outfitting beginning after July 1. Consequently, no adverse effects to reintroduced wolves are expected from visitor use in national parks.

Current land management in national parks and national forests place restrictions on human use of important ungulate and grizzly bear seasonal ranges, primarily during spring. These restrictions occur at the same time and in habitats similar to those that would be used by denning wolves.

During the first 5 years, few animals will be outside of Yellowstone National Park or adjacent wilderness areas. Wolf populations would be recovered in the Yellowstone area, probably within about 10 years, and would be removed from protection under the ESA with states assuming management outside of national parks and national wildlife refuges.

Under this alternative wolves wold be reintroduced into Yellowstone National Park as a nonessential experimental population. Section 10(j) of the ESA requires that nonessential experimental populations be managed as a species proposed for listing outside of national parks and national wildlife refuges and as a threatened species within these jurisdictions. Section 7 of the ESA requires agencies to examine their actions and to avoid those that would jeopardize a listed species. If they determine that a proposed action would adversely affect a listed species, they are required to consult with the FWS, who much determine if the proposed action is likely to jeopardize the continued existence of the species. These procedures would apply to the reintroduced population within national parks and national wildlife refuges.

Outside of parks and wildlife refuges, federal agencies are only required to confer with the FWS if the agency determines their proposed action is likely to jeopardize the species. Unlike consultation under Section 7 for listed species, the determination in a “conference” is not binding on the federal agency proposing the action. Under this threshold, few agencies would need to confer with the FWS.

Land management agencies currently place restrictions on human use of important ungulate and grizzly bear seasonal ranges, primarily during spring. These restrictions occur at the same time and in habitats similar to those that would be used by denning wolves. Approximately 6.6 million acres of national forest is wilderness, recommended wilderness, or other undeveloped or roadless status.

On national forests, three general types of activities involve large areas of national forest land: livestock grazing, timber harvest, and recreation. The areas involved in these program activities are described in Chapter III, Livestock and Land Use Sections.

Livestock grazing occurs on approximately 4 million acres of national forest. No livestock grazing occurs in Yellowstone National Park nor in large areas on national forest adjacent to the park. This area, about 7.5 million acres, includes the park and large areas of designated wilderness. In general, grazing occurs on the perimeter of this area outside the park and wilderness are, although some grazing does occur within wilderness. The season of grazing varies by area but generally runs from mid June through October.

The limits on public use to protect den areas would likely not affect initiation of grazing on national forest allotments. Additionally, this alternative calls for agency control of depredating wolves and killing or harassing of wolves that are attacking or harassing livestock by livestock operators on public land. Consequently, livestock grazing areas would not likely be adjusted to accommodate wolf occupancy if conflicts developed.

It is difficult to estimate effects restrictions to protect wolf dens will have on timber harvest. However, several factors would indicate effects would be very small. As with livestock grazing, the bulk of timber harvest is generally on the outside perimeter of the central park and wilderness area; mostly on the Targhee National Forest where wolf numbers are projected to be quite low. In comparison, a small proportion of the analysis area is affected by timber harvest, about 3% of the national forest area in the analysis area.

Other seasonal restrictions designed to protect important wildlife areas such as ungulate winter range and birthing areas, grizzly bear spring range, and protection of roads and water quality during spring thaw already limit areas of harvest during the wolf denning period. In northwestern Montana during early stages of population establishment road closures that were in place for other reasons have been extended for short periods of time (2-4 weeks) to provide security for wolf dens close to roads. In other instances only “no stopping” provisions were imposed along short segments of road to keep curiosity seekers from entering the denning area; traffic was not impaired. In other instances, no action was needed or taken to protect den areas. No areas have been closed for long periods of time. It is unlikely that closures to protect wolf dens would preclude a measurable portion of annual timber harvest; some sales could occasionally be delayed slightly if they were proposed during the April 1 to June 30 period.

Recreational activities during the denning period are normally at the lowest level of any time of year. Other limitations on access, for reasons discussed previously, and snow and trail conditions at higher elevations generally limit activities in higher elevation backcountry areas. Commercial outfitting generally does not begin until after this period. The only hunting is spring hunting for black bear in some areas. It is possible that wolves could den in several areas that would affect access to national forest land. Under one situation, only the area within one mile of dens would be affected. In other situations, the closed area could include the road accessing an area and under this situation a much larger area could be limited to vehicle access. With most wolf territories likely occurring within the park or adjacent wilderness or roadless areas, affects on national forest areas with vehicle access during the denning period would be small.

Activities to control damage by wildlife or livestock or property are conducted primarily by private individuals or ADC. Most control activities are for coyote depredation on cattle or sheep, using a variety of techniques. Aerial shooting is limited by weather, terrain, and cost, and is not permitted by private individuals on federal land. Other techniques include leg-hold traps and neck snares.

Only tow toxicants are registered by the Environmental Protection Agency for control of coyotes. These are Compound 1080 toxic collars and M-44s. Toxic collars are placed on the necks of sheep, and when bitten by a coyote, they expel Compound 1080 (sodium fluoroacetate). These devices are registered for operational use and receive extremely limited application. M-44s may be used by private owners on private land after operator certification. However, there are no certified operators in the primary analysis area now (ADC pers. commun.). Use of M-44s is not authorized on any public land around Yellowstone.

M-44s are primarily used by ADC to control coyotes on private land in response to landowner requests. Use of M-44s by ADC through cooperative agreement with landowners on private lands in the primary analysis area may involve up to 185 ranches (see Chapter III, Land Use). The devices are not used on every ranch every year or on any ranch all year, but may be used based on the particular situation (ADC personnel, pers. commun.).

Impact on use of M-44s is expected to be very limited for two reasons. First, they are not authorized for use in national parks, national wildlife refuges, or on national forests in the analysis area. Further, they cannot be used in areas where they may kill a threatened or endangered species, and are not used in most of the area because of the risk to grizzly bears. Consequently, their use is mostly restricted to low elevation private lands on the periphery of the primary analysis area and in several major river valleys. Second, the provisions in this alternative to control wolves that depredate on livestock, the provision that would allow livestock operators to harass wolves near livestock, and the likelihood that most wolves would avoid low elevation areas with high levels of human activity all suggest few wolves would occupy areas where M-44s are currently used.

However, it is possible that wolves may frequent some valleys and while they are there, use of M-44s in that locality may be suspended. For example, in northwestern Montana where a population of wolves lives, use of M-44s is not limited where single wolves may show up. Rather, where a group of wolves in known to live, M-44 use is restricted in the area at the time wolves are there.

Conclusions – Temporary confinement facilities would disturb up to three sites within Yellowstone National Park, public access would be restricted up to one mile (1.6 km) around the facilities, but overall visitor use would not be affected. Human activity may be restricted up to one mile around active den sites from April 1 to June 30. Based on the seasonality of both visitor activity and wolf denning activity, no measurable limitation on visitor use is expected. Some timber sales on national forests may be delayed slightly if proposed during the April 1 to June 30 period. Affects on recreational access to national forest areas would be small. Temporary limitations in a few areas on M-44s for control of coyotes may occur. No other land-use restrictions are proposed and no changes in public land-use levels or patterns are expected.

Impacts on Visitor Use

Visitors to Yellowstone National Park and the Yellowstone area will know wolves live there, and will have the opportunity to see or hear wolves, or see their sign. In Denali National Park, Alaska, an estimated 15% of park visitors see wolves (Mech et al. 19910, and the concentrations of wildlife in open areas in Yellowstone National Park are expected to attract wolves to those places (Koth et al. 1990) where they will be observable.

A small percentage of potential backcountry uses could be inconvenienced by temporary travel restrictions in the vicinity of wolf confinement and release sites. April-June visitation to Yellowstone makes up 26% of annual park use (Table 3-35); April-June backcountry use made up 19.2% of the April-October backcountry visitor-use nights, and involved 1.4% of stock-use nights in 1992 (Table 3-36). Day use by a few hikers in Yellowstone National Park could be directed to alternative trails if wolf release sites were adjacent to 1 of 4 population trails in the northern part of the park – roughly 240 hikers could be affected (Table 3-39).

Of 6,151 commercially outfitted backcountry visitor-use nights recorded in Yellowstone National Park, April-October 1992, none were recorded in April or May, and just 215 in June, representing 3.5% of the April-October total. Stock-use nights for April-May were zero, and June stock-use nights amounted to 1.5% (90 of the April-October total of 6,194). Consequently, no adverse effect is expected on outfitter operators in Yellowstone National Park (Table 3-38).

Assuming monthly distribution of general recreational use on the six greater Yellowstone national forests (Table 3-43) would be similar to those of the national parks, few visitors would be suing the backcountry April-June. Monthly breakouts of outfitter use on greater Yellowstone national forests were not available, but snowy or muddy trails and high stream levels in higher elevations would normally prevent much use April-June, when travel might be restricted near wolf dens.
Conclusions – Visitors to Yellowstone would have opportunity to see or hear wolves or see their sign. A slight increase of visitor use (5%-10%) may occur in part for this purpose. No change in visitor-use patterns or use by commercial outfitters is projected.

Impacts on Economics

Background Information for Analysis – An economic analysis of the effects of wolf reintroduction into the Yellowstone area entails examining each potential source of economic costs or benefits and estimating its economic effect. The analysis contained here follows the outline presented by Duffield (1992). The areas of potential economic effects examined are the following: (1) effects on hunter harvest; (2) effects on livestock depredation; (3) effects on land-use restrictions; (4) effects on visitor use; and (5) effects on existence values.

Value of Foregone Benefits to Hunters – A reduced number of big game animals available for harvest can directly affect the available hunting opportunities. Reduced hunting opportunities translates into a reduced number of hunters and hunter days spent in the field. This reduction in big game hunting activity represents a social cost associated with wolf reintroduction.

Two independent studies examined the projected effect of a recovered wolf population in the Yellowstone area on ungulate populations and hunter harvest. Mack and Singer (1992b) estimated that the hunter harvest of big game species on the Northern Yellowstone Range may be reduced by about 27% for antlerless elk, 100% for antlerless mule deer, and 100% for antlerless moose. If these reductions are primarily achieved through reductions in existing special permit hunts for antlerless animals, deer populations could be expected to increase, elk populations could decline by 5%-30%, and moose populations could be expected to remain stable. Reduction of hunter harvest of other types of big game due to wolf recovery would be negligible.

Boyce and Gaillard (1992) estimated that a recovered wolf population in the Yellowstone area would reduce hunter elk harvest in two specific areas. Boyce and Gaillard (1992) predict that elk harvests would decline by 5%-10% for Wyoming’s Jackson elk herd (a decline of 165 to 330 elk harvested) and 1%-2% for the North Fork Shoshone elk herd (a decline of 6 to 13 elk harvested). They predict that reduced hunting opportunities associated with wolf reintroduction will be limited to elk in the two areas noted above. The estimates of reduced hunting opportunities provided by Boyce and Gaillard (1992) and Mack and Singer (1992b) are presented together to offer a range of expected value losses to big game hunters associated with wolf recovery in the Yellowstone area.

A relatively simple methodology was used to estimate the reduced net social benefits and reduced hunter expenditures that could be associated with wolf recovery. This methodology is likely to overstate these reductions as described below. Given harvest reductions, reductions in hunter days are based on hunter success and days hunter per hunter (Montana Department of Fish, Wildlife and Parks 1988) as detailed in the notes to Table 4-4. This simplifying assumption is made that the reduction in hunter days equals the reduction in harvest, divided by success rate, times the average numbers of days per hunter. This assumption may be appropriate for special permit hunts but will likely overstate the reduction in hunter days during the general season if hunters continue to hunt but with lower success rates. The total expected reduction in hunter days due to wolf recovery is 2,439 to 4,879 days (Table 4-4). The estimated hunter days per hunter for antlerless deer special permit hunts (4.9 days per hunter) are based on Montana hunt district 313 and 314 averages for both antlerless and antlered deer hunts. It is possible that this leads to an overstatement of the hunt effort associated with antlerless mule deer hunts, particularly if deer hunting in these districts is incidental to elk hunting.

As shown in Table 4-4, reduced hunter harvest of elk, mule deer, and moose in the Yellowstone area due to wolf recovery could result in losses on the order of $187,000 to $465,000 per year. Additionally, an estimated $207,000 to $414,000 in hunter expenditures would be lost to the 3-state region.

Table 4-4
Annual economic vales and expenditures associated with reduced hunting opportunities arising from wolf reintroduction to the Yellowstone area.

Area/Species	Boyce and Gaillard	Mack and Singer
Northern Yellowstone Range Reduced Antlerless Elk Reduced Antlerless Deer Reduced Antlerless Moose		 280 [a] 122 9
Jackson Herd Reduced Elk Harvest	 165-330	
National Forest Shoshone Herd Reduced Elk Harvest	 6-13	
Reduced Elk Hunting Days	2,439-4,879 [b]	1,020 [b]
Reduced Moose Hunting Days	0	65 [b]
Reduced Deer Hunting Days	0	1,213 [b]
Reduced Value of Elk, Deer, Moose Hunting (1992 dollars)	232,437-464,935 [c]	187,335 [c]
Total Reduced Expenditures Associated with Big Game Hunting (1992 dollars)	206,998-414,081 [d]	257,870 [e]

[a] The 280 antlerless elk reduction is assumed by Mack and Singer (1992b) to be split between 27 elk reduction in general season and 253 elk reduction in the late season hunt

[b] For Mack and Singer, calculation of hunting days based on success ratio for Montana hunt district 131 general season antlerless elk of 0.396 and late season 0.71 (Duffield 1989). Antlerless mule deer success ratio 0.493 for Montana districts 313 and 314, and moose success is 0.85 based on hunting statistics for Montana Region 3 (Montana Department Fish, Wildlife and Parks 1988). Days per hunter are 5.48 for hunt district 313 general season, and 3.0 for late season (Duffield 1989). Days per hunter for deer in Montana hunt districts 313 and 314 is 4.9. Montana Region 3 moose hunters averaged 6.1 days per hunter (MT DFWP 1988). For Boyce and Gaillard, calculation of hunting days is based on 1991 success rate for Jackson elk herd of 0.37 and days per hunter 5.47 for this herd (Wyoming Game and Fish, 1992).
[c] Based on estimates of net economic value per day of $95.30 for elk hunting (Duffield 1988), and $64.09 for deer hunting (Brooks 1988). Moose hunting is assumed to be twice as valuable as elk hunting.
[d] Based on average expenditures for elk hunting in Wyoming of $84.87.
[e] Based on average expenditures per day of $131.07 for elk and moose hunting and $95.35 for deer hunting.

Lost Value Due to Livestock Depredation – A second area of potential costs associated with wolf reintroduction to the Yellowstone area is livestock depredation. The calculation of lost value due to this depredation is straightforward. The lost value per year is equal to the estimated number of lost animals per year times the market value of those animals.

Wolf depredation on domestic livestock would likely be minimal during the first 5 years after the beginning of reintroduction. After that period, as recovery levels are approached and achieved, depredation losses are expected to be in the range of 1 to 32 cattle per year and 17 to 100 sheep per year. Table 4-5 shows the estimated economic value of the projected losses associated with wolf depredation in the Yellowstone area. It is estimated that between $1,888 and $30,470 in livestock depredation losses would occur under Alternative 1.

Lost Value Due to Land-Use Restrictions – It is expected that any land-use restrictions due to the reintroduction of wolves into the Yellowstone area will not result in lost economic value. While some area visitors may be inconvenienced due to restrictions placed on visitation in areas of high sensitivity confinement and release sites, this inconvenience is unlikely to result in any appreciable loss of economic value. Therefore, the net economic cost due to land-use restrictions is estimated to be zero.

Table 4-5
Annual economic costs associated with livestock depredation in the Yellowstone area. [a]

	Low estimate	High estimate	Average estimate
Cattle lost	1	32	19
Ave. value per cow [a]	715	715	715
Sheep lost	17	110	68
Ave. value per sheep [a]	69	69	69
Total lost value/year	1,888	30,470	18,277

[a] Average value per head figures are based on an average of the Montana, Idaho, and Wyoming value for all cattle and all sheep in the states as of January 1, 1993 (Montana, Idaho, and Wyoming Departments of Agricultural Statistics, pers. commun.).

Economic Effect of Changes in Visitor Use – Wolves are a high profile species with interest nationwide (Duffield 1992). Reintroduction of wolves under Alternative 1 will further increase national awareness of the presence of wolves in Yellowstone National Park. One possible effect of this increased awareness is increased visitation to the park. Table 4-6 shows how different groups of respondents answered the question “if wolves were present in the GYA, would you visit the area more frequently, less frequently, or the same frequency as you currently do?” Except for one group with a very small sample size, all groups reported that a larger percentage would visit more frequently than would visit less frequently. It should be pointed out however that for a majority of respondents the presence of wolves would not change their visitation patterns.

A 1993 national and regional survey sponsored by FWS found a recovered population of wolves in the Yellowstone are would lead to an estimated 10.4% increase in visitation from residents of Montana, Idaho, and Wyoming, and an increase of 4.8% from out of region residents. It is estimated that there would also be a commensurate percentage increase in visitor expenditures. Based on the model of Duffield (1992), estimated increased expenditures in the Yellowstone area due to wolf reintroduction would be $3.35 million per year for 3-state residents and $19.65 million per year for out of region residents (Table 4-7). It should be noted that the standard errors on the estimates of percentage changes in visitation are quite large, and in all cases a 95% confidence interval on these estimates includes zero. Therefore, the estimates presented in Table 4-7 should be viewed as indicators of the likely direction of change in visitation rather than predictions of the percentage change.

Table 4-6
Comparison of anticipated visitation patterns with wolf reintroduction in the Yellowstone area, by population group.

Sample	% who would visit more	% who would visit the same	% who would visit less
(A) Residents of Mont., ID, Wyo.			
Who visited Yellowstone area in 1992 n = 79 or 24.5% of sample	21.5	69.6	8.9
Who had ever visited Yellowstone area n = 281 or 87% of sample	21.0	68.3	10.7
Who not visited Yellowstone area n = 42 or 13% of sample	33.3	42.9	23.8
(B) Out of 3-state region residents			
Who visited Yellowstone area in 1992 n = 5 or 1.6% of sample	0.0	80.0	20.0
Who had ever visited Yellowstone area n = 81 or 27.1% of sample	16.0	74.1	9.9
Who had not visited Yellowstone area n = 218 or 72.9% of sample	35.3	44.0	20.6

Table 4-7
Estimates of increased visitation and expenditures in the Yellowstone area due to wolf reintroduction.

Response/Statistic	MT, ID, Wyo. Residents	Out of Region Residents
Current trips/year for sample	577	166
Sample extra trips	99	17
Sample fewer trips	39	9
Net change in trips	60	8
% increase in trips and expenditures	+10.4%	+4.8%
Estimated change in expenditures in Idaho, Mont., Wyo. (millions of dollars)[a]	+3.35	+19.65

[a] Calculation of increase in expenditures in the Yellowstone area due to wolf reintroduction draws from Duffield (1992) adjusted to 1992 price levels.

Economic Effects on the Value Potential Visitors Place on Wolves – A final area of potential change in economic value associated with wolf reintroduction is the value potential visitors and others place on having a recovered wolf population. There are two components to this value. There is a value associated with hearing or seeing wolves. There is also what is called “passive use” or “existence value”. Existence value is the value a person associates with the knowledge that a resource exists, even if that person has no plans or expectations of ever directly using that resource (Krutilla 1967).

The methodology used follows that of Duffield (1992) and Duffield et al. 1993. The basic idea is to ask individuals how much they would be willing to contribute to a fund to help or oppose wolf recovery. Two random samples of potential respondents were drawn: one from all listed phone numbers in the U.S., and the other from all listed phone numbers in the 3-state region (Idaho, Montana, and

Wyoming). Because wolf reintroduction is a potentially contentious and divisive issue, it was anticipated that two distinct groups of respondents would respond to the survey: those who support wolf recovery and attach a value to their existence in the Yellowstone area, and those who oppose recovery and attach a value to the absence of wolves.

The key survey question asked respondents if they would be willing to buy a lifetime membership in a trust fund established to support or oppose effects to reintroduce wolves to the Yellowstone area. Respondents were presented with varying dollars costs for trust fund membership. The responses as to respondents' willingness to pay for membership in the trust funds were analyzed in other to estimate the average amount those favoring or opposing wolf recovery in the Yellowstone are would be willing to pay to support or oppose wolf recovery (Table 408). The total net economic existence value per year of wolf reintroduction to the Yellowstone area is about $8.3 million (Table 4-8).

Conclusion – Estimated economic effects include a $187,000 to $465,000 annual loss in benefit to hunters from fewer big game animals available for harvest. Additionally, potential reduced hunter expenditures are estimated at $207,000 to $414,000 for the 3-state region. Loss to livestock is estimated to range from $1,888 to $30,470 annually (Table 4-9). Economic existence value of wolves in the Yellowstone area is estimated at $6.6 million to 9.9 million annually (Table 4-9). Expenditures from estimated increased visitation due to the presence of wolves is projected at a positive $23 million annually.

Table 4-8
Estimated mean values of wolf reintroduction in the
Yellowstone area to potential visitors and others under Alternative 1

Welfare Measure/Statistic	Mont., Wyo., Idaho Residents	Out of Region Residents	All
Mean value for those [a] supporting reintroduction (Standard Error) [b]	20.50 (1.43)	8.92 (0.74)	
Mean value for those opposing reintroduction (Standard Error)	10.08 (1.48)	1.52 [d] (0.55)	
Population supporting wolf reintroduction	391,204	50,152,416	
Population opposing wolf reintroduction	340,522	25,774,280	
Aggregate net economic value/year [c]	321,201	28,572,785	
Calibration e	0.286	0.286	
Estimated net economic value/year (Standard Error)	91,863 (9,179)	8,171,817 (811,470)	8,263,860 (956,437)

[a] The mean values are calculated as a truncated mean with the truncation level at $50 for 3-state residents and at $25 for out region residents. The truncated mean valuation calculation included both responses from people with directory listed phone numbers and non-listed numbers, contacted through a random dialing procedure. In the aggregation of mean values an assumption was made of not difference in willingness to pay between those respondents with listed phone and those not listed. This assumption was tested by making a non-parametric comparison of the responses from a small random digit dialing sample with the listed sample. The mean values from the random digit sample were higher than those from the listed sample.
[b] All standard errors on estimates of mean net willingness to pay were estimated using a simulation procedure with 5,000 iterations (Krinsky and Robb 1986).
[c] Values are calculated assuming a perpetual benefit stream from a one time trust fund deposit amortized at a 7% real interest rate
[d] The sample size for the out of region respondents opposing wolf reintroduction to the Yellowstone area was not adequate to estimate willingness to pay. A non-parametric comparison of the Yellowstone area and central Idaho, out of region, oppose responses yielded quite similar means. $1.16 for Idaho vs. $6.67 for Yellowstone area. Because of the closeness of the estimates, the estimated Idaho mean of $1.52 was also used to estimate the Yellowstone area out of region, oppose willingness to pay.
[e] This factor is an estimate of the ratio of the amount individuals would actually contribute to the amount they state they would contribute, based on Duffield and Patterson (1991) and Ward and Duffield (1992).

Table 4-9
Annual net social benefits associate with wolf recovery in the Yellowstone area under Alternative 1.

	Annual Impact (thousands of 1992 dollars)	
	Low estimate [c]	High estimate [c]
(A) Benefits associated with wolf recovery	6,673.1	9,854.3

Annual net economic value of wolf recovery		
(B) Costs associated with wolf recovery Foregone value to hunters [a]	187.3	464.9
Value of livestock losses	1.8	30.5
Annual wolf management cost until recovery [b]	478.0	478.0
Total costs	667.1	973.4

[a] Lost value to hunters could possible be overstated as this figure is based on hypothetical willingness to pay and has not been calibrated in any way as hove the net economic benefits estimates.

[b] Note that one half of the total management costs of wolf recovery to both the Yellowstone area and central Idaho are included in the costs associated with this alternative. This cost will only be incurred until wolf recovery is achieved, which varies between alternatives. Other costs and all benefits will continue into perpetuity making annual net benefits significantly higher in many cases once recovery is achieved.

[c] For the benefits estimates, the low and high estimates represent a 95% confidence interval on the estimates of net willingness pay for the alternative. For each category of costs, the low and high estimates represent the best estimates of minimum and maximum costs associated with an alternative.

Adverse Effects

Some elk, deer, moose, and bison populations would be reduced from 3% to 30% from current high population levels. Levels of change would vary widely by species and population. Effects of elk populations would range from a projected decrease in the northern range elk herd of 5%-30% (from about 17,300 to between 12,100 and 16,400 elk) to an overall change in the Yellowstone, Jackson, and North Fork Shoshone River populations of 5%-20% (from about 36,726 to between 29,381 and 34,890 elk). Mean populations for mule deer would be 3%-19% lower than current high population levels and moose might be less than 7% lower. Bison populations might decline less than 15%. Bighorn sheep, pronghorn, and mountain goats are not predicted to be significant prey for wolves because of their low numbers relative to other wild ungulates, their use of escape terrain, and their use of areas close to human habitation. Wolf recovery will likely not affect these ungulates.
Hunter harvest of antlerless big game may also change from some ungulate herds. Mack and Singer (1992a) estimated that if antlerless elk harvests were reduced 27% (from an average of 994 antlerless elk/year to 714 antlerless elk/year) effects would be as described above. They also found northern range mule deer would increase in the presence of wolf predation if the antlerless deer harvest of 122 antlerless deer/year were eliminated. Moose numbers ranged roam 13% smaller to 12% larger if moose harvests were reduced ½ (from 31 to 16 moose/year) in the presence of wolf predation. Boyce and Gaillard (1992) did not project wolf recovery to affect the hunter harvest in Montana, but the did predict the harvests to decline 5%-10% for Wyoming's Jackson elk herd (from about 3,300 elk/year to between 2,970 and 3,135 elk/year) and 1%-2% for the North Fork Shoshone elk herd (from about 640 elk/year to between 627 and 634 elk/year).

Some livestock will be killed by wolves. Estimates of average annual depredation by 100 wolves are about 19 cattle (range 1-32) and 68 sheep (range 17-110). It is not expected to have a measurable effect on livestock production for the livestock industry as a whole, but the few livestock operators that are affected each year could sustain most of the loss projected for the year.

Visitors would be restricted from about 3 mi^2 (7.8 km^2) around wolf confinement and release facilities. There will be short-term impacts to vegetation in the confinement facilities during the reintroduction phase. No measurable effect on the overall pattern of visitor use is expected. Human activity could be restricted around wolf dens on up to 16 mi^2 when five or fewer wolf breeding pairs have been established.

Adverse effects of this alternative include foregone benefits to hunters of $190,000-$460,000 per year and a potential reduction in hunter expenditures in the recovery area of $210,000-$410,000 per year. Additionally, losses to area ranchers due to livestock predation by wolves may be on the order of $1,800-$30,500 per year. These livestock losses could, however, be mitigated to a large degree by a private compensation fund, such as the one currently administered by Defenders of Wildlife.

Short-term and Long-term Effects

Short-term and long-term effects describe the relationship between local short-term uses of human's environment and the maintenance and enhancement of long-term productivity of the environment. During the early stages of wolf recovery, the short-term effects of wolf predation on wild ungulates would be undetectable. Short-term effects on hunter harvests would also be undetectable. As the wolf population reached the recovery level (10 packs, about 100 wolves), long-term effects of wolves on wild ungulate populations would include a reduction of ungulate numbers of 3%-30% from current high population levels. Hunter harvests of antlerless big game may also be reduced for some ungulate herds in the long term. Harvests of antlered big game animals should not be affected. Because this alternative provides for flexibility in managing wolves and federal and state wildlife agencies can and already use various program sand strategies to enhance and manage wild ungulate populations, a recovered wolf population could have reduced long-term effects on wild ungulate populations and hunter harvest.

Reintroduction of wolves into Yellowstone National Park and establishment of a recovered wolf population would result in few short-term effects on livestock. As the wolf population became established, wolves dispersing to areas beyond the park to areas that have livestock grazing, will likely encounter livestock on either public or private land. Some wolves will kill some livestock. Wolf related losses are not expected to have a measurable effect on livestock production from a long-term industry standpoint, but the few livestock operators that are affected could sustain substantial loss in a given year. Use of toxicants that are lethal to wolves will be more restricted in the short term because of the presence of an experimental population of wolves.

Visitor access to about 3 mi^2 (7.8 km^2) around wolf confinement facilities in Yellowstone National Park would be restricted during the confinement periods. This would be for several months for 3-5 years. Because these areas will not be in normal visitor-use areas, no measurable effects on visitor-use patterns are expected. Some short-term effects on vegetation in the confinement facilities are expected ruing the reintroduction phase. After completion of the reintroduction and rehabilitation and re-vegetation of the sites, there will be no long-term effects. No short-term adverse effects are expected outside of national parks. No long-term effects on land use have been identified.

In the short term there will be management costs on the order of $478,000 dollars per year and these will continue to the projected day of recovery of 2002. Losses to livestock and hunters are likely to be less than predicted in the short term and rise to the predicted level in the long term (after full recovery). The total estimated economic effects per year apply to both the short term and the long term.

Long-term reestablishment of the wolf to the system would reestablish more complete long-term predator/prey relationships. Computer simulations predict ungulate populations would fluctuate in response to winter severity, habitat conditions, hunter harvest, predation, and other environmental factors, just as they have in the past. Population highs are projected to be lower; but population lows will not be as low. Winter mortality of ungulates, particularly young animals, is projected to be less than past trends without wolves. Long-term reestablishment of complex ecological relationships in the system would be effected.

The restoration of a viable wolf population to the Yellowstone area would increase the maintenance and enhancement of long-term productivity of the environment by restoring the ecosystem to near pre-colonial natural conditions. Wolves being a large social predator, as the top of the food chain, would restore the only large land mammal currently missing as functional park of the Yellowstone ecosystem. A population of wolves and their interaction with other biotic components would add to the long-term stability of the natural biological and evolutionary processes in the Yellowstone area.

The long-term presence of wolves will represent a significant restoration of a missing component of the ecological system. A slight long-term increase of visitor use is projected because people will want to have an opportunity to see or hear wolves or see their sign in a wild setting. The reestablishment of this large predator will have significant positive long-term effects on ecological relationships and ecosystem functions.

Irreversible and Irretrievable Commitments of Resources

Because this alternative provides for flexibility in managing wolves and federal and state wildlife agencies can and already use various programs and strategies to enhance and manage wild ungulate populations, a recovered wolf population should not have irreversible effects on wild ungulate populations or hunter harvests. For ungulate herds where the primary management objective is to sustain higher big game populations to maximize hunter harvest, wolf recovery could reduce the number of animals available for harvest on a sustained basis. However, this alternative allows for relocation of wolves in circumstances where wolf predation causes significant reductions in ungulate populations.

Some wolves will kill some livestock. Wolves are not expected to have a measurable effect on the livestock industry but a few livestock producers could sustain substantial loss in a given year. Average annual depredation of livestock by a recovered population of wolves is projected to be about 19 cattle (range 1-32) and 68 sheep (range 17-110). The number of depredations will vary widely among years, but over the long term some livestock losses will be an irreversible commitment of resources. Any compensation paid by either state agencies or private groups to livestock operators for loss of livestock to wolves will be irretrievable by the group paying the compensation. No long-term effects or any irreversible or irretrievable commitments of resources regarding land use have been identified.

From an economic perspective, the only irreversible and irretrievable commitments of resources lie with the wolf management costs and the hunter and livestock losses as they occur.

Cumulative Effects Analysis

Ungulate Populations and Hunter Harvest – In general, all three state wildlife management agencies use hunter harvest as the primary tool to meet population number and harvest level objectives for big game ungulate populations. While all agencies have good hunting mortality data, and use this data as a guide to regulate the ungulate populations, little data is available quantifying other mortality sources such as wounding loss, illegal harvest, over-winter mortality, vehicle collisions, disease, and mountain lion, coyote, black bear, and grizzly bear predation. However, the outcome of these losses is inherently incorporated into other population parameters such as age/sex compositions (particularly reproductive success), and population trend counts.

Indeed, many modeled ungulate populations (particularly Wyoming) have mortality from predators and other sources incorporated into them by default without identification of cause specific mortality because the models attempt to mimic the observed dynamics of the population. None of the models investigating wolf predation on ungulates in the Yellowstone area compared wolf predation to other predators. Boyce (1990) and Boyce and Gaillard (1992) noted other predators preyed on ungulates but considered those predator effects as a component of the dynamics of the ungulate population without wolves. Mack and Singer's (1992a) models mimic observed ungulate population parameters and estimate population numbers without quantifying mortality from other wild predators. Their models estimated wolf predation as a worst case scenario, because they considered wolf predation additive to the population. Functional and numerical responses of wolves to increasing or decreasing ungulate populations or compensatory responses of ungulates to wolf predation were not included in Mack and Singer's (1992a) models and they noted "…ungulate populations may be larger than we predicted and hunter opportunities and harvests may not be affected to the degree proposed in our models."

Overall, a recovered wolf population (10 packs, about 100 wolves) may kill about 1,200 ungulates/year (primarily elk, deer, moose, and bison) in the Yellowstone area. This wolf kill represents about 1% of the 95,000 elk, deer, moose, and bison living in the area and bout 8% of the annual hunter harvest of 14,314 elk, deer, moose, and bison.

Since most models investigating wolf predation attempted to mimic ungulate populations under past conditions, mortality from other sources such as predators was already included. All models predicted wolves would decrease ungulate populations. Hunter harvests were predicted to decline in some situations (Garton et al. 1990, Boyce and Gaillard 1992, Garton et al. 1992) and in most cases this decline was limited to the antlerless harvests (Vale and Peek 1990, Mack and Singer 1992b).

Recovered wolf populations living in three areas (Yellowstone National Park, Jackson Hole, and North Fork Shoshone) were predicted to reduce the elk population 5%-20% (Boyce and Gaillard 1992). Subsequent to wolf recovery, hunter harvest may be reduced 2% for the North Fork area and as much as 10% for the Jackson Hole area. No reduction in hunter harvests were predicted for the northern range herd. Wolves living only on Yellowstone's northern range were predicted to reduce elk numbers 5%-30%. Following wolf recovery, hunter harvests of northern range elk may be reduced slightly (Garton et al. 1990) or only the antlerless a harvest may be reduced 27% (Mack and Singer 1992b).

With mortality form wolf predation, deer populations from three areas were predicted to decline 3%-19% (Boyce and Gaillard 1992). For a recovered wolf population living only in Yellowstone's northern range, deer populations were predicted to increase if hunter harvest of 122 antlerless deer/year were discontinued (Mack and Singer 1992b). Moose were predicted to decline no more than 7% (possibly more on the heavily hunted northern range, Boyce and Gaillard 1992). Mack and Singer (1992b) found the moose population on the northern range could remain stable with additional wolf predation if the antlerless harvests were discontinued. Bison populations in Yellowstone and Grand Teton National Parks were predicted to decline no more than 15% with a recovered wolf population (Boyce and Gaillard 1992).

One study in the North Fork Flathead river drainage in and near Glacier National Park is investigating cause specific mortality on ungulates in a multi-predator:multi-prey system. Of the 113 adult female ungulates (38 elk, 40 deer, and 35 moose) collared between 1989 and 1993, 43 have died. Of the 43, wolves killed nine (21%). This compares to mountain lions killing 13 (30%), bears seven (16%), humans seven (16%), and coyotes three (all deer, 7%). The remaining four (9%) died of unknown causes or old age (D. Pletscher, Univ. of Montana, unpubl. data). Inferring from this study, wolf predation on ungulates within site specific areas of the Yellowstone area is no expected to comprise more than 21% of the total predator caused mortality on adult female elk, deer, and moose in any one area.

Livestock – Within Idaho, Montana, and Wyoming, about 200,000 cattle and calves and about 300,000 sheep and lambs die annually from a variety of causes, prior to market (Table 4-10). Total mortality of cattle from all causes in Idaho, Montana, and Wyoming range from 1.1% to 1.3% per year and total calf mortality ranges from 4.3% to 4.7% per year. Total mortality of sheep from all causes in the three states range from 4.6% to 6.6% and total lamb mortality ranges from 14.9% to 18.8% (National Agricultural Statistics Service 1992).

Losses of adult cattle due to factors other than predators range from 98.8% to 99.5%. calf mortality, due to factors other than predators, ranges from 96.0% to 97.6% of all losses. Factors other than predators cause from 67.0% to 75.2% of total adult sheep losses and lamb mortality, due to factors other than predators, ranges from 39.5% to 69.5% (Table 4-10).

Losses inflicted by all predators range from 0.5% to 1.2% of total mortality of adult cattle, and calf mortality due to predators range from 2.4% to 4.0%. Of the total mortality of sheep, losses caused by all predators range from 24.8% to 33.0%, and lamb mortality due to predators range from 30.5% to 60.5% (Table 4-10).

Depredation by coyotes constitutes the largest predator factor. Estimated losses to wolves would likely be in the range of 0.004% of total cattle deaths and 0.02% of total sheep deaths. Losses of livestock from wolf predation is not expected to comprise an average more than 0.1% of any class of livestock in the analysis area and no cumulative impact on livestock populations is expected.

Land Use – Current limits on visitor access in Yellowstone National Park are described in Chapter III. Limits on visitor access under this alternative would include up to 3 mi^2 (5 km^2) around each of up to three confinement and release facilities during the reintroduction phase. These areas would not be located in normal visitor-use areas and would represent about 0.08% of Yellowstone National Park. During April to mid June approximately 161,790 acres (253 mi^2, 655 km^2) are closed to visitor use for grizzly bear management reasons (see Chapter III, Land Use). This area represents 7.3% of the park's area.

Limits on intrusive human activity in the vicinity of wolf dens from late April through June could result in restricted access to some areas for about a 3-month period. These limits would apply when there are five or fewer breeding pairs of wolves and would be at the discretion of the land management agencies. If all dens were in areas that required limits on human activity, about 5 mi^2 (13 km^2) could be affected.

There area 8.6 million acres (34,800 km^2) of national forest (Table 3-15) and about 6,500 miles (10,500 km) of national forest roads (table 3-29) within the primary analysis area. About 42% (2,700 miles; 4,400 km) of the roads are either closed or have seasonal travel restrictions. About 4 million acres (16,200 km^2) are closed to motorized use, about one half million acres (2,000 km^2) have seasonal access restrictions (primarily during spring), and travel is restricted to designated routes that access about 1.4 million acres (5,700 km^2) (Table 3-30). If all spring seasonal

Table 4-10
Total livestock mortality rates (percent of total deaths) from specific non-predator and predator causes in Idaho, [a] Montana, and Wyoming. [b]

	Cattle			Calves			Sheep			Lambs		
Mortality Causes	Idaho	Montana	Wyoming	Idaho	Montana	Wyoming	Idaho	Montana	Wyoming	Idaho	Montana	Wyoming
Total Losses	22,000	26,000	15,000	50,000	60,000	30,000	14,000	42,000	33,000	36,000	100,000	81,417
Weather	2.3	13.8	17.3	9.0	15.0	29.0	1.5	10.5	8.7	11.9	17.1	13.6
Health	30.9	30.8	35.4	51.4	42.8	41.0	26.4	32.2	31.1	14.3	10.9	7.3
Birthing	7.7	11.5	10.0	13.4	22.3	20.0	10.0	8.8	9.3	14.6	21.3	8.7
Poison	8.2	5.4	17.3	1.0	0.7	2.3	5.5	4.0	10.5	1.2	0.9	3.6
Theft	1.4	1.2	3.3	1.0	0.7	1.0	1.7	3.3	7.2	0.9	2.7	1.9
Other	49.0	36.1	16.0	21.8	15.5	2.7	21.9	16.4	5.1	26.6	12.6	4.4
Non-predator subtotal	99.5	98.8	99.3	97.6	97.0	96.0	67.0	75.2	71.9	69.5	65.5	39.5
Coyotes	0.1	0.1	0.0	1.8	2.0	3.3	25.3	18.1	20.9	25.0	26.1	44.6
Bobcats	**[c]	**[c]	**[c]	**[c]	**[c]	**[c]	*[d]	0.0	0.1	*[d]	0.1	0.3
Dogs	0.0	0.2	0.0	0.1	0.2	0.2	2.9	4.8	2.2	1.6	1.5	1.1
Bears	*[d]	*[d]	0.0	*[d]	*[d]	0.0	3.4	0.7	1.5	1.7	0.3	0.7
Eagles	*[d]	*[d]	0.0	*[d]	*[d]	0.0	*[d]	0.3	0.6	*[d]	1.2	5.8
Fox	*[d]	*[d]	0.0	*[d]	*[d]	0.0	*[d]	0.2	0.3	*[d]	4.8	5.6
Lions	0.2	0.4	0.7	0.1	0.3	0.3	*[d]	0.2	2.5	*[d]	0.5	2.2
Other	0.2	0.5	0.0	0.4	0.5	0.2	1.4	0.5	0.0	2.2	0.0	0.2
Predator subtotal	0.5	1.2	0.7	2.4	3.0	4.0	33.0	24.8	28.1	30.5	34.5	60.5

[a] Idaho calf and lamb numbers based on Montana-Wyoming averages of calf/cattle and lambs/sheep.
[b] Idaho Agric. Stat. Serv. 1992a, 1992b; Montana Agric. Stat. Serv. 1992, 1992b; Nat. Agric. Stat. Serv. 1992; Wyoming Agric. Stat. Serv. 1992a, 1992b, 1992c.
[c] Included in the mountain mortality rate.
[d] Included in the other predator mortality rate.

restrictions to protect denning wolves were totally additive this would affect less than 0.04% of total national forest area or decrease the area open to unrestricted access by about 0.1%.

There are an estimated 8,274 farms in the 17 counties around Yellowstone, with an estimated 4,673 farms larger than 160 acres (65 ha; U.S. Department of Commerce 1989a,b,c). Within the Yellowstone primary analysis area there are an estimated 1,713 farms larger than 160 acres (65 ha) and an estimated total of 3,073. Use of M-44s is possible on about 185 farms and ranches. The presence of wolves prior to recovery may limit the use of M-44s on several of these 185 farms and ranches during any one year. No cumulative effects on the public use of public land or on the use of M-44s are expected.

Economics – Total personal income in the region in 1990 was about $35 billion with the 17 county area accounting for about 12% or $4.2 billion. Wolf restoration would not significantly affect the proportion of the economy derived from farm income, local services, other industry, or non-earned income. Increase expenditures by visitors to Yellowstone National Park (currently estimated at about $425 million annually) would increase $23 million/year or about 5%. Reintroduction of wolves could reduce hunter harvests from their current average of 14,314 ungulates/year by 1,200, reducing hunt expenditures by $187,000 to $465,000/year or about 8% lower than their current levels. Annual livestock losses are currently about 8,340 cattle ($715/each) worth about $5,963,100 and 12,993 sheep ($69/each) worth about $896,517 or about $6,859,617/year. Wolf depredation could result in average annual increased losses up to 19 cattle ($13,585) and 68 sheep ($4,692) or $18,277/year. This would represent a 0.0026 increase in livestock losses annually.

Central Idaho

Impacts on Ungulate Populations

Impacts of a recovered wolf population (about 100 wolves) on elk populations in central Idaho were projected bases on POP-II (Bartholow 1985, Mach and Singer 1992a) computer simulation model. Population models were developed to predict the impact of wolves on elk populations, but because available information on population numbers and parameters was insufficient to model populations of other species, impacts on other species were extrapolated from elk models where possible.

At a predation rate of 15 ungulates/wolf/year plus 10% for occasional excessive killing (Carbyn 1983:971, Boyce 1990, Mack and Singer 1992b), 100 wolves would kill 1,650 ungulates per year (approximately 0.59% of central Idaho's pre-harvest total ungulate population). Based on availability and vulnerability of prey species., 100 wolves are predicted to kill about 495 elk and 1,155 deer (combination of mule deer and white-tailed deer) annually. Wolves will kill other ungulates occasionally, but wolf experts expect them to rely most heavily on deer and elk as prey.

Overall impacts of a recovered population of about 100 wolves are expected to be minimal. The expected increase in mortality because of wolf predation may affect the elk population so that a 10%-15% reduction in cow elk harvest (396-594 fewer cows harvested in central Idaho than in 1991) may be required if the current level of bull elk harvest is to be maintained and the elk population and bull:cow ratio is to remain within acceptable limits. Wolf predation is not expected to affect mule deer or white-tailed deer populations enough to require changes in current season structure or harvest levels. Impacts on moose are expected to be minimal. Extent and impact of predation on Rocky Mountain bighorn sheep sub-populations is more difficult to predict, but some herds with low productivity may be vulnerable to wolf predation when on winter range with inadequate escape terrain, may be impacted significantly. Mountain goats would rarely be vulnerable to wolf predation. Agencies would be permitted to capture and relocate wolves if big game populations were being significantly decreased by wolf predation.

Elk – The central Idaho elk population was modeled based on data from annual elk sightability surveys. Model assumptions included:

1. Starting population of 76,300 elk with structure of 25 bulls:100 cows:35 calves (Table 3-48). The model assumes these parameters accurately reflect the real population.

2. Population is stable to slightly increasing.

3. Current (1991) level of harvest in central Idaho would be maintained (8,137 bulls, 3,957 cows).

4. Ten percent wounding loss (i.e., 8,137 bulls and 3,957 cows were harvested legally by hunters in 1991; an estimated 814 bulls and 396 cows were mortally wounded but not retrieved by hunters).

5. Deer are estimated to be 1.13 times more vulnerable to predation by wolves than elk (Mack and Singer 1992b:4-51). After correcting for availability (76,300 elk vs. 159,500 deer), 2.36 deer are predicted to be killed for every one elk (i.e., 30% elk, 70% deer).

6. Predation rate of 15 ungulates/wolf/year plus 10% to account for occasional excessive killing by wolves (16.5 ungulates killed/wolf/year).

7. Wolves prey disproportionately on bull elk during winter because bulls may enter winter in a weakened condition following the rut (e.g., 56.5% bulls vs. 43.5% cows, Mack and Singer 1992b; 60% bulls vs. 40% cows, Boyd et al. in prep.). To account for sex-differential predation rates and adjust for availability of bulls in the population, wolf predation was modeled at 60% bulls and 40% cows if the bull:cow ratio was ≥25 bulls:100 cows; 50% bulls and 50% cows if the bull:cow ratio was 20-25 bulls:100 cows; 40% bulls and 60% cows if the bull:cow ratio was 15-20 bulls:100 cows; and 35% bulls and 65% cows if the bull:cow ratio fell below 15 bulls:100 cows. Twenty percent of all elk killed by wolves are expected to be calves (Boyd et al. in prep.).

After model parameters were initialized, natural mortality was adjusted to make the model simulate a stable to slightly increasing (population increases 0.4% per year for ten years, or 0.08% per year for 15 years) elk population prior to wolf predation (Table 4-11). Predation by 100 wolves was then added into the model to predict impacts on the elk population.

A predation rate of 15 ungulates/wolf/year plus 10% to account for occasional excessive killing was used in the model based n consumption and kill rates presented in several studies (Keith 1983, Boyce 1990, Vales and Peek 1990, Mack and Singer 1992b), and adjusted for the comparative size of ungulates in central Idaho. This predation rate is near the moderate kill rate of 13.4 elk/wolf/year used by Vales and Peek (1990), and is slightly higher than the 12 ungulates/wolf/year predation rate expected in Yellowstone (Mack and Singer 1992b, this document), because in central Idaho, wolves are expected to rely more heavily on smaller ungulates (i.e., deer) than in Yellowstone.

The central Idaho elk population models have several recognized shortcomings:

1. Recent change in elk hunting season structure which may result in more older bulls in the population (elk season was moved out of the rut period) is not reflected in 1992 estimates of population structure.

2. Elk and deer were the only prey considered in assessment of impact on elk, but wolves will also kill other ungulates occasionally. Hence, impact on elk and deer may be slightly less.

3. Wolves are expected to feed heavily on animals injured (or killed but not retrieved) during hunting season. Consequently, predation would be lower when crippled or unretrieved dead ungulates were available.

4. These models consider wolf predation to be completely additive to other sources of mortality. In reality, an unknown proportion of elk killed by wolves would have died from some other cause.

5. These models do not incorporate stochastic variation. Density-dependent functional and numerical responses of elk and wolves (e.g., wolves switching to alternative prey when one prey species declines or another is particularly abundant, increased or decreased reproductive success of elk and/or wolves in response to favorable or unfavorable weather, habitat, or physical condition, etc.) are difficult to predict and were not incorporated into the models.

6. If bull:cow ratios decrease, hunter success will decrease and fewer bulls will be harvested. Current (1991) harvest level of bulls is not likely to be maintained if bull:cow ratios decline significantly.

For these reasons, actual impacts of wolf predation may be somewhat less than predicted by the model.

Table 4-11
Projected 10-15 year impacts of wolf predation (100 wolves) on central Idaho elk population under different management scenarios. One hundred wolves are expected to kill 15 ungulates/wolf/year plus 10% excessive kill (70% deer:30% elk).

	Time 0		10 Years		15 Years	
	Pop [a]	Bull:Cow:Calf	Pop [a]	Bull:Cow:Calf	Pop [a]	Bull:Cow:Calf
No Wolves Maintain current elk harvest levels (10% wounding less assumed) [b]	76,300	25:100:35	79,094	14:100:35	86,131	16:100:35
100 wolves kill 15 ungulates/wolf/yr [c] +10% excessive kill (70% deer:30% elk)[d] Maintain current elk harvest levels	76,300	25:100:35	69,056	6:100:35	66,665	0:100:35
100 wolves 5% reduction in cow harvest	76,300	25:100:35	74,782	9:100:35	78,436	8:100:35
100 wolves 10% reduction in cow harvest	76,300	25:100:35	80,506	11:100:34	90,195	15:100:34
100 wolves 15% reduction in cow harvest	76,300	25:100:35	86,227	14:100:34	101,941	20:100:34

[a] Pop = Population size.
[b] Estimated 1991 harvest = 8,137 bulls and 3,957 cows.
[c] Predation rate based on Vales and Peek (1990) and Mack and Singer (1992b) and adjusted for smaller ungulate size in Idaho compared to Yellowstone.
[d] Species-specific predation rate derived from availability (159,375 deer: 76,300 elk) and vulnerability ratios (1.3 deer : 1 elk) (Mack and Singer 1992b)

Impact on population size, parameters, and trend – The central Idaho elk model predicted that without wolves, the central Idaho elk population will continue to grow at a low rate (r = 0.004 for 10 years, or r = 0.008 for 15 years). Although the population increased over time, the model predicted the bull:cow ratio would decline during the same period because more bulls die each year than are being replaced in the population. This model suggests that a current productivity (35 calves:100 cows), the 1991 level of bull harvest cannot be sustained without reducing the bull:cow ratio. Alternatively, it is possible that the initial population structure entered into the model may have been inaccurate because of misclassification of bulls:cows:calves during winter sightability surveys. Misclassification of calves as cows would result in a lower bull:cow ratio than exists in reality and result in a lower estimate of productivity. If productivity of central Idaho's elk population was higher than 35 calves:100 cows, more bulls would be replaced into the model population annually. Additionally, recent changes in elk hunting regulations that moved the hunting season after the rut may result in more adult bulls in the population in the future, and possibly a lower bull harvest and higher productivity. The predicted decrease in the bull:cow ratio is further compounded because the model does not incorporate a functional response component to reflect a decrease in hunter success resulting from fewer bulls being available in the population.

One hundred wolves are predicted to kill 1,650 ungulates/year, of which 30% (495) are expected to be elk (approximately 0.55% of the pre-harvest elk population). If the population model accurately mimics the dynamics of central Idaho's elk population without wolf predation (i.e., an elk population heavily regulated by hunting), the elk population cannot sustain the current level of bull and cow harvest with the added predation of 100 wolves (Table 4-11). More bulls would be killed by hunters, wolves, and other natural causes than are being replaced annually. To maintain population size and a satisfactory bull:cow ratio under the current bull harvest and compensate for the added mortality from wolf predation, harvest of cow elk may have to be reduced 10%-15% (396-594 fewer cows killed annually in central Idaho than were killed in 1991, Table 4-11). A reduction in cow harvest by 10% (396 cows) will allow for predation of 100 wolves, an acceptable bull:cow ratio, and a population that is increasing faster (r = 0.005 for 10 years, or r = 0.011 for 15 years) than the population without wolves (Table 4-11).

Mule Deer – Mule deer comprise about 81% of central Idaho's deer population (19% white-tailed deer). Based on availability and vulnerability, and a predation rate of 15 ungulates/wolf/year (plus 10% excessive killing), 100 wolves are expected to kill approximately 495 elk and 1,155 deer per year. If mule deer are killed in proportion to their abundance, wolves will kill about 936 mule deer annually (approximately 0.64% of the pre-harvest population). Mortality of these additional 936 mule deer is not anticipated to cause any observable or measurable impact on the central Idaho mule deer population. No changes in season structure or harvest strategy are expected to be necessary because of predation by wolves.

White-tailed Deer – White-tailed deer account for about 19% of deer in central Idaho. If wolves prey on white-tailed deer in proportion to their abundance and vulnerability, 100 wolves are expected to kill approximately 219 white-tailed deer per year (approximately 0.61% of the pre-harvest population). The white-tailed deer population appears to be increasing throughout its range in central Idaho, and it is unlikely that predation of 100 wolves will have any measurable impact on white-tails in the primary analysis area. No changes are expected to be necessary in the Idaho Department of Fish and Game's (IDFG) management strategy because of wolves.

Moose – Moose are an important prey animal for wolves in many areas where the two species are sympatric (e.g., Gasaway et al. 1083, Ballard et al. 1987, Gasaway et al. 1992), and wolves will kill some moose in central Idaho. In the North Fork of the Flathead River drainage in northwestern Montana and southeastern British Columbia, wolves inhabit a multi-prey system similar to that in central Idaho. Wolves in the North Fork of the Flathead River drainage prey on moose occasionally (6.6% of ungulates killed), but rely most heavily on white-tailed deer (63.8% of ungulates killed) and elk (29.7% of ungulates killed) (Boyd et al. in prep.).

Moose numbers are believed to be increasing but populations are continuing to be managed with a conservative bulls-only harvest. Because of their relatively sparse population density and the abundance of smaller prey species, it is doubtful that wolves will rely heavily on moose as a significant food source. Impact on the moose population is expected to be minimal. No changes in IDFG management are expected to be necessary to compensate for wolf predation.

Rocky Mountain Bighorn Sheep – Rocky Mountain bighorn sheep are not expected to be vulnerable to predation by wolves during summer when they inhabit high elevation sub-alpine and alpine habitat. In winter, however, bighorn sheep in central Idaho move to lower elevations where they typically occupy shrub/grass and ponderosa pine/Douglas-fir/grass habitats where snow accumulation is minimal (Hanna 1990). Wintering often occurs in areas with steep, rocky terrain in which sheep can escape predators, but some sub-populations that winter at lower elevations in areas with inadequate escape terrain may be susceptible to predation by wolves.

It is difficult to predict the effect of wolf predation on the overall sheep population in central Idaho, but smaller sub-populations of bighorn sheep that are vulnerable to predation during winter may be impacted significantly. The current mature-ram-only harvest of bighorn sheep is conservative, but productivity of many herds is very low (Table 3-48), and nay additional source of mortality may result in significant declines in these herds.

Under this alternative, the FWS and the IDFG could capture and relocate wolves if they were severely impacting bighorn sheep herds.

Mountain Goat – Predation by wolves is not expected to impact mountain goat populations in central Idaho. Mountain goats typically summer at high elevations in alpine and sub-alpine areas where they will not be vulnerable to predation by wolves. Although most mountain goats move to lower elevations in winter (Oldenburg 1992c), their selection of steep, rocky terrain in proximity to cliffs protects them from predation by wolves.

Conclusions – A recovered population of wolves in central Idaho is predicted to kill approximately 1,650 ungulates per year. Composition of ungulates killed by wolves is expected to be about 30% elk (approximately 495 elk) and 70% deer (an estimated 936 mule deer and 219 white-tailed deer). Wolves will occasionally kill moose and bighorn sheep, but deer and elk are expected to comprise most of their diet. Wolf predation is not expected to result in measurable or observable changes in populations of deer, moose, or mountain goats, but changes in management of elk in central Idaho may be required to prevent populations declines. Some bighorn sheep populations that winter at low-elevation in areas without adequate escape terrain may be vulnerable to predation by wolves, and could suffer significant declines. However, under this alternative, wolves that severely impact important big game populations could be captured and moved to another location. As a result of this flexibility in the experimental rule, predation by wolves could be reduced before bighorn sheep populations were severely decreased. Wolves will kill some healthy ungulates, but a large percentage of prey killed by wolves will be very young, very old, sick, injured, or otherwise disadvantaged. Consequently, fewer ungulates will die from malnutrition associated with winter stress. To a small extent, competition among ungulates for food and space will be reduced, and the health of surviving ungulates may be increased an undetermined, but probably minimal, amount.

Impacts on Hunter Harvest

To continue the current level of bull elk harvest (8,137 in 1991) in central Idaho while maintaining the current population size (post-harvest population 76,300 elk) and an acceptable bull:cow ratio, harvest of cow elk may have to be reduced 10%-15% (396-594 fewer cows harvested in central Idaho than in 1991). A reduction in cow harvest by 10% (396 cows) will allow for predation of 100 wolves, an acceptable bull:cow ratio, and an elk population that is increasing faster than the current elk population without wolves (Table 4-11).

No modifications in harvest of deer, moose, bighorn sheep, or mountain goats are expected to be required to accommodate for predation by 100 wolves.

Conclusions – Harvest of cow elk may have to be reduced y 10%-15% in central Idaho (396-594 fewer cows killed than in 1991) to accommodate for predation by 100 wolves. No changes in management of harvest for deer, moose, bighorn sheep, or mountain goats are expected to be necessary.

Impacts on Domestic Livestock

Elements of this alternative that will likely influence impacts on domestic livestock include (1) reintroduction of wolves into central Idaho with management as a nonessential experimental population under Section 10(j) of the ESA, (2) intensive monitoring of wolves with attempted capture and return of dispersing wolves to the central Idaho area, (3) control by public agency personnel of any wolves depredating on livestock, (4) the option allowing private landowners to kill wolves that are attacking or killing domestic livestock on private land and allowing harassment of wolves near livestock on both public and private land, and (5) the option for livestock operators to receive a permit to kill depredating wolves on public land allotments (when ADC personnel are not able to resolve the problem) after at least six packs are established.

Wolves would be released in central Idaho in areas that have a low density of livestock. During the first five years after this alternative is implemented, wolf numbers and depredations of livestock are expected to be low. Wolf populations are expected to be recovered in central Idaho area about 10 years after reintroductions begin. Upon recovery, wolves would be removed from the ESA, and the state of Idaho and the tribes would manage wolves as agreed in the Memorandum of Agreement between the state and tribes.

Most livestock depredations by wolves in the 10 central Idaho counties are expected to occur in the 14,446,331 acre (58,487 km^2) block of contiguous USDA Forest Service land. In addition, depredations are expected in a thin band of surrounding private land. In general, the acreage of the band of private land is expected to include about 1/3 or 1,135,035 acres (4595 km^2) of the 3,405,107 acres (13,786 km^2) of private land existing in the 10 central Idaho counties.

During the summer grazing period (most grazing on public lands takes place between May 1 and October 31), approximately 182,925 adult cattle and calves and 223,523 adult sheep and lambs are distributed across the 14,446,331 acre (58,487 km^2) central Idaho primary analysis area (Table 4-12 and Figure 3-25). About 101,331 (approximately 1/3) of the cattle remaining on the 3,405,107 acres (13,786 km^2) of private land surrounding the USDA Forest Service land are also believed to be susceptible to wolf predation.

Wolf depredation on livestock if highly variable between year (Mack et al. 1992b) and among areas (Table 4-12). Projection of depredation rates from other areas (i.e., Minnesota, Alberta, and Montana) is difficult because terrain, vegetation, size of farms, livestock husbandry practices, and prey species and populations differ among areas (Fritts et al. 1992).

However, to provide an estimate of potential impacts of a recovered wolf population (about 100 wolves) on livestock in Idaho, the following equation (also used in the Yellowstone area analyses) was developed to standardized depredation rates from other studies in relation to total livestock and wolf numbers (Table 4-12).

Table 4-12
Mean livestock depredation rates, livestock numbers, and wolf numbers from other study areas (Mack et al. 1992b) compared to Idaho.

Study Area	Size (acres)	No. Wolves	No. Cattle	No. Sheep	Mean Annual Cattle Depredation	Mean Annual Sheep Depredation
Alberta	34,346,450	1,500	257,941	10,000	235	31
Minnesota	14,578,700	1,460	229,064	23,719	27	50
Montana	4,826,269	44	75,000	11,000	3	2
Idaho	14,466,331	100[a]	182,925	223,523	10[a]	57[a]

[a] Projected.

$$\frac{\text{Number of livestock in analysis area (Idaho)}}{\text{Number of livestock (other study area)}} \times \frac{\text{Number of wolves in analysis area (Idaho)}}{\text{Number of wolves (other study area)}} \times \text{Mean annual Depredations (other study area)} = \text{Estimated annual Depredations in analysis area (Idaho)}$$

Application of this equation to comparable data from Alberta, Minnesota, and northwestern Montana resulted in mean estimates of about 57 sheep (range 32-92) and 10 cattle (range 1-17) taken annually by a recovered wolf population in Idaho (Table 4-13).

Cattle and sheep will likely constitute 95%-100% of annual livestock depredations in central Idaho, both because of the low numbers of other types of livestock (Table 3-51) in the central Idaho area and because of similar results in other study areas (Table 4-13).

Depredation rates on sheep are expected to be higher than depredation rates on cattle in central Idaho. Depredations on sheep usually involve more individuals killed over a shorter period of time than cattle (Fritts 1990). Sheep on central Idaho allotments are tended by herders who keep the animals moving throughout the summer. The presence of herders may reduce or deter depredations by wolves (Curnow 1969).

Wolves are expected to prey on more calves than adult cattle in central Idaho. In other areas, calves comprise 68%-85% of cattle losses (Mack et al 1992b). Because most calving takes place before cattle are placed on allotments, depredations on calves should be lower than otherwise expected. Most calves will be past the size of greatest vulnerability when they are moves to allotments (Fritts 1990).

Table 4-13
Estimated standardized sheep and cattle depredation rates in central Idaho based on a comparison of standardized rates from other study areas. Rates are standardized according to the estimated number of cattle, sheep, and wolves in each area.

	Idaho Annual Depredation Estimates	Idaho Annual Depredation Estimates
Comparison Study Area	Sheep	Cattle
Alberta	46	11
Minnesota	32	1
Montana	92	17
Idaho	57	10

Data from other areas concerning depredation on lambs verses adult sheep are varied. Because most lambing in central Idaho takes place before sheep are placed on allotments, lambs will be past the size of greatest vulnerability. Wolves are not expect to significantly select lambs over adult sheep in central Idaho.

Most wolves living near livestock areas where native prey is available are not expected to prey on livestock as is true in other areas. Lone wolves may have a slightly greater tendency to prey on livestock (USFWS 1987).

Wolf depredations on livestock are expected to be variable between areas and between years. Only a small percentage of livestock owners are expected to be affected by depredations annually, although a few owners could sustain serious losses in a given year.

Most livestock (both cattle and sheep) depredations in central Idaho are anticipated in mid to late summer, when elk calves and deer fawns are maturing and becoming less vulnerable and wolf pups are requiring more food but are still unable to hunt effectively with the pack. In remote wooded allotments where cattle are unattended, depredation rates could occasionally approach those recorded in the Simonette River Valley in Alberta, where 38-40 wolves killed or injured 27 cattle in one year (Table 4-1).

Expected depredations on pets (dogs) – Wolves will infrequently kill dogs. In Minnesota, wolves attack dogs at a rate of about one incident per 22,000 households per year. Incidents per year range from one to six. About four wolf/pet (dog) incidents are reported from British Columbia per year. Minnesota supports about 1,500-1,750 wolves while British Columbia wolf populations number more than 6,300.

The 10 county central Idaho area (22,687,424 acres; 91,852 km^2) contains about 2,527 farms with an average human population density of 2.6 people/mi^2 (1.0 km^2). Wolf depredations on domestic dogs are expected to be infrequent in central Idaho but will probably be emotionally disturbing to dog owners affected. The most likely sites of dog depredations will be rural residences along the edge of national forests containing wolf populations.

Conclusions – During the first five years after reintroductions begin, livestock depredations by wolves should be minimal because of intensive monitoring and management of radio-collared wolves. As wolves become established, depredation rates will begin to approach those from other areas in North American. About ten cattle (range 1-17) and 57 sheep (range 32-92) are expected to be taken annually by a recovered population of 100 wolves in central Idaho.

Impacts on Land Use

This alternative includes the reintroduction of non-essential experimental population of wolves into central Idaho. Federal agencies would only have to confer with the USFWS on activities that may jeopardize the species (outside of national parks and national wildlife refuges) and such determination would not prohibit the federal agency from proceeding with the activity. No constraints on private actions and private lands would apply.

No land-use restrictions are planned under Alternative 1, but the option to protect densities will remain available until ≥5 packs are established. This alternative will not impact any ADC activities other than those affected by existing EPA label restrictions on the use of M-44s. Existing Section 7 terms and conditions on the use of leg-hold traps and neck snares in “occupied wolf range” would no longer apply.

Implementation of Alternative 1 may have a slight impact on the use of M-44s in some areas in the 10 county central Idaho area. During 1992, M-44s were used on 30 private premises and 1 BLM site in the 10 county central Idaho area. Label restrictions on M-44s restrict their use in national forests and in areas where threatened or endangered species may be adversely affected.

If wolves showed up on private land in Idaho where M-44s were currently being used to control coyote depredations, their use may be suspended. However, because livestock operators can harass wolves near livestock, it is likely that wolves would avoid low elevation private lands, and impacts on the use of M-44s would be slight.

Conclusions – Reintroduction of an experimental population of wolves into central Idaho is not expected to impact existing land uses. Due to existing label restrictions, a slight impact on the use of M-44s to control coyotes could occur in some areas as “occupied wolf range” in central Idaho expands. Existing Section 7 terms and conditions on the use of leg-hold traps and neck snares in “occupied wolf range” would no longer apply.

Impacts on Visitor Use

Visitors to the backcountry of Idaho will have an opportunity to hear and observe wolves or their sign in the next decade. Wolf howling programs in Algonquin Provincial Park have been popular to visitors since 1963 (Strickland 1988).

Nature study, hiking, walking, and camping activities in Idaho are all projected to experience moderate to high growth to the year 2010. Hunting activities in Idaho are projected to experience low growth to the year 2010 (IDPR 1989).

Tourism and outdoor recreation are growing in Idaho. Wolves are a high profile species with interest and support nationwide. Reintroduction of wolves under Alternative 1 will further increase national awareness of the presence of wolves in central Idaho.

It is possible, but not certain, that the establishment of wolves could attract increased visitors to central Idaho in the next decade and beyond. Although some people may not venture into the Idaho backcountry because of a fear of wolves, others will probably visit central Idaho hoping to hear or observe wolves or their sign.

A slight reduction in the number of cow elk tags for sale will preclude some hunters from visiting the central Idaho backcountry. A few people who not hunt big game may be reluctant to do so in the future if they perceive that wolves are reducing big game populations in that area.

Conclusion – Reintroduction of wolves may attract increased visitors to central Idaho in the next decade and beyond. It is also possible visitation may decrease. Although some people will not venture into central Idaho's backcountry because of a fear of wolves or because there may be fewer cow elk tags, more people may visit because of the widespread high interest in the wolf and because of the relative uniqueness of the animal in the lower 48 states.

Impacts on Economics

Background Information for Analysis – An economic analysis of the effects of wolf reintroduction into central Idaho entails examining each potential source of economic costs or benefits and estimating its net economic effect. This analysis follows the outline presented by Duffield (1992). Areas of potential economic effects examined are the following: (1) effects on hunter harvest; (2) effects of livestock depredation; (3) effects on land-use restrictions; (4) effects on visitor use; and (5) effects on existence values.

Value of Foregone Benefits to Hunters – A reduced number of big game animals available for harvest directly affects the available hunting opportunities. Reduced hunting opportunities translates into a reduced number of hunters and hunter days spent in the field. This reduction in big game hunting activity represents a social cost associated with wolf reintroduction. Based on a recovered population of 100 wolves in the central Idaho area, it is predicted that a reduction of 396-594 cow elk harvested per year may be necessary to stabilize populations and sustain the current bull elk harvest levels (see preceding discussion on effects on ungulate populations for derivation of these estimates).

A relatively simple methodology was used to estimate the reduced net social benefits and reduced hunter expenditures that could be associated with wolf recovery in central Idaho. This methodology is likely to overstate these reductions as described below. Given harvest reductions, reductions in hunter days are based on hunter success and days hunted per hunter as detailed in the notes to Table 4-14. The simplifying assumption is made that the reduction in hunter days equals the reduction in harvest divided by success rate, times the average number of days per hunter. This assumption may be appropriate for special permit hunts but will likely overstate the reduction in hunter days during the general season if hunters continue to hunt but with lower success rates. Total expected reduction in hunter days due to wolf recovery is 14,619 to 21,928 days (Table 4-14).

Table 4-14
Annual economic values and expenditures associated with reduced hunting opportunities arising from wolf reintroduction to central Idaho

Area/Species	Low Estimate	High Estimate
Reduction in antlerless elk harvest	396	594
Reduced elk hunting days[a]	14,619	21,928
Value per day of elk hunting[b]	$51.77	$51.77
Reduced value of elk hunting	$756,810	$1,135,214
Expenditures per day associated with elk hunting[b]	$39.10	$39.10
Total reduced expenditures associated with big game hunting	$571,591	$857,386

[a] Calculations based on average success rate for central Idaho units of 21.4% (Idaho Fish and Game, unpubl. data 1991) and average number of days per Idaho elk hunting trip of 7.9 (McLaughlin et al. 1989).
[b] Sorg and Nelson 91986) inflated to 1992 price level.

Reduced hunter harvest in elk in central Idaho due to wolf recovery could result in lost net benefits to hunters totaling $756,810 to $1,135,214 per year. Potential reduced hunter expenditures in Idaho are estimated between $571,591 to $857,386 per year.

Lost Value Due to Livestock Depredation – A second area of potential costs associated with wolf reintroduction to central Idaho is the possibility of depredation on livestock. The calculation of lost value due to depredations is straightforward. The lost value per year is equal to the estimated number of lost animals per years times the market value of these animals.

Wolf depredation on domestic livestock would likely be minimal during the first five years after the beginning of reintroduction. After that period, as recovery levels are approached and achieved, depredation losses are expected to be in the range of 1 to 17 cattle per year and 32 to 92 sheep per year. The estimated economic value of the projected losses associated with wolf depredation in central Idaho range from $2,923 to $18,501 with the average estimate of $11,083 (Table 4-15).

Lost Value Due to Land-Use Restrictions – It is expected that any land-use restrictions due to the reintroduction of wolves to central Idaho will not result in lost economic value. While some area visitors may be inconvenienced due to temporary restrictions placed on visitation in areas of high sensitivity (release sites or vulnerable den sites when <6 packs are established), this inconvenience is unlikely to result in any appreciable loss of economic value. Therefore, the net economic cost due to land-use restrictions is estimated to be zero.

Table 4-15
Annual economic costs associated with livestock depredation in central Idaho under Alternative 1

	Low Estimate	High Estimate	Average Estimate
Cattle lost	1	17	10
Average value per cow[a]	$715	$715	$715
Sheep lost	32	92	57
Average value per sheep[a]	$69	$69	$69
Total lost value/year	$2,923	$18,503	$11,083

[a] Average value per head figures are based on an average of the Montana, Idaho, and Wyoming value for all cattle and sheep in the states as of January 1, 1993 (Idaho, Montana, and Wyoming Departments of Agricultural Statistics, per. commun.).

Note: The estimates above are based on a 3-state average of livestock values for consistency with the Yellowstone area analysis. Idaho average values are $755 per head for all cattle and $66 per head for all sheep.

Economic Effect of Changes in Visitor Use – Wolves are a high profile species of national interest (Duffield 1992). Reintroduction of wolves under Alternative 1 will further increase national awareness of the presence of wolves in central Idaho. This increased awareness may affect visitation to the area. Table 4-16 shows how different groups of respondents answered the question "if wolves were present in central Idaho, would you visit the area more frequently, less frequently, or the same frequency as you currently do?" The groups reported that a larger percentage would visit more frequently than would visit less frequently. It should be pointed out, however, that most respondents said the presence of wolves would not change their visitation habits.

A 1993 national and regional survey (J. Duffield, et al., Univ. of Montana, Missoula, unpubl. data) found that a recovered population of wolves in central Idaho would lead to an estimated 8.2% increase in visitation by out of area residents, and an estimated 1.9% increase for Montana, Idaho, and Wyoming residents. There would be an estimated commensurate change in expenditures by visitors to the area. There was insufficient data available to estimate the dollar change in expenditures in central Idaho. Table 4-17 details the calculation of the estimated percentage changes. It should be noted that the standard errors on the estimates of percentage changes in visitation are quite large, and in all cases a 95% confidence interval on these estimates includes zero. Therefore, the estimates presented in Table 4-17 should be viewed as indicators of the likely direction of change in visitation rather than predictions of the percentage change.

Table 4-16
Comparison of expected changes in visitation patterns to central Idaho because of wolf reintroduction

Sample	% who would visit more	% who would visit the same	% who would visit less
(A) Residents of Mont., Id, Wyo.			
Who visited central Idaho in 1992 n = 71 or 21.7% of sample	22.5	67.6	9.9
Who had ever visited central Idaho n = 167 or 51% of sample	16.2	73.1	10.8
Who never had visited n = 160 or 48.9% of sample	30.0	35.6	34.4
(B) Out of 3-state region residents			
Who visited central Idaho in 1992 n = 2 or 0.6% of sample	0.0	100.0	0.0
Who had ever visited central Idaho n = 28 or 8.9% of sample	28.6	64.3	7.1
Who never had visited n = 286 or 91% of sample	36.4	43.0	20.6

Table 4-17
Estimates of increased visitation and expenditures in central Idaho, due to wolf reintroduction.

Response / Statistic	Montana, Idaho, Wyoming Residents	Out of region residents
(A) Estimated increase in visitation		
Current trips/year for sample	992	98
Sample extra trips	79	11
Sample fewer trips	60	3
Net change in trips	19	8
% change in trips and expenditures	+1.9%	+8.2%

Economic Effects on the Value Potential Visitors Place on Wolves – We have previously presented the theory and methodology involved in estimating net willingness to pay for wolf reintroduction. The total net economic existence value per year of wolf reintroduction to central Idaho is about 8.4% million (Table 4-18).

One issue not investigated is whether individuals would be willing to pay the stated amounts for both wolf recovery in the Yellowstone area and in central Idaho. This question was not examined in this study. A conservative way to look at this issue is to compare the benefits of wolf recovery in either the Yellowstone area or Idaho to the combined costs of recovery in both areas. Either of these values when compared against the estimated combined economic costs to both the Yellowstone and central Idaho areas still show large positive net social benefits associated with wolf reintroduction in either of the two areas.

Conclusion – It is estimated that the existence value of wolf recovery in central Idaho under Alternative 1 will lead to total benefits of \$6.85 million to \$10.01 million per year. Visitation and visitor expenditures may increase due to wolves in central Idaho. Total costs of wolf recovery are estimated at about \$1.24 million to \$1.63 million per year (Table 4-19).

Table 4-18
Estimated mean values of wolf reintroduction in central Idaho to potential visitors and others under Alternative 1

Welfare Measure/Statistic	Montana, Wyoming, Idaho residents	Out of region residents	All
Mean value for those [a] supporting reintroduction (Standard Error)	15.60 (1.36)	8.73 (0.71)	
Mean value for those opposing reintroduction (Standard Error)	8.19 (1.39)	1.52 (0.55)	
Population supporting wolf reintroduction	369,822	52,215,096	
Population opposing wolf reintroduction	327,059	24,721,833	
Aggregate net economic value/year [b]	216,196	29,259,317	
Calibration [c]	0.286	0.286	
Estimated net economic value/year (Standard Error)	$61,832 (7,233)	$8,368,165 (807,208)	$8,429,997 (807,240)

[a] The mean values are calculated as a truncated mean with the truncation level at $50 for 3-state residents and at $25 for out of region residents. The truncated mean valuation calculation included both responses from people with directory listed phone numbers and non-listed numbers, contacted through a random dialing procedure. In the aggregation of mean values an assumption was made of no difference in willingness to pay between those respondents with listed phone and those not listed.
[b] Values are calculated assuming a perpetual benefit from a one time trust fund deposit amortized at a 7% real interest rate.
[c] See explanation and citations on calibration in Table 4-8

Table 4-19
Annual net social benefits associated with wolf recovery in central Idaho under Alternative 1

	Annual impact (thousands of 1992 dollars)	
	Low Estimate [c]	High Estimate [c]
(A) Benefits associated with wolf recovery		
Annual net economic value of wolf recovery	6,847.8	10,012.2
(B) Costs associated with wolf recovery		
Foregone value to hunters [a]	756.8	1,135.2
Value of livestock losses	2.9	18.5
Annual wolf management cost until recovery [b]	478.0	478.0
Total costs	1,237.7	1,631.7

[a] Lost value to hunters could possibly be overstated as this figure is based on hypothetical willingness to pay and has not been calibrated in any way as have the net economic benefits estimates.
[b] Note that one half of the total management costs of wolf recovery to both the GYA and central Idaho are included in the sots associated with this alternative. This cost will only be incurred until wolf recovery is achieved, which varies between alternatives. Other costs and all benefits will continue into perpetuity making annual net benefits significantly higher in many cases once recovery is achieved.
[c] For the benefits estimates, the low and high estimates represent a 95% confidence interval on the estimates of net willingness pay for the alternative. For the individual costs, the low and high estimates represent the best estimates of minimum and maximum costs associated with an alternative.

Adverse Effects

No adverse effects are expected on deer, moose, or mountain goat populations in central Idaho, but modifications in cow elk harvest may be required to prevent significant declines in elk some populations. Some herds of bighorn sheep with low productivity and inadequate escape terrain on winter range could potentially suffer substantial declines.

The reintroduction of an experimental population of wolves into central Idaho will result in the loss of about ten cattle (range 1-17) and 57 sheep (range 32-92) annually. An occasional dog will also be killed by a recovering population of wolves in central Idaho.

An expansion of occupied wolf range, due to the reintroduction of an experimental population of wolves, may lead to a slight reduction in the use of M-44s in the control of coyotes in central Idaho. As wolves approach recovery in the next decade, some people will not venture into the central Idaho backcountry because of a fear of wolves.

Adverse effects of this alternative include foregone benefits to hunters of $757,000 to $1,135,000 per year. The potential reduction in hunter expenditures in the recovery area are estimated at $572,000 to $857,000 per year. Additionally, losses to area ranchers due to livestock depredation by wolves may be $2,923 to $18,503 per year. These livestock losses could, however, be mitigated to a large degree by a private compensation fund, such as it currently administered by Defenders of Wildlife. Individuals who oppose wolf reintroduction will also suffer adverse economic effects if wolves are reintroduced to central Idaho.

Short-Term and Long-Term Effects

Establishment of a recovery-level wolf population would have some short-term and long-term effects on ungulate populations. A population of 100 wolves would kill approximately 495 elk and 1,155 deer and small numbers of moose and bighorn sheep per year. No measurable or observable effect is expected on deer, moose, or mountain goat populations, but some adjustments in management of elk may be required if current bull harvest level is to be maintained. Decrease in some populations of bighorn sheep that winter on low-elevation areas with inadequate escape terrain are possible. Fewer ungulates may die of malnutrition associated with winter stress. Surviving ungulates may benefit slightly from reduced competition for food and space.

The reintroduction of an experimental population of wolves is expected to result in the loss of about ten cattle (range 1-17) and 57 sheep (range 32-92) annually. Losses of livestock are expected to be variable between years and between areas. No long-term effects on overall livestock production in central Idaho is expected. In the short term, an individual livestock producer could sustain a substantial loss of livestock (most likely sheep) in a given year. The continuation of an existing private compensation program will help reduce monetary losses of individual livestock operators.

Reintroduction of an experimental population of wolves is expected to have few short-term or long-term effects on land use in central Idaho. A slight reduction in the use of M-44s to control coyotes may occur as “occupied wolf range” expands.

In the short term, the reintroduction of wolves into central Idaho will be controversial and will attract nationwide attention. Initially reintroduced wolves that are collared will be “famous” and people can be expected to venture into central Idaho hoping to hear or see them. In the long term, the presence of wolves in central Idaho will continue to attract some people to the state and to the backcountry who would otherwise not visit and will preclude some people from visiting the central Idaho backcountry because of fear of wolves.

The reintroduction of wolves can also be expected to lead to a minor long-term reduction in the annual sale of cow elk tags. Many people who would have otherwise bought these tags may not visit the central Idaho backcountry.

In the short term there will be management costs of approximately $478,000 per year and these will continue to the projected date of recovery of 2002. Losses to livestock and hunters are likely to be less than predicted in the short term and rise to the predicted level in the long term (after full recovery). The total estimated economic benefits (increase in visitor expenditures and existence value of about $8.4 million) per year apply to both the short term and the long term.

Long-term reestablishment of the wolf to the system would reestablish more complete long-term predator-prey relationships. Computer simulations predict ungulate populations would fluctuate in response to winter severity, habitat condition, hunter harvest, predation, and other environmental factors, just as they have in the past. Population highs are projected to be lower; but population lows will not be as low. Winter mortality of ungulates, particularly young animals, is projected to be less than past trends without wolves. Long-term reestablishment of complex ecological relationships in the system would be effected.

The long-term presence of wolves will represent a significant restoration of a mission component of the ecological system. A slight long-term increase of visitor use is projected because people will want to have the opportunity to see or hear wolves or see their sign in the a wild setting. The reestablishment of this large predator will have significant positive long-term effects on ecological relationships and ecosystem functions.

The restoration of a viable wolf population to the central Idaho area would increase the maintenance and enhancement of long-term productivity of the environment by restoring the ecosystem to near pre-colonial natural conditions. Wolves being a large social predator, at the top of the food chain, would restore a primary large ungulate predator that is currently missing as a functional part of the ecosystem. A population of wolves and their interaction with other biotic components would add to the long-term stability of the natural biological and evolutionary processes in the central Idaho area.

Irreversible and Irretrievable Commitments of Resources

There are no anticipated irreversible or irretrievable commitments of big game resources or hunting opportunity in central Idaho.

The reintroduction of an experimental population of wolves into central Idaho is expected to lead to the loss of about 10 cattle (range 1-17) and about 57 sheep (range 32-92) annually. Any livestock losses will be irreversible and irretrievable. Any compensation paid by private groups to livestock operators will reduce the monetary loss.

From an economic perspective, the only irreversible and irretrievable commitments of resources lie with the wolf management costs and the hunter and livestock losses as they occur. The program could at any time be modified to mitigate or eliminate these losses.

Cumulative Effects Analysis

Ungulate Populations and Hunter Harvest – One hundred wolves are predicted to kill about 1,650 ungulates per year, or approximately 0.59% of central Idaho's total ungulate population. Wolves are predicted to annually kill 0.55% of the elk population and 0.63% of the total deer population (mule deer and white-tailed deer combined). In comparison, in 1991 hunters harvested an estimated 33,000 ungulates (12.0% of the total pre-hunt ungulate population) in central Idaho, including 13.7% of the elk population and 11.5% of the deer population.

In the North Fork of the Flathead River drainage in northwestern Montana and southeastern British Columbia, wolves exist in a multi-predator-prey ecosystem similar to that in central Idaho (Ream et al. 1991). Wolves killed 4.1% of female elk (Bureau 1992) and 6.7% of female white-tailed deer (Rachael and Pletscher in prep.) annually. Comparatively, wolves did not impact ungulates more than other predators. Mountain lions annually killed 13.4% of female elk (Bureau 1992) and 4.9% of female white-tailed deer (Rachael 1992, Rachael and Pletscher in prep.). Bears (both black and grizzly bears) are important predators in Montana and British Columbia and killed an estimated 1.5% female elk (Bureau 1992) and 3.4% of female white-tailed deer (Rachael 1992, Rachael and Pletscher in prep.) annually.

Mountain lions and black bears are also common predators throughout central Idaho, and they will continue to prey on ungulates in central Idaho in the presence of wolves. However, it is important to not that the density of 100 wolves in the 17,502,720 acre (70,861 km^2) central Idaho primary analysis area (1 wolf/175,027, acres; 1/709 km^2) would be considerably lower than the density of wolves in the North Fork of the Flathead River drainage in Montana and British Columbia. Mountain lions and black bear populations are extremely difficult to estimate, and estimates are not currently available for central Idaho. However, predation of 100 wolves would be significantly less than predation of current populations by lions and bears.

Domestic Livestock – In Idaho, 22,000 cattle, 50,000 calves, 14,000 sheep, and 36,000 lambs are lost annually to non-predator and predator causes (Table 4-10). Most livestock are lost to non-predator causes, including weather, health, birthing, poison, theft, and other causes.

Predators account for 0.5% of annual cattle losses, 2.4% of annual calf losses, 33% of annual adult sheep losses, and 30.5% of annual lamb losses.

Coyote depredation accounts for 25.3% of annual sheep losses and 25% of annual lamb losses. About 3,542 sheep and 9,000 lambs are lost to coyotes annually.

Under all alternatives, average annual loss of cattle and sheep to wolves is expected to fall within the range of 1-17 cattle and 32-92 sheep. A recovered wolf population would be expected to contribute between 0.003% and 0.029% of total annual cattle and calf losses and between 0.064% and 0.184% of total annual sheep and lamb losses in Idaho.

Within the 10 county central Idaho area, approximately 12,314 cattle and calves and 9,336 sheep and lambs are lost annually to a variety of causes (Table 4-20). Of these losses, approximately 224 cattle and calves and 2,913 sheep and lams are lost to predators. Estimated annual losses of 10 cattle and calves and 57 sheep and lambs to wolves would increase annual estimated total livestock losses in the 10 county central Idaho area by 0.31% and increase annual estimated predator caused livestock losses by 2.1% (Table 4-20).

Table 4-20
Central Idaho cumulative effects of estimated wolf depredations on livestock with all other estimated livestock losses. Ten county central Idaho area. Livestock losses pre-rated to 10 county area from total livestock losses in Table 4-10

Livestock Numbers (April)	Estimated annual livestock losses	Estimated annual livestock losses to predators	Estimated annual livestock losses to wolves	Increase in annual livestock losses from wolf depredation (present)	Increase in predator caused losses of livestock from wolf depredations
Cattle & calves 384,900	12,314	224	10	0.08%	4.5%
Sheep & lambs 100,713	9,336	2,913	57	0.61%	2.0%
Totals	21,650	3,137	67	0.31%	2.1%

Land Use – National forest lands in central Idaho contain 4,125,589 acres (16,703 km^2) of wilderness and about 5,900,000 acres (23,900 km^2) of roadless areas. Of 20,316 miles (32,757 km) of system roads on national forest lands, approximately 10,805 miles (17,396 km) are closed or are restricted in use in some way (Table 3-54).

Livestock grazing is sometimes restricted near riparian areas on public land allotments. Livestock are usually restricted from areas with newly replanted trees for about five years. The impact of the recent listing of salmon species in Idaho as threatened or endangered is not known at this time, although some grazing restrictions are expected. A 58% reduction in grazing in the Stanley Basin area on the Sawtooth National Forest was recently recommended. Many of the reductions were associated with allotments containing prime Chinook salmon spawning habitat.

Label restrictions on M-44s prohibit their use in areas occupied by threatened or endangered species that would be susceptible. Consequently, use of M-44s is prohibited in occupied gray wolf range. Expansion of the wolf population in central Idaho may also lead to a reduction in the use of M-44s on farms located near wolf range. In the 10 county central Idaho area, M-44s were used on 30 private premises and on one Bureau of Land Management (BLM) site in 1992.

Visitor Use – In 1991, an estimated 232,000 residents and 133,000 non-residents fished in Idaho and an estimated 158,000 residents and 35,000 non-residents hunted in Idaho. In addition, 194,000 residents and 188,000 non-residents participated in primary non-residential non-consumptive activities in Idaho (USFWS 1992, Table 3-55).

In 1992, residents spend a estimated 2,417,000 days fishing in Idaho while non-residents spent 439,000 days fishing (Table 3-55). Residents of Idaho also spent 1,941,000 days hunting and non-residents hunted for 226,000 days. In addition, residents spend 1,722,000 days participating in non-residential non-consumptive activities in Idaho while non-residents spent 1,717,000 days participating in non-residential non-consumptive activities (USFWS 1992, Table 3-55).

In the 36 big game management units covering the central Idaho Primary Analysis Area (Figure 3-24), 91,959 hunters spent a total of 688,175 days in the field in 1991.

A total of 102 outfitters and guides operate in 36 big game management units in the central Idaho Primary Analysis Area. In 1992, these 102 outfitters and guides provided big game tags to 4,614 non-residents and 465 residents (Table 3-58). Most tag sales were for non-resident deer and elk hunters.

Nine national forests in central Idaho provide over 8,600,000 Recreation Visitor Days (RVDs) annually (Table 3-57). About 47% of the RVDs associated with developed areas, while about 53% of the RVDs are associated with dispersed (non-developed) and wilderness settings. RVDs are expected to continue to grow annually across central Idaho Primary Analysis Area.

In 1992, 10,000 people floated the Main and Middle Forks of the Salmon River through central Idaho wilderness areas. A total of 9,171 people signed in at trail heads in the Frank Church Wilderness Area. USDA Forest Service rangers met 21,230 visitors in the Frank Church Wilderness Area. Use in the Frank Church Wilderness Area has increased rapidly in recent years.

Tourism and outdoor recreation are growing in Idaho. Wolves are a high profile species with interest and support nationwide. Reintroduction of wolves under Alternative 1 will further increase national awareness of the presence of wolves in central Idaho.

It is likely that the recovery of wolves will attract increased visitors to central Idaho in the next decade and beyond. Although some people will not venture into the Idaho backcountry because of fear of wolves, others will visit central Idaho hoping to hear or see wolves or their sign.

A few people who now hunt big game may be less likely to do so in the future if they perceive that wolves are reducing game populations.

Economics – Total personal income in 1990 was about $1.43 billion for the 10 county area. Wolf restoration would not significantly affect the proportion of the economy derived from farm income, local services, other industry, or non-earned income. Visitation to central Idaho was expected to increase slightly, about 2%, which could result in increase expenditures which are currently unknown but likely in the millions of dollars. Reintroduction of wolves could reduce hunter harvests from their current average of 33,539 ungulates/year by 1,650, reducing hunter expenditures by $600,000 to $900,000/year or about 5% lower than their current levels. Annual livestock losses are currently about 12,314 cattle ($715/each) worth about $8,804,510 and 9,366 sheep ($69/each) worth about $646,254 or about $9,450,764/year. Wolf depredation could result in average annual increased losses up to 10 cattle ($7,150) and 57 sheep ($3,933) or $11,083/year. This would represent a 0.0012 increase in livestock losses annually.

Environmental Consequences
Alternative 2
Natural Recovery (No Action) Alternative

Yellowstone

Impacts on Ungulate Populations

In this alternative wolves would be listed as endangered throughout the northern Rocky Mountain area and managed without the flexibility of an experimental population rule. Wolf recovery would be attained through wolf dispersal into the Yellowstone area. Wolves would most likely disperse from areas in northwest Montana or northern Idaho. Under this alternative, wolf recovery could take decades and may not occur until 2025 (30 years).

Before recovery, dispersing wolves could colonize areas and form packs throughout the Rocky Mountains but outside the Yellowstone recovery area. Predicting where these wolves would occur and how they might affect ungulate populations outside the recovery area is too speculative and is not attempted by this EIS.

Migratory wolves may colonize areas within the Yellowstone area as individuals and some individuals may form isolated packs (at least two breeding individuals). Individual wolves and isolated packs may continue to appear and disappear for many years, maybe decades, because of the high mortality associated with individual dispersing wolves and the susceptibility of isolated packs to become extinct because of various biological and human-caused mortality factors.

During the early stages of wolf appearance and disappearance, wolf predation effects on ungulate populations would probably be undetectable because so few wolves would occur in the Yellowstone area at any one time. Once several packs establish in areas providing high security and survival in or near the Yellowstone recovery area, wolf numbers may increase rapidly and reach recovery goals in as little as ten years. During this rapid increase in wolf numbers, and when recovery is attained, wolf predation effects on ungulate populations might be similar to those found in Alternative 1. This alternative does not provide for wolf relocation if wildlife management agencies are not able to meet big game management objectives. Therefore, a rare case might exist where wolves may impact some ungulate populations to a greater degree than what was predicted for Alternative 1.

Conclusions – Under this alternative, wolves would be listed as endangered throughout the northern Rocky Mountains and wolf recovery (10 packs, about 100 wolves) in the Yellowstone area would be attained through wolf dispersal from northwest Montana and northern Idaho. Wolf recovery would likely not occur until 2025 (30 years). For many years and possibly decades, individual dispersing wolves or packs (two breeding individuals) may appear and disappear because of high mortality associated with dispersing wolves. During these early years of wolf appearance and disappearance, wolf predation effects on ungulate populations in the Yellowstone area would likely be undetectable. Once several packs are able to establish in the Yellowstone recovery area, wolf recovery levels may be reached in as little as ten years. During this rapid increase in wolf numbers, wolf predation effects on ungulates might be similar to those found in Alternative 1. Alternative 2 does not provide for wolf relocation and a rare case could exist where wolves may impact some ungulate populations more than predicted in Alternative 1.

Impacts on Hunter Harvest

As described under Impact on Ungulate Populations, wolf recovery will take many years, possibly decades. During the early years of wolf recovery, individual wolves and packs may appear and disappear because of high mortality associated with dispersing wolves. Wolf effects on hunter harvest will likely be undetectable during the early stages of recovery. After several packs of wolves become established and the wolf population approaches recovery levels, wolf effects on hunter harvest many be similar to those described in Alternative 1. This alternative does not provide for wolf relocation if wolves are affecting a state's ability to meet its big game populations. Consequently, a rare case might exist where wolves could impact an ungulate her and the associated hunter harvest more than predicted in Alternative 1.

Conclusions – Under this alternative, wolf recovery could take many years, possibly decades. During the early years, a few wolves may appear and disappear from the Yellowstone area and wolf effects on hunter harvest would be undetectable. After several packs become established and the wolf population reaches recovery, wolf predation may effect hunter harvest in a manner similar to Alternative 1. Alternative 2 does not provide for wolf relocation and a rare case may exist where wolves could impact an ungulate herd and the associated hunter harvest more than predicted in Alternative 1.

Impacts on Domestic Livestock

Elements of this alternative that will likely influence impacts on domestic livestock include retention of wolves as an endangered species throughout the northern Rocky Mountains, no reintroduction of wolves, intensive monitoring of wolves dispersing from northwestern Montana that will be relied upon to establish populations in Yellowstone National Park, and control by public agency personnel of wolves depredating on livestock. The public would not be allowed to legally kill wolves that are attacking or killing domestic livestock. Wolves would recolonize the recovery areas but would also recolonize other areas throughout the northern Rocky Mountains and would be allowed to remain if conflicts were few. However, wolves would not recovery rapidly. The probability that populations would establish in the Yellowstone area in the near future is extremely low; in the next several decades, substantially higher. Recovery would take a long time, perhaps 30 years.

Wolves would slowly recolonize areas throughout the northern Rocky Mountains and eventually reach the Yellowstone area. Livestock depredations would likely be comparable to that in northwestern Montana, averaging 0-6 cattle and 0-10 sheep per year. As new areas are occupied by wolf packs, sometimes in areas of high livestock density, this rate could be seen in each comparable area. Because of the long period likely required to reach recovery in the Yellowstone area, these conditions could continue for some time.

Wolves would likely occur in a number of locations in western Montana and northern Idaho prior to establishing populations in the Yellowstone area. The number of areas where they would form breeding pairs is unknown. Livestock depredations would occasionally occur in these areas. Wolves may initially establish at lower elevations in the Yellowstone area, potentially in areas with higher livestock densities. This would likely increase the level of livestock depredation over those estimated for Alternative 1.

A likely scenario for establishment of a wolf population in the Yellowstone area would be sporadic occurrences of single animals with occasional reproduction. Because of the high mortality of dispersing animals and the high susceptibility of very small pioneering populations to fail to establish, sporadic establishment, reproduction, and failure could occur several times. After pairs are established in secure areas and persistent, successful reproduction occurs, growth of the population to recovery levels would occur fairly rapidly, perhaps in ten years. Livestock depredations in the Yellowstone area may then be similar to those described under Alternative 1. If wolves occupy lower elevational areas during population establishment, this could bring them into closer association with rural residences and increase depredation on livestock and domestic dogs.

Conclusions – Uncertainty about where wolves would establish and how long wolf recovery would take are major factors in this alternative. Wolves would probably establish in several areas in Montana and Idaho prior to Yellowstone. Livestock losses would likely average 0-6 cattle and 0-10 sheep per year in each area where packs established during this period. Wolf populations may attempt to establish but fail several times before self-sustaining populations are established in Yellowstone. After establishment wolf recovery would take about ten years. At wolf recovery, livestock depredations would be similar to Alternative 1. These would average about 19 cattle (range 1-32) and about 68 sheep (range 17-110) per year in the Yellowstone area. Recovery could take up to 30 years.

Impacts on Land Use

Elements of this alternative that will influence impacts on land use include retention of wolves as a fully protected endangered species throughout the northern Rocky Mountains and no reintroduction of wolves. Wolves dispersing from northwestern Montana and northern Idaho will be relied upon to establish populations. Agencies would control wolves that depredate on livestock, working animals, or pets, but the public could not kill or harass wolves.

Management actions to protect wolves could include seasonal closure of public land up to one mile (1.6 km) around active wolf den sites from March 15 to July 1 during population establishment. This would result in limits on recreational use of areas near wolf dens, may limit access if roads or trails are closed to protect wolves at den sites, and delay other activities such as livestock grazing or timber harvest until after this period. Application of toxicants that are lethal to wolves would be precluded in areas occupied by wolves.

Because wolves would slowly recolonize areas throughout the northern Rocky Mountains, eventually reaching the Yellowstone area, effects on land use on public lands would be greater than projected for Alternative 1. As new areas are occupied by wolf packs, sometimes in areas of higher human activity, and because of the potential of wolves to occupy lower elevation areas during the establishment period, this could bring them into closer association with human activities. Because of the long period likely required to reach recovery in the Yellowstone area, these conditions could continue for some time. Perhaps the biggest factors of the natural recovery alternative regarding land use is the lack of predictability.

During the early stages of population establishment, active den sites within Yellowstone National Park would be closely monitored. Because of the requirement to aggressively protect the first wolves denning in Yellowstone National Park in more than half a century, people would be precluded from using areas within one mile (1.6 km) of wolf den sites, based on the type of human use and the physical features of terrain. This would occur from March 15 to July 1.

In most of the territories of the recovering wolf population were near areas used by people these area restrictions would affect a total of 21-35 mi^2 (54-91 km^2). However, this period is the lowest season of recreational use. Early season visitors mainly use the main roads and primary developed facilities, and not the backcountry. Also some of the denning areas will likely be located in areas already under visitor-use limitations for grizzly bear management. In northwestern Montana during early stages of population establishment road closures have been extended for short periods of time (2- weeks) to provide security for wolf dens close to roads that would have opened. No areas have been closed for long periods of time. Restrictions would also be increased substantially if human activity caused wolves to abandon dens resulting in wolf pup mortality, or if illegal killing of wolves, facilitated by public access, resulted in wolf mortality that precluded population recovery. In the absence of these factors, effects on recreational use and public access would not likely be measurable.

The limits on public land use to protect den areas from March 15 to July 1 would likely not affect initiation of grazing on livestock allotments where the likelihood of conflict was low or there was no history of depredation. However, it is possible that grazing may be delayed or suspended on areas with active dens or with a history of depredation. Wolf control guidelines under this alternative preclude capture and relocation or killing of wolves or wolf pups prior to August 1. Consequently, livestock on allotments where depredations occur prior to August 1 may be moved to alternative allotments or out of the area.

Lack of predictability of the frequency of these situations makes quantification difficult. In early stages of population establishment the potential impacts will be much lower and will vary widely over the period of recovery. Average allotment size on national forests in the Yellowstone area is about 15 mi^2 (39 km^2) and average about 1.5 permits per allotment. At the maximum range, if all ten territories of a recovered wolf population were on public land livestock allotments, up to ten allotments totaling about 150 mi^2 (390 km^2) involving about 15 permits could be affected. The probability that all wolves would den outside of the park on livestock allotments is low, so the actual effects are more likely toward the lower end of the range.

Effects on timber harvest activities would likely be somewhat greater than those described for Alternative 1. The closure of a one mile (1.6 km) area around dens may delay some timber harvest or preclude access to some timber harvest areas from March 15 to July 1. However, in other areas where wolves live, and where standards and guidelines to provide for other resources such as ungulate winter ranges and birthing area have been adequately applied in sale design, there has been little effect on levels and timing of timber harvest activities. Additionally, most access roads have use and weight restrictions for protection of road beds during spring so use is already limited during most of this period.

Effects on ADC activities would likely be greater than those projected in Alternative 1. Use of techniques such as aerial shooting, trapping, and snaring are used only on a limited basis on public land, and would likely be further limited or curtailed in areas occupied by wolves, particularly during spring and early summer, and especially near wolf dens or rendezvous areas. Snaring would likely not be allowed in areas of wolf occupancy because of the high risk. Trapping is relatively low risk if small traps are used and traps are checked frequently. Aerial shooting by qualified individuals is also relatively low risk but the public controversy often associated with aerial shooting by government employees may limit its use in some areas. Use of toxicants is not now authorized on public land in the primary analysis area, and future proposed use would likely not be allowed in areas occupied by wolves.

Use of M-44s by both ADC and private applicators would be limited in areas occupied by wolves. Because of the increased possibility of wolves occupying lower elevation areas the effects on the use of M-44s, though limited, would likely be greater. Wolves may show up in several other areas prior to establishment in Yellowstone and the use of M-44s would be precluded in these areas. For example, in northwestern Montana where a population of wolves exists, use of M-44s is not limited where single wolves may range. Rather, where a pack of wolves is know to live, M-44 use is restricted in the area at the time wolves are in the vicinity.

Conclusions – The areas affected by natural recovery would be uncertain and recovery would take a long time. Closures up to one mile (1.6 km) around den sites from March 15 to July 1 would limit recreational use on up to 21-35 mi^2 (54-91 km^2). Livestock grazing on up to ten allotments totaling about 150 mi^2 (390 km^2), involving about 15 permits, may be delayed until after July 1. Grazing may be delayed or suspended on allotments with active dens or a history of high depredation rates. Activity on several individual timber sales may be delayed until after July 1 but no effect on overall timber harvest is expected. Use of toxicants lethal to wolves and some ADC methods would be limited in areas occupied by wolves.

Impacts on Visitor Use

Under natural recovery, visitors to Yellowstone National Park and the Yellowstone area will know wolves live there, and will have the opportunity to see or hear wolves, or see their sign but these benefits would be delayed until populations were established, compared to Alternative 1. In Denali National Park, Alaska, an estimated 15% of park visitors see wolves (Mech et al. 1991), and the concentrations of wildlife in open areas in Yellowstone National Park are expected to attract wolves to those places (Koth et al. 1990), where they will be observable.

A small percentage of potential backcountry users could be inconvenienced by temporary travel restrictions in the vicinity of wolf den sites from March 15 to July 1. April-June visitation to Yellowstone makes up 26% of annual park use; April-June backcountry use made up 19.2% of the April-October backcountry-use nights, and involved 1.4% of stock-use nights in 1992. Day use by a few hikers in Yellowstone National Park could be directed to alternative trails if wolf den restrictions limited use of popular trails – roughly 240 hikers could be so affected.

Of 6,151 commercially outfitted backcountry visitor-use nights recorded in Yellowstone National Park April-October 1992, none were recorded in April or May, and just 215 in June, representing 3.5% of the April-October total. Stock-use nights for April-May were zero, and June stock-use nights amounted to 1.5% (90 of the April-October total of 6,194). Consequently, little adverse effect is expected on outfitter operations in Yellowstone National Park.

Assuming monthly distribution of general recreational use on the six national forests would be similar to those of the national parks, comparatively few recreationists would be using the backcountry April-June. Monthly summaries of outfitter use on the national forests were not available, but snowy or muddy trails and high stream levels in higher elevations would normally prevent much use April-June, when travel might be restricted within a mile (1.6 km) of wolf dens.

Conclusions – Recreational users to Yellowstone would eventually have opportunity to see or hear wolves or see their sign but this would take several decades. A slight increase of visitor use may occur specifically for this purpose once populations have established. A small number of visitors may be limited in using areas near wolf dens from March 15 to July 1 but this represents a small percentage of overall visitation. No change in visitor-use patterns or use of commercial outfitters is projected.

Impacts on Economics

Impacts on the Economic Value Associated with Hunter Harvest – The economic impact of natural recovery on hunter harvest in the Yellowstone area is likely to be the same as under Alternative 1, after the population has fully recovered. This impact is estimated at $59,300 to $147,200 annually (Table 4-21). However, this impact will occur several decades later than under Alternative 1, due to the long period anticipated before a fully recovered population has stabilized.

Economic Impacts on Domestic Livestock – Livestock depredation under the Natural Recovery Alternative could be slightly higher than under Alternative 1 after recovering populations begin inhabiting the Yellowstone area. This level of depredation would likely be reached only after a number of years, or even decades, and during the preceding years depredation levels would likely be lower than under Alternative 1. This loss is estimated to average $600 to $9,700 annually over the period of recovery (Table 4-21).

Impacts on Visitor Use and Expenditures – Once wolves reach the recovered population level, and their presence in the Yellowstone area becomes widely known, visitation to the Yellowstone area may increase to some degree. The timing of this increase is unknown, though the direction and degree of the change in visits or expenditures may be similar to that for Alternative 1.

Table 4-21
Annual net social benefits associated with wolf recovery in the Yellowstone area under natural recovery.

	Annual Impact (thousands of 1992 dollars)	
	Low Estimate [c]	High Estimate [c]
(A) Benefits associated with wolf recovery		
Annual net economic value of wolf recovery	1,733.8	2,560.9
(B) Cost associated with wolf recovery		
Foregone value to hunters [a]	59.3	147.2
Value of livestock losses	0.6	9.7
Annual wolf management cost until recovery [b]	250.0	250.0
Total costs	309.9	406.9

[a] Lost value to hunters could possibly be overstated as this figure is based on hypothetical willingness to pay and has not bee calibrated in any way as have been net economic benefits estimates.

[b] Note that one half of the total management costs of wolf recovery to both the Yellowstone and central Idaho are included in the costs associated with this alternative. This cost will only be incurred until wolf recovery is achieved, which varies between alternatives. Other costs and all benefits will continue into perpetuity making annual net benefits significantly higher in many cases once recovery is achieved.
[c] For the benefits estimates, the low and high estimates represent 95% confidence interval on the estimates of net willingness pay for the alternative. For the individual costs, the low and high estimates represent the best estimates of minimum and maximum costs associated with an alternative. Except for management costs the benefits and costs for this alternative is identical to Alternative 1. The only difference is that the benefits and other costs do not start until there is some natural recovery, assumed to be in the year 2010. The capitalized value of a perpetual stream of the annual costs and benefits beginning in the year 2010 is discounted to the present (1993) then amortized in perpetuity.

Economic Effects on the Value Potential Visitors Place on Wolves – In the case of natural recovery, the benefits to existence values are the same as under Alternative 1 but this value is not realized until the wolf population is recovered, or at least is beginning to recover. In this analysis, it is assumed that the full existence value is realized when there is a breeding pair of wolves in living in the Yellowstone area. It is anticipated that under natural recovery a breeding pair of wolves will be present in the Yellowstone area by the year 2010. In calculating the benefits to existence value under this alternative the aggregate net existence value per year is discounted back in 1993 from the year 2010 at a 7% real discount rate. Under these assumptions natural recovery of wolves in the Yellowstone area has an net economic value of between $1.73 and $2.56 million per year (Table 4-21).

Conclusion – It is estimated that natural recovery in the Yellowstone area under Alternative 2 will lead to total benefits of $1.73 million to $2.56 million per year and total costs of $310,000-$407,000 per year. The largest component of total costs would be the wolf management costs of $250,000 per year.

Central Idaho

Impacts on Ungulate Populations

Impacts of 100 wolves are expected to be about the same under this alternative as described under Alternative 1 – Reintroduction of Experimental Populations, except that wolves would not be relocated even if the added predation was significantly impacting ungulate populations in localized areas. Recovery would take longer under this alternative than in Alternative 1, so predation would increase gradually over a longer period of time as the wolf population increased to recovery level. Impacts on native ungulate species area expected to be minimal. However, smaller sub-populations of bighorn sheep may be reduced if predation by wolves is heavy when bighorns are vulnerable on winter range. With a recovered wolf population, fewer ungulates may die from malnutrition associated with winter stress. Surviving ungulates may benefits slightly from reduced competition for food and space.

Conclusions – Recovery would take longer to achieve under this alternative than under Alternative 1, and the level of predation caused by wolves would increase more gradually over a longer period of time as the wolf population slowly increased and expanded at a natural rate. A recovery-level wolf population is expected to have the same impact on elk, deer, moose, and mountain goat populations under this alternative as under Alternative 1. Consequences of wolf predation on bighorn sheep may be more severe under this alternative. Predation of 100 wolves is more likely to result in serious declines of some bighorn sheep populations with inadequate escape terrain on winter range because wolves could not be captured and relocated even if they were significantly impacting big game populations.

Impacts on Hunter Harvest

No modifications in harvest of deer, moose, or mountain goats are expected to be required to accommodate for predation by 100 wolves. Harvest of cow elk may have to be reduced 10%-15% (same as in Alternative 1) to maintain current bull harvest and population level.

Harvest of bighorn sheep rams may have to be reduced or eliminated in some herds if those herds are vulnerable on winter range and are being impacted significantly by wolf predation.

Conclusions – Cow elk harvest may have to be reduced 10%-15% to accommodate predation of 100 wolves, and harvest of bighorn sheep rams may have to be reduced or eliminated in some areas where sheep populations are particularly vulnerable to predation by wolves while on winter ranges with inadequate escape terrain.

Impacts on Domestic Livestock

Elements of this alternative that will likely influence impacts n domestic livestock include: (1) retention of "endangered" status for wolves throughout Idaho with no reintroduction; (2) intensive monitoring of wolves dispersing from northwestern Montana or Canada that will be relied upon to establish populations in central Idaho; (3) wolves depredating on livestock will be relocated or lethally controlled by public agency personnel; and (4) livestock operators or other members of the public would not be allowed to legally kill wolves that are attacking or killing domestic livestock. Wolves would be expected to recolonize the central Idaho are, but would also recolonize other areas throughout Idaho, and would be allowed to remain if conflicts were few. Wolves would not be expected to recover in central Idaho for at least 20 years.

Most livestock allotments are located in the southern half of the central Idaho primary analysis area. Because dispersing wolves from Canada and northwestern Montana are expected to recolonize the northern half of the central Idaho area first, livestock depredations during the initial 5-10 years of Alternative 2 implementation are expected to be minimal.

As wolves move into the southern portion of the central Idaho primary analysis area and outlying private lane, livestock depredations will likely increase. As wolves approach recovery (estimated to be in about 20 years), annual livestock depredations will probably approach about 12 cattle (range 1-17) and 60 sheep (range 32-92), see related analysis in Alternative 1.

Depredation rates are expected to be higher than those under Alternatives 1, 3, and 4, because private livestock operators would not be allowed to shoot or harass wolves depredating on or harassing domestic livestock. Wolves would be more likely to disperse onto private land and come in contact with additional livestock during natural recovery.

Because of the potential for wolves to disperse onto private land during the recovery period, the potential interaction with domestic dogs is higher under this alternative than Alternatives 1, 3, and 4.

Conclusion – Recovery of wolves is expected to take about 20 years in central Idaho under the natural recolonization alternative. As wolves would toward recovery in the second decade of this alternative and begin to recolonize the southern part of the central Idaho area, annual livestock depredations are expected to approach abut 12 cattle (range 1-17) and 60 sheep (range 32-92).

Impacts on Land Use

This is the "No Action" Alternative. Because wolves would be fully protected under the ESA, Section 7 would apply and would require consultation on all federal activities that may affect wolves. Current direction of the FWS on gray wolf Section 7 consultations is that if implemented "management actions prescribed by the USDA Forest Service, such as timber harvest and road restrictions to protect ungulates and their habitat, adequately protect wolves" (USFWS 1992).

Current restrictions include limiting activities within one mile (1.6 km) of active wolf dens or rendezvous sites from March 15 to July 1, and placing some restrictions on non-selective control methods of animal damage control within occupied wolf range (USFWS 1992).

M-44s are currently used on 30 private premises and one Bureau of Land Management sties in the 10 county central Idaho area. Label restrictions preclude the use of M-44s on national forest lands or in areas that may affect threatened or endangered species. Because wolves dispersing from Canada or northwestern Montana may settle into areas of private land, use of M-44s may be suspended in those areas.

Other terms and conditions of ADC activities in “occupied wolf range” include: (1) no neck snares can be used; (2) leghold traps must be checked at least once a day; and (3) number 3N or smaller traps should not be used in proximity to occupied dens or rendezvous sites, unless coordinated with FWS. The requirement to check leghold traps at least once a day may reduce the use of this technique to control coyotes in some areas newly recolonized by wolves. Although neck snares are not used extensively in central Idaho, they are used in special situations to control coyotes. Expansion of “occupied wolf range” in the future will likely affect the use of neck snares.

Den site restrictions may affect timing of livestock grazing and timber harvest activities on national forest lands in central Idaho. Impacts to recreational activities are expected to be minimal although the establishment of den sites in some areas could restrict access during the March 15 to July 1 period. Wolves are not expected to recover under this alternative for at least 20 years in central Idaho. If recovery goals are not being achieved, land-use restrictions could become more severe. Future federal activities cannot jeopardize survival and recovery of wolves by contributing to excessive wolf mortality or contributing to major declines in ungulate populations (Wolf Management Committee 1991). In Minnesota, Michigan, and Wisconsin, all but one national forest, the Chippewa, had open road density guidelines to minimize the risk of human-caused wolf mortality. Open road density restrictions varied from 0.9 mile open road/mi^2 to 1.2 miles open road/mi^2 (0.56 km/km^2 to 0.75 km/km^2).

The Northern Rocky Mountain Wolf Recovery Plan (USFWS 1987) promotes identification and maintenance of dispersal (movement) corridors between Canada and Idaho and the northwestern Montana recovery area. Management emphasis is directed at preventing human-caused wolf mortality and adhering to existing big game management guidelines. Under Alternative 2, more emphasis may be placed on wolf management in the northern Idaho panhandle.

Conclusions – The natural recolonization of wolves into central Idaho is expected to have some minor effects on the timing of livestock grazing and timber harvest activities in the one mile (1.6 km) closure area around active den sites during the period March 15 to July 1. The expansion of “occupied wolf range” as wolves begin to recolonize more areas in central Idaho is expected to have some impacts on ADC’s use of M-44s and leghold traps to control coyotes. Access related restrictions could become more severe in the future if recovery does not proceed as quickly as expected.

Impacts on Visitor Use

Implementation of Alternative 2 will delay the opportunity for people to hear or observe wolves or their sign in central Idaho for 20 years. Because this alternative will not be as controversial as other alternatives including reintroductions, media coverage will not be as intense and not as many people will realize that wolves inhabit Idaho. As wolves become more common during the second decade of this alternative, impacts on visitor use will begin to approach those in Alternative 1. Some people who fear wolves will be more likely to visit the central Idaho area during the early years of this alternative, versus later years as wolves become more numerous. As wolves recover under this alternative, other impacts to visitor use will be similar to Alternative 1. If recovery does not precede as quickly as expected, possible access restrictions in the future could limit visitor use to some portions of central Idaho.

Conclusions – The natural recolonization of wolves will not impact visitor use in central Idaho as quickly as Alternative 1. Because this alternative will not be as controversial as alternatives including reintroductions, not as many people nationally will be aware of wolves in central Idaho. As wolves begin to recover in the second decade of this alternative, impacts on visitor use will be similar to those described under Alternative 1.

Impacts on Economics

Impact on the Economic Value Associated with Hunter Harvest – The economic impact of natural recovery on hunter harvest in central Idaho is likely to be the same as under Alternative 1, after the population has fully recovered. This impact is estimated at $504,300 to $756,400 annually (Table 4-22). This impact, however, will occur several decades later than under Alternative 1 due to the long period anticipated before a fully recovered population is in place.

Economic Impact on Domestic Livestock – Livestock depredation under the Natural Recovery Alternative could be slightly higher than under Alternative 1 after recovering populations have begun to inhabit central Idaho. This level of depredation would likely be reached only after a number of years, or even decades. During the preceding years depredation levels would likely be lower than under Alternative 1. This loss is estimated to average $1,900 to $12,300 annually over the period of recovery (Table 4-22).

Impacts on Visitor Use and Expenditures – After wolves reach the recovered population level and their presence in central Idaho becomes widely known, visitation to central Idaho may increase to some degree. The timing of this increase is unknown, though the direction and degree of the change in visits or expenditures may be similar to that for Alternative 1.

Impact on the Existence Value of Wolves – For Alternative 2, the benefits to existence values are the same as under Alternative 1 but this value is not realized until the wolf population is recovered, or at least is beginning to recover. In this analysis, it is assumed that the full existence value is realized when there is a breeding pair of wolves in living in central Idaho. It is anticipated that under natural recovery a breeding pair of wolves will be present in central Idaho by the year 1999. In calculating the benefits to existence value under this alternative, the aggregate net existence value per year is discounted back to 1993 from the year 1999 at a 7% real discount rate. Under these assumptions, natural recovery of wolves in central Idaho has a net economic value of between $4.26 million and $6.22 million per year (Table 4-22).

Conclusion – Natural recovery in central Idaho under Alternative 2 is estimated to lead to total benefits of $4.26 million per year and total costs of $757,2000-$1,018,700 per year (Table 4-22).

Table 4-22
Annual net social benefits associated with wolf recovery in central Idaho under natural recovery

	Annual Impact (thousands of 1992 dollars)	
	Low Estimate [c]	High Estimate [c]
(A) Benefits associated with wolf recovery		
Annual net economic value of wolf recovery	4,258.2	6,220.1
(B) Costs associated with wolf recovery		
Foregone value to hunters [a]	504.3	756.4
Value of livestock losses	1.9	12.3
Annual wolf management cost until recovery [b]	250.0	250.0
Total costs	756.2	1,018.7

[a] Lost value to hunters could possibly be overstated as this figure is based on hypothetical willingness to pay and has not been calibrated in any way as have the net economic benefits estimates.
[b] Note that one half of the total management costs of wolf recovery to both the GYA and central Idaho are included in the costs associated with this alternative. This cost will only be incurred until wolf recovery is achieved, which varies between alternatives. Other costs and all benefits will continue into perpetuity making annual net benefits significantly higher in many cases once recovery is achieved.
[c] For the benefits estimates, the low and high estimates represent a 95% confidence interval on the estimates of net willingness pay for this alternative. For the individual costs, low and high estimates represent the best estimates of minimum and maximum costs associated with an alternative. Except for management costs the benefits and costs for this

alternative is identical to Alternative 1. The only difference is that the benefits and other costs do not start until there is some natural recovery-assumed to be in the year 1999. The capitalized value of a perpetual stream of the annual costs and benefits beginning in the year 1999 is discounted to the present (1993) then amortized in perpetuity.

Environmental Consequences
Alternative 3
No Wolf Alternative

Yellowstone

Impacts on Ungulate Populations

Under this alternative, wolves wold not be expected to establish populations in the Yellowstone recovery area and state and federal government agencies would not implement or promote programs to enhance their recovery. Unrestricted killing of wolves has precluded establishment of wolf populations in southeastern Alberta where wolves were not a management objective (Alberta Forestry Lands and Wildlife 1991) and was a major factor in the reduction of wolves in Minnesota until federal protection was provided (Fuller et al. 1992). Mortality rates of wolf populations greater than about 28% often result in population declines (Fuller 1989).

Wolves have been observed and single wolves were sporadically killed in northern Montana for the last three decades (Flath 1979, Day 1981). However, no populations established until the early 1980s. Wolf populations established near Glacier National Park because of protection of wolves in western Alberta and southeastern British Columbia and federal protection of wolves in the United States which allowed survival of southward dispersing animals. Even with protection it has required over 20 years for a small population to establish in northwestern Montana.

Examination of the population dynamics of wolves in Yellowstone National Park through computer models indicate that a small population could persist in Yellowstone National Park. However, under a management program which involved control of all wolves involved in conflict situations and unrestricted hunting of wolves outside of the park, simulations indicated the wolf population would decline and likely become extinct within a few years (Boyce 1990).

Conclusions – Under the management framework of this alternative, it is unlikely that wolves would successfully disperse from Canadian populations to Yellowstone. It would be unlikely wolves could survive in sufficient numbers and establish a population in Yellowstone in the foreseeable future. Consequently, wolves would not affect wild ungulate populations in the Yellowstone area. State wildlife management agencies would continue to manage ungulate populations according to their wildlife management objectives, without the need to consider the potential impact from predation by wolves.

Impacts on Hunter Harvest

For the reasons outlined above, wolf recovery wold not proceed and wolves would not be expected to establish populations in Yellowstone National Park or in the Yellowstone area. Consequently, wolves would not affect wild ungulate populations so hunter harvest adjacent to the park would not be affected. State wildlife management agencies would continue to manage ungulate populations and hunter harvests according to their wildlife management objectives, without the need to consider the potential impact from predation by wolves. Hunters would not be able to hunt in an area with a complete compliment of native carnivores or would they have the opportunity to harvest wolves after wolves are recovered and managed by the states.

Conclusions – Because wolves would not establish populations in the Yellowstone area, ungulate populations and the associated hunter harvests would not be affected. State wildlife management agencies wold continue to manage ungulate populations and hunter harvests without considering the potential impacts of wolf predation on hunter harvests.

Impacts on Domestic Livestock

Elements of this alternative that would influence effects on domestic livestock include removal of protection of wolves from all areas outside of national parks and national wildlife refuges, the permitted killing or harassing of any wolf by the public at any time and the removal of any wolves that threatened livestock in Idaho, Montana, and Wyoming. Wolves would likely persist in low numbers on the east and west side of Glacier National Park but would likely not persist in other areas. The wolves that have established in northwestern Montana outside of Glacier National Park would be eliminated over the short term. Wolf depredations on livestock would be infrequent.

The situation would likely be similar to that in eastern Montana and North and South Dakota during the 1970s through the early 1990s. Occasional dispersing single wolves were reported being observed or killed. Extremely infrequent reports of livestock being killed by wolves were reported. No predictable level of depredations on livestock or domestic dogs are expected to occur in the Yellowstone area.

Livestock depredation in northwestern Montana from 1987 to 1992 averaged three cattle and two sheep per year from wolves occurring outside of Glacier National Park. These wolves would likely be eliminated and this level of depredation would likely not occur. However, some wolves from Canada or the population in Glacier would continue to disperse into Montana and occasionally establish pairs for a short period. Some of these wolves wold occasionally kill livestock so depredations would be expected to occur at a very low level and in a very sporadic manner.

Conclusions – No predictable level of depredations on livestock or pets are expected to occur in the Yellowstone area. Depredations in northern Montana would occur at a very low level and in a very sporadic manner.

Impacts on Land Use

Under this alternative no additional land-use restrictions or changes in land-use would occur because of the wolves in the Yellowstone area. During several years in Glacier National park there have been short temporary restrictions around wolf dens in the spring when wolves denned very close to roads. These temporary measures could occasionally continue to be used as necessary in Glacier National Park.

M-44s for the control of coyotes cannot be used in areas occupied by wolf populations. The use of M-44s has not been proposed for use in areas where wolf packs occur in northern Montana but with wolf populations not occurring outside of Glacier National Park and wolves removed from protection of ESA there would be no restrictions on their use because of wolves. There is no current use of M-44s on public land in the Yellowstone analysis area. There is limited use on a few private ranches at lower elevations. There wold be no restrictions on their use because of wolves under this alternative.

Conclusions – Under this alternative, there would be no land-use restrictions or changes in land use because of the presence of wolves.

Impacts on Visitor Use

Visitors who favor a return of wolves to Yellowstone (a ratio of six for to one against), and who indicated that a presence of wolves would improve the Yellowstone experience (McNaught 1985), would be denied the experience. Backcountry use would change little, except that those visitors who might visit the backcountry specifically to see or hear wolves or see their sign, would possibly be discouraged from that visit. Commercial outfitters would be unable to offer their clients the experience of traveling in wolf country, or in areas where every member of the native large mammal fauna was present. Wolf populations would only occur in Glacier National Park so visitors of these states wishing the opportunity to see or hear wolves would need to go there.

Conclusions – Visitors who favor a return of the wolf to Yellowstone would be denied the experience of having wolves in Yellowstone. Backcountry use would change little. Some visitors who might visit the backcountry to see or near wolves might be discouraged from that visit. People in the northern Rocky Mountains of the U.S. would have the opportunity to see or hear wolves in Glacier National Park.

Impacts on Economics

Impacts on the Economic Value Associated with Hunter Harvest – Under this alternative, there would be no reduction in ungulate herds or hunter harvest due to wolves. Consequently, there would be no economic loss to hunters associated with wolves in the analysis area.

Economic Impact on Domestic Livestock – In the absence of wolf populations there would be no identifiable economic loss associated with wolf predation on livestock in the primary analysis area.

Impact on Visitor Use and Expenditures – In the absence of wolf populations there would be no expected change in visitation due to wolves. Consequently, there would be no expected change in visitor expenditures due to wolves.

Impact on the Existence Value of Wolves – In the absence of wolves in the Yellowstone area, there is a continuation of current population levels. Accordingly, there is not change in existence values.

Conclusions – The only estimated costs of this alternative are management costs of $50,000. This amount amortized at 7% implies an annual cost of $3,500. The positive and negative economic effects described for alternatives that result in recovered wolf populations in the Yellowstone area would not occur with this alternative.

Central Idaho

Impacts on Ungulate Populations

Wolves would be killed whenever possible. Wolves would not be allowed to recover and would have no positive or negative impacts on ungulate populations. Lone wolves may occasionally disperse or travel through central Idaho, but that would be rare, and predation by these few animals would be inconsequential.

Conclusions – Wolves would have no positive or negative impacts on ungulate populations in central Idaho.

Impacts on Hunter Harvest

Wolves would be killed whenever possible. Wolves would not be allowed to recover and would have no positive or negative impacts on hunter harvests in central Idaho. Lone wolves may occasionally disperse or travel through central Idaho, and effects on hunter harvests by these few animals would be undetectable.

Conclusions – Wolves would have no impact on hunter harvest or management of big game populations in central Idaho.

Impacts on Domestic Livestock

Removal of wolves from endangered species status in both the federal and state government if expected to result in the removal of any existing wolves in central Idaho and the long-term prevention of wolves becoming established in central Idaho. Because wolves are capable of dispersing long distances, an occasional wolf from Canadian populations may show up in central Idaho. With no protection, any wolves which do disperse into Idaho are not expected to survive for long periods. No measurable impacts on cattle, sheep, or dogs are expected. Any depredations will be infrequent and isolated.

Impacts on Land Use

Removal of wolves from endangered species status will result in the eventual removal of any existing wolves in central Idaho and the long-term prevention of wolves becoming established in central Idaho. Terms and conditions of Section 7 of the ESA covering ADC activities in “occupied wolf range” in central Idaho will not be applicable now or in the future. In particular, use of M-44s, 1080 toxic collars, and above ground strychnine will no longer be restricted in use because of the presence of wolves in central Idaho. In addition, leghold traps will no longer need to be checked once a day in “occupied wolf range,” neck snares will no longer be restricted in “occupied wolf range,” and the use of leghold traps around occupied den sites or rendezvous sites will not have to be coordinated with the FWS.

Impacts on Visitor Use

Implementation of Alternative 3 could have varied but subtle impacts on visitor use in central Idaho. Because 19.7% of surveyed Yellowstone National Park visitors agreed with the statement “I wold be afraid to hike in the park if wolves were present” (McNaught 1985), some people may venture into the central Idaho backcountry in the future who wouldn’t if wolves were present.

Because of the national interest in wolf recovery, implementation of Alternative 3 could cause some non-residents to not visit central Idaho, because of dissatisfaction with the cessation of protection for the gray wolf.

Impacts on Economics

Impact on the Economic Value Associated with Hunter Harvest – This alternative would result in no wolves being present in central Idaho. There would be no reduction in ungulate herds or hunter harvest due to wolves. Consequently, there would be no economic loss to hunters associated with wolves in the central Idaho area.

Economic Impact on Domestic Livestock – In the absence of wolves in central Idaho there would be no predictable economic loss associated with wolf predation on livestock in the area.

Impact on Visitor Use and Expenditures – In the absence of wolves in central Idaho there wold be no expected change in visitation to the area due to wolves. Consequently, there would be no expected change in visitor expenditures due to wolves.

Impact on the Existence Value of Wolves – In the absence of wolves in central Idaho, there is a continuation of current population levels. Accordingly, there is no change in existence values.

Conclusions – The only estimated costs of this alternative are management costs of $50,000. This amount amortized at 7% implies an annual cost of $3,500. The positive and negative economic effects for alternatives that result in recovered wolf populations in central Idaho would not occur with this alternative.

Northwestern Montana

Impacts on Ungulate Populations

Under this alternative, wolves would not be expected to establish populations outside of Glacier National Park. State and federal government agencies would not implement or promote programs to enhance their recovery elsewhere in Montana. Unrestricted killing of wolves has precluded establishment of wolf populations in southeastern Alberta where wolves were not a management objective (Alberta Forestry Lands and Wildlife 1991) and was a major factor in the reduction of wolves in Minnesota until federal protection was provided (Fuller et al. 1992). Mortality rates of wolf populations greater than about 28% often result in population declines (Fuller 1989).

Wolves have been observed and single wolves were sporadically killed in northern Montana for the last three decades (Flath 1979, Day 1981). However, no populations established until the early 1980s. Wolf populations established near Glacier National Park because of protection of wolves in western Alberta and southeastern British Columbia and federal protection of wolves in the United States which allowed survival of southward dispersing animals. With protection, it has required over 20 years for a small population to establish in northwestern Montana.

Wolves could persist in Glacier National Park under this alternative. However, under a management program which involved control of all wolves involved in conflict situations and unrestricted hunting of wolves outside of the park, the wolf population would likely decline outside the park and not reach recovery levels. This would potentially result in up to 1,200 to 1,650 fewer ungulates being killed by wolves in northwestern Montana annually.

Conclusions – Under the management framework of this alternative, it is likely that wolves would continue to persist in Glacier National Park but it would be unlikely wolves could survive in sufficient numbers and establish a recovered population in northwestern Montana in the foreseeable future. Consequently, wolves would not affect wild ungulate populations except in the park. State wildlife management agencies would continue to manage ungulate populations according to their wildlife management objectives, without the need to consider the potential impact from predation by wolves.

Impacts on Hunter Harvests

For the reasons outlined above, wolf recovery would not proceed, and under this alternative wolves would not be expected to establish populations outside of Glacier National Park. Consequently, wolves would gradually cease to affect wild ungulate populations outside the park so hunter harvests adjacent to the park would not be affected. Under this alternative, hunter harvests of female ungulates may be slightly higher than their current level because the three wolf packs currently residing outside of Glacier National Park would have no protection and would likely be eliminated. State wildlife management agencies would continue to manage ungulate populations and hunter harvests according to their wildlife management objectives, without the need to consider the potential impact from predation by wolves. Hunters would not be able to hunt in an area with a complete compliment of native carnivores nor would they have the opportunity to harvest wolves after wolves are recovered and managed by the states.

Conclusions – Because wolves would not establish populations outside of Glacier National Park, ungulate populations and the associated hunter harvests of female ungulates may increase slightly above levels that would occur if natural recovery were to proceed in northwestern Montana. State wildlife management agencies would continue to manage ungulate populations and hunter harvests without considering the potential impacts of wolf predation on hunter harvest.

Impacts on Domestic Livestock

Elements of this alternative that would influence effects on domestic livestock depredations would include removal of protection of wolves from all areas outside of national parks and national wildlife refuges, the permitted killing or harassing of any wolf by the public at any time and the removal of any wolves that threaten livestock in northwestern Montana. Wolves would likely persist in low numbers on the east and west side of Glacier National Park but would likely not persist in other areas. The wolves that have established in northwestern Montana outside of Glacier National Park would be eliminated over the short-term, thus reducing livestock losses.

The situation would likely be similar to that in eastern Montana and North and South Dakota during the 1970s through the early 1990s. Occasional dispersing single wolves were reported being observed or killed. Extremely infrequent reports of livestock being killed by wolves were reported. No predictable level of depredations on livestock or domestic dogs were expected to occur in the Glacier area.

Livestock depredation in northwestern Montana from 1987 to 1992 averaged three cattle and two sheep per year from wolves occurring outside Glacier National Park. These wolves would likely be eliminated and this level of depredation would likely not occur. However, some wolves from Canada or the population in Glacier would continue to disperse into Montana and occasionally establish pairs for a short period. Some of these wolves would occasionally kill livestock and depredations would be expected to occur at a very low level in a very sporadic manner.

Conclusions – Depredations in northern Montana would occur at a very low level and in a very sporadic manner.

Impacts on Land Use

Under this alternative no additional land-use restrictions or changes in land use would occur because wolves in most of Montana. During several years in Glacier National Park there have been short temporary restrictions around wolf dens in the spring when wolves denned very close to roads. These temporary measures could occasionally continue to be used as necessary in Glacier National Park.

M-44s for the control of coyotes cannot be used in areas occupied by wolf populations. The use of M-44s has not been proposed for use in areas where wolf packs occur in northern Montana but with wolf populations not occurring outside of Glacier National Park and wolves removed from protection of ESA, there would be no restrictions on their use because of wolves. There is very limited current use of M-44s on public land in the Glacier area and on a few private ranches at lower elevations. There would be no restrictions on their use because of wolves under this alternative.

Conclusions – Under this alternative, there would be no land-use restrictions or changes in land use because of the presence of wolves. Up to 35 square miles that may have been impacted by land-use restrictions to protect wolves outside of Glacier National Park will not be impacted.

Impacts on Visitor Use

Visitors who favor a return of wolves and who believe that a presence of wolves would improve their outdoor experience, would be denied that experience in Montana except in Glacier National Park. Backcountry use would change little, except that those visitors who might visit the backcountry specifically to see or hear wolves or see their sign, would possibly be discouraged from that visit. Commercial outfitters would be unable to offer their clients the experience of traveling in wolf country. Wolf populations would only occur in Glacier National Park so visitors wishing the opportunity to see or hear wolves would need to go there.

Conclusions – Visitors who favor a return of the wolf would be denied the experience of having wolves outside of Glacier National Park. Backcountry use would change little. Some visitors who might visit the backcountry to see or hear wolves might be discouraged from that visit. People in the northern Rocky Mountains of the U.S. would only have the opportunity to see or hear wolves in Glacier National Park.

Impacts on Economics

Impacts on the Economic Value Associated with Hunter Harvest – Under this alternative, there may be a slight increase in ungulate herds or hunter harvest due to wolves being eliminated from areas outside of Glacier National Park. Consequently, there could be a potential economic benefit to hunters with wolves being absent from Montana except inside Glacier National Park.

Economic Impact on Domestic Livestock – In the absence of wolf populations there would be some economic benefits associated with reduction of wolf predation on livestock in northwestern Montana.

Impact on Visitor Use and Expenditures – The disappearance of wolf packs except in Glacier National Park could result in a potential decrease in visitation due to the absence of wolves. Consequently, visitor expenditures would decrease.

Impacts on the Existence Value of Wolves – In the absence of wolves in most of Montana, there could be a decrease in the existence value associated with wolves in northwestern Montana.

Conclusions – The only estimated costs of this alternative are management costs of $50,000 needed to change state and federal laws. This amount amortized at 7% implies an annual cost of $3,500. The positive and negative economic effects described for alternatives that result in recovered wolf populations would not occur with this alternative.

Environmental Consequences
Alternative 4
Wolf Management Committee Alternative

Yellowstone

Impacts on Ungulate Populations

Wolves cold recover under this alternative but may not recover until 2010, 10 years later than for Alternative 1, Reintroduction of Experimental Populations. Under this alternative, wolves could have similar effects on ungulate populations described for Alternative 1.

As in Alternative 1, a recovered wolf populations (10 packs, about 100 wolves) might reduce the elk population on Yellowstone's northern range 5%-30% (Boyce 1990, Boyce and Gaillard 1992, Mack and Singer 1992b) from a 1990 estimate of 17,3000 (Mack and Singer 1992a) to about 12,100-16,400 animals. Elk of the Jackson herd south of Yellowstone National Park may decline 4%-8% (from about 15,187 to between 13, 972 and 14,580) while elk on the North Fork Shoshone herd may only decline 2%-3% (5,343 to between 5,182 and 5,236 elk). Deer, moose, and bison populations would likely decline as described in Alternative1.

Some wolves may colonize areas where their presence would be undesirable and state big game management objectives could not be met. This alternative provides for habitat and wild ungulate population enhancement and removal of wolves if wolves prevent states from meeting big game management objectives. These provisions may reduce the negative effects wolves may have on certain ungulate populations and associated hunter harvests. However, given the complex nature of predator-pry dynamics and the enormous number of conditions and tools that might enhance ungulate populations, quantifying reduced effects on ungulates would be speculative and could only be evaluated on a case by case basis with wolves present in the system.

Under this alternative, wolves would have less protection outside national parks and wildlife refuge boundaries. Consequently, wolves and their effects on ungulates might be concentrated in parks (Yellowstone) and refuges (National Elk Refuge) and not dispersed throughout suitable habitats in the Yellowstone area. Under these conditions, wolf predation effects on ungulates might be quite similar to those predicted in models that examined wolf predation on ungulates in Yellowstone National Park and the National Elk Refuge area (Boyce 1990, Garton et al. 1990, Boyce and Gaillard 1992, Mack and Singer 1992b).

Conclusions – With this alternative, wolves would recovery in the Yellowstone area around 2010, 10 years later than for Alternative 1. For Alternative 4, a recovered wolf population may reduce ungulate populations as described in Alternative 1. Alternative 4 provides for habitat and wild ungulate population enhancement and removal of wolves if wolves prevent the states from meeting their big game population objectives.

Impacts on Hunter Harvest

During the early stages of wolf recovery (prior to 2010), wolf effects hunter harvests would be undetectable. At wolf recovery levels (10 packs, about 100 wolves), hunter harvests of primarily antlerless animals may be reduced for some herds, similar to the levels described in Alternative 1. Boyce (1990) and Boyce and Gaillard (1992) predicted wolf recovery would not affect hunting opportunities in Montana. For the Jackson herd, Boyce and Gaillard (1992) estimated hunter harvest may decline 5%-10% (from about 3,330 elk/year to between 2,970 and 3,135 elk/year) while hunter harvests for the North Fork Shoshone herd may decline 1%-2% (from about 640 elk/year to between 627 and 634 elk/year). Mack and Singer (1992b) estimated wolf recovery could reduce antlerless elk harvests of the northern range elk herd 27% (from an average 994 antlerless elk/year to 714 antlerless elk/year). They also predicted antlerless deer harvests could be reduced but male harvests of elk and deer would not be affected. A recovered wolf population living on Yellowstone's northern range may also reduce the availability of northern range moose permits from an average 31/year to 16/year (Mack and Singer 1992b). This alternative provides for habitat and wild ungulate population enhancement which could reduce the negative effects wolves may have on ungulate populations and the associated hunter harvests.

Conclusions – During the early stages of wolf recovery (prior to 2010), wolf effects on hunter harvest would be undetectable. At wolf recovery levels (10 packs, about 100 wolves), hunter harvests of primarily antlerless animals (females and young) may be reduced for some big game herds. The effects of hunter harvests would be similar to those described in Alternative. Male harvests should not be affected. This alternative provides for habitat and wild ungulate population enhancement. These provisions could reduce the negative effects (described above and in Alternative 1) that wolves may have on hunter harvests.

Impacts on Domestic Livestock

Elements of this alternative that will likely influence impacts on domestic livestock include reintroduction of wolves to Yellowstone National Park, immediate control by public agency personnel of any wolves depredating on livestock, and allowing livestock operators to kill wolves that are attacking or harassing domestic livestock or pets on private land and on livestock allotments on public land. During the first five years, few animals will be outside of Yellowstone National Park or in areas that contain livestock. There are large areas surrounding the reintroduction area that have no livestock grazing, approximately 7.5 million acres (303,800 km^2). Wolf populations would likely be recovered in Yellowstone National park but wolf mortality would likely be substantially higher than under Alternative 1 and recovery would take longer, possibly 10 years.

A summary of wolf depredation on domestic livestock in several areas of North America is presented in the environmental consequences for Alternative 1. In addition, estimates of wolf depredation on cattle and sheep, based on the experience in other areas is also presented in the analysis of effects of Alternative 1. Those projections result in estimates of annual livestock depredations by wolves of about eight cattle (range 1-13) and 68 sheep (range 38-110) on national forests surrounding Yellowstone National Park. In some allotments that are very remote, are within the home range of several wolf packs, and where livestock are not tended or checked for long periods of time, depredation rates may approach those observed in the Simonette River experimental area in Alberta for short periods of time.

The provision to allow livestock operators to kill wolves that are perceived either attacking or harassing livestock on both private and public land livestock allotments would increase wolf mortality compared to that expected under Alternative 1. Similar management is employed in southern Alberta and few wolves occur or persist on private land or in readily accessible public lands. Similar results would be expected in the Yellowstone area with wolves occurring almost exclusively in Yellowstone National Park and remote portions of surrounding wilderness areas. Consequently, livestock depredations likely would be fewer than those projected above. Other aspects of annual livestock depredation, such as livestock class most effected, level of operators affected, and high variability between years and between areas, would likely be similar. Depredations on domestic dogs would likely be extremely rare.

Conclusions – During the first five years after beginning reintroduction, livestock losses to wolves would likely be very few. During the next five years or so, loss rates may be similar to those in Alternative 1. However, because livestock operators are permitted to kill wolves that are harassing or killing livestock under this alternative, losses are likely to be fewer that under Alternative 1. As recovery levels are approached and achieved, depredation rates would be expected to be toward the lower range of those estimated for alternative 1 and would likely occur mostly on remote national forest allotments. Losses are estimated to average less than eight cattle and 68 sheep annually. Wolf depredation on domestic dogs is expected to be very infrequent but will be emotionally disturbing to some of those affected.

Impacts on Land Use

Elements of this alternative that may impact land use include reintroduction of wolves to Yellowstone National Park and designation of wolves outside national parks and national wildlife refuges as a special state managed nonessential experimental population; states would each develop wolf management plans. Agencies would control wolves that are involved in livestock, working animal, or pet depredation; livestock operators would be allowed to kill wolves that are perceived attacking or harassing livestock on private land or public land livestock allotments. Seasonal closures up to one mile (1.6 km) around active wolf den sites from April 1 to June 15 would be used to protect dens in the early stages of population establishment. This alternative would preclude the use of toxicants that are lethal to wolves in areas where wolf occupancy is the management objective. During the first five years, few animals will be outside of Yellowstone National Park or wilderness areas. Wolf populations would likely be recovered in Yellowstone National Park but wolf mortality might be substantially higher than under Alternative 1 and recovery would take longer, possibly 20 years.

The effects of this alternative on land use in national parks and national wildlife refuges would be very similar to those described under Alternative 1. Those would include the construction and maintenance of up to three temporary confinement and release facilities in Yellowstone National Park and restriction of visitor activity near those facilities. In the short term, visitor access to about 3 mi^2 (7.8 km^2) around wolf confinement and release facilities would be restricted.

During the early stages of population establishment, active den sites within the park would be closely monitored. Human activity in the vicinity of the dens, likely to disrupt successful denning, would be precluded within one mile (1.6 km) of den sites. This period would extend from April 1 to June 15.

The focus of population establishment would be in Yellowstone National Park. Previous studies indicate that most wolves would line in the northern third of the park. Effects would be more focused there. Estimates are that 7-11 packs could live in this area. Consequently, restrictions may affect a total of 7-11 mi^2 (18-29 km^2). However, this is the lowest season of visitor use; early season use primarily on main roads and developed facilities, with little backcountry use. Some denning areas will likely be located in areas already under visitor limitations for grizzly bear management so the area affected likely would not be totally additive.

Three general types of activities involving large areas of national forest land include livestock grazing, timber harvest, and recreation.

The limits on public use to protect den areas occurs from April 1 to June 15. Most livestock are permitted on national forests after these dates so would likely not affect initiation of grazing on national forest allotments. This alternative also calls for agency control of depredating wolves, and killing of wolves that are attacking or harassing livestock by livestock operators. Consequently, livestock grazing areas would not likely be adjusted to accommodate wolf occupancy if conflicts developed.

It is difficult to estimate effects restrictions to protect wolf dens will have on timber harvest. Timber harvest varies by year and by national forest but is projected to average about 28,000 acres (113 km^2) annually (about 55% on the Targhee National Forest west and southwest of Yellowstone National Park). However, several factors suggest effects would be very small. Most timber harvest is on the outside perimeter of the central park and wilderness areas; mostly on the Targhee National Forest, where wolf numbers are projected to be quite low. In comparison, a small proportion of the primary analysis area is affected by timber harvest (about 3% of the national forest area). Other seasonal restrictions designed to protect important wildlife areas such as ungulate winter range and birthing areas, grizzly bear spring range, and protection of roads and water quality during spring thaw already limit areas of harvest during the wolf denning period. It is unlikely that closures to protect wolf dens would preclude a measurable portion of annual timber harvest. Some sales could occasionally be delayed slightly if they were proposed during the April 1 to June 15 period.

Recreational activities during the April 1 to June 15 period are normally at the lowest level during the year. Other limitations on access, for reasons discussed previously, and snow and trail conditions at higher elevations generally limit activities in higher elevation backcountry areas. Commercial outfitting generally does not begin until after this period. The only hunting is spring hunting for black bear in some areas. It is possible that wolves could den in several areas that would affect access to national forest land. Under one situation, only the area within one mile (1.6 km) of dens would be affected. In other situations, the closed area could include the road accessing the area and under this situation a much larger area could be limited to vehicle access. With most wolf territories likely occurring within the park or adjacent wilderness or roadless areas, affects on national forest areas with vehicle access during the April 1 to June 15 period would be small.

The effects of animal damage control activities would likely be less than those projected for Alternative 1. The use of techniques, other than toxicants, would not be affected. The effect of the use of M-44s is expected to be very limited for two reasons. First, they are not currently authorized for use in national parks, national wildlife refuges, or on national forests in the primary analysis area. This comprises about 11 million acres (44,600 km^2) or about 70% of the primary analysis area. Further, they cannot be used in areas where they may kill a threatened or endangered species. Therefore, they are not used in areas occupied by grizzly bears. Consequently, they are used primarily on low elevation private lands on the periphery of the analysis area or in several of the major river valleys.

This alternative calls for agencies to control wolves that depredate on livestock. It would also allow livestock operators to kill wolves that attack or harass livestock. Those factors, and the likelihood that most wolves would avoid low elevation areas with high levels of human activity, make it unlikely that wolves would occupy areas where M-44s are currently used.

Conclusions – Temporary confinement facilities would occur at up to three sites within Yellowstone National Park. Public access would be restricted up to one mile (1.6 km) around the facilities during the confinement period. No measurable affects on overall visitor use would not occur. Human activity would be restricted in an area up to one mile (1.6 km) around active den sites from April 1 to June 15 and may limit access to 21-35 mi^2 (54-91 km^2). No measurable effects on recreational access to national forests are expected. Livestock grazing areas would not be adjusted to accommodate wolf occupancy. Some timber harvest sales occasionally may be delayed slightly if they were proposed during the April 1 to June 15 period. No impact on animal damage control activities is expected.

Impacts on Visitor Use

Under this alternative visitors to Yellowstone National Park and the Yellowstone area will know wolves live there, and will have the opportunity to see or hear wolves, or see their sign. Most wolves would occur within Yellowstone National Park and in some areas of the adjacent national forest wilderness areas. In Denali National Park, Alaska, an estimated 15% of park visitors see wolves (Mech et al. 1991), and the concentrations of wildlife in open areas in Yellowstone National Park are expected to attract wolves to those places (Koth et al. 1990), where they will be observable.

A small percentage of potential backcountry users could be inconvenienced by temporary travel restrictions in the vicinity of wolf dens from April 1 to June 15. April-June visitation to Yellowstone makes up 26% of annual park use; April-June backcountry use made up 19.2% of the April-October backcountry-use nights, and involved 1.4% of stock-use nights in 1992. Day use by a few hikers in Yellowstone National Park could be directed to alternative trails if wolf den restrictions limited use of popular trails – roughly 240 hikers could be so effected.

Of 6,151 commercially outfitted backcountry visitor-use nights recorded in Yellowstone National Park April-October 1992, none were recorded in April or May, and just 215 in June, representing 3.5% of the April-October total. Stock-use nights for April-May were zero, and June stock-use nights amounted to 1.5% (90 of April-October total of 6,194). Consequently, little adverse effect is expected on outfitter operations in Yellowstone National Park.

Assuming monthly distribution of general recreational use on the six national forests would be similar to those of the national parks, comparatively few recreationists would be using the backcountry April-June. Monthly summaries of outfitter use on the national forests were not available, but snowy or muddy trails and high stream levels in higher elevations would normally prevent much use April-June, when travel might be restricted within one mile (1.6 km) of wolf dens.

Conclusions – Recreational users to Yellowstone would eventually have opportunity to see or hear wolves or see their sign. A slight increase of visitor use may occur specifically for this purpose once populations have established. A small number of visitors may be limited in using areas near wolf dens from April 1 to June 15 but no change in visitor-use patterns or use by commercial outfitters is projected.

Impacts on Economics

Impact on the Economic Value Associated with Hunter Harvest – the economic impact of the Wolf Management Committee Alternative on hunter harvest is likely to be the same as under Alternative 1, once the population has fully recovered. This is estimated to range from $187,300 to $464,900 annually (Table 4-23).

Economic Impact on Domestic Livestock – It is estimated that livestock depredation under the Wolf Management Committee Alternative could be slightly lower than under Alternative 1 estimated to range from $1,900 to $30,500 and average $18,277 annually.

Impact on Visitor Use and Expenditures – It is estimated that visitation will increase 10% for area residents and 5% for out of region residents. Visitor expenditures to the Yellowstone area are estimated to increase about $23 million, the same amount as under Alternative 1.

Impact on the Existence Value of Wolves – Under the Wolf Management Committee Alternative it is estimated that the net economic value of wolf existence in the Yellowstone area will be equal to that in Alternative 1 at approximately $8.3 million per year (see Table 4-8).

Conclusions – Wolf recovery in the Yellowstone area under Alternative 4 will lead to estimated total benefits of $6.67 million-$9.85 million per year and total costs of $3.41 million-$372 million per year (Table 4-23). By far, the largest component of total costs wold be the wolf management costs of $3.22 million per year.

Table 4-23
Annual net social benefits associated with wolf recovery in the Yellowstone area under Wolf Management Committee Alternative.

	Annual Impact (thousands of 1992 dollars)	
	Low Estimate [c]	High Estimate [c]
(A) Benefits associated with wolf recovery		
Annual net economic value of wolf recovery	6,673.1	9,854.3
(B) Costs associated with wolf recovery		
Foregone value to hunters [a]	187.3	464.9
Value of livestock losses	1.9	30.5
Annual wolf management cost until recovery [b]	3,225.0	3,225.0
Total costs	3,414.2	3,720.4

[a] Lost value to hunters could possibly be overstated as this figure is based on hypothetical willingness to pay and has not been calibrated in any way as have the net economic benefits estimates.
[b] Note that one half of the total management costs of wolf recovery to both the Yellowstone and central Idaho areas are included in the costs associated with this alternative. This cost will only be incurred until wolf recovery is

achieved, which varies between alternatives. Other costs and all benefits will continue into perpetuity making annual net benefits significantly higher in many cases once recovery is achieved.

[c] For the benefits estimates, the low and high estimates represent a 95% confidence interval on the estimates of net willingness to pay for the alternative. For the individual costs, the low and high estimates represent the best estimates for minimum and maximum costs associated with an alternative.

Central Idaho

Impacts on Ungulate Populations

If wolves are not reintroduced into central Idaho, recovery will continue at a slow rate, and impact on ungulates may remain negligible for the foreseeable future. If wolves are reintroduced, recovery will proceed more rapidly, but the impact of wolf predation is still expected to be minimal. Wolves would not be permitted to be a detriment to ungulate populations. Wolves that were preventing the IDFG from meeting its management objectives could be relocated to other areas. Overall impacts on ungulate species would be similar to those described under Alternative 1, except that funding would be provided annually by the FWS to IDFG for enhancement of ungulate populations.

Conclusions – If wolves were not reintroduced into central Idaho, wolf recovery would occur at the same rate as Alternative 2. Wolves that significantly impact local ungulate populations (e.g., bighorn sheep) could be captured and relocated. Therefore, impact on ungulate populations would be the same as described for Alternative 1. The FWS would provide funding to the IDFG for enhancement of ungulate populations to further reduce the possibility of wolf predation resulting in a decline in ungulate populations. Fewer ungulates may die of malnutrition associated with winter stress. Surviving ungulate may benefit slightly from reduced competition for food and space.

Impacts on Hunter Harvest

To maintain the current size of the elk populations and continue the current level of bull harvest in central Idaho, harvest of cow elk may have to be reduced 10%-15% (same as Alternative 1). A reduction in cow harvest by 10% will allow for predation of 100 wolves, an acceptable bull:cow ratio, and an elk population that is increasing faster than the current elk population without wolves (Table 4-11).

No modifications in harvest of deer, moose, bighorn sheep, or mountain goats are expected to be required to accommodate for predation by 100 wolves.

Conclusions – Harvest of cow elk may have to be reduced 10%-15% in central Idaho (396-594 fewer cows killed than in 1991) to accommodate for predation by 100 wolves. No changes in management of harvest for deer, moose, bighorn sheep, or mountain goats are expected to be necessary.

Impacts on Domestic Livestock

Elements of this alternative that will likely influence impacts on domestic livestock include: (1) lethal control by public agency personnel of any wolves depredating on livestock; (2) option for livestock operators to kill wolves that are attacking or harassing domestic livestock or pets on private land and on livestock allotments on public land. During the initial five years under natural recovery, wolf populations would likely remain very low and would rarely come in contact with livestock. Most wolves coming in contact with livestock and detected by private livestock operators would likely be killed. Until recovery goals are achieved, any wolves taken on public or private lands by livestock operators because of livestock depredations and those wolves found to be illegally taken, would be replaced in the reintroduction zone. With no reintroduction after five years, wolves would probably not recover in central Idaho in the foreseeable future. With reintroduction, wolves are expected to recovery after an additional 15 years (year 2015).

The provision to allow livestock operators to kill wolves that are perceived as either attacking or harassing livestock on both private land and public livestock allotments is expected to increase mortality of wolves in livestock areas and decrease livestock depredations under this alternative. Based on applicable studies from Minnesota, Alberta, and Montana, and taking into account provisions of this alternative, a recovered population of 100 wolves is expected to result in the annual loss of about eight cattle (range 1-17) and 40 sheep (range 32-92). Similar to other alternatives, depredations are expected to be highly variable between areas and between years. In some allotments that are very remote, lightly tended, and located close to more than one wolf pack, depredation rates may occasionally approach those observed in the Simonette River experimental area in Alberta. In the Simonette River area, 39-40 wolves killed or injured 27 cattle in one year (Table 4-1). Depredations on domestic dogs would be very rare under this alternative, as very few wolves would be expected to exist near private land.

Conclusions – Implementation of the Wolf Management Committee Alternative is expected to result in the reintroduction of wolves in the year 2000 with recovery by the year 2015. Wolf depredations on livestock are expected to be less under this alternative than Alternative 1, 2, and 5. As wolves approach recovery (100 animals) late in the second decade of this alternative, average annual losses of livestock are expected to approach about eight cattle (range 1-17) and 40 sheep (range 32-92).

Impacts on Land Use

With reintroduction of wolves after the initial five years of Alternative 4 implementation, recovery would likely occur in central Idaho within 15 years (2015).

Within the experimental area in Idaho, federal agencies would only have to confer with FWS on activities that are likely to jeopardize the wolf (outside of national parks and national wildlife refuges), and such determination would not prohibit the federal agency from proceeding with the activity if a negative effect was determined. Because of this standard, most agencies in Idaho would not need to consult or confer on land-use changes and their effects on wolves within the defined area (Wolf Management Committee 1991).

Seasonal closures of up to one mile 91.6 km) around active wolf dens from April 1 to June 15 may be used to protect wolves from human disturbances during the early stages of population establishment. Use of toxicants lethal to wolves would be precluded in areas where wolf occupancy is the management objective.

Seasonal closures around dens would have little impact on livestock grazing or timber harvest on national forest lands in central Idaho. Minor adjustments in timing of these activities may be necessary in areas around known wolf dens.

Seasonal closures around active dens could also impact recreational access to national forest lands between April 1 and June 15. Because recreational activities are normally at a low level during this time of year, impacts would be slight.

Implementation of Alternative 4 would have minor impacts on the use of M-44s in the 10 county central Idaho area. During 1992, M-44s were used on 30 private premises and one BLM site in the 10 county central Idaho area. Label restrictions on M-44s restrict their use in national forests and in areas where threatened or endangered species may be adversely affected.

If wolves show up on private land in Idaho where M-44s are currently being used to control coyote depredations, use of M-44s may be suspended. However, because livestock operators can shoot wolves depredating on livestock or harassing them, few wolves would live on low elevation private lands, and impacts on the use of M-44s would not be measurable. Existing Section 7 terms and conditions on the use of leg-hold traps and neck snares in “occupied wolf range” would likely no longer apply under this alternative.

Conclusions – Implementation of the Wolf Management Committee Alternative is expected to result in few impacts on land use in central Idaho. Seasonal closures of up to one mile (1.6 km) around active den sites during the early phases of wolf population establishment may have some minor short-term impacts on the timing of timber sales or livestock grazing and on recreational access to national forest lands. As "occupied wolf range" increases under this alternative, a slight impact on the use of M-44s could occur. However, because few wolves are expected to exist near private land under this alternative, any impact on the use of M-44s would be slight.

Impacts on Visitor Use

Under Alternative 4, wolf recovery in central Idaho would occur by natural recolonization for the first five years of implementation, followed by an expected reintroduction of an experimental population of wolves.

With a reintroduction of an experimental populations after the first five years, recovery in central Idaho would likely be achieved by the year 2015. Visitors to central Idaho would slowly have more opportunity to hear or observe wolves or their sign in the following years.

Because wolf issued have a high profile in the United States, and because wolves are rare in the lower 48 states, many people are expected to visit the central Idaho backcountry in the future specifically for the chance to hear or see wolves. Overall impacts on visitor use are expected to be similar to Alternative 1.

Implementation of the Wolf Management Committee Alternative also includes the reintroduction of replacement wolves for wolves killed by livestock operators or other individuals. These reintroductions are expected to generate additional public awareness of wolf recovery effects in central Idaho.

Conclusions – Implementation of the Wolf Management Committee Alternative is expected to result in a reintroduction of wolves into central Idaho in the year 2000, followed by the recovery of wolves in about the year 2015. The expected reintroduction of wolves in about the year 2000 is expected to receive national attention. Because of the high profile of wolves and their rarity in the lower 48 states, many people are expected to visit the central Idaho backcountry specifically for the opportunity to hear or see wolves. Overall impacts on visitor use are expected to be similar to Alternative 1.

Impacts on Economics

Impact on the Economic Value Associated with Hunter Harvest – The economic impact of the Wolf Management Committee Alternative on hunter harvest in central Idaho is likely to be the same as under Alternative 1 after the population has fully recovered. This is estimated to range from $756,800 to $1,135,200 annually (Table 4-24).

Economic Impact on Domestic Livestock – It is estimated that livestock depredation under the Wolf Management Committee Alternative could be slightly lower than under Alternative 1, and cost of depredations is estimated to range from $2,900 to $18,500 annually after a recovered population is established.

Impact on Visitor Use and Expenditures – it is estimated that visitation and expenditures by visitors to central Idaho will change by the same amount as under Alternative 1.

Impact on the Existence Value of Wolves – Under the Wolf Management Committee Alternative, it is estimated that the net economic value of wolf existence in central Idaho will be equal to that in Alternative 1 at approximately $6.85 million-$10.01 million annually.

Conclusion – Wolf recovery in central Idaho under Alternative 4 is estimated to lead to total benefits of $6.85 million-$10.01 million per year and total costs of $3.98 million-$4.38 million per year (Table 4-

24). By far, the largest component of total costs would be the wolf management costs of $3.22 million per year (Table 4-24).

Table 4-24
Annual net social benefits associated with wolf recovery in central Idaho
under the wolf management committee alternative.

	Annual Impact (thousands of 1992 dollars)	
	Low Estimate [c]	High Estimate [c]
(A) Benefits associated with wolf recovery		
Annual net economic value of wolf recovery	6,847.8	10,012.2
(B) Costs associated with wolf recovery		
Foregone value to hunters [a]	756.8	1,135.2
Value of livestock losses	2.9	18.5
Annual wolf management cost until recovery [b]	3,225.0	3,225.0
Total costs	3,984.7	4,378.7

[a] Lost value to hunters could possibly be overstated as this figure is based on hypothetical willingness to pay and has not been calibrated in any way as have the net economic benefits estimates.
[b] Note that one half of the total management costs of wolf recovery to both the Yellowstone and central Idaho areas are included in the costs associated with this alternative. This cost will only be incurred until wolf recovery is achieved, which varies between alternatives. Other costs and all benefits will continue into perpetuity making annual net benefits significantly higher in many cases once recovery is achieved.
[c] For the benefits estimates, the low and high estimates represent a 95% confidence interval on the estimates of net willingness pay for the alternative. For the individual costs, the low and high estimates represent the best estimates of minimum and maximum costs associated with an alternative.

Northwestern Montana

Impacts on Ungulate Populations

Under this alternative, wolves would be more intensively managed outside of Glacier National Park than currently. State and federal government agencies would implement and promote programs to enhance wolf recovery elsewhere in Montana. Mortality rates of wolf populations greater than abut 28% often result in population declines (Fuller 1989) so in areas of Montana with extensive agriculture or development, wolf packs would not persist.

Wolves in Glacier National Park and elsewhere in northwestern Montana could persist under this alternative. This would potentially result in up to 1,200 to 1,650 ungulates being killed by wolves in Montana annually, however the intensive management of both wolves and ungulate habitat would likely result in very little, if any, decrease in ungulate populations above current levels.

Conclusions – Under the management framework of this alternative, it is likely that wolves would continue to persist in northwestern Montana. Consequently, wolves could affect wild ungulate populations outside Glacier National Park. State wildlife management agencies would continue to manage ungulate populations according to their wildlife management objectives, with little need to consider the potential impact from predation by wolves, except to move wolves if problems were documented or to enhance ungulate habitat.

Impacts on Hunter Harvests

For the reasons outlined above, wolves would be expected to establish populations outside of Glacier National Park but they would be managed intensely. Consequently, wolves would not affect wild ungulate populations outside the park so hunter harvests in northwestern Montana would not be affected. It is possible that hunter harvests of female ungulates may be slightly higher than their current level because of ungulate habitat enhancement and intensive wolf management. State wildlife management agencies would continue to manage ungulate populations and hunter harvests according to their wildlife management objectives, with little need to consider the potential impact from predation by wolves. Hunters in northwestern Montana could hunt in an area with another native carnivore and would have the opportunity to harvest wolves after wolves are recovered and managed by the states.

Conclusions – Because wolves would be intensively managed in northwestern Montana, ungulate populations and the associated hunter harvest of female ungulates may increase slightly above levels that would occur if natural recovery were to proceed in northwestern Montana. State wildlife management agencies would continue to manage ungulate populations and hunter harvests with little consideration of the potential impacts of wolf predation on hunter harvest.

Impacts on Domestic Livestock

Elements of this alternative that would influence effects on domestic livestock depredations would include reduced protection of wolves from areas outside of national parks and national wildlife refuges, the permitted killing or harassing of wolves by the public and agencies under a wide variety of conditions, and the removal of any wolves that threaten domestic animals in northwestern Montana. Wolves would likely persist in low numbers in northwestern Montana outside of Glacier National Park but would likely not persist in other areas of Montana, thus reducing the potential for livestock losses.

Livestock depredation in northwestern Montana from 1987 to 1992 averaged three cattle and two sheep per year from wolves occurring outside of Glacier National Park. Under this alternative wolves would be more intensively managed and this level of depredation would likely be reduced. Some wolves would occasionally kill livestock but depredations would be expected to occur below current projected levels.

Conclusions – Depredations in northwestern Montana would occur at a low level.

Impacts on Land Use

Under this alternative no additional land-use restrictions or changes in land use would occur over current projected levels because of wolves. During several years in Glacier National Park, short temporary restrictions have been implemented around wolf dens in the spring when wolves denned very close to roads. These temporary measures could occasionally continue to be used as necessary in Glacier National Park and may be used elsewhere in northwestern Montana.

M-44s for the control of coyotes cannot be used in areas occupied by wolf populations. There is very limited current use of M-44s on public land in northwestern Montana and there would continue to be very few instances where their use would be affected. There would continue to be restrictions on their use because of wolves under this alternative.

Conclusions – Under this alternative, there would be no land-use restrictions or changes in land use above current levels because of the presence of wolves. Up to 35 square miles may be impacted by land-use restrictions to protect denning wolves outside of Glacier National Park.

Impacts on Visitor Use

Visitors, who favor a return of wolves and who believe that a presence of wolves would improve their outdoor experience, would be denied that experience except in more remote areas of northwestern Montana. Visitors, wishing the opportunity to see or hear wolves, would need to go to these types of areas.

Conclusions – Visitors who favor a return of the wolf would be denied the experience of having wolves except outside of remote areas in northwestern Montana. Backcountry use would change little.

Impacts on Economics

Impact on the Economic Value Associated with Hunter Harvest – Under this alternative, there may be a slight increase in ungulate herds or hunter harvest over current projections. Consequently, there could be a potential economic benefit to hunters associated with wolves being present in remote areas of northwestern Montana.

Economic Impact on Domestic Livestock- Because of the intensive management of wolf populations, there would be some economic benefits, above currently projected levels, associated with reduced wolf predation on livestock in northwestern Montana.

Impact on Visitor Use and Expenditures – The restricted distribution of wolf packs could result in a potential decrease in visitation. Consequently, visitor expenditures may slightly decrease.

Impact on the Existence Value of Wolves – In the absence of wolves in many areas of Montana, there could be a decrease in the existence value of wolves in northwestern Montana compared to current conditions.

Conclusions – The positive and negative economic effects described for other alternatives that result in recovered wolf populations could be similar for northwestern Montana under this alternative. However, the costs are much greater because of the intensive level of management of both wolves and ungulates and the longer time frames required for wolf populations to reach recovery levels.

Environmental Consequences
Alternative 5
Reintroduction of Non-experimental Wolves

Yellowstone

Impacts on Ungulate Populations

Under this alternative, wolves would be reintroduced into several suitable areas in the Yellowstone recovery area and wolves would be fully protected under the ESA. Federal agencies and cooperating state agencies and tribes would implement programs to enhance wolf recovery (see Chapter 2 for specific details). Wolf recovery wold likely be attained by 2000 (7 years), two years sooner than in Alternative 1. Under this alternative, wolf impacts on ungulate populations would be similar to those in Alternative 1 and take place in a shorter time frame. This alternative does not provide for wolf relocation if wildlife management agencies are unable to meet big game management objectives. Therefore, a rare case might exist where wolves may impact some ungulates populations to a greater degree than predicted for Alternative 1.

Conclusions – In this alternative, wolves would be reintroduced into several places throughout the Yellowstone recovery area and wolf recovery would be attained in about the year 2000 (7 years). Wolf predation effects on ungulate populations would be similar to those described in Alternative 1, except the effects would occur sooner. Alternative 5 does not provide for wolf relocation if wolves prevent the states from meeting their big game population objectives. Therefore, a rare case could exist where wolves may reduce an ungulate population more than predicted in Alternative 1.

Impacts on Hunter Harvest

As stated above in Impact on Ungulate Populations, wolves would be reintroduced in several places throughout the Yellowstone recovery area and recovery would be attained in the year 2000. Wolf impacts on hunter harvest would be similar to those described in Alternative 1, except they would occur sooner because of the accelerated pace of wolf reintroduction in Alternative 5.

Hunter harvest of primarily antlerless ungulates (females and young) might be reduced for some ungulate herds. Antlered (males) harvests in most herds should not be affected. This alternative does not provide for wolf relocation if wolves prevent the states from meeting their big game management objectives (hunter harvest). Consequently, a rare case might exist where wolves could affect an ungulate population and associated hunter harvest more than predicted in Alternative 1.

Conclusions – Under this alternative, wolf impacts would likely involve a reduction in hunter harvest of primarily antlerless animals for some herds. Hunter harvest of antlered animals should not be affected. Wolf impacts on hunter harvest would be similar to those described in Alternative 1, except the impacts may occur sooner. Alternative 5 does not provide for wolf relocation and a rare case could exist where wolves affect hunter harvests more than predicted in Alternative 1.

Impacts on Domestic Livestock

Elements of this alternative that will likely influence impacts on domestic livestock include rapid reintroduction of wolves, under the most protective measures of the ESA, wolves will be intensively monitored, dispersing animals will be allowed to establish territories where suitable habitat exists, no control by public agency personnel of any wolves depredating on livestock. Livestock would be removed on public land where conflicts develop, and the public would not be allowed to legally kill wolves that are attacking or killing domestic livestock.

During the first several years, few wolves would be outside of Yellowstone National Park or in areas that contain livestock. Wolves would recolonize the recovery areas, but would also recolonize other areas throughout the northern Rocky Mountains and would be allowed to remain. However, wolves would recover rapidly, likely within 3-10 years.

Because this alternative calls for not control of wolves that depredate on livestock and removal of livestock from public land where conflicts occur, depredations initially would likely be comparable to those described under Alternative 1. However, in the absence of control of depredating wolves, rates on remote areas may be more comparable to those described for the Simonette River, Alberta, experiment; 5-7 times higher for a short period until the conflict was resolved.

Livestock depredation on private land could be a serious problem locally because of less wolf control. This alternative calls for relocation of depredating wolves on private land where chronic problems exist if other methods to resolve problems were unsuccessful. Livestock depredation rates would not be expected to be substantially higher than those experienced in other areas of North America. However, local tolerance would likely be very low and illegal killing wolves would likely be high.

Recovery under this alternative is projected to proceed rapidly and may occur in 5-7 years. As recovery levels are approached and achieved, depredation rates would be expected to become what higher than the range of those seen in other areas of North America because depredation rates in other areas are lower with control of depredating wolves. Wolf depredation on domestic dogs is expected to be very infrequent, but will be emotionally disturbing to some of those affected.

Conclusions – During the first several years livestock losses to wolves would likely be few, if any. Later, the loss rates may be similar to those in northwestern Montana averaging several cattle and sheep per year. However, because livestock operators are not permitted to kill wolves that are killing livestock and agency control would be conducted only on private land that has chronic problems, losses are likely to be higher than under Alternative 1. Losses are estimated to average more than 19 cattle and 68 sheep annually. Wolf depredation on domestic dogs is expected to be very infrequent but will be emotionally disturbing to some of those affected.

Impacts on Land Use

Elements of this alternative that may influence impacts on land use include rapid reintroduction of wolves under the most protective measures of the ESA. Wolves will be intensively monitored, and dispersing animals will be allowed to establish territories where suitable habitat exists. Agencies would control wolves depredating on livestock only on private land with chronic depredations and where other methods of conflict resolution have been unsuccessful. On public land where conflicts develop, livestock would be removed. The public could not legally harass or kill wolves. During the first several years, few animals would be outside of Yellowstone National Park or wilderness areas. Wolves would recolonize the recovery areas, but would also recolonize other areas throughout the northern Rocky Mountains and would be allowed to remain. However, wolves would likely recover within 5-10 years.

Section 7 of the ESA requires agencies to examine their actions and to avoid those that would jeopardize a listed species. If they determine that a proposed action would adversely affect a listed species, they are required to consult with the FWS, who in turn must determine if the proposed action is likely to jeopardize the continued existence of the species. These procedures would apply to the reintroduced population within national parks and national wildlife refuges and to all other federal land and federal actions.

Allocation of land for implementing this alternative in national parks and national wildlife refuges would be greater than those described under Alternative 1. Those would include the construction and maintenance of up to five temporary confinement and release facilities in Yellowstone National Park and the restriction of visitor activity in the vicinity of those facilities. In the short term, visitor access to about 5 mi^2 (13 km^2) around wolf confinement and release facilities would be restricted.

Impacts on activities in national parks and national wildlife refuges would be somewhat greater than those described under Alternative 1. During population establishment, active den sites would be closely monitored. Because of the likely requirement to aggressively protect the first wolves denning in Yellowstone National Park, intrusive activities would be precluded within one mile (1.6 km) of the den sites. This would extend from March 15 to July 1. If most of the territories of the recovering wolf population occurred within the park, restrictions could affect a total of 21-35 mi^2 (54-91 km^2).

On national forests and other public land, impacts on the activities that involve large areas of public land – livestock grazing, timber harvest, and recreation – would be greater than described for any of the other alternatives.

Public land-use limits to protect den areas from March 15 to July 1 would likely not affect initiation of grazing on livestock allotments where the likelihood of conflict was low or there was no history of depredation. However, it is possible that grazing on areas with active den areas or where there has been a history of depredation may be delayed or suspended. This alternative calls for agency control of depredating wolves only on private land and only after other methods have failed and chronic depredations continue. Wolf control guidelines under this alternative preclude capture and relocation or killing wolves prior to August 1. Consequently, on public land allotments where wolves depredate on livestock, the livestock will likely be moved to alternative allotments or out of the area.

Although livestock grazing on public land could be substantially more affected, the effects on timber harvest would probably be very similar to those described for Alternative 1. In other areas where wolves have recolonized, and standards and guidelines to provide for other resources such as ungulate winter ranges and birthing areas have been adequately applied in sale design, there has been little effect on levels and timing of timber harvest. However, if wolf mortality impaired population establishment and recovery because of den site disturbance or illegal killing facilitated by roaded access on public land, road density standards established to limit mortality could limit the area available for timber harvest.

Wolves would be reintroduced to Yellowstone National Park and would be allowed to establish territories in suitable habitat. There is considerable uncertainty about where wolves may establish territories and attempt to den, but under this alternative they would be allowed to remain. This would probably affect recreational use and public access to public land more than Alternative 1.

In northwestern Montana during early stages of population establishment road closures have been extended for short periods of time (2-4 weeks) to provide security to wolf dens close to roads that otherwise would have been opened. No areas have been closed for long periods of time. Effects would increase if disturbance by humans caused wolves to abandon dens resulting in wolf pup mortality, or if illegal killing of wolves, facilitated by public access, resulted in wolf mortality that precluded wolf population recovery. In the absence of these factors, effects on recreational use and public access would likely not be measurable.

Effects on ADC activities would be greater than projected for other alternatives. Techniques such as aerial shooting, trapping, and snaring are used only on a limited bases on public land. Use of these techniques would be limited further or curtailed in areas that are occupied by wolves, particularly during spring and early summer, especially in the area of wolf dens or rendezvous areas. Snaring would likely not be allowed in areas of wolf occupancy because of the risk to non target animals. Trapping is relatively low risk if small traps are used and if traps are checked frequently. Aerial shooting by qualified individuals is relatively low risk but the public controversy often associated with aerial shooting by government employees may limit use in some areas. The use of toxicants is not now authorized on public land in the analysis area. However, future proposed use would likely not be allowed in areas occupied by wolves because label restrictions preclude their use in such areas.

M-44s are primarily used by ADC to control coyotes on private land in response to landowner requests. They may also be used by private landowners on private land after the operator received certification. Use of these devices by both ADC and private applicators would be precluded in areas occupied by wolves. Because of the increased possibility of wolves occupying and remaining in lower elevation areas, including private land, the effects on M-44 use would likely be increased over present use. For example, in northwestern Montana where a population of wolves lives, use of M-44s is not limited where single wolves may range. Rather, where a pack of wolves lives, M-44 use is restricted in the area when wolves are there. Under this alternative, M-44 use would likely be further restricted in areas that contain wolf breeding pairs, persistent use by dispersing animals, or in areas where wolf survival would greatly facilitate recovery.

Conclusions – This alternative would have the most impact on land use. Public use of a total of 5 mi^2 (13 km^2) around release sites would be precluded. Public use and access restrictions around den and rendezvous sites would affect an additional 21-35 mi^2 (54-91 km^2). Livestock grazing on public land allotments could be seasonally delayed or precluded on allotments with active wolf dens or persistent depredation problems. Seasonal access for recreation or resource development activities could be delayed from March 15 to July 1 to protect wolf dens. ADC activities in areas occupied by wolves would be limited to those posing no lethal risk to wolves.

Impacts on Visitor Use

With reintroduction of wolves as an endangered species visitors to Yellowstone National Park and the Yellowstone area will know wolves live there, and will have the opportunity to see or hear wolves, or see their sign and these benefits would accrue slightly faster than Alternative 1. In Denali National Park, Alaska, an estimated 15% of park visitors see wolves (Mech et al. 1991), and the concentrations of wildlife in open areas in Yellowstone National Park are expected to attract wolves to those places (Koth et al. 1990), where they will be observable.

A small percentage of potential backcountry users could be inconvenienced or access precluded by seasonal restrictions in the vicinity of wolf den sites from March 15 to July 1. April-June visitation to Yellowstone makes up 26% of annual park use; April-June backcountry use made up 19.8% of the April-October backcountry-use nights, and involved 1.4% of stock-use nights in 1992. Day use by hikers in Yellowstone National Park could be directed to alternative trails if wolf den restrictions limited use of popular trails – roughly 240 hikers could be so affected.

Of 6,151 commercially outfitted backcountry visitor-use nights recorded in Yellowstone National Park, April-October 1992, none were recorded in April or May, and just 215 in June, representing 3.5% of the April-October total. Stock-use nights for April-May were zero, and June stock-use nights amounted to 1.5% (90 of the April-October total of 6,194). Consequently, little adverse effect is expected on outfitter operations in Yellowstone National Park.

Assuming monthly distribution of general recreational use on the six national forests wold be similar to those of the national parks, comparatively few recreationists would be using the backcountry April-June. Monthly summaries of outfitter use on the national forest were not available, but snowy or muddy trails and high stream levels in higher elevations wold normally prevent much use March-June, when travel might be restricted within one mile (1.6 km) of wolf dens.

Conclusions – Recreational users to Yellowstone would have opportunity to see or hear wolves or see their sign within a decade. A slight increase in visitor use is expected specifically for this purpose once populations have established. A small number of visitors may be limited in using areas near wolf dens from March 15 to July 1 but this represents a small percentage of overall visitation. No change in visitor-use patterns or use by commercial outfitters is projected.

Impacts on Economics

Impacts on the Economic Value Associated with Hunter Harvest – the economic impact of Alternative 5 on hunter harvest in the Yellowstone area is likely to be slightly greater than under Alternative 1, after the population has fully recovered. This economic impact is estimated to be $187,300 to $464,900 annually (Table 4-25).

Economic Impact on Domestic Livestock – It is estimated that livestock depredation under the Alternative 5 could be slightly higher than what was estimated under Alternative 1 (estimated at $1,888-$30,470 with an average of $18,277 annually).

Impact on Visitor Use and Expenditures – It is estimated that visitation to the Yellowstone area will change by the same amount as under Alternative 1.

Impact on the Existence Value of Wolves – Under Alternative 5 it is estimated that the net economic value of wolf existence in the Yellowstone area will be equal to that in Alternative 1 estimated at about $8.3 million per year.

Conclusions – It is estimated that wolf recovery in the Yellowstone area under Alternative 5 will lead to total benefits of $6.67 million-$9.85 million per year and total costs of $2.89 million-$3.20 million per year (Table 4-25). By far, the largest component of total costs would be the wolf management costs of $2.70 million per year (Table 4-25).

Table 4-25
Annual net social benefits associated with wolf recovery in the Yellowstone area under Alternative 5.

	Annual Impact (thousands of 1992 dollars)	
	Low Estimate [c]	High Estimate [c]
(A) Benefits associated with wolf recovery		
Annual net economic value of wolf recovery	6,673.1	9,854.3
(B) Costs associated with wolf recovery		
Foregone value to hunters [a]	187.3	464.9
Value of livestock losses	1.9	30.5
Annual wolf management cost until recovery [b]	2,700.0	2,700.0
Total costs	2,889.2	3,195.4

[a] Lost value to hunters could possibly be overstated as this figure is based on hypothetical willingness to pay and has not been calibrated in any way as have the net economic benefits estimates.
[b] Note that one half of the total management costs of wolf recovery to both the Yellowstone and central Idaho areas are included in the costs associated with this alternative. This cost will only be incurred until wolf recovery is achieved, which varies between alternatives. Other costs and all benefits will continue into perpetuity making annual net benefits significantly higher in many cases once recovery is achieved.
[c] For the benefits estimates, the low and high estimates represent a 95% confidence interval on the estimates of net willingness pay for the alternative. For the individual costs, the low and high estimates represent the best estimates of minimum and maximum costs associated with an alternative.

Central Idaho

Impacts on Ungulate Populations

Impacts of wolves on ungulates under this alternative are expected to be similar to those described under Alternative 1: Reintroduction of Experimental Populations, except that wolves could not be relocated if they were impacting ungulate populations in localized areas, even if this added predation was severely impacting ungulate populations. However, this alternative would provide money annually for enhancement of ungulate populations. Overall, impact on ungulate populations in the primary analysis area is expected to be minimal.

Conclusions – Impact on ungulates is expected to be similar to the impact on ungulates under Alternative 1, except that wolves could not be captured and relocated, even if they were severely impacting certain ungulate populations. Consequently, impact on vulnerable bighorn sheep populations may be more severe than described for Alternative 1. However, habitat enhancement may lessen the impact of wolf predation.

Impacts on Hunter Harvest

To maintain the current population size and continue the current level of bull elk harvest in central Idaho, harvest of cow elk may have to be reduced 10%-15% (same as Alternative 1). A reduction in cow harvest by 10% will allow for predation of 100 wolves, as acceptable bull:cow ration, and an elk population that is increasing faster than the current elk population without wolves (Table 4-11). Enhancement of ungulate habitat may lessen impacts of predation on ungulate populations.

No modifications in harvests of deer, moose, or mountain goats are expected to be required to accommodate for predation by 100 wolves.

Harvest of bighorn sheep rams may have to be reduced or eliminated in areas where herds are being impacted significantly by wolf predation because they are vulnerable on winter range with inadequate escape terrain.

Conclusions – Cow elk harvest may have to be reduced 10%-1% to accommodate predation of 100 wolves, and harvest of bighorn sheep rams may have to be reduced or eliminated for some herds that are particularly vulnerable to predation by wolves while on winter range. No changes in management of harvest for deer, moose, or mountain goats are expected to be necessary.

Impacts on Domestic Livestock

Elements of this alternative that will likely influence impacts on domestic livestock include: (1) rapid reintroduction of wolves under the most protective measures of the ESA, (2) allowing dispersing animals to establish territories where suitable habitat exists, and no control by public agency personnel of any wolves depredating on livestock.

If conflicts with livestock on public land occur, livestock would be removed. Wolves attacking or killing livestock could not be legally be killed. Reintroduced wolves would likely come in contact with livestock within one or two years in central Idaho. Wolves would not only become established in central Idaho, but also on other private and public land throughout Idaho. Recovery is expected by the year 2000.

As wolves approach recovery under Alternative 5, depredation rates on livestock are expected to be higher than under other alternatives. Based on comparison with known depredation rates from Minnesota, Alberta, and Montana, and adjusted because of elements of this alternative, about 14 cattle (range 1-17) and 70 sheep (range 32-92) are expected to be lost annually to wolves in central Idaho. In some years, lack of wolf control and other factors could lead to annual depredation rates higher than 17 cattle and 92 sheep. For some allotments that are very remote, lightly tended, located close to more than one wolf pack, and where there is no wolf control, depredation rates may occasionally approach those observed in the Simonette River experimental area in Alberta, where 39-40 wolves killed or injured 27 cattle in one year (Table 4-1). Removal of livestock from public land where conflicts with wolves occur will partially offset increased depredation rates caused by the absence of legal wolf control under this alternative.

Under this alternative, wolves on private land could be relocated if chronic depredation problems existed and after other methods to resolve problems were unsuccessful. Because management and control options are extremely limited under Alternative 5, local tolerance of wolves would likely be very low and illegal killing of wolves would probably be high.

As in Alternative 2, dispersing wolves would be allowed to stay in areas outside of central Idaho, including both private agricultural lands and public rangelands. Depredations on domestic dogs are expected to be higher under this alternative than any other, although still infrequent. In Minnesota, where about 1,200 wolves lived in a area with 68,000 households, one dog was lost per 22,000 households per year.

Conclusions – The rapid reintroduction of wolves under endangered status in central Idaho will result in the annual loss of about 14 cattle (range 1-17) and 70 sheep (range 32-92). Depredation rates are expected to be higher under this alternative than other alternatives as no wolf control will be implemented. Instead, livestock will be removed from allotments where losses occur.

Impacts on Land Use

Under Alternative 5, wolves would be rapidly reintroduced into Idaho under full protection of the ESA. Wolves would likely recover in central Idaho within 5-10 years.

Wolves would be protected under measures of the ESA. Den site closures from March 15 to July 1 would be in effect. Because wolves would receive all protections of the ESA, Section 7 would apply and would require consultation on all federal activities that may affect wolves. Current direction by the FWS on Section 7 consultations for gray wolves is that “management actions prescribed by the USDA Forest Service, such as timber harvest and road restrictions to protect ungulates and their habitat, adequately protect wolves” (USFWS 1992).

Current restrictions include limiting activities within one mile (1.6 km) of active wolf dens or rendezvous sites from March 15 to July 1, and placing some restrictions on non-selective control methods of ADC within occupied wolf range (USFWS 1992).

Grazing on national forest land may be impacted by wolf presence prior to recovery. Wolf control guidelines under this alternative preclude capture and relocation or killing of wolves or wolf pups prior to August 1. Consequently, livestock on public land allotments where depredations occur will likely be moved to alternative allotments or out of the area.

Impacts from Section 7 consultations would likely be very similar to Alternative 2. In areas where wolves occur and standards and guidelines to provide for other resources such as ungulate winter ranges and birthing areas have been adequately applied in sale design, there should be little effect on levels and timing of timber harvest. However, if wolf population establishment and recovery is impaired by illegal killing, road density standards could be implemented ($\leq$1 mile open road/1 mi^2 habitat; 0.62 km/km2); these could limit the area available for timber harvest and recreational activities.

Impacts on the use of M-44s would initially be greater under this alternative than any other, because rapidly reintroduced wolves would likely move into some areas of private land, and M-44s would be precluded or suspended in those areas. Because wolves would be expected to be recovered sooner under this alternative than for the other 4 alternatives, the impact would likely cover a shorter time.

Other terms and conditions of ADC activities in “occupied wolf range” include: (1) no neck snares can be used, (2) leghold traps must be checked at least once a day, and (3) number 3N or smaller traps should not be used in proximity to occupied dens and rendezvous sites, unless coordinated with the FWS. The requirement to check leghold traps at least once a day may reduce the use of this technique to control coyotes in some areas newly recolonized by wolves.

Conclusions – Reintroduction of non-experimental population of wolves into central Idaho could impact some land uses in central Idaho. One mile (1.6 km) closures around den sites from March 15 to July 1 may have minor impacts on the timing of timber sales or livestock grazing. If illegal killing precludes successful wolf recovery under this alternative, more stringent access related restrictions may be instituted, including road density standards ($\leq$1 mile open road/mi^2 of habitat; 0.62 km/km^2). As “occupied wolf range” expands under this alternative, some ADC activities, including the use of M-44s and leghold traps, will probably be affected.

Impacts on Visitor Use

Implementation of Alternative 5 would lead to the quickest recovery of wolves in central Idaho and would provide the quickest opportunity for visitors to hear and observe wolves or their sign. Overall impacts on visitor use would be similar to Alternative 1.

Impacts on Economics

Impacts on the Economic Value Associated with Hunter Harvest – The economic impact of Alternative 5 on hunter harvest in central Idaho is likely to be slightly higher than under Alternative 1 and is estimated at $756,800 to $1,135,200 (Table 4-26).

Economic Impact on Domestic Livestock – It is estimated that livestock depredation under the Reintroduction of Nonessential Wolves Alternative (Alternative 5) could be slightly higher than under Alternative 1 after recovering populations begin inhabiting central Idaho. This cost is estimated to range from $2,900 to $18,500 annually.

Impact on Visitor Use and Expenditures – It is estimated that visitation to central Idaho will change under Alternative 5 (may increase) and be about the same as under Alternative 1.

Impact on the Existence Value of Wolves – Under the Alternative 5 it is estimated that the net economic value of wolf existence in central Idaho will be equal to that in Alternative 1 at about $6.85 million-$10.01 million annually (Table 4-26).

Conclusions – It is estimated that wolf recovery in central Idaho under Alternative 5 will lead to total benefits of $6.85 million-$10.01 million per year and total costs of $3.46 million-$3.85 million per year (Table 4-26).

Table 4-26
Annual net social benefits associated with wolf recovery in central Idaho under Alternative 5.

	Annual Impact (thousands of 1992 dollars)	
	Low Estimate [c]	High Estimate [c]
(A) Benefits associated with wolf recovery		
Annual net economic value of wolf recovery	6,847.8	10,012.2
(B) Costs associated with wolf recovery		
Foregone value to hunters [a]	756.8	1,135.2
Value of livestock losses	2.9	18.5
Annual wolf management cost until recovery [b]	2,700.0	2,700.0
Total costs	3,459.7	3,853.7

[a] Lost value to hunters could possibly be overstated as this figure is based on hypothetical willingness to pay and has not been calibrated in any way as have the net economic benefits estimates.

[b] Note that one half of the total management costs of wolf recovery to both the Yellowstone and central Idaho areas are included in the costs associated with this alternative. This cost will only be incurred until wolf recovery is achieved, which varies between alternatives. Other costs and all benefits will continue into perpetuity making annual net benefits significantly higher in many cases once recovery is achieved.

[c] For the benefits estimates, the low and high estimates represent a 95% confidence interval on the estimates of net willingness pay for the alternative. For the individual costs, the low and high estimates represent the best estimates of minimum and maximum costs associated with an alternative.

Chapter V

Consultation and Coordination

Consultation and Coordination

Consultation and Coordination of the Proposal

During preparation and development of the proposal, a wide variety of professional contacts were established. Wolf biologists and managers throughout the U.S. and Canada were contracted. Various wolf management plans produced by Canadian and Alaskan natural resource agencies were obtained. During development of the EIS proposal an interagency interdisciplinary team was established, with representatives from various federal agencies, states, and tribes (see List of Preparers). During all EIS team meetings and briefings, discussions were held regarding potential management strategies for wolf restoration and reintroduction. During these meetings and briefings discussion were often around how a wolf restoration plan that both could result in wolf recovery and address the concerns of the various publics could be developed. The ideas, thoughts, data, criticisms, and experiences about wolf reintroduction and the EIS were being sought to try and develop a proposal that could receive concurrence from as many affected parties as possible. This section summarizes the interagency coordination that occurred and was used to develop the proposed action of reintroducing wolves as experimental populations into both Yellowstone National Park and central Idaho.

1989-1992 As part of the Montana Wolf Recovery Program, 268 presentations on wolves were attended by 11,725 people giving biologists an opportunity to hear first-hand the concerns of local residents about wolves and wolf recovery.

May 1991 Several thousand people attended public meetings and hearings about the Wolf Management Committee process and expressed their opinions about wolves and wolf recovery. Several biologists who later became EIS team members were involved in that process.

1991-Weeks of:

12/02 Ed Bangs (FWS and Project Leader), Wayne Brewster (NPS), Kirk Horn (FS) designated agency representatives. Discuss roles with Northern Rocky Mountain Wolf Recovery Coordinator (FWS) Dr. Steven Fritts. Discuss with Montana Dep. Fish, Wildlife & Parks. Weekly and monthly progress reports were prepared for the FWS Regional Director and Director. Quarterly reports were prepared for Congress.

12/09 Meeting with FWS Regional Staff and Christine Turk (NPS) and John Farrell (DOI) to discuss NEPA and legal compliance.

12/16 Meet FWS and NPS in Denver to discuss EIS task directive (plan to develop and schedule draft EIS). Discuss with (FEW) former Project Leader of S. Sea Otter EIS. Initial contact with state resource agencies.

12/23 Draft letter to cooperating federal, state and tribal agencies, and initiate contacts with others with special knowledge or interest in wolf recovery (see list of preparers/formal reviewers, this chapter). These individuals received monthly EIS progress reports, and all EIS scoping documents and reports.

1992-Weeks of:

01/06 Contact states of Montana, Idaho, and Wyoming, private members Wolf Management Committee (4), FWS Grizzly Bear Coordinator, FWS Region 1, Washington, D.C. Public affairs.

01/13 Contact Mexican Wolf Coordinator and Mr. Demarchi (B.C.). 02/03 FS appoints representative (Laird Robinson) for EIS team.

02/17 FWS, NPS, and FS meet to plan issue scoping open houses.

02/24 Yellowstone Park Superintendent briefed.

03/09 EIS team (FWS, NPS, FS, Animal Damage Control, state representatives) meet in Denver.

03/16 Forest Service briefed. Congressional briefing in D.C. Contact made with Montana, Idaho, and Wyoming Congress and Senate state staffs.

03/23 Contact with Montana on state role. FWS offices in affected regions help set up 7 national open houses. Open house news release sent to Montana, Wyoming, Idaho livestock and conservation groups, Congressional offices, followed by phone call. Mailed news release to 212 people per request.
03/30 Idaho legislature passes bill to allow Fish and Gam participation. Congressman Marlenee requests hearings.
04/06 Open houses held. Federal and state agencies participate.
04/13 Issue scoping open house held, 27 in Montana, Wyoming, and Idaho.
04/20 National issue scoping open houses (7) held.
04/27 Meet with FWS regional and Washington, D.C. staffs.
05/11 EIS team meets in Helena to review open houses. Set schedule for alternative scoping hearings. Wyoming and Idaho Cooperative Wildlife Research Units contacted for economic analysis.
05/18 Issue content analysis team begins in Helena.
05/25 Content analysis team finishes analysis and prepares report.
06/01 FWS and Idaho F&G meet with Idaho state legislative Oversight Committee in Boise, Idaho. Montana Coop Unit contacted about economic analysis.
06/08 FWS representatives attend "media" tour in Yellowstone. University of Montana awarded economic contract.
06/22 FWS meets with Univ. of Montana economics team. EIS team, including Wind River Tribes and state representatives meet in Denver to finalize issue scoping report and hearings.
07/13 NPS and FS comments indicate economic analysis on track. FWS meets several private groups in Cody, and Meeteetse, Wyoming.
07/27 Alternative scoping brochure mailed and published in Montana, Wyoming, Idaho Sunday papers (circulation 230,000).
08/03 Alternative scoping open houses begin.
08/10 Alternative scoping open houses (27) completed.
08/17 Six alternative scoping hearings held.
08/24 EIS team members (FWS, NPS, ADC, and Montana, Wyoming, Idaho) attend Second North American Wolf Symposium and meet with other biologists and managers from throughout the world that are working on wold issues and research.
09/28 Alternative scoping content analysis team begins in Missoula. John Farrell (DOI) provides EIS writing training to EIS Team in Yellowstone Park.
10/05 FWS, Idaho F&G, and Univ. of Montana economist meet with Idaho Oversight Committee in Dubois, Idaho.
10/13 Alternative scoping completed.
10/19 EIS team meets in Helena to discuss significant issues, alternative scoping report, and alternatives.
11/02 FWS regional office briefed. Idaho F&G meets with Oversight Committee.
11/09 Greater Yellowstone Coordinating Committee (NPS & FS Supervisors) briefed in Idaho Falls.
11/16 Idaho F&G meets with Oversight Committee. FWS briefs FWS Region 6 project leaders.
11/23 Idaho F&G and ADC give presentation to Idaho stockgrowers. Idaho F&G internal meeting on EIS.
12/07 FWS and Wyoming G&F on TV panel discussing wolves. Idaho F&G meets with Oversight Committee. FWS follows up on complaints that the wolf monitoring program not working in Wyoming or Idaho. Contact state and federal biologists to check with cooperators about monitoring.
12/14 EIS team meets in Denver to discuss alternatives, brief FWS, NPS, ADC Regional Directors.
12/21 FWS briefing to Regional Forest staff in Missoula.

1993-Weeks of:
01/04 FWS brief FS Supervisor Management Team in Missoula.
01/11 Idaho F&G brief Idaho Senate Natural Resources Committee. Dr. Fritts completes

analysis of definition: When does a group of wolves become a “wolf population?”, during which 23 biologists familiar with wolves and genetics provided input. Definition of a wolf population is “2 pair successfully raising at least 2 young for at lest 2 consecutive years in a recovery area.”

01/18 Idaho F&G brief Idaho House Natural Resources Committee. FWS discusses state wolf resolution with Montana Senate Committee.

01/25 EIS writing team meets in Boise, Idaho, to standardize alternatives and impact analysis chapters. Team meets with Idaho Oversight Committee.

02/08 More complaints about wolf monitoring system in Idaho. Contact FWS state office, FS, NPS, states, and FWS Region 1 to ensure monitoring program working.

02/15 Comments received on draft document that requested legal review of draft experimental population rule by DOI Regional Solicitor. Idaho F&G meets internally to discuss impacts to ungulates in Idaho and with Oversight Committee.

02/22 FWS discusses EIS at Montana Wildlife Society meeting in Great Falls.

03/08 Yellowstone Superintendent (NPS) briefed. FWS briefs several Idaho state senators and FWS Region 1 Regional Director in Boise, Idaho.

03/15 FWS and NPS Regional Directors and Regional Solicitors briefed in Denver.

03/22 Dr. Fritts completed analysis of “Whether the 1987 Northern Rocky Mountain Wolf Recovery Plan goal of: 10 breeding pairs of wolves, in each of 3 separate areas (but with some level of interchange), for 3 consecutive years is a viable wolf population” (Yes). He reviewed wolf recovery objectives in all recovery plans in the U.S. and 43 (25 of 43 provided input) biologists familiar with wolves and wolf population biology for their advise.

04/05 Brief Regional Forester and staff in Missoula, Montana. Idaho F&G and FWS discuss wolf issues at Idaho and NW section meetings of The Wildlife Society.

04/12 Review comments on first draft EIS from EIS team members.

04/19 Review revised draft EIS with NPS, FWS, and DOI in Denver.

05/03 Dr. Fritts completed recommendations for wolf reintroduction techniques. Analysis included contacting 56 wolf biologists, captive animal experts, veterinarians, and people with experience with captive wolves or canids.

05/17 Brief FWS Region 1 staff in Portland, Oregon.

05/24 Brief Washington, D.C. staff on DEIS and proposal.

06/15 DEIS completed, approved, and sent to printer for public distribution.

06/15 Invitational letter sent to over 300 groups who might be interested in arranging a talk about the DEIS.

06/21 Director Montana FW&P briefed on DEIS.

06/24 Director Wyoming G&F briefed on DEIS.

06/25 Director Idaho F&G and Idaho legislative Oversight Committee briefed on DEIS.

07/01 DEIS completed, congressional, media, and special interest groups briefings held in Washington, D.C.

07/06 Mass mailing of DEIS and summary begins.

07/18 DEIS summary printed in 6 Montana, Wyoming, and Idaho newspapers (circulation about 280,000).

08/16 Arrangements made to print additional 500 copies of DEIS.

08/17 News release announcing hearings on DEIS mailed.

08/25 Hearings held in Dillon, Missoula, and Bozeman, Montana.

08/31 Hearings held in Couer d’ Alene, Lewiston, and Idaho Falls, Idaho.

09/01 Hearings held in Jackson, Riverton, and Cody, Wyoming.

09/27 Hearings held in Helena, Montana, Cheyenne, Wyoming, and Boise, Idaho.

09/28 Hearings held in Salt Lake City, Utah, Seattle, Washington, and Denver, Colorado.

09/30 Hearing held in Washington, D.C.

10/05 EIS team attends short training course on analysis of public comment by John Farrell (OEA).

10/09 News release announcing close of public comment period on October 15 was mailed.

10/14 Several requests for an extension of the comment period are received, including a request by Congressman Thomas (Wyo.).

10/15 News release and Federal Register Notice prepared and the comment period extended until November 26, 1993.
10/18 Comment and analysis team (37 people) begins in Missoula, Montana.
11/09 Core EIS team meets in Helena to discuss agency comment on FWS's proposal and DEIS.
11/23 News release announces close of public comment period on November 26, 1993.
12/20 Content analysis completed, 160,284 comments received.
01/27 Regional Offices of FWS, NPS, and USDA Forest Service briefed on public comment and modifications on FWS proposal.
02/08 EIS team members meet in Butte, Montana, to discuss direction of FEIS proposal.
02/25 Brief Washington, D.C. staff on FEIS.
04/01 FEIS proposal completed and sent to printer.
04/29 FEIS, including proposal distributed to public.

The Record of Decision can not be approved until 30 days after release of the FEIS. The Record of Decision is the document that determines what course of action will be made regarding wolf recovery in the Yellowstone National Park and central Idaho areas.

Consultation and Coordination In Development of the EIS

Planning for the Reintroduction of wolves into Yellowstone National Park and central Idaho was initiated in November 1991 when Congress directed the FWS to prepare a DEIS. An interagency team (see list of preparers, this chapter) was established during the spring of 1992. During preparation of the DEIS, federal, state, and local agencies, specialist interest groups, and the public were consulted to obtain descriptive information, identify significant issues and effects, and identify effective mitigating measures and reasonable alternatives to the proposal. The first series of 34 public meetings was held by the Service in April 1992 (see public participation section, this chapter). At these meetings the Service presented information about the DEIS process and requested the public to identify issued they believed were important to wolf recovery (see Chapter 1 for discussion of issues). In August 1992, another series of 27 meetings and 6 hearings was held to identify alternatives for wolf reintroduction (see Chapter 2 for discussion of alternatives). The agencies and organizations listed at the end of this "Consultation and Coordination" section was contacted by the FWS during preparation of the DEIS and FEIS.

Summary of Public Involvement

Introduction

This section summarizes the public involvement process (scoping) that was conducted in 1992 to identify issues and alternatives regarding wolf reintroduction into Yellowstone National Park and central Idaho. The section is divided into two parts. The issue section described the process used to identify issues and discusses those issues and how they were addressed in the FEIS. See Chapter 1 for specific information. The second part describes the process used to identify alternatives and discusses those alternatives and how they are used in the FESI. Twelve major alternatives that were identified are listed and discusses. Seven alternatives were addressed through discussions in scoping. Five were chosen to be displayed for detailed analysis in the FEIS. See Chapter 2 for specific information.

Issue Scoping

Issues Scoping Process – The FWS formally began the EIS process on April 3, 1992, by publishing a notice of intent to prepare an Environmental Impact Statement (EIS) in the Federal Register (FR Doc. 92-7681, Vol. 57-No. 65). A few days earlier, on Mach 23, 1992, the FWS has also issued a news release announcing the beginning of the EIS process and the schedule for issue scoping open houses. In late March, a letter and a poster that announced the start of an EIS on wolf reintroduction into Yellowstone National Park and central Idaho requesting public involvement was mailed to approximately 2,500 people and individuals that had either previously expressed an interest or may have had an interest in wolf recovery.

Public issue scoping was the first opportunity for public involvement during this process. The FWS initiated this step by developing and distributing a brochure that detailed the EIS process, background information, issue identified to date, and explained how to become involved in the EIS process. People were asked to identify their issues and concerns related to wolf reintroduction into Yellowstone National Park and central Idaho. On march 31, 1991, this brochure was sent to about 12,000 people who had requested to be placed on the mailing list.

During April 1992, open houses were held in 27 communities in Wyoming, Montana, and Idaho. Seven other open houses were held in cities outside of Wyoming, Montana, and Idaho. The open houses were announced in news releases to the print, radio, and television media in late March. At many open house locations, agency personnel contacted local media immediately prior to the open house to remind the public of the EIS process and open house opportunity. The open houses started at 4:00 p.m. and lasted until 8:00 p.m. At open houses, people could watch a 10-minute issue scoping video about the EIS process, wolf recovery, and how to become involved in the process and could review maps of Idaho and Yellowstone areas. People could talk with representatives of the FWS, National Park Service, Forest Service, Animal Damage Control, and state wildlife management agencies, and ask questions about wolves, wolf recovery, the ESA, and the EIS process. People who attended the open houses received copies of the issue scoping brochure, and posters that requested public involvement in the EIS process, and were encouraged to leave written comments with the agency personnel or mail them later.

Verbal comments or questions were heard and responded to by the agency representatives, but verbal testimony was not formally recorded.

More than 1,730 people attended these open houses, as shown:

	Wyoming		Montana		Idaho
April 6	Jackson Hole (100) Cody (100) Riverton (50)	April 10	Missoula (85) Bozeman (200) Billings (25)	April 9	Couer d' Alene (25) Challis (40) Salmon (60)
April 7	Rock Springs (20) Dubois (20) Pinedale (10)	April 13	Hamilton (75) Red Lodge (20) West Yellowstone (20)	April 15	Lewiston (20) Stanley (15) Idaho Falls (75)
April 8	Casper (35) Cheyenne (25) Thermopolis (6)	April 14	Helena (20) Dillon (120) Gardiner (60)	April 16	Grangeville (50) McCall (20) Boise (25)

National meetings were held:

April 20	Seattle, Washington (60) Anchorage, Alaska (12)
April 21	Salt Lake City, Utah (110)
April 22	Albuquerque, New Mexico (35) St. Paul. Minnesota (60) Denver, Colorado (110)
April 28	Washington, D.C. (30)

Written public comments on issues were solicited at the open houses and through the media. The 45-day issue-scoping comment period ended May 15, 1992. An interagency content analysis team began compiling the public comments on May 18, 1992. Some 1,800 issue scoping forms and 1,900 letters, including eight petitions, were received that identified the issues that people felt should be considered in the DEIS. Comments were received from all fifty states and several foreign counties. The issue scoping content analysis team developed two documents, "Summary of Public Comments on Reintroduction of the Gray Wolf to Yellowstone National Park and central Idaho, May 29, 1992," and "Report for the Fish and Wildlife Service on Gray Wolf EIS Analysis of Public Comments – Comments in Addition to Summary Report."

A summary of these documents "Summary of Public Comments on Reintroduction of the Gray Wolf to Yellowstone National Park and central Idaho, June 1992" was prepared and mailed to approximately 16,000 people who participated in issue scoping or requested to be placed on the EIS mailing list. During alternative scoping in August 1992, many people also commented on issues they believed were important and needed to be considered in wolf reintroduction. All of those issues had been previously identified, but it was apparent from public comment during alternative scoping that the 31 previous issue categories needed to be further refined to fully reflect and address public concerns. Thirty-nine separate wolf reintroduction issues and impacts were finally categorized and addressed in the EIS process. Those 39 separate issues and impacts and concerns were summarized into nine major issue and concern categories that encompassed all significant and relevant issues. Those nine categories were used to display differences between alternatives.

Alternative Scoping

The notification process for public scoping of alternatives began with a Notice of Public Hearings in the Federal Register on June 29, 1992 (FR Doc. 92-15172, Vol. 57, No. 125). On July 8, 1992, people who participated in the issues scoping process in the spring of 1992, along with others who expressed an interest (about 16,000 total) were mailed the "Summary of Public Comments on Reintroduction of the Gray Wolf to Yellowstone National Park and Central Idaho" which contained the schedule for alternative scoping open houses and hearings.

On July 15, 1992, the first news release announcing the alternative scoping open houses and hearings was sent to news media throughout the United States. Over 500 media contacts, including newspapers, and radio and television stations, received the release. On July 31, 1992 another news release was sent announcing the exact dates, locations, and times of the hearings.

In August and September 1992, the FWS asked the public to help identify various ways to address wolf reintroduction. An alternative scoping brochure was developed that provided background information, described five alternatives already identified by the public (No Wolf, Wolf Management Committee, 1987 Wolf Recovery Plan, Natural Recovery, and Accelerated Recovery), and requested the public's help with identifying other wolf reintroduction alternatives. This brochure was mailed on July 30, 1992, to over 20,000 people who had previously requested to be involved in the EIS process. The brochure was also inserted in the August 2, 1992, Sunday edition of six regional newspapers in Wyoming, Montana, and Idaho that had a combined circulation of about 230,000.

Open houses were held in 27 communities in Montana, Idaho, and Wyoming. Each open house started at 4:00 p.m. and ended at 8:00 p.m. The public was invited to watch a 10-minute video and obtain an alternative scoping brochure that provided information about wolves, wolf management, and the EIS process. The public was encouraged to leave or mail in written comments. Verbal comments were not formally recorded. The open house locations and attendance (#) were as follows:

	Wyoming		Montana		Idaho
August 3	Jackson Hole (28) Riverton (28) Dubois (43)	August 6	Billings (12) Bozeman (12) Missoula (20)	August 11	Couer d' Alene (7) Stanley (11) Salmon (17)

August 4	Rock Springs (22) Cheyenne (6) Thermopolis (17)	August 7	Red Lodge (20) Hamilton (?) West Yellowstone (3)	August 12	Lewiston (10) McCall (4) Challis (13)
August 5	Cody (60) Casper (16) Pinedale (8)	August 10	Gardiner (20) Dillon (27) Helena (16)	August 13	Grangeville (12) Boise (20) Idaho Falls (20)

Attendance at alternative scoping open houses in August totaled 228 in Wyoming, 159 in Montana, and 104 in Idaho (total 491).

In addition, six public hears were held where the public could leave written comments and/or give verbal testimony. Sign up to give testimony began at noon. The hearings began at 2:00 p.m. and ended at 10:00 p.m. Congressional and tribal representatives and the Governors of each state were given first opportunity to speak and up to five minutes to present their testimony.

State legislators were giving the next opportunity to speak for three minutes. The general public was given the opportunity to speak for up to three minutes by signing up between noon and 9:00 p.m. for a random drawing that was held hourly. Alternative scoping brochures were provided and everyone was encouraged to leave written comments whether they chose to sign up to testify or not. Everyone who wished to speak had the opportunity to give testimony – every hearing has more times allotted then there were speakers. The hearing locations and approximate attendance (#) were as follows:

August 18	Cheyenne, Wyoming (325 people attended and 121 testified) Helena, Montana (450 people attended and 142 testified) Boise, Idaho (130 people attended and 92 testified)
August 19	Cheyenne, Wyoming (7:00 a.m. until noon because the 18^{th} was primary election day in Wyoming)(9 people attended and 6 testified) Seattle, Washington (45 people attended and 35 testified) Salt Lake City, Utah (400 people attended and 73 testified) Washington, D.C. (75 people attended and 30 testified)

Nearly 5,000 people commented through letters, petitions, or hearing testimony. Responses included 2,450 letters and post cards, 500 statements in hearing transcripts, 17 petitions, and 18 form letters. The petitions included 1,642 signatures and the form letters, 128 signatures. An interagency team was formed to review and analyze the information. Public comments were read and specific comments on alternatives, new alternatives, and issues were identified. These comments were then entered into a compute program for easier sorting and retrieval. A report “Reintroduction of the Gray Wolf: The Public’s Responses to Alternative Scoping” was prepared. The public expressed a wide range of opinions about wolf recovery alternatives. At lest 25 different mixes of the five basic alternatives were identified by the public. In addition to the five draft alternatives the public had previously identified, and numerous modifications or combinations of portions of those alternatives, four other alternatives representing new concepts were recommended.

A summary “Alternative Scoping Report” was mailed to nearly 30,000 people on the EIS mailing list on November 18,1992. The mailing list for the progress planning report in April 1993 included 32,000 addresses representing all 50 states and 40 foreign counties.

Public Review of the DEIS

Solicitation of Public Comment on the DEIS

The public comment process began on July 1, 1993, with a press conference in Washington, D.C. In addition, a news release announcing release of the DEIS and information on the days and locations for opportunities to provide public testimony (hearings) was mailed to over 500 media contacts throughout the United States.

The notice of availability of the DEIS appeared in the Federal Register on July 16, 1993. People who participated in the 1992 issue and alternative development processes, along with others who expressed an interest, were mailed the DEIS summary which included a response form to comment on the DEIS alternatives. Full DEIS documents were mailed to all potentially affected agencies, public libraries, many special interest groups, and to all who requested the complete DEIS. These initial mailings began on July 6, 1993 and because of the volume (1,200 EIS and 42,000 summaries) continued for several weeks. All people who requested a full EIS or summary were provided copies as soon as possible. An additional 500 copies of the DEIS was printed in August 1993 to satisfy the number of requests for it.

In addition, the DEIS summary, a schedule of the hearings, and a request to report wolf sightings was printed in the form of a newspaper flyer and was inserted into the Sunday (July 18 & 25) editions of six major newspapers in Montana (*Bozeman Chronicle* and *Billings Gazette*), Idaho (*Lewiston Tribune* and *Boise Statesman*), and Wyoming (*Casper Star Tribune* and *Cheyenne Eagle Tribune*). These newspapers have a combined circulation estimated at 280,000.

In mid-June 1993, the FWS sent out an invitational letter to over 300 groups, primarily in Montana, Wyoming, and Idaho, that expressed an interest in the Gray Wolf EIS. The letter notified them that a presentation about the DEIS could be arranged for their group if they desired. The presentation was similar to the DEIS briefing that was presented to Congress, special interest group, and the Department of Interior in Washington, D.C., on July 1, 1993. Listed below is a summary of the public meetings that were requested and held in summer-fall 1993.

Date	Group	Location	# Attending
07/07	Defenders of Wildlife	Yellowstone National Park, Wyo.	16
07/11	Meeteessee Multiple Use	Meeteessee, Wyo.	85
07/17	E. Wyo. Resource Providers No-Wolf Option Committee N. Rockies Cons. Coop	Jackson, Wyo.	16
07/19	W. Wyo. Resource Providers Common-Man Inst.	Gillette, Wyo.	12
07/23	Nez Perce	Lawpai, Idaho	8
07/23	General Public	Missoula, Mont.	20
08/11	Optimists	Great Falls, Mont.	16
08/19	Forest Service	Great Falls, Mont.	20
08/23	Rotary	Hamilton, Mont.	23
08/23	Stockgrowers	Hamilton, Mont.	40
08/24	Lions Club	Hamilton, Mont.	20
08/24	General Public	Hamilton, Mont.	40
09/08	Mont. & Idaho USDA ADC	Big Timber, Mont.	85
09/13	Chamber Commerce	Cody, Wyo.	35
09/15	Kiwanis	Hamilton, Mont.	25
09/15	Wolf Ed. & Research	Ketchem, Idaho	50
09/17	History Soc.	Sun River, Mont.	17
09/21	Farm Bureau	Townsend, Mont.	32
09/22	People for West	Bozeman, Mont.	15
09/22	Forest Service	Rexberg, Idaho	25
09/23	Forest Service	Dillon, Mont.	15
09/23	Forest Service	Helena, Mont.	15
10/05	Lions Club	Great Falls, Mont.	20
10/05	Backcountry Horsemen	Ronan, Mont.	40
10/11	Audubon	Great Falls, Mont.	45
10/12	Forest Service	Townsend, Mont.	12
11/15	Soc. Range Mange.	Cody, Wyo.	60
12/09	Montana Stockgrowers	Billings, Mont.	30
12/10	Helena M. School	Helena, Mont.	100

12/14	Idaho Guides	Boise, Idaho	45
12/29	Lions Club	Missoula, Mont.	40

Total of 31 presentations to about 1,022 people. Many of these meetings were covered by local news media.

Hearings

In addition to the July newspaper flyer, news releases announcing the hearing schedules were distributed on August 17 and on August 27. Overall, hearing schedules were well publicized.

Three hearings were held in Montana on August 25. Ed Bangs listened in Dillion; about 25 people attended and 11 testified. In Missoula, Laird Robinson listened; about 120-170 attended and 43 testified. In Bozeman, Joe Fontaine listened; about 100 people attended and 35 testified.

On August 31, three hearings were held in Idaho. In Couer d' Alene, John Rachael (IDF&G) listened; 5 people testified and 19 attended. In Lewiston, Jerome Hansen (IDF&G) listened; 19 people testified and 45-50 attended. In Idaho Falls, Laird Robinson listened; 43 testified and 125-140 attended. Local news coverage was good.

The Wyoming hearings had been scheduled for August 18, but at the request of several groups and senators and a congressman from Wyoming who said they needed more time to prepare, the hearings were rescheduled to follow those in Montana and Idaho. On September 1, three hearings were held in Wyoming. In Jackson, Laird Robinson listened; 76 testified and 150-200 attended. In Riverton, Steve Fritts listened; 32 testified and 45-50 attended. In Cody, Ed Bangs listened; 43 testified and 110-125 attended.

On September 27, public hearings were held in the state capitals of Montana, Idaho, and Wyoming. In Helena, Montana, about 110 people attended and Ed Bangs listened to about 40 people testify. In Boise, Idaho, about 100 people attended and Ted Koch listened to about 54 testify. In Cheyenne, Wyoming, about 150 people attended and Larry Shanks listened to about 87 people testify.

On September 28, hearings were held in Salt Lake City, Utah; Seattle, Washington; and Denver, Colorado. In Salt Lake, 100 people attended and Ed Bangs listened to 51 people testify. In Seattle, about 40 people attended and Steve Fritts listened to about 16 people testify. In Denver, about 120 people attended and Larry Shanks listened to about 75 people testify.

On September 30, the 16th and last in this series of public hearings was held in Washington, D.C. About 80 people attended. Laird Robinson and Ed Bangs listened to about 42 people testify.

Nearly 1,500 people attended and nearly 700 testified at the 16 hearings about the DEIS. All hearings were well covered by the media and all allowed more opportunities to speak than there were speakers. Many people also turned in written statements.

Extension of Public Comment Period

On October 14, 1993, messages, including one from Congressman Thomas (Wyo.), were received requesting an extension of the public comment period (scheduled to end October 15) on the DEIS. Discussions with the content analysis team leaders, EIS team members, and the Regional Office indicated that a month extension would allow the program to still be completed within a reasonable time frame in 1994, although the completion of he FEIS would not occur until April 1994.

On October 15, a Federal Register notice and news release announcing the extension were prepared. Several reporters called and were notified of the extension. Core EIS team members and several special interest groups (both sides) were also notified.

Public Comment on the DEIS

Between July 1 and November 26, 1993, comments on the DEIS were received from over 160,200 individuals, organizations, and government agencies. These comments arrived in over 12,000 letters, resolutions, hearing testimonies, and 52 petitions. Sixty-three form letters were identified. Response were received from all 50 states and several foreign countries. This degree of public response is one of the largest for any federal project in our country, and indicates the strong interest people have in the management of wolves.

A content analysis team prepared a report ("Summary of Public Comments on the Draft Environmental Impact Statement for the Reintroduction of Gray Wolves to Yellowstone National Park and central Idaho," Dec. 1993, 240 pp.) summarizing public responses to the DEIS and the methodology used to analyze public comment. A summary of that report was prepared for the public and was mailed to about 42,000 addresses on the Gray Wolf EIS mailing list in early March 1994.

List of Organizations and Persons Sent the DEIS for Review

Federal Agencies

Copies of the DESI were provided to federal, state, and local agencies, Native American tribes, interest groups, and organizations who may be affected by the final decision and the above list of preparers-reviewers. Copies of the FEIS are being provided to the above organizations and interest groups. For a list of those agencies that responded to the DEOS see Summary of Public Comments on the Draft Environmental Impact Statement (1993) or contract the FWS in Helena, Montana.

Due to the voluminous number of people and organizations on the mailing list, copies of the DEIS have been provided to public libraries in Montana, Wyoming, and Idaho, and in national cities where open houses or public hearings were held in 1992: Salt Lake City, Utah; Denver, Colorado; Albuquerque, New Mexico; St. Paul, Minnesota; Washington, D.C.; Anchorage, Alaska; Seattle, Washington.

Council on Environmental Quality
Information Office

Environmental Protection Agency
Director, Office of Federal Activities

Regional Director, Region 8
Denver, Colorado

Regional Director, Region 10
Seattle, Washington

U.S. Dep. of Agriculture
Secretary of Agriculture

U.S. Dep. of Energy
Animal & Plant Health Inspector Service
Animal Damage Control
    Deputy Administrator
    Regional Director, Western Region
    State Director, Idaho
    State Director, Montana
    State Director, Wyoming

National Park Service
    Office of Director

    Regional Director
    Alaska Region

    Regional Director

Extension Office/Information Office

USDA Forest Service
    Wildlife and Fish Staff
    Regional Forester, Region 1
    Regional Forester, Region 2
    Regional Forester, Region 4
    Regional Forester, Region 6

U.S. Dep. of Energy, Idaho Falls, Idaho

U.S. Dep. of Interior
Secretary of Interior
Office of the Solicitor

Bureau of Indian Affairs
    Office of Director
    Area Director, Billings, Montana

Bureau of Land Management
    Office of Director

Lemhi County Planning & Zoning Comm.
Lemhi Country Courthouse

President
Lewis and Clark State College

President
North Idaho College

Pacific Northwest Region

Regional Director
Rocky Mountain Region

Superintendent
Grand Teton National Park

Superintendent
Yellowstone National Park

United States Fish & Wildlife Service
Office of Director
Regional Director, Region 1
Regional Director, Region 3
Regional Director, Region 6
Regional Director, Region 7
Ecological Services
State Offices Idaho, Montana, Wyoming
Boise, Helena, Cheyenne

State of Idaho
Honorable Cecil Andrus
Governor

Director
Dep. of Commerce

Director
Dep. of Fish and Game

Director
Dep. of State Lands

President
Eastern Idaho Technical College

President
Idaho State University

Director
Dep. of Commerce

Director
Dep. of State Lands & Farm Loan

Director
Game and Fish Dep.

State Planning Coordinator
State Capitol

President
University of Wyoming, Wyoming State Legislature

Native American Tribes Elected Officials

Chairman
Nez Perce Tribal Executive Council
Lapwai, Idaho

Chairman
Couer d'Alene Tribal Council
Plummer, Idaho

Chairman
Blackfeet Tribal Business Council
Browning, Montana

Chairman

President
University of Idaho

State of Montana
Honorable Marc Raciot
Governor

Director
Dep. of Commerce

Director
Dep. of Fish Wildlife & Parks

Director
Dep. of Natural Resources and Conservation

Commissioner
Dep. of State Lands

Director
Montana Dep. of Agriculture

Montana State Library
U.S. & Senate Documents Dep.

President
Montana State University

President
University of Montana

Provost
Western Montana College

State of Wyoming
Honorable Mike Sullivan
Governor

Chairman
Shoshone/Bannock
Fort Hall, Wyo.

Federal Elected Officials

Honorable Larry Craig
U.S. Senate, Idaho

Honorable Dirk Kempthorne
U.S. Senate, Idaho

Honorable Michael Crapo
U.S. House of Representatives, Idaho

Honorable Larry LaRocco
U.S. House of Representatives, Idaho

Honorable Max Baucus
U.S. Senate, Montana

Honorable Conrad Burns
U.S. Senate, Montana

Honorable Pat Williams
U.S. House of Representatives, Montana

Honorable Alan Simpson
U.S. Senate, Wyoming

Honorable Craig Thomas
U.S. House of Representatives, Wyoming

Confederate Salish & Kootenai Tribes
Pablo, Montana

President
Fort Belknap Community Council
Harlem, Montana

Chairman
Fort Peck Executive Board
Poplar, Montana

Chairperson
Little Shell Tribe
Havre, Montana

President
Northern Cheyenne Tribal Council
Lame Deer, Montana

American Sheep Industry
Englewood, Colorado

President
American Sheep Industry Assoc.
Rock Springs, Wyoming

Associate Press
Boise, Idaho

Jack Atcheson & Sons Inc.
Butte, Montana

Backcountry Horseman of Montana
Helena, Montana

Backcountry Horseman of Wyoming
Lander, Wyoming

Beaverhead County Farm Bureau
Dillon, Montana

Billings Gazette
Cody, Wyoming

Blueribbon Coalition
Idaho Falls, Idaho

Casper Star
Laramie, Wyoming

Chamber of Commerce
Campbell County
Gillette, Wyoming

Chamber of Commerce
Gardiner, Montana

Chamber of Commerce
Ketchum-Sun Valley
Sun Valley, Idaho

Chamber of Commerce
Worland, Wyoming

Executive Director
Gem State Hunters Assoc.
Homedale, Idaho

Greater Yellowstone Coalition

Local Elected Officials

Board of County Commissioners
Custer County, Idaho

Board of County Commissioners
Park County
Cody, Wyoming

Idaho County Commissioner

Businesses and Organizations

American Farm Bureau Federation
Washington, D.C.

Colorado Farm Bureau
Denver, Colorado

Chairman
Arapahoe Business Council
Fort Washakie, Wyoming

Common Man Institute
Abundant Wildlife Society
Gillette, Wyoming

Defenders of Wildlife
Washington, D.C.

Defenders of Wildlife
Rocky Mountain Region
Missoula, Montana

Ducks Unlimited
State March Coordinator
Boise, Idaho

Earth First!
Wolf Action Network
Bozeman, Montana

Environmental Defense Fund
Washington, D.C

Environmental Defense Fund
Rocky Mountain Office
Boulder, Colorado

Fishing & Hunting News – Editor
Seattle, Washington

Foundation for North American Wild Sheep
Cody, Wyoming

Executive Director
Friends of the Earth
Washington, D.C

Gallatin Valley Snowmobile Assoc.
Bozeman, Montana

Idaho Woolgrowers Assoc.
Boise, Idaho

Institute for Tourism & Rec. Research
University of Montana

International Assoc. of Fish & Wildlife Agencies
Washington, D.C

International Wolf Center

Bozeman, Montana

Publisher
High Country News
Paonia, Colorado

Humane Society of the U.S
Washington, D.C.

Idaho Cattle Association
Boise, Idaho

Executive Vice President
Idaho Cattle Association
Boise, Idaho

Idaho Conservation League
Ketchum, Idaho

Idaho Conservation League
Sun Valley, Idaho

President
Idaho Farm Bureau
Boise, Idaho

Idaho Field Archery Association
Orofino, Idaho

Idaho Guides & Outfitters

President
Idaho Hunters Association
Homedale, Idaho

President
Idaho Outfitters & Guides Assoc.
Boise, Idaho

Idaho Outfitters & Guides License Board
Boise, Idaho

Idaho State Rifle & Pistol Assoc.
Meridian, Idaho

National Fish & Wildlife Federation
Washington, D.C.

President
National Park
Washington, D.C.

National Parks & Conservation
Rocky Mountain Regional Director
Salt Lake City, Utah

National Trappers Association, Inc
Bloomington, Illinois

National Wildlife Federation
Washington, D.C.

Executive Director
National Wildlife Federation
Central Rocky Mountain Region
Boulder, Colorado

National Wildlife Federation
Northern Rocky Mountain Office
Missoula, Montana

Elk, Minnesota

Mission Wolf
Littleton, Colorado

Director
Montana Department of Agriculture

Montana Farm Bureau

Montana Farmer Stockman

Montana Farmers Union

Montana Guides & Outfitters

Executive Vice President
Montana Stock Growers Assoc.

President
Montana Wildlife Federation

Montana Wool Growers Association

National Assoc. of State Recreation Planners
Atlanta, Georgia

National Audubon Society
Washington, D.C

National Audubon Society
Rocky Mountain Regional Office
Boulder, Colorado

Refuge Manager
National Elk Refuge
Jackson, Wyoming

Northern Plains Resource Council
Billings, Montana

Northern Plains Resource Council
Helena, Montana

Northern Rockies Conservation Cooperative
Jackson, Wyoming

No-Wolf Option Committee
Wapiti, Wyoming

Pheasants Forever, Inc
St. Paul, Minnesota

Post Register
Idaho Falls, Idaho

Powder River Basin Resource Council
Bozeman, Montana

Public Land Access Assoc. Inc.
Bozeman, Montana

President
Putting People First
Washington, D.C.

Refuge Manager
Red Rock Lakes NWF
Lima, Montana

National Wildlife Federation
Regional Director, Wyoming

Native American Fish & Wildlife Society
Broomfield, Colorado

Natural Resources Council of America
Washington, D.C.

The Nature Conservancy
Arlington, Virginia

The Nature Conservancy
Big Sky Director, Montana

Nature Conservancy
Silver Creek Preservation
Picabo, Idaho

North American Wild Sheep Foundation
Boise, Idaho

Sierra Club
Wyoming Chapter

Sierra Club Legal Defense Fund, Inc
San Francisco, California

Jim & Cat Urbigkit
Lander, Wyoming

Voice of the Wolf, Inc
Endangered Species Foundation
Golden, Colorado

Washington Wolf Project
Seattle, Washington

The Wilderness Society
Washington, D.C.

The Wilderness Society
Northern Rockies Regional Office
Bozeman, Montana

The Wilderness Society
Utah Office
Salt Lake City, Utah

Publications Director
Wildlife Management Institute
Washington, D.C.

Chairman
Wildlife Program Environ. Defense Fund
Washington, D.C.

The Wildlife Society
Bethesda, Maryland

Wildlife Society
Idaho Chapter
Boise, Idaho

The Wildlife Society
Northwest Section
Boise, Idaho

Executive Director
Rocky Mountain Elk Foundation
Missoula, Montana

Rocky Mountain News
Denver, Colorado

Chairman
Shoshone Business Council
Fort Washakie, Wyoming
Sierra Club
Northern Plains Regional Rep.
Sheridan, Wyoming

Wildlife Society
Wyoming Chapter

Wild River Multiple Use Advocates
Riverton, Wyoming

Wolf Ecology Project
University of Montana

Wolf Fund
Moose, Wyoming

Wolf Haven
Tenino, Washington

Executive Director
Wolf Recovery Foundation
Boise, Idaho

President
World Wildlife Fund
Washington, D.C.

Executive Vice President
Wyoming farm Bureau Federation

Wyoming Guides & Outfitters

Executive Director
Wyoming Outdoor Council, Inc.

Wyoming Public Lands Council
Casper, Wyoming

Wyoming Stockgrowers

Executive Director
Wyoming Wildlife Federation

Wyoming Woolgrowers Association

President
Wyoming Woolgrowers Assoc.

Yellowstone Association
Yellowstone Park, Wyoming

Because of the voluminous number of people and organizations on the mailing list, not all are listed. A complete list of names (addresses may not be released) is available upon request from the FWS.

Comments and Responses

Introduction

Public review of this document was extensive. Over 12,00 of the 160,284 public comments received were letters. The great bulk of these comments were directed at registering opposition to or support for the reintroduction of wolves in the Yellowstone area and central Idaho. Many comments were essentially votes, and contained a statement of opinion and were not substantive input to correct or improve the content of the EIS or the proposal. Comments that provided substantive input to environmental issues or alternatives or toward improvement of the EIS were in the minority.

Publishing all of this commentary quickly proved unreasonable due to the large volume and lack of usefulness of much of the content in the letters and cards. Therefore, it became necessary to reduce the size of the FEIS. All public comments are, however, on file and open to the public at the FWS Endangered Species Office in Boise, Idaho; Helena, Montana; and Cheyenne, Wyoming.

Published in the FEIS are the letters and responses to federal, state, local government, Indian tribal organizations, and all agencies authorized to develop and enforce environmental standards [NEPA 102(2)(c)]. All of the extensive material and comments from individuals and organizations not published in the FEIS was screened for major issues. Those issues are described and responded to in the section that follows the agency letters. Many issues are not environmental but are responded to anyway.

In addition, 14 letters from the most prominent or most vocal large private organizations representing the diverse points of view and concerns about the proposal are included and responded to in detail as representative examples of the commentary and issues raised by the public at large on both sides of the issue. All other letters are available to the public a the locations previously mentioned. Only in this way could the FEIS be kept at a reasonable size and be responsive to CEQ Rules of reducing unnecessary paperwork (sec. 1500.4(c) CEQ Regulations).

Federal 009424, Bureau of Mines, Oct. 8

1. Thank you for your opinion and observations. The FWS is aware that some people will continue to try to use the high interest and strong symbolism of wolves to achieve other objectives. The FWS is committed to utilizing sound biology regarding the need for any type of land use restrictions that may be required to foster wolf population recovery. Please see Appendix 13 regarding the latest scientific thinking regarding the need for land-use restrictions and wolf population recovery.

Federal 11241, USDA Forest Service, Oct. 21

1. The economic analysis assumed no compensation would be given to livestock producers so it reflects the high range of potential economic impact on the livestock industry. The current private compensation program, operated by the Defenders of Wildlife, has worked effectively in Montana. It is their stated position, that the program would continue until wolves are recovered and removed from the protection of the Endangered Species Act.

2. Wolves, unless they are deliberately killed, are quite compatible with most types of recreational activities. The presence of wolf populations in the central Idaho and Yellowstone areas will likely add to human enjoyment

and attraction to these areas and the small increase in visitation related to the presence of wolves will not compromise the recovery of wolf populations in those areas.

3. The counties in each Primary Analysis Area are listed in the Summary under Location of the Proposed Area.

4. The FWS is the sole lead agency for the EIS. The USDA Forest Service and National Park Service are Cooperating Agencies. Other agencies were asked to participate in the preparation or review of EIS materials but were not designated cooperating agencies.

5. This has been clarified in Chapter 2, Alternative 4. For each alternative, changes in state or federal laws are discussed under the heading *Are changes in current state or federal law required*?

6. M-44s are not a commonly used ADC tool in the affected areas. The FWS has defined occupied wolf range in the FEIS to clarify when and where M-44 use may be affected. Please see Glossary of Terms for definition of occupied wolf range. No significant impact on ADC activities of M-44 use has occurred in northwestern Montana because of wolves and none is expected in either the Yellowstone or central Idaho areas.

7. Background on why the FEIS was directed by Congress is in Chapter 1, Background.

8. The process to delist wolf populations has been added as an appendix (Appendix 11). The analysis of wolf population viability indicates that the wolf population can not be delisted until all 3 recovery areas (northwestern Montana, central Idaho, and Yellowstone) reach 10 breeding wolf pairs for 3 consecutive years. This would constitute a 3 part meta-population of wolves that wold be considered viable and recovered (roughly 300 wolves total). While individual recovery areas could be downlisted to threatened once 10 breeding pairs were established for three years, they could not be delisted at that point.

9. The proposed action is the preferred alternative.

10. An active and scientifically sound education and information program was always assumed to be part of Alternative 1 and that portion of that alternative has been strengthened and emphasized in the FEIS.

11. The recommendation that “land management agencies would be encouraged to implement land use guidelines that enhance ungulate habitat” is not mandatory. The FWS recognized ungulate populations throughout most the areas proposed for wolf population recovery are at high levels and that state, tribal, and federal wildlife management programs are largely responsible for the abundant prey base that makes wolf recovery possible. However, the FWS recognizes that weather or other conditions can change and that continued diligence and management will be required in the future if ungulate populations are to continue providing benefits to humans and a host of predators, including wolves. Close coordination with the states and tribes will be necessary to achieve those objectives.

12. Under the proposal federal agencies, other than national parks and national wildlife refuges, would follow the procedures applicable to a species proposed for listing. That wold consist of “conferring” with the FWS on activities that the agency determined wold jeopardize the continued existence of the species. The conference determination is nonbinding and activities may proceed at the discretion of the federal agency. These complete procedures are contained in the Final Rule (Federal Register Vol. 49, No. 167:3385-33894) and the Section 7 Regulations. Similar procedures would be required for Alternative 4. You are correct that under Alternative 3, Section 7 of the ESA would not apply because wolves would be removed from protection of ESA. Procedures under Alternative 2 and 5 would maintain full application of Section 7 as outlined in the Regulations as for any listed threatened or endangered species.

13. Alternative 1 would require that special federal rules be developed, including further public participation. Any rule would clearly describe wolf management strategies.

14. A section (Appendix 11) has been added to the FEIS describing the delisting process.

15. The experimental boundary areas were not changed to conform with Forest Service management areas. Experimental population areas would be managed under separate special regulations applicable to each area but containing identical provisions as described in the proposed action. Any line describing different management areas will at some point cross different man-made boundaries.

16. The techniques for successfully releasing wolves have been clarified in the FEIS and it is clear that wolf reintroduction techniques may be modified, based upon experience, so they can be most successful.

Whether that means soft or hard releases will be most successful for either central Idaho or Yellowstone remains to be learned. Please see Appendix 4, Synopsis and Perspective.

17. The change is reflected in the FEIS. See Chapter 2, Alternative 1, *Implementing this Alternative would involve.*

18. It is important that investigations of wolf/livestock conflicts be reported quickly and wording in the FEIS reflects this, but the mandatory reporting period remained 24 hours.

19. The FEIS has increased emphasis on public education and law enforcement. The 10% loss to illegal mortality and other causes is a realistic assumption.

20. In Alternative 1, the capture and release of females and their young until October 1 is based upon the experience in 1989 where 2 wolf pups were moved and released in early September but were apparently too young to care for themselves and starved to death. Females with young that attacked livestock again after being released on site would be moved from the area. The purpose of the control program is to minimize livestock loses caused by wolves using the control tools necessary to ensure wolf recovery and stop further livestock losses.

21. Education and law enforcement have been emphasized in the FEIS in chapter 2, Alternative1, Summary.

22. This information is available in *Wolves for Yellowstone?* Vols. I-IV, referenced in the FEIS. This information is not readily available for the central Idaho area.

23. The actual areas where habitat enhancement for the prey base may occur or the specifics of such work would be determined at the local level and by the affected agencies. This type of level of information is at a much finer scale than is needed in this FEIS, which addresses how wolf populations should be managed and recovered.

24. Local support or tolerance of wolves is critical to the long-term success of the proposal. Use or enjoyment of natural resources on public lands are important to local communities both from an economic and social perspective. The FWS's proposal does not impose any different regulations or conditions regarding use of private or public lands than are currently in place for the management of a wide variety of other wildlife species or natural resource conservation programs.

25. Your suggested wording has been added to the FEIS in Chapter 3, Yellowstone: Land-Use Restrictions, National Forests.

26. This information provided in the DEIS is correct and was obtained from a source in “Wolves for Yellowstone? Vol. II” and Idaho Fish and Game progress reports. It should be noted trend counts do not count all the animals in a population and are not population estimates.

27. These changes in timber harvest on the Targhee National Forest do not significantly change the predicted effect of wolf recovery.

28. Thank you.

29. This correction has been made on Figure 3-20.

30. A Glossary of Terms has been added.

31. You suggested wording has been added to the FEIS in Chapter 3.

32. Information from all the studies of livestock losses caused by wolves in North America was used in the analysis. Estimates of potential livestock losses by wolves, on average, are reasonably accurate.

Federal 11215, National Park Service, Oct 15

1. The FEIS reflects a more conservative management strategy in the earlier stages of wolf recovery. Language has been added to the FEIS to address this concern and provide the flexibility that natural

resources managers must have to address unforeseen conflicts with their mandated responsibilities. See Chapter 2, Alternative 1, *Implementing this Alternative would involve.*

2. Because wolves on National Park Service lands would be considered a threatened species, the National Park Service must consult with the FWS on activities that may affect wolf recovery. Control (including harassment) of wolves for livestock depredations in the Park would be allowed only by appropriate government agencies and then on a case-by-case basis with cooperation and approval from the National Park Service. Wolves would not be controlled to reduce predation pressure on ungulate populations in a National Park.

Federal 5804, EPA, Sept. 20

1. The discussion of reintroduction techniques points out the strong advantages of reintroduction to increase genetic diversity of the founding population. Reintroduction can also increase wolf population numbers in each segment of the 3-part meta-population within a similar time frame, which allows more interchange between the segments, thus strengthening overall wolf population viability. Please see Appendix 9.

Federal 010872, BLM, Idaho, Oct 15

1. Thank you for your comments.

Federal 013701, ADC, Nov. 22

1. The measurable effects of the proposed action are believed to occur within the primary analysis area. For the purposes of the experimental population "occupied wolf habitat" has been defined and that definition included in the Glossary of Terms. That definition states that occupied wolf habitat are those areas having confirmed presence of resident breeding packs or pairs of wolves or areas being consistently used by 1 or more wolves over a period of at least 1 month. Application of this definition would occur throughout the experimental population areas. As you are aware, a similar application has been used in northwestern Montana for several years where wolf populations occur. The only limits on ADC activities have been to limit the use of M-44 devices within the territories of wolves that have been documented.

2. The FWS will continue to provide ADC current information on the distribution of wolves. This has been added to the FEIS, Chapter 2, Alternative 1.

3. ADC was an active participant throughout the EIS process and was provided the opportunity to review all DEIS documents. The FEIS correctly states that toxicants that ADC use for predator control (M-44s) are prohibited in areas occupied by wolf populations (see Glossary of Terms for definition of occupied wolf habitat) according to EPA labeling restrictions. You are correct that experimental nonessential populations are considered proposed species outside of national parks and national wildlife refuges. Consequently, for the purposes of Section 7 consultation in the experimental populations areas, ADC would only need to confer on proposed actions that the agency had determined would jeopardize continued existence of the gray wolf. These provisions are contained in the FEIS and will be incorporated into any special regulations developed for an experimental population. The proposal and evaluation of environmental consequences do not propose other restrictions on other types of ADC control methods (see Chapter 1, Alternative 1, and Chapter 4). The FWS proposal does not propose a 24 hour trap check policy as you suggest. The FWS assumed that ADC would continue to use appropriate methods to avoid killing nontarget species, including wolves, when employing potentially lethal control methods.

4. Analysis of ADC operations in Montana indicate that producers personally address 70% of sheep and 97% of cattle losses which are not related to predation. Of the remaining 30% of sheep and 3% of cattle losses producers believed were caused by predators, 89% of sheep and 93% of cattle losses were absorbed without requesting ADC assistance or compensation (Bangs et al. 1994). Analysis indicated that use of M-44s is already very low within the habitat likely to be occupied by wolves in the central Idaho and Yellowstone areas. The presence of wolves in unlikely to have any significant effect on ADC activities.

5. An appendix (11) has been added that discuses the delisting process.

6. Small mammals are a relatively unimportant food source for wolves compared to ungulates.

7. Wolves were one of the most widely distributed land mammals in the world and occurred in every habitat in North American that contained ungulates; the statement that wolves were common is correct. However, while wolves were naturally most abundant where prey was most abundant, the historic abundance at any one location could never be documented or verified.

8. Wolves are very adaptable and will occupy areas where people allow them to live. Wolves will not be confined to Yellowstone National Park. The proposal manages wolves so that conflicts with people are minimized.

9. Humaneness was an issue with the public and FWS policy states animals shall be humanely treated.

10. Designation of wolves reintroduced as experimental nonessential populations and the provisions included in the proposal are directed at increasing management flexibility, reducing adverse effects, and addressing the concerns expressed by state, tribal, and other federal authorities. These measures are specifically included to address the concerns you describe for management of species under full protection of ESA versus experimental nonessential populations. Few is any changes in local land uses were identified, and those that may affect ADC programs are identified in Chapter 2, Alternative 1, and Chapter 4.

11. Wolves will not be confined just to Yellowstone National P ark. The ungulate analysis in the "Wolves for Yellowstone?" reports and the DEIS indicated that there was a year round abundance of ungulates in Yellowstone National Park upon which wolves could feed. In fact, wolf-prey models estimated about 10 wolf-packs could subsist solely on ungulates living on Yellowstone's northern winter rage.

12. The livestock numbers in the DEIS reflect the best information that could be obtained and reflect the differences in livestock numbers between summer and winter seasons.

13. The language in Chapter 3, Animal Damage Control Techniques, regarding animal shooting has been corrected.

14. This has been corrected in Chapter 3 and Chapter 4.

15. We believe as stated that no taking of private lands, as protected by the Constitution, will result from the proposal. It is true that the Defenders of Wildlife has indicated their program will terminate when wolves are delisted. However, at that time management authority will revert to the respective states and the involved states have differing laws and policies regarding payment of compensation for wildlife damage to livestock or other property (see Chapter 3). The FWS is not proposing a federal compensation program for wildlife damage to livestock caused by wolves. Identifying all livestock losses and correctly identifying the predator involved will continue to be a problem. Some livestock losses may occur due to unknown or undetermined causes. This Minnesota example you cite shows that not all losses are detected but data also indicates that some losses initially reported caused by wolves are later determined to have been due to other causes. Information on these various reporting rates from both Minnesota and British Columbia are presented in Chapter 4, Alternative 1, in the FEIS. While some losses will likely go undetected and unreported, the presence of wolves will not significantly affect the overall rate of livestock losses.

State 010371, Montana Dep. FW&P, Oct. 14

1. If the state of Montana wanted to have management responsibility for wolf recovery, regardless if they were designated an experimental populations or not, if could do so under a cooperative agreement with the FWS. Of course any state management program must be within current federal guidelines and regulations regarding wolf management and result in recovery of wolf populations.

2. The alternative you requested called for removal of the wolf from the federal list of threatened or endangered species and management of wolves under state authorities via natural recovery with no reintroductions. Your proposed alternative is discussed in Chapter 1. It was not specifically chosen for detailed analysis but the major provisions of the alternative were included in Alternative 4, the Wolf Management Committee Alternative, and Alternative 2, the Natural Recovery Alternative – The No Action Alternative and the

environmental consequences were displayed in Chapter 4 for each of the alternatives. This alternative was not considered for detailed analysis because: (1) the management concerns described are addressed through the Wolf Management Committee and Natural Recovery Alternatives and the No Wolf Alternative in Wyoming, (2) it would not be consistent with existing federal and some state laws and Congressional direction, (3) the conflicting intent of current state laws and, (4) the uncertain direction, future authorization, and implementation of state laws. Chapter 1 and 2 of the FEIS have been changed to include additional description of Montana's statutory authority regarding management of wolves and other concerns.

3. It is intended that the base funding for wolf recovery be provided to the states as part of the proposed action.

4. The provisions for states assumption of management implementation of the proposal has been further clarified in the FEIS. States are invited and encouraged to prepare wolf management plans for their respective states that are within the management provisions established for each experimental population. The states are further invited to identify the provisions for wolf management that would provide for wolf population recovery in concert with meeting state ungulate management objectives. If state or tribal wolf management programs are within the provisions of the experimental population regulations, cooperative agreements with each state or tribal government would be executed between the U.S. Fish and Wildlife Service and the state or tribal wildlife management agency to implement the management program. Upon achieving the wolf recovery objectives outlined in the proposed action, the U.S. Fish and Wildlife Service would initiate actions to remove the wolf in the northern Rocky Mountains from the federal list of threatened and endangered species and management authority would revert to the respective states and tribes for resident wildlife species. The procedures for "delisting" are described in Appendix 11, which has been added to the FEIS.

5. These conditions have been clarified in Chapter 2, Alternative 1, Summary. Any experimental rule would be very specific describing proposed wolf management and would undergo further public review. Also see Glossary of Terms, Unacceptable Impacts on Ungulate Populations.

6. As requested, the experimental rule boundary was extended north to the Missouri River in central Montana. The Missouri River was chosen because the record of wolf sightings and wolf mortalities indicates that during the last several decades, wolves have occurred (and been killed) north but not south of the river. While the rive may not act as a barrier to wolf movements, current information indicates wolves south of the river would more likely be experimental wolves leaving the Yellowstone area and those north of the river would likely be naturally dispersing wolves from northwestern Montana or Canada.

7. We concur that wolf habitat is large ungulates. The FEIS encourages land management agencies to provide quality ungulate habitat, but the impact of predation by 100 wolves is unlikely to result in a need for widespread ungulate enhancement programs. However, the states could likely reprogram any federal assistance for wolf recovery efforts into any segment of a wolf recovery program they felt was most advantageous, as long as wolf recovery was not compromised.

8. The Alternative 1 budget proposal reflects increased cost for law enforcement, public education, wolf monitoring, and many other aspects of a wolf recovery program. It is unlikely, with thousands of other ungulate predators in the ecosystem, that 100 wolves would require increased monitoring of ungulates above current levels.

State 011338, Wyo. Gov., Oct. 15

Thank you for your comments. The FWS has made adjustments in the proposal in the FEIS to address some of your concerns. The following address specific comments.

1. The provisions for state assumption of management implementation of the proposal has been further clarified in Chapter 2, Alternative 1 of the FEIS. States are invited and encouraged to prepare wolf management plans for their respective states that are within the management provisions established for each experimental population. The states are further invited to identify the provisions for wolf management that would provide for wolf population recovery in concert with meeting state ungulate management objectives. If the state wolf management programs are within the provisions of the experimental population regulations, cooperative agreements with each state or tribal government would be executed between the U.S. Fish and Wildlife Service and the wildlife management agency to implement the management program for management of

wolves outside the national parks and national wildlife refuges. Specific funding commitments would be part of those cooperative agreements.

2. Based upon the public comment on the DEIS, land use restrictions on public land was a major issue. Planned land use restrictions proposed in the FEIS are public access restrictions in the vicinity of confinement facilities within Yellowstone National Park during the period when wolves are confined prior to release. Additionally, intrusive human activity in the vicinity of wolf dens and rendezvous sites during the April 1 to June 30 period may be implemented bases on the determination of federal land management agencies that the activity put wolf pups at risk. These provisions are applicable when there are 5 or fewer breeding pairs in an experimental population area. When there are more than 5 breeding pairs, there would be no land use restrictions for wolves.

3. There is no provision for federal compensation for livestock depredations included in the proposal. Compensation for wolf depredations has been paid by private funding in northwestern Montana. Compensation is paid immediately by the private organization upon confirmation from the FWS that wolves caused livestock depredation.

4. The potential effect of wolf reintroduction on the sport harvest of big game animals in Wyoming has been described in the environmental consequences in Chapter 4. Further, the state has been invited to identify, in the state wolf management plans, those situations where wolf relocation would be required to address the unlikely event of excessive wolf predation on ungulate populations.

5. Upon achieving the wolf recovery objectives outlined in the proposed action, the U.S. Fish and Wildlife Service would initiate actions to remove the wolf in the northern Rocky Mountains from the federal list of threatened and endangered species and management authority would revert to the respective state or tribal government. The procedures for “delisting” are described in Appendix 11, which has been added to the FEIS.

6. The comments and additional concerns of the Wyoming Game and Fish Department, the Wyoming Department of Agriculture, the Wyoming Department of Environmental Quality, the Wyoming water Development Commission, and the Wyoming Department of Commerce, Division of Parks and Cultural Resources are addressed in the following pages and the appropriate changes have been made in the FEIS.

State 300700, Wyo. G&F, Sept. 27

1. The proposal assumed that there would be increased costs associated with control and that the agency responsible for control (ADC, WYG&F, or the tribes) would be compensated for increased management costs. The budget for implementation of Alternative 1 included those expected costs. However, the program did not specifically include compensation to livestock producers since a private program exists and such costs were expected to be minimal. The state should pursue the option of using the private compensation program while wolves are listed.

2. Program costs will shift from wolf reintroduction and protection at the early phases of the program to one of control and population management at recovery levels. The FWS has repeatedly stated that a state regulated public harvest would be relatively inexpensive and would be the likely choice of wildlife management tools to control wolf population numbers and distribution once they are delisted.

3. The concept of a trust fund is a good one and the FWS will assist the states in developing such a fund through the private sector.

4. Thank you for pointing out changes to some big game population units in the primary analysis area. These data were not available when data was being summarized for the DEIS. Data already summarized and available in *Wolves for Yellowstone?* Vol. I was presented to illustrate population trends of major ungulate herds within the primary analysis area. Management objectives, population data, and even the herd units themselves continually change as better information is obtained. For most herds, the updated data you provided shows ungulate populations near or above the levels reported in the DEIS. These new data do not affect the analysis of impacts on ungulate herds and any effects of wolves on ungulate populations would be within the ranges presented.

5. Thank you for the information. This additional information does not affect the analysis of wolf predation on ungulate populations.

6. The Jackson moose population is discussed in Chapter 3, The Affected Environment, and average harvest is presented in Table 3-12. The analysis of wolf predation effects on the Jackson moose population is discussed in Chapter 4, Environmental Consequences, and cited in Boyce and Gaillard's (1992) modeling of wolf predation on ungulates including the Jackson moose herd. Their models suggest a recovered wolf population may decrease the moose population about 7%.

7. The analysis of wolf predation effects on mule deer used previously developed models (referenced in the analysis) to demonstrate the overall impacts a recovered wolf population might have on ungulates in the Yellowstone area. Inclusion of the sub-population of mule deer in the Jackson area into the substantially larger Sublette herd does not change the analysis of effects on deer for the Jackson area. Wolf predation effects (from possibly 1 pack of wolves) on the substantially larger Sublette herd might likely be undetectable or at least lower than the 3% population reduction estimated in the analysis.

8. Wolf predation will not significantly reduce the Jackson and Targhee bighorn sheep herds. As stated in Chapter 4, Environmental Consequences, some bighorn sheep populations were not estimated to be affected by wolves because of the low numbers relative to other prey populations, and their use of escape terrain. Provisions are included in Chapter 2, Alternative 1, allowing movement of wolves having unacceptable impacts on ungulates as defined in state or tribal management plans and approved by the FWS through cooperative agreements.

9. Thank you for the updated information. The updated calf/cow ratios were not available when data was being summarized for the DEIS. Data already summarized and available in *Wolves for Yellowstone?* Vol. II was presented in the DEIS to illustrate population trends of major ungulate herds within the primary analysis area. The updated data you provided does not affect the analysis of wolf effects on elk populations east of Yellowstone National Park.

10. The analysis presented in Chapter 4 showed the effects a recovered wolf population would have on various ungulate populations throughout the primary analysis area. Additional ungulate herds or larger ungulate populations added to the analysis means more ungulates available to wolves and subsequent reduced effects of wolves on those ungulate populations. As stated in the analysis, the FWS recognizes ungulate populations can be quite different from one another in terms of population numbers, hunter harvests, and other physical and biological characteristics. Additionally, the FWS cannot predict exactly where wolf packs may establish territories, thus wolves will not impact all ungulate herds in the primary analysis area. However, the analyses and ranges of impacts presented would apply to most ungulate herds if wolves were associated with them.

11. Thank you for the updated population data. With the conservative population data presented, the analysis of wolf effects on mule deer populations might likely be greater than effects on a larger mule deer population. Indeed, with the much larger mule deer population numbers you provided, wolf predation effects on mule deer herds might be lower than the 3% predicted in Boyce and Gaillard (1992). Also see the response regarding data collection and the overall implications of wolf predation on ungulate populations.

12. Thank you for the update population statistics.

13. From the information available, nearly all elk, deer, and a few moose populations inhabiting areas in or near the Yellowstone National Park have population numbers in excess of several thousand. Also, harvests in many Wyoming herd units averaged hundreds of antlerless animals for elk and deer herds east and south of the park. For the herds having large antlerless harvests, reducing the antlerless harvest might be possible if wolf predation reduced ungulate numbers below objective levels. It is possible wolves could keep very small moose populations at low numbers in combination with severe winters, human harvest, and other factors (i.e., the predator pit theory) and affected the antlered harvest, but moose tend to be more difficult to kill than elk or deer and for areas east of the park, moose will not likely be a primary prey species compared to the more numerous elk and deer populations. Elk and deer because of their relative abundance will probably be the primary prey.

14. The primary analysis area was limited to places where wolves would most likely inhabit and to those ungulates wolves would most likely have impacts on at recovery levels. The FWS cannot predict exactly where wolves might set up territories. However, based on the population sizes of the ungulate herds near Dubois, if 1 pack of wolves lived in this area, it is unlikely the effects would be greater than demonstrated for other herds in the analyses presented. Indeed, with more ungulates available for wolves to prey on, overall impacts to some herds (and to associated hunter harvest) might be less than predicted. Overall impacts would be less because significantly more animals would be available and the impacts would be spread

among more herds. The FWS also recognized wolf predation might severely impact some ungulate herds because of increased vulnerability (i.e., Whiskey Mountain sheep herd) and that wolf presence might inhibit the states and tribes from meeting their wildlife management objectives. The FWS believes the states and tribes are better able to determine those rare instances where wolves might severely impact wildlife populations and the FWS will work closely with those agencies in developing plans that promote wolf recovery and provide flexible management options when state and tribal objectives are being compromised.

15. We generally agree with your statements.

16. The FWS believes that the states are in the best position to determine what constitutes significant impacts or excessive predation to native ungulate populations. The FWS will work closely with the states during development of their state wolf management plans to incorporate state concerns about wolf predation on ungulate populations as long as wolf recovery is clearly not compromised in the process. Lethal control of listed wolves to resolve conflicts with ungulate objectives when 10 or fewer wolf packs are present in a recovery area is not an option the FWS would normally support.

17. The FWS stands by its definition of a viable wolf population being 100 wolves in each of 3 recovery areas, with some movement of wolves between areas for three consecutive years. Please see Glossary of Terms and Appendix 9. One hundred wolves (for 3 consecutive years) solely in the Yellowstone ecosystem could be downlisted to threatened but would not constitute a viable wolf population which could be delisted by itself. The delisting process and criteria have been described in Appendix 11.

18. The proposal in the FEIS has been modified to continue to allow private landowners to kill wolves that are attacking livestock on private land and to harass wolves in an non-injurious manner on private lands. Reporting requirements have been further defined and what constitutes non-injurious harassment has been defined (see Glossary of Terms). Further, killing of wolves by livestock permittees on public land through permit will not be allowed until more than 5 breeding pairs of wolves are in an experimental population area and such permits will not be issued until after ADC and other authorized agencies have been unsuccessful in resolving the depredation problem and depredations continue.

19. These change have been incorporated in the FEIS.

20. This has been clarified in the FEIS Glossary of Terms.

21. The FWS clearly discusses how problem wolves would be managed. See Chapter 2, Alternative 1, Summary and *Implementing this alternative would involve.* We would work closely with the states during the development of any state wolf management plans which could identify how dispersing animals would be managed.

22. See response #20 to the USDA Forest Service comments.

23. This has been added to Alternative 1 in *How does this alternative address the major issues and concerns of the public?* in the FEIS.

State 30068, Wyo. Dep. Agric., Oct. 4

1. The proposed action in the FEIS designates any reintroduced population as experimental nonessential. Provisions are included to provide for livestock owners to kill wolves that are killing livestock, reporting requirements of any killing under these provision are identified, and evidence that wolves were responsible must be confirmed. Private land owners may harass wolves in a non-injurious manner on their land at any time but he harassment must be reported so management agencies are made aware of wolf presence. The public at large is not permitted to kill wolves except in the unlikely circumstance to protect human life.

2. The proposal invites the states and tribes to prepare wolf management plans that are within the framework of the proposal and the experimental population regulations. When these state plans are completed and the FWS determines that they are within the provisions, the FWS will enter into cooperative agreements for the states and tribes to assume implementation of the respective plans. The FWS must retain oversight responsibility until the wolf is removed from the endangered species list.

3. The cost estimates of implementing each alternative are based upon the opinion of wildlife managers who have implemented other wolf management and animal translocation programs. The relative costs of each alternative were provided in Appendix 5 to address a strong public concern about the cost of wolf recovery.

4. The FEUUS discusses how many wolves are needed for a self sustaining population (Appendix 9).

State 30069, Wyo. Dep. Agric. Board Position, Aug. 27, 1992

1. Thank you for your comments. The proposal includes the invitation to each state to develop state wolf management plans. The states and tribes are further invited to identify the provision for wolf management that would provide for wolf population recovery in concert with meeting state and tribal ungulate management objectives. If the wolf management programs are within the provisions of the experimental population regulations, cooperative agreements with each state or tribal government would be executed between the U.S. Fish and Wildlife Service and the state or tribal wildlife management agency to implement the management program for management of wolves outside of national parks and national wildlife refuges. Specific funding commitments would be part of those cooperative agreements. The proposal calls for reintroduction into Yellowstone National Park but all of Wyoming would be included in the experimental population area so that all wolves in Wyoming would be “experimental nonessential” and could be managed under the same rules. While the wolf population would be expected to center in and around Yellowstone National Park, this provides the flexibility for Wyoming to include wolf management provisions in their wolf management plans to address concerns regarding wolf management throughout Wyoming.

2. The FWS proposal allows ranching families and local and state (and tribal) officials a great deal of power and authority to take action on wolves or wolf packs that attack domestic animals or wolf packs that severely impact big game populations. The flexibility already allowed under the ESA for naturally occurring non-experimental wolves has successfully resolves the few conflicts that have occurred between domestic animals and wolves in northwestern Montana. The FWS proposal allows even more flexibility to manage and minimize conflicts.

State 012178, Wyo. State Leg., Oct 14

Thank you for your comments. The proposed action has provision for control of wolves that attack livestock including providing for livestock owners to kill wolves that are killing livestock on private land. Additionally, Wyoming has been invited and encouraged to prepare a state wolf management plan that is within the parameters of the experimental population regulations. The FWS would then enter into a cooperative agreement, including financial support, by which the state could assume management responsibility outside of national parks and national wildlife refuges through the state management plan. However, removal of the wolf from the list of endangered and threatened species prior to achieving recovery objectives is not within FWS authorities.

1. Wolves outside Yellowstone will still be under the authority of the FWS, unless Congress changes the ESA. However, the FWS proposal gives the states much flexibility regarding wolf management outside national parks and wildlife refuges and encourages the states and tribes to implement wolf management policy consistent with federal guidelines.

2. The minimum baseline numbers of wolves that define a viable wolf population have been defined in Appendix 9. Wolf numbers above this level are the responsibility of the states and tribes. The FWS proposal also encourages the states and tribes to develop wolf management plans to define acceptable and unacceptable impacts to game populations.

State 30065, Wyo. Dep. of Environmental Quality, Sept. 7

1. Wild wolves are not a threat to human safety. Stories of wolves attacking children are not verified or documented in North America. Wolves normally prey on wild large ungulates, but will sometimes attack livestock. That is why livestock are defined as domestic large ungulates (cattle, sheep, horses, and mules). In addition the types of wounds on large livestock can be more accurately and conclusively determined to be wolf-caused than wounds on smaller animals. Some of the responses to the DEIS indicated that some people intended to violate or take advantage of any provisions that allowed private take of wolves. For this reason

and others, a fair system must be developed that protects both livestock producers and the taxpayer who is funding wolf recovery efforts. The FWS hopes the states will better define livestock with these criteria in mind. Wolves in northwestern Montana have not attacked domestic animals other than sheep and cattle and 2 dogs. However, the DEIS recognized the local public's concern about control of wolves that attack pets or domestic animals, other than livestock. In the FEIS, wolves that attack such domestic animals twice, instead of three times as stated in the DEIS, will be moved. The public will still be allowed to harass wolves found on private property but such harassment must be non-injurious.

2. Ms. Forselius correctly points out that the $23 million annual increase in visitor expenditures does not match the abstract. The abstract was in error and was corrected.

   Ms. Foreslius correctly points out that there is uncertainty as to the total effects of increased visitation to Yellowstone. It was beyond the scope of our tack to examine the effect of congestion on future visitation increases to Yellowstone. Additionally, we did not examine the limitations which might be presented by the existing roads and facilities in Yellowstone. Rather, as noted in Chapter 4, the analysis states that the numbers presented should be viewed as indicators of the likely direction of change in visitation and expenditures rather than predictions of the percentage change. The best available data indicates that presence of wolves in Yellowstone would lead to an increase in visitation and visitor expenditures.

   The authors recognized that willingness to pay as reported by respondents overstates "true" willingness to "write the check". For this reason a calibration factor was used to scale down stated willingness to pay to "true" willingness to pay. This calibration factor was not based on a sturdy of Yellowstone visitors, as Forselius states, but rather on a study of threatened fisheries in the Big Hole and Yellowstone Rivers in Montana. In this study (funded by the US Environmental Protection Agency) it was found that actual case donations to a fund to lease water rights in order to protect sensitive fisheries were approximately 28% of stated willingness to pay amounts.

   The calculations by Ms. Forselius of her estimated value of ungulates killed by wolves are not obvious to us. The estimates in the Chapter 4 analysis are based on actual anticipated reductions in hunter days and hunter expenditures. These reductions in hunter days are derived from 2 independent assessments of the effect of predation on big game harvests. The assumptions made in estimating reduced benefits to hunters were conservative in that their effect was to overstate the true losses to hunters.

3. The estimates used in the DEIS recognized that people will actually pay less than they offer and this was factored into the economic calculations.

4. The wolf kill rate for the Yellowstone area is 12 ungulates/year/wolf not 120. In Chapter 4 of the DEIS, the potential loss of hunting opportunities could likely be overstated as recognized by the Wyoming Game and Fish Department. The figures in the FEIS reflect the potential effect of a recovered wolf population as accurately as possible and the estimates of the value of lost ungulates of over $1 million are not correct.

State 30066, Water Development Committee, Oct. 1

1. You are correct that Yellowstone National Park has expressed concern on the level of visitation, particularly during the winter season. However, at the present time the National Park Service has established no limit on total visitation nor any seasonal limitations. The FEIS relied on the visitation trends and the economic analysis conducted on likely consequences of having wolves in Yellowstone and central Idaho. The projected trends in Idaho are similar based on independent analysis. The form that future visitation management may take in Yellowstone National Park would be unsubstantiated speculation. Whether this results in any numerical limits, overall annual limits, limits by area, limits by season or other forms is unknown. Current evidence indicates that more people will visit areas with wolves and others will extend an already planned visit. This results in increased economic activity. The economic benefits analyzed are realistic for the foreseeable future.

State 009232, Division Park & Cult., Sept 27

1. Thank you for your comment. Any construction associated with wolf recovery would adhere to proper procedures and regulations.

State 010368, Idaho F&G, Oct. 12

1. The Idaho Fish and Game would need to have regulatory authority to manage wolves before the FWS could consider transferring management to the state.

2. The proposal and the experimental rule has provisions for capture and relocation or removal of problem wolves both within and outside of the central Idaho primary analysis area and outside the Yellowstone primary analysis area. The definition of “problem wolves” has been further defined in Chapter 2, Alternative 1 and in the Glossary of Terms. We would encourage the state to include provisions of addressing problem wolves throughout each of the experimental population areas in Idaho.

3. There is private funding available for confirmed livestock losses. However, the state could certainly reprogram any federal funding received for wolf recovery and management to other priorities they considered more important, so long as recovery activities were not compromised. The FWS intends to fund wolf recovery activities.

4. Although this would be highly unusual occurrence, this statement has been included in Chapter 2, Alternative 1, *Implementing this Alternative would involve.*

5. The criteria have been included as part of the FEIS in Appendix 11.

6. The proposal encourages the states and tribes to prepare wolf recovery plans and enter into cooperative agreements with the FWS, however adequate funding will be subject to interpretation.

7. See definition of livestock in Glossary of Terms which calls for states or tribes to include specific definitions of livestock in their respective plans.

8. The FWS plans to work closely with the state and tribes in the development of their plans.

9. The FWS is willing to work closely with the states to ensure that unacceptable impacts to wild ungulate populations is defined in a manner that protects the states’ interest in maintaining adequate hunting opportunities and the general public’s interest that wolf recovery is not compromised by such management. The FWS believes there is a middle ground which can satisfy both these interests. The FWS believes states are in the best position to define unacceptable impacts to ungulate populations while the FWS is required, at least initially, to determine what may compromise wolf recovery. Public misinformation about the perceived impact of wolves on ungulate populations, compared to mountain lions for instance, will lead to local public pressure to control wolves. Public education and a strong federal oversight on state wolf management plans appears a fair means to ensure both legal authorities are incorporated into the state plans.

10. This concept has been incorporated into Chapter 2, Alternative 1 of the FEIS.

11. See response #7.

12. Federal, state, or tribal agencies conducting wolf reintroduction will consider both soft and hard releases in both areas. Based upon experience, the method that works best will be utilized.

13. We thank the Idaho Wolf EIS Oversight Committee members for their hard work and assistance in providing input into the Gray Wolf EIS process and their help is respectfully acknowledged.

County 012924, Bear Lake County Commissioners, Idaho, Nov. 4

Thank you for your comments.

Response 009432, Star Valley Conservation District, Wyo., Oct. 11

1. Thank you for your comments. You are correct, wolves are not biologically endangered in Alaska and Canada, but wolves in Wyoming, Montana, and Idaho are listed as an endangered species and recovery of viable populations is mandated by federal law. Repeated searches of the Yellowstone and central Idaho areas over the past 20 years have documented occasional lone wolves but no packs have been located.

Senator 11341, Senator Larry Craig, Idaho, Oct. 15

1. Wolves are not a threat to human safety but if they were the ESA already allows take (includes killing) of listed species to protect human life. Additionally, the proposal calls for allowing livestock owners to kill wolves that are killing or maiming livestock on private land and to harass wolves in a non-injurious manner at any time on private land. Harassment for these experimental populations has been defined in the Glossary of Terms.

2. The Glossary of Terms has been included to better define harassment. Livestock owners will be allowed to kill wolves that are killing livestock on private land and harass wolves in a non-injurious manner. The reporting requirement for such actions are described in Chapter 2, Alternative 1.

3. State participation has been encouraged from the beginning of the EIS process. Additionally, the states and tribes are encouraged to develop state or tribal wolf management plans that are within the provisions of the experimental population regulations and to assume management of wolves through cooperative agreements with the FWS.

4. Any federal rulemaking associated with either Alternative 1 or 4 would be conducted within appropriate federal procedures, including public reviews and NEPA procedures.

Tribal 009988, Nez Perce, Oct. 12

1. The Nez Perce tribe's treaty rights have been added to the legal context section in Chapter 1 and the Affected Environment section in Chapter 3, Central Idaho.

2. There have been and will likely continue to be a few naturally dispersing wolves wandering into the central Idaho and Yellowstone areas. In fact, the presence of reintroduced wolves may actually attract and hold some dispersing wolves from northwestern Montana. However, as a practical management strategy, neither the public nor a biologist (after successful reproduction occurred and unmarked wolves become more common) would be able to distinguish the origin of wolves within the experimental area.

3. All appropriate scientific tools will be used to initially monitor wolf population growth and dispersal. Killing wolves will not be taken lightly and would be the last resort to resolving conflicts, particularly during the early stages of population recovery. The FWS intends to work closely with landowners, states, and tribes.

4. This concept of increased education is part of Alternative 1.

5. The FWS has made the commitment to the states and tribes that wolves can be moved if serious impacts are occurring to ungulate populations and encouraged the states and tribe to develop management plans to identified these criteria. While specific funding is not being provided for ungulate enhancement in the FEIS, existing programs on federal lands throughout the wolf recovery areas manage habitat for wild ungulates. Federal funding for wolf recovery efforts could be reprogrammed by the states or tribes as long as wolf recovery was well served.

6. The FWS is committed to financially supporting the wolf recovery process.

7. A Glossary of Terms has been added to the FEIS.

8. See response 1.

9. Thank you, the correction has been made.

10. Humane has been taken from the sentence.

11. Thank you for your interest in being a participant in wolf recovery.

12. The role of the FWS is to recover a viable wolf population. The recovery objective of 10 breeding pairs in each of 3 areas for 3 consecutive years with some level of interchange between the areas (usually a level of one dispersing individual per generation successfully breeding is enough), meets the requirement for wolf population viability (see Appendix 9). The current level of dispersal does not violate the Section 10(j)

amendment of ESA which maintains that "populations must be geographically separate". To the best of our knowledge no population of wolves exists in either central Idaho or Yellowstone.

13. Populations "founders" are the individuals that form the genetic base of a new population. Founders become important because a population begun by only one male and one female wolf is likely to have much less genetic diversity (and hence be much more susceptible to inbreeding problems) than a population begun by 20 males and 20 females.

14. Thank you.

15. Information and education has been emphasized in Alternative 1. Cost estimates are included in Appendix 5.

16. The impact of wolf recovery on state, tribal, and federal authority is discussed in Chapter 1, Issues and Impacts Evaluated in the EIS and will not change tribal legal authorities. The proposed action will not change tribal authorities.

17. Wolves could be moved but not killed to resolve wolf/ungulate conflicts. The FWS encourages the states and tribes to define excessive or unacceptable impacts, keeping in mind the FWS intent for this provision, in the development of the state and tribal management plans. Wolf predation that caused a substantial decrease in an ungulate population and consequently affected hunter harvest rates could be unacceptable, but a simple decline in hunter success rates would not constitute unacceptable impacts that would justify removal of wolves.

18. Provisions have been included in Alternative 1 allowing land management and natural resource agencies to employ, at their discretion, land-use restrictions around sensitive wolf habitat (i.e., dens) when 5 or fewer breeding pairs are in an experimental area.

19. Tribal authorities were included in the sentence. See Appendix 11 for a discussion on the delisting process.

20. The FWS has included the corrections to the FEIS to recognize tribal authorities.

21. This concept has been included in Alternative 1 of the FEIS.

22. The estimated time table and budget for wolf recovery are reasonable scenarios but they are likely not exact. If reintroductions did not begin until 1995 then recovery would likely not occur until 2003.

23. Language regarding inappropriate husbandry has been added to Alternative 1.

24. To date, wolf recovery in northwestern Montana has not caused any land use impacts, thus the costs have not been identified.

25. You are correct, but wolf populations will continue to grow until something (usually human-caused mortality) stops it. You are correct that Alternative 2 has a higher potential for wolf conflict with livestock than Alternative 1. Wolf population growth in northwestern Montana is likely to continue as wolf populations in Idaho are establishing themselves. This would be followed by similar patterns in the Yellowstone and likely other areas. A major factor with this alternative is the length of time it would take to reach recovery and the uncertainty of how it would progress.

26. The FWS invited all the tribes in the potentially affected areas to participate at the beginning of the EIS process, this offer included funding for travel to EIS team meetings. Only the Wind River Tribes and Nez Perce chose to become actively involved at this time.

27. Alternative 4 was proposed in the DEIS just as it was presented to Congress in 1991.

28. The tribes treaty rights have been added to the FEIS and discussed in Chapter 3, Central Idaho: The Region. A map showing the approximate boundary of the ceded area is in Figure 3-23.

29. The primary analysis area in central Idaho generally consists of the Forest Service lands. Nez Perce ceded lands have been included in Figure 3-23. The Nez Perce Reservation is shown on Figures 3-22 and 3-23. Description of the affected environment (Chapter 3, Central Idaho: The Region) has been expanded to incorporate description of Nez Perce treaty provision and resources and other comments. Land ownership

and management jurisdiction and direction area displayed in Table 3-46 and in the text in Chapter 3, Description of the Affected Environment, Central Idaho.

30. The following sentence has been added to the end of the second paragraph in the Wildlife section of the central Idaho portion of Chapter 3, Affected Environment: “The Nez Perce Tribe is guaranteed by the Treaty of 1855 the privilege of hunting on open and unclaimed federal land within their ceded area.”

31. Estimates of bull:cow ratios in central Idaho big game management units vary from 10 bulls:100 cows to 81 bulls:100 cows, but among all units the ratio averages 25 bulls:100 cows.

    Estimates of cow:calf ratios during late winter surveys ranged from 15 calves:100 cows to 68 calves:100 cows. The calf:cow ratio combined among all central Idaho units is 35 calves:100 cows.

    Although it is impossible to predict exact impacts on individual management units without knowing for certain exactly where, and at what density, wolf packs will establish, some management units with lower bull:cow and calf:cow ratios may be more susceptible to significant impacts than other units. Over all of the units in the central Idaho area, impacts are projected to be as described in Chapter 4, Environmental Consequence, Central Idaho, Impacts on Ungulate Populations section in the EIS.

32. We did not intend to imply that state-regulated harvest is the only legitimate harvest of moose, or that tribal harvest of moose is inappropriate in any way. We apologize that this section might have been interpreted this way.

    The last 2 sentences of the second paragraph under Chapter 3, Central Idaho: Ungulate Populations and Hunter Harvest, Moose, Hunting seasons and harvest have been deleted. The paragraph has been changed and now reads: “In 1991, 149 of 185 state permittees in central Idaho management units killed a bull moose (Table 3-4). About 8.1% of the pre-hunting season moose population was harvested by controlled-hunt permittees. Tribal hunters were documented to have harvested at least 14 moose under treaty rights. In addition to moose harvested legally by state and tribal hunters, 18 moose were known to be killed illegally, and 3 moose were killed by automobiles (Table 3-49).”

33. One ram was know to be harvested by a tribal member under treaty rights, but Idaho Fish and Game mangers and conservation officers strongly believe that more were harvested in the central Idaho area. Consequently, Idaho Fish and Game believes it is more accurate to say “at least one” was harvested than it wold be to make the assertion that “one” was harvested. It is not, in any way, out intention to imply that harvest of bighorn sheep by tribal members under treaty rights is any less legitimate than harvest of bighorn sheep by state permittees.

34. The FWS believes few restrictions are likely to be necessary to promote wolf recovery. Currently, if wolves are present in an area, the FWS may implement restrictions to promote recovery if necessary. Those few restrictions that may be necessary include restricting activities around den or rendezvous sites or placing restrictions on nonselective control methods.

35. M-44s are a very effective tool for controlling coyotes. It is reasonable to speculate that if use of M-44s was restricted in an area for a prolonged period and other control methods were not intensified to compensate, the coyote population, and consequently predation by coyotes, may increase. However, as indicated in the DEIS, M-44s are currently used in relatively few areas in central Idaho. Any increase in coyote predation because of restrictions on use of M-44s is expected to be minor.

    Although not infallible by any means, leg-hold traps can be quite selective when used by experienced professionals. Careful selection of trap size, set design, trap placement, lure, and adjustment of pan tension greatly reduces capture of non-target species. As indicated in the DEIS, the FWS noted in it Biological Opinion on ADC’s control program that number 3N or smaller traps may pose a threat to juvenile gray wolves and should not be used in proximity to occupied dens and rendezvous sites. Judicious selection of trap size (e.g., Victor #1.75 double coil-spring) and placement (i.e., outside occupied denning and rendezvous areas) will dramatically decrease the likelihood of injuring wolves during coyote control efforts. The size of leg hold traps (#3 or smaller) used for coyotes are unlikely to catch or hold adult wolves which have much larger feet.

    Shooting can be nonselective if the shooter is not 100% sure of their target. Shooters should always be 100% sure of their target. All ADC personnel involved with coyote depredation control efforts in areas occupied by wolves will be trained in wolf identification.

36. Tribal biologists should have been included in the definition of “occupied wolf range” in the FWS’s 1992 biological opinion. Unfortunately, they were not. This paragraph merely restates the definition of “occupied wolf range” as it appeared in that biological opinion.

37. As stated in Chapter 4, Central Idaho, Impacts on Ungulate Populations, Elk, the number of wounded animals available during and after hunting season would likely result in a reduction of wolf predation on healthy big game animals during this time.

38. Thank you. The sentence in Chapter 4, Central Idaho, Impacts on Domestic Livestock has been changed to read: “Wolves would be released in central Idaho in areas that have a low density of livestock.”

39. The sentence has been changed to read: “Upon recovery, wolves would be removed from the ESA, and the state of Idaho and the tribes would manage wolves as agreed in a Memorandum of Agreement between the state and tribes.”

40. It is true that the general taxpayer dollars funding wolf recovery activities would be spend and would benefit people living in the central Idaho and Yellowstone areas. However, this spending is simple a redistribution of general tax dollars into specific programs and is not viewed as an economic benefit but as a cost to the general public.

Tribal 50450, Nez Perce Testimony

Thank you for these comments. All the issues were addressed in the responses to the written comments provided by the Nez Perce Tribe.

Tribal 50415, Blackfeet Tribe

1. Thank you for your comments. The participation and support of the Blackfeet Nation is appreciated and has greatly contributed to the success of wolf recovery in northwestern Montana.

   The FWS recognizes that wolves are considered a special or sacred animal to some native American tribes. Please see Chapter 1, Issues Addressed in Alternatives, Spiritual and Cultural Values.

Canada 6762, F&W Serv., Sept. 24

1. The respective states and tribes would determine how many wolves would exist in each recovery area above the minimum number required for a viable wolf population.

2. The FWS has legal responsibilities for wolf recovery but is unequivocal in its desire to support wolf recovery and management actions by the states and tribes, if they choose to do so. The transfer of management authority would be through approved state and tribal wolf management plans and cooperative agreements with the FWS.

3. Until a Record of Decision is approved, the FWS cannot have detailed discussions with Canadian authorities regarding donor wolf populations. The FWS has informally discussed these matters with representatives of wildlife management agencies in both British Columbia and Alberta and indicate the desire for help from Canadian authorities in selection areas to obtain wolves These provinces have indicated they would consider being a source of wolves for any reintroductions into the western U.S.

4. The range of livestock losses presented in the analysis covers any animals “lost” to wounding. The loss estimates provided in the analysis do not include the economic effect of the private compensation program.

5. The FWS does not plan to reintroduce wolves in northwestern Montana because the population, which started as a result of natural dispersal from Canada, is growing at about 22%/year and now numbers about 65 individuals.

6. Thank you. Wording in Appendix 2 has been changed.

Representative Craig Thomas Testimony, Wyoming

1. The FWS is mandated under the Endangered Species Act, as are all other federal agencies, to promote and provide for the recovery of threatened and endangered species. The FWS is the primary agency responsible for developing plans designed to recover threatened and endangered species. The proposal in this FEIS provides an opportunity to recovery wolves in the northern Rocky Mountains and ultimately remove them from the list of threatened and endangered species. The proposal also provides for more flexible management of wolves to promote their recovery.

2. In the analysis of wolf impacts on livestock in Chapter 4. A recovered wolf population (about 100 wolves) is expected to kill about 1-13 cattle and 38-68 sheep annually in the Yellowstone area and about 1-17 cattle and 32-92 sheep in central Idaho (Chapter 4, Alternative 1, Impacts on Domestic Livestock). Livestock losses to wolves are not expected to comprise more than 0.1% of any livestock class in the Yellowstone and central Idaho primary analysis areas considered for wolf recovery. Prior to wolf recovery livestock losses are expected to be less. Control provisions are part of the proposal because wolves are expected to occur outside of Yellowstone National Park and that some livestock depredations will occur.

3. You are correct in stating wolf sightings have occurred in Yellowstone National Park in recent years. One canid suspected to be a wild wolf was filmed in Yellowstone and 1 wolf was killed just south of the park in 1992. Evidence suggests individual and lone wolves have occurred throughout the Yellowstone area for decades. However, no breeding or reproducing pairs or packs of wolves have been confirmed in the Yellowstone or central Idaho areas. (Please see Appendix 12 for additional information.)

Wyoming Director of Agriculture

Thank you for your comments.

Supervisor, Cody Conservation District Board

Thank you for your comments.

013699, Senator Frank Murkowski, Alaska, Nov. 10

Thank you for your comments.

1. The entire wolf reintroduction and recovery program in both Yellowstone National Park and central Idaho, including reintroduction, education, law enforcement, control, planning, and monitoring is projected to cost a total of about $6,000,000. This level of funding covers both areas from 1994 to 2002. The actual cost of obtaining and transporting wolves for reintroduction is only a fraction of those costs. The majority of costs associated with obtaining wolves for reintroduction, regardless of where they come from, would involve the expenses and equipment of American (possibly state, tribal, and federal) biologists to the release and post release monitoring sites. Obtaining wolves from Alaska would likely involve more cost than from western Canada because of the greater distances involved from transporting both staff and wolves.

2. The best scientific techniques to conduct wolf reintroduction, including where any donor wolves would come from, was thoroughly investigated. Extraordinary efforts were taken to involve the public and professional wildlife biologists in the preparation of the EIS including professionals involved with management of wolves and other wildlife species in Alaska.

3. During the initial phases, a wide variety of natural resource agencies were contacted to provide technical review and comment. One of the agencies contracted was the Alaska Department of Fish and Game. Dave Kellyhouse, Director Wildlife Conservation, agreed to help review drafts and has received monthly updates

about its development. Several biologists who had experience with wolf management and research in Alaska were contracted at various times throughout the process so their technical expertise could be utilized.

During the spring of 1992, 27 open houses were held in Wyoming, Montana, and Idaho, and 7 other open houses in other parts of the United States to inform the public about the program and solicit ideas that should be considered in the EIS. On April 20, 1992, an open house was held in Anchorage, Alaska. The concept of how wolves would be reintroduced and where they would come from was one of the ideas that was discussed.

Because of the numerous public comments related to wolf reintroduction techniques, Dr. Steven Fritts, the scientific advisor for the Team, developed a peer reviewed section to address those types of technical issues (Appendix 4). As part of that effort, the question of where reintroduced wolves should come from was asked of 56 biologists (including several from Alaska) familiar with the behavior of wolves both in the wild and captivity. That opinion suggested that the greatest chance for successful reintroduction included using wolves from areas most like Yellowstone National Park and central Idaho. Experts believed that it was important to use wolves that were familiar with mountainous areas and that preyed on elk and deer (and possibly bison). Wolves from British Columbia and Alberta would be most genetically similar to those now recolonizing northwestern Montana and would be most likely to quickly adapt to the climate, terrain, prey, and other conditions in the Yellowstone and central Idaho areas.

4. While it is certainly possible that wild wolves from Alaska or in the eastern U.S. and Canada or even captive wolves might be successfully used for any potential wolf reintroduction in the Yellowstone or central Idaho area, the greatest chance for success appeared to involve using wolves from Alberta or British Columbia. The experts contacted to help develop the reintroduction technique proposed in the DEIS (including the source of reintroduced wolves) were contacted again to seek broader consensus on the methods that offer the greatest chance for a successful reintroduction of wolves. The potential sources of any reintroduced wolves is a topic for discussion in the final EIS. Based upon the expert comment analyzed to date, it is doubtful that wolves from Alaska would be the first choice of donor stock from a biological perspective.

Responses to Major Issues Raised About the DEIS

This section responds to the significant issues addresses by the public in their comments on the DEIS "The reintroduction of gray wolves to Yellowstone National Park and central Idaho." A detailed summary of 160,284 comments was prepared in December 1993 and this discussion follows the format in that document (U.S. Fish and Wildlife Service, Summary of Public Comments on the Draft Environmental Impact Statement for the Reintroduction of Gray Wolves to Yellowstone National Park and central Idaho, December 1993, 240pp.)

The major issues of public review which were raised are identified below and response provided on each issue. Issues that were interrelated were grouped and discussed together. A few were actually parts or subissues of major issues and although comments were identified in each "subissue," they were sometimes combined under one issue in this report. Issues that received the most comments from respondents were "Want Fully Endangered Status," "Cost of the Program to Taxpayers," "Wolf is the Missing Component of the Ecosystem," "Strategies to Control Wolves," "Federal, State, Local, & Tribal Authority," "Effect of Wolf on Livestock and Pets," "Compensation for Livestock Killed," "Regulated Public Take," "Restrictions on Public Lands," and "Need for Education." The responses to issues in this section serve as a supplement to the discussions in Chapter 1 regarding issues. The FWS found few instances where changes were required in its earlier discussions of the issues identified during public scoping.

The National Environmental Policy Act Process and Public Involvement

1. *Voting* – Respondents were overwhelmingly impressed with the amount of public involvement that has gone into this project. Not all felt their side was treated equally and the comments varied widely. Most of those favoring Alternative 1 felt the process treated them fairly and those favoring Alternative 3 felt the public involvement efforts focused too much on "outside" influence over what they viewed as a local issue. Numerous residents of the states involved commented that they distrusted the process as it reflects a popularity vote for the wolf. They were especially concerned that questionnaires and petitions were passed out to Yellowstone National Park visitors, including young children. They felt that this was inappropriate and would swing the "vote" to favor reintroduction. Likewise, most of these same interests supported putting the issue up for vote within the States involved. The comments focused heavily on the numbers of each particular side and what that might mean to the FWS analysis of public opinion.

   > "The … (DEIS) exhibits excellence in biological and socioeconomic assessment, and the DEIS process has been exemplary in its attention to public involvement."

   > "I want a vote on each state ballot to decide this issue – put the results into the EIS."

   Response – The process of analyzing public comment required under the National Environmental Policy Act (NEPA) is not a voting process. Totaling the number of comments on a specific alternative or issue was not the principal objective and was therefor relatively unimportant to preparation of the FEIS. Substantive comments that improved the FEIS, the proposal, corrected errors, or identified omissions, and clarified the FEIS for use by a decision maker were the key objectives in analyzing public comment.

2. *Hearings* – Several people commented on the hearing process and how that might be handled differently in the future. Several residents criticized the day of the week their particular hearing was held and how that affected them personally. Residents were also vocal about "outsiders" jetting in to the hearing and jetting back out again and that speaking preference should be given to locals first.

   > "Every time you plan a public meeting you plan it during the middle of the week and the middle of the day so that nobody can comment on it."

Response – Hearings on the DEIS were conducted in a manner (random drawing from 2 to 10 p.m.) and at a large number of locations to encourage public comment and give as many people as possible the same opportunity to comment. Testimony and written comments were treated the same way in the analysis process; one method of comment did not carry more weight than another.

3. *Preparation of the DEIS* – Several respondents commented on the process used to prepare the DEIS. The comments ranged from overwhelming support to total distrust of the public involvement process. Several people complimented the FWS and particularly Project Leader Ed Bangs for the outstanding job of public involvement and the professionalism of the document. Several commented favorably on the readability of the Summary, on the clarity of the document, and the clear comparison of the alternatives chart. Others believed the document and particularly Ed Bangs were biased and did not reflect sound scientific analysis.

   "We commend the U.S. Fish & Wildlife Service for its work on the DEIS, and on the various associated studied. We are also very encouraged by the open and well-organized public involvement process. Overall, we think the agency has done an excellent job under very difficult circumstances."

   Response – The DEIS was prepared by an interagency interdisciplinary team that followed NEPA procedures. Every attempt was made to conduct a fair and unbiased analysis. See Chapter 5 for a List of Preparers.

4. *State management plans* – Numerous respondents said they could support wolf reintroduction and the proposed alternative as long as the public is given the opportunity to comment on the state management plans during the rule-making process.

   "It is essential that plans be provided for public review and comment and that the conditions for transferring management authority be clearly spelled out."

   Response – The FWS has encouraged the states and tribes to develop wolf management plans utilizing state wildlife management planning and public involvement. Any state or tribal plan that is clearly within the guidelines of the FWS proposal and experimental rule (which will be available for national public review) could be adopted by the FWS by cooperative agreements. However, if state or tribal plans contain management strategies that the FWS determines are outside the provisions of the proposal or experimental rule, a modification of the rule would be required and this rule would be available for comment by the national public.

5. *Time Table for Recovery* – Several people felt the FWS should develop a strict timetable for recovery.

   "To some opponents of wolf reintroduction, delay is equated with winning and a hope that this program will lose momentum. The DEIS should commit to a specific time-table for completion of the final EIS and reintroduction…"

   Response – The FWS has set a fairly rigid time table for wolf recovery with clear and measurable targets. See Alternative 1, the proposed action.

6. *Consultation With Other Agencies, Landowners* – Several example were provided on how people believed the DEIS did not comply with NEPA, and there were also respondents who felt that the DEIS and public involvement process went well beyond the requirements of NEPA.

   "…without knowledge of: 91) the number of gray wolves to be released; or (2) the management restrictions to be imposed once the gray wolves are released, the Fish & Wildlife Service could not consider, much less adequately consider, any of the environmental impacts of the Proposed Alternative. Thus, any decision to implement the Proposed Alternative based upon the DEIS will violate the NEPA. Only after the Fish & Wildlife Service promulgates the special regulations can they adequately consider the environmental impacts of the Proposed Alternative."

Response – The EIS complied with NEPA procedures and was listed in the federal register in the category (LO) Lack of Objectives, which means the review by EPA did not identify potential environmental impacts requiring substantive changes to the proposal. An experimental rule would be required to implement the FWS proposal but this rule was fully discussed in the EIS and would not require further NEPA analysis. The amount of public notification and participation in the EIS was extraordinary. See Chapter 5 for more information.

7. *Compliance with other laws* – Some respondents believed the FWS did not comply with the FWS regulation 17.81(d) and felt that should have been addressed in the DEIS. They felt agreements should be signed by the government and the affected persons holding an interest in land, on whether the latter agrees with wolf reintroduction.

   "17.81(d): The Fish and Wildlife Service shall consult with appropriate State fish and wildlife agencies, local governmental entities, affected Federal agencies, and affected private landowners in developing and implementing experimental population rules…I have private property rights in Idaho, Valley, and Custer counties but I have received no inquiry about my agreement nor has my County commissioners or land-use committee that I know of."

   Response – The FWS widely publicized the EIS process and attempted to contact and work with the public and all potentially affected government agencies. The agreement of those entities with the Service proposal is desirable but not required. The EIS complies with applicable federal laws and regulations.

8. *Evaluation of Public Comments* – Numerous respondents commented on whether their letter or comment would make a difference and that the evaluation of public comments needs to be conducted by an impartial, interdisciplinary team.

   "The evaluation of public input should be done by a truly interdisciplinary team. Not a bunch of biologists, but by a truly mixed group. The scientific evidence should be carefully scrutinized, together with all of the social and economic impacts of wolf recovery. Perhaps the FWS shouldn't even do it, but should turn it over to a group of non-government scientists, not government scientists, for a thorough and unbiased evaluation."

   Response – The analysis of public comment during scoping and the DEIS review process was conducted by a team of specialists containing few biologists. The EIS was prepared by a diverse team with interdisciplinary expertise (see List of Preparers in Chapter 5).

General Comments on the DEIS

Many respondents voiced concerns and raised questions on the DEIS in general. Some brought out points on definitions and terminology. Others raised specific questions that the DESI did not address. The concern that public education was not incorporated appeared frequently. Several were disappointed that issues they raised during the scoping process were not addressed in the DEIS, and some felt there were alternatives presented during scoping that should have been brought forward. There were comments raised on the timeframes for the DEIS and how long the process is taking. Some people felt too much time has been spend on this process and others felt further analysis is necessary.

1. *Definitions / Terminology*

   "The Idaho chapter of the Wildlife Society suggests that DEIS terminology be clarified regarding 'unacceptable impacts on ungulate populations' and 'chronic problem wolves.' The former should specify levels of depredation and ungulate density likely to be considered unacceptable.

> For chronic problem wolves, incident recurrence intervals and procedures for individual wolf identification must be specified."

Response – A glossary of terms has been added to the FEIS.

2. *Issues Not Analyzed in the DEIS*

   Response – The DEIS considered all issues identified in the public scoping process and not reasons were identified to change that initial analysis (see Chapter 1). The impact of the proposal on woodland caribou and other listed species was specifically addressed in the FWS interagency consultation (Appendix 7).

3. *Other comments on the DEIS.*

   Response – Specific inquiries were made, both before and after the DEIS was released for comment, into the question of what constitutes a viable wolf population. The FEIS provides that information. No evidence has been produced to suggest changes in that assessment. Monitoring for wolves throughout Montana, Wyoming, and Idaho continues but as of yet (394) no breeding pairs of wolves have been documented in the Yellowstone or central Idaho areas.

Comments on Policy and Laws

Many comments pertaining to policy are located in the discussions for particular issues. Other comments focused on whether the policy and process met the legal intent of the constitution, federal rulemaking process, other federal laws and acts, and laws of the various states and counties. A sampling of the comments regarding these topics follow:

1. *Federal Rulemaking Process* – Several people urged the FWS to provide the state management plans to the public for review and comment prior to transfer of wolf management. They also encouraged cooperation between the states involved and the FWS in reintroduction efforts and the rule making process.

   > "…wolves would be managed cooperatively…We support this arrangement as long as the public is given the opportunity to comment on the state management plans during the rule making process."

   Response – The federal rulemaking process requires public review, appropriate NEPA compliance, and hearings, if they are requested.

2. *Location and Timing of Reintroduction* – Some respondents supported the Idaho reintroduction occurring after Yellowstone. They felt that what is learned from a Yellowstone reintroduction would make Idaho's more successful and economical. At the same time, they recommended the FWS develop a monitoring plan to determine whether central Idaho already harbors a wolf population. Such a program could effectively respond to concerns about existing wolf populations if and when the time is right for an Idaho reintroduction.

   > "We see a benefit to having Idaho reintroduction lag slightly behind Yellowstone. Experience in Yellowstone should provide valuable guidelines for restoring wolves."

   Response – The FWS's 1987 wolf recovery plan recommended waiting for wolf recovery in central Idaho for 5 years. That time period ended in 1992 and still no wolf packs have been discovered (Appendix 12). There is a strong advantage to wolf population viability to having wolves reintroduced to the Yellowstone and central Idaho areas at the same time. The number of population founders would be increased and interchanged between segments of the meta-population would be increased (Appendix 9).

3. *Legality of Policy* – Respondents questioned whether the policy met the intent of the ESA, the U.S. Constitution, the National Park Service Organic Act, the National Environmental Policy Act, state law, and county plans.

   ESA

   > "There is nothing in the ESA that allows the Service to introduce a listed species into an area that is outside its historic range. Regulations concerning the introduction of listed species and designation as experimental populations (50 CFR 17.81a) expressly require such releases to be within the probable historic range of the species. This raises very serious questions whether any proposed introduction of wolves is even within the scope of the Act."

   Response – The proposed action is within the historic range of the gray wolf and follows the recommendations in the FWS 1987 Wolf Recovery Plan.

   U.S. Constitution

   > "This letter serves as testimony and lawful notice to you, a government officer and public servant, to formally make you aware of the limitations the Constitution for the United States and the Constitution for Idaho places upon you…'The authority of public officers to proceed in a particular way and only upon specific conditions as to such matters implies a duty not to proceed in a manner other than that which is authorized by the law'…ARTICLE V OF THE BILL OF RIGHTS…commands '…nor be deprived of life, liberty, or property, without due process of law nor shall private property be taken for public use without just compensation.'"

   Response – The recovery of wolves, as proposed, does not violate the Constitution regarding take of private property without just compensation. See Appendix 6 for further information.

   National Park Service Organic Act

   > "16 U.S.C. 1. Section 1 of the National Park Service Organic Act mandates the conservation of the natural and historic aspects of the Park for the enjoyment of future generations. However, implementation of the Proposed Alternative will violate the Act for two reasons. First, the gray wolf that the FWS proposes to release in the Park never naturally or historically inhabited the Park…Thus, implementation of the Proposed Alternative will not leave the Park 'unimpaired for the enjoyment of future generations.' Second, the release of gray wolves in the Park will not conserve the natural wildlife therein. Instead, the gray wolves will decimate the ungulate herds which inhabit the Park, as well as destroy the ecological balance in the Park."

   Response – Wolf recovery does not violate this Act because wolves were native to the Park and wolves will not significantly impact other Park resources. To the contrary, the return of wolves to the park will restore a missing ecological component.

   NEPA

   > "The discussion of legal context needs clarification…You should point out that, under Federal supremacy, any state laws that conflict with a duly enacted Federal regulation, such as the experimental population rules, or that conflict with the ESA itself, are legally mullified. The Council on Environmental Quality NEPA regulations require discussion of conflicts with state and local laws, 40 CFR 1506.2(d)."

   Response – The FEIS points out where state law conflicts with federal law in the legal context section, Chapter 1 and in Chapter 2 under the Alternatives.

State and County

> “Wyoming has a predator law that says we can shoot wolves, and we’re not going to change it. The legislature of Wyoming has stipulated that they are against wolves, and this has never been considered.”

> “…there is an Idaho law which prohibits Idaho Fish and Game from participating in such actions as described in the proposed alternative selected by U.S. Fish and Wildlife Service without express permission from the Idaho state legislature…we could certainly manage the wolf within the state, but, again, it must carry the strength of law. Administrative rule is easy to change. The law is not as easy.”

Response – State, county, and tribal law does not supersede the ESA. Before the states or tribes can assume wolf management in their areas of responsibility they much have laws that conform to federal guidelines or acknowledge the supremacy of federal law regarding management recovery of federally listed species.

4. *Other general comments on laws*

   Response – Any modification of existing law that would be required to implement an alternative was identified in the discussion of that alternative.

Endangered Species Act

The categories “Experimental Nonessential Designation” and “Reintroducing Wolves under the Fully Endangered Status” were added as new issues to this analysis because of the large number of comments made to each subject.

1. *Endangered Species Act* – The majority of individuals that responded to this issued were very opposed to the experimental, nonessential designation. They wanted the wolf fully protected under the ESA and felt any attempt to do otherwise was against the law. However, there were also many who felt the ESA should be abolished, particularly those who favored Alternative 3.

   Response – Many people wanted ESA either strengthened, modified, or abolished. This FEIS does not deal with the ESA itself. The proposed action is in compliance with ESA.

2. *Experimental / Nonessential Designation* – Those who support the experimental designation favored the flexible control options it would provide landowners and land managers. However, many respondents opposed this designation saying it was in violation of Section 10(j) of the ESA. They felt this designation would go against the very intent of the ESA because it would allow individuals to kill the wolf.

   Response – Section 10(j) of the ESA which established the experimental rule provision and guidance for the use of a nonessential or essential designation is part of the ESA. People objected to the use of the experimental provision because individual wolves have been known to be able to naturally disperse into Wyoming and Idaho. However, the FWS believes the Section 10(j) rule can be applied to areas where populations are wholly separate geographically from non-experimental populations. Since surveys have failed to locate breeding pairs of wolves (indicating no populations exist) in either the central Idaho or Yellowstone areas, the FWS considers those areas separate from existing wolf populations in northwestern Montana.

   An experimental population in national parks and national wildlife refuges is treated as a threatened species for the purposes of Section 7 consultation with the FWS. In other areas, Section 7 consultation is not required with the FWS. Only an informal conference is required for federal actions that are determined likely to jeopardize the continued existence of the species for areas outside of national parks or refuges. Experimental populations do not have land-use restrictions associated with them unless they are identified as part of the experimental rule. Critical habitat is not designated for nonessential experimental populations (50 CFR 17.81[f]).

3. *Reintroduce Under Fully Endangered Species* – A very large volume of comments were received on this issue. Respondents wanted the wolves reintroduced under fully endangered status. They were concerned about existing wolves losing their protective status under the experimental designation.

   Additionally, a large amount of respondents wanted "reverted" language added to the plan which states that if wolves have not reached at least half of the recovery goal (10 breeding pairs) in each area by 2002, then all wolves immediately return to full endangered species status.

   Response – Under the FWS proposal, the boundaries of the experimental population area do not include areas currently occupied by naturally recolonizing fully protected wolf packs in northwestern Montana. Wolves inhabiting areas outside of the experimental population area will not loose their fully protected status. The FWS proposal of reintroducing wolves as nonessential, experimental populations in the Yellowstone and central Idaho areas provides the best opportunity for recovery of endangered wolves in the northern Rocky Mountains while providing management flexibility to address local concerns about issues related to wild ungulate populations, hunter harvests of wild ungulates, livestock depredations, and land-use restrictions.

Delisting the Wolf / Wolf Not Endangered

1. *Delisting the Wolf* – Most respondents did not want the wolf delisted, feeling it would go against the ESA. Others supported delisting but with the conditional statement that if wolves drop below 10 breeding pairs, they would again resume full ESA protection. Still other feared that delisting would never occur even if the wolf fully recovers, precluding them from protection their property.

   Response – It is the intent of the FWS to recover wolf populations in the Northern Rocky Mountains and, following procedures in ESA, delist them (see Appendix 11) using sound biological criteria. Many people support or oppose delisting for a wide variety of non-biological reasons.

2. *Wolf Not Endangered* – A large portion of individuals felt the wolf was not endangered and cited many States that have large wolf populations. Most of those respondents favored Alternative 3.

   Response – Wolves are listed by ESA in the lower 48 states. However, while gray wolves are absent from most of their historic range in the lower 48 states, they are common in Canada, and Alaska so they are not in danger of extinction in those areas.

Effects of Wolf Reintroduction on Other Wolves

The major concern expressed in the comments on this issue was that wolves were already present in the designated recovery areas in Yellowstone National Park and in central Idaho. The majority of concern stems from the proposed experimental, nonessential provision in the Proposal, Alternative 1. Introducing wolves, under this provision, into these areas already populated by wolves would compromise the fully protected status of naturally occurring wolves. A few individuals endorsed Alternative 2 because there would be no introduced wolves and all wolves present in Montana, Idaho, and Wyoming would retain full protection under ESA.

> "…we (Nez Perce Tribe)…suggest some modifications to the alternative. We…suggest that only the animals brought in for the reintroduction be classified as experimental. Naturally occurring animals drifting in and any offspring should be considered non-experimental and receive full protection."

Response – See discussion in Chapter 1 and Appendix 12. If breeding pairs of wolves existed in the central Idaho or Yellowstone areas, it is likely they would have been discovered and documented through the ongoing monitoring program. No compelling evidence suggest that any wolf population survived in either area between the 1930s until the present time or that naturally dispersing wolves from Canada or northwestern Montana have successfully reproduced and populations have become established in either the Yellowstone or central Idaho areas.

Hybridization of Wolves With Other Canids

The issue of hybridization of wolves with dogs and coyotes was raised by a few commenters. Many respondents asserted that research has established that hybridization is occurring in a large percentage of wolf populations and that the question needs to be addressed in the final EIS.

> "…How does the Federal government propose to manage coyotes, wolves, dogs, wolf-dog hybrids, wolf-coyote hybrids within the introduction area? Will all types which contain any wolf genetic material be manage, and protected, as if each individual were Canis lupus?"

Response – The FWS stands by it discussion of this issue in Chapter 1. Hybridization with either dogs or coyotes by wild gray wolves is not a significant issue related to wolf reintroduction in the western U.S.

Federal, State, and Tribal Authority

The issue of who should have control of wolf reintroduction evoked a considerable response from the public, including local, state, and tribal governments, and interest groups. One view was that wolf management should be led by the FWS. Federal guidance, it was stated, would provide the kind of uniform, consistent policy needed for the success of the project. Many respondents were distrustful of state and local authorities who were regarded as being too provincial and too vulnerable to local pressures to provide the kind of leadership needed to manage the complexities involved in the reintroduction of the wolf.

Although there were numerous people accepted cooperative management among the federal and state agencies involved, federal oversight was often mentioned as essential. Also frequently stated was that federal, state, and local cooperation was acceptable if wolf management was in full conformity with the ESA. Another element said by many respondents as necessary to federal or cooperative management was public involvement.

Although in the minority, there were adamant supports of state management of wolf recovery. Those comments were generally tied to Alternative 3 and Alternative 4. Federal control was seen by many of these respondents as being an infringement on the rights of states to govern their own affairs.

> "USFWS should continue to have responsibility for managing wolves until recovery is achieved. With three states involved, management would be too complex and also vulnerable to anti-wolf factions."

Recovery Areas

Comments to "Recovery Areas" were subdivided into 3 categories: wolves traveling into recovery areas, the actual boundaries of recovery areas, and people's preference as to where recovery areas should be.

1. *Wolves traveling into Recovery Areas* – Comments were disparate and touched on a wide range of issues. A few queries were raised on the status of wolves coming from non-experimental areas found in a recovery area where introduced wolves would have "experimental" classification.

There were also several respondents who voice their belief that wolves do exist in certain designated recovery areas, particularly Yellowstone, and made recommendations as to how the reintroduction plan should address this situation.

> "The 'experimental' designation that FWS has introduced has legal flaws and is not appropriate in Yellowstone where wolves migrate from northwest Montana. Experimental wolf populations can only be established in an area geographically isolated from other wolves."

Response – Individual wolves will likely continue to disperse into the areas designated as experimental population areas. However, as a practical management strategy to recover and manage wolf populations, it would be impossible to distinguish experimental from occasional non-experimental wolves within an experimental population and reintroduction area.

2. *Recovery Boundary Areas* – Many people challenged the efficacy of the boundaries of the recovery areas, but differed widely on what the boundaries should be. Some stated the areas were too small, others said it was too large, and a third contingent labeled the boundaries as being arbitrary and unscientifically based.

   > "I am concerned about the total size of the area mapped for location of the proposal experimental population area…This covers more territory than I think necessary for the success for the project. Location of the recovery populations within the Frank Church, Selway-bitterroot, and Gospel-Hump Wilderness areas should be sufficient territory for recovery. Relocation here will also minimize people and/or livestock impacts and enhance the success of the project."

   Response – Large experimental areas were established to promote management flexibility of reintroduced wolves which may travel extensively. The experimental areas do not include any known wolf populations or packs. The Missouri River appears, based upon the past and recent pattern of wolf sightings and recorded mortalities, to be a demarcation of wolf occurrence and was used as a boundary in Montana. It is important to have clearly defined boundaries so the public or agencies are not mistaken about whether they are in or out of an experimental population are and what management options are available.

3. *Preference for Recovery Areas* – Several comments reflected a confusion on terminology. It was obvious that some of the respondents equated recovery areas to locations where wolves would be released, or assumed that recovery areas necessarily provided protection.

   Opinions was polarized between those respondents who supported a wider range for wolf introductions and those totally against wolf introduction. Many of the comments pertained to the Yellowstone area.

   > "It is my opinion that wolves need to be introduced first into Yellowstone National Park and then into Central Idaho. This reintroduction would provide an initial enhanced protection of monitoring and evaluation because it is in a National Park."

   There were also many comments indicating that the wolf should instead be introduced in New York, Washington, D.C., and other eastern states.

   Response – This EIS, by congressional direction, only deals with the effect of wolf reintroduction to the Yellowstone National Park and central Idaho. The experimental areas were designed to permit both wolf recovery in the Yellowstone and central Idaho areas and reasonable management of reintroduced wolves wherever they may occur near those areas.

Humane Treatment of Wolves

This issue shares many comment elements with the "Hard/Soft Release" issue, "Wolves' Rights / Welfare / Dignity" issue, and the "Wolf As a Missing Component of the Ecosystem" issue. This issue is also closely related to the “Strategies to Control Wolves,” “Illegal Killing of Wolves,” and “Regulated Public Take of Wolves” issues. Because these management strategies differ among alternative, comments are split when they relate to a given alternative.

> “We need to do everything in our power to protect these beautiful creatures and give them a safe environment in which to live.”

Response – The FWS will ensure that wolves are treated as humanely as possible.

Hard and Soft Release

Many respondents commented on the implementation of hard release versus soft release methods. The overwhelming majority of those who responded to this issue criticized hard release techniques. Some believed wolves which are hard released would leave the designated recovery area in search of their former territories; a few feared wolves would either starve or predate upon the “easiest prey” (livestock) resulting in immediate conflicts with ranchers. Many commenters cited past failures of hard releases and felt this method would be an inappropriate risk of wolf recovery funding and a delay in overall recovery efforts, hence the more reliable soft release techniques should be implemented to ensure successful establishment of wolf populations in the recovery areas. Some saw hard release methods as “cruel,” “severe,” and “inhumane.” General responses speaking to this issue and responses specifically addressing Alternative 1, 4, and 5 all received analogous concerns and comments:

> “Hard releases of wolves usually results in the animals trying to return to where they come from. Acclimating these wolves in pens for six to eight weeks will make central Idaho wolf recovery more realistic.”

Response – The FWS will initially use and evaluate both hard and soft release of wolves. Currently, few reintroductions of wild wolves have been attempted and it is unknown which technique may be most effective. Whichever method or modifications of a method appear most effective will be used to improve the success of future wolf reintroductions.

Management Strategies

Many people commented on various strategies to protect wolves; these comments were captured in this category. Several facets of protection were presented: (1) stricter protection in the earlier stages of recovery, (2) replacement of wolves which are killed, (3) the length of time for recovery, (4) habitat protection, and (5) the reintroduction of wolves from Alaska or Canada that are presently in danger of being killed.

1. *Early Protection* – A very large percentage of comments to this issued asked for “more restrictive protection in the early phases of recovery.” Many added that the control measures in the current DEIS were much to liberal. The bulk of these statements were directed at Alternative 1.

   > “(Alternative 1)…does not provide enough protection during the early stages of reintroduction, and places too much emphasis on controlling the wolf for the benefit of the stockman, and hunter, as well as giving the stockman the opportunity to control the wolf himself.”

   Response – The FWS proposal has been changed to allow more restrictive management in the early phases (5 or fewer breeding pair) of wolf recovery if needed.

2. *Wolf Replacement* – Many others talked about replacement of wolves that were removed for livestock depredation and poaching.

> "…wolves lost to disease and the inevitable poaching should be replaced, lest the introduced stock dwindle to nothing."

Response – Wolf mortality from illegal killing or control is not expected to prevent wolf population growth through recovery. Wolf reintroduction would continue until wolf populations were firmly established (3-5 years). A policy of "put and take" would not be needed for wolves that were illegally killed.

3. *Recovery Time* – Many respondents were concerned about the time it would take to recover wolves with Alternative 1, 2, and 4.

   > "…Alternative 1 does not appear likely to result in the quick recovery of wolves…Without habitat protection from inappropriate human use, and with considerable potential for abuse of the control of 'problem' wolves, recovery would likely be slow, if it occurred at all."

   Response – The FWS stands by it assumptions and the estimates of the time frames in which wolf recovery may occur under the various alternatives. However, it is obvious that wolf population growth rates are dependent on several factors that could dramatically change these estimates of wolf population growth (see sample letter Mech et al. 1993).

4. *Habitat protection* – Many people were concerned about habitat protection and asked that critical habitat be designated for both recovery areas. This was a common theme of comments regarding Alternatives 1 and 5.

   > "…critical habitat must be designated for both these regions. Federal and state agencies should work pro-actively to protect all critically designated and potential wolf habitat in these two regions including such issues as road densities, livestock grazing and hunting which might effect wolves in their habitat."

   > (Alternative 1) "…there does not seem to be in place a strategy for protection of critical habitat, the key element to the reintroduction strategy."

   Response – The FWS believes sufficient habitat exists in the proposed reintroduction areas to support a recovered wolf population. Wolves are an adaptable species and wolf density is largely a function of prey density. An ample abundance of prey exists in the Yellowstone and central Idaho areas to support recovered populations. Critical habitat is not designated for nonessential experimental populations.

5. *Reintroduction of Alaskan / Canadian Wolves* – Many people offered management suggestions that would promote protection of the wolves. Some suggested transferring wolves from Alaska to "help alleviate the population pressures faced there."

   > "there are nearly 300 wolves destined to be destroyed in (Alaska). Most of them are already radio collared…this would also help defuse an explosive situation."

   Response – The FWS intends to use a source of donor wolves that has the greatest chance of resulting in a successful reintroduction program. Discussions with other biologists indicate that wolves living in habitats and feeding on prey most similar to those in the Yellowstone and central Idaho areas would be preferred donor stock for reintroduction.

Strategies to Control Wolves (Moving vs. Killing)

The opinions express on strategies to control wolves were confined primarily to 4 areas: (1) agency versus private control provisions; (2) moving versus killing wolves; (3) harassment should not be allowed; and (4) wolves removed from the population should be replaced.

"The biological evidence is that wolves do not conflict substantially with livestock. It undoubtedly will happen; it will be a problem. When it's a problem, problem animals will have to be dealt with. There's no doubt about that."

1. *Agency vs. Private Control* – There was a strong feeling expressed that should killing of a wolf be necessary, it should be carried out only be state or federal agents, particularly if the wolves were on public land.

   "Wolves should not be killed by private citizens unless a human life is in danger. Wolves should not be killed or removed for depredations on public lands. Where livestock depredations occur on private land, offending wolves should be relocated by government officials…if wolves are killed, they should be replaced quickly."

   Response – The FWS has addressed the opportunity for the public to control wolves, particularly in the early stages of recovery, and encourages professional agency control in most instances.

2. *Moving vs. Killing* – Most felt that control should be limited to moving wolves and killing wolves should not be considered as a control strategy. The whole premise of "control" of wolves was questioned by some, who stated that if wolves proved a problem to livestock, then adjustment should be made in the way in which livestock are managed rather than the wolves. Several suggestions were made, such as moving of livestock from a threatened area, use of certain breeds of guard gods, etc.

   "If wolves kill livestock, they should be relocated and livestock owners paid for confirmed losses."

   Response – The FWS recognizes some form of wolf management is necessary to resolve conflicts with domestic animals and, in some unusual circumstances, wild ungulate populations. In the early stages of wolf recovery when the financial investment is highest, the FWS believes it is appropriate to move problem wolves. After wolves become more established, it is not unreasonable to allow more management flexibility to the point of killing individual problem wolves. Wolves preying on and eating wild ungulates should be moved rather than removed (killed) from the population.

3. *Harassment as a Control Strategy* – A large number of commenters felt that the provisions allowing harassment of wolves should be deleted. This sentiment was often referenced regarding provision in Alternative 1.

   Response – Harassment has been defined in the glossary of terms. In certain circumstances, non-injurious harassment of wolves by the public may reduce the need for control of wolves that may attack livestock.

4. *Wolves Removed Should be Replaced* – Many individuals commented that wolves lost to human intervention, whether legal or illegal, should be replaced.

   "I truly believe that wolves and ranchers can coexist under the Proposed Alternative. I think that all introduced wolves lost by human intervention should be replaced by reintroduction, not natural reproduction, within at least on year.

   "Any wolf removed from reintroduced population must be replaced. ALL wolf control should be managed by FWS."

   Response – See above answer under Management Strategies 2.

Regulated Public Take of Wolves

Because each alternative called for different levels of regulated public take, the comments were categorized according to the alternative.

Alternative 1

Alternative 1 allowed public take under some conditions, particularly when a wolf was in the act of wounding or killing livestock. Private individuals might also non-injuriously harass wolves at any time. Two common themes were detected in the comments: a distrust of allowing ranchers to kill wolves on public land in Alternative 1 and that only public officials should be allowed to kill wolves.

Alternative 2

Under Alternative 2 only agencies could move wolves for livestock depredations. Most supported these provisions based on the concerns displayed under Alternative 1.

Alternative 3

All wolves could be killed at any time by anyone under Alternative 3. Many commenters supported Alternative 3 for that reason alone because the Proposed Alternative would apply fines for illegally killing wolves.

Alternative 4

Alternative 4 had similar provisions to Alternative 1 with the addition that private individuals could kill wolves believed to be harassing their livestock. It was felt by commenters that this would be abused and impede wolf recovery.

Alternative 5

Agencies would be allowed to move wolves in chronic depredation areas. Although the definition of a chronic area received scrutiny, people were generally supportive of this provision.

Response – Other than to protect human life, regulated take by the public on public lands has been restricted to times when normal control procedures have failed. Special permits would be required for this regulated take, and then only in the later phases of wolf recovery. The FWS believes that allowing regulated take in certain situations on private land will not compromise wolf recovery and may quickly identify and remove individual problem wolves from the recovering wolf population. The strict enforcement of the provisions on private land are envisioned to reduce attempts by individuals to violate the special rules and unnecessarily kill wolves illegally.

Illegal Killing of Wolves

General opinion was soundly against illegal killing of wolves under the reintroduction program. The regulated public take provision allowing private individuals to kill wolves on private lands was repeatedly condemned. Commenters felt that illegal killing would increase with the lenient protection afforded the wolf and that laws would not be enforced.

Several suggestions were offered as ways to discourage killing of wolves:

Reintroduce two wolves for every one killed
Land-use restrictions to include loss of grazing rights on public lands
Strict enforcement of the laws on illegal killings
Relocation of wolf as a last resort

Many people were concerned that Alternative 1 was too lenient in its protection of wolves, and illegal killings would occur with little or no retribution. Others representing ranching concerns stated wolves would be killed to protect ranching interests regardless of the laws protecting wolves.

> "Harassment and taking of wolves under Alternative 1 are too liberal. We particularly oppose the provision allowing private individuals to kill wolves on public lands."

Response – Take has been defined in the glossary of terms. The FWS believes that some wolves will be illegally killed by that an effective public information and law enforcement program will reduce the number of killings to a level that does not impact overall wolf population growth and recovery. Illegally killing a wolf that is part of an experimental population carries the same penalties (up to $100,000 fine, 1 year prison, loss of special permits, loss of equipment used in the crime) as illegally killing a fully endangered non-experimental wolf.

The experimental rule defines what is not considered illegal take. The rule would allow wolves to be killed, under fairly strict conditions, by designated agencies, the public on private lane, livestock permittees on public land, or by non-negligent, unavoidable, and unintentional take during otherwise legal activities. All other take would be considered a violation of the Special Experimental Rule and a take (Section 9) violation under the ESA.

Law Enforcement

Of the less than 200 people who addressed the issue of law enforcement, there was almost unanimous support of effective law enforcement to help ensure the success of wolf reintroduction. There were many requests to increase the law enforcement budget set in Alternative 1 at $25,000 to $100,000.

Several people mentioned the need to institute swift punishment and strict penalties for those individuals violating laws protecting wolves.

> "Alternative 5 is the only one that calls for enhancement of law enforcement programs…there should be an aggressive law enforcement program associated with any reintroduction alternative."

Response – This law enforcement portion of alternative 1 has been strengthened. A great deal of irrational fear and misinformation has been generated by the public. Many people indicated in their comments on the DEIS that they would kill voles and violate the law if given the opportunity. While a public education and information program can do much to prevent violations and reduce hysteria among some members of the public, it appeared that an effective law enforcement program must be an active and strong component of any recovery program.

Land-Use Restrictions and Den Site Restrictions

Both issues elicited a large number of comments and proved sharply divisive. Many respondents indicated they did not want any restrictions placed on the use of public lands. The primary point of contention for many was not wolf introduction, but land-use restrictions that people feared would be initiated at some point as a result of wolf introduction.

> "We're not afraid of the wolf, per se. What we're afraid of is the land-use restrictions that go along with the introduction of the wolf in Yellowstone National Park."

> "I believe that land restrictions around dens should be implemented [with alternative 1]. The current pro-wolf stance of much of the general public would support this now, and it would be wiser to implement den area restrictions, and remove them if they proved unnecessary, then to leave them out now and try to impose them in two or three years."

1. *Land-Use Restrictions*

   Response – The FWS believes that the most recent evidence about wolf habitat requirements indicate few, if any, land-use restrictions would be required to achieve wolf recovery in the Yellowstone and central Idaho areas (see Appendix 13).

2. *Use of Public Land for Grazing* – There were several individuals who reiterated that they did not think grazing of livestock by the public should precedence over other uses on public lands.

   Response – The FWS believes that wolf recovery should not generally impact other natural resource programs on public land, including livestock grazing.

3. *Den Site Protection* – The large number of respondents who commented on den and rendezvous sites consistently mentioned 3 things: (1) restrictions around den and rendezvous sites were a critical element of a successful alternative; (2) the ability to implement these restrictions in the future should be maintained as part of the proposal; and (3) the DEIS failed to designate critical habitat for the wolves.

   > "Areas around wolf dens and congregating areas should be given seasonal closures to prevent disturbance. If illegal killing occurs, restrictions should be placed on use of roads, grazing, mining, and timbering."

   Most respondents implied that restrictions around den and rendezvous sites should be seasonal from approximately April to September and consist of a 1 mile radius safety zone.

   Response – The only instance where some form of land-use restriction may be required is around active wolf den sites in the spring and early summer when wolf pups may be vulnerable to obtrusive disturbance by humans. The first wolves in the recovery areas will be very "famous" and may attract enormous attention from the public. At least early in the reintroduction effort, the option to protect wolf dens from intentional or unintentional harmful human disturbance has been left to the discretion of managers if land management or natural resource agencies identify a specific need.

Private Property Rights

This issue deals with the effect wolf reintroduction would have on private property rights. With few exceptions, individuals responding to the issue expressed dismay at the wolf introduction plan, which many said was an affront to private property interests. Many people were indignant that the DEIS declared that wolf introduction is proposed would have no impact on private property rights.

Wolf introduction per so. was not condemned universally, although certainly there was strong sentiment against it. The central point of argument by a majority of respondents on this issue was that private property rights were not being properly evaluated in the planning process and that wolf recovery was taking precedence over consideration of private property rights.

> "The discussion of the potential impact on private property rights should more explicitly point out that under Christy v. Hodel, 857 F2d 1324 (9th Cir. 1988), it is unlikely that private property would be considered legally 'taking' for 5th Amendment purposes in the event of predation by wolves."

Response – The FWS believes that its assessment of the effect of wolf recovery on the rights of private property owners as protected under the U.S. Constitution is accurate and no "taking" will occur (Appendix 6).

Effects of the Wolf on Livestock and Pets

A primary reason given against wolves was their effect on livestock, and to a lesser degree pets. Ranchers around the 2 recovery areas have spoken loudly and clearly on this issue. A pervasive argument was that wolves would prefer a cow to a deer or elk.

> "Very few people visiting Yellowstone Park would ever get to see a free-roaming wolf, while landowners and ranchers would be continually subjected to livestock losses and harassment by wolves."

People who wanted the wolf returned were well aware of ranchers concerns, but cited the low number of cows and sheep that are predicted to be taken by wolves and that grazing on public lands must be shared with the wolf.

> "If wolves leave the park and kill livestock that would just be a risk the rancher would have to take. Public land is for everybody and wildlife are included, so wolves should be put back into YNP."

Response – Some wolves will kill livestock and occasionally other domestic animals and pets. However, the proposed wolf control program is similar to the one that has been operational in Montana since 1987. The Montana program has resolved livestock losses caused by wolves and allowed for continued wolf population growth. Wolf recovery and control of the occasional wolf that attacks livestock can occur simultaneously. The proposed wolf control program should effectively resolve most conflicts between wolves and domestic animals, including pets.

Compensation for Livestock Depredations

Comments to the issue of compensation for livestock depredation were both general and alternative-specific. Generalized aspects of the issue can be categorized as being either pro or con with supporting reasons, or different aspects can be emphasized. Examples of the latter include whether it is federal or private compensation, whether private compensation is adequate, or if certain management restrictions should be applied for compensation.

Private Funds

> "What happens if private funds expire? Where exactly do private funds originate? What kind of guarantee is there on these funds?"

Federal Funds

> "Would like to see some Federal trust compensation for losses."

Combined Funds

> "…would private funding sources be able to cover the costs? I would have no objection to a little Federal assistance…"

Wolf Opponents Against Compensation

> "…Do you know how much trouble livestock people are having trying to get damages for the cattle that have been killed by the grizzly?"

Wolf Proponents Against Compensation, or With Modifications

> "If ranchers do not properly herd and manage their animals, it's not the fault of the predator nor the responsibility of the taxpayer to remunerate him for his losses."

Wolf Proponents For Compensation

> "Of course if livestock has been killed by wolves then the rancher should be compensated but with strict guidelines…"

Response – As a standard policy, the U.S. Government does not compensate for property damage caused by wildlife, other than fund USDA ADC to operate control, research, and education programs to minimize damage. A private program exists that compensates livestock producers for losses caused by wolves. This program has been in place and effective since 1987. A total of about $12,000 has been paid to date. It is unknown if the states will pay for livestock losses caused by wolves.

Favor or Preference Given by Government to Special Interest Groups

Comments on this issue were mainly finger-pointing and name-calling aimed at what they viewed as “the other side.” Many felt the FWS needed to listen to the majority and not the minority or special interest. The comments seemed to break into 2 main factions – who claimed the agriculture-livestock industry and local special interests had too much influence and those who claimed the special interest groups outside the proposal area had too much influence. Both sides claimed they were the majority, that the FWS was listening too much to the minority. They had different definitions and interpretations of public land, and claimed they were on the right side of taxpayers. Both sides claimed Alternative 1 reflected bias for the other side and that the FWS as “caving in” to the big money and political influence of the opposite viewpoint. A few claimed that wolf reintroduction would succeed only if a plan was implemented which was nature-based, not human-based. Still others claimed that people needed to come before wolves.

Local Influence Versus Outsider Influence – Most comments on this issue varied by the part of the country people lived in. Those living within Montana, Idaho, and Wyoming claimed they should be the ones listened to most because they pay local taxes, they have to live in the area where the decision is being made, they will suffer the most economically, and they have been managing the West very well before outsiders started meddling in their business. Those respondents living outside the area claimed that western ranchers and livestock industry have had too much influence in the past, that special interests on surrounding lands should not dictate biological policy on public lands, and that the land belongs to all people of the United States. The debate hinged on (1) who owns the land – the people who lived in the states involved, or all citizens of the United States; (2) who has the most influence with the FWS and the fear that the decision would be swayed by special interests. Most respondents living within the affected states saw the special interests as animals rights advocates, environmentalists, preservationists, and those against hunting, trapping, fishing, trail riding, and in favor of locking the people out of the federal lands. Most respondents living outside these states saw the special interests as livestock owners, ranchers, local politicians, and the states’ management agencies. Several people commented they wanted federal oversight and that they did not want the states responsible for management of the wolves as the “States’ management agencies would be too susceptible to pressure from the livestock industry and special interest groups.” Others said federal management would be too insensitive to local situations and it would be forced on the area by wealthy outsiders.

> “…For too long western ranchers have grazed on Federal land at the expense of the tax payers and wildlife in this Country…Since we taxpayers are subsidizing the livestock industry, we should have the right to demand that wolves be part of the natural landscape.”

> “I wholeheartedly believe that a lot of the support behind these efforts are coming from these radicals and that their ultimate goal is to abolish most forms of outdoor activity such as hunting, trapping, fishing, possibly even trail riding, and camping in our wilderness areas. Other goals they seek to attain are the elimination of livestock us of public lands, and further crippling of the timber industry.

Response – No special preference was given to any special interest group during preparation of the EIS.

Subsidies Given by Government to Special Interest Group

Some respondents indicated they believed the government was subsidizing special interests, particularly ranchers and livestock owners, by allowing them to graze on public lands. They felt this was being allowed at the expense of their tax dollars. Many of these people perceived that all livestock owners in the west were on public lands. The issue seems to center around whether people believe in wildlife rights or ranchers rights to graze on public lands.

> "I am personally very tired of hearing from ranchers in regards to their livestock. I am tired of their grazing on public lands, esp. in or around national parks, and competing for food with the animals already living there! I feel the animals of the wild should be completely protected and livestock should go! By putting livestock and ranchers first, we are putting nature in a terrible, unbalanced situation…"

Response – The FWS stands by it analysis that this EIS dose not affect any other programs that some people may consider subsidies to various special interest groups.

Political Influence

The modest number of people (less than 100), who discussed the issue as it related to wolf introduction, expressed widely divergent views. Many respondents at both ends of the spectrum conveyed their exasperation with the political system and the role it has played in determining the outcome of the issue. Several people in favor of wolf reintroduction stated that western politicians and lobby groups had hindered the reintroduction effort. Others also disparaged having politics instead of science as the guiding force in reintroduction efforts. It commenting on Alternative 5, several people felt it represented the best alternative for wolf recovery; however they did not endorse the plan because they thought it politically unfeasible.

Many respondents against reintroduction reiterated their view that the political process had not worked to their advantage. A few people expressed their fears of a "hidden agenda" by pro-wolf advocates to "lock up the land." There were also many respondents who resented people or groups outside the local community or state having undue influence on introducing wolves into an area in which they live. Several respondents mentioned the ESA and stated that they thought it had been misused.

> "The wolf recovery in YNP should not be political pawn on the agenda of any group, it should be instituted because it is the right thing to do. We must restore the wolf link in the broken chain of the YNP ecosystem."

> "My concern as a state legislator is that the wolf will be used to shut down industry, using the hammer of the Endangered Species Act."

Response – Preparation of the EIS is primarily a technical exercise. However, decision makers can use whatever information they choose in making their Record of Decision. While the local public received the most notification and had the greatest chance to participate in the NEPS process, the EIS deals with endangered species and public lands, so it has been a issue of national interest.

Effects on Local Economy

This issue relates to the economic effects that wolves will have on communities near the recovery areas. This is closely tied to the "Effects of Wolves on Livestock" issue, "Effects on Big Game and Hunting Opportunities" issues, the "Visitor Use" issue, and "Restrictions on Use of Public Lands" issue.

> "The second largest industry in this state (Idaho) is tourism. Hunters, fishermen and sightseers come to hunt, fish and observe the wildlife. The introduction of wolves will have an adverse effect on this industry because it will have a bad effect on the other wildlife."

> "According to the survey, only 3.5% of the Yellowstone National Park area economy is due to livestock. Whereas 39.5% is due to services, much stemming from tourism. Just considering the number of people who benefit from this ecologically whole proposal…wolf introduction is clearly a superior act."

Response

Negative Economic Impacts – It is true that the negative economic impacts will be primarily incurred by livestock producers and, if wolves cause impacts to the harvest of female ungulates, to some extent the state wildlife agencies who sell hunting licenses and businesses involved in the hunting of female ungulates. Analysis indicated that, even without compensation for livestock losses, these effects would be relatively minor compared to potential benefits. Those anticipated effects are discussed in the EIS. Under the FWS proposal no negative impacts are predicted to occur on resource extraction activities (mining, forestry, etc.) or the tax base.

Positive Economic Impacts – Visitors to Yellowstone National Park are estimated to spend about $424 million annually. Analysis suggests that increased tourism expenditures (some estimates at $23 million/year) and the existence value (the value that Americans place on knowing wolves would be in the Yellowstone and central Idaho areas) would be the primary source of positive economic impacts. The positive benefits estimated by public surveys have been adjusted by studies which indicate that people are really willing to pay only a fraction of what they indicate resource values are worth to them during surveys. Overall, the analysis indicated that wolf recovery would result in positive economic benefits of millions of dollars annually in both Yellowstone and central Idaho. While the precise values may be questioned, the FWS believes the trends are accurate.

Cost of Program to Taxpayers

This issue was one of the most mentioned by respondents. There were several facets to the issue. Foremost in people's feelings that wolf reintroduction was simply a waste of taxpayers' money and could be used for other programs. This opinion was especially prominent among those who supported the No Wolf Alternative. No matter what their reasons for supporting this alternative, a common denominator was the cost of wolf reintroduction. Economic efficiency was compared among alternatives, and questions were raised about how costs and benefits were calculated.

> "The current Administration ran on a campaign slogan of 'It's the Economy, Stupid!' I believe one of the best ways for the Federal government to stimulate the economy is to stop funding unnecessary programs like wolf recovery and concentrate on reducing the deficit."

> "For too long my tax dollars have been used to kill predators and 'nuisance' animals. I think it is time to stop that practice and begin to reintroduce species wherever they have once existed."

Response – The wolf reintroduction program would be funded through general taxpayer revenues possibly supplemented with contributed private funds. The FWS proposal, if implemented in 1994 and wolves were recovered in 2002 would cost a total (over an 8-year period, including both areas) of slightly more than $6 million. The estimated value of each alternative was included in the EIS because cost was a major issue with the public. In the long run, alternative 2 (natural recovery) would cost more than the FWS proposal (experimental reintroduction) because wolf recovery would take about 20 years longer. Alternatives 4 and 5 are the most expensive because they involve much more habitat acquisition and more intensive management.

Effects on Visitor Use

This issue centers on the effects wolves will have on visitor use. Response centered almost exclusively on the Yellowstone recovery area. This issue is closely related to the "Effects on Local Economy" issue and "Effects on Big Game" issue.

Increased Visitor Use

> "I have never been to Yellowstone National Park, but would greatly consider traveling to the Park if I could possibly see an animal like the gray wolf."

Decreased Visitor Use

> "(Wolves) will not bring in extra tourist money…wolves won't be seen by tourists. Wolves will kill young bison, elk, etc…decrease tourist viewing of wild animals in Yellowstone."

Response – analysis indicated that on average people would find the Yellowstone and central Idaho areas more desirable to visit if wolf populations were present. The data for central Idaho has been corrected to reflect an earlier analysis error. The DEIS stated the range of change in visitor use in central Idaho if wolf populations were present was +2 to –12%. The negative value resulted from 2 respondents who indicated they would visit central Idaho much less (up to 90 visits fewer) if wolves were present. A check of data indicated these 2 respondents did not visit central Idaho at all in previous years, so those data points were omitted. The reanalysis indicated that wolf populations would result in a slight (2%) increase in visitor use in central Idaho, which confined the trend in other estimates of change in visitor use patterns due to the presence of wolves. The Yellowstone data indicated a +5-10% increase in visitation. Analysis indicated that wolves would not change the numbers or distribution of other resources (ungulates, small mammals, etc.) to the extent that would likely effect tourism.

Effects of Wolves on Big Game

The predominant response was that wolf introduction would have a negative impact on big game. Many people cited examples in Alaska, Minnesota, and Canada where wolf predation has resulted in the diminishing of certain big game animals.

A large number of respondents saw no need to interfere with the present situation that has produced large numbers of big game. The wolf was therefore viewed with obvious alarm by those who believed wolves hold the potential of disrupting that balance. It was stated that hunters – combined with existing predators such as bears and coyotes – are adequate to regulate big game. Some believed the introduction of the wolf furnishes unwanted competition to hunters which could have a severe impact on certain local or state economies where hunting is an important business.

Many respondents did not concur with the often repeated rationale supporting wolf introduction – that wolves improve game herds by killing the sick, old, and diseased. Wolves do not just cull the sick and old, it was stated, they feed on whatever they can, including the young of big game, and livestock.

Many people favored wolf introduction to meet a stated need to reduce overpopulation of big game in the Yellowstone area. Present attempts at management have proved ineffective, it was stated. A large number of those who saw the introduction of the wolf as a positive impact on big game reiterated the belief that the wolf would help restore balance in the ecosystem. The statement was frequently made that the wolf would improve the health of big game herds, culling the sick and old, and promoting the long term survival of the fittest.

A number of individuals asserted that wolf recovery should be given priority even if reintroduction were to result in a diminished supply of ungulates. Better to let nature find its own balance, it was suggested, without the interference of humans striving to keep big game numbers at an unnaturally high level.

Negative Impact on Big Game

> "…The negative effects of wolves on populations of ungulates is especially apparent in years when there is heavy snow or crusted snow…Wolves do kill weak and deformed animals, but wolves kill many perfectly fit, healthy animals…It is a fact that wolves prefer females that are in late stages of pregnancy and young animals."

Positive Effect on Big Game

> "Since wolves are one of the only animals able to prey on American bison, reintroduction of wolves will help the ranching community, which also complains about buffalo-carried brucellosis (spontaneous abortion). If Park bison herds were naturally limited by predation, there would be less chance of range cattle contracting the disease from bison roaming out of the park."

Response – The FWS believes the analysis of the potential effect of wolves on ungulate populations is as accurate as is currently possible without having wolves present. Wolves can certainly act in concert with other predators, hunting pressure, or environmental factors, and impact ungulate populations. On average, wolves tend to prey on the less fit members of ungulate populations. The FWS expects that the need to reduce wolf predation on ungulates will be rare but that such occurrences are possible and that there should be a mechanism in the experimental rule (moving wolves to reduce localized predation pressure) to address these unlikely but possible situations, yet promote wolf recovery. It should be absolutely clear that at above recovery levels, wolves, like any mortality factor, can impact ungulate populations. The states will almost certainly manipulate wolf density (at a level above population recovery levels) through regulated harvest programs, once wolves are above recovery levels.

Effects of Wolves on Hunting Opportunities

A large number of respondents stated that hunters and hunting opportunities should receive priority in any decisions about the wolf. Equally adamant were those people who were insistent that the needs of the wolf be given primary consideration. This issue is closely related to the "Effects on Big Game" issue.

There was little doubt expressed among those opposed to wolves that the presence of wolves would have a negative impact on hunting opportunities. The general opinion was that wolves would significantly diminish the number of ungulates available to the sport hunter. Several comments touched on the loss of revenue for what was stated as an important industry in Montana and Idaho. Little middle-ground was evident.

Many people in favor of wolf introduction did not anticipate a conflict because they did not think wolf introduction would seriously affect big game numbers. However, there were those who did anticipate a conflict of interest and voiced the opinion that the wolf should be the priority, not providing opportunities to hunters to shoot big game.

> "The real effect of the wolf reintroduction is replacement of man as the predator. The numbers of big game taken by wolves is reported as minimal to some. Nobody knows the numbers…The hunter is supposed to take that risk."

> "I am a big game hunter/sportsman and think we all can share the surplus game! The howl of a wolf as well as the bugle of an elk all adds to the ritual of hunting and improves the experience of the natural world."

Response – Recent scientific research indicates that wolf populations can compete with human hunters for some of the harvestable surplus in ungulate populations under some circumstances. The FWS believes that the estimates of the potential effect of a recovered wolf population on hunter harvest are as accurate as is currently possible without having wolves present in these areas. The states will likely manage recovered wolf density and distribution through a regulated harvest program to reduce or compensate of such occurrences.

Effects on Wolf Recovery on Human Safety

These comments were all of 2 distinct and opposing schools of thought. Obviously, one line of thinking was that wolves are certain to attack humans, and the other that wolves pose no threat to human lives.

Threat

> "Nobody has the right to endanger my life or my children's lives by introducing predators that kill for a living."

Not A Threat

> "Wolves instinctively shy away and avoid contact with humans and there hasn't been a single situation when a healthy wolf seriously injured or killed anyone reported in all of North America."

Response – Wild wolves are not a significant threat to human safety. The fact that so many people mistakenly believed that wolves are a significant threat to people indicated a strong need for an accurate public education and information program.

Effects of Wolf on Other Predators, Endangered Species, and Other Wildlife

1. *Other Predators* – A small number of commenters focused on the potential effect wolves might have on other predators, in particular the grizzly bear, mountain lion, and red fox. There was general disappointment that the DEIS dedicated only a small section to the expected impacts to these animals.

   > "Introduction of wolves would upset the balance that exists today between food sources and numbers of other predators."

   > "In my learning (as a biology student) I've come to realize that wolves and bears should inhabit the same areas, in the long run each benefiting the other…I strongly urge the reintroduction of wolves to YNP. I also recommend other predator reintroductions."

   Response – Wolves have coexisted with various other predators in many areas of North America. Although some readjustments in the carnivore community may occur, only additional research focused on those predators will evaluate the subtle extent of those changes. Studies have been initiated and funded by natural resource agencies on grizzly bears, mountain lions, wolverine, lynx, and coyotes. A study initiated and partly funded by the FWS and NPS is currently evaluating mountain lion and wolf interaction in and near Glacier National Park. These studies will provide useful comparisons when wolves become established.

2. *Endangered Species* – The issue of the wolf's effect on other endangered species focused on the grizzly bear, the Selkirk caribou, and whooping crane. Commenters were concerned that reintroduced wolves would have an adverse effect on these species which could be considered a "take" under the ESA and that this issue had not been adequately addressed in the DEIS.

   > "No data is provided as to the Selkirk caribou herd – a highly endangered species. Caribou territory is within a direct line with wolves if a hard drop is made (in Idaho) and they move north, northwest 'back home' as they probably will. Wolves are a heavy predator of caribou…"

   Response – The FWS believes its biological evaluation accurately predicted the effect of the proposed action on endangered species, threatened species, and candidate species in Montana, Wyoming, and Idaho (see Appendix 7).

3. *Other Wildlife* – A few respondents also felt that introduction of another predator would impact populations of small mammals and fowl.

   > "The degradation of the range caused by exploding…ground-dwelling critter populations (prairie dogs, marmots, etc.) would likely be reversed within a few years if wolves are reintroduced.

   Response – The FWS believes its analysis of the effect of wolves on other wildlife populations (no significant effect) is accurate. Small mammals are not an important food item to wolves.

Diseases and Parasites to and from Wolves

Most respondents who commented on this issue expressed concern about diseases and parasites introduced wolves could transfer to other animals and to humans in recovery areas. The disease most often mentioned was rabies.

Several people advocated additional research be conducted on the possible effects of wolf introduction on other animals and humans. Also, several individuals noted as a potential problem warranting further study was the possibility of exposing introduced wolves to diseases or parasites that could decimate their numbers.

> "Wolves are known rabies carriers. We have enough health problems in our culture today, what we don't need is another problem!"

Response – Wolves will be given vaccinations when they are handled to reduce the chances of them catching diseases from coyotes and other canids. Wolves will eventually naturally develop resistance to exposure to canid diseases that are present in wildlife and domestic dog populations in the western United States. Wolves will not significantly increase the transmission of rabies or other diseases.

The Wolf as a Missing Component of the Ecosystem / Wolves Not Native

1. *Missing Component* – This issue was one of those most commented on . A majority of respondents in favor of reintroduction stated that the wolf was a necessary component of the ecosystem that is now missing. This was especially true for the Yellowstone area, with few mentioning central Idaho. Many people evidenced this by the overpopulation of elk and bison in the park and the wolf's necessary role as the only major missing predator. In addition, enjoyment of the park as a complete ecological system, as it was when the park was first designated, was often cited as a reason for the wolf's return.

   > "By establishing the population as non-experimental it will give more impetus to change the real use of public land to an ecosystem management approach, with a healthy balance of predator and prey species. This is the only answer for sustained, long-term ecosystem health."

2. *Wolf Not Native to YNP* – Many argued that the gray wolf was never native to Yellowstone National Park and does not belong there now. They stated that information from the scientific community indicated the prairie wolf was the only species known to inhabit the region. Consequently, they felt gray wolves did not belong in this area. Furthermore, some stated that government records showed that wolves only migrated to the park when ranchers, homesteaders, and the government combined to eradicated them. They felt that this issue must be thoroughly researched and addressed before any reintroduction can occur.

   > "…it is hard to understand why we would pay this amount of money to force an animal to live somewhere it which they are not indigenous."

   Response – Wolves were once an important native component of the Yellowstone and central Idaho ecosystems.

Wolves Rights, Welfare, and Dignity

One of the largest single reasons given by commenters for the return of the wolf was that as one of God's creatures it has right to exist and that because humans got rid of them, we have an obligation to return them. Many comments were also received concerning the most humane methods of returning the wolf, making this issue somewhat related to the wolf management strategies issues and the use of hard or soft release. Some people for the No-Wolf Alternative used the argument that reintroduced wolves would be subjected to harassment and killing.

> "Wolves, like other wildlife, have a right to exist in a wild state. This right is in no way related to their known value to mankind. Instead, it derives from the right of all living creatures to coexist as part of the natural ecosystems."

Response – Wolves, like any wild animal, will be treated as humanely as possible during handling, reintroduction, and management.

Subspecies

A primary concern identified by many respondents was that government officials would introduce a non-native wolf species into the recovery areas. There was considerable criticism of any plan to "reintroduce" a species never found in the area. Many people advocated natural recovery because of the belief that there are presently wolves in the designated recovery areas and natural recovery would avoid the problems that could result from bringing in non-native species.

Another view offered by a few respondents was that introducing wolves would contribute genetic diversity to any currently existing wolf population.

> "…Ignoring subspecific differentiation is not only irresponsible, but also illegal…reintroducing *Canis lupus lycaon* or any other subspecies except *Canis lupus irremotus*, into Canis lupus irremotus range, would not be legal…This reintroduction lacks scientific integrity."

Response – Early taxonomists, often utilizing few specimens, named 24 subspecies of gray wolf (*Canis lupus)* in North American based upon skull characteristics, body size, and color. Recent taxonomic investigations indicated fewer subspecies of wolves originally occupied North America than was formerly believed. The wolf populations that inhabited the Yellowstone and central Idaho areas were eliminated by about 1930. Recent taxonomic work based upon statistical analysis of skull measurements and pelt characteristics indicated that those wolves were slightly smaller and contained fewer black color phase individuals than the more northern Canadian wolves that are now dispersing southward and occupying Montana. Whether these size and pelt differences were due to local geographical or climatic conditions, or very distinct genetic differences is being discussed in the scientific arena. Some recent molecular investigations suggest that gray wolves throughout northern North America are all one subspecies of *Canis lupus.* This work indicates only red wolves and Mexican wolves are genetically different at the molecular level. Both these methods of analysis are subject to further confirmations and study.

Need for Research and Monitoring

Comments on these 2 separate issues overlapped significantly and therefore are discussed together. These issues are closely tied to the question of whether or not wolves already exist in the recovery areas and what research and monitoring will occur to determine the extent of those populations. These issues have close ties to the Alternatives, particularly Alternative 1 which will or will not introduce wolves based on monitoring results of the existing population.

> "There is substantial evidence that there are wolves already in the Greater Yellowstone Ecosystem. The USFWS should vigorously investigate this before any wolves are reintroduced."

Many comments were specific to monitoring of populations in Idaho and suggested time frames in which monitoring should occur and what types of monitoring should take place. Nearly all comments on these issues stated that research and monitoring should begin immediately.

> "…efforts in Central Idaho should be delayed at least three years to allow time to determine whether viable wolf populations already exists."

Response

Research – Obtaining information through scientific techniques has lead to tremendous benefits to society. Wildlife management has been greatly improved through scientific investigations and research, including the use of radio telemetry technology. Any reintroduction of wolves would be closely monitored and new information used to improve the program. However, wolves have been intensively studied in many areas of North America and many of the basic questions about wolf biology and behavior are well documented. Currently, another massive research program is not needed to re-study the basic nature of wolves in the western United States. While there will certainly be some interesting and necessary questions that may arise from the actual reintroduction of a top predator into an ecosystem, more research or study is certainly not required before wolf restoration could proceed. The number and level of “predictive” models and studies conducted to date have fully exhausted the ability to predict what effects wolves may have on the ecosystem in Yellowstone and central Idaho without wolves actually being present. Additional studies appear unnecessary and would only serve to increase overall costs and delay real progress toward wolf recovery and delisting.

Monitoring – There has been varying intensities of monitoring for wolf activities throughout Montana, Wyoming, and Idaho since the 1960’s. those surveys indicated occasional lone wolves have sporadically occurred throughout the northern Rocky Mountains of the United States for at least the past 30 years. Wolf surveys and monitoring have been increased within the past 5 years but still no wolf packs have been documented in Idaho or Wyoming. Currently, 5 wolf packs live in northwestern Montana, all north of Interstate 90. Please see Appendix 12 for further details of wolf monitoring in these 3 states.

What Is a Viable Wolf Population

Many people question whether enough wolves would be introduced to constitute a viable population. Some felt that reintroduction was necessary to increase genetic diversity to maintain a viable population. Still others felt that the small number of wolves introduced was only a guise to the true number that would be needed to constitute a viable population before delisting can occur.

> “The FWS has a reputation of not keeping their word on population levels. For instance, the grizzly bear population goal numbers have been recently changed. The wolf numbers and bear numbers will be changed so that they will never be recovered and we will have to live with endangered species regulations.”

Response – This issue was specifically examined in detail and incorporated extensive scientific peer review. The goals outlined in the 1987 Wolf Recovery Plan of having 10 breeding pairs of wolves (estimated about 100 individuals) in each of 3 recovery areas [with at least 1 individual moving from one recovery area to the other per generation (about every 10 years)] for 3 consecutive years would constitute a viable wolf population. This goal would involve a total population of about 300 wolves. Please see Appendix 9 for further details.

Travel Corridors

Many people stressed the importance of maintaining / enhancing migration corridors, especially to increase wolf genetic diversity. Some felt that sufficient corridors do not exist now for Natural Recovery and that reintroduction of wolves is necessary. Others felt that wolves will simply lock up more land to multiple use by the protection of corridors. A major contention by many commenters was that the proposal (Alternative 1) did not designate critical habitat.

> “If reintroduction of wolves into Yellowstone does occur in 1994, it should not replace efforts to develop an effective carnivore corridor between Glacier National Park and Yellowstone.”

Response – Wolves are very good dispersers and have been documented to travel up to 550 miles. The 3 wolf recovery areas (northwestern Montana, central Idaho, and Yellowstone) are close enough to each other and are surrounded by enough public or remote private lands, that at this time, there is not an identified need to protect additional areas so wolves can successfully disperse between recovery areas once wolf populations become established in each area.

Range Requirements

One of the principal objections of wolf reintroduction, especially to Yellowstone, was that wolves would not confine themselves to the park, but would instead follow their prey onto private winter range. Others questioned whether the proposed recovery areas were large enough – given the wolf's need for very large territories.

> "How do you propose to keep them in the park? Are you going to fence them in?"

Response – Many people incorrectly assumed wolves would only occur in Yellowstone National Park. The FWS has repeatedly stated that wolf reintroduction into Yellowstone National Park would eventually result in wolves occupying areas throughout the Yellowstone area. Like almost any wildlife population, a wolf population will require active management during and after recovery to resolve the conflicts that will occasionally occur. Wolves are not dependent on any specific habitat type and can live almost anywhere there is ungulate prey. Critical habitat is not designated for nonessential experimental populations.

Unauthorized Release of Wolves

Of the 14 people who indicated concern about this issue, several expressed their objection to private citizens or groups surreptitiously bringing in wolves or wolf hybrids into a proposed recovery area to represent an already-existing wolf population in an attempt to thwart reintroduction. It was suggested by a few people that release of wolves or hybrids was being accomplished by pro-wolf forces. Some people asked what was being done to counteract such activity.

> "…special anti-wolf persons may introduce animals to prevent this project from going ahead."

Response – There have been unauthorized releases of captive wolves or wolf/dog hybrids in Montana, Idaho, and probably Wyoming. Some of those individuals have been prosecuted. To the best of our knowledge, captive wolves or wolf-dog hybrids are unlikely to impact wild wolf populations. Any attempt to capture or release wild wolves in the contiguous United States without authorization from the FWS would be a violation of the ESA and, in many cases, state law. The FWS definition of a wolf population (2 breeding pairs successfully producing at least 2 pups for 2 successive years in a recovery area) will nearly eliminate any confusion and potential delay in implementing wolf recovery programs, resulting from the potential sightings of temporary groups of captive wolves or wolf-dog hybrids that were illegally released.

Spiritual, Cultural, and Social

This issue relates to the spiritual symbolism of the wolf, its cultural significance to the West, preserving the wolf for future generations, and the benefits people ascribe to simply knowing that wolves exist in the recovery areas.

This issue is closely related to the "Enjoyment of Wolves" issue, "Wolves' Rights/Welfare/Dignity" issue, and the "Wolf As A Missing Component of the Ecosystem" issue.

> "…our spiritual lives are empty because the wolf has been systematically killed by the government over the past century."

Wolf opponents also saw the wolf as a symbol – in this case, a symbol of a disappearing western ranching lifestyle and another example of "Big Brother."

> "…reintroduction…back into the forest environment of Yellowstone National Park is not compatible with the current uses and needs of the people who must live in the three state area. Their needs must be placed far above the desires of others living in distant parts of the country and in love with the ideals of free roaming wolves.

Response – Many people commented on their values and how their spiritual, cultural, or social lives might be affected by the presence of wolves. Native Americans, in particular, emphasized the importance of the wolf to their traditional beliefs and culture. The FWS recognizes that many people have very strong values and emotions, both positive and negative, associated with wolves. The actual presence of wolves in the Yellowstone and central Idaho areas will affect the strength and intensity of these values but only with time, individual experience, and association with wild wolves are these values likely to be significantly changed or affected by wolf recovery.

Enjoyment of Wolves (Seeing and Hearing)

This issue centers of peoples' desires to see and hear wolves. This issue was almost exclusively targeted to Yellowstone National Park and not to central Idaho. An opposite opinion was that some wanted nothing less than to listen to the wolf's howl and that few tourists would see or hear it.

> "Knowing the wolf has been removed and that there is, or at least was, no chance of seeing or hearing a wolf in the park diminishes the wilderness experience in this otherwise superb showcase of nature."

Response – The FWS understands and respects the right of people to form and hold their own personal opinions about how they might enjoy or not enjoy the presence of wild wolves.

Need for Education

People in favor of wolf recovery commented on the importance of having the FWS implement a well-funding education program consisting of accurate, accessible information for the public (especially ranchers, hunters, and farmers). They asked that this program explain the history of the wolf, how it is an important component of the ecosystem, how wolves will affect recovery regions, what the recovery program is, and do so in a manner which is factual versus emotional and myth-related.

Although respondents who were for the "No Wolf Alternative" agreed on the importance of a public education program, they commented that the public should be told about the negative affects wolves would have on the livestock industry. They felt that current information unfairly glamorizes the wolf, and that the government is spreading misinformation about wolf recovery.

Respondents In Favor of Wolf Reintroduction

> "The most difficult challenge we face in advancing wolf recovery in Idaho is to create an environment in which people will allow wolves now living in Idaho to survive. To achieve this goal, Federal and state agencies must establish a lasting commitment to public education."

Some respondents would like education specifically for the ranchers:

> "Require an education program for livestock producers holding public land grazing permits."

Respondents Against Wolf Recovery Efforts

> "…the ill-informed public sentiment will keep the wolf alive until it drives the rancher off the land."

Response – Alternative 1 has been modified to increase the emphasis on education. Many of the comments on the DEIS, such as fearing for the children's safety, believing wolves will eliminate the need to control ungulate numbers by hunting, that wolves depend upon wilderness, fears about widespread economic ruin, and a belief that a "lock up" of public lands would be necessary for wolf recovery, demonstrated the need for more factual information to be provided to the public. Because of the lack of factual knowledge some people had about wolves and the ESA, some people openly state they would violate the law. This also indicates an aggressive and accurate education and information program will be a necessary part of any wolf reintroduction and management program.

Wolf Recovery in Other Areas of the Country

While wolf recovery in other parts of the country is outside the scope of this analysis, substantive comments were recorded. These are examples:

> "…(favor) expansion and addition of areas in which wolf recovery is to occur both in the northern Rockies and outside this area e.g. Colorado."

There were also those who suggested reintroducing wolves to eastern cities.

> "There were wolves in the New York City area at one time. Why not plan a few there?"

Response – While numerous requests were made to examine wolf restoration in many other areas of the United States, Congress directed that this EIS only examine wolf reintroduction in the Yellowstone and central Idaho areas. Wolf population recovery will involve the presence of wolves throughout much of western Montana, central and northern Idaho, and northwestern Wyoming.

Additional Comments and Responses a Sample of Public Comment

Following are 14 letters from the most prominent or most vocal large private organizations representing the diverse points of view and concerns about the proposal. The letters are responded to in detail as representative examples across the whole spectrum of the commentary and issues raised by the public at large on both sides of the issue.

L. David Mech and 15 other wolf experts 009978

1. Thank you for your comments. We appreciate your comments on the scientific and professional quality of the DEIS and the published scientific information which provided the basis for the analysis.

Wildlife Management Institute 008878

1. Thank you for your comment. The EIS has been corrected to read harass or take. The Glossary of Terms has been added to clarify terms as you suggested.

2. The FWS recognized that depredations on domestic animals other than those defined as livestock (cattle, sheep, horses, and mules) will occur and those conflicts must be managed. Conflicts with smaller domestic animals in Montana have been rare (1 dog was killed in 1990). However, the proposal does not allow private landowners to take wolves in the act of depredating on smaller domestic animals because those types of animals are relatively uncommon in the Yellowstone and central Idaho areas. Further, the types of wounds wolves may inflict of small animals are not so characteristic as those on larger livestock so confirmation of a wolf attack would be more difficult to document. It does not seem prudent that an endangered species, which has been reintroduced at considerable expense to the public, should be killed because it supposedly

attacked a chicken. The FWS proposal does allow these types of problem wolves to be controlled once these types of conflicts are documented by the responsible agencies. The FWS proposal further allows the states and tribes some additional flexibility to define livestock in their wolf management plans as long as the intent of the FWS's criteria for selecting cattle, sheep, horses, and mules was maintained. Also the number of wolf conflicts with domestic animals other than livestock required to initiate wolf control was reduced from 3 incidents per year to 2 incidents per year.

3. The proposal has been changed to allow natural resource agencies to implement land use restrictions around active wolf den sites between April 1 and June 30 when there are 5 or fewer breeding pairs of wolves in a recovery area as required when intrusive human activity would put wolf pups at risk. By law, critical habitat can not be designated for nonessential experimental populations and there is no indication that wolves, at least at this time, require special travel corridors to disperse between recovery areas.

4. The FWS coordinated the proposed action with other recovery plans for threatened and endangered species. Please see Appendix 7, the FWS's biological opinion on the effect of the proposed action on threatened and endangered species in Montana, Wyoming, and Idaho. The FWS believes that considerable differences exist between the habitat requirements of wolves and grizzly bears.

5. Large predators, especially wolves are key components of functioning healthy ecosystems. Coordination and integration between recovery programs for listed species, conservation programs for potentially listed species, other wildlife and natural resource programs, and the needs of people (ecosystem management) is a high priority within the FWS and other federal agencies. However, by Congressional direction this EIS only evaluates and recommends potential actions for the reintroduction of wolves to Yellowstone National Park and central Idaho.

Safari Club International 011524

1. Thank you for your comments. It is true that wolves will prey upon some male ungulates, both adults and calves. However, the impact that wolf predation will have on hunter harvest of male ungulates will be very limited. Because there are more females than males, and the age structure of females tends to be older than males in the ungulate population because of human harvest patterns, female ungulates will be disproportionately preyed upon by wolves (see Peterson et al. 1982 where there was little competition between wolves and humans for male moose in Alaska). Harvest of female ungulates is used by wildlife management agencies to control ungulate herd size to specific limits based upon habitat, damage to private property, and other objectives. Hunter harvest of male ungulates depends upon may factors (weather, calf survival, recruitment, and other mortality factors) and varies widely from year to year. The annual range of variation in human harvest of ungulates is larger than the predicted impact of wolf predation. The expected impact of 100 wolves on ungulates is predicated to be less than 10% of the reported human harvest, and 1%-2.5% of all causes of mortality, even if all wolf predation was totally in addition to other forms of mortality. Some estimates suggest the hunter wounding loss alone (minimum of 10%) is greater than the expected ungulate mortality that could be caused by wolves. In addition some ungulate herds are already above population objective levels and more tags are offered than there are hunters to use them. Therefore, any reductions required in human harvest to compensate for additional ungulate mortality caused by wolves is expected to be minor and focused on the female segment of the harvest that is used to control the overall population levels. The potential loss of female ungulate hunting opportunity and lost revenues to the state agencies are one of the costs of wolf recovery and were identified in the EIS. It is unknown how or if the states or tribes would compensate for any lost revenues.

2. The FWS has requested the states and tribes to identify excessive wolf predation on ungulates in their wolf management plans and has provided more specific guidelines in the proposal and in the Glossary of Terms.

3. The analysis indicated that wolves would generally not have a detrimental effect on bighorn sheep populations in central Idaho. The FWS recognized that in a few situations wolves might impact a specific bighorn sheep herd (or other ungulates) that are inhabiting areas without adequate escape cover or marginal habitat. Alternative 1 (the proposal) allows the states and tribes to move wolves in these situations, which were expected to be rare. Thus any potential impact would be mitigated in Alternative 1 compared to Alternative 2 (natural recovery).

4. The FWS estimated the predation rate on livestock based upon the type of management that would occur. In Alternative 1 (experimental reintroduction), wolf management is much more flexible than in Alternative 2

(natural recovery); most reintroduced wolves are radio collared and monitored; and wolves are more likely to live in areas with fewer conflicts with livestock if they are reintroduced rather than if they establish populations on their own. There Alternative 1 was expected to have a slightly lower rate of livestock depredations than Alternative 2 because of increased management flexibility, particularly on private lands.

5. The FWS did use data from Minnesota and Canada (see Chapter 4, Alternative 1, summary of Wolf Depredation on Domestic Livestock in Other Areas of North America) to estimate the rate that pets may be killed by wolves (1 incident per 22,000 households per year). Only 1 dog has been documented to have been killed by wolves in Montana since wolf recovery began in 1986. Wolf depredation on pets is expected to continue to be a very infrequent occurrence (average less than 1 a year). Currently the private compensation program only pays for wolf-caused losses to livestock and is only projected to operate until wolf populations are delisted. There are no plans in the proposal for a federal compensation program to mitigate for livestock losses to predators, other than increased funding to ADC or other agencies for predator control activities.

6. The presence of wolves was predicted to cause a slight increase in tourism. Some people indicated that they would either be more likely to visit, come more often, or stay longer if wolves were present, so that there would be an overall positive economic impact. The economic analysis did take into account a discount rate which addressed the fact that people are only willing to pay a fraction of what they theoretically say they will be willing to pay for a particularly activity (see Chapter 4, Alternative 1, Impacts on Economics).

7. You are correct that Yellowstone National Park has expressed concern on the level of visitation particularly during the winter season. However, at the present time the National Park Service has established no limit on total visitation nor seasonal limitations. The EIS relied on the visitation trends and the economic analysis conducted on likely consequences of having wolves in Yellowstone and central Idaho. The projected trends in Idaho are similar based on independent analysis. The form that any future visitation management may take in Yellowstone National Park would be unsubstantiated speculation. Whether this results in any numerical limits, overall annual limits, limits by area, limits by season, or other forms is unknown. Current evidence indicates that more people will visit the areas with wolves and others will extend an already planned visit. This results in increased economic activity.

8. The predicated potential impact of wolf predation to big game hunting opportunity is limited and focused on female ungulate harvest (a hunting activity that primarily involves residents). No significant impact was specifically anticipated to nonresident hunting opportunity or revenue. The value placed on lost net social benefit due to reduced harvest and the reduced expenditures by hunters was based upon values derived from resident and nonresident hunting. These economic impacts are displayed in Chapter 4, Alternative 1, Impacts on Economics, Value of Foregone Benefits to Hunters. The visitation surveys indicated that desire for hunting opportunities in areas that contain wolf populations may actually increase demand for nonresident hunting licenses in Montana, Wyoming, and Idaho.

9. The FWS recognizes that wolf population levels above recovery levels, will ultimately be decided by the states and will almost certainly involve control by public harvest. The size and stability of wolf populations will depend on these state's management objectives outlined in state management plans. Uncontrolled wolf populations can have a wide range of effects on ungulate populations depending on a host of other interacting factors, ranging from a positive effect to a severely negative effect. An uncontrolled wolf population will certainly have more of an effect on ungulate populations than that predicated for a recovered wolf population. An uncontrolled wolf population would likely cause more livestock losses and possibly effect hunting opportunity more than predicated for a recovered wolf population but little other economic impact would result. Since the territorial behavior of wolves is a primary factor regulating their density, there would likely be a more widespread but not more severe impact to other types of wildlife, including other predators and listed species if wolf populations were totally uncontrolled by people. Wolves, like any other wildlife species, will require some management by people and for these reasons the proposal includes measures to address affects on domestic livestock and management of ungulates.

Sierra Club 008880

1. Thank you for your comments. The proposal recommends the use of nonessential experimental population rule [Section 10(j)] to facilitate wolf reintroduction into Yellowstone National Park and central Idaho. Wolves historically occupied nearly all of North America and lone wolves have been documented to disperse 550 miles, so almost no area of North America could be considered solely geographically separate to individual wolves. At the present time, and despite reasonable monitoring efforts, no breeding pairs of wolves have

been documented in either of the proposed experimental areas. Therefore, while lone wolves have occasionally been documented in these areas, and other areas of the western U.S., for several decades, no wolf population has developed or been present. These areas are separate from existing wolf populations. There is no geographic overlap between the existing wolf population in Montana and either of the proposed experimental population areas. The proposed experimental population areas are therefore outside the current range of the species. The proposal recognizes that if breeding pairs were discovered in either or both of these areas before wolves were reintroduced that the area occupied by those breeding pairs could not be included within an experimental area. Those wolves would have most likely resulted from natural dispersal from the northwestern Montana wolf population and therefore would not be considered separate from existing wolf populations. See Appendix 8 and Appendix 11 for additional information.

2. The FWS and its cooperators have been looking and recording wolf and wolf pack activity for over 20 years throughout the northern Rocky Mountains of the U.S. Wolf packs are very visible, they leave distinct tracks, scats, kills, and have very distinct howling. If wolf packs had existed in either Idaho or Wyoming, it is highly probable that they would have been located and documented. Newly forming wolf packs in northwestern Montana have been documented using methods that are applied throughout Idaho, Montana, and Wyoming. Please see Appendix 12 which discusses the results of these wolf monitoring programs.

3. Critical habitat can not be designated for nonessential experimental populations. Wolves simply need prey and to not be excessively persecuted by people. Habitat conditions in the Yellowstone and central Idaho are more than adequate to support recovered wolf populations. There are 100,000 to 250,000 ungulates in these areas.

National Audubon Society 009987

1. Thank you for your comments. Please see answer #1 to Sierra Club above.

2. Please see answer #2 to Sierra Club above.

3. The proposed experimental areas do not include breeding pairs of wolves although they likely do include one or more individual wolves. However, lone wolves have been documented throughout these areas for decades without breeding pairs forming or persisting. One of the purposes of the ESA is to recover listed species; the presence of lone wolves in those areas has not, at least up to this point of time, resulted in wolf populations developing. The experimental population line in Montana was adjusted northward to the Missouri River because few reports of wolves occurred south of it. The pattern of sightings in recent years indicates the Missouri River may act as a geographic feature affecting the movement patterns of wolves. This may influence naturally dispersing wolves as well as reintroduced wolves dispersing out of Yellowstone National Park.

4. The definition of harass and take for the purposes of the proposed action have been clarified in the Glossary of Terms. This should clarify exactly what a private individual will have authority to do.

5. The FWS can not turn over its authority for endangered and threatened species, including wolves, to the states or tribes until they are delisted. However, the FWS can, through cooperative agreements and other documents permit the states and tribes to lead implementation of wolf restoration efforts, as long as those programs are within the authorities of the ESA and within the provisions of each experimental population rule.

6. Wolf populations require very few land-use restrictions to successfully recover. See Appendix 13 for further information. However, the proposal was modified to recognize that in some limited situations, particularly during the earliest phases of recovery, some restrictions around active den sites may be necessary.

7. Wolf populations will be recovered in the primary analysis areas, unless states or tribal wolf management plans expand those areas. The 10 breeding pair per area for three consecutive years is a minimum goal not a maximum number to be managed down to. Wolf populations falling below the minimum number could be relisted following procedures in the ESA (including emergency listing). The wolf populations will not be isolated as you suggest.

The Wolf Recovery Foundation 013880

1. Thank you for your comments. Your alternative “Augmentation plan” was one of the alternatives considered and was substantially addressed in Alternative 5 which was reintroduction of non-experimental wolves. That alternative would have used reintroduction of wolves under full protection of the ESA to enhance or “augment” the natural recovery of wolves as portrayed under Alternative 2 (the basic management strategy you recommended). There were so many various blends of the 5 basic alternatives suggested by various public’s during alternative scoping that it was unreasonable to separately analyze each permutation as a separate alternative.

2. The proposal is designed to use adaptive management or “learn by doing” to reintroduce and recover wolf populations. Reintroduction techniques and management strategies have been modified in the EIS to more fully protect wolves during the early stages of recovery. This should assure that management flexibility can respond to as yet unforeseen complications. In their comments on the DEIS, Dr. L. David Mech and 15 other of the most respected wolf biologists in North America believed that “adoption of this plan should result in a recovered wolf population in the general timetables outlined in the document”.

3. The FWS recognizes the importance of public information and education. The proposal was modified to strengthen the public education and law enforcement component (Please see Chapter 2, Alternative 1). All phases of any wolf recovery program would be closely coordinated with other interested parties, particularly the states and tribes, to increase local involvement and avoid duplication of effort.

4. Humane treatment of wolves will be a top priority in any wolf reintroduction program. Any reintroduction program will be continually modified based upon experience to reduce costs and improve effectiveness. At the current time it is unknown if hard or soft release techniques will be the most effective at restoring wolf populations. An extensive peer review was used to develop the techniques experts initially believed were most likely to succeed (see Appendix 4).

5. The FWS believes that efforts to locate wolf pack activity in Idaho has been adequate to locate any packs present. Please see Appendix 12 that has been added which summarizes monitoring efforts and results and above response #2 to comments by the Sierra Club.

6. A “No Action” alternative simply means that the management program that alternative is not different than the one now being used. No action can be thought of as “no different management action than is currently being used”. The program now in place in Montana and the one that would be used in Idaho if wolves were discovered, is basically Alternative 2 (Natural Recovery).

American Farm Bureau Federation 012183

1. Thank you for your comments. There was an exhaustive and thorough scoping process that identified a wide range of issues related to wolf reintroduction. The Farm Bureau’s comments were incorporated into that process (see Chapter 1, Scoping of Issues). While all issues were considered, some were not evaluated further because they were based on misinformation, were subsets or slight variations of other issues that were considered in detail, or were not significant to the decision being made. The reasons issues were or were not evaluated further were discussed in detail in Chapter 1, Scoping of Issues. The sheer volume of comments received during development of the proposal and the DEIS made it unreasonable to respond specifically to every issue in every letter.

2. Healthy wild wolves pose no significant threat to people (see Appendix 14). Like any mammal, wolves can contract rabies or other diseases that could potentially be transmitted to humans. However, the issue was thoroughly investigated and conclusions discussed in Chapter 1, Scoping of Issues, Impact of Wolf Recovery on Diseases and Parasites and Impact of Wolf Recovery on Human Safety/Health (also see Appendix 14 and 15).

3. As required by law, the EIS fully evaluated the potential effect of wolf recovery on other listed species, including woodland caribou, and found there are likely to be no significant impact (please see Chapter 1, Scoping of Issues, Impact on other Endangered Species and Appendix 7).

4. While there is some scientific debate about the potential number and type of subspecies of gray wolves that historically inhabited the Northern Rocky Mountains, wolves were certainly native to the park. Furthermore,

there is little concern that hybridization will be a significant impact to wolf recovery because it has not been a significant factor to gray wolf population anywhere else in North America where wolves, coyotes, and does coexist. (please see Chapter 1, Scoping of Issues, Wolf Subspecies, Wolf/Dog/Coyote Hybridization, and Wolves Not Native to Yellowstone Park).

5. The issue of wolf subspecies is very confusing to many people who are not familiar with taxonomic study and the taxonomic history of the gray wolf. This issue is important to the understanding of wolf recovery efforts in the Northern Rocky Mountains of the U.S. and was examined in detail including scientific peer review (please see Chapter 1, Scoping of Issues, Impact of Wolf Recovery on Wolf Subspecies).

6. Wolves are a highly adaptive species and can utilize a wide variety of habitats and prey items. Wolves take from almost any area of North America could learn, adapt, and thrive in the northern Rocky Mountains of the U.S. within a relatively short time frame (a few years or generations). A peer review of potential reintroduction techniques (please see Appendix 4) indicated that the greatest opportunity for a successful reintroduction would occur if wild wolves, that were accustomed to preying on elk and deer in mountainous habitat (or possibly bison), were used for reintroduction. The best place to obtain wolves for reintroduction into the Yellowstone and central Idaho areas would likely be areas in the Rocky Mountains of Alberta and British Columbia. If a reintroduction were to occur, the specific areas where wolves would be captured would have to be closely coordinated with Canadian authorities. A review of the efforts to locate wolf and wolf pack activity in the Yellowstone area is documented in Appendix 12.

7. Please see the above responses to similar concerns expressed by the Sierra Club (please see Chapter 5, Responses to Example Letters, Sierra Club).

8. The proposal was developed with a high level of coordination with state and local involvement (please see Chapter 5, Consultation and Coordination of the Proposal and EIS). Any potential regulations (such as nonessential experimental population rules) developed as a result of this EIS would undergo further public review and NEPA compliance was required by regulation.

Mountain States Legal Foundation 010365

1. Thank you for your comments. ESA requires that all federal agencies “conserve” listed species…using all methods and procedures which area necessary…procedures include but are not limited to…live trapping and transplantation. Animal reintroduction is a widely used, scientifically accepted, and a very successful wildlife management technique. Reintroduction has been one of the most important techniques used to restore many of the wildlife species in North America, such as bighorn sheep, elk, moose, geese, turkeys, and many types of fish, to name only a few. The FWS and cooperators have obtained or reintroduced various species (adults, young, and eggs) from other countries that are listed in the ESA such as Mexican wolves, grizzly bears, woodland caribou, whooping cranes, and peregrine falcons, to facilitate recovery programs in the U.S. The FWS believes that cooperation with other agencies and countries is within its authorities under the ESA, particularly when such reintroductions involve establishment of nonessential experimental populations.

2. Yellowstone National Park was part of the natural habitat of gray wolves in North America. Wolf populations were extirpated from the park by 1930, and if there was a subspecies of wolf unique to that area then it does not now exist. However, more modern taxonomic studies indicate that there were far fewer subspecies of wolves than previously believed and the subspecies of wolves that historically inhabited the Yellowstone and central Idaho areas were much more widely distributed than previously believed. Please see Chapter 1, Scoping of Issues, Impact of Wolf Recovery on Wolves Because Wolves Were Not Native to Yellowstone National Park, and Impact of Wolf Recovery on Wolf Subspecies, and the above response to the Sierra Club, for further information.

3. The ESA defines “endangered species” as any species which is in danger of extinction throughout all or a significant portion of its range. Wolves are currently absent from about 99% of their historic range in the contiguous United States. Wolves were listed as endangered species under the procedures outlined in ESA in 1974.

4. The FWS and it cooperators have searched for wolves and wolf pack activity for over 20 years without documenting it in either the Yellowstone or central Idaho areas. Please see Sierra Club response #2 and Appendix 12 for additional information.

5. The gray wolf population in northwestern Montana is outside of the proposed nonessential experimental population areas for Yellowstone National Park and central Idaho. Please see the above response #1 to the Sierra Club.

6. Wolves have been documented to occasionally fight with or even kill grizzly bears but such instances are rare. A review by grizzly bear and wolf biologists throughout North America and Europe indicate that grizzly bears and wolves coexist and there was no projected impact to grizzly bear populations that would result from wolf population recovery. Please see Chapter 1, Scoping of Issues, Impacts of Wolf Recovery on other Endangered Species and Appendix 7 for further information.

7. The EIS took a hard look at the potential effects of various alternatives that address the issue of wolf reintroduction into Yellowstone National Park and central Idaho. Studies on the potential effects of wolves go back to 1988. The public involvement process was very detailed and exhausting and all the potential impacts identified by the public were addressed in the EIS. Please see Chapter 5, Consultation and Coordination of the Proposal and EIS; Chapter 1, Issue and Alternative Scoping; and Chapter 4, Environmental Consequences for further details.

8. If the decision involves special regulations (such as experimental population rules) then the legal process required to develop those regulations would be followed. Implementation of any experimental population rule would require publishing a draft rule in the Federal Register, public review, appropriate NEPA compliance, and publication of the final rule. However, the EIS does clearly state the number and types of wolves that would be released as well as all management restrictions that might be imposed. Please see Chapter 2, Alternative 1, and Appendix 4.

9. The proposal does not violate the takings clause of the Fifth Amendment. Please see above response to the American Farm Bureau Federation and Appendix 6.

10. Healthy wild wolves are not a significant threat to human safety in North America despite several stories, old “news” reports, and myths to the contrary. Unfortunately, many people continue to confuse the potential threat to human safety from wild wolves (virtually none) with human injuries inflicted by captive wolves or captive wolf/dog hybrids (dogs are estimated to injure nearly 200,000 people per year in the U.S. seriously enough to require medial attention). This issue was addressed in detail, please see Chapter 1, Scoping of Issues, Impact of Wolf Recovery on Human Safety/Health and Appendix 15.

11. Wolves will not destroy ecological balance within the park but will in fact contribute to a more complete ecosystem. Reintroduction of wolves does not violate the National Park service Organic Act but in fact contributes to the National Park Service’s responsibilities under ESA, its Organic Act and National Park Service Policy. Please see Chapter 1, Legal Context and Chapter 4, Environmental Consequences for further information.

The Wolf Fund 013747

1. Thank you for your comments. The management strategy outlined in the proposal attempts to address many of the concerns of local citizens about wolves and their management under the ESA while promoting a reasonable rate of gray wolf population recovery. Please see response #2 to the Wolf Recovery Foundation for further information.

2. The proposal has been modified to enhance education and information efforts to address as many of the concerns of local residents as possible. In addition, the proposal maintains the position that very few, if any, land use restrictions are required to achieve wolf population recovery to demonstrate that endangered species recovery need not impact local uses of public lands.

3. The proposal has been modified to clarify the FWS’s intent to involve the states and tribes in wolf recovery. Please see Chapter 2, Alternative 1, *Who will manage wolves?,* for further information.

Abundant Wildlife Society 010360

1. Thank you for your comments. The EIS has consistently and clearly states that the reintroduction of wolves into Yellowstone National Park will result in wolf populations establishing themselves throughout

approximately 17,600 mi^2 to 29,130 mi^2 in and around the park. The first brochure published about the EIS process “Congress Directs EIS on Wolf Reintroduction to Begin” (April 1992) stated, “The park is the core of the Greater Yellowstone Area, which is more than 69% (11.7 million acres) federal land”…”A large amount of the land in the northern Rocky Mountains is owned by the public, but wolf populations, like many wildlife populations, will not confine their movements solely to public lands”. This information was also provided in other subsequent EIS brochures and reports and the DEIS. Please see summary tables in Chapter 2 (Tables 2-5, 2-6, and 2-7) for further information about the expected areas that wolf populations will occupy under various management strategies.

2. Wolves were native to the area now designated as Yellowstone National Park. An expert review of various wolf related issues (*Wolves for Yellowstone?* Vol. II) indicated all the experts agreed that wolves were native to the park area. The theory that wolves did not occupy the park until forced there by human persecution ignores basic wolf behavior and the factors that regulate wildlife population distribution and density. Wolf packs are highly territorial and usually will attack and often kill any strange wolves. Lone dispersing wolves are wary of trespassing in neighboring pack territories and seek out areas without resident wolf packs to try and establish new pack territories. If there were habitat to support prey (ungulates) in the Yellowstone National Park area then wolves would have always been able to live there. Although it will never be known what the historic and prehistoric record is clear that wolves were part of the animal community in the area that became Yellowstone National Park for at least the last several thousand years.

3. The FWS proposal does not include a federal program to directly compensate livestock producers for livestock killed or maimed by wolves. The EIS does recognize that a private program exists and encourages livestock producers to take advantage of the program if they choose to. The proposal does include a federal funded ADC or other agency program to control any problem wolves. In Montana the agency control and private compensation program have been very effective. Since 1987, 17 cattle and 12 sheep have been documented killed by wolves and the compensation program has paid those producers nearly $12,000. While the cause of some livestock losses will never be known, the radio telemetry monitoring of wolves, as has occurred in Montana (there would even be closer monitoring of wolves in Yellowstone and central Idaho since initially nearly all wolves would be radio-collared) has greatly aided to quickly identifying losses and controlling problem wolves.

4. The FWS or individuals employed by the FWS have and can be sued for liable and other charges. Each case would go through standard legal processes and be decided upon its merits according to law.

5. Wolves are not a significant threat to human health or safety in North America. Please see response #2 to the American Farm Bureau Federation.

6. Please see responses #4 and #5 to the American Farm Bureau Federation and response #2 to the Rocky Mountain States Legal Foundation.

7. The potential for wolf-dog-coyote hybridization is not a serious threat to the recovery of gray wolf populations in the northern Rocky Mountains of the U.S. Dogs (including wolf-dog hybrids) or wolves legally held in captivity (breeding stock obtained prior to the ESA or if appropriate permits had been obtained) are not protected by the ESA. Anyone who choose to shoot a “dog” in areas reasonably suspected to be occupied by a wild lone wolf or wolves is responsible for their actions and could be persecuted under the ESA, if the animal in question was a wild wolf. Each case would be judged on its merits. In Montana, to date, 2 livestock producers reported shooting what they thought was a large dog threatening livestock near their house, another person in Wyoming shot a wolf that he said he believed was a coyote. All these individuals reported the incidents and fully cooperated with authorities. Based upon the individual circumstances of each case, none of these individuals has been prosecuted. Please see response #4 to the American Farm Bureau Federation.

8. Unless there is a change in the law or the listing status of wolves, the recovery efforts for gray wolves will continue until wolf populations become established in the Yellowstone and central Idaho areas, which is estimated to take 3-5 years of reintroductions leading to recovery about 2002. Once established, the wolf population would be managed under the experimental rules, and be encouraged to naturally increase until the wolf population meets recovery levels. A letter commenting on the DEIS from Dr. L. David Mech and 15 other of the top wolf experts in North America stated “we wanted to emphasize our agreement on a critical point: adoption of this plan should result in a recovered wolf population in the general time tables outlined in the document.”

9. The EIS portrays the potential effect of wolf population recovery on ungulate populations and hunting opportunity as well as can be predicted without wolves actually present in the Yellowstone and central Idaho ecosystems. The effects of wolves on ungulate populations has been extensively studied in North America and that information used in developing models that predicted the effect of a recovered wolf population in the Yellowstone and central Idaho areas (see *Wolves for Yellowstone?* Reports, 1990 & 1992, for more detailed information on methods and results). The FWS has also provided funding to investigate the effects of wolves on ungulate populations (about 40 white-tailed deer, 40 moose, and 40 elk, all adult females were radio collared and intensively monitored since 1990) in and near Glacier National Park where about 45 wolves live. Wolves killed 10 (mainly deer), mountain lions killed 14 (mainly elk), bears killed 7, humans killed 7, coyotes killed 3 deer, and unknown causes killed another 4 radio collared ungulates. These date indicated that ungulate mortality rates were not unusually high or that ungulate populations were being decimated by predation. In the Yellowstone area wolves are expected to prey primarily on elk, and in central Idaho, mule deer. The potential effect of wolves on hunting opportunity, if any, was a slight decrease in permits to hunt some types of female ungulates. In addition, the proposal permits, under certain conditions, the states and tribes to define when wolves are severely impacting ungulate populations and provides them the flexibility to address those unlikely situations, if they arise. Please see Chapter 2, Alternative 1 and Chapter 4, Alternative 1, Impacts on Ungulate Populations for further information.

10. The EIS clearly defines a viable wolf population and the criteria for delisting. Please see Appendix 9 and Appendix 11.

11. Wolves probably do not know or care if humans are trying to benefit or harm them; they are animals that are likely trying to live their lives as nature intended. Wolf recovery, like most wildlife management programs, is conducted by people for the benefit of people. Many people indicated they supported wolf recovery because they (people) wanted to know that wolves again roam historic habitat in the western U.S. and that the world's first National Park, Yellowstone, is a more complete ecosystem with wolf populations present. Misinformation and misperceptions do contribute to some public resentment of wolves and the "shoot, shovel, and shut-up" attitude that is promoted by those that would deliberately violate the law. The proposal has been modified to emphasize the role of an accurate public information and education in fostering successful wolf recovery efforts.

12. The EIS process is not a vote. NEPA procedures mandate that the EIS process be open to a national audience. Since the ESA is federal law and public lands (National Parks, National Wildlife Refuges, National Forests, and Bureau of Land Management lands) are managed for the benefit of present and future generations of American, everyone should have the opportunity to contribute their ideas and thoughts. The final proposal has been modified in response to substantive public comment and contains provisions to address concerns of local and regional publics.

13. Wolf Recovery is consistent with National Park Service Policy. Please see the above response #11 to the Rocky Mountain States Legal Foundation.

14. The effect of the proposed action on other threatened and endangered species was evaluated in accordance with current law and regulations. Wolf recovery will not jeopardize the habitat or populations of other endangered or threatened species. The results of that evaluation are contained in Appendix 7.

15. The table that summarizes the impacts of the various wolf management alternatives has been clarified. Under the No Wolf Alternative the table has been changed to read "no new or additional impacts" since wolf populations currently do not exist in the Yellowstone or central Idaho areas and under this alternative they would likely not exist in the future. After being extirpated in the 1950s, wolf packs did not recolonize southern B.C., southern Alberta, or northwestern Montana until they became legally protected from unregulated human-cause mortality. In Alberta and B.C., some areas, by intention, do not have wolf populations because of unregulated human-caused mortality.

16. Please see above response #9 to your letter.

17. The impact of wolf populations will be within the primary analysis areas in the Yellowstone and central Idaho areas. The experimental population areas include a much larger area because individual wolves can occasionally travel long distances. The potential impact of an occasional lone wolf traveling outside the primary analysis area is too small to be measured or to be a significant impact on livestock losses, big game, hunting opportunities, land use restriction, visitor use, or economics. By having a large area covered under the experimental rule, the management flexibility to deal with an occasional wandering wolf is increased. In

addition, the states and tribes also will have more flexibility to incorporate the concerns of their constituents into their respective wolf management plans.

18. Wolf den were historically reported inside Yellowstone National Park, so there is no doubt that some wolves can live and den solely within the park. A panel of wolf experts estimated that the park itself could support about 13 wolf packs based solely upon year-round pry abundance in the park. Most of these wolves would live on the northern range. However, wolves will den in a variety of habitats throughout the Yellowstone area, both within and outside of Yellowstone National Park. The FWS has made it clear that the ultimate impact of reintroducing wolves into the park will be that wolf packs will occur throughout the Yellowstone area. The proposal includes provisions including allowing private land owners to harass wolves on their land, to kill wolves attacking livestock on private land, to kill wolves attacking livestock on private land, and control of problem wolves by management agencies when they attack livestock.

Defenders of Wildlife 011514

1. Thank you for your comments. The proposed action in the FEIS has been modified to include the potential use of some land use restrictions if necessary when there are 5 or fewer wolf packs in the recovery areas. If necessary, these potential restrictions were intended to be used near active den sites on a seasonal and as needed basis. At this time it is highly unlikely that road density guidelines would be applied, particularly over a broad area.

2. A Glossary of Terms has been added to the FEIS which includes a definition of the term opportunistic, non-injurious harassment.

3. Please see above response #1 to the Sierra Club about efforts to monitor wolf activity in Idaho. Please also see Appendix 12.

Idaho Cattle Association 010799

1. Thank you for your comments. Having wolf populations in the Yellowstone and central Idaho areas will not significantly impact the spread or prevalence of rabies or other diseases that can be contracted by canids. Please see Chapter 1, Scoping of Issues, Impact of Wolf Recovery on Disease and Parasites, and the above response #2 to the American Farm Bureau Federation.

2. As directed by Congress, the EIS only addresses wolf reintroduction into Yellowstone National Park and central Idaho. Under the proposal, wolf population recovery will occur in the primary analysis areas. Known (marked) wolves, introduced as experimental animals that move into other states can be captured and returned to the primary analysis areas on a case by case basis. Eventually other states may elect to recover or reintroduce wolf populations in their areas, but in all likelihood, gray wolves will be recovered and delisted by that time and management would be under the jurisdiction of the respective states.

3. Wolves are not a significant threat to human life or safety in North America. The ESA and the proposal already allow for the taking of listed species that threaten human life and safety, but in the case of wolves this situation would be highly unusual. Please also see response #2 to the American Farm Bureau Federation.

4. The proposal will not affect Constitutional private property rights. Please see Appendix 6 for further information.

5. Wolf predation on livestock is predicated to be a very minor factor in the overall rate of livestock losses in Idaho, Wyoming, and Montana. Within the primary analysis areas annual livestock losses from all causes in each area are already about 21,000 to 22,000 head. Livestock depredations by a recovered wolf population is expected to cause another 10-19 cattle and 57-68 sheep losses per year in each area. This level of loss will not effect the livestock industry in either area. Please see Table 3-59 at the end of Chapter 3 and Chapter 4, Alternative 1, Summary of Wolf Depredations on Domestic Livestock in Other Areas of North America, for further information.

6. The cost estimates for each alternative were presented as accurately as possible. The Wolf Management Committee costs were given as they appeared in the Committee report given to Congress in May 1991. The

additional costs of potential delays in wolf recovery, potential litigation, an exceptionally high level of illegal activity, or other unforeseen or unpredictable factors were not included as part of the cost of any alternative.

7. Livestock losses were predicated as accurately as possible given the fact that few, if any, wolves currently exist in the Yellowstone or central Idaho areas. Depredation rates were based on data from Canada and Minnesota from areas where wolves and livestock coexist. In northwestern Montana, livestock losses to wolves (where about 75 wolves now live), since 1987 when the first depredation in recent history occurred, have averaged about 2.4 cattle and 1.5 sheep per year. Sixteen wolves have been controlled to reduce further losses. The Defenders of Wildlife compensation program has paid a total of about $12,000 to all those producers who have verified or probable losses caused by wolves since 1987. Livestock losses will probably effect a small number of producers each year but it is highly unlikely that catastrophic losses will occur to any producer. Please see the above response #4 to the Safari Club International and Chapter 4, Alternative 1, Impacts on Domestic Livestock.

8. The projections of increased visitation and increased economic activity were developed by an independent team associated with the University of Montana. When you consider that visitors to Yellowstone National Park are estimated to annually spend about $425,000,000 in Wyoming, Montana, and Idaho and that the issue of this EIS about wolf recovery generated a record number of public comments (160,284) it does not seem unlikely that areas such as Yellowstone and central Idaho will become more attractive for some people to visit more often or stay longer and thus generate more revenue to the local economies than will be lost in occasional livestock depredations or a slight lost opportunity hunting for female ungulates. Both the expected positive and negative economic aspects are described in Chapter 4, Alternative 1, Impacts on Economics for display of economic effects.

9. The number, distribution, and persistence of wolves needed to determine if a wolf population would be eligible for delisting has been carefully investigated using scientific methods and peer review. Appendix 8 and 9 discuss the basis for the population objectives and Appendix 11 has been added which describes the recovery goal and delisting process.

10. This has been corrected to read that Idaho Fish and Game is prohibited from participation in wolf recovery issues without expressed permission of the legislature.

11. The proposal encourages the state of Idaho and tribes to become active participants in wolf recovery activities, with funding assistance from the FWS. The states are even encouraged to lead implementation of the proposed rule through their own wolf management planning process, as long as it is within the provisions and intent of the experimental population rule. However, the FWS can not give its authority to recovery listed species to the states until populations are recovered and delisted according to the provisions of the ESA. The FWS fully intends that wolves be recovered and delisted as soon as possible and clearly has supported sole state and tribal authority at that time. See Appendix 11 for further information.

Western Environmental Trade Association 009995

1. Thank you for your comments. Wolves are an extremely adaptable species compared to many in North America. Unless about 30% or greater of a wolf population is deliberately killed by people each year, wolf populations will expand. Therefore, wolves could live in a wide variety of habitats in North America where there is food (ungulates) and there were minimal conflicts with domestic animals. Wolves simply need to be tolerated by people and not deliberately prosecuted. Contrary to popular belief, wolves are not nocturnal, secretive, or wilderness dependent animals. The reason that wolves only existed in remote wilderness areas in the 1930s through 1970s, is because those remote lands were the only places that wolf populations survived human persecution. Because of the vast tracts of public land, low human density, abundance of ungulates, legal protection from unregulated human killing, and their life history and behavior, wolves in the northern Rocky Mountains of the U.S. need almost no land-use restrictions. Alternative 1has been modified to allow some land use restrictions if they become necessary to reduce intrusive human disturbance to be applied around active den sites from April 1 to June 30 when there are 5 or fewer packs. Please see Appendix 13 for further information.

2. A recovered wolf population has been clearly defined in the EIS as 10 breeding pair, in each of three recovery areas (central Idaho, Yellowstone, and northwestern Montana) for three successive years with some limited interchange between the recovery areas (a total of about 300 wolves). Please see Appendix 9 for further information and Appendix 11 for delisting procedures.

3. The economic analysis looked at the costs (livestock losses, existence value of not having wolves present, potential lost hunting opportunity for some types of ungulates, and management costs) and benefits (increased visitation, existence value of having wolves present) of a recovered wolf population in Yellowstone and central Idaho. Under the proposal, the presence of a wolf population resulted in an estimated annual positive net economic effect of $6-$8.6 million for Yellowstone and $5.6-$8.4 million for central Idaho. Please see Chapter 4, Alternative 1, Impacts on Economics for display of analysis.

The Wildlife Society 009980

1. Thank you for your comments. The potential for using land-use restrictions during the early phases of wolf recovery has been added to the proposal. Please see Chapter 2, Alternative 1.

2. The proposal has been modified to shorten the reporting period for private individuals both harassing (7 days) and taking (as soon as possible, but no later than 24 hours) wolves. In addition a Glossary of Terms has been added to the EIS.

3. The proposal has greatly emphasized the importance of an aggressive but balanced public education and information program as well as an increased law enforcement program to ensure compliance with any experimental population regulations. Please see Chapter 2, Alternative 1.

List of Preparers

The Environmental Impact Statement was prepared under the supervision of the U.S. Department of Interior, Fish and Wildlife Service.

Important Notice

The FWS has sole responsibility for the content and direction of the FEIS. Participation or review by technical representatives of other agencies does not imply concurrence, endorsement, or agreement to any recommendations, conclusions, or statements in the FEIS. All public comments, including those from agencies that participated in the development of the DEIS, were addressed and are available for public review.

Persons who contributed to the preparing of the statement or where formally requested to be involved in its review are listed below.

Gray Wolf Interagency EIS Team

This team bears primary responsibility for preparing the plan. The members are:

Ed Bangs – U.S. Fish and Wildlife Service, Wildlife Biologist. Gray Wolf EIS Project Leader. Responsible for plan development, direction, and content.

Carol Tenney – U.S. Fish and Wildlife Service, Data Automation Clerk. Responsible for coordinating correspondence, mailing lists, and Team administrative support.

Steve Fritts – U.S. Fish and Wildlife Service, Wolf Recovery Coordinator, Northwestern U.S., Responsible for wolf science expertise.

Wayne Brewster – National Park Service, Research Administrator. National Park Service representative on Gray Wolf EIS planning team.

John Mack – Biological Technician, Yellowstone National Park. Responsible for compiling and analyzing ungulate data for the Yellowstone portion of the DEIS and FEIS.

Laird Robinson – USDA Forest Service Representative. Public Affairs Specialist. Responsible for Public Participation Expertise.

Jerone Hansen – Idaho Department of Fish and Game Representative, responsible for preparation of central Idaho portion of EIS.

Jan Rachael – Idaho Department of Fish and Game, Wildlife Biologist. Responsible for preparing central Idaho portion of EIS.

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Other University of Montana team members include: Dr. Dan Pletscher (wildlife biologist, Professor School of Forestry), Dr. Claire Montgomery (economist, Asst. Professor School of Forestry), Dr. David Patterson (statistician, Assoc. Professor, Department of Mathematical Sciences), Dr. Stewart Allen (social psychologist and recreation specialist, consultant, formerly taught at University of Idaho), and Chris Neher (economics and computer specialist, M.A. economics, University of Montana).

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Issue Scoping Content Analysis Team

Team that analyzed public comment during issue scoping (April-May 1992).
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DEIS Technical Review and Coordination Team

This group was formally requested to review and provide oversight on the draft Gray Wolf EIS. They were kept informed of DEIS progress but were not requested to provide specific comments before the draft was released for public review. They represent unique wolf management and recovery or EIS expertise or represented agencies that were potentially affected by a decision on wolf reintroduction in Yellowstone National Park or central Idaho.

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Glossary

Glossary of Terms

Glossary of Terms

Alternatives – Different ways that wolves could be reintroduced to or managed in the Yellowstone National Park and central Idaho areas. Five alternatives were developed and considered in depth in this EIS.

Breeding Pair – An adult male and an adult female wolf that have produced at least two pups that survived until December 31 of the year of their birth, during the previous breeding season.

Chronic Problem Wolves – Wolves that have been confirmed to have depredated on domestic animals at least once after an initial depredation and relocation because of depredations on domestic animals.

Compensation – Payment to owners of livestock that had livestock killed or maimed by wolves to compensate for the lost monetary value of the livestock.

Control – Deliberate planned management of wolves to minimize human-wolf conflict. This includes establishing barriers (i.e., noise makers, guard dogs, moving and herding livestock, or building fences), harassing wolves, aversive conditioning of wolves, capturing problem wolves and releasing and monitoring them on site, capturing problem wolves and relocating them to other areas, placing problem wolves in captivity, or killing problem wolves.

Critical Habitat – The specific areas within the geographical areas occupied by a species at the time it is listed on which area found the physical or biological features essential to the conservation of the species and which may require special management considerations or protection. Critical habitat can not be designated for nonessential experimental populations.

Cumulative Effects/Impacts – The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonable foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place of a period of time.

Delist – to remove a species, subspecies, or population from the federal list of threatened species and endangered species and subsequent protection of the Endangered Species Act. This action, in effect, places the species, subspecies or population under management authority of the states or tribe.

Depredation – The confirmed killing or maiming of lawfully present domestic livestock on federal, state, tribal, or other public lands, or private lands by one or more wolves, accompanied by the likelihood that additional livestock will be killed or maimed by wolves. The FWS, ADC, or FWS authorized state or tribal agencies will confirm killing or maiming of domestic livestock.

Domestic Animals – Any animal purposely raised (fed, cared for, or sheltered) by humans and usually dependent upon humans for it survival. This would include livestock, food/fiber animals, captive game animals, fowl, working animals, guarding animals, and pets.

Downlist – A change of the classification of wolves from “endangered” to “threatened.” This change in classification could occur for either the Yellowstone or central Idaho experimental populations after either reached ten breeding pairs for three consecutive years. All wolves in Wyoming, Montana, and Idaho could be reclassified to threatened when tow of the three sub-populations in the meta-population identified in the recovery plan reached ten breeding pairs for three consecutive years.

Effects/Impacts – Effects (or impacts) may be direct, which are caused by the action and occur at the same time and place, or indirect, which area caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems. Effects include ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative. Effects may also include those resulting from actions which may have both beneficial and detrimental effects, even if on balance the agency believes that the effect will be beneficial.

Endangered Species – Any species which is in danger of extinction throughout all or a significant portion of its range and which is formally listed as endangered under the Endangered Species Act.

Endangered Species Act of 1973, as amended. 16 U.S. C. 1531 et seq. *(ESA)* – Congressional Act which provides for the listing and protection of endangered and threatened fish, wildlife, and plants.

Experimental Population – A 1982 amendment to the Endangered Species Act established the experimental population designation [Section 10(j)] and defined an experimental population as: "… any population (including any offspring arising solely therefrom) authorized by the Secretary for release under paragraph (2), but only when, and at such times as, the population is wholly separate geographically from non-experimental populations of the same species." Further in the amendment it was made clear that the term applies to populations that are derived from endangered or threatened species for which the Secretary of Interior has determined that a release will further the conservation of that species. The experimental population designation denotes more flexible management for introduced endangered species or threatened species.

Experimental Population Area – Designating an experimental population must include a description of the area in which such population will be found and where it will be identified as experimental. This establishes, in effect, the experimental population area, in which the experimental population rules apply. Outside those boundaries the gray wolf (except in Minnesota) is protected as an endangered species. The experimental population area must be geographically separate from areas containing existing wolf populations.

Experimental Population Rule – Designation of an experimental population includes the development of special rules to identify geographically the location of the experimental population and identify, where appropriate, procedures to be utilized in it management. The special rule for each experimental population is developed on a case by case basis. Development of the special rule includes publication of the proposed regulation in the Federal Register, public comment on the proposed regulations, and publication of the final regulations prior to reintroduction of experimental populations.

Harass – According to the Endangered Species Act Regulations, harass is defined as "intentional or negligent act or omission which creates the likelihood of injury to the wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to breeding, feeding, or sheltering" (50 CFR 17.3). For the purposes of this EIS and the proposed experimental rule, permitted harassment and pursuing will be limited to pursuing adult wolves (> 6 months old) on foot, horseback, or non-motorized or motorized vehicle (without approaching closer than 20 feet); discharging firearms or other projectile launching devices in proximity to but not in the direction of wolves; throwing objects in the general direction of but not at wolves; or making any loud noise in proximity to wolves. The basic intent is to allow wolves to be scared or chased from the immediate area without causing any physical injuries. In this EIS, permitted harassment and pursuing includes allowing private landowners to harass adult wolves (> 6 months old) on private land at any time and allowing public livestock grazing permittees or their designated agents, as part of their grazing permit, to harass adult wolves near lawfully present livestock in an opportunistic, non-injurious (see definition of opportunistic and non-injurious) manner provide that all such incidents are reported within seven days. In instances where wolves were simply witnessed feeding on livestock carrion, wolves may be harassed (see definition above) and the incident must be reported to the proper authorities for investigation.

Hard Release – The immediate and direct release of wolves into a new environment.

In the Act of Wounding or Killing Livestock – To be engaged in the pursuit and grasping, biting, attacking, wounding, or feeding upon livestock that are alive. If wolves are observed feeding on livestock carcasses it cannot be assumed that wolves killed the livestock until investigation by proper authorities has confirmed that wolves were responsible for that or other livestock losses in the immediate area (one mile radius).

Incidental Take – (see below for full definition of “take” for this EIS). The taking (killing, wounding, maiming, injuring, or physically harming) of wolves, under permit or conditions established by the FWS in an experimental population rule, that occurs accidently and despite reasonable care during otherwise legal activities (e.g., as the result of legal activities and in conjunction with ADC control activities for other species). Within an experimental population area all wolves taken under the conditions permitted by the experimental population rule by agencies or the public will not be considered take under the Endangered Species Act. Any and all wolves taken outside the provisions of the experimental population rule would be considered take under the Endangered Species Act.

Land-Use Restrictions – Restrictions on human activities on public lands. A wide variety of such restrictions are used for a wide variety of purposes. Relatively few such restrictions are required to successfully recover wolf populations unless human-caused mortality of wolves is unusually high. Examples of the types of restrictions that have been used by natural resource managers to assist in wolf population management are seasonal road-trail closures to reduce human access to wolf dens or rendezvous sites or prohibition on certain types of motorized access. Land-use restrictions also include restrictions on certain human activities in the habitat of an endangered or threatened species in order to comply with Section 7 of the Endangered Species Act of 1973. That section requires that “Each Federal agency shall, in consultation with and with the assistance of the Secretary, insure that any action authorized, funded, or carried out by such agency (herein after in this section referred to as an “agency action”) is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined by the Secretary, after consultation as appropriate with affected States, to be critical, unless such agency has been granted an exemption for such action…” In nonessential experimental population areas the section 7 requirements of ESA only apply inside National Parks and National Wildlife Refuges. Any potential land-use restrictions necessary for species recovery in other areas must be established as part of the experimental rule.

Livestock – Cattle, sheep, horses, and mules. The states and tribes may better define and possibly expand the definition of livestock in their wolf management plans given the criteria that the FWS has established that dead livestock must be reasonably capable and large enough to sustain wounds that can be determined to be caused by wolves and are reasonably likely to be considered a prey item for wolves.

M-44 cyanide Devices (“coyote getters”) – A 3-component, spring-activated ejector device developed specifically to kill coyotes and other canine predators. Components consist of (1) a capsule holder wrapped with fur, cloth, or wool, (2) ejector mechanism, and (3) a hollow tube (to be driven into the ground) for holding the ejector mechanism. When the capsule holder is pulled, a spring-activated device propels sodium cyanide into the animal’s mouth causing its death. The EPA registration and ADC policy do not allow the use of these devices in areas known to be occupied by listed species that may be killed by them.

Meta-population – Recovery of wolf populations in the northern Rocky Mountains of the U.S. requires a wolf population be established that is composed of three (Yellowstone, central Idaho, and northwestern Montana) parts, or sub-populations, which in combination would be called a meta-population. Groups and breeding pairs of wolves in each of (1) the Yellowstone experimental population area, (2) the central Idaho experimental population area, or (3) the area of Montana, Idaho, or Wyoming that is not part of an experimental population area, would be classified as one third of the meta-population.

National Environmental Policy Act (NEPA) – An Act passed by Congress in 1969 which is the basic national charter for protection of the environment. NEPA established a process that requires consideration of environmental consequences for federal actions. Procedures ensure that high quality environmental information is available to public officials and citizens before federal decisions are made and actions are taken. Specifically, the responsible federal official must submit a detailed report on "major federal actions significantly affecting the quality of the human environmental" prior to taking major federal actions. The EIS is a primary means of meeting NEPA requirements.

Nonessential – Under the provisions of the 1982 amendment of the ESA [Section 10(j)] which authorizes reintroductions of experimental populations, experimental populations must be designated either "essential" or "nonessential." "Nonessential" refers to an experimental population whose loss would not be likely to appreciably reduce the likelihood of the survival of the species in the wild. Except in national wildlife refuges or national parks, "nonessential" populations are treated under Section 7 of the ESA as "proposed species." Thus, federal agencies must only confer with the FWS on activities that the agencies believe might jeopardize the species. Moreover, the agencies would be under no obligation under Section 7(a)(2) to avoid actions likely to jeopardize the species. In national parks and national wildlife refuges they are treated as threatened species. Congress expected that most experimental populations would be considered "nonessential."

Non-experimental Wolves – Wolves receiving all protections of the Endangered Species Act, as amended, as distinguished from wolves that are members of an experimental population.

Northern Rocky Mountain Wolf Recovery Plan – A document prepared by a team of individuals with expertise regarding the biological and habitat requirements of the wolf, outlining the tasks and actions necessary to recovery the species within parts of it former range in the Rocky Mountain Region. The original plan was completed in 1980. The revised Recovery Plan was approved August 3, 1987.

Occupied Gray Wolf Range – For purposes of this EIS "occupied wolf range" is defined as follows: Areas of confirmed presence of resident breeding packs or pairs of wolves or area consistently used by $\geq$1 resident wolf or wolves over a period of at least one month. Confirmation of wolf presence is to be made or corroborated by the U.S. Fish and Wildlife Service. Exact delineation of area will be described by (1) 5-mile radius around all locations of wolves and wolf sign confirmed as described above (non radio monitored), (2) 5-mile radius around radio locations of resident wolves when <20 radio locations are available (for radio-monitored wolves only), or (3) 3-mile radius around the convex polygon developed from $\geq$ 20 radio locations of a pack, pair, or single wolf taken over a period of $\geq$ 6 months (for radio-monitored wolves). This definition applies only within the Yellowstone and central Idaho experimental population areas.

Open Road Density – Length of two-wheel drive accessible roads with unrestricted public access (i.e., miles of open road/square mile) per give amount of area.

Opportunistic, Non-Injurious Harassment (see "harass") – Opportunistic means as the presents itself (i.e., the wolf travels onto and is observed on private land or near livestock). A wolf could not be tracked through snow or by dogs and then harassed or harassed by aircraft. A wolf could not be chased and harassed for an extended period of time (over 15 minutes). Any harassment must not cause bodily injury, maiming, or death.

Pack – A group of wolves, usually consisting of a male, female, and their offspring from one or more generations.

Pets – Dogs and cats.

Population (of wolves) – At least two breeding pairs of wild wolves successfully raising at least two young each year (until December 31 of the year of their birth), for two consecutive years in an experimental population area.

Primary Analysis Area – The geographic area considered affected by a major federal action and thus receiving detailed evaluation of the potential effects of the action in the Environmental Impact Statement. The area in which a wolf population is expected to have a measurable environmental impact. This area is much smaller than the experimental population area for the Yellowstone and central Idaho areas.

Problem Wolves – Wolves that have depredated on lawfully present domestic livestock or other members of a group or pack of wolves including adults, yearlings, and young-of-the-year that were directly involved in the depredations; or fed upon the livestock remains that were a result of the depredation; or were fed on or are dependent upon adults involved with the depredations (because before these young animals mature to where they can survive on their own, they will travel with the pack and learn the pack's depredation habits). Wolves that have depredated on domestic animals other than livestock, two times in an area within a calendar year.

Proposed Action (Proposal) – The proposed action or proposal exists at that stage in the development of an action when an agency subject to the Act (NEPA) has a goal and is actively preparing to make a decision on one or more alternative means of accomplishing that goad and the effects can be meaningfully evaluated. Preparation of an environmental impact statement on a proposal should be timed so that the final statement impact may be completed in time for the statement to be included in any recommendation or report on the proposal.

Public Land – Lands under administration of federal agencies including but not limited to the National Park Service, USDI Fish and Wildlife Service, USDA Forest Service, USDI Bureau of Land Management, U.S. Department of Energy, and U.S. Armed Forces. In their wolf management plans the states and tribes may choose to designate and manage lands under their jurisdiction for the benefits of wolves.

Recovered Wolf Population (see definition of viable wolf population below) – In the Northern Rockies a recovered wolf population is ten breeding pairs of wolves in each of three areas for three successive years with some level of wolf movement between areas.

Recovery – See above definition.

Reintroduction – The release of animals into an area that was part of their original geographic range, but from which they have declined or disappeared, for the purpose of establishing a new wild population.

Remove from the Wild – Capture and placement into permanent captivity or killing of problem wolves.

Significant Modifications to the Experimental Rule – Changes in the provisions of the experimental population rule that are sufficient, as determined by the FWS, to require publication of a revised draft regulation in the Federal Register, undergo public review and comment, and publication of a revised experimental population rule that would change management provisions that apply to an experimental population area.

Soft Release – The release of wolves from a temporary confinement facility where they were held to acclimate them to the general area of the release, to a free-ranging situation. “Soft” release is a relative term depending largely on the duration of holding at the release site and the freedom of the wolves to conduct basic (minimum) biological activities.

Take – The ESA defines “take” as: To harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct. See above definition of Harass which includes definition of permitted harassment and pursuing, and see definition of Unavoidable and Unintentional Take below.

Threatened Species – Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Toxicants – A poison or poisonous substance.

Unacceptable Impacts on Ungulate Populations – States and tribes are encouraged to define “unacceptable impacts on ungulate populations” in their management plans subject to FWS approval. Until such time the term will mean the following: Two consecutive years with a cumulative estimated 50% decrease in population estimates for a particular species of ungulate in a game management unit or distinct herd segment over the previous 5-year average (unit or herd must contain average greater than 100 animals). If wolf predation is believed to be a primary cause of ungulate mortality (greater than 50% of documented adult or young mortality) and herd size and/or overall estimated sustained harvest would be less than 50% of the previous 5-year average (pre-wolf numbers) then wolves may be moved to reduce ungulate mortality rates and assist in herd recovery, but only in conjunction with application of other commonly professionally acceptable wildlife management techniques.

Unavoidable and Unintentional Take – Accidental, non-negligent take (see above definition of take) which occurs despite reasonable care, is incidental to otherwise lawful activity and without the intent to do so. Examples would include striking a wolf with an automobile, capturing a wolf in a trap set obviously for another species. NOTE: Shooting a wolf when the individual states they believed it to be an animal other than a wolf, does not qualify as unavoidable or unintentional take. This is consistent with most state laws where killing of wild animals or domestic animals because of mistaken identity is illegal. Shooters have the responsibility to be sure of their targets.

Viable Population or Minimum Viable Population of Wolves (population viability) – The number, distribution, and persistence of wolves considered necessary for a wolf population to have a reasonable likelihood of survival for the foreseeable future. Recovery goals for the wolf in the Northern Rocky Mountain Wolf Recovery Plan and this EIS are ten breeding pairs in each of three recovery areas for three successive years with some level of interchange between areas. The FWS considers that a viable (recovered) wolf population will exist in the Northern Rockies once this goal is attained.

Wolf Management Committee – In October 1990, Congress directed the Secretary of Interior to appoint a 10-member Wolf Management Committee (WMC) to develop a wolf reintroduction and management plan for central Idaho and YNP. The WMC was required to consist of representatives of the USNPS; USFWS; USFS; Game and Fish Departments of Idaho, Montana, and Wyoming; two conservation groups; the livestock and hunting communities. The WMC’s report recommended that Congress designate wolves in Idaho, Wyoming, and Montana (with the exception of the Glacier National Park area) as an experimental population, effective until July 1, 1993 (WMC 1991). During this interval, wolves in the experimental population area would be managed by the USFWS with ample control for depredations on livestock, including taking of wolves seen killing or harassing livestock, by livestock producers. By July 1, 1993, the states would prepare and adopt wolf management plans agreeable to the Secretaries of Interior and Agriculture and governors of the three states. An EIS and rulemaking process would be conducted during the same period. Following completion of the necessary processes, states would assume primary management authority throughout the experimental population area except in national parks and national wildlife refuges. The WMC recommended the states follow guidelines in its report in developing management plans. The report called for reintroduction to YNP/ If a breeding population has not been confirmed in central Idaho after 5 years, a reintroduction would be evaluated there.

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Appendices

Appendix 1
Chronology of Wolf Recovery in the Northern Rocky Mountains

Summary of Wolf Status and Recovery in Northern Rocky Mountains

1700 Wolves were abundant throughout all of North America, north of Mexico City, except extreme desert regions.
1850 Extermination of ungulates and large predators, including bison and wolves, begin in the West.
1900 Big game and predators were decimated by unregulated harvest and settlement.
1910 Wolves were virtually eliminated in eastern U.S., greatly reduced in West.
1915 U.S. Biological Survey initiated wolf control in West.
1925 Viable wolf populations were reported eliminated from West.
1944 The last documented wild wolf was killed in the greater Yellowstone area.
1950 Reports of wolves in Wyoming, Montana, and Idaho continued. Lone wolves were killed in Montana and Idaho every decade until the present time.
1966 British Columbia began recovery and wolf populations increased southward. Reports of wolves continued in U.S. and increased slowly. Wolf reintroduction into Yellowstone National Park was recommended by several biologists.
1971 The first interagency meeting for management of the northern Rocky Mountain Wolf was held in Yellowstone National Park. Reports indicated there may have been 10-15 wolves in Yellowstone area and 5-10 in Glacier National Park.
1972 Wolf research by Wolf Ecology Project, University of Montana, began by evaluating wolf reports and sightings. They found no evidence of wolf packs in Montana.
1973 The ESA was enacted: wolves became protected in the U.S.
1973 Wolves became protected by Montana State law.
1974 An Interdisciplinary Wolf Recovery Team was appointed and led by a Montana Fish and Game representative. Introduction was considered in selected areas.
1977 Wolves became protected by Idaho State law.
1978 A lone wolf was photographed and another killed in central Idaho.
1978 The Wolves of Yellowstone report indicated no wolf packs in the Yellowstone area; viable populations ended by 1925.
1979 A lone wolf was monitored adjacent to Glacier National Park.
1980 A lone wolf depredated on livestock near Big Sandy, Montana, and was killed by FWS. This was the first documented depredation in over 50 years.
1980 The “Northern Rocky Mountain Wolf Recovery Plan” was completed by the FWS.
1986 The first wolf den in the western U.S. in over fifty years was documented in Glacier National Park.
1987 The revised “Northern Rocky Mountain Wolf Recovery Plan” was reviewed by the public and approved by the FWS.
1987 National Park Service director Mott suggested beginning EIS for reintroduction to Yellowstone. Park Service began wolf information program.
1987 A wolf pack near Browning, Montana, depredated on livestock and was removed by the FWS. Representative Owens (Utah) introduced a bill to require the NPS to introduce wolves to Yellowstone National Park (H.R. 3378 Sept 30, 1987). It was not passed.
1988 The Interim Wolf Control Plan was approved by FWS. The Wolf Recovery Program in Montana was staffed and funded.
1988 Congress directed National Park Service and FWS to conduct “Wolves for Yellowstone” studies and mandated appointment of Wolf Recovery Coordinator.
1989 Depredating wolves from Marion, Montana, were relocated, leading to the establishment of the Ninemile wolf pack near Missoula, Montana. Representative Owens (Utah) introduced bill to Congress requiring initiation of EIS for wolf reintroduction to Yellowstone (H.R. 2786 June, 1989). It was not passed.

1990	Senator McClure (Idaho) introduced a bill “to provide for the reestablishment of the gray wolf in Yellowstone National Park and central Idaho Wilderness” (5.2674 May, 1990). It did not pass.
1990	The NPS and FWS completed the first “Wolves for Yellowstone?” report, Vol. I and II.
1990	Congress established the Wolf Management Committee. No Congressional or agency action was taken on the Committee’s May 1991 recommendation.
1991	Congress directed the FWS, in consultation with the Park Service and the Forest Service, to prepare a DEIS on wolf recovery in Yellowstone National Park and central Idaho.
1991	Congress funded the FWS to support the Animal Damage Control Wolf Management Specialist position in the West.
1991	A black wolf was illegally poisoned on a livestock allotment in a central Idaho Wilderness area.
1991	Two separate radio-collared wolves moved into Idaho. One stayed, the other went back to Canada.
1992	The NPS and the FWS completed the second “Wolves for Yellowstone?” report, Volumes III and IV.
1992	An estimated 40 wolves in 4 packs occupied northwestern Montana. All packs except the Ninemile Pack, which resulted from relocation of a problem wolf in 1989, and Murphy Lake Pack were still in the Glacier National Park area. Lone wolves continued to be reported throughout Montana, Idaho, and Wyoming but no wolf reproduction was documented in Idaho or Wyoming.
1992	A possible wild wolf was photographed in Yellowstone. A wolf was shot just south of Yellowstone. No other wolves were located despite increased monitoring.
1992	Congress directed the FWS to complete final EIS by January 1994 and that it expected the proposed alternative to conform to existing law.
1993	An estimated 45 wolves in 5 packs occupy northwestern Montana. Monitoring efforts increased in Idaho and Wyoming but no wolf packs were located.
1994	An estimated 7 breeding pair (65-70 wolves) are being monitored in northwestern Montana. No breeding pairs located in Idaho or Wyoming or in the proposed experimental population area.

Chronology of Gray Wolf EIS

11/13/91	Congress directs FWS to prepare EIS on wolf reintroduction into Yellowstone National Park and central Idaho.
12/3/91	EIS team selections begin, continue through March 1992.
3/92	Idaho Legislature passes bill that allows Idaho Fish and Game to participate in EIS.
3/23/92	News release on issue scoping open houses issued.
3/25/92	Letter and poster requesting participation sent to over 2,500 groups or individuals that may be interested in EIS.
4/3/92	Notice of Intent to prepare EIS published in Federal Register. News release provided.
4/3/92	Issue scoping brochure sent to 10,000 people on mailing list.
4/6/92	Series of 34 issues scoping open houses (9 each in Wyoming, Montana, Idaho, and 7 National) began, 1,730 people attended.
5/15/92	Issue Scoping Comment period closed. Nearly 4,000 comments received.
6/29/92	Notice of Hearings published in Federal Register.
7/8/92	Issue scoping report sent to 16,000 people on mailing list, includes alternative scoping open house schedule.
7/10/92	News release on issue scoping report issued.
7/17/92	News release announcing alternative scoping open houses issued.
7/30/92	Alternative scoping brochure mailed to about 20,000 people on mailing list.

7/31/92	News release on alternative scoping hearings issued.
8/2/92	Brochure inserted in 230,000 Sunday newspapers in Wyoming, Idaho, and Montana.
8/3/92	Series of 27 alternative scoping open houses began, 491 people attended.
8/18/92	Series of 6 alternative scoping hearings begins, about 1,400 people attended and 430 testified.
9/4/92	Comment period for alternative scoping closed, nearly 5,000 comments received. News release issued.
11/18/92	Alternative scoping report sent to about 31,000 people on mailing list, representing all 50 states and 40 foreign countries.
1/4/93	DEIS is prepared.
4/93	DEIS progress report was sent to about 32,000 people remaining on mailing list.
6/93	DEIS completed and public review requested during 90 days public comment period.
8/93 & 9/93	16 public hearings conducted; 4 locations in each state of Idaho, Montana, and Wyoming, and 4 in cities in other parts of the country. More than 1,500 people attended and about 700 presented testimony at these hearings.
11/26/93	Comment period on DEIS closed.
12/10/93	Analysis of over 160,000 public comments on DEIS completed.
3/94	Summary of public comment mailed to about 42,000 people and organizations on Gray Wolf EIS mailing list.
5/94	Final EIS released.

Appendix 2
Technical Summary:
Wolf Biology and Ecology

Biology

Taxonomy – Wolves have existed throughout North America and have occupied nearly all habitats in the Northern Hemisphere except for true deserts. Early taxonomists divided the North American gray wolf into 24 subspecies based on skull characteristics, body size, and color; often utilizing few specimens. The subspecies of wolf that was described for the central Rocky Mountains, *Canis lupus irremotus*, was similar to other subspecies in the western United States and southwestern Canada.

Contemporary research using multivariate statistical analysis and molecular genetics, along with larger sample sizes suggests that 24 subspecies are unwarranted and that 5 North American subspecies are more reasonable. These subspecies overlap extensively with each other since they represent averages and trends in morphology that occur within a given geographical area. Genetically, there is very little distinction among gray wolf populations, at least in part due to the mobility of the species. Currently, all populations of wolves in the lower 48 states, regardless of subspecies classification, are listed as endangered except for the gray wolf in Minnesota which is listed as threatened.

Physical Characteristics – The wolf is the largest wild member of the dog family Canidae. Coat color ranges from white to shades of gray to black. In Minnesota, most wolves are gray or shades of brown. However in Montana, black wolves are as common as gray wolves. Adult males average 90-100 pounds with extreme range of 43-175 pounds, while adult females average 80-90 pounds with an extreme range of 39-125 pounds. Males are usually 5-6.5 feet long from nose to tail tip, and females range from 4.5-6 feet in length. Most wolves stand 26-32 inches tall at the shoulder.

With long legs and a deep narrow chest, the wolf is well suited for far-ranging travel. Wolves have large feet which aid in wintertime travel over crested snow and allow them an advantage for preying on various ungulates, which can sink much deeper into the snow. Front feet are slightly larger than rear feet. Wolf tracks average about 4 inches wide and 5 inches long including the claw marks. Wolf and large domestic dog (great Dane, St. Bernard, and Irish wolfhound) tracks are similar in size, and often impossible to differentiate from each other in the field.

Two important means of communication for wolves are howling and scent-marking. Within a wolf pack, howling serves in the identification, location, and assembly of separated pack members. It may also be particularly useful in facilitating the movements of pups and adults from one rendezvous site to the next. Howling may serve a social function when pack members rally around the alpha individuals and greet each other. It is also a means of advertising the presence of the pack within its territory, and the pack's willingness to defend resources such as pups, a kill, and the territory from other wolves. This avoids direct conflicts between packs.

Scent-marking is the application of an animal's odor to it environment. It is used by wolves to communicate information regarding territory, position in the dominance hierarchy, location of food, and even the behavioral or physiological condition of the animal. Scent-marking usually involves urinating or defecating. Scent marks are commonly made at route junctions and especially along the edges of pack territories. These scent marks inform lone wolves or packs when they are entering another pack's territory.

Pack Organization – The basic social unit in wolf population is the pack. A pack consists of 2 to 30 wolves (average about 10) which have strong social bonds to each other. Packs are formed when 2 wolves of the opposite sex develop a pair bond, breed, and produce a litter of pups. Central to the pack are the dominant (alpha) male and (alpha) female. The remaining pack members are usually related to the alpha pair and constantly express their subordinate status through postures and expressions when interacting with the dominant pair. Young members approaching sexual maturity may challenge the dominate animals, which can result in changes in each wolf's social position in the pack.

Wolves become sexually mature at 2 years of age. Breeding within the pack usually occurs only between the top-ranking alpha male and female. Although courtship behavior occurs in varying degrees throughout the year, the actual breeding season occurs from late January through April, depending on the latitude. Wolves in higher latitudes generally breed later. Wolves in Yellowstone National Park (45 degrees latitude) bred any time from late January to late February and possibly early March. During the breeding season in late winter, the pack may move extensively within its territory.

Pregnant wolves complete digging of dens as early as 3 weeks before the birth of the pups. Most wolf dens are burrows in the ground, usually in sandy soil. Wolves may also den in hollow logs, rock caves, or abandoned beaver lodges. Some dens are used traditionally by a wolf pack from year to year. Also, certain specific areas (on the other of 5 mi^2, 13 km^2) may contain several den sites which are used in different years by the pack. Some wolf packs can be sensitive to human disturbance during this season and may abandon the den if disturbed. This poses a particular risk to very young pups that cannot regulate their own body temperature.

Wolf pups, in general, are born in late March to May after a 63-day gestation period. In Yellowstone, wolf pups are born any time from late March through April. Litter sizes of wolves usually range from 4 to 7. In Yellowstone National Park, the average litter size taken from dens in the early 1900s was 7.8 pups and varied from 5 to 13. Average litter size in northwestern Montana now average just over 5 pups per litter.

With the denning area established in the spring, pack movements center around the den. However, adult pack members often travel throughout their territory for food. The maternal female is usually at the rendezvous site more than other adults, but she may also travel throughout the territory as pups grown and are weaned. All pack members may help feed the female and pups. Pack members also provide play and protection for the growing pups. The pups are weaned at 5 to 6 weeks of age.

A wolf pack will usually move from the den site (or occasionally from a second den site) to the first rendezvous site when the pups are 6-10 weeks of age which is in late-May through early July. The first rendezvous site is usually within 1-6 miles (2-10 km) of the natal den and often consists of meadows and adjacent timber with surface water nearby. A succession of rendezvous sites are used by the pack until the pups are mature enough to travel with the adults, usually by September or early October. Each successive rendezvous site is usually 1-4 miles (2-6 km) from the previous site. Occupancy times vary from 10-67 days. As with dens, rendezvous sites may receive traditional use by wolf packs year after year. Wolves appear less sensitive to human disturbance at later rendezvous sites then they do at the first one.

By about October, pups are mature enough to travel with the adults, and the pack moves throughout the territory. As the pack travels throughout its established territory, the alpha wolves usually lead the pack and choose the direction and specific routes of travel. Wolves often travel on established routes including trails, roads, and frozen waterways, occasionally cutting across from one such route to another. Daily travel distances for wolf packs are typically in the range of 1-0 miles (2-15 km), while distances between successive kills vary from 8-34 miles (13-55 km). Wolf packs in Yellowstone National Park included both summer and winter ranges of ungulates within their territories.

In most wolf populations, pack occupy exclusive territories. Territories may range in size from 80 mi^2 (210 km^2), as in Minnesota, to over 660 mi^2 (1,700 km^2) as in Alberta. Territories in northwestern Montana average about 300-400 mi^2 (780-1,040 km^2). Lone wolves may range over areas in excess of 1,000 mi^2 (2,590 km^2). As pack members are traveling, they deposit urine and scat markers which identify their territories. Foreign wolves entering established territories may be killed.

Mortality – Wolves die from a variety of causes: malnutrition, disease, debilitating injuries, interpack strife, and human exploitation or control. In areas with little or no human exploitation, the primary causes of mortality are disease or poor nutrition in pups or yearlings and death of adults from other wolves. Mortality rates in unexploited populations can average about 45% for yearlings and 10% for adults. In Minnesota during 1969-1972, September appeared to be a critical month for malnourished wolf pups to survive. Minnesota wolf pups with body weights less than 65% of standard weight had a poor chance of survival, whereas pups of at least 80% of standard weight had a high survival rate. Body weights appeared related to available food supply. Mortality rates of wolf pups in exploited populations can reach 80%.

Fall and winter may be critical periods for wolf survival. Beginning in the fall, wolf mortality rates are most influenced by the degree of exploitation or control by humans. Overwinter (October-March) mortality rates within packs ranged from 0%-33% for a minimally exploited population to 14%-88% for a heavily exploited population. Established wolf populations apparently can withstand human-caused mortality rates of 28%-35% without declining. Protected wolf populations can increase at rates of 28%-35%.

Dispersal – The nature and extent of dispersal in wolves appears related to wolf density and prey availability. In low-density populations, these animals may disperse just out of their natal pack's territory into an unoccupied area, find another lone wolf of the opposite sex, and form a new pack. In high-density populations, such animals may stay in the pack, if possible, and wait for changes in the rank order and opportunities to mate. If forced out, these loners may trail a pack or live in the buffer zones between territories to avoid packs. In some situations, young adult wolves may disperse hundreds of miles. However, mortality is often high among dispersing animals and therefore, the chances of finding a mate and successfully establishing a new pack are low. Wolves may disperse at ages ranging from 9-28 months or more. Dispersal in later winter by yearlings is common.

Ecology

Niche – In North America, the wolf is a predator primarily of large ungulates. All biological and social aspects of the wolf make it adapted for this role. No other carnivore in the western United States replaces the ecological role of the wolf. Although the coyote (*Canis latrans*) occasionally preys upon young, old, and vulnerable ungulates, its main diet consists primarily of small animals. The coyote does not prey year-round on large ungulates. Other wild animals that regularly prey on large mammals in North American include mountain lions (*Felis concolor*) and black (*Ursus americanus*) and grizzly bears (*Ursus arctos*). Although the mountain lion regularly preys on large ungulates, its methods of hunting (primarily "ambush") and social organization (solitary) contrast sharply with the socially cooperative methods of the wolf. Black and grizzly bears, usually solitary by nature, stalk and kill moose, elk, and deer and take mostly calves but occasionally take vulnerable adult ungulates as well.

Food Habits – In general, wolves depend upon ungulates for food year round. In northern Montana, elk, moose, and deer (mule and white-tailed deer) are the principal prey species. Smaller mammals can be an important alternative to ungulates in the snowfree months. These small mammals include beaver, marmots, ground squirrels, snowshoe hare, pocket gophers, and voles. In various areas of North America, during years of abundant beaver populations, beaver have comprised 25%-75% of spring-fall diets of wolves, so in those areas or situations, they may prey less on young ungulates. Nonetheless, when these figures for beaver are converted to a biomass basis, ungulates still constitute the bulk of the summer diet and certainly of the annual diet. In areas where beaver are not so abundant, ungulates usually account for more than 90% of the biomass consumed by wolves.

Prey Consumption Rates – On an average, wolves eat 9 lbs. of meat per wolf per day during winter. Although the wolf is capable of eating large quantities of food in short time, such quantities are not always available. Thus, wild wolves may have to go for several days at a time without eating. Wolves probably could fast for periods of 2 weeks or more while searching for vulnerable prey. When food is available, wolves can replenish themselves to prepare for another period of fasting. The wolf, with its large stomach capacity, seems well adapted for this cycle of feasting and extended fasting.

The frequency of kills by a wolf pack varies tremendously, depending on may factors including: (1) pack size; (2) diversity, density, and vulnerability of prey; (3) snow conditions; and (4) degree of utilization of the carcasses. Because the wolf's prey varies in size from small mammals to beaver to bison, the kill rate of each species varies according to the amount of food each provides.

In Minnesota, where wolves east white-tailed deer almost exclusively, estimated kill rates range from 15-19 deer per wolf per year. In areas where elk are the dominant prey, these kill rates are generally lower. In Riding Mountain National Park, one wolf averaged 14 ungulates killed per year which included deer, elk, and moose. Based on prey abundance in Yellowstone, the primary prey is expected to be elk and mule deer. It has been estimated that wolves will kill an average of 12 ungulates/wolf/year.

Influence of Wolf Predation on Ungulate Populations – Wolf predation on larger ungulate populations usually result in smaller fluctuations in ungulate numbers over the years. Smaller die-offs from winter-kill may occur because wolves are preying on weakened animals before they die.

Wolf predation is one component of total annual mortality in many ungulate populations. Wolves usually do not deplete their prey populations, but may keep some prey species at low levels if ungulate populations are already low and other limiting factors exist. Computer models have predicted that wolves in the Yellowstone area may reduce ungulate numbers by 5%-30% and decrease fluctuations in the populations, but would not have devastating effects on the prey populations.

Influence on Other Predators – Wolf impacts on other predators can vary. Coyotes may be less abundant in Yellowstone with wolves present, and red fox (*Vulpes vulpes*) may benefit from wolf presence. Bears and wolves usurp carcasses from each other, and wolves occasionally prey upon bears and vice versa, but published information suggests neither species would be significantly affected. Brown bears and gray wolves coexist throughout much of North American and Eurasia. Sympatric populations of wolves and grizzly bears do not appear to significantly impact survival or reproduction of the other. Some indirect competition for spring carrion, winter-weakened ungulates, and newborn calves may occur between wolves and grizzlies in Yellowstone. However, based on data from other geographic areas, grizzlies appear quite able to coexist with wolves; because grizzlies are omnivorous and not totally dependent upon ungulates, it is likely grizzlies will easily adapt to the presence of wolves.

Appendix 3
Public Attitudes About Wolves:
A Review of Recent Investigations

Public attitudes toward wolves in America, both in general and in relation to Yellowstone National Park, have been surveyed by numerous investigators. This paper presents a chronological summary of surveys, including both Yellowstone-related ones and those involving other areas of the country. All such surveys are included, whether they involve Yellowstone or not, in order to more fully portray American attitudes about wolves, and trends in those attitudes.

Minn (1977) studied attitudes toward wolf recovery in Rocky Mountain National Park, Colorado, and found that 74.2% of respondents favored wolf restoration, and 25.8% did not.

Kellert (1985b) found that in Minnesota, there was “a strong positive perception of the timber wolf among all sample groups except farmers,” and that all groups agreed that the timber wolf was “symbolic of nature’s wonder and beauty.”

In a survey of attitudes among members of the National Cattlemen, American Sheep Producers, and National Trappers Association, and members of the public in the Rocky Mountains and Alaska, Kellert (1985a) found that in the Rocky Mountain region, 50% liked wolves and 30% did not.

McNaught (1985), in a survey of Yellowstone National Park visitors, found that they favored reintroduction 3 to 1, and that they believed, 6 to 1, that “a presence of wolves would improve the Yellowstone experience.”

Bath (1987a) surveyed various Wyoming interest groups, and found that 91.2% of members of the Wyoming Stock Growers were not in favor of wolf reintroduction in Yellowstone National Park; 89.2% of Defenders of Wildlife members were in favor of wolf reintroduction, as were 66.8% of Wyoming Wildlife Federation members.

Bath (1987b) surveyed the public in Wyoming counties around the park, and found that 51% opposed wolf reintroduction in Yellowstone National Park, and 39% favored it. Bath also found that those opposing wolf reintroduction had a poorer knowledge level about wolves than those favoring it.

Bath (1987c) surveyed the Wyoming general public, and found that 48.5% favored wolf reintroduction into Yellowstone National Park, 34.5% opposed it, and 17% had no opinion.

Lenihan 91987) surveyed Montana residents, and found that 65% believed that wolves belong in the state; 78% of people living in the state’s most populous counties agreed, while 54% of rural Montanans agree. Of those surveyed, 78% believed that “ranchers should be able to shoot wolves that attack livestock on their own property.” A majority (52%) approved of reintroduction of wolves into areas of Montana, Idaho, and Yellowstone Park, but 56% of those from rural counties did not approve. A majority (59%) believed that ranchers should be compensated for livestock lost. Lenihan found that two most important rationale for support of wolf reintroduction were that wolves were an important member of thee ecological community (41%), and wolves were historically present (40%). The most important rational for opposition were that livestock losses would be unacceptably high (57%).

A survey conducted by the Idaho Environmental Science Teachers (1987) through the University of Idaho Wildlife Issues Course found that 78% of Idahoans agreed with the statement that “I would like to see wild populations of wolves exist in Idaho,” while 12% disagreed and 10% had no opinion.

Tucker and Pletscher (198) surveyed hunters and residents of Flathead County (northwestern Montana), and found that 71.5% of the residents of the North Fork area and 58.3% of the hunters in Flathead County hoped that wolves would continue to inhabit the area and “should be allowed to spread beyond this area." They also concluded that "support [for wolves] could dwindle if restrictions on recreational and commercial uses were introduced to promote recovery."

Bath and Buchanan (1989) surveyed attitudes of five different interest groups in Wyoming: members of the Wyoming Stock Growers, of Defenders of Wildlife, of Wyoming Wildlife Federation, of the statewide public, and of counties near the proposed recovery area. They found that "extremes of the issues were defined by the stock growers and members of Defenders of Wildlife. Most members of the Wyoming Wildlife Federation and the statewide public had positive attitudes toward wolf-restoration, although the public in counties surrounding the wolf-recovery site held more negative attitudes."

Bath and Phillips (1990) and Bath (1991) surveyed the Montana and Idaho general public, and found that 43.7% of Montanans, 48.5% of Wyomingites, and 56% of Idahoans favored wolf reintroduction into Yellowstone National Park, while 40.3% of Montanans, 34.5% of Wyomingites, and 27% of Idahoans were opposed. No opinion of wolf reintroduction was held by 15% of Montanans, 17% of Wyomingites, and 17% of Idahoans.

Kellert (1990) surveyed Michigan public attitudes. Of Upper Peninsula residents, 64% favored wolf restoration, 15% opposed it, and 21% were uncommitted. Of Lower Peninsula residents, 57% favored restoration, 9% opposed it, and 34% were uncommitted.

Bath and Phillips (1990) noted that the primary reason for opposition among Idaho and Montana residents to wolf reintroduction was the cost of the program, which agreed with Bath's (1987c) survey of Idaho residents. Bath and Phillips asked survey subjects if they would change their minds if a variety of conditions were met (including financial compensation for livestock losses, keeping livestock losses to less than 1%, and keeping wolves in the park and surrounding wilderness areas), and concluded that "most respondents who do not favor reintroducing the wolf would not change their opinion regardless of the options presented to them. On the other hand, if wolves could be monitored effectively and be restricted within the park and surrounding wilderness areas, an additional 27% (Montana) and 25% (Idaho) would be in favor of wolf reintroduction."

The Wyoming Game and Fish Department (Thompson 1991) surveyed Wyoming residents on wolf reintroduction, and found that 44% were in favor of Yellowstone Park wolf reintroduction, while 34.5% were opposed and the remaining 21.5% were undecided or had no opinion. This was very similar to Bath's (1987c) findings, but in other respects the two studies differed. For example, Thompson found that more than 30% (compared to 16.2% of Bath's respondents) of respondents would change their opposition to wolf restoration if wolves could be kept in the park and adjacent wilderness areas. Thompson also found that 14% of those opposed to wolf restoration (compared to 6.3% of Bath's respondents) would change their opinion if there was a compensation program for wolf restoration. On the other hand, Bath and Thompson's respondents agreed quite closely, 58.5% and 56.8% respectively, that wolves that killed livestock should be killed.

Freemuth (1992) asked Idahoans, "Do you favor or oppose having wolves in the wilderness and roadless areas of central Idaho?" He found that 72.4% favored wolves, 22.1% opposed them, and 5.4% did not know or had no opinion.

Eisenstein (1992) conducted an attitudinal survey analysis of 52 representative individuals regarding wolf restoration in Yellowstone National Park. He was seeking detailed responses on concerns and issues, rather than quantifiable yes-or-no expressions of positions. Thus his work does not statistically analyze public opinion, but summarizes and presents great amounts of personal position and opinion. His conclusions included the following general statement about wolves: "The interviews revealed not only polarization, but gross misunderstandings and misconceptions concerning the wolf and the program. It was clear that people still do believe in the horror stories of the wolf and 'Little Red Riding Hood.' Many respondents stated as fact that they know wolves kill people."

Duffield et al. (1992) surveyed American citizens nationally and found that "while GYA [Greater Yellowstone Area] respondents are nearly evenly divided in their opinion on wolf reintroduction, the U.S. respondents are heavily in favor of reintroduction. Almost everyone in the GYA has an opinion on this issue with only 7% saying they 'don't know.' The national sample shows a strong majority favoring wolf recovery – by about a 2:1 margin." When asked to respond to the statement, "I dislike even the idea of wolves being present in Yellowstone Park," 25% of the Yellowstone are respondents strongly agreed, while 4%-6% of U.S.-wide respondents agreed.

Public approval of wolf reintroduction in Yellowstone National Park is high. Nationally, the public is very strongly in favor of reintroduction, while regionally there is at least a slight majority in favor of reintroduction. There is still some public concern over safety risks, that is, over the possibility that wolves might attack people. McNaught (1985) found that 19.7% of his respondents would be afraid to hike in Yellowstone Park if wolves were present.

There is a great concern among potentially affects stock growers that wolves will kill their stock, and any losses are unacceptable to them. There is strong public support for a compensation program to protect livestock owners from financial losses due to wolf depredation. There was likewise strong public concern over the need to control distribution, in whatever management scenario is ultimately adopted. The public does not want wolves to have unlimited freedom to range on public and private lands, and wants wolf control measures to be stringent and promptly enacted.

The surveys do not agree on whether the public considers wolves a serious threat to wildlife populations, but among the surveys there is a consistent level of public concern over possible impacts on wildlife, especially as those might affect hunter harvest. There is significant public concern over the monetary costs of implementing a reintroduction program.

Appendix 4
Scientific Techniques For The Reintroduction of Wild Wolves

Introduction

A wide variety of potential strategies exist for reintroducing wolves. Developing of the following approach was based on (1) results of the previous relocations of wolves, (2) responses to questionnaires sent to 56 individuals who are familiar with behavior of wolves in the wild or in captivity, (3) practical limitations such as climate and human access to release sites, and (4) the best judgement of biologists (familiar with the Northern Rocky Mountains and recovery of those wolves) as to which procedures were most likely to succeed. Some of the specific factors and variables considered regarding the selection of wolves were: numbers and genetics of wolves to be used, effect of wolf removals on the donor population, age and breeding status of wolves, whether to use wolves already pair-bonded or to attempt artificial pair-bonding of adult wolves after capture, and the likelihood of breeding in captivity. Variables considered on the subject of capture, transport, confinement, and release included: capture method, transport method, type of release ("hard" or "soft"), time of year of capture and release, length of holding period, type of holding facility, care needed in captivity, what to fed wolves in captivity, and structure and size of pens at release sites. Other considerations were: cost, humanness, whether to use radio-collars or capture collars, climate conditions and physiographic characteristics of capture and release sites, timing of ungulate hunting seasons in or near release areas, whether to conduct reintroductions into Yellowstone and central Idaho concurrently, the number of years over which releases would be necessary to establish a population in each area, and the need to acquire better information for use in planning future reintroductions.

General Approach

In summer 1994, an intense public information campaign will be started in the Yellowstone and central Idaho areas to inform the public that wolves will soon be present. This effort will include information on how to identify wolves and distinguish them from coyotes and other animals, and will inform hunters of the possibility of encounters with wolves and that they should not be killed.

Different approaches to reintroduction will be used in Yellowstone and central Idaho, and each approach will be continually evaluated and modified as necessary (Adaptive Management/"Learning by Doing☺ (Walters 1986). For Yellowstone National Park, the approach will be to capture, transport, hold, and soft-release small to moderate sized Canadian packs (4-7 individuals) that ideally will include the breeding (alpha) female/pair and pups of the year. Strong emphasis will be placed on including the alpha male and female, as those wolves already are pair-bonded and presumably proven breeders. The approach in central Idaho will be to capture, transport, and hard release non-breeding members of packs that are of prime dispersal age (1-2 years old) or adults of unknown status and thus duplicate as nearly as possible the process by which pack formation naturally occurs. Wolves often disperse from their packs as yearlings or young adults and then search for a mate and vacant areas where they can begin their own pack(cf. Rothman and Mech 1979, Fritts and Mech 1981, Peterson et al. 1984, Ballard et al. 1987, fuller 1989, Gese and Mech 1991, Boyd et al. in press). Experience has indicated translocated wolves, that do not home, revert to lone wolf/disperser behavior (Fritts et al. 1984, 1985; Fritts 1993).

Wolves selected for reintroduction will be from areas of British Columbia (B.C.) or Alberta that are similar to Yellowstone and central Idaho (mountainous terrain with elk and deer as the main prey). Use of Canadian wolves will be pending approval of Canadian authorities and approval of all necessary permits. Various legal aspects of the different phases discussed below will be addressed in compliance with Provincial, State, and Federal regulatory agencies. Wolves from B.C. and Alberta are probably genetically similar and of the same genetic stock that is now colonizing northwestern Montana (Brewster and Fritts 1994, Nowak 1994). Wolves will not be taken from areas where significant diseases, such as tuberculosis and brucellosis are known to be present. Exact sites for wolf captures would be selected by Canadian authorities. Ideally these areas would have enough treeless landscape to make helicopter darting of wolves possible, and would be accessible by air or road to allow capture and transport of wolves. Removal of wolves from Canada would cause a temporary local reduction in wolves, but numbers would recover to original levels.

Capture, Transport, Confinement, and Release

Capture methods will include both helicopter darting (preferred) and standard trapping techniques used in research captures of wolves. Traps will be modified to prevent foot damage, and the entire trapping process will stress safety to the animals, This assistance of local game management officials and the local public (including registered trappers) may be necessary in identifying areas used by packs and possibly in their capture. Special efforts will be made to capture the alpha (breeding) pair from the packs, especially the alpha female which will be identified by evidence she has nursed pups. If possible, the packs selected would not all have adjoining territories in other to reduce the chances of them being closely related.

In October and November, entire packs, or as many pack members as can be obtained (estimated at 4-7 wolves per pack), will be captured by helicopter darting. Although it is anticipated that most captures will occur by darting from a helicopter, trapping in September-November (and possibly August as well) by program personnel or contracted local trappers may be necessary to supplement darting and could even become the primary capture technique. If captures require several days or more, the wolves captured first will be transported to a proper holding facility or veterinary hospital and held until remaining pack members are captured.

Captured wolves will be examined for body condition and infectious diseases, and blood and fecal samples collected for assessment of their health. As a preventative measure, wolves may be given vaccinations and antibiotics. Blood and fecal samples will be collected to determine which disease may be present in the donor population. A plan that addresses disease aspects and deals with the possibility of importing any disease with the wolves will be developed and reviewed by wildlife disease specialists. Tissue samples for genetic analyses, (i.e., ear-punches and whole blood) will be collected from each captured wolf.

Effort will be made to capture and transport wolves from six packs in a the manner described above. We anticipate that up to 30 wolves will be captured and released in the first year, but only 20 will contribute to establishment of a population in the recovery areas because some will soon leave, disappear, or die. After capture, breeders and pups will be separated from non-breeding pack members (mostly 1 to 2 year old wolves). As soon as possible the adults and their pups will be flown to holding pens already prepared in Yellowstone Park. Non-breeding adults and other wolves of uncertain pack affiliation will be flown or drive to Idaho and released without a holding period.

Only the Yellowstone wolves will be held in pen (one acre or larger) at the release sites. Pens will be build with chain link fence, fence overhang, underground digging barrier, inside electric hot wire, shade, water, visual security, and other features of existing capture wolf facilities. Pens will be double hot wired on the outside to prevent grizzly bears and other large animals from trying to enter them. At the time the wolves are placed in their acclimation pens, adults will be fitted with either capture collars (Mech and Gese 1992) or standard radio collars; pups will have standard collars. There will be as many as three individual pens and release sites in Yellowstone and 1-2 release sites in central Idaho. Sites will be areas with year round populations of prey (elk and/or deer) nearby, will not be within sight of permanent human facilities and will be separated from each other by at least five miles in Yellowstone. All release sites will be closed to the public and human activity will be restricted within a one mile radius of pens. Every effort will be made to avoid disturbance by humans and any habituation to humans while the wolves are in captivity. Site selection and pen design will be such that wolves could be fed and observed with minimal disturbance. Wolves will be fed road-killed ungulates that are handled by project personnel in such a way as to minimize the amount of human scent left on them.

Keepers will stay in wall tents or trailers (out of view of) but at least ¼ mile from the sites. Efforts will be made to eliminate human activity on at least two sides of the pens. Monitoring of fence integrity, human, and animal activity may be done with remote cameras.

On or about December 5, the doors to the pens will be left open and the wolves allowed to leave. Actual dates of release at the three sites would be staggered by a few days in order to monitor movements and behavior during the early post-release period and follow any individuals that quickly left the site. If deep snow is not yet causing site access or other problems for keepers, release dates will be delayed further until weather conditions did become prohibitive, but not later than January1. Carrion will be left at or near the site until the wolves no longer used or appeared to need it. Carrion will consist of road-killed ungulates collected and frozen during fall 1994. An estimated 2,400 lbs. of carrion will be fed to the wolves while in captivity and another 2,400 lbs. made available after release. Locations of released wolves in Yellowstone and central Idaho will be determined by radio-telemetry at least three times a week, depending on weather conditions. Radio-tracking will be both from the ground and from aircraft, but weather conditions may cause telemetry flights to be infrequent. Radio-collared wolves that leave the primary analysis areas in Yellowstone and central Idaho will be returned as needed.

The procedures described above will be repeated yearly for 3-5 years or until breeding populations (at least two pairs successfully raising two young each for two consecutive years) become established in Yellowstone and central Idaho. Wolves from the same general areas in Canada, but not the same packs, will be captured for use in reintroduction in years 2, 3, 4, and 5. The same pens at the Yellowstone release sites will be reused in subsequent years unless a pack became established in the immediate area. In that case the pens and releases will be moved (estimated 5-10 miles) outside areas packs were using. After a population becomes established, the release pens will be disassembled and the site left in as natural a state as possible.

Synopsis and Perspective

Wolves from Canada will be reintroduced into Yellowstone and central Idaho. Breeding adults and their pups will be released into Yellowstone in December after being held there in pens for several weeks and fed deer and elk carrion. Non-breeding adult wolves, mostly from the same packs will be released into central Idaho in autumn without previously being held there. Reintroductions will be repeated in following years until populations become established in both areas.

There have been very few previous introductions of gray wolves on which to base this plan. Prior experiences with artificially moving wolves from one location to another have revealed a strong tendency for the animals to travel widely and try to return to their place of origin (Fritts 1993). This experiment attempts to alleviate that problem with Yellowstone by a period of confinement at the release site (“soft” release), as has been successful with the Red wolf reintroduction program (mostly captive-raised wolves) (Phillips et al. in press). However, conducting a soft release in central Idaho involves more logistical problems due mainly to difficult access. We concluded that the most feasible approach for Idaho is to hard release wolves of dispersal age, with the expectation that many will travel extensively, but some will pair bond and form new packs in much the same manner as occurs naturally. Separation from their packs and release in another area simulates natural dispersal and the creation of lone wolves as potential progenitors of new packs. Studies of hard released wolves have shown that after a period of orientation their behavior appears to be the same as naturally dispersing lone wolves.

Because of the dearth of previous experience and lack of proven reintroduction techniques for wild wolves, it is clear that the reintroduction program will not proceed predictably or smoothly, at least at first (Fritts 1993). We doubt that any single technique is best for every wolf or every wolf pack because of substantial differences in temperament and behavior among wolves. Planning and preparation for each stage of the reintroduction must be meticulous and consider numerous factors and variables. Even so, anticipation of every problem is impossible; unexpected turns of events will occur. These must be responded to quickly. Some modification and refinement to the above procedure will undoubtedly be made as experience dictates. Major modifications would generally add complexity and expense to the relatively simple project design outlined here.

This reintroduction effort will provide much new and valuable information about how to conduct a reintroduction of wild wolves. The project will be successful because it involves repeated releases of wolves and adaptation of procedures (“learning by doing”) until populations are established. However, any observers who are unprepared for temporary setbacks and the death of some of the wolves involved will be disappointed.

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Individuals to Whom Questionnaire Was Sent.
An Asterisk Indicates Those Responding:

Dr. Layne G. Adams *	Dr. Mark R. Johnson	Dr. Rolf O. Peterson
Dr. Theodore N. Bailey	Dr. Paul W.B. Joslin *	Mr. Michael K. Phillips *
Dr. Warren B. Ballard *	Mr. David Kelleyhouse	Dr. Daniel Pletscher *
Ms Vivian Banchi	Dr. Erich Klinghammer	Dr. Robert R. Ream

Dr. A. T. Bergerud
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Ms. Diane K. Boyd *
Mr. John W. Burch
Dr. L.N. Carbyn *
Mr. Ray Demarchi
Mr. Jim Dutcher *
Mr. Michael W. Fairchild *
Dr. Todd K. Fuller
Mr. Johns R. Gunson *
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Appendix 5
Cost Estimates For
Wolf Reintroduction Alternatives

Alternative 1: Reintroduction of Experimental Populations

Summary – A nonessential experimental population rule would be established by regulation. In October and November, entire packs, or as many pack members as cold be obtained (estimated at 4-7 wolves per pack), would be captured by helicopter darting, possibly supplemented by trapping. Breeding adults and their pups from three packs would be transported to and confined at three release sites in Yellowstone National Park. Yearlings and other adults (about 15) would be immediately released in central Idaho. In December, wolves in Yellowstone (about 15) would be released. The wolves would be monitored and returned to release sites as necessary. Fifteen wolves/year would be reintroduced to each area for 3-5 years, for a total of 45-75 wolves per area. If hard release techniques proved as successful as soft release, or if establishment of wolf populations took less than five years, then overall program costs would be lower. After wolf reintroduction and establishment of a wolf population, wolves would be monitored in each area until recovery (ten breeding pair in each of three recovery area for three successive years) is achieved (about 2002). After recovery wolf populations are managed by the states.

Annual estimated costs of implementing Alternative 1

	1994-1998 Reintroduction/Year		1999-2002 Monitoring/Year
	Yellowstone	Idaho	Each Area
Staff / Support	$200,000	$200,000	$150,000
Monitor Donor Population	$ 30,000	$ 30,000	0
Facility Preparation / Care	$100,000	0	0
Capture / Transport	$ 20,000	$ 20,000	0
Confine / Release	$ 20,000	$ 5,000	0
Monitor Wolves	$ 50,000	$ 50,000	$ 50,000
Public Education / Law Enforcement	$100,000	$100,000	$ 25,000
Wolf Control	$ 25,000	$ 25,000	$ 50,000
Administration / Support	$ 70,500	$ 53,000	$ 41,250
Total Annual Cost	$615,500	$438,250	$316,250
Total Project Cost	$3,077,500	$2,415,250	$1,265,000
Grand Total All Costs Until Recovery	$6,757,750 (1992 dollars)		

Alternative 2: Natural Recovery of Wolf Populations

Summary – An enhance wolf recovery program similar to the one that has been implemented in Montana since 1988 wold begin in the central Idaho and the Yellowstone areas. This program would emphasize public information and education. The program would also control wolves that attacked livestock, fund research on wolves and their prey, and enhance the current wolf monitoring program to better document the location and distribution of any wolves that disperse into these areas. The Montana program currently utilizes two full time and 1-2 seasonal biologists and annually costs about $200,000/year. This program also employs a full time Animal Damage Control Wolf Management Specialist that annually cost about $50,000/year. Establishing enhanced wolf recovery programs in the central Idaho and Yellowstone areas, that would be similar to the Montana wolf recovery program, would cost about $250,000/area/year.

Annual estimated costs of implementing Alternative 2

Staff / Support (estimated 65% staff time I & E)	$ 95,000
Research (Wolf and Ungulate)	$ 40,000
Monitoring (Equipment, Aircraft, Contracts)	$ 20,000
Control (ADC Support, Including I & E Efforts)	$ 50,000
Education / Information (I & E) (Printing, etc)	$ 20,000
Administration / Office Support	$ 25,000
Annual Grand Total (1992 dollars/area/year)	$250,000

If wolf recovery took 30 years and more active recovery programs were established in both the Yellowstone and central Idaho areas, total costs ($500,000 x 30) would be $15,000,000.

If wolf recovery programs were only established in the central Idaho and Yellowstone areas after a wolf pair was documented and the programs were discontinued in each area as soon as ten breeding pairs were documented for three consecutive years, total costs would be about $10,000,000 (recovery still estimated in 2025).

Alternative 3: No Wolf Recovery

Summary – Special legislation would be prepared for action by Congress and the states of Montana and Idaho. Wolves would be removed from the list of threatened and endangered species in the northern Rocky Mountains of the United States. Without legal protection form persecution by people wolf recovery in these areas would not occur. A few wolf packs would continue to exist in extreme northwestern Montana in Glacier National Park and lone wolves would occasionally occur in other areas but would not persist. No additional costs would be involved with control of wolves that attack livestock.

The only costs associated with implementing this alternative are associated with staff time and travel required to draft legislation to change current federal and state law. It is estimated that changing legislation and regulations would require two people working for one year and support (travel, per diem, equipment, etc.). We estimate that implementing this alternative would cost about $100,000. Wolf recovery and additional yearly costs would not occur.

Annual estimated costs of implementing Alternative 3

1994 - $100,000, no subsequent costs.

Alternative 4: Wolf Management Committee

Summary – congress would pass special legislation designating wolves throughout most of Montana and all of Idaho and Wyoming as a special state-managed nonessential experimental population. For two years the states would develop their wolf management plans, during which time the FWS would manage wolves as an experimental population. Liberal take of wolves by the public and agencies would be allowed for any wolves harassing or attacking livestock. In 1996 wolves would be reintroduced (same techniques as the Experimental population alternative) into Yellowstone National Park and, if in five years, breeding activity had not documented, possibly central Idaho. Any wolves documented killed in control actions or illegally would be replaced. If wolf mortality from control associated with livestock protection was 30%, recovery would occur in Yellowstone about 2010 and in central Idaho about 2015. A total of 45-75 wolves would be introduced initially and 125 reintroduced as replacements in each reintroduction area. If wolf mortality from control was 20%, recovery would occur in Yellowstone about 2007 and central Idaho about 2012. A total of 45-75 wolves would be reintroduced initially and 75 reintroduced as replacements in each reintroduction area.

Annual cost estimates of implementing Alternative 4[a]

Plan Task	Agency	2 Planning Years	5 Implementation Years
State Plan	States	$ 442,000	$ 110,000
EIS / Rule	Federal	$ 900,000	0
Information	All	$ 860,000	$ 2,006,000
Reintroduction	NPS/FWS	$ 650,000	$ 3,685,000
Wolf Management	All	$ 110,000	$ 2,907,000
Law Enforcement	All	0	$ 1,810,000
Land Management	FS	$ 700,000	$ 2,250,000
Wolf Monitoring	All	$ 690,000	$ 2,523,000
Ungulate Monitoring	All	$ 210,000	$ 3,515,000
Wolf Research	All	$ 580,000	$ 3,012,000
Ungulate Research	All	0	$ 1,394,000
Ungulate Enhancement	States	0	$10,690,000
Grand Total		$5,142,000	$33,902,000

[a] Annual Cost Estimates for the first seven years of this plan are those provide to Congress by the Wolf Management Committee in the May 1991 report.

Total – first seven years of plan implementation - $39,044,000
Estimated Plan implementation per year after first seven years - $6,000,000/year.

Grand Total Costs Recovery in 2012 – (7 + 12 years) = $111,004,000
Grand Total Costs Recovery in 2015 – (7 + 15 years) = $129,044,000

Alternative 5: Reintroduction of Non-experimental Wolves

Summary – Wolves would be reintroduced to the Yellowstone and central Idaho areas, and managed as fully endangered species. No experimental population rule would be established. Habitat conditions for wolves would be improved through $3,000,000/year of improvements/purchases/easements of vital ungulate habitats. Similar techniques to the Reintroduction of Experimental Populations alternative (Alternative 1) would be used but for a longer period of time (until ten breeding pairs were established in each area, but at least five years). If hard release of wolves was a successful as soft release, overall program costs would be slightly lower. There wold be an enhanced law enforcement program. After ten breeding pair were established they would be monitored until delisting. Recovery would probably occur about 2000.

Annual cost estimates for implementation of Alternative 5

	1994-1998 Reintroduction/Year		1999-2000 Monitoring/Year
	Yellowstone	Idaho	Each Year
Staff / Support	$ 200,000	$ 200,000	$ 150,000
Monitor Donor Population	$ 30,000	$ 30,000	0
Facility Preparation / Care	$ 100,000	0	0
Capture / Transport	$ 20,000	$ 20,000	0
Confine / Release	$ 20,000	$ 5,000	0
Monitor Wolves	$ 50,000	$ 50,000	$ 50,000
Law Enforcement	$ 100,000	$ 100,000	$ 100,000
Wolf Control	$ 10,000	$ 10,000	$ 10,000
Ungulate Habitat	$ 1,500,000	$ 1,500,000	$ 1,500,000
Administration / Support	$ 104,500	$ 87,250	$ 71,500
Total Annual Cost	$ 2,134,500	$ 2,002,250	$ 1,881,500
Annual Project Cost	$10,672,500	$10,011,250	$ 7,526,000
Grand Total All Costs Until Recovery	$28,209,750 (1992 dollars)		

Appendix 6
Wolf Reintroduction into Yellowstone National Park and Central Idaho And Executive Order 12630
(Government Actions and Interference With Constitutionally Protected Property Rights)

Under Executive Order 12630, executive departments and agencies should review their actions carefully to prevent unnecessary taking of private property. Governmental actions, including federal regulations or proposed federal regulations, that may have an impact on private property should be scrutinized to avoid undue or unplanned burdens.

The proposed action to reintroduce gray wolves into Yellowstone National Park and central Idaho has been designed to avoid affecting private property. If gray wolves are released in Yellowstone National Park, Wyoming, and central Idaho, they will be released and managed so the recovery actions are compatible with existing private land used (principally ranching) so that the lifestyle and income are not negatively affected. Other wild predators, such as coyotes, mountain lions, black bears, grizzly bears, foxes, and golden eagle presently utilize lands in public and private ownership and are an accepted part of the natural environment. Private landowners are concerned that wolves will depredate on livestock and that wolf recovery will place restraints on their land management practices or reduce their incomes. Wolves just like other large predators will occasionally attack livestock. However, currently there is a private compensation program to pay for livestock killed by wolves. In addition, under the interim wolf control plan, wolves that kill livestock are controlled by the U.S. Fish and Wildlife Service, Animal Damage Control, or cooperating agencies. This plan promotes wolf recovery and resolves conflicts with livestock. Designation of the released population as a nonessential experimental population means the released wolves will be treated as though they are a proposed species except inside National Parks and National Wildlife Refuges where they will be treated as threatened for ESA Section 7 consultation requirements. Private property will not be affected by land-use restrictions because of wolf recovery.

We anticipate that gray wolves will initially be viewed as a novelty by the local community and attract considerable attention. Eventually, however, we believe gray wolves will be viewed as a normal part of the local resident’s natural environment and the wolves will received diminishing attention from the local populace.

The U.S. Fish and Wildlife Service foresees no need to purchase lands as part of this gray wolf recovery effort. If such a need arose, acquisition would be only from willing sellers. Land values in northwestern Montana have not been noticeably affected by wolves recently recolonizing that area and there is no reason to suspect that wolf presence will negatively affect land values in other parts of Montana, Idaho, or Wyoming.

The reintroduction will undoubtedly attract that interest of wildlife viewers throughout the United States as well as other areas. Tourism is a major industry in the Yellowstone and central Idaho areas and some tourists will include visits to these areas because wolves are present. Federal public land on National Forests, Wildlife Refuges, Bureau of Land Management lands, and National Parks will provide the public with opportunities to visit areas where wolves are present. Visitors are unlikely to be a trespass nuisance on private lands.

Appendix 7
Intra-Service Section 7 Evaluation
The Reintroduction of Gray Wolves to
Yellowstone National Park and Central Idaho

Description of Proposed Action

In 1991 Congress directed the U.S. Fish and Wildlife Service to prepare an environmental impact states (DEIS) on wolf reintroduction in Yellowstone National Park and central Idaho. In the DEIS, the U.S. Fish and Wildlife Service's proposed action is to capture gray wolves in Canada and release them in Yellowstone National Park and central Idaho. Starting in October 1994, three breeding adults and their pups (15 wolves) would be captured in southern British Columbia and Alberta, held in three pens in Yellowstone National Park for 6-8 weeks, fed ungulate carcasses (collected from road kills, etc.), and released in December. In addition, 15 yearlings and non-breeding adults would be immediately released in central Idaho in October. All wolves would be radio-collared and monitored three times a week. Wolves would be moved as necessary to facilitate recovery in central Idaho and the area surrounding Yellowstone National Park. The reintroduction would occur under authorities of Section 10(j) of the Endangered Species Act which allow a high level of management flexibility within the experimental population areas, for listed species designated as nonessential experimental populations. In addition to other provisions, the special rule would allow moving any wolves that impact or have potential to impact other listed species. The reintroduction would continue until a wild wolf population was established (defined as two wild breeding pair, successfully raising at least two young for two consecutive years in an area). It is expected reintroductions would occur for 3-5 years. As a result of this action would populations should reach viability [defined as ten breeding pair, in three areas (northwestern Montana, central Idaho, and the area in and around Yellowstone National Park), for three consecutive years] by 2002. At that point wolf populations could be delisted and managed solely by the respective states and tribes. Wolves have naturally recolonized and are expanding in northwestern Montana so the proposed action only involves central Idaho and the Yellowstone area. This Intra-Service Section 7 evaluation involves the proposed action (preferred alternative) in the DEIS on the Reintroduction of Gray Wolves in Yellowstone National Park and central Idaho, July 1993.

Location

The proposed project involves the northern Rocky Mountains of the United States, and specifically refers to the states of Montana, Idaho, and Wyoming. The experimental population area for Yellowstone includes all of Wyoming, and that portion of Montana and Idaho east of Interstate 15 and south of the Missouri River from the Montana-North Dakota border to Great Falls. The experimental area for central Idaho includes that portion of Montana and Idaho west of Interstate 15 and south of Interstate 90. Wolf populations resulting from this reintroduction are expected to occur primarily in the Greater Yellowstone and central Idaho areas (see Figure 1) but individual wolves may occasionally occur throughout the three states. Wolves outside this proposed experimental rule area (i.e., northwestern Montana and northern Idaho) are listed as endangered and are not affected by the conditions of the proposed experimental rule.

Listed Species or Critical Habitat Considered

Threatened and Endangered Species – Montana, Idaho, Wyoming

Gray wolf (*Canis lupus*)
Grizzly bear (*Ursus arctor horribilis*)
Woodland caribou (*Rangifer tarandus caribou*)
Black-footed ferret (*Mustela nigripes*)
Bald eagle (*Haliaeetus leucocephalus*)

Peregrine falcon (*Falco peregrinus*)
Whooping crane (*Grus americana*)
Piping plover (*Charadrius melodus*)
Least tern (*Sterna antillarum*)
Pallid sturgeon (*Scaphirhynchus albus*)
Sockeye salmon (*Oncorhynchus nerka*)
Chinook salmon (*Oncorhynchus tschawytscha*)
Kendall Warm Springs dace (*Rhinichthys osculus thermalis*)
Wyoming toad (*Bufo hemiophrys baxteri*)
Five Species of Snake River mollusks including:
-Desert valvata snail (*Valvata utahensis*)
-Bliss rapids snail (undescribed *Hydrobiid*)
-Idaho springsnail (*Pyrgulopsis idahoensis*)
-Snake River physa snail (*Physa natricina*)
-Banbury Springs limpet (undescribed *Lanx* sp.)
MacFarlane's four-o'clock (*Mirabilis macfarlanei*)

Objectives of the Action

Successful implementation of the proposed action will foster the recovery of gray wolf populations in the northern Rocky Mountains of the United States. Beginning establishment of a wolf population that will grow to ten breeding pairs of wolves, in both the central Idaho and Yellowstone National Park recovery areas, which comprise two of three wolf recovery areas (northwestern Montana, central Idaho, and the Greater Yellowstone area) necessary for the recovery of gray wolves in the northern Rocky Mountains of the United States, will contribute to recovery of the species. Natural wolf recovery has established a growing population of about 45 wolves in northwestern Montana. Successful reintroduction of wolves designated as an nonessential experimental population in central Idaho and Yellowstone National Park beginning in 1994 will establish viable wolf populations in those areas by about 2002. About 30 wolves will be captured in Canada in October for 3-5 consecutive years. Fifteen wolves (yearlings and non-breeding adults) per year will be taken directly to Idaho and released. Fifteen wolves (adults and their pups) per year will be transported to Yellowstone National Park and held in three separate 1-acre pens for 6-8 weeks before being released. These wolves will be radio collared and monitored 1-3 times per week. Wolves will be moved as required to enhance wolf recovery. Several wolves from each wolf pack will be captured and radio collared until a recovered population is established so that wolf population growth can be closely monitored. Recovered wolf populations will be managed by the respective state wildlife resource agencies, in much the same manner as mountain lions and black bears currently are managed.

Explanation of Impact of Action on Listed Species or Critical Habitat

Gray Wolf – Beneficial effect. Wolves currently recolonizing northwestern Montana and potentially northern Idaho will no be impacted by the proposed action because those wolves are outside the proposed experimental population rule area. Some wolves that are offspring of reintroduced wolves will eventually leave the experimental area and travel into northwestern Montana. These wolves will contribute to increased genetic diversity but are unlikely to significantly impact the rates of wolf population growth in Montana. The capture and release of wolves from Canada into the reintroduction areas is not likely to impact the natural dispersal rate of wolves from Canada into northwestern Montana, because most wolves captured for reintroduction will not be adjacent to the United States-Canada border.

This action will lead to the recovery of wolf populations in the Yellowstone and central Idaho areas by about 2002, enhancing recovery of the species. The genetic diversity of wolves in the Yellowstone and central Idaho areas will be increased as a result of reintroduction rather than eventual natural immigration of closely related wolves from northwestern Montana. The proposed experimental rule will result in some wolves being killed, moved, or removed from the reintroduction areas because of conflicts with livestock, ungulate populations, or possibly other listed species. Such losses of individual wolves are incorporated as part of the wolf recovery-reintroduction program and are not expected to significantly affect wolf population growth to recovery. There have been occasional lone wolves in the central Idaho and Yellowstone areas for decades. Such individuals might become more exposed to mortality under an experimental population rule than they currently are. However, any increased vulnerability would be mitigated by reintroduction because any rare mortalities would be more than offset by reintroduction of 15 wolves/year and the chances of finding mates and producing young by such individuals are greatly enhanced by reintroduction. See reintroductions of Gray Wolves in Yellowstone National Park and central Idaho Final Environmental Impact Statement for details of wolf management and recovery.

Grizzly Bear – Not likely to adversely effect. Grizzly bears and wolves co-exist throughout the northern Hemisphere and would be expected to co-exist in the recovery areas. Wolf and grizzly bear research in and near Glacier National Park has indicated only minor interaction between bears and wolves, other than that they both kill ungulates. Bears will occasionally usurp wolf-killed ungulates by driving wolves away. Wolves and grizzly bears have been documented to kill each other in a few other areas of North America but such instances are uncommon and unlikely even in areas with high densities of both grizzly bears and wolves. Wolves and bears usually avoid direct contact with one another. Wolves may both provide and compete for ungulate carcasses with grizzly bears, but such competition should be insignificant. Ungulate populations are expected to decrease less than 15% from their current high levels because of recovered wolf populations. Grizzly bear densities are not strongly linked to ungulate density. Recent investigations indicate that it is unlikely that wolves will have a detrimental effect on grizzly bear numbers or survival. If any unforeseen effects did occur or were likely, the proposed experimental population rule allows for wolves in the experimental population areas to be moved to other areas to resolve local conflicts with other listed species. In addition to the regular monitoring of reintroduced radio collared wolves, there is an active grizzly bear research and management program in and around Yellowstone National Park, including monitoring of radio collared bears, that would likely detect significant potential impacts or competition. For references see Servheen and Knight 1990, Koth et al. 1990, Mattson and Knight 1992.

The confinement of wolves at three temporary 1-acre pens in Yellowstone National Park will occur from late October until late December for 3-5 years. While during this time most grizzly bears will be going into hibernation, some may be attracted to these facilities because of odors. The pens will be designed (chain link fence, digging barrier, and double hot wired on the outside) so that it will be very difficult for grizzly bears to enter them. Therefore, bears will not receive any positive reinforcement by approaching the pens. Food (ungulate carrion primarily obtained from road killed ungulates) for the wolves will be stored off site and in locations where bears are not attracted to it (freezers at already developed areas). Pens will not be located in areas that are vital fall grizzly bear habitat. Secure facilities will also be provided for the people caring for the wolves. All individuals involved in the program will receive specific training in bear safety and proper methods of sanitation and behavior in grizzly bear country. Since the park receives millions of visitors each year and backcountry users, hunters, and outfitters-guides often camp and recreate in grizzly bear country with minimal conflicts, no bears should become “nuisance bears” and be required to be removed from the wild as a result of this proposal. No bear mortalities or threats to human safety are expected to occur as a result of the facilities, confinement, or feeding of wolves.

Woodland Caribou – Not likely to adversely affect. Wolves feed on ungulates including woodland caribou. Wolves, in combination with other factors, have been at least partly responsible fore declines or suppression of woodland caribou populations in parts of Canada (Gunson 1992). The habitat of woodland caribou in northern Idaho (about 40-50 caribou) is outside the proposed experimental population rule area in central Idaho. If wolf recolonization were to occur in this area of northern Idaho, it would most likely result from individual wolves naturally dispersing from expanding populations in Canada and northwestern Montana, and not from wolves resulting from wolf reintroduction into the experimental population area in central Idaho. By reintroducing wolves and accelerating wolf population recovery in central Idaho, the states will gain more management flexibility sooner than if natural recovery was to slowly progress, therefore maximizing the ability of resource manage to mitigate or prevent any potential impact of wolf predation on woodland caribou. Natural recovery increases the chances that wolves would naturally recolonize the area in northern Idaho where these caribou live, before wolf populations can be delisted and managed entirely by the states. While predation may be an important factor in the Selkirk Woodland Caribou population, the caribou recovery team did not recommend removal of predators as a step in reducing caribou mortality. They also did not believe that wolf predation was likely to limit caribou population growth in the foreseeable future (Wayne Wakkinen, Idaho Fish and Game, pers. commun.). This caribou population is intensively monitored by radio telemetry and any radio-collared wolves could be located during caribou monitoring. Therefore, potential impacts or predation from wolves would likely be quickly detected. It is unlikely that wolves from central Idaho would colonize the specific areas where these caribou live and if they did, focus on caribou as prey to an extent that would impact caribou recovery. To date, wolves in Montana have appeared to focus hunting behavior in lower elevations and on white-tailed deer. In the area where woodland caribou now live in Idaho, white-tailed deer are usually at lower elevations and are much more abundant than are woodland caribou, so wolves are unlikely to find and heavily prey upon woodland caribou prior to wolf population recovery (2002). If known (marked) reintroduced wolves traveled outside the experimental population area, they would likely be captured and moved back. Furthermore the experimental rule permits any experimental wolves that are affecting the recovery of other endangered or threatened species to be moved. In addition, Section 10 of the Endangered Species Act provides authority to the Secretary of the Interior to enhance the survival of listed species, which could include protecting endangered caribou from excessive predation by another listed species, such ad naturally dispersing wolves from northwestern Montana or Canada.

Black-footed Ferret – No effect. Wolf recovery is unlikely to have effects on black-footed ferrets. Wolves do not regularly prey on mammals smaller than beaver. Wolves resulting from the proposed action are expected to be uncommon in the habitats (prairie dog towns) or areas (Meeteetse and Shirley Basin, Wyoming or Charles M. Russell National Wildlife Refuge, Montana) that are currently proposed for ferret recovery. Wolves can contract and transmit disease, such as canine distemper, rabies, and plague, which can seriously impact ferrets. However, wolves, which will be uncommon, are not expected to significantly affect the transmission of diseases because these types of diseases are already common among coyotes, foxes, and badgers which are already abundant throughout Montana, Wyoming, and Idaho.

Bald Eagle – No effect. Wolves are not known to prey on bald eagles or their nests, which are primarily in trees or on steep cliffs in the potentially affected areas. Bald eagles occasionally utilize carcasses of ungulates killed by wolves. Bald eagles and wolves occur throughout most of Canada and Alaska and despite extensive research on both species, no negative impacts to eagle populations because of wolves have been documented. The facilities would not be active during the period that bald eagles nest. Any facilities required to confine wolves as part of the reintroduction program would not be constructed near active eagle nests or eagle concentration areas, such as fall fish spawning areas.

Peregrine Falcon – No effect. Wolves are not known to prey on peregrine falcons or their nests which are typically on cliffs. Wolves do not usually prey on small bird, waterfowl, or small mammals and there will not compete for food with peregrine falcons. Peregrine and other falcons and wolves co-exist in parts of Canada and Alaska without apparently affecting one another. Any facilities required to confine wolves would not be constructed near active peregrine falcon hack sites or aeries. Facilities would not be active during the time that falcons nest.

Whooping Crane – No effect. Wolves, other than rare dispersing individuals resulting from the proposed reintroduction, are unlikely to move to the Gray's Lake National Wildlife Refuge in Idaho or Red Rock Lakes National Wildlife Refuge in Montana, where the only known concentrations of Whooping Cranes currently exist in the northern Rocky Mountains. There is no known breeding populations of Whooping Cranes in potentially affected areas. Wolves in Wood Buffalo National Park, Canada, have been documented to occasionally depredate on Whooping Crane nests and may occasionally kill adult cranes that are disabled or unable to fly. However, such instances are unlikely and rare in Idaho due to the timing of Whooping Crane presence in Idaho (summer), cranes do not nest in this area, and because wolves are most likely to be denning at that time and their movements would be most likely restricted to more remote areas close to Yellowstone National Park and central Idaho. If such unexpected conflicts were to occur or appeared likely, the experimental population rule allows wolves to be moved from areas within the experimental population are to resolve conflicts with the recovery of other listed species.

Piping Plover – No effect. Wolves, other than rare dispersing individuals resulting from the proposed action, are unlikely to move into areas with plovers (primarily lower elevation, prairie or sagebrush areas in eastern Montana). Wolves are not expected to use sandy beaches along lakes, reservoirs, and alkaline lakes where plovers nest. Wolves rarely feed on small birds or their nests.

Least Tern – No effect. Wolves, other than rare dispersing individuals resulting from the proposed action, are unlikely to move into areas with terns (primarily lower elevations, prairie or sagebrush areas in eastern Montana). Wolves are not expected to use sandy beaches along lakes and reservoirs where terns nest. Wolves rarely feed on small birds or their nests.

Pallid Sturgeon – No effect. Wolves do not usually prey on fish and are unlikely to occur in fish habitat.

Sockeye Salmon – No effect. Wolves have been documented to feed on spawning salmon when they are abundant and accessible. It is likely that most of the salmon eaten by wolves would have already spawned, since they would be easier to catch or would be washed up near shore as carrion. Wolves would have trouble catching salmon prior to spawning in the large water bodies of the Snake River system. The low numbers of salmon and wolves make it highly unlikely that wolves would even catch or feed on salmon in the northern Rocky Mountains.

Chinook Salmon – No effect. Wolves have been documented to feed on spawning salmon when they are abundant and accessible. It is likely that most of the salmon eaten by wolves would have already spawned, since they would be easier to catch or would be washed up near shore as carrion. Wolves would have trouble catching salmon prior to spawning in the large water bodies of the Snake River system. The low numbers of salmon and wolves make it highly unlikely that wolves would even catch or feed on salmon in the northern Rocky Mountains.

Kendall Warm Springs Dace – No effect. Wolves are not documented to frequent hot springs or feed on small fish. Wolves, other than occasional dispersing individuals, are unlikely to occur in this area. Wolves also are not documented to utilize specific habitat occupied by the dace (one warm spring).

Wyoming Toad – No effect. Toads are not a normal prey item of wolves. Wolves are unlikely to occur in the area occupied by the Wyoming Toad (SE Wyoming).

Five Species of Snake River Mollusks – No effect. Mollusks are not a normal wolf prey. Wolves are not known to effect mollusk populations or frequent mollusk habitat. Wolves, other than rare occasional dispersing individuals, are not expected to occur in this area.

MacFarlane's Four-o'clock – No effect. Wolves are not normally plant eaters and are not documented to affect populations of plants. Approximately 100 wolves in central Idaho is unlikely to have any effect on plant distribution or abundance. Wolves will not effect ungulate distribution and numbers to the extent that could impact ungulate grazing patterns and consequently plant distribution.

Critical Habitat

No critical habitat has been designated by the proposal, nor is the proposal likely to impact critical habitat of any other listed species. Therefore, no designated critical habitat will be affected by the proposed action.

Impacts to Category 1, 2 and 3 Candidate Species

The list of category 1, 2, and 3 candidate species for Wyoming, Montana, and Idaho was reviewed and wolf recovery will not affect any of these species. See Appendix I for list.

Recommendations to Avoid Impacts or Enhance Species Conservation

The proposed action is anticipated to have a beneficial effect on the gray wolf so there are no recommendations for avoiding impacts to the species.

The proposed action is not likely to adversely impact grizzly bears or woodland caribou. There will not be a significant impact on grizzly bears or caribou. Any potential adverse impacts on grizzly and woodland caribou that could result from wolf competition or predation can be minimized by close monitoring of reintroduced wolves (many of whom will be radio collared and monitored as part of the reintroduction strategy) and continued monitoring of woodland caribou and grizzly bears, encouraging wolf population growth on Forest Service lands in central Idaho where woodland caribou do not live, and by implementing provisions in the experimental population rules that allow experimental wolves to be moved if negative impacts to populations of other listed species occur or are likely to occur. In the unlikely event that wolves of unknown origin, focus their hunting efforts on woodland caribou populations in northern Idaho, the Secretary of the Interior could issue a permit under Section 10 of the Endangered Species Act, to move wolves from the immediate area to reduce predation pressure on caribou and still achieve wolf recovery. Conflicts with grizzly bears around facilities in Yellowstone National Park will be minimized by locating the facilities in areas without high fall bear use, secure construction of the temporary pens and employee facilities, following established guidelines for sanitation in grizzly habitat, providing bear safety training for all project employees, and properly storing wolf food off-site.

The proposed action is not anticipated to have any impacts or affect on the black-footed ferret, bald eagle, peregrine falcon, whooping crane, piping plover, least tern, pallid sturgeon, sockeye salmon, chinook salmon, Kendal warm springs dace, Wyoming toad, any of the five species of Snake River mollusks, or MacFarlane’s four-o’clock. Therefore, there are no recommendations for avoiding impacts of these species.

Conclusion

It has been determined that the proposed reintroduction of nonessential experimental populations of gray wolves into central Idaho and Yellowstone National Park will have a beneficial affect on gray wolves. It has been determined that the proposed action will not be likely to adversely impact grizzly bears or woodland caribou. It has been determined that the proposed action will have no affect on the black-footed ferret, bald eagle, peregrine falcon, whooping crane, piping plover, least tern, pallid sturgeon, sockeye salmon, chinook salmon, Kendall warm springs dace, Wyoming toad, any of the five species of Snake River mollusks, or MacFarlane’s four-o’clock. Candidate species in Montana, Wyoming, or Idaho will not be affected by the proposed action.

Project Leader ____________________ Date: 4/4/94

May Affect:________________ Not Likely to Adversely Affect:___✓___

Comments:

United States Department of Interior

FISH AND WILDLIFE SERVICE
Boise Field Station
4696 Overland Road, Room 576
Boise, Idaho 83706

July 15, 1993

Ed Bangs, Project Leader
Gray Wolf EIS
Fish and Wildlife Service
P.O. Box 8017
Helena, Montana 59601

Subject: Biological Assessment for the Gray Wolf EIS
(6001.4000/1-4-93-SP-97)

Dear Mr. Bangs:

The Boise Field Office (BFO) has reviewed the biological assessment for the proposal to implement a program for the reintroduction of wolves into Central Idaho and Yellowstone. We concur with your determination that the proposal is not likely to adversely affect grizzly bear and woodland caribou, and will not effect bald eagle, peregrine falcon, whooping crane, Bruneau Hot Springs snail, the five Snake Ricer snails, and Macfarlane's four-o'clock. The BFO understands that we will have the opportunity to review another biological assessment analyzing the effects of this proposal on the endangered gray wolf.

Sincerely,

Charles H. Lobdell
Field Supervisor

cc: FWS-ES, Portland

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May 7, 1993. Phone conversation with U.S. Fish and Wildlife Service Boise Idaho Field office (Secretary). Request threatened and endangered species list for Idaho.

May 7, 1993. Phone conversation with U.S. Fish and Wildlife Service Cheyenne Wyoming State office (Jane Roybal). Request threatened and endangered species list for Wyoming.

May 7, 1993. Phone conversation with U.S. Fish and Wildlife Service Helena Montana State office (Scott Jackson). Request threatened and endangered species list for Montana.

May 21, 1993. Conversation with Scott Jackson (USFWS, Helena, Mont.) review draft biological evaluation (BE). Copies sent to Boise, Idaho, and Cheyenne, Wyoming, state offices for review.

May 27, 1993. Phone conversation with Ted Koch (USFWS, Boise, Idaho) to check species list and discuss (BE). A few minor revisions suggested.

May 27, 1993. Conversation with Scott Jackson (USFWS, Helena, Montana). Discuss BE, review comments on draft. A few minor revisions suggested and incorporated.

May 27, 1993. Phone conversation with Steve Brockmann (USFWS, Cheyenne, Wyo.). Review comments on draft BE. A few minor suggestions made and incorporated.

May 27 and June 1, 1993. Phone conversation with Wayne Wakkinen (Idaho Fish and Game, Woodland Caribou Project Leader, Bonner’s Ferry, Idaho). Discuss woodland caribou and conclusions in BE. Some suggestions made for BE and incorporated.

Threatened and Endangered Species – Idaho

Gray wolf (*Canis lupus*)
Grizzly bear (*ursus arctos horribilis*)
Woodland caribou (*Rangifer tarandus caribou*)

Bald eagle (*Haliaeetus leucocephalus*)
Peregrine falcon (*Falco peregrinus*)
Whooping crane (*Grus americana*)

Sockeye salmon (*Oncorhynchus nerka*)
Chinook salmon (*Oncorhynchus tschawytscha*)

Desert valvata snail (*Valvata utahensis*)
Bliss rapids snail (undescribed *Hydrobiid*)
Idaho springsnail (*Pyrgulopsis idahoensis*)
Snake River physa snail (*Physa natricina*)
Banbury Springs limpet (undescribed *Lanx* sp.)

Plants
Macfarlane's four-o'clock (*Mirabilis macfarlanei*)

Proposed Species
White sturgeon (*Acipenser transmontanus)*(Kootenai River population only)

Candidate Species
Preble's shrew (*Sorex Preblei*)
Pygmy rabbit (*Brachylagus idahoensis*)
Townsend's big-eared bat (*Plecotus townsendii townsendii*)
Northern Idaho ground squirrel (*Spermophilus brunneus brunneus*)
Southern Idaho ground squirrel (*Spermophilus brunneus endemicus*)
North American wolverine (*Gulo gulo luscus*)
North American lynx (*Felix lynx canadensis*)

White-faced Ibis (*Plegadis chihi*)
Trumpeter swan (*Cygnus buccinator*)
Harlequin duck (*Histrionicus buccinator*)
Northern goshawk (*Accipiter gentilis*)
Ferruginous hawk (*Buteo regalis*)
Columbian sharp-tailed grouse (*Tympanuchus phsianellus columbianus*)
Mountain quail (*Oreortyx pictus*)
Black tern (*Childonias niger*)
Loggerhead shrike (*Lanius ludovicianus*)
White sturgeon (*acipenser transmontanus*) (Kootenai River population only)
Bull trout (*Salvelinus confluentus*)
Bonneville cutthroat trout (*Oncorhynchus clarki utah*)
Snake River fine-spotted cutthroat trout (*Oncorhynchus clarki* ssp.)
Redband trout (*Oncorhynchus mykiss gibbsi*)
Leatherside chub (*Gila copei*)
Wood River sculpin (*Cottus lieopomus*)

Spotted frog (*Rana pretiosa*)

Plants
Aase's onion (*Allium aaseae*)
Meadow pussytoes (*Antennaria arcuata*)
Jessica's aster (*Aster jesscae*)

Goose Creek milkvetch (*Astragalus anserinus*)
Mourning milkvetch (*Astragalus atratus* var. *inseptus*)
Mulford's milkvetch (*Astragalus mulfordiae*)
Barren milkvetch (*Astragalus sterilis*)
White clouds milkvetch (*Astragalus vexilliflexus* var. *nubilus*)
Trangular-lobed moonwart (*Botrychium ascendens*)
Crenulate moonwart (*Botrychium crenulatum*)
Broad-fruit mariposa (*Calochortus nitidus*)
Christ's Indian paintbrush (*Castilleja christii*)
Cusick's false yarrow (*Chaenactis cusickii*)
Centennial rabbitbrush (*Chrysothamnus parryi* ssp. *montanus*)
Yellow spring-beauty (*Claytonia lanceolata* var. *flava*)
Davis' wavewing (*Cymopterus davisii*)
Douglass' wavewing (*Cymopterus douglassii*)
Clustered lady's-slipper (*Cypripedium fasciculatum*)
Idaho douglasis (*Douglasis idahoensis*)
Standley whitlow-grass (*Draba trichocarpa*)
Broad fleabane (*Erigeron latus*)
Salmon River fleabane (*Erigeron salmonensis*)
Guardian buckwheat (*Eriogonum meledonum*)
Howell's gumweed (*Grindellia howellii*)
Bugleg goldenweed (*Haplopappus insecticruris*)
Palouse goldenweed (*Haplopappus liatriformis*)
Snake River goldenweed (*Haplopappus radiatus*)
Water howellia (*Howellia aquatilis*)
Davis' peppergrass (*Lepidium davisii*)
Slick spot peppergrass (*Lepidium papilliferum* (*L. montanum* var. *p*.))
Bruneau River prickly phlox (*Leptodactylon glabrum*)
Hazel's prickly phlox (*Leptodactylon pungens* ssp. *hazeliae*)
Smooth stickleaf (*Mentzelia mollis*)
Stalk-leaved monkeyflower (*Mumulus patulus*)
Rydberg's musineon (*Musineon lineare*)
St. Anthony evening primrose (*Oenothera psammophila*)
Idaho penstemon (*Penstemon idahoensis*)
Lemhi penstemon (*Penstemon lemhiensis*)
Obscure phacelia (*Phacelia inconspicua*)
Clearwater phlox (*Phlox idahonis*)
Salmon twin bladderpod (*Physaria didymocarpa* var. *lyrata*)
Alkali primrose (*Primula alcalina*)
Bartonberry (*Rubus bartonianus*)
Tobias' saxifrage (*Saxifraga bryophora* var. *tobiasiae*)
Spalding's silene (*Silene spaldingii*)
Wavy-leaf thelypody (*Thelypodium repandum*)
Out-of-tune sticky tofieldia (*Tofieldia glutinosa* ssp. *absona*)
Owyhee clover (*Trifolium owyheense*)

Threatened and Endangered Species – Montana

Black-footed ferret (*Mustela nigripes*)
Gray wolf (*Canis lupus*)
Grizzly bear (*Ursus arctos horribilis*)

Bald eagle (*Haliaeetus leucocephalus*)
Peregrine falcon (*Falco peregrinus*)
Whooping crane (*Grus americana*)

Least tern (*Sterna antillarum*)
Piping plover (*Charadrius melodus*)

Pallid sturgeon (*Scaphirhynchus albus*)

Candidates Species
Preble's shrew (*Sorex preblei*)
Spotted bat (*Euderma maculatum*)
Swift fox (*Vulpes velox*)
North American wolverine (*Gulo gulo luscus*)
North American lynx (*Felis lynx*)
Pygmy rabbit (*Brachylagus idahoensis*)
Woodland caribou (*Rangifer tarandus caribou*)

Ferruginous hawk (*Buteo regalis*)
Northern goshawk (*Accipiter gentillis*)
Baird's sparrow (*Ammodramus bairdii*)
Black tern (*Childonias niger*)
Trumpeter swan (*Cygnus buccinator*)
Harlequin duck (*Histrionicus histrionicus*)
Loggerhead shrike (*Lanius ludovicianus*)
Colombian sharp-tailed grouse (*Tympanuchus phasianellus columbianus*)
Mountain plover (*Charadrius montanus*)
White-faced ibis (*Plegadis chihi*)

Spotted frog (*Rana pretiosa*)

Rocky Mountain capshell (snail)(*Acroloxus coloradensis*)
Meltwater lednain stonefly (*Lednia tumana*)
Brown's microcylleopus riffle beetle (*Microcylleopus browni*)
Warm Spring zaitzevan riffle beetle (*Zaitzeva thermae*)
Regal fritillary butterfly (*Speyeria idalia*)
Alexander's rhycophilan caddisfly (*Rhyacophila alexanderi*)

Plants
Sapphire rockcress (*Arabis fecunda*)
Leadville milkvetch (*Astragalus barrii*)
No common name (*Botrychium crenulatum*)
Peculiar moonwart (*Botrychium paradoxum*)
No common name (*Carex lenticularis* var. *dolia*)
Alpine rabbitbrush (*Chrysothamnus parryi* ssp. *montanus*)
Long-styled thistle (*Cirsium longistylum*)
Yellow spring-beauty (*Claytonia lanceolata* var. *flava*)
Clustered lady's-slipper (*Cypripedium fasiculatum*)
Rabbit wild buckwheat (*Eriogonum agopus*)
Howell's gumweek (*Grindellia howellii*)
Water howellia (*Howellia aquatilis*)
Keeled bladderpod (*Lesquerella carinata*)
Few-seeded bladderpod (*Lesquerella humilis*)
Pygmy poppy (*Papaver pygmaeum*)
Cary's beardtongue (*Penstemon caryi*)
Hemhi beardtongue (*Penstemon lemhiensis*)
Primrose (*Primula alcalina*)
Persistent sepal yellowcress (*Rorippa calycina*)
Shoshonea (*Shoshonea pulvinata*)
Spalding's catchfly (*Silene spaldingii*)

Wyoming sullivantia (*Sullivantia hapemannii*)

Threatened and Endangered Species – Wyoming

Black-footed ferret (*Mustela nigripes*)
Gray wolf (*Canis lupus*)
Grizzly bear (*Ursus arctos horribilis*)

Bald eagle (*Haliaeetus leucocephalus*)
Peregrine falcon (*Falco peregrinus*)
Whooping crane (*Grus americana*)

Kendall Warm Springs dace (*Rhinichthys osculus thermalis*)

Wyoming toad (*Bufo hemiophrys baxteri*)

Candidate Species
Preble's shrew (*Sorex preblei*)
Spotted bat (*Euderma maculatum*)
Allen's 13-lined ground squirrel (*Spermophilus tridecemlineatus alleni*)
Preble's meadow jumping mouse (*Zapus hudsonicus preblei*)
Pygmy rabbit (*Brachylagus idahoensis*)
Fringed-tailed myotis (*Myotis thysanodes pahasapensis*)
Swift fox (*Vulpes velox*)
North American wolverine (*Gulo gulo luscus*)
Plains (Eastern) spotted skunk (*Spilogale putorius interrupta*)
North American lynx (*Felis lynx canadensis*)

Trumpeter swan (*Cygnus buccinator*)
White-faced ibis (*Plegadis chihi*)
Harlequin duck (*Histrionicus histrionicus*)
Ferruginous hawk (*Buteo regalis*)
Northern goshawk (*Accipiter gentilis*)
Columbian sharp-tailed grouse (*Tympanuchus phasianellus columbiansu*)
Long-billed curlew (*Numenius americansu*)
Black tern (*Childonias niger*)
Loggerhead shrike (*Lanius ludovicianus*)

Western boreal toad (*Bufo boreas boreas*)
Spotted frog (*Rana pretiosa*)

Black Hills redbelly snake (*Storeia occipitomeoculata ahasapae*)

Colorado cutthroat trout (*Salmo clarki pleuriticus)*
Bonneville cutthroat trout (*Salmo clarki utah*)
Flannelmouth sucker (*Catostomus latipinnis*)
Sturgeon chub (*Hybopsis gelida*)
Plains topminnow (*Fundulus sciadicus*)
Roundtail chub (*Gila robusta*)
Leatherside chub (*Gila copei*)

Narrow-foot hygrotus diving beetle (*Hygrotus diversipes*)
Jackson Lake springsnail (*Pyrgulopsis* aka *Fontelicella*)
(=Elk Island snail or *Aminicola robusta*)
Jackson Lake snail (*Helisoma Carinifex jacksonense*)
Cave physa (=Wyoming cave snail)(*Physella Physa seplunca*)

Plants
Sapphire rockcress (*Arabis fecunda*)
Barr's milkvetch (*Astragalus barrii*)
Bitterroot milkvetch (*Astragalus scaphoides*)
No common name (*Botrychium crenulatum*)
Peculiar moonwart (*Botrychium paradoxum*)
Cascade reedgress (*Calamagrostis tweedyi*)
No common name (*Carex lenticularis* var. *dolia*)
Alpine rabbitbrush (*Chrysothamnus parryi* ssp. *montanus*)
Long-styled thistle (*Cirsium longistylum*)
No common name (*Erigeron lackschewitzii*)
Rabbit wild buckwheat (*Eriogonum agopus*)
Howell's gumweed (*Grindellia howellii*)
Water howellia (*Howellia aquatilis*)
Few-seeded bladderpod (*Lesquerella humilis*)
Lemhi beardtongue (*Penstemon lemhiensis*)
Primrose (*Primula alcalina*)
Persistent sepal yellowcress (*Roripa calycina*)
Shoshonea (*Shoshonea pulvinata*)
Spalding's catchfly (*Silene spaldingii*)
Bitterroot trisetum (*Trisetum orthochaetum*)

Appendix 8
Memorandum Regarding Definition of a Wolf Population

1378 March 11, 1994

Memorandum

To: Project Leader, Yellowstone and Central Idaho Gray Wolf EIS, Ecological Services, 100 North Park, Suite 320, Helena, MT 59601

From: EIS Team Wolf Scientist and Northern Rocky Mountain Wolf Recovery Coordinator

Subject: Definition of “Wolf Population”

Per your request I have attempted to define a “population” of wolves, since a biological definition may be called for in the development of the Yellowstone and central Idaho Wolf EIS.

I could find no previous definition of wolf population in the scientific literature.

The process I used was as follows:

1. Review definitions of “population” in textbooks on population ecology.
2. Survey the opinions of 23 biologists familiar with wolves.
3. Incorporate my own view. These were formulated in university coursework, personally researching wolves, and through familiarity with the published information on the species.

There is no hard and fast definition for a population. Most textbook definitions convey the concept of a group of individuals of a certain species occupying an arbitrarily defined area at an arbitrarily defined time. The idea that reproduction is occurring is either specifically stated or implied in practically all definitions encountered. Moreover, some definitions include the idea that a population will have a birth rate, death rate, sex ratio, age structure, etc., implying a substantial number of individuals is involved over enough time to establish more than an instantaneous rate.

The majority of respondents to my survey indicated that reproduction must be occurring in order for a group of wolves to be considered a population. The entire range of responses varied from 1-2 wolves to 10 breeding pairs of wolves. The ability of the “population” to sustain itself long-term and even demonstrate some measure of “viability” was important to several respondents.

In view of all the input, I propose the following definitions of a wolf population for purposes of this EIS:

> *“A wolf population is at least 2 breeding pairs of wild wolves successfully raising at least 2 young each year (until December 31 of the year of their birth), for 2 consecutive years in an experimental area.”*

The group of wolves would cease to be a population if one or both pairs do not survive, do not maintain their pair-bond, do not breed, do not produce offspring, or if both pups do not survive for the specified period.

It is extremely important to recognize that the definition above represents the minimum standards for a wolf population. The definition does not describe a recovered wolf population or a viable wolf population. In fact it falls far short of describing either.

According to this definition, I do not believe it is appropriate to speak of a current greater Yellowstone (GYA) wolf population. The level of reported and confirmed wolf activity there is far short of that which would meet the definition. Similarly, I doubt that it would be appropriate to speak of a central Idaho wolf population. The information we have for Idaho is more indicative of occasional immigration of single wolves from a breeding population(s) elsewhere, possible with intermittent reproduction in some years, but with very low survival of any wolves that travel there or are born there.

Another consideration with Idaho is as follows. If wolves were in Idaho and met the population definition there, then it would be appropriate to speak of an Idaho population. (One can arbitrarily define the area of consideration for this purpose, and a state border is satisfactory). However, in a biological sense it would be just as legitimate to argue that naturally-occurring breeding pairs in Idaho comprise the southern extremity of the Montana population, which in turn is part of a population extending north to Banff and Jasper National Parks in Canada. No physiographic barrier exists to impede movement back and forth between the two states, and dispersing wolves entering Idaho would most likely be from Montana. The relatively discontinuous habitat between Montana and the GYA and between Idaho and the GYA would cause me to view any GYA population as more of a distinct entity.

I see no reason to believe that we are even close to having a separate population in the GYA or in Idaho, although the proximity of Idaho to the Montana wolves will likely result in population development there before in the GYA.

Appendix 9
Memorandum Regarding a Viable Wolf Population in The Northern Rocky Mountains

100 North Park
Suite 320
Helena, MT 59601

1378 February 23, 1994

Memorandum

To: Project Leader, Yellowstone and Central Idaho Gray Wolf EIS, Ecological Services, 100 North Park, Suite, 320, Helena, MT 59601

From: EIS Team Wolf Scientist and Northern Rocky Mountain Wolf Recovery Coordinator, Ecological Service, 100 North Park, Suite 320, Helena, MT 59626

Subject: Assessment of whether population goal established for delisting in the 1987 Northern Rocky Mountain Wolf Recovery Plan constitutes a viable wolf population.

The Northern Rocky Mountain Wolf Recovery Plan established a population goal for delisting of 10 breeding pairs of wolves in 3 separate areas for 3 consecutive years. Subsequent discussions of reintroduction and recovery in the greater Yellowstone area and central Idaho have assumed that a more or less self sustaining or “viable” population would be in place in the Northern Rockies once this goal was attained. The question of whether the recovery goals in the Recovery Plan are still valid and should be included in the EIS is a matter deserving careful consideration. The assessment of viability of populations has evolved rapidly since the plan was finalized. Therefore, I have attempted to re-examine the issue with inclusion of recent advances in the field of conservation biology and the contemporary concept of population viability.

I attempted to consider only biological criteria in reassessing the population goal in the recovery plan. The process I followed in conducting this analysis was to:

1. Survey recent published literature on population viability analysis (PVA) and minimum viable populations (MVP) and assess the implication to wolves in the Northern Rocky Mountain area of the U.S.

2. Review recovery goals in other recovery plans for wolves (Mexican wolf, Eastern Timber wolf, Red wolf), most of which are completed after the last revision of the Northern Rocky Mountain Wolf Recovery Plan and after the field of conservation biology was more fully developed.

3. Survey the opinions of biologists who have studies wolves.

4. Incorporate my own thoughts.

Note that my approach did not include an effort to determine the number of wolves required for population viability through modeling. The rationale for that decision will be apparent from the discussion below.

Results

Literature Survey

In recent years it has been widely recognized that larger populations are much more likely to persist for longer periods. Small populations are susceptible to several types of problems (e.g., genetic, demographic, environmental) that can lead to extinction. A minimum viable population (MVP) is a population large enough to overcome those problems and allow "long-term" persistence. Discussions of MVPs are predicted on the availability of a minimum secure area, sometimes referred to as minimum area requirement (MAR) where a population has a selected probability of survival for an arbitrarily chosen period (Soule and Simberloff 1986, USFWS 1989). Population viability analysis (PVA) is the process of estimating MVPs within a range of genetic and demographic conditions. Time periods selected for population survival are often 50, 100, 200, or more years and the probability of survival is often set at 95%.

The estimation of MVP is difficult and imprecise (Soule 1987; Boyce 1992, 1993). MVP theory is an apparently sound but untested concept (Peek et al. 1991). A complex of considerations are involved including genetic diversity, demographic stochasticity, environmental stochasticity, natural catastrophes, social dysfunction, and spatial distribution of the population. Genetic viability ensures heterozygosity and the associated reproductive vigor needed for population growth and adaptation to changing environments. Demographic factors affect population size and persistence and include such parameters as sex ratio, litter size, mortality rates, age at first reproduction, and number of breeders. Variance in individual reproductive performance has been shown to be a major component of both demographic and genetic stochasticity and thus is a major component of the analysis of population viability. Changes in climate and other unpredictable aspects of the environment are important, as they affect the availability of key resources – especially vulnerable prey in the case of wolves. Small populations have been shown to lose genetic variability much faster than larger populations, and this "genetic drift" is the overriding factory controlling the lose of genetic variation, although it can be countered with only one or a few migrants per generation.

PVA has been applied to the red wolf (*Canis rufus*), the Mexican wolf (*Canis lupus baileyi*) and the Italian wolf (see below). Each of these taxa represent far more challenging conservation problems than the restoration and survival of wolves in the Northern Rockies of the U.S. because of the scarcity of individuals and initial absence of a wild population (Mexican wolf and red wolf) and habitat problems.

Calculations that consider genetic factors such as inbreeding generally involve an estimation of the ratio of the effective population size[1] (N_e) to the total population (N). A 1% level of inbreeding per generation, which is often assumed to be the maximum acceptable for short-term viability, requires an N_e of at least 50 (Soule 1980:160). We can safely conclude that the minimal size of a wolf population must be well in excess of 50 just to meet the "1% rule". Bath et al. (1988) using the Reed et al. (1986) formula calculated that an $N_e = 50$ required 46-150 wolves (about the number expected to exist in the Yellowstone ecosystem)(Yellowstone National Park et al. 1990). For long-term viability of an animal population, $N_e = 500$ has been suggested (cf. Franklin 1980, Lande and Barrowclough 1987). These rough figures for short-term and long-term survival have led to the so-called 50/500 rule for genetic fitness which is often used, despite a slim empirical basis (Shafter 1990:73). Many writers have stressed this number may only be the right order of magnitude, and that we do not have the ability to predict hard numbers (cf. Grumbine 1990, Boyce 1992). Clearly, finding an area to support $N_e = 500$ of wolves in the lower 48 states is very unlikely, as this would equate to a total population in the low thousands.

1 Effective population size (N_e) is defined as the number of animals that would have the same reduction in genetic variability over time as an ideal population in which, for example, population numbers are constant, sex ratio equal, and all members contributed equally to each subsequent generation. The N_e of a population of mammals is usually smaller than the total number of animals because, for example, not all animals are breeders, differing sex ratios, variances in family size, and variances in population size from one generation to the next (Mysterud and Falck 1989).

As mentioned above, determining MVP via models is difficult for a variety of reasons, a major one being unpredictable changes in the environment (Boyce 1992). Soule and Simberloff (1986:19) observed that thoughtful estimates of MVP for many animal species are rarely lower than an N_e of a few hundred, and this lower limit would often correspond to an actual population of about 1,000. Soule (1987) guessed that MVPs would often be in the low thousands.

In reviewing MVP studies, Boyce (1992:500) pointed out that five different studies synthesizing data on extinction for different vertebrate taxa have revealed that populations below N = 50 consistently show a high probability of extinction, whereas populations above 200 are often reasonably secure, given protected habitat. PVA's done to date indicate that for isolated populations, preservation of most of the gene pool for several centuries will require maintenance of total populations of hundreds or thousands. Thomas (1990) used empirical data to estimate population sizes necessary for medium to long-term persistence and concluded that 10 is too few, 100 is usually inadequate, 1,000 is adequate for species of normal variability, and 10,000 should permit persistence of most birds and mammals. Nonetheless, populations that occupy habitat fragments that are far too small to hold thousands of individuals sometimes have strong conservation potential. If isolation is not complete, population variability is low, and the environment is stable, geometric mean values of 500 may allow long-term persistence.

One wild wolf population has been especially instructive about population viability of the species and three other lend insight. The Isle Royale wolf population was probably founding about 1949 from a single gray wolf pair. The population has numbered as high as 50, declined to around a dozen animals in 1988, and then increased to 17 in winter 1993-94 because of two litters produced in 1993 (R.O. Peterson, Michigan Tech. Univ., pers. commun.). Wayne et al. (1991) estimated that about 50% of the heterozygosity has been lost, compared to mainland wolves. Both the founder effect and genetic drift were instrumental in reducing genetic variability which may have been responsible for the decline of the population. Despite development of these problems, it is important to note that the Isle Royale population thrived for 30 years and is still present, although of debatable viability today, some 44 years after colonization. Remnant wolf populations in Italy, Spain, and Portugal, numbering about 100, $\leq$200, and $\leq$200 respectively for several decades or more, have repopulated those countries rather than becoming extinct.

Boyce (1990) used a simple extinction model to demonstrate the strong relationship between the area (size) of the recovery zone for a hypothetical Yellowstone wolf population and expected time to extinction. For example at N = 40, the time to extinction was 20.8 years and at N = 60 it was 357.8 years. Boyce used these results to emphasize that the security of a Yellowstone National Park wolf population could be greatly increased by expanding the recovery zone outside the Park, which was assumed to increase population size. The area necessary to support a viable population of wolves was estimated in the 4,000-5,000 mi^2 range by Mech (in Henshaw 1979:430) and Soule (1980:163). Yellowstone National Park is about 3,472 mi^2 and the greater Yellowstone area has 18,281 mi^2 of federal land; the central Idaho recovery area is about 12,355 mi^2.

Spatial distribution of a population has a major influence on its viability (Gilipin 1987). In nature many populations exist as partially isolated sets of sub-populations, termed "meta-populations." Genetic variability lost within each sub-population can be offset by new variants being reintroduced by interchange between sub-populations. Moreover, a meta-population is less vulnerable to demographic and environmental stochasticity. Extinction of one sub-population is likely to be followed by recolonization from another – contrasted with, for example, a scenario in which all individuals living within a single area are poisoned out and that area is too isolated for new colonizers to reach it. In a true meta-population, dispersers from one sub-population are likely to reach and rekindle the sub-population in another area.

Related to the meta-population concept, the size and spatial distribution and configuration of reserves has received much theoretical treatment. Goodman (1987) believed that a series of reserves, equal in total area to one large reserve, would have fewer extinctions from environmental perturbation that a large one so long as there was migration between them. The extent to which environmental perturbations act in concert between different patches of a meta-population is a critical factor in determining the advantage of that arrangement (Gilpin 1987).

There is general consensus in the conservation biology literature that most (possibly all) U.S. reserves are too small for long-term support of large vertebrate species (Schonewald-Cox 1983, Newmark 1985, Salwasser et al. 1987, Soule 1987, Grumbine 1990). Newmark (1985) examined eight parks and park assemblages and concluded that only one could support populations (MVP = 50) of wolves and other wide-ranging mammals. At a MVP of 500, even the largest preserve was six times too small. Sililar conclusions were reached by Schonewald-Cox (1983), Salwasser et al. (1987), Grumbine (1990), and others.

Recovery goals and PVA's for other wolf populations

Recovery Teams in the U.S. were among the first to grapple with the question of what constitutes a viable population of wolves as they set recovery goals for wolves in different regions of the country. Except for the Mexican Wolf Recovery Plan, which is under revision, the plans specifically call for the re-establishment of more than one population as a part of ensuring viability. The current Mexican Wolf Plan recommends the establishment of a captive population of unspecified size and the re-establishment of a wild population of at least 100 wolves in a 5,000 mi^2 area. The Northern Rocky Mountain Wolf Recovery Plan has the objective of ten breeding pairs of wolves in each of three recovery areas for three consecutive years (USFWS 1987). This approach considers numbers, subdivision of the population into essentially a meta-population by way of distribution of available habitat, and some demonstration of persistence.

The revised Eastern Timber Wolf Recovery Plan specifics the need for 2 "viable" populations (Minnesota's plus one other) (USFWS 1992). For a population outside of Minnesota to be considered viable, it must: (1) if isolated, average at least one wolf/50 mi^2 (self-sustaining, $\geq$ 200 wolves) distributed within a minimum of 10,000 mi^2 over five consecutive years, or (2) if located within 100 miles of a self-sustaining wolf population, must average at least one wolf/50 mi^2 or consist of 100 wolves in an area of at least 5,000 mi^2 over five consecutive years. The team believed that a population of at least 200 located more than 200 mi. from the Minnesota population (e.g., northern New York or northern Maine) was large enough to be viable, as well as to have sufficient genetic diversity to exist indefinitely in isolation, and that a smaller population (>100) in Wisconsin/Michigan will remain viable and retain necessary genetic diversity via immigration from Minnesota (USFWS 1992:25-26). Overall, the Team believed that a healthy, self-sustaining population should include at least 100 interbreeding wolves.

The Red Wolf Recovery/Species Survival Plan's objective is to reestablish three or more wild populations totaling about 220 within the historic range. The Mexican and red wolf recovery plans include maintenance of captive populations and assume intensive management of both captive and wild populations. Long-term maintenance of these captive breeding programs to reinforce the captive and wild programs is viewed as a necessity (USFWS 1992, USFWS 1989).

The only formal PVAs done to date have been on the Mexican wolf (*Canis lupus baileyi*) (not yet completed), the wolf in Italy (Ciucci and Boitani 1991), and the red wolf (*Canis rufus*) (USFWS 1989). The red wolf analysis used a software program developed by Dr. Jonathan Ballou, whereas Mexican wolf and Italian wolf analyses employed the computer program "VORTEX" (Seal and Lacy 1989). The PVA for the Italian wolf was unique in that it examined an existing wild population (280-300 individuals). This analysis suggested a fairly high probability of extinction within 100 and 60 years for the two presumably isolated sub-populations if any increase in adult mortality occurred, even in the absence of any environmental instability or inbreeding depression, but a high probability of survival if adult mortality held at 10%. Immediate establishment of a captive population was recommended and management intervention of the wild population(s), i.e. translocation of animals or genetic material, was recommended. Problems for the Italian wolves are greatly exacerbated by the separation of the two main populations. This PVA depicted extreme sensitivity of the Italian population to any increase in adult mortality. Assessment of the predictions of this model should consider the resurgence of this population from around 100 wolves for several decades to its present size. The PVA for hundreds or thousands that were determined necessary for viability. The chosen approach was to manage as a meta-population with intensive migration management to preclude genetic and demographic problems. Establishment of 220 red wolves in the wild and 330 in captivity is the goal (USFWS 1989).

Survey of wolf biologists

In November-December 1992, I used a mail questionnaire to ask 43 biologists familiar with wolves whether a scenario as in the Northern Rocky Mountain Wolf Recovery Plan would equate to a viable population. No effort was made to define “viability”; the biologists were expected to use their own inherent understanding of the concept. I asked: (1) whether a population of ten breeding pairs alone for three consecutive years would constitute a viable population; and (2) whether ten breeding pairs (assumed to be 100-150 wolves) in three areas for three consecutive years constituted a viable population.

Sixteen (64%) of the 25 biologists who responded felt that ten breeding pairs sustaining themselves for three consecutive years at least met the minimum standards for a viable population. Six of the 16 commented that ten pairs was marginal for viability and/or was viable only if interchange with another population occurred. Seven respondents believed this number was too few.

When asked if three such groups of ten breeding pairs in a meta-population for three consecutive years would meet the definition of “viable”, 20 or 25 (80%) responded that it would meet the definition, while two disagreed (indicating that ten years or some higher number of wolves was necessary). The remaining three respondents were not sure or did not give a distinct response. Two respondents thought that ten breeding pairs would comprise a population of 30-40 and 50 wolves, respectively, rather than 100+, and one of those respondents believed a minimum of 100 (i.e., > 10 breeding pairs) was necessary for viability. Thirteen respondents made implication that an isolated single population was likely in for future difficulty, but exchange among three sub-populations, or with the Canadian population, would greatly enhance viability of sub-populations, Overall, the capacity for movement of individuals between sub-populations was of considerable concern to respondents. Relatedness of founders was another frequently mentioned consideration.

Conclusions

Many analyses of MVP have involved small populations of rare taxa. Most treatments of population viability include two assumptions: (1) that the population is totally isolated, and (2) that no management would occur. Neither assumption is likely to be valid for wolves in the Northern Rockies of the U.S. First, the Northern Rockies population would be connected to the Canadian population via the Rocky Mountain chain northward from Glacier National Park to the Banff-Jasper Parks in Alberta and B.C. Movement of wolves between those area has been documented. (That corridor may be vital to the long term future of wolves in the Northern Rockies of the U.S.) Second, there is no reason that a dwindling sub-population could not be augmented by individuals or packs from a nearby area.

The ability of the new population in Yellowstone or Idaho to sustain itself long-term will depend in part on the amount of genetic variability at the start, which depends partly on the number of founders. Very simple, the more wolves starting the population, the stronger the genetic base for the population will be. Note that this argues for reintroduction over natural recovery. In natural recovery the population would be based on a small number (2+) of founders, which could be fairly closely related, as they would be derived from a population in Montana or Idaho that likewise probably was founded by a few animals (a double bottleneck effect). In a reintroduction, not only more individuals be used, but the degree of genetic variability they carry and their degree of relatedness could be determined prior to reintroduction. Of course the success of a Yellowstone or central Idaho wolf population is contingent on several other factors including a mortality rate low enough to allow population growth to the level of ten packs. Another advantage of reintroduction is that the sub-populations could be brought up to recovery level fairly synchronously. Components of the meta-population would then be better able to naturally augment one another (demographically) and the entire population would attain “viability” sooner.

The importance of movement of individuals between sub-populations cannot be overemphasized. The dispersal ability of wolves makes such movement likely, unless wolves were heavily exploited between recovery areas, as could happen in the more developed corridor between central Idaho and Yellowstone National Park. Intensive migration management might become necessary if one of the three sub-populations should develop genetic or demographic problems. I see no reason why migration management should be view negatively. It will be necessity in other wolf recovery programs. Some, however, may view such management intervention as ‘unnatural.’

It is fairly clear that ten breeding pairs in isolation will not comprise a “viable” population (i.e., have a high probability of survival for a long period without human intervention). Thirty or more breeding pairs comprising some 300+ wolves in a meta-population with genetic exchange between sub-populations should have a high probability of long-term persistence. However, if a range or scale of different population sizes could be displayed representing the entire “viability” spectrum (from “minimally viable” to “unquestionably viable”). I believe the definition in the current recovery plan would be on the lower half of the scale.

My conclusion is that the 1987 wolf recovery plan’s population goal of ten breeding pairs of wolves in three separate recovery areas for three consecutive years is reasonably sound and would maintain a viable wolf population in the foreseeable future. The goal is somewhat conservative, however, and should be considered minimal. The addition of a few extra pairs would add security to the population and should be considered in the post-EIS management planning. That could always be done as a periodic infusion if deemed necessary.

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Biologists Who Responded to Questionnaire on Wolf Population Viability

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Appendix 10
Summary of Ungulate Mortality in The Yellowstone and Central Idaho Primary Analysis Areas

Table A10-A
Annual estimated losses of ungulates/year from all causes that would occur to maintain stable ungulate population in the Yellowstone primary analysis area.

					Estimated Losses[a]	
Species	Postharvest population	Adult females	Young born/adult female/year	Number born/year	Hunters	Other losses[b]
Elk	56,100	33,660 (60%)	0.72	24,235	8,334	15,901
Deer	29,500	16,225 (55%)	1.2	19,470	5,287	14,183
Moose	5,800	3,480 (60%)	0.8	2,784	551	2,233
Bighorn	3,900	2,340 (60%)	0.5	1,170	130	1,040
Bison	3,600	1,800 (50%)	0.5	900	131	769
Total	98,900	57,505		48,559	14,433	34,126

[a] Total ungulate loss/year = 48,559 (hunting 30%, other 70%). Estimated wolf cause ungulate mortalities/year = 1,200 or 2.5% increase/year at recovered level (100 wolves).
[b] Other ungulate losses include disease, starvation, winter kill, wounding loss, poaching, predation, accidents, road kill, fighting, etc.

Table A10-2
Annual estimated losses of ungulate/year from all causes that would occur to maintain stable ungulate populations in the central Idaho primary analysis area.

					Estimated Losses[a]	
Species	Postharvest population	Adult females	Young born/adult female/year	Number born/year	Hunters	Other losses[b]
Elk	76,300	43,673	0.72	31,445	12,094	19,351
Deer	159,600	99,750	1.20	119,700	21,000	98,700
Moose	1,700	1,700	0.80	816	163	653
Bighorn	1,800	1,187	0.50	594	66	528
Mountain Goat	2,000	1,230	0.80	984	35	949
Total	241,400			153,539	33,358	120,181

[a] Total ungulate loss/year = 153,539 (hunting 22%, other 78%). Estimated wolf cause ungulate mortalities/year = 1,600 or 1% increase/year at recovered level (100 wolves).
[b] Other ungulate losses include disease, starvation, winter kill, wounding loss, poaching, predation, accidents, road kill, fighting, etc.

Note: These tables are intended to be representative estimates of overall mortality rates from all causes in ungulate populations (newborn-adult) rather than a prediction of the precise ungulate population dynamics/mortality in the primary analysis areas in the Yellowstone and central Idaho areas.

Appendix 11
Delisting Endangered Species and Threatened Species

Species are listed, delisted, or their status as threatened or endangered is changed according to provisions and procedures in Section 4 of the ESA.

Selected portions of that section read:

DETERMINATION OF ENDANGERED AND THREATENED SPECIES

Sec. 4 (a) GENERAL – (1) The Secretary shall by regulation promulgated in accordance with subsection (b) determine whether any species is an endangered species or a threatened species because of any of the following factors:

(A) the present of threatened destruction, modification, or curtailment of its habitat or range;

(B) overutilization for commercial, recreational, scientific, or educational purposes;

(C) disease or predation;

(D) the inadequacy of existing regulatory mechanisms;

(E) other natural or manmade factors affecting its continued existence.

(b) BASIS FOR DETERMINATION – (1)(A) The Secretary shall make determinations required by subsection (a)(1) solely on the basis of the best scientific and commercial data available to him after conducting a review of the status of the species and after taking into account those efforts, if any, being made by any State or foreign nation, or any political subdivision of a State or foreign nation, to protect such species, whether by predator control, protection of habitat and food supply, or other conservation practices, within any are under its jurisdiction, or on the high seas.

(c) LISTS – (1) The Secretary of the Interior shall publish in the Federal Register a list of all species determined by him or the Secretary of Commerce to be endangered species and a list of all species determined by him or the Secretary of Commerce to be threatened species. Each list shall refer to the species contained therein by scientific and common name or names; if any, specify with respect to such species over what portion of its range it is endangered or threatened, and specific any critical habitat within such range. The secretary shall from time to time revise each list published under the authority of this subsection to reflect recent determinations, designations, and revisions made in accordance with subsection (a) and (b).

(2) The Secretary shall

(A) conduct at least once every five years, a review of all species included in a list which is published pursuant to paragraph (1) and which is in effect at the time of such review; and

(B) determine on the basis of such review whether any such species should –

(i) be removed from the list
(ii) be changed in status from an endangered species to a threatened species; or
(iii) be changed in status from a threatened species to an endangered species.

Each determination under subparagraph (B) shall be made in accordance with the provisions of subsection (a) and (b).

(g) MONITORING – (1) The Secretary shall implement a system in cooperation with the States to monitor effectively for not less than five years the status of all species which have been recovered to the point at which the measures provided pursuant to this Act are no longer necessary and which, in accordance with the provisions of this section, have been removed from either the lists published under subsection (c).

(2) The Secretary shall make prompt use of the authority under paragraph 7 of subsection (b) of this section to prevent a significant risk to the well being of any such recovered species.

The 1987 Recovery Plan for Gray Wolves in the Northern Rocky Mountains stated:

The primary objective was "To remove the northern Rocky Mountain wolf from the Endangered Species List by securing and maintaining a minimum of ten breeding pairs in each of three recovery areas for a minimum of three consecutive years." The secondary objective was "To reclassify the Northern Rocky Mountain wolf to threatened status over its entire range by securing and maintaining a minimum of ten breeding pairs in each of two recovery areas for a minimum of three consecutive years." The tertiary objective was "To reclassify the Northern Rocky Mountain wolf to threatened status in an individual recovery area by securing and maintaining a minimum of ten breeding pairs in the recovery area for a minimum of three successive years. Consideration will also be given to reclassifying such a population to threatened under similarity of appearance after the tertiary objective has been achieved and verified, special regulations are established, and a State management plan is in place for that population."

The FWS looked in detail at the criteria that must be met to declare a population of wolves recovered and the procedures that must be followed to delist that population (Appendix 9). The analysis of what is a viable wolf population indicated that a wolf population could be considered recovered by securing and maintaining a minimum of ten breeding pairs of wolves in each of three recovery areas (northwestern Montana, central Idaho, and the Yellowstone area) for a minimum of three consecutive years, only if there was a reasonable (distribution of wolf pack territories compared to average or estimated wolf dispersal distances) of some interchange of wolves (minimum of one new individual breeding per generation) between the parts of the meta-population (experimental population areas, recovery areas or other nearby wolf populations). Since the three recovery areas (northwestern Montana, central Idaho, and Yellowstone area) are within relatively close proximity to one another and lone wolves have been documented to move between these, or similar, areas even at low wolf density, the criteria for wolf recovery in the 1987 Wolf Recovery Plan are still valid. If the criteria for wolf recovery were to change based upon new information then the recovery plan for wolves in the Northern Rocky mountains of the U.S. would be revised. Any revision would include public comment on proposed changes.

Al the following procedures must be followed to delist the wolf population in the northern Rocky Mountains of the U.S.

1. The wolf population meets the criteria set for recovery (population viability).

2. The Secretary shall make the determination, solely on the basis of the best scientific and commercial data available to him after conducting a review of the status of the species and after taking into account those efforts, if any, being made by any State or foreign nation…to protect such species…that gray wolves in the northern Rocky Mountains are not an endangered species or threatened species because of any of the following factors:

   (A) the present or threatened destruction, modification, or curtailment of its habitat or range; (there must be enough secure habitat to support a wolf population)

   (B) overutilization for commercial, recreational, scientific, or educational purposes; (wolf populations must be able to maintain themselves above recovery levels despite man-caused mortality)

(C) disease or predation; (wolf populations must be able to maintain themselves above recovery levels despite natural mortality)

(D) the inadequacy of existing regulatory mechanisms; (the states and tribes must have the authorities, laws, and enforcement of regulations to ensure that wolf populations are managed in a manner that they do not decline below recovery levels. For instance wolves in Wyoming could not be delisted while Wyoming law classified wolves as an unprotected predator)

(E) other natural or manmade factors affecting its continued existence; (wolf populations continue to have the recommended level of interchange of genetic material, and that they are able to maintain a recovered population level in the face of other factors not listed in A-D above)

The Secretary would publish the intent and evidence to delist wolf populations in the Federal Register. This process would be subject to full public review, but the decision to change the status of listed species is made solely on the best scientific and commercial data available at that time.

IT SHOULD BE CLEARLY AND ENQUIVOCALLY UNDERSTOOD THAT IT IS THE INTENT AND LEGAL MANDATE OF THE FWS TO RECOVER AND THEN FOLLOW LEGAL PROCEDURES TO DELIST GRAY WOLF POPULATIONS IN THE NORTHERN ROCKY MOUNTAINS OF THE U.S.

Appendix 12
Wolf Monitoring Programs in
Idaho, Montana, and Wyoming

History of Wolf Monitoring in Idaho

Sightings of wolves have been reported occasionally in Idaho since they were believed to have been eradicated in the early 1930s. Despite this history of infrequent sightings and the recently increased level of monitoring reports of wolf sightings, there is only marginal evidence to suggest that wolves are more abundant in Idaho today than they were 10-20 years ago.

Before the 1980s, sightings and reports of wolves primarily occurred incidental to other outdoor activities. Few, if any, surveys had been conducted. However, in 1978 a hunter shot a wolf near Warm Lake in the Boise National Forest, and in 1981, an Idaho Department of Fish and Game wildlife biologist photographed a wolf in the Clearwater National Forest during a big game survey flight.

Kaminski and Hansen (1984) researched historical information on the presence of wolves, searched agency files, and interviewed personnel for records and reports on wolf occurrence. In 1983 and 1984 they conducted the first extensive field survey for wolves in central Idaho. They found evidence of 1-4 single wolves during their field surveys, but found no evidence of pack activity.

In 1985, Hansen (1986) analyzed random wolf reports, sent questionnaires to hunters, trappers, and outfitters, and conducted field surveys during winter in northern Idaho. He found no conclusive sign of wolves in any of the areas he searched. Concentrations of wolf reports were not apparent, but more sightings occurred along the Montana-Idaho border than elsewhere.

Siddall (1989) analyzed and solicited reports of wolves received between September 1988 and April 1989. Of 248 reports Siddall analyzed, 78 were rated (Weaver 1978) as probable, 137 were rated as possible, and 33 were discounted. Analysis of the reports suggested a concentration of reports from the Boise and Payette National Forests in the Bear Valley, Warm Lake, and Landmark areas in central Idaho, and areas in and near the Clearwater National Forest in northern Idaho. Other apparent concentrations occurred on the Nez Perce National Forest near Dixie and near the North Fork Salmon River.

Johnston and Erickson (1990) analyzed random and solicited wolf reports received between June 1989 and February 1990. Of 170 reports they analyzed, 78 were rated (Weaver 1978) and 92 were rated possible. Concentrations of reports were evident from between the Lochsa and North Fork Clearwater River drainages, east and south of Dworshak Reservoir, in the South Fork Clearwater River drainage, the Upper South Fork Salmon Rive and Middle Fork Salmon River, and northwest of Stanley in the Cape Horn area.

In July 1991 an Idaho Department of Fish and Game employee video-taped two wolves in the Bear Valley area in the Boise National Forest. One month later, however, a wolf was found poisoned in that area. Presence of wolves has not been confirmed in the Bear Valley area since then.

Rachael (1993) analyzed 207 wolf reports received by the U.S. Fish and Wildlife Service, the Idaho Department of Fish and Game, and all National Forests in Idaho between January 1991 and June 1993. Concentrations of reports occurred in three areas: the Bear Valley area of the Boise National Forest (where one of two wolves known to occur there was found poisoned in July 1991), the Red River Ranger District of the Nez Perce National Forest, and the area west of Lobo Pass and north of the Lochsa River in the Clearwater National Forest. More than 93% of all sightings were of single animals.

A wolf that was radio-collared in Glacier National Park in September 1990, was located in the Kelly Creek drainage of the Clearwater National Forest in Idaho in January 1992, just west of the Idaho-

Montana border. That wolf was located in the Kelly Creek area during regular telemetry flights until autumn 1993. Multiple attempts to receive a signal from this animal's radio collar since then have failed, and the transmitter has exceeded its expected life; however the animal was observed by Fish and Game Department personnel in a helicopter in early February 1994.

Personnel from the Idaho State Office of the USFWS spend several weeks with Forest Service personnel during winter of 1991 and 1992 and summer of 1992 conducting surveys in the Boise National Forest, the Nez Perce National Forest, and elsewhere in Idaho. Presence of only two wolves was confirmed (both in the Bear Valley area where one was later found poisoned).

A USFWS temporary biologist and volunteer began conducting surveys for wolves and investigating timely reports of wolves throughout the state in June 1993. Positive evidence of wolf(ves) was found on the Nez Perce National Forest, but its current presence could not be confirmed. Presence of wolves are not documented from other parts of the state in 1993.

Two temporary biologists for the Nez Perce National Forest conducted surveys for wolves and goshawks in the Red River Ranger District during summer 1993, and Forest Biologist Steve Blair has been coordinating immediate responses to credible, timely wolf reports on the forest. Forest Service personnel were able to obtain positive evidence (scats and tracks) of wolves in summer 1993. However, a USFWS wolf survey crew from Washington that conducted extensive efforts to locate wolves in the Nez Perce National Forest during a 1-month period during summer 1993 found no positive evidence of wolves.

Several other National Forests have been cooperating in the effort to survey for wolves. In summer 1993, a part-time survey crew for the Panhandle National Forests investigated a series of reports near Wallace, Idaho, but failed to obtain positive evidence. Challis National Forest personnel have conducted wolf survey programs since 1990 and contributed to identifying wolves in the Bear Valley area in 1991. Payette National Forest personnel have participated in a wolf survey program in west-central Idaho since 1990. In addition to monitoring the radio-collared wolf in the Kelly Creek drainage of the Clearwater National Forest, Forest Biologist Dan Davis, has been coordinating rapid responses to credible, timely reports of wolf observations.

Two special interest groups have also contributed to the effort of surveying for wolves in Idaho. Wolf Haven has conducted several howling surveys in cooperation with land management agency biologists in Idaho since 1991, but these surveys have not let to the confirmation of the existence of wolves. The Wolf Recovery Foundation, a private organization from Boise, has also sponsored numerous wolf howling surveys throughout Idaho. These surveys have not been successful in confirming the presence of wolves. The foundation also sponsored a 1-800 number for the public to report wolf sightings.

The USFWS has continually requested that the public and state and federal agency biologists report sightings of wolves or wolf sign in a timely manner. The USFWS plans to continue to survey for wolves in 1994 in close cooperation with land management agency biologists.

Single wolves have probably inhabited or traveled through Idaho in recent years. However, despite numerous wolf surveys conducted throughout the state, and hundreds of thousands of sportsmen and recreationalists who spend over 8,000,000 visitor-days in central Idaho annually, and the hundreds of hours Idaho Department of Fish and Game wildlife biologists spend conducting survey flights on big game populations on winter ranges each year, few wolves have been confirmed to exist in Idaho. Although a few single animals probably occur in the state and the population of wolves in western Montana is increasing, wolf recovery in Idaho and elsewhere is dependent upon successful pair formation and reproduction. No evidence of breeding activity or packs of wolves has been reported in the state.

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Gray Wolf Monitoring in Montana

Eradication of the gray wolf was initiated in Montana in 1883 with the advent of a bounty system and was completed by a federal agency by the 1930s. At the same time the wolf was being eradicated from the southern portions of Alberta and British Columbia. In the late 1960s the British Columbia provincial government allowed wolf populations to increase in the southeastern portion of the province by reducing wolf hunting and trapping. The Alberta province reduced its predator control program in the 1960s. Reduction of predator control programs and reduced hunter harvest allowed for wolf populations to increase and recolonize southward toward Montana and Glacier National Park (Singer 1975). Since the 1960s sightings and documentation of wolves in northwestern Montana has steadily increased. The wolf was listed as a predator in Montana until 1973 when it was protected by state law and the federal Endangered Species Act of 1973.

Although wolves were rarely seen in Montana in the early 1990s, reports of sightings persisted through the first half of the twentieth century with a significant increase around the 1960s. Singer (1075) collected 77 wolf sightings for the period of 1910-1975, 24 of which were made form 1960 to 1975 in and around Glacier National Park. Kaley (1976) updated Singer's report and obtained 53 additional sightings around Glacier National Park in 1976. Most reports were of single animals (63%) or pairs (22%), with two packs of six wolves being reported in 1968 and 1973 (Brewster and Fritts 1992). Singer reported that 14 wolves were shot, and 15 trapped between 1910 and 1974 in the North Fork of the Flathead River drainage. Residents observed what they believed to be wolf pups in 1948, 1967, 1971, and 1973 although a den was never found.

The Wolf Ecology Project was established in 1972 by Dr. Robert Ream from the University of Montana. Under Dr. Ream's guidance, the Project collected wolf observations and searched for wolves in Montana. Day (1981) and Ream and Mattson (1982) recorded and analyzed wolf observation reports including accounts of sightings, howling, tracks, dens, scats, kills, dead wolves, and scent posts from western Montana, Idaho, and northwestern Wyoming during 1982 through 1979. A total of 400 reports were collected (Brewster and Fritts 1992). Day (1981) collected 372 wolf reports, of which 93 were questionable and not used. His "very good" category consisted of five wolves that were killed in 1964, 1968, 1972, 1974, and 1977. These animals were probably dispersers from Canada. A wolf was also killed in southwestern Montana in 1941 (Flath 1979). A majority of the reports (261) were from 1967 to 1977 (Day 1981). Single animals comprised 71% of the observation reports. Day used clumpings of sightings to determine wolf distribution and possible establishment, similar to the monitoring system that was adopted by the U.S. Fish and Wildlife Service in 1989. The reports indicated two clumpings: one was in northern Montana centered around Glacier National Park and the Bob Marshall Wilderness area; the other was in the Beaverhead National Forest in southwestern

Montana and the adjacent Salmon and Targhee National Forests in Idaho (Day 1981). Subsequent searches did not locate or confirm any pack or breeding pair.

Flath (1979) collected wolf reports from southwestern Montana from 1968 to 1978 and described an increase in wolf observations in 1968 that steadily declined from 1974 to 1978. Most of the reports (90%) were of singles or pairs with no evidence of resident wolf pack activity. One possible den was reported in 1974.

From July 1970 to 1978, the Wolf Ecology Project (Ream and Mattson 1978) collected 78 reports within the Rocky Mountain Front or within 10 km of its boundaries; 42 were rated very good, 30 good, and 6 fair. Reports were of 38 sightings, 39 of wolf sign, and one dead wolf. Findings indicated that there was no resident population, only single wolves moving through the area.

Ream and Mattson (1982) found that reports west of the Continental Divide were centered along the North and Middle Forks of the Flathead River and in the Kootenai area in extreme northwestern Montana. East of the Continental Divide, reports occurred along the Rocky Mountain front along the Glacier National Park/Bob Marshall Wilderness complex (Brewster and Fritts 1992).

The Wolf Ecology Project and the U.S. Fish and Wildlife Service collected, recorded, and investigated wolf observations from 1970 to 1988. The information was recorded and stored in a computer data base. In 1989, the U.S. Fish and Wildlife Service implemented a 3-phase monitoring system to determine the establishment and distribution of wolves in Montana and Wyoming: An observation card was developed based on the information sheet that had been used by the Wolf Ecology Project and distributed to all land management agencies to record wolf observation or sign. Training was also provided to agency personnel about wolf biology and ecology and how to look for and record sign and observations. As the information was obtained it was placed into the computer data base and analyzed for clumping of sightings. Clusters of multiple animals or of different color combination of animals suggest the presence of breeding pairs or pack activity. Numbers of reports have gone from 158 in 1989 to 180 in 1993, with a high of 370 in 1992 (U.S. Fish and Wildl. Serv. 1992).

Surveys are normally conducted when a cluster of sightings are received from an area. In 1991, approximately 7,400 miles or roads and trails were surveyed by U.S. Fish and Wildlife biologists, (900 miles by snowmobile, 1,200 miles by trail bike). U.S. Forest Service biologists surveyed 2,825 miles of trails and roads in 70 different drainages along the Rocky Mountain Front. In 1992, U.S. Fish and Wildlife biologists surveyed 14,000 miles of roads and trails (1,700 miles by snowmobile, and 1,000 miles by trail bike). In 1992, U.S. Forest Service biologists surveyed 1.007 miles of trails in 55 different drainages along the Front. A lone male wolf was discovered during the 1991 surveys and is being monitored on an occasional basis by tracks and other sign. Wolf activity of single and multiple animals was documented in six drainages in 1991 and of only single animals in 1992 (U.S. Fish and Wildlife Service 1992). Surveys were continued in 1993 with approximately the same level of intensity as in 1991 and 1992, however, the information from these surveys have not been compiled.

In 1992, 12 students from San Francisco State University conducted surveys for 14 days in an area west of Kalispell. In 1993, 12 students surveyed the Upper Yaak area and 16 students surveyed the area around Lost Trail Pass for 14 days each. A possible howl was heard in each area but no wolf activity was found. Personnel from Wolf Haven International and U.S. Fish and Wildlife Service biologists provide training for the survey participants.

The first denning of wolves in Montana in over 50 years was documented in Glacier National Park in 1986 (Ream et al. 1986). Since that time wolves have been increasing in number and distribution in northwestern Montana (U.S. Fish and Wildl. Serv. 1992). In the winter of 1993-94, there were five breeding pairs or packs living completely within northwestern Montana, one pack with a territory partially in Montana and Canada, and two packs in Canada adjacent to the Montana border (Figure 1). Approximately 65-70 wolves inhabit Montana and at least five litters (24 pups) were born in 1993. Several members of all packs have been radio-collared to determine pack dynamics and to document progress towards recovery goals.

In summary, reports of wolves have been made in Montana since the species was essentially eradicated in the 1930s. No doubt many of the reports involved coyotes, domestic dogs, or other animals. Many others probably involved single (probably dispersing) wolves from Canada. The increase in sightings after 1968 seems to have been associated with the reduction of wolf control and harvesting in Canada. Wolf sightings continue to increase as the species becomes established in Montana and disperse to other areas of the northwest. The historical pattern clearly indicates that as the wolf's range expands southward, reports of wolves may proceed establishment of breeding pairs or packs by many decades.

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Gray Wolf Monitoring in Wyoming

Early Wolf Monitoring Surveys

A survey for wolves was initiated in 1974 to determine the status of wolves in northwestern Wyoming (Vining 1975). The results of that survey were "…inconclusive as to the existence of a 'wolf' in Wyoming." Evidence collected (primarily scats) suggested the presence of a "large canine" in the Shoshone National Forest east of Yellowstone National Park (YNP). Vining's survey could not estimate the number of "large canines" nor estimate distribution in northwest Wyoming. Vining described his survey as superficial and recommended continued efforts to determine the status of wolves in Wyoming. Weaver (1978), in survey work in and near YNP, detected two instances in 1975 and 1977 of what may have been a lone wolf in the Shoshone National Forest 1 km-22 km east of YNP. Wolf packs or wolf reproduction were not detected in either the Vining (1975) or Weaver (1978) survey efforts during the 1970s.

The Wyoming Game and Fish Department (WYGF) summarized nine reports of wolves from 1978 to 1985 (Yellowstone National Park, unpub. data). Reports of sporadic (never a cluster of similar reports within the same year), were of single animals, and did not show concentrated activity or indicate the presence of wolf pack activity in northwestern Wyoming.

Recent Wolf Monitoring Program Activity

In 1989, the FWS instituted a more aggressive wolf reporting system and established a network of state and federal agency contacts to record reports of wolf sightings. The FWS also encouraged the public to report wolf sightings to appropriate authorities. All reports of wolves were recorded on a wolf observation card and entered in a computer database. Training sessions conducted in 1989 and 1991 and provided instruction and techniques on locating, verifying, and documenting wolf presence in an area. Employees from several federal agencies and WYGF attended these sessions.

In 1990, personnel from the FWS, USDA Forest Service, Bureau of Land Management, and WYGF participated in a meeting to upgrade the wolf reporting system in Wyoming and review possible reports of wolves in 1989 and 1990. Review of sightings and associated surveys did not indicate any wolf pack activity.

In 1991, the FWS received reports of wolves in the Dubois area, southeast of YNP. Fish and Wildlife Service conducted interviews with people and surveys of the area in March 1991 but did not find wolf presence. National Park Service and WYGF personnel conducted additional field surveys in the Du Noir area in August 1991 but wolf presence was not detected. Fish and Wildlife Service, USDA Forest Service, and WYGF personnel conducted an additional survey later in August 1991 in the Dubois area and did not find convincing or conclusive evidence of wolves or wolf presence in the area. An additional winter survey was conducted in the Dubois area in December 1991 by FWS and WYGF, and no evidence of wolves or wolf packs was found. In summary, the wolf monitoring system in Wyoming showed a concentration of wolf reports in the Dubois, Wyoming area southeast of YNP. Based on the concentration of reports, several surveys were conducted in 1991 and no convincing evidence of wolf presence was found. Additionally, no evidence of breeding activity, reproduction, or wolf pack activity was found. In the fall 1991, the FWS in cooperation with WYGF, began a new effort to gain information from hunters. Posters of wolf presence and identification and wolf sightings report cards were made available at state game check stations.

In 1992 and 1993, the FWS continued to collect reports of wolf sightings in Wyoming. Following an incident in late September 1992 when a wolf was killed south of Yellowstone National Park, FWS, National Park Service, and WYGF personnel search a 100 mi^2 area where the animal was killed and found no evidence of the presence of other wolves or wolf activity.

In an effort to further increase awareness of wolves and encourage people to report when they see wolves or wolf sign, FWS personnel gave 14 presentations and training sessions on wolves and wolf identification during April and May 1993. Presentations and training sessions were held throughout the Yellowstone area in Wyoming and Idaho and personnel from USDA Forest Service, BLM, WYGF and the general public attended. Based on a small cluster of reports of wolf activity in the Thorofare area southeast of Yellowstone, FWS and USDA Forest Service personnel conducted a field survey of the area in early July 1993. No evidence of wolves or wolf sign was found.

Fish and Wildlife Service personnel conducted wolf surveys in January 1994 in several areas east and south of YNP. Surveys detected only one instance of possible wolf sign (tracks) in the Berry Creek area south of YNP. The tracks suggested presence of a lone wolf. Large tracks were again reported in the Pacific Creek area south of YNP and could be the Berry Creek animal. Both reports suggest perhaps one lone wolf may be inhabiting areas south of YNP. To date no surveys or confirmed reports suggest breeding or reproduction of wolves or wolf pack activity in northwestern Wyoming. Additional surveys may be conducted in the future based on clusters of credible wolf reports. Additional presentations and training sessions to increase awareness and information about wolves will continue in the future.

Gray Wolf Monitoring in Yellowstone National Park

Introduction

Wolf sightings have been infrequently reported throughout Yellowstone and the surrounding area from the late 1920s (when the last known wolves were killed in Yellowstone) to the present.

Weaver (1978) provides a summary of wolf extermination in Yellowstone and possible occasional occurrence in and near Yellowstone from the late 1800s to April 1977. Weaver believed two pack of wolves may have been present during the mid-1930s but they not persist. For the next 30 years wolf reports (singles and pairs) were sporadic. An increase of reports occurred from 1967 to 1977 and was probably due to implementation of a system recording wolf sightings. During the 1970s, sporadic reports suggested mostly single animals in the northeast and northwest portions of the park. Tracks and howls suggested a lone, large canid may have been in an area 1-22 km east of the park in the Shoshone National Forest in spring 1977 (Weaver 1978). Weaver (1978) did not find any evidence of persistent wolf pack activity during the 1970s. Meagher (1986) summarized a total of 106 possible wolf reports from 1977 to 1986. Of the 106, 95 (90%) were judged to be coyote or impossible to categorize. The remaining 11 reports were determined to represent nine possible occurrences of wolves in the Yellowstone National Park area. If the nine occurrences were wolves, all were considered transients and the data did not suggest resident (pack) activity up to 1986 (Meagher 1986).

Since Meagher's (1986) report, wolf sightings have continued to be reported and with interest in wolf reintroduction into Yellowstone and the gray wolf EIS, reports of wolves have greatly increased to 177 reports in and around Yellowstone (160 in Yellowstone) for 1993. Of the 1993 total only two reports appear suggestive of single wolves.

In recent years, additional activities have been initiated to increase both the public and park employee awareness of wolves and encourage them to report possible sightings of wolves in Yellowstone. Yellowstone's reporting system for rare animals (including wolves) has also been updated, revised, and computerized to facilitate the analysis and summarization of rare animal sightings. Currently, anyone believing they saw a wolf is asked some basic questions regarding animal location, description, track measurements (if any), and the habitat in which it was seen. All wolf reports in research files from 1987 to 1993 were entered into a computer database to facilitate analysis. Basis information in the database included the month, day, year, and time of sighting, number of wolves, if photos were taken, track length and width if appropriate, location, and description of habitat. The answers to these questions were recorded on a Rare Animal Sighting form. Many times, based on the quality of the report, type of description, and location, reports are investigated to collect additional data (look for tracks, scats, measure vegetation, etc.) in an effort to better determine the species of animal seen. If the visitor or employee took photos or videos, the Park asks if copies can be made and those copies are included with the report. Many times photos can determine positively identify the animal. All data from a report is then recorded in a computer database. Currently, anyone may report a wolf sighting in the park by contacting any of the park Visitor Centers, rangers stations, park rangers, or contacting the Bear Management Office (where reports are summarized and entered into a computer database). All reports are taken regardless of the quality and entered into the database.

Summary of Reports from 1986 Through 1993

Reports of possible wolves in the Yellowstone are have been few from 1986 to 1990, averaging 8/year. Reports of wolves in Yellowstone greatly increased between 1991 and 1993, probably due to the increased interest in and publicity about wolves and wolf recovery in the Yellowstone area.

In 1992, several reports were received (tracks, sightings, photos) suggesting at least two individual wolves were present in the Yellowstone area. One apparently wild wolf was filmed feeding on a bison carcass in Yellowstone's Hayden Valley. Another different individual was killed September 30, 1992, south of Yellowstone National Park and search efforts the following week by National Park Service, Wyoming Game and Fish, and U.S. Fish and Wildlife Service personnel revealed no other wolves present in about 100 mi^2 area. In 1993, only two reports of appeared suggestive of wolves. One report was of wolf tracks in the Otter Creek area and one was a sighting of a wolf-like animal feeding on a bison carcass. To date, no wolf reports have indicated any concentrated wolf activity in Yellowstone and no reported have revealed the presence of pack activity or successful breeding in Yellowstone National Park.

Conclusions

Reports of wolves submitted to Yellowstone National Park have greatly increased from 1987 to 1992. Most reports were classified as unknown because too little information was present to verify or determine what a person may have seen. Many reports were determined to be Yellowstone's large coyotes and many reports have photos supporting such conclusions. Physical evidence, photos, and large tracks suggest two separate wolves may have been in or near Yellowstone in 1992. Reports in 1993 suggest one or two wolves may have been in Yellowstone National Park in 1993. None of the reports, suggestive of wolves, indicate concentrated activity of multiple animals indicative of pack formation, breeding, or reproduction.

Other Activities

Every year during all seasons, biologists spend hundreds of hours surveying ungulate herds or locating radio-collared wildlife from aircraft in Yellowstone and no one has reports seeing wolves or wolf-like animals in the park from 1986 to 1993. In early 1993, a survey was conducted over part of Yellowstone's northern range in search for wolves or wolf sign; nothing was found. In late spring, a Forest Service employee reported hearing wolves howling south of the park. Soon after a survey flight was conducted in the area to look for wolves or possible rendezvous sites. Nothing was found. Additionally. U.S. Fish and Wildlife Service and Forest Service personnel visited this backcountry location searching for wolf sign for several days and found none. No wolf howling was heard. No further reports of multiple wolves were received from the area.

Numerous information and training sessions have been held for park and concession employees from 1992 to 1994. In February 1992, a informative presentation was given to park rangers, resources management coordinators, and other park staff discussing wolf identification and sign (tracks, scats, etc.), wolf recovery in northwestern Montana, and upcoming wolf EIS process, and where to report possible wolf sightings. In July 1993, National Park Service and U.S. Fish and Wildlife Service personnel gave five workshops to park and concessionaire employees regarding wolf ecology, wolf identification, and wolf recovery efforts in northwestern Montana, and where to report possible wolf sightings. Also in July 1993, information was provided to all range sub-districts and visitor centers in the park describing the revised Rare Animal Observation system, how to fill out possible wolf reports, and where to send the reports. The new computerized system was introduced and instructions were included on how to fill out the form. In Yellowstone Today, the park newspaper given to all visitors at the park gates when they enter, an informative article described the history and status of wolves in Yellowstone and characteristics of wolf identification, and encouraged visitors to send all reports of wolves to the Bear Management Office or contact the appropriate authorities.

In January 1994, another series of meetings was held primarily for ranger and resource management personnel to inform them of the Rare Animal Observation system, how to report wolf observations, how to identify tracks, take measurements, make casts, and where to report sightings of wolves and other rare animals. Continue monitoring for wolves, collection and analysis of reports, and periodic informative articles will continue.

Appendix 13
Research Information Bulletin

Research
Information bulletin
U.S. DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
NO. 57
DATE 1993

Updating Our Thinking on the Role of Human Activity in Wolf Recovery

It is common for land managers and administrators involved in wolf (Canis lupus) management to assume that human development within wolf habitat is a hindrance to wolf recovery. Thus, researchers are often asked questions like “We are planning to build a new dock and parking area on Wolf Lake; how will that affect wolf recovery?” This kind of question pervades national forest and national park plans and has been pondered with regularity by both federal and state resource mangers.

Meanwhile, wolves have been extending their ranges into regions of much greater human development. The apparent contradiction has created both confusion and misdirected effort.

Wolves Are Not Habitat-sensitive

Originally, wolves lived in every habitat in the Northern Hemisphere that supported large mammals – their main prey. When wolves were persecuted, however, the only population left were those in inaccessible and heavily forested wilderness.

Legal Protection Was Important

The wolf was placed on the endangered species list in 1967, and recovery plans were approved for three subspecies. Legal protection, however, was not provided for the wolf until 1974. Three important factors characterized the status of wolves when administrators, researchers, and land managers began planning wolf recovery: (1) wolves had been unprotected throughout their history, and human taking had caused their demise, (2) reservoir populations of wolves in areas targeted for recovery were low, and (3) recent wolf habitat was being developed for human purposes. Research and planning for wolf recovery involved examining and trying to reverse these three factors. Legal protection was instituted and wolves began to increase.

Meanwhile, early research showed that in Wisconsin, Michigan, and Minnesota, wolf populations generally inhabited only areas with road densities less than 0.23 km^2 because higher road densities allowed human access, which led to illegal, accidental, or incidental wolf deaths. In addition, it seemed logical that developments such as highways, power lines, railroads, and mining operations would tend to deter wolf dispersal, because wolves inhabited only inaccessible or semi-accessible wilderness. Anecdotal evidence indicated reluctance of some wolves to cross highways and railroads (i.e., a dispersing radio-collared wolf returned to its natal region after encountering the outskirts of a large city; another was struck by a vehicle). Recovery plans reflected this information, and recommendations were made to limit human development in wolf recovery areas. The Eastern Timber Wolf Recovery Plan prepared in 1975 even warned about a possible cumulative effect of minor developments that could add up to major changes in habitat.

Wolves Are Increasing Their Range

At present, wolves have greatly increased their numbers

And range in Minnesota and have recolonized several parts of Wisconsin and Michigan. In the West, they have colonized parts of Montana, Idaho, and Washington; they are also immigrating into North Dakota and South Dakota. Although the newly colonizing populations are initially establishing in the less accessible parts of their new range, in several areas they have colonized regions with road densities greater than 0.23 km/km^2. Furthermore, their founders had to have passed through areas of considerable development and crossed 4-lane highways, railroads, pipelines, power lines, and other human development.

When wolves were unprotected or only newly protected, it was believe important to restrict human development in wolf recovery areas. It is clear now that the critical factor in wolf recovery was legal protection and not the few restrictions on minor developments. In short, given legal protection, wolves have adapted to human development.

A revision in thinking about the requirements for wolf recovery seems in order. So long as full or partial protection is granted wolves and prey remains adequate, the only habitat or human-use restrictions that seem necessary are those on activities that actually destroy wolf or prey habitat or that clearly hinder wolf dispersal. Hindrances would be (1) extensive corridors of open areas of high human settlement or use and (2) extensive livestock-raising areas.

Wolves Are Expanding Their Range in Europe and Asia

Lessons from Europe and Asia can be applied to the United States. Given legal protection, wolves in Italy increased from about 100 in early 1970s to about 300 at present and have made their way around Rome from population reservoirs in southern mountains to areas of higher human densities north of Rome. In India, wolves are inhabiting patches of wild habitat in highly human-populated regions. In both areas, the animals remain in the secure habitat during the day and scavenge in and around villages at night.

As protected populations of wolves recolonize former habitats in the contiguous 48 states, land managers and administrators concerned about wolf recovery and conservation may turn their thoughts from concerns about minor human developments to considering how humans and wolves can live together. The latter considerations must include protecting livestock from depredations and learning how to restrict or attenuate wolf populations. Two major tools of importance will be (1) education of the public and natural resource managers about the need for wolf population regulations, and (2) careful land-use zoning to establish zones where wolves will be allowed to live and zones where excessive conflict with humans will mandate that they be kept wolf-free.

For further information contact:

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Appendix 14
Information on Wolves in the Former Soviet Union

United States Department of Interior

FISH AND WILDLIFE SERVICE

Ecology Services
100 N. Park, Suite 320
Helena, MT 59601

1378 October 22, 1993

Prof. Dr. D. I. Bibilov
Inst. of Anim Evol Morph & Ecol
Russian Academy of Sciences
Leninskyi Pr. 33
Moscow, W-71, RUSSIA

Dear Dmitry:

Greetings from Montana.

I would like to ask a favor of you. I have enclosed a letter from a Mr. Will Graves to Ed Bangs, our wolf Environmental Impact Statement (EIS) Team Leader. In his letter, Mr. Graves gives his views on reintroducing wolves to Yellowstone National Park and central Idaho. He alleges to provide a great deal of information from the former USSR on wolf biology and behavior. Most of the information he provides is used to argue against restoring wolves. Unfortunately there are no citations of literature mentioned, so I do not know how to check the accuracy of the information he presents. We need to respond to all comments on the EIS, but do not know exactly how to respond to this man's letter.

Would you please read the letter and let me know whether you think the information about wolves in the former Soviet Union is correct. Any information on how to find the references he uses would also be appreciated. We would also welcome any comment you have on our draft EIS which proposes that wolves be reintroduced to Yellowstone and central Idaho as experimental populations (draft enclosed).

Thank you for your help. I recognize and appreciate your good work toward conservation of the wolf in the former Soviet Union.

Sincerely,

Steven H. Fritts, Ph.D.
Northern Rock y Mountain
Wolf Recovery Coordinator

Dr. Steven H. Fritts
Northern Rocky Mountain
Wolf Recovery Coordinator
Ecological Services
100 N. Park, Suite 320
Helena, MT 59601

Dear Steven:

Thank you for the opportunity to read and comment the Mr. Grave's letter concerning possible consequences of wolf reintroduction into Yellowstone National Park. Briefly, we may give the following comments on it.

1. The absence of exact bibliography references makes it difficult to realize what source of information was used and cited by Mr. Grave. Reading the letter we could not find whom Mr. Grave meant saying "Soviets have professionally documented…", "recent Russian research states…", "Russian and Soviet literature about wolves…" and so on. We should note, that there were a lot of speculations and incorrect reports on harmful role of wolf in Soviet and Russian hunting magazines and books supported by former Ministry of Agriculture, but very few true research on that subject in Russia. Reading Mr. Grave's letter we have formed an impression, that his opinion is based mainly on highly speculative hunting magazine publications and/or in popular hunting books (Pavlov's for instance).
2. Certainly, there are several problems related to free living wolf populations in our country. Most serious among them are: human impact on wolf populations and related dysfunction of natural ecosystems in which wolf must be represented as an original component (there are some recorded examples for different areas); occupation of wolf ecological niche by stray dogs after wolf extermination (that is typical situation for many regions which wolf eliminated), and, as a rule, stray dogs function much more effectively then wolves for both spreading over diseases and parasites and for epizootiology of rabies.
3. There is a potential danger of wolf involvement in rabies circulation, but in Russia wolf does not play the main role in epizootology of this disease. The main role is attributed to red fox and raccoon dog, and, in lesser extent, to stray dogs, in that relation wolf often plays a positive role reducing numbers of those noticed species.
4. We do not touch here speculations concerned with wolf attacks on people, different estimations of meat consumption by wolf, possible impact on wildlife populations, etc. A discussion of these issues may be a subject for a big review, not for a short letter. We may only mention, that in Russia veterinarians and some wildlife biologists had speculated about great amount of meat consumed by wolf (always counted like meat take from soviet people) and those speculations well fitted to official communistic ideology in former Soviet Union, but all known correct researches show that wolves in Russia do not consume more meat, than in north America.

Generally speaking, Mr. Grave's letter is based speculative and arguing information from unidentified "Russian source", and, in any case, it reflects the opinion of the only one side involved in long and highly speculative discussion of wolf role in Russia. We do not suggest, that arguments represented by Mr. Grave may be accepted as "scientifically proved" evidences from Russia on potentially harmful role of wolf in Yellowstone ecosystem. More comprehensive retrospective review of the problem can be represented after research based on over viewing of available Russian literature. Such work would take a time and can be made, if granted. We may propose, that 7-8 month's research resulting in comprehensive review of Russian literature can be conducted by us, if, in the case of need and interest from American side, it will be supported by totally 1000$ grant for two persons involved.
Further investigation on subjects mentioned in Mr. Grave's letter need planning of special research project. Under current political and economical situation in Russia we may discuss possible research on wolf role in particular ecosystems of Russia at present time only if such sort of research can meet a support from any organization interested in the subject.

With warm regards,

Dimitry Bibikov,
Professor of zoology,
Member of IUCN
Wolf specialist group

Nikita Ovsyanikov
Dr. of zoology
Member of IUCN
Wolf specialist group

Appendix 15
Article – Wolf Attacks on Humans

Audubon March 1990

*W*ho's *A*fraid of the *B*ig *B*ad *W*olf?

By L. David Mech

A TWIG SNAPPED, AND I KNEW the wolves were returning. Straddling the carcass of the moose that fifteen of them had just pulled down, I peered through the snowy birch and fir trees to see two of the creatures rushing straight toward me. I was twenty-two years old back then and had a quick decision to make: Should I reach for my movie camera or my revolver? (A film of those two big beautiful animals bearing down on me would be incredible, but why had the Park Service insisted I carry a gun?) I pulled the revolver.

Instantly I realized my mistake. Just the movement of my hand was enough to show the wolves that it was a human being who had usurped their kill, and they vanished.

Meanwhile, above me Don Murray spiraled around in the little ski plane from which we had watched the whole pack swarm over this four-hundred-pound moose calf and, despite valiant charges by the cow, bring its struggling body down. When I invited the bush pilot to join me in inspecting the remains, he politely declined. "A pilot belongs in the air," he proclaimed solemnly. "I'll watch from above."

Later, Murray told me that he had seen most of the wolves run off when I was still 150 yards from the kill. And we had both watched the last couple of wolves reluctantly leave when I was within about a hundred feet. Murray then saw all of the animals assemble 250 yards away while I was examining their kill. Eventually the two rambunctious wolves decided to race back toward the carcass, no doubt forgetting I was still there.

I don't know how many times in the thirty years since that scene on Michigan's Isle Royale I have regretted pulling the gun instead of pointing the movie camera. Over and over again during my career as a wolf biologist I have found that rather than worrying about whether wolves would attack me, I worried about how I could get closer to them.

Nevertheless, a large segment of the public still believes that wolves are dangerous to humans. The issue of possible wolf predation on humans has arisen several times during the current public debate over whether to reestablish wolves in Yellowstone National Park. For example, in a 1989 booklet called "Wolf Reintroduction in the Yellowstone National Park: A Historical Perspective," author T.R. Mader lists several alleged threats and attacks by wolves under the heading "Misconception 10 – wolves pose no threat to man himself."

Though it's certainly true that a number of aggressive encounters between wolves and humans have been documented, few if any have led to serious injury, and they often involve extenuating circumstances. So what is the actual situation? Can wild wolves be trusted around humans or not? To answer that question, we must explore well-documented reports of wolf-human encounters.

ONE OF THE EARLIEST and best accounts of a wolf attack was reported in a 1985 issued of Arctic, published by the University of Calgary Press. In the winter of 1915 a team of scientists with sled dogs was camped near the northwestern coast of Canada's Northwest Territories. When an adult female wolf, thought to be in heat, attacked the lead sled dog, the rushed out of their tents half-dressed. The wolf then attached two of them. One man shooed it off "with the flapping front" of this wool shirt. The other, ethonologist Diamond Jenness, threw a boulder at it. When the wolf tired to bite Jenness' leg, he grabbed the animal by this back of the neck, and "it screwed its head round and fastened its teeth in my arm," Jenness said. "I tried to choke it with the left hand – unsuccessfully – but after a moment it let go and moved away a little, when the Dr. immediately shot it."

Of interest here are the presence of the dogs, the turmoil, the fact that one man so easily shooed off the wolf and another actually grabbed it. It's not surprising that the wolf "screwed its head round" and bit Jenness, for most wild carnivores will try to bite when grasped by the back of the neck in order to escape. That the wolf came so close to Jenness that he had to grab it in self-defense is most significant. It is likely that the wolf was highly frightened and confused. And when feeling trapped, wolves may respond automatically with a quick, short bite. Twice I have been so bitten by tame wolves and once by a wild one.

Another interesting wolf-human interaction also involved a dog. One December day in 1970 Sanford Sandberg, a logger from Skibo, Minnesota, brought his dog to his cutting in Superior National Forest. Sandberg and a partner were cutting logs when a deer bounded within a few yards with two wolves almost on top of it. The deer stopped, the loggers waved their arms, and the wolves ran off.

While the loggers discussed the incident, a wolf rushed back and began fighting with the dog at Sandberg's feet, its tail banging against the man's leg. The wolf soon gave up and ran off, and Sandberg picked up his frightened dog.

Suddenly, the second wolf came dashing back, leaping up a the dog, catching its lower canine in Sandberg's red-and-black-checkered wolf jacket, and tearing a six-inch rip in it. For an instant Sandberg looked right into the mouth of the wolf before the animal dropped down and ran off. Sandberg never claimed he had been attacked. He said, "I'm sure the wolf was after my dog."

On a snowy January day in 1982, nineteen-year-old Ron Poyirier was out snowshoe-hare hunting in a thick cedar swamp north of Duluth. He caught a glimpse of movement just ahead, when a wolf came from nowhere and knocked him down. He rolled on the ground with the wolf and grabbed it by the throat to hold it away, it kicked and clawed him but did not bite. Poyirier's .22 rifle was still in his hand but not pointed toward the wolf. Nevertheless, the youth fired a hot, and the wolf disappeared. Poyirier suffered a one-and-a-half-inch scratch on his right thigh from one of the wolf's claws. The most reasonable explanation for this incident is that the youth was wearing hunting clothes laced with buck scent. The may have been chasing a deer – which could have been the movement Poyirier glimpsed – and confused the youth's scent with that of the deer.

No such circumstances surrounded the wolf-human interaction on Ellesmere Island in the High Arctic when a pack of six wolves closely checked out a team of scientists. As reported in a 1978 issue of the Journal of Mammalogy, the scientists saw the wolves approach and threw clods of tundra at them to ward them off. But the wolves kept coming. One jumped up and grazed the cheek of botanist Mary Dawson, leaving saliva on but not injuring her. In that region wolves have not been hunted or persecuted and are generally neutral toward humans, showing neither fear nor aggression. What the wolf pack was up to when they approached Dawson's team defies explanation.

Somewhat more explainable, but still highly unusual, was a report in a 1985 Journal of Mammalogy in which three zoologists were harassed by at least three wolves about fifteen kilometers southeast of Churchill, Manitoba. On June 29, 1984, the three men had just stopped to rest when they spied a wolf charging them from ten yards away. One man yelled and stamped his feet. The wolf stopped about twenty feet away and retreated just as a second wolf charged and came to within ten feet o Peter A. Scott. Scott sounded a "bear horn" used for scaring away polar bears. "Wolf B responded by blinking one, twitching its ears, and completing its third lunge in a slight divergence off course." It landed about a yard from Scott, trotted off at a right angle, and paused ten feet away.

The zoologists climbed trees and watched the wolves trot back and forth in an arc fifteen to thirty-five yards long for four hours. The men finally retreated two miles to their vehicle after not seeing a wolf for fifteen minutes. Later they found a den and evidence of pups in the general area.

Other, less detailed reports of wolf attacks on humans include the following: In August 1987, a young girl camping in Algonquin Park, Ontario, was bitten by a wolf when she shined a light at the creature; in British Columbia, a forester was treed by wolves, and a woman was reportedly injured when she was trying to beat off a wolf.

What is notable in all these reports, besides the highly unusual wolf behavior, is the fact that no one was seriously injured. If a wolf or pack were really to attack a person like they attack prey, the result would be instant and deadly. I have seen wolves attack several prey animals, and there is nothing hesitant about the attack. No one could ever grab a wolf by the neck or throat if it lunged the way it does at prey. Wolves can crack open the heavy upper leg bones of musk oxen and sever a cow's tail at the base with a single bit. To kill moose and other large prey, they must tear through several inches of hair and very thick hides. Indeed, captive wolves, wolf-dog hybrids, and, for hat mater, even dogs who have been mismanaged have killed or seriously injured people in very short attacks.

THE WOLF ATTACKS related above seem to represent either threats, defensive reactions, or some other kind of non-predatory interaction. In addition, when appraising alleged wolf attacks, one must always consider the possibility that the attack was made by a tame wolf. Such an explanation immediately comes to mind for the Algonquin Park incident. Many people who own pet wolves that they acquire as pups need to get rid of them as the wolf matures. Because Algonquin park is so well known for wolves, it would be a likely area for such a release.

Of course if a wolf is stricken with rabies, as sometimes happens in North America in latitudes above 60 degrees north, it is a different story. Rick Chapman, a graduate student of mine, was attacked by a rabid wolf at the Arctic National Wildlife Refuge in Alaska. He had spend months studying a wolf den there and was working on his doctorate. Chapman was watching the den when he noticed a strange wolf approach the pack and fight them. The next day the same wolf near came Chapman at his tent. After rattling pots and pans to scare it off, he finally had to report to bopping the wolf over the head with a hiking boot. The wolf left and returned again only to meet the same fate. On the wolf's third attempt, Chapman knew something was wrong with the animal, and he shot it. The wolf turned out to be rabid, as did several of the wolves it had fought with at the den.

The incident is reminiscent of a record in the Journal of Mammalogy in 1947. A wolf attacked a trainman who was riding on a little railroad "speeder" through the bush in Canada. The man hit the wolf with implements several times, and was later assisted by a train crew who happened by. Finally the wolf was killed. Although the wolf was never checked for rabies, it would certainly be a good explanation for the animal's bizarre behavior.

Rabies may also explain numerous newspaper accounts of wolf attacks on humans in mideastern counties, where the disease has been a regular problem throughout history. On the other hand, colleagues of mine in India and the Soviet Union have told me of accounts of attacks on humans by nonrabid wolves that they believe were true. The reports from India usually involve youngsters from rural villages who are attacked while relieving themselves in fields in the morning. They are often carried away and later found dead.

This "child lifting" is popularly attributed to wolves, and twenty to thirty reports a year have reached me, giving the names, ages, and villages involved. The problem is that the incidents have not yet been properly investigated by competent biologists. In an article in the Times of India, a local leopard hunter disputed the official view that wolves were attacking children and claimed the attacks were made by leopards. Not an unreasonable explanation considering that leopards are known to kill people. But until foreign reports are thoroughly checked, judgment on them must be suspended.

Even if found to be true, we must not conclude too much from the Eurasian reports. There is too much evidence that North American wolves are not dangerous to humans. Some nineteen million visitor days with no wolf attacks have been recorded in Minnesota's Superior National Forest along. In addition, the national parks of Canada and Alaska could boast many million more safe visitor days, as could Canada's provincial parks.

Furthermore, there have been incidents of humans interacting positively with wild wolves in the High Arctic (above 70 degrees north latitude), where wolves are not persecuted by humans. For example, ornithologist David Parmelee once grabbed a wolf pup and carried it back to his tent. The mother wolf followed at his heels and slept outside his tent until he released the pup.

Frank Miller, a Canadian Wildlife Service caribou biologist, reported in a 1978 issue of Musk-ox (published by the University of Saskatchewan) that G.A. Calderwood surprised two wolves near the U.S.-Canadian Arctic weather station, Mould Bay. "The wolves rose to their feet but did not flee. When Calderwood knelt on the ground to put film in his camera, one of the wolves approached, licked (his) face, uttered a gurgling sound, then turned and trotted off with the other wolf."

While this may sound incredible, my own experience leads me to believe it. During the past four summers I have spent my vacations in the High Arctic studying a pack o f wolves who were just about as friendly. I have had seven adults surround me as I lay watching their den, a yearling steal my fake fur hat when it blew off me, and pups and their mother howl within a year or two of me as I took notes.

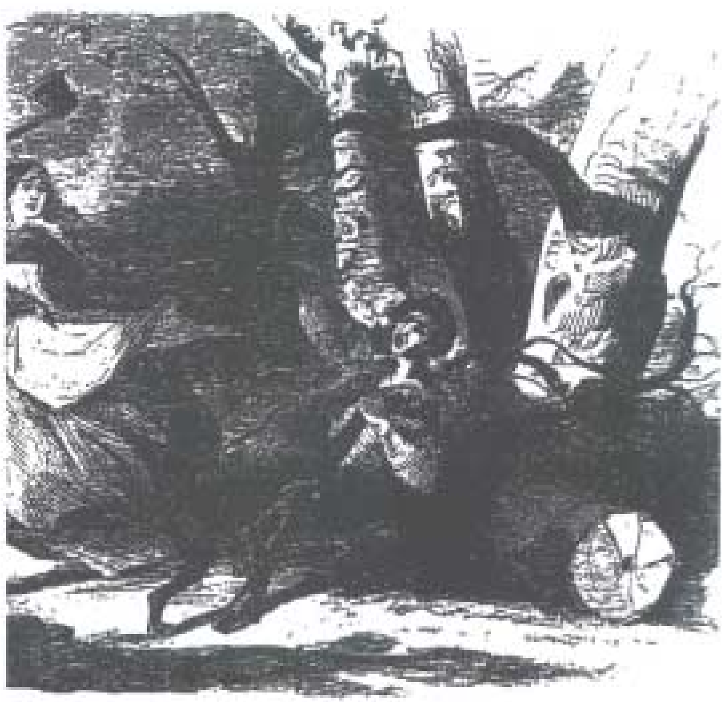
In another case a four-week-old pup toddled up to me while I filmed its mother a few feet away and yanked on my bootlace until it untied the bow!

The most dramatic demonstration of how tolerant of me the pack is occurred when they killed a muck-ox calf in front of me and a companion. As they tore apart the carcass, I crawled toward them on hands and knees to take notes on what they were eating. The subordinates (younger wolves) allowed me to within about thirty-five feet before leaving, but the alphas (elders) continued to feed undisturbed while I sat twenty feet away.

The tolerance shown by this wolf pack has allowed me to gain tremendous insights into wolf social behavior that could not have been obtained in any other way.

During all of my interactions with this pack the wolves accepted and never threatened any of us. In fact, a photographer, unbeknownst to me, actually invaded the den itself when the pups were two to three weeks old. I am not certain how the adults behaved, but I know they did not attack him. On the other hand, for the rest of that summer the mother of the pups was much less tolerant of me than she had been the previous two years. The next denning season she abandoned the den and bore her pups many miles away. The point here, however, is that despite what the wolf must have considered an extreme intrusion, she did not attack.

Of course, individual wolves and packs are highly variable. Some might attack under conditions where others might not, and the potential for a wild wolf to injure a human during an attack is great. Thus one can never say never when discussing the possibility of wolf attacks on humans. Nevertheless, the weight of evidence indicates that humans have little to fear from healthy wild wolves. Certainly the remote possibility of wolf attacks should in no way inhibit sound wolf reestablishment.



Can wild wolves be trusted around humans in a heavily visited park like Yellowstone? The evidence shows we have little to fear.

Appendix 16
Advantage of a Nonessential Experimental Wolf Population

Designating a wolf population as nonessential, experimental contributes to the recovery and conservation of wolves in the northern Rocky Mountains. Effects of wolves on domestic livestock, big game populations, and land use restrictions were some of the major issues the public identified during development of the FWS's Reintroduction of Gray Wolves to Yellowstone National Park and Central Idaho EIS. Under the FWS proposal, special management activities are proposed to reduce perceived or real effects wolves might have on human activities. Examples of these management activities proposed under this special rule would include movement of wolves, harassment of wolves away from private land and domestic livestock, take (killing) of wolves by FWS authorized agencies, and in some special cases, take of wolves by the public.

Allowance in the proposal for private landowners to harass wolves found on private land in an opportunistic non-injurious manner has not been shown to interfere with the breeding, reproduction, feeding, predation on native ungulates, or other major biological processes of wolves and there harassment does not harm wolves or wolf recovery efforts. It is the intention of the FWS proposal to promote wolf recovery in areas where their presence is most compatible with other resource activities and this would most likely occur on public lands having few or no livestock and in areas away from private lands. It is undesirable to have wolves frequent or have dens on private lands where they are not desired within the experimental areas because of the slight but increased potential of conflicts with livestock, pets, and other human activities on private lands. Harassment acts as a form of aversive conditioning and reduces the chances of having to possibly control problem wolves later in the future. Harassment may also condition wolves to be wary of people and human activities. This harassment allowance could likely promote and aid in recovery of wolves in the northern Rocky Mountains as private citizens have recourse to ward off potential problems which might likely reduce landowner frustration and which might prevent or substantially reduce indiscriminate and unnecessary killing of wolves, including those animals living in areas where conflicts with human activities do not exist.

The incidence of wolf depredations in the Yellowstone and central Idaho areas is expected to be low, especially during the early stages of wolf recovery because of low wolf numbers. However, some livestock owners could sustain depredation losses and provisions for flexible wolf control and harassment are essential to the recovery of the species. It is the intention of the FWS's proposal to allow non-depredating wolves to be the founders to the recovering wolf population in the northern Rocky Mountains. Non-depredating wolves would likely have no conflicts with humans or human activities and these wolves are wanted in the population. Wolves directing their behavior or activities toward livestock will be moved or removed from the population. Based on the projected low rates of wolf depredation on livestock, the few wolves moved or removed from the population are not likely to impede the ultimate objective of recovery of wolves in the central Idaho or Yellowstone area.

As demonstrated for wolf populations living near domestic livestock in other areas (Minnesota and northwestern Montana), a responsive wolf control program that addresses conflicts between wolves and domestic livestock, reduces the degree of wolf depredation on livestock, increase public acceptance of wolf populations which likely reduces illegal wolf mortality, and allows for wolf population growth toward recovery levels. Not only does take of depredating wolves stop the depredation, timely response to actual depredations alleviates the perception of government inaction that results in indiscriminate killing or non-offending wolves. Consequently, conservation of the entire wolf population is enhanced as only those few offending wolves are removed, and those wolves not directing their behavior toward livestock or other human activities are allowed to reproduce and are not subject to human cause mortality.

The current wolf management program in Montana is designed to control wolves that attack livestock and provides for almost no land-use restrictions to protect wolves. This wolf management program is similar to the one being proposed for the experimental population areas in Yellowstone and central

Idaho and has resulted in an expanding wolf population (22% per year over the past nine years) and a growing public acceptance of wolf populations and their recovery.

Reintroduction of wolves into Yellowstone and central Idaho will enhance wolf population viability in the northern Rocky Mountains by increasing the genetic diversity in the wolf population, increase genetic interchange between segments of the population, and accelerate reaching wolf population recovery goals 20-30 years sooner than under the current natural recovery policy. Public opinion surveys, public comments on wolf management planning, and the positions of elected local, state, and federal government officials consistently indicated they and the public will repeatedly and fervently resist any attempts to reintroduce wolves without assurances that current uses of public and private lands would not be disrupted by wolf recovery activities, that wolves that attack livestock will be controlled, and that in the rare instances where wolf predation may significantly impact big game populations that the state wildlife management agencies can resolve those types of conflict. Such assurances can be made under nonessential, experimental population designations.

As wolf populations grown, more management flexibility can be warranted. Wolves have a relatively high reproductive rate and with six packs of wolves present in a population (over 50% of a recovery level objective), about 20-25 pups could be born each year which would compensate for any increased mortality resulting from increased management flexibility (provisions allowing private individuals to take wolves in the act of depredating on livestock on public grazing allotments or private lands). Accounting for a possible 10% loss of wolves to control actions and an additional 10% loss from other mortality sources, the reproductive output of six packs of wolves provides for a wolf population increasing at or near 22% per year which can accommodate more flexible wolf management when $\geq$6 packs are present which will further address local concerns and resistance to wolf recovery efforts and reduce the need and costs of agency actions to resolve wolf/human conflicts while encouraging continued rapid wolf population growth.

Closely regulated and rational public control of wolves in the act of depredating on livestock can also more effectively focus on individual problem wolves because the situation is addressed as the conflict is occurring rather than hours or days after a problem is documented. Indiscriminate (or illegal) control may be less focused on individual problem wolves and more likely to target groups of wolves that contain problem individuals compared to immediate control of individual problem wolves as depredations are occurring.

Having wolves designated as a nonessential experimental population under the FWS proposal means no critical habitat could be designated for wolves and none would be needed. Millions of acres of public land containing hundreds of thousands of wild ungulates currently provide more than enough habitat to support a recovered population of wolves in the Yellowstone and central Idaho experimental areas.

Reintroduction of wolves designated as nonessential, experimental populations into Yellowstone National Park and central Idaho will substantially enhance the conservation and recovery of gray wolves in the northern Rocky Mountains of the United States because:

1) the public will resist efforts to reintroduction or recovery wolf wolves without the assurances that local land uses will not be adversely affected which are only available under a nonessential experimental designation;
2) provisions of the experimental rule will allow for rapid wolf population growth and address the legitimate concerns of local residents;
3) wolf population viability is greatly enhanced and accelerated by reintroduction into the Yellowstone and central Idaho areas;
4) the proposed action will not hinder the growth of wolf populations outside the experimental populations areas.