



Yellowstone Wolf Questions - a digest

Why ask questions about Yellowstone wolves, and who wants to know what?

The Northern Rocky Mountain Wolf Recovery Plan, approved in 1987, proposes translocating wolves to Yellowstone National Park (park) and adjacent public lands. Since the plan was approved, many questions have been raised about the effects of having wolves in the Yellowstone area. In August 1988, Congress directed the Interior Department's National Park Service and U.S. Fish and Wildlife Service to study four questions: 1) Whether wolves would be controlled in and out of the park; 2) how would wolves affect their prey in the park and big game hunting in areas around the park; 3) how would wolves affect grizzly bears; and 4) how would wolf recovery zones be laid out? These questions led to other related ones, also listed here. More questions remain, and funding to study some of them has been appropriated in the 1990 budget. Some questions can only be answered definitively when wolves are experimentally or naturally restored and studied in the Yellowstone recovery area.

Who is answering the questions, and how?

To answer the questions posed by Congress, the National Park Service and the U.S. Fish and Wildlife Service used three different approaches to gather the information: 1) extensive review of scientific studies, 2) consultation and compilation of the opinions of 15 North American and nine Eurasian wolf, bear, and ungulate experts, and 3) three computer simulations by population dynamics modelers at two universities. The 15 North American experts were empaneled and their opinions sought and compiled through a process called the Delphi technique. In this digest we refer to the Delphi panelists as "the 15 wolf experts." Wildlife agencies of Idaho, Montana, and Wyoming furnished data for several of the ten studies.

This is not the whole report on the questions. Here is how to get one.

Wolves for Yellowstone? A Report to the United States Congress, Volume II, Research and Analysis, 586 pages, contains the detailed results of the ten studies. The studies include many tables and figures and hundreds of references. You can obtain a copy for \$16.30, postage paid, from the Yellowstone Association, P.O. Box 117, Yellowstone National Park, Wyoming 82190. Executive summaries of the report (known as Volume I, 44 pages, \$4.20, postage paid) are available from the same source. Copies of this digest are available upon request from the Superintendent, P.O. Box 168, Yellowstone National Park, Wyoming 82190.

CAUTION: Omissions ahead!

For brevity and simplicity, conditional and qualifying phrases, even some major complex conclusions, are not included in this digest. If you want the whole story, you can not get it from this digest. Read the whole report. The views expressed here and in the report are those of the experts who studied the questions and do not necessarily represent the opinions of the Department of the Interior.

The studies digested here and in Wolves for Yellowstone? should be considered progress reports, because all the studies' authors will want to read and understand what everyone else wrote on these topics, and they may wish to modify some of their conclusions based on more complete information. For instance, not all the data on Yellowstone area wolf prey numbers, ranges, and harvests were available to the Delphi panelists when those 15 wolf experts offered their opinions on questions posed to them.

Are gray wolves native to Yellowstone?

Wolf bones found in Lamar Cave in the park prove that wolves lived there 1,000 years ago. Fifteen North American wolf experts unanimously agree that wolves were a part of the original ecosystem in Yellowstone National Park. The range of gray wolves was continuous over most of North America - most of the northern hemisphere - until exterminated by humans. Elk, one of wolves' major prey species, have also been in Yellowstone for at least 1,000 years, based on paleontological and historical evidence.

What happened to Yellowstone's wolves?

They were eliminated during a period of history when wolves and other predators were being killed as a national policy.

Gray wolf packs were eliminated from the park by the 1930s. At least 136 wolves, including 80 pups, were killed in the park from 1914 to 1926. Individual wolves are reported in the park now and then, but not confirmed by hard evidence. For example, from 1980 to 1986, 106 reports were evaluated, and all but 11 judged to be coyotes. Nine were classed as possible sightings, and of those, one was judged probable.

Why return wolves to the Yellowstone area?

The Endangered Species Act of 1973 stated, "[It is] the policy of Congress that all Federal departments and agencies shall seek to conserve endangered species and threatened species." Under that act, the gray wolf is listed as endangered in the 48 conterminous states except Minnesota, where it is listed as threatened.

How could wolves return to the park?

Three ways: 1) wolves could return to Yellowstone eventually by natural recolonization (a remote but increasing possibility with wolves recolonizing northwestern Montana), 2) federal legislation could direct reintroduction, or 3) they could be restored as an experimental population under Section 10(j) of the Endangered Species Act of 1973 (ESA).

The Northern Rocky Mountain Wolf Recovery Plan, approved in 1987, proposes recovering wolves in three areas: northwest Montana, central Idaho, and the greater Yellowstone area, with a recovery goal of ten breeding pairs of wolves in each recovery area.

A 1982 amendment to the ESA, section 10(j), would allow wolves translocated to the Yellowstone area to be designated an experimental population. In establishing the experimental population designation, Congress intended to give managers broad flexibility in managing reintroduced populations of wolves and other endangered species.

Red wolves were successfully reintroduced to the wild in North Carolina as an experimental population, and the experimental population rule has been used or proposed for recovery of eight other endangered species in various parts of the United States.

If wolves are restored to the greater Yellowstone area,...

How many wolves will there be, and where will they live?

The recovery goal for the Yellowstone recovery area in the Northern Rocky Mountain Wolf Recovery Plan is ten pairs of wolves reproducing for 3 years in a row. When that goal is met, the wolves in the Yellowstone recovery area would be recommended for removal from the list of endangered species. Assuming each pack (a breeding pair and their kin) would average 10 wolves, that would mean 100 wolves in the Yellowstone area upon recovery. That figure, 100 wolves, was used hypothetically to compute such things as wolf:ungulate ratios, and is the goal in the recovery plan that, when reached, would allow the Yellowstone wolf population to be removed from protection under the Endangered Species Act. Compare that with the estimate of 13 packs of wolves in the next paragraph, but do not confuse them. One figure (10 packs, 10 wolves each) is a recovery goal; the other (13 packs of 7-10 wolves each) is a mean of estimates of what may actually take place.

Among the 15 wolf experts consulted, there was often a wide range of opinions on questions posed to them. In some cases, means computed from that wide range are presented here and in the complete report.

Fifteen wolf experts predict about 13 packs (range: 3-35), mostly in Yellowstone National Park, and they predict it will take about 20 years for wolf pack territories to stabilize after reintroduction. Each pack may average 7-10 wolves. Five to 10 other packs may try to set up territories mostly outside the park. The size of the core area and management practices would determine if they would be allowed there, and would limit the number of wolves. Adding lone wolves to the expected number of packs, about 150 wolves may live

in and near the park. If these 15 wolf experts' projections are correct, wolves can be recovered and delisted in the Yellowstone recovery area.

Based on prey available to wolves, a park researcher predicts 110-150 wolves can live in the park; 70-90 of them on the park's northern range, and 40-60 in the rest of the park.

University of Idaho modelers predict 7-9 wolf packs totalling about 75 wolves may live on Yellowstone's northern winter range, 1-2 packs might live on other park winter ranges, and 3-4 partly migratory packs could live in the park and nearby. They say some lone wolves would also live there.

A University of Wyoming modeler estimates 58 wolves may settle on the northern range in and near the park, with only 8 in the rest of the park. He anticipates that 15-25 wolves may disperse annually, after full recovery.

The 15 wolf experts predict most wolves will live in the north central part of the park, because that is where most prey animals live. Some areas will have no wolves, or just nomads, because too few prey animals live there, or because snow becomes too deep to permit either prey or wolves to live there all year.

Access by wolves to key ungulate winter ranges next to the park would enhance the probability of the wolves surviving and recovering quickly.

The 15 wolf experts predict that, in summer, most wolves will live within the park near their homesites where young elk, deer, bison, and moose are available as prey. (Small mammals may be important during this period, too.)

In winter, wolf packs will hunt mostly elk on elk winter ranges at lower elevations in and near the park, according to the 15 wolf experts.

Yellowstone National Park alone might support the recovery goal of 10 packs of wolves, but the size of area needed to recover wolves fully can only be known after wolves are placed in the park and they learn to use their new habitat.

No speculation, no projections or computer models, nothing short of restoration and accompanying research can answer definitively some of the questions surrounding wolf recovery.

Is there enough food for wolves?

Prey is abundant. Eight species of large hoofed mammals (ungulates) summer in the park: elk, mule deer, bison, pronghorn, bighorn sheep, moose, and an occasional white-tailed deer or mountain goat. Prey numbers can vary substantially from year to year.

In other study areas, one wolf may eat 7-28 ungulates per year, depending upon prey size, alternate prey species, snow conditions, and weather. If the diet of wolves in the Yellowstone recovery area is 85% elk, they may eat roughly 7-13 elk per wolf per year.

In the summers of 1980-88, Yellowstone Park contained an annual average of 37,800 ungulates. (Drought, fires, and a severe winter in 1988-89 combined to

reduce ungulate numbers about 30% parkwide.) In the winters of 1980-88, the park contained an annual average of 23,100 ungulates.

A recovered wolf population of 10 packs of 10 wolves (100 total) in Yellowstone National Park would result in wolf:ungulate ratios of 1 wolf:378 ungulates in summer, and 1 wolf:231 ungulates in winter. Seven other areas where native wolves were studied had wolf/prey ratios of 1:96-328. (Wolves do not take all prey species at equal rates.) On the northern Yellowstone elk winter range before 1988, for every 100 elk there were 10 mule deer, 3 bison, 2 pronghorn, 1 bighorn sheep, and 1 moose. Using 1980-88 figures for winter, modelers predict 75 wolves in 7-9 packs would share the northern range (an area of about 382 square miles) with 17,450 elk, 1810 mule deer, 450 bison, 390 pronghorn, 270 bighorn sheep, and perhaps 100 moose; about 1 wolf:247 prey animals.

Although the density of wolves (7-9 packs, 75 wolves, or 1 wolf per 5 square miles) on Yellowstone's 386-square-mile northern range in winter could be among the highest on record, the ratio of one wolf per 247 prey animals would be among the lowest on record. That means there will be lots of prey for each wolf; few wolves with many prey animals.

In winter on the northern range, wolves will take mostly elk, some bison, a few mule deer or moose, and almost no pronghorn or bighorn sheep. On other winter ranges in the park, wolves will take mostly elk and bison. Through the year, wolves will take all age classes of prey animals, but more young and old than middle-aged prey. Parkwide in summer, wolves will take young prey animals in this order: elk, mule deer, bison, moose, bighorn sheep, and pronghorn.

Beaver live in Yellowstone, but will not be major prey for wolves, because they are not numerous in areas where wolves are likely to live.

How will wolves affect big game hunting near the park?

First, what will be their effect on prey populations?

The 15 wolf experts predict that no native big game species will be driven to extinction by wolves.

At wolf:ungulate ratios predicted, wolves would not limit ungulate populations. When prey biomass (weight of animals in an area) per wolf exceeds 11,000 kg (24,250 lbs.), wolves appear unable to limit their prey. With 100 wolves in Yellowstone Park, prey biomass per wolf would be 58,570 kg (129,123 lbs.) in winter and 86,140 kg (189,990 lbs.) in summer.

Wolves will have different effects on different prey species and on different herds of those species.

Most wolf experts predict elk populations will decrease less than 20% (range 4%-30%) and then stabilize after 10 years, assuming 10 wolf packs. Wolf predation on elk will reduce nutritional stress on elk, improve their physiological condition, and increase their reproduction.

Ten years after reintroduction, assuming a stable wolf population of 10 packs of 10 wolves each, 15 wolf experts expect a reduction in the mule deer population of between 20% and 30%.

Ten years after wolf reintroduction, assuming a stable wolf population of 10 wolf packs of 10 wolves each, the 15 wolf experts expect a reduction in the moose population of between 10% and 15%. Wolves kill moose less frequently than elk where moose and elk live together.

The 15 wolf experts project that ten packs of wolves over 10 years may reduce park bison by 5%-20%; one computer population model predicts a 10% reduction in bison.

Pronghorn, bighorn sheep, mountain goat, and white-tailed deer populations will be affected little or not at all, according to the experts.

Some questions remain about wolf effects on bison, heavily hunted Gallatin and Sand Creek elk herds, and on moose on the northern range north of Yellowstone National Park. Research is continuing on these questions.

Then, how should that affect hunting near the park?

Sport hunting for any big game species need not be eliminated or reduced just because wolves are restored, say a majority of the 15 wolf experts. Sport hunting and wolf predation target different animals. Depending on hunting regulations, hunters usually take prime-age animals, while wolves take mostly young and old.

The 15 experts recommend that hunting should be regulated only as needed, and must be coordinated with both wolf and big game management objectives.

A recovered wolf population will not affect hunting on the northern Yellowstone elk herd.

Modelers predict a need for reduction of harvests on Gallatin and Sand Creek elk herds. See the section on special elk hunts, below.

What are big game populations and hunter harvests of them?

Eight elk herds totaling 44,500-49,600 elk partly overlap Yellowstone National Park. From 1980 to 1988, an average of 31,000 elk summered in the park; 18,500 wintered there. There is no hunting or human-sponsored reduction of elk in Yellowstone National Park.

Seven of the eight elk herds in and around the park increased an average of 38% during a series of mild winters in the 1980s. Only the Madison elk herd may have decreased slightly.

Hunter harvest of elk near Yellowstone Park from 1980-88 averaged 7,000 per year, according to figures supplied by three state wildlife agencies.

Estimates of all mule deer herds more than doubled from 1980 to 1988. Eight mule deer herds surrounding the park may exceed 20,500 animals. Annual harvests of mule deer near the park averaged 3,200 during the 1980s.

White-tailed deer are sighted only occasionally in the park in summer. Healthy or expanding whitetail populations winter far from areas wolves would probably occupy, so their numbers and harvests are not expected to be influenced and are not reported here.

Moose populations surrounding the park were stable or increasing from 1980 to 1988, but a population estimate is not available now. Moose harvests averaged 545 in areas surrounding the park during the 1980s.

Some 3,900 bighorn sheep in 15 herds live within 3-35 miles of Yellowstone. Annual bighorn sheep harvests averaged 130 legal rams 1980-88.

Approximately 2,000 bison live in the park summer and winter. The 15 wolf experts are widely divided on the question of how wolves will affect bison; most predict bison will be a minor prey, but some say bison will be a major prey for wolves.

Pronghorn total 390 on the northern range. They winter mostly north of the park, where depredation hunts have taken 10-50 per year from 1985-88.

Less than 100 mountain goats live near Yellowstone. A few summer inside. Harvest figures for mountain goats were not reported, because wolves were not expected to affect their numbers significantly.

Special elk hunts: the interaction of wolves and hunters.

Special hunts on the Gallatin, Montana, and Sand Creek, Idaho, elk herds are conducted to control populations and prevent damage on their winter ranges. Modelers concluded both west-side herd sizes were larger than previously thought (Maps of these herds are in Wolves for Yellowstone?).

Modelers predict the Gallatin elk herd could support 10 wolves if harvest is reduced from an average of 436 elk to 300-400 elk, mostly bulls. With five wolves, antlerless hunts at half the current level of antlerless elk taken could harvest 350-450 elk, total.

If 10 wolves prey in summer on the portion of the Sand Creek elk herd that uses the park for 150 days, management to reduce cow harvest and increase bull harvest could yield a hunter harvest of 170-270 elk, similar to the 1980-88 average of 219 elk harvested there, according to modelers.

These heavily hunted herds can support wolves if hunters take mostly bulls. With hunters and wolves both taking elk, monitoring of harvest and predation must be increased, so managers can meet their objectives.

Harvests and wolf predation on some elk herds have not been modeled.

The combined effects of both hunter harvest and potential wolf predation on several elk herds on the park's south and east boundaries have not been projected by computer modeling, but will be in 1990 studies. Results are expected to be intermediate between those for elk herds that live on the northern boundary, where hunter harvest is low, and western boundary herds, where hunter harvest is high, because harvest rates for the south and east herds lie somewhere between harvest rates for the north and west herds.

Wolf recovery would demand more be known about area ungulate herds.

Several kinds of data will be needed on large ungulate herds that may support both hunter harvest and wolf predation: trend counts, sex and age composition, movements, migrations, and distributions, sightability corrections of counts, and effects of large-scale perturbances (series of severe winters, catastrophic diseases, climatic changes, etc.).

How would wolf management zones be laid out?

The purpose of wolf management zones would be to provide for different management goals and objectives in different areas in the greater Yellowstone area. Zones should balance the biological needs of wolves with other land and resource values and socioeconomic interests. Zones can be laid out along biological, physiographic, or administrative lines, taking into consideration such factors as: prey distribution, grazing allotments, state big game management objectives, land ownership and use, and public input. Under a zone management system, protection for wolves would decrease, and control increase, with distance from a core recovery area.

A broad range of alternatives for zones is available. Seven different scenarios are described in Wolves for Yellowstone? The report favors no specific scenario. Options range from a very large core area where wolves are protected on all federal lands to a very limited core area, such as Yellowstone National Park alone, with management of wolves outside the park as the prerogative of state wildlife management agencies, or any number of scenarios among those options.

Wolf control to resolve wolf/livestock problems and to meet states' other wildlife management objectives must be integrated with recovery goals.

Reintroduced wolves designated by the Secretary of Interior as a nonessential experimental population would not require significant land-use restrictions. Congress intended broad flexibility for experimental population management, but the extent of that flexibility has not been tested in the courts.

The Minnesota case of Sierra Club vs. Clark (court denied sport trapping of wolves classified as threatened) did not pertain to experimental populations, so is not directly applicable to wolf management in the greater Yellowstone area.

If wolves colonize Yellowstone on their own, they must be protected as an endangered species without the flexibility allowed to manage them as an experimental population. However, with an experimental population, there is a much broader range of wolf control and management options available for wolf recovery and to provide solutions to potential conflicts.

Section 10(j) of the Endangered Species Act allows special regulations to be written to permit state cooperative management of wolves outside national parks and wildlife refuges that may include control of wolves by citizens on private lands to prevent livestock depredation.

Under the experimental population designation, management regulations must be in place before wolves are translocated to the park to begin the recovery process.

How will wolves be managed? Considerations and options:

Some wolves will probably leave the recovery area. Some may try to settle in areas nearby. Those wolves must be managed (controlled), as an integral part of the recovery program.

In Yellowstone National Park, the rare problem wolf (such as sick, injured, or habituated to humans) can be killed or removed. No change in park policies or regulations would be needed to control problem wolves.

Control outside the park will be used to reduce depredations on livestock and unacceptable predation on hunted big game species. All wolf control is recognized as controversial.

There are many options for laying out a wolf recovery area and a system of wolf management.

Will wolves harm or benefit grizzly bears or other predators?

Wolves and grizzly (brown) bears coexist in Canada, Alaska, and Eurasia. The scientific literature and scientists from North America and Eurasia agree that wolves and grizzly bears will have little impact on each others' numbers.

Wolves may reduce coyote numbers, but coyotes will still be abundant. Red foxes and other scavengers that depend on carrion may increase. Coyotes and mountain lions are being studied in Yellowstone so effects of wolf recovery on those species can be better understood.

How will wolves affect park visitors' enjoyment of wildlife?

Prey species will not change their behavior or distribution much, if at all, so opportunities to view park wildlife will change little.

Closures of a few square miles may be needed near some active wolf den sites, about April 1 to June 15 (prior to most summer visitors' arrival).

About 60,000 park visitors have enjoyed wolf howling interpretive programs at Algonquin Provincial Park, Ontario, since 1963. About 40,000 actually heard wolves howl. Many Yellowstone Park visitors would hear wolves, and, because of the park's open views, a few would get to see them.

Can people still visit the park safely with wolves there?

Risk to humans from healthy wild wolves is practically nonexistent. Rabies is rare in wolves. There are no verified cases of serious human injuries from healthy wild wolves in North America.

Wolves will not interfere significantly with recreation in or near the park, or threaten humans. Most wolves are very shy, and make every effort to avoid people in national and provincial parks and other wildlands across North America.

Will wolves kill livestock, and will they be controlled if they do?

Based on experience in Minnesota and Montana and literature from Canada, the U.S. Fish and Wildlife Service expects wolves occasionally to prey on domestic animals. These wolves will have to be captured, and relocated or killed to stop or reduce depredation. Control actions could slow the recovery process.

Wolf depredation on livestock is very low in Minnesota, Alberta, and British Columbia where wolf/livestock interactions have been studied. Because livestock grazing on allotments in the greater Yellowstone area is mainly for short periods in summer, the period of exposure of livestock to wolves would be shorter than in the areas studied.

Compensation for depredation is recommended, and may be funded by conservationists.

Control of problem wolves is legal, but the means of recolonization or method of reintroduction will determine wolf control options. Under the Endangered Species Act, wolves that naturally recolonize Yellowstone would be fully protected as endangered species, with control allowed only by the U.S. Fish and Wildlife Service and authorized agents. Proposed experimental population status for Yellowstone wolves would allow more options for management than would be available if they were classified as an endangered species.

Under special rules written to manage an experimental population, a control plan would have to be prepared with participation of the three states. Some state laws would have to be modified to enable state involvement in wolf management.

Intensive control would reduce conflicts with livestock and big game management, but could lengthen the time to wolf recovery. Minimal control would lead to more conflicts with livestock and big game management, but would reduce wolf recovery time and increase the chance of attaining a recovery-level population.

What other questions will be addressed by studies funded for 1990?

Recognizing that a number of concerns remain, these topics will be investigated in 1990:

- How vulnerable might moose on the northern range be to reduction by combined human harvest and wolf predation?
- Elk calf mortality - what kills the calves and when?
- How will wolves affect the Jackson Hole elk herd? (computer modeling)
- How can DNA fingerprinting help us positively separate wolves, coyotes, and domestic dogs, and characterize how closely wolves and coyotes of Yellowstone are related to others in the northern Rocky Mountains?

- What does the paleontological and archeological literature tell us about wolf prehistory in the greater Yellowstone area?
- What can a sophisticated computer model tell us about mule deer and elk population dynamics in greater Yellowstone?
- What effects will the 1988 fires and winter range acquisition have on wolf/elk predictions? (computer modeling)
- How will wolves and grizzly bears affect each other in the Firehole River area, where bison as carrion are seen as critical to grizzly bear welfare?
- What is the small mammal prey base for wolves, and what percentage of a Yellowstone wolf's diet might consist of small mammals?
- How will wolf recovery affect the region socially and economically?

Numerous other questions may be addressed by future studies.

This paper may be cited as:

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