



The value of wolves for local communities in the Greater Yellowstone Area, USA

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Short title: Local value of wolves beyond a protected area, USA

Key Message: The 1994 wolf reintroduction in Yellowstone National Park was a biodiversity conservation decision that was informed by economic valuation of ecosystem services.

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Picture 1: Douglas W. Smith, Yellowstone Wolf Project Leader, with tranquilized wolf, February 21, 2009, Yellowstone National Park.
Courtesy: NPS photo.



Picture 2: Druid pack pups, June 13, 2005, Yellowstone National Park.
Courtesy: NPS photo Dan Stahler

What was the problem?

Gray wolves were exterminated from the Western United States by 1930. They were listed as an endangered species in 1974 under the U.S. Endangered Species Act. A recovery plan was developed by the U.S. Fish and Wildlife Service in 1987 for the Northern Rockies, including Yellowstone National Park. Yellowstone is an important protected area, the USA's first national park, and wolves were the only missing species from its assemblage of native top carnivores. One result of this was a lack of natural control of elk, which migrated north of the park in winter and sometimes conflicted with domestic livestock grazing. Grazing pressure by elk in riparian areas impacted aspen regeneration, beaver populations, and riparian songbirds. However, wolf recovery proposals were controversial due to potential impacts (predation of livestock, poaching) of reintroducing wolves in local communities of the 17-county Greater Yellowstone

Area.

What ecosystem services were considered?

Wolves increase biodiversity of the park, which has a value through wolf viewing in a park setting. Wolves are also valuable due to the restoration of natural predator and prey relationships, although this is much harder to quantify. There are other ecosystem services which were not considered as they are yet to be confirmed. The reintroduction of wolves could also have an impact on the spread of zoonotic diseases. The presence of the full suite of predators in the ecosystem may further positively affect the water quality of the region.

What approach was followed?

A series of preliminary ecological and economic studies were initiated by Yellowstone National Park in 1990. Ecological studies identified, among other questions, the likely impact on domestic livestock, the target size for a recovered population, and the adequacy of the ungulate prey base. Using the ecological foundation, ecosystem services related to wolf recovery were estimated using stated preference non-market valuation methods (e.g. contingent valuation), for both direct use (wildlife viewing) and existence values. This initial study was based on a sample of the park visitors' population (Duffield 1991). It was found that the primary motivation for visiting Yellowstone was wildlife observation. Wolf recovery was favored by a large majority of park visitors, and the preferred species for viewing were primarily the large carnivores, with grizzly and black bear topping the list along with mountain lions, wolverine and moose. Significant existence values were identified for wolves based on the desire to have a complete and healthy ecosystem that included wolves and on the bequest motive of biodiversity for future generations of visitors to enjoy. In a benefit-cost framework, these values were found to be far in excess of the estimated costs of livestock predation and reduced elk hunting opportunities. Both the ecological and economic work were further refined and published in a report to Congress in 1992, including Duffield (1992). On the basis of these reports, Congress authorized work on an Environmental Impact Statement (EIS) to inform a future decision on the question of wolf recovery. The findings reported in the EIS were:

Visitor use would increase (+5% for out of area residents and +10% for local residents). At recovery, losses are estimated to be \$187-\$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 \$23,000,000 and the existence value of wolves is estimated at \$8,300,000 a year. (U.S. Fish and Wildlife Service, 1994a, Abstract).

What input was required in terms of data, resources, and capacity?

Since the primary ecosystem services in question (hunting of ungulates such as elk, viewing of wolves, and existence values for wolves) were non-market, it was necessary to conduct surveys. The only key market parameters were the market value for livestock.

The non-market economic data was obtained through surveys of park visitors and regional and national households. The EIS economic analysis utilized two surveys. One was a June 1991 survey of park visitors with 762 completed responses. The other survey included households and had two strata: regional and national. The surveys were designed to inform two accounting frameworks for evaluating the decision: a regional economics and a benefit-cost perspective. A key finding from the standpoint of regional economics was that wolves would have a very

significant positive net impact on the regional economy (on the order of \$20 million) due to estimated increased visitation (based on response to contingent behavior questions and questions on expenditures). The household survey was necessary to measure existence values (passive use values) for both users (park visitors) and nonusers (other U.S. residents). Values related to hunting were based on previous non-market (travel cost model and contingent valuation) economic studies of Montana elk and deer hunting (Brooks 1988; Duffield 1988).

In terms of capacity, it was necessary that the economics team have experience (and credibility) in the area of non-market valuation and regional economics. The team included a Ph.D economist with 20 years experience in these fields, an MA economist with computational and data base management skills, and a Ph.D. statistician.

Did the approach result in policy uptake?

Because this was a high-profile public decision, the decision process included scoping of issues and identification of a broad range of alternatives from a “no cow” alternative (removing domestic livestock and fences from the entire region) to an accelerated wolf recovery alternative. The preferred alternative was a middle ground that included reintroduction of wolves from Canada into Yellowstone (and also Central Idaho), but as an “experimental population” with management rules that included removing “problem wolves” that preyed on livestock by the federal Animal Damage Control Service and the right of livestock owners to shoot wolves under some circumstances. Compensation mechanisms were also installed for livestock producers. Wolf management costs associated with reintroduction were estimated at USD 3,077,500 for a five-year reintroduction effort (1994–1998) and about \$1.3 million for monitoring and wolf control (1999–2002), or about \$320,000 per year¹ (White et. al, 2005).

From the economic perspective, while the study provided an answer to the question “does this make economic sense” from an efficiency (benefit-cost) perspective, it is likely that the distributive findings (the regional economy benefits) seem most important and are the only ones widely cited in the popular press (e.g. Chadwick 2010). Another key distributive issue was that while on aggregate, livestock predation levels were projected to be (and have been) relatively low, there is a fairness issue in that any given single rancher or farmer that experiences predation on his or her herds may be heavily impacted. It was important that a non-governmental entity (Defenders of Wildlife) stepped forward and funded and administered a livestock compensation program providing market value-based compensation to ranchers for confirmed wolf kills.

References

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¹ Wolf reintroduction proved to be less costly and speedier than anticipated. Actual wolf reintroduction took only two years, not five, and cost only about \$870,000 for both Yellowstone and Idaho combined (\$585,000 in the first year and \$285,000 in the second year). However, the combined annual continuing costs of wolf monitoring and management are now substantially higher than earlier estimates, even when corrected for inflation. For example, the U.S. Fish and Wildlife Service estimates the additional continuing cost to taxpayers until delisting will be about \$1.5 million per year.

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Picture 3: Canadian radio-collared wolf in pen prior to release in Yellowstone National Park, January 1996.
Courtesy: NPS photo



Picture 4: Wolf watchers at Slough Creek. March 2005
Courtesy: NPS photo