

The Return of *Canis lupus*?

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Background

Packs of wolves once roamed throughout North America. Gradual loss of habitat from westward expansion as well as extermination programs by local and national governments led to their demise and eventual extinction in the United States (Smith et al. 1999). These programs were implemented because wolves were viewed as dangerous predators.

However, it is argued that predators provide benefits to a naturally functioning ecosystem. One of the natural ecosystems that seemed to be missing the impact of wolves as major predators was the Greater Yellowstone Area, specifically Yellowstone National Park (YNP). By 1926, there were no gray wolf packs in YNP. In 1995, following years of extensive planning, wolf restoration to YNP began when wolves were brought from Canada to YNP to be released. This decision was not without major controversy, which continues today.

Your job as a research team is to investigate the background of this wolf restoration by reading the articles below. After every group member has been briefed on the background, you should start analyzing the arguments from both sides of the issue. Based on the information from the articles, you should fill in the chart below with the pros and cons of having wolves in an ecosystem.

Readings

1. *Wolf Restoration*, Yellowstone National Park, National Park Service.
<http://www.nps.gov/yell/naturescience/wolfrest.htm>
2. *Wolves in Yellowstone: A Short History*, Yellowstone Insider.
<http://yellowstoneinsider.com/2009/05/03/wolves-in-yellowstone-a-short-history/>
3. *History of Wolves in Yellowstone*, Wikipedia.
http://en.wikipedia.org/wiki/History_of_wolves_in_Yellowstone
4. Neimeyer, C. 2007. The Good, Bad and Ugly, Depending on Your Perspective. *Transactions of the 72nd North American Wildlife and Natural Resources Conference*, 287–296.
<http://www.wildlifemanagementinstitute.org/PDF/10-The%20Good%20Bad....pdf>
5. Hardy-Short, D.C., and C.B. Short. 2000. Science, Economics, and Rhetoric: Environmental Advocacy and the Wolf Reintroduction Debate, 1987–1999. *USDA Forest Service Proceedings*, 2: 65–72.
http://www.fs.fed.us/rm/pubs/rmrs_p015_2/rmrs_p015_2_065_072.pdf
6. Letter titled “An Ongoing Battle: Ranchers vs. Wolves,” which appeared in *The Online Pioneer*, Ontario, Canada.
http://www.propertyrightsresearch.org/an_ongoing_battle.htm
7. Letter titled “Why Kill More Wolves in Montana? Comments Needed to Quell the Hysteria” by Dr. Nathan Varley, written in response to the state of Wyoming proposing a wolf-trapping season in 2012.
<https://yellowstonereports.com/report.php?date=2013&cid=1775>

Pros and Cons to Having Wolves in an Ecosystem

Pros	Cons

Part I – Wolf #9

Gray wolves (*Canis lupus*) were trapped in Canada and put in acclimation pens before being released. Fourteen wolves were introduced in 1995, and seventeen more in 1996.

Wolf #9, a female, was one of the wolves in the first shipment in 1995. Wolves are assigned numbers based on their radio collar. Soon after release, #9's mate, #10, was shot and killed illegally outside the park. Around the same time as #10's death, #9 gave birth to eight pups. The National Park Service team trapped #9 and her pups to put them back in the acclimation pen and held them throughout that first summer.

During the fall, they were all released. The family even received an added bonus. Male wolf #8, a disperser from another pack, was waiting outside the pen to become #9's new mate and the pups' new adopted father (Smith et al. 1999). The pups wasted no time accepting #8, as they were seen nipping, barking, and pulling on his tail. The willingness to adopt offspring that have been sired by another male is rare in the mammal world (Smith and Ferguson 2005). One of those male pups, #21, actually adopted five pups that were not his and became a great alpha male himself. Thus, #9 put the Yellowstone wolf population back on the map.

Questions

1. What was the rationale behind introducing wolves to the Greater Yellowstone Ecosystem (GYE)?
2. Explain what a *keystone species* is and why they are essential to a particular ecosystem. How do keystone species factor in the overall *food web* of that ecosystem?
3. Acclimation pens were used for wolves during the reintroduction process. Please explain why these were used. What precautions did the wolf project staff take so that the wolves did not become habituated?
4. Wolf #8 showed a rare type of social behavior by adopting offspring that were not his own. Why would this behavior be rare in mammals? How could this be a beneficial behavior?

Part II – Wolf #21

Wolf #21 spent a little over two years with his mother (#9) before venturing out to become the alpha male of another pack. He fathered pups every year from 1998–2004, including 20 pups in 2000. #21 became a legend to “wolf-watchers,” not only because of his size, but also because of his calm and gentle spirit. He was often seen walking away from a kill he had just made so that he could urinate or take a nap. This would allow the younger wolves to take their fill. Alphas typically eat first and will defend their right against others. #21 also was seen playing with the young wolves and letting them climb on top of him, much like a human father might do when wrestling with his young sons. Rick McIntyre, a biological technician for the Yellowstone Wolf Project, describes #21 the following way:

When pups harassed him by biting his tail or ears, #21 would often just walk away; I once saw him cross the road and hide in some bushes to get away from pups that were bothering him. Of course, he also used his great size and strength to benefit his pack. If the younger wolves were attacking an elk, but could not pull it down, #21 would run in and help bring it down (Smith et al. 2005).

#21 died in 2004, which made him an exceptionally long-lived wild wolf. He definitely left a legacy. In 2001, his pack numbered thirty-seven, the largest known wolf pack in history. Many of his pups went on to either join other packs or start other packs.

Questions

1. Wolf #21 was obviously very successful at reproducing. Come up with a couple hypotheses as to what made him this successful. How do you think he was able to hold his alpha status for so long?
2. His pack of 37 wolves did not last. Knowing what you know about factors that limit population growth, why was this so? What is the difference between *interspecific* and *intraspecific competition*?

Part III – Data

Table 1 — Number of wolves and number of packs at the end of each year*

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
# Wolves	21	51	86	112	118	119	132	148	174	171	118
# Packs	3	9	7	11	11	8	10	14	13–14	16	13
	2006	2007	2008	2009	2010	2011					
# Wolves	136	171	124	96	97	98					
# Packs	13	11	12	14	11	10					

1995–1999 data represents Greater Yellowstone Area (GYA); 2000–2011 data is specific to Yellowstone National Park.

Table 2 — Predominant prey species *

Species	2011 Wolf Kills
Elk	78%
Bison	4%
Deer	5%
Moose	<1%
Pronghorn	<1%
Bighorn sheep	<1%
Badger	<1%
Jackrabbit	<1%
Coyote	4%
Raven	<1%
Wolves	2%
Unknown	4%

Table 3 — Livestock predation*

	Cows	Dogs	Goats	Sheep	Foal
1997	6	0	0	68	0
1998	3	1	0	0	0
1999	4	6	0	13	1
2000	7	8	0	39	0
2001	22	4	0	117	0
2002	37	1	0	74	0
2003	42	0	10	85	0
2004	74	4	2	81	0

*All data was compiled from the Yellowstone Wolf Project Annual Reports (1995–2011).

Questions

- When referring to Table 2, you can see that elk are the preferred prey of wolves in Yellowstone. They have been the preferred prey since 1995. In 1995–96, wolves were observed chasing, but not killing any bison. Bison kills were first recorded in 1997, and in 2001 still only made up 4% of wolf kills. Please explain this specific behavior.
- Related to population growth, what is the difference between *density-dependent* and *density-independent* factors? List at least two different hypotheses as to why the wolf population numbers in Table 1 dropped slightly from 2003–04 and then seemed to drop significantly from 2007–11.
- Define *carrying capacity*. From the data, what would you assume was the approximate carrying capacity of wolves in Yellowstone?

Part IV – Management Plan

You should now have a good foundational knowledge of the wolf reintroduction debate. There are good arguments on both sides of the issue. The previous stories and questions have addressed some of the things biologists have learned about wolves since their reintroduction. But questions remain concerning whether wolves have helped stabilize the Greater Yellowstone Ecosystem or whether they have caused more harm than good. Was there really a need for the reintroduction? These are some of the questions that are central to a debate about how to manage this population of wolves.

Your job is to create a management plan that not only stresses the importance of wolves as a keystone species to this ecosystem, but also satisfies both sides of the controversy: the National Park Service/Yellowstone Wolf Project and the local ranchers/specific state departments (i.e., Fish, Wildlife, and Parks Commissions). Your plan can be in the form of a paper or a presentation. Please try to be creative and thorough. You should use the information and sources from this case or any other scientific articles you can find. Please cite your sources. In your plan, you should also incorporate and explain the following terms that were introduced in Parts I–III:

- Trophic cascade
- Carrying capacity
- Interspecific/intraspecific competition
- Density dependent/independent factors (related to population growth)
- Keystone species
- Food web



Image credit: Photo of wolves from the Druid pack bedded down in the snow in Yellowstone National Park, courtesy National Park Service, U.S. Department of the Interior, <http://www.nps.gov/imr/photosmultimedia/photogallery.htm?id=25C97BD8-155D-451F-675E208BE082FE26>.

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