

ABSTRACT

Gray Wolf Reintroduction and Recovery in the Northern Rocky Mountain Region

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My thesis topic covers gray wolf recovery in the Northern Rocky Mountain region in the last decade. Gray wolves were reintroduced into Yellowstone National Park in 1995, by way of the Endangered Species Act, and significantly changed the ecology of the park, restoring aspen trees, healthy streams, and re-establishing a balance in the ecosystem. These changes were good, and healthy changes for the ecosystem, but caused significant stress for farmers and ranchers in the surrounding area. After approximately 13-15 years, the gray wolf population had grown exponentially and the process of removing them from the Endangered Species List (ESL) began. After removal from the ESL, wolves were under state management for the first time ever. However, state management is not necessarily supportive of gray wolf recovery, and puts their population in danger of extirpation again. There were and are several political issues surrounding gray wolf recovery, and my thesis seeks to describe the cultural attitude toward gray wolves, in order to provide a framework with stakeholders to create a state management plan that supports both stakeholders and wolves.

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GRAY WOLF REINTRODUCTION AND RECOVERY IN THE NORTHERN ROCKY
MOUNTAIN REGION

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CHAPTER ONE

The Gray Wolf

Wolves Then

The gray wolf (*Canis lupus*) has a long history in North America, from living in coexistence with Native Americans, to eradication by European settlers, and eventual conflict with ranchers and farmers, the wolf has had many roles in American culture. Before European colonists settled North America, the wolf was honored and respected by Native Americans (Rinkevich 2010). Wildlife, especially buffalo, and other large animals were greatly admired by Native American tribes. In Apache culture, the wolf was regarded as powerful, and could impact their everyday life (Rinkevich 2010).

The Native American way of life was conducive to living amidst wildlife because their nomadic lifestyle allowed for symbiotic relations with wildlife in the area. The impact Native Americans had on the environment was minor, their influence on wildlife, regarding space and competition, compared to incoming settlers, was trivial. However, living off the land was not free from all conflict. Native American tales depicted the wolf as a creature to be respected rather than feared. Their descriptions of wolves are completely different than the European descriptions that later dominated the cultural outlook on the predator.

Gray wolves were the top predator in much of North America, but that began to change when colonists started settling lands that wolves occupied. People and wolves were coexisting and it was not ideal for either party. As settlers began rapidly populating

the states, gray wolves and Native Americans began to lose much of their previously occupied territory (Rinkevich 2010). When settlers came to America, they began colonizing the land and populating these areas, creating competition for food and space with wildlife. Gray wolves continued to be pushed to the edge of their territory as the colonies grew, and before long they had inadequate territory for pack life.

The wolf is an apex predator, meaning it is in natural competition with humans for food and space. An apex predator is a predator that essentially controls ecosystem function and structure, meaning that the wolf was one of the most impactful animals in the environment of North America (Brook et. al 2012). This, in addition to a cultural fear of the wolf that came from European history, lead to the extirpation of gray wolves from American territories in the 19th century. Children's stories from centuries ago feature the wolf as the main antagonist such as *Little Red Riding Hood*, or the *Three Little Pigs* (Dutcher 2013). It is natural that colonists and settlers did not feel safe living near wolf packs, wolves are dangerous, after all, and their solution was to drive them off. Predator eradication was in large part due to the bias against wildlife that predominated in the 18th and 19th centuries in America.

Extirpation.

With the movement westward in the 1800s, wolves were pushed further out of their natural habitats. In the early days of European settlement in the Americas, wildlife was a nuisance, and was driven off land that settlers sought to colonize. During this time in the United States, wildlife was largely eradicated, extirpated, or driven to extinction due to the fear of the potential threat, physical or commercial, that wildlife posed. In the mid-1800s, settlers in the West promoted hunting of wolves, and wolves were hunted as

prizes, and a way of livestock management. As this was happening, gray wolf populations saw a vast change in numbers, the population had declined from about “400,000 [gray wolves, but after the legalization of hunting], only about 450 wolves had survived. It was nearly the end of an entire species” (Halls 2005).

Wolves were hunted for many reasons, but the common reasons were human safety, livestock safety, or ungulate management (Creel and Rotella 2010). Of the conflicts with wolves, “[t]he greatest of these conflicts involves wolves and the livestock industry” (NRM Gray Wolf 2011). In the early 19th and 20th centuries, predator control was a concept that ranchers and government agencies thought would help control gray wolf populations (USFWS 2011). Bounty programs began in the late 1860s, and paid people for wolf carcasses that they would bring in to their state wildlife agency (USFWS 2011).

After gray wolves were eradicated from most of the territories in the United States, hunting was impossible, because there no wolves left to hunt. When wolves were placed on the Endangered Species List, and reintroduced into recovery areas, wolf hunting was on the forefront of many stakeholders’ minds. Gray wolves are hunted throughout the states, but each wildlife management program designates hunting quotas. In Wyoming, the areas directly outside of Yellowstone National Park (YNP) are designated as trophy hunting areas (Wyoming Management Plan 2011). In Idaho, there are set hunting quotas per ‘wolf area’ in the state (Idaho Management 2002). Wolves are managed in Wolf Management Units in Montana, and these units designate the number of wolves that can be hunted (Montana Wolf Advisory Counsel 2003).

Wolves Now

Current Population Status

Gray wolves are currently listed as ‘not threatened’ on IUCN’s red-list (list of endangered species worldwide), but their status in the United States is highly complicated. When the Endangered Species Act was the Endangered Species Preservation Act of 1966, wolves were one of the first species to be added to the list (Creel and Rotella 2010). Their numbers were so low that many scientists feared for their existence as a species (Mech and Biotani 2010). Along with reintroduction and recovery, gray wolves were protected under federal law, and their populations grew exponentially. Gray wolf populations were no longer endangered, and their status on the red-list changed to ‘not threatened.’ However, this could be a temporary condition for wolves, due to the current threat of hunting in the states wolves occupy.

In the past fifty years, the US wolf population has increased significantly, beginning with their reintroduction to YNP in 1994. From that reintroduction, the first 3 packs have grown exponentially to about 109 packs in the Northern Rocky Mountain region (USFWS 2011). In 2011, “the estimated population was 1,774 wolves in the Northern Rockies region,” which is a dramatic increase from only 50 individuals reintroduced in 1995 (NRM GW: Defenders in Action 2010).

As wolves continue to repopulate areas of the United States, the Endangered Species Act started to be questioned. If a species on the Endangered Species List is not endangered, why is it on the list? Tension between the states and the federal government has increased with healthier and larger populations of wolves. The choice to remove gray wolves from the Endangered Species List appeased stakeholders and state governments,

but significantly threatened wolf populations in those states. States were given control of wolf populations from about 2009-2012, and are now passing hunting laws to allow general hunting of gray wolves. Accounting for those hunted will be important to determining the future of the gray wolf population. Gray wolves have moved from being protected to being heavily hunted at an unprecedented rate that brings to question if gray wolf populations are in danger of extinction in the next decade (Creel and Rotella 2010).

Wolf Life

Biology: Pup Life

One of the many dimensions of the world of the gray wolf is their progression from pup to member of the pack. Understanding how wolves survive and thrive in their natural environments, through biology, ecology, and social behavior is essential to recognizing the relevance of gray wolves in the states. The beginning of a gray wolf's life starts in a den as one of two to five pups, which are usually born in the late winter/early spring. According to The Western Great Lakes Biologue on gray wolves, pups are usually born and reared in dens for the first six weeks of their lives (USFWS: Western Great Lakes 2011). They are fed their "mother's milk for the first month, then are gradually weaned and fed regurgitated meat" (USFWS: Western Great Lakes 2011). Once they reach seven to eight months, they are considered fully grown and will join the pack in the search for food. Packs typically consist of about 5-20 wolves, which occupy different roles to protect pups and feed the rest of the pack.

Diet

According to Kevin Sanders, the “Bearman”, who lives and does research in Yellowstone National Park, wolves eat about “800 pounds of meat per month” and have a “feast and famine” type of diet (Sanders 2004). They are highly territorial, but have vast amounts of territory that they protect, up to 1,000 square miles (USFWS 2011). Because their territories are so large, they travel “over large areas to hunt, [a maximum of] 30 miles a day,” to find prey (USFWS 2011). About 90% of the time wolves prefer elk over other prey, based on predation statistics, but the other 10% of their diet consists of bison, elk, moose and other small game in YNP (Sanders 2004). Wolves prey on a range of animals, but their hunting depends mostly upon season, and availability of prey. In the spring and summer, wolves favor elk for prey, because they are abundant and their size makes them a good food source (Metz et. al 2012). During the summer months, wolves are most likely to prey on elk calves because they are abundant and vulnerable (Metz et. al 2012).

Social Behavior: Pack status

Wolf social interactions are typical of their history as canines; they tend to stay with the family they grew up in, and form packs that hunt together (Wildlife Society 2011). Hunting in packs is beneficial for each individual wolf because if they were to hunt alone, they would not acquire as much food. One of the main reasons wolves can hunt larger prey, is because their numbers allow them to strategically prepare for hunts better than the prey (in situations where the hunt is successful). In a pack, there is only one breeding pair that has pups for the whole pack, but the entire pack is responsible for taking care of, and raising the pups. Every pack is different, but the average pack has

about 5-20 wolves per pack (Stenglein et al. 2011). Adult wolves that are not breeding wolves are generally siblings of the breeding pair, but every once in a while, a lone wolf will join a pack that accepts him or her. These wolves help raise the pups and watch pups when other wolves are hunting. Social interactions between wolves are vast, and unique, revealing much about specific hierarchy in the pack, and how each wolf has a role in their pack (Stenglein et al. 2011).

Social Behavior: Pack hierarchy

Wolf packs have specific hierarchy, which helps maintain harmony in the pack, if each member knows their role, conflicts will not cause dispersal of the pack, in most cases. There are alphas, betas, omegas and pups, dependent upon the wolf's personality and behavior in social situations. The tendency to be submissive will determine the wolf's role as an omega in the pack. On the flip side, a leaning toward dominant behavior will determine if the wolf is naturally an alpha or beta (dependent on gender) (Dutcher 2013). The alpha male and female are the sole breeders in the pack, and betas are directly underneath in hierarchy and help to hunt. Lastly, an omega wolf is a wolf which is least dominant in the pack, but his or her role as caretaker is influential to pup survival (Dutcher 2013). These are only a few social interactions of wolves in a pack, demonstrating the wolves' strong social and emotional bonds (Dutcher 2013).

Ecology: Ecosystem Role

Wolves are immensely valuable to the health of the ecosystem. Their position in the environment makes them both apex predators and a keystone species. An apex predator is essentially an ecosystem manager, they control and manage the ecosystem through their advantage over other, smaller predators (Brook et al. 2012). They not only

control prey populations and ensure ecosystem balance at the prey level, but create competition for other predators that might threaten prey populations through excess predation. Essentially, apex predators manage and control smaller predators, and prey populations to ensure a balanced ecosystem (Brook et al. 2012). Without an apex predator, a dominant herbivore will typically disrupt the balanced system by overconsumption of vegetation, resulting in stress for smaller herbivores. Wolves and other apex predators are able to maintain this balance by regulating numbers of dominant herbivores in the ecosystem, illustrating the significance of their presence in the ecological community.

Along with their role as apex predator, wolves also fall into the role of keystone species. A keystone species is an organism in the community that supports the natural structure of the ecosystem, meaning their role is fundamental to safeguarding the wildlife, vegetation, biotic, and abiotic factors for continued health of the environment. The wolf represents a keystone species because their instinctive behavior is regulating prey populations and preventing increased competition in the ecological community.

Wolf presence in the ecosystem of Yellowstone, has exceedingly impacted the environment in visible ways. Vegetation patterns are impacted by wolf predation, due to wolf regulation of herbivory, including the extent to which ungulates feed on vegetation (Wilmers et al. 2003). Herbivore overpopulation decreases resources for other organisms in the environment, such as beaver and others that heavily rely on vegetation as their main food source (Ripple 2000; Perisco and Meyer 2012). Wolves help maintain the balance by feeding on specific ungulates such as “elk, deer, bison and small mammals” (NRM GW 2011). It is hypothesized that wolves benefit the ecosystem through their

influence on trophic cascades, and therefore management of structure of the natural environment (Ripple 2000).

Ecology: Habitat

Wolves are species generalists, so they can live in most areas that support any type of wildlife. Yellowstone was the reasonable site of reintroduction because wolves are adaptable creatures, and are able to find a niche in a natural environment. They do not require a specific habitat or food that would keep them in a confined area, allowing their distribution to be unbounded. Wolves currently occupy mountain ranges and wilderness areas of the Northwestern states, although some packs exist in Michigan (Dutcher 2013). They migrate and live in areas that support their predatory needs and provides cover, protection and isolation. The following figure shows the distribution of gray wolves in the Northern Rocky Mountains as of 2012 (Fig. 1-1).

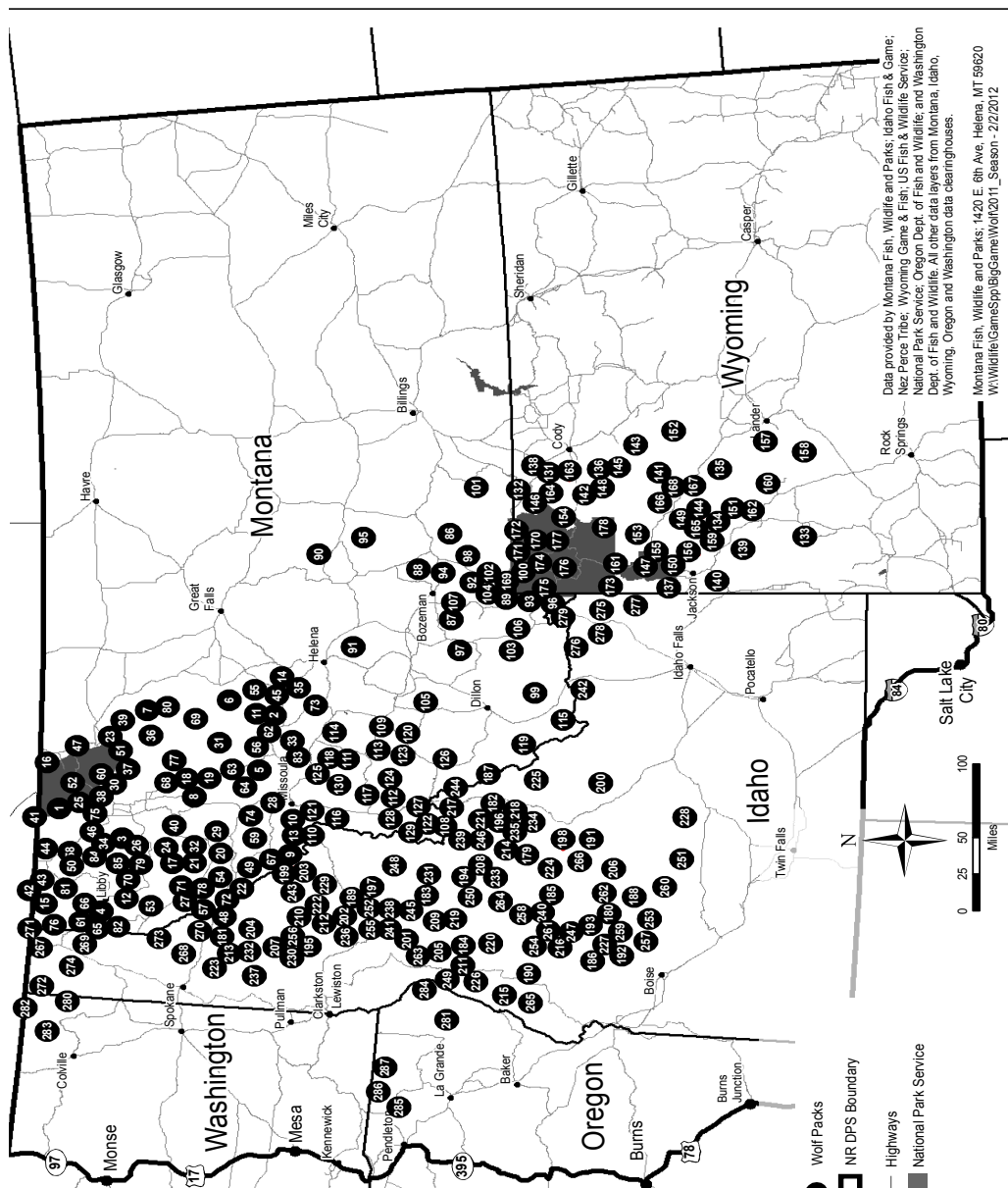


Figure 1-1: Distribution of gray wolf packs in the Northern Rocky Mountain region as of 2012. Compiled by Montana, Idaho, Wyoming, Oregon and Washington State Wildlife Departments (United States Fish and Wildlife Department 2013).

Reintroduction

Purposes behind Reintroduction

Wolves are paramount for the American ecosystem, because their native behavior and interaction in the ecological community supports ecosystem balance. In Yellowstone, after missing a top predator like the wolf for many years, elk began to overshadow the park, monopolizing in unprecedented areas (Ripple 2000). They took advantage of the grass and growing tree shoots along riverbeds because the area had good vegetation and accessible water. This drastically affected the environment in variable ways including increasing stress to other animals such as birds, beavers, and insects (Jenks 2004; Perisco and Meyer 2012). The elk not only ate the grass near the streams, but disrupted shrubs and trees that were a natural part of the environment (Jenks 2004). This disruption caused a change in the environmental structure that affected the natural processes in the environment (Wilmers et al. 2003).

When wolves were reintroduced to the community of Yellowstone, they restored biodiversity by displacing elk from open meadows and wetlands to their natural habitat on hills and higher elevation areas, reducing the vulnerability to wolf predation (Wilmers et al. 2003). As a result, important native plants such as willow and aspen began recovering from years of over-browsing, providing habitat for resident birds, fish, beaver and other creatures (Jenks 2004; Ripple 2000). Wolf hunting increased scavenging behavior, allowing for smaller predators to rely on availability of carrion, instead of hunting themselves (Wilmers et al. 2003). Wolf predation increased, causing the population of old, weak and diseased elk to diminish, and gradually support a stronger and healthier population of elk (Atwood et al. 2006). As a result of the elk population

steadily becoming increasingly fit, their population growth slowed, allowing for improved distribution of vegetation . The ecosystem structure of Yellowstone was severely changed by wolf presence, benefitting and reinforcing the complexity of the natural environment.

Process of Reintroduction

In 1980, the US Fish and Wildlife Service launched their plans to reintroduce wolves back to the Northwestern United States by releasing a “draft wolf recovery plan for wolves in the [Northern] Rocky Mountain region” (NRM GW: Defenders in Action 2011). Their plans included building a public education program to inform and educate the public on the importance of wolves, and started a compensation program for livestock losses caused by wolves (an increasing concern for ranchers in the area) (NRM GW: Defenders in Action 2011). Defenders of Wildlife and the USFWS worked closely together to ensure a lasting future for wolves by including the public in recovery decisions. The public was thrilled to see such a rare thing as a natural wolf, however, those with an interest in agriculture and livestock were agitated by the threat of wolf subsistence. The debate between wildlife advocates and landowners in the region continues to this day. However, reintroduction of gray wolves was in the interest of the ecosystem, an integral concern for the entire country, therefore regional disputes were suspended for the time being.

After the plan for recovery was approved, biologists and conservationists began gathering wolf packs from Northern Canada to introduce into YNP, and in 1996, they released the last of three packs into the region (NRM GW: Recovery 2011). As wolves were reintroduced to YNP, they began recolonizing parts of northern Montana from the

packs that had been in Canada (Jenks 2004). Wolf populations grew exceedingly because they were federally protected, which denied hunters from legal ‘take’ of gray wolves.

Ecosystem Impact

Reintroduction came with countless changes, from elk migration, to scavenger reestablishment, and aspen tree recruitment, resulting in a trophic cascade (Winnie 2012). Elk began to repopulate areas with higher elevation, their natural habitat, since streams were not sheltered from wolf hunting (Ripple 2000). Beaver activity increased with decreased elk habitation of streams, which benefited stream health, including expanding riparian areas, increasing species richness, and promoting stream health (Perisco and Meyer 2012). These impacts promoted aquatic plant recruitment, leading to macro-invertebrate diversity, and nourished bird communities along riparian communities (Perisco and Meyer 2012). Fish were free from increased nutrients and sediment solids from elk excrement, and water quality in streams was restored, increasing aquatic species populations (Jenks 2004). Vegetation was no longer threatened by over-consumption, and habitat thrived (Wilmers et al. 2003). The environment looked healthier than it had been in years, a result of the reintroduction of wolves (Wilmers et al. 2003; Winnie 2012).

Opposition to Reintroduction

As wolves were removed from a large part of the United States in the 19th and 20th century, there were vast areas of land available for cultivation. Landowners began to use the land for livestock and agriculture, supporting their families and providing food for the rest of the population. Without wildlife to disrupt the land, ranchers grew accustomed to the benefits of minimal threats to their livestock. The idea of wildlife threatening livestock provoked ranchers, because it was their livelihood. Throughout history,

predators have been viewed as deleterious to livestock, equipping ranchers with a natural distaste of them, especially near their property. As wolves continued to spread into rural areas, there was cause for concern pertaining livestock safety. In light of wolves being placed on the Endangered Species List, hunting was illegal, unless there was a serious threat to their farm or ranch (USFWS 2011). Although wolves were not considered a serious concern, the idea that they might cause an issue was a fear for those who owned free-ranging livestock, and other animals that were easy prey for wolves.

Coexistence

Living with Wolves

Since wolves are spreading after their reintroduction to Yellowstone, it is increasingly critical for landowners to be aware of natural wolf behavior. As they spread to states adjacent to Yellowstone, and the northern states, “more than 1,650 wolves live in Idaho, Montana, Wyoming and parts of Washington and Oregon where dispersing wolves have formed new packs” (NRM GW: Defenders in Action 2011). It is imperative to realize the results, both repercussions and perks, of wolf recovery in the Northern Rockies.

Negative Effects for Ranchers/Farmers

Gray wolf populations influence landowners in the region, due to their similar preferences for habitat to cultivate and occupy (Dutcher 2011). This coincidence could cause a predicament for ranchers in the Northern Rockies because they fear wolf depredation of their livestock. The natural tendency of wolves is to occupy grasslands and prairies with exposed prey, which may cause conflicts with ranchers, but wolves tend

to avoid areas where human presence is explicit (Montana Fish, Wildlife and Parks). It is rare to see a wolf pack predating a herd of cattle, although this it is not impossible, 73 wolves were 'lethally controlled' for livestock purposes in Idaho last year (Idaho 2011). However, this was only 73 of the population of about 600 in all of Idaho, demonstrating that the distinct fear of wolf depredation of livestock is misplaced. The distinction between 73 individuals and 73 packs is imperative, documentation of packs threatening cattle is less likely than individual wolves looking for susceptible prey.

Wolves that are frantic enough to hunt cattle are those in desperate scenarios, and are often lone wolves without a pack. It has been tested, and proved that wolves prefer natural prey to livestock, meaning that wolves found near livestock populations are not representative of the larger population of gray wolves (Metz et. al 2003). Although wolves are known to hunt during calving season, the danger to cattle populations is insignificant (Bergstrom 2010). While wolves may prefer more natural prey (like elk or bison), there is a chance of them hunting unprotected livestock (Jung 2011). However, if any predation happens at a different time of year, it may be attributed to a lone wolf (Sanders 2004). Lone wolves are much more erratic in hunting behavior and take any opportunity they have to hunt prey (Dutcher 2013). If a wolf is preying on livestock, it is likely that it is a lone wolf (Sanders 2004).

Methods for Coexistence

The main issue for ranchers or farmers attributed to wolves is their populations of livestock, but there are some solutions that have been presented to help deter predation by wolves and other predators. While some methods may be wishful thinking, other methods can help ranchers prevent some of the wolf predation that may happen on their property.

One method is fladry, in which a farmer or rancher places a red flag system around the ranch or livestock in order to warn wolves to not enter that territory (Dutcher 2013). This is one method that is used in a many areas where predators and ranchers live in close quarters. An updated method is electric fencing, which can protect “newborn animals and nursing mothers” (Dutcher 2013). Ranchers can protect their open ranging livestock by monitoring and other warning systems, such as guard dogs and night watchmen (Dutcher 2013). Defenders of Wildlife and the Wildlife Society are working on nonlethal methods to prevent livestock losses and are trying to share some of the costs with ranchers (NRM GW: Defenders in Action 2010).

Defenders of Wildlife, a wolf-advocate non-profit organization, has a program to compensate ranchers for wolf-kills on their livestock, which helps prevent the rancher from losing the investment they had in that particular animal (NRM GW: Defenders in Action 2010). Although this is not a perfect solution, it is rare that wolves are the cause of livestock losses (Carlson et al. 2009). While wolves can be the cause of livestock depredation, they are marginal threats whereas major threats to livestock include other predators (such as coyotes), disease and natural catastrophes; “[in] Idaho in 2011, 10 cattle and 54-62 sheep were killed by wolves, whereas 260 cattle and 11, 600 sheep were killed by other predators- 60% of the latter being coyotes” (Bergstrom 2009). Wolves compensate for the losses that ranchers usually lose to coyotes, but they also keep the coyote population in check (Carlson et al. 2009). Other problems, such as natural disasters, can threaten cattle populations more than wolves do, in fact, in the Northern Rocky Mountain region in 2008, “a single severe storm killed 1200 calves and

lambs,” which is 558 more than overall wolf kills in the entire region in 2008 (Carson et al. 2009).

Realistically, making an effort to understand the natural behavior of gray wolves’ would assist those living in close quarters with them. Wolves rarely risk close contact with humans or their territory, but if it seems as though a wolf is responsible for a deceased cattle on a rancher’s property, their state wildlife department should be able to determine cause of death (Montana Fish; Wildlife and Parks). If it is proven to be a wolf-kill, the state and or Defenders of Wildlife will compensate the rancher for that loss in income (Defenders 2010). If a wolf has preyed on cattle, it is usually a diseased or sick adult, or young, vulnerable calf (Metz et al. 2003). In the event that a wolf has killed a calf, or diseased cattle, most states have a compensation program to help reimburse the rancher for the profit he lost with the death of that specific animal (USFWS 2011).

The Culture of the Gray Wolves

Early Views of Wolves in America

Before European settlers, Native Americans lived among wolves, and were accustomed to living with wildlife and predators in the region. Settlers, on the other hand, were unaccustomed to living near predators, because they were used to living in urban environments with minimal interaction with wildlife. Many Native American cultures have myths about wolves that passed from generation to generation. One of these cultures was the Apache people, who had a great respect of the wolf. The Apache’s not only had mythical stories of wolves and mountain lions competing, but they had a belief that ‘wolf power’ played a part in their culture (Rinkevich and Parker 2010). In many “Native

American tribes, the Spirit Wolf is a creature of great wisdom, revered as a spiritual guide” (Dutcher 2013).

Landowner’s Perspective

The gray wolf was wiped out from a majority of the United States (except for some areas in Michigan) over a period of about 100 years (Jenks 2004). Along with wolf reintroduction and recovery, came disputes involving stakeholders with distaste for wolf presence. The issue with wolf recovery is more attributed “with deeply held personal values than with [the] wolves themselves” (Bruskotter et al. 2011). Beliefs have not changed in the past 40 years since wolves were eradicated from the 48 contiguous states. People are still convinced that wolves threaten their livestock, land and family, and strive to protect their possessions (Creel and Rotella 2010). The major issue with wolf reintroduction for landowners is the possibility of wolves occupying their land. The possibility of wolves subsisting on lands owned by farmers or ranchers is more of a threat due to the growing population of gray wolves out of Yellowstone. As wolves spread, and hunting is made legal, wolf populations have faced significant hindrances. In the past decade, about 84% of wolf mortalities “were caused by humans and at least 80% of these were intentional” (Bruskotter et al. 2011).

Hunting has seen a rise in popularity in the past decade as wolves have gradually been taken off of the Endangered Species List. It is now legal to hunt wolves in most of the states they inhabit. The idea behind hunting now is not for safety purposes, but for game and population control. The main reason behind promoting wolf hunting is general fear for livestock and/or people, but “wolves have not killed or physically injured people in the Northern Rocky Mountains region (NRM) since reintroduction,” implying that the

most realistic argument stakeholders have is their threatened livestock (Creel and Rotella 2010). The fear of losing livestock is legitimate, but misplaced. It is clear that wolves are not the greatest threat to livestock populations, and the cultural fear of wolf predation is not founded in the scientific facts (Bruskotter, et. al 2011). Stakeholders in the region should be educated on wolf behavior to combat this cultural perspective.

General Population Concerns Regarding Reintroduction

The general public, however, is highly supportive of wolf reintroduction. Tourism in Yellowstone spiked with the recovery of wolf populations, and the novel idea that natural wolves were back in the states (Bruskotter et al. 2011). In a poll taken in 2003, the “[g]eneral public was more positive toward wolves, [but] hunters attitudes were more negative” (Bruskotter et al. 2011). After World War II, the public’s attitude toward wildlife started to shift from complete predator eradication to a healthier outlook on the environment and it’s impact on our health.

This shift in the public is mostly occurred in urban areas with little to no interaction with wildlife; the “[r]elationship between attitudes toward wolves and actions actually undertaken to effect wolves is likely to depend on one’s access to wolves and one’s motivation to engage in such behavior” (Bruskotter et al. 2011). Those who do not interact with wildlife in this manner are much more apt to support wolf and other wildlife recovery because they do not personally deal with the lifestyle change that living in close proximity to wildlife brings (Bruskhottter et al. 2011).

Politics

While wolves have started making a comeback in America, people are realizing coexistence is no longer a possibility but a reality. It has been a hard transition to

determine how to address the possibility of wolves on their property. Each state where wolves have repopulated, have passed hunting laws, threatening the entire wolf population of the Northern Rocky Mountain region. The politics surrounding wolf rehabilitation are complex and complicated because the voice of the people is very split on the issue. In the current political climate, laws that are being passed are in favor of stakeholders with land perceived to be in danger, and do not account for the benefits wolves provide to the ecosystem.

CHAPTER TWO

The Political Atmosphere

Laws Impacting Gray Wolves

The First Laws About Wolves: Eradication Campaigns

As European settlers began entering the West, they systematically began depleting populations of elk, deer and bison, the natural prey of wolves (USFWS 2011). In order to protect livestock from the potential threat of wolf predation, ranchers and private citizens prompted the government to open up a bounty on wolves in order to remove the threat to livestock (NRM GW 2011). However, forceful elimination of gray wolves was not specifically against them, but all wildlife, especially predators. The eradication and predator control programs in the 19th and 20th centuries were mainly against predators that threatened livestock; such as bears, mountain lions and coyotes (Bruskotter 2010). As a result of predator eradication and bounty hunting, gray wolves in the territorial West were nearly hunted to extinction by 1930 (Alderman 2009). Montana was one of the states most populated with wolves in the early 20th century, and therefore one of the states with the highest hunting ratios (Montana Wolf Advisory Counsel 2003). After the first statewide bounty was passed in 1884, approximately 5,450 wolf hides were brought in to receive a bounty (Montana Wolf Advisory Counsel 2003).

Changing Outlooks on Wolves: Wolf Protections

The idea that predators were odious and needed to be removed, predominated settlers and ranchers minds, and there was nothing to prevent total eradication in the US. In the 1960s, people were realizing that this wildlife eradication caused an irreversible

effect on the environment. The beginning of the environmentalist movement started with publications detailing environmental degradation, alerting citizens of their severe impact, and spurring a period of legal environmental protection that led to the passing of the Endangered Species Act (Bruskotter 2010).

The Endangered Species Act of 1973

The Endangered Species Act protected species of wildlife that were threatened or in danger of extinction. The government of the US believes that endangered and threatened wildlife are important because they hold “esthetic, ecological, educational, historical, recreational, and scientific value to the Nation and its people,” (Why Save Endangered Species? 1991). As the Endangered Species Act came to fruition, species that were endangered and threatened were placed on the List and were immediately provided protections under federal law, making it illegal to harm or threaten a species in any area in the United States (Endangered Species Program 2005). The passing of the Endangered Species Act was the “most comprehensive legislation for the preservation of endangered species ever enacted by any nation...it enshrined biodiversity as a legally protected value in the United States” (Perry 2012). The Endangered Species Act began with the purpose of maintaining and increasing populations of wildlife that were in danger of extinction.

The first step for determining endangered species is using the best scientific and commercial data available to determine if a species is endangered or threatened (Perry 2012). A species may become endangered or threatened through multiple avenues, such as habitat loss, human exploitation, and an unnatural balance in the ecosystem. Species are faced with pollution, minimal living space, and competition from unnatural or

invasive animals. As scientists and stakeholders began to see the threats that were increasingly depleting populations of wildlife, the reactive response was to preserve.

The Endangered Species Act has begun that process of preservation by deterring threats to wildlife through legal protections such as the development of conservation plans (Perry 2012). Conservation plans are developed by the US Fish and Wildlife Service (USFWS) to determine effective ways to conserve important populations of endangered/threatened species and are implemented by the federal government for all states to abide by. Among other protections, the Endangered Species Act prohibits “take” of an endangered or threatened species through the means of hunting, wounding or trapping, but also through habitat destruction or modification (Perry 2012). Therefore, state governments are not allowed to purposefully harm animals, or develop in areas designated as critical habitat. Environmental Impact Statements and Species Survival Plans are the best way to prevent ‘take’ of endangered animals. Impact statements evaluate the land in areas of upcoming development, and determine what implications may be for the specific area. One specific implication for endangered species is the diminishing of invaluable habitat. Species Survival Plans, on the other hand, estimate the populations of studied species in order to prevent further harm to the species or their natural habitat.

Endangered Species Act of 1973: What does “endangered” even mean?

A species is determined to be endangered when it “is in danger of extinction throughout all or a significant portion of its range,” which was true of gray wolves in the 1970s before they were reintroduced (Alderman 2009; ESA Definitions). Gray wolves (and other species of wolves) were one of the first species listed on the Endangered

Species Act (ESA) in 1973 (NRM GW: Background and Recovery 2010). Gray wolves were classified as ‘endangered’ in the lower 48 states, but in Minnesota, they were classified as ‘threatened’ (Montana Wolf Advisory Counsel 2003). As part of their placement on the ESA, conservation plans were developed to reintroduce them back to the Northwestern United States. In order to facilitate recovery for gray wolves in the United States, the Fish and Wildlife Service (USFWS) developed a reintroduction plan to fulfill the requirements of the ESA (Perry 2012).

Reintroduction through the Lens of Policy

The Northern Rocky Mountain Wolf Recovery Team was assembled in 1975 and their plans to reintroduce wolves back into Yellowstone (YNP) were finally approved in 1987 when the FWS chief accepted the necessity of reintroduction for gray wolves (Perry 2012). The plan involved reintroducing 90 – 150 gray wolves back into Yellowstone (YNP) from packs in Canada (Alderman 2009). The packs were reintroduced into three different areas; “northwestern Montana, central Idaho, and the Greater Yellowstone Area for three consecutive years” (Perry 2012). However, this plan was not free from political conflict, many stakeholders in the region were irritated that wolves were coming back to the states, and were not supportive of the proximity of wolf packs to their land. However, this would not prevent wolf reintroduction or protections, the Recovery Plan “concluded that the preferred action [for maximum ecosystem recovery] was the reintroduction of wolves from Canada into central Idaho and [YNP] where they would receive full endangered protection under federal law” (Perry 2012).

In 1995, fourteen wolves from different packs in Canada were captured and transported to Yellowstone (YNP) (Sanders 2004). The area where they were

reintroduced was suitable for recovery because there was little interaction with livestock, natural prey was available and the habitat was supportive of wildlife (Perry 2012). The wolves that were transported from Canada were placed in packs by biologists based on dominant or subordinate behavior, evenly distributed over the three packs that would be released (Sanders 2004). These packs were placed in three separate acclimation pens to allow them to develop social structure before they were released into the wild (Sander 2004). There were three packs released that year, in 1995, and in 1996, there were four packs released through the same process (Sanders 2004).

National Protections

Endangered Species Act Practical Protections

Gray wolves were listed as endangered under the ESA, and were under federally protected, enabling them to expand without being hunted. The goal of the Recovery Plan was to remove the gray wolf from the endangered species list “by securing and maintaining a minimum of 10 breeding pairs in each of the three recovery areas for a minimum of 3 successive years” (USFWS: Recovery Plan 1987). The ESA provided protections for all animals listed at a federal level, meaning it would be a federal offense to harm an endangered (wolf) population (Recovery Plan 1987). Under federal law, all areas of the United States were to abide by this law, therefore all territory in the US was open to wolf repopulation (Recovery Plan 1987).

The ESA offered a variety of protections in order to secure wolf populations. The most significant protection that affected repopulation was forbidding the “ ‘take’ [of] an endangered species...to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct” (Perry 2012, ESA Section 3-19).

Besides strict physical protections, the ESA offered conservation protections that would use “all methods and procedures which are necessary to bring any endangered species or threatened species to the point” where they were no longer endangered or threatened (Perry 2012, ESA Section 2-5b)

Practical Conservation

The ESA’s goal was to preserve and conserve populations that were and are in danger of (or threatened by) extinction (Perry 2012). In order to suppress these threats to wildlife, the ESA implemented programs to educate the public about wildlife and their contribution to the ecosystem. The USFWS and other conservation agencies accomplished these goals by “monitoring, law enforcement, public outreach, research, and regulating human-caused mortality through public harvest, defense of property by the public, agency control to reduce livestock depredation and predation on wild ungulates, and mitigation of the rare potential threat to human health and safety” (Carmichael 2012).

After less than ten years of these protections, gray wolves were close to being at recovery levels. Without the threat of hunting, population growth for gray wolves was exponential, and they began expanding into states adjacent to YNP. Their population increased significantly under federal protections, and in 2011, there were “>1,700 wolves in a 3-part meta-population in Montana, Idaho, Wyoming; eastern one-third of Oregon and Washington; and a small part of northern Utah” (Carmichael 2012).

Removal of Wolf Protections

Delisting: Causes for Delisting

With wolf repopulation in the NRM, a call for delisting began long before 2011. In 2000, the USFWS recognized that there had been more than twenty breeding pairs in the Northern Rockies for at least three consecutive years, recognizing that wolves were moving toward recovery in the states around Yellowstone (Alderman 2009). The road to recovery began after determining that wolves were now threatened, and no longer endangered (Alderman 2009). The USFWS requested that states come up with their own management plans before turning over management. Plans would be approved if genetic conductivity was proved, and as long as a minimum of 10 breeding pairs (100 wolves) per state was protected (Wyoming 2011). The reason for prioritizing genetic conductivity was to ensure that gray wolves were able to safely migrate into and out of YNP.

Delisting: Down-listing

By 2002, the USFWS determined that recovery goals were met by gray wolf populations (Wyoming 2011). The USFWS down-listed wolves from endangered to threatened in 2003, establishing a distinct population segment of the Northern Rocky Mountains (NRM) (Perry 2012). A ‘distinct population segment’ determines a specific population of wolves in a certain area in the United States, in order to monitor wolf populations regionally as well as nationally. After down-listing, the USFWS asked Montana, Idaho and Wyoming to prepare management plans for gray wolves to determine how the states would maintain a ‘healthy, viable’ wolf population if they were delisted (Alderman 2009). A ‘healthy, viable’ wolf population was defined as at least 10

breeding pairs and 100 wolves, with sufficient genetic exchange between the three different populations, and outside of the park (YNP) (Wyoming 2011).

Delisting: The Long Process of Delisting

The USFWS attempted to pass rules to speed up the delisting of gray wolves in the states of Idaho, Montana and Wyoming, but they were faced with bumps along the way (Alderman 2009). In 2011, the ‘wolf rider,’ a revision of the 2009 rule was passed in Congress (Perry 2012). The 2009 rule reissued the 2008 rule with proof of additional statistical information regarding genetic conductivity (Alderman 2009). The 2008 rule called for an establishment of a distinct population segment (DPS) in Montana, Idaho, and Wyoming, along with Washington, Oregon, and some of Utah, termed the Northern Rocky Mountains (NRM) and removes this population from the protections of the ESA (Alderman 2009). The law that passed in April 2011, delisted wolves in Montana and Idaho, but rejected Wyoming’s State Management Plan for gray wolves (Perry 2012). This lifted federal protections from those two states, and transferred management to Idaho and Montana (Perry 2012).

The states in the Northern Rocky Mountain (NRM) region are legally committed to maintaining a wolf population of at least ten breeding pairs and one hundred wolves per state (Alderman 2009). However, releasing wolf management to the states appeased those stakeholders who fought hard to control wolf populations in their state, rather than those concerned with wolf conservation. The state governments were more concerned with those stakeholders who were landowners and hunters, rather than the purpose of wildlife management, which would promote preservation of wolf populations in their state.

Moving from Federal to State Management

Transition to State Management: Individual states

Idaho, Montana, and Wyoming have a vocal hunter and rancher population who argue for relaxed monitoring of wolf populations. These states' laws concerned with wolves involve more hunting of wolves than protection for wolves. The trend in state management is designating wolves as big game or predatory animals, and then managing them as such (Alderman 2009). Game species are usually managed by public hunting, and kept in consistent balance with a limited number of 'take' each year. But predatory animals can be hunted, without a license all year long (Alderman 2009).

There are many differing opinions about the turnover of wolf management to states in the NRM region. Some believe state plans are inadequate for managing wolf populations, and think increased hunting is necessary. Over half of deer and elk hunters believe that "the best management strategy for wolves [is] to reduce wolf populations to the minimum pack numbers necessary to keep them off the Endangered Species List" (Bruskotter 2011). These stakeholders have one interest in mind: minimal wolf populations. They believe wolves are pests, and should be controlled rather than allowed to diminish livestock populations.

However, others believe that current plans are aggressive concerning the unregulated hunting of such a recently endangered animal, and argue that there should be more limits on wolf hunting. Advocates of wolf conservation, such as Defenders of Wildlife thought handing management over to the states could help "ensure the long-term future of a healthy, sustainable wolf population," but have not seen the states hold up to this standard (NRM: Defenders in Action 2010). As states regulate opposing

stakeholders, their laws begin to lean to one side, accommodating more for the hunters/ranchers and disregarding population preservation or conservation.

Effects of State Management: Wolf Populations

In order to estimate the managing techniques' affect on wolf populations, it is imperative to investigate the trends of wolf hunting. According to the Montana State University's Department of Ecology, about 37.1% of wolves were killed in Montana and Idaho in the year of their delisting (Alderman 2009). In both states, the legalized number of hunted wolves increased the year after their state management plans were accepted (Idaho 2011; USFWS 2012). In Montana, the hunting quotas increased from 75 to 186 wolves hunted per year (Creel and Rotella 2010). States have shown their support of wolf hunting, disregarding the conservation aspect of wildlife management.

In order to understand the impact of wolf hunting, Creel and Rotella (2010) researched the relationship between human off-take, total mortality and population dynamics of gray wolves. In Montana and Idaho, the states immediately approved for delisting, the hunting quotas for wolves were almost if not entirely satisfied within a month of their first wolf-hunting season (Creel and Rotella 2010). In this study, they learned that wolf populations can sustain hunting at reasonable harvest numbers, but states have not established a sustainable harvest for the wolves in the NRM. The study determined that the current affects of harvesting on wolves are not compensatory to natural mortality, but additive. Meaning wolves are unable to sustain the population losses endured by excessive hunting. The current hunting trends and statuses that have been implemented are not supportive of a sustainable, growing or migrating wolf population.

In Montana and Idaho, the 2009 rule allowed delisting of wolves immediately along with proposed state management. Wyoming's plan, however, was not accepted in 2009 and endured multiple revisions before it finally was accepted. The USFWS, and the federal government did not at first accept their plan for managing wolves. The Wyoming Management Plan of 2009 was rejected because the USFWS was unsure whether the protections provided were sufficient for conservation of the gray wolf population, and because there was a major recovery area (YNP) in the state, the USFWS wanted to be sure populations could migrate out of the park (Perry 2012). After several revisions, the Wyoming Management Plan was accepted by the USFWS in 2011, with additional supervisions, including legal language that increased protections for wolves.

Individual State's Management

The Wyoming Management Plan for Gray Wolves

The differences between the 2009 and 2011 Wyoming Management Plan are few, but the most notable change concerns 'genetic exchange' (Perry 2012). The biggest hesitation that USFWS had was migration out of Yellowstone into the NRM region safely (US Department of Interior 2012). Wyoming's new plan sustains a "recovered, stable and sustainable population of wolves that is genetically connected to other subpopulations of NRM DPS" (Wyoming 2011).

The new plan integrates genetic stability by developing scientific methods to monitor genetic exchange with other populations outside of YNP (Wyoming 2011). This legal language allows the USFWS to reconsider delisting of gray wolves in the state of Wyoming and allowing state management. After considering genetic connectivity and ensuring that plans met requirements for turnover, the state of Wyoming received

management of the gray wolf, and they were no longer nationally protected. The state of Wyoming then developed a basic gray wolf management plan that has six objectives. At least 10 breeding pairs and 100 wolves in Wyoming will be maintained, apart from YNP, and the additional conservation areas (YNP and WRR: Wild River Reservation). When these conservation areas are included in the population, Wyoming Game and Fish (WGF) will retain that at least 15 breeding pairs, and 150 wolves in the state.

In the state of Wyoming, the largest population of gray wolves is in Yellowstone. Therefore, management in Wyoming will account for proximity to the park. Directly outside of the park is designated as the 'Trophy Management Area,' (TMA) where wolves are managed separately from the entire state. Wolves are managed as predatory animals outside of these 'Trophy Management Areas.' Predatory wildlife management allows for hunting without a license, regardless of reason. Therefore, if wolves are found in the state of Wyoming, hunting is legal, even without a license. However, hunting in 'Trophy Management Areas' (TMA) is different, the areas are directly outside of YNP, they have hunting seasons for wolves (instead of year-round) and are seasonally expanded to account for natural dispersal of wolves. In this 'Trophy Management Area' (TMA), licenses are necessary for legal wolf hunting.

This management plan sets out to appease the USFWS by writing in the requirements of the federal government to receive control of wolf populations. Wyoming Game and Fish (WGF) promises to develop scientific protocols for population monitoring, however, this data is concentrated in one area of the state, the Trophy Management Areas (TMA), which cannot account for the status of statewide wolf populations. However, safeguards for hunting quotas are established in the plan. In the

rare case that quotas are not reached, wolf-hunting season will be extended. Although, from recent hunting statistics, it would not seem as though reaching hunting quotas will be the biggest dispute for WGF (WGF Wolf Harvest 2011).

In regards to genetic connectivity, WGF is responsible for managing “wolves with the goal of continuing to enable successful wolf movement and dispersal between and among the NRM’s three subpopulations,” meaning the three states, Idaho, Montana and Wyoming (Wyoming 2011). Their method of confirming genetic exchange is to provide evidence for “at least one effective natural migrant per generation entering into” YNP (Wyoming 2011). WGF acquires these genetic samples from as deceased wolves in order to establish a framework.

Concerns for Wyoming’s stakeholders regarding wolf management include the fear of wolves negatively affect elk herds, and deprive cattle populations. WGF wants to assure their stakeholders that wolf predation will be handled to the best of their ability. Regarding cattle populations, WGF will use lethal controls when evidence shows a wolf was responsible for the deceased cattle. As far as elk, WGF will minimize impacts from wolves on elk, by diminishing wolf populations in problem areas.

The Wyoming Management Plan for Gray Wolves: Impact On Gray Wolves

The state of Wyoming appeases hunters in the policies regarding wildlife management. In order to appease these stakeholders’, conservation in the states far from nationally protected land is disregarded. The only land where wolves are thoroughly preserved in Wyoming is Yellowstone, a federally owned national park. Outside of the park, wolves are trophy animals, hunted depending on season. This area is considered a ‘protection and conservation’ area in the state. It is seasonally expanded during wolf

“dispersal periods [to] protect dispersers” (Wyoming 2011). However, it is unclear whether seasonal expansion protects dispersers or not. The idea behind expansion is to protect wolves from their designation as predatory animals in the rest of the state, but wolves are still hunted in TMAs, the only difference is that hunters are required a license, and there is a limit on how many wolves may be hunted each year.

These “protections” provided by WGF to wolves should not be accepted or supported by the USFWS because they do not support the goals of the ESA. Regulated hunting on wolves is necessary and even encouraged, but regulations such as these are not supporting the future of the species. Wolves are much more than ‘predatory animals’ and should be treated as such. It is frightening how fast a recently endangered species has gone from protected to over-hunted in a short time period (Bruskotter et al. 2011). There is incompatibility between the goals of the USFWS, those who advocated and created the ESA, and those who wrote the WGF Wolf Management Plan.

The Wyoming Management Plan for Gray Wolves: Wyoming Predator Management

In other management plans that Wyoming has developed for large predatory animals, their management style is significantly different. In the Mountain Lion Management Plan for Wyoming, “Lion Management Units” were developed to “allow managers to address local management issues while maintaining the overall management objective for the regional population” (WMLMP 2006). In contrast to the systematic Mountain Lion management, wolves are managed much differently. They are treated as a baseline ‘predatory animal’ and their management is not dependent on region. The only area that is designated as a ‘management unit’ would be the TMA outside of YNP.

From the two different Management Plans, mountain lions seem to be less of a threat to the stakeholders in Wyoming than wolves are. However, this is not consistent with the behavior and ecology of the two species. After wolf reintroduction, the impact of the two predators present in YNP created a complex trophic cascade, which helps to understand the interaction between the two species and estimate the state's management strategies for both. The absence of wolves in YNP allowed elk to occupy areas where they were safe from mountain lions, with adequate vegetation and water availability, and after wolves were reintroduced, elk moved to areas of higher elevation (Winnie 2012; Ripple 2000). In turn, elk became more vulnerable to mountain lion predation on hills and high areas (Atwood et. al 2006). It was proven that mountain lion-elk predation was not decreased due to wolf predation on elk, meaning elk populations were faced with a double threat of predation (Atwood et. al 2006). Each predator is equally responsible for population losses of elk, however, wolves are managed more harshly due to their elk preference. Therefore the stark differences in methods of management between the two predators seems illogical. If mountain lions are equally responsible for decreasing elk populations, why are wolves singled out for depreciating elk populations?

The Wyoming Mountain Lion Management Plan

The statistics regarding mountain lion hunting quotas are significantly lower than gray wolf hunting quotas in the past year (WWMP 2011; WMLMP 2006). The plan also takes into account the misplaced young of hunted mountain lions, which is not considered in the gray wolf plan (WMLMP 2006). Of the three hunting management objectives, two are concerned with maintaining and growing the mountain lion population in the state, which is not similar in the gray wolf plan (WMLMP 2006; WWMP 2011). Mountain

lions are managed through Lion Management Units which sections the population of mountain lions into different regions of the state, dependent on mountain lion occupation of each designated area. However, wolves are simply designated as predatory animals outside of TMA and YNP, rather than determining their hunting quotas based on regional population. Finally, the plan requires designating the mountain lion populations as stable, source, or sink, to determine the population status in Wyoming, but wolf monitoring is not explained in their plan (WMLMP 2006; WWMP 2011).

Stark Differences Between the Two Plans

These methods of management, along with the way each management plan is written illustrates the regard for mountain lions as predators, and the distaste for gray wolves as pests. The goal surrounding mountain lion management is sustainability and growth, whereas the gray wolf plan is a method of maintaining low-level populations to satisfy their removal from the ESA. It is disappointing that this population of such a recently endangered species is not more appreciated. It is staggering how quickly a protected endangered species has become more hunted than any other predator in the region. Wolves should be managed more scientifically, according to their biological and social history, instead of what the culture may believe about them. They were remarkably recovered in the United States, and their presence has not been respected or appreciated. However, wolves are more valuable than they are being treated, they have improved the ecosystem greatly, and if wolves were seen for their benefit rather than risk, a management plan that prioritized sustainable populations could be developed.

CHAPTER THREE

Current Management of Gray Wolves in the Northern Rocky Mountain Region

State Management

Impacts of Current State Management

In recent years, after wolves were placed under state management, their population numbers immediately began to decline. Without federal government protections, states have begun to excessively hunt wolf populations. Under state management, wolf populations have diminished, at rates that are not sustainable for future populations of gray wolves in the NRM (Bergstrom 2009). This puts gray wolf populations in jeopardy of being placed back on the Endangered Species List in Montana, Idaho and Wyoming (Bergstrom 2009). Gray wolves would be back under federal protections, something undesirable for state governments. What is it about state management that threatens wolf populations so severely? Is it likely that state management will improve before wolves are re-extirpated from the region?

Brief History

As wolves began repopulating the states in the NRM, the tension regarding reintroduction elevated. Their population and migration patterns were expanding rapidly, causing stakeholders and state governments to question their status as ‘endangered’ and then ‘threatened’. When it was clear that wolves had reached their final stages as nationally protected wildlife, they were placed under the care of state management, it was

the first time in history a previously endangered species would be under state management (Creel and Rotella 2010).

As wolves were delisted from the Endangered Species List, it seemed as though this was more of a political move than a method to preserve the species more efficiently. There was little input from wolf biologists and conservationists in regards to delisting the gray wolf, and the law was passed based on population numbers rather than ecological function and benefit. Delisting was not a sufficient method to preserve the population growth of the gray wolf, in fact it is acutely detrimental to gray wolf populations (Creel and Rotella 2010). There is significant evidence that wolves are not back to their original numbers in the region (Carlson 2009), and conservation rather than degradation will be most affective for the ecological interest in respect to a growing wolf population.

Northern Rocky Mountain Management

State Management Methods

Idaho, Montana, and Wyoming were the three states where repopulation was most poignant. Each of these three states wrote separate Management Plans, and only Idaho and Montana passed the first round of delisting in 2009, when wolves were first down-listed (Alderman 2009). In 2011, however, wolves were completely de-listed, and states had full control of their management plans (Perry 2012). The only requirement was to maintain “at least 10 breeding pairs and 100 wolves” (Idaho 2002; Wyoming 2010).

State Management Methods: ‘Predatory’ Management

Every state in the Northern Rocky Mountain (NRM) region that currently have wolf populations, has designated wolves as ‘predatory animals’ (Perry 2012; Idaho 2002;

Wyoming 2010). Predatory management equates wolves with pest species, making them unprotected and liable to aggressive hunting (Wyoming 2010; Idaho 2002). However, wolves are far from pest-like in their predatory behavior. They are selective of their prey, and hunting is associated with prey in poor nutritional condition (Metz et al. 2012).

Wolves are methodical in their hunting style, they do not hunt their prey without first “assessing prey vulnerability” (MacNulty et al. 2007). Pests, on the other hand, usually abuse the availability of their prey, causing severe declines in prey population. While wolves have influenced elk populations, as noted earlier, they have not diminished the quality of the populations, rather the quantity (Bergstrom 2009). Wolf prey is selected based on their poor physical condition, leading to a population funnel to create stronger herds of elk (Atwood et al. 2007). Their designation as ‘predatory animals’ is inappropriate because it neglects natural behavior and ecological role.

State Management Methods: Impact to Wolf Dynamics

Wolves maintain and support ecosystem structure by controlling populations of elk and coyotes (Wilmsers et. al 2003). Losing the wolf again will set the ecosystem back to the unbalanced structure where it was before wolf reintroduction. Instead of feeding off of carrion provided by wolves, coyotes will attempt to regain a place as a top predator in Yellowstone (Switalski 2003). Elk will repopulate stream areas, over-consuming aspen shoots, and impact the park’s ecology (Jenks 2004). In addition to these specific species changes, countless others would be impacted if wolves were to be lost again (Bergstrom 2009). Therefore, management of wolves as pests is inappropriate, and must be reevaluated.

In addition their improper designation as ‘predatory animals,’ the main goal behind gray wolf management is diminishing wolf abundance (Idaho 2002; Wyoming 2010). Wolf management aims for lowest-population approach (Idaho 2002; Wyoming 2010), instead of a sustainable, or attainable population that might increase positive benefits of wolf presence. However, this management technique is inappropriate because species management should be focused on maintaining the population, rather than diminishing it.

Compared Predatory Management Plans

In comparison to other predator management plans, wolves are treated significantly different than grizzly bears and mountain lions, the other, larger, predators in the region. Grizzly bear and mountain lion management are not as strict as wolf management has been (Idaho 2002; Wyoming 2006). Wolf management plans have designated the 10/100 (breeding pairs/individuals) approach to management, which follows the ESA rule of minimum capacity (Wyoming 2011), to keep wolves off the Endangered Species List, which is undesirable for states. Their agenda in writing management plans, is to maintain directly above the minimum population of wolves in order to appease the federal government, and avoid re-listing on the Endangered Species List. The theory is monitoring populations to assure they will not be placed on the Endangered Species List (Idaho 2002; Wyoming 2011). Specific state management plans reveal the cracks in the ideology regarding wolves through their disproportionate management techniques.

Individual State Management

Idaho State Management

Idaho's State Management Plan was written in 2002 (at least 7 years before wolves were de-listed) and their management policy regarding wolves is to maintain a population of 15 packs in the state. However, 'packs' is not clearly defined in the plan (Idaho 2002), permitting the population to vary greatly depending on how 'packs' is defined. The discrepancy in the definition of packs allows the state to be unclear in their documentation about the actual population of gray wolves in their territory.

Idaho State Management: Harvest Information

Aside from issues in Idaho's Management Plan, it is difficult to interpret statistics that have been released regarding harvesting and wolf populations. Their harvest information for each year is divided into different regions, some of which have a limit of how many wolves can be hunted per year (Idaho 2014). From this the totals are derived at the end of the season. In 2011, the first year wolves were off the Endangered Species List, 255 wolves were hunted, and 124 were trapped, totaling 329 total wolf-kills that did not pertain to wolf predation of livestock (Idaho 2014). In fact, only about 73 wolves were lethally controlled for livestock purposes, 59 by Wildlife Services on private land (Idaho 2011).

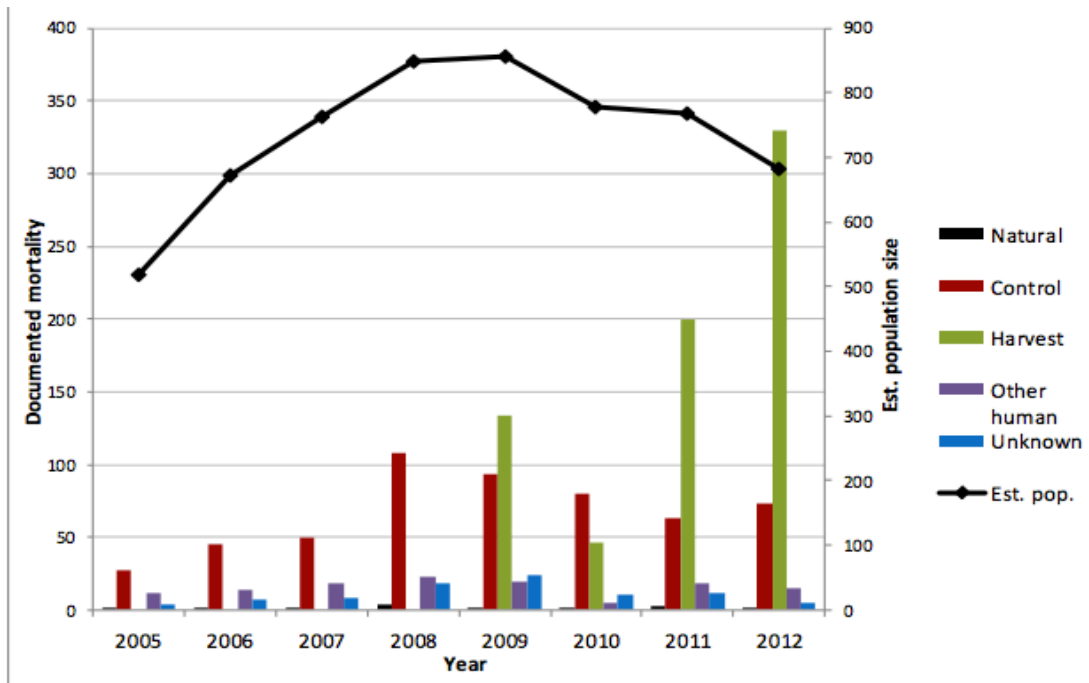


Figure 3-1: Gray wolf mortality in Idaho in the past few years is largely due to harvest, and has greatly impacted their population numbers (Idaho Fish and Game: Monitoring Report 2011).

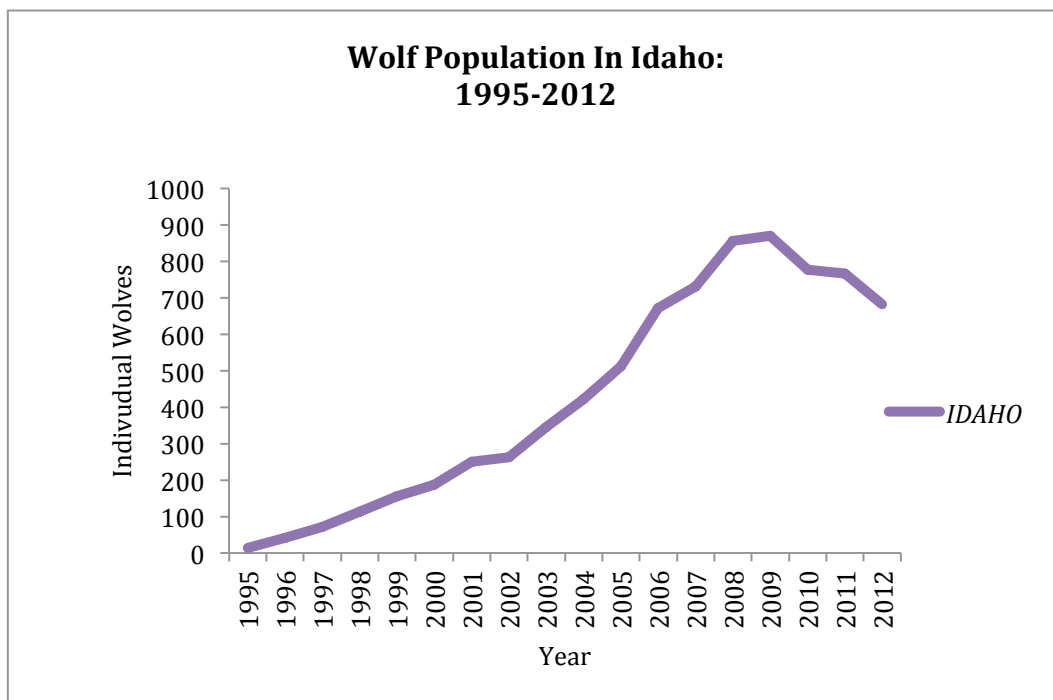


Figure 3-2: Wolf population by year in Idaho, from 1995(reintroduce-tion) to 2012; sharp decrease in 2009, when first delisted (USFWS Wolf Population by Year 2012).

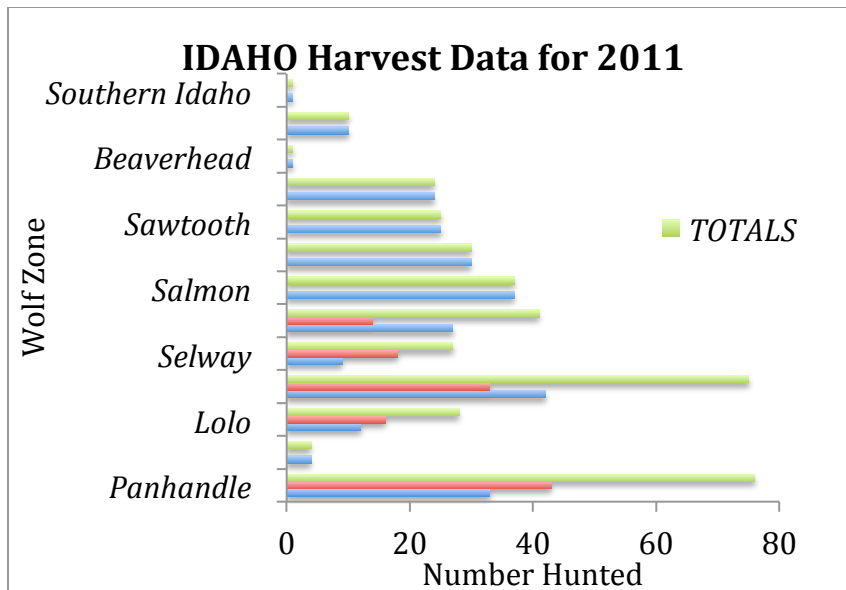


Figure 3-3: Hunting statistics by 'Wolf Zone' in Idaho for 2011 (Idaho Fish and Game Wolf Harvest 2012).

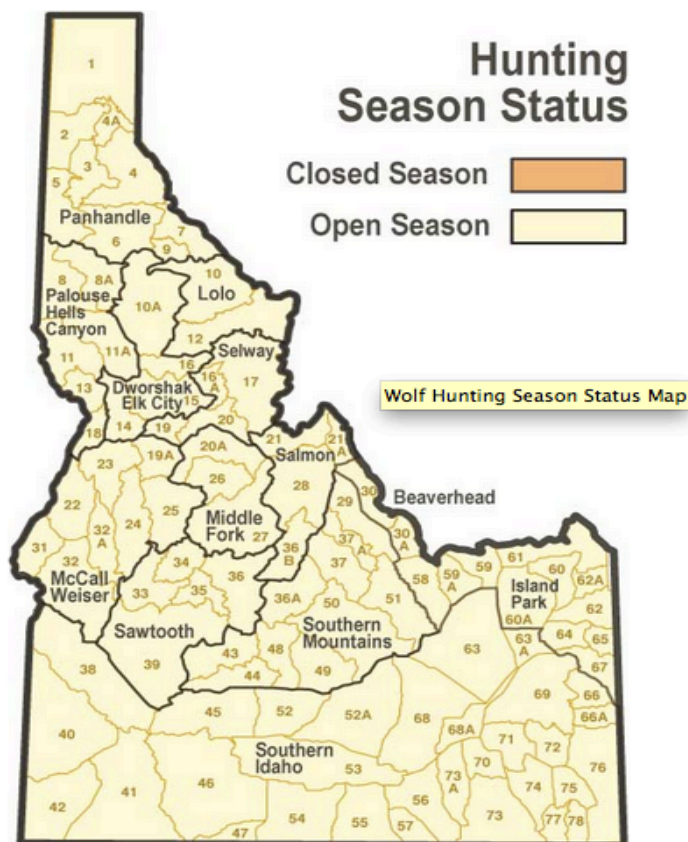


Figure 3-4: 'Wolf Zones' distributed in Idaho based on different populations per area (Idaho Fish and Game: Harvest Information 2013).

If wolves were truly managed for their predation of livestock, there would be more than 59 wolves lethally controlled by Wildlife Services (Idaho 2014). This illustrates that hunting accounts for much more than solely predation control. Since there was a low population of wolves ‘lethally controlled,’ wolf predation must not be as much of an issue as previously predicted. However, there were an additional 329 wolves harvested, accounting for 78.8% of the total population of wolves harvested by humans (Idaho 2014). If the reason wolves were managed as ‘predators’ is their predation of cattle, why is much of the population harvested for recreation, and not for predation control?

It seems that wolves are managed as game species in addition to predatory species. However, this is not clearly stated in any of the wolf management plans. The basic reason that wolves are hunted in management plans is to control predation of cattle, which is not the biggest issue in the state. Wolves only accounted for about 92 cattle kills, and 337 sheep kills (Idaho 2011). However, coyote and other predator-kills of livestock were not recorded, or found on Idaho’s website. Evidence that coyote and other scavengers hunt more than wolf packs, can be found in multiple scientific articles, such as Carlson’s article on evidence to support wolf populations. Cattle and livestock predation is the least of the stakeholder’s worries, as is clear in the statistics from the Idaho Monitoring Report.

Idaho State Management: Impact of Hunting Rates

These management plans are mostly supportive of hunters, under the guise of managing wolf predation of livestock. In the Idaho Management Plan, the managers recognize stakeholder input, and decide that “the most important objective within the

management plan will be conflict resolution, when populations meet or exceed the population goal of the plan,” recognizing that population control is the main goal, and not predation control (Idaho 2002). It is unclear why the wolf population exceeding management goals is a ‘conflict’ other than for hunters in Idaho. Recognizing that wolves are not being managed as predatory animals, even when the state has designated them as such, illustrates the conflicting goals between state management and the ESA.

Besides focusing on hunting, Idaho elevates the status of game species over predators in the state (Idaho Predator Control). While game species bring in the most revenue for the state wildlife departments, it is not the correct method for wildlife management. Predators have a significant ecological role in the community, without predators, game species would control the environment. An example of the state prioritizing game over predators, is Idaho. Their brochure on predator management details how and why predators are managed, discounting the benefit of predators. The brochure asserts that predator control is lethal control or removal (which is typically lethal removal), assuring the public that predators will be taken care of when threats are determined (Idaho Predator Control).

Predators and Game Species Management Techniques

This brochure shows the elevated importance of game species above other species, assuming predators are the only reason for low game populations. However, game populations may be diminished for a multitude of reasons, such as the prevalence of disease, habitat loss or climate change. This statement proves that knowledge is lacking respecting the ecological function and environmental factors in the region. The ‘scientific’ statements claimed are not founded in a true understanding of wildlife,

ecosystems or environmental factors. This, in addition to the assessment of the Idaho Wolf Management Plan, with a bias for hunting, and extreme support of game over other wildlife leads us to conclude that a majority of the information regarding wolf behavior is inaccurate and needs to be re-evaluated.

Northern Rocky Mountain State's Hunting Management

Wyoming Management: Interpretation of Hunting

The synopsis of the Wyoming Management Plan is written in the previous chapter, and some of the values of the state are revealed in their hunting statistics from the previous year. WGF records harvest numbers, but by hunter success based on region and number of wolves available for hunting, instead of wolves' killed (Wyoming 2010). Their statistics include number of hunting days, licenses sold, and total number of

<p style="text-align: center;">GRAY WOLF HARVEST STATEWIDE BY TOTAL HUNTERS 2012</p>						
	LICENSES SOLD	NUMBER ACTIVE HUNTERS	TOTAL HARVEST	TOTAL RECREATION DAYS	HUNTER SUCCESS	DAYS/ HARVEST
STATE TOTAL	4287	3403	42	25169	1%	599.3
RESIDENT	4102	3249	39	24329	1%	623.8
NONRESIDENT	185	154	3	840	2%	280.0

Figure 3-5: Wolf hunting statistics based on hunter success, and licenses sold in Wyoming (Wyoming Fish and Game: Harvest Information 2012).

recreation days (Wyoming Harvest 2012). Basing wolf hunting statistics on the success of the hunter reveals something about the priorities of the state. The fact that even their harvest statistics are anthropocentric, illustrates the overall dislike of wolves, which may

lead to improper managing techniques. The following figure shows ‘wolf statistics’ for the state of Wyoming, based on hunter success or licenses sold.

It seems that states are more concerned with diminishing the wolf population than with maintaining or sustaining the population for the perpetuation of ecosystem health. Although wildlife management plans are for the preservation of species, plans involving wolves are more challenging due to the continued political debate about gray wolves. The viability of wolves and creating a sustainable situation for their population should be the main goals of state management. This, however, does not seem to be the case. If state governments continue to struggle to perpetuate the health of wolf populations, they may face another turnover of management in the near future. State management should uphold the ecological value of the wolf and promote viable populations above 10 breeding pairs. Managing the wolf as a recently endangered species calls for more cautious and futuristic planning than current management plans.

The Importance of Native Gray Wolf Populations

A Balanced Ecosystem

Wolves have exceedingly benefited the environment where they have been reintroduced (Wilmer et. al 2003; Dutcher 2013). There is clear evidence that wolves have brought back a healthy balance to YNP and in other areas where they are migrating (Jenks 2004). Wolves have not only recovered the endangered cottonwood trees, but have helped re-establish control of stream erosion, and rebuild a healthy and conducive stream ecosystem with birds, insects, and fish (Perisco and Meyer 2012). Wolves have displaced elk from streams, causing elk populations to migrate to higher grounds (Winnie 2012). This movement of elk populations has allowed the stream ecosystem to re-balance

(Perisco and Meyer 2012). Trees are free to grow without over-grazing to threaten their populations (Ripple 2000). In addition to tree re-population, stream water quality has improved greatly without deer excrement to disturb the system (Jenks 2004). Along with the benefits that wolves have brought the ecosystem, there have also been an “increase in grizzly bear and mountain lion populations,” causing the decline of the Yellowstone elk herd which will reintroduce shrubbery to the river and provide shade for the fish and other animals in the water (Jenks 2004).

Along with this balance of elk populations, wolves also create some competition with other predators and scavengers, and in turn provided them food from the leftover carrion (Wilmsers et al. 2003). Wolves are in competition with coyotes, and instead of providing them prey, they provide carrion for coyotes to feed off of instead (Switalski 2003). Those scavengers, such as coyotes and birds of prey, without wolves present, will opportunistically hunt smaller prey, rather than relying on carrion, which could cause an imbalance in the ecosystem (Ruff 1995). Repopulation of wolves in the region has allowed scavengers their place in the ecosystem and some of the structure is restored (Switalski 2003). In total, wolves have completely altered the ecosystem in a desirable way, allowing the ecosystem to re-establish the full and healthy balance (Jenks 2004).

The Clear Benefit Of Wolf Presence

It is evident that wolves are a necessary part of the ecosystem, they promote balance and stability, and maintain healthy populations of large herbivores and smaller predators. One of the many predators that are benefitted by the presence of wolves in the ecosystem are coyotes (Switalski 2003). Wolves naturally provide carrion to coyotes, causing a decrease in coyote predation of smaller prey and livestock. Decreased coyote

threats to livestock are associated with the presence of wolves, due to their relationship in competition (Merkle 2009). When wolves were out of the picture, coyotes were more abundant in the ecosystem, causing more distress than benefit to the ecosystem of the NRM region (Dutcher 2013). Coyotes are opportunistic hunters which results in increased livestock mortalities than if wolves were present (Merkle 2009). Statistically, coyotes are more of a threat to livestock than wolves are, showing that wolves are more beneficial to livestock populations than harmful (Carlson 2009).

Impact on Elk Hunting

Elk populations are an important species for hunters in the NRM region, however, many fear that wolves threaten the perpetuation of these elk herds (Metz 2012). However, this discounts the nature of wolf predation. Wolves naturally seek out the weak and lame of any prey population (Atwood et al. 2010). They are able to hunt large ungulates by chasing down the less fit and able of populations. With these elk out of the picture, the elk population is able to reproduce with better survival rates than if the weak and diseased were still in the population (Hebblewhite 2013). By hunting the vulnerable, wolves make the population of elk healthier and more likely to thrive, providing hunters better quality elk when they are hunting with wolves instead of competing with them (Hebblewhite 2013).

The Threat of Wolf Hunting

Wolf hunting is a fairly new phenomena in the Northern Rockies, since the gray wolf was so recently endangered in the states. While wolf populations are adaptable to lower levels of harvest, the current trends for wolf harvest are far to high for the wolf population to combat (Creel and Rotella 2010). Hunting wolves impacts various aspects

of the wolf's life, including dispersal and migration of packs (Pearson 2008). Studies have estimated wolf dispersing success in areas of high harvest, and their annual survival rates are only 16% (Pearson 2008). As harvest rates increase, wolf populations have more trouble dispersing into new areas without facing the risk of hunting. This has caused a decline in wolf migration to different territories, leading to a more susceptible population in areas of high hunting risk. Population numbers have started to decline due to these risks and more in the Northern Rockies. Hunting wolves is no longer a solution to any livestock problem, but a method to eliminate the species from the NRM.

Poor Management Techniques

What is the purpose behind managing any wildlife? Managing wildlife is for the purpose of maintaining, sustaining and preserving wildlife for the purpose of perpetuating the natural health of the environment through ecosystem balance. However, wolf management, since turnover it's to state governments, has not considered these goals concerning wolf populations. The states in the NRM desire wolf degradation rather than wolf conservation. Their reasons behind wolf-hatred are not founded in scientific evidence, rather cultural distaste of the predator. Moving forward, is there a method to secure wolf populations, while avoiding political upheaval?

Looking at the below figures, illustrates a significant decline in wolf populations since 2009, when wolves were placed under the control of state management programs. Wolf populations have significantly diminished after they were taken off the Endangered Species List. Population decline after such recent protection from the federal government is an anomaly, and an issue that must be handled politically. Meanwhile, wolf populations are fragile, and must be managed properly for the success of the species.

Instead of managing for minimal populations, states should seek to support invaluable wolf populations.

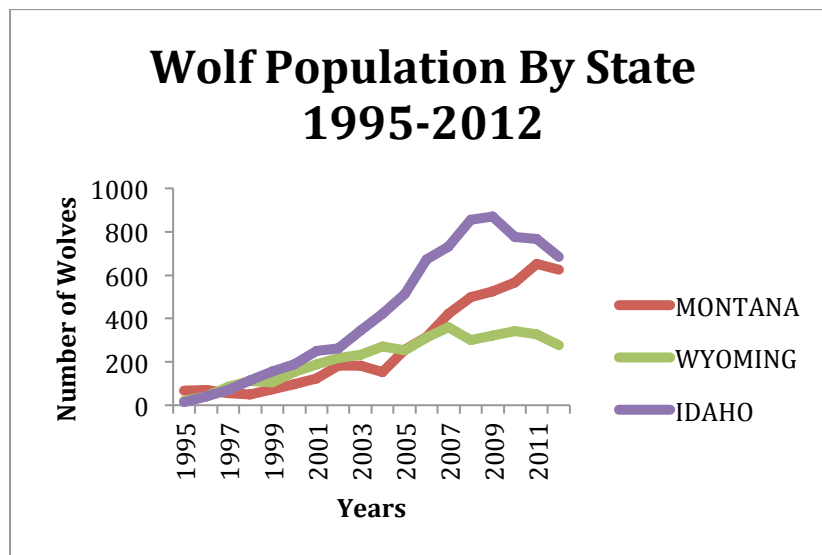


Figure 3-6: Gray wolf populations from reintroduction to current status after two years of being delisted. Beginnings of population diminishing starting in 2010, when state management plans were implemented (USFWS: Wolf Current Population 2012).

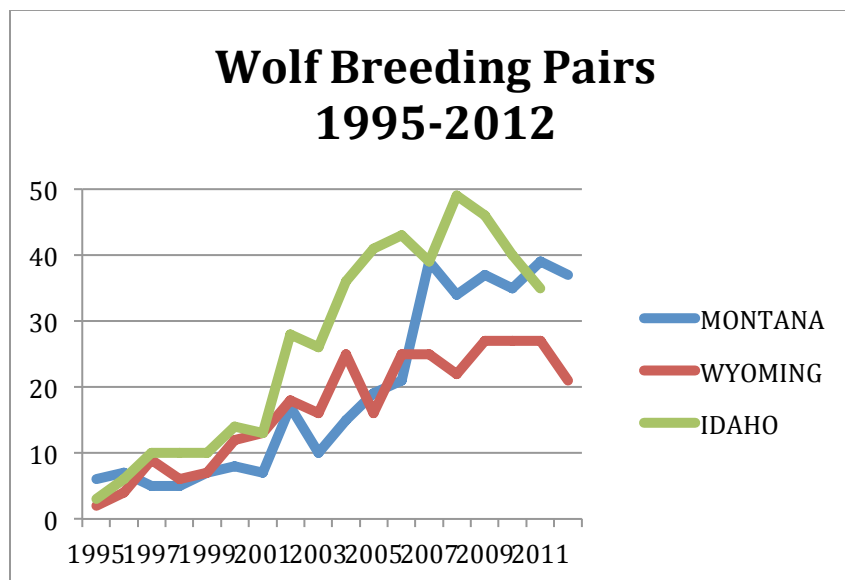


Figure 3-7: Population in the NRM by breeding pair, to show how packs have reacted to state management hunting policies (USFWS: Wolf Current Population 2012).

The management plans currently in place in the states are not sustainable for the protection of the gray wolf species as a whole. Management of gray wolves should strive for a healthy, viable population of wolves, as the Endangered Species Act calls for. However, state management is putting wolves in danger of placement back on the Endangered Species List. In the first year of management in Idaho, the state with the largest wolf population, their population diminished by 11% (Idaho 2011). If hunting is sustained at the level it is at now, it will be in less than a decade that wolves will need to be relisted on the ESA, costing the federal government an estimated \$30 for gray wolf recovery efforts (Bergstrom 2009).

Wolves under current state management in the Northern Rocky Mountain (NRM) region are already threatened by extirpation. Their populations are unable to sustain the current level of hunting, and will soon noticeably dissipate from the region. Wolves are already in danger of being threatened and endangered again, due to over and unregulated hunting. Over-hunting will eventually lead to severely diminished wolf populations and will threaten the existence of the species in the NRM region. In order to prevent this from occurring, a scientifically based management plan is necessary for wolves in all three states.

CHAPTER FOUR

Ideal Management Plan

Purpose for Writing a Different Plan

The flaws in the management techniques of current state control of wolf populations are evident in the numbers. The decline of 11% of Idaho's gray wolf population in one year alone shows how vital finding a balance between over-hunting and over-regulation (Bruskotter 2012). However, in the current political atmosphere, taking away the state's right to manage wildlife will only exasperate the situation. Therefore, creating a management plan that assures sustainable management of gray wolves is not only necessary, it is required. The following is a potential management plan for states in the NRM region to produce and implement.

Political Upheaval

Wolves had satisfied the delisting requirement for the USFWS as early as 2003, when Idaho, Montana and Wyoming were asked to prepare management plans in the event they were permitted to control wolf populations (Alderman 2009). Therefore, in 2009, when the USFWS was attempting to remove wolves from ESA protections, by defining their populations as 'biologically recovered,' states were eager to use the definition to their advantage (Bruskotter 2012). Clearly, keeping wolves on the

Endangered Species List was not in the interest of the USFWS, or NRM states. Although wolf populations are “neither genetically nor demographically viable under state management plans,” it is not feasible to maintain their protections under the ESA, due to lack of political endorsement (Bergstrom 2009).

Therefore, adapting a management plan that accounts for the drive for hunting, alongside intentional wildlife protections, is one method to combat potential extirpation. State management of gray wolves will definitively create confidence in hunters and landowners, therefore state control of wolf populations is crucial. Livestock owners are comfortable with state control because they sense similar principles within their own state government. State management creates confidence in ranchers because they are supported by their government’s response to a wolf problem. Government officials managing wolves will encourage ranchers because they are familiar with the territory and the owners of the land. Since state government is more distinctive than federal government, ranchers may be more supported by state government.

The goal in creating a state management plan for gray wolves, is to compromise between over-hunting and over-regulation. This plan is one method for attempting to prioritize wolf populations while placating wolf hunters. Wolf hunting is not completely eliminated in this plan because it would be counterproductive because of the political situation regarding wolf management. If wolves were replaced on the ESA, the political turmoil that would ensue could deteriorate any progress that wolves have made in the past thirty years in the NRM region. Therefore, appropriate state management is the best adjustment that can be made to promote viable wolf populations in the region. Hopefully, with declined hunting rates, and standard protections, wolf populations may be able to

stabilize in the region. The goal in writing an optimal management plan is to appease stakeholders while unapologetically supporting gray wolf perpetuation and their increased population growth in the contiguous United States.

Management Changes: Hunting Quotas

When states first gained control of wolf populations, they legalized wolf hunting, therefore removing this right will inexplicably aggravate wolf hunters. Therefore, maintaining hunting quotas, will be an important avenue for appeasing stakeholders in the states. Instead of allowing over-hunting, states will create stricter hunting quotas and educate hunters on wolf ecology. In response, wolf hunters will be free to vocalize their concerns regarding changes to hunting seasons. These concerns will be addressed by considering enacting changes in management plans depending on the opinion of a majority of stakeholders. Since changes in management techniques will take place in accordance with hunter's desires, wolf hunters may be more supportive of changes in state management.

Management Changes: Stakeholder Involvement

State management will support voters by holding stakeholder focus groups, concentrating on stakeholder opinions about management techniques and additional suggestions they might have. Allowing the general public to have a voice will alleviate any disputes about the current method of wolf management. Changes in management plans can be implemented in response to these focus groups, and citizens will be confident in their ability to change how gray wolves are managed. Familiarity, and the chance to change management techniques are important values of voters, and part of the reason for state management.

Avoiding 'Endangered' Status for Wolves

Adapting state management to ensure gray wolf populations are maintained above the minimum requirement for placement back on the Endangered Species List is becoming increasingly important. The concern with current state management is that their control of wolves is aggressive, not allowing for wolf population numbers to stabilize. In order to ensure a lasting population of wolves, states must adapt to the wolf population and understand their dynamics and behavior. The reason behind adapting a gray wolf management plan for states in the NRM region is to protect states and wolves from placement back on the Endangered Species List.

Goals for Management Plan

1. To increase monitoring and evaluation of wolf packs in each state in the Northern Rocky Mountain region.
2. To create 'safe' wolf areas in each state where wolves are protected from hunting.
3. To supplement hunter's education with wildlife education, specifically for the role of the gray wolf in the Northern Rocky Mountain ecosystem.
4. To regulate hunting, in order to protect gray wolves from placement back on the Endangered Species Act.

Implementation

Monitoring and Evaluation Techniques: Minimum Population Management

Currently the minimum population goal for each state in the NRM is ten packs and one hundred wolves. Looking at the overall population in the NRM, this diminishes the population by 80% (USFWS GW Population 2012). Diminishing the wolf population

by that large of a number will not be sustainable in the long-term. However monitoring every wolf (currently 1585) in the NRM is not possible either. If 10 packs, with 10 individuals each, on average, are monitored in each state, this accounts for 20% of the population. Monitoring this population illustrates the picture of wolf populations in the NRM, and will provide them some protection from being put back on the Endangered Species List.

Monitoring Statistics

In this management plan, a minimum of ten packs will be monitored, and will not be considered the 'minimal' population goal. In order to do this, one member of ten different packs should be radio-collared to acquire accurate information. The same monitoring technique was used with African Wild Dogs in Zimbabwe and helped improve breeding, and translocation (Painted Dog Conservation). Acquiring this information will be based on the individual pack's behavior throughout the year, and their yearly mortality/natality rates. In order to understand pack behavior, wolf populations can be measured many ways, by mapping their typical territory and migration patterns, as well as hunting patterns. This will give the biologists a view of where wolves occupy territory by season, and if there are any outside pressures influencing the pack's territory preferences.

Monitoring Statistics: Mortality and Natality Rates

Measuring mortality and natality rates is fairly simple information to acquire because it is based on how many wolves are in the territory. Mortality rates are based on the amount of wolves that died that year. Each pack will be measured for separate mortality/natality rates. Keeping track of how many wolves die in each pack will be

important to develop a wholesome idea of wolf integration back into the ecosystem.

Typical reasons for death include disease, predator/prey hunting accidents, wolf hunting, or lethal control. Acquiring statistics for these numbers will help determine the real reasons for high wolf mortalities and if something needs to change in management policy.

Natality rates, on the other hand, are more complicated. Natality rates include the how many pups were born, and how many pups survive and join the life of the pack as adults. The pup survival information is the most important information because it is the main source of increase in wolf populations. Knowing how many pups join the pack will be helpful in determining wolf social behavior and proximity to other packs. These rates will provide more information for understanding breeding behavior and the life cycle of the typical wolf.

Monitoring Statistics: Hunting Rates

Acquiring hunting information will not change much from the current hunting statistics. Hunted wolves must be documented, tagged, and located. It may be difficult to acquire pack information for each individual wolf, but body measurements should be taken to determine age. Documenting the information about the biology of the wolf killed will determine health of the individual and predict status of the general wolf population in the region. This method is also used in African Wild Dog management and has helped to maintain the health of the species (Painted Dog Conservation 2013). Based on the info acquired from individual wolves, the percentage per designated 'wolf zone' can be determine based on population information. From this population, approximately 5% of wolves from each zone should be the designated quota for hunting per year.

Monitoring Statistics: Migration Statistics

Migration patterns will help predict where packs occupy territory and how they move throughout the year. Documenting these patterns per pack will be straightforward if at least two members of each pack are radio-collared. There are more than 20 wolves radio collared in each state right now, therefore, ensuring two radio-collared wolves per pack is easy. Migration patterns will show an overview of wolf patterns by year, and what causes changes in movement. By this time in their population growth, most wolf packs should be settled in their territories, making abnormal behaviors clearer because they will be outside of the normal wolf behavior.

Obtaining information about typical migration patterns for 20% of the population will not reveal all patterns in wolf population or where wolves occupy territory in each state, but it may illustrate how spacing and typical packs behave seasonally. This helps to evaluate stimuli adversely impacting wolves, or where packs occupy territory near ranchland. This gives the Fish and Wildlife Service scientists background to adapt wolf behaviors in their management plan.

Procuring the previous information develops a full understanding of wolf integration in the states. If the management plan is focused on sustaining a viable wolf population, this information will be an avenue to developing and enhancing their management plans based on behaviors and trends that are recognized as occurring in the wolf population. Wolf experts and wolf biologists who understand of wolf behavior and ecology are equipped to evaluate this information and determine the needs of the species.

Interpretation of the Data

Wolf biologists who have solely studied the wolf their entire life have a great understanding of wolf behavior that will be essential to determining changes that need to be made. Most of the data can be graphed or mapped in order to visualize population growth/decline, or migration techniques. This will be implemented and added to status reports done each year to determine if changes need to take place in management plans. The only threat to management plans is if more than 25% of their monitoring population is lost. If information for more than two packs is not available due to wolf hunting or lethal control, these two packs must be replaced within the year. If two more packs are not found and radio-collared, evaluation of the management plan for the state must be done. This is in order to prevent losing more of the population than the Endangered Species Act requires, and is a protection for states. The information found from the evaluation to population growth/decline and migration patterns will be an essential part of ensuring that the management plans are accomplishing their goals.

Wolf Protections: Safe Areas

In each state in the NRM region, there will be designated 'safe' areas for wolves, where they will be free from hunting or lethal control. These areas will not be near ranchers or farms to prevent harm to agriculturalists and livestock. Hunting will be illegal in these areas, and these areas only. Wolves are free to be hunted (within limits) outside of these areas. This is for the protection of the state, and the protection of the wolf population. This will increase and establish wolf populations and allow them an area of retreat. One example of a conservation plan designating habitat is the Black Bear Conservation Coalition that has designated areas of 'critical habitat' for the threatened

black bear, and it has given space for the population to grow, without outside impacts (Black Bear Conservation Coalition 2013). This has worked well for them, and can be attributed to wolf populations by simply allowing minimum protection on a small percentage of the territory of the state.

It will be required that at least 5 % of each state's area is designated as a 'safe' wolf area. This is a small amount of the state, less than a national park, meaning the requirement from the states is minimal (US National Park Service 2014). State wildlife programs should not have trouble finding an area to designate as a 'safe' area, but if it seems unrealistic, a compromise can be worked toward. These areas will only consist of 5% of the state and will be distributed in the area that meets the following requirements.

Each state will be different due to the regional area distributions, but each state is expected to designate at least 5% of their area. If wolf populations are much lower or much higher in a certain state, the distribution of area can be determined separately or together. Meaning, if there is a large population of wolves, there will not need to be more than one designated area for a 'safe' zone. However, if the population is smaller and more spread out in the state, the 5% can be distributed into two or three 'safe' areas in order to allow for more wolves access, and cause less of an impact in one specific area in the state.

Establishing these wolf protections will be important to maintaining a sustainable wolf population in the NRM region. 'Safe' wolf zones protect wolves from some of the threats of the Endangered Species Act, and protect states from the danger of diminishing wolf numbers too low, leading to their placement back on the Endangered Species List. These wolf protections will help the wolf population, and the state management plans

maintain a healthy population of wolves in their state. Minimizing the amount of land designated will cause the process to take less time and work to implement, and therefore ensure wolves are protected immediately. This will be important to learning how to manage wolves for their protections and for sustained hunting numbers.

Wolf Education

Educating the public on the benefits of grey wolves is a necessary part of the state's management plan for wolves. The main goal of state management of wildlife is to promote and understand the scientific benefit of all wildlife. Education is the best way to spread more information regarding wildlife and debunk any myths that might be general knowledge. In many predator conservation programs, like the cheetah and the African wild dog, education programs are the main avenue for changing the outcome for the species at risk (Cheetah Conservation Fund 2013; Painted Dog Conservation 2013). In order to spread knowledge about wildlife, an education program must be implemented. This education program will equip the state wildlife services for confronting public opinion about gray wolves. It will provide better information to the public to develop a supportive mind-set toward wolves, and it will increase hunter safety regarding pack behavior and dynamics.

Wolf Education: Education Programs

Wolf biologists and experts will develop an education program to implement in wildlife agencies and services in the NRM region, specifically for gray wolves. This method has been used as a part of black bear conservation, and has been successful in integrating predators into the lifestyle of hunters, ranchers and the general public (BBCC 2013). Park rangers and those who teach the wolf hunting/trapping classes will be

required to attend a three-week class on wolf education, to have a better base for which plans they will implement regarding gray wolves. In order for a more developed idea of the scientific aspects of the wolf, wolf biologists will be teaching these classes.

In each national park department, there must be an area dedicated to wolf education. A poster, a demo, a fake wolf, anything can serve as part of the public education. As long as there is something emphasizing the ecological benefits of wolves, not only information on hunting, the education requirements will be met. Wolf biologists and experts will need to write an education program to distribute to state departments, if states do not write their own. This will mean easy implementation, and little time and effort devoted.

Wolf Education: Hunting Education

Since wolf hunting is a big trend in the NRM region, wolf education will be easily implemented into hunting classes. This is a method implemented in Black Bear conservation, and it helps the hunter understand more about the wildlife they are hunting (Black Bear Conservation Coalition 2013). This will only be one section of their class; it will include wolf benefits, and wolf social behavior to explaining the impact of hunting on wolves. This addition to the wolf hunting classes will help wolf hunters appreciate the gray wolf as a predator, and a part of the ecosystem.

Changes in Hunting Rates

In the past few years, gray wolves have been off the Endangered Species list, and wolf hunting has become increasingly popular. Since wolf hunting is a huge trend in the NRM region, deregulating hunting will not be an option. Compromising for hunting and

for wolf populations means lowering hunting quotas in the states in the NRM region. Permitting hunting, but at lower numbers will compromise the two perspectives.

Wolf hunting in the Idaho and Wyoming is at levels that the wolf population cannot sustain (Creel and Rotella 2010). If hunting is continued at these high numbers for consecutive years, wolves will be in danger of extirpation again. The hunting quotas that states in the NRM region hold are not viable for the wolf population. Wolves must be managed with more caution than the current hunting quotas. The monitoring techniques implemented will develop hunting quotas that are sustainable.

Changes in Hunting Rates: Wolf Population Monitoring

The ten packs that are monitored per state will establish sustainable hunting harvest for wolves, and keep them off the Endangered Species list. The information that gathered from the radio-collared wolves will reveal population trends and help predict where the population will be in the future at current hunting rates. Developing hunting quotas will take time, because evaluation of trends is not immediate. Therefore, finding the balance between hunting and protection will not be accomplished in the first year.

Changes in Hunting Rates: Sustainable Harvest

Sustainable harvest numbers includes the protection of the ten packs to be monitored. These numbers will be different per state, and per 'zone', but the hunting quotas cannot exceed 5% of the population for each region. This percentage will be set for a minimum of five years, before statistical evaluation is able to predict population trends. After five years, if populations are at undesirable levels, management policies can be evaluated and changed.

The ten monitored packs are under the protections of the state government. This radio-collared population will protect the state from losing control of wolf management. Therefore, losing any member of the monitored population is to be taken seriously. They are the only population in the state that will be illegal to hunt. If a radio-collared wolf is killed, the hunter's hunting license revoked for a minimum of three years, and a fine will be paid for equipment and monitoring information that was lost.

Discussion

Length of Implementation

This management plan will be implemented for a minimum of five years before changes in management will be considered. It is important for a management plan to be consistent for a few years before trends are understood. Wolf populations will vary by season and by year, therefore, understanding trends in populations will take several years to determine. Trends will be evaluated by graphing monitoring reports and interpreting the changes in population dynamics. Federal wolf experts will interpret changes in population dynamics and predict what may cause changes by year, and overall.

Length of Implementation: Interpretation of Acquired Statistics

The most important part of the evaluation process is determining if the management plan is effective and reaches its goals. The main goal of the change in management is to support a steady wolf population in the NRM region. If the plan is effective, wolf populations will be consistent, meaning they will only differ by one hundred individuals per year. To create a sustainable gray wolf population in the NRM region, tolerance of population changes will be minimal. The difference of one hundred

individuals per year, ensures that the population is steady rather than declining. A declining wolf population is undesirable because it puts the gray wolf in danger of extirpation in the region. Ensuring that the gray wolf population is steady is important for better state management of wolves.

Attitudes about State Management

In addition to concerns about wolf population dynamics, the management plan seeks to ensure ranchers, hunters and the general public are supported by state management. Confirming that citizens are supported by the management plan will be an important part in determining effectiveness of the implemented management plan. Surveys and reports over five years must be conducted to understand changes in attitudes and evaluate of the management plan.

Attitudes about State Management: Surveys

In order to provide the best situation for each group of citizens in the state, different surveys must be conducted depending on priorities of each group. Hunters, ranchers/farmers, and the general public must be surveyed differently because of their stake in gray wolf populations. Each survey will be adapted to the lifestyle of the different stakeholders, and will include two to three general questions about wolf populations.

Hunters will be surveyed about the impact and effectiveness of current hunting management because equipping hunters with accurate wolf information is essential for good wildlife management. Ranchers will be surveyed about issues regarding wolf proximity to their private lands because it is important to understand livestock predation rates. The general public will be surveyed about the general impact of wolves in the state

because it is important to understand the stake each party has in wolves and management. Each party's opinions will be documented to discover the different attitudes toward wolves. Measuring the opinion of each group is important to understanding the current management plan, and if it is supporting each group as it should. If negative attitudes toward management are recorded, changes must be made to the management plan in order to support the stakeholders of the state.

Two questions regarding effectiveness of management will be asked to all groups. These two questions will be the only questions that are documented over all three parties. Understanding attitudes of different stakeholders in each state is important to determine if change in management techniques is necessary. If the stakeholders do not see the goals of the management plan as effective, changes in the management plan will be made.

Conclusion

Goals of State Management

The main goal of state management of gray wolf populations is compromise between the needs of the gray wolf population and the values of the stakeholders in the state. Achieving this compromise is not easy, but it will impact the future of wildlife management and the gray wolf population. The goal of managing wildlife is not minimum populations, but support of the ecological values of the wildlife and a healthy environment which creates viability of the total ecosystem. This is important for wildlife, and also to the human population, since, without a thriving ecosystem, clean air and water are scarce. Ensuring the balance of the ecosystem creates a better situation for all parties.

State management will be an avenue for creating a better ecosystem, because it brings the value of the ecosystem to the forefront. Supporting the gray wolf in state management is important to support the overall ecosystem. Wolves are an essential part of the ecosystem of the NRM, and their removal will greatly decrease the benefits to the environment. Finding a balance between exponential growth in wolf populations, and extirpation from the NRM will be an important task for state management.

Environmental Impact

Creating a stable environment for gray wolves is the first step in finding that balance. An achievable goal for state management is to experiment and discover the best situation to create steady population of gray wolves. The ideal situation is finding the best management techniques to support a viable, sustained population of gray wolves in the NRM. Searching for this balance in management will require knowledge to understand trends in stakeholder opinions and wildlife populations.

The importance of management being in the hands of the state is to bring gray wolf management closer to home. Familiarity and specificity are important both to stakeholders, and gray wolves alike. Adapting to the needs of the stakeholders and the needs of the wildlife can be better done by specific management, rather than overall management. State management supports public opinion and ideals by adapting depending on general attitudes of stakeholders. This generates support for the management plan and enables implementation to be more effective.

The idea behind writing this management plan is that both the stakeholder and the gray wolves be supported. The only way to build support for wildlife management is to adapt to the needs and opinions of the stakeholders who live with or around wildlife. The

goal of wildlife management is to be the voice of the environment and wildlife and work with those who must deal with the impact of that wildlife management. The only way gray wolf management will be sustained is if the voice of the people and that of the wolf are both considered.

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