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Ethics and Wolf Management: Attitudes Toward and Tolerance of Wolves in Washington State

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ETHICS AND WOLF MANAGEMENT: ATTITUDES TOWARD AND TOLERANCE
OF WOLVES IN WASHINGTON STATE

A Thesis

Presented to

The Faculty of the Department of Environmental Studies

San José State University

In Partial Fulfillment

of the Requirements for the Degree

Master of Science

by

Julie Callahan

December 2012

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The Designated Thesis Committee Approves the thesis titled

ETHICS AND WOLF MANAGEMENT: ATTITUDES TOWARD AND TOLERANCE
OF WOLVES IN WASHINGTON STATE

by

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APPROVED FOR THE DEPARTMENT OF ENVIRONMENTAL STUDIES

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ABSTRACT

ETHICS AND WOLF MANAGEMENT: ATTITUDES TOWARD AND TOLERANCE OF WOLVES IN WASHINGTON STATE

by Julie Callahan

Approximately seventy-five years after extirpation from Washington State, gray wolves (*Canis lupus*) returned. As of December 2012, eight packs had arrived from adjacent states and provinces. Delisted from the Federal Endangered Species List in the eastern one-third of Washington, state wildlife managers now have the authority to manage wolves without federal supervision. As a result, one seven-wolf pack has been destroyed. The current study was developed to provide information for managers and policymakers to modify wolf management policies to fit the new regulatory context. Effects of a range of cultural and demographic factors on attitudes toward wolves and tolerance of wolf-human interactions were assessed using surveys mailed to 1,500 residents in Washington State. Factors included risk perception, experience with and knowledge of wolves, socio-demographic factors, and cultural attributes. Unexpectedly, 48.3% of respondents approved of wolves; only 18.1% disapproved of them in the area. Most respondents (57.2%) also indicated that danger to humans was not a reason to disapprove. Disapproval of wolves by suburban respondents (53.7%) was surprisingly greater than by citizens living in rural regions (39.0%). Wildlife managers must avoid preconceived stereotypes and guide differing groups to unite to minimize wolf-human conflicts, building bridges among stakeholders believed to hold irreconcilable differences, in order to support sustainable recovery of wolves.

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Introduction

Motivation and Scope

Ethics in our Western world has hitherto been largely limited to the relations of man to man. But that is a limited ethic. We need a boundless ethic which will include the animals also...the time is coming when people will be amazed that the human race existed so long before it recognized that thoughtless injury to life is incompatible with real ethics. Ethics is in its unqualified form extended responsibility to everything that has life. (Schweitzer 1924, 1)

Wolf Ethics

Historically, humans have chosen to exterminate wolves as a way to manage their relationship with them. Such types of environmental policy and wildlife management indicate an issue with the ethical treatment of wildlife in our society. A shift took place in the mid- to late-1900s as scientists acknowledged the ecological value of wolves, and ethicists discussed their moral value.

Tied to economic interests and politics, some wildlife managers have not kept up with these changes in science and ethics. Many wildlife managers seem to view wolves as if they are merely an agricultural commodity to be harvested. Washington state is no longer on the outside looking in as the Rocky Mountain States learn how to manage this spectacular keystone species, extirpated slightly less than a century ago and reintroduced less than twenty years ago. As quickly as endangered wolves in Washington have begun to increase in numbers, wildlife managers have begun to kill them. Wildlife managers have given two ranchers permits to kill wolves found threatening their livestock. Sadly, a female wolf from the Wedge Pack in eastern Washington was killed by a member of the Washington Department of Fish and Wildlife (WDFW) in Stevens County on August 7,

2012, for repeatedly preying on livestock. There had been evidence that members of this pack had caused depredations but not this particular female. Otherwise, wolves continue to be “protected” by state endangered species laws. As of September 6, 2012, wildlife managers from the WDFW prepared to kill four more wolves from the Wedge Pack even though conservation groups argued there was little evidence they were to blame for the recent livestock depredations in eastern Washington. By September 28, 2012, the WDFW announced they had completed their mission of killing six wolves from the Wedge Pack, including the alpha male and female.

Under the recently adopted Washington wolf conservation management plan, the wolf recovery objective is to have fifteen successful breeding pairs of wolves for three years distributed across three recovery regions – an eastern Washington zone, a northern Cascades zone, and a southern Cascades zone that includes the Southwest and into the Olympic peninsula (Wiles et al. 2011). The requirement is to have at least four successful breeding pairs in each of those zones. At the time of this writing, according to Nate Pamplin, assistant director of the WDFW, there are two known packs in the north Cascades, none in the south Cascades, and six in the eastern Washington zone. An interesting note is that although wolves are listed as an endangered species in the state, in the eastern third of the state, wolves are considered part of the federally delisted area of the northern Rocky Mountain district population. That means wildlife managers are protecting and recovering this endangered species in the state and killing them at the same time.

Wolves are literally and figuratively a target in many areas of the United States. As of September 2012, 23,000 people from 33 states had applied for the 6,000 wolf hunting permits the state would issue for its fall hunting season, to begin November 3, 2012 (Barrett 2012). The cost of the hunting licenses is \$30 for residents of Minnesota and \$250 for out-of-state hunters. Out of the estimated wolf population of 3,000 in Minnesota, up to 400 wolves can be killed during the fall season of 2012. A week prior to the announcement about the wolf-hunting licenses in Minnesota, the United States Fish and Wildlife Service (USFWS) announced that wolves in Wyoming would no longer be listed as endangered. There are an estimated 350 wolves living in the state, and they are listed as predatory animals, effective October 1, 2012, meaning anyone can kill any wolf in the state at any point in time.

Since wolves were delisted in Montana and Idaho in 2011, more than 500 animals have been killed by hunters and trappers. The delisted status will continue in Wyoming as long as the wildlife agencies in the state maintain a population of at least 100 wolves, including ten breeding pairs. Wolves are possibly the only wildlife species managed to a biological minimum in this way. There is some hope for these wolves as eight conservation groups plan to file a lawsuit against the USFWS to reinstate the wolves' protected status. Unfortunately, the actual lawsuit will not be heard until after the start of the Wyoming wolf hunt (Barrett 2012). Wolves are persecuted as unwanted vermin rather than treated like the valuable native wildlife they are. It is the same approach that

led to the eradication of wolves from the northern Rockies nearly a century ago, and it is still a persistent threat to wolves today.

It appears the controversies over wolf management revolve around ethics and not science. As mentioned previously, biologically, wolves can and will exist throughout the world without the interference of humans. Their biological carrying capacity is not the issue. It is the social carrying capacity or the tolerance that humans have or do not have toward wolves that limits their habitat. It then becomes a moral issue as to whether we value wolves as individuals, packs, and a species. The answer to those questions requires an ethical framework to help us decide how we ought to live with wolves.

Wolves, as well as other large carnivores, provide an opportunity to raise questions about environmental policy and wildlife management. Wolves generate feelings of strength, integrity, family bonds, as well as fear, despair, and danger. They represent a powerful image for many people and can lead the way to a new and innovative dialogue regarding issues arising from attitudes toward wolves and wolf-human interactions.

In addition, wolf policies demonstrate the moral health of our society. If our policies do not include the health and well-being of wolves as well as other sentient species, what does that say about our moral ethics? What ethical responsibilities do people owe to wolves? Such questions require an ethical interpretation. In an interview transcript on the Green Global Travel blog on September 17, 2012, Suzanne Stone said,

“If you look into the eyes of a wild wolf, there is something there more powerful than many humans can accept.”

After wolves were reintroduced in Yellowstone National Park (YNP) and Central Idaho (CID) in 1995 and 1996, they were managed by the USFWS, as they were listed as an endangered species under the Endangered Species Act of 1973 (Smith 2005).

Between 2003 and 2010, the USFWS proposed delisting gray wolves in portions of the Northern Rocky Mountain (NRM) Distinct Population Segment (DPS) multiple times. The management of the USFWS, headed by Ed Bangs, NRM DPS Wolf Recovery Coordinator, thought the necessary wolf management goals had been met. Each effort was challenged in Federal court, and, at the end of 2010, gray wolves in the NRM DPS remained listed as an endangered species.

On April 15, 2011 President Obama signed Public Law 112-10, The Department of Defense and Full-Year Continuing Appropriations Act, 2011. One section of the act required the Secretary of the Interior to reissue the final rule, previously published on April 2, 2009, delisting gray wolves in the NRM DPS, except in Wyoming. This ruling took effect on May 5, 2011 (Wiles et al. 2011). This was the first time in the history of the ESA that protections were eliminated by politicians rather than scientists, setting a dangerous precedent for managing other controversial species in the future. As a result of the ruling, wolves in Montana, Idaho, eastern Washington, eastern Oregon, and Utah were federally delisted and would be managed by the respective states going forward (Wiles et al. 2011).

Similar to Idaho and Montana, Wyoming began managing wolves in their state under an approved management plan, effective September 30, 2012 (Federal Register 2011). As of December 31, 2011, the NRM DPS was reported to have at least 1,774 wolves in at least 287 packs (groups of two or more wolves with territories inside the NRM DPS that persisted until December 31, 2011). At least 109 packs met the definition of a breeding pair (packs that contained at least one adult male, one adult female, and two or more pups on December 31, 2011) (USFWS 2012).

From the 1930s until July 2008, no breeding pairs or packs of wild wolves were known to reside in Washington, although individual wolves were occasionally seen. These sightings were believed to be wolves that had wandered across the border from Idaho or Canada, or wolf-dog hybrids that had been released into the wild. With the success of the federal wolf-recovery efforts in the RMS, increasing numbers of wolves migrated into eastern Washington. As of this writing, wolves in the western two-thirds of Washington are listed as endangered under federal law; however, in the eastern third of the state, they have been removed from federal listing. Wolves are still listed as endangered under state law throughout Washington (Wiles et al. 2011).

The stated purpose of the wolf management plan was to ensure the reestablishment of a self-sustaining population of gray wolves in Washington and to encourage social tolerance for the species by addressing and reducing conflicts (Wiles et al. 2011). As the wolf population continues to grow and human development continues to sprawl, different forms of wolf management are required to address the varying

tolerances of wolf-human conflicts that will occur due to increased abundance and distribution. Human-related mortality, particularly illegal killing and legal control actions to resolve conflicts, is the largest limiting factor for wolves in the northwestern United States (Wiles et al. 2011). Illegal killing has already been documented in Washington.

The abundance and distribution of wolves in most areas is influenced by the biological carrying capacity (BCC) and the social carrying capacity (SCC) (Beyer et al. 2006; Huber et al. 2008; Kastelic 2007). The concept of BCC suggests the quantity of any wildlife species is limited by the ability of the existing habitat to support it. The SCC suggests the population level of wolves is limited by the human tolerance toward them and by interactions between wolves and humans (Beyer et al. 2006). The BCC can be managed to support more or fewer wolves by varying components of their habitat such as varying amounts of food, water, shelter, and space. The BCC of wolves is mainly focused on population size and distribution. The SCC is also defined by wolf-human interactions and, therefore is a smaller number than the BCC because of the limitations created by managing the population and distribution to minimize wolf-human conflicts (Beyer et al. 2006). Clark et al. (2005) states that successful wolf restoration is not too difficult biologically; however, it is politically complex. Successful, long-term wolf management requires an integration of varying attitudes and tolerance into the decision-making process.

Historically, the main limiting factor facing gray wolves has not been limits to their habitat, but persecution through hunting, trapping, and predator control programs (Paquet et al. 1999). As the public perception of wolves becomes more positive, and the prominence of the livestock industry diminishes, wolves are biologically able to reclaim what is left of their former habitat (Paquet et al. 1999). Understanding the SCC or attitudes toward and tolerance of wolves can help wildlife managers when making wolf management decisions by providing education, minimizing wolf-human conflicts, working with livestock producers to deter wolves with non-lethal methods, and targeting residents whose attitudes can be positively affected.

Wolves adapt to varying habitats and utilize an extensive variety of prey. Successful wildlife management involves not only understanding the biology of a species and its habitat, but also understanding the public attitudes toward the species or the SCC. As mentioned in a Michigan Department of Natural Resources (MDNR) report, Wolf management can be less about management of wolves than about managing the issues created by wolf-human interactions and differences in stakeholder tolerance regarding those interactions (Beyer et al. 2006). If no SCC exists, understanding the attitudes toward stakeholders and interested citizens provides useful information to establish management procedures that can help reduce wolf-human conflicts and increase the tolerance of wolves (Beyer et al. 2006).

Inextricably linked to the SCC of wolves are the values and beliefs people hold toward wolves. Those core values and beliefs guide people's thoughts, actions, and

tolerance. They help answer the questions of how one ought to act toward wolves or wolf ethics. Through an understanding of wolf ethics, policymakers can formulate and modify policy decisions to benefit both humans and wolves in a shared environment. This study assessed attitudes toward and tolerance of wolves in Washington and makes recommendations for potential wolf management strategies.

Background

We reached the old wolf in time to watch a fierce green fire dying in her eyes. I realized then, and have known ever since, that there was something new to me in those eyes—something known only to her and the mountain. I was young then, and full of trigger-itch; I thought that because fewer wolves meant more deer, that no wolves would mean hunter's paradise. But after seeing the green fire die, I sensed that neither the wolf nor the mountain agreed with such a view. (Leopold 1949, 130)

Before the European colonization of North America, the gray wolf (*Canis lupus*) enjoyed the widest distribution of any land mammal. It inhabited the entire continent except for the southeastern United States, habitat of the red wolf (*Canis rufus*). Gray wolves were common throughout most of Washington State prior to 1800. It is estimated that 2,300 to 5,000 wolves inhabited the state prior to the Euro-American settlement, approximately during the 1820s (Wiles et al. 2011). However, by the early part of the twentieth century, wolves were extirpated in the contiguous United States (USFWS 2006). In *The Wolves of North America*, written in 1944, Stanley Young and Edward Goldman identified twenty-three subspecies of wolves in North America. This includes areas in Alaska and Canada that have maintained large populations of wolves even as

they were extirpated in the conterminous United States. As of 1995, taxonomists recognized as few as five subspecies of wolves in North America (Fischer 1995).

Wolves are a keystone species, and they are a vital component of their ecosystem (USFWS 2006). The recovery of the gray wolf after its eradication from Yellowstone National Park almost ninety years ago demonstrates how crucial keystone species are to the long-term sustainability of the ecosystems they inhabit (Wagner 2010). As carnivores at the top of the food chain, gray wolves help maintain balance within the chain, and support diverse and healthy ecosystems. A study on Isle Royale, Michigan found convincing evidence of top-down control of a food chain by wolves (Paquet et al. 1999). Wolf predation regulated moose density, which then regulated growth rates of balsam fir. As the wolf population declined, fir growth was suppressed due to high numbers of moose. The abundance and distribution of wolves and other top predators help keep populations of herbivores (plant-eating animals) under control. Although they will eat a varied diet if necessary, the prey of choice for wolves are elk, moose, and deer (Clark et al. 2005). These larger herbivores require substantial quantities of woody stems, herbs, and lichens to meet their energy requirements for growth and reproduction. They can quickly deplete a landscape of vegetation, the primary producer of energy in an ecosystem (Terbough et al. 1999). When wolves are present in the ecosystem, however, the population of animals such as deer, elk, and moose are typically kept in check, leaving enough vegetation for smaller herbivores (Terbough et al. 1999).

Without wolves and other top predators, ecosystems are simplified and biodiversity ultimately becomes reduced. Vegetation communities can be greatly altered by herbivores when top predators are removed from ecosystems, as a result of effects that cascade through successively lower trophic levels (Ripple and Beschta 2004). The absence of highly interactive carnivore species such as wolves can thus lead to simplified or degraded ecosystems (Soulé et al. 2003). The removal of top predators increases the number of large herbivores causing overgrazing, decreases the amount of ground nests for bird and small mammal populations, and increases extinctions (Terbough et al. 1999). Since their reintroduction in Yellowstone, wolves have overwhelmingly targeted elk over other prey. This has coincided with an increase in willow heights in several areas. It has been suggested that restoration of willow populations has led to a ten-fold increase in beaver populations, as well as a significant songbird rebound (Smith 2005; Wagner 2010).

Similarly, elimination of wolves has possibly led to many important ecological changes in Olympic National Park in northwestern Washington (Wiles et al. 2011). Preliminary research suggests that overbrowsing by elk during the past century has been responsible for significant changes in riparian plant communities, such as extreme declines in new growth of black cottonwood and bigleaf maple (Beschta and Ripple 2009). This may have triggered increased riverbank erosion and channel widening. Reduced amounts of large woody debris in river channels have possibly shrunk rearing

habitat for salmon, steelhead, and resident fish. These changes in river ecology may have also decreased the amount of prey available for fish, birds, and bats (Wiles et al. 2011).

In the absence of wolves, mesopredators, such as coyotes, move to the top of the food chain (Prugh et al. 2009; Wiles et al. 2011). Mesopredators prey on a wide variety of smaller animals. They survive by changing to different prey items upon depletion of a preferred food source. Wolves suppress coyote populations by territorial aggression and predation (Crabtree and Sheldon 1999). Various scavenger species such as bears, foxes, and raptors eat what wolves leave behind (Wiles et al. 2011).

In addition to the role wolves play in increasing biodiversity, they also improve the gene pool of their prey species over time by culling genetically inferior individuals. When hunting, wolves often focus on the young, old, and sick animals in a prey group (Clark et al. 2005). For example, a gray wolf will chase down a herd of ungulates until it can kill a slower animal left behind. This coursing technique may more effectively reduce the probability of a genetically weak animal reproducing than the typical hunting tactics used by other carnivores (Mech 1970).

The public did not realize the benefits of wolves until after the wolves had been extirpated from the Rocky Mountain States. Fur trappers started hunting wolves in large numbers after 1830. Before 1850, wolf hunting took place for sport, rarely for money. During the 1850s and 1860s, the fur market shifted from beaver pelts to hides of other animals such as bison, deer, elk, and wolves. In 1853, the American Fur Trading Company shipped three thousand wolf-hides from outposts along the Yellowstone River

in the western United States, and the numbers continued increasing for many decades (Lopez 1978). A new occupation called “wolfing” developed due to the demand for wolf pelts between 1860 and 1885 (Fischer 1995). After the formation of the Hudson’s Bay Company in the Pacific Northwest during the 1820s, trapping of wolves as a commercial source of fur became serious business (Wiles et al. 2011). The company began a complex trading system with Native Americans across the region, with trading taking place at four different forts in Washington State. From 1821 to 1859, tens of thousands of pelts were traded at these forts, although not all of them came from Washington wolves. Despite the success of this trade, wolves remained fairly abundant in many areas of Washington into at least the 1850s (Wiles et al. 2011).

The method used by “wolfers” was simple and extremely effective (USFWS 2006). They killed a buffalo, inserted strychnine into the entrails, tongue, and flanks of the animal and arranged the poisoned buffalo every three to four miles in a circular pattern. The wolves unknowingly ate the buffalo carcasses and died close by, easily retrieved by the wolfer (Fischer 1995). The Hudson’s Bay Company had also used strychnine to poison wolves at its initial farming operation in Washington (Wiles et al. 2011). The company set high values for wolf pelts to encourage Native Americans to kill wolves. Residents of the Oregon country (which included Washington) convened their first “Wolf Meeting” in 1843 and established a \$3 wolf bounty (Wiles et al. 2011).

Before the 1880s, wolfers were the only real threat to wolves as cattlemen and farmers had not yet arrived in large numbers and begun their persecution of wolves.

During the 1870s, hundreds of thousands of bison were killed a year, providing plenty of meat for wolves to eat. This helped keep the wolf population high despite the wolfers (Lopez 1978).

Events of the 1880s and 1890s began the decline of the wolf population and the hatred of wolves that would last for generations. The near-eradication of the bison and other big-game animals and the boom of the livestock industry produced a prejudice that still exists today. Although the slaughter of the bison is a well-known part of American wildlife history, many people are unaware that early settlers exploited all western game species. Miners, trappers, steamboat workers, and homesteaders all took the meat they needed from nature with few limitations (Fischer 1995).

Once the bison were gone, the settlers in the West focused on elk, deer, moose, antelope, and bighorn sheep. It took almost half a century for big-game populations to recover from the widespread slaughter that occurred. At the beginning of the twentieth century, populations of elk, deer, and antelope were at levels so low that, by modern standards, they would qualify as endangered species (Fischer 1995).

The decline of game animals not only eliminated the wolves' prey base, it generated a desperate appeal for predator control from hunters distressed by the decline in deer and elk populations. Wolves had few allies at the close of the nineteenth century. Viewed as a threat to hunters and ranchers, wolves presented no understandable value unless they were dead (Fischer 1995).

The arrival of large herds of livestock in the early 1880s provided the food wolves lost when their natural prey base was depleted. Hatred for wolves grew as the western livestock industry expanded and ranchers suffered heavy losses to wolves. In comparison, livestock depredation in areas currently populated by wolves is minimal, less than 1% (Fischer 1995; Niemeyer 2012). However, much like now, wolves were only one of many problems ranchers faced. They also had to fight weather, disease, fluctuating meat prices, livestock rustling, and the dangers of driving livestock. Unfortunately for the wolves, they were the one problem that could easily be controlled by being wiped out. With few, if any, wolf advocates at the time, there were no limits placed on the destruction of wolves in the United States (Lopez 1978). As per Doug Smith, one of the original wolf biologists involved in the wolf reintroduction in the RMS and now working in YNP, wolves were one of the only wild carnivores who refused to coexist with humans on human terms. They stood their ground and refused to accommodate the desires of humans as had coyotes, mountain lions, and black bears (Smith 2005).

Wolf eradication efforts were haphazard and disorganized until industry associations became involved. Bounties established by the territorial and state legislatures became the main political avenue for wolf extermination. Once the bison were gone, most of the wolfers changed occupations because killing wolves had become increasingly difficult. With wolfers gone, ranchers used bounties to create incentives for people to kill wolves (Fischer 1995). Although documented well, wolves in Washington

were heavily persecuted during the last half of the nineteenth century as ranching and farming became established in the state (Wiles et al. 2011). Typical methods of destruction were poisoning, trapping, and shooting. It is believed most wolves in Washington were eradicated by 1900. Additionally, a bounty of \$15 per wolf was paid by the state in the early 1900s to eliminate the remaining wolves (Wiles et al. 2011).

The first Montana bounty legislation, which the legislature passed in 1884, awarded hunters \$1 for each wolf. According to the *Montana Bounty Certificate Book*, bounty hunters presented 5,450 wolf pelts for payment the first full year after the bounty act became law (USFWS 1987). Payments increased as wolves became increasingly scarce. The \$1 bounty in 1884 reached as high as \$15 per wolf in 1911. Livestock growers and hunters pressured state governments to offer bounties and urged Congress to direct federal agencies to eliminate wolves. Since there was no value placed on wolves at that time, there was virtually no resistance to their destruction (Fischer 1995).

In 1915, the federal government passed a law calling for the extermination of wolves on federal lands. Between July 1, 1915 and June 30, 1942, government hunters killed 24,132 wolves, even in national parks (Lopez 1978). It was difficult to kill the last remaining wolves because they were aware of the dangers of men and traps and the wolves avoided both. Wolf pelts went for as high as \$150 a piece at this time. To kill the remaining wolves, government hunters used poisons and steel traps. When these methods were ineffective, hunters would search for wolf dens, looking for pups they would pull out and strangle (Lopez 1978).

Cattle ranching, being a somewhat speculative business, often suffered financial losses. Although wolves were often not the reason for those losses, they were singled out as the scapegoat. Killing wolves seemed to signify hope for the future. Dead wolves were synonymous with economic expansion in the West (Lopez 1978). Expansion of the frontier meant dominating and conquering wolves and other large predators. Fearing them all, the colonists saw them as representations of hostility and danger.

Many Native Americans had a strong connection with wolves. The wolf symbolized a powerful and mysterious animal as well as a medicine animal. Some Native American tribes revered wolves for various qualities. They provided food for the entire pack, including the sick and old; they ensured the education of the wolf pups; they bravely defended their territory against other wolves; and they demonstrated superior stamina and hunting abilities. As per Lopez (1978), the wolf was the one animal that remained distinct and exemplary as an individual, yet served the tribe. As the individual grew stronger, the tribe grew stronger. As the tribe grew stronger, the individual also grew stronger. The Nootka, Kwakiutl, and Quillayute Native American tribes of the lower Pacific Northwest coast, held annual wolf rituals. They were typically conducted in the beginning of winter before a full moon and served to welcome young people formally into the tribe as well as to renew tribal bonds for existing tribal members. Initiation through the wolf ceremony was key to one's sense of identity with the tribe. The ceremony was generally described as individuals being "stolen" by wolves, facing a terrifying confrontation, and emerging "wolflike." One of the plains tribes, the Pawnee,

had a different facet of tribal identification with the wolf. Their renewal ceremony was held in the spring, focusing on death and rebirth. Being an agricultural and a hunting tribe, the wolf symbolized both corn and buffalo. The birth and death of the “Wolf Star” (Sirius) every night reflected the wolf’s path to and from the spirit world (Lopez, 1978).

Although wolves were respected by certain Native American tribes, they were occasionally killed for utilitarian purposes. Wolf pelts were used to make ruffs for parkas and for trade. Wolves that preyed on Native Americans’ food traps or their horses would sometimes be killed. The Cherokee believed that by killing a wolf, however, they were asking for revenge by other wolves. Many tribes believed that game would disappear if they killed a wolf. If a Kwakiutl tribesman of British Columbia killed a wolf, the carcass would be lain out on a blanket and four small pieces of meat would be cut off and given to each person who had participated in the wolf kill. By eating these pieces of wolf meat, the tribesmen were showing their regret for the wolf’s death and demonstrating that he was a good friend (Lopez, 1978)

Eventually, non-Native American people also began to appreciate the wolf. The North American hatred toward wolves started to change with conservationists such as Aldo Leopold. During his early years in the Forest Service, Leopold killed many wolves as well as other predators as part of the government effort to increase deer populations. However, after becoming acquainted with numerous leading scientists, Leopold changed his ideas about predators and predator management (Fischer 1995). Although it did not occur during his lifetime, he called for the return of wolves to Yellowstone Park.

Scientists began to realize the integral role wolves played in nature. Films and books in the 1960s and 1970s no longer portrayed wolves as ferocious and cruel, but as animals that helped maintain the balance of ecosystems. In 1963, Farley Mowat released the book *Never Cry Wolf* that first informed the public about wolves and their habits. The book release initiated a more positive attitude toward wolves by the American people. Although there was some controversy surrounding information presented in Mowat's book, it did more to stir the public's interest in and concern for wolves than had all the previous scientific works combined. Wildlife television programs discussing wolves and wolf science aired often (Fischer 1995). Due to the positive exposure that wolves received, the public's attitude toward wolf conservation changed. In 1973, the Endangered Species Act (ESA) passed Congress and it mandated protecting listed species, including the wolf where it survived in the contiguous United States. This is critical because although most accounts stated that wolves were eliminated from the Rocky Mountain States by 1930, occasional wolf sightings continued. This provided them protection under the ESA. The gray wolf was listed under the ESA of 1973 and protected as an endangered species in the continental United States in 1974 (Nadeau and Mack 2006).

In 1975, The United States Fish and Wildlife Service (USFWS) assembled the Northern Rocky Mountain Wolf Recovery Team to carry out the mandate of the ESA. The team, consisting of biologists, a representative of the National Audubon Society, and a University of Montana forestry professor, prepared plans for restoring the wolves. In

1978, in his seminal report, *Wolves of Yellowstone*, John Weaver of the Yellowstone Park Service recommended restoring wolves by introducing them to the park (Weaver 1978). His idea would take almost two more decades before it would occur.

The first recovery plan the team completed in 1980 did not address the numerous difficult questions regarding logistics, goals, and management of the wolf restoration. It was a start; however, it was a disappointment to many because of its superficiality. It presented a plan for restoring the wolves by 1987 to areas where self-sustaining populations do not now exist. Unfortunately, the timing of the recovery plan coincided with the election of Ronald Reagan as president. He appointed a man who was considered an anti-environmentalist by many, James Watt, as Secretary of the Interior. This slowed wolf recovery plans, although it did not completely end them (Fischer 1995).

While lacking support from Watt, the USFWS continued to work on the wolf recovery plan as mandated in the ESA. Attempts to build public support for wolf restoration in the NRM took place. However, the wolf recovery team was spending approximately 80% of its time discussing how to kill wolves and only approximately 20% on how to protect them (Fischer 1995).

By 1983, conservationists' interest in wolf recovery had expanded. Tom France, an attorney who ran the northern Rockies office of the National Wildlife Federation, began attending recovery team meetings. In November 1983, the recovery team released a draft plan identifying the three recovery areas of the NRM. These included northwestern Montana, central Idaho, and Yellowstone Park. It established a recovery

goal of ten breeding pairs of wolves (a breeding pair being the essential element of a pack) for each recovery area. The plan also proposed a system of controlling wolves based on dividing each recovery area into distinct zones of protection (Fischer 1995).

In October 1985, the team submitted a final draft of the plan, recommending natural wolf recovery for northwestern Montana and central Idaho and reintroduction for Yellowstone Park. They suggested that agencies reintroduce wolves to Yellowstone under the experimental population provision of the ESA. The document was distributed to state wildlife agencies, conservation groups, the livestock industry, and newspapers. Eighty-five percent of the written public comment received was favorable. For the plan to go into effect, an executive from the USFWS was required to sign it. After considerable difficulty, signing of the wolf recovery plan occurred in August 1987 (Bangs 2005; Fischer 1995).

In 1988, the USFWS hired Ed Bangs to lead the Montana wolf recovery program. He gave over 300 presentations to approximately 14,000 people to help establish the USFWS as a credible source of information on wolves. Bangs focused on informing state wildlife agency employees who lived and worked near the communities where wolf recovery was taking place. He realized such people could be important local opinion leaders (Fischer 1995).

In July 1993, the USFWS along with other agencies, drafted an Environmental Impact Statement (EIS). It analyzed a variety of alternatives, ranging from not reintroducing wolves to Yellowstone Park to reintroducing them under strict terms as per

the ESA (Fischer 1995). In the fall of 1993, when the public comment period for the draft EIS ended, the USFWS had received over 180,000 comments (Bangs 2005). According to Ed Bangs, it received more public comments than any similar document in the United States (Fischer 1995).

Release of the final EIS occurred in June 1994, and the Interior Secretary at the time Bruce Babbitt approved it (Bangs 2005; Fischer 1995). The EIS designated the Greater Yellowstone Area and Central Idaho recovery areas as Nonessential Experimental Population Areas and called for reintroductions of wolves as nonessential experimental populations, a less protective classification under section 10(j) of the ESA, to facilitate wolf management and conflict resolution. In 1995 and 1996, sixty-six wolves captured in Alberta and British Columbia, Canada moved to the NRM with thirty-one wolves taken to Yellowstone Park and thirty-five taken to Central Idaho (Nadeau and Mack 2006).

Additionally, in 1995, the Nez Perce Tribe (NPT) completed, and the USFWS approved, the Wolf Recovery and Management Plan for Idaho, allowing the NPT and the USFWS to work cooperatively to recover and manage wolves in the Central Idaho recovery area. Idaho Wildlife Services collaborated with the USFWS to support investigation and implementation of wolf control actions in response to livestock depredation (Nadeau and Mack 2006).

A number of tribes currently reside in Washington. In the mid-1800s, eight treaties (known as the “Stevens Treaties”) were negotiated with tribes in the future area

of Washington State. The treaties created reservations for the limited use of the tribes (Wiles et al. 2011). Federally recognized tribes with reservations generally have authority to manage fish and wildlife within their reservation. WDFW has established a Wolf Interagency Committee composed of WDFW, tribes, federal and state land managers, and the U.S. Fish and Wildlife Service to nurture organization and cooperation on wolf management in Washington. Individual tribes may choose to develop their own wolf management plans, as several tribes in other states have done. In areas where wolves are federally listed as endangered, tribes are subject to federal Endangered Species Act regulations. However, in areas of Washington where wolves become federally delisted, it is possible for tribes to create their own wolf management plans and regulations. These plans may or may not be consistent with the state wolf plan. If conflicts occur, they are discussed in government-to-government meetings between WDFW and the tribes (Wiles et al. 2011).

In March 2002, the Idaho Legislature passed the Idaho Wolf Conservation and Management Plan (IWCMP). In April 2003, the Legislature passed House Bill B294 allowing the State to participate in wolf management and the Idaho Fish and Game (IDFG) to help implement the IWCMP and support wolf management with the NPT and the USFWS (Nadeau and Mack 2006).

In December 2002, the NRM wolf population reached the stated goal of thirty breeding pairs of wolves distributed throughout the states of Idaho, Montana, and Wyoming for three consecutive years. The USFWS initiated the delisting process, the

ultimate goal of the agencies involved, when the NRM wolf population met or exceeded established population goals and the three states each had wolf management plans approved by the USFWS to ensure long-term conservation of wolves. Wolf population goals were met in 2002, and Idaho and Montana had wolf management plans approved by the USFWS (Nadeau and Mack 2006). Approval of Wyoming's wolf management plan, however, did not take place and go into effect until September 30, 2012, so delisting was delayed (Nadeau and Mack 2006).

In response to this delay, in January 2005, the USFWS revised the 10(j) Rule so that it only applies within the Nonessential Experimental Population Areas for states with USFWS-approved wolf management plans. This rule is an interim measure that allowed Idaho and Montana to petition the Department of Interior to assume many daily wolf management activities. In January 2006, the Secretary of Interior and the Governor of Idaho signed a Memorandum of Agreement (MOA) transferring most management roles from the USFWS to the State of Idaho. In April 2005, the Governor of Idaho and the NPT signed an MOA outlining responsibilities between Idaho and the NPT relating to wolf conservation and management (Nadeau and Mack 2006).

On January 29, 2007, the USFWS announced its proposal to remove gray wolves in Idaho, Montana, Wyoming, eastern Oregon, Utah, and the eastern one-third of Washington from the endangered species list. The delisting proposal was open for public comment for sixty days. The agency conducted a series of public hearings on the proposal in each of the affected states. The USFWS expected to issue a final rule by the

end of 2007. Until 2011, when delisting from the ESA took effect, wolves in Washington remained under the protection of the federal government.

Considerable reported wolf activity took place in the North Cascades area of Washington during the early 1990s, which is believed to have been wolves travelling from southern British Columbia (Wiles et al. 2011). From 1991 to 1995 20 confirmed wolf sightings were reported. Wolf reports in Washington declined from 1996 to 2001, possibly due to a reduced emphasis on data collection. Reports increased again in approximately 2002, probably due to dispersal of wolves from recovering adjacent states such as Idaho and Montana, as well as an increase in data collection efforts by state biologists (Wiles et al. 2011). The first confirmed breeding pack, the Diamond Pack was confirmed in Pend Oreille County by the WDFW in July, 2009 (Wiles et al. 2011).

Literature Review

Conceptual Framework

The biological carrying capacity (BCC) of a species represents the connection of the ecological components of the habitat required to support that species. The components of this habitat are food, water, shelter, and space. The amount of each determines the total BCC required for a species to maintain a certain population. It has been suggested that the BCC can be managed to adjust the number of wolves by adjusting the various ecological components (Beyer et al. 2006).

The social carrying capacity (SCC) is a similar concept to the BCC in that humans create a limit on the amount of wolves within a habitat. The SCC model emphasizes the need to define and manage for socially acceptable goals to help prevent the development of costly and disruptive conflicts (Beyer et al. 2006). Therefore, the model is an important tool in managing politicized wildlife species such as wolves. There are two main differences between the BCC and the SCC. First, the BCC only includes the maximum number of wolves that can be tolerated within an ecosystem whereas the SCC not only includes the maximum number, but also a minimum number that can be accepted within a human society. The second main difference is that wolf management is more about managing the wolf-human interactions that occur as opposed to the study of abundance and distribution as with the BCC.

A regional SCC for wolves is defined by the level of abundance and interactions acceptable to enough stakeholders such that there is a low level of wolf-related issues

(Minnis and Peyton 1995). When wolf abundance and interactions with stakeholders fall within a range that most stakeholders can accept, wolves are being managed within the SCC. If there is no range acceptable to key stakeholders, a SCC does not exist and could only be created by shifting stakeholder attitudes and tolerance.

The importance of the SCC is in minimizing issues that arise due to wolf-human interactions because wildlife managers are more aware of negative attitudes and can manage wolves to avoid potential conflicts, such as helping ranchers implement non-lethal methods for protecting livestock or educating the public about how to minimize attacks against pets. Conflicts with wolves are sometimes escalated to state or federal courts for various reasons such as disagreements between pro-wolf and anti-wolf advocates or livestock producers opposing pro-wolf legislation. When these types of legal entanglements take place, state and federal agencies lose their ability to fulfill their mandates due to outside interference and unnecessary delays. If wolves are managed within the social carrying capacity range, and there are minimal conflicts, the federal or state agencies are better able to manage wolves successfully.

The SCC model suggests three specific factors that can be targeted by management to reduce wolf-related issues: (1) the abundance and distribution of wolves, (2) the interactions between stakeholders and wolves, and (3) the attitudes and tolerance of residents (Beyer et al. 2006). Wildlife managers should strive to find a balance between the maximum and minimum numbers of wolves that can be tolerated by local residents. Minimizing interactions between stakeholders and wolves can be

accomplished by limiting the frequency of livestock depredations. Resident attitudes and tolerance can be shifted by finding methods of shifting attitudes in a more positive direction. This research focused on studying attitudes and tolerance of interested residents of Washington because if no SCC exists, modifying the abundance and distribution of wolves or limiting livestock depredations may not reduce conflicts. In such a situation, it may be necessary for wildlife managers to assess attitudes and tolerances (Peyton et al. 2007).

Related Research

Although the concept that the social environment determines a type of wildlife; social carrying capacity is not a recent concept (Peyton et al. 2007). The SCC model has had limited use in wildlife management due to some difficulty in measuring and describing it (Gigliotti et al. 2000). However, there have been other studies examining attitudes, beliefs, and perceptions toward wolves and other carnivores (Kellert 1990; Koval and Mertig 2004). Although the SCC model is comprised of other factors besides assessing attitudes, this assessment is key to shifting tolerance and reducing wolf-human conflicts. Peyton et al. (2007) discussed the need for wolf management to shift the range of tolerance to create some acceptable level of wolf abundance and wolf-human interactions so as to avoid future conflicts. One SCC study published by the Michigan Department of Natural Resources (MDNR) (Beyer et al. 2006) discusses the biological status of wolves, the SCC, and wolf management practices. Beyer et al. (2006) discuss the social issues associated with wolf management. The SCC model presented is used to gain an understanding of public attitudes toward wolf abundance and management. One

assertion of the study is that in order to establish an SCC, there has to be some level of wolf abundance that is acceptable to the majority of stakeholders. The writers of the report state that without this type of balance, conflicts will arise, threatening a wolf management program. To measure the SCC, it is important to not only analyze the highest amount of wolves that can be tolerated, but also the lowest level, as well as the preferred level by various stakeholders.

The author of this study was not able to assess the social carrying capacity of wolves in Washington; however, she did assess attitudes toward and tolerance of wolves and wolf-human conflicts. The author chose to include the term “social carrying capacity” in the literature review for two main reasons: 1) SCC suggests the inclusion of a society of interested citizens who are stakeholders and thus expands the concept beyond traditionally defined interest groups, and 2) it differs from BCC in that it incorporates both maximum and minimum acceptable levels of wolf abundance creating more of a socially inclusive range as opposed to merely a biological maximum level. Ultimately, the author believes the assessment of SCC intersects with an assessment of attitudes and tolerance. Therefore, in the absence of assessing SCC for wolves in Washington, she assessed attitudes.

Kellert (1990) conducted a study of attitudes toward wolves by Michigan citizens. At that time, he found considerable support for wolves by most major stakeholder groups with the notable exception of farmers. Even deer hunters and trappers appeared to have highly positive attitudes toward wolves. Koval and Mertig (2004) conducted a follow-up

study for the MDNR, and Michigan State University, East Lansing, Michigan. This report indicated that the fear of wolves had declined since the prior surveys. However, there was strong support for managing nuisance wolves and wolf numbers (Koval and Mertig 2004).

In 2005, MSU conducted another study to determine the contemporary attitudes toward wolves (Beyer et al. 2006). One of the main concerns expressed by 70% of interested residents statewide was that wolves pose a serious threat to human safety (Beyer et al. 2006). The concerns about human safety as an important reason for lowering numbers of wolves was a consistent theme with the public in each of the three regions surveyed in the MSU attitude survey. The next most important factor for reducing the wolf population was the number of pets attacked by wolves near homes. Livestock producers represent a rural group of stakeholders in the northern regions of the State with more exposure to wolf-human interactions. Their responses consistently showed they were more sensitive to the matter of fearless and nuisance wolves than was the statewide distribution of interested citizens (Beyer et al. 2006).

The MSU study also analyzed the public attitudes toward various wolf management options. The options suggested were 1) leave wolves alone, 2) selectively kill problem wolves, 3) reduce wolf population size by killing a portion of the wolves, 4) live trap and relocate wolves, and 5) use fertility control to reduce population size. The researchers found that people were more supportive of all options when human safety or threat to domestic animals was a problem. They were less supportive of the options as a

way of managing deer predation. The least preferred option was leaving wolves alone. Option number three was chosen by 49% to 59% of the respondents, depending on the reason for management. Fertility control was favored by approximately one-half of the respondents. Seventy-five percent of the respondents favored options two and four when public safety or the killing of domestic animals was the reason. Option four was favored by 65% of the respondents when deer predation was the issue.

In a related study of hunting as a form of wolf management in Sweden, Ericsson et al. (2004) found that although hunting is not favored as a method, it is not always opposed by the Swedish public. The strongest argument for the use of hunting as a form of management involved a human attack by a wolf. Additionally, the authors found that sizeable increases in livestock destruction or brutal killings of livestock by wolves could also shift public attitudes in favor of hunting. They found that 13% of the public opposed wolf hunting under any of the circumstances provided by the surveyors. Ericsson et al. (2004) also found hunters were more likely than the non-hunter public to support wolf hunting as a main form of management. However, their data showed that hunters do not support hunting of wolves under all circumstances. The researchers note that hunters and people living in wolf areas are relatively small stakeholder groups, making up a very small proportion of the total population. They mention the need to keep this in perspective when determining wolf management policies. Their conclusion was that there was no overwhelming public barrier to prevent wolf population control through hunting in Sweden, given that there was acceptable justification.

Chavez et al. (2005) conducted a study of attitudes of rural landowners in Minnesota toward wolves. They surveyed two groups of respondents, those living in a “wolf group,” which was within wolf range, and those living in a “no wolf group,” which was outside of wolf range. The majority of respondents to this survey were older males from a predominantly rural agricultural background and involved in agriculture or livestock production. These characteristics are linked to more conservative attitudes and perceptions toward wolves and wolf management. In contrast to Kellert (1999), who discussed an increase in positive attitudes toward wolves among farmers in Minnesota from 1985 to 1998, Chavez et al. (2005) found a slightly unfavorable attitude toward wolves. This was linked to an overall perception that wolves posed the greatest risk to farming and livestock in northwest Minnesota. Similar studies have found that farmers and ranchers hold the most negative attitudes toward wolves (Bath and Buchanan 1989; Kellert 1986; Nelson and Franson 1988).

Chavez et al. (2005) concluded that proximate factors have little influence on rural residents’ attitudes toward wolves as suggested by a lack of major attitude differences between geographic groups. They suggest cultural biases may play an important role in shaping rural attitudes toward wolves in northwest Minnesota due to shared cultural beliefs, norms, and values often found in rural communities. They go on to state that since many rural occupations are nature-extractive, rural residents often hold utilitarian attitudes toward the natural environment. Wolves may lack value for many rural residents with respect to a rural lifestyle. Their study concludes that no matter what

risk wolves pose to livestock, rural perceptions toward wolves in northwest Minnesota will remain negative due to strong cultural anti-wolf biases. The negative social stigma that has been attached to wolves for centuries (Fritts et al. 2003; Lopez 1978; Kellert 1986) may well be the most important factor influencing rural attitudes toward wolves in northwestern Minnesota.

Kleiven et al. (2004) conducted a study of attitudes toward large carnivores in Norway. The results of the study were similar to other studies of attitudes toward large carnivores (Bjerke et al. 2000; Williams et al. 2002). They found that older people, women, people with less education, rural residents, and people who suffer an economic loss due to carnivores have more negative attitudes toward them. One of the conclusions of Kleiven et al. (2004) is that certain broad ranges of acceptable population numbers can be identified, but the conditions will fluctuate, even within the short term of a few years. They are influenced by social, economic, political, and cultural conditions. The authors determined respondents were more accepting of wolves as their living proximity decreased. As in the study conducted at MSU (2006), the respondents had stronger concerns as the perceived threats to humans and domestic animals increased. Like previous studies, Bjerke et al. (2000) and Kleiven et al (2004) found generally women had a greater fear of large carnivores as compared to men. However, Williams et al. (2002) found females had more positive attitudes toward wolves than did males.

Additionally, Kleiven et al. (2004) discovered that a higher level of education had a positive effect on the acceptance of large carnivores, whereas the amount of economic

loss suffered had a negative effect. However, these conditions were of less importance when the carnivores lived far away from the respondents. Further, they found that those people living in small communities, characterized as “clearly rural,” generally expressed fewer acceptances than people living in larger communities. Kleiven et al. (2004) concluded the attitudes toward large carnivores may be directly linked to the public’s perceived lack of control over their own lives. In addition to the fact that many people actually suffer substantial economic loss, and one-half of the public expressed fear of wolves (Bjerke et al. 2000); the general feeling of being unable to influence policies about resource management and rural development can contribute to negative attitudes toward large carnivores such as wolves.

At the time of their study, Kleiven et al. (2004) acknowledged wolves were seen as highly controversial animals in Norway. Wolves had recently returned after near extinction for several decades. Therefore, the public was not familiar with wolves and this generated much fear. As per Bjerke et al. (2000), a portion of the high level of fear reported in the general public could have been attributed to a lack of knowledge about the ecology and behavior of wolves. Kleiven et al. (2004) concluded that through habituation and education, some of this fear can be reduced. However, Kleiven et al. (2004) also warned that even with education and habituation, the acceptance of large carnivores such as wolves is directly linked to a variety of social issues and conditions. If individuals fear economic hardship or oppose agricultural policies, they may choose to communicate their dismay through actions toward large carnivores like wolves, although

these species are merely a symbol of larger political issues. The ultimate conclusion of Kleiven et al. (2004) was that acceptance levels of wolves probably have limited value for policy and management decisions unless the acceptance levels are taken in broader policy contexts. The authors recommend a “multidimensional” approach to reviewing attitudes toward large carnivores. This approach is related to SCC in that as Kleiven et al. (2004) found, acceptance of large carnivores such as wolves is a complex issue. Positive attitudes are not only related to the type of animal species, but also dependent on personal values and perceptions. The most effective model will not be “one-size-fits-all.” It will need to address specific issues with interested members of the public such as livestock producers and conservationists.

Similarly, Ericsson and Heberlein (2003) found that although there may be strong public support for wolf recovery, those who live with wolves and whose well-being may be directly affected may have more negative attitudes. Even after controlling for differences in knowledge and predation experience, hunters and people living in wolf areas still had more negative attitudes toward wolves than non-hunters and residents living outside wolf areas. The authors suggest this means there are other unmeasured variables working in the system. As also discussed by Kleiven et al. (2004), wolves appear to have a symbolic dimension that transcends biological issues. These studies suggest that rural people see wolf restoration as an indication of the dominance of larger society. Therefore, their negative thoughts may not reflect direct negative experience with wolves such as predation, but rather the symbolic representation of wolves. Certain

groups, such as hunters and people who live in wolf areas, may see wolf restoration as a symbol of urban society dominating rural values. Ericsson and Heberlein (2003) conclude that to promote wolf recovery, it is essential to study the people who are most directly affected by wolves. Ericsson and Heberlein (2003) claim that these groups are often not included in general population surveys since they compose only small numbers in any society. This issue is of critical importance for wolf management because as the wolf population grows and more and more, rural people are more directly affected.

Williams et al. (2002) conducted a cumulative study summarizing attitudes toward wolves and their reintroduction from the years 1972-2000. The authors stated that single studies fail to capture changes in attitudes over time. The purpose of this study was to assess the change in attitudes toward wolves during an almost thirty-year period throughout various global locations. In addition to understanding whether attitudes changed over time, Williams et al. (2002) were interested in discovering changes in attitudes due to geographical location. The conclusions of Williams et al. (2002) were that two factors may suggest more favorable attitudes toward wolves in the future. The authors believe increases in education, particularly environmental education, lead to more positive attitudes toward wildlife in general, including wolves. Additionally, the results of Williams et al. (2002) showed that those people with less exposure to wolves had more positive attitudes toward them. Williams et al. (2002) predicted that agricultural employment would decline, leading to fewer people being exposed to wolves and, therefore, more people with positive attitudes. However, the authors found that older

people tended to have more negative views toward wolves and since the American population is aging, there might be some increase in negative attitudes in the future. This negative factor may not be significant because younger people who have been socialized during a time when public attitudes are more positive will eventually replace the older generation.

As previously mentioned in other studies, Williams et al. (2002) found that certain groups of people, such as farmers, livestock growers, and rural people with direct experience with wolves tend to be more negative and they are resistant to change. Williams et al. (2002) again suggested that wolves may represent a larger issue such as urban dominance. The authors discussed the connection between wolf restoration and the attitudes toward society. Although biological status plays an important part in successful wolf restoration, positive and negative attitudes toward wolves also play an important part. Williams et al. (2002) doubted that education campaigns could successfully change these types of value-based attitudes. The authors suggested targeting those groups believed to be more favorable toward wolves such as females, people with higher education and income, hunters, and trappers. Furthermore, Williams et al. (2002) suggested that future research of attitudes toward wolves should include a ten-year follow-up. The authors believe that this is the best method of measuring and understanding changes in individual regional areas.

Problem Statement

Now delisted in the eastern one-third of the state, this research examined the human tolerance toward wolves in Washington, as these predators may no longer benefit from the protection of the federal government. As the population of wolves continues to grow in Washington, the number of wolf-human conflicts will also increase. The main purpose of this research was to study resident attitudes toward and tolerance of wolves in the state of Washington. This assessment can guide wildlife managers in choosing the most effective management methods to minimize wolf-human conflicts in the most expedient manner. The following question was addressed by this study: What beliefs and perceptions affected attitudes toward and tolerance of wolves in Washington State? This question was investigated by evaluating variables reflecting cultural values, risk perceptions, experience with wolves, knowledge of wolves, socio-demographic factors, and state and federal wolf management perceptions.

Objectives and Hypotheses

The main objective of this research was to assess the Social Carrying Capacity (SCC), resident attitudes toward and tolerance of wolves, and wolf-human interactions in Washington State to provide a useful tool for wildlife managers and policymakers when establishing and modifying wolf management policies. The goal of wildlife managers should be to avoid unnecessary conflict among stakeholders and to build community support for wolf management policies.

This thesis addressed the research questions:

- 1) Do cultural values affect attitudes toward and tolerance of wolves and wolf-human interactions?
- 2) Does risk perception affect attitudes toward and tolerance of wolves and wolf-human interactions?
- 3) Does experience with wolves affect attitudes toward and tolerance of wolves and wolf-human interactions?
- 4) Does knowledge of wolves affect attitudes toward and tolerance of wolves and wolf-human interactions?
- 5) Do socio-demographic factors affect attitudes toward and tolerance of wolves and wolf-human interactions?
- 6) Do attitudes toward state and federal management of wolves affect attitudes toward and tolerance of wolves and wolf-human interactions?

To investigate these questions, this study examined the importance of cultural factors including conservationist values through environmental and historical attitudes, utilitarian values through attitudes toward hunting and tourism, and animal appreciation values through attitudes toward environmental ethics and aesthetics. Schwartz et al. (2003) defined conservationists as those with a conservation-utilization emphasis, and those with a conservation preservation emphasis, as both were concerned with the continuation of natural resources and thus, could be classed as conservationists. Utilitarians were oriented toward the goal of resource exploitation, such as hunting, with

the goal of generating sustained yields by collecting surpluses. “Wise use” was the principle of utilitarians (Schwartz et al. 2003). This study examined risk perception factors by assessing attitudes toward human safety, pet safety, livestock safety, costs of managing wolves, and federal control of private property. This study examined socio-demographic factors by assessing attitudes by age, gender, education level, income, east versus west of the Cascade Crest, rural versus urban residence, and stakeholder group. This researcher examined attitudes regarding wolf management by assessing attitudes toward wolf management goals, effectiveness, and efficiency of wolf management and methods used, as well as costs incurred from wolf management. Research questions were examined using the following hypotheses:

H1: Attitudes toward and tolerance of wolves and wolf-human interactions would correlate positively with:

H1a: Conservationist and animal-appreciation perspectives

H1b: Increased knowledge of wolves

H1c: Suburban and urban regions

H1d: Living west of the Cascade Crest

H1e: Increased education

H1f: Female gender

H1g: Conservation-minded stakeholder group members

H1h: Positive attitudes toward wolf management

H2: Attitudes toward and tolerance of wolves and wolf-human interactions would correlate negatively with:

H2a: Utilitarian perspectives

H2b: Increased risk perception

H2c: Male gender

H2d: Rural region

H2e: Living east of the Cascade Crest

H2f: Utilitarian stakeholder group-membership such as hunting or livestock-producing

H2g: Negative attitudes toward wolf management.

Methods

Choice of Methods

To assess attitudes toward and tolerance of wolves, I used a mixed-methods approach, combining qualitative and quantitative methods to provide triangulation (cross-examination for accuracy) of the information collected. Initially, data collection for the study was derived from notes of the Wolf Working Group (WWG) meetings and from comments received during the public scoping meetings. With the information retrieved from the WWG meetings and the public comments, a preliminary survey was designed. This survey was emailed to members of the WWG to obtain their input. Once their comments were received, the survey was modified to reflect any necessary changes. I then administered the survey to random citizens in Washington to assess the existing attitudes toward and tolerance of wolves and wolf-human interactions in Washington. The random citizens were selected through a commercial survey research company.

Setting and Study Site

The study system of this project encompassed the entire state of Washington. Random interested citizens throughout the state were sent a wolf attitude questionnaire. Washington is comprised of thirty-nine counties (figure 1) with a total population of approximately 6 million people. The state has been divided into nine ecoregions that represent broad ecological patterns (figure 2). Each ecoregion has a distinctive composition and pattern of plant and animal species distribution. Ecoregions make biological sense, compared to politically derived lines, such as county, state, or national

boundaries. They also provide an ecological basis for dividing the state into subunits for conservation planning purposes (Wiles et al. 2011). The Washington Department of Fish and Wildlife (WDFW) expected wolves to initially reoccupy five of the nine ecoregions. These ecoregions are the Canadian Rocky Mountains, Blue Mountains, North Cascades, Okanogan, and East Cascades (Wiles et al. 2011).

Figure 1. Washington State counties.
Data Source: Washington Secretary of the State (2007).

Figure 2. Washington State ecoregions.

Data Source: Washington Department of Natural Resources. 2004. *Forest Legacy Program 2004*. AON Update for Washington State.

The Canadian Rocky Mountains Ecoregion is located in the northeastern corner of the state and is sparsely populated. It is home to some of Washington's wildest country and is dominated by the Selkirk Mountains and the Pend Oreille River. It encompasses 4% of the state and extends beyond Washington's borders into Idaho, Montana, and sections of Canada. Much of this ecoregion is mountainous, reaching heights of 7,000 feet and lows in the Pend Oreille and Columbia River valleys of approximately 1,300 feet above sea level. Horseshoe-shaped valleys and craggy mountain peaks were formed by retreating glaciers. The Columbia and Pend Oreille Rivers both run through this ecosystem.

The climate of the Canadian Rocky Mountains Ecoregion varies significantly from north to south. The northern end experiences cold winters and warm summers

while a narrower range of temperatures is encountered in the southern end. Precipitation ranges from 80 inches, much of it snow, in the northern mountains to under 20 inches in the southern valleys. Overall, the precipitation averages just less than 30 inches annually.

The vegetation of the Canadian Rocky Mountains Ecoregion is comprised of Alpine meadows, dense coniferous forests, riparian woodlands, and rolling grasslands. Ponderosa pine and Douglas-fir forests are common at the low elevation dry sites. The wetter portions of the low elevation contain western red cedar, western hemlock, grand fir, and western white pine tree with lady fern and devil's club. The higher elevation forests consist of white bark pine, western larch, and subalpine fir. The understory of this area is comprised of fool's huckleberry, Sitka alder, big huckleberry, and Cascade mountain ash. Black cottonwood and willows are found along the riparian zones of the Columbia and Pend Oreille Rivers. Grasslands are located on the lower foothills and on southern facing higher hillsides.

Large mammal species in the Canadian Rocky Mountains Ecoregion include white-tail deer, mule deer, Rocky Mountain elk, moose, bighorn sheep, and black bear. In lesser numbers are mountain caribou, gray wolves, wolverines, and grizzly bears. A variety of bird species, such as the black-backed woodpecker and the Northern goshawk are found in the upland forests. The rivers host white sturgeon, burbot (a freshwater cod), mountain whitefish, and bull trout.

The Blue Mountains Ecoregion is Washington's smallest. It is located in the far southeastern corner of the state. The mountains are a high plateau with ponderosa pine

forests, some old prairie, and steeply cut canyons. Only 1% of Washington lies within this ecoregion. This sparsely populated area is popular for activities such as hunting, fishing, snowmobiling, and skiing. The Blue Mountains are the westernmost ranges of the Middle Rockies that extend into Oregon, Idaho, and Montana.

The Blue Mountains are mostly volcanic. The upland soils on the plateau are fertile due to a covering of volcanic ash and windblown silts. The peaks of the Blue Mountains rise from a plateau above the Snake River. The Snake and Grande Ronde Rivers have created fissures in the highlands. The rivers have carved out deep hillsides, bluffs, and sheer rock faces. The river bottoms are considerably lower. Elevations range from 750 feet along the Snake River to almost 6,400 feet at Mount Misery. Annual precipitation along the river valleys in the Blue Mountains Ecoregion ranges from 9-18 inches, while the mountains can experience more than 100 inches annually. The higher elevations correlate to a wetter and colder climate while the lower elevations experience dryer and hotter conditions

Coniferous forests are prominent in the Blue Mountains Ecoregion. At the higher elevations, subalpine fir and Engelmann spruce are typical. Douglas-fir and ponderosa pine are prevalent at mid-elevations. Shrubs such as Western juniper, snowberry, mountain mahogany, bitterbrush, and sage can be found in the higher canyons along the Snake and Grande Ronde Rivers. Grasslands are common at lower elevations. Mountain alder, willows, and aspen along the streamside areas support more wildlife species than

any other plant community in the ecoregion. The Blue Mountains Ecoregion has an estimated 246 wildlife species, with approximately one-third located in the riparian area.

The Blue Mountains Ecoregion is home to mule deer, Rocky Mountain elk, black bears, coyotes, raccoons, and cougars. The forest supports birds such as chickadees, woodpeckers, and bluebirds. Raptors such as the golden eagle visit the steep cliff faces. The rivers support populations of Coho salmon, Chinook salmon, as well as steelhead, rainbow, and bull trout.

The North Cascades Ecoregion is located in the northern part of the state, toward the west side. It encompasses approximately 10% of the state with some of the largest expanses of wilderness in the contiguous United States. The ecoregion lies north of Snoqualmie Pass and west of the Cascade crest, extending northward into British Columbia. It is a sparsely populated area with more concentrations of residential structures in the lower elevations.

Similar to the Blue Mountains, the North Cascades are steep, rugged mountains formed by volcanic activity. The highest peaks are volcanoes such as Mount Baker and Glacier Peak, which climb to more than 10,000 feet. The valley elevations go down to 500 feet in some areas. Prominent features are glacially carved u-shaped valleys and cirques. The Skagit, Stillaguamish, Snohomish, and Nooksack Rivers drain the North Cascades and flow toward Puget Sound.

Precipitation in the North Cascades Ecoregion ranges from 60-160 inches annually as either rain or snow. It falls mainly between October and April, with snow

often 20 feet deep, covering the high elevations for several months of the year. Snow packs fluctuate throughout the winter in the middle elevations and are rare in the lower valleys.

The vegetation at the higher elevations of the North Cascades Ecoregion consists of mountain hemlock, Pacific silver fir, yellow cedar, and subalpine parklands. Forests of Pacific silver fir and western hemlock cover the slopes of the middle elevations. The lower elevations are forested by Douglas-fir, western red cedar, and western hemlock interspersed with riparian areas lined with broadleaf trees such as red alder and big leaf maple.

The North Cascades Ecoregion provides habitats for mammals such as mountain goats, elk, black bears, lynx, gray wolves, grizzly bears and wolverines. Due to less residential development and logging disturbance than other regions of the Cascade Mountains, this ecoregion provides a preferable habitat for wildlife. The North Cascades Ecoregion also supports a vast range of breeding birds, including bald eagles, osprey, harlequin ducks, marbled murrelets, spotted owls, Wilson's warbler, and rufous hummingbird.

The Okanogan Ecoregion is located in north-central Washington, the Cascades, the Rockies, and the Columbia Plateau. It has been described as the mountains between mountains because it separates the North Cascades and the Northern Rockies. This ecoregion covers approximately 14% of the state and extends into British Columbia. It includes river valleys such as the Methow, the Okanogan, and the Colville.

The Okanogan Ecoregion formed from a combination of volcanoes, plate tectonics, and glaciers. The eastern portion of the Okanogan contains some of Washington's oldest metamorphic and sedimentary rock. Minerals such as gold, lead, zinc, and quartzite have been left by sandstone and limestone layered over the region. Fossilized remains of plants, fish, and insects are found near Republic in Ferry County. Elevations in the Okanogan Ecoregion range from 8,000 feet at the mountaintops down to 800 feet at the river valleys. The Columbia River forms the southern boundary of this ecoregion.

Drastic swings in temperature and precipitation are found in the Okanogan Ecoregion. The Okanogan valley in the west receives less than 12 inches of annual precipitation as it lies in the shadow of the Cascade Mountains. However, on the east side of the region, precipitation nearly doubles due to storm fronts that encounter the Canadian Rocky Mountains. The temperatures can fluctuate from summer highs in the 90s to as low as -48 degrees F, recorded in 1968.

As in most of the other ecoregions, the plant communities of the Okanogan Ecoregion vary with elevation. Alpine and subalpine meadows are interspersed with white bark pines, lodgepole pines, and subalpine larch in the higher elevations. Dropping down to slightly lower elevations, stands of Engelmann spruce and subalpine fir are found. Forests of ponderosa pine, Douglas-fir, western larch, western white pine, and quaking aspen are found at lower elevations, extending down into the valleys. Fruit

orchards and alfalfa fields are mixed with sagebrush and grasslands in the river valleys as well.

The Okanogan Ecoregion hosts the largest lynx population in the contiguous United States. Other carnivores found in this area are wolves and grizzly bears. Large herbivores such as moose, mountain goats, and bighorn sheep can be found in the Pasayten Wilderness located in the northwestern corner of the ecoregion. More than 200 species of birds spend some portion of their lives in the Okanogan Ecoregion. Examples include sage thrashers, ptarmigans, harlequin ducks, ospreys, and eagles. A wide range of amphibians and reptiles such as western rattlesnakes, painted turtles, and Great Basin spade foot toads can be found in this ecoregion.

Biologists have identified key habitat types in the Okanogan Ecoregion. Riparian areas and wetlands provide critical ecological habitat for tiger salamanders, Columbia spotted frogs, great blue herons, and sandhill cranes. Northern goshawks, white-headed woodpeckers and Western gray squirrels inhabit the ponderosa pine stands, while songbirds, sharptail grouse, and deer feed on the tender buds and shoots of aspen forests. The lodgepole forests of the ecoregion offer perfect habitats for snowshoe hares and the lynx.

One of Washington's most diverse Ecoregions is the East Cascades Ecoregion. It includes the mountains on the east side of the Cascades and the foothills that level into the Columbia Plateau. This ecoregion comprises approximately 10% of the state. It extends south into Oregon.

The East Cascades Ecoregion, formed by glaciers, contains wide, u-shaped valleys and steep cliffs. The average elevation in the highlands is 3,000 to 7,000 feet; however, Mount Adams reaches a height of 12,000 feet. The lowest elevation drops down to 100 feet above sea level along the Columbia River Gorge. The nation's largest granite batholith exists in this ecoregion in the Stuart Range. Serpentine soils are also found in this ecoregion. The watersheds of Tumwater and Hell-Roaring Canyons that drain the eastern slopes of Mount Adams flow into the Columbia River.

Similar to the Okanogan Ecoregion, the Eastern Cascades Ecoregion experiences huge fluctuations in climate. Annual precipitation can range anywhere from 20 inches at lower elevations to more than 120 inches, mostly as snow, in the higher elevations. Temperatures are milder at the lower elevations and severely cold in the mountains of the higher elevations.

The Eastern Cascades Ecoregion is one of Washington's most heavily forested ecoregions with Douglas-fir found throughout. At the highest elevations, subalpine fir, white bark pine, Engelmann spruce, and mountain hemlock flourish. Western larch and lodgepole pine are found at middle elevations. Below that is a mixture of Douglas-fir and ponderosa pine, with an understory of snowberry and Idaho fescue. Moving into lower elevations of the foothills, Garry oak woodlands are common. Sagebrush and bunchgrass occupy the lowest elevations of the East Cascades Ecoregion. Coniferous wetlands in the mountains play an essential role in hydrological cycles. They collect and release snowmelt to the headwaters of streams and rivers. Stands of black cottonwood, alder,

and willow at lower elevation riversides also play an important role hydrologically and biologically. They serve as corridors for wildlife as well as nesting, feeding, and breeding sites for birds. The meadows and cliffs of the Wenatchee Mountains provide shelter for a number of endemic plants such as the Wenatchee checker-mallow and Seely's silene, Wenatchee larkspur, and the showy stickseed. Rare plant diversity is found in the Columbia River Gorge as well.

Large mammals found in the East Cascades Ecoregion include blacktail deer, mule deer, Rocky Mountain elk, black bear, and cougar. Less numerous mammals are the mountain goat and the fisher, now potentially extirpated. The ecoregion supports approximately 190 bird species including northern goshawks, pileated woodpeckers, and Vaux's swifts. The drier forests provide habitats for the flammulated owl, pygmy nuthatch, and white-headed woodpecker. Peregrine falcons are starting to recover in the ecoregion. Chinook salmon, Coho salmon, and steelhead run in the rivers and streams of this ecoregion. Cutthroat trout and rainbow trout are also found in the colder waters.

Research Design

Data were collected from WWG meetings, public scoping meetings, and mail questionnaires. The data collected were analyzed using both qualitative and quantitative methods to provide triangulation. After analyzing data obtained from WWG meetings and public scoping meetings, a preliminary survey was designed and emailed to the members of the WWG and key members of the WDFW. Once distributed, I used feedback via email from interested members to obtain further input and clarification with

the expectation of fine-tuning the survey. I reviewed the feedback received from the WWG and WDFW Members and modified the survey to address any additional comments and suggestions discussed.

The survey was designed to obtain information regarding the respondents' attitudes toward wolves and wolf management, cultural values, risk perception, experience with wolves, knowledge of wolves, and socio-demographics. These data were used to assess the key factors affecting attitudes toward and tolerance of wolves and wolf-human interactions in Washington State. I used the questionnaire from the MSU study (Beyer et al. 2006) as a template. Changes and adjustments were made based on issues specific to Washington, information received from WWG meetings, comments from public scoping meetings, and personal communications with WWG and WDFW members (figure 3).

Figure 3. Research design.

Describes the flow of survey preparation, data collection, data analysis and expected results.

Data Collection

Survey Creation Process

I attended two WWG meetings in Ellensburg, Washington to record comments from the participating stakeholders (September 13, 2007 and October 29, 2007). A tape recorder was used to record the information presented during the WWG meetings to be analyzed at a later time. Immediately following each meeting, the author made field notes, summarizing the discussion to facilitate the data analysis. The researcher reviewed comments from the public scoping meetings, looking for repeating themes.

I communicated via email and telephone with interested members of the WWG and WDFW to receive feedback on the preliminary survey I prepared. Participants were asked to provide comments and suggestions regarding the questions contained in the preliminary survey. They were also asked to provide any additional issues they foresaw with regard to wolves and wolf-human interactions.

Once the final questionnaire was designed, a pilot survey was sent to 300 random citizens to check for potential issues with questions. Based on the results of the pilot survey, necessary adjustments were made to account for any issues with questions on the survey instrument. A similar procedure was performed in the Michigan study (MDNR 2006). After the pilot study was analyzed and adjusted as necessary, the final questionnaire (Appendix A) was mailed to a random sample of Washington residents selected from Survey Sampling International (SSI), a commercial survey research company.

The author of this study emailed a representative of SSI to request, first 300, then 1,500 names and addresses from Washington State. The author of this study provided a spreadsheet containing the total number of contacts required, broken out by Washington counties. SSI was asked to verify that there were no duplications between the second list and the first list of 300 contacts. The contacts were paid for by credit card over the telephone. The list was received on a spreadsheet via email within three hours of the payment transaction. The total cost for the two samples was \$388.00. The questionnaire mailing followed a modified tailored design method (Dillman 2000).

The questionnaire was mailed to the identified respondents by first-class mail. Each questionnaire included a cover letter explaining the reason for the study and the importance of each respondent's participation (Appendix A). Respondents were asked to return the survey even if they were not interested in completing it. There was one box to check if respondents were not interested in wolf issues. Included in the package to each respondent was a stamped return envelope.

Survey Process

The survey consisted of mailing 1,500 questionnaires to random residents of Washington state who were eighteen years or older. Mailed questionnaires were chosen as opposed to telephone interviews to remove any bias that could have occurred from a live conversation. The names and addresses of the Washington residents were provided by SSI. Respondents were randomly selected from a household database.

A pilot survey of 300 questionnaires was sent out four months prior to the final questionnaire mailing. The pilot survey was also sent to members of the WDFW and the WWG for any comments or suggestions. After receiving input and the returned data, the questionnaires were revised as necessary.

The survey was mailed out in March 2009. Three hundred twenty-five questionnaires were completed (partially or fully) and returned. The respondents had the option to state if they were not interested in wolf-related issues and answer only the demographic questions. Approximately 20% of the 325 completed questionnaires were from respondents not interested in wolf-related issues. This percentage was reflected in

the column entitled, “No Response” or “Not Interested in WA Wolves” in the tables included in Appendices B-E. Additionally, ninety-one questionnaires were returned unopened due to an incorrect address.

The survey data from the questionnaires were entered into SPSS as soon they were received. After being entered into SPSS, the questionnaires were dated so as to avoid duplication of entry. There were no names on the questionnaires or the return envelopes to ensure anonymity. The data were analyzed using frequency distributions and crosstabs.

Analytic Methods

The data collected from the WWG meetings and public scoping meetings were analyzed using qualitative methods. The tape recordings from each WWG meeting were transcribed. I transcribed my own recordings to aid in the analysis of the data. The transcripts were reviewed for relevant and repeating themes. The same process was used for the comments received from the public scoping meetings and from comments from WWG members.

The data collected from the questionnaires were analyzed using quantitative methods such as frequency distributions and cross tabulation with Statistical Package for the Social Sciences (SPSS) software. The dependent (response) variables of this study consisted of the respondents’ attitudes toward wolves. Various categories of questions were asked of the respondents and these categories represent independent (predictor) variables. One group of questions was designed to assess cultural values, risk perception,

experience with wolves, knowledge of wolves, and socio-demographic information. The second group of questions was designed to assess attitudes regarding management of wolves. The resulting information received from the final data analysis of the questionnaire was compared to the information received from the WWG meetings and from the public scoping meetings. The purpose of the comparison was to substantiate or question the results of the survey.

The values were analyzed using frequency distributions and cross tabulation in SPSS. SPSS is one of the most widely used programs for statistical analysis in social science. Cross tabulation analysis gives a basic picture about the interrelation of two variables and helps determine interactions between them. Cross tabulation enables the analyst to see the most significant relationships between two selected variables. The one constant, dependent variable used with this analysis was the question, “How would you summarize your opinion about having wolves in Washington?”

The groups of variables analyzed in this study were Cultural, Risk Perception, Experience with Wolves, Knowledge of Wolves, Stakeholder, Socio-Demographic, and Attitudes Toward Wolf Management. Certain groups of variables were divided further into pairs of variables that had similar traits (table 1). The Cultural variable was broken down into the sub-groups Conservationist, Utilitarian, and Animal Appreciation. Groupings of questions from the survey were analyzed relating to these categories. The Conservationist group includes environmental and historical variables. These variables relate as they both represent an interest in preserving the present and historical

environment. In previous studies, they have been cited as important variables when assessing positive attitudes toward wolves (Ericsson et al. 2003; Kellert 1999; Thompson and Gasson 1991).

The environmental and historical conservationist values analyzed were either derived from responses to statements asked in relation to the questions, “How important are each of the following statements as a reason for having wolves in Washington?” or “How strongly do you agree or disagree with the following statements?” The six statements chosen for this analysis represent environmental and historical attitudes toward wolves (Appendix B).

The Animal Appreciation group includes Animal Ethics and Aesthetics. The similarity between these variables is the ethical and aesthetic appreciation of animals without a utilitarian or conservationist requirement. Citizens with higher response rates in this category would be expected to have more positive attitudes toward wolves (Bright and Manfredi 1996; Kellert 1999; Thompson and Gasson 1991). The animal ethics and aesthetics variables analyzed were derived from responses to statements asked in relation to the questions such as, “How important are each of the following statements as a reason for having wolves in WA?” and “How strongly would you support or oppose using your Washington tax dollars for wolf management programs with the following goals?” The four questions chosen for this analysis represent animal ethics and aesthetic attitudes toward wolves (Appendix C). They explore ideas regarding whether wolves have a right

to exist in Washington or not and whether they should be protected for purely aesthetic purposes.

The Utilitarian group includes hunting and tourism, which relate because they represent activities that are utilitarian in nature. Individuals or groups associated with more utilitarian values have had negative attitudes toward wolves in related studies (Chavez et al. 2005; Kleiven et al. 2004; Treves and Karanth 2003). The hunting and tourism variables analyzed were derived from responses to various statements made in relation to the questions “How important are each of the following statements as a reason for having wolves in WA?,” “How important are each of the following statements as a reason to not have wolves in WA?,” or “How strongly do you agree or disagree with the following statements?” The six statements chosen for this analysis represent utilitarian attitudes toward wolves with regard to hunting and tourism (Appendix D).

Risk Perception was comprised of the categories Human safety, Pet safety, Livestock safety, Management costs, and Federal control of private property. In previous studies, individuals scoring high in these risk perception categories tended to have a higher disapproval of wolves (Chavez et al. 2005; Enck and Brown 2000; Wilson 1997). Risk Perception was analyzed by running crosstabs with the main question, “How would you summarize your opinion about having wolves in Washington?” and certain variables regarding risk to humans, pets, livestock, costs, and federal control of private property.

Experience with wolves consisted of responses to eight questions regarding frequency of contact with wolves such as hearing, seeing, or killing them (Ericsson et al.

2003; Williams et al. 2002). Knowledge of wolves consisted of responses to twelve questions regarding various wolf facts (Ericsson et al. 2003; Kellert 1999). Also assessed were the socio-demographic factors including age; gender; education level; income level; living east or west of the Cascade Range; living in a rural, urban, or suburban residence; and stakeholder group with which respondents may identify (Bruskotter et al. 2007; Williams et al. 2003).

In the survey was a series of questions asked regarding opinions of wolf management goals, effectiveness and efficiency, and methods to assess whether having confidence in these various aspects of wolf management would affect attitudes toward wolves. The majority of responses to the questions in the survey regarding attitudes toward wolf management were perceived ideas, as wolves and wolf management were relatively new in Washington at the time this survey was mailed. As with the prior analysis, these variables were cross-tabulated with the question, “How would you summarize your opinion about having wolves in Washington?”

Table 1. List of Variables Assessed

Cultural	Knowledge of Wolves
Conservationist	
Environmental	Socio-Demographics
Historical	Age
Utilitarian	Gender
Hunting	Education level
Tourism	Income level
Animal Appreciation	East versus west of Cascade Crest
Environmental ethics	Type of community
Aesthetics	Rural
	Urban
Risk Perception	Suburban
Human safety	Stakeholder group
Pet safety	
Livestock safety	Attitudes Toward Wolf Management
Costs of managing wolves	Goals
Federal control of private property	Effectiveness and efficiency
	Methods and costs
Experience with Wolves	

Data from the surveys were analyzed using frequency distributions and cross tabulation (Ericsson et al. 2003).

The statistical models used to determine the response variables were as follows:

$$1. \text{ CV} + \text{RP} + \text{EX} + \text{K} + \text{S} = \text{ATTW}$$

Cultural values + risk perception + experience with wolves + knowledge of wolves + socio-demographics = attitude and tolerance toward wolves. Combining the data received from the covariates resulted in describing the relationship of each covariate with the attitude toward wolves.

2. **G + EE + M = ATWM**

Goals + effectiveness and efficiency + methods = attitudes toward wolf management. Combining the data received from the covariates resulted in describing the relationship of each covariate with the attitude toward wolf management.

Results

Opinion of Having Wolves in Washington

The survey provided questions to respondents about their approval, disapproval, or non-interest in having wolves in Washington (figure 4). The majority of Washington residents who responded (N=313) were in favor of having wolves in Washington (48.3% approved). Most approval was strong approval (Strongly Approve, 29.5%). Those respondents who disapproved totaled 18.1%. Approximately 20% of respondents were Not Interested in the subject of wolves in Washington.

Figure 4. Opinions of Wolves: Respondents' opinions about having wolves in Washington (N=313).

Cultural Values

Conservationist

The higher the disapproval of wolves in Washington by respondents, the higher the percentage of responses to the questions was Not a Reason or Slightly Important Reason. Conversely, the higher the approval of wolves, the higher the percentage of responses to the questions was Very Important Reason or Somewhat Important Reason (Appendix B). Additionally, those respondents who Strongly Disagreed with the statement that wolves could provide ecological benefits (N=27), had more negative attitudes toward wolves (Strongly Disapprove, 73% and Somewhat Disapprove, 50%) (figure 5). Similarly, residents who Strongly Approved of wolves (N=65) responded that wolves have ecological benefits (Strongly Approve, 69.1% and Somewhat Approve, 23.3%). The results support positive attitudes toward and tolerances of wolves, as less conservationist-minded respondents are less supportive of wolves in Washington and residents who are more conservationist-minded are more supportive of wolves in Washington.

Figure 5. Conservationist/Environmental factor correlated with attitudes toward wolves. Response to the statement: Wolves would provide ecological benefits (N=238).

One somewhat surprising result of this analysis was the response to the statement, “Wolves provide food for other species such as grizzlies, eagles and ravens.” Only 45.8% of the respondents who Strongly Approved of wolves in Washington (N=96) answered that this was a Very Important Reason and 28.1% responded that it was a Somewhat Important Reason. This differs from responses to the previously mentioned question. Perhaps the difference was due to a perception that providing food for other species was not as much of an ecological benefit as some other effects of wolves or maybe using ravens in the statement created negative connotations.

It is also interesting to note the response to the statement, “Wolves had a historic presence in WA and should be here now.” The vast majority of respondents who Strongly Approved of wolves in Washington (N=96) answered that this statement represented an important reason (Very Important, 79.2% and Somewhat Important, 14.6%). Similarly, a high percentage of residents who Strongly Disapproved of wolves (N=39) responded it was Not a Reason (82.1%) and a Slightly Important Reason (7.7%) (figure 6).

Figure 6. Conservationist/Environmental factor correlated with attitudes toward wolves. Response to the statement: Wolves had a historic presence in WA and should be here now (N=243).

Animal Appreciation

Respondents who Strongly Approved of wolves responded favorably to animal ethics and aesthetic variables. To the statement, “Regardless of our laws, wolves have a right to exist in WA,” 80.2% of respondents who Strongly Approved of wolves believed this was a Very Important Reason to have wolves in the state (figure 7). Conversely, 84.6% of residents who Strongly Disapproved of wolves answered that this was Not a Reason to allow wolves to live in Washington.

Residents who Strongly Disapproved of wolves in Washington viewed animal appreciation values negatively. Interestingly, respondents who Strongly Approved of wolves showed less support for animal ethics and aesthetics when asked about using their Washington tax dollars to support wolf management programs for aesthetic benefits (N=95), (Strongly Support, 24.1%; Somewhat Support, 35.8%; Somewhat Oppose, 5.3%; Strongly Oppose, 6.3%; and Neither Support nor Oppose, 28.4%). The responses for those residents who Strongly Disapproved (N=37) of wolves in Washington were consistent for each of the four questions.

Figure 7. Conservationist/Animal Appreciation factor correlated with attitudes toward wolves.

Response to the statement: Regardless of our laws, wolves have a right to exist in WA (N=243).

Utilitarian

With regard to the utilitarian values of tourism, having wolves in Washington to increase tourism was not viewed as particularly important, positively or negatively, for either those residents who approved of wolves or those who did not. A slightly higher majority of respondents who Strongly Approved of wolves (N=96) answered that tourism could be an economic benefit (Very Important, 19.8% and Somewhat Important, 33.3%). Similarly, over 60% of respondents in each wolf attitude category answered that having

increased non-native tourists in Washington as a result of resident wolves was not a reason to not have wolves. Therefore, if tourism represents a utilitarian value, it was not clear whether it had any discernible effect on attitudes toward and tolerances of wolves.

Hunting limits were a more important factor than increased tourists to those respondents who Strongly Disapproved of wolves in Washington. When given the following statement as a reason to not have wolves in Washington: “Hunting will be reduced due to the impact on big game populations,” 82.1% of the respondents who Strongly Disapproved of wolves (N=39) answered that reduction in game was a Very Important Reason and an additional 10.3% responded that the game effect was a Somewhat Important Reason to disapprove of wolves (figure 8). The results were somewhat less consolidated with respondents who Somewhat Disapproved of wolves (N=18), (Very Important Reason, 33.3% and Somewhat Important Reason, 33.3%). Of the residents who Strongly Approved of wolves (N=94), 60.6% responded that game hunting was Not a Reason, and of the respondents who Somewhat Approved, 49.2% answered that hunting of game was Not a Reason. Responses to other questions regarding the effects of hunting generated similar results. The responses to hunting as a utilitarian value support the hypothesis that more utilitarian values correlates with more negative attitudes toward wolves.

Figure 8. Utilitarian/hunting factor correlated attitudes toward wolves.
Response to statement: Hunting will be reduced due to the impact on big game populations (N=239).

Risk Perception

With regard to attitudes toward wolves and risk to life, respondents who Strongly Disapproved of wolves were mostly concerned about pet and livestock safety (Appendix E). Interestingly, human safety seemed to be of lesser concern. Only 30.8% of those respondents who Strongly Disapproved of wolves (N=39) answered that being a danger to humans was a Very Important Reason not to have wolves in Washington.

Surprisingly, 28.2% responded that it was Not a Reason. Responses to the two additional

questions about safety to humans yielded similar results. Those respondents who Strongly Approved of wolves (N=94) had a larger division between those two categories (Very Important Reason, 0.0% and Not a Reason, 62.8%). Conversely, for respondents who Strongly Disapproved of wolves, danger to pets (N=38) was a larger issue (Important Reason, 50.0%) and even more so for danger to livestock (N=39), (74.4%). The pattern was similar for residents who Strongly Approved of wolves in Washington.

Financial costs generated stronger opinions by respondents who Strongly Disapproved of wolves. When it was suggested, “Wolves may create high management costs for the state and this could deplete funds for other wildlife,” 79.5% (N=39) responded it was a Very Important Reason to not have wolves in Washington. Similarly, to the statement, “Livestock producers will have to take extra measures to protect their livestock,” respondents who Strongly Disapproved of wolves (N=38) answered overwhelmingly that this was also a Very Important Reason (81.6%) “to not have wolves” (figure 9). Each of the questions relating to increased costs due to the presence of wolves resulted in similar findings. Costs to state wildlife agencies as well as to livestock producers was less of an issue for respondents who Strongly Approved of wolves.

Figure 9. Risk Perception factor correlated with attitudes toward wolves.
Response to the statement: Livestock producers will have to take extra measures to protect their livestock (N=237).

The fifty-six respondents who disapproved of wolves answered that the risk of federal control of land due to wolf management was a Very Important Reason to not have wolves (Strongly Disapprove, 73.7% and Somewhat Disapprove, 55.6%). Federal control of land was strikingly less of an issue for respondents who approved of wolves (N=155) (Strongly Approve, 8.4% and Somewhat Approve, 25.0%). Consistently, the results from questions pertaining to risk perception support the hypothesis that lower risk

perception correlates with more positive attitudes toward wolves and higher risk perception connects with more negative attitudes toward wolves.

Experience with Wolves

Experience with wolves did not appear to suggest any definitive opinion toward wolves in Washington. Respondents who Strongly Disapproved of wolves had slightly more experience with wolves by seeing them, hearing them, or living within 60 miles of wolf populations. The most interesting finding in this section of the analysis was to the question, “How many times have you killed a coyote or cougar?” Of the thirty-six respondents who Strongly Disapproved of wolves, 61.1% answered that they had killed a coyote or cougar More Than Once. In contrast, only 7.5% of the ninety-three residents who Strongly Approved of wolves had killed a coyote or cougar More Than Once. Additionally, in answer to the question, “Have you had livestock or pets killed by a coyote or cougar, 35.3% of the thirty-four respondents who Strongly Disapproved of wolves answered More Than Once. Only 19.4% of the ninety-three residents who Strongly Approved of wolves responded that they had livestock or pets killed by a coyote or cougar. This may suggest that since wolves were relatively new residents in Washington, many residents may have had limited experience with wolves; however, these respondents may have had experiences with other large predators such as coyotes and cougars.

The respondents’ experiences with coyotes and cougars may have translated to expectations of similar experiences with wolves in the future. It is possible that more

experience with wolves may affect attitudes and tolerance based on experience with other large predators; however, since there were no specific questions asked about attitudes toward other large predators, this was not clear. Therefore, there was no conclusive answer to whether more or less experience with wolves correlates with attitudes about or tolerances of wolves.

Knowledge of Wolves

The majority of respondents correctly answered the questions regarding knowledge of wolves. The responses to the two following statements were of interest. The first statement was “wolves typically kill animals that are sick and old.” The answer to this statement is “true;” however, 72.2% of respondents who Strongly Disapproved (N=36) of wolves in Washington answered this question incorrectly (figure 10). The high percentage of respondents disapproving of wolves and answering this statement incorrectly could be due to the belief that wolves typically kill healthy, young animals. These perceptions were most likely passed on within families and communities from one generation to the next and rarely questioned. It is possible individuals with these opinions were not exposed to factual information about wolves.

The majority of respondents who Strongly Approved of wolves (N=90) answered this question correctly (84.4%). The second variable of interest was the statement, “wolves provide valuable benefits to their ecosystems.” Again, a far greater percentage of respondents who Strongly Disapproved of wolves (N=27) answered this question incorrectly (70.4%) as opposed to those residents who Strongly Approved of wolves

(N=95) in Washington (1.1% incorrect and 98.9% correct). Knowledge of wolves possibly affected attitudes and tolerance because respondents who had the most negative attitudes toward wolves erroneously believed that wolves eat healthy young prey and provide no benefits to the ecosystem.

Figure 10. Knowledge of Wolves factor correlated with attitudes toward wolves. Response to the statement: Wolves typically kill animals that are sick and old (N=212).

Socio-demographic Factors

The next group of variables analyzed was Socio-demographics. A higher percentage of respondents were born during the years of 1940 and 1952 (39.0%). Residents born from 1900-1939 comprised 21.4% of the total respondents, those born from 1953-1965 represented 27.8% of respondents, and those residents born from 1966-

1991 represented the remaining 11.9%. It was difficult to determine if age was a significant factor in assessing attitudes toward wolves in Washington. The majority of responses for each of the varying attitudes toward wolves tended to fall in the 1940-1952 age group. The only exception to this was with the fifty-nine respondents who Somewhat Approved of wolves (1940-1952, 40.7% and 1953-1965, 44.1%). The results were no clearer when analyzing each individual age group in comparison to attitudes. Although 42.9% of younger respondents (1966-1991) Strongly Approved of wolves (N=94), this age group only made up 11.9% of the total number of respondents. Weighting of the data would be required to determine if there was any significance. Similarly, 33.9% of those residents born from 1940-1952 Strongly Approved of wolves (N=115); however, this age bracket represented 39.0% of the total respondents. For this study, there was no clear connection between age and attitudes toward wolves. In a paper analyzing thirty-eight quantitative surveys conducted between 1972 and 2000, Williams et al. (2002) found that older people consistently had more negative attitudes.

A higher percentage of males responded to the questionnaire than females (males, 70.7% and females, 29.3%). As with the age variable analysis, it was difficult to determine if gender differences related to differing attitudes toward wolves. A higher percentage of the forty respondents who Strongly Disapproved of wolves were males (95.0%). A higher percentage of males also Strongly Approved (N=96) of wolves than females (64.6% and 35.4%, respectively). However, since there was a disproportionate mixture of male and female respondents, it may not be accurate to assume these

percentages were representative of the Washington population as a whole. As per the 2010 Washington Census, the population of the state was comprised of approximately 50% males and 50% females. If the data were weighted with this statistic in mind, it would appear there was a correlation between gender and attitudes toward wolves with more males disapproving of wolves and more females approving of wolves. However, this conclusion would require additional analysis to substantiate. Williams et al. (2002) support this finding in the thirty-eight surveys they studied as males had more negative attitudes toward wolves than females.

In this study, education and income levels were not clear indicators of attitudes toward wolves either. There was some indication that those respondents with higher education approved of wolves more than respondents who did not have a higher education (H1e). In the study by Williams et al. (2002), people with higher levels of education had more positive attitudes toward wolves. As per Kellert (1980), this was because more education often leads to a greater awareness of wildlife and the environment.

State wildlife managers believe there is a clear distinction between opinions of those residents who live east of the Cascade Crest versus those residents who live west of it. Those on the east are believed to be less tolerant of wolves and those on the west, more tolerant. In this study, 48.2% of the respondents answered that they resided east of the Cascade Crest (N=146) and 51.8% responded they live west (N=157) of it. As expected, those respondents living in the west had a higher approval of wolves (N=96)

(Strongly Approve, 54.2%) versus those in the east (Strongly Approve, 45.8%).

However, the difference was not overwhelming. It was somewhat larger for the sixty respondents who Somewhat Approved (West, 58.3% and East, 41.7%). The most interesting finding in this analysis was that the percentage of respondents who Strongly Disapproved of wolves (N=40) was only slightly greater for respondents living east of the Cascade Crest (East, 52.5% and West, 47.5%). The disapproval of wolves was not higher for respondents living east of the Cascade Crest, which was surprising, especially with a higher percentage of ranchers and hunters living in that area. As per the 2010 Washington Census, 78% of the population lived west of the Cascade Crest and 22% east of the Crest. This suggests that, if weighted, the results may have shifted further away from the expectation. The response rate of this questionnaire was interesting. Perhaps more residents from east of the Cascade Crest responded because this area was the location of most of the known wolf packs in Washington. These eastern residents may have had more of an opinion about wolves because they lived closer to them.

Of greater significance were findings of the region analysis (figure 11). The common expectation was that those residents who had the most disapproval of wolves resided in rural regions and those who had the highest approval of wolves lived in the urban or suburban regions. Surprisingly, more respondents from the Suburban region (S) Strongly Disapproved (N=41) of wolves (53.7%) than did residents from the Rural (R) (39.0%) and Urban (U) (7.3%) regions. Respondents who Somewhat Disapproved of wolves (N=18) fell into the expected pattern – R (50%), S (33.3%), and U (16.7%). The

regional responses of the ninety-six residents who Strongly Approved of wolves were R (25%), S (52.1%), and U (22.9%). In the Somewhat Approve (N=61) category, the mix was R (15.0%), S (60.0%), and U (25.0%). It is important to note that approximately 50% (50.8%) of the 309 returned and completed questionnaires were received from Suburban residents. Rural residents made up 26.5% and Urbanites 21.4%. The remaining 1.3% of respondents did not answer. If the statistics for the Urban and Suburban groups were combined, this percentage breakout would not be too different from the actual population make up. As per the 2000 Census, 82% of the population was urban (2,500 or more persons) and 18% were rural. It was not clear to this author why the majority of residents who Strongly Disapproved of wolves lived in a suburban area or why 28.9% of rural residents Strongly Approved of wolves. Both of these findings were unexpected.

Figure 11. Socio-demographics/Region factor correlated with attitudes toward wolves (N=313).

In summary, the analysis of attitudes toward and tolerance of wolves based on socio-demographic factors of age, gender, residential area, education level, and income level was inconclusive. The only factor that appeared to have a relationship was gender; however, since a much higher percentage of respondents were male and this was not representative of the population of Washington, this result was unclear.

Stakeholder Group

In prior studies, stakeholder groups have been an important indicator of attitudes toward wolves because it has been shown that certain groups, such as farmers and livestock producers, tended to have more negative attitudes toward wolves (Williams et al. 2000), while conservationists tended to have more positive attitudes. In this study, the

results were somewhat inconclusive. Those residents who responded that they hunted as an outdoor activity totaled 26.8% of the total returned surveys (N=325). From these respondents, the split between approval and disapproval of wolves was approximately the same (Strongly Disapprove, 36.8%; Somewhat Disapprove, 9.2%; Strongly Approve, 27.6%; Somewhat Approve, 18.4%; and Undecided, 8.0%). Only 15.6% of respondents (N=295) answered that they belonged to a hunting organization. Out of that group, 52.2% disapproved of wolves (N=56) and 32.6% approved (N=151) of them. Only 14.4% of the respondents answered that they belonged to an animal welfare or animal rights organization (N=292). Out of that group, 7.2% disapproved of wolves (N=3) and 76.2% approved (N=32) of them. Of those who answered that they did not belong to such an organization, 21.2% disapproved of wolves (N=53) and 47.2% approved (N=118).

Clearly, a higher percentage of respondents approved of wolves and belonged to an animal rights organization; however, with only 14.4% of respondents in this category, the results were not conclusive. Only 9.8% of respondents answered that their family's income was provided directly from livestock farming (N=295). Out of those 29 respondents, 48.3% disapproved of wolves (N=14), (Strongly Disapprove, 27.6% and Somewhat Disapprove, 20.7%) and 44.8% approved of wolves (N=13) (Strongly Approve, 34.5% and Somewhat Approve, 10.3%). Based on the results of the stakeholder groups – hunters, conservationists, and livestock producers – it was unclear if

there was a correlation with attitudes toward and tolerance of wolves and wolf-human interactions.

Attitudes Toward Wolf Management

Negative attitudes toward wolves have been associated with lack of confidence in state and federal wildlife agencies. The first set of wolf management questions analyzed were in relation to goals. They were designed to assess attitudes toward state wildlife agencies and corresponding attitudes toward wolves. Respondents were asked how strongly they would support or oppose using their state tax dollars for a variety of wolf management programs. As expected, most of the responses linked those who disapproved of wolves with those who opposed the various wolf management programs and similarly, those residents who approved of wolves tended to support many of the wolf management programs.

Three questions provided slightly different results. The first question was whether residents would support or oppose using their tax dollars to increase tourism in Washington. As expected, respondents who disapproved of wolves tended to oppose this program. However, residents who approved of wolves were not as supportive of this program as they were of many of the others. Only 19.1% of the ninety-four respondents who Strongly Approved of wolves Strongly Supported this program and 28.7% Somewhat Supported it. A large percentage (37.2%) of respondents answered that they Neither Supported Nor Opposed this program. The lack of support for the tourism program seemed to indicate respondents did not view tourism as an important reason to

have wolves in Washington. In a study conducted by Duffield and Neher (1996) in Yellowstone National Park, it was determined that the regional net economic benefit would be approximately \$43 million a year due to increased non-resident tourism expenditure based on the presence of wolves in the park. In a different study conducted by Cromley (1997), respondents disagreed most with hunting and tourism as reasons to reintroduce wolves in Wyoming. Perhaps this question was unclear in that the attempt was to link financial benefits to the state via tourism to an increased wolf population. Referring back to the statement that directly linked these two ideas, “Wolves could provide economic benefits in Washington by increasing tourism,” residents’ responses were somewhat ambiguous.

The second question with differing results was whether residents would support or oppose using their tax dollars to keep wolves away from residential areas. The results suggest most respondents would support this program. The willingness to use their money for this program may indicate that whether respondents support or oppose wolves, they were concerned with safety for themselves, their families, their pets, and their livestock.

One question that provided slightly different results than expected was in regard to compensation for owners who lose livestock to wolves. A higher percentage of respondents who Strongly Disapproved (N=37) of wolves than who Strongly Approved (N=94) of them, Strongly Supported this program (Strongly Disapproved, 59.5% and Strongly Approved, 17.0%). These results may suggest that residents who opposed

wolves were concerned about financial losses due to wolf predation on livestock and those who approved of wolves viewed this as less of an issue. The results of this inquiry support the correlation between attitudes toward wolves and attitudes toward wolf management goals.

The next set of wolf management questions was designed to assess respondents' attitudes toward the effectiveness and efficiency of government personnel to make wolf management decisions. For all of the questions in this category, the majority of respondents who Strongly Approved of wolves either Strongly Agreed or Somewhat Agreed with the statements about effectiveness and efficiency. Residents who Strongly Disapproved (N=33) of wolves were less consistent in their responses. When asked if they felt management decisions would be "adequately based on good science," 39.4% Strongly Disagreed, 15.2% Somewhat Disagreed, 24.2% Somewhat Agreed, 15.2% Strongly Agreed, and 6.1% Neither Agreed Nor Disagreed. The results were similar for the statements, "Consider the opinions of all WA citizens in a fair way" and "Use procedures that are transparent and accessible to the public." However, with regard to the statement, "Respond to wolf issues in a timely manner," the responses from residents who Strongly Disapproved (N=33) of wolves were quite close between Strongly Disagreed and Strongly Agreed (Strongly Disagree, 36.4%; Somewhat Disagree, 6.1%; Somewhat Agree, 6.1%; Strongly Agree, 33.3%; and Neither Agree Nor Disagree, 18.2%). A relatively high percentage of respondents appeared to be unsure whether wildlife managers would respond to wolf issues in a timely manner or not. Perhaps the

responses to this question were somewhat ambiguous because wildlife managers in Washington have not previously been required to address this issue. In summary, there was some evidence that respondents' attitudes toward wolf management effectiveness and efficiency related to their attitudes toward and tolerance of wolves and wolf-human interactions.

The last set of wolf management questions was designed to assess attitudes toward the methods and costs of wolf management. One interesting observation was that a higher percentage of respondents who Strongly Disapproved of wolves (N=37) disagreed with the statement, "The most effective method of managing wolves is to educate the public about how to live with wolves" (Strongly Disapprove/Strongly Disagree, 73.0% and Strongly Disapprove/Somewhat Disagree, 8.1%). Residents who Strongly Approved (N=94) of wolves agreed with the statement but not as much as expected (Strongly Approve/Strongly Agree, 51.1% and Strongly Approve/Somewhat Agree, 39.4%). Similar results occurred in response to the statement, "Conservation groups and ranchers should work together to develop proactive and non-lethal methods for managing wolves" (Strongly Disapprove (N=37)/Strongly Disagree, 67.6% and Strongly Disapprove/Somewhat Disagree, 5.4%). Those respondents who Strongly Approved (N=94) of wolves were more supportive of this program (Strongly Agree, 74.5% and Somewhat Agree, 21.3%). There was a stronger response to the statement, "Conservation groups and ranchers should share the costs associated with developing, implementing, and monitoring proactive and non-lethal methods for managing wolves"

by residents who Strongly Disapproved (N=37) of wolves (Strongly Disagree, 86.5% and Somewhat Disagree, 2.7%). Respondents who Strongly Approved (N=94) of wolves were less in favor of this program than when asked about working together (Strongly Agree, 34.0% and Somewhat Agree, 31.9%).

In regard to the statement, “Wolves should be managed by hunting, like other large predators such as cougars and bears,” the majority of respondents who Strongly Disapproved (N=37) of wolves agreed with this program (Strongly Agree, 73.0% and Somewhat Agree, 13.5%). Surprisingly, only slightly more than half the residents who Strongly Approved (N=94) of wolves disagreed with this program (Strongly Agree, 29.8% and Somewhat Agree, 22.3%). An interesting finding was that slightly over half of respondents who approved of wolves tended to also agree with hunting them as a form of management. In summary, attitudes toward wolf management methods and costs appeared to be correlated with attitudes toward and tolerance of wolves.

Discussion

As hypothesized, attitudes toward, and tolerance of, wolves and wolf-human interactions were positively affected by conservationist and animal appreciation perspectives and negatively affected by utilitarian perspectives. In previous studies, respondents with positive attitudes toward wolves stated that wolves have an important ecological role, a historical presence, and a right to exist (Cromley 1997; Lenihan 1987; Thompson and Gasson 1991). As expected, respondents who had the highest disapproval of wolves tended to have the least interest in conservationist and animal appreciation values.

Stakeholders living in rural areas of Washington held more positive attitudes toward wolves than was expected. This result is in direct contrast with previous research. For example, Williams et al. (2002) found that although there was a potential for positive attitude change within a community, some social groups are resistant to change. Farmers, livestock producers, and rural residents who have had direct experience with wolves are likely to hold onto negative attitudes. They state that this was “because wolves may affect their economic interests or are a symbol of urban dominance.” Those individuals living in rural areas may view pro-wolf interests of the larger urban society as forcing their viewpoints on them. The results of this study contradict such conclusions. Perhaps state wildlife managers could work with ranchers and rural citizens to use non-lethal methods of deterring wolves. Rural residents represent a potential and unexpected ally for wolves.

There was a strong correlation between respondents' approval of wolves and how they responded to questions pertaining to animal ethics and aesthetic values. Washington residents more favorable toward wolves were less willing to support wolf management programs if they were required to help pay for those programs. Possibly, respondents may have had negative attitudes toward state government agencies and did not believe that their tax dollars would be used positively for the benefit of wolves.

The connection between utilitarian values and approval of wolves was less consistent. There was a clear correlation between tolerance of wolves and attitudes toward hunting. Those respondents who had the highest disapproval of wolves tended to have the highest concern for hunting limits due to wolves. They answered negatively to questions suggesting hunting limits may be imposed or a situation of reduced hunting of ungulates such as deer and elk due to wolves in Washington. Respondents who had more positive attitudes toward wolves had more positive attitudes regarding hunting limitations. Limits faced by hunters due to increasing wolf populations are an ongoing debate in most areas where wolves currently reside (Ericsson et al. 2003).

The results of the assessment of tourism as a factor correlating with attitudes toward wolves suggest that a potential increase in tourism due to wolves was not an important issue for most residents of Washington. An increase of money into the state from non-native tourists was not an important reason to support wolves. Although a study conducted in Yellowstone National Park, by Duffield et al. (1996) found that regional net economic impacts due to reintroduction of wolves amounted to 43 million

dollars annually, increased non-resident tourism expenditure due to wolves in Washington was not a significant determinant of positive attitudes toward wolves. Perhaps, hunting is more representative of a utilitarian value than tourism because the idea of reduced hunting due to competition from wolves is more personal, immediate and tangible than any benefit or drawback of tourism. Money received through tourism would not be directly realized by respondents, whereas if the prey base for hunters is diminished, that will be quickly realized by respondents interested in hunting. Therefore, it is understandable that questions about the potential effects on hunting due to the presence of wolves would elicit stronger responses than questions about tourism.

Respondents who had a low risk perception of wolves in Washington had more positive attitudes and tolerance of wolves. Similar to prior studies, residents with a higher risk perception particularly fear for livestock, pets, costs, and federal control of land had more negative attitudes toward and tolerance of wolves and wolf-human interactions (Chavez et al. 2005, Kleiven et al. 2004). In contrast to Kleiven et al. (2004), it is interesting that the majority of respondents with negative attitudes toward wolves did not view wolves residing in Washington as an important risk to human safety.

The Wood River Wolf Project has been designed to test and demonstrate tools and methods for coexistence of sheep and wolves in Idaho. As of the writing of this paper, the information from this project is available to all interested livestock producers in Blaine County, Idaho. There has even been a hotline set up to help those who are interested. For the past five years, this project has successfully shown that non-lethal

methods can be used so wolves and sheep can live in the same area, even with sheep grazing on large areas of public land. This project is a collaboration between wildlife managers from Blaine County, sheep producers, Defenders of Wildlife, and federal agencies. Blaine County is the first county in the nation to adopt non-lethal wolf strategies as part of its public policy. One of the tools used to corral sheep at night is electrified portable flag fence called turbo fladry. Other tools used by the Wood River Wolf Project are human patrols, livestock protection dogs, and noisemakers. Additionally, Swiss biologists are currently testing a sheep collar that is a wolf-warning device. It is expected to register heart rate changes in sheep, alert sheep producers to attacks via text message and simultaneously emit a non-lethal spray or sound repellent (Clark 2012).

Respondents who disapproved of wolves were more concerned with the potential for high management costs for the state as opposed to those residents who approved of wolves. The fear of losing livestock may relate to associated costs for ranchers. Related types of questions regarding management costs resulted in similar answers. Respondents who disapproved of wolves were concerned with the costs associated with predation, having to take extra measures to protect their livestock and losing money hunters and fisherman paid through licensing and permits. Kleiven et al. (2004) suggested that residents may show their fear of potential future economic difficulties by demonstrating negative attitudes toward large carnivores such as wolves. It may be helpful to investigate a form of financial assistance to help ranchers who lose their livestock to

predation by wolves. It may also be helpful to work with livestock producers to find methods of deterring wolves from preying on their animals and threatening their livelihood.

From responses to the survey, it was clear there was a direct correlation between risk perception of more federal control of land and negative attitudes toward and tolerance of wolves and wolf-human interactions. Clark et al. (2005) discussed how local culture is still often dominated by the idea of “rugged individualism” in which each person feels entitled to behave as they wish without considering outside influences. In connection with this are the ideas of private property rights and states’ rights. Many individuals and groups feel these rights are threatened by federal legislation that protects wildlife such as the wolf re-introduction in the Rocky Mountain States. Clark et al. (2005) stated, “Many locals distrust the federal government and resent what they see as efforts to impose outside values on them” (50). They go on to state that historical “users of the land” feel disrespected and marginalized by current decision processes. They feel they should not be told what to do on their own land and not even on federal land. They are also fearful their livelihoods and local control are in jeopardy. Ericsson et al. (2003) suggested that people who have weak attitudes toward wolves are easily swayed by publicized events. For instance, when there were political claims that wolves would create outside urban influence on residents in the Adirondack Mountains, attitudes became more negative.

The analysis did not demonstrate that experience with wolves had a direct correlation with attitudes toward wolves and wolf-human interactions. This result is in direct conflict with previous studies. For instance, Ericsson et al. (2003) found that people with experience of wolves had more negative attitudes. Perhaps respondents in Washington have not had enough time to develop significant experiences with wolves because wolf populations in Washington have only recently begun to expand and wolf-human interactions have been minimal. In the summary of attitudes by Williams et al. (2002), the authors concluded that respondents with less experience with wolves had the most positive attitudes. It is possible attitudes toward and tolerance of wolves may become more negative as people in Washington have more interactions with wolves. The response to the question about killing a coyote or cougar presented some interesting results. There seemed to be some correlation between respondents who have killed a coyote or cougar more than once and negative attitudes toward wolves. Perhaps, respondents who have killed other predators more than once view wolves as an additional predator that will require their time, effort, and expense for personal or financial safety.

The investigation of whether more knowledge of wolves led to more positive attitudes and less knowledge to more negative attitudes was fairly conclusive. Negative attitudes toward wolves related to respondents who did not understand the ecological benefits of wolves and who were not aware that wolves tended to kill sick and old animals. This result is similar to previous studies that correlated less knowledge of wolves with more negative attitudes. In a study by A. J. Bath (1992) in which Montana

and Idaho residents' attitudes toward wolf reintroduction in Yellowstone were analyzed, the author found that respondents with lower knowledge scores tended to have more negative attitudes. Perhaps, if provided with more factual information, respondents who do not understand or value the ecological benefits of wolves and who view them as a risk because they believe they eat young, healthy ungulates may change their opinions. For instance, hunters who view wolves as a threat to the hunting prey base may change their views if they understand that wolves improve the gene pool of the ungulates by culling the sick and old animals.

Previous studies have found connections between age, gender, education level, and stakeholder group and attitudes toward wolves. Williams et al. (2002) reported that respondents who are older, male, less educated, and associate themselves with a utilitarian stakeholder group have more negative attitudes. Although a higher percentage of males responded to this survey than females, the results suggest that females in Washington are generally approving of wolves. Chavez et al. (2005) reported that residents of many sampled households declared that they would defer the questionnaire to the "man of the house", even when the woman was supposed to respond to the survey because men were the major decision-makers. Perhaps, this explains why a higher percentage of questionnaires were received from males.

The educational assessment suggested that respondents with a higher education level may have had a higher approval of wolves than respondents with a lower education level; however, the results were inconclusive. Other studies have shown that higher

education correlates with great tolerance of wolves, possibly by broadening residents' perceptions of wolves and a greater understanding of the important role that wolves play in their ecosystems (Naughton-Treves et al. 2003).

An interesting socio-demographic assessment in this study related to attitudes toward respondents who lived east and west of the Cascade Crest (CC). It was somewhat surprising that the analysis did not show a great difference between residents living in the east and the west. This may suggest that although a higher majority of residents who disapproved of wolves may live in the east, the percentage of residents who disapproved of wolves in the east was not as high as expected. Perhaps wildlife managers and policy makers have misconceptions of eastern residents' attitudes toward wolves. Slightly over one-third of respondents from eastern Washington stated that they live in Spokane, the second largest city in the state. Conceivably, residents of Spokane have positive attitudes toward wolves because they live in the city and are not concerned about certain risks such as to livestock and pets or federal control of their land. There are also tribes living in eastern Washington and they may have more positive attitudes toward wolves due to their historical relationships with wolves. I do not know how many, if any respondents are part of a tribe as I did not include that question in my survey. In addition to tribes, there may be ranchers willing to work with wildlife managers to implement non-lethal forms of wolf management. Perhaps wolf managers from the Washington Department of Fish and Wildlife could form an alliance with large conservation-oriented landowners as well as

representatives of the Colville Tribe living in Okanogan and Ferry counties and together implement non-lethal forms of wolf management.

Interestingly, regional attitudes toward wolves provided unexpected information. The expectation from previous studies was that residents living in rural areas would have a higher disapproval of wolves than residents living in suburban and urban areas (Kleiven et al. 2003). In this study, a higher percentage of respondents who strongly disapproved of wolves lived in suburban regions than lived in rural regions. As per the 2010 Census data, the last decade has been one of increasing diversity in Washington, especially in metropolitan suburbs. Perhaps the minority groups moving to the suburbs have a high risk perception of wolves due to lack of knowledge or misconceptions. This may explain why a higher percentage of respondents living in suburbs Strongly Disapproved of wolves. Educational outreach by wildlife managers and policy makers could help shift attitudes toward wolves in a more positive direction. There may also be a concern by minority populations that managing wolves will lead to increasing costs that they will be required to share. If they do not value wolves, they would not have an interest in contributing their money to help manage them. Perhaps, as part of the educational outreach, wildlife managers could share information about the environmental benefits of wolves. Contributing to the shift in negative attitudes toward wolves, between rural and suburban residents, may be an increase in suburban residents moving to rural areas due to a valuation of environmental amenities such as environmental quality and a slower pace

of life. These respondents may have more favorable attitudes toward wolves, and wildlife in general even though they now live in rural areas.

As expected, respondents who belong to animal welfare or animal rights groups tended to have more positive attitudes toward wolves. Additionally, residents who hunted, belonged to hunting organizations, or relied on livestock farming for their income tended to have more negative attitudes toward wolves. In their quantitative summary of attitudes toward wolves, Williams et al. (2002) found that people from environmental groups had positive attitudes toward wolves. Ericsson and Heberlein (2002) state that hunters in Sweden tended to have more negative attitudes toward wolves than non-hunters. Various studies have found that farmers and livestock producers have the most negative attitudes toward wolves (Bath and Buchanan 1989; Chavez et al. 2005; Kellert 1986). Hunters, conservationists and state wildlife managers could form alliances to discuss how to maintain a suitable prey base for hunters and wolves and how to use non-lethal methods of managing wolves, similar to the methods used by the Wood River Wolf Project. Possibly, by working together as a team, these organizations could meet all of their goals successfully.

Respondents who were disapproving of wolves correlated with negative attitudes toward wolf management programs, and those residents more supportive of wolf management programs were more supportive of wolves. From this analysis, it was clear that respondents who disapproved of wolves in Washington did not believe that public education programs would be the most effective method of managing wolves. They also

did not approve of livestock producers and conservation groups working together to manage wolves. A high percentage of residents with negative attitudes toward wolves disapproved of sharing costs between these two groups to help manage wolves.

Respondents with positive attitudes toward wolves in Washington approved of sharing costs between livestock producers and conservation groups. Differing stakeholders often have preconceived ideas about the other. In order to allow the wolf population to flourish in Washington without using lethal methods, these differing groups, such as livestock producers and conservation groups will need to work together. This type of collaboration could be successful in minimizing loss of livestock, as well as ethically managing wolves by using non-lethal methods.

As in many other states in the nation, there are widely differing opinions between residents of the United States regarding approval of wolves, how they should be managed, and who should share the costs to manage them. This study attempted to understand some of the variables correlated with approval and disapproval of wolves. The intent was to help wildlife managers understand factors affecting attitudes toward and tolerance of wolves and wolf-human interactions, to help them manage wolves in the most efficient and effective way possible.

The ideal situation for wildlife managers is to minimize wolf-human interactions. This can be accomplished by implementing some of the non-lethal wolf management tools discussed as well as by forming alliances between differing groups. These groups could meet at regular intervals to discuss wolf-related issues and to work together to

resolve them. It is important that members of each of these groups be heard without any individual or group feeling marginalized. It may also be helpful for the WDFW to establish compensation programs for livestock producers. These compensation programs could be used to reimburse livestock producers should they lose livestock to wolf depredation as well as to help assist in the cost of implementing non-lethal wolf management tools. Education programs could be used to help alleviate fears of residents regarding the safety of their pets. Perhaps, the wildlife managers at the WDFW could create information sheets that would be mailed out to residents, explaining methods of protecting their pets such as bringing them in at night and not leaving pet food outside. As the wolf population in Washington continues to grow, increased wolf-human interactions are a clear possibility. A worthwhile goal is to minimize wolf-human interactions and to respond effectively and efficiently to the conflicts that arise. Forming alliances between differing stakeholder groups to work together to ethically manage wolves using non-lethal methods. Additionally, more public education regarding the benefits of wolves, methods of keeping pets safe, and methods of keeping livestock safe may be helpful to increase the tolerance of wolves in Washington.

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APPENDIX A: Consent Form and Survey

Department of Environmental Studies

One Washington Square
San José, CA 95192-0115
Voice: 408-924-5450
Fax: 408-924-5477

March 2009

Dear Washington Citizen,

I am a graduate student in the Environmental Studies Department at San Jose State University working in Washington. Washington State currently has a very small wolf population that is expected to grow. The federal government has recently removed federal protected status for wolves in the Northern Rocky Mountain region. Although this action is being challenged in court at this time, primary responsibility for managing wolves has shifted from the federal government to individual states in that region, and in eastern Washington. Wolves used to live in Washington and wolves from the northern Rockies have wandered into the state in recent years. It is expected that wolves will continue to migrate into Washington on occasion. In preparation, the Washington Department of Fish & Wildlife (WDFW), guided by a Wolf Working Group (WWG) of 17 citizens is currently in the process of developing a Wolf Conservation and Management Plan for the state. This Plan will address wolf conservation and management issues. This questionnaire is intended to help determine the attitudes toward wolves by Washington citizens. The results of the survey will be provided to the WDFW for their use.

There are a wide range of opinions about wolves in Washington that must be considered with regard to a wolf management plan. A diverse group of citizens has been involved in the design of this survey to ensure that it will not be a waste of your time. You have been randomly selected to receive the attached survey to help consider the public views toward wolves in Washington. **This is your opportunity to provide input!** Your views may be like those of others not taking part in this research. **Your individual response to this survey is very important.**

If you have no interest in wolf issues you can go directly to question 13 of the survey and be finished in less than two minutes. It is just as important to know how many citizens have no interest in wolves as to learn the opinions of those who do. Please return the survey in the self-addressed, postage paid envelope provided.

If wolf issues are important to you it will take less than 15 minutes to complete the survey. Please return the survey in the self-addressed, postage paid envelope provided.

You indicate your voluntary agreement to participate by completing the survey. Please know that all data collected will remain confidential and your privacy will be protected. If you choose, you may refuse to participate in this survey and you may quit at any time. The results of this study may be published, but any information that could result in your identification will remain confidential.

If you have any questions about the survey, I will be happy to talk with you. I can be reached at 408-981-4134 or by email at jcstars@earthlink.net. If you have any questions regarding your rights as a survey respondent, please contact Dr. Will Russell at 408-924-5487 or via email at will.russell@sjsu.edu. Questions about research subject's rights may be presented to Pamela Stacks, Ph.D., Associate Vice President, Graduate Studies and Research, at (408)924-2480. Thank you in advance for participating and helping develop an understanding of the attitudes of Washington citizens toward wolves.

Sincerely,

A handwritten signature in cursive script that reads "Julie Callahan".

Julie Callahan
Graduate Student
San Jose State University
Environmental Studies Department
408-981-4134
jcstars@earthlink.net

The California State University:
Chancellor's Office
Bakersfield, Channel Islands, Chico,
Dominguez Hills, East Bay, Fresno,
Fullerton, Humboldt, Long Beach,
Los Angeles, Maritime Academy,
Monterey Bay, Northridge, Pomona,
Sacramento, San Bernardino, San Diego,
San Francisco, San José, San Luis Obispo,
San Marcos, Sonoma, Stanislaus

Your Opinions Regarding Wolves in Washington

1. How would you summarize your opinion about having wolves in Washington? (Please check one)

- ☐ I am not interested in Washington's wolves
(Please go page 10 and answer questions 13 - 20)
☐ I Strongly Approve
☐ I Somewhat Approve
☐ I Am Undecided
☐ I Somewhat Disapprove
☐ I Strongly Disapprove

2. In your opinion, how important are each of the following statements as a reason for having wolves in Washington?

	Not a Reason	Slightly Important Reason	Somewhat Important Reason	Very Important Reason	Undecided
a) As predators, wolves could benefit Washington's ecosystem by helping <i>control other wildlife populations</i> such as coyotes.	1	2	3	4	U
b) There are people who appreciate wolves and want to know that wolves exist in Washington.	1	2	3	4	U
c) Future generations of citizens could benefit if we maintain wolves in Washington.	1	2	3	4	U
d) Wolves had a historic presence in Washington and should be here now.	1	2	3	4	U
e) People want to view, hear, photograph or study wild wolves in Washington.	1	2	3	4	U

	Not a Reason	Slightly Important Reason	Somewhat Important Reason	Very Important Reason	Undecided
f) Wolves could eventually become another game species for Washington hunters.	1	2	3	4	U
g) Regardless of our laws, wolves have a right to exist in Washington.	1	2	3	4	U
h) Wolves could provide economic benefits in Washington by increasing tourism.	1	2	3	4	U
i) Wolves provide food for other species such as grizzlies, eagles and ravens.	1	2	3	4	U
j) Increased wolf populations could decrease levels of overpopulated deer and elk, improving growth of vegetation and creating additional nesting sites for birds as well as food and building sources for beavers.	1	2	3	4	U
k) Other _____					

3. In your opinion, how important are each of the following statements as a potential reason to not have wolves in Washington?

	Not a Reason	Slightly Important Reason	Somewhat Important Reason	Very Important Reason	Undecided
a) Wolves are a danger to humans	1	2	3	4	U
b) Wolves are a danger to pets	1	2	3	4	U
c) There will be an increase of non-resident tourists in the state	1	2	3	4	U
d) Wolves may create high management costs for the state and this could deplete funds that could be spent on other wildlife species	1	2	3	4	U

	Not a Reason	Slightly Important Reason	Somewhat Important Reason	Very Important Reason	Undecided
e) Wolves are a danger to livestock	1	2	3	4	U
f) Livestock producers will have to take extra measures to protect their livestock	1	2	3	4	U
g) Hunting will be reduced due to the impact on big game populations	1	2	3	4	U
h) Money that hunters and fisherman contribute by way of license and permit fees could be spent on wolves	1	2	3	4	U
i) Wolf management may lead to more Federal control of land	1	2	3	4	U

j) Other _____

Your Knowledge of Wolves

4. The following statements address your knowledge about wolves. You are not expected to know all the answers to these statements. Please choose the best response to each.

	True	False	Undecided
a) Wolves were almost eradicated in the lower 48 states of North America by 1930.	1	2	U
b) Wolves used to live throughout the entire United States.	1	2	U
c) There is a wolf recovery project in the Rocky Mountain States.	1	2	U
d) Wolves are only found in North America.	1	2	U
e) Wolf packs generally average around 30 wolves.	1	2	U

	True	False	Undecided
f) Wolves have a complex social structure.	1	2	U
g) Typically, there is only one breeding pair of wolves in each pack.	1	2	U
h) Wolves typically kill animals that are sick and old.	1	2	U
i) Wolves usually mate for life.	1	2	U
j) Wolves mostly feed on small mammals like mice and rabbits.	1	2	U
k) Wolf attacks against humans are extremely rare.	1	2	U
l) Wolves provide valuable benefits to their ecosystems.	1	2	U

Map of Washington Counties

Wolf Situation Table

Each situation below describes hypothetical impacts associated with varying numbers and distributions of wolves in Washington. No one of these specific examples have been demonstrated to be accurate on the ground; these are simply hypothetical situations to which we would like your response. Apply this information when you answer questions 5 and 6 that follow.

Situation 1: - No wolves

Situation 2:

- Wolves in a few counties at very low numbers
- Rare sightings
- No loss of livestock to wolves in most years
- Rare loss of pets or hunting dogs to wolves
- No impact on deer and elk harvest due to wolves

Situation 3:

- Wolves in many counties but at low numbers
- Occasionally seen near rural homes or roads in some areas
- Less than 1% of farms per year lose livestock
- Some loss of pets and hunting dogs likely, however less than 10 per year
- No impact on deer and elk harvest due to wolves

Situation 4:

- Wolves exist in most counties at moderate numbers
- Often seen near rural homes or roads in many areas
- About 1% of farms per year lose livestock
- Pets and/or hunting dogs known to be lost yearly to wolves averages 15 to 20
- A small decrease in deer and elk harvest due to wolves

Situation 5:

- Wolves exist in all counties in the highest numbers that can be sustained by habitat
- Frequent, widespread sightings near rural homes and roads, occasional sightings near towns
- About 2% of farms per year lose livestock
- Pets and/or hunting dogs known to be lost yearly to wolves averages 20-25
- A moderate decrease in deer and elk harvest due to wolves

Using the situations in the “Wolf Situation Table” and the Map of Washington Counties above, answer questions 5 and 6. Circle one answer for each question.

5. Regarding wolves living west of the Cascades Crest

	Situation					Undecided
a) The Situation that I prefer is	1	2	3	4	5	U
b) The Situation with the <u>lowest</u> number of wolves I can accept is	1	2	3	4	5	U
c) The Situation with the <u>highest</u> number of wolves I can accept is	1	2	3	4	5	U

6. Regarding wolves living east of the Cascades Crest

	Situation					Undecided
a) The Situation that I prefer is	1	2	3	4	5	U
b) The Situation with the <u>lowest</u> number of wolves I can accept is	1	2	3	4	5	U
c) The Situation with the <u>highest</u> number of wolves I can accept is	1	2	3	4	5	U

Your Opinions Regarding Managing Wolves in Washington

7. How strongly would you support or oppose using your Washington tax dollars for wolf management programs with the following goals?

	Strongly Support	Somewhat Support	Neither Support Nor Oppose	Somewhat Oppose	Strongly Oppose
a) Help people understand the importance of wolves.	1	2	3	4	5
b) Keep deer and elk populations balanced.	1	2	3	4	5
c) Increase tourism in Washington	1	2	3	4	5
d) Promote use of non-lethal tools by ranchers to manage wolves approaching their livestock.	1	2	3	4	5
e) Preserve wolves as a wildlife species.	1	2	3	4	5
f) Keep wolves away from residential areas.	1	2	3	4	5
g) Compensate owners who lose livestock to wolves.	1	2	3	4	5

	Strongly Support	Somewhat Support	Neither Support Nor Oppose	Somewhat Oppose	Strongly Oppose
h) Encourage collaboration between conservation organizations and ranchers to develop, use and monitor proactive, non-lethal wolf management tools.	1	2	3	4	5
i) Encourage resident wolf populations for aesthetic benefits.	1	2	3	4	5
j) Provide various ecological benefits such as controlling other predators (i.e. coyotes and cougars), increasing food for other species (i.e. ravens and bears), and increasing vegetation by lowering the number of browsing species such as deer and elk.	1	2	3	4	5

8. Assuming additional funds are necessary to implement the Wolf Management Plan, how strongly would you

	Strongly Support	Somewhat Support	Neither Support Nor Oppose	Somewhat Oppose	Strongly Oppose
a) Washington's General Tax Fund	1	2	3	4	5
b) A statewide wildlife tax	1	2	3	4	5
c) The Federal Government	1	2	3	4	5
d) Private environmental organizations	1	2	3	4	5
e) Increased fees for hunting and fishing licenses	1	2	3	4	5

9. How strongly do you agree or disagree with the following statements?

	Strongly Agree	Somewhat Agree	Neither Agree Nor Disagree	Somewhat Disagree	Strongly Disagree
a) Wolves should be trapped and relocated to suitable regions of Washington where natural migration is difficult or impossible.	1	2	3	4	5
b) Wolves should be managed by hunting, like other large predators such as cougars and bears.	1	2	3	4	5
c) The most effective method of managing wolves is to educate the public about how to live with wolves.	1	2	3	4	5
d) The threat of a wolf hurting or killing a human is so low that it should not be an important factor in determining the total number of wolves allowed to live in Washington.	1	2	3	4	5
e) Hunting limits should be adjusted to allow for more prey for wolves.	1	2	3	4	5
f) Washington's wolf population should not be allowed to impact deer and elk numbers to the point where hunting of those species is more restricted.	1	2	3	4	5
g) I would not be worried about my personal safety when recreating outdoors in an area occupied by wolves.	1	2	3	4	5
h) Conservation groups and ranchers should work together to develop proactive and non-lethal methods for managing wolves.	1	2	3	4	5

	Strongly Agree	Somewhat Agree	Neither Agree Nor Disagree	Somewhat Disagree	Strongly Disagree
i) Wolf populations living in Washington would provide ecological benefits.	1	2	3	4	5
j) Conservation groups and ranchers should share the costs associated with developing, implementing and monitoring proactive and non-lethal methods for managing wolves.	1	2	3	4	5

10. How strongly do you agree or disagree with the following statements regarding how government agency personnel will make wolf management decisions?

	Strongly Agree	Somewhat Agree	Neither Agree Nor Disagree	Somewhat Disagree	Strongly Disagree
a) Adequately based on good science.	1	2	3	4	5
b) Consider the opinions of all Washington citizens in a fair way.	1	2	3	4	5
c) Use procedures that are transparent and accessible to the public.	1	2	3	4	5
d) Respond to wolf issues in a timely manner.	1	2	3	4	5

Your Experience With Wolves

The following questions pertain to your experience with wolves, or with coyotes or cougars. Circle one answer for each question.

11. Approximately how many times have you experienced the following?

	Never	Once	More Than Once	Unsure
a) Seen a wolf in the wild?	1	2	3	4
b) Heard a wolf howl?	1	2	3	4
c) Lived within 60 miles of known wolf populations?	1	2	3	4
d) Had livestock or pets killed by a wolf?	1	2	3	4
e) Killed a wolf?	1	2	3	4
f) Had livestock or pets killed by a coyote or cougar?	1	2	3	4
g) Killed a coyote or cougar?	1	2	3	4
h) Seen a wolf in some type of enclosed facility?	1	2	3	4

Some General Questions About the Respondents to Our Survey

The following general questions are being asked so that we can compare the opinions of Washington citizens with different backgrounds and experiences. Thank you again for your help.

12) Do you participate in any of the following outdoor activities? (Please check all that apply)

☐ Camping	☐ Hunting	☐ Bird Watching
☐ Hiking/Walking	☐ Canoeing/Kayaking	☐ Wildlife Photography
☐ Snowmobiling	☐ Snow Boarding	☐ Driving Off-Road Vehicles
☐ Skiing	☐ Viewing Wildlife	☐ Fishing

☐ Other Outdoor Recreation: _____

13) Have you belonged to any of the following types of organizations in the past three years?

a) An organization that is hunting related	☐ Yes	☐ No
b) An environmental organization that is not hunting related	☐ Yes	☐ No
c) An animal welfare or animal rights organization	☐ Yes	☐ No

14) In what county of Washington do you live? _____

15) In what other Washington counties have you lived for more than 5 years?

16) Is any of your immediate family's income provided directly from the following?

a) Livestock farming	☐ Yes	☐ No

b) Trapping ☐ Yes ☐ No

c) Conservation or animal protection organizations ☐ Yes ☐ No

17) What year were you born? 19_____

18) Are you male or female? ☐ Male ☐ Female

19) Please check your highest completed level of education. (Please choose one answer)

☐ Less than high school

☐ Completed high school or GED

☐ Vocational or trade school

☐ Some college

☐ Two-year degree

☐ Four-year degree

☐ Graduate school

20) What was the total 2007 annual income, before taxes, of all members of your immediate family living in your household? (Please choose one answer)

☐ Less than \$10,000

☐ \$10,000 - \$39,000

☐ \$40,000 - \$69,000

☐ \$70,000 - \$99,000

☐ Greater than \$100,000

☐ Choose not to answer

APPENDIX B: Public Tolerance of Wolves in Washington Compared to Conservation Variables Based on Six Survey Questions

<i>Survey questions and responses</i>	Response %				
	Strongly Disapprove	Somewhat Disapprove	Undecided	Somewhat Approve	Strongly Approve
In your opinion, how important are each of the following statements as a reason for having wolves in Washington?					
Future generations of citizens could benefit if we maintain wolves in WA (N = 242)					
Not a Reason	82.1	38.9	6.9	1.7	1.0
Slightly Important Reason	7.7	61.1	20.7	23.2	4.2
Somewhat Important Reason	5.1	0.0	48.3	41.7	18.8
Very Important Reason	2.6	0.0	6.9	30.0	71.9
Undecided	2.6	0.0	17.2	3.3	4.2
As predators, wolves could benefit from WA's ecosystem by helping control other wildlife populations (N = 243)					
Not a Reason	84.6	50.0	3.4	3.3	1.0
Slightly Important Reason	2.6	38.9	17.2	16.4	7.3
Somewhat Important Reason	2.6	5.6	48.3	52.5	24.0
Very Important Reason	10.3	5.6	20.7	26.2	66.7
Undecided	0.0	0.0	10.3	1.6	1.0
Wolves had an historic presence in WA and should be here now (N = 243)					
Not a Reason	82.1	50.0	17.2	3.3	2.1
Slightly Important Reason	10.3	50.0	34.5	19.7	4.2
Somewhat Important Reason	0.0	0.0	31.0	42.6	14.6
Very Important Reason	7.7	0.0	10.3	32.8	79.2
Undecided	0.0	0.0	6.9	1.6	0.0
Wolves provide food for other species such as grizzlies, eagles and ravens (N = 240)					
Not a Reason	84.2	66.7	11.1	14.8	6.3
Slightly Important Reason	7.9	22.2	22.2	26.2	17.7
Somewhat Important Reason	2.6	11.1	40.7	29.5	28.1
Very Important Reason	5.3	0.0	14.8	26.2	45.8
Undecided	0.0	0.0	11.1	3.3	2.1
Increased wolf populations could decrease levels of overpopulated deer and elk, improve growth of vegetation and create additional nesting sites for birds as well as food and building sources for beavers (N = 236)					
Not a Reason	80.6	50.0	11.1	8.2	5.3
Slightly Important Reason	8.3	27.8	7.4	11.5	6.4
Somewhat Important Reason	0.0	11.1	59.3	29.5	25.5
Very Important Reason	11.1	5.6	18.5	45.9	61.7
Undecided	0.0	5.6	3.7	4.9	1.1
How strongly do you agree or disagree with the following statements?					
Wolf populations living in Washington would provide ecological benefits (N = 238)					
Strongly Disagree	73.0	50.0	0.0	1.7	0.0
Somewhat Disagree	10.8	16.7	10.3	5.0	0.0
Somewhat Agree	5.4	0.0	41.4	51.7	28.7
Strongly Agree	5.4	5.6	17.2	23.3	69.1
Neither Agree Nor Disagree	5.4	27.8	31.0	18.3	2.1

APPENDIX C: Public Tolerance of Wolves in Washington Compared to Animal Appreciation Variables Based on Four Survey Questions

<i>Survey questions and responses</i>	Response %				
	Strongly Disapprove	Somewhat Disapprove	Undecided	Somewhat Approve	Strongly Approve
In your opinion, how important are each of the following statements as a reason <u>for having</u> wolves in Washington?					
There are people who appreciate wolves and want to know that wolves exist in WA (N = 243)					
Not a Reason	76.9	77.8	20.7	21.3	3.1
Slightly Important Reason	15.4	16.7	6.9	31.1	10.4
Somewhat Important Reason	0.0	5.6	58.6	32.8	35.4
Very Important Reason	7.7	0.0	10.3	14.8	50.0
Undecided	0.0	0.0	3.4	0.0	1.0
People want to view, hear, photograph or study wild wolves in WA (N = 243)					
Not a Reason	76.9	83.3	13.8	16.4	5.3
Slightly Important Reason	17.9	16.7	44.8	31.1	15.6
Somewhat Important Reason	2.6	0.0	34.5	29.5	26.0
Very Important Reason	2.6	0.0	3.4	23.0	52.1
Undecided	0.0	0.0	3.4	0.0	1.0
Regardless of our laws, wolves have a right to exist in WA (N = 243)					
Not a Reason	84.6	61.1	24.1	21.3	3.1
Slightly Important Reason	5.1	33.3	10.3	19.7	3.1
Somewhat Important Reason	2.6	0.0	34.5	23.0	12.5
Very Important Reason	7.7	0.0	20.7	36.1	80.2
Undecided	0.0	5.6	10.3	0.0	1.0
How strongly would you support or oppose using your Washington tax dollars for wolf management programs with the following goals: Encourage resident wolf populations for aesthetic benefits (N = 236)					
Strongly Support	5.4	0.0	7.1	3.4	24.1
Somewhat Support	0.0	0.0	21.4	16.9	35.8
Somewhat Oppose	13.5	11.8	14.3	23.7	5.3
Strongly Oppose	78.4	64.7	10.7	15.3	6.3
Neither Support Nor Oppose	2.7	23.5	46.4	40.7	28.4

APPENDIX D: Public Tolerance of Wolves in Washington Compared to Utilitarian Variables Based on Six Survey Questions

Survey questions and responses	Response %				
	Strongly Disapprove	Somewhat Disapprove	Undecided	Somewhat Approve	Strongly Approve
In your opinion, how important are each of the following statements as a reason for not having wolves in Washington?					
Wolves could eventually become another game species for WA hunters (N = 242)					
Not a Reason	78.9	55.6	58.6	57.4	65.6
Slightly Important Reason	13.2	27.8	1.3	16.4	9.4
Somewhat Important Reason	2.6	11.1	13.8	18.0	9.4
Very Important Reason	5.3	5.6	0.0	4.9	11.5
Undecided	0.0	0.0	17.2	3.3	4.2
Wolves could provide economic benefits in WA by increasing tourism (N = 240)					
Not a Reason	76.3	77.8	29.6	32.8	21.9
Slightly Important Reason	18.4	22.2	22.2	37.7	22.9
Somewhat Important Reason	5.3	0.0	22.2	21.3	33.3
Very Important Reason	0.0	0.0	11.1	4.9	19.8
Undecided	0.0	0.0	14.8	3.3	2.1
How important are each of the following statements as a potential reason to not have wolves in WA?					
Hunting will be reduced due to the impact on big game populations (N = 239)					
Not a Reason	2.6	16.7	29.6	49.2	60.6
Slightly Important Reason	5.1	16.7	18.5	24.6	19.1
Somewhat Important Reason	10.3	33.3	33.3	14.8	13.8
Very Important Reason	82.1	33.3	3.7	9.8	3.2
Undecided	0.0	0.0	14.8	1.6	3.2
There will be an increase of non-resident tourists in the state (N = 237)					
Not a Reason	64.9	77.8	63.0	77.0	76.6
Slightly Important Reason	10.8	11.1	11.1	11.5	10.6
Somewhat Important Reason	2.7	0.0	11.1	9.8	6.4
Very Important Reason	21.6	5.6	7.4	0.0	3.2
Undecided	0.0	5.6	7.4	1.6	3.2
How strongly do you agree or disagree with the following statements?					
Hunting limits should be adjusted to allow for more prey for wolves (N = 238)					
Strongly Disagree	86.5	72.2	10.3	11.7	9.6
Somewhat Disagree	2.7	22.2	17.2	21.7	17.0
Somewhat Agree	2.7	0.0	13.8	33.3	28.7
Strongly Agree	5.4	0.0	6.9	3.3	20.2
Neither Agree Nor Disagree	2.7	5.6	51.7	30.0	24.5
WA's wolf population should not be allowed to impact deer and elk numbers to the point where hunting of those species is more restricted (N = 236)					
Strongly Disagree	17.1	5.6	13.8	5.0	16.0
Somewhat Disagree	5.7	0.0	31.0	30.0	24.5
Somewhat Agree	0.0	5.6	27.6	26.7	20.2
Strongly Agree	77.1	72.2	10.3	18.3	21.3
Neither Agree Nor Disagree	0.0	16.7	17.2	20.0	18.1

APPENDIX E: Public Tolerance of Wolves in Washington Compared to Risk Perception Variables Based on Nine Survey Questions

<i>Survey questions and responses</i>	Response %				
	Strongly Disapprove	Somewhat Disapprove	Undecided	Somewhat Approve	Strongly Approve
How important are each of the following statements as a reason to <u>not</u> have wolves in Washington?					
Wolves are a danger to humans (N = 238)					
Not a Reason	28.2	27.8	22.2	36.7	62.8
Slightly Important Reason	25.6	27.8	14.8	45.0	31.9
Somewhat Important Reason	12.8	5.6	25.9	10.0	2.1
Very Important Reason	30.8	38.9	29.6	6.7	0.0
Undecided	2.6	0.0	7.4	1.7	3.2
Wolves are a danger to pets (N = 237)					
Not a Reason	13.2	16.7	14.8	36.1	39.8
Slightly Important Reason	10.5	27.8	18.5	32.8	45.2
Somewhat Important Reason	26.3	27.8	25.9	23.0	9.7
Very Important Reason	50.0	27.8	37.0	4.9	4.3
Undecided	0.0	0.0	3.7	3.3	1.1
Wolves may create high mgmt. costs for the state and this could deplete funds for other wildlife (N = 239)					
Not a Reason	5.1	0.0	7.4	13.1	37.2
Slightly Important Reason	5.1	22.2	18.5	45.9	37.2
Somewhat Important Reason	10.3	27.8	44.4	26.2	16.0
Very Important Reason	79.5	50.0	22.2	9.8	6.4
Undecided	00.0	0.0	7.4	4.9	3.2
Wolves are a danger to livestock (N = 239)					
Not a Reason	2.6	0.0	7.4	9.8	28.7
Slightly Important Reason	7.7	16.7	14.8	31.1	30.9
Somewhat Important Reason	15.4	16.7	22.2	44.3	26.6
Very Important Reason	74.4	66.7	51.9	14.8	11.7
Undecided	0.0	0.0	3.7	0.0	2.1
Livestock producers will have to take extra measures to protect their livestock (N = 237)					
Strongly Disagree	0.0	5.6	0.0	11.5	28.0
Somewhat Disagree	10.5	0.0	18.5	31.1	31.2
Somewhat Agree	7.9	33.3	25.9	41.0	25.8
Strongly Agree	81.6	61.1	48.1	14.8	12.9
Neither Agree Nor Disagree	0.0	0.0	7.4	1.6	2.2
Money that hunters and fisherman contribute by way of license and permit fees could be spent on wolves (N = 238)					
Strongly Disagree	15.8	38.9	33.3	36.1	59.6
Somewhat Disagree	2.6	11.1	25.9	29.5	9.6
Somewhat Agree	13.2	22.2	25.9	13.1	14.9
Strongly Agree	68.4	27.8	3.7	9.8	8.5
Neither Agree Nor Disagree	0.0	0.0	11.1	11.5	7.4
Undecided	2.6	5.6	28.6	8.3	8.4

Appendix E (continued)

<i>Survey questions and responses</i>	Response %				
	Strongly Disapprove	Somewhat Disapprove	Undecided	Somewhat Approve	Strongly Approve
How important are each of the following statements as a reason <u>to not have</u> wolves in Washington?					
Wolf management may lead to more Federal control of land (N = 239)					
Not a Reason	13.2	5.6	10.7	26.7	43.2
Slightly Important Reason	5.3	16.7	7.1	20.0	23.2
Somewhat Important Reason	5.3	16.7	14.3	20.0	16.8
Very Important Reason	73.7	55.6	39.3	25.0	8.4
How strongly do you agree or disagree with the following statements?					
The threat of a wolf hurting or killing a human is so low that it should not be an important factor in determining the total number of wolves allowed to live in WA (N = 238)					
Strongly Disagree	40.5	33.3	13.8	5.0	1.1
Somewhat Disagree	2.7	27.8	34.5	10.0	1.1
Somewhat Agree	8.1	11.1	17.2	13.3	5.3
Strongly Agree	27.0	16.7	20.7	51.7	36.2
Neither Agree Nor Disagree	21.6	11.1	13.8	20.0	56.4
I would not be worried about my personal safety when recreating outdoors in an area occupied by wolves (N = 236)					
Strongly Disagree	36.1	27.8	14.3	6.7	3.2
Somewhat Disagree	16.7	27.8	25.0	16.7	4.3
Somewhat Agree	11.1	0.0	25.0	11.7	3.2
Strongly Agree	8.3	22.2	28.6	38.3	35.1
Neither Agree Nor Disagree	27.8	22.2	7.1	26.7	54.3