Coexistence[1] Between Gray Wolves and Humans:

A Long-Term[2] Sustainability[3] Study

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"Wolves, like other wildlife, have a right to exist in a wild state. This right is in no way related to their known value to mankind. Instead, it derives from the right of all living creatures to coexist as part of the natural ecosystem." – Summary of Public Comment (SPC), 2007

[1] Coexistence: "the fact of living…together at the same time or in the same place." (Cambridge Dictionary, 2020)

[2] Long-Term Sustainability: existing for current and future generations, without an end date.

[3] Sustainability: "in a way that causes little or no damage to the environment and therefore able to continue for a long time." (Cambridge Dictionary, 2020)

Abstract

Gray wolves are essential keystone species[4] that regulate a biological ecosystem. (Estes, Terborgh, Brashares, Power, Berger, Bond and Wardle, 2011) There are many reasons why maintaining a healthy population of keystone species[5] in the wild is essential. Gray wolves: 1) Are family pack animals that work together as a team, (San Diego Wolf Conservation Center, 2019) 2) Create a trophic cascade[6], (Estes et al., 2011) 3) Are meant to be in the lower 48 states based on historical range, (Colorado Wolf and Wildlife Center, 2019) 4) Have been unfairly eradicated by humans in the past, 5) Have been identified as endangered species during specified times, 6) Have a symbiotic relationship with birds, 7) Serve an essential purpose warranting conservation[7], 8) Are the ancestors of domesticated dogs, 9) Have a fear of humans and tend to stay away from them (Colorado Wolf and Wildlife Center, 2019), and 10) Rarely attack humans. Some species transform our planet through their existence.

Despite scientific evidentiary support respecting the ecological importance of gray wolves, the canine continues to be a problem for many humans. If the problem is that there is a coexistence concern for gray wolves in the wild and humans living together, then a reason for this should be obtained if people are willing to share. Perception[8] is essential when deriving reasons for why coexistence is problematic for competing

[4] Essential Species: “absolutely necessary; indispensable” animals. (Dictionary.com, 2020)

[5] Keystone Species: “a species whose presence and role within an ecosystem has a disproportionate effect on other organisms within the system. A keystone species is often a dominant predator whose removal allows a prey population to explore and often decreases overall diversity.” (Dictionary.com, 2020)

[6] Trophic Cascade: “an ecological term for a process (of change) that starts at the top of a food chain and tumbles right down to the bottom.” (Collins Dictionary, 2020)

[7] Conservation: “the protection of plants and animals, natural areas, and interesting and important structures and buildings, especially from the damaging effects of human activity.” (Cambridge Dictionary, 2020)

[8] Perception: “a belief or opinion, often held by many people and based on how things seem; the quality of being aware of things through the physical senses, especially sight [humans]” or smell (wolves). (Cambridge Dictionary, 2020)

species. Humans reluctance to coexist with apex predators has consequences, some of which humans are already experiencing.

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The results indicated that a long-term sustainability solution depends on: 1) humans ability to minimize their own unchecked growth and development, in order to allow wild keystone species to live with the land, 2) the human species ability to change their perspective on wild species, thereby allowing them to live peacefully, in an ecologically balance manner, 3) the human species ability to adapt to new norms and implement protection strategies that ensure planetary health and human health, simultaneously, and 4) wolves ability to stay away from humans and their livestock. Coexistence between gray wolves and humans is dependent on mostly the human species ability to implement planetary health and human health measures, simultaneously.

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Literature Review

Trophic Cascade

Gray wolves are a keystone species that create a trophic cascade when they are either introduced, reintroduced, or removed from an entire ecosystem. They used to inhabit most of the lower forty-eight states, until humans started to eradicate them from their system. (Bangs, 1994) The wolves were viewed as a problem species because they killed grazing and big game animals, including: elk, deer, sheep, cattle and other herding species. (Bangs, 1994) Wolves disappeared around the 1930's from many states, a loss justified mostly by ranchers who claimed they interfered with the existence and survival of their livestock and hunters who viewed them as big game competition. (Bangs, 1994) While the removal of this canine allowed the prey species to produce and develop for human hunters to decimate, and humans to alter and inhabit the land, it also created an unstable ecosystem that directly and/or indirectly caused an overpopulation of prey species, destruction of natural vegetation in regions where healthy wolves once inhabited, and poor land and soil quality to develop. "In general, the loss of apex predators, such as the gray wolf, influence[s] the food chain of an ecosystem. The loss influences and/or alters the intensity of the herbivory, as well as the overall abundance or composition of plants in the area." (Estes et al., 2011) Some researchers and scientists have found that ecosystem collapse could happen when a top predator is removed from the functional food chain.

Many argue wolves have an inherent right to live on the land, regardless of their impact on the human species. Some conservationists of wild animals would argue that humans are drawn to the wild because it symbolizes and exemplifies traits we recognize in our own species. The understanding we have of the animal depends on "fleeting and incomplete" experiences with them and of them, in the wild. (Steinhart, 2016)

Keystone Species

Removing a portion of the food chain has adverse effects on the other wildlife in the ecosystem. "While the effects of different species interactions on each other are not always readily evident, there is an

impact to removing a portion of the food chain. Prey species could either multiply rapidly, or diminish in numbers, due to the other adverse conditions. Removing an apex predator [creates a top down effect]" (Estes et al., 2011), where forest disease that was once manageable by a balanced ecosystem, starts to develop and spread, because weaker prey species are not being removed by the top down process, and prey species overpopulate an area, because there is no predator to regulate their pack numbers. (Estes et al., 2011)

Removal of a keystone species could directly or indirectly influence the health and quality of the vegetation in the area where the species were once eradicated. Based on a study conducted through Oregon State University, research found that the reintroduction of wolves into Yellowstone National Park has allowed the willow trees in the vicinity to grow much taller than they were growing, when the wolves were not present. (Oregon State University, 2020) Without the wolves to regulate the elk populations, the study found that the willows were being suppressed by the influx of the prey population, overusing, and browsing the land. (Oregon State University, 2020) The report compared data between the time periods of 1988 – 1993, 2001 – 2004, and 2016 – 2018. (Oregon State University, 2020)

Yellowstone Wolf Plans

When the wolves were released into Yellowstone National Park in 1995, it was considered a "soft release" because packs or pairs of the canines were captured from Canada, placed in a holding facility, fed by their capturers, and then released into the backcountry after a few months. (Steinhart, 1995, pp. 265) Yellowstone discovered that the reintroduction of the gray wolves into Yellowstone National Park created a "healthy ecology of fear in the elk populations. The aspen trees, that the elk once feed upon too abundantly, [started] growing back in stronger numbers." (Binns, 2007) According to the "Great Predator Debate", provided by the Idaho Wolf Education and Research Center, removal of the apex predators would eventually have adverse effects on humans. Humans are thriving on the land that they have altered and developed, while animals are merely surviving. (Idaho Wolf Education and Research Center, 2020) For many people, the

reintroduction of the wolf to Yellowstone, represented a return of true wildness to the symbolic heart of wilderness found in North America. (Steinhart, 1995, pp. 238)

Colorado Wolf Plans

Colorado's Wolf and Wildlife Center (CWWC) has investigated some of the opinion pieces regarding wolves supposed depredation on livestock, in response to their restoration efforts to have gray wolves reintroduced into the Colorado Rocky Mountains. CWWC claim that a respondent does not need to choose the wolf or elk side, as the concern is not necessarily two- sided; "A vote to restore wolves in western Colorado does not make someone against elk." (Colorado Wolf and Wildlife Center, 2018) The statistics they use claim that the state of Colorado has over 758,000 deer and elk prey populations, numbers that are "more than enough to share between hunters and natural carnivores." (Colorado Wolf and Wildlife Center, 2018) According to their findings, there are some areas where the elk populations are so abundant, that "multiple tags are awarded to each hunter and hunt success rates are high." (Colorado Wolf and Wildlife Center, 2018) The numbers that indicate the elk populations are thriving based on their population numbers, are reported about 25 years after the reintroduction of the wolves into Yellowstone and Idaho. Instead of prey populations deaths being connected to wolf depredation, these studies suggest that prey species death is often more likely tied to the fatal Chronic Wasting Disease (CWD) that infects populations. A 2011 study found that the presence of wolves, instead of influencing the spread of the disease, could help mitigate and/or even prevent the spread of CWD, because these predators are a natural filtration system that hunts and preys on the weak and sick populations, removing them from the herds before they infect the rest of their population. (Sargeant, Weber, & Roddy, 2011) The CWWC argues that the reintroduction of the wolves into their state does not have to do with selecting a side but re-establishing a natural balance into the ecosystem.

Idaho Wolf Plans

When the wolves were released into Central Idaho in 1995, it was a “hard release” because the experimental population was captured from Canada and released directly into the wild national forest, without a waiting period. (Steinhart, 1995, pp. 264) Based on political preferences, “predatory bureaucracy is the definitive history of America’s wolves and [the] policies towards predators.” (Robinson, 2005) To further support this predatory bureaucracy concept, Idaho Department of Fish and Wildlife (IDFW) developed and implemented their management plans for wolves based on the supposed preferences and viewpoints of the Idaho residents and population; according to their findings, most of the Idaho population does not want the wolves here. (IDFW, 2020) Idaho Fish and Game (IDFW) open hunting season to appease the hunting public. (IDFW, 2020) The office claims that opening a wider hunting season would likely have little to no impact on the total number of wolves in the state, because hunters do not often catch wolves. (IDFW, 2020) Most of the wolves hunted and killed are younger wolves, who tend to stray from their pack, or that are curious enough to travel into areas where hunters could trap and kill them. (IDFW, 2020) IDFW used to collar wolves much more frequently, but now use cameras to track the species behavioral patterns and whereabouts. (IDFW, 2020) The landscape of the Yellowstone National Park area is arguably much more conducive to effective wolf monitoring, while the landscape in Idaho is rugged and challenging. (IDFW, 2020)

IDFW’s hunting report has expanded the hunting season in many of the state’s regions for the 2019 and 2020 season, in order to “better manage…wolf population[s] at a level that balances long-term persistence with reduced conflicts with livestock, and also maintain[s] big game herds at levels that provide ample hunting opportunities.” (Idaho Big Game 2020 Seasons & Rules, 2019) The expansion of hunting opportunities in the state of Idaho has enraged wolf conservationists and those who seek to protect and support this endangered species. The Federal government has begun to strip wolves of their endangered species status, based on the current administration objectives. The state of Idaho has systematically begun to strip the wolves of their protections, by opening the hunting season range. Ed Schriever, Director of IDFW, and

the report suggests that Idaho's deer herds are "healthy and abundant" and hunting activity is a family tradition that goes back generations. (Idaho Big Game 2020 Seasons & Rules, 2019) Consequently, IDFW wants to continue to provide the opportunities for hunting, fishing and trapping families and people to enjoy their sport and continue to obtain big game food. Unfortunately, big game hunting also includes trophy hunting, which damages the prey populations and reduces the apex predator populations, unnecessarily. Their report findings indicate that the population of elk are in "good shape", and near "historic levels" in some cases. (Idaho Big Game 2020 Seasons & Rules, 2019) The statewide harvest amounts have exceeded "20,000 animals for five straight years", which "has happened only once before". (Idaho Big Game 2020 Seasons & Rules, 2019) The rules and plans focus on improving relationships with private landowners, livestock owners and reducing "crop depredation caused by deer and elk on private lands." (Idaho Big Game 2020 Seasons & Rules, 2019) According to IDFW's findings, the expanded hunting season in Idaho is meant to maintain longer-term persistence of the wolf populations, with a healthy prey population available for hunters to harvest; the actual results of the rules are currently unknown and may be much more destructive to the species than the department acknowledges.

International Wolf Plans

Poland implemented a human dimensions study in 2019 across 6 regions where wolves were present continuously or where they were recently reintroduced, focused mostly on rural resident's perspectives and foresters. (Gosling, Bojarska, Gula, and Kuehn, 2019) The study obtained 292 responses from rural residents, and 325 respondents from foresters. (Gosling et. al., 2019) The findings found that most of the responses were either neutral or positive, with respect to wolf protection and recovery. (Gosling et. al., 2019) The responses varied across regions with differing historical populations and current populations of wolves. In regions where wolves were recently reintroduced, there was more favor for protecting them, than in regions where they had already existed for years and depredated on livestock. (Gosling et. al., 2019) The harm to livestock is a major

contributing factor to implementing wolf management plans and has a large impact on the outcome. (Gosling et. al., 2019) Foresters tended to have more negative attitudes towards wolves across all the regions than the rural residents, who required more education on the wolf dilemma to fully understand the benefits of ongoing wolf conservation. (Gosling et. al., 2019)

France exterminated their wolf populations in the early 1930's. (Skogen, Mauz and Krange, 2009) Wolves naturally began reentering the country over the mountains from Italy, amongst controversial speculation and challenges. These canines have reestablished themselves in the Alps, and compensation is paid through the Berne Convention for livestock damage. (Skogen et. al., 2009) Portugal arguably has a stable wolf population between roughly 200 to 300 individuals, with the species receiving country protections and ranchers receiving compensation for livestock loss. (Eggermann et. al., 2011) Spain's wolf population is estimated to be around 2,000 to 3,000, with compensation offered to ranchers for livestock loss. Wolves in Spain are a game species that has expanded into Madrid, Avila, Guadalajara and Salamanca. (Musiani, 2009) Italy has an estimated stable population of about 600 to 700 wolves, that receive country protections; (Boitani, 1992) their wolf populations have increased from about "100 in the early 1970's to about 300 at present and have made their way around Rome from population reservoirs in southern mountains to areas of higher human densities north of Rome." (Bangs, 1994) India has found a way for wolves and humans to coexist, with minimal management established on the populations. Wolves remain in a secure habitat during the day, and at night, they scavenge around human villages similar to coyotes, without posing a serious threat of attack. (Bangs, 1994) In many of these successful predator management programs, compensation for livestock loss and country protections are two of the main contributing factors to successful wolf stability, recovery and/or reintroduction.

Canada may arguably be one of the best places for wolves to exist. As of 1995, there were an estimated 50,000 wolves found in the wild. (Steinhart, 1995, pp. 156) Hunters take about 2,000 of the wild

wolves, while southern Alberta and British Columbia have the “highest harvest rates”. (Steinhart, 1995, pp. 156) Despite open hunting seasons, and being protected on only about 2.7 percent of the wild land, the wolves survive on this landscape, potentially due to less human population encroaching on the land. The wolves have wild space to roam freely, without too much restraint. (Steinhart, 1995, pp. 156)

Wolf Monitoring

Monitoring activities in Yellowstone National Park often receive contributions through the “Rare Animal Observation System”, for rangers and resource management personnel to report wolf observations, wolf tracks, and to capture wolf measurements. (Bangs, 1994) Biologists would spend “hundreds of hours surveying ungulate herds or locating radio-collared wildlife from aircraft. No reports of wolves in Yellowstone were collected between 1986 to 1993. A US Forest Service reported hearing wolves howling in 1993, but a survey flight conducted to locate them did not find any signs of wolves.” (Bangs, 1994) Unfortunately, sightings were not found in the immediate years, prior to reintroduction of the species in 1995. (Bangs, 1994)

IDFW allows its residents and visitors to document sightings of wolves and observations with their office through a reporting tool found on their website; this assists them with the discovery of wolf presence.

Conflict

Hunters and private landowners view wolves as a threat to their game and form of productive existence. The wolves are either viewed as competition for the big game hunting season, because they are hunting the same prey species humans are harvesting, and/or they are viewed as a cause of livestock depredation; whether the evidence suggests it or not. Defenders of Wildlife have found that wolf depredation could account for “less than 1% of livestock loss in the Northern Rockies.” (Defenders of Wildlife, n.d.) Humans perception of gray wolves has also been influenced by mythological connotations and negative “Big Bad Wolf” media attention given to the animal; to the point where people have learned to fear and hate the species, and

support the diminishment of their population numbers. (Skogen, 2009) Unwarranted disdain has led to the management and regulation of wolves based on human preferences for land and game, and not necessarily on the healthiest outcome for the wolf populations.

Actual reports of human deaths by wolf attacks, however, are few and far between, if not completely non-existent. A wolf attack was reported in 1985, based on a 1915 sled dog team of scientist's experience in Canada's Northwestern Territories. (Bangs, 1994) The female wolf attacked the lead sled dog, and then the scientists that came outside trying to ward it off. The wolf had arguably been defending itself, and understandably attacked in the manner it did, to protect itself from the assault it was receiving from the people. "It's no surprising that the wolf 'screwed its head round' and bit Jenness, for most wild carnivores will try to bite when grasped by the back of the next in order to escape." (Bangs, 1994) In this case, the wolf attacked in self-defense, and did not kill the dogs or the men; the men killed the wolf.

Other cases were reported of wolves attacking troublesome dogs, or people wearing clothing that smelled of prey animals that wolves hunt. In a 1978 experience on Ellesmere Island in the High Arctic, six wolves came towards a team of scientists that tried to ward them off; the wolves continued to approach them. In this region, the wolves do not have much experience with humans, so this was a unique encounter. The scientists were unsure of the wolves' purpose in this interaction, as they are not persecuted by humans in this area, and they are generally neutral to humans. (Bangs, 1994) The relevance seems to suggest that wolves in regions that have minimal human interaction, are generally curious of human species, and neutral towards them. In other cases, wolves with liters of pups nearby harassed people who came into their territory, because their young were close by; a natural response for any animal. (Bangs, 1994) A camper who shone a light on a wolf was bitten, because the light temporarily scared the animal. (Bangs, 1994) While these experiences suggest that wolves could attack if they are threatened, which is a natural response for any species, "…the fact that no one was seriously injured" was the main takeaway of these encounters. (Bangs, 1994)

The findings suggest that if a wolf were to really attack a human as they do with prey they hunt-to-kill, the result would be instantaneous and deadly. (Bangs, 1994) Graduate students and scientists studying wolves in the wild have been known to be attacked, because the researcher is intruding on the species habitat range and bothering the wolves. Wolves killing children who stray off into the fields have been reported, but mostly in India. The attack on researchers is due to healthy wolves reacting to perceived threatening situations where they would rather be left alone, and the killing of children or "child lifting" has been the result of irresponsibility on the child and parents part. (Bangs, 1994) Reports suggest that nobody could grab a wolf "by the neck or throat if it lunged the way it does at prey." (Bangs, 1994) The attacks that have occurred by healthy wolves in the wild have been related to wolves reacting to threatening and/or harassing situations.

The statistics on wolf attacks by tame wolves and wolf dogs in captivity, and wolves in the wild, need to be distinguished between each other, because mixing this data would provide for unreliable results on wolf behavior. If wolves mostly attack because they are being threatened, harassed and/or they are defending themselves, then this would differ between wolves that kill merely to kill, as humans do. Wolf attacks by sick wolves with rabies and healthy wolves also need to be distinguished between each other. The findings suggest that unless the wolf is a tame captive wolf, a wolf dog, or a wolf with a sickness, the wild species will rarely if ever attack humans for reasons other than self-defense; if the healthy wild wolves are mixed with the tame captive, wolf dogs, and rabid wolves, then the data will not be accurate. Findings for healthy wolves in the wild claim that "there is too much evidence that North American wolves are not dangerous to humans." (Bangs, 1994)

Instead of being violent, reports of wolf and human interactions in the high arctic, where wolves are not persecuted by humans and the encounters are rare, often find the canines to be friendly and playful with humans. (Bangs, 1994) Wolves are the ancestors of domesticated dogs. In one case, an ornithologist picked up a wolf pup and carried it back to his tent, with the mother wolf following in his footsteps the entire way; the mother slept outside the researchers tent until he released the pup. (Bangs, 1994) In another case, a

researcher in the high arctic had 7 wolves around him as he studied their den, with the pups playing with his equipment in a non-destructive manner; the mother and pups howled within a few feet as he took notes. (Bangs, 1994) The researcher would take video footage of the wolves, with the pups toddling up to him in a playful way, while the mother watched. (Bangs, 1994) The most dramatic experience of tolerance for this researcher was when the wolves killed a "musk-ok calf in front of him and his companion" and ate it right in front of them without being disturbed by the human presence. (Bangs, 1994) The wolves accepted these researchers, and never threatened them. (Bangs, 1994) At one point when the pups were two and three, the mother wolf became bothered or annoyed by the presence of the human but did not attack; she merely moved her family's location. (Bangs, 1994) The report suggests that wolves could attack humans if threatened, but they could also be personable, friendly, and responsive to relocation and adaption measures, when necessary. (Bangs, 1994) However, the conclusion is that the rare possibility of attack should not impede upon long-term protection and reestablishment. (Bangs, 1994)

Perception

Perception abilities vary between the human species and wolf species. Studies have been conducted to determine whether humans are themselves, domesticated animals. (Steinhart, 1996, pp. 139) Humankind has been fighting against the "dark, the formless, the terrible, the old chaos" (Steinhart, 1996, pp. 93) concept of wilderness and wildness[9] for generations, in its constant pursuit towards civilization[10]. The more civilized humankind becomes, the more detached it becomes from its wild ancestors from which it evolved. (Steinhart, 1996) Due to our evolved forms of perception, both species rely on difference senses to derive their truth about the world. Wolves rely more on their sense of smell, which is much more developed and sensational

[9] Wildness: "the character of being uncultivated, undomesticated, or inhospitable." (Dictionary.com, 2020)
"Today, the howl reminds us that our past is deep rooted in wildness…It epitomizes the wilderness we have fought so successfully to conquer and now must fight to save." (Steinhart, 1995)

[10] Civilization: "an advanced state of human society, in which a high level of culture, science, industry, and government has been reached." (Dictionary.com, 2020)

than the human's ability. Humans rely more on their sense of sight, often denying the smells associated with what they see, at a much more developed sensory level than a wolf's ability to view the color spectrum. (Steinhart, 1996) Humans ability to deny its existence, and remove itself from nature, is one of the many reasons why they have betrayed wolves. (Steinhart, 1996) Wolves are often viewed by humans as the epitome of what they have spent years civilizing themselves away from; this includes the canines many characteristics, from their howl, to the pack hierarchical structure, to their hunting abilities, to their ability to perceive the world around them. (Steinhart, 1996) Domestication[11] of the wolf has led to an infantile version of the adult wolf. (Steinhart, 1996) Domesticated dogs are often viewed as infants, while the wolf is considered the full adult. (Steinhart, 1996) Various studies on the differences between dogs and wolves have found that intelligence[12] excels in these animals, in different forms. (Steinhart, 1996) A dog is more adapted to a human environment, and therefore better at learning training tasks. (Steinhart, 1996) A wolf, on the other hand, is not as capable of following rudimentary tasks, as they are of practicing problem solving skills. (Steinhart, 1996) A wolf can perceptively utilize mechanical skills, by recognizing unnatural objects and occurrences within the habitat. (Steinhart, 1996) For example, they may view a fallen tree on a boulder, and know to stay away from it because it could mean trouble. (Steinhart, 1996) A dog, on the other hand, cannot perceive this type of risk, and may view the tree as a play device, and crawl over it, despite the inherent risks involved. (Steinhart, 1996) Dogs have adapted to a human environment. A wolf has adapted to a wild environment.

Humans intelligence is focused on objects created by humans. (Steinhart, 1996) For example, human's minds are focused on cars, clothes, or television, which represent an altered and unnatural reality they have created in a calculated manner (Steinhart, 1996) Wolves view the world with twists, turns, and connected

[11] Domestication: "Frank explains, selects for infantile qualities such as docility and dependence, and turns animals into infantile forms of their wild ancestors, since the infantile form is more trainable than the adult form." (Steinhart, 1996, pp. 131)

[12] Intelligence: "the capacity to adapt to changes in one's environment…depends on the environment one is in. There really is a qualitative difference between the natural environment and the human environment." (Steinhart, 1996, pp. 130)

natural processes that keep it alive. Wolves rely more on the sensory perceptions, while humans rely more on their calculated perceptions. (Steinhart, 1996) Humans are detached from the natural world, in varying degrees, while wolves are detached from the human world, in varying degrees. (Steinhart, 1996) The difference in perceptive abilities between wolves and humans challenges them to find a place of coexistence.

The concept of perspective inspired the methodological process for this research project. If humans had encroached on wolf habitat, could wolves learn to adapt to human's entry? Could human's compromise, and learn to live with wild wolves? Based on studies, if a dog could adapt to a human environment by perceiving the world around them through the lens of a human created world, then could a wolf do the same? Or would a wolf be the model of wildness, and continue to be associated with the old naturalistic world that humankind has been civilizing itself away from? The end goal of civilization has many consequences associated with it. While humans may view it as a humanistic achievement, its long-term sustainability possibilities may be much more limited, if humans continue to evolve on land that is inherently wild. Is civilization a long-term sustainability solution? Perception is important when creating a long-term sustainability plan.

Coexistence

Gray wolves were persecuted by humans until 1967, when they were placed on the endangered species list and when recovery plans were implemented, in 1974. (Bangs, 1994) Prior to these years, humans took over their habitat, and replaced the wolves that once existed throughout the United States, wherever big prey animals were found. (Bangs, 1994) Human predators replaced wild predators. Domesticated livestock prey replaced wild prey. Wolves experienced accidental death and poaching closer to where urban populations existed, and where roads were developed. (Bangs, 1994) Wolves began to demonstrate an intelligence and ability to adapt and persist, through human development. (Bangs, 1994)

The recovery plans have been most successful in regions where legal protections were established to protect their numbers, non-lethal deterrence strategies were implemented (Stone, Breck, Timberlake,

Haswell, Najera, Bean & Thornhill, 2017), and where human development has been minimized in wolf recovery areas. (Bangs, 1994) According to these findings, the ability for wolves and humans to coexist with each other, is dependent upon their ability to avoid each other's habitats. Where humans exist, wolves tend to receive secondary consideration, in favor of protecting the human rights that have encroached on wolf habitat. (Bangs, 1994) The findings for these statements are recognized in the Reintroduction of Gray Wolves to Yellowstone National Park and Central Idaho final report:

> So long as full or partial protection is granted wolves and prey remains adequate, the only habitat or human-use restrictions that seem necessary are those on activities that actually destroy wolf or prey habitat or that clearly hinder wolf dispersal. Hindrances would be (1) extensive corridors of open areas of high human settlement or use and (2) extensive livestock-raising areas. (Bangs, 1994)

Coexistence of gray wolves and humans depends on either human's decision to implement population control plans on their species, to minimize the spread of their numbers onto gray wolf habitat, or the revision of their practices, with legal ramifications, for wolf depredation. Ongoing education is necessary to explain to the public why coexistence of humans and wolves is necessary, for ecological balance and the protection of both human and wolf species long-term. Education could consider successful wolf population plans established in other countries, including Europe, Asia and India.

Non-lethal deterrence strategies are necessary for achieving coexistence. Multiple studies have been conducted to determine how effective these strategies are as a response to wolf depredation on livestock. In a study conducted over a 7-year period, that compared livestock protected areas to livestock enclosures that were not protected by non-lethal deterrence measures (Stone et al., 2017), researchers found that "sheep depredation losses to wolves were 3.5 times higher in the Nonprotected Area (NPA) than in the Protected Area (PA)." (Stone et. al., 2017) Wolves were not controlled with lethal measures in the PA area and sheep depredation in this region were attributed to wolves in "just 0.02% of the total number of sheep present, the lowest loss rate among sheep-grazing areas in wolf range statewide" (Stone et. al., 2017). The outcome

indicated that utilizing non-lethal control methods would help reduce livestock depredation caused by wolves. (Stone et. al., 2017)

For a humane approach to wolf management, there are various non-lethal deterrence methods available. Humane wolf management options include: “Foxlights, Turbofladry, range riders, wind dancers, carcass removal and use of multiple livestock guardian dogs…”. (Tilseth, 2020) Humans being present is a deterrence. When ranchers manage their livestock with a careful watch, multiple staff, and dogs to monitor and patrol the livestock enclosures, they could minimize livestock depredation; wolves tend to stay away from areas where humans are present. (Niemeyer, 2016) When ranchers practice predator and livestock protection simultaneously, promoting their organizational practices as “predator friendly”, they build relations with the authorities and minimize both livestock and predator loss. (Niemeyer, 2016) When ranchers keep their livestock away from enclosures that overlap into known predator territory, cooperate with authorities by going elsewhere, and bring their livestock into safe enclosures before it gets too dark, they minimize loss. (Niemeyer, 2016) Lava Lake Land and Livestock in Idaho was known for being “predator friendly” for years. (Niemeyer, 2016) On various occasions, they would relocate their livestock when they received notice that the area they planned to move their livestock to, was near a known wolf pack. (Niemeyer, 2016) The Phantom Hill pack, a rare all-black pack of wolves, were well known for years, frequently causing ranchers to relocate their livestock, before the last collared female named “Judith” 218.994 was shot by a hunter, and brought into a check station. (Niemeyer, 2016)

In order to restore wolves to the lower Rockies and Pacific Northwest, non-lethal management strategies needed to be developed as a response to the ranchers concerns about reintroduction. (Tilseth, 2020) Achieving a compromise was necessary to get multiple partners and organizations working together, for the reintroduction of gray wolves into Yellowstone National Park and Central Idaho, in 1995. Classifying the species as non-essential experimental wolves gave the U.S. Fish and Wildlife, the federal agency of the U.S.

government, within the U.S. Department of the Interior, the legal right to manage the wolves reintroduced. (Niemeyer, 2016)

Idaho Federal Recovery Plan [1995]

Federal regulations have established the gray wolf as an endangered species, due to the loss of their population numbers in comparison to their historic range. Management of the wolves has been largely left to the states to effectively determine strategies that would work for the state and its resident citizens, while also meeting the Federal regulations for wolf protection. IDFW claims their policies regarding wolves represents the views of the state residents, and their perspective, opinions, and requests for wolf management. (IDFW, 2020) While the Director may not agree that predation of livestock is the fault of the wolves, their management plans are established to meet the greater needs of the population they serve. (IDFW, 2020)

Public Hearings in Idaho have been conducted over the years, to gather feedback from the public on their perspective of wolves in the state. The Summary of Public Comments on the Draft Environmental Impact Statement for the Reintroduction of Gray Wolves to Yellowstone National Park and Central Idaho, dated December 19, 2007, obtained from Boise State University's Albertson's Library archives, indicates that the state responded to hearing responses they received from the public, when selecting methods for managing the wolves that were reintroduced into their state. (SPC, 2007) These public hearings were in direct response to the 1991 Draft Environmental Impact Statement (DEIS) that Congress directed to the U.S. Fish and Wildlife service, in consultation with the National Park Service and Forest Service, to prepare, covering five alternatives for how to manage the wolves in the state of Idaho. (SPC, 2007) The public comment period ran from July 1, 1993 to October 15, 1993. (SPC, 2007) Over 160,000 individuals, organizations and government agencies responded in this hearing, with over 12,000 letters, resolutions, hearing testimonies and 52 petitions. (SPC, 2007) "This degree of response from the public is very likely one of the largest for any proposed Federal action in our country to date and indicates the strong interest people have in the management of wolves." (SPC,

2007) Many different issues were raised regarding these animals, with all the comments taken into consideration. (SPC, 2007)

Five alternatives were recognized for management of the wolves, with the biggest issues surrounding: Big Game, Hunting Harvest, Domestic Animal Depredation, Land-Use Restrictions, Visitor Use, and Local Economies. (SPC, 2007) The five alternatives included: 1) Reintroduction of Experimental Populations (FWS proposal), 2) Natural Recovery, 3) No Wolf, 4) A Wolf Management Committee, and 5) Reintroduction of Nonexperimental Wolves. (SPC, 2007)

Alternative 1 would introduce the wolves into Central Idaho and Yellowstone National Park, "unless a wolf population (two wild breeding pairs, raising at least two young for the previous two years in an area) had been documented by October 1994," (SPC, 2007) which they had not discovered. Under this strategy, the wolves would be managed by FWS, with ongoing monitoring activity. Wolves could be killed or moved under this strategy, if they were the cause of livestock (cattle, sheep, horses and mules only) depredation, or if there was considered excessive predation on ungulate populations in the wild. (SPC, 2007) These over amounts would be determined by the department. There would be no Federal Compensation program under this plan. Toxicants would be prohibited from killing the wolves under this alternative, based on Animal Damage Control (ADC) policies and the Environmental Protection Agency (EPA) regulations, prohibiting these methods of killing the populations. (SPC, 2007) Wolves were estimated to recover by 2002 under this strategy.

Alternative 2 would mean no management of the wolves, with a natural recovery process allowed. No purposeful wolf reintroduction would be carried out, and the state would allow for the wolves to naturally reestablish themselves over time. (SPC, 2007) Wolves could move back into their historic range habitat in the northern Rocky Mountains and be allowed to remain there if not too much depredation of livestock or ungulate populations occurred. (SPC, 2007) There would be no Federal Compensation program, while a private fund would exist. (SPC, 2007) Wolves would not be controlled if conflicts arose, which they would, with livestock or domesticated animal attacks. (SPC, 2007) Any big game killing that interfered with recovery efforts

would result in land-use restrictions, while there would already be some land-use restrictions where wolf dens were located, in order to protect their habitat. (SPC, 2007) Road restrictions would result, where drivers would be limited in their ability to access certain areas, due to wolves located in those protected regions. (SPC, 2007) Livestock grazing would also be restricted on certain land, deemed to contain wolves in proximity. (SPC, 2007) Recovery and reestablishment of wolves, under this strategy, would take longer (estimated recovery would not be reached until 2012 in central Idaho), but it would be a natural recovery solution. (SPC, 2007)

Alternative 3 would involve complete extermination of the wolves, through any means possible. (SPC, 2007) There would be no endangered species protection placed on them, at the state or Federal level. (SPC, 2007) There would be no restriction on killing the wolves, nor a restriction on the method to exterminate them. (SPC, 2007) Poachers could use Animal Damage Control methods to remove the populations as they saw fit, and there would be no recovery in Idaho. (SPC, 2007) This method was utilized during the eradication era of wolf management, in the late 1800's and early 1900's. (SPC, 2007)

Alternative 4 would involve management of the wolves, with State, Tribal, and Federal Agency compensation for livestock predation. (SPC, 2007) Congress would amend the ESA or pass legislation that would change the current status of the wolves, from endangered species, to being classified as "special state-managed nonessential, experimental populations". (SPC, 2007) There would be few land-use restrictions in this strategy, and killing the wolves for attacking livestock, would be permissible. (SPC, 2007) Gray wolves would be estimated to recover in Idaho around 2015, based on this strategy. (SPC, 2007) They would also be managed as Big Game animals, based on the state regulations for big game hunting. (SPC, 2007). Recovery of the wolves in Idaho would take much longer to recover than in Alternative 1, but not as long as in Alternative 2. (SPC, 2007)

Finally, Alternative 5 would permit reintroduction of the wolves into Central Idaho by FWS, until 10 breeding pairs were established, without being designated as an "experimental population." (SPC, 2007) Wolf recovery would be a major priority, land-use restrictions would be implemented to focus on wolf recovery

(including road closures, grazing allotments, and protection of key wolf habitats), and these priorities would be promoted and established. (SPC, 2007) If wolves depredated on livestock or ungulate populations, no state management would occur. (SPC, 2007) If wolves continued to attack livestock, then they would be moved. (SPC, 2007) Compensation for livestock loss would be available from existing private programs, with no Federal compensation. (SPC, 2007) Wolf habitat would be protected, and wolves ability to obtain food through abundant prey, would not be minimized; in other words, there would be enough food for them to eat. (SPC, 2007) Under this strategy, they would likely recover by 2000. (SPC, 2007) This would be the fastest recovery strategy for the gray wolves.

U.S. Fish and Wildlife Service (FWS) selected alternative 1, with a focus on reestablishing an experimental population of wolves into Yellowstone and Central Idaho. The condition for release was that at least 2 naturally occurring wolf packs needed to be identified in those regions, prior to the experimental populations being released. (Bangs, 1994) This alternative allowed management of the wolves by government agencies and the public, in case they depredated on livestock, and impacted ungulate populations too significantly for human comfort levels. (Bangs, 1994) Land use restrictions would not exist once at least 6 packs were established. (Bangs, 1994) This alternative would allow for wolf recovery by 2002, with at least "10 breeding pairs, about 100 wolves", for at least 3 consecutive years. (Bangs, 1994)

This plan recognized that an estimated percentage of cattle, sheep and ungulates would be killed by wolves each year. (Bangs, 1994) The reintroduction would not affect hunter harvest of male ungulates, but could "reduce hunter harvests of female elk, deer, and moose for some herds." (Bangs, 1994) Bighorn sheep, mountain goats and antelope populations would not be affected, because the wolves would not be predicted to hunt these animals. (Bangs, 1994) Visitor use to view the wolves for recreational activity and park purposes would increase funding into the state parks system, estimated about $23,000,000, while the existence of the wolves would be estimated to be about "8,300,000 a year". (Bangs, 1994) The findings also estimated that "a

recovered wolf population may reduce populations of elk 5% - 30%, deer 3% - 19%, moose 7% - 13%, and bison up to 15%." (Bangs, 1994)

In Central Idaho, the recovered wolf population was predicted to kill a certain number of cattle, sheep and ungulates each year. (Bangs, 1994) Those numbers were estimated at approximately 1-17 cattle, 32-92 sheep and 1,650 ungulates. (Bangs, 1994) Additionally, in Idaho, the findings found that "a recovered wolf population" would not impact hunter harvest of deer, moose, bighorn sheep, or mountain goats, or impact the ungulate populations that significantly in Central Idaho. (Bangs, 1994) The predator existence would not cause any road restrictions, or limitations on public or private land, and revenue would be brought in for visitor purposes. (Bangs, 1994) There would be financial losses, hunter losses, and livestock losses. (Bangs, 1994) However, the benefits for reintroduction would be considered more favorable than the losses. (Bangs, 1994)

Idaho State Response Plan [2002]

A few years after the reintroduction plan was established for Central Idaho by the federal government, the State of Idaho prepared a plan in response to the reintroduction. The goal of their revised plan was to ensure the "long-term survival of the wolves in Idaho, while minimizing wolf-human conflicts that result when wolves and people live in the same vicinity." (Idaho LWOC, 2002) For the state of Idaho, human perception of wolves differed dramatically from human perception of wolves in other states, in favor of wolf protection and conservation. Even though ranchers could install fladry fencing as a deterrent to wolf depredation on livestock in their communities and on their private land, as a compromise and solution to the lethal take of wolves, many Idaho residents were still unwilling to accept these creatures in their nearby vicinity, whether they depredated on livestock or not; this is based on findings from The Wolf River Project. (Stone, 2020) The Wood River Wolf Project presented a webinar discussion on non-lethal deterrent strategies for managing wolves in the state of Idaho, on April 30, 2020, in Zoom virtual webinar format. The discussion represented how the

state of Idaho is one of the most challenging states and locations in the United States, if not the world, to advocate and practice wolf conservation, because the state is full of many sheep ranchers and herders who are intolerant of this apex predator. (Stone, 2020)

The state of Idaho challenged the federal reintroduction plan by referencing the Constitutional rights provided to citizens, under Article 1, Section 1, stating: “All men are by nature free and equal, and have certain inalienable rights, among which are enjoying and defending life and liberty; acquiring, possessing and protecting property; pursuing happiness and securing safety.” (Idaho LWOC, 2002) The state of Idaho asked the federal government on record, to remove the wolves from the state, by delisting them from their endangered status, and maintaining the position of the 2001 House Joint Memorial No. 5. (Idaho LWOC, 2002)

Under the state of Idaho’s plans, the state would maintain a much stronger management plan for gray wolves within their boundaries, classifying them as big game animals, rather than endangered species. (Idaho LWOC, 2002) Under the state’s plan: 1) The IDFW Manager could manage wolves through the department, 2) Tribes in Idaho could manage wolf populations, 3) The wolves classification would change from endangered to big game, “furbearer, or special classification of predator that provides for controlled take after delisting, at the discretion of the Idaho Fish and Game Commission,” (Idaho LWOC, 2002), 4) The wolves would be regulated and monitored, while maintaining actual wolf population numbers would be deemed unrealistic in the state of Idaho. As the regulators claimed, if “wolves…expand their range without causing unacceptable conflict, they will be allowed to do so” (Idaho LWOC, 2002), 5) There would be variable monitoring mechanisms for obtaining total wolf numbers, 6) Wolf Depredation Management would be controlled through the U.S. Department of Agriculture, as well as IDFW, where increasing numbers of wolves would be removed more aggressively, based on humans right to protect their person and property, on private, state and federal lands (Idaho LWOC, 2002), 7) Education would be continuously provided to emphasize wolf biology, management and conservation, with the state of Idaho deeming a balanced view of the “societal impacts of

wolf reintroduction" (Idaho LWOC, 2002), and 8) Funding would rely on Federal funding for establishment, since the plan recognizes that the animal is "of national significance", even though they fail to recognize it as an endangered species. (Idaho LWOC, 2002)

When the federal government handed over management of wolves in Idaho to the state, the authorities began implementing the response plan aggressively. (Niemeyer, 2016) Many state officials were infuriated that wolves had been reintroduced into their state and upset with the federal government for daring to perform the recovery. (Niemeyer, 2016) Regardless, enough wolves had established themselves, by the time the reins were turned over. (Niemeyer, 2016)

Methods

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https://www.academia.edu/43300164/Coexistence_Between_Gray_Wolves_and_Humans_A_Long-Term_Sustainability_Study

Informational Interviews

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Limitations

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Map Analysis

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Qualtrics Survey Analysis

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Outline

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ArcGIS Online Hosted Layer Published Map

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Attribute Table

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Photos and Video Clips

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Arc Story Map

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Fieldwork

Fieldwork data collected during the last week of winter quarter 2020, and spring 2020 included site visits to locations outside of the Boise, Idaho area where wolves could be found in the wild. On the relocation drive from Aliso Viejo, CA to Boise, ID during the second week of the winter quarter 2020, the researcher thought she viewed a black lone wolf close to the border of Nevada and Oregon, at about 1:05pm. This creature leapt over some cattle fences and entered the enclosure where three cattle were grazing about a quarter of a mile ahead. The location was in Malheur County, Oregon, along the 95 freeway, after leaving Humboldt County, Nevada. McDermitt is the closest city to where the lone wolf was viewed.

Since studies indicate that wolves have a low tendency to attack visitors entering their territory, some fieldwork was conducted in the winter 2020 and spring 2020 to marginally confirm this theory, after obtaining an Idaho Parks recreational permit, in the winter 2020. The mode of observation was hiking through wolf prone areas. The first hike was a guided tour through Yellowstone National Park, in March 2020. The second hike was a solitary walk, through the Boise National Forest in Idaho City, in May 2020. Both hikes included observation for wolf scat, listening for wolf howls, and looking for wolf tracks.

One site location for wolves was obtained at N 44.34693' W110.49763 in Yellowstone National Park, during the first hike tour experience on March 15, 2020; this is the lower basin area where a wolf pack was identified by visitors and the tour guide, the day prior. This place is next to Grand Loop Road, alongside the Nez Perce Creek, overlooking the open space area. The land in Yellowstone is volcanic, with about 90 percent of the park above intensive thermal activity. (SCTBCA, 2020)

Outings for wild gray wolves was restricted based on novel coronavirus covid-19 state restrictions, during the spring of 2020. (Idaho covid-19, 2020) The second hike occurred when phase 1 stay-at-home restrictions were lifted from the state. On May 11, 2020, the researcher made a trip to Idaho City to take a short hike through Pine Creek trail, for observational purposes. The goal was to put fear of predators into perspective, along a remote mountain trail in the Boise National Forest. A source indicated that wolves could be found in this location. Another source indicated they had seen wolves near Lucky Peak dam, along the road leading to the trail, in the winter. The hike included a review of the land, to observe whether any tracks, or remnants were around that could indicate wolf behavior and activity. If a sighting of wolf activity were identified, the researcher could report the findings to IDFW, to incorporate into their database from citizen observation. The fencing at the base of the trailhead was also observed. There were not any obvious signs of wolf activity. Again, the purpose of this observational walk was to view the trail system and the forest

characteristics, while searching for signs of wolf presence; the objective was to put fear of predators into perspective.

Based on the data and information collected from a wildlife professionals memoir account of the reintroduction of wolves into Central Idaho, and his experience in the field trapping and managing these predators, any potential fear of wolf attack was mitigated, during this trail walk experience, on May 11, 2020. The wildlife professional's findings indicated that: "wolves [had] killed only two people in the last 100 years in North America: a woman in Alaska who was jogging along a remote road, and a man who was hiking in Saskatchewan. There are few deaths attributed to wolves that the numbers barely register with state or federal agencies or health departments." (Niemeyer, 2016)

The overall purpose of the fieldwork was to utilize the lessons learned about gray wolves and apply the background to potential encounters in the wild. There were no expectations that wolves would be viewed in any of these experiences. Any observation of wild wolves would help identify place and location of this rare species and allow the researcher to learn more about this elusive animal.

The Idaho community is aware that gray wolves exist in the wild landscape of their state, based on reports that are published by wildlife management agencies and nonprofits. Actual observation by a researcher of wolf tracks, wolf scat, wolf howls, and/or actual wolf packs contributes to location-based information for these rare species, in Idaho. The goal is to confirm that gray wolves exist in the wild in Idaho, based on observation obtained through citizen outings. The researcher's inability to view a wolf during this short time frame, without tracking devices to locate the species, did not and does not imply that the canines do not exist in the wilderness of Idaho.

Gray Wolf Long-Term Sustainability Plan 2020

Essential

Idaho's federal gray wolf sustainability plan was established in 1994 for Yellowstone National Park and Central Idaho. Idaho's state plan was developed in 2002 in response to the federal plan. A future conservation plan is now being proposed, that will incorporate many of the decisions of Alternative 1's Reintroduction of Experimental Populations (FWS proposal) with additional specifications not already outlined, as an ongoing recovery plan for gray wolves in the State of Idaho. This sustainability plan is also influenced by the results found in the methodology section of this paper. The difference is that the reintroduced wolves and wolves already living in Idaho, would be classified as essential species, rather than as an experimental population, clarified in alterative 5 of the Idaho Federal Recovery Plan. As essential species, wolves would be protected under the endangered species act.

Based on research conducted surrounding this apex predator, it is clear that with more education and knowledge surrounding the issue, a majority of the population in the state of Idaho could be in favor of considering a long-term sustainability plan, focused on maintaining healthy populations of gray wolves in the state.

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New Proposed Plan [2020]

Ranchers

While some of the previously mentioned plan objectives would be considered, there would be some revisions to the already established Alternative 1 Plan. While it would be permissible for the ranchers and hunters to kill wolves if they attack their livestock, the ranchers would need to provide valid evidence that the wolf was responsible for the depredation of their livestock. The permissibility to kill a wolf is based primarily on the need to maintain reasonable relations with the ranchers, and allow them another outlet, other than

monetary compensation, for their traumatic loss; it is not implemented for the benefit of wolves. When investigated and audited for a kill, ranchers would be required to provide this evidence, after each take. If they fail to provide valid evidence, then a fine would be issued based on the individual monetary value of the wolf killed. Ranchers would need to apply for a hunting license and meet all state and federal regulations permitting them to kill an animal.

Hunting and killing wolves for excessive predation on ungulate populations would still be permissible. When investigated and audited for a kill, the hunters would be required to provide evidence that the wolves were responsible for the excessive predation on ungulate populations. If the findings indicated that humans were responsible for the excessive depredation of ungulate populations, not the wolves, or that disease (CWD or similarly related) caused by excessive livestock grazing, for example, was the actual cause of the death, then harvest[13] of the wolves would not be justified, and a large fine would be implemented on the human killer, not limited to the total amount each individual wolf is worth in its protected area. Since it is estimated that the value of wolves existence is about $8,400,000 a year in Central Idaho, this amount would be divided by the estimated total number of wolves in the State of Idaho, in order to determine the individual value of one of the apex predators. This number would be revised yearly, based on the total value of the wolves in existence in the state that year. The individual value of the wolves could not be drastically altered each year. The deciding agency or department would then select the level of financial responsibility to place on the hunters and/or ranchers, found guilty of poaching a wolf that was not at fault for depredation of their livestock, or excessive depredation of ungulate populations.

IDFW Management

IDFW would no longer be responsible for managing the gray wolf population numbers, through lethal operations. They would be responsible for issuing permits to ranchers and hunters, enforcing protection

[13] Harvest: “catch or kill (animals) for human consumption or use.” (Dictionary.com, 2020)

measures for the endangered species, and monitoring the total number of wolves in the state. The system already in place for citizens to report their observations of wild wolves to the department would still be in effect, and could be found at this website: https://idfg.idaho.gov/species/observations/add#speciesid-19117. The department would be responsible for finding strategies for coexistence of gray wolves and humans, through non-lethal control methods.

IDFW management could include relocation of wolves who were found guilty of excessive predation on livestock or ungulate populations. Ranchers who contact authorities regarding perceived livestock depredation could receive a monetary reward, on a case-by-case basis determined by the department, for identifying the wolf depredation, and avoiding lethal take of the predator as a response. Lethal take of wolves through any means possible, including: shooting, poisoning, trapping, snaring and other methods of control by ranchers, would be discouraged and penalized, if they were found guilty of engaging in the practices in a revengeful manner, for wolf depredation on their livestock. Many ranchers are known to quickly blame livestock loss on wolves, without fairly assessing the situation. (Niemeyer, 2016) This continuous practice of blame without evidence, would not be acceptable by the authorities. Federal and state trappers in the State of Idaho and neighboring states who are legally permitted to provide this type of assistance, would be able to employ non-lethal capture strategies to relocate wolves, including with: trapping devices that cause minimal damage, such as McBride #7, darts that do not cause damage to the animal other than to sedate them, and non-excessive medication and vaccines, meant to calmly transport the animals to new locations and cure them of any diseases. (Niemeyer, 2016)

Management of wolves through capture methods would also be permitted by the department for routine collar replacement, non-lethal research purposes, reintroduction recovery efforts, and/or to administer veterinary measures that do not cause undue harm to the animal. Undue harm would include veterinary services that alter the animal through means other than neutering or spaying, and means that shorten the wolf's life expectancy, unnecessarily.

Even if the removal of the state of Idaho's lethal wolf control measures would cause human conflict, the state residents would be required to adjust to the endangered species protection granted to gray wolves in the state. Idaho would have to manage human conflict to determine if wolf conflict occurs and determine the underlining reasons for the human conflict. If Idahoans challenging the protection regulations are doing so merely because they are intolerant of wolves, and do not want to implement deterrence strategies just because they do not like this apex predator, they would have to be managed through discussion and education, focused on the importance of the gray wolf in ecological systems. Studies have found that wolves could exist in a state of nature without humans. However, humans could not necessarily survive without wolves, because the loss of the apex predator would create an unnatural ecological imbalance that would eventually harm human health and future generations of people, through the trophic cascade scenario. (Estes et. al., 2011) Through education, these conflicted humans would be provided valid information on why the wolves are essential to the state, and their intolerance of the animal is unsubstantiated, bordering the lines of oppression, violence, assault on human long-term health and well-being, and destructive to planetary health pertaining to natural resources.

While constitutional rights under Article 1, Section 1, claim that men are free and equal, and have rights that protect their life, liberty, property, pursuit of happiness and safety, evidence would be provided in response to this statement, that demonstrates how the conflicted individual could deter wolves away from their property. Implementing deterrence strategies would maintain these individuals' constitutional rights, while also ensuring the rights of their neighbors and other United States citizens. Education would be provided on why singular individual rights could jeopardize the rights of thousands to millions of other people, based on the current generation and time-period we have now entered. The health and welfare of many could be adversely affected, by the intolerant destructive lethal wolf management actions, of a single individual. In response to the State of Idaho's 2002 plan, the health, well-being, and protection of thousands to millions of

other people's constitutional rights, would take precedence over the individual protection of one single individual.

This focus on the constitutional rights of many versus a few, is based on the current unpredictable, conflicted time-period the U.S. and the World have entered together, witnessing the spread of environmentally induced and heighted natural resource catastrophes, including but not limited to: covid-19, wildfires and climate change. (Vidal, 2020) There has been a disconnect between the health of human beings and the health of the environment over the years, paving the way for a new discipline known as planetary health. (Vidal, 2020) Planetary health bridges the connection between human health and planetary health. "Kate Jones, chair of ecology and biodiversity at UCL, calls emerging animal-borne infectious diseases an 'increasing and very significant threat to global health, security, and economies.'" (Vidal, 2020) In order to curb the spread of infectious diseases potentially caused by human destructive activities on the environment, thereby affecting human health, it is necessary to consider the constitutional rights of the majority, over the individual, when it comes to enforcing endangered species protections.

Hunters

Gray wolves would continue to maintain their endangered species status and be protected under federal and state laws. For hunters, it would not be permissible to kill wolves without valid reason for the action. Valid reasons for killing one of these protected predators would be: 1) If the wolf was threatening the well-being of a person and it was clear that killing the predator was the only recourse, 2) If the wolf was diseased or injured, and killing the wolf would be more humane than continuing its suffering, and 3) If the wolf was excessively depredating on livestock and/or ungulate populations, and it was not actually eating the prey animal it killed; valid evidence for this activity would need to be provided and documented. If ranchers or hunters kill a wolf, they would be required to document the take with state and federal authorities, with evidence provided for reason of the kill. If found guilty of averting the law, the ranchers or hunters would be

fined, and potentially sentenced to imprisonment. Each of these reasons for killing wolves would be strongly discouraged, by offering tax incentives at the end of the year for individuals who do not kill a wolf, but instead utilize deterrence and preventative non-lethal strategies.

Trophy hunting of gray wolves, including but not limited to: aerial gunning, poison controls, trapping/snares and land-and-shoot is prohibited. Hunters and ranchers would find themselves facing fines, and imprisonment, for hunting gray wolves for sport. Shooting and killing a wolf based merely on the assumption that they caused depredation, or unsubstantiated fear that their presence is a disturbance, would be illegal reasons to kill a wolf. Harassing a gray wolf by locating it in its wild state of existence, and then disturbing it by throwing items at it, getting too close to its dens, cornering it, and/or preventing it from escaping, would be punishable by fines and possible imprisonment, depending on the severity of the harassment. On a case-by-case basis, the media could become involved.

Compensation for Loss

There would be federal and state compensation programs for livestock depredation loss caused by wolves. Compensation from existing private funding sources would also still be permissible. The government would focus on educating the ranchers on how to effectively manage their land, through non-lethal wolf deterrence strategies.

Deterrence

The ranchers would be required to establish safer fencing around their land, whether that means through building higher fences that wolves cannot jump over or setting aside a portion of their livestock each year to be considered predator food. The ranchers would be compensated by the government to set aside select cattle or other livestock for the wolves to eat, to deter them away from their more economically beneficial producing cattle and livestock. This practice of feeding the predators would establish a balance between the ranchers and wolves and would allow both livestock management and natural predation to

occur, in order to maintain as healthy an ecosystem as possible, along with meeting the demands placed on ranchers for economic livestock production. Since the practice of slaughtering livestock for economic gain could be considered as violent and unnatural as a wolf excessively killing livestock or ungulate populations, the ranchers would be educated on their tendency to behave similarly to the wolves they are accusing of violent and inhumane depredation. A compromise could then be reached, through education and understanding of the consequences of both species' actions.

Ranchers would be required to practice non-lethal strategies for wolf management, if they do not want to feed the predators. There are a variety of non-lethal deterrence methods that have been effective. (Stone, et. al, 2017) Ranchers could focus on establishing safer fencing around their land, by incorporating fladry around their livestock enclosures. (NY Conservation Center, 2020) Government compensation could be offered if the ranchers need to replace their current fencing with this recommended deterrence, and/or the challenges to employ the fencing would create an additional financial strain; it is understood that there is a known higher capital cost associated with this deterrence tool. (Primm & Robinson, n.d.) Education could be offered voluntarily free of charge, for workers who require additional assistance with installing and utilizing this fencing strategy. Fladry is a line of cordage, with red flags that are draped along the fencing. Field experiments have found that this fence could be effective for up to 60 days, to deter wolves away from pastures. (Primm & Robinson, n.d.) When combined with a sufficient electrical current as "Turbo Fladry", the fencing is much more effective in longer-term deterrence, to keep wolves away from sensitive livestock enclosures. (Primm & Robinson, n.d.) If ranchers are concerned that the implementation of fladry fencing would indicate their preference for gray wolf protection, then they could be educated to understand that their employment of this required fencing does not automatically indicate their preference for gray wolf conservation efforts; the implementation strategy is merely a required installation for healthier and safer livestock protection practices.

Rationale

Ranchers have encroached on wolf habitat, so they would be responsible for ensuring that their practices do not excessively interfere with the natural ecosystem balance, requiring apex predators. If it is found that ranchers are contributing unnecessarily to climate change and additional unnecessary ecological destruction, then they would be required to pay added fines for their destructive practices. Continued education would be required by ranchers, so that they are made aware of the natural imbalance consequences of their slaughtering actions on the ecosystem, and agricultural production on the land. The consequences for not engaging in long-term sustainability practices, including feeding the predators, or implementation of deterrence mechanisms, would result in fines being issued, based on the total value of the landowner's assets, and their income; similar to an income-driven repayment plan.

Human Population Control

While the concept of human population control on growth is a contentious issue, implementing this objective would allow wolf recovery to be more successful in the United States. Since findings suggest that wolf recovery is more successful in deeply wooded areas, with minimal human interference and habitat areas with less road and urban development, it is clear that humans need to minimize their extensive increase in population numbers in the U.S. and abroad, in order to compromise with wolf recovery and other species recovery plans. (National Congress on Optimum Population and Environment, 1971) Studies have been conducted to determine people's perception of the human population growth problem. (Meffe, 1994) The U.S. could look to previously established population control methods utilized in other countries that have implemented population control policies, including China's "one child per family", Pakistan's "2.1 births", Russia, and/or Korea or begin to implement their own. (The Wilson Quarterly, 1996) "'We fail to mandate economic sanity,' writes Garrett Hardin, 'because our brains are addled by compassion,'" a concept he argues

is challenging our natural resources to their capacity, placing us all on lifeboats that do not have enough room to save the entire sinking human population. (Hardin, 1995)

A population control method that could be experimented with could be to designate people in different categories, based on their family sizes. The first category of people would be considered “givers” if they choose to have no kids, or 1 child. They would be considered “givers” because they would be giving up their ability to have 2 or more children, thereby reducing population size because 0 and 1 is less than the total number of 2 parents needed to produce a child. They could even receive monetary awards as tax right offs at the end of the year from the government, for being in this category. The second category would be considered “stabilizers”, or parents who have 2 children, to equal the total number of 2 parents needed to produce a child. In vitro parents would be considered within each of these categories because even though one parent may not be present throughout the life of a child, the sperm or egg needed to produce the child still belonged to a live man, thereby requiring 2 people. The LGBT community would still be considered in these categories if they chose to have children through in vitro methods. The second parent whose sperm or egg was not utilized, would be responsible for paying for the child created by the in vitro parent, if the couple is legally wed, while the non-present parent would not be responsible. The third category would be considered “developers” because they would be the families having more than 2 children.

Similar to the way people are required to pay for excess baggage on an airplane, people with more than 2 children would be required to pay more for their increased number of children. While the first 2 children would be designated within the givers or stabilizers population, as evidence on their drivers licenses, id cards, social security cards and birth certificates, any child over the 2nd in a family would have the label “developers” on their drivers licenses, id cards, social security cards and birth certificates, indicating that their parents chose to pay more for them.

Parents with more than 2 children would understandably, or ideally, be parents with more money to pay for their additional expenses. They would have to pay more on their taxes each year, they would not

receive write-offs for having more than 2 children, and they would have to pay an increased amount at any public facility they take their child to that requires payments. For example, hospital bills, parks, education, libraries, museums, and other publicly funded programs, would charge a higher fee depending on the status of the child. Parents would be responsible for paying the added fees until the child reaches 18 years of age. Private companies could choose whether they want to charge higher or not, on a voluntary basis.

These fees could be considered “excess” fees, to offset the challenges placed on the economy and natural environment, for increasing the population. The economy overall would change, from making money off of a growing population as a benefit, to making money from a growing population as a cost. Education for “developers” parents focused on explaining why creating excess numbers would be problematic for the economy and natural environment would be required at least every three years, for a total of six years, while their children are growing up. It would not be legal to discriminate against these “developer” children in comparison to the “givers” and “stabilizers”, other than to designate them to establish proper fees. The children would not be responsible for their parent’s choices. They would be required to pay if they continue the excess process with their own children.

Preventative, non-destructive birth control measures, a step above goodwill and voluntary constraints, would be preferred over disease outbreak birth control methods or fertility control practices at childbirth. (Hardin, 1995) Proponents of human population control could review abortion and fertility policies for more information if they are interested in this route. (Seminar of Human Fertility and Population Problems, 1963) The incentive program to discourage excessive birth would ideally, minimize the need to practice a medically induced birth control program, where children would be neutered in the same way a pet animal is. Disease virus outbreaks similar in nature to the coronavirus covid-19, would be considered a fatalistic and destructive approach to population control. The birth control program through disease outbreaks would be considered destructive, not preventative, since this form would occur after the population has already exceeded its

intended growth numbers. A human population control policy that prevents the births is preferable to a method that controls the numbers after the impact.

Goal

The purpose for establishing these regulations would be to monitor the wolf populations, hunters, rancher's, and human growth activity, in order to ensure that a compromise is met, and the unnatural increase of livestock production, hunting depredation, and human population development, is not degrading the land to the point of dangerous fatalistic revolt within the panarchy[14] model. Essentially, the objective would be to minimize as many deaths as possible, of both human and wild animal species. The long-term sustainability plan would override current plans that preserve civilized human life, at the expense of wild animal life. If it is unclear why livestock and hunting depredation is destructive, then education would be offered to explain the dangerous unnatural imbalance of predator loss, affecting all human and animal species, in the long-term. Wild wolves' ability to completely stay away from humans, a strategy that would ensure their continued survival, is deemed an idealistic goal by many humans. Therefore, civilized humans have a responsibility to mitigate the influence of their development and activity on the wild, to achieve long-term sustainability. Again, through education, conflicted humans would be provided valid information on why the wolves are essential, and their intolerance of the animal is unsubstantiated, bordering the lines of oppression, violence, assault on human long-term health and well-being, and destructive to natural resources.

[14] Panarchy: "the study of how economic growth and human development depend on ecosystems and institutions, and how they interact. It is an integrative framework, bringing together ecological, economic and social models of change and stability, to account for the complex interactions among both these different areas, and different scale levels." (Sustainable Scale Project, 2003)

Conclusion

When we educate with a full understanding of a species and its ecological impact on the environment, human individuals could learn to understand the importance of preserving the historic landscape, and why conservation of a species is so important. Developing a long-term sustainability plan depends on: 1) The human species ability to compromise its own unchecked growth and development, in order to allow wild keystone species to live with the land, 2) The human species ability to change their perspectives on wild species, thereby allowing them to live peacefully, in an ecologically balanced manner, and 3) The human species ability to adapt to new norms, and implement protection strategies that ensure planetary health and human health, simultaneously. “Man may yet restore himself to health if he will learn to understand himself in relation to the world of nature in which he evolved”, stated Montagu in Peter Steinhart’s *The Company of Wolves*. Wolves require humans to consider data and science, while also simultaneously integrating thought and feeling, to practice protection and conservation strategies. (Steinhart, 1995)

Gray wolves’ inherent value with the land, void of their influence from and for man, needs to be considered, while also understanding their keystone species status. The land may restore itself to health when humankind stops dangerously pushing the panarchy model into the revolt stage and allows nature to regulate itself through the natural process, without human interference. Mitigation and preventative strategies are preferable to lethal take, and destructive deterrence. Based on minimal fieldwork conducted, it is also clear that staying away from wild gray wolves is one of the best strategies to conserving their numbers and ensuring their survival. If wolves could learn to completely stay away from humans practicing lethal wolf strategies, this would also ensure their continued survival. When humans do not encroach on wolf habitat, wolves live. In order to curb the spread of infectious diseases potentially caused by human destructive activities on the environment, thereby affecting human health, it is necessary to consider the constitutional rights of the majority, over the individual, when it comes to enforcing endangered species protections on gray wolves, in

the state of Idaho. Essentially, a long-term sustainability solution for the coexistence of gray wolves and humans depends on the human species decision to step back and allow the planet to re-balance itself.

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Appendix

Definitions

Civilization: "an advanced state of human society, in which a high level of culture, science, industry, and government has been reached." (Dictionary.com, 2020)

Coexistence: "the fact of living…together at the same time or in the same place." (Cambridge Dictionary, 2020)

Conservation: "the protection of plants and animals, natural areas, and interesting and important structures and buildings, especially from the damaging effects of human activity." (Cambridge Dictionary, 2020)

Coronavirus (covid-19): "any of a group of RNA viruses that cause a variety of diseases in humans and other animals." (Oxford Dictionary, 2020)

Domestication: "Frank explains, selects for infantile qualities such as docility and dependence, and turns animals into infantile forms of their wild ancestors, since the infantile form is more trainable than the adult form." (Steinhart, 1996, pp. 131)

Essential Species: "absolutely necessary; indispensable" animals. (Dictionary.com, 2020)

Explanatory Variable: plotted on the x-axis, a type of independent variable by which the response variable depends. An entirely independent variable is not affected *at all* by any other variables. This variable is explanatory because it is not independent for certain. (Bolano, 2019)

Harvest: "catch or kill (animals) for human consumption or use." (Dictionary.com, 2020)

Intelligence: "the capacity to adapt to changes in one's environment…depends on the environment one is in. There really is a qualitative difference between the natural environment and the human environment." (Steinhart, 1996, pp. 130)

Keystone Species: "a species whose presence and role within an ecosystem has a disproportionate effect on other organisms within the system. A keystone species is often a dominant predator whose removal allows a prey population to explore and often decreases overall diversity." (Dictionary.com, 2020)

Long-Term Sustainability: existing for current and future generations, without an end date.

Panarchy: “the study of how economic growth and human development depend on ecosystems and institutions, and how they interact. It is an integrative framework, bringing together ecological, economic and social models of change and stability, to account for the complex interactions among both these different areas, and different scale levels.” (Sustainable Scale Project, 2003)

Pearson Correlation: method is the most common method to use for numerical variables; it assigns a value between − 1 and 1, where 0 is no correlation, 1 is total positive correlation, and − 1 is total negative correlation. (Nettleton, 2014)

Perception: “a belief or opinion, often held by many people and based on how things seem; the quality of being aware of things through the physical senses, especially sight [humans]” or smell (wolves). (Cambridge Dictionary, 2020)

Response Variable: plotted on the y-axis, the variable affected by the change of the independent variable. (Bolano, 2019)

Sig. 2-tailed: “The Sig(2-tailed) item in the output is the two-tailed p-value. The p-value is the evidence *against* a null hypothesis. The smaller the p-value, the strong the evidence that you should reject the null hypothesis. If you have a small p-value in this area then the test has a significant result; You can reject the null hypothesis that the mean is not equal to a specified mean. A “small” p-value is one that is less than your chosen alpha level; If you didn’t choose an alpha level, then use 5% (0.05). The “specified mean” is the one you stated in the “hypothesized mean difference” box when you ran the test.” (Statistics How To, 2020)

Sustainability: “in a way that causes little or no damage to the environment and therefore able to continue for a long time.” (Cambridge Dictionary, 2020)

Trophic Cascade: “an ecological term for a process (of change) that starts at the top of a food chain and tumbles right down to the bottom.” (Collins Dictionary, 2020)

Wildness: “the character of being uncultivated, undomesticated, or inhospitable.” (Dictionary.com, 2020)

"Today, the howl reminds us that our past is deep rooted in wildness…It epitomizes the wilderness we have fought so successfully to conquer and now must fight to save." (Steinhart, 1995)

Research Plan

Actor	**Interest**	**Involvement**
Idaho Fish and Wildlife	*This section has been removed based on IRB restrictions. If you would like the full results, you can view them on academia.edu: https://www.academia.edu/43300164/Coexistence_Between_Gray_Wolves_and_Humans_A_Long-Term_Sustainability_Study*	*This section has been removed based on IRB restrictions. If you would like the full results, you can view them on academia.edu: https://www.academia.edu/43300164/Coexistence_Between_Gray_Wolves_and_Humans_A_Long-Term_Sustainability_Study*
Monitoring Volunteer	*This section has been removed based on IRB restrictions. If you would like the full results, you can view them on academia.edu: https://www.academia.edu/43300164/Coexistence_Between_Gray_Wolves_and_Humans_A_Long-Term_Sustainability_Study*	*This section has been removed based on IRB restrictions. If you would like the full results, you can view them on academia.edu: https://www.academia.edu/43300164/Coexistence_Between_Gray_Wolves_and_Humans_A_Long-Term_Sustainability_Study*
Oregon State University E-Campus	Capstone Project	Faculty Adviser and Committee Members
Esri ArcGIS	Map Software Licensing	Gray Wolf Capstone Project

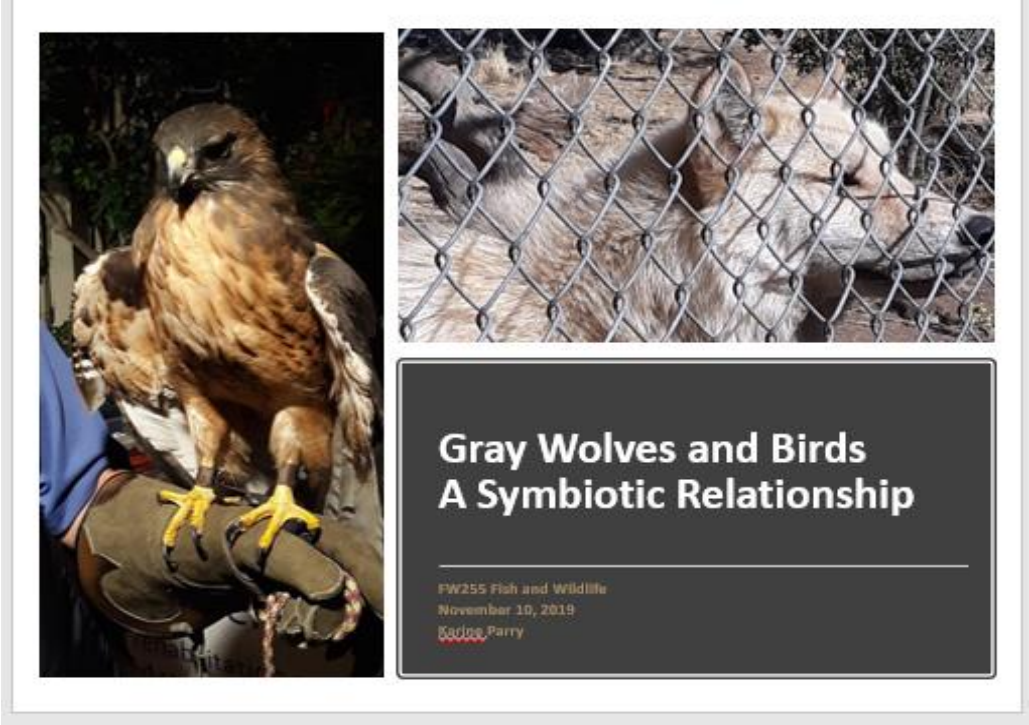
Spatial Scale	**Temporal Scale**	**Jurisdictional Scale**	**Institutional Scale**
History: Gray wolves once inhabited most of the lower 48 states. (See maps below for historic and current range)	History: The planet has been changing and evolving, for billions of years. Species grow, adapt and change to the natural cycles of the planet.	History: Gray wolves once roamed the United States because there were much fewer humans to attack them, and this was their native home.	History: Native Americans created folklore around gray wolves, and stories have been told, featuring the wolf. They are sacred animals in some cultures and did not need extensive protection.
Today: Gray wolves now inhabit parts of Washington, Oregon, Idaho, Wyoming, California and Nevada. Colorado is	Today: People are overpopulating the land, polluting the sea and sky, and destroying natural resources. The loss of gray wolves would	Today: Gray wolves have been extirpated from most of the lower 48 states. Many hunters are now turned conservationist and	Today: Gray wolves need continued protection by legal standards, as well as conservation efforts. There are many organizations that

trying reintroduce them.	mean quiet nights, and no natural filtration system for the prey population.	regret the actions of the early 1900's, against this apex predator.	fight for gray wolf safety and preservation.
Sustainable 1: Gray wolves are a keystone species and trophic cascade. This is a reason to restore their numbers.	Sustainable 1: Gray wolves help with climate changes, because they filter out weaker prey, and help prevent overuse of the land, by managing prey populations.	Sustainable: Gray wolves have endangered species status to protect them, meaning they have Federal support. Many states also have state and local laws that protect them, from being killed. Fish and Wildlife support the continued protection of gray wolves.	Sustainable: Some of the wolf conservation organizations include – Defenders of Wildlife, Wolf Awareness Incorporated, Pacific Wolf Coalition, and various Wolf Sanctuary's. People could donate to these organizations, to help them continue protection. They could also vote on ballot initiatives to help them get reintroduced, or to continue protections for them.
Sustainable 2: Gray wolves may help control the prey populations from over grazing the land and destroying vegetation.	Sustainable 2: There have been 2 documented deaths by gray wolves in the wild on humans, in the past century. Gray wolves have neophobia, or fear of humans. This means that they are good predators to keep around, because they are afraid of us, and do not physically harm us.	Sustainable: Gray wolves bring in visitors to sanctuaries, zoos and educational facilities, because people want to learn about them. They also bring tourists to Yellowstone State Park, who pay money towards parks. The state parks have laws that protect the wolves.	Sustainable: These organizations fighting to protect gray wolves create jobs, and volunteer opportunities, which are economically beneficial.
Sustainable 3: Gray wolves are not the main cause of livestock fatality. Many livestock are non-native, and pollute the land, with	Sustainable 3: Gray wolves are endangered species, and keeping them on the planet, helps preserve a species that should be here.	Sustainable: Many advocacy and sanctuary organizations for wolves exist, to challenge legislation	Sustainable: Conserving and protecting the wolf makes better people, and allows them to focus on doing something good, for

excess methane emissions. Gray wolves may mitigate the spread of viruses and illnesses, by eating the weak from the population, in order to keep the prey stronger, and more sustaining.	The loss of the species could be ecologically problematic.	and continue their protections.	something else. Conservation work is good for people's souls and creates a positive political agenda.

Past Course Assignments Supplementing This Study

FW 255 Fish and Wildlife [Fall 2019]



FW 563 Some Species Have Transformed Our Planet [Spring 2019]

FW 583 Gray Wolves: A Vulnerability Study [Fall 2018]

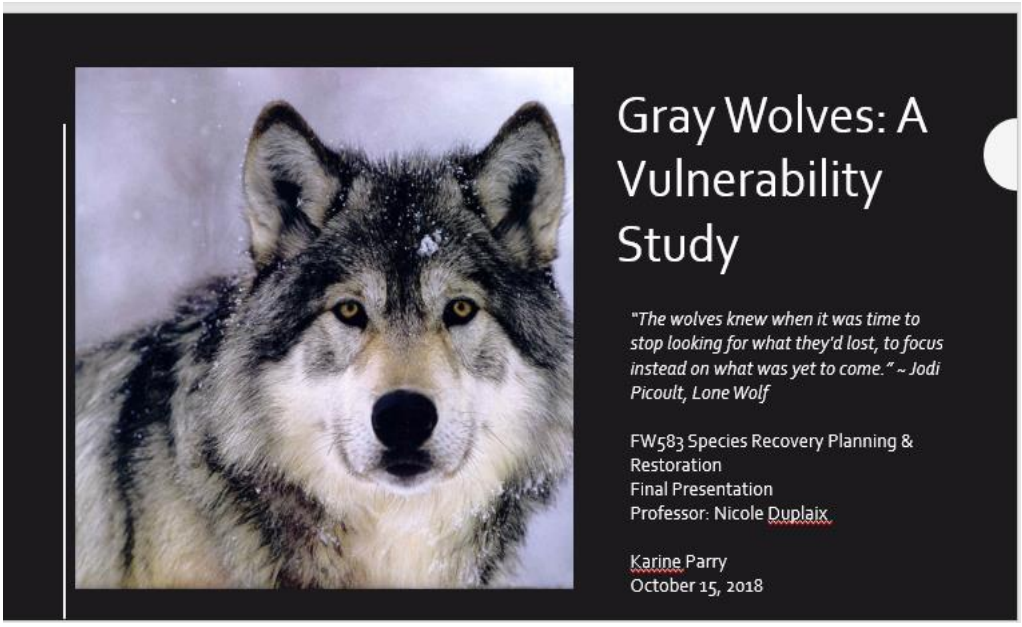
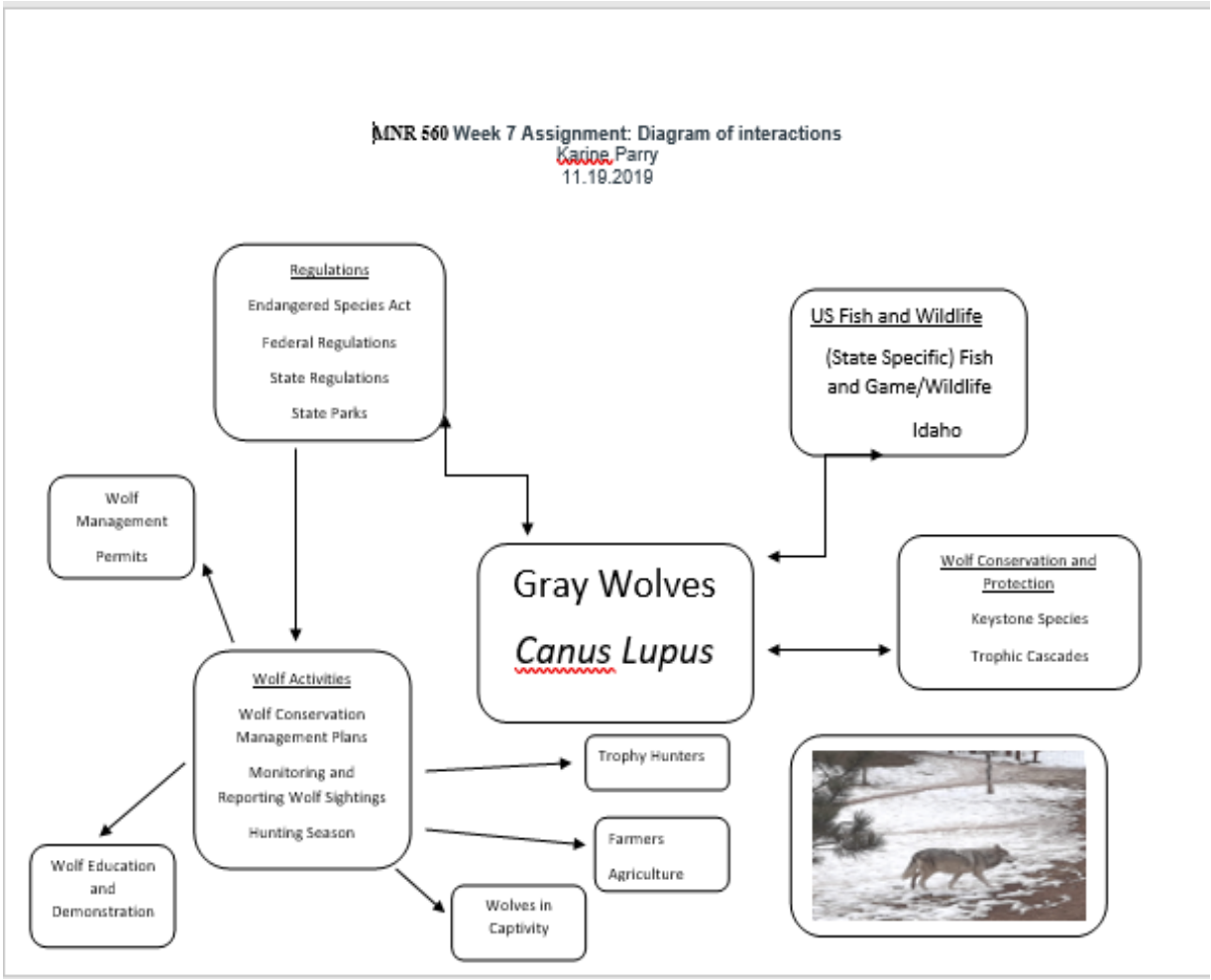


Diagram of Interactions



Research Calendar

Winter 2020

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Spring 2020

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Informational Interview Data

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Default Qualtrics Survey Report [Winter 2020 – Spring 2020]

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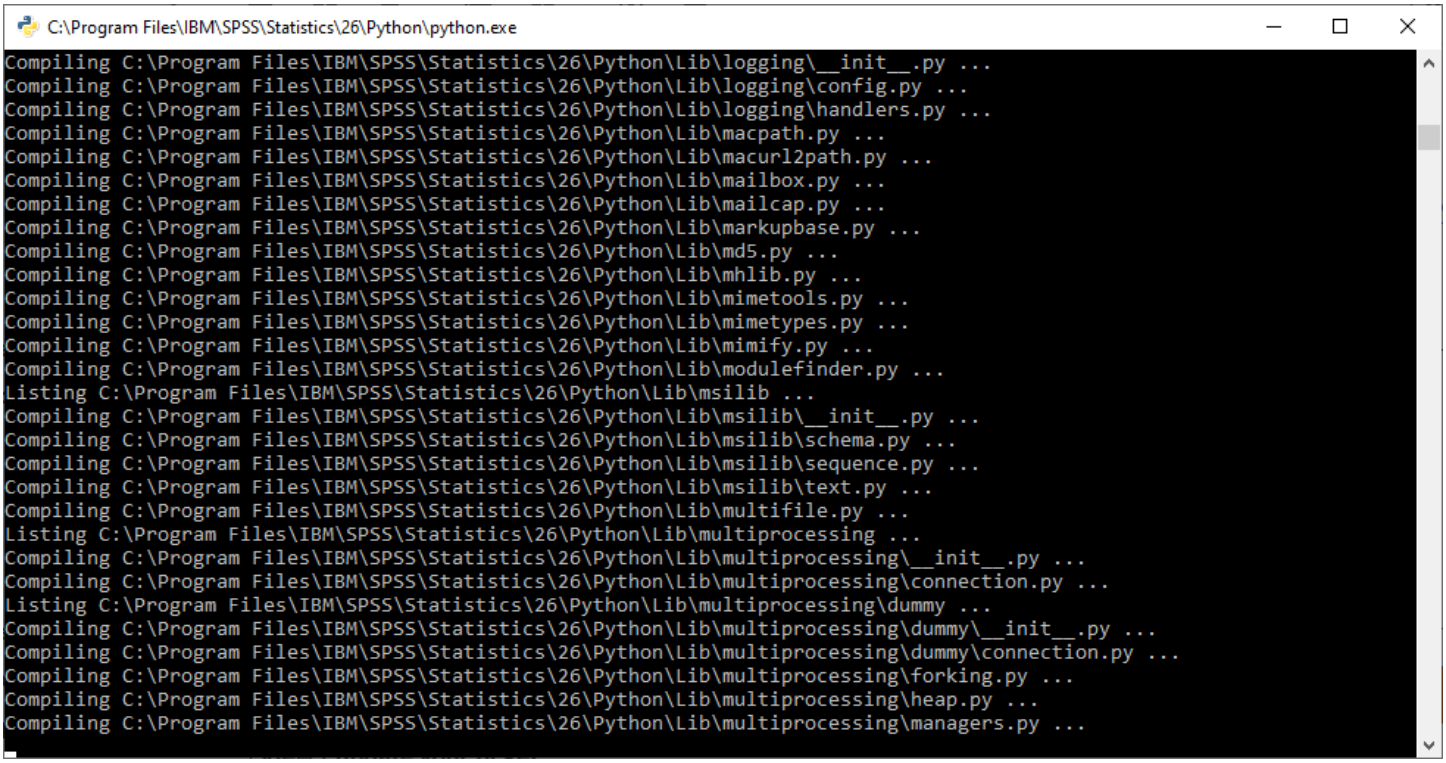
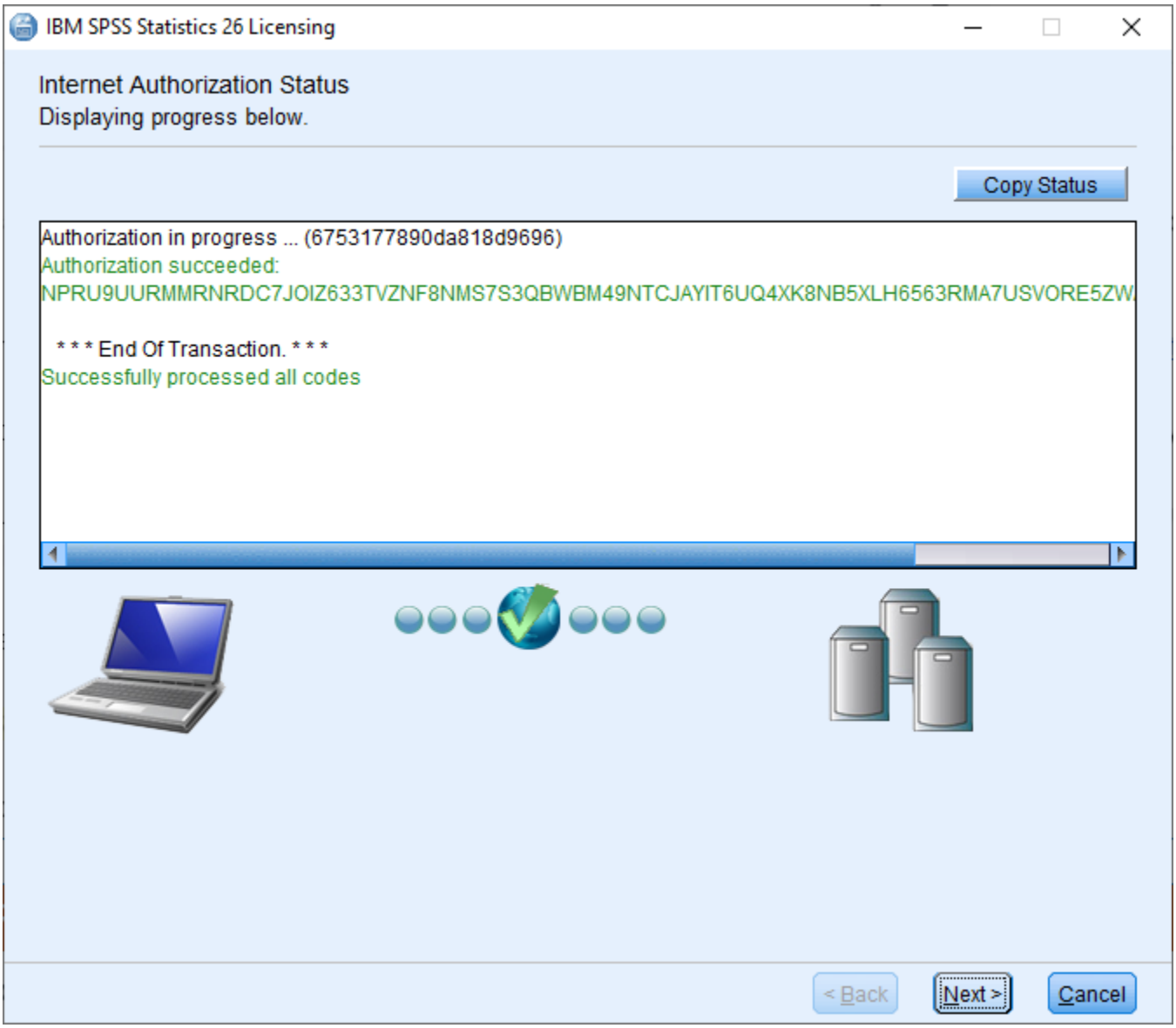
SPSS Installation Process





SPSS Bivariate Pearson Correlation Results

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Sharing Map from ArcGIS 10.5.1 to ArcGIS Online

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