Recommended Updates for the Bad River Band of Lake Superior Chippewa Tribe's Ma'iingan Management Plan

Abigail Fergus
Alma College 2017
Biology Department

Abstract

Canis lupus (gray wolf) management plans change with time to match new scientific findings, policy, and cultural needs. Anishinaabe Indians call the wolf Ma'iingan and respect it as a brother. They believe that whatever happens to Ma'iingan will also happen to the Anishinaabeg. The Bad River Band reservation is located in northern Wisconsin on Lake Superior and provides habitat for four wolf packs. In 2013, the Bad River Band published its first Ma'iingan management plan, which calls for an update every five years. I conducted interviews with local wolf biologists, non-tribal livestock owners, and tribal members in order to collect political, cultural, and scientific considerations for the plan's update. I also reviewed literature for further formulation of recommendations. I proposed changes to Bad River's Ma'iingan management plan in order to better insure the legal protection of the wolf. Developing issues related to Ma'iingan, such as the spread of chronic wasting disease Wasting Disease and the wolf's potential to control diseased populations as well as the review of the Endangered Species Act were also addressed. These changes will be considered by the Bad River Band wildlife specialist and tribal council for the 2018 management plan update.

Keywords: Ma'iingan, Anishinaabe, gray wolf, *Canis lupus*, management

To Lacey Hill-Kastern and the Bad River Band of Lake Superior Chippewa Indians

"Both the Indian and the wolf have come to be alike and experience the same thing. Both of them have a mate for life. Both have a Clan system and a tribe. Both have had their land taken from them. Both of them have been hunted for their… hair. And both have been pushed very close to destruction"

-Edward Benton-Banai

Introduction

While the gray wolf (*Canis lupus)* is one of the most studied animals, its conservation is rendered difficult by ecological, political, and cultural factors. Best practices for a given wolf management plan may not be the same for that of another due to differences in surrounding habitat, stakeholder attitudes, and non-tribal policy. The Bad River Band of Lake Superior Chippewa Indians is set to update its Ma'iingan (gray wolf) management plan in 2018; this is the first of regular five year updates the 2013 plan will receive. Adaptive management that the update of the plan heralds is appropriate for the conservation of large predators, because they are difficult to study, experience long generations, require a lot of land, and are generally difficult to collect data on without long-term studies (Theberge et al., 2006; Ripple et al., 2016). Human-caused threats to Ma'iingan, such as habitat loss and recreational harvest, make the protection that management plans extend to the wolf important. The ways that wolves affect their ecosystems render the band's conservation plan important for ecological reasons in addition to cultural values.

Ma'iingan is a brother to the Anishinaabeg, a group of peoples indigenous to North America, including the members of the Bad River Band (Benton-Banai, 2010). According to the Anishinaabe creation story, Ma'iingan was the first companion to the first man. The creation story has similarities to the Abrahamic story of Adam and Eve. Ma'iingan and the first man traveled the world naming all that the Creator made. When they were done, the Creator separated the two, but stated that what happens to one of them, would happen to the other (Benton-Banai, 2010). Wolves, especially during the period of dog domestication, served as a valuable companion to hunter-gatherers because humans and wolves/early dogs could warn each other of danger and ward off other large competitors (Treves and Bonacic, 2016). The canine also provided companionship and aid in transporting goods to humans. Ojibwe peoples also traditionally used wolf tracks to find deer to hunt (Treves and Bonacic, 2016). Because of this connection, the conservation of Ma'iingan continues to be important to the future of

Anishinaabe peoples.

In the United States, there has been a history of tribes being treated as less than the stakeholder in wolf conservation that they are (Vucetich et al., 2013). This has resulted in a lack of Anishinaabe values within state management plans. Because tribes are limited sovereigns with a government-to-government relationship to the United States and hold jurisdiction over hunting and gathering on their reservation, many feel the Bad River Band's management plan should be recognized by the state of Wisconsin. This, however, is not the case and the state government has questioned the plan's lack of surrounding livestock owner input given the aspect of the plan which calls for protection of wolves in ceded land, where the state and tribes share rights over hunting and gathering.

The tribe's management plan currently protects at least 16 wolf individuals (Hill, 2013). Usually 20 to 25 wolves occupy the reservation in four packs: the Kakagon Sloughs pack, the West Firelane pack, the Morrison Creek pack (also known as the Little Girl's Point pack in the Upper Peninsula of Michigan), and the Potato River pack. The plan has a minimum goal population of two packs with three wolves in each, but no maximum population goal. Wolf hunts are banned by the management plan, but tribal members may kill a wolf in the act of depredating or threatening to depredate livestock or a pet (Hill, 2013). Generally, though, tribal members have been found to have significantly more tolerance of Ma'iingan than non-tribal members (Shelley, 2010). This study, which involved a survey to gauge tolerance in varying demographics within Wisconsin toward wolves, called for interviews to be conducted in order to gather more nuanced input on the matter. This thesis, in part, sets an example of how this could be done.

Threats to wolves

Bad River's Ma'iingan plan is also rendered important by threats to wolf populations. Wolf harvests have been employed with the justification that these hunting seasons will reduce attacks on

livestock (Vucetich et al., 2013). These hunts, however, have been backed by questionable research and impair the wolf's ability to serve as an effective apex predator, or regulate other populations and systems in its ecosystem (Vucetich et al., 2013). Because misconceptions and resulting actions against wolves, effective conservation based on sound research is important for the sustainability of wolf populations.

A common argument used to justify the hunting of wolves is that those not killed will learn to fear humans and thus stay away from farms and other homes (Vucetich et al., 2013). In an evaluation of Michigan's wolf harvest plan, however, it is pointed out that wolves have no ability to differentiate between poaching and harvesting. If wolves were to learn to stay away from farms when members of their pack were killed, it would have happened already as the United States has a long history of wolf bounties and poaching. Furthermore, the elimination of one wolf can lead to the break up of a pack and result in a new individual establishing itself in that territory. Dispersing wolves are more likely to prey on livestock than are established packs (Vucetich et al., 2013).

Another questionable aspect of wolf harvests is that they treat the wolf, an apex predator, like a game animal (Vucetich et al., 2013). Wolves, unlike deer or other game ungulates (hooved animals), live a pack lifestyle. If a breeding female is shot, for example, the entire pack will be negatively impacted. Wolf harvest plans don't account for this. If the same number of wolf and ungulate individuals are killed, overall wolf populations will be impaired more than overall ungulate populations due to the aforementioned pack dynamic. Culling of wolves has also been found to lead to more disease spread within populations, possibly due to increased dispersal from packs being broken up (Vucetich et al., 2013). Reproduction may also increase in an unstable manner as a result of stress induced in wolves by hunting pressure, leading to an unexpected and unsustainable upshot of the wolf population (Bryan et al., 2015). This, in addition to the potential breaking up of packs as a result of an alpha death, lead to unstable population fluctuations overall.

Carnivore-Human conflict is rising globally with the growing human population and increased recovery of carnivores One reason behind the trend of increasing wolf harvests in state management plans may be the revenue governments foresee gaining from wolf hunting seasons (Bruskotter, n.d.). State governments have also claimed that allowing the hunting of wolves will improve tolerance of them. In Idaho, for example, wolf tags are sold for $11.50 compared to $19.75 for an adult deer or $10.75 for a juvenile or senior deer (Licenses, Tags and Permits). This tag pricing does not seem to encourage sustainable levels of harvest, given the wolf's pack dynamic earlier mentioned. In the end, attitudes did not improve toward the wolf in Idaho (Bruskotter, n.d.). This has negative implications for rates of poaching, as negative attitudes tend toward the animal in question tend to increase poaching rates (Treves et al., 2013). The failure the Idaho government saw in improving attitudes toward wolves by allowing their hunting may reflect the same result that occurs after government culling or removing protections from an animal: it is seen by potential poachers as less valuable (Chapron and Treves, 2016).

While the Bad River Band's management plan bans the harvest of wolves, Wisconsin and Michigan have hosted hunting seasons in the recent past and this threatens reservation packs. Even if the reservation continues to serve as a sanctuary to wolves, inbreeding is still a threat within the reservation. Inbreeding has posed a threat to wolf populations in instances where long periods of time pass before a new wolf with a more varied genome arrives on the scene (Vucetich et al., 2012). A drop in fitness, the number of offspring that live to reproduce, has been exhibited in species that experience inbreeding depression (Huisman et al., 2016; Hedrick and Kalinowski, 2000). For example, in red wolves (*Canis rufus*) a correlation between smaller body sizes and inbreeding has been found (Brzeski et al., 2014). This could indirectly be leading to lowered fitness. Though other studies exist that evaluate issues such as wolf predation on livestock and competition with human hunters, these problems are highly location dependent. Within Yellowstone National Park, for example, wolves were

found to have impacted elk populations in a non-uniform manner across different regions(Garrott et al., 2005). Because of variability of factors that go into wolf interactions with potential prey, it is valuable for the Bad River Band to have a conservation plan that is regularly updated (as it will be for the first time since its publication in 2013) and calls for research on best practices for management in and around the reservation.

The gray wolf occupied most geographical areas within what is now the United States before European colonization (Bruskotter et al., 1973). Much of the wolf's historical habitat has been lost and now the canine occupies 15 percent of its preexisting range. In addition to the fact that a portion of the wolf's historical range is now unsuitable, some argue that the percentage of range unoccupied must remain that way due to human intolerance. This argument has also been used against the conservation of the Canada Lynx (*Lynx canadensis*), but failed to remove the cat's protections. The logic behind this objection to wolf population restoration is questionable, because attitudinal surveys have found tolerance to be greater in urban areas without wolf populations than in rural areas with populations. Additionally, whether human tolerance or intolerance of wolves is justified or not, it has no bearing on the important role the predator plays in ecosystems and cultures. In the end, the decision between whether to define suitable habitat for wolves in social or scientific terms will affect not only gray wolves, but the conservation of other animals to come (Bruskotter et al., 1973).

Ecological value of wolves

The conservation of wolves through the band's management plan is important for the ecological value the canine holds. Wolves maintain stable populations of herbivores via regular predation, compared to when herbivore populations are dependent on food availability (Wilmers et al., 2012). When herbivores are regulated by bottom-up mechanisms, i.e. the amount of food available to them, their numbers fluctuate more frequently, which makes them more vulnerable to extinction. When wolves are present, ungulate numbers are more consistent and are buffered from the threat of

extinction. Wolves may also stabilize scavenger populations. When large predators are absent, scavengers must rely on harsh winters alone to kill animals and provide carrion (Wilmers et al., 2012).

Wolves, as apex predators, can lead to more evenly dispersed grazing by ungulates (Ripple and Beschta, 2012). Not only does this have the potential effect of preventing all individuals of a plant species from existing only in disease-susceptible clusters, but it also can establish critical habitat (Wilmers et al., 2012). The even spread of browsing due to predation pressure may bring other benefits. The woody plants that have been found to grow more successfully after wolves reoccupied Yellowstone provide shade over rivers and cool water. This phenomenon supports cold water fish such as trout (Wilmers et al., 2012).

After the gray wolf was reintroduced to Yellowstone in the 1990s, elk populations dropped to about half their size when the canine was absent (Vucetich et al., 2005). However, it appeared that wolves were only a compensatory predator, only preying on those already weakened by age or disease, and did not threaten the existence of the elk population. Most of the elk found to be killed by wolves were not healthy and strong, but were starving, very young, or very old. Since reintroduction, the wolf-elk ratio has stabilized to about 9.8 wolves per 1,000 elk (Beschta et al., 2016). This supports the prediction put out by earlier research that the reintroduction of the wolf would lead to elk and wolf populations balancing out, rather than to elk being wiped out from the park (Beschta et al., 2016). A major way in which gray wolves reduce ungulate populations is by cutting down on their recruitment levels (Creel and Christianson, 2009; Rutledge et al., 2011). The fact that the wolves were found to eat the young (recruits) and the starving (potential recruiters) supports the trend found in Vucetich's 2005 study. This pattern of wolf predation on the weak shows that healthier elk may remain in a population to continue the species' reproductive success.

Gray wolves also affect other predators. In one case of wolf reintroduction, the canine's presence caused an ecosystem to transition back to its historical four-link cascade of wolf-coyote-fox-

prey and altered population sizes throughout the food chain (Levi and Wilmers, 2012). Without wolves, coyotes suppress fox numbers and small animals, such as mice, are not heavily preyed upon. With the presence of wolves, coyotes are suppressed and fox populations rise. The gray wolf's mesopredator suppression causes large prey and small prey to be killed more often than intermediate-sized prey. One benefit of this shift is the reduction of pathogens, such as Lyme disease and hantavirus, which are only found in large and small species (Levi and Wilmers, 2012).

Wolves may play a part in controlling disease within their prey species. One example is chronic wasting disease (CWD), an illness that degrades the brain and leads to certain mortality (Geist et al., 2017). CWD has been a growing issue for Cervidae, such as white-tailed deer (*Odocoileus virginianus*), in North America. Similar to mad cow disease, CWD is the misfolding of a protein and can be transferred both from infected individuals and contaminated habitat where the individual grazed or died, for example (Wild et al., 2011). The contagions can then remain in the environment for years. Human hunting of contaminated cervids is not as likely to cut down on CWD as wolf predation. Current CWD trends seem to be unaffected by human hunting. The disease is contagious before its symptoms are apparent to humans. Forty-two days after contact, a cervid individual may become contagious, but signs apparent to humans do not manifest until 6 to 11 months into infection. The disease takes 18 to 36 months to run its course, ending with the death of the cervid (Wild et al., 2011).

Wolves may be able to pick up on CWD disease cues earlier than humans, because prey individuals that carry disease or parasites often are conspicuous to non-human predators (Wild et al., 2011). If wolves were to selectively prey on cervids with CWD, this would also result in more stable cervid populations. This is because mortality would be more consistent if caused more by predation than sweeping and insatiable disease. Even if wolves don't actually have the capability of early disease detection, non-selective predation on cervid populations can cut down on CWD by reducing population density and thus the spread of disease. Predation behavior research, however, indicates that wolves

prefer preying on young, old, and diseased individuals and this indicates that they may be capable of detecting CWD. Canines and humans both seem to break down the CWD prion within the digestive tract rather than take up the disease or continue its spread. Models project the wolf, rather than humans, having a superior ability to suppress the disease within a population of cervids. Wolf predation holds the added benefit of cervid populations becoming more robust and disease resistant. One model projected that CWD could be cut in half after a decade and eradicated after a century. This is based on the condition that wolves remove 15 percent of the deer population per year. Future research should include in a model, unlike this study, risk of CWD spread from cervid carcasses as an indicator for the prevalence of the disease in an environment (Wild et al., 2011).

Materials and Methods

Recommendations for the Bad River Band's wolf management update were based on literature review and input gained from livestock owners surrounding the reservation, wolf scientists near the reservation, and tribal members living on the reservation via interviews and informal conversation. In-depth interviews explored sentiments toward gray wolves and their management with a standard set of questions (Figure 1).

Respondents were not made to answer all questions if they felt they were neutral or not knowledgeable on the matter. Questions and the methodology of the in person interviews were approved by Alma College's Institutional Review Board committee. In-person interviews were pursued, because while questionnaire attitudinal surveys toward wolves have been conducted in Wisconsin and on the reservation in the past, more nuanced responses may be gained in conversation (Shelley, 2010). The three demographics interviewed were chosen for their roles as stakeholders and experts in wolf management issues. Hunters were not counted as an interest group, because that category was not mutually exclusive in the interview pool from the existing categories (each category included individuals who identify as hunters). No individual interviewed identified with more than one of the three demographics surveyed.

Livestock owners were identified using Iron and Ashland Counties' GIS websites to trace ownership of agricultural land. Phone numbers were obtained through telephone books and all apparent livestock owners were contacted for interviews three times over three weeks via phone call or voicemail. All known wolf experts in the northern Wisconsin area were contacted for interviews. Elders and government employees were the primary tribal members targeted for interviews. This is because the study was conducted in summer, so school groups could not be easily targeted. Much of the work for this study was conducted from the tribe's natural resources offices, so tribal members that work in those offices were easy to contact. A daily elder lunch made for another convenient pool of tribal

members to gain input from. Tribe members were offered tobacco ties when asked for an interview. While no elders, communicated with at the daily elder lunch, followed up for a formal interview, general input gained from elders at these lunches was recorded for consideration in the update of the management plan.

Input gained from all stakeholders was utilized both to better understand the values and needs of each demographic in relation to wolf management and to gain direct recommendations for alterations to the management plan. While the sample pool is small, Fisher's exact test was performed for certain questions in order to demonstrate how interview information can be ranked and analyzed in order to demonstrate overlap and variation in opinion and values between demographics such as the tribal members, livestock owners, and scientists. Final suggestions for change to the plan were based on these interviews and literature review. Recommendations were fine-tuned for the situation the Bad River Band's wolves face politically, culturally, and ecologically.

Results

Out of 30 farming operations contacted, three owners gave interviews on their sentiments regarding gray wolves and their management. Local wolf biologists were contacted once and all individuals except a representative with the DNR responded for an interview. This resulted in four scientists being interviewed. An official count of tribal members offered an interview in person was not kept. Around 1,800 tribal members live on the reservation and every member encountered at the tribal offices and at the daily elder lunch was offered an interview resulting in four members interviewed. A Facebook post detailing the study and providing population information on reservation Ma'iingan was also shared by the Tribal Warden and the Tribal Wildlife Specialist as an attempt to gain more interviewees. All but one interviewee had seen a wolf at least once, even if briefly. Most respondents, despite their self-reported attitude, described the event of seeing a wolf as a unique and interesting experience.

Attitudes that stakeholders held toward gray wolves were ranked between positive, mixed, and negative and varied significantly (*P = 0.006, Fisher's exact test*) (Table 1). All scientists and tribal members had positive feelings about wolves, while all farmers had mixed feelings.

Stakeholder approval of the no harvest and the lethal control aspects of the plan toward gray wolves was ranked and ran through Fisher's exact test (Table 2). The groups varied significantly in approval level (*P = 0.0222, Fisher's exact test*). All tribal members approved of these aspects of the plan; three of the members approved both aspects and one supported the zero harvest aspect but not the lethal control the plan allows under certain circumstances. Every scientist that answered this question approved of both aspects of the plan. One farmer was neutral on the matter, one farmer was against these aspects of the plan, and the third did not reply to this prompt.

Approval of the management plan's proposed six mile buffer zone was measured between groups with Fisher's exact test (Table 3). The responses given between supportive, neutral, and against were influenced significantly by which group (tribal, scientist, or farmer) the respondent was in (*P = 0.0166, Fisher's exact test*). Each tribal member and scientist who responded to the prompt approved of the buffer zone, while two farmers opposed the zone and one was neutral on the matter. All other questions asked of interviewees were not formatted in a ranked manner and thus were not statistically analyzed due to their more open-ended nature.

Respondents seemed to have the most trouble answering questions relating to how the depredation of pets, livestock, and hunting dogs should be handled. It appeared that interviewees would initially answer one way if looking at the three categories of animals in an emotional way then another when processing the question with the owner's responsibility to take care of the animal or the owners' financial loss in mind. Costs to government and the historical handling of depredations by government were also factored into responses by interviewees. Often, the interviewee came to the conclusion that s/he wasn't sure how depredation situations should be handled. When asked how pet, hunting dog, and

livestock owners should protect against wolves killing their animals, answers varied between stating that they shouldn't be expected to, they can't prevent depredations, they should keep animals under control with leashes/fencing, they should guard animals with dogs/donkeys/ranchers, they should use deterrents such as fladry, they should keep animals near the house, and they should provide a small amount of food for wolves so that they are not tempted by the live animals. In addition to addressing depredations or the risk they pose, respondents identified key aspects of wolf management involving education, communication, wolf monitoring, habitat preservation, effective policy, and ongoing research. A number of wolf scientists, in particular, raised the need to diversify sources of wolf management funding in order to prevent disproportionate control in the issue by a stakeholder group such as hunters, who often pay for conservation via the purchase of hunting tags. Several respondents across stakeholder groups offered applying for grants, fundraising, taxing outdoor hobbyist supplies, collecting donations, finding cheaper management methods, and using funds from special license plates as venues to achieve broader funding.

Discussion

These recommendations, along with the interviews and research that contributed to them, were formulated from a perspective new to the history, needs, and politics of the Bad River Band and surrounding livestock owners. This seemed to make the livestock owners feel as though they were being interviewed by a neutral party, compared to their wariness of engaging on these subjects with wildlife specialist Lacey Hill-Kastern, despite the fact she's known many of the farmers her whole life. Pursuing this project as someone new to the management plan also held the benefit of a fresh set of eyes with the resources to dedicate the large part of half a year to developing suggested changes and additions to the plan and the tribe's management efforts.

Limitations that came with this research situation included limited time to form relationships with elders and other members of the tribe in order to successfully gain interviews. While Hill-Kastern shared much of the trial and error that went into the plan development, another difficulty was fully comprehending what stopgaps, due to financial, political, and societal issues, exist between the tribe and the level and quality of wolf management it desires.

Interviews

Conducting in-depth interviews, suggested by Shelley's 2010 dissertation, allowed for the gathering of more nuanced input than surveys might have provided. This input can also be ranked in order to gain the quantitative aspect that questionnaires offer. Additionally, the interview format allowed respondents to answer free from the influence that pre-selected answer options may pose. The challenge raised with this method is deciding how to rank responses and how to do so accurately, but self-ranking also poses the threat of error.

The primary challenge in the interviewing method was learning how to gain trust from tribal members and livestock owners in order to secure an interview. This seemed to limit the amount of interviews conducted. Lacey Hill-Kastern hosted events to gather input regarding Ma'iingan when she

was initially drafting the management plan, but this medium did not see much participation from the tribe either. More success in gaining feedback was seen when both types of stakeholders were met where they were comfortable. For some tribal members, this meant showing up to the elder lunch regularly to build rapport. Some of the input that informed these update recommendations was gained by regularly attending the daily elders' lunch at the Bad River Band's elder center. After some trust was gained by showing up repeatedly to engage, elders shared in informal conversation some common desires related to Ma'iingan. These include the desire for more knowledge about the reservation packs and for a hands-off approach to conservation. The elders' lunch and other community gatherings, such as the pow wow, are valuable for making connections with tribal members in order to gather input. Elders seemed more receptive when pictures of and information about reservation Ma'iingan were shared. Possibly, this media sparked their curiosity and memories and this may be what led to an increase in sharing other stories about experiences with reservation Ma'iingan and thoughts on how to conserve them well.

In the future, commentary from more age categories of tribal members could be gained by making a presence at community events such as the annual pow wow. In order to connect successfully with livestock owners, it was important to pay attention to the farming season. One conflict experienced was that farmers were contacted during hay bailing season, which required long days of work. On the other hand, a method that seemed successful in gaining livestock owner trust was attending the Iron County Fair and connecting to individuals in the livestock displays and then asking those farmers interviewed to reach out to their colleagues.

A base understanding of the connection a farmers have with their livestock was also beneficial in forming connections. While Lacey Hill-Kastern has grown up in the area, has an understanding of agriculture, and personally knows many of the farmers, many of the livestock owners are unwilling to talk to her about the management plan. Conducting interviews as someone new to both the tribe and the

livestock owners seemed to help overcome this issue. If the study were conducted over a longer span of time than the five weeks it took place in northern Wisconsin, further relationships may have been established with both livestock owners and tribal members.

Traditional Ecological Knowledge

Traditional Ecological Knowledge (TEK) relates to biota and systems within an ecosystem and is passed down through generations of indigenous peoples (Service et al., 2014). Generally, indigenous peoples of North America lived in a sustainable manner thanks to TEK, before colonization occurred and influenced this way of life (Wood and Wilckers, 2008). Hunter-gatherer lifestyles gave indigenous peoples an intimidate knowledge and dependency on other life, from predators to prey (Wood and Wilckers, 2008). It is possible that TEK exists regarding how Anishinaabeg historically lived with Ma'iingan. This knowledge can be pursued by reaching out to members of the Bad River Band and other bands, and if found, used to inform modern coexistence with Ma'iingan. In addition to the Anishinaabe creation story involving Ma'iingan, various other stories entail the wolf teaching lessons to Anishinaabeg (Usik, 2015). These stories often reflect what environmental values Anishinaabe have traditionally held. The analysis of these stories and the lessons Anishinaabe gain from them may also help to shed light on how the peoples successfully co-inhabited North America with the gray wolf since before colonization. One Anishinaabe value these stories exemplify is that humans are lesser than other members of their ecosystem because of the dependence humans have on other biota to survive. This type of information provides a very different perspective than Aristotle's view that humans were above all biota and which informed Western science (Usik, 2015).

Lack of State Recognition

While the State of Wisconsin has not explicitly stated reasoning behind its refusal to acknowledge the Bad River Band's Ma'iingan Management Plan, the Minnesota DNR in the past has openly dismissed Anishinaabe wolf management input as a “cultural concern” and decided it should not

have influence in related decision making (Usik, 2015). This line of reasoning fails to recognize the ways in which European culture and thinking dominates wolf management in the U.S.. Values that can be traced back to Europe before colonization, such as livestock husbandry, exploitation of the feminized earth, a Christian right to dominion, preference for the “more useful” domestic animal over wild animals, and a Aristotelian hierarchy that places humans above all wild animals, are often upheld by modern wolf management goals. The logic employed by the Minnesota DNR also reduces Anishinaabe nations from the sovereigns they are to a cultural interest group (Usik, 2015). With this in mind, Wisconsin's government can be pressed in the future for further explanation of its lack of recognition toward Bad River's plan and the arguments above may be presented if applicable.

Corridors and Habitat

Tribal reservations and national parks have been found to serve as effective sanctuaries for wolf populations (United States Geological Survey, 2004). A three-year study in Voyageur National Park found that wolf deaths within the park were largely natural while outside the park they were largely human-caused. Despite the protection that these sanctuaries can provide, the populations within them are still threatened by inbreeding if they are isolated from other packs. Establishing corridors between these sanctuaries, in which hunting of wolves is not allowed, may help to resolve this issue (United States Geological Survey, 2004).

Most of a wolf’s diet is composed of ungulates (Pimlott, 1967). Wolves are more capable of controlling a population of deer, for example, in their natural primary habitat of forest and much of this original landscape has been destroyed. Seventy percent of the land originally covered with forest in the United States has been clear cut and grown over with young forest while only six percent of today’s forest is old growth, dating back to 175 years ago (Populations and Ecosystems). Because of this trend, the habitat of wolves should be fostered. Further research should explore whether old or young forests affect wolves differently. This is of special interest to the tribe, as its members have discussed the

advantages and disadvantages of reviving old growth forest to the reservation .

Habitat may also have a bearing on whether wolves prey upon livestock. Risk maps have been developed for Wisconsin to show where depredations are likely to take place (Treves et al., 2004). Large amounts of pasture land near pack territory and far from forest have been found to be a major indicator of where a wolf-livestock conflict will take place, possibly due to livestock density (Treves et al., 2011; Treves et al., 2004). Overall amount of roads, pasture land, and livestock densities seem to have bearings on wolf-livestock conflict (Treves et al., 2004). Because so many variables factor into the likelihood of a wolf preying on livestock, further research should be conducted to develop risk maps specific to the reservation and buffer zone, and those already produced for Wisconsin can be publicized by the tribe's conservation program.

Prey Availability

Much research has been conducted regarding wolf predation on livestock and wild ungulates. In Chavez and Gese's 2005 study, areas with low densities of native prey and high densities of livestock still saw more wolf predation on deer, moose, and muskrats than on farm animals (Chavez and Gese, 2005). This trend may demonstrate that secondary, or less desirable and productive, prey are still important to gray wolves. Muskrats made up the second largest percentage of the diet of wolves in this study (Chavez and Gese, 2005). The types of small prey wolves use to subsidize their diet vary between habitats, but other examples include the leftovers from herons mentioned earlier in the paper and the consumption of salmon near oceans (Robinson et al., 1991; Adams et al., 2010). Very low levels of native prey can also increase livestock predation in the gray wolf (Meriggi and Lovari, 1996). If multiple, smaller populations of varied wild ungulate species are present, wolves may be more prone to prey on them than on livestock. Beavers make up a large portion of the reservation wolves' diet (L Hill, personal communication, August, 2017). A more detailed breakdown of the reservation packs' diets, including whether they have any level of dependency on livestock or cattle carcasses, should be

explored in future research.

Buffer Zone

The buffer zone outlined in the current plan with the purpose of better protecting the reservation wolves by extending the no-hunt zone has about a six-mile radius marked by well-known highways (Figure 2). Adrian Wydeven, director of the Timber Wolf Alliance and former DNR employee, recommended altering this buffer zone in order to achieve success in gaining recognition from the Wisconsin DNR (Figure 2). The general guideline he gave was to alter the zone to encompass about the same amount of land, but with areas that would be potentially less controversial based on the stakeholders that live within them. The Red Cliff Band of Lake Superior Chippewa Indians has in recent years also developed a Ma'iingan management plan. Bad River's buffer zone could extend across Lake Superior to encompass Red Cliff's reservation. The zone could also include the Apostle Islands National Park, which the band has a history of working with through a piping plover project. This possibility should be explored with the tribal councils of the Bad River Band and the Red Cliff Band in addition to the National Park Service.

Co-management

While no wolf-caused livestock depredations have been reported on the reservation in the past 7 years, working to develop a management plan and co-management with the state of Wisconsin is best done before any potential issues arise with the reservation wolf packs. A workshop involving numerous Indian nations and federal government staffers underlined the value of discussing an issue, in this case Indian power over managing endangered species, before any issues related to the topic arise (Wilkinson, 1997). The value in the timing of this conference was that the federal government employees were able to focus on hearing and understanding indigenous perspectives before being distracted by a plethora of stakeholder opinions that would come with more heated debate regarding the endangered species act. This meeting also resulted in the recognition that federal employees must

receive permission from a tribe before entering its land and in respect for the government-to-government relationship between tribal and federal governments.

Benefits possible if the Bad River Band were to achieve co-management of wolves in the buffer zone with the Wisconsin government include the recognition of the tribe as a sovereign government, involvement of the tribe in decision making, shared management costs between the tribe and the state, management better catered to the buffer zone than what federal control might offer, quicker results due to increased resources, and the sustainable management of Ma'iingan (Adelzadeh, 2006). In order to reap these benefits, differences in culture, ideals, and religion would have to be overcome. A major hurdle may be the difference in how the gray wolf is viewed by different stakeholders. To Westerners, the wolf is an animal, whether menacing to livestock or crucial to ecosystems. To Anishinaabeg the wolf is a brother whose fate is entwined with Anishinaabeg. In order to overcome these differences, both views must be respected in the process of co-management and trust must be developed beforehand. Recommendations on building this trust relationship can be found under the outreach and personnel sections.

The successful efforts of the Nez Perce Tribe and the Fish and Wildlife Service (FWS) to recover the gray wolf population in Idaho offers pertinent lessons for the Bad River Band. Despite success seen in the collaboration, the tribe held concerns regarding the funding and power balance involved with the wolf recovery (Ohlson et al., 2008). The tribe struggled to provide needed funds for the project and felt that the amount of funds it had to put forward was not fair, especially given the losses the tribe experienced with the historical, unwilling ceding of territory. Furthermore, the FWS contested that the tribe was subordinate in the project, while the tribe argued that the collaboration was one of co-management (Ohlson et al., 2008). To avoid similar controversies and potential issues, the Bad River Band should clearly outline an agreement regarding funding and power sharing before it enters into a potential collaboration with the state of Wisconsin for wolf management.

Research Funding

As discussed earlier in this paper, wolf harvests are often justified by a flawed understanding of the wolf's capability to learn. While it's abused in some scenarios, the tactic of conditioning wolves can be employed responsibly via non-lethal methods. This approach also protects against the hard-to-predict results of impacting pack dynamics by killing an individual within it via lethal control. Conservation plans are an effective route through which to explore what non-lethal methods are suited for preventing both livestock and wolf death in a given habitat. The cost of non-lethal devices and the process of testing which ones are effective in a given habitat is substantial. Still, this investment benefits many stakeholders in wolf management and currently the federal government offers funding for this exploration.

For the past two years, the Fish and Wildlife Service has offered the Wolf Livestock Demonstration Project Grant Program to states and tribes in order to fund up to 50 percent of costs to prevent and compensate for livestock loss due to wolf predation. This program could help to prevent livestock kills by the reservation packs. It may also serve to build good relations with surrounding farmers. An issue often posed by those against non-lethal control of wolves is the cost of mechanisms such as fencing or guard animals. Splitting the cost between the tribe, willing farmers, and the federal government could resolve this issue and establish trust between the tribe and non-tribal landowners, which is beneficial to the conservation of Ma'iingan.

Compensation

The current management does not offer compensation to those who lose livestock or pets to wolf predation. This continues to seem unnecessary given the reservation's extended history without any wolf depredations being reported (L Hill, personal communication, August, 2017). If co-management in the buffer zone, which contains over 30 livestock operations, is achieved the Tribe should consider with the state under what conditions compensation might be offered. Troubling aspects

of compensation include the fact that it seems to have little baring on stakeholder attitudes and that it might encourage livestock owners to continue their husbandry practices rather than exploring new options to potentially cut down on conflicts (Naughton-Treves et al., 2003). Hypothetically if the state pushes for or if the tribe desires to offer compensation for depredations in the buffer zone, a condition should be included which requires that farmers be able to demonstrate their attempt at husbandry conducive to reducing conflict such as the proper handling of carcasses and keeping livestock close to human habitations when possible.

Outreach

In addition to the outreach that would be accomplished in pursuing the Wolf Livestock Demonstration Project Grant Program, the tribe could search for further common interest with stakeholders that regularly influence wolf conservation, such as farmers. The Farm Bill is scheduled to be updated in 2018. If both local farmers and the tribe value small livestock operations rather than Confined Animal Feeding Operations (CAFOs), the two groups could work together to advocate for an update that brings more subsidies to small farmers rather than factory farm operations. As mentioned earlier, risk maps developed to show likely locations of wolf conflicts, like those produced by Adrian Treves at University of Wisconsin-Madison, can also be publicized by the tribe for the benefit of farmers and hunters. Collaborating with hunters and farmers in programming, similar to what the tribe has offered in the past on trapping, may also forge positive relations through the sharing of knowledge (L Hill, personal communication, August, 2017). Further education and communication regarding wolf behavior, ecology, and reintroduction is called for. In interviews some farmers expressed mistrust to state, federal, and tribal government handling of wolf management. This backs the lack of trust that an attitudinal survey taken in 2015 by Browne-Nuñez et al. demonstrated. Findings in this study that all stakeholder groups, especially farmers, were likely to kill wolves is also alarming and may be remedied with increased outreach. Common concerns that spark negative attitudes toward wolves and managing

governments should be addressed in outreach (Browne-Nuñez et al., 2015). This includes education on the origin of wolves on the reservation, the goals of the management plan, and issues surrounding wolves that might intimidate stakeholders such as the threat of habituation or predation.

Erik Olson, assistant professor of natural resources at Northland College, recommends that communication regarding conservation issues should be put into terms that stakeholders will be receptive to and that places the importance of management into context, rather than numbers. Instead of managing to a maximum wolf population for example, goals can be set to be measured in terms of what stakeholders value, whether it be low depredation numbers for farmers or frequent wolf sightings for tribal members. Thomas Gehring, professor of biology at Central Michigan University, framed the cost of varying non-lethal control tactics to reduce wolf depredation by reporting how many lost livestock would cost the same amount of each method (Gehring, 2017). Farmers may also be receptive to the benefit that wolves bring in balancing beaver populations, because farmers often struggle with beaver-caused flooding (Stronen et al., 2007). For a tribal member, a focus on how policy protects Ma'iigan would likely be better suited.

Voigt Decision

The Voigt decision may serve as a valuable model for how the tribe could gain support and cooperation from non-members in Ma'iingan management without sacrificing its relationship with Ma'iingan or its conservation goals. The years leading up to this decision, which recognized the treaty rights of Lake Superior area Anishinaabeg to hunt and fish in their traditional ways, were filled with animosity from non-Indians (Satz and Apfelbeck, 1996). While fishing or hunting, Indians faced violence such as rock throwing and the spewing of racial slurs. Advertisements called for hunting Indians in order to protect various prey species such as deer or muskie from what non-Indians said were unfair and unsustainable practices, spearing and shining fish for instance. The Bad River Band was one of various tribes facing opposition from non-members who claimed their treaty rights should

be abolished for the sake of equality between tribal and non-tribal fishers and hunters (Satz and Apfelbeck, 1996).

The Boldt decision came out of a Washington case before the Voigt decision and ruled that the involved tribes had a right to half of steelhead and salmon harvests in the state (Satz and Apfelbeck, 1996). This court ruling still did not change the aggressive attitudes against Indians. Even when the Washington state government began to focus on fostering co-management (after several failed attempts at repealing the Boldt decision), campaigns continued to display intolerance toward Indians and their treaty rights to hunt and fish (Satz and Apfelbeck, 1996).

In response to the treatment they received by non-Indians, some indigenous leaders publicly defended their rights leading up to the Voigt decision (Satz and Apfelbeck, 1996). The Lac Courte Oreilles band organized a commission to document instances of racism Indians were facing over the hunting and fishing controversy. The group gathered this information via forums and called on schools, government, mass media, and churches to address issues of discrimination and violence that Indians were facing and to mediate between whites and Indians. In the end, Lac Courte Oreilles vs. Wisconsin (the Voigt decision) ruled that Anishinaabeg had a right to harvest the historical amount of fish and other wildlife needed to enable a modest living. The Wisconsin government can only intervene when Indians' harvest activity threatens the life or the ability of non-Indians to hunt or fish. While intolerant sentiments continued to exist after the Voigt decision, changing attitudes have been seen in non-Indians. This has led to instances of non-Indians standing up against the racism experienced by tribal members (Satz and Apfelbeck, 1996).

Jim St. Arnold, former tribal council member and chairman of the Keweenaw Bay Indian Community, experienced this shift in white attitudes toward his culture and Anishinaabe harvesting of natural resources such as fish (St. Arnold, 2009). This came after years of involvement St. Arnold had, with the rest of the Keweenaw tribal council, in establishing the tribe's harvest regulation policies so

that the state of Michigan could not do so for them. A common theme in his tribe's approach was refusing to relent when the Michigan DNR pointed out that the tribe's regulations didn't match that of the state, and instead putting the burden of politically or biologically sound proof back on the Michigan DNR. St. Arnold also attributed the tribe's success in self-defining harvest regulations to the help the tribe's attorney lent and the length of time the tribe spent in developing these rules. After the success that the Voigt tribes saw, St. Arnold shared that some non-natives who previously held negative attitudes toward them asked for advice regarding fishing and harvesting rights. Once when St. Arnold was running an informational booth, a white man addressed St. Arnold aggressively, claiming that treaty rights ruin deer populations. A different white man stepped in, intervened, and later explained to St. Arnold that in the past he would've spoken to St. Arnold in that same berating tone. To St. Arnold, that experience showed that while racism is still prominent in issues of resource conservation, the situation is improving. He also attributed this to the increasing level of involvement tribes have in the management of their resources (St. Arnold, 2009).

In addition to individual responses that reflect a shift toward support of tribes and their rights by non-Indians, the coalition Honor Our Neighbors' Origins and Rights (HONOR) was created in Wausau, WI in order to combat remaining anti-Indian sentiments and to defend the legitimacy of treaty rights (Satz and Apfelbeck, 1996). Through conversations efforts, tribes have supported not only their own abilities to hunt and gather, but those of non-Indians as well. The formation of the Great Lakes Indian Fish and Wildlife Commission (GLIFWC) in order to conserve species important to Anishinaabeg and the voluntary limitation on harvests Indians have put on themselves shows a history of willingness to enable non-Indians to hunt and fish as well. Many tribes also run hatcheries in order to help maintain healthy fish populations (Satz and Apfelbeck, 1996). The tribe already has a group, including non-tribal advocates, similar to the HONOR, which may collaborate with the tribe and lend a hand in wolf conservation: The Timberwolf Alliance. Ways in which the alliance is willing and able to be involved

with the tribe's efforts should be explored.

The Voigt decision required a great level of commitment from tribal attorneys and support, such as funding from their respective tribes (Bichler, 2009). It's also important to note that it was not one tribe tackling the legal issues behind the Voigt decision, but eight working together (Bichler, 2009). The case also demonstrates the value of working for co-management with the state (Meyer, 2009). Even when the tribes don't receive everything they want out of co-management, there tends to be a more equal give-and-take between the tribes and the state in these situations. Pressing for a legal case runs the risk of losing all power over the situation at hand if a judge rules entirely in favor of one side (Meyer, 2009). Ultimately, treaties are what empowered the success seen in co-management and jurisdiction through the Voigt decision (Tierney, 2009). While a regulation period occurred after the Voigt decision and determined, in part based on some similar cases in the Pacific West, the power dynamic between tribes and the state, not all questions about the case have been answered (Tierney, 2009). For example, it is unclear until put to the legal test whether the Voigt decision could directly protect Ma'iingan. Perhaps the applicability of the Voigt decision and Anishinaabe resources treaties could be argued by pointing out Ma'iingan's importance as an apex predator to the healthy population of all other levels of the trophic cascade, including prey animals and plants.

Similarities and lessons can be drawn between the controversies over the Voigt decision and what the tribe faces with the Ma'iingan Management Plan today. Farmers interviewed expressed their concern for being able to maintain a livelihood, which resonates with non-tribal hunters desire to have what they perceived as a fair opportunity to hunt and fish during the days of the Voigt decision.

Personnel

While the band hires a seasonal wildlife technician for the summer in addition to the full-time wildlife specialist position held by Lacey Hill-Kastern, this amount of personnel is not conducive to conducting wolf research. This is important to note, because best practices for wolf management varies

greatly depending on habitat, politics, and stakeholders. Research can help cater a management plan to the reservation wolves' situation. To get around this issue, partnerships with surrounding schools such as Northland College and University of Wisconsin could be established in order to conduct research that benefits the tribe, overall wolf knowledge, and the students and faculty involved. Interested tribe members have historically been trained in conducting wolf howl surveys and this should continue in order to collect more data. Further tribal involvement could be established through a council, like the Timber Wolf Alliance, made of invested tribal members who wish to take part in educating on and advocating for wolves. Collaboration could also result in the production of an annual report, for distribution within the reservation, regarding that year's wolf population. This would also fulfill the desire expressed by various elders for more knowledge about the reservation Ma'iingan.

Web Development

Currently the tribal website has a page dedicated to some information on the band's wildlife conservation efforts as well as how to contact with Lacey Hill-Kastern, wildlife specialist. Further development of the page, a goal the tribe mentions on the main website, could aid in outreach and recruitment of personnel for Ma'iingan conservation efforts. A more developed site could host depredation risk maps, information on the farm bill, and an annual Ma'iingan report previously mentioned. It could also contain useful links to resources such as Congress's website so that stakeholders can keep up-to-date on legislation affecting Ma'iingan, farmers, and tribes. This could serve spreading knowledge on bills related to Ma'iingan management, such as bill S. 164 introduced to the 115th Congress. This proposed legislation would remove Endangered Species Act protections for gray wolves in Wyoming and the Great Lakes states and prevent the wolf from being listed again in the future (Senate Bill 164 (2017)). Other links may include the Timber Wolf Alliance's page and regular posting of news related to Ma'iingan, such as the recent overruling of the McKittrick case, which increased protections for endangered species against what are claimed to be accidental killings. Further

expanding web content could serve as another medium through which high school and/or college student involvement could occur. Social media platforms such as Facebook could be employed to further publicize this web content as well.

Terminology

The tribe's plan is currently referred to as the Ma'iingan Management Plan. Word choice is often important in conservation for the connotations its stakeholders will draw. Because Ma'iingan hold even more than ecological value to Anishinaabeg, it would be valuable to gauge how tribal members feel about the use of the term “management” rather than other words such as “preservation” or “conservation.” This can be done at elder lunches and tribal events and through an online survey. A more positive connotation with the terminology used may make tribal members feel more included in decisions regarding Ma'iingan and more willing to help in conservation and education efforts.

The way in which wolf management/conservation/preservation is framed also may have a bearing on attitudes in outside stakeholder groups. Human reintroduced wolves versus reestablished wolf populations have had bearings on reported stakeholder attitudes just as phrasing within management plans (Williams et al., 2002). This should be considered in terminology used within Bad River's plan in order to better gain desired cooperation and collaboration with stakeholders such as livestock owners and hunters.

Enforcement

While the content of the management plan is comprehensive, it lacks legal teeth without an ordinance to back the plan with repercussions for its violation. A successful ordinance can be fashioned to enforce the ban on hunting Ma'iingan and to set limitations on when lethal control can be taken against Ma'iingan (Figure 3). Penalties in the proposed ordinance were based on fees set by the federal government to punish similar violations against endangered species and could be presented to the tribal council for approval.

Another area that should be explored in the enforcement of the plan is what power the tribe has over those who live within the reservation, but aren't a member of the tribe. Land within the bounds of the Bad River Band reservation is fragmented so that non-tribal members live on and own some parcels. This was caused by the Dawes Act of 1887, which allowed Congress to designate equal allotments of land to tribal members and then sell whatever land remained to non-Indians (Monette, 1996). It is unclear what legal power the tribe would have if a non-tribal member who lived within the reservation were to violate the management plan. According to the *Montana vs. U.S.* case, tribes have jurisdiction over non-members when the action of the non-member impairs the tribe's sovereignty, health, or welfare. While indigenous law in the U.S. is inconsistent, it may be beneficial for the tribe to evaluate it in the management plan. For example, the way in which policy harms Ma'iingan and thus the tribe in terms of sovereignty, health, or welfare could be outlined and argued to violate the outcome of *Montana vs. U.S.*.

While the historical interpretation of *Montana vs. U.S.* has been inconsistent, the tribe may be able to hold non-members to following a tribal code regarding Ma'iingan. This could be done using the power the tribe holds over regulating and excluding non-members on the reservation, especially if it is clearly indicated when entering the reservation that codes must be followed (Tinker, 2014). For those non-tribal members who live on the reservation, further binding to the tribal code could be established if the non-members use a tribal service such as fire prevention or water access. If the tribe were to establish an implied consent policy affecting all those that take advantage of tribal services, such as water and electricity, all non-members that use these resources could also be required to follow a code protecting Ma'iingan (Tinker, 2014).

Applying these Recommendations

While some of the recommendations put forward can be quickly implemented with relative ease, such as the Ma'iingan code if approved by the tribal council, other elements would require more

of a time investment. Longer-term initiatives such as developing a web page and an annual report for the Ma'iingan Management Plan could be outlined as goals to be fulfilled before the next update in 2023 and progress can be analyzed at that point.

Figures and Tables

1. How does the gray wolf affect you?
2. How do you feel about gray wolves?
3. How should the depredation of a pet be handled?
4. How should the depredation of livestock be handled?
5. How do you feel about the conservation of the gray wolf?
6. What measures do you take/should be taken to prevent depredations?
7. In what way do you feel the state and federal government should be involved with wolf management?
8. In what way do you feel scientists should be involved with wolf management?
9. In what way do you feel tribal governments should be involved with wolf management?
10. What do you think are the key components of an effective wolf management plan?
11. How do you think the tribe/state should fund wolf management?
12. The Bad River Wolf Management Zone entails zero recreational wolf harvest, but does allow lethal control of wolves found to be causing depredations. How do you feel about this strategy?

Figure 1. Questions asked of interviewees to gauge attitudes and needs in relation to wolf management.

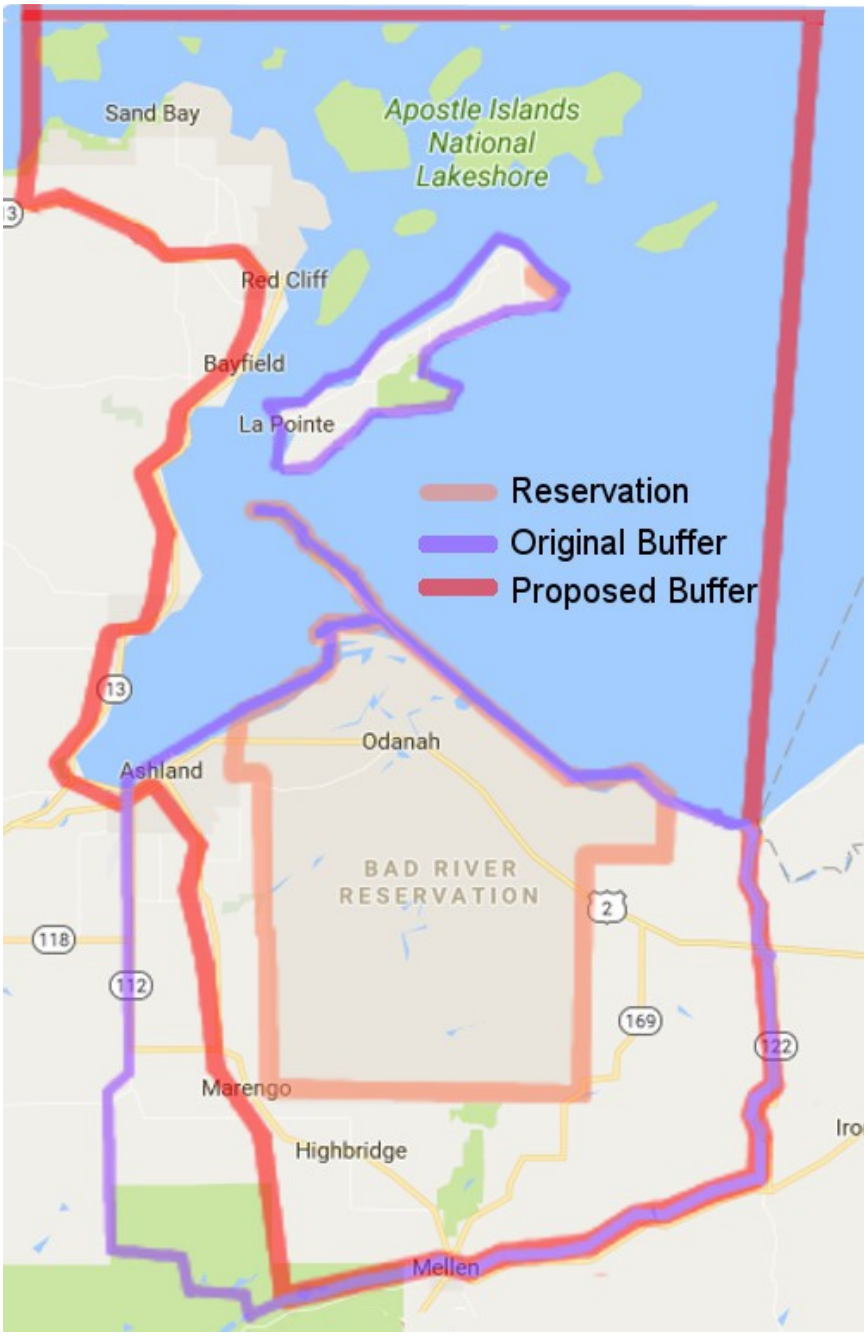

Figure 2. Mapped comparison of the original buffer zone, proposed buffer zone, and reservation boundaries. With the cooperation of the Wisconsin state government, the buffer zone would extend the tribe's policy banning wolf harvest but allowing lethal control in cases of depredation.

CHAPTER 307 - Ma'iingan Code

Section 307.1 - Purpose

It is the purpose and intent of this ordinance to protect Ma'iingan on the Bad River Reservation. The Tribe values Ma'iingan as a brother whose fate is tied with that of the Anishinaabeg.

Section 307.2 - Jurisdiction

Any violation of this ordinance shall be referred to the Bad River Tribal Court.

Section 307.3 – Harvest of Ma'iingan

The recreational harvest of Ma'iingan is not allowed on the Bad River Reservation.

Section 307.4 – Lethal Control of Ma'iingan

A tribal member may take lethal action against Ma'iingan only if Ma'iingan is found in the act of threatening the life of a domesticated animal or person on private land. Bad River Natural Resources staff will only take lethal action against Ma'iingan for the same reasons and/or if non-lethal action is not working to deter Ma'iingan from causing these threats.

Section 307.5 – Reporting Ma'iingan conflicts

If potential conflict with Ma'iingan occurs, such as the depredation of livestock or a pet, a Tribal warden or the Bad River Wildlife specialist must be informed within 24 hours. If the legal lethal control of Ma'iingan is taken on private property in order to protect domesticated animals, both the Bad River staff listed and the Wisconsin DNR need to be contacted.

Section 307.10- Penalty

(a) A violation of section 307.3 or 307.4 shall result in a minimum forfeiture of no less than $3,500 and up to a maximum of $13,000.

(b) A violation of section 307.5 shall result in a minimum forfeiture of no less than $1,500 and up to a maximum of $8,500.

(c) Tags for any species including fish may be withheld upon failure to pay the set forfeiture or with flagrant or multiple violations, tags will be withheld.

Figure 3. Proposal for an ordinance to protect reservation Ma'iingan and give Bad River's management plan legal teeth. Formatting was based on the tribe's trapping ordinance and violation fees were based on those put forward by the U.S. Government for similar offenses against endangered species.

Table 1. Attitude toward wolves in tribal members, scientists and farmers with P = 0.006

	Tribal	Scientist	Farmer
Positive	4	4	0
Mixed	0	0	3
Negative	0	0	0

Table 2. Approval of lethal control allowed and harvest banned by management plan with P= 0.0222

	Tribal	Scientist	Farmer
Against	0	0	1
Neutral	0	0	1
Support	4	4	0

Table 3. Approval of proposed buffer zone P = 0.0166

	Tribal	Scientist	Farmers
Against	0	0	2
Neutral	0	0	1
Support	3	4	0

Annotated Bibliography

Adelzadeh, M. (2006). *Empowerment in an era of self-determination: the case of the washoe tribe and us forest service co-management agreement* [thesis].

Adams, L.G., Farley, S.D., Stricker, C.A., Demma, D.J., Roffler, G.H., Miller, D.C., Rye, R.O.. (2010). Are inland wolf–ungulate systems influenced by marine subsidies of Pacific salmon? *Ecological Applications, 20*(1), 251–262.

Beschta, R. L., Painter, L. E., Levi, T., Ripple, W. J. (2016). Long-term aspen dynamics, trophic cascades, and climate in northern Yellowstone National Park. *Canadian Journal of Forest Research,46*(4), 548-556. doi:10.1139/cjfr-2015-0301

Benton-Banai, E. (2010). *The Mishomis book: the voice of the Ojibway.* Minneapolis, MN: University of Minnesota Press.

Bichler, H.J. (2009). *Minwaajimo, Telling A Good Story*. Speech presented at Preserving Ojibwe Treaty Rights for the Past 25 Years Symposium in Wisconsin, Bad River. Retrieved from http://www.glifwc.org/minwaajimo/Speech/Howard%20J.%20Bichler.pdf

Brzeski, K.E., Rabon, D.R. Jr, Chamberlain, M.J., Waits, L.P., Taylor, S.S. (2014). Inbreeding and inbreeding depression in endangered red wolves (*Canis rufus*). *Molecular Ecology, 23*(17), 4241-4255.

Bruskotter, J.T., Treves, A., Way, J.G. *The Challenge of Conserving Carnivores in the American West* [thesis].

Bruskotter, J. T., Vucetich, J. A., Enzler, S., Treves, A., Nelson, M. P. (2013). Removing Protections for Wolves and the Future of the U.S. Endangered Species Act (1973). *Conservation Letters, 7*(4), 401-407.

Bryan, H.M., Smits, J.E.G., Koren, L., Paquet, P.C., Wynne-Edwards, K.E., Muisiani, M. (2015). Heavily hunted wolves have higher stress and reproductive steroids than wolves with lower hunting pressure. *Functional Ecology, 29,* 347-356.

Chapron, G., Treves, A. (2016). Blood does not buy goodwill: allowing culling increases poaching of a large carnivore. *The Royal Society Publishing,* 283: 20152939. http://dx.doi.org/10.1098/rspb.2015.2939

Chavez, A.S. and Gese, E.M. (2005). Food Habits of Wolves in Relation to Livestock Depredations in Northwestern Minnesota. *The American Midland Naturalist, 154*(1),253–263.

Creel, S. and Christianson, D. (2009). Wolf Presence and Increased Willow Consumption by Yellowstone Elk: Implications for Trophic Cascades. *Ecology, 90*(9),2454-2466.

Garrott, R.A., Gude, J.A., Bergman, E.J., Gower, C., White, P.J., Hamlin, K.L. (2005). Generalizing wolf effects across the Greater Yellowstone Area: a cautionary note. *Wildlife Society Bulletin, 33*(4),1245–1255.

Gehring, T. M. (2017, November 15). *Testing Non-Lethal Management Tools for Reducing Livestock Losses to Carnivores*. Lecture presented in Michigan, Alma.

Geist, V., Clausen, D., Crichton, V., Rowledge, D. (2017). The Challenge of CWD: Insidious and Dire. *Living Legacy White Paper Series, 1*.

Hedrick, P.W. and Kalinowski, S.T. (2000). Inbreeding depression in conversation biology. Annual *Review of Ecology and Systematics, 31,*139.

Huisman, J., Kruuk, L.E.B., Ellis, P.A., Clutton-Brock, T., Pemberton, J.M. (2016). Inbreeding depression across the lifespan in a wild mammal population. *Proceedings of the National Academy of Sciences, 113*(13),3585–3590.

Levi, T. and Wilmers, C.C. (2012). Wolves–coyotes–foxes: a cascade among carnivores. *Ecology, 93*(4),921–929.

Meriggi, A., Lovari, S. (1996). A Review of Wolf Predation in Southern Europe: Does the Wolf Prefer Wild Prey to Livestock? *The Journal of Applied Ecology, 33*(6),1561.

Meyer, G. (2009). *Minwaajimo, Telling A Good Story*. Speech presented at Preserving Ojibwe Treaty Rights for the Past 25 Years Symposium in Wisconsin, Bad River. Retrieved from http://www.glifwc.org/minwaajimo/Speech/George%20Meyer.pdf

Monette, R. A. (1996). Treating tribes as states under federal statutes in the environmental arena: where laws of nature and natural law collide. *Vermont Law Review*, *21*(111).

Naughton-Treves, L., Grossberg, R., & Treves, A. (2003). Paying for Tolerance: Rural Citizens Attitudes toward Wolf Depredation and Compensation. *Conservation Biology, 17*(6), 1500-1511. doi:10.1111/j.1523-1739.2003.00060.x

Ohlson, D., Cushing, K., Trulio, L., Leventhal, A. (2008). Advancing indigenous self-determination through endangered species protection: Idaho gray wolf recovery. *Environmental Science & Policy, 11*(5), 430-440. doi:10.1016/j.envsci.2008.02.003

Pimlott, D.H. (1967). Wolf Predation and Ungulate Populations. *American Zoologist, 7*(2),267–278.

Population and Ecosystems: Forests. (n.d.). In *Atlas of Population and Environment*. Retrieved from http://atlas.aaas.org/index.php?part=2&sec=eco&sub=forests

Ripple, W.J., Beschta, R.L. (2012). Trophic cascades in Yellowstone: The first 15years after wolf reintroduction. *Biological Conservation, 145*(1),205–213.

Ripple, W. J., Chapron, G., López-Bao, J. V., Durant, S. M., Macdonald, D. W., Lindsey, P. A., … Zhang, L. (2016). Saving the World's Terrestrial Megafauna. *BioScience, 66*(10), 1st ser., 807-812.

Robinson, W.L., Groebner, D.J., Schultz, R.N. (1991). Foraging of Gray Wolves at a Great Blue Heron Rookery. *American Midland Naturalist, 126*(1),196.

Rutledge, K., McDaniel, M., Boudreau, D., Ramroop, T., Teng, S., Sprout, E., Costa, H., Hall, H., Hunt, J. (2011) Scavenger. *In: National Geographic Society*.

Satz, R. N., Apfelbeck, L. (1996). The White Backlash and Beyond. In *Chippewa Treaty Rights: The Reserved Rights of Wisconsin's Chippewa Indians in Historical Perspective* (pp. 101-124). Madisn, WI: Wisconsin Academy of Sciences, Arts and Letters.

S. 164, 115th Cong. 2017

Service, C. N., Adams, M. S., Artelle, K. A., P., Grant, L. V., Darimont, C. T. (2014). Indigenous Knowledge and Science Unite to Reveal Spatial and Temporal Dimensions of Distributional Shift in Wildlife of Conservation Concern. *PLoS ONE, 9*(7).

Shelley, V. (2010). *The Influence of Culture on Attitudes to Wolves and Wolf Policy among Ojibwe Tribal Members and Non-tribal Residents of Wisconsin's Wolf Range*. (Unpublished master's thesis). University of Wisconsin-Madison.

St. Arnold, J. (2009). *Minwaajimo, Telling A Good Story*. Speech presented at Preserving Ojibwe Treaty Rights for the Past 25 Years Symposium in Wisconsin, Bad River. Retrieved from http://www.glifwc.org/minwaajimo/Speech/Jim%20St.%20Arnold.pdf

Stronen, A. V., Brook, R. K., Paquet, P. C., Mclachlan, S. (2007). Farmer attitudes toward wolves: Implications for the role of predators in managing disease. *Biological Conservation, 135*(1), 1-10. doi:10.1016/j.biocon.2006.09.012

Theberge, J.B., Theberge, M.T., Vucetich, J.A., Paquet, P.C. (2006). Pitfalls of Applying Adaptive Management to a Wolf Population in Algonquin Provincial Park, Ontario. *Environmental Management, 37*(4),451–460.

Tierney, K. (2009). *Minwaajimo, Telling A Good Story*. Speech presented at Preserving Ojibwe Treaty Rights for the Past 25 Years Symposium in Wisconsin, Bad River. Retrieved from http://www.glifwc.org/minwaajimo/Speech/Kathryn%20L.%20Tierney.pdf

Tinker, P. H. (2014). In Search of a Civil Solution: Tribal Authority to Regulate Nonmember Conduct in Indian Country. *Tulsa Law Review, 193*.

Treves, A., Bonacic, C. (2016). Humanity's Dual Response to Dogs and Wolves. *Trends in Ecology & Evolution, 31*(7), 489-491. doi:10.1016/j.tree.2016.04.006

Treves, A., Martin, K. A., Wydeven, A. P., Wiedenhoeft, J. E. (2011). Forecasting Environmental Hazards and the Application of Risk Maps to Predator Attacks on Livestock. *BioScience, 61*(6), 451-458. doi:10.1525/bio.2011.61.6.7

Treves, A., Naughton-Treves, L., Harper, E.K., Mladenoff, D.J., Rose, R.A., Sickley, T.A., Wydeven, A.P. (2004). Predicting Human-Carnivore Conflict: a Spatial Model Derived from 25 Years of Data on Wolf Predation on Livestock. *Conservation Biology, 18*(1),114–125.

Treves, A., Naughton-Treves, L., Shelley, V. (2013). Longitudinal Analysis of Attitudes Toward Wolves. *Conservation Biology, 27*(2), 315-323. doi:10.1111/cobi.12009

United States Geological Survey. (2004). *Gray Wolves in and Adjacent to Voyageurs National Park, Minnesota Research and Synthesis*. (NPS/MWR/NRTR/2004-01). Denver, CO: National Park Service.

United States, National Oceanic and Atmospheric Administration , General Counsel. (2008, December). *Endangered Species Act Penalty Schedule*. Retrieved from http://www.gc.noaa.gov/documents/gces/6-ESA/esa_1208.pdf

Vucetich, J. A., Bruskotter, J.T., Peterson, R.O. (2013). *Evaluating the scientific soundness of plans for harvesting wolves to manage depredations in Michigan*. Little River Band of Ottawa Indians Natural Resources, Report No. 2013-3.

Vucetich, J.A., Nelson, M.P., and Peterson, R.O. (2012). Should Isle Royale Wolves be Reintroduced? A Case Study on Wilderness Management in a Changing World. *The George Wright Forum, 29,*126-147.

Vucetich, J.A., Smith, D.W., Stahler, D.R. (2005). Influence of harvest, climate and wolf predation on Yellowstone elk, 1961-2004. *Oikos, 111*(2),259–270.

Wild, M. A., Hobbs, N. T., Graham, M. S., Miller, M. W. (2011). The Role Of Predation In Disease Control: A Comparison Of Selective And Nonselective Removal On Prion Disease Dynamics In Deer. *Journal of Wildlife Diseases, 47*(1),78-93.

Williams, C. K., Ericsson, G., Heberlein, T. A. (2002). A Quantitative Summary of Attitudes toward Wolves and Their Reintroduction (1972-2000). *Wildlife Society Bulletin, 30*(2), 575-584.

Wilkinson, C. (1997). The Role of Bilateralism in Fulfilling the Federal-Tribal Relationship: The Tribal Rights-Endangered Species Secretarial Order. *Washington Law Review, 72*(1063).

Wilmers, C.C., Darimont, C.T., Hebblewhite, M. (2012). Restoring Predators as a Hedge against Climate Change. In Brodie, J.F., Post, E.S., Doak D.F. *Wildlife Conservation in a Changing Climate* (330-341). Chicago, IL: University of Chicago Press.

Wood, M. C., Welcker, Z. (2008). Tribes as trustees again: the emerging tribal role in the conservation trust movement. *Harvard Environmental Law Review, 32*.