

The Reintroduction of Bison on the ASCCA Property

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Introduction

Bison (also known as Buffalo) are an important keystone species that are native to Alberta grasslands (Picardi, 2019). For many years, bison roamed North America and contributed to their ecosystems as well as Indigenous peoples of Canada (AWA, 2020). However, with the settlement of Europeans in the 1800's, bison almost became an extinct species. In recent years, bison populations have been reintroduced to Alberta parks including Elk Island National Park and Banff National Park in order to restore the native state of the land (Parks Canada, 2017). The Ann & Sandy Cross Conservation Area (ASCCA), which is located southwest of the city of Calgary, has shown interest in reintroducing bison to their land as well. It is the desire of the ASCCA to use the very best land management practices and use research to determine what those practices should be. The ASCCA currently uses cattle to manage its grassland to mimic historical native wildlife browsing, however would bison be a better alternative given the risks and fencing required? In this paper, background information on bison including literature reviews and analysis will be discussed, followed by perspectives on grazing, management, safety, their pros and cons, as well as recommendations.

Background information

History of Bison in North America

To begin our discussion on bison, it is important to note the rich history of bison in Canada and Alberta. Before European settlement, about 30 million bison roamed the Great Plains of North America (Picardi, 2019). There is lots of evidence of the presence of bison in Canada and Alberta from many sources including traditional knowledge, explorer accounts, and archeological evidence such as fossils and buffalo rubs found all across the country (Parks Canada, 2017). Buffalo rubs are stones that have been rubbed smooth by bison for many years,

which can be seen in many natural areas in Canada (Gov. of Manitoba, 2009). Unfortunately, by the end of the 1800's less than 1,000 bison could be found on the whole North American continent (Picardi, 2019). The drastic decrease of bison populations were due to three main reasons: habitat loss, disease and human impacts (AWA, 2020).

In regard to habitat loss, Indigenous peoples traditionally played a role in grassland management that is no longer in use (AWA, 2020). Controlled fires were performed to clear forests and renew grazing areas. However, in recent years Alberta provincial laws have restricted most controlled fires (Kristensen & Ried, 2016). As a result, these natural disturbances have been reduced and bison have lost grassland areas. Additionally, lots of the prairies in Alberta have been converted to fields for agriculture and urbanization (AWA, 2020). Secondly, diseases such as tuberculosis, brucellosis and anthrax have historically been transmitted to herds of bison, killing many bison and decreasing their populations (AWA, 2020). Finally, the most impactful reason for bison decline has been human influence (AWA, 2020). First, the increased paving of roads has caused lots of vehicle collisions with bison. Also, another huge impact is over-hunting. Bison hunting has made the most significant impact on populations historically in the 1800's, and is still a problem today (AWA, 2020). Back in the 1800's, European settlers hunted bison for power over Indigenous groups (Phippen, 2019). Also, bison fur played a major role in the fur trade supported by European settlement in Canada (Foster & Parrott, 2006). Today, there is not as much hunting in Canada as there has been in the past, however many hunters still seek out bison for their fur and meat. Needless to say, it is unfortunate to see the drastic decline in bison populations as it makes significant insight into why reintroducing them back to Alberta is so important.

Importance of Bison

Bison are a native keystone species to Alberta. According to Picardi (2019), a keystone species is defined as “a species on which other species in an ecosystem largely depend, such that if it were removed the ecosystem would change drastically”. Unfortunately, through the years bison have become recognized food and fur sources rather than a keystone species; therefore they have been categorized like cattle rather than a wild animal (Bayne et al, 2019). However, bison are very much wild and still need to be protected.

Bison are a large mammal species that are part of the bovid family. Estes (2020) defines bovine animals as any hoofed mammal in the family *Bovidae* and order *Artiodactyla*. This includes antelopes, sheep, goats, cattle and buffalo. What sets bison apart from other hoofed animals is their unique horns and flat front skulls often used for ramming. They are also the largest member of the bovid family weighing between 1300-2000 pounds (Estes, 2020). Bison are a massive species that eat a variety of grasses and are mainly vegetarian with the exception of some insects that get eaten while feeding on the grass (Allred et al, 2011).

Considering that bison are one of the larger animals in their family, it is no coincidence that they have major effects on the environment (Lipson et al, 2011). Bison eat and restore nutrients from a wide range of grasses, they transition well between dry and wet seasons and they can contribute to nutrient and resource cycling in farming systems. This is because their manure is considered good fertilizer for grasses. As well as with mitigation strategies, they can help to improve productivity and reduce land conversion (Lipson et al, 2011). Although this research was conducted strictly on water buffalo, bison that may be brought to the ASCCA land will have the same positive effects on the land; by eating more diverse grass species, they can help get rid of some of the invasive grasses that regular cattle do not eat (Lipson et al, 2011). The article goes on to explain that this is because bison tend to graze on invasive grasses which

can allow the growth of native grass species to return.

Connection to Indigenous Communities

Bison have a very strong cultural importance to Indigenous peoples in Canada. Historically, bison had a harmonious relationship with humans, where Indigenous peoples would create grassland areas for the bison, and the bison provided important resources for them such as food and materials for tools (Parks Canada, 2017). As mentioned, bison were critical food sources to Canadian Indigenous groups before the settlement of Europeans, where their meat could feed large families and communities (Canadian Geographic, 2021). Moreover, hides were often used to make clothing such as hats, coats, blankets, gloves (Canadian Geographic, 2021).

Additionally, bison were seen as spiritually powerful beings in many Indigenous tribes, and still continue to be today (NABM, 2020). Their horns and hides serve as religious artifacts, and they are viewed as symbols of honour and generosity (NABM, 2020). Before the arrival of settlers, the Ann and Sandy Conservation Area was the territory of the Blackfoot nation along with wildlife including bison (ASCCA, 2015). This rich history of bison in Alberta and their relationship with Indigenous peoples is very much a part of the history of the ASCCA.

Ann and Sandy Cross Conservation Area

The ASCCA is a 4,800 acre natural area southwest of the city of Calgary (ASCCA, 2015). As a part of their mission statement and guiding principles, they are committed to providing space for native species of wildlife and educating the public on conservation with education programs (ASCCA, 2015). Reintroducing bison to the property would be a great opportunity to inform the public on the historical importance of bison, as well as their importance to local Indigenous communities and their role as a keystone species. Additionally, it is part of the ASCCA long-term implementation plan in habitat management to provide specific

habitat and opportunities for repopulation of native species, including supporting the relocation programs of other agencies for native species (ASCCA, 2015). Furthermore, buffalo rubs can be seen on the property today, as evidence for the traditional presence of bison on the land. Therefore, it is evident that it is in the best interest of the ASCCA to consider the reintroduction to bison on their property. Currently, grazing throughout the ASCCA has mainly been done by elk and cattle which protects native grasses and the land from erosion (ASCCA, 2015). So far these animals have done a fairly good job managing the grasslands for now, however with the advantages of bison grazing and their historical importance the introduction of bison of ASCCA could be beneficial.

Bison and Grazing

The ASCCA currently uses cattle to manage its grassland to mimic historical native wildlife browsing (ASCCA, 2015). However, would bison be a better alternative? First, it is important to explore cattle grazing versus bison grazing in grasslands by comparing their differences and similarities in grazing. As explained, bison are good for the ecosystem for many reasons. Birds use their winter fur to build their nests (Parks Canada, 2017) and bison feces can function as a natural fertilizer to their habitats (Nosowitz, 2016). Additionally, their reintroduction supports ecological integrity, contributes to bison conservation, and creates opportunities for education on bison ecological and cultural importance (Parks Canada, 2017). Moreover, cattle have many similarities to bison on their environmental effects. Both cattle and bison hooves aerate soil which helps disperse native seeds and causes better overall plant growth (Picardi, 2019). Bison and cattle grazing and wallowing provides habitat for elk, ground squirrels, badgers (Parks Canada, 2017). Both animals are strongly attracted to recently burned areas of pastures when grazing and tend to avoid steep slopes (Helzer, 2014.)

Since the near extinction of bison, many Canadian landscapes have been replaced by agricultural lands where domestic cattle are the dominant grazers instead (Allred et al., 2011). As for grazing alone, the differences between a bison-grazed pasture and a cattle-grazed pasture are pretty minimal (Helzer, 2014). Cattle tend to prefer areas that are closer to water, while bison are not limited by distance to water (Allred et al., 2011). Cattle also prefer areas with woody vegetation, while bison often avoid them. (Allred et al., 2011). Therefore, bison-grazed pastures tend to have fewer heavily grazed and trampled areas near trees and standing water than cattle pastures do (Helzer, 2014). Additionally, it is believed that bison cause less trampling and erosion damage to grasslands than cattle, and the bison's diet is higher in grasses, therefore causing less long-term damage to grasslands (Helzer, 2014). Additionally, as previously mentioned bison tend to graze on invasive grasses which can allow the growth of native grass species to return.

Now that previous methods used to maintain grasslands are becoming less popular or unattainable such as controlled fires, it is critical to be able to use bison as a technique (Picardi, 2019). A common technique used is fire, because when fires take place in nature they burn away debris that is preventing new plants from growing and help restore balance in the ecosystem (Bayne et al, 2019). It also has been used to remove pests and disease, regenerate land, and remove unwanted vegetation buildup (Bayne et al., 2019). Historically, Indigenous peoples often used this technique to restore their lands along with allowing bison to roam freely and graze on the grasses. With Calgary's city growing so fast and tendencies to have significant damaging fires across Alberta, people are no longer allowed to use controlled fires as a method of restoring their lands (Bayne et al, 2019). There are also public perceptions pertaining to risks from burns getting out of control, as well as the impacts of smoke pollution and ecological damage. This is

especially true for areas that are known for being dry and having issues with fire such as Alberta. To avoid any unnecessary fires that get out of control, all controlled fires are prohibited unless authorized by the city (Kristensen & Ried, 2016). The government has also implemented fire bans during dry spells, and often protect certain areas where it is more urbanized that fires are illegal (Kristensen & Ried, 2016). The ASCCA foundation is one of many affected by this. Because of regulations as well as potential dangers, it is not an option for the ASCCA to use as a method for land regulation. However, with not being allowed to use wildfire, invasive species have the potential to take over and native grasses are prone to diminishing. In order to prevent this, bison have been looked at as an alternative option since they could be considered the next best legal option.

Banff National Park and Elk Island National Park

As discussed, for thousands of years bison roamed the lands of Alberta, including what is now our National Parks (Parks Canada, 2017). After the drastic over-hunting and endangerment of bison in Canada, there were almost no bison left in Alberta. However, starting in 1907 to 1912, the Canadian government purchased one of the last herds of bison from Montana and shipped over 700 wild bison by train to Elk Island National Park (Parks Canada, 2020). Since then, Elk Island Park has been an influential area for bison conservation to North America (Parks Canada, 2020) In 2017, a small herd of plains bison from Elk Island National Park were reintroduced to Banff National Park on the eastern slopes. It is a remote area with wide, grassy valleys that bison need to thrive (Parks Canada, 2017). Therefore, the only two national parks where Bison have been reintroduced so far in Alberta are Banff National Park and Elk Island National Park (Parks Canada, 2017). So far, the introduction of bison has been a success where the bison have been roaming the parks and fulfilling their role in the ecosystem as a keystone

species (Parks Canada, 2020).

Buffalo Management

Aside from all the benefits of bison for grazing, there are also disadvantages that should be acknowledged. Bison can be dangerous animals and strict safety measures must be incorporated into any kind of habitat plan. One necessary safety measure includes appropriate fencing. Fences used to keep bison must be very strong and durable to sustain any type of ramming or kicking. Additionally, the fencing should be strong enough to keep both adult bison and calves locked inside since even young bison can weigh around 500 pounds and can kill people if they become aggressive (Stenwigg et al 2016). A resulting issue that arises considering the ASCCA, is that they stand for conservation for a wide variety of wildlife. The ASCCA property is home to hundreds of animals that utilize the land for safety from hunters, food, reproduction and habitat (ASCCA, 2015). Many animals, especially elk, like to come and go on the property freely, which is important for their health to roam and graze. With this in mind, the fencing that is used to keep bison in must not affect the other animals at all or at least as little as possible.

Considering the ASCCA property, it can be observed that current fencing is placed to mark property borders and strategically constructed to not intervene with animals. To incorporate bison to the property, there are two potential recommendations for fencing options. The first idea would be to build sturdy fences that are made with strong metal that the bison could not physically knock down, but are spaced out enough that other smaller animals could get through. They would also have to be low enough that other animals (that are better at jumping than bison) could jump over. The maximum height bison can jump is up to 6 feet. Therefore, the fencing would have to be around 7 feet tall while deer on average can jump 10 feet high and elk can jump up to 8 feet high (Treutt et al., 2001). These bars would have to be spread out enough that

smaller animals such as baby deer, fox, rabbits and many other creatures could go under or between the bars while the adult deer and elk could jump over. While making sure it is strong enough to hold the buffalo in, the gaps between the bars would not allow the bison through and would be high enough that they could not jump over.

The second fencing recommendation would be to set up sectioned areas within the ASCCA property. Some of these areas could be enclosed by fences for bison, while the rest of the property would have open space accessible for other wildlife. Having multiple areas would still allow for the bison to be moved around and graze in different locations while being properly and safely fenced in. Once one area was efficiently grazed, the bison could be moved to another location and be used there. Overall, proper fencing would be the number one safety precaution that needs to be carefully considered. This would help in order to keep the bison contained, as well as in protecting both the staff, other wildlife and hikers.

Safety Precautions

The ASCCA has specific trails for hikers to go and enjoy the property. If bison were not properly kept when being reintroduced to the land, hikers could be in serious danger. Parks Canada (2019) refer to bison as wild animals; even though they may appear docile, they are dangerous, unpredictable and may charge without warning. Parks Canada (2019) explains that bison will charge at cars, people on bikes and people walking by without any apparent reason. To keep hikers safe, there are a few recommendations that should be put in place. The first is to have signs allowing people to know and be aware that there are bison in this location. Secondly, educating hikers on the warning signs of a charging bison would also be important. These warning signs usually include snorts, shakes or tosses of the head, raising its tail or turning its back, raising its tail and defecating (Parks Canada, 2019). Aggressive bison may also paw at the

ground, make false charges, stop grazing to stare at it's threat. If any of these instances happen, it is crucial to back away immediately while being as quiet as possible (Parks Canada, 2019). By warning hikers and properly educating staff on bison encounters, it would significantly reduce any injury or death from occurring.

Over the last 100 years the city of Calgary has expanded greatly (Canadian geographic, 2021). Since the initial purchase of land in 1945 (which is now part of the ASCCA), many residential areas and roads have gotten closer to the area (ASCCA, 2015). The ASCCA is located just off the main highway 22X and 160th street, southwest of the city of Calgary limits (ASCCA, 2015). Currently, new developmental projects have been completed or are still underway that are within close proximity of the area. Some of these projects include the new ring road project and new residential expansions (City of Calgary, 2021). Considering these projects, with the increase of nearby expansions to the ASCCA also creates higher numbers of people nearby. This is important to acknowledge when contemplating the reintroduction of bison, because as already noted bison can be extremely dangerous to humans if they escape or are aggravated. Therefore, if it was decided to reintroduce bison to the ASCCA, this risk would have to be weighed out in terms of safety to the overall community of southwest Calgary and surrounding area.

Recommendations and Conclusion

After doing extensive research on bringing bison to the ASCCA, one issue that arose was how many bison would be required. This concern can become mathematical because there is a required number needed in a herd to avoid things such as inbreeding depression (Licht, 2017). Inbreeding depression happens when the population is small so males fight over limited females and end up inbreeding out of desperation to spread their genes (Estes, 2020). Any genetic deficiencies that this particular family had are now enhanced over years of interbreeding

occurring (Licht, 2017). Interbreeding will increase the death of the population from a bad gene that has an increased likelihood of occurring when the same family members are bred, which results in a decrease in the population (Licht, 2017). Simple mathematics can be used to understand how to get the perfect population size that will not overpopulate but is large enough to avoid mass inbreeding. Licht (2017) discusses how a healthy North American buffalo herd will require at least 50 buffalo and can expand into the hundreds healthily. In reading this information, it would be recommended to at least bring 50 bison onto the ASCCA property so they can reproduce and thrive. If 50 at a time is not amenable, then an introduction program should be planned that every few years new bison are brought in to keep new genes in the gene pool.

Overall, after exploring background information on bison including literature reviews and analysis, as well as perspectives on grazing, management, and safety, it would be in the best interest of ASCCA to go ahead with the reintroduction of bison. Given the risks and fencing required, there are many advantages to having bison on the ASCCA property. These advantages include improved grassland management, inclusivity of native species, and educational opportunities on keystone species, bison history and indigenous significance. All of these align with the ASCCA mission, which is to ultimately “protect habitat and provide space for native species of wildlife; and promote and support conservation by engaging in conservation related activities” (ASCCA, 2015) . The introduction would come with a cost of having correct fencing for safety and public awareness of risks, however if the ASCCA is prepared to make these adjustments it would seem to be the best option moving forward in grassland management and the overall conservation and wellness of ASCCA.

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