



BUFFALO HERD FEASIBILITY STUDY

JULY 2023

PREPARED BY:

Village Earth

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FOR:

Fond du Lac Band

of Lake Superior Chippewa





Fond du Lac Band of Lake Superior Chippewa Reservation Business Committee

Chairman Kevin R. Dupuis, Sr. Secretary/Treasurer Robert Abramowski
District I Wally J. Dupuis District II Brad Blacketter District III Roger M. Smith, Sr.

RESOLUTION # 242123

Resolution to Adopt the Fond du Lac Buffalo Herd Feasibility Study

The Fond du Lac Reservation Business Committee, on behalf of the Fond du Lac Band of Lake Superior Chippewa, hereby enact the following Resolution:

WHEREAS, the Fond du Lac Band of Lake Superior Chippewa are a sovereign people, who occupy the Fond du Lac Reservation and retain their aboriginal rights of self-government and self-determination pursuant to the Treaty of LaPointe of September 30, 1854, 10 Stat. 1109; the Indian Reorganization Act of 1934, 25 U.S.C. § 461 et seq.; the common law of the United States; and as recognized by the United Nations Declaration on the Rights of Indigenous Peoples of September 13, 2007; and


WHEREAS, it is the sovereign obligation of the Fond du Lac Reservation Business Committee, as the duly-constituted governing body of the Fond du Lac Band, to exercise the responsibilities of self-government and management over the Band's affairs; and

WHEREAS, the Fond du Lac Reservation Business Committee has developed the Fond du Lac Reservation Buffalo Herd Feasibility Study to be a guide to assist the Fond du Lac Band of Lake Superior Chippewa in the development of a buffalo herd; and

WHEREAS, NOW THEREFORE BE IT RESOLVED, that the Fond du Lac Reservation Business Committee hereby adopt the "Fond du Lac Band of Lake Buffalo Herd Feasibility Study as a guide for the future buffalo herd development on the Fond du Lac Reservation

We do hereby certify that the foregoing Resolution was duly presented and acted upon by vote of 4 for, 0 against, 0 silent, with a quorum of 5 being present at a Special Meeting of the Fond du Lac Reservation Business Committee held on August 23, 2023 on the Fond du Lac Reservation.


Kevin R. Dupuis, Sr.
Chairman


Robert Abramowski
Secretary/Treasurer

Executive Summary

In the summer of 2022, the Fond du Lac Band of Lake Superior Chippewa and the Fond du Lac Reservation Business Committee contracted the non-profit Village Earth to conduct a buffalo feasibility study for the establishment of a buffalo herd on tribal lands through the use of a grant from the Intertribal Buffalo Council (ITBC). The desire for this feasibility study came about as part of the Band's current food sovereignty initiative and in response to Band members requesting greater access to buffalo as a traditional food. The initial purpose of establishing a buffalo herd was to enhance food sovereignty and food security for the Band. Over the course of viable pasture assessments and discussions, the purpose has evolved to the herd being utilized more for cultural purposes and education as well as a food source for ceremony and traditional purposes. This document outlines the Fond du Lac Reservation's land base, reservation history, pasture, soil, forage assessments as conducted by the USDA's Natural Resources Conservation Service (NRCS), and infrastructure requirements. Additionally, this document summarizes feedback from the community and their overall support for establishing a buffalo herd on the reservation.

Initially, the Fond du Lac Band suggested five different parcels of land for consideration. Through analyzing various resource assessments and considering the Band's visions for the buffalo herd, we have identified two 60-acre pastures and one 120-acre pasture within the external reservation boundaries that could support a buffalo herd and have determined that it would be feasible for the Fond du Lac Band of Lake Superior Chippewa to establish a buffalo herd. Based on the soil analysis and forage production analyses conducted by the NRCS, along with comparisons to similar-sized buffalo operations in the area, we have determined it would be feasible for the Band to establish a buffalo herd and have developed three herd management alternatives for the Band to choose from based on their preferences.

Village Earth recommends Alternative A: "Minimum Infrastructure and Management" as the preferred alternative, as it requires the lowest investment in infrastructure, with minimal requirements for supplemental feed during the winter months. Additionally, it will allow the Band to scale-up infrastructure as the herd grows. Which, if any, of the alternatives is chosen is at the Band's complete and sovereign discretion.

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STUDY CONTRIBUTORS

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Chase is Village Earth's Agriculture & Natural Resources Specialist. He is from Eden Prairie, MN, and is an enrolled member with the Mandan tribe of the Three Affiliated Tribes. He has a M.S. in natural resource sciences from North Dakota State University in 2022, where he conducted research on the recovery of soil and vegetation following reclamation on degraded lands. He has a background in land and tribal resource management research and planning.

David Bartecchi, M.A.

David Bartecchi is Executive Director of Village Earth, a 501(c)(3) not-for-profit organization based in Colorado. He received his Master's of Arts in Cultural Anthropology from Colorado State University. David has over 20 years of experience researching Native Land Tenure Issues and working on practical solutions for bison restoration, native agriculture, community mapping, and GIS throughout Indian country.

STUDY CONTRIBUTORS

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Raven McMullin

Raven is a Writer and Researcher for Village Earth. She is from the Navajo reservation in Twin Lakes, NM. She received her B.A. in Political Science with a minor in Legal Studies from Colorado State University in 2020, and is now pursuing her master's in public policy at Arizona State University. She has a background in community outreach and tribal advocacy, and is passionate about contributing to NLAP's mission to present accessible and reliable data tools for tribes to utilize at their own discretion.

INTRODUCTION

Project Background

The Fond du Lac Band of Lake Superior Chippewa has been aggressively pursuing food sovereignty on the reservation since 2016. These efforts have included the development of a 36-acre farm, with commercial kitchens and a cannery, that includes roughly 5 acres of vegetable production for tribal use. An agricultural division was developed and began operations in 2022, including the development of a strategic plan for the division. As part of these food sovereignty efforts, the Band surveyed community members for feedback on the traditional foods they would like greater access to. These surveys revealed that buffalo was one of the more common responses. This prompted the Band to conduct a feasibility study to explore the validity of establishing a buffalo herd on the reservation.

Currently, no pastureland is specifically set aside for buffalo grazing, and the infrastructure for a buffalo herd is minimal, with few areas developed enough to be viable options. Several parcels of land used for hay in recent years have been identified as potential locations for a buffalo herd. The Band received funding from the Intertribal Buffalo Council to contract Village Earth (a 501(c)3 Nonprofit Organization) to conduct a feasibility study for a buffalo herd within the Fond du Lac Reservation's boundaries. The purpose of this study is to determine the feasibility of establishing a buffalo herd on the reservation, the use of the herd for cultural education and ceremony, and the use of the herd to further the Band's food sovereignty efforts.

Statement of Purpose

For the Fond du Lac Band of Lake Superior Chippewa, there are two main reasons for establishing a buffalo herd on the reservation. The first is to increase food sovereignty and food security for the Band's members on the reservation. Through responsible and sustainable management of the buffalo herd, the Band could provide a traditional food source to its members. The second reason is to re-establish the cultural relationship between buffalo and members of the Band. Establishing a herd will support cultural education for Band members (primarily the youth) and will help foster the resurgence of cultural and traditional practices.

Vision Statement

Through the establishment and proper management of a buffalo herd, The Fond du Lac Band of Lake Superior Chippewa will sustain a herd of 10-70 buffalo (depending on the alternative enacted), re-establish the relationship between buffalo and Ojibwe peoples, return ceremonies and traditions to the people, educate youth and other members of the community about buffalo and the Ojibwe peoples, return buffalo to the ecosystems of northern Minnesota, and will respect and honor the buffalo in our care.

Scope of Study

This study was intended to determine the feasibility of establishing a buffalo herd on the Fond du Lac Reservation through the examination of soil, vegetation, water, pasture stocking rates, pasture carrying capacity, buffalo forage needs, etc., and the potential financial implications (fencing/corral/buffalo /equipment costs, butchering, meat storage, buffalo product markets, etc.) of herd establishment. This report focuses on blending current and potential ecological conditions with tribal finances required for establishing and sustaining a successful buffalo herd. The remainder of this document aims to answer the following question: **Is it feasible to establish a buffalo herd on the Fond du Lac Reservation? If so, what is the best way for this to be done?**

SWOT Analysis

Analysis of establishing and managing buffalo on the Fond du Lac Reservation.

STRENGTHS	WEAKNESSES
Return/strengthen cultural connection to buffalo	Limited land/area to work with
Healthy & nutritious food source	Lack of equipment needed for buffalo
Job opportunities on Reservation	Fencing and infrastructure costs

OPPORTUNITIES	THREATS
Cultural education	Drought
Possible education for surrounding area	Potential buffalo disease issues
Potential source of income from schools/university	Potential loss of future income for leasing out/haying pasture
Buffalo meat/materials for traditional/cultural purposes (ceremony)	Potential impacts to surrounding areas
	Loss of 60+ acres for hunting and gathering purposes
	Limits funds that could be used for habitat conservation and improvement
	Limits funds available for other natural resource projects (elk habitat rehabilitation and elk reintroduction)
	Increased livestock would require increased predator management and prevention
	Increased activity in area could decrease wildlife populations in area of herd (removing hunting viability in surrounding areas)

HISTORICAL & ECOLOGICAL CONTEXT

History

As recent as 18,000 years ago, the entire state of Minnesota, apart from the southwestern and southeastern corners, was covered by glacial ice shelves. Over the next 4,000 years, these glacial ice shelves receded northward and exposed the southern half of Minnesota while the northern half remained covered by glacial ice until the end of the ice age around 11,000 years ago, exposing all but the very northern reaches of the state. It is believed that the many lakes, rivers, ponds, and wetland areas of Minnesota are remnants of these receding glaciers. Minnesota lies at the intersection of three major ecosystems: prairie, boreal forest, and deciduous forest; the Fond du Lac Reservation lies within the boreal forest and wetland ecosystem of northern Minnesota. Since the glacial recession 11,000 years ago, the climate has been relatively consistent, with temperature and precipitation levels remaining within stable ranges.

However, the climate of northern Minnesota has warmed by roughly 3 degrees since 1895, with the years between 1985 and 2015 being the warmest on record.

Additionally, the yearly ice cover on Lake Superior has decreased by approximately 76 percent since the early 1970s. These deviations from historical conditions can have large effects on the native flora and fauna of the area as well as far-reaching impacts on the people that rely on those species for survival.

Despite being one of the most iconic species of the American west, buffalo were nearly driven to extinction in the mid-1800s due to unchecked killing and habitat loss. Prior to settlers migrating west from the east coast, buffalo roamed freely over more than two-thirds of the North American continent, ranging from the Appalachian Mountains west to the Rocky Mountains and north through western Canada up to Alaska. Across this vast range, historic buffalo populations have been estimated to have been somewhere between 30 and 60 million as recently as the 1850s. However, by the turn of the century, buffalo populations are estimated to have dwindled down to a mere 300 or so individuals living in small, isolated herds

History

across the plains. This near eradication of buffalo was no accident and, while there are other factors to consider, can be predominantly explained by two factors.

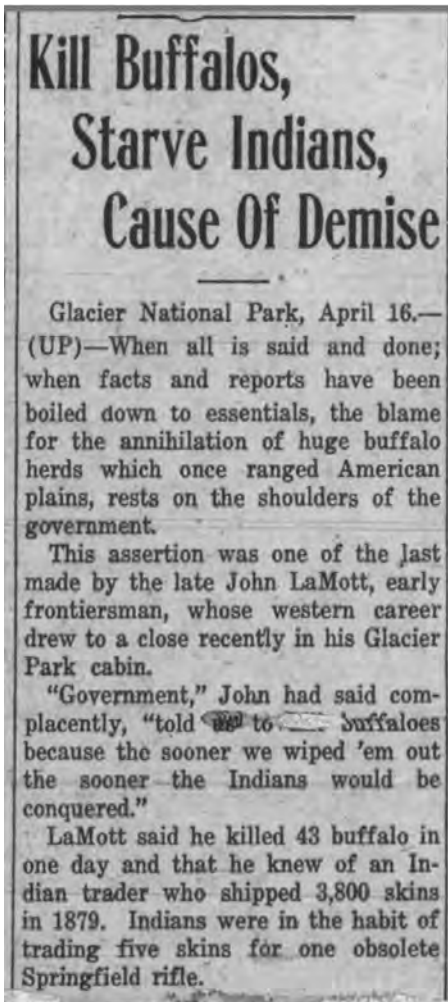


Figure 1. Laurel Outlook, *Kill Buffalos, Starve Indians, Cause of Demise*, Photograph, Newspapers, April 16, 1930, <https://www.newspapers.com/article/laurel-outlook-buffalo/68807752/>.

HISTORICAL & ECOLOGICAL CONTEXT

1. As settlers from the east coast pushed westward across the continent, they looked to remove buffalo from the land in order to establish livestock and farming operations.
2. The federal government did not have regulations in place to prevent the over-harvesting and killing of buffalo. This lack of regulation permitted overkilling efforts that were part of the larger war on Native American tribes and culture in the west. By allowing the elimination of buffalo (a major source of food and cultural touchstone for many tribes), they were attempting to eradicate the Native American population.¹

By 1870, the number of wild buffalo had been reduced to the point that state legislatures urged the federal government to step in and enact laws to regulate buffalo harvesting. This decade saw a string of bills and regulations enacted by Congress in attempts to put an end to hunting buffalo across the United States, with the exception being within Native American reservation boundaries.²

Furthering these buffalo protection efforts, the Lacey Act of 1894 looked to stop poaching on public lands in the United States, as well as addressed various jurisdictional issues, with the primary purpose of establishing a buffalo herd in Yellowstone. The Lacey Act ultimately aided in the resurgence efforts of buffalo populations.³ Led by land and wildlife managers at Yellowstone, these efforts to re-establish wild buffalo populations began in 1902 when these managers purchased 21 buffalo from privately-owned buffalo herds.

History

As a result of these efforts (and the efforts of other public and private entities, including Native American Tribes), over the past 125 years, the buffalo population in the United States has grown to approximately 500,000. This number is expected to continue to grow as more data comes to light about the ecological benefits that buffalo have on grasslands and as tribal nations continue to re-establish their relationships with these animals and grow their own buffalo herds.

In the end, attempts to remove Native American tribes from the west by decimating the buffalo populations were unsuccessful. However, these efforts did lead to the removal of Native Americans from much of their ancestral lands and forced them onto reservations, further removing them from their traditional food sources and creating a dependent relationship between them and the federal government.

With the resurgence of buffalo across Indian Country, many tribes are working to take back their sovereignty and regain their cultural identities through re-establishing their relationships with these relatives. These efforts can be seen as part of a larger effort to reclaim food stability and sovereignty at the tribal and regional levels. The buffalo in this context provides a sustainable and nutritious source of protein that also provides connection to cultural histories and traditions.

For indigenous peoples like the Ojibwe, the relationships between the people and the various plants and animals of northern Minnesota were not just one of subsistence but also that of reciprocity and respect. The people and these species relied on one another for survival and the people took their role as stewards of the land to heart.

History

While there are many more, examples of plant and animal species that play a large role in the northern Minnesota ecosystem and Ojibwe cultures are: manoomin (wild rice), cedar, birch, ash, blueberries, raspberries, maple trees, pine (red and white), moose, beaver, otter, wolves, black bear, snowshoe hare, wild turkeys, bobcat, wood buffalo, walleye, northern pike, lake trout, and perch.

HISTORICAL & ECOLOGICAL CONTEXT



Figure 2. Scot Martin, *Manoomin*, Photograph, Flickr, October 13, 2016, <https://www.flickr.com/photos/iamnothamlet/29844227223>.

Original Place Names

The Ojibwe are originally from the east coast of North America and are estimated to have arrived in northern Minnesota by the late 1600s. The Ojibwe have a long history of living in northern Minnesota and their relationships with the land reflect this long history. This history and connection to the area is seen in present-day Minnesota, with Ojibwe words being used as the basis for the names of places (cities, towns, rivers, lakes, etc.). An example of this is seen in the naming of the Fond du Lac Band (and subsequent reservation) and the entomological history of the area.

History

Waiekwakitchigami is the original Ojibwe name translated by the French as Fond du Lac, meaning “the bottom or end of the lake.”⁴ According to the Band’s historical accounts and early maps, the name “Fond du Lac” and the Ojibwe version of the name applied to the entire Duluth-Superior area. Similarly, another name, **Onigamiinsing**, meaning “little portage,” is now often used to refer to the current city of Duluth.⁵ Early land maps indicate that this name refers to the “ancient portage across Minnesota Point, roughly located where the ship canal is located today.”

Since the 1854 treaty, **Nagaajiwanaang** (“where the flow of the river stops”), has been the Ojibwe way to refer to the Fond du Lac Reservation.⁶ The Band’s historical accounts state that “while the name is assumed to be the Ojibwe version of French Fond du Lac, the name originally applied to the area below the rapids of the St. Louis River where the current of the river slowed before entering the harbor, roughly in the Fond du Lac neighborhood of the city of Duluth where the American Fur Company trading post was located after the War of 1812.”⁷ It is of historical and contextual importance to note that the original Nagaajiwanaang Reservation was 1.25 times the current size of the reservation, with its boundaries extending westward to the exterior edges of the 1854 Ceded Territory.



Figure 3. Joseph Nicollet, 1843 Map, Map, Duluth Stories, 1843, <https://duluthstories.net/ojibweplacenames.html>.

HISTORICAL & ECOLOGICAL CONTEXT

History

Treaty History

Prior to 1837, the Ojibwe lived throughout the northern half of present-day Minnesota. The signing of the White Pine Treaty in 1837, which is regarded as the first treaty signed between the Ojibwe and the United States, established the transfer of millions of acres of timber to the U.S. in exchange for annual payments for up to 20 years. The breakdown of these payments was to be: \$9,500 to be paid in money; \$19,000 to be delivered in goods; \$3,000 for establishing three blacksmith shops, supporting the blacksmiths, and furnishing them with iron and steel; \$1,000 for farmers, and for supplying them and the Indians with implements of labor, with grain or seed and whatever else may be necessary to enable them to carry on their agricultural pursuits; \$2,000 in provisions; and \$500 in tobacco. Additionally, \$70,000 was allocated to fur traders, and \$100,000 to “mixed blood” relatives.⁸ Hunting, fishing, and gathering rights in the ceded territory were still guaranteed to the Bands.

HISTORICAL & ECOLOGICAL CONTEXT

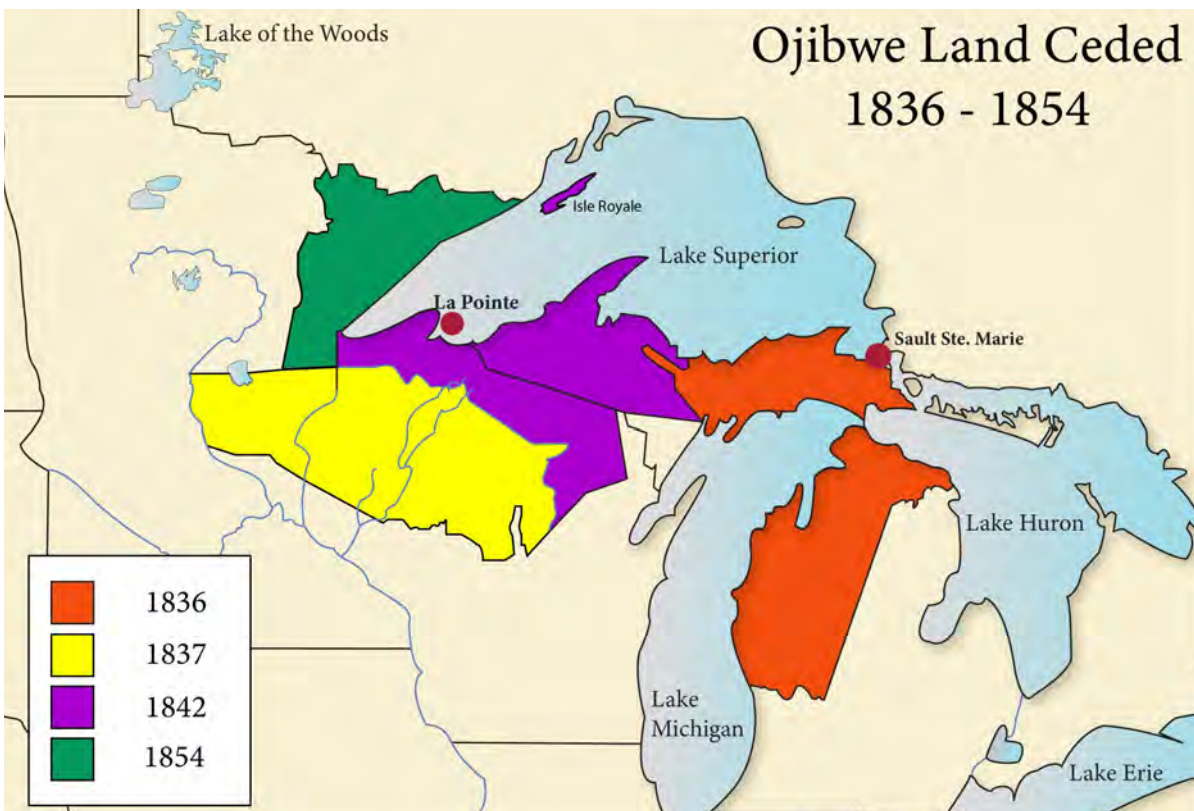


Figure 4. Colin Mustful, *Ojibwe Land Ceded*, Map, Colin Mustful, February 5, 2019, <https://www.colinmustful.com/resisting-removal-the-1854-treaty-of-la-pointe/>.

History

The signing of the White Pine Treaty ushered in the treaty era between the U.S. and the Ojibwe of northern Minnesota and Wisconsin. Some of the other more notable treaties that occurred in the years that followed are:

- The 1842 Treaty of La Pointe, which ceded large tracts of land located in the Lake Superior watershed in Wisconsin and the western Upper Peninsula of Michigan in exchange for greater compensation than outlined in the 1837 Treaty.
- The 1854 Treaty of La Pointe established reservation lands of over 101,000 acres for the Fond du Lac Band of Lake Superior Chippewa. Signed by Henry C. Gilbert and David B. Herriman (U.S. commissioners) and leaders of the Ojibwe Bands of Lake Superior and the Mississippi on September 30, 1854, this treaty proclaimed the cession of all Lake Superior Ojibwe lands to the U.S. in the Arrowhead Region of Northeastern Minnesota in exchange for reservations for the Lake Superior Ojibwe in Wisconsin, Michigan, and Minnesota.

Refer to the previous page for a map of these land cessions. More detailed maps of each ceded territory can be found on the Fond du Lac Band's website.⁹

History

The Impact of Allotment

The Dawes Act of 1887 ushered in the allotment era and initiated policies on the Ojibwe reservations that ultimately reduced the Fond du Lac Reservation land area (as reserved in the Treaty of 1854) by roughly two-thirds. The Dawes Act policies continued until 1934, at which time nearly three-fourths of the Fond du Lac Reservation was owned by non-Natives. In 1934, the Indian Reorganization Act (IRA) was passed, which allowed the Fond du Lac Band to begin re-acquiring land.¹⁰

As of 1981 (when re-organization ended), the Fond du Lac Band had regained control of just over half of the lands within the reservation boundaries.

The Dawes Act had a devastating impact on Native agriculture across the United States and largely explains the disparities between Native and non-Native agriculture producers that persist to this day. In fact, when you compare agriculture revenue between Native and non-Native producers on reservations that were allotted versus reservations that were not allotted (using data from the 2017 Census of Agriculture for American Indian Reservations), the difference is striking. On non-allotted reservations, over 75% of agriculture revenue goes to Natives, while on allotted reservations, less than 11% of the revenue goes to Natives.¹¹

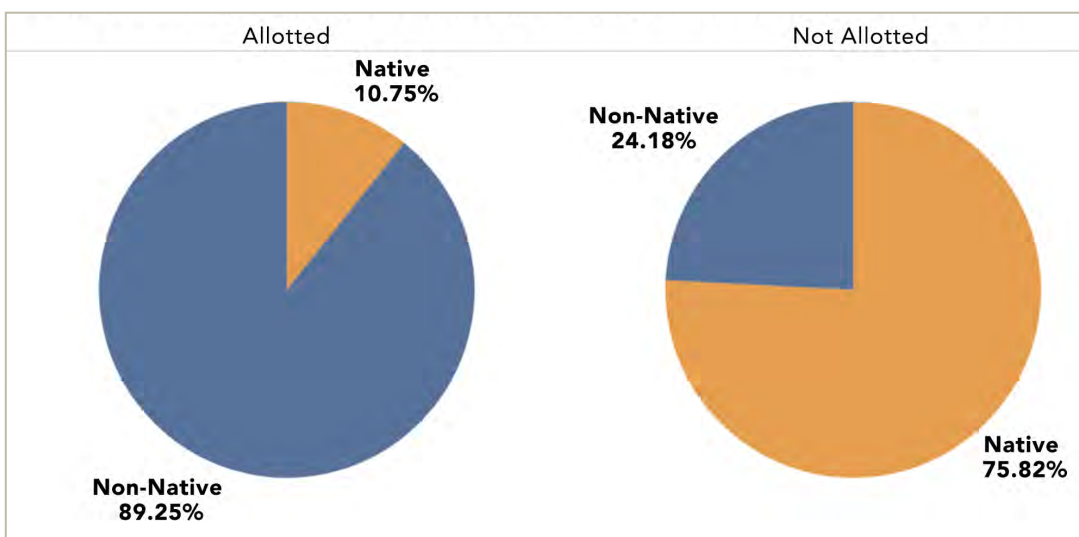


Figure 5. Native Lands Advocacy Project (NLAP). *Market Value of Agricultural Products Sold on All Reservations (Allotted vs. Non-Allotted)*, Infographic, Native Land Information System (NLIS), <https://nativeland.info/storymaps/legacy-of-allotment/>. See **Appendix A** for full-size figure.

History

The Native Lands Advocacy Project (NLAP) estimates that since 1840, over \$749 billion of agricultural revenue have been extracted from reservation lands nationwide by non-Native producers due to Dawes Act policies and other related policies (such as well-documented discrimination in lending and federal agriculture support for Native operators).¹²

HISTORICAL & ECOLOGICAL CONTEXT

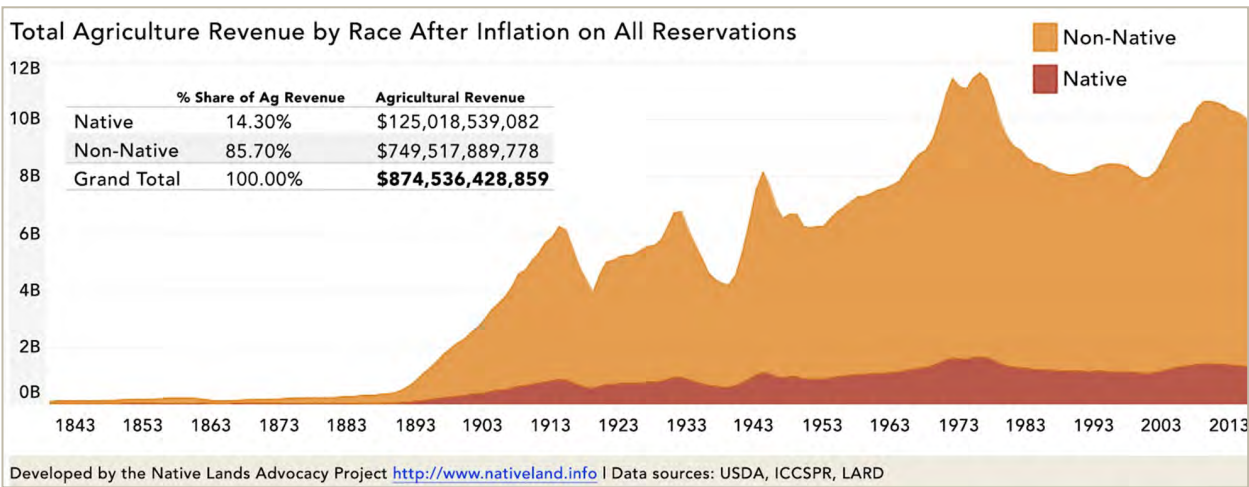


Figure 6. NLAP, *Total Agriculture Revenue by Race After Inflation on All Reservations*, Infographic, NLIS, <https://nativeland.info/dashboard/agriculture-revenue-from-contemporary-us-native-lands/>. See **Appendix B** for full size.

NLAP estimates that Fond du Lac, while representing a small share of that nationwide lost agricultural revenue, has lost over \$147 million in agricultural revenue during the same period.¹³

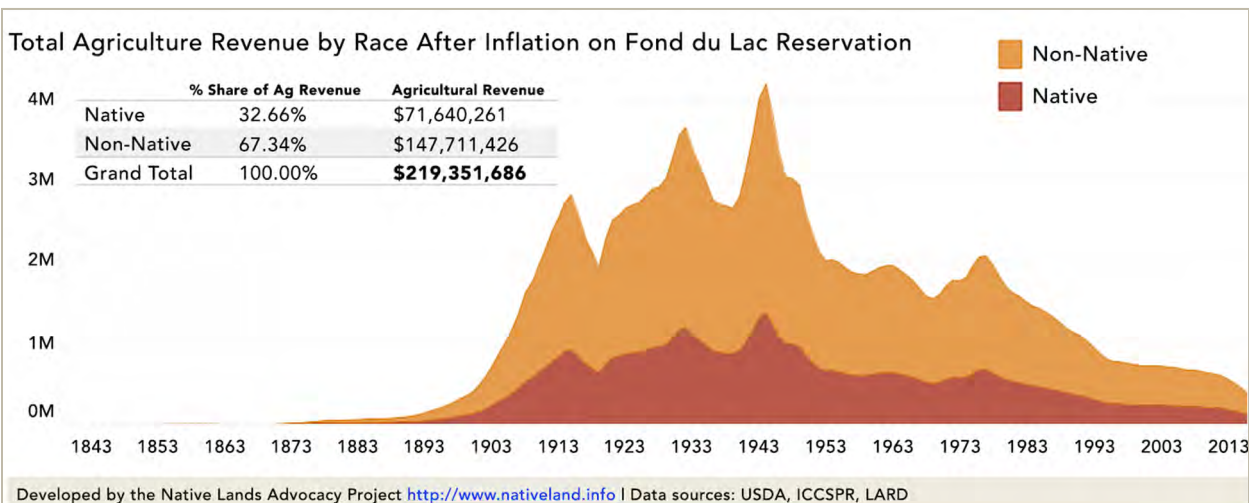


Figure 7. NLAP, *Total Agriculture Revenue by Race After Inflation on Fond du Lac Reservation*, Infographic, NLIS, https://public.tableau.com/shared/KWF5TXXYK?:display_count=y&:origin=viz_share_link&:embed=y. See **Appendix B** for full-size figure.

Present Day

USDA Census of Agriculture

According to the United States Department of Agriculture (USDA) Census of Agriculture for American Indian Reservations, over \$394,000 in agricultural products were sold from the Fond du Lac Reservation in 2017. Yet only \$83,000 (21.07%) went to Native producers.¹⁴

Looking back at past Census data, this trend appears to be worsening. In fact, between 2012 and 2017, when non-Native revenue experienced a 5% decrease, Native operators experienced a 68% drop in revenue share.¹⁵

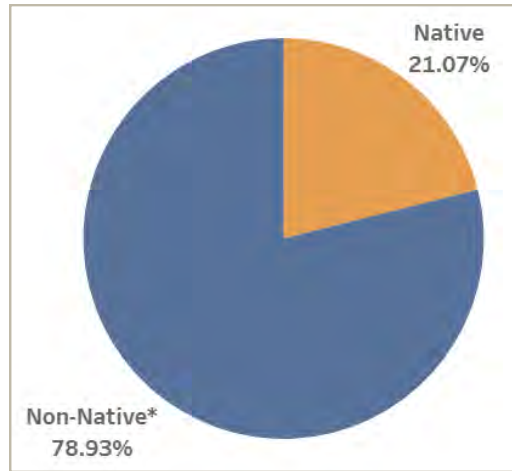


Figure 8. NLAP, *Market Value of Agricultural Products Sold (\$1000s) by Race on Fond du Lac Reservation*, Infographic, NLIS, https://public.tableau.com/shared/7C92SCP5S?:display_count=y&origin=viz_share_link&embed=y. To see the full image this figure is taken from, see **Appendix C**.

Change in Market value of agriculture products sold (\$1000s) for Fond du Lac Reservation

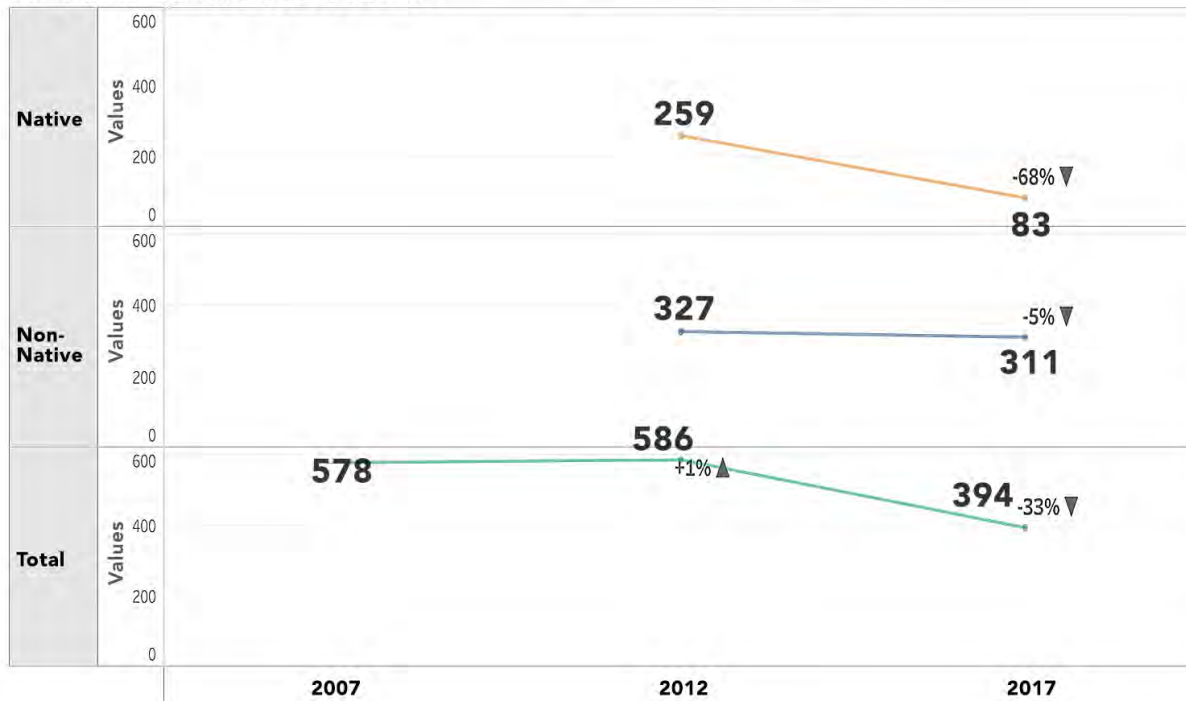


Figure 9. NLAP, *Change in Market Value of agriculture products sold (\$1000s) for Fond du Lac Reservation*, Infographic, NLIS, https://public.tableau.com/shared/TKZM5F49T?:display_count=y&origin=viz_share_link&embed=y.

HISTORICAL & ECOLOGICAL CONTEXT

Present Day

Despite the decrease in revenue, the number of both male and female Native operators on Fond du Lac has increased each year from just 1 in 2007 to 14 in 2017.

HISTORICAL & ECOLOGICAL CONTEXT

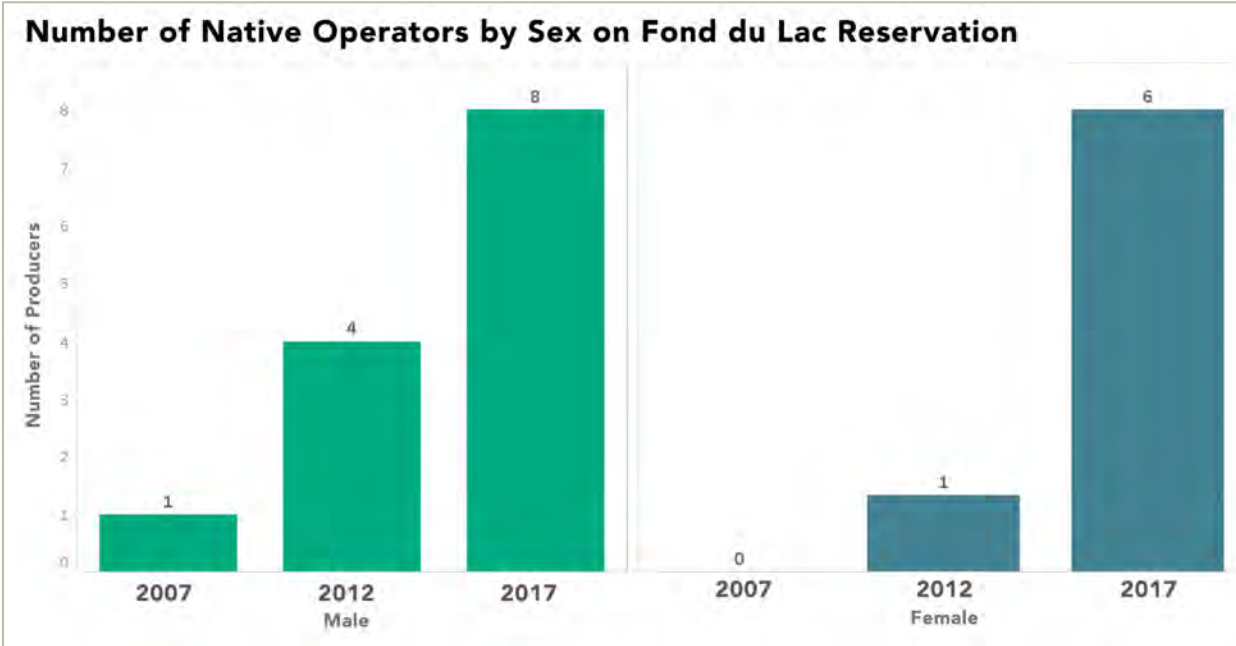


Figure 10. NLAP, *Number of Native Operators by Sex on Fond du Lac Reservation*, Infographic, NLIS, https://public.tableau.com/shared/BTCHCCWTY?:display_count=y&:origin=viz_share_link&:embed=y.

During this same period, however, the data shows a decrease in male and female non-Native producers from 55 in 2007 to 40 in 2017.

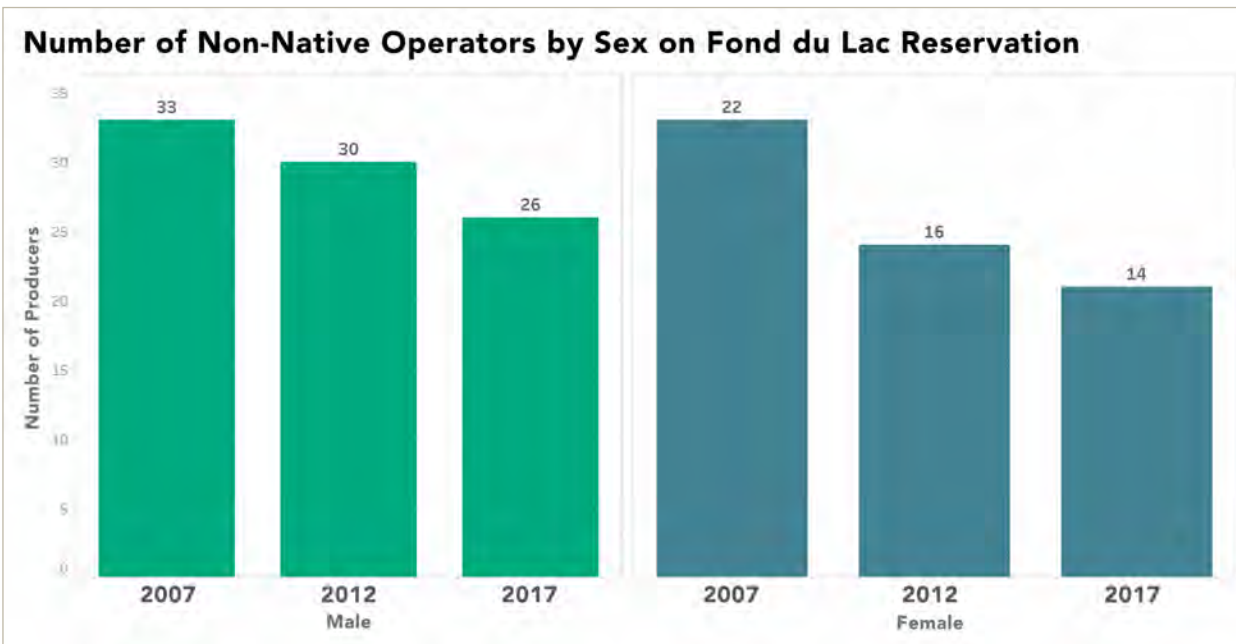


Figure 11. NLAP, *Number of Non-Native Operators by Sex on Fond du Lac Reservation*, Infographic, NLIS, https://public.tableau.com/shared/RPHSSYZFY?:display_count=y&:origin=viz_share_link&:embed=y.

Present Day

The average age of farmers has also decreased on the Fond du Lac Reservation from 52 years of age in 2012 to 44 years of age in 2017.

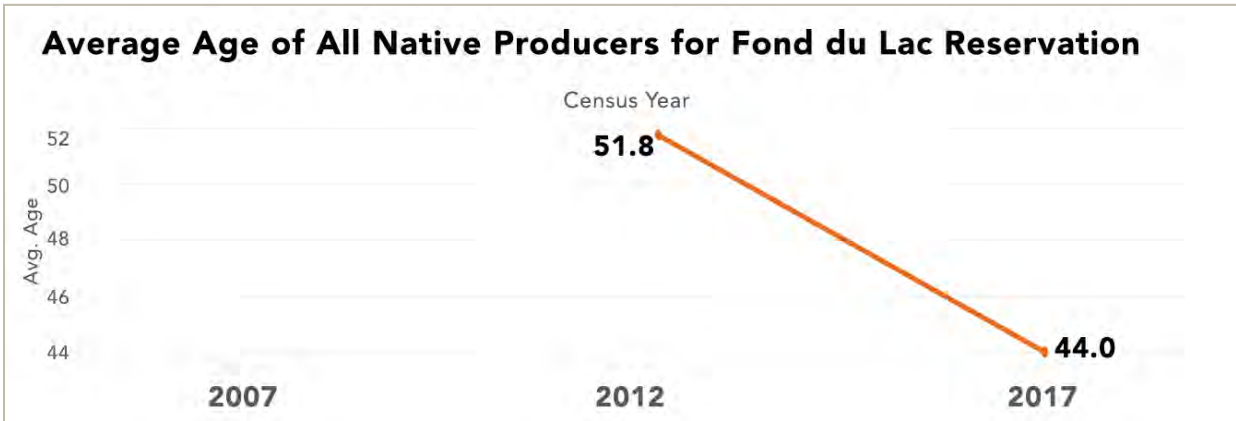


Figure 12. NLAP, *Average Age of All Native Producers for Fond du Lac Reservation*, Infographic, NLIS, https://public.tableau.com/shared/BZTRMSP7D?:display_count=y&origin=viz_share_link&embed=y.

The data suggests that even though non-Natives capture a larger share of the agriculture revenue their numbers are decreasing at the same time, and the number of young Native operators is increasing. If adequately supported, Native agriculture producers can recapture an increasing share of the market value of agricultural products sold. This transition from non-Native to Native is not only good for those producers and their families but also has a multiplier effect on the overall reservation economy. By building linkages with Native producers to purchase more local commodities for the schools and food programs (while stopping leakages through the purchasing of off-reservation commodities), more dollars can stay in circulation on the reservation.

Present Day

Fond du Lac's Land Base

The Fond du Lac Reservation comprises 101,500 acres of land. According to 2019 data from the BIA, 35,323 acres are classified as Indian trust lands.¹⁶

According to the most recent (2019) data from the National Land Cover Database (which maps 17 different land cover classifications), woody wetlands account for 52% (51,538 acres) of the Fond du Lac Reservation and off-reservation trust lands, and deciduous forests account for another 22% (22,161 acres) of the land base. These two land cover types alone account for nearly three-fourths of the Fond du Lac Reservation land base.

HISTORICAL & ECOLOGICAL CONTEXT

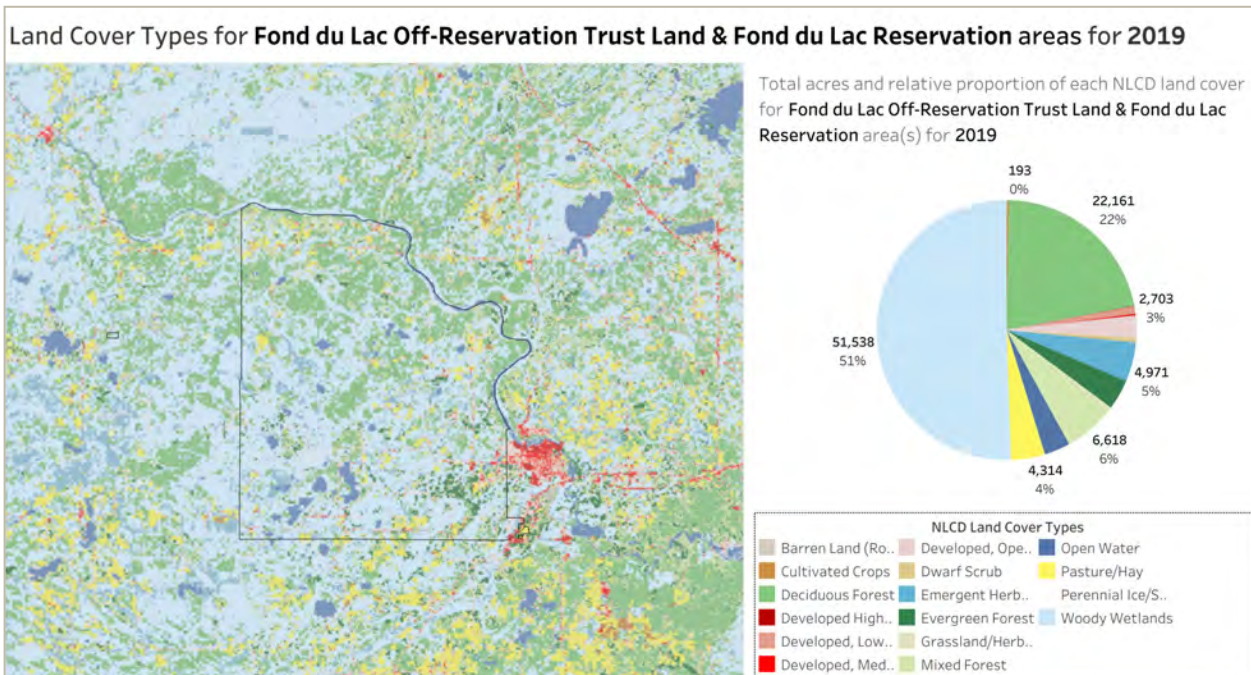


Figure 13. NLAP, *Land Cover Types for Fond du Lac Off-Reservation Trust Land & Fond du Lac Reservation areas for 2019*, Infographic, NLIS, https://public.tableau.com/shared/RMNFEXGFC?:display_count=y&:origin=viz_share_link&:embed=y. See **Appendix D** for full-size figure.

Present Day

Data from the 2021 Soil Survey Geographic Database (SSURGO) show that 36% (36,165 acres) of the Fond du Lac Reservation is classified as either “farmland of statewide importance” or “prime farmland.” Whereas 64,310 acres (63% of the land base) of the Fond du Lac Reservation is classified as “not prime farmland.” Additionally, 1,527 acres (1.5% of the land base) would be classified as “prime farmland” if the areas were drained. However, draining lands and clearing land for agriculture only further fragments intact habitats, compromising biodiversity and the availability of culturally important plants and animals.¹⁷

HISTORICAL & ECOLOGICAL CONTEXT

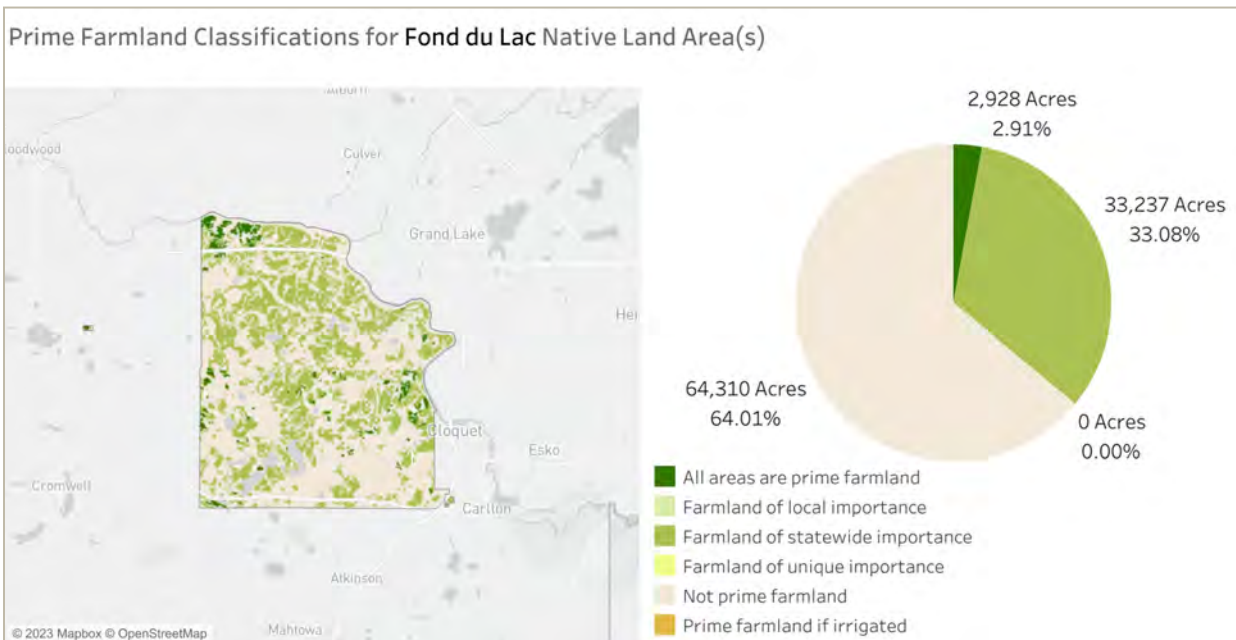


Figure 14. NLAP, Prime Farmland Classifications for Fond du Lac Native Land Area(s), Infographic, NLIS, https://public.tableau.com/shared/TMKBX2769?display_count=y&:origin=viz_share_link&:embed=y.

With regards to the possibility of buffalo reintroduction on the reservation, these areas would not be suitable for buffalo as the forage and space would be sub-optimal. The most recent update of the Cropland Data Layer (2021), however, indicates that there are roughly 4,587 acres of grassland/pastureland on the reservation, an increase of 43% since 2020, which could be utilized for buffalo pasture, provided the forage is of sufficient quality and quantity.¹⁸

Present Day

Fond du Lac has an abundance of intact habitat. NLIS’s intact habitat cores map represents modeled Intact Habitat Cores, or minimally disturbed natural areas at least 100 acres in size and greater than 200 meters wide. The map ranks the intact cores based on a “core quality index,” or score related to the perceived ecological value of each core and categorizes them as either Good, Better, or Best. The majority of the Fond du Lac Reservation is comprised of intact habitat cores ranked as “Better” and “Good” aside from those areas where there is cultivated agriculture or urbanization. A buffalo pasture should not negatively impact any of these cores unless there are additional roads or development to assist with herd management.¹⁹

HISTORICAL & ECOLOGICAL CONTEXT

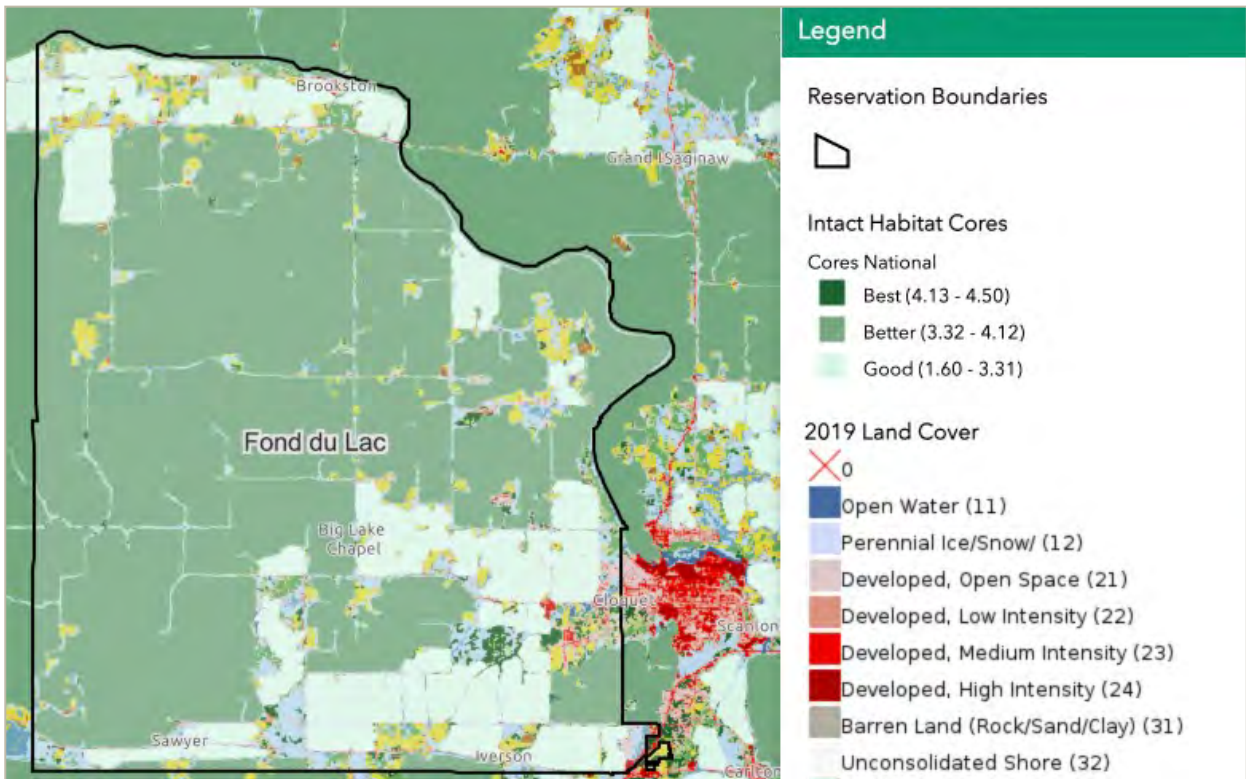


Figure 15. NLAP, *Intact Habitat Cores for the Fond du Lac Reservation*, Map, NLIS, <https://www.nativeland.info/thematic-maps/intact-habitat-on-us-native-lands/>.

Present Day

Pivoting to the reservation’s capacity to feed the community, we present key information from NLAP’s Carrying Capacity Dashboard. Utilizing a carrying capacity model developed by Peters et al. in “Carrying Capacity of U.S. Agricultural Land: Ten Diet Scenarios,” NLAP created this dashboard, which uses the acreage of a reservation’s agricultural land base to estimate how many people the land can feed.²⁰ When looking at the entirety of Fond du Lac’s agricultural land base, 168 acres are Perennial Cropland, 68 acres of Cultivated Cropland, and 4,587 acres of Grazing Land.

HISTORICAL & ECOLOGICAL CONTEXT

NLAP calculated that Fond du Lac lands could feed an estimated 3,026 people per year, or roughly 75% of the current population with its current agricultural land base.

This is based on a standard American diet and assumes 100% of agricultural lands were being utilized and the diversity of fruits, vegetables, and grains was increased.

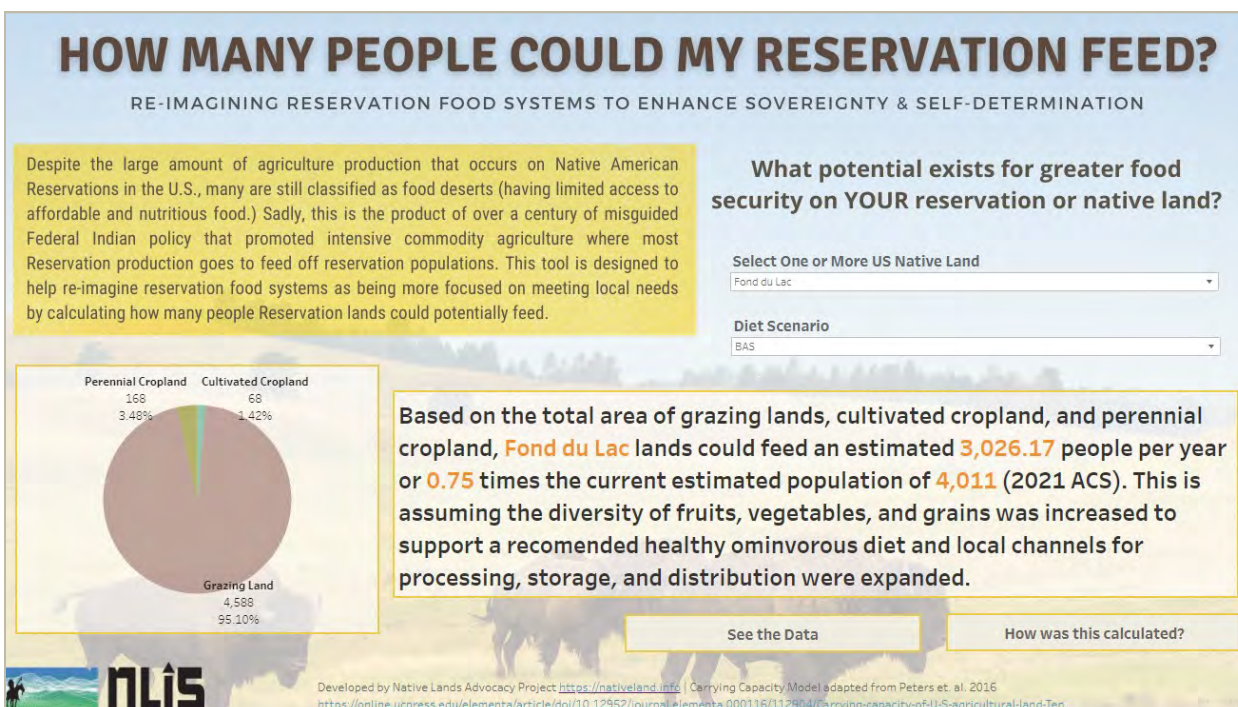


Figure 16. NLAP, *Carrying Capacity for the Fond du Lac Reservation*, NLIS. See **Appendix E** for full-size figure.

FEASIBILITY OF BUFFALO REINTRODUCTION

Background

The purpose of this study is to determine how many buffalo can be sustainably managed on the Fond du Lac Reservation and the infrastructure (both physical and organizational) needed for their care and management as part of the Fond du Lac Band's greater food sovereignty initiatives.

There are currently three pastures that are in consideration for herd establishment; two consist of roughly 60 acres each and the third is 120 acres. There is currently little to no infrastructure present for a buffalo herd at either possible location; this is a crucial point for the establishment of a herd and is something that will be addressed before seed herd acquisition. Soil and forage assessments have been conducted on each of the possible pastures and have determined the possible stocking rates for buffalo in these pastures based on forage production, landscape, and the types of soil present. These factors, as well as infrastructure (including equipment/machinery needed for transporting and working the herd) and staffing costs/concerns, have been used to create the alternative management strategies provided in this document.

Cultural Programs

Traditionally, in the fall, the people of Fond du Lac would travel roughly 50-100 miles south to hunt plains buffalo to stock meat stores for the coming winter months. This was a yearly event that was held in high regard by the people and seen as a crucial food source for the harsh Minnesota winters to come. In fact, the importance of these hunts and the subsequent meat that the buffalo would provide to the people was such that the organization and rules of the hunts enforced group hunting strategies and forbade lone hunters from engaging, lest they scare off the herd.

Cultural Programs

The Fond du Lac Reservation lies in an area that is considered to be in between the historic ranges of North America’s two buffalo species: plains buffalo and wood buffalo. Prior to the Dawes Allotment era, the Fond du Lac Reservation was more than twice the size it is in the present day. The northern reaches of the 1854 Treaty lands are thought to be within the historic southern range of wood buffalo, which had a range stretching from Alaska through Canada and into northern Minnesota and North Dakota.

The historic range of the plains buffalo extended from the Rocky Mountains down into Oklahoma and Texas and northward into southern and central Minnesota, ending roughly 100 miles south and west of the reservation. The listed Ojibwe word for buffalo is **pijiki** or **bizhiki**, though the most common word for buffalo used by Ojibwe people is **mashkode-bizhiki**, which means “medicine heart buffalo.” There is speculation that this name/phrasing for buffalo was intended to distinguish between buffalo and cattle, further illustrating the significance and cultural distinction that buffalo have to the Ojibwe people. While it is not clear that there were ever buffalo present on the Fond du Lac Reservation as it is today, there is sufficient evidence from the known ranges of these buffalo and cultural accounts to support the historical relationship between the Fond du Lac Band and buffalo (wood and plains) and the cultural importance of these species.



Figure 17. Alex Kormann, *Bison roamed*, photograph, StarTribune, January 21, 2023, <https://www.startribune.com/bison-fond-du-lac-reservation-buffalo-native-american/600245408/>.

Cultural programs that could revolve around the established buffalo herd could be education and participation in traditional buffalo processing (butchering, hide preparation, meat preparation, etc.) as well as incorporating the meats and other resources provided by the buffalo in ceremonies and other cultural areas. Traditional buffalo uses and cultural stories and knowledge about the buffalo could be incorporated into youth programs and schools.

Public Comment

Methods

NLAP constructed a print and online survey questionnaire to gather feedback from the Fond du Lac Reservation community about the possibility of reintroducing buffalo to reservation lands. The online version of the feedback survey was created utilizing the Get Feedback platform. Both versions of the feedback survey consisted of five sections to gauge respondent demographics and opinions on buffalo reintroduction: demographic questions, questions indicating agreement/disagreement, site preference, rating, and short answer questions. The number of questions within each section varied from 6-12 questions, and the questionnaire had a total of 33 questions (see **Appendix F** for a copy of the questionnaire). The print surveys were handed out to community members at the Fond du Lac State of the Band meeting on February 16, 2023. The online survey was made available on the same day (February 16, 2023) and remained open to community members until April 21, 2023.

Fond du Lac Mashkode-bizhikiwag Project Feedback Survey

This survey is anonymous and is being collected by the Fond du Lac Band of Lake Superior Chippewa for the purpose of assessing the feasibility of reintroducing mashkode-bizhikiwag (Buffalo) on a pasture on Fond du Lac reservation lands. This survey will take approximately 15-20 minutes to complete.

ABOUT THE RESPONDENT

Please select one of the multiple choice answer options for each question:

1. Are you a member of the Fond du Lac Band of Lake Superior Chippewa?
 Yes, I am a member. No, I am not a member.
2. Are you a lineal descendant of Fond du Lac Band of Lake Superior Chippewa?
 Yes, I am a lineal descendant. No, I am not a lineal descendant.
3. Do you currently reside on the Fond du Lac Reservation?
 Yes, I reside on Fond du Lac. No, I do not reside on Fond du Lac.
4. Do you currently reside on another Reservation?
 Yes, I reside on another reservation. No, I do not reside on another reservation
5. Have you ever lived on Fond du Lac Reservation?

Figure 18. Community survey. See **Appendix F** for the full survey.

Public Comment

Results

During this time, 163 surveys were returned either virtually or in person to the Fond du Lac Planning Department. Of these completed surveys, 136 indicated that they are enrolled as Fond du Lac Band members, with 80 claiming to live on the reservation. 27 indicated that they are not enrolled as Fond du Lac Band members (7 of these 27 indicated that they are lineal descendants of the Fond du Lac Band but not enrolled), with 8 claiming to live on the reservation.

Of the surveys submitted & completed, 82% indicated general agreement (78% indicating favor) towards establishing a buffalo herd on the reservation, with the majority of those surveyed favoring the old turkey farm pasture.

The most prevalent reasons for supporting the buffalo herd were cultural and traditional reasons, food sovereignty and security, and education.

The most commonly cited reasons by the 14 respondents against buffalo herd establishment were the cost of the herd and required infrastructure (fencing and equipment), the possible disparity in people that would benefit (financially or otherwise), and where to find qualified staff/enough staff and sufficient training for buffalo staff. A common response from the community members was that they would want transparency and frequent communication and updates on the buffalo herd.

The results of the survey show that, of the completed surveys, up to 82% of participants would be in favor of the Band establishing a buffalo herd on the reservation. This number is an overwhelming majority but should not necessarily be interpreted as a sufficient representation of the thoughts and opinions of the total Band membership. These 163 survey respondents represent approximately 3-4% of the total enrolled Band members of the Fond du Lac Reservation (current enrollment is around 4,200). The design and intent of this survey were to get a general sense of what people on the Fond du Lac Reservation think about the possibility of the Band establishing a buffalo herd on reservation lands.

Proposed Pastures

1. Steven's Road (46.869943511955256, -92.680474868117)

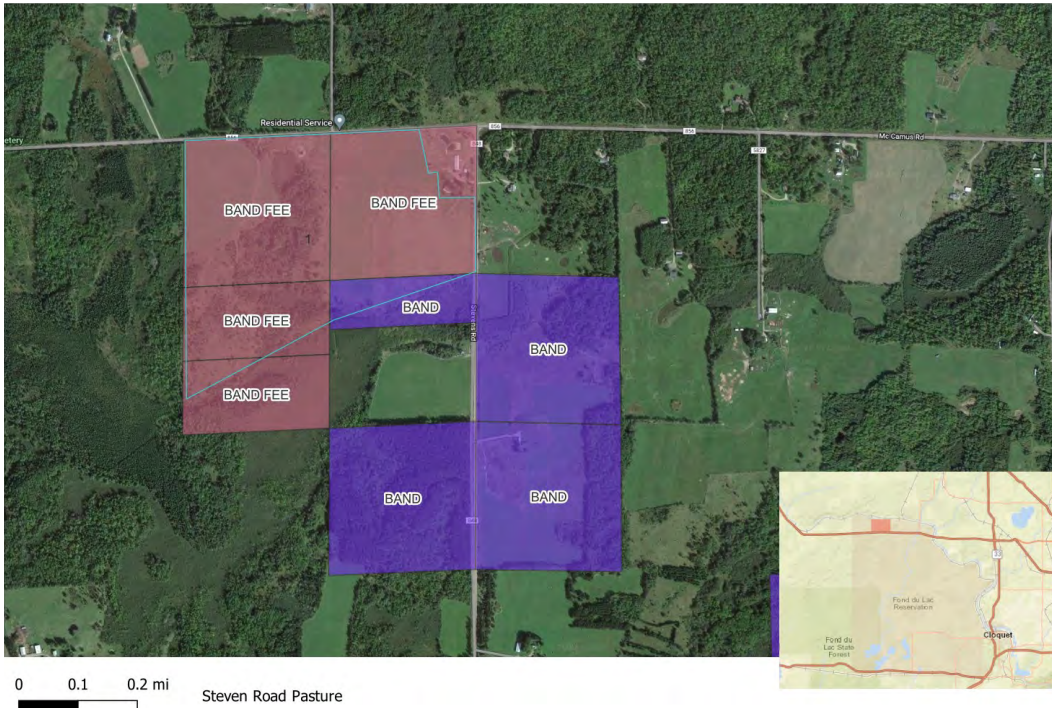


Figure 19. NLAP, *Steven's Road Pasture*, Map. See **Appendix G** for the full-size figure.

2. Turkey Farm (46.79510630872764, -92.51203738167602)



Figure 20. NLAP, *Turkey Farm Pasture*, Map. See **Appendix G** for the full-size figure.

**FEASIBILITY OF
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Proposed Pastures

3. Parviainen Road Site (46.706154, -92.711171)



Figure 21. NLAP, *Parviainen Road Site*, Map. See **Appendix G** for the full-size figure.

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Initial Analysis & First-Round Suitability Analysis

Rangeland Analysis Platform (RAP) and Natural Resources Conservation Service (NRCS) Analysis

The present-day soils and ecosystems of Minnesota, including those on the Fond du Lac Reservation, are attributed to glacial activity. “Geologically, the Fond du Lac Reservation is part of the Laurentian peneplain and occupies the western part of the Superior Upland. Soil types range from very poorly drained organic soils to well-drained soils with gravel and sandy loam subsoils.”²¹

Analysis of NRCS Forage Study

SITE	GRAZEABLE ACRES	NRCS FORAGE	RANGELAND ANALYSIS PLATFORM
Steven’s Road	60	1700-3600 lbs./acre	1446-2274 lbs./acre
Turkey Farm	60	900-2200 lbs./acre	842-1831 lbs./acre
Parviainen Road	120	Not published ²²	415-2196 lbs./acre

According to the 2017 NRCS report, since it was not a growing season, forage totals were obtained from existing St. Louis County soil data based on their soil suitability group and not data for the specific tract of land in question. According to NRCS, “[f]orage suitability groups provide a forage production estimate one can expect to see on the selected site based on the present soils.”

By contrast, the Rangeland Analysis Platform (RAP) calculates forage totals based on 26 years of data for the specific fields in question. However, the RAP totals are derived from remotely sensed (satellite) data vs. actual forage measurements. Despite the difference in the data sources, they differ only by about 18%, with the NRCS estimate generally estimating more forage per acre than the RAP. In either case, the best and most accurate estimates are derived from actual onsite measurements of forage. However, provided the time of year, these methods are sufficient to get a general idea of forage production.

Case Study Analysis

In addition to soil and forage tests, another great way to learn about what to expect for raising buffalo in your particular region and climate is to find a local example. A great example was located 145 miles southwest of the Fond du Lac Reservation, the Horseshoe Grove Bison Ranch, located in Paynesville, Minnesota. What is great about this example is the amount of information we obtained from a USDA video posted on YouTube.²³



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Figure 22. Minnesota NRCS, *Rotational Grazing of Organic Bison in Central Minnesota*, Screenshot, Youtube, April 23, 2020, <https://www.youtube.com/watch?v=n2r9SlRimMM>.

Case Study Analysis

1. Central Minnesota Case Study: Horseshoe Grove Bison Ranch

Location: 20030 199th Avenue NE, Paynesville, MN, 56362. (320) 276-8272

Awards: Named 2021 Outstanding Conservationists for Kandiyohi County

History: Started in 2013 with 13 buffalo.

USDA Video Profile: <https://www.youtube.com/watch?v=n2r9SIRimMM>

Google Earth KML: https://drive.google.com/open?id=1LMi_Z6ftgShDheWgFXE6850OtioVAJZ1&authuser=david%40villageearth.org&usp=drive_fs

Total Acres 2021: 160

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Figure 23. Minnesota NRCS, *Rotational Grazing of Organic Bison in Central Minnesota*, Screenshot, Youtube, April 23, 2020, <https://www.youtube.com/watch?v=n2r9SIRimMM>.

Number of Buffalo: 70 head (2.3 head per acre)

Number of Paddocks: 14

Rotation: 3-4 days per paddock

Fencing: 4-wire high tensile electrified with metal T-Posts with 25 joules of power

Case Study Analysis

1. Case Study: Horseshoe Grove Bison Ranch (continued)

Comparison of Horseshoe Grove Bison Ranch to Steven’s Road Pasture, Turkey Farm Pasture, and Parviainen Road Site

Based on the map provided in the video, we were able to map the boundaries and process the forage totals in the Rangeland Analysis Platform using the same 30-day grazing period, 3% body weight forage intake, and 25% harvest efficiency. That way, we are comparing “apples to apples.” According to the RAP data, Horseshoe Grove has about 20% higher forage production than Stevens Road, 50% better than the Turkey Farm pasture, and roughly 71% better forage than production than Parviainen Road. In the video, Ken Hess, owner of Horseshoe Grove, said the forage quality improved after he put buffalo onto the pasture. This is consistent with the historical data from the RAP, which shows a clear increase in forage quantity (below) after 2013 when Ken Hess started his herd with 13 buffalo. Before that time, the forage at Horseshoe Grove would have been similar to that found on Steven’s Road.

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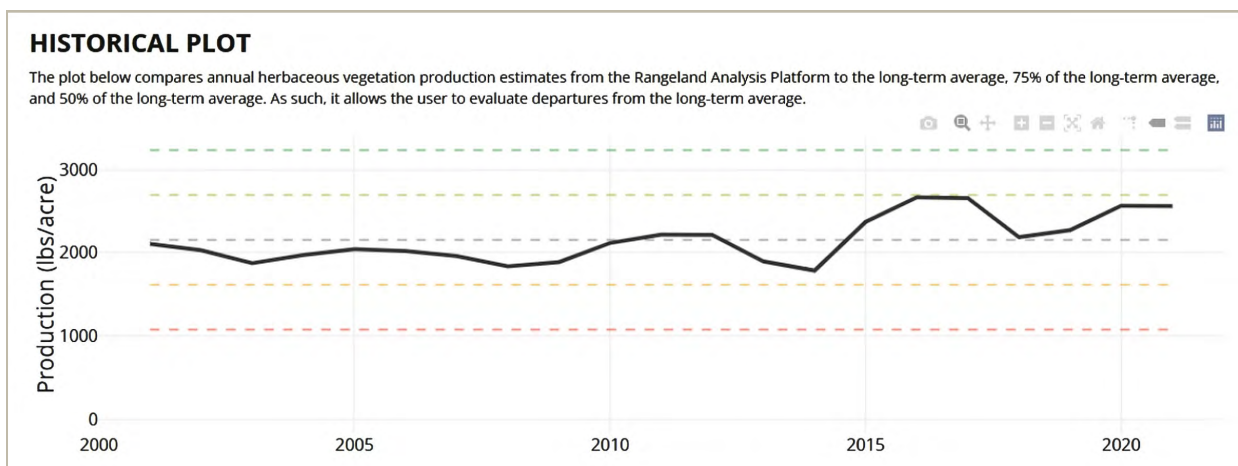


Figure 24. NLAP, *Historical Plot for Horseshoe Grove Bison Ranch*, Infographic, Rangeland Analysis Platform. See **Appendix H** for full-size figure.

Case Study Analysis

1. Case Study: Horseshoe Grove Bison Ranch (continued)

Comparison of Horseshoe Grove Bison Ranch to Steven’s Road Pasture, Turkey Farm Pasture, and Parviainen Road Site (continued)

While the USDA video of Horseshoe Grove highlighted their rotational grazing system where Mr. Hess moved his buffalo through 14 different paddocks totaling 160 acres, keeping them in any paddock only 3-4 days, for the sake of comparison, we used the same 30-day grazing period as we did for the Turkey Farm and Steven’s Road. Rotational grazing is an excellent method to increase the number of animals on a particular tract of land without overgrazing as it allows forage and soils to recover between feedings.

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SITE	GRAZEABLE ACRES	RANGELAND ANALYSIS PLATFORM	ACTUAL STOCKING	RAP RECOMMENDED STOCKING
Steven’s Road	60	1446-2274 lbs./acre		67 avg. (.89 acres per animal)
Turkey Farm	60	942-1831 lbs./acre		58 avg. (1.03 acres per animal)
Parviainen Road	120	415-2196 lbs./acre		37 avg. (3.24 acres per animal)
Horseshoe Grove	160	1787-2667 lbs./acre	70 animals (.43 animals per acre)	86 avg. (1.86 acres per animal)

See the Appendices to view the RAP graphics (Stocking Rate Estimates, Stocking Rate Time-Series Plots, etc.) for the Horseshoe Grove Bison Ranch (**Appendix H**), Steven’s Road Pasture (**Appendix I**), and Turkey Farm Pasture (**Appendix J**).

Case Study Analysis

2. Local Case Study: Quartermaster Buffalo

Location: Quartermaster Buffalo, 53 Church Road # 3, Esko, MN 55733

Total Acres 2022: 92.2

Number of Buffalo: ~15 based on aerial photo count

Number of Paddocks: 2

Rotation: Unknown

Fencing: 7-wire high tensile electrified with metal T-Posts

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Figure 25. NLAP, *Quartermaster Buffalo*, Map, Google Earth.

Case Study Analysis

2. Local Case Study: Quartermaster Buffalo



Figure 26. *Fencing from Google Street View*, Photograph, Google Earth.

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Comparison of Horseshoe Grove Bison Ranch to Steven’s Road Pasture, Turkey Farm Pasture, and Parviainen Road Site

Based on GIS analysis of the aerial imagery, we were able to map the boundaries and process the forage totals in the Rangeland Analysis Platform using the same 30-day grazing period, 3% body weight forage intake, and 25% harvest efficiency. According to the RAP data, Quartermaster has about 15% lower forage production than Stevens Road, 22% better production than the Turkey Farm pasture, and 26% better production than the Parviainen Road Site. Horseshoe Grove by comparison has about 33% better forage production than Quartermaster even though Horseshoe Grove has more acres per animal. This is most likely because of the rotational grazing system utilized by Horseshoe Grove that allows the forage to recover between feedings.

HISTORICAL PLOT

The plot below compares annual herbaceous vegetation production estimates from the Rangeland Analysis Platform to the long-term average, 75% of the long-term average, and 50% of the long-term average. As such, it allows the user to evaluate departures from the long-term average.

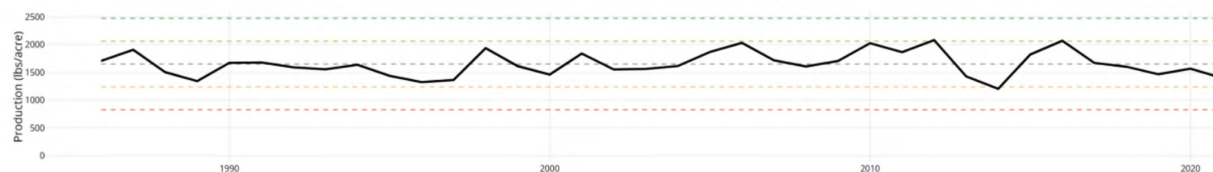


Figure 27. NLAP, *Historical Plot for Horseshoe Grove Bison Ranch*, Infographic, Rangeland Analysis Platform. See **Appendix K** for full-size figure.

Case Study Analysis

2. Local Case Study: Quartermaster Buffalo

Comparison of Horseshoe Grove Bison Ranch to Steven’s Road Pasture, Turkey Farm Pasture, and Parviainen Road Site

SITE	GRAZEABLE ACRES	RANGELAND ANALYSIS PLATFORM	ACTUAL STOCKING	RAP RECOMMENDED STOCKING
Steven’s Road	60	1446-2274 lbs./acre		67 avg. (.89 acres per animal)
Turkey Farm	60	942-1831 lbs./acre		58 avg. (1.03 acres per animal)
Parviainen Road	120	415-2196 lbs./acre		37 avg. (3.24 acres per animal)
Horseshoe Grove	160	1787-2667 lbs./acre	70 animals (.43 animals per acre)	86 avg. (1.86 acres per animal)
Quartermaster Buffalo Ranch	45.4	1204-2084 lbs./acre	Est. 15 (3.02 animals per acre)	44 avg. (1.03 acres per animal)

See **Appendix K** to view the RAP graphics (Stocking Rate Estimate, Stocking Rate Time Series Plot, etc.) for the Quartermaster Buffalo Ranch.

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Target Herd Structures for 5 Years

Alternative A: Minimum Infrastructure & Management

This alternative will utilize one of the 60 acre pastures in its entirety. Fencing will be placed around the exterior boundary of the pasture. The pasture will then be stocked with roughly 5-10 buffalo, which will have the ability to roam the entire 60 acres. This alternative will allow the Band to start a buffalo herd for relatively low upfront costs for fencing, infrastructure, and individual buffalo. In year two of having the herd, the Band is then eligible to apply for the NRCS's Environmental Quality Incentives Program (EQIP) grant which would cover costs of cross fencing and water infrastructure.²⁴ From there, the Band can decide how they wish to go forward with the buffalo herd management, possibly moving to one of the following alternatives.

Pros: Relatively low start up cost for herd, manageable number of buffalo, little to no concern for overgrazing, minimal environmental impacts, little to no negative ecological impacts, EQIP funding for herd expansion

Cons: Little to no contribution to food sovereignty, sporadic harvesting schedule (unlikely to be yearly), will reduce the wildlife populations in the area due to increased activity

Alternative B: Phased Approach with Paddocks and Rotational Grazing

Split one of the 60-acre pastures into paddocks (4 paddocks of 15 acres each or 3 paddocks of 20 acres each), and start with a smaller herd of 5-10 bison, which can be increased slowly as direction of herd and Band needs are reassessed, and rotate the buffalo throughout the year on a predetermined rotation schedule.

This rotation schedule will be based on the forage productivity (rate of forage growth) of the pasture and paddocks, typically with rotations occurring every 2-10 days or whenever the forage in the paddock gets around 4-6 inches tall. In doing so, no one paddock is too impacted by buffalo grazing activity because each paddock is allowed time to rest and recover, the herd is smaller and requires fewer people to work/monitor them, and the smaller herd size and regular rotation of activity between paddocks prevents compounding ecological impacts from buffalo activity,

Target Herd Structures for 5 Years

which allows the buffalo to have greater positive impacts on the pastures and surrounding areas as compared to potential negative ones. This alternative would involve the occasional harvesting of bulls for meat and ceremonial purposes. It will also allow for the introduction of new buffalo in order to maintain genetic diversity within the herd.

Pros: Relatively low start up cost for herd, manageable number of buffalo, little to no concern for overgrazing, minimal environmental impacts, little to no negative ecological impacts

Cons: Little to no contribution to food sovereignty, sporadic harvesting schedule (unlikely to be yearly), requires more staff and staff time to rotate and manage the herd, higher startup costs for materials (more fencing, water tanks, corrals, etc.), will reduce the wildlife populations in the area due to increased activity

Alternative C: Full Stocking and Fencing

Utilize one of the possible pastures in its entirety year-round and stock it at the Rangeland Analysis Platform recommended stocking rate of between 55 and 70 buffalo animal units (UA) (1 mature bull or 1 cow/calf pair). Harvesting could occur more frequently, which would support food sovereignty efforts, followed by new buffalo introduction to retain genetic diversity.

The issue with this alternative is that within a few years of herd establishment, the pasture would be stocked at or near capacity. Stocking this many animal units would utilize and most likely out-graze the forage produced by the pastures and could deteriorate the pasture's soil via compaction as well as nitrogen and phosphorus addition from animal waste. The high stocking rate could also have higher levels of ecological and environmental impacts on the surrounding areas.

If planning to subsidize grazing with animal feed throughout the year, especially during the winter, then this alternative may be able to work for several years. However, this alternative does not appear to be the most cost-effective nor sustainable from an ecological or animal well-being perspective.

Target Herd Structures for 5 Years

Alternative C: Full Stocking and Fencing (continued)

Pros: Food sovereignty support, more consistency in harvesting availability, greater genetic diversity, greater opportunity for traditional harvesting programs and ceremonial use

Cons: Risk of overgrazing and negative environmental/ecological impacts is high, high start-up cost, requires more staffing, requires intentional management as there is not much room for herd growth, will reduce the wildlife populations in the area due to increased activity

Alternative D: No Buffalo, Wildlife Promotion

This alternative revolves around not using funds to start a buffalo herd on the reservation and instead uses the buffalo herd funding to support habitat and wildlife conservation efforts on the reservation. With this alternative, the habitat for traditional and cultural wildlife in the area could be improved and conserved through funding projects and initiatives like introducing a wild elk herd on the reservation. Buffalo and buffalo meat could be purchased as needed from buffalo ranches in the area as needed by the Band.

Pros: Funding is able to be allocated to local habitat and wildlife initiatives, no impact on local wildlife from buffalo activity, no impacts to hunting or gathering on the reservation, still can acquire buffalo for cultural/ceremonial/food sovereignty purposes

Cons: No buffalo herd, costs associated with buying a buffalo or two throughout the year as needed, no buffalo-based educational or cultural activities, possible loss of income from buffalo herd

Buffalo Infrastructure and Staffing

1. Herd manager (full-time) with skills in buffalo or cattle management. **1 FTE**
2. Assistant to the herd manager (part-time). **.5 FTE**
3. One or more ranch hands that can be hired on contract.
4. Buffalo project manager to manage finances, grants, purchasing, etc. **.25 FTE**
5. **Water:** The herd will need access to water in every paddock. Since there are no natural water sources accessible in any of the sites, the water will need to be provided via troughs (one trough in each paddock). It's recommended that the troughs measure 24 feet in diameter with a height of 26 inches so that multiple buffalo are able to drink at one time. At the Turkey Farm site, these troughs can be filled using the existing well. A well or water line would have to be constructed at the Steven's Road site.
6. **Equipment:** Currently, there does not appear to be any equipment on site necessary for managing a buffalo herd. Some of this necessary equipment includes: stock trailer (price depends on size, brand, and age of trailer but can range anywhere from \$5,000 - \$20,000), truck capable of hauling trailer, ATV for working/moving buffalo (\$5,000 - \$15,000), snowmobile for working buffalo in the winter (\$5,000 - \$15,000). There are also some pieces of equipment which are optional but helpful, including: skid steer (\$10,000 - \$20,000), trailer-mounted hay bail unroller (\$3,000 - \$7,000). The equipment required will depend entirely on the type of management that will be used. In all reality, if the plan is to simply release the buffalo into a pasture and leave them be with little to no management (apart from rotation between paddocks), then the equipment above can be rented and does not need to be purchased by the tribe.
7. **Fencing:** We mapped the fencelines based on our on-site observations and high-resolution UAV imagery obtained during our Spring 2023 site visits. Using this data, we divided each pasture into three paddocks of varying sizes based on ease of management, water availability, and fencing cost. Using total perimeter and corner counts, we were able to acquire an estimate from a reputable fencing company in Tennessee (Timeless Fence). The materials and prices quoted were then used to estimate the cost of materials required to construct an electric fence for each of these pastures (Steven's Road and Turkey Farm).

Buffalo Infrastructure and Staffing

The estimated total cost of fencing materials for the Steven's Road site is \$42,006.82 and the estimated cost of fencing materials for the Turkey Farm site is \$46,609.19. The breakdown of these estimated costs can be found in **Appendix L**. These costs are intended to be estimates of the fencing material and should not be interpreted as direct quotes, as market values can change and pricing for materials can differ by supplier and location. The quantity of PVC posts and wooden posts in the material breakdowns were over-estimated based on the perimeters of the paddocks and pastures. These estimates do not include shipping costs or the labor required to build the fencing systems.

We did not conduct fencing estimates on the Parviainen Road site. This is because, upon further analysis of the forage production, vegetation, and the soil structure of the site, it was determined that this site would not be optimal for supporting a buffalo herd. While this site was worth performing a site analysis on, it was decided that the Steven's Road and Turkey Farm sites would be better suited for raising a buffalo herd and that establishing the fence, electric, and water systems would be easier at these sites (Turkey Farm already has holding pen fencing, electricity, and well water access).

This report does not include an estimate for corral systems at any of the sites. Given the anticipated size and intended utilization of the buffalo herd, buying and constructing a permanent corral system is not entirely necessary. If there comes a point when corrals and livestock chutes are required, it is possible to rent the necessary equipment. However, we have created mock-ups of potential corral systems, which can be found in **Appendix M**.

Acquiring Seed Herd

Herd Acquisition

Possible donation herds

- **American Prairie**
<https://americanprairie.org/bison-restoration/>
(406) 585-4600
- **National Wildlife Federation**
<https://www.nwf.org/Our-Work/Wildlife-Conservation/Bison/Tribal-Lands>
(800) 822-9919
- **Alaska Department of Fish & Game & the Alaska Wildlife Conservation Center**
Herd of wood buffalo imported from Canada (from herds in British Columbia, Alberta, Yukon, and Northwest Territories) in 2022
<https://alaskawildlife.org/about/wood-bison-restoration/>
(907) 783-0058
- **Red Lake, Pine Ridge, Shakopee Mdewakanton Sioux, and Prairie Island** have herds; they could be a possible source for some buffalo and/or for knowledge about herd establishment, in addition to Edward Iron Cloud III.

Purchasing animals

Estimated cost (per head)²⁵

- Calf/Yearling (bull): ~ \$2000-2500 (plains), ~\$500-5500 (woods)
- Mature Cow: ~\$2500-\$3500 (depending on if bred or not; breeding cows cost more)
- 2+ Year Bull: ~\$3000-\$4000 (depending on if bred or not; breeding bulls cost less)

Acquiring Seed Herd

Transporting Buffalo

1. State Regulations

- ⇒ The driver is required to have a Transporter Authorization and Welfare of Animals During Transport certification.
- ⇒ Location of origin and destination must be identified and declared cleared by the veterinary inspection.
- ⇒ If getting buffalo from Canada, need to clear customs via customs appointment and livestock health inspection by licensed veterinarian per USDA regulations.

2. Vaccinations

- ⇒ Bovine Tuberculosis
- ⇒ Bovine Brucellosis
- ⇒ John's Disease

3. Needed Infrastructure

- ⇒ Fencing (higher and reinforced), corrals, water tanks/stock water (at least at one site), vehicles for transportation and daily work (cattle trailer, semi power unit, ATVs, snowmobiles, etc.)

4. Veterinarian

- ⇒ If imported from outside the state of Minnesota, a certification of veterinary inspection is required.

Butchering, Meat Distribution, Marketing

Hunting & Harvesting Regulations on Reservation Lands

The state of Minnesota has laws in place to regulate the harvesting of wild game animals to maintain healthy populations of various species as well as to manage biodiversity and ecological health. There are also state and federal laws that must be followed for threatened and listed species at the state and federal levels. Buffalo are not a listed species at either level and since they are classified as livestock in this situation and not as wildlife, there are no hunting season or harvest limit regulations from the state that would need to be adhered to. The harvesting of these animals will be solely up to the discretion of the tribal council, natural resources department, and Band members.

Custom/Commercial Butchering Options

Buffalo meat to be sold off-reservation must be harvested and processed in a way that complies with USDA guidelines. Among other things, those guidelines require that the animal be processed/packaged in a facility inspected by the USDA with a certified USDA inspector on-premises. The packaging then receives a stamp indicating it is for sale. The meat can then be distributed to stores or consumers or stored in an inspected cold-storage facility until it is ready to be sold.

Meat that will be used or sold on the reservation must comply with the Band's health regulations for meat (if they exist). Typically, this meat can be processed at a "Custom" facility (where a hunter might take a deer, elk, or moose to be processed). Custom processing is typically cheaper than that done in a USDA-approved facility.

Butchering, Meat Distribution, Marketing

The Fond du Lac Band's new Na'enimonigamig Cannery has a basic custom processing facility and includes a hoist and winch, stainless steel food prep tables, sinks, cleanable surfaces, etc. needed for basic butchering and packaging of buffalo. There is also a walk-in cooler/freezer in the facility, but it remains uncertain whether it can be used for meat storage. This facility is a valuable resource for processing meat locally.



Figure 28. *Fond du Lac's Na'enimonigamig facility*, Photograph, taken during site visit.

**FEASIBILITY OF
BUFFALO
REINTRODUCTION**

Butchering, Meat Distribution, Marketing



Figure 29. *Na'enimonigamig's basic butchering facility*, Photograph, taken during site visit.

**FEASIBILITY OF
BUFFALO
REINTRODUCTION**



Figure 30. *Na'enimonigamig's walk-in cooler*, Photograph, taken during site visit.

Table & Map of Custom Butchers

On the following page is a table consisting of meat processing locations in the area that claim to be able to process buffalo, along with their addresses and phone numbers. A map is included below the table for reference and areal spacing.

Butchering, Meat Distribution, Marketing

Table & Map of Custom Butchers

NAME	ADDRESS	NUMBER
Stokke's Meat	4019 Canosia Road Cloquet, MN 55720	(218) 729-7156
Quartermaster Buffalo	53 Church Road Esko, MN 55733	(218) 879-4177
Floodwood Custom Meats	12343 Grangruth Road Floodwood, MN 55736	(218) 348-7056
Schneider Custom Meats	73741 Jensen Road Askov, MN 55704	(320) 838-3669
Lake Haven Meats	92850 Military Road Sturgeon Lake, MN 55783	(218) 372-8300
Bear's Den	5231 MN-33 Saginaw, MN 55779	(218) 729-6056

**FEASIBILITY OF
BUFFALO
REINTRODUCTION**

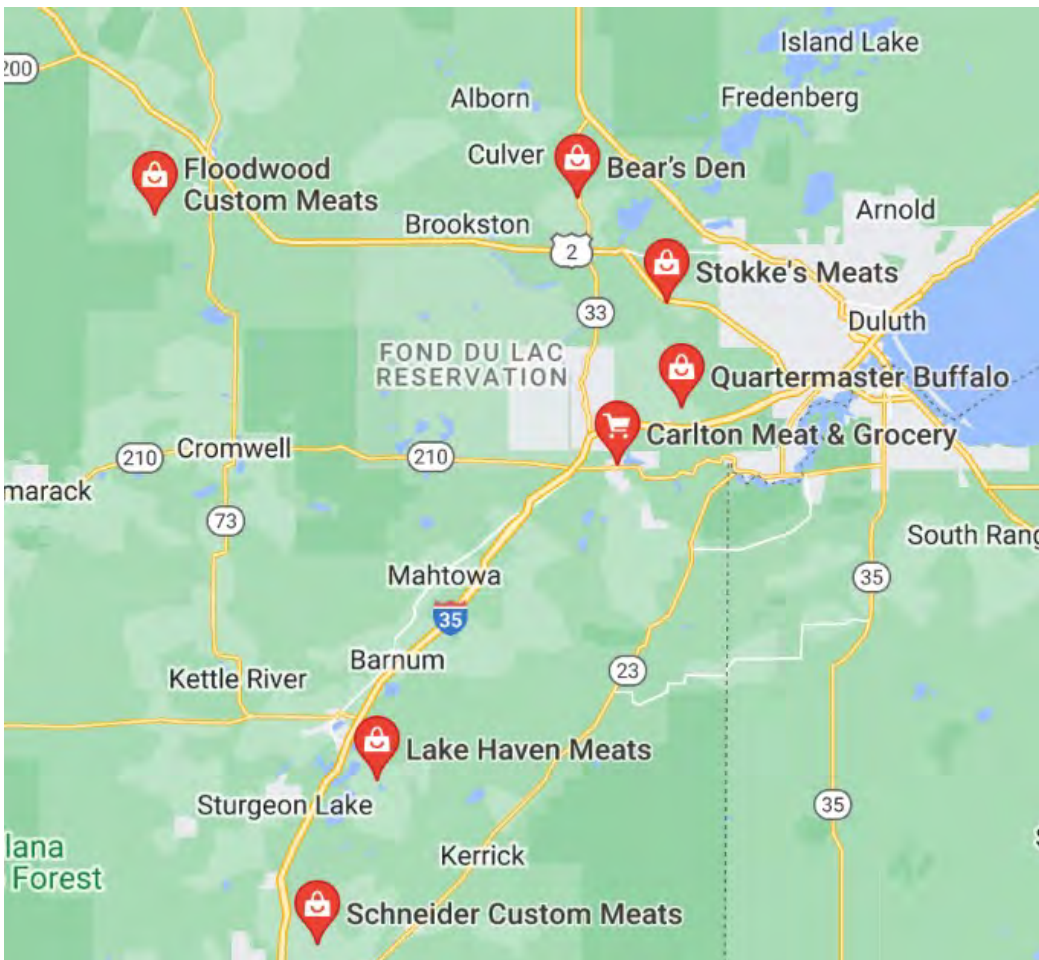


Figure 29. Map of Custom Butchers, Map, Google Maps.

Butchering, Meat Distribution, Marketing

Example Cuts/Packaging for 523 lb Buffalo

CUT	PACKAGE WEIGHT	UNITS	TOTAL LBS.
Ground	1.5 lbs.	118	199
Chuck Roast	3.2 lbs.	17	58
Sirloin Steak	1 lb.	15	17
Rib Steak	1.5 lbs.	17	30
Cube Steak	1 lb.	29	36
Stew Meat	2.26 lbs.	5	11.3
T-Bone Steaks	1.4 lbs.	11	15.7
Rump Roast	3 lbs.	3	9.2
Pikes Peak Steak	3 lbs.	3	9.5
Short Ribs	2.44 lbs.	10	24.4

Note: Butchering options provided in this document are solely commercial butchering and meat packaging options. The Band and its members are able to harvest and butcher these animals themselves and in ways that they see fit for cultural and traditional purposes as well as for food sovereignty.

Cold Storage Options

There are not many cold storage options available within the general area of the reservation. That being said, given the projected scale of the buffalo herd and its intended purposes (cultural, traditional, educational, food sovereignty, etc.), paying for large-scale/industrial cold storage options is not necessary. A full-grown buffalo will provide roughly 150-400 lbs. of meat depending on the size of the individual buffalo. With the size of this herd unlikely to be greater than 15-20 animals at any given time and one to two buffalo being harvested a year, the Band will most likely only require one, possibly two, chest freezers for meat storage.

Butchering, Meat Distribution, Marketing

It is understood that, at this point, this herd is not being established for commercial purposes and is intended to be used primarily for cultural/traditional purposes, a section on commercial production, USDA regulations, and commercial transportation will not be included in this document. The feasibility of this can always be done at a future date if the Band would like to explore this option.

Trade With Other Tribes (Meat & Processing)

Trade between Native Nations could be a potential option for acquiring other food/commodities that cannot be produced or are produced on a smaller scale than may be ideal, on the Fond du Lac Reservation. There are quite a few tribes in the Great Lakes/Midwest region that could potentially be open to some sort of trade. This report is not able to speculate on whether or not specific tribes would be open to entering into a trade agreement with Fond du Lac, though there are various tribal coalitions and groups that consist of multiple tribes working together and sharing resources to increase tribal food sovereignty. The Fond du Lac Band would need to explore these possible partnerships internally if interested.

Financial Plan

Capital Expense

The management entity of this herd would have few members (one 1 FTE and one .5 FTE), given the goals and vision for the herd. The fencing and water costs (outlined on pages 41-42) would be the only required infrastructure to start the herd. Unless donated, buffalo would have to be purchased from one of the organizations/communities listed on page 44 or from another source. A stock trailer for hauling buffalo, a truck for hauling the trailer, ATVs, and snowmobiles are not necessarily required but would make working and managing the herd easier.

Operating Expenses

Operating expenses will consist primarily of paying the full-time and part-time herd managers, paying any hourly help required throughout the year for various reasons, maintaining fences and equipment, vaccinations (if needed), electricity, and municipal water usage.

Potential Revenue Sources

A. Grants

- Tanka Fund
- Native American Agriculture Fund
- Honor the Earth

B. Fundraising

- Crowdfunding (Adopt-A-Buffalo)

C. National Resources Conservation Service (NRCS)

- EQIP Grants

D. Custom Hunts

- Custom hunts sell from \$5,000 - \$10,000

E. Agritourism

- Individuals, institutions, and schools are often willing to pay for tours.

SUMMARY TABLE OF ALTERNATIVES

ALTERNATIVE	DESCRIPTION
<p>A: Minimum Infrastructure & Management</p>	<p>Fence the exterior perimeter of chosen pasture and implement a small scale corral system. Acquire 5-10 buffalo and allow free roaming and grazing throughout fenced pasture year round. This alternative requires monitoring of herd and pasture for health with little to no handling of buffalo, unless required.</p>
<p>B: Phased Approach with Paddocks & Rotational Grazing</p>	<p>Fence the perimeter of the chosen pasture. Divide the interior of the pasture into paddocks of equal size, number of paddocks will depend on tribal preference (more paddocks will require more frequent rotation and handling of buffalo). Implement a small scale corral system. Acquire 5-10 buffalo and allow them to graze and roam freely in one of the paddocks. Rotate the herd from one paddock to another on a set schedule (frequency of rotation will depend on paddock size and herd size). Each paddock will require a water source for the buffalo—either natural or water tank.</p>
<p>C: Full Stocking & Fencing</p>	<p>Fence the perimeter of the chosen pasture and construct a large scale corral system. Acquire 55-70 buffalo at one time and manage the herd and pasture at the maximum carrying capacity for the designated pastures. This will require more management of the herd in order to prevent overgrazing and to maintain buffalo numbers within the pasture carrying capacity. Could require more than one water source depending on size of source.</p>
<p>D: No Buffalo, Wildlife Promotion</p>	<p>Tribe does not construct infrastructure for buffalo herd and does not acquire seed herd. Instead, resources intended for buffalo herd are diverted to support wildlife and natural resources currently on the reservation as well as to promote habitat conservation and restoration for traditional species, such as moose and elk.</p>

SUMMARY TABLE OF ALTERNATIVES

RECOMMENDED ALTERNATIVE

Alternative A: Minimum Infrastructure & Management

Village Earth recommends Alternative A: Minimum Infrastructure and Management for the Fond du Lac Band's buffalo reintroduction efforts.

This alternative will utilize one of the 60 acre pastures in its entirety. Fencing will be placed around the exterior boundary of the pasture. The pasture will then be stocked with roughly 5-10 buffalo, which will have the ability to roam the entire 60 acres. This alternative will allow the Band to start a buffalo herd for relatively low upfront costs for fencing, infrastructure, and individual buffalo. In year two of having the herd, the Band is then eligible to apply for the NRCS's EQIP grant which would cover costs of cross fencing and water infrastructure.²⁶ From there, the Band can decide how they wish to go forward with the buffalo herd management, possibly moving to one of the other alternatives.

Pros: Relatively low start up cost for herd, manageable number of buffalo, little to no concern for overgrazing, minimal environmental impacts, little to no negative ecological impacts, EQIP funding for herd expansion.

Cons: Little to no contribution to food sovereignty, sporadic harvesting schedule (unlikely to be yearly), will reduce the wildlife populations in the area due to increased activity.

**RECOMMENDED
ALTERNATIVE**

NOTES

¹ Aude Chesnais, “Bison numbers increase a whopping 1031% on Native Lands,” Native Land Information System, March 5, 2021, <https://www.nativeland.info/uncategorized/bison-numbers-increase-a-whopping-1031-on-native-lands/>.

See this source to read more about the systematic near-extinction of the American wild buffalo (and how recovery efforts have increased buffalo populations significantly in recent years).

² “Game Laws,” All About Bison, <https://www.allaboutbison.com/history-of-legislation/>.

³ “Game Laws.”

⁴ “Ojibwe Place Names for the Duluth Area,” Duluth Stories, <https://www.duluthstories.net/ojibweplacenames.html>.

⁵ “Ojibwe Place Names for the Duluth Area.”

⁶ “Ojibwe Place Names for the Duluth Area.”

⁷ “Ojibwe Place Names for the Duluth Area.”

⁸ “1837 Land Cession Treaties with the Ojibwe & Dakota,” Treaties Matter, <https://www.treatiesmatter.org/treaties/land/1837-ojibwe-dakota>.

⁹ “FDL Resource Management,” Fond du Lac Band of Lake Superior Chippewa, <https://www.fdlrez.com/rm/fdlmaps.htm>. This site has more detailed maps of each cession related to the Fond du Lac Band.

¹⁰ Ronald A. Janke, “Chippewa Land Losses,” *Journal of Cultural Geography* 2, no. 2 (1982): 84-100, <https://doi.org/10.1080/08873638209478619>.

¹¹ “The Legacy of Allotment on Contemporary Native Agriculture,” Native Land Information System, <https://www.nativeland.info/storymaps/legacy-of-allotment/>. To read more about the devastating impacts of the Allotment Era on Native lands & communities, view this storymap.

¹² “Agriculture Revenue from U.S. Native Lands,” Native Land Information System, <https://www.nativeland.info/dashboard/agriculture-revenue-from-contemporary-us-native-lands/>.

¹³ “Agriculture Revenue from U.S. Native Lands.”

NOTES

¹⁴ “USDA Census of Agriculture for American Indian Reservations,” Native Land Information System, <https://www.nativeland.info/dashboard/usda-census-of-agriculture-for-american-indian-reservations/>.

¹⁵ “USDA Census of Agriculture for American Indian Reservations.”

¹⁶ “Bureau of Indian Affairs Land Area Totals for U.S. Native Lands for 2019,” Native Land Information System, <https://www.nativeland.info/dashboard/land-area-totals-for-us-native-lands/>.

¹⁷ “Soil Capability on U.S. Native Lands,” Native Land Information System, <https://www.nativeland.info/dashboard/soil-capability-on-conus-native-lands/>.

¹⁸ “What’s Growing on U.S. Native Lands,” Native Land Information System, <https://nativeland.info/dashboard/whats-growing-on-native-lands-in-the-coterminous-united-states/>.

¹⁹ “Intact Habitat Cores on U.S. Native Lands,” Native Land Information System, <https://www.nativeland.info/thematic-maps/intact-habitat-on-us-native-lands/>.

²⁰ Peters et al., “Carrying Capacity of U.S. agricultural land: Ten diet scenarios,” *Elementa: Science of the Anthropocene* 4, no. 000116 (2016), <https://doi.org/10.12952/journal.elementa.000116>.

²¹ Fond du Lac Resource Management Division, *Integrated Resource Management Plan*, 2018, fdlrez.com/rm/downloads/FDL_IRMP-101817.pdf.

²² NRCS forage data is based off internal soil type classifications, which they used when they conducted the assessment for Fond du Lac in the fall of 2022. Parviainen Road was not a part of this study, so they did not put together a forage production range using their system. The data they used to determine forage ranges for the other pastures is not available/published.

²³ Minnesota NRCS, “Rotational Grazing of Organic Bison in Central Minnesota,” Youtube, April 23, 2020, video, <https://www.youtube.com/watch?v=n2r9SIRimMM>.

²⁴ Natural Resources Conservation Service, “Environmental Quality Incentive Program (EQIP),” United States Department of Agriculture, <http://nrcs.usda.gov/sites/default/files/2022-06/EQIP-Factsheet%20%282%29.pdf>.

NOTES

²⁵ The actual cost per head will depend on the weight, height, and genetics of the buffalo as well as the current market and geographical area, these ranges are estimates for what one could anticipate paying.

²⁶ Natural Resources Conservation Service, “Environmental Quality Incentive Program.”

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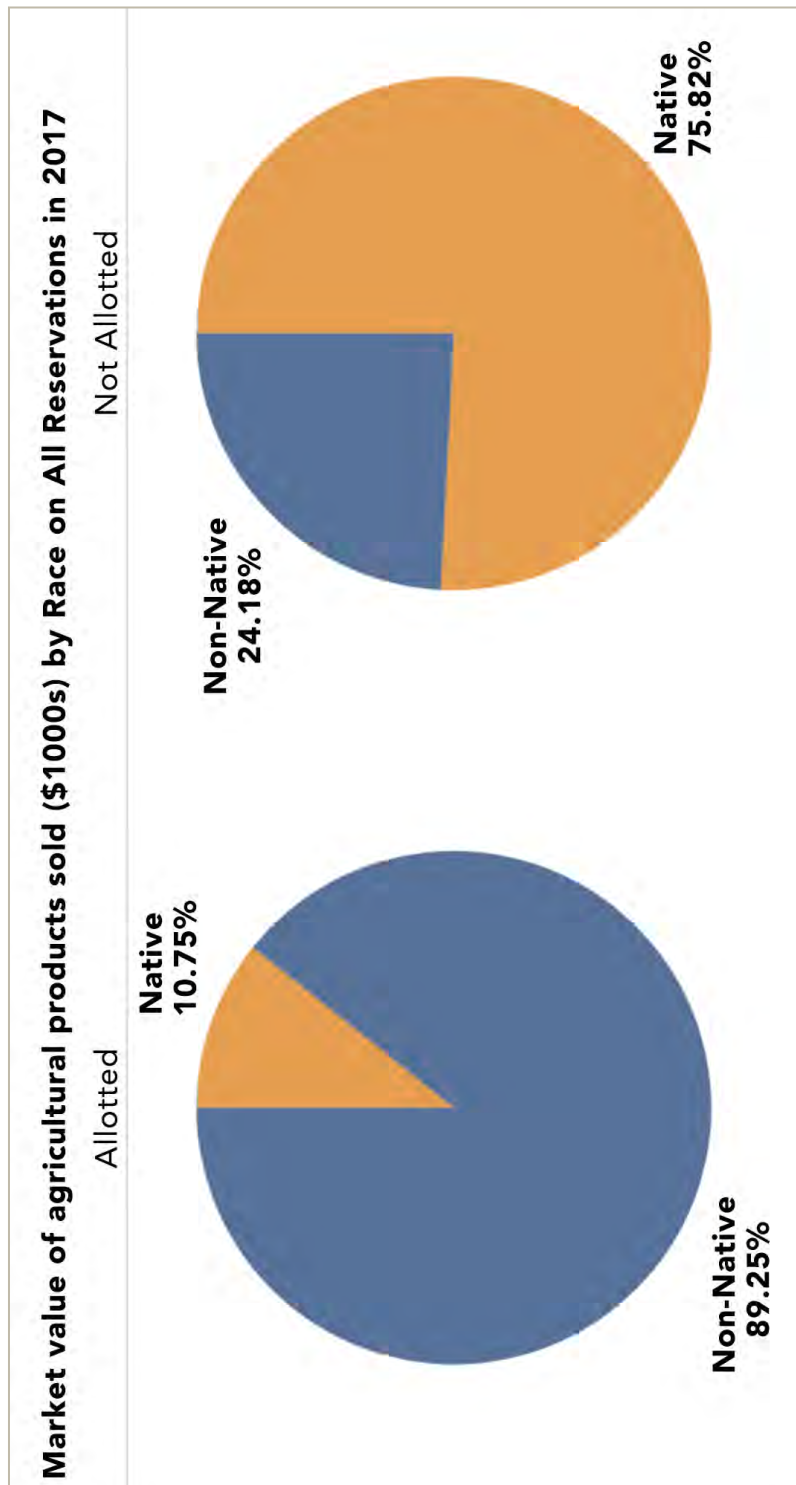
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“What’s Growing on US Native Lands.” Native Land Information System. <https://nativeland.info/dashboard/whats-growing-on-native-lands-in-the-coterminous-united-states/>.

APPENDICES

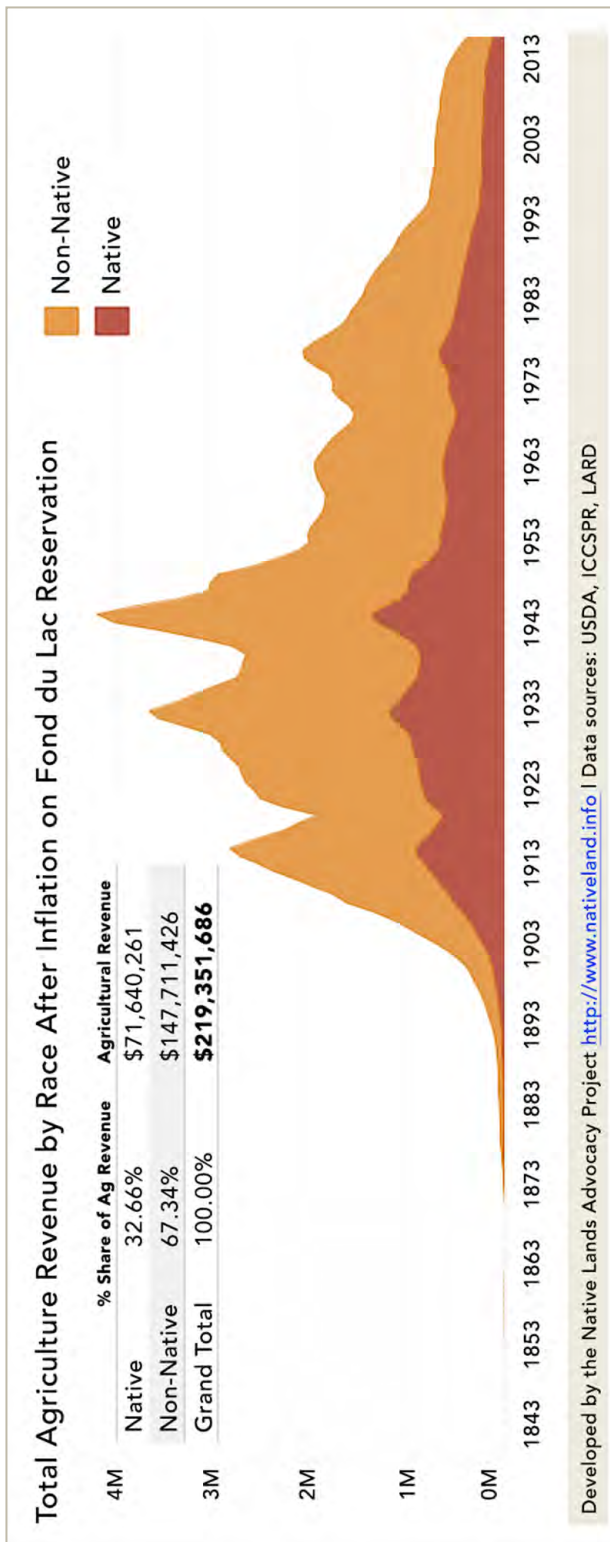
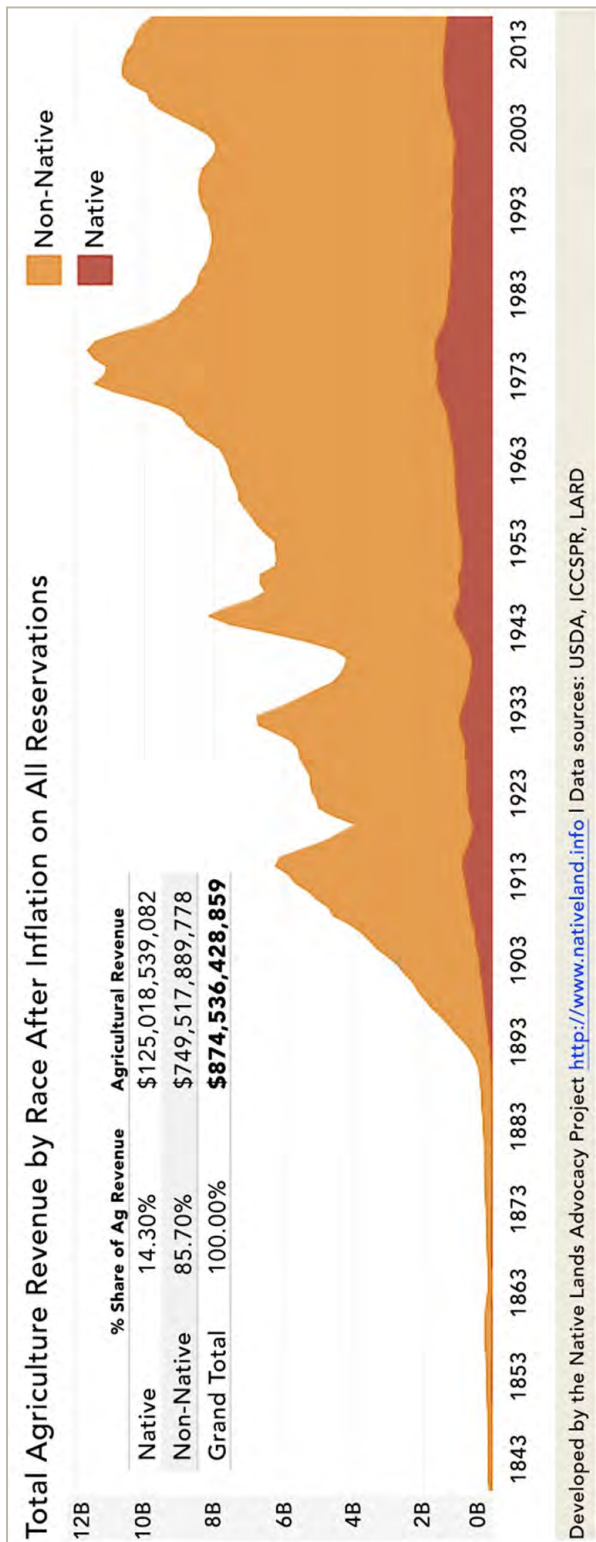
Appendix A

Market Value of Agricultural Products Sold (\$1000s)
by Race on All Reservations in 2017



Appendix B

Lost Agriculture Revenue for All Reservations (left) and Fond du Lac (right)



Appendix C

Market Value of Agricultural Products Sold (\$1000s) by Race on Fond du Lac Reservation in 2017

Agriculture on Native Lands

Data from the 2007, 2012 and 2017 USDA Census of Agriculture for American Indian Reservations

Table Explorer Change Over Time About the Data

Reservation(s)
Fond du Lac

Data Chart Explorer Population Age of Producers Census Questions

Census Year Market Value of Agricultural Products Sold Market value of agricultural products sold (\$1000s)

2017

2017 Total

Native	Non-Native*	Total
83	311	394

2017 Median (requires two or more reservations in filter)

Native	Non-Native*	Total
83	311	394

% change from 2007 to 2012 and 2012 to 2017**

	2007	2012	2017
Native			-68% ▼
Non-Native*			-5% ▼
Total			-33% ▼

Market value of agricultural products sold (\$1000s) by Race on Fond du Lac Reservation(s) in 2017

Native 21.07%	Non-Native* 78.93%
------------------	-----------------------

How this variable is distributed across all reservations
No items highlighted

Native

Non-Native*

Total

Yakama Colville Yakama

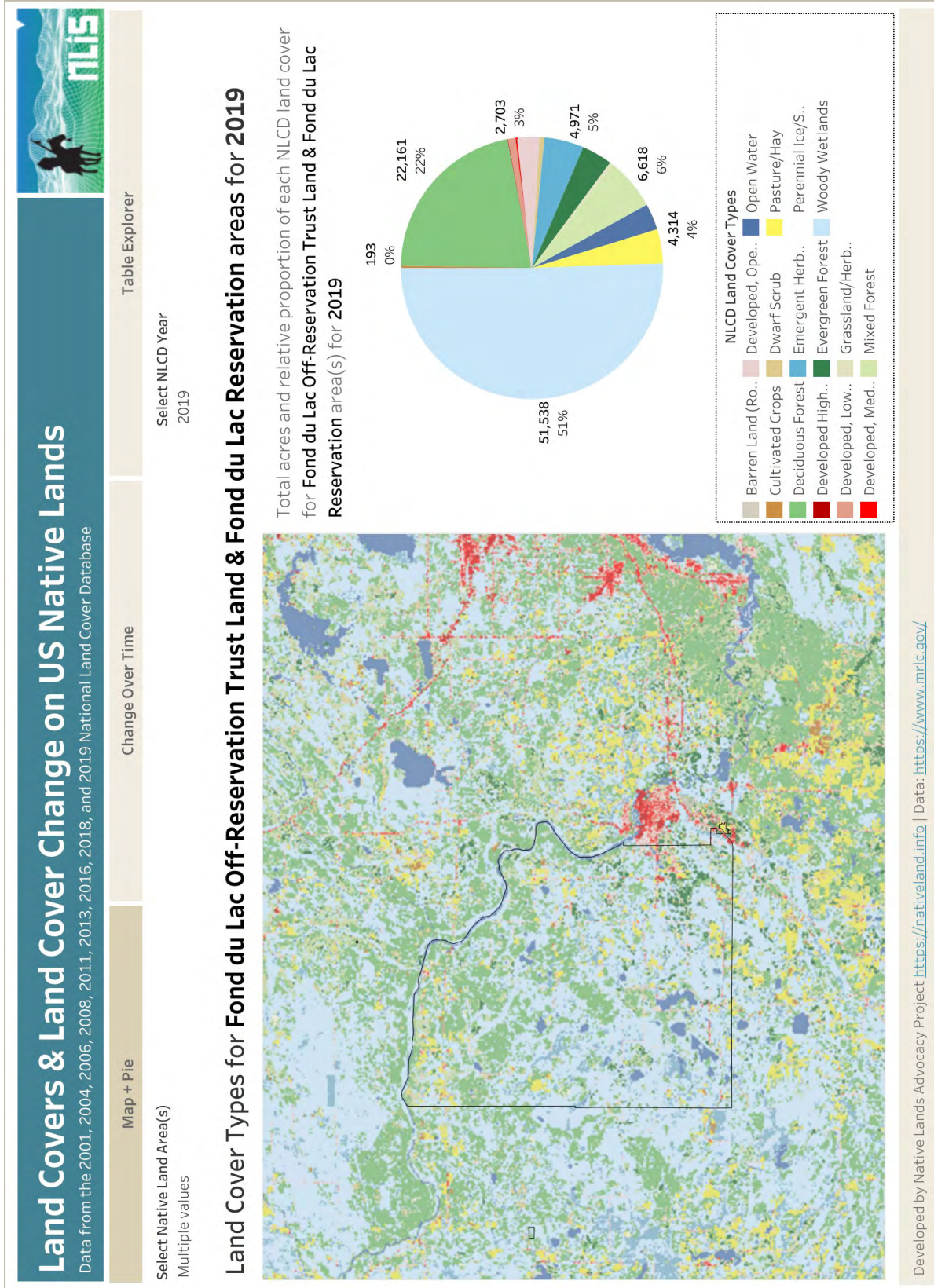
*The value for "Non-native" is calculated by subtracting "Native" from the reservation "Total." In some cases the values for "Native", "Non-Native", and "Total" were not published by USDA to avoid disclosing data for individual producers. This is the most likely explanation for discrepancies between Native, Non-Native, and Total. Use the Table Explorer to see whether data was included or excluded for a particular reservation.

**Change that occur between census years may be partly attributed to the inclusion or exclusion of particular reservations from year to year, when filter includes more than one reservation

Developed by Native Lands Advocacy Project | <http://www.nativeand.info> | Data Source: USDA NASS

Appendix D

Land Cover Types for Fond du Lac Off-Reservation Trust Land & Fond du Lac Reservation Areas for 2019



Appendix E

Carrying Capacity Dashboard for Fond du Lac Reservation

HOW MANY PEOPLE COULD MY RESERVATION FEED?

RE-IMAGINING RESERVATION FOOD SYSTEMS TO ENHANCE SOVEREIGNTY & SELF-DETERMINATION

Despite the large amount of agriculture production that occurs on Native American Reservations in the U.S., many are still classified as food deserts (having limited access to affordable and nutritious food.) Sadly, this is the product of over a century of misguided Federal Indian policy that promoted intensive commodity agriculture where most Reservation production goes to feed off reservation populations. This tool is designed to help re-imagine reservation food systems as being more focused on meeting local needs by calculating how many people Reservation lands could potentially feed.

What potential exists for greater food security on YOUR reservation or native land?

Select One or More US Native Land
Fond du Lac

Diet Scenario
BAS

Land Type	Area (ACS)	Percentage
Grazing Land	4,588	95.10%
Perennial Cropland	168	3.48%
Cultivated Cropland	68	1.42%

Based on the total area of grazing lands, cultivated cropland, and perennial cropland, **Fond du Lac** lands could feed an estimated **3,026.17** people per year or **0.75** times the current estimated population of **4,011** (2021 ACS). This is assuming the diversity of fruits, vegetables, and grains was increased to support a recommended healthy omnivorous diet and local channels for processing, storage, and distribution were expanded.

See the Data

How was this calculated?

Developed by Native Lands Advocacy Project: <https://nativeland.info/> | Carrying Capacity Model adapted from Peters et al. 2016 <https://online.ucpress.edu/elementa/article/doi/10.12952/elementa.000116/11.2907/Carrying-capacity-of-US-agg-cultural-land-Ten>

Appendix F

Community Survey (Page 1 of 4)

Fond du Lac Mashkode-bizhikiwag Project Feedback Survey

This survey is anonymous and is being collected by the Fond du Lac Band of Lake Superior Chippewa for the purpose of assessing the feasibility of reintroducing mashkode-bizhikiwag (Buffalo) on a pasture on Fond du Lac reservation lands. This survey will take approximately 15-20 minutes to complete.

ABOUT THE RESPONDENT

Please select one of the multiple choice answer options for each question:

1. Are you a member of the Fond du Lac Band of Lake Superior Chippewa?
 Yes, I am a member. No, I am not a member.
2. Are you a lineal descendant of Fond du Lac Band of Lake Superior Chippewa?
 Yes, I am a lineal descendant. No, I am not a lineal descendant.
3. Do you currently reside on the Fond du Lac Reservation?
 Yes, I reside on Fond du Lac. No, I do not reside on Fond du Lac.
4. Do you currently reside on another Reservation?
 Yes, I reside on another reservation. No, I do not reside on another reservation
5. Have you ever lived on Fond du Lac Reservation?
 Yes, I have lived on Fond du Lac. No, I have never lived on Fond du Lac.
6. Where do you currently reside? This question is **OPTIONAL**. We only ask this to get a sense of where our respondents are from.
Reservation: _____ City: _____ State: _____

AGREE/DISAGREE

Please fill in a circle to indicate your response to each of the following statements:

1. "Our Band and its members benefit from farming and ranching on the reservation."

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. "Today, agriculture on the reservation enhances the natural environment on the Reservation."

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Appendix F

Community Survey (Page 2 of 4)

3. "Agriculture on this reservation supports our cultural beliefs and practices."

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

4. "I generally support the Band's efforts to promote more Native farmers and ranchers on this Reservation."

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

5. "I believe a buffalo herd on the reservation would promote our cultural beliefs and practices."

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

6. "I believe a buffalo herd would be more beneficial to the land than cattle."

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

7. "I believe a buffalo herd would promote economic development on Fond du Lac reservation."

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

8. "I believe a buffalo herd could be a source of high-quality protein for the Band."

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

9. "I would like to learn more about the history of buffalo in this region and the cultural and spiritual significance they have had to the Native peoples of North America."

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

10. "I support the Band's effort to restore Buffalo to Fond du Lac reservation lands."

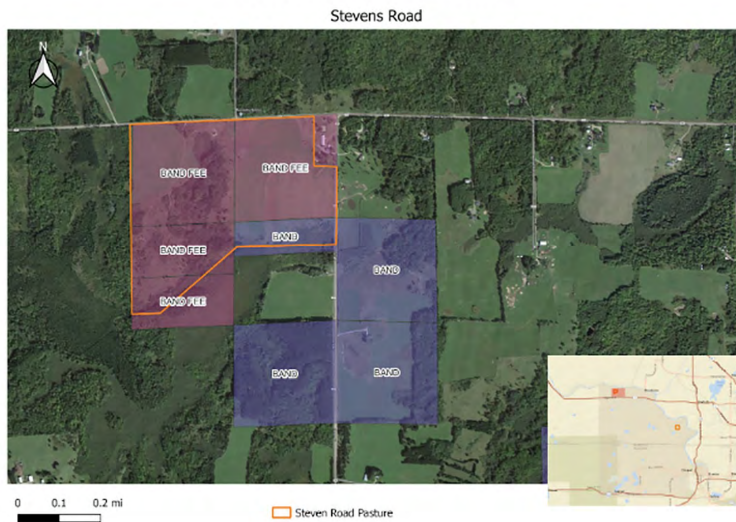
Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Appendix F

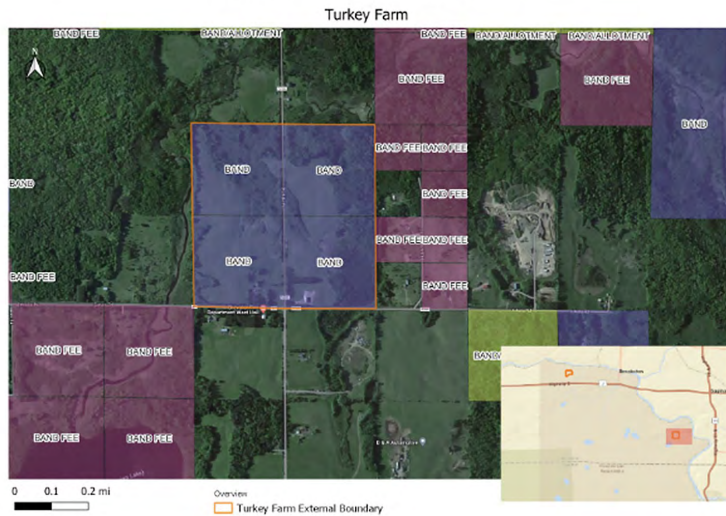
Community Survey (Page 3 of 4)

The Band is considering two sites for possible buffalo reintroduction: Steven’s Road at the northwest portion of the reservation and the Old Turkey Farm at the northeast portion of the reservation. After reviewing the photos of the two sites and their highlighted land areas, answer the following questions.

Site 1: Steven’s Road



Site 2: Old Turkey Farm



Out of the two sites (Steven’s Road or the Old Turkey Farm), which is your preferred site for buffalo reintroduction? Please explain.

Appendix F

Community Survey (Page 4 of 4)

Please share any additional thoughts you have about the two sites above with respect to buffalo reintroduction.

ORDERED SET

On a scale from 1=Not important at all to 5= Very important, rate each of the following items by how important they are to you as they relate to the reintroduction of buffalo to the Fond du Lac lands:

- Cultural programs (1= Not important at all, 5= Very important)
- Youth programs
- Distributing meat to elders/community members
- Rangeland rehabilitation
- Breeding genetically pure buffalo
- Using the hay from Band trust lands
- Tourism
- Trading animals, meats, and/or hides with other Bands/Tribes
- Packaging and selling meat from the buffalo
- Selling whole animals to third-party buyers to be processed for meat
- Selling live animals
- Tanning hides and utilizing other parts of the buffalo

SHORT ANSWER

Do you think that the Band should establish a buffalo herd on the Fond du Lac Reservation?
Please use the space below to explain why or why not.

What do you believe will be the most significant challenges to starting a buffalo herd on the Fond du Lac Reservation?

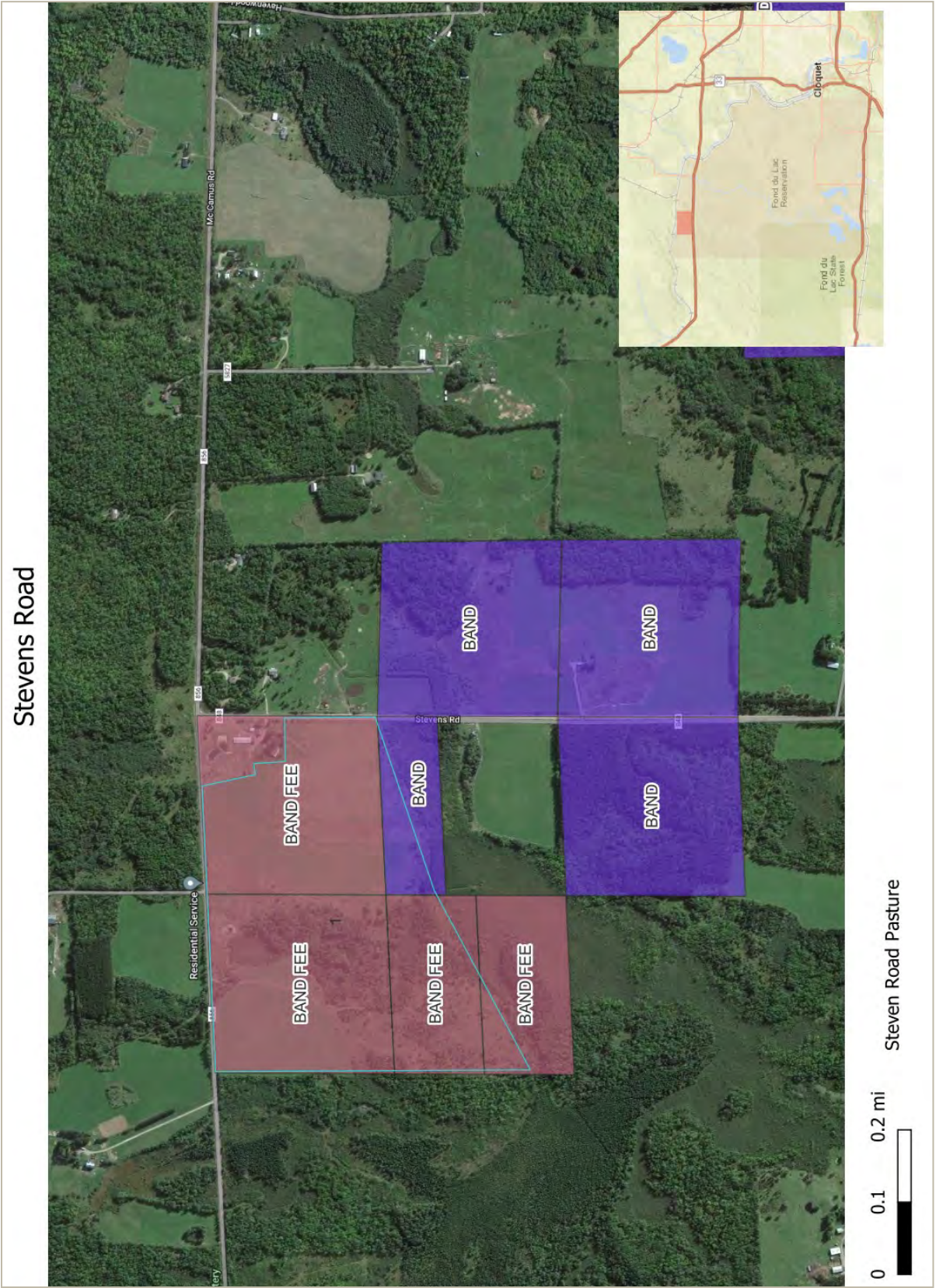
Please provide any additional comments about the idea of starting a small buffalo herd on the Fond du Lac reservation.

Thank you for completing the survey!

Your responses will significantly assist the Fond du Lac Band of Lake Superior Chippewa in assessing the feasibility of reintroducing mashkode-bizhikiwag (Buffalo) on reservation lands.

Appendix G

Proposed Pasture (1 of 3): Steven's Road



Appendix G

Proposed Pasture (2 of 3): Turkey Farm



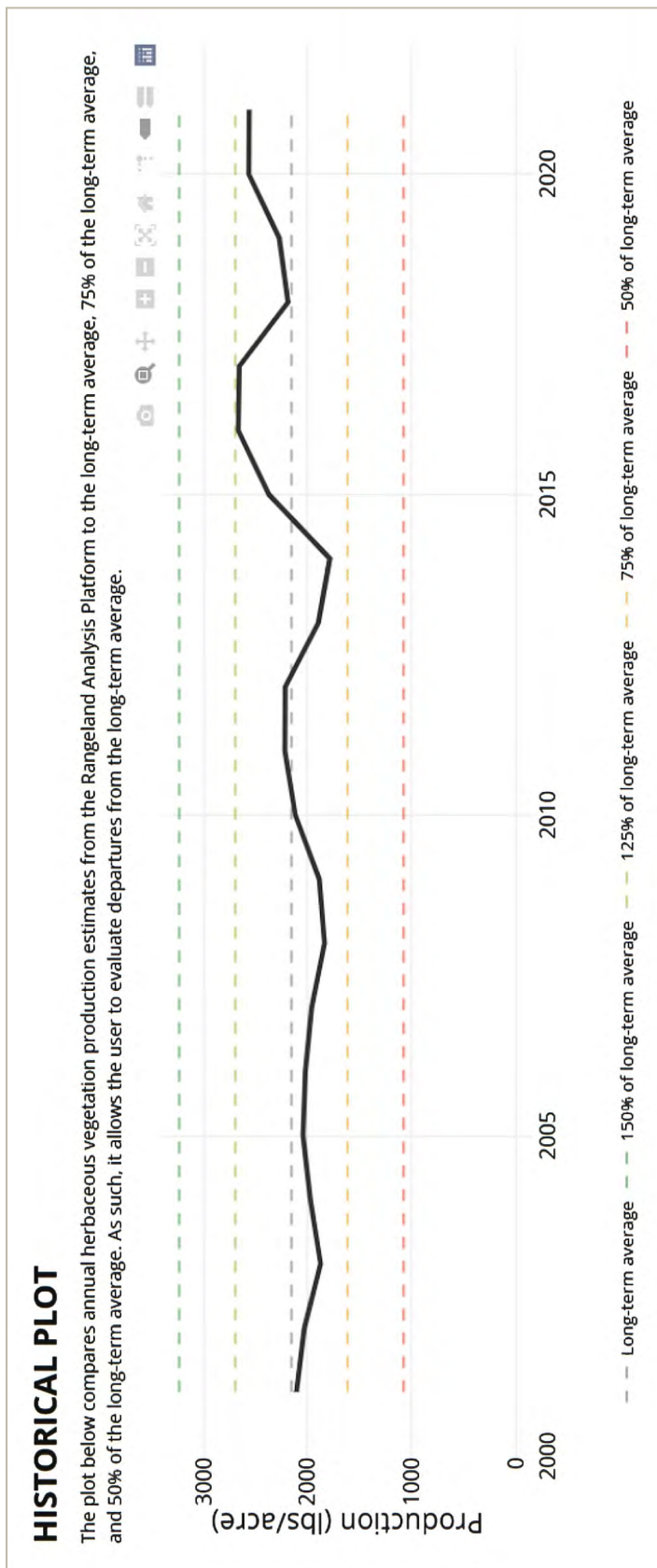
Appendix G

Proposed Pasture (3 of 3): Parviainen Road Site



Appendix H

Horseshoe Grove Bison Ranch: Historical Plot from the RAP



Appendix H

Horseshoe Grove Bison Ranch: Proper Stocking Estimation (left) & Stocking Rate Time-Series Plot (right) from the RAP

Proper Stocking Estimation for Horseshoe Farms Bison Ranch

STOCKING RATE SUMMARY (2001-2021)

The table below provides estimates of long-term average herbaceous vegetation production and the stocking rates (given user-defined stocking information) for the selected land unit. The lowest and highest values and range provides information about annual variability.

	Average	Lowest value	Highest value	Range
Production (lbs/acre)	2156	1787	2667	880
Stocking rate (animals)	86	71	107	36

NOTE: Stocking rate estimate assumes herbaceous production is readily accessible to and consumable by livestock during the grazing period selected. Estimates should be refined by taking into account seasonal availability of plant growth, topography, watering locations, grazing distribution, and any additional factor that would limit accessibility or consumption by livestock.

STOCKING RATE TIME-SERIES PLOT

The plot below depicts estimated stocking rates for each year of the user-defined long-term average period given the user-defined stocking information.



Appendix H

Horseshoe Grove Bison Ranch: Land Unit Map from the RAP



Appendix I

Steven's Road Pasture: Proper Stocking Estimation (left) & Stocking Rate Time-Series Plot (right) from the RAP

Proper Stocking Estimation for Steven's Road

STOCKING RATE SUMMARY (2001-2021)

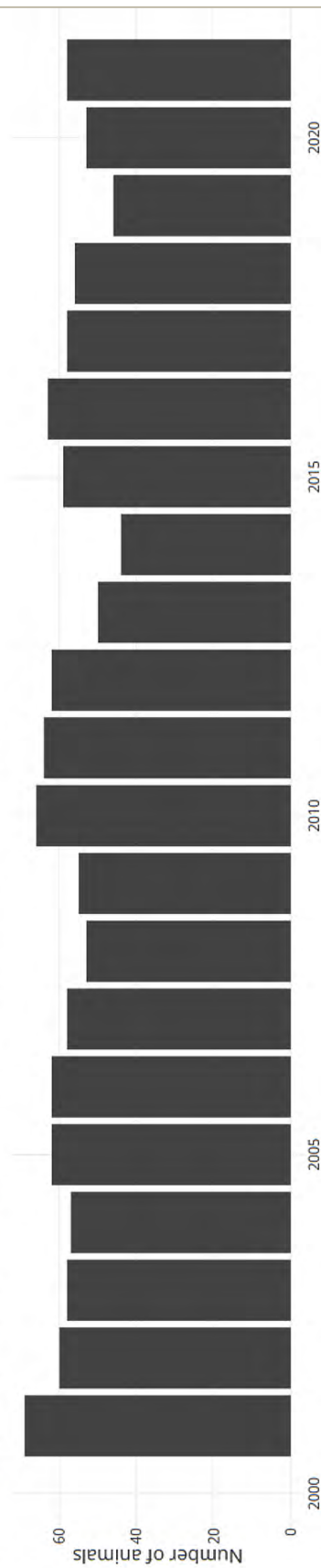
The table below provides estimates of long-term average herbage production and the stocking rates (given user-defined stocking information) for the selected land unit. The lowest and highest values and range provides information about annual variability.

	Average	Lowest value	Highest value	Range
Production (lbs/acre)	1893	1446	2274	828
Stocking rate (animals)	58	44	69	25

NOTE: Stocking rate estimate assumes herbage production is readily accessible to and consumable by livestock during the grazing period selected. Estimates should be refined by taking into account seasonal availability of plant growth, topography, watering locations, grazing distribution, and any additional factor that would limit accessibility or consumption by livestock.

STOCKING RATE TIME-SERIES PLOT

The plot below depicts estimated stocking rates for each year of the user-defined long-term average period given the user-defined stocking information.



Appendix I

Steven's Road Pasture: Land Unit Map from the RAP



LAND UNIT MAP

Appendix J

Turkey Farm Pasture: Proper Stocking Estimation (left) & Stocking Rate Time-Series Plot (right) from the RAP

Proper Stocking Estimation for Turkey Farm

STOCKING RATE SUMMARY (2001-2021)

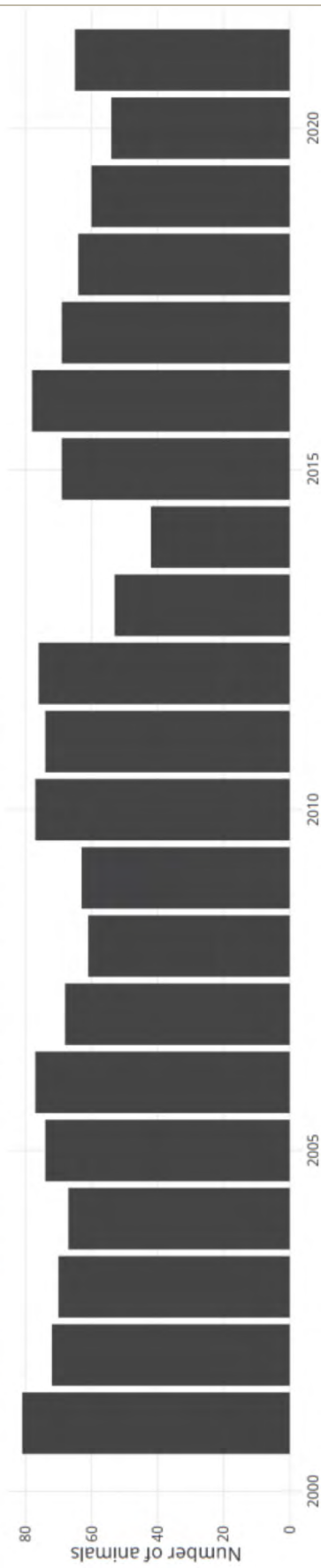
The table below provides estimates of long-term average herbage production and the stocking rates (given user-defined stocking information) for the selected land unit. The lowest and highest values and range provides information about annual variability.

	Average	Lowest value	Highest value	Range
Production (lbs/acre)	1525	942	1831	889
Stocking rate (animals)	67	42	81	39

NOTE: Stocking rate estimate assumes herbage production is readily accessible to and consumable by livestock during the grazing period selected. Estimates should be refined by taking into account seasonal availability of plant growth, topography, watering locations, grazing distribution, and any additional factor that would limit accessibility or consumption by livestock.

STOCKING RATE TIME-SERIES PLOT

The plot below depicts estimated stocking rates for each year of the user-defined long-term average period given the user-defined stocking information.



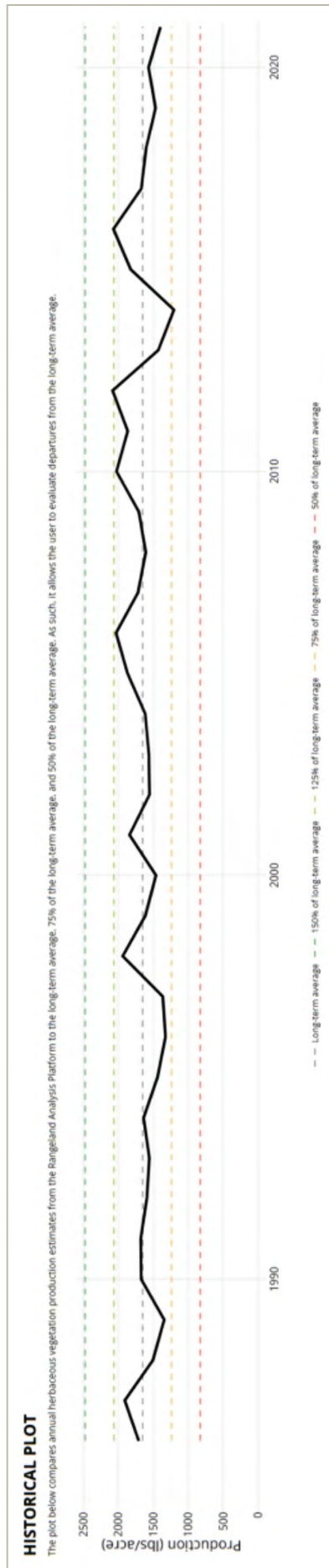
Appendix J

Turkey Farm Pasture: Land Unit Map from the RAP



Appendix K

Quartermaster Buffalo Ranch: Historical Plot from the RAP



Appendix K

Quartermaster Buffalo Ranch: Proper Stocking Estimation (left) & Stocking Rate Time-Series Plot (right) from the RAP

Proper Stocking Estimation for Quartermaster Buffalo

STOCKING RATE SUMMARY (1986-2021)

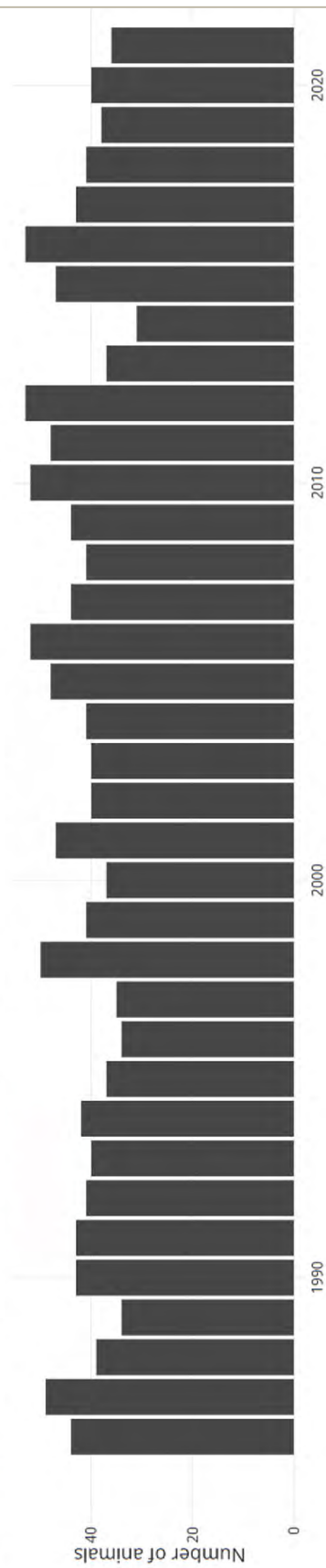
The table below provides estimates of long-term average herbaceous vegetation production and the stocking rates (given user-defined stocking information) for the selected land unit. The lowest and highest values and range provides information about annual variability.

	Average	Lowest value	Highest value	Range
Production (lbs/acre)	1652	1204	2084	880
Stocking rate (animals)	42	31	53	22

NOTE: Stocking rate estimate assumes herbaceous production is readily accessible to and consumable by livestock during the grazing period selected. Estimates should be refined by taking into account seasonal availability of plant growth, topography, watering locations, grazing distribution, and any additional factor that would limit accessibility or consumption by livestock.

STOCKING RATE TIME-SERIES PLOT

The plot below depicts estimated stocking rates for each year of the user-defined long-term average period given the user-defined stocking information.



Appendix K

Quartermaster Buffalo Ranch: Land Unit Map from the RAP



Appendix K

Quartermaster Buffalo Ranch: Historical Production Report from the RAP

Historical Production Report

SITE SUMMARY

Long-term average (1986-2021)

Average annual production: 1652 lbs./acre

150% of average annual production: 2479 lbs./acre

125% of average annual production: 2065 lbs./acre

75% of average annual production: 1239 lbs./acre

50% of average annual production: 826 lbs./acre

Soil Survey production estimates

Soil survey data not available for this location.

Appendix L

Fencing Cost Estimate for Steven's Road Pasture

Steven's Road	Description	Unit Price	Quantity	Total
	8' x 2.125" Timeless Rigid PVC T-Post	\$17.25	1032	\$17,802.00
	8' x 6" Wood Post	\$27.99	166	\$4,646.34
	4000' High Tensile Wire	\$195.00	21	\$4,095.00
	End Strain Insulator	\$15.00	21	\$315.00
	Spinning Jenny	\$166.00	3	\$498.00
	46000W Energizer w/ Remote	\$2,090.00	1	\$2,090.00
	Wheel Tightener (10 ct)	\$37.50	11	\$412.50
	Wheel Tightener Tool	\$23.00	2	\$46.00
	Open End 3-4 Taps (50 ct)	\$14.00	15	\$210.00
	Four Slot Crimp Tool	\$63.00	2	\$126.00
	6' Ground Rod	\$18.00	3	\$54.00
	Two Piece Ground Rod Clamp	\$3.75	3	\$11.25
	165' Double Insulated Underground Cable	\$60.00	1	\$60.00
	Cotter Pins (50 ct)	\$6.25	111	\$693.75
	24' x 26" Water trough	\$2,599.00	3	\$7,797.00
	12' Gate	\$525.00	6	\$3,150.00
	Total Cost			\$42,006.84

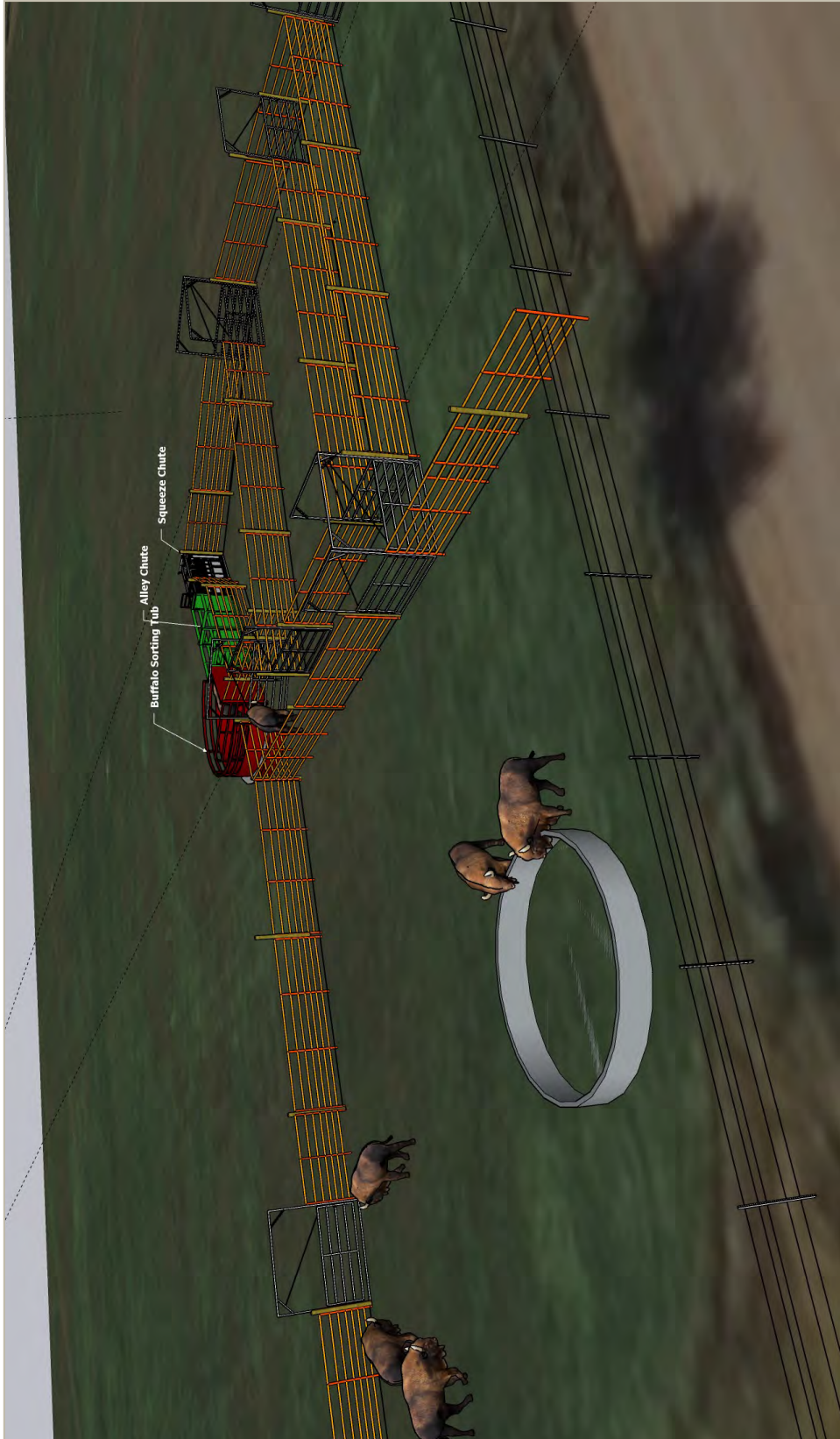
Appendix L

Fencing Cost Estimate for Turkey Farm Pasture

Turkey Farm	Description	Unit Price	Quantity	Total
	8' x 2.125" Timeless Rigid PVC T-Post	\$17.25	1013	\$17,474.25
	8' x 6" Wood Post	\$27.99	306	\$8,564.94
	4000' High Tensile Wire	\$195.00	21	\$4,095.00
	End Strain Insulator	\$15.00	21	\$315.00
	Spinning Jenny	\$166.00	3	\$498.00
	46000W Energizer w/ Remote	\$2,090.00	1	\$2,090.00
	Wheel Tightener (10 ct)	\$37.50	11	\$412.50
	Wheel Tightener Tool	\$23.00	2	\$46.00
	Open End 3-4 Taps (50 ct)	\$14.00	15	\$210.00
	Four Slot Crimp Tool	\$63.00	2	\$126.00
	6' Ground Rod	\$18.00	3	\$54.00
	Two Piece Ground Rod Clamp	\$3.75	3	\$11.25
	165' Double Insulated Underground Cable	\$60.00	1	\$60.00
	Cotter Pins (50 ct)	\$6.25	109	\$681.25
	24' x 26" Water trough	\$2,599.00	4	\$10,396.00
	12' Gates	\$525.00	3	\$1,575.00
	Total Cost			\$46,609.19

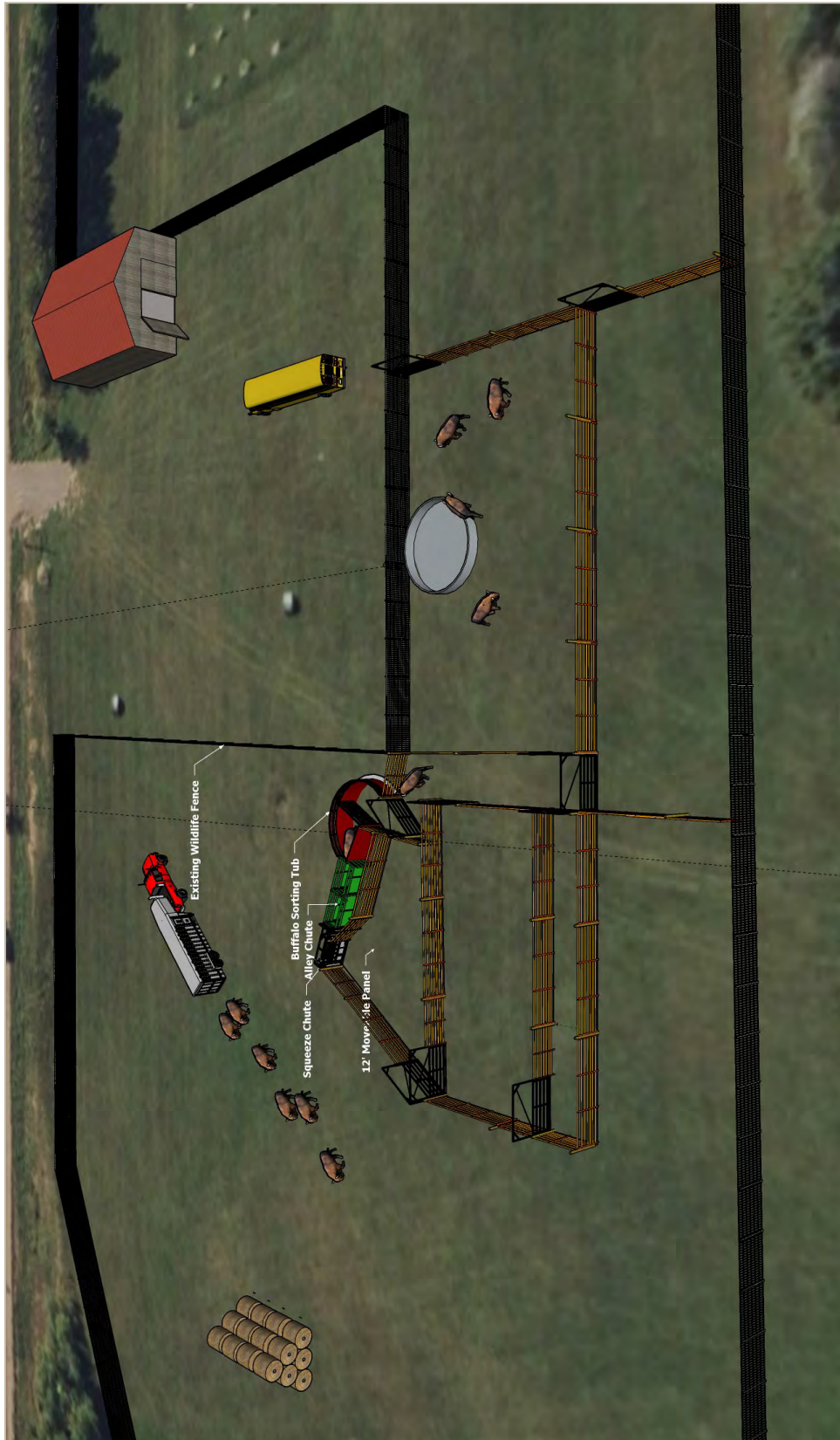
Appendix M

Steven's Road Pasture Mock-up: Aerial perspective of Steven's Road Pasture with 24 foot water tank and corral system looking southeast.



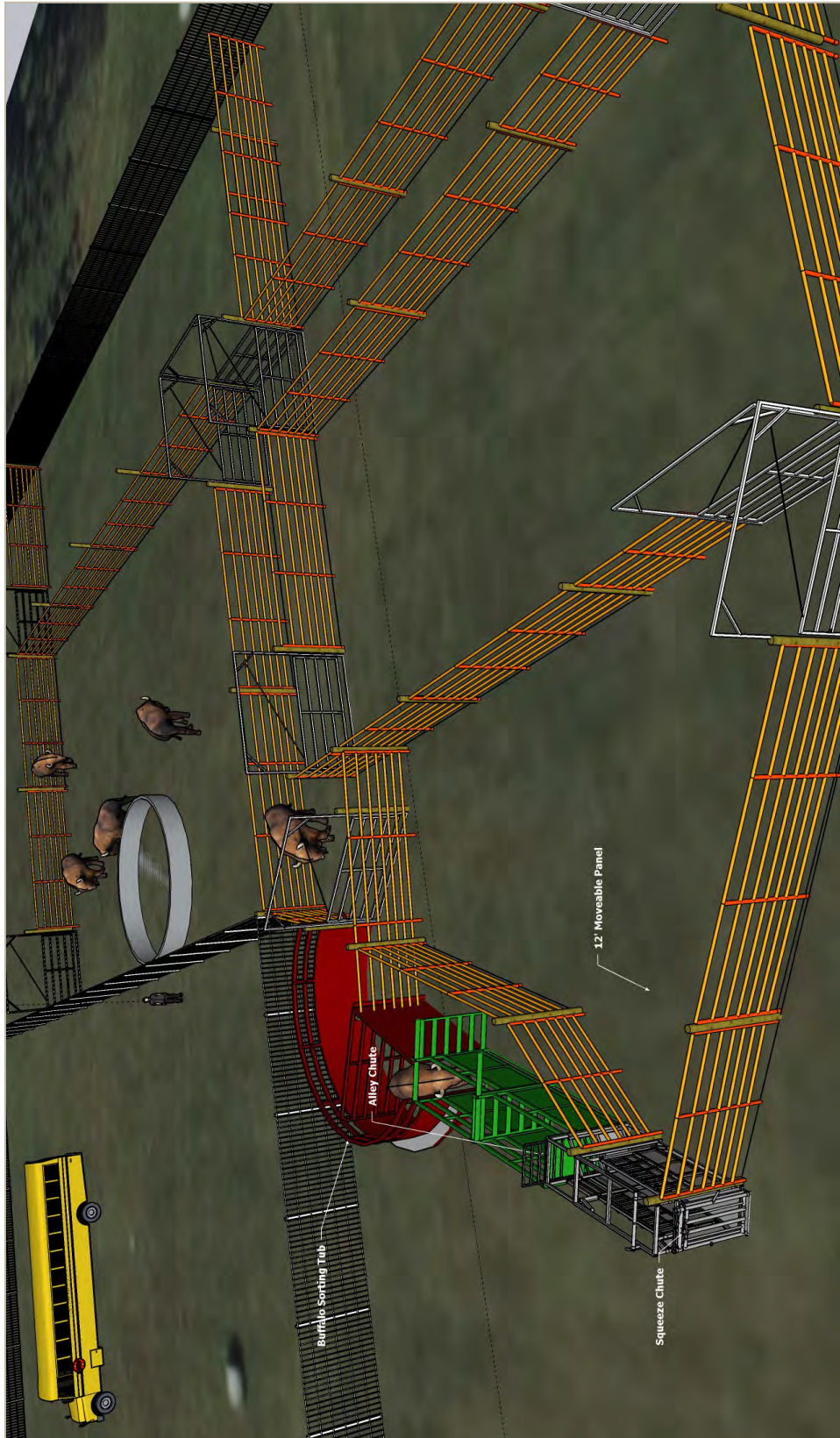
Appendix M

Turkey Farm Pasture Mock-up (1 of 3): Aerial view of proposed Turkey Farm corral system looking in southward direction.



Appendix M

Turkey Farm Pasture Mock-up (2 of 3): Closeup view of sorting tub, looking westward.



Appendix M

Turkey Farm Pasture Mock-up (3 of 3): Closeup view of 24 foot stock tank.



Appendix N

UAV Data: Steven’s Road Pasture

Village Earth, with permission from Fond du Lac Natural Resources Department, mapped the Steven’s Road & Turkey Farm pastures using a AV. The raw and processed data will be shared with the Fond du Lac Band.

The specifications for Steven’s Road Pasture are below.

Collected	May 25, 2023, 10:29 a.m.
Images Uploaded	457
Input GP	5.5.484000
Output Size	20707 x 22588 @1.83 inch/pixel
Average AGL Alt	455.39 ft
URL	https://www.mapsmadeeasy.com/maps/public/d429c47f5fa14cef91964a27b2b89512

Appendix N

UAV Data: Turkey Farm Pasture

Village Earth, with permission from Fond du Lac Natural Resources Department, mapped the Steven’s Road & Turkey Farm pastures using a AV. The raw and processed data will be shared with the Fond du Lac Band.

The specifications for Turkey Farm Pasture are below.

Collected	May 25, 2023, 9:31 a.m.
Images Uploaded	484
Input GP	5.808000
Output Size	19884 x 22023 @1.86 inch/pixel
Average AGL Alt	471.16 ft
Collected	May 25, 2023, 9:31 a.m.
