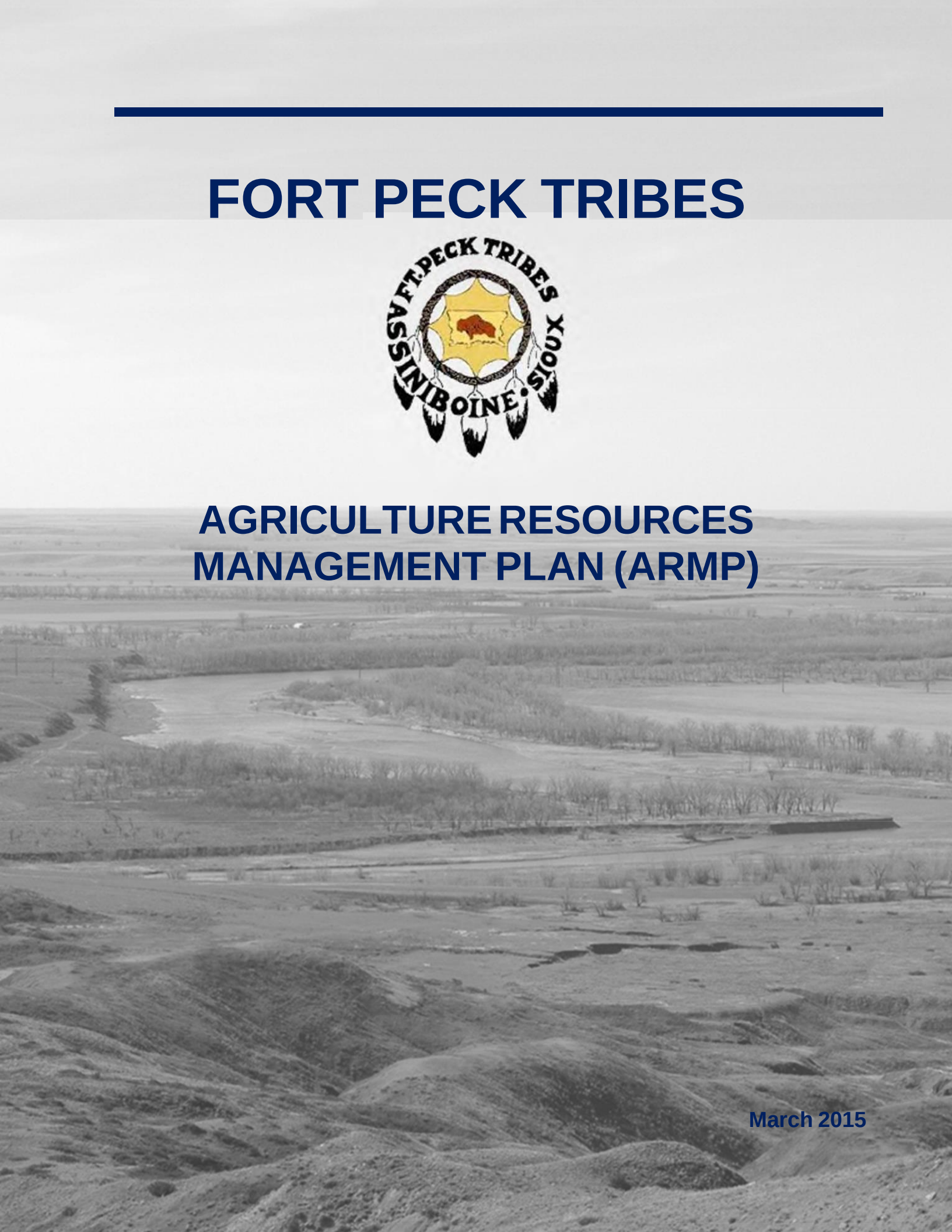
FORT PECK TRIBES



AGRICULTURE RESOURCES MANAGEMENT PLAN (ARMP)

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Fort Peck Tribes Agriculture Resources Management Plan (ARMP)

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Introduction

1.1 PURPOSE

This document is intended to create a management strategy and plan to govern the management and administration of Tribal lands and those held in trust by the Bureau of Indian Affairs (BIA). The goal is to incorporate local knowledge, history, traditions, and management strategies into an overall guidance document for Tribal and Trust lands within the Fort Peck Reservation. Incorporating local information and data in the Agricultural Resource Management Plan (ARMP) will lead to more local control of the agricultural resources on Tribal and Trust lands within the Fort Peck Reservation.

1.1.1 *Mission Statement*

The mission of the Assiniboine and Sioux Tribes is to protect and enhance the natural resources of the Fort Peck Indian Reservation in keeping with cultural and traditional practices. The Tribes will:

- Work together to promote agriculture by providing efficient, timely, and reliable services to the people, communities, industries, and other Tribal agencies.
- Protect, conserve, and maintain the highest sustainable productive potential of Tribal and Trust agricultural lands.
- Maximize revenues derived from Tribal natural resources while protecting their sustainability.
- Educate people on the services provided to the agricultural community and the services available to those starting in agriculture.

The ARMP will be managed and implemented to ensure that the Mission Statement is adhered to and that each statement is fulfilled to the best extent possible.

1.2 AUTHORIZATION

The Fort Peck Tribes derive the authority to supersede Federal regulations as outlined in the American Indian Agriculture Resource Management Act – 25 U.S.C. § 3702 & 3712. As outlined in Code, the BIA shall manage agricultural resources consistent with the Agricultural Resource Management Plan and the Integrated Resource Management Plan. Implementation of the ARMP will require coordination and cooperation from the BIA with the Fort Peck Tribes and their respective departments.

1.3 CONTRIBUTING MEMBERS

This document was created by the Fort Peck Tribes' Natural Resources Department through the coordination and cooperation of the following groups:

- Tribal Water Resource Department
- Tribal Minerals Department
- Office of Environmental Protection
- Fort Peck Landowners Association
- Fort Peck Community College
- Natural Resource Conservation Service
- Fort Peck Agency

Public comment and input was encouraged and taken at numerous points in the development of this document. The development of the ARMP was a collaborative effort by the previously mentioned parties.

Overall Management Goals

2.1 CRITIAL TRIBAL VALUES

In managing the agricultural resources on the Fort Peck Reservation it is important to identify critical Tribal values; ensure the ARMP does not conflict with critical Tribal values; and work to improve or enhance the critical Tribal values in the policies and management decisions outlined in the ARMP. The overall critical Tribal values are outlined below.

- Preserving the value of our farmlands and rangelands.
- Maximizing the beneficial use of the Tribal water rights allocation.
- Encourage ownership, stewardship, and management of lands within the Fort Peck Reservation by Tribal members.
- Protect and preserve cultural, historical, and archeological resources.

2.2 5-YEAR MANAGEMENT GOALS

The Tribes have determined the following to be legitimate and attainable short-term management goals for the agricultural resource.

- Improve the management strategy and tracking procedures for Pasture Leases to improve the forage quality.

- Create a Tribal-wide resource database to improve management of the agricultural resources, increase Tribal efficiency, and optimize revenue generation from Tribal and Trust tracts.
- Implement a systematic review and inspection plan for all Range Units and Pasture Leases.
- Implement a soil quality improvement strategy for all Tribal and Trust farmlands.
- Reduce the number of idle Tribal and Trust tracts within the Fort Peck Irrigation Project.
- Implement a lease program which assists new Tribal Farmers and Ranchers attain farmland and Range Units.
- Determine the feasibility of developing additional irrigation within the Reservation.
- Implement a noxious weed control and management plan.

2.3 10-YEAR MANAGEMENT GOALS

The Tribes have determined the following to be legitimate and attainable long-term management goals for the agricultural resource.

- Acquire targeted lands, in accordance with the Section IX – Land Acquisition and Trade of the Land Use Policy, which will add value to the Tribal agricultural resource. The Land Use Policy is included in Appendix A.
- Improve Range Unit forage condition while reducing club moss and noxious weed colonies.
- Improve Range Unit exterior boundary fence conditions.
- Develop water resources on Range Units to improve livestock and forage management through accessing the Tribal MR&I water pipeline network.
- Develop new irrigation within the Fort Kipp and Sprole areas.
- Improve the soil quality of all Tribal and Trust farmlands within the Reservation.
- Improve irrigation infrastructure and facilities condition within the Fort Peck Irrigation Project.
- Implement improvements on idle Tribal and Trust tracts within the Fort Peck Irrigation Project.
- Implement a water accounting system to track the point of use and quantity of water used under the Tribal water allocation.

- Implement a Timber Use Plan to maximize the beneficial use of Tribal and Trust timber lands.
- Create a competitive agricultural leasing environment in which Tribal members have an opportunity start new agricultural operations or grow existing operations.

Reservation Setting

3.1 PHYSICAL TRAITS

3.1.1 *Reservation Boundary*

The Fort Peck Indian Reservation is located in the northeastern corner of Montana. It is bordered on the west by Porcupine Creek, the east by Big Muddy Creek, and the south by the Missouri River. The northern boundary is located approximately 20 miles south of the Canadian border. The Reservation is 100 miles long and 40 miles wide and lies within the Missouri River drainage. It occupies portions of 4 counties: Roosevelt, Valley, Daniels, and Sheridan.

The Reservation is comprised of 2.1 million acres. Approximately 916,000 acres are held in trust for the Assiniboine and Sioux Tribes and their members. About 624,000 acres of rangeland are trust lands with 385,000 acres in Range Units and 238,500 acres in farm/pasture leases. The Range Units are comprised of allotted (trust) land and tribal land.

3.1.2 *Landscape*

The Fort Peck Indian Reservation lies in the Northern Dark Brown Glaciated Plains. Elevation ranges from 1,875 feet to 3,100 feet. Most of the inventoried Range and Pasture Units consist of level to steeply sloping upland glaciated plains. The landscape is frequently dissected by steep drainage ways and cobbled ridges.

A sheet of glacial ice covered most of the Fort Peck Indian Reservation in the recent geologic past. This sheet was over 1,000 feet thick and extended south beyond the present course of the Missouri River. As it retreated northward, the ice sheet left a mantle of till that averages 20 to 25 feet in thickness. As a result, gently sloping to steep, mostly very deep and well-drained, loamy and clayey textured soils are common across the Reservation. Some of the glacial till has eroded, exposing the sandstone and shale material. All of the exposed rocks are sedimentary. Marine sediment was deposited during the Cretaceous age as shale, siltstone, and sandstone. Unconsolidated alluvial deposits of gravel, sand, silt, and clay line the drainage ways.

There is an infrequent occurrence of springs, seeps and other areas with a seasonal water table close enough to the surface to influence plant composition and production on the Reservation. Lower landscapes also experience rare flooding events.

Floodplains represent nearly 10 percent of the landscape. These soils are nearly level and deep. Soils are well-drained, moderately well-drained, and poorly drained. The poorly drained soils are often salt affected. These soils generally remain in rangeland as they are too poor to farm. These areas are characterized by the following soil components: Harlem, Havre, Lohler, Lallie, and Nobe.

Small areas of overflow exist where salt and/or alkali accumulations are present. Overflow sites are areas that receive run-off moisture from uplands. These sites occur in small bands and patches associated with alkali basins and at isolated alkali seeps. Overflow sites are also found at the base of badlands erosional side-slopes, such as along the Missouri River floodplain. These areas comprise a very minor part of the Northern Great Plains, and this limited acreage may explain why little research has been published in this area.

Moderately steep to steep uplands, terraces, and outwash plains represent nearly 25% of the landscape. These shallow to deep, well-drained soils are formed in glacial till, outwash, consolidated shale, and weakly consolidated sedimentary beds. These areas are characterized by the following soil components: Tinsley, Cabba, Zahill, and Hillon.

Level to strongly sloping uplands, fans, and terraces represent about 65% of the landscape. Soils are deep and well-drained. They formed in glacial till, alluvium, outwash, and eolian deposits. These areas are characterized by the following soil components: Farland, Turner, Beaverton, and Williams-Zahill.

3.1.3 *Climate*

The Glaciated Plains are characterized by a semi-arid, temperate climate. Summers are generally warm, with frequent hot spells and occasional cool days. Winters are cold, experiencing frequent arctic air surges. Minimum and maximum temperatures range from less than -40 degrees Fahrenheit to greater than 100 degrees Fahrenheit.

Precipitation varies monthly. Mean annual precipitation ranges from 10 to 14 inches, with approximately 75% of the precipitation falling as steady soaking, frontal system rain in late spring to early summer. Summer rains are usually accompanied by thunderstorms. Winter snowfall is seldom heavy. Severe drought occurs, on average, two out of every ten years (Copper, et al. 2001).

The growing season on the Fort Peck Indian Reservation ranges from 105 to 125 days.

3.1.4 *Plants*

The historic climax plant community (HCPC) is the basis for plant community interpretations. The HCPC is determined by evaluating relic areas and other areas protected from excessive disturbance. The HCPC is comprised of a mixture of tall and medium height cool and warm

season grasses, native forbs, and native shrubs. About 80% of the annual production is from grasses and grass-like plants, most of which are produced during the cool season. Forbs contribute a smaller percentage of species composition, while shrubs make a minor component of total annual production.

The interpretive plant community is the Historic Climax Plant Community (HCPC). Cool season, tall and mid-grasses (bluebunch wheatgrass, green needlegrass, western wheatgrass, and thickspike wheatgrass) dominate the HCPC. Prairie junegrass is the most common shortgrass. Other shortgrasses and sedges include plains reedgrass, threadleaf sedge, and needleleaf sedge. Species such as western and thickspike wheatgrass and green needlegrass are able to out-compete bluebunch wheatgrass on ecological sites in Northeastern Montana. Blue grama is the only common warm season grass. Range inventories on Fort Peck and Fort Belknap Reservations (2001-2004) did not report any sideoats grama or little bluestem (also warm season grasses). Grasses represent about 80% of total annual production in the community.

Dotted gayfeather, American vetch, white prairie clover, and purple prairie clover are warm season forbs that commonly occur on these sites. American vetch and the prairie clovers are nitrogen-fixing species, and are also valuable forage producing plants. Groundplum milkvetch, scurfpea, and prairie thermopsis are lower-successional forbs that have the ability to fix nitrogen. White milkwort, biscuitroot, wild onion, and western yarrow may be present as minor components of the plant community. Forbs represent about 15% of total annual production.

Winterfat and Nuttall's saltbush are common warm and cool season shrubs, respectively. They are valuable forage for wildlife and livestock. Silver sagebrush and fringed sagewort, two additional warm season shrub species, may represent a minor component of the HCPC. One would not expect to find more than a trace of broom snakeweed and pricklypear cactus in the HCPC. Very few cool season shrubs grow on the site. Overall, shrubs account for about 5% of annual plant production.

Departures from the HCPC generally result from management actions, drought, colonization and recruitment of noxious weeds, and a change in natural fire regime. Under continued adverse impacts, vegetative vigor declines and lower-successional species gradually replace HCPC species.

This shift in species composition is most evident as deep-rooted cool season perennial grasses (green needlegrass, western wheatgrass, thickspike wheatgrasses) are replaced by short, warm season grasses (blue grama, sandberg bluegrass), fringed sagewort (a half-shrub), and forbs (western wallflower, scarlet globemallow, western yarrow, biscuitroot).

The dominance of these shortgrasses, non-nitrogenous-fixing forbs, and warm season half-shrubs disrupts ecological processes, impairs the biotic integrity of the site, and restricts the system's ability to recover to higher seral states. Thus, the site loses much of its resiliency.

3.1.5 *Animals*

Parts of the Reservation where HCPC occurs provide forage for mule deer and pronghorn throughout the majority of the year. However, most of the reservation is not in HCPC, so overall wildlife forage potential is limited by decreased production and reduced diversity of forbs and shrubs. Most deer use occurs along woody draws, coulees, badland range sites, and other ecological site borders.

The species diversity and cover associated with the HCPC provide habitat for sharp-tailed grouse and other upland birds. Primary use occurs along the ecotones, where grasslands transition to woodland draws and increased deciduous tree and shrub cover. However, most of the reservation has reduced quality habitat. Big sagebrush is rare on the Reservation, which limits the potential for sage grouse habitat. The few sage grouse that exist in the Glaciated Plains are usually associated with silver sagebrush.

Species diversity and litter provide favorable habitat for deer mice, rabbits, and other small mammals. Golden eagles, redtail hawks, and ferruginous hawks are common.

Sites that are characterized by communities in mid to early seral stages are less suitable for big game, upland birds, and small mammals. However, they are more suitable for prairie dogs. Prairie dog towns also have potential for use by burrowing owls, upland plovers, and other wildlife species.

3.2 WATER RESOURCES

Agriculture is the primary industry on the Fort Peck Reservation and water is key to the potential productivity of this industry. Surface water is scattered throughout the area in the form of perennial and intermittent streams, springs, and reservoirs. Livestock watering facilities were found throughout the Reservation, but the majority of spring developments were non-functional. Windmills were primarily non-functional, as were the majority of solar-powered wells. Most Range and Pasture Units rely entirely on intermittent and perennial streams and reservoirs for livestock water. Due to a lack of water sources, pastures are over-utilized around water sources and under-utilized 1.5 to 2 miles from water sources, and not utilized over 2 miles from water sources. Riparian areas were also overgrazed and often abused to the point of erosion and destruction of woody species.

3.2.1 *Hydrologic Setting*

The Missouri River borders the reservation on the south, Big Muddy Creek to the east, and Porcupine Creek to the west. Hydrologic conditions correlate to the state of rangeland health. Highly functioning plant communities under good management accompany sites with good hydrology. Canopy cover (grass, forbs, and shrubs) in such communities is greater than 90%. Plant cover and litter are adequate to optimize infiltration and minimize runoff and erosion. Sites in early or low seral states are generally considered to be in poor hydrologic condition.

3.2.2 *Fort Peck-Montana Compact*

The Fort Peck-Montana Compact, ratified by the Tribal Executive Board on April 29, 1985, is the governing document with respect to the development, diversion, and/or use or water within the Fort Peck Reservation. The Tribal Water Right grants the Tribes the right to divert annually from the Missouri River, tributaries, and groundwater beneath the reservation the lesser of (1) 1,050,472 acre-feet of water, or (2) the quantity of water necessary to supply a consumptive use of 525,236 acre-feet per year for the uses and purposes set forth in the Compact. The Tribal Water Right has a priority date of May 1, 1888 and is held in trust by the United States for the benefit of the Tribes.

The Tribal Water Right is one of the largest water rights in the United States on the Missouri River system while also being one of the earliest priority dates. These unique circumstances put the Tribes in a beneficial position with respect to development and beneficial use of water to serve tribal members and improve the agricultural economy on the Reservation. A large portion of the Water Right is being used to supply water for the Tribal MR&I Project as well as the Dry Prairie Rural Water Project located off the Reservation. Other large users of the Water Right are the Fort Peck Irrigation Project and private irrigation systems along the Missouri River.

The Tribal Water Code was developed through Resolution 993-86-5 to set in place a system for applicants applying for either ground or surface water rights within the Reservation under the Tribal Water Right umbrella. The Water Code also outlines provisions, procedures, and penalties for the reporting, documentation, and dispute resolution for all water rights within the Reservation. All permits and water rights applications and allocations are managed by the Tribal Water Resources Department. Moving into the future it is imperative that the Tribes implement a system to track and account for all water use on the Reservation to apply to the Compact. With large potential water development projects on the horizon and an elongated drought in the greater Missouri/Mississippi River Basin an accurate accounting of water will be imperative to maintain the current allocation in the Compact.

3.3 AGRICULTURAL RESOURCES

3.3.1 *Croplands*

Croplands comprise over 1.3 million acres within the exterior boundary of the Fort Peck Reservation. Broken into three distinct categories, croplands are identified as dryland, irrigated, or potentially irrigable land. Crops grown vary to an extent depending on the type of cropland but generally consist of small grains such as wheat and barley; lentils such as peas and beans; and forage crops such as alfalfa. The vast majority of cropland lies in the southern and eastern portions of the Reservation. Soils in these areas are generally better suited for crop production. Dryland acres are typically found off the Missouri River floodplain and in the elevated areas north of US Highway 2. Irrigated land is found along the Missouri River along the entire reach of the Reservation's southern boundary. Land identified as potentially irrigable is generally located in the southern and eastern corner of the Reservation along the Missouri River and Big Muddy Creek drainage.

Currently crop production makes up a majority of the local agricultural economy and drives a significant portion of the overall economy within the Reservation. Production of small grains, primarily grown on dryland farms, has steadily increased throughout the Reservation even as acres have been removed from production. Markets have remained relatively steady for small grains making that the primary crop produced. Increased production and the potential for an additional increase in production in the future have led to construction of a number of large grain terminals with unit train load-out capacity. Production numbers from the USDA National Agricultural Statistics Service in 2011 indicate that the Fort Peck Reservation and the counties it resides in was the highest producing area in Montana for spring wheat. Statistics from the USDA indicate spring wheat and small grain production are trending up on and directly adjacent to the Reservation.

Since the inception of the USDA's Conservation Reserve Program (CRP) over 200,000 acres have been signed up and removed from agricultural production. The CRP program paid landowners to remove unproductive fields or fields with poor or erosive soils from production and seed them back to native grass. The majority of acres signed up in the program remain in the program. Typically fields which have been enrolled in CRP remain in native grass and out of crop production even after they have left the program. These fields generally are used as range or pastureland after exiting the CRP program. Yearly signups and renewal cycles for land currently in the program make determining an exact acreage of land enrolled in the program different each year. CRP has had a drastic impact on agricultural production in the region through the removal of production acres however improved farming methods and increased efficiency have minimized the negative impact.

3.3.2 *Rangelands*

Range Units consist of multiple tracts of tribal and allotted land which have been put in Trust. These Trust tracts were grouped for land management purposes and are granted to lessees as single Units. A full map of the Range Units is provided in Appendix B. Rangelands have been grouped into 93 Range Units which comprise 371,062 acres of the Reservation. Most Range Units (91%) are 1,000 to 10,000 acres in size. Of these, 25 fall between 1,000 and 2,000 acres. The smallest Range Unit is 708 acres in size. The largest Range Unit encompasses 26,362 acres. Of the 93 Range Units, 26 include a single pasture. The remaining Range Units are divided into 2 to 13 pastures each.

Ranching makes up the second leg of the agricultural industry on the Reservation. Leasing of Range Units provides prime grazing for cattle producers through the summer months allowing a number of commercial cattle operations a place for grazing. Additionally, Range Units are used to operate the Fort Peck Tribal Ranch commercial cattle herd as well as the Tribal buffalo herd.

The Units are primarily leased by medium to large operations with herds well over 500 head. Most grazing permits are issued for 5.5 months, beginning May 15 and ending October 31. The lease agreements are 10 years in length and permit holders are required to maintain boundary and cross fences. At the time of the 2000-2001 inventory water developments and fence improvements were lacking and very few Range Units had grazing systems designed and/or implemented. Improvements to the Units have been made over the last decade but those improvements have been limited in nature and generally only occur if the lessee is enrolled in the NRCS EQIP program. In most cases the boundary fences on the Units are in poor condition and limited cross fencing is present.

In the 1980s, an extreme drought set back vegetative production and the rangelands have been experiencing gradual recovery ever since. To compensate for reductions in annual production, the BIA cut stocking rates in 1984 and reduced them again in 1988. Stocking rates have remained at reduced (1988) levels since that time. To properly manage rangelands, Tribal staff requested updated resource information. In 1996, the Fort Peck Tribal Department of Natural Resources contacted the Natural Resources Conservation Service (NRCS) Poplar Field Office with a request to complete a range inventory on 93 Range Units, encompassing 371,062 acres. This inventory was completed in 2001 and provided data for Range Units as discussed in this document. The original request for additional data grew into a comprehensive resource inventory of Range and Pasture Units for the entire Fort Peck Indian Reservation. The study and work done through this report have opened the possibility of increasing stocking rates on Range Units where it is determined to have no detrimental effect on the continued operational value of the Unit.

The various aspects and components of the Range Units in general and each Range Unit individually will be discussed in detail in subsequent sections of this report.

3.3.3 *Pasturelands*

Pasture Units are single-tract land classifications consisting of native grasses or alfalfa. Due to farm numbering practices by the BIA and FSA, multiple Pasture Units may have the same tract number, but one Pasture Unit is never comprised of more than one tract. Currently there are 2,315 Pasture Units throughout the Reservation ranging in size from one acre to 640 acres. In many cases Pasture Units consist of land which was once farmed and then reseeded to native grasses or alfalfa. The majority of the Pasture Units are not located in the hills or breaks but on more gradual and gentle lands.

Pasture Unit leases are granted on an annual basis and carrying capacity is determined by acreage as opposed to stocking rate as used on Range Units. Pasture Units are generally grazed or hayed depending on the operator. Due to the uncertainty of the short-term leases, permit holders generally stock Pasture Units to the limit and graze until the feed is gone, seeking a different Pasture Unit to lease the following year. There is little to no incentive for lessees to utilize proper grazing management procedures or invest in range improvements on the Pasture Units. Given the number of Pasture Units without functional fences and without water availability, it appears that many lessees utilize the Pasture Unit in conjunction with other property, either deeded or leased. Production from Pasture Units is limited and sporadic in nature due to the lease structure and volume of tracts to supervise.

Pasture Units are discussed in further detail in subsequent sections of this report.

3.3.4 *Timberlands*

Timberlands make up approximately 9,000 acres within the Reservation, primarily along the Missouri River floodplain and other major tributaries flowing through the Reservation. A Riparian Hardwood Inventory of the Fort Peck Reservation was completed in 1993 by a collaborative group of resource conservation organizations. The inventory was then used to complete an official Forest Plan which was adopted in March 2002 by the BIA and Tribes. Information regarding timberlands throughout this document primarily comes from the two documents referenced above.

Currently there is no commercial timber production occurring within the Reservation. Timberlands are used for hunting, firewood gathering, grazing, wildlife production, recreation, and cultural resources currently. The most common hardwood species is the plains cottonwood found primarily along the banks and floodplain of the Missouri River. Box Elder and Green Ash are also present but to a limited extent throughout the floodplains of the river and major tributaries. Timber harvest does occur on a small scale throughout the Reservation to provide firewood for tribal members. Timber harvesting on Trust and Tribal lands is monitored through a Timber Permit process administered through the Natural Resource Office.

Vegetation with the riparian hardwood forest on Trust lands is dominated by tall trees and tall shrub overstory. Medium height shrubs and native grasses make up most of the understory. Trees in the tall vegetation layer have an average canopy cover of 29%. Trees in the medium and short vegetation layers were less common, with 4 and 1% canopy cover, respectively. Shrubs had the greatest canopy cover of the four lifeforms on the Reservation having 12% canopy cover in the tall layer, 40% in the medium layer, and 13% in the short layer. Native grasses were not observed growing in the tall vegetative layer, but they had 26% canopy cover in the medium layer and 15% in the short layer. Forbs had the least total canopy cover of the four lifeforms, not being present in the tall layer, having 13% canopy cover in the medium layer, and 7% in the short layer.

3.4 LOCAL TRIBAL ECONOMY

3.4.1 *Agricultural Impacts*

The local economy on the Fort Peck Reservation and that along the Missouri River west of the Big Muddy Creek is heavily dependent on agriculture and agricultural production. The agricultural industry drives a majority of business within the region, whether it is direct agricultural production such as sale of commodities or in-direct transactions such as equipment, chemical sales, fuel sales, etc. Economic conditions in the area, with exception to oil production in far eastern Montana, largely follow the trends and market prices of the commodities produced in the area like small grains and cattle. New markets for agricultural production are present now within and around the Reservation.

Extensive research and investigation has been done on the potential for bio-fuels refining as well as high-value cash crop production within the Reservation. Emerging markets are largely still forage and feed based and marketed either locally or within Montana. Working with federal and state agencies, local farmers are now incorporating oil seed crops in their crop rotations in dry land applications. The Tribes is actively pursuing opportunities in bio-fuel production and have invested considerably in studying the potential for production within the Reservation boundary. Construction of a local bio-fuel refining facility would drastically change local agriculture markets and provide alternatives to local producers while encouraging oil seed crop production.

Two large grain unit-train elevators have been built within fifty miles of the Reservation. Both facilities were constructed due to increased demand for American small grains from foreign markets in Southeast Asia. North central and northeast Montana is currently targeted from increased production of small grains such as spring wheat and durum. Experts forecast small grain production from northeast Montana, including the Fort Peck Reservation, to continue to increase for the foreseeable with modifications in farming techniques.

3.4.2 *Current Agricultural Base*

Crop production within the Reservation primarily consists of small grains harvested from dryland areas. According to the USDA National Agricultural Statistics Service the geographic area including and surrounding the Reservation statistically ranks as the top producing area in Montana for hard red spring wheat. Winter wheat production in the same region also ranks amongst the top in the state according to the same source. Spring and winter wheat are the primary small grain crops produced through the Reservation with durum, barley and feed grains also contributing to small grain production.

Wheat prices have remained steady in recent years helping to maintain a stable market for commodities produced within the Reservation. Over the last decade droughts both in the United States and in other grain producing countries have caused both domestic and international grain markets to increase commodity prices due to shortages in supply. Overall, the northeast corner of Montana and the Reservation has been isolated from drought and has taken advantage of an increase in market prices. Production numbers have remained steady with moderate growth in the area however avenues to market are currently changing. Small local elevators are now being replaced with large scale commercial elevators capable of loading out 110-car unit trains for shipping. In the near future there will be five large commercial elevators operating either within the Reservation boundary or within a 25-mile radius. Market access for grain growers is currently at an all-time high for producers within the Reservation.

Pulse crops are currently used in rotation on dryland fields to rotate out wheat while allowing natural nitrogen infusion into soils. Peas, lentils, beans, and mustard are common pulse crops found on the Reservation. Generally harvested as seed crops, pulse crops have a limited market locally. Main markets for sale of these crops are elevators in central North Dakota and Great Falls, Montana. Shipping and transportation costs weigh heavily on pulse crops harvested for seed however in recent years market prices have maintained at levels sufficient to cover additional costs associated with bringing product to market. Peas and lentils are also hayed and used as feed for livestock herds in the area as well. The nutritional values of these crops make them a reasonable source of feed for wintering cattle herds in the area. Pulse crops continue to be a niche crop included in crop rotations in the area. A substantial increase in production of these crops is unlikely until markets or avenues to market are established closer to the Reservation. Until that time pulse crops provide as much or more value in the benefits they supply to soils when included in crop rotations.

Hay production has been a staple of crop production on the Reservation for decades. Alfalfa and grass hay make up the majority of hay produced within the Reservation and surrounding areas. Barley, oats, and millet are also grown for hay primarily to feed local herds of livestock through the winter. Alfalfa is the primary commercial hay crop produced on the Reservation and sold as high-quality feed for commercial herds. Droughts in other regions of the country have driven up

alfalfa hay prices over the past ten years. Local and regional commercial herds and feedlots have been the primary market for alfalfa hay. However dairy farms along the east coast and in the mid-east along with cattle and horse ranches in the southern US have become primary target markets in recent years. Premiums are paid for certified alfalfa hay and in some cases "pre-bloom" hay with increased protein levels. Native grass hay from Pasture Units, old CRP fields, and fields seeded to native grass make up a large portion of hay production on the Reservation. Grass hay is generally sold locally for livestock herds within or adjacent to the Reservation and not marketed on a large scale due to a lower nutritional quality. Grass hay is vital to commercial livestock herds, both large and small, within the Reservation to feed through the winter and spring.

Oil-seed crop production was once a viable market and maintained a measurable market share within northeast Montana and the Reservation. Markets however have retracted and contracting facilities for production acres have drastically reduced acres under contract. During the 70's and early 80's Culbertson operated one of the five oil seed crushing facilities in the US. Crops such as canola were locally grown supplying a large portion of the feed stock for the facility. However markets have changed and the Culbertson crushing facility has now been mothballed largely eliminating the market for oil seed crops in the area. As previously noted, the Tribes are actively pursuing bio-fuels production facilities to relocate on the Reservation. This will be discussed in more detail in subsequent sections of this document.

3.4.3 *Potential Markets*

Irrigation within the Reservation has created the potential for additional cropland markets within the area. Local producers and the Tribes have actively pursued additional markets. Because the largest production base is dryland production there are limitations for expansion of current markets.

Oilseed crop production is a potential market which the area has proven itself as a proven producer of such crops. Currently there is no active facility within 300 miles of the Reservation to market oilseed crops. Neighboring Canada continues to be one of the largest producers of oil seed crops such as canola and safflower in the world. Canadian production of oilseed crops generally results in exports to Asian markets for consumption or oil extraction. The US also imports oilseed from Canada to facilitate bio-fuel production along the west coast and in the Midwest. Few elevators in Montana buy and sell oilseed reducing market access for these crop in Montana. Canadian elevators in Saskatchewan actively market oilseed however exports fees, taxes, and transportation costs make it cost prohibitive for producers within the Reservation.

Currently tax incentives and public grant funding for crushing and refining facilities for bio-fuels are expiring and not actively being renewed. Focus in the US has shifted from bio-fuel subsidies to federal deficits and balancing the federal budget. Few facilities have been successful in the Rocky Mountain Region in attempting to process or produce bio-fuels. The Tribes have

identified a potential location for a bio-fuels facility east of Wolf Point near the Macon area where a previous refinery was located. Multiple private investors and companies have had discussions with the Tribes regarding the site and partnering potential in a refining facility. Due to regulatory restraints and emission limits interested parties and the Tribes have targeted a 20,000 barrel per day bio-diesel refinery for the Reservation. Because of the location feedstock for the facility is not the primary concern. Local and regional capacity for producing oilseed crops far exceeds the demand a facility of this magnitude would require. Additionally, proximity to Canadian markets also drives down the feedstock cost for a potential refinery. Potential off-take/sales markets are available for a bio-diesel facility located on the Reservation. Due to federal and tribal policy mandating the purchase of bio-fuels for vehicle operation if available, a significant volume of product would be purchased to serve the tribal and federal fleet. The Tribes have a unique opportunity to capitalize on bio-fuel production within the Reservation even with a shift away from federal subsidies. Location of the facility in a proven oilseed producing area, proximity to Canadian markets, and a substantial local sales market for bio-diesel make construction of a facility on the Fort Peck Reservation an attractive option. If developed this could open the door for hundreds of thousands of dryland production acres to have access to another product market. Introduction of a new oilseed market in the area would introduce millions of dollars into the local economy and substantially diversify the production abilities of local producers.

Croplands

4.1 DRYLAND

Dryland production accounts for the overwhelming majority of crop production within the Reservation. With over one million acres of active or potential production within the Reservation dryland farming makes up a majority of the local economy.

When the Reservation was established each enrolled member was allotted 120 acres of dryland production ground. The allotment was intended to be farmed by the allottee for production and consumption to support the family. Up until the last three decades these lands had been passed down from generation to generation and maintained in the original family. In most cases lands were left to multiple members of the family creating fractionated ownership on the majority of allotted acres. Over the last three decades there has been a shift from owner operated acres to either leasing or outright sale of allotted lands to both enrolled and non-enrolled members of the Tribes. Due to input costs and ongoing costs associated with farming, the majority of original allotted families now either lease their lands through the BIA or private leases. Larger operators now lease or control most farmable dryland acres and have incorporate them into large blocks to increase efficiency in farming operations.

Originally during the early 1900's nearly every farmable acre was broken up and placed into production. Productive and unproductive acres both were farmed for decades, eliminating native grasslands and vegetative cover for the soils. From this practice the region has suffered substantial losses in topsoil and degradation in overall soil health. Over the last three decades portions of the historically farmed dryland acres have been removed from production and returned to native grasslands through the USDA CRP program. The original goal of the CRP program was to reduce and minimize soil erosion created from farming practices in unproductive or highly erodible areas. Under the program landowners were paid to take land out of production and reseed it to native grasses, reducing the likelihood of erosion and restoring native habitat. Over the last two decades the USDA has maintained approximately 175,000 acres of CRP within the Reservation (data.gov, Sept 26, 2013). This trend has reduced the overall acres in dryland production within the Reservation however production has remained the same and slightly increased.

4.1.1 *Management Goals*

The overall goal in management of Tribal and allotted dryland acres is to improve the soil quality and stability so as to build a solid foundation for production into the future. The future of dryland production within the Reservation will rely in large part on the engagement of producers and the Tribes in actively promoting and engaging in Best Management Practices to improve soil health. Management goals laid out in this section reflect basic soil health improvement practices established by state and federal agencies. Due to the lack of cumulative data available the primary goal for the Tribes should be establishing baseline data for all Tribal and allotted tracts.

Much of the actively farmed dryland acres within the Reservation have experienced erosional degradation to the topsoil in some form. Topsoil depths in the northern half of the Reservation average approximately 3-6 inches in depth while averaging approximately 6-12 inches in depth along the Missouri River bottom and major tributaries. Erosion in most cases as left either clayey or sandy soils exposed for the receiving seed bed. In these cases reestablishment of topsoil will be an extremely lengthy process requiring implementation of multiple soil health BMPs.

Organic matter present in the soils has historically been low due to continuous cropping over the last two decades. Similar to topsoil organic matter present in soils is generally higher along the Missouri River bottom and major tributaries. The introduction of no-till farming practices have helped start to reverse the trend by allowing organic matter left post-harvest to decompose into the topsoil generating additional organic matter in the topsoil horizon. Methods such as chemical fallowing and reseeding into stubble are now being implemented in areas across the Reservation. Additionally, introduction of crop rotation plans and the inclusion of pulse crops or nitrogen infusing crops are methods promoted by state and federal agencies to increase organic matter as well as improve overall soil health.

A notable side effect from topsoil erosion is the increase in soil pH and alkalinity. Exposure of clayey soils in some areas has increased the presence of pH and alkaline afflicted soils. Clayey soils naturally retain more mineral deposits such as salts in rainwater or runoff due to the tight pore spaces in the soil. Additionally, clay soils create a natural capillary action with groundwater or subsurface moisture pulling water to the surface. Once water is pulled to the surface carrying the minerals or salts it retains the soils dry out and the remaining mineral salt deposits are left at the surface of the soil horizon or within the active root zone. High salt retention leads to high pH readings in soils and high alkalinity, both of which have a negative impact of the growth potential in the soils. Soil pH and alkalinity are crucial components to maintaining and improving soil health in dryland production acres.

Best Management Practices for use in dryland farming acres varies widely due to site conditions, soil conditions, and farming practices. For specific BMPs applicable to each tract it is recommended to engage the local NRCS soil conservationist for development of a comprehensive soil health improvement plan and farm plan. General BMPs available for implementation may include but are not limited to the following:

- Reduce tillage to protect existing soil organic matter
- Avoid soil compaction
- Implement cover crops for erosion reduction
- Develop comprehensive crop rotation plan for implementation
- Leave harvested crop residue for decomposition and organic matter improvement
- Manage pests and nutrients efficiently, avoiding overuse of chemical application
- Diversify cropping system by including pulse crops or nitrogen infusing crops

The techniques outlined above are applicable for both dryland and irrigated tracts within the Reservation boundary. Each tract is unique in its soil health and condition and should be evaluated and treated as such. The BMPs outlined are general improvement practices applicable to every tract, specific practices for each BMP suggestion can be developed to fit the site conditions. Coordination with NRCS staff for implementation of each BMP is suggested for maximum effectiveness and production increase.

4.1.2 *Management Issues*

Currently there is no active database or baseline data on soil quality and health for the majority of Tribal and allotted dryland tracts within the Reservation. Without the establishment of baseline data it is difficult to determine fair market value to set a baseline lease rate for these tracts. Existing lease rates are not based on soil type or soil quality to determine market value. This process has created an environment in which it is difficult to determine if the lease rate is

competitive or under market value. In a number of cases the lease rates for tracts is likely undervalued for the soil quality of the tract. Similarly, lessees have no basis to determine whether their lease rates are commensurate with the quality of the land. Lack of an outlined process for determining soil health and quality to set baseline lease rates is the primary management issue for Tribal and allotted dryland tracts.

There is no evaluation or enforced requirement for the submittal of a crop rotation plan or farm operations plan with the execution of a lease. Upon leasing a Tribal or allotted tract the lessee is not required to submit an approved or reviewed crop rotation plan for the tract for the first three years let alone the duration of the lease. No assurance is made that the operations of the lessee will not have a detrimental effect on the soil quality or health, effectively leaving a tract in worse condition reducing future lease value. Additionally, there is little tract history for the Tribes, allottee, or lessee to review crop rotations, farming practices, or potential pest or fungus problems. When a lease structure is driven by lease rate it often times has a long term detrimental effect to the overall soil quality and health. Acquisition of information and requirement of lessees to plan puts an impetus on evaluating and managing soil quality and health over the duration of the lease and for future lessees.

4.1.3 *Improvement Recommendations*

The following provides basic improvement recommendations which should be implemented by the Tribes and BIA to improve overall soil health and productivity of Tribal and allotted dryland tracts. These recommendations are not all inclusive however provide a general framework for implementing a beneficial program for improving soil quality.

- All dryland tracts would benefit from a baseline soil health scorecard being completed upon all new leasing of the tract. Each scorecard should be maintained on file with its respective tract for comparison of improvement or degradation of soil health upon termination of the lease.
- Incentives should be considered for inclusion in all new leases for implementation of soil health BMPs to improve the overall soil health upon termination of the lease. Incentives could include the following:
    - Lease payment reductions
    - Lease term extension options without competitive rebid
    - Preferred lessee status with the Tribes for other lands (This would require negotiation with BIA staff and potentially Resolution action to develop.)
- Require or incentivize completion of a farm management plan by each lessee which would include:

  - Soil health baseline development
  - Development of soil health BMP plan to be implemented over the duration of the lease
  - Crop rotation plan outline over the duration of the lease
- Require completion of a soils health scorecard prior to termination of all leases.

Implementation of a Soil Health Scorecard Program with the lease program should be of highest priority and the easiest to implement. Gathering baseline data on each dryland tract can only be done with the cooperation of the lessee and operators within the Reservation. Coordination with the lessee on the completion of the scorecard both prior to leasing and upon completion of the lease will help establish a soil quality data base which can be monitored and used for targeted approaches to soil health improvement. The information collected should be maintained on record with each tract so it can be used to value the productivity of the land and determine baseline lease rates at fair market values. It is important to consider an incentive program to get buy-in from lessees and participation in the data collection. A copy of the Soil Health Scorecard developed by local NRCS soil conservationists is included in Appendix C.

4.1.4 *Areas of Interest*

At this time there are no specific areas of higher importance within the Reservation boundary. Improvement to soil health will be beneficial to allottees and the Tribes regardless of the location. At which time future market opportunities are developed, specific areas of interest targeted for improvement may develop. This section of the document should be revisited and revised upon the development of alternative markets for dryland producers such as oilseed or pulse crop seed.

4.2 IRRIGATED

Irrigated acres account for only a small portion of the total Tribal and allotted tracts. Irrigation is limited to the areas along the Missouri River bottom along the southern boundary of the Reservation. Currently the only irrigated Tribal and allotted tracts are located within the Fort Peck Irrigation Project (FPIP). There is no current irrigation in place on individual Tribal or allotted tracts outside of the FPIP boundary.

When the Reservation was established each enrolled member was allotted 40 acres of irrigable acres. The allotment was intended to be farmed by the allottee for production and consumption to support the family. These tracts traditionally have been passed down from generation to generation and maintained in the original family. Again most tracts were left to multiple members of the family creating fractionated ownership on the majority of allotted irrigable acres. A large percentage of irrigable tracts have been sold by allotted members over the last two decades to non-tribal operators. The Tribes have actively engaged in reacquiring fee lands within

the Reservation boundary, especially within the FPIP. The Tribal Farm and Ranch owns a significant block of land within the FPIP which it irrigates to raise alfalfa and grain feeds for the Tribal livestock herd.

The FPIP was built by the BIA and put into operation in the 1930s in concert with the construction of the Fort Peck Dam. Because the dam drastically changed the natural spring floods that irrigated the bottom lands within the Reservation the FPIP was built to create irrigation to benefit the Tribes and its enrolled members. The FPIP is a 21,000 acre gravity irrigation system with two large pump stations, one located at Frazer and one at Wiota. The Frazer Unit consists of approximately 13,000 acres while the Wiota Unit consists of approximately 8,000 acres. The FPIP was built as a flood irrigation system using contours to irrigate each field. The irrigation delivery system has had significant improvements but little since the 1980s when the pump stations were upgraded. Irrigated tracts within the FPIP have in large part been improved through land leveling and gated pipe installation. However, the vast majority of Tribal and allotted tracts leased within the FPIP have not been improved since its construction. These tracts are typically contour flood irrigated with native grasses or alfalfa in production. Some tracts are either not irrigable or aren't currently irrigated due to their condition and lack of production.

4.2.1 *Management Goals*

The overall management goal for irrigable Tribal and allotted tracts within the FPIP is to improve the land value by improving on-farm irrigation for each tract. Whether you're inside or outside of the Reservation boundary irrigable land demands premium lease rates in northeast Montana. Irrigable acres are few and far between and have the potential for producing high yields and high value crops. The soil quality and soil health is generally high for Tribal and allotted tracts within the FPIP however the on-farm infrastructure and portions of the delivery infrastructure are in severe disrepair.

The FPIP has taken an active role in improving deteriorated portions and sections of the delivery system. Over the last six years over $1.5 million dollars has been spent on repairing structure, upgrading pump stations, and lining delivery canals. However, the deferred maintenance estimate remains in excess of $50 million dollars for the delivery system. Pump station improvements were completed in 2013 ensuring a reliable delivery source for the foreseeable future. The delivery system remains operational and in fair condition in most areas. Turnouts and headgates to fields, particularly to Tribal and allotted tracts, are in fair to poor condition and in need of replacement. Drains gathering irrigation runoff are overall in poor condition with ponding and clogging being prolific in the Frazer Unit. The FPIP has started a maintenance and replacement program for culverts and field turnouts. Additionally, delivery improvements such as canal lining are taking place. Improvements to the FPIP infrastructure are crucial to on-going success and continued operation of irrigated lands. Due to the increasing deferred maintenance

budget it will be impossible for the FPIP to bring the system to good condition without substantial infusions of Federal money.

Over the last twenty years substantial improvements have been made in on-farm irrigation within the FPIP. In some cases lessees have leased Tribal or allotted ground and paid for on-farm improvements such as land leveling, delivery improvements, and drain improvements. These leases have resulted in idle tracts not only becoming productive but an overall increase in the land value due to irrigation improvements. Lessees have used the NRCS EQIP program to cost share on-farm improvements and offset the capital cost associated with improving the lands. EQIP dollars are available for on-farm improvements with a cost share of 50/50 matching contribution. Specific Indian Earmark set-aside funds are available through EQIP to reduce the competitive pool and fund improvements on Tribal and allotted lands. However in recent years producers have turned away from leasing idle tracks and using the EQIP program to fund improvements due to two factors. The first factor is the increased cost of construction and capital requirements for the remaining tracts. The remaining idle tracts are generally the worst remaining and require the most capital infusion to implement land leveling or irrigation improvements. Secondly, the Tribal lease program will only issue a ten year maximum lease making it difficult to recoup the capital outlay and make profit on the tract. The combination of these two factors has created an environment in which lessees are cautious of undertaking the task of improving the remaining unimproved and idle tracts.

4.2.2 *Management Issues*

There are currently no incentives in place to attract lessees to lease idle tracts within the FPIP and carry the capital cost for improvements. Lessees have moved away from the lease and improve model due in large part to the Tribes limiting the lease period to a maximum of ten years. Capital cost models for implementing on-farm improvements show that it takes 7-8 years before the debt service on the capital outlay is paid. That leaves only two to three years remaining for profitability on the tract. Once the term of the lease expires there is no further guarantee that the operator who paid for the improvement will be able to secure the lease again to make profit from his capital investment in the tract. This uncertainty has all but halted an operator from investing significant capital in idle Tribal and allotted tracts.

Currently the lease process allows for hay permits on idle tracts within the FPIP. These hay permits allow an operator to select tracts with good stands of native grass, lease them for one season at markedly low rates, and hay the tract with no long term commitment. The current system encourages operators to seek out idle tracts and make short term gains without investing in the long term operation of the tract. With no obligation for future years operators are allowed to make management decisions which at times have a detrimental effect on the tract and its value in future years. The program short-circuits the leasing process and allows for poor stewardship of the land without penalty.

The Tribes do not have a program in place to assure that each Tribal and allotted tract within the FPIP has the headgate opened and irrigation run at least once each season. To qualify for NRCS EQIP funding the applicant is required to prove that the tract has been irrigated at least two of the last five years. Because many of the remaining Tribal and allotted tracts have been idle for years it will be nearly impossible to prove irrigation history and qualify for EQIP funding for on-farm improvements. Without EQIP funding the capital cost exceeds the ability of an operator to recoup his investment and make a return on that investment. Record keeping of irrigation history of each tract and the annual application of water to each tract is imperative for the future use of EQIP funding to improve the value and productivity of Tribal and allotted tracts within the FPIP.

4.2.3 *Improvement Recommendations*

The following provides basic improvement recommendations which should be implemented by the Tribes and BIA to improve the value and production of the irrigable Tribal and allotted tracts within the FPIP. These recommendations are not all inclusive however provide a general framework for implementing a beneficial program for improving idle tract values.

- Modify the Hay Permit process to require an operator to sign a minimum of a three year operational permit.
- Incentivize lessee investments in idle tracts to improve on-farm irrigation infrastructure. These incentives could include the following:
    - Lease payment reductions
    - Lease term extension options without competitive rebid
    - Implementing a 15-year lease term for idle tracts planned for improvement
    - Preferred lessee status with the Tribes for other lands (This would require negotiation with BIA staff and potentially Resolution action to develop.)
- Implement and idle tract operations program in which every Tribal and allotted idle tract is irrigated or attempted to be irrigated a minimum of one time each irrigation season.
- Implement a field headgate and field drain culvert replacement program. Replace each field headgate and drain culvert during construction work on adjacent canals and laterals.

4.2.4 *Areas of Interest*

The entire FPIP, shown on Exhibits 1 and 2, has been identified as an area of interest in the existing Tribal Land Acquisition and Consolidation Plan adopted by the Council in 2012. Because irrigable land is valuable in the region the Tribes are focused on improving the operation and condition of the FPIP and tract within it. Working with the BIA and local water users, the Tribes are actively engaging in implementing infrastructure improvement projects throughout the FPIP. The Tribal Farm has implemented numerous on-farm improvements and

turned what was an undervalued portion of the FPIP into one of the most productive areas within the system. Using that same process and methodology the Tribes intend and should focus on slowly working through the remaining idle Tribal and allotted tracts within the FPIP. These tracts are the easiest areas within the Reservation to improve land values and revenue generation due to their access to irrigation water. Additionally, with the use of the NRCS EQIP program and other state funding sources there is funding available for completion of these projects at reduced costs.

4.3 POTENTIALLY IRRIGABLE

The Reservation has a number of potentially irrigable acres within its boundary along the Missouri River. Currently all potentially irrigable acres are either dryland farmed or covered in timber. Acres identified as potentially irrigable are typically within a two mile radius of a stable and consistent water supply which can be accessible for irrigation. With the Missouri River serving as the southern boundary of the Reservation nearly the entire southern portion of the Reservation falls within the potentially irrigable buffer zone.

As discussed in previous sections the FPIP is located in the western portion of the Reservation serving essentially Wolf Point all the way west to Nashua. Substantial private irrigation has been developed by enrolled families along the Missouri River southwest of Poplar and more south east of Brockton developed by non-enrolled members. The remainder of the Missouri River bottom remains dryland farmed or leased to local operators. Soils along the river bottom are generally in good condition and consist of silty clays or silty sands. Production in these areas is above average for dryland production in the same area outside of the irrigable buffer. This in large part is due to improved soil condition and soil health. Areas within the irrigable buffer are the highest in demand for leasing within the Reservation due to their production under dryland conditions.

After construction of the Fort Peck Dam the State of Montana and the Fort Peck Tribes entered into the Fort Peck Tribes-Montana Water Compact. The Compact grants the Tribes a water right of up to two million acres-feet of instream flow from the Missouri River. The water outlined in the Compact is intended for use in municipal water supply, irrigation, supply to the FPIP, and water rights for enrolled members. It's managed by the aggregate amount of water used by the Tribes or enrolled members within the Reservation boundary. Currently there is no accurate estimation of the volume of water used by the Tribes and its members. The Tribes have not accurately accounted for all water development within the Reservation and the aggregate water use. The Tribal Water Resource Office is developing a water rights tracking and monitoring program to determine the amount of water currently used under the Compact and the volume of water remaining for additional development. This information will be vital to the Tribes in pursuing future irrigation development within the Reservation boundary.

Potentially irrigable acres, in aggregate, have the potential to dramatically increase the local economies on the Reservation if developed. Acres are currently leased at dryland rates and produce slightly above average dryland production rates. Development of irrigation on an individual tract can increase its value and lease rate nearly threefold. Additionally, irrigation will increase the productivity of the tract up to fourfold. The increase in both lease rates and production would have a measurable positive impact on the Tribes and the local economy.

4.3.1 *Management Goals*

The overall goal on potentially irrigable lands is to systematically develop new irrigation and improve the value of Tribal and allotted tracts in the areas identified. Irrigation development in the areas identified will not only increase land values but also agricultural production in the area.

4.3.2 *Management Issues*

The primary hurdle for future irrigation development on potentially irrigable lands is the severe fractionation of ownership in allotted lands. As discussed in previous sections fractionated ownership has become prevalent in allotted lands. Generations have passed in which owners have passed land down to their kids and now those kids have passed it down to their kids. In some extreme cases one forty acre tract can have up to fifty listed owners. For the BIA and Tribes to act on behalf of the aggregated ownership group of that tract at least 51% of the ownership stake must agree and sign over authority to the Tribes for management and operation. In most cases this fractionated ownership stretches not only off the Reservation but typically out of the State making acquiring the necessary approvals and signatures from owners extremely difficult. The Tribes have and are exploring options for making management decisions on behalf of owners of fractionated tracts however the legal hurdles associated with the process have been difficult. The Tribes has explored outright purchase of fractionate tracts as well. Purchase of these tracts provides a number of benefits, not the least of which is a clean title. However purchase of each fractionated tract within the potentially irrigable areas is not likely leaving the same problem to manage. Until the BIA and Tribes develops a legal procedure to make decisions on behalf of ownership of fractionated tracts it is unlikely that further irrigation development will occur.

4.3.3 *Improvement Recommendations*

The following provides basic improvement recommendations which should be implemented by the Tribes and BIA to improve the potential for future irrigation development of Tribal and allotted tracts. These recommendations are not all inclusive however provide a general framework for implementing a beneficial program to move towards future development.

- Actively encourage enrolled members to purchase fractionated tracts.

- Pursue Tribal acquisition of fractionated tracts in the North Sprole and Fort Kipp project areas.
- Work with the BIA to develop a management strategy for decision making authority for fractionated tracts.
    - May include setting a benchmark for fractionation at which point the BIA and Tribes determines that the aggregated ownership cannot make educated decisions.
    - May be triggered by lack of ownership activity in management decisions for the property over a set period of time or idle tract stance for a set duration to trigger Tribal management control.
- Incentivize investment from enrolled and non-enrolled members alike in irrigation development. Those incentives may include but are not limited to.
    - Increased lease terms
    - Priority status for release of the property or lease extension options
    - Reduction in lease rate during irrigation development and for the first five year of operation under irrigation

4.3.4 *Areas of Interest*

The Tribes have investigated two large areas for potential irrigation development on the eastern end of the Reservation. The North Sprole Irrigation Area and the Fort Kipp Irrigation area have been targeted by the Tribes and local operators as prime areas for irrigation development. Exhibits 3 and 4 show the locations of the areas of interest and the theoretical boundaries each project would have. Preliminary studies have been completed on both sites with Engineer's Estimates of capital costs and life cycle costs. Both areas meet the criteria for potentially irrigable land and currently experience above average yields under dryland production due to soil quality and health.

The North Sprole Irrigation Area is located between Poplar and Brockton with the north and south boundaries being the Missouri River and US Highway 2. Extensive research and preliminary work has been completed on the potential project. The layout is proposed to consist of over forty irrigation pivots and pipeline supply networks feeding the system. Two pump station sites were proposed off of the Missouri River to potentially feed the system. The area would be run and the irrigation system managed by the Tribes allowing local operators to lease acres irrigated under pivot. The project has stalled out due in part to the capital cost of building the system. The Tribes at this point do not have the capital to fund a project of this nature and have not found a suitable private partner to work with in developing the area. This area is of high importance for future development of agriculture within the Reservation and is high on the priority list for implementation by the Tribal Council.

The Fort Kipp Irrigation Area is located south to southeast of Fort Kipp on the far eastern boundary of the Reservation. This project was investigated in 2011 with a private irrigation development company, Agri-Industries from Williston, ND. The proposed layout consisted of 10-12 pivots supplied by a central pipeline system with one pump station site along the Missouri River servicing the system. Similar to the North Sprole project the system would be operated by the Tribes and irrigated acres would be leased to local operators under a competitive lease process. The original structure of the project with Agri-Industries involvement would have had Agri-Industries financing the pivots for the Tribes with eventual transfer of ownership to the Tribes after debt service was paid. The project eventually was tabled due to the difficulty in gathering the volume of signatures for the fractionated ownership of the allotted tracts included in the project. The project still remains viable and is of high priority to the Tribes however until issues with fractionated ownership of the land can be resolved its completion will be difficult.

Rangeland

5.1 OVERVIEW

5.1.1 *Land Cover/Use and Ecological Sites*

The two land unit types inventoried for this study were Range Units and Pasture Units. Range and Pasture Units are vastly different in size, type of use, and maintenance. Whereas Range Units are generally large expanses of rangeland, capable of sustaining livestock herds for an entire grazing season, Pasture Units are more localized and purpose-specific plots of land. Range Units on the Fort Peck Reservation range in size from 708 to 26,362. Pasture Units range from less than an acre to 640 acres.

Pasture Units are single-tract land classifications. Multiple Pasture Units may have the same tract number, but one Pasture Unit is never comprised of more than one tract. Pasture Unit leases are granted on an annual basis and carrying capacity is determined by acreage as opposed to stocking rate. Due to the uncertainty of the short-term leases, permit holders generally stock Pasture Units to the limit and graze until the feed is gone, seeking a different Pasture Unit to lease the following year. There is little to no incentive for lessees to utilize proper grazing management procedures or invest in range improvements on the Pasture Units. Given the number of Pasture Units without functional fences and without water availability, it appears that many lessees utilize the Pasture Unit in conjunction with other property, either deeded or leased.

5.1.2 *Woodlands*

Woodland canopy was reported in the Pasture Unit study, but excluded from Range Unit reports. In total, 10,144 acres of woodlands were mapped in Pasture Units. All woodlands occurred along the Missouri River. About 76% of these acres were mapped as “light canopy” with a suggested

stocking rate of 0.35 AUMs/acre. Remaining acres were mapped as "heavy canopy" with a suggested stocking rate of 0.25 AUMs/acre.

Many of the woodlands were not grazed by livestock. Woodlands mapped as "heavy canopy" were often unfenced and did not have livestock water developments. Most of the woodland units that were grazed by livestock were grazed during the winter months. These units were often contiguous along the river, with a fence separating them from cropland to the north. Livestock usually had access to the river for water. Cottonwoods, ash trees, and buffaloberry provided excellent shelter for livestock. Smooth bromegrass was the dominate grass species in the woodlands. In 2007, bromegrass production approached 6,000 lbs/ac on woodland acres, but this value may have been artificially high due to abnormally high production in 2007.

5.1.3 *Fence Conditions*

1,631 miles of fence were recorded over the course of the three-year inventory of Pasture Units. Fence lines were plotted by driving Pasture Unit perimeter on an ATV and logging points through GPS. An average of data from the two study periods revealed that most (75%, 1,218 miles) of the fence lines are in fair condition, with only 15% (248 miles) in good condition and 10% (165 miles) in poor condition. Classifications were based on visual observation of the fence. The classification "good" refers to fences with at least four tight strands of barbed wire and solid fence posts. A fence in good condition was presumed to be cattle-tight. "Fair" condition refers to fences that could be improved, but are capable of retaining cattle under normal grazing conditions. "Poor" condition fences are characterized by broken-wire and fallen posts. "Poor" condition fences would not hold cattle under normal grazing conditions. Some Pasture Units have good fences on three sides and a dilapidated fence (with open gates) on the fourth side. In such situations, it is presumed that the neighboring land owner or lessee shares forage or water across property boundaries. Some Pasture Units are also inclusions in large pastures or fields and are not fenced from adjacent property.

The percentage of fences in "good" condition was notably higher in the 2006-07 inventory than the 2005 study. This is believed to reflect differences in evaluation by data collectors rather than any significant difference in fence quality from the eastern to western portion of the Reservation. Fence data from the 2005 and 2006-07 inventories is available in chart form on page 15 of the 2006-2007 Pastureland Inventory (Lacey & Ayers 2007). Page 14 of the same document provides a map of the Reservation with the distribution of fence lines.

The percentage of fence types was not reported in 2005. In the 2006-07 inventory, data collectors found that 98% of the 835 miles recorded was barbed wire fence. The remaining 2% consisted of electric fence. Although less than 15 miles of electric fence were mapped, many miles of electric wire were found lying on the ground or hanging from old barbed wire fences. Woven wire (net-

wire) fencing was uncommon and occurred only in short reaches. Generally, woven wire was used to reinforce existing barbed wire fences near corrals or working pens.

Fence lines in the Range Units were recorded on the maps at the end of the Unit Profiles. Total miles of fence were not reported, nor were the fence types or conditions of fences. Data collectors in Range Units reported, frequently, that cross fences would allow for better rangeland management practices, primarily in helping to implement a rotational grazing system. In Range Units where cross fences were in place, it was often reported that gates were left open to allow livestock to utilize water from adjoining pastures.

5.1.4 *Water Developments*

Water availability is a limiting factor on most of the Reservation. In both Range and Pasture Units, land degradation was reported around water sources and lack of water developments restricted the use of some grazing units. Some operators have compensated for water deficiencies by hauling water to their livestock.

Approximately 353 water developments were recorded on Pasture Units. Developments consisted of 152 reservoirs/stock dams, 82 stock tanks and troughs, 51 wells, and 67 other improvements. The breakdown of water developments in Pasture Units is available in more detail on page 17 of the 2006-2007 Pastureland Inventory (Lacey & Ayers 2007). The condition of water developments was also recorded in 2006-07. Over half of the water developments were reported as fair or poor condition. A map showing the distribution of water sources in Pasture Units across the Reservation is available in the 2006-2007 Pastureland Inventory, page 18. During both the 2005 and 2006-07 contracts, some potential water sources were not mapped because of the difficulty in determining their reliability during dry years.

Water availability impacted season of use and livestock distribution in most Range Units. As range trend information shows in the Range Unit Profiles, pastures are being abused around water sources and under-utilized where feed is greater than 1.5 miles from water. Six of the Range Units are enrolled in the Environmental Quality Incentives Program (EQIP). These Range Units have water developments in place, are currently developing water sources, or have plans to develop water. Several Range Units have nonfunctioning tanks, reservoirs, wells, and/or windmills in place.

Grazing capacity in the Range Units was calculated with and without additional water development. In some cases, the grazing capacity of the pasture was predicted to more than double with additional water sources. By developing water sources such that livestock are always within 1.5 miles of water, grazing distribution will be improved, decreasing the occurrence of localized over and under-grazing.

5.1.5 *Season of Use*

Range Units receive seasonal use. 73 of the 93 Units are grazed 5.5 months per year. One Unit is grazed for ten months consecutively and this unit is degraded from the near-constant use. Five units are grazed for less than five months per year and four are grazed for more than six months. For most units (65 of the 93), the season of use extends from May 15 to October 31. Lessees in eleven units turn livestock out between March 1 and May 1. Thirteen lessees turn livestock onto their units between May 25 and June 5. One lessee turns livestock out on August 23. All livestock are out of the Range Units by November 30, with the exception of the 10 month season of use lessee who runs from May to March. Eleven lessees remove livestock from the Range Units between mid-August and October 31.

5.2 STUDY RESULTS AND DISCUSSION

5.2.1 *Similarity Index*

Similarity index to historic climax plant community is defined as the present state of vegetation on an ecological site in relation to the historic climax plant community for that site. It is expressed as the percentage, by weight, of the historic climax plant community present on the site. The similarity index to historic climax provides a measurement of change that has taken place on a site. It is the result of how climate and management activities have affected the plant community on a site (NRCS 2003).

Similarity indices averaged 38% on the Range Units. A detailed account of similarity indices for each ecological site is provided (by Unit) in the Range Unit Profiles.

Similarity indices were comparable in Pasture Units across the Reservation. More than 64% of the acres inventoried across the Reservation had similarity indices of less than 35%. Only a small portion of the acreage of Pasture Units (10-17%) reported similarity indices over 45%. No acres were inventoried with a similarity index greater than 75%. The divergence of the present plant communities from the historical climax plant community (HCPC) raises a serious concern.

Similarity indices are higher on steep (run-off) sites than gently sloping (normal and run-in) sites. This disparity is believed to be due to higher livestock use on gently sloping sites and lesser use on steep sites. Soil moisture availability is higher on run-in and, to a lesser extent, normal sites than on run-off sites. Increased soil moisture allows plants to retain a heightened level of moisture in their tissues for a longer period during the growing season. Livestock prefer these more palatable plants, particularly later in the grazing season when the steeper sites are drying out. Even early in the growing season, livestock, particularly cattle, will avoid steeper terrain. Additionally, water developments on the Reservation rarely occur on run-off sites. Most are located in coulees or on normal sites.

The disparity in similarity indices between normal and run-off sites indicates that current livestock grazing programs are adversely impacting rangeland. Available data suggests that past and present land management practices have and are adversely affecting the HCPC in many of the Range and Pasture Units.

5.2.2 *Forage Production*

Total annual production averaged 789 lbs/ac on Range Units.

Production was lowest on dense clay sites and highest on wet meadow and overflow sites. Forage production includes only the portion of the total plant production that livestock eat. Annual forage production values followed total annual production, except on wet meadow and overflow sites. The presence of snowberry on these sites greatly decreased the pounds per acre of available forage. Annual forage production on Range Units averaged 652 lbs/ac during the study period.

Forage production was generally lower on the Pasture Units than on the Range Units. Average annual forage production on Pasture Units was 907 lbs/ac across all sites. The weighted average for annual forage production on Pasture Units was 941 lbs/ac. Forage Production on most of the Pasture Units is estimated to be at 1/3 to 1/2 of its potential.

5.2.3 *Rangeland Health*

The 17 indicators of rangeland health (USDI and USDA, 2000) were evaluated at each of the sampling locations by comparing "on site conditions" with the conditions described in the NRCS's Ecological Reference Area Worksheets.

58 of the 93 Range Units included rangeland health summaries. Of these 58, most (81%) had a degree of departure from the ecological site descriptions of "none to slight" for soils. Hydrology was slightly worse, with 67% of the Range Units recorded as having a degree of departure of "none to slight." The remaining 33% had a "slight to moderate" degree of departure. Of the three factors, biologic health was worst. Only 17% of the 58 Units studied had a degree of departure that was "none to slight." Most (71%) had a degree of departure of "slight to moderate" and 12% had "moderate" departure from the ecological site description.

In most Pasture Units, the degree of departure from ecological site descriptions and/or ecological reference areas was "none to slight" or "slight to moderate" for rills, water flow patterns, pedestals, bare ground, gullies, wind scouring, litter movement, soil surface resistance to erosion, soil surface loss, compaction layer, plant mortality/decadence, litter amount, and invasive plants. However, degree of departure from ecological site descriptions and/or ecological reference areas were frequently "moderate to extreme" or "extreme" for plant community composition and distribution relative to infiltration and runoff, functional/structural groups, annual production,

and reproductive capability of perennial plants. The "moderate to extreme" departures in the western ½ of the Reservation were largely attributed to the dominance of dense clubmoss and blue grama. The "moderate to extreme" departure in the eastern ½ of the Reservation was more often attributed to the loss of a significant functional group (such as tall, cool-season bunchgrasses) or a decline in total herbage production, than to dense clubmoss coverage.

5.2.4 *Trend*

The direction of change in ecological status observed over time is an extremely critical consideration in pasture and rangeland management on the Fort Peck Reservation. Trend allows managers to adapt practices, based on potential future changes, to meet long-term objectives. Trend requires data and/or observations at two or more points in time. Because trend is calculated in this report based on data and observations made at a single inspection, it should be considered "apparent trend."

Trend on 61% of the Pasture Units in the eastern 1/3 of the Reservation and 58% in the western 2/3 was not apparent. In the Range Units, trend was not apparent on approximately 75% of the acres. Apparent trend was moving away from the historic plant community on 36% of the Pasture Unit acres in the eastern 1/3 of the Reservation, 7% in the western 2/3, and 6% of the Range Unit acres. Apparent trend was moving toward the historic plant community on 2% of the Pasture Unit acres in the eastern 1/3 of the Reservation, 35% in the western 2/3, and 19% of the Range Unit acres.

Limited herbage production, lack of litter, and a loss of tall bunch grasses from the plant community are major concerns in many pastures.

5.2.5 *Suggested Stocking Rates*

Stocking rates were calculated for each tract and ecological site within each Range Unit and each ecological site within each Pasture Unit. Ecological site and rangeland health impacted stocking rates. Rates were highest for overflow and wet meadow sites. Generally, higher stocking rates are expected on normal sites (clayey, silty, and sandy) and lower rates are expected on run-off sites (steep, dense clay, gravel, and shallow).

Pasture Unit data may deviate from normal test samples due to a different sampling protocol. Study plots and transects were located in areas of light grazing, which tended to be higher on steep and shallow sites. Normal sites were typically more heavily grazed.

Suggested stocking rates in 2006 and 2007 tended to be slightly higher than the suggested stocking rates made in 2005. The lower stocking rates in 2005 may be a reflection of higher clubmoss densities that occur in the western half of the Reservation. Suggested stocking rates are based on a one-time appraisal of vegetation and soil conditions. They should be treated as

starting points and adjusted over time using additional data. Stocking rates for Pasture Units were calculated by ecological sites. One Pasture Unit may contain numerous stocking rates pertaining to different sites within the boundary. These stocking rates and total AUMs per Pasture Unit can be found in Appendix D: Excel workbooks "Pasture Units 2005" and "Pasture Units 2006-2007."

5.2.6 *Range Improvements*

Range improvements (fences and water developments) were sparse on Range and Pasture Units throughout the Reservation. Some lessees on Range Units are enrolled in the Environmental Quality Incentives Program (EQIP) and have made or are making improvements through the NRCS's help. Because Range Units are leased under a ten-year contract, lessees have more incentive to improve and manage their leased grounds than lessees of Pasture Units.

5.2.6.1 *RECOMMENDATIONS*

- Both Range and Pasture Units would benefit from an increased investment in fence and water maintenance and development.
- Fences are needed to control the timing, distribution, and number of livestock grazing per pasture. Most Range Units have operable boundary fences, but lack sufficient cross-fencing to allow for a rotational grazing system.
- Pasture Units are often included in other property and have no boundary fences or have dilapidated fence lines. Pasture Unit lessees indicated that the current leasing situation is not conducive to fence maintenance and construction.
- Water developments, like fences, would improve livestock grazing distribution and allow regions where water is a limiting factor to be grazed during various seasons and for longer periods.
- Additional water developments are needed to facilitate a livestock grazing program. However, as with fences, lessees on Pasture Units lack incentive to invest private capital in constructing additional water developments on Tribal lands.
- Increasing the length of Pasture Unit leases to at least 5, and preferably 10 years, would increase incentive for investing in and maintaining improvements.
- Lease incentives or cost shares to lessees who build or maintain improvements could also provide the necessary impetus for range improvements.

5.2.7 *Noxious Weeds*

Noxious weeds were far more common in the Pasture Units than the Range Units. There may be several explanations for this difference. Pasture Units are smaller, disjointed, and scattered across the Reservation. Many of the Pasture Units border and/or include roads, public areas, and buildings. These high-use areas have greater exposure to noxious weed contamination and, due to degradation, higher susceptibility. In addition, the small size of Pasture Units allowed data

collectors to check each Unit more thoroughly for noxious weeds. Data collectors working in the Range Units were less likely to discover all of the noxious weed patches in the Unit while running transects.

Noxious weeds appear to be an increasing resource problem. Canadian thistle was the most commonly occurring noxious weed, with a particularly large infestation in Tract T268 (Chelsea SW Topoquad). Most of the 108 patches of Canadian thistle recorded in Pasture Units were on overflow sites or along the edges of cropland.

Leafy spurge patches were found in 49 locations within the Pasture Units and 6 locations in the Range Units. Although most patches were relatively small and could be effectively controlled with an herbicide treatment program, the infestations along the Poplar River (in Windy Butte Topoquad) are extremely serious. Most of the infestations did not appear to have been treated.

5.2.7.1 *RECOMMENDATIONS*

- For effective weed control, the Fort Peck Tribal Natural Resource Department should map the locations of all noxious weeds and develop a Noxious Weed Management Plan. In addition to the map, the plan should include strategies for controlling infestations.
- A noxious weed education awareness program should be initiated and/or strengthened.
- Cost share programs to assist weed control efforts by lessees and private landowners should be evaluated on a species-by-species basis.
- The advantages and disadvantages of contracting noxious weed control programs with independent contractors and/or surrounding counties should be evaluated with respect to a noxious weed control program implemented and conducted by the National Resources Program Office.
- It may be beneficial for the department to establish, build, fund, and operate its own noxious weed program.

5.2.8 *Dense Clubmoss*

Dense clubmoss (*Selaginella densa*) is a native, perennial, evergreen forb of the spike moss family. It forms dense mats that are generally less than one inch in height. Clubmoss, a pteridophyte, reproduces by spores, rather than seeds. Its root system is shallow, but extensive, and allows the plant to absorb most of the moisture from storms with ¼ inch or less precipitation (Lacey & Ayers 2007; Lacey et al. 1995). Distribution of clubmoss ranges from the Alaska panhandle to northwest California and east to the Dakotas. It is most common on the mixed-grass rangeland of Montana, Alberta, Saskatchewan, and North Dakota (Brewer 2005).

Dense clubmoss has no forage value for livestock and little to no forage value for wildlife (Crane 1990; Lacy et al. 1995).

Heavy infestations of dense clubmoss create barriers on the soil surface that inhibit water infiltration, forage yield, and biological diversity. Clubmoss impedes plant succession by limiting the ability of other species to establish (Brewer 2005). A dense clubmoss/blue grama sod, like that found on the Fort Peck Reservation, is highly resistant to plant succession. When historic climax plant communities cross the threshold to lower successional states that are characterized by 25% or more dense clubmoss cover, a steady state is reached. Each of the primary processes: 1) hydrology (capture, storage and redistribution of precipitation), 2) energy capture (conversion of sunlight to plant and animal matter), 3) nutrient cycling (cycling of nutrients through the physical and biotic components of the environment), and 4) community dynamics (the collection of organisms that exist in any locality) has been degraded beyond the point of self-repair (within a reasonable length of time). While a clubmoss-invaded or clubmoss-dominated needle-and-thread/blue grama community is resistant to further deterioration (including the establishment of invasive species), it also lacks the resiliency to return to the historic climax plant community. Thus, plant succession on 45,000 clubmoss-infested acres is not expected to occur without significant management inputs.

On the Fort Peck Reservation, clubmoss density contributed to the lack of species diversity and limited new plant growth on both Range and Pasture Units. Clubmoss cover exceeded 30% on nearly 40% of the inventoried Pasture Unit acres and 50% of the Range Unit acres. Consequently, conversion of solar energy to plant production, water and nutrient cycling, and community dynamics are impaired on nearly half of the inventoried acres.

Dense clubmoss cover tends to decrease eastward from Porcupine Creek to the Big Muddy. Clubmoss canopy cover was highest in Pasture Units located in the western 1/3 of the Reservation, much reduced in pastures located in the middle 1/3 of the Reservation, and lowest in pastures located in the eastern 1/3 of the Reservation. Only 9% of the acres inventoried in the eastern 1/3 of the Reservation had clubmoss cover greater than 30%. About 62% of acres in the same region reportedly had less than 10% clubmoss cover (Lacey & Ayers 2007). This trend in clubmoss cover distribution is consistent with research at Montana State University (Payne, Taylor and Whitmer, 1967). Long-term trend data on ground cover and vegetation composition are needed to provide cause-and-effect relationships for the higher canopy classes of clubmoss cover in the western third of the reservation.

There was no apparent correlation between heavy livestock use over large areas and high clubmoss cover or between light livestock use and low clubmoss cover. Although dense clubmoss infestations are sometimes linked to recent grazing management practices, no evidence of this association was found in Valley County (Lacey & Ayers 2007). This is consistent with Brewer's (2005) article, claiming that grazing timing, intensity, and frequency have little impact on clubmoss infestations. It is likely that dense clubmoss has been prevalent for centuries in some areas of the Reservation.

Clubmoss was more predominate on the normal sites than run-in or run-off sites. Cover on normal sites was generally highest on medium-textured soils (silty) and lowest on the large-textured soils (sandy). It frequently occurs with blue grama (Lacey et al. 1995). There is a strong negative correlation between dense clubmoss cover and ground cover by other vegetation or litter (Crane 1990).

5.2.8.1 *MANAGEMENT OPTIONS FOR DENSE CLUBMOSS*

Grazing/Trampling:

The weak root system of dense clubmoss is easily disturbed by livestock hooves. While low stocking densities and continual grazing may lead to an increase in dense clubmoss cover (due to minimal ground surface disturbance and continual pressure on key species), high stocking densities and seasonal grazing may be an effective tool for dense clubmoss control.

In a study by Kilian, Johnson, & Nelson (2009) "hoof action" was reportedly more effective at short-term reduction in dense clubmoss ground cover than treatments with an aerator. In their study, aeration resulted in a 70-72% reduction in dense clubmoss cover, whereas "hoof action" produced a 93% reduction. The "hoof action" treatment was conducted by confining 244 cattle on a 2-acre plot for 24 hours. Mechanical treatment was conducted by making one pass with an AerWaytm aerator on one acre and two passes with the same aerator on a second one-acre plot.

Dense clubmoss cover increased on grasslands in southern Alberta under a rotational grazing system, but decreased under a continuous grazing system of the same intensity (Smoliak 1960). Crane (1990) also reported that dense clubmoss decreases under grazing pressure due to trampling. In a 4-year study in Montana, clubmoss on a control site decreased from 21 to 17.6 percent during a period of normal rainfall compared to the site grazed by sheep, which decreased from 15.1 to 7.1 percent.

Vogel and Van Dyne (1966) found that clubmoss cover decreased more on grazed areas than protected areas in their study. High levels of dead clubmoss contributed to litter cover on the grazed site.

Fire:

The role of fire in maintaining the historic climax plant communities is not fully understood. Historic fires, ignited by lightning and Early Americans, are theorized to have burned these lands on a natural interval of 5-7 years (Frost 1998). The 18th century "active use" of fire has evolved to an effort to minimize burning. Present fire ecology is, therefore, an aberration from historic fire regimes that characterized the Reservation.

Evidence of wildfire reducing or eliminating clubmoss has been found in north central Montana, where sites had adequate fuel to maintain a fire (Lacey & Ayers 2007). In southwestern Manitoba, fire significantly reduced dense clubmoss cover. Only minimal recovery of the species was observed in the subsequent three growing seasons (Shay et al. 2001). Reintroduction of a fire regime may be beneficial to the environment in helping to control clubmoss density and facilitate plant succession. Currently, however, plant growth in clubmoss dominated communities is inadequate to carry fire.

Mechanical:

Studies show that mechanical treatment can be effective in controlling clubmoss cover. Mechanical treatments include disking, harrowing, chiseling, manure treatment, and reseeding. Most treatments effectively decrease dense clubmoss for the long-term. Dense clubmoss does not readily reestablish on sites treated by mechanical means. Dolan & Taylor (1972) found that 30 years after mechanical treatment was applied, the species still had not recovered its pre-treatment density, vigor, or basal ground cover. Mechanical treatment for clubmoss is being applied on some lands on the Reservation with good to excellent results (Lacey & Ayers 2007). For optimum long-term results, a proper grazing management regime should be implemented following treatment.

Chiseling is currently the most common method of treating large infestations of dense clubmoss. Chiseling, as shown in two independent studies in Montana, significantly decreases the surface ground cover of dense clubmoss and increases the total productivity of the site by allowing establishment of other species (Brewer 2005; Lacey et al. 1995). In short-term results, it was found that spring treatment reduced dense clubmoss ground cover more and enabled more grass production than fall treatment. Spring chiseling reduced clubmoss cover from 48% (before treatment) to 24% (after treatment); while fall chiseling reduced clubmoss cover from 48% to 31%. Brewer (2005) also tested the impact of chiseling at different angles and found that, while positioning the Aerator at 10 degrees provided better clubmoss cover reduction, it also caused the most ground surface disturbance, resulting in reduced grass production. Chiseling is most successful on productive sites that are limited by blue grama, clubmoss, and other shallow-rooted species. As of 1995, the net value of chiseling varied from $8 to $38 per acre, depending on grazing management practices (Lacey et al. 1995).

Fertilizer:

Treatment with fertilizer has been utilized to increase the competitiveness of taller species and thereby negatively impact dense clubmoss. Success, however, is largely dependent on precipitation. Mulching has been found to nearly eliminate dense clubmoss in some situations (Crane 1990). Manure application reduces dense clubmoss cover, with little discrepancy between

treatment intensities (Dolan & Taylor 1972). Fertilizer treatment has been effectively used in the past (Crane 1990), but was not referred to in recent scientific literature.

Chemical:

Chemical control has been used effectively in the past (Crane 1990), but is not referred to in recent scientific literature.

5.2.8.2 *RECOMMENDATIONS*

- The Tribal Natural Resources Office should explore the viability of different management options for clubmoss cover on the Fort Peck Reservation.
- Implementing a fire regime in coordination with improved grazing practices is the preferred method of controlling clubmoss cover in this region.
- The use of high stocking rates and rotational grazing on tribal lands has the potential to disturb clubmoss establishment without negatively impacting desirable vegetation. Research shows that sheep are more effective than cattle at disturbing the clubmoss through hoof action.
- Establishment of more intensive grazing management would provide opportunity to increase stocking density to increase disturbance of clubmoss through hoof action. Increased grazing management would also provide periods of growing season deferment that would favor establishment of desirable species in areas of disturbed clubmoss crusts.
- The Office should also evaluate cost-share opportunities for mechanical treatment. As with fire, mechanical treatments should be followed by a well-managed grazing protocol, which allows the establishment and regeneration of desirable species.
- The Office should initiate an educational effort to better inform ranchers about the benefits of mechanically treating suitable sites where clubmoss cover exceeds 25%. Demonstration projects and tours should be key components of the educational effort.
- To ensure that control efforts and grazing practices are conducive to the removal of clubmoss and improvement of historic range plants, the Fort Peck Tribal Natural Resources Office should establish a monitoring program.

5.2.9 *Prescribed Grazing*

Rangeland health is a concern across the Reservation. Similarity indices, which are comparisons of the present plant community to the historic climax plant community, were less than 35% on 43% of the Range Unit acres and 70% of the Pasture Unit acres. Many departures from climax appear to be a result of livestock grazing (past and/or present).

Suggested stocking rates are about 1/3 to 1/2 of the ecological potential on Pasture Units. These suggested rates are based on a one-time assessment of soil and vegetation conditions and should be regarded as starting points. Because proper stocking is a prerequisite to proper range

management, Range and Pasture Unit stocking rates should be adjusted to the proposed levels. Resource conditions should be monitored over time and stocking rates adjusted on the basis of progress toward specific goals and objectives.

Prescribed grazing (using livestock grazing for weed control and encouraging growth of desirable species) can be a powerful and inexpensive tool for rangeland management. The effectiveness is relative to the timing, intensity, and frequency of use (Rinella & Hileman 2009).

The absence of adequate water sources and cross-fencing on Range Units and the absence of water and boundary fences on Pasture Units are restrictive factors in land management practices. Water development and fence improvements should be priorities in managing these lands. Only in the presence of adequate water and fences can grazing systems be implemented that promote rangeland health.

5.2.9.1 *RECOMMENDATIONS*

- On Range Units and larger Pasture Units, a grazing system should be developed and maintained to promote rangeland health.
- Where prescribed grazing is not practical (small Pasture Units, units without adequate water or fences), proper stocking rate and season of use should be established and enforced. Prescribed grazing and proper stocking rates would allow native plants opportunities to regain vigor following defoliation, thereby facilitating plant succession.
- The similarity index and 17 rangeland health indicators suggest that grazing management should be more pro-active on both Range and Pasture Units.
- Prescribed grazing systems should be implemented where practical.
- Prescribed burning may be used in conjunction with grazing to mimic natural fire regimes across the Reservation.

5.2.10 *Deferred Grazing/Dormant Season Use*

Most Range and Pasture Units on the Reservation have poor species composition and low plant vigor, particularly on sites where dense clubmoss is predominant. Grazing information was not available for Pasture Units, but grazing permits for the Range Units indicated that the range is being grazed annually throughout the growing season. Two thirds of the Range Units are grazed consistently from May 15 to October 31. Of the remaining 29 Range Units, 28 are grazed during June, the most productive month for plant growth in Northeastern Montana. Only one Range Unit limits grazing to the dormant season (August 23 to October 31).

Range condition on sites that have been intensely and heavily grazed in the past can improve under livestock grazing, but condition improves more rapidly when protected during the growing season (Vogel & Van Dyne 1966). Continually grazing rangeland during the growing season limits the reproductive potential of desirable species. Perennial grasses are particularly sensitive

to growing season use by cattle, because cattle select grasses over forbs and shrubs (Kirby et al. 1986). Annual production is not immediately impacted by grazing during the growing season. In fact, plants will experience a short term increase in vegetative production under grazing (Nelson et al. 2006). However, repeated use of range pastures during the growing season limits seed production. This repeated restriction on reproductive potential results in a long-term decrease in desirable species.

If allowed time for recovery, regeneration, and establishment of a seed base, range plants can withstand a high level of grazing intensity. Rotational grazing systems that alternate season of use in each pasture may aid this process (Branson & Miller 1981). Additional, longer grazing periods, and thus longer deferments, promote secondary succession in key species better than numerous short grazing periods at the same stocking rate (Reece et al. 1996).

Deferred rotation grazing stems from the rotational grazing concept in which livestock are moved from pasture to pasture as proper or full use is attained. Under deferred rotation grazing, grazing on at least one pasture each year is deferred until key species have produced seed. Order of pasture use is changed annually or biannually to ensure that no pasture is grazed during the same period every year (Jefferies 1970).

5.2.10.1 *RECOMMENDATIONS*

- Make dormant season grazing available by offering extended season of use on lease contracts.
- Provide incentive for lessees to implement a rotational grazing system which defers grazing on at least one pasture each year.

5.2.11 Summary/Recommendations

Ecological condition and trend of upland range sites has improved significantly on much pastureland since the 1980s. Native plant communities are still generally intact and the presence of noxious weed is relatively low across the reservation. However, dense clubmoss has invaded thousands of rangeland acres and presents both a barrier to a return to the historic climax plant community and a buffer against further rangeland degradation and weed infestation.

Many Range and Pasture Units require additional livestock water sources and fencing to improve livestock distribution and allow for varied season of use.

Riparian vegetation has been negatively impacted by season long grazing. Trend in riparian area and woody draws is a significant resource concern. Development of riparian pastures and implementation of a riparian grazing program would benefit riparian areas. Short-term exclusion of livestock from riparian areas will bring about rapid recovery of stream function and habitat quality.

Present salt and mineral placement (adjacent to water) is likewise poorly executed. Good range management principles are lacking on most Range and Pasture Units.

Proper range management dictates that animal numbers must be controlled, season of grazing regulated and varied annually, and livestock properly distributed throughout pastures. Observing these principles of range management would prevent further rangeland health deterioration attributed to overstocking, overgrazing, overutilization, and over-rest. Under good management, desirable forage plants would receive ample recovery time for growth, reserving residues to survive drought or winter desiccation, leaving sufficient litter for soil surface cover, and retaining robust above and below ground biomass. Each of these factors is critically important to maintaining or moving toward HCPC.

Utilizing cross-fences, water developments, and salt and mineral placement to encourage better livestock distribution would be a valuable start to improved rangeland management.

Varying season of use and managing for weeds and clubmoss cover are also important management tools. Deferred rotation grazing, which puts at least one pasture per Range Unit into rest or dormant season grazing use each year, would greatly improve the condition of the rangelands.

5.3 RANGE UNIT GOALS & OBJECTIVES

The following goals and objectives are divided into six units: management goals, management objectives, 10 year management tools, 5 year management tools, 2 year management tools, and 1 year management tools. Management goals identify desired outcomes for the Fort Peck Reservation as they relate to the rangeland. Goals are broad ideas without timeframes. Management objectives identify quantifiable, tangible steps that should be taken to meet goals. Objectives should have timelines. Action items are specific tasks that facilitate accomplishment of goals and objectives.

5.3.1 Management Goals

- Provide a stable economic base for the Tribes.
- Provide economic stability for Tribal livestock owners.
- Manage for sustainable resource conditions.
- Manage for sustainable water quality.
- Manage for sustainable wildlife production.
- Manage for sustainable fisheries.
- Provide revenue from grazing lands to Tribes and Allottees.
- Maintain wildlife habitat and wildlife populations.
- Stabilize Tribes' income from Range and Pasture Units.

- Provide opportunity for sustainable livestock production for tribal members.
- Nurture a strong local economy.

5.3.2 Management Objectives

- Improve forage production for livestock by 20% in 5 years.
- Improve rangeland health to functioning condition on 70% of rangeland in 10 years.
- Improve 80% of riparian areas to Proper Functioning Condition in 10 years.
- Control club moss on 50% of infested acres in 10 years.
- Manage invasive species so that new infestations are treated within 1 year and old infestations treated to reduce risk of spread within 5 years.
- Maintain or improve fences to functioning condition in 5 years on Range Units and on Pasture Units with more than 75 AUMS.
- Maintain or improve water developments to functioning condition in 5 years on Range Units and on Pasture Units with more than 75 AUMS.
- Develop program to provide additional flexibility in lease terms within 10 years.
- Increase revenue from Range Units and Pasture Units by 20% in 5 years and 40% in 10 years.

5.3.2.1 ACTION STEPS FOR EACH OBJECTIVE

(A) IMPROVE FORAGE PRODUCTION

- Control of club moss and noxious weeds will create the fastest response for forage production.
- Development and repair of livestock drinking water sources will allow use of currently unused forage.

(B) IMPROVE RANGELAND HEALTH

- Implementation of a managed grazing program will provide opportunity for improved rangeland health.
- Improving rangeland health will require control of timing and intensity of grazing.
- Providing a rotation of growing season deferment will provide opportunity for increased vigor and reproduction of desirable perennials.
- Develop and maintain water sources for livestock to encourage more even distribution of livestock across Range and Pasture Units.
- Improve and develop new boundary and cross-fences for better livestock management and for the implementation of an effective rotational grazing system.

(C) IMPROVE RIPARIAN AREAS

- Inventory riparian areas to determine current condition.
- Identify factors that prevent areas from functioning.
- Develop plan to address factors reducing riparian function.

- Maintain, repair, or build fences that provide grazing deferment in riparian areas.
- Develop and implement grazing strategy for riparian pastures.
- Provide protection for riparian areas by drawing livestock away from stream corridors with alternative water sources, salt and mineral placement, and cross fencing.

(D) MANAGE/CONTROL DENSE CLUBMOSS

- Establish a dense clubmoss monitoring program to ensure that control efforts and grazing practices are conducive to the removal of clubmoss and improvement of historic range plants.
- Develop clubmoss control project.
- Determine criteria to evaluate need for clubmoss control, criteria to determine what treatments are appropriate for specific conditions.
- Develop protocol that will allow targeted grazing intended to break up club moss.
- Implement and maintain clubmoss control program, including mechanical treatment and grazing practices that encourage reestablishment of native perennial grasses.
- Initiate an educational effort to better inform ranchers about the benefits of mechanically treating suitable sites where clubmoss cover exceeds 25%.
- Implement demonstration projects and tours as key components of the educational effort.

(E) MANAGE INVASIVE SPECIES

- Implement and maintain a noxious weed control plan.
- Map the locations of all noxious weeds and develop a Noxious Weed Management Plan.
- Develop strategies for controlling infestations.
- Develop a noxious weed education awareness program.
- Participate in cost-share programs to assist weed control efforts by lessees and private landowners should be evaluated on a species-by-species basis.
- Evaluate advantages and disadvantages of contracting noxious weed control programs with independent contractors and/or surrounding counties should be evaluated with respect to a noxious weed control program implemented and conducted by the National Resources Program Office. It may be beneficial for the department to establish, build, fund, and operate its own noxious weed program.

(F) MAINTAIN OR IMPROVE FENCES

- Inventory current fence condition.
- Determine budget to improve non-functioning fences.
- Develop plan to cost share fence repair.

- Develop plan to include fence maintenance into lease program.
- Improve and develop new boundary and cross-fences for better livestock management and for the implementation of an effective rotational grazing system.

(G) MAINTAIN OR IMPROVE WATER DEVELOPMENTS

- Inventory current conditions of water developments.
- Determine budget to improve non-functioning water developments.
- Develop plan to cost share water development.
- Develop plan to include water development maintenance into lease program.

(H) DEVELOP FLEXIBILITY INTO LEASES

- Provide opportunity for flexibility in seasons of use.
- Develop plan for each pasture within a Range Unit or Pasture Unit to receive periodic grazing season deferment.
- Change lease contracts to make dormant season grazing available on Range Units and Pasture Units.
- Determine protocol to allow additional flexibility to lessees as to when grazing can occur.
- Extend the period when grazing can occur while reducing the time that grazing does occur in a given year.
- Allow use of multiple pasture units to be used in conjunction to provide a grazing rotation during the grazeable period of the year.

(I) IMPLEMENT MANAGEMENT PLANS ON RANGE UNITS AND PASTURE UNITS WITH MORE THAN 75 AUMS

- Inventory Range Units and Pasture Units.
- Establish working group with Tribe and NRCS to develop grazing plans.

(J) INCREASE REVENUE FROM RANGE AND PASTURE UNITS.

- Encourage and maintain wildlife habitat and opportunities for revenue from hunting and fishing.
- Develop partnership arrangements with lessees/permittees, BIA, and other parties to establish conservation plans, cost share approaches, and other measures to encourage lessees and permittees to take greater responsibility for weed control, range improvements, and other measures, such as additional stipulations to lease/permit renewal terms to promote overall improvements.
- Provide opportunities for tribal members and families who aren't current lessees and permittees to become operators.
- Develop a comprehensive record of all Pasture Units, lessees, acreages, and health assessments.

- Verify boundaries and improvements on Pasture Unit tracts and group into larger management units where feasible.
- Establish a Pasture Unit naming system which distinguishes distinct units.
- Write medium to long-term (3-10 year) lease contracts for the Pasture Units once appropriately divided and grouped.

5.3.3 Ten-Year Management Actions

- Assess current rangeland health, state of improvements, and grazing plans for Range and Pasture Units.
- Review the management plan for Range and Pasture Units on the Fort Peck Reservation.
- Evaluate whether goals are being met and/or if further adjustments need to be made in plan implementation to see that lessees are working toward the betterment of the Units and making the recommended changes.
- Determine whether an additional incentive program is necessary to encourage lessees to work toward the outlined management goals.
- Reassess the management plan and make additional recommendations and/or changes to the goals section based on improvements or lack of improvements made in the past ten years.
- Develop grazing management plan for 10-year Range Unit lease. Determine what improvements and treatments are needed for the property and write into the contract.
- Reallocate 10-year leases (for Range Units) based on the conditions of the contract and how those conditions are being met.

5.3.4 Five-Year Management Actions

- Evaluate the condition of rangeland, state of improvements, and grazing plans for Range and Pasture Units.
- Determine if lessees are meeting the requirements and conditions of lease contract. Where lessees fall short, action should be taken to revoke short-term leases or recommend operational adjustments.
- Remap the location of noxious weeds. Reassess areas of concern where noxious weeds occur and determine plan of action in continued control and eradication of noxious species. Provide direction to lessees for noxious weed control where needed.
- Reassess clubmoss control practices and determine which treatment methods appear most cost effective. Make treatment recommendations for clubmoss control accordingly.
- Evaluate the effectiveness of the clubmoss education program and adjust accordingly.

5.3.5 Two-Year Management Actions

- Review lease/permit stipulations so as to encourage operators to take greater responsibility, while accessing NRCS and/or BIA technical assistance and other financing tools to promote improvements.

- Assess the condition of boundary and cross fences on Range and Pasture Units.
- Assess the condition of water improvements and determine where further improvements are needed.
- Assess the health of riparian corridors and develop grazing options that consider these regions.
- Collect data to evaluate the effectiveness of clubmoss control treatments.
- Collect data to document the effectiveness of noxious weed control treatments.

5.3.6 One-Year Management Actions

- Meet with operators to determine areas of concern, analyze lease contract terms, and review grazing plans.
- Monitor grazing practices and ensure a deferred rotation grazing system is in place and stocking rate recommendations are being met and adhered to.
- Monitor the presence and development of range improvements and noxious weed and clubmoss control efforts on Range and Pasture Units.
- Reevaluate lease rates.
- Adjust billing to reflect the level of cooperation by lessees in improving the rangelands. (Implement/utilize the incentives program).
- Maintain rural water system and erosion prevention.
- Inspect 20% of the Pasture Units (alternating which Units are inspected annually). Collect field studies to ensure that contract conditions are being met.

5.4 AGRICULTURAL MANAGEMENT UNIT PROFILE

5.4.1 *Range Unit Profiles*

1. Unit title
2. Ownership
   a. Acreage
3. Authorized Trust Land Use
   a. Total number of months grazed
   b. On date and off date
   c. Number of AUMs stocked (as based on BIA permit)
4. Calculated Grazing Capacity
   a. Without water improvements
      i. Total AUMs/Range Unit
      ii. AUMs/pasture in Range Unit
   b. With water improvements
      i. Total AUMs/Range Unit
      ii. AUMs/pasture in Range Unit
5. Unit Description
   A. Ecological Interpretations
      i. Water

ii. Site 1 Description
iii. Site 2 Description
iv. Vegetation
    a. Key management species
    b. Increasers & invaders
    c. Dense Clubmoss cover
v. Noxious weeds
vi. Transect Table
    a. Transect Number
    b. Range Site
    c. Total Production
    d. Forage Production
    e. Stocking Rate
    f. Similarity Index
    g. Initial Trend
    h. Plant Community
vii. Trend
viii. Rangeland Health
    a. Soils
    b. Hydrologic cycle
    c. Plant community
        *Chart
ix. Total Available Forage

B. Range Improvements
C. Management Issues/Guidelines

6. 10 year Management goals
7. 1-3 year Management goals
8. Similarity Index/Trend Map
9. Plant Community/Clubmoss Cover Map
10. Grazing Permit

5.4.2 *Range Units*

The Range Unit Profiles provide detailed information concerning each of the 93 Range Units on the Fort Peck Reservation. Each Profile includes the following information: 1) total acreage; 2) current authorized trust land use as listed on the grazing permit; 3) grazing capacity with and without water improvements, as calculated by the NRCS, for the entire Range Unit and, where appropriate, pastures within the Range Unit; 4) unit description detailing the ecological information gathered by the NRCS in the rangeland inventory; 5) 10 year management goals; 6) 1-3 year management goals; 7) similarity index/trend map; 8) plant community/clubmoss cover map; and 9) grazing permit.

All Range Unit Profiles follow the same template, but information was not always available to complete every section. Inventory data for several units was incomplete, inconsistent, or mixed

with data from other units. The inventory data used for these profiles was gathered by the NRCS in 2000 and 2001; the report and maps were completed in 2003.

AUMs per pasture were determined by estimating the percentage of total acreage occupied by each pasture and multiplying that value by total AUMs. Due to a lack of GIS data documenting pasture boundaries and acreages and linking that information to stocking rates, per pasture AUMs are estimates based off of maps provided by the NRCS. There is no guarantee that the fences mapped on the NRCS maps in 2003 are still intact or functional. There may also be more fences today, particularly on the Units enrolled in the EQIP program. Field verification should be conducted, particularly on Range Units where stocking rates vary significantly between pastures. The figure provided ascribes the same stocking rate to each pasture. Without further study and GIS information, a more accurate value cannot be attained.

Lease/Permit Transactions

Range Units, unlike Pasture Units, are comprised of various grouped tracts. Because Range Units are larger and are leased under a ten-year contract, lessees have more incentive to manage their leased Units for long-term sustainability. Grazing fees on Range Units are issued by AUM.

Pasture Units lack the incentive-based structure of Range Units. Many Pasture Units are too small to manage independently and must be managed with the adjoining property. Often, the Pasture Units are not fenced separately from neighboring pastures. Leases are issued annually and grazing fees are determined on a per acre basis. A lessee pays the same fee whether the pasture is stocked with 10 AUMs, 100 AUMs, or 0 AUMs. Incentive is, therefore, high for lessees to overstock units and desert the lease the following year.

Fixed costs have no bearing on optimum grazing levels (Workman 1986). Optimum grazing levels for lessees decreases when fixed costs are converted to variable costs. With variable costs, there comes an economic incentive to graze at the level where marginal cost is equal to marginal revenue. A reduced stocking rate becomes the economic optimum under the variable cost system. This strategy was detailed by Whitson and Ragsdale (1976). Converting from a fixed (per acre) grazing fee to a variable (per AUM) fee and extending leases from one-year contracts to a minimum of three years would encourage better stewardship and range management practices.

Pastureland

6.1 OVERVIEW

Pasture Units are small (less than 640 acre) units within the Fort Peck Reservation that are leased out annually. A total of 2,315 Pasture Units were inventoried; 980 in 2005 and 1,335 in 2006-2007. The large number of Pasture Units made it impractical to develop management plans for

each unit. Instead, units were grouped into land use categories and further divided by size and stocking rate into classifications with similar units. Each classification was then assigned a set of generalized land management recommendations.

The three land-use categories identified for these Pasture Units were: rangeland, cropland, and improved land. The acreage of each Pasture Unit devoted to rangeland, cropland, and/or improved land was calculated as a percentage of total acreage.

The category "rangeland" includes all Pasture Units inventoried as 100% rangeland. These Pasture Units were treated as grazing lands and received a full inventory, including clubmoss cover, similarity index, and stocking rates. 1,567 Pasture Units were comprised of 100% rangeland. These Pasture Units were further sorted by carrying capacity, such that approximately 100 Pasture Units fell under each category. Management recommendations are provided for Units with similar acreage and AUMs.

"Cropland" refers to all Pasture Units that were inventoried as being entirely devoted to crop production. In 2006-07, "out acres" (acres occupied by out-buildings or other man-made facilities) and "go-back acres" (abandoned cropland) were included as cropland. 112 Pasture Units (40 in the western 2/3 of the Reservation and 72 in the eastern 1/3) qualified as cropland. "Cropland" pastures did not receive a full inventory. Categories like clubmoss cover, similarity index, and stocking rate were irrelevant on these acres.

"Improved" lands refer to Pasture Units that were seeded to introduce species for tame pasture or CRP. Inventory data is often only partially complete on these units, relative to how the pasture was seeded and what it was being used for. Clubmoss cover was generally absent on these lands. Stocking rates were determined on some improved pasture in the 2005 study, these pastures were listed independently. For the sake of consistency, improved pasture stocking rates should not be included with AUM calculations for rangeland pastures. 83 of the 2,315 Pasture Units were listed as "improved." Only 16 of these Pasture Units occurred in the western 2/3 of the Reservation, the remaining 67 were found in the eastern 1/3. This may be due to differences in discretion between data collectors.

Not all Pasture Units were devoted to a single use class. Many Pasture Units included two land use types and some encompassed all three. These Pasture Units were further divided into the following categories: "range and cropland", "range and improved land", "cropland and improved land", and "rangeland, cropland, and improved land."

11 Pasture Units in the 2005 data and 18 Pasture Units in the 2006-07 data had rangeland, cropland, and improved acreages that did not add up to the total acres for the Pasture Unit. Some of these problems were obvious data entry errors. Changes were made to these Pasture Units to correct for different acreages where possible. All changes were recorded in red print for tracking

purposes. The data remains unchanged in the Access database. With the corrections in place, only five Pasture Units could not be categorized. These five (3 from 2005 and 2 from 2006-07) showed no acreage under total acres and each category. Pasture Units with incomplete and corrected data require field verification to determine where the fault in the data occurs.

The following table (Table 1.1) shows the divisions of Pasture Units into categories:

Table 1.1 – Pasture Unit Categories

	2005 (West 2/3)	2006-07 (East 1/3)	Totals
100% Rangeland	690	877	1567
100% Cropland	40	72	112
100% Improved Pastureland	16	67	83
Range and Cropland	150	242	392
Range and Improved Pasture	68	42	110
Crop and Improved Pasture	1	17	18
Range, Crop, and Improved	12	16	28
Uncategorized	3	2	5
Totals	**980**	**1335**	

After Pasture Units were divided into the seven categories: “rangeland”, “cropland”, “improved pastureland”, “range and cropland”, “range and improved pastureland”, “crop and improved pastureland”, and “range, crop, and improved pastureland”. Pasture Units with some percentage of rangeland were further divided by carrying capacity. These Pasture Units were grouped into the following divisions: 0-4 AUMs, 5-6 AUMs, 7 AUMs, 8-13 AUMs, 14-19 AUMs, 20-35 AUMs, 36-75 AUMs, and >75 AUMs.

The following tables (2.1 and 2.2) show the breakdown of Pasture Units with rangeland into different carrying capacities:

Table 2.1 – Pasture Units Western 2/3 of Reservation

Number of Pasture Units 2005 (Western 2/3 of Reservation)					
AUMs	**Rangeland**	**Range/Crop**	**Range/Improved**	**Range/Crop/Improved**	**Total**
0-4	25	22	3	2	
5-6	48	6	3	0	
7	40	9	2	0	
8-13	141	38	6	4	
14-19	93	23	7	1	
20-35	163	38	22	1	
36-75	157	14	15	2	
>75	23	0	10	2	
	690	**150**	**68**	**12**	**920**

Table 2.2 – Pature Units Eastern 1/3 of Reservation

Number of Pasture Units 2006-07 (Eastern 1/3 of Reservation)					
AUMs	**Rangeland**	**Range/Crop**	**Range/Improved**	**Range/Crop/Improved**	**Total**
0-4	80	35	11	1	
5-6	137	16	3	0	
7	172	8	0	0	
8-13	117	42	8	2	
14-19	98	28	4	1	
20-35	99	46	9	6	
36-75	107	56	5	5	
>75	67	11	2	1	
	877	**242**	**42**	**16**	**1177**

Table 2.3 – Pasture Units on Fort Peck Reservation

2005-2007 Totaled Pasture Units on Fort Peck Reservation					
AUMs	**Rangeland**	**Range/Crop**	**Range/Improved**	**Range/Crop/Improved**	**Total**
0-4	105	57	14	3	179
5-6	185	22	6	0	213
7	212	17	2	0	231
8-13	258	80	14	6	358
14-19	191	51	11	2	255
20-35	262	84	31	7	384
36-75	264	70	20	7	361
>75	90	11	12	3	116
	1567	**392**	**110**	**28**	**2097**

1,236 Pasture Units currently provide less than 20 AUMs of livestock grazing (59% of Pasture Units). It is not practical or economically feasible to initially devote management efforts to areas with such small potential for economic improvement. Efforts should be focused initially on the 116 Pasture Units (5.5% of total) that provide more than 75 AUMS.

In the long term, a more sustainable management strategy would be to group the Pasture Units into larger management groups, similar to the groupings for the Range Units. The current number of Pasture Units prevents any sort of organized management. Many of the challenges faced on the Pasture Units could be better addressed if the tracts were grouped into management

units with 1,000 or more AUMs per unit. Addressing these challenges would become feasible and allow the Pasture Units to become a tool for meeting overall goals and objectives.

Pasture Units do not have a reliable naming system. The unique number for each Pasture Unit is the number assigned to the Unit when the data was entered in Access. For 2005 data, this number is titled simply "ID" and the values range from 6 to 1029. In 2006-07 data, the unique value is titled "PastureID" and the values range from 1032 to 2384. For further identification, each Pasture Unit ID is accompanied by the corresponding topoquad, field ID, tract ID, township, section, and range. Township, section, and range were excluded from the excel spreadsheets, but are available on the access database and can be exported to excel and linked to the data there.

Tract numbers are not unique to Pasture Units. In multiple cases, one tract number will pertain to numerous Pasture Units in various topoquads throughout the Reservation. 40 tract numbers appeared in both the 2005 and 2006-07 data sets. These tract numbers are identified in an Excel document with the corresponding topoquad and field number for further review. In most cases, different entries for the same tract number have unique data entries. Occasionally (for example T6060), two entries will have the same acreages and most of the same inventory data, indicating that the site may have been inventoried twice, once in each collection period, and given unique pasture and field IDs in each study.

Repeated tracts are listed in the Excel Workbook "Pasture Unit Summary." Three sheets are devoted to repeated tracts. The first sheet lists tracts that appear in 2005 data and again in 2006-07 data. The second sheet lists tracts that repeat within 2005 inventory data. The third sheet lists tracts that repeat within 2006-07 data. Due to expected data entry errors it is likely there are more repeat tracts that did not appear when the data was sorted by tract number. Pasture Units with same tract numbers should be reviewed and given unique identities for future identification and management purposes.

Pasture Unit information is divided into three Excel workbooks. The "Pasture Unit Summary" workbook, as previously mentioned, includes repeat data and Tables 1.1, 2.1, and 2.2. The "Pasture Units 2005" workbook lists all Pasture Units inventoried in the western 2/3 of the Reservation on the first sheet. Subsequent sheets divide Pasture Units into land use categories and then AUMs per land use category. The third workbook, "Pasture Units 2006-07", is structured after the 2005 data.

All Excel data was queried in Access and exported to Excel for processing and review. The original Access database remains intact and unchanged.

Data collectors in 2005 and 2006-07 reported that the maps of ecological sites supplied by the BIA were at times inconsistent with study results. According to instruction, no changes were made to ecological sites on the maps, despite the fact that the new NRCS ecological site key

characterized sites differently. Sites along the Roosevelt and Sheridan County line were most noticeably questionable. Silty-steep sites in this location were mapped in the same tract of land as sites mapped as clayey-steep. The only discrepancy was the site's position north or south of the county line. Due to the mapping situation, the analysis of Similarity Index values and concurrent stocking rate values is weakened.

6.1.2 *RECOMMENDATIONS*

- Data indicates that Pasture Units on the Fort Peck Reservation require better documentation, organization, and management.
- Pasture Units require some form of unique identification for reference purposes and tract numbers should not be relied on as identifying values.
- Permit holders indicated that there is little to no incentive for investing in Pasture Units through range improvements, water development, and grazing management practices. The current one-year leases discourage permit holders from managing for long-term forage productivity and rangeland health. Likewise, the acre-based lease system does not mandate that permit holders stock Pasture Units according to the carrying capacity of that Unit. Permit holders seek the short-term benefit by overstocking the lease and seeking new leases the following year. With no guarantee of a long-term contract there is no incentive for long-term planning.
- Prior to developing grazing plans for the 2,315 Pasture Units, an effort should be made to ground verify the GIS data. Where feasible, Pasture Units should be grouped to form larger Units, as was done with Range Units. An identification system should be implemented to name each Pasture Unit (as grouped) and lease contracts should be written for those larger units. The current one-year, acre-based, fixed cost lease system should be disbanded and replaced by longer term (3-10 year), variable fee (per AUM), lease contracts.

Timberland

7.1 FUEL AND ENERGY

Timberlands are generally located along the Missouri River bottom and along its major tributaries. Timbered areas consist primarily of large cottonwood trees and smaller brush such as Russian Olive trees. The intent during the original allotment was to provide each family enough timber on their lands to build homes and/or provide a fuel source for heating during the winter. Local timber was intended to be harvested for wood fuels for homes and to be used in tribal ceremonies and tribal history.

The existing timber stands within the Reservation is not large enough for any commercial operations or to support a large biomass boiler. The commercial production potential within the

Reservation is limited to nonexistent. The primary focus for the existing timberlands remains to produce local firewood for enrolled members. The Tribes uses a timber permit program to permit timber harvest on Tribal and allotted tracts.

7.1.1 *Management Goals*

The overall management goal for timberlands is to maintain a sustainable stand of timber for use by enrolled members. Timber within the Reservation is important for local enrolled members both as a fuel source for heating of homes and as a cultural resource. Wood stove heating provides winter heat for numerous homes throughout the Reservation. Access to local timber provides these households with substantially reduced heating costs in an area of elevated poverty levels. Additionally, enrolled members use harvested timber for cultural ceremonies and in the reconstruction of culturally important facilities for these ceremonies. Harvest of local timber is important to maintaining the accuracy and traditions passed down from generation to generation in these ceremonies.

7.1.2 *Management Issues*

There currently is no inspection process or inventory process in place to identify and grade existing stands of timber. Members submit a permit for timber harvest generally identifying the location of the stand they intend to harvest with the Tribes. There is no evaluation of the site prior to timber harvest or following harvest to ensure that the permit was followed, proper site cleanup occurred, and identifying the condition of the remaining stand. The permit, included in Appendix E, outlines basic information to be filed and tracked but due to staffing concerns little follow through is done once it is processed.

7.1.3 *Improvement Recommendations*

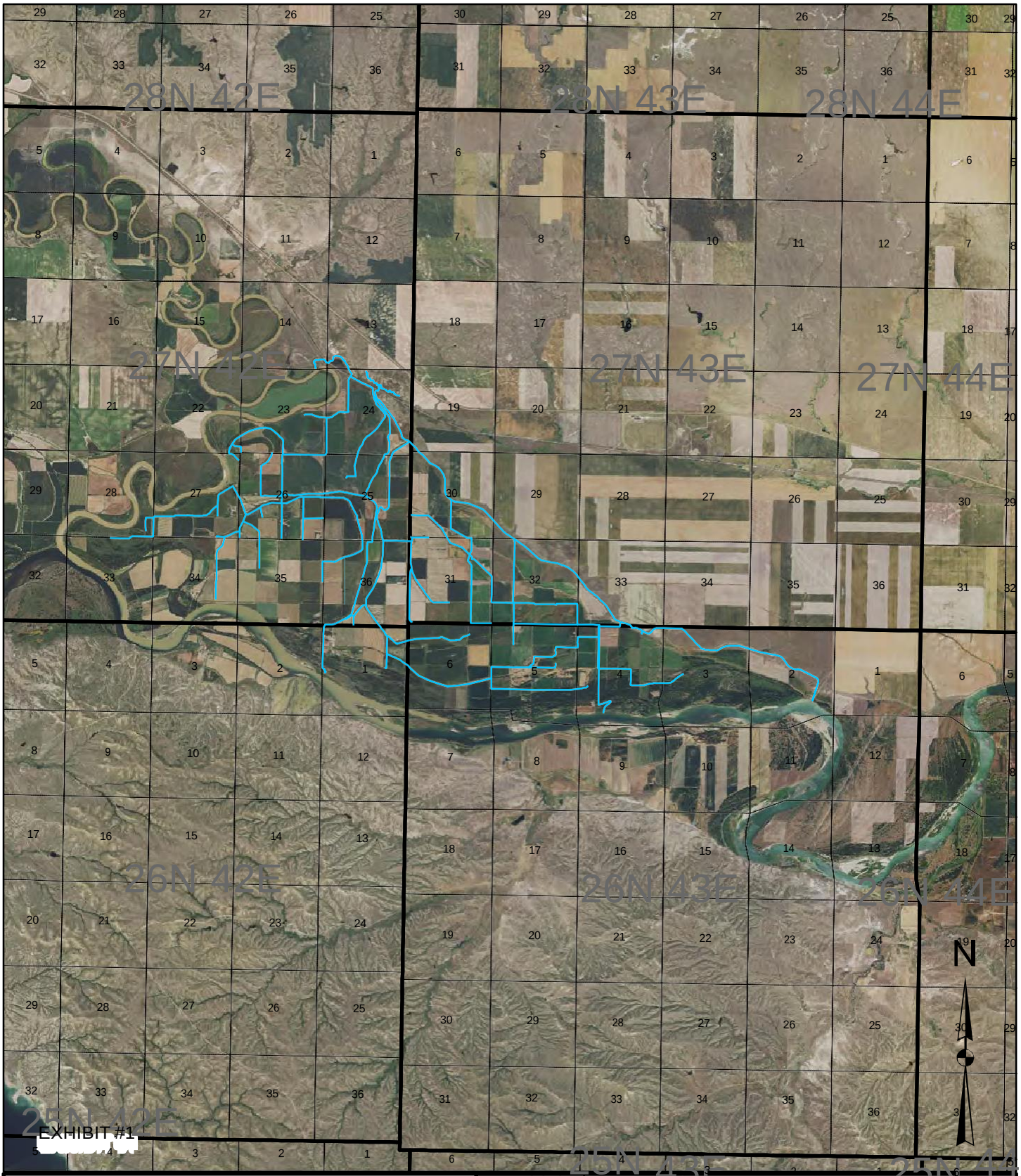
The following provide basic improvement recommendations which should be implemented by the Tribes and BIA to improve overall timber stand within the Reservation. These recommendations are not all inclusive however provide general framework for implementing a beneficial program for improving and sustaining timber quality and quantity.

- A timber inspection process should be implemented to document stand health and quantity in areas targeted for harvest.
- The timber permit process should include a pre- and post-harvest assessment of each site to track and quantify the resource and its condition. The assessment should include the following:
    - Site accessibility
    - Timber stand health, pre and post
    - Site conditions and safety concerns
    - Estimated period of growth required before allowing subsequent harvest

7.1.4 *Areas of Interest*

There have been no established areas of interest in timberlands at this time. Timberlands are currently not a priority for operation, management, or acquisition by the BIA or the Tribes. In the event that this situation changes this section of the ARMP should be updated.

EXHIBITS



Fort Peck Tribes
Agricultural Resource Management Plan
Fort Peck Irrigation Project
Wiota Unit

REVISIONS	
Date	By

WWC ENGINEERING
1275 MAPLE STREET, SUITE F
HELENA, MT 59601
(406) 443-3962

File:	Drawn By: RDN	Checked By: STH	Date: 2/25/15	Scale: NTS

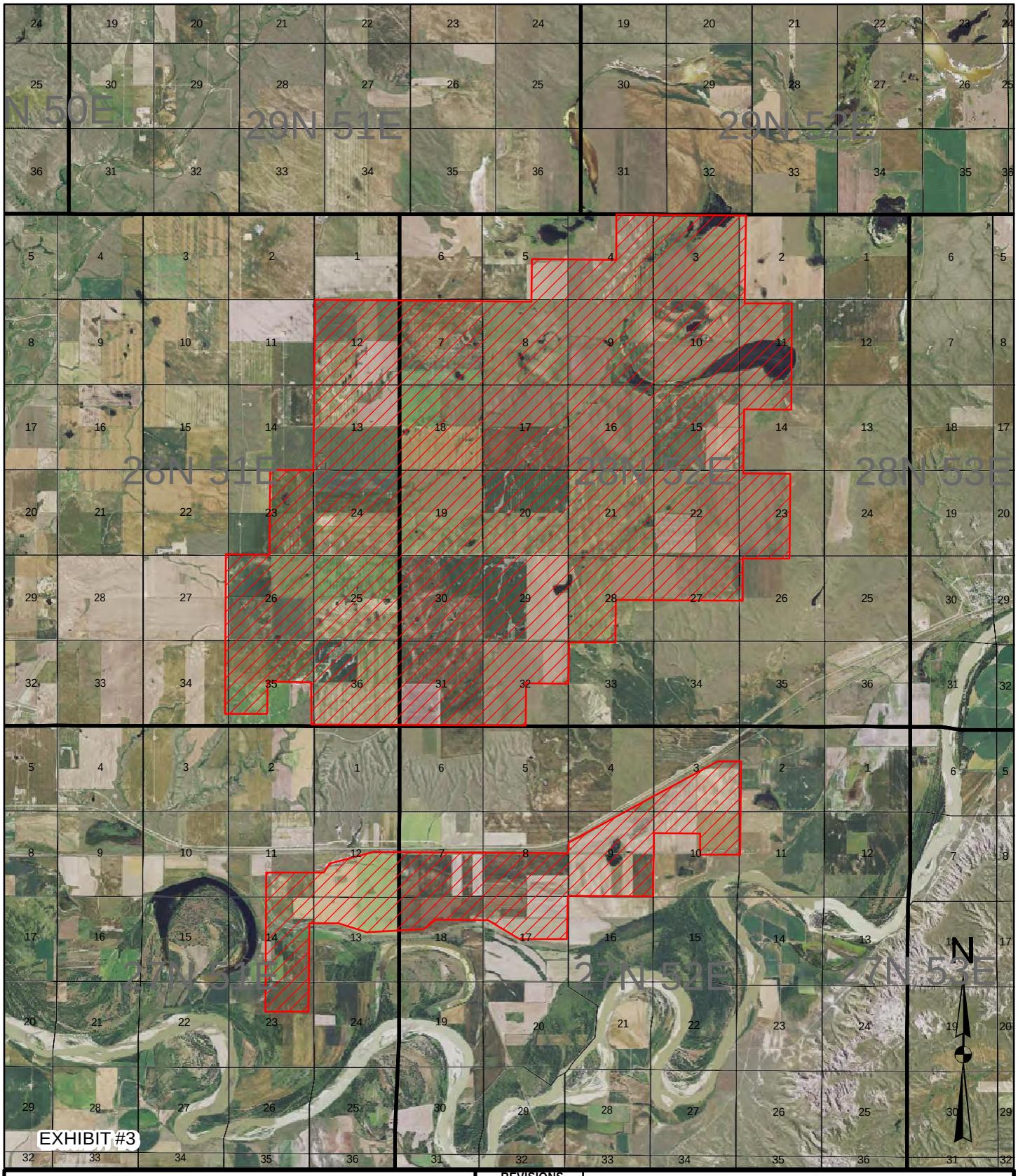
EXHIBIT #2

Fort Peck Tribes
Agricultural Resource Management Plan
Fort Peck Irrigation Project
Frazer Unit

REVISIONS	
Date	By

WWC ENGINEERING
1275 MAPLE STREET, SUITE F
HELENA, MT 59601
(406) 443-3962

File:	Drawn By: RDN	Checked By: STH	Date: 2/25/15	Scale: NTS

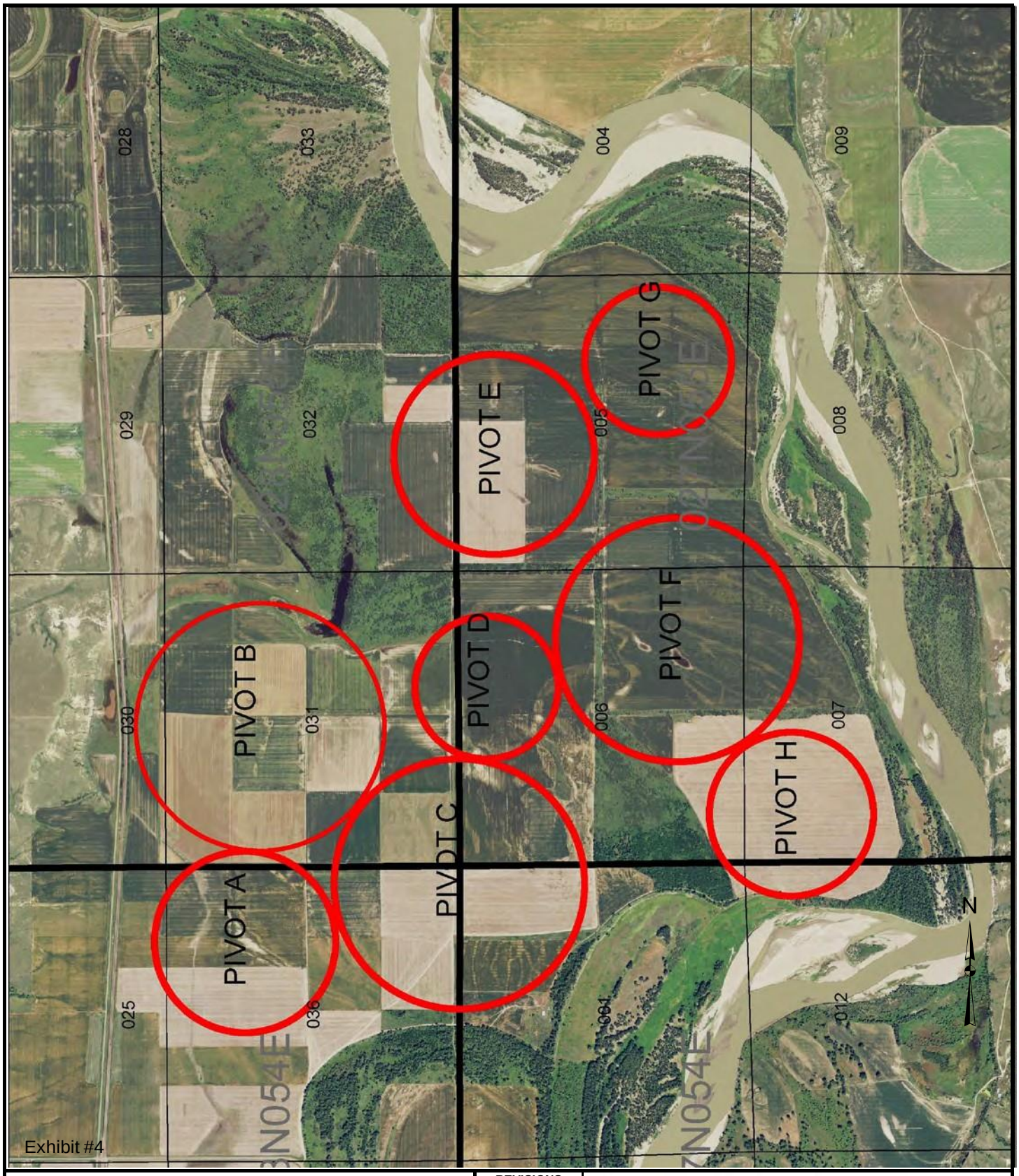


Fort Peck Tribes
Agricultural Resource Management Plan
North Sprole Irrigation Area

REVISIONS	
Date	By

WWC ENGINEERING
1275 MAPLE STREET, SUITE F
HELENA, MT 59601
(406) 443-3962

File:	Drawn By: RDN	Checked By: STH	Date: 2/25/15	Scale: NTS



Fort Peck Tribes
Agricultural Resource Management Plan
Fort Kipp Irrigation Project

REVISIONS	
Date	By

WWC ENGINEERING
1275 MAPLE STREET, SUITE F
HELENA, MT 59601
(406) 443-3962

File:	Drawn By: GPV	Checked By: STH	Date: 8/23/13	Scale: NTS

APPENDIX C

ONSITE NEPA DOCUMENT CHECKLIST EXAMPLE

EXAMPLE

ONSITE NEPA DOCUMENT CHECKLIST

Fort Peck Indian Reservation

Range Unit:

Previous NEPA document that applies:

		Yes	No
1	There are ground disturbing activities **not** described in the previous NEPA document.		
2	Construction of improvements is **not** being constructed as described in the previous NEPA document.		
3	Will fences impede wildlife movement?		
4	Will people be impeded from accessing usual gathering, hunting or fishing areas?		
5	Will usual travel routes be blocked?		
6	There are effects to surface and/or groundwater resources that are not described in the previous NEPA document.		
7	This action will affect a species listed or proposed for its critical habitat listed under the Endangered Species Act.		
8	This action will affect properties listed or eligible for listing in the National Register of Historic Places.		
9	This action would have an adverse effect on unique geographic features, such as wetlands, wild or scenic rivers, refuges, floodplains, streams or rivers, or prime farmlands.		
10	This action threatens to violate federal, state, local, or tribal law or requirements imposed for protection of the environment.		
11	This action will have a disproportionately high and adverse effect on low income or minority populations.		
12	This action will limit access to, and ceremonial use of Indian sacred sites on federal lands by Indian religious practitioners, or significantly adversely affect the physical integrity of such sacred sites.		
13	This action will contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species known to occur in the area, or may promote the introduction, growth, or expansion of the range of such species.		

A "Yes" to any answer will require further analysis of the environmental impacts in an Environmental Assessment pursuant to the National Environmental Protection Act.

Preparer's Name and Title _____

Superintendent Concurrence:_____Date:_____

APPENDIX D

SITE-SPECIFIC CONSERVATION PLAN EXAMPLE