Blackfeet Climate Change Adaptation Plan

BLACKFEET NATION

April 2018

blackfeetclimatechange.com

BLACKFEET NATION

P.O. BOX 850, BROWNING, MONTANA 59417
(406) 338-7521 FAX (406) 338-7530

RESOLUTION

NUMBER 214-2015

WHEREAS, The Blackfeet Tribal Business Council is the duly constituted governing body within the exterior boundaries of the Blackfeet Indian Reservation; and

WHEREAS, The Blackfeet Tribal Business Council has been organized to represent, develop, protect and advance the views, interests, education and resources of the Blackfeet Indian Reservation; and

WHEREAS, According to Article VI, Section 1(a) of the Constitution of the Blackfeet Tribe the Blackfeet Tribal Business Council has the power to negotiate with federal and local governments on behalf of the Tribe and pursuant to Sections 1(e) and 1(g) respectively, has the power to manage all economic affairs and enterprises of the Blackfeet Reservation in an acceptable and businesslike manner and in accordance with the Plan of Operations and pursuant to Section 1(k) has the power to enact ordinances for safeguarding the safety of residents of the Blackfeet Reservation; and

WHEREAS, The Blackfeet Tribal Business Council believes that it is in the best interests of the Blackfeet Reservation, its people and its natural resources to develop a Climate Change Adaptation Plan to maintain the natural function of the Blackfeet Tribes ecosystem because the integrity of this ecosystem is facing extensive threats from climate change; now

THEREFORE, BE IT RESOLVED as follows:

1. That the Tribal Business Council of the Blackfeet Indian Reservation does hereby endorse and support the Climate Change Adaption Plan grant in a Joint Application of the Blackfeet Tribe and the Confederated Salish and Kootenai Tribes to the Bureau of Indian Affairs Tribal Cooperative Landscape Conservation Program to address climate adaptation planning; and

2. That the Chairman and Secretary of the Blackfeet Tribal Business Council are hereby authorized to sign this Resolution on behalf of the Blackfeet Tribal Business Council.

ATTEST

Tyson T. Running Wolf

Tyson T. Running Wolf, Secretary
Blackfeet Tribal Business Council

THE BLACKFEET TRIBE OF THE BLACKFEET INDIAN RESERVATION

Harry Barnes, Chairman
Blackfeet Tribal Business Council

CERTIFICATION

I hereby certify that the foregoing Resolution was adopted by the Blackfeet Tribal Business Council during a duly called, noticed and convened Special Session assembled for business on 21st day of May, 2015, with six(6) members present to constitute a quorum and by a vote of six(6) members FOR, zero(0) members AGAINST and zero(0) members ABSTAINING.

(Corporate Seal)

Tyson T. Running Wolf

Tyson T. Running Wolf, Secretary
Blackfeet Tribal Business Council

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Harry Barnes, Chairman
Terry J. Tatsey, Vice-Chairman
Tyson T. Running Wolf, Secretary
Tinsuwella Bird Rattler, Treasurer

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Timothy Davis
Harry Barnes
Joseph "Joe" McKay
Nelse St. Goddard
Terry J. Tatsey
Tyson T. Running Wolf
Carl D. Kipp
Iliff "Scott" Kipp, Sr.
Roland Kennerly, Jr.

Opening letter for the Climate Change Adaptation Plan

The Blackfeet (Amskapi Piikani) have long believed that we are the caretakers of the land and resources where we have resided for many thousands of years. To this day, we use this land for spiritual and cultural purposes. The Blackfeet Nation strives hard to retain its culture in this modern era where impacts to our world are changing, and that we recognize we must adapt and this plan will help guide us in that endeavor.

The Blackfeet Nation has an abundance of natural resources i.e. forestland, oil and gas reserves, wildlife, fish, water and vegetation and plants that serve our economic, social, cultural and spiritual needs. Our connection to the land and its resources is the base from which we draw on for our cultural and spiritual needs. We hold many of our ceremonies out in the environment following the path laid down by our ancestors over thousands of years. We must hold on to these spiritual ties to the land and pass them on to our youth who are destine to become our future leaders and caretakers of the land.

We live in harmony with the land and the environment and the sustenance that is provided by our lands, and with the gifts of life sustainability come the responsibility to protect the land, water and environment from which we maintain our livelihood. In this document, we hope to use the traditional ecological knowledge of our elders who have lived long lives and have seen the changes over time and can shared their experiences of survival over time to assist in the Climate Change Adaptation Plan.

Harry Barnes, Chairman
Blackfeet Tribal Business Council

ACKNOWLEDGEMENTS

Financial support for this project has been provided by the U.S. Bureau of Indian Affairs, the Tribal Resilience Program, the Great Northern Landscape Conservation Cooperative, and the National Indian Health Board.

This plan would not have been possible without the contributions of many people. We would like to acknowledge the following individuals:

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Cover Photo
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KEY TERMS[†]

Adaptation (climate change): actions in response to actual or expected climate change and its effects, that lessen harm or exploit beneficial opportunities. It includes reducing the vulnerability of people, places, and ecosystems to the impacts of climate change.

Adaptation Actions: actions or activities that the tribe could take to achieve its climate change adaptation or preparedness goals.

Adaptation Goals: what the tribe wants to accomplish in the priority planning areas through adaptation or preparedness actions.

Adaptive Capacity: the ability of a system to accommodate or respond to the changes in climate with minimum disruption or cost. Generally, systems that have high adaptive capacities are better able to deal with climate change.

Climate: the "average weather" generally over a period of three decades. Measures of climate include temperature, precipitation, and wind.

Climate Change: any significant change in measures of climate (such as temperature, precipitation, or wind) lasting for an extended period of time (decades or longer). Climate change may result from natural factors and processes and from human activities that change the atmosphere's composition and land surface.

Exposure: the presence of people, assets, and ecosystems in places where they could be adversely affected by hazards.

Global Warming: average increase in the temperature of the atmosphere, which can contribute to changes in global climate patterns. Global warming can occur from a variety of causes, both natural and human induced.

Greenhouse Gas (GHG): any gas that absorbs infrared radiation in the atmosphere; examples include carbon dioxide, methane, nitrous oxide, ozone, and water vapor.

Mitigation (climate change): actions that reduce the levels of greenhouse gases in the atmosphere; includes reducing emissions of greenhouse gases and enhancing sinks (things that absorb more greenhouse gases than they emit). Examples include switching to renewable energy sources and implementing energy efficiency measures.

[†] The key terms listed here are adapted from the Institute for Tribal Environmental Professionals' (ITEP's) Climate Change Adaptation Plan Template. ITEP has provided the terms for use in tribal climate change adaptation plans and encourages the modification and adaptation to suit each plan. See: http://www7.nau.edu/itep/main/tcc/Resources/adaptation

Planning Area: this is an area in which the tribal government manages, plans, or makes policy affecting the services and activities associated with built, human, and natural systems. For example, within the sector Utilities, you might have planning areas of Water and Electricity.

Priority planning areas: planning areas of particular importance to the tribal government or community which are vulnerable to climate change impacts.

Resilience: ability of a social or ecological system to absorb disturbances while retaining the same basic structure and ways of functioning, the capacity for self-organization, and the capacity to absorb stress and change.

Risk: risk is the consequence of an impact times the probability or likelihood that the impact will happen.

Sector: general grouping used to describe any resource, ecological system, species, management area, etc. that may be affected by climate change. For example, Transportation, Utilities, Water Resources, Forest Resources, Human Health, or Cultural Resources and Traditions.

Sensitivity: how much a system is directly or indirectly affected by changes in climate conditions (e.g., temperature and precipitation) or specific climate change impacts (e.g., sea level rise, increased water temperature). If a system is likely to be affected as a result of projected climate change, it should be considered sensitive to climate change.

Vulnerability: the susceptibility of a system to harm from climate change impacts. It's a function of how sensitive the system is to climate and the adaptive capacity of the system to respond to such changes. Generally, systems that are sensitive to climate and less able to adapt to changes are considered to be vulnerable to climate change impacts.

Executive Summary

Through climate adaptation planning the Blackfeet Nation leadership is actively seeking to protect our communities and diverse ecosystems from the impacts of a rapidly changing climate. This plan is the result of the unique holistic Blackfeet Nation planning process that includes all parts of tribal government, while respectfully considering traditional values and a collective community vision for our future. Underlying the plan is the Blackfeet understanding that people and nature are one and that people can only be healthy if we ensure the health of the environment we are part of. The process and production of this climate plan has been a timely effort that is informing the Blackfeet Agricultural Resource Management Plan which is being developed concurrently. Both plans will then inform the Integrated Resource Management Plan which will be carried out over the next two years.

Planning Process

The Blackfeet Nation climate adaptation planning process began in 2016, led by Gerald Wagner of the Blackfeet Environmental Office and facilitated by the Center for Large Landscape Conservation. Through these internal and external planning activities, the Blackfeet Nation is deliberately planning for the increasing impacts of climate change and also hopes to share their process and lessons with others struggling to make sense of the impact the changing climate is having on their lives. We hope this effort and the resulting plan will lead the way for communities looking to integrate climate adaptation planning into human health and natural resource management.

The planning process began with a review of climate change trends and predictions which are summarized in a table of the predicted impacts specific to the northwest Montana region (see Appendix A). The climate impact predictions were presented at a series of three informational and planning meetings with eight different resource management sectors: agriculture, culture, forestry, fish, wildlife, land and range, water, and human health. The planning team facilitated discussions with the managers and other experts to identify sector-specific impacts within the Blackfeet Nation. Participants in each sector were guided through a process of identifying sector-specific vulnerabilities, using the Institute for Tribal and Environmental Professional's (ITEP) Vulnerability and Risk Matrices and Identifying Priority Planning Areas tool. From the identified impacts, the project team then worked with managers in each sector, often with in-person follow-up meetings, to create goals, strategies, and actions for climate change adaptation.

In addition to the planning work being carried out by sectors within the Blackfeet Nation, planning participants attended a variety of regional and national conferences addressing climate adaptation. Gerald Wagner (Blackfeet Environmental Office) and Melly Reuling (Center for Large Landscape Conservation) were invited to present on holistic climate adaptation planning on a plenary panel at the National Adaptation Forum in Minneapolis, Minnesota in April 2017. They also presented at the Roundtable on the Crown of the Continent Annual Conference and at other regional Climate Adaptation Planning meetings supported by ITEP. The Blackfeet Environmental Office, in collaboration with the Center for Large Landscape Conservation, received a Climate Impacts and Health grant from the National Indian Health Board to look at health-related impacts of climate change in January of 2017. This allowed attendance at the National Climate and Health Conference in Atlanta, Georgia in March of 2017.

Summary of Impacts and Priorities by Management Sector

This section provides a brief overview of each planning sector (chapter): the sector's focus, major climate change impacts to the sector, the priority level for adaptation planning, and the major adaptation goals decided through the planning process. (The specific strategies and actions for each sector goal are located in the plan's chapters.)

Agriculture

While climate change is increasing growing season length, day length and photoperiod will remain constant as temperatures rise. Higher temperatures, earlier snowmelt, decreasing summer precipitation and other climate change drivers will negatively impact irrigated land, grain production, livestock production, and pollinators, and these climate change drivers will also increase the probability for fire. The priority for addressing climate change impacts to agriculture is high, as there is both high risk and high vulnerability.

We have eight goals for adapting the agriculture sector to climate change: to 1) promote healthy ecosystems; 2) create an environment where producers can make money; 3) promote specific types of crops based on human nutrition needs; 4) support cropland production in the Blackfeet Nation; 5) support healthy livestock operations; 6) improve land governance; 7) establish monitoring systems for adapting to changes in the environment; and 8) develop a comprehensive emergency management plan that takes agriculture into consideration to help take advantage of federal programs and money.

Cultural Resources and Traditions

Climate change is shifting the ranges of plant and wildlife species, including species of cultural importance to the tribe. Climate change is expected to impact traditional lifeways, including hunting, gathering, and fishing. It is also expected to impact ceremonial sites and items that are integral to Blackfeet culture and history (artifacts). The priority for addressing climate change impacts to cultural resources and traditions is high, given there is both high risk and high vulnerability.

All members of the Blackfeet Nation are responsible for protecting and preserving Blackfeet tribal culture and cultural properties, under the guidance of the Blackfeet Tribal Historic Preservation Office. Specific adaptation goals, strategies, and actions are forthcoming.

Fish

Warmer temperatures, earlier snowmelt, and decreased stream flow in the late summer months, among other climate change drivers, are negatively impacting fish habitat. Shifts in timing of peak flows, lower flows, higher stream temperatures, and competition from non-native fish are predicted to reduce cutthroat trout and bull trout abundance. Increased frequency and intensity of wildfires will likely increase stream sediment, peak flows, and channel scouring. The priority for planning to protect fish habitat is high given that there is both high risk and high vulnerability.

We have three overarching goals for adapting to climate change impacts to fish habitat: to 1) assess quality and quantity of fish habitat in lakes and streams; 2) ensure healthy habitat for fish and maintain healthy fish populations; and 3) protect recreational fishing opportunities.

Forestry

As temperatures warm and snow pack decreases, climate change is increasing the risk of fires and may likely result in more frequent fires and fires of greater severity. We determined that the priority for addressing climate change impacts to fire management is high, given there is high risk and medium vulnerability.

We have two main goals for adapting fire management to climate change: to 1) ensure the health and productivity of natural resources in forest and range systems in the face of changing fire regimes; and 2) address wildland-urban interface issues to protect communities from increasing fire risk.

Human Health

For planning purposes, the human health chapter focuses on air quality and vector-borne diseases, though climate change impacts to human health are much more extensive and varied. Changing weather patterns are increasing the populations and changing the geographical and seasonal distributions of some species that carry viruses and diseases such as mice (Hantavirus), mosquitoes (West Nile virus), and ticks (Lyme disease). Climate change also poses a threat to air quality, as forest fires are expected to increase in frequency and severity. Airborne allergens like tree, grass, and weed pollen, plus indoor and outdoor molds, are expected to increase. Climate change has disproportionate impacts children, pregnant women, persons with disabilities, older adults, people in more vulnerable occupational groups (like people who work outside and emergency response personnel), people who live or work in buildings without air conditioning and ventilation controls, and persons with preexisting chronic medical conditions have more vulnerability to health impacts from climate change. The priority for planning for human health is high, as both risk and vulnerability are high.

We have six overarching goals for adapting to climate change impacts to air quality and vector-borne diseases. We want to 1) increase air quality monitoring; 2) increase monitoring of vectors and vector-borne diseases; 3) increase community awareness of climate-related health risks and adaptation techniques; 4) explore ways to possibly reduce mosquito populations near homes, schools, and places of work; 5) improve air quality in the Blackfeet Nation; and 6) enhance medical service provision for people with medical conditions related to air quality or vector-borne diseases.

Land and Range

The land and range chapter focuses on protecting native grassland vegetation in a changing climate. Changing precipitation patterns are expected to increase the spread of noxious weeds and will impact plant composition in native rangeland, particularly of fescues. The priority for land and range planning is high, given high risk and medium-high vulnerability.

To meet our broader goal of maintaining healthy grasslands by preserving native vegetation species mix and reducing noxious weed invasion, we created seven action steps. The adaptation actions include reexamining and adjusting, if and when necessary, grazing and stocking rates to account for climate change impacts, as well as regulating hay coming into the Blackfeet Nation (i.e. hay must be certified weed free).

Water

Climate change is expected to decrease both water quality and quantity as temperatures increase, snowpack levels decrease, snowpack melts earlier, precipitation patterns change, and late summer stream flows decrease. The priority for addressing climate change impacts to water quality and quantity are high, as risk and vulnerability are both high.

We have three main adaptation goals in the water sector: to 1) reduce the frequency of higher-intensity floods in order to reduce erosion, property damage, and habitat damage or change; 2) assess floodplains to mitigate future property damage, and 3) ensure that downstream users have access to sufficient water flows and water quality.

Wildlife

The wildlife chapter focuses on planning to maintain wildlife populations and habitat and limit impacts of a changing climate. There are two key pathways for wildlife habitat loss in a changing climate: 1) increases in invasive species, and 2) decreased connectivity. Changes in climate are already affecting wildlife habitat in many ways, including influencing insect outbreaks, changing wildfire frequency, intensity, and behavior, and altering water levels in wetlands, streams, and lakes. We determined that the planning priority is medium-high.

Elk are one of the many species in the Blackfeet Nation that may be impacted by climate change.

We have ten strategies for reaching our goal of maintaining wildlife populations and habitat in the face of changing climactic conditions. We strive to 1) reduce and mitigate human-wildlife conflict; 2) educate and promote an understanding of connectivity, climate change adaptation, and wildlife; 3) understand and maintain the integrity of core habitat areas in the Blackfeet Nation and better protect them; 4) protect ecological connectivity to endure that fauna can adapt to climate change; 5) reassess and establish hunting and fishing limits to align with populations affected by climate change; 6) cooperate with range services to positively impact range habitat for wildlife; 7) coordinate with forestry to implement wildlife-related best management practices; 8) understand population dynamics of a variety of birds, mammals, reptiles, and amphibians in light of stressors including climate change and human disturbance; 9) create action plans for protecting priority species; and 10) build a healthy partnership with the Oil and Gas Department and Blackfeet Forestry (to offer opportunities to comment on management plans between departments and to develop trust and improve inter-departmental communication).

Implementation of this Plan

This plan is meant to be a "living document," intended to be regularly revisited and updated to reflect changes in the tribe's needs and priorities (as illustrated in Figure 1). To be most effective, each sector will monitor and measure progress in implementing adaptive actions and help determine whether actions are enhancing the tribe's overall climate change preparedness. The completed sector chapters are a significant body of work from which to start building resilience to climate change impacts, and they are a base from which to build future project work, research and funding. This plan will inform the tribe's larger planning processes, including the holistic management planning, water resources management planning, agriculture resource management planning, and food security planning processes that are currently underway. This plan will continue to be integrated into all other relevant planning processes in the Blackfeet Nation. Likewise, these planning processes can feed back into future climate change plan updates and revisions.

FIGURE 1: CLIMATE CHANGE ADAPTATION CYCLE

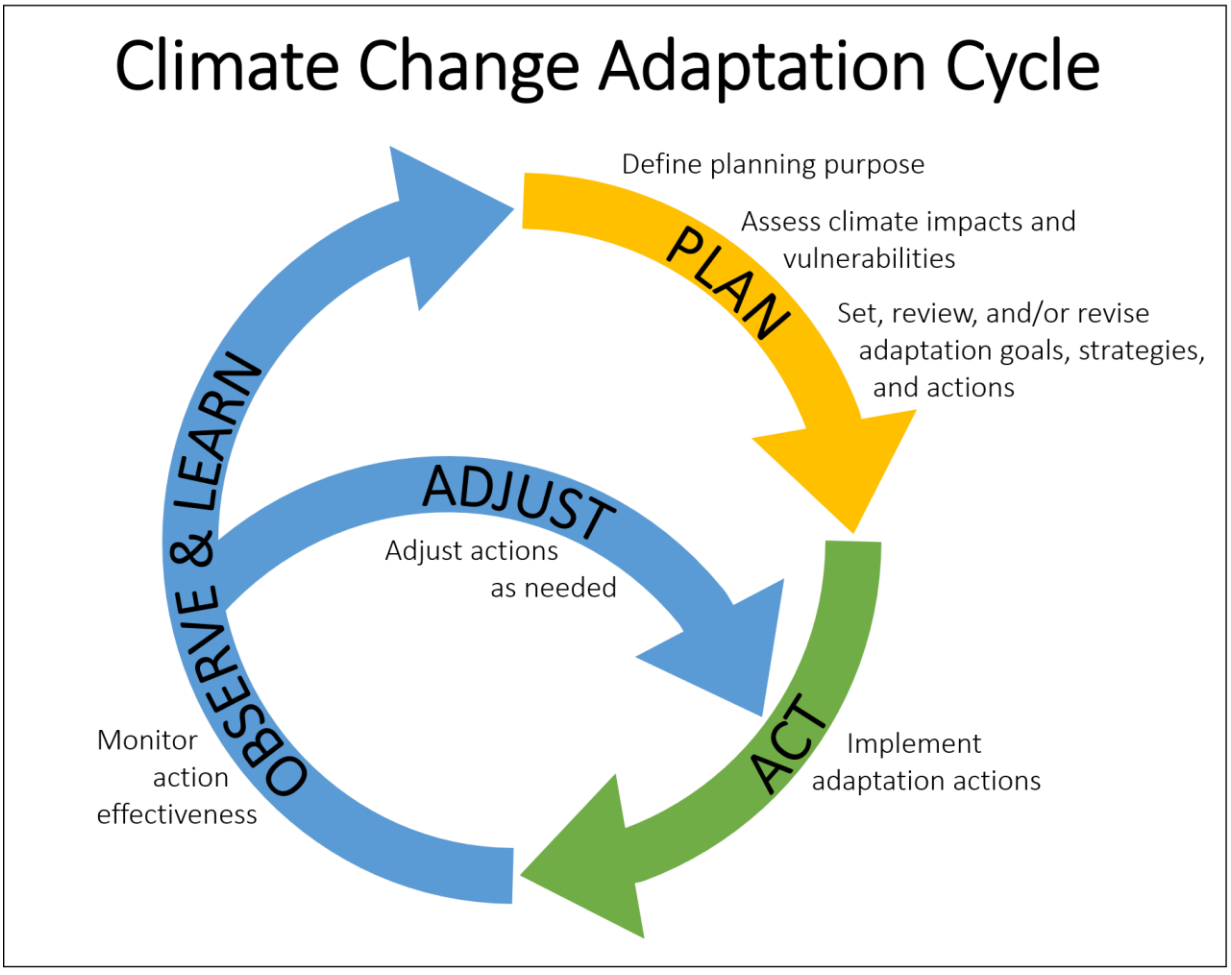


Diagram modified from Climate Smart Conservation Cycle Framework in Climate-Smart Conservation: Putting Adaptation Principles into Practice[1] and DPIPWE 2014 after Jones 2005, 2009
https://www.betterevaluation.org/sites/default/files/Tasmanian%20Parks%20and%20Wildlife%20Service.jpg

1. Introduction

Many people of the Amskapi Pikuni Nation have been noticing changes in local weather patterns for quite some time. People nationwide, as well as globally, are witnessing the changing of climates. Cattle producers and those who catch lobster off the coast of Maine, people who grow wheat and corn in the Midwest, coastal tribal members who fish the oceans and rivers for salmon, halibut, and crab, people who manage the already depleted water resources in the Southwest, and urban community dwellers are all observing climate-related changes that are beyond what their average weather experiences have been throughout their lifetimes or what oral histories have shared for tens of thousands of years.

Observing weather patterns and changes in those patterns has been a part of *Niitsitapiiksi* (The Real or The Original People) existence since breath was first breathed into our lungs by Creator. Within our homelands, we were the first climate scientists or climatologists, the first physicians and weathermen, the first hunters and wildlife biologists, the first equine and canine veterinarians, geologists and medicine people, the first to walk holy, the first to have and love and provide for our families in this nation, the first stewards of the land and water and all that lived on the land (*Ksakoomitapiiksi*), flew in the air (*Natoyiitapiiksi*), or lived in or around the water (*Soyiitapiiksi*). We have lived in and for our traditional homelands for thousands of generations, adapting to a changing world and changing climates.

Climate change is defined as an overall change in average weather patterns, continuing over a long period of time. The science of "climate change" used to be debatable. Even if people were mildly concerned about the possibility of the world's climates changing, many believed this was a concern for the future. However, the reality of the current changing weather patterns globally can no longer be debated. Weather patterns create climates that either support or do not support people and nature in the various regions of our world.

The reality of the current changing weather patterns globally can no longer be debated.

Climate change can no longer be ignored or left to future generations. The world's weather patterns are changing and decades of overwhelming independent scientific records from weather stations, satellites, ocean buoys, tide gauges, and many other non-biased measuring instruments worldwide are providing data that all confirm that our planet, and hence the Amskapi Pikuni Nation and the Blackfoot Confederacy Homelands, is warming.[2,3]

Climate Change is here, grounded firmly in the present. The world's weather patterns are changing due to human activity and the effects are being felt not only within the Blackfeet Nation, but also worldwide. Because of the BEO Director's strong interest in climate change, its impacts to the Blackfeet Reservation, and its undeniable warming of the planet, this Blackfeet Climate Change Adaptation Planning (BCCAP) was begun.

Five years ago, a study to learn the priorities of the Pikuni people concerning climate change was initiated by a tribal member and her colleague.[4] Many of the results from this investigation and the "voices of the people" are included in this Plan. Amskapi Pikuni priorities for climate change adaptation were also included in the National Climate Assessment (2016). The National Climate Assessment is a summary of the impacts of climate change (now and in the future) from a team of over 300 scientists, assessing key impacts on all U.S. regions: Northeast, Southeast and Caribbean, Midwest, Great Plains, Southwest, Northwest, Alaska, Hawai'i and Pacific Islands, as well as the country's coastal areas, oceans, and marine resources. The National Climate Assessment helps us to understand what changes are actually happening around the country and what this means for our lives and the living things around us.[5]

The BCCAP is the beginning of a strategic effort to protect our homelands, the relationships that we have with our homelands, and the life that is sustained by these diverse ecosystems.

The fundamental relationships that exist between the Indigenous Peoples of this nation and the distinct ecosystems that make up this part of the world is built upon interrelationship. This symbiotic connection between all things living and the *Siksikaitapiiksi* (Blackfoot Confederacy People) has existed ever since Creator placed us here, within our traditional homelands, in much of what is now called Montana, Alberta and Saskatchewan, Canada, as well as regions of both Idaho and Wyoming. This coexistence governed our "ways of being" and "ways of knowing," and is evidenced throughout the fabric of our holy ceremonies, culture, language, traditional names, societies, and past and current ways of life.

"Indigenous knowledges, as the ancient traditions of many peoples around the planet remind us, reside in the land, in the life that constitutes the ecologies in which we participate, and dwells within the earth's environments."

- Daniel Wildcat, Muscogee Creek Nation

This relationship has been disrupted to some degree by forced assimilation policies such as the multi-generational residential institutional boarding school system that caused a measurable disconnect to the land, a diminishment of relationship with our helpers: the four-legged, winged, and those that live in and around the water, a change in our natural "first-language" capability, and the amount of community members that walk in our holy ceremony ways. Nevertheless, our traditional Amskapi Pikuni Blackfeet understandings, language, and ways of knowing are some of our strongest weapons and an ally against a changing climate. Even though forced assimilation policies (such as the Relocation Act) have been major drivers in over 70% of our tribal members and members' children and grandchildren living away from the Blackfeet Nation, many are deeply rooted in the homelands, their families, and the spirit of the people.

Our traditional Amskapi Pikuni Blackfeet understandings, language, and ways of knowing are some of our strongest weapons and an ally against a changing world climate.

In this chapter, we provide a very brief background on Blackfeet tribal history, governance, culture, socioeconomic opportunities and challenges, and a program designed to prepare future Blackfeet climate change leaders. We then provide an overview of climate change planning in the region.

1.1 Blackfeet Tribal History, Governance, and Culture[†]

The Amskapi Pikuni (Blackfeet) are the southernmost members of an independent confederation of four Blackfoot warrior tribes of the Northern Plains. The four member-nations of the Blackfoot Confederacy, sovereign from north to south, are the Northern Piikani or Aapatohsi Piikani, the Siksika (Siksikawa), the Kainai (All Chiefs or Blood) and the Amskapi Pikuni or Southern Pikuni. Of the four tribes of the Blackfoot Confederacy, the Amskapi Pikuni is the only tribe that was divided to the south by the foreign governments' decisions to create the United States/Canadian border. Disparagingly, this isolated the Amskapi Pikuni from their relations to the north, straining or severing familial and community ties in the past in multi-variant ways.

For thousands of generations the Amskapi Pikuni fiercely defended and enjoyed a vast region of territory with their three other member tribes. These lands stretched westward along The Backbone or what is now known as the Canadian and Montana Rocky Mountains or Crown of the Continent (*Miistahksistsi*), with the mountains being a western border. To the north, Blackfoot Confederation homelands were delineated by the North Saskatchewan River (*Ponoka Sisaahta*). What is now Missoula's Hellgate Canyon formed the southwest border of Confederated Blackfoot territory. From here, homelands extended eastward along the Yellowstone River (*Otah koii tah ta yi*) to Apsa'alooke (Crow/Maistoo) Country, skirting the edge of the Northern Cheyenne tribal lands and then running northwards along the boundaries of Lakota, Dakota, and Nakotah Nation.

At this eastern boundary of the Blackfoot Confederacy homelands, going due north past the Sweet Grass and Cypress Hills, and the Medicine Line or *Kaayih kimi koyii* (United States-Alberta Alberta-Saskatchewan borders), our territories rose up past what is now Hobbema, Alberta to the northernmost boundary set by the North Saskatchewan River (Figures 2 & 3).

[†] This section was written by Kim Paul PhDc, with her thesis as a key reference:
Paul, K. (2015). *Stories of Contaminated Waste Sites in Amskapi Pikuni Blackfeet Country.* Retrieved from https://scholarworks.umt.edu/cgi/viewcontent.cgi?article=5545&context=etd

FIGURE 2: ORIGINAL BLACKFOOT TERRITORY, 1800

Rather than incorporating a written account of our history within these homelands, Amskapi Pikuni records were kept via oral tradition for hundreds of generations. Creation stories attest to our beginnings within the territory where we are at present. The seasonal movement of bands across these same lands has provided the natural rhythm of life since creation, and our summertime gathering together of our many bands has always been a traditional time of passing on the combined histories of the confederated tribes. This has always been the way of the *Siksikaitapiiksi*. Oral history accounts were accepted as fact, not just as anecdotal tales.

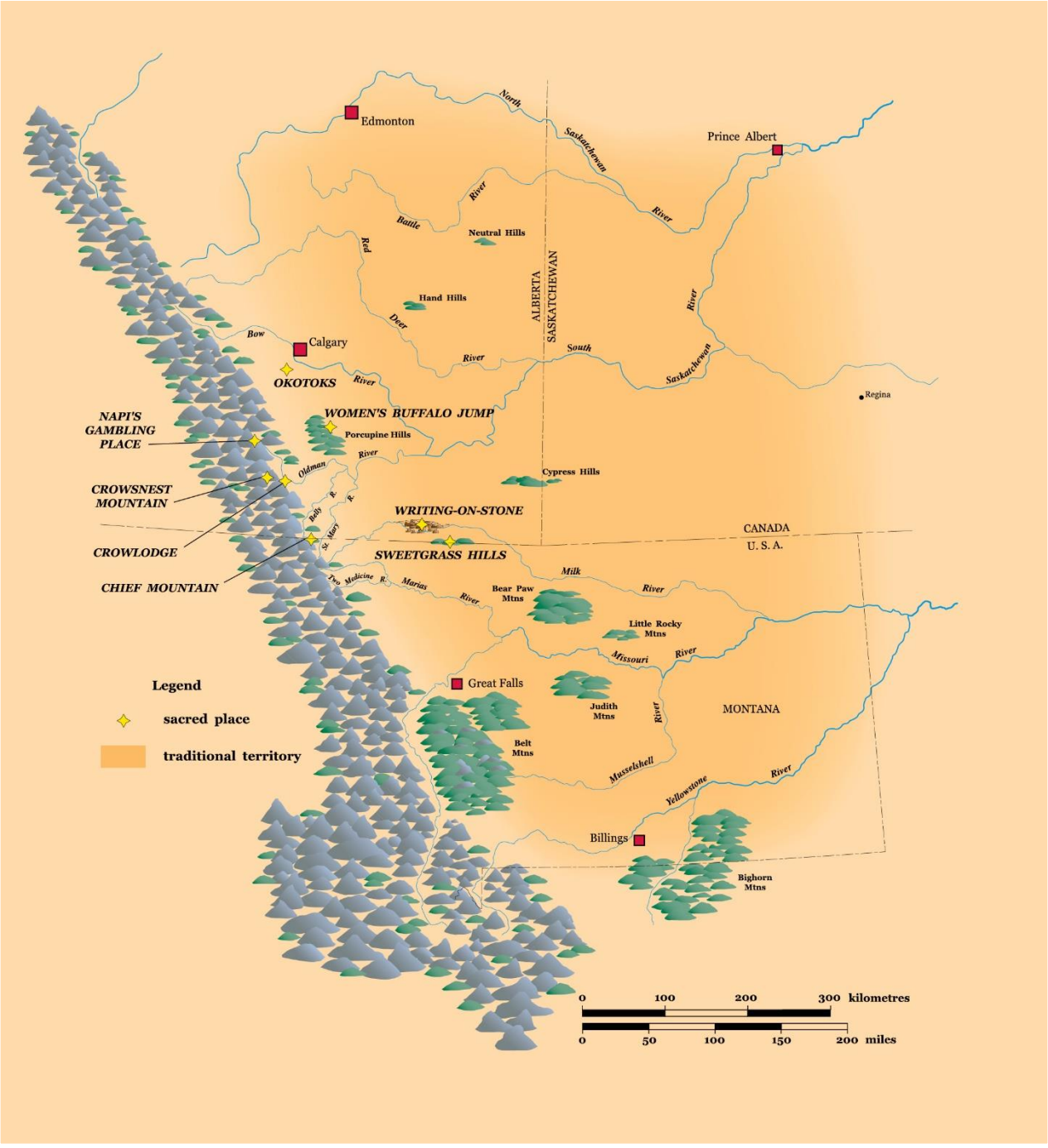
Such verbal retellings over generations kept the "recordings" in memory. Accounts of these combined histories emerged within stories of seasonal hunts, warrior activities and societal responsibilities, gatherings of nations, ceremonial structures, population records, band movements, and simple day-to-day lifestyles. Accounts of hunting buffalo on foot, before the horse came to the Northern Plains, go unquestioned. These are our histories, whether written or not. Repeated generational versions of the diverse ways buffalo jumps were used, along the cliffs above Lower Two Medicine River, are featured in many oral history accounts, as well as oral reports of the "last" buffalo hunt along the Sweet Grass Hills.

While hundreds of lodge/tipi rings, tools, *iinnii* (buffalo) skulls and bone fragments have been found at the sites, the stories are much richer than just the archaeological record. There is little tangible evidence (western science methodology) regarding most aspects of the traditional oral history record of the Pikuni, yet many Pikuni understand that the stories are true and continue to share them forward. As our stories advance into the present and the future, we are now beginning to include a changing climate.

This oral history keeping was not entirely extinguished with the advent of the non-native population's successful access to and "ownership" of traditional Blackfoot Confederacy territories. However, it was greatly minimized by the cultural and societal changes that were a consequence of the forced assimilation policies, most definitively by the boarding school era. The forced or coerced removal of children, to adulthood, to far-away places such as Carlisle, Pennsylvania or Genoa, Nebraska has had many negative impacts to our people, though we are working to change this. During these times, we understand that many atrocities were committed. We also recognize that our people were punished for speaking in their only language at the time, and as a consequence they often refused to speak our first language in children's presence, or to teach their children. We further understand the mission of these residential schools was to "kill the Indian and save the man,"[6] thereby strategically diminishing all that it meant to be Pikuni at that time. Oral history keeping was also diminished by the cultural and societal changes that were a result of the imposed "reservation" boundaries, and the Canadian/American border.

Along with the disruption of an oral history keeping culture as old as time, odiously, our spiritual connection to our Creator and all Holy Ones, and our spiritual belief systems became

Figure 3: Blackfeet Traditional Territory



The Blackfoot's traditional territory spread eastward from the Rocky Mountains, across the northwestern plains. *Figure Courtesy of Glenbow, Calgary, Alberta.*

illegal nationwide. Further, we were no longer able to continue the thousands of years old Amskapi Pikuni form of governing ourselves and instead began a different way.

As Pikuni, we have all been affected by the generations of abhorrent theft of our territories, identity, language, and variable destructions of our ways of life. It is effortless to make the connections between this particular piece of our history and our current challenges.

Considering the far-reaching impacts of these assimilation strategies to our ancestors, our grandparents, our Aunties and Uncles, cousins and siblings, ourselves, our children, and our grandchildren, it is taking a concerted and consistent effort by many past and current community members to reclaim and regrow our language, strengthen our traditional ways of being and our ceremonial relationships, and to return to conscientious stewardship of all that we have been blessed with (to include each other). There were, and still are, many challenging consequences to the genocidal practices that were imposed upon us, but we are still here and we are thriving.

The expansive lands that the Blackfoot Confederacy fiercely defended for tens of thousands of years diminished with the coming of non-native trappers and settlers from the East, North and South. It was not that the Blackfeet homelands were lost through a series of battles with anyone. Instead, disease came with the incoming non-Natives, diseases to which the *Siksikaitapiiksi* had no acquired immunity.

Because we were an oral history people, our winter counts have been lost over the generations, for many reasons. As a result, we must use non-Native accounts and data from those days. A student of earlier Blackfoot history, McClintock (1910) estimated the total Blackfoot population in 1780 at 30-40,000.[7] A smallpox epidemic that erupted in 1781-82 was probably initiated by contact with the Hudson Bay Company and Northwest Fur Company trappers, after they set up posts on both branches of the Saskatchewan River. The contact with the trappers resulted in death for about half of the Confederated Blackfoot, claiming approximately 20,000 lives.[8]

A measles epidemic killed another third of the population in 1819. In 1836, many Confederated Blackfoot children died of diphtheria or "strangulation of the throat".[9]

A subsequent smallpox epidemic a year later came with the first steamboat to arrive at the headwaters of the Missouri River in 1837, the S.S. St. Peters. Of the remaining Amskapi Pikuni, there were an estimated 4,000 fatalities between 1837 and 1838.[10] The smallpox epidemic was so horrendous and prolonged that it was recorded in the Southern Pikuni winter count for two years.

In 1864, an epidemic of scarlet fever decimated the surviving Blackfoot bands. Over 1,100 more Blackfoot had died by the spring of 1865. The Confederated Blackfoot then attacked a notorious "whiskey fort" and trading establishment in the Cypress Hills called the Rocky Mountain House, blaming the British traders for the scarlet fever epidemic. By 1890, over

three-fourths of the remaining Pikuni had died from recurring smallpox, measles, scarlet fever, diphtheria and starvation. Only 4,560 Amskapi Pikuni (Southern Blackfeet) remained in 1907.[11]

During this time, the incoming foreign governments created legislations as far away as Paris, France, London, England, and the District of Columbia to set lines of demarcation between what is now Canada and the United States.

These legislations may as well have been written and agreed upon on the moon, for the original people of both countries neither knew anything of them, nor spoke the language they were written in.

List of Treaties and Events:

1783: The Paris Treaty (*Not signed by the Blackfeet*)

1794: The Jay Treaty (*Not signed by the Blackfeet*)

1817: The Rush-Bagot Treaty (*Not signed by the Blackfeet*)

1818: The London Convention (*Not signed by the Blackfeet*)

1842: The Webster-Ashburton Treaty (*Not signed by the Blackfeet*)

1846: The Oregon Treaty (*Not signed by the Blackfeet*)

1851: The Fort Laramie Treaty of 1851. (*Not signed by the Blackfeet*) – The Blackfeet refused to attend this treaty negotiation, though one source estimates that 10,000 people attended from various tribes. Consistent with "negotiations" at this time, Article 5 defined Blackfeet Territory, extremely and illegally diminishing the land-base by now defining the parameters of the Musselshell, Missouri, and Yellowstone Rivers, as well as the Rocky Mountain Range as the exterior boundaries.[12]

1855: Lame Bull Treaty / Judith River Treaty (See Appendix B - *This is the only treaty ever signed by Blackfeet, potentially under false pretenses*) – This treaty was attended by the Blackfeet, Nez Perce, Salish, Pend d'Orielle, and Flathead. It is passed down in oral history accounts that the Blackfeet believed they were signing this document to create a common hunting ground, as many people of different tribes at this point were starving. As there were no fluent English-speaking Blackfeet at the time, the Blackfeet were completely dependent upon a translator hired by railroad interests. The Blackfeet understood that their signatures were agreeing to this designation only for a period of ninety-nine years. Ratification of this treaty took place in 1856.[13]

1865: Treaty of 1865 (*Not signed by the Blackfeet)* - Although this treaty was never ratified, nor agreed upon by the Blackfeet, it was a maneuver by then Montana Governor Meagher and the Indian Agent in Blackfeet Country, Gad Upson. It was a further move to decrease Blackfeet lands and even without ratification, settlers moved into the areas proposed for cessation illegally.[14]

1857-61: The Northwest Boundary Survey (*Not signed by the Blackfeet*)

1870: Bear River Massacre – The early morning massacre of over 200 (though this number could be much greater by oral accounts) Amskapi Pikuni children, teens, mothers, grandmothers, grandfathers, and others, while the men of the camp were away on a hunt. All because one non-Indian was killed by a Pikuni man. One man, whom was kicked out of a military academy due to his erratic behavior and unwarranted violence…One man, who beat his wife often (the sister of the man-Owl Child-who killed the non-Indian). So many lives for just one man.

1873-74: Executive Orders were proclaimed by then President Grant, to further diminish the Blackfeet people's homelands. This Executive Order vastly reduced the lands of the Blackfeet, Assiniboine, Gros Ventre, and Sioux. The lands involved in yet another illegal consumption of territory, traversed land north of the Missouri and Sun Rivers, all the way east to the Dakota borders. With this Executive Order, the southern boundary of Blackfeet territory was reduced from the Sun River to the Marias River.[15]

1872-76: The International Boundary Survey (*Not signed by the Blackfeet*)

1875: In this year, pressure was placed upon President Grant for the restoration of lands taken by the 1873 and 1874 Executive Orders; "some of the lands" were returned.[16]

1880: Another Executive Order (President R.B. Hayes) in the far-away place Washington DC, stole back the land returned by President Grant in 1875.[17]

1883-84: Starvation Winter- Over 500 Blackfeet people were deliberately starved and died at Old Agency, awaiting the rations.[18]

1886: The Dawes Act (*Not signed to by the Blackfeet*) - Many agree that this Act was one of the most heinous, strategic, governmental assimilation legislations ever imposed upon the Blackfeet and all Indigenous people nationwide. Again, this legislation was created and forced upon sovereign tribal nations by legislators in Washington DC, which could have been as far away as the moon to the Pikuni. This policy changed the Pikuni way of life, and that of all of this nation's original people, forever. In essence, the Dawes Act was the authorization for all American Indian lands to be surveyed and divided into small individual "allotments," wherein we were "given" small parcels of our own lands that were already ours. In this way, the government decided that only certain Blackfeet could "receive" lands (decided by age and gender), thereby enabling the government to only allot a small percentage of the Blackfeet population while stealing a great portion of land. In addition, the tens-of-thousands of years old social systems of the Pikuni were almost destroyed. People were moved onto the individual allotments and the tribal band system of subsistence and seasonal movement, community, protection, relationship, interrelationship with biosystems, provision, and existing social units was severely strained. Carlson (1981)[19] determined some of the specific goals of the government, via the Dawes Act, to be:

1) Breaking up of tribes as a social unit
2) Imposing legislation that ultimately would drastically reduce Native lands, by minimizing the number of Native people allotted and thereby freeing the remaining un-allotted Indian lands to white settlers, for profit
3) Creating an individualistic society as opposed to a community/band-minded society

Certainly, we can clearly see and experience the devastation this particular Act imposed, and continues to impose, on Native people.

1907-1908: Enforcement of the Dawes Allotment Act began with the Pikuni. It is rumored that this occurred so that the illegal International Water Treaty of 1908, taking all waters from the St. Mary River (with no compensation nor thought to the Pikuni water rights or needs) up into Canada. Only 2,656 Blackfeet tribal members were allotted at this time,[20] though the number of tribal members was much higher, so that the remaining tribal lands could be deemed "surplus" and again taken.

1911: Post-allotment lands were opened up for sale. It is estimated that within the Blackfeet tribe alone, over 156,000 acres were stolen in this way,[21] with the money received for these lands going to the U.S. Government.

1911: Some additional allotments were made, for children born after the middle of the year. They "received" 80 acres of their own land.[22]

1925: The International Boundary Commission

These legislations may as well have been written and agreed upon on the moon, for the original people of both countries neither knew anything of them, nor spoke the language they were written in. The original inhabitants of the land were not consulted, nor did they agree to their homelands being divided by a protracted series of actions that people of European descent perpetrated against the Blackfeet people through "westward expansion." After being forcefully divided from our relations to the north, unbeknownst to the Amskapi Pikuni, homelands were quietly taken by a series of actions, generally initiated in Washington, DC. The policies and practices of westward expansion and "manifest destiny" systematically removed the ties of Blackfeet people to Pikuni homelands, culture, and identity, such that government or business interests could invade the region, taking land and resources.

It is understood that these debilitating impacts were not purely a result of culture-based collisions with non-natives but were part of an organized governmental plan to marginalize Indigenous peoples for their land-base.

During this time, the U.S. government contracted the slaughter of over 25-30 million buffalo to force starvation, and weaken the tribes of the Northern Plains.[23,24] Then came further governmental land grabs, the forced removal of children to boarding schools, and an early morning surprise massacre of a camp of elders, women and children (Bear River, Jan. 23, 1870),

all rapidly decimating the remaining Amskapi Pikuni.[25] In 1907, in what was becoming the United States of America, Montana was newly considered a state. In this same year there remained only approximately 4,560 Amskapi Pikuni in the southern portion of their homelands.[26]

Without a doubt, our past informs our future, while our present speaks volumes towards our strength, courage, and resiliency.

While there are many painful, repeated, generational impacts due to the forced assimilation policies and genocidal practices imposed upon us, as Amskapi Pikuni in 2018, we are over 17,000 members strong. Beyond that, our people potentially number ten times more than this count, or more. Our people include our children and grandchildren, aunts and uncles, cousins, and sisters and brothers that we value and love, whether they are on the government roles as tribal members or not.

We still retain approximately 1.5 million acres, and our territory is one of the largest sovereign tribal nations within the United States. We understand that what is now called Glacier National Park, is a part of who we are, have always been, and will always be.

Our Amskapi Pikuni Nation is often described as "stepping back in time," and in some ways, this is true. We can employ humor as a buffer when challenged in many areas related to this.

We can also be proud that to a great degree, we have protected our many species of fish and wildlife, plant communities, and "over 518 miles of streams and 180 bodies of water, including eight large lakes".[27] We can take heart in our active recovery of our first language, we are strengthened and protected by the repatriation of our Holy Bundles and Medicine Pipes. We are proud of the decades long battle, that many members of our tribe have continued, to protect the Badger-Two Medicine areas. We are further encouraged by the safeguarding of Ninnastako, Chief Mountain. As a people, we are counting coup by our existence. We are Pikuni.

We are a vibrant, rich people, whom have survived some of the worst holocaust oppressions known to mankind. We are resilient beyond the definition of this word. As a tribe, a combined community of people, we are determinedly creating a strong future; one of recouping our land-base,[28,29] our language,[30,31] our spiritual beliefs and ceremonies and the fabric of who we are, our economy, and the protection and sustainability of "All that is Pikuni." Yes, we may be challenged and suffer in many ways still…but "the times they are a changing."

Current Governance:

The Amskapi Pikuni Tribe, of what is now known as Northern Montana, is currently governed by a nine-member tribal council, the Blackfeet Tribal Business Council (BTBC). The council oversees the management of tribal lands and resources, business enterprises, and programs and services of the tribe. The BTBC elected leaders are representative of the four regions within the Blackfeet Nation and serve four-year staggered terms, with elections being held in June every other year.[32]

The protection and governance of the sovereign Pikuni Nation and its people is an honor-bound relationship that extends back to creation, and though the selection process has changed, the traditional principles and values of stewardship have not.

Culture:

Unlike many tribal nations within the U.S., we, the Amskapi Pikuni remain within our traditional homelands. We have been here since the beginning. Although it is worthy to note that tangible archeological evidence proves this within the scientific paradigm, more imperatively, our Pikuni critical understandings, our Creation stories, place us here. They do not speak of a far-away country that we migrated from across a land bridge, our Creation Stories place us in the very same lands, from the North Saskatchewan River down past the Yellowstone River, from the mountains eastward into what is now Saskatchewan and the North and South Dakotas. We have occupied this region for over 10,000 years.[33]

In many ways, our culture, being intertwined with "place" and our first language, has been preserved while we have expanded our lifestyles to include the current times. There is no doubt that we were hard hit by the calculated annihilation of the buffalo, the systematic reduction of our territories, the diseases that came with a foreign people which we had no developed immunities to, and the forced assimilation policies imposed upon us by a foreign government. Still yet we remain, we are victorious, we count coup with our every breath. Our culture remains, our holy bundles and medicine pipes are steadily returning. These gifts from Creator, once illegal, have been recovered by the unified dedication and steeled determination of some of our tribal members (both here and across "the line") and we are grateful. Our Holy Ceremonies are recovered and there is forward movement in the re-establishment of the age-graded warrior societies that provided a foundation of responsibilities, respect, and life-tools essential to the protection, survival and provision of our family units, bands, and tribe.

Although the societies have changed through the years, as we continue to *iikakiimaat* (try hard), we will fortify and reclaim all that remains of the structures that helped our people be strong and care for each other. Society membership begins at a young age, like our Chickadee Society, learning the responsibilities, songs, and dances that are transferred with membership, learning how to care for the old people, care for the camp, keep wood by each lodge, and to

encourage younger society members. Depending on your age or accomplishments, a Pikuni might be a member of any of the other following societies:

Kakoiks - Pigeons/Doves

Soiis ksisiiks – Mosquitoes

Maatsiiks – Braves

Kanatsomiitaiks – Crazy Dogs

Iisoyii – Front Tails/Tails

Maistoopatakiiks – Crow Carriers

Imiitaiiks – Dogs

Sinopaiiks – Kit Foxes

Iinakiiks – Catchers/Seizers/Soldiers

Motokiiks – Buffalo Women Society

Stumikiiks - Bulls

Iikskinai – Horn Society

The complex social systems of the four distinct Blackfoot divisions was intricate, well developed for practicality, resource provision, protection of the people and homelands, social order, and familial relationship. It is shared that our societies actively worked together to maintain order in the camp, perform daily duties, keep watch at all times of day and night, administrate the directions of the hunt, strengthen relationship, and carry the responsibility of the welfare of the people. This societal way of life preserved and sustained the needs and growth of a fluid people, in constant movement, depending on the forces of the seasons or the nutritional needs of the people. These traditional societies also include current societies that are more region-oriented such as the Green Wood Burners, Rough Riders, etc.

Our many traditional food sources and medicines are tied to our homelands and woven into our culture and holy ceremonies, remaining with us to this day. We gather our medicines, our holy smudges, and our traditional plant and animal foods from the many diverse ecosystems that continue to thrive in Amskapi Pikuni Country. We have been taught that some plants are heart medicine and some pull poison from a spider bite, while others take the pain from a bee sting. We know the plants used for teas to cure ulcers and stomach upset, the ones to stop a wound from bleeding. We have transferred rights for some medicines and others are for day-to-day living. We understand that some plants have multiple uses and we have passed down the correct times of year to gather these plants, as well as what part of the plant to use, and how to use it. We gather from the mountain areas, from wetland areas and stream banks, we gather from meadows and plains. We pass our understandings on. Hunting food sources remains an important means of providing for our grandparents and families. We learn at a

young age to be respectful of the life that is being given, whether for food or medicine or to call our Holy Ones. This is part of being Pikuni.

Our culture has expanded to include a celebration of our old ways via pow-wow competitions and social dancing, we continue to work hides, bead, make our family's moccasins, we still win and lose at stick game, we carry pipes, rattles, bundles, medicine pipes, we sit holy. We take part in western education and ways of providing for our families, via employment practices that are as diverse as the landscape. We are now ranchers and poets, teachers and physicians, we are espresso shop owners and counselors. We are Indian Relay superstars, lawyers and scientific researchers, we walk holy, we play team and individual sports, and we participate in rodeo. We are learning about food sovereignty and social justice, we are fighting against health disparities, and as a determined effort we are continuing our culture through the protection of our diverse ecosystems within a changing world and climate, to include the *Natoyiitapiiksi, Ksakoomiitapiiksi, Soyiitapiiksi,* and *Niitsitapiiksi*. Our culture is our homelands, our ceremonies, our people, the ones that live in the air, on the land, and in the water. The continuance and protection of our culture is being achieved as we move forward in the adapting to a changing climate.

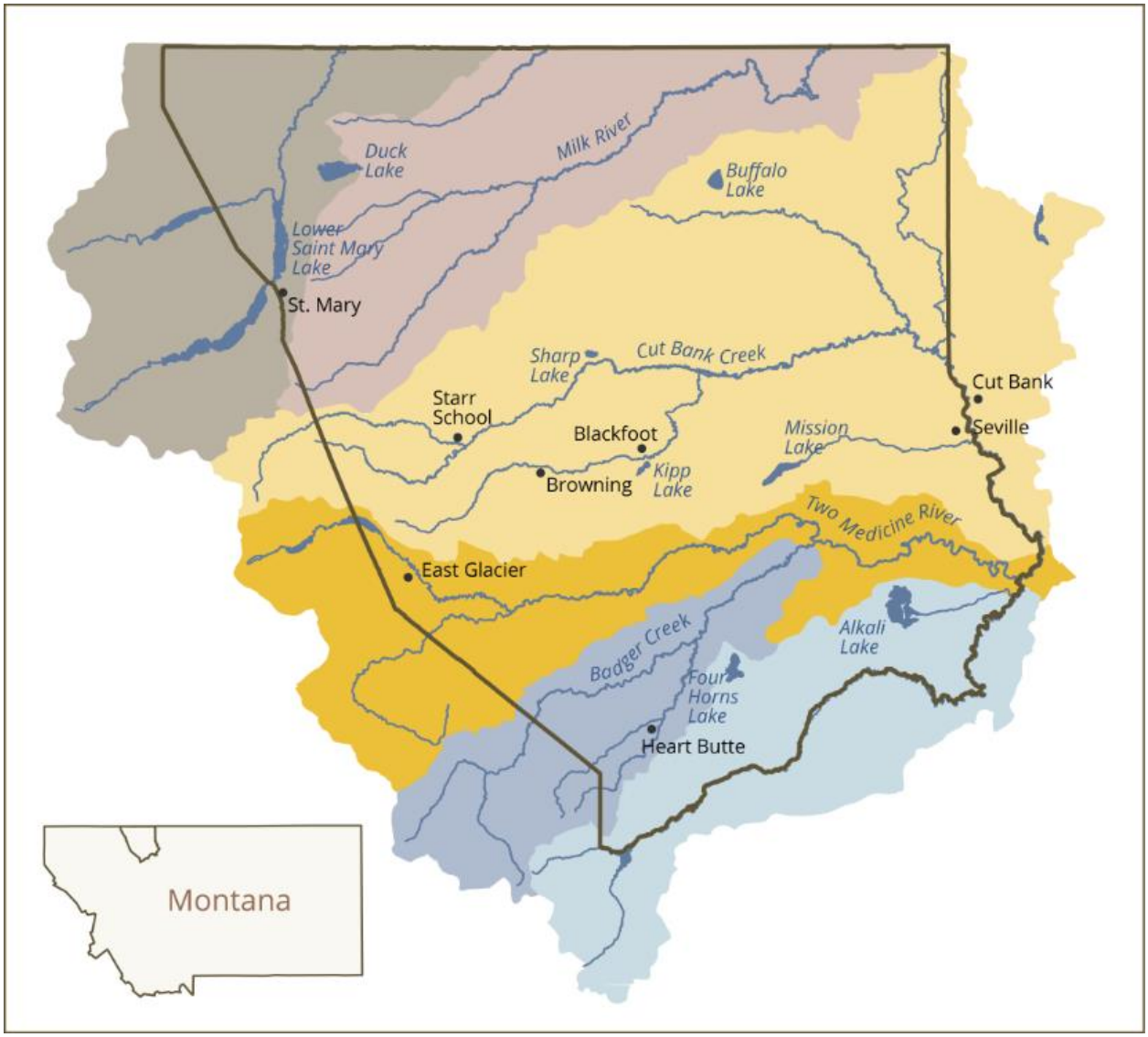
1.2 Socioeconomic Profile

The Blackfeet Nation has 17,321 enrolled members, and it is one of the 10 largest tribes in the United States.[34] According to the 2011-2015 American Community Survey,[35] approximately 11,000 people live within the Blackfeet Nation (Figure 4), though this estimate is disputed by some tribal members. Almost 80% of people living in the Blackfeet Nation are American Indian, and the median age is 29.5.[36] Covering over one million acres, the Blackfeet Nation is the third largest sovereign tribal nation in Montana by area, and tenth nation-wide. It has seven large communities: Browning, Heart Butte, East Glacier, Starr School, Babb, Blackfoot, and Seville. The median income on the Blackfeet Nation is $26,930, while the mean household income is $41,002.[37] According to the 2011-2016 American Community Survey 5-Year Estimates, thirty-three percent of families have incomes below the poverty level, though some tribal members believe this estimate is incorrect. In July 2017, Montana's Department of Labor & Industry reported an unemployment rate of 10.8% on the Blackfeet Nation, compared to a state-wide unemployment rate of 3.9%. Within the Blackfeet Nation, 43% of employed people work for government.[38]

A limited number of job opportunities helps explain the higher-than-average unemployment rate. While more economic opportunities are needed in the area, tribal and private ventures are growing. Tribal economic ventures are primarily operated through the Siyeh Development Corporation (Siyeh). Established in 1999, Siyeh is governed by a board that is separate from the Blackfeet Tribal Business Council. Currently, Siyeh operates Glacier Family Foods and Fuel Kiosk (a grocery store and fuel stop), Oki Communications (an internet service provider), Blackfeet Heritage Center & Art Gallery, Holiday Inn & Express Glacier Peaks Hotel, Sleeping

Wolf Campground, StarLink Cable, Two Medicine Water, Glacier Peaks Casino, and Little Peaks Casino. Private enterprises that employ local people include Native American Bank, Teeple's IGA (a grocery store), Faught's Blackfeet Trading Post, Radio Shack, Taco Johns, Subway, Junction Drive-Inn, Glacier Laundry, Town Pump Food Store (a fuel station with food), Browning Lumber & Hardware, Native Life Store (a fabric, quilting, and gift shop), and several coffee shops. Major employers in the Blackfeet Nation are the Blackfeet Tribe, Siyeh, Blackfeet Housing Authority, Blackfeet Community College, Browning Public Schools, Indian Health Service, and the Bureau of Indian Affairs.[39] Agriculture is also an important economic contributor. Wheat, barley, and hay are the principle crops.[40]

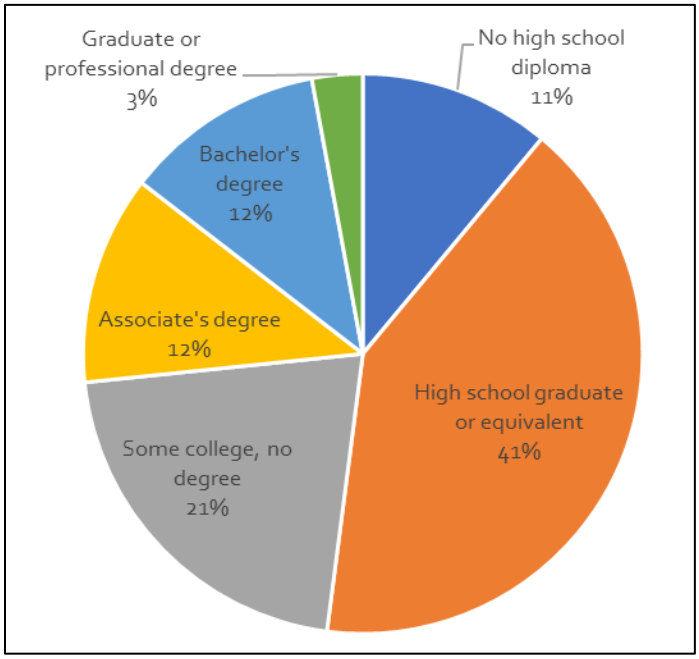
FIGURE 4: MAP OF THE BLACKFEET NATION



Located in northwest Montana, the Blackfeet Nation borders Canada. *Source: Blackfeetnation.com*

Nature-based tourism and recreation contributes somewhat to the economy, but there is extensive room for expanding the tribe's tourism and recreation industry. Eight large lakes and 518 miles of streams are found in the Blackfeet Nation.[41] The area offers opportunities for hiking, camping, boating, fishing, swimming, horseback riding, snow sports, and water sports.[42] The tribe operates five campgrounds: Duck Lake, Red Eagle, Chewing Blackbones, Sleeping Wolf, and Buffalo Calf Campgrounds.

FIGURE 5: EDUCATIONAL ATTAINMENT BY PEOPLE LIVING IN THE BLACKFEET NATION



Note that some tribal members believe the Associate's degree estimate cited above to be low.
Data from the U.S. Census Bureau, 2011-2015 American Community Survey 5-Year Estimates.

A former Senior Research Economist with the Montana Department of Commerce, Susan Ockert, reported that that the Blackfeet Nation was underserved in the following private sectors: grocery stores, doctors and clinics, and financial institutions.[43]

This suggests that investment in the private sector could expand the Blackfeet Nation's economy. Ockert concluded that people are spending money outside the Blackfeet Nation to acquire retail goods and consumer services. Diversifying the economy could contribute more employment opportunities and also help address food insecurity and a limited availability of year-round food resources.[44] The Tribal Government places a high priority on addressing the social needs of the Amskapi Piikani. While Tribal Government resources are at the high end of the Tribe's overall salary levels, the Blackfeet Nation is a very underserved population in both government and private sectors when compared to the general American populace.

Tribal members lead a variety of organizations than offer educational and social assistance programs. For example, Blackfeet Manpower, also known as "*Nit-Sit-Tah-Poh-Tahk-Kaaks*" Working Friends One-Stop Center, aims to "provide education, training, case management, advocacy and support services to increase employability" of people living within the Blackfeet Nation. It offers G.E.D. exam preparation and fee assistance, a financial assistance program, an empowerment program for pregnant/parenting teens, and administers Tribal Temporary Assistance for Needy Families.

Blackfeet Community College in Browning.
Photo by Jacob Levitus.

Blackfeet Community College (BCC) offers one-year certifications and two-year Associate's degrees in the Arts and Sciences, including degrees in business, computer information systems, education, human services/behavioral health, liberal arts, math and science, health science, pre-engineering, nursing, Piikani studies, Piikani language, construction technology, building trades, emergency medical technology, and tribal advocacy. About 400 – 500 students attend BCC.[45] In 2020, the College intends to grant its first Bachelor's degree.[46]

New Horizons for Blackfeet Land Management

The Blackfeet people are crossing into an unparalleled time wherein they control a greater amount of their land and resources within the Blackfeet Nation than at any time since the imposed Homestead and Dawes Acts. Although the extensive traditional territory of the Blackfeet was greatly marginalized by United States government actions in the past, the Amskapi Pikuni forge ahead strongly in their preparations to protect their remaining lands and bio-systems. Now is an opportune moment to infuse climate change adaptation frameworks and initiatives into multiple efforts. Below is a description of some recent events that make this a uniquely important time for the Blackfeet and which set the stage for the tribe to become regional leaders in climate change adaptation:

Acquiring tribal trust land

The Blackfeet Nation recently acquired more than 326,000 acres of allotted, fractionated tribal trust land through the Cobell Settlement.[47] The land is managed by the Bureau of Indian Affairs and is generating $2.5 million in new revenue annually for the tribe.[48] On July 31, 2017, the Department of Interior announced the Blackfeet will receive money to acquire additional tribal trust lands.[49]

Passing the Blackfeet Water Compact

In April 2017, the Blackfeet Nation voted to accept a water rights compact and settlement that provides the tribe with jurisdiction over nearly 800,000 acre-feet of water annually and provides more than $470 million for water-related projects.[50]

Agriculture Resource Management Planning (ARMP)

In 2018, the tribe will complete the development of its Agricultural Resource Management Plan (ARMP). The ARMP will address resources and land management, agriculture policy and develop a food code while integrating challenges like economic development and

environmental stressors such as drought and climate change. The Blackfeet Natural Resource Conservation District is developing the ARMP, which will include climate change adaptation strategies that will inform the larger Integrated Resource Management Plan.

Integrated Natural Resource Management Planning (IRMP)

The tribe initiated an Integrated Natural Resource Management Planning process in 2017. Integrated planning will prepare the tribe to address coinciding challenges introduced in the ARMP and include development, housing needs, and forestry management and more through coordinated and proactive steps.

Protecting the sacred Badger-Two Medicine

In January 2017, the Blackfeet Nation won protection for Badger-Two Medicine, an area sacred to the tribe within the Helena-Lewis and Clark National Forest bordering the Blackfeet Nation on the southwest side. This was accomplished when, after a long battle, the U.S. Department of Interior agreed to retire all oil and gas leases in the area.[51] Harry Barnes, Blackfeet Nation Tribal Business Councilman wrote, "The Badger-Two Medicine is a powerful cultural region.

We've lived for 30 years under the threat that it might be industrialized, and we're extremely grateful that this cloud is finally lifted. This area is like a church to our people and retiring the last of the leases is a tremendous step toward permanent protection of the Badger-Two Medicine".[52]

The battle for Badger-Two Medicine lasted over two decades and was hard fought by many. Tribal members acquired funding to support years of work to get the land designated as a "historical protection area" in the early 2000's. Terry Tatsey, Vice-Chairman of the Blackfeet Tribal Business Council, and John Murray, the Tribe's Historic Preservation Officer, secured tribal members and elders, archeologists, ethnobotanists, and other experts to document holy sites and traditional plant and medicine gathering areas over seasons and years. Even though the last battle for the Badger-Two Medicine was won, the Blackfeet Nation will always be under pressure to maintain the protection of these types of cultural, traditional and sacred lands.

The Blackfeet won protection for Badger-Two Medicine in 2017. ***Photo by Melly Reuling.***

Creating a Blackfeet national park

Efforts are underway to create a national park conserve on land within ten miles of Glacier National Park and the Helena-Lewis and Clark National Forest. A recent grant award from the Healthy Watersheds Consortium Grant Program and a partnership with The Nature Conservancy are aiding the conservation effort.

1.3 Climate Change Internship Program: Preparing Future Leaders

10 Blackfeet Climate Warriors participated in the Climate Change Internship Program for 10 weeks during the summer of 2017.

Blackfeet youth are our future. We believe it is crucial to equip youth with an in-depth understanding of climate change impacts and to empower them to take action now and in the future to build a more resilient nation. Consequently, in 2017, the Blackfeet Environmental Office established a Climate Change Internship Program to connect Blackfeet youth with managers who are addressing climate change impacts in the Blackfeet Nation. With assistance from two grants awarded to the Blackfeet Environmental Office, the Program hired 10 interns, or "Climate Warriors," for 10 weeks in the summer of 2017. After an orientation by a Climate Change Coordinator, the Climate Warriors observed and completed projects with the following departments/institutions: The Native Science Field Center at Blackfeet Community College,

the Land Department, the Forestry Department, the Agriculture Department, the Fish and Wildlife Department, the Tribal Historic Preservation Office, the Bison Program, and the Environmental Office. The Climate Warriors learned first-hand about climate change through a series of field trips, including a journey up sacred Chief Mountain (*Ninna-Stako*) and a trip to the Mission Mountains where they learned how managers with the Confederated Salish and Kootenai Tribes are protecting whitebark pine forests in a changing climate. They also met with Anna BullShoe and Tara Luna to learn about medicinal plants and consider how climate change is impacting culture and human health, and Lea Whitford, a Planner in the Blackfeet Economic Development and Planning Department to learn about how the tribe considers environmental impacts in planning for infrastructure and other development projects. The 2017 Program culminated with the Climate Warriors presenting posters from their summer projects at the Northwest Tribal Climate Summit, a conference hosted by the Confederated Salish and Kootenai Tribes at Salish Kootenai College in the Flathead.

1.4 Why is the Blackfeet Nation Planning for Climate Change?

"Climate change is real. It is here in Blackfeet Country, and it is happening now. We must think ahead."

This is the message we have been hearing from tribal members as we discuss our observations of climate change and share data from scientific literature. Many tribal members' livelihoods and cultural practices are closely tied to the land, and many of us have been feeling the impacts of climate change for many years. Climate change has the potential to be catastrophic globally, regionally, and locally in our nation. In many respects, our tribe is restricted to the current exterior boundary of our lands, making our land base similar to an island. There is a great strength to be nurtured in understanding and exercising our sovereign rights within our "island". However, we recognize that within the limits of our exterior boundaries, our ability to gain some of the livelihood and resources we need and want is limited. At the same time, we have proven resilient to many extremely difficult events, to include a forced reduction of our homelands and most especially, the violence enacted through colonization. With our immeasurable strengths, our wisdoms gained through our historical experiences, and our current understandings, we choose to plan now. We have lived on this land, amongst the different biosystems, for thousands of years and we will live here for thousands more. We choose to plan and take action now. We believe in protecting our people, our lands, and all that lives within.

1.5 Planning in a Regional Context

Planning for climate change is occurring at many different scales across the world and northwest Montana is no exception. This section summarizes some of the climate assessment and adaptation initiatives in the region. Information and inspiration from initiatives marked

with an asterisk (*) informed this plan, and other initiatives could provide inspiration, information, and assistance in the future.

Regional initiatives

*Montana Climate Assessment**

The 2017 Montana Climate Assessment discusses climate change impacts in relation to Montana's forests, agriculture, and water, and it includes some general adaptation strategies for managing Montana's forests.

*Northern Rockies Adaptation Partnership**

In 2016, the Northern Rockies Adaptation Partnership (NRAP) completed its draft report, "Climate Change Vulnerability and Adaptation in the Northern Rocky Mountains," a plan for climate change in the Northern Rockies.[53] The report identifies vulnerabilities and adaptation strategies and tactics in the Northern Rocky Mountains relevant to resource management. NRAP is a partnership between the U.S. Forest Service; U.S. Department of Agriculture regional offices and regional national forests; U.S. Forest Service Pacific Northwest and Rocky Mountain Research Stations; Glacier, Yellowstone and Grand Teton National Parks; Great Northern and Plains and Prairie Potholes Landscape Conservation Cooperatives; Department of Interior North Central Climate Science Center; Greater Yellowstone Coordinating Committee; Oregon State University; and EcoAdapt.

Climate Smart Glacier Country

Climate Smart Glacier Country is currently working to address challenges of climate change in the Glacier National Park region through a series of working groups and through creating a Whitefish Climate Action Plan.

Tribal initiatives

*Confederated Salish and Kootenai Tribes Climate Change Strategic Plan** was written to create a foundation for developing effective strategies to address climate change and protect the environment. It serves as a model for tribes seeking to plan for increasing resilience to climate change.

County initiatives

Climatewise workshop and action plans

In 2011, Missoula County partnered with Headwaters Economics, in cooperation with the Clark Fork Coalition and the Geos Institute, to convene a Climatewise Workshop. They prepared a Primer Report on Climate Change in Missoula County, along with five climate change action plans focused on local impacts, wildfire severity and growth, flooding, river de-watering, and fish and wildlife.

City initiatives

City of Helena

In 2009, Helena completed a Climate Change Task Force Action Plan, and in June 2017, Helena adapted the Paris Accord goals.

City of Bozeman

Bozeman completed its Community Climate Action Plan in 2011.

These regional planning initiatives suggest that there are many opportunities for collaborating across jurisdictions as the Blackfeet Nation builds climate change resilience. Learning from each initiative and sharing insights with others as the Blackfeet Climate Change Adaptation Plan is implemented can increase our collective efficiency and pace of adaptation.

2. Cultural Perceptions of Climate Change Impacts

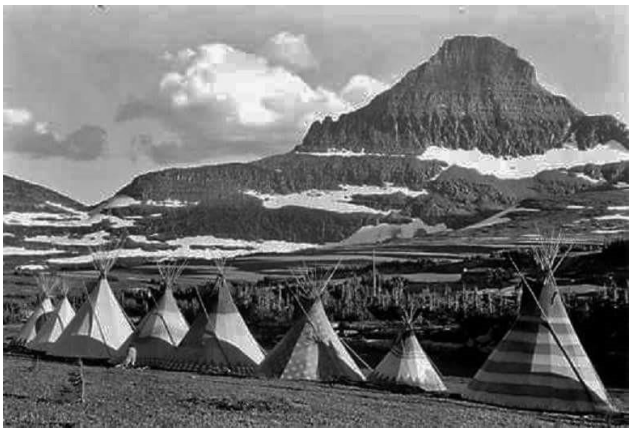
This section is a beginning, a draft to summarize the concerns of the impacts of climate change on all living things within the Pikuni homelands. It is the voice of many different Amskapi Pikuni Blackfeet community members. These concerns are holistic and not just for ourselves, but include the *Natoyiitapiiksi* (the Sky Beings), the *Sakoomiitapiiksi* (all life that lives on the land-and in the land), the *Sooyiitapiiksi* (the Water Beings), and the *Niitsiitapiiksi* (the people) in the context of a changing climate.

It is our hope that this document contributes to the "sharing and understanding of what people are thinking, and what's going on with our [the Blackfeet] environment."[C]

The following section contains quotes and ideas from over 29 different community members of the Blackfeet Nation including Elders, Medicine People, Tribal Council members, educators, those working for tribal and non-tribal programs and agencies, ranchers and other community members, as well as young adults.

We attempted to capture the range of perspectives and include many quotes herein, to let the voices of the people speak for themselves.[‡] Interviewees are anonymous, referenced only by letter.

Perspectives of *Niitsiitapiiks* (The Original People) regarding Climate Change:



Blackfeet encampment under Divide Mountain. ***Photo from tribal archives.***

The Blackfeet "understand **change happens.**"[G] In fact, some find that their "entire worldview is all about renewable energy."[O] The Blackfeet people however, do not all have the same perspective on climate change. "**People can't even come to consensus if there even is climate change,** and to what degree, and you know you could say that education is a priority, because educating people about the realities of climate change to land and water, and what scientifically we could expect, but how do we know that the science is, that scientists know the answer? So, education could be educating with the wrong answers."[A] Some of the non-natives working on climate change issues are acting "without accepting the fact that change is a reality."[G] Furthermore, "**there are things that reveal themselves because of climate change.**"[A]

[‡] Interviews in this chapter were conducted for a research project led by Kim Paul, Blackfeet Tribal Member, and Laura Caplins-Bosak, Nature-Link Institute. Research was supported by the Roundtable on the Crown of the Continent's Adaptive Management Initiative and the Great Northern Landscape Conservation Cooperative.

In order to address climate change impacts:

"[Y]ou're better off being **well-rounded** because you never know…you're always better off being able to tap into a number of different things… one does not outweigh the other, you know there is always going to be that balance that we are taking care of, that's why in our lodge we have a balance, man…woman…, in our ceremonies we have a balance."[B] "All are important, and all are part of the system."[C] "**We have to balance ourselves as people**, the responsibility part of it, and being on a level plane of all species."[E]

Getting at a true understanding regarding climate change will not be a short process and will require the help of non-humans:

"There's so much that's trying to be done in a short period of time and you can't get actual answers, you can get opinions or philosophies or theories, but to get a true understanding and really prepare for something…you know that drove us to be those long-term visionary thinkers, and **ask more than just humans for help**. We ask animals, we ask rocks, we ask place, we ask whoever our helpers are in our painted lodges for help, guidance, and support…so… that holistic process."[G]

"I think the people are as much a part of the climate as the land, the water, the mountains, the animals. We have to ask ourselves, if the animals are controlling their growth for resource management, what are we doing? I thought that's our resource right there. **That little child. That's our resource.**"[V]

Who is responsible for climate change and its impacts is unclear, with some people having "more of a management perspective rather than **a responsibility perspective.**"[E] Some find that "it's our responsibility in this time. If you are given a lot then you are required a lot. **We were given the knowledge** of how to do those things. Of how to have that relationship with animals, the water, the stars and all that. So, it really is our responsibility, I think."[O]

People also feel that the impacts of climate change are due to the action of others:

"Obviously we aren't responsible for the greenhouse effect we are going through right now. We aren't responsible for the destruction of the water. We're not responsible for the destruction of the land."[P]

Observed changes in the weather and climate

Changes in the timing of weather events, winter temperatures, precipitation patterns, surface water, and wind events were all noted. **Weather events are occurring later than usual**. Some community members find that, "We're actually a month behind, climate-wise, on this side of the mountains. [In the spring], everything else is turning green and we haven't even started. Now we don't even get snow till end of February or into March, where we always got snow in October. It's so nice in the fall time, it's like 50 degrees, so different from before.[M,N]

Another two agree, finding that; "Long time ago we started winter in October and it finished up at the end of March. Now we aren't really starting until January."[O,P]

The **winters are not as cold** as they used to be. For instance, one community member stated, "I can remember the whole month of March being way below zero."[O,P] Another agreed, finding that there are, "No cold winters anymore and this is causing viruses and infections in our community to be increasingly on the rise. The extreme cold used to kill these off and now we see so many flu, virus, and infections because the cold is not coming like it used to be. This lack of cold not killing virus' effects plants, people, livestock and their grasses."[FF]

Pikuni lodges at sunset. *Photo by Mya Davis.*

Precipitation patterns are changing. It used to snow more, generally beginning in October and snowing till March and even up to May. After the snows, it would become very rainy. This is when "it used to snow for about 8 months, and then [we would] get a lot of rain in a short time."[N] There used to be more snow in the winter, with "snow up to the roofs," and with "snow on the ground from Oct to May – couldn't see the ground."[D] "Once it stopped snowing, then it started raining, and it used to rain and rain and rain and rain, then by Indian days it started drying out and the grass was really good out on the prairies. But this has changed entirely."[M,N]

Another concurs that when "[w]inter set in, it set in in October…cold, lot of snow up until the end of March. Then we had spring. The first two weeks of June was our rainy season. It rained steady. None of that happens now."[P]

There is an increase in the winds. Everyone who mentioned the wind, mentioned that the wind is more "fierce" than before and that, "The wind blows more now."[Q] "[Wind has] always been here but hasn't been this ferocious. We get these 80-90 mph out of the blue…We've always had wind, but these winds are more fierce, stronger, constant that every year we can expect higher winds. Now we know when it's blowing hard a storm's gonna follow it."[N] Finally, some also suggest a change in the timing of the wind. "The wind used to blow mainly in the fall…Now when you get into February, March, and April we never used to have much wind. Now it blows."[P]

Observed changes in the *Sakoomiitapiiks* (all life that lives on or in the land-including the land**), *Sooyiitaapiiks* (**the ones that live under water or in the water**) and *Natoyiitapiiks* (**all flying ones**)**

Today the culmination of these changes in temperature, precipitation and wind are resulting in **less available water**. "As soon as we get even a little snow or runoff the ground just sucks it up, it's so thirsty. Before when you'd go into town in the spring time you'd have all those runoff

creeks that would run across the road and we haven't had that in a long time."[G] For instance, "[t]he river down there has changed so much and is only about knee deep,"[M,N] with some "water bodies drying up."[Q] This is in part because "[t]here's nothing been building up in the ground. The lakes and stuff have shrunk so bad. A lot of them are dry. These little puddles and stuff, it all helps to feed the water."[S] "The water was just so low and warm it killed all the fish. Then it froze solid for the winter so anything that was left for the winter, killed it. So now it's just almost a dead lake."[S]

There are also changes in the bio-geography of the natural landscape. There is concern over the "**shorter growing season**. These changes impact **the grass** that is able to grow, **the cattle** who then eat the grass, and finally **the people** who depend on these cattle for their livelihood. Because this economy is hugely agriculture-based it affects a lot of people… I am [also] thinking about our…forages like hay and small grains. Because the tribe is involved a little in small grain production. I'm seeing a little bit of **decline in the production** because the growing season is a little bit cooler than it's been."[R]

These changes also impact the plants. For instances, "Our plants aren't going to sleep during the winter anymore, the way they are supposed to. This change in our winters, to milder weather, is **changing the growing pattern of the plants**. Bulbs aren't hibernating. I saw crocus blooming last month. We were fall gathering (at the end of October, when it usually blizzards), and the crocuses were blooming. These changes have got to be affecting the way plants hold their energy."[AA] This is a very odd occurrence, as the crocuses are the first sign of spring, usually blooming in the flats in late May, and in the mountains in June.

Sage, berries, sweetgrass and willows are seen as declining in population. There are also changes in the locations of trees on the landscape "with **the trees moving further up the mountain.**"[F]

Predator numbers are increasing. There is an increase in the number of grizzly bears, mountain lions and wolves within the Blackfeet Nation, and along with this increase "there's a lot of predation."[R] The bears are greatly increasing in number. The "grizzly bears just keep multiplying, we used to see a lot of black bears, but rarely see those anymore."[M,N] This is in part because "[w]here a sow grizzly used to have one and maybe two [cubs], now they are having three and maybe four. The numbers are getting so many."[P] "I think this is because their bodies are not facing the demands of the long, cold winters and so can feed more babies. You know like a mare won't catch if she's too skinny or not healthy…maybe the bears have a lot of extra reserve, and that signals the ability to produce more offspring."[GG] The mountain lion and wolf populations have also increased. In particular, the "wolf population has doubled. Wolves are not natural to this area."[M,N] We also understand that predators have been impacted by state and federal policies like the Endangered Species Act, thereby increasing population.

The priorities in addressing climate change impacts

There is a great deal of concern with the impacts of climate change on **the Blackfeet people**. This is in part because "in our way of thinking, our worldview, everything is based on relationships. We're not the caretakers for the mother earth; she's the caretaker for us."[O] A changing climate therefore is concerning for the well-being of all. "We already live in an economically depressed area, the poverty rate is high, and the impacts of climate change will be magnified here because we're already in a stressed environment, so it will be hard on people here."[D] "Climate change is going to have a bigger impact on that social strain."[F]

People worry about **the next generation**. "How are these changes going to affect our children and grandchildren?"[Z] "I don't think we have the ability to adapt like we used to. I think people are so rooted today in their way of life or how they do things. I think that adaption is something that's kind of a lost art, so to speak."[R] One perspective is that "adaptation is going back to local, focusing on local food production and moving away from mass production and making sure communities are taking care of themselves and their food production, for sustainability and harvesting natural foods that are there."[F]

A Pikuni Rainbow. We are planning for climate change now so that our children can have a better future.
Photos by Blackfeet community members.

Climate change will impact **the animals**. "I am concerned about the deer, the buffalo…I feel for the buffalo and the bears. Just any animal in general. They all have a right. They all have life…. They can't speak for themselves and it's up for us to try and protect them."[T] It is a problem to "not have a place to call free roaming."[B] There has been **an increase in fences** which restrict animal movement. "We don't want that fence up because he's stopped the migration route for the elk" [17]. Besides the elk, there is concern regarding **the health of the deer**. When talking about a mule deer, a community member noted "there is something wrong with them…shoot one…it had one horn and when he shot it the other horn fell off and when they went to cut it open there was a big blister, a sore". Furthermore, there is concern that the whitetail deer "might have blue tongue disease."[Q]

Many were "really concerned with **the fish** and especially cold-water fish…Eventually, the glaciers are melting and that's where a lot of our base flow for streams comes from. We've seen that fish need a certain temperature and discharge for being able to survive. Wildlife, they

pretty much migrate from water hole to water hole so if the stream dries up they can go to another one. That includes deer, birds. However, the fish, once the stream dries up, if they can't find a pool to stay in until the dry period passes then they are going to die because the water gets too warm and they basically suffocate."[W]

Fish aren't the only ones needing water. "I always think about **the birds** that migrate through here, if they don't have the potholes and the lakes to continue to migrate through here…they don't know any other way and they are going to die as the water continues to dry up. It's going to have huge impacts on our waterfowl, and they are some of the most sacred animals in our bundles, the loons, and the swans and the blue heron, the crane…"[F] The frogs and bees also "aren't around like they used to be anymore."[J]

People are concerned with both the ability of **the plants** to sustain themselves on the landscape, as well as people's access to these plants. **Sage, berries, sweet grass, peppermint and willows** are of specific concern. Many "collect plants and roots and berries for medicinal, ceremonial, and personal use and because of climate change, our places that we generally went to…because our options are becoming less and less, now we're in competition with each other…Not only am I in need of it, but there are lots of birds and animals, tiny to big, that all need these things."[B] "The systems and circumstances that we have right now, that's been in place for thousands and thousands of years, so really everything had adapted to the climate of now."[D]

It starts with **the water**. "Once the water is gone everything else will follow."[S] "Everything kind of revolves around the water."[A] "Water is very important to us. It's our source of life."[T] "The spiritual realm, the relationship that we have with the water. We can live a little while without food, but we can't live very long without water. It really concerns me right now with our people. I'm looking at it more as **a break in relationships**, not so much as how we take care of the water but as how we broke our relationship, reciprocity. I would say it's because **we aren't doing our renewal ceremony.**"[O]

Water problems include, "…the **fracking and the drilling** [which] is poisoning these waters…,"[A] "…non-point source pollution where it's pretty much watershed wide… **livestock waste** or **fertilizers** or even **sediment,**"[W] and "[s]ome [of the] **dams, reservoirs**, [which] may not be necessary anymore – tear them down, take them out."[B] We need to "recycle water, use it three times before it goes off the reservation."[F]

"**Overgrazing** is a big issue…A lot of people bring in cattle for the summer."[R] The Blackfeet Nation has "the best feed in the entire state."[V] This could be why "40,000 head of cattle come in here from May to September" to graze.[V] This over grazing is compounded "with a shorter growing season, they are overgrazing a lot of our native ranges so the feed source for wildlife is pretty diminished too."[R] This is particularly important since, "**our economy is largely agriculture based**…If we don't preserve and protect what we have now we are going to diminish it to the point where we aren't going to be able to sustain it."[R]

Invasive animals, plants and insects are problematic. On the reservation "they deemed feral horses an invasive species…. We have a huge, I'm going to call them feral horse population…they impact the soil more than a cow does or an elk or deer. Blackfeet are a horse culture, so those **horses are important** to them. They are considered valuable."[R] It is estimated that on the reservation there are about 10,000 horses of which 5,000 are unmanaged. Knapweed, leafy spurge and the pine beetle are also invasive plants presenting problems. "Knapweed is terrible. We have it everywhere. It's so hard to kill."[S] "There is also a greater amount of new weeds like leafy spurge. Also, the lack of water is causing the weeds to overwhelm the grasses because the weeds are predatorial and take the water first."[FF] The invasive insect is the Pine Beetle. The "beetle that's killing everything off."[Q]

Conclusion

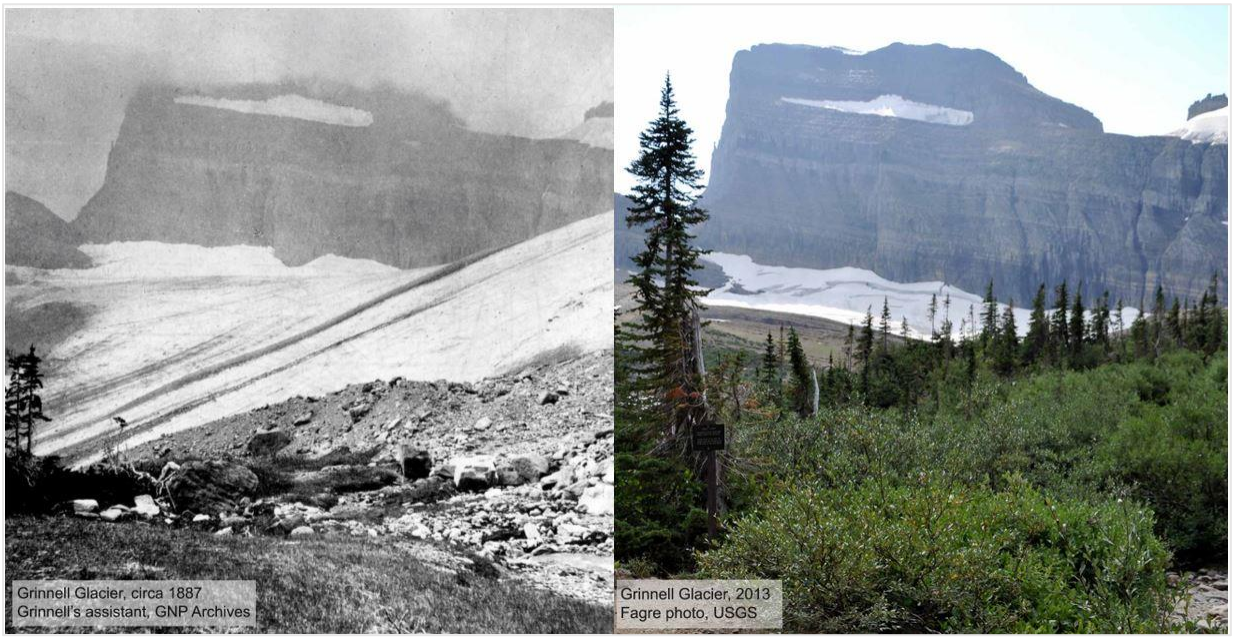
The Blackfeet people are seeing numerous changes in their environment due to our changing climate. These changes range from weather patterns to hydrological flows to plant and animal populations. Community members feel that the path forward in dealing with these changes needs to acknowledge that change happens, and view the relationship between the Blackfeet people and the natural world as a reciprocal relationship, which hinges on balancing the needs of all involved. This will take time and require the help and consideration of humans and non-humans alike. The Blackfeet have the knowledge to do this.

3. Climate Change and its Impacts

Globally, temperatures are rising, and temperature and precipitation extremes are becoming more common.[54] In the United States, average annual temperatures increased by 1.8°F between 1895 and 2016.[55] Human activities in the past 50 years, resulting in an unprecedented accumulation of greenhouse gases, especially carbon dioxide, methane, and nitrous oxide, are the primary cause of this warming.[56] For example, atmospheric carbon dioxide has increased by more than 40% since the Industrial Revolution (which lasted from about 1760 to about 1840), primarily due to burning coal, oil, and gas, and forest clearing.[57]

Looking solely at global or national averages does not give an accurate picture of climate change impacts in north central Montana. Impacts in this area may be greater than national averages would suggest, because the rate and magnitude of climate warming in Montana has been greater. For example, the average annual temperature in Montana increased 2.7°F between 1950 and 2015,[58] much higher than the amount of warming the United States has experienced over an even longer time period.

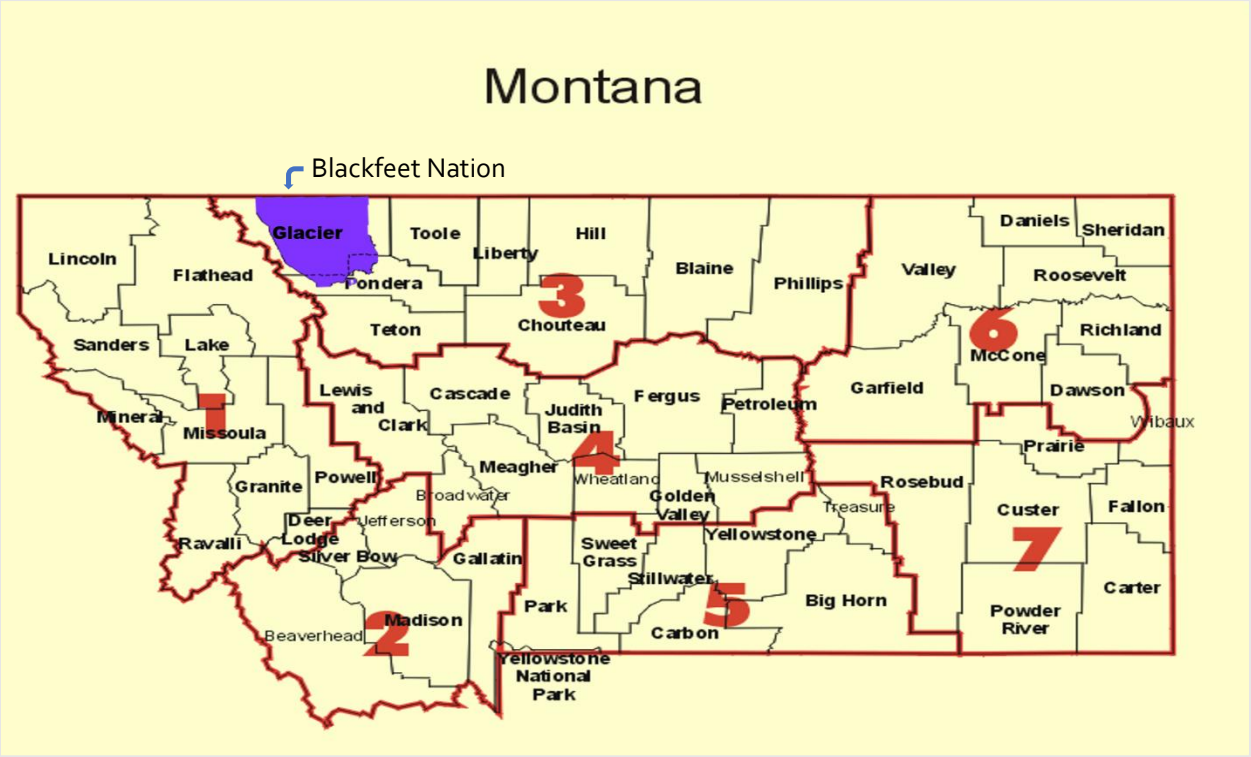
Figure 6: Grinnell Glacier



Photos of Grinnell Glacier in Glacier National Park show the Glacier has diminished considerably in size from 1887 to 2013.[59]

While such change can be difficult to visualize, the disappearing glaciers in Glacier National Park are a local, visible reminder that the climate is warming (see Figure 6). Since 1966, 39 glaciers in the Park have shrunk, some by as much as 85%.[60] Other climate change impacts may not be as easy to see at first glance, though the accumulating effects on the local environment, air, water, weather, oceans, and ecosystems are significant. This section highlights the major ways climate change is impacting the regional environments of north central Montana.

FIGURE 7: MAP OF MONTANA CLIMATE DIVISIONS



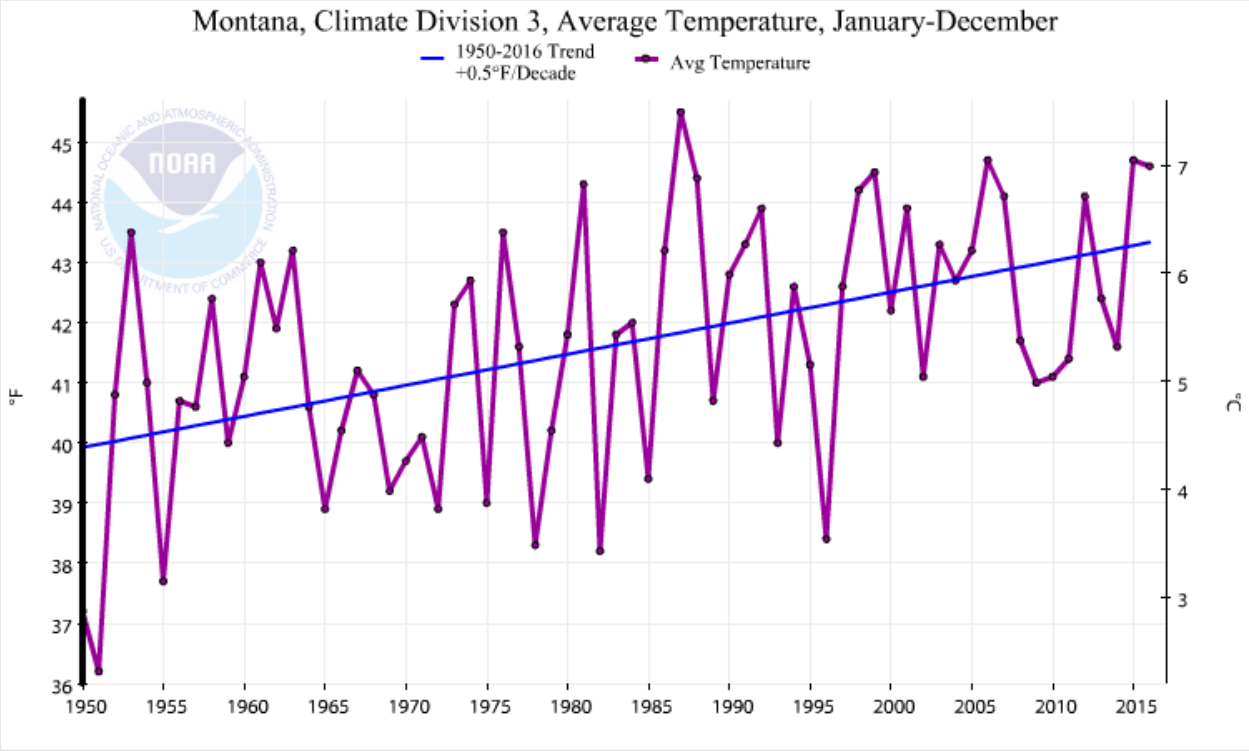
The Blackfeet Nation is located in the North Central Climate Division 3, a climate division defined by the National Oceanic and Atmospheric Administration. *Source:* *http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/regional_monitoring/CLIM_DIVS/montana.gif*

The Blackfeet Nation is located in Montana's North Central region (Division 3), a climate division defined by the National Oceanic and Atmospheric Administration (see Figure 7). The North Central region has seen an average temperature increase of .51°F each decade from 1950 to 2015, with most warming occurring in winter and spring (see Figure 8).[61] In the same period, the total number of days exceeding 90°F in Montana has increased by 11 days while the number of cool days each year has decreased by 15 days.[62] Though Montana's overall growing season length has increased by 12 days,[63] effective season length can be limited by reduced water availability.[64] While the North Central region has not seen a significant change in summer, fall, and spring precipitation since 1950, it has had an average precipitation decrease of .09 inches per decade in winter, mostly attributed to natural climate variability.[65] Furthermore, the Central Rocky Mountains have been experiencing declining stream discharge over the last half century, with significant declines in the month of August.[66]

To understand how climate change will impact north central Montana's environment in the future, it is important to acknowledge several sources of uncertainty when making predictions at the regional scale. Climate modeling, ecological responses, and human adaptive responses all introduce uncertainty when predicting the future.[67] While there is consensus that climate change is happening and that its impacts are here and will be experienced far into the future,

the degree to which it will impact the globe depends on how people act now and in the future. While precise predictions cannot be made about future conditions, there is evidence that across Montana, average annual temperatures will increase (high agreement, robust evidence), annual precipitation will increase in winter, spring, and fall (moderate agreement, moderate evidence), and precipitation will decrease in the summer across Montana (moderate agreement, moderate evidence).[68]

FIGURE 8: AVERAGE ANNUAL TEMPERATURE IN MONTANA FROM 1950-2016



Data from the National Oceanic and Atmospheric Administration shows a trend of increasing average temperature (+.5°F per decade) in North Central Montana since at least 1950. *Source: NOAA.*

Contributing to uncertainty is the degree to which the global community will take action to limit and reduce greenhouse gas emissions. When scientists make climate predictions, they must account for different emissions scenarios, which are referred to as Representative Concentration Pathways, or RCPs. For example, RCP 2.6, at one extreme, assumes "immediate and rapid reductions in emissions," while RCP 8.5, at the other extreme, assumes a continuation of current global emission increases.[69] A more middle-of-the-road scenario is RCP 4.5, known as the stabilization scenario. The United Nations Paris Agreement intends to curb emissions at levels between RCP 2.6 and RCP 4.5.[70] Table 1 compares North Central Montana scenarios for RCP 4.5 with RCP 8.5. Note that the overall trends are similar for the two scenarios: hotter average temperatures, longer growing seasons, increased late winter and early spring precipitation, and decreased summer precipitation). However, the magnitude of change is greater for RCP 8.5.

TABLE 1: MID-CENTURY AND END-OF-CENTURY CLIMATE CHANGE PREDICTIONS FOR THE NORTH CENTRAL MONTANA CLIMATE DIVISION.

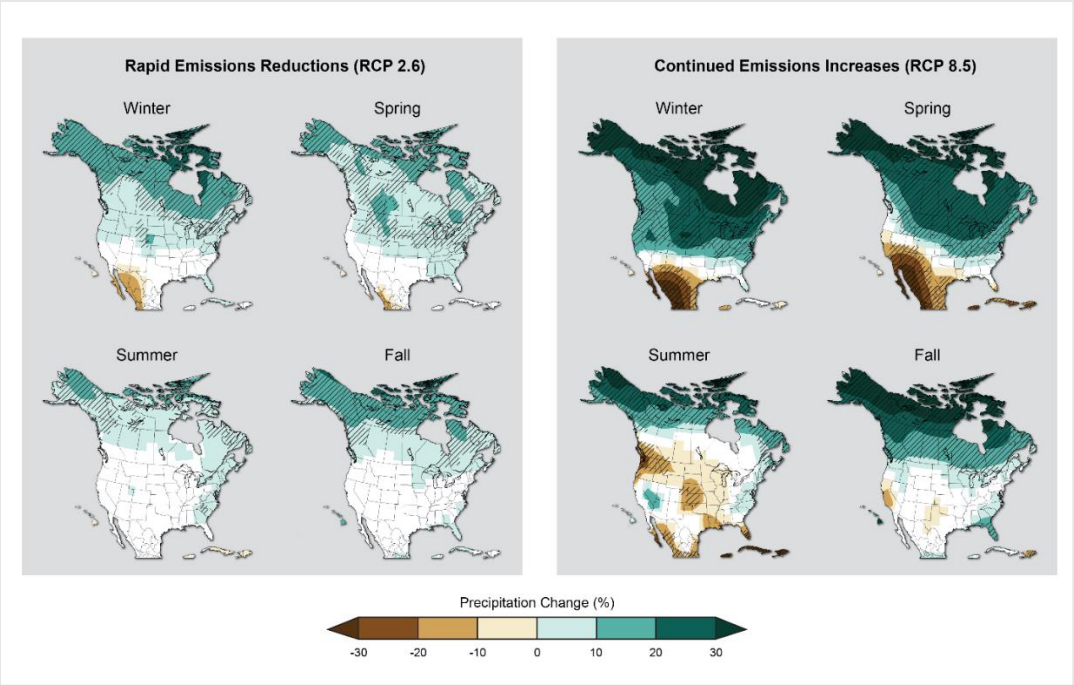
Type of change	Timeframe	Amount of change under RCP 4.5 emissions scenario	Amount of change under RCP 8.5 emissions scenario
Increase in average annual daily maximum temperature	Mid-Century: 2040-2069	+4.4 to +4.6°F	+5.9 to +6.1°F
	End-of-Century: 2070-2099	+5.8 to +6.6°F	+10 to +10.8°F
Change in number of days above 90°F	Mid-Century: 2040-2069	+3 to +7 days	+11 to +16 days
	End-of-Century: 2070-2099	+4 to +11 days	+32 to +38 days
Change in number of freeze-free days	Mid-Century: 2040-2069	+31 to +34 days	+40.5 to +43.5 days
	End-of-Century: 2070-2099	+38 to +44 days	+64.5 to +72 days
Change in annual precipitation	Mid-Century: 2040-2069	+1.5 to +1.8 inches	+1.8 to +2.4 inches
	End-of-Century: 2070-2099	+1.5 to +1.8 inches	+1.8 to +2.4 inches
Change in monthly precipitation March, April, and May	Mid-Century: 2040-2069	+4 to +7.5 inches	+4 to +11 inches
	End-of-Century: 2070-2099	0 to +.45 inches	+.25 to +.45 inches
Change in monthly precipitation June, July, and August	Mid-Century: 2040-2069	0 to -5 inches	0 to -5 inches
	End-of-Century: 2070-2099	0 to -.2 inches	0 to -.2 inches

Climate change predictions are based on comparisons to historical 30-year averages from 1971 to 2000. *Source: 2017 Montana Climate Assessment*[71]

In Montana, state-wide average annual temperature is expected to rise up to 6.6°F (for RCP 4.5) and possibly up to 10.8°F (for RCP 8.5) by the end of this century.[72] Climate modeling experts predict there will be 3 - 7 more high temperature days per year by the mid-century in North Central Montana, based on the RCP 4.5 scenario.[73] The hotter temperature days are predicted to increase most in the month of August,[74] a time when water is in shortest supply. Monthly precipitation will decrease, on average, up to 5 inches in North Central Montana in the months of June, July, and August in the period 2040 to 2069 (for both RCP 4.5 and 8.5 scenarios).[75] In contrast, monthly precipitation is expected to increase up to 7.5 inches in March, April, and May in North Central Montana the same period (RCP 4.5), and possibly greater increases are expected under the RCP 8.5 scenario.[76] Warmer temperatures are likely

to increase the frequency and severity of drought conditions in the late summer and early fall, and exacerbate drought conditions when they do occur throughout the year.[77]

Figure 9: Predicted Precipitation Change in the US and Canada



This figure, from the 2014 National Climate Assessment, shows the predicted precipitation change in each season under RCP 2.6 and RCP 8.5. Under both scenarios, precipitation is expected to increase in winter and spring in north central Montana, and either decrease (RCP 8.5) or remain the same (RCP 2.6) in summer. *Image source: NOAA NCDC/ CICS-NC.*

Though summer precipitation will decline, winter and spring snowmelt and precipitation predictions suggest water availability may concentrate in the relatively cooler parts of the year (see Figure 9).[78,79] Decreased spring snowpack has been observed and is predicted into the future,[80,81,82] as is an earlier onset of spring snowmelt.[83,84,85] This means that peak spring stream runoff is occurring earlier in the year,[86,87,88] and more runoff in winter is predicted.[89] Furthermore, long-term stream monitoring has demonstrated that there are already lower stream baseflows (the portion of the stream not from runoff) in late summer,[90,91,92] a trend predicted to continue into the future. These lower baseflows, along with warmer air temperatures, are causing stream temperatures to warm.[93,94] The frequency of flooding may increase, especially in spring, due to earlier snowmelt, rain-on-snow events and increased precipitation.[95,96]

In short, climate change is likely to raise temperatures, increase precipitation and snowmelt in colder parts of the year, and decrease precipitation in hotter parts of the year in North Central Montana. These trends have a variety of implications for humans and the environment. A major implication is that rising temperatures and changes in snowpack and runoff timing will exacerbate drought.[97] Living with climate change will require adaptation and increased resilience in Blackfeet Country.

4. Planning Areas and Plan Scope

The Blackfeet Nation began the formal climate change adaptation process in 2016, facilitated by the Blackfeet Environmental Office and the Center for Large Landscape Conservation. The planning process was guided by the Institute for Tribal Environmental Professionals' (ITEP's) Adaptation Planning Toolkit,[98] and by the National Wildlife Federation's paper "Climate Smart Conservation: Putting Adaptation Principles into Practice".[99] Molly Cross, Director of Climate Change Adaptation for the North America Program of the Wildlife Conservation Society, began the planning process began by reviewing climate change trends and predictions. Cross created a summary table of the predicted climate change impacts specific to the northwest Montana region (see Appendix A). The project team presented the climate predictions summary table at a series of three information and planning meetings with resource managers; then the planning team facilitated discussions with managers and other experts to identify sector-specific impacts within the Blackfeet Nation. The work resulted in the eight subsequent planning areas, or sectors, showcased in the following chapters: agriculture, cultural resources and traditions, fish, forestry, human health, land and range, water, and wildlife.

Sector planners were guided through a process of identifying sector-specific vulnerabilities, using ITEP's Vulnerability and Risk Matrices and ITEP's Identifying Priority Planning Areas tool (see Tables 2, 3, and 4). Vulnerability is the susceptibility of a system to harm from climate impacts. Vulnerable systems are usually both sensitive to climate and are less able to adapt.

The planning team met with managers to identify priorities for climate change adaptation. *Photo by Melly Reuling.*

Vulnerability and risk analyses assisted planners in determining scope, facilitating the selection of areas within each sector that should be prioritized as a planning area. For example, health sector planners elected to focus on air quality and vector-borne diseases, even though climate change is impacting many other facets of human health, including water quality, food security, cancer, etc. **Prioritization was important because each sector is very broad, with many climate change impacts.** Prioritizing areas with the greatest vulnerability helps focus the plan and increase the ability of managers to identify and then implement action steps.

Table 2: Vulnerability Matrix

SENSITIVITY	ADAPTIVECAPACITY		
	HIGH	MEDIUM	LOW
HIGH	MEDIUM	MEDIUM-HIGH	HIGH
MEDIUM	MEDIUM-LOW	MEDIUM	MEDIUM-HIGH
LOW	LOW	MEDIUM-LOW	MEDIUM

Table copied from Institute for Tribal Environmental Professionals. "Adaptation Planning Toolkit." Northern Arizona University, 2013. http://www7.nau.edu/itep/main/tcc/Resources/adaptation

Vulnerability is the susceptibility of a system to harm from climate impacts. Vulnerable systems are usually both sensitive to climate and are less able to adapt.

Table 3: Risk Matrix

CONSEQUENCES	PROBABILITY		
	HIGH	MEDIUM	LOW
HIGH	HIGH	MEDIUM-HIGH	MEDIUM
MEDIUM	MEDIUM-HIGH	MEDIUM	MEDIUM-LOW
LOW	MEDIUM	MEDIUM-LOW	LOW

Table copied from Institute for Tribal Environmental Professionals. "Adaptation Planning Toolkit." Northern Arizona University, 2013. http://www7.nau.edu/itep/main/tcc/Resources/adaptation

Vulnerability & Risk → Priorities

Table 4: Identifying Priority Planning Areas

RISK	VULNERABILITY	
	HIGHER	LOWER
HIGHER RISK	HIGHER PRIORITY	MEDIUM PRIORITY
LOWER RISK	MEDIUM PRIORITY	LOWER PRIORITY

Table copied from Institute for Tribal Environmental Professionals. "Adaptation Planning Toolkit." Northern Arizona University, 2013. http://www7.nau.edu/itep/main/tcc/Resources/adaptation

From the identified impacts and vulnerability assessments, the project team then worked with managers in each sector to create goals, strategies, and actions for climate change adaptation. As the chapters were drafted and revised, the planning team would often follow-up with in-person development meetings, emails, and phone calls to planners until the chapters were completed.

Chapter organization and variability

Each chapter (with the exception of Cultural Resources and Traditions) is organized into five main sections. The *introduction* identifies the planning area that is the focus of the chapter. The *observed impacts* section identifies climate change impacts that are currently taking place. The *expected impacts* section identifies climate change impacts that are projected to occur by the end of the century. The observed impacts and expected impacts sections are sets of working hypotheses about climate change that are based on day-to-day observations and/or interpretations of climate change literature (e.g. literature like the Montana Climate Assessment[100]). These hypotheses were formed for the purposes of assessing climate change vulnerability and then strategizing adaptation goals and actions. The *assessment* section shows the conclusions the planners reached about probability of impacts (confidence and potential consequences) to the planning area(s), as well as their conclusions about levels of risk (estimated risk and priority) and vulnerability (exposure, sensitivity, and adaptive capacity). The *adaptation strategies* section outlines the planners' goals, strategies, and actions for adapting to climate change. Goals are the major results planners want to accomplish, the broad primary outcome. Strategies are the approaches planners want to take to achieve the goals. Actions are the physical steps (often measurable) that the planners might take to accomplish the goals. Finally, the sections conclude, to varying degrees based on planners' objectives, to identify the required and existing authority/capacity in the sector, partners and potential funding sources, funding needs for addressing the estimate impacts, and existing programs that contribute towards resilience.

Planners' preferences in approach varied for each sector, as evidenced by variability in style between chapters. Some planners chose to incorporate suggested impact statements from literature reviews, while others relied primarily on their own observations and expertise. Some planners preferred a broader scope, as evidenced by the agriculture and human health chapters, while others chose a narrower focus and/or committed to fewer actions. The latter approach may reflect staff availability and funding outlooks, as each planning team has a thorough understanding of the resources and staff time available in their respective departments. For example, the fish chapter reflects that the tribe is in the process of hiring a fisheries biologist. The cultural resources and traditions chapter is unique in that it does not include a set of goals, strategies, and actions like the other chapters, something that should be addressed in the next round of planning. The planning process provided flexibility in these regards, understanding that each sector operates differently. The planning team emphasized the importance of chapter authors exercising full ownership over their section of the plan.

Scope of this Plan

This plan covers eight sectors: agriculture, cultural resources and traditions, forestry, fish, human health, land and range, water, and wildlife. While it is broad in this respect, it still does not cover every important sector, and other sectors that will be impacted by climate change should be considered in future planning processes (e.g. infrastructure development, housing, education, recreation, etc.). Additionally, the plan does not cover the full breadth of any of the eight sectors, as time and financial constraints required more focus for the initial planning effort. In the future, climate change planning should consider possibly adding more planning areas in each sector (or, alternatively, reducing the scope of focus in sectors where planning may prove to be too broad to implement).

The plan provides a thorough description of the context in which the Blackfeet live and manage, detailing the climate change drivers and impacts observed and projected for the region, as well as the tribe's cultural, historical, and socioeconomic context. A limitation of this plan is that it does not include monitoring and evaluation of outcomes or outputs in any of the sectors. Until a monitoring component is added, it will be difficult to measure or assess the impact of adaptation actions.

And yet the plan is a key ignition point for driving momentum in formal climate change planning and implementation. **In this regard, the planning process was just as important, if not more so, as the product.** The planning process ensured that, as much as possible, sector managers wrote and took full ownership of their sections in the plan. The planning itself brought people together from multiple departments, multiple times, bringing new information about climate change, sparking conversations that spanned departmental boundaries, and ultimately bringing the urgency of climate change to the forefront of decision-makers' minds. Dialogue throughout the planning process increased understanding of intersecting roles and responsibilities related to resource management, and improved communication. The planning process increased awareness of existing and future climate change impacts to the Blackfeet Nation while underscoring that the Pikuni people have the power to act now to increase their resilience to climate change.

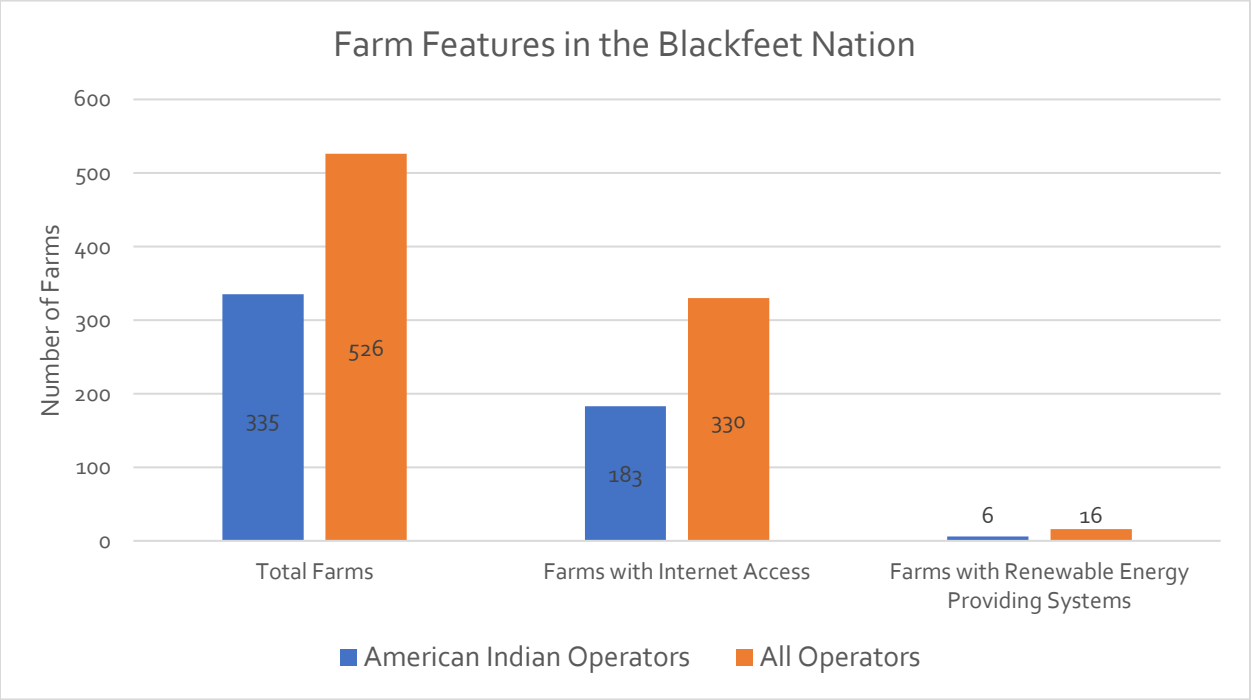
Ultimately, the planning process has built momentum around planning and adaptation in such a way that the process sparked a climate change internship program for 10 Blackfeet youth, a new website that highlights climate-related environment and health impacts and adaptation opportunities (see https://blackfeetclimatechange.com/), and a new climate adaptation initiative, called The Beaver Project, that is designed to increased natural water storage in the Blackfeet Nation. While the plan does not do everything, both the product and the process have increased commitment to building resilience to climate change.

5. AGRICULTURE

This chapter was developed through meetings and correspondence with the Blackfeet Agriculture Resource Management Planning team. The first two sections, *observed impacts* and *expected impacts*, are sets of working hypotheses about climate change that are based on day-to-day observations and/or interpretations of climate change literature (e.g. the Montana Climate Assessment). These hypotheses were formed for the purposes of assessing climate change vulnerability and then strategizing adaptation goals and actions. This marks the first formal, multi-sector climate change adaptation planning effort in the Blackfeet Nation. This and other sections of the plan will be revisited and updated periodically as action items are implemented and adaptation efforts produce insights for future planning.

The goal of the Agriculture Sector is to focus on planning for irrigated land, grain production (especially wheat and barley), livestock production (horses and cattle, plus forage quality and quantity), seasonal crops, pollinators, and potential for fire damage. Agriculture management is currently under the jurisdiction of several departments with current efforts to create an Agriculture Department. The focus area is located across the Blackfeet Nation.

FIGURE 10: FARM FEATURES IN THE BLACKFEET NATION



64% of farms in the Blackfeet Nation have American Indian Operators. A lower percentage of American Indian operated farms have internet access (54% vs 63%). 37.5% of farms with renewable energy providing systems are American Indian operated. *Data source: USDA NASS, 2012 Census of Agriculture.*[101]

There are 335 farms operated by Blackfeet or members of other US tribes comprising 957,476 acres.[102] Table 5 summarizes agricultural land use in the Blackfeet Nation. American Indians manage over 32,000 cattle and calves on the reservation, almost 5,000 horses, and approximately 2,300 bison.[103]

Table 5: Blackfeet Nation Agriculture Information

Characteristics	Unit	[1]American Indian Operators	[2]All Operators	Characteristics	Unit	[1]American Indian Operators	[2]All Operators
Farms	Number	335	526	**Operators**	Number	422	797
Land in Farms **Reservation** **Acres in Farms**	Acres Acres	957,476 874,564	1,771,525 1,329,854	**Operator Gender**	Male Female	307 115	563 234
Total Cropland	Farms Acres	153 113,118	296 497,108	**Primary Occupation**	Farming Other	211 211	452 345
Harvested Cropland	Farms Acres	129 72,080	254 313,138	**All Operators**	Average Age	55	54
Irrigated Land	Farms Acres	69 72,027	130 72,027	**Farms with Internet Access**	Number	183	330
All Wheat for Grain	Farms Acres Bushels	27 23,448 889,467	95 121,889 4,210,226	**Renewable Energy Providing Systems**	Farms	6	16
Barley for Grain	Farms Acres Bushels	32 20,806 673,551	100 98,224 3,823,633	**Forage Land**	Farms Acres Tons, dry	116 25,216 37,030	204 61,802 97,435
Horses and Ponies Inventory	Farms Number	227 4,816	308 5,437	**Horses and Ponies Sold**	Farms Number	50 743	69 787
Cattle and Cows Inventory	Farms Number	228 4,816	315 66,432	**Cattle and Calves Sold**	Farms Number	185 16,070	292 36,096

1. At least one of the reported operators (out of a maximum of three) is self-identified as American Indian either exclusively or in combination with other races

2. Data are for farms and ranches reporting at least some agricultural production on reservations during 2012.

Source: This table is reproduced from USDA NASS's Montana Field Office U.S. American Indian Agriculture at a Glance, 2012 Census of Agriculture.[104]

Observed Impacts

Relative to irrigated hay, the productivity of non-irrigated hay is decreasing due to warming temperatures. With increased temperatures, climate change impacts could also extend the growing season; however, non-irrigated hay will also be more susceptible to drought, lowering its production.

Expected Impacts

Most of the impacts described in this section are derived from the Montana Climate Assessment's description of impacts to the North Central climate division and interpreted with

known differences between the broader region and the specific locality of the Blackfeet Reservation. For example, one notable difference is that while small-grain production dominates the agricultural landscape of the North Central climate division, earning it the name of "the Golden Triangle," cattle production dominates in the Blackfeet Nation. Furthermore, given the absence of climate data and monitoring specific to the Blackfeet Nation, these impacts should be interpreted with an understanding that they have an added layer of uncertainty.

The future of Ag in Indian Country. *Photo by Mya Davis.*

Impacts to Irrigated Land

Climate change is increasing the length of the growing season. However, day length and photoperiod will remain constant, and drought will likely increase, most likely curtailing many of the benefits brought by a longer season. Evapotranspiration stress from rising temperatures and drought will likely increase farmers' reliance on irrigation. However, diminishing mountain snowpack will constrain the amount of water available for irrigation and makes its capacity less reliable (particularly effecting hay, sugar beet, malt barley, market garden, and potato production). With an extended growing season, earlier snowmelt will further limit water availability in the latter part of the season. So, while climate change will likely increase irrigation demand, groundwater and natural surface water storage will diminish.

Impacts to Grain Production

Crop production trends are influenced by a variety of economic factors, making it difficult to pinpoint climate as a single source of changing production. Climate impacts combine with changing global commodity prices, changes in crop selection, government subsidies, crop insurance programs, improved cultivars, and specialized marketing channels to influence farm yields and incomes. However, increasingly volatile weather from climate change will increase market uncertainty, locally and globally, creating costs for crop selection and crop quality - costs that will be borne by producers and marketers. Warming temperatures will likely persuade farmers to shift towards winter wheat production, as spring wheat production can suffer from rising temperatures. Economic factors will complicate the shifting ratio of spring to winter wheat and will, along with climate change, likely influence shifts to other crops like corn. Corn and soybean acreage has increased in Montana in response to economic factors and possibly increased growing season length and warming temperatures.

Climate change will likely influence the impact of crop diseases like stripe rust (which infects wheat), wheat streak mosaic virus, leaf spot diseases, and insect and mite-vectored diseases. For example, stripe rust can be more aggressive at higher temperatures, decreasing yield and diminishing crop quality.

Crop pest survival and crop damage are predicted to increase with rising temperatures. The wheat stem sawfly causes more crop loss in winter wheat than in spring wheat, so its impacts may increase as farmers shift to winter wheat crops in response to warming conditions.

Climate change may further reduce crop yields by increasing weeds in some areas. Yellow star thistle and salt cedar are predicted to expand in range, while the ranges of spotted knapweed and downy brome are expected to shift. Weed responses will be variable, however, and leafy spurge is expected to contract. Adding to the complexity of crop and range management is that increased carbon dioxide concentrations may decrease the effectiveness of herbicides. Climate change will also likely alter the effectiveness of biocontrol agents in a range of ways, making them more or less effective, depending on the specific weed and biocontrol agent.

Branding in Indian Country. ***Photo by Mya Davis.***

Impacts to Livestock Production

In Montana, a decreasing supply of water for irrigation (see "Impacts to grain production" sub-section, above) will likely impact livestock producers who rely on irrigated hay production. Non-local impacts of climate change may impact producers in the Blackfeet Nation by increasing demand for hay exports from Montana. Changes in climate will also impact producers who graze livestock on non-cropped pasture and rangeland (see also Land and Range chapter). Forage quantity may decrease, and quality may degrade as temperatures rise and drought conditions increase in northwest Montana. More specifically, crude protein and digestible organic matter may decline in forage, negatively impacting animal nutrition. Heat stress will increasingly impact livestock as the number of days with temperatures above 90°F increases. Climate is likely to impact disease transmission in livestock, although Montana-specific data are lacking for cattle. Overall, predictions are difficult due to the complex array of factors that impact the livestock industry. For example, most Montana livestock producers ship cattle out of state to feedlots, so climate impacts in other regions will affect their operations. However, if the Blackfeet are successful in their efforts to establish their own meat packing plant, this could benefit beef producers significantly and could be seen as a key adaptation strategy.

Impacts to Pollinators

Climate change has already triggered a decline in some species of pollinators. As temperatures warm, plant and pollinator phenology (the timing of life cycle activity) will likely shift. The shift may occur in such a way that pollinators and plants are not synchronized. Furthermore, as farmers respond to drought conditions and reduced yields, they may expand their farming area, encroaching upon pollinator habitat.

Increased Probability for Fire

A projected net effect of climate change is increased fire severity. Greater fire severity will result from warmer weather and past management policies like forest fire suppression.[105] This could directly increase agricultural losses to fire and negatively impacting the health of agricultural workers with prolonged exposure to unhealthy particulate levels from regional fires.

Agriculture Assessment

The location of concern is the entire Blackfeet Nation. At the same time, agriculture management will need to consider local micro-climates and the east-west rain gradient found in the Blackfeet Nation. The timeframe begins now and extends into the future, as some of the expected impacts are already being observed.

Probability of Impacts to Agriculture

There is a high probability of impact. Warmer annual temperatures, increased extremely high temperature days, reduced snow pack, earlier snowmelt, decreasing summer precipitation, and increased frequency and severity of drought are key drivers.

Confidence

High

Potential Consequences of Impacts

Potential consequences are high.

Increased volatility in climate will negatively impact producers and consumers by increasing prices of grain and beef. Potential economic costs include increased prices for agricultural inputs, decreased average yields, and increases in frequency of agricultural losses to extreme weather events.

From an ecological standpoint, attempts to recover declining yields may lead producers to expand areas of cultivation or livestock range, overtaking habitat for pollinators and other types of flora and fauna that inhabit spaces near and within farms. Expanding agricultural areas would require more water, decreasing its availability for ecological functions. Increased applications of herbicides and pesticides could decrease water quality.

VULNERABILITY:

Exposure

The exposure is high for grain and livestock production.

Sensitivity

Sensitivity is high.

Adaptive Capacity

The adaptive capacity is low, given constraints and complexities of governing fractionated land parcels in the Blackfeet Nation. However, money from the Cobell settlement buy-back program, the passage of the Water Compact, and the current agriculture resource management planning process together create exciting opportunities for building climate resilience in Blackfeet agricultural management.

Vulnerability

Vulnerability is high.

RISK:

Estimated Risk

The estimated risk is high, given that there are both high consequences and high probability.

Priority

Priority is high, given that there is high risk and high vulnerability.

Agricultural Adaptation Strategies: Goals and Actions

Responsible Party

The core staff of the Agricultural Resource Management Planning (ARMP) process are currently laying the foundation for a brand-new agriculture department, with the ultimate goal of having the new agriculture department's staff be responsible for implementing the agricultural adaptation strategies. The primary ARMP planner reports to the Blackfeet Natural Resources Conservation District and the Tribal Business Council.

Hay bales in the Blackfeet Nation.
Photo by J. Pecora Photography.

Purpose (Goals)

1) Promote healthy ecosystems
2) Create an environment where producers can make money
3) Promote specific types of crops based on human nutrition needs
4) Support cropland production in the Blackfeet Nation
5) Support healthy livestock operations
6) Improve land governance
7) Establish monitoring systems for adapting to changes in the environment
8) Develop a comprehensive emergency management plan that takes agriculture into consideration to help take advantage of federal programs and money

Priorities

The priority for agricultural management is high.

Preparedness Goals: Strategies and Actions

Goal 1: Promote healthy ecosystems

Strategies:

a) Promote soil health

Actions:

1) Make soil quality part of the appraisal process so that agricultural land value is dependent on the health of the soil
2) Investigate no-till farming to see if there is a methodology that does not use spraying
3) Identify methodologies that will allow us to keep carbon in the ground (e.g. no till farming) – especially, to see if there is a methodology that reduces reliance on spraying, such as use of cover crops, crop rotation, or plant buffers
4) When appropriate, encourage tillage and no-till practices that promote soil health, innovations in cover-cropping, and/or rotation with pulse and other crops

b) Restore and protect water ways and wetlands

Actions:

1) Restore riparian areas by installing off-site watering troughs
2) Protect existing wetlands habitat
3) Encourage co-existence with beavers to promote riparian area creation and maintenance and increase natural water storage
4) Maintain stream-flows and geomorphology of rivers and streams, with an understanding of natural patterns of fluctuation (e.g. via modification by beavers)
5) Identify areas of natural water storage and look at effects of infrastructure on restoring those areas. Identify wetlands that have been created by current inefficiencies of water infrastructure, since repairing the infrastructure may eliminate the wetlands. Identify places where new wetlands should be created to compensate for repaired infrastructure
6) Identify possible areas for wetlands restoration, including areas where wetlands

were removed during creation of current infrastructure

c) Create and protect wildlife habitat

Actions:

1) Promote sage grouse protection on farms and tribal public lands
2) Create designations for permanent land conservation
3) Enhance native pollinator habitat (both floral and nesting resources on natural and managed lands)

d) Utilize sustainable energy for agricultural operations

Actions:

1) Use alternative energy to pump water off-site

e) Assess all resources that are available for tribal producers that will augment larger conservation goals (e.g. financial incentive programs), and assist producers with accessing those resources

f) Change the eligibility requirements with USDA programs so they are aligned with trust land management complexities

Actions:

1) Continue to make recommendations with Senators Tester and Daines
2) Make memorandums of understanding between the USDA and the Department of Interior (via the Bureau of Indian Affairs)

g) Utilize traditional ecological knowledge to augment conservation practices

Actions:

1) Recognize where people fit in the larger ecosystem so that natural processes are better observed and respected
2) Augment the preservation of specific species through the use of traditional storytelling
3) Infuse the Blackfeet language in conservation and agricultural practices

h) Promote crops and farming practices with high ecological value

Actions:

1) Promote organic crops and organic rangeland
2) Promote crops grown using conservation practices
3) Promote pulse crops (e.g. lentils, chickpeas)

Goal 2: Create an environment where producers can be more profitable

Strategies:

a) Identify the resources the tribe has and utilize them in ways that most benefit the tribe while sustaining the environment

b) Encourage independence from commodity markets to support stable tribal markets

Actions:

1) Create a food code to define the safety standards for commercial production (e.g. fruit, nuts, cattle) to position people to become suppliers
2) Develop the Agriculture Resource Management Plan and consider climate change in production goals and objectives
3) Create agriculture incentive programs to diversify agriculture profiles and move producers into cash crops that are less affected by climate change
4) Plan for entering specialty markets
5) Market products to health food stores and local institutions, including local schools
6) Encourage grass finishing and explore markets for grass-fed beef
7) Encourage building Blackfeet processing and packing facilities
8) Identify and promote branding and certification for tribal and/or environmentally-friendly products and explore production of organic products
9) Take advantage of the geographic environment and better land practices to make more money on produce in specialty markets
10) Promote honey production, in part, by supporting pollinator gardens

Goal 3: Promote specific types of crops based on human nutrition needs

Strategies:

a) Use incentives to promote high nutrition crops and food production

Actions:

1) Promote greenhouses and hoop houses

Goal 4: Support cropland production on the reservation

Strategies:

a) Manage water in a way that will support crop production

Actions:

1) Push for national money for Bureau of Indian Affairs to upgrade the irrigation system
2) Keep irrigation systems in good working order and update old ones to prevent water leaking and waste
3) Encourage diversification of crops through incentive programs
4) Promote buffer areas between production land and water resources to benefit pest management, erosion control, and habitat
5) Support forage and hay production
6) Mitigate invasive species and diseases

Actions:

a. Develop the strategic plan for invasive species by pulling stakeholders together and creating a steering committee of the different governments and jurisdictions working in the Blackfeet Nation

Goal 5: Support healthy livestock operations

Strategies:

a) Manage water for cow and calf operations

b) Manage pests and invasive species

c) Create mechanisms that allow us to prevent overgrazing (including issues like controlling overpopulation of horses)

d) Create healthy forage

Actions:

1) Manage horse populations

Goal 6: Improve land governance

Strategies:

a) Centralize agriculture management by completing the Agriculture Resource Management Plan (ARMP), which includes grazing plans, the water permitting process, and irrigation

b) Dissolve complexities of trust land management so areas can be conserved in some places and elsewhere people can build on their own land.

Actions:

1) Put policies in place to preserve identified priority areas (e.g. zoning)
2) Consolidate fractionated land parcels

Goal 7: Establish monitoring systems for adapting to changes in the environment

Goal 8: Develop a comprehensive emergency management plan that takes agriculture into consideration to help take advantage of federal programs and money (e.g. for emergencies like drought, massive snow storms, other extreme events, and to deal with the cascading effects of climate impacts like a snow storm that kills cattle and then attracts grizzlies)

Required and Existing Authority/Capacity

Primary authority for the Agriculture Resource Management Planning process (ARMP) is given through the Agriculture Resource Management Plan Act of 1993, and secondary authority given through the Public Law 638. The tribe passed Resolution #19-2015 to enter into the contract to conduct the ARMP.

Partners and Potential Funding Sources

Partners and potential funding sources include the U.S. Department of Agriculture's Rural Development, Farm Service Agency, and Natural Resources Conservation Service programs, the Bureau of Indian Affairs, the Bureau of Reclamation, the State of Montana's Department of Natural Resources and Conservation, the National Fish and Wildlife Foundation, The Nature Conservancy, the University of Arkansas School of Law's Indigenous Food & Agriculture Initiative, Montana State University's (MSU) Indigenous Land Tenure Project, and MSU's Department of Health and Human Development.

6. Cultural Resources and Traditions

This chapter was developed through research with consultants and in a working partnership with the Blackfeet Environmental Office's Climate Change Coordinator, a tribal member, and after consultation with the Blackfeet Tribal Historic Preservation Office. The first two sections, *observed impacts* and *expected impacts*, are sets of working hypotheses about climate change that are based on a review of climate change and cultural impacts literature. These hypotheses were formed for the purposes of assessing climate change vulnerability and to inform future strategic planning. This marks the first formal, multi-sector climate change adaptation planning effort in the Blackfeet Nation. This and other sections of the plan will be revisited and updated periodically as action items are implemented and adaptation efforts produce insights for future planning.

Cultural resource management is under the jurisdiction of the Blackfeet Tribal Historic Preservation Office.

The goal of the Cultural Resources and Traditions Sector within this Climate Change Adaptation Plan, is to support the sustainability of traditional lifeways. In doing so, we honor the goals of continued preservation of our true heritage, including cultural resources within our community, the broader landscape, and, when applicable, in museums. As traditional practices and belief systems are lived and shared by knowledgeable community members, elders, Society members, Medicine People, Bundle and Pipe Carriers, etc., we understand that "cultural preservation" is a way of living, thinking, honoring, and believing. These are actions and choices, not just words on a page.

This is a beginning. A foundation, that as a joined community, we can build together. The following are potential impacts from changing weather patterns which could adversely affect our cultural resources and traditions. Certainly, as we continue to shape and build this plan together, with continued input from our rich and diverse community, we will learn together the best ways to protect all that was given us by Creator.

Observed Impacts

Climate change is shifting the ranges of plant and wildlife species.[106] Shifting ranges pose a problem as political and jurisdictional borders are not shifting with species.[107]

Expected Impacts

The impacts described in this section come from a review of literature on climate change impacts to tribal cultural resources and traditional lifeways. It is divided into two sections:

1) Impacts to traditional lifeways and impacts to artifacts
2) The recognition that impacts to artifacts will impact traditional lifeways and vice versa. (Note: "Artifacts" is a term from western science and is used here simply as a placeholder for describing items integral to Blackfeet culture and history.)

Ninnastako (Chief Mountain) is many different things to the Piikani people. The mountain is revered as a holy place, where our people have gone since the beginning of time – to fast, seek answers to prayers, make or complete vows, leave offerings, seek visions, smoke pipe, sweat, or to come together in an effort to protect our holy sites from the oil exploration and production industries. Some believe Ninnastako is alive, in Spirit form our Protector. Some believe it is just "a pile of rocks." Our Creation Stories include Ninnastako. *Photo by Tre Harwood.*

Impacts to Traditional Lifeways

Many Blackfeet gather plants for medicinal, ceremonial, subsistence, economic, and/or artistic purposes. Further, all forms of life (four-legged, winged, water and sky-beings) are honored in holy, traditional ceremonies. They are our "Medicine," our protectors, our guides, and healers. Finally, some roots, wild potatoes, onions, berries and wild game have provided sustenance for thousands of generations. For many present-day Pikuni families, they are still the primary sources of food during the relevant seasons for each. Climate change is predicted to impact the availability of plants and animals, increasing the availability of some species and decreasing the availability of others. This means it will impact the ability to hunt, fish, and gather in traditional Blackfeet territories.[108] Climate change would likely make it more difficult to access traditional foods, and could increase food insecurity.[109] Furthermore, such rapidly changing ecological conditions could erode traditional knowledge and cause confusion and uneasiness.[110,111] This could be translated as, "The changing seasons could make it harder to get our winter meat. In addition, as each ceremony begins or ends with the berry soup of 10,000 prayers (Gramma's Words), climate change could rapidly change our ability to gather berries for our spring and fall openings, Okaans, and other Medicine Lodges, which in turn could have a negative effect on our ceremonies and the ability to teach the values of these ceremonies to each next generation."

Impacts to Culturally Significant Vegetation

Climate change is predicted to impact plant life through a variety of pathways. Rising temperatures, decreasing precipitation, and drought in the late summer may lead to the decline of some plant species while favoring others.[112] High heat from fires may cause a loss of soil fertility, impacting vegetation.[113] Changes in seasonality and phenology could mean that there is a loss of synchronicity between species and that landscapes could be altered as plant blooming times shift.[114] A loss of pollinators could impact the landscape by reducing plant fertility.[115] More frequent drought and warming temperatures are projected to cause dieback of tree and plant species like birch and sweet grass.[116] While species have evolved with frequent wildfires in this landscape, increasing fire frequency and severity can threaten culturally important species.[117,118] Additionally, ceremonial sites may change in appearance as species ranges shift.[119] The Blackfeet have witnessed the marginalization of sweet grass as a result of so many lease cattle being on a favorite "secret coulee," or sweet grass picking location. Now, as weather patterns are changing there is a predicted dieback of some holy plant species.

Beargrass at Upper Two Medicine. ***Photo by Mya Davis.***

Impacts to Culturally Significant Wildlife

As with plant species, climate change is expected to change the prevalence of culturally significant wildlife. Climate change may change wildlife distribution and possibly decrease local population sizes by driving habitat losses, increasing disease threats, decreasing wildlife food sources, increasing invasive species, and pushing wildlife to migrate north.[120,121,122] More frequent and intense fires may change the migratory patterns of traditionally hunted animals and significantly alter landscape features used for navigating while hunting or gathering.[123]

Impacts to Aquatic Species

Climate change will impact aquatic species that are important for subsistence and culture, and it will impact tribal sovereignty and rights associated with water resources, hunting, fishing, and gathering.[124] Declining fish and loss of water supplies are directly impacting aquatic species.[125]

Impacts to Ceremonies

Climate change could impact traditional ceremonies by changing the timing of plant life cycles.[126] More and/or heavier precipitation could impact ceremonial cycles as well.[127] Changes in snowmelt timing, glacial melting, and climate extremes like drought and flooding could jeopardize water used for ceremonial purposes.[128] Flooding and fires could prevent access to ceremonial sites.[129]

Impacts to Artifacts

Climate change is expected to increase the exposure and deterioration of artifacts in the landscape. More artifacts could be exposed as glaciers melt.[130] Decreased precipitation could expose submerged cultural sites in lakes, make sites more vulnerable to fire and wind, and increase exposure as vegetation is lost and erosion increases.[131] Exposed artifacts and cultural sites are more likely to deteriorate faster with rising temperatures.[132] Increased wildfires could damage structures and archaeological resources and increase susceptibility to erosion and flooding, as well as increase risk of looting after a fire.[133,134] Heavy precipitation in the late winter and early spring could increase flooding and increase risk of artifact exposure.

Climate change could also impact museum collections. Increased temperatures could mean more stresses on heat, ventilation, and air conditioning systems in storage facilities and an increased need for environmental controls.[135] In collections without appropriate climate controls, there may be an increased rate of chemical decay and greater stress on artifacts as temperatures warm.[136] Increased precipitation and/or heavier precipitation could increase the risk of facility leaks or floods and potential wetting of museum pieces.[137]

Cultural Resources and Traditions Assessment

The location of concern is Blackfeet Nation-wide, and also includes traditional territories. The Blackfeet Tribal Historic Preservation Office will also consider Pikuni items (artifacts) housed in collections outside of the Blackfeet Nation. The timeframe begins now and extends into the future, as impacts are already occurring.

Probability of Impacts to Cultural Resources and Traditions

High

Confidence

High

Potential Consequences of Impacts

Potential consequences are high. Many Amskapi Pikuni believe that Creator has blessed us with tangible items (artifacts) that provide food security to our families (*inniskim*), protection and healing, and answers to prayer (our paints, bundles, pipes, rattles, and other holy gifts from Creator). Even at the very least, without a belief in the spiritual powers of these artifacts, they give many people a sense of purpose and meaning and a connection to our ancestors. In addition to providing a source of healing, protection, provision, strength, courage, peace, ability to escape the enemy, etc. sacred items and sites are irreplaceable.

VULNERABILITY:

Exposure

The exposure is high for impacting traditional lifeways and for impacting cultural resources like artifacts and sacred sites that reside on the landscape.

Sensitivity

High

Adaptive capacity

The adaptive capacity is medium. Political boundaries are rigid and not readily changeable, making it difficult to adapt to shifting plant and wildlife ranges and changes in abundance. Traditional lifeways were jeopardized by centuries of colonization and concerted efforts to suppress and eliminate native religious and traditional practices, with the result that many tribal members express concern about an ongoing loss of traditional knowledge. At the same time, years of effort by the tribe to repatriate bundles and other sacred beings from distant museums have resulted in a resurgence of traditional and ceremonial practices. The National Historic Preservation Act "gives" the tribe some level of control over cultural sites and artifacts outside the political borders of the Blackfeet Nation. Reserved treaty rights allow access to specified public lands for wood and timber cutting, hunting, fishing, and gathering.

Adaptation is not new to the Blackfeet. For example, the Blackfeet have already adapted their spiritual practices under extreme circumstances. During the time when native religious practices were declared illegal, the Blackfeet moved the annual *O'kaan* from the late summer to the Fourth of July to mask their ceremony as a federally-sanctioned public event.[138] Climate change will require similarly creative adaptive action.

Climate change has the potential to impact traditional ceremonies, such as Pow wows like Native American Indian Days and Butte Indian Days.
Photo by Libby Khumalo.

Vulnerability

High.

RISK:

Estimated Risk

The estimated risk is high, given that there are both high consequences and high probability.

Priority

Priority is high, given that there is high risk and high vulnerability.

Cultural Resources and Traditions Adaptation Strategies: Goals and Actions

Responsible Party

All members of the Blackfeet Nation are responsible for protecting and preserving Blackfeet tribal culture and cultural properties, under the guidance of the Blackfeet Tribal Historic Preservation Office.

Purpose (Goals)

To preserve and protect all that Creator has blessed us with, both spiritually and physically, in an effort to provide a sustainable model for future generations, no matter the stressors. With the help of the Holy Beings, Grandfathers and Grandmothers, etc. the Amskapi Pikuni have protected culture and ceremonies since the beginning of time… we continue to adapt.

7. FISH

This chapter was developed through meetings with managers from the Blackfeet Environmental Office and the Blackfeet Fish and Wildlife Department, and then revised through face-to-face, telephone, and email correspondence. The first two sections, *observed impacts* and *expected impacts*, are sets of working hypotheses about climate change that are based on day-to-day observations and/or readings of climate change literature. These hypotheses were formed for the purposes of assessing climate change vulnerability and then strategizing adaptation goals and actions. This marks the first formal, multi-sector climate change adaptation planning effort in the Blackfeet Nation. This and other sections of the plan will be revisited and updated periodically as action items are implemented and adaptation efforts produce insights for future planning.

For planning purposes, the focus of the fish sector is fish and fish habitat, with the intent to assess and create the benefits of healthy functioning fish habitat in the context of climate change. This planning area includes bodies of water and substrate required for fish spawning, breeding, feeding, and growth which are located on and near the Blackfeet Nation. The geographical impact is expected throughout Montana. The timeframe for these expected changes are estimated to be in the near-term (0-10 years), though long-term impacts must be considered as well.

OBSERVED IMPACTS

Fishing in the Blackfeet Nation. ***Photo by Coy Harwood.***

Lake and stream water levels are lower due to warmer days. Algae has increased as a result of reduced water levels and warmer water temperatures, plus added nutrients. The warmer water temperatures are detrimental to trout. Some people who fish have observed that the warmer water temperatures affect fish biting and the quality of the fish. In warmer waters, people have found the fish meat itself is mushy compared to when the waters are colder. A lot of people engage in catch-and-release fishing, but when they are fishing in hotter weather, the fish are less likely survive a release attempt, and some people who fish say they do not like to fish in hotter weather because they are concerned about fish survival.

EXPECTED IMPACTS

Impacts on Fish

The effects of climate change on fish and other aquatic species include loss of habitat, reduced flows, and higher water temperatures. Climate change impacts can be compounded by locally-driven impacts, for example, roads and timber sales.

Warming water temperatures will impact fish and fish habitat. Climate change will increase water temperatures in lakes and streams, with resulting lower levels of dissolved oxygen. Concerns about fish disease will increase. Climate change is also expected to stress macroinvertebrates. High water temperatures are also detrimental to fish not only from a physical aspect but from the increase in toxicity from pollutants such as ammonia. The toxicity of ammonia is a function of pH and temperature. Increases of both are bad for the fish.

Streams are projected to warm differentially, with larger temperature increases in lower elevations and smaller increases in the coldest streams. Since Salmonid species such as bull trout and cutthroat (including Westslope Cutthroat Trout, also found in the Blackfeet Nation) require colder water temperatures, they will likely be impacted by warming temperatures.

Cold-water habitats for Salmonids are predicted to decrease in the future, including for cutthroat trout and bull trout[139]

Nonnative fish like brook trout, brown trout, and rainbow trout often displace cutthroat and bull trout. Brook trout tolerate colder temperatures like cutthroat, but brown trout and rainbow trout will still find places where the temperatures are too cold for their habitat, leaving some refugia for cutthroat.[140]

Climate change may cause streams to warm, making them less suitable as habitat for native fish species. *Photo by Kim Paul.*

Climate change will increase variation in the timing and rates of water flow, impacting fish. This is because climate change is driving earlier snowmelt, high midwinter floods, and reduced

snowpack. Peak flows (and floods) may damage fish redds if scouring flows occur when eggs are in the gravel or newly hatched fish are emerging.[141] Decreased snowpack is projected to impact fish by decreasing summer low flows by and shifting the timing of peak flows. A shift in the timing of peak runoff will impact fish spawning. Lower flows combined with warmer air temperatures will increase stream temperatures. Higher stream temperatures and competition from non-native fish will reduce cutthroat trout and bull trout abundance.[142]

Impacts by Wildfire

Wildfires will impact fish and fish habitat. Wildfires are predicted to increase, increasing stream sediment, increasing peak flows and channel scouring, and raising stream temperatures by decreasing vegetation[143].

Potential Consequences of Impacts

Not responding to the impacts of climate change will result in the loss of bull trout, especially if the headwaters are not protected. If fishing is not regulated and catch-and-release fishing is not stopped during high temperatures, fish populations could decline. Without appropriate action, there is an increased risk of invasive plant species in water. Without appropriate action in the face of climate change, recreational fishing opportunities could be negatively impacted or lost. The Blackfeet Reservation is currently a renowned fishing destination and a huge revenue source for the tribe as a whole, and climate change impacts to fish could harm the whole tribe.

Fish Assessment

Location of Concern

The location of concern is Blackfeet Nation-wide.

Probability of Impacts to Fish

Climate change is already negatively impacting fish, and there is a high probability it will negatively impact fish in the future.

Confidence

High

Potential Consequences of Impacts

The potential consequences are high.

VULNERABILITY:

Exposure

High

Sensitivity

Very high

Adaptive Capacity

The adaptive capacity is low because fish and fish habitats are already stressed from factors not directly related to climate change. For example, the St. Mary Diversion Dam functions poorly, resulting in the taking of fish. Connectivity is decreasing due to loss of stream habitat from warming water temperatures and dams. Additionally, reconnecting stream habitat is risky when weighed against the risk of invasion from non-native species. Furthermore, roads often follow streams and rivers, meaning that the trees that could normally provide shading to cool aquatic habitats are missing and not easily replaced. Increasing threats from aquatic invasive species like zebra mussels will be a thing to watch. Harmful algal blooms (HABs) are also a concern because they can result from higher water temperatures and increased nutrients from animal waste and dead plant material. HABs can create hypoxic zones and toxins that can kill fish.

Vulnerability

High

RISK:

Estimated Risk

High

Priority

The priority for implementing climate change adaptation actions is high given that there is both high risk and high vulnerability.

Fish Adaptation Strategies: Goals and Actions

Responsible Party

The Blackfeet Fish and Wildlife Department and the Environmental Office are responsible for creating and implementing adaptation strategies to protect fish and fish habitat. The Blackfeet Fish & Wildlife Department is currently in the process of hiring a fisheries biologist who could increase focus on protecting fish and fish habitat.

Purpose (Goals)

The purpose is to assess and create the benefits of healthy functioning fish habitat, with three goals:

1) Assess quality and quantity of fish habitat in lakes and streams,
2) Ensure healthy habitat for fish and maintain healthy fish populations, and
3) Protect recreational fishing opportunities.

Priorities

The priority for fish population and habitat management is high.

Preparedness Goals: Strategies and Actions

Goal 1: Assess quality and quantity of fish habitat in lakes and streams

Strategies:

a) Hire a fisheries biologist to implement a monitoring program

Actions:

1) Decide on key indicators and routinely measure them (e.g. water temperature, water levels, water flow, dissolved oxygen, etc.)

b) Hire a hydrologist to manage water resources for uses other than agriculture and irrigation

c) Identify and monitor what fish are in what lakes and streams

Actions:

1) Net fish to determine what fish type, age, size, and quantity are in the lakes and streams and to determine whether the food supply is good

Goal 2: Ensure healthy habitat for fish and maintain healthy fish populations

Strategies:

a) Increase communication and cooperation among the departments most responsible for fish habitat, while engaging the Tribal Council: Environment (water quality), Water Resources (water quality), Fish & Wildlife, and Forestry

Actions:

1) Consult with the Nonpoint Source Program, which has a management plan with best management practices to reduce habitat impacts which could benefit fish habitat

b) Hire a fish biologist

c) Maintain and restore stream structure and function

Actions:

1) Restore floodplains and channels so they store cool water
2) Ensure effective passages for aquatic organisms, and include fish ladders on impassable dams and diversions
3) Restore riparian vegetation
4) Maintain or restore American Beaver populations

d) Maintain higher summer flows and mitigate effects of lower flows

Actions:

1) Increase the Fish & Wildlife Department's understanding of secured water rights under the new Water Rights Compact and seek possibilities for increasing instream flows
2) Understand the amount of water withdrawals for human use from within the boundaries of the Blackfeet Nation, and decide how much water should be retained for fish

3) Allow for more water to flow from regulated water bodies during low flow periods
4) Investigate creating a reservoir on the Willow Creek stream to help with flooding and to maintain water for later use
5) Explore the possibility of building beaver dam analogues (beaver mimicry) to increase natural water storage and repair riparian habitat

e) Remove or relocate roads away from stream channels and floodplains, where especially sensitive

f) Reduce interactions between native and nonnative fish species

Actions:
1) Facilitate movement of native fish to streams with suitable temperatures
2) Increase the size of suitable habitat wherever possible
3) Reduce nonnative fish species by increasing harvest of nonnative fish (e.g. encourage sport fishing, manually or chemically remove non-native fish)

g) Manage grazing to restore riparian systems

Actions:
1) Monitor and adhere to standards and guidelines for water quality
2) Protect stream and lake edges from cattle grazing (e.g. improve water quality by using fencing)
3) Reduce cattle in riparian areas
4) Provide off-stream or off-lake (water body) water sources for livestock

h) Reduce the frequency and severity of fires where appropriate and possible

Actions:
1) Reduce hazardous fuels
2) Employ erosion control structures after a fire (e.g. use water checks like logs, large boulders, etc.)

i) Protect redds from scouring after heavy precipitation

Actions:
1) Use erosion control structures (e.g. water checks like logs, rocks, etc.) after big rain events to prevent erosion

j) Protect streams and lakes from harm by all-terrain vehicle recreational use

Actions:
1) Minimize use by recreational vehicles in stream beds and lake edges
2) Educate recreational users about the impacts they can have on fisheries and fisheries habitat
3) Prevent recreationists from creating new roads

k) Address invasive species that effect habitat health

Actions:
1) Establish and sustain check stations to reduce invasive populations

2) Evaluate lakes and streams to understand distribution of native species

l) Develop a native fish hatchery to bolster local populations

Actions:

1) Update existing fish hatchery plans

m) Alter fishing regulations and practices to protect native fisheries

Actions:

1) Possibly close waters to fishing when the temperatures are so high that it causes more stress to the fish than would be healthy for them
2) Educate the public on best fishing practices
3) Investigate ending gill-netting in other water bodies (gill-netting is not allowed on St. Mary Lake due to bull trout in that system)
4) Bolster enforcement

n) Protect and restore headwater habitat

Actions:

1) Coordinate with relevant managers to prevent cutting of forests and grazing near headwaters streams
2) Stream restoration/stabilization of degraded streams
3) Prioritize watershed restoration in the most important places, using climate change model predictions

o) Protect cold stream temperatures in the summer

Actions:

1) Narrow unnaturally widened channels
2) Restore and maintain stream shade
3) Limit grazing in some areas

p) Manage connectivity

Actions:

1) Weigh the advantages and risks of temporarily or permanently removing barriers for native fish to permit them to move to new or previous habitat, recognizing that removing barriers may allow colonization by nonnative fish

q) Possibly assist migration to unpopulated water bodies. Only do this after weighing potential impacts to other species (i.e. How would moving cutthroat to a new water body impact amphibians or invertebrates?)

r) Implement the Blackfeet Nation Bull Trout Management Plan that was developed in coordination with the U.S. Fish & Wildlife Department

Goal 3: Protect recreational fishing opportunities

Strategies:

a) Reevaluate fish populations by understanding stocking and take levels, working jointly with Montana Fish, Wildlife & Parks and the U.S. Fish and Wildlife Service

   Actions:
   1) Conduct fish surveys

b) Evaluate habitat health of lakes and waterways

   Actions:
   1) Work with Water Resources (water quality) and Environment (water quality), and fish biologists to assess biotic and abiotic conditions

c) Address invasive species that effect habitat health

   Actions:
   1) Establish and sustain check stations to reduce invasive populations
   2) Evaluate lakes and streams to understand distribution of invasive species

d) Stock fish when appropriate

Required and Existing Authority/Capacity

Tribal Council has the required and existing authority/capacity to implement the preparedness actions, as does the Blackfeet Fish and Wildlife Department and, to some extent, the Environmental Office. The loss of habitat and changes from locally-driven impacts, such as roads and timber sales, compounds climate change impacts. However, the locally-driven direct impacts can be mitigated by management practices, but they have to be implemented by Council action and then enforced by the tribal departments such as Tribal Forestry and Fish and Wildlife. Reduced flows can be mitigated somewhat on regulated water bodies.

Partners and Potential Funding Sources

Partnerships help ensure the health of fish and fish habitat and are integral to enacting preparedness goals and actions. Partners include the Blackfeet Environmental Office, Blackfeet Fire Management (Forestry), Montana Fish Wildlife and Parks, U.S. Fish and Wildlife Service, the Bureau of Reclamation, the Province of Alberta, and Glacier National Park. There is a need to work hand-in-hand with the U.S. Fish and Wildlife Service and Glacier National Park in order to protect and maintain bull trout habitat and to implement the Blackfeet Nation's bull trout management plan. There is also a need to work with the Bureau of Reclamation and U.S. Fish and Wildlife Service to address the poorly-functioning St. Mary Diversion Dam. The Dam is currently causing fish losses downstream, including illegal take of bull trout. The Water Rights Oversight and Implementation Committee may have ideas on how to use some of the Tribe's water rights to improve habitat for fish.

Funding Needs for Addressing the Estimated Impacts

Potential funding sources for addressing the estimated impacts include the Water Compact damage claim funds, hydro power mitigation funding, and other grant funding. Funding needs and sources for addressing the estimated impacts to fish are to be determined.

Existing Programs that Contribute Towards Resilience

There are a variety of existing activities by the Blackfeet Nation that are already building the resilience fish and fish habitat to climate change. Here are a few examples:

- The Water Compact was enacted in 2017, clearly defining the Tribe's water rights, and making management more feasible.
- The Blackfeet Fish & Wildlife Department regulates fish taking by only allowing catch-and-release in some of the streams and by restricting the times of day fish can be taken.
- The Blackfeet Nation is a top fly-fishing destination. This means that the Fish & Wildlife Department has a large group of stakeholders who value the health of the fisheries in the Blackfeet Nation. What's more, there is evidence that fly fishermen are self-regulating during hotter temperatures by refusing to fish in times they believe would stress released fish.
- The dam at Midvale protects native fish from interacting with non-native fish.

8. Forestry

This chapter was developed through meetings with managers from Blackfeet Fire Management and Forestry, and then revised through email correspondence. The first two sections, *observed impacts* and *expected impacts*, are sets of working hypotheses about climate change that are based on day-to-day observations and/or readings of climate change literature. These hypotheses were formed for the purposes of assessing climate change vulnerability and then strategizing adaptation goals and actions. This marks the first formal, multi-sector climate change adaptation planning effort in the Blackfeet Nation. This and other sections of the plan will be revisited and updated periodically as action items are implemented and adaptation efforts produce insights for future planning.

The goal of the Forestry Sector is to focus on planning for fire management in a changing climate. Fire management is consolidated within the Blackfeet Forestry Department. The proximity of the Blackfeet Nation to Glacier National Park and Helena-Lewis and Clark National Forest creates opportunities for park fires to spread onto the Blackfeet Nation.

A forest in the Blackfeet Nation. *Photo by Mya Davis.*

Observed Impacts

Climate change has already impacted forests in a variety of ways, and Blackfeet Nation residents have observed fire events during unusual times of year, one example being the occurrence of two large wildland fires on a single night in January. A recent fire in an aspen stand was unusual and more intense than usual. Additionally, residents have observed changes in wind frequency. There used to be a "dead of winter" when winds would calm down, accompanied by a similar calm period in summer. Now they observe more frequent wind events, which may be attributable to changes in the jet stream. With increased winds, fires have a greater chance of spreading to grasslands and within forests.

Expected Impacts

Climate change will increase the risk of fires and could result in fires that are more intense and/or severe. One way is through a longer fire season, extending from earlier in the spring to later in the fall. Summer precipitation is key to reducing fire risk in summer and early fall but changing precipitation patterns could push the fire season later into the fall if winter weather does not come early enough. There is also an increased variability in the timing of fires. Fire events may be more likely to occur during unusual times of year due to unusually warm temperatures, low relative humidity, high winds, and ignition points.

Forest health is partly driven by snow pack, since much of the water used by trees comes from snowmelt. As more precipitation falls as rain, rather than snow, there may be an increase in the risk of fire occurrence. Even with big rainstorms, wind accompanies the rain, blows away snow, and evaporates soil moisture. When spring rains come, they may create a flush of grass growth that can act as increased fuel when it dries during summer warming.

Longer growing seasons with drier conditions will increase the availability of fuel for fires. While forests on the reservation naturally have a low frequency, high severity fire regime, they have lost the mosaic of conditions required for historic burn patters. Now, a homogenous tree age class and build-up of fuels makes forests more prone to widespread burning of more intense fires. Warmer weather and drought increase insect outbreaks, diminishing stand health and increasing fuel loadings, also increasing fire risk. These changes can also increase the amount of area burned, and possibly the intensity and/or severity of those burns.

Climate change may increase the risk for more intense and severe fires. ***Photo by Sadie Harwood.***

Fires can have a negative impact on soils. As fire severity increases, so do concerns about soil erosion in burned areas. Fire events and subsequent erosion can create ash/sediment inputs to streams. If a fire is hot enough, soils can become hydrophobic (when the soils repel water), resulting in serious costs to agricultural producers who must then leave fields fallow for two years after an intensely hot burn, an economic cost.

Increased uncertainty poses challenges for fire management planning. It is difficult to understand exactly how fuel load will build in relation to increased rainfall, a longer growing season, and changes in drought and pest stressors over time. Currently, fuel loads may not be a big concern, but Glacier National Park and surrounding National Forests have high fuel loads that could lead to intense fires that spread into the Blackfeet Nation. Additionally, recent fires have seen fairly good regeneration, but if a fire comes through a regeneration area, there is cause for concern about diminished regeneration.

Forestry Assessment

The location of concern is Blackfeet Nation-wide. At the same time, fire management must be addressed at a large, regional scale to account for bordering forests in Glacier National Park and Forest Service lands. Forests and rangelands need to be addressed on an equal plane for fire susceptibility. The timeframe begins now and extends into the future, as some of the expected impacts are already being observed.

Probability of Impacts to Fire Management

There is a high probability of impact. Temperature is a key driver and warming is highly likely.

Confidence

High

Potential Consequences of Impacts

Potential consequences are high.

Increased fire frequency and intensity will negatively impact human health by posing a hazard during active burns, and by diminishing air quality through smoke.

Potential economic costs include a loss of timber base, a cost to logging operators in particular. Declining tourism is likely to result when vacation rentals are threatened by fires. This could force people out of some areas, while drawing people into other areas. Generally, past fires have harmed hotel business and outfitting activities. Permittees, producers and allottees, and landowners face high consequences, with potential lost acreage and impacts on cattle, loss of leasing income, and the potential for lasting impacts on the resource.

From an ecological standpoint, wildlife will be affected by changing habitat structure, including socially, economically, and culturally-important species. Water quality and supply could decrease, especially if fires burn hot enough to create hydrophobic soil conditions. Post-fire erosion also poses sediment concerns for aquatic ecosystems. Changes in water supply timing could be part of the challenge.

Finally, increased fire frequency and intensity may harm cultural resources. Traditional and medicinal plants like subalpine fir, savisberry, roots, and other berries facing range shifts and extirpation are threatened by changes in fire regimes. Lodgepole Pines used for teepee poles and ceremonies could be threatened if a fire enters a fire regeneration area.

VULNERABILITY:

Exposure

The exposure is high, for both forests and grasslands.

Sensitivity

Sensitivity is high, and the resources are already stressed.

Adaptive Capacity

The adaptive capacity is medium.

While these systems have a reasonable ability to adapt, they could be pushed past the breaking point. As these systems adapt, what will be lost? While something will grow, it is unclear what it will be. What will be the costs to human communities and values?

Vulnerability

Vulnerability is medium to medium-high, depending on the adaptive capacity.

RISK:

Estimated Risk

The estimated risk is high, given that there are both high consequences and high probability.

Priority

Priority is medium-high, given that there is high risk and medium vulnerability.

Forestry Adaptation Strategies: Goals and Actions

Responsible Party

Blackfeet Forestry Department is the responsible party.

Purpose (Goals)

1) Ensure the health and productivity of natural resources in forest and range systems in the face of changing fire regimes
2) Address wildland-urban interface issues to protect communities from increasing fire risk

Priorities

The priority for fire management is medium-high.

Preparedness Goals: Strategies and Actions

Goal 1: Ensure the health and productivity of natural resources in forest and range systems in the face of changing fire regimes

Strategies:

a) Create more heterogeneity with a mosaic of forest patches differing in age structure for increased resilience to changing fire regimes

   Actions:
   1) Shape Forestry and Fire Management Plans with this goal in mind
   2) Targeted application of prescribed fire, mechanical thinning, plantings, and restoration
   3) Identify and pursue different funding mechanisms (e.g. Reserve Treaty Right Lands funding)

b) Shape Forestry and Fire Management Plans in light of climate

   Actions:
   1) Evaluate annual allowable harvest
   2) Work with wildlife departments (Tribal and U.S. Fish and Wildlife Service) to

develop best management practices in a tiered consultation process

c) Gain a better understanding of current conditions to better manage for desired future conditions

Actions:

1) Assess forest conditions to identify which areas are best suited to timber activity, thinning, and the application of fire

d) Continue to develop partnerships that allow for interagency collaboration on fire management

Actions:

1) Engage with fire experts at Helena-Lewis and Clark National Forest, Glacier National Park, Missoula Fire Lab, etc.

e) Advance planning to more effectively address fire

Actions:

1) Include climate information in upcoming Forestry and Fire Management Plans
2) Better integrate the Forestry and Fire Management Plans, perhaps to create a Fuels Management plan

f) Coordinate grazing so as to reduce the harmful impacts of increasing range fire

g) Protect forest resources in the face of increasing pest and fungal infestations

Actions:

1) Work with an entomologist to evaluate infestation risk and occurrence and to identify management strategies

h) Understand, protect, and sustain five-needle pine populations

Actions:

1) Collaborate with partners to evaluate whitebark pine genetic stock on the reservation
2) Research White Pine Blister Rust (*Cronartium ribicola*) to isolate from Mountain Pine Beetle (*Dendroctonus ponderosae*) and understand the impacts of each
3) Obtain maps of whitebark pine stands
4) Protect disease resistant whitebark pine trees from fire and beetles
5) Evaluate limber pine populations along the front and take actions to protect key populations from fire and disease

i) Protect Lodgepole Pine, especially young stands

Actions:

1) Use appropriate hazard fuel reduction in adjacent stands
2) Alter fire management plans to protect species from dwarf mistletoe (*Arceuthobium spp.*)

Goal 2: Address wildland-urban interface issues to protect communities from increasing fire risk

Strategies:

a) Educate homeowners on how to reduce the risk of forest fire

   Actions:
   1) Expand upon existing fire prevention program
   2) Hold workshops to educate home owners
   3) Increase site visits and encourage wildland urban interface best practices

b) Collaborate with local fire departments (volunteer, Forest Service, Glacier National Park, and Blackfeet Fire Management) to reach out to communities and better address risks and fire fighting

   Actions:
   1) Revisit cooperative agreement to include climate impacts

9. Human Health

This chapter was initially developed through face-to-face meetings with people in the health field in the community and then expanded in scope in consultation with the Blackfeet Environmental Office and the Blackfeet Environmental Office's Climate Change Coordinator. It was revised through face-to-face, telephone, and email correspondence. The first two sections, *observed impacts* and *expected impacts*, are sets of working hypotheses about climate change that are based on day-to-day observations and/or readings of climate change literature. These hypotheses were formed for the purposes of assessing climate change vulnerability and then strategizing adaptation goals and actions. This marks the first formal, multi-sector climate change adaptation planning effort in the Blackfeet Nation. This and other sections of the plan will be revisited and updated periodically as action items are implemented and adaptation efforts produce insights for future planning.

Increased risks to human health, due to a changing climate, are becoming more prevalent and varied. Health research investigations are exposing increases in water, food, and vector-borne diseases (from mice, ticks, mosquitos, etc.), temperature-related illnesses and death, air-quality impacts, and health challenges related to extreme weather events.[144,145,146,147] Health challenges within the Blackfeet nation are arising from increasing wildfires and extreme temperature and weather events. Heat exhaustion and heat related death, injury and death due to strong winds, or increased precipitation events and flooding (such as induced by tornados or other severe storms) may increase as the climate changes. Although scientific understanding of how climate change affects human health is advancing, comprehension of climate-related health impacts is just in the beginning stages. Many Blackfeet tribal members understand that as the climate changes, so does human health.

Many Blackfeet tribal members understand that as the climate changes, so does human health.

Within America, medical and biomedical professionals are relating health challenges such as increased asthma, and allergic reactions and sensitivities, to climate change (e.g. The U.S. Global Change Research Program's "The Impacts of Climate Change on Human Health in the United States").[148] Changes in climate impact human health directly and indirectly. Impacts are indirect when they are mediated by social, behavioral, environmental, and/or institutional contexts, which influence changes in exposure and health outcomes. It is important to consider that climate change threats can occur simultaneously, resulting in compounding or cascading health impacts.[149]

The Indigenous Peoples of America have been involved in promoting preventative and healthy lifestyles, climate modeling, and health projections since the beginning of time. As America's First People, first stewards of the lands, waters, and first stewards of all other living things, indigenous people were the first physicians, first weathermen, first scientists, and first climatologists, etc. within our homelands. Many Amskapi Pikuni are conscious of the need for balance and historically chose to thrive in a meaningful way that benefited all living things. Thus, the traditional seasonal movement of the bands of people within each tribe not only was beneficial to the *Niitsitapiiks* (the Real People or Pikuni people), but also to the *Natoyitapiiks*

(all flying things), *Sakoomiitapiiks* (all things living in or on the land), and *Soyiitapiiks* (all water beings), which includes the health of all.

It is important to understand that the Pikuni have been adapting to climate and population changes for hundreds of generations, so this is nothing new. It is also worth mentioning that members of the Blackfeet Nation care about our priorities. They care so much that the Blackfeet Climate Change Adaptation Management Priorities,[150] a community research investigation featuring many community members' voices, was included in the 2016 National Climate Assessment.

The focus of this initial Health Sector is on air quality and vector-borne diseases. It is a beginning, since climate-related health concerns extend more broadly than these initial two planning priorities. As we move forward, we eagerly look forward to hearing from our community in each of the areas covered within this plan. In this way, the plan will be strengthened as we expand on our understandings together. We will work together to build definitive Pikuni-relevant data that will inform and help improve our response to current and future health risks.

Observed and Expected Impacts

The following are climate related health challenges that are already beginning to occur within the Blackfeet Nation and worldwide:

Changing Weather Patterns are Increasing Some Species Populations

Changing weather patterns are increasing the populations of some species that carry viruses and diseases such as mice (Hantavirus), mosquitoes (West Nile virus), and ticks (Lyme disease).

Climate change is causing populations of certain disease carrying vectors to increase.

Climates changing means seasons changing. This means that geographic areas and seasonal distributions of the above vectors (things that carry disease or viruses), and the diseases they carry, will be altered. Rising temperatures are changing precipitation events (the rain patterns are changing), so there is more ability for mosquitos to breed and transmit West Nile virus, which is the number one mosquito-borne disease in the Blackfeet Nation and across the U.S. Around the world, the changing rain patterns are increasing populations of malaria-carrying mosquitos and increasing other mosquito-borne diseases such as dengue fever.

These same weather pattern changes are beginning to expand the distributions of ticks. This is

especially important to understand if you work outside or spend time in the outdoors, whether on foot or horseback. Ticks carry Lyme disease, which has infected more than one community member locally.

Changing Climate is Impacting Air Quality

Changing climate is impacting air quality by increasing wildfires, with forest fires expected to increase in frequency and severity.[151]

As the Pikuni people have experienced more frequent and intense periods of air pollution during fire seasons over the past years, we understand that air quality can be negatively affected even hundreds of miles from the fire's actual locations.

Climate change poses an air quality threat, as it increases fire frequency and severity. High winds in our area, which some tribal members believe to be increasing in severity, coupled with drought, may exacerbate dust exposure. Wind has been a "friendly challenge" to the Pikuni people, as many believe the wind coming off the *Miistaksis* (mountains) cleans our air within the remaining homelands of the Amskapi Pikuni Nation. We are also now learning that the wind can carry particulate matter, as experienced during increasing fire seasons, as well as after Mt. St. Helens erupted in May of 1980, carrying ash 700 miles to Pikuni Country and depositing variable amounts across our communities.[152]

The health impacts of wildfire smoke particulates are especially harmful to children because as they breathe smoke in, their smaller bodies are less able to get rid of the harmful particles that are in the smoke. Children breathe more air per pound of body weight than adults, and are still developing, compounding the damage. Older community members are also at greatest risk, along with our children, for illness from smoke.

Smoke exposure causes many different health challenges. These challenges can include chest pain, faster heartbeat (due to heart working harder to get oxygen pumped to body via bloodstream), and wheezing; smoke exposure can also bring on increased asthma attacks. In addition to increased coughing and trouble breathing, direct wildfire smoke inhalation can cause sinus infection, headache, sore throat, tiredness and runny nose.[153] Long-term smoke inhalation of $PM_{2.5}$ (Particulate Matter measuring 2.5 micrometers) or smaller can cause cancer, lung disease, and cardiovascular disease.[154]

The most damaging fire pollutants are the fine particulate matter floating in the air. If the air is hazy or smoky, then there is definitely particulate matter in the air. Particulate matter from fires is made up of microscopic solids and liquid droplets that form in the air due to fire and contain many chemicals, from sulfur dioxide to nitrogen oxides, and sometimes the highly carcinogenic BTEX chemicals (Benzene, Toluene, Ethyl-Benzene, and Xylene).

Health and climate scientists understand that any particle smaller than 10 micrometers or PM_{10} can be damaging to your health because they can get very deep into your lungs and some of these chemicals actually get into your bloodstream. Much of the fine particulate matter that is floating in wildfire smoke is less than $PM_{2.5}$.

The most damaging fire pollutants are the fine particulate matter floating in the air. If the air is hazy or smoky, then there is definitely particulate matter in the air.

To understand how small $PM_{2.5}$ is, the average human hair is about 70 micrometers, so the diameter of a single human hair is about 70 times bigger than the fine particulate that is breathed in when our air is affected by wildfire smoke! By explaining the micro-size of the particulate matter in smoky air, we can understand how this particulate matter can get deep into the lungs and lung tissue (alveoli), to cause damage even though we may not realize this is happening.

These filters are used to monitor air quality in the Blackfeet Nation. Both air filters were left out for 24 hours in Browning, Montana on two different days. The filter on the left shows particulate accumulation on a cleaner air day. The filter on the right shows particulate accumulation in 24 hours on a day when there was a forest fire in the area. *Photos by Gerald Wagner.*

Again, increased prevalence of forest fires will heighten ash exposure and increase asthma-related health issues, as well as wheezing, elevated heartrate, coughing, trouble breathing, sinus infection, headache, sore throat, tiredness, and runny nose. Increased winds (coupled with drought conditions) have the potential to increase dust from soil dispersions and lessen air quality.

According to a 2014 study by the OECD, air pollution is now the main environmental cause of premature death, surpassing both poor sanitation and a lack of drinking water.[155] Compared to all causes of mortality, particulate matter air pollution ranks 13th, contributing to approximately 800,000 premature deaths per year.[156]

As a final reminder, long-term exposure to fine particulate matter over time can cause cancer, lung disease, and cardiovascular (heart) disease. Respirator masks can offer some protection from fine particles, provided they are labeled N95 or N100, however, they do *not* filter out hazardous gases (such as carbon monoxide, formaldehyde, and acrolein).[157]

Changing Weather Patterns are Causing an Increase in Airborne Allergens

Air pollution and airborne allergens, attributable to climate change, are currently responsible for premature death and increased hospital admissions.[158] The most recent data assembled by representatives from the Environmental Protection Agency (EPA), the Department of Human and Health Services (DHHS), the National Oceanic and Atmospheric Administration (NOAA), the National Aeronautics and Space Administration (NASA), the Department of Agriculture (USDA), and the Department of Veteran's Affairs (VA) projects "hundreds to thousands of premature deaths, hospital admissions, and cases of acute respiratory illnesses each year in the U.S. by 2030".[159]

Airborne allergens (aeroallergens) include tree, grass, and weed pollen (especially ragweed), indoor and outdoor molds, and proteins associated with animal dander, dust mites and cockroaches. As growing seasons lengthen, the quantity and allergenicity of pollen increases, as does pollen distribution.[160]

Climate change is increasing the growing season for allergens such as ragweed.

Dust and high winds transport spores which can have negative health consequences, as some people are allergic to their pollen. Changes in plant phenology and community structure, and expected impact of climate change, could also lead to increases in plant-based allergens. With earlier spring and later fall seasons, plant-based allergen season may be extended.

As growing seasons for allergen producing plants such as ragweed become longer,[161] and the areas that these plants grow in become larger due to changing weather patterns, increased airborne allergens will increasingly challenge health in populations,[162] most especially children due to their immature respiratory and immune systems. The growth patterns of these plants are changing due to higher temperatures and the increasing carbon dioxide levels, which promote growth and release of airborne allergens.[163] Just as our Blackfeet community members have reported seeing savisberry and chokecherry bushes growing in different elevations than before, so too are allergen producing plants expanding their geographical growth areas.[164]

More frequent and intense drought can increase airborne soil dust, which can lower air quality and cause breathing and visibility problems. Responses include immediately seeking shelter, and staying low, while covering the eyes, nose, and mouth.[165]

Climate change may reduce the mixing of indoor and outdoor air, as people close windows and doors to control temperatures in their homes or businesses. Reduced air mixing can increase concentrations of indoor air pollutants since they are not as diluted by outdoor air. Indoor air contaminants can include carbon monoxide (CO), fine particles (PM2.5), nitrogen dioxide, formaldehyde, radon, mold, and pollen. The majority of people spend 90% of their time indoors.[166]

Changing Weather Patterns Impact Some Populations Disproportionately

Some populations are disproportionately vulnerable to health issues from declining air quality as a result of climate change, including indigenous peoples. People with low incomes, children and pregnant women, older adults, vulnerable occupational groups (people who work outside, emergency response personnel) persons with disabilities, and persons with preexisting or chronic medical conditions are also more vulnerable (especially people with asthma, hypertension, diabetes, chronic obstructive pulmonary disorder, and atrial fibrillation). So too are people who live or work in buildings without air conditioning and ventilation controls.[167]

Vulnerable populations suffer disproportionately from health challenges, as is evidenced within our own communities. Rates of preventable death, caused by many environmental, social, or behavioral causes, are much higher than other ethnicities across Montana and nationwide. Indirect impacts to health are experienced when they are mediated by social, behavioral, environmental, and/or institutional contexts, which influence changes in exposure and health outcomes. This means that there are many factors that can either work independently or together to negatively influence health, as a result of climate change. This is especially important for us to realize as we experience many community stressors, including trauma, generational trauma, compounding grief events, poverty, joblessness, lifestyles associated with the effects of residential boarding schools, violence, oppression, and the forced assimilation policies of past and current governments.

Indoor air quality, for populations that cannot afford indoor air filtering systems, is also expected to decrease as dust, particulate matter, and airborne contaminants increase, potentially leading to "sick home syndrome."

In addition, vulnerable populations may live in homes with inferior quality building materials used to build federally funded housing projects. These homes are more susceptible to mold due to higher water tables from changing precipitation events. Mold growth in homes can cause significant health impacts. Dampness indoors can increase mold, dust mites, and bacteria, as well as increase off-gassing of damp building materials, releasing volatile organic compounds and other chemicals.[168]

Climate Change and Health

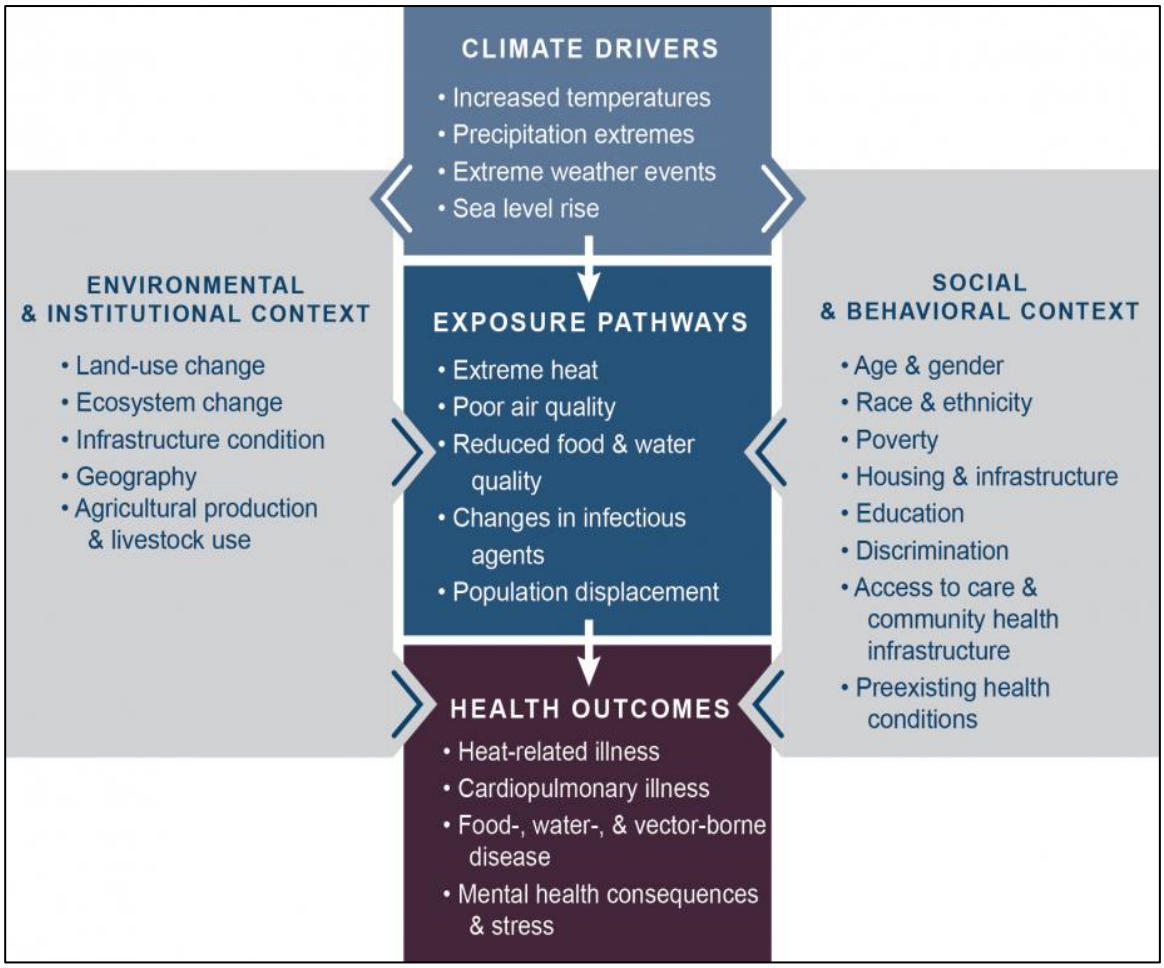
There is a significant need for governmental or private resources dedicated to climate-related health research. By extension, there is a local Amskapi Pikuni need to build long-term datasets that will quantify change in air quality and vector populations, as well as illness, disease, and mortality incidence due to changes in air quality and vector populations, in an effort to reduce disease and death.

Currently, needed advances in climate-related health data collection are limited by the lack of systems in place to evaluate connections between air quality or vector populations, and diagnosis of air quality related disease, as well as vector-borne diseases and deaths as they relate to changes in climate, worldwide. However, as a sovereign nation, the Blackfeet have

the ability to create such mechanisms and to model projected climate changes and health impacts, to improve current quality of life, and to protect families and community from the increasing impacts of climate change.

There is a local Amskapi Pikuni need to build long-term datasets that will quantify change in air quality and vector populations, as well as illness, disease, and mortality incidence due to changes in air quality and vector populations.

FIGURE 11: CLIMATE CHANGE AND HEALTH



This conceptual diagram illustrates the exposure pathways by which climate change affects human health. Here, the center boxes list some selected examples of the kinds of changes in climate drivers, exposure, and health outcomes explored in this report. Exposure pathways exist within the context of other factors that positively or negatively influence health outcomes (gray side boxes). Some of the key factors that influence vulnerability for individuals are shown in the right box, and include social determinants of health and behavioral choices. Some key factors that influence vulnerability at larger scales, such as natural and built environments, governance and management, and institutions, are shown in the left box. All of these influencing factors can affect an individual's or a community's vulnerability through changes in exposure, sensitivity, and adaptive capacity and may also be affected by climate change.

Source: https://health2016.globalchange.gov.[169]

This health section truly is just a beginning of understanding and learning how to reduce negative health impacts due to climate change. In working together, we have the potential to impact health in a strong and positive way.

Human Health Assessment

Negative impacts on air quality are already occurring; however, they are temporally-sensitive. Air quality impacts from climate change are greatest in summer. Vector populations are expected to increase in Blackfeet communities with a changing climate. Health concerns are predominately concentrated among human communities, both outdoors and in homes. Areas with fewer resources and more at-risk populations will require more attention, as will lowland areas more prone to bolder exposures.

Probability of Impacts to Air Quality and Vector Populations

High

Confidence

High

Potential Consequences of Impacts

Potential physical consequences are high.

Direct effects of decreased air quality will increase stress on people with asthma, increasing asthma attacks. The World Health Organization has tracked the causes of 3.7 million deaths related to outdoor air pollution, which include: ischemic heart disease (40 %), stroke (40 %); chronic obstructive pulmonary disease (COPD) (11 %), lung cancer (6 %) and acute lower respiratory infections in children (3 %).[170] People with compromised breathing or respiratory systems, older adults, and children, athletics and social activities will be affected by increased prevalence of smoke from fires.

Mold also affects community health, especially when water tables are high.

Direct effects of vector population increase are vector-borne diseases such as Hantavirus, Lyme disease, and West Nile. The CDC reports that of all fifty states, Montana has the 7th highest cumulative hantavirus incidence per state.[171] Further, 36% of all hantavirus cases nationwide result in death. Glacier County, in which the Blackfeet Nation is located, has the third highest incidence of hantavirus in the state,[172] with all of these cases occurring within Blackfeet communities.

The Montana Department of Health and Human Services reports tick-borne diseases in Montana range from Lyme disease (most prevalent) to Rocky Mountain Spotted Fever (2nd most prevalent in Montana), to Tularemia (3rd most prevalent), to Colorado Tick Fever and Tickborne Relapsing Fever (both tied for 4th).[173] Two deaths were reported in Montana (2016) from West Nile virus,[174] a virus that infects humans via mosquito vector.

From a social standpoint, consequences are high.

Unhealthy air decreases the aesthetics of an area, impacting the economy by decreasing tourism potential. Tourism is a major economic driver in Glacier County. Highways may be

closed by fire or low visibility due to air quality. Workforce productivity may decrease as the prevalence of illnesses like asthma and stomach problems increase.

VULNERABILITY:

Exposure

The exposure risk for air contaminants and vectors is high.

Sensitivity

Sensitivity is high.

Adaptive Capacity

The adaptive capacity is low.

Vulnerability

Vulnerability is high. Our population is currently considered an "at-risk vulnerable population."

RISK:

Estimated Risk

The estimated risk is high.

Priority

Priority is high. This report is an adaptive plan providing information and suggestions to meet the immediate and future needs of this community.

Human Health Adaptation Strategies: Goals and Actions

Responsible Party

Indian Health Services and the Blackfeet Environmental Office are the responsible parties.

Purpose (Goals)

1) Increase air quality monitoring
2) Increasing monitoring of vectors and vector-borne diseases
3) Increase community awareness of climate-related health risks and adaptation techniques
4) Explore ways to possibly reduce mosquito populations near homes, schools, and places of work
5) Improve air quality in the Blackfeet Nation
6) Enhance medical service provision for people with medical conditions related to air quality or vector-borne diseases

Priorities

It is a high priority to make a unified effort to combat the health effects of climate change relative to air quality and vector-borne disease within the Blackfeet population.

Preparedness Goals: Strategies and Actions

Goal 1: Increase air quality monitoring

Strategy:

a) Create a monitoring plan for air quality, within the 7 sub-communities of Blackfeet Nation, to include increased sampling during fire season

Goal 2: Increase monitoring of vectors and vector-borne diseases

Strategies:

a) Create a monitoring plan for deer mice, tick, and mosquito abundance

b) Monitor vector-borne disease incidence within Blackfeet population, particularly hantavirus, tick-borne diseases such as Lyme, and West Nile over time

Goal 3: Increase community awareness of climate-related health risks and adaptation techniques

Strategies:

a) Educate and encourage community members to take steps to prevent exposure to air contaminants, allergens, and particulates

   Actions:

   1) Increase health messaging to encourage people to stay indoors in a ventilated building when the air quality is poor to reduce exposure to particulate matter

b) Educate and encourage community members to take steps to prevent their exposure to vector-borne diseases

   Actions:

   1) Teach community members how to prevent rodent infestation in homes and other buildings, including outbuildings and haystacks. Additionally, instruct property owners in the removal of surplus material piles on their property that are attractive to mice. Finally, instruction will be given on how to take precautions when opening buildings that have been unused for a while.
   2) Distribute pamphlets that show the community how to prevent exposure to hantavirus.
   3) Distribute pamphlets to the community about the 4 D's of West Nile Virus prevention to help people avoid exposure (Avoid being outside at **D**awn & **D**usk. Use approved insect repellents (**D**EET) and wear long sleeves and pants (**D**ress) while outdoors to help protect against mosquito bites, and remove standing water near homes (**D**rain) to help decrease the number of mosquitoes near residences.) Encourage people to use window screens and air conditioning in summer months to help keep mosquitoes out of houses.
   4) If mice droppings or nests are found in the home or outbuildings, follow recommended clean-up procedures.

Goal 4: Explore ways to reduce mosquito populations near homes, schools, and places of work

Strategies:

a) Investigate the risk and utility of encouraging bat activity near standing water (e.g. by using bat houses), since bats consume mosquitoes.

b) Investigate the risk and utility of managing mosquitoes by removing mosquito breeding sites and applying pesticides where necessary, while recognizing the potential ecological and human health costs of using these methods.

Goal 5: Improve air quality in the Blackfeet Nation

Strategies:

a) Improve infrastructure to promote high indoor air quality

Action:

1) Explore providing assistance for remediating homes and buildings damaged by water to prevent mold growth

b) Create tribal policies to improve outdoor air quality

Actions:

1) Regulate and reduce emissions of ozone precursors.
2) Promote using alternative transportation like walking and cycling to not only reduce toxic emissions, but also to achieve the co-benefit of increasing physical fitness.
3) Promote construction of community walking and cycling trails.
4) Promote tree planting in Browning, Star School, Seville, and Heart Butte, as well as within future infrastructure development projects, to help reduce particulate matter, ozone, and other pollutants.

Goal 6: Enhance medical service provision for people with medical conditions related to air quality or vector-borne diseases

Strategy:

a) Support medical providers offering immunotherapy treatment, which can help people with pollen allergies have increased tolerance.

Required and Existing Authority/Capacity

- Blackfeet Tribal Council, Blackfeet Tribal Honorary Council, Blackfeet Environmental Department, Blackfeet Tribal Housing Authority, Blackfeet Tribal Programs, Blackfeet Service Unit: Indian Health Hospital and Clinics, Blackfeet Water Resources Department, Blackfeet Tribal Health Department, Montana School District 9 Administrative Board, Blackfeet Community College Administrative Board
- Community effort to increase understanding of health issues as they relate to a changing climate, i.e. air quality issues.
- Incorporate students from multiple disciplines at the local tribal community college, such

as engineering, nursing, natural resources, etc.
- Contact Blackfeet scientists and researchers, and their collaborators, to develop climate related studies.
- The Blackfeet Tribal Business Council is the existing authority, maintaining the oversight of the health of the people, the homelands, and all life and resources within the homelands.

Partners and Potential Funding Sources

- Bureau of Indian Affairs
- Environmental Protection Agency
- National Institutes of Health
- Department of Health and Human Services
- FEMA- previous disaster and emergency service drills
- Brownsfield grant- Hazmat training is a potential source of funding

Funding Needs for Addressing the Estimated Impacts

Funding for a full climate adaptation community health plan.

Existing Programs that Contribute Towards Resilience

- Blackfeet Environmental Office
- Blackfeet Water Resource Department
- Blackfeet Fish & Game
- Blackfeet Area Indian Health Service Hospital and Clinics
- Blackfeet Forestry Department
- Blackfeet Department of Agriculture
- Blackfeet Land Department
- Blackfeet Tribal Health Department

10. Land and Range

This chapter was developed through meetings with managers from the Blackfeet Land Office, and then revised through face-to-face conversation. The first two sections, *observed impacts* and *expected impacts*, are sets of working hypotheses about climate change that are based on day-to-day observations and/or readings of climate change literature. These hypotheses were formed for the purposes of assessing climate change vulnerability and then strategizing adaptation goals and actions. This marks the first formal, multi-sector climate change adaptation planning effort in the Blackfeet Nation. This and other sections of the plan will be revisited and updated periodically as action items are implemented and adaptation efforts produce insights for future planning.

The goal of the Land and Range Sector is to focus on planning for protecting native grassland vegetation in a changing climate. Land and range management is primarily under the jurisdiction of the Blackfeet Land Department. However, agriculture resource management planning is currently underway in the Blackfeet Nation, which may result in the creation of an agriculture department with shared responsibility for land and range.

A cowboy saving a calf in winter.
Photo by Rikki Ollinger.

Observed Impacts

Precipitation regimes are shifting and diminishing in length and quantity of moisture. Decreasing moisture weakens native vegetation and allows for noxious weeds to thrive and overtake the native species mix. Thirty percent of snow is lost to evaporation.

Expected Impacts

Throughout the Blackfeet Nation, climate change will result in an increase in the spread of noxious weeds and will impact plant composition in native rangeland, particularly of fescues.

Land and Range Assessment

Threats from noxious weeds span the entire Blackfeet Nation. Noxious weed invasion has already occurred for over a decade. Native vegetation is currently stressed, so the planning timeframe begins now and continues over the long-term.

Probability of Impacts to Native Grassland Management

There is a high probability of impact, as impacts are already occurring.

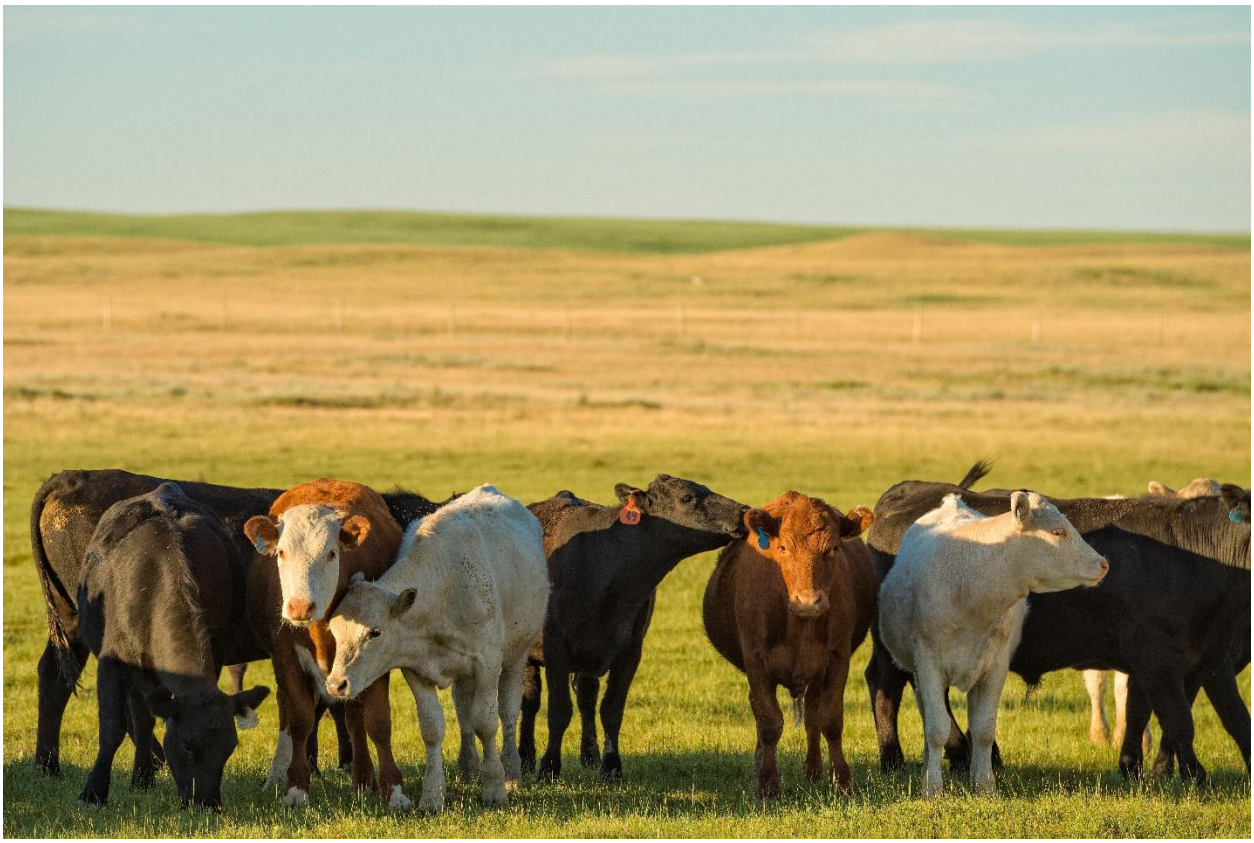
Confidence

High

Potential Consequences of Impacts

Potential consequences are high.

The spread of noxious weeds will negatively impact the economy, with losses to cattle ranchers, agriculture, and decreased water retention. Culturally, gathering of traditional and medicinal plants will be affect by changes in the harvest period. Additionally, the removal of ground cover can expose artifacts, creating legal and cultural challenges. Finally, changes in grassland composition may lead to changes in the ranch lifestyle culture in the Blackfeet Nation and reduced income from cattle grazing leases.



Climate change may impact cattle ranching in the Blackfeet Nation.
Photo by J. Pecora Photography.

VULNERABILITY:

Exposure

There is a high level of exposure, and native vegetation is already exposed.

Sensitivity

Sensitivity varies based on micro-climate. Closer to the mountain front, sensitivity is high, and then shifts to medium as one moves east across the Blackfeet Nation.

Adaptive Capacity

Adaptive capacity is medium because vegetation has the ability to adapt over time. Adaptive capacity, however, requires a focus on policy, as we must change how we manage the land. Adaptability is species-dependent, something policy changes must take into consideration. Policies must support the adaptation process.

Vulnerability

Vulnerability is medium-high.

RISK:

Estimated Risk

The estimated risk is high, given that there is both high consequence and high probability.

Priority

Priority is high, given that there is high risk and medium-high vulnerability.

Land and Range Adaptation Strategies: Goals and Actions

Responsible Party

Blackfeet Land Department and/or future Agriculture Department

Purpose (Goal)

1) Maintain healthy grasslands.

Priorities

The priority for grassland management is high.

Preparedness Goals: Strategies and Actions

Goal 1: Maintain healthy grasslands

Strategy:

a) Preserve healthy native vegetation species mix and reduce noxious weed invasion

Actions:

1) Reexamine, and adjust if and when necessary, grazing and stocking rates to account for climate impacts.
2) Regulate hay coming into the Blackfeet Nation (i.e. hay must be certified weed free).
3) Alter the Resource Management Plan (a Bureau of Land Management planning document) to include increased attention to invasive plants (e.g. training cows to eat knapweed, etc.).
4) Implement a detection dog and invasives management program similar to the one used for aquatic check stations (i.e. dogs will be trained to sniff out weeds).
5) Manage Conservation Reserve Program lands for native vegetation.
6) Engage with non-profits and partners with lands in the Blackfeet Nation (i.e. roadways) to effectively manage invasive weeds.

7) Install snow fences for the prairie potholes to reduce loss of snow.

Required and Existing Authority/Capacity

It is important to make partnerships and build capacities with the community. Partnerships should be formed with the following agencies and groups: The Tribe, the community, the Bureau of Indian Affairs, the Natural Resources Conservation Service, Montana Department of Transportation, Bureau of Land Management, Bureau of Reclamation, Fish & Wildlife, and Glacier and Pondera Counties. All are partners in some capacity and many are potential sources of funding (e.g. could fund snow fences for the prairies).

11. WATER

This chapter was developed through meetings with managers from the Blackfeet Environmental Office and then revised through face-to-face, telephone, and email correspondence. The first two sections, *observed impacts* and *expected impacts*, are sets of working hypotheses about climate change that are based on day-to-day observations and/or readings of climate change literature. These hypotheses were formed for the purposes of assessing climate change vulnerability and then strategizing adaptation goals and actions. This marks the first formal, multi-sector climate change adaptation planning effort in the Blackfeet Nation. This and other sections of the plan will be revisited and updated periodically as action items are implemented and adaptation efforts produce insights for future planning.

Pristine Headwaters flowing from Miistaksis, "From Mountaintop to Mountaintop," Many Glacier. *Photo by Mya Davis.*

The goal of the Water Sector is to focus on planning to maintain water quantity and quality. This goal is important for maintaining sufficient water for municipal water use, irrigation, in-stream wildlife uses, recreation, and livestock water use. Water quality standards support drinkable, swimmable, and fishable waters, and attention is given to both surface and ground water, including wells. Water quantity management is under the jurisdiction of Water Resources Department, while water quality is under the jurisdiction of the Blackfeet Environmental Office (BEO). Water Quality Standards are under the BEO Water Quality Department. They are draft standards which mostly match federal standards, they default jurisdictionally until BEO receives delegation authority from the U.S. Environmental Protection Agency. They are tribally approved. Water uses are under the jurisdiction of the Water Resources Department, now that the Water Compact has been approved. Amounts and operation may need to be worked out between the tribe and the federal government. Sherburne Dam operations need to be fixed to protect fish (Bull Trout) from dewatering.

Observed Impacts

More frequent and severe winds in the spring have already been observed. There are big downpours, but they dry up quickly because of the winds and warmer temperatures. There are no long-term changes noted at the local level yet.

Expected Impacts

In general, climate change is expected to decrease both water quantity and quality. Climate change will increase water temperatures in lakes and streams, and lower levels of dissolved oxygen. Warmer water temperatures increase fish disease concerns. Increased temperature and lower water levels may cause the migration of tolerant fish and macroinvertebrate species into areas that were habitat for more intolerant species. Macroinvertebrates are a key indicator of water quality, as some can handle worse water quality, while others need higher water quality. Climate change is expected to stress macroinvertebrates.

Upper Two-Medicine Lake. *Photo by Kim Paul.*

Climate change will also change the hydrograph by increasing variation in the rates of water flow timing, for example the timing of peak runoff may impact fish spawning. More water may enter the system in the spring than it has in the past, pulsing through the system more quickly, with lower flows in the summer. Warmer temperatures may also not be conducive to cold-water species' egg survivability.

Spring time floods may impact drinking water through erosion and sedimentation. While groundwater-fed communities might not be affected, communities fed by surface flows, like those drawing from Cutbank Creek, may experience poor water quality. Currently, sediment ponds at Cutbank Creek can be used to divert water when they know a sediment pulse is coming. Increased flood risk also raises risk of sewage overflow, posing health and safety risks from spreading contaminants. Recently, big floods, like the 2011 flood, have damaged infrastructure. Bigger floods in the future might cause damage to areas that are currently considered relatively safe from floods. Climate change may affect the riparian ecosystem and cause vegetation and stream geomorphology changes. Stream banks may not be able to contain floods and erosion, leading to a domino effect.

Changes in water quality and quantity will impact livestock water use and rangeland habitat, with changes in forage productivity and haying practices. It will also impact wildlife water use, and lead to poorer habitat. Less water may increase salinity. Too much salinity is bad for livestock to drink as water gets more concentrated with dissolved salts. Wildlife are generally able to migrate away from water with high salinity but forced migration can cause them stress.

There is an increased risk of invasive species as water flows change and disturbances change. Bluegreen algae, didymosphenia, and zebra mussels are examples of species that could invade waterways as water warms and has more nutrients from agricultural practices and other sources of pollution.

Thermal fish kills could result from temperature highs and increased parasites that are tolerant to warm water increase. Dewatering aquifers causes reduced return flows to streams resulting in dewatered streams, especially late in the season after snow has melted. Water loss in reservoirs and streams will increase due to evapotranspiration as the temperatures of air and water increase. Leaky pipes can burden storm water and sewer systems by the inflow of groundwater.

Quantified water rights may change as less water is available to junior users. Conflict and water theft are issues. Instream flows must be maintained to protect species of importance. Water storage in the Blackfeet Nation, both natural and constructed, should be a priority for policy makers, otherwise, water will flow to downstream users. Uses for water need to be developed and recorded, as in the Draft Water Quality Standards document. Examples of uses that need to be considered are recreation, irrigation, cultural, wildlife, aquatic life, domestic, etc. "Use or lose."

Beaver mimicry is one strategy for water storage in the Blackfeet Nation.

Water Assessment

The timeframe for impacts begins now and extends into the future, as some of the expected impacts are already being observed. The location of concern is Blackfeet Nation-wide. However, it is important to note that there is a rain gradient extending across the Blackfeet Nation, moving from more precipitation in the west to less precipitation in the eastern section. The rain gradient is expected to hold even as the climate changes. All life stages of salmonids, except spawning, would generally be supported in the eastern half of the Blackfeet Nation.

Probability of Impacts to Maintaining Water Quality and Quantity

High

Confidence

High

Potential Consequences of Impacts

From a social standpoint, potential consequences are medium to high. Closures to recreation due to algal blooms pose a concern. Less drinking water could be a (high) consequence.

Potential consequences to culture are medium. Low water flows impact quality relocation sites for sweat lodges. Changes can impact culturally important wetland and floodplain plants.

Consequences for the economy are predicted to be high. Consequences include costs to irrigation, saline seeps, fishing charges, water treatment, and less water supply. Impacts to agricultural economics are high, as people may have to buy hay, sell cattle to decrease stock, and haul water. Grazing allotments on public lands may be impacted, and fees for cattle grazing (animal unit months) may change. Land prices may be impacted. Impacts to recreation-based tourism may have large economic consequences.

Finally, from a legal perspective, consequences are predicted to be low-medium.

Water storage could be used to generate electricity. When tied to wind power, a water use cycle is created via "pumped hydro".

The tribe needs to focus the water resources branch into management of water use, in other words, have a water master and a hydrologist to oversee the vast resource of water from the compact in the amount of 800,000-acre-feet of water per year.

VULNERABILITY:

Exposure

The exposure is medium to high.

Sensitivity

Sensitivity is medium. The western side of the Blackfeet Nation is more sensitive to changes in climate, while the eastern side is more adaptive to change and less sensitive. More information is needed about thresholds; if species are on the edge of what they can tolerate, then they may be affected. Some species may be very sensitive to climate impacts during particular times of year, or particular times of their life history.

Adaptive Capacity

Adaptive capacity is low, though it depends on the quality of the habitat, human land use impacts, and other factors. It may vary from place to place.

Vulnerability

Vulnerability is high on the western side of the Blackfeet Nation, and it is low on the eastern side. Vulnerability will depend on species-level tolerance for the changes.

RISK:

Estimated Risk

The estimated risk is high on the western side of the Blackfeet Nation, and low to medium on the eastern side.

Priority

Priority is medium to high.

Water Adaptation Strategies: Goals and Actions

Responsible Party

Blackfeet Environmental Office

Purpose (Goals)

1) Reduce the frequency of higher-intensity floods in order to reduce erosion, property damage, and habitat damage or change
2) Assess floodplain to mitigate future property damage
3) Ensure that downstream users have access to sufficient water flows and water quality

Priorities

The priority for maintaining water quality and quantity is high.

Preparedness Goals: Strategies and Actions

Goal 1: Reduce the frequency of higher-intensity floods in order to reduce erosion, property damage, and habitat damage or change

Strategy:

a) Promote wetlands, floodplains, and riparian area health because they offer capacity to mitigate floodwater and filter and store water

   Actions:
   1) Protect key wetlands, restore wetlands, and divert water to wetlands in order to boost water storage and groundwater recharge
   2) Identify degraded riparian areas and employ stream restoration and beaver mimicry work, where appropriate
   3) Live trap and relocate beavers to restore wetlands

Goal 2: Assess floodplain to mitigate future property damage

Strategy:

a) Assess floodplain to mitigate future property damage

b) Utilize mapping software (e.g. Global Information Systems) to better understand the geographical setting of the watershed

   Actions:

1) Map the floodplain
2) Map channel migration (how a river may move in the future)
3) Enhance mapping and monitoring of water use across reservations
4) Chart water wells, septic systems, water extraction sites, stock water reservoirs, and oil wells

Goal 3: Ensure that downstream users have access to sufficient water flows and water quality

Strategy:

a) Promote regeneration of aquifers through strategic water storage, irrigation, and land use

Actions:

1) Build reservoirs
2) Work with farmers and ranchers to reduce use of pesticides
3) Conserve water through better irrigation practices (i.e. use as tool to spread water out to recharge shallow aquifers)
4) Employ snow fences to trap snow
5) Identify water saving techniques (i.e. low flow toilets, rain-water capture)

Required and Existing Authority/Capacity

Planning for all future concerns needs to start immediately. It is important to set a five-year plan. Authorities and capacities already exist within the Tribe. They include the Water Resources Department (water use permitting for all uses), the Natural Resources Conservation Service, the Agriculture Department, the Housing Authority, the Tribal Council, and schools. Potential partners within and outside the Tribe include: the Blackfeet Environmental Office, Blackfeet Water Resources, the Blackfeet Land Department, School District 9, the Helena-Lewis and Clark National Forest, the Bureau of Land Management, U.S. Fish and Wildlife Service, Montana Fish, Wildlife and Parks, Blackfeet Community College, Bureau of Reclamation, U.S. Geological Survey, Bureau of Indian Affairs, Montana Department of Environmental Quality, Natural Resources Conservation Service, Indian Health Services, and non-governmental organizations.

Partners and Potential Funding Sources

There are many potential funding needs. Storage dams are one example of a need. Millions will be needed. The US government and the State of Montana are two potential funding sources.

12. WILDLIFE

This chapter was developed through meetings with managers from the Blackfeet Fish and Wildlife Department, and then revised through face-to-face, telephone, and email correspondence. The first two sections, *observed impacts* and *expected impacts*, are sets of working hypotheses about climate change that are based on day-to-day observations and/or readings of climate change literature. These hypotheses were formed for the purposes of assessing climate change vulnerability and then strategizing adaptation goals and actions. This marks the first formal, multi-sector climate change adaptation planning effort in the Blackfeet Nation. This and other sections of the plan will be revisited and updated periodically as action items are implemented and adaptation efforts produce insights for future planning.

This chapter includes a section unique from the other chapters in the climate change plan – a Wildlife Populations and Habitat Assessment. The section is added because the Wildlife Sector includes a lot of species and there is no single measure of vulnerability or risk. It is therefore helpful to assess climate change impacts to a broader habitat category rather than individual species for this first, broad climate change planning initiative.

An eagle flying over Blackfeet Country. *Photo by Rikki Ollinger.*

The goal of the Wildlife and Wildlife Habitat Sector of this plan is to focus planning to maintain wildlife populations and habitat and limit impacts of a changing climate. Wildlife management in the Blackfeet Nation is under the jurisdiction of the Blackfeet Fish and Wildlife Department. Wildlife habitat management is influenced by that department as well as the Environmental, Forestry, Water Resources, and Land Departments. Adjacent to the Blackfeet Nation, wildlife and wildlife habitat management is under various jurisdictions of federal, state, and provincial authorities, namely, Glacier National Park, Lewis and Clark National Forest, Bureau of Land Management, U.S. Fish and Wildlife Service, Montana Fish, Wildlife, and Parks, Bureau of Reclamation and parallel Crown and provincial agencies in Alberta, Canada. This planning document will mainly focus on the Blackfeet Nation but acknowledges that wildlife crosses boundaries with the previously mentioned jurisdictions. To ensure habitat needs for far-ranging species are considered, we will need to coordinate many management efforts with neighboring agencies.

Observed and Potential Impacts

Climate change will affect most wildlife species indirectly through changes in habitat structure, prey availability, ecological disturbance, disease dynamics, and shifts in human activities.[175] Two key pathways for wildlife habitat loss in a changing climate are: 1) increases in invasive species and 2) decreased connectivity. Connectivity can be lost at multiple scales, and of particular concern are a) individuals' ability to move through the landscape to meet their daily needs, b) their ability to complete seasonal migrations, and c) their ability to adjust to potentially shifting habitat. In addition to the climate changing habitat, residential and energy development are the primary threats to connectivity.[176]

Changes in the climate are already affecting wildlife habitat in many ways, including influencing insect outbreaks and the resulting effects on forests and animals, changing wildfire frequency, intensity, and behavior, and altering water levels in wetlands, streams, and lakes.

Grizzly scratches at a berry patch. ***Photo by Kim Paul.***

Resulting changes in forest composition and availability of specific habitats affect many wildlife species including some listed under the Endangered Species Act. Potential effects to plant phenology and production of berry-producing plants like huckleberry (*Vaccinium* spp.), chokecherry (*Prunus virginiana*), and savisberry (*Amelanchier alnifolia*) could cause food shortages for many species, including bears. When natural food sources decrease for bears and other animals they often adapt by switching to human-related foods like garbage, livestock, or crops, coming into greater contact with people.

We know that climate change is affecting wildlife and wildlife habitat, but direct and indirect impacts are difficult to predict because of the complexity of interrelations between climate, habitat and animals and varying habitat needs for different species. We don't have enough baseline information and are not currently collecting enough data on species makeup and numbers to clearly identify and understand effects of climate change on wildlife or habitat.

Decreased snowpack from climate change will lead to losses in snow-dependent species such as snowshoe hare, wolverine, Canadian lynx, and ptarmigan habitat. Changes in the timing of seasons will lead to behavioral and range changes of grizzly bear, wolverine, and other species, possibly leading to increased conflict with humans. For example, grizzly bears may emerge from hibernation earlier, den later, and search for unnatural, human-related food sources to make up for changing availability of their normal food. Increases in the number and intensity of wildfires is expected, with fires potentially leading to fragmentation of habitat and stresses to the environment by completely changing the composition of forests. Increased drought is expected. Vegetation along riparian areas will change. Lakes and streams will retain less water, water temperatures will rise, and fish populations will be affected. Each change of

habitat or species numbers and composition, whether positive or negative, will cause further impacts on other species through the web of predator/prey relationships or interspecific competition for habitat.

Wildlife Populations and Habitat Assessment

The location of concern is Blackfeet Nation-wide. The types of habitat impacted range from high elevation mountain ecotypes to aspen woodland, conifer forest to prairie pothole and grassland, agricultural land to low elevation riparian creek and river bottoms. Each type of habitat holds its own combination of wildlife species and has its own risk of impacts from climate change. The probability of impact is medium with variations between high and low depending on individual type of habitat or vegetation and animal species.

For example, some habitats will be more prone to fires. There is a high probability of impact on wildlife and wildlife habitat from fires due to climate change. As average temperatures increase and annual rainfall decreases, fire intensity increases and fire behavior changes. Insects that were normally controlled by prolonged low temperatures during the winter are increasing now (i.e. the Mountain Pine Beetle) and have a devastating effect on pine, spruce, and fir trees, often killing them and creating more dry fuel and increasing risk of fire.

More fires, larger fires, and hotter fires create more drastic changes in habitat than normal. Larger expanses of uniform burned areas that normally have mosaics of islands of unburned forest or lower intensity burns offer less suitable habitat for most wildlife species. Less available suitable habitat results in higher stress/lower populations or replacement of natural food sources for unnatural ones and increased likelihood of conflict with humans.

Forest fires can cause drastic changes to wildlife habitat.

The local economy may be impacted through decreased tourism. Wild land fires with the smoky air obscuring vistas and irritating nostrils and lungs are not a draw for tourists. Hundreds of acres of blackened stumps and charred ground is not what people want to experience for their vacation. More frequent and severe fires will have an impact on the tourism industry that so many businesses and people count on in this area. Reduced populations of wildlife would also have an impact on tourism. Changes in wildlife populations and habitat will affect hunter success and participation and thereby affect tribal members economically as well as their traditional practices. How much of an impact these changes might have is difficult to predict.

Some insects like ticks respond favorably to increases in annual temperature. Ticks can be vectors of wildlife disease as well as cause general poor condition in wildlife leaving them more susceptible to health problems.

Wildlife Adaptation Strategies: Goals and Actions

Responsible Party

Ultimately the Blackfeet Tribal Business Council as the governing body of the Blackfeet Nation is responsible for managing wildlife and habitat on much of the land within the boundaries of the Blackfeet Reservation. Within the Tribal government the Blackfeet Fish & Wildlife Dept. is responsible for wildlife management. Wildlife habitat must be considered in plans and actions of the Forestry, Oil and Gas, Environmental, Solid Waste, Water Resources, and Land Departments. The Bureau of Indian Affairs is responsible for managing much of the wildlife habitat on trust land. Outside of the boundaries of the Blackfeet Nation, that management responsibility belongs to the National Park Service, the U. S. Forest Service, Bureau of Land Management, Montana Fish, Wildlife, and Parks, Montana Department of Natural Resources and Conservation, Bureau of Reclamation, U. S. Fish and Wildlife Service, and various provincial and Crown agencies in Canada.

Purpose (Goals)

1) Maintain wildlife populations and habitat and limit disturbance in the face of changing climatic conditions

Priorities

The priority is medium-high.

Preparedness Goals: Strategies and Actions

Goal 1: Maintain wildlife populations and habitat and limit disturbance in the face of changing climatic conditions

Strategies:

Note: Rather than focus on one or a few umbrella species hoping that they will indicate if a problem related to climate change is occurring, our goal is to monitor many species to try to detect changes that might not be obvious in a few representatives. We do not believe we can always predict which species might react in a positive or negative way to climate change considering the complex interrelationships between animals and habitats. Perhaps we can identify patterns or species that will act as indicators of problems, so we can adapt more efficient strategies in the future.

a) Reduce and mitigate human-wildlife conflict

   Actions: (All currently being done by Blackfeet Fish & Wildlife Dept.)
   1) Promote Bear-aware camping practices, provide reduced cost bear spray, and promote bear-wise hunter/hiker practices
   2) Educate neighborhood residents on reducing attractants (garbage, bird feeders, pet food, barbecues, grain, etc.)
   3) Cost share for bear-proof electric fence around sheep pasture, pig pens, bee yards, chicken coops, calving areas
   4) Educate Ranchers to reduce cattle depredation

5) Maintain carcass redistribution program.

b) Educate and promote an understanding of connectivity, climate change adaptation, and wildlife

Actions:

1) Engage with school districts and teachers to influence curriculum/school events to educate and promote connectivity, climate change, and wildlife understanding
2) Develop new (or flesh out existing) community events with education components to educate and promote connectivity, climate change, wildlife understanding

c) Understand and maintain the integrity of core habitat areas in the Blackfeet Nation in the face of climate change to better protect them

Actions:

1) Devise monitoring programs to increase understanding of shifting habitat distributions and animal ranges (trapping genetics, harvest numbers, etc.)
2) Maintain prairie habitat by excluding fire and reducing non-native species
3) Protect quaking aspen habitat and investigate the appropriateness of allowing wildfire, using prescribed fire in older stands, protecting aspen from grazing, reducing conifer encroachment, and other measures
4) Develop detailed mapping of habitats across the reservation
5) Integrate climate projections into Fish and Wildlife species planning
6) Continue to develop relationships with agencies, NGOs, and academics to share resources, fund work, and protect core habitat

d) Protect ecological connectivity to ensure that fauna can adapt to climate change

Actions:

1) Continue to develop relationships with agencies, NGOs, and academics to share resources, fund work, and protect ecological connectivity
2) Identify and map key corridors and connectivity areas on and across the Blackfeet Nation
3) Promote wildlife-friendly fencing where possible
4) Research and pursue wildlife roads mitigation (such as underpasses and overpasses)
5) Protect or restore prairie potholes
6) Protect stands of mature forest
7) Maintain healthy American beaver populations to provide riparian habitat structure

e) Reassess and establish hunting and fishing limits to align with populations affected by climate change

f) Cooperate with range services to positively impact range habitat for wildlife

g) Coordinate with Forestry to implement wildlife-related best management practices

Actions:

1) Manage fire to promote wildlife habitat
2) Alter slash pile management for facilitating ungulate movement

3) Time forestry operations to align with wildlife management goals
4) Sustain multi-story, sub-alpine forest for local lynx populations

h) Understand population dynamics of a variety of birds, mammals, reptiles and amphibians in light of stressors including climate change and human disturbance

Actions:

1) Identify target species and conduct surveys to identify range and relative population abundance and to map and monitor habitat
2) Liaise with government and non-governmental partners such as The Nature Conservancy, who have done previous work in this area

i) Create action plans for protecting priority species, including:
1) Mammals: grizzly, bison, swift fox, wolves, otter, beaver, lynx, elk, bighorn sheep. Mountain goats, wolverine, antelope, moose
2) Birds: long billed curlew, bald eagle, golden eagle, common loon, sharptailed grouse, owls, black-billed magpie, western meadow lark, sandhill crane
3) Fish: bull trout, cutthroat trout
4) Amphibians: leopard frog

j) Build a healthy partnership with the Oil and Gas Department and Blackfeet Forestry

Actions:

1) Offer opportunities to comment on management plans between departments
2) Develop trust and improve inter-departmental communication

Required and Existing Authority/Capacity

The Department of Fish and Wildlife has a law enforcement division and a threatened and endangered species program. The Department is currently developing a fisheries program.

Partners and Potential Funding Sources

Internal partnerships to continue and improve include Blackfeet Forestry, Blackfeet Environmental Office, Water Resources Department, the Land Department, Blackfeet Community College, and local school districts. External partnerships to continue and improve are with Glacier National Park, Helena-Lewis and Clark National Forest, the Bureau of Land Management, U.S. Fish and Wildlife, Montana Fish and Wildlife, Blackfeet Community College, Bureau of Reclamation, U.S. Geological Survey, Confederated Salish and Kootenai Tribes, and non-governmental organizations.

13. Next Steps

The Blackfeet Climate Change Adaptation Plan (BCCAP) marks the beginning of a formally coordinated effort to describe current climate change impacts, to predict future impacts, to assess vulnerabilities, and to outline goals, strategies, and actions for increasing resilience to climate change. The plan conveys actionable steps within the context of the region's changing climate, in a place where Amskapi Pikuni people have lived and acted as stewards for thousands of years.

The BCCAP is intended to be a "living document," one that is consulted frequently and regularly revisited and updated to reflect changes in the Tribe's needs and priorities. As such, several next steps are recommended:

- Every effort should be made to implement the action steps outlined in the BCCAP. To be most effective, each sector should monitor and measure progress in implementing adaptive actions and help determine whether actions are enhancing the Tribe's overall climate change preparedness. While incorporating indicators for monitoring outputs and outcomes was outside the scope of the initial BCCAP, determining measurable indicators for goals in each sector is important for helping to understand whether actions are ultimately helping the Blackfeet Nation to adapt to climate change.
- The results of the actions (outputs and outcomes), as determined through monitoring, should be used to adjust actions and then to ultimately revise the BCCAP.
- Chapters should be updated as major staff changes occur, and as departments are prepared to commit to actions. For example, the Department of Fish and Wildlife is in the process of hiring a fisheries biologist, and when they fill the position, the fish chapter should be updated in collaboration with the Water Resources Department. The Cultural Resources and Traditions chapter should be updated as soon as possible to include goals, strategies, and actions.
- The next plan revisions should be scheduled to ensure the plan is revised comprehensively at regular intervals, perhaps every three to five years. Future climate change planners should consider possibly adding more planning areas in each sector, or, alternatively, reducing the scope of focus in sectors where the current plan may prove to be too broad to implement.
- The BCCAP should be used to inform the tribe's larger planning processes, including the holistic management planning, water resources management planning, agriculture resource management planning, and food security planning processes. The plan should continue to be integrated into all other relevant planning processes in the Blackfeet Nation. Likewise, these planning processes should feed back into future climate change plan updates and revisions.

The Blackfeet Climate Change Adaptation Plan is a significant body of work from which to start building resilience to climate change impacts, and it is a base from which to build future project work, research, and funding. The very act of bringing people together from multiple sectors has brought climate change to the forefront of conversations and decision-making in the Blackfeet Nation. The planning process has also improved coordination between departments. For example, it increased shared understanding of fisheries management goals and activities between the Blackfeet Water Resources Department and the Blackfeet Fish and Wildlife Department. One early, tangible outcome is that the planning process created The Beaver Project, a coordinated effort between the Blackfeet Fish and Wildlife Department, Blackfeet Community College, the Blackfeet Environmental Office, the Agriculture Resource Management Planning team, the Center for Large Landscape Conservation, and others designed to increase natural water storage in the Blackfeet Nation by protecting beaver (nature's "wetlands engineers") and restoring riparian areas. The Beaver Project has received funding from multiple foundations and agencies and began in January 2018. Finally, the planning process built momentum for creating the Blackfeet Country & Climate Change website[§] (https://blackfeetclimatechange.com/), a platform for sharing information about climate change impacts to the environment and human health, and a place to share updates with the public about existing and potential opportunities for building resilience to climate change in the Blackfeet Nation.

The Blackfeet Country and Climate Change Website: blackfeetclimatechange.com

[§] The Blackfeet Country & Climate Change website was initially created through funding from the National Indian Health Board.

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APPENDIX A: CLIMATE CHANGE IMPACTS IN THE BLACKFEET NATION

Climate change projects for the Blackfeet Nation (2040-2060)*	Confidence
Warmer annual average temperatures (+3-7°F)	High confidence of warming, but we do not know exact rate and magnitude of warming
+13-22 more extremely high temperature days (over ~85-90°F) (now we experience approximately 7 days/year above that temperature)	High confidence
Increases in winter and spring precipitation (+0-10%)	Medium to high confidence
Decreases in summer precipitation (-0 – 10%)	Low confidence
More frequent heavy precipitation events (even if no change in annual precipitation amount)	Medium to high confidence
More precipitation falling as rain than snow, especially at lower elevations and in the shoulder seasons	Medium confidence
Decreased spring snowpack and a hastening of the onset of spring snowmelt, especially at lower elevations. High elevations may stay cold enough to hold snowpack, depending on how quickly temperatures rise	Medium confidence in snowpack declines at lower elevations
Earlier timing of spring stream runoff	High confidence
Lower stream baseflows in the late summer	Medium confidence
Warmer stream temperatures, due to warmer air temperatures and lower baseflows	High confidence of warming, but we do not know exact rate and magnitude of warming
Warmer temperatures likely to increase the frequency and severity of drought, even if precipitation increases by 5-10%	High confidence
Increases in the frequency of flooding, esp. in spring, due to earlier snowmelt, rain-on-snow events and increased precipitation	High confidence
Longer growing season (+2-4 weeks)	High confidence

**Sources include: IPCC 2007 and references, PRISM historical climate data, Leppi et al. 2011, Luce & Holden 2009, Stewart et al. 2005, Rood et al. 2008, Hamlet and Lettenmaier 2007, Mantua et al. 2010, Isaak et al. 2012, Pederson et al. 2009, U.S. National Climate Assessment 2014, input from Steve Gray (former WY State Climatologist, now Dir. Alaska Climate Science Center) and Greg Pederson (USGS), and an analysis of CMIP5 Climate Model Datasets by Imtiaz Rangwala (NOAA).*

APPENDIX B: TREATY OF 1855

FRANKLIN PIERCE,

PRESIDENT OF THE UNITED STATES OF AMERICA,

Oct. 17, 1855.

TO ALL PERSONS TO WHOM THESE PRESENTS SHALL COME, GREETING:

WHEREAS, a treaty was made and concluded at the council ground on the Upper Missouri, near the mouth of the Judith River, in the territory of Nebraska, on the seventeenth day of October, in the year one thousand eight hundred and fifty-five, between A. Cumming and Isaac I. Stevens, commissioners on the part of the United States, and the Blackfoot and other tribes of Indians, which treaty is in the words and figures following, to wit:—

Articles of agreement and convention made and concluded at the council ground on the Upper Missouri, near the mouth of the Judith River, in the territory of Nebraska, this seventeenth day of October, in the year one thousand eight hundred and fifty-five, by and between A. Cumming and Isaac I. Stevens, commissioners duly appointed and authorized, on the part of the United States, and the undersigned chiefs, headmen, and delegates of the following nations and tribes of Indians, who occupy, for the purposes of hunting, the territory on the Upper Missouri and Yellow Stone Rivers, and who have permanent homes as follows: East of the Rocky Mountains, the Blackfoot nation; consisting of the Piegan, Blood, Blackfoot, and Gros Ventres tribes of Indians. West of the Rocky Mountains, the Flathead nation; consisting of the Flathead, Upper Pend d'Oreille, and Kootenay tribes of Indians, and the Nez Percé tribe of Indians, the said chiefs, headmen and delegates, in behalf of and acting for said nations and tribes, and being duly authorized thereto by them.

Title.

ARTICLE 1. Peace, friendship and amity shall hereafter exist between the United States and the aforesaid nations and tribes of Indians, parties to this treaty, and the same shall be perpetual.

Peace to exist with U. States.

ARTICLE 2. The aforesaid nations and tribes of Indians, parties to this treaty, do hereby jointly and severally covenant that peaceful relations shall likewise be maintained among themselves in future; and that they will abstain from all hostilities whatsoever against each other, and cultivate mutual good-will and friendship. And the nations and tribes aforesaid do furthermore jointly and severally covenant, that peaceful relations shall be maintained with and that they will abstain from all hostilities whatsoever, excepting in self-defence, against the following named nations and tribes of Indians, to wit: the Crows, Assinebeins, Crees, Snakes, Blackfeet, Sans Arce, and Aunce-pa-pas bands of Sioux, and all other neighboring nations and tribes of Indians.

Peace to exist with each other and with certain other tribes.

ARTICLE 3. The Blackfoot nation consent and agree that all that portion of the country recognized and defined by the treaty of Laramie as Blackfoot territory, lying within lines drawn from the Hell Gate or Medicine Rock Passes in the main range of the Rocky Mountains, in an easterly direction to the nearest source of the Muscle Shell River, thence to the mouth of Twenty-five Yard Creek, thence up the Yellow Stone River to its northern source, and thence along the main range of the Rocky Mountains, in a northerly direction, to the point of beginning, shall be a common hunting-ground for ninety-nine years, where all the nations, tribes and bands of Indians, parties to this treaty, may enjoy equal and uninterrupted privileges of hunting, fishing and gathering fruit, grazing animals, curing meat and dressing robes. They further agree that they will not establish villages, or in any other way exercise exclu-

Blackfoot Territory recognized as common hunting ground.

sive rights within ten miles of the northern line of the common hunting-ground, and that the parties to this treaty may hunt on said northern boundary line and within ten miles thereof.

Provided, That the western Indians, parties to this treaty, may hunt on the trail leading down the Muscle Shell to the Yellow Stone; the Muscle Shell River being the boundary separating the Blackfoot from the Crow Territory.

No settlements to be made thereon.

And provided, That no nation, band or tribe of Indians, parties to this treaty, nor any other Indians, shall be permitted to establish permanent settlements, or in any other way exercise, during the period above mentioned, exclusive rights or privileges within the limits of the above-described hunting-ground.

Vested rights, not interfered with.

And provided further, That the rights of the western Indians to a whole or a part of the common hunting-ground, derived from occupancy and possession, shall not be affected by this article, except so far as said rights may be determined by the treaty of Laramie.

Certain territory to belong to the Blackfoot nation.

ARTICLE 4. The parties to this treaty agree and consent, that the tract of country lying within lines drawn from the Hell Gate or Medicine Rock Passes, in an easterly direction, to the nearest source of the Muscle Shell River, thence down said river to its mouth, thence down the channel of the Missouri River to the mouth of Milk River, thence due north to the forty-ninth parallel, thence due west on said parallel to the main range of the Rocky Mountains, and thence southerly along said range to the place of beginning, shall be the territory of the Blackfoot nation, over which said nation shall exercise exclusive control, excepting as may be otherwise provided in this treaty. Subject, however, to the provisions of the third article of this treaty, giving the right to hunt, and prohibiting the establishment of permanent villages and the exercise of any exclusive rights within ten miles of the northern line of the common hunting-ground, drawn from the nearest source of the Muscle Shell River to the Medicine Rock Passes, for the period of ninety-nine years.

Provided also, That the Assiniboins shall have the right of hunting, in common with the Blackfeet, in the country lying between the aforesaid eastern boundary line, running from the mouth of Milk River to the forty-ninth parallel, and a line drawn from the left bank of the Missouri River, opposite the Round Butte north, to the forty-ninth parallel.

How to enter and leave the common hunting ground.

ARTICLE 5. The parties to this treaty, residing west of the main range of the Rocky Mountains, agree and consent that they will not enter the common hunting-ground, nor any part of the Blackfoot Territory, or return home, by any pass in the main range of the Rocky Mountains to the north of the Hell Gate or Medicine Rock Passes. And they further agree that they will not hunt or otherwise disturb the game, when visiting the Blackfoot Territory for trade or social intercourse.

Indians to remain in their respective territories except, &c.

ARTICLE 6. The aforesaid nations and tribes of Indians, parties to this treaty, agree and consent to remain within their own respective countries, except when going to or from, or whilst hunting upon, the "common hunting-ground," or when visiting each other for the purpose of trade or social intercourse.

Citizens may pass through and live in the Indian territory.

Protection against depredations.

ARTICLE 7. The aforesaid nations and tribes of Indians agree that citizens of the United States may live in and pass unmolested through the countries respectively occupied and claimed by them. And the United States is hereby bound to protect said Indians against depredations and other unlawful acts which white men residing in or passing through their country may commit.

Roads, telegraph lines, and military posts, &c. may be established.

ARTICLE 8. For the purpose of establishing travelling thoroughfares through their country, and the better to enable the President to execute the provisions of this treaty, the aforesaid nations and tribes do hereby consent and agree, that the United States may, within the countries respectively occupied and claimed by them, construct roads of every

description; establish lines of telegraph and military posts; use materials of every description found in the Indian country; build houses for agencies, missions, schools, farms, shops, mills, stations, and for any other purpose for which they may be required, and permanently occupy as much land as may be necessary for the various purposes above enumerated, including the use of wood for fuel and land for grazing, and that the navigation of all lakes and streams shall be forever free to citizens of the United States.

Annual payment for benefit of Blackfoot nation.

ARTICLE 9. In consideration of the foregoing agreements, stipulations, and cessions, and on condition of their faithful observance, the United States agree to expend, annually, for the Piegan, Bloed, Blackfoot, and Gros Ventres tribes of Indians, constituting the Blackfoot nation, in addition to the goods and provisions distributed at the time of signing this treaty, twenty thousand dollars, annually, for ten years, to be expended in such useful goods and provisions, and other articles, as the President, at his discretion, may from time to time determine; and the superintendent, or other proper officer, shall each year inform the President of the wishes of the Indians in relation thereto: *Provided, however*, That if, in the judgment of the President and Senate, this amount be deemed insufficient, it may be increased not to exceed the sum of thirty-five thousand dollars per year.

Same subject.

ARTICLE 10. The United States further agree to expend annually, for the benefit of the aforesaid tribes of the Blackfoot nation, a sum not exceeding fifteen thousand dollars annually, for ten years, in establishing and instructing them in agricultural and mechanical pursuits, and in educating their children, and in any other respect promoting their civilization and christianization: *Provided, however*, That to accomplish the objects of this article, the President may, at his discretion, apply any or all the annuities provided for in this treaty: *And provided, also*, That the President may, at his discretion, determine in what proportions the said annuities shall be divided among the several tribes.

Provisions to secure peace, and indemnity against Indian depredations.

ARTICLE 11. The aforesaid tribes acknowledge their dependence on the government of the United States, and promise to be friendly with all citizens thereof, and to commit no depredations or other violence upon such citizens. And should any one or more violate this pledge, and the fact be proved to the satisfaction of the President, the property taken shall be returned, or, in default thereof, or if injured or destroyed, compensation may be made by the government out of the annuities. The aforesaid tribes are hereby bound to deliver such offenders to the proper authorities for trial and punishment, and are held responsible in their tribal capacity, to make reparation for depredations so committed.

War not to be made on other tribes except in self-defence.

Nor will they make war upon any other tribes, except in self-defence, but will submit all matters of difference between themselves and other Indians to the government of the United States, through its agent, for adjustment, and will abide thereby. And if any of the said Indians, parties to this treaty, commit depredations on any other Indians within the jurisdiction of the United States, the same rule shall prevail as that prescribed in this article in case of depredations against citizens. And the said tribes agree not to shelter or conceal offenders against the laws of the United States, but to deliver them up to the authorities for trial.

Provision against depredations of other Indians.

Criminals to be surrendered.

Annuities may be stopped in case of violation of this treaty.

ARTICLE 12. It is agreed and understood, by and between the parties to this treaty, that if any nation or tribe of Indians aforesaid, shall violate any of the agreements, obligations, or stipulations, herein contained, the United States may withhold for such length of time as the President and Congress may determine, any portion or all of the annuities agreed to be paid to said nation or tribe under the ninth and tenth articles of this treaty.

Provision against intoxica-

ARTICLE 13. The nations and tribes of Indians, parties to this treaty, desire to exclude from their country the use of ardent spirits or other

tion or the introduction of ardent spirits.

intoxicating liquor, and to prevent their people from drinking the same. Therefore it is provided, that any Indian belonging to said tribes who is guilty of bringing such liquor into the Indian country, or who drinks liquor, may have his or her proportion of the annuities withheld from him or her, for such time as the President may determine.

This treaty to be in full for compensation.

ARTICLE 14. The aforesaid nations and tribes of Indians, west of the Rocky Mountains, parties to this treaty, do agree, in consideration of the provisions already made for them in existing treaties, to accept the guarantees of the peaceful occupation of their hunting-grounds, east of the Rocky Mountains, and of remuneration for depredations made by the other tribes, pledged to be secured to them in this treaty out of the annuities of said tribes, in full compensation for the concessions which they, in common with the said tribes, have made in this treaty.

The Indians east of the Mountains, parties to this treaty, likewise recognize and accept the guarantees of this treaty, in full compensation for the injuries or depredations which have been, or may be committed by the aforesaid tribes, west of the Rocky Mountains.

Annuities not to be taken for debts

ARTICLE 15. The annuities of the aforesaid tribes shall not be taken to pay the debts of individuals.

ARTICLE 16. This treaty shall be obligatory upon the aforesaid nations and tribes of Indians, parties hereto, from the date hereof, and upon the United States as soon as the same shall be ratified by the President and Senate.

In testimony whereof the said A. Cumming and Isaac I. Stevens, commissioners on the part of the United States, and the undersigned chiefs, headmen, and delegates of the aforesaid nations and tribes of Indians, parties to this treaty, have hereunto set their hands and seals at the place and on the day and year hereinbefore written.

A. CUMMING. [L. S.]
ISAAC I. STEVENS. [L. S.]

Piegans.

NEE-TI-NEE, or "the only chief," now called the Lame Bull,	his x mark.	L. S.
MOUNTAIN CHIEF,	his x mark.	L. S.
LOW HORN,	his x mark.	L. S.
LITTLE GRAY HEAD,	his x mark.	L. S.
LITTLE DOG,	his x mark.	L. S.
BIG SNAKE,	his x mark.	L. S.
THE SKUNK,	his x mark.	L. S.
THE BAD HEAD,	his x mark.	L. S.
KITCH-EEPONE-ISTAH,	his x mark.	L. S.
MIDDLE SITTER,	his x mark.	L. S.

Bloods.

ONIS-TAY-SAY-NAH-QUE-IM,	his x mark.	[L. S.]
THE FATHER OF ALL CHILDREN,	his x mark.	[L. S.]
THE BULL'S BACK FAT,	his x mark.	[L. S.]
HEAVY SHIELD,	his x mark.	[L. S.]
NAH-TOSE-ONISTAH,	his x mark.	[L. S.]
THE CALF SHIRT,	his x mark.	[L. S.]

Gros Ventres.

BEAR'S SHIRT,	his x mark.	[L. S.]
LITTLE SOLDIER,	his x mark.	[L. S.]
STAR ROBE,	his x mark.	[L. S.]

SITTING SQUAW, his x mark. [L. S.]
WEASEL HORSE, his x mark. [L. S.]
THE RIDER, his x mark. [L. S.]
EAGLE CHIEF, his x mark. [L. S.]
HEAP OF BEARS, his x mark. [L. S.]

Blackfeet.

THE THREE BULLS, his x mark. [L. S.]
THE OLD KOOTOMAIS, his x mark. [L. S.]
POW-AH-QUE, his x mark. [L. S.]
CHIEF RABBIT RUNNER, his x mark. [L. S.]

Nez Percés.

SPOTTED EAGLE, his x mark. [L. S.]
LOOKING GLASS, his x mark. [L. S.]
THE THREE FEATHERS, his x mark. [L. S.]
EAGLE FROM THE LIGHT, his x mark. [L. S.]
THE LONE BIRD, his x mark. [L. S.]
IP-SHUN-NEE-WUS, his x mark. [L. S.]
JASON, his x mark. [L. S.]
WAT-TI-WAT-TI-WE-HINCK, his x mark. [L. S.]
WHITE BIRD, his x mark. [L. S.]
STABBING MAN, his x mark. [L. S.]
JESSE, his x mark. [L. S.]
PLENTY BEARS, his x mark. [L. S.]

Flathead Nation.

VICTOR, his x mark. [L. S.]
ALEXANDER, his x mark. [L. S.]
MOSES, his x mark. [L. S.]
BIG CANOE, his x mark. [L. S.]
AMBROSE, his x mark. [L. S.]
KOOTLE-CHA, his x mark. [L. S.]
MICHELLE, his x mark. [L. S.]
FRANCIS, his x mark. [L. S.]
VINCENT, his x mark. [L. S.]
ANDREW, his x mark. [L. S.]
ADOLPHE, his x mark. [L. S.]
THUNDER, his x mark. [L. S.]

Piegans.

RUNNING RABBIT, his x mark. [L. S.]
CHIEF BEAR, his x mark. [L. S.]
THE LITTLE WHITE BUFFALO, his x mark. [L. S.]
THE BIG STRAW, his x mark. [L. S.]

Flathead.

BEAR TRACK, his x mark. [L. S.]
LITTLE MICHELLE, his x mark. [L. S.]
PALCHINAH, his x mark. [L. S.]

Bloods.

THE FEATHER, his x mark. [L. S.]
THE WHITE EAGLE, his x mark. [L. S.]

Executed in presence of—

JAMES DOTY, *Secretary.*
ALFRED J. VAUGHAN, Jr.
E. ALW. HATCH, *Agent for Blackfeet.*
THOMAS ADAMS, *Special Agent Flathead Nation.*
R. H. LANSDALE, *Indian Agent Flathead Nation.*
W. H. TAPPAN, *Sub-Agent for the Nez Percés.*
JAMES BIRD,
A. CULBERTSON,
BENJ. DEROCHE, } *Blackfoot Interpreters.*
BENJ. KISER, his x mark,
Witness, JAMES DOTY, } *Flat Head Interpreters.*
GUSTAVUS SOHON,
W. CRAIG,
DELAWARE JIM, his x mark,
Witness, JAMES DOTY, } *Nez Percé Interpreters.*
A CREE CHIEF, (BROKEN ARM,) his mark.
Witness, JAMES DOTY.
A. J. HOEEKEORSG,
JAMES CROKE,
E. S. WILSON,
A. C. JACKSON,
CHARLES SHUCETTE, his x mark.
CHRIST. P. HIGGINS,
A. H. ROBIE,
S. S. FORD, Jr.

And whereas, the said treaty having been submitted to the Senate of the United States for its constitutional action thereon, the Senate did, on the fifteenth day of April, eighteen hundred and fifty-six, advise and consent to the ratification of the same, by a resolution in the words and figures following, to wit:

IN EXECUTIVE SESSION, SENATE OF THE UNITED STATES,
April 15, 1856.

Resolved, (two thirds of the Senators present concurring,) That the Senate advise and consent to the ratification of the articles of agreement and convention made and concluded between the United States and the Blackfeet and other tribes of Indians, at the council ground on the Upper Missouri River, October seventeenth, eighteen hundred and fifty-five.

Attest: ASBURY DICKINS, *Secretary.*

Now, therefore, be it known, that I, FRANKLIN PIERCE, President of the United States of America, do, in pursuance of the advice and consent of the Senate, as expressed in their resolution of the fifteenth day of April, one thousand eight hundred and fifty-six, accept, ratify, and confirm the said treaty.

In testimony whereof, I have caused the seal of the United States to be hereto affixed, having signed the same with my hand.

Done at the city of Washington, this twenty-fifth day of April, A. D. one thousand eight hundred and fifty-six, and of the independence of the United States the eightieth.

[L. S.]

FRANKLIN PIERCE.

By the President:
W. L. MARCY, *Secretary of State.*