



# CLIMATE CHANGE IMPACTS AND ADAPTATION ON TRIBAL LANDS

*A literature review of Tribal Climate Change Adaptation plans*

SEPTEMBER 2023

## INTRODUCTION

In the summer of 2023, the Native Lands Advocacy Project (NLAP), a project of Village Earth, conducted a literature review on tribal climate adaptation plans in an attempt to identify climate trends, projected changes, and conditions on tribal lands to date. In addition, this literature review identifies key areas of concern that Native Nations have for the future of their lands and peoples, as well as identifies data gaps and data needs for effective climate mitigation and adaptation.

Village Earth is a 501(c)(3) nonprofit organization based in Fort Collins, Colorado. In 2019, Village Earth founded the Native Lands Advocacy Project (NLAP) with funding from the Indian Land Tenure Foundation. In addition to consulting privately with tribes and Native organizations, NLAP maintains a data platform, the Native Land Information System (NLIS) at [nativeland.info](https://nativeland.info). The NLIS serves as a clearinghouse of data for Native lands in the United States—especially data related to agricultural planning, climate adaptation, land tenure, and historical documentation. **By creating free, public access to interactive, value-added data tools and educational resources, NLAP supports sovereign tribal decision-making.** Learn more about our work [here](https://nativeland.info).<sup>1</sup>

NLAP's work continues to be guided and funded by trusted partners in Indian Country. This literature review was conducted as part of the development of a Climate Data Portal, created with funding from the Native American Agriculture Fund.

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<sup>1</sup> About the Native Land Information System, [nativeland.info/about/](https://nativeland.info/about/).

To conduct this literature review, NLAP performed a meta-analysis of public climate change adaptation plans from 23 Tribal Nations from across the United States of America. The bulk of these plans come from tribes in the Pacific Northwest, Alaska, and the Great Lakes Regions. These plans were acquired from the National Congress of American Indians (NCAI) database for completed tribal climate change adaptation plans.

NCAI's database is by no means an exhaustive list of tribal climate change adaptation plans, but they are publicly available and provide useful insight into the current status of climate change adaptation planning across Indian Country. This meta-analysis is not intended to be representative of all Tribal Nations and their planning processes, nor do these findings represent data needs and concerns for all Tribal Nations. This is an ongoing process as the impacts of climate change evolve, as new data and technologies are created, and as more Tribal Nations prepare for and respond to climate change. This document is an initial analysis of trends in climate change adaptation planning across Tribal Nations; it serves as a preliminary guide for initiating discussions. This report is not intended to be an exhaustive analysis, nor does it provide in-depth analyses on the specifics contained within individual planning documents.

As stated above, this analysis identifies trends in climate change adaptation planning for Tribal Nations by assessing concerns, areas of emphasis in the planning documents, and identified data gaps and needs. This analysis was conducted using the MaxQDA coding software which allows the user to upload and read documents, and then create and assign classification identifiers to different passages in order to conduct cross-analyses. This enables the user to **identify trends and commonalities across multiple documents and identify relationships between identified data topics within and between documents.**

For this analysis, **125 data topics were identified** across the 23 climate change adaptation planning documents. References to these data topics were identified as occurring 2801 times across all plans. It should be noted that these topics are not evenly distributed across the documents as some documents are longer, more detailed, and more holistic while others are more initial planning documents that contain general information on climate change adaptation. Some of the most commonly referenced topics were:

- Traditional/Cultural “Resources” (272 references),
- Partner Organizations/Agencies (197 references),
- Habitat/Biodiversity (183 references),
- and Indigenous Knowledge (TEK) (137 references).



Apart from **Partner Organizations/Agencies**, these topics highlight the top levels of concern for these Tribal Nations when planning for climate change (a breakdown of topic references across all plans can be found in Figure 7, located in Appendix A). In many of these documents, the preservation of cultural heritage through the protection of cultural resources is an area of emphasis, with several of the documents including the use, or even restoration, of traditional ecological knowledge and land management techniques in attempts to combat climate change on Native lands and to promote the continuation of cultural resources. Some examples of identified cultural resources are: berries, fish species, tree species, roots, locations, etc.

Additionally, the identified data topics can be used to **assess data gaps, as well as areas that will require continued monitoring and updating as climate change impacts unfold**. The most commonly cited data topics in these plans were:

- Water (204 references),
- Temperature (167 references)
- Weather (137 references),
- and Migration/Phenology (125 references)

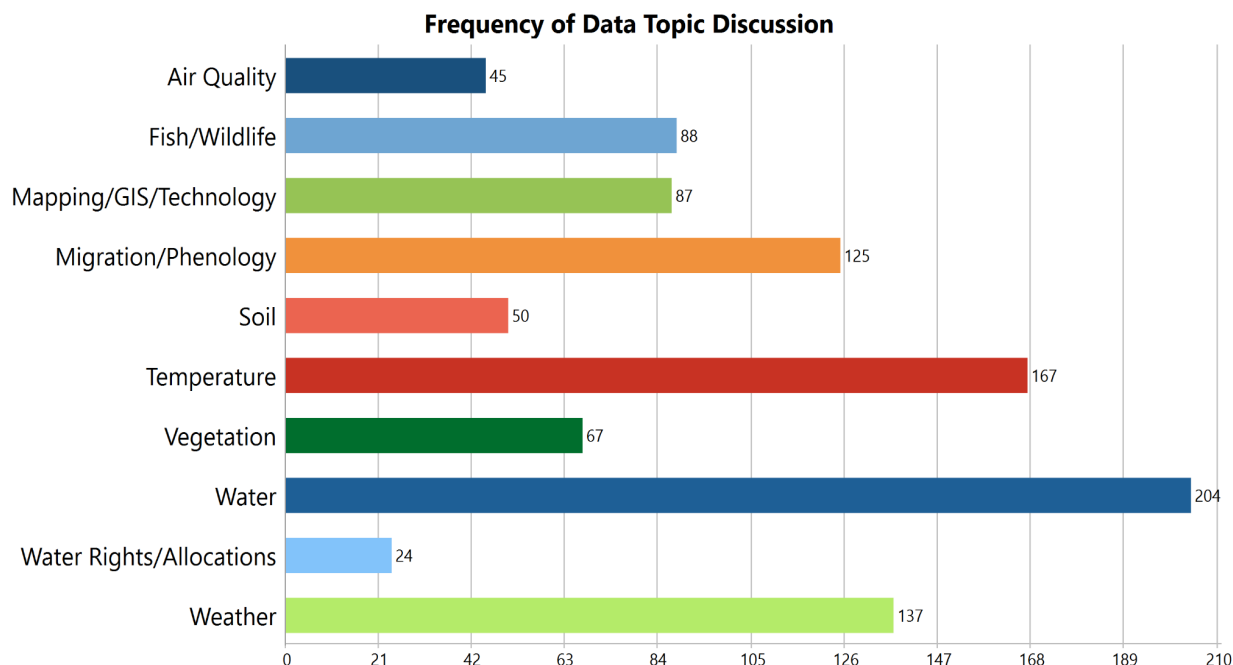
Figure 1 (see next page) displays the frequency of 10 common data topics.

**Water** was applied to any passage within the planning documents containing discussion of water quality (including algae/bacteria), water levels, and stream/river flow alterations. **Temperature** and **water** are closely applied in many of these plans, as these documents often discuss temperature concerns in terms of air temperature increases and the impact on water temperatures throughout watersheds. This is also tied to water quality as habitat for cultural and traditional resources.

**Weather** was used to identify areas within the plans that discussed weather patterns and any alterations in them, including precipitation amounts, timing, and seasonality. The specifics of these data needs vary by region (and even at the reservation level), which means that it is not possible to draw a singular, universal conclusion about climate change impacts across Indian Country nor what Tribal Nations will need in order to prepare for them.

**Species migration and phenology** (changes in life cycle and timing) were discussed in 13 of the 23 plans covered in this literature review.





**Fig 1.** This chart shows the number of times each data topic was discussed across all 23 plans and provides insight into the data areas that tribes are most concerned about.

Plans from the Pacific Northwest and Great Lakes regions account for a large proportion of the 125 identified data topics (112/125), though the causes differ between regions. In the Pacific Northwest, tribes indicated concern about the changes in water quality (primarily ocean acidification and water temperature), alterations in flow rates resulting from changes in precipitation timing and state (rain vs. snow), and how these will impact the salmon, mussels, oysters, and other aquatic traditional resource populations.

Tribes in the Great Lakes region primarily indicated concern about species migration and loss due to warming temperatures (both air and water), especially for culturally significant species at the southern edge of their range (e.g. moose). These tribal documents also mentioned concerns for the phenology of various fish species and the potential alteration of the regional food chain. Loss of wild rice as a result of alterations in the hydrology and water quality in watersheds as a result of weather pattern alterations and temperature increases was a large concern for the tribes in Northern Minnesota and Wisconsin.

## METHODS

For this analysis, 23 tribal climate change adaptation planning documents were analyzed using MaxQDA software. These plans were from tribes in the following regions: 12 plans from the Pacific Northwest, 4 from Alaska, 3 from the Great Lakes area, 3 from the Southwest, and 1 from the Northeast.

Before beginning the analysis, NLAP identified and created data topics (based on prior research and conversations with partners) that were anticipated to appear in these plans. Examples of these include: **Region**, which identifies the location of the Tribal Nations (regions will be discussed in more detail later in this document), **Weather, Culture/Traditional Resources, Water, Air Quality**, and **Temperature**.

Throughout the analysis process, additional data topics were created as their importance became apparent. Examples of these topics include **Infrastructure** and **Migration/Phenology**.

Using MaxQDA, relevant passages in the planning documents were selected and classified under their relevant data topic(s). In addition to identifying data topics throughout the documents, memos (notes) were also added to passages that contained unique perspectives, helpful context, or discussions related to larger systemic changes or issues.

Through the coding process, NLAP was able to conduct a meta-analysis of the available planning documents, identify trends and commonalities between documents, and identify the relationships between data topics. The results of this meta-analysis can be used to direct the focus for climate change research, aid in planning processes, highlight funding needs, and, potentially, influence policy.

## Regional Profiles

### PACIFIC NORTHWEST

In the Pacific Northwest, many of the climate adaptation plans included concerns for **increased intensity and regularity of wildfires**. These concerns were attributed primarily to **the increase in average temperature and prevalence of drought conditions in the region due to alterations in precipitation events and type** (snowfall vs. rain). These discussions about wildfire and drought often led to discussions about air quality degradation due to wildfire smoke and increased ozone levels (which increases as temperatures rise and precipitation decreases). These concerns were amplified for many of the tribes due to infrastructure issues, the rural nature of reservations, and reservation road systems (many reservations have limited



access roads) as well as limited community buildings with cooling systems and air filters.

Another prevalent concern in plans from the Pacific Northwest was the increasing prevalence of foodborne illnesses from seafood (particularly mussels, clams, and oysters) as a result of increasingly degraded environments. **This not only impacts the physical health of individuals but also adds stress to the community, hinders the economy by preventing people from selling their harvests, and creates a disconnect between the people and traditional food sources.**

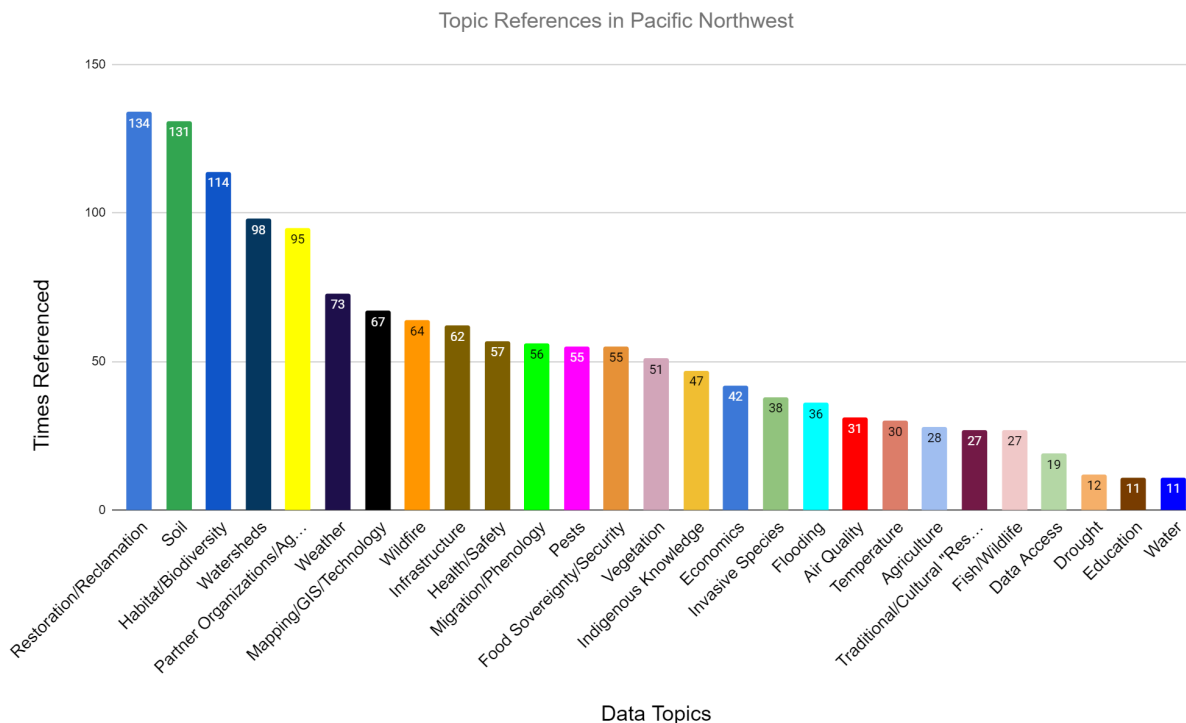
Due to the number of rivers and streams in the region, working with state, local, and federal programs to restore and protect watersheds was a commonality across the plans from the Pacific Northwest. Watersheds in this region are heavily influenced by mountain and glacial snowmelt in the watershed headwaters. With snowpack decreasing across the region and more areas being associated with rain-snow transition zones, or simply rain zones, the collaboration between organizations, private landowners, and Tribal Nations to properly manage and allocate the changing water resources and hydrology will be crucial to the region's long term stability.

Changes to hydrology are also affecting the landscape through habitat alterations and decreases in biodiversity. Peak streamflows change as a result of warming temperatures, increased rainfall, and decreased snowpack, and these changes affect the phenology and habitable range of species in these areas. **Shifts in the life cycles of various species have already been observed as the temperature and regional hydrologies change.** Other species have been migrating (or are expected to migrate) to higher elevations due to temperature and weather changes. The alterations in biodiversity and species phenology puts a strain on Native communities as cultural resources/nonhuman relatives migrate away from tribal lands and into inaccessible areas, potentially impacting peoples' physical and mental health as well as creating a disconnect between the people and their cultures.

One of the plans from the Pacific Northwest region focused heavily on the restoration of traditional land management practices (TEK)—primarily fire—and how increasing the use of these practices could aid in adapting to and combating climate change. Reclaiming and restoring traditional ecological knowledge to the land is represented in the frequency of the data topic [Restoration/Reclamation](#) in Fig. 2. While this individual plan was unique in that its planning was centered around utilizing traditional ecological knowledge and processes, other plans also included aspects of traditional ecological knowledge and its importance to communities. However, these plans primarily referenced traditional ecological knowledge in terms of seasonal signs (e.g. when it's time to hunt, fish, harvest berries, etc.) and how



climate change is altering the timing and phenology of that knowledge. Many of these plans mentioned bringing traditional ecological knowledge back to the landscape and land management practices.

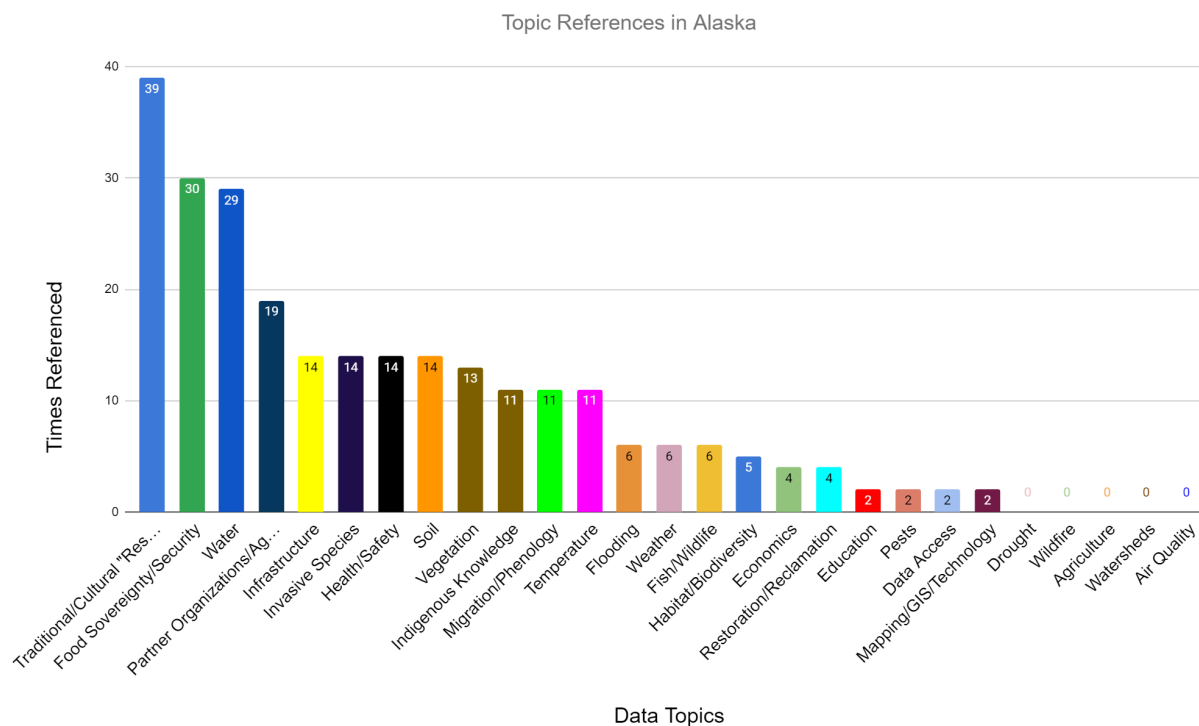


**Fig 2.** This chart provides a breakdown of the referenced data topics in the Pacific Northwest plans. From this bar chart, the most commonly referenced data topics were **Restoration/Reclamation**, **Soil (erosion)**, and **Habitat/Biodiversity**.

## ALASKA

Climate adaptation plans from Tribal Nations in Alaska shared many of the concerns and provided similar information as plans from the Pacific Northwest. **One aspect that differentiates the Alaskan plans from those of the Pacific Northwest is the potential need to relocate communities further inland to higher and drier grounds.** These relocations are the result of experienced and forecasted sea level rise in the coastal and delta areas that Tribal Nations are in. **These plans were concerned with the potential loss of traditional and cultural practices as well as resources as a result of relocation, the changes in weather patterns (temperature and precipitation), ocean acidification, and sea level rise.**

Access to water (especially potable water) was a concern for the communities that are in more remote/isolated areas (islands, deltas, etc.), so establishing the proper infrastructure (wells, updated sewage systems, septic tanks) to support these communities and to provide them with clean water was an important aspect within these plans. Other types of infrastructure such as electricity and roads were also identified as needs throughout these plans. Due to their remote locations, many of these communities have insufficient access to electricity (with some relying almost entirely on generators). Lack of access to the Alaskan road system is a problem for these communities in emergency situations. The need for sufficient and reliable infrastructure is becoming increasingly more important as climate change continues and the potential for wildfire, flooding, and severe weather is increasing. These plans noted several funding sources and possible partnerships that could increase community infrastructure as well as provide them with climate change adaptation planning and disaster prevention.



**Fig 3.** This chart provides a breakdown of the referenced data topics in the Alaskan plans. **Traditional/Cultural "Resources"** was the most common data topic, followed by **Food Security** and **Water**. **Health** and health influencers were also commonly referenced in these plans.

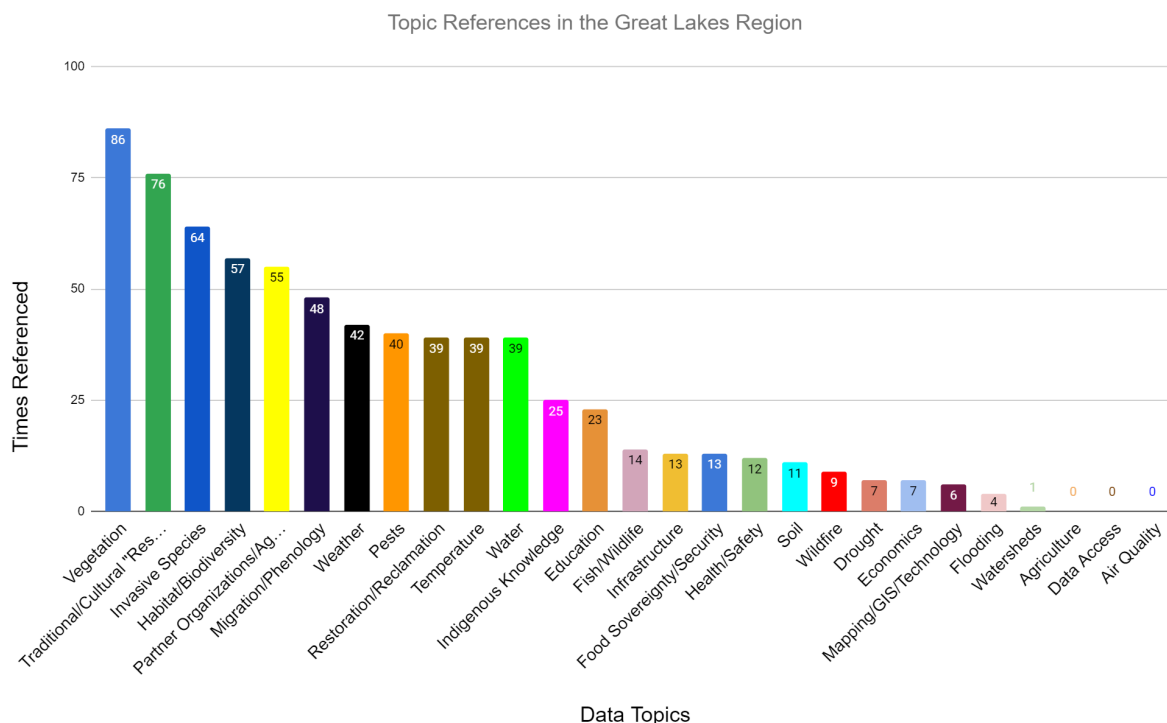
## GREAT LAKES

In the Great Lakes region, climate change adaptation plans focused primarily on **increasing temperature and the impacts this will have on annual precipitation, with more rain and less snow** (except along Lake Superior). The change in average temperatures has already been shown to affect the length of time that ice is on the lakes, shortening by several weeks so far with shorter periods projected. These alterations in temperature also account for fewer days below 10 degrees fahrenheit, as well as fewer days below zero degrees fahrenheit. This is a concern for the spread of invasive species (emerald ash borer) and pests (ticks) that historically would have been killed off over winter due to the extreme cold.

The migration of species out of (e.g. moose) and into (e.g. maples) the region are of significant concern for the tribes in this region due to the cultural and traditional values that they hold. Many of these species have been, and continue to be, used as a food source and in other ways crucial to their livelihoods since time immemorial. The loss of habitat for these species and dwindling biodiversity is of grave concern.

The habitats with the greatest concern of loss are the wetlands and peatlands of Northern Minnesota, which account for large amounts of biodiversity as well as store large amounts of carbon and methane. The increase in average temperatures and the decrease in precipitation has decreased water levels in these habitats, leading to loss of species, both vegetation and wildlife, that depend on these ecosystems. As these areas dry, they release stored carbon and methane into the atmosphere, adding to climate change and increasing temperatures. Additionally, the loss of these ecosystems also affects water quality downstream, as these areas act as upland water filters. There are many state and federal lands bordering and overlapping Tribal Nations in the Great Lakes region. Because of this, tribes work closely with state and federal agencies on land management and planning initiatives (e.g. memorandum of understanding between the Superior National Forest and the Fond du Lac, Bois Forte, and Grand Portage Chippewa Tribes). Partnerships between Tribal Nations and these agencies play a significant role in these planning documents, especially when it comes to invasive species and watershed concerns.





**Fig 4.** This chart provides a breakdown of the referenced data topics in the Great Lakes plans. The most commonly appearing data topics were **Vegetation**, **Traditional/Cultural "Resources,"** and **Habitat/Biodiversity**, solidifying the concerns for species loss and migration in this region.

## SOUTHWEST

In the Southwest region, three of the main concerns identified in climate change adaptation plans were **increased wildfire frequency and intensity, increased average temperatures, and decreases in water (access, storage, and quality).** **These plans discussed the need for improved infrastructure on reservations to help adapt to and combat these climate change impacts.** This includes increasing access to, and the stability of, electricity and internet, with there even being a discussion about establishing a reservation-wide electrical grid in order to increase the reliability and sustainability of electricity in the area. The need for more reliable electricity partially stems from the need to power air conditioning units during periods of high temperatures (which are increasing) as well as the need to heat buildings during the winters in areas at elevation.

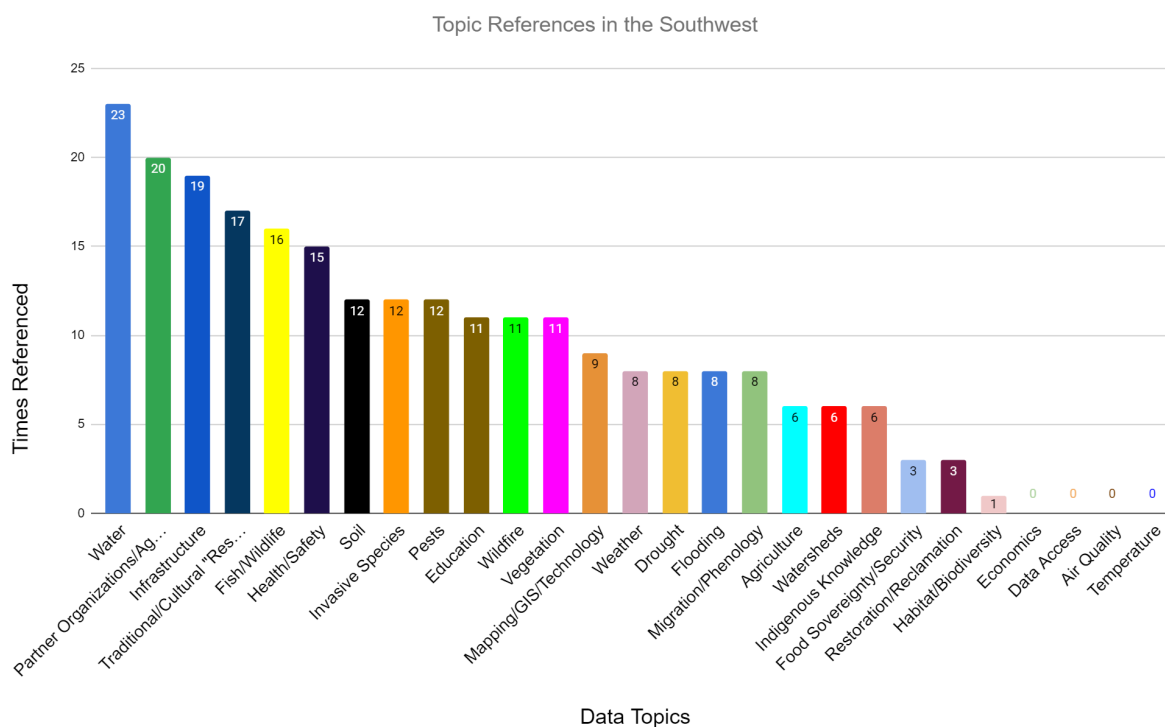
The need for improved road systems, and funding for these improvements, was also discussed in these plans. They noted the need for improved roads to be able to

withstand increasing temperatures as well as the need for updated culvert systems to mitigate flood damage during wet seasons and severe weather events. This region's plans also discussed the need for greater community education about climate change, the dangers of increased heat (and other climate change impacts), and what can be done at the local level. **One plan spent a significant amount of time discussing the threat that wildfires, heat, flooding, and poor air quality pose for children and their education opportunities, citing that oftentimes during these events schools are closed which limits learning for children in these communities.** This was a unique aspect of this plan that was not echoed in the other plans analyzed for this review.

The Southwest region's plans also identified **invasive species and pests as a concern for both native species and human health. These plans were greatly concerned with regard to the diseases they carry and their impacts to the health of community members.** The presence of mosquitoes carrying zika virus has increased over the last few years as environmental conditions have changed. Ticks carrying lyme disease and mice carrying hantavirus have also become more prevalent in the Southwest. Pests also include beetles that are responsible for killing trees on reservations (e.g. the goldspotted oak borer beetle). The increase in dead and dying trees across the landscape opens up space in the canopy for invasive species establishment and increases standing fuels for wildfire. In addition to these pests, one tribe's plan also discussed the issues they have had with feral horses. These herds of wild horses are known to degrade ecosystems through the trampling and overgrazing of vegetation. Feral horses are a large problem across the western United States. There are multiple state and federal programs established to aid in the removal of these horses, but the problem currently outpaces the solution.

These invasive and pest species pose large-scale threats to traditional and cultural resources (acorns, berries, roots, basket materials) throughout the region. Alterations in the hydrology and weather (including temperature) patterns in the Southwest are also expected to change the phenology and timing of cycles that tribal members and various species rely on throughout the year. Because of the prevalence of invasive species and pests, as well as water access and quality issues that are ongoing in the Southwest, these plans included mention of many potential partners (state, federal, local, and other organizations).





**Fig 5.** This chart provides a breakdown of the referenced data topics in the Southwest. The most commonly referenced data topics in these plans were **Water**, **Partner Organizations/Agencies**, and **Infrastructure**.

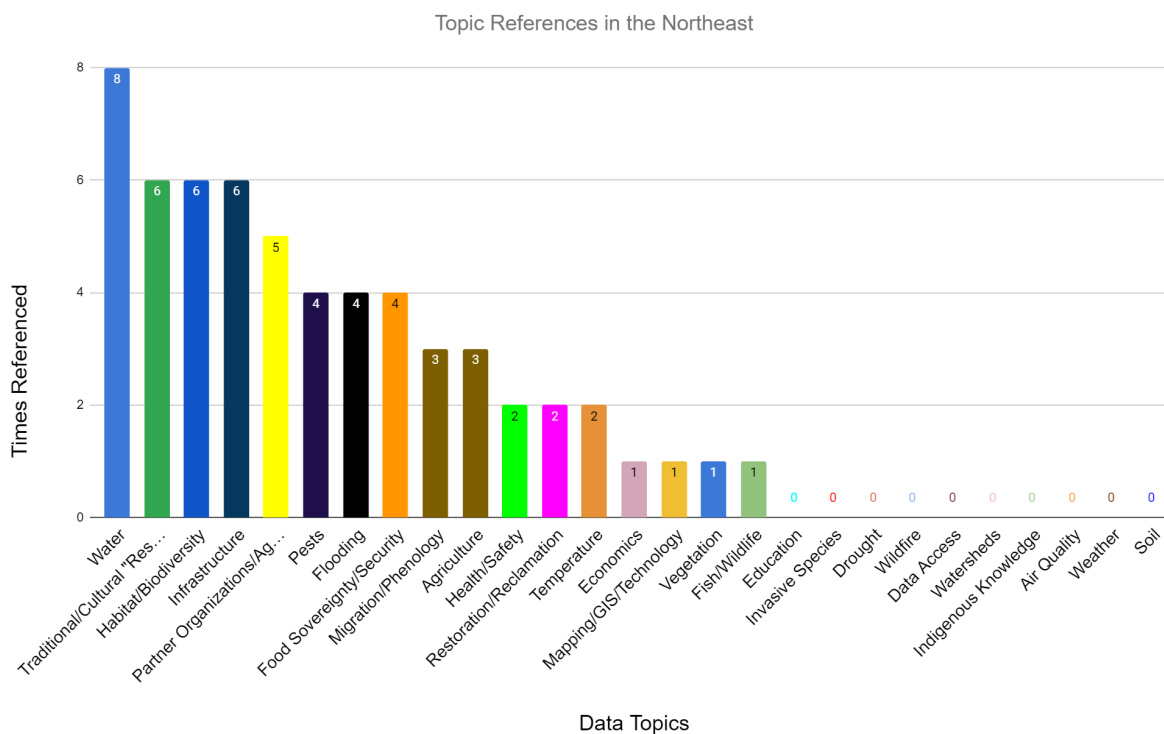
## NORTHEAST

At the time of conducting this literature review, NLAP was able to analyze only one climate change adaptation plan for a Tribal Nation in the Northeast (located on Long Island, New York). The most commonly referenced data topics for this plan were **Cultural/Traditional Resources**, **Water**, **Habitat/Biodiversity**, and **Organization/Agency Partnerships**.

In this plan, the **Water** and **Cultural/Traditional Resources** data topics were closely related. This is because the cultural and traditional resources that are of concern when planning for climate change are sacred sites, burial sites, and traditional food harvesting areas. **These aspects of the tribe's culture are impacted by the threat of flooding, the erosion of sacred sites, and the increased toxicity of traditional aquatic foods (oysters, clams, mussels, etc.) due to poor water quality from ocean pollution and acidification.**

This plan discussed the threats posed by increasing temperatures and sea level rise for the wetland habitat and species biodiversity in the Northeast (threat of habitat loss, especially wetland habitats, was a common topic of discussion across many climate change adaptation plans). The partnership potentials for this Tribal Nation centered around local watershed and estuary management programs, focusing on water quality and flood mitigation.

Another data topic that was referenced frequently was **Infrastructure**, which was used in the majority of the plans in this literature review, but for a variety of different reasons. In this plan, the infrastructural needs consisted of greater energy production and capabilities on the reservation in order to retain power to cool buildings during high heat periods as well as to heat buildings during cold periods. This Tribe also included the need for improved culvert systems, drainage ditches, and water control structures to handle flood waters and sea level rise. This plan also noted the necessity of restoring wetlands and marsh areas as well as creating barriers around these habitats to protect them from sea level rise and high tide.



**Fig 6.** This chart provides a breakdown of the referenced data topics in the Northeast. The most commonly referenced data topics in this plan were **Water**, **Traditional/Cultural "Resources"**, **Habitat/Biodiversity**, and **Infrastructure**.

## Key Findings

Despite the differences in encountered and anticipated climate change impacts, commonalities in these plans existed across all regions. One of these commonalities was the inclusion of **Infrastructure** and the need to increase and update existing infrastructure systems. Infrastructure concerns primarily focused on roadways (and the lack thereof) for moving around as well as getting on and off of the reservation, especially in emergency situations such as an evacuation due to wildfire or flooding. This included the need to update road systems to withstand potential flooding as well as the need for culverts and sewage reinforcement. Infrastructure needs also extended to updating community buildings (council buildings, schools, community centers, etc.) to make them more energy efficient as well as able to serve as a place for people to shelter in extreme weather conditions, including days with poor air quality.

**Health** was another key area identified by these plans as a concern linked to climate change, primarily stemming from extreme weather, heat, and poor air quality. Loss of cultural and traditional resources, foods, and habitats were also discussed as potential causes of decreased health on reservations. In this case, the plans noted how disconnection from cultures and traditions could have negative effects on the health of community members.

The increase of **Invasive Species** and **Pests** (including viruses, bacteria, parasites, and fungi) on reservations and the threats they pose to many cultural resources (animals, plants, land area, water, etc.) as well as to the health of the people were discussed in the majority of plans.

From an initial assessment, the majority of **Invasive Species** threats/concerns come from invasive **vegetation** species that put pressure on native species through resource competition. These invasive species are, typically, more readily adaptable to the changing climate and are able to thrive in a wider range of climatic conditions than most native species, especially if those native species are already living on the edge of their range. These invasive species are also effective at establishing themselves in degraded soils following disturbances (fire, flood, mudslides, degradation due to development, etc.), which are expected to occur with greater frequency and intensity in the future. **This poses a threat to many culturally significant species, perpetuating the disconnection between Tribal communities and traditional lifeways.** With the increase in competition and accelerating climate change, it is possible that many native species will disappear from these areas as they migrate to more favorable conditions. The loss of these native species could lead



to alterations in habitat, potentially causing a change in wildlife biodiversity on reservations as they migrate elsewhere in search of preferred habitat and climatic conditions. The loss of these species would put strain on these reservation communities as they lose traditional resources for food and other uses (ceremonial, tools, clothing, etc.). Many of these species are also of cultural and spiritual importance and their loss would be felt in ways other than food security and ecological alteration.

The increase (current and projected) of **Pests** on reservations is also included in many of these adaptation plans. **These pests (bacteria, viruses, fungi, parasites and the animals that carry them, e.g. ticks, mice, mosquitoes) pose a threat to the health of community members as well as various species (vegetation and wildlife), which further exacerbates the human health implications due to decreases in cultural species and food security.** While there were many different types of pests discussed in these planning documents, differing by regionality and local environment, some were more prevalent than others. Ticks, primarily those that carry lyme disease, have been found in new areas (e.g. western Oregon), indicating that the range of this pest is expanding as average temperatures increase and weather patterns change. These ticks and the diseases they carry are not only a threat to human health but also to wildlife. For example, in the Great Lakes region, ticks are being considered as a potential threat to the moose and deer populations due to warmer temperatures allowing them to be more active in the winter months, a period of time when they were historically dormant. Additionally, deer populations across the United States are seeing major die-offs due to chronic wasting disease and other bacteria and parasites that are expanding in range and increasing in prevalence due to warming climates. Another pest concern is the increased prevalence of toxic algae and bacteria in bodies of water. In aquatic environments, increasing average temperatures and added pollutants from agriculture and developed areas create the conditions necessary for toxic algal growth. This poses threats to human health and wellbeing by making these bodies of water largely unusable: swimming is dangerous, consuming fish and other foods from the water is unsafe, and the water is not suited for drinking. **This further limits resources for sovereignty, sustainability, and security for tribal members on reservations, increasing community dependence on municipal water resources and store bought foods.** Many of these Tribal Nations have cultural ties to the waters on their lands, and the diminishment of these ties due to the inability to use the water could have cultural, spiritual, and mental health implications.

**One thing of note that was common across these plans was that they did not discuss the idea of stopping climate change.** There was some mention of driving vehicles less to reduce emissions, but even that was not a prominent aspect of any



plans. Tribal Nations are not responsible for climate change and are minor contributors, at most, to the environmental destruction of the past 150 years, and yet they are some of the most directly impacted by the changing climate. Therefore, the plans these communities produced were focused on identifying current and predicted issues in order to prepare for them, and on increasing the resiliency of the people, the culture, and the lands. They were not focused on stopping nor preventing the changes, but rather trying to adapt to them. They use available data (and discuss collecting more data at the local level) to increase the odds of success in their adaptations.

The lack of indigenous voices in climate change discussions on the national and global scale, the undermining of indigenous knowledge by western science, and a dearth of relevant land and climate data for tribal geographies could lead to a sense of hopelessness in Native communities, thus contributing to the current limited number of tribal climate change adaptation plans. These observations are based on the themes and tones presented in these reviewed plans as well as the number of published tribal plans available for review. This literature review is part of the Native Land Advocacy Project's efforts to develop data tools and technical support that will empower tribal climate planning and decision-making.

## Recommendations

The planning documents reviewed for this study provide a good starting point for research into climate change adaptation planning and data need trends across Indian Country. This review is intended to identify climate change concerns, needs (data, funding, capacity, etc.), and regional partnership opportunities for Tribal Nations. The plans involved in this study are completed and published for public use and use the most up to date scientific data, projections, and local knowledge to create forward-thinking planning documents.

While this is a good starting point, the use of published planning documents poses an issue in terms of planning biases. While there are many published climate change adaptation plans to review, there are far more Tribal Nations and communities than there are completed plans (this review included 23 plans, while there are over 574 federally recognized tribes in the United States, as well as unrecognized and state recognized tribes, all representing varying climate concerns and needs). This means that the needs and trends found across these plans may not be wholly representative of the needs and trends across all of Indian Country, but more tailored to the tribes that have the capacity to create climate change adaptation plans.



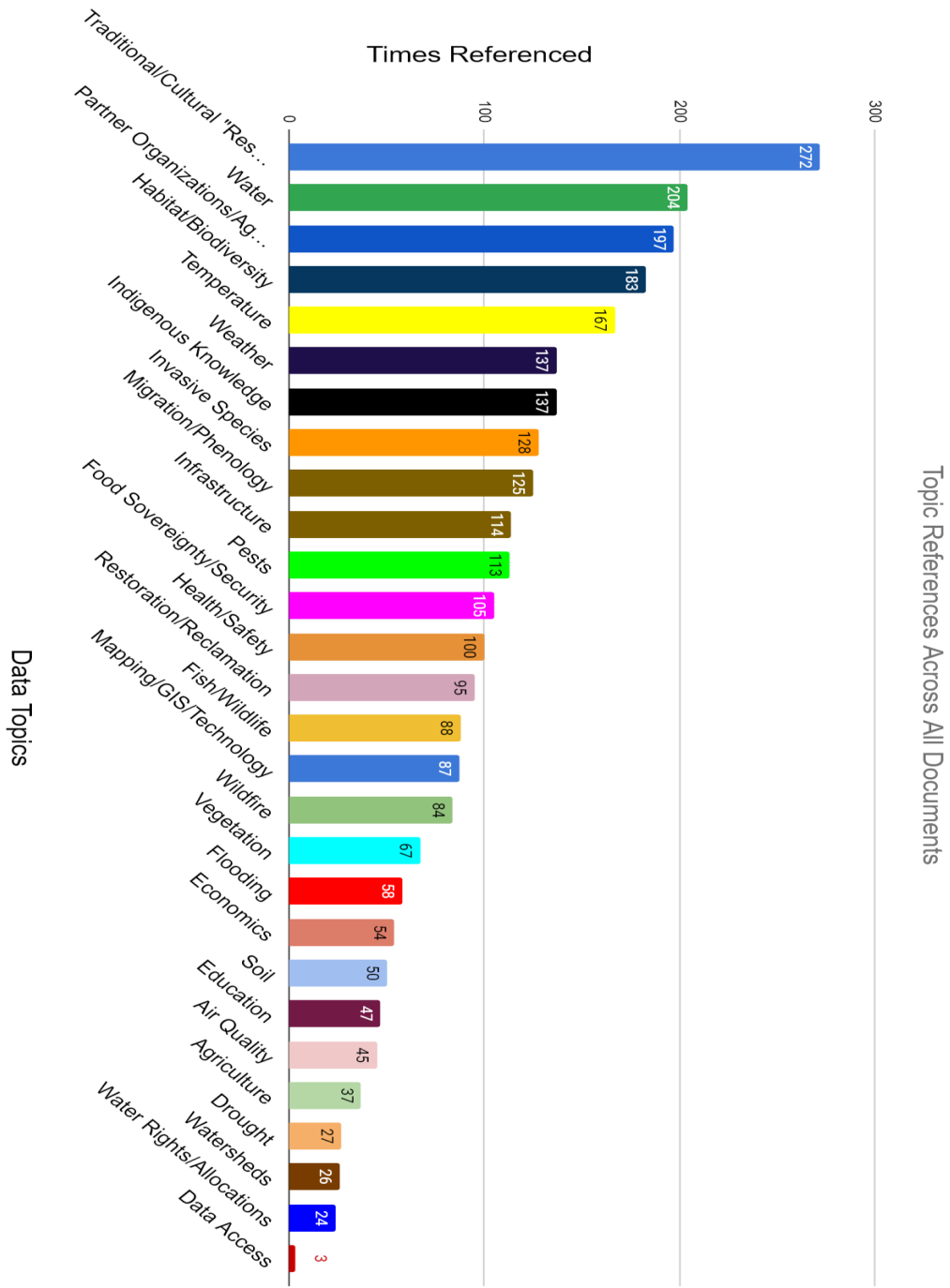
There are many possible reasons for tribes not completing a climate change adaptation plan. Not knowing where to begin or what processes to follow, not having access to relevant data, lack of funding, lack of capacity, lack of support from the community or tribal government as well as a host of other reasons could be responsible for incomplete or nonexistent planning documents. One way that external organizations can help is by making relevant data and technical support freely available to tribes. This is where resources like this review become relevant.

By identifying needs and trends across a select number of plans, we are able to better understand the status of climate change adaptation planning in Indian Country. This understanding then directs our research, data acquisition, and resource production to fill those identified needs. From there, more literature reviews can be completed as a greater number of plans are developed, enabling the fine tuning and progression of data development and production.

While this initial review is rather narrow in scope, it provides a starting point for identifying and fulfilling data and capacity needs for Tribal Nations looking to develop climate change adaptation plans. Tribal Nations are already experiencing climate change in their communities, regardless of where they are in their climate change planning process. By using regional data and projections in addition to traditional ecological knowledge for monitoring their local environments, they are adapting to their changing environment as they have done for generations and will continue to do for generations more.



### APPENDIX A: DATA TOPICS REFERENCED ACROSS ALL REVIEWED DOCUMENTS



**Fig 7.** This chart shows the number of times each identified data topic was used across all 23 plans, showing the commonalities in climate change planning and concerns amongst Tribal Nations.



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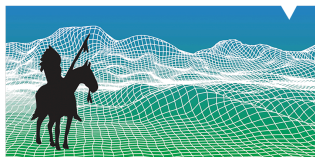
Emma Scheerer

## **THANK YOU**

to the Native American Agriculture Fund for supporting the development of a Climate Data Portal for U.S. Native Lands.

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