

Climate Change Impacts and Adaptation on tribal lands; a literature review of Tribal Climate Change Adaptation plans

Introduction

In the summer of 2023, Village Earth, as part of the Native Lands Advocacy Project (NLAP), conducted a literature review on tribal climate change adaptation plans in an attempt to identify climate change trends to date and projected changes and conditions in Indian Country. In addition, this literature review is attempting to identify concerns that Tribal Nations have for the future of their lands and people, as well as to expose data gaps and data needs that Tribal Nations require to best plan for, and adapt to, climate change. Village Earth is a 501 (c)(3) nonprofit organization based in Fort Collins, CO. The Native Lands Advocacy Project is a project led by Village Earth, in addition to partnerships with other Native American-led organizations, whose work is centered on compiling, processing, contextualizing, and making available data for tribes and tribal land managers to use to strengthen tribal land sovereignty and resources management rights. NLAP also conducts research, writes reports, and consults with tribes on various types of projects. This literature review is funded by the Native American Agriculture Fund and is part of a larger climate change initiative.

For this literature review, we are performing a meta-analysis by reading through 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. Data topic classifications were used while reading through these plans in order to identify commonalities and information from all of the plans involved. NCAI's database is by no means an exhaustive list of Tribal climate change adaptation plans, but they are publicly available and provide good 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 continue, as new data and technology is created, and as more Tribal Nations plan and prepare for climate change. This document is meant to serve as an initial analysis of trends in climate change adaptation planning across Tribal Nations and to be used as a preliminary guide for initiating discussions. This report is not intended to be exhaustive analysis nor does it provide in depth analyses on specifics contained within the planning documents, as more comprehensive reports will be produced in the future.

As stated previously, this analysis is intended to identify 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 documents, read through them, and then create and assign classification identifiers to different passages and information contained within the documents in order to conduct cross-analyses on all documents. 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, 2801 data topics were identified and applied across the 23 Tribal Nation climate change adaptation planning documents.** It should be noted that these 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. The most commonly referenced data topics were; “Traditional/Cultural “Resources” (272), “Partner Organizations/Agencies” (197), “Habitat/Biodiversity” (183), and “Indigenous Knowledge (TEK)” (137). Apart from “Partner Organizations/Agencies”. These data topics highlight the top levels of concern for these Tribal Nations when planning for climate change (breakdown of data topic references across all plans can be found in Figure 7, located in Appendix A). In many of these documents, the preservation of their cultural heritage through the protection of their 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 their lands and to promote the continuation of cultural resources. Some examples are: berries, fish species, tree species, roots, locations, and anything else that might be important to the people.

Additionally, the identified data topics are being used to identify data gaps and needs as well as aspects that will require continued monitoring and updating as climate change impacts unfold. The most commonly cited data topics are; “Water” (204), “Temperature” (167), “Weather” (137), and “Migration/Phenology” (125) (frequency of data topic reference in Fig. 1). “Water” was applied to anywhere within the planning documents where they discussed water quality (including algae/bacteria), water levels, and stream/river flow alterations. “Temperature” and “water” are closely applied in many of the plans because when these planning documents discuss their concerns with temperature changes, it is often in terms of air temperature increases and its impact on water temperatures throughout the watershed. This is then tied to water quality as well 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 conclusion about climate change impacts across Indian Country nor what Tribal Nations will need in order to prepare for them.

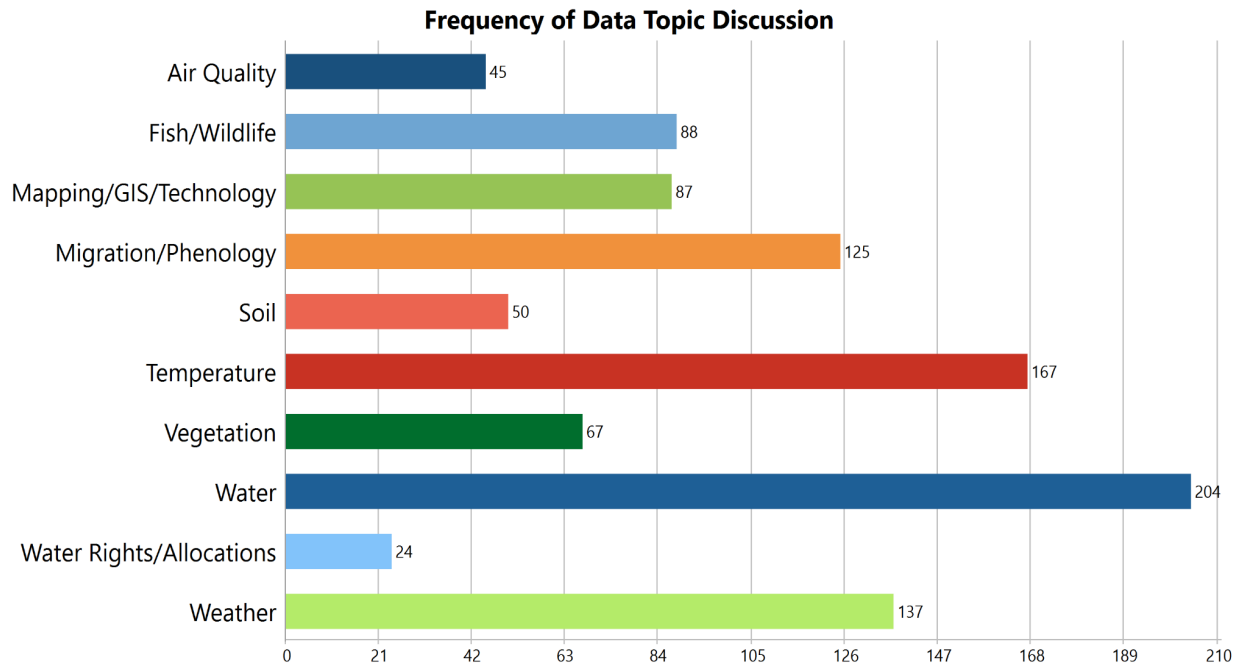


Fig 1. This chart shows the number of times each data topic was discussed across all 23 plans and provides insight into the data areas that tribes are most concerned about.

The migration and phenology (changes in life cycle and timing) of species are discussed in 13 of the 23 plans used for this review. 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 are concerned 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. Whereas tribes in the Great Lakes region are primarily concerned about species migration and loss due to warming temperatures (both air and water), especially for culturally significant species that are at the southern edge of their range as it is (e.g. moose). These tribal documents also mention 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 is a large concern for the tribes in Northern Minnesota and Wisconsin.

Methods

For this analysis, 23 tribal climate change adaptation planning documents (12 from the Pacific Northwest, 4 from Alaska, 3 from the Great Lakes area, 3 from the Southwest, and 1 from the Northeast) were analyzed in MaxQDA software. Many of the possible data topics used were created before beginning the analysis based on previous work that had been done by NLAP and other sources. Examples of these include; “Region” which identifies the location of the Tribal Nations (these regions are discussed later in the document), “Weather”,

“Cultural/Traditional Resources”, “Water”, “Air Quality”, and “Temperature”. Additional data topics were created throughout the analysis to account for topics that were not identified in previous work as climate change concerns (e.g. “Infrastructure”, “Migration/Phenology”). Throughout the planning documents, relevant passages were selected and classified under the correlating data topic (if one did not exist for a passage then a new one was created). In addition to identifying data topics throughout the text, memos (notes) were also added to documents at sections to mark unique perspectives, provide context, or relate to larger systemic changes or issues. Through the coding process we are able to conduct a meta-analysis of the available planning documents and identify trends and commonalities between documents as well as identify the relationships between data topics. The results of the meta-analysis will be used to direct the focus for climate change research, aid in the planning process, highlight funding needs, and, potentially, influence policy.

Regional Profiles

Pacific Northwest

In the Pacific Northwest, many of the climate adaptation plans include 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 on wildfire and drought oftentimes lead to discussions on air quality degradation due to wildfire smoke and increased ozone levels (which increases as temperatures rise and precipitation decreases). These concerns are amplified for many of the tribes due to infrastructure issues, the rural nature of the reservations, and reservation road systems (many reservations have only a couple of access roads for the reservation) as well as limited community buildings with cooling systems and air filters. In the plans from the Pacific Northwest, health concerns due to 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.**

Working with state, local, and federal programs to restore and protect watersheds is a commonality across the plans from the Pacific Northwest, due to the large numbers of rivers and streams in the region. These watersheds 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. These changes to hydrology are also affecting the landscape through habitat alterations and decreases in biodiversity. Alterations to peak streamflows change as a result of warming temperatures, increased rainfall, and decreased snowpack, are affecting 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 the community as cultural resources migrate away from tribal lands and into inaccessible areas, potentially impacting people’s 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 their 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 “Restoration/Reclamation” in Fig. 2). While this plan was unique in that its planning was based 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 reference 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. The use of traditional ecological knowledge is mentioned in many of these plans as something tribes would like to bring back to the landscape and land management methods.**

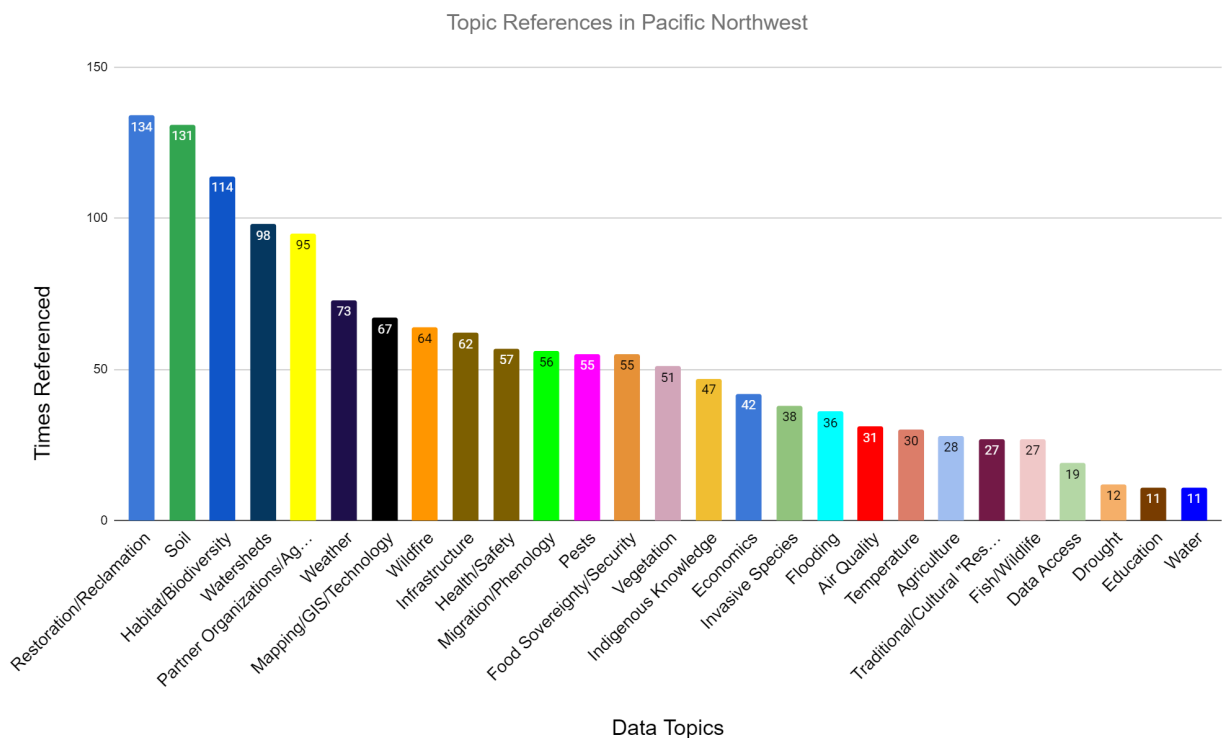


Fig 2. This chart provides a breakdown of the referenced data topics in the Pacific Northwest. From this bar chart, the most commonly referenced data topics are “restoration/reclamation”, “soil” (erosion), and “habitat/biodiversity”.

Alaska

The climate adaptation plans from Tribal Nations in Alaska share many of the concerns and provide similar information as the plans from the Pacific Northwest. **One aspect that differentiates the Alaskan tribal 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 the communities are in. **Tribes are 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) is a concern for the communities that are in more remote/isolated areas (islands, deltas, etc.) so setting up the proper infrastructure (wells, updated sewage systems, septic tanks) to support these communities and to provide them with clean water is an important aspect within these plans. Other types of infrastructure such as electricity and roads are 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 Alaska 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 note several funding sources and partnership possibilities for them to participate in to increase community infrastructure as well as to provide them with climate change adaptation planning and disaster prevention.

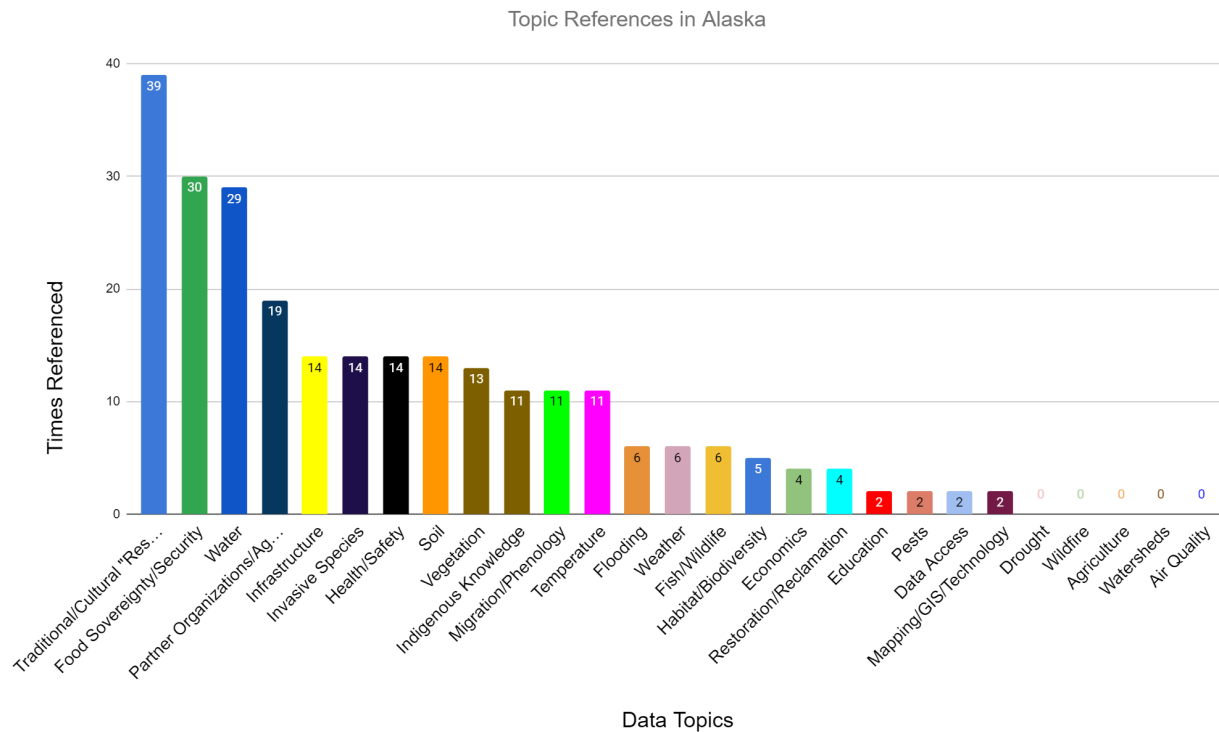


Fig 3. This chart provides a breakdown of the referenced data topics in Alaska. “Traditional/cultural “resources” appears to be the most common data topic, followed by food security and water. “Health” and health influencers were commonly referenced in these plans which aligns with the indicated areas of concern in these plans.

Great Lakes

In the Great Lakes region, the climate change adaptation plans focus primarily on the increase in temperature and the impacts that will have on precipitation received throughout the year, 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 zero degrees fahrenheit. This is a concern for the spread of invasive species (emerald ash borer) and pests (ticks) that 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 up they release stored carbon and methane into the atmosphere, adding to climate change and the 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.

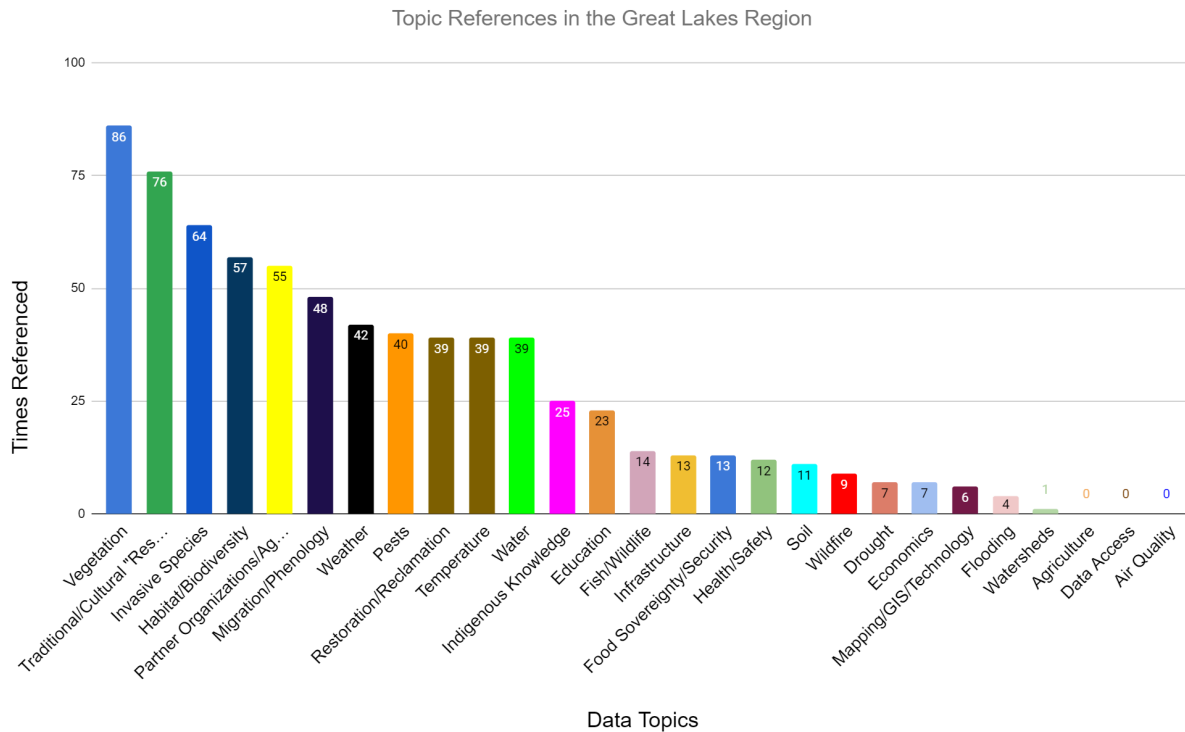


Fig 4. This chart provides a breakdown of the referenced data topics in the Great Lakes. The most commonly appearing data topics are “vegetation”, “traditional/cultural resources”, and “habitat/biodiversity”, solidifying the concerns for species loss and migration in this region.

Southwest

For the Southwest region, three of the main concerns that the climate change adaptation plans look to address are increased wildfire frequency and intensity, increased average temperatures, and decreases in water (access, storage, and quality). These plans discuss the need for improved infrastructure on their reservations to help adapt to and combat these climate change impacts. This includes increasing their 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 only increasing) as well as needing to heat buildings during the winters in areas at elevation.** The need for improved road systems, and funding for them, is discussed in these plans. They note the need

to improve roads to be able to withstand the increasing temperatures as well as updating culvert systems to mitigate flood damage during the wet seasons and severe weather events. The plans in this region also discuss the need for greater education in the community about climate change, the dangers of increased heat (and other climate change impacts), and what they can do at the local level. **One plan spends 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 is a unique aspect of this plan that is not echoed in the other plans used in this review.

The tribes in this region present invasive species and pests as a concern for native species and human health. The greatest pest concerns are with regard to the diseases they carry and their impacts to the health of community members. The presence of zika virus carrying mosquitoes has increased over the last few years as conditions have changed to fit their preferences. Lyme's disease carrying ticks and hantavirus carrying mice have also increased in prevalence in the Southwest. Pests also include beetles that are responsible for killing trees on these reservations, with the goldspotted oak borer beetle specifically being referenced. 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 discusses 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 common and 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 has been larger than the solution so far. Because of the prevalence of invasive species and pests, as well as the water access and quality issues that are ongoing in the southwest, these plans include many state, federal, local, and other organizations that they currently and could potentially partner with on these issues. **These invasive and pest species pose large-scale threats to traditional and cultural resources (acorns, berries, roots, basket materials) throughout the region. The 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.**

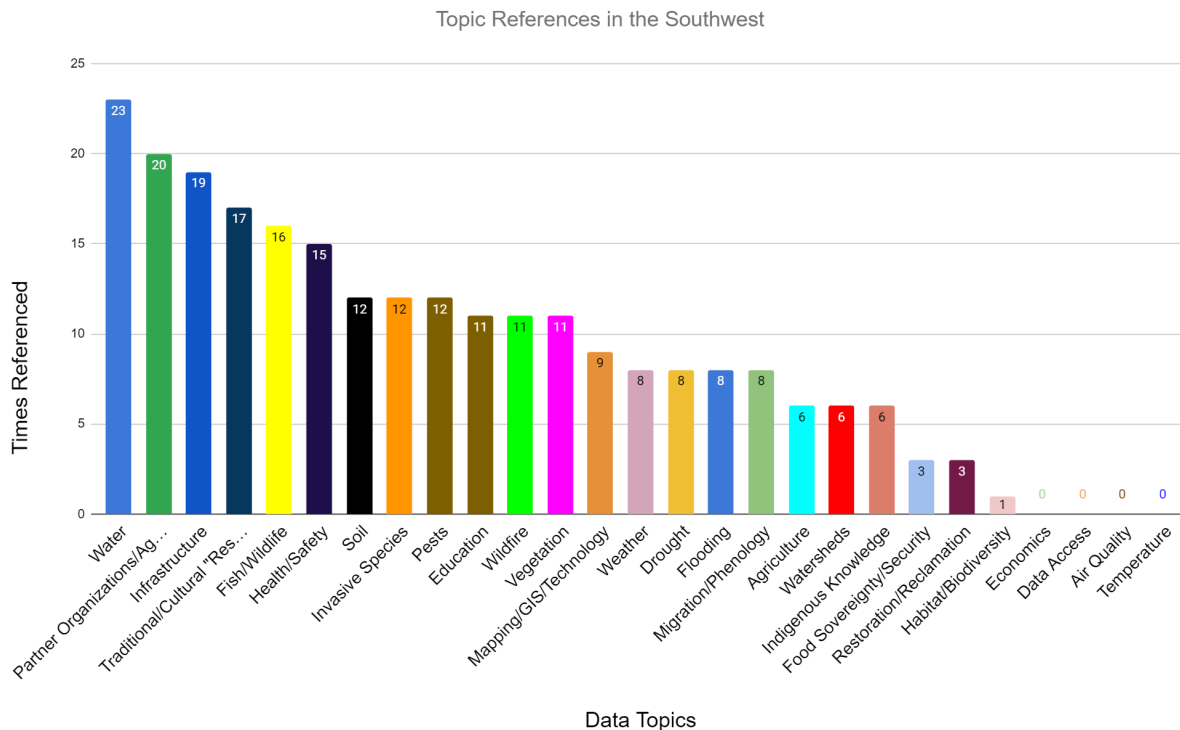


Fig 5. This chart provides a breakdown of the referenced data topics in the Southwest. The most commonly referenced data topics in these plans are “water”, “partner organizations/agencies”, and “infrastructure”.

Northeast

So far, we have been able to conduct analysis on 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 are “Cultural/Traditional Resources”, “Water”, “Habitat/Biodiversity”, and “Organization/Agency Partnerships”. In this plan, the “water” and the “cultural/traditional resources” data topics are 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 traditional life and the culture of this tribe 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.** The threats that increasing temperatures and sea level rise pose for the wetland habitat and species biodiversity in the area are discussed throughout this plan (threat of habitat loss, especially wetland habitats, is a common topic of discussion across many climate change adaptation plans). The partnership potentials for this Tribal Nation center 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 a large majority of the plans in this literature review for a variety of different reasons. In this plan, the infrastructural needs consist 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 includes the needs for improved culvert systems in the roads, drainage**

ditches, and water control structures to handle flood waters and sea level rise. They also note the necessity to restore wetlands and marsh areas as well as to create barriers around these habitats to protect them from sea level rise and high tide.

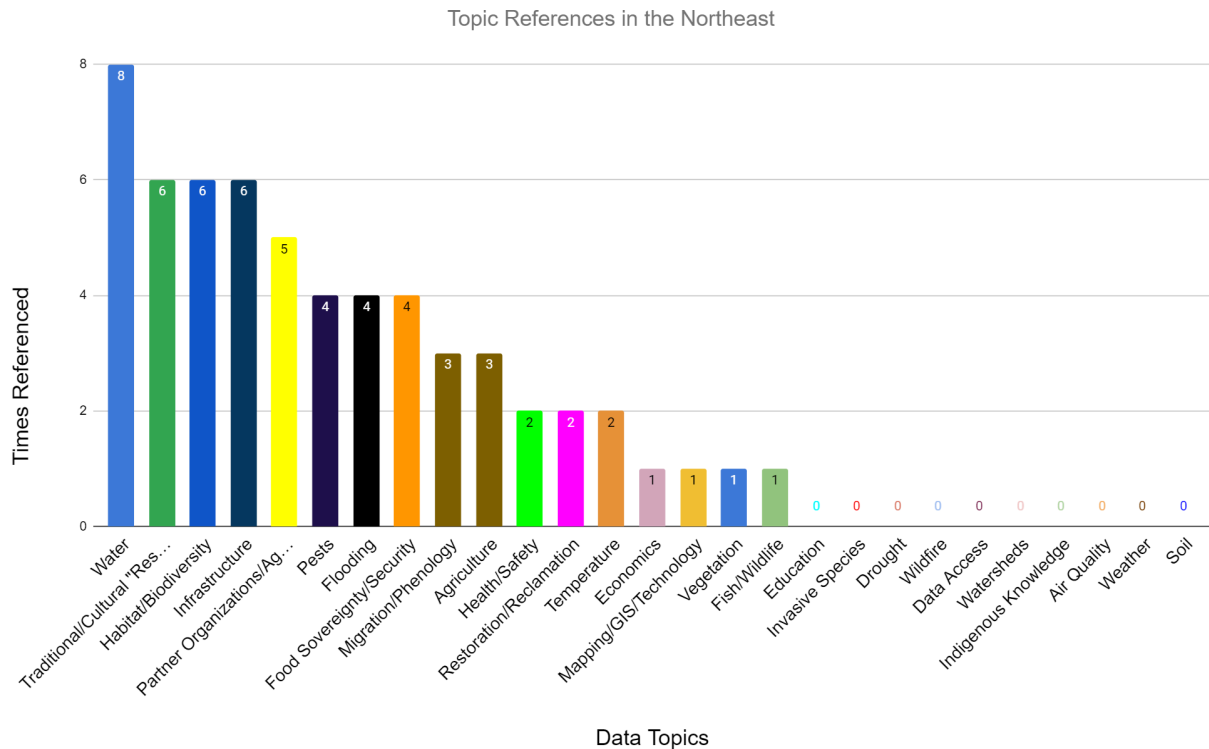


Fig 6. This chart provides a breakdown of the referenced data topics in the Northeast. The most commonly referenced data topics in these plans are “water”, “traditional/cultural resources”, “habitat/biodiversity”, and “infrastructure”.

Key Findings

Despite the differences in encountered and anticipated climate change impacts, commonalities exist across all identified regions. One of these commonalities was the inclusion of infrastructure and the need to increase and update existing infrastructure systems. **Infrastructure concerns primarily focus on roadways (and 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 increase their road systems to withstand potential flooding as well as the need for culverts and sewage reinforcement (if needed). **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 go in extreme weather conditions, including days with poor air quality.** Health was another area that these plans identified as a concern for 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 possible causes for decreases in health on reservations in**

several plans. In this case, the plans noted how the disconnection from their cultures and traditions could have negative effects on the health of community members.

The increases in invasive species and various pests (including viruses, bacteria, parasites and fungi) on reservations and the threats they pose to the many cultural resources (animals, plants, land area, water, etc.) as well as to the health of the people are discussed in the majority of plans. **From an initial assessment, the majority of these threats come from invasive vegetation species that are putting 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 species are also good 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 cultural species, perpetuating the disconnection between the people and traditional ways.** With the increase in competition and accelerating climate change, it is likely 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 importance and their loss would be felt in ways other than food security and ecological alteration.**

The increase in prevalence and the threat of pests on reservations is cause for concern and included in many of these adaptation plans. These pests (bacteria, viruses, fungi, parasites and the animals that carry them- ticks, mice, mosquitoes) pose a threat to the health of community members as well as various species, both 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 (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 threaten wildlife. For example, in the Great Lakes region, ticks are starting to be 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. The increase in average temperature and added pollutants from agriculture and developed areas to aquatic environments, create the conditions necessary for toxic algal growth. This poses threats to human health and wellbeing by making these bodies of water unusable for the

most part; dangerous to swim, inedible fish and other things from the water, and the water is not safe to drink. **This further limits resources for sovereignty, sustainability, and security for tribal members throughout reservations, increasing the dependence on municipal water resources and store bought foods.** Many of these Tribal Nations have cultural ties to the waters on their lands, the loss of these ties due to the inability to use the water could have cultural 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 not driving as much to reduce emissions, but even that was not a prominent aspect of these plans. The plans these Tribal Nations have produced are focused on identifying current and predicted issues in order to prepare for them. These documents are focused on increasing the resiliency of the people, the culture, and the lands. They are not focused on stopping or preventing the changes, but rather trying to adapt to them. These communities 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. There is not much they can do to stop climate change but there is a lot that they can do to prepare for and adapt to the changes that are coming. They are using the available data as well as attempting to create more on the local level to increase the odds of success in their adaptations. The lack of indigenous voices on the national and global scale in climate change discussions and the undermining of indigenous knowledge by western science could lead to a sense of hopelessness in tribal communities and thus contributing to the limited number of tribal climate change adaptation plans. These claims are not intended to make insinuations nor are they based on data apart from the themes and tones presented in these reviewed plans as well as the number of published tribal plans to review. The data and insight that this literature review is hoping to produce will contribute to these efforts.

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 great starting point, the use of published planning documents poses an issue in terms of planning biases. Meaning that 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, there are over 574 federally recognized, as well as unrecognized and state recognized, Tribal Nations and communities throughout the U.S.), which would mean 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 abilities to put together a climate change adaptation plan. There are many possible reasons for tribes not completing a climate change adaptation plan. Not knowing where to begin nor the

data needs, lack of funding, lack of capacity, lack of support from the community or tribal government as well as a whole host of other reasons could be responsible for missing planning documents. One way that organizations can help is by making as much data freely available as possible that tribes can access and apply to their communities. This is where reviews like this one come into play. 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 and direct research and data acquisition and production to fill those identified needs. From there, more reviews can be completed as a greater number of plans are developed, enabling the fine tuning and progression of data development and production. So while this 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. In 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 they will continue to do so for generations more. Through these knowledge bases (both traditional and western science) they are strengthening the resiliency of their communities and their cultures.

The findings in this document are representative of trends that have emerged in the initial stages of this review. This study is ongoing and is expected to identify trends and needs across Indian Country as more analyses are conducted and as more plans are added. These 23 documents have provided some beneficial insight into the status of climate change adaptation planning in Indian Country and will be essential in the completion of this study. There is still much to do in terms of adaptation planning and identifying the issues and the needs of these Tribal Nations is a crucial first step.

Appendix A: Data topic reference across all review documents

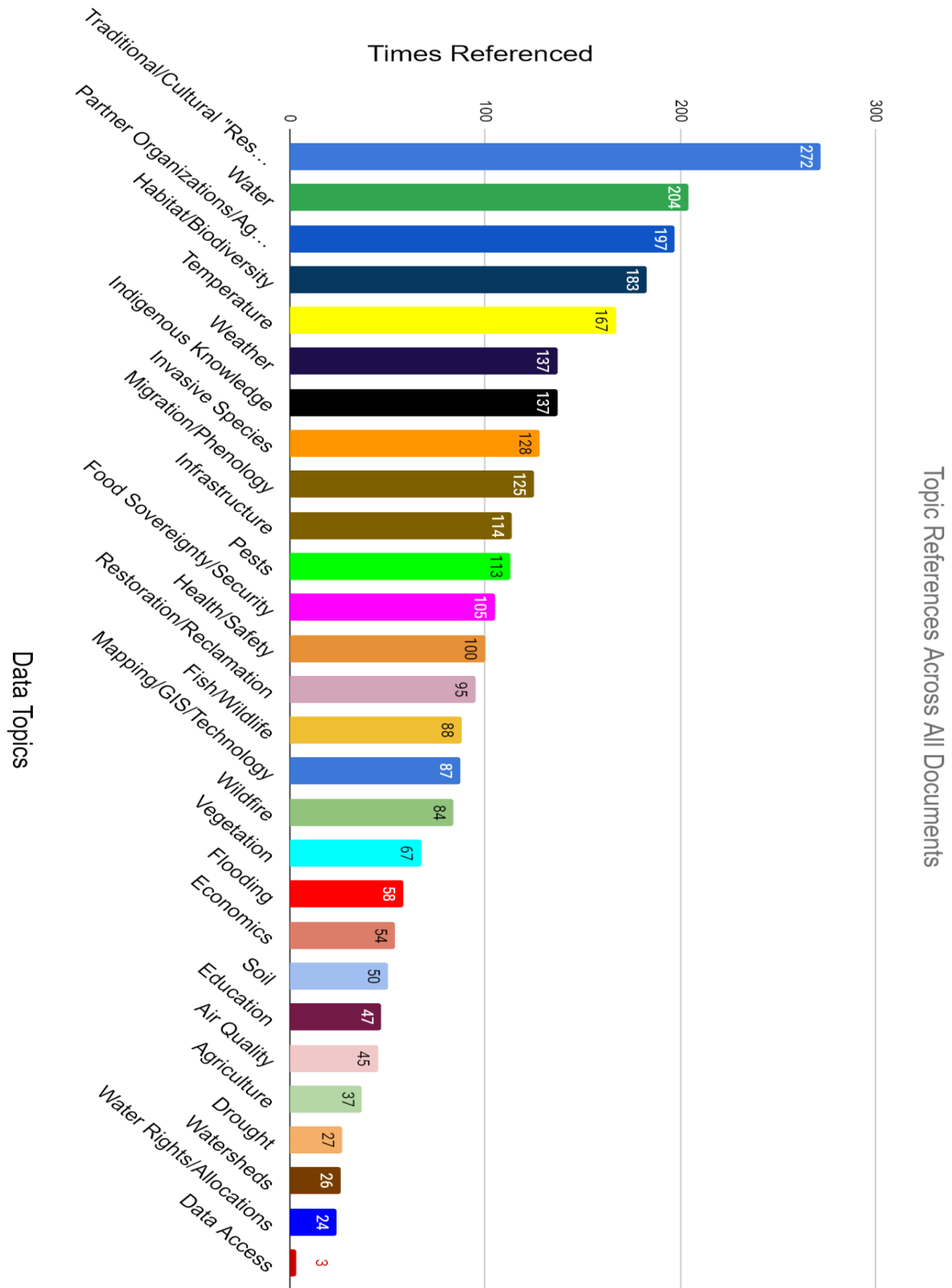


Fig 7. This chart shows the number of times each identified data topic was used across all 23 plans showing the commonalities and disparity in climate change planning and concerns amongst Tribal Nations.

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