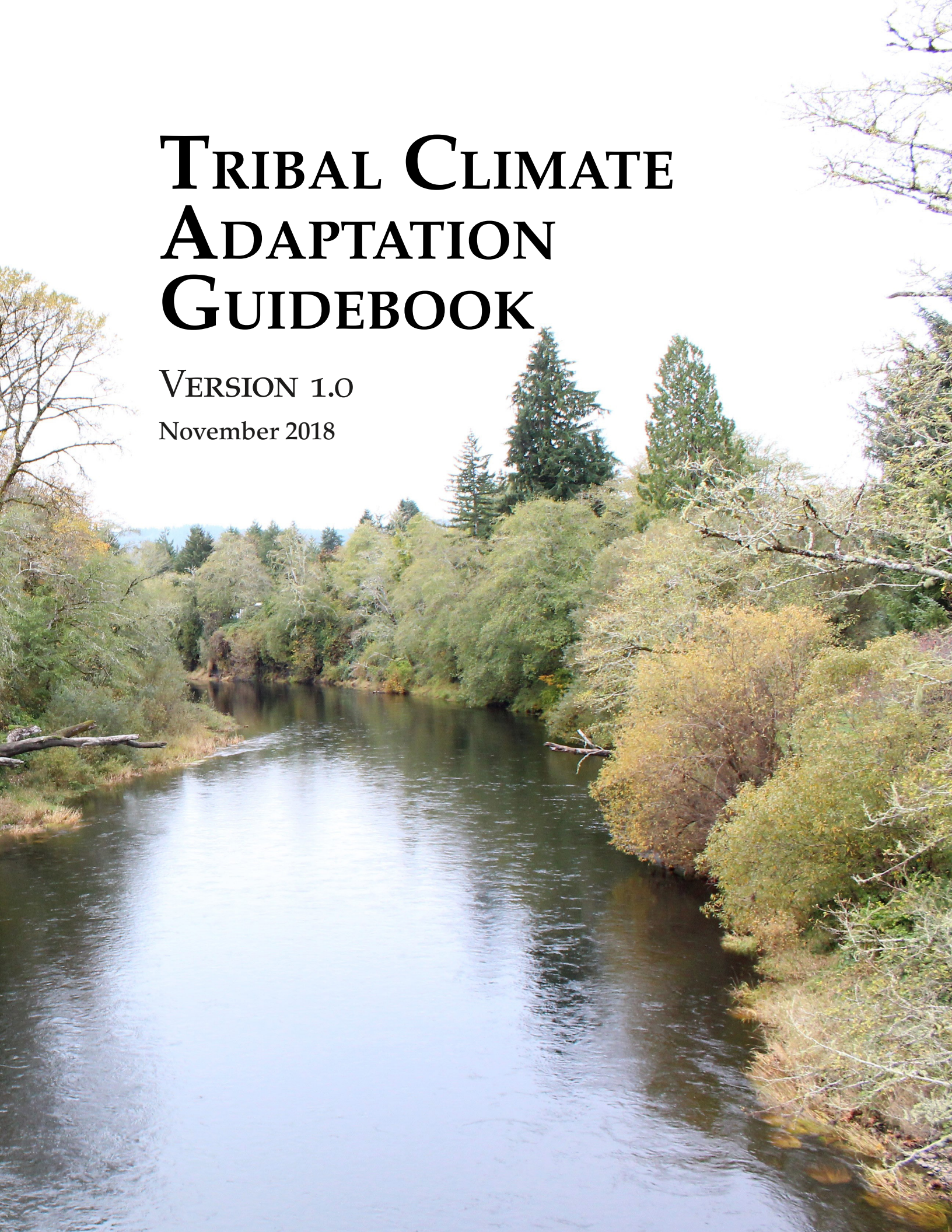
Tribal Climate Adaptation Guidebook

Version 1.0

November 2018



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The ***Oregon Climate Change Research Institute (OCCRI)*** was established by the Oregon State Legislature in 2007 to conduct climate change research, provide information on climate change, assess the state of knowledge, and assist local adaptation efforts. The vision of OCCRI is to achieve a climate-prepared Northwest by building a climate knowledge network, cultivating climate-informed communities, and advancing the understanding of regional climate, impacts, and adaptation. OCCRI is based at Oregon State University (OSU) in the College of Earth, Ocean, and Atmospheric Sciences (CEOAS). OCCRI is home to the Pacific Northwest Climate Impacts Research Consortium (CIRC), a climate-science-to-action team funded by the National Oceanic and Atmospheric Administration (NOAA).

Adaptation International is a mission driven organization that partners with tribal and western communities to build resilience to climate change. Adaptation International uses collaborative approaches to connect the best available science and tools with local and traditional knowledges to empower communities to be holistic, equitable, and adaptive.

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- 1854 Treaty Authority
- Alaska Native Tribal Health Consortium
- Blackfeet Nation
- Citizen Potawatomi Nation
- Coeur D'Alene Tribe
- Confederated Salish and Kootenai Tribes
- Fond du Lac Band of the Lake Superior Chippewa Indians
- Jamestown S'Klallam Tribe
- Karuk Tribe
- Lac du Flambeau Tribe
- Makah Tribe
- Marshall Island Indigenous Peoples
- Menominee Indian Tribe
- Native Village of Newtok
- Native Village of Selawik
- Native Villages of St. Mary's and Pitka's Point
- Nez Perce Tribe
- North Olympic Development Council
- Puyallup Tribe
- Quinault Indian Nation
- Red Lake Band of the Lake Superior Chippewa Indians
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- Samish Indian Nation
- Shoshone-Bannock Tribes
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Introduction

The changing climate is affecting critical cultural and community resources, species, habitats, people, and assets.[1] In many cases, these changes are likely to be profound, having the potential to significantly affect the lifeways of Indigenous communities. Yet, since time immemorial, tribes have maintained their cultural traditions, demonstrating a high degree of resilience in the face of changing environmental and social conditions.[2]

Climate Change Impacts & Indigenous Communities

> *"In the Upper Snake River Watershed, this time-period [the last 10,000 years] included: a transition out of an ice age; mass emergence and migration of plants and animals; and the collision of societies, materials and goods, and disease from the opposite side of the world. USRT* [Upper Snake River Tribes Foundation] *member tribes now face the environmental, societal, and cultural effects of human-driven global climate change and will look both to their proven cultural strengths and the adoption of innovative techniques to continue to successfully adapt and thrive on the landscape."—Upper Snake River Tribes Foundation Climate Change Vulnerability Assessment*

Indigenous peoples have lived on and with the land since time immemorial. Through the impacts of settler colonialism, genocide, and forced removal from Native homelands, Indigenous peoples have endured undue hardships that have resulted in social conditions that limit tribal capacity for resilience.[3] Many tribes are still rebuilding their Nations, prioritizing issues such as enhancing health, reducing poverty, decreasing homelessness, increasing support for veterans, improving education, protecting reserved rights, and asserting their sovereignty.

The effects of climate change interact with other existing social, political, economic, and environmental changes, and can exacerbate current stressors or create cascading effects.[4] Indigenous peoples are impacted by climate change at disproportionately higher rates than other populations. In addition, many tribal communities are located in geographically vulnerable environments, making them more exposed and sensitive to climate change.[5] Climate change stands to affect tribal sovereignty and self-determination, tribal culture, and the community health of Indigenous peoples.[6]

As sovereign governments, federally recognized tribes have a government-to-government relationship with the United States federal government. This relationship entails a trust responsibility to protect the treaty rights, lands, assets, and resources of federally recognized tribes.[7] Climate change threatens tribal sovereignty and self-determination by potentially affecting treaty and reserved rights, including subsistence rights and access to traditionally significant plant, animal, and aquatic species.

As climate change alters the land, ecosystems, and species distributions, tribes with resource-based livelihoods may lose access to natural resources within traditional homelands, Usual and Accustomed areas, and ceded or ancestral territories.[8] Climate change also negatively impacts tribal community health and well-being—which involves the interconnection of social, cultural, spiritual, environmental, and psychological health—through reductions in the quality and quantity of or access to culturally important species, subsistence foods, and traditional nutrition sources.[9]

Traditional Knowledges in Climate Change Initiatives

> *"TKs* [Traditional Knowledges] *and western science each have their own strengths and weaknesses; neither is superior to the other. Braided together, both can retain their own identity while strengthening the whole body of knowledge regarding climate science."*—Gary S. Morishima, Quinault Management Center, Quinault Indian Nation, *Climate Change and Indigenous Peoples: A Primer*

> *"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* [our adaptation plan]*, we hope to use the traditional ecological knowledge of our elders who have lived long lives and have seen the changes over time[.]"*—Harry Barnes, Chairman Blackfeet Tribal Business Council, *Blackfeet Climate Change Adaptation Plan*

Each tribe has a unique system of gathering, organizing, interpreting, applying, and sharing knowledge related to their people, culture, and traditions. This body of knowledge and these knowledge systems can be described as "Traditional" or "Indigenous" knowledges. These knowledges refer to "ways of knowing" that "can encompass culture, experiences, resources, environment, and animal knowledge" that "are passed down generationally from elder to youth through oral histories, stories, ceremonies, and land management practices."[10]

By providing observational evidence and informing the development of adaptation strategies that are culturally appropriate, Traditional Knowledges (TKs) are essential to tribal understanding of climate change. Yet, TKs are eroding as environmental changes and the timing of traditional ecological events become less reliable in determining the timing and practice of traditional and cultural activities.[11]

The *Guidelines for Considering Traditional Knowledges (TKs) in Climate Change Initiatives* refers to TKs as "[I]ndigenous communities' ways of knowing that both guide and result from their community members' close relationships with and responsibilities towards the landscapes, waterscapes, plants, and animals that are vital to the flourishing of [I]ndigenous culture."[13] These traditional information systems are held by tribal members and shared through tribal community, cultural practices, oral history, as well as direct family lineage, across multiple generations over long periods of time. TKs encompass many aspects of traditional practices and cultural information, not only but including environmental knowledges. The term Traditional Ecological Knowledge (TEK) refers to application and utilization of these generationally based TKs with natural resources on the landscape in management, collection, ceremonial sustainability efforts, or reciprocity behaviors and practices. TEK was first coined as the "cumulative body of knowledge, practice, and belief, evolving by adaptive processes and handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment."[14] This *Guidebook* recognizes that the terms ***Traditional Knowledges*** and ***Traditional Ecological Knowledge*** are defined and manifested differently among different tribes and knowledge holders.

Traditional Knowledges (TKs)—complex and multifaceted Indigenous knowledge systems encompassing many aspects of traditional practices and cultural information.

Traditional Ecological Knowledge (TEK)—complex and multifaceted Indigenous knowledge systems based in Traditional Knowledges that are often direct application and utilization of Traditional Knowledges having to do with ecology, ecosystems, or the environment.

Traditional Knowledges encompasses a wide variety of overarching traditional practices that are foundational bases for traditional culture. Traditional Knowledges may include, but is not limited to: storytelling, seasonality, phenology, identification of cultural items, patterns, or traditions, and genealogy. Traditional Ecological Knowledge is the application of the specific area of Traditional Knowledges and Indigenous Science that relates to the environment and ecology, including botanical knowledge, medicinal application (collection and/or administration), hunting, fishing, gathering, processing of material(s), caretaking (such as burning, coppicing, thinning), astronomy, phenology, ecological markers, species markers, and weather and climate knowledge.[12]

Throughout this *Guidebook*, the term TKs is used to include both environmentally focused and non-environmentally focused TKs. Tribal community members, staff, and leadership in most cases have already noticed changes to the environment or recent, novel extreme weather events. Other noted observations may include shifts in the patterns and/or timing of important environmental events; and how drought, extreme heat, or heavy rainfall events may have affected species, habitats, as well as community and cultural resources important to the tribe. These observations and relevant TKs that support tribal culture and traditions can be identified and applied to climate change adaptation as appropriate.

Deciding how and where it is appropriate to incorporate TKs is a decision that can only come from each tribal government and knowledge holder. A knowledge holder is most often a tribal member who has been imparted with and/or actively participates in TK and/or TEK activities based on generations-worth of information.

When working with partners outside the tribe, sharing TKs requires approval from governing entities such as specific committees and tribal leadership. Tribes maintain the right not to share TKs with external partners but could incorporate those knowledges separately as part of their internal planning process. Tribes and knowledge holders have the right to decline to share TKs and should only share TKs with free, prior, and informed consent.[15]

It is important to identify tribal policies concerning and addressing Tribal Intellectual Property Rights, which can include oral traditional information, and understand the tribe's legal processes for addressing the information, which is sometimes prevented from general public release along with the legal restrictions of these tribal intellectual properties.

Using TKs in climate change planning can benefit the tribe, promote greater collaboration with partners, and improve the outcomes of adaptation planning. Generational oral tradition information is not necessarily termed "Traditional Knowledges" or "Traditional Ecological Knowledges," but acknowledged as a traditional information system without labels. Many tribes have already incorporated information that is pertinent to their tribe and TKs into tribal policies and procedures.

Tribal Leadership in Adaptation & Resilience

"We've always been good at adaptation. You look at the 500 years that the western civilizations have been here… And the tribes are probably one of the best adapters of being able to survive right along next to the western cultures."—Swinomish Indian Tribal Community member, *Swinomish Climate Change Initiative Climate Adaptation Action Plan*

"Our tribes are strong and resilient people. We have lived on these lands for countless generations, from time immemorial. We will continue to flourish on our homelands for countless generations to come."— *Climate Adaptation Plan for the Territories of the Yakama Nation*

"Adaptation has long been part and parcel of indigenous communities; indeed their very survival and continuity as peoples depended on successful response to change."—Gary S. Morishima, *Climate Change and Indigenous Peoples: A Primer*

Adaptation is the processing of culturally relevant information and practices while implementing a suite of actions to better prepare for and adjust to new conditions while maintaining cultural protection in order to reduce risk, utilize new opportunities, and enhance resilience. ***Resilience*** is the capacity of a community to withstand, survive, and thrive by applying adaptation actions that maintain and adhere to essential cultural functions, identities, and structures while co-existing with and managing for changing conditions.[16] ***Indigenous resilience*** may include protecting, preserving, and enhancing tribal resources, cultural and traditional knowledge and practices, identity, and sovereignty in the face of climate and other changes.

Despite facing disproportionate impacts from climate change, tribes have demonstrated leadership in building resilience by actively responding and adapting to climate change.[17] Tribes are on the frontlines of changing conditions, have deep cultural and spiritual connections to natural resources, continue to articulate and adapt to these same impacts for much longer than recognized from a Western perspective, and recognize the importance of taking action to ensure a better future for the next generations. Tribes use multiple avenues to achieve and maintain resilience. These approaches are often multi-tiered, have far-reaching effects as they have been passed down generationally, and often are not identified by labels or titles in the same manner as Western Science. At the foundation of Native resilience are TKs and TEK, or knowledge-based practice.[18]

Tribes across the country have proactively developed tribal climate adaptation plans and other resilience actions with the support of federal funding opportunities, including the Bureau of Indian Affairs (BIA) Tribal Resilience Program, the Environmental Protection Agency, the Department of Energy, other federal agencies, and non-federal partners (Figure 1).

The BIA has supported tribes' adaptation planning process through their Tribal Resilience Program since 2011. The program has provided $37 million supporting 425 grants, 124 of which were grants to individual tribes for climate adaptation, according to numbers provided to this Guidebook from the BIA. Grants have funded a range of activities, including travel expenses (so that tribal staff could attend climate change training courses) and financial support for climate change vulnerability assessments and adaptation plans. A list of tribal climate resilience programs, reports, and actions can also be found on the University of Oregon Tribal Climate Change Guide.

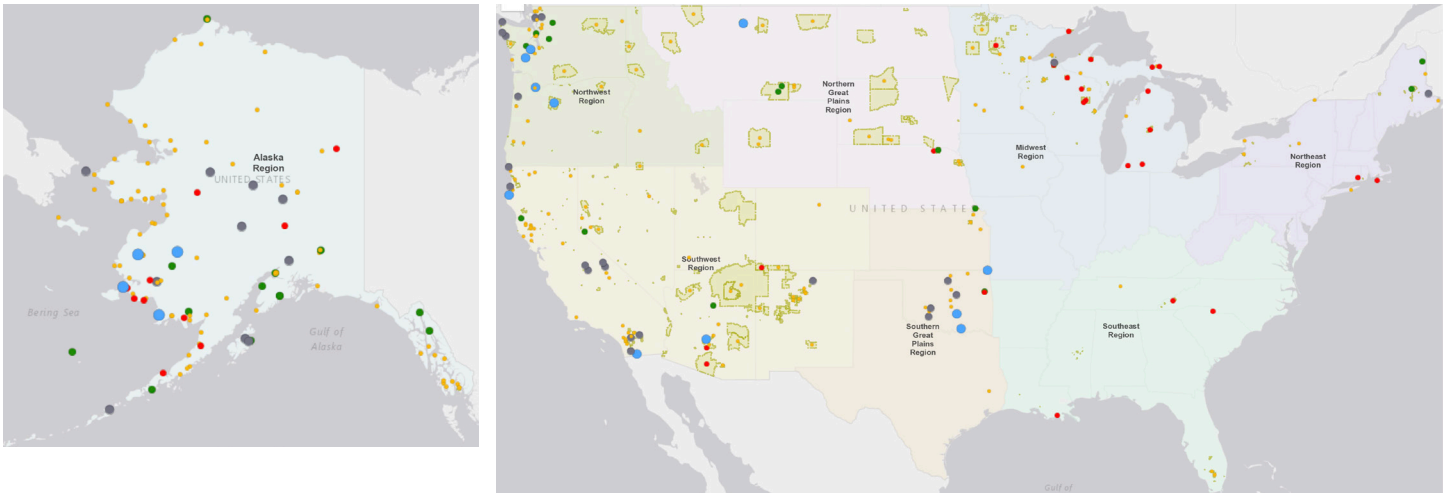

Figure 1 US Indigenous Peoples Resilience Actions. Tribal climate projects funded by the Bureau of Indian Affairs, other federal agencies, and other non-federal partners. Activities shown include projects focused on planning and assessment (orange dots); adaptation and implementation (red dots); monitoring and research (green dots); governance and capacity building (gray dots); and youth or traditional knowledges (blue dots). Additional projects for the Pacific Islands and Caribbean are available online.Visit the source website for further context and details.[19]

Tribes also recognize the importance of working together to enhance resilience by jointly addressing climate change-related vulnerabilities. Regional intertribal groups support information sharing and learning between tribes working on climate change. Tribal organizations supporting information sharing include: the Affiliated Tribes of Northwest Indians; Northwest Indian Fisheries Commission; Columbia River Inter-Tribal Fish Commission; Point No Point Treaty Council; the Upper Snake River Tribes Foundation; the Inter-Tribal Council of Michigan; and the Great Lakes Indian Fish & Wildlife Commission. This work is further facilitated by networks, including: the Pacific Northwest Tribal Climate Change Network and the Institute for Tribal Environmental Professionals.

Why Develop a Tribally Focused Guidebook?

> *"I don't believe in magic. I believe in the sun and the stars, the water, the tides, the floods, the owls, the hawks flying, the river running, the wind talking. They're measurements. They tell us how healthy things are. How healthy we are. Because we and they are the same. That's what I believe in."*—*Billy Frank Jr.*, Nisqually Tribe[20]

> *"The Tribes believe everything in nature is embodied with a spirit. The spirits are woven tightly together to form a sacred whole (the Earth). Changes, even subtle changes that affect one part of this web affect other parts. Protecting land-based cultural resources is essential if the Tribes are to sustain Tribal cultures."*—*Climate Change Strategic Plan for the Confederated Salish and Kootenai Tribes of the Flathead Reservation*

One of the first adaptation guidebooks, *Preparing for Climate Change: A Guidebook for Local, Regional, and State Governments*, was devised as a partnership between the University of Washington and King County, Washington in 2007.[21] This guidebook outlines a helpful set of steps that a local government could follow to conduct a vulnerability assessment and develop an ***adaptation plan***. Though intended primarily for Western local municipal governments, the guidebook has been used around the world, including by Native American tribes. There are several other adaptation guidebooks designed to incorporate climate change adaptation planning into: federal and state land management;[22] conservation planning for fish, wildlife, and habitats;[23] and provide local governments an adaptation framework.[24] Still other guidebooks are designed to empower communities to plan for climate change.[25] Most of these guidebooks are written from a perspective of Western Science and culture. While valuable, these materials typically do not recognize the unique conditions of tribal governments and cultures.

adaptation plan—documents how an entity identifies and assesses the vulnerability of key concerns and planning areas that are likely to be affected by changing climate conditions; develops adaptation goals and actions to reduce vulnerability and increase resilience; and establishes a plan to implement and monitor success of adaptation actions.

adaptation planning—the process by which an entity identifies and assesses the vulnerability of key concerns and planning areas that are likely to be affected by changing climate conditions; develops adaptation goals and actions to reduce vulnerability and increase resilience; and establishes a plan to implement and monitor success of adaptation actions.

At the same time, many tribes across the country have been leading exemplary efforts to address climate change (Table 1). There are also several organizations providing various types of support and resources for tribal climate change ***adaptation planning*** (Appendix A).

This *Tribal Climate Adaptation Guidebook* builds on the ongoing climate-related work in tribal communities, provides a framework for climate change adaptation planning in the context of existing tribal priorities, and directly considers the unique issues facing Indigenous communities. Specifically, this *Guidebook* directs readers to the foundation of existing resources and tribal adaptation efforts. It identifies opportunities for braiding together Traditional Knowledges and Western Science in developing adaptation plans. The framework outlined here will be useful for tribes in different phases of climate adaptation planning efforts. The framework also supports learning from the experiences, approaches, and lessons of tribes working to become more resilient to climate change. The *Tribal Climate Adaptation Guidebook* is designed to support tribes' efforts to proactively adapt to climate change and thrive for generations to come.

How To Use The Guidebook

This *Guidebook* follows a holistic approach to adaptation planning called *community-driven climate resilience planning*. Community-driven climate resilience planning is "the process by which residents of vulnerable and impacted communities define for themselves the complex climate challenges they face, and the climate solutions most relevant to their unique assets and threats."[26]

There is a range of terminology applied to this type of planning. In this *Guidebook*, the term ***adaptation planning*** is used while recognizing that tribes can identify and employ terms that resonate most for them. Broadly, this *Guidebook* begins by drawing on the tribe's unique vision, context, and culture to arrive at a set of tribal priorities. The tribe then assesses the vulnerability of these priorities and develops appropriate solutions. Finally, the framework provides strategies to build capacity and implement solutions.

Step 1 offers guidance to Center the Tribe's Adaptation Effort in the tribe's vision and priorities. Also covered in Step 1 is guidance on engaging tribal leadership and community members and ways the tribe may consider incorporating TKs in climate change adaptation planning.

The next four steps constitute the climate adaptation planning process: Identify Concerns and Gather Information (Step 2), Assess Vulnerability (Step 3), Plan for Action (Step 4), and Implement and Monitor Actions (Step 5). Each step is connected to and emanates from the tribe's vision and priorities and considers multiple knowledges and perspectives (Figure 2).

Note: These steps are iterative and cyclical and may need to be revisited periodically through the adaptation planning process.

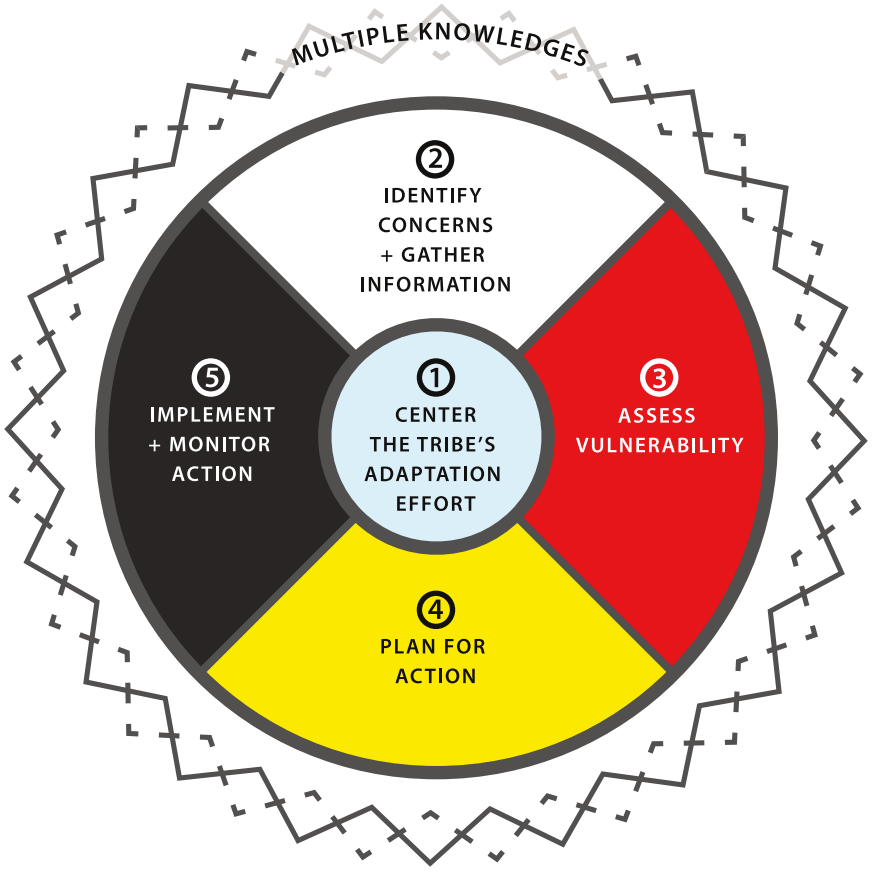

Figure 2 ***Tribal Climate Adaptation Guidebook*** **Framework.** A visual outline of the climate change adaptation planning framework presented in the *Tribal Climate Adaptation Guidebook*. While there are multiple variations of associating these colors with the cardinal directions in traditional medicine wheels, the color-direction pairing used in the *Guidebook's* graphic was inspired by the article "Holistic Resource Management Meets Native Culture" by Roylene Rides at the Door and Cliff Montagne published in the Autumn 1996 issue of *Winds of Change: American Indian Education and Opportunity* on pages 136–141.

The *Tribal Climate Adaptation Guidebook* can be used by tribes at various stages of adaptation planning, from those that have worked in this area for years to those that have not yet formulated or initiated a plan. It can help not only those who are well-resourced, but also in situations where a single tribal staff member may be tasked with outlining an adaptation plan. The *Guidebook* need not be followed in sequential order, nor in its entirety. Adaptation planning does not always happen in order and often follows available funding. The *Guidebook* is designed so that tribes can work through any applicable section and skip sections that are not applicable.

Throughout the *Guidebook*, the reader will encounter several features:

- ***Checklists***—suggested activities within each section;
- ***Checkpoints***—opportunities to sustain three ongoing themes throughout the *Guidebook*:
  - ***Traditional Knowledges***—considerations for including TKs throughout the adaptation planning process relying on the *Guidelines for Considering Traditional Knowledges (TKs) in Climate Change Initiatives*. References to specific guidelines and actions are denoted by number (*e.g.*, *CTKW Guideline 4*);
  - ***Community Engagement***—opportunities and strategies to engage the tribal community in the adaptation planning process;
  - ***Documentation***—opportunities to document the status of the adaptation planning process;
- ***Guiding Questions***—helpful questions to consider within each section;
- ***Case Studies***—tribal examples illustrating a particular activity (Table 1); and
- ***Resources***—external resources providing greater context or more specific guidance on a particular aspect of adaptation planning (a compilation of resources is found in Appendix A).

Table 1 Tribal Case Studies Highlighted in the *Tribal Climate Adaptation Guidebook*. The *Tribal Climate Adaptation Guidebook* highlights adaptation planning efforts from many tribes throughout the five step framework. Checkmarks indicate in which phase of the planning process each tribe is highlighted.

	Step 1	Step 2	Step 3	Step 4	Step 5
1854 Treaty Authority				X	
Alaska Native Tribal Health Consortium	X				
Blackfeet Nation				X	
Citizen Potawatomi Nation	X				
Coeur D'Alene Tribe	X				
Confederated Salish and Kootenai Tribes	X		X		
Fond du Lac Band of the Lake Superior Chippewa					X
Selawik				X	
Jamestown S'Klallam Tribe	X		X	X	X
Karuk Tribe	X				
Lac du Flambeau Tribe	X				
Makah Tribe	X			X	X
Marshall Island Indigenous Peoples					X
Menominee Indian Tribe	X				X
Native Village of Newtok	X				
Native Villages of St. Mary's & Pitka's Point		X			
Nez Perce Tribe	X			X	X
North Olympic Development Council				X	X
Puyallup Tribe		X		X	
Quinault Indian Nation	X				
Red Lake Band of the Lake Superior Chippewa Indians	X		X	X	
Saint Regis Mohawk Tribe		X	X	X	
Samish Indian Nation				X	
Shoshone-Bannock Tribes	X	X	X	X	
Stillaguamish Tribe	X				
Suquamish Tribe					X
Swinomish Indian Tribal Community	X		X	X	X
Tohono O'odham Nation	X		X	X	
Tulalip Tribes					X
Upper Snake River Tribes		X		X	
Yakama Nation		X		X	
Yurok Tribe	X	X		X	

[1] T. M. Bull Bennett et al., "Chapter 12: Indigenous Peoples, Lands, and Resources," in *Climate Change Impacts in the United States: The Third National Climate Assessment*, ed. Jerry M. Melillo et al. (Washington, DC: US Global Change Research Program, 2014), 297–317.

[2] Kathryn Norton-Smith et al., *Climate Change and Indigenous Peoples: A Synthesis of Current Impacts and Experiences* (Portland, OR: US Department of Agriculture, Forest Service, Pacific Northwest Research Station, 2016).

[3] Norton-Smith et al., *Climate Change and Indigenous Peoples.*

[4] Douglas J. Nakashima et al., *Weathering Uncertainty: Traditional Knowledge for Climate Change Assessment and Adaptation* (Paris and Darwin: UNESCO and United Nations University, 2012).

[5] Nakashima et al., *Weathering Uncertainty.*

[6] Norton-Smith et al., *Climate Change and Indigenous Peoples.*

[7] Norton-Smith et al., *Climate Change and Indigenous Peoples.*

[8] Norton-Smith et al., *Climate Change and Indigenous Peoples*; Nakashima et.al., *Weathering Uncertainty.*

[9] Norton-Smith et al., *Climate Change and Indigenous Peoples.*

[10] Norton-Smith et al., *Climate Change and Indigenous Peoples*, 13.

[11] Norton-Smith et al., *Climate Change and Indigenous Peoples.*

[12] Samantha Chisholm Hatfield et al., "Indian Time: Time, Seasonality, and Culture in Traditional Ecological Knowledge of Climate Change," *Ecological Processes* 7, no. 1 (2018): 25, https://doi.org/10.1186/s13717-018-0136-6.

[13] Climate and Traditional Knowledges Workgroup (CTKW), *Guidelines for Considering Traditional Knowledges (TKs) in Climate Change Initiatives* (Climate and Traditional Knowledges Workgroup, 2014).

[14] Kirsten Vinyeta and Kathy Lynn, *Exploring the Role of Traditional Ecological Knowledge in Climate Change Initiatives* (Portland, OR: US Department of Agriculture, Forest Service, Pacific Northwest Research Station, 2013), 2.

[15] CTKW, *Guidelines for Considering Traditional Knowledges.*

[16] The Kresge Foundation and Island Press, *Bounce Forward: Urban Resilience in the Era of Climate Change, A Strategy Paper from Island Press and The Kresge Foundation* (Washington, DC: Island Press, 2015); "Glossary," US Climate Resilience Toolkit, accessed October 2, 2017, https://toolkit.climate.gov/content/glossary.

[17] Nakashima et.al., *Weathering Uncertainty.*

[18] Nakashima et.al., *Weathering Uncertainty.*

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[21] Amy K. Snover et al., *Preparing for Climate Change: A Guidebook for Local, Regional, and State Governments* (Oakland, CA: ICLEI – Local Governments for Sustainability, 2007).

[22] Christopher W. Swanston et al., *Forest Adaptation Resources: Climate Change Tools and Approaches for Land Managers* (Newtown Square, PA: US Department of Agriculture, Forest Service, Northern Research Station, 2016).

[23] Patty Glick et al., *Scanning the Conservation Horizon: a Guide to Climate Change Vulnerability Assessment* (Washington, DC: National Wildlife Federation, 2011); Erika L. Rowland, et al., *Considering Multiple Futures: Scenario Planning To Address Uncertainty in Natural Resource Conservation*. (Washington, DC: US Fish and Wildlife Service, 2014).

[24] Snover et al., *Preparing for Climate Change*; California Emergency Management Agency and California Natural Resources Agency, *California Adaptation Planning Guide: Planning for Adaptive Communities* (Sacramento, CA: California Emergency Management Agency and California Natural Resource Agency, 2012).

[25] Rosa Gonzalez et al., *Community-Driven Climate Resilience Planning: A Framework, Version 2.0* (National Association of Climate Resilience Planners, 2017).

[26] Gonzalez et al., *Community-Driven Climate Resilience Planning.*

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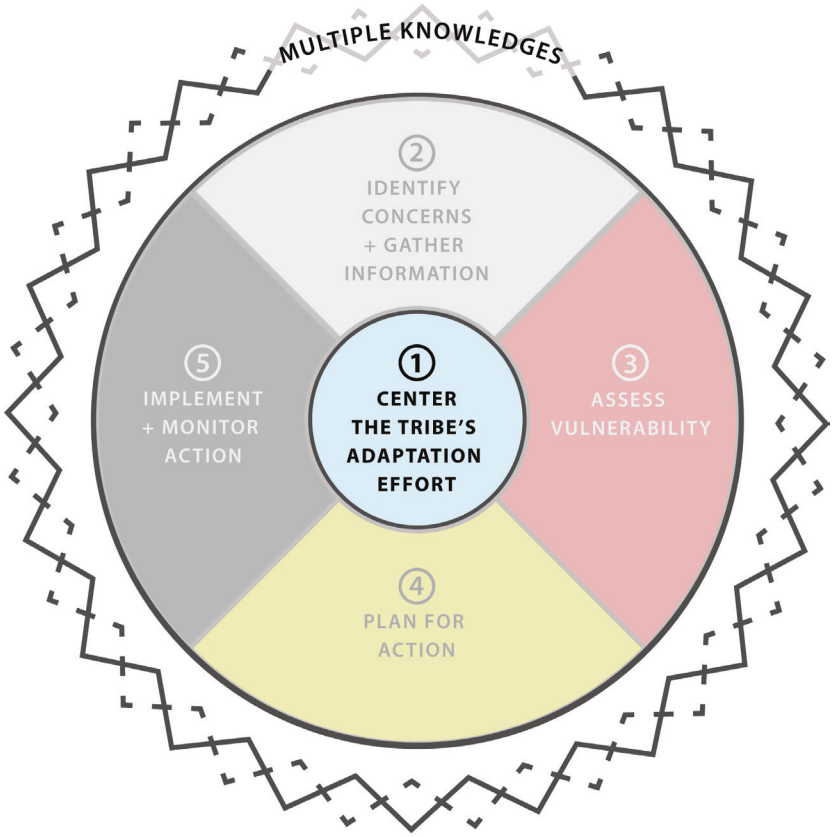

Step 1: Center the Tribe's Adaptation Effort

This step covers embedding the climate adaptation planning process within the tribe's community vision and goals. Sections within this step may be followed in any order applicable to the tribe.

- ❑ 1.1 Select Climate Change Planning Approach
- ❑ 1.2 Assemble the Climate Change Planning Team
- ❑ 1.3 Develop a Vision, Goals, and Objectives
- ❑ 1.4 Consider Opportunities & Risks of Incorporating Traditional Knowledges
- ❑ 1.5 Gain Tribal Leadership Support
- ❑ 1.6 Tribal Community Engagement
- ❑ 1.7 Pursue Funding
- ❑ 1.8 Engage External Partners

1.1 Select Climate Change Planning Approach

> *"Our lands and resources are the basis for our spiritual life. That's been our way since time began. By preparing for further environmental change, we can mitigate threats to our way of life."*—Joe Durglo, Chairman of the Confederated Salish and Kootenai Tribes, *Climate Change Strategic Plan for the Confederated Salish and Kootenai Tribes of the Flathead Reservation*

Because climate change affects nearly every aspect of the tribal community, there are many opportunities to begin building climate resilience rooted in the tribe's values and priorities.

✓ Checklist

- ❑ Select Climate Change Planning Approach

Select Climate Change Planning Approach

Many tribes choose to start adaptation planning because of notable changes in the natural environment and a desire to maintain tribal culture, community health, and ways of life for future generations. Each tribe is unique, having its own land base, population, history, culture, spirituality, language, government, societal organization, knowledge system, values, economies, traditions, and relationship with the natural environment. Likewise, the key vulnerabilities around changing climate conditions, and the adaptation planning process itself, will be unique to each tribe.

Climate change planning efforts vary from conducting distinct vulnerability analyses and adaptation plans to integrating climate change into existing planning efforts, such as:

- Emergency response planning;
- Drought, heat, and flood planning; and
- Natural resource management planning.[1]

For example, the Tohono O'odham Nation in its climate adaptation plan "chose to start the climate change adaptation planning process by focusing on three sectors that are likely to be affected by these changes in the near future – Water Resources, Human Health, and Emergency Management."[2] Common among many adaptation planning efforts are: an analysis of climate change impacts to and vulnerability of key concerns; and development of adaptation strategies to reduce that vulnerability.

Planning for climate change and building resilience is a process, not the outcome of a single project. Consider the potential approaches (Table 2) and choose the best fit for the tribe knowing that the tribe can continue to build on these efforts over time. Monitoring and evaluating the success of the approach and actions will allow the tribe to make the best use of additional resources and opportunities as they become available.

Table 2 Potential Approaches for Climate Change Planning. This table outlines approaches tribes can take to begin planning for climate change. Some advantages and disadvantages are given for each approach.

Approach	Advantages	Disadvantages	Example
Sector Focus *(e.g., water resource management, or transportation)*	• Ability to focus limited resources on a specific topic or topics. • Use of existing management framework	• Potential to miss co-benefits or negative impacts across sectors	*Tohono O'odham Nation Climate Change Adaptation Plan*—Focused planning efforts on three sectors: Water Resources, Human Health, and Emergency Management. *Mitigwaki idash Nibi: (Our Forests and Water) A Climate Adaptation Plan for the Red Lake Band of Chippewa Indians*—Focused planning efforts on water and forest resources.
Species/Habitat Focus *(e.g., salmon, cedar, the nearshore environment, or sagebrush steppe)*	• Targeted efforts around a single species • Use of existing management framework • Community support for protection of key resources • Some funding for implementation of adaptation actions	• Potential to miss co-benefits or negative impacts across sectors • Potential difficulty involving a broad set of the community	*Shoshone-Bannock Tribes Climate Change Assessment and Adaptation Plan*—Conducted a climate change vulnerability assessment for 34 plant and animal species. *Climate-Informed Reforestation on Menominee Indian Reservation*—Focus on responding to disease and enhancing the long-term health of the forest and associated resources. *Stillaguamish Tribe Natural Resources Climate Change Vulnerability Assessment*—Identified 57 individual species and 10 habitat types for a vulnerability assessment.
Community Group *(e.g., fishermen, subsistence gatherers, elders, or youth, etc.)*	• Focus on people and values • Enhanced commitment and support by groups	• May limit consideration of climate risks for other groups	*Makah Tribe Climate Adaptation Plan*—Climate change planning process utilized a community-based approach focusing on community and cultural priorities. *Yurok Tribe Climate Change Adaptation Plan for Water & Aquatic Resources*—Climate and health assessment focused on community groups that are at higher risk for impacts from changes to water resources. *Karuk Tribe Climate Vulnerability Assessment*—Focused on the Tribe's unique cultural relationship with fire.

Recent Extreme Climate-related Event *(e.g., major drought, flood, or heat wave, etc.)*	• Fresh memories can focus the community • Opportunity for rapid action to prepare for future events	• Process for addressing other issues unclear • Consideration of changing conditions need to be explicit to build resilience	*The Citizen Potawatomi Nation Climate Change Vulnerability Assessment*—An increasing number of climate-related events, such as severe flooding in 2007 and 2015, motivated the Tribe to assess and identify vulnerabilities relative to climate change with a focus on water.
Comprehensive *(e.g., consideration of multiple climate impacts affecting multiple sectors, habitats, or community groups)*	• Consideration of community climate risks • Opportunity to identify actions with multiple co-benefits • Potential to avoid selecting actions that have negative impacts on other sectors	• Large effort that requires substantial staff capacity, time, and leadership support • Significant time commitment to address multiple sectors and issues • Potential challenge for effectively communicating results across sectors to a variety of audiences	*Swinomish Climate Change Initiative Climate Adaptation Action Plan*—Included: coastal resources, upland resources, physical health, and community infrastructure and services. *Climate Change Strategic Plan Confederated Salish and Kootenai Tribes of the Flathead Reservation*—Included: forestry, land, fish, wildlife, water, air quality, infrastructure, people, and culture.
Funding Opportunities *(e.g., a grant program may provide resources to address particular aspects of climate change depending on grant requirements)*	• Direct funding can jump-start adaptation planning efforts • Funding can support staff time and make adaptation planning a priority	• There may be grant requirements that limit what can be included or addressed • Can be difficult to expand efforts beyond one-time funding	*Alaska Native Tribal Health Consortium Climate and Health Assessment Reports*—Tapped into a variety of different funding sources, including (but not limited to) the US Indian Health Service, the Environmental Protection Agency Indian General Assistance Program, and various Landscape Conservation Cooperatives. *Swinomish Climate Change Initiative Climate Adaptation Action Plan*—Large grant enabled a multi-pronged approach and spurred staff and community engagement.
Existing Planning Efforts *(e.g., fisheries management plan, rangeland management plan, hazard mitigation plan, integrated resource management plans, forestry management plans, emergency management plans, land use management plans, comprehensive plans, housing plans, transportation plans, water resource plans, drought management plans, wildfire response plans, and habitat conservation plans)*	• Updating and existing plan can be an easy place to begin incorporating climate change information and adaptation actions into existing programs. • Funding not limited to climate change and may fit within other non-climate change funding opportunities • Likely have existing staff and resources dedicated to updating and implementing plans	• May limit consideration of climate risks for other groups or sectors	*Lac du Flambeau Tribe Resilience Initiative*—Part of Tribe's resilience initiative focused on incorporating climate change into an updated hazard mitigation plan.

Community Engagement Checkpoint

Consider talking with other staff members, elders, and members of tribal leadership to identify and build support for the best place to begin the adaptation planning process.

Traditional Knowledges Checkpoint

At the beginning of the climate change adaptation planning process, consider whether or not the tribe plans to incorporate Traditional Knowledges (TKs) (see Section 1.4) and ensure "that all collaboration with TK holders occurs according to principles of Free, Prior, and Informed Consent," (*CTKW Guideline 7 Actions*).

Guiding Questions

- Does it make more sense for the tribe to start small—focusing on a specific sector, species, habitat, community group, or issue—or start more broadly?
- Has there been a recent extreme weather event that affected the tribal community, or are extreme events happening more frequently?
- What are the current funding opportunities available? Can they fund some or all of the work that the tribe wants to accomplish?
- Is there an existing planning process or management plan update that could be modified to include climate change? If the answer is yes, then ask the following questions. If the answers to the following questions are yes, then this is a great opportunity for ***mainstreaming***—an approach to adaptation planning that involves integrating climate adaptation into existing management functions and planning efforts.[3]
    - Does a member of the climate change planning team have a good relationship with the person leading the existing planning process or management plan update? Does that person have the resources (funding and/or staff) to help support the inclusion of climate change?
    - Is there flexibility in the scope of the project to include climate change?
    - Can the funds for the existing project accommodate additional work to incorporate climate change?
    - Are there any potential conflicts with incorporating climate change into the project? Can those conflicts be addressed?

Resources

The **Climate-Informed HCP website** offers resources and examples for how to incorporate climate change into existing habitat conservation planning.

The ***Disaster Resources*** page of the **Pacific Northwest Tribal Climate Change Project** *Online Tribal Climate Change Guide* includes information about disaster management and planning resources that may assist tribes in addressing climate-related disasters.

1.2 Assemble the Climate Change Planning Team

"Let us put our minds together and see what life we can make for our children."—Tatank Iyotanka (Sitting Bull), Hunkpapa Lakota

"Everything on the earth has a purpose, every disease an herb to cure it, and every person a mission. This is the Indian theory of existence."—Christal Quintasket (Mourning Dove), Salish

Building a diverse climate change planning team will ensure that all voices are heard in the planning process.

Checklist

- ❑ Brainstorm List of Potential Planning Team Members
- ❑ Select and Invite Planning Team Members
- ❑ Appoint a Leader

The climate change planning team will guide the tribe's adaptation efforts from start to finish and beyond. The team will help establish or refine visions, goals, and objectives (Section 1.3). The team will provide critical insights into assessing vulnerability and risk, selecting adaptation actions, and tracking and evaluating the success of those actions. The team will be important in reaching out to other members of the community and championing the tribe's climate resilience work. The planning team could consider pursuing diverse participation from as many sections of the tribal community as possible to ensure that all voices are heard in the planning process.

The size of the planning team depends on the scope of the planning process and should strike a balance between ensuring adequate representation—from different tribal departments, elders, and community members—and ensuring effective participation from all planning team members. Beyond the planning team, other community members can be involved as contributors, subject matter experts, and interested community members.

Tribal staff and other planning team members are often responsible for multiple duties and may have limited time to devote to climate change adaptation planning unless there is specific funding. While it may be advantageous for some tribes to secure funding for a dedicated staff person to lead climate change planning, this need not always be the case. Among 15 tribes in the Columbia River Basin, eight have a dedicated staff person to work on climate change planning, but most of these staff members are only able to spend less than half of their time on climate planning activities.[4] Consider building an effective climate change planning team and using their time efficiently.

Brainstorm List of Potential Planning Team Members

Considering the selected planning approach (Section 1.1), identify potential tribal staff and community members who may have integral roles and could serve on the climate change planning team. Also consider including external partners (Section 1.8).

Potential planning team members could include:[5]

- Tribal leadership (e.g., chief, elders, tribal council);
- Community board or association members (e.g., health board, regional board, corporation board);
- Tribal hunters, trappers, fishers, gatherers, farmers;
- Community health representatives (e.g., health center, AmeriCorps member, local health aide, social services, traditional medical practitioners);
- Emergency response and natural hazard managers;
- Community development and planning (e.g., environmental, economic, housing);
- Community services representatives (e.g., waste manager, water operator, transportation infrastructure, safety officers);
- Educational community (e.g., school officials, education department, youth council);

- Interested community members (e.g., elders, adults, youth);
- Tribal youth;
- Business owners;
- Natural resources managers (e.g., lands department, forestry, coastal);
- Culture and heritage preservation representatives;
- Neighboring tribes;
- Neighboring local jurisdictions (e.g., city, county);
- State and federal agency representatives of co-managed or utilized resources;
- Regional entities (e.g., air districts, landscape planning organizations); or
- Regional science organizations, universities, or non-governmental organizations.

Select and Invite Planning Team Members

After brainstorming a list of potential planning team members, select individuals and invite them to join the climate change planning team. Consider the following criteria:[6]

- Ability to participate;
- Knowledge of climate change and planning;
- Length of time in community;
- Depth of knowledge of the community;
- Job position and organizational affiliation;
- Involvement in planning/programs;
- Good local knowledge of specific sectors, resources, or programs;
- Connectedness to core tribal audiences (i.e., elders, youth); and
- Representative of a diverse cross-section of the community.

When inviting potential planning team members to participate, describe the types of activities they may be asked to participate in and how much time may be needed for their contribution to the team. Activities could include:

- Gathering information;
- Regular planning team meetings to identify and organize key areas of concern, assess vulnerability, and identify and evaluate potential adaptation actions;
- Community engagement (e.g., informal and planned events);
- Networking with external partners (e.g., neighboring jurisdictions, consultants);
- Monitoring or evaluating the success of selected actions; and
- Documenting the plan or process.

To keep the planning team members engaged and excited about participating in the adaptation planning process, consider the following strategies:

- Ask tribal council or leadership to officially form a climate change planning team and/or direct tribal department staff to participate;
- Provide food and a small gift at the first meeting;
- Provide a small stipend to each planning member following each meeting, if funding is available (thereby keeping funding in the community rather than hiring an external contractor); and
- Share details about your planning team members publicly so they get recognition for the time and energy they are dedicating to the process.

Appoint a Leader

Appoint one or two people to serve as team leader(s) of the climate change planning team who can build rapport and advocate for the process both internally and externally. Some potential criteria for selecting a team leader include:

- A local tribal community or staff member;
- Good understanding of the tribe's responsibilities and objectives;
- Ability to communicate well in both tribal and non-tribal contexts;
- A person with some level of authority who is well-respected by the community;

- Working relationship with tribal leadership and connections across tribal departments;
- Managerial and facilitation skills;
- Adequate time and resources to dedicate to the process; and
- Basic understanding of climate change and impacts (prospective leaders and planning team members can build this capacity by attending trainings, such as the Institute for Tribal Environmental Professionals Climate Adaptation Trainings or the Northwest Climate Adaptation Science Center Tribal Climate Camps).

Community Engagement Checkpoint

Consider providing an opportunity for interested tribal community members to participate on the planning team. There are a variety of ways to recruit participants, including:[8]

- Posting announcements in public areas;
- Soliciting applications;
- Creating a pamphlet about the adaptation planning process with details on how interested parties can get involved;
- Holding a community event (e.g., community bingo) and talking about the adaptation planning process; and
- Partnering with existing community groups to host events to discuss the adaptation planning process and recruit members.

Regardless of who ends up on the official planning team, be sure to invite all community members to community input events throughout the adaptation planning process.

Traditional Knowledges Checkpoint

Consider including one or more people from the tribe who can contribute knowledge about the tribe's protocols for accessing and sharing Traditional Knowledges (TKs) with the climate change planning team. Before discussing TKs, consider how best to "[d]evelop an internal protocol/processes that ensures that all participants in these projects are informed of risks, benefits, and anticipated outcomes" *(CTKW Guideline 7).* And be sure to "[t]rain tribal staff and Traditional Knowledges holders on protocols needed to govern sharing and protection of Traditional Knowledges" (*CTKW Guideline 5*).

Case Studies

Table 3 demonstrates the breadth of tribal departments and groups on the climate change planning teams for the Confederated Salish and Kootenai Tribes,[9] the Jamestown S'Klallam Tribe,[10] and the Tohono O'odham Nation.[11]

Table 3 Example Climate Change Planning Team Member Representations. This table lists the represented departments or groups participating on the climate change planning teams for the Confederated Salish and Kootenai Tribes, Jamestown S'Klallam Tribe, and the Tohono O'odham Nation.

Tribe	Climate Change Planning Team Representation	
Climate Change Strategic Plan for the Confederated Salish and Kootenai Tribes of the Flathead Reservation	Culture Committees Emergency Services Forestry Historic/Cultural Preservation Housing Authority Human Resource Development Lands Division Mission Valley Power	Natural Resources Safety Division Salish Kootenai College Social Services Tribal Council Tribal Health & Human Services Tribal Law & Order Tribal Services
Jamestown S'Klallam Tribe Climate Vulnerability Assessment and Adaptation Plan	Adaptation International Chief Financial Officer Chief Operations Officer Economic Development Authority Environmental Planning Family Support Services Fish and Game	Health Administrator Natural Resources Planning Tribal Elders Tribal Facilities Tribal GIS Specialist Washington Sea Grant
Tohono O'odham Nation Climate Change Adaptation Plan	Academic Partner Graduate Students Water Resources Director	

Resources

The **Alaska Native Tribal Health Consortium** environmental planning manual, *7 Generations: Addressing Village Environmental Issues for the Future Generations of Rural Alaska*, offers resources for recruiting environmental planning team members, including an application, a meeting announcement, and an agenda.

In the **University of Washington Climate Impacts Group** guidebook, ***Preparing for Climate Change***, Chapter 6 discusses when, why, and how to form a planning team (also called a *preparedness team*), characteristics to look for in a team leader and members, and typical work efforts and products.

1.3 Develop a Vision, Goals, and Objectives

"The Yakama Nation is strong, and our strength is growing. By continuing to blend our traditional knowledge with newer innovations, and by reshaping our long-established tribal community and natural resource programs, the Yakama Nation will continue to thrive amidst an ever-changing world."—Climate Adaptation Plan for the Territories of the Yakama Nation

"The Karuk Tribe values the interests and wellbeing of the Karuk People. The values associated with this wellbeing are primarily health, justice, economic security, education, housing, self-governance, as well as the management and utilization of cultural/natural resources within and adjacent to the Karuk Aboriginal Territory now and forever."—Karuk Tribe Eco-Cultural Resources Management Plan

Developing a vision, goals, and objectives for climate adaptation can ensure planning efforts remain centered on the tribe's values and goals for future generations.

Checklist

- ❑ Develop a Vision
- ❑ Make Initial Scoping Decisions
- ❑ Articulate Goals and Objectives

Develop a Vision

Developing a vision for the tribe's climate change adaptation planning initiatives can help ensure climate change planning efforts remain rooted in the tribe's overall vision and strategic goals for the future of its people. The two quotes above reflect the vision of the Yakama and the Karuk tribes for their adaptation planning efforts. According to the Alaska Native Tribal Health Consortium environmental planning manual, *7 Generations*, "a vision is a dream of what is possible. It is an overall picture of what the community wants to be and how it wants to look in the future."[12]

The tribe may already have a vision statement and/or strategic goals for environmental planning that can be adopted or adapted for the climate adaptation planning initiative vision. Review the tribe's overall vision and strategic plan to see how it relates to, or informs, climate change adaptation planning. There are a number of community exercises listed in this *Guidebook's Resources* that may help the community and planning team develop and articulate a vision for the tribe's climate change adaptation planning.

Guiding Questions

- What is the vision for the tribe's adaptation planning process? The vision can help answer the following questions:[13]
    - Where the tribe comes from and where it is going?
    - Where does the tribe want to be culturally, economically, and socially in the future?
    - What does the tribe feel needs to be protected?
    - What is important for great-great-great grandchildren?
    - What information does the tribe want to include from the tribe's heritage?
    - What information could be included about how the tribe's ancestors lived?
    - What traditions does the tribe currently maintain and want to carry forward?

Make Initial Scoping Decisions

Making initial decisions about the temporal, geographic, and governance scope of the process will provide context to help shape goals and objectives.

Planning timeframe: Define the timeframe for assessing and addressing impacts.

- Is the planning timeframe for a five-year plan, a 10-year plan, etc.?
- How long will the current effort within the planning process last?
- What time horizons are being planned for? The 2050s, 2080s, or seven generations from now?
- Are the actions taken today able to address issues 100 years from now, or should the focus be on actions with a shorter time frame?

Geographic areas: Define the physical area(s) to which the plan applies. This decision is closely linked to the plan's goals and objectives because the plan will need to focus on specific geographic areas in order to achieve the desired outcomes.

- What geographic areas will be considered in the current adaptation planning effort? For example, the effort could be focused on any of the following: the tribal reservation, off-reservation fee land, trust land, traditional homelands, Usual and Accustomed areas, open and unclaimed areas, treaty areas, a watershed, a segment of coastline, or land where treaty-protected resources may be affected.

Governance: Identify who has direct management or federal trust responsibilities over the land and natural resources within the chosen geographic focus area(s) and who could indirectly influence management within the chosen geographic focus area(s) (for example, federal/state agencies, regional planning organizations). This will help to identify entities that may need to be involved in the adaptation planning process. See also Section 1.8.

- Is the tribe focused on what it directly controls, or does the tribe want to identify actions that will require cooperation from external organizations or governing bodies? Note: It is possible for a plan to have a mix of both.

Articulate Goals and Objectives

Developing ***goals*** and ***objectives*** built off the tribe's vision for climate change adaptation planning will help guide and frame choices during all phases of planning, implementation, and measuring of success.

> ***goals***—general statements about desired long-term outcomes.
>
> ***objectives***—specific statements focused on how to achieve a specific goal.

Clearly articulated goals can ensure that the tribe's plan is well designed. Clearly articulated goals can also keep those involved focused on the motivations behind developing an adaptation plan. Objectives capture specific accomplishments or outputs that are important in achieving the goals. Goals spell out what the tribe wants to happen; objectives help the tribe reach those goals.

Brainstorm the ultimate goals for the tribe's climate change adaptation planning. Goals can be broad or specific. Potential goals include:

- Increasing public awareness of climate change and its projected impacts on the community;
- Engaging tribal members to develop and implement actions to enhance resilience;
- Increasing the tribe's technical capacity to prepare for climate change impacts;
- Increasing the resilience of the community's built, natural, and human systems;
- Strengthening community partnerships to reduce climate change vulnerability and risk;
- Mainstreaming information about climate change vulnerabilities, risks, and resilience into planning, policy, and investment decisions; and
- Creating the foundation for ***transformational adaptation*** of how the tribe operates and thrives in a climate-altered future. That is; taking actions that move beyond increment changes to existing systems and include consideration of system-wide changes or changes across more than one systems; focus on long-term change; and directly question of the effectiveness of existing systems, social injustices and power imbalances.[14]

Documentation Checkpoint

Consider drafting an outline of the adaptation plan based on the tribe's selected planning approach (Section 1.1) and articulated goals and objectives (Section 1.3). This outline will likely evolve throughout the planning process. However, having an outline can help organize what information needs to be gathered. Having an outline can also keep the adaptation process on track, working to address the needs expressed by the tribe. See the *Tribal Climate Change Adaptation Plan Template* from the Institute for Tribal Environmental Professionals *Climate Change Resources Adaptation Planning Tool Kit.*

Even without an outline, it is important to capture and document the vision, goals, and objectives of the adaptation planning process. These descriptions can be used when adding new members to the planning team, when discussing adaptation planning, and when filling in grant reports. For example, the Lac du Flambeau Tribe created a summary sheet describing the vision and goals of the Tribe's *Resilience Initiative*.

Community Engagement Checkpoint

Consider involving the tribal community in developing a vision for the climate change adaptation planning effort. There are several ways to get the community's input, including holding a community meeting or engaging in informal conversations. Invite all community members—youth, adults, and elders—to participate in the visioning process. See *Resources* for examples of community participatory visioning exercises.

Case Studies

Quinault Indian Nation

The Quinault Indian Nation Quinault Climate Change Program states on its website that the Tribe's long-term goal is "a healthy, resilient environment and a community of Elders, families and children with the capacity to adapt to climate change with flexible management options, economic opportunities and Quinault cultural continuity."[15]

Nez Perce Tribe

The Nez Perce Tribe developed a series of adaptation goals along with objectives to address risks identified in a risk matrix assessment of forest, water, and economic resources in the Clearwater River Basin. Below is one example from the *Clearwater River Subbasin (ID) Climate Change Adaptation Plan*:

"Goal 1: Create partnerships to research local effects of climate change on water resources, forestry, and the economy.

> Objective: Bring together appropriate parties, including Universities, federal and state agencies, nonprofit organizations, and other relevant parties conducting climate change research in the sub-basin."[16]

Red Lake Band of Chippewa Indians

This goal and associated objectives from *Mitigwaki idash Nibi: (Our Forests and Water), A Climate Adaptation Plan for the Red Lake Band of Chippewa Indians* provides an example of how specific objectives can serve to make goals more concrete:

"Goal 5: Facilitate meaningful stakeholder engagement with tribal membership, neighboring communities, and other tribes.

- Objective 5-1: Ensure the Red Lake tribe's climate resilience through public education actions such as volunteer activities, tree plantings, public events, etc. in order to increase tribal membership buy-in
- Objective 5-2: Designate climate coordinator to track feedback and implement community meetings both on and off the reservation
- Objective 5-3: Engage local K-12 schools and the tribal college with climate awareness
- Objective 5-4: Engage downstream communities as partners in climate resilience."[17]

Lac du Flambeau Tribe

The Lac du Flambeau Tribe completed an extensive community and staff engagement process to develop the vision and goals of the Tribe's *Waswagoning Gaagige Bimaadiziwin Gaawin Geqaabi Naniizanasinoon,* or Lac du Flambeau Resilience Initiative.

[Vision:] "Through a coordinated effort we will identify actions that reduce risks to protect *minobimadiziiwin* (culture and way of life) and the economy of the *Waswagoning* (Lac du Flambeau) community for the next seven generations."

[Goal 1:] "Ensure that our action plan reflects the voice and vision of the community by following our Ojibwe traditional knowledge that has been passed down through our customs and traditions."

[Goal 2:] "Guide our community in preserving and protecting Grandmother Earth and our way of life, for today and the next seven generations."

[Goal 3:] "Increase the capacity of tribal program managers to incorporate environmental impact concepts into the everyday management of their departments."[18]

Selawik, Alaska

Principles for integrating climate change planning into local decision-making are outlined in *Appendix C General Climate Change Adaptation Guidelines* in the report *Climate Change in Selawik, Alaska: Strategies for Community Health*.[19]

Resources

The **Alaska Native Tribal Health Consortium** environmental planning manual, *7 Generations: Addressing Village Environmental Issues for the Future Generations of Rural Alaska*, contains an in-depth discussion on developing a vision in its Step 2.

In the **University of Washington Climate Impacts Group** guidebook, ***Preparing for Climate Change***, Section 10.1 discusses in depth establishing a vision and guiding principles for a climate-resilient community.

The **World Wildlife Fund South Pacific Programme** ***Climate Witness Community Toolkit*** is a collection of participatory community exercises for climate change and adaptation planning. The *Community Values*, *Priority Values*, and *Two-Way Vision* exercises, or adaptations of them, may be useful in helping the community articulate a vision and goals for climate adaptation planning.

The **Institute for Tribal Environmental Professionals** has a *Tribal Climate Change Adaptation Plan Template* in their online *Climate Change Resources Adaptation Planning Tool Kit.*

1.4 Consider Opportunities & Risks of Incorporating Traditional Knowledges

> *"Making TKs [Traditional Knowledges] a vital part of [climate] initiatives is critical to many indigenous peoples, as TKs is the basis for many indigenous peoples' adaptive governance capacity."—Guidelines for Considering Traditional Knowledges (TKs) in Climate Change Initiatives*

> *"Restoration of historic structures and functions of cultural-use plants, foods, habitat, and animals will remain a priority. Additionally, a continued understanding of cultural place names will continue to be significant. Therefore, the Tribes will have continued Tribal Elder involvement in resource planning, because the importance of oral histories that convey the voice of ancestors is valued."—Climate Change Strategic Plan for the Confederated Salish and Kootenai Tribes of the Flathead Reservation*

Incorporating Traditional Knowledges (TKs) in climate change adaptation planning is not without risk, but can provide a significant amount of value.

✓ Checklist

- ❑ Internal Conversation about Including and Protecting Traditional Knowledges
- ❑ Communicate Expectations around Traditional Knowledges with External Partners

Internal Conversation about Including and Protecting Traditional Knowledges

Consider having an internal conversation about TKs, deciding if and how TKs will be included in the tribe's climate change adaptation planning. As the Climate and Traditional Knowledges Workgroup (CTKW) pointed out in the group's *Guidelines for Considering Traditional Knowledges (TKs) in Climate Change Initiatives*, "[TKs] have guided [I]ndigenous interactions with the landscape for millennia" and incorporating them into adaptation planning efforts can help strengthen the assessment of vulnerability and guide the development of culturally appropriate and effective adaptation strategies.[20] The climate change planning team—in consultation with and with approval from tribal leadership, the tribe's TK holders, and relevant tribal departments, organizations, staff, and community members—may wish to explicitly and carefully evaluate the opportunities and risks of utilizing TKs in the planning process. At the beginning of the climate adaptation planning process, each tribe must decide how and whether or not to incorporate TKs in the planning process. Each tribe must decide how and with whom TKs will be shared, how TKs are to be defined, and how best to weigh the opportunities and risks associated with sharing TKs (Table 4).[21] Consider using the above-mentioned *Guidelines* when deciding whether or not and how to incorporate and/or share TKs throughout the tribe's climate adaptation planning efforts.

Guidelines for Considering Traditional Knowledges (TKs) in Climate Change Initiatives

"There are few protections for indigenous peoples who share TKs with federal partners to ensure that TKs will remain the right and property of indigenous peoples or knowledge holders."—Guidelines for Considering Traditional Knowledges (TKs) in Climate Change Initiatives

In response to the growing interest in and recognition of the importance of TKs for understanding, adapting to, and mitigating the impacts of climate change, the Climate and Traditional Knowledges Workgroup (CTKW), consisting of Indigenous scholars and other experts working with issues of TKs, created a set of guidelines for sharing TKs. The *Guidelines for Considering Traditional Knowledges (TKs) in Climate Change Initiatives* is a set of guiding principles and suggested actions for both tribes and external partners in order to minimize the risks involved with sharing TKs with non-tribal partners. Recognizing that knowledge sharing in this context is an ethical issue, the CTKW's *Guidelines* "seek to raise awareness of potential risks to Indigenous peoples and potential options for best practices."

Guideline 1: Understand key concepts and definitions related to TKs.

Guideline 2: Recognize that [I]ndigenous peoples and holders of TKs have a right NOT to participate in federal interactions around TKs.

Guideline 3: Understand and communicate the risks for [I]ndigenous peoples and holders of TKs.

Guideline 4: Establish an institutional interface between [I]ndigenous peoples, TK holders, and government for clear, transparent and culturally appropriate terms-of-reference, particularly through the development of formal research agreements.

Guideline 5: Provide training for federal agency staff working with [I]digenous peoples on initiatives involving TKs.

Guideline 6: Provide specific direction to all agency staff, researchers, and non-[I]ndigenous entities to ensure that protections for TKs requested by tribes and knowledge holders are upheld.

Guideline 7: Recognize the role of multiple knowledge systems.

Guideline 8: Develop guidelines for review of grant proposals that recognize the value of TKs, while ensuring protections for TKs, [I]ndigenous peoples, and holders of TKs.

Table 4 Opportunities, Risks, and Ways to Reduce Risk of Incorporating Traditional Knowledges in Climate Change Initiatives. This table lists example potential opportunities, risks, and ways to reduce risk when incorporating Traditional Knowledges. The table is not exhaustive.

Opportunities	Risks	Ways to Reduce Risk
• Grounding risk assessment and analysis in TKs • Defining earlier environmental baselines • Ensuring that adaptation planning results and actions are consistent with and support TKs • Identifying and protecting culturally appropriate values • Identifying sensitive areas or resources (e.g., plants, gathering areas, burial grounds) • Understanding variability of ecological processes • Identifying impacts to be mitigated • Providing observational evidence for modeling projections • Identifying strategies for adapting	• Misappropriation and misuse of TKs • Lack of clarity between individuals, departments, and partners on what constitutes TKs • Exploitation of communities and/or resources • Identification or exposure of sensitive areas/resources (e.g., plants, gathering areas, burial grounds) • May create additional administrative burden (to exempt sensitive information) particularly in federal funding opportunities that generally require all data produced with grant money be publicly available.	• Management protocols for sharing TKs • Ensure that agencies or other partners have conformed to the protocols of the tribe for ethical research, such as review by a tribal council, tribal institutional review board, or cultural committee, among other possible relevant institutions that vary from community to community (*CTKW Guideline 2*). • Train tribal staff and TK holders on protocols needed to govern the sharing and protection of TKs (*CTKW Guideline 5*). • Address legal statutes and guidelines from tribal leadership and tribal attorneys so employees and members are aware of legal guidelines for these areas. • Detail how data will be collected and stored and specify rules for access, ownership and control, if any will exist *CTKW Guideline 6*).

Communicate Expectations around Traditional Knowledges with External Partners

Consider having a conversation with external partners to communicate how the tribe defines TKs for the current effort and to establish and communicate protocols for working with and around the tribe's TK processes. When entering into agreements with external partners, ensure that all Indigenous peoples have a fundamental right of "Free, Prior, and Informed Consent":

- ***Free***—procedural fairness in negotiations;
- ***Prior***—Indigenous peoples should be involved from the beginning and consent should be obtained before TKs are accessed;
- ***Informed***—understanding of the costs, benefits, risks, and opportunities; and
- ***Consent***—processes for obtaining consent should affirm the right of Indigenous peoples to decline to share TKs, and saying "no" should have no legal implications for respecting Indigenous rights and interests and fulfilling trust and/or legal obligations.[22]

In addition, from the beginning of the adaptation planning process any sharing of TKs should be guided by the philosophy of "Cause No Harm," which aims to:

- Define the roles and responsibilities of all partners clearly and carefully;
- Define what information will be shared;
- Establish use, ownership, and means to interpret or share information; and
- Harbor respect, trust, equity, and empowerment.[23]

If the tribe chooses to share information about TKs with non-tribal partners, the tribe has some responsibilities to help ensure a positive outcome, including:

- Clearly articulating the conceptions of the tribe's knowledge system and communicating the expectation that the peoples' TKs will be respected and held as valid (*CTKW Guideline 1*);
- Training tribal staff and TK holders on protocols needed to govern the sharing and protection of TKs when working with non-tribal partners *(CTKW Guideline 5);*
- Making available personnel or resources to aid external partners in educating themselves regarding the tribe's approach toward working with non-tribal partners on projects involving TKs (e.g., What are common pitfalls? How can these be avoided? What subjects should be avoided? What is the community's protocol for accessing and asking about knowledge?) (*CTKW Guideline 1*); and
- Ensuring that non-tribal partners conform to protocols for ethical research (e.g., tribal council review, tribal institutional review board, cultural committee) (*CTKW Guideline 2*). Consider developing a TK-specific contract or contract clause with any outside collaborators.

By choosing not to share TKs with federal agency partners or other non-tribal partners, the tribe is responsible for explicitly communicating that choice and the right not to disclose information about the tribe's knowledge systems (*CTKW Guideline 2*).

Community Engagement Checkpoint

Ensure that all tribal members and tribal staff involved in the climate change adaptation planning process—either as planning team members, as participants in community engagement events, or TK holders—are informed about the tribe's definition of TKs, internal protocols, risks, benefits, and outcomes around sharing TKs (*CTKW Guideline 7 Actions*).

Consider ensuring "that all collaboration with Traditional Knowledge holders occurs according to principles of Free, Prior, and Informed Consent" (*CTKW Guideline 7 Actions*). An action under *CTKW Guideline 4* states: "collaborate with project partners to develop predetermined methods for each step of bringing TK into climate change initiatives."

Also consider the importance of understanding and communicating potential risks for TK holders who may be involved (*CTKW Guideline 3*). It may be helpful to consult a tribal attorney to help identify risks to both natural and cultural resources as well as intellectual property. The tribe may determine some risks are and are not acceptable and decide whether and how to share TKs (*CTKW Guideline 3 Actions*).

Guiding Questions

- What are the tribe's conceptions about its knowledge system? How does the tribe define TKs with respect to climate adaptation planning?
- What are the tribe's internal protocols, especially legal, that the climate change planning team and knowledge holders should know with respect to sharing, storing, seeking, and using TKs? How will the tribe communicate these protocols?
- What are the risks of incorporating TKs that are unique to the tribe? What strategies will be implemented to reduce the risks? Note: It can be useful to consult a tribal attorney.
- What methods will be used for incorporating TKs into each step of the adaptation planning process?
- Whose approval needs to be obtained (e.g., tribal leadership, knowledge holders)?

When developing methods for including TKs in the climate change adaptation planning process, consider the following questions from *CTKW Guideline 4*:[24]

- What are the appropriate goals and objectives related to inclusion of TKs?
- How will TK holders be involved as equal partners?
- How will TKs be identified? Will federal staff request information as part of a federal grant? Will TK holders offer up information that they feel is relevant?
- How will TKs be shared within the planning team? Who will have access to this information?
- How will TKs be documented and/or stored for safekeeping? What confidentiality measures will be employed and enforced? Who will oversee these measures? Who will have access? Who will be responsible in the event that these measures fail? (See *Resources* at the end of this section in this *Guidebook* for an example data sharing agreement.)
- What obligations within the tribal community will accompany the TKs that are involved, if any?
- Who will oversee the TKs guidance and continuance of knowledges?
- Who will enforce these standards? By what means will TKs holders redress potential grievances? What are the penalties for the measures failing?

Coeur D'Alene Tribe

The Coeur D'Alene Tribe and University of Idaho worked together to develop a data sharing protocol and agreement that represents an essential pathway for ethical, collaborative research, that helps protect the intellectual property and Traditional Knowledges of participating parties and researchers. These documents were created as part of the SQIGWTS project that sought to convey the meaning and significance of the Tribe's Schitsu'umsh (Coeur d'Alene) Indigenous knowledge and practice. The two key features of the information and data sharing agreements are:

- *Protocol and Best Practice for the Research on and Public Distribution of Information from Projects involving Indigenous Peoples*; and
- *Terms & Conditions—Intellectual Property and Traditional Knowledge*.

Yurok Tribe

The Yurok Tribe Environmental Program conducted the *Utilizing Yurok Traditional Ecological Knowledge to Inform Climate Change Priorities* project in 2012 to "inform tribal planning related to climate change impacts to culturally significant wildlife and habitats that support these species" and to "identify priority areas for tribal research, resource management, and adaptation planning."[25] The project consisted of three phases: scoping and protecting intellectual property; primary data collection (elder interviews); and Traditional Ecological Knowledge (TEK) analysis. Throughout the project starting from the proposal to final documentation, several measures were implemented to protect intellectual property and culturally sensitive information.

The project included a disclaimer on data sharing that stated "all TEK collected data is considered to be the sole property of the Yurok Tribe" and "TEK data will not be provided to the NPLCC [North Pacific Landscape Conservation Cooperative] or any outside entity as grant products or deliverables."[26]

During the scoping phase, concerns, including the need to clearly protect TEK information, were identified. Over the course of several months, the project team worked with the tribal attorney office to develop contracts, informed consent/use agreements, and questions to be used in structured interviews. Before scheduling interviews, the project team completed a *Full Informed Consent* process, which included sending each participant the list of questions, a contract, and informed consent/use agreement. Example contracts and agreements are available as appendices to the report.

Alaska Native Tribal Health Consortium

The Alaska Native Tribal Health Consortium (ANTHC) partnered with Alaska Native communities across the state to conduct TK-informed climate and health assessments. Throughout these assessments, ANTHC received permission for the use of all content in the final reports, all reports were reviewed by Tribal council coauthors, and ANTHC secured written approval from all partners prior to distribution. Everyone entered into the process knowing that the information would be publically available. Traditional Knowledges were protected by ensuring that no information was included that was not pre-approved by authors, contributors, and partners.[27]

1.5 Gain Tribal Leadership Support

"Our people have long lived by an idea that we know best how to govern ourselves. We pursue every opportunity to take back control of our lands, our government, and our resources. This [climate change strategic plan] is another example of our pursuit for a better homeland for future generations."—Joe Durglo, Chairman, Council Confederated Salish and Kootenai Tribes, *Climate Change Strategic Plan for the Confederated Salish and Kootenai Tribes of the Flathead Reservation*

"If adaptation is to be our future, we at Swinomish have already proved ourselves equal to the challenge. In the spirit and knowledge of our long history, I urge those within our community to embrace this challenge, and to meet it with every confidence of success. That is the true essence of Swinomish."—M. Brian Cladoosby, Chairman, Swinomish Indian Senate, *Swinomish Climate Change Initiative Climate Adaptation Action Plan*

Support from tribal leadership is critical to the success of the tribe's climate change adaptation planning efforts.

✓ *Checklist*

- ❑ Engage in Formal and Informal Outreach to Tribal Leadership

Engage in Formal and Informal Outreach to Tribal Leadership

Tribal leadership, such as tribal council, can provide advice on how to scope or focus planning efforts, allocate additional resources, and direct tribal staff to actively participate in the adaptation planning process. In addition, tribal council can pass resolutions on climate change to demonstrate that the tribe supports and recognizes the importance of taking action on climate change. Resolutions can also elevate the relative priority for adaptation planning within the tribe and across the community. Some tribes choose to begin the adaptation planning process by reaching out to tribal leadership both informally and formally. Others have tribal staff work directly on portions of the adaptation planning process and then present those initial findings to tribal leadership later in the process.

Informal outreach to tribal leadership could include:

- Inviting tribal council members to community outreach meetings; or
- Engaging in initial conversations with department managers, tribal council members, elders, and other tribal leadership to lay the foundation for the climate change adaptation planning effort.

Formal outreach to tribal leadership could include:

- Developing and proposing a draft climate change resolution to tribal leadership that affirms the need to address climate change and potentially directs staff to work on climate adaptation (See *Resources* & *Case Studies* for a template and examples);
- Drafting and requesting approval for a letter of support from tribal leadership to include in grant applications;
- Formally presenting to tribal council and/or tribal leadership on climate change and the need for adaptation planning; or
- Commenting at public and community meetings.

Traditional Knowledges Checkpoint

Seek involvement and approval, if appropriate, from tribal leadership in the decision to incorporate Traditional Knowledges (TKs) in the tribe's climate change adaptation planning process to "ensure that all collaborations with TK holders occurs according to principles of Free, Prior, and Informed Consent" (*CTKW Guideline 7*). In addition, tribal leadership can direct personnel or resources to aid in training both tribal staff and external partners about the tribe's knowledge system and protocols (*CTKW Guideline 1*).

Guiding Questions

- Why is climate change a concern for the tribe? Consider creating a high level summary of potential change, observations or concerns from tribal members and staff, alterations to traditional landscape or cultural resources, or reference to a key extreme weather event that is motivating the tribe to plan for climate change. (See *Resources*.)
- What requests are there for tribal leadership?
    - What are the overall goals of the adaptation planning effort? (Section 1.3)
    - What existing tribal efforts or programs are relevant to climate change adaptation and can be used as a foundation for action?
    - What other key features or actions will be included in the planning process?
- Would a resolution or letter of support help codify or enhance the importance of climate change planning?

Case Studies

Confederated Salish & Kootenai Tribes

The Confederated Salish and Kootenai Tribes of the Flathead Reservation in Montana formalized a resolution to develop a *Climate Change Strategic Plan*. The resolution includes clauses declaring the tribes' intent and commitment to address the effects of climate change.[28]

Swinomish Indian Tribal Community

A *Proclamation of The Swinomish Indian Senate on A Swinomish Climate Change Initiative*, in included in Appendix 1 of the *Swinomish Climate Change Initiative Impact Assessment Technical Report*.[29]

Native Village of Newtok

The Community of Newtok issued *Relocation Report: Newtok to Mertarvik,* which discusses plans to move the village. The report includes a resolution (Appendix 8) of the Native Village of Newtok's Traditional Council adopting a set of guiding principles for the relocation to and development of Mertarvik, the new village site.[30]

Lac du Flambeau Tribe

The Lac du Flambeau Tribe chose to solidify the findings of the first phase of the Tribe's climate change resilience initiative by having the Tribal Council pass a resolution listing out the key concerns that will be included in the first phase of the Tribe's climate change vulnerability assessment and adaptation planning process.[31]

Resources

The **Institute for Tribal Environmental Professionals** *Climate Change Resources Adaptation Planning Tool Kit* offers guidance and a "Tribal Resolution for a Climate Change Adaptation Initiative" template.

Climate change resolutions often include a general description of climate change impacts the tribe is likely to experience. Consider including information from recent assessments and syntheses focused on climate impacts to Indigenous peoples.

- *Climate Change and Indigenous Peoples: A Synthesis of Current Impacts and Experiences*[32]
- *The Third National Climate Assessment*[33]
- *The Fourth National Climate Assessment Volume 1: Climate Science Special Report*[34]
- See Section 2.4 in this *Guidebook* for other resources

1.6 Tribal Community Engagement

> *"[I]ndigenous peoples have long maintained...that their homelands are being transformed irreversibly by climate change...and that they have unique contributions to make toward climate decision-making due to their extensive experiential knowledge."—Douglas J. Nakashima, et al., Weathering Uncertainty: Traditional Knowledge for Climate Change Assessment and Adaptation.*

Community engagement should be tailored to the community, specific to the audience, and occur early and often throughout the duration of the planning process.

✓ Checklist

- ❑ Identify Community Engagement Opportunities
- ❑ Identify Community Engagement Methods

Community engagement is the facilitation of purposeful reflection and discussion among tribal community members about topics of common concern and decision-making.[35] Community-driven climate change adaptation planning focuses on incorporating community members throughout the adaptation planning process to enhance the place-based connection by focusing on key issues, assets, and resources that are important to the community and to help ensure the ultimate effectiveness of the actions developed through the plan.[36] Community engagement often has two goals: 1) educating or sharing information about climate change with the community; and 2) requesting input from the community about how the adaptation planning process and its outcomes can best be used or meet the needs of the community.

Engaging the tribal community by sharing information early and often can motivate community members to participate and offer input. This can help build support for climate change adaptation planning and implementation. Successful engagement will identify and acknowledge the community's concerns, gain community support, and ensure the ultimate effectiveness of adaptation actions developed throughout the adaptation planning process.

Identify Community Engagement Opportunities

Identify opportunities to engage the community throughout the climate change adaptation planning process. Throughout this *Guidebook*, *Community Engagement Checkpoints* highlight opportunities and considerations for engaging the community at various stages of the adaptation planning process.

In Step 1 *Center the Tribe's Adaptation Effort*, consider opportunities to: share information and seek input to select an initial climate change planning approach (Section 1.1); invite community members to be involved in the climate change planning team (Section 1.2); seek input on the community's vision and goals for climate change adaptation planning (Section 1.3); ensure a shared understanding of protocols and protections around Traditional Knowledges (Section 1.4); and build in funding for community engagement activities (Section 1.7).

In Step 2 *Identify Concerns and Gather Information*, consider opportunities to: seek input from community members to identify needs and concerns (Section 2.2); and determine how those concerns may be influenced by climate change and gather information on observed changes (Section 2.3). In Step 4 *Plan for Action*, consider opportunities to seek input from the tribal community on potential adaptation actions (Section 4.2). In Step 5 *Implement and Monitor Actions*, consider opportunities to share progress on implementing adaptation actions with the tribal community (Section 5.2). See Appendix B for locations of all *Community Engagement Checkpoints*.

The *Guiding Questions* identify additional opportunities where it would be beneficial for the climate change planning team to engage the tribal community for the purpose of sharing information or requesting input.

Identify Community Engagement Methods

Identify multiple methods of engagement that work best with the tribal community. Methods for community engagement may vary depending on the audience and whether the purpose is to share or request information. Different segments of the community may prefer to receive information in different ways or by different people. Methods that may be successful in engaging tribal youth may not be appropriate for engaging tribal elders. Some examples include:

- **Sharing information in the tribal newsletter, on the tribe's website, or on the radio** (e.g., stories from elders or other members of the climate change planning team, introduction to the adaptation planning process, a series on the impacts of climate change, announcements for community focused events);
- **Posting flyers in high traffic areas** (e.g., community gym, health centers, elder center, grocery store, gas station);
- **Tribal social media platforms** (e.g., the tribe's Facebook page);
- **Hosting a community town hall meeting** (e.g., providing space for the community to come together, discuss the tribe's adaptation planning process, provide input, and learn about climate resilience, preferably hosted by members of the climate change planning team and including food or snacks);
- **Distributing surveys** (e.g., electronic and paper copies to the community to identify key concerns);
- **Visiting elders and listening the environmental changes they have observed** (e.g., informal discussions);
- **Youth engagement** (e.g., working with local schools, teachers, and students to engage tribal youth in the visioning and planning process);
- **Silent voting** (e.g., when requesting individual information in a group setting, community members may be more likely to share information if it is not shared out loud. This way, honest answers can be shared without fear of by family or friends.); or
- **One-on-one meetings with department leads** (e.g., informal discussions).

If possible, allocate funding to support engagement activities that are tailored to specific audiences. The funding can be used to provide food and beverages at community meetings, print flyers and other handouts, pay tribal staff to conduct interviews or write articles, and offer childcare during the meetings.

Try to communicate about climate change adaptation planning in ways that best resonate with the tribe and other stakeholders. Each tribe has a unique cultural context and language, which can be used to empower the tribal community to deal with the problems posed by climate change.[37] Look to build engagement opportunities around and connect with existing tribal priorities that will be affected by climate change. This can enhance community and tribal leadership support for adaptation planning as it builds off the existing concerns and issues that are important to the tribe. Also, consider providing information and receiving feedback in the tribe's Native language if appropriate.

The Saint Regis Mohawk Tribe, located in New York state, structured the *Climate Change Adaptation Plan for Akwesasne* around the Tribe's traditional Mohawk Thanksgiving Address. The plan acknowledges each element of Creation detailing climate change considerations and outlining adaptation steps.[38]

The Confederated Tribes of the Umatilla Indian Reservation focused the Climate Change Vulnerability Assessment on "first foods" and looked specifically at how climate change will affect foods that play a critical role in the Tribe's community and their culture.[39]

The Oglala Lakota Nation, located in South Dakota, translated the concept of "sustainability" to "Oyate Omniciye," which means "Circle meetings of the People" in the Nation's Native Lakota language. The Nation also chose to write the *Official Regional Sustainable Development Plan of the Oglala Sioux Tribe* first in Lakota and then translate it into English.[40]

Traditional Knowledges Checkpoint

Frequent community engagement can encourage, maintain, and facilitate the incorporation of Traditional Knowledges (TKs). Consider developing "an internal protocol/processes that ensures that all participants in these projects are informed of risks, benefits, and anticipated outcomes" (*CTKW Guideline 7*) and training "tribal staff and TKs holders on protocols needed to govern sharing and protection of TKs" (*CTKW Guideline 5*).

Guiding Questions

- Who are the key groups that need to be involved for the planning effort to be successful? (See Section 1.2)
- What information is needed from these groups?
- What are the best approaches for engaging with these groups?
- How much funding can be set aside for effective community engagement?[41]
- What stories about climate change threats and opportunities will resonate best with the target groups for outreach and engagement? Are there specific resources or ongoing initiatives that are tribal priorities and will resonate with certain segments of the community and can be used to enhance engagement? (See Section 4.5 for more information about sharing stories.)

Case Studies

Makah Tribe

The Makah Tribe developed a community engagement process to inform and create the foundation for the Tribe's full climate change adaptation planning process. The Tribe used a mixed set of methods, including developing and sharing a community survey and hosting a community dinner to share information and gather input on key community concerns.[42]

Lac du Flambeau Tribe

The Lac du Flambeau Tribe committed to an extensive community engagement process at the beginning of the Tribe's adaptation planning efforts, which was called the Tribe's *Resilience Initiative*. This engagement included electronic and paper surveys, presentations at a large annual community gathering, TK interviews with elders, and talking circles with youth.[43]

Resources

*T*he **Movement Strategy Center** ***Community-Driven Resilience Planning: A Framework*** offers a framework for community engagement and empowerment.

Climate Access is a non-profit organization building support for climate solutions through a learning network, piloting innovative engagement projects, and providing strategic consulting services. The non-profit offers a wide variety of engagement resources.

Rooted in Resilience's ***Community Resilience Toolkit*** is a collection of online tools for facilitating community resilience workshops around understanding local climate impacts and solutions.

The ***Community Resilience Building Workshop Guide*** outlines steps and tasks to host and facilitate a community workshop from preparing for the workshops, exploring hazards, and identifying vulnerabilities and strengths to identifying and prioritizing actions.

The ***Climate Education*** page of the **Pacific Northwest Tribal Climate Change Project** *Online Tribal Climate Change Guide* includes climate, environmental, and scientific educational resources, including links to videos and educational talks relevant to tribal climate change issues intended to broaden understandings of climate change and climate impacts.

1.7 Pursue Funding

Cast a wide net when applying for funding to support climate change adaptation activities.

Checklist

- ❑ Research Funding Opportunities
- ❑ Write and Submit Grant Proposals

Research Funding Opportunities

Research and create a list of relevant funding opportunities that the tribe can apply for. Tribes have used a variety of funding sources to support climate adaptation planning (Table 5).

Table 5 Funding Sources Useful for Climate Adaptation Planning. This table lists key funding sources that many tribes have used in their adaptation planning process.

Bureau of Indian Affairs (BIA) Tribal Resilience Program	https://www.bia.gov/bia/ots/tribal-resilience-program
Environmental Protection Agency Indian General Assistance Program	https://www.epa.gov/tribal/indian-environmental-general-assistance-program-gap
Administration for Native Americans	https://www.acf.hhs.gov/ana/grants
Federal Emergency Management Agency Pre-Disaster Mitigation Program & Hazard Mitigation Program	https://www.fema.gov/pre-disaster-mitigation-grant-program https://www.fema.gov/hazard-mitigation-assistance
National Oceanic and Atmospheric Administration Climate Program Office	https://cpo.noaa.gov/

While there may be a limited number of grants specifically focused on climate change (e.g., the BIA Tribal Resilience Program), there are many other grants that can help tribes address the impacts of climate change for specific sectors (e.g., Department of Energy grants can support renewable energy development; US Department of Agriculture supports agriculture programs; the US Forest Service supports fish, wildlife, and forest projects; the Centers for Disease Control, Indian Health Service, and National Institutes of Health support projects focused on public health). There are often also funding opportunities from states, private foundations, and non-governmental organizations seeking to support Indigenous communities in addressing climate change.

Consider browsing federal and non-federal funding opportunities using the *Resources* at the end of this section and creating a list of relevant grants that could support some or all of the work the tribe wants to accomplish.

Write and Submit Grant Proposals

Many tribes are familiar with grant writing, but for those who need more guidance, see *Resources* for grant writing training opportunities. Consulting the list of potential funding opportunities, select one or more grants to apply for. Funders will often hold webinars describing the funding opportunities and the grant process. Some agencies will assist and collaborate in writing grants or offering technical assistance. Seek out more information about the funding opportunities, particularly how the proposals will be scored, and reach out to the contact person with any questions. If relevant, ask other staff members to help assemble and submit the grant. Customize the tribe's proposal to meet the goals of the grant even if those requirements don't meet all the climate adaptation goals of the tribe. Remember that there will be other funding opportunities and the initially funded work can be expanded in the future.

Traditional Knowledges Checkpoint

When applying for federal funding to conduct climate change adaptation planning projects that will include Traditional Knowledges (TKs), ensure that the requirements of the grant would not require that "all data collected during the grant period be presumed to be under ownership of the federal government" (*CTKW Guideline 8*). "If funding entails a requirement to disclose based on Federal rules associated with publicly funded research, then alternative sources of funding should be sought for activities related to the collection of TKs if indigenous governments or knowledge holders do not wish TKs to become publicly available" (*CTKW Guideline 8*). If data sharing requirements are not specified, contact the grant officer to clarify how data gathered or used in the project are expected to be shared and if data sharing agreements can be arranged in advance to protect TKs. See Section 1.4 for example data sharing agreements.

Community Engagement Checkpoint

When writing grants, consider including in the budget expenses for community engagement, such as hosting a community meal, compensation for planning team members, or other means for supporting community engagement functions if allowed by the funding agency. For example, some federal grants may not allow funds to be used to provide food, but some may be used to host workshops. It is frequently easier to include these costs if they are incorporated into the grant from the beginning.

Guiding Questions

Brainstorm the following topics to explore funding needs and possible solutions:[44]

- What are the specific existing programs and initiatives within the tribe that can be used for climate change adaptation planning and implementation? List them out.
- What are the funding and technical resource needs of the tribe as it relates to adaptation?
- What barriers or challenges exist to accessing the funding and technical resources needed and how might the tribe overcome those barriers?
- What tribally sensitive or privately held TK information and/or intellectual property needs safeguarding? Make sure to analyze grant requirements to ensure protection of tribal rights and information.
- What existing relationships with funders does the tribe have and how might those relationships open the door to new or additional funding?

Resources

The ***Funding page*** of the **Pacific Northwest Tribal Climate Change Project** *Online Tribal Climate Change Guide* provides up-to-date information on grants, programs and plans that may assist tribes in addressing climate change through a broad range of sectors. The funding page also features grants and funding opportunities from foundations and non-governmental organizations seeking to support Indigenous communities in addressing climate change. The funding page is organized by grant deadline and updated weekly.

The **Bureau of Indian Affairs (BIA)** has been supporting tribes' adaptation planning process through their Tribal Resilience Program since 2011. The program has provided $37 million supporting 425 grants, 124 of which were grants to individual tribes for climate adaptation, according to numbers provided to this *Guidebook* from the BIA. Grants have funded a range of activities, including travel expenses (so that tribal staff could attend climate change training courses) and financial support for climate change vulnerability assessments and adaptation plans.

The **Environmental Protection Agency** (EPA) provides a variety of financial assistance to tribes, including the Indian General Assistance Program, that can be used to support tribal climate change adaptation planning efforts.

The Administration for Native Americans provides short-term project funding in the following program areas that may be applicable for climate adaptation planning: Native American Language Preservation, Social and Economic Development, Environmental Regulatory Enhancement, and Native Youth Initiative for Leadership, Empowerment, and Development. Training and technical assistance is available to applicants for project and proposal development and to grantees for project implementation and reporting.

The **Federal Emergency Management Agency** Pre-Disaster Mitigation Grant Program is designed to assist States, US Territories, Federally recognized tribes, and local communities in implementing a sustained pre-disaster natural hazard mitigation program in order to reduce the overall risk to the population and structures from future hazard events.

The **National Oceanic and Atmospheric Administration (NOAA) Climate Program Office** manages competitive research programs in which NOAA funds high-priority climate science, assessments, decision support research, outreach, education, and capacity-building activities designed to advance our understanding of Earth's climate system and to foster the application of this knowledge in risk management and adaptation efforts.

The **US Department of Agriculture (USDA)** has 150 Programs and Resources available to assist tribes in adapting to climate change. An online guide to those resources is in development and will be available on the USDA Climate Hubs website.

The **Federal Government** provides guidance on how to navigate its grant system (grants.gov) and identify and apply for funding opportunities specific to Native American tribal governments and organizations.

The **Alaska Native Tribal Health Consortium** *Capacity & Training* section of the website maintains recordings of webinars covering grantwriting basics for the EPA's Indian General Assistance Program grants.

The **Institute for Tribal Environmental Professionals** maintains a collection of grant writing resources on its website.

1.8 Engage External Partners

Engaging external partners can enhance a climate change adaptation planning process, especially when clear roles and expectations are set at the beginning.

Checklist

- ❑ Identify External Partners
- ❑ Communicate Expectations

Identify External Partners

Identify external partners that can enhance the climate change adaptation planning process. Many tribes have high internal staff capacity and technical expertise in the fields of natural resource management and scientific analysis. However, funding for such positions are often from non-climate change-related grants, which limits their capacity to devote time to climate change planning and analysis for the tribe.[45] Other tribes have limited staff capacity for climate change analyses.[46] As such, many tribes have sought expertise from external partners (e.g., universities, federal agencies and programs, private and non-profit organizations, and intertribal organizations) for training, data, and analysis to support the tribe's climate change adaptation planning efforts.[47]

It can be important to identify external partners who may have direct management of federal trust responsibilities over the land and natural resources within the geographic areas of interest and those who could indirectly influence management within the geographic areas of interest (e.g., federal agencies, state agencies, and regional planning organizations).

Developing partnerships with external organizations can have benefits beyond the end of a specific climate adaptation planning project. Collaborations with academic institutions, non-profit or private sector organizations, and federal agencies can create avenues for lasting technical, communication, grant writing, implementation, or design support. Some tribes work with neighboring jurisdictions (e.g., city, county, state, federal, private, and other tribes), particularly in the cases of checkerboard tribes and tribes that have Usual & Accustomed areas that border or are on private or federal lands. In addition, tribes may not have the authority to take action without partnering with federal agencies in the context of co-management responsibilities. It may also be advantageous to partner with other nearby tribes or jurisdictions to jointly pursue funding opportunities.

Communicate Expectations

In any external partnership, it is important to clearly and formally define the roles and expectations for each party, especially before Traditional Knowledges (TKs) are included or shared. Once the tribe's climate change planning team and leadership agree about the definition and role of TKs in the climate change adaptation planning process and the protocols surrounding them (Section 1.4), relevant definitions, protocols, and expectations should be communicated formally to external partners.

Traditional Knowledges Checkpoint

It will be important for all tribal and external partners involved in the climate change adaptation planning process to understand key concepts and definitions related to Traditional Knowledges (TKs) and the tribe's protocols around TKs (*CTKW Guideline 1*). This may include working with external partners to ensure proper training for external agency staff and researchers as well as training tribal staff and TK holders on proper protocols (*CTKW Guideline 5*). It is also important to "understand and communicate the risks for indigenous peoples and holders of TKs" when considering including TKs in climate change adaptation planning, which may include consulting a tribal attorney and ensuring external partners disclose any potential risks of disclosure due to federal laws (*CTKW Guideline 3*). Consider developing formal research agreements with external partners that clearly articulates methods for bringing TKs into each step of the adaptation planning process (*CTKW Guideline 4*). Also consider checking with the area Indian Health Board's Institutional Review Board process for applicable requirements.

Case Studies

Tribes of the Treaty of Olympia

The three Tribes within the Treaty of Olympia Area on Washington's Olympic Peninsula—Quinault Indian Nation, Quileute Tribe, and Hoh Tribe—partnered to create a memorandum of understanding among the Tribes and Oregon State University, which was contracted to perform work. The three Tribes worked together to agree on common resources that were important both economically and culturally to the three Tribes during the development of their *Climate Change Vulnerability Assessment for the Treaty of Olympia Tribes*.[48]

Community Engagement in Alaska

The Alaska Native Tribal Health Consortium (ANTHC) collaborated with native communities and governments, regional associations, and federal agencies to create reports characterizing the changing climate conditions in over 20 communities with photos and key observations from community members. Throughout these assessments, ANTHC received permission for the use of all content in the final reports, all reports were reviewed by Tribal council coauthors, and ANTHC secured written approval from all partners prior to distribution. Everyone entered into the process knowing that the information would be publically available. TKs were protected by ensuring that no information was included that was not pre-approved by authors, contributors, and partners.[49]

Swinomish Indian Tribal Community

The Swinomish Indian Tribal Community engaged a diverse set of stakeholders to contribute to the *Swinomish Climate Change Initiative Climate Adaptation Action Plan*. The Tribe partnered with the University of Washington Climate Impacts Group for climate science analysis. Recognizing the inter-jurisdictional climate impacts, the Tribe also created a strategy advisory group composed of representatives of Skagit County, the Town of La Conner, and the Shelter Bay Community. A Tribal community interest group also participated in discussions about the adaptation plan.[50]

Resources

The ***Scientists*** page of the **Pacific Northwest Tribal Climate Change Project** ***Online Tribal Climate Change Guide*** lists tribal and non-tribal climate scientists conducting research on issues that may be relevant to tribal climate change efforts. All information about climate scientists is derived from publicly available sources.

The **National Oceanic and Atmospheric Administration** ***Western Region Climate Service Providers Database*** is a directory of climate service providers in the Western United States. The database can be searched by type of information or service (e.g., workshops, decision support tools, vulnerability assessments, training and education, etc.) and by geographic area or sector served in order to find which provider(s) serve that area.

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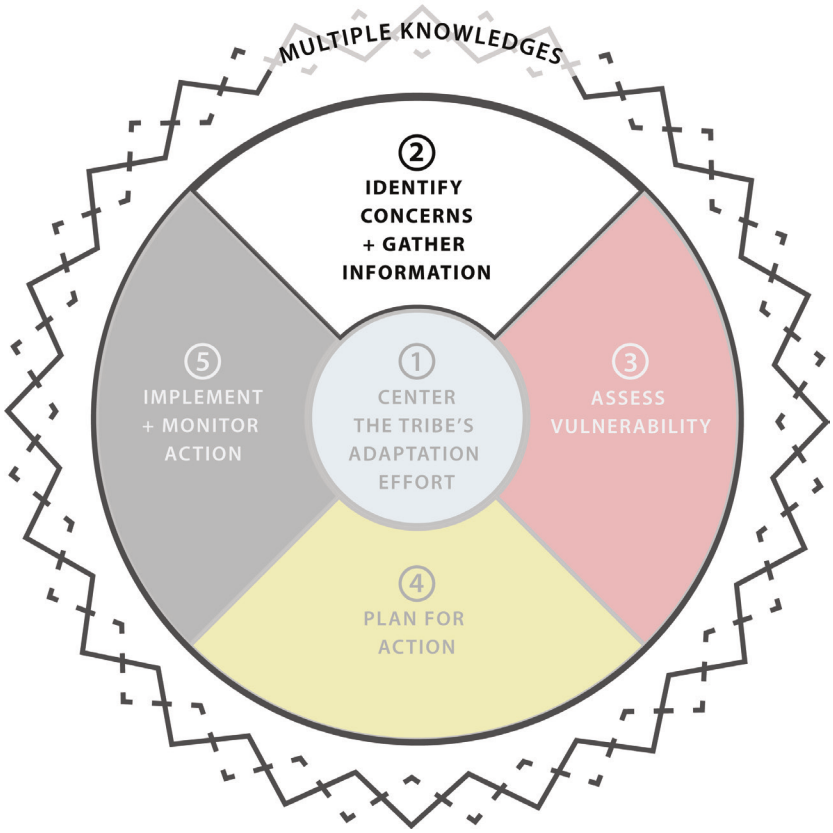


Step 2: Identify Concerns and Gather Information

"Culturally significant resources at risk are: fisheries, sacred sites, traditional subsistence species, and other traditional resource uses. Our ancestral homeland is slowly being stripped of diversity by former and present activities that have depleted old growth forest characteristics, resulted in loss of grasslands and open canopies, decreased fisheries and water quality, habitat loss, as well as increased unnatural abundance and distribution of conifer and shrub species."—Karuk Tribe Department of Natural Resources, *Eco-Cultural Resources Management Plan*

"Many cultural resources are non-renewable resources. They can be one day or thousands of years old. Their destruction is a gross violation of everything we value."—Flat Head Culture Committee, *Climate Change Strategic Plan for the Confederated Salish and Kootenai Tribes of the Flathead Reservation*

This step is about identifying the tribe's climate-related concerns and gathering information from multiple perspectives to better understand the challenges and set the stage for assessing vulnerability and planning for action.

- ❑ 2.1 Gathering and Application of Relevant Traditional Knowledges
- ❑ 2.2 Identify and Organize Key Concerns
- ❑ 2.3 Document Observed Changes from Multiple Perspectives
- ❑ 2.4 Collect Regional and Local Climate Change Projections

2.1 Gathering and Application of Relevant Traditional Knowledges

"Yurok elders have a good understanding of how the environment has changed over a relatively short period of time (less than 200 years). While not always attributable to climate change, these changes often reflect ecosystem loss and environmental degradation that resulted from the loss of autonomy and self-determination regarding management of resources, lands, waters, and ecosystems within the last 150 years. Additionally elder's experience provides a benchmark of how less disturbed ecosystems should function."—Utilizing Yurok Traditional Ecological Knowledge to Inform Climate Change Priorities: Final Report

"These recent efforts are a continuation of the work our elders have done for years in observing and considering climate change on our lands."—Joe Durglo, Chairman, Council Confederated Salish and Kootenai Tribes, *Climate Change Strategic Plan for the Confederated Salish and Kootenai Tribes of the Flathead Reservation*

Build off the base of where and how the tribe may already incorporate Traditional Knowledges in tribal planning or policy activities.

✓ Checklist

- ❑ Identify Where Existing Traditional Knowledges Are Being Applied
- ❑ Determine Whether and How to Collect Additional Traditional Knowledges

Identify Where Existing Traditional Knowledges Are Being Applied

The traditional practices and culture of the tribe are often held in Traditional Knowledges (TKs) (see Section 1.4). The tribe may already incorporate TKs in tribal planning or policy activities, but may not refer to them as "Traditional Knowledges." Western Science uses terms such as ***Traditional Knowledges*** and ***Traditional Ecological Knowledge*** (TEK) to describe how longstanding generational tribal knowledges are held, transferred, and applied within a tribe, and when referring to Indigenous Science. These terms attempt to describe what tribes already do without the tribes labeling it as such. Identifying where and how TKs and TEK are already being applied can serve as a base to build on within the tribe's climate change adaptation planning process.

Identify what TKs are already incorporated in the tribe's planning process or management systems, that the tribe may not describe as "TKs", but may be relevant to this western definition. Consider looking for things that may not be called TKs that the tribe already does and that contain a wealth of knowledge that can be useful for climate adaptation planning:

- Identify TKs that are already collected or stored within the tribe's cultural committee;
- Identify information that may not have been used previously but could now be used (consider adaptations, patterns, ceremonial adjustments, additional foods, etc.); and
- Identify what TKs are being utilized in ways that are not articulated or written (maintenance, sustainability practices, reciprocity rites, etc).

These TKs can be applied throughout the adaptation planning process as appropriate to help identify concerns (Section 2.2); gather evidence for observed changes (Section 2.3); conduct the vulnerability assessment (Step 3); gather adaptation actions, set adaptation goals, prioritize actions (Step 4); and define and monitor success of actions (Step 5).

Determine Whether and How to Collect Additional Traditional Knowledges

Consider whether the tribe needs or desires to collect additional TKs and what methods would be used. Collection methods may include formal and/or informal processes depending on how the tribe prefers to proceed. Methods can include but are not limited to semi-structured interviews, free form conversation among elders, talking circles, tribal events, ceremonies, or other options dictated by the tribe. Encouraging free form conversation with elders and other tribal members can bring up issues and topics of concern tribal members know but may not be aware they know. Often times

it will take time for the depth of TKs to be revealed as it pertains to traditional culture. Each community is different and needs to cooperate to identify traditional aspects that need to be maintained, revitalized, and sustained through climate change adaptation planning.

Revisit Section 1.4 about considering opportunities and risks of incorporating TKs. Apply ways to reduce risks that the tribe may already practice or may wish to incorporate further in their practices. Decide whether additional TK collection needs to be done through a separate grant or whether this information can be protected within the given grant opportunity (See Section 1.7 about funding).

Guiding Questions

- What information does the tribe use when making decisions, applying management strategies, or using TEK? How will these be implemented?
- Does the tribe want to separate TKs and TEK, or blend these both together when establishing a process?
- Who are the key individuals in the tribe who hold, utilize, or apply TKs? How do these TKs differ from each other, how they are used or applied, how they are implemented in behavior, policy, or management applications?
- What sacred knowledge needs to be kept within the tribe and what information can be, or has been shared in either written or other formats?
- What are the risks of making TKs more "open" and/or applied? What protocols are in place for addressing those risks?

Case Studies

Utilizing Yurok Traditional Ecological Knowledge to Inform Climate Change Priorities

The Yurok Tribe conducted interviews with tribal elders to gather Traditional Ecological Knowledge on observed climate change within the Yurok Reservation and Ancestral Territory. "Everyone had observed gradual and progressive changes over their lifetimes in numerous resources and ecosystems," according to the interviews.[1] Reported changes included:

- Disappearance of or decrease in presence, abundance, or availability of species;
- Loss of habitats and ecosystems;
- Changes in timing and associations traditionally relied upon to signal the timing of migratory species;
- Arrival of novel invasive species or plant diseases;
- Changes in river and tributary flows, temperatures, and water quality;
- Changes in temperature and precipitation associated with specific seasons;
- Loss of fog; and
- Recent historic drought.

Confederated Salish and Kootenai Tribes

In the Confederated Salish and Kootenai Tribes *Climate Change Strategic Plan*, "the Climate Change Planning Coordinator collaborated with the Salish Pend d'Oreille Culture Committee, Kootenai Culture Committee, and Historic Preservation/ Cultural Preservation Department to conduct elder interviews" to gather knowledge about elders' observations and experiences of climate change. Excerpts from the interviews are included in the plan.[2]

2.2 Identify & Organize Key Concerns

> *"This selection of Shared Concerns was not a prioritization of any issue or resource, as all species, resources, and habitats identified by the member tribes are interconnected and important. USRT [Upper Snake River Tribes Foundation] sees an urgent need to assess the climate change vulnerability for ALL Shared Concerns identified by USRT member tribes, perhaps under future funding and vulnerability assessment efforts."—* Upper Snake River Tribes Foundation Climate Change Vulnerability Assessment

While recognizing that all concerns are important, organizing the climate change adaptation planning process around key concerns and planning areas relevant to existing programs and departments can facilitate implementation of adaptation actions.

✓ Checklist

- ❑ Compile Full List of Concerns
- ❑ Organize Concerns around Existing Programs and Departments
- ❑ Select Key Concerns

Compile Full List of Concerns

Climate change is expected to affect the land, water, animals, plants, and the built environment, leading to far reaching impacts on tribal culture, community health, subsistence, economies, ways of life, and sovereignty. Acknowledging that everything is important, it may be necessary to limit the scope of the adaptation planning process, at least initially, based on available resources and tribal staff capacity. Over time and with additional resources, the scope may be expanded to include all the potential concerns related to climate change and develop adaptation actions for every potential concern.

Identifying concerns can be done using a variety of approaches with input from the community and the climate change planning team. Approaches to identify concerns may include, but are not limited to:

- Planning team meetings;
- Community workshops;
- Semi-structured interviews with key tribal staff and elders;
- Community surveys distributed through multiple avenues;
- Community events; and
- Informal communications.

Organize Concerns around Existing Programs and Departments

Organizing concerns around existing programs, departments, or upcoming decisions creates a structure that can facilitate successful implementation of adaptation actions. Grouping concerns in this way allows the climate change planning team and the tribal community to see the issues they care about—or are responsible for as part of their job duties—reflected in the plan. It also enhances ownership of the eventual development and implementation of adaptation actions.

Organizing concerns into ***planning areas***—sectors or systems that mirror the tribe's governance and management structure or important ecosystem and human systems—creates a framework that helps with the subsequent steps of identifying, evaluating, and prioritizing adaptation actions. Example planning areas include: forestry, fisheries and wildlife, water resources, agriculture and rangelands, cultural resources, energy, housing, transportation, telecommunications, economic development, health, emergency management, and public safety.

There are a variety of ways that concerns can be organized within planning areas. For some tribes, the planning areas are based around different topic areas or sectors (e.g. fisheries management, transportation, human health, and emergency management). Other tribes have created planning areas around habitats (e.g., grouping all related species that are concerns into that habitat) or by climate impact of concern (e.g., rising sea levels, wildfire risk, and extreme heat). There may be a few concerns that do not neatly fit within a current department or existing program. Those can be considered cross-cutting issues, requiring collaboration across departments or programs in order to accurately assess vulnerability and develop effective adaptation actions. Table 6 lists planning areas defined by different tribes.

Note: Upon organizing concerns into planning areas, it may become clear that there are gaps in the expertise of the climate change planning team. This may be an opportunity to add a member with the appropriate expertise to the team (Section 1.2) or consult with local or regional experts within the tribe or among external partners (Section 1.8).

Guiding Questions

- Are there current management programs or plans that are already designed to work on or manage the identified concerns?
- Are there groups of concerns that fall under the same department or management structure?
- Are these groupings appropriate to become planning areas (e.g., different fish species falling under the same aquatic management program, different buildings managed by the same facilities department; or asthma, diabetes, and substance abuse programs all being run by the health clinic)?

Select Key Concerns

Given the selected planning approach (Section 1.1) and goals and objectives (Section 1.3), the climate change planning team, with input from the tribal community, will sort through the organized concerns and identify a set of ***key concerns***—the natural and built resources, assets, and issues that are most important to the tribe, have the potential to be affected by climate change, and can be addressed within the scope of available resources and capacity.

Within the climate change planning team, discuss how many concerns can successfully be addressed over the course of the current effort. Keeping the tribe's goals for adaptation planning in mind, look for opportunities to mainstream to help identify which concerns to focus on first. For example, if the community is updating a key management plan in the near future and information from the climate assessment could support that updated plan, it may make sense to start with those issues that fit within that management plan.

Table 6 Example Planning Areas. This table lists the planning areas in which key concerns were grouped, as defined by the Puyallup Tribe, Yakama Nation, Shoshone-Bannock Tribes, and Saint Regis Mohawk Tribe.

Tribe	Planning Areas	
Puyallup Tribe *Climate Change Impact Assessment and Adaptation Options*	Fisheries & Hatcheries Shellfish Wildlife Restoration Sites	Water Quality Cultural Resources & Archaeological Sites Transportation Public Health & Safety
Climate Adaptation Plan for the Territories of the Yakama Nation	*Community Resources:* Cultural Heritage Health and Public Safety Tribal Infrastructure Lands and Agriculture	*Environmental Resources:* Forestry Water and Wetlands Fisheries Shrub-Steppe and Rangelands Wildlife and Vegetation Toxics
Shoshone-Bannock Tribes *Climate Change Assessment and Adaptation Plan*	Sagebrush Steppe Aquatic Riparian	Forests Habitat Generalists

St. Regis Mohawk Tribe *Climate Change Adaptation Plan for Akwesasne*	The People Mother Earth The Waters The Fish Small Plants and Grasses The Berries Three Sisters (traditional foods, corn, beans, squash) Medicine Herbs Animals	Trees The Birds The Four Winds (air quality) The Thunderers Grand Mother Moon The Sun The Stars The Four Beings The Creator

Guiding Questions

- What aspects of the community or resources the tribe depends on are being affected or are likely to be negatively affected by climate change in the future?
- Which resources, assets, or species are particularly critical to the community (consider cultural value, traditional value, social value, economic value, and ecosystem value)?
- Does weather and climate represent a hazard to the identified resource, asset, or species (e.g., is it climate-relevant)?
- Are there specific upcoming decisions that the tribe will make that this assessment can support? Which concerns are relevant to those decisions?
- Are there key people, experts, or partners who need to be brought in to adequately evaluate and address the resources or concerns identified?

Documentation Checkpoint

Document all identified concerns, including the groups of people to whom the concern is particularly important. Concerns not included in the current effort can be noted as areas for future work.

Community Engagement Checkpoint

Working collaboratively with staff, community members, elders, tribal leadership, and other non-tribal partners (if relevant) is a great way to identify the needs and concerns of the community and focus the climate change vulnerability assessment and adaptation plan to address those needs. It is important to use a transparent process to select the key concerns to ensure that the planning team and community understand why certain concerns were selected for the current effort and why others were saved for future efforts. An open and transparent process will help ensure that everyone feels that their input was valued and remains engaged in the adaptation planning process. Follow up with community members who have expressed concerns that were not selected as key concerns to let them know that their concerns will be addressed when more time and resources are available.

Traditional Knowledges Checkpoint

If Traditional Knowledges (TKs) are to be considered and included in this climate adaptation planning process, consider the following categories when identifying key areas of concern:

- Traditional foods;
- Regalia and traditional materials (e.g., baskets, plants, etc.);
- Geography (e.g., sacred sites, prayer sites, petroglyphs, historical markers);
- Botany/Forestry (e.g., medicinal plants, markers, tree lines, specific plants, bent trees, etc.);
- Hunting and Fishing species and practices;
- TK indicator species; and
- Other categories that may be applicable to tribal tradition.

Refer to the pre-determined methods for bringing in TKs (Section 1.4), following all tribal protocols and ensuring that all TK holders understand potential risks involved in sharing TKs (*CTKW Guideline 3*). Remember that TK holders reserve the right NOT to participate in sharing TKs and to cease participating at any time (*CTKW Guideline 2*).

Case Studies

Upper Snake River Tribes

The Upper Snake River Tribes (USRT) Foundation supports four member tribes that reside in environments similar enough to have many common concerns related to the potential impacts of a changing climate on their natural and cultural resources. Because the USRT Foundation works to support all four of its member tribes, its *Climate Change Vulnerability Assessment for the Upper Snake River Watershed* focused on evaluating the climate change vulnerability of "Shared Concerns." The USRT Foundation held site visit meetings with each of the four tribes to understand their priorities and areas of concern. Following the site visits, the project team synthesized notes and information gathered during the visits. The resulting list of climate change concerns included 46 animal species, plant species, habitats, and resource issues that were Shared Concerns—that is, natural resources identified as particularly valuable for more than one tribe. Due to limited project funding and time, the USRT Foundation was unable to fully investigate all 46 Shared Concerns in the course of the project. The USRT Foundation instead selected 28 Shared Concerns to focus on for the project, noting 18 Shared Concerns to be assessed in future climate work. The USRT Foundation then organized those Shared Concerns around habitat types as their planning areas: Sagebrush Steppe, Wet Meadow, Aquatic, Riparian, Forest, and People.[3]

Resources

The **World Wildlife Fund South Pacific Programme** ***Climate Witness Community Toolkit*** is a collection of participatory community exercises for climate change and adaptation planning. Exercises such as *mapping*, *community timeline*, *animal and plant inventory* and others may be useful in identifying, organizing, and prioritizing the community's concerns.

2.3 Document Observed Changes from Multiple Perspectives

"Elder observations indicate that the climate has noticeably changed within their lifetime and as stated prior, the knowledge they gained from parents, grandparents, and great grandparents goes back at least three generations. These first-hand accounts of the impacts of climate change further demonstrate its effect on the Tribes"—Climate Change Strategic Plan for the Confederated Salish and Kootenai Tribes of the Flathead Reservation

"The changes already being seen are substantial, and by the end of the century we will likely be facing unprecedented changes to our natural environment and the economies that depend on it."—Clearwater River Subbasin (ID) Climate Change Adaptation Plan

Understanding past climate and environmental changes and how they have affected the key concerns from multiple perspectives can help ground the assessment, improve buy-in, and set the stage for assessing future climate-related risks.

✓ Checklist

- ❑ Identify Climate Variables and Thresholds
- ❑ Document Observed Changes
- ❑ Compile List of Relevant Climate-Related Variables

Identify Climate Variables and Thresholds

Different aspects of climate change will be more or less important for each key concern. For any given concern, there may be specific climate variables that are particularly vital to the continued health and integrity of that concern. For example, certain fish species, including salmon and steelhead, will be susceptible to changes in streamflow (both lower summer flows and higher winter flows) and increasing water temperatures,[4] while infrastructure will continue to be affected by a variety of climate change related effects, including heavy rainfall and associated flooding or sea level rise and coastal storms.[5]

There may be more than one climate-related exposure affecting a key concern (e.g., salmon are susceptible to both changing streamflows and stream temperatures). There may also be thresholds that, if crossed, will have a disproportionate impact. For example, warmer water temperatures can negatively affect salmon survival. Water temperatures exceeding 15.5°C [59.9°F] increase the rate of disease and mortality among Chinook salmon.[6]

For each key concern, list climate variables that the concern is sensitive to, making note of particular thresholds. Gather input from climate change planning team members or other tribal staff or tribal members with expertise in each key concern. This input can come from staff expertise, Traditional Knowledges (TKs) (Section 2.1), or tribal and non-tribal publications.

Document Observed Changes

Summarizing how conditions have changed in the past—including experiences with recent extreme events—can help determine the vulnerability of key concerns to future changes. This collection of information and analysis may also identify current hazards and risks that the community may not be fully prepared to address or could identify additional concerns to consider. If that is the case, reevaluate the selection of key concerns (Section 2.2) to decide whether it needs to be amended.

This could be done by the climate change planning team during a community workshop, or in partnership with an academic or private sector consultant. Valuable sources of information can include: tribal elders; Traditional Knowledge holders; tribal staff; tribal and non-tribal monitoring records; archives of interviews, photos, or surveys; and tribal and non-tribal publications, data, and reports (see *Resources*).

Compile List of Relevant Climate-Related Variables

Up until this point, the framework has focused on the tribe's key concerns and identifying how they are influenced or sensitive to climate and environmental change and how they have been changing. Next, consider looking across all key concerns and creating a consolidated table of climate variables, recording which planning areas and key concerns are sensitive to each variable, and how each variable has changed in the past. Section 2.4 will build off of this table to record how each variable is projected to change in the future.

Community Engagement Checkpoint

Gathering information from the tribal community on observed changes can help create a holistic understanding of how the tribe is experiencing climate change. Having conversations about observed changes can be a starting point for some tribes. Any information coming from those conversations can be integrated into this framework. The tribal community could be engaged in this step through a survey, during a community workshop, or through targeted interviews with tribal members.

Traditional Knowledges Checkpoint

Many tribes hold Traditional Knowledges (TKs) about environmental conditions that favor or challenge certain species or ecosystems. TKs can provide different and complementary "information" about past climate and environmental changes. Information can include but is not limited to: data, changes in traditional practices, behaviors, management, belief systems, ceremonial practices, harvests, weather and trends, guidance, cultural adherences, etc. TKs could provide information that isn't customarily collected from a Western perspective, such as the timing of certain ecological events that are important for tribes. External scientific information may be limited in its spatial or temporal coverage of areas of tribal concern that local tribal data or knowledge could complement. TKs can also provide information about non-climate factors that already stress a given key concern (e.g., overharvesting) and under what types of conditions the key concern thrives (e.g., cultural fire use and resulting growth in basket materials, seeds, plant health, roots, and foods). Note that, if the tribe is a confederation or has multiple bands, information could vary depending on each tradition and cultural adherence, and it will be important to incorporate all relevant information.

Tribes often have data monitoring or GIS boundary layers that would be useful to climate adaptation planning efforts. However, they may not want to share this information with external partners and risk having that data become public. Consider developing a data management and sharing agreement to protect data sovereignty of tribal data sources. (See Section 1.4 *Case Studies* for templates.)

Refer to the predetermined methods for bringing in TKs (Section 1.4), following all tribal protocols and ensuring that all TK holders understand potential risks involved in sharing TKs (*CTKW Guideline 3*). Remember that TK holders reserve the right NOT to participate in sharing TKs and to cease participating at any time (*CTKW Guideline 2*).

Guiding Questions

- What types of climatic events currently cause stress for each key concern?
- What recent extreme climate events have affected the key concerns? How?
- When do environmental conditions go from a nuisance to a problem for each key concern?
- Are there specific climate-related environmental thresholds that, once crossed, will significantly affect key concerns?
- How have the tribe's surroundings—the land, sea, animals, plants, and air—changed or stayed the same over the last generation or more?[7]
- What changes to climate or environmental patterns have tribal members observed?[8]

- What are the historical temperature and precipitation patterns for the region? How do those vary annually and by season?
- What recent extreme climate events have affected the key concerns? How?
- Are there other long-term stressors affecting the key concerns?
- Are there indicator species (specific plants, animals, and materials) being impacted that are altering cultural traditions?

Case Studies

Indigenous Observations of Climate Change in the Lower Yukon River Basin
Hunters and elders in the villages of St. Mary's and Pitka's Point were interviewed on their observations of climate change in the Lower Yukon River Basin in Alaska. Observed changes included:

- Shifting flora and fauna patterns with implications for subsistence;
- Unpredictable weather patterns and dangerous ice conditions with safety implications; and
- Shifting resource base as reliance on fossil fuels grows.[9]

Resources

The *Publications* page of the **University of Oregon Pacific Northwest Tribal Climate Change Project** *Online Tribal Climate Change Guide* has a database of tribal scholarly publications with abstracts and materials provided by the publications.

The **National Oceanic and Atmospheric Administration (NOAA) National Center for Environmental Information** online tool *Climate at a Glance* allows users to select one of several climate variables, timescale and month(s) of interest, and location (e.g., state, region, climate division, and city). The site can generate a plot and return the data for the observations from 1895 to the present day, including information about historical averages, trends over time, and a ranking of the data values. Plots and data can be exported.

The **NOAA Climate Explorer** allows users to access and download visual presentations of observed and projected climate information for temperature and precipitation variables by county or station.

The **NOAA Regional Climate Centers** Applied Climate Information System is designed to manage the complex flow of information from climate data collectors to end users. The main purpose is to alleviate the burden of climate information management for people who use climate information to make management decisions.

With the **National Phenology Network** Phenology Observation Portal users can select species, location, and time period to download phenological data.

The **Local Environmental Observer (LEO) Network** is a network of local observers and topic experts who share knowledge about unusual animal, environmental, and weather events. LEO users can connect with others in the community, share observations, raise awareness, and find answers about significant environmental events. Users can also engage with topic experts in many different organizations and become part of a broader observer community.

The **Environmental Protection Agency (EPA)** partners with more than 40 data contributors from various government agencies, academic institutions, and other organizations to compile a key set of indicators related to the causes and effects of climate change. The indicators are published in the EPA report *Climate Change Indicators in the United States*.

2.4 Collect Regional and Local Climate Change Projections

Understanding how climate is expected to change in the future informs the vulnerability and risk assessment of key concerns.

✓ Checklist

- ❑ Collect Future Climate Projections from Existing Resources
- ❑ Decide Whether More Detailed Information is Needed

Future changes in climate may not always manifest as a continuation of past changes, particularly as some changes are expected to accelerate in the future without severe reductions in current greenhouse gas (GHG) emissions. In this part of the planning process, the climate change planning team (and other partners if appropriate) will collect and summarize relevant future ***climate projections***—the simulated response of the climate system (e.g., temperature, precipitation, etc.) to a scenario of future emissions or concentrations of GHGs and aerosols, generally derived using global climate models. This information, combined with the information collected in Section 2.3, can be used to assess the degree to which each concern is exposed to present and future climate change and will inform the vulnerability and risk assessment process (Step 3).

Keep in mind that more information and data are not always better. The amount of climate projection information the tribe gathers is ideally tailored to decisions the tribe is making. ***Actionable information*** is information at a sufficient timescale, resolution, and certainty that it can inform decisions. A summary of climate projections from existing assessment reports may be sufficient for some tribes, while others may require more localized or customized information. Section 3.1 describes different approaches tribes have used get the climate exposure information they needed to conduct their vulnerability assessment.

Collect Future Climate Projections from Existing Resources

Information on how the climate is expected to change in the future can be found in scientific publications, synthesis and assessment reports, and decision-support and data visualization tools. If available, start with local assessments, moving on to state or regional assessments and summaries, then seeking out information at the federal or national level. Choose a template for recording projected climate information for each variable affecting a key concern from Section 2.2. The *Preparing for Climate Change: A Guidebook for Local, Regional, and State Governments* has an example table of how to organize a summary of projected climate changes.[10]

While it is generally good practice to use assessment literature over individual studies, there may be situations in which the tribe may need to use individual studies. To evaluate the credibility of individual climate change studies, consider the following questions from *Preparing for Climate Change*:[11]

- Are the authors clearly identified as experts?
- Has the study been peer-reviewed?
- Does the study's results make sense?
- Are the results placed in the context of existing understanding?
- Is there supporting evidence for the study's conclusions?
- Does the study address uncertainty?
- What are the potential biases?
- How old is the study?[12]

When gathering and evaluating future climate projection information, collect supplementary information about the data itself, including:

- The range of climate change that the community could experience;
- The level of certainty of the information;
- The methods resulting in a climate change projection (e.g., the climate model or models used), emissions scenarios, timeframe for future projection, timeframe for historical comparison, geographical area, how data was translated or downscaled to local levels); and
- The source publication and year.

The planning team may be able to gather the information if there are team members who are comfortable navigating scientific assessment reports and other resources. However, the planning team may find that more resources or guidance is needed. It could be valuable to partner with a climate science expert or organization that could review the information collected by the planning team and to recommend additional resources. Alternatively, a consultant could be hired to synthesize climate projections relevant to the tribe (see Section 1.8 *Engage External Partners*). If additional partners are brought into the process at this point, it will be particularly important to clearly articulate the specific information needed.

Decide Whether More Detailed Information is Needed

After compiling available future climate projection information from existing resources for each of the variables identified in Section 2.3, consider whether there are any gaps in information that the tribe may need to fill. Compile a list of variables for which more localized or specific information is needed. For example, a detailed spatial analysis of stream habitat suitability for salmonids over the tribe's defined geography may be needed in order to effectively implement adaptation actions to promote healthy stream habitat; or localized sea level rise projections combined with historical coastal flooding probabilities may provide the tribe with the quantitative, probabilistic information needed to make informed coastal planning decisions. Whatever the need may be, clearly articulate what is needed and seek external partners that can supplement the work the climate change planning team has done.

In some cases, information needs may be beyond the scope of the current effort or available funding. In these cases, document needs and then looking for additional resources or grant programs that can fund that work in the future.

Guidance on Global Climate Models, Emissions Scenarios, and Time Frames

Future climate projections found in multiple online tools and resources are based on ***global climate models*** (GCMs)—numerical computer representations of the Earth's air, water, and land based on physical, chemical, and biological properties, and how these components interact over time and space. GCMs are the most sophisticated tools for understanding the climate system. However, while highly complex and built on solid physical principles, GCMs still simplify the actual climate system. There exist more than thirty different GCMs. Because there are several ways to model, or simplify, the actual climate system, each GCM is constructed a little differently.

To project future climate, scientists provide the GCMs an emissions scenario, then the GCMs simulate what would happen to the air, water, and land over the next century under that emission scenario. An ***emissions scenario*** is a plausible representation of future emissions of greenhouse gases (GHGs) and aerosols based on a coherent and internally consistent set of assumptions about driving forces, such as demographic and socio-economic development, technological change, energy use, and land use. Since scientists do not know precisely the amount of GHGs and aerosols the world will emit over the next century, scientists use several emissions scenarios.

When gathering future climate projections, note which GCMs and emissions scenarios were used. It is best practice to use at least ten GCMs, looking at the average and range of answers across all of them.[13] It is also common practice to consider two future emissions scenarios: a higher (business-as-usual) scenario and a lower (reduced emissions future) scenario.

It is also important to identify and record the time period for future climate projections as well as the historical period with which future projections are compared. It is best practice to average across a 30-year period when looking at future compared to historical climate. Many of the online tools and resources present future climate information with averaged results across a 30-year period. Different tools and resources will use different 30-year windows for future projections as well as the historical period of reference. It is important to make note when projections from several different sources are used. The results may be presented as projections for the "2050s" or the "2080s", but what this generally means is that the results have been averaged over 30 years centered on those decades (e.g., the 2050s = 2040–2069; the 2080s = 2070–2099). It is common practice to consider a mid-century time frame and a late-century time frame.

Documentation Checkpoint

At this point, it is a good idea to synthesize all of the relevant information that has been collected, ensure that it is consistent with the goals of the planning process, and include it in the adaptation plan. It may be helpful to:

- Develop a section that contains all relevant climate impacts information in one location and is easy for non-scientists to understand;
- Work with elders and other tribal members to prepare a set of narratives to illustrate how climate has changed in the past and how the tribe adapted in response; or
- Present climate change information in a locally relevant way by creating storylines about how tribal life might look in the future under the projected climate to help people relate climate change to their everyday lives.

Guiding Questions

- What are the projected changes to key climate variables and thresholds that affect the key concerns? (Be as quantitative as needed in summarizing this information, the goal is to have enough information to inform the tribe's decisions)
    - How much hotter is it projected to be by the 2050s, the 2080s, or beyond?
    - How are precipitation patterns projected to change by the 2050s, the 2080s, or beyond?
- How are extreme events (e.g., droughts, extreme heat, heavy rainfall events, etc.) projected to change in the future?
- How could climate change affect the region, and do these impacts pose a risk for my community?[14]
- Will climate reach extremes not currently experienced? For example, will the region see summer temperatures above 100 degrees Fahrenheit, when that is not experienced right now?
- Will uncommon, extreme climate events happening today become more common in the future? For example, will "100-year floods" occur more frequently?
- How is a given variable projected to change during the 21st century? That is, increase, decrease, stay the same, unknown (variables could include temperature, precipitation, sea level, snowpack, streamflow, wildfires, etc.).[15]
- How will projected changes vary by season?[16]
- Over what geographies are changes expected?
- What time scales are important to the tribe to help inform decisions?

Resources

There are many online tools and resources for future climate projection information. The following are some recommended examples. New tools and resources are continually being created so it will be beneficial to reach out to a local climate service provider for updated recommendations.

A **National Climate Assessment (NCA)** report is facilitated and released by the US Global Change Research Program every four years. Including participation from thirteen federal agencies, the NCA reports synthesize the latest climate science as it relates to the United States and includes regional and sectoral chapters, including chapter(s) pertaining to Indigenous peoples. *The Third National Climate Assessment* was released in 2014. *The Fourth National Climate Assessment* is in press at the time of writing. Volume 1 (*Climate Science Special Report*) is available; Volume 2 (regional and sectoral chapters) will be available December 2018.

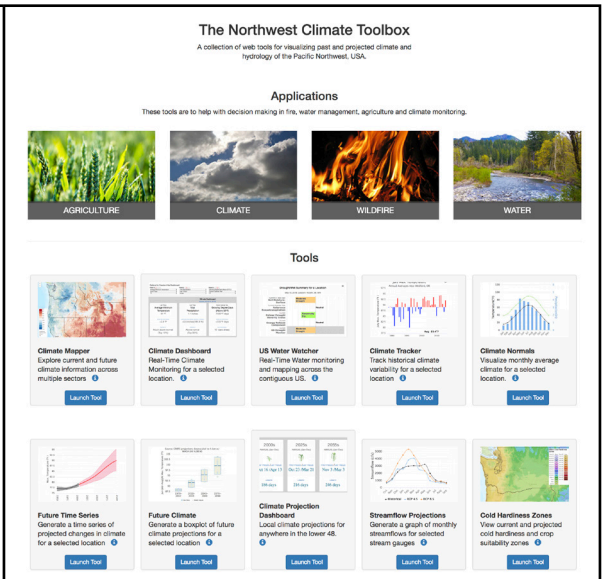
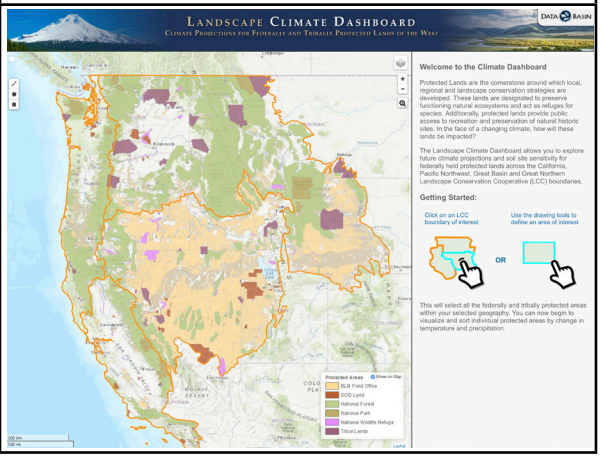
Regional, State, & Local Climate Assessments synthesize the science and impacts of climate change relevant to a particular area or jurisdiction. These assessments can be found by searching for assessments within a region of interest using clearinghouses, including the Climate Adaptation Knowledge Exchange, Adaptation Clearinghouse, and US Climate Resilience Toolkit and its Tribal Nations portal.

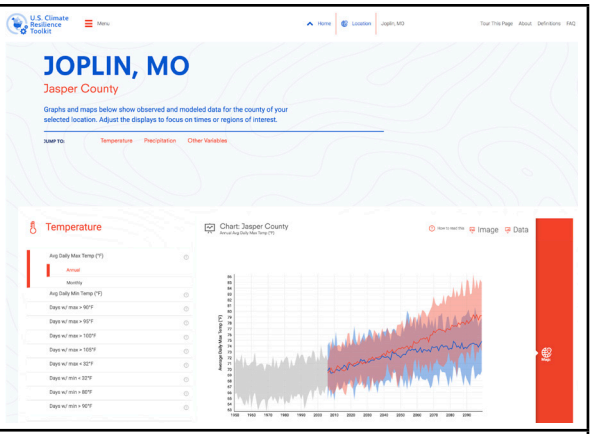
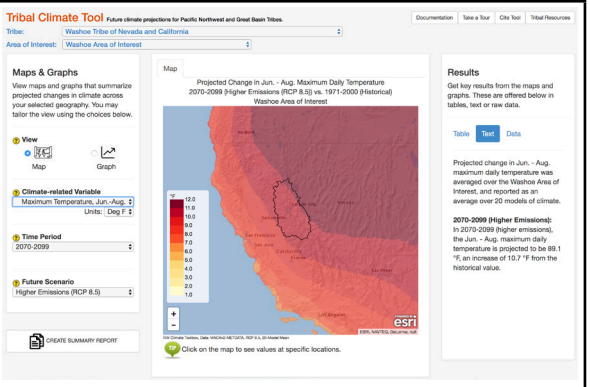
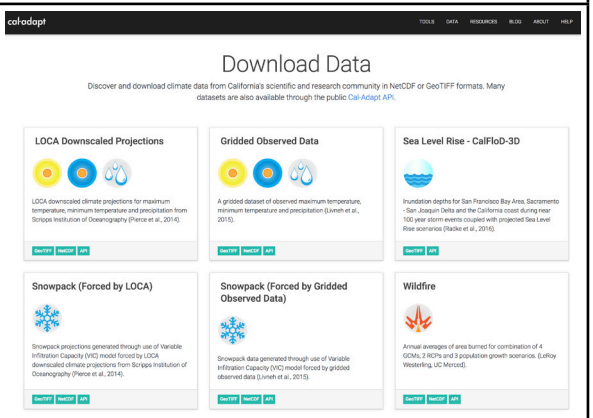
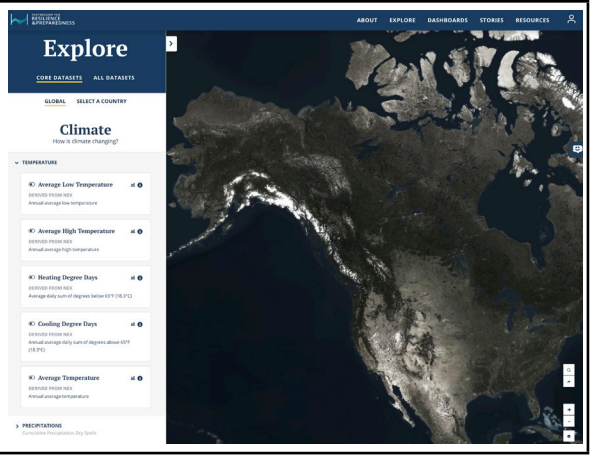
Several federal agencies have funded **Regional Climate Organizations** across the country to provide climate services. Regional climate organizations have a wealth of climate information and resources that regional stakeholders can access. Regional climate organizations include:

- The National Oceanic and Atmospheric Administration (NOAA) Regional Integrated Science and Assessment teams;
- The Department of Interior (DOI) Climate Adaptation Science Centers and associated Bureau of Indian Affairs regional Tribal Liaisons;
- The DOI Landscape Conservation Cooperatives; and
- The US Department of Agriculture Climate Hubs.

There are many **Online Climate Data Visualization and Export Tools** that can be used to gather climate projections. Table 7 lists a selection of some of the current online climate data tools.

Table 7 Selection of Online Climate Data Tools. There are many online tools to access, visualize, and download figures and summaries of future climate projections. This table lists a selection of useful tools.

Northwest Climate Toolbox	A collection of web tools for visualizing past and projected climate and hydrology of the Pacific Northwest. Some variables cover the entire Continental US and portions of British Columbia. Climate variables related to agriculture, water, and fire are also included. Future climate projections can be visualized on colorful maps, summary plots, and simple numbers. All data and plots can be downloaded.	
Landscape Climate Dashboard	A data visualization tool from the Conservation Biology Institute that summarizes future projections of climate and vegetation for the Landscape Conservation Cooperatives. It features climate projection summaries on federally recognized tribal lands.	

NOAA's Climate Explorer	Has observed and projected climate information for several temperature and precipitation variables by county. Plots and data can be downloaded.	
Tribal Climate Tool	The University of Washington Climate Impacts Group has developed a suite of resources that may be useful to tribes at any stage in the process of evaluating their vulnerability to climate change. The tool provides vulnerability assessment guidance and data tailored to the needs and capacities of Northwest and Great Basin tribes.	
Cal-Adapt	Provides a view of how California may be affected by changing climate conditions. A variety of tools and resources are available to create county level or custom summaries of climate projections for temperature, precipitation, wildfire, sea level rise, and more.	
Partnership for Resilience and Preparedness	A clearinghouse for easy access and analysis of climate, physical, and social data. Mostly at a national or global scale.	

[1] Kathleen Sloan and Joe Hostler, *Utilizing Yurok Traditional Ecological Knowledge to Inform Climate Change Priorities: Final Report June 30, 2014* (Yurok Tribe, 2014).

[2] Confederated Salish and Kootenai Tribes, *Climate Change Strategic Plan for the Confederated Salish and Kootenai Tribes of the Flathead Reservation* (Confederated Salish and Kootenai Tribes of the Flathead Reservation, 2013).

[3] Sascha Petersen et al., *Upper Snake River Tribes Foundation Climate Change Vulnerability Assessment (*Upper Snake River Tribes Foundation and Member Tribes, 2017).

[4] Tim Beechie et al., "Restoring Salmon Habitat for a Changing Climate," *River Research and Applications* 29, no. 8 (2013): 939–960. https://doi.org/10.1002/rra.2590.

[5] Susan L. Cutter et al., "Chapter 11: Urban Systems, Infrastructure, and Vulnerability," in *Climate Change Impacts in the United States: The Third National Climate Assessment*, eds. Jerry M. Melillo et al. (Washington, DC: US Global Change Research Program, 2014).

[6] Dale A. McCullough, *A Review and Synthesis of Effects of Alterations of the Water Temperature Regime on Freshwater Life Stages of Salmonids, with Special Reference to Chinook Salmon. USEPA Report 910-R-99-010.* (Washington, DC: Environmental Protection Agency, Region 10, 1999).

[7] Kathleen Sloan and Joe Hostler, *Yurok Tribe and Climate Change: An Initial Prioritization Plan* (Yurok Tribe, 2011).

[8] Susan Jamerson (Washoe Department of Environmental Protection), personal communication to Sascha Petersen, September 27, 2017

[9] Nicole Herman-Mercer et al., "Indigenous Observations of Climate Change in the Lower Yukon River Basin, Alaska," *Human Organization* (2011): 244–252.

[10] Table 4.1 in Amy K. Snover et al., *Preparing for Climate Change: A Guidebook for Local, Regional, and State Governments* (Oakland, CA: ICLEI – Local Governments for Sustainability, 2007), 38–39.

[11] Snover et al., *Preparing for Climate Change.*

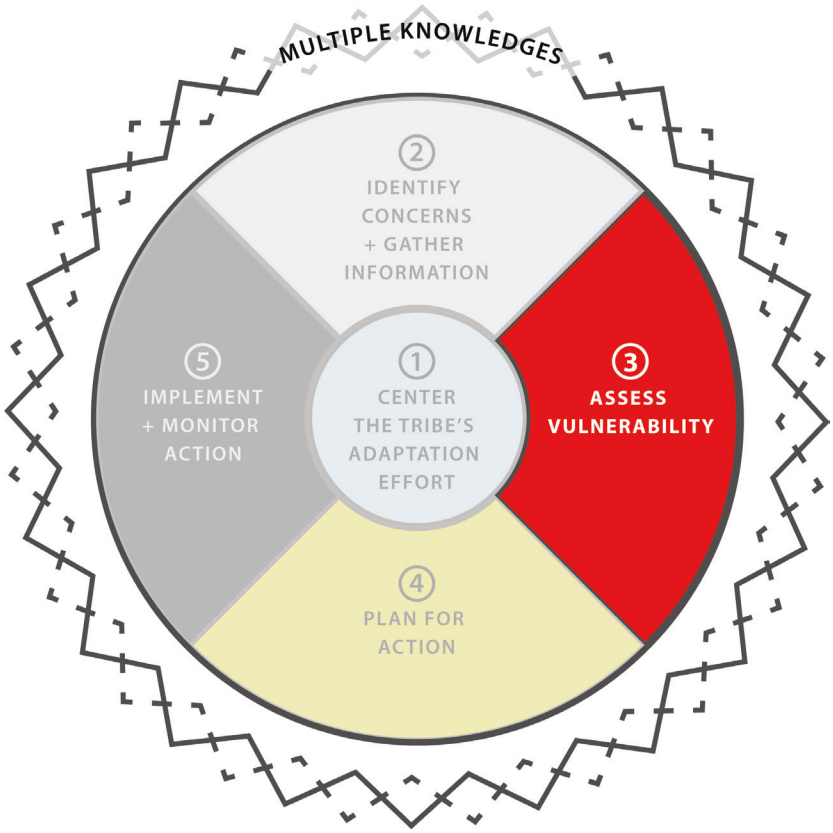
[12] Snover et al., *Preparing for Climate Change.*

[13] Philip Mote et al., "Guidelines for constructing climate scenarios," *Eos, Transactions American Geophysical Union* 92, no. 31 (2011): 257–258, https://doi.org/10.1029/2011EO310001.

[14] Snover et al., *Preparing for Climate Change.*

[15] Snover et al., *Preparing for Climate Change.*

[16] Snover et al., *Preparing for Climate Change.*



Step 3: Assess Vulnerability

"To the Ojibwe, natural resources are cultural resources. There is no separation between how the bands manage and interact with a resource and how their culture endures: one is dependent on the other. Climate change, however, is threatening the very viability of many natural resources important to the Ojibwe.—Climate Change Vulnerability Assessment and Adaptation Plan, 1854 Ceded Territory Including the Bois Forte, Fond du Lac, and Grand Portage Reservations

This step covers assessing the vulnerability of the tribe's key climate-related concerns in order to better understand how different species, resources, and assets may be affected by climate change and to support the development of adaptation actions.

- ❑ 3.1 Select Vulnerability Assessment Approach
- ❑ 3.2 Vulnerability Assessment Approach Case Studies
- ❑ 3.3 Determine Relative Climate Change Vulnerability
- ❑ 3.4 Select Priority Planning Areas

3.1 Select Vulnerability Assessment Approach

A vulnerability assessment does two things: First, it deepens the community's understanding of how different species, resources, and assets could be affected by climate change. Second, it supports the tribe's development of actions to adapt to climate change.

Checklist

- ❑ Select Vulnerability Assessment Approach

There are many approaches that the tribe can use to assess vulnerability. ***Vulnerability*** is the degree to which a key concern is susceptible to adverse effects of climate change as determined by ***climate exposure***, ***sensitivity***, and ***adaptive capacity*** (Figure 3). The concerns that are more sensitive and less able to adapt or respond are *more vulnerable* while those that are less sensitive and more able to adapt or respond are *less vulnerable*.

> ***climate exposure***—An extreme weather event or changing climate condition that could adversely affect people, livelihoods, species, ecosystems, environmental functions, services, resources, infrastructure, and economic, social, and cultural assets.
>
> ***sensitivity***—the degree to which a species, asset, or resource is affected by an extreme weather event or changing climate conditions.
>
> ***adaptive capacity***—the ability to adjust to potential impacts, take advantage of opportunities, and respond to extreme weather events and changing climate conditions.

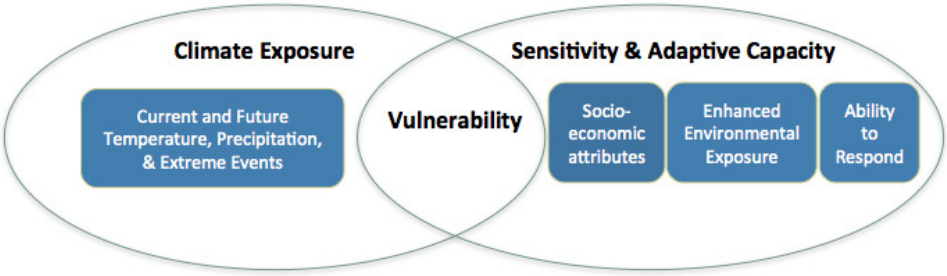


Figure 3 Components of Vulnerability. Vulnerability is determined by climate exposure, sensitivity, and adaptive capacity.[1]

Select Vulnerability Assessment Approach

Each vulnerability assessment approach is slightly different, but most include two components:

- Assessing vulnerability: combining exposure, sensitivity, and adaptive capacity; and
- Selecting initial ***planning areas***: assessing risk or using a multi-criteria approach to identify the potential magnitude of impact.

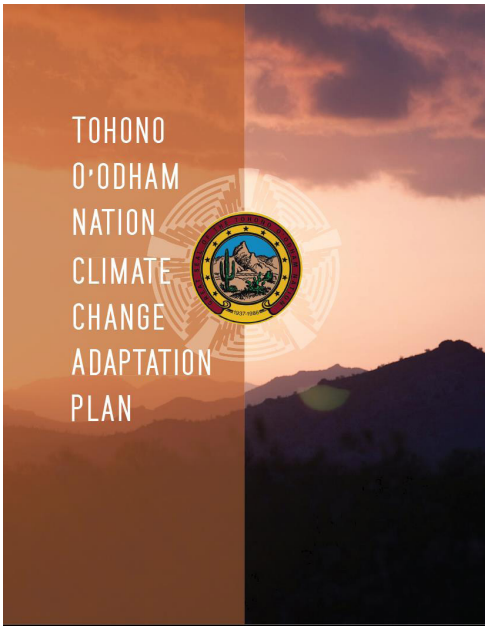
Table 8 highlights five ways tribes have approached this process. The table illustrates how available funding and selected approaches for adaptation planning tend to determine how much time and effort tribes can dedicate to each component of their vulnerability assessments. More detail on each case study is provided in Section 3.2. Tribes and tribal organizations in different regions of the country use similar approaches.

Table 8 Summary of Five Different Vulnerability Assessment Approaches. This table summarizes five different approaches that tribes have used to assess climate vulnerability and prioritize adaptation planning efforts. Examples of each of the matrices, assessment criteria, and a description of the process each tribe used is provided in Section 3.2.

Approach	Qualitative Staff Input Tohono O'odham Nation	Vulnerability & Risk Confederated Salish and Kootenai Tribes	Guided Staff Input Jamestown S'Klallam Tribe	Vulnerability Index Shoshone Bannock Tribes	Multi-Criteria Swinomish Indian Tribal Community
Exposure	Summary of State Level Climate Projections	Existing Climate Projections + Observations	Climate projections, local sea level rise analysis + Observations	Downscaled climate projections + Observations with detailed spatial analysis	Downscaled climate projections with detailed spatial analysis + staff input & estimated probability
Sensitivity	Input from Staff, Community, and Partners	Input from Staff	Guided input from Staff	Detailed assessment of biology literature	Quantitative Impact + Staff Assessment
Adaptive Capacity		Input from Staff	Guided input from Staff	Literature and staff assessment	Staff Assessment
Vulnerability	Consequences of Impacts	Vulnerability Matrix	Vulnerability Matrix	Climate Change Vulnerability Index Results	Vulnerability Matrix
Selecting Planning Areas	Risk Assessment	Risk Assessment	Staff Input - Multi-Criteria Analysis using: Timing, Magnitude, Irreversibility	Staff Input - Multi-Criteria Analysis using: Vulnerability, Likelihood, Unique Value	Risk Assessment
	Pre-selected Sectors	Staff input using Risk & Vulnerability			Staff input using Risk & Vulnerability

Case Study 1: Qualitative Staff Input—The Tohono O'odham Nation

"We chose to start the climate change adaptation planning process by focusing on three sectors that are likely to be affected by these changes in the near future – Water Resources, Human Health, and Emergency Management."—Dr. Selso Villegas, Director of the Nation's Water Resources Department.[2]



The Tohono O'odham Nation partnered with the Center for Climate Adaptation Science and Solutions (CCASS) and the Institute of the Environment, at the University of Arizona, on the Nation's climate vulnerability assessment.[3]

Climate Exposure: CCASS provided relevant state level summaries of projected climate changes for the Nation and conducted related research. The entire project focused on a pre-selected set of three sectors: water resources, human health, and emergency management.

Vulnerability Assessment: The assessment was completed primarily by Tribal departments and considered the climate exposure, other stressors, and consequences of impacts. The process also gathered input from elected representatives, community members, and youth. Descriptive tables were created for each key concern, summarizing the exposure, impacts, other stressors, consequence, probability, adaptation strategies, and funding opportunities (Figure 4).

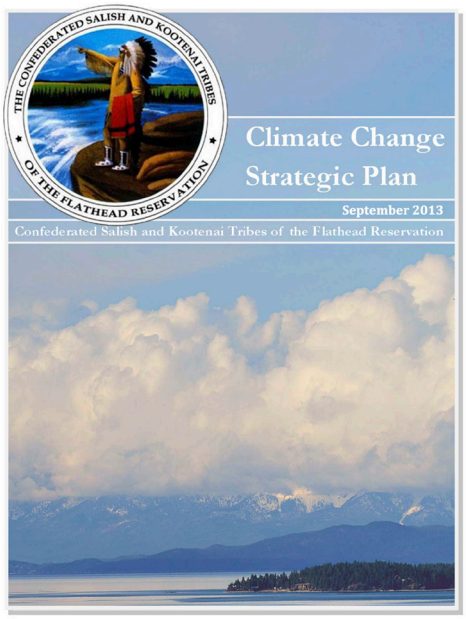
Selecting Planning Areas: Planning areas were identified at the beginning of the project as part of a sector-based approach to adaptation planning.

Table 5. Proposed adaptation strategies for reduced surface water availability for livestock and wildlife.

Sector	Water Resources/Natural Resources
Climate Driver(s)	Drought
Potential Impacts	Less surface water available for livestock and wildlife.
Other Stressors	Use of streams and wetlands (including repairs to streambanks and livestock ponds) requires USACE permits (404 and 401), a time-consuming process USACE is considering reclassifying some streams as navigable waters, which could further tighten restrictions on use for livestock
Consequences of Impact	Greater stress on livestock Ranchers may have to sell livestock
Probability of Impact	Medium-High
Potential Adaptation Strategies	Ranchers can continue to pay Tohono O'odham Utility Authority (TOUA) and the Nation's Well Maintenance Program to deliver water for livestock Rehabilitate stressed rangelands through deferment and reconstruction of levees or other structures
Funding Opportunities or Implementation Strategies	NRCS Emergency Watershed Protection (rangeland rehabilitation)

Figure 4 Example Summary Table from the Tohono O'odham Nation's Climate Adaptation Plan. The Tohono O'odham Nation created tables for each key concern that summarize the sector, climate driver, impacts, other stressors, impacts, probability of impact, potential adaptation strategies, and funding opportunities.[4]

"Our lands and resources are the basis of our spiritual life. That's been our way since time began. By preparing for further environmental changes, we can mitigate threats to our way of life. Our traditions rely on abundant populations of native fish, and wildlife, healthy plant communities, clear air, water, undisturbed spiritual sites, prehistoric and historic campsites, dwellings, burial grounds, and other cultural sites because these areas reaffirm the presence of our ancestors."—Joe Durglo, Chairman Confederated Salish and Kootenai Tribes, Climate Change Strategic Plan for the Confederated Salish and Kootenai Tribes of the Flathead Reservation.



The Confederated Salish and Kootenai Tribes completed a climate change vulnerability assessment[5] following the framework of the Institute for Tribal Environmental Professionals (ITEP) and using a combination of existing climate change projections, Traditional Knowledges, and technical tribal staff input.

Climate Exposure: Information for this element of the analysis was gathered from a combination of regional projections from the 2009 *National Climate Assessment*, *Global Climate Change Impacts in the United States*, and the 2011 *Missoula County Climate Action: Creating a Resilient and Sustainable Community* report.

Vulnerability Assessment: The vulnerability assessment was completed by Tribal departments and local organizations following ITEP's guidance and used a vulnerability matrix. Input from these participants helped qualitatively determine the sensitivity, adaptive capacity, and relative vulnerability of the different sectors identified in the plan. Short explanations of why a specific ranking level was selected are included in the summaries provided by the plan.

Risk Analysis: A risk analysis was included as a follow up to the vulnerability assessment (Figure 5) in which the participants estimated the probability and magnitude of climate change impacts on the different focus sectors.

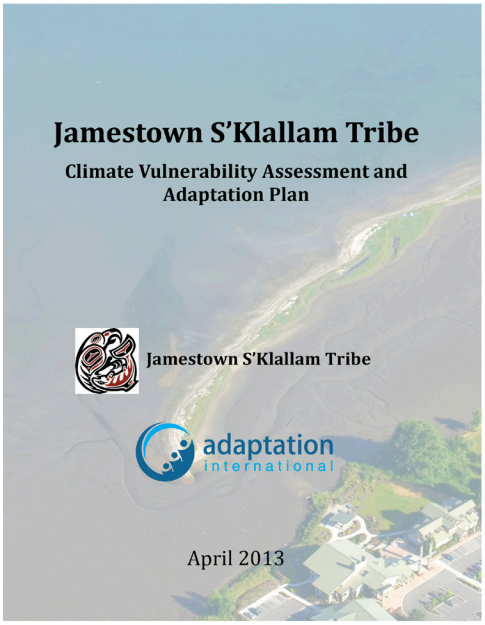
RISK	LIKELIHOOD		
CONSEQUENCES	HIGH	MEDIUM	LOW
HIGH	HIGH	MEDIUM-HIGH	MEDIUM
MEDIUM	MEDIUM-HIGH	MEDIUM	MEDIUM-LOW
LOW	MEDIUM	MEDIUM-LOW	LOW

Figure 5 Risk Assessment Matrix. The Institute for Tribal Environmental Professionals risk matrix is a product of likelihood and consequences.[6]

Selecting Where to Focus Planning Efforts: The Tribes used the ITEP matrix for selecting priority planning areas by combining the identified vulnerability and risk within each of the focus sectors.

Case Study 3: Guided Staff Input—Jamestown S'Klallam Tribe

"There is a lot of controversy around climate change, but the bottom line is that it's a reality."—Ron Allen Chairman, Jamestown S'Klallam Tribe, Jamestown S'Klallam Tribe. 2013. Climate Change Vulnerability and Adaptation Plan.



The Jamestown S'Klallam Tribe completed a climate change vulnerability assessment and adaptation plan[7] for a set of identified key concerns. The Tribe used a combination of existing climate projections, customized and localized sea level rise projections, and guided staff input from a diverse set of Tribal departments to complete the assessment.

Climate Exposure: The climate exposure information came from a combination of existing sources, including the 2009 *Washington State Climate Impact Assessment* and inputs to the 2014 *National Climate Assessment*. The project also developed locally specific sea level rise projections to map potential exposure to key coastal resources and infrastructure.

Vulnerability Assessment: The Tribe used guided input from a diverse group of Tribal staff and elders to identify the sensitivity and adaptive capacity of the key concerns in the context of projected climate exposures. Over the course of a daylong workshop, they used a series of large group sessions and smaller breakout groups to assign sensitivity and adaptive capacity rankings for each of the key concerns. These rankings were combined to identify relative vulnerability (Figure 6).[8]

Selecting Where to Focus Planning Efforts: The Jamestown S'Klallam Tribe used a second workshop to prioritize planning areas based on both their vulnerability scores and their intrinsic value to the tribe that is not necessarily reflected in the scores. They did not do a traditional risk assessment that includes only the magnitude and likelihood of consequences. Instead, the Tribe considered the magnitude of impacts, timing of impacts, persistence and reversibility of impacts, likelihood of impacts, importance of the system at risk, distribution of impacts, and potential to adapt in a multi-criteria decision analysis used to select where to focus the Tribe's adaptation planning efforts.[10]

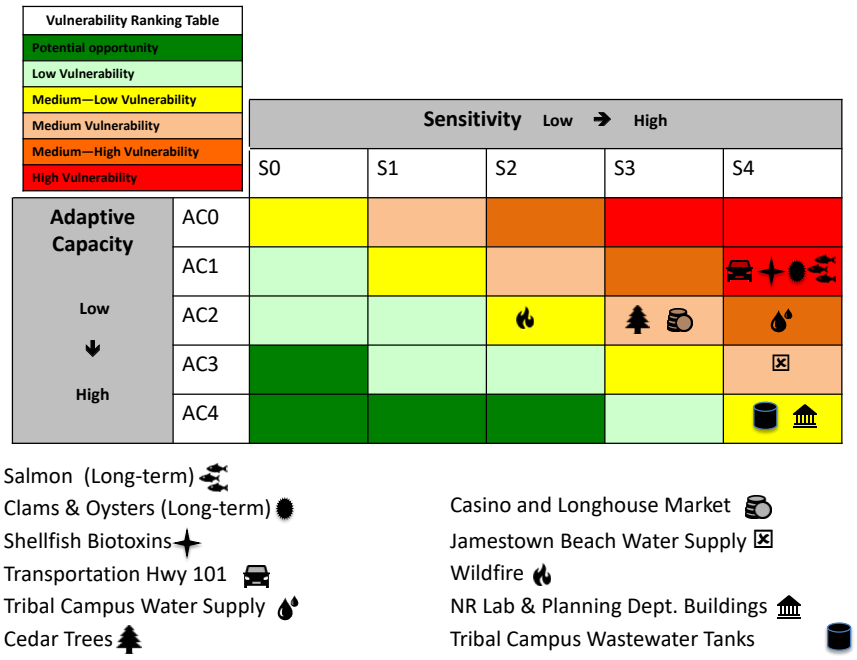


Figure 6 Vulnerability Rankings of Key Concerns for the Jamestown S'Klallam Tribe. The Jamestown S'Klallam Tribe assessed relative vulnerability of key areas of concern by using sensitivity and adaptive capacity rankings determined by the Tribe's climate change planning team. Each key concern was scored based on its sensitivity (S0 - not sensitive to S4 - extremely sensitive) and ability to adapt (AC0 - no ability to adapt to AC4 extensive ability to adapt) to the climate exposures.[9]

Case Study 4: Vulnerability Index—Shoshone-Bannock Tribes

"I cherish my reservation, just because that is where my family is… So, when I think about my position here, I think about managing in a way that they have something in the future to manage themselves."—Elese Teton, Tribal Water Engineer, Shoshone-Bannock Tribes.[11]

The Shoshone-Bannock Tribes of the Fort Hall Reservation completed a natural resource-focused climate change vulnerability assessment and adaptation plan[12] using Nature Serve's Climate Change Vulnerability Index and tribal staff expertise. The Tribes partnered with Adaptation International, Oregon State University, and the University of Washington to complete the assessment.

Climate Exposure: Climate change exposure relied on analysis of detailed, localized climate projections for the project region selected by the Tribes. This customized and locally specific analysis—which included a summary of projected changes to temperature, precipitation, and snowpack—was augmented with existing projections of changes to streamflow, wildfire regimes, and pest outbreaks.

Vulnerability Assessment: The Tribes' vulnerability assessment centered on *Nature Serve's Climate Change Vulnerability Index (CCVI).* The process involved combining Western biological literature on the species of concern with Traditional Knowledges (TKs) of Tribal members who participated in the Core Team to evaluate 19 different factors (Figure 7) that affect species sensitivity and adaptive capacity. Each factor was assigned to one of five categories based on how those factors affect species vulnerability: *Unknown*, *Neutral*, *Somewhat Increase*, *Increases*, and *Greatly Increases Vulnerability.* The Tribes reviewed the initial rankings assigned by project partners, making changes as necessary to incorporate TKs and refine the assessment. The project found the ability of the species and surrounding system to respond to climate exposures played a key role in determining the relative vulnerability of the species.

Table 4: Factors used to evaluate species' climate vulnerability in the CCVI analysis.

Factor	Description
Indirect Climate Exposure Factors	
Sea Level Rise	Effects of sea level rise on species habitat (not relevant for Shoshone-Bannock species)
Natural Barriers	Geographic features of the landscape that may restrict a species from naturally dispersing to new areas
Anthropogenic Barriers	Features of anthropogenically altered landscapes (urban or agricultural areas, roads, dams, culverts) that may hinder dispersal for terrestrial and aquatic species
Climate Change Mitigation	Effects of land use changes resulting from human responses to climate change (seawall development, wind farm, biofuel production)
Species Sensitivity and Adaptive Capacity Factors	
Dispersal / Movement	Ability of species to disperse or migrate across the landscape to new locations as conditions change over time
Historical Thermal Niche	Exposure to temperature variation over the past 50 years
Physiological Thermal Niche	Dependence on cool or cold habitats within the assessment area
Historical Hydrological Niche	Exposure to precipitation variation over the past 50 years
Physiological Hydrological Niche	Dependence on a specific precipitation or hydrologic regime
Disturbance	Dependence on a specific disturbance regime likely to be impacted by climate change
Dependence on Ice / Snow	Dependence on ice, ice-edge, or snow-cover habitats
Restriction to Uncommon Geologic Features	Dependence on specific substrates, soils, or physical features such as caves, cliffs, or sand dunes
Habitat Creation	Dependence on another species to generate habitat
Dietary Versatility	Breadth of food types consumed; dietary specialists vs. generalists (animals only)
Pollinator Versatility	Number of pollinator species (plants only)
Propagule Dispersal	Dependence on other species for propagule dispersal
Sensitivity to Pathogens or Natural Enemies	Pathogens and natural enemies (e.g., predators, parasitoids, herbivores, and parasite vectors) that can increase or become more pathogenic due to climate change
Sensitivity to competition from native or non-native species	Species may suffer when competitors are favored by changing climates
Interspecific Interactions	Other interspecific interactions not including diet, pollination, and habitat creation
Genetic Variation	Measured genetic variation (high, medium, low)
Genetic Bottlenecks	Occurrence of bottlenecks in recent evolutionary history
Reproductive System	A plant's reproductive system may serve as a proxy for a species' genetic variation or capacity to adapt to novel climatic conditions (plants only)
Phenological Response	Phenological response to changing seasonal temperature and precipitation dynamics

Figure 7 Vulnerability Assessment Factors Used by the Shoshone-Bannock Tribes. This figure shows a summary of the factors used by the climate change vulnerability index in conjunction with the projected changes to temperature and moisture for the Shoshone-Bannock Tribes' vulnerability assessment geographical area to determine relative vulnerability of each species of concern.[13]

Risk Analysis and Selecting Planning Areas: The Shoshone-Bannock Tribes did not conduct a traditional risk assessment focused on identifying the magnitude and likelihood of consequences to determine where to focus their climate adaptation planning efforts. Instead, the Tribes assigned scores for each species using the following criteria:

- *vulnerability*—as a relative measure of how the species are likely to be affected by changing climate conditions;
- *likelihood of impacts*—probability based on expert judgement that the impact will occur in a specific time period;
- *unique value of the species*—considering the social, cultural, and economic values of the species and assigning higher scores to species that have higher values; and
- *synergies with internal and external resources and processes*—consideration of on-going resilience or planning efforts so as not to miss a "window of opportunity" to develop strategies in support of an ongoing effort.

Case Study 5: Multi-Criteria Analysis—Swinomish Indian Tribal Community

"The scientific evidence of climate change is increasingly abundant and convincing … Given the geographic location and characteristics of the Swinomish Indian Reservation, climate change impacts on the Reservation community are perceived to potentially be both significant and long-term." —Swinomish Climate Change Initiative Impact Assessment Technical Report

In 2010, the Swinomish Indian Tribal Community completed a two-year climate change vulnerability assessment and adaptation planning process that incorporated customized analysis of projected climate changes, a quantitative risk assessment, and selection of focus areas for action by sub-sector.[14]

Climate Exposure: The Tribe used a wide-ranging combination of global climate projections, reports, and, where possible, downscaled regional and local projections. To better assess the potential impacts of those projections, many exposures (such as sea level rise) were mapped onto risk zones for the reservation. Probability of impacts was assigned based on expert opinion at the time of the exposure assessment (Figure 8).

Vulnerability Assessment: The vulnerability assessment relied on identifying assets and resources that would be affected in different risk zones and specific local qualitative projections of impacts based on staff assessment of sensitivity and adaptive capacity.

Risk Analysis: The Swinomish Indian Tribal Community completed a risk assessment for each of the focus sectors and elements by combining the vulnerability (impact level) with the probability of impact. In this case, risk was the product of the vulnerability and probability of impact.

Selecting Planning Areas: The Tribe used the combination of the vulnerability and risk assessment results to identify "priority planning areas" and determine where to focus their adaptation action development (Figure 9).

Sector	Element	Potential Impacts (Types)	Impact Extent	Estimated Timeframe	Probability/ Confidence
(Transportation, cont'd.)	Road System Integrity	Flooding damage from storm/tidal surge, buckling/cracking from higher temperatures	Roads within shoreline vicinity (surge), all roadways (heat)	Near-term, increasing to long term	Medium/ High
	Bridges	Erosion of bridge footings from higher tides/storm surges	Rainbow Bridge, SR20 Bridges	Increasing to long-term	Medium/ High
		Increased fatigue/deterioration of bridge joints from increased/ prolonged heat	Rainbow Bridge, SR20 Bridges	Increasing to long-term	Medium/ High
	Public Transit	Service disruption, impact-related closures	Routes serving the Reservation	Increasing to long-term	Medium/ High
	Marine transport facilities	Increasing inundation of marine facilities and ports from gradual sea level rise and higher tides	Shore-dependent facilities and structures	Increasing to long-term	High/ High
Cultural Resources & Traditions	Coastal sites/artifacts	Increasing inundation of sites from gradual sea level rise	Sites within 5 vertical feet of MHHW	Increasing to long-term	High/ High
	Burial sites/human remains	Disturbance/exposure from severe storm events	Sites within 8 vertical feet of MHHW	Near-term, increasing to long-term	Medium/ Medium
	Cultural use plants and animals	Loss/migration of traditional cultural use species	Site/species dependent	Increasing to long-term	Medium/ Medium
	Traditional use areas	Loss of treaty resources (e.g., fishing, hunting, gathering)	Site/resource dependent	Increasing to long-term	Medium/ High
	Shellfish harvesting	Potential loss of harvest sites and opportunities due to impacts to shellfish populations and habitat	All shellfish beds and habitat	Increasing to long-term	High/ High
	Beach seining	Potential loss of beach seining sites and opportunities	All current beach seine sites	Increasing to long-term	High/ High
	Marine facilities	Increasing impacts to dock facilities from rising sea level, impairing fishing activities	All dock facilities	Increasing to long-term	High/ High

Figure 8 Example Summary Table of Climate Change Impacts in the Swinomish Climate Change Impact Assessment. Summary of potential climate change impacts to transportation and cultural resources within the Swinomish reservation vicinity.[15]

PLANNING AREAS WITH SYSTEMS THAT ARE...

	Low Vulnerability	High Vulnerability
High Risk	***May be** priority planning areas*	***Should be** priority planning areas*
Low Risk	***Are unlikely to be** priority planning areas*	***May be** priority planning areas*

Figure 9 Planning Area Prioritization Matrix Used by the Swinomish Indian Tribal Community. The Swinomish Indian Tribal Community considered vulnerability and risk to determine on which planning areas to focus their adaptation action development efforts.[16]

3.3 Determine Relative Climate Change Vulnerability

Relative vulnerability rankings are a key input in deciding where to focus the tribe's adaptation planning efforts. Key concerns that are more vulnerable may need immediate attention while those that are less vulnerable could be addressed in the future. There may be instances where climate change creates areas of opportunity that current conditions do not support.

Checklist

- ❑ Compile Information on Components of Vulnerability
- ❑ Determine Relative Vulnerability Rankings

As can be seen from the examples provided in Section 3.2, relative climate change vulnerability can be assessed either quantitatively or qualitatively and depends on the climate exposure, sensitivity, and adaptive capacity.

Compile Information on Components of Vulnerability

Climate Exposure—includes everything from more frequent heavy rainfall events and coastal or riverine flooding to higher temperatures and more intense periods of drought. Changes in the extent, magnitude, and frequency of extreme weather events can have significant effects on the things the tribe cares about. Using existing resources available for climate projections, it is possible to identify quantitative projections for many of these climate exposures. Where quantitative projections are not available, exposure can be qualitatively assessed (i.e., identifying direction and magnitude). See Section 2.4 for more guidance on collecting and summarizing relevant and actionable climate exposure information.

Sensitivity—depends on the nature of the key concern and the climate exposure variable. A particular concern may be very sensitive to changes in water availability but only slightly sensitive to changes in temperature. For example, the different tree species pinyon pine and douglas fir, which live near each other in dry coniferous forests, will likely be exposed to the same increases in temperature and potential drought conditions. However, each species has a different level of tolerance of drought conditions and thus can be more or less sensitive to those conditions.[17] Similarly, due to physiology, elders and youth are more sensitive to extreme heat events than young adults and adults.[18]

Adaptive Capacity—of a key concern is critical in determining the impacts to climate and extreme weather events. Identifying key limitations to adaptive capacity can help determine how to design and focus adaptation actions to reduce those limitations and help the species, asset, or system respond positively to projected changes. For example, with changing food supplies in a particular habitat, a generalist species that eats a variety of plants will likely have a higher adaptive capacity than specialist species that relies on only one or two plants for survival. Similarly, a drinking water supply system that has two water sources (groundwater and surface water) and two sets of pumps is better prepared to shift between those sources if one source is affected by changing precipitation patterns (has higher adaptive capacity) than a water supply system dependent on a single water source.

Traditional Knowledges Checkpoint

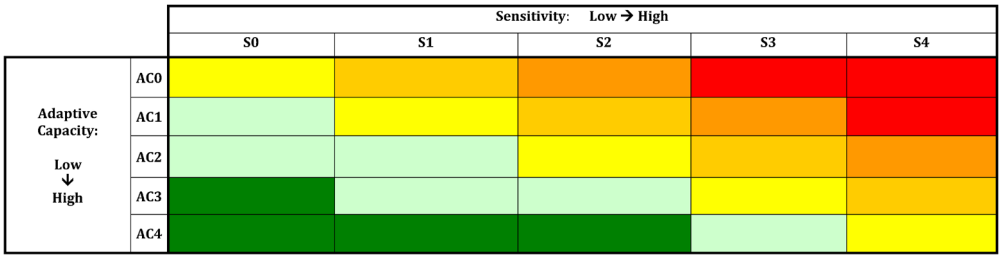
Traditional Knowledges (TKs) can make a valuable contribution to the assessment of exposure, sensitivity, and adaptive capacity. Refer to the predetermined methods for bringing in TKs (Section 1.4) following all tribal protocols and ensuring that all TK holders understand potential risks involved in sharing TKs (*CTKW Guideline 3*). Discussion and agreement of what TKs are acceptable, legal, and approved to be shared, and with whom, is vital.

Determine Relative Vulnerability Rankings

The tribe can use relative vulnerability rankings to help determine where to focus adaptation planning efforts. Assigning sensitivity and adaptive capacity scores for the range of climate exposures can be used to calculate the relative vulnerability of each of the key concerns. One way to do this is by using a relative vulnerability matrix.

- *High vulnerability key concerns* (e.g., orange and red colors in Figure 10) that have higher sensitivities and lower adaptive capacities. This means that those areas are likely to be affected first and worst by the changing climate conditions.
- *Lower vulnerability key concerns* (e.g., light and dark green colors in Figure 10) have lower sensitivity and higher adaptive capacities. This means that those key concerns are not as likely to be affected, won't be affected immediately, or may be areas of opportunity for the tribe in the future. For example, some species and resources may actually do better with changing climate conditions, creating potential economic or other opportunities for the tribe.

There are a variety of approaches tribes have used to complete a relative vulnerability assessment process (See Section 3.1 and Section 3.2). A relative vulnerability matrix (Figure 10) such as the one used by the Jamestown S'Klallam Tribe, can summarize information that the tribe can use to focus planning efforts.



Vulnerability Ranking Table
Potential Opportunity
Low Vulnerability
Medium-Low Vulnerability
Medium Vulnerability
Medium-High Vulnerability
High Vulnerability

Sensitivity Levels	
S0	Key Concern will not be affected by the projected impacts
S1	Key Concern will be minimally affected by the projected impacts
S2	Key Concern will be somewhat affected by the projected impacts
S3	Key Concern will be largely affected by the projected impacts
S4	Key Concern will be greatly affected by the projected impacts

Adaptive Capacity Levels	
AC0	Key Concern is not able to accommodate or adjust to impacts
AC1	Key Concern is minimally able to accommodate or adjust to impact
AC2	Key Concern is somewhat able to accommodate or adjust to impact
AC3	Key Concern is mostly able to accommodate or adjust to impact
AC4	Key Concern is able to accommodate or adjust to impact in a beneficial way

Figure 10 Example Relative Vulnerability Assessment Matrix. This matrix shows relative vulnerability assessment rankings by color. Orange and red colors represent higher vulnerability (have higher sensitivities and lower adaptive capacities). Light and dark green colors represent lower vulnerability (have lower sensitivities and higher adaptive capacities).[19]

Guiding Questions

Exposure - See Section 2.4 for guiding questions on climate exposure.

Sensitivity

- Are there already existing climate or other stresses to the key concern?
- What are some existing stressors that climate change could exacerbate?
- How do current climate conditions and extreme weather affect the key concern?
- What factors are the key concerns sensitive to and by how much?
- What are the key concern's important climate and weather thresholds? Is there a maximum water temperature above which a key fish species cannot survive? Is the species of concern currently located near the edge or lowest elevation portion of its range? Is the infrastructure item or asset designed to operate in the projected range of climate changes?

Adaptive Capacity[20]

- Is the key concern already able to accommodate or respond to current extremes? What about projected changes in climate?
- How easy or hard will it be for the system to adjust to the future changes? Why?
- Are there alternative options (e.g., redundancy) for the key concern if one aspect of it is damaged?
- Are there barriers to the system's ability to accommodate changes in climate (e.g., regulations based on historic climate conditions; other competing uses of the system; high number of organizations involved in managing the system; or biologic, geographic, or physical barriers)?
- Will the rate of climate change be faster than the system's ability to adapt?
- Are there other stresses on the planning area that will reduce its ability to adapt to climate change?
- Does the tribe currently have the capacity to address the impact with minimal cost and disruption?

Reality Check

Once the tribe has completed the relative vulnerability assessment process, pause and have the climate change planning team evaluate the reality of the assessment results.

In many (but not all) cases, climate change will increase current vulnerabilities. Members of the climate change planning team may already have a sense of the relative vulnerabilities between the key concerns, and it makes sense to review and ground truth these results. If the results are different than expected, investigate why it may be so in order to confirm the results of, identify errors in, or identify necessary modifications to the assessment. Consider the following questions:

- Do the final results of the relative vulnerability assessment make sense? If not, why not?
- Are there any significant surprises that cannot be explained?
- Were Traditional Knowledges included in the right manner, according to tribal policy and accurately following tribal cultural protocols?
- Are there any gaps where more input, data, or expertise is needed?

Finally, it is important to understand the limitations of and assumptions inherent in the chosen vulnerability assessment approach. Quantitative approaches may be limited by the detailed inputs available to run the tools or models. Qualitative assessments may be limited by the expertise of the people consulted or involved in the assessment. Knowing these limitations can aid in understanding the results.

Resources

The **University of Oregon Pacific Northwest Tribal Climate Change Network** *Online Tribal Climate Change Guide* provides an extensive list of tribal adaptation planning reports, summaries, and associated resources.

The **US Climate Resilience Toolkit** *Tribal Resilience Resource Guide* has links to tribal resources and summary project materials from tribes that have completed climate change vulnerability assessments.

Tribes such as the Stillaguamish, Shoshone-Bannock, and the Navajo have utilized the ***NatureServe Climate Change Vulnerability Index*** while preparing their vulnerability assessments. The index provides a standardized framework for assessing the relative vulnerability of key species, but relies on specific data inputs and classification of species-specific factors that may or may not tell the full story of climate change vulnerability for that species.

The **National Wildlife Federation** *Scanning the Conservation Horizon: A Guide to Climate Change Vulnerability Assessment* provides advice and guidance on conducting natural resource focused vulnerability assessments.

The **Institute for Tribal Environmental Professionals** *Climate Change Resources Adaptation Planning Tool Kit* provides templates for a vulnerability assessment process and other portions of the adaptation planning process.

3.4 Select Priority Planning Areas

Given finite time and limited resources it is useful to determine where to start taking action to enhance resilience.

Checklist

- ❑ Complete a Qualitative or Quantitative Risk Assessment
- ❑ Identify Priority Planning Areas

Planning efforts are always limited in some way by time, money, or other resources. So, it is useful to pick a place to start taking action. This does not imply that the areas selected are more important than other concerns, merely that these planning areas are good opportunities for the tribe to start taking action. The five case studies (Section 3.1 and Section 3.2) highlight different approaches that tribes have used to focus their adaptation planning efforts.

Complete a Qualitative or Quantitative Risk Assessment

A ***risk assessment*** is the process of identifying the probability of occurrence multiplied by the magnitude of consequences of an adverse event or impact. Using a risk assessment, or other approach, to assess the consequences of changes in climate can help determine which issues will have the greatest impact on the community. Some tribes use explicit consideration of risk to help determine where to focus their adaptation planning efforts. Others incorporate consideration of risk into a multi-criteria assessment process. Either way, the goal is to use the information to determine where to focus the tribe's adaptation planning efforts.

For example, two different tribal neighborhoods are both located near a river that is vulnerable to flooding from heavy precipitation events. In one neighborhood, five houses are located in the potential flood zone. In the other neighborhood, 25 houses and the tribe's casino are located within the potential flood zone. Assuming the likelihood of flooding in both neighborhoods is the same, then the consequence of the second neighborhood flooding is higher since more homes and buildings would be affected. (This assumes consequences are measured as both the direct impacts of the number of homes, buildings, and important economic resources affected and the secondary impacts of that flooding.) So, the risk of the second neighborhood flooding is higher than that of the first neighborhood. Higher risk areas can be the focus of initial adaptation planning efforts.

Using either a traditional risk assessment focused on the likelihood and consequence of an impact (See the Case Studies *Confederated Salish and Kootenai Tribes* and *Swinomish Indian Tribal Community* in Section 3.2) or a multi-criteria analysis that includes a variety of factors—such as the unique value of the species or the magnitude and irreversibility of potential impacts (See the Case Studies *Jamestown S'Klallam Tribe* and *Shoshone-Bannock Tribes* in Section 3.2) to assess the potential impacts to the community with each key concern. Rely on input from the planning team, community members, and partners to complete the risk assessment process.

Note: No matter which approach the tribe uses, it is important to be consistent across the assessment and use the same variables to assess risk so that the risks can be compared. These variables may include, but are not limited to, impacts to people (e.g., loss of life, physical injury, and mental health), impacts to infrastructure (e.g., loss of homes, impacts to businesses, and impacts to infrastructure), or cultural significance (e.g., loss of culturally important plant and animal species, and limited access to cultural sites or resources).

Identify Priority Planning Areas

The results of the risk assessment will guide the selection of priority planning areas. In some cases, these planning areas may be pre-determined by the adaptation planning approach or may be further refinements of the initial planning areas identified in Section 1.1. In other cases, they may be a subset of those initial areas focusing on the highest vulnerability, highest risk, or near-term opportunities for action (depending on the criteria used in the assessment). This selection of planning areas to focus on (or the refinement of key concerns to focus on within a planning area) can help target funding, resources, and time on the areas where investment is most needed.

Collaborate with the appropriate members of the planning team, community, partners, and others in the assessment process to determine the criteria for selecting planning areas to move forward into the planning for action phase. For example, consider whether key concerns above a certain risk ranking (e.g., high risk) should be prioritized. Or, consider whether low vulnerability or low consequence items would be best left for a future phase of the tribe's adaptation planning work. Narrowing the focus of the assessment will allow the tribe to use a finite set of resources effectively.

Guiding Questions

- Who or what will be affected if a given impact occurs? How many people? What types of infrastructure? What natural systems? These consequences might include impacts to operations, or ecological, social, cultural, and legal impacts.
- What is the magnitude or scale of the impact? For example, how much of the key concern would be affected by a flood? How long? What is the magnitude of monetary damages? Would people be endangered, or merely inconvenienced?
- What are the cultural, social, environmental, and psychological effects associated with the key concern being affected (e.g., mental health effects of losing homes, loss of income and employment from destruction of businesses; how do decreases in species affect food availability, economic revenues, and tribal culture)?
- What is the likelihood of those impacts occurring? How often will they occur in the future?
- What criteria will be used to determine which concerns or planning areas to focus on for initial action?
- How does each key concern (e.g., sector, species, habitat, resource, or asset) score based on the selected criteria? In general, do more vulnerable, culturally significant concerns score higher?

Case Studies

The Red Lake Band of Chippewa Indians

The Red Lake Band of Chippewa Indians in Minnesota used an alternative risk matrix layout in their vulnerability assessment in *Mitigwaki idash Nibi: (Our Forests and Water)*. The Tribe ranked the consequences and probability as high, medium, or low, and assessed their ability to respond. Based on these rankings, the Tribe categorized risks overall as high, medium, or low.[21]

St. Regis Mohawk Tribe

The St. Regis Mohawk Tribe completed a *Climate Change Adaptation Plan for Akwesasne* (the Mohawk Nation Territory) in 2013. As part of this plan, the Tribe's Environment Division investigated the potential impacts of climate change on a wide range of tribal resources grouped by 18 planning areas, such as the People, the Waters, and Small Plants and Grasses.[22]

Resources

The **World Wildlife Fund South Pacific Programme** *Climate Witness Community Toolkit* is a collection of participatory community exercises for climate change and adaptation planning. The *Root Cause Analysis* exercise can help the community identify primary and secondary effects of a climate change-related problem that will aid in determining the magnitude of consequences of a particular climate exposure.

The **Institute for Tribal Environmental Professionals (ITEP)** *Climate Change Resources Adaptation Planning Tool Kit* is a collection of templates and other resources developed by by ITEP to assist tribes in their climate change adaptation planning process. Questions from the Adaptation Planning Worksheet, and the associated matrices can help the tribe's planning team identify vulnerabilities.

[1] Alexander "Sascha" Petersen et al., "Climate Change and the Jamestown S'Klallam Tribe: A Customized Approach to Climate Vulnerability and Adaptation Planning," Michigan Journal of Sustainability 2, no. 1 (2014): 16. http://dx.doi.org/10.3998/mjs.12333712.0002.003.

[2] Dr. Villegas (Director of Tohono O'odham Nation Water Resources Department), personal communication to Sascha Petersen, May 30, 2018.

[3] Tohono O'odham Nation, *Climate Change Adaptation Plan* (Tohono O'odham Nation, 2018).

[4] Tohono O'odham Nation, *Climate Change Adaptation Plan*.

[5] Confederated Salish and Kootenai Tribes, *Climate Change Strategic Plan for the Confederated Salish and Kootenai Tribes of the Flathead Reservation* (Confederated Salish and Kootenai Tribes of the Flathead Reservation, 2013).

[6] "Worksheet: Adaptation Planning—Climate Change Resources Adaptation Planning Tool Kit,"Institute for Tribal Environmental Professionals (ITEP), accessed June 14, 2017. http://www7.nau.edu/itep/main/tcc/Resources/adaptation.

[7] Jamestown S'Klallam Tribe, *Climate Change Vulnerability and Adaptation Plan* (Jamestown S'Klallam Tribe, 2013).

[8] Jamestown S'Klallam Tribe, *Jamestown S'Klallam Tribe Climate Vulnerability Assessment and Adaptation Plan Appendices* (Jamestown S'Klallam Tribe, 2013), 12–13, http://www.jamestowntribe.org/programs/nrs/climchg/JSK_Climate_Change_Adaptation_Report_Appendices.pdf.

[9] Jamestown S'Klallam Tribe, *Climate Change Vulnerability and Adaptation Plan*.

[10] Jamestown S'Klallam Tribe, *Climate Vulnerability Assessment and Adaptation Plan Appendices*, 14–15, http://www.jamestowntribe.org/programs/nrs/climchg/JSK_Climate_Change_Adaptation_Report_Appendices.pdf.

[11] Shoshone-Bannock Tribes, "Dammen Baa - Shoshone-Bannock Tribes Action on Climate Change," published on Aug 14, 2017, video, https://www.youtube.com/watch?v=oYJSxXnUsx0.

[12] Sascha Petersen et al., *Shoshone-Bannock Tribes Climate Change Vulnerability Assessment and Adaptation Plan* (Shoshone-Bannock Tribes, 2017).

[13] Petersen et al., *Shoshone-Bannock Tribes*.

[14] Swinomish Indian Tribal Community, *Swinomish Climate Change Initiative: Impact Assessment Technical Report* (Swinomish Indian Tribal Community, 2009).

[15] Swinomish Indian Tribal Community, *Swinomish Climate Change Initiative: Impact Assessment Technical Report*.

[16] Amy K. Snover et al., *Preparing for Climate Change: A Guidebook for Local, Regional, and State Governments* (Oakland, CA: ICLEI – Local Governments for Sustainability, 2007).

[17] Hyojung Kwon et al., "The Influence of Hydrological Variability on Inherent Water Use Efficiency in Forests of Contrasting Composition, Age, and Precipitation Regimes in the Pacific Northwest," *Agricultural and Forest Meteorology* 249 (2018): 488–500, https://doi.org/10.1016/j.agrformet.2017.08.006.

[18] Allison Crimmins et al., eds., *The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment* (Washington, DC: US Global Change Research Program, 2016).

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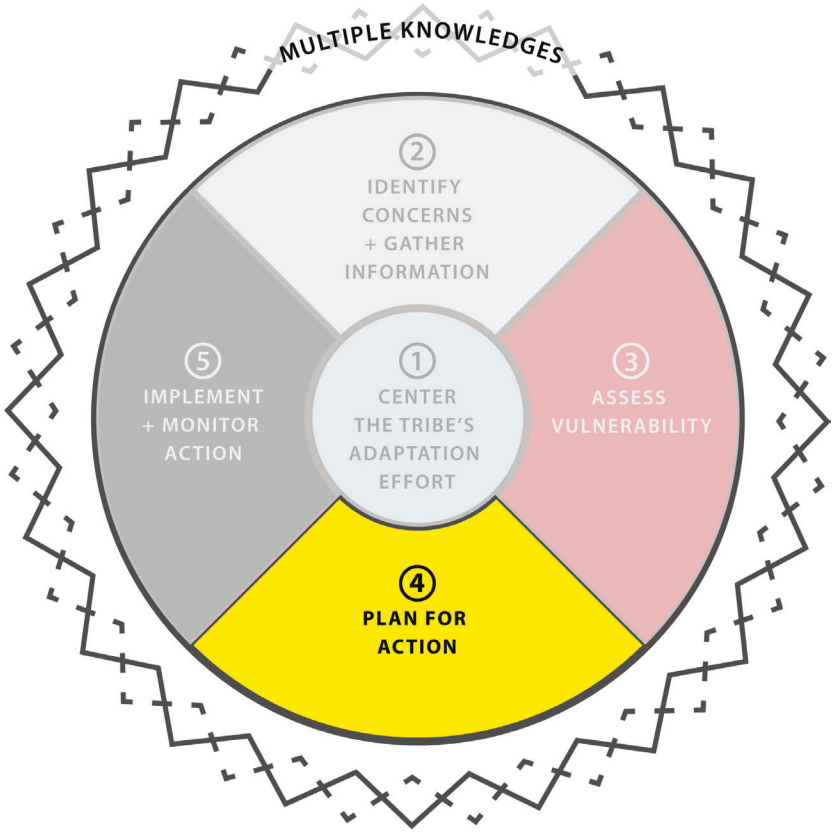
[20] Many of these guiding questions come from: Institute for Tribal Environmental Professionals (ITEP). "Climate Change Adaptation Planning," Materials from Training held in Anacortes, WA at the National Tribal Forum on Air Quality, May 12, 2014.

[21] Jerilyn Jourdain, *Mitigwaki idash Nibi: (Our Forests and Water) A Climate Adaptation Plan for the Red Lake Band of Chippewa Indians* (Sagle, ID: Model Forest Policy Program, 2014).

[22] St. Regis Mohawk Tribe, *Climate Change Adaptation Plan for Akwesasne (draft)* (St. Regis Mohawk Tribe, 2013).



Step 4: Plan for Action

Developing the adaptation plan is where the tribe can use all of the information gathered during the first few steps of the adaptation planning process to identify and customize actions that can be used to reduce vulnerability and build resilience to climate change.

- ❑ 4.1 Set Adaptation Goals
- ❑ 4.2 Identify Adaptation Actions
- ❑ 4.3 Evaluate & Prioritize Actions
- ❑ 4.4 Implementation Plans
- ❑ 4.5 Sharing the Story of the Tribe's Adaptation Work

4.1 Set Adaptation Goals

> *"Planning for adaptation must necessarily follow and be guided by community goals. For the purposes of this project, the project team was guided by existing goals as contained in documents approved and developed by the Tribal Senate. The primary guiding document is the Swinomish Comprehensive Plan, which addresses goals for all major functions and activities within the Reservation."—Swinomish Climate Change Initiative Climate Adaptation Action Plan*

Clearly articulated goals can help guide the development of specific adaptation actions, and keep those involved focused on the desired long-term outcomes in each planning area.

Checklist

- ❑ Develop Adaptation Goals for Each Planning Area

Develop Adaptation Goals for Each Planning Area

Before developing specific adaptation actions, it is useful to identify adaptation goals for each planning area and the associated key concerns. ***Adaptation goals*** are general statements about what the tribe wants to accomplish in a priority planning area.[1] The University of Washington Climate Impacts Group guidebook, *Preparing for Climate Change: A Guidebook for Local, Regional, and State Governments,* recommends being specific about the timeframe for goals, remembering the audience for goals, engaging others outside the planning team, and following guiding principles for goal development.[2] When setting adaptation goals, consult the tribe's vision and overall goals for adaptation planning (Section 1.3). Choose one or more goals for each planning area. For example, goals for coniferous forests could be to: 1) decrease wildfire risk; 2) increase forests' abilities to withstand drought; and 3) limit the extent and magnitude of pest outbreaks.

Guiding Questions

- Are there existing goals for each planning area?
- How will climate change affect those goals? How do goals need to be modified to account for changing conditions?
- What is one (or more) overarching goal for each planning area related to climate change adaptation?

Case Studies

Shoshone-Bannock Tribes

The *Shoshone-Bannock Tribes Climate Change Vulnerability Assessment and Adaptation Plan* identifies key climate concerns, associated goals—which the plan calls objectives, and a number of actions to help achieve those goals. The plan groups adaptation actions with similar end goals by strategy. Examples for the *Forest Habitats* planning area include:

- Objective 1: Prepare for and limit the effects of more frequent or intense droughts and wildfires;
- Objective 2: Prepare for shifts in the distribution of forest species and habitats;
- Objective 3: Species-specific resilience or survival strategies;
- Objective 4: Limit the effect of invasive species to enhance the natural resilience of forest habitats;
- Objective 5: Enhance forest health to increase resilience to disturbance;
- Objective 6: Invest in monitoring, evaluation, and research to better understand how changing climate conditions are affecting forests, aspen, and pinyon pine; and
- Objective 7: Enhance outreach and education efforts within the tribal community to build climate literacy and support for future actions.[3]

Red Lake Band of Chippewa Indians

The climate adaptation plan for the Red Lake Band of Chippewa Indians, *Mitigwaki idash Nibi: (Our Forests and Water)*, is organized around eight key high-level goals, including:

- "Protect and preserve our water quality and fishery";
- "Manage/reduce/prevent invasive species";
- "Encourage climate risk awareness in Tribal program planning and implementation"; and
- "Facilitate meaningful stakeholder engagement by expanding partnership efforts to downstream communities and other management entities."[4]

Nez Perce Tribe

The Nez Perce Tribe *Clearwater River Subbasin (ID) Climate Change Adaptation Plan* focuses on forest, water, and economic resources in the Clearwater River Basin. The plan identifies goals by sector (i.e., general, forest resources, and water resources). Some example goals include:

- "Create partnerships to research local effects of climate change on water resources, forestry, and the economy";
- "Include climate change adaptation assessment data, goals, and objectives in local and regional planning documents"; and
- "Manage wildfire risk in the wildland-urban interface (WUI) zone."[5]

4.2 Identify Adaptation Actions

> *"What we are seeing on the Owyhee is probably due to less water, but what else? Hot days. It has gotten very hot. Let's not leave it there…What do we DO about it?"—Beverly Crum, Shoshone-Paiute Elder, Upper Snake River Tribes Foundation Climate Change Vulnerability Assessment*

Be creative and inclusive when working with tribal staff and community members to create a list of potential actions that could be used to achieve the adaptation goals for each key concern or planning area.

✓ Checklist

- ❑ Identify Ongoing Actions Related to Adaptation
- ❑ Compile a List of Potential Adaptation Actions for Each Adaptation Goal

After establishing goals, the climate change planning team and others can work together to identify, customize, and refine specific adaptation actions to achieve those goals. An ***adaptation action*** is a specific activity that can be implemented in order to achieve adaptation goals. Consider the key factors that influence vulnerability and think about concrete ways to reduce vulnerability by decreasing exposure, reducing sensitivity, and increasing adaptive capacity. Building off the best and promising practices from other communities and customizing adaptation actions will allow them to be effective for the community.

Identify Ongoing Actions Related to Adaptation

The first place to look for ideas for adaptation actions is in the work that the tribe is already doing. Departments, agencies, and other entities within the tribe may already be thinking about climate change. Identify any adaptation efforts in existing tribal plans for natural resources, environmental, cultural, transportation, or other public service sectors. Work already underway, or planned for, likely has the departmental and institutional support and funding to be carried out. It may be a matter of slightly adjusting the inputs, targets, or scope of these efforts to ensure that they help the tribe prepare for future climate.

Compile a List of Potential Adaptation Actions for Each Adaptation Goal

The next set of places to look is to other tribes who have already completed adaptation plans, published and gray literature, federal agencies or partnerships, Traditional Knowledges (TKs), or from the community's own imagination. These actions may need to be customized to align with the tribe's priorities, TKs, and co-management responsibilities. For example, an action from the US Forest Service Adaptation Resource that says: maintain or restore riparian areas by "…promoting a diversity of tree and plant species to increase stream shading, provide a source of woody debris, stabilize the soil, and provide habitat and connectivity for wildlife"[6] would ideally be modified to specify which types of trees to plant and where to plant them.

Gather as many adaptation actions as possible from a variety of sources and then refine those actions, making them relevant to the tribe. When gathering adaptation actions, consider actions within the categories defined in Table 9. Also, the tribe's staff, climate change planning team, and community members may come up with new possibilities. The inclusion of TKs within this process has the potential to inform the development of adaptation actions that are better connected to and support the tribe's traditional practices and culture.

Create a structure to organize the collected adaptation actions. It may be convenient to organize actions by planning area and associated goals. Actions may also be organized by climate impacts or type of strategy or another method that works for the tribe. Choose an organizational structure that best helps the tribe evaluate, customize, and implement actions.

Traditional Knowledges Checkpoint

Invite tribal cultural resource managers to participate in identifying adaptation measures. This may include identifying traditions and cultural patterns that have already adapted to a changing climate and fostering discussions about what kind of adaptations are culturally appropriate.

Identify Traditional Knowledges (TKs) pertaining to adaptations. Are there circumstances that are, or have been, requiring adaptations (occasionally or increasingly)? How can adaptation measures work for these situations now and into the future?

When possible invite and encourage cultural resource managers to participate in elders' meetings to meld guiding the future of adaptation possibilities with TKs and possible documentation efforts.

Identify situations that require adaptations. Which adaptation measures are acceptable, and which are entirely unacceptable per traditional customs? Is adjusting cultural foods possible (e.g., ceremonial rites requirements, etc.)? Is it possible to change, add or increase use of other natural resource materials used in traditional practice?

Refer to the pre-determined methods for bringing in TKs (Section 1.4), following all tribal protocols and ensuring that all TK holders understand potential risks involved in sharing TKs (*CTKW Guideline 3*). Remember that TK holders reserve the right NOT to participate in sharing TKs or to cease participating at any time (*CTKW Guideline 2*).

Table 9 Adaptation Action Categories and Examples. Types of adaptation actions to consider along with a description of those actions and examples of specific actions developed by tribal communities that fit within those categories.

Type of Action	Description	Examples
Collaboration and Partnerships	Working with other organizations to implement actions	"Ranchers can continue to pay Tohono O'odham Utility Authority (TUOA) and the Nation's Well Maintenance Program to deliver water to livestock."—*Tohono O'odham Nation Climate Change Adaptation Plan* "Work with private landowners and key state and federal agencies to set back dikes, remove armoring, and address other barriers that limit floodplain connectivity."—***Shoshone Bannock Tribes Climate Change Assessment and Adaptation Plan***
Policies and Regulations	Updating legal and policy framework for actions to incorporate future conditions	"Streamlined permitting for adaptation activities."—***Swinomish Climate Change Initiative Climate Adaptation Action Plan*** "Launch a "medicine plant restoration program," including the development of a medicine garden."—**St. Regis Mowhawk Tribe *Climate Change Adaptation Plan for Akwesasne* (draft)**
Operations and Management	Changing the way processes or procedures are carried out	"Develop and maintain greenhouse capacity to grow and plant native and cultural plant species (11-25 years)."—***Climate Change Strategic Plan for the Confederated Salish and Kootenai Tribes*** "Sinking of the sewer mains in some areas means that the system is vulnerable to freezing. This problem can be addressed by more frequent monitoring and maintenance. Developing connections that are durable and accommodate significant movement, and support (foundation) systems for soft thawing soils, may improve the long term performance of the system."—***Climate Change in Selawik, Alaska Strategies for Community Health***

Outreach and Education	Spreading the word and involving more people in creating and implementing solutions	"Develop outreach and education materials that will inform the tribal community of the real and potential dangers of climate change and help the community prepare for these changes."—*Climate Adaptation Plan for the Territories of the Yakama Nation* "Develop and expand existing programs to increase youth empowerment, including youth forums, language revitalization, and community organizing trainings to support further reintegration back into culture."—*Yurok Tribe Climate Change Adaptation Plan for Water and Aquatic Resources*
Research, Monitoring, and Assessment	Gathering additional data or information to guide future action or evaluate the success of selected actions	"Inventory important sugar maple stands for climate protective site characteristics."—*Climate Change Vulnerability Assessment and Adaptation Plan: 1854 Ceded Territory Including the Bois Forte, Fond du Lac, and Grand Portage Reservations* "Create a monitoring and reporting system to track how cedar abundance and yields are changing. Partner with traditional harvesters to gather on-the ground observations."—*Jamestown S'Klallam Tribe Climate Vulnerability Assessment and Adaptation Plan: Appendices*

Source: Institute for Tribal Environmental Professionals (ITEP). "Climate Change Adaptation Planning," Materials from Training held in Anacortes, WA at the National Tribal Forum on Air Quality, May 12, 2014; Missy Stults et al., Climate Change Vulnerability Assessment and Adaptation Plan: 1854 Ceded Territory Including the Bois Forte, Fond du Lac, and Grand Portage Reservations (Duluth, MN: 1854 Ceded Territory, 2016).

Community Engagement Checkpoint

Engaging with community members, elders, and tribal staff beyond the planning team can bring in other expertise, viewpoints, and experience to help the tribe collect all relevant and useful ideas for adaptation actions. Consider engaging the community by:

- Hosting workshops or meetings on particular topics (this narrows the discussion and allows the tribe to capture specific feedback);
- Using existing tribal gatherings as opportunities for engagement and dialog;
- Soliciting written input and feedback on ideas from the community; or
- Visiting with selected tribal members and elders to obtain their direct input.

Guiding Questions

- What potential actions are being used by other tribes, agencies, conservation groups, or others to address similar climate concerns?
- Does the climate change planning team or tribal staff have recommendations of where to look for specific adaptation actions?
- What new actions would the community like to see undertaken?
- What actions can be taken at no cost or with limited funding?
- How can a specific action be customized to the tribe's local geography and context to make it as effective as possible?
- Are there actions that could be implemented now and then refined or expanded in the future?

Case Studies

Yakama Nation

In the *Climate Adaptation Plan for the Territories of the Yakama Nation*, adaptation actions are grouped by planning areas and then by the type of action. The types of actions fell into one of two categories: *Research and Monitoring* and *Management and Implementation*.[7]

Tohono O'odham Nation

In the Tohono O'odham Nation *Climate Change Adaptation Plan*, the Nation developed adaptation actions for a variety of concerns focused on water resources, human health, and emergency management. For each concern the Nation identified one or more actions along with potential funding sources for implementing each action.[8]

Swinomish Indian Tribal Community

In the *Swinomish Climate Change Initiative Climate Adaptation Action Plan*, the Strategy Advisory Group identified a list of potential adaptation actions. These actions were grouped into five main categories (planning areas): coastal resources, upland resources, community infrastructure and services, physical health, and cultural resources. Each category has a number of specific adaptation actions identified to help achieve the goals for that category.[9]

Shoshone-Bannock Tribes

As part of the Tribes' *Climate Change Assessment and Adaptation Plan*, the Shoshone Bannock Tribes developed an Adaptation Workbook with hundreds of actions grouped by planning areas (habitats) and adaptation goals (called objectives). See Section 4.1 for a subset of those objectives.[10]

Resources

The **World Wildlife Fund South Pacific Programme** *Climate Witness Community Toolkit* is a collection of participatory community exercises for climate change and adaptation planning. The *Sun Ray Exercise* or adaptations of it may be useful in brainstorming solutions to reduce the sensitivity or existing stressors of key concerns.

As part of the **Institute for Tribal Environmental Professionals** *Climate Change Resources: Adaptation Planning Tool Kit*, there is a downloadable database, called *Guides and Tools for Climate Change Adaptation Planning*, with resources for adapting to climate change in various sectors including agriculture, buildings, coasts, emergency services, fish and wildlife, forests, health, land use, utilities, and water. See the *Adaptation Strategies* tab.

The **University of Oregon Online Tribal Climate Change Guide** provides up-to-date information on a wide range of funding opportunities, programs, and resources relevant to tribes working to address climate change. The *Tribal Climate Change Adaptation Plans* page lists examples of tribal climate change adaptation plans, as well as other plans and planning resources that may be useful reference guides for developing and implementing tribal climate change adaptation plans and climate vulnerability assessments.

The **US Forest Service** report, *Forest Adaptation Resources: climate change tools and approaches for land managers*, outlines adaptation strategies and approaches for forest land management. Climate change tools and approaches for land managers are available in Chapter 3 of the report. The Forest Service breaks down adaptation actions into options, strategies, approaches, and tactics depending on the focus and level of the intervention.[11] A *Tribal Adaptation Menu* is being developed in collaboration with tribes in the Great Lakes region and is planned to be available on the Great Lakes Indian Fish and Wildlife Commission website in 2019.[12]

Adaptation Partners is a science-management partnership focused on climate change adaptation in the western United States. Browse the *Climate Change Adaptation Library* to find adaptation actions focused on natural resource systems and sectors, including forest vegetation, non-forest vegetation, riparian/wetland, water resources, fisheries, wildlife, and recreation.

The **US Department of Agriculture** Midwest, Northeast, and Northern Forests Climate Hubs produced a report, *Adaptation Resources for Agriculture: Responding to Climate Variability and Change in the Midwest and Northeast*, compiling and organizing adaptation approaches and actions for agriculture.

The report *Voluntary Resilience Standards: An Assessment of the Emerging Market for Resilience in the Built Environment*, by **Meister Consultants Group**, characterizes ways to increase resilience in the built environment.

The **Environmental Protection Agency** compiled adaptation actions that can be explored in its *Climate Change Adaptation Resource Center*.

The **Model Forestry Policy Program** has worked with more than 40 communities including many tribes through its *Climate Solutions University*. Many of those adaptation plans include actions that can be drawn from and customized to the tribe's unique context.

The **US Climate Resilience Toolkit** provides a searchable set of case studies, adaptation plans, and resources from across the country. The Toolkit's *Tribal Nations* portal links to tribally specific plans and resources from which adaptation actions can be considered.

The **Bureau of Indian Affairs Tribal Resilience Program** supports tribal adaptation efforts. It provides information on previous and current funding opportunities as well as a *Tribal Resilience Resource Guide* that summarizes previously funded projects by tribe and links to additional planning resources. The tribe can identify actions by selecting *Tribes* and clicking on the Fact Sheets for the tribe. If the tribe has a published plan a link to it will appear in the *documents* section.

The **Georgetown Climate Center** *Adaptation Clearinghouse* is an online library of adaptation plans, resources, tools, and reports relevant to adaptation planning efforts. Many tribal vulnerability assessments and adaptation plans are included in the clearinghouse. The clearinghouse can be easily searched, bringing up results of tribal adaptation plans just by searching *tribe*.

The **EcoAdapt** *Climate Adaptation Knowledge Exchange* is an online library of plans, resources, tools, and reports relevant to adaptation planning efforts. Tribal adaptation plans are included in the library. The library is easily searchable for case studies and documents from other tribal adaptation planning efforts.

4.3 Evaluate & Prioritize Actions

"A necessary first task in beginning assessment of potential strategies is scoping the range of possible options. After surveying a variety of resources and discussing the possibilities with the Strategy Advisory Group, a broad array of potential strategies was identified."—Swinomish Climate Change Initiative Climate Adaptation Action Plan

Evaluating and prioritizing adaptation actions will help focus efforts on implementing actions that will work for the tribe.

Checklist

- ❑ Select Criteria to Evaluate Adaptation Actions
- ❑ Create Prioritized List of Adaptation Actions

Select Criteria to Evaluate Adaptation Actions

Selecting which actions to do first requires prioritization. Start by deciding on a selection process and specific evaluation criteria that the climate change planning team can use to prioritize adaptation actions. It is useful to have a mix of criteria that represent a variety of factors that will ultimately determine the success of the actions. Criteria could include (but are not limited to): effectiveness, cost (or cost/benefit), technical feasibility, political feasibility, cultural value, time frame, flexibility, and others.

The evaluation criteria can depend on available resources and the scope and vision of the present effort. For example, if funding or time is limited, the selection process can simply be qualitative (i.e., "high", "medium", and "low" categories) assessments, or the planning team can discuss and select actions, or vote on which actions to include in the plan. A detailed description of potential criteria, rationale for selecting that criteria, and examples from tribes who have used the criteria in their adaptation planning process are included in Table 10. There are other evaluation criteria or considerations that could be considered beyond what is listed in the Table 10.

Table 10 Types of Criteria for Prioritizing Adaptation Actions. This table lists general types of criteria that could be used to prioritize and select adaptation actions along with examples of each criteria type.

Type of Criteria	Description & Rationale	Examples
Feasibility	**While feasibility can change over time, for an action to be effective it must be able to be implemented.** Can be combined or separated by type of feasibility (technical, political, social)	"Feasibility: Encompasses both technical and political feasibility; includes the likelihood of obtaining support for action and whether the action is possible to implement."—**Puyallup Tribe *Climate Change Impact Assessment and Adaptation Options*** "Technical Feasibility: Current technology can be used and physically implemented to solve the problem it is meant to address." "Political & Social Feasibility: Action has political and social community support or, at a minimum, does not have political or community opposition. This also considers the "fundability" of an action."—***Climate Change Preparedness Plan for the North Olympic Peninsula*** Ranked actions from 1-5 based on two feasibility criteria (technical and political).—***Shoshone-Bannock Tribes Climate Change Assessment and Adaptation Plan***

Costs & Benefits	**How the benefits of the action (both monetary and other non-monetary benefits) compare to the costs** Given the realities of limited budgets, it is good to assess the overall cost and relative benefits for a specific action.	"Fiscal impact and feasibility: What is the degree of fiscal impact of the proposed strategy based on estimated financial requirements, commitments, and terms?"—***Swinomish Climate Change Initiative Climate Adaptation Action Plan*** "Affordability: Overall expense and ease of covering the costs with Tribal budget, grants, or other funds."—**Puyallup Tribe** ***Climate Change Impact Assessment and Adaptation Options*** "Cost-benefit analyses should be applied to evaluate the social and environmental costs of building and maintaining climate vulnerable structures."—***Climate Change in Selawik, Alaska Strategies for Community Health***
Co-Benefits & Alignment with Tribal Goals	**The additional non-climate benefits the action provides to the community** Many adaptation actions will support, promote, or help achieve other tribal priorities and goals. Considering which actions have the most co-benefits can help determine what to do first.	"Community goals: Does the proposed strategy align with desires and needs of the Reservation community as expressed through Tribal planning documents and other sources?"—***Swinomish Climate Change Initiative Climate Adaptation Action Plan*** "Community acceptance: Is the proposed option consistent with community values, goals and policies? To what degree are tribal members likely to accept this strategy? Does the strategy integrate local and traditional knowledge, based on the experience of living in a place and observing the environment?"—**Samish Indian Nation** ***Climate Adaptation Planning Framework***
Flexibility	**The action can be updated and changed over time to respond to changing conditions.** To be effective, adaptation actions need to be flexible and have the ability to be modified as the environment changes.	"Dynamic/adaptive approach: Does application of the proposed strategy allow for responding to changing facts and circumstances, or it rigid and inflexible?—***Swinomish Climate Change Initiative Climate Adaptation Action Plan*** "Adaptive/Flexible: The proposed strategy allows for responding to uncertain outcomes or timing of climate change impacts."—***Climate Change Preparedness Plan for the North Olympic Peninsula***
Timeframe for Implementation	**When the action needs to be done (or started) to be effective** Knowing when an action should (or could) be implemented can help focus adaptation efforts or create a framework for action over time. Consider balancing short and long-term needs and priorities.	"Timeframe for Implementation: The ideal timeframe for initiating implementation of the proposed action in order to be most effective. Actions requiring more immediate action received higher scores."—***Climate Change Preparedness Plan for the North Olympic Peninsula***

Effectiveness	**How effective the action will be in addressing the key vulnerabilities** Does the action have the potential to address the extent of expected changes?	"Effectiveness: Likelihood that the action will work to address identified climate vulnerabilities."—**Puyallup Tribe *Climate Change Impact Assessment and Adaptation Options*** "Comprehensiveness: Does the proposed strategy address the range of anticipated impacts and risk for the affected asset/resource, or if it is limited in application?" "Long-term sustainability: Does the proposed strategy promote a sustainable long-term solution, rather than a short-term "band-aid" fix?"—***Swinomish Climate Change Initiative Climate Adaptation Action Plan***
Funding Availability	**Availability of funding to implement the action** Is there funding available (or potentially available) for the action?	"Affordability: Overall expense and ease of covering the costs with Tribal budget, grants, or other funds."—**Puyallup Tribe *Climate Change Impact Assessment and Adaptation Options***

Create Prioritized List of Adaptation Actions

Once the planning team has agreed upon the evaluation criteria, those criteria can be used to evaluate and select high priority adaptation actions. There are multiple ways to do this. One way is to work through each action and assign a score (e.g., 1 to 3, or 1 to 5) for each of the criterion for each adaptation action. Actions that score higher could be prioritized for implementation. Note: Some categories, such as cost, may need to be scored in reverse (low cost = 3, high costs = 1) so that the sum adequately helps prioritize lower costs actions if that is a goal for the tribe.

After evaluating adaptation actions using the selection criteria, the planning team will decide how to rank the actions. There are many ways to do this ranking. The tribe could, for example, choose the top three adaptation actions based on score, choose to pursue all actions that exceed a minimum scoring threshold, or group actions based on what can be done now or in the future (see call out box).

See *Case Studies* for additional examples. No matter what approach is taken to evaluate and prioritize adaptation actions, this is a great place in the process to set the foundation for monitoring and evaluating (Step 5) the success of those actions. If ideas about how actions should be monitored or tracked arise in this process, document those ideas so they can be considered and/or used in Step 5.

One way to group adaptation actions:

Actions that can be implemented within current adaptation planning effort. These are starting point actions that are easy to fund (or already have the funding), have support for implementation, may have resilience benefits at little cost, or provide other needed environmental, social, economic, or cultural benefits.

Actions that could be implemented now or in the future but require additional information, resources, or authorities before implementing. High impact actions—those that may be more costly or difficult to implement, but have the potential to significantly increase community resilience—frequently fall into this category. The tribe may want to begin exploring these additional information and resource needs as part of the current planning effort.

Actions that are not suitable or realistic at this time.

Community Engagement Checkpoint

Consider getting community input on the prioritized adaptation actions. Frequent community engagement increases the likelihood of tribal members supporting the final implementation process. Workshops and other tribal gatherings may provide appropriate settings for sharing information with the tribe about the adaptation planning process and gathering input and reflections on the validity and effectiveness of the prioritized adaptation actions. Be sure to notify tribal members well in advance of any event via effective communications for the community (e.g., ground or electronic mail, community boards, and direct phone calls). Transparency and open sharing helps not only inform the development of those actions, but increases their validity, and will make it easier to implement those actions.

Documentation Checkpoint

Climate change adaptation plans are often living documents that are revised and updated over time. Thus, it is important to keep notes of the tribe's choices in this step. Capturing this information does not have to involve writing a report, it can be as simple as a short description of the process for selecting criteria and a list of the criteria. This record keeping will help in the future if the tribe moves beyond these efforts to evaluate or implement adaptation actions not prioritized at this point. Document the criteria selected and rationale for selecting those criteria; the process of scoring (who scored the actions); the results of the scoring; and the ultimate set of prioritized actions along with why those actions were selected. This shows all tribal members and the tribal leadership how choices were made, can be critical for solidifying support for implementation, and makes it easy to go back and identify additional actions for implementation in the future.

Guiding Questions

- Which selection criteria (Table 10) are most relevant to the tribe?
- What other selection criteria does the tribe want to include to best reflect tribal priorities?
- Given the tribe's current funding and approach, what is the best way to evaluate the actions (e.g., in a working meeting, through a workshop, or through electronic or paper surveys)?
- How are a diverse set of perspectives and expertise being incorporated into the evaluation process?
- How will the actions be adaptively managed and allow for learning?

Case Studies

Swinomish Indian Tribal Community

In the *Swinomish Climate Change Initiative Climate Adaptation Action Plan* the climate change planning team (their Strategy Advisory Group) reviewed each adaptation action according to a set of evaluation objectives to help "determine useful and appropriate options for specified climate change impacts, and they were also used as a guide in helping to prioritize multiple strategies."[13] The evaluation objectives included: comprehensiveness, long-term sustainability, dynamic/adaptive approach, fiscal impact and feasibility, non-regulatory approaches, and community goals.

Shoshone-Bannock Tribes

The Shoshone-Bannock Tribes *Climate Change Assessment and Adaptation Plan* development process evaluated their actions based on the following criteria: technical feasibility; political feasibility; flexibility/adaptability, and co-benefits. They gave each action a numerical ranking between 1 and 5, summing the scores from these categories to prioritize actions to implement. Actions with higher scores were more ready to be implemented. They made notes on relative costs, timeframe for implementation, legal feasibility, and cultural significance that will help inform implementation. This evaluation process created a robust workbook and living document that the Tribes plan to continue using to help guide their adaptation efforts for many years to come.[14]

Puyallup Tribe

In their *Climate Change Impact Assessment and Adaptation Options* report, the Puyallup Tribe used a similar approach to the Shoshone-Bannock Tribes. The Puyallup Tribe focused on different criteria than the Shoshone-Bannock Tribes in evaluating their adaptation actions: effectiveness, affordability, and feasibility.[15]

North Olympic Development Council

The North Olympic Development Council led a climate preparedness project that involved three tribes (Jamestown S'Klallam Tribe, Lower Elwah Tribe, and Makah Tribe), three cities, and two counties. In the *Climate Change Preparedness Plan for the North Olympic Peninsula*, the planning team scored adaptation actions from 1 to 4 based on five selected criteria. They summed the scores to develop a list of actions for implementation in three different sectors: ecosystems, critical infrastructure, and water supplies. The planning team also noted the associated timeframe for implementation [Immediate, Near-term (0–3 years), Medium-term (3–10 years), Long-term (>10 years)] and any key opportunities or concerns with each action.[16]

Red Lake Band of the Lake Superior Chippewa Indians

In their *Mitigwaki idash Nibi: (Our Forests and Water) A Climate Change Adaptation Plan*, the Red Lake Band of the Lake Superior Chippewa Indians used a SWOT (Strength, Weakness, Opportunity, Threats) assessment typically used in a business setting to identify priority adaptation action areas.[17]

Selawik Strategies for Community Health

With support from the Alaska Native Tribal Health Consortium, the Selawik community along with many others in the northwest arctic developed climate adaptation and resilience plans focusing on the health of their villages. In *Climate Change in Selawik, Alaska: Strategies for Community Health*, instead of using an official set of evaluation criteria, the Selawik community developed actions in accordance with ten principles for integrating climate change into local decision-making.[18]

Samish Indian Nation

In their *Climate Adaptation Planning Framework*, the Samish Indian Nation identified six criteria (implementation mechanisms, resource needs, urgency, expected value, community acceptance, and equity) to guide the selection of adaptation actions. They evaluated each action qualitatively based on a low to high scale (1–5).[19]

4.4 Implementation Plans

> *"A common pitfall of community-driven planning is that the process stops with the publication of the plan and implementation stalls due to lack of resources and political will."—Community-Driven Climate Resilience Planning: A Framework, Version 2.*

Adaptation actions are more likely to be effective when they have an implementation plan.

✓ Checklist

- ❑ Create Implementation Plans for Prioritized Actions

Adaptation actions are most effective when they have a plan for implementation. This means identifying early on who will take the lead on those actions, what it will take for them to be implemented, the opportunities for implementation, and the timeframe for implementation.

Create Implementation Plans for Prioritized Actions

An implementation plan creates a road map for each action that can be followed one piece, one sector, or one department at a time. Ask tribal staff members, community members, and other partners (if applicable) to review the adaptation action text for their individual areas of expertise and ask them to add relevant context, set appropriate targets, and highlight areas of overlap with other existing resources and projects. The implementation plan also creates a framework to track the effectiveness of the selected actions and report to the tribe and other stakeholders. When creating an implementation plan, consider, at a minimum, the following items:

- Timeframe for action;
- Lead (person, group, department, or agency);
- Partnerships required (if necessary);
- Funding required;
- Indicators of success; and
- Opportunities for mainstreaming with existing department responsibilities and actions.

Look for diverse and comprehensive funding sources that can support a wide range of actions, including infrastructure and restoration (see Section 1.7). To the extent possible, identify when adaptation actions can be integrated into existing departmental operations and management. Mainstreaming adaptation into ongoing efforts can be critical for securing support and funding for implementing these actions. In addition, using an existing structure for tracking the success of the actions makes monitoring and evaluation easier. The Institute for Tribal Environmental Professionals highlights this in their *Adaptation Toolkit* by saying that it is important to "work with each department of the tribal government to integrate the adaptation plan into ongoing planning and management activities of all tribal departments. It might be included in other plans such as a natural resource plan, drought management plan, or disaster preparedness plan, etc…The ultimate goal of developing and implementing a climate change adaptation plan is to make your tribe more resilient to climate change."[20]

Guiding Questions

- For the prioritized adaptation actions, what will make that action successful in the community?
- Who (individuals or departments) will lead the implementation of each action?
- How much will it cost and what are potential funding sources?
- What partnerships (if any) are required to make the implementation successful?
- What is the timing for implementation?
- What opportunities exist for mainstreaming this action into existing processes, plans, or management responsibilities?
- How far in the future will the implementation be checked on?
- What is the authority and capacity needed to implement each action? Is that capacity sufficient? If not, what needs to be improved to make the implementation successful.

Case Studies

North Olympic Development Council

In the *Climate Change Preparedness Plan for the North Olympic Peninsula*, the climate change planning team identified the timeframe for implementation, lead groups, co-benefits, opportunities, and concerns. They also came up with implementation steps (or key action steps) for each adaptation action.[21]

Red Lake Band of the Lake Superior Chippewa Indians

In their *Mitigwaki idash Nibi: (Our Forests and Water) A Climate Adaptation Plan*, the Red Lake Band of Chippewa Indians included an appendix that identified the responsible parties, timeframe for implementation, resources needed, and indicators of success for each of the adaptation actions developed as part of their planning process.[22]

Swinomish Indian Tribal Community

The Swinomish Indian Tribal Community considered these principles for implementation of adaptation actions:

- **"Flexibility in approaches:** Because of the number and complexity of many climate change issues, there may be few common solutions to the same basic impacts as they affect different areas; adaptive response may be required for changing circumstances.
- **Public education/outreach:** Communication, information, and training on identified issues are vital to building support within the community for action.
- **Relevancy**: Relating to facts, current issues, and real-world situations will help to make issues and actions more relevant to the local community.
- **Political realities**: Address political constraints and institutional barriers realistically. Issues of organizational capacity and mainstreaming adaptation actions must be addressed.
- **Incremental approach**: Phasing and scaling of actions may help to cope with issues such as governmental inertia and challenging funding requirements.
- **Regional approach/partnerships**: Some issues are larger than individual jurisdictions; cooperative efforts may be useful or necessary to promote effectiveness or to increase capacity for response."[23]

Resources

The **World Wildlife Fund South Pacific Programme** *Climate Witness Community Toolkit* is a collection of participatory community exercises for climate change and adaptation planning. The *Community Action Plan* exercise engages the community to create a timeline to define tasks and implementation steps and identify when and in what order these steps should happen.

4.5 Sharing the Story of the Tribe's Adaptation Work

Documenting and sharing the process and the products of the tribe's adaptation work, while protecting sensitive information, can support both continued community engagement and the long-term success.

✓ Checklist

- ❑ Compile Written Documents
- ❑ Create Outreach Products
- ❑ Develop a Communications Plan

Compiling the work completed in this and previous steps and developing creative ways to share that progress will do three things. First, it will help create a sense of completion and accomplishment for the planning team and others partners. Second, it will provide a centralized set of resources and materials that can be used by the tribe to support ongoing or future adaptation efforts. Third, sharing these resources will continue to build momentum and support for the implementation of adaptation actions.

Compile Written Documents

This is a great point in the adaptation planning to collect and synthesize the products developed over the course of the adaptation planning process. This compilation may include semi-final products (such as the prioritized adaptation actions developed in Section 4.3, or process documents (such as folders of meeting notes, survey results, and slides from presentations). Once the resources are compiled, the planning team may identify key gaps or decide it is valuable to add additional documents describing the process or the end products.

Create Outreach Products

Look for creative ways to develop outputs of the adaptation planning process that serve a variety of needs and make the results more meaningful to key audiences, such as tribal leadership, funders, tribal members, and other partners.

Take a step back from the details of the climate change adaptation process and work with the planning team to identify ways to share the tribe's building resilience story. This may simply mean distilling technical reports into graphically focused summary sheets that can be read by tribal members who do not have a technical background. It may mean creating content for a weekly radio segment or posts in a tribal newsletter to share results or continue the resilience dialogue in the community. Or, it may mean investing in the development of a video (or series of videos) that shares the results of the tribe's work and can reach an audience that would not be reached through reports or documents. Note: The process used for incorporation of Traditional Knowledges (TKs) can further support the appropriate use of that information in other efforts that benefit the tribe, such as grants or management practices.

Develop a Communications Plan

For each of the outreach materials or approaches selected, develop a communications plan. To be effective, this plan should include identifying: the audience(s) for this information; how best to reach those audiences; the key messages of the materials; and any desired calls to action. Consult Section 1.6 to find effective ways to engage and communicate with different audiences within the tribal community.

These outreach products can also be a great way to celebrate progress on adaptation. While adaptation planning is never truly done, taking time to share the results broadly with, and beyond, the community is a great way to reward the planning team for their hard work and acknowledge all the hard work that has gone into building resilience.

Traditional Knowledges Checkpoint

It is imperative for both tribal staff and external partners to know and honor tribal guidelines on what information can and cannot be shared so that sensitive information remains protected within the tribe. Tribes may consider with whom certain information may be shared, and may do so on a case-by-case basis, and may defer at any point. The sharing of information may include one or more of the following options: only within the tribe, intertribally or with the public. For information that can be shared outside the tribe, "ensure that each of the contributions of tribal partners are recognized in final products, publications, and efforts to publicize the projects" (*CTKW Guideline 7 Actions*).

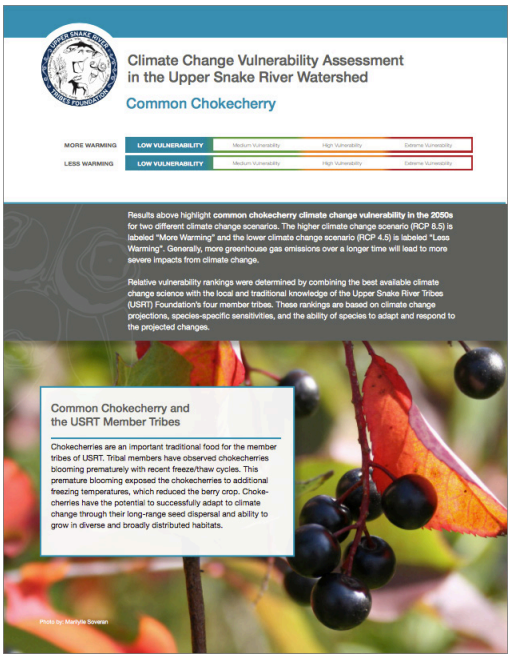
Guiding Questions

- What information can and cannot be shared, written, or documented?
- What opportunities exist to create products that share the results in innovative ways and help build support for adaptation throughout the tribe? (Approaches may include, but are not limited to, graphics, videos, radio broadcasts, and newsletters.)
- What opportunities exist to incorporate results of the adaptation planning process into existing management plans, policies, procedures, and approaches?
- Can results of the adaptation planning process be posted on the tribe's website and shared through tribal networks to support and inform the work of other tribes? If not all of the information can be shared, are there portions of it that can be shared?

Case Studies

Upper Snake River Tribes Foundation (USRT)

The USRT created short summary sheets for key focus species that provided a graphically rich way to share information with the tribal community on the relative climate change vulnerability of different species.[24]



Using Videos to Tell Climate Stories

The Shoshone-Bannock Tribe and the Puyallup Tribe have used videos to help share their stories about why they are doing adaptation planning. These videos, like the summary sheets, are likely to reach a different and potentially broader audience than a typical written adaptation plan.

Puyallup Tribe

Through the re-creation of a traditional canoe journey, the Puyallup Tribe's video highlights how climate change will affect the Tribe and Tribal culture. Changing climate conditions threaten the Tribe's efforts to reinvigorate and enhance the use of and connection to their traditional resources.[25]

The Salmon People at Risk: What Climate Change Means for the Puyallup Tribe

Duration: 5:03

Shoshone-Bannock Tribes

The Tribes created a short video to tell their story entitled *Dammen Baa "Our Water."* This video provides the background for the climate project, highlights pathways forward on adaptation, and reaches audiences that would not read the more detailed adaptation plan. The video has been shared at many conferences and could be used to help secure funding for additional efforts.[26]

Developing the Next Generation of Leadership:

Many tribes are working to share their cultural traditions with youth. These teachings and trainings can also help share information about climate change, how it will affect key resources, and what actions can be taken to increase the resilience of those resources. For example:

- The Affiliated Tribes of the Northwest Indians has a tribal youth engagement project in collaboration with the Wisdom of the Elders. Together with the Puyallup Tribe they developed two short films on tribal climate impacts featuring tribal youth.
- The Blackfeet Nation completed its *Blackfeet Climate Change Adaptation Plan* in 2018. As part of their planning process, 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. The program hired ten interns, the "Climate Warriors" for ten weeks in the summer of 2017.

[1] Institute for Tribal Environmental Professionals (ITEP). "Climate Change Adaptation Planning," Materials from Training held in Anacortes, WA at the National Tribal Forum on Air Quality, May 12, 2014.

[2] Amy K. Snover et al., *Preparing for Climate Change: A Guidebook for Local, Regional, and State Governments* (Oakland, CA: ICLEI – Local Governments for Sustainability, 2007).

[3] Sascha Petersen et al., *Shoshone-Bannock Tribes Climate Change Vulnerability Assessment and Adaptation Plan* (Shoshone-Bannock Tribes, 2017).

[4] Jerilyn Jourdain, *Mitigwaki idash Nibi: (Our Forests and Water) A Climate Adaptation Plan for the Red Lake Band of Chippewa Indians* (Sagle, ID: Model Forest Policy Program, 2014).

[5] Nez Perce Tribe Water Resources Division, *Clearwater River Subbasin (ID) Climate Change Adaptation Plan* (Nez Perce Tribe, 2011).

[6] Christopher W. Swanston et al., *Forest Adaptation Resources: Climate Change Tools and Approaches for Land Managers* (Newtown Square, PA: US Department of Agriculture, Forest Service, Northern Research Station, 2016), 38.

[7] Yakama Nation, *Climate Adaptation Plan for the Territories of the Yakama Nation* (Yakama Nation, 2016).

[8] Tohono O'odham Nation, *Climate Change Adaptation Plan* (Tohono O'odham Nation, 2018).

[9] Swinomish Indian Tribal Community, *Swinomish Climate Change Initiative Climate Adaptation Action Plan* (Swinomish Indian Tribal Community, 2010).

[10] Petersen et al., *Shoshone-Bannock Tribes*.

[11] Swanston et al., *Forest Adaptation Resources*.

[12] Robert Croll, personal communication to Sascha Petersen, October 25, 2018.

[13] Swinomish Indian Tribal Community, *Swinomish Climate Change Initiative Climate Adaptation Action Plan*, 39.

[14] Petersen et al., *Shoshone-Bannock Tribes*.

[15] Puyallup Tribe of Indians, *Climate Change Impact Assessment and Adaptation Options: A collaboration of the Puyallup Tribe of Indians and Cascadia Consulting Group* (Puyallup Tribe of Indians, 2016).

[16] Sascha Petersen et al., *Climate Change Preparedness Plan for the North Olympic Peninsula: A Project of the North Olympic Peninsula Resource Conservation & Development Council and the Washington Department of Commerce, funded by the Environmental Protection Agency* (North Olympic Development Council, 2015).

[17] Jourdain, *Mitigwaki idash Nibi*.

[18] Michael Brubaker et al., *Climate Change in Selawik, Alaska: Strategies for Community Health* (Anchorage, AK: Alaska Native Tribal Health Consortium, 2012), 37.

[19] Samish Indian Nation, *Climate Adaptation Planning Framework* (Samish Indian Nation, 2017).

[20] "Adaptation Planning Background Material—Climate Change Resources Adaptation Planning Tool Kit," ITEP, accessed June 14, 2017, http://www7.nau.edu/itep/main/tcc/Resources/adaptation.

[21] Petersen et al., *Climate Change Preparedness Plan for the North Olympic Peninsula*

[22] Jourdain, *Mitigwaki idash Nibi*.

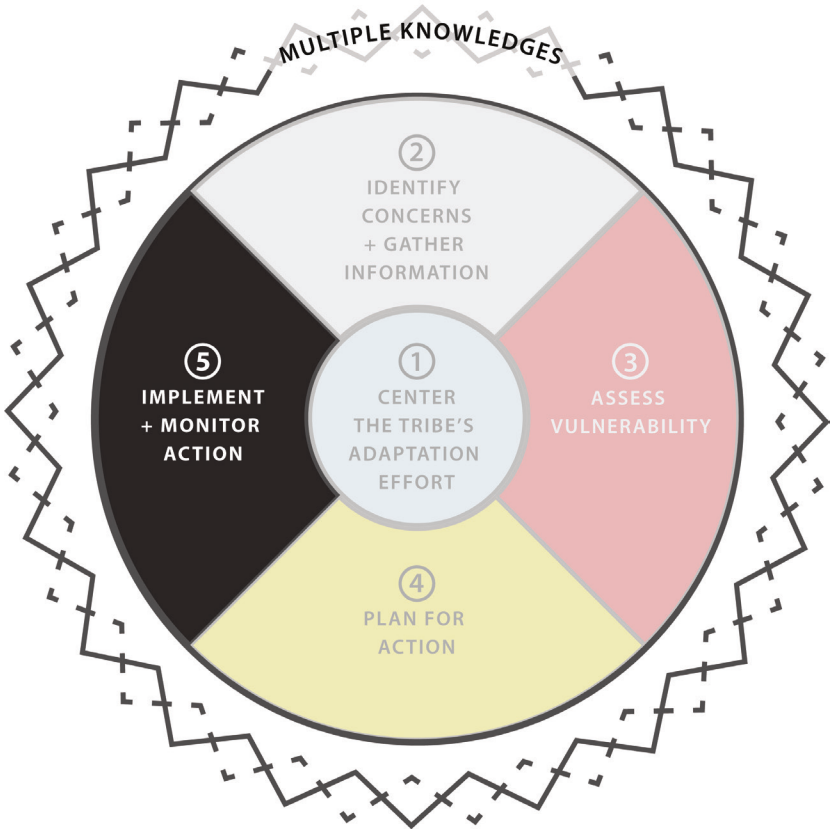
[23] Swinomish Indian Tribal Community, *Swinomish Climate Change Initiative Climate Adaptation Action Plan*, 76.

[24] "Climate Change Vulnerability Assessment for the Upper Snake River Watershed," Climate, Upper Snake River Tribes, accessed October 18, 2018, http://www.uppersnakerivertribes.org/climate/.

[25] Wisdom of the Elders, "The Salmon People at Risk: What Climate Change Means for the Puyallup Tribe," US CLimate Resilience Toolkit, last modified August 31, 2017, https://toolkit.climate.gov/videos/salmon-people-risk-what-climate-change-means-puyallup-tribe.

[26] Shoshone-Bannock Tribes, "Dammen Baa - Shoshone-Bannock Tribes Action on Climate Change," published on Aug 14, 2017, video, https://www.youtube.com/watch?v=oYJSxXnUsx0.

[27] Blackfeet Nation, *Blackfeet Climate Change Adaptation Plan* (Blackfeet Nation, 2018).



Step 5: Implement & Monitor Actions

"The collaborative framework needed to appropriately identify, plan and implement watershed scale restoration priorities, as well as maintain treated areas, will require collective vision and long term dedication."—Karuk Tribe Department of Natural Resources Eco-Cultural Resources Management Plan

- ❑ 5.1 Take Action
- ❑ 5.2 Monitor & Evaluate Actions
- ❑ 5.3 Compile Everything
- ❑ 5.4 Continue Building Resilience

5.1 Take Action

Start by implementing actions that have the fewest barriers, the highest chance of success, and the greatest resilience value.

Checklist

- ❑ Identify Initial Adaptation Actions
- ❑ Consider Implementing a Pilot Project

Identify Initial Adaptation Actions

There are many ways to move forward implementing actions. One challenge is that rarely is it possible to move forward with all of the priority actions (Section 4.4) at the same time. Consider starting with low or no-cost actions like outreach and education; or focusing on a key window of opportunity (e.g., a grant-funded activity, an update to a management plan) as this can be a good opportunity to begin implementing priority actions.

The climate change planning team has already helped identify actions relevant to their tribal departments. The key is to start with a few small elements and move forward from planning to action. This will demonstrate tangible progress to the community, tribal leadership, and potential funders, that can help create the momentum for tackling the harder, or bigger, actions and changes identified in the plan. The plan itself can be used to support grant applications and justify funding for implementing individual adaptation actions.

Consider Implementing a Pilot Project

The planning team can consider implementing a pilot project (or a set of pilot projects) to test the effectiveness of priority actions, and to decide how best to launch each adaptation action at scale. Pilot projects have the benefit of not being seen as permanent and frequently face lower political and financial barriers. If successful, a pilot project (limited in extent or geographic scope) can rapidly be scaled or rolled out to other areas. Pilot projects demonstrate measurable success and can:

- Help identify obstacles, logistical challenges, and possible unintended consequences in a semi-controlled, small-scale context;
- Help determine if goals and timelines are appropriate and that the appropriate tracking, monitoring, and reporting takes place;
- Provide a forum for gathering feedback from tribal members, staff, and leadership that can be used to inform the full-scale roll out of the action; and
- Secure tribal and staff buy-in.

A pilot project isn't always necessary. A full-scale launch may be appropriate where similar adaptation actions have been previously executed under similar conditions (for example, by other tribes, or in areas with similar geography and topography) with successful results. Full-scale implementation is also appropriate for smaller actions, or if an immediate response to an urgent vulnerability is necessary.

Guiding Questions

- What are the key near-term opportunities to integrate actions into ongoing activities or into management plan development/update?
- Where can the tribe have immediate success and demonstrate action?
- Where can implementation tasks be mainstreamed so that they fit within tribal staff members' existing responsibilities?

Tulalip Tribes and the Sustainable Lands Strategy

The Tulalip Tribes recognize the importance and vulnerability of local salmon species to changing climate conditions and non-climate stressors. To begin to address some of these concerns, in 2010 the Tulalip Tribes partnered with local farmers and Snohomish County to launch the Sustainable Lands Strategy. The partnership recognizes that farms, fish, and floodplain management can all work together.

One major success was the establishment of active riparian buffers to provide benefits to both fish and farmers. Farmers receive financial support to build "living fences" of trees along rivers that both protect farms from debris during floods and also provide protection of in-stream salmon habitat, by decreasing farm run-off, improving water quality, and providing shade to keep water cool and more hospitable to salmon populations.[1]

Menominee Indian Reservation Reforestation

Following instructions from Tribal Elders, the Menominee Indian Tribe of Wisconsin is working to integrate science with Traditional Ecological Knowledge and support climate-informed forest restoration practices. Changing climate conditions are creating new challenges to traditional practices that have preserved 220,000 acres of forestland that has cultural, environmental, and economic value to the Tribe.

Since 2008, the Menominee Forest has been affected by the tree disease, oak wilt, which can cause oak trees to lose all their leafs and die within as little as four weeks. In the Menominee Forest, 350 infected pockets had to be cut down to slow or stop the spread of the disease. Replanting at 20 of the affected sites has included tree species that are rare or not currently present in the forest but are expected to do better with changing climate conditions in the region. These plantings include shagbark hickory, white oak, bur oak, and American elm. The reforested areas will enhance cultural benefits and provide sources of wild foods and medicines, and reduce non-Native plant invasion.[2]

Marshall Islands and Flood Warning System

A coastal flood event in March of 2014 provided a literal "wake up call" to the residents of the Marshall Islands, as waves inundated and damaged more than 100 homes between 3:00 am and 5:30 am. The unusually high tide inundated a significant portion of the community and provided a glimpse into the future with climate change and sea level rise and how it will affect the people of the island.

Since January of 2015, a group of partners has come together to develop a comprehensive early warning system that utilizes existing climate and weather services to notify people when potential hazards like coastal flooding are going to impact the island. This collaboration has led to better communication on the island and the development of a new tool that more accurately forecasts tidal elevations.[3]

Suquamish Monitoring of Ocean Acidification

The Suquamish Tribe in Puget Sound is partnering with the University of Washington to develop innovative new tools to monitor the health of zooplankton populations in their waters. Ocean acidification threatens the shellfish that are a critical cultural, natural, and economic resource for the Tribe. One of the first steps in responding to changing ocean chemistry is to better understand and assess the impacts of those changes. The Tribe hopes to support the development of underwater cameras and image recognition software that can automatically capture images of zooplankton, classify them, and help monitor the impacts of changing conditions on those species.[4]

5.2 Monitor & Evaluate Actions

Actively monitoring, measuring the success of actions, and gathering feedback from tribal staff and community members will allow the tribe to evaluate whether the actions are having the desired outcomes. This information can be used to modify those actions over time to make them more effective.

✓ Checklist

- ❑ Develop Indicators of Success for Each Action
- ❑ Commit to Monitoring Indicators

Developing a process to measure the success and effectiveness of each action is frequently overlooked, yet important for successful adaptation. Monitoring each action independently will allow the tribe to have the data it needs to identify when the actions are working and when they need to be modified or improved to increase their effectiveness. ***Indicators of success*** are measurable characteristics of implementing adaptation actions that can be monitored over time. Ultimately, a comprehensive list of indicators compiled from all of the actions will allow the tribe to track progress across sectors, programs, and the community, and monitor that progress over time.

Develop Indicators of Success for Each Action

To increase effectiveness of adaptation actions, consider developing one or more indicators that can be monitored to determine if the actions are successful in having the desired effect. These indicators can be focused on specific individual components of the process (e.g., number of people trained and workshops held) or specific outcomes (e.g., increased awareness). Process indicators can be used to track progress in implementing action. Outcome indicators can be used to track progress in reducing environmental risk and enhancing resilience. When developing both types of indicators, consider the principles for developing good indicators of adaptation success (Table 11).

Table 11 Principles for Developing Indicators of Adaptation Success. This table describes three principles and their rationales to consider when developing indicators of success for adaptation actions.

Principle	Rationale
Focusing on the Purpose	Keeping in mind the community's vision and guiding principles is important for developing useful and relevant metrics of success. The metrics should: • Align with the tribal community's vision and goals; • Keep the intended user of the information in mind; • Be assigned to a specific person or department; • Be relevant to any applicable decision-making processes within the tribe; and • Be shared broadly to keep the community engaged.
Systems Thinking	Everything is connected. Adaptation indicators need to take into account the larger systems that affect adaptation outcomes. The measures should match the scale of the adaptation action to the level of integration with other sectors. Creating a group of holistic and balanced indicators can paint a more realistic picture. For example, consider: • Short- and long-term measures; • Small- and large-scale measures; • Objective and subjective measures; and • Indicators that track primary, secondary, and cascading impacts.
Delivering Impact	A good indicator will enable verification of the stated adaptation goals. Ensure validity, where possible make them quantitative, and base them on performance and consequences.

Source: Urban Sustainability Directors Network, *Developing Urban Climate Adaptation Indicators* (Urban Sustainability Directors Network, 2017).

There are multiple criteria for selecting indicators. See *Case Studies* and *Resources* for examples. Using measurable indicators that can be objectively evaluated over time will help assess progress in implementing the adaptation actions. Indicators can help simplify reporting on progress to tribal members, leadership, and other stakeholders. Consistent reporting helps to generate additional interest, promote accountability, improve project management, and attract political and financial support for the resilience building initiative. The tracking timeline will vary depending on the type of adaptation actions selected. However, this stage is valuable whenever it occurs because it offers the opportunity for reflection, revision, and improvement.

Developing, selecting, and monitoring indicators should not distract from the important work of implementing actions. However, if indicators are designed to fit within existing management structures and reporting requirements, they will not add too much work for the planning team or the tribal departments who are responsible for implementing the actions. The value indicators provide in measuring success, communicating progress, and identifying when adaptation actions are not working or need to be updated or modified is critical to ensuring the long-term success of the tribe's adaptation efforts.

Commit to Monitoring Indicators

Once the tribe has selected a set of indicators, develop an approach for tracking these indicators and progress in implementing the adaptation actions overtime. Early planning helps ensure that systems are in place to collect information throughout the implementation of the adaptation plan. Determining how well the actions are working is vital for ensuring that the tribe meets the goals and objectives for the adaptation planning process.

Developing an efficient, consistent, and reliable approach for collecting and managing the indicators can include:

- Identifying which members of the planning team will help with each of the tracking and reporting tasks;
- Creating a schedule for collecting the information;
- Deciding on the methods used to collect and document this information (if possible integrate information collection into an existing process or standard operating procedure); and
- Establishing how the information will be reported.

Finally, the climate change planning committee does not have to disband upon the completion of the adaptation plan. This group can be instrumental in implementing actions, monitoring the success of those actions, and continuing to guide the tribe's adaptation efforts.

Documentation Checkpoint

Be sure to document not only the suite of indicators that the tribe selects, but also the process for collecting, consolidating, and reporting information on those indicators. This documentation will be important over time as staff roles and responsibilities change and will support future updates to the adaptation plan and actions.

Traditional Knowledges Checkpoint

"Develop measures of success for projects from multiple perspectives/knowledge systems - define parameters of success from both western science and TKs [Traditional Knowledges]" (*CTKW Guideline 7 Actions*)

Community Engagement Checkpoint

Think of ways that the tribe can sustain community engagement and support for implementing adaptation actions over time. Regularly communicating to the community about progress in the adaptation planning process and inviting them to be a part of the co-creative process can be effective in building engagement, support, and buy-in from tribal members, and help sustain and further climate adaptation planning efforts.

Guiding Questions

- What have other tribes and governmental or nonprofit entities done? Reviewing published adaptation plans to explore existing tracking methods, networks, and long-term datasets can help identify appropriate indicators.
- What are the best and most appropriate ways to monitor the success of implementing each action?
- Who will be responsible for tracking this information?
- How will that information be shared back to departmental or tribal leadership and the community?
- Can the indicators being tracked be compiled and used to inform future efforts?
- Does each indicator have a measurable value or benefit to the target audiences?
- Does the suite of selected indicators cover each component of the plan?
- Who is the target audience? Beyond tribal members, are there other decision-makers or technical experts that the tribe wants to keep apprised of progress?
- How can the information be delivered to best reach the target audience? For example, a simple set of graphics alone might do the trick for a large group of stakeholders, but a detailed report might be more effective for a group of technical experts.
- How frequently will these indicators be updated and reported?

Case Studies

Swinomish Indian Tribal Community

The Swinomish Indian Tribal Community developed a set of *Indigenous Health Indicators*. A similar approach to indicators could be used to measure the progress of enhancing Indigenous community health through climate adaptation planning. The indicators include:

- Community connection (work/job quality, sharing, and relations);
- Natural resource security (quality, access, and safety);
- Cultural use (sense of place, respect/stewardship, and practice);
- Education (the teachings, elders, and youth);
- Self-determination (healing/restoration, development, and trust); and
- Resilience (self-esteem, identity, and resilience).[5]

North Olympic Development Council

The North Olympic Development Council led an adaptation planning process for Jefferson and Clallam Counties in Washington State in 2015. The planning process included three tribes (Makah, Lower Elwha, Jamestown S'Klallam). To monitor the implementation of actions identified in the *Climate Change Preparedness Plan for the North Olympic Peninsula* they developed a *Climate Adaptation Dashboard* that used voluntary reporting to track progress on implementing adaptation actions.[6]

Nez Perce Tribe

The Nez Perce Tribe *Clearwater River Subbasin (ID) Climate Change Adaptation Plan* identifies a number of metrics to track progress in implementing their adaptation actions. Those metrics include:

- Number of attendees at each meeting, and quality of information provided;
- Inclusion of Tribal concerns and adaptation strategies into updated US Forest Service Forest management plans;
- Number of presentations given to regional officials;
- Documentation of changes made to existing ordinances;
- Completion of floodplain modeling scenarios;
- Development of site-specific restoration plans;
- Development and distribution of educational materials; and
- Number of road miles and crossings improved.

Resources

The **Centre for Indigenous Environmental Resources** *Climate Change Planning Tools for First Nations Guidebook Series* recommends using the following criteria when developing indicators. Note: Its guidebook refers to *indicators* as *metrics*.

- Valid – Is the indicator measuring the appropriate result?
- Reliable – Is the indicator consistent over time?
- Sensitive – Will the indicator detect changes?
- Simple – Is the indicator based on data that are easy to collect and analyze?
- Useful – Will the indicator help the tribe make decisions?
- Affordable – Can the indicator be measured within the existing budget?

The **Environmental Protection Agency State and Local Energy and Environment Program** *Local Climate Action Framework: A Step-by-Step Implementation Guide* recommends considering whether an indicator is: relevant, measurable, and accessible.

The **Wildlife Conservation Society Climate Adaptation Fund** produced a report entitled *Monitoring & Evaluation in Climate Change Adaptation Projects: Highlights for Conservation Practitioners*, which synthesizes current thinking around monitoring and evaluating climate adaptation efforts involving conservation.

The **Urban Sustainability Directors Network Climate Adaptation Indicators Group** completed a review of adaptation frameworks and indicators in 2015. The *Developing Urban Climate Adaptation Indicators* report provides examples and recommendations for successfully developing indicators.

The **Northwest Forest Plan** (NWFP) is an example of a successful outcome of a federal-tribal partnership about monitoring forest health. In 2015, the Regional Interagency Executive Committee released its *NWFP 20-year Monitoring Report*, providing two decades of monitoring data for the Northwest forests. This is an example of how tribes can tap into existing monitoring programs to help them track the status of climate effects in their region overtime.

5.3 Compile Everything

Documenting what the tribe has done to adapt to climate change in a manner that will continue to be useful for the tribe is critical to the long-term success of building climate resilience.

Checklist

- ❑ Compile Materials Created Throughout the Process
- ❑ Finalize Outputs of the Adaptation Planning Process
- ❑ Present Final Materials to Tribal Leadership

Compile Materials Created Throughout the Process

Compiling a cohesive set of materials from the adaptation planning process and filling in any gaps by creating summary reports will solidify the foundation for future work. If the work has been funded by an outside agency or grant, there are generally requirements to submit the final products as part of the end of the grant period. Gather materials from each step of the process, and organize those materials in a manner that will be useful for the tribe. Gathering materials is easiest when documenting progress along the way.

Finalize Outputs of the Adaptation Planning Process

Writing a stand-alone adaptation plan may be required by the funders, but is not the only way to document the results of the adaptation planning process and make those results accessible and useful. Look for ways to develop outputs that serve a variety of needs. These synergies can be found in mainstreaming actions and developing approaches to monitoring and evaluation that help measure the success of the plan over time. The process used for incorporation of Traditional Knowledges (TKs) can further support the appropriate use of that information in other efforts such as applying for future grants, improving management of natural resources and identifying cultural resources.

Present Final Materials to Tribal Leadership

The compiled set of resources and any plan or summary should be reviewed by the climate change planning team. It also may be valuable (or required) to present the plan to tribal leadership for formal adoption. Formal adoption or approval of the plan can help institutionalize the results of the adaptation planning process, maintain momentum for climate change adaptation, and enhance support for implementation of initiatives and actions, even as tribal leadership changes over time.

Traditional Knowledges Checkpoint

It is imperative for both tribal staff and external partners to know and honor tribal guidelines on what information can and cannot be shared so that sensitive information remains protected within the tribe. Tribes may consider with whom certain information may be shared, and may do so on a case-by-case basis, and may defer at any point. The sharing of information may include one or more of the following options: only within the tribe, intertribally, or with the public. For information that can be shared outside the tribe, "ensure that each of the contributions of tribal partners are recognized in final products, publications, and efforts to publicize the projects" (*CTKW Guideline 7*).

Guiding Questions

- What are the funding requirements of the grant and how can they be satisfied?
- Where are there opportunities to incorporate the results of the adaptation planning process into existing management plans, policies, procedures, and approaches?
- Can results be posted on the tribe's website and shared through tribal networks to support and inform the work of other tribes? If not all of the information can be shared, are there portions of it that can be shared?

Resources

The **Institute for Tribal Environmental Professionals** provides the *Tribal Climate Change Adaptation Plan* template as part of their *Climate Change Resources Adaptation Planning Tool Kit*. If a stand-alone adaptation plan is required, the tribe can base their plan off this template and customize it to reflect the tribe's approach.

5.4 Continue Building Resilience

> *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* [our adaptation plan] *will help guide us in that endeavor.*—Harry Barnes, Chairman Blackfeet Tribal Business Council, *Blackfeet Climate Change Adaptation Plan*

As stewards of the land, tribes have been fostering long-term social and ecological resilience since time immemorial. This creates an excellent foundation for continuing building resilience. Putting in place a process or roadmap that the tribe can continue to use over time as changes occur to: update the plans; refine or expand the actions; and continue to adapt is critical to long-term success.

Successful adaptation planning requires an understanding that social and environmental conditions will continue to change for decades and generations. Because of this, adaptation actions will also need to be updated over time. The climate change planning team or departmental managers (if the actions are mainstreamed) can plan to revisit and modify the adaptation plan from time to time as new information about expected climate changes and impacts become available and as the tribe's priorities change.[8]

If possible, set a goal to return either to this full adaptation planning process (Figure 11) (starting at Step 2) in a certain number of years, or to revisit the plans and programs in which the adaptation actions are embedded as those plans are updated. Setting a public goal or requirement to update the plan can enhance accountability and help ensure the investment of time and energy needed to make the updates.

As the plans are updated, explore opportunities to increase the effectiveness of adaptation actions; discontinue ineffective actions; and incorporate new information, data, resources and/or changes to non-climate factors as appropriate. Consider reconvening the planning team, community members, or tribal leadership who had been involved in the planning process and incorporate feedback into any updates or adjustments.

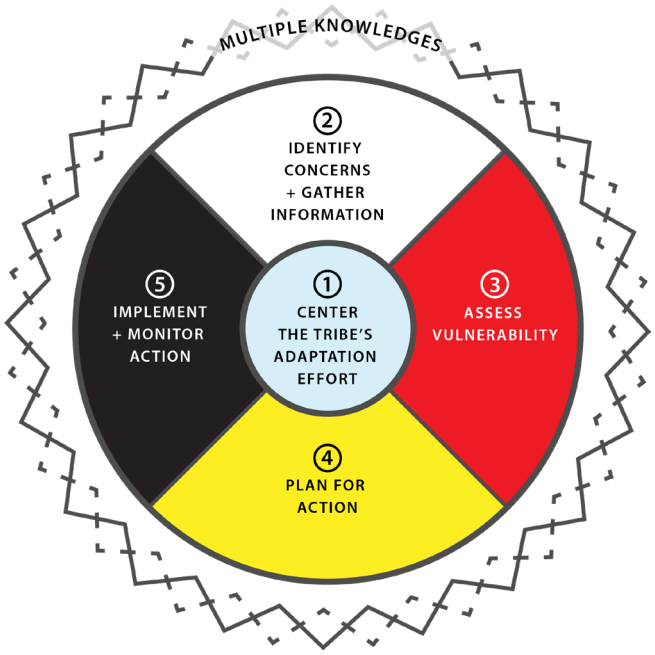


Figure 11 *Tribal Climate Adaptation Guidebook* Framework. The adaptation planning process outlined in the *Tribal Climate Adaptation Guidebook* is circular (Steps 2–5) and may be repeated over time as information and environmental and social systems change.

When updating or revising the plan consider the following:

- **The Monitoring Plan:** Have actions been successful? Where have they fallen short and what could be done to improve the effectiveness of those actions?
- **The Tribal Community:** Are there new challenges facing the community that need to be addressed requiring new focus areas or priorities? Has the social or political climate altered and affected tribal priorities?
- **The State of the Science:** Do new climate projections match those in the tribe's plan or have scientists discovered something new that needs to be incorporated into the planning efforts? (For example: the Jamestown S'Klallam Tribe completed their climate adaptation plan[9] in 2013 using three sea level rise scenarios. In 2015, the Tribe participated in the development of a regional climate preparedness plan for the North Olympic Peninsula,[10] which took advantage of new sea level projections that assigned likelihoods to various future sea level scenarios. While the differences between the 2013 and 2015 sea level projections were subtle, the 2015 projections allowed for better prioritization and ranking of vulnerabilities in the areas of interest.[11])
- **The Vulnerability Assessment:** Is there any new information that would inform or change the vulnerability assessment results? Do the criteria for prioritizing key concerns need to be altered based on changes in tribal priorities?
- **New Windows of Opportunity:** Are there new opportunities for funding or actions that the tribe can take advantage of to expand the reach and effectiveness of the adaptation actions in the plan?

Enhancing resilience to changing climate conditions is a process and not the result of a single project. The work that the tribe does in this adaptation planning process outlined in this *Tribal Climate Adaptation Guidebook* lays the foundation for all future adaptation planning efforts. This work includes: identifying key climate-related vulnerabilities; convening the right people to develop effective adaptation actions to reduce those vulnerabilities in a culturally grounded and appropriate manner; meaningfully engaging the community; incorporating Traditional Knowledges where appropriate; developing and institutionalizing indicators to measure success; and committing to revisit and update data, products, materials, and plans over time. A solid adaptation planning foundation can support the tribe long after the funding for any single adaptation effort runs out. Flexibility and a willingness to update the adaptation actions over time will ensure that the tribe and the critical natural and cultural resources that are integral to the economic, cultural, and spiritual fabric of the community continue to thrive for the next seven generations.

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[2] "Snapshot: Climate-Informed Reforestation on Menominee Indian Reservation," American Society of Adaptation Professionals, accessed October 18, 2018, https://adaptationprofessionals.org/wp-content/uploads/2015/05/MTE-Snapshot-8-10-17-1.pdf.

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Glossary

actionable information—Information at a sufficient timescale, resolution, and certainty that it can inform decisions.

adaptation—Processing culturally relevant information and practices while implementing a suite of actions to better prepare for and adjust to new conditions while maintaining cultural protection in order to reduce risk, utilize new opportunities, and enhance resilience.

adaptation action—A specific activity that can be implemented in order to achieve adaptation goals.

adaptive capacity—The ability to adjust to potential impacts, take advantage of opportunities, and respond to extreme weather events and changing climate conditions.

adaptation goal—General statement about what the tribe wants to accomplish in a priority planning area.

adaptation plan—Documentation of how an entity identifies and assesses the vulnerability of key concerns and planning areas that are likely to be affected by changing climate conditions; develops adaptation goals and actions to reduce vulnerability and increase resilience; and establishes a plan to implement and monitor success of adaptation actions.

adaptation planning—The process by which an entity identifies and assesses the vulnerability of key concerns and planning areas that are likely to be affected by changing climate conditions; develops adaptation goals and actions to reduce vulnerability and increase resilience; and establishes a plan to implement and monitor success of adaptation actions.

climate exposure—An extreme weather event or changing climate condition that could adversely affect people, livelihoods, species, ecosystems, environmental functions, services, resources, infrastructure, and economic, social, and cultural assets.

climate projections—The simulated response of the climate system (e.g., temperature, precipitation, etc.) to a scenario of future emissions or concentrations of greenhouse gases and aerosols, generally derived using global climate models.

community engagement—The facilitation of purposeful reflection and discussion among tribal community members about topics of common concern and decision-making.

emissions scenario—A plausible representation of future emissions of greenhouse gases and aerosols based on a coherent and internally consistent set of assumptions about driving forces such as demographic and socio-economic development, technological change, energy use, and land use.

global climate models—Numerical computer representations of the Earth's atmosphere, water, and land based on physical, chemical, and biological properties, and how these components interact over time and space.

goal—General statement about desired long-term outcomes.

indicators of success—Measurable characteristics of implementing adaptation actions that can be monitored over time.

key concerns—The natural and built resources, assets, and issues that are most important to the tribe, have the potential to be affected by climate change, and can be addressed within the scope of available resources and capacity.

mainstreaming—An approach to adaptation planning that involves integrating climate adaptation into existing management functions and planning efforts.

objective—Specific statement focused on how to achieve a specific goal.

planning areas—Sectors or systems that mirror the tribe's governance and management structure or important ecosystem and human systems.

resilience—The capacity of a community to withstand, survive, and thrive by applying adaptation actions that maintain

and adhere to essential cultural functions, identities, and structures while co-existing with and managing for changing conditions. Indigenous resilience may include protecting, preserving, and enhancing tribal resources, cultural and traditional knowledge and practices, identity, and sovereignty in the face of climate and other changes.

risk assessment—The process of identifying the probability of occurrence multiplied by the magnitude of impact of an adverse event.

sensitivity—The degree to which a species, asset, or resource is affected by an extreme weather event or changing climate conditions.

Traditional Ecological Knowledge (TEK)—complex and multifaceted Indigenous knowledge systems based in Traditional Knowledges that are often direct application and utilization of Traditional Knowledges having to do with ecology, ecosystems, or the environment.

Traditional Knowledges (TKs)—complex and multifaceted Indigenous knowledge systems encompassing many aspects of traditional practices and cultural information.

transformational adaptation—Taking actions that move beyond increment changes to existing systems and include consideration of system-wide changes or changes across more than one systems; focus on long-term change; and directly question of the effectiveness of existing systems, social injustices and power imbalances.

vulnerability—The degree to which a key concern is susceptible to adverse effects of climate change as determined by climate exposure, sensitivity, and adaptive capacity.

Acronyms

Abbreviation	Term
ANTHC	Alaska Native Tribal Health Consortium
BIA	Bureau of Indian Affairs
CASC	Climate Adaptation Science Center
CTKW	Climate and Traditional Knowledges Workgroup
DOI	Department of Interior
EPA	Environmental Protection Agency
GCM	Global Climate Model
GHG	Greenhouse Gases
ITEP	Institute for Tribal Environmental Professionals
LEO	Local Environmental Observer
NCA	National Climate Assessment
NOAA	National Oceanic and Atmospheric Administration
OCCRI	Oregon Climate Change Research Institute
PREP	Partnership for Resilience and Preparedness
TEK	Traditional Ecological Knowledge
TKs	Traditional Knowledges
USCRT	United States Climate Resilience Toolkit
USDA	United States Department of Agriculture
USRT	Upper Snake River Tribes

Appendix A. Resources & Organizations Supporting Tribes

This appendix lists the resources and organizations supporting tribal climate change adaptation planning that are mentioned in the *Tribal Climate Adaptation Guidebook*.

Organization	Resources
Adaptation Insight	Climate Informed Habitat Conservation Plans: https://sites.google.com/site/climateinformedhcps/
Adaptation International	Tribal Resilience projects: https://adaptationinternational.com/tribal-resilience/
Adaptation Partners	Climate Change Adaptation Library: http://adaptationpartners.org/library.php
Administration for Native Americans	Grants: https://www.acf.hhs.gov/ana/grants
Affiliated Tribes of Northwest Indians	Climate Change Program: http://www.atnitribes.org/climate-change
Alaska Native Tribal Health Consortium	Community Environment & Health Capacity & Training: https://anthc.org/what-we-do/community-environment-and-health/tribal-capacity-and-training/ *7 Generations: Addressing Village Environmental Issues for the Future Generations of Rural Alaska:* http://environmentalaska.us/uploads/3/4/5/1/34511121/7g_manual_version_4.pdf
Bureau of Indian Affairs	Tribal Resilience Program: https://www.bia.gov/bia/ots/tribal-resilience-program Tribal Resilience Resource Guide: https://biamaps.doi.gov/tribalresilience/resourceguide/
California Energy Commision	Cal-Adapt: https://cal-adapt.org
Centre for Indigenous Environmental Resources	*Climate Change Planning Tools for First Nations Guidebook Series*: http://www.yourcier.org/climate-change-planning-tools-for-first-nations-guidebooks-2006.html
Climate Access	https://climateaccess.org/
Community Resilience Building	Workshop Guide: https://www.communityresiliencebuilding.com/crbworkshopguide
Conservation Biology Institute	Landscape Climate Dashboard: http://climatedashboard.org/
Department of Interior Climate Adaptation Science Centers (CASC)	Northwest CASC Tribal Climate Camps: https://nwcasc.uw.edu/partners/tribal-partners/ CASCs: https://casc.usgs.gov/node/730 Tribal Liaisons: https://casc.usgs.gov/tribal-indigenous Landscape Conservation Cooperatives: https://lccnetwork.org/map
EcoAdapt	Climate Adaptation Knowledge Exchange: https://www.cakex.org/
Environmental Protection Agency	Indian General Assistance Program: https://www.epa.gov/tribal/indian-environmental-general-assistance-program-gap *Climate Change Indicators in the United States*: https://www.epa.gov/climate-indicators Climate Change Adaptation Resource Center: https://www.epa.gov/arc-x/strategies-climate-change-adaptation State and Local Energy and Environment Program *Local Climate Action Framework: A Step-by-Step Implementation Guide:* https://19january2017snapshot.epa.gov/statelocalclimate/local-climate-action-framework-step-step-implementation-guide_.html
Federal Emergency Management Agency	Pre-Disaster Mitigation Grant Program: https://www.fema.gov/pre-disaster-mitigation-grant-program
Georgetown Climate Center	Adaptation Clearinghouse: http://www.adaptationclearinghouse.org/
Great Lakes Indian Fish and Wildlife Commission	Climate Change Program: http://glifwc.org/ClimateChange/ Tribal Adaptation Menu: https://data.glifwc.org/archive.bio/Tribal%20Menu%20Flyer%209-18.pdf

Institute for Tribal Environmental Professionals	Climate Adaptation Trainings: http://www7.nau.edu/itep/main/tcc/Training/Trainings Adaptation Planning Tool Kit: http://www7.nau.edu/itep/main/tcc/resources/adaptation Grant Writing Resources: http://www7.nau.edu/itep/main/eeop/Resources/res_grant
Local Environmental Observer (LEO) Network	LEO Network: http://www.leonetwork.org/en/docs/about/about
Meister Consultants Group	*Voluntary Resilience Standards: An Assessment of the Emerging Market for Resilience in the Built Environment:* https://cadmusgroup.com/papers-reports/voluntary-resilience-standards/
Model Forestry Policy Program	Climate Solutions University: http://www.mfpp.org/communities/
Movement Strategy Center	Community-Driven Resilience Planning: A Framework: https://www.adaptationclearinghouse.org/resources/community-driven-climate-resilience-planning-a-framework-2017.html
National Oceanic and Atmospheric Administration	Climate Programs Office: https://cpo.noaa.gov/ Western Region Climate Service Providers Database: https://wrcc.dri.edu/ClimSvcProviders/ National Center for Environmental Information Climate at a Glance: https://www.ncdc.noaa.gov/cag/ Climate Explorer: https://toolkit.climate.gov/climate-explorer2/ Regional Climate Centers Applied Climate Information System: http://www.rcc-acis.org/ Regional Integrated Sciences and Assessment teams: https://cpo.noaa.gov/Meet-the-Divisions/Climate-and-Societal-Interactions/RISA/RISA-Teams
National Phenology Network	Phenology Observation Portal: https://data.usanpn.org/observations/
National Wildlife Federation	*Scanning the Conservation Horizon: A Guide to Climate Change Vulnerability Assessment*: https://www.nwf.org/~/media/PDFs/Global-Warming/Climate-Smart-Conservation/NWFScanningtheConservationHorizonFINAL92311.ashx
NatureServe	Climate Change Vulnerability Index: http://www.natureserve.org/conservation-tools/climate-change-vulnerability-index
Oregon Climate Change Research Institute	*Tribal Climate Adaptation Guidebook*: http://www.occri.net
Pacific Northwest Climate Impacts Research Consortium	Northwest Climate Toolbox: https://climatetoolbox.org/
Partnership for Resilience and Preparedness (PREP)	PREP clearinghouse: https://www.prepdata.org/
Rooted in Resilience	Community Resilience Toolkit: http://rootedinresilience.org/programs/communities-for-resilience/toolkit/
United States Climate Resilience Toolkit (USCRT)	USCRT: https://toolkit.climate.gov/ Tribal Nations Portal: https://toolkit.climate.gov/topics/tribal-nations Tribal Resilience Resource Guide: https://toolkit.climate.gov/tool/tribal-resilience-resource-guide
United States Department of Agriculture (USDA)	USDA Climate Hubs: https://www.climatehubs.oce.usda.gov *Adaptation Resources for Agriculture: Responding to Climate Variability and Change in the Midwest and Northeast*: https://www.climatehubs.oce.usda.gov/sites/default/files/adaptation_resources_workbook_ne_mw.pdf
United States Forest Service	*Forest Adaptation Resources: climate change tools and approaches for land managers:* https://www.fs.fed.us/nrs/pubs/gtr/gtr_nrs87-2.pdf Northwest Forest Plan 20-year Monitoring Report: https://www.fs.fed.us/r6/reo/monitoring/reports/20-year/

United States Global Change Research Program National Climate Assessment (NCA)	Third NCA: http://nca2014.globalchange.gov/ Fourth NCA Volume 1, Climate Science Special Report: https://science2017.globalchange.gov/ Fourth NCA Volume 2: forthcoming
University of Oregon Pacific Northwest Tribal Climate Change Project	Online Tribal Climate Change Guide: https://tribalclimateguide.uoregon.edu/ Disaster Resources: https://tribalclimateguide.uoregon.edu/disaster-resources Climate Education: https://tribalclimateguide.uoregon.edu/climate-education Funding: http://tribalclimateguide.uoregon.edu/funding Scientists: https://tribalclimateguide.uoregon.edu/scientist Publications: https://tribalclimateguide.uoregon.edu/literature Tribal Climate Change Adaptation Plans: https://tribalclimateguide.uoregon.edu/adaptation-plans
University of Washington Climate Impacts Group	*Preparing for Climate Change: A Guidebook for Local, Regional, and State Governments*: http://cses.washington.edu/db/pdf/snoveretalgb574.pdf Building Capacity for Tribal Climate Change Vulnerability Assessments: https://cig.uw.edu/our-work/decision-support/building-tribal-capacity-for-climate-change-vulnerability-assessment/ Tribal Climate Tool: https://climate.northwestknowledge.net/NWTOOLBOX/tribalProjections.php
Urban Sustainability Directors Network	Climate Adaptation Indicators Group *Developing Urban Climate Adaptation Indicators*: http://us.iscvt.org/wp-content/uploads/2017/01/Urban-Adaptation-Indicators-Guide-2.9.16.pdf
Wildlife Conservation Society	Climate Adaptation Fund report: *Monitoring & Evaluation in Climate Change Adaptation Projects:* *Highlights for Conservation Practitioners:* https://static1.squarespace.com/static/59775f896b8f5b54f7106ff8/t/5a7d356b24a6949ae9ea7b17/1518155368656/Monitoring%26Eval_ReDesign2018_B.pdf
World Wildlife Fund South Pacific Programme	Climate Witness Community Toolkit: https://www.pacificclimatechange.net/document/climate-witness-community-toolkit-wwf-south-pacific-programme

Appendix B. Summary of Checklists & Checkpoints

Steps, Sections, & Checklists	Community Engagement	Traditional Knowledges	Documentation
Step 1: Center the Tribe's Adaptation Effort			
1.1 Select Climate Change Planning Approach ❑ Select Climate Change Planning Approach	X	X	
1.2 Assemble the Climate Change Planning Team ❑ Brainstorm List of Potential Planning Team Members ❑ Select and Invite Planning Team Members ❑ Appoint a Leader	X	X	
1.3 Develop a Vision, Goals, and Objectives ❑ Develop a Vision ❑ Make Initial Scoping Decisions ❑ Articulate Goals and Objectives	X		X
1.4 Consider Opportunities & Risks of Incorporating Traditional Knowledges ❑ Internal Conversation about Including and Protecting Traditional Knowledges ❑ Communicate Expectations around Traditional Knowledges with External Partners	X		
1.5 Gain Tribal Leadership Support ❑ Engage in Formal and Informal Outreach to Tribal Leadership		X	
1.6 Tribal Community Engagement ❑ Identify Community Engagement Opportunities ❑ Identify Community Engagement Methods		X	
1.7 Pursue Funding ❑ Research Funding Opportunities ❑ Write and Submit Grant Proposals	X	X	
1.8 Engage External Partners ❑ Identify External Partners ❑ Communicate Expectations		X	
Step 2: Identify Concern & Gather Information			
2.1 Gathering and Application of Relevant Traditional Knowledges ❑ Identify Where Existing Traditional Knowledges Are Being Applied ❑ Determine Whether and How to Collect Additional Traditional Knowledges			
2.2 Identify and Organize Key Concerns ❑ Compile Full List of Concerns ❑ Organize Concerns around Existing Programs and Departments ❑ Select Key Concerns	X	X	X
2.3 Document Observed Changes from Multiple Perspectives ❑ Identify Climate Variables and Thresholds ❑ Document Observed Changes ❑ Compile List of Relevant Climate-Related Variables	X	X	

2.4 Collect Regional and Local Climate Change Projections ❑ Collect Future Climate Projections from Existing Resources ❑ Decide Whether More Detailed Information is Needed			X
Step 3: Assess Vulnerability			
3.1 Select Vulnerability Assessment Approach ❑ Select Vulnerability Assessment Approach			
3.2 Vulnerability Assessment Approach Case Studies			
3.3 Determine Relative Climate Change Vulnerability ❑ Compile Information on Components of Vulnerability ❑ Determine Relative Vulnerability Rankings		X	
3.4 Select Priority Planning Areas ❑ Complete a Qualitative or Quantitative Risk Assessment ❑ Identify Priority Planning Areas			
Step 4: Plan for Action			
4.1 Set Adaptation Goals ❑ Develop Adaptation Goals for Each Planning Area			
4.2 Identify Adaptation Actions ❑ Identify Ongoing Actions Related to Adaptation ❑ Compile a List of Potential Adaptation Actions for Each Adaptation Goal	X	X	
4.3 Evaluate & Prioritize Actions ❑ Select Criteria to Evaluate Adaptation Actions ❑ Create Prioritized List of Adaptation Actions	X	X	X
4.4 Implementation Plans ❑ Create Implementation Plans for Prioritized Actions			
4.5 Sharing the Story of the Tribe's Adaptation Work ❑ Compile Written Documents ❑ Create Outreach Products ❑ Develop a Communications Plan		X	
Step 5: Implement & Monitor Actions			
5.1 Take Action ❑ Identify Initial Adaptation Actions ❑ Consider Implementing a Pilot Project			
5.2 Monitor & Evaluate Actions ❑ Develop Indicators of Success for Each Action ❑ Commit to Monitoring Indicators	X	X	X
5.3 Compile Everything ❑ Compile Materials Created Throughout the Process ❑ Finalize Outputs of the Adaptation Planning Process ❑ Present Final Materials to Tribal Leadership		X	
5.4 Continue Building Resilience			

Oregon State University

Oregon Climate Change Research Institute

Climate Impacts Research Consortium

adaptation international

North Pacific Landscape Conservation Cooperative