



Samish Indian Nation

Climate Adaptation Planning Framework



December 2017



Samish Indian Nation: Adaptation Planning Framework

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CLIMATE CHANGE WORKING GROUP

The group is currently comprised of the following representatives:

Leslie Eastwood	Tribal member, General Manager
Dana Matthews	Tribal Council Secretary, Health and Human Services Director
Jenna Burnett	Tribal Councilmember, Finance Department
Jackie Ferry	Cultural Director/Tribal Historic Preservation Officer
Toby McLeod	Tribal member, Natural Resources Department
Zam DeShields	Planning Director

Additional members may be recruited to the group from the Samish Community.

Staff support for the Working Group and preparation of this report was provided by Stacy Clauson, Climate Adaptation Assistant.

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KEY TERMS

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

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

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

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

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

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

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

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

Planning Area: This is an area in which the tribal government manages, plans, or makes policy affecting the services and activities associated with built, human, and natural systems.

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

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

Risk: Consequence of an impact and probability or likelihood that the impact will happen.

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

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

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

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EXECUTIVE SUMMARY

The purpose of adaptation is to develop a resilient community, one that takes proactive steps to prepare for the impacts of projected climate change. The Samish Indian Nation endeavors to be a climate resilient community preparing for potential impacts of climate change, so that our children and our grandchildren can be healthy, prosperous, and enjoy our natural resources and cultural traditions.

Under direction of the Tribal Council, we have begun a climate change adaptation planning process to identify how the Samish can prepare for and strengthen our resilience to extreme weather developments, sea level rise, and other impacts of climate change. This planning framework is a resource tool for the Samish Indian Nation to break down the adaptation process into several discrete steps, help assess vulnerabilities, devise strategies for improving resilience, locate tools and resources that will help, and develop and implement a plan for adaptation.

This report is organized into the following sections:

- Section 1 describes initial steps to identify adaptation planning frameworks and build support for adaptation planning.
- Section 2 provides an overview of steps taken so far to identify planning priority areas and the potential for climate change to impact these areas, as well as different methods and tools for conducting vulnerability analysis.
- Section 3 describes preliminary goals and objectives for the Adaptation Planning process.
- Section 4 contains resources for identifying adaptation options.
- Section 5 contains resources for prioritizing adaptation options.
- Sections 6 and 7 contains resources for implementing and monitoring progress.

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INTRODUCTION

OVERVIEW

Since time immemorial, the Samish people have lived and prospered on the land and water of the Salish Sea in Washington State (Figure 1). Over time, the Samish people have successfully navigated a variety of changes while maintaining a strong connection to the resources, rich lands, and waters of our region. While many of us may have moved away, we are still connected to this place and through it, to each other.

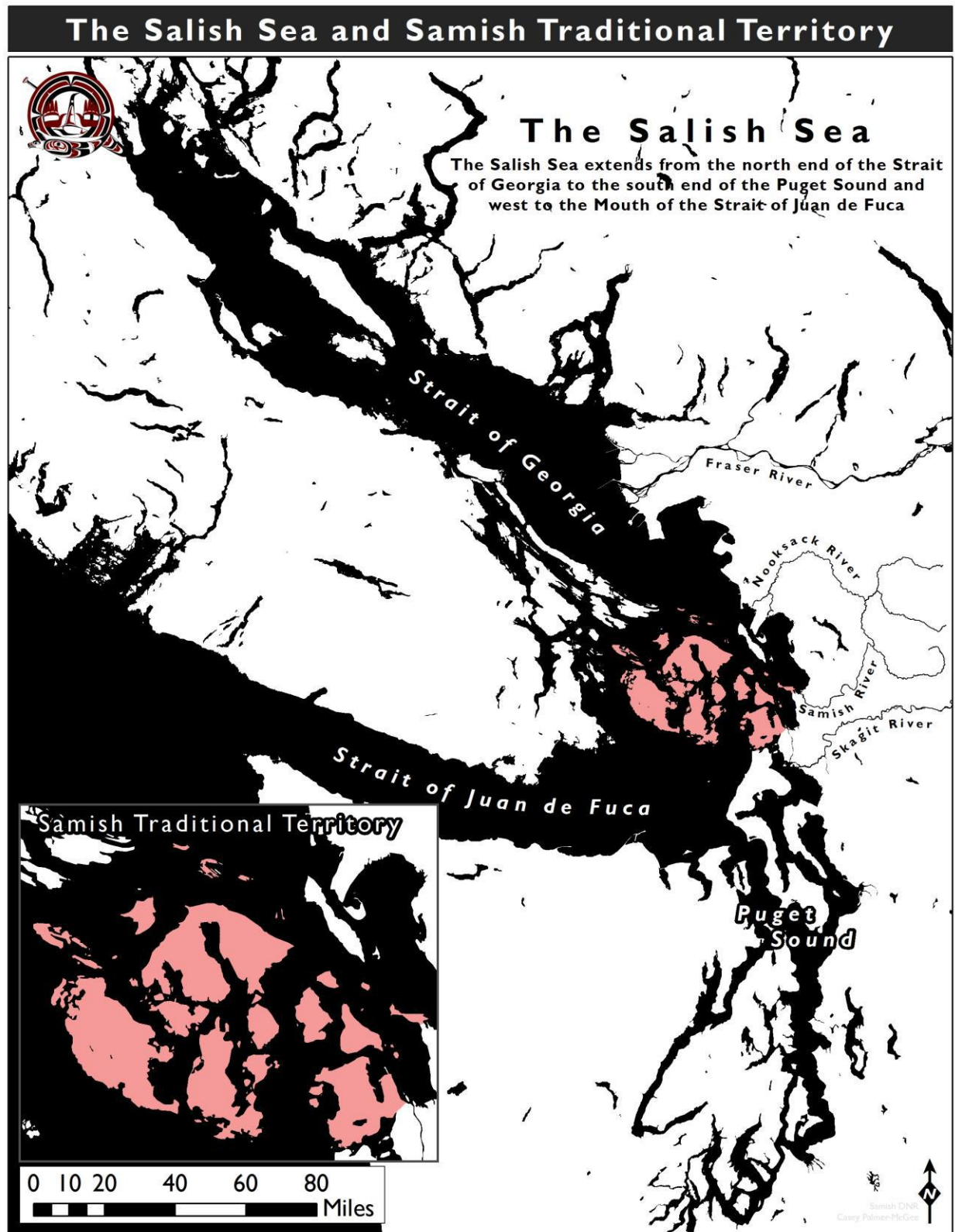


Figure 1: Samish Indian Nation Traditional Territory

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Through our strong connection with the natural world, we are beginning to see changes, such as an increase in extreme weather events and in the number of species struggling to survive and adapt.

Changes in climate conditions have the potential to impact natural processes in the ocean and forests, damaging habitats and the wildlife that live there. Impacts associated with extreme weather events, like flooding, pose an increased risk of injury, illness and loss of businesses and homes. Sea levels will rise with continued ocean and atmospheric warming, potentially submerging culturally important places and traditional use areas. Together, the changes can influence human health and wellbeing by affecting the food we eat, the air we breathe, and the water we drink. Understanding the threats that climate change pose can help us work together to lower risks and mitigate issues.

As a community, the Samish are beginning to think about how these changes impact our culture and traditions, our community facilities and investments, the natural resources that surround and sustain us. Tribal members agree on the need to focus energy towards Seven Generation planning throughout the Tribe's traditional territories². The Samish Indian Nation Tribal Council has recognized that this long-term planning must take climate change into account. Under direction of the Tribal Council, we have begun a climate change adaptation planning process to identify how the Samish can prepare for and strengthen our resilience to extreme weather developments, sea level rise, and other impacts of climate change.

ADAPTATION PLANNING

The Samish Indian Nation endeavors to be a climate resilient community preparing for potential impacts of climate change, so that our children and our grandchildren can be healthy, prosperous, and enjoy our natural resources and cultural traditions.

It is the Samish's intention to build resilience into policies, programs, projects and infrastructure. The Samish Climate Adaptation Plan is a part of this effort. The Climate Adaptation Plan will guide current and future decision makers in developing policies and programs to prepare for the impacts of climate change and build resiliency into everyday operations and short and long-term infrastructure investments.

Adaptation planning is a multi-staged process, depicted in Figure 2.

Through the adaptation planning process, the Samish Indian Nation will work through the following questions:

² 2016 5 Year Plan objective 2.7.4 "Define a 7 Generation Vision concurrent with Comprehensive Plan)" and goal 6.2 "Establish and maintain a natural resource presence and participation throughout Samish Traditional Territory."

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1. How is climate anticipated to change?
2. What are key issue/planning areas that we want to focus on in our adaptation planning?
3. How do changes in climate affect these key resources, assets and services within the Samish Traditional Territories?
4. What are our goals and objectives for our priority planning areas?
5. How will climate changes affect Samish's ability to achieve these goals and objectives?
6. What actions can be taken to avoid, minimize or mitigate these impacts?

This report marks the beginning of the Samish Indian Nation's adaptation planning efforts (part of Step 1 as depicted in Figure 1), and is intended to provide an overview of frameworks, models and tools for vulnerability assessment and adaptation planning that will occur in the next steps of the adaptation planning effort. In particular, this report will summarize strategies and resources to support Samish efforts to complete Steps 2-7 below. It is important to note that adaptation planning is an on-going process, intended to be responsive and flexible to new information, input and needs.

REPORT ORGANIZATION

This report is organized into the following sections:

- Section 1 describes initial steps to identify adaptation planning frameworks and build support for adaptation planning.
- Section 2 provides an overview of steps taken so far to identify planning priority areas and the potential for climate change to impact these areas, as well as different methods and tools for conducting vulnerability analysis.
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- Sections 6 and 7 contains resources for implementing and monitoring progress.

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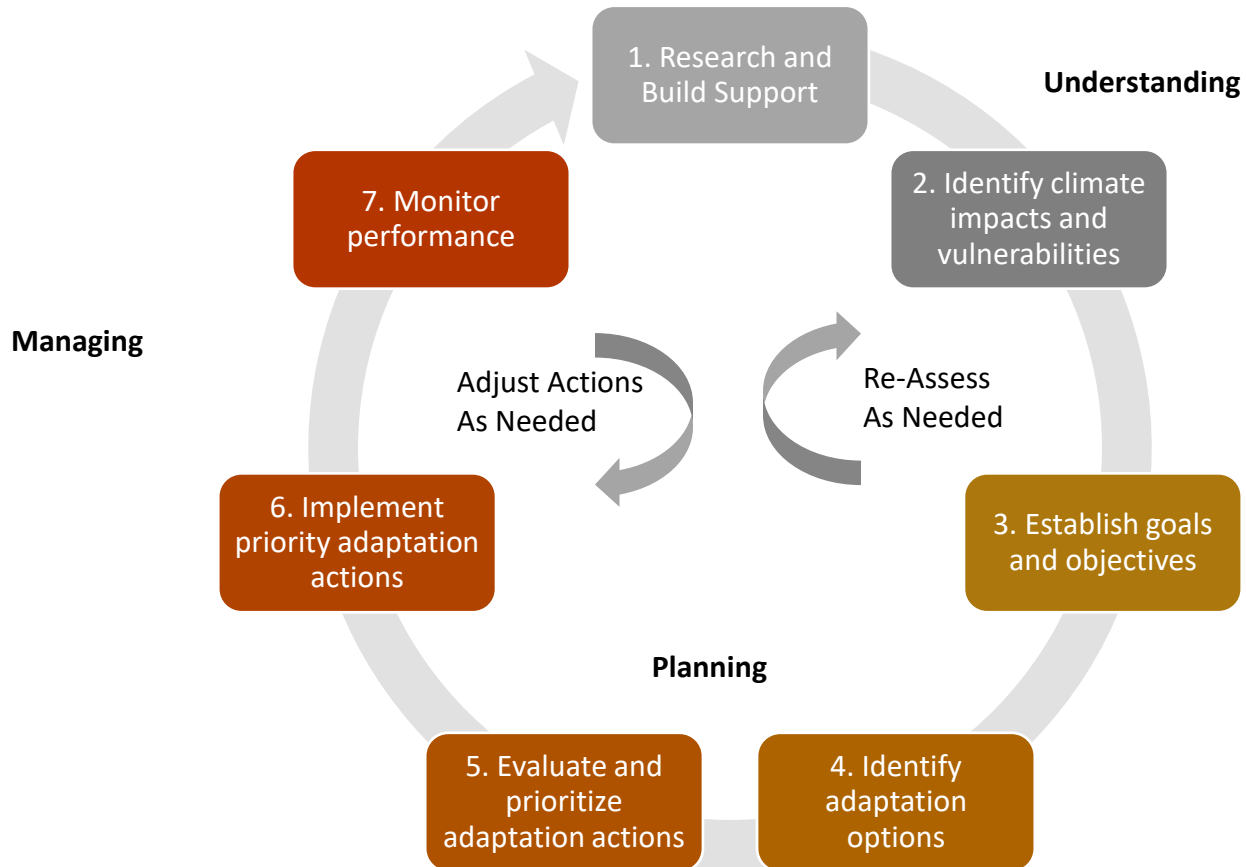


Figure 2: Climate Change Adaptation Planning Cycle. Adapted from "Quick Guide to Climate-Smart Conservation."

STEP ONE: RESEARCH AND BUILD SUPPORT

The following outlines steps taken to initiate the Samish climate adaptation planning process.

OVERVIEW OF THE PLANNING PROCESS

Samish Climate Change Adaptation Planning was initiated by the Samish Tribal Council, who in May 2016 passed Resolution 2016-05-008, recognizing climate change as a long-term concern and the need to take climate change into account by incorporating climate change adaptation planning throughout its program management plans.

In late 2016, the Samish Indian Nation received a BIA grant to build capacity to conduct climate change adaptation planning. Two key focuses of this project were to:

- Develop a culturally appropriate climate planning process for the Samish Indian Nation.
- Identify priority climate planning areas based on Samish values and the best scientific data and models.

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The following deliverables are required outcomes of the BIA grant:

- Samish climate adaptation planning framework;
- Report reviewing existing literature on climate science in the region;
- Final report. Final report on the development of Samish climate planning priorities, including a plan for additional data collection and supplemental monitoring.

This report satisfies the Samish climate adaptation planning framework deliverable.

In 2017, the Samish Indian Nation received grant funding support from the Department of Energy Office of Indian Energy Policy and Programs to continue these planning efforts. Under this grant, the Samish Indian Nation will continue the adaptation planning process, completing Adaptation Planning Steps 2-5 indicated in Figure 1.

The general schedule for this work is as follows:

Table 1: Preliminary Schedule for Adaptation Planning Efforts

Task	Description	Anticipated Schedule
Vulnerability and risk assessment	Perform Vulnerability and risk assessments of impacted/potentially impacted sectors of importance	Summer-2018
Goals and objectives	SMART resilience goals for high priority sectors set	Fall-2018
Adaptation Actions	Research, develop, assess and select Resilience actions	Summer-2019
Samish Climate Resiliency Plan	Samish Climate Resiliency Plan adopted by Tribal Council and mainstreamed across all Tribal programs	Fall-2019
Implementation	Annual work plan and monitoring efforts	Fall-2019

APPROACH TO COMMUNICATION AND COLLABORATION

Communication and collaboration is accomplished through a layered, bi-directional approach, where information, knowledge and input flows back and forth between different internal stakeholders (Figure 3). At the center of the process is the Working Group, functioning as the steering committee for the project. Working group members serve as a conduit for information exchange between Samish Departments, set the direction for tribal member engagement, and

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provide recommendations to the Tribal Council on adaptation plans and programs. Knowledge and input from tribal staff and tribal members is gathered and brought to the Working Group to inform their actions. At the same time, the Working Groups is responsible for disseminating information to tribal members and staff and involving these individuals in the decision-making process.

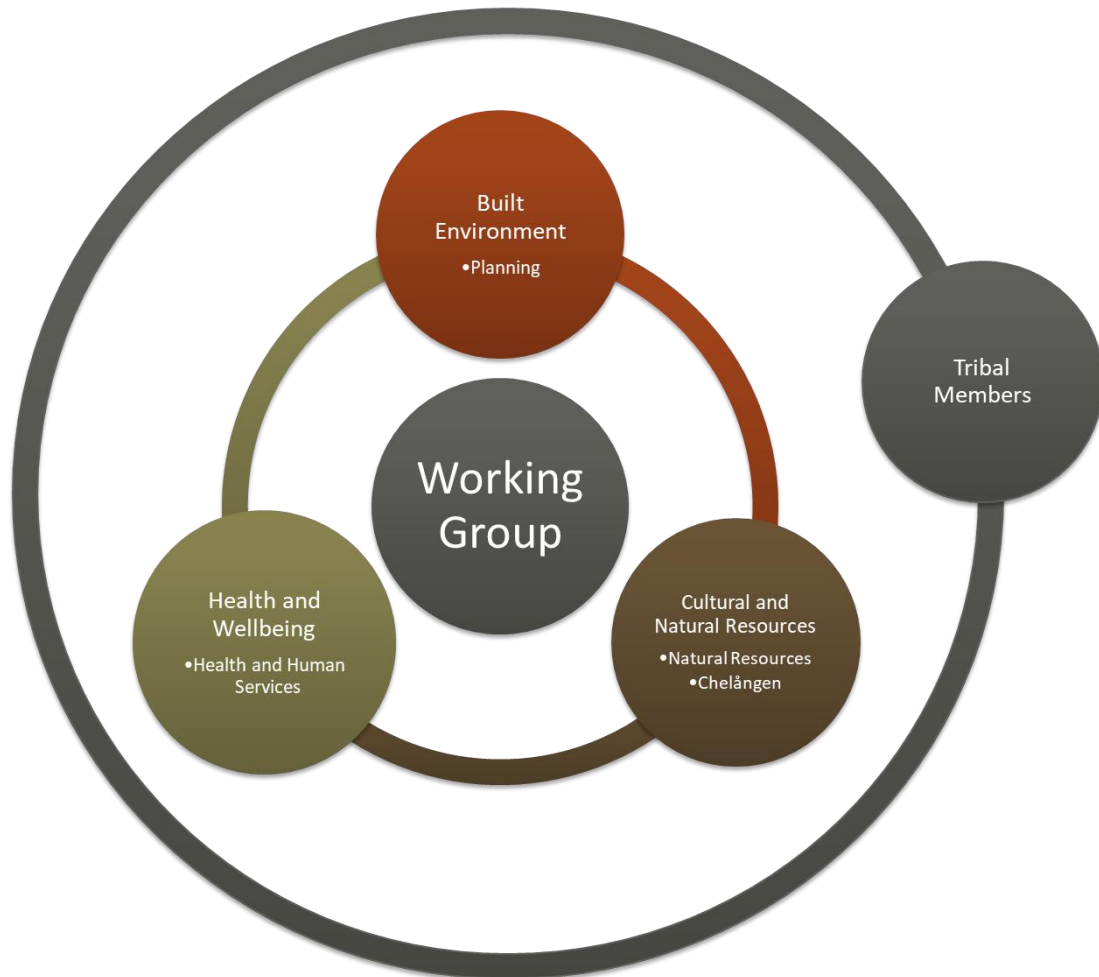


Figure 3: Conceptual graphic depicting approach to communication and collaboration

TRADITIONAL ECOLOGICAL KNOWLEDGE

Traditional Ecological Knowledge (TEK), generally does not have a singular, universal description and can be expressed in various but most often orally, through languages, stories, songs, and protocols. TEK holders obtain knowledge through direct connections with the environment and as gifts from their ancestors. This knowledge often contains invaluable descriptions of resources that are important to tribal members, including the location or timing of traditional harvesting, the vulnerability of species to climate changes, shifts in species ranges or timing of

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important cycles, as well as past actions taken by tribal ancestors to respond to impacts and remain resilient through prior challenges.

TEK is important building block for many aspects of climate adaptation planning. As noted by Venyeta and Lynn (2013), “The detection of environmental changes, the development of strategies to adapt to these changes, and the implementation of sustainable land-management principles are all important climate action items that can be informed by TEK” (p. 8). Utilizing TEK also ensures that indigenous adaptation and mitigation strategies will be culturally appropriate and able to address relevant issues. TEK, therefore, is an important source of knowledge to inform and integrate within the adaptation planning process (Figure 2). The following provides an overview of some potential information that TEK could contribute to the adaptation planning process:

- Vulnerability Assessments. TEK has the potential to inform various aspects of this step, by comparing historical conditions with present-day conditions to identify changes over time. TEK can provide baseline climate history, identify local climatic changes, and provide information on the environmental and cultural impacts associated with these changes (both direct and indirect), with an understanding of spatial and temporal scales that the changes may be occurring.
- Goals and Objectives. TEK provides an important window into what the Samish value and desire to protect from threats posed by climate change.
- Adaptation Options. The Samish have been adaptive and resilient to changes throughout their history in this place. This provides a way of knowing that can lead to the development of creative solutions and strategies to adapt to current changes in the climate.
- Evaluate and Prioritize Adaptation Options. TEK can provide important information necessary to prioritize actions to build resiliency.

Under the climate adaptation planning framework, TEK will be gathered. It is vitally important that TEK be gathered and shared in a culturally sensitive manner, in the interest of respecting and protecting such core knowledge. It is important to note that this information is part of the tribe’s and tribal members’ identity, and loss of control of this knowledge may be “a cultural, if not a spiritual, affront to the tribe” (Wall 2013).

The Samish Personnel Policy addresses confidentiality (Policy 5.142), but this does not specifically address traditional ecological knowledge. As a result, prior to taking steps to gather TEK, it is recommended that the Samish develop an internal protocol for how tribal members will be approached, how information will be recorded, what consent is required, and how the information will be stored and shared. This policy should be reviewed with the Working Group and General Manager. The *Guidelines for Considering Traditional Knowledges in Climate Change Initiatives* (CTKW 2014) provides a resource for development of this protocol.

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CLIMATE ADAPTATION WORKING GROUP

The Samish Climate Adaptation Planning effort is led by the Climate Adaptation Working group (Working Group). The Working Group is comprised of the following members:

Table 2: Samish Indian Nation Climate Adaptation Working Group Members

Leslie Eastwood	Tribal member, General Manager
Dana Matthews	Tribal Council Secretary, Health and Human Services Director
Jenna Burnett	Tribal Councilmember, Finance Department
Jackie Ferry	Cultural Director/Tribal Historic Preservation Officer
Toby McLeod	Tribal member, Natural Resources Department
Zam DeShields	Planning Director

TRIBAL MEMBER ENGAGEMENT

Outreach to and engagement of tribal members was a key part of the adaptation planning effort, to build support for the project and ensure that the outcomes from this process were grounded in the culture and priorities of the tribal members. To guide these efforts, the Working Group established a Communications Plan (Appendix A) and incorporated a number of different outreach and engagement activities in this part of the adaptation planning process, including:

- **Website:** The Department of Natural Resources has maintained a [website](#) devoted to the climate change planning process – including background information materials, planning updates, links to surveys, and document drafts.
- **Tabling at Cultural events:** Department of Natural Resources staff provided project information and solicited input of tribal community members at several tribal cultural events.
- **Communication materials:** Developed materials for the new tribal website, including an ESRI Story Map and slideshow on climate change impacts to help form a foundation for tribal member engagement on climate change. Also developed a series of three traditional story booklets that integrated traditional stories, climate change and natural resource literacy activities, and language and cultural information aimed at responding to the need for culturally appropriate communication materials. Sample materials are contained in Appendix B.

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- *Survey:* A tribal member survey was conducted requesting input to establish the priority planning areas related to climate change. Participation was encouraged by offering giveaway items provided by Samish Carving Circle and Cultural Department.

Despite these efforts, engagement of tribal members was challenging, as evidenced by low participation and response in surveys and other input activities. Public engagement with climate change remains low in the United States (van der Linden *et. al* 2015), so the results were not unexpected. There may be many reasons for a lack of engagement, including the spread-out nature of the tribal membership that hinders face-to-face communication, challenges with framing and messaging in a culturally responsive manner that generates interest, barriers to participation (e.g., over reliance on electronic means), and the limited time and energy of tribal members to devote to providing information and input. Outreach and engagement efforts will need to be refined as the project moves forward to the next steps to address several of the lessons learned through this process, including the following:

- *Integration of outreach with other efforts.* Integrating with other planning efforts aimed at gathering tribal member input (e.g., Comprehensive Plan or Seven Generation planning). This work could further explore community values, and help to ensure that adaptation planning is focused on the priorities of the community.
- *Use of multiple, overlapping methods with range of technology needs.* Outreach should incorporate a mixture of methods that would reach different audiences through different means (e.g., ranging from personal communication (interviews, etc.), tabling at community events, and social media).
- *Surveys.*
 - A paper hardcopy mailed to tribal members with incentives for response were provided. Paper hardcopy surveys are generally preferred over electronic surveys, due to limited access to or use of technology, particularly among some segments of the tribal community (e.g., Elders).
 - Limit the survey length, using an abbreviated survey containing no more than a couple of questions.
- *Framing.* Research on the psychology of climate communications provides guidance on creating messages that are more likely to resonate with tribal members and promote involvement and action (van der Linden *et. al* 2015):
 - Highlight relevant personal experiences through stories.
 - Activate and leverage tribal norms to promote and increase collection action.
 - Emphasize the present and make climate change impacts and solutions relevant (and local, if possible).
 - Frame policy solutions in terms of what can be gained, not in terms of what can be lost.

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- Tap into tribal members' deeply held motivations for caring for the Seventh Generation.

As the project moves forward to the next stages, an evolving Communications Plan will continue to guide engagement and outreach efforts. In addition, special consideration should be given to collection of TEK. The following overviews key input from the Working Group that may assist with this communication:

- It is important to recognize that many tribal members are still very oral in the way they communicate and share information, and need information presented and shared following an oral tradition. Be prepared to tell a story that helps to explain an issue in a culturally sensitive way and then solicit information, effectively combining education with input.
- Consider partnering with tribal members to facilitate interviews/conversations with other tribal members, with staff assisting to document the conversation.
- Integrate with other efforts underway, such as the collection of oral histories or the Seventh-Generation planning process.
- Be careful of the terminology used. Branding the conversation as *Climate Adaptation* or *Climate Change* made it sound too technical or scientific, and alienated tribal members from the project. Tribal members may have felt that they did not have the understanding or expertise to participate. For each opportunity to engage, consider how to reframe the conversation to topics that may have more resonance with tribal members (e.g., Are there as many clams available to harvest as there were when you were a child?). In the case of existing cultural events, frame the conversation in response to the event purpose or topics.
- Identify locations where a workshop/focus group could be held that are close to where tribal members live. This way we can meet tribal members where they are at.

REGIONAL CONTEXT

Federal and state agencies, tribal governments, and counties and cities have similarly been developing actions plans to address and adapt to the changing climate, often referred to as climate change adaptation planning. The following is a brief overview of efforts underway at other governments:

- *National:* At the national level, the U.S. Global Change Research Program (USGCRP), established by section 103 of the Global Change Research Act of 1990 (15 U.S.C. 2933), the Federal Government has supported scientific research, observational capabilities, and assessments necessary to improve the understanding of and response to climate change and its impacts on the Nation. Among the responsibilities of the USGCRP is to

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publish assessments that provide analyses of current and future climate change impacts across the nation; the [Third National Climate Assessment](#) (NCA) was published in May 2014. At this time, a draft copy of the Fourth National Climate Assessment has been prepared and is available [here](#). The Assessment will contain a chapter focused on tribal issues. In addition, more than 30 agencies within the federal government have completed vulnerability assessments, adaptation plans, and other studies. A list of and links to these studies is available [here](#).

- **State:** At the state level, the Washington State Legislature approved the State Agency Climate Leadership Act SB 5560 in 2009, which included provisions in sections 10 through 13 for the formation of an “integrated climate change response strategy” to “better enable state and local agencies, public and private businesses, nongovernmental organizations, and individuals to prepare for, address, and adapt to the impacts of climate change.” The resulting report, [Preparing for a Changing Climate - Washington State’s Integrated Climate Response Strategy](#), was completed in 2012 (Adelsman and Ekrem 2012). The Strategy describes how existing and new state policies and programs can respond to the impacts of climate change and calls on state agencies to make climate adaptation a standard part of agency planning. In addition, several agencies have conducted Climate Change Vulnerability Assessments, including the [Washington State Department of Transportation](#) (including a pilot assessment in [Skagit County](#)), the [Washington Department of Fish and Wildlife](#), and [Washington State Parks](#).
- **Local:** Locally, counties and cities in the region within the Samish Indian Nation’s traditional territory have also taken steps to plan for climate change. Notably, [Skagit County](#), Whatcom County and the [City of Bellingham](#) have adopted climate protection plans that recognize the need for action. The City of Anacortes has also integrated climate change into its [Comprehensive Plan](#), containing a goal for Anacortes to “be a regional leader in mitigating and adapting to climate change”. Policies supporting this goal include:
 - Initiate efforts to identify potential local climate change impacts on built, natural and human systems and conduct a priorities assessment.
 - Consider climate change impacts, including sea level rise, when conducting review of proposed land use and transportation actions and programs.
- **Universities and Research Organizations:** The University of Washington Climate Impacts Group is conducting a project to build tribal capacity for climate change vulnerability assessment.
- **NGOs:** Non-governmental environmental organizations have also led climate change planning efforts in the region. As an example, the Friends of San Juans completed a [Sea Level Rise Vulnerability Study for San Juan County](#).

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- ***Tribal Nations:*** Indian Tribes are also providing leadership on climate change action. Several Tribal Nations in Western Washington have initiated or completed Climate Change priorities assessments. Table 3 provides an overview of different tribal planning efforts.

Table 3: Overview of Climate Adaptation Planning efforts of Tribal Nations in Western Washington

Tribal Name or Affiliation	Planning Priority Areas	Hazard Assessment	Vulnerability Assessment	Adaptation Plan	Other
Columbia River Basin Tribes					X ³
Jamestown S’Klallam	X	X	X	X	
Lummi Nation		X	X	X	
Nooksack Indian Tribe					X ⁴
Northwest Treaty Tribes	X	X			
Puyallup Tribe of Indians		X	X	X	
Quileute Nation		X	X	X	X ⁵
Sauk Suiattle Indian Tribe		X			
Stillaguamish Tribe	X ⁶	X	X	X	
Swinomish Tribe			X	X	X ⁷
Treaty of Olympia Tribes	X ⁸		X		

³ Capacity assessment to assess the Tribal communities’ policy and technical capacity and needs to address climate change.

⁴ Conducted a comprehensive analysis of climate change impacts on freshwater habitat and Pacific salmon in the South Fork of Nooksack River. Also evaluated the effectiveness of restoration tools that address Pacific salmon recovery. Identified and prioritized climate change adaptation strategies or recovery actions for the South Fork that explicitly include climate change as a risk.

⁵ Completed an evaluation of Traditional Ecological Knowledge and Climate Change

⁶ Established a list of priority species and habitats.

⁷ Efforts have also focused on monitoring Health and Wellness.

⁸ Established list of priority species.

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STEP TWO: IDENTIFYING CLIMATE IMPACTS AND VULNERABILITIES

The following outlines steps to take in assessing climate change impacts and vulnerabilities.

ESTABLISH PLANNING PRIORITIES

One of the key steps in this process is to engage with tribal and staff members to identify key assets and resources that they feel are most important to protect. This step provides staff and tribal members with the opportunity to describe what they value, and why. Incorporating local values into the climate-change planning process in a structured way and effectively using local knowledge not only improves the identification of priority actions for climate change adaptation, but also supports successful implementation.

In response to this need, the Department of Natural Resources has coordinated with staff, tribal members, and the Working Group to identify key planning areas, contained in the companion report, *Samish Indian Nation Climate Adaptation Planning Priorities*. These priorities should be re-examined throughout the adaptation planning process to ensure that efforts are focused on issues of key concern to the Samish community.

EXPLORE HAZARDS TO PLANNING PRIORITIES

For each of the assets identified as a planning priority, an analysis of the potential climate hazards is completed to determine whether climate change represents a hazard or impact to the assets of value. If a potential hazard exists, this would provide a signal that more analysis, in the form of a vulnerability or risk analysis, is needed.

In response to this need, the Samish Indian Nation have conducted a literature review and summarized key predicted climate changes, contained in the *Samish Indian Nation Climate Change State of Scientific Knowledge*. This information was then synthesized in the *Samish Indian Nation Climate Adaptation Planning Priorities* to provide an initial scoping of potential impacts to planning priorities.

ASSESS VULNERABILITY AND RISK

Once planning priorities have been established and an initial scoping of climate hazards to these assets is completed, a more in-depth analysis of each asset's vulnerability can be completed. Vulnerability generally refers to the degree to which a system is susceptible to, or unable to cope with, adverse impacts. The opposite of vulnerability, and the goal of adaptation planning, is resilience. Resilience is a community's ability to absorb disturbance while retaining its basic structure and function.

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A Vulnerability Assessment (VA) will build on the initial scoping of climate impacts contained in the *Samish Indian Nation Climate Change State of Scientific Knowledge*, assessing in more detail an asset's ability to cope with and adapt to projected climate changes. A VA provides a relative understanding of what things are more or less vulnerable and why they are vulnerable or not vulnerable. As a result, a VA provides a foundation upon which to understand climate risks and vulnerabilities, prioritize which impacts most need to be addressed in adaptation planning, and efficiently allocate resources.

There is no standard method or framework to assess vulnerability to climate change. A variety of approaches are reported in the literature, and implemented by different institutions and organizations. In general, there are three key steps: assessing current vulnerability, estimating future conditions, and estimating future vulnerabilities, as depicted in Figure 4.

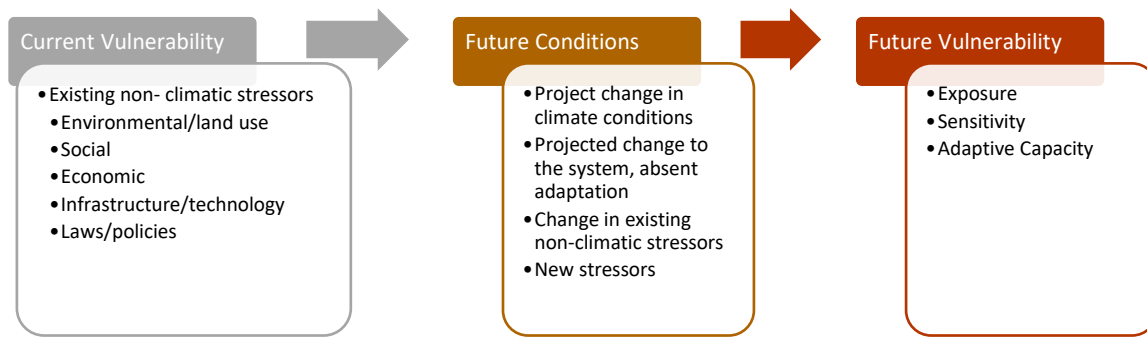


Figure 4: Steps of vulnerability assessment

Future vulnerability can be evaluated using different tools or frameworks. While there can be a variety of different methods used, the overall framework is generally consistent, combining an analysis of exposure to changes in climate with sensitivity to the predicted change. These two components are then combined to estimate an overall vulnerability, as depicted in Figure 5.

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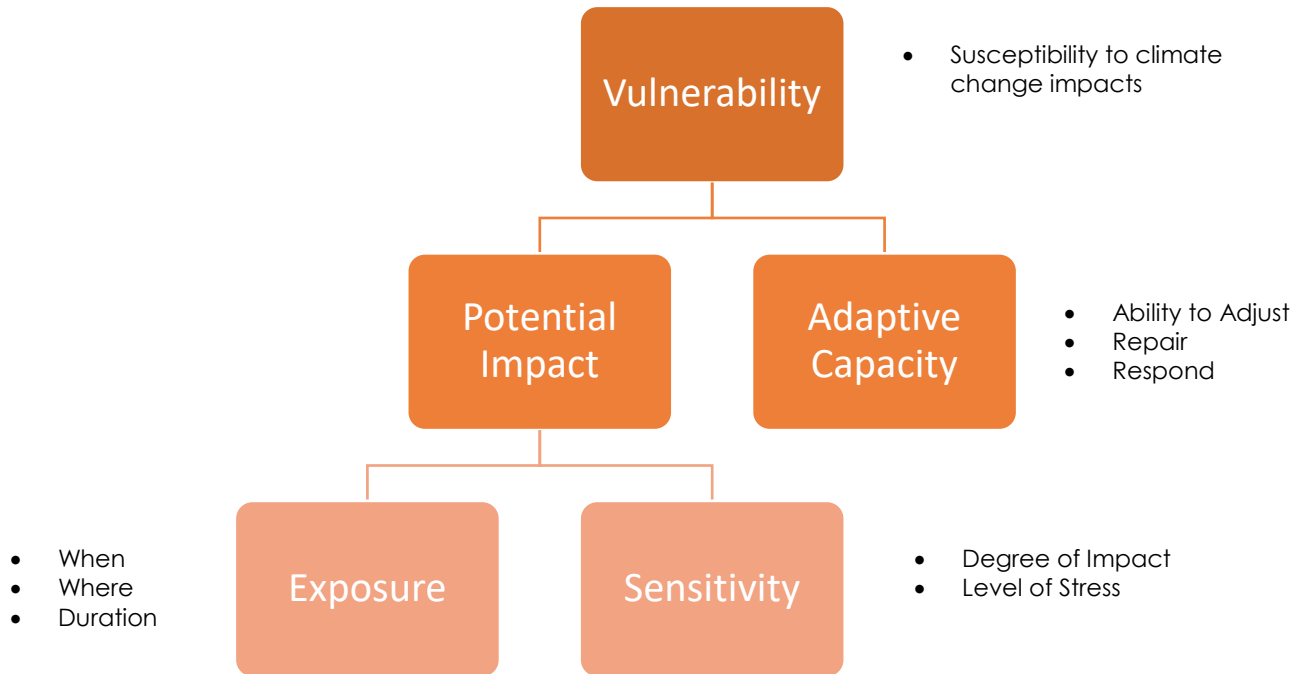


Figure 5: Model of vulnerability. Adapted from “Scanning the Conservation Horizon – A Guide to Climate Change Vulnerability Assessment.”

The following definitions are used to describe vulnerability and its associated components:

- **Vulnerability** is defined by the Intergovernmental Panel on Climate Change (IPCC 2007, 2014) as the susceptibility (of a species, system or resource) to the negative effects of climate change and other stressors. Under this definition, vulnerability is composed of three separate but related components: exposure, sensitivity and adaptive capacity.
- **Exposure** is the extent, magnitude, and rate of change to which a system is exposed to significant climatic variations, and includes both direct and indirect impacts of climate change.
- **Sensitivity** to climate change provides an indication of the degree to which the system is likely to be affected by climate change. Sensitivity can also be combined with likelihood (probability) to determine potential impacts, or **risk**. Risk also includes an evaluation of the magnitude of consequences. Risk assessments can be detailed and complex, and do not necessarily need to occur as part of an adaptation planning process.
- Finally, **adaptive capacity** is the ability of system to adjust to climate change – including climate variability and extremes – to moderate potential damages, to take advantage of opportunities, or to cope with the consequences.

Table 4 provides an example of a spreadsheet that can be used to gather the information needed to complete a rapid assessment of vulnerability.



Table 4: Sample Rapid Vulnerability Assessment Table

Assessment Focus⁹ <i>Asset or resource being evaluated</i>	Summary of Existing Non-Climatic Stressors <i>What are existing stressors that may impact the resource or asset or exacerbate hazards?</i>	Summary of Exposure <i>How do today's climate extremes affect the resources/ sector?</i> <i>How do the projected changes in climate affect the resource or sector?</i>	Summary of Sensitivity <i>How is the system likely to be affected by the exposure?</i>	Summary of Potential Impacts <i>Why does it matter? What problems might result?</i>	Summary of Adaptive Capacity <i>What is the ability of the system to respond to impacts (e.g., high, medium, low)?</i> <i>Consider what is already available and what is needed to adapt.</i>	Probability of impact/ confidence <i>What is the likelihood and confidence of impact (e.g., high, medium, low)?</i> <i>Consider severity/frequency of past impacts and how that may differ with changing climate.</i>	Consequence Rating <i>How would you estimate the magnitude of potential consequences (e.g., low, medium, high)¹⁰?</i>
Community Development:	1. Conference building and portion of RV	1. Sea level rise 2. Increased storm surge	1. Potential flooding or inundation of portion of	1. RV park closed for repair, temporary loss of revenue	Low	High/High	High

⁹ Assessment focus refers to the specific issue you are discussing. This may include specific pieces of infrastructure or asset classes (e.g., roads, a wastewater treatment plant), natural systems (e.g., a forest, wetlands, rangelands, aquatic habitat), species (e.g., salmon, elk) and community services (e.g., water supply, storm water management), public health, etc. You can be as specific or as general as you like, although being more specific often helps with discussion about impacts and consequences.

¹⁰ "Low" consequences: Not very disruptive, occurring as a small scale, and/or relatively easy to deal with. Easy to adapt to the consequences.

"Medium consequences: We lack some resources of knowledge about how to cope; occurring at a meaningful scale but maybe not everywhere.

"High" consequences: Very disruptive of traditional ways of life or economic activity; occurring at a large scale or devastating for a particular place.

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Fidalgo Bay Resort	sites are located close to shoreline 2. Living shoreline/ berm in place for shoreline protection along portion of site (in front of ocean side RV sites and remaining beach to NW) 3. Recent beach nourishment and restoration efforts completed 4. Unstable slope located along Fidalgo Bay Rd 5. Hwy 20 is highly vulnerable to extreme weather impacts/ flooding to east of site	3. Changes in precipitation, including increased number and intensity of high rainfall events	site due to sea level rise/storm surge 2. Scouring of beach/loss of shoreline protection 3. Access limitations after storm events 4. Increased potential for landslide activity near access roadway during heavy rainfall events. 5. Saltwater or floodwater intrusion into sewer collection system.	2. RV park reconstruction or repair costs 3. Loss of cultural resources 4. Loss or damage to restoration materials/ shoreline protection 5. Cost of additional shoreline restoration or repair			
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Once the background information is collected, overall vulnerability can be assessed by comparing the sensitivity of an asset or resource to climate impacts against the adaptive capacity of the asset or resource to withstand these impacts. For each asset or resource being examined, these concepts can be assessed and the results incorporated into a vulnerability matrix (Table 5) to assign relative ranking scores that can be used to identify the assets or resources with the highest potential vulnerability, relative to other assets or resources evaluated. This step provides an opportunity to focus adaptation resources on assets with greater relative vulnerability.

Table 5: Vulnerability Matrix

		Sensitivity Low → High			
Adaptive Capacity Low ↓ High			Low	Medium	High
			Minimally affected	Somewhat affected	Greatly affected
	Low	Minimally able to adjust			Fidalgo Bay Resort
	Medium	Somewhat able to adjust			
	High	Able to accommodate or adjust			

Green = Low Vulnerability (dark green = low, lighter green = medium-low)

Yellow = Medium Vulnerability

Red = High Vulnerability (red = high; orange = medium-high)

Using this matrix, a user would first consider the potential impact and the resource's sensitivity to this impact. For example, if the resource is located in a nearshore area, consider how it would be affected by sea level rise. Then, the user would determine the ability to respond or adjust to the impact – for example, are structures setback sufficiently to accommodate the amount of sea level rise, or could a seawall protect the structures.

The following are examples of how to determine the relative vulnerability ranking, after you determine sensitivity and adaptive capacity:

High Vulnerability = High Sensitivity + Low Adaptive Capacity
Medium Vulnerability = Medium Sensitivity + Medium Adaptive Capacity, OR
Medium Vulnerability = Low Sensitivity + Low Adaptive Capacity, OR
Medium Vulnerability = High Sensitivity + High Adaptive Capacity

Using the Fidalgo Bay Resort example from Table 4, the resort is anticipated to have high vulnerability, due to its low adaptive capacity and high sensitivity.

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This type of vulnerability matrix provides one rapid assessment method. However, because of the complexity of trying to assess the impacts of a changing climate on natural and social systems that are themselves in flux, vulnerability assessments rarely can be assessed under one method. The differences mainly stem from the tools and methods used to assess exposure, sensitivity and adaptive capacity.

A variety of community-wide assessment tools have been developed that enable users to address multiple planning areas – these are effective integrative tools that allow a rapid assessment of vulnerability, such as the matrix in Table 5. However, it should be noted that these tools may lack depth that could be achieved by using a sector-specific tool. A community may instead opt to use several methods, perhaps taken from different research fields, as needed to provide more sector-specific information. Ultimately, the decision of which tools to use is guided by the goals and objectives of the adaptation planning process. Table 6 provides an overview of different tools that may be used for assessing vulnerability in different planning areas:

Table 6: Summary of different Vulnerability Assessment tools for different planning areas.

Tool	Description
<i>Community-Wide</i>	
Tribal Climate Change Adaptation Planning Toolkit	Toolkit of templates and other resources to assist tribes in their climate change adaptation planning process. Developer: Institute for Tribal Environmental Professionals (ITEP), http://www7.nau.edu/itep/main/tcc/Resources/adaptation
Adaptation Planning for Coastal Communities	Training offered by NOAA focused on adaptation planning. Provides several Vulnerability Assessment tables to guide community vulnerability assessment planning. Chapter 4 of adaptation guide provides overview of steps to include in vulnerability assessment. Developer: NOAA Digital Coast, https://coast.noaa.gov/digitalcoast/training/climate-adaptation.html and https://coast.noaa.gov/data/digitalcoast/pdf/adaptationguide.pdf
Climate Ready Estuaries, Being Prepared for Climate Change: A Workbook for Developing Risk-	Guidance for conducting risk-based climate change vulnerability assessments and developing adaptation action plans. It is an ideal tool for organizations that manage places, watersheds or coastal environments. Developer: US EPA,

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Tool	Description
Based Adaptation Plans	https://ofmpub.epa.gov/apex/cct/r/cct_apex/files/static/v36Y/CRE2014Workbook_All_Aug29_508.pdf
U.S. Climate Resilience Toolkit	Provides a five-step process that outlines steps that communities can take to identify, assess, and confront their climate vulnerabilities. The site also provides resources (e.g., data, tools, case studies) from across the federal government to help communities put the process into action. Includes spreadsheet tool for conducting rapid vulnerability assessment. Developer: US EPA, https://toolkit.climate.gov/steps-to-resilience/explore-hazards
Vulnerability, Consequences, and Adaptation Planning Scenarios (VCAPS)	Participatory modeling process incorporating facilitated conversations that produce scenarios, represented by diagrams, linking climate and weather changes to local consequences. The diagrams also show opportunities for appropriate adaptation actions. Developer: Social and Environmental Research Institute and the Carolinas Integrated Sciences and Assessments Programs, http://www.vcapsforplanning.org/
<i>Sector Specific - Human Health and Wellbeing</i>	
Building Resilience Against Climate Effects (BRACE)	Framework to help health departments prepare for and respond to climate change. The BRACE framework is a five-step process that helps health departments to understand how climate has and will affect human health, and enables health departments to employ a systematic, evidence-based process to customize their response to local circumstances. The first step of the BRACE framework focuses on anticipating climate impacts and assessing associated health vulnerabilities. Developer: CDC, https://www.cdc.gov/climateandhealth/pubs/AssessingHealthVulnerabilitytoClimateChange.pdf (Note: Oregon health has adapted the BRACE framework and has put together a toolkit here).
<i>Sector Specific - Transportation</i>	

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Tool	Description
Vulnerability Assessment Scoring Tool (VAST)	Enables users to document the vulnerability of transportation assets in a study area. The assessment includes (1) determining the scope of the vulnerability assessment, (2) selecting appropriate indicators, (3) collecting data about those indicators, and (4) devising an approach to convert raw data about indicators into scores. The result is a set of vulnerability scores that can be used to rank assets by vulnerability or inform other analyses of the results. Developer: US DOT, https://www.fhwa.dot.gov/environment/sustainability/resilience/adaptation_framework/modules/index.cfm?moduleid=4#tools
<i>Sector Specific - Drinking Water/Water Utilities</i>	
Creating Resilient Water Utilities (CRWU)	Risk assessment application, which helps utilities in adapting to extreme weather events through a better understanding of current and long-term weather conditions. Developer: US EPA, https://www.epa.gov/crwu/build-resilience-your-utility
<i>Sector Specific - Community Infrastructure/Critical Facilities</i>	
Flood Vulnerability Assessment (FVA)	Tool designed to allow managers of facilities to assess the flood vulnerability of a one-building critical facility or a site of buildings (up to seven) that function as one critical facility (e.g., a medical campus). Developer: Midwestern Regional Climate Center and Illinois-Indiana Sea Grant, http://mrcc.isws.illinois.edu/FVA/index.jsp
<i>Sector Specific - Cultural Resources</i>	
Cultural Resources Climate Change Strategy	Sets out a vision and broad approach for managing impacts to and learning from cultural resources under modern climate change. Developer: NPS, https://www.nps.gov/subjects/climatechange/upload/NPS-2016_Cultural-Resources-Climate-Change-Strategy.pdf
<i>Sector Specific - Natural Resources</i>	
<i>Note: Within Natural Resources, there are a variety of different approaches to conducting a vulnerability assessment, including three main approaches: 1) correlative, 2) mechanistic; or 3) trait-based. In some cases, these methods may be combined (Foden and Young 2016). Vulnerability assessments can also focus on individual species, habitats or places.</i>	

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Tool	Description
	<i>A correlative approach uses regression analysis to characterize species' relationships with bioclimatic variables across their ranges. This approach is now considered outdated.</i> <i>Mechanistic or process-based models predict species' likely responses to changing environmental conditions by explicitly incorporating known biological processes, thresholds and interactions. These models are complex and require significant data inputs, and therefore may be outside the scope and scale of a vulnerability assessment needed to design adaptation strategies for the Samish Indian Nation.</i> <i>A trait-based approach uses species' biological characteristics to estimate their sensitivity and adaptive capacity to climate change, typically combining these with estimates of the extent of their exposure to climate changes. This approach is useful for assessing a large suite of species and has been used by a number of agencies and tribes in the region, and therefore is a good candidate to pursue if a detailed sector-specific vulnerability assessment is needed to support Samish Indian Nation's Natural Resources planning work.</i> <i>The examples below incorporate aspects of trait-based approaches.</i>
The Climate Change Vulnerability Index (CCVI)	Uses a scoring system that integrates a species' projected exposure to climate change in an assessment area with three factors associated with climate change sensitivity: (1) indirect exposure to climate change; (2) species-specific factors (including dispersal ability, temperature and precipitation sensitivity, etc.); and (3) documented response to climate change. The CCVI is intended for use with terrestrial and aquatic (but not marine) animals and plant species. This tool has been used by the Stillaguamish tribe in their vulnerability analysis. It does not address marine species or habitats. Developer: NatureServe, http://www.natureserve.org/conservationtools/climate-change-vulnerability-index
Scanning the Conservation Horizon: A Guide to Climate Change Vulnerability Assessment	This guidance material details various approaches for assessing sensitivity, exposure, and adaptive capacity for ecosystems, habitats and species. Developer: National Wildlife Federation, https://www.nwf.org/~media/PDFs/Global-Warming/Climate-Smart-Conservation/NWFScanningtheConservationHorizonFINAL92311.ashx

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Tool	Description
Coastal Hazard Wheel	Coastal adaptation system that incorporates a coastal classification system and functions as a key for classifying a particular coastal location, determining its hazard profile, identifying relevant management options and communicating coastal information. Developer: UNEP-DHI Partnership, http://coastalhazardwheel.org/
U.S. EPA. A Framework for Categorizing the Relative Vulnerability of Threatened and Endangered Species to Climate Change	The EPA Framework is composed of four modules. Module 1 categorizes baseline vulnerability to extinction or major population reduction. Module 2 scores the likely vulnerability of a species to future climate change, including the species' potential physiological, behavioral, demographic, and ecological response to climate change. Module 3 combines the results of Modules 1 and 2 into a matrix to produce an overall score of the species' vulnerability to climate change. Module 4 is a qualitative determination of uncertainty of overall vulnerability based on evaluations of uncertainty done in each of the first 3 modules. Developer: US EPA, https://nepis.epa.gov/Exe/ZyPDF.cgi/P100QR9T.PDF?Dockey=P100QR9T.PDF
North American Marine Protected Area Rapid Vulnerability Assessment Tool	Designed to help marine protected area managers evaluate the implications of climate change for the habitats of their sites. The tool has three parts (a user guide, a set of blank worksheets, and a booklet containing sample completed worksheets), which used provide a rapid vulnerability assessment framework and adaptation strategy development process. Developer: Commission for Environmental Cooperation and EcoAdapt, http://www3.cec.org/islandora/en/item/11733-north-american-marine-protected-area-rapid-vulnerability-assessment-tool-en.pdf
Methodology for Assessing the Vulnerability of Marine Fish and Shellfish Species to a Changing Climate	Framework that provides decision makers with information on the relative vulnerability of fish species to expected changes in climate and ocean conditions. The Methodology uses information on species life history characteristics, species distributions, and projected future climate and ocean conditions to estimate the relative vulnerability of fish species to changes in abundance (and to some extent distribution).

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Tool	Description
	Results from applying the methodology can help fisheries managers and scientists identify ways to reduce risks and impacts to fisheries resources and the people that depend on them. Scientists can use the results to identify gaps and help prioritize research. Managers can use the results to identify potential impacts and start discussions on possible management approaches to reduce impacts and increase resilience of fish species, fisheries, and fishing-dependent communities. Developer: NOAA NMFS, https://www.st.nmfs.noaa.gov/Assets/ecosystems/climate/documents/TM%20OSF3.pdf

In choosing an assessment process and method, it is important to remember that there is value in the process as well as the final outputs. It is also important not to become overwhelmed by the lack of certainty or available data, as this can lead to ‘data-paralysis’ that hinders progress towards development of adaptation strategies.

PRIORITIZE ADAPTATION ACTION AREAS

At this time, with more detailed vulnerability assessment information available, it may be beneficial (though not required) to reassess the priority adaptation planning areas identified as part of Step Two. This can be accomplished by several different methods, two of which are discussed here.

RISK AND PRIORITY MATRICES

Matrices provide a quick, low tech solution to evaluating priorities by sorting a diverse set of issues into an order of relative importance. The process depicted here is a two-step process that first assesses risk, and then establishes priorities.

Characterizing risk may help participants to gauge whether they can accept the level of risk climate changes poses to the community’s assets and resources. To characterize risk, you will incorporate the probability of impact and consequence information from Table 4 into a risk matrix that considers the probability of the climate change impacts against the consequences of the impacts, depicted in Table 7.

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Table 7: Risk Matrix

		Consequence Low → High		
Probability High → Low		Low	Medium	High
	High			Fidalgo Bay Resort
	Medium			
	Low			

Green = Low Risk

Yellow = Medium Risk

Red = High Risk

Using the Fidalgo Bay Resort example from Table 4, there is a high probability of impact and the consequences from the impact are anticipated to be high, meaning that there is high risk.

Then, you can combine relative rankings from the vulnerability and risk matrices, Table 5 and Table 7 respectively, to identify high priority adaptation action areas. If an asset or resource has high risk and high vulnerability, this might indicate that there this is a high priority for adaptation action planning. Table 8 depicts an adaptation action priorities matrix.

Using the Fidalgo Bay Resort example from Table 5 and Table 7, the resort is anticipated to have high vulnerability and high risk, suggesting it might be a high priority for adaptation planning and action.

Table 8: Adaptation Action Priorities Matrix

		Vulnerability High→ Low	
Risk High → Low		High	Low
	High	Fidalgo Bay Resort	
	Low		

Green = Low Priority

Yellow = Medium Priority

Red = High Priority

PRIOTIZATION CRITERIA

In lieu of a matrix approach, criteria could also be used to prioritize the vulnerabilities. Prioritization criteria allows participants to step back and evaluate how assets and resources should be prioritized, based on the values of the community. As such, it is a more refined approach than the matrix noted above. The establishment of prioritization criteria can be difficult, as it requires an understanding of community values. The following is a set of criteria

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recommended by the IPCC and used by Jamestown S’Klallam in their adaptation planning efforts.

- **Magnitude of impacts** – the scale and intensity of the impacts;
- **Likelihood of impacts** – how likely the impact is to occur;
- **Persistence and Reversibility of impacts** – how long lasting or irreversible the impacts are;
- **Timing of Impacts** – when the impact is likely to occur;
- **Distributional nature of impacts** – whether specific groups or the whole community would be impacted;
- **Importance of System at risk** – the cultural, economic, or social value of the system affected; and
- **Potential for adaptation** – the availability and feasibility of actions to prepare for or respond to the climate impacts.

Each criterion was scored on a 1 to 5 scale with 1 being low and 5 being high.

STEP THREE: ESTABLISH GOALS AND OBJECTIVES

A key step in planning is to determine what you want to accomplish. The following outlines potential goals for the adaptation planning process, as well as preliminary objectives to reach in pursuit of these goals.

COORDINATION WITH SEVEN GENERATION VISION AND COMPREHENSIVE PLAN

The Climate Adaptation plan is just one part of a coordinated effort by the Samish Indian Nation to plan for the community, creating a number of long- and short-term plans to guide decision-making and ensure actions by the tribal government are consistent with the values of the tribal membership. Figure 6 provides a conceptual diagram showing the relationship between the different planning efforts that will be underway in 2018 and 2019, including the Climate Adaptation Planning effort.

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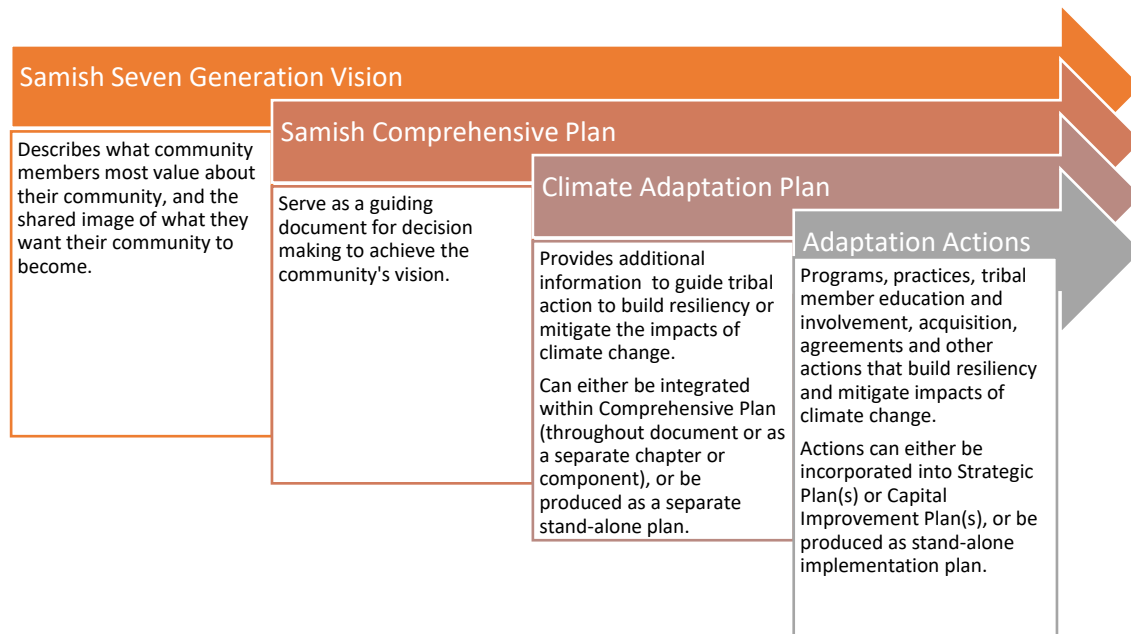


Figure 6: Conceptual Diagram of Samish Tribal Nation Coordinated Planning

Because the Climate Adaptation Plan is a component of the Comprehensive Planning process, it is important that the development of goals and objectives addressing climate adaptation be coordinated with this planning process.

GOALS

Goals are overarching principles that guide decision making. They are broad-based, long-term policy statements, and help to define the benefits that the plan is trying to achieve. The eventual success of the Samish Climate Adaptation Plan will be measured by the degree to which its goals are accomplished.

The following are draft goals that could form the basis of the future Samish Climate Adaptation Plan:

1. Position the Samish Indian Nation to be a climate resilient community taking proactive steps to prepare for projected climate change impacts.
2. Incorporate climate information into decision-making and planning.
3. Build resilience into all Samish programs and services, policies, operations and infrastructure.
4. Support sustainable and flexible solutions aimed at lessening or responding to the impacts of climate change.

These goals should be revisited during the next steps in the adaptation planning process, and coordinated with the Comprehensive Planning process. It is important to note that goals may

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evolve and change as more information about climate impacts and vulnerabilities becomes known.

OBJECTIVES

Objectives are specific, measurable steps that can be taken to meet the goal. Objectives define specific accomplishments or outcomes that are important to achieve on the way to reaching a goal. Unlike goals, objectives are specific, measurable, and typically have a defined completion date. They are more specific and outline the “who, what, when, where, and how” of reaching the goals.

To implement the draft goals noted above, the following presents draft objectives to guide the planning effort:

1. Increase tribal member awareness of climate change and its impacts by creating and implementing a communications plan by second quarter of 2017.
2. Monitor climate change mitigation and adaptation planning efforts underway at all levels of government throughout the adaptation planning process.
3. Review existing climate change impact assessments and scientific literature relevant to the Salish Sea region to evaluate projected climate change impacts on the Samish Traditional Territories by the end of 2017.
4. Assess the vulnerability of the built environment, cultural and natural environment, and tribal member health and wellbeing within the Samish Traditional Territory by mid-year 2019.
5. Develop a range of adaptation strategies and actions that may be implemented to reduce identified vulnerabilities and make the Samish Indian Nation more resilient to climate change by mid-year 2019, including the following priority planning areas:
 - a. Preserve Samish properties and infrastructure, economic development opportunities, and community infrastructure and systems essential to the Samish Indian Nation for current and future generations and under changing climate conditions.
 - b. Protect culturally significant natural resources, habitats, landscapes, sites and artifacts within Samish Traditional Territory from being compromised by climate change impacts.
 - c. Ensure the health, wealth, education and security of Samish tribal members in a new climate future.
 - d. Identify opportunities to partner with other governments and organizations to reduce vulnerability.
6. Complete and adopt Samish Climate Resiliency Plan by end of 2019.
7. Identify and implement ongoing monitoring processes to assess performance of climate adaptation actions by end of 2019.

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8. Identify frameworks to incorporate 'climate-smart' analysis and criteria into tribal government planning and decision-making processes by end of 2019.
9. Coordinate adaptation planning with other tribal planning efforts, such as the Samish Indian Nation Comprehensive Plan, to be initiated in 2018.

These objectives should be revisited during the next steps in the adaptation planning process.

STEP FOUR: IDENTIFY ADAPTATION OPTIONS

With a climate-informed set of goals and objectives in hand, it is now time to turn to the development of a broad array of adaptation strategies and options designed to reduce the 'key vulnerabilities'. Adaptation options can come in several forms, but are generally either focused on either a) building resilience or adaptive capacity, or 2) avoiding or reducing risks. As an example, a policy aimed at building resilience for salmon might focus on addressing other stressors that are already impacting salmon populations, such as urbanization, sedimentation and pollution, changes in streamside vegetation, erosion, draining of wetlands and other practices. A policy aimed at reducing risk would explore climate smart restoration planting, ensuring that future plantings are selected with changing climate conditions in mind and within areas that are protected and have high soil moisture content.

Strategies can involve structural or capital improvements, educational and advisory measures, regulatory measures, agreement and involvement of Samish in nontribal management decisions, and cultural and behavioral measures. Structural measures are physical or technological adaptation options. Educational and advisory measures pertain to research or research collaborations as well as raising awareness about climate change risks and outcomes in the community. Policy changes or agreements may require partnerships with other governments within the region. Cultural and behavior measures relate to behavioral and cultural changes within a community. These options may require the involvement of the community's traditional ecological knowledge in order to successfully be implemented.

The following are tools and guides available that contain sample adaptation options. Ultimately, adaptation options will need to be designed specifically to address the goals and objectives, risks, and opportunities specific to Samish adaptation planning. In addition to these tools, a review of other tribal adaptation plans may provide guidance for different adaptation strategies to evaluate. Table 9 provides an overview of tribal plans that could be consulted.

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Table 9: Summary of different Adaptation Planning tools for different planning areas.

Tool	Description
<i>Community-Wide</i>	
Adaptation Clearinghouse	Compilation of resources to help communities reduce or avoid the impacts of climate change. Focuses on climate change impacts that adversely affect people and the built environment, including the following priority planning areas: water, coastal areas, transportation, infrastructure and public health sectors, and ecosystems. Developer: Georgetown Climate Center, http://www.adaptationclearinghouse.org/
Adaptation Planning for Coastal Communities	Training offered by NOAA focused on adaptation planning. Chapter 5 of Adaptation Guide provides an overview of adaptation planning, including example approaches to addressing predicted impacts. Developer: NOAA Digital Coast, https://coast.noaa.gov/digitalcoast/training/climate-adaptation.html and https://coast.noaa.gov/data/digitalcoast/pdf/adaptationguide.pdf
Synthesis of Adaptation Options for Coastal Areas	Provides a brief introduction to key physical impacts of climate change on estuaries and a review of adaptation options available to coastal managers to reduce their systems' vulnerability to climate change impacts, specifically addressing wetlands, sediment transport, shoreline and erosion, invasive species, habitat for vulnerable species, and water quality and availability. Developer, US EPA: https://www.epa.gov/sites/production/files/2014-04/documents/cre_synthesis_1-09.pdf
Climate Change Adaptation Resource Center	Contains strategies for adapting to climate change for a number of different planning areas, including air quality, water utilities, water quality, ecosystems, waste facilities, and public health. Developer: US EPA, https://www.epa.gov/arc-x/strategies-climate-change-adaptation

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Tool	Description
Climate Change Mitigation & Adaptation Using the STAR Community Rating System to prioritize planning and make decisions	Guide for adaptation planning, including potential climate action strategies and actions. Part 2 specifically addresses adaptation planning. Developer: STAR Communities, http://www.starcommunities.org/download-the-star-climate-change-guide/
Preparing for Climate Change: A Guidebook for Local, Regional, and State Governments	Guide for adaptation planning, including potential climate action strategies and actions. Developer: UW Climate Impacts Group, King County, and ICLEI, http://iclei.usa.org/wp-content/uploads/2015/08/PreparingForClimateChange_Sept2007.pdf
Center for Climate Strategies Adaptation Guidebook	Provides methodology for climate adaptation action planning and policy development. Appendix 3 of this guidebook provides climate adaptation strategies for a variety of planning areas, including infrastructure, natural systems, health and society, economic activities, and cross-cutting issues. Developer: Center for Climate Strategies, file:///C:/Users/sclauson/Downloads/CCSAdaptationGuidebook2011%20(1).pdf
Green Works for Climate Resilience: A Guide to Community Planning for Climate Change	Provides an overview of nature-based approaches that can be used to respond to and prepare for the impacts of climate change. Developer: National Wildlife Federation, http://www.nwf.org/~media/PDFs/Global-Warming/Climate-Smart-Conservation/2014/green-works-final-for-web.pdf
<i>Sector-Specific – Human Health and Wellbeing</i>	
Public Health Adaptation Strategies	Provides guidance to health officials to develop strategies and programs to help communities prepare for the health effects of climate change. Developer: CDC, https://www.epa.gov/arc-x/public-health-adaptation-strategies-climate-change

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Tool	Description
Adaptation in Action: Grantee Success Stories from CDC's Climate and Health Program	Highlights successful ways communities have responded to the challenge of climate change. Developer: APHA, https://www.apha.org/~media/files/pdf/topics/environment/adapt_in_action.ashx
Summary of Adaptation Strategies	List of potential adaptation strategies. Developer: California Energy Commission's Climate Change Center, http://public.health.oregon.gov/HealthyEnvironments/climatechange/Toolkit/Documents/4-Taking-Action/Community-based-climate-adaptation-planning-case-study.pdf
<i>Sector-Specific – Transportation</i>	
Resilient and Sustainable Transportation Systems Program	Compilation of a number of different resources on preparing for and adapting to extreme weather events. Developer: AASHTO, http://environment.transportation.org/center/rsts/products_programs.aspx and http://environment.transportation.org/environmental_topics/infrastructure_resilience/key_resources.aspx
Climate Change: Activities at the Transportation Research Board	Compilation of a number of different resources on preparing for and adapting to extreme weather events. Developer: Transportation Research Board, http://www.trb.org/Main/SpecialtyPageClimateChange.aspx
<i>Sector Specific - Drinking Water/Water Utilities</i>	
Adaptation Strategies Guide for Water Utilities	Provides adaptation options for drinking water, wastewater and stormwater utilities based on region and projected climate impacts. Developer: US EPA, https://www.epa.gov/sites/production/files/2015-04/documents/updated_adaptation_strategies_guide_for_water_utilities.pdf and https://www.epa.gov/arc-x/climate-impacts-water-utilities
<i>Sector Specific - Community Infrastructure/Critical Facilities</i>	

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Tool	Description
Tribal Green Building Toolkit	Strategies/resources for assessing, prioritizing, developing, and implementing green building codes; guidance for updating existing codes or developing new codes. Developer: US EPA, https://www.epa.gov/green-building-tools-tribes/tribal-green-building-toolkit
Achieving Hazard-Resilient Coastal & Waterfront Smart Growth	Ideas shared by smart growth and hazard mitigation experts related to building hazard-resilient coastal communities. Developer: US EPA and NOAA, https://coastalsmartgrowth.noaa.gov/pdf/hazard_resilience.pdf
Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards	Actions for these natural hazards: Drought, Earthquake, Erosion, Extreme temperatures, Flood, Hail, Landslide, Lightning, Sea level rise, Severe wind, Severe winter weather, Storm surge, Subsidence, Tornado, Tsunami, Wildfire. Developer: FEMA, https://www.fema.gov/media-library/assets/documents/30627?id=6938
<i>Sector Specific - Cultural Resources</i>	
Cultural Resources Climate Change Strategy	Sets out a vision and broad approach for managing impacts to and learning from cultural resources under modern climate change. Developer: NPS, https://www.nps.gov/subjects/climatechange/upload/NPS-2016_Cultural-Resources-Climate-Change-Strategy.pdf
<i>Sector Specific - Natural Resources</i>	
Climate-Smart Conservation, Putting Adaptation Principles into Practice	Adaptation planning framework for natural resource managers. Includes 5-step adaptation planning process, including section addressing possible adaptation options. Developer: National Wildlife Federation, http://www.nwf.org/~media/PDFs/Global-Warming/2014/Climate-Smart-Conservation-Final_06-06-2014.pdf

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Tool	Description
National Fish, Wildlife, and Plants Adaptation Strategy	Unified approach for reducing negative impacts of climate change on fish, wildlife, plants, and natural systems upon which they depend. Developer: National Fish, Wildlife and Plants Climate Adaptation Partnership, https://www.wildlifeadaptationstrategy.gov/pdf/NFWPCAS-Final.pdf
Forest Adaptation Resources: Climate Change Tools and Approaches for Land Managers	Presents a menu of adaptation strategies and approaches for forest ecosystems. Developer: USDA, https://www.fs.fed.us/nrs/pubs/gtr/gtr_nrs87-2.pdf

STEP FIVE: EVALUATE AND PRIORITIZE ADAPTATION OPTIONS

After identifying potential solutions, it is time to prioritize these options. This step necessitates the establishment of evaluation criteria to guide this process. There are different criteria that can be used, but generally this revolves around consideration of the following factors:

- *Implementation mechanisms.* Is implementation possible given existing policies, laws and regulations? If not, what changes would be required?
- *Resource needs.* What are the costs and resources needed to implement options (e.g., available staff resources/expertise, funding, potential community partners)? Can the needs be met, or are additional resources needed?
- *Urgency.* What is the timeline for implementation and is the timing right to address the impact? What are the costs of delaying action, both in terms of what might be lost and in terms of what it would cost to implement later rather than now?
- *Expected value.* Will the action reduce risk (e.g., the probability or magnitude of the impact?) What is the magnitude of the loss/degree of potential consequences? What is the cost to implement relative to the expected value of the reduced risk/increased resilience and any co-benefits the action will provide? Does the action apply to multiple hazards, and help to build overall community resilience? Can the option be leveraged and combined with other actions to strengthen resilience and reduce costs?

Samish Indian Nation: Adaptation Planning Framework

- *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?
- *Equity.* Does the strategy unfairly benefit or burden some people, places or interests at the expense of others?

These factors can be qualitatively evaluated using a categorical scale, such as from low (1) to high (5). Table 10 provides a sample evaluation framework.

Samish Indian Nation: Adaptation Planning Framework

Table 10: Example Adaptation Action Evaluation Framework

Assessment Focus¹¹ <i>Asset or resource being evaluated</i>	Cost <i>Estimated funding needs and potential sources</i>	Ease of Implementation <i>Authority/capacity that already exists, compared to what is needed</i>	Political/Community Support <i>Alignment with community values</i>	Timing of Action <i>Estimated timeline to implement</i>	Partnerships Required <i>Partners desired or needed</i>	Equity <i>Consider benefits and burdens to particular members of community</i>	Expected Value <i>Potential effectiveness in responding to threat</i>

¹¹ Assessment focus refers to the specific issue you are discussing. This may include specific pieces of infrastructure or asset classes (e.g., roads, a wastewater treatment plant), natural systems (e.g., a forest, wetlands, rangelands, aquatic habitat), species (e.g., salmon, elk) and community services (e.g., water supply, storm water management), public health, etc. You can be as specific or as general as you like, although being more specific often helps with discussion about impacts and consequences.

STEPS SIX AND SEVEN: IMPLEMENT AND MONITOR

Once there is community and political agreement on a set of identified strategies, the work can transition from planning to implementation. This transition will be aided by the development of an implementation plan that breaks each strategy into identifiable steps, assigns each step to one or more people, identifies resource needs and sources, and includes a schedule describing when each step will be completed.

In addition, a plan should be put in place to track, evaluate and communicate performance. This plan should include schedules, milestones, and performance metrics for each adaptation action. Ideally, design of the tracking and evaluation process should occur upfront, in tandem with development of the adaptation plan.

Monitoring and evaluation provides an opportunity to step-back and evaluate the implementation, focusing on two key questions: 'are we doing the right things?' and 'are we doing things right?' Evaluation can be focused on whether the implementation is meeting the goals established in the adaptation plan or, alternatively, it can be assessed by monitoring changes in vulnerability as identified in the Vulnerability Assessment. However, since the timing of climate change impacts is still uncertain, it may be difficult to assess level of success (or lack thereof) in the plan's early years. Some impacts, which will occur regardless of climate change (e.g., hazard events), may be easier to monitor than those that are likely to occur more slowly over time, like sea level rise.

Things to consider when designing the tracking and evaluation process include:

- How often should the planning team meet to review the plan and discuss its progress?
- How will the planning team keep the Tribal Council and tribal members apprised of progress and obstacles?
- How should progress be reported? Besides reporting the status of the action implementation, the following additional items may be considered:
 - Were there any unexpected problems, obstacles, or delays associated with the action? If so, how were they overcome?
 - Have there been any indicators of success or failure of implemented actions in meeting the intended goals? Any losses avoided?
 - Were there any unintended consequences (positive or negative) due to implementation of an action?
 - Are there any new stressors or challenges that may hinder action-specific or overall success? If so, can anything be done to overcome them?

Table 11 provides sample performance measures that could be adapted for a climate adaptation plan:

Samish Indian Nation: Adaptation Planning Framework

Table 11: Summary of different sources for performance metrics.

Tool	Description
Indigenous Health Indicators	Contains a set of community-based indicators of indigenous health specific to Native American tribal communities in the Puget Sound/ Salish Sea region of the Pacific Northwest. Developer: Swinomish Indian Tribal Community, http://www.swinomish-nsn.gov/ih/
Community Resilience Planning Guide	Contains example performance metrics to gauge community resilience. Developer: NIST https://www.nist.gov/sites/default/files/community-resilience-planning-guide-volume-2.pdf
Partnership for Sustainable Communities – Sustainable Community Indicator Catalog	Contains a catalog of indicators that can measure progress toward sustainability objectives. The indicators in this catalog focus on the relationships among land use, housing, transportation, human health, and the environment. Developer: University of Pennsylvania’s Penn Institute for Urban Research, the HUD Office for International and Philanthropic Innovation and the Partnership for Sustainable Communities, https://www.sustainablecommunities.gov/indicators/discover
Center for Climate Strategies Adaptation Guidebook	Provides methodology for climate adaptation action planning and policy development. Chapter 4 provides metrics that can be used to evaluate the effectiveness of adaptations and monitor their performance. Developer: Center for Climate Strategies, file:///C:/Users/sclauson/Downloads/CCSAdaptationGuidebook2011%20(1).pdf

Monitoring may identify needed course corrections that will result in an update to the plan. The plan should also be periodically revisited in order to ensure that it continues to reflect community values, priorities and needs.

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APPENDIX A: COMMUNICATIONS PLAN



Samish Indian Nation

Climate Adaptation Communications Plan



February 2017



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PURPOSE

The Samish Indian Nation Tribal Council has given direction to take climate change into account by incorporating climate change adaptation planning throughout its program management. In response, staff has initiated a climate change planning process designed to develop an understanding of the Tribe's unique vulnerabilities and adaptive capacity amid local, regional, and global changes in climate, extreme weather, and sea level rise. The first step in climate change planning is to review the broad mix of information available on future climate conditions and potential impacts, examining these issues through a lens of what matters most to the Samish Indian Nation.

One of the primary objectives of the initial stages of this adaptation plan is to develop a culturally appropriate climate planning process. Determining the best techniques to engage tribal members is an important component to satisfying this objective. This Communications Plan outlines a series of potential engagement techniques that could be used to solicit tribal member contributions, input, and direction for the vulnerability analysis.

One of the challenges in designing engagement techniques is to ensure that the technique(s) used are appropriate for the way in which you plan to use the input. In other words, it is important to think about your goals ahead of time. The following analysis incorporates a public engagement framework designed by International Association for Public Participation (IAP2). The IAP2 Spectrum of Public Involvement is a well-researched and used tool in the field of communications. This framework outlines a spectrum of public participation, ranging from "inform" to "empower" (See Attachment 1). The level of engagement and impact of tribal members into the decision-making processes increases as you move from "inform" to "empower".

STRATEGY

The communications plan includes a four-pronged approach to involving tribal members in this process. The four elements include inform, consult, involve, and collaborate from the IAP2 Spectrum of Public Involvement (see Attachment 1). The following describes the goals and techniques proposed to be used for each of these elements.

INFORM

The "Inform" level of involvement is the lower scale of public impact, but is an important starting point for the Vulnerability Assessment.

Inform

Public Participation Goal: To provide tribal members with balanced and objective information to assist them in understanding the problem, alternatives, opportunities and/or solution’.

Promise to tribal members: We will keep you informed.

Example Techniques:

- *Newsletter*
- *Web site*
- *Open house/tabling at cultural events*
- *Guest blogs*
- *Videos*

In this stage, I anticipate that the communication techniques will be focused on two key objectives: 1) Communication and 2) Education.

Communication is dissemination of information about the plan, the process and the status. This is largely a one-way conversation, with a variety of materials and vehicles to reach a wide audience with varying interest levels.

Educational materials provide an opportunity to establish a base level of information that will enhance the effectiveness of tribal member engagement efforts. It will be important to provide a variety of learning opportunities that appeal to differing levels of interest, different issues, geographic areas and time commitments. Some members may prefer a classroom type setting; others prefer print or on-line materials and others may want frequent and brief contact that allow them to choose whether to link to an in-depth discussion of a topic.

Key techniques to fulfill this communication goal include:

1. **Early development of issue framing.** Based on research that has been conducted on climate change communications, there are several ‘rules of thumb’ that we should strive to meet with this communication:
 - Tailor your message to your audience. For example, frame climate change in ways that your audience can relate to, in ways that respect their beliefs.
 - Be clear about what you’re asking of people before you engage them.
 - To capture your audience’s attention, talk about climate impacts in local, immediate terms.
 - Don’t overwhelm folks with scary climate problems – talk about climate solutions or community resiliency.

The framing of climate change should be intriguing, inviting and appeal to the community's core values. Key messages should be consistently communicated throughout the process by staff.

2. *Progress updates through the newsletter.*

3. ***Development of a web page.*** The web page will provide a central forum for tribal members to access information about the plan and the process. It is envisioned that the website will provide general information about the project (e.g., timeline, goals, purpose), as well as information materials (see below).
4. ***Creation of informational materials.*** The materials should be designed to be approachable and accessible to a wide range of tribal members. Materials could include:
- Pamphlet with general information about the project.
 - A short informational video that can be viewed on the City's website and taken to community meetings covering basic facts and data about projected climate change impacts in the region.
 - Two-page news article format materials that present a straightforward, graphically-rich summary of key areas of concern emerging from the project (see examples from the Jamestown S'Klallam Tribe here: http://www.jamestowntribe.org/programs/nrs/JKT_Key_Area_of_Concern_All_Oct_2013%20v2.pdf).
 - Development of a Climate Change Curriculum. In the model of the Master Gardener program, this could include training for interested tribal members who can then function as ambassadors and help to disseminate information and/or lead discussion groups.
 - Sponsorship of a visiting lecturer series or panel discussions. We could use this to outreach to experts in fields of interest, as well as to representatives from other tribal nations who have embarked on a climate change planning process.

Attachment 2 contains materials developed for the first phase of the climate adaptation planning effort.

CONSULT

Consultation is a higher level of engagement, in which tribal members provide direct input. Consultation is still a one-way form of communication, but unlike inform, tribal members are providing the input.

Consult

Public Participation Goal: To obtain tribal member feedback on analysis, alternatives, and/or decisions.

Promise to tribal members: We will keep you informed, listen to and acknowledge concerns and aspirations, and provide feedback of how tribal member involvement influenced the decision.

Example Techniques:

- *Surveys*
- *Focus Groups*
- *Community mapping*
- *Tabling at cultural events*

Key techniques to fulfill this communication goal include:

- **Survey.** A community survey could be created, and participation solicited as part of on-going communication through the newsletter, via e-mail, or through the website. The objective of the survey would be to gather tribal member input on key areas of concern.
- **Tabling at cultural or other tribal events.** Identify existing gathering events where staff could attend to solicit input from tribal members. Events would need to be carefully selected and attendance by staff designed to be respectful and not disrupt the event. At these events, there are several different types of consultation activities that could be used, including:
 - Participatory mapping. Participatory mapping can be used to engage tribal members in a mapping process to identify their resources, perspectives, and priorities. Through sharing this information, tribal members can become part of decision-making, and the process of creating maps can become as important to building community consensus as the maps themselves.
 - Brainstorming. Members could be asked for systems or resources that may be impacted by changes in climate.
 - Audio or Video blogs. Tribal members could be asked to make quick audio or video blogs capturing their thoughts about climate change.
- **Creation of storytelling materials.** Storytelling materials that bring tribal member voices to the forefront and discuss their experience with and concerns about climate change. This could take several different forms, including a series of Guest Blogs on the website (see this site for an example: <https://whereareyourkeys.org/>), creation of a short audio or videos containing interviews with different tribal members that could be made available on the website, or compilation of audio/video blogs from events (see above).

INVOLVE

Involvement transitions to a two-way dialogue, in which tribal members provide direct input

and there is clear feedback on how this input influenced the decision.

Involve

Public Participation Goal: To work directly with the public throughout the process to ensure that public concerns and aspirations are consistently understood and considered.

Promise to tribal members: We will work with you to ensure that your concerns and aspirations are directly reflected in the alternatives developed and provide feedback on how public input influenced the decision.

Example Techniques:

- *Workshops*
- *Deliberative polling*

- **Workshops.** Workshops could be designed in the early or later stages of the project, depending on the desired outcomes for tribal member input. These could provide an opportunity for brainstorming issues, and prioritizing key concerns. Because of the dispersed nature of the tribe, this strategy may not be practical.
- **Polling.** Polling, much like surveys, could be used, with input solicited. Polls are typically more narrowly focused than surveys, gathering member opinions on a single topic or item. Through polling, members could be asked to rank priorities from a list.

COLLABORATE

Collaborate reflects a consensus approach to decision-making, in which tribal members are involved in decision-making.

Collaborate

Public Participation Goal: To partner with the tribal members in each aspect of the decision including the development of alternatives and the identification of the preferred solution.

Promise to tribal members: We will look to you for advice and innovation in formulating solutions and incorporate your advice and recommendations into the decisions to the maximum extent possible.

Example Techniques:

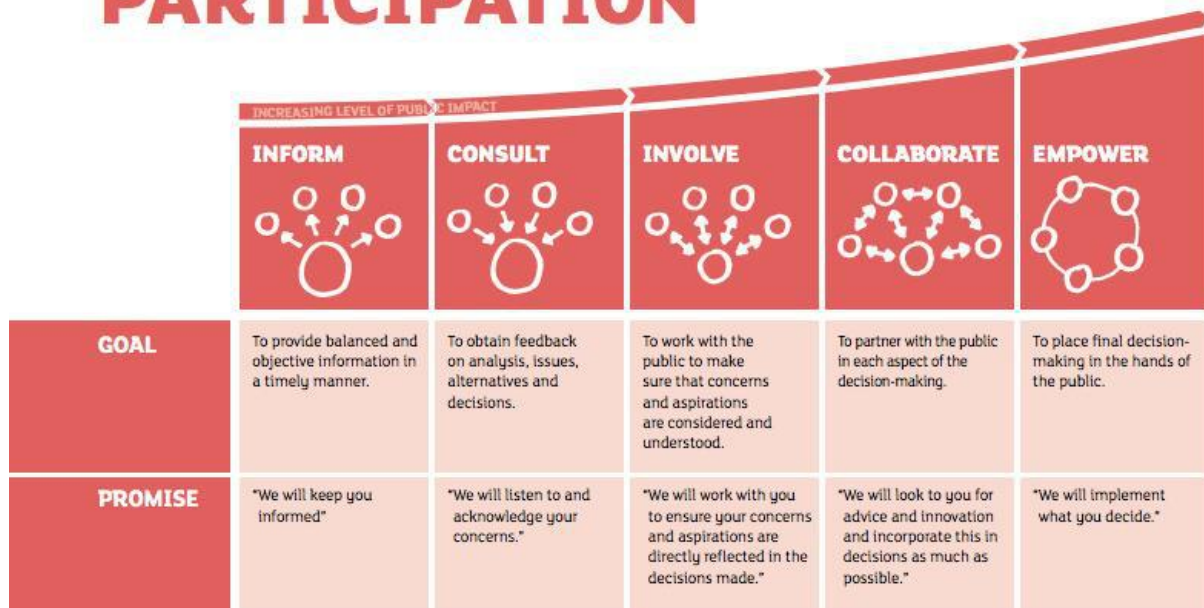
- *Advisory committees (e.g., the Working Group)*
- *Consensus-building participatory decision-making.*

The Climate Adaptation Working Group, in its leadership role in this project, is envisioned to function in this capacity. Tribal members are encouraged to participate in the Working Group.

ATTACHMENTS

1. IAP2 Spectrum of Public Participation

IAP2 SPECTRUM OF PUBLIC PARTICIPATION





APPENDIX B: SAMPLE COMMUNICATIONS MATERIALS

Conserving the Southern Resident Killer Whales

Q'ellhólmechen



Our Orca Family

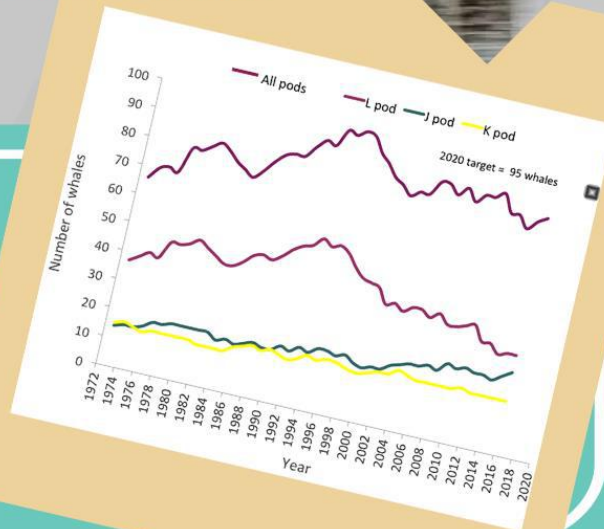
"As the killer whale goes, so goes our world" - Ken Hansen 2001

The Samish recognize other species in nature as part of an extended family to whom we are related and have responsibilities. We have long understood the significance of the Southern Residents to this region.



Range/Distribution

The Southern Resident Killer Whales (SRKW), or Orcas, are actually a large extended family comprised of three pods: J, K, and L pods. The SRKWs are frequently seen, from spring through fall, in the protected inshore waters of the Salish Sea.



Despite recent births in the second half of 2015 and beginning 2016, there has been a net loss of four SRKWs since 2011. This trend, along with the continued decline of Chinook salmon and the noted appearance of emaciation among members of the local pods, are reasons for concern.

Key Challenges:

Listed as endangered in both the United States and Canada, and their population is closely tied to the overall health of the ecosystem. Key threats include:



Prey Availability



Pollution and
Contaminants



Vessels and Noise

<https://www.epa.gov/salish-sea/southern-resident-killer-whales>



How is Climate Change impacting Orcas?

Q'ellhólmechen



Survival and birth rates in Southern Resident Killer Whales (SRKWs) are correlated with coastwide abundance of salmon. The abundance of their preferred prey, Chinook salmon, has declined from historical levels in the Salish Sea. Declines in Chinook abundance could lead to further decreases in fertility and survival of SRKWs.



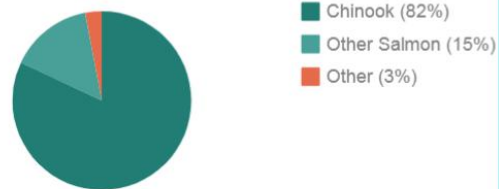
Our Orca Family

Climate change is predicted to impact salmon:

- ✿ Increased winter flooding.
- ✿ Decreased summer and fall stream flows
- ✿ Increased temperatures in streams and estuaries.

Small shifts in water temperature could alter the timing of migration, reduce growth and availability of oxygen in the water, and increase salmon susceptibility to toxins, parasites and disease.

Southern Resident Killer Whale Diet



Further, salmon survival during their first few months at sea is linked to ocean conditions such as surface temperature and salinity. Ocean conditions also affect food supplies, numbers of predators, and migratory patterns for salmon.

In addition, ocean acidification and ocean warming may interact to intensify exposure and potential bioaccumulation of toxins and other pollutants in the Salish Sea, producing elevated concentrations in top predators, like Orcas.

How can YOU do your part:

We all share in the responsibility to help assure that the whales have a clean, productive and serene environment. The following are some things YOU can do:

- ✿ Get involved in efforts to protect and restore salmon habitat in your community!
- ✿ Eat sustainably-harvested salmon and other seafood.
- ✿ Dispose of unused medicine and chemicals properly.
- ✿ Watch whales responsibly - they are sensitive to noise and disturbances from boats.

**What climate issues are most important to you?
HELP Samish prioritize climate issues and actions!**



Participate in a survey!



Scan this or go to the DNR
Climate Change webpage on
the Samish website!

Please contact Stacy Clauson with any comments or questions.



360-293-6404 x121



sclauson@samishtribe.nsn.us



SAMISH PREPARES

OUR PROMISE TO FUTURE GENERATIONS

We want our children and their children to be healthy, prosperous, and enjoy our natural resources and cultural traditions. Working together to identify and prepare for the impacts of a changing climate, we can fulfill this promise for future generations.



The first step in preparing is to understand more about future climate conditions.

We are already seeing changes in our local climate.

These changes are expected to accelerate and become more pronounced in the coming decades. Even if we stop emissions of harmful gases, the excess gases in the atmosphere would still take many decades to escape – as a result, we have 'locked in' changes to our climate for our children and their children.

Our changing climate will affect our natural resources and quality of life in many ways:



WATER RESOURCES



COASTAL FLOODING



NATURE'S BENEFITS



CULTURE



HEALTH

We must act SOON to prepare for these changes.

- ✿ Impacts are already being felt and it takes time to put actions into place.
- ✿ The impacts are local – you and your family are on the “front line”.
- ✿ Even if emissions stabilize, climate change impacts will last many years.
- ✿ Preparation can reduce costs and improve effectiveness.





TEMPERATURE & PRECIPITATION

Temperatures are increasing in all seasons, with the greatest increases in summer temperatures. We expect to experience drier summers, and more frequent and more intense rainfall events.



WATER RESOURCES

Warming temperatures will mean more precipitation will fall as rain and snowpack levels will decline. We expect more frequent and widespread winter and spring flooding, and increasing risk of summer drought.



COASTAL FLOODING

Sea levels are rising, and increasing the risk of coastal flooding. Sea level rise and coastal flooding threaten beach loss and coastal cliff erosion and can cause damage to or loss of traditional sites and resource areas, as well as buildings and infrastructure.



NATURE'S BENEFITS

Many of the plants, animals, and habitats, along with the benefits and cultural significance they provide, are not adapted to the new climate conditions. Shellfish, salmon, and orca are some of the key species that may be impacted.



CULTURE

Changes have the potential to impact traditional foods, cultural resources, and traditional sites that serve as a foundation of Samish cultural life.



HEALTH

Climate change affects the food we eat and the air we breathe. It also leads to extreme weather events, like flooding, droughts, and wildfires. All of these impacts affect human health.

GrFor more information on potential climate change impacts, review the University of Washington's State of Knowledge Report.

We need YOUR input.

- ✿ Help us to identify changes that may already be happening.
- ✿ Identify potential impacts that will affect your family and future generations.
- ✿ Prioritize which impacts are the most important to prepare for.
- ✿ Identify actions that we can take to prepare.

To PROVIDE input: Please contact Stacy Clauson with any comments or questions.



Participate in a survey!



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We all want good health for ourselves and our children. Climate change is already impacting our health. We can plan now to avoid some of the impacts and ensure our children and their children have a healthier world tomorrow.



HEALTH

6

Ways
**CLIMATE
CHANGE
HARMS
HEALTH**
among the
Samish Indian
Nation

1 Reduced Air Quality

Air pollution makes chronic conditions like diabetes harder to manage and contributes to higher rates of asthma, heart attacks, lung cancer, stroke and death.



HEALTH

Premature Deaths

200000

Air pollution is estimated to cause 200,000 early deaths each year in the U.S. - nearly 6 times the number of fatalities from motor vehicle crashes. This number is projected to increase as temperatures rise.

100000

In the Seattle area, it is anticipated that declining air quality conditions could double the number of excess deaths during the summer months attributed to poor air quality.



Air pollution is an important aspect of the physical environment that impacts health. Warmer summer temperatures are expected to increase exposure to poor air quality, making it difficult to meet the air quality standards necessary to protect public health.

1 Reduced Air Quality

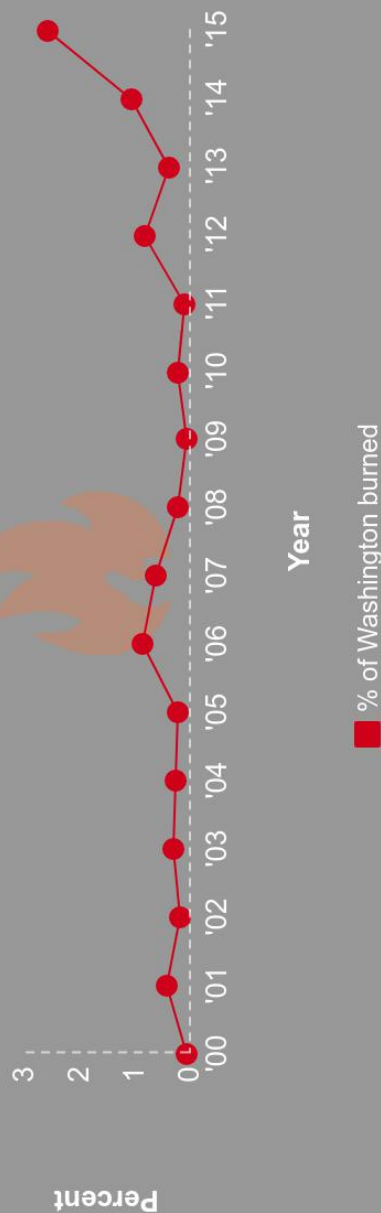


Larger and more frequent wildfires could increase particulate pollution, which impacts respiratory health.

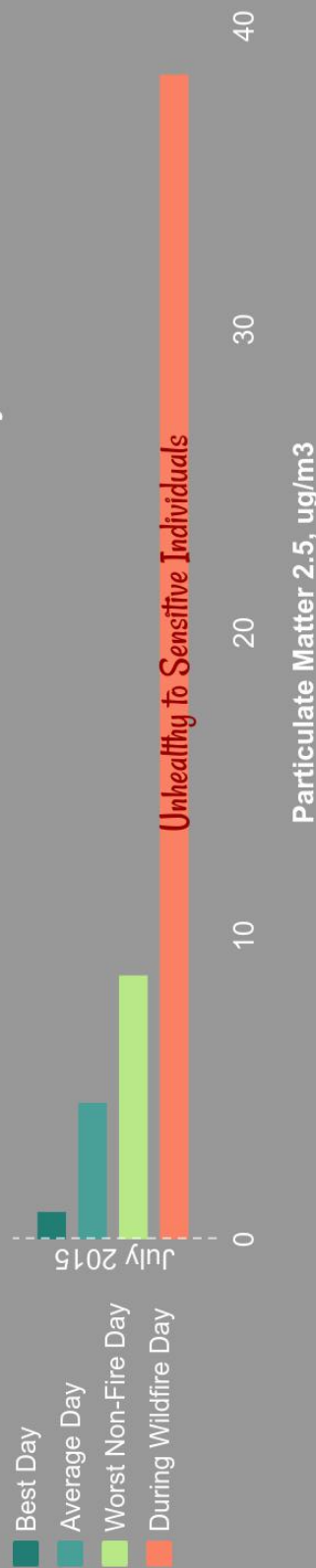
Large wildfires are occurring more often, and wildfire seasons are lasting longer.

Though wildfire on the west side of the Cascades is rare, several studies estimate that the annual area burned could more than double as a result of climate change.

% of Washington State burned



Wildfires often cause Worst Air Pollution Days of the Year



1 Reduced Air Quality



HEALTH

Increased temperature and levels of carbon dioxide enable plants to increase pollen production, exacerbating allergies.



If CO2 emissions continue at the current pace, pollen counts are projected to nearly double by 2060.

In the spring, pollen from flowering trees causes most allergies, and already trees are blooming days, or even weeks, earlier now than they did several decades ago, and as a result the pollen season is becoming increasingly longer.

Poor air quality, which is anticipated to become more common, enhances allergic responses in susceptible individuals.

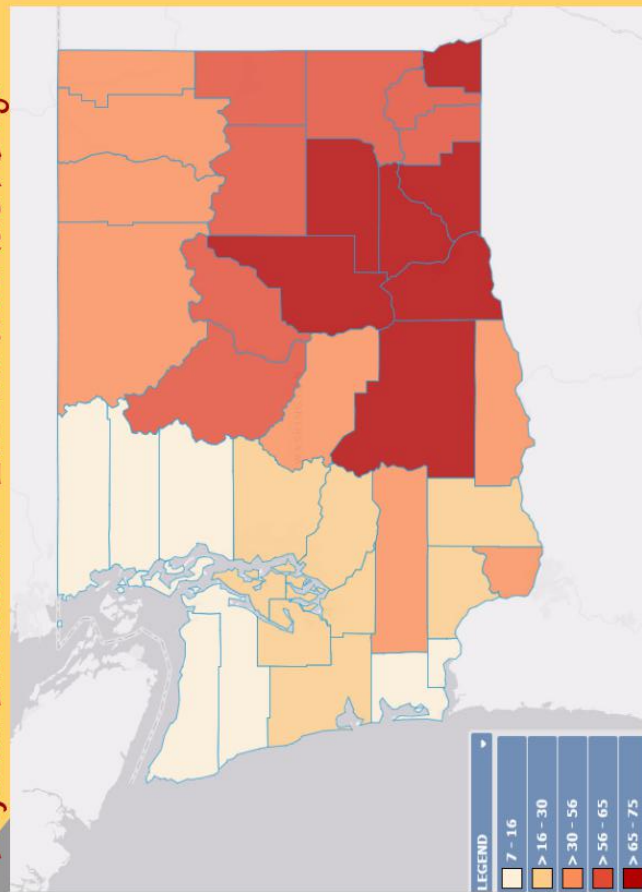
2 Heat-Related Illness

Extreme heat – the leading weather-related cause of death in the U.S. – causes heat exhaustion and deadly heat stroke.



HEALTH

Projected Increase in # Extreme Heat (90°) Days



Graphic developed by the CDC National Environmental Public Health Tracking Network. For more information visit <https://ephtracking.cdc.gov/DataExplorer/index.html?c=15&i=-1&m=-1>

The Salish Sea region will average up to 16 extreme heat days/year by 2080. The historical average is less than one.

Washington State already averages approximately 3 heat stress related hospitalizations for every 100,000 population, or approximately 200-300 hospitalizations per year. This rate is likely to increase with more extreme heat days.

In addition, extreme heat exacerbates underlying health conditions like diabetes. A study in King County identified a 78% increase in diabetic-related mortality on an extreme heat day and an 8% increase in emergency calls.

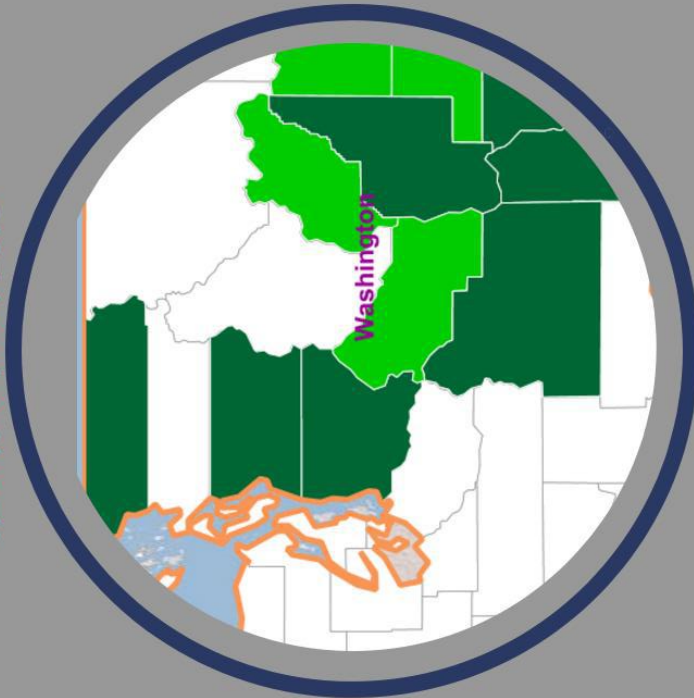
3 Disease

Exposure to infectious diseases that cause illness and death will increase as mosquitoes, ticks, and other vectors spread to northward.



HEALTH

West Nile Virus, 2015



Increasing air temperatures and changes in precipitation patterns may affect vector (e.g., mosquito, tick, flea, etc.) distribution, habitat and population growth. In the case of mosquitoes, these changes may mean more opportunities for bites that could spread disease.



3

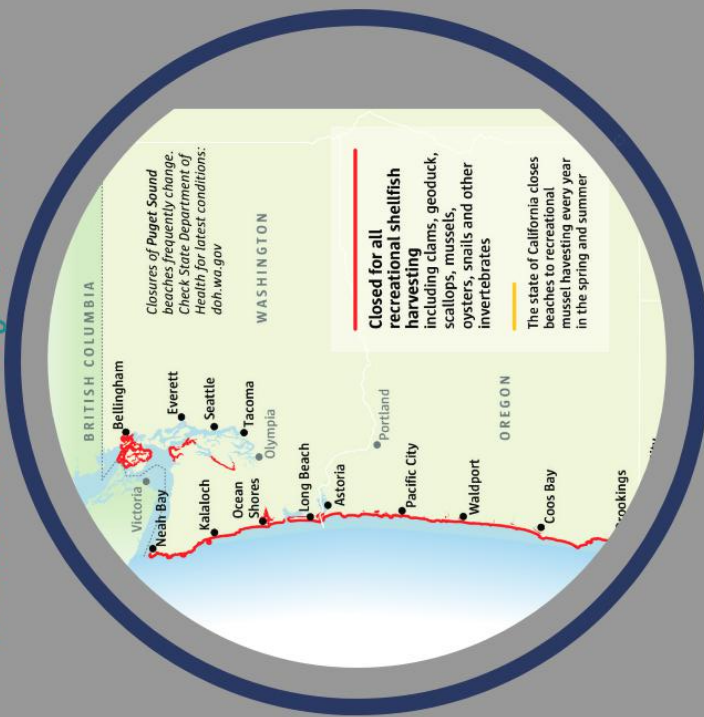
Disease

Warming and other climate changes also influence algae growth, which produce biotoxins that can cause diseases that are harmful to humans and wildlife.



HEALTH

West Coast Toxic Algal Bloom, 2015



A large toxic algal bloom off the West Coast in 2015 closed many beaches for shellfish harvesting.



Toxins in Lakes

Freshwater lakes across the state are also monitored for harmful toxins produced from algae, with a large number of exceedances of safe levels in the warm summer of 2015, resulting in lake closures for swimming and fishing.

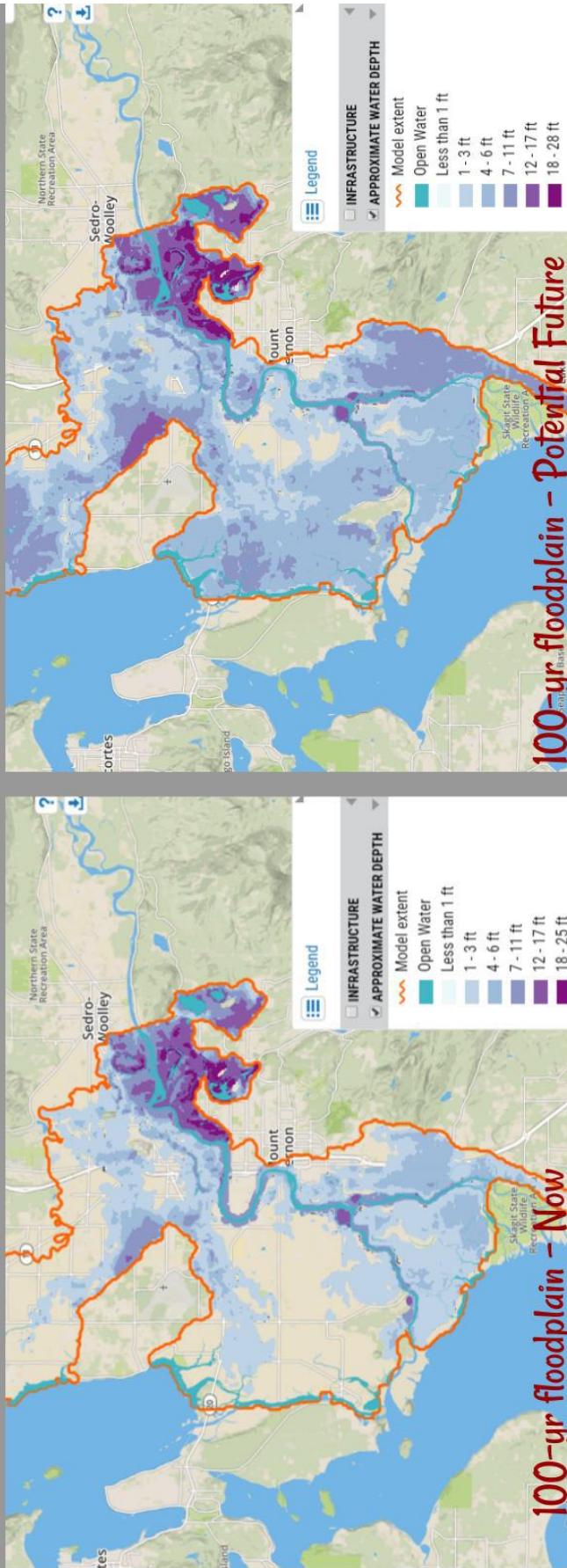
4

Illness & Injury

Increased flooding may cause physical harm, or may expose community members to pathogens through contact with contaminated waters and/or mold.



HEALTH



Graphic developed by the Skagit Climate Science Consortium (SC2). For more information visit <http://www.skagitclimatescience.org/>

Flood-prone areas are popular places to live. Over 225,000 people live within a FEMA-flood hazard area in Washington State. In the Skagit-Samish watershed, the area prone to flooding is anticipated to expand by approximately 74 percent (above), placing more people in the danger zone.

5 First Foods

It may be harder to access safe and nutritious traditional foods or medicinal plants which are associated with prevention and mitigation of chronic diseases like diabetes and heart disease.



HEALTH



Shellfish

Rising sea levels and more acidic oceans threaten shellfish beds. Increases in harmful algal blooms can also accumulate in shellfish, making them unsafe to eat.



Salmon

Salmon are threatened by warming streams and changes in stream flow. Sea wall development in response to sea level rise affects nearshore habitat important to salmon.



Labrador tea

Plants, like Labrador or swamp tea, which grow in bog or wet areas, may be impacted by changes in temperature and precipitation.

6 Wellbeing

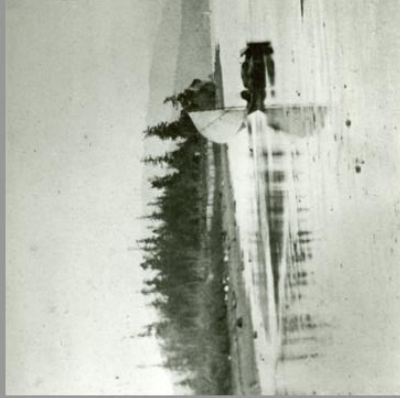
Impacts from a changing climate can lead to loss of community connections, sense of place and linkages with ancestors and homeland, cultural traditions, and spiritual teachings.



HEALTH



Materials for weaving or other traditional skills may become more difficult to find and harvest.



Important cultural sites may be impacted by rising sea levels.



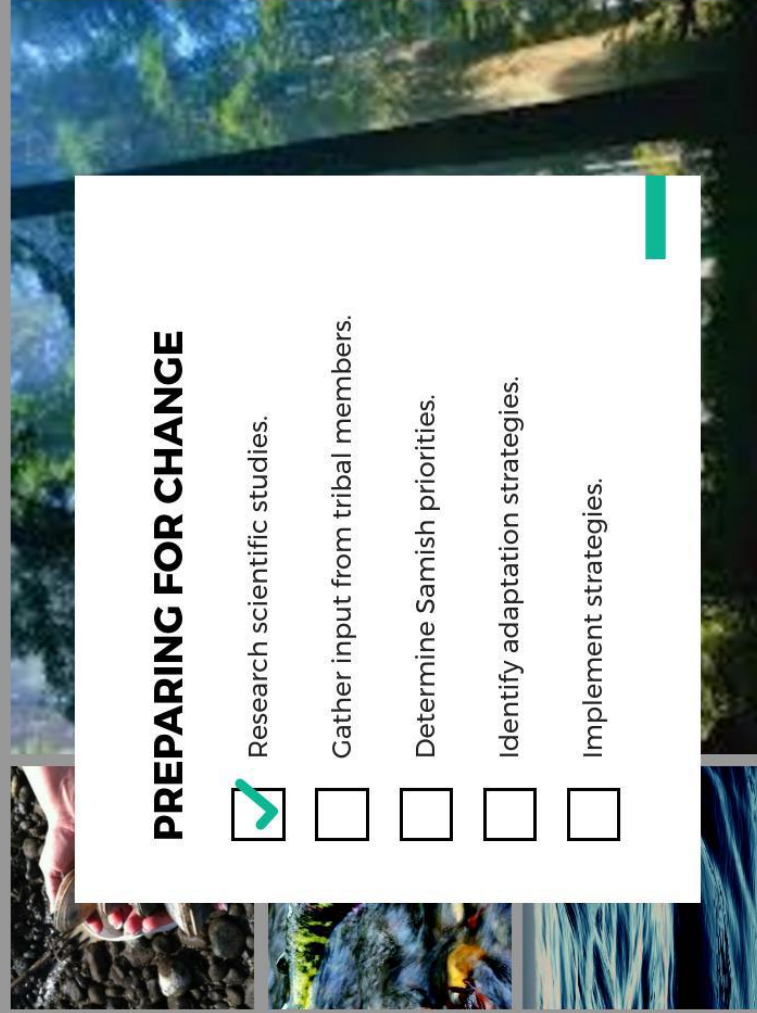
Iconic species like orca whales are susceptible to decline, as their food becomes more difficult to find.



Traditional foods such as clams and oysters are increasingly threatened.

SAMISH PREPARES

OUR PROMISE TO FUTURE GENERATIONS



The Samish Tribal Council has directed that climate change planning be integrated into all Samish programs. Samish have started to identify and prioritize key areas of concerns, based on Samish values.

Learn more about the project and how to get involved!

Contact Stacy Clauson at 360-293-6404 ext. 121 to
sclauson@samishtribe.nsn.us

