



Samish Indian Nation

Climate Adaptation Planning Priorities



December 2017



Samish Indian Nation: Climate Adaptation Planning Priorities

ACKNOWLEDGEMENTS¹

This project would not have been successful without the combined efforts of the Climate Change Working Group and support of the Samish Indian Tribe Council. The collaborative approach taken by the Samish Indian Nation proved invaluable in evaluating potential climate impacts, and identifying and prioritizing the key areas of concern. With this project, the Samish Indian Nation has created a foundation for on-going climate adaptation planning and made a crucial step towards mainstreaming climate change considerations into its on-going planning and operations.

CLIMATE CHANGE WORKING GROUP

The group is currently comprised of the following representatives:

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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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Samish Indian Nation: Climate Adaptation Planning Priorities

TABLE OF CONTENTS

Introduction	7
Overview	7
Adaptation Planning	7
How this Report was Prepared	9
Report Organization	10
The Samish Indian Nation	11
History	11
Profile of Samish Indian Nation Today	14
Preliminary Planning Priority Areas	16
Built Environment	16
Natural and Cultural Resources	28
Health and Wellbeing	55
Additional Data Collection Needs	59
References	60
Appendices	
Appendix A	A-1
Appendix B	B-1

LIST OF TABLES

Table 1: Overview of Potential Impacts to Samish Community Facilities	20
Table 2: Overview of Potential Impacts to Infrastructure in Samish Traditional Territory	22
Table 3: Plants and Animals of Key Cultural Significance whose species or habitat may be vulnerable to climate change.	31
Table 4: Plants and Animals of Key Ecological Significance whose species or habitat may be vulnerable to climate change.	A-1

LIST OF FIGURES

Figure 1: Climate Change Adaptation Planning Cycle. Adapted from “Quick Guide to Climate-Smart Conservation.”	9
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Samish Indian Nation: Climate Adaptation Planning Priorities

Figure 2: Conceptual Diagram depicting how information and input was gathered to prepare this report.	10
Figure 3: Samish Indian Nation Traditional Territory	12
Figure 4: Conceptual diagram showing the key climate adaptation planning priority areas.	16
Figure 5: Graphic illustrating potential sea level rise impacts to Fidalgo Bay Resort by 2100, based on a High Emissions Scenario. For illustrative purposes only.....	17
Figure 6: Samish Indian Nation Properties	19
Figure 7: Map depicting climate impacts vulnerability results for state facilities in Skagit County (WSDOT 2011).....	27
Figure 8: Map depicting ecosystems with predicted High Vulnerability from Climate Change, based on varying levels of confidence (red=high, orange = less than high, and yellow = not specifically evaluated). Data source: WDFW 2015 (habitat vulnerability rankings) and WA DNR (GIS data on vegetation formations).	30
Figure 9: Map of areas with key cultural importance that are predicted to be impacted by climate change.....	54
Figure 10: Conceptual Diagram of Health and Wellness Impacts from Climate Change. (Source: “The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment” 2016)	55

Samish Indian Nation: Climate Adaptation Planning Priorities

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.

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: 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.

Sector: General grouping used to describe any resource, ecological system, species, management area, etc. that may be affected by climate change.

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.

Samish Indian Nation: Climate Adaptation Planning Priorities

EXECUTIVE SUMMARY

Since time immemorial, the Samish people have lived and prospered on the land and water of the Salish Sea. Samish culture and social ties, as well as tribal member physical and spiritual health is intertwined with this place, and the foods, medicines, and resources that reside here.

We recognize that our tribal culture, traditional ways of life, lands, and resources are increasingly vulnerable to the impacts from climate change. This type of challenge is not entirely new to the Tribe, which has successfully navigated and adapted to past disruptions. Yet, the potential magnitude and rate of change necessitates that consideration of climate change be incorporated into the Tribe's planning efforts and operations.

In keeping with the Samish vision to ensure the health, wealth, education and security of Samish tribal members, we have initiated a climate change adaptation planning effort. One of the first steps in this process is to identify key assets and resources that they feel are most important to protect.

Samish has previously established a series of values that guide our work toward meeting our vision, one of which focuses on key priorities. The stated priorities are to preserve, protect, and promote our culture and traditions while developing the health, wealth, education, and security of our membership.

The following document explores these priorities and how they may be impacted under changing climate conditions. These priorities are organized around three broad categories: Built Environment, Natural and Cultural Resources, and Health and Wellbeing.

This work, together with two companion documents (*Samish Indian Nation Climate Adaptation Planning Framework* and *Samish Indian Nation Climate Impact Assessment*), provide background for incorporation into future climate adaptation planning steps, including a more detailed vulnerability assessment.

This report is organized into the following sections:

- Section 1 contains background on the Samish Indian Nation and their connection to the landscape; and
- Section 2 identifies key climate adaptation planning priorities.

Samish Indian Nation: Climate Adaptation Planning Priorities

INTRODUCTION

OVERVIEW

Since time immemorial, the Samish people have lived and prospered on the land and water of the Salish Sea in Washington State. 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.

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.

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."

Samish Indian Nation: Climate Adaptation Planning Priorities

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 1.

One of the key steps in an adaptation planning 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. It also represents an important scoping exercise to ensure that adaptation planning efforts are focused on the most important resources.

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, which are summarized in this report. In addition, the Samish Indian Nation has also conducted a literature review and summarized key predicted climate changes, contained in the *Samish Indian Nation Climate Change State of Scientific Knowledge*. This companion report contains information of predicted climate changes.

The information on predicted climate changes has been synthesized in this report to provide an initial scoping of potential impacts to 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.

Samish Indian Nation: Climate Adaptation Planning Priorities

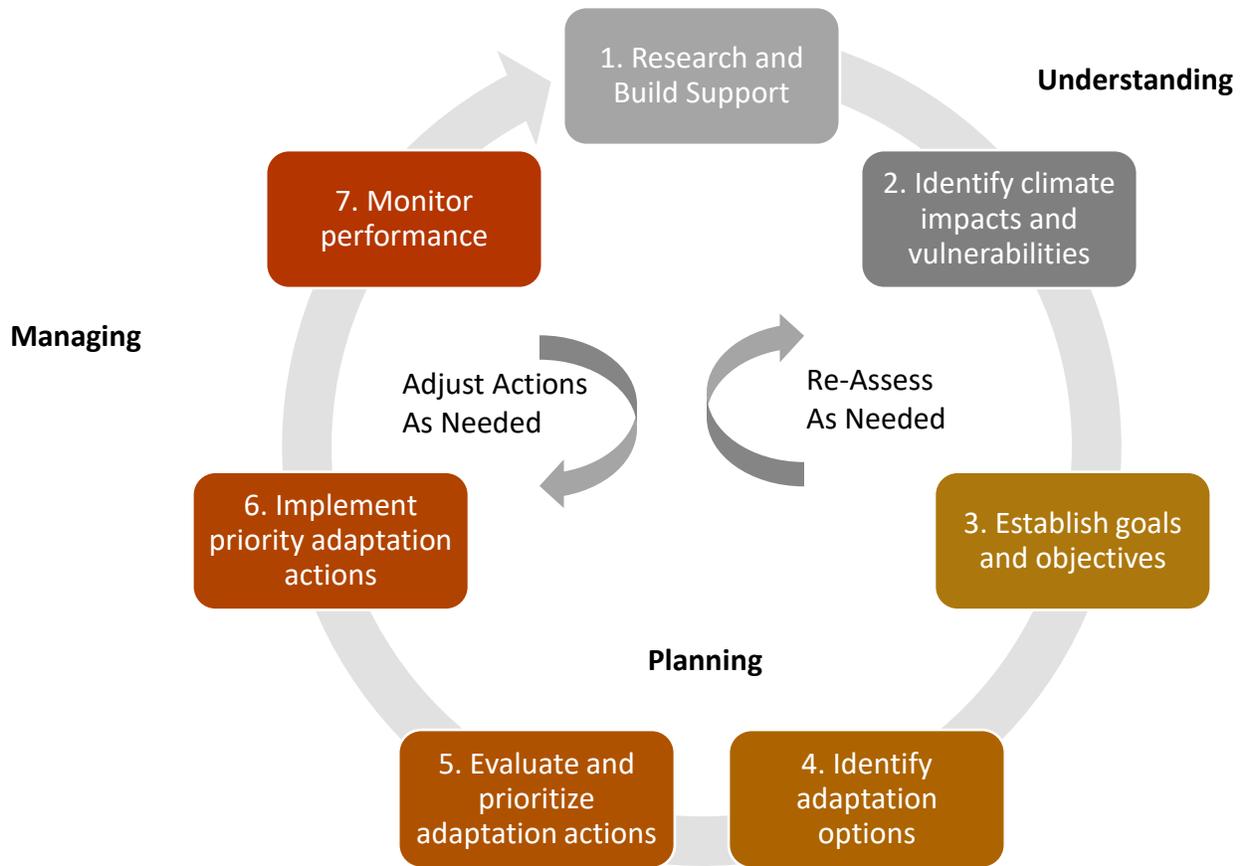


Figure 1: Climate Change Adaptation Planning Cycle. Adapted from "Quick Guide to Climate-Smart Conservation."

HOW THIS REPORT WAS PREPARED

Knowledge and information for this report was gathered from tribal members through surveys and other communications (Appendix B). Additionally, staff met with tribal staff from the Planning, Natural Resources, Chelängen and Health and Human Services departments to overview key climate changes and identify key assets and resources that they feel are most important to protect.

This input was shared with the Climate Adaptation Working Group, who refined and added to this input (Figure 2). It is important to note that this information may continue to evolve as more detailed vulnerability assessments are completed.

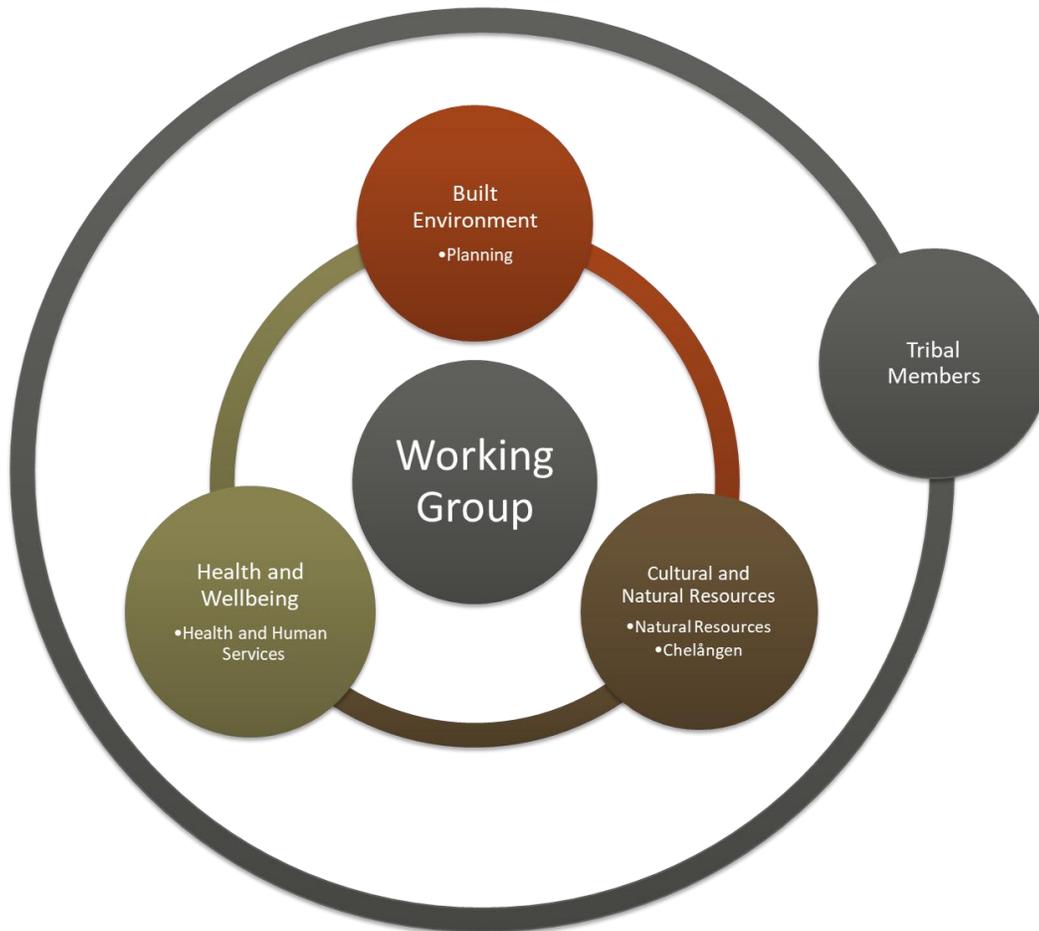


Figure 2: Conceptual Diagram depicting how information and input was gathered to prepare this report.

REPORT ORGANIZATION

This report is organized into the following sections:

- Section 1 contains background on the Samish Indian Nation and their connection to the landscape; and
- Section 2 identifies key climate adaptation planning priorities.

Samish Indian Nation: Climate Adaptation Planning Priorities

THE SAMISH INDIAN NATION

The following section provides context to understand where the Samish are coming from and where they are now.

HISTORY

Since time immemorial, the Samish people have lived and prospered on the land and water of the Salish Sea. The Samish's Traditional territory consists of Samish, Guemes, Cypress and the smaller islands south of Lummi, the north and west shores of Fidalgo Island, the islands of Blakely and Decatur, and the east and south shores of Lopez Island (see Figure 3).

The Samish established numerous different villages within this territory, building longhouses where many local families could live. A village site (Qwlhól) was located on Fidalgo Island near March's Point. In addition, Samish winter villages were on the east and west sides of Samish (village names were E7chíqen and Xwtl'échqs, respectively) and on the south and west sides of Guemes Island (village names were Sx'wayimelh and Qwéngqwengále7, respectively) and on the north side of Fidalgo Island (village names were Q'eléts'ilhch and Ts'x'wines, respectively) (Suttles 1974). In the spring, the Samish moved to the south shore of Lopez Island to gather camas and to fish for spring salmon.

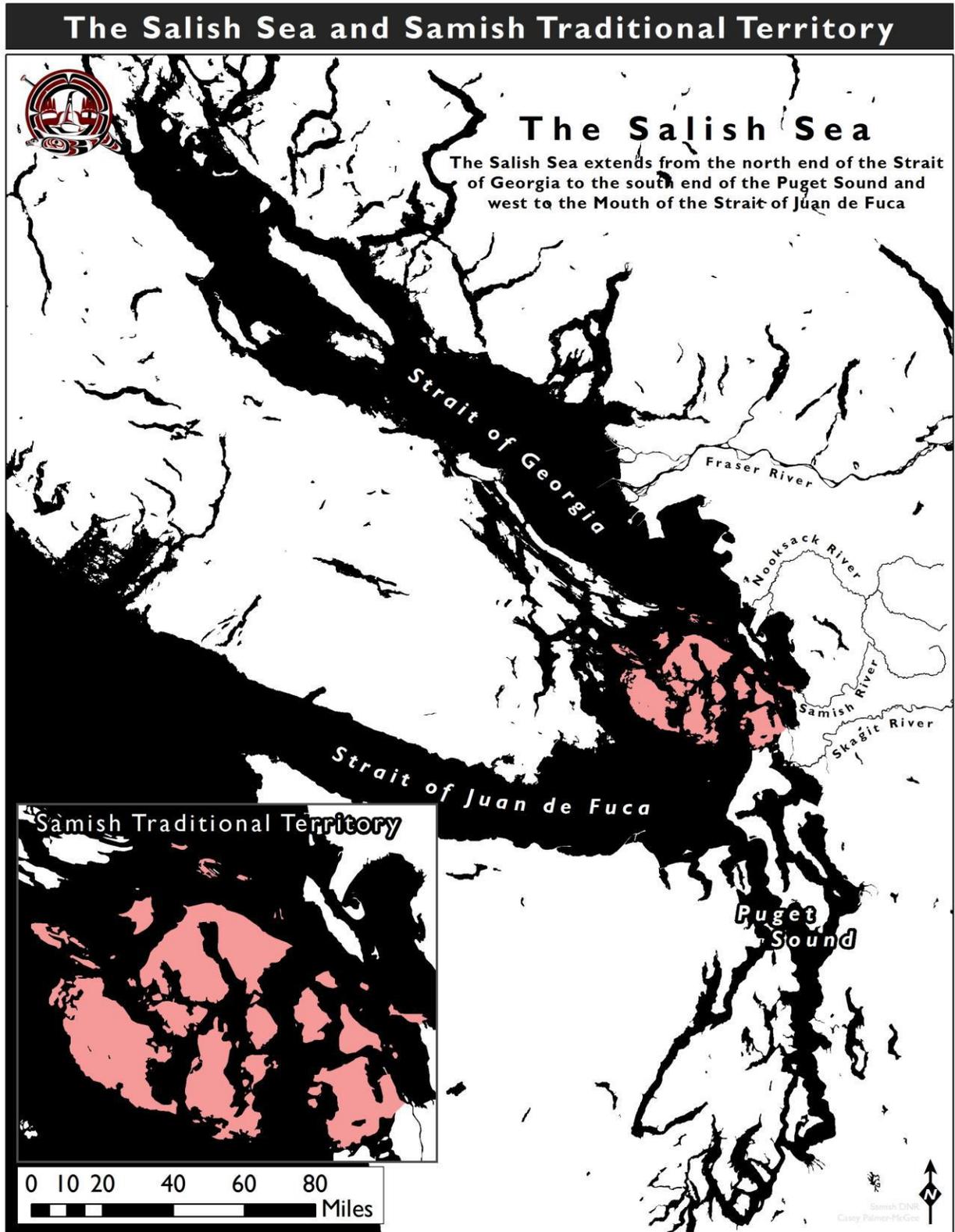


Figure 3: Samish Indian Nation Traditional Territory

Samish Indian Nation: Climate Adaptation Planning Priorities

Samish people were respected for their spiritual strength as well as their skillful carving of canoes and construction of longhouses. At E7chíqen the longhouse measured several hundred feet with some documents reporting it to be as long as 1,250 feet.

Though the Samish inhabited a large area, the tribe navigated the territory using canoes, the traditional transportation highways of the Salish Sea. Some tribal members would also marry far outside of their surroundings and relations, fostering a network of “kinships” throughout the Salish Sea region. Tribal members relied on these relationships during tough times in order to be able to access areas of food and shelter that were not currently in their home territory. The Samish hosted gatherings of visitors from far and wide, including Olympic tribes, Canadian bands, as well as visitors from Oregon Territory and eastern Washington Territory. Celebrations sometimes continued for days, perhaps in observance of a marriage or the naming of a new baby, or maybe the passing of a person of honor.

As a shoreline focused tribe, the food, traditions, and culture of the Samish Indian tribe are inextricably linked to the beaches, bays, forests and prairies they inhabit. Samish oral history includes teachings of the plant people, the sea creatures, the fur bearing and winged creatures. These stories passed down from our ancestors convey how both the natural and spiritual worlds entwine and cannot be separated. These teachings, also called our Chelángen, guide the Samish people in their daily lives and offers a unique and irreplaceable system of beliefs, from birth to death and beyond.

The elders of the Samish Indian Tribe would often tell children when they were growing up that, “When the tide was out, our table is set for dinner.” This saying reflects the abundance of food resources needed to survive that could be found living on the beaches or in the waters close to shore.

Fish are a key food resource; more than 20 species of fish were eaten, including all 5 species of Pacific Salmon, Steelhead trout, halibut, herring, sucker, chub and occasionally sturgeon. The fish changed with the season - the Samish trolled for spring salmon in the channel between Lopez and San Juan Islands; caught halibut off Lopez, Blakely and Cypress in the early summer; fished via reef-netting for sockeye off the south end of Lopez Island in mid-summer; and moved eastward in fall to fish silver and dog salmon from several rivers (Suttles 1974).

Shellfish are also a key food resource, and several types were harvested. Clams, cockles and mussels were harvested from the shoreline, crab from eelgrass beds. The surrounding estuaries, forests, prairies also contain a variety of food sources. Birds, including upland, waterfowl and shore birds, are an important food source. Some land mammals such as deer, elk, and seal are also part of these first foods. A variety of vegetables were harvested or cultivated, including sprouts, bulbs, and roots. Berries and fruits were also harvested.

Resources, including cedar trees and bark, grasses, and plants were used to make the canoes, nets, bows, harpoons and other tools used to hunt, fish and gather.

Samish Indian Nation: Climate Adaptation Planning Priorities

In gratitude for accepting any one of these gifts, the Samish tradition is to use a prayer or a song of thanks for the gift that was left by the ancestor. The Samish language (a dialect of Coast Salish known as “Straits Salish,”) also reflects this connection to the land and place, with names often reflecting how a place was used or what resources could be found there. The 13 moons calendar reflects the natural cycles that marked various activities, including preparation for hunting, fishing and gathering.

Among Samish traditional teachings, the Samish Nation have a tradition of planning for the coming Seventh Generation. Elders are the holders of wisdom and teachers of the generations to come, sharing their knowledge and protecting and preserving the gifts that will sustain future generations.

PROFILE OF SAMISH INDIAN NATION TODAY

The Samish Indian Nation is a federally-recognized tribe, successor to the large and powerful Samish Tribe, and a signatory to the Treaty of Point Elliott in 1855. The Samish have been impacted by past decisions by the U.S. Government, including omission of the tribe from the list of federally recognized tribes in 1969. This oversight had a major impact on the Tribe’s ability to exercise its sovereignty, indigenous rights, and environmental stewardship. It took 27 years of untold hardship and struggle to ultimately return the Samish Indian Nation to federal recognition in 1996, with no lands, or reinstatement of treaty hunting, fishing, or gathering rights provided as a part of that decision.

Samish has continued to pursue the trust obligations required of the Department of Interior, acknowledging the Tribe's eligibility to take further lands into Trust.

Absent a homeland base, many members of the tribe have moved in search of income and opportunities. Tribal members reside predominantly in Washington State, but also throughout the United States (most notably in Oregon, California, Idaho and Montana and Alaska) and in other countries, such as in British Columbia, Canada.

The Samish has over 1,800 enrolled tribal members. A General Council of all voting-age tribal members governs the Samish. The General Council gives direction to a seven-member Tribal Council that is elected by the General Council. The Tribal Council, in turn, oversees the welfare and resources of the Tribe, including its constitution, economic development, policies, legislation, enrollment, and justice.

The Administrative Offices for the tribal government are based in the Anacortes area, on Fidalgo Island. The Tribe offers to its members a wide variety of services and opportunities such as:

Samish Indian Nation: Climate Adaptation Planning Priorities

- Housing Assistance, with services designed to ensure that tribal members have the opportunity for, and access to, housing that is responsive to their cultural and physical needs and free from any form of discrimination.
- Preschool and Elders' Services, which provides educational programs that foster the preservation of Samish culture and traditions.
- Health Care and Wellness, which provides services and programs designed to ensure the health and wellbeing of tribal members.
- Social Services, which offers a variety of services and programs designed to empower families and individuals toward obtaining self-sufficiency and improving their wellbeing.
- Cultural Enrichment, which works to preserve, promote, and protect Samish traditions, culture, and language
- Education Assistance, which provides support for tribal members to pursue educational opportunities.

The Samish also work with state and federal agencies on several grants to protect the environment and preserve natural and cultural resources, as well as create a sound economic base for our tribe and each individual family.

The Samish are a strong and committed people. We are committed to reestablishing our homelands, strengthening our tribal culture, demonstrating traditional stewardship of cultural and natural resources, and being a contributing force in the economic base of our region. In short, the Tribe is continuing in the ways of their ancestors, carrying forth the values and visions of a strong Samish Indian Nation.

Samish Indian Nation: Climate Adaptation Planning Priorities

PRELIMINARY PLANNING PRIORITY AREAS

Three broad categories organize the climate adaptation planning priority areas (Figure 4).

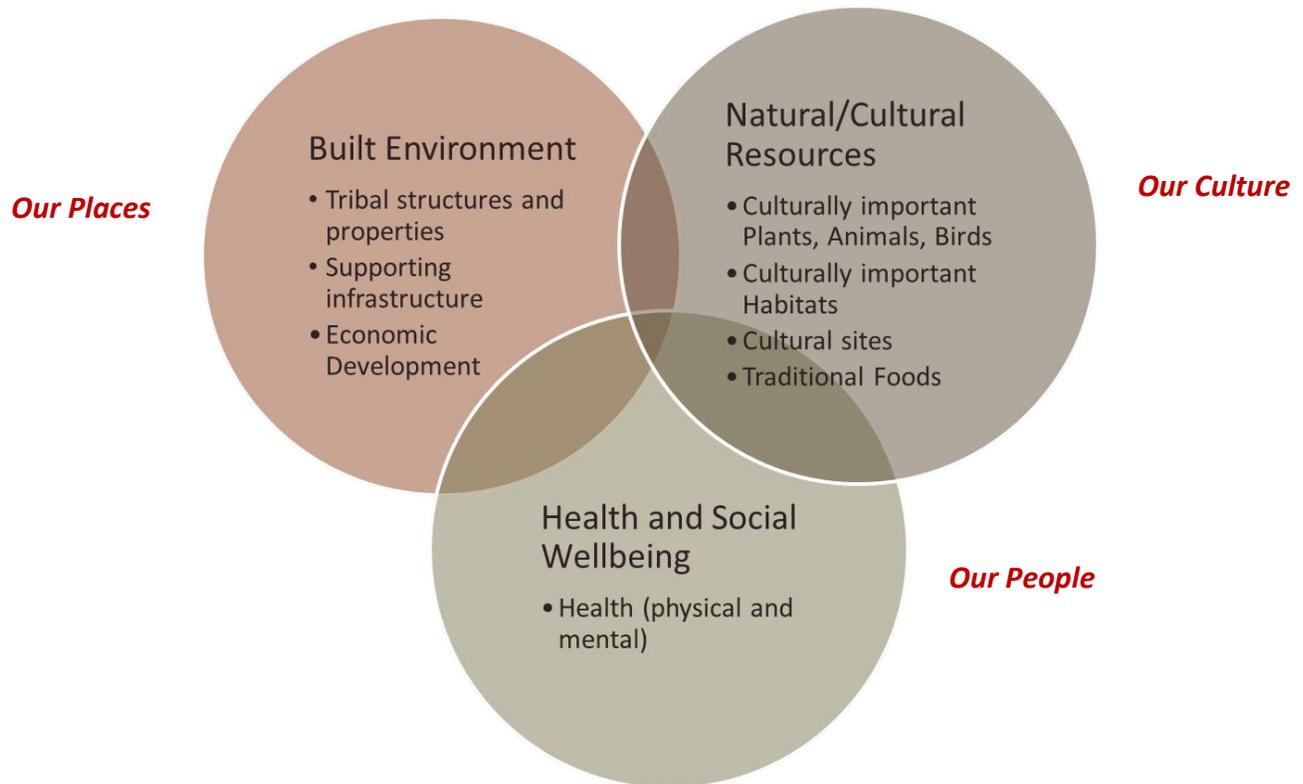


Figure 4: Conceptual diagram showing the key climate adaptation planning priority areas.

BUILT ENVIRONMENT

ECONOMIC AND COMMUNITY DEVELOPMENT

Economic Development

Economic resilience is a key focus area for the Samish Indian Nation. Economic stability allows the Tribe to develop and maintain revenue sources, jobs and services for its tribal members.

Presently, the Samish own and operate the Fidalgo Bay Resort, a waterfront RV and cottage resort located in the heart of Samish ancestral homeland on Fidalgo Island in Anacortes, Washington. This is a key tribal enterprise, and the Tribe is continually adapting the space to ensure its productivity.

Changes in the climate may impact this property in several different ways, including:

Samish Indian Nation: Climate Adaptation Planning Priorities

- Potential flooding or inundation of a portion of site due to sea level rise/storm surge (Figure 5);
- Increased incidences of saltwater intrusion, corrosion, flooding and inundation of the wastewater collection (sanitary sewer) system³;
- Scouring of beach/loss of shoreline protection;
- Access limitations after storm events; and
- Increased potential for landslide activity near access roadway during heavy rainfall events.



Figure 5: Graphic illustrating potential sea level rise impacts to Fidalgo Bay Resort by 2100, based on a High Emissions Scenario. For illustrative purposes only.

The resulting impacts to the tribe could be short- or long-term and include:

- Damage and repair to existing buildings and infrastructure, resulting in RV park reconstruction or repair costs;
- RV park closure for repair, resulting in temporary loss of revenue;
- Cost of additional shoreline restoration or repair;
- Temporary loss of revenue; and
- Long-term reduced 'footprint' for economic use.

The tribe is also exploring different economic development opportunities, and has reinstated the economic arm known as Samcor. Decisions about the direction of future opportunities should consider potential climate change impacts.

³ Anacortes' recent 20-year planning process determined that the wastewater system is not at risk in the near term to effects of sea level rise, but identified some risks.

Samish Indian Nation: Climate Adaptation Planning Priorities

In addition, future land acquisition for economic and community development purposes would benefit from a climate-smart analysis that ensure that properties are suitable for intended purposes under changing climate conditions.

Community Development

Community development in this context refers to the places where tribal members live, get services, learn or celebrate, practice traditional skills, or participate in other tribal activities. These are important spaces that help to provide for basic needs of tribal members, as well as build community ties and preserve community traditions, culture, and language.

At this time, Samish owns and operates several community spaces (Figure 6), including:

- Tribal Government Administrative Buildings in Anacortes;
- Tribal Government Offices and Cultural Resource spaces at Summit Park in Anacortes;
- Samish Longhouse in Anacortes;
- Fidalgo Bay Resort (addressed above); and
- Samish Health and Human Services in Anacortes.

Samish Indian Nation: Climate Adaptation Planning Priorities

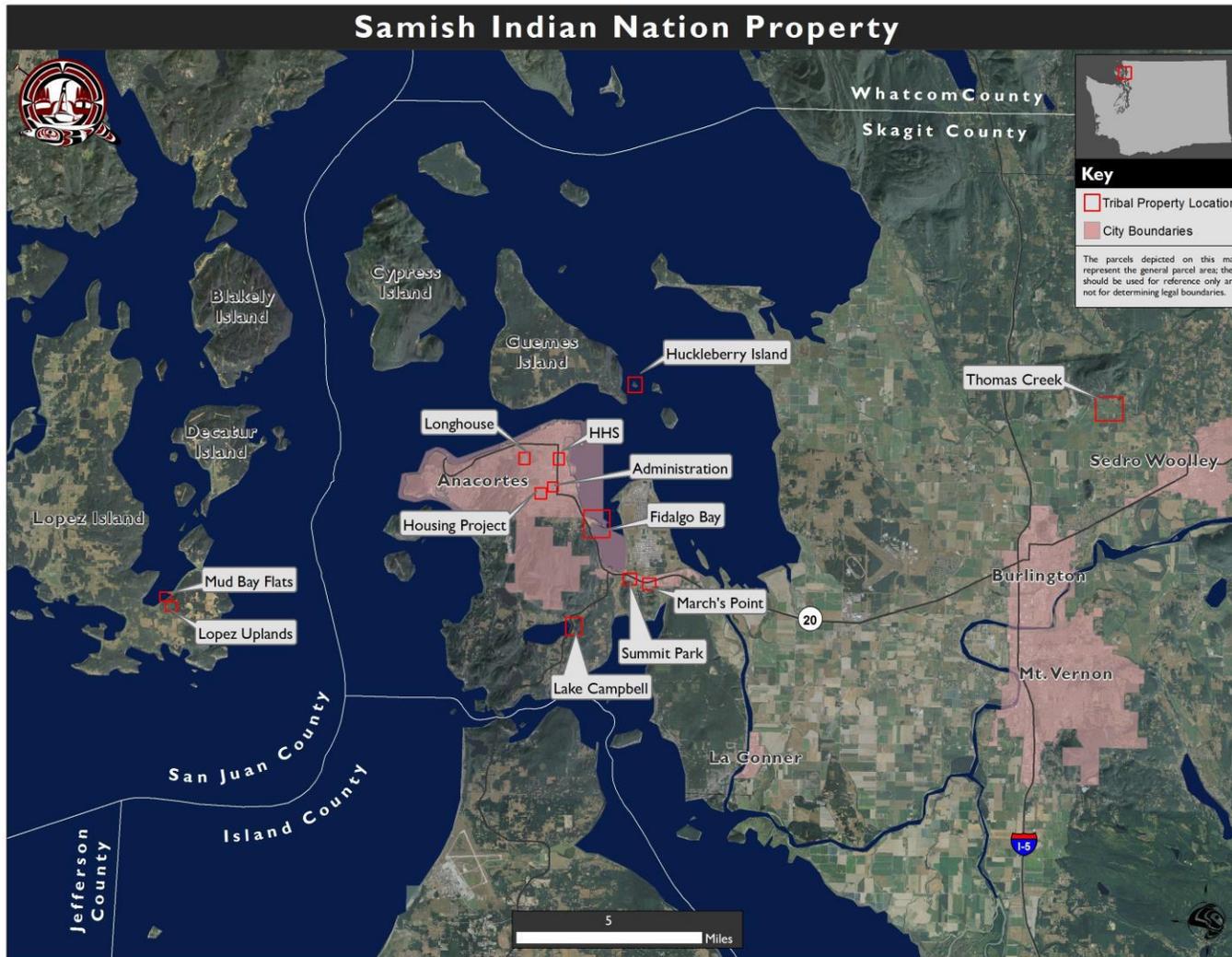


Figure 6: Samish Indian Nation Properties

Samish Indian Nation: Climate Adaptation Planning Priorities

In addition, Samish has other properties that are currently undeveloped but may be used for community spaces in the future. Of particular note, the development of the People's House (Xwíłngexwáw7xw) is underway on the Campbell Lake site in Skagit County. Changes in the climate may impact these properties in different ways as outlined in Table 1:

Table 1: Overview of Potential Impacts to Samish Community Facilities

Property	Potential Impacts
Campbell Lake	<ol style="list-style-type: none"> 1. Hwy 20 is located within 100-year floodplain of Campbell Lake. As a result, there may be potential access limitations during flooding events (Hwy 20). 2. A portion of site appears contains steep slopes (15-40 or over 40 percent). As a result, there is increased potential for landslide activity during heavy rainfall events. 3. Site is designated as a Moderate fire hazard area. Wildfire risk may increase under future climate conditions.
Samish Administration	<ol style="list-style-type: none"> 1. Transportation on/off Fidalgo Island is limited to certain routes, such as Hwy 20, that are exposed to increasing flood risks. As a result, there may be access limitations after storm events. 2. The Anacortes Wastewater Treatment facility is potentially threatened by flood risks and rising sea levels. Storm surges, combined with rising seas and changing precipitation patterns, could impact service from these facilities.
Health and Human Services	<ol style="list-style-type: none"> 1. Transportation on/off Fidalgo Island is limited to certain routes, such as Hwy 20, that are exposed to increasing flood risks. As a result, there may be access limitations after storm events. 2. The Anacortes Wastewater Treatment facility is potentially threatened by flood risks and rising sea levels. Storm surges, combined with rising seas and changing precipitation patterns, could impact service from these facilities. 3. The Anacortes Water Treatment facility was recently updated, and included improvements designed to mitigate impacts from flooding and sediment loading associated with climate change.
34th Street Housing Project	<ol style="list-style-type: none"> 1. Transportation on/off Fidalgo Island is limited to certain routes, such as Hwy 20, that are exposed to increasing flood risks. As a result, there may be access limitations after storm events. 2. The Anacortes Wastewater Treatment facility is potentially threatened by flood risks and rising sea levels. Storm surges, combined with rising seas and changing precipitation patterns, could impact service from these facilities. 3. The Anacortes Water Treatment facility was recently updated, and included improvements designed to mitigate impacts from flooding and sediment loading associated with climate change.

Samish Indian Nation: Climate Adaptation Planning Priorities

Property	Potential Impacts
Longhouse	<ol style="list-style-type: none"> 1. Transportation on/off Fidalgo Island is limited to certain routes, such as Hwy 20, that are exposed to increasing flood risks. As a result, there may be access limitations after storm events. 2. The Anacortes Wastewater Treatment facility is potentially threatened by flood risks and rising sea levels. Storm surges, combined with rising seas and changing precipitation patterns, could impact service from these facilities. 3. The Anacortes Water Treatment facility was recently updated, and included improvements designed to mitigate impacts from flooding and sediment loading associated with climate change.
Summit Park	<ol style="list-style-type: none"> 1. Transportation on/off Fidalgo Island is limited to certain routes, such as Hwy 20, that are exposed to increasing flood risks. As a result, there may be access limitations after storm events. 2. The Anacortes Wastewater Treatment facility is potentially threatened by flood risks and rising sea levels. Storm surges, combined with rising seas and changing precipitation patterns, could impact service from this facility. 3. The Anacortes Water Treatment facility was recently updated, and included improvements designed to mitigate impacts from flooding and sediment loading associated with climate change.
March's Point	<ol style="list-style-type: none"> 1. Transportation on/off Fidalgo Island is limited to certain routes, such as Hwy 20, that are exposed to increasing flood risks. As a result, there may be access limitations after storm events. 2. The Anacortes Wastewater Treatment facility potentially threatened by flood risks and rising sea levels. Storm surges, combined with rising seas and changing precipitation patterns, could impact service from these facilities. 3. The Anacortes Water Treatment facility was recently updated, and included improvements designed to mitigate impacts from flooding and sediment loading associated with climate change.
Huckleberry Island	<ol style="list-style-type: none"> 1. Loss of beach from sea level rise. This may impact important cultural sites as well as limit boat-landing sites. 2. A portion of site appears contains steep slopes (15-40 or over 40 percent). As a result, there is increased potential for landslide activity during heavy rainfall events. 3. There is no water available on the island for fire suppression. Under changing climate conditions, wildfire risk may increase.
Lopez Island (Upland)	<ol style="list-style-type: none"> 1. Certain inland & lowland areas of San Juan County are vulnerable to tidal flooding or storm surge when specific conditions occur simultaneously: high tide, heavy rain, high winds, such as Mud Bay Rd. on Lopez Island, which much be crossed to access this site. 2. Site is located in moderate to high wildfire risk. Wildfire risk may increase under future climate conditions. 3. The islands are increasingly lacking water when and where it is needed, particularly during the summer months. Studies of seawater intrusion

Samish Indian Nation: Climate Adaptation Planning Priorities

Property	Potential Impacts
	in late 1990s suggestion there is potential for seawater intrusion near site. The availability of water may be further impacted by changing climate conditions.
Thomas Creek	1. Site and surrounding area is located within 100-year floodplain. Flooding risk is likely to increase under future climate conditions, limiting use of the property as well as access.

COMMUNITY INFRASTRUCTURE

Community infrastructure, such as utilities (water, wastewater, stormwater), transportation (roadways, ferries, etc.), energy and power, and communications are essential for the Samish Indian Nation to provide services and programs for its tribal members, as well as provide opportunities for economic development. The Samish Indian Nation currently has limited infrastructure facilities that it owns and operates, but instead utilizes facilities provided by governments, districts and companies within the region.

These facilities may be impacted by changes in the climate in different ways, as outlined in Table 2.

Table 2: Overview of Potential Impacts to Infrastructure in Samish Traditional Territory

Infrastructure Type	Potential Impacts
Drinking Water system	<p>In the Skagit County area, the Lower Skagit Watershed lacks water when and where it is needed, particularly during the summer months. A sizable portion of rural Skagit County (an estimated 5,700 lots) is affected by the Skagit River Basin Instream Resources Protection Program Rule (WAC 173-503) adopted in 2001, which established minimum river and stream flows for salmon habitat. It does not apply to the Samish River basin or Fidalgo, Cypress, Guemes, Hope and Goat Islands. Instream flows in the Skagit River are not met on average 100 days out of the year, typically during the end of the dry season in late summer and early fall.</p> <p>Guemes Island has experienced significant seawater intrusion along its northern coast and in limited areas of its southern coast.</p> <p>In the San Juan Islands, water shortage is a key concern. Annual precipitation is relatively low, underground aquifers are limited, and surface reservoirs are in short supply. Much of the County relies on groundwater wells (from rainwater) for residential and commercial needs. Seawater intrusion problems in certain coastal areas, including Lopez Island. Ecology has closed some surface water sources to new water appropriations. The USGS estimates of recharge for San Juan County are the lowest in Western Washington. Even in non-drought years,</p>

Samish Indian Nation: Climate Adaptation Planning Priorities

Infrastructure Type	Potential Impacts
	<p>some existing residential wells are insufficient to provide water year-round, and require periodic deliveries by one of four private water haulers.</p> <p>Changes in climate may impact water availability in a number of ways, including:</p> <ol style="list-style-type: none"> 1. Reduction and/or sporadic disruptions in summertime supply. 2. Increased well salinity. 3. Seawater intrusion into fresh groundwater supplies. 4. Inundation or other disruption to water treatment facilities. The Anacortes Water Treatment plant was recently upgraded, and the construction incorporated climate-smart techniques designed to address projections for increased flooding and sediment load. 5. Contamination of supplies from inundation or flooding. <p>A preliminary climate assessment of the Puget Sound identified drinking water as a high risk under changing climate conditions (Siemann and Whitely Binder 2017).</p>
Wastewater/ Sanitary Sewer System	<p>Sewer service is available in Anacortes, Burlington, Big Lake, Concrete, La Conner, Mount Vernon, and Sedro-Woolley. Otherwise, rural portions of the County are served by on-site septic systems, some of which are failing.</p> <p>San Juan County contains approximately 21 sewer districts or large on-site sewage systems of varying size. Otherwise, wastewater is provided by on-site septic systems.</p> <p>Changes in climate may impact the ability to safely treat wastewater in a number of ways, including:</p> <ol style="list-style-type: none"> 1. Inundation/backup of treatment systems from higher tides, storm surges. In the case of Anacortes, a recent 20-year planning process determined that the wastewater system is not at risk in the near term to effects of sea level rise, but identified some risks. For example, some sanitary sewer manholes are anticipated to be impacted by rising sea levels: manholes located on Cabana Lane and Flounder Bay Lane, which could be submerged under the 20-year sea level projection; and manholes in the gravity sewer line on Christianson Road, which are operated by a pump that could be overwhelmed in an extreme tide event. In the long-term, the study indicated that there is potential for risk to the treatment facility if the area experiences a 5-foot sea level rise. 2. Increasing inflow and infiltration into the sanitary sewer collection system from increasing ground water table (in areas that are tidally influenced), resulting from sea level rise. 3. Rainwater inflow and infiltration entering the system during heavy rain events. For example, the City of Anacortes is already experiencing inflow and infiltration issues at its treatment plant, which can lead to reduced treatment efficiency, and potential overflows of the collection system.

Samish Indian Nation: Climate Adaptation Planning Priorities

Infrastructure Type	Potential Impacts
	<p>4. Facilities could be inoperable or damaged by floods. All municipal wastewater treatment facilities are currently threatened by flood risks. It is anticipated that under current 100-year flood conditions, municipal wastewater treatment facilities as well as major storm water pumping systems could be inoperable for up to 45 days of perhaps longer. The 100-year flood condition is anticipated to be exacerbated by changes in precipitation patterns.</p> <p>5. Sea level rise and changing precipitation may contribute to septic system failures and current septic system designs, especially in coastal areas.</p> <p>A preliminary climate assessment of the Puget Sound identified on-site sewage systems (i.e. septic systems) as being at high risk under changing climate conditions (Siemann and Whitely Binder 2017). If these systems fail, there is increased risk for illness due to water contamination, as well as reduced ability to harvest foods such as shellfish.</p>
Stormwater Drainage System	<p>The City of Anacortes has two combined sewer outflows (CSOs) which have the potential to allow untreated wastewater combined with stormwater to discharge to Guemes Channel during extreme storm events.</p> <p>In some areas of San Juan County, development and growth has increased local flooding due to past drainage practices. The County’s reliance on groundwater as the primary source of fresh water also has implications for promoting infiltration of stormwater. With climate change, ensuring infiltration of stormwater and groundwater recharge will become increasingly prominent because the County’s water resources are precipitation driven and much of the County’s water supply is from groundwater and impounded lakes. As groundwater demands increase (due to higher temperatures and greater population), and especially if water resources become more scarce (due to altered precipitation patterns and higher temperatures), maximizing stormwater infiltration and storage in the landscape will gain increasing importance.</p> <p>Changes in climate may impact the ability to safely slow and treat stormwater in a number of ways, including:</p> <ol style="list-style-type: none"> 1. Inundation/backup of drainage lines and discharge points from higher tides, storm surges 2. Runoff volumes exceed current stormwater design capacity, leading to flood conditions 3. Increase in combined Sewer overflows (CSOs) due to intense rain events 4. Some stormwater outfalls will be inundated and may need to be replaced at higher locations 5. Damage to discharge outfalls from bank erosion <p>These impacts can lead to more non-point surface runoff and increased nutrient loading, which can impact human health and the health of aquatic and marine species.</p>

Samish Indian Nation: Climate Adaptation Planning Priorities

Infrastructure Type	Potential Impacts
Energy/Power Systems	<p>Electrical power in the region is mainly derived from hydropower sources, with eight hydroelectric facilities located upstream on the Nooksack and Skagit river systems (Nooksack Hydro, Koma Kulshan Associates, Upper Baker, Lower Baker, Newhalem, Gorge, Diablo, and Ross). Hydroelectric operations may be impacted by changes in precipitation, resulting in seasonal operations of hydroelectric projects not being aligned with streamflow due to reduced snowpack. In addition, there is predicted to be increased difficulty balancing objectives for reservoir operations in summer due to lower low flows.</p> <p>In Skagit County, Puget Sound Energy provides electric service through a series of overhead and underground distribution lines and substations.</p> <p>In San Juan County, electric power is made possible by a series of submerged submarine cables that connect substations to mainland systems. Areas where these cables cannot be buried beneath the sea floor, and where they come ashore at the substation, are points of particular vulnerability. San Juan County utilities are also affected by damage to surface power lines on the mainland.</p> <p>Changes in climate may impact power service in several ways, including:</p> <ol style="list-style-type: none"> 1. Service disruption during and following extreme weather events. For instance, in Skagit County there is the potential for substation facilities located in valley to be threatened by flood risks. 2. Decrease in summer hydropower production, combined with increases in summer cooling demands, will stress power production and distribution.
Communications	<p>Skagit County is serviced by a number of cell and internet service providers through a series of underground and overhead facilities.</p> <p>In San Juan County, phone and radio communication are limited in many parts of the county; as a result, vulnerability may be greater on islands where cell service is less used. Land-based telephone and internet service are made possible by a series of submerged submarine cables that connect to mainland systems. Areas where these cables cannot be buried beneath the sea floor, and where they come ashore at the substation, are points of particular vulnerability. San Juan County utilities are also affected by damage to surface power lines on the mainland.</p> <p>Changes in climate may impact communications in a few ways, including:</p> <ol style="list-style-type: none"> 1. Service disruption from severe storm events 2. Potential service disruption in case of summer ‘rolling blackouts’, which may limit electricity needed to operate equipment
Transportation: Roads and Transit	<p>Changes in climate may impact transportation routes in many ways, including:</p> <ol style="list-style-type: none"> 1. Inundation of roadways due to flood activity (coast and river flooding). Major transportation routes within Skagit County, including portions of I-5,

Samish Indian Nation: Climate Adaptation Planning Priorities

Infrastructure Type	Potential Impacts
	<p>Hwy 20 and Hwy 11 are within 100-year flood zones where the frequency and severity of flooding may impact these transportation corridors. A study completed by WSDOT identified Hwy 20, 11, and 536 as having High Vulnerability to climate change impacts; while portions of I-5 through Skagit County were identified as having Moderate Vulnerability (Figure 7). Low vulnerability classifies roads that will remain open, but may result in reduced capacity, or no impact. Moderate vulnerability classifies roads that will experience temporary closures no more than 60 days). High vulnerability classifies roads that experience closures for more than 60 days for any one event.</p> <ol style="list-style-type: none"> 2. Increased incidence of fire that may close roads 3. Erosion of bridge footings from high tides, surges and/or deterioration of bridge joints from thermal expansion and contraction 4. Accelerated damage to roads from extreme heat events or flooding
Transportation: Marine (e.g. ferries)	<p>Changes in climate may impact marine transportation facilities in a few ways, including:</p> <ol style="list-style-type: none"> 1. Damage from storm events 2. Potential inundation of marine facilities and ports from gradual sea level rise and higher tides. WSDOT's analysis of ferry routes indicated a low risk for WSDOT operated ferry routes. The Guemes Ferry loading dock and parking area may be more vulnerable to sea level rise impacts.

Samish Indian Nation: Climate Adaptation Planning Priorities



Figure 7: Map depicting climate impacts vulnerability results for state facilities in Skagit County (WSDOT 2011).

Samish Indian Nation: Climate Adaptation Planning Priorities

The Samish Indian Nation has identified a desire to become more self-sufficient, working toward utility independence as it improves its properties. As the Samish Indian Nation explores opportunities to become utility-independent, it should consider how changes in the climate will impact these facilities.

EMERGENCY SERVICES

Emergency management protects communities by coordinating and integrating activities necessary to build, sustain, and improve the capability to mitigate against, prepare for, respond to, and recover from disasters, man-made or otherwise. As with infrastructure, the Samish Indian Nation currently does not provide emergency management services, but rather its tribal members utilize existing services provided by governments, districts, and non-profits in the area in which they live.

Residents in the Samish Traditional Territory have historically dealt with high water (flooding in both riverine and marine systems), severe windstorms, harsh winter storms, wildfires, landslides, drought and other natural hazards. Changes in climate are anticipated to exacerbate the frequency, duration, and intensity of these events. As a result, it is anticipated that there will be an increasing demand for these services.

CULTURAL AND NATURAL RESOURCES

Projected changes in temperature, precipitation, sea level, hydrology, and ocean chemistry threaten Samish ceremonial sites, burial sites, tribal traditions, and cultural practices that have relied on native plant and animal species since time immemorial.

CULTURALLY OR ECOLOGICALLY IMPORTANT PLANTS AND ANIMALS

Samish traditional stories, passed down from our ancestors, convey how both the natural and spiritual worlds entwine and cannot be separated. These teachings, also called our Chelángen, guide Samish people in their daily lives and offers a unique and irreplaceable system of beliefs.

Changes in the climate threaten the plant people, the sea creatures, the fur bearing and winged ones that we share our world with. Figure 8 depicts habitat types within and surrounding the Samish Traditional Territory that have been predicted to be at High Vulnerability from the impacts of climate change (WDFW 2015).⁴ These habitats comprise much of the cultural landscape of the region, and many of the plants and animals with key cultural significance to the

⁴ *The Samish Indian Nation Climate Change State of Scientific Knowledge* has more detailed information on the different types of habitat that are included in Figure 8.

Samish Indian Nation: Climate Adaptation Planning Priorities

Samish depend on these areas during a part or all of their life cycle or range⁵. Table 3 provides an overview of some of the species with identified cultural use that have part of their life cycle or range within these threatened habitats, and as a result may be adversely impacted by a changing climate.⁶

⁵ It is important to note that there are varying degrees of confidence on the vulnerability assessment. Additional study for areas with less than high confidence (orange and yellow in Figure 8) is recommended to improve confidence of the vulnerability assessment findings.

⁶ Note: This is not an exhaustive list of species with cultural use, and may be amended or appended throughout the climate adaptation planning process.

Samish Indian Nation: Climate Adaptation Planning Priorities

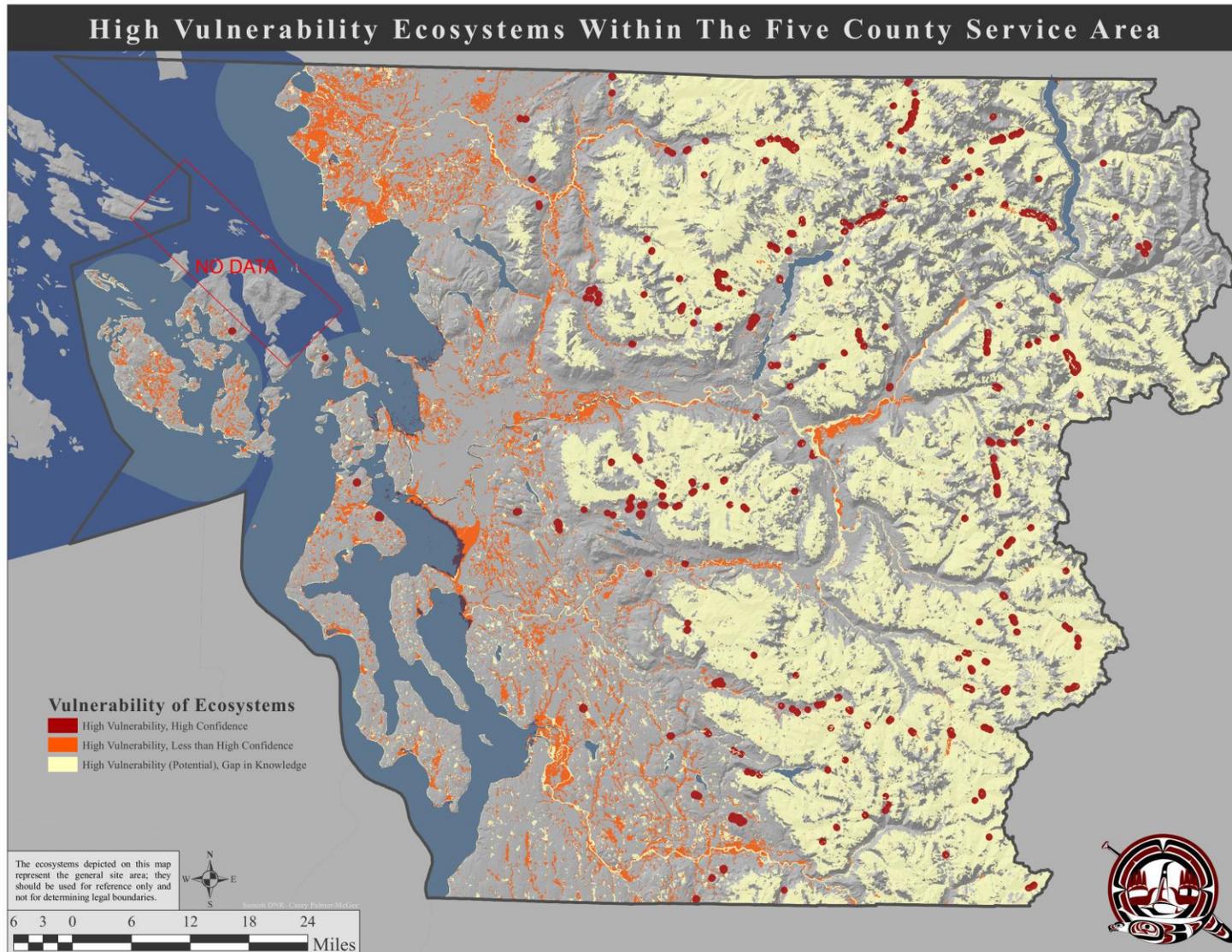


Figure 8: Map depicting ecosystems with predicted High Vulnerability from Climate Change, based on varying levels of confidence (red=high, orange = less than high, and yellow = not specifically evaluated). Data source: WDFW 2015 (habitat vulnerability rankings) and WA DNR (GIS data on vegetation formations).

Samish Indian Nation: Climate Adaptation Planning Priorities

Table 3: Plants and Animals of Key Cultural Significance whose species or habitat may be vulnerable to climate change.

Taxa	Species Name	Common Name	Samish Name	Cultural Significance	Prior Studies of Species Climate Vulnerability Ranking	Range or Life-cycle occurs within Habitat Areas with High Vulnerability ⁷
Amphibians	<i>Rana pretiosa</i>	Oregon spotted frog	Wéxes	Symbol incorporated into traditional crafts, artwork or ceremonies, Important marker of passage of time.	High (Stillaguamish 2015) or Moderate-High (WDFW 2015)	Yes
Birds	<i>Haliaeetus leucocephalus</i>	Bald Eagle	Kwélengsen	Incorporated into ceremonial activities, Material in traditional skills, such as basketry, weaving, beading, carving, Symbol incorporated into traditional crafts, artwork or ceremonies, Traditional tool for hunting, gathering, or ceremonial activity	Medium (UW n.d.) Low (Stillaguamish 2015) Moderate (WDFW 2015) Moderate in San Juan Islands and Georgia Strait Basin and Skagit-Samish and San Juan Watersheds (McManus 2014)	Yes
Birds	<i>Buteo jamaicensis</i>	Hawk	Ts'íx-ts'íx	Incorporated into ceremonial activities	Ferruginous hawk: Low-Moderate (WDFW 2015) Cooper's Hawk: Low in Skagit-Samish and San	Potentially, Needs Additional Analysis

⁷ Species are included if part of all of their life-cycle or range coincides with High Vulnerability Habitats depicted in Figure 8.

Samish Indian Nation: Climate Adaptation Planning Priorities

Taxa	Species Name	Common Name	Samish Name	Cultural Significance	Prior Studies of Species Climate Vulnerability Ranking	Range or Life-cycle occurs within Habitat Areas with High Vulnerability ⁷
					Juan Watersheds (McManus 2014)	
Birds	<i>Selasphorus rufus</i>	Hummingbird	ᵂwét'ch'eli7	Symbol incorporated into traditional crafts, artwork or ceremonies	Climate Endangered (Rufous Hummingbird) (Audubon 2014)	Yes
Birds	Several species	Owl (e.g., Screech, Barn, Snow)		Incorporated into ceremonial activities	Climate Threatened (Barn Owl and Snowy Owl) (Audubon 2014)	Yes
Birds	Several species, but Grebe were key	Marine and Water Birds		Food for community gatherings and ceremonies, featured in traditional stories, dances or songs, Incorporated into ceremonial activities, Symbol incorporated into traditional crafts, artwork or ceremonies, Important marker of passage of time.	Clark's grebe: Moderate (WDFW 2015) Red-breasted grebe: Low-Moderate (WDFW 2015) Western grebe: Moderate (WDFW 2015) Moderate (Siemann and Whitely Binder 2017)	Yes

Samish Indian Nation: Climate Adaptation Planning Priorities

Taxa	Species Name	Common Name	Samish Name	Cultural Significance	Prior Studies of Species Climate Vulnerability Ranking	Range or Life-cycle occurs within Habitat Areas with High Vulnerability ⁷
Birds	<i>Corvus corax</i>	Raven	Skw't'ó7	Featured in traditional stories, dances or songs, Incorporated into ceremonial activities, Symbol incorporated into traditional crafts, artwork or ceremonies	Climate Threatened (Audubon 2014)	Potentially, Needs Additional Analysis
Birds	Several species, but Wigeon, Mallard and were key	Waterfowl	Mó7oqw (duck)	Food for community gatherings and ceremonies, featured in traditional stories, dances or songs, Incorporated into ceremonial activities, Symbol incorporated into traditional crafts, artwork or ceremonies, Important marker of passage of time.	Barrow's Goldeneye: High (WDFW 2015) Black Scoter: Moderate-High (WDFW 2015) Cinnamon Teal: Moderate (WDFW 2015) Dusky Canada Goose: Low-Moderate (WDFW 2015) Harlequin Duck: Moderate-High (WDFW 2015) Long-tailed duck: Low-moderate (WDFW 2015)	Yes

Samish Indian Nation: Climate Adaptation Planning Priorities

Taxa	Species Name	Common Name	Samish Name	Cultural Significance	Prior Studies of Species Climate Vulnerability Ranking	Range or Life-cycle occurs within Habitat Areas with High Vulnerability ⁷
					Surf scoter: (WDFW 2015) White-winged scoter: (WDFW 2015)	
Birds	<i>Larus occidentalis</i>	Western gull	Qwení7	Food for community gatherings and ceremonies	Climate Endangered (Audubon 2014)	Yes
Fishes	<i>Salvelinus confluentus</i>	Bull trout		Food for community gatherings and ceremonies, featured in traditional stories, dances or songs, Incorporated into ceremonial activities, Symbol incorporated into traditional crafts, artwork or ceremonies, Traditional tool for hunting, gathering, or ceremonial activity, Important marker of passage of time.	High and Moderate-High (Coastal Recovery Unit) (WDFW 2015)	Yes
Fishes	<i>Oncorhynchus tshawytscha</i>	Chinook (king)	Yómech	Food for community gatherings and ceremonies, featured in traditional stories, dances or songs, Incorporated into ceremonial activities, Symbol incorporated into traditional crafts, artwork or ceremonies,	High (UW n.d. and Stillaguamish 2015) and Moderate-High (WDFW 2015) High (Siemann and Whitely Binder 2017)	Yes

Samish Indian Nation: Climate Adaptation Planning Priorities

Taxa	Species Name	Common Name	Samish Name	Cultural Significance	Prior Studies of Species Climate Vulnerability Ranking	Range or Life-cycle occurs within Habitat Areas with High Vulnerability ⁷
				Traditional tool for hunting, gathering, or ceremonial activity, Important marker of passage of time.	Very High in San Juan Islands and Georgia Strait Basin and Skagit-Samish and San Juan Watersheds (McManus 2014)	
Fishes	<i>Oncorhynchus keta</i>	Chum (dog)	Kw'ól7exw	Food for community gatherings and ceremonies, featured in traditional stories, dances or songs, Incorporated into ceremonial activities, Symbol incorporated into traditional crafts, artwork or ceremonies, Traditional tool for hunting, gathering, or ceremonial activity, Important marker of passage of time.	Hood Canal Summer Chum ESU: Moderate-High (WDFW 2015) Very High in San Juan Islands and Georgia Strait Basin and Skagit-Samish and San Juan Watersheds (McManus 2014)	Yes
Fishes	Several species	Cod	Qwtóyesen	Food for community gatherings and ceremonies	Pacific Cod (Salish Sea): High (WDFW 2015)	Yes
Fishes	<i>Oncorhynchus kitsutch</i>	Coho (silver)	Q'échqs	Food for community gatherings and ceremonies, featured in traditional stories, dances or songs, Incorporated into ceremonial activities, Symbol incorporated into traditional	High (Stillaguamish 2015) Very High in San Juan Islands and Georgia Strait Basin and	Yes

Samish Indian Nation: Climate Adaptation Planning Priorities

Taxa	Species Name	Common Name	Samish Name	Cultural Significance	Prior Studies of Species Climate Vulnerability Ranking	Range or Life-cycle occurs within Habitat Areas with High Vulnerability ⁷
				crafts, artwork or ceremonies, Traditional tool for hunting, gathering, or ceremonial activity, Important marker of passage of time.	Skagit-Samish and San Juan Watersheds (McManus 2014)	
Fishes	<i>Oncorhynchus clarki clarki</i>	Cutthroat trout		Food for community gatherings and ceremonies, featured in traditional stories, dances or songs, Incorporated into ceremonial activities, Symbol incorporated into traditional crafts, artwork or ceremonies, Traditional tool for hunting, gathering, or ceremonial activity, Important marker of passage of time.	Westslope Cutthroat: Low-Moderate (WDFW 2015) Very High in San Juan Islands and Georgia Strait Basin and Skagit-Samish and San Juan Watersheds (McManus 2014)	Yes
Fishes	<i>Platichthys stellatus</i>	Flounder		Food for community gatherings and ceremonies		Yes
Fishes	<i>Hippoglossus stenolepis</i>	Halibut	Sótx, Só7tx	Food for community gatherings and ceremonies		Potentially, Needs Additional Analysis
Fishes	<i>Clupea pallasii</i>	Pacific herring	Slhó:7nget	Food for community gatherings and ceremonies	Moderate-High (WDFW 2015) High (Siemann and Whitely Binder 2017)	Yes

Samish Indian Nation: Climate Adaptation Planning Priorities

Taxa	Species Name	Common Name	Samish Name	Cultural Significance	Prior Studies of Species Climate Vulnerability Ranking	Range or Life-cycle occurs within Habitat Areas with High Vulnerability ⁷
					Moderate in San Juan Islands and Georgia Strait Basin (McManus 2014)	
Fishes	<i>Oncorhynchus gorbuscha</i>	Pink (humpback)	Hénen	Food for community gatherings and ceremonies, featured in traditional stories, dances or songs, Incorporated into ceremonial activities, Symbol incorporated into traditional crafts, artwork or ceremonies, Traditional tool for hunting, gathering, or ceremonial activity, Important marker of passage of time.	Very High in San Juan Islands and Georgia Strait Basin and Skagit-Samish and San Juan Watersheds (McManus 2014)	Yes
Fishes	<i>Several species</i>	Sculpin/ bullhead		Important marker of passage of time.		Yes
Fishes	<i>Several species</i>	Snapper/ rockfish		Food for community gatherings and ceremonies	High in San Juan Islands and Georgia Strait Basin (McManus 2014)	Yes
Fishes	<i>Oncorhynchus nerka</i>	Sockeye (red)	Séqi7	Food for community gatherings and ceremonies, featured in traditional stories, dances or songs, Incorporated into ceremonial activities, Symbol incorporated into traditional	Ozette Sockeye: Moderate (WDFW 2015)	Yes

Samish Indian Nation: Climate Adaptation Planning Priorities

Taxa	Species Name	Common Name	Samish Name	Cultural Significance	Prior Studies of Species Climate Vulnerability Ranking	Range or Life-cycle occurs within Habitat Areas with High Vulnerability ⁷
				crafts, artwork or ceremonies, Traditional tool for hunting, gathering, or ceremonial activity, Important marker of passage of time.		
Fishes	<i>Several species</i>	Sole		Food for community gatherings and ceremonies		Yes
Fishes	<i>Oncorhynchus mykiss</i>	Steelhead		Food for community gatherings and ceremonies, featured in traditional stories, dances or songs, Incorporated into ceremonial activities, Symbol incorporated into traditional crafts, artwork or ceremonies, Traditional tool for hunting, gathering, or ceremonial activity, Important marker of passage of time.	High (Stillaguamish 2015) and Moderate-High (WDFW 2015)	Yes
Fishes	<i>Hypomesus pretiosus</i>	Surf smelt	Kwa'tl's	Food for community gatherings and ceremonies, Important marker of passage of time.	Moderate-High (WDFW 2015) High in San Juan Islands and Georgia Strait Basin (McManus 2014)	Yes

Samish Indian Nation: Climate Adaptation Planning Priorities

Taxa	Species Name	Common Name	Samish Name	Cultural Significance	Prior Studies of Species Climate Vulnerability Ranking	Range or Life-cycle occurs within Habitat Areas with High Vulnerability ⁷
Invertebrates	<i>Haliotis kamtschatkana</i>	Abalone		Brought into area through trade	Pinto Abalone: Moderate-High (WDFW 2015)	Yes
Invertebrates	<i>Bombus</i>	Bumble bee	Semóye7	Incorporated into ceremonial activities, Material in traditional skills, such as basketry, weaving, beading, carving, Traditional medicine	Morrison's Bumble Bee: Moderate (WDFW 2015) Suckley Cuckoo Bumble Bee: Moderate (WDFW 2015) Western Bumble Bee: Moderate-High (WDFW 2015)	Potentially, Needs Additional Analysis
Invertebrates	<i>Katharina tunicata</i>	Chiton/ Chinese slipper		Food for community gatherings and ceremonies		Yes
Invertebrates	Several species	Clams	St'ló7om, Skw'lhá:y'7, Swá:m (horse clam), X7óxwe7 (littleneck clam)	Food for community gatherings and ceremonies, featured in traditional stories, dances or songs, Traditional tool for hunting, gathering, or ceremonial activity	High in San Juan Islands and Georgia Strait Basin (McManus 2014) High (Siemann and Whitely Binder 2017)	Yes

Samish Indian Nation: Climate Adaptation Planning Priorities

Taxa	Species Name	Common Name	Samish Name	Cultural Significance	Prior Studies of Species Climate Vulnerability Ranking	Range or Life-cycle occurs within Habitat Areas with High Vulnerability ⁷
Invertebrates	Several species	Crab	Á7chx	Food for community gatherings and ceremonies, Featured in traditional stories, dances or songs		Yes
Invertebrates	<i>Dentalium spp.</i>	Dentalium		Brought into area through trade		Potentially, Needs Additional Analysis
Invertebrates	<i>Apis mellifera</i>	Honey bee	Semsemóye7	Incorporated into ceremonial activities, Material in traditional skills, such as basketry, weaving, beading, carving, Traditional medicine		Potentially, Needs Additional Analysis
Invertebrates	<i>Osmia</i>	Mason bee		Incorporated into ceremonial activities, Material in traditional skills, such as basketry, weaving, beading, carving, Traditional medicine		Potentially, Needs Additional Analysis
Invertebrates	<i>Mytilus spp.</i>	Mussel		Food for community gatherings and ceremonies	High (Siemann and Whitely Binder 2017)	Yes
Invertebrates	Several species	Oyster	Tl'éxwtl'exw	Food for community gatherings and ceremonies, Important marker of passage of time.	Olympia Oyster: High (WDFW 2015)	Yes

Samish Indian Nation: Climate Adaptation Planning Priorities

Taxa	Species Name	Common Name	Samish Name	Cultural Significance	Prior Studies of Species Climate Vulnerability Ranking	Range or Life-cycle occurs within Habitat Areas with High Vulnerability ⁷
					High in San Juan Islands and Georgia Strait Basin (McManus 2014) High (Siemann and Whitely Binder 2017)	
Invertebrates	Several species	Scallop		Incorporated into ceremonial activities		Yes
Invertebrates	Several species (e.g. <i>Pandalus platyceros</i>)	Shrimp		Food for community gatherings and ceremonies		Yes
Invertebrates	<i>Strongylocentrotus spp.</i>	Urchin	Xixwe7	Food for community gatherings and ceremonies		Yes
Mammals	<i>Castor canadensis</i>	American beaver	Sqeláw7	Featured in traditional stories, dances or songs, Symbol incorporated into traditional crafts, artwork or ceremonies	Low (Stillaguamish 2015)	Yes
Mammals	<i>Ursus americanus</i>	American black bear	Schétxwen	Brought into area through trade		Yes
Mammals	<i>Neovison vison</i>	American mink		Symbol incorporated into traditional crafts, artwork or ceremonies		Yes

Samish Indian Nation: Climate Adaptation Planning Priorities

Taxa	Species Name	Common Name	Samish Name	Cultural Significance	Prior Studies of Species Climate Vulnerability Ranking	Range or Life-cycle occurs within Habitat Areas with High Vulnerability ⁷
Mammals	<i>Odocoileus hemionus columbianus</i>	Black-tailed deer	Sméyes	Food for community gatherings and ceremonies, Incorporated into ceremonial activities, Material in traditional skills, such as basketry, weaving, beading, carving, Symbol incorporated into traditional crafts, artwork or ceremonies, Traditional medicine, Important marker of passage of time., Traditional tool for hunting, gathering, or ceremonial activity, Brought into area through trade	Moderate (Stillaguamish 2015)	Yes
Mammals	<i>Canis latrans</i>	Coyote		Featured in traditional stories, dances or songs		Yes
Mammals	<i>Cervus canadensis</i>	Elk	Q'oyá:ch	Brought into area through trade	Low (UW n.d.) High in Skagit-Samish Watershed (McManus 2014)	Yes
Mammals	<i>Canis lupus</i>	Gray Wolf	Steqóye7	Symbol incorporated into traditional crafts, artwork or ceremonies, Featured in traditional stories, dances or songs	Low-Moderate (WDFW 2015)	Yes
Mammals	<i>Ursus arctos horribilis</i>	Grizzly bear		Brought into area through trade	Moderate (UW n.d.; Stillaguamish 2015)	Yes

Samish Indian Nation: Climate Adaptation Planning Priorities

Taxa	Species Name	Common Name	Samish Name	Cultural Significance	Prior Studies of Species Climate Vulnerability Ranking	Range or Life-cycle occurs within Habitat Areas with High Vulnerability ⁷
Mammals	<i>Oreamnos americanus</i>	Mountain goat	Sxwít'í7	Brought into area through trade	Moderate (UW n.d.) or High (Stillaguamish 2015)	Yes
Mammals	<i>Orcinus orca</i>	Orca (killer) whale	Q'ellhólmeche n	Featured in traditional stories, dances or songs, Symbol incorporated into traditional crafts, artwork or ceremonies	Moderate-High (Southern Resident); Low-Moderate (Transient/Offshore) (WDFW 2015) High (Siemann and Whitely Binder 2017)	Yes
Mammals	<i>Lutra canadensis</i>	River otter		Symbol incorporated into traditional crafts, artwork or ceremonies, Featured in traditional stories, dances or songs	Moderate in San Juan Islands and Georgia Strait Basin and Skagit-Samish and San Juan Watersheds (McManus 2014)	Yes
Mammals	<i>Enhydra lutris</i>	Sea otter	Sq'á7at'l'	Featured in traditional stories, dances or songs, Symbol incorporated into traditional crafts, artwork or ceremonies	Low-Moderate (WDFW 2015)	Potentially, Needs Additional Analysis
Mammals	<i>Phoca vitulina</i>	Seal	Ásxw	Symbol incorporated into traditional crafts, artwork or ceremonies		Potentially, Needs Additional Analysis
Plants	<i>Alnus Spp.</i>	Alder		Material in traditional skills, Traditional medicine, Traditional	Low (UW n.d.)	Yes

Samish Indian Nation: Climate Adaptation Planning Priorities

Taxa	Species Name	Common Name	Samish Name	Cultural Significance	Prior Studies of Species Climate Vulnerability Ranking	Range or Life-cycle occurs within Habitat Areas with High Vulnerability ⁷
				tool for hunting, gathering, or ceremonial activity.		
Plants	<i>Lomatium nudicaule</i>	Barestem biscuitroot	Q!exmín	Traditional medicine		Yes
Plants	<i>Xerophyllum tenax</i>	Bear grass		Material in traditional skills, such as basketry, weaving, beading, carving		Yes
Plants	<i>Rubus leucodermis</i>	Black cap		Food for community gatherings and ceremonies, Material in traditional skills, Important marker of passage of time.		Potentially, Needs Additional Analysis
Plants	<i>Rubus Spp.</i>	Blackberry	Sqw'eláIngexw	Food for community gatherings and ceremonies, Material in traditional skills, Important marker of passage of time.		Potentially, Needs Additional Analysis
Plants	<i>Camassia Spp.</i>	Camas	Qwlhó7el	Food for community gatherings and ceremonies, Featured in traditional stories, dances or songs, Important marker of passage of time.		Yes
Plants	<i>Rhamnus purshiana</i>	Cascara		Traditional medicine		Yes

Samish Indian Nation: Climate Adaptation Planning Priorities

Taxa	Species Name	Common Name	Samish Name	Cultural Significance	Prior Studies of Species Climate Vulnerability Ranking	Range or Life-cycle occurs within Habitat Areas with High Vulnerability ⁷
Plants	<i>Typha latifolia</i>	Cattail		Featured in traditional stories, dances or songs, Material in traditional skills, such as basketry, weaving, beading, carving		Yes
Plants	<i>Anthemis tinctoria</i>	Chamomile		Traditional medicine		Potentially, Needs Additional Analysis
Plants	<i>Prunus emarginata</i>	Cherry		Material in traditional skills, Traditional medicine, Traditional tool for hunting, gathering, or ceremonial activity.		Potentially, Needs Additional Analysis
Plants	<i>Fritillaria lanceolata</i>	Chocolate lily		Food for community gatherings and ceremonies		Yes
Plants	<i>Ribes Spp.</i>	Currant		Food for community gatherings and ceremonies, Material in traditional skills, Important marker of passage of time.		Yes
Plants	<i>Oplopanax horridum</i>	Devil's club		Material in traditional skills, such as basketry, weaving, beading, carving, Incorporated into ceremonial activities, Traditional medicine		Yes
Plants	<i>Cornus nuttallii</i>	Dogwood		Important marker of passage of time.		Potentially, Needs Additional Analysis

Samish Indian Nation: Climate Adaptation Planning Priorities

Taxa	Species Name	Common Name	Samish Name	Cultural Significance	Prior Studies of Species Climate Vulnerability Ranking	Range or Life-cycle occurs within Habitat Areas with High Vulnerability ⁷
Plants	<i>Zostera marina</i>	Eelgrass (Wide-blade eelgrass)		Symbol incorporated into traditional crafts, artwork or ceremonies		Yes
Plants	<i>Tsuga heterophylla</i>	Hemlock		Traditional medicine		Yes
Plants	<i>Equisetum spp.</i>	Horsetail		Food for community gatherings and ceremonies		Yes

Samish Indian Nation: Climate Adaptation Planning Priorities

Taxa	Species Name	Common Name	Samish Name	Cultural Significance	Prior Studies of Species Climate Vulnerability Ranking	Range or Life-cycle occurs within Habitat Areas with High Vulnerability ⁷
Plants	<i>Vaccinium Spp.</i>	Huckleberry		Food for community gatherings and ceremonies, Material in traditional skills, such as basketry, weaving, beading, carving, Important marker of passage of time.		Yes
Plants	Several species	Kelp		Featured in traditional stories, dances or songs, Symbol incorporated into traditional crafts, artwork or ceremonies		Yes
Plants	<i>Ledum groenlandicum</i>	Labrador tea	Moq'wem	Traditional medicine		Yes

Samish Indian Nation: Climate Adaptation Planning Priorities

Taxa	Species Name	Common Name	Samish Name	Cultural Significance	Prior Studies of Species Climate Vulnerability Ranking	Range or Life-cycle occurs within Habitat Areas with High Vulnerability ⁷
Plants	<i>Arbutus menziesii Pursh</i>	Madrona (Pacific Madrone)		Traditional medicine		Yes
Plants	<i>Acer macrophyllum</i>	Maple		Material in traditional skills, Traditional tool for hunting, gathering, or ceremonial activity.		Yes
Plants	<i>Holodiscus discolor</i>	Ocean spray (ironwood)	Q'ech'ilhch	Material in traditional skills, such as basketry, weaving, beading, carving, Important marker of passage of time., Traditional tool for hunting, gathering, or ceremonial activity		Yes
Plants	<i>Rosa Nutkana or Rosa Rugosa</i>	Rose		Traditional medicine		Yes
Plants	<i>Artemisia ludoviciana</i>	Sage		Brought into area through trade		Potentially, Needs Additional Analysis

Samish Indian Nation: Climate Adaptation Planning Priorities

Taxa	Species Name	Common Name	Samish Name	Cultural Significance	Prior Studies of Species Climate Vulnerability Ranking	Range or Life-cycle occurs within Habitat Areas with High Vulnerability ⁷
Plants	<i>Gaultheria shallon</i>	Salal	T'áqe7	Food for community gatherings and ceremonies		Yes
Plants	<i>Rubus spectabilis</i>	Salmonberry	Elíle7	Food for community gatherings and ceremonies, Material in traditional skills, such as basketry, weaving, beading, carving, Important marker of passage of time.		Yes
Plants	Several species	Seaweed		Symbol incorporated into traditional crafts, artwork or ceremonies, Incorporated into ceremonial activities		Yes
Plants	<i>Amelanchier alnifolia</i>	Serviceberry		Food for community gatherings and ceremonies, Material in traditional skills, such as basketry, weaving, beading, carving, Important marker of passage of time.		Yes
Plants	<i>Lysichiton americanus</i>	Skunk cabbage		Traditional medicine		Yes

Samish Indian Nation: Climate Adaptation Planning Priorities

Taxa	Species Name	Common Name	Samish Name	Cultural Significance	Prior Studies of Species Climate Vulnerability Ranking	Range or Life-cycle occurs within Habitat Areas with High Vulnerability ⁷
Plants	<i>Shepherdia canadensis</i>	Soapberry (Buffalo berry)	Sxwáseng	Food for community gatherings and ceremonies., Important marker of passage of time.		Yes
Plants	<i>Urtica dioica</i>	Stinging nettle	Ts'exts'ex	Food for community gatherings and ceremonies, featured in traditional stories, dances or songs, Material in traditional skills, such as basketry, weaving, beading, carving, Traditional medicine, Traditional tool for hunting, gathering, or ceremonial activity, Important marker of passage of time.		Yes
Plants	<i>Rubus parviflorus</i>	Thimbleberry	T'éqwem7	Food for community gatherings and ceremonies		Yes
Plants	<i>Schoenoplectus acutus</i>	Tule		Material in traditional skills, such as basketry, weaving, beading, carving, Important marker of passage of time.		Yes

Samish Indian Nation: Climate Adaptation Planning Priorities

Taxa	Species Name	Common Name	Samish Name	Cultural Significance	Prior Studies of Species Climate Vulnerability Ranking	Range or Life-cycle occurs within Habitat Areas with High Vulnerability ⁷
Plants	<i>Thuja plicata</i>	Western red cedar	ᶒpéy7	Featured in traditional stories, dances or songs., Symbol incorporated into traditional crafts, artwork or ceremonies, Material in traditional skills, Important marker of passage of time., Traditional medicine, Traditional tool for hunting, gathering, or ceremonial activity.	Medium (UW n.d.)	Yes
Plants	<i>Allium Spp.</i>	Wild onion		Food for community gatherings and ceremonies, Traditional medicine	<i>Allium diction:</i> Presumed stable (WA DNR Heritage Program 2017)	Yes
Plants	<i>Salix Spp.</i>	Willow		Material in traditional skills, Traditional tool for hunting, gathering, or ceremonial activity.		Yes

Samish Indian Nation: Climate Adaptation Planning Priorities

Taxa	Species Name	Common Name	Samish Name	Cultural Significance	Prior Studies of Species Climate Vulnerability Ranking	Range or Life-cycle occurs within Habitat Areas with High Vulnerability ⁷
Plants	<i>Cornus sericea</i>	Willow		Traditional tool for hunting, gathering, or ceremonial activity		Yes
Plants	<i>Achillea millefolium</i>	Yarrow		Traditional medicine		Yes
Plants	<i>Chamaecyparis nookatensis</i>	Yellow cedar		Material in traditional skills		Yes
Plants	<i>Taxus brevifolia</i>	Yew		Traditional tool for hunting, gathering, or ceremonial activity.		Yes

Appendix A contains a list of other plants and animals that have been identified as having key ecological significance.

CULTURAL SITES

The whole of the Samish Traditional Territory comprises an important cultural landscape for the Samish, but there are locations within the region that are of key cultural significance, either because of the linkages the site provides with our ancestors, the memory and artifacts from past villages, or the connection to traditional skills and practices.

Many of these sites may be threatened by climate change, in particular rising sea levels that may inundate or disturb artifacts. Figure 9 depicts sites of key cultural importance that are predicted to be impacted by climate change.

Samish Indian Nation: Climate Adaptation Planning Priorities

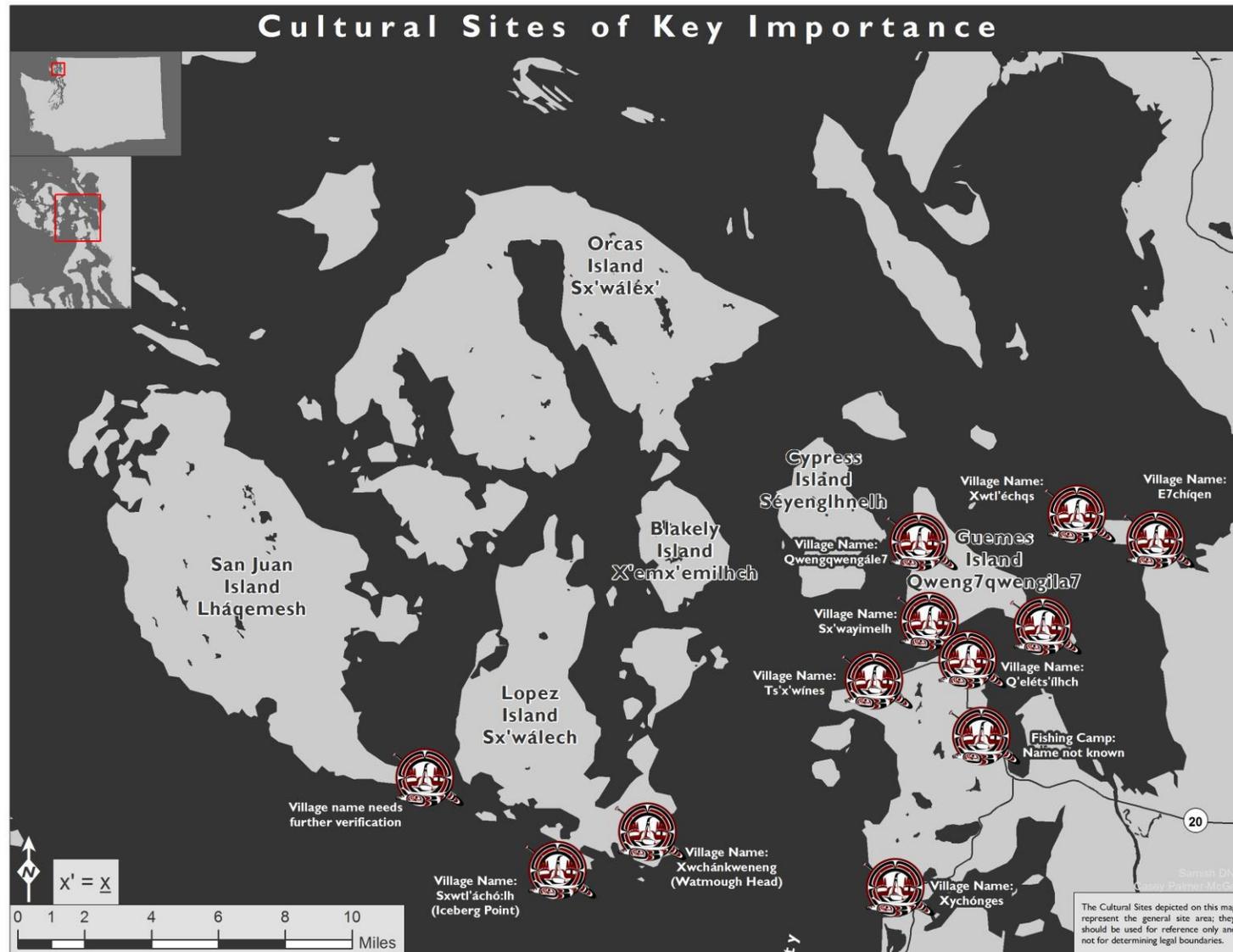


Figure 9: Map of areas with key cultural importance that are predicted to be impacted by climate change.

Samish Indian Nation: Climate Adaptation Planning Priorities

HEALTH AND WELLBEING

The Samish Indian Nation is committed to developing and sustaining the health, wealth, education and security of the Samish Indian Nation membership. By ensuring tribal member health and wellbeing, we build the capacity for tribal members to engage in our culture and traditions and share those with generations to come. At the same time, by protecting our culture and traditions, we sustain our connection to each other, our homeland, and enrich our minds, bodies and souls.

The impacts from climate change are likely to pose an additional stressor to our tribal members, some of which are burdened by current challenges such as housing and food insecurity, poor physical health, social isolation or mental health issues. Figure 10 and the following section outlines some of the key Samish climate adaptation planning priorities impacting health and wellness.

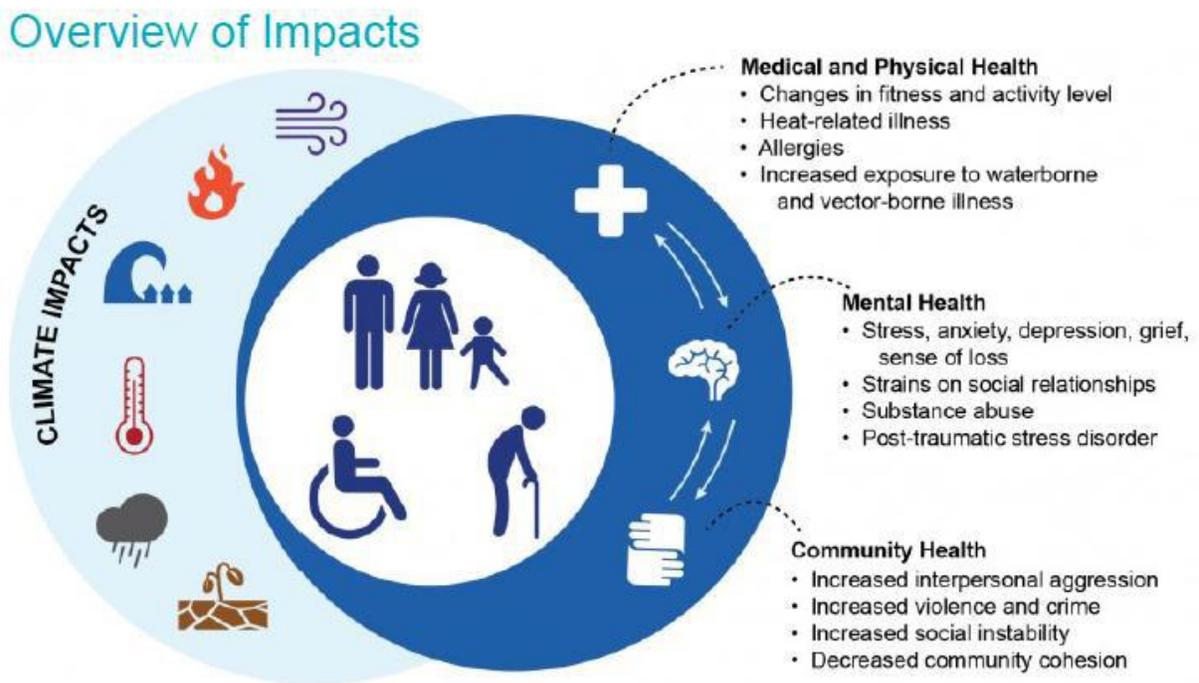


Figure 10: Conceptual Diagram of Health and Wellness Impacts from Climate Change. (Source: “The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment” 2016)

Samish Indian Nation: Climate Adaptation Planning Priorities

MEDICAL AND PHYSICAL HEALTH

Chronic health disease.

Climate change would add to the burden of underlying chronic diseases such as diabetes, heart disease and associated disorders. This could come from extreme heat (heat-related illnesses, heat advisories, etc.) and from air pollution.

Asthma, respiratory allergies.

Climate change may cause air quality to worsen and exacerbate underlying asthma and respiratory disease issues. Air quality is predicted to be adversely affected by increasing concentrations of allergens, particulate matter, and ground-level ozone. This is a concern for Samish Social Service clients that may have chronic health conditions, such as asthma, but do not have funding to seek medical care. These individuals will be particularly vulnerable to these impacts due to a lack of medical care.

Heat-related illness.

Extreme heat causes heat stress and heat stroke and exacerbates pre-existing health conditions, such as diabetes, heart and kidney disease. For example, King County, Washington officials have reported a 3% increase in heat-related hospital admissions 10% increase in deaths during extreme heat events (Isaksen et al 2015, 2016).

Many Vocational Rehabilitation (VR) clients served by Samish Health and Human Services work in industries that demand outdoor physical labor (e.g., landscaping, fisheries, etc.), and therefore may be susceptible to heat stress-related illness.

Many clients served by Samish Health and Human Services are homeless or living in compromised housing conditions, which may become worse with extreme weather events. For example, some people may be living outside or in tents and may be unable to avoid extreme heat events or worsening air quality. Additional resources may be needed to address these emerging issues.

MENTAL HEALTH

Stress and depression.

Scientists have identified range of mental health consequences of climate change, from stress to clinical disorders, such as anxiety, depression, post-traumatic stress, and suicidality (“The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment” 2016). A preliminary climate assessment of the Puget Sound indicated that stress levels are anticipated to increase under changing climate conditions (Siemann and Whitely Binder 2017). These impacts often interact with other social and environmental stressors, such as housing or food insecurity.

Among the Samish, there is concern that loss of cultural resources or employment insecurity, lack of safe and secure housing, rising household costs, health threats, and other related impacts

Samish Indian Nation: Climate Adaptation Planning Priorities

will interact and cumulatively increase stress and depression. Impacts may be particularly difficult for clients with past drug dependency issues or suffering from PTSD or other mental health issues. This may pose a significant challenge for clients trying to find new employment. Many Social Service clients served by Samish Health and Human Services are living with mental health issues, and additional impacts related to a changing climate could pose increase stress and anxiety.

In addition, many clients served by Samish Health and Human Services work in job situations that do not provide sick leave, and may need to choose between their health and job if illness occurs. These individuals may be particularly vulnerable to declining health or employment insecurity.

Finally, many tribal members are pursuing educational opportunities. In order to do so, they need financial and emotional support and time. Tribal members need to feel secure and optimistic about the opportunities that education may bring. Household and individual economic resiliency is a key part of this. There is concern that climate change may adversely impact tribal members' sense of security, impacting their educational attainment and future opportunities.

Loss of social connection/increased social instability.

Some clients are disconnected to culture, but some are connected and regularly engage in traditional activities such as gathering berries. Loss of these resources would be a significant impact and could result in loss of social connections and identity.

COMMUNITY WELLBEING

Household costs.

Changes in the climate may cause energy, food, and water prices to rise, which may stress families already struggling to meet basic needs, and may cause more families to have difficulty meeting rising household costs. This could be a significant impact to families that are on a fixed income and are currently challenged with meeting their basic needs.

Safe and secure housing.

Many clients served by Samish Health and Human Services already are living in compromised housing conditions (e.g., leaking roof, located in floodplain, etc.), which may become worse with extreme weather events.

Food insecurity.

Food insecurity is already an issue for many clients, who may rely upon the Food Bank or other services. Scientists predict that changes in climate will have consequences for food access, including contamination, spoilage, and the disruption of food distribution. If access to food is impacted (e.g., rising costs, decreased availability, etc.) these families and individuals would likely be the first to feel the impacts as they are already food insecure.

In addition, scientists predict that climate change will impact the nutritional quality of foods in several important ways. It is predicted that elevated sea surface temperatures will lead to

Samish Indian Nation: Climate Adaptation Planning Priorities

greater accumulation of metals, such as mercury, in seafood (“The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment” 2016). This is a concern for the Samish, whose diet has traditionally relied on seafoods as a key source of food. In addition, the nutritional value of some staple crops, such as wheat and rice, is predicted to decrease as rising levels of atmospheric carbon dioxide continue to reduce the concentrations of protein and essential minerals (“The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment” 2016). This may be an issue for individuals that rely on these staples for a sizeable portion of their diet.

A preliminary climate assessment of the Puget Sound identified locally harvestable foods, such as shellfish, as being at high risk under changing climate conditions (Siemann and Whitely Binder 2017). Shellfish are expected to be harmed by increasing ocean acidification; the potential for more harmful algal blooms, reduced oxygen; and increased contaminant loading related to more intense heavy rain events and the likelihood for more storm water run-off and combined sewer overflows. Other foods, such as plants and animals, may also be impacted.

Employment insecurity.

Many tribal members and clients served by Samish Health and Human Services work in traditional natural resource industries, such as fishing. A preliminary climate assessment of the Puget Sound indicated that many natural resource-based industries, such as fisheries and aquaculture as well as timber harvest, are likely to be at high risk under changing climate conditions (Siemann and Whitely Binder 2017).

If the fisheries industry continues to decline, this may threaten their employment or ability to earn a living wage through this kind of work. Many will not have the skills needed to transition into other employment opportunities. Therefore, the need for retraining and job placement services is likely to increase. In addition, if there is a decline in fisheries, support industries (e.g., boat manufacturing) may be impacted. Finally, most clients served by Samish Health and Human Services are either self-employed or work in small businesses, which may not have the capacity/resources to recover from impacts from extreme weather, rising costs, or other impacts that may be associated with climate change. This could impact employment security.

ADDITIONAL DATA COLLECTION NEEDS

As the project moves forward, one of the key areas for additional data collection includes gathering of traditional ecological knowledge and input on planning priorities from tribal members.

As discussed more fully in the *Samish Indian Nation Climate Adaptation Planning Framework*, engagement of tribal members in this first step of the climate adaptation planning process was challenging, as evidenced by low participation and response in surveys and other input activities. 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, as detailed more fully in the *Adaptation Planning Framework*.

In addition, while the *Samish Indian Nation Climate Change State of Scientific Knowledge* report contains a summary of predicted climate change impacts, this information should be supplemented with traditional ecological knowledge. As further detailed in the *Samish Indian Nation Climate Adaptation Planning Framework*, this knowledge would greatly enhance the next stages of the planning process and would contribute to the identification of vulnerabilities, development of goals and objectives, as well as the identification and selection of adaptation strategies and actions.

Finally, it is important to note that climate change science is a complex and evolving discipline that is constantly being enriched by additional research studies. Every effort should be made to track the progress of additional research efforts throughout the planning process.

Samish Indian Nation: Climate Adaptation Planning Priorities

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Samish Indian Nation: Climate Adaptation Planning Priorities

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Samish Indian Nation: Climate Adaptation Planning Priorities

APPENDICES

Samish Indian Nation: Climate Adaptation Planning Priorities

APPENDIX A

Table 4 contains a list of ecologically important species whose habitat may be impacted by a changing climate.

Table 4: Plants and Animals of Key Ecological Significance whose species or habitat may be vulnerable to climate change.

Taxa	Species Name	Common Name	Samish Name	Prior Studies of Species Climate Vulnerability Ranking	Range or Life-cycle occurs within Habitat Areas with High Vulnerability ⁸
Birds	<i>Corvus brachyrhynchos</i>	American crow			Yes
Birds	<i>Circus cyaneus</i>	Northern harrier			Yes
Birds	Several species	Marine and Waterbirds (e.g., Red-breasted merganser, black brant)		Common loon: Low-Moderate (WDFW 2015) Marbled Godwit: Moderate (WDFW 2015)	Yes
Birds	<i>Falco peregrinus</i>	Peregrine Falcon		Low (WDFW 2015)	Yes
Birds	Several species	Pigeon		Band-tailed pigeon: Low-Moderate (WDFW 2015)	Yes
Birds	<i>Callipepla Spp.</i>	Quail		Mountain Quail: Moderate (WDFW 2015)	Yes
Birds	<i>Agelaius phoeniceus</i>	Red-winged blackbird			Yes
Birds	<i>Turdus migratorius</i>	Robin			Potentially, Needs Additional Analysis

⁸ Species are included if part of all of their life-cycle or range coincides with High Vulnerability Habitats depicted in Figure 8.

Samish Indian Nation: Climate Adaptation Planning Priorities

Taxa	Species Name	Common Name	Samish Name	Prior Studies of Species Climate Vulnerability Ranking	Range or Life-cycle occurs within Habitat Areas with High Vulnerability ⁸
Birds	<i>Catharus ustulatus</i>	Swainson thrush		Increase in territory likely (Stillaguamish 2015)	Potentially, Needs Additional Analysis
Birds	Several species	Swallow			Potentially, Needs Additional Analysis
Birds	<i>Cathartes aura</i>	Turkey vulture			Potentially, Needs Additional Analysis
Fishes	<i>Squalus suckleyi</i>	North Pacific Spiny Dogfish			Yes
Fishes	<i>Merluccius productus</i>	Pacific hake		Low-Moderate (WDFW 2015)	Yes
Fishes	<i>Ammodytes hexapterus</i>	Pacific sand lance		Moderate-High (WDFW 2015)	Yes
Fishes	<i>Sardinops sagax</i>	Pacific sardine			Yes
Fishes	<i>Syngnathus leptorhynchus</i>	Bay pipefish			Yes
Fishes	<i>Anoplopoma fimbria</i>	Sablefish			Yes
Fishes	<i>Notorynchus cepedianus</i>	Broadnose Seven-gill shark		Moderate (WDFW 2015)	Yes
Fishes	<i>Cymatogaster aggregata</i>	Shiner perch			Yes
Fishes	<i>Gasterosteus aculeatus</i>	Three-spine stickleback			Yes
Fishes	<i>Acipenser Spp.</i>	Sturgeon		Green Sturgeon (Southern DPS): Moderate (WDFW 2015)	Yes
Fungi	Several species	Fungi/lichen			Yes
Invertebrates	<i>Clinocardium nuttallii</i>	Cockle			Yes

Samish Indian Nation: Climate Adaptation Planning Priorities

Taxa	Species Name	Common Name	Samish Name	Prior Studies of Species Climate Vulnerability Ranking	Range or Life-cycle occurs within Habitat Areas with High Vulnerability ⁸
Invertebrates	<i>Procambarus Spp.</i>	Crawfish			Yes
Invertebrates	<i>Thamnophis Spp.</i>	Garter snake			Yes
Invertebrates	<i>Gonidea angulate, Anodonta californiensis, Anodonta nuttaliana, Margaritifera falcata</i>	Mussel (freshwater)		Moderate (WDFW 2015)	Yes
Invertebrates	<i>Taricha granulosa</i>	Newt			Yes
Invertebrates	<i>Enteroctopus dofleini</i>	Octopus	Sq'á:ymekw'		Yes
Invertebrates	<i>Pandalus platyceros</i>	Prawn			Yes
Invertebrates	Several species	Salamander		Cascade Torrent salamander: High (WDFW 2015) Cope's Giant salamander: Moderate-High (WDFW 2015) Dunn's salamander: Moderate-High (WDFW 2015)	Yes
Invertebrates	<i>Metridium spp.</i>	Sea anemone			Yes

Samish Indian Nation: Climate Adaptation Planning Priorities

Taxa	Species Name	Common Name	Samish Name	Prior Studies of Species Climate Vulnerability Ranking	Range or Life-cycle occurs within Habitat Areas with High Vulnerability ⁸
Invertebrates	<i>Parastichopus californicus</i>	Sea cucumber			Yes
Invertebrates	Various (e.g., <i>Loligo opalescens</i>)	Squid			Yes
Mammals	Several species	Bat		Little brown Bat: High (UW n.d.) Hoary Bat: Low-Moderate (WDFW 2015) Silver Haired Bat: Low-Moderate (WDFW 2015) Spotted Bat: Low-Moderate (WDFW 2015) Townsend's Big-eared Bat: Moderate-High (WDFW 2015)	Yes
Mammals	<i>Neotamias sp.</i>	Chipmunk			Potentially, Needs Additional Analysis

Samish Indian Nation: Climate Adaptation Planning Priorities

Taxa	Species Name	Common Name	Samish Name	Prior Studies of Species Climate Vulnerability Ranking	Range or Life-cycle occurs within Habitat Areas with High Vulnerability ⁸
Mammals	<i>Mustela frenata</i>	Long-tailed weasel			Potentially, Needs Additional Analysis
Mammals	<i>Erethizon dorsatum</i>	North American porcupine			Potentially, Needs Additional Analysis
Mammals	<i>Lepus americanus</i>	Snowshoe hare			Yes
Mammals	Several species	Squirrel		Townsend's Ground squirrel: Moderate (WDFW 2015)	Potentially, Needs Additional Analysis
Plants	<i>Vaccinium alaskaense</i>	Alaska blueberry			Yes
Plants	<i>Schoenoplectus americanus</i>	American three-square			Yes
Plants	<i>Juncus balticus</i>	Baltic rush			Yes

Samish Indian Nation: Climate Adaptation Planning Priorities

Taxa	Species Name	Common Name	Samish Name	Prior Studies of Species Climate Vulnerability Ranking	Range or Life-cycle occurs within Habitat Areas with High Vulnerability ⁸
Plants	<i>Arctostaphylos uva-ursi</i>	Bearberry			Yes
Plants	<i>Agrostis Spp.</i>	Bent grass			Yes
Plants	<i>Populus balsamifera ssp. trichocarpa</i>	Black Cottonwood			Yes
Plants	<i>Cornus canadensis</i>	Bunchberry			Yes
Plants	<i>Malus Spp.</i>	Crab apple			Yes
Plants	<i>Pseudotsuga menziesii</i>	Douglas fir		Medium (UW n.d.)	Yes
Plants	<i>Corylus cornuta</i>	Hazelnut			Yes
Plants	<i>Juniperus Spp.</i>	Juniper			Yes
Plants	<i>Lupinus arboreus</i>	Tree lupine			Yes
Plants	<i>Salicornia depressa</i>	Pickleweed			Yes
Plants	<i>Sambucus racemosa</i>	Red elderberry			Yes
Plants	<i>Honckenya peploides</i>	Seabeach sandwort			Yes
Plants	<i>Distichlis spicata</i>	Seashore saltgrass			Yes
Plants	<i>Argentina anserina</i>	Silverweed			Yes

Samish Indian Nation: Climate Adaptation Planning Priorities

Taxa	Species Name	Common Name	Samish Name	Prior Studies of Species Climate Vulnerability Ranking	Range or Life-cycle occurs within Habitat Areas with High Vulnerability ⁸
Plants	<i>Picea Spp.</i>	Spruce		Sitka: High (UW n.d.) Engelmann: High (UW n.d.)	Yes
Plants	<i>Hierochloe hirta</i>	Sweet grass			Yes

Samish Indian Nation: Climate Adaptation Planning Priorities

APPENDIX B



Samish Indian Nation Climate Change Survey



September 2017



TABLE OF CONTENTS

CONTENTS

Executive Summary.....	3
Introduction	4
Methodology of Surveys	4
Tribal Member Survey	4
Staff Survey	5
Results and Findings.....	5
Tribal Member Survey	6
Changes in Climate.....	6
Priorities for Preparation Actions	7
Staff Survey	7
Participation.....	7
Adaptation Actions	8
Priorities for Preparation Actions	8
Appendix A: Tribal Member Survey Detailed Results.....	A-1
Appendix B: Tribal Staff Survey Detailed Results.....	B-1

EXECUTIVE SUMMARY

In Spring/Summer 2017, Samish Department of Natural Resources conducted two surveys of climate change: one focused on tribal members and the other on Samish staff. The Tribal Member Climate Change survey was designed to capture Samish tribal member input on how climate change is likely to impact individual tribal members and the tribal community, as well as priorities for climate adaptation planning areas. The Tribal Staff Climate Change survey was designed to capture staff input on how services may need to adjust to a changing climate, as well as priorities for climate adaptation planning areas.

Samish tribal members feel climate change is a problem, likely to cause harm to their family and the Samish tribal community. Most tribal members indicate that climate change impacts are already underway and causing impacts.

Samish staff members identified several ways in which the services they provide may be impacted, including interruption of services because of extreme weather events, increased need for services, and loss of cultural resources.

In general, respondents support action to prepare for these impacts. Tribal members and staff prioritize actions that address impacts to water (supply and quantity), air quality, tribal member health and wellbeing, cultural artifacts and sites, plants and animals, and safety and emergency response. In addition, staff also prioritized actions that addressed impacts to community infrastructure (e.g., roadways, water and sewer systems, etc.), while tribal members prioritized actions that addressed impacts to tribal finances.

Due to a low response rate for the tribal member survey, the results, while important, may not reflect the beliefs of the Samish tribal community with high confidence. In addition, some departments were not well represented in the staff survey and their input may therefore not be included in the survey results.

INTRODUCTION

In Spring/Summer 2017, Samish Department of Natural Resources conducted two surveys of climate change: one focused on tribal members and the other on Samish staff. The Tribal Member Climate Change survey was designed to capture Samish tribal member input on how climate change is likely to impact individual tribal members and the tribal community, as well as priorities for climate adaptation planning areas. The Tribal Staff Climate Change survey was designed to capture staff input on how services may need to adjust to a changing climate, as well as priorities for climate adaptation planning areas.

While it is difficult to capture the full spectrum of concerns and priorities through a survey, the goal was to establish a baseline of information on tribal member and staff concerns and priorities that could be used as input by the Climate Adaptation Working Group in their efforts to identify key planning areas and develop actions that can enable the Samish to prepare for climate impacts to these key areas.

METHODOLOGY OF SURVEYS

TRIBAL MEMBER SURVEY

Tribal members were surveyed using two different survey instruments. The first survey employed closed and open-ended question formats and contained 10 questions, two of which were permission questions. Closed questions require the respondent to choose from a set of pre-selected answers that generally represent the spectrum of a response scale, e.g., from “very important” to “very unimportant.” Open questions ask respondents to volunteer answers using their own words, a kind of “top-of-the-mind” response. Both question formats have advantages and disadvantages. Closed questions allow for more accurate statistical analysis, but involve pre-packaged responses on commonly recognized topics. Open questions allow respondents to express their own views (within some space limits), but involve more subjectivity in analysis.

Tribal member participation in the survey was solicited through several different methods:

- At cultural events, including Samish Camp, the Health Fair, and the July Whale Tour;
- At the annual General Council meeting;
- Embedded on the Climate Change webpage on the Samish Indian Nation website, and
- Through the Summer newsletter.

Participation was encouraged through use of a raffle. The survey was open from May 15th through July 31st. A total of 25 responses were received (three participants began but did not complete the survey), for a response rate of less than 2 percent, a relatively low response rate.

In order to solicit additional input, an abbreviated survey was then implemented. To create the abbreviated survey instrument, four questions were removed from the first survey that focused on participant observation of changes in the climate. As a result, the abbreviated survey instrument employed closed and open-ended question formats and contained six questions, two of which were permission questions. Tribal member participation in the survey was solicited through several different methods:

- At cultural events, including the September Whale Tour;
- Linked via a social media post on the Samish Facebook page;
- Embedded on the Climate Change webpage on the Samish Indian Nation website, and
- Through the Fall newsletter.

The survey was open from August 30th through approximately the end of October. A total of 29 responses were received, for a response rate of less than 2 percent. In total, 54 surveys were received for a response rate of 3 percent, a relatively low response rate. This response rates highlights the challenge in obtaining tribal member feedback when the tribal population is dispersed and there is less ability to meet one-on-one with members.

Due to this low response rate, the results, while important, may not reflect the beliefs of the Samish tribal community with high confidence, and therefore caution should be used in interpreting and applying the survey information. The results are summarized below, with complete responses in Appendix A.

STAFF SURVEY

The Tribal Staff survey also employed closed and open-ended question formats and contained 7 questions. Survey participation was solicited via an email sent to all-staff from the Director of Natural Resources. The survey was open from June 27th through July 31st. A total of 18 responses were received (three participants began but did not complete the survey), for a response rate of approximately 36 percent. The results are summarized below, with complete responses in Appendix B.

RESULTS AND FINDINGS

The following is a breakdown of the survey results, starting with the tribal member survey and then focusing on the staff survey.

TRIBAL MEMBER SURVEY

CHANGES IN CLIMATE

1. More than half of survey participants (73%) believe that **climate change is extremely or somewhat likely to cause significant harm** to their families or the Samish tribal community.
2. The majority of survey participants reported that they **are already beginning to experience some forms of climate changes** in their lifetime¹. Survey participants identified the greatest awareness of these changes in climate:
 - a. More precipitation is falling as rain (rather than snow) in mountain areas (96% aware, including 32% extremely aware, 36% very aware, 16% moderately aware, and 12% slightly aware)
 - b. Increases in air temperatures (92% aware, including 28% extremely aware, 44% very aware, 12% moderately aware, and 8% slightly aware)
 - c. Drought conditions (92% aware, including 28% extremely aware, 32% very aware, 16% moderately aware, and 16% slightly aware).
3. The majority of survey respondents (60%) reported that **changes in the climate are causing problems** for their family, the Samish tribal community, or themselves¹. Survey respondents were then asked to describe the problems changes were occurring, in their own words. Eleven respondents chose to answer this question. A variety of different impacts were noted by respondents, and text analysis completed of the responses identified the following impacts in the greatest frequency:
 - a. Salmon and other fish species – respondents were concerned that changes would impact fish populations and ability to find healthy fish (45%)
 - b. Habitat – participants noted a variety of changes in habitat that may impact plants and animals (27%)
 - c. Water quality or quantity (18%)
 - d. Shellfish - respondents were concerned that changes would impact shellfish (18%).
4. Respondents were asked to list (in their own words) up to five impacts from a changing climate that, if no actions are taken, they were concerned would **adversely affect their family, the Samish tribal community, or themselves in the future**¹. Thirteen respondents chose to answer this question. A variety of different impacts were identified, and text analysis completed of the responses identified the following impacts with the greatest frequency:
 - a. Sea level rise (61.5%)
 - b. Water quality or quantity (53.8%)

¹ Question was not included in abbreviated survey.

- c. Habitat (30.7%)
- d. Erosion (30.7%)
- e. Salmon (30.7%)

PRIORITIES FOR PREPARATION ACTIONS

1. A few tribal members listed the following assets or resources as not a priority to protect from the impacts of climate change: Community infrastructure, tribal finances, traditional lifestyle and skills, and impacts on plants or animal species or habitats (see Appendix A for full list).
2. Over half of survey respondents indicated that **water (e.g., supply and quality) was essential (63%) to protect from the impacts of climate change**. Other resources and assets that were identified as high priorities for protection include:
 - a. Tribal member health and wellbeing (45% essential and 43% high priority)
 - b. Air quality (43% essential and 43% high priority)
 - c. Impacts on plants and animals (44% essential and 40% high priority)
 - d. Safety and emergency response (27% essential and 53% high priority)
 - e. Cultural artifacts and sites (48% essential and 29% high priority)
 - f. Traditional foods (29% essential and 48% high priority)
 - g. Tribal finances (29% essential and 47% high priority)
 - h. Tribal-owned property (43% essential and 33% high priority)
3. Respondents who indicated that impacts on plants and animals were a high or essential priority were then asked to list which **plants, animals or habitats of key cultural significance** do you think require the most attention by the Samish Indian Nation, to protect from the adverse impacts from climate change. A total of 42 respondents answered this question and, based on text analysis, the following species were identified in the greatest frequency:
 - a. Salmon (78%)
 - b. Salish Sea (38%)
 - c. Orca (38%)
 - d. Shellfish (36%)
 - e. Cedar or forest (26%)

STAFF SURVEY

PARTICIPATION

1. In general, staff from different departments participated in the survey, though several divisions within the Health and Human Services department either did not participate or did not include their department in the response, including: Education, Housing, and Human Services.

IMPACTS TO SERVICES

1. A variety of impacts to services that the Samish Tribal Government provides were noted. In particular, travel was an area of concern, particularly with respect to how extreme weather events may impact travel associated with tribal services. See Appendix B for a full list of services that may be impacted by a changing climate.

ADAPTATION ACTIONS

1. Many staff members reported not being aware of actions departments were currently taking to prepare for the impacts of climate change. Several noted mitigation measures, such as recycling or commuting by bicycle, that staff members or departments were doing to reduce carbon emissions associated with climate change.
2. Several respondents expressed concern about the cost of providing services increasing, due to increasing number of tribal members needing services due to the impacts of climate change.
3. Some specific purchasing/capital improvement actions were noted, such as installing renewable energy sources and reusable materials. See Appendix B for a full list of comments.

PRIORITIES FOR PREPARATION ACTIONS

1. No listed resources or assets were identified by survey respondents as having no priority for protection (see Appendix B for full list). A limited number of resources and assets were identified with a low priority, including tribal finances, traditional medicine, and Land (e.g. erosion or landslides).
2. Over half of survey respondents indicated that **water (e.g., supply and quality) (77%), air quality (66%), tribal member health and wellness (66%), cultural artifacts and sites (56%), safety and emergency response (61%), and community infrastructure (56%) were essential to protect from the impacts of climate change.** Other resources and assets that were identified as high priorities for protection include:
 - a. Impacts on plants and animals (50% essential and 44% high priority)
 - b. Traditional foods (44% essential and 44% high priority)
 - c. Traditional lifestyle and skills (41% essential and 47% high priority)
3. Respondents who indicated that impacts on plants and animals were a high or essential priority were then asked to list which **plants, animals or habitats of key cultural significance** do you think require the most attention by the Samish Indian Nation, to protect from the adverse impacts from climate change. A total of 13 respondents

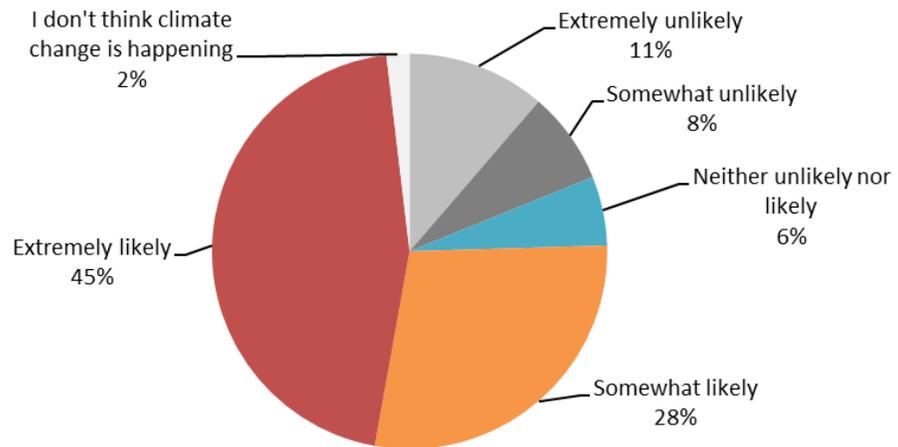
answered this question and, based on text analysis, the following species were identified in the greatest frequency:

- a. Shellfish (57%)
- b. Orca (36%)
- c. Nearshore, mudflats, estuaries (28%)
- d. Salmon (28%) and Fish (28%)

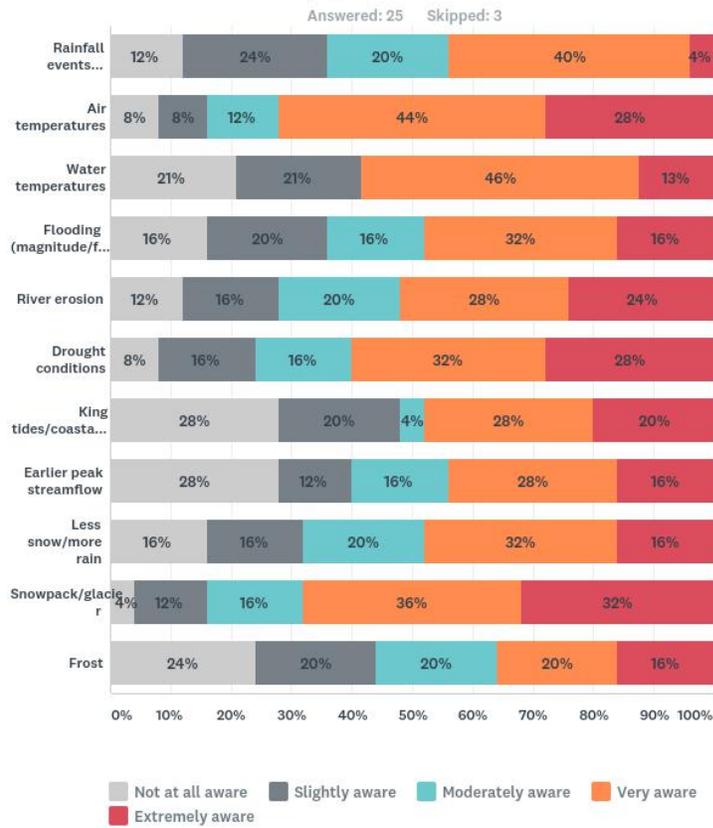
APPENDIX A: TRIBAL MEMBER SURVEY DETAILED RESULTS

The following contains the full responses to the Tribal Member Samish Indian Nation Climate Change Survey.

Q3 How likely do you think it is that climate change will cause significant harm to your family or the Samish tribal community within the next several decades?



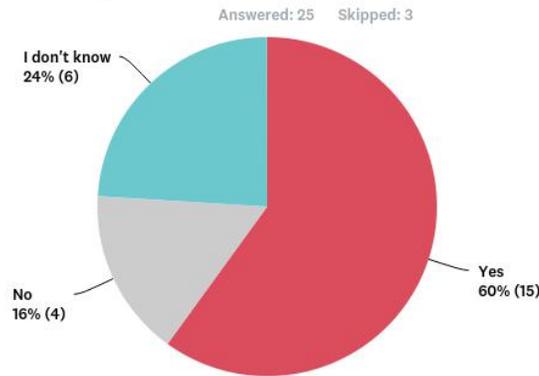
Q4 Describe changes in the pattern of weather you have experienced in your lifetime. Please rank by your awareness of these changes.



2

2

Q5 Are the changes in climate identified above causing problem(s) for you, your family or the Samish tribal community?



Q6 Please describe the problem(s) that these changes are causing. ²

² Question not included in abbreviated survey.

Answered: 11, Skipped: 17

- Over use of ground water used to maintain food gardens, due to drought conditions
- Threatening cultural traditions, practices
- Temperature change
- Less salmon and salmon is at the base of the food chain
- Warmer waters, less fish returns
- Increased rain fall limits crop sizes, which decrease crop production.
- loss of fish populations
- reduction of ecosystems, less salmon, less orcas, more erosion and flooding causing less habitat space for animals, ocean acidification causing erosion of shells.
- Traditional plants are harder to find and have shorter seasons.
- heat exhaustion, causing problems with foundation of my house.
- Harder and harder to find good healthy fish and shellfish

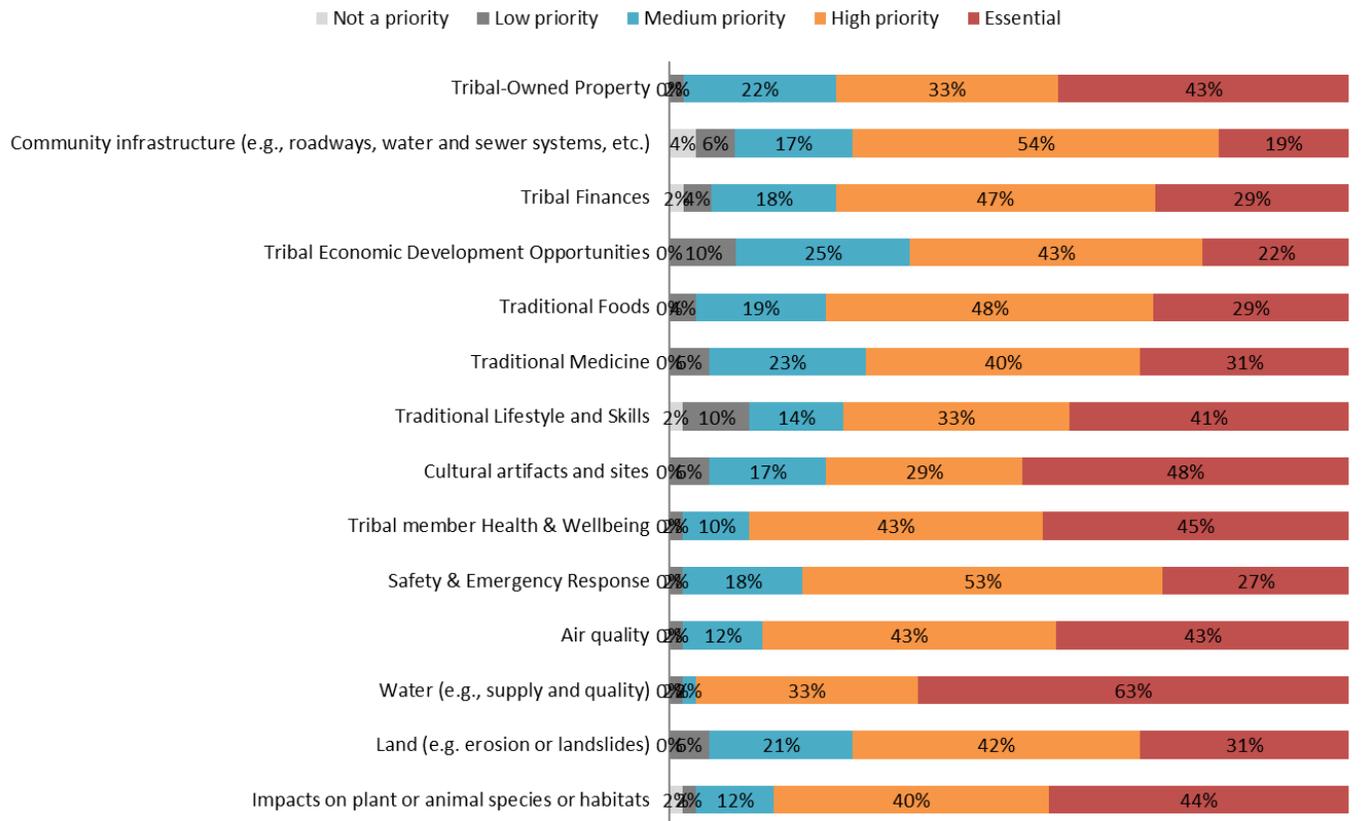
Q7 Please list up to five impacts from a changing climate that you are concerned will, if no actions are taken, adversely affect you, your family or the Samish tribal community in the future.²

Answered: 13, Skipped: 15

- Rising sea levels due to glacial melt
- Traditional lifestyle
- Rising sea level
- Inability to sustain tribal tradition utilizing natural resources
- Rising oceans
- Melted polar caps
- Forest Fires
- dangerous high temps
- loss of streams
- extinction of salmon and orcas
- Orcas will continue to starve
- the foundation could result in inability to reside there.
- Sea level rise
- River erosion effecting spawning habitat of fish
- Water quality
- Lack of icebergs
- Inability to sustain natural food chain
- Erosion
- Flooded farmlands
- Soft shell-Shell Fish
- health of shellfish

- increase in ocean levels
- erosion and destruction of habitats in the Salish sea
- Salmon will continue to be sparse
- Flooding
- Acidification of water - softening of shells and dead shellfish
- Drought conditions increasing risk of tree failure
- Air quality
- Changes to tidal resources
- Drought
- Longer and colder winters
- Ocean level rising
- increase in temperatures
- ecosystem collapses in the water
- Sea level rise will affect Fidalgo Bay Resort, tribal lands, and island beaches
- Drought conditions increasing risk of wildfire
- Cedar requires shade trees for first 100 years. Evergreens survive in the Northwest on a limited range of rainfall, No trees, no shade, no cedar.
- Fewer salmon returns
- Home and building the erosions
- river erosion
- landslides and erosion of infrastructure
- Availability of cultural and medicinal plants
- Melting snow too early in season
- Overcome by insects
- The natural beauty of our home will be altered forever.
- Heat waves
- animal population reduction
- loss of forests and phytoplankton from floods and warm climates, causing less absorption of CO2
- Rising temperatures of rivers
- Glacier recession - big source of water

Q8 In your opinion, what resources or assets are the most important for the Samish Indian Nation to try and protect from the impacts of climate change? Please rank by order of priority.



Q9 Which plants, animals or habitats of key cultural significance do you think require the most attention by the Samish Indian Nation, to protect from the adverse impacts from climate change?

Answered: 42, Skipped: 15

- salmon
- Fish
- Salmon
- All fish
- Salmon
- Salmon
- Halibut
- Sea animals
- Cedar (and not just climate impacts, protect from clear cutting)
- Cedar trees

- Cow
- salmon
- Salmon
- archaeological sites
- Cedar trees
- Southern Resident Orcas
- Indian Celery
- salish sea
- ORCA
- Mussels
- Mussels
- Salish Sea
- Eagles or other birds of prey
- Killer Whale
- Sea animals
- Salmon
- Eagles
- Salmon
- Corn
- plants used in weaving
- Cedar trees
- Eagles
- Chinook Salmon
- Orcas
- Shellfish
- Clams
- Clams
- San Juan waterway
- Eagle
- Sea animals
- Shell life
- Shellfish
- Clean flowing rivers
- madrona trees
- Orcas
- Camas
- Salmon
- Salmon
- Wolves
- Oysters
- Cedar trees (native trees)

- Cedar
- Seals
- Salmon
- Orcas
- Bison
- Shell fish
- Iron wood (Ocean Spray)
- THE WHOLE SALISH SEA
- Camas
- Deer
- Water quality
- Native shrubs
- Salish Sea
- Inter tidal zones
- Cat tails
- Land surrounding the salish sea
- Clams
- Land - all equal balance. Traditional foods
- Sea life - all equal balance.
- People - health and care
- Teachings of survival without technology dependence
- Schooling - Preschool through 12th grade, traditional teachings
- Pink salmon
- Dog salmon
- Sockeye salmon
- King salmon
- Silver and steel salmon
- Salmon
- Cedar
- Ocean health - stop pollution
- Orcas, and food chain
- Forests
- Water - streams, lakes, oceans
- All creatures great and small
- Ocean health - stop pollution
- Orcas, food chain
- Forests
- Water
- All creatures
- Near shore habitat
- Camas fields

- Salmon routes
- Salish sea overall health/Orca habitat
- All fresh water sources
- Salmon
- Shores
- Plants
- Rising sea levels
- Dry world – fires
- Salmon
- Crab
- Eagles
- Deer
- Clams
- Fish
- Plants
- Animals and plants that are good to eat
- Salmon
- Beaches
- Crustaceans
- Orcas
- Cedar
- Orca
- Salmon
- Clams
- Beaches
- Waterways, rivers
- Trees
- Orcas
- Salmon
- Shellfish
- Water habitats
- Marine life - salmon, whales, etc.
- Forest areas
- Salmon
- Orcas
- Endangered species
- Orcas
- Salmon
- All endangered species
- Salmon
- Edible plants that provide nutrition

- Shellfish areas
- Salmon growth
- Sea vegetation
- Eelgrass
- Salmon
- Oysters/Shellfish
- Estuary zones
- Orca
- Salmon
- Fish - stop nets in river!
- Crabs
- Birds
- Trees
- Cedar

Q10 Do you have any additional comments on climate change?

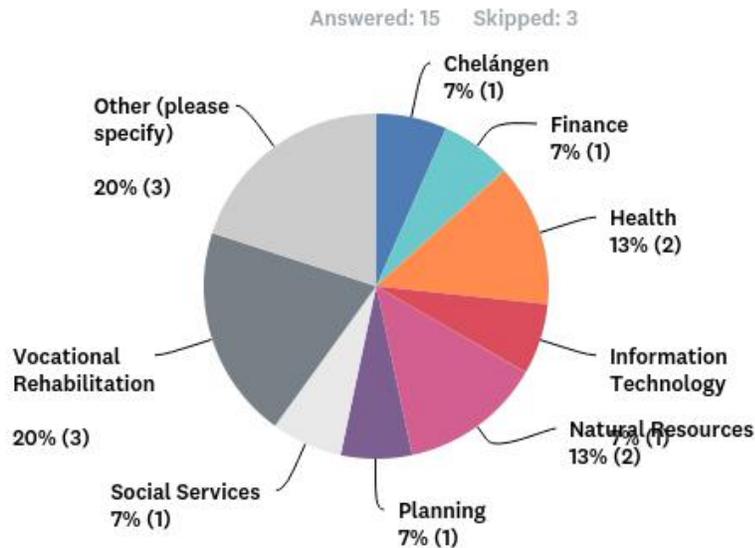
Answered: 14, Skipped: 43

- Climate change is a real issue facing us and we need to figure out how to mitigate its effects
- I like your approach of preparation rather than advocacy.
- We need to protect all things that are majorly important to our culture
- We can all help!
- Diversity to be taught in life
- Change our ways
- Change our ways
- I feel as though all these things are interconnected and the most vulnerable resources are actually highest priority. With any of the pieces missing that will be the direction of collapse. Perhaps education about transitioning into humanity being of lower impact would be the most helpful.
- Very concerned about global climate changes. We see it with worldwide flooding, worse epic storms, also fire storms.
- Climate change is bad

APPENDIX B: TRIBAL STAFF SURVEY DETAILED RESULTS

The following contains the full responses to the Tribal Staff Samish Indian Nation Climate Change Survey.

Q1 Please identify the Samish department that you work for.



Q2 Given your understanding of the potential changes in climate, please list at least one way that climate change could impact the services that you provide to tribal members.

Answered: 16, Skipped: 2

Natural Resources

- The warmer stream temperatures and higher winter flows would decrease the amount of salmon fry that are caught during our beach seine surveys.
- Protection and restoration of natural resource availability

Chelángen

- Sea level rise impacting cultural resources along the shoreline

Planning

- During the fall/winter/spring the Campbell Lake properties are difficult to climb and causes safety concerns as high winds knocks over trees and the driveways are too slick to drive up in a regular vehicle and tediously difficult in some SUV's and trucks.

Health

- Increased spending for environment-related illnesses
- An increase in chronic health conditions such as diabetes and heart disease; an increase in respiratory problems such as asthma.

Social Services

- Lower quality of health due to lower fish populations and lower air & water quality

Vocational Rehabilitation

- Employment options for our native male participants
- We do a lot of outreach. One impact already I have noticed is increased flooding. It's a logistics thing for us and doing outreach.

Longhouse

- Health and Wellness, Water quality

Information Technology

- Cloud services costs could increase

Finance

- We wouldn't be able to do any accounting work if the administration offices were under water.

Administration

- Stressed tribal members over helpless feelings about changes

Department Not Identified

- Flooding could cause travel issues
- Due to unpredictable weather outreach could be impacted. Many of our consumers are employed through the fishing industry which will be heavily impacted.

Q3 What action(s) are you or your department already doing that help the Samish to be more resilient to the impacts of climate change?

Answered: 16, Skipped: 2

Natural Resources

- I am trying to ride my bike to work more instead of driving to reduce my carbon footprint.
- Restoration projects that take sea level rise into account and climate resilience planning.

Chelángen

- None

Planning

- We are working on getting those driveways paved

Health

- Providing health and wellness educations for Samish Tribal Members. Also, discussing the feasibility of adding a Climate Change section to the Health Information Links page on the Samish Website.

Vocational Rehabilitation

- Nothing
- Recycling

Social Services

- Composting and recycling

Longhouse

- Well checks for children, also available to Elders

Information Technology

- n/a

Finance

- Not sure what we can do.

Administration

- Promoting education about the importance of small impacts

Department Not Identified

- Recycling and conservation
- none that I am aware of

Q4 What new action(s) do you think you or your department will need to take to prepare for the impacts of climate change?

Answered: 15, Skipped: 3

Natural Resources

- Samish DNR and the tribe as a whole could adopt policy from the Paris Agreement.
- Integrate our planning work into the tribe's comprehensive plan with Zam

Chelángen

- Not sure.

Planning

- Chains for vehicles to make climbing hills easier when wet or snowed on would be a temporary start

Health

- Stay well within our budget to help off-set the potential increase in costs of medical care
- At minimum, to begin with, adding a Climate Change section on the Samish Website.

Social Services

- Finding other ways to reduce waste and help the environment

Vocational Rehabilitation

- Unsure
- Unknown

Longhouse

- I'd like to see more renewable energy resources installed at the Longhouse..

Information Technology

- n/a

Finance

- Not sure.

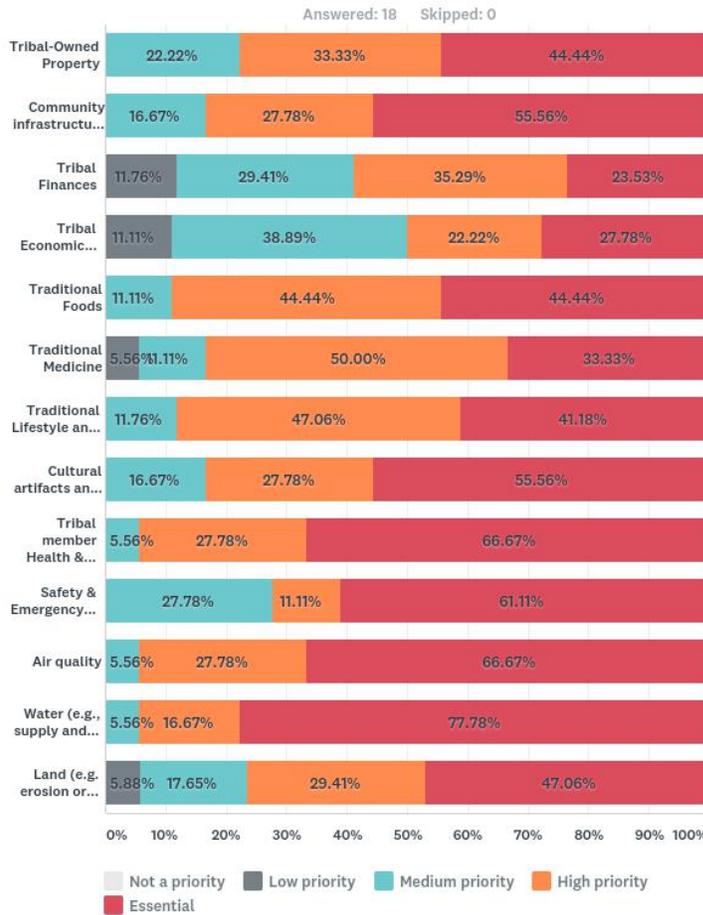
Administration

- Become better consumers of reusable materials

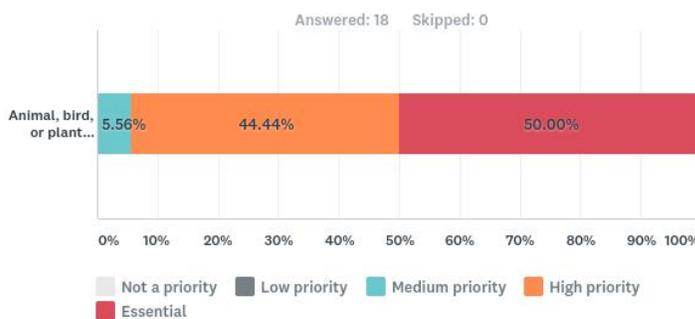
Department Not Identified

- be prepared for an increase in consumers that are displaced by climate change.

Q5 In your opinion, what resources or assets are the most important for the Samish Indian Nation to try and protect from the impacts of climate change?



Q6 Animal, bird or plant species or habitats (please rate priority for action)



Q7 If you indicated impacts on plant or animal species or habitats was a high or essential priority, please list up to five species or habitats that should be focused on.

Answered: 14, Skipped: 4

- fisheries, fresh and salt water

- All plants, animals and habitats are important to me
 - Eelgrass
 - Vertebrate
 - Food fish
 - Sea life overall seems disproportionately impacted
 - salmon
 - Salmon and Orca
 - Eagles
 - shellfish
 - wetlands areas in Skagit
 - Owls
 - Salmon
 - bird populations
 - Dungeness crab
 - Marine
 - Vegetation
 - shellfish
 - Water ways, small and large (creeks, lakes, runoff, bay, sea)
 - All other birds
 - eagles
 - shoreline around the area
 - Devils Club
 - forage fish
 - seals, orcas, etc.
 - forage fish
 - Insect Species
 - cedar forests
 - Deer habitat
 - salmon
 - herons
 - eagles
 - Deer
 - Shellfish
 - beach life, clams, mussels, etc.
 - salmon
 - Plant Species
-
- estuaries
 - Green belts for wildlife from shore to forests
 - shellfish

- orcas
- herons
- Forests
- medicinal and cultural use plants
- beaches
- clams
- Fungi Species
- ducks
- Sea Stars
- oysters
- wetlands, Padilla bay
- orcas
- Waters
- Orca
- Bees
- Fish
- Birds
- Deer