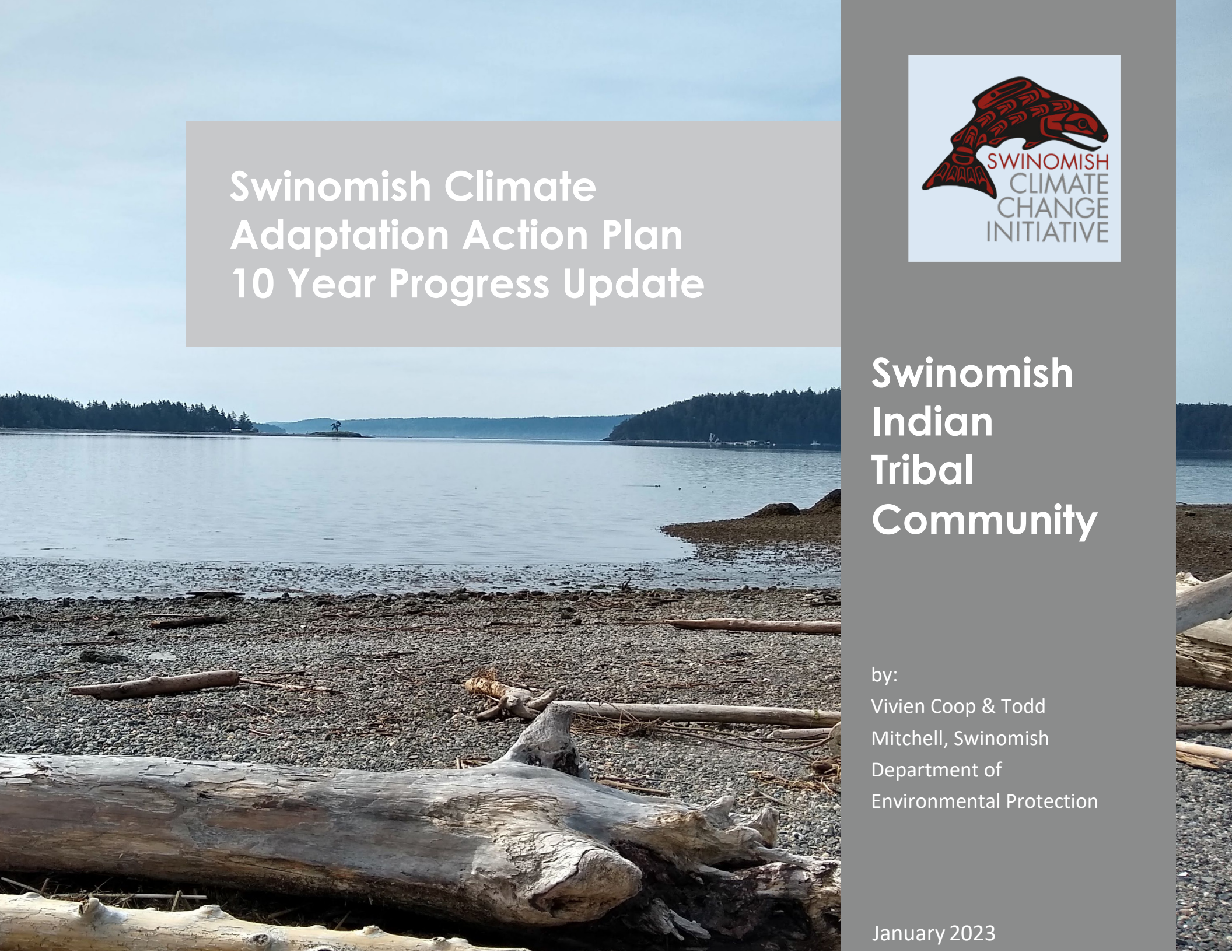

Swinomish Climate Adaptation Action Plan 10 Year Progress Update

SWINOMISH CLIMATE CHANGE INITIATIVE

Swinomish Indian Tribal Community

by:
Vivien Coop & Todd Mitchell, Swinomish Department of Environmental Protection

January 2023

Acknowledgements

Climate change touches every part of our society, and this update is a way to recognize and bring together all the people working on projects to protect our Tribal Community and make it resilient to climate change.

- Vivien Coop & Todd Mitchell, editors, Swinomish Department of Environmental Protection

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This report and the Workshop videos will be available at: https://www.swinomish-climate.com/

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I. Introduction

In 2021, the Swinomish Indian Tribal Community (SITC) continued updating the 2010 Swinomish Climate Adaptation Action Plan (2010 CAAP). The Swinomish Climate Adaptation Action Plan 10 Year Progress Update (CAAP 10 Year Update) documents the current status of the climate change adaptation actions proposed in the 2010 CAAP. The CAAP 10 Year Update also develops recommendations that help the SITC continue adapting to climate change impacts in the future.

The purpose of the CAAP 10 Year Update is to inform both the Swinomish Community and SITC Departmental Staff on the SITC's climate change adaptation progress. The CAAP 10 Year Update informs the Swinomish Community through community outreach and education. While putting together the CAAP 10 Year Update, the Department of Environmental Protection (DEP) created the Swinomish Climate Change Community Workshop Series in the summer of 2022 (see Figure 1 and several community surveys. The workshops and surveys inform the Swinomish Community on climate change and gather the community's perspectives on past, present, and future climate change adaptation actions. Additionally, the CAAP 10 Year Update collaboratively pools together adaptation action progress updates from across multiple departments.

Figure 1. *A timeline for the 2022 Swinomish Climate Change Community Workshop Series (Source: DEP, 2022).*

Global Climate Change

Global warming and climate change already impact ecosystems that play essential roles in our culture, health, identity, and ways of life. Currently, regions and ecosystems around the world experience the effects of climate change (see figure 2): increases in average atmospheric and sea temperatures, decreasing snow and ice levels, increased drought conditions, changes in the chemistry of sea water, and rising sea levels (Allen, et al., 2018). Climate change is pressuring fish and wildlife to adapt to changing habitats. Humans also have to adapt to reduce their vulnerability to current and future climate change impacts, such as sea level rise, more severe weather events, and food insecurity.

While adaptation projects help address current climate change impacts, mitigation projects are also important in order to address future impacts. Mitigation strategies address the root causes of global warming and climate change. Global warming refers to the increase in global average temperatures (Kuhlman, Lange, Freimund, & Gabrisch, 2016). According to the Intergovernmental Panel on Climate Change, global average surface temperature between 2006 and 2015 was 1.5°F (0.87°C) higher than the average between 1850 and 1900 (IPCC, 2018).

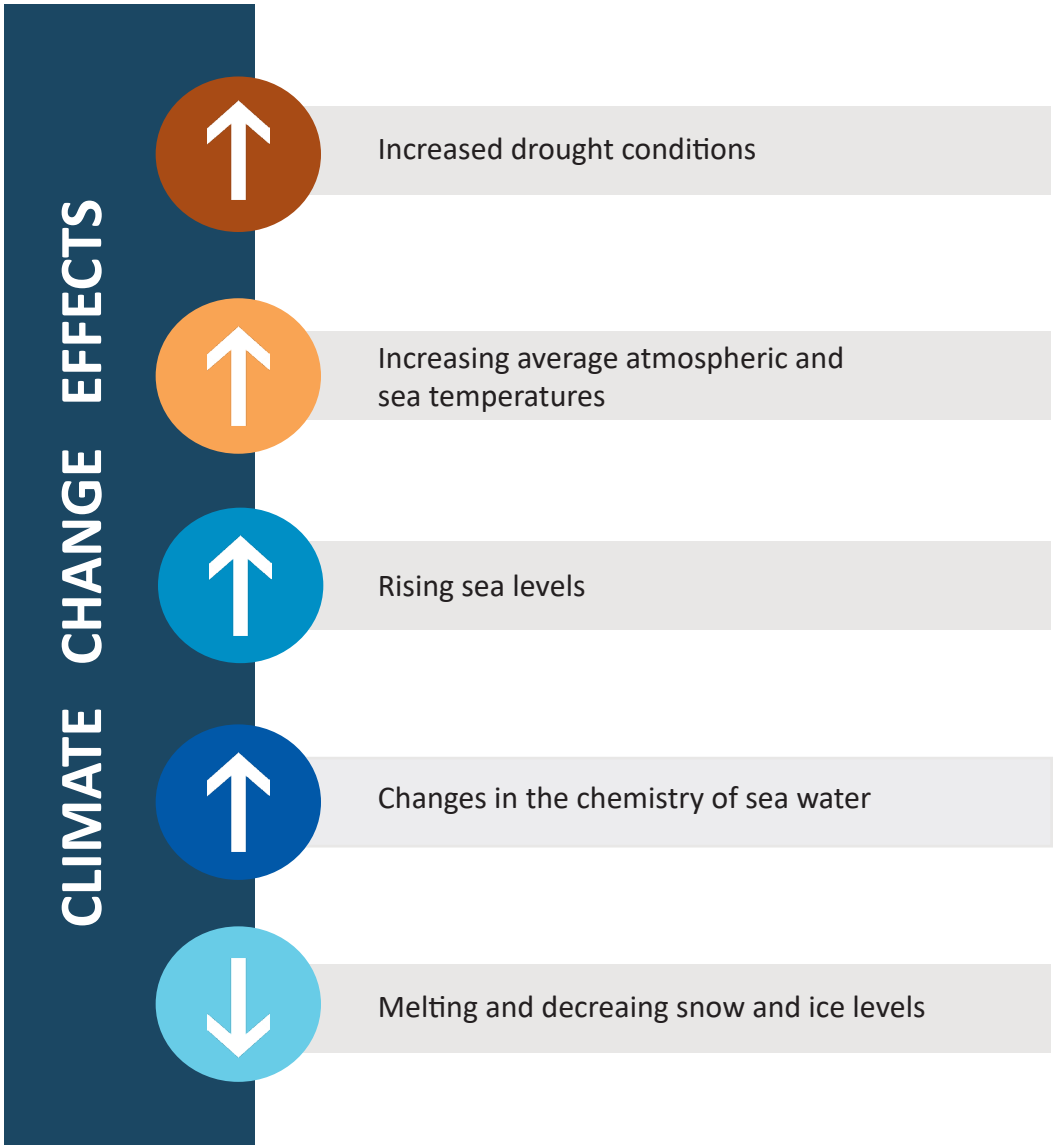


Figure 2. *Climate change effects graphic (Source: DEP, 2022; Allen, et al., 2018).*

Human activities, such as the burning of fossil fuels, deforestation, wetland conversion and other land use changes, are the main causes of rising atmospheric and oceanic temperatures since the 1950s (Allen, et al., 2018). Burning fossil fuels produces greenhouse gases such as carbon dioxide and methane. Greenhouse gases contribute to the greenhouse effect (Figure 3) by acting like a heat-trapping blanket. As humans produce more greenhouse gases, the blanket becomes thicker, trapping more heat within the Earth's atmosphere and resulting in warmer average temperatures (Kuhlman, Lange, Freimund, & Gabrisch, 2016).

As more greenhouse gases are emitted, average global temperatures will increase by about 0.4°F (0.2°C) every decade, which will cause long-term shifts in air and ocean temperatures and precipitation (Roop, Mauger, Morgan, Snover, & Krosby, 2020; NIFC, 2016). Reducing greenhouse gas emissions can help protect future generations from experiencing worsened climate change impacts. Communities can reduce greenhouse gas emissions by reducing how much we emit greenhouse gases or by increasing the storage of these emissions in oceans, forests, and soils.

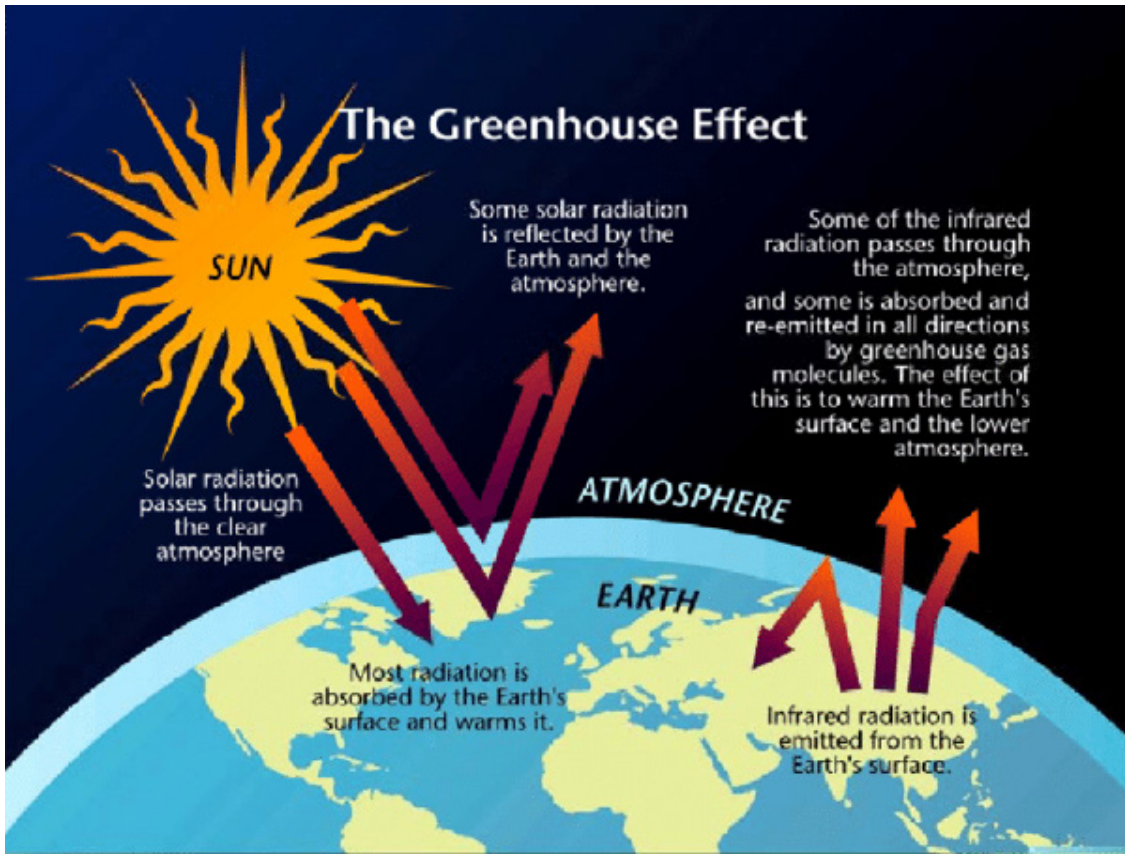


Figure 3. *The Greenhouse Effect. (Source: Brenner et al., 2001).*

Climate Change in Western Washington

Climate variability and change will impact land and marine areas in Western Washington. These impacts will alter the region's water cycle, natural resources, and ecosystems, which play key roles in shaping the cultures and identities of communities in Western Washington. Rising average temperatures and changing precipitation patterns will affect important factors including:

Snowpack and stream flow. Changes to snowpack, stream flow, the timing of water in streams, and the amount of water in streams affect the productivity and survival of salmonoids and other aquatic organisms (Zimmerman, Kinsel, Beamer, Connor, & Pflug, 2015). Additionally, lower summer stream flows reduce water supplies for aquatic habitats, irrigation, and drinking water (NIFC, 2016).

Sediment transport. While sediment transport is important for building coastal and aquatic habitats, too much sediment transport can harm fish and other aquatic organisms. Wetter winters and higher peak stream flows can carry more sediment downstream (Mauger & Vogel, 2020; NIFC, 2016). Greater amounts of sediment transported by the stream can impact salmon and other aquatic species' passage, productivity, and survival (Zimmerman, Kinsel, Beamer, Connor, & Pflug, 2015; SITC, 2009).

Sea level rise and storm surges. With heavy rain events expected to become more intense, flood risk in Western Washington will increase (Mauger, et al., 2015). Sea level rise and stronger storm surges can place habitats, culturally important artifacts and sites, and critical development and infrastructure along the coastline at risk (Mauger, et al., 2015; NIFC, 2016).

Fish and wildlife. Warmer temperatures and changing climates will affect species populations, distribution, and migration patterns. For example, warm-blooded species may seek out cooler areas as summer temperatures increase (NIFC, 2016).

Forests. Warmer temperatures and drier conditions increase the risk of large wildfires, forest disease, and pest infestation (Mauger, et al., 2015). Additional impacts may include changes in and migration of forest and wildlife species in response to increased temperatures (Mauger, et al., 2015). New areas open up as snowpacks melt earlier, allowing some plant species to expand into those areas (NIFC, 2016).

Western Washington experiences rising average temperatures and changing precipitation patterns. According to projections by the University of Washington Climate Impacts Group, average annual temperatures by the end of the century will increase by 5°F (2.8°C) for a low greenhouse gas emissions scenario and 8.5°F (4.7°C) for high emissions scenario in Western Washington (Mauger & Vogel, 2020). Western Washington has experienced several notably warm years in the past decade, with 2015 recorded as the warmest year since 1895 (UW Climate Impacts Group, 2018).

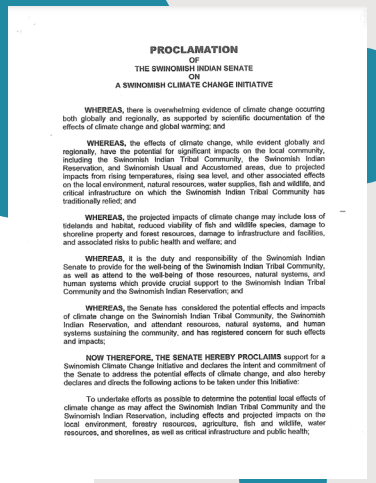
Projections also show changes to precipitation patterns in Western Washington. Although annual precipitation models vary with some projecting wetter conditions and some projecting drier conditions, most models predict less precipitation during summer months between June and August (Mauger & Vogel, 2020; NIFC, 2016). As average temperatures increase, more winter precipitation will fall as rain than as snow (Mauger & Vogel, 2020). In Western Washington, the impacts from changes in temperature and precipitation patterns will continue or accelerate in the future.

Figure 4. *Swinomish agricultural lands (Source: WWU Disaster Risk Reduction Studio, 2021).*

Swinomish Climate Action Adaptation Plan

CLIMATE DELIVERABLE TIMELINE

2007



PROCLAMATION
OF
THE SWINOMISH INDIAN SENATE
ON
A SWINOMISH CLIMATE CHANGE INITIATIVE

WHEREAS, there is overwhelming evidence of climate change occurring both globally and regionally, as supported by scientific documentation of the effects of climate change and global warming; and

WHEREAS, the effects of climate change, while evident globally and regionally, have the potential for significant impacts on the local community, including the Swinomish Indian Tribal Community, the Swinomish Indian Reservation, and Swinomish Usual and Accustomed areas, due to projected impacts from rising temperatures, rising sea level, and other associated effects on the local environment, natural resources, water supplies, fish and wildlife, and critical infrastructure on which the Swinomish Indian Tribal Community has traditionally relied; and

WHEREAS, the projected impacts of climate change may include loss of tidelands and habitat, reduced viability of fish and wildlife species, damage to shoreline property and forest resources, damage to infrastructure and facilities, and associated risks to public health and welfare; and

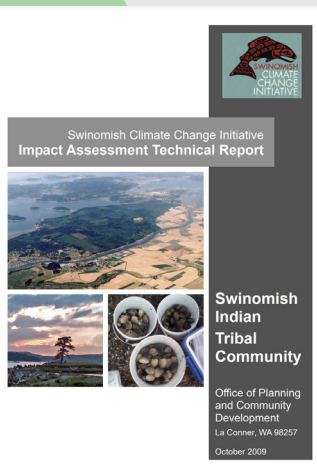
WHEREAS, it is the duty and responsibility of the Swinomish Indian Senate to provide for the well-being of the Swinomish Indian Tribal Community, as well as attend to the well-being of those resources, natural systems, and human systems which provide crucial support to the Swinomish Indian Tribal Community and the Swinomish Indian Reservation; and

WHEREAS, the Senate has considered the potential effects and impacts of climate change on the Swinomish Indian Tribal Community, the Swinomish Indian Reservation, and attendant resources, natural systems, and human systems sustaining the community, and has registered concern for such effects and impacts;

NOW THEREFORE, THE SENATE HEREBY PROCLAIMS support for a Swinomish Climate Change Initiative and declares the intent and commitment of the Senate to address the potential effects of climate change, and also hereby declares and directs the following actions to be taken under this Initiative:

To undertake efforts as possible to determine the potential local effects of climate change as may affect the Swinomish Indian Tribal Community and the Swinomish Indian Reservation, including effects and projected impacts on the local environment, forestry resources, agriculture, fish and wildlife, water resources, and shorelines, as well as critical infrastructure and public health;

2009



Following several extreme local weather and tidal events prior to 2010, the Swinomish Indian Tribal Community (SITC) took interest in examining climate change impacts on the Reservation community. In 2007, the Swinomish Tribal Senate passed a proclamation to assess potential climate change impacts and develop adaptive responses to these impacts. The U.S. Department of Health and Human Services Administration for Native Americans awarded a grant to SITC to help fund a two-year Climate Change Initiative. Through this initiative, SITC directed its efforts towards adaptation actions to mitigate potential climate change impacts on the Reservation community.

The first year of the Climate Change Initiative project focused on assessing the potential climate change impacts on the Swinomish Indian Reservation. In 2008, the Swinomish Office of Planning and Community Development with support from the University of Washington Climate Impacts Group began analyzing potential climate impacts and mapping “risk zones” using scientific models and data. To address issues arising from on-Reservation and off-Reservation areas, the SITC also formed a Strategy Advisory Group,

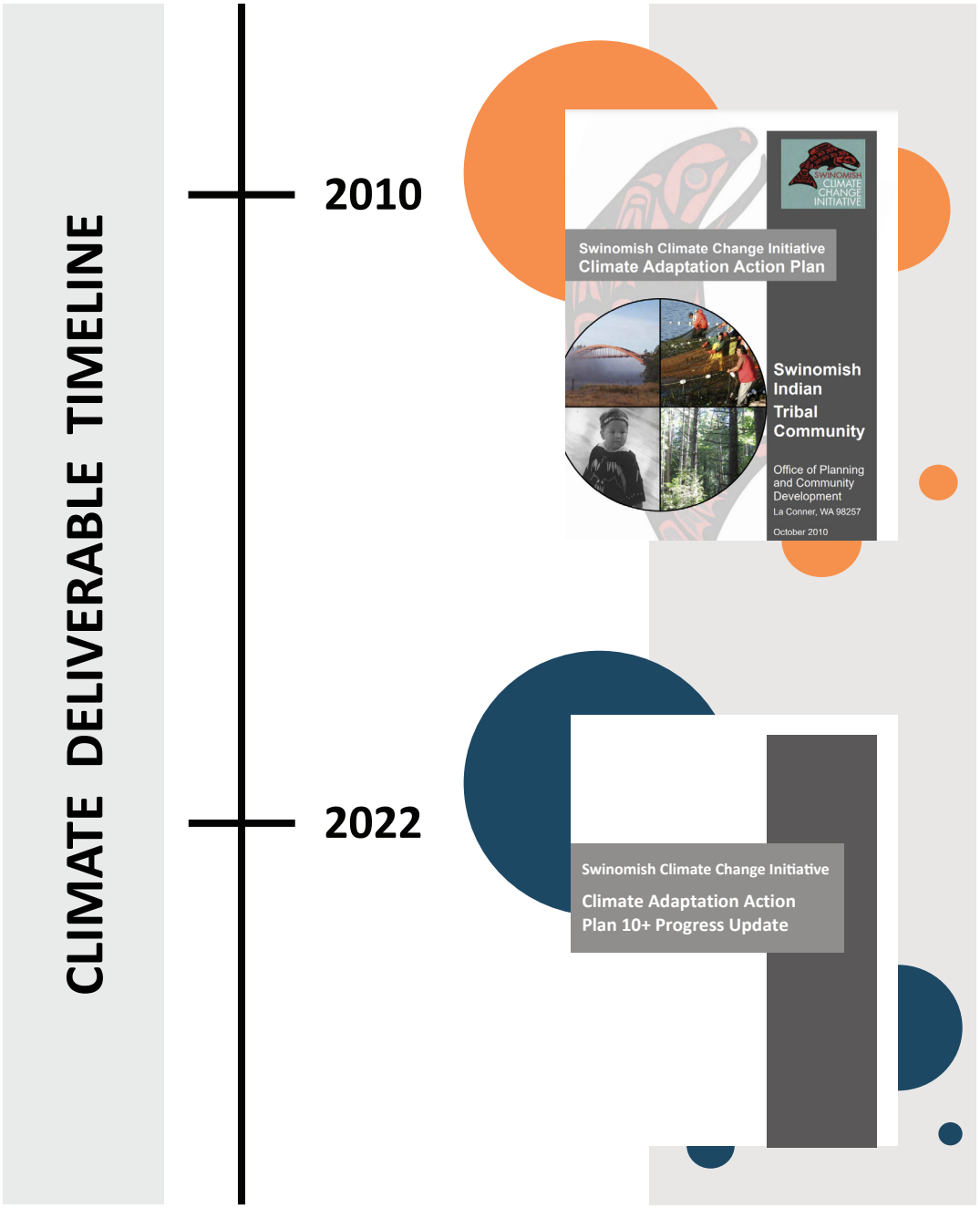


Figure 5. *SITC climate change deliverables timeline (Source: DEP, 2022).*

which consisted of representatives from Skagit County, the Town of La Conner, and the Shelter Bay Community. Based on the identified impacts and inventory of tribal assets and resources within risk zones, these groups developed a vulnerability assessment and a risk analysis of potential impacts. The information gathered in these assessments and analyses focused primarily on human systems and natural systems. These efforts led to the development of the 2009 Impact Assessment Technical Report.

The second year of the project focused on developing potential strategies for addressing the impacts identified in the 2009 Technical Report though the Community Engagement Advisory Group (CEAG) made up of Tribal members and staff. This precursor to the Protect Mother Earth Workgroup also educated the Community about climate change at Swinomish.

In 2010, the SITC released its Climate Adaptation Action Plan, which provided potential mitigation strategies for addressing climate change impacts on the Reservation. These strategies focused on impacts to coastal resources, upland resources, physical health, and community infra-structure and services. The 2010 CAAP developed adaptation goals, evaluated and recommended potential strategy options based on climate impacts, and considered challenges to implementing these potential strategies.

An interim progress update to the CAAP Chapter 8 tables was completed in 2018, then reformatted and expanded on in this project (Appendix A).

II. CAAP 10 Year Progress Update

The 2022 CAAP 10 Year Progress Update describes the adaptation actions SITC has taken since 2010 as well as future adap-tation plans to address climate change impacts. Following the general organization of the 2010 CAAP, this progress update report divides adaptation action into four subsections congruent with the 2010 CAAP:

8.1 Coastal Resources Adaptation Actions
8.2 Upland Resources Adaptation Actions
8.3 Public Health Adaptation Actions
8.4 Community Infrastructure Adaptation Actions

This section's four adaptation action subsections are each assigned a color (see Figure 6) for clarity. Each subsection also contains contain an introductory summary, the primary climate change impacts for each adaptation action subsection, the Swinomish tribe's main adaptation actions that address climate change impacts, key climate change accomplishments, and future efforts and new possibilities.

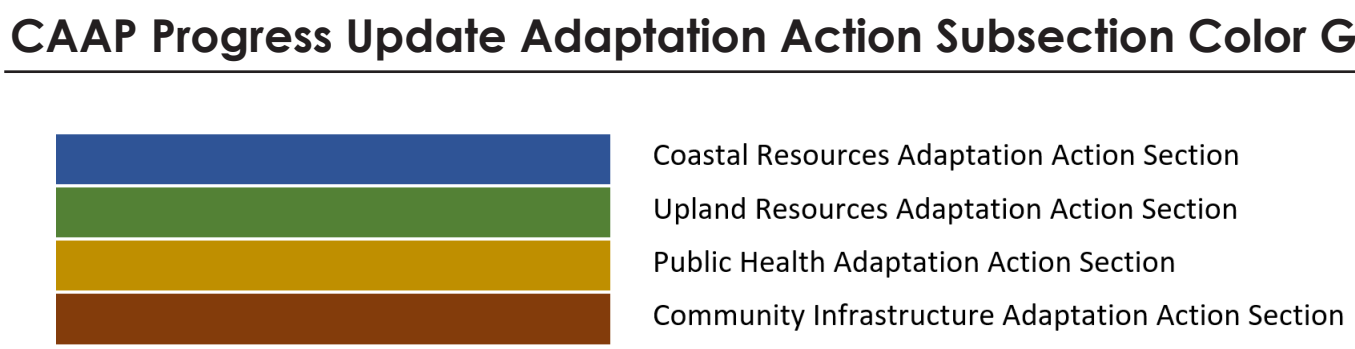


Figure 6. *Graphic depicting the color key for the CAAP progress update adaptation action subsections (Source: WWU Disaster Risk Reduction Studio, 2021).*

8.1 Coastal Resources Adaptation Actions

Coastal resources include:

1. Shorelines and beaches, tidelands, estuarine wetlands, and marine habitats
2. Marine Species within coastal habitats
3. Human development within coastal habitats

Surrounding the Swinomish Reservation lies approximately 26 miles of shorelines and 2,900 acres of tidelands held by the SITC (SITC, 2010). Along the western side of the Swinomish Reservation, near Lone Tree Point and Kiket Island, tidelands provide locations for productive shellfish beds (SITC, 2010). Estuarine wetlands, located along both the eastern and western shorelines, harbor habitats for fish and other marine species (SITC, 2010). Wetlands at Lone Tree Point and along the Swinomish Channel provide eel grass habitat, which fish use for foraging (SITC, 2010).

Human development also lines the shoreline. This development includes residential houses, tribal fishing docks, tribal agricultural and economic development lands, and several lease activities (SITC, 2010). The agricultural lands are located south of SR20 and near the Swinomish Channel. In the economic development area at the north end of the Swinomish Reservation is a Tribal casino, gas station, and RV park. Additionally, a log transport yard, boat repair facility, and private campground are located on leased tribal land along the shoreline (SITC, 2010).

Climate change's main impacts on coastal resources stem from sea level rise and storm surge. Inundation from these events may reduce the amount of land available for habitats and development and alter the composition of habitats, such as the salinity and acidity of the water (SITC, 2010). Adaptation actions address the impacts to natural resources, habitats, and shoreline development. These actions focus on protecting and restoring beaches, eelgrass beds, and estuarine wetlands that are used for spawning and habitats, as well as reducing the risks to beachfront residences and businesses. The SITC has pursued two basic approaches to addressing sea level rise and storm surge:

Approach 1: Facilitate natural adaptation processes by enabling key habitats and resources to migrate shoreward.
Approach 2: Construct coastal barriers – also known as coastal armoring – that hinder sea levels and waves from damaging existing buildings and coastal resources.

Although these two strategies often conflict, in some cases, combining armoring strategies with restoration and soft alternative strategies can be effective at minimizing negative effects to the built environment and the natural environment. The SITC continues to study how climate change impacts coastal resources, such as impacts from erosion and water acidity, in order to assist in determining the best possible action for addressing climate change impacts on coastal resources.

Coastal Resources Climate Change Impacts

Weakened Fish & Shellfish Viability

Climate change is affecting water temperature, CO2 levels, and pH acidity levels

Shoreline & Beach Erosion

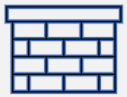
Sea level rise and human impacts are causing beaches and bluffs to erode

Inundation of Marine Habitats

Climate change is affecting water temperature, CO2 levels, and pH acidity levels

Coastal Resources Types of Adaptation Actions

Regulations for Protection



- Coastal setback restrictions
- Hard armoring

Continued Study

- Tidal marsh erosion study
- Algal rack study
- Water acidity study

Soft Armoring & Habitat Restoration

- Planting native species
- Restoring habitats with soft armoring

Coastal Resources Adaptation Accomplishments

SITC Climate Change Adaptation Projects

I. Smokehouse Dike Setback Project

The Smokehouse Dike Setback Plan (see Figure 7) is an ambitious project conducted by the SITC and the Skagit River System Cooperative (SRSC). The project aims to construct nearly 6,000 feet of new dike through the agricultural lands, and either breaching or removing the existing dikes along the Swinomish Channel. The project will convert nearly 120 acres of Swinomish-donated Flats into a wetland habitat.

From 2005 to 2014, the SITC and SRSC have been gradually restoring the agricultural lands along the Swinomish Channel to their natural estuarine habitat. Self-regulating tide gates were installed to replace previous tide gates that harmed fish movement into the Smokehouse tidal channels (SRSC, 2022). The SITC and SRSC also planted approximately 83 acres of native vegetation along the Swinomish Channel to improve the habitat for Juvenile Chinook and other species (SRSC, 2022).

SHORT-TERM GOALS

The short-term goal of the project is to protect existing infrastructure and agricultural practices.

LONG-TERM GOALS

The long-term vision for the project is to reconnect the Channel with old estuaries and increase wetland habitat. The recovered wetland would allow for salmon populations to rebound and invite waterfowl to the area.

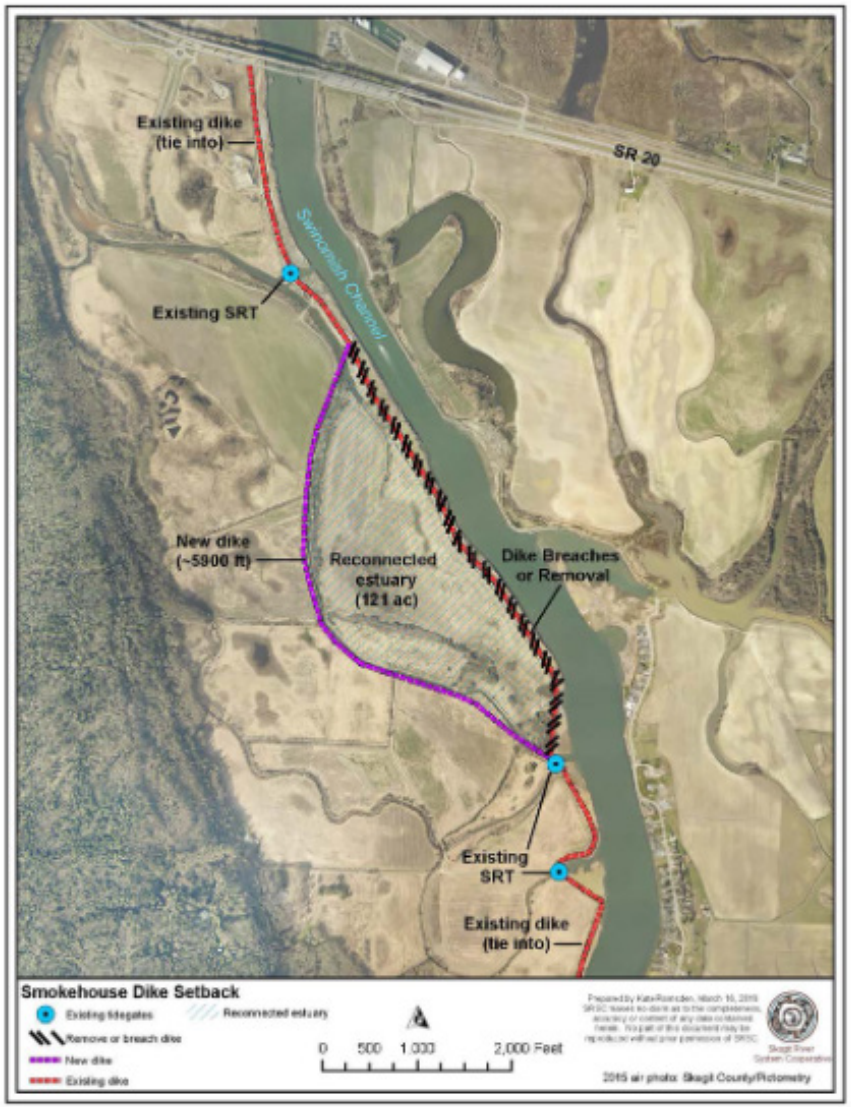


Figure 7. *Map showing one draft of the Swinomish Dike Setback Project where the dikes along the Swinomish Channel are destroyed and remade farther back inland (Source: WWU Disaster Risk Reduction Studio, 2021).*

II. Revitalizing Young Clam Populations

Burning fossil fuels increases the carbon dioxide levels in the atmosphere and in our oceans. More carbon dioxide in our oceans increases how acidic our oceans are. Ocean acidification makes it difficult for shellfish, such as clams, to build their shells.

However, Courtney Greiner in Swinomish Fisheries led an experiment to study whether adding back crushed shells to beaches or the presence of robust algal communities would improve the survival of young clams in that area (SITC, 2022). So far, robust algal communities negatively impacts young clam growth and survival (SITC, 2022). However, beach areas that Greiner and her team added crushed shells had lightly less acidic ocean water than areas where they didn't add crushed shells (SITC, 2022).

Figure 8. *Swinomish Fisheries studying the effects of robust algal communities and crushed shells on young clam populations (Source: SITC, 2022).*

III. Native Shellfish Restoration Project

Shellfish are a critical resource to the SITC. Increasing ocean water acidity, warmer summers with more intense heat waves, and wetter winters with more intense flood events are negatively impacting shellfish. Since 2010, the Swinomish Shellfish Company, the Puget Sound Restoration Fund, the Skagit River System Cooperative, and the Swinomish Fisheries department have been working on habitat restoration and Olympia oyster revitalization projects.

The Swinomish Shellfish Company agreed to host an Olympia restoration project where half a million-oyster seed was dispersed on the company's oyster farm in Similk Bay (see Figure 9). The project's goal is to one day have breeding size population that might naturally repopulate the bay. The company is able to harvest and sell all viable Olympia oysters from the project. Furthermore, this project addresses presumed inundation of shellfish beds due to sea level rise.

Figure 9. *Swinomish Olympia Oyster restoration project lead by the Swinomish Fisheries Department (Source: SITC, 2022).*

IV. Clam Garden Project

Lead by the Swinomish Fisheries and Social Services Department, the SITC had a multi-year plan to develop the 1st clam garden in the United States (SITC, 2018e). This clam garden creation is a priority in the Climate Adaptation Plan, and the project's core principle is strong community involvement and an inter-disciplinary approach to addressing climate change (SITC, 2018e). The clam garden will be placed in the Reservation tidelands (SITC, 2022).

Figure 10. *Swinomish clam garden project lead by the Swinomish Fisheries and Social Services Department (Source: SITC, 2018e).*

V. Swinomish Coastal Planning Projects

The Department of Environmental Protection is addressing sea level rise concerns with homeowners and other individuals impacted by sea level rise. Snee-oosh Beach, Shelter Bay Marina Basin, and the Pull and Be Damned bluff all are at risk of sea level rise (SITC, 2022). In addition to sea level rise, some of these three locations could also be at risk of storm surge (see Figure 12) and erosion hazards (SITC, 2022).

Figure 11. *Storm surge impacts to low-lying homes and properties on the Swinomish Reservation (Source: SITC, 2022).*

VI. Climate Change Vulnerability Model

The SITC and the SRSC completed a shellfish and finfish resource vulnerability model that shows how climate change will affect nearshore habitats. The Climate Change Vulnerability Model used a qualititative tool determine the risks sea level rise and wave energy pose to nearshore habitats. Additionally, the Climate Change Vulnerability Model predicted sea surface temperatures using a model (SITC, 2022). The purpose of the Climate Change Vulnerability Model was to be able to predict future habitat viability for Chinook salmon, cockle clam larvae, and Dungeness crab that are post larval and juvenile (SITC, 2022).

VII. Swinomish Shorelines and Sensitive Areas Code

The Department of Environmental Protection lead the update of the Swinomish Shorelines and Sensitive Areas (SSA) Code to include climate change impacts such as sea level rise and storm surge in inundation risk zone mapping (SITC, 2022). The SSA Code update also helps habitat restoration efforts on the Reservation. The SSA favors removing structures from marine habitat, which accomplishes the following goals: beach nourishment, preventing the loss of marine habitat, and supporting fish and waterfowl habitat (SITC 2022).

Figure 12. *A comparison of shorelines before and after shoreline restoration and structure removal (Source: SITC, 2022).*

VIII. Lone Tree Beach Nourishment Project

In 2017, the SITC decided to nourish the northern beach at Lone Tree Point because Lone Tree Point is a valuable cultural site to the Swinomish Community. Before restoration began, the Tribe evaluated the impacts that would be associated with restoring Lone Tree Point (SITC, 2022). Since the beach nourishment project was completed in 2017, SITC staff have continued monitoring the beach and sea level's impacts on the Lone Tree Point beach (SITC, 2022).

Coastal Resources Next Steps and Future Possibilities

SITC Climate Change Adaptation Projects

I. The Shore Friendly Program

The Shoreline Friendly program has successfully provided Swinomish landowners with free technical assistance, geological surveying, and logistics of physically moving their homes away from the shoreline. Relocation is a touchy subject; people would rather armor their shorelines than move their homes. Shoreline Friendly protects nearshore ecosystems through lessening the hardship of relocating which in turn lessens the implementation of harmful mitigation techniques, such as shoreline armoring.

Figure 13. *A shoreline that has soft armoring (Source: DEP).*

II. Oyster Aquaculture Farm

The Swinomish tribe is assessing the viability of starting on oyster aquaculture operation on the reservation. Tribal government has the authority and interest to establish an aquaculture operation, but funding is limiting any further progress. SRSC is completing research on shellfish survivorship that has potential to incite further interest into shellfish and shellfish ecosystem preservation.

8.2 Upland Resources Adaptation Actions

Upland resources consist of forest lands, wildlife habitat, upland wetlands, and upland water resources. These water resources include four small streams and the Swinomish Reservation's groundwater (SITC, 2010). Several private wells and Tribal wells have access to the Reservation groundwater (SITC, 2010). With no true old growth remaining, most of the Reservation uplands is covered with a mix of forest stands, ranging in their age classes and regrowth. The wildland-urban interface, which is the area where houses are within or near forested areas, is located in the southern and western areas of the Reservation (SITC, 2010).

Climate change poses significant impacts to forest species, wildlife, and human development within the uplands. With warmer temperatures and drier conditions, wildfire poses the most significant impact due to the number and density of residences within the wildland-urban interface (SITC, 2010). Almost 30% of the uplands is located within the wildland-urban interface (SITC, 2010). The SITC has focused on reducing or eliminating the amount of combustible sources where possible (SITC, 2010). Heat stress will also affect forest species as warmer temperatures increase the survival of invasive plants and pests. Invasive plants and pests can kill off native plants, resulting in a shift in wildlife foraging conditions. Additional impacts from heat stress include decreases in the wetland and freshwater resources, stream flows, and groundwater recharge (SITC, 2010). The SITC has pursued adaptation strategies such as forest management, wildlife habitat enhancement, and water/stream management.

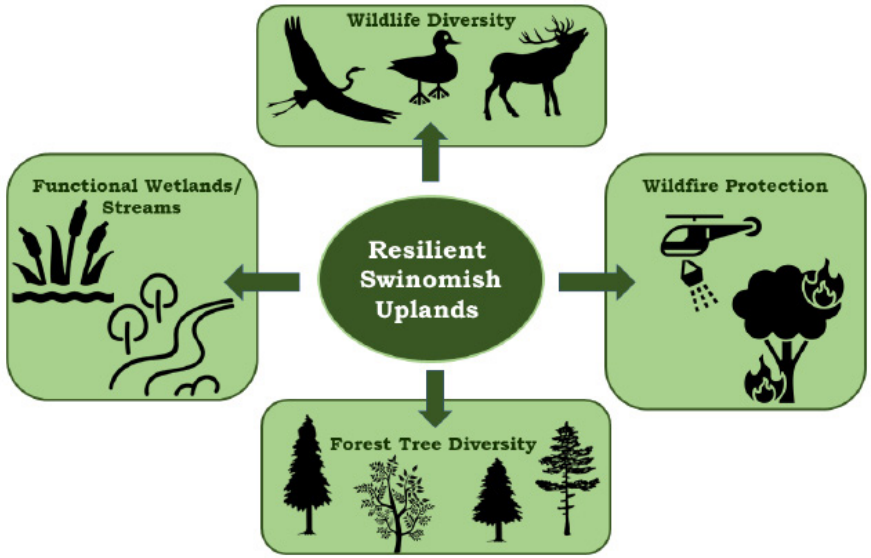


Figure 14. *Graphic illustrating four environmental factors that increase the uplands flora and fauna resiliency (Source: WWU Disaster Risk Reduction Studio, 2021).*

Upland Resources Climate Change Impacts

Loss of Species From Heat Stress

High temperatures create conditions for drought resistant species and changes wildlife foraging resources/habitat

Wildfire Risk

Increasing temperatures create fuel loads, resulting in high wildfire risk

Loss of Water

Higher temperatures will reduce volume and consistency of freshwater stream flow and contribute to degredation of wetlands

Upland Resources Types of Adaptation Actions

Regulations for Protection

- Forest thinning
- Adopting Fire-Wise Standards

Continued Study

- Continued monitoring
- Maintaining foraging habitats and resources

Soft Armoring & Habitat Restoration

- Riparian and stream restoration
- Water rights review

Upland Resources Adaptation Accomplishments

SITC Climate Change Adaptation Projects

I. Wildlife Hunting and Gathering

The Wildlife Department set photo traps to establish a baseline of mammals in the Treaty area. Some of the wildlife the Wildlife Department cataloged were bulls sparing, gathering cedar bark, cougar, mountain goats, elk. The Wildlife Department also works with youth to teach how to harvest cedar from selected forests.

Figure 15. *Swinomish The Wildlife Department set photo traps to establish mammal baselines and worked with youth to teach cedar harvesting (Source: DEP).*

II. Restoration, Skagit River System Cooperative (SRSC)

The SRSC installed a new bridge across alluvial fan at Downey Creek on the Suiattle River. This bridge will now enable adequate fish passage nearby. Much of the SRSC's restoration work will directly benefit salmon rearing and spawning habitat and build resiliency into local river ecosystems. Furthermore, the SRSC has been working on the Illabot Creek Alluvial Fan Restoration Project (SRSC, 2023). A roughly half-mile section of Illabot Creek was deemed "heavily degraded" (STSC, 2023). The SRSC have completed a restoration feasibility study and Phase I of construction on the Illabot Creek restoration project to help protect and enhance critical salmon rearing and spawning habitat (SRSC, 2023).

Figure 16. *SRSC restoring rearing and spawning salmon habitat and the new bridge the SRSC installed at Downer Creek (Source: DEP).*

8.3 Public Health Adaptation Actions

Climate change poses significant direct and indirect impacts to public health. Warmer summers with worse heat events and wildfire seasons with more wide-spread and intense smoke events are direct climate change impacts (SITC, 2010). Wildfire and heat-related hazards also make heat-related illnesses, air quality issues, and respiratory diseases more prominent issues in the public health sector. Additionally, more frequent flood events and severe storm events are contributing towards toxic seafood contamination and the spread of hazardous contaminants and solid waste.

Figure 17. *Image of the "Swinomsh Hats" (Source: WWU Disaster Risk Reduction Studio, 2021).*

Public Health Climate Change Impacts

Sea Level Rise & Flooding

Sea level rise and more frequent flooding hazards can spread hazardous materials

Higher Wildfire Smoke Risk

Drier summers are creating more favorable conditions for wildfires

Climate Change's Mental Heath Toll

Climate change's impacts are taxing on the community's mental health

Public Health Types of Adaptation Actions

Hazardous Material Cleanup Projects

The Whitmarsh cleanup project and boat spill cleanup projects mitigate impacts to public health

Emergency Air Quality Monitoring Equipment

Emergency use eqipment can detect harmful compounds in the air during smoke events

Community Education and Communication

Informing community members on potential hazardous air or materials is important

Public Health Adaptation Accomplishments

SITC Climate Change Adaptation Projects

I. Indigenous Health Indicators

Swinomish Community Environmental Health created Indigenous Health Indicators to show how important non-physical health is to the overall wellbeing of the Swinomish community. Climate change impacts Swinomish community health by affecting first foods availability.

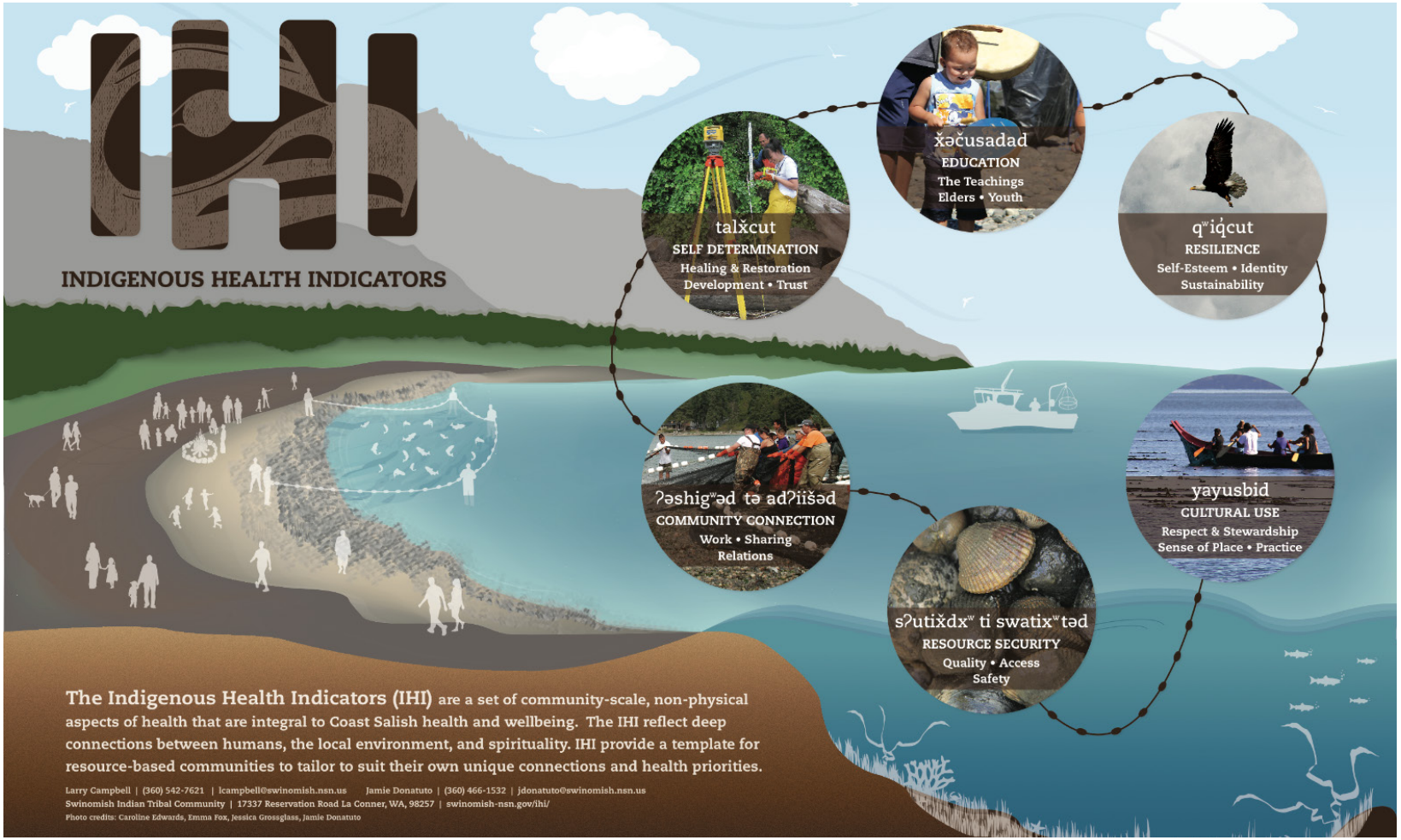


Figure 18. *Indigenous Health Indicators diagram (Source: Swinomish Community Environmental Health).*

II. Air Quality Station Updates

The Department of Environmental Protection installed new equipment and renovated one of the DEP's air quality stations in the summer of 2022. Located on the northern part of the Reservation near the Swinomish Casino, this newly renovated air quality station increases the DEP's air quality monitoring capacity during wildfire smoke events.

Figure 19. *The new DEP air quality station located near the Swinomish Casino (Source: DEP).*

III. Skagit Climate Science Consortium

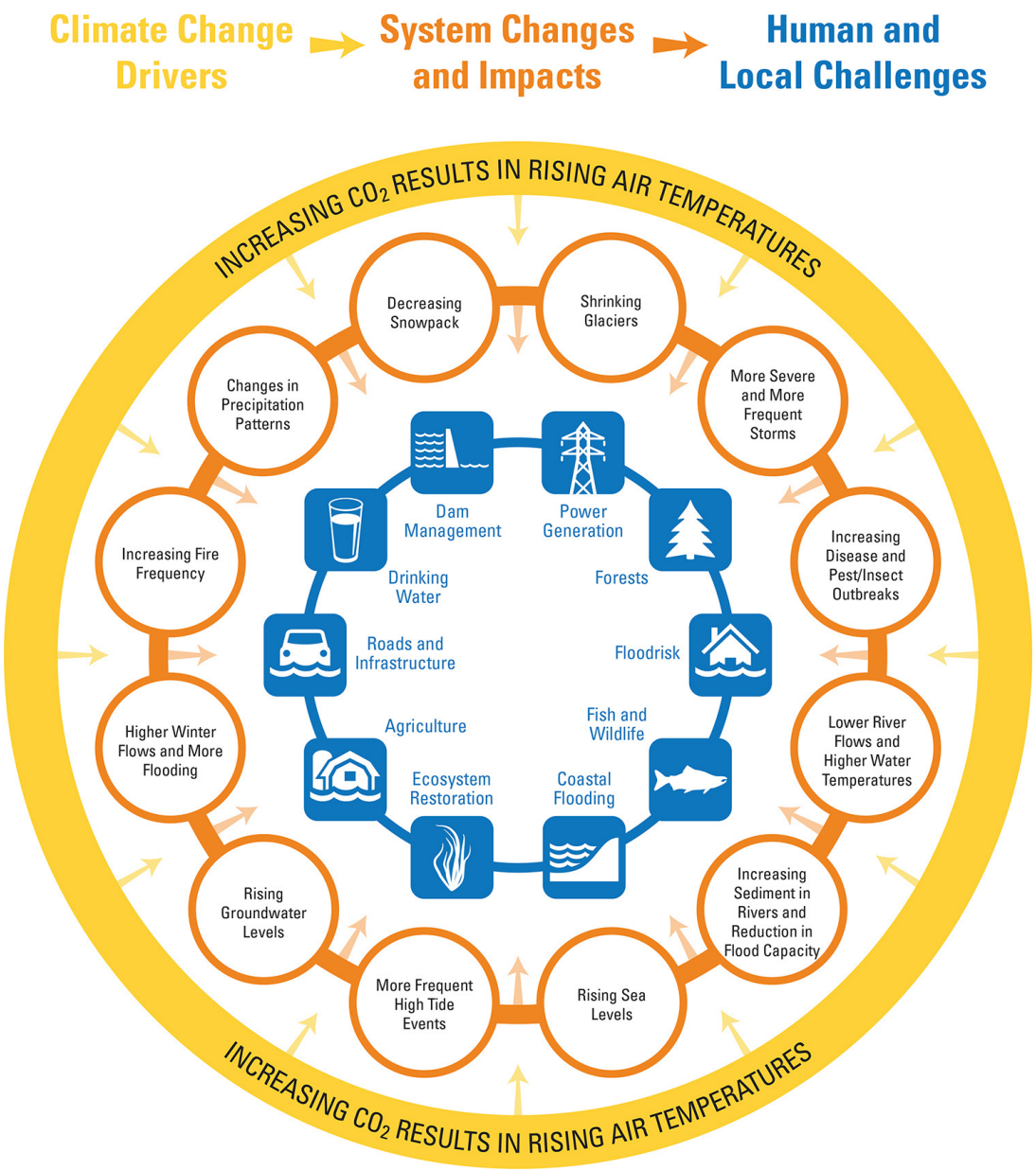


Figure 20. *The new DEP air quality station located near the Swinomish Casino (Source: DEP).*

The Skagit Climate Science Consortium (SC2) -- a non-profit, tax-deductible organization -- was created through collaboration between both on-Reservation and off-Reservation entities (SITC, 2022). Staff from

- The Swinomish Environmental Policy Department,
- Seattle City Light,
- the University of Washington Climate Impacts Group,
- U.S. Geological Survey,
- NOAA,
- Western Washington University,
- Pacific Northwest Laboratories,
- National Park Service, and
- Skagit River System Cooperative

all contributed towards Swinomish receiving EPA funding to create SC2 (SITC, 2022). SC2's purpose is to promote collaborative scientific research on climate change and engage with local decision-makers, community planners, and organizations dedicated to habitat restoration (SITC, 2022). Figure 20 shows the connections between climate change drivers, how climate change drivers change and impacts systems, and climate change challenges on local levels to people.

8.4 Community Infrastructure Adaptation Actions

Community infrastructure includes transportation components, utilities (water, sewer, and storm drainage systems), and emergency services. Transportation networks provide access to and from the Swinomish Reservation, allowing for the movement of people and essential services. Damage to transportation networks may isolate the SITC from the broader community. Additionally, disruptions to utilities and emergency services may impact large portions of the Swinomish Reservation population.

Climate change may result in more frequent disruptions to community infrastructure and services. For example, a shift from a snow dominant storage basin to more rain dominant may reduce freshwater sources, impacting water supplies (SITC, 2010). Warmer summers may increase energy demands due to cooling needs. Sea level rise and tidal surges may erode banks and coastal areas, causing damage to stormwater discharge outfalls. Addressing these climate change impacts will likely require coordination with multiple jurisdictions in order to find an effective, long-term strategy. As climate-related storm events become more frequent, improvements to emergency planning may prove critical in the event of service disruptions, to assist SITC during extended power outages, and to address greater demand on emergency services.

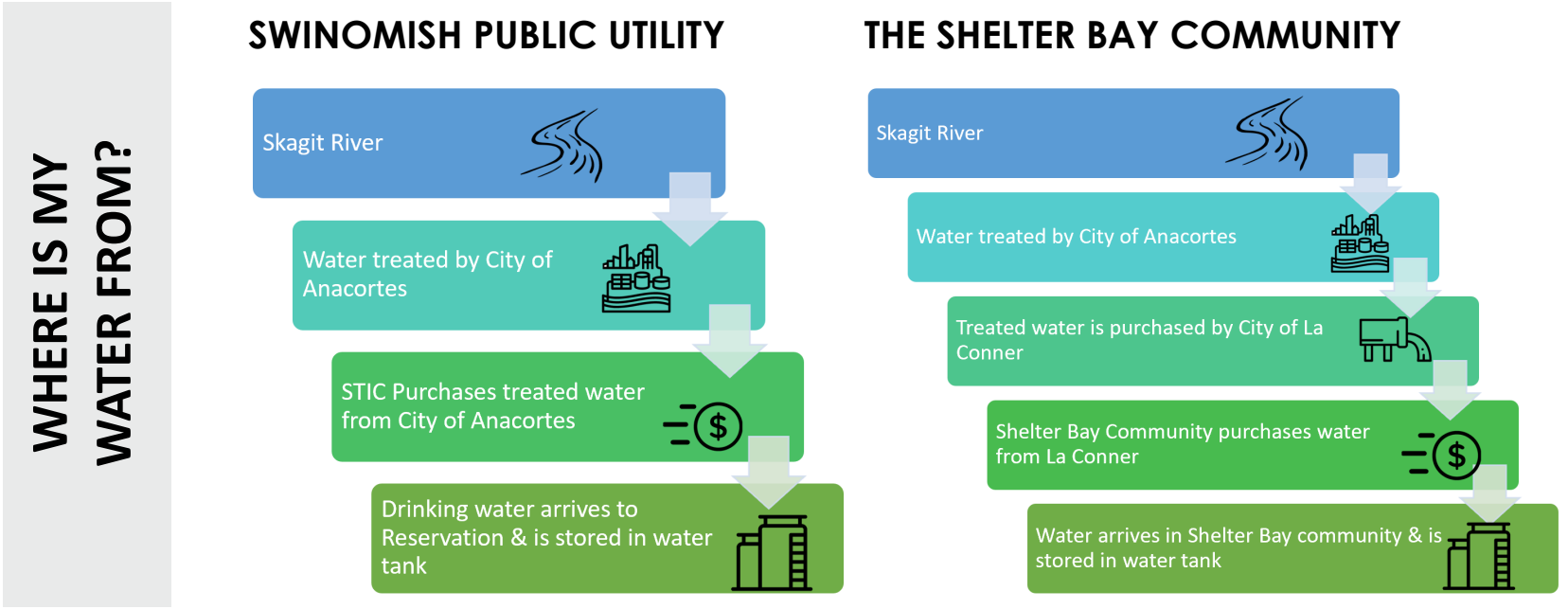


Figure 21. *Infographic on sources of water for Swinomish Public Utility and the Shelter Bay Community (Source: WWU Disaster Risk Reduction Studio, 2021).*

Community Infrastructure Climate Change Impacts

Reduced Freshwater

Climate change is causing drier summers and ranier winters reducing water sources capacities

Higher Wildfire Risk

Drier summers are creating more favorable conditions for wildfires

More Intense Storms

Sea level rise is leading to more frequent and intense winter storms

Community Infrastructure Types of Adaptation Actions

Rain Gardens & Bioswales

These would help regulate excess water from storms and other hydrological events

Public / Owner Outreach & Education

Help to inform community members about the declining freshwater availability to encourage conservation

Local Emergency Plan

In case of a disaster, this plan will help outline procedures, response, contacts, and community protection

Community Infrastructure Adaptation Accomplishments

SITC Climate Change Adaptation and Mitigation Projects

I. Reduction in Government Employee Commuting

In 2009, following the Swinomish Climate Change Proclamation, the Swinomish Indian Tribal Community committed to having four-day work weeks with 10-hour workdays. By reducing work weeks to four days instead of five, the Swinomish Indian Tribal Community is reducing carbon emissions by reducing the number of commutes per week.

II. New Utilities and Newly Repaired Utilities

New utilities have been installed across the Swinomish Reservation such as a new water tower and a new generator to pump water during an emergency. Additionally, water leaks in utility lines have been fixed across the Reservation.

Figure 22. *New water tower for water storage, fixed water leaks in utilities lines, and new generator to pump water during an emergency (Source: DEP).*

III. Community Emergency Response Team

Swinomish also has been preparing for climate change's more immediate, emergency related hazards. The Community Emergency Response Team with it's community trainings and trailers better prepare the Swinomish Community for any climate change related hazards or disasters. Furthermore, with new generators and emergency supplies stocked at the Youth Center, Swinomish is better prepared for a climate change related emergency.

Figure 23. *Community Emergency Response Team training at the Swinomish Casino on the Incident Command Structure (Source: DEP).*

IV. CAAP 2020 and Onward

So far, the CAAP 10 Year Update highlighted current climate change impacts happening on different parts of the Reservation, what adaptation action strategies the SITC has used to address those climate change impacts, and some notable climate change adaptation projects that have been completed since 2010. Climate change is an interdisciplinary problem that cannot be confined to any one SITC department and program. So, moving forward, multiple SITC departments and programs will have a great opportunity to work collaboratively in planning and implementing future adaptation projects. Strategic planning, specifically, is important to help guide future climate change adaptation action development (see figure 24.

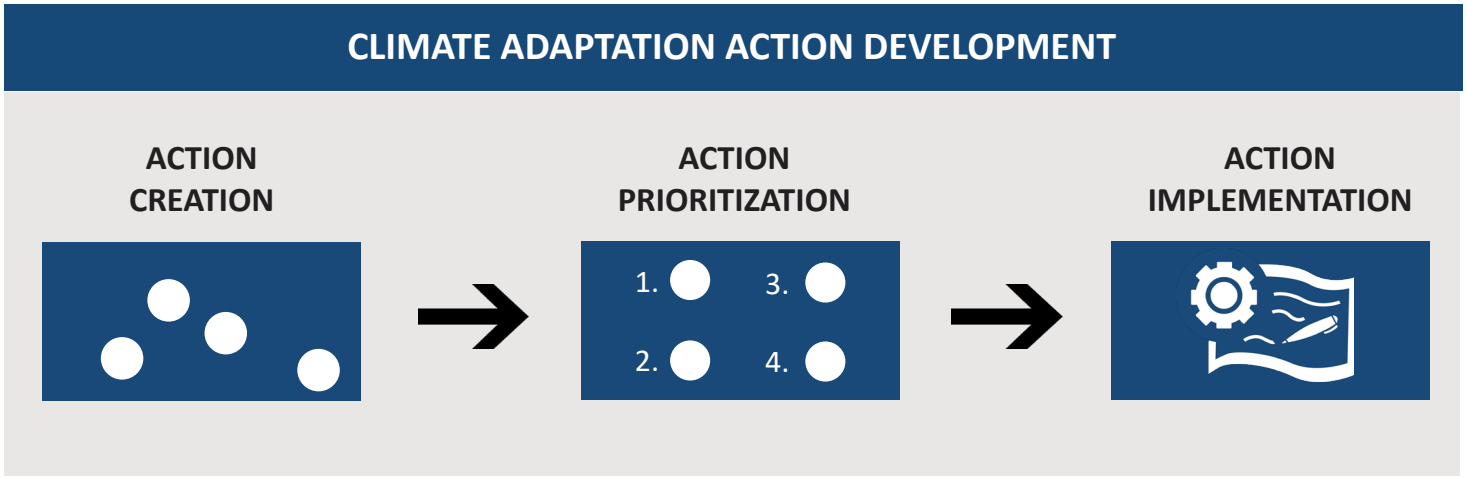


Figure 24. *Graphic depicting climate change adaptation development from action creation to action implementation (Source: DEP).*

The following *DEP Strategic Planning* subsection details the Swinomish Department of Environmental Protection's strategic plan to adapt to climate change impacts in the future. This climate change strategic plan can serve as a template for other departments and programs that are also working on climate change adaptation and mitigation projects.

DEP Strategic Planning

A Guiding Strategic Plan to Approach Future Climate Adaptation Actions

	OBJECTIVE	ACTIVITY	CLIMATE CHANGE IMPACT	ACTION
1	**ENVIRONMENTAL EDUCATION** Outreach to Community, visibility/ communications; inter-departmental collaborations	DEP EE program (wildfire info, PME, recycling, waste reduction)	General CC outreach across DEP Sections and projects and general response and outreach for Community regarding climate change	Outreach
2	**WATER QUALITY** Monitor and interpret trends in water quality to support actionable climate change science and protect habitat and human health from climate-related WQ impacts.	Water Quality Program ongoing freshwater and marine water monitoring of sensitive habitats	Impacts on marshlands; Inundation of shellfish beds and weakened shellfish viability; Degreda-tion of wetlands from reduced water	Monitoring; Restoration
		Smokehouse/ Fornsby Dike Set back project	Impacts on estuaries	Diking and Armoring; Restoration
		Lone Tree Creek Restoration	Degredation of wetlands from reduced water; Enhance in-stream and riparian ecosystems	Restoration
		Stormwater mapping and monitoring (outfall/darinage GPS, rain gardens)	Inundation and backup of drainage discharge from higher tides and storm surges	Monitoring; Storrmwater
3	**GROUNDWATER** Monitor and interpret groundwater resources quantity and quality (saltwater intrusion) to inform climate adaption/mitigation strategies and priorities.	Groundwater Program ongoing monitoring of water availability on Reservation	Impacts to groundwater quantity due to reduced recharge and/or increased use; Reduced river streamflow during the summer and overall; Declines in volume and consistency of freshwater flows and peak summer runoff for riparian uses	Monitoring
		Reduced potable water supply due to decreased sources	Diminished aquifer recharge from precipitation; Salinization of groundwater due to saltwater intrusion	Monitoring
		Aquifer and GW protection	Study groundwater availability under climate change scenarios; Protect aquifer recharge/ groundwater withdrawal areas	Code Amendments

	OBJECTIVE	ACTIVITY	CLIMATE CHANGE IMPACT	ACTION
4	**NEARSHORE** Monitor and assess shoreline conditions to inform and implement activities to promote shoreline stability, longevity and adaptability, and relevent regulation and permitting.	Nearhshore Program ongoing beach and bluff mapping and surveying	Shoreline management; Planning for sea level rise in high risk areas	Monitoring
		Shore friendly program landowner partnerships and restorations	Bank Erosion; Inundation of low-lying structures and parcels; Inundation of tideland and marine habitat, and loss of forage and spawning areas for fish and waterfowl	Land Aquisiotion; Incentives to Relocate; Restoration; Diking and Armoring
		Similk Bay restoration project	Inundation of low-lying roads and bridges; Impacts on estuaries	Diking and Armoring; Restoration
		Swinomish Channel Marsh Restoration off Doosdawhub Creek	Weakened viability of finfish; Impacts on estuaries	Restoration
		FEMA pre-disaster mitigation project for Pull-And-Be-Damned shoreline mangement & planning	Bank Erosion; Inundation of low-lying roads and bridges; Road closures from storm surge and wildfire	Land Aquisiotion; Incentives to Relocate; Restoration; Diking and Armoring
		Shoreline and Sensitive Areas Code Technical Update	Shoreline management; Inundation of tideland and marine habitat, and loss of forage and spawning areas for fish and waterfowl	Code Amendments
5	**ENVIRONMENTAL MANAGEMENT** Monitor and adapt environmental management practices to changing climate and associated increase risk to Reservation natural resources.	Traditional Plants phenology research for climate change status monitoring	Degredation of wetlands from reduced water	Restoration
		Brownfields Tribal Response Program (including oil spill response)	Spread of hazardous contaminants & solid waste due to flooding;	Hazardous Materials Management
		Noxious Weeds Program: Creation and upkeep of Intregrated Pest Management Plan (Weeds SOP for DEP Manual)	Increase in vegetative or other pest infestations	Monitoring
		Rain Garden management; Increase storm capacity and buffers from vegetation		Stormwater, Restoration; Emergency Trasportation Strategy

	OBJECTIVE	ACTIVITY	CLIMATE CHANGE IMPACT	ACTION
6	**FORESTRY** Identify, monitor, and adapt forest practices to changing climate and associated increased wildfire risk.	Forestry Program: implement FMP	Forest management that promotes diversity and resilient species	Forest Management
		Creation and upkeep of Intregrated Pest Management Plan	Increase in forest pest infestations and disease vectors	Monitoring
		Fire community risk assessment/ planning	Wildfire risk to forest stands and the urban/forest interface (wildland urban interface)	Forest Management
7	**ENVIRONMENTAL COMPLIANCE**	Conduct technical environmental review for permit applications	Shoreline management; Inundation of tideland and marine habitat, and loss of forage and spawning areas for fish and waterfowl	Code Amendments
8	**AIR QUALITY** Monitor and interpret trends in air quality to support actionable climate change science, protect habitat and human health from climate-related AQ impacts (including reducing emissions of Green House Gases), and provide technical recommendations in responding/ building resiliency to emergency AQ events.	Air quality emergency response (DEP); information for responders & Community on refinery releases, inversions & burn bans, wildfire smoke response	Air quality emergency response	Monitoring; Outreach
		Improve air quality monitoring capacity for emergency response capacity including PM2.5 (wildfire smoke)	Improve air quality monitoring capacity	Monitoring

DEP Swinomish Community Surveys

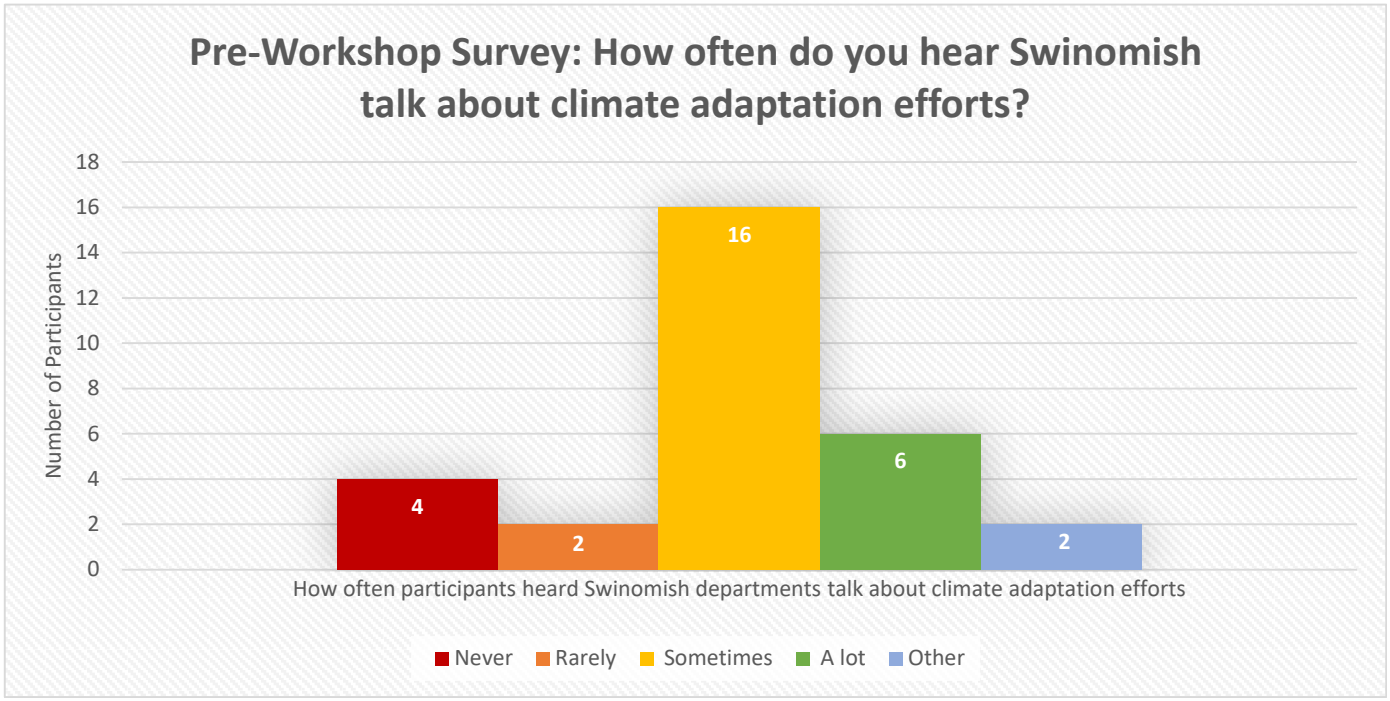
Integrating Community's Climate Change Perpectives Into Strategic Planning

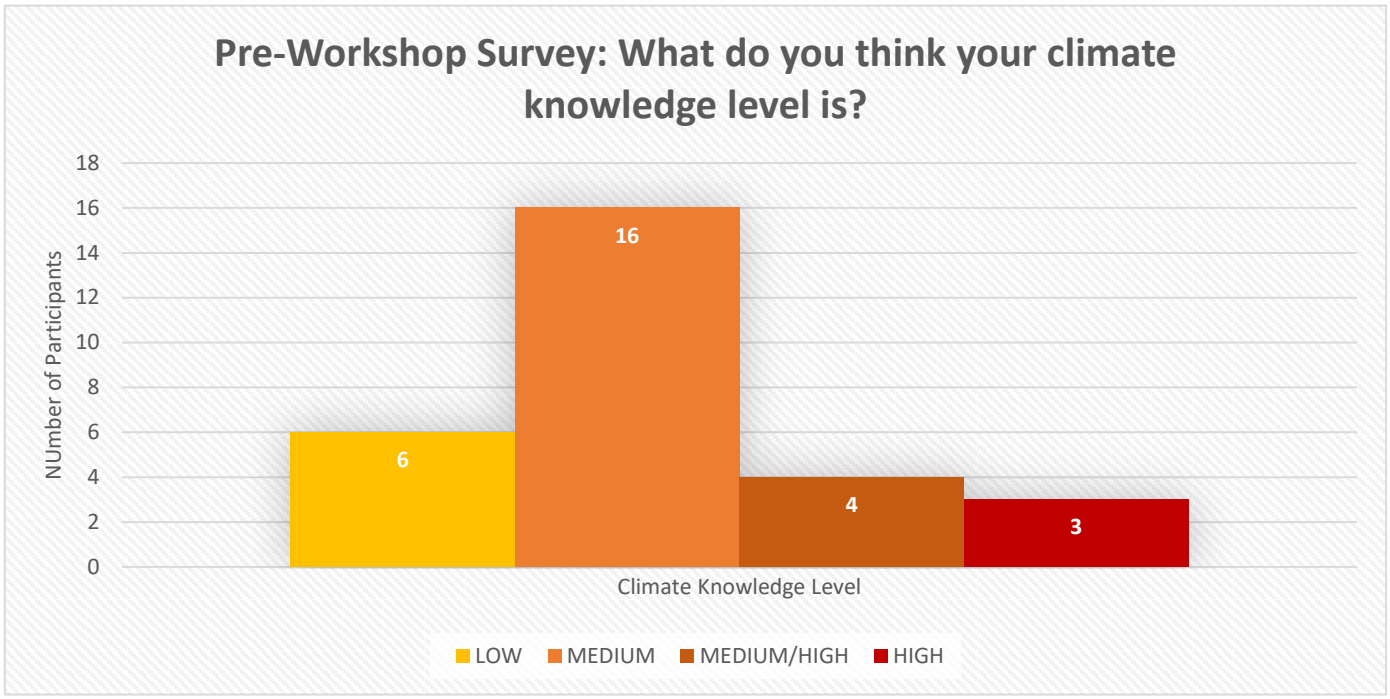
Swinomish has a place-based and community-based culture. Community input on all future plans for the Swinomish Reservation is critical to the functioning of both the community itself and the community's cultural needs. Regarding prioritizing climate adaptation actions, several departments across the tribe have conducted community surveys and community workshops in order to best gather the community's perspectives on how the tribe should move forward with climate change adaptation.

The 2022 Swinomish Climate Change Community Workshop series consisted of workshops themed around an introduction to climate versus weather, an introduction to temperature, the water cycle, sea level rise and geohazards, wildfires, and a climate change wrap-up workshop. The workshops provided attendees with a shared meal, a 15-minute informational presentation, and an hour-long discussion and Q/A between the community and SITC staff. Furthermore, workshop attendees responded to surveys before and after each workshop. These surveys aided the DEP in improving future workshops and informing the DEP on the community's perspectives and priorities on future climate change adaptation efforts. This subsection includes the some of the survey results from the climate change workshop series.

Furthermore, this subsection includes the community survey results from DEP surveys conducted to better gather the Swinomish community's perspectives on climate change as a whole and climate change adaptation actions. At the 2022 Annual Clam Bake, community members completed digital and physical surveys. This subsection includes some of the survey results from the general Community Climate Change Adaptation Survey.

CLIMATE CHANGE COMMUNITY WORKSHOP SURVEY





Post-Workshop Survey: What do you think the tribe should work on next for climate change?

"Ask the fishers, people who live on lower water areas - how to protect N End businesses."

"Raingardens!! Raingardens!!"

"I would like to see, if available oral histories to help provide knowledge and temporal perspectives relating to climate change and sea level rise issues."

"Roundtable discussion with elders."

"Recycling"

"Going along with chairman's ideas with being the focus to our youth, fishing, and plants."

"It would be extremely more helpful (and probably more efficient) to have more widespread, less restrictive home food deliveries to seniors/elders."

"Forest management"

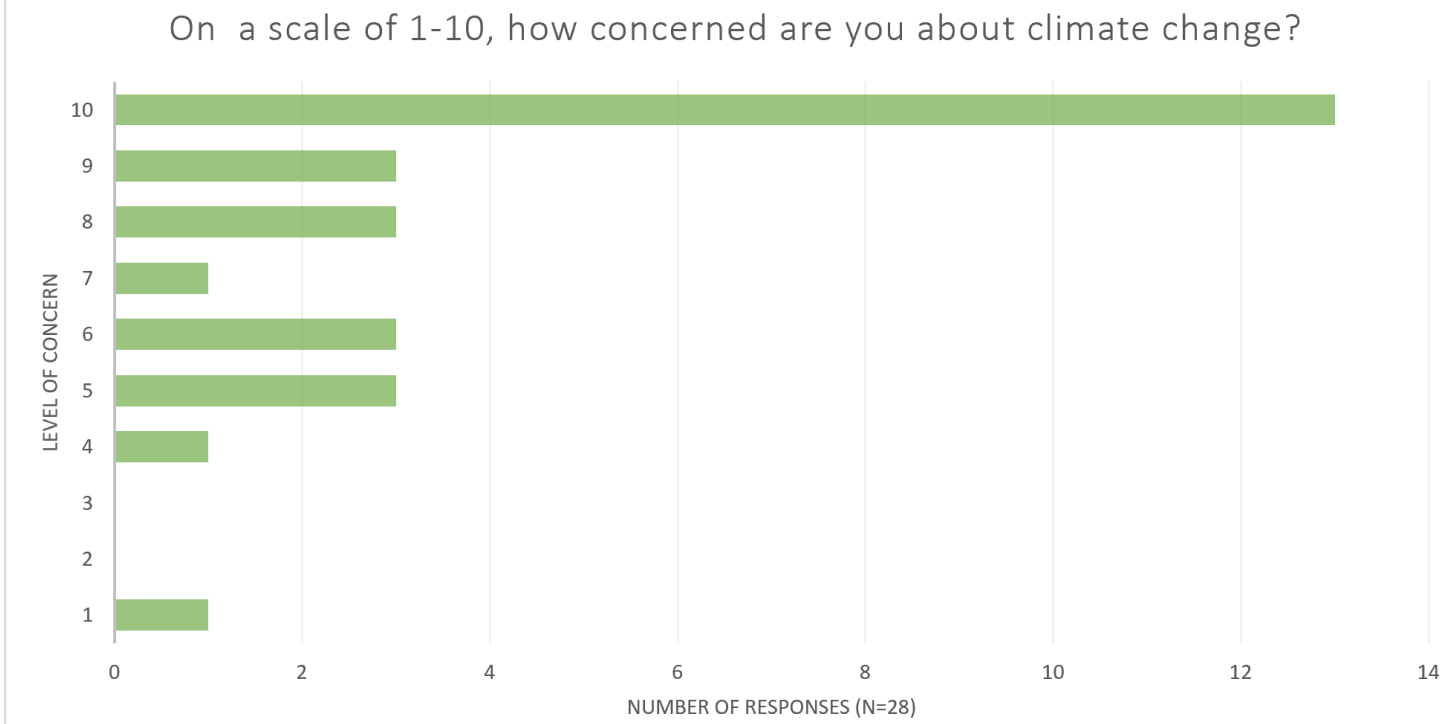
"It would also be helpful to improve internet access & options (on Reservation) as well as publicly for zoom/online options for meetings & workshops"

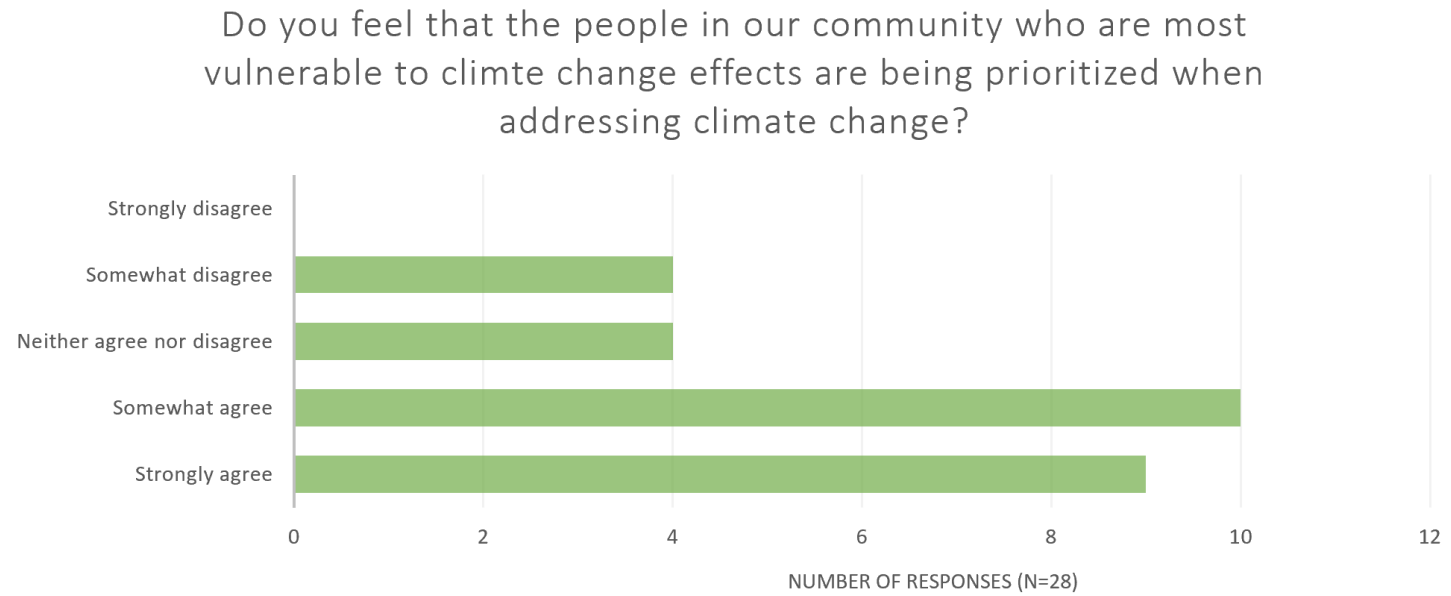
"Dike restoration"

"Shorefriendly program is great!"

"Assistance with crabbers & fishman to operate positive usage, litter, trash, ect."

CLIMATE CHANGE ADAPTATION SURVEY RESULTS





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Appendix A: Progress Update Tables

In an effort to streamline the *CAAP 2010 Progress Update* Section, more detailed descriptions of each adaptation action are listed in this appendix. This appendix is organized by "Action Categories" where similar adaptation actions are grouped together for clarity. Each adaptation action comes from one of the color-coded subcategories used earlier in this report (see Figure 20): Coastal Resources Adaptation Actions, Upland Resources Adaptation Actions, Public Health Adaptation Actions, and Community Infrastructure Adaptation Actions.

CAAP Progress Update Adaptation Action Subsection Color Guide

Figure 20. *Graphic depicting the color key for the CAAP progress update adaptation action subsections (Source: WWU Disaster Risk Reduction Studio, 2021).*

Furthermore, the tables in this appendix include the following information for each adaptation action:

- The adaptation action's number
- The climate change impacts that the action addresses
- A brief description of the action and involved SITC departments
- Estimated vulnerability attributed to the climate change impacts the action addresses (from the 2010 CAAP)
- Estimated risk attributed to the climate change impacts the action addresses (from the 2010 CAAP)
- The status of the adaptation action as of 2020
- What has been accomplished from 2010 to 2020 on each adaptation action
- What are possible next steps moving forward from 2020 for each adaptation action

Climate Change Adaptation Action Progress Updates

Action Categories	Section	Action Number (Climate Change Impact)	Action Description (Involved Departements)	2010 Vulnerability (Climate Impact)	2010 Estimated Risk (Climate Imapct)	2020 STATUS	2020 ACTIONS TO DATE	POSSIBLE NEXT STEPS
[Reducing or Minimizing] Diking and Armoring		**8.1-3** (Shorelines and beaches)	Diking and armoring (DEP)	High	High	No action	Continue to minimize hard armor and promote soft alternatives.	Future prospects regarding dikes surrounding the agricultural lands dike setback proposal. See Action 8.1-18 for dike removal update.
		8.1-8 (Shoreline management)	Removal of shoreline structures (DEP, OPCD)	High	High	On-going	Norman Bulkhead removed; Continue to minimize hard armor and promote soft alternatives	Permitting to maintain SSA code for armor replacements after service life with soft armoring.
		8.1-10 (Inundation of tideland and marine habitat)	Diking and armoring (DEP)	High	High	Not critical	Continue to minimize hard armor and promote soft alternatives.	See Action 8.1-18.
		8.1-18 (Impacts on estuaries)	Removal of dikes on aglands (DEP, SRSC)	High	High	Initiated	Began preliminary design planning.	Continue design planning and research.
		8.1-22 (Bank erosion on developed lots)	Flood-proofing and armoring (DEP)	High	High	Not critical	See Actions 8.1-7 & 8; Continue to minimize hard armor and promote soft alternatives.	Continue to minimize hard armor and promote soft alternatives thru drift cell mapping of priority replacements thru Shore Friendly, and FEMA study at PBD.
		8.1-26 (Bank erosion on developed lots)	Bank stabilization (DEP)	High	High	Initiated	Shore Friendly Program; See Action 8.1-9	x
		8.1-27 (Inundation of low-lying structures and parcels)	Build and raise dikes (DEP)	High	High	Not critical	See Action 8.1-18; Continue to minimize hard armor and promote soft alternatives.	x
		8.1-28 (Inundation of low-lying structures and parcels)	Flood-proofing and armoring (DEP)	High	High	Not critical	See Acton 8.1-10; Continue to minimize hard armor and promote soft alternatives.	x

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[Reducing or Minimizing] Diking and Armoring		**8.4-1** (Inundation of low-lying roads and bridges)	Build and raise dikes (DEP)	Medium	Medium	Not critical	Continue to minimize hard armor and promote soft alternatives.	No direct action is underway regarding the current dikes in place.
		8.4-10 (Road closures from storm surge and wildfire)	Build and raise dikes (DEP)	Medium-High	Medium	Not yet initiated	Continue to minimize hard armor and promote soft alternatives.	x
Restoration		**8.1-12** (Inundation of low-lying roads and bridges)	Fill addition and removal to maintain depths (DEP)	High	Medium-High	On-going	Completed several fill removal projects along Swinomish Channel; Completed beach nourishment project at Lone Tree Spit; Continue to removal/addition projects as they arise.	Continued dredge spoils fill removal in historic estuaries where feasible along the Swinomish Channel. Continue Lone Tree beach and spit research for fisheries access.
		8.1-16 (Weakened viability of finfish)	Pocket estuary restoration (DEP, SRSC)	High	Medium-High	Some elements completed	Completed Turner's Bay road removal and Lone Tree Point beach nourishment projects.	Continue additional projects identified in Chinook Recovery Plan.
		8.1-17 (Impacts on estuaries)	Pocket estuary fill removal (DEP, SRSC)	High	High	Some elements completed	Completed Turner's Bay and Swinomish Channel fill removal projects.	In design phase for Dunlap (Swinomish Channel Phase 3), Smokehouse, and Similk projects.
		8.2-1 (Quality of wildlife forage resources)	Create forage and habitat enhancement projects to mitigate the effects of climate change on big game (DEP; HWD)	High	Medium-High	Initiated	Continue the studies on deer and elk that are currently in progress.	Community outreach and public education can inform hunters and other members on the importance of maintaining areas with good foraging resources for big game species, especially deer and elk.
		8.2-2 (Quality of wildlife forage resources)	Create forage and habitat enhancement projects to mitigate the effects of climate change on waterfowl (DEP; HWD)	High	Medium-High	Some elements completed	Completed and maintaining buffer plantings along tidal channels in the Swimomish Aglands; Barley plantings in the Swinomish Aglands.	Creating forage and habitat enhancement projects for waterfowl includes assessing the SITC's interest in pursuing management and research activities related to waterfowl. Potential to undertake forage and habitat enhancement projects.

Climate Change Adaptation Action Progress Updates

Action Categories	Section	Action Number (Climate Change Impact)	Action Description (Involved Departements)	2010 Vulnerability (Climate Impact)	2010 Estimated Risk (Climate Imapct)	2020 STATUS	2020 ACTIONS TO DATE	POSSIBLE NEXT STEPS
Restoration		**8.2-3** (Quality of wildlife forage resources)	Preserve the Pacific Flyaway Area	High	Medium-High	UNKNOWN	No interview or research found related to the progress update for Pacific Flyway.	Engage with state and federal wildlife agencies to understand waterfowl population trends and predict future consequences of climate change on migratory waterfowl habitat.
		8.2-6 (Degredation of wetlands from reduced water)	Restore and enhance wetlands (DEP)	High	Medium-High	Initiated	Began inventory and assessment of upland wetlands.	Complete wetlands assessments and rankings for protection.
		8.2-7 (Degredation of wetlands from reduced water)	Enhance in-stream and riparian ecosystems (DEP)	High	Medium-High	Some elements completed	Lone Tree Creek project began in 2007 and Phase 2 was completed in summer 2021.	Potential next steps include continuation of riparian planting and creation of buffer projects; Plan and implement Lone Tree Creek restoration Phase 3.
		8.2-11 (Declining freshwater flows and reduced freshwater)	Riparian restoration and management (DEP)	Medium-High	Medium-High	Initiated	Began wetland inventory; Lone Tree Creek project began in 2007 and Phase 2 was completed in summer 2021.	Continuing to update the wetland inventory can help identify areas in need of restoration, especially as climate change continues to impact riparian environments.
Monitoring and Data Collection		**8.1-7** (Shoreline management)	Planning for SLR in high risk areas (DEP)	High	High	On-going	Shelter Bay study has halted, however, Pull -and-Be Damned study and Snee-Oosh study continue.	Research will continue for the Pull-and-Be-Damned Study and the Snee-Oosh Study.
		8.1-14 (Inundation of shellfish beds and weakened shellfish viability)	Buffer acidity (Fisheries, SRSC)	High	Medium-High	On-going	Developed Adaptation Strategy for Climate Change Impacts on Swinomish Shellfisheries report.	Continue to build and monitor clam garden impacts on acidity and clam growth; Continue to finalize and implement projects identified by Adaptation Strategy for Climate Change Impacts on Swinomish Shellfisheries report.

Climate Change Adaptation Action Progress Updates

Action Categories	Section	Action Number (Climate Change Impact)	Action Description (Involved Departements)	2010 Vulnerability (Climate Impact)	2010 Estimated Risk (Climate Imapct)	2020 STATUS	2020 ACTIONS TO DATE	POSSIBLE NEXT STEPS
Monitoring and Data Collection		**8.1-20** (Impacts on marshlands)	Biennial monitoring of marsh erosion (SRSC)	High	High	On-going	Biennial monitoring of Bay Fringe began in 2012 and will continue as long as funding from the SRSC allows.	Continue monitoring.
		8.1-21 (Impacts on marshlands)	Algal rack/suspended sediment routing evaluation for marsh (SRSC)	High	High	On-going	Continue monitoring the algal rack that has developed in Swinomish tidal marshes.	Continued research on the source and impact of algal rack accumulation can help find a causation and incite future intervention into this issue.
		8.2-14 (Reduced river streamflow during the summer and overall)	Evaluate streamflow reduction (DEP, SC2, UW)	Medium-High	Medium-High	On-going	Continue to research and monitor Reservation streamflow.	Monitoring can allow staff members to identify streams and/or rivers that are more heavily impacted, which can help set the foundation for regulations of policies that only allow for a certain amount of water in a specific location to be used due to the low peak flows.
		8.2-30 (Increase in forest pest infestations and disease vectors)	Update inventory and increase monitoring to identify problems (DEP)	Medium-High	Medium-High	On-going	Continue monitoring for pest/disease outbreaks; No action on analyzing forest inventory.	Past inventory Data needs to input into a database for analysis.
		8.4-13 (Contamination of drinking water supplies from flooding)	Well testing after flooding events (SUA)	Medium	Medium	Not critical	No new actions; SUA wells not located in floodplain.	x
		8.3-5 (Respiratory disease)	Improve monitoring/ reporting, maintain/ strengthen public health services (SHA)	Medium-High	Medium-High	UNKNOWN	Indoor air quality issues addressed when discovered or reported. No specific plans in place due to higher precipitation events. Keep fans working, site drainage functional, and residents educated.	NEED: housing updates to address indoor air quality/ mold problems as flooding/ increased water drainage increases due to increases in concentrated precipitation events.

Climate Change Adaptation Action Progress Updates

Action Categories	Section	Action Number (Climate Change Impact)	Action Description (Involved Departements)	2010 Vulnerability (Climate Impact)	2010 Estimated Risk (Climate Imapct)	2020 STATUS	2020 ACTIONS TO DATE	POSSIBLE NEXT STEPS
Monitoring and Data Collection		**8.3-10** (Air pollution)	Air quality emergency response (DEP)	High	High	Some elements completed	Has equipment available to measure air quality during an emergency	Consider internal wildfire smoke forecasting in the future
		8.3-11 (Air pollution)	Improve air quality monitoring capacity (DEP)	High	High	Some elements completed	Installed new air quality station in the Village in 2022	Increase air monitoring stations, censors, and staff
Outreach		**8.2-4** (Changes in the quantity and/or quality of wildlife forage resources)	Public and owner outreach and education	High	Medium-High	Not yet initiated	Occasionally use Facebook and Qyuuqs newsletter to distribute information.	x
		8.2-13 (Declines in volume and consistency of freshwater flows and peak summer runoff for riparian uses)	Public and owner outreach and education (SUA)	Medium-High	Medium-High	Complete	Developed system to work with homeowners on reducing leaks.	The utilities department will continue to watch the water meters for signs of potential leaks in the future. There are no other further plans at this time.
		8.2-24 (Wildfire risk to forest stands and the urban/forest interface)	Adopt and maintain Firewise community standards and fire buffer zones (Property owners, Fire District #13)	High	High	Not yet initiated	Shelter Bay used Firewise standards; not high need for other parts of Reservation.	Amending land clearing and building codes to include wildfire prevention methods.
		8.4-9 (Road closures from storm surge and wildfire)	ITS weather warnings and fire danger levels (SPD-EM)	Medium	Medium	Complete	Uses CodeRED mass notification system.	x
		8.4-21 (Reduced potable water supply due to decreased sources)	Water conservation and education	Medium	Medium	Not yet initiated	No action.	Adding water conservation and education to the indigenous science class in the future.

Climate Change Adaptation Action Progress Updates

Action Categories	Section	Action Number (Climate Change Impact)	Action Description (Involved Departements)	2010 Vulnerability (Climate Impact)	2010 Estimated Risk (Climate Imapct)	2020 STATUS	2020 ACTIONS TO DATE	POSSIBLE NEXT STEPS
Outreach		**8.4-35** (Reduction in agricultural drainage from sea level rise)	Inform the agricultural community of scientific projections (DEP)	Medium	Medium-High	On-going	Continue to share research on SC2 website.	x
		8.3-1 (Heat-related illness)	Education, emergency preparation, cooling centers, better alerts (SPD-EM)	High	Medium-High	UNKNOWN	Everbridge Mass Notification System implemented to provide alerts.	Increase community opt-in sign-ups.
		8.3-6 (Toxic seafood contamination)	Health studies on options/ strengthen community food roles (Medical)	Medium-High	Medium-High	UNKNOWN	Current project on climate change and health with WA DOH; two potential projects (submitted) on HABs; creation of 13 Moons curriculum to increase community food knowledge and use; exploration of tribal food sovereignty	Full implementation of 13 Moons curriculum; formalize partnerships with HABs researchers to increase knowledge and likelihood in local areas; explore food sovereignty options such as resource sharing; continued studies and education.
		8.3-12 (Air quality)	Community Air Quality Education (DEP)	High	Medium-High	Initiated	Waiting for approval on grant for air quality education website	Work with community on recording individual's health during poor air quality events and work with community on how to move forward with wood-burning to heat homes.
		8.3-14 (Solar radiation)	Education	Low	Low	UNKNOWN	No action.	x
Comm-unication Beyond the Reservation		**8.1-32** (Inundation of low-lying structures and parcels)	Inform the Skagit Community of potential risks via SC2 (SC^2)	High	High	On-going	SC2 is accessible and continues to publish new research.	On-going
		8.1-33 (Inundation of low-lying structures and parcels)	Charette with City of LaConner	High	High	Not yet initiated	No charette with the City of LaConner.	x
		8.1-34 (Inundation of low-lying structures and parcels)	Surge Festiavl with Museum of NW Art (MONA)	High	High	Initiated	First Surge Festival held between 2018-2019.	x

Climate Change Adaptation Action Progress Updates

Action Categories	Section	Action Number (Climate Change Impact)	Action Description (Involved Departements)	2010 Vulnerability (Climate Impact)	2010 Estimated Risk (Climate Imapct)	2020 STATUS	2020 ACTIONS TO DATE	POSSIBLE NEXT STEPS
Comm-unication Beyond the Reservation		**8.2-3** (Changes in the quantity and/or quality of wildlife forage resources)	Preserve the Pacific Flyaway Area	Medium-High	Medium-High	UNKNOWN	No interview or research found related to the progress update for Pacific Flyway.	Engage with state and federal wildlife agencies to understand waterfowl population trends and predict future consequences of climate change on migratory waterfowl habitat.
		8.4-22 (Reduced potable water supply due to decreased sources)	Import water from local jurisdictions (SUA)			Not yet initiated	No action; SITC has MOA with the City of Anacortes until 2046.	x
		8.3-13 (Air quality)	Air Quality Cross Departmental and External Agency Communication (DEP)	Medium-High	Medium-High	Initiated	DEP plans to work more closely with EM on the next Comprehensive Emergency Management Plan.	Work more closely with sharing information and time-sensitive air quality updates between the DEP, local refineries, and the Northwest Clean Air Agency.
Aquaculture		**8.1-13** (Inundation of shellfish beds and weakened shellfish viability)	Shoreward habitat migration/re-establish beds (Fisheries, SRSC)	High	Medium-High	On-going	Continue to build and monitor clam garden impacts on nearshore environment and Tribal community; Continue to finalize and implement projects identified by Adaptation Strategy for Climate Change Impacts on Swinomish Shellfisheries report	Create and maintain a model depicting the vulnerability of shellfish and finish research required for further physical intervention, such as building a shellfish aquaculture.
		8.1-15 (Inundation of shellfish beds and weakened shellfish viability)	Aquaculture operations (Shellfish Co,. Fisheries, SRSC)	High	Medium-High	Initiated	Assessed the viability of building oyster farm; Started Shellfish Co. oyster farm	x
		8.3-7 (Toxic seafood contamination)	Explore feasibility of sustainable shellfish aquaculture (Fisheries)	High	High	UNKNOWN	Fisheries working on clam gardens as a local food source that can be monitored and as a climate change adaptation activity.	Scope site location and develop monitoring plan for clam garden; Build and monitor clam garden.

Climate Change Adaptation Action Progress Updates

Action Categories	Section	Action Number (Climate Change Impact)	Action Description (Involved Departements)	2010 Vulnerability (Climate Impact)	2010 Estimated Risk (Climate Imapct)	2020 STATUS	2020 ACTIONS TO DATE	POSSIBLE NEXT STEPS
Construction Standards Review		**8.2-17** (River flash flooding due to increase in large storm frequency)	New modeling standards for culvert construction (UW)	Medium	Medium-High	Some elements completed	Completed modeling; Continue to develop culvert-design web tool.	x
		8.4-6 (Road damage from intensified heat events)	Retrofit roads and implement new design standards and materials (OPCD)	Medium	Medium	Not yet initiated	Requires design standards to be codified.	x
		8.4-37 (Increased culvert failure due to increased flows)	New modelling and standards for culvert construction	Medium-High	Medium-High	Some elements completed	Completed modeling; Continue developing culvert design tool.	x
		8.3-2 (Heat-related illness)	Housing retrofit/ design for passive cooling (Housing)	Medium	Medium		No action.	x
Plan Drafting		**8.2-5** (Change in steelhead survival due to stream temperature changes)	Create steelhead recovery plan (Fisheries)	Medium-High	Medium-High	UNKNOWN	Not able to schedule an interview: 2018: a steelhead recovery plan was in progress.	SITC hoped to complete the steelhead recovery plan by 2019 and implement the plan by 2023.
		8.2-10 (Declines in volume and consistency of freshwater flows and peak summer runoff for riparian uses)	Create drought management plan (OPCD, DEP)	Medium-High	Medium-High	Initiated	Began some research with SC2 and University of Washington.	Develop a drought management plan?
		8.4-16 (Reduced potable water supply due to decreased sources)	Develop a drought management plan (DEP)	Medium	Medium	Not yet initiated	No actions in place.	x

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Plan Drafting		**8.4-29** (Increased demand on emergency services during severe storm and wildfire events)	Develop a local emergency plan (SPD-EM)	Medium	Medium	On-going	Updated Comprehensive Emergency Management Plan in 2018.	The next update will be in 2023.
Training		**8.2-23** (Wildfire risk to forest stands and the urban/forest interface)	Enchance training and support wildfire management response (SITC, Fire District #13)	High	High	Initiated	Created four forestry crew positions.	Adopt and maintain Firewise practices and standards on the Reservation uplands; Continued education and outreach efforts to inform the community on increased wildfire risk.
		8.4-28 (Increased demand on emergency services during severe storm and wildfire events)	Community emergency preparedness training (SPD-EM)	Medium	Medium	Initiated	Few training opportunities; Funding challenges for CERT programs.	Continuation to preparedness fairs and CERT trainings after the COVID-19 pandemic passes and it is safe to be in close proximity to one another.
Water Conservation		**8.2-8** (Declines in volume and consistency of freshwater flows and peak summer runoff for riparian uses)	Water conservation/restrict diversions (SUA)	Medium-High	Medium-High	Complete	Reduced leaks and unmetered uses; Replaced all water meters with new accurate ones.	Hopefully the improved accuracy from replacing the water meters combined with the use-based fee will encourage community members conserve water by limiting their usage.
		8.2-9 (Declines in volume and consistency of freshwater flows and peak summer runoff for riparian uses)	Increase storage capacity (SUA, IHS)	Medium-High	Medium-High	Complete	Finished constructing reservoir in 2016.	x
		8.2-20 (Diminished recharge from salinization of groundwater due to saltwater intrusion)	Water conservation/restrict drawdown (SUA)	Medium-High	Medium-High	Complete	Replaced all water meters and finished constructing reservoir.	x

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Water Conservation: Regulations and Incentives		**8.4-17** (Reduced potable water supply due to decreased sources)	Rate incentives and disincentives for water usage (SUA)	Medium	Medium	Complete	Established use-based system.	x
		8.4-18 (Reduced potable water supply due to decreased sources)	Grey-water treatment for non-potable uses (SUA)	Medium	Medium	Some elements completed	x	Casino developing an water treatment upgrade to use reclaimed water for irrigation (?)
		8.4-19 (Reduced potable water supply due to decreased sources)	Water-efficient appliances and fixtures for facilities and housing (SHA)	Medium	Medium	UNKNOWN	Need further clarification.	x
		8.4-20 (Reduced potable water supply due to decreased sources)	Voluntary and mandated water restrictions (SUA)	Medium	Medium	Not critical	SITC has ample access to water.	x
		8.4-23 (Reduced potable water supply due to decreased sources)	Use Tribal aquifers for backup water supply (SUA)	Medium	Medium	Not critical	SITC has ample access to water.	x
		8.4-24 (Reduced potable water supply due to decreased sources)	Develop additional water storage and harvesting (SUA; IHS)	Medium	Medium	Complete	Finished constructing reservoir in 2016.	x
Protect Potable Water Supply		**8.2-18** (Diminished recharge from salinization of groundwater due to saltwater intrusion)	Develop alternate and new supply sources (SUA)	Medium-High	Medium-High	Not critical	Saltwater intrusion has not been a major concern on the Reservation.	That currently it is not a problem, but it will need to be paid attention to.

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Protect Potable Water Supply		**8.2-19** (Diminished recharge from salinization of groundwater due to saltwater intrusion)	Increase storage capacity (SUA, IHS)	Medium-High	Medium-High	Complete	Finished constructing reservoir in 2016.	x
		8.2-21 (Diminished recharge from salinization of groundwater due to saltwater intrusion)	Reverse osmosis for desalinization (SUA)	Medium-High	Medium-High	Not critical	Expensive process; Prioritize water conservation.	x
		8.4-12 (Contamination of drinking water supplies from flooding)	Stockpile and maintain emergency water supplies (SUA)	Medium	Medium	Some elements completed	Completed water reservoir in 2016.	x
		8.4-15 (Contamination of drinking water supplies from flooding)	Identify and protect vulnerable facilities (SUA)	Medium	Medium	Complete	Back-up power in three pump stations; Capital Projects developed to upgrade older water lines.	x
Code Amendments		**8.1-4** (Shorelines and beaches)	Development restrictions and setbacks (DEP, OPCD)	High	High	On-going	Continue setback waivers, monitor shoreline, update SSA code, and implement new rules.	The OPCD & DEP will update the Shoreline and Sensitive Areas Code in order to adapt to the changing environment.
		8.1-5 (Shoreline management)	Shoreline code amendment (DEP, OPCD)	High	High	On-going	SSA code update completed and adopted in 2018; Continue to monitor shorelines, update SSA code, and implement stricter rules.	Adapt and amend the code for clarity. DEP continue to research and monitor beaches to update the SSA Code as necessary.
		8.1-6 (Shoreline management)	Shoreline regulation and management (DEP, OPCD)	High	High	On-going	Continue to minimize hard armor and monitor shorelines.	Develop tracking system for armor conversions.

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Code Amendments		**8.1-11** (Inundation of tideland and marine habitat, and loss of forage and spawning areas for fish and waterfowl)	Development restrictions and setbacks (DEP)	High	Medium-High	On-going	See Action 8.1-6; Continue to monitor shorelines, update SSA code, and implement new rules.	x
		8.1-19 (Impacts on estuaries)	Allow shoreward migration (DEP)	High	High	On-going	See Actions 8.1-5 & 6.	x
		8.1-23 (Bank erosion on developed lots)	Development restrictions and setbacks (DEP, OPCD)	High	High	On-going	Continue to monitor erosion, update SSA code, and implement new rules; See Actions 8.1-6 & 11.	x
		8.1-30 (Inundation of low-lying structures and parcels)	Development restrictions and setbacks (DEP)	High	High	On-going	See Action 8.1-11; Continue to monitor shorelines, update SSA code, and implement new rules.	x
		8.2-22 (Study groundwater availability under climate change scenarios)	Protect aquiferrecharge/ groundwater withdrawl areas (OPCD, DEP)	Medium-High	Medium-High	Some elements completed	Completed groundwater model; Developing an aquifer and groundwater ordinance.	Develop codes that protect aquifers and groundwater areas.
Land Aquisition		**8.1-1** (Shorelines and beaches)	Land acquisition (LMD)	High	High	Not yet initiated	no recent land acquisitions	Depends on willing property owners and funding
		8.1-25 (bank erosion)	Land acquisition (DEP, LMD)	High	High	Not yet initiated	See Action 8.1-1	Depends on willing property owners and funding
		8.1-31 (Inundation of low-lying structures and parcels)	Aquire properties in risk zones (LMD)	High	High	Initiated	SITC purchased several tideland parcels in Turners Bay;	See action 8.1-1

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Incentives to Relocate		**8.1-2** (Shorelines and beaches)	Incentives to relocate (DEP)	High	High	Initiated	Shore Friendly provides landowners with free technical assistance, geological surveying, and logistics of armor replacement or physically moving their homes away from the shoreline	Use permitting/ SSA Code to reduce new construction and remodeling of existing buildings in sea level rise risk zones. continue and expand the Shoreline Friendly Program to further help Swinomish landowners sustainably adapt to climate change.
		8.1-9 (Inundation of tideland and marine habitat, and loss of forage and spawning areas for fish and waterfowl)	Incentives to relocate (DEP)	High	Medium-High	Initiated	See Action 8.1-2; Shore Friendly Program	x
		8.1-24 (Bank erosion on developed lots)	Incentives for relocation and avoidance (DEP)	High	High	Initiated	Shore Friendly Program; See Action 8.1-9	x
		8.1-29 (Inundation of low-lying structures and parcels)	Relocate higher away from exposure (DEP)	High	High	Initiated	See Action 8.1-4	Updating the Inundation Risk Zone map.
Water Rights		**8.2-12** (Declines in volume and consistency of freshwater flows and peak summer runoff for riparian uses)	Transfer water to supplement flows	Medium-High	Medium-High	Not critical	SITC is not considering water transfers due to water rights, but is monitoring stream flows.	Not currently looking to supplement water flows.
		8.2-15 (Reduced river streamflow during the summer and overall)	Include climate change in water rights review (WA DOE)	Medium-High	Medium-High	Not yet initiated	SITC has not initiated a water rights discussion with WA DOE.	x
Forest Management		**8.2-25** (Wildfire risk to forest stands and the urban/forest interface)	Engage in forest practices, including thinning and controlled burns to reduce risk (DEP)	High	High	Initiated	Includes thinning practices and burn ban policy in FMP draft; No action on controlled burns.	x

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Forest Management		**8.2-26** (Wildfire risk to forest stands and the urban/forest interface)	Increase forest stand diversity to enhance resilience (DEP)	High	High	Initiated	Includes thinning practices in FMP draft.	Implementation of thinning practices to reduce risk where feasible.
		8.2-27 (Changes in forest species from heat stress)	Forest management that promotes diversity and resilient species (DEP)	High	Medium-High	Initiated	Includes variable retention harvest in FMP draft.	To maintain forest productivity, reduce loss from fire and disease infestations. Accelerating forest goods while maintaining natural forest, appearance, diversity, and species.
		8.2-28 (Changes in forest species from heat stress)	Tailored harvests and thinning to promote diverse mosaic (DEP)	High	Medium-High	Initiated	Includes patch cut and density thinning in FMP draft.	See action 8.2-26.
		8.2-29 (Changes in forest species from heat stress)	Extend harvest cycles to retain select species (DEP)	High	Medium-High	Initiated	Includes rotational cycles and uneven aged management in FMP draft.	A continuation of landscape level management practices to maintain select species and healthy forestry practices.
		8.2-31 (Increase in forest pest infestations and disease vectors)	Forest thinning and controlled burns to eradicate problems (DEP)	Medium-High	Medium-High	Not critical	Prioritizes thinning practices for commercial activities.	Goal to implement prescribed burning that follows local fire protection.
		8.2-32 (Increase in forest pest infestations and disease vectors)	Forest management promoting diversity and resilient species (DEP, Property owners; BIA, WA DNR)	Medium-High	Medium-High	Initiated	Includes variable retention harvest in FMP draft.	x
Emergency Transport-ation Strategy		**8.4-2** (Inundation of low-lying roads and bridges)	Raise road level (DEP, OPCD, PW)	Medium	Medium	Not yet initiated	No plans to raise roads.	No roads have been raised, and there are no immediate plans to raise any roads in the near future.
		8.4-3 (Inundation of low-lying roads and bridges)	Relocate route (DEP, OPCD, PW)	Medium	Medium	Not yet initiated	Requires additional support and funding.	x

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Emergency Transport-ation Strategy		**8.4-4** (Inundation of low-lying roads and bridges)	Abandon route (DEP, OPCD, PW)	Medium	Medium	Some elements completed	Removed Kukutali Causeway.	Assess what roads might be the next most vulnerable to sea level rise.
		8.4-5 (Road damage from intensified heat events)	Increased pavement maintenance (OPCD)	Medium	Medium	Initiated	Plans to begin assessment and inventory of damaged roads.	Use asset managing system and maintenance schedule for roads. Future actions will be part of general road maintenance and do not need new approaches.
		8.4-7 (Road closures from storm surge and wildfire)	Develop alternate routes in risk zones (OPCD)	Medium-High	Medium	Not yet initiated	Implemented temporary signs during high precipitation events. Actions revolving around sign placement depended on road ownership.	x
		8.4-8 (Road closures from storm surge and wildfire)	Increase storm capacity and buggers from vegetation (DEP, OPCD)	Medium-High	Medium	Some elements completed	Planted a couple raingardens; Continuing a stormwater study.	Using stormwater study, consider vegetative buffers, education and/or incentives, especially in areas with high stormwater volume.
		8.4-11 (Road closures from storm surge and wildfire)	Restrict road construction in risk zones (DEP, OPCD)	Medium-High	Medium	UNKNOWN	No interview scheduled	x
Energy Conservation		**8.4-25** (Service disruption of communication and energy systems)	Develop alternate energy systems (Energy Cmte)	High	Medium-High	Initiated	Installed solar panels to some Tribal buildings.	Need restarting of Energy Ad-Hoc Cmte.
		8.4-26 (Service disruption of communication and energy systems)	Develop backup energy supply (SUA, SPD-EM)	High	Medium-High	Initiated	Installed emergency generators for many tribal buildings and solar panels installed at FD13.	Continue installations as funding allows.
		8.4-30 (Increased energy demand to counter higher temperatures)	Retrofits for cooling efficiency (SUA; PW)	High	Medium-High	Initiated	Received grants to update building insulation.	x

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Energy Conservation		**8.4-31** (Increased energy demand to counter higher temperatures)	Develop energy conservation programs (SUA; PW)	High	Medium-High	UNKNOWN	SUA has initiated several energy efficient strategies in tribal buildings, including the installation of LED lightbulbs.	SUA also hopes to secure funding to improve insulation in older homes on the Reservation.
		8.4-32 (Increased energy demand to counter higher temperatures)	Use alternative energy systems to supplement increased energy demand (SUA; PW)	High	Medium-High	Initiated	Installed solar panels on some Tribal buildings.	Suggested that focusing on energy efficiency in buildings could help address the projected increases in energy demand due to climate change.
Comm-unication Systems		**8.4-27** (Service disruption of communication and energy systems)	Develop alternate communication system (SPD-EM)	High	Medium-High	Complete	Provided GETS/WPS cards; Established two volunteer amateur radios.	Need to issue GETS/WPS cards to new public safety officials; increase involvement and participation In amateur radio systems.
Stormwater		**8.4-14** (Contamination of drinking water supplies from flooding)	Increase stormwater capacity (SUA)	Medium	Medium	Some elements completed	Planted a couple raingardens and constructed potable water storage structure; Continue stormwater study.	Using stormwater study, consider raingardens, vegetative buffers, education and/or incentives, especially in areas with high stormwater volume.
		8.4-33 (Inundation and backup of drainage discharge from higher tides and storm surges)	Relocate discharge lines out of risk zones (OPCD)	Low	Medium-High	Not yet initiated	Depends on road ownership as large stormwater lines are in city roads.	Review road assessment and inventory project outputs.
		8.4-34 (Inundation and backup of drainage discharge from higher tides and storm surges)	Increase storage capacity of pipes (OPCD)	Low	Medium-High	Not yet initiated	Depends on road ownership.	Review road assessment and inventory project outputs.

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Stormwater		**8.4-36** (Erosion damage to stormwater outfalls)	Replace or relocate discharge lines in risk zones	High	Medium-High	Not yet initiated	Requires study on erosion impacts.	x
Mental Health		**8.3-16** (Climate change menal health toll)	Better enable the community to cope with climate change's mental health side effects (Medical, ECH)	High	High	UNKNOWN	UNKNOWN	UNKNOWN
Hazardous Materials Management		**8.3-8** (Spread of hazardous contaminants & solid waste due to flooding)	Locate solid waste mang, facilities outside of risk zones (DEP, EM)	Medium-High	Medium	UNKNOWN	Working with Legal to update public health codes in 2017; hope to include climate change related items such as this.	x
		8.3-9 (Spread of hazardous contaminants & solid waste due to flooding)	Remove/ contain hazardous materials in risk zone (DEP)	Medium	Medium	Complete	Whitmarsh landfill cleanup action plan written in 2018; cleanup completed.	Whitmarsh landfill on-going monitoring; no other cleanup sites identified.
Public Health Service Strategies		**8.3-3** (Disease vectors)	Maintain, strengthen public health services, vaccinations (Medical)	Medium-High	Medium-High	UNKNOWN	Established ties with Skagit County public health department and WA Dept of Health on climate change projects, but not vector specific (see toxic contam below).	Continued to work with City and State to identify vectors of concern.
		8.3-4 (Respiratory disease)	Improve monitoring/ reporting, maintain/ strengthen public health services (Medical)	High	High	UNKNOWN	Have established ties with Skagit County public health department and WA Dept of Health on climate change projects; a Swinomish community health assessment in 2017 will identify respiratory issues and priorities; established a Swinomish community health department.	Work with DEP and Envr Health Officer on addressing identified respiratory health issues.

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Cultural Practices		**8.3-15** (Indigenous Health Indicators (IHI's) cultural use and practices)	Fortify tribal cultural capacity/ resilience (ECH)	High	High	Some elements completed	Added climate change specific curriculum to 13 Moons; Assess potential comm health impacts via modified BRACE framework; Implement 13 Moons curriculum and evaluate potential increases in community health resiliency.	Partner with fisheries for clam garden work to address natural resources jeopardized by climate change. Continue holding workshops with the 13 moons curriculum.

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