

# SOUTHEAST ALASKA ENVIRONMENTAL CONFERENCE: REPORT ON THE CLIMATE CHANGE ADAPTATION SUMMIT



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## EXECUTIVE SUMMARY

In Southeast Alaska climate change impacts are unique and are longer-term impacts such as heavy rains causing flooding, ocean acidification, warmer waters, snowfall variations, warm springs followed by frost affecting wild berry production, invasive species, and toxins in the marine environment. These factors impact food security and access and abundance of culturally important resources. In September 2016, the Central Council of Tlingit and Haida Indian Tribes of Alaska, in collaboration with Southeast Alaska Tribal Ocean Research, held a two-day workshop in Ketchikan to review and plan monitoring, mitigation, and adaptation strategies to address climate change in their region. Alaska Sea Grant facilitated the discussion of this workshop, which became called the Southeast Alaska Climate Adaptation Summit. There were 80 participants at the workshop; approximately 30 were from Federal and State agencies, the University, as well as various Southeast Alaska non-profits. The remaining 50 participants were environmental program managers and coordinators from 17 Tribes in Southeast Alaska. Funding from the North Pacific LCC provided travel funding and daily conference costs at the Cape Fox Lodge in Ketchikan.

Researchers from the State of Alaska, federal agencies, the University of Alaska Southeast, and Southeast Alaska non-profits provided information on the latest research on resources identified by Southeast Alaska Tribes as culturally important; salmon, shellfish, berries, yellow cedar, as well as cultural sites and human health. Over two-days participants described their concerns related to these resources. This included concerns raised about changing ocean conditions including ocean acidification, warming water, harmful algae blooms, contamination of water sources, both marine and freshwater, changes in the terrestrial environment, and phenology. For example, residents note that warmer water in the marine environment at the outflow of streams is causing a disruption in the salmon migration patterns, which moving into the future will make it more difficult for fisheries managers to ensure adequate escapement and harvest timing.

The outcome of the summit will be an effort to build greater collaboration and sharing of tools and information. Participants discussed activities to pursue as a group that involve community based monitoring such as marine and riverine water monitoring program. Water monitoring would establish a long-term program to document stream temperature and flow, marine temperature and salinity, and snow depth and rain volume. This includes building a collaboration between agencies, the University, local non-profits, and Tribal environmental programs. In addition, organizers of the summit recognized that a central repository was needed to provide communities with basic information on climate change

and resulting impacts in Alaska, a method of sharing stories of successes, and tools for planning monitoring, mitigation, and adaptation activities as an outcome of this project. To bring together information about community resilience and adaptation in Alaska a website called Adapt Alaska is being developed. Besides having unique content the website will act as a portal to other relevant sites that are specific to Alaska. Additional funding for the website has been provided by the Aleutian Bering Sea Islands Association, and the Aleutian Pribilof Islands LCC. Alaska Sea Grant will host and manage the website to provide long-term stability and will incorporate existing relevant Alaska Sea Grant web materials on climate change and coastal hazards. Finally, Central Council has received funding from the Bureau of Indian Affairs to draft a region-wide climate adaptation plan. The plan is currently in development and will incorporate information that was learned as part of this summit and take advantage of the information being compiled for the Adapt Alaska website.

## INTRODUCTION

Climate change is a complex global phenomenon offering an uncertain future that is difficult to communicate to local audiences. There are too many competing factors: physical forces, politics, economic, and cultural barriers (Ballantyne 2016:10). Lost in this discourse is clarity in the message to northern communities of the state of the science and how local observations are taken into consideration in the verification of climate impacts at the local level. It has become difficult for local people to understand what are actual effects of climate change, what is global warming, and what are weather and climate variability (Moser 2010:33; Weber 2016:4). In Southeast Alaska climate change impacts are unique and are longer term impacts such as heavy rains causing flooding, ocean acidification, warmer waters, snowfall variations, warm springs followed by frost affecting wild berry production, invasive species, and toxins in the marine environment. These factors impact food security and access and abundance of culturally important resources.

In early December 2015, the Central Council of Tlingit and Haida Indian Tribes of Alaska (CCTH) and Southeast Alaska Tribal Ocean Research (SEATOR) at the Sitka Tribe of Alaska in collaboration with the Swinomish and Tulalip Tribes of Washington, the US Forest Service, and others held a climate change adaptation workshop in Tulalip Washington for Southeast Alaska Tribes. Tribes from the region discussed climate stressors and prioritized their concerns of the impacts of climate change. Even in Southeast Alaska climate change impacts differ regionally such as storm surges eroding the coastline in Yakutat, to Wrangell where ocean acidification may be the most drastic impact to the local economy and way of life (Frisch, et al. 2015; Mathis, et al. 2015). In some parts of Southeast Alaska residents are observing an important cultural resource, yellow cedar, slowly start to disappear. Cedar is used in bentwood boxes and Chilkat blankets as well as other cultural elaborations that are important for Tlingit and Haida identity.

The outcome of the climate change workshop was one of the most significant concerns of Southeast residents was potential climate change impacts to resources important for subsistence practices and cultural elaboration. Recent studies have documented the harvest and use of wild resources by Southeast Alaska residents (Holen, et al. 2014; Sill and Koster 2017). Participants in these studies have voiced concerns over changes in their areas due to climate change.

To address the concerns of Tribes in Southeast Alaska, CCTH in collaboration with SEATOR and their planning team added two days to the annual Southeast Alaska Environmental Conference in September 2016 to discussing climate adaptation planning. Alaska Sea Grant facilitated the discussion of this workshop, which became called the Southeast Alaska Climate Adaptation Summit. As a result of the workshop in Washington the group chose to focus on a few key resources; salmon, shellfish, berries, yellow cedar, as well as cultural sites and human health.

## METHODS

This workshop was held in Ketchikan on September 21-22, 2016. There were 80 participants at the workshop; approximately 30 were from Federal and State agencies, the University, as well as various Southeast Alaska non-profits (see Appendix 1 for schedule). The remaining 50 participants were environmental program managers and coordinators from 17 Tribes in Southeast Alaska. The workshop is a partnership with CCTH and SEATOR. Funding from the North Pacific Landscape Conservation Cooperative (LCC) provided travel funding and daily conference costs at the Cape Fox Lodge in Ketchikan. Researchers from the State of Alaska, Federal agencies, the University of Alaska Southeast, and Southeast Alaska non-profits provided information on the latest research on resources noted above identified by Southeast Alaska Tribes as culturally important. The first day was dedicated to discussing the latest monitoring activities for these important cultural resources. This was followed at the end of the day by small group discussions; 6 groups of approximately 10-12 participants. A summary of discussion groups is provided below. Moderators were given a list of questions including which communities are represented in the group and what is the current issues related to climate change in your community. This was followed by a brainstorming session to get groups to think about immediate things they could do to address the second question and then a follow-up question to get them to think about planning for future research with funding. The questions were based on the second question; if given no new funding, what monitoring, mitigation, or adaptation projects could your Tribe undertake, and with outside assistance, which includes technical assistance and a small amount of funding, what one project would you want to undertake as part of the Tribe's Environmental Program. Answers to each question were recorded by the moderators as well as a general outcome for each group. Groups then provided a synthesis to the larger workshop. On the second day, additional monitoring activities were discussed through presentations by University, State, Federal, and regional non-profits. At the end of the second day a summary was provided and plans and partnerships were discussed.

## SOUTHEAST ALASKA CLIMATE CHANGE ADAPTATION SUMMIT

The following is a summary of the group discussions. Responses could be broken down by issues having to do with water, changes in the landscape, and phenology, or climatic conditions impacting seasonality of resources. Although the focus of the workshop was on salmon, shellfish, the forest environment, and cultural sites, respondents did not limit their discussion to these resources. It should also be noted that earlier in the week water quality was a bit topic due to discussions between tribes and the Environmental Protection Agency on fish consumption rates, and contaminants. Therefore water, and especially a desire for clean water, was a common theme discussed throughout.

### *WATER*

#### **Ocean Conditions**

Southeast Alaska has an economy and way of life developed around a maritime culture. Changing ocean conditions were noted as a major concern for residents. Southeast Alaska residents rely on shellfish for subsistence and commercial fisheries. Important are clams for subsistence, Dungeness crab for subsistence and commercial fishing, as well as other crab species such as tanner and king crab for commercial fisheries, especially in the Wrangell and Petersburg areas. Ocean acidification is a major concern and few species in Alaska have been studied to understand the effects of changing ocean pH (<http://www.aos.org/alaska-ocean-acidification-network/>). Residents are concerned about the impacts of ocean acidification on phytoplankton, zooplankton and salmonids. Tribes from the Haines area noted recent low returns for king crab and would like to know more about changing ocean conditions and the impacts on king crab, an important commercial species.

#### **Riverine**

Impacts in the riverine environment can be broken down first into warming conditions including the loss of snowpack in the winter, and lack of rain in the summer. The second category is contamination. As noted above the US Environmental Protection Agency attended the first few days of the Southeast Environmental Conference so water contamination had been discussed earlier in the week and was still on the minds of participants.

### *WARMING CONDITIONS*

Warming water conditions and reduction of snowpack in the winter is of great concern to communities who rely on streams for rearing and spawning habitat for salmon. Along with warming weather increased winds and storms are leading to greater erosion on beaches as well as causing landslides. Residents note

changes in freezing thresholds, complete loss of permafrost, shoreline erosion along streams degrading spawning and rearing habitat, and sloughing of bluffs and beaches as well as sedimentation in the rivers. Residents of Haines note the disappearance of glaciers that once provided cold water for spawning salmon in the summer coupled with a lack of snow in the winter. Winter precipitation they note is more often in the winter in the form of rain instead of snow in the lowlands. Nearby Skagway residents are also concerned about rising temperatures and how this affects stream flows. They have noted the absence of salmon in Town Creek. They also note that glacial outbursts flood areas and threaten cultural and historical sites. To the south Craig residents also note the loss of a snow pack in the winter on Prince of Wales Island. Residents of nearby Ketchikan would like to see more baseline monitoring of streams as they are concerned about the lack of cold winters and low snow fall. They note that the fishing season has been shortened in recent years and there have been poor yields.

A consistent supply of water is important for Southeast Alaska communities not only for salmon runs but also for power. One respondent noted that water levels in the Metlakatla areas is causing issues as they are having difficulty with consistent stream flow to run their hydroelectric power. Many communities have had to increase their use of diesel generators due to low water flow or other issues with hydropower stations (Cherry, et al. 2010).

### *CONTAMINATION*

Residents of Southeast Alaska communities are concerned about water quality, especially in areas where there are transboundary watersheds with mineral development projects near streams in British Columbia near the Taku, Whiting, Stikine, Iskut, Unuk, and Nass Rivers (<http://www.lynncanalconservation.org/mining/>). Currently there are 10 mineral development projects in progress in the transboundary watersheds of Southeast Alaska and British Columbia. One respondent noted that climate change impacts such as the increase in rain and snow and temperature variations can affect mining wastes and overflows.

Residents of the Juneau area are especially concerned with contamination of freshwater sources and impacts to coastal and marine sediments. They are concerned that clams and crab may be impacted and pick up heavy metals. They note a reluctance of city of Juneau to recognize environmental contamination of recreational areas nearby that are important for harvest these resources. Some of the concern with mining development is that residents do not feel that past mining areas have been adequately addressed.

For example, there are concerns about Kasaan Bay where there are mines that have been long closed but environmental remediation has not been adequately addressed. They would like more information how increased precipitation causing erosion will leach contaminants from these mines into the environment. In Haines, there is a water supply project underway to provide a long-term solution for clean drinking water sources. They would like to see modeling of their drinking water sources to climate change.

#### *TERRESTRIAL*

Residents of Southeast Alaska note that they understand that sea level rise will not be an issue for their area as isostatic rebound is occurring faster than the sea is rising. However, they are concerned that with yellow cedar forest die off and lower precipitation in the summer they could be at risk for forest fires. In addition, they are also concerned about landslides that may occur due to lower forest cover and periods of higher precipitation such as in the winter that will fall as rain instead of snow. This occurred in Sitka some years prior. They note that current models suggest climate will change the risk of landslides. The models suggest a large impact when it does occur, but a low probability that an event will occur. Residents of Sitka, Juneau, and Klukwan are concerned about the high cost of repair from landslides such infrastructure repair or replacement, as well as the impacts to resource development projects like mine tailing storage facilities which could cause environmental degradation.

#### *PHENOLOGY*

The shift in the timing of salmon migration is one of the topics most discussed by communities, and was especially noted by residents in Saxman in southern Southeast Alaska. Some attribute this to a changing rainfall pattern. Most residents who participated in the discussions said this is a region wide problem. This past year (2016) the water in estuaries and channels was warmer and lower which they said made salmon returning to streams to spawn subject to interception. Residents note that warmer water in the marine environment at the outflow of streams is causing a disruption in the salmon migration patterns, which moving into the future will make it more difficult for fisheries managers to ensure adequate escapement and harvest timing. Residents have observed how the warmer water makes the salmon sluggish in estuaries.

Managers need to ensure escapement into the rivers, but the salmon are pooling up near streams waiting for the proper temperature and river height to migrate and if they all migrate at once then it will be difficult to manage for over escapement. In addition, this makes it difficult for subsistence fishers who will need to be in the right place at the right time to harvest. In Hydaburg over the past 20 years, residents



have noted much warmer winters and a reduced snow pack. They said the water in nearby streams has warmed 10 degrees Fahrenheit over a 20-year period.

In 2016 residents of some communities noted a late run of sockeye followed by an early run of coho. One resident noted that coho salmon arrived in mid-June. They noticed the coho while they were Chinook and sockeye salmon fishing, early summer hunting activities. Residents said one project that should start immediately would be monitoring water temperatures to try to understand salmon phenology. In addition to changes in run timing of native species, residents have noticed new species arriving. This includes sun fish near Hydaburg as well as tuna, shad, Humboldt squid, and mackerel.

Besides the ocean environment warming weather is affecting their harvest of deer which are migrating between the uplands and lowlands and different times. Warming weather means that deer stay up in the uplands longer. This means it's difficult to find them in traditional areas during the hunting season. There was also an early rut this past year (2016). Local-residents relate this to an early spring. Blueberries are ripening at different times as well making it difficult to harvest them at traditional times.

#### *COMMUNITY BASED MONITORING*

The outcome of the discussions both in the small groups as well as during presentations is that local environmental coordinators in the communities are keenly interested in beginning, or increasing their already existing efforts, to conduct monitoring projects. They are looking for partners that can provide expertise. Below is a figure of the strengths of each party invested in local monitoring efforts (Figure 1). To accomplish community based monitoring efforts will require 1) technical experts from the University of Alaska, SEATOR, and local non-governmental organizations such as The Nature Conservancy and Southeast Alaska Watershed Coalition, 2) land managers such as the U.S. Forest Service and the U.S. Fish and Wildlife Service including funders who also act as coordinators of public and private partnerships like the North Pacific Landscape Conservation Cooperative, and finally 3) local experts in each of the Tribes as well as the NGOs working in the region.

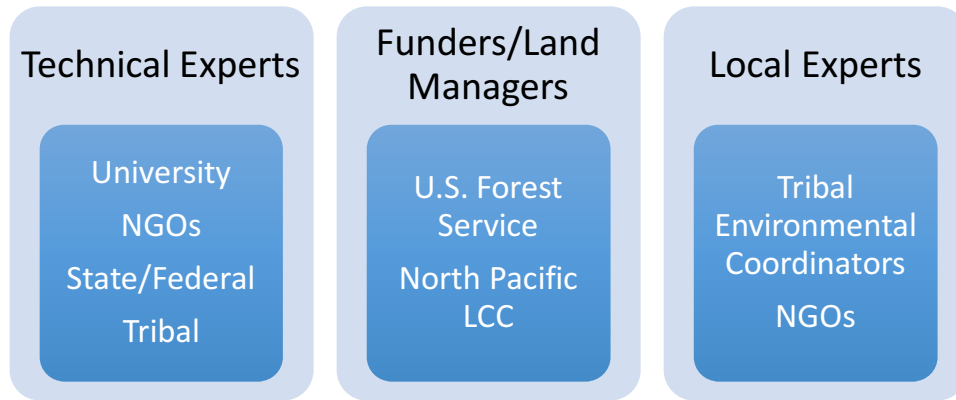


Figure 1. Collaborative partnerships for engaging in community based monitoring in Southeast Alaska

Below are some of comments provided regarding community based monitoring. There are some overlapping ideas from different communities. Each comment has been provided in its' entirety.

- Kasaan – A resident noted that the effort should be to continue harmful algae bloom (HAB) monitoring, shellfish tissue testing, develop climate adaptation plan and outreach/education to schools, and participate in LEO network (Alaska Native Tribal Health Consortium, Local Environmental Observer).
- Kasaan – One major project should be to initiate stream monitoring station including temperature, pH, gauge flow (river forecast center gauge stations). A geographic area of focus should be the Karta River.
- General idea – There should be an internship program to engage local high school students in resource monitoring to connect to the landscape of their community and help build local workforce.
- Klukwan – The community would like to begin a water quality monitoring program.
- Juneau – There should be an effort to expand snow pack monitoring, and develop a water quality monitoring program.
- Kake – Effort should be on maintaining HAB work, and expand the water quality program.
- Sitka – Effort should be on maintaining HAB work and participate in exiting yellow cedar working groups.
- Craig – Maintain existing HAB and water quality monitoring work.
- General idea – Monitor effects of relative sea level rise on local beaches and subsistence resources.
- General idea – Initiate a broad scale basic water quality monitoring program. This includes stream height and temperature, coastal temperature and salinity, snow depth and rain volume. Characteristics of this effort would be:
  - Requires consistent sampling, but minimal time requirement.

- Use of inexpensive sampling equipment (some already acquired through SEATT sampling activities):
  - Meter stick for stream and snow height
  - Cheap rain gauges (< \$100)
  - Thermometer for water temperatures
  - Refractometer for salinity
- Efforts should be a collaborative regional plan so that all communities are collecting the same type of data.
- Autonomous, consistent, and multi-year data collection in streams and nearshore marine environments using cost effective techniques (e.g., HOBO data loggers, fish counters).

Besides the broad interest in stream monitoring noted above one of the main overarching themes is transference of knowledge between generations. The transference of knowledge between generations is one idea to have youth who are interested in science also gather knowledge of their elders so that they may engage in both worlds. One idea is to develop a community specific educational plan to use in schools and community functions that includes involving youth and elders to better help them understand past, current, and future environmental issues. This also includes how climate change affects everyone's lives and future and help in fostering understanding on ways to mitigate these threats through programs like stream monitoring and locally grown food and fishing programs at the local level.

## DISCUSSION: SOME FINAL THOUGHTS

### *RESPONSE: TRADITIONAL KNOWLEDGE AND CLIMATE SCIENCE*

There are challenges inherent in producing local level responses to climate change. There are "temporal and often geographic distance between cause and effect" (Moser 2010:33). The science involved is complex and often projected at large regional scales or even globally as in the case of SLR projections.

Residents of rural communities in Alaska, especially along the coast are experiencing changes in their environment that are noticeable in a single lifetime. The close connection that indigenous people have with the land depending on the environment for food, mobility, and ultimately survival make them well positioned to observe climate change (Cochran, et al. 2013:558; Krupnik and Jolly 2002). Hunters and fishers in the North respond to climate change by utilizing adaptive strategies that modify their production activities, and modifications to the culturally constructed rules inherent in hunting and fishing in order to secure their livelihoods (Berkes and Jolly 2001:2). Northern indigenous peoples ways of

observing and understanding the local environment are a key component of indigenous knowledge systems in the North (Marino and Schweitzer 2009:210).

Communicating climate change and understanding community perspectives on change and adaptation strategies should be done in a way that understand the social processes as well as the physical environment. “Adhering to a constitutive view of communication necessitates embracing the ontological perspective that climate change is not only a physical phenomenon, but indeed also an ideological, cultural, and symbolic issue that takes on different meanings dependent on different people and places” (Ballantyne 2016:10). The widespread discourse of vulnerability, and extension of the discourse of resilience, has created a “fertile context for research that focuses on the social, cultural, and economic impacts of climate change in the Arctic” (Moerlein and Carothers 2012:1). In order to be effective scientists and those that communicate climate change to communities need to be more effective in the scholarship of communication (Moser 2010:37). If there is more attention to the effective use of developing a narrative with communities, this will lead to more constructive efforts of adaption planning.

#### *MOVING FORWARD: CLIMATE ADAPTATION PLANNING EFFORTS IN ALASKA*

Climate adaptation efforts in the United States are often structured around steps in the resilience process. The U.S. Climate Resilience Toolkit is often used as a framework for communities to address climate change. This involves five steps: 1) identifying the problem, 2) examining impacts and vulnerabilities, 3) reviewing options and actions, 4) evaluating risks and costs, and 5) taking action (NOAA 2016). In studies about climate change indigenous residents of the North are becoming more central as impacts in the North are more pronounced; however, these studies are often about the impact of a changing climate, without actually including those indigenous participants in the studies (Cochran, et al. 2013:558)

Changes in the environment that are intricately tied to climate change are also compounded by social changes. In many cases community residents do not perceive environmental change as different than social changes that are occurring in their communities (Moerlein and Carothers 2012:6). Prior to the 1960s when indigenous communities in the North were not tied to modern infrastructure mobility was an effective strategy of dealing with environmental change (Henshaw 2009:157). Projecting climate change futures into the next century needs to be done in a time frame identified by the community. This planning

process should be framed in the context of coproducing knowledge between climate experts and local planners.

In attempting to coproduce knowledge to address adaptation planning on the Olympic Peninsula in Washington State, adaptation experts worked with the Jamestown S’Klallam Tribe to incorporate local knowledge and concerns that are inherent in their adaptation strategies. They began by providing a framework that included “assessment of climate exposure, sensitivity, and adaptive capacity. *Climate exposure* is the extent and magnitude of a climate and weather event on an area of concern. *Sensitivity* is the degree to which an area of concern is susceptible to a climate impact. *Adaptive capacity* is the ability of an area of concern to adjust to or respond to the changing conditions” (Petersen, et al. 2014:14). This provides a framework for the community to prioritize their climate related vulnerabilities and increase community resilience. Through the workshop the community participants were able to first provide a list of concerns, rank the sensitivity of those concerns, then rank the adaptive capacity of each (Petersen, et al. 2014:17).

This exercise provides a process to allow for the community to provide their feedback and drive the discussion of their climate exposure, their vulnerability, and their sensitivity and adaptive capacity. This follows resilience planning steps but also includes additional criteria. Susskind et al. (2015:51) revised the resilience planning framework to 1) generate usable knowledge about risks and responses, 2) cultivate community literacy about risks and responses, 3) increase optimism about collective risk management, and 4) enhance collaborative capacity. Increasing optimism is one of the most critical components of adaptation planning; however, in an area such as Southeast Alaska with such high capacity for local research and monitoring, communities should be included as full collaborators. The goal is that Tribes and communities will choose to work collaboratively to plan for climate change adaptation, breaking down barriers in the adaptation planning process (Moser and Ekstrom 2010; Werners, et al. 2015). The outcome will be an effort already in the planning stages by some tribes and communities, and provide motivation to others, to begin the adaptation planning process and to make climate change a consideration in everyday planning. As Tribes in Southeast Alaska move forward this last point is one that leaders in the area would like to incorporate into Tribal environmental planning.

Some final thoughts from community members at the Southeast Alaska Climate Adaptation Summit include a focus on working together across the region. This includes building a collaboration between

agencies, the University, NGOs, and Tribes. Within this effort should be an effort by communities to engage in efforts that work best to address the community's capacity and needs.

Another comment was to figure out how to get governmental organizations to sit together, and communicate transparently. Respondents note that this will take time and there may be growing pains as efforts are initiated. There have been small measures of success that show that progress has been made, which gets otherwise recalcitrant participants on board and provides a base for bigger ideas and projects.

One way to start collaborative efforts is to start at the smaller regional level. For example, Prince of Wales Island has four Tribes. The four tribes work collaboratively and plan collectively for the island, supporting each other in their efforts through resolutions. One small project they work on together is recycling efforts. So, for the community of Hydaburg for example, climate adaptation is part of the consortium planning so the community doesn't have to spend as much time and effort on it. These efforts could then be expanded to a collaboration on the larger scale, a Southeast Alaska region wide climate adaptation plan. The plan is currently underway by Central Council with support from the Bureau of Indian Affairs.

At the completion of the Southeast Climate Adaptation Summit, funding was still available for dissemination of what was developed as part of the workshop. It was recognized that a central repository was needed to provide communities with basic information on climate change and resulting impacts in Alaska, a method of sharing stories, and tools for planning monitoring, mitigation, and adaptation activities. In an effort to bring together information about community resilience and adaptation in Alaska, funding was provided to a contractor, Agnew::Beck Consultants to develop a website called Adapt Alaska. Besides having unique content the website will act as a portal to other relevant sites that are specific to Alaska. The funding provided by this project for dissemination will pay for the website development, introductory pages, and linking to existing relevant Alaska Sea Grant sites on climate change and coastal hazards. Additional funding for the website has been provided by the Aleutian Pribilof Islands Association, and the Aleutian and Bering Sea Islands LCC. The additional funding provides for developing additional website specific materials and linking to other sites on the web. The consultant will complete a website structure in May 2017 with a draft of the website reading for testing by June 2017.

## CONCLUSION

Coastal community residents in Alaska can take small steps to adapt today to what is occurring and begin the planning process to adapt to changes that they will see in their lifetimes. Climate change will impact communities and adaptation to these changes can be an opportunity to empower communities to build capacity and provide for improved community wellbeing and sustainability. Alaska Natives have been adapting to climate change and rising sea levels for thousands of years. Knowledge and observations made by rural residents of Alaska of the changing climate can become part of the solution to adaptation and provide feedback for scientific observations creating a dialogue with climate scientists that will ultimately lead to the adaptation solutions of the future.

In the short-term some recommendations for management and engagement with communities include the following.

- Due to changing phenology for salmon and deer migration, there should be more flexible seasons for local harvest, especially subsistence seasons.
- Shellfish are an important species for subsistence and abundance has declined in recent years. There should be an effort and permitting to allow for the seeding of new shellfish beds in intertidal zones.
- More effort should be invested by managers in understanding the impacts of increasing temperatures on rainfall and snow pack, and how this will influence future salmon rearing and spawning habitat.
- More studies should be conducted to understand the impacts of historic mining, and whether changes in precipitation from climate change will cause erosion at these sites.
- HAB monitoring should include shellfish monitoring, as well as an increase in funding to understand the impacts of a warming ocean on the frequency and spread of HABs.
- The impacts of ocean pH on Alaska marine species should be more fully studied.

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APPENDIX A

**MONDAY, September 19, 2016**  
**Mining Day**

<b>8:00AM – 8:30AM</b>	- Registration
<b>8:30AM-8:35AM</b>	- Introduction of President Peterson: Desiree Duncan, Central Council Tlingit & Haida Indian Tribes of Alaska
<b>8:35AM-8:45AM</b>	- Welcome: President, Ketchikan Indian Community Irene Dundas and Lee Wallace, President of Organized Village of Saxman
<b>8:45AM-9:30AM</b>	- Conference Overview: Raymond Paddock III, Central Council Tlingit & Haida Indian Tribes of Alaska - Conference Participant Introductions
<b>9:30AM-10:15AM</b>	- Central Council Tlingit & Haida Trans Boundary mining project: Jennifer Hanlon
<b>10:15AM – 10:30AM</b>	- <b>BREAK/DOOR PRIZE</b>
<b>10:30AM-11:15AM</b>	- United Tribal Trans Boundary Mining Workgroup - Rob Sanderson Jr., Fred Olsen.
<b>11:15AM-12:00PM</b>	- Transboundary Mining Technical Workgroup on monitoring – Terri Lomax
<b>12:00PM – 1:30PM</b>	- <b>LUNCH BREAK/DOOR PRIZE</b>
<b>1:30PM – 2:00PM</b>	- Lieutenant Governor Byron Mallott
<b>2:30PM-3:00PM</b>	- Alaska Department of Environmental Conservation Alaska Monitoring and Assessment Program (AKMAP) Southeast AK – Amber Bethe, Alaska Department of Environmental Conservation
<b>3:00PM – 3:15PM</b>	- <b>BREAK/DOOR PRIZE</b>
<b>3:15PM – 4:30PM</b>	- Anti-degradation tier III, Water Quality – Michelle Hale
<b>4:30PM</b>	- <b>ADJOURN</b>

**TUESDAY, September 20, 2016**  
**Solid Waste Day**

**9:00AM – 10:00AM** - Environmental Awareness on Solid Waste & Backhauling - Ted Jacobson, RuralCap

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**10:00AM – 10:15AM** - **BREAK/DOOR PRIZE**

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**10:15AM-11:15PM** - Total Reclaim backhauling – Reilly Kosinski

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**11:15AM-12:00PM** - Paul Berry, City of Gustavus

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**12:00PM – 1:30PM** - **LUNCH BREAK/DOOR PRIZE**

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**1:30PM –2:00PM** - Safety Briefing before field trip

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**2:00PM – 4:00PM** - Field Trip to Ketchikan Landfill (Bring boots and warm clothes)

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**4:00PM - 4:30PM** - Stump the Chump – Ted Jacobson

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**4:30PM** - **ADJOURN**

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**TUESDAY, September 20, 2016**  
**State & Tribal Response (STRP)**

**9:00AM – 9:30AM** - Welcome and Introductions (Who and Organizations)

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**9:30AM-10:15AM** - SEAK Geographic Response Strategy – MST1 Jeffry Crews (USCG)

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**10:15AM – 10:30AM** - **BREAK**

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**10:30AM–11:15PM** - Outreach to Communities: Implementing Cultural Activities into Environmental Issues - Joy D. Britt, ANTHC

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**11:15AM – 12:00PM** - My Year #1 as STRP - Brian Holter Jr., Klawock Tribe

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**12:00PM – 1:30PM** - **LUNCH BREAK**

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**1:30PM –2:15PM** - Amy Rodman – Alaska Dept. Environmental Conservation (ADEC)

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**2:15PM – 3:00PM** - Home Heating Tank & Outreach Education – Ivy Patton, Native Village of Eyak

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**3:00PM – 3:15PM** - **BREAK**

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**3:15PM – 4:30PM** - Discussion, Reports, Workshop Recap & Announcements

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4:30PM - ADJOURN

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**WEDNESDAY, September 21, 2016**  
**Water Quality/Fish Consumption Rate**

9:00AM-9:45AM - Fish Consumption Rate Video: Guy Archibald

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9:45AM – 10:30AM - FCR - Michael Opheim, Seldovia Village Tribe

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10:30AM – 10:45AM - **BREAK/DOOR PRIZE**

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10:45AM-11:45AM - ADEC Fish Consumption Rate – Michelle Hale, Alaska Department of Environmental Conservation (ADEC)

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11:45AM-12:00PM - Recorded Message: U.S. Senator Lisa Murkowski and Dan Sullivan

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12:00PM – 1:30PM - **LUNCH BREAK/DOOR PRIZE**

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1:30PM – 2:15PM - EPA Perspective on Water Quality Criteria and related issues – Lon Kissinger, US EPA

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2:15PM - 3:00PM - Who's in, Who's out, and Beyond FCR – Kendra Zamzow PhD., Center for Science in Public Participation (CSP2)

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3:00PM – 3:15PM - **BREAK/DOOR PRIZE**

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3:15PM – 3:45PM - Fish Consumption and Harvest Estimate Comparison – Davin Holen, UAF and Lauren Sill, Alaska Department of Fish & Game

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3:45 – 5:00 PM - Subsistence Food Web – Michelle Ridgeway, Oceanus Alaska

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5:00 PM - **ADJOURN**

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**THURSDAY, September 22, 2016**  
**Subsistence and Cultural Resources Impacts by Climate Change Session**

<b>9:00AM-9:15AM</b>	- How we arrived at this workshop – Raymond Paddock and Chris Whitehead
<b>9:15AM – 9:30AM</b>	- Workshop end result: Development of work plan - Davin Holen and Cer Scott
<b>9:30AM-10:00AM</b>	- Participant and Presenter Introductions
<b>10:00AM – 10:15AM</b>	- Review Topics – Davin Holen
<b>10:15AM – 10:45AM</b>	- Salmon – Colin Shanley, The Nature Conservancy and Deborah Hart, Southeast Alaska Fish Habitat Partnership
<b>10:45AM – 11:00AM</b>	- <b>BREAK/DOOR PRIZE</b>
<b>11:00AM – 11:30AM</b>	- Shellfish – Elizabeth Tobin, (UAF) University of Alaska Fairbanks Juneau Center
<b>11:30AM – 12:00PM</b>	- Harmful Alga Blooms – Chris Whitehead, Sitka Tribe of Alaska
<b>12:00PM – 1:30PM</b>	- <b>LUNCH BREAK/DOOR PRIZE</b>
<b>1:30PM – 2:00PM</b>	- <b>Forest Environment</b> – Brian Buma, University of Alaska Southeast
<b>2:00PM-2:30PM</b>	- Cultural Resources – Martin Stanford, US Forest Service
<b>2:30PM – 3:00PM</b>	- Human Health – Jake Bell, Alaska Native Tribal Health Consortium (ANTHC)
<b>3:00PM – 3:15PM</b>	- <b>BREAK/DOOR PRIZE</b>
<b>3:15PM – 4:00PM</b>	- Group discussion of adaptation and monitoring activities
<b>4:00PM-5:00PM</b>	- Group reports to workshop

## FRIDAY, September 23, 2016

### Climate Change Session

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- 9:00AM-9:05AM** - Review of Day 1 and Goals of Day 2
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- 9:05AM – 9:30AM** - Ocean Acidification – Meg Chadsey, Washington Sea Grant and Esther Kennedy, Sitka Tribe of Alaska
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- 9:30AM-10:00AM** - Shoreline Monitoring – Jacqueline Overbeck, Alaska DNR DGGS
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- 10:00AM – 10:15AM** - **BREAK/DOOR PRIZE**
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- 10:15AM – 10:45AM** - Stream Monitoring – Angie Flickinger, Southeast Alaska Watershed Council
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- 10:45AM-11:15AM** - Climate Change, Coastal Transformation, and Sustainable Foods – Linda Kruger and Adelaide Johnson, USFS
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- 11:15AM – 11:45AM** - Subsistence Adaptation and the Regulatory Process – Lauren Sill, Alaska Department of Fish & Game
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- 11:45PM – 12:15PM** - Aquaculture – Gary Frietag, Alaska Sea Grant
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- 12:15PM – 1:45PM** - **LUNCH BREAK/DOOR PRIZE**
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- 1:45PM – 2:00PM** - BIA work plan development – Raymond Paddock – Next Steps BIA Climate
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- 2:00PM – 3:00PM** - Work plan – Raymond Paddock, Central Council and Chris Whitehead, Sitka Tribe of Alaska and Michelle Davis, EPA
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- 3:00PM-3:30PM** - Workshop conclusion and assessment – Davin Holen
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