LOOKING FORWARD, LOOKING BACK

Building Resilience Today

Training One Report

International Arctic Research Center
Fairbanks, AK

April 16-18, 2019

BUILDING RESILIENCE TODAY PROJECT TEAM

Table of Contents

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International Arctic Research Center
University of Alaska Fairbanks

AK CASC
Alaska Climate Adaptation Science Center

Project Overview

The Alaska Climate Adaptation Science Center (AK CASC) and the Aleutian Pribilof Islands Association (APIA), designed the *Looking Forward, Looking Back: Building Resilience Today* project (hereafter BRT) as a series of trainings and workshops with tribal community leadership and members to collaboratively develop the western science knowledge and Indigenous Knowledge necessary for tribal community adaptation plans.

Rather than replicate existing tribally-focused climate adaptation training in Alaska, this pilot project sought to include a range of best practices in education, specifically in climate science and tribal engagement, and build upon the experience and expertise of the partner teams and communities, the facilitating team, and subject-matter experts.

Training One Participants. Photo: Molly Tankersley

The overarching goal of *Building Resilience Today* is to introduce planning tools that strengthen community capacity to plan for the future, while maintaining important values grounded in the past. The core idea of the *Looking Forward, Looking Back: Building Resilience Today* project is to include multiple knowledges (Indigenous Knowledge and western science) into adaptation plans that result in resilient communities. *Looking Forward* refers to the need to plan for our rapidly changing climate by critically considering current and future projected climate and its impacts on the community and Tribe. *Looking Back* refers to the need for any realistic tribal planning process, and subsequent planning document, to be grounded in Indigenous and local knowledge.

The project consisted of two group trainings in Fairbanks, AK, and five community workshops in Kwigllingok, Kotlik, Iliamna, Quinhagak, and St. Michael, AK. Both trainings and workshops were designed to integrate the elements of the core BRT idea.

Training One: The goal of the first training was to bring the cohort of community members and project team members together to work in teams to gain a common understanding of local climate impacts and longer-term climate projections at the local, regional, statewide, Arctic, and global level.

Community Workshops: The community workshops were a series of onsite meetings where the project team traveled to the partner communities to further develop locally-relevant information, present projected climate impacts to the community, and contextualize western science.

Training Two: The final training brought the participating community members and project team members back together to further develop capacity and learn about adaptation resources.

This report describes the first training, held April 16-18, 2019, at the International Arctic Research Center in Fairbanks, AK.

Kotlik community members during the BRT visits. Photo: Ryan Toohey

Project Objectives

1. *Increase knowledge about the earth's climate system from Indigenous Knowledge and western climate science, including past experiences and observations, impacts and projections of change.*

2. *Increase awareness of tools, resources, and approaches for climate adaptation planning and decision-making.*

3. *Facilitate cross-community learning about how other communities, Tribes, and organizations are responding to and planning for climate related impacts.*

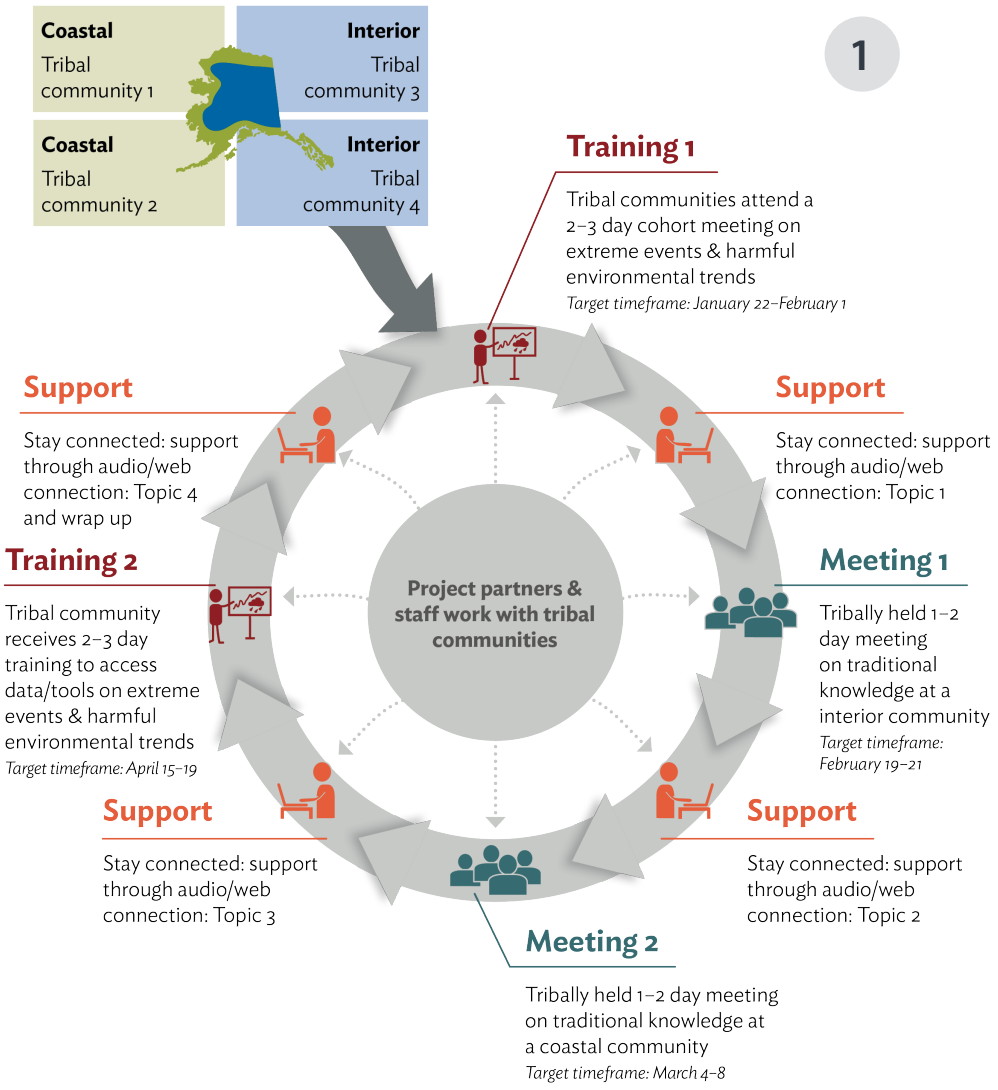
4. *Document traditional areas of interest, key subsistence species, and environmental changes that are important to each community.*

5. *Develop a synthesis document for each community that summarizes Indigenous knowledge species and significant traditional/sustainable practices that Tribes want to perpetuate.*

Project Design

Project Structure

Initially, the BRT pilot project sought to recruit coastal and inland tribal communities to represent climate challenges in different ecosystems (see Figure 1, right). However, after a variety of outreach efforts (please see the following section), only coastal communities applied for the opportunity to participate in the project. The adjacent figure represents the original conceptual model of the project. Due to project participants and the co-production methodology employed throughout this project, Meetings 1 and 2 evolved into individual community visits (2-3 days) within each participating community during autumn of 2019.



During these visits, the project team met with multiple stakeholders through a variety of meetings and community events to document local and Indigenous knowledge on current local conditions, environmental observations of change, the community's Traditional Use Area and subsistence species and seasonality. Audio conference communication and project-related support occurred between trainings and community workshops.

Community Recruitment and Selection

The first round of community recruitment was based on several issues: current landscape and resource planning, local capacity building, *Statewide Threat Assessment* designation[1], and prior tribal adaptation training and planning. Electronic and hard copy applications were sent to the communities targeted but few communities applied. During a second round of statewide recruitment, assisted by the Alaska Native Tribal Health Consortium and the Environmental Protection Agency Region 10, communities self-selected to apply to the project. Email announcements, with an electronic application and flyer, were sent to Tribes during this second round of outreach recruitment.

[1]Alaska Statewide Threat Assessment https://www.denali.gov/wp-content/uploads/2019/11/Statewide-Threat-Assessment-Final-Report-November-2019-1-2.pdf

Communities were selected based on the following criteria:

- A complete application, including the responses to application questions
- Range of team members, including representation of the Tribe, city, and corporation or other key people
- Interest shown during project recruitment (attending the webinar, calling and emailing)
- Project travel budget (project budget was limited, but travel cost estimates allowed maximizing participation)
- Proximity of applicant villages (two villages in same area)
- Existing adaptation planning efforts
- Absence of a completed, or nearly completed, community adaptation plan
- Ability to attend and participate in Fairbanks trainings

Participant Communities

The community selection process resulted in five BRT partner communities: Iliamna, Kotlik, Kwigillingok, Quinhagak, and St. Michael.

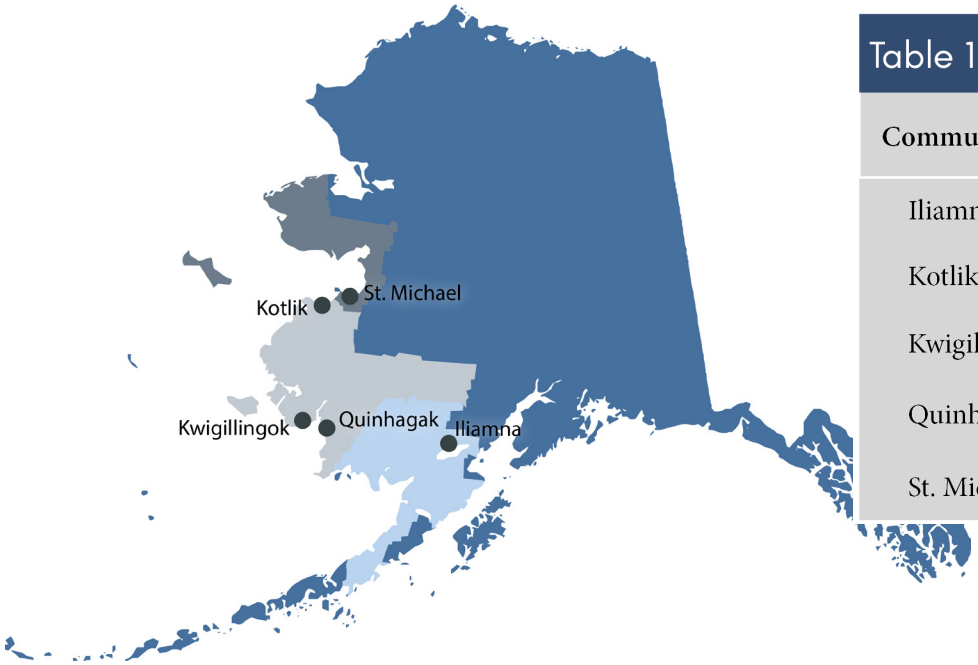


Table 1. Participant affiliation (n=11)

Community	City	Tribe	Village Corporation
Iliamna	1	2	0
Kotlik	0	1	1
Kwigillingok	0	1	0
Quinhagak	1	2	1
St. Michael	2	2	0

*Table 1. Training One participants, Kettle 2019. The 11 community participants attended Training One and varied in their roles. The community participants' affiliations (City, Tribe, Village Corporation) varied among the communities, but collectively incorporate a range of governance perspectives to consider in adaptation actions. * Note: these numbers represent the total number of affiliations of participants during Training One.*

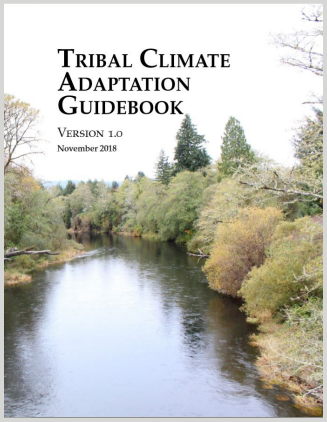
Pre-training Communication

To be responsive to the partnering communities in the design of the Training One agenda, the project team referenced environmental concerns expressed in the community applications and held a pre-training audio conference meeting with participants on March 21 and 22, 2019 to share an overview of the project.

Science Communication and Learning Strategies

The BRT project employed a deliberate approach that used best practices in climate communication (such as framing the issue, storytelling, and real-world applicability – Corner et al. 2018) as well as learning approaches tailored to a range of learning styles. The Mapping a Personal Story of Ecological Change activity helped to raise potential ways to frame climate issues, tied in personal feelings, and cultural maintenance. The sharing of stories throughout the training helped to build a common bond, and is a recognized form of traditional teaching within the Alaska Native community.

Relevant Resources



The training included an introduction to tools like the Tribal Adaptation Guide Book, the Adapt Alaska Toolkit booklet, and reference to completed Alaska tribal adaptation plans such as Oscarville Adaptation Plan and Nome Tribal Climate Adaptation Plan.

BRT participant map changes they see on the land. Photo: Molly Tankersley

BRT participants during a mapping exercise. Photo: Ryan Toohey

Learning Styles Addressed

While not a central theme of this project, the project team touched on the concept that every person has a unique style of learning and purposely sought to provide activities that addressed a variety of learning preferences. There are many factors that influence an individual's learning that range from environmental to social factors, such as: how warm or noisy a room is, working alone, and working in pairs or in a small group. Learning relates to the ways we take in new or complex information. Learners have ways that they prefer to take in information[2], which are:

Auditory - Hearing, listening, and talking through new or difficult information
Visual - Seeing pictures, graphics, maps information or data visualized, text
Kinesthetic - Moving, being in motion, while taking in information
Tactile - Using or working with your hands, while taking in information

[2]Springer, M. 2008. Differentiation Through Learning Styles and Memory. 2nd Edition., Thousand Oaks, CA. Corwin Press.

Fairbanks Training One

The following roadmap served as the broad agenda during the first meeting (Figure 2, below).

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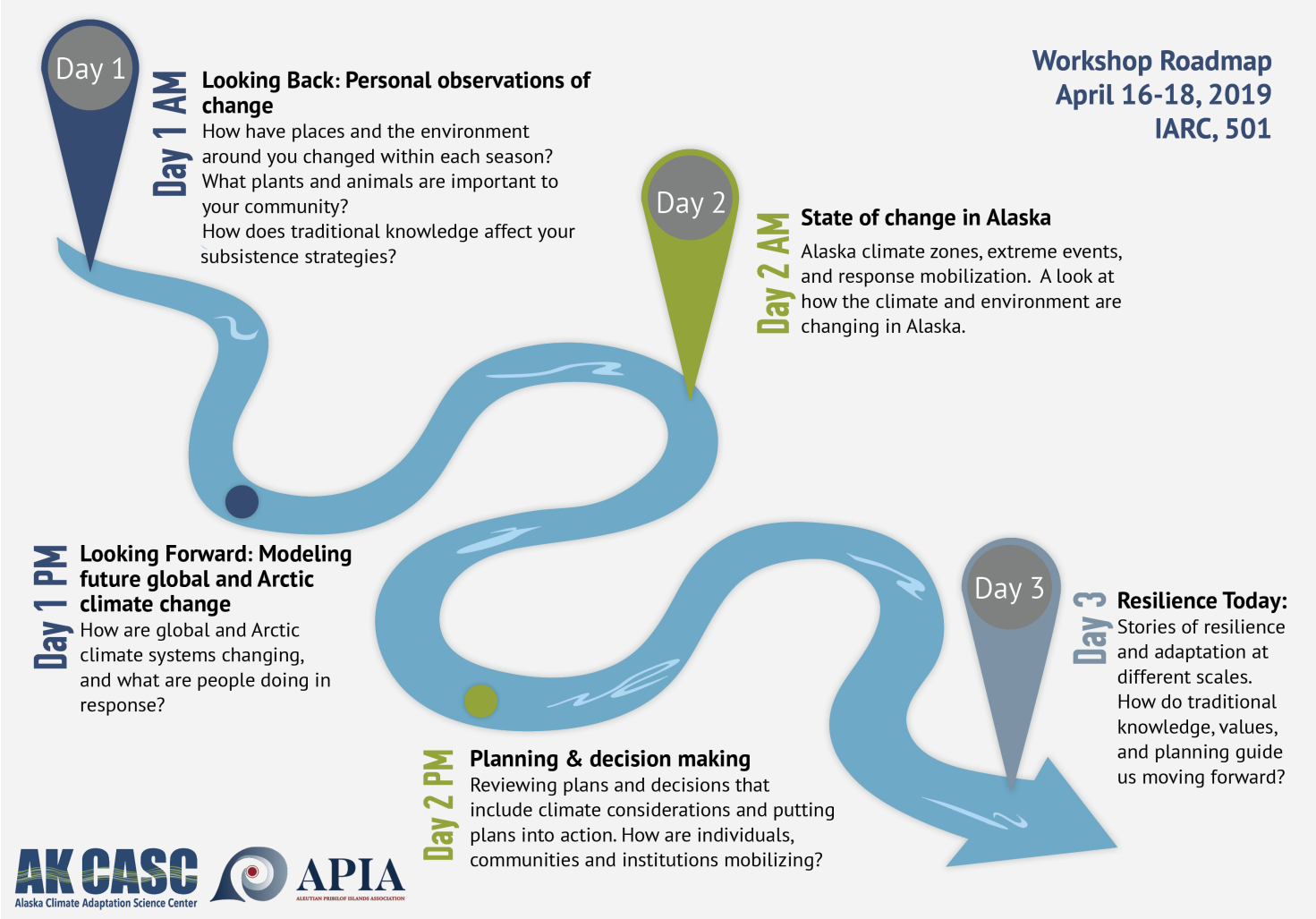


Training One focused on the first four project objectives on page 5. Training content was designed to:

1. *Increase knowledge about the earth's climate system through an Indigenous Knowledge and western climate science lens*
2. *Increase the understanding of how others are responding to climate impacts across scale, from local to global, including the Arctic*
3. *Begin to document the community's area of interest and identify the species the community depends and relies on*
4. *Provide a handful of adaptation planning resources and examples*

The first morning of the training was devoted to establishing cohort familiarity, through detailed introductions common to Alaska Native protocol, and reviewing group agreements developed by First Alaskans' Institute to support engagement in the training environment.

The rest of the training was a blend of Western science learning and community information sharing designed to:

- increase the local and traditional knowledge sharing among the participants;
- build a common understanding of the climate impacts in each community; and,
- provide a foundation for the forthcoming community workshops.

Participant definitions of Resiliency and Adaptation

During the workshop, participants collectively explored and defined the concepts of resiliency and adaptation.

Resiliency — surviving change, survival, fight, bounce back, learning from lessons, power, pliability, absorbing change, strength through time, dependable, strong, tough, teach to follow traditions, supporting one another, capacity to recover, determination, stand your ground, exercise, plasticity, strengthen, power, to fight.

Adaptation — education, innovation, survival, capability, malleable, change, survive, problem solve, adjust to adapt, conform, adjust, encouraging each other, lifestyle change, being prepared, perservering in the face of change, deal with the situation, efficacy, preparedness, to change our way, learn new way, make a change, learn to do things better than what they have learned, responsive, adjust.

BRT participants and instructors during Training One Photos: Molly Tankersley

Sharing Relevant Climate Science

The structure of Training One included time to share climate science related to local and community climate impacts as well as broad changes occurring in Alaska, across the Arctic, and globally. Arctic climate experts, John Walsh, Rick Thoman, and Jeremy Littell, presented on the global-to-local context of climate change, and highlighted the climate changes and impacts communities can anticipate between now and the end of the 21st century, or 2100.

Expected Climate Changes on a Global, Regional, and Local Scale

Presenter: John Walsh, International Arctic Research Center

John Walsh gave an overview of the global rise in temperature, showed the warming trend line in climate data, and explained how the different global emission scenarios related to the Paris Climate Agreement.

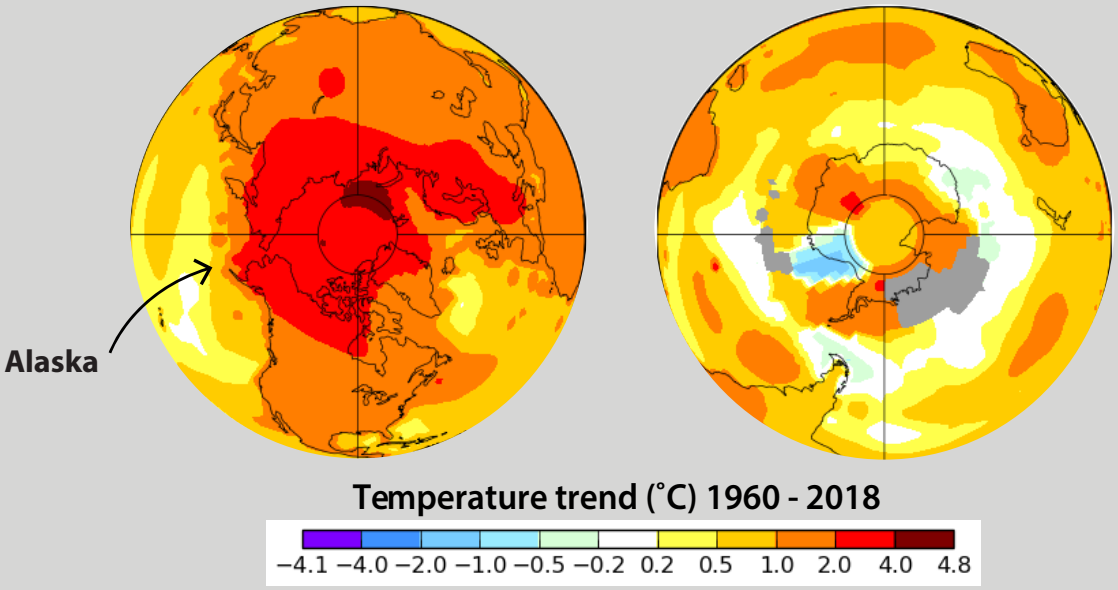
Key messages:

- **Alaska and the Arctic are the front lines of climate change – warming faster now, and projected to warm faster in the future, than the global average.**
- **Trends show that the climate is warming even though there is variability, creating the need for adaptation planning.**
- **The magnitude of future changes depends strongly on global emissions scenario, so there is a need for mitigation.**

AIR TEMPERATURE

3

The Arctic is warming faster than the planet as a whole.



Change in surface air temperature from 1960-2018 was between +3.6 and +7.2° F, depending on location, for Alaska, and higher for the Arctic (left) compared to the rest of the planet, including the southern hemisphere (right) (Figure 3).

Projected increase in Arctic air temperature for 2070-2090 is 3.6 to 9.0° F, more in winter and autumn than summer and spring.

Alaska statewide trend is warming.

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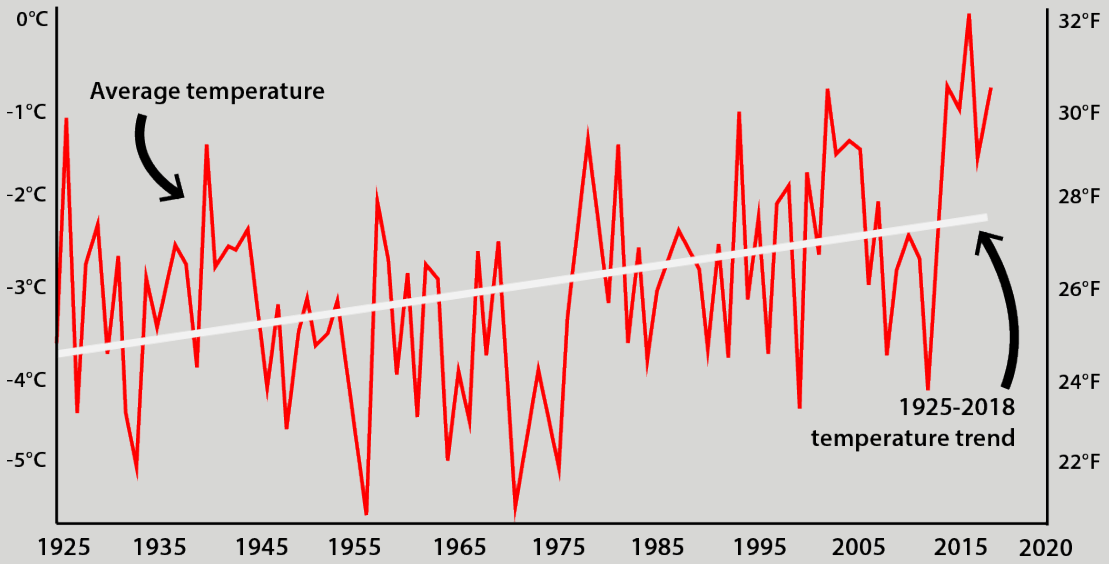


Alaska annual temperatures averaged over the state have increased, but are variable from 1925 to 2018 (Figure 4).

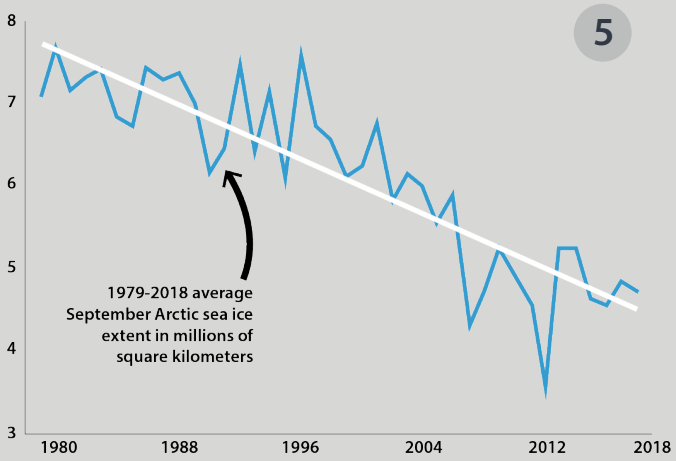
About 2.5 to 3.0° F increase in global temperature is inevitable at this point and is most of what is agreed to in the Paris Agreement; the difference between that and the 3.6 to 7.2° F global change in temperature depends on emissions for different future global economic pathways (Figure 8).

Warm days (those above 77° F) will increase, precipitation will likely increase in all seasons with more in fall and winter than summer and spring; and ice free conditions in September in the Arctic Ocean are expected by the 2030s to 2050s under a higher emissions scenario.

SEA ICE

Sea ice has decreased by about 40% in the Arctic since 1979 (Figure 5), and unprecedented low levels occurred in the Bering Sea in 2018 and 2019 (Figure 6).

5



Sea ice extent in the Bering Sea, 1850–2019

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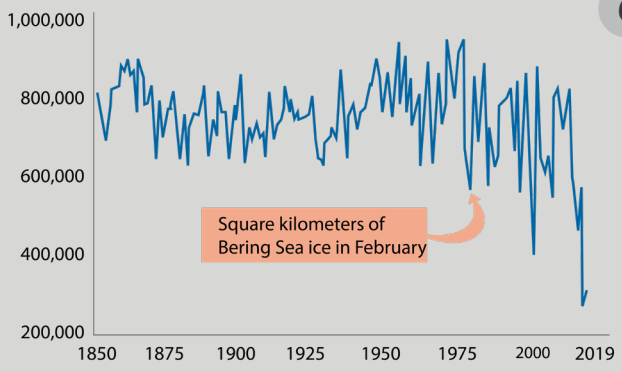
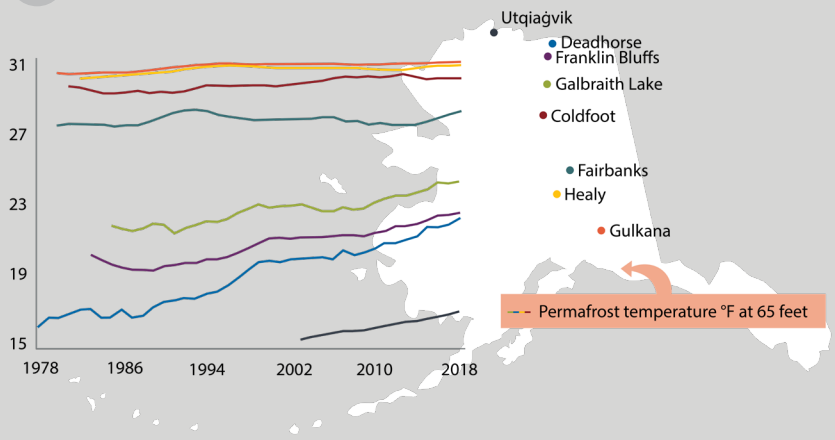


Credit: Zachary Labe, University of California, Irvine.
Data source: Scenarios Network for Alaska + Arctic Planning

LAND

North slope permafrost temperatures have been steadily increasing from 1978 to 2018.

7 Alaska permafrost temperatures, 1978–2018



Credit: Vladimir Romanovsky, Geophysical Institute.
Data source: GI Permafrost Lab Thermal State of Permafrost. Database, NSF

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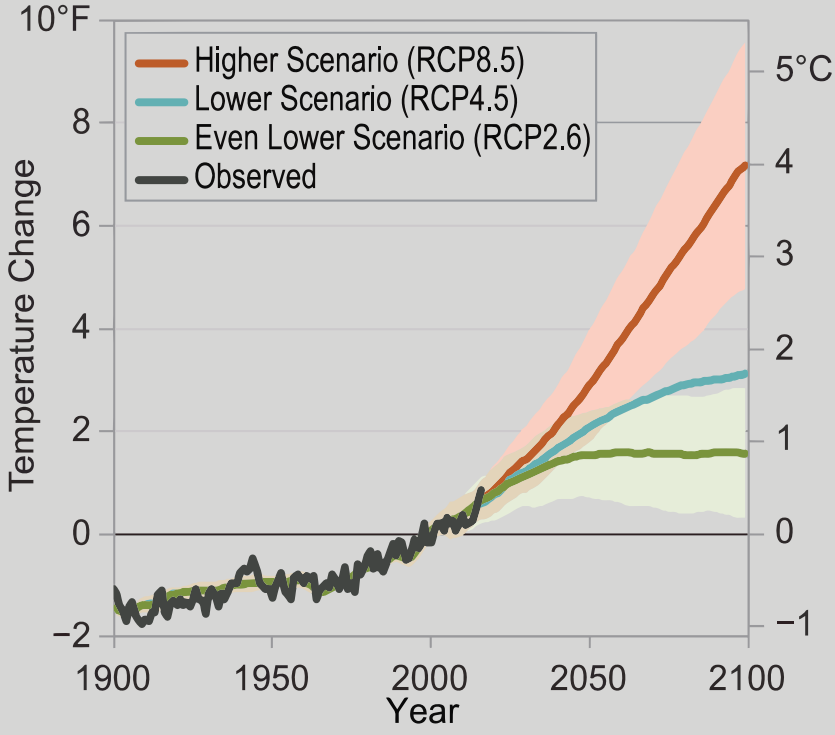
Snow cover will decrease. Rain on snow events will increase where snow still persists.

Impacts will include an increase in annual permafrost temperatures (Figure 7), drying of Arctic lakes, trends toward both vegetation greening and browning, longer growing seasons, increasing wildfire hazard and smoke impacts.

CLIMATE MODELS AND UNCERTAINTY

8 Global Average Temperature Change



Climate scientists create a range of possible future climate scenarios based on the amount of greenhouse gases produced known as Representative Concentration Pathways (RCPs).

The shaded bands around the lines indicate the range of model outcomes for each scenario. Based on emissions already in the atmosphere, there is an inevitable amount of warming that will occur, about 2.5° F degrees by 2080, because the average lifetime of CO_2 in the atmosphere is about 50 years.

Decisions between now and then determine which scenario ultimately becomes reality. In previous agreements adopted in 2009 and 2010, governments set a goal of keeping global temperature increases below 3.6° F above pre-industrial levels.

The Paris Agreement reaffirms the 3.6° F goal, while urging efforts to limit the increase to 2.7° F. The agreement also sets two other long-term mitigation goals: (1) a peaking of emissions as soon as possible, (2) net greenhouse gas neutrality (as much greenhouse gases are removed from the atmosphere as are emitted) in the second half of the century. Recent emissions are more consistent with RCP 8.5 than the lower emissions scenarios.

Using Climate Models

Jeremy Littell demonstrated how climate information can be used for planning and adaptation, emphasizing that there will be variability and surprises, and the rates of change across Alaska will vary.

Presenter: Jeremy Littell

Key messages:

- **The future will be a bumpy ride. Variability and extremes will still occur even if the average of projections looks smooth.**
- **Scenarios aren't forecasts. Plan for surprises and extremes.**
- **Let the decision and planning you need to do guide the use of climate model projections, not the other way around.**
- **Don't wait for better projections, you'll always be waiting!**

How do climate models work?

Climate models are developed on computers by using mathematical calculations to mimic natural processes that happen in the atmosphere, ocean and land. They show ways climate could likely be in the future and can help us plan for possible future conditions and develop solutions. In some ways, global climate models are similar to weather forecasts, but they focus on the processes and time scales necessary to simulate the climate at many dozens of miles and over seasons to centuries. To find the accuracy of these models, scientists compare the simulated historical climate conditions to historical observations of weather and climate to see if trends match up.

Natural processes alone, without greenhouse gas emissions, do not explain the observed temperature increases (Figure 9).

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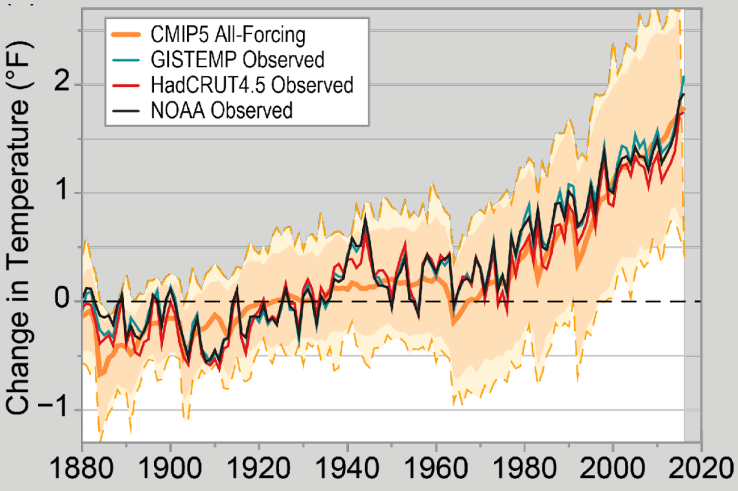
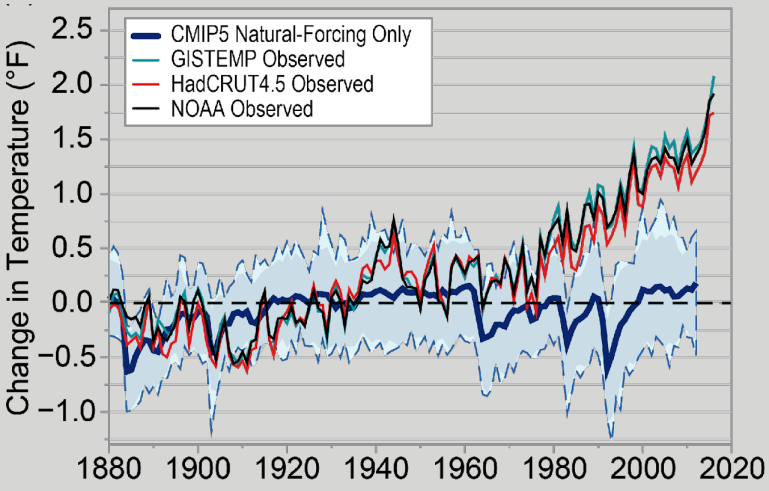
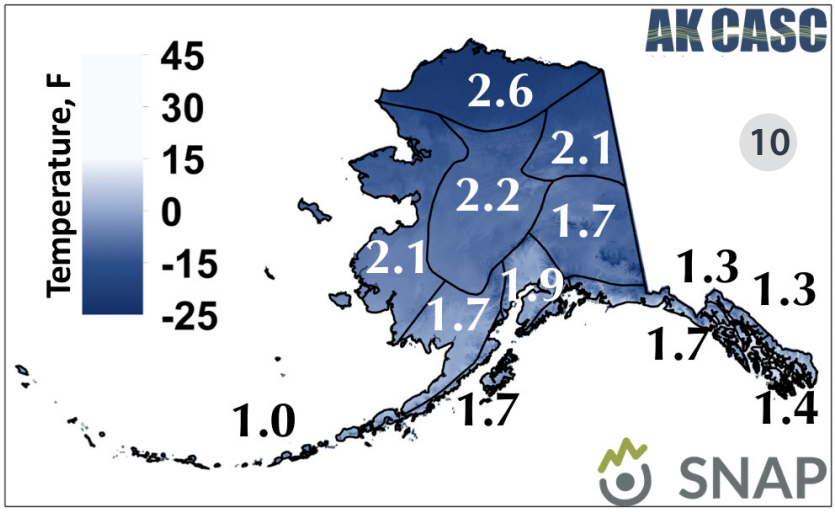


Global climate models with the the influence of greenhouse gas emissions.



Global climate models without the the influence of greenhouse gas emissions. In this scenario, the models (blue line, with a blue range of simulations) do not track the observed rise in temperatures compared to three different versions of observed global temperatures.

The rates of global, Arctic, and Alaska temperature change are fast, but across Alaska, the rates of change vary within the state. The North Slope is warming at 2.6 times the US average, and Alaska is averaging about twice the US rate (Figure 10). The lines on the map indicate climate divisions, and the numbers on the divisions indicate the rate of temperature change compared to that for the lower 48 states.



AK 1970-99 annual temperature and divisional warming rates (F), 1970 – 2016, relative to lower 48 US states. Data: SNAP, NOAA NCE

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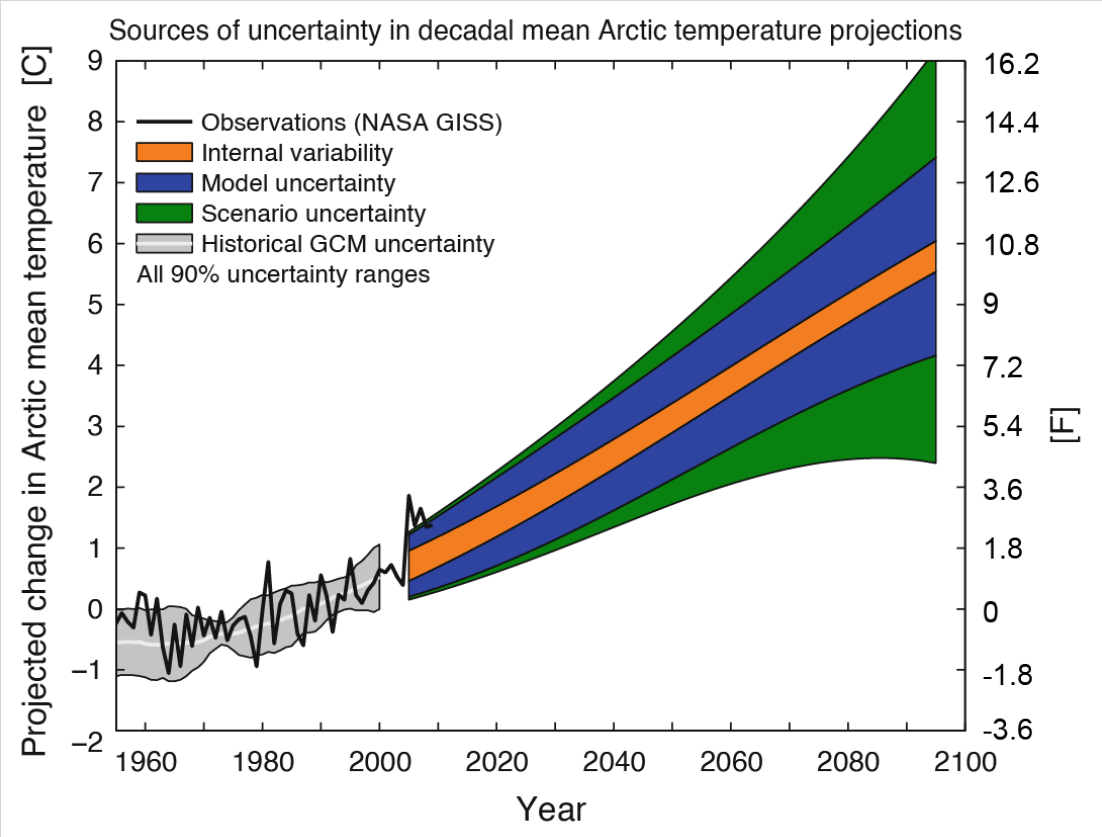


Global climate models (GCMs) capture the historical climate well, here represented by the NASA GISS (Goddard Institute for Space Studies) global observed record (Figure 11). GCMs project future climate using the main drivers of the climate system, such as land, ocean, and atmospheric processes, and include a range of possible greenhouse gas emissions scenarios.

There are three main sources of uncertainty in these projections: internal variability (the natural variability in climate from year to year), differences among models, and emissions scenarios (Figure 11). While internal variability is a larger source of uncertainty in the next 30 years, differences among models will create as much or more uncertainty until about 2050. Emissions scenarios are the source of more uncertainty late in the 21st century.

Weather and Climate Extremes

Presenter: Rick Thoman

Rick Thoman stressed the realities of increased weather extremes and long-term climate trends.

Key messages:

- **Today's extremes will not be tomorrow's extremes; today's extremes may be tomorrow's typical!**
- **Preparing for tomorrow's extremes means planning for: coastal flooding as a year-round threat, continuing erosion, abrupt ecological changes, and new hazards such as heavy winter rains, and summer heat.**

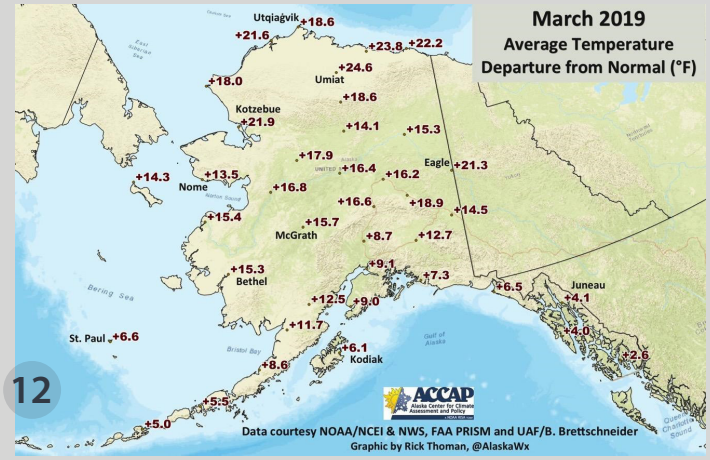
Weather extremes have immediate impacts that range from small impacts to threatening life and property. They are short duration, and "weather" goes back to "normal" even if the impacts are permanent.

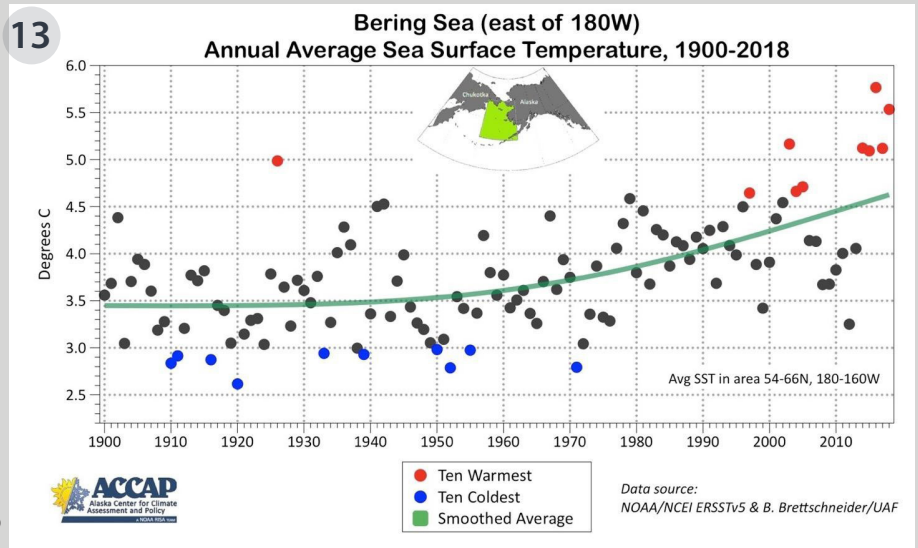
Climate extremes are long duration in the making - weeks to centuries. They have impacts on society, the environment, and they may be sudden. They may be long term, and may or may not go back to normal.

Climate extremes in Alaska can be illustrated by March 2019 temperatures (Figure 12), most communities in Western Alaska, the Interior, and the North Slope are 15 to 20° F warmer than the 1981-2010 normal!

The pattern of extremes in historical records of regional temperature and sea temperature are clear: Warm extremes are by far more common now than cold extremes. In an unchanging climate, they should be similar.

Differences between March 2019 observed and normal average temperatures for weather stations in Alaska.

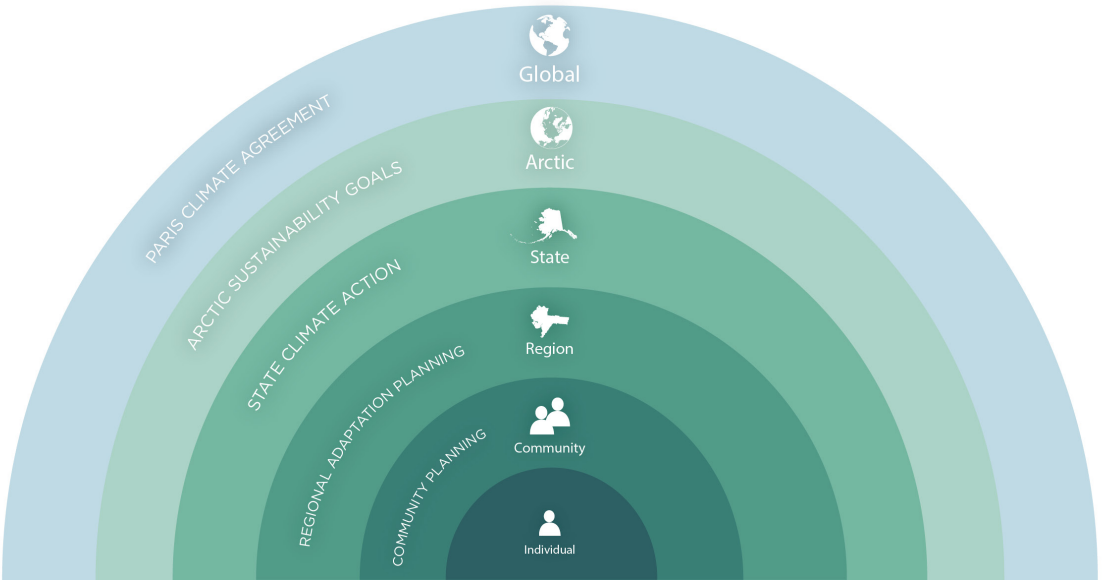




Sea ice is changing very fast, illustrating the rapid rate of change in extremes. This is in part due to changing sea surface temperatures (left).

For example, nine of the ten warmest Bering Sea sea surface temperatures have occurred since 1998 (Figure 13).

Linking Local to Global Action: An Introduction to the UN Sustainability Goals



14

By exploring local climate impacts of warming, and regional to global temperature change, along with the low and high emission scenarios, participants were able to see the connection between global climate change and their communities. In his presentation, John Walsh explained the role of the Paris Agreement in relation to the different emission scenario futures. Participants also received a brief overview of the United Nation's Sustainability Goals and were encouraged to consider how these same goals could be revised to create a set of Arctic Sustainability Goals (Figure 15). **It is critical to take local and regional action when action is not taking place at state and national levels.**

15

Building on Indigenous Knowledge and Experience

Training One content covered Project Objective 1's emphasis on local and Indigenous Knowledge and Objective 3's emphasis on community learning. The learning goals were to facilitate cohort familiarity, increase understanding of the local experience with climate impacts, and begin to establish the knowledge base for effective community visits. This helped create information tailored to regional- and community-specific planning efforts to share during the on-site community workshop events.

Participants also elaborated on community and Indigenous Knowledge in small interactive breakout group activities followed by large group discussions. Breakout groups were structured by community when the goal of the exercise was primarily community driven, and by small groups at other times to facilitate cohort development and cross-community sharing. Exercises included:

BRT participants during the Social-Ecological Change exercise. Photo: Molly Tankersley

Mapping a Story of Social-Ecological Change

Participants were provided paper, crayons and markers, then asked to individually draw a visual, like a map or picture, of a place they know well. On the map or drawing, participants were to draw ecological changes to the land they observed. Once the personal maps were completed, participants: 1) shared out their stories of change and observations in small groups, 2) discussed common changes experienced among the communities, and 3) identified how the community is responding. Common observed changes identified by the breakout group are listed in Appendix 3.

This exercise is an introductory lesson used as a best practice for engaging intergenerational community members, K-12 educators, and students to explore and share personal connection with the social and ecological changes, and to provide a starting point for collectively thinking and exploring climate change. The lesson can be accessed at:

https://sites.google.com/alaska.edu/arcticandearthsigns/learning-activities/mapping-a-personal-story-of-social-ecological-change

Concept Mapping: What do I know about the impacts and feedbacks of a warming Arctic and planet?

This interactive activity helped participants work together to share what they know about climate change impacts, linking those impacts to warming global temperatures and the relationship between the interconnected parts of the earth's system. This activity builds on prior knowledge and experience and helps to look at the earth, and especially the Arctic's climate and natural system, as a whole.

Participants were provided a poster sheet of paper with individual cards of climate impact descriptions and pictures taped randomly on the poster paper. Participants then discuss amongst themselves the connection between the impacts, like how decreased snow days may relate to an increase in summer wildfires.

Participants then drew a line and briefly explained the relationship between two impacts: A decrease in snow days will mean less moisture in the land, especially with an early snow melt, and increase the chance for wildfire due to lack of water and warmer summer temperatures. This exercise helped to provide a holistic view of the climate system and validated the participants' knowledge. This exercise is an interactive process used as a pre-and post assessment in Arctic Climate change education and can be accessed at:

https://sites.google.com/alaska.edu/arcticandearthsigns/learning-activities/understanding-impacts-and-feedbacks-of-climate-change-in-the-arctic

BRT participants during the Concept Mapping exercise. Photo: Molly Tankersley

Considering Future Scenarios and Information Needed: What do I want to know about when I think of 2030 or 2050 for my community?

During this activity, participants were asked to imagine their home community in the years 2030 or 2050. They were asked the following questions:

- What do you want to know about your community if you suddenly arrived there in 2030 or 2050?
- What would you need to know to find out if your community was healthy, sustainable, and prosperous?

Responses to some of these questions related to questions about: the extent of animal migration or loss, subsistence lifestyle, population demographics, mining development, pollution, and weather extremes.

Themes of what kind of information is needed to assist with decision-making were then identified and prioritized as questions in order of importance. An example of the questions are listed below. The purpose of this exercise was to allow participants to gain some insight into "planning forward," for an uncertain future.

COMMUNITY QUESTIONS

1. What major development projects have happened that are extracting resources? For example Pebble Mine - did it happen?
2. Have there been developments related to stabilization of coastlines? For example, was rip rap put along coastline to deal with coastal erosion in St. Michael?
3. What is the extent of coastal erosion?
4. Subsistence animals - where are they in relation to the community?
5. What new animals have moved in?
6. Are the animal species polluted or healthy?
7. Vegetation - What plants do we have and where are they? For example, trees and berries.
8. What new species of vegetation have moved in?
9. Will there still be a subsistence lifestyle? Are we still gathering and hunting?
10. Is there enough food and can it be accessed - food security?
11. Are we getting sick from the animals (zoonotic diseases)?
12. What is the extent of the sea ice?
13. Glaciers - did they melt, are there any?
14. Sea level rise - will St. Michael be under water?

BRT participants share their drawings of ecological change in small groups . Photo: Molly Tankersley

Values Exercise

This activity gave participants the opportunity to work collaboratively in their community groups through a series of rounds that required them to collectively agree on common values that they would choose to guide their community planning. Participants were provided a small stack of mini-cards with names of values and asked to pick the top 20 values, then progressively narrow their choices down to their top three values. Some of the values were: *Honesty, Family, Love, Hard Work and Working Together.* It was an exercise in finding common ground and discussing what are important values that assist in decision-making as leaders and as community members.

Identifying Species of Concern

Participants worked in community groups to list the many plant, marine mammal, fish, bird, and animal species they relied on and harvested. This exercise provided an opportunity to recognize the variety of species that each community depends on and has concerns about. Participants also had further opportunities to share brief stories and observations of change.

BRT participants map Arctic warming concepts. Photo: Molly Tankersley

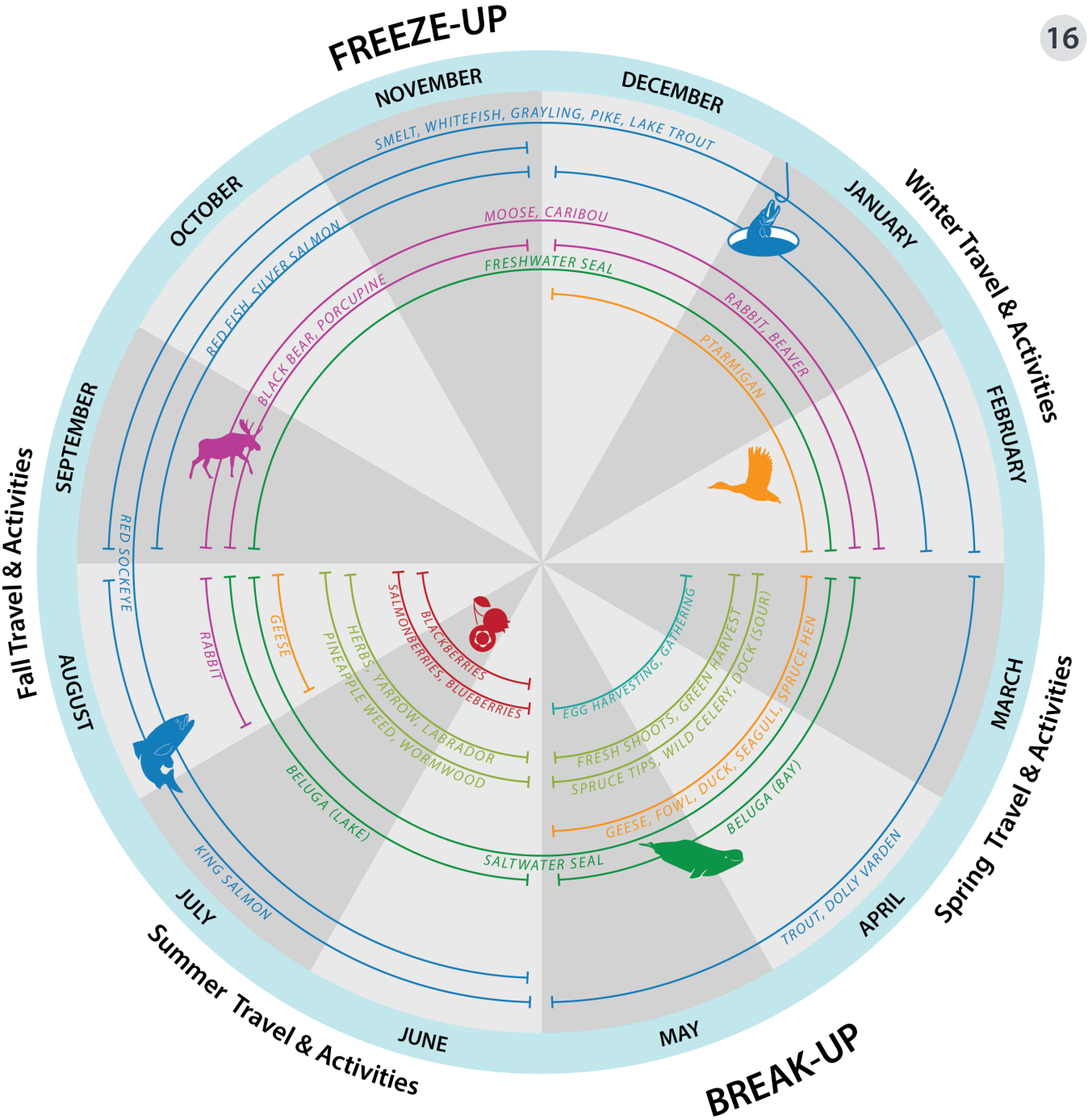
Identifying Areas of Concern

Each Alaska Native community in Alaska historically had a Traditional Use Area, prior to the 1971 passage of the Alaska Native Claims Settlement Act (ANCSA). Alaska Native communities still have common use areas that may be based on current land use and ownership or historical land use.

To help identify each participating community's area of concern, the project team provided the community teams large scale maps of the land and area around their villages. Working in their teams, they identified a use area that the project team could use to start developing detailed climate projections for each community.

Identifying past and current Seasonal Subsistence Changes

In order to document observed changes, participants were asked to list past and current subsistence hunting or gathering practices, identifying any observed changes in the arrival, harvesting, or hunting time of key species. Participants used poster paper and worked in their community groups to document the changes they are seeing or experiencing. These observations were documented in the form of Subsistence Calendars (Figure 16).



Considering the Role of Traditional Knowledge in Planning

Traditional practices, beliefs, and knowledge guided Alaska Native people in living sustainably, celebrating and honoring relations, and surviving the Arctic and sub-Arctic lands that have been home throughout generations. As communities plan for increasing changes to the land and climate that include significant challenges or potential disruptions, relying on and strengthening traditional practices and knowledge contributes to well-being and a sense of community.

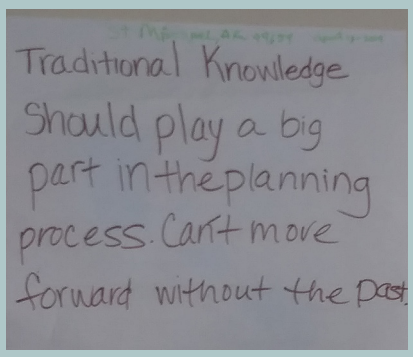
Socially cohesive communities are known to be resilient following major disruptions like an extreme weather event.[3] In this activity, participants were asked:

What role do you think including Traditional Knowledge should play in your planning projects?

Where are the places or who are people that you would seek out for gathering Traditional Knowledge to help in the plan or planning process?

PLACES TO SEEK TRADITIONAL KNOWLEDGE

- Interview Elders
- Discussions at meetings and *maqi* (steambaths)
- Church
- Regional Associations that have documented traditional knowledge
- CDQ group
- Cultural activities
- Village and regional corporation projects
- Books that have historical information
- Tribal and missionary records of families
- Old school project interviews of Elders
- Museum and publications
- Cultural camp
- Hunters and gatherers
- Youth
- The Internet
- Home
- Tribal Offices
- Corporation
- City
- School
- Forming an Elders Group
- Tribal Chief
- Historians



These exercises resulted in a greater understanding of the nature of how climate changes are affecting communities, as well as the commonalities among and differences between communities. Participants from communities and the training organizers alike increased their general familiarity with the challenges faced by other communities. The stories participants shared increased knowledge of similar and divergent conditions, impacts, and challenges.

[3] Baussan, D., Social Cohesion: The Secret Weapon in the Fight for Equitable Climate Resilience. May 2015.https://www.americanprogress.org/issues/green/reports/2015/05/11/112873/social-cohesion-the-secret-weapon-in-the-fight-for-equitable-climate-resilience/

Training outcomes

The Decision Contexts Communities Face

17

The exercises in the BRT workshop illustrated that while many communities face common challenges, they each have unique issues and cannot adopt one-size-fits-all adaptation approaches (Figure 17). The timing and size of some impacts will vary across the project communities. For example, permafrost and snowpack changes may be more extreme in Kwigillingok and Quinhagak than more northerly communities like Kotlik and St. Michael, while all are concerned about coastal erosion and flooding now and into the future. Similarly, governance structures vary across the communities with the history of tribal, corporation, and city development; these may affect the development of strategies with respect to land ownership and changes in resource use in the future.

Forming local community planning teams that include active involvement and sincere collaboration from the local entities, including the tribal and/or city government and the local ANCSA village corporation, along with key populations like Elders, youth, or women's or men's groups will help to build collective, supportive and sustained action for the community.

Community decision making clearly involves responding to ongoing environmental changes, current social issues and increasingly, planning for the future. Decisions are made by individuals, households, Tribes, corporations, and cities and include:

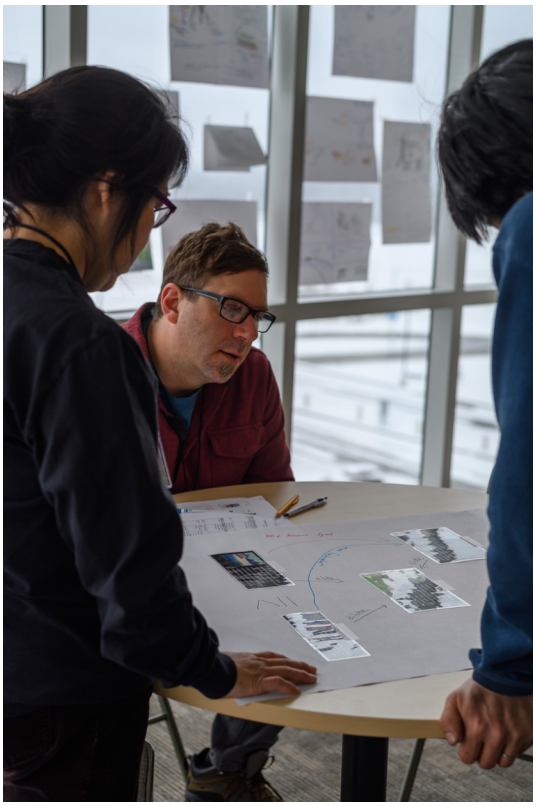
- When and how much to harvest
- What and how to monitor changes; when to do something to forestall the impacts of changes
- Infrastructure repair and replacement
- Possibility of and potential locations for relocation
- Whether and what relationships to develop with state, federal agencies, or other entities
- How to increase food security
- How to ensure education of youth
- How to ensure public health
- How to transfer Traditional Knowledge to younger generations and maintain a unique culture as an Alaska Native person, family, and tribal community

Evaluation Process and Response

Project funding was identified at the outset to provide for formal evaluation of the training. The Alaska Center for Climate Assessment and Policy (ACCAP) observed the proceedings and completed a formal evaluation. An evaluator observed much of the proceedings and used survey and focus group methods with the participants to develop the evaluation.[4]

In terms of learning objectives, the training appeared to be largely successful in that all learning objectives had 50% or greater response that the training increased the participants understanding "Quite a bit" or "A lot", although their knowledge of how other communities are preparing for climate change impacts scored equally for "A little" or "Some".

Several logistical and project challenges were highlighted in the responses, most having to do either with the delays imposed by government shutdown and funding allocation or travel logistics details. Participants also suggested better aligning the training activities with the time of day to increase effectiveness of learning (e.g., hands-on and icebreaker activities after lunch when there is a lull rather than in the morning, and talks with lots of information in the morning rather than in the afternoon). Finally, communication of the training objectives and a detailed agenda would have helped.



Artwork created by BRT participants during Training One. Photos: Molly Tankersley

[4] Kettle, N. 2020. Looking forward, looking back building resilience today: project evaluation. Fairbanks, AK: Alaska Center for Climate Assessment and Policy. 16 pages.

Table 2. Self-assessed learning during the training workshop (%). n= 11

	Not at all	A little	Some	Quite a bit	A lot
Historical climate change in Alaska	0	0	8	58	33
Potential future climate change in Alaska	0	0	0	42	58
Climate impacts that are happening in other communities in Alaska	0	0	8	42	50
How other communities in Alaska are preparing for climate change impacts	0	25	25	33	17
Climate change planning efforts that are happening at the regional, Alaska, and worldwide level that affect my community	0	0	25	42	33

Table 2. Survey Question: How much did the workshop increase your understanding of the following topics?

Participants suggested areas where they would like more information later in the project, including the following:

- Climate-related actions at the state [Alaska] and national level
- Funding and grant opportunities (n=2)
- ANCSA – land issues, policy, etc.
- The districts [climate divisions or tribal conservation districts?] that were divided
- Mapping, ArcGIS, historical community land/scene pictures
- Teaching and interactive tools and exercises to get and keep our communities engaged
- Scientific evidence of actual change for communities
- Permafrost areas and communities that may need to relocate
- Are some animals going to be harder to hunt and harvest in the future?

APPENDIX 1: Training 1 Agenda

Looking Forward, Looking Back: Building Resilience Today
April 16-18, 2019 - IARC Fairbanks Alaska

Tuesday, April 16

MORNING

8:30 Welcome
Acknowledgment of land with Malinda Chase & Elena Sparrow

8:40 Project overview
Malinda Chase, Jeremy Littell, and Ryan Toohey

9:00 Evaluations
Nathan Kettle

9:15 Introductions

9:55 Group Agreements
Krista Heeringa

10:15 Training Goals, Key Messages, and Learning Styles

11:30 Personal Observations of Change
Katie Spellman

AFTERNOON

1:00 Global and Arctic Climate Change
John Walsh

3:15 Common Climate Change Language and Concepts
Krista Heeringa

3:30 UN Sustainability Goals
Alicia Clement

4:00 Adaptation- How are global changes affecting the Arctic and Sub-Arctic
Katie Spellman

4:15 Arctic Responses to Climate Change- How is the Arctic mobilizing to respond to climate change impacts?

4:45 Days Reflections

Wednesday, April 17

MORNING

8:30 Parking lot

8:45 How are global changes affecting the Arctic and Sub-Arctic?
Katie Spellman

9:15 Extreme Events
Rick Thoman

11:00 Governance and Decision-making
Amy Lovecraft

AFTERNOON

1:15 Governance, Planning & Decision-Making Landscape
Amy Lovecraft

2:30 Choosing and Using Climate models for Alaska

3:30 Planning Approach, Framing and example of types of plans
Erica Lujan

4:45 Day 2 Reflection

Thursday, April 18

MORNING

8:30 Reflections from Day 2

8:45 Community Leadership and planing team

9:15 Traditional Knowledge: In Planning

11:00 Subsistence Species

11:30 Traditional Land Use Mapping

AFTERNOON

12:30 Working lunch (next steps)

1:30 Evaluation

2:15 Closing remarks

APPENDIX 2. Western Science Climate Information

Figure citations

Figure 1. Heather McFarland, International Arctic Research Center

Figure 2. Molly Tankersley, Alaska Climate Adaptation Science Center

Figure 3. GISS Surface Temperature Analysis (GISTEMP). Data: NASA Goddard Institute for Space Studies. Map is based on gridded observed temperature for land (GHCNv4: GISS analysis based on GHCN v4) and ocean (ERSST v. 5: NOAA/NCEI's Extended Reconstructed Sea Surface Temperature) temperature.

Figure 4. Data: nCLIMDIV, NOAA NCEI / NOAA National Climatic Data Center. doi:10.7289/V5M32STR

Figure 5. Data: NSIDC

Figure 6. Zachary Labe, University of California, Irvine. Data: Scenarios Network for Alaska + Arctic Planning

Figure 7. Vladimir Romanovsky, International Arctic Research Center. Data: GI Permafrost Lab Thermal State of Permafrost, NSF

Figure 8. Fourth National Climate Assessment

Figure 9. : Knutson, T., J. P. Kossin, C. Mears, J. Perlwitz, and M. F. Wehner, 2017: Detection and Attribution of Climate Change. Climate Science Special Report: Fourth National Climate Assessment, Volume I. Wuebbles, D. J., D. W. Fahey, K. A. Hibbard, D. J. Dokken, B. C. Stewart, and T. K. Maycock, Eds., U.S. Global Change Research Program, Washington, DC, USA, 114–132. doi:10.7930/J01834ND

Figure 10. Alaska Center for Climate Assessment and Policy. Data: Scenarios Network for Alaska + Arctic Planning, NOAA NCEI

Figure 11. Hodson, D. L. R., Keeley, S. P. E., West, A., Ridley, J., Hawkins, E. and Hewitt, H. T. (2013) Identifying uncertainties in Arctic climate change projections. Climate Dynamics, 40 (11-12). pp. 2849-2865. ISSN 1432-0894

Figure 12. Rick Thoman, Alaska Center for Climate Assessment and Policy. Data: NOAA/NCEI, NWS, FAA PRISM, B. Brettscheider

Figure 13. Alaska Center for Climate Assessment and Policy. Data: NOAA/NCEI ERSSTv5, B. Brettscheider

Figure 14. Molly Tankersley, Alaska Climate Adaptation Science Center

Figure 15. United Nation Sustainability Goals

Figure 16. Molly Tankersley, Alaska Climate Adaptation Science Center (template adapted from Krista Heeringa, Community Partnership for Self-Reliance). Content: BRT community teams

Figure 17. Molly Tankersley, Alaska Climate Adaptation Science Center. Content: BRT project team

APPENDIX 3: Group Breakout Exercise Outcomes

Activity: Observations of a place and key species led by Katie Spellman on April 16th, 2019

Instructions: Imagine a place special to you. What changes have you observed?

Changes we have observed – common themes:

- Group 1:
  - Erosion
  - Moving homes due to erosion
  - Plant and animal diseases
  - Channels of rivers changing
  - Timing of seasons / plants / animals / birds / fish / ice
  - New species

- Group 2:
  - Insects –abundance, timing
  - Caterpillar
  - Seagulls a month early
  - Berries disappearing – cranberries, blackberries
  - Lightning in January
  - Winds higher, more

- Group 3:
  - Trees are getting bigger
  - Bears hiding in the bigger trees (danger), more bugs in the trees, change in viewshed
  - New trees appearing, establishing
  - Less ice
  - Warmer winters (less fuel needed)
  - Fleas – dog and cats!!

- Group 4:
  - Sick animals – lesions, different smells, disease
  - Public safety (eating animals) and public health
  - Permafrost thaw
  - Thick ice
  - Hotter sun
  - Sun rises and sets in a different place; stars are in a different place
  - Powerlines pulled out of ground and shifting
  - Permafrost visible and melting into water (river and ocean)
  - Cemeteries
  - Sea ice used to go further south, into Aleutians. Now Kotzebue or even further north
  - Less snow, more rain in December
  - High tide is higher than in youth