

# Alaska Tribal Resilience Learning Network



## Climate Information for Adaptation Planning

April 8-10, 2025

International Arctic Research Center, Fairbanks



Climate Information for Adaptation Planning participants and facilitation team.



International  
Arctic Research  
Center

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# Acknowledgments

*Hosted by the Alaska Tribal Resilience Learning Network in partnership with the Native American Fish and Wildlife Society. Scholarships for UAF credit support by the UAF, Tribal Government USDA Drumbeats program.*

## ORGANIZING AND TRAINING TEAM

**Organizing Team:** Krista Heeringa, Malinda Chase, Lori Petrauski, Jerilyn Kelly, and Jolene Auliye  
**Guest Trainers:** Nancy Fresco, Scenarios for Alaska and Arctic Planning and Emily Sousa, IARC Geospatial Education Specialist

**Guest Presenters:** Jessica Garron and Evan Joyce

**Participant Presenters:** Colleen Timmer, Native Village of Hooper Bay and Paimiut; Lucy Martin, Native Village of Kwigillingok; Rayna Paul, Native Village of Kipnuk

## PARTICIPANTS WERE FROM THE FOLLOWING TRIBES AND ORGANIZATIONS:

- Native Village of Fort Yukon
- Kwethluk Alaska
- Native Village of Kwinhagak
- Chevak Native Village
- Native Village of Kipnuk
- Native Village of Paimiut/Hooper Bay
- Native Village of Kwigillingok
- Nunapitchuk
- Akiak
- Tanana Chiefs Conference, Infrastructure Division
- Kawerak, Inc., Climate Change Program
- Alaska Center for Climate Assessment & Policy at the University of AK Fairbanks, Engagement Specialist
- Alaska Institute for Justice Climate Justice Program Coordinator



Jerrilyn Kelly presenting on the language we use to understand the world, and talk about climate science.

# Training Overview

## TRAINING DESCRIPTION

This interactive workshop was designed to help you find, interpret, and apply climate projections and science in planning, proposal writing and decision making that is relevant to your community, village corporation lands, or municipality.

## TRAINING OBJECTIVES

- Increase understanding of terms used in addressing climate issues.
- Introduce data sources and climate projections useful in climate adaptation planning and proposal development.
- Demonstrate how to interpret and apply data source and climate science using local and Indigenous Knowledge as the basis for interpretation.
- Compile a document of relevant climate data, projections and stories that can be utilized in planning, proposal development and advocacy.

## CONTEXT

The objectives for the Climate Information for Adaptation were developed in December 2024 and registration for this training opened in early January. In just a few short months between when the training was advertised and when it was held in early April the federal funding landscape shifted drastically. Many of the tribes present at the training expressed experienced funding pauses and cancellations that support important and significant climate adaptation strategies. Examples included cancellation of funding for a significant erosion abatement project in Kipnuk through the FEMA Building Resilient Infrastructure and Communities (BRIC) program, suspension of funds for a feasibility study on a potential relocation site in Kwigillingok, and frozen funds for a feasibility study where major work had already been conducted in Fort Yukon. Tribes that have been consistently working towards steps to protect their communities from risks of rapid erosion and flooding and the setbacks posed by suspended and canceled funds are significant.

## KEY CONCERNS: Shared following the Mapping a Personal Observation of Change

- More unpredictable weather, earlier springs, and more wind
- Flooding - increased amount of storms
- Erosion - land disappearing - homes needing relocation
- Land subsidence - floating moss - impact to building and maintaining infrastructure
- Salt water intrusion and freshwater ponds drying up
- Challenges to animals from less snow and more freezing rain, there are more sick animals and impact to subsistence including decreased fish counts. There are new plants coming in and accessing subsistence is more challenging.
- Loss of sea and river ice



Playing the terminology matching game.

# Training Content

## Activities

A primary activity that guided the individual and small group activities of the workshop including a training worksheet (Appendix 1). The questions and activities in this worksheet were designed to assist participants integrating data tools into climate adaptation planning or proposal development. Some segments of this activity were amended or cut short. The evaluation did not include questions related to the efficacy of this approach.

Several games and interactive activities were utilized during this training. These included the Mapping a Personal Observation of Change<sup>1</sup> and Understanding Impacts and Feedbacks of Climate Change in the Arctic, both adapted from Arctic & Earth Signs<sup>2</sup>. We also utilized a vocabulary matching exercise and the vocabulary Fly Swatter Game<sup>3</sup> to introduce new climate and remote sensing terminology. These activities were all completed on Day One. For review we developed a climate jeopardy game utilizing [jeopardylabs.com](https://jeopardylabs.com) that reviewed key terminology and concepts on Day Three.

## Community Presentations

Community presentations were given by Colleen Timmer with the Native Village of Hooper Bay and Paimiut, Rayna Paul with the Native Village of Kipnuk, and Lucy Martin with the Native Village of Kwigillingok. Each presented on existing adaptation priorities, current strategies for furthering this work as well as ongoing and new challenges. Each presenter shared strategies that provided useful examples for how to move forward on adaptation strategies that resonated with other participants. Colleen shared an infographic developed by Hooper Bay with support from partner Alaska Wildlife Alliance that characterizes climate impacts by the current generation, next generation, and 3rd generation. This infographic resonated with workshop participants and displayed the current and future climate impacts in a way that was easily digestible. Rayna Paul shared a variety of strategies being pursued by Kipnuk including completing a tribal hazard mitigation plan independent from direct support from FEMA. Lucy Martin from Kwigillingok shared some of the arc GIS products that she has completed on behalf of the native village of Kwigillingok, including a story map profiling climate impacts. Workshop participants expressed how valuable it was to hear from other communities to learn about strategies and examples that might work for their own communities.



Lucy Martin, Tribal Resilience Coordinator for Native Village of Kwigillingok presenting.

1 <https://arcticandearthsigns.alaska.edu/learning-activities/mapping-a-personal-story-of-social-ecological-change>

2 <https://arcticandearthsigns.alaska.edu/learning-activities/understanding-impacts-and-feedbacks-of-climate-change-in-the-arctic>

3 Fly Swatter Game instructions available through an online search of educational games.

# Data Tools Explored

Day Two focused on introducing publicly available (free and online) remote sensing data and climate projections. Broad overviews were given in the morning, and the afternoon participants had the opportunity to explore several tools with the guidance of instructors Dr. Nancy Fresco and Emily Sousa. Both Nancy and Emily first provided a broad overview of data tools in the morning of Day 2, and in the afternoon participants had the opportunity to navigate the tools in smaller groups working through each in greater detail. Jolene Auliye gave an overview of climate concerns facing Shaktoolik and Jerilyn Kelly an overview of climate concerns facing Quinhagak that were both used as reference points and examples on identifying and evaluating potentially useful data sources.

## Considerations for including remote sensing in planning with Emily Sousa

Emily profiled several publicly available remote sensing data tools that have the potential for being used in an adaptation planning context in Alaska. Among the tools that were demonstrated that had the most interest in terms of its potential usefulness, and ease of use was ESRI's Living Atlas of the World, [Wayback](#) application that allows viewers to easily compare satellite imagery between the years 2014-2025. There was a significant range of familiarity with GIS and use of mapping software among participants ranging from no prior experience to those that regularly use mapping in their work. This range of familiarity posed notable challenges in determining which tools to profile, and to what depth

## Guiding questions for deciding what type of imagery could be useful for planning

What do I want to know?

*Sea ice extent, temperature over time, how quickly permafrost is melting, photos of storm damage, etc*

What **timeframe** do I need?

*Decades, a few days, a snapshot in time, a summary of changes over a few years, etc.*

What is the **resolution** I need?

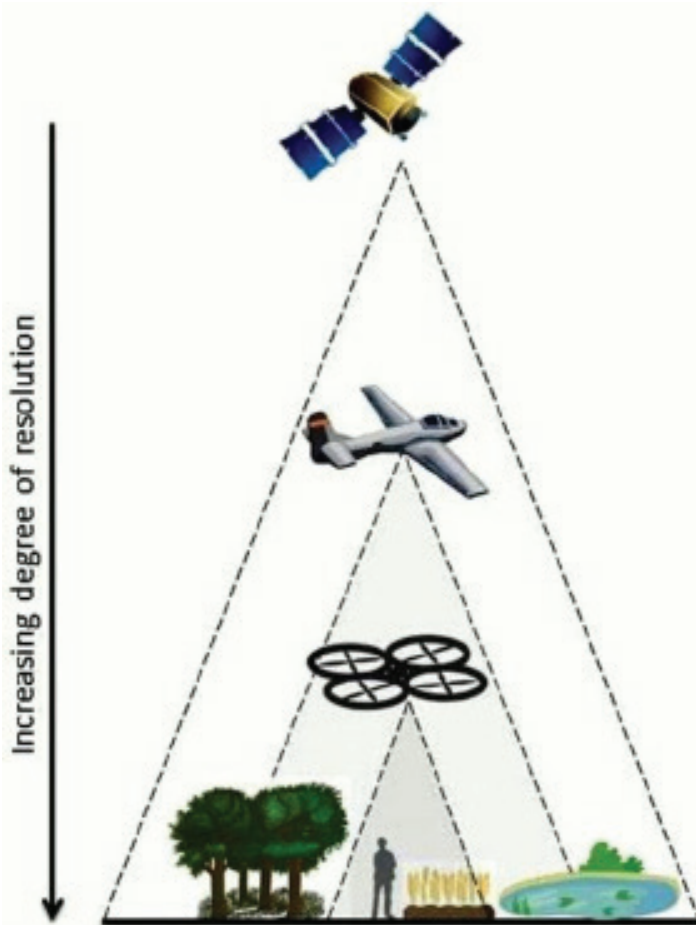
*Need to fine details - houses, infrastructure, shoreline. Broad patterns, no need to see fine details, etc.*

What **scale** do I need?

*Regional, statewide, community, small strip of riverbank, etc.*

## Data tools profiled

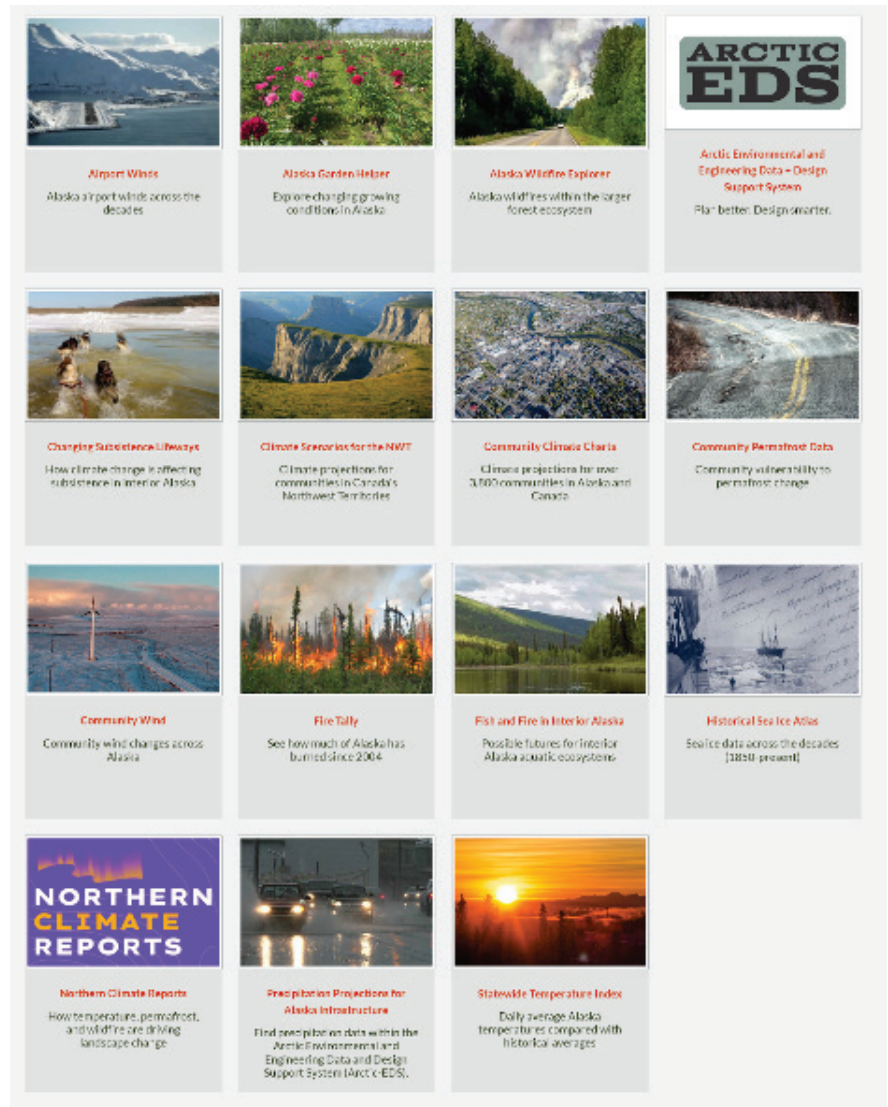
- [State of Alaska Geoportal](#)
- [NASA Worldview](#)
- [ESRI ArcGIS Living Atlas of the World](#)
- [Earth Map](#)



Nixon et al., 2017

## SNAP Data Tools

The [Scenarios for Alaska and Arctic Planning \(SNAP\)](#) Climate Tools offer ways to look and think about climate projections. Modeled climate projections can be a useful tool in thinking about what the climate might look like in the future to help guide the decisions that are being made today. Several of the SNAP climate tools were introduced including the Community Permafrost Data and the Northern Climate Reports. While the use of examples were used to demonstrate some of the profiled tools, at least one participant suggested working through an example from “beginning to end” that showed how to find and then put together data for a community.



Nancy Fresco, introducing what goes into models.

## Guest Presentation

Two guest presentations were given. The first presentation was given by Dr. Jessica Garron profiling how drone imagery can support a variety of community planning and environmental response priorities such as monitoring coastal erosion, supporting search and rescue, and inspecting vulnerable community infrastructure. Dr. Garron also discussed how individuals can work towards their drone pilot license to support the growing team of individuals that can respond to current and emerging issues. The second presentation was given by UAF Graduate student Evan Joyce that profiled the topobathy and bathymetry coastal mapping effort being led by a variety of partners including UAF and the US Army Corps of Engineers. Key features of this mapping effort include mapping underwater elevation profiles especially useful in modeling wave and floodwater movement.

# Workshop Agenda

## Day 1 April 8

8:30 Arrival and Breakfast  
9:00 Welcome & Introductions  
10:15 Break  
10:30 Personal observations and stories of change activity  
11:15 Activity report out  
12:00 Lunch  
1:00 Climate Change Language and Terminology  
1:45 Carbon Cycle  
2:15 Break  
2:30 What goes into climate projections introduction  
3:15 Connecting climate impacts to climate variables activity  
4:00 Daily wrap-up and departure for Permafrost Tunnel Tour  
4:30 Close

## April 9

8:00 Arrival and Breakfast  
8:30 Preview of the day and check-in  
9:00 Considerations for evaluating information for planning and decision making  
9:20 Finding climate data and projections in existing plans  
10:00 Break  
10:15 Shaktoolik Case Study  
10:30 NASA data tools overview  
11:00 Break  
11:15 Quinhagak Case Study  
11:30 Scenarios for Alaska and Arctic Planning (SNAP) data tools overview  
12:00 Lunch  
1:00 Energizer  
1:30 Climate and environment break-out #1  
3:00 Break  
3:15 Climate and environment break-out #2  
4:30 Daily wrap up & close

## April 10

8:30 Arrival and Breakfast  
9:00 Preview of the day and check-in  
9:30 Climate data and projections debrief  
10:00 Community presentation  
10:15 Break  
10:30 Community Panel  
11:15 Using Drone photography - Mike DeLue  
11:40 Bathymetry data - Evan Joyce  
12:00 Lunch  
1:00 Climate terms Jeopardy review  
1:45 Telling the story of climate impacts in your community  
2:45 Break  
3:00 Climate planning and action in uncertain times  
3:45 Evaluation  
4:00 Announcements and training wrap-up  
4:30 Close

# Training Worksheet

## What is the purpose of this handout?

The purpose of this handout is to help you work through personal, or community specific examples of how to interpret and apply remote sensing data tools and SNAP climate projections introduced during this training. We hope that by working through relevant examples, the information you compile on this worksheet can contribute to, or strengthen existing planning or proposal efforts you may already be doing. This worksheet can be completed for a community or region.

## Activity 1, Step 1: Climate change in my community

1. Describe your community, region or area of concern.
2. Describe some of the significant changes you have experienced in your community or area of concern in the last [5,10,20,+ years] that could be related to climate change.
3. What changes can you imagine might occur in the next [10, 20 and 50 years]?

## Step 2: Action Mapping

4. Highlight, or place a check mark, next to the climate impacts that are of greatest concern to you or your community?
5. What are you concerned about with these climate impacts now and/or in the future?
6. What actions could you or your community/ organization take now, if you knew it would make a difference for impacts being experienced today.
7. What actions could you or your community/ organization take now to make a difference for impacts that might be experienced down the road?
8. Do you know if these impacts or actions are included in an existing plan or assessment?

**Table 1**

| Planning or Action Step                                                                              | Example Communication and Planning Tool                                                  | Audience                                      |
|------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|-----------------------------------------------|
| We need to build local (or regional) consensus in order to move forward.                             | Posters, PowerPoint, 1-2 pagers, Facebook posts                                          | Local community                               |
| Our community (organization leadership) has consensus on moving forward, but need to begin planning. | Adaptation Plan, SCERP, HMP, Risk Assessments (permafrost thaw, flooding, erosion), etc. | Local community and state or federal agencies |
| We have plans in place but are working on permits.                                                   | Permit or regulation                                                                     | State and federal agencies                    |
| We have plans and permits in place but need to acquire funding.                                      | Funding proposal                                                                         | Funder                                        |
| We need to influence policies related to a species or area of concern.                               | Policy brief, public testimony                                                           | State or federal agencies                     |
| We need to mobilize collective action and share our story with a broad audience.                     | Media, film, story maps                                                                  | General, broad audience                       |

## Activity 2: Climate variables related to key concerns

Environmental data and climate change projections are based on a variety of variables that can be used to describe the climate system including things like (temperature, precipitation, sea surface temperature, and wind direction). These variables impact the land and environment in diverse ways such as (permafrost thaw, flooding, drought, and extreme events). The impact is a result of change in the climate system.

9. Describe the climate impacts (permafrost thaw, flooding, drought, and extreme events) that you think are most related to the changes you drew on your map or described earlier. You can list more than one.
10. What climate variables (precipitation, temperature, wind, sea surface temperature) do you think are most related to those climate impacts?

## Activity 3: Finding climate projections and data in existing plans

Look through your community's existing plans or assessments?

11. What's the time frame, area, and scale the plan covers?
12. Is the plan still current?
13. Whose is the plan written for?
14. Is there climate information included? If so, what does it include?
15. What other sources of data are included?
16. Do you understand it?

## Activity 4: Computer Lab

Step 1: After having time to learn about different climate information tools, navigate to the website and tool that has the climate information most relevant to the climate impacts you have identified.

- Scenarios for Alaska and Arctic Planning- Climate Tools
- State of Alaska Geoportal
- NASA Worldview
- NASA Eyes on Earth
- ESRI ArcGIS Living Atlas of the World
- Earth Map

Step 2: Take a screenshot, or download the map or graphic for your community or area of concern and paste below. (Screenshots: Windows users: Shift+S+Windows Key or Screenshots or Mac users: Shift+Command+4)

Step 3: For each map or graphic you include, answer the following questions for remote sensing tools:

17. Do you understand what the map, graphic, or data says?
18. Describe what you think the map or graphic shows?
19. Do you think you/ your community could use the information for planning, proposal development or advocacy? Why or why not?

## Activity 5: What is the best information to plan or tell your story of climate change?

Based on your community and the actions you need to take, what information would you find most helpful in your work and why?

20. Based on your community and the actions you need to take, what information would you find most helpful in your work and why?
  - Indigenous Knowledge
  - Local observations or photographs
  - Existing reports
  - Specific mapping or environmental assessments
  - Drone imagery
  - Satellite imagery
  - Climate Projections

# Workshop Evaluation

## Did you get what you wanted out of this training? Why or why not?

- Yes, a lot of climate information. Mapping and predictions, better prepare our community
- Yes, before this training it was rather difficult obtaining maps/ aerial maps of my community through a public search engine.
- What are the data sources for climate factors affecting AK communities and how can I apply them to assist communities.
- Learned a lot and put into perspective what I used to hear at home from my Elders.
- Awesome information, resource
- Yes, I really needed a 101 class on the topic
- I wasn't sure what to expect but I did like it. I wanted time to get to know people and learn how to help them.
- yes. I was able to meet new people and get connections on things I want to work on
- Yes. Seeing this training in person helped me personally (new tools, etc.) but I also learned/ observed strategies and formats I will use when facilitating meetings or sharing tools with communities/ Tribes in my region.
- Yes, some very helpful tools we can use to explain to funders
- Yes, gathered a lot of information, how to approach, create mapping, future predictions, mainstreaming. What website we can use to gather very useful information.
- Yes, there is so much information that was shared that is beneficial for us. Finding out more resources and tools we could use to create or develop a plan.
- Yes, more mapping skills need more climate projections
- Yes, I learned new things I will utilize like the mapping software.
- Yes. This specific training really opened all the possible tools to help with community projects.
- Yes, new resources how that FEMA BRIC is canceled. our communities can collaborate
- Yes, I have learned a lot

## Most highly rated aspects and sessions of the training

- Opportunity to connect, learn and share with others (9)
- Climate projects and profile of the SNAP tools (6)
- Community Presentations (6)
- Review of publicly available remote sensing tools (5)
- Climate and remote sensing data break-out sessions (3)
- Presentation on drone photography and how it can be utilized (3)
- Presentation on bathymetry data (2)
- Climate change language and terminology (2)
- Training worksheet activities (2)
- Climate planning in uncertain times (2)
- What goes into climate downscaling (1)

## Suggestions for improving the training in the future summary

- Start the training with prayer or positive words, Play music during breaks. Stretch times, sometimes we get sleepy listening and sitting for long periods of time.
- maybe fidget toys. kleenex
- Activities to pair with each presentation to break it up and energize us.
- This training helped me open up my mind. I've learned a lot and it was very interesting hearing stories from each individual from their community.
- It would help if there were interpreted words included in the vocabulary.
- Maybe more community sharing presentation time. Thorough question/ answer so I can be more prepared.