



# Coastal Resilience in Alaska

April 21, 2020

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# Current and Future Challenges to Alaska Coastal Resilience

Jeremy S. Littell,  
US Geological Survey and  
DOI Alaska Climate Adaptation Science Center







Kivalina

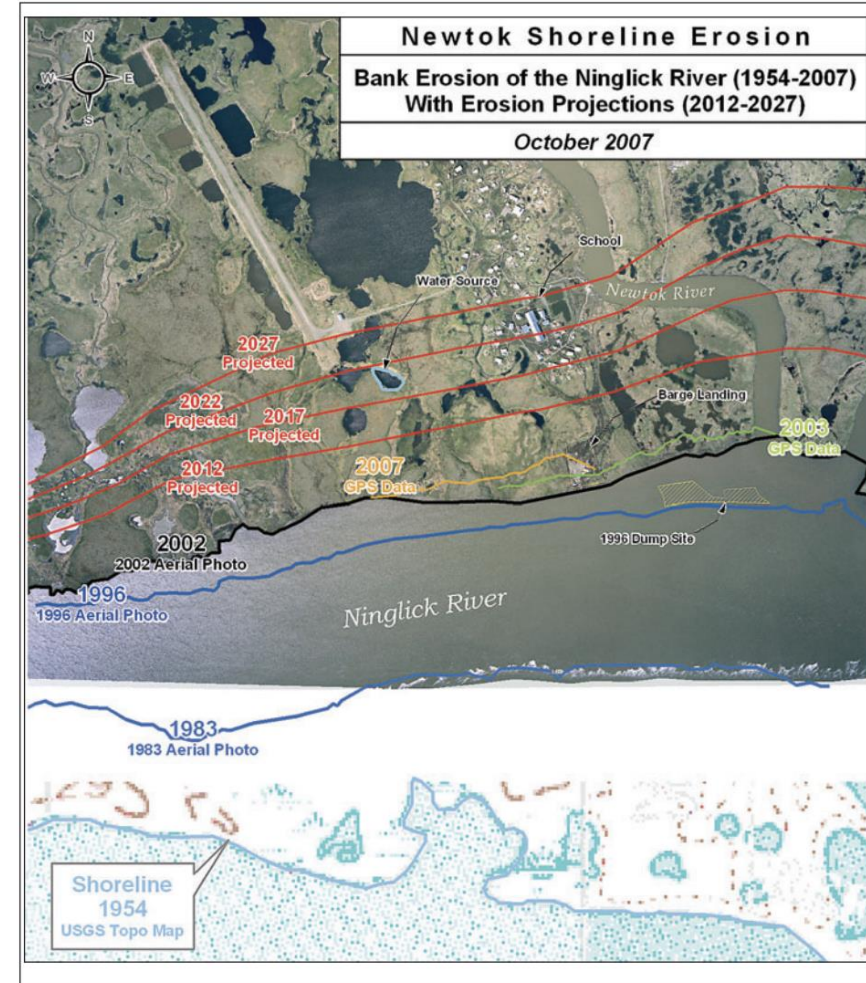
<https://toolkit.climate.gov/image/1184>



Shishmaref



Figure 6: Shoreline Erosion Map for the Village of Newtok, Alaska, October 2007



Newtok

<https://dggs.alaska.gov/hazards/coastal/monitoring-shishmaref.html>

<https://www.gao.gov/new.items/d09551.pdf>

Vulnerability Type	Coast Type		
	Exposed	Sheltered	Riverine
Possible Erosion	●	■	▲
Erosion	●		▲
Erosion and Flooding	●	■	▲
Flooding and Possible Erosion	●	■	▲
Flooding	●	■	▲

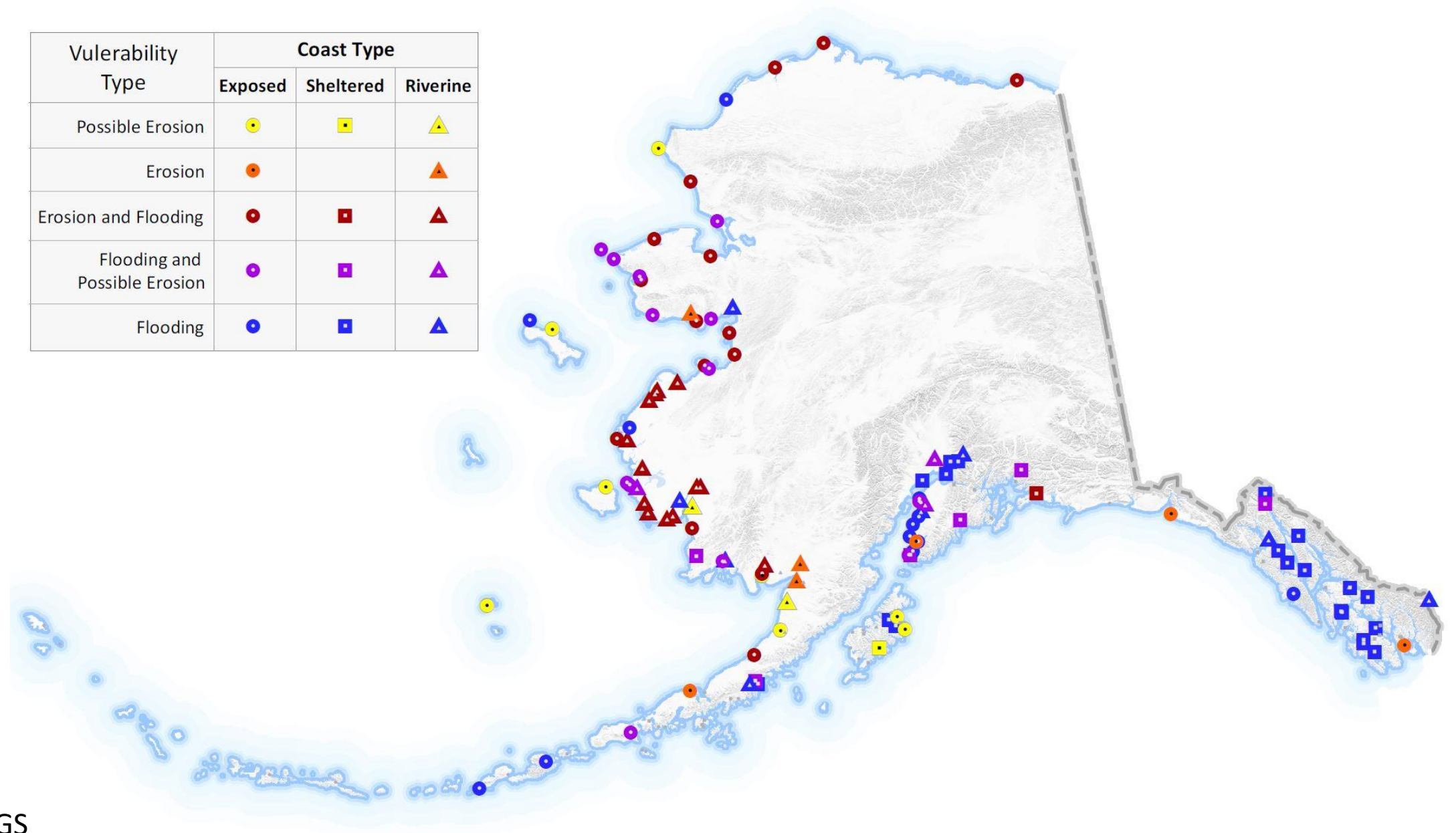


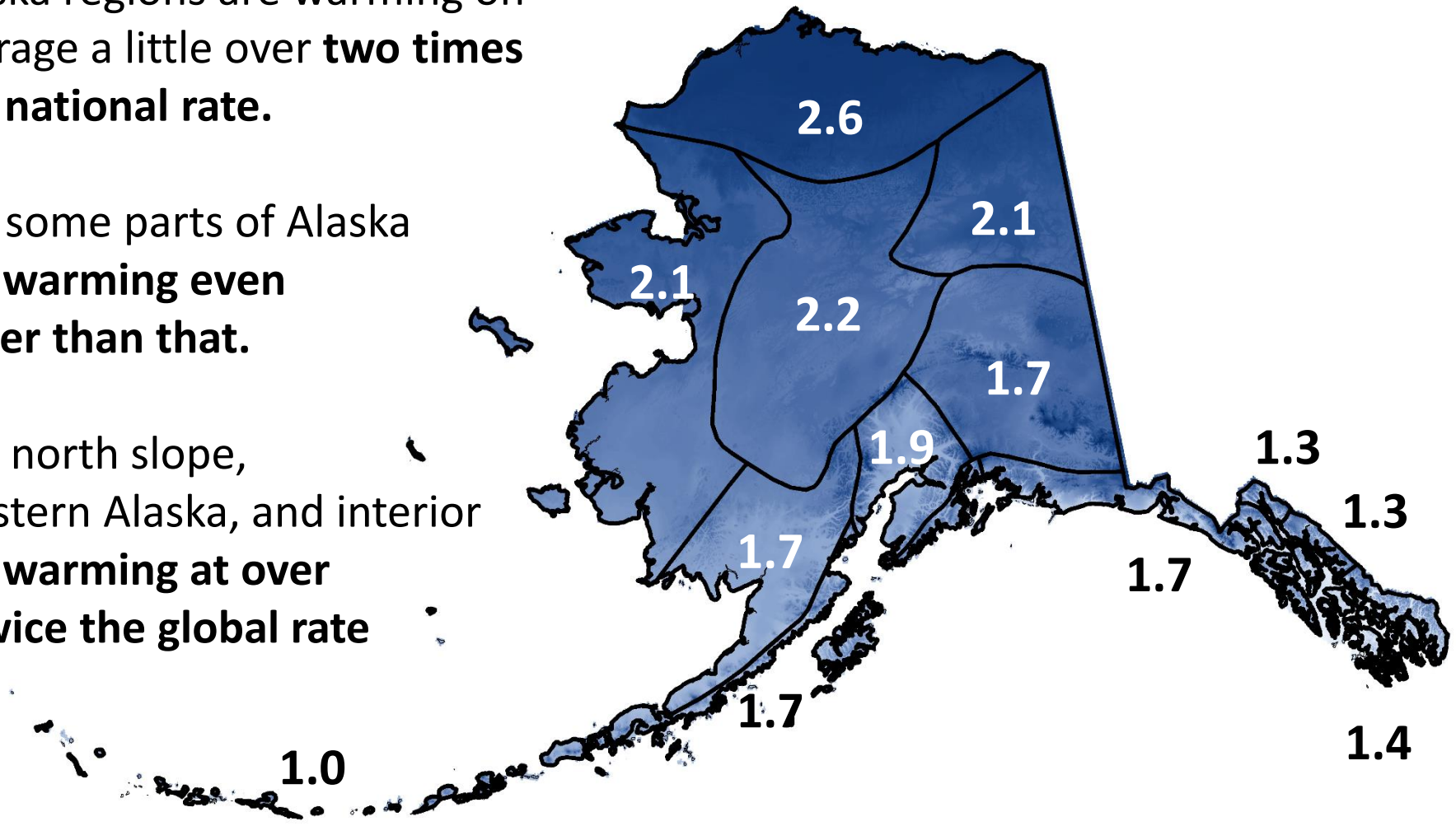
Figure: AK DGGS



Alaska regions are warming on average a little over **two times the national rate**.

But some parts of Alaska are warming even **faster than that**.

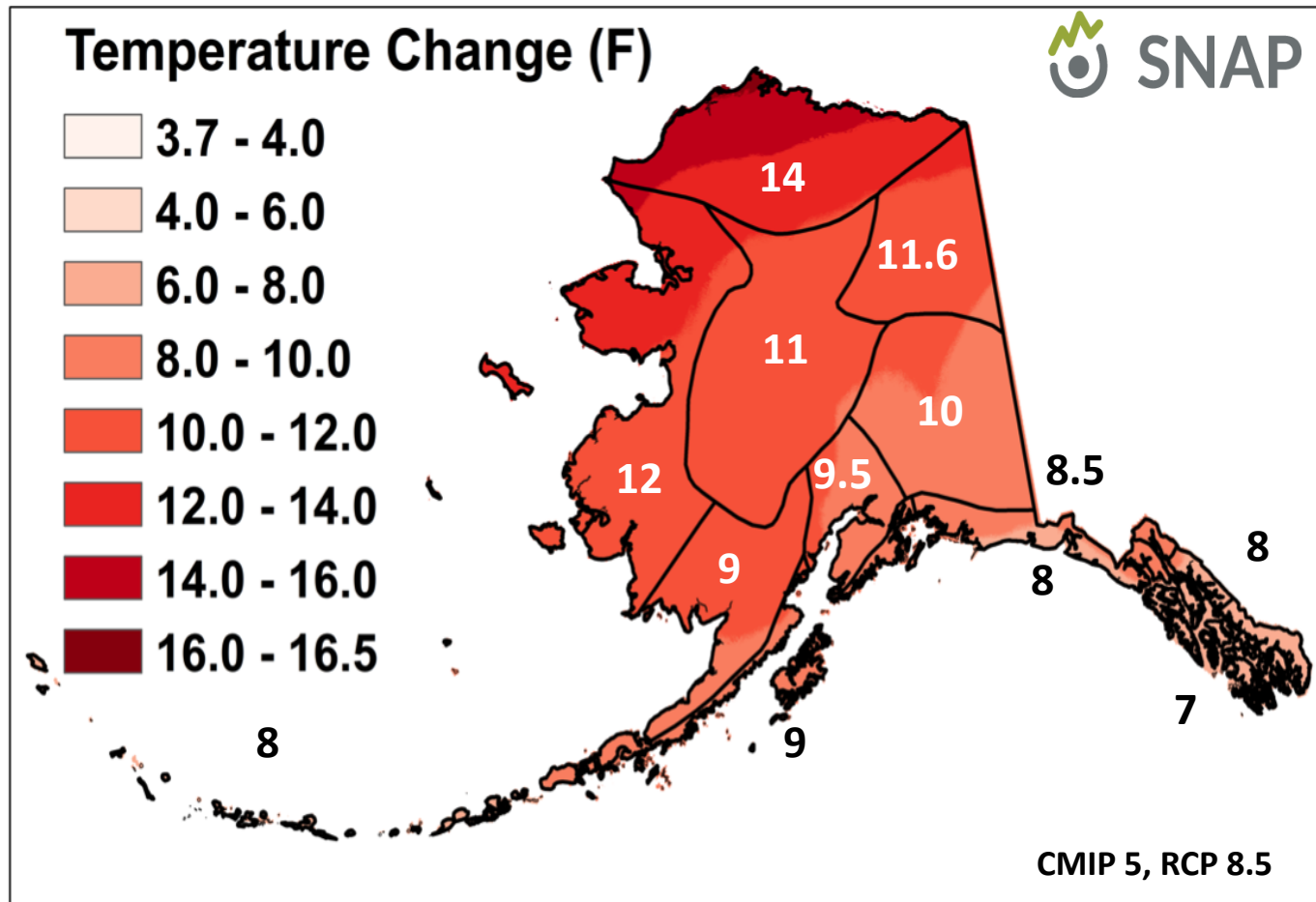
The north slope, Western Alaska, and interior are warming at over **twice the global rate**



This map shows climate divisions of Alaska. The number for each climate division indicates the rate of warming compared to the CONUS; 2.6 means *2.6 times the rate of US warming*

*1970-1999 average annual temperature, with state climate division rates of change compared to US average for 1970-2016. Data: NOAA NCEI*

# Temperature changes by the late 21<sup>st</sup> century



Projected warming is greater than the historical variability by the 2050s.

For planning and adaptation purposes, however, *the timing and magnitude of fundamental change* is key.

2070-2099 projected change in annual average temperature compared to 1970-1999 for AK. 5 climate model average, higher emissions. NCA4 Ch. 26, 2018. Climate division averages also from UAF/SNAP data.

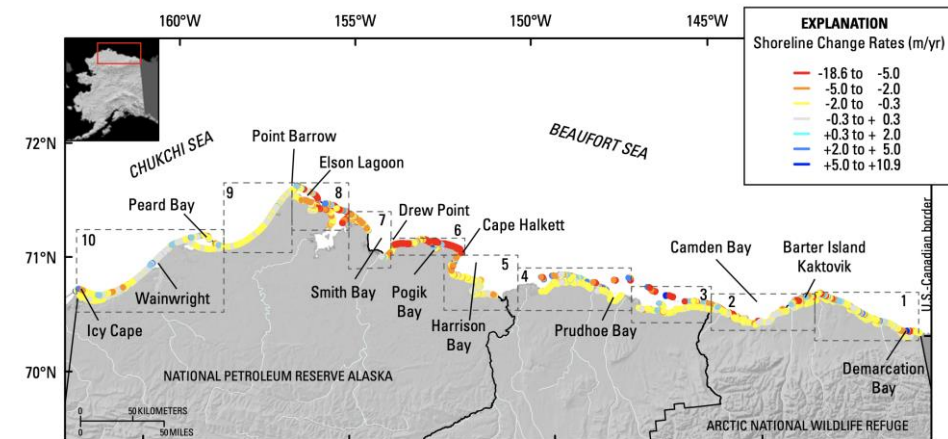
# Permafrost Thaw



Barter Island, near Kaktovik, AK (Credit: S. Harrison, USGS Pacific Coastal and Marine Science Center. Public domain.)

In places where there is a long history of western science shoreline and permafrost data, rates of erosion due to permafrost thaw can be calculated.

Much of the western coast of Alaska has insufficient observations to conduct community-level analysis.



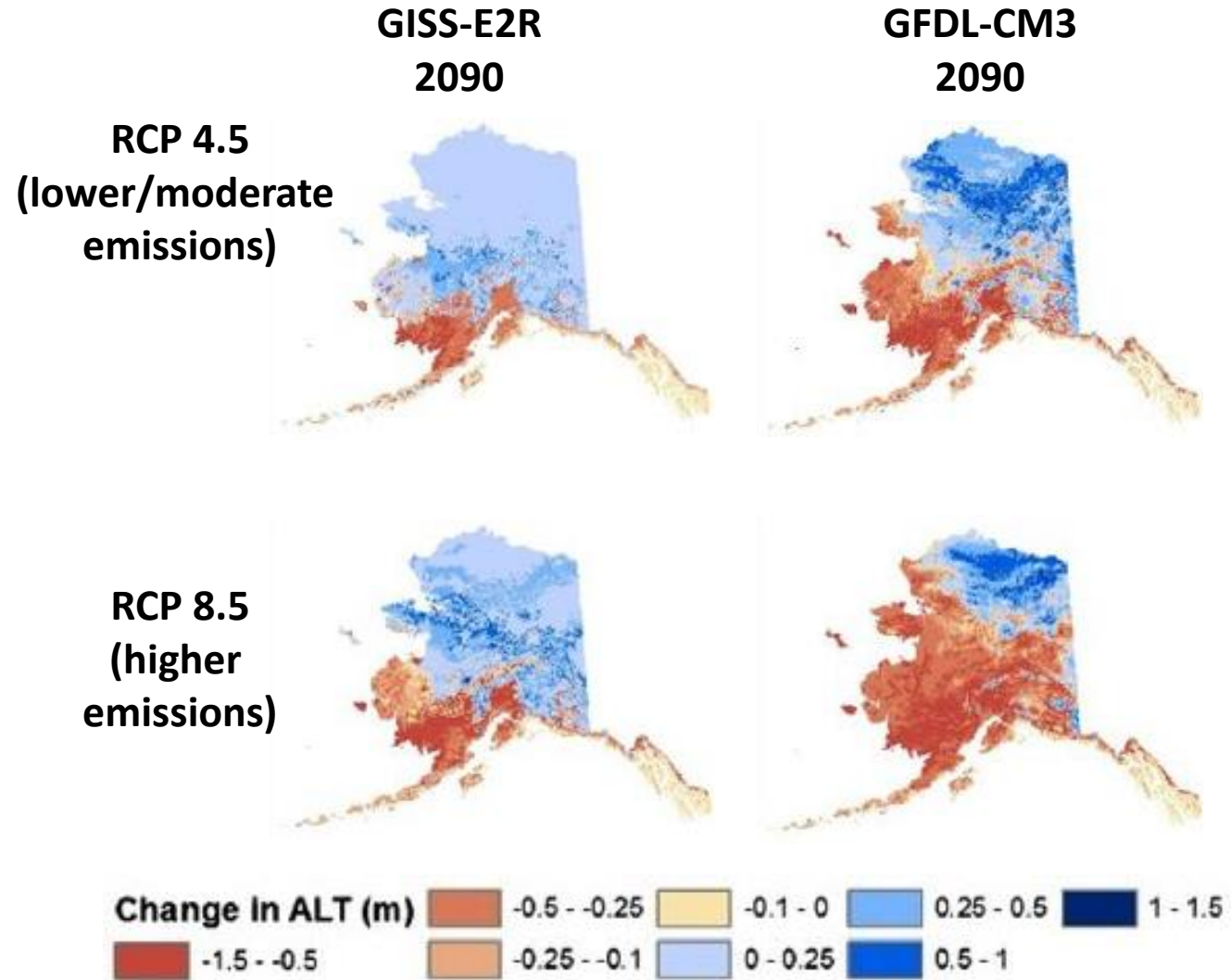
Map of the north coast of Alaska study area showing color-coded shoreline change rates, the boundaries of the ten analysis regions (dashed boxes and numbers), and key geographic locations discussed in the report.

# Permafrost Thaw

Permafrost is projected to continue to thaw.

Projections indicate active layer (seasonal thaw) depths inconsistent with near-surface permafrost over much of the Bering Sea coast under a model with less warming under moderate (RCP 4.5) emissions.

Thaw is projected over the entire west coast of Alaska under a model with more warming under higher (RCP 8.5) emissions.



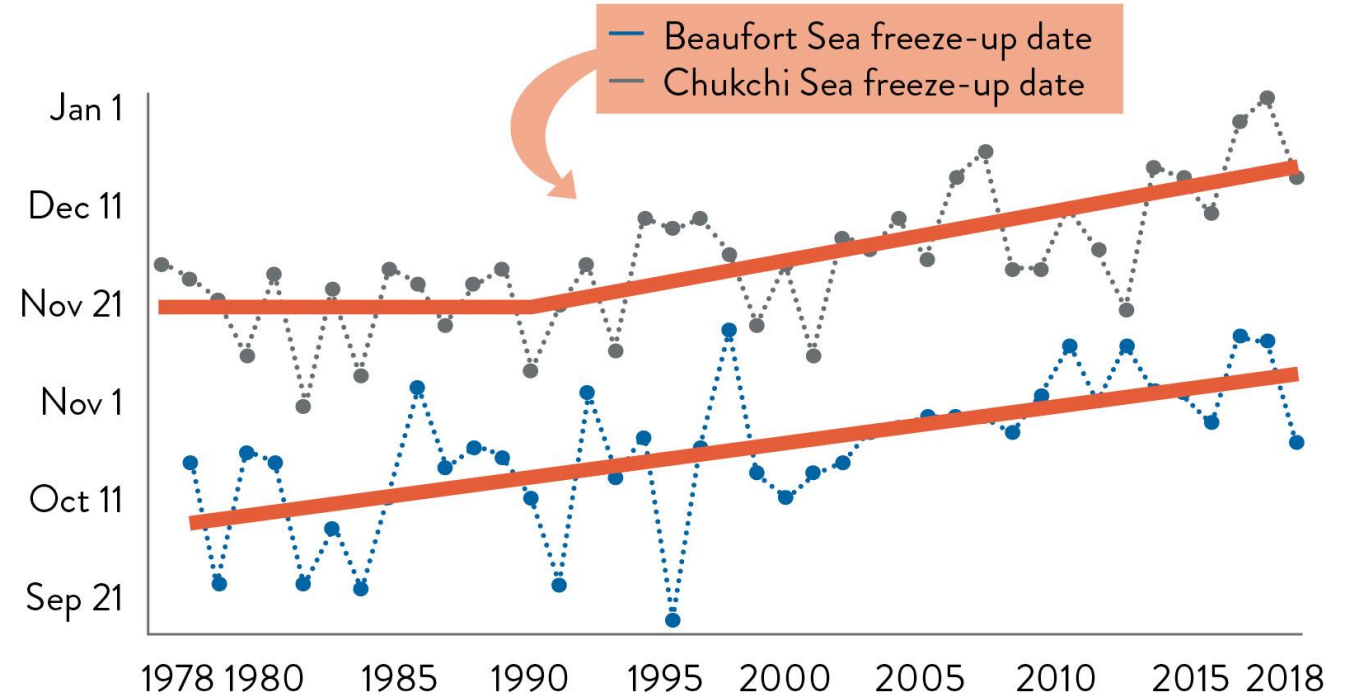
Relative to 1986-2005 baseline.  
Modified from Melvin et al. 2017, PNAS

# Sea ice-free season

Ice-free conditions in the Bering, Chukchi, and Beaufort seas are projected to increase roughly 1 week per decade south of latitude 60N and about two weeks per decade north of latitude 65N.

This would result in considerably longer ice-free seasons, during which storms (usually fall and winter) of even historical magnitude would be more likely to cause erosion and flooding events.

## Freeze-up dates, Beaufort and Chukchi Seas, 1978–2018



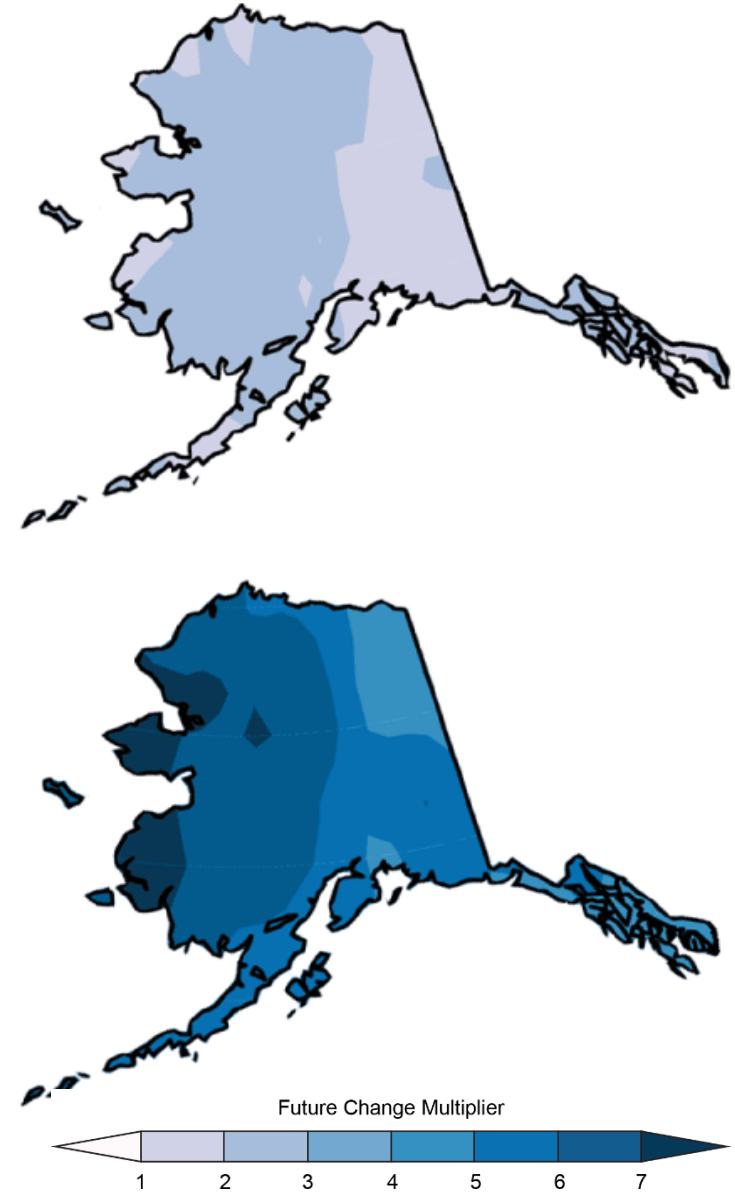
Credit: Rick Thoman, Alaska Center for Climate Assessment and Policy.

Data source: NSIDC Sea Ice Index, V3



# Extreme precipitation

- The frequency of extreme (1yr in 20yrs historically) precipitation events doubles in much of Alaska under low emissions (RCP 2.6).
- Under higher emissions, the frequency of these events becomes much more frequent, 1 in 5 in southeast Alaska and 1 in 3 in parts of the YK Delta and western Alaska.



34 GCMs, 2081=2100 relative to 1981-2000. NCA3, 2014

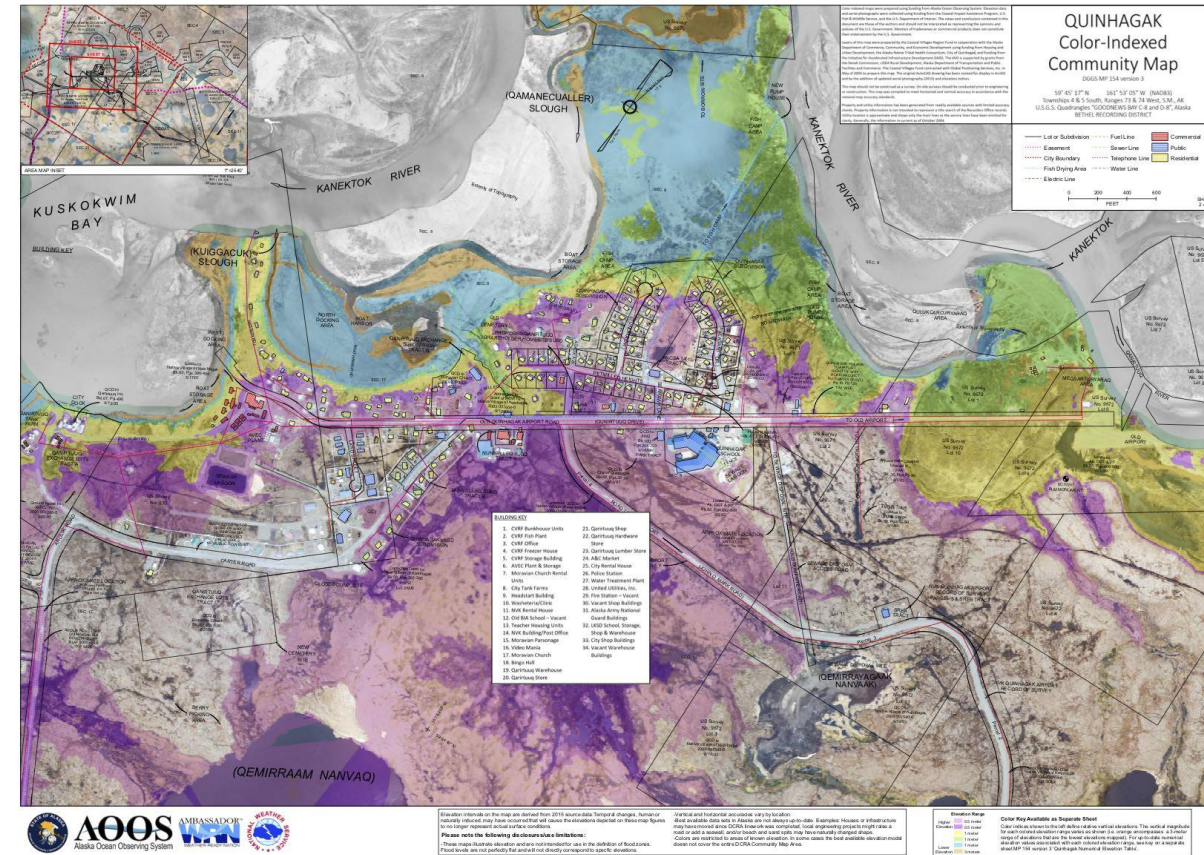
# Adaptation needs

Ideally, hazard projections and data would result in risk maps for existing communities and potential relocation sites.

Much of coastal Alaska does not have adequate elevation data to project community level flood risks.

Shorelines are changing so quickly, both in position and topography, that "baseline", if it existed, is fluid.

A number of community collaborations with Alaska DGGs and other federal, state, and Tribal entities are collaborating to meet such needs, but the rate of change and absence of even basic data represent considerable challenges.



Detailed color-coded flood elevation map for Quinhagak, AK. Collaboratively developed by Alaska DGGs, AOOs, NWS, and City of Quinhagak, among others. Source: Alaska DGGs

# Socioeconomic complexity

- Food and energy security
- Decolonization
- Sovereignty





# Information Successes, Needs and Opportunities

- Coastal Mapping Strategy – Alaska DGGs
- Capacity to bridge between western science and indigenous knowledge
  - Example: BIA Tribal Climate Science Liaison Malinda Chase
  - Example: NWS community partners / observers
- Scientific capability:
  - Coastal mapping – shoreline, bathymetry, elevation
  - Forecasting – improving models and new capabilities all the time



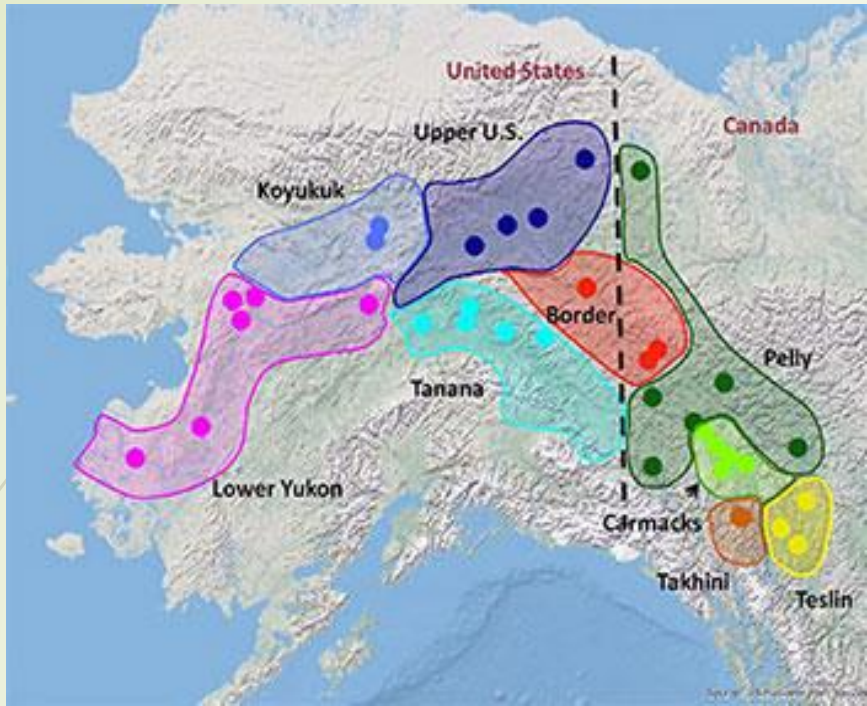
# Tribal Climate Resilience in Alaska





There are 575 Federally Recognized Tribes in the United States

229 Federally Recognized Tribes in Alaska



# Coastal Resources Impact on Interior Communities

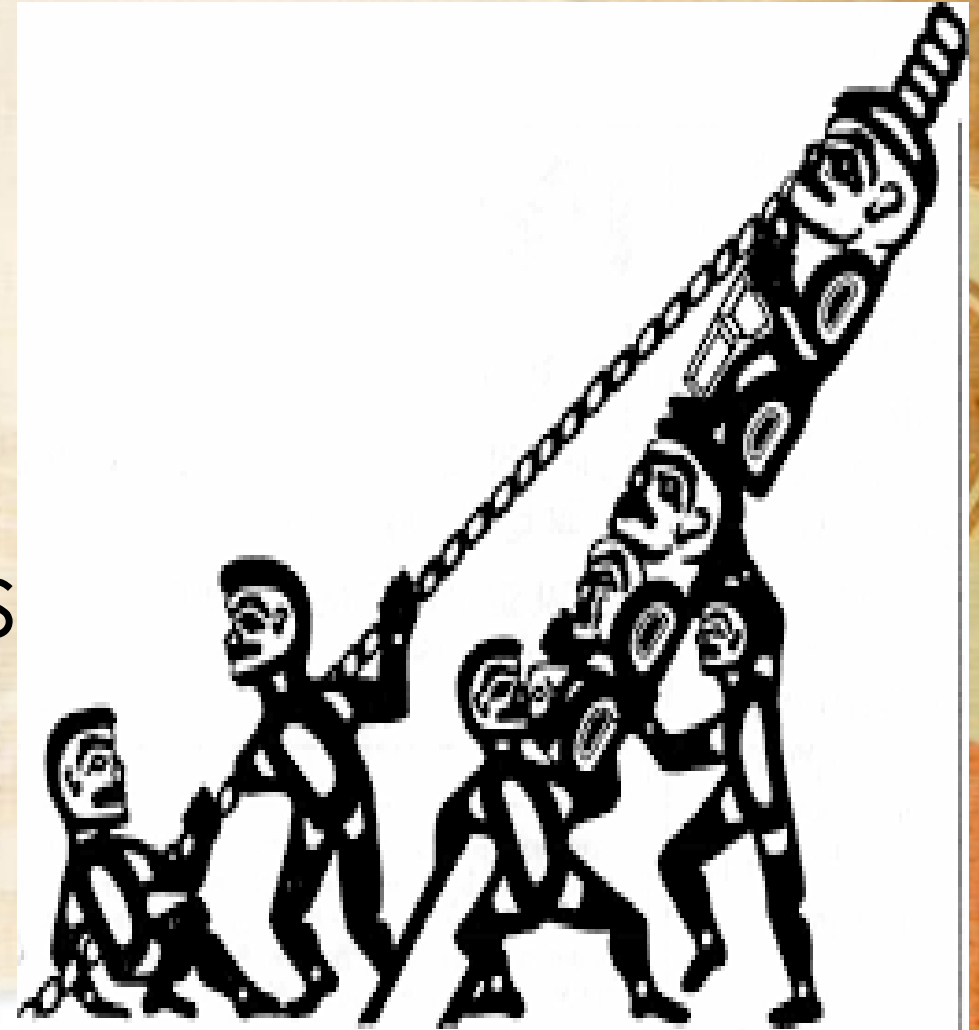
# Subsistence Resources



- Climate impacts to traditional gathering calendars
- Maintain important First Foods like berry species
- Impacts to salmon
- Impacts on special forest products like cedar

# Wooch.een (Working Together)

- Offset Cost
- Share Resources
- Develop Partnerships



# Identifying our Issues



**Erosion**



**Permafrost Melt**

# Harmful Algae Bloom



# Ocean Acidification





# Barriers

- Even with these efforts, it's hard to plan for these slow-moving/unseen disasters
- The biggest barrier to adaptation is the multiple bureaucracies, mandates and regulations that don't fit the system we see unfolding around us.
- Lack of resources generally
- Made worse by competitive granting process for something that all our communities need (ie., Adaptation Planning)

# Traditional/Indigenous Knowledge



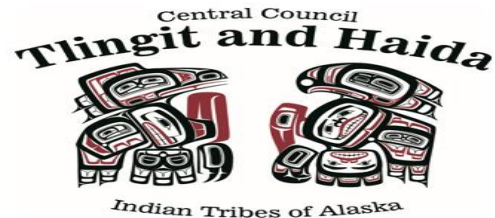
# Regional Efforts

- Central Council Tlingit and Haida's Climate Change Adaptation plan
- Southeast Alaska Tribal Ocean Research (SEATOR)
- EPA Region 10 Tribal Operations Committee



# Central Council Tlingit and Haida's Climate Change Adaptation Plan

The Central Council of the Tlingit and Haida Indian Tribes of Alaska  
Climate Change Adaptation Plan



By  
The Central Council of the Tlingit and Haida Indian Tribes of Alaska  
July 10, 2019

1

## I. The Central Council of the Tlingit and Haida Indian Tribes of Alaska and Resilience

The Central Council of the Tlingit and Haida Indian Tribes of Alaska (Tlingit & Haida) is a federally recognized Indian Tribe that serves 20 villages and communities stretching over 43,000 square miles within the Alaska Panhandle. The Tlingit and Haida membership is among the largest, most isolated, and most geographically dispersed of Native or Tribal populations nationwide. The region encompasses a 525-mile strip of coastline and interior waterways, bordered by Canada on the north, south, and east, with the Gulf of Alaska on the west.

The area of Southeast Alaska known as the "Panhandle" or the "Alexander Archipelago" is one of the few temperate rain forests in the world. It consists of many islands which comprise the Alexander Archipelago, and a thin strip of mainland running from Dixon Entrance to Icy Bay. Southeast Alaska stretches from approximately 54 degrees north latitude at the southern tip of Prince of Wales Island to 60 degrees north latitude near Yakutat, Alaska. The many sounds, channels, straits, fjords, narrows, bays, coves and natural harbors create a maze of waterways between the islands and the mainland.

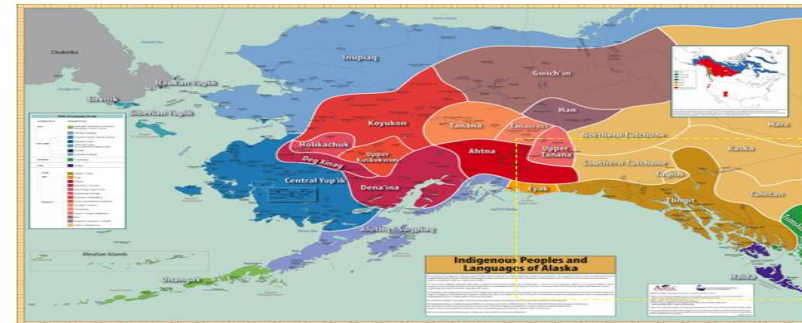


Figure 1: Tlingit and Haida Ancestral Land and Waters – Yellow dotted-lined box. (Source: UAF)

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<http://www.ccthita.org/services/community/environmental/documents/T&HClimateChangeAdaptationPlan.pdf>

# A Climate Change Adaptation Plan & Template for a Unique Region

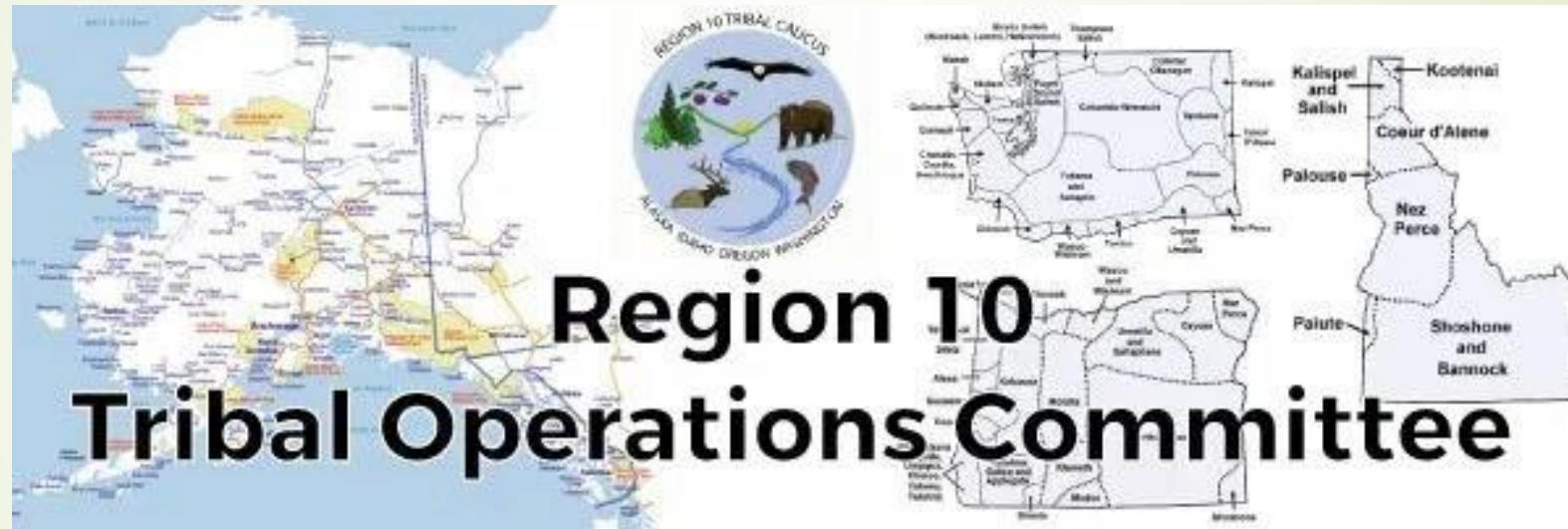


# Shellfish / Harmful Algal Bloom / Ocean Acidification / Biomass Survey – SEATOR



<http://www.seator.org/>

# EPA Region 10 Tribal Operations Committee

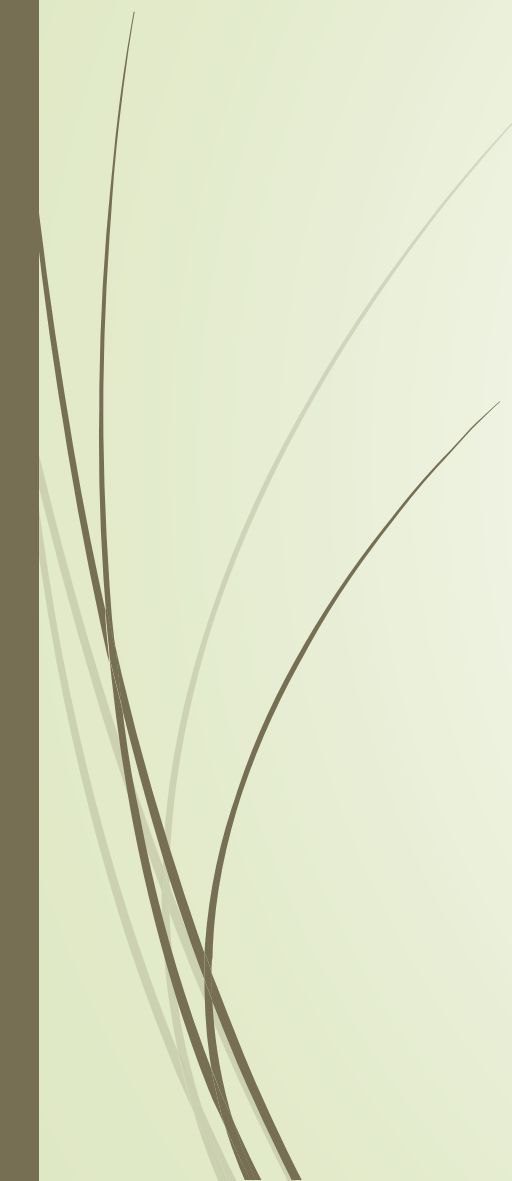


- Subsistence Initiative

<http://region10rtoc.net/home/>



# A quick note on tribal response to COVID-19

- ▶ 130+ Alaska Native Tribes have issued Tribal Orders requesting that outsiders not visit their communities at this time
  - ▶ Regardless of federal or state direction the appropriate authority for all inquiries is the tribe in our communities Check out the National Indian Health Board website for more info [https://www.nihb.org/public\\_health/coronavirus\\_disease\\_2019.php](https://www.nihb.org/public_health/coronavirus_disease_2019.php)
  - ▶ **Please share this** with any of your colleagues who have oversight on operations in Alaska
- 



# Gunalcheesh/Haw'aa/Thank you!

- Raymond Paddock III, Environmental Coordinator,  
Native Lands and Resources
- Central Council of the Tlingit & Haida Indian Tribes of  
Alaska  
9097 Glacier Highway  
Juneau, AK 99801
- Phone number: (907)463-7184 or
- Email: [rpaddock@ccthita-nsn.gov](mailto:rpaddock@ccthita-nsn.gov)



# Working Together to Adapt to a Rapidly Changing North



**Aaron Poe**

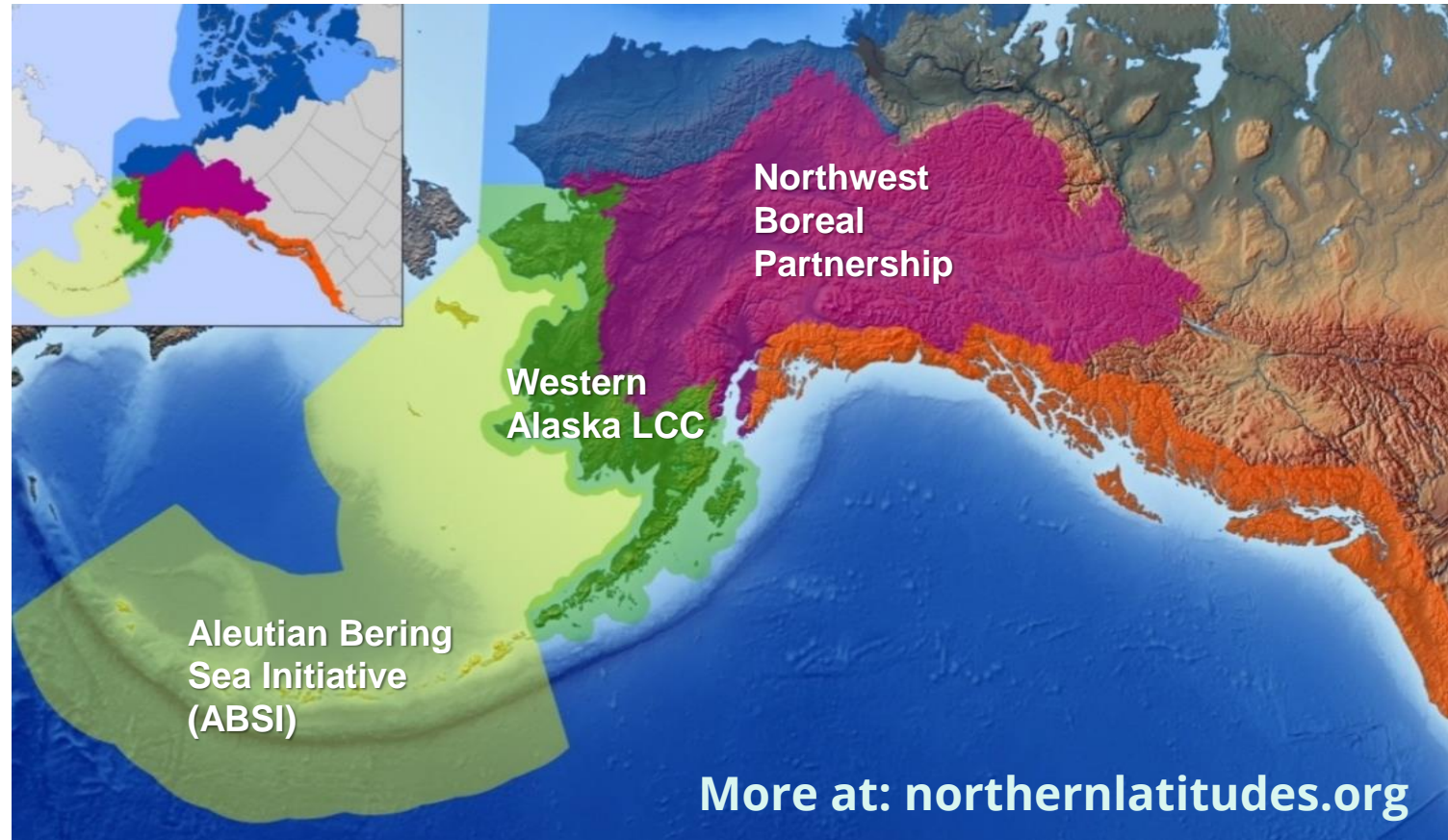
Alaska Conservation Foundation

- [ABSIPartnership.org](http://ABSIPartnership.org)
- [SustainableSoutheast.net](http://SustainableSoutheast.net)

[apoe@alaskaconservation.org](mailto:apoe@alaskaconservation.org) & Twitter: @ABSILCC

# The Northern Latitudes Partnerships

- **Non-regulatory** (formerly “LCCs”) public-private partnerships led by diverse Steering Committees
- A ‘collective impact’ approach for issues too big for any entity to handle alone
- Formerly funded by the U.S. Fish and Wildlife Service as 5 “LCCs”; **now with 150+ partners** across Alaska & northwest Canada
- Continuing to **build upon** 9 years of trust and cooperation among our partners



# A Progression from Science & Information to Adaptation & Resilience

During our first 5 years:

- 169 mostly science projects
- ~\$34.5 million in funding
- Over a 200% match on those funds

Now

- 150+ partner entities
- **A legacy of 220+ projects**
- 37 member organizations on three Steering Committees



# Current and Former Steering Committee

## Entities



# Our Host Organizations



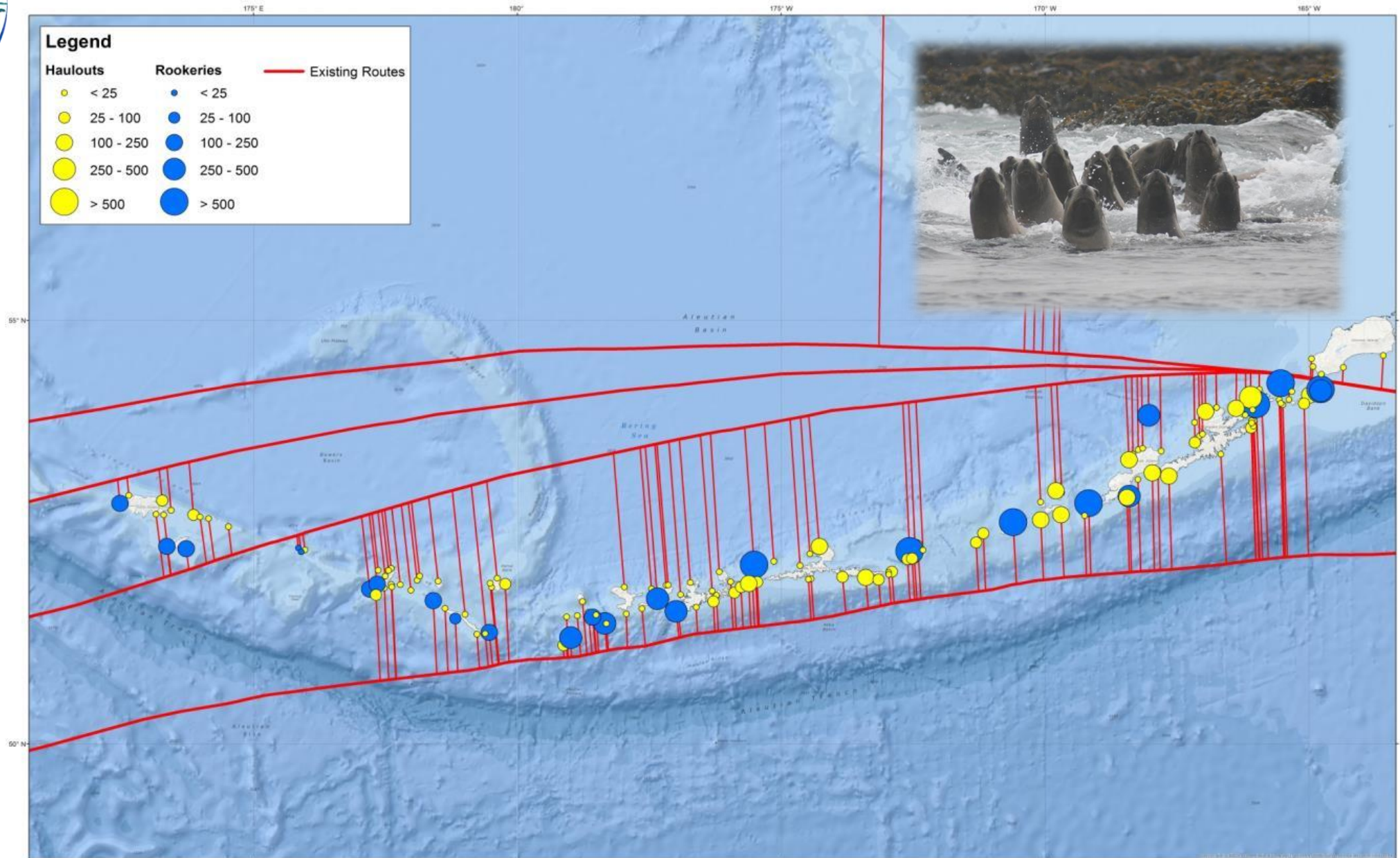
Three support staff housed in two nonprofit organizations

## Our Largest Funder



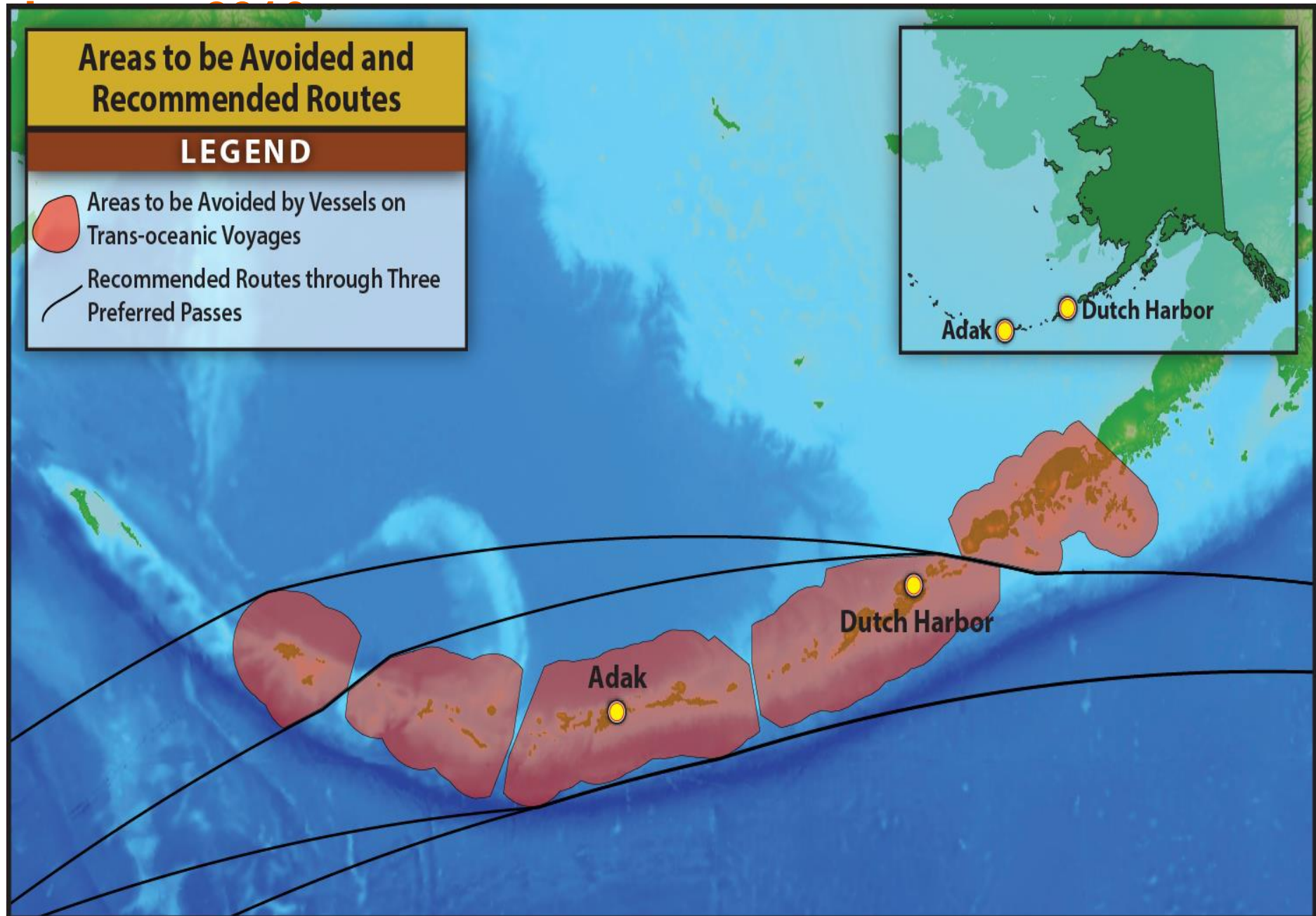


# Steller Sea Lions & Shipping Routes in the





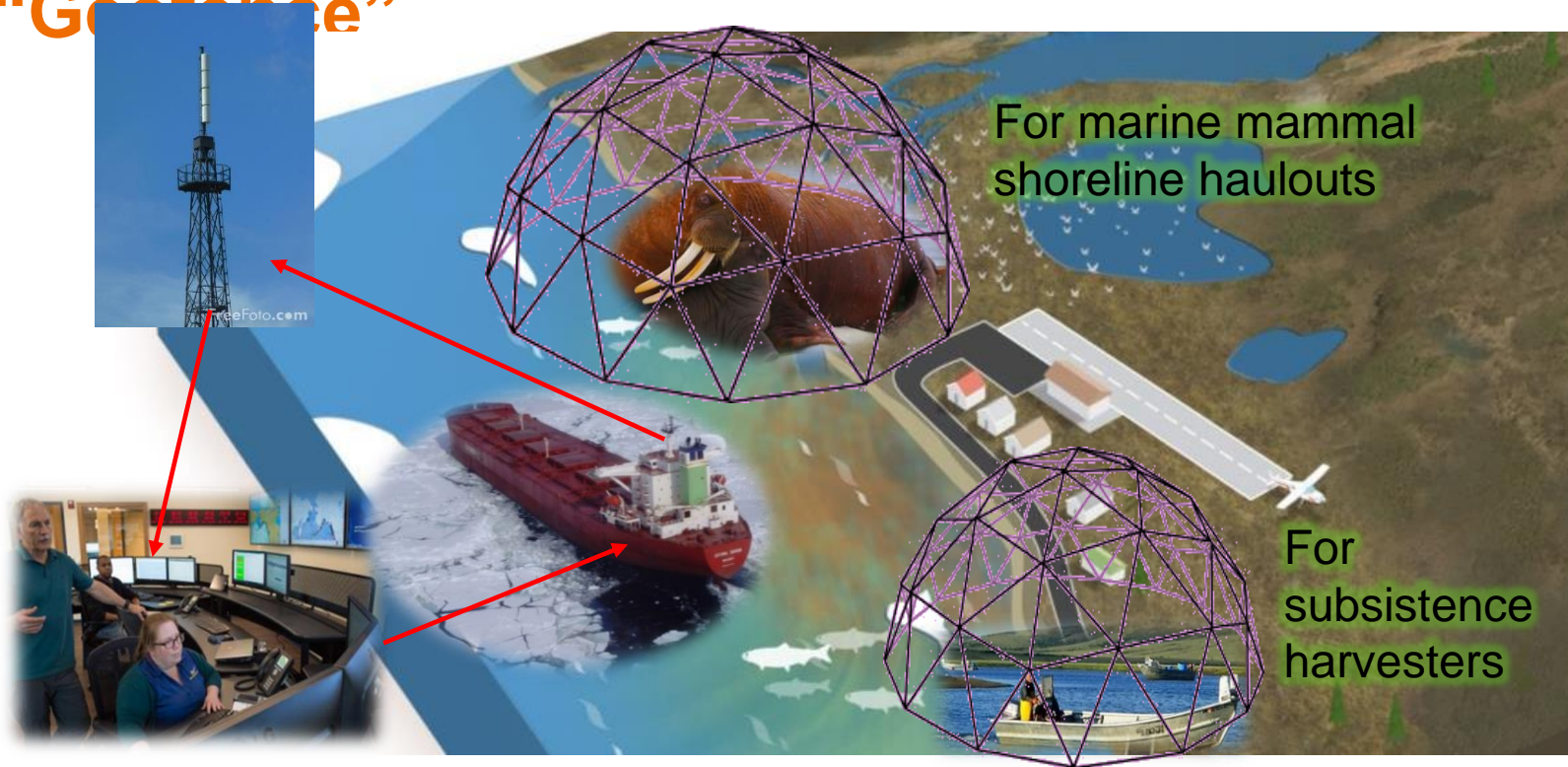
# Five 'Areas to be Avoided' Went Into Effect







# A New, More Dynamic Tool: A Marine "Geofence"



- GPS-based virtual perimeter for **large vessels** triggered by Automatic Identification System (AIS)
- Virtual fences to minimize impacts to species and coastal hunters
- In partnership with industry nonprofits; informed by agencies and tribes  
More at: [www.AlaskaGeofence.org](http://www.AlaskaGeofence.org)
- Funding from Department of Homeland Security & Wildlife Conservation Society

# 5 Regional Coastal Resilience & Adaptation Workshops in 2016

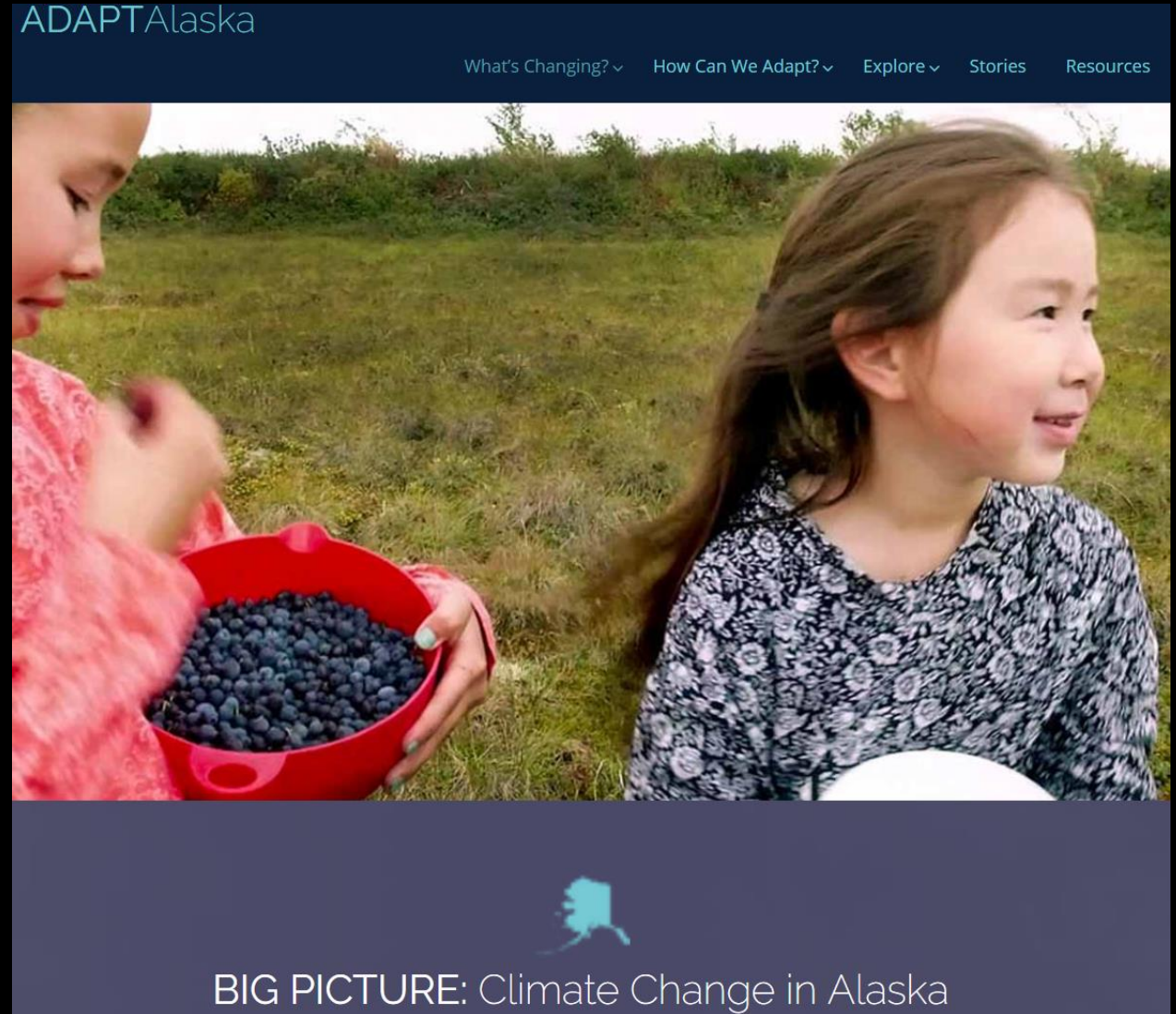


- Bering Strait, Nome
- Aleutian/Pribilofs, Unalaska
- Bristol Bay, King Salmon
- Northwest Arctic, Kotzebue
- Southeast Alaska, Ketchikan (Alaska Sea Grant)

300 individuals, 52 tribes, 16 state & federal agencies

# www.AdaptAlaska.org

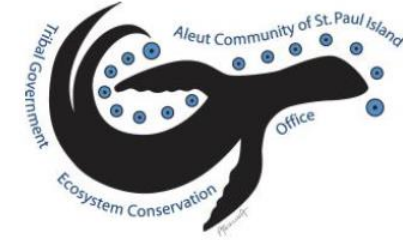
- ❖ Launched in 2017, now hosted by Alaska Sea Grant
- ❖ Tools, resources for communities, agencies, (e.g., from our coastal resilience toolbox)
- ❖ A place to see/share adaptation success stories and connect with others





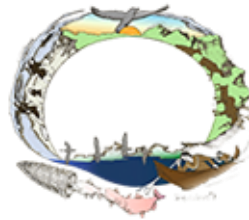
# Indigenous Sentinels Network

## Enhancing Indigenous-Led Community-Based Monitoring



### Program Goal

To provide remote, indigenous communities with tools, training, networking and convening, coordination, and capacity for ecological, environmental, and climate monitoring.



Tanana  
Chiefs  
Conference



Western Alaska  
Landscape Conservation Cooperative



NORTHWEST BOREAL  
Landscape Conservation Cooperative



More at [www.beringwatch.net](http://www.beringwatch.net)



# SUSTAINABLE SOUTHEAST PARTNERSHIP

Resilient Peoples and Place



Local Business



Energy Independence



Food Security



Community Fisheries  
& Forestry

## Triple Bottom Line Approach



People



Planet



Profit

More at: [SustainableSoutheast.net](http://SustainableSoutheast.net)

# Adaptation Needs Surfaced by these Partnerships

*“Well that’s a month long conversation...”*

- Data needs galore
- Telecommunications infrastructure and technology for remote communities
- There is no clearinghouse for adaptation information, data and resources



## Barriers to Collaboration and *Action*

- Financial assistance operations are convoluted and slow making it hard for federal agencies to partner
- Communities don't have the resources to really share their needs *or* enough venues where they are heard
- There's no central authority for leadership on adaptation



# Adaptation Opportunities Are There, But...

- Individuals and businesses who want to act lack the information to do so
- *Increased* recognition of the value of Indigenous Knowledge but limited capacity/venues to connect with science and management
- Key players in adaptation have recently lost funding support
- A sense from large, private funders that '*Alaska is fine*'





# Outpacing the Predicted Change...



# Alaskan's are having to move forward

**Aaron Poe**

[apoe@alaskaconservation.org](mailto:apoe@alaskaconservation.org) & Twitter: @ABSILCC





## Coastal Resilience in Alaska

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