# What are Alaska Tribal Infrastructure Needs for Addressing Climate Impacts?

## Key Findings for Alaska

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# ALASKA BY THE NUMBERS

The state of Alaska alone is **1/5** the size of the lower 48.

Over **1/3** of all federally recognized tribes are in Alaska.


The average rural community population in Alaska: **<500**


**200** of Alaska's **336** communities are off of the road system.

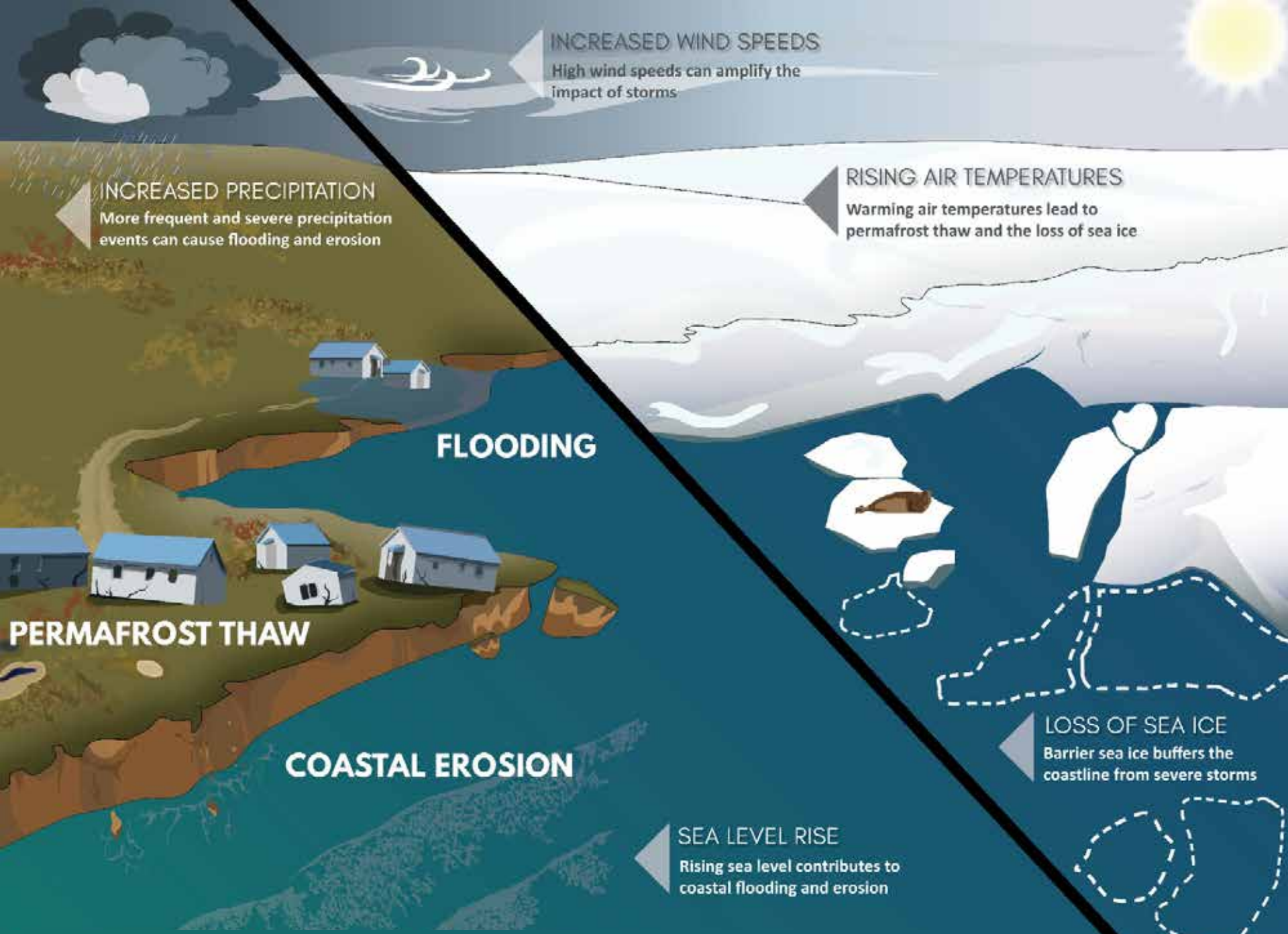
**95%** of the **144** environmentally threatened communities facing infrastructure impacts from erosion, flooding, and permafrost thaw are small and low-income.

Each year the average rural Alaskan harvests **295** pounds of food from the land and waters.

In February 2020 the cost of gas in Noatak, AK was **$10/gallon.**


*Adapted with permission from the Alaska Climate Adaptation Science Center.*

# Notable events in and around Alaska, 2014–2019




**Credit:** *Alaska Climate Adaptation Science Center; adapted with permission from the Alaska Arctic Observatory and Knowledge Hub.*

# Flooding

Ice Jam Flood in Galena, 2013

Photo: NWS

# Erosion

Newtok, Summer 2006

Photo: VSW

Newtok, Summer 2019

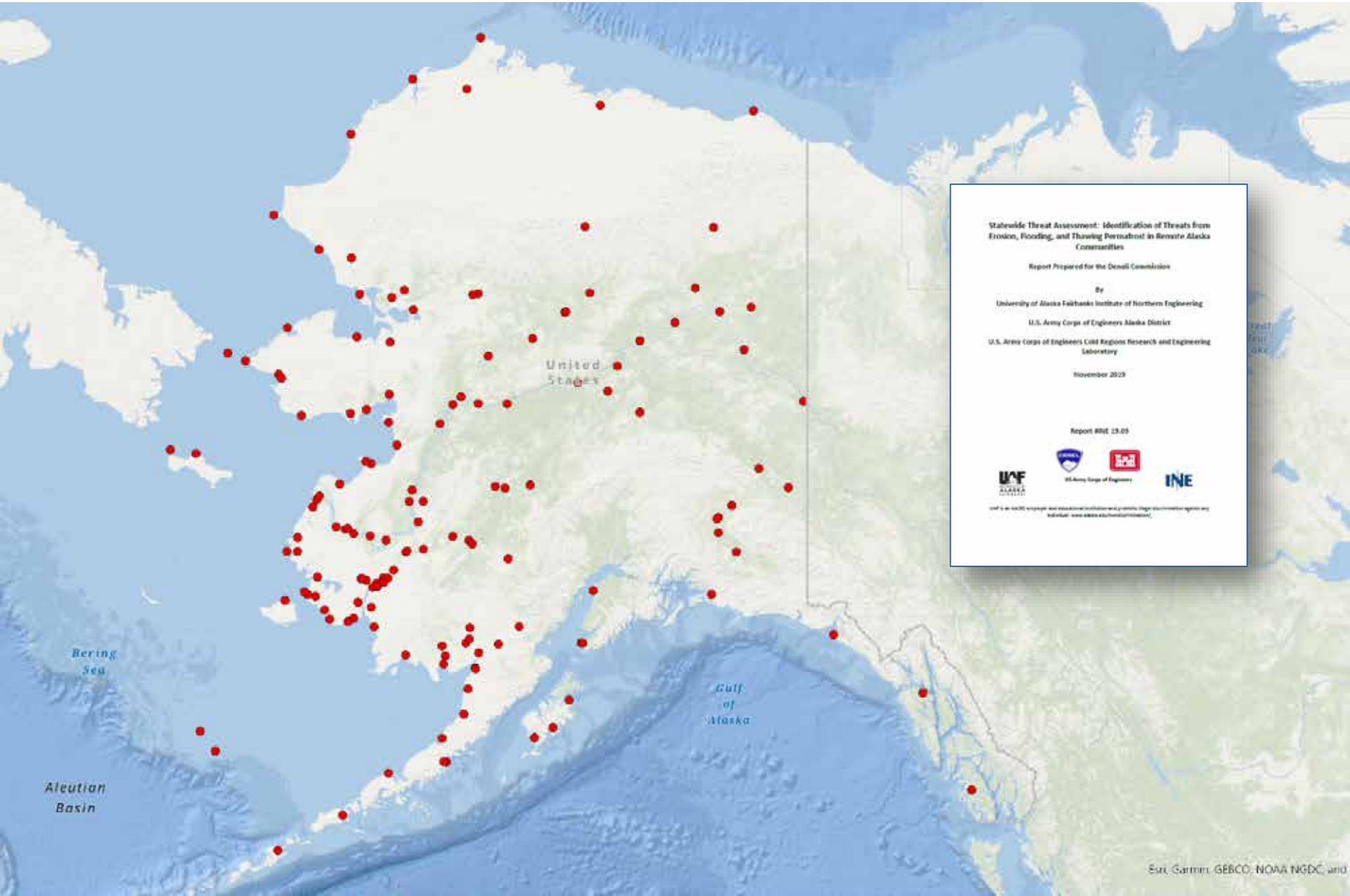
Photo: ANTHC

# Thawing Permafrost

Shifting Boardwalk in Newtok

Photo: ADN

# 144 Environmentally Threatened Communities






Statewide Threat Assessment: Identification of Threats from Erosion, Flooding, and Thawing Permafrost in Remote Alaska Communities

Report Prepared for the Denali Commission

By

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# Challenges & Vulnerabilities of Rural Alaska

- **Cost of implementing adaptation strategies**
  - Remoteness and lack of roads; Seasonal shipping realities
  - Lack of local resources (gravel) for projects
- **Technical expertise required for adaptation strategies**
  - There is specific technical expertise to address needs (ex: land/site control; innovative building design)
- **Often only one physical infrastructure for specific public use**
  - Failed facility affects everyone in the village (ex: infrastructure for drinking water source or single washeteria)
- **Limited communication infrastructure**
- **Significant funding program barriers**
  - Programmatic, regulatory requirement (ex: cost share, needing cost/benefit analysis)

# Existing Stressors

- **Overcrowding and lack of housing**
  - Overcrowding of homes in Alaska Native villages can reach rates approximately 12 times the national average in some areas
- **Access to clean water**
  - Damage to water and sanitation infrastructure adversely impacts human health - waterborne diseases; decreased availability and quality of drinking water
- **Increased accidents and injuries**
  - Attributed to extreme weather events, such as droughts, floods, storms, and ice loss
- **Food insecurity**
  - Diminished food quality and quantity of subsistence resources; decreased access
- **Mental/Spiritual health**
  - Acute events and slower-moving impacts close to home are causing anxiety, depression, and post-traumatic stress disorder

# Unmet Infrastructure Needs in Alaska Native Villages

**Congressional Request to Bureau of Indian Affairs:**

*"...develop a report outlining the unmet infrastructure needs of tribal communities and Alaska Native Villages in the process of relocating to higher ground as a direct result of the impacts of climate change on their existing lands."* [1]

[1] FY 2020 House appropriations report 116-100
[2] Including 4 Alaska Native Non-Profits and 4 Alaska Native Regional Health Corporations
[3] Communities in Threat Groups 1 and 2 for erosion, flooding and thawing permafrost

# What is Unmet Infrastructure Need?


The $$ needed over next 50 years to protect infrastructure

The $$ currently available through federal programs. About $13 million average per year

**Protection-in-place:** The use of shoreline protection measures and other controls to prevent or minimize impacts. These measures allow the community to remain in its current location.

**Managed retreat:** Moving a portion of the community away from hazard-prone areas to locations in the community or adjacent to the current site. In order to successfully retreat, a community needs developable land nearby.

**Relocation:** Moving the entire community to a new location that is not connected to the current site. Relocation is the option of last resort.

# Protection-in-Place

Rock revetment in Kivalina

Photo: Alaska ShoreZone

# Managed Retreat


Managed retreat in Napakiak

Photo: City of Napakiak

# Relocation

Newtok’s new village site, Mertarvik

Photo: UMCOR

# Three Phases of Adaptation

## Assess Risk

- Collect site-specific baseline data such as LIDAR, bathymetry, tidal determinations, river currents, sediment transport, flood history, and geotechnical investigations
- Determine the suitability of available climate projections and downscale models if appropriate
- Conduct hazard-specific forecasts such as shoreline mapping, inundation and storm surge modeling, hydrodynamic modeling, permafrost degradation modeling, etc.

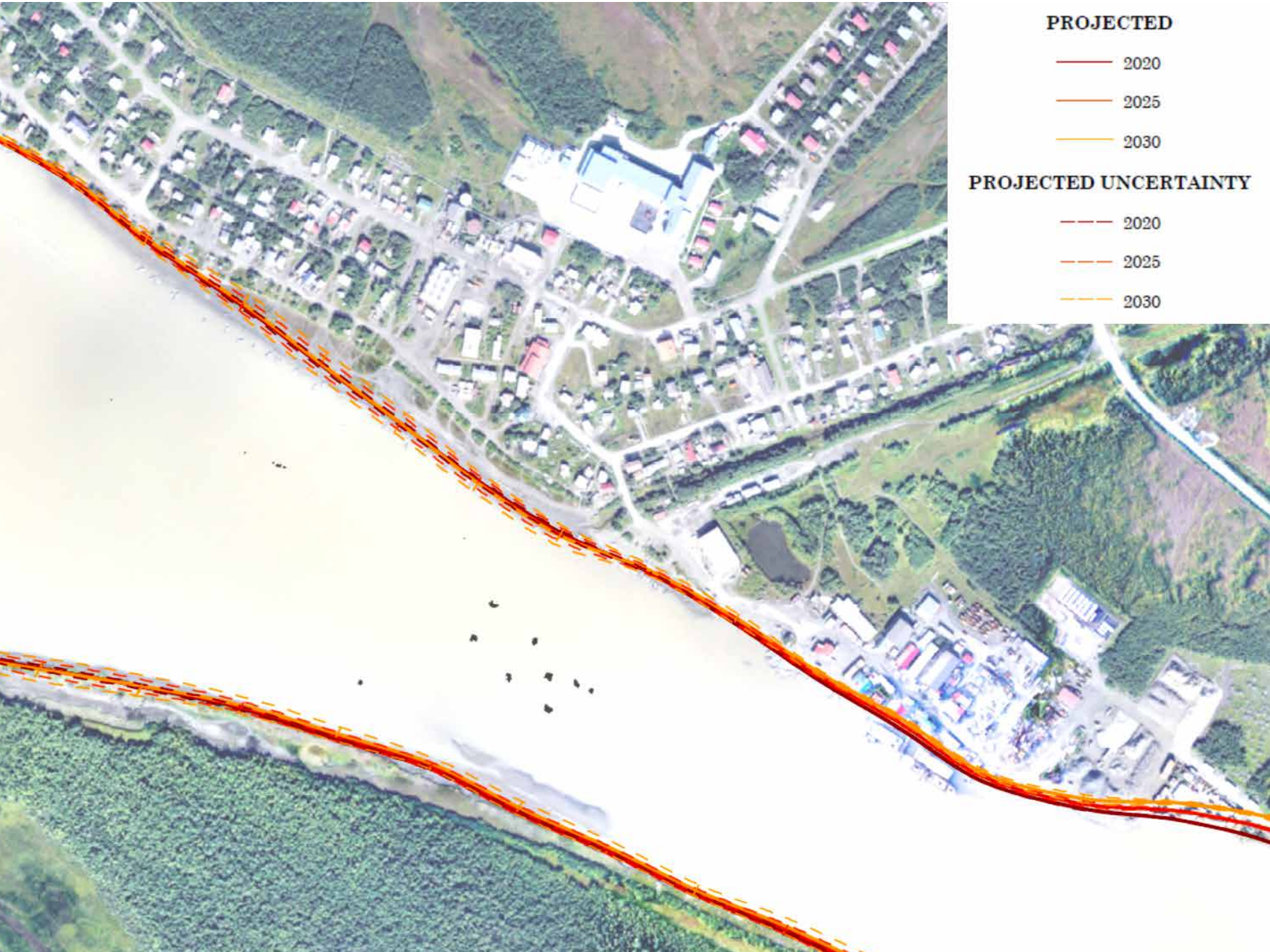
## Planning

- Develop strategies to respond to the risks identified in the previous step, accounting for the requirements of individual types of infrastructure, such as power plants, water and sewer distribution lines, barge landing sites, schools, washeterias, community centers and other vital offices or facilities.
- Identify both near-term and long-term solutions.

## Implementation

- Carry out preferred solutions or pathways through locally-managed construction or outside project management contractors.
- Includes permitting, contracting, administrative reporting, and reimbursement processes.

**Local Understanding of Risk** → **Local Actions to Reduce Risk** → **Increased Local Resilience**


PROJECTED
2020
2025
2030
PROJECTED UNCERTAINTY
2020
2025
2030

# Napakiak, Alaska Case Study

Walter Nelson is the Napakiak Managed Retreat Coordinator, funded by a grant from the Bureau of Indian Affairs Tribal Resilience program.

- **Threat:** Extremely aggressive erosion is actively and quickly eliminating the land upon which the community lives.
- **Mitigation Strategy:** Napakiak leadership has decided to implement a managed retreat to a location further back on the island on which they live to protect from erosion.
- **Barrier:** Navigating the complex limitations and requirements of funding agencies is expensive and slow. Napakiak's school sites less than 200 feet from the riverbank and will be impacted in 1-2 years. It is very likely the school will be impacted before a new school can be built.


Protect-in-Place
Managed Retreat
Relocation
Can physical measures be implemented to imitigate threats?
NO
Is there a safe place within existing community to move threatened facilities?
NO
Is relocation to the new site the only feasible mitigation option?
YES
YES
YES
Select: Identify the type of structural mitigation from list of options.
Quantify: Use map tools to delineate the extent of the community impacted by the threats.
Estimate: Determine the cost from baseline relocation cost modified by regional land and population factors.
Quantify: Use map products to delineate quantities (length, area, quantity).
Estimate: Determine cost based on a percentage of modified baseline relocation cost adjusted by regional and population factors.
Estimate: Determine cost based on regional unit cost factors (quantity x unit cost).

# What is Unmet Infrastructure Need?


$77-97 million/year (~$80 million average) over next 10 years

$90-100 million/year over next 10 years*

$13 million average/year

Alaska Native villages face an estimated **$3.5 billion** in threats to infrastructure over the next 50 years from erosion, flooding, and permafrost thaw.

**Does not include $833,210,000 needed in the hub communities (Bethel, Kotzebue, Nome)*

# Four Key Messages

**Key Message 1:** Complete Risk Assessments

**Key Message 2:** $80 Million Annual Implementation Funding Gap

**Key Message 3:** Most Federal Funding Programs are not Designed Specifically to Address Environmental Threats to Infrastructure

**Key Message 4:** Long-term Multidisciplinary Technical Assistance Teams Can Support Tribal Communities to Address Environmental Threats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