

Geohazard Evaluation & Geologic Mapping for Coastal Communities

Savoonga
2013

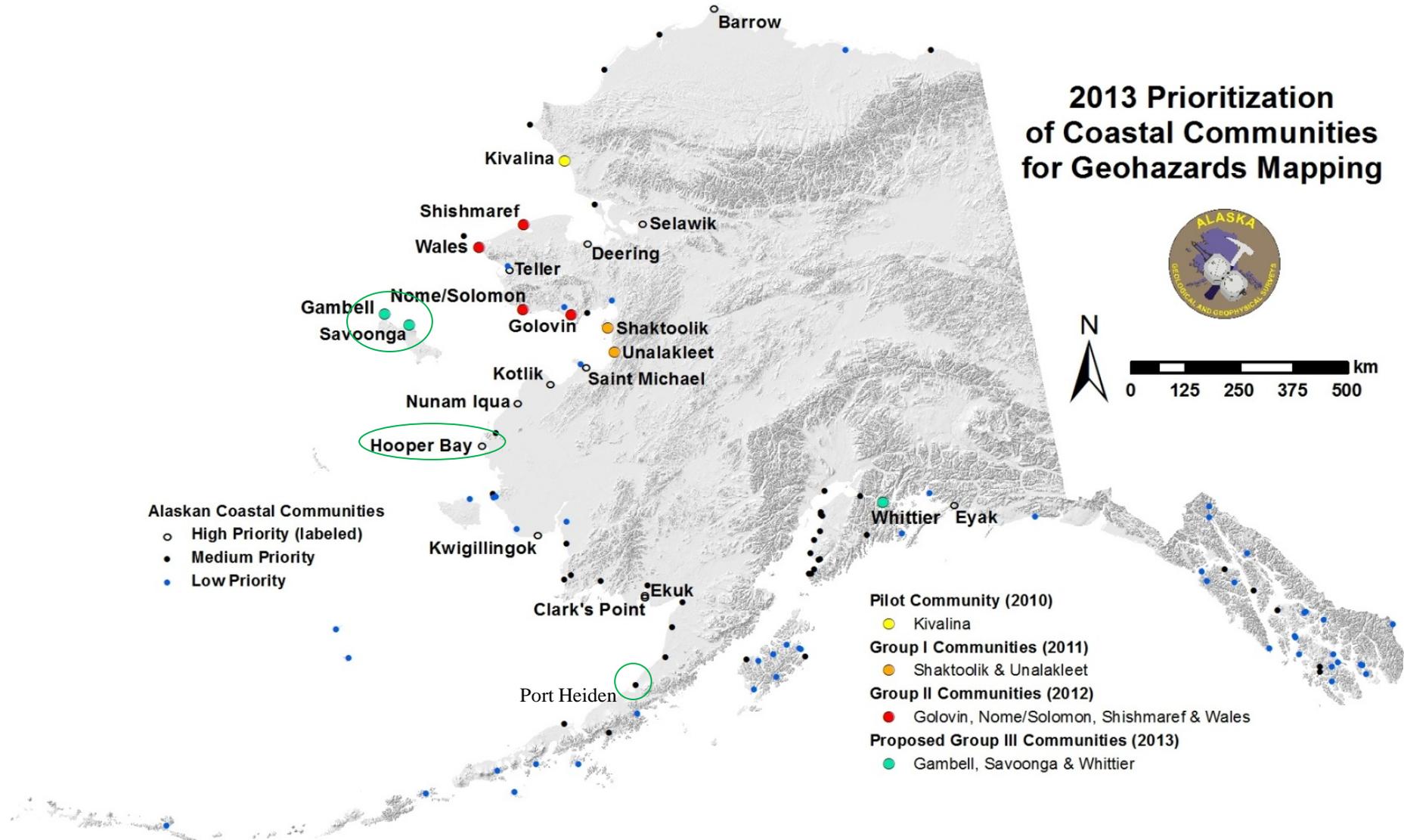
*A multi-year project
from the Alaska
Division of Geological
& Geophysical Surveys*



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PROJECT INFORMATION

- Funded with money from the Coastal Impact Assistance Program (CIAP)



PRODUCTS/GOALS

Maps and other products that aid communities in the identification and documentation of natural coastal hazards (such as flooding and erosion) that need to be considered in development or conservation projects to ensure protection of human life, property and the coastal environment.



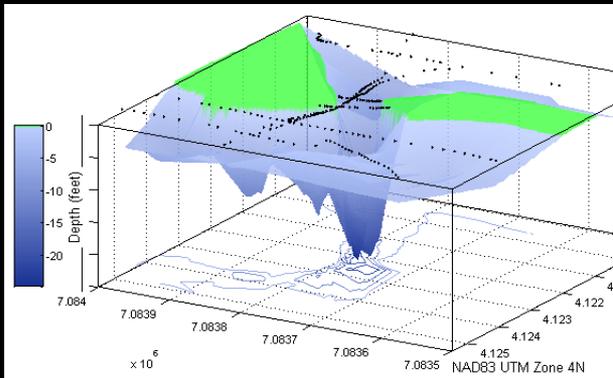
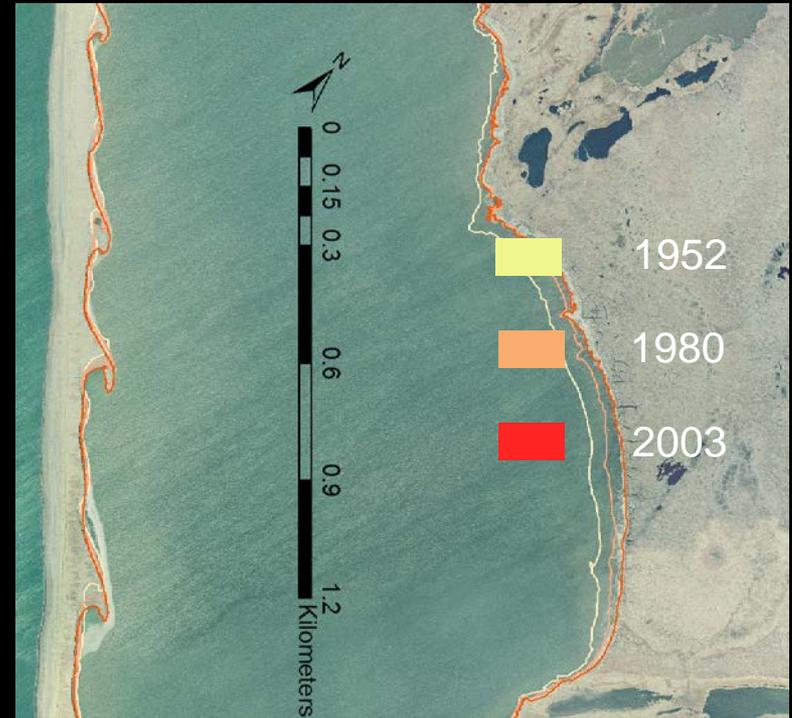
Golovin, Alaska (Photo by Toby Anungazuk, November 2011)

BASELINE MEASUREMENTS

Shishmaref Shiptracks, August 2012

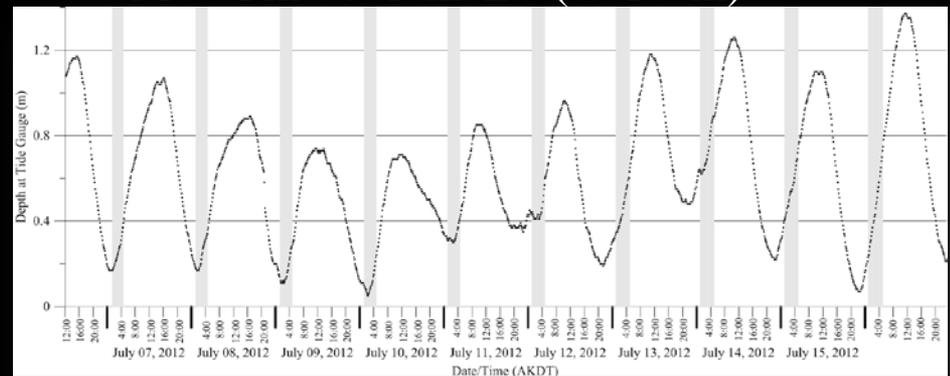


Historic Shorelines (Kivalina)



Nearshore water depths (Shishmaref)

Water level measurements (Golovin)

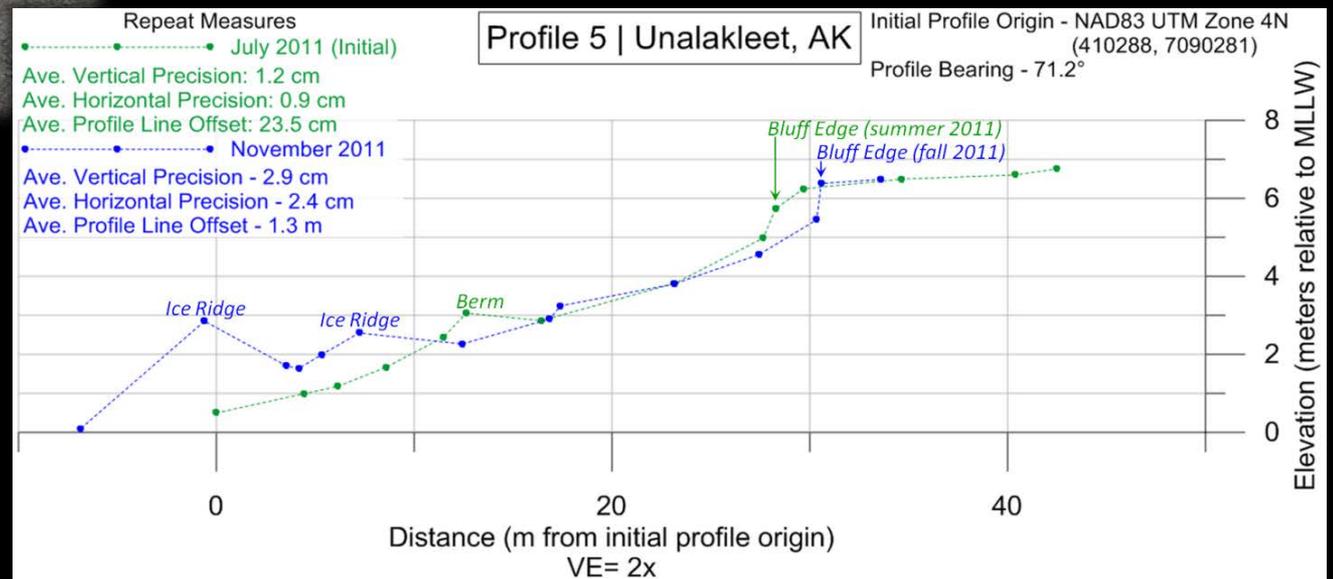


BASELINE MEASUREMENTS

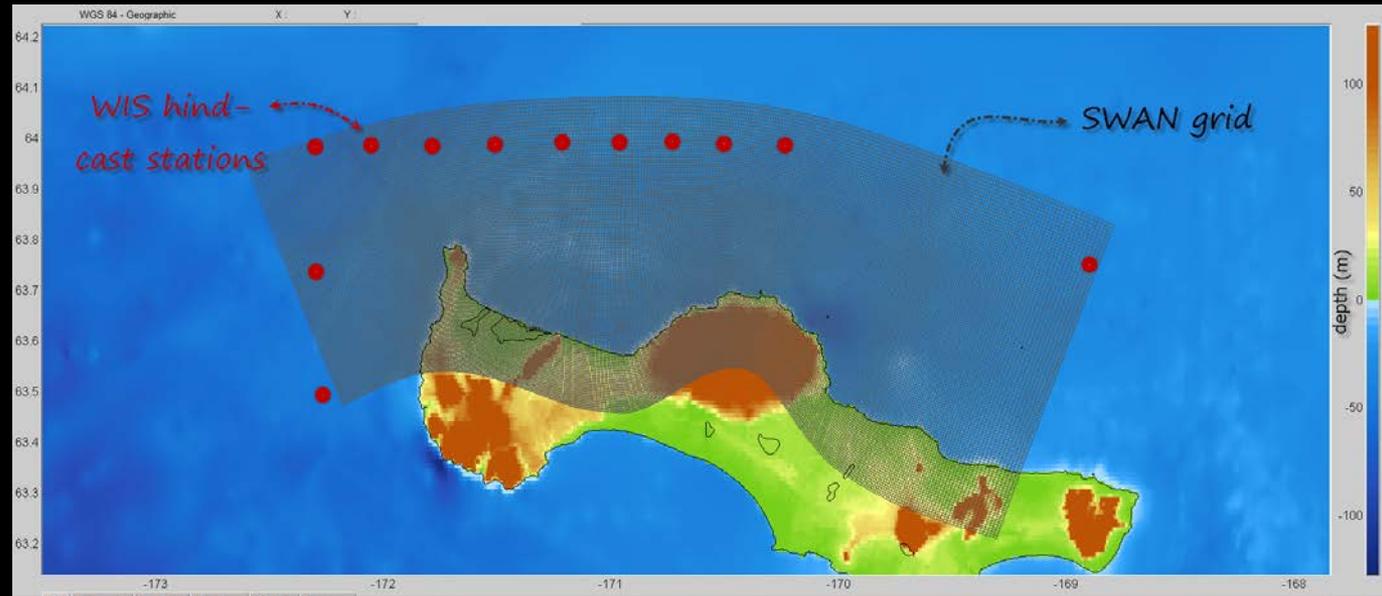
Beach materials (sand, gravel)



The height and shape of the beach (Unalakleet)

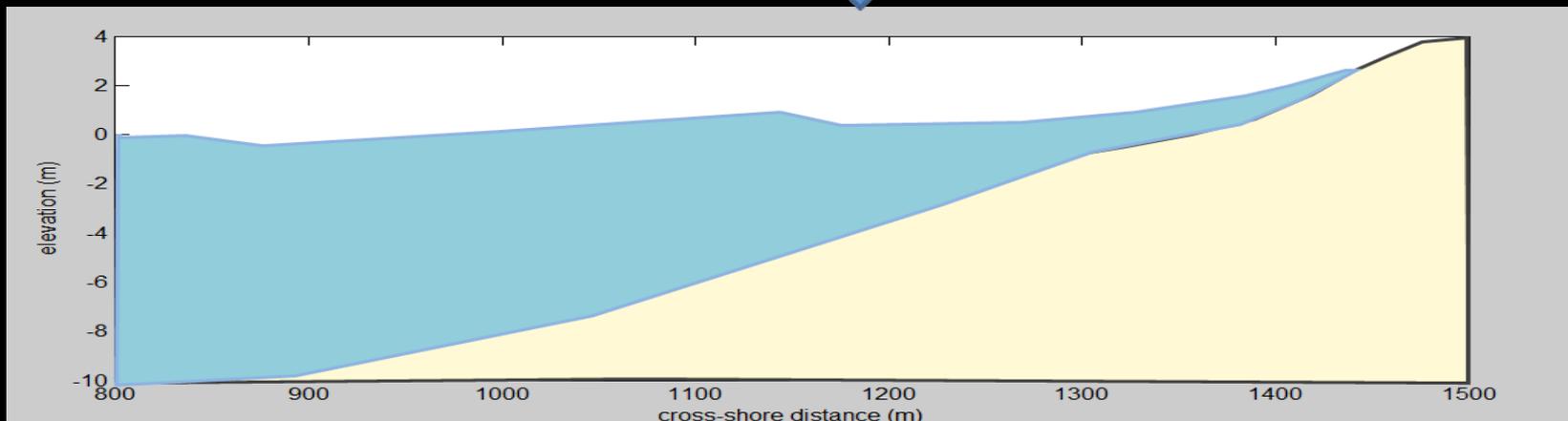


STORM SURGE MODELING



Series of model grids will be run for various storm scenarios

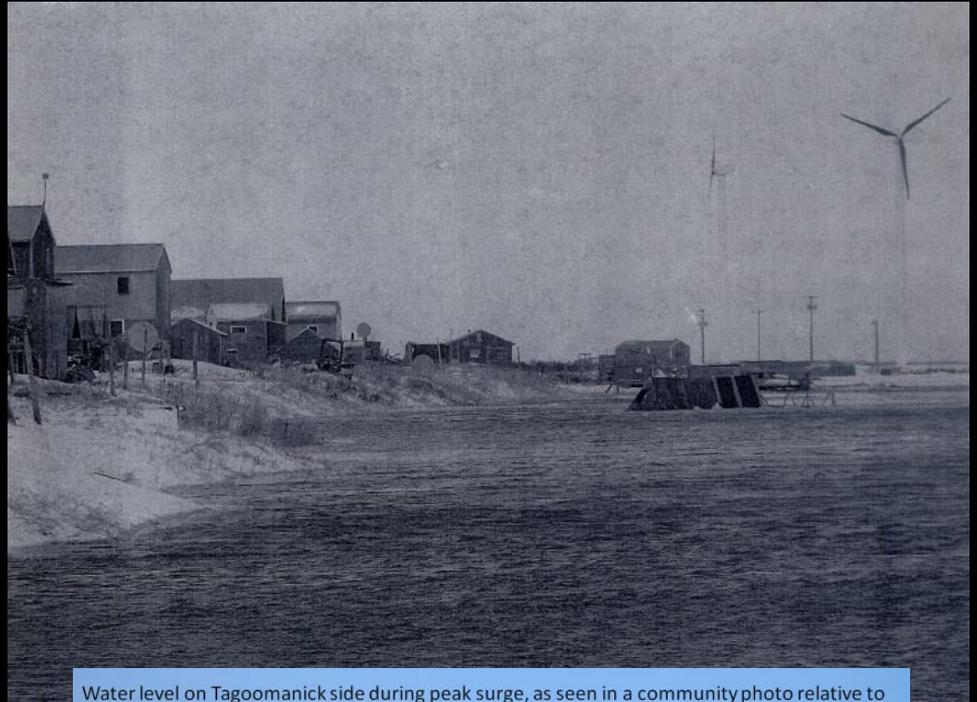
Maximum wave heights are calculated at the across-shore profiles



DOCUMENTATION OF EVENTS

Measure past flood levels from local accounts and photos (Shaktoolik)

Measure identifiable flood features (Nome)

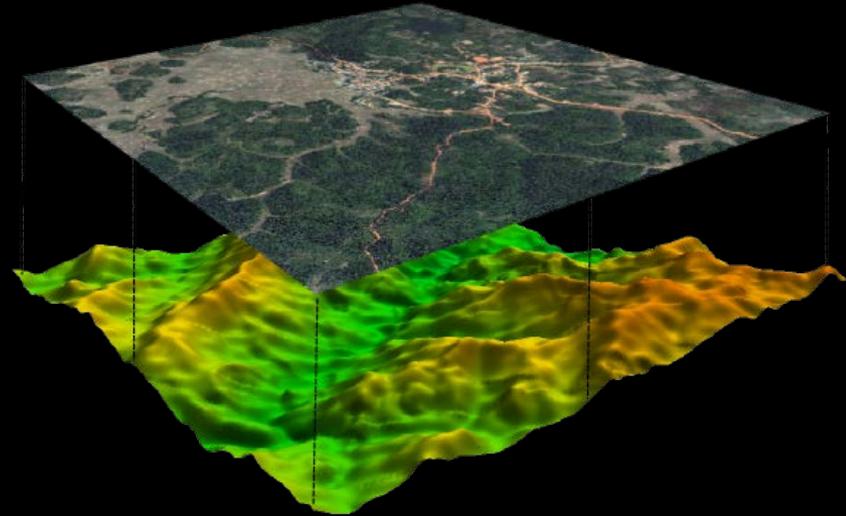


Water level on Tagoomanick side during peak surge, as seen in a community photo relative to the fish drying rack – elevation measured at height of GPS antenna. (copy of original photo not yet obtained)



METHODS

High-precision GPS



Ground control for air photo
correction and elevation mapping

DGGS Approach to Coastal Geohazard Mapping



U.S. Army Corps
of Engineers
Alaska District

Study Findings and Technical Report

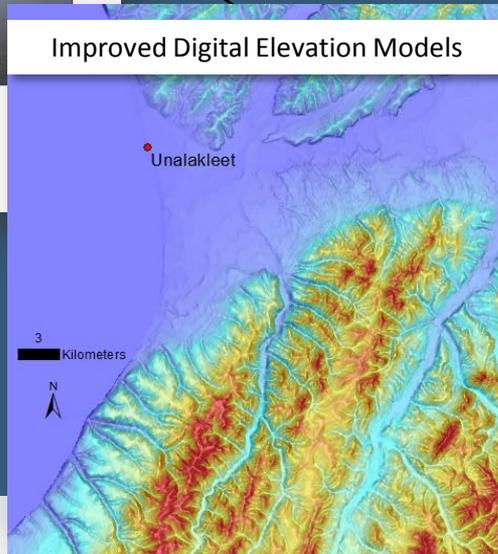
Alaska Baseline Erosion Assessment



Erosion at the community of Eganook

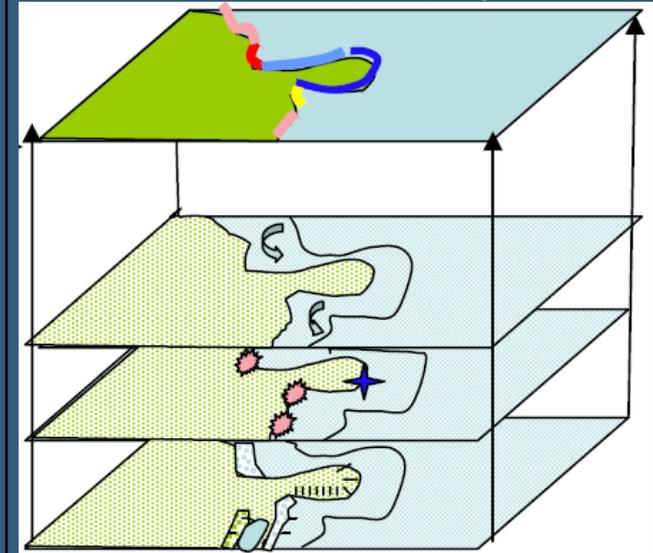
Outside reports, maps, model results, expert and resident knowledge

Improved Digital Elevation Models



Synthesis

Coastal Classification and Vulnerability Bands/Ribbons/Lines/Strips



(RESPONSE & BRGM, 2006)

Composite Coastal Hazard Maps for Alaskan Communities

Included Information:

- Geomorphology & Coastal Processes
- Historically Recorded Hazards
- Existing Defenses
- Local Knowledge

Field investigations including baseline data collection & ground truthing

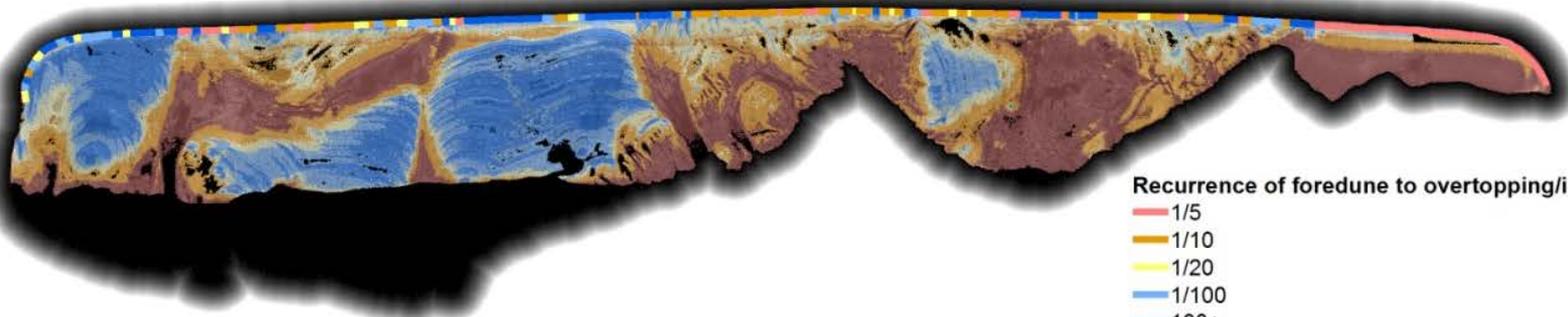


MAP EXAMPLES

Erosion & Flood Vulnerability (near Shishmaref)



- Shoreline Change Rates
- More than 2 m/yr retreat
 - 1-2 m/yr retreat
 - STABLE
 - 1-2 m/yr advance
 - More than 2 m/yr advance



- Recurrence of foredune to overtopping/inundation
- 1/5
 - 1/10
 - 1/20
 - 1/100
 - 100+

- Inundation Map
- 1/5 annual chance of flooding
 - 1/10 annual chance of flooding
 - 1/20 annual chance of flooding
 - 1/100 annual chance of flooding
 - Above 100 year surge height
 - Insufficient Elevation Data



COMMUNITY INVOLVEMENT



- Seeking input about areas of concern (erosion, flooding), proposed map extent
- We can precisely record past storm impacts (memories or photographs)
(will preserve historic record and also improve storm surge forecasting)
- Discuss options for aerial photos and elevation mapping
- Hire local boat operators
- Feedback about helicopter use/timing
- Community representatives can be involved in scientific review process for publications

170°45'0"W

170°30'0"W

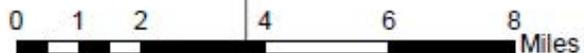
170°15'0"W

63°45'0"N

63°45'0"N



Extent of Proposed DGGS 2013 Field Investigations in Support of Geohazard Mapping for Savoonga, AK



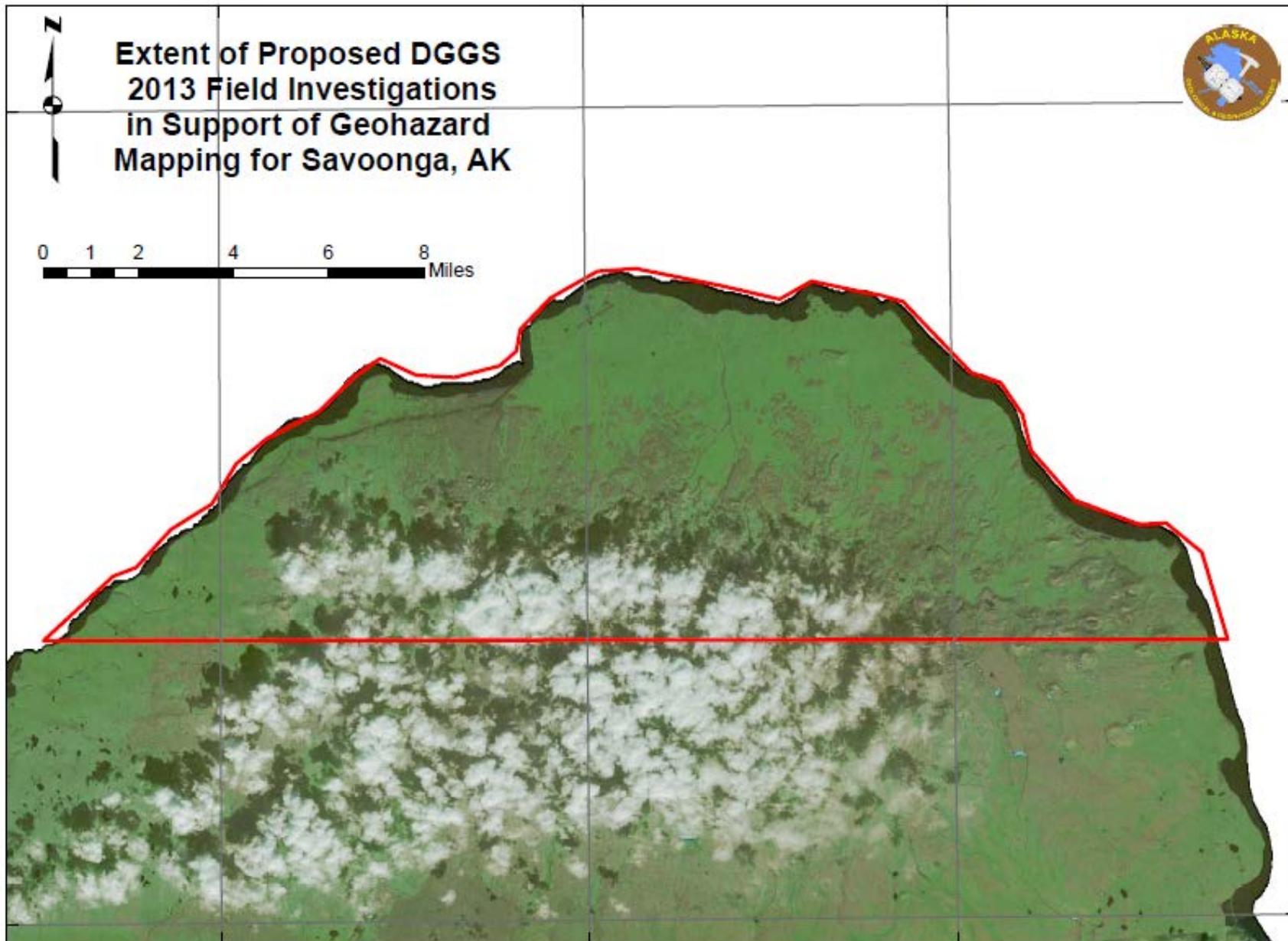
63°30'0"N

63°30'0"N

170°45'0"W

170°30'0"W

170°15'0"W



THANK YOU

