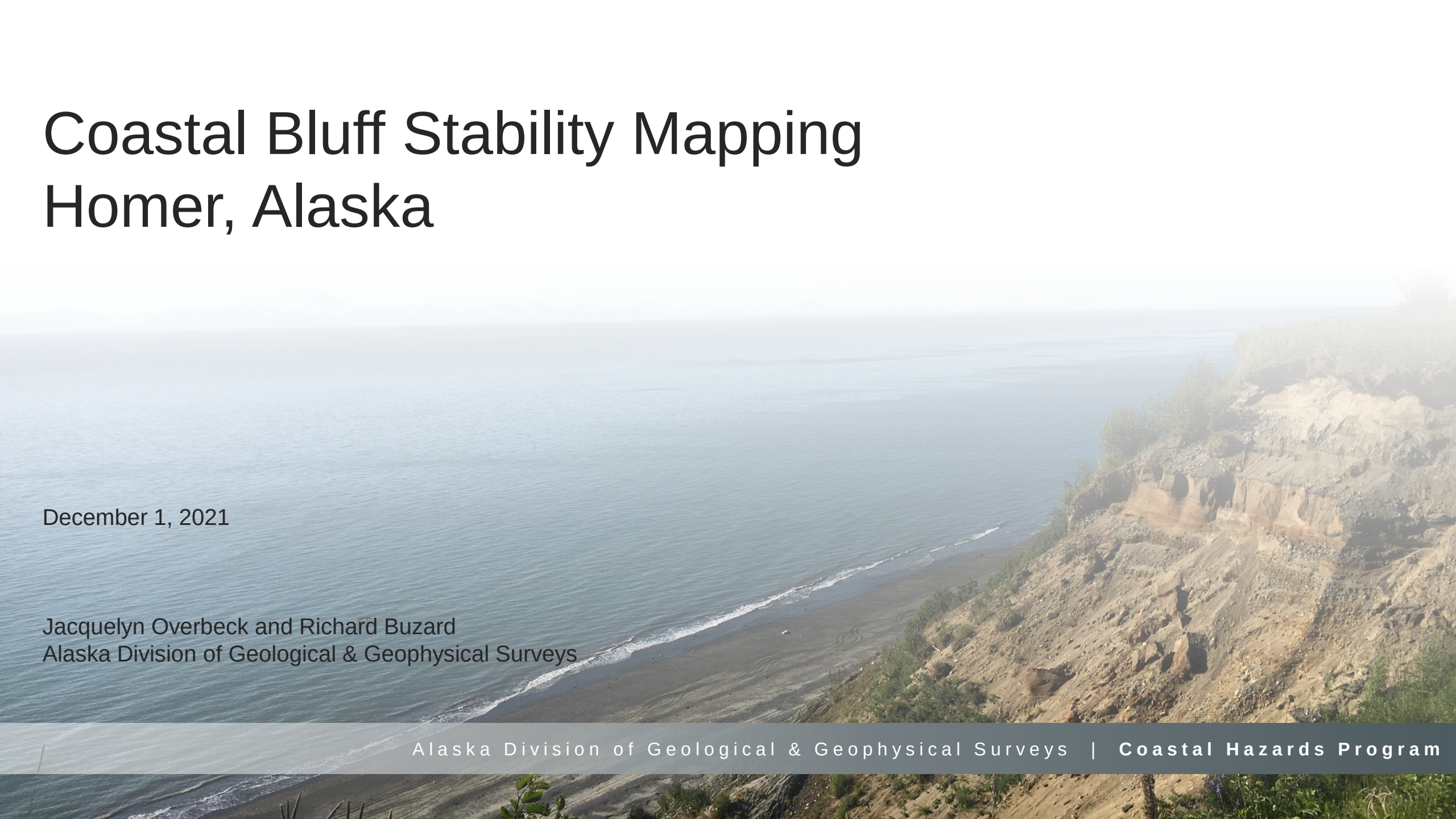
Coastal Bluff Stability Mapping
Homer, Alaska



December 1, 2021

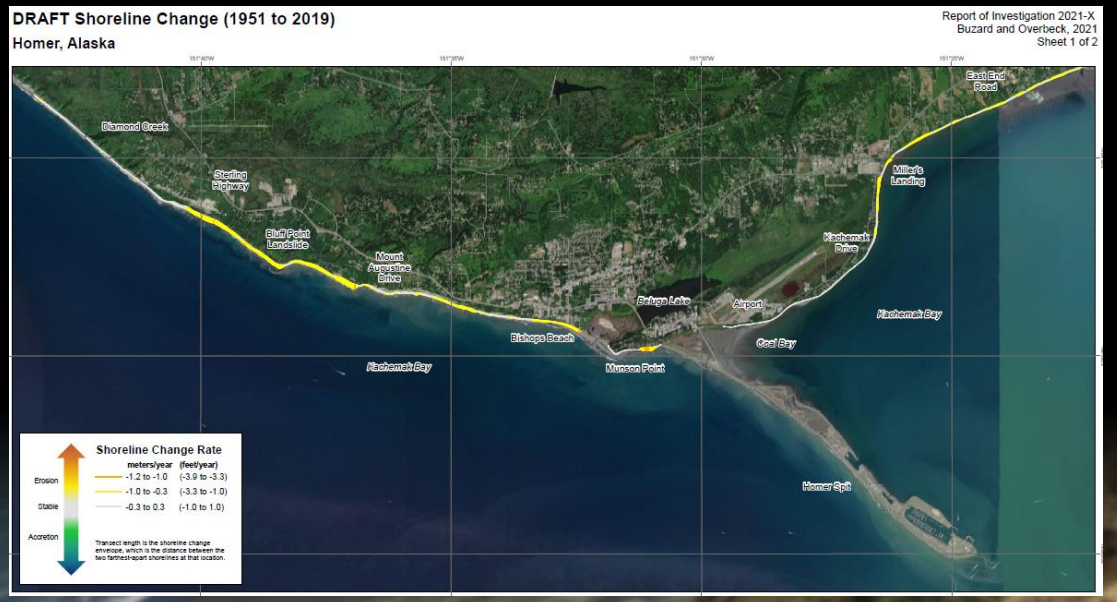
Jacquelyn Overbeck and Richard Buzard
Alaska Division of Geological & Geophysical Surveys

Coastal Bluff Stability Mapping: Project History

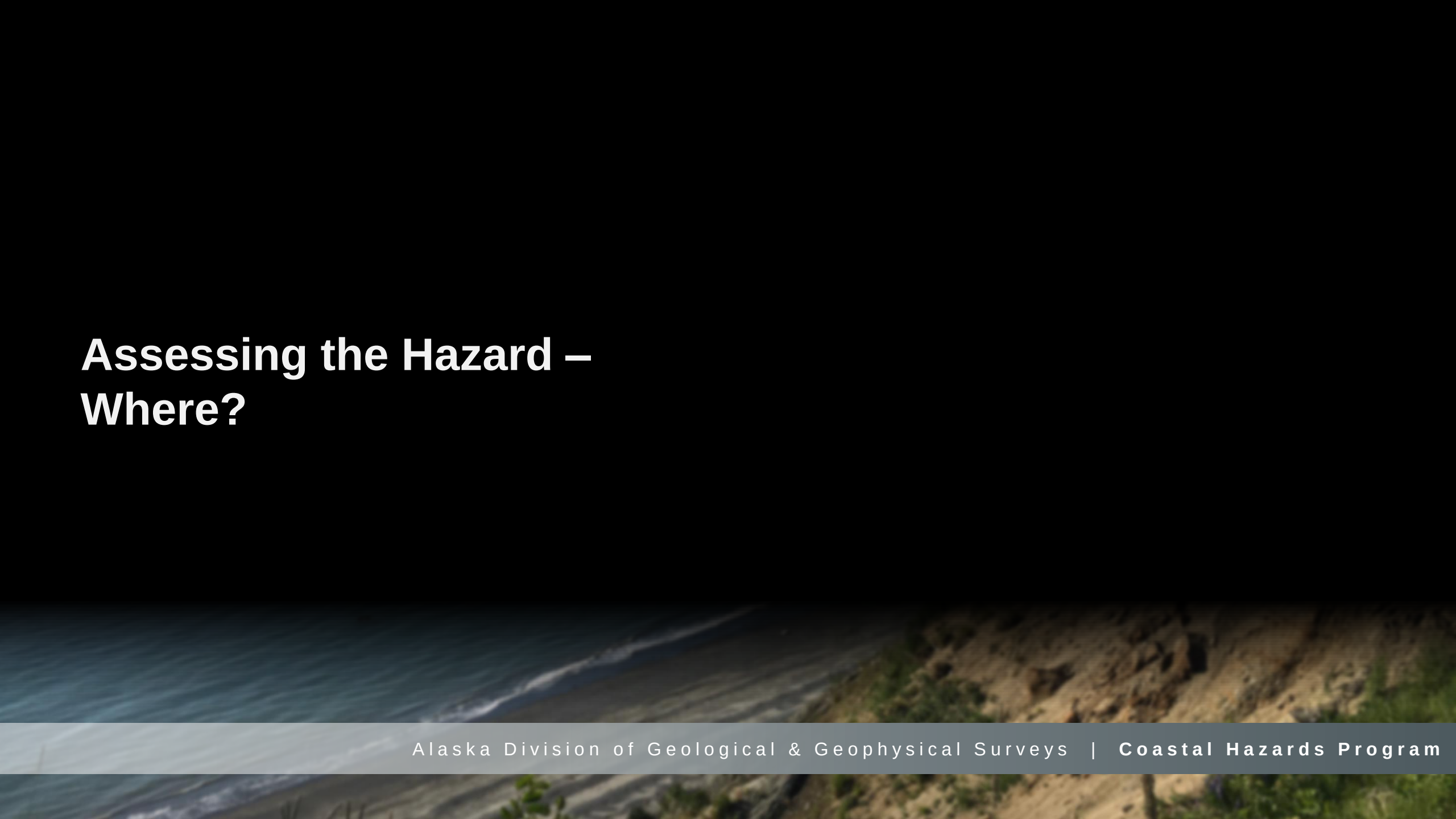
- 2018 DGGS Collects lidar to support landslide hazard project.
- 2019 initiate FEMA funded Coastal Bluff Stability Analysis.
- 2020-2021 present to Homer Planning Commission and for focus group for detailed feedback.
- 2021 provide final deliverables and outreach meetings.
- December 31, 2021 project completed.
- Future guidance through SOA.

Coastal Bluff Stability Mapping: Project Overview & Deliverables

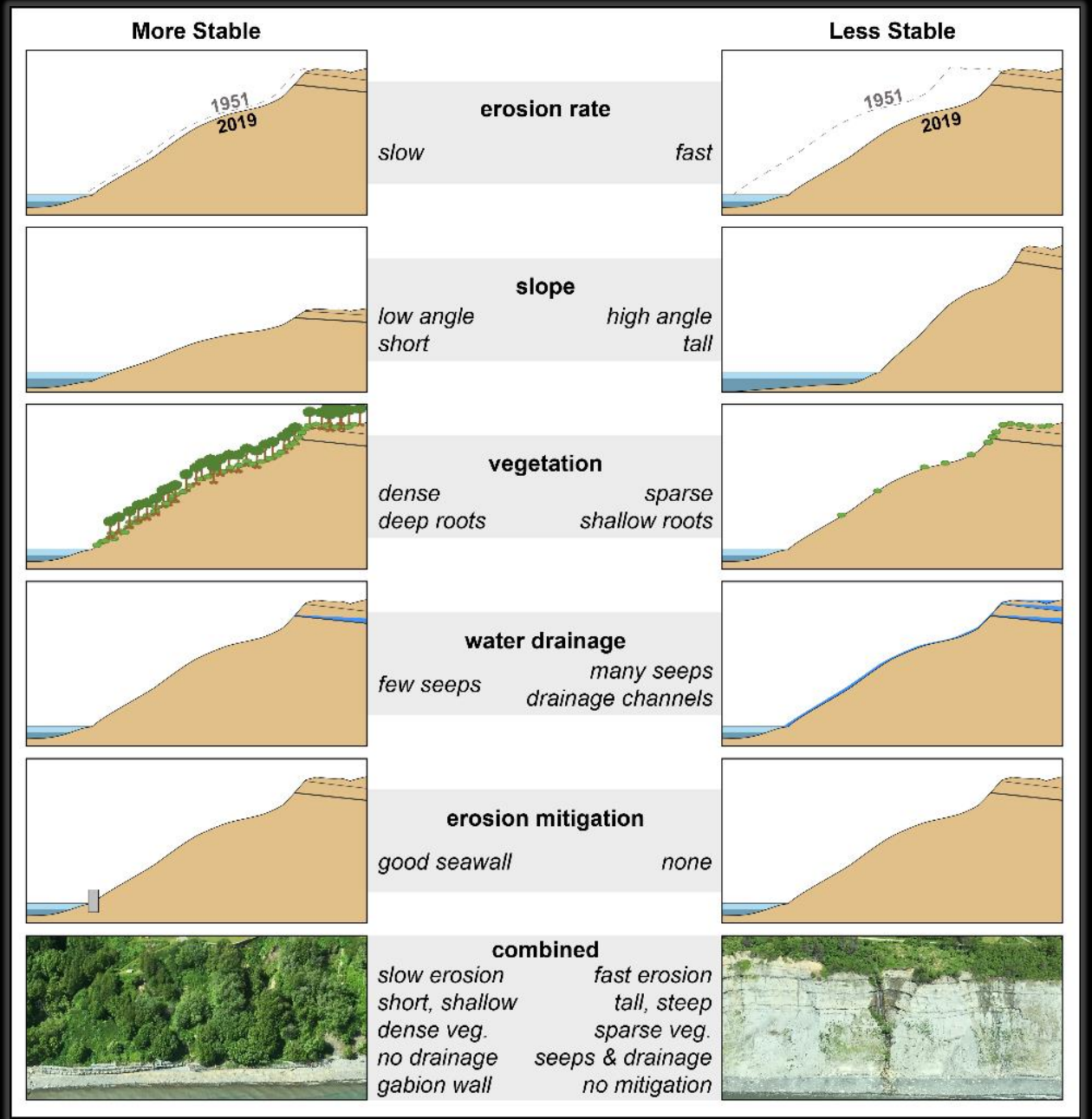
- Update shoreline change assessment (from Baird and Pegau).
- Use existing methods to define coastal bluff stability metrics and map bluffs in Homer.
- Provide data in relevant format for decision making on City Zoning policies.



Assessing the Hazard – Where?



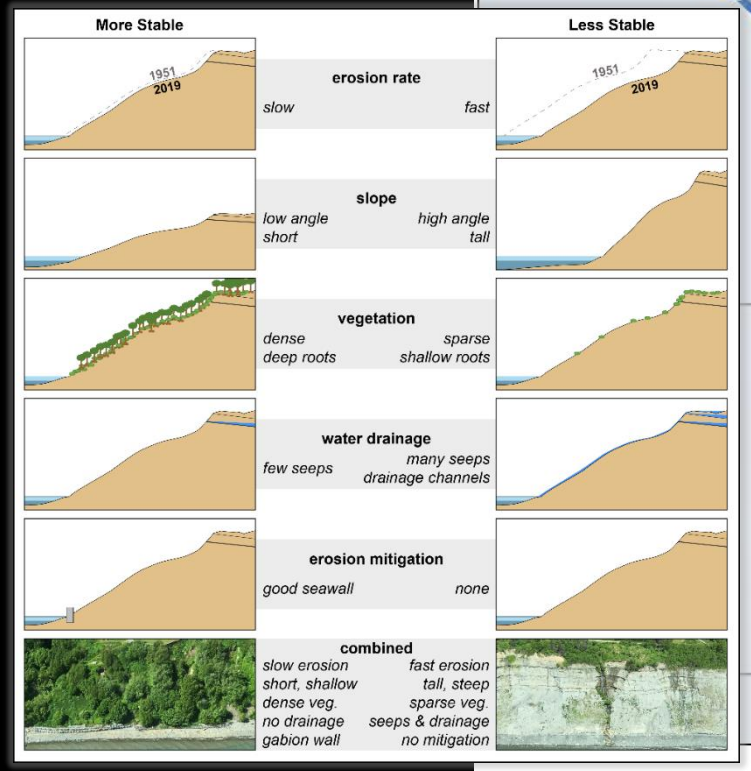
Coastal Bluff Stability Analysis: Analysis

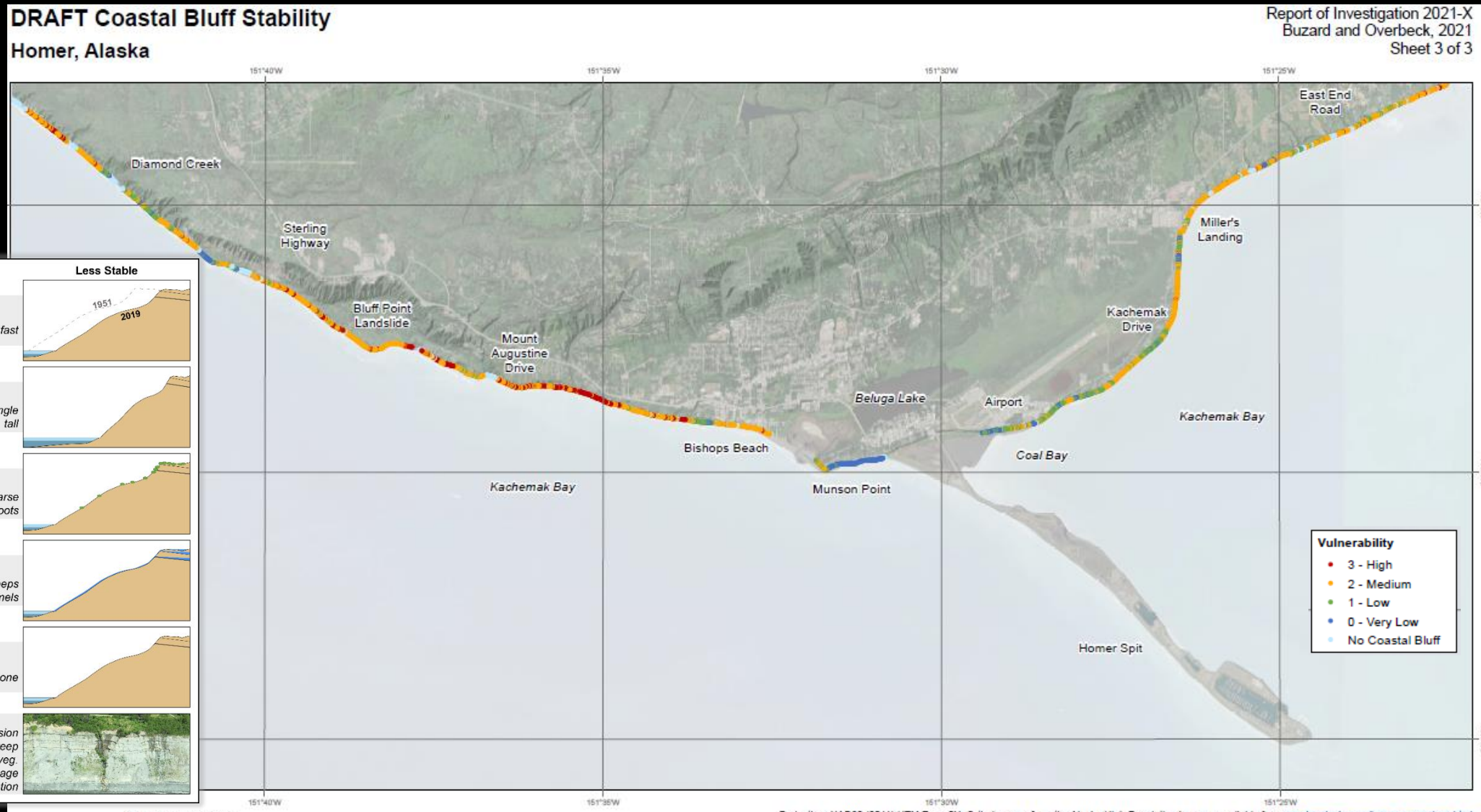


Bluff Stability Analysis based on Maine Geological Survey, 2015, Coastal bluffs maps: Maine Geological Survey [website]: www.maine.gov/dacf/mgs/pubs/mapuse/series/descrip-bluff.htm

https://www.youtube.com/channel/UCs0-6PGoKbrO3jrnREdKKgQ/videos

Coastal Bluff Stability Analysis: Final Map





STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

website: dggs.alaska.gov

N
0 1 Mile
0 1 Kilometer
1:50,000

Projection: NAD83 (2011) UTM Zone 5N. Orthoimagery from the Alaska High Resolution Imagery available from agc.dnr.alaska.gov/imagery_services.html
Coastal bluff vulnerability represents the potential for and impacts of slope failure. Vulnerability is estimated using slope angle, height, historical erosion, existing shoreline protection, vegetation, and drainage patterns. Red and orange areas tend to have faster erosion rates, less vegetation and protection, and taller and/or steeper bluffs.Green and blue areas generally have shorter and less steep slopes and more vegetation and/or protection. Some green and blue areas may not technically be coastal bluffs. Light blue areas are generally creekbeds or flanks.

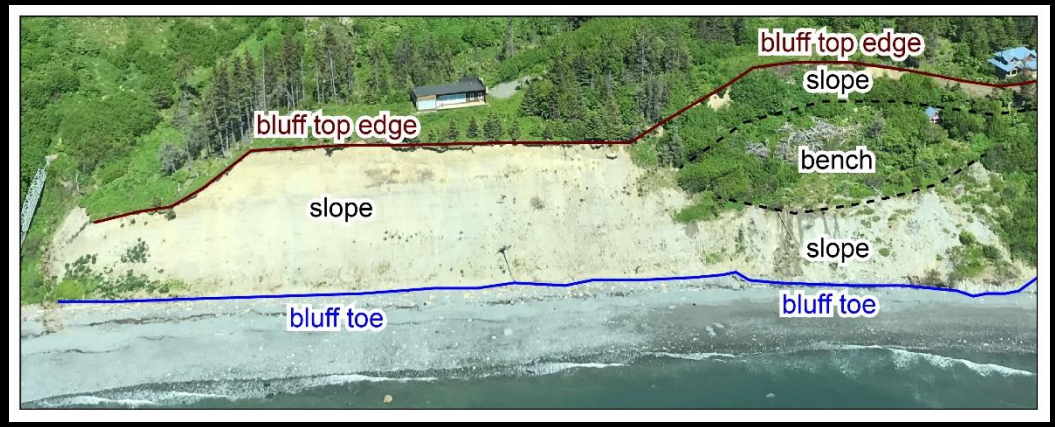
This work is funded by the Federal Emergency Management Agency. The Alaska Division of Geological & Geophysical Surveys is a Cooperating Technical Partner.

Data for Decision Making – How Much?

Coastal Bluff Stability Mapping: Data for Decision Making

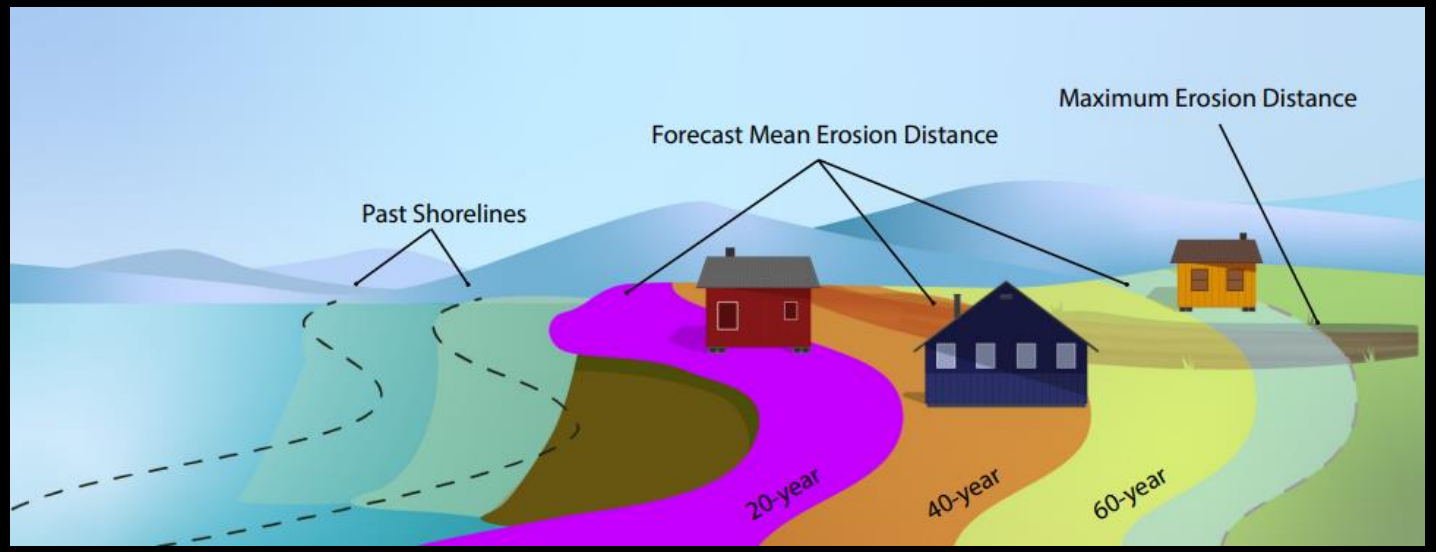
“Bluff” means an abrupt elevation change in topography of at least 15 feet, with an average slope of not less than 200 percent (two feet difference in elevation per one foot of horizontal distance). – City of Homer

In Homer, most coastal bluffs have slopes between 31 and 87 percent.



Coastal Bluff Stability Mapping: Data for Decision Making

No structure may be closer than **40 ft from the top of a coastal bluff**, and not closer than 15 feet from the toe.—City of Homer

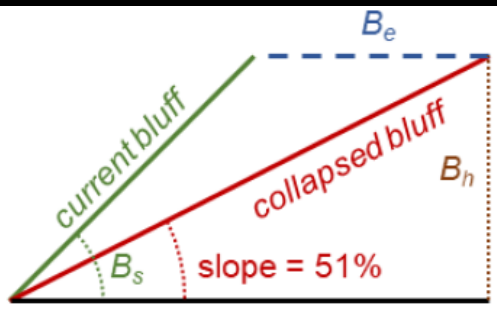


Two methods for evaluating potential erosion forecast **distance** within the bluff stability parameters:

- Historical Shoreline Change Rate
- Computed Bluff Failure Distance

$$B_e = B_h \times (B_s - 0.51)$$

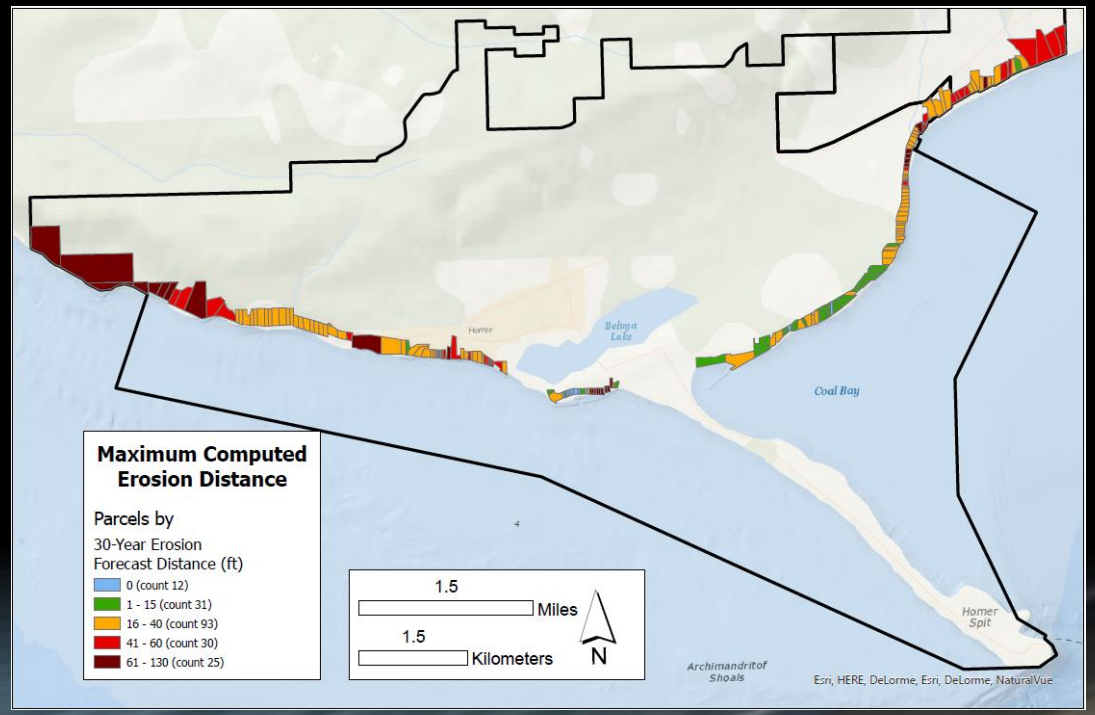
B_e = Horizontal bluff erosion due to slope failure
B_h = Bluff height
B_s = Average bluff slope percent (as a fraction)

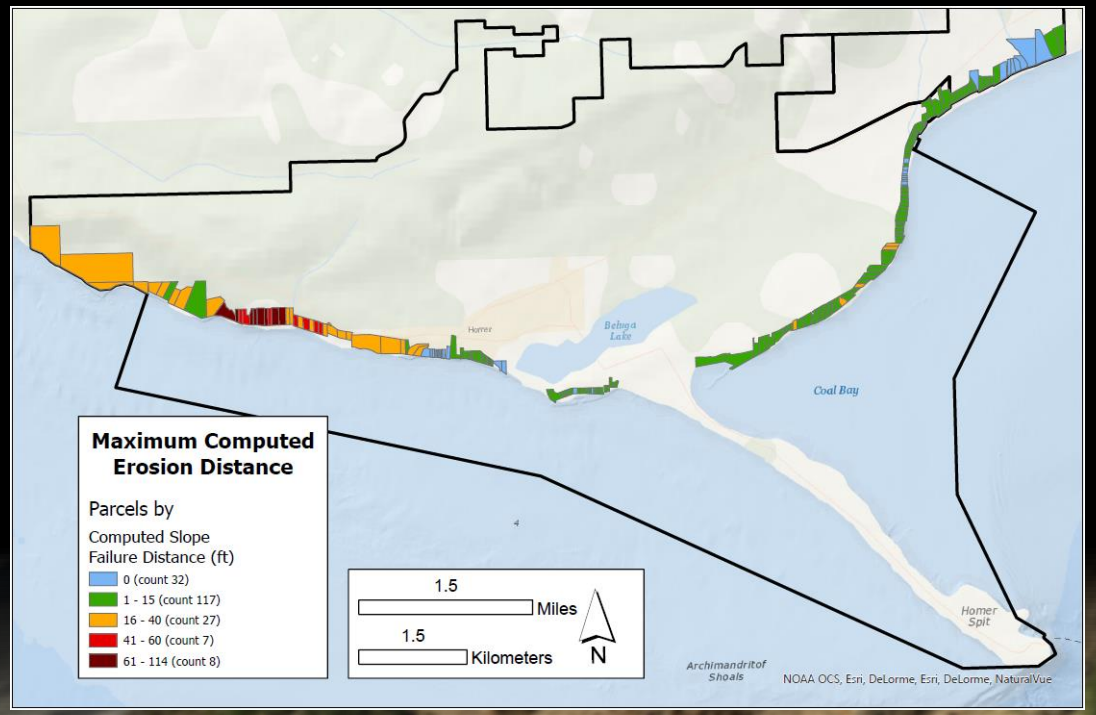


Coastal Bluff Stability Mapping: Data for Decision Making

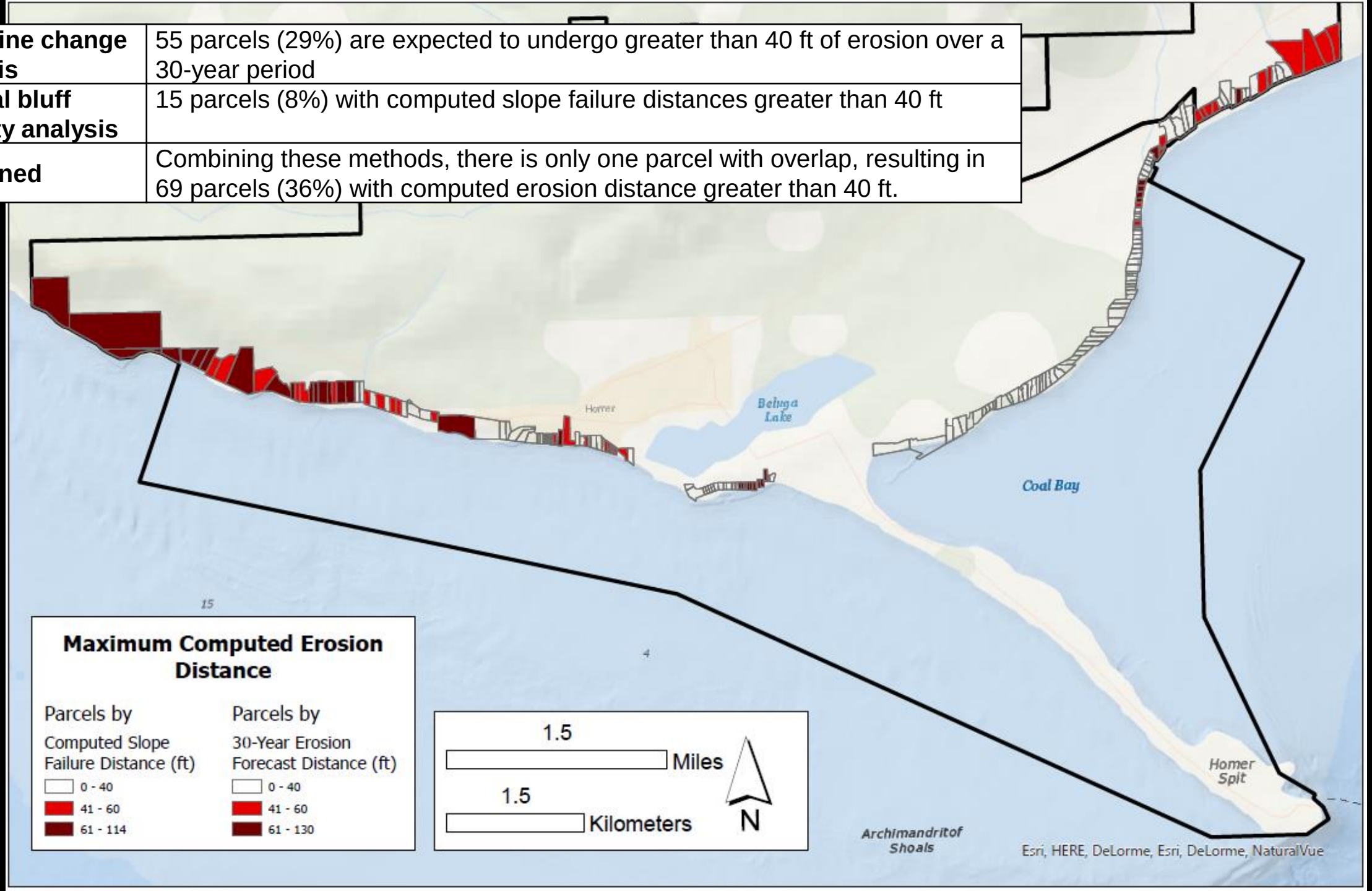
Determining forecasted erosion distance and slope failure distance based on parcel.

Parcels are not differentiated between developed and undeveloped.





Shoreline change analysis	55 parcels (29%) are expected to undergo greater than 40 ft of erosion over a 30-year period
Coastal bluff stability analysis	15 parcels (8%) with computed slope failure distances greater than 40 ft
Combined	Combining these methods, there is only one parcel with overlap, resulting in 69 parcels (36%) with computed erosion distance greater than 40 ft.



Coastal Bluff Stability Mapping: Summary

Key Findings

- Data to assist in changes to City Zoning Code:
  - Bluff Definition
  - Coastal Setback

Many of the parcels within the City boundary are already developed.

Next Steps

- Report and maps awaiting administrative review in DGGS. Report makes for outreach materials with the public.

- FEMA project coming to an end. DGGS available for future public meetings and technical guidance.

Contact Information
https://dggs.alaska.gov/hazards/coastal/

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