COASTAL BLUFF STABILITY MAPPING HOMER ALASKA

HOMER PLANNING COMMISSION MEETING DECEMBER 4, 2019 JACQUELYN OVERBECK

ALASKA DGGS COASTAL HAZARDS MAPPING

Dept. Natural Resources, Division of Geological & Geophysical Surveys

Our mission: Determine the potential of Alaskan land for production of metals, minerals, fuels, and geothermal resources, the locations and supplies of groundwater and construction material, and the potential geologic hazards to buildings, roads, bridges, and other installations and structures (AS 41.08.020).

Coastal Hazards Program

Mapping, Monitoring, and Modeling Coastal Flood and Erosion Hazards



Mapping

Monitoring

Modeling

INTRODUCTION TO COASTAL SETBACK CODES

States around the US that participate in the federal Coastal Zone Management Act have developed a variety of ways to zone and code for coastal erosion threats:

- Alabama—regulations require a permit for (1) removing primary dune or beach sands and vegetation or otherwise altering the primary dune system, (2) constructing any new structure, or (3) making any substantial improvement to any existing structure on property between the mean high tide and the "construction control line."
- **Delaware**—The building line is the state minimum setback requirement. It is defined in terms of certain distances, depending on the area, landward of a contour above the water line. It is set forth on maps the DNREC prepares with reference to a commonly used vertical datum.
- **Florida**—permit applications by forecasting the seasonal high-water line 30 years from the date of the permit application. Line of jurisdiction is the 50-foot setback line.
- **Georgia**—50-foot setback that applies to the upland component of the project as measured horizontally inland from the coastal marshland.
- **Hawaii**—generally establishes shoreline setbacks between 20 and 40 feet inland from the shoreline (mean high tide line).
- **Maryland**—100-foot setbacks from the mean high water line along tidal waters and tidal wetlands. In a "resource conservation area," area characterized by nature-dominated environments (e.g., wetlands, forests, abandoned fields and resource-utilization activities), there is a 200-foot minimum setback.
- And so on. This information was taken from Coastline Construction Restrictions by Mark Randall and Hendrik deBoer, 2012.

TAKING EXAMPLES FROM OTHER STATES

Coastal Bluffs







Maine Geological Survey

Map Resolution

Since these are regional maps, some shores mapped as sta-

ble may contain small

areas that are unstable A bluff, too small to appear on the map, is shown in the photo

This bluff exhibits the

characteristics of an

unstable bluff: curved tree trunks, exposed

roots, and bare ground

on a steep slope. It is an area to be concerned

about on a local scale However, this degree of detail is not shown

on the map above.

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Explanation from Coastal Bluffs Map

Classification and Mapping of Maine's Coastal Bluffs

Geologists classified the coastal bluffs on this quadrangle map by observing the shoreline from small boards. They assigned one of the following categories to the type of bareline sees below the high tide line: (1) ledge (exposed bedrock outcrops), (2) amored (seawall, ripra, gabien, bulkhead, etc.); (3) sail marsh; or (4) beach, muld flat, or other loose sediment. Ruled patterns on the man indicate the shoreline type. Gray areas on the map indicate segments of the shoreline without significant coastal bluffs. Where significant bluffs were present geologists noted various character-istics of the bluff face such as the slope of the bluff (steep to gentle), features on the bluff face indicatsuccorrection unit rates determined down the slope (slumped blocks) relatives on use built mee more measure ing recent movement of matteriat alope of valgetation (base (slumped blocks) of sediment, liakalidae scars, fallen trees), and the amount and type of vegetation (base stability of each blurght face as being (1) stable (green), (2) information, geologists assesses) unstable (yellow), or (3) highly unstable (red). This classification is based on observed features that reflect recent activity on the bluff face. Examples of bluff faces with different stabilities are shown in the panel of photographs to the right.



Limitations of the Data

This map is intended to provide only general information on the overall stability of bluffs. It is not intended to be the sole basis upon which specific land-use decisions are made. The information portrayed on this map is based on visual inspection of the coast from offshore, and parts of the shoreline may have changed slightly since the field work was completed. Because of the map scale, shoreline characteristics are generalized into 150-foot segments. It is important to realize that the bluff classification only shows the average stability inferred for each section of the shoreline (see Map Resolution section above). For an evaluation of specific shoreline erosion risks, landslide potential, or historical trends, certificat geologists or geotechnical engineers should conduct site-specific

Neither the Department of Conservation, nor its employees or agents; (1) make any war-ranty, either expressed or implied for merchantability or fitness for a particular purpose, as to the accuracy or reliability of the information shown on the map; nor are they (2) liable for any damages, including consequential damages, from using the map or the inability to use the map.

SHORELINE TYPE BLUFF FACE Ledge Armored Salt marsh Beach / flat Highly unstable Unstable Stable NO BLUFF Note: The classification of the bluff is indicated by a colored, patterned band extending landward from the shoreline (dark blue line). The width of the band is NOT related to the width of the bluff. Stability rank refers to RECENT bluff face activity. Shoreline Type Description of Shoreline at or Below the High-Tide Line Ledge Greater than 50% bedrock. May include minor accumulations of sediment that occur in small coves or other sheltered areas (see photo at left). Consists of riprap, seawalls, groins, jetties, and other engineered structures. Armored Condition of armor may indicate degree of stability of bluff face. Salt marsh Mostly to fully vegetated salt marsh with minor tidal flat environm nts. May include small rocky outcrops. Beach / flat Sediment, ranging in texture from mud (tidal flats) to cobbles (gravel beaches) May include small rocky outcrops or small patches of vegetation. Bluff Face Typical Characteristics of Bluff Face (above high-tide line) Highly Near vertical or very steep bluff with little vegetation and common exposure of instable bare sediment. Fallen trees and displaced blocks of sediment common on bluff face and at base of bluff. Unstable Steep to gently sloping bluff mostly covered by shrubs with a few bare spots. Bent and tilting trees may be present. Gently sloping bluff with continuous cover of grass, shrubs or mature trees. Relatively wide zone of ledge or sediment occurs at the base of the bluff. No bluff Broad, gently sloping vegetated land or bare ledge with less than three feet of sediment cover. Not Mapped Some portions of the shoreline have not been mapped for bluff type.

Classification of Coastal Bluffs

DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

PROJECT DELIVERABLES

- Summarized recommendations for City code updates with a suite of options based on mapped features.
- Coastal Bluff Stability Database alongshore gridded features, which will include all measurements considered in analysis (e.g. position of MHW shoreline, beach slope, bluff toe height, bluff slope, etc.)
- Coastal Bluff Stability Map and Report map will show the linear feature of the coastal bluff stability database with features that show the stability of the bluff, while the report will be a user-guide to the map.



PROJECT SCOPE

- Lidar oblique imagery—DGGS was able to collect lidar and oblique imagery in 2019 as a part of the landslide project.
- Establish NOAA Authoritative Tidal Datum— NOAA's Office for Coastal Management funded the collection of an authoritative datum in 2018, which will be available for this work.
- ✓ Historical Shoreline Assessment—City of Homer completed up to 2012 shoreline.
- Review existing policies for other coastal states.
- Update shoreline change assessment with 2019 lidar-derived shoreline.
- Sample lidar for alongshore coastal segments and delineate visual bluff stability features; compute coastal bluff stability metrics.
- Compute correlations between bluff stability features and metrics.
- Project Coordination! Kick-off meeting, project progress, and final meeting (open to public optional).



CONTACT INFORMATION

- Are there any preferences to paths for research coastal zoning methods?
- Are there any products that weren't discussed that need to be included?
- What is the capacity for the City of Homer to use GIS data?
- How does this project fit in with existing geospatial datasets?
- Next meeting might not be until next year.
- Who is the best contact for small questions to determine if they should be brought to the Planning Commission?

Contact

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LIDAR FOR COASTAL MAPPING

