Report of Investigation 2021-3 Unalakleet

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Unalakleet, Alaska, in 2015. Shorezone, shorezone.org.

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UNALAKLEET EROSION EXPOSURE ASSESSMENT

This is a summary of results from an erosion forecast near infrastructure at Unalakleet, Alaska. We conduct a shoreline change analysis, forecast 60 years of erosion, and estimate the replacement cost of infrastructure in the forecast area. Buzard and others (2021) describe the method and guidance for interpreting tables and maps.

Source data for this summary include the following:

- Shoreline change assessment ArcGIS shapefiles from Overbeck and others (2020) updated to the vegetation line if appropriate.
- Infrastructure AutoCAD outlines and metadata from Division of Community & Regional Affairs (2004) Community Profile Map series.
- Added infrastructure such as roads, water and sanitation facilities, and outbuildings, delineated if visible in the most up-to-date high resolution (≤ 0.66 ft [20 cm] ground sample distance) aerial orthoimagery (Overbeck and others, 2016).

Unalakleet is built on a sand and gravel spit at the head of Norton Sound where the Unalakleet River exits into the sound. Storm surge and riverine processes cause erosion at Unalakleet (U.S. Army Corps of Engineers [USACE], 2009). The highest rates of erosion were at the tip of the spit until a wall of gabions (wire baskets filled with rocks) were built in 2000 (USACE, 2009; Overbeck and others, 2020). The gabions were damaged in a storm in 2003 (USACE, 2009). In 2010, a rock revetment was constructed to reinforce the gabions and by 2017

a sheet pile revetment was extended to protect the entire end of the spit up to the fish processing facility (USACE, 2017). Other segments of the coast have also been reinforced, including placement of rip rap along airport facilities and a rock revetment in front of the school (City of Unalakleet, 2008; Overbeck and others, 2016).

Erosion forecasts cannot be made in areas with significant erosion protection. Unprotected segments of coast were stable or accreted between 1951 and 2015 (Overbeck, 2020), so there is no long-term erosion trend to forecast. For these reasons, we do not forecast erosion at Unalakleet.

Beach erosion can be measured from repeat beach elevation surveys from GPS or digital elevation models. For example, Kinsman and DeRaps (2012) collected pre- and post-storm elevation profiles that show the November 2011 storm surge caused beach erosion and deposition typical of a fall storm, with no major permanent land loss. DGGS also collected beach elevations in 2014, 2015, 2017, 2018, and 2019. Continued monitoring and a longer record of beach elevation data can help identify whether and when infrastructure may become exposed to erosion.

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