Report of Investigation 2021-3 Pilot Point

EROSION EXPOSURE ASSESSMENT—PILOT POINT

Richard M. Buzard, Mark M. Turner, Katie Y. Miller, Donald C. Antrobus, and Jacquelyn R. Overbeck

Pilot Point, Alaska, in 2006. Shorezone, shorezone.org.

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EROSION EXPOSURE ASSESSMENT—PILOT POINT

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PILOT POINT EROSION EXPOSURE ASSESSMENT

This is a summary of erosion forecast results near infrastructure at Pilot Point, 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:

- Delineated vegetation lines and change assessment by Buzard and others (2021) following the methods of Overbeck and others (2020).
- Infrastructure AutoCAD outlines and metadata from Division of Community & Regional Affairs (2002) 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 (Quantum Spatial, 2020).
- Computed infrastructure cost of replacement based on square or linear footage from Buzard and others (2021).

Pilot Point is located on the northwest coast of the Alaska Peninsula on the eastern shore of Ugashik Bay, where the Ugashik River, King Salmon River, and Dago Creek meet before entering Bristol Bay. Erosion is driven by storm surge (U.S. Army Corps of Engineers, 2008). From 1957 to 2019, the shoreline directly in front of the community remained stable or accreted. However, towards

Dago Creek, north of town, sections of the shoreline underwent net erosion or accretion, reaching distances of almost 600 feet in 66 years (about 9 feet per year). Erosion undermined the bulkhead at Dago Creek as recently as 2019 (Bristol Bay Native Association and Bristol, 2019).

We forecast erosion 60 years from the most recent shoreline (2019) at 20-year intervals to identify the exposure of infrastructure to erosion. The only erosion that is forecast occurs near the bulkhead. The forecast shows 3,500 ft of Dago Creek Road exposed to erosion through 2079, but erosion does not reach the power lines in the 2079 erosion forecast (table 1). Erosion forecasts in front of the bulkhead are less reliable because the shoreline history is complex and because of the bulkhead. Erosion or accretion could occur around the bulkhead and both scenarios negatively impact its function. Given the circumstance and forecast limitations, we place the bulkhead cost of replacement in the middle erosion forecast range of 2039 to 2059, with the same cost as a barge landing. The total estimated cost of infrastructure exposed to erosion is $3.9 million (± $1.2 million) by 2079 (table 2; fig. 1). We did not estimate erosion exposure for fuel, power, or water lines because the data were not available and the infrastructure are not in the erosion forecast area.

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Table 1. Quantity of infrastructure with estimated erosion exposure by linear footage (LF), square footage (SF), or count (n).

Quantity of Exposed Infrastructure			
Erosion Forecast Date Range	**Buildings & Tank Facilities (n)**	**Roads (LF)**	**Bulkhead (n)**
2019 to 2039	0	1,859	0
2039 to 2059	0	682	1
2059 to 2079	0	964	0
Combined Total	0	3,505	1

Table 2. Replacement cost of infrastructure exposed to erosion per 20-year interval.

Cost to Replace Exposed Infrastructure				
Erosion Forecast Date Range	**Buildings & Tank Facilities**	**Roads**	**Bulkhead**	**Sum**
2019 to 2039	$0	$743,800	$0	$743,800
2039 to 2059	$0	$272,800	$2,500,000	$2,772,800
2059 to 2079	$0	$385,700	$0	$385,700
Combined Total	$0	$1,402,300	$2,500,000	$3,902,300

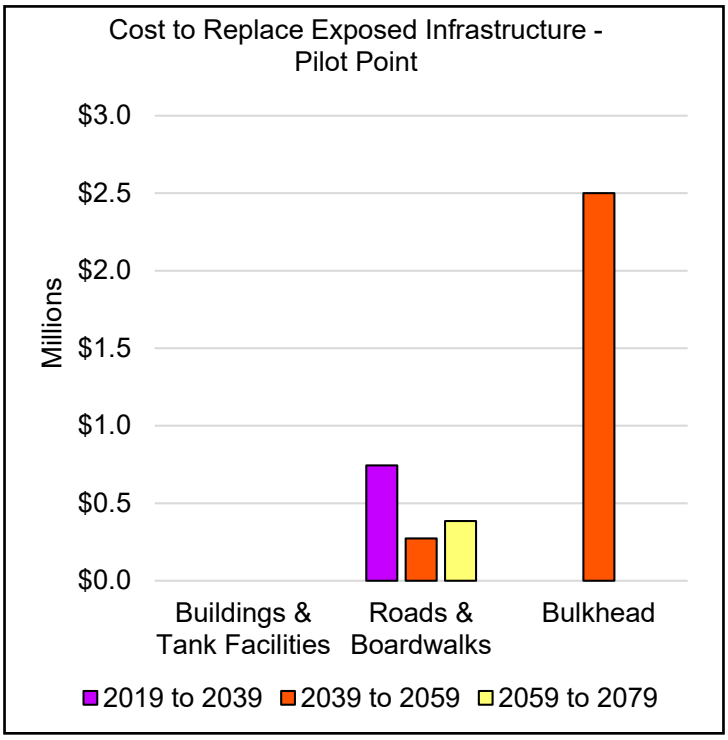

Figure 1. This figure summarizes the replacement cost of all infrastructure in the erosion forecast area. Twenty-year intervals are symbolized by color: purple represents the time interval 2019 to 2039, red represents 2039 to 2059, and yellow represents 2059 to 2079. The greatest cost is the barge landing (bulkhead).

ACKNOWLEDGMENTS

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Buzard, R.M., Turner, M.M., Miller, K.Y., Antrobus, D.C., and Overbeck, J.R., 2021, Erosion exposure assessment of infrastructure in Alaska coastal communities: Alaska Division of Geological & Geophysical Surveys Report of Investigation 2021-3. https://doi.org/10.14509/30672

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Erosion Exposure
Pilot Point, Alaska

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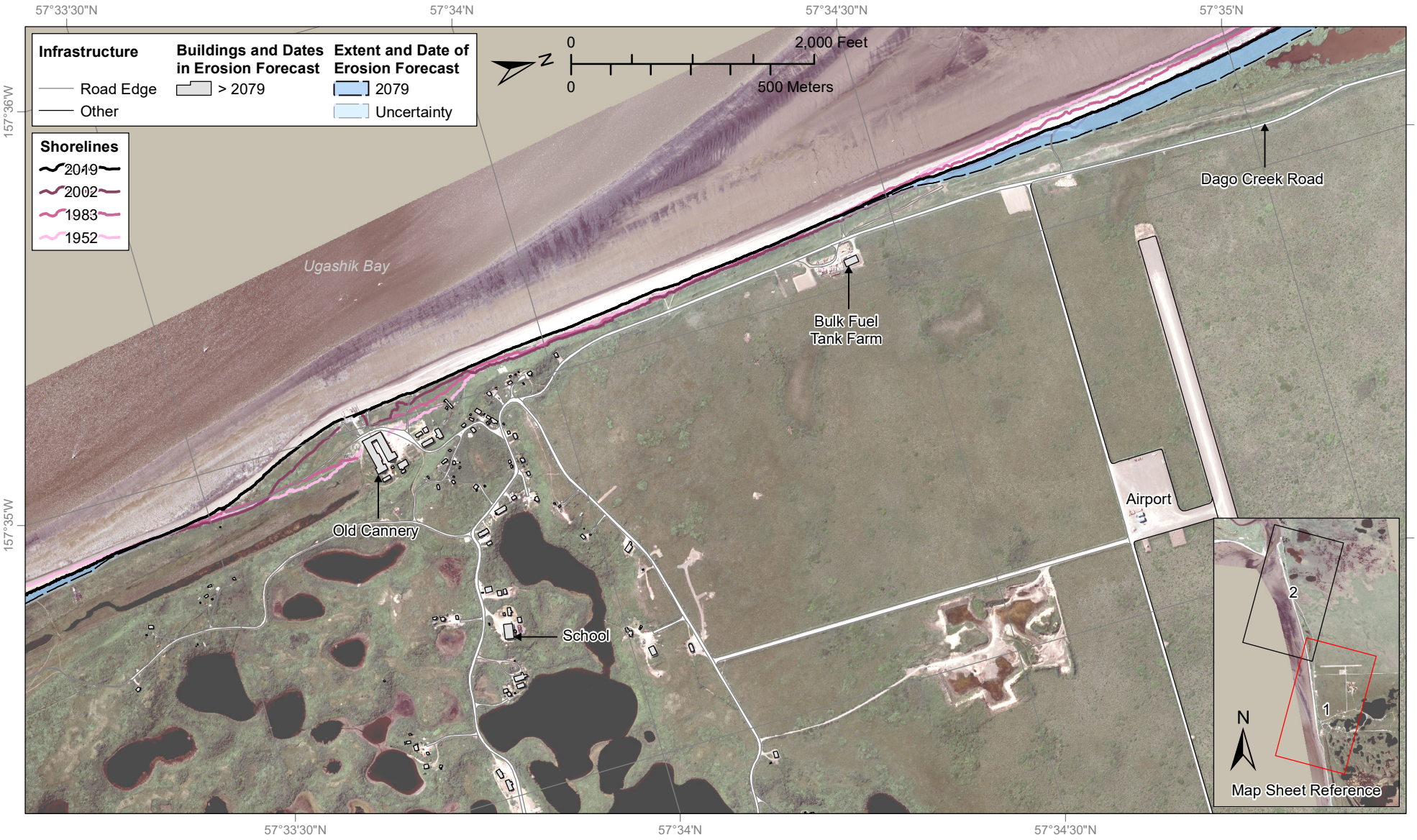

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Projection: NAD83 UTM Zone 4N. Orthoimagery year: 2019. Orthoimagery available from elevation.alaska.gov

Erosion and accretion of coasts and rivers result in shoreline change. These rates of shoreline change at Alaska communities are calculated from historical and modern shorelines (shorelines shown as lines in pinkscale and labeled by year). The long-term (1952 to 2019) shoreline change rate is used to forecast where erosion could impact community infrastructure. Erosion is forecast to year 2079 (dark blue) with a 90 percent confidence interval area of uncertainty (light blue). Buildings in the erosion forecast area are colored by impact year range: 2019 to 2039 (purple), 2039 to 2059 (orange), 2059 to 2079 (yellow), and no impacts expected by 2079 (gray). For more detailed information about the impacts to infrastructure from erosion at Pilot Point, refer to the Pilot Point erosion exposure assessment report.

This work is part of the Coastal Infrastructure Erosion Vulnerability Assessment project funded by the Denali Commission Environmentally Threatened Communities Grant Program. Components of this map were prepared by the Alaska Department of Commerce, Community, and Economic Development (DCCED) using funding from multiple municipal, state, federal, and tribal partners. The original AutoCAD drawing of the infrastructure data layers was converted to ArcGIS.

Erosion Exposure
Pilot Point, Alaska

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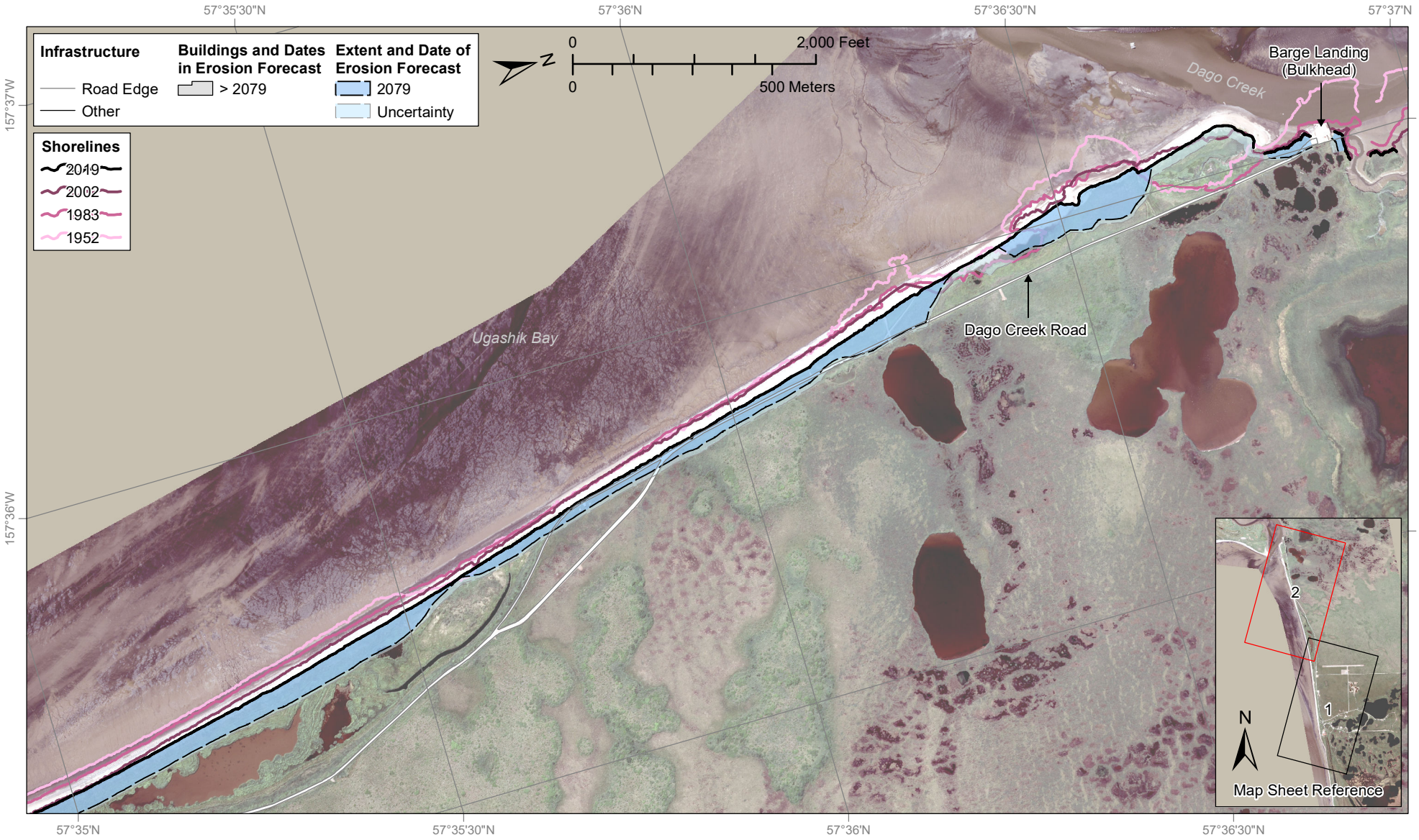

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