EROSION EXPOSURE ASSESSMENT—TELLER

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Suggested citation:
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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TELLER EROSION EXPOSURE ASSESSMENT

This is a summary of erosion forecast results near infrastructure at Teller, 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 (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 ($\leq 0.66$ ft [20 cm] ground sample distance) aerial orthoimagery (Overbeck and others, 2016).
- Computed infrastructure cost of replacement based on square or linear footage from Buzard and others (2021).

Teller is located on the western Seward Peninsula between Port Clarence and Grantley Harbor, two water bodies separated by dynamic sand spits on either side of the Harbor entrance. Grantley Harbor and Port Clarence empty into the Bering Sea at the Bering Strait. Much of the infrastructure in Teller is located on one of the sand spits, which extends from and is backed by a bluff. Between 1950 and 2015, the high water line on the west coast underwent erosion between 0 and 2.6 feet per year (Overbeck and others, 2020). The eastern side of the spit is mostly stable, but erosion and accretion are estimated at up to 2 feet per year. Teller is subject to flooding from storm surge that also results in bluff erosion and undercutting near infrastructure (U.S. Army Corps of Engineers [USACE], 2009). Seawalls are built near the waste-water lagoon and the Port Clarence mouth of Freshwater Lake (USACE, 2009) and have stabilized the shoreline, although the seawalls are in various states of disrepair (Overbeck and others, 2020).

We forecast erosion 60 years from the most recent shoreline (2015) at 20-year intervals to identify the exposure of infrastructure to erosion. The analysis is carried out on the Port Clarence side of Teller, where erosion is driven by storm surge events (City of Teller and LeMay Engineering & Consulting Inc., 2017). We do not include the Grantly Harbor side of Teller because the water line is relatively stable and there is no vegetation line shoreline to measure (Overbeck and others, 2020). Forecasts are not made where erosion protection (seawall) is built in front of the sewage lagoon and Freshwater Lake (USACE, 2009).

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No infrastructure is found in the erosion forecast area by 2075 except the cemetery. Erosion is forecast to undermine the seaward section of the cemetery throughout the 60-year period, but most of the cemetery is beyond the erosion forecast area. If the seawall did not prevent erosion, or were damaged, the school and wastewater lagoon would likely be exposed to erosion before 2075.

ACKNOWLEDGMENTS

This work was funded by the Denali Commission Village Infrastructure Protection Program through the project “Systematic Approach to Assessing the Vulnerability of Alaska’s Coastal Infrastructure to Erosion.” The community of Teller was not consulted for this report.

REFERENCES


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 pink scale and labeled by year). The long-term (1950 to 2015) shoreline change rate is used to forecast where erosion could impact community infrastructure. Erosion is forecast to year 2075 (dark blue) with a 90 percent confidence interval area of uncertainty (light blue). Buildings forecast to be impacted by erosion are colored by the range of years when the impact is forecast to occur: 2015 to 2035 (purple), 2035 to 2055 (orange), 2055 to 2075 (yellow), and no impacts expected by 2075 (gray). For more detailed information about the impacts to infrastructure from erosion at Teller, refer to the Teller 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 (DCCEED) using funding from multiple municipal, state, federal, and tribal partners. The original AutoCAD drawing of the infrastructure data layers was converted to ArcGIS.