

Report of Investigation 2021-3 Togiak

EROSION EXPOSURE ASSESSMENT—TOGIAK

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



Togiak, Alaska, in 2006. Shorezone, shorezone.org.



Published by
STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS
2021



EROSION EXPOSURE ASSESSMENT—TOGIAK

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

Report of Investigation 2021-3 Togiak

State of Alaska
Department of Natural Resources
Division of Geological & Geophysical Surveys

STATE OF ALASKA

Mike Dunleavy, Governor

DEPARTMENT OF NATURAL RESOURCES

Corri A. Feige, Commissioner

DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

Steve Masterman, State Geologist and Director

Publications produced by the Division of Geological & Geophysical Surveys (DGGs) are available to download from the DGGs website (dgg.alaska.gov). Publications on hard-copy or digital media can be examined or purchased in the Fairbanks office:

Alaska Division of Geological & Geophysical Surveys
3354 College Rd., Fairbanks, Alaska 99709-3707
Phone: (907) 451-5010 Fax (907) 451-5050
dggspubs@alaska.gov | dgg.alaska.gov

DGGs publications are also available at:

Alaska State Library,
Historical Collections & Talking Book Center
395 Whittier Street
Juneau, Alaska 99811

Alaska Resource Library and Information Services (ARLIS)
3150 C Street, Suite 100
Anchorage, Alaska 99503

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>



Contents

Togiak Erosion Exposure Assessment	1
Acknowledgments	2
References	2

EROSION EXPOSURE ASSESSMENT—TOGIAK

Richard M. Buzard¹, Mark M. Turner¹, Katie Y. Miller¹, Donald C. Antrobus², and Jacquelyn R. Overbeck¹

TOGIAK EROSION EXPOSURE ASSESSMENT

This is a summary of results from an erosion forecast near infrastructure at Togiak, 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 the Division of Community & Regional Affairs (2003) 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, 2019).

Togiak is located on the northern section of Bristol Bay, south of the Ahklun Mountains, where the Togiak River exits into Togiak Bay. U.S. Army Corps of Engineers (USACE) (2009) and the 2019 hazard mitigation plan indicate coastal and riverine erosion are great concerns for Togiak (Bristol Bay Native Association and Bristol Engineering Services Company, LLC [BBNA and Bristol], 2019). However, the erosion rates reported by USACE (2009) are not consistent with measure-



ments from historical and modern aerial imagery (1953 to 2018) that show the shoreline is relatively stable or accreting (Overbeck and others, 2020). Some erosion occurs on the banks of Nasaurluq Creek, but the change is too small to measure from historical and modern aerial imagery. The majority of Togiak's infrastructure is protected from coastal erosion by a seawall (built in 1984) and boulders placed on the beach (BBNA and Bristol, 2019). The community performs seawall maintenance and replenishes beach sediment (BBNA and Bristol, 2019). The section of town south of the seawall is not protected. Due to these factors, we cannot forecast erosion at Togiak.

Despite long-term shoreline stability, there is still exposure to beach erosion and sediment scouring from storm surge flooding. Relatively small erosion events can impact infrastructure near the coastline. Beach erosion can be measured from repeated beach elevation surveys using GPS or digital elevation models. DGGS collected beach elevations at transects along the coast fronting Togiak in 2016 and 2017. Continued monitoring and a longer record of beach elevation can help identify whether and when infrastructure may become exposed to erosion.

¹ Alaska Division of Geological & Geophysical Surveys, 3354 College Rd., Fairbanks, Alaska 99709-3707

² Alaska Native Tribal Health Consortium, 4000 Ambassador Drive, Anchorage, Alaska 99508

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 Togiak was not consulted for this report.

REFERENCES

- 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>
- Division of Community & Regional Affairs, 2003, Community profile map, Togiak: Department of Commerce, Community, and Economic Development. <https://www.commerce.alaska.gov/web/dcra/PlanningLandManagement/CommunityProfileMaps.aspx>
- Bristol Bay Native Association and Bristol Engineering Services Company, LLC (BBNA and Bristol), 2019, Traditional village of Togiak tribal hazard mitigation plan [2019-2024]: Bristol Bay Native Association and Bristol Engineering Services Company, LLC, 244 p.
- Overbeck, J.R., Buzard, R.M., Turner, M.M., Miller, K.Y., and Glenn, R.J., 2020, Shoreline change at Alaska coastal communities: Alaska Division of Geological & Geophysical Surveys Report of Investigation 2020-10, 29 p., 45 sheets. <https://doi.org/10.14509/30552>
- Quantum Spatial, 2019, Bristol Bay shoreline 2018 imagery—Technical data report: Quantum Spatial, 10 p.
- U.S. Army Corps of Engineers (USACE), 2009, Alaska baseline erosion assessment report summary—Togiak, Alaska: U.S. Army Corps of Engineers Alaska District, 3 p.