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ANNOTATED BIBLIOGRAPHY SERIES IN SUPPORT OF COASTAL COMMUNITY HAZARD PLANNING—NORTHWEST ALASKA

GOLOVIN, ALASKA

Prepared by Jacquelyn Smith and Nicole Kinsman

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This annotated bibliography is part of a series created to facilitate access to documents useful for coastal geohazard evaluation and community planning in Northwest Alaska. Below is a comprehensive list of community-specific information sources, each with full bibliographic information and an informative-style annotation that highlights content pertaining to the community of Golovin, Alaska. For a detailed description of the preparation and scope of this resource, please refer to this bibliography series' foreword. Any notable errors and/or omissions may be reported to the Coastal Hazards Program manager at the Alaska Division of Geological & Geophysical Surveys (DGGS).

Alaska Department of Commerce, Community, & Economic Development (DCCED), accessed 2011, Division of Community & Regional Affairs (DCRA) Community Profiles [website]: Department of Commerce, Community, & Economic Development.

http://www.commerce.state.ak.us/dca/profiles/profile-maps.htm

This website provides access to community profile maps for community-based planning. The maps are available in 24" by 36" and 30" by 42" formats. The Golovin maps were created in 2004, 1996, and 1980 based on land surveys and/or interpretation of aerial imagery. Subsistence hunting grounds, habitat areas, community buildings, and public facilities are delineated. Shoreline position and potential erosion zones are included in the map content. All maps have been sponsored by the Alaska Division of Community & Regional Affairs and contracted to local agencies for production.

Alaska Department of Natural Resources Division of Coastal and Ocean Management (DCOM), accessed February 2011, Alaska coastal management program [website]: Alaska Department of Natural Resources Division of Coastal and Ocean Management.

http://alaskacoast.state.ak.us/Explore/Tour.html

This website outlines the Alaska Coastal Management Plans for each coastal district. It provides stewardship plans "to ensure a healthy and vibrant Alaskan coast that efficiently sustains long-term economic and environmental productivity."

Blier, Warren, Stanley Keefe, Wilson A. Shaffer, and Sung C. Kim, December 1997, Storm surges in the region of western Alaska: Monthly Weather Review, vol. 125 p. 3094–3108.

The authors describe the relationship between storm surges in Alaska and extratropical cyclones. They have identified Norton Sound and the Bering Sea as the two regions most vulnerable to cyclone-linked coastal flooding. A statistical storm surge model was developed in order to provide advanced warning to coastal villages, however, the author highlights that a more accurate model would be necessary to utilize this warning system as a hazard mitigation strategy. The installation of storm surge gauges would also be required for this warning system to be used successfully.

Cacchione, David A., and David E. Drake, 1979, Sediment transport in Norton Sound, Alaska: U.S. Geological Survey (USGS), Open File Report 79-1555, 88 p.

This report is an investigation of sediment dynamics in Norton Sound and the northern Bering Sea. The major topic of the research was sediment movement and hydrodynamic stresses that occur in the Sound and their relationship to Bering Sea ocean dynamics. Other studies have found sediment accumulation from the Yukon River inconsistent with the rate of supply. The modes of transport for this loss of materials are discussed in the report. This study attempts to provide a description of the bottom transport of sediments, pollutants, nutrients, and other particulate matter, as well as identify hazardous sea floor conditions in Norton Sound.

Chapman, Raymond S., Sung-Chan Kim, and David J. Mark *for* U.S. Army Corps of Engineers, Alaska District, 2009, Storm damage and flooding evaluation, storm-induced water level prediction study for the western coast of Alaska: Vicksburg, Mississippi, U.S. Army Engineer Research and Development Center, Coastal and Hydraulics Laboratory, 92 p.

Technical assistance was provided by the U.S. Army Engineer Research and Development Center, Coastal & Hydraulics Laboratory in assessing storm-generated regional water levels and currents at selected sites of ongoing and potential COE projects along the western coast of Alaska. The purpose of this study was to develop frequency-of-occurrence relationships for storm-generated water levels at 17 communities along the western coast of Alaska. Storm wind, pressure, ice, and surge data were generated for each of the areas, and the bathymetry was updated. Fifty-two storm event simulations were performed and a database of water levels versus return period was developed for each site.

Drake, D.E., D.A. Cacchione, R.D. Muench, and C.H. Nelson, 1980, Sediment transport in Norton Sound, Alaska: Marine Geology, vol. 36, p. 97–126.

This study examines the suspended sediment and ocean circulation of the northeastern part of the Bering Sea shelf. The authors describe the fate of sediment delivered by the Yukon River to the southwestern corner of Norton Sound and the importance of storm events in Norton Sound associated with erosion and sediment transport. Landsat images were also used to inspect the distribution of sediments and regional circulation in the Sound.

Hartig, Larry *of* Alaska Department of Environmental Conservation & Governor's Climate Change Sub-Cabinet, October 2010, State of Alaska and State/Federal Executive Roundtable Activities Regarding the Arctic [presentation]: Anchorage, Alaska, Northern Waters Task Force, 53 p.

http://housemajority.org/coms/anw/pdfs/26/NWTF_Powerpoint_Hartig_01Oct10.pdf

This is a powerpoint presentation about the state and federal executive roundtable activities regarding the Arctic. The discussion includes hazards associated with declining Arctic sea ice extent, melting of permafrost, storm surges, and coastal erosion. Thirty-one villages are identified as imminently threatened: Barrow, Kivalina, Selawik, Allakaket, Hughes, Huslia, Shishmaref, Deering, Teller, Koyukuk, Nulato, Golovin, Shaktoolik, Unalakleet, Saint Michael, Kotlik, McGrath, Emmonak, Alakanuk, Chevak, Newtok, Nunapitchuk, Lime Village, Eyak (Cordova), Napakiak, Akiak, Chefornak, Kwigillingok, Dillingham, Clark's Point, and Port Heiden. Specific photos and engineering initiatives for four communitites are discussed, including: Kivalina, Shishmaref, Unalakleet, and Newtok.

Immediate Action Workgroup (IAWG), Michael Black and Patricia Opheen, eds., March 2009, Recommendations to the Governor's Subcabinet on climate change: Immediate Action Workgroup, 162 p.

The Immediate Action Workgroup was established to address known threats to Alaskan communities caused by coastal erosion, thawing permafrost, flooding, and fires. This report is a follow-up to the recommendations made in April 2008 and provides recommendations of actions and policies to be implemented in 2009 and 2010. The community of Golovin has been recognized as receiving agency actions from four of the five main supporting agencies. Documented dates of flood disasters in Golovin are also compiled.

Immediate Action Workgroup (IAWG), Michael Black and Patricia Opheen, eds., 2008, Recommendations report to the Governor's Subcabinet on Climate Change: Immediate Action Workgroup, 86 p.

This report provides recommendations to the Alaska Governor's Subcabinet on Climate Change by the Immediate Action Workgroup (IAWG). Community statements are provided for Golovin discussing the community's vulnerability to storm surge hazards.

Johnson, Walter R., and Zygmunt Kowalik, April 1986, Modeling of storm surges in the Bering Sea and Norton Sound: Journal of Geophysical Research, vol. 91 no. C4, p. 5119–5128.

Based on the results of a numerical model used to examine sea level, currents, and ice distribution during Bering Sea storm events, the authors suggest that the presence of land-fast ice in Norton Sound has a measurable effect on the size and onshore arrival time of storm surge events. Both land-fast and pack ice are included as parameters in the model runs. The model is validated using observations and measurements from the February 1982, March 1982, and November 1974 storm events and reproduces observations of sea ice redistribution during these events.

Mason, Owen K., and James W. Jordan, 2002, Minimal late Holocene sea level rise in the Chukchi Sea—Arctic insensitivity to global change?: Global and Planetary Changes, vol. 32, p. 13–23.

In this article, Mason and Jordan outline the apparent disconnect between late Holocene global sea level rise and the moderate sea level rise observed in Northwest Alaska. Radiocarbon ages taken from peat and storm deposits in Seward Peninsula lagoons allowed for the reconstruction of a sea-level curve spanning the last 6,000 years. The results indicate that sea level in Northwest Alaska has risen an average 0.3 mm per year compared to the global average of 1–2 mm per year. The authors suggest several hypotheses for these differing rates, including cold sea surface temperatures (limited steric expansion), geoid variation, and/or the development of permafrost. Although observed rates of sea-level rise are moderate for the Chukchi Sea, the article cautions that the response of northern Alaska's coasts to future global climate change remains uncertain and requires continued investigation.

Mikulski, Pearl, *of* Kawerak, Inc., *for* the Chinik Eskimo Community, the City of Golovin, and the Bering Strait Development Council, June 2009, Golovin local economic development plan 2009–2013: Kawerak, Inc., 77 p.

This document is required by AS 29.40.030 to define policy statements, goals, and standards for the physical, social, and economic development of Golovin. The ten economic development priorities include:

1. *Water and sewer with a year-round water source.*
2. *Relocation of generator building with the addition of alternative energy options.*
3. *Rock quarry development and heavy equipment purchasing.*
4. *Erosion control due to a lack of a breakwater barrier.*
5. *Roads that include access to subsistence areas.*
6. *Building a new community store.*
7. *Building a small boat harbor.*
8. *Community zip code and new post office.*
9. *Building a recreational and daycare facility.*
10. *Crosswind runway meeting minimum FAA standards.*

Miller, Thomas P., Raymond L. Elliott, Warren I. Finch, and Robert A. Brooks, 1976, Preliminary report on uranium-, thorium-, and rare-earth-bearing rocks near Golovin, Alaska: U.S. Geological Survey (USGS), open-file report no. 76-71, 13 p.

The USGS found considerable concentrations of uranium-, thorium-, and rare-earth-bearing rocks about 15 miles northeast of Golovin. These deposits are associated with alkaline dikes, and with allanite, which covers at least 250 square km, and which is of great economic interest. This report was a brief study of alteration and/or mineralization associated with these dikes and their relation to similar dikes and rocks that occur elsewhere in the province.

Pattison, F.H., 1986, Environmental assessment, Golovin airport, Golovin, Alaska: Alaska Region Department of Transportation Federal Aviation Administration (FAA), 38 p.

This document describes City of Golovin's dependence on the local airport to meet year-round transportation needs. The current runway safety area is only 80 feet wide by 2,400 feet long, and must be enlarged to 150 feet wide by 4,800 feet long to meet community needs. The surface of the runway is 8 feet amsl, and 25.33 acres out of 54.87 acres of airport property are owned by the current airport sponsor. This report gives proposals for actions to alleviate these problems.

Rodney P. Kinney Associates, Inc., and Kawerak Transportation Program *for* Chinik Eskimo Community, March 2007, Golovin long-range transportation plan: Chinik Eskimo Community, Golovin, Alaska, Indian reservation roads program no. E04177-GOLOVIN, 14 p.

This plan outlines transportation priorities for the community of Golovin and its surrounding boundaries. The prioritized list of projects includes:

1. *Upgrading the community streets in the City of Golovin with the appropriate surface material and dust control additive (total estimate of $2 million).*
2. *Constructing community streets in the City of Golovin with appropriate surface material and dust control additive (total estimate of $14 million).*
3. *Constructing proposed subsistence and economic routes (total estimate of $715 million).*
4. *Improving landfill road to dump (total estimate $2 million).*
5. *Constructing a one-lane bridge over Chinik Creek (total estimate $5 million).*
6. *Constructing new gravel source road (total estimate $4 million).*
7. *Clearing, grubbing, and flagging of existing routes encroached by willows and shrubs (total estimate $10,000 per acre).*
8. *Construct berm road in town (total estimate $680,000).*
9. *Construct water access road (total estimate $4 million).*
10. *Construction and upgrades to marine facilities such as boat landings, harbors, ports, barge landings, and breakwater structures (total estimate $7 million).*
11. *Providing route staking, navigational upgrades, and signage to inventory routes to improve safety during winter travel, prevent disorientation, and aid in rescue operations (total estimate $100,000 per mile).*

This inventory of updated roads projects the need of the community over the next 20 years.

Sallenger, Asbury H., Jr., 1983, Measurements of debris-line elevations and beach profiles following a major storm—Northern Bering Sea coast of Alaska: U.S. Geological Survey Open-File Report 83-394, 12 p.

From introduction: "During November 1974, a severe storm occurred in the Bering Sea; winds gusted to greater than 100 km/hr and barometric pressure dropped 34 mb. Combined storm surge and wave runup reached as high as 5 m along the northern Bering Sea coast of Alaska. Shortly after the storm, the northern Bering Sea froze. Following breakup in 1975 and during the ice-free season of 1976, we surveyed beach profiles and elevations of debris-lines at stations around the northern Bering Sea coast of Alaska. In this open-file report, these data are used to show the approximate magnitude of combined storm surge and wave runup in the study area."

Sallenger, Asbury H., Jr., and John R. Dingler, September 1978, Coastal processes and morphology of the Bering Sea coast of Alaska: U.S. Geological Survey, Menlo Park, California, Research Unit No. 431, 66 p.

The purpose of the research outlined in this paper was to characterize the regional physical environment of the Bering Sea coast of Alaska to prepare for potential oil and gas development and subsequent hazards to infrastructure and environment. The net direction of longshore transport, coastal morphology, and reconnaissance-based beach morphology and sediment characteristics were used as indicators. Measurements were taken along the Bering Sea coast of debris-line elevations that were reached during the 1974 Bering Sea storm. Coastal change was measured near Nome using nearshore coastal profiling and aerial photography during 1976 and 1977. Wave characteristics and sea level variations were also measured to check the validity of the wave model used. The specific objective of the research was to develop a coastal setback line beyond which petroleum development would not occur.

Simpson, J.J., January 1984, Final report, Task Force on Erosion Control: Alaska Department of Transportation & Public Facilities, project no. R-30023, 101 p.

The Erosion Control Task Force was appointed to investigate and inventory potential erosion problems on a statewide basis, to prioritize the erosion problem sites by severity and need, and to provide preliminary design plans where immediate remedial action is required. Sites were rated based on public safety, public property, private property, time of projected loss, ability to move, approximate replacement value, and economic value. Projected costs of erosion protection measures were analyzed and totaled $16,802,300 for all projects. This report outlines specific engineering projects to reduce the effects of coastal and riverine erosion for communities throughout Alaska.

The erosion problem in Golovin has been identified by beach mining at the sediment source to the current village site. This report suggests using a beach fill in front of the community to stabilize the natural slope and for the community to stop all beach mining operations.

Tetra Tech *for* Immediate Action Workgroup—Advisory Group of the Governor's Climate Change Sub-Cabinet, June 2010, Imperiled community water resources analysis: Anchorage, Alaska, Tetra Tech, 47 p.

This report summarizes climate-related threats to water and wastewater infrastructure in Alaskan communities including those at risk of flooding, saltwater intrusion, loss of surface water supply, erosion, and sedimentation of the source region. The primary objectives of the analysis were to:

1. *Identify and select study group communities whose water infrastructure is threatened*
2. *Collect information on the threatened water infrastructure for the study group communities*
3. *Analyze information to determine the climate-related impacts to study group community water infrastructure. (p. 2)*

Golovin is identified as being susceptible to lack of sea ice, changed timing in sea ice formation, and increased effects of storm surges on the unbuffered shoreline. The community water storage tank and septic lines are identified as being at risk from melting permafrost, coastal and river erosion, and ivu. A general community profile is available in the report that outlines the socioeconomic, geologic, and climatic setting, provides an overview of the existing water resources in the community, and summarizes a brief history of documented historical impacts to existing water infrastructure.

The City of Golovin Hazard Mitigation Planning Team and URS, Agnes Moses, ed., November 2008, The City of Golovin multi-hazard mitigation plan: The City of Golovin, 96 p.

This plan was developed to comply with FEMA regulations under the Repetitive Flood Claims Program. The City of Golovin does not currently participate in the National Flood Insurance program and is therefore ineligible for the National Flood Insurance Act Grant Programs. Participation in the NFIP has been identified as a high priority action as a result of this plan.

This hazard analysis includes the identification, screening, and profiling of 12 possible hazards to Golovin, eight of which are discussed in detail. These include:

1. *Shoreline erosion*
2. *Earthquake from the Kigluaik–Bendeleben faults*
3. *Flooding events*
4. *Ice override (ivu)*
5. *Permafrost melting and instability*
6. *Severe weather*
7. *Wildland fire*
8. *Naturally-occurring uranium and resulting radon*

U.S. Army Corps of Engineers, accessed 2011, Civil works floodplain management services [website]: U.S. Army Corps of Engineers, Alaska District.

http://www.poa.usace.army.mil/en/cw/fld_haz/floodplain_index.htm

This website provides flood-hazard data for communities throughout Alaska. A link to a flood-hazard-specific bibliography, maintained by the U.S. Army Corps of Engineers, is provided. The worst flood event for Golovin was documented in 1913, in which the National Flood Insurance Program did not participate. Survey information is available for specific buildings that have been previously inundated by a flood event.

U.S. Army Corps of Engineers, March 2009, Study findings and technical report—Alaska baseline erosion assessment: Elmendorf Air Force Base, Alaska, U.S. Army Corps of Engineers, Alaska District, 68 p.

http://www.poa.usace.army.mil/AKE/Home.html

This statewide assessment was conducted by the U.S. Army Corps of Engineers to coordinate, plan, and prioritize responses to erosion throughout Alaska. The report has designated 26 communities as priority action communities, including Golovin. Golovin is subject to both coastal and riverine erosion, resulting in risk to community structures such as the retail store, road, boat launch, utility poles, and others. At the current status,

damages are expected within 10 years. Detailed assessment of erosion is still necessary to develop potential solutions.

U.S. Government Accountability Office (GAO), June 2009, Report to congressional requestors—Alaska Native villages, limited progress has been made on relocating villages threatened by flooding and erosion: U.S. General Accountability Office Report GAO-040895T, 53 p.

http://www.gao.gov/products/GAO-09-551

This report is a follow-up to the 2003 GAO report on flooding and erosion in Alaska Native villages, and was completed to identify concerns due to climate change that have increased the urgency of federal and state efforts. The GAO developed recommendations for Congress that include:

1. *A flooding assessment to augment the erosion assessment completed by the Army Corps of Engineers*
2. *An amendment to federal legislation so that 64 more villages may be eligible for grants*
3. *Designating a federal entity to oversee and coordinate village relocation efforts*

The report has identified 31 villages as facing imminent flooding and erosion threats, including Golovin.

U.S. Government Accounting Office (GAO), 2003 [2004], Alaska Native villages—Most are affected by flooding and erosion, but few qualify for federal assistance: U.S. General Accounting Office Report GAO-04-142, 82 p.

http://www.gao.gov/products/GAO-04-142

This study was conducted to provide recommendations to Congress to improve how state and federal agencies respond to flooding and erosion in Alaska. This was done by:

1. *Determining the extent to which these villages were affected.*
2. *Identifying federal and state flooding and erosion programs.*
3. *Determining the current status of efforts to respond to flooding and erosion in nine villages.*
4. *Identifying alternatives that Congress may wish to consider when providing assistance for flooding and erosion (see "Highlights" section).*

The recommendations provide alternatives to current actions taken during flooding and erosion responses by federal agencies, including the Denali Commission. The adoption of policies by the Denali Commission would guide investments in infrastructure for Alaska Native villages affected by flooding and erosion. Golovin is recognized as one of 184 Alaska Native villages affected by flooding and erosion.

Weeks, John B., 1970, Water-resources reconnaissance of the Golovin area, Alaska: U.S. Geological Survey Open File Report Technical Data Unit Classification Number 449, 10 p.

This is a reconnaissance investigation of Golovin, Alaska, involving an inventory of existing sources of water, including water quality, and a report of the principal findings. This study was done by request of the Rural Alaska Community Action Program (RurAlCAP), to develop adequate water supply for the village of Golovin. The recommendations of this investigation suggest that Golovin either develop a ground-water supply below the spring, construct a gallery well near the pond, or develop a water supply from Chennik Creek. Regardless of the alternative pursued, the water obtained will require treatment to reduce pollution hazard.

Wise, James L., Albert L. Comiskey, and Richard Becker, 1981, Storm surge climatology and forecasting in Alaska: Anchorage, Alaska, Arctic Environmental Information and Data Center, University of Alaska, 26 p.

The objective of this study was to improve the quality of life and the security of property in coastal areas susceptible to flooding by enhancing the decision-making process for human activities and development. This study compiles historical climatological data to develop a surge forecast regression equation.

The Seward Peninsula, Norton Sound, and Lower Yukon areas are identified as having the greatest frequency of reported coastal storms in Alaska. Norton Sound exhibits shallow waters offshore, combined with the open waters of the Bering Sea, allowing for a long fetch for storm wave development. The range of wind directions for the development of storm surges is limited to west-southwest to west; however, flooding is experienced due to rising water levels throughout the sound. Two storms, in 1974 and 1977, were documented for Golovin and used for this study.
