



U.S. Army Corps
of Engineers
Alaska District

ALASKA BASELINE EROSION ASSESSMENT

Erosion Information Paper - Barrow, Alaska

Current as of September 14, 2007

Community Information

Barrow (BARE-row, a.k.a. Ukpeagvik), population 4,065, is the northernmost community in North America. Barrow is located on the Chukchi Sea coast 10 miles south of Point Barrow (from which it takes its name) and is about 835 miles north of Anchorage. Barrow is a 1st Class City, within the North Slope Borough. The city limits encompass 18.4 square miles of land and 2.9 square miles of water. The OMB Community Erosion Survey was completed by Michael Stotts, North Slope Borough.

Description of Erosion Problem

Barrow is situated on the Chukchi Sea coastline that runs in a northeast and southwest direction. This orientation leaves Barrow most susceptible to storms from the north and west. The storms that impact the coast during the open water season (August-October) typically are short in duration but intense. The coast is characterized by bluffs up to 30 feet high fronted by a narrow beach. The bluffs decrease in height to the north where the coast becomes a wide gravel beach backed by fairly level tundra. Analyses of aerial photographs indicate that the beach used to be much wider than it is today. This provided the bluffs more protection from storm events. The beach narrowing appears to be a result of storm events and using the beach and adjacent bluff as a borrow source for gravel. The beach narrowing has resulted in the bluff being more susceptible to wave attack and subsequent erosion during the fall storm season. A 1963 storm event was the most extreme storm experienced by the community. About 14 feet of the bluff eroded on average, and as much as 35 feet in some places. Although Barrow has experienced storm damage and erosion problems for decades, this single storm caused as much as a third of the total erosion that the bluff has experienced over the last 5 decades. The presence of sea ice plays a large part in protecting the community from storm events. Near shore pack ice can prevent the formation of waves during storm event; however, when the pack ice remains further offshore for longer periods of time severe storms can generate wind driven waves that can cause significant shoreline erosion.

The Corps of Engineers' 2007 *Draft Integrated Interim Feasibility Report and Environmental Impact Statement* indicates average annual bluff erosion is occurring at a rate of 1.02 feet per year based on aerial photography analysis (1948-2003). However, episodic erosion can result in more extensive losses with large storms. Some roads and homes in the Barrow neighborhood have been relocated due to threat of erosion damage. Portions of the Utqiagvik Village historic/archeological site in Barrow have been lost to erosion and the site continues to be threatened. Beach berms are constructed annually by the North Slope Borough to protect Barrow

and Browerville from continued erosion and flooding damages including recurring erosion to the local beach frontage road (Stevenson Road).

Potential Damages

Coastal erosion and flooding threaten residential and commercial structures, roads, the below ground utilidor, other local utilities, and the Utqiagvik Village archaeological/cultural site. Storm damage reduction efforts in recent years by the North Slope Borough and others have included: (1) offshore dredging with beach nourishment, (2) construction of sacrificial berms, (3) shoreline road maintenance, and (4) HESCO Concertainers®. About \$28 million was spent over a decade on the North Slope Borough's Beach Nourishment Program to place about 100,000 cubic yards of material on the Barrow beach. Flood water overtopped Stevenson Road during a storm in 2000, washing out 4 sections of the road on the way to the Naval Arctic Research Laboratory (NARL) site (up to 200 yards in length). Approximately \$330,000 was spent to repair this, and it is estimated that the road needs to be repaired every 3 years, or approximately \$110,000 annually. Some community measures that have met with varying degrees of success include: large geotextile "supersacks" laid on the bank slope, surplus wooden utilidors filled to create a seawall, old tar barrels laid on the upper beach slope, and Longard geotextile tubes laid along the base of the bank or berm. (Longard tube is a double-lined polyethylene impermeable inner liner with a geotextile outer liner.) On average approximately 15,000 cubic yards of material is placed annually to protect the community that was estimated at \$567,000 annual expense in 2006 values according to the 2007 report. The Corps 2007 draft report proposed a coastal flooding and bluff erosion protection project. Also, in recent years, local entities have employed in some cases the non-structural choice of relocating some vulnerable facilities farther from erosion danger. These approaches and new projects may help reduce the risks from erosion and flooding, but many structures and infrastructure remain vulnerable.

Photos and Diagrams

Erosion photos and diagrams depicting linear extent of erosion in the community are attached.

References

USACE. 2007. *Alaska Community Erosion Survey, OMB approved number 07100001*, expires September 30, 2009 administered to Michael Stotts, North Slope Borough on September 14, 2007.

USACE. 2007. *Alternative Formulation Briefing Document (Independent Technical Review Version) Barrow, Alaska Coastal Storm Damage Reduction Draft Integrated Interim Feasibility Report and EIS.* Alaska District, U.S. Army Corps of Engineers.

USACE. 2002. *Coastal Storm Damage Reduction Feasibility Study.* Alaska District, U.S. Army Corps of Engineers.

USACE. 2006. *Hydraulics Hydrology Report: Barrow.* Alaska District, U.S. Army Corps of Engineers.

USACE. 2006. 10 May 2006. *Section 117 Expedited Erosion Control Project Barrow, Alaska Continuing authorities Project Fact Sheet (Draft).*

Additional Information

This information paper, as well as those for other communities, can be accessed on the internet at www.alaskaerosion.com. For more information please contact the Corps of Engineers, project manager at (907) 753-5694 or email Alaska.Erosion.POA@usace.army.mil



Photo 1: Coastal Flooding & Erosion. 2000.



Photo 2: Coastal Flooding & Erosion. 2000.



Photo 3: Rebuilding Beach Berm during Storm. 2000.



Photo 4: Barrow Bluff Erosion. 2000.



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Linear Extent of Erosion
Part 1



Alaska Baseline Erosion
Barrow, Alaska

CHUKCHI SEA



Date of Aerial Photo: 20 July 03

NOTE: The extent of erosion shown on this figure is based on interviews with the community. This data has not been field verified. This figure is only intended to show areas of erosion, not rates or severity of erosion



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--- Linear Extent of Erosion

Part 2



Alaska Baseline Erosion
Barrow, Alaska

CHUKCHI SEA

Naval Arctic Research Lab
(NARL)

Date of Aerial Photo: 20 July 03

NOTE: The extent of erosion shown on this figure is based on interviews with the community. This data has not been field verified. This figure is only intended to show areas of erosion, not rates or severity of erosion



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Linear Extent of Erosion
Part 3



Alaska Baseline Erosion
Barrow, Alaska