

**Community Erosion Assessment
Kalskag, Alaska
26 January 2009**

1. Community: Kalskag, Alaska



Figure 1: Location and vicinity map

2. Community Profile Summary:

Upper Kalskag, a.k.a. Kalskag (KAL-skag), is a second class city of 271 people located on the north bank of the Kuskokwim River in the Kuskokwim Recording District in the Unorganized Borough, 2 miles upriver from Lower Kalskag. It is 30 miles west of Aniak, 99 miles northeast of Bethel, and 348 miles west of Anchorage. The climate in Kalskag is semi-arctic with influences from the Bering Sea. Snowfall averages 60 inches, with total precipitation of 19 inches per year. Temperatures range from -55 to 87 degrees Fahrenheit. The Kuskokwim is ice-free from mid-June through October.

3. Concise Description of Erosion Problem:

The community has various concerns regarding erosion affecting their community. Their main concerns regarding infrastructure have to do with the loss of utilities such as the school water well. The cemetery is also of great concern as it is an actively used burial area. Other concerns relate to loss of residential structures and native land allotments.

For the purposes of the analysis in this report, the erosion rates were broken up into five river reaches. Reach 1 is located at the upstream end of town and terminates upstream of the cemetery. Reach 1 is approximately 1,200 feet long and is eroding at an average rate of 0.25 feet per year. Reach 2 is comprised of the next 750 feet of riverbank downstream from Reach 1. It is eroding at approximately 1.75 feet per year. Reach 3 is comprised of the next 1,500 feet of bank downstream from Reach 2 and includes the community's barge landing; erosion in this area is estimated to be about 4.0 feet per year on average. Reach 4 consists of 2,500 feet of bank along the apex of the local river bend, at the end of the airstrip; this area is eroding at an average annual rate of 7.5 feet per year. Reach 5 is the last section of erosion concern and is defined as the last 2,900 feet of bank before the community boundary. Most of the expected land loss comes from Reach 5; it is eroding at an average rate of 9.0 feet per year.

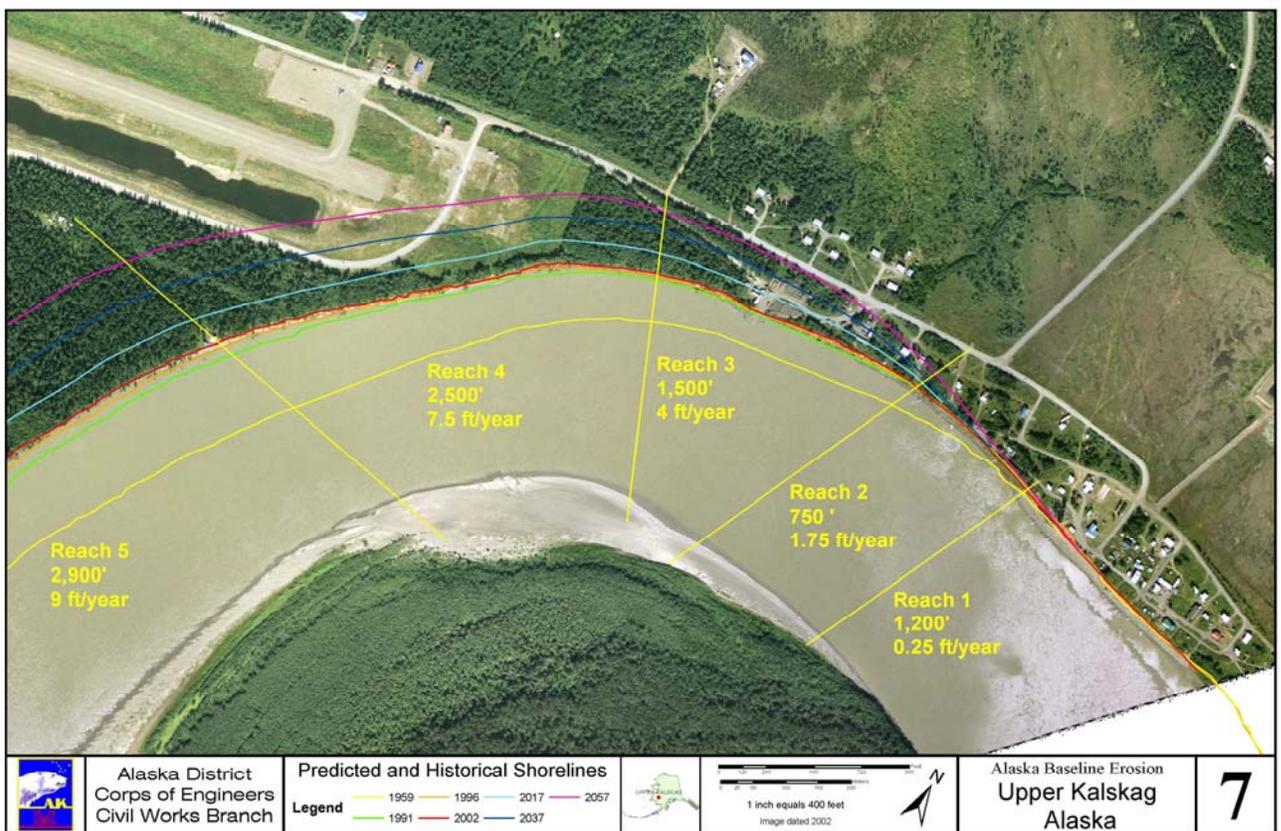


Figure 2. Upper Kalskag Erosion Map

4. Potential Erosion Damages

Using the projected erosion interval lines on the aerial photograph, the economic damages were developed for the 50-year period of analysis and broken down into the sub-intervals of 0-10 years, 11-30 years and 31-50 years. Breaking down the economic damages into these sub-intervals allows us to determine when the greatest economic impact is expected to occur. Determining when the greatest economic impact could occur is important so that timely decisions can be made when an erosion retarding

measure needs to be taken. For the purposes of this report, damages were assessed by time interval rather than attempting to estimate the exact year that the damage occurs. The analysis was completed in this manner to try and account for two types of uncertainty:

1. That which is associated with predicting erosion which is progressing at varying rates over time (including episodic events); and
2. That which exists when performing a surface analysis as opposed to doing an in depth investigation such as soils exploration and expensive modeling efforts.

Damage Categories

The approach used to determine potential erosion damages is based on several assumptions as they pertain to the damage categories of residential, commercial, public infrastructure, and land values. This evaluation relies on previous reports and information gathered during site visits to determine appropriate values where data was unavailable. Assumptions used for the various damage categories are described more fully in the following discussion of future damages.

Though many potential damage categories were evaluated during this assessment, Upper Kalskag's expected erosion damages fit into four classifications: land, residential structures, infrastructure, and cemetery relocation. Structures were considered a loss when the bank line encroached within ten feet of the structure's foundation. Infrastructure considered for damages include roads, utilities, fuel stations and pipelines. Approximately 19 percent of erosion damages in Upper Kalskag are expected to occur within the first 10 years of the examined time period.

Expected Damages

The period of analysis for this evaluation is 50 years and all damage categories have net present values calculated based on the federal fiscal year 2009 discount rate of 4 5/8 percent. The sections below detail expected losses with a summary provided in Table 1.

Upper Kalskag is losing approximately 52,500 square feet of land (1.20 acres) per year. Estimated land losses for Reach 1 are 0.35 acres with land losses of 1.54 acres for Reach 2, 7.02 acres for Reach 3, 21.95 acres for Reach 4, and 30.56 acres for Reach 5. It is expected that 61.42 acres will be lost over the examined 50-year period of analysis with a corresponding value of \$614,000, a net present value of \$245,000, and an average annual loss of \$12,700.

Residential damages consist of five outbuildings and three residences which are valued at \$622,000 with a net present value of \$236,000 and an average annual loss of \$12,200. There are no commercial or public buildings that are expected to be threatened.

Damages to Upper Kalskag’s infrastructure consist of the following items: 2,530 feet of road, a well, and the school fueling point. Infrastructure damages are valued at \$1.2 million with a net present value of \$539,000 and an average annual loss of \$27,800.

24 plots from the local cemetery will need to be relocated throughout the 50-year period with a total cost of \$180,000, a net present value of \$98,000, and an average annual loss of \$5,100.

Summary

Table 1 summarizes expected damages by category in the aforementioned time intervals.

Table 1: Summary of Expected Damages.

Damage Category	Quantity	Time Span (Years)			Total value (50 years)	Net Present Value	Annual Average Value
		0-10	11-30	31-50			
Land (acres lost)	61.42	\$132,000	\$241,000	\$241,000	\$614,000	\$245,000	\$12,700
Residential	3	4,000	618,000	--	622,000	236,000	12,200
Infrastructure	--	288,000	511,000	385,000	1,184,000	539,000	27,800
Cemetery relocation	24	75,000	53,000	53,000	180,000	98,000	5,100
Total Damages	--	\$499,000	\$1,423,000	\$679,000	\$2,600,000	\$1,118,000	\$57,800

5. Potential Solutions:

Non-structural solutions include relocating the school’s fuel filling point further back from the river bank at a cost of \$25,000¹ and developing a community well further from the edge of the riverbank at a cost of \$120,000.²

A riprap revetment could be constructed to protect a graveyard. The revetment would be 275-feet long and include a tieback key at the upstream end to prevent erosion from flanking around the structure and a tieback or thickened section at the downstream end. Approximate costs are \$700,000 which is roughly \$2,525 per linear foot of revetment.

6. Conclusion:

The community of Kalskag has a minor erosion problem that could impact infrastructure. Because the potential damages are to public infrastructure and the cost of the proposed solution is relatively small, this would make the proposed solution a good candidate for the Corps Section 14 program. The community likely would not have the financial capability of providing the required local match, and would need to seek assistance through the state or other entities to come up with the required funding.

7. Community Photos:

¹ Source: Alaska Village Safe Water Program

² Source: Alaska Village Electric Cooperative



N 61° 32.225' W 160° 18.803' Upper Kalskag P1011159
Photo 1. Top of the bank in front of cemetery. Fence is 6.0' to the top of the bank.



N 61° 32.267' W 160° 19.120' Upper Kalskag P1011167
Photo 2. Looking downstream, 4" arctic pipe exposed.



N 61° 32.115' W 160° 20.080'

Upper Kalskag

P1011188

Photo 3. Streambank near the airport looking downstream.

8. Additional Information:

This assessment, as well as those for other communities, can be accessed on the internet at www.AlaskaErosion.com. The web site also contains additional information on addressing erosion issues, educational materials, and contact information.



Alaska District
Corps of Engineers
Civil Works Branch

Predicted and Historical Shorelines

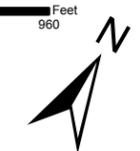
Legend

— 1959	— 1996	— 2017	— 2057
— 1991	— 2002	— 2037	



1 inch equals 400 feet

Image dated 2002



Alaska Baseline Erosion
Upper Kalskag
Alaska