Appendix 4: Flooding, Erosion and Related Hazards Impacting Alaska's Communities

Identification of Issues

Some 6,600 miles of Alaska's coastline and many of the low-lying areas along the state's rivers are subject to severe flooding and erosion. Most of Alaska's Native villages are located on the coast or on riverbanks.

Government Accountability Office Report 04-142

In 2003, Congress directed the Government Accountability Office (GAO) to study Alaska Native Villages affected by flooding and erosion to determine the extent to which these communities were affected, what state and federal programs were available to address flooding and erosion in these communities, the status of efforts to address flooding and erosion, and what Congress might do in the future to address these issues. The report found that 184 out of 213, or 86 percent, of Alaska Native villages are affected by flooding and erosion to some extent. The report found that while many of the problems in these communities are long-standing, various studies indicate that coastal villages are becoming more susceptible to flooding and erosion due in part to rising temperatures.

In addition, the amount and accuracy of floodplain information in Alaska varies widely from place to place. Detailed floodplain studies have been completed for many of the larger communities and for the more populated areas along some rivers. For example, the Federal Emergency Management Agency (FEMA) has published Flood Insurance Rate Maps that show floodplain boundaries and flood elevations for communities that participate in the National Flood Insurance Program. However, because only a handful of Alaska Native villages participate in the program, many of the villages have not had their 100-year floodplain identified by FEMA. In addition, little or no documented floodplain information exists for most of the smaller communities. Moreover, no consolidated record has been maintained of significant floods in Alaska Native villages. The Corps' Flood Plain Management Services has an ongoing program to identify the 100- year flood elevation, or the flood of record of flood-prone communities through data research and field investigations.

Congress directed the GAO to focus on nine coastal and riverine communities affected by annual and episodic flooding and erosion: Kaktovik, Barrow, Point Hope, Kivalina, Shishmaref, Koyukuk, Unalakleet, Newtok and Bethel. Of these communities, four – Kivalina, Koyukuk, Newtok, and Shishmaref - were identified as being in imminent danger from flooding and erosion and were making plans to relocate.

Government Accountability Office Report 09-551

In 2009, GAO further reviewed the progress of the 31 villages threatened by flooding and/or erosion that will impact the long-term viability of the community. Twenty-eight of the 31 communities are incorporated; three are unincorporated. This list includes the following incorporated communities: Akiak, Alakanuk, Allakaket, Barrow, Chefornak, Chevak, Clark's Point, Eyak (Cordova), Deering, Dillingham, Emmonak, Golovin, Hughes, Huslia, Kivalina Kotlik, Koyukuk, McGrath, Napakiak, Nulato, Nunapitchuk, Port Heiden, Saint Michael, Selawik, Shaktoolik, Shishmaref, Teller, and Unalakleet. The list also includes the following unincorporated villages: Kwigillingok, Lime Village, and Newtok.

The GAO divides threatened communities into three categories based on relocation actions or intentions: 1) likely to move all at once; 2) likely to gradually migrate to a new location over time; and 3) not exploring immediate relocation. The three incorporated communities identified as "likely to move all at once" include Shishmaref, Kivalina, and Shaktoolik (Table 14). These communities are under threat by coastal storm surge, which has been eroding shoreline and destroying or threatening infrastructure. Anecdotally, the winter ice pack that protected these communities has been forming later and melting earlier in recent years. This has resulted in an increase in the eroding effects of the coastal storm surges. These are the most critical of the endangered communities and are furthest along in addressing their situation.

Hughes, Unalakleet, Koyukuk, Nulato, Golovin, Allakaket, Huslia, and Teller are classified in the report as "likely to gradually migrate to new location over time" (Table 14). These are both coastal and riverine communities and are victim to either river erosion or severe coastal storm surge.

Table 13: Community Relocation Status

Status	Frequency	Percent
Likely to Move all at Once	3	2%
Likely to Gradually Migrate to New Location Over Time	8	5%
Not Exploring Immediate Relocation	17	93%
Total	28	100%

Table 14: Imminently Threatened Communities

Village	Likely to Move all at Once	Likely to Gradually Migrate to a New Location Over Time	Not Exploring Immediate Relocation	NFIP Participant
Akiak			√	
Alakanuk			√	
Allakaket		√		
Barrow			√	
Chefornak			√	
Chevak			√	
Clark's Point			√	
Eyak (Cordova)			√	√
Deering			√	
Dillingham			√	√
Emmonak			√	√
Golovin		√		
Hughes		√		
Huslia		√		
Kivalina	√			
Kotlik			√	
Koyukuk		√		√
Kwigillingok*				
Lime Village*				
McGrath			√	√
Napakiak			√	
Newtok*				
Nunapitchuk			√	
Port Heiden			√	
Saint Michael			√	
Selawik			√	
Shaktoolik	√			
Shishmaref	√			√
Teller		√		
Unalakleet		√		
Total	3	8	17	6

Incorporated communities identified by GAO as "not exploring immediate relocation" include Akiak, Alakanuk, Barrow, Chefornak, Chevak, Clark's Point, Eyak (Cordova), Deering, Dillingham, Emmonak, Kotlik, McGrath, Napakiak, Nunapitchuk, Port Heiden, Saint Michael, and Selawik (Table 14).

Of noteworthy importance, many other communities in Alaska have flooding and erosion impacts: however, these 28 incorporated and 3 unincorporated communities are identified as the most heavily impacted by the GAO. Furthermore, only six communities are also NFIP participants including Cordova, Dillingham, Emmonak, Koyukuk, McGrath, and Shishmaref.

Recorded Floods

The U. S. Army Corps of Engineers (USACE), Alaska District, Floodplain Management Services publishes flood hazard and floodplain information with the goal of reducing the threat to life from flooding in Alaska and minimizes flood-caused economic losses. This information is also intended to aid federal, state and local agencies in guiding development in the communities. Federal agencies and many state and local authorities require new buildings to be built outside the floodplain if practical, or to have the first floor elevated above the 100-year flood level if the building is located in a floodplain.

Table 15: Communities with Floods Occurring - Alaska

	Communities	Percent	Cumulative Percent
Flood in Community	83	51%	51%
No Flood in Community	69	42%	93%
NA	11	7%	100%
Total	163	100%	

The most recent floods recorded were in 2009. They were caused by ice jams during breakup on the Yukon and Kuskokwim Rivers. The earliest recorded for this database were 1913 floods caused by a storm surge in Teller, Golovin, and Koyuk in Norton Sound. The historic record data available shows that many communities in Alaska have had floods in the past. A "Most Recent Flood" event was recorded for 66 Communities, a 'Flood of Record' was identified for 49 communities, and 32 communities recorded a 'Worst Flood Event on Record'. 83 communities had a flood recorded. Common causes of riverine flooding were "ice jam" or "rainfall" while for coastal areas 'coastal storm surge' was listed as a common cause. This is not a complete record of floods in Alaska despite the efforts of the Corps to make it so.

Unfortunately, in Alaska small populations, remote locations, and high costs make data collection in many areas of the State difficult. Recording flood information is no exception.

The most information is known about the 31 active NFIP communities (out of 164 Alaska organized communities) which represent almost 90% of Alaska's population. Historic flood information is somewhat

inconsistent as well, more is known about recent floods than past floods. Often, only the more severe floods were recorded in the past - especially in rural areas. Other data in the report included 'Recommended Building Base Elevation', 'Flood Plain Report', 'Flood Insurance Study' and 'Flood Gauge'.

Table 16: Table Attributes of Flood Data Reported

Variable	Yes	No	DK	% Yes
Recommended Building Base Elevation*	40*	123	-	28%
Flood Plain Report	34	85	44	21%
Flood Insurance Study	32	114	17	17%
Flood Gauge	24	125	14	15%

*Yes means a Recommended Building Base Elevation was reported

The Recommended Building Base Elevation is the recommended elevation of the bottom of the first floor of a building. (This is a recommendation by the Alaska District, Corps of Engineers. "The Corps does not regulate the flood plain; participating communities may have different requirements").

Flood Plain Reports are done by the U.S. Army Corps of Engineers, Alaska District, and the Federal Emergency Management Agency for various communities in Alaska to determine attributes of the flood plain situation in that area. A Flood Insurance Study is "an engineering study performed by FEMA to identify flood-prone areas, insurance risk zones, and other flood data within a community." A Flood Gauge is a one-foot by eight-foot staff gauge typically placed in a prominent place within the community and meant to function during severe floods. It often has attached plaques that indicate the elevation of community buildings, the flood of record, and the Recommended Building Elevation".

Alaska Village Erosion Technical Assistance Program

The Alaska Village Erosion Technical Assistance Program (AVETA) responded to legislation that directed the U.S. Army Corps of Engineers (USACE) to investigate issues surrounding erosion at several Alaska Native villages. As part of this effort, the Corps examined erosion rates and control, potential relocation, and impacts to Alaska Native culture and tradition.

The final AVETA report documented the responses to questions raised in the Consolidated Appropriations Resolution, 2003 PL 108-7, Division D - Energy and Water Development Appropriations, 2003, Conference Report (H.R. 108-10, page 807), Senate Report (S.R. 107- 220, page 23), and HR 108-357, Section 112, page 10, Conference Report Energy and Water Development Appropriations Bill, 2004 with regards to the communities of Bethel, Dillingham, Kaktovik, Kivalina, Newtok, Shishmaref, and Unalakleet.

The questions asked were: what are the costs of ongoing erosion, what would it cost to relocate a community, and how much time do these communities have left before they are lost to erosion. The following table summarizes the answers to these questions.

Community	Costs of Future Erosion Protection	Cost to Relocate	How Long Does the Community Have*
Bethel	$5,000,000	N/A	> 100 years
Dillingham	10,000,000	N/A	> 100 years
Kaktovik	40,000,000	$ 20 – 40 Million	> 100 years
Kivalina	15,000,000	$ 95 – 125 Million	10 – 15 years
Newtok	90,000,000	$ 80 – 130 Million	10 – 15 years
Shishmaref	16,000,000	$100 – 200 Million	10 – 15 years
Unalakleet	30,000,000	N/A	> 100 years

*These numbers assume no future erosion protection, including that listed here, is not implemented.

Alaska Baseline Erosion Assessment

Erosion is a major problem for many Alaska communities. In 2005, the USACE conducted a Baseline Erosion Assessment (BEA) of all communities in Alaska. The aim was to coordinate, plan, and prioritize appropriate responses to erosion throughout Alaska. The Corps identified 178 Alaska communities as having reported erosion problems. One hundred five of these were incorporated communities and are discussed here. Erosion is not to be equated with flooding. While erosion and flooding are often related issues, flooding has distinct attributes that are not related to erosion. Erosion is the subject of the Corps study.

Table 17: Erosion Assessment of Alaska Communities

After a research and analysis process the Corps designated three levels of community erosion status;

Erosion for Communities Assessment	# Communities	%	% Alaska's Population
Priority Action Community	23	14%	3%
Monitor Conditions Community	41	25%	7%
Minimal Erosion Community	41	25%	56%
No Identified Erosion Issues	47	29%	(All other) 34%
Not rated	11	7%	
Total	163	100%	100%

(A) "Priority Action Communities" (N=23)—indicating a need for immediate and continuing attention to erosion issues. (B) "Monitor Conditions Communities." (N=41) – meaning erosion problems are present but not significant enough to require immediate action and (C) "Minimal Erosion Communities." (N=41) – In these communities erosion was identified as minor and no change was expected in the foreseeable future. Forty seven communities with no erosion history were not rated.

The Priority Action Communities represent about 2.6% of Alaska's population while the Monitor Conditions Communities make up about 7.3% of the population with the Minimal Erosion Communities having about 56% of Alaskans.

Table 18. Declared Flood Disasters: 2000 to 2009

Year	Date	Disaster Types	Active Disaster	Number
2009	12/18	Severe Storms, Flooding, Mudslides and, Rockslides	1,865	
2009	06/11	Flooding and Ice Jams	1,843	
2008	09/26	Severe Storms, Flooding, Landslides, and Mudslides	1,796	
2006	12/08	Severe Storms, Flooding, Landslides, and Mudslides	1,669	
2006	10/16	Severe Storms, Flooding, Landslides, and Mudslides	1,663	
2006	08/04	Snow Melt and Ice Jam Flooding	1,657	
2005	12/09	Severe Fall Storm, Tidal Surges, and Flooding	1,618	
2005	03/14	Severe Winter Storm		1,584
2004	11/15	Severe Winter Storm Tidal, Surges and Flooding	1,571	
2003	04/26	Winter Storm		1,461
2002	12/04	Winter Storms		1,445
2002	06/26	Flooding		1,423
2000	02/17	Winter Storms And Avalanches	1,31 6	

This Table shows the number of communities experiencing a declared flooding disaster since 2000.

Table 19. Number of FEMA Declared Flood Disasters Since 2000

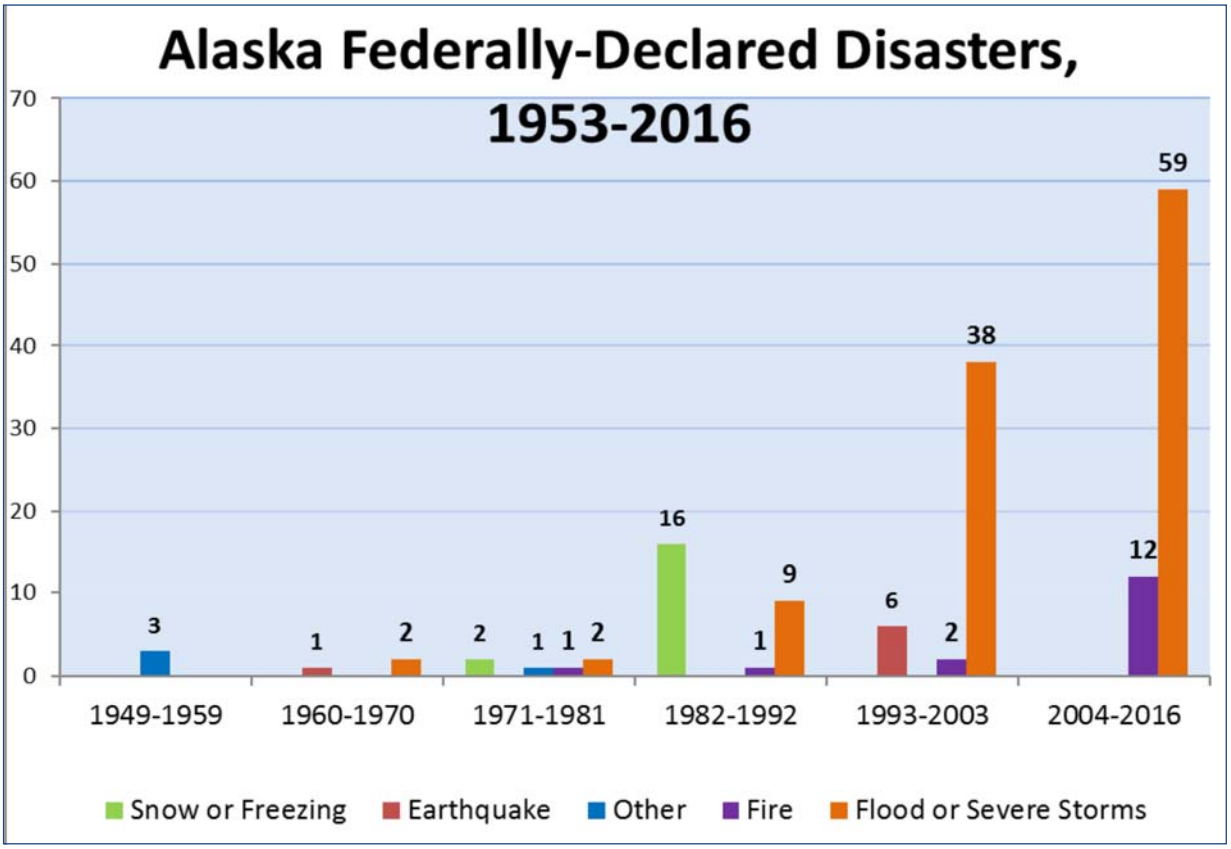
# Disasters in Community	# Communities	%	Cumulative %
3	27	17%	17%
2	40	24%	41%
1	28	17%	58%
0	68	42%	100%
Total	163	100%	

A federal emergency is declared when, in a formal process, it is decided that the State and local governments are unable to deal with the disaster at hand and federal assistance is warranted. FEMA coordinates this federal response. Thirteen such disasters with a flooding component have occurred since 2000. Fifty eight percent of Alaska's organized communities experienced at least one of these emergencies. Sixteen percent or 27 organized communities experienced three emergencies.

Risk Mapping, Assessment and Planning: Assisting Alaska Native Villages

Over the last several decades, the number of presidentially-declared disasters in Alaska has increased dramatically, as illustrated in Figure 1, below[1]. The majority of these disasters are caused by flooding associated with severe storms. Over the past decade, most of these events have occurred in the Bethel and Yukon-Koyukuk census areas (see Figure 2). Both census areas are comprised of small, remote, predominantly Alaska Native communities. These communities are especially vulnerable because both census areas are part of Alaska's vast unorganized borough where there is no borough form of government to provide services and other resources to address disaster events. Only six of the 68 Alaska Native villages within these two census areas participate in the National Flood Insurance Program (NFIP).[2] Half of the villages within these census areas are ineligible to participate in the NFIP because they are not incorporated municipalities[3]. Storm events are increasingly putting these communities at risk to loss of life and property. Recent studies indicate that the frequency and intensity of these storms is likely to increase, especially in western Alaska.[4]

Figure 5: Alaska Federally Declared Disasters, 1953-2016



1 Data acquired from http://www.fema.gov/disasters/grid/state-tribal-government/86

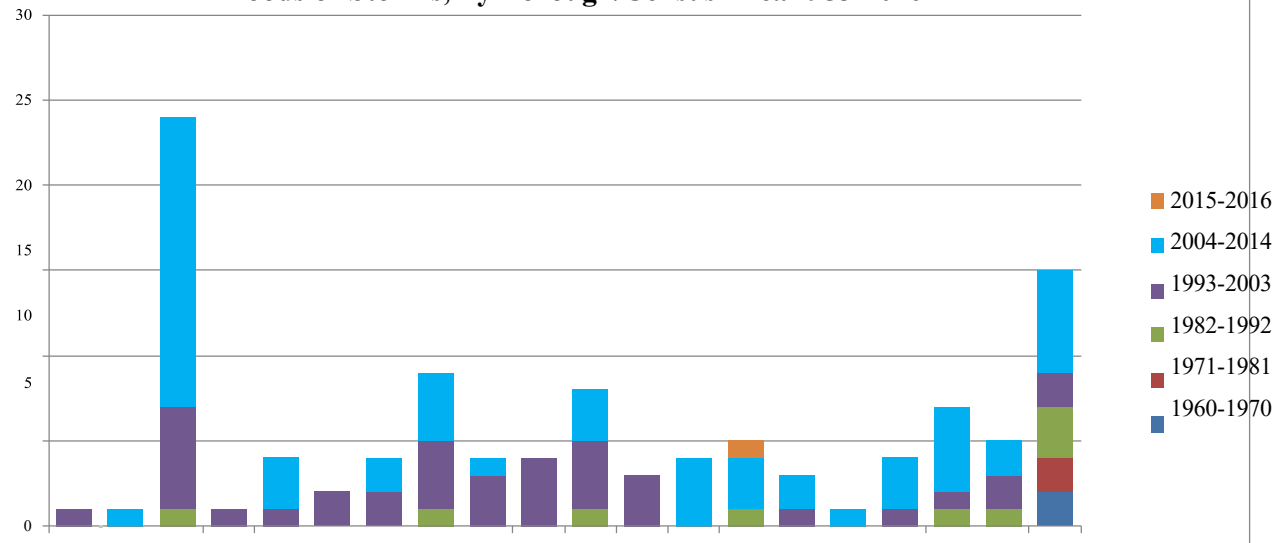
2 The six communities are Aniak, Bethel, Kwethluk, Galena, McGrath and Nenana.

3 To participate in the NFIP, communities agree to enforce regulations for land use and new construction in high-risk flood zones. In Alaska, municipal incorporation is required for land use regulation.

4 Terenzi, John; Ely, Craig R.; Jorgenson, M. Torre (2014): Storm-surge flooding on the Yukon-Kuskokwim Delta, Alaska. In Arctic 67 (3), pp. 360–374. DOI: 10.14430/arctic4403. See also: http://arctic.journalhosting.ucalgary.ca/arctic/index.php/arctic/article/view/4403

State and Federal agencies have been concerned about the impact of flooding and other natural hazards on the safety and viability of Alaska Native communities for some time. This briefing paper summarizes some of these efforts, including key observations and needs identified by prior efforts. The paper also looks at ways in which the tools, resources and technical assistance offered through FEMA's Risk Mapping, Assessment and Planning (Risk MAP) Program could enhance local understanding of risk in Alaska Native villages and inform local decisions to take action to increase disaster resilience in these communities. Understanding risk and having reliable data from which to make informed decisions to take action to reduce or mitigate risk are crucial to community-driven efforts to increase disaster resilience.

Figure 6: Alaska Federally-Declared Disasters, Floods or Storms, By Borough/Census Area 1953-2016



Efforts to Assist Alaska Native Villages with Flooding, Erosion and Other Hazard Issues

A number of efforts have taken place to address severe flooding, erosion and other natural hazards in Alaska's rural communities. Several key observations and needs have been identified through these efforts:

- Assistance to imperiled communities should be based on a fair and defensible methodology which prioritizes communities by level of threat and need
- The community must be a key player in the decision-making process
- Imperiled communities (and the agencies assisting them) need quantifiable data from which to make informed decisions
- A coordinated, interdisciplinary approach to address community threats is essential to increasing community resilience

State of Alaska Efforts in the 1980s

In 1982, the Alaska Department of Community and Regional Affairs5 prepared a report, ***"A Listing of Alaskan Communities for documentation of Erosion Problems"***[6]. Although the report was not specific to Alaska Native villages, 68% (169 of 248) of the communities identified as impacted by erosion and flooding were Alaska Native villages.[7] In 1983, an Erosion Control Task Force was appointed by the State of Alaska 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 required8. Sites were rated based on public safety, public property, private property, time of projected loss, ability to move, approximate replacement value, and economic value.

2003 U.S. Government Accountability Office (GAO) Study

In 2003, Congress directed the GAO to study Alaska Native villages affected by flooding and erosion and to 1) determine the extent to which these villages are affected, 2) identify federal and state flooding and erosion programs, 3) determine the current status of efforts to respond to flooding and erosion in nine villages, and 4) identify alternatives that Congress may wish to consider when providing assistance for flooding and erosion. GAO was directed to focus in particular on six villages - Barrow, Bethel, Kaktovik, Kivalina, Point Hope, and Unalakleet. Based on recommendations of State of Alaska and federal officials, GAO added the villages of Koyukuk, Newtok, and Shishmaref. [9]

GAO reported that most of Alaska's more than 200 Alaska Native villages were affected to some degree by flooding and erosion, most commonly caused by severe storm events on Alaska's coastline or by river flooding, such as during the spring breakup of river ice. GAO identified 213 Alaska Native Villages.[10] Of these 213 communities, GAO found that **184 villages, or 86 percent**, were affected to some extent by flooding and erosion. Of the nine focus villages, GAO found four to be in imminent danger from flooding and erosion and making plans to relocate (Kivalina, Koyukuk, Newtok and Shishmaref).

GAO identified several issues that created impediments to Alaska Native villages receiving assistance:

5 Now Alaska Department of Commerce, Community, and Economic Development (DCCED)
6 State of Alaska, Department of Community and Regional Affairs, *A Listing of Alaskan Communities for Documentation of Erosion Problems*, Prepared by Woodward-Clyde Consultants (Anchorage, Alaska: September 1982).
7 These 169 communities were included in the 213 Alaska Native villages GAO identified in 2003
8 State of Alaska, Department of Transportation & Public Facilities, *Task Force on Erosion Control Final Report,*
Prepared by J.J. Simpson (Alaska: January 1984).
9 GAO, *Alaska Native Villages: Most Are Affected by Flooding and Erosion, but Few Qualify for Federal Assistance*, GAO-04-142 (Washington, D.C.: Dec. 12, 2003).
10 GAO defined an Alaska Native village as a village that (1) was deemed eligible as a Native village under the Alaska Native Claims Settlement Act and (2) has a corresponding Alaska Native entity that is recognized by the Bureau of Indian Affairs. On the basis of these criteria, 213 Alaska Native villages were identified. A listing of the 213 Alaska Native villages is provided in Table 1, beginning on page 10.

- It was difficult to assess the severity of erosion and flooding issues because **quantifiable data are not available** for remote locations.
  - ◊ Because only a handful of Alaska Native villages participate in the NFIP, the floodplain hasn't been mapped for most of these communities.
- Many Alaska Native villages are small, remote, and have a subsistence lifestyle. They often lack the resources to respond to flooding and erosion on their own.
- Small and remote Alaska villages often fail to qualify for assistance under Federal programs because they do not meet the program's criteria; in particular, the cost- benefit requirements
- Even villages that do meet the cost/benefit criteria of Federal programs may still fail to qualify for assistance if they cannot provide or find sufficient funding to meet the cost- share requirements for the project.

2007 – 2011 State of Alaska Immediate Action Work Group

In September 2007, Alaska's Governor established the Climate Change Sub-Cabinet to lead the preparation and implementation of an Alaska climate change strategy. Within the sub- cabinet, an Immediate Action Work Group (IAWG), an interdisciplinary, interagency working group, was created for the early assessment and development of an action plan addressing climate change impacts on coastal and other vulnerable communities in Alaska. The IAWG was tasked with identifying the short-term, emergency actions the State of Alaska needed to take to prevent loss of life and property in imminently-threatened communities.

Using the 2003 GAO report as guidance, the IAWG focused on six imminently threatened communities – Kivalina, Koyukuk, Newtok, Shaktoolik, Shishmaref and Unalakleet.[11]

In its second report (2009) to the Sub-Cabinet, the IAWG called for immediate steps to "*identify communities at risk, timeframe, and true needs to address climate change impacts,*" and to prioritize "*needs based on risks to lives, health, infrastructure, homes, businesses, subsistence harvests, significant cultural attributes, and the quality of life.*"[12]

The IAWG stressed that informed decisions made by imminently-threatened communities required substantial coordination and ***the identification, collection and analysis of data to make the most effective decisions for long-term viability and sustainability of imminently- threatened communities.***

11 The IAWG arrived at these villages using the GAO-04-142 report, which identified 9 highly threatened communities (Shishmaref, Newtok, Kivalina, Koyukuk, Unalakleet, Barrow, Bethel, Kaktovik, and Point Hope). Based on meetings held in Fairbanks and Anchorage, Alaska November 6, 2008 and November 19-20, 2008, the list was shortened to the communities of Shishmaref, Newtok, Kivalina, Koyukuk, and Unalakleet and the village of Shaktoolik was added.

12 Immediate Action Work Group, ***Recommendations Report to the Governor's Subcabinet on Climate Change***, March 2009.

One of the final tasks the IAWG attempted to address before it disbanded in 2011 was to develop a methodology for prioritizing Alaska's imminently threatened communities based on level of threat and need. The 2009 report provided suggestions for potential metrics for this prioritization.

2009 Alaska Baseline Erosion Assessment

Based on the findings of a 2004 federal field hearing on the impacts of severe erosion and flooding on Alaska Native villages, Congress directed the U.S. Army Corps of Engineers (USACE) to conduct an Alaska erosion baseline study to coordinate and plan the appropriate responses and assistance for Alaska villages in the most need and to provide an overall assessment on the priority of which villages should receive assistance. Because the USACE lacked authority to assess flooding threats, a baseline assessment of erosion threats, only, was conducted and flood was not considered.

The USACE found that 178 communities reported erosion problems. Twenty-six communities were classified as "Priority Action Communities" to be considered for immediate action by either initiating an evaluation of potential solutions or continuing with ongoing efforts to manage erosion. Sixty-nine communities were identified as "Monitor Conditions Communities", where erosion problems are present but not significant enough to require immediate action. Eighty-three communities were designated "Minimal Erosion Communities", in which minimal erosion-related damages were reported or would not be expected in the foreseeable future.

2009 Follow-Up GAO Report

Prompted by concerns of State of Alaska officials regarding the growing impacts of climate change on erosion and flooding in Alaska Native villages, in 2009 Congress directed GAO to follow up on the 2003 report, to address: 1) the flooding and erosion threats that Alaska Native villages currently face, 2) the federal programs that are available to assist villages facing potential disasters, 3) the status of village relocation efforts, and 4) how federal assistance to relocating villages is prioritized.[13]

The 2009 study identified 31 villages (see Figure 3 on page 9) located throughout the state of Alaska's river and coastal areas, which are imminently threatened by flooding and erosion.
Twenty-six of the imminently threatened villages were identified as Priority Action Communities in the USACE Alaska Baseline Erosion Assessment. GAO included five additional imminently threatened villages (Allakaket, Hughes, Koyukuk, Nulato, and Teller) based on the 2003 study and the work of the IAWG.

Of these villages, 12 were exploring relocation options for all or a portion of the existing villages. Four of the 12 communities – Kivalina, Newtok, Shaktoolik and Shishmaref – were identified as needing to move the entire community as soon as possible.

13 GAO, ***Alaska Native Villages: Limited Progress Has Been Made on Relocating Villages Threatened by Flooding and Erosion***, GAO-09-551 (Washington, D.C.: June 2009).

Denali Commission Environmentally Threatened Communities Program

In September 2015, President Obama designated the Denali Commission as the lead federal agency for coordinating federal efforts to mitigate the impacts of erosion, flooding and permafrost degradation in rural Alaska.

In order to fulfill this role, the Commission established the Environmentally Threatened Communities Program. The commission used GAO-09-551 as guidance to for identifying environmentally-threatened communities, specifically the 31 imminently threatened communities identified by GAO. A primary focus of the program has been to fund specific projects in the four communities identified by GAO as needing to relocate as soon as possible – Kivalina, Newtok, Shaktoolik and Shishmaref. The program also designates a statewide Disaster Response Fund for the remaining 27 communities identified by GAO as imminently threatened.

To determine how assistance would be provided to the remaining 27 communities, Commission staff proposed the development of a general Community Prioritization Methodology based on the threats due to erosion, flooding and permafrost degradation. This was basically the method sought by the IAWG to identify communities based on level of threat and need. The Commissioners did not agree to fund the prioritization effort.

How Risk MAP Can Provide Assistance

FEMA's Risk MAP Program could address many of the needs identified for Alaska Native villages by the efforts discussed above. The following section reviews these observed needs (listed on page 2) and the role Risk MAP can play:

- ***Assistance to imperiled communities should be based on a fair and defensible methodology which prioritizes communities by level of threat and need***

  The IAWG and the Denali Commission proposed but never completed efforts to develop prioritization methodologies based on threats and needs of Alaska Native villages.

  Prioritization is the first step in the Risk MAP process. States are asked to develop a quantitative approach to prioritize communities to determine which communities FEMA will study. The State of Alaska developed a prioritization methodology to guide the study of NFIP-participating communities in Alaska. A similar approach could be taken to prioritize imminently-threatened Alaska Native villages based on level of threat and need.

  There is data on which to base this prioritization. The Alaska Baseline Erosion Assessment still serves as a good source of prioritization of communities based on erosion threats. The USACE has developed a flood hazard database that catalogs floods throughout the state. The first phase was dedicated to researching hazard mitigation plans, ice jam databases, disaster declarations and indices, and other

publically available flood records. All data is searchable by community name and flood year. This data should lend itself well to a prioritization of flood hazards. In addition, the Alaska Division of Geological and Geophysical Surveys (DGGS) has been processing and compiling the baseline data necessary to include coastal hazards in the decision making/prioritization process. In 2010, the IAWG funded the ***Imperiled Communities Water Resources Analysis*** which provided a cursory evaluation of the climate-related risks (primarily flooding and erosion) associated with 214 communities eligible for funding by the Alaska Department of Environmental Conservation (ADEC) Village Safe Water (VSW) Program. From this broad master list of communities, 26 communities were initially identified and designated as the study group. Based on this analysis, a study group of 25 communities (all Alaska Native villages) was identified as likely to face near- term climate change related impacts to their water and wastewater infrastructure.

- ***The community must be a key player in the decision-making process***[14]
  This may seem obvious, but ensuring community involvement in the process is not always easy to do. Risk MAP's Discovery Process provides a perfect time to engage the community and establish a relationship with local leadership. Variations of the Discovery Interview and Discovery Meeting could be developed to better meet the needs of Alaska Native villages. DCRA has long experience with working with Alaska's small rural communities and has many resources that could be drawn on.

- ***Imperiled communities (and the agencies assisting them) need quantifiable data from which to make informed decisions***
  It is very difficult for a community to know how to respond to environmental threats without clear understanding and guidance on the nature of the threat, what the current and predicted impacts are, and what options there are to address the threat. Alaska Native villages that have made decisions about how to respond to environmental threats have relied upon studies of the threats to provide this guidance. For example, the village of Newtok made its decision to relocate based on an erosion assessment that was conducted in the community in the early 1980s.[15]

14 The State Division of Community and Regional Affairs (DCRA) was able to ensure this involvement by providing grant funding to a local community coordinator for the villages of Newtok, Kivalina, Shaktoolik, and Shishmaref with the engagement of inter-agency working groups and the development of Strategic Management Plans for each community. The Denali Commission has taken over the funding of these local coordinators.

15 City of Newtok, Alaska. ***Ninglick River Erosion Assessment***, Addendum. Prepared by Woodward-Clyde Consultants, November 29, 1984.

In 2008-2011, the State of Alaska administered the Alaska Climate Change Impact Mitigation Program to support the imminently-threatened communities the IAWG was working with. The first step of the program was to provide funding to the community to conduct a Hazard Impact Assessment to identify the nature of the environmental threat, establish current and predicted impacts, and provide recommendations to the community on alternatives to address the impact. This was seen as a critical first step in the community decision-making process.

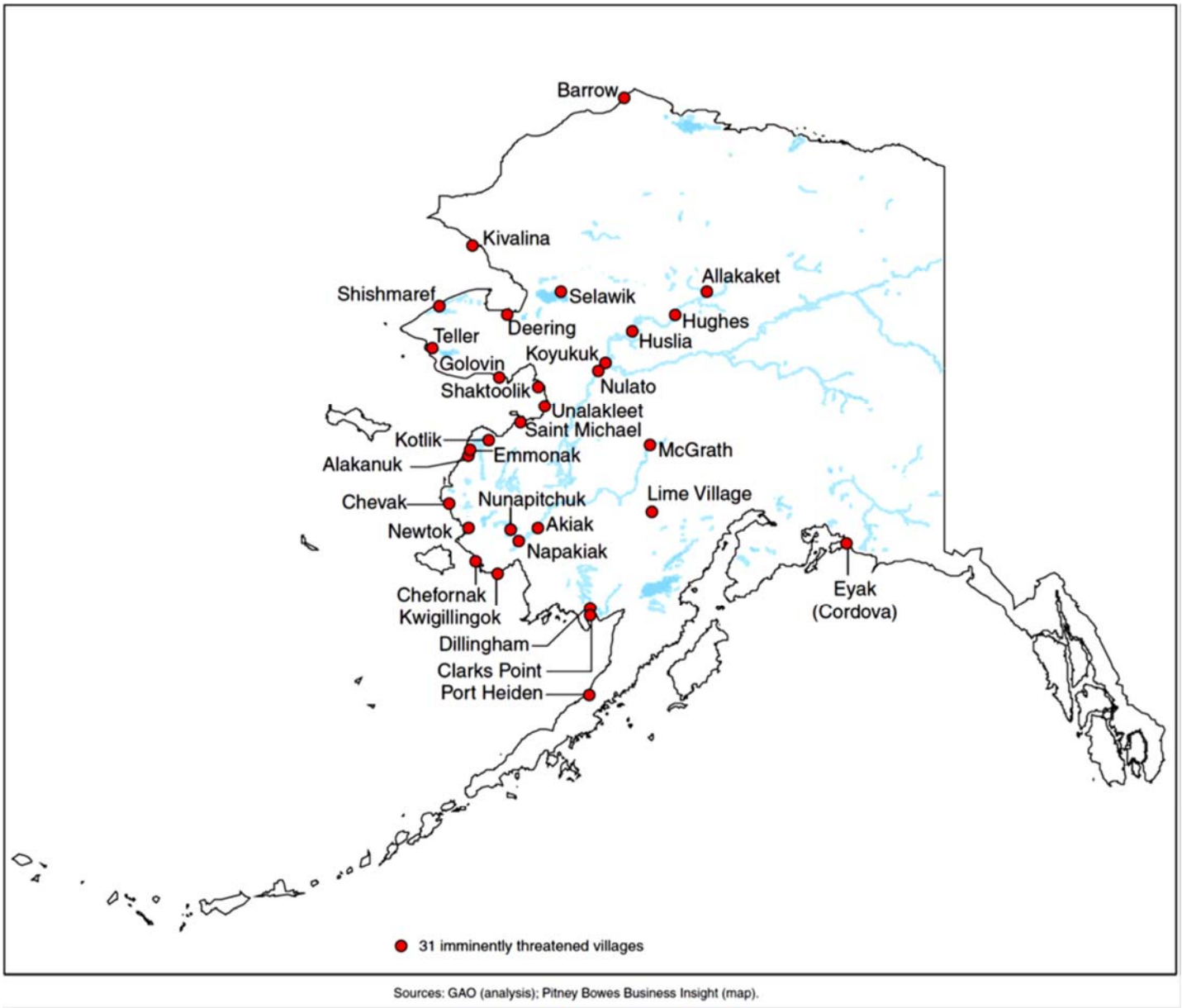
Risk MAP provides similar information to a community through the acquisition of high- quality data to identify risks and to enable better risk assessments. FEMA's risk assessments provide the community with the information and tools needed to understand risk and to make informed decisions about future actions. Many of the non-regulatory tools and products of Risk MAP could enhance the local decision-making process.

- ***A coordinated, interdisciplinary approach to address community threats is essential to increasing community resilience***

The IAWG's first step to addressing the need of imperiled communities was, ***"Begin by developing a collaborative organizational structure that can focus the combined capabilities of local, regional, state, and federal stakeholders on the problems at hand ... Team work is essential. Relying on one agency to carry out the mission risks both waste and lack of action."***[16]
Interagency coordination is basic to the Risk MAP process, which relies upon partnerships between federal, state, tribal and local government stakeholders. The State of Alaska Risk MAP Coordinator has organized and facilitated interagency working groups (also known as village planning groups) over the past decade for the communities of Newtok, Kivalina, Shaktoolik and Shishmaref. DCRA, the agency responsible for coordinating the State of Alaska's Risk MAP Program, is tasked by two State of Alaska Administrative Orders (AO 231 and AO 239) *"to act as the state coordinating agency to coordinate with the other state and federal agencies to propose long-term solutions to the ongoing erosion issues in... affected coastal communities..."*

16 Immediate Action Work Group, ***Recommendations Report to the Governor's Subcabinet on Climate Change***, Final Report, April 17, 2008.

Figure 7: Thirty-one Imminently-Threatened Alaska Native Villages Identified by GAO



Sources: GAO (analysis); Pitney Bowes Business Insight (map).

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