

**PRESENTATION TO THE STATE OF ALASKA
CLIMATE CHANGE COMMISSION**

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by

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1.0 SLIDE 1 – CORPS OF ENGINEERS SPLASH SCREEN

2.0 SLIDE 2 – INTRODUCTIONS

3.0 CORPS OF ENGINEERS MISSION (SLIDE 3)

The Corps of Engineers is an engineering and construction agency with a water related civil works mission, design and construction services for Army and Air Force facilities, and regulatory oversight for navigable waterways of the United States. Our emergency operations center is activated during local emergency situations such as during a flood, and we also provide field support for FEMA during post disaster recovery operations. We undertake work for others under our Interagency and International Services program, and have a program to provide Planning Assistance to States. This presentation will focus on our civil works activities in Alaska, but I mention our overall responsibilities to provide a complete picture.

The Corps maintains and operates seven world class laboratories under the umbrella of the Engineering Research and Development Center (ERDC). ERDC's mission is to provide science, technology, and expertise in engineering and environmental sciences in support of the armed forces and the Nation.

4.0 CORPS OF ENGINEERS CAPABILITY (SLIDE 4)

The Corps' Civil Works mission grew out of maintaining navigation of the nation's rivers and harbors and remains centered on water related planning, design, construction, and maintenance and operation activities. Historically the Corps' missions have been Navigation, Flood Damage Reduction, Hydropower, Water Supply Storage, Emergency Stream bank Protection, Coastal Storm Damage Reduction, and Emergency Preparedness Response and Recovery. Recreation has been a Corps mission in the past, however has been deemphasized as Federal revenues have become scarcer. A relative new mission, instituted within the last 20 years or so, is Environmental Protection and Restoration. The Alaska District has constructed projects in all of these mission areas in Alaska.

The Corps navigation mission involves providing and maintaining navigational access for commercial cargos. This mission includes constructing access channels and protective works such as breakwaters. The Corps does not typically construct features such as piers, docks, or upland facilities. Navigation markers and beacons are provided and maintained by the Coast Guard. Navigation projects are probably the largest category of projects that the Alaska District conducts in Alaska.

The flood damage reduction mission is fairly self explanatory. The Corps provides structural and non-structural projects such as dikes and levees, raising structures, diverting flood flows, or in special cases, relocation of facilities, or even entire communities. Flooding is an issue in many Alaskan coastal communities and the Corps has many projects of this type.

Hydropower and water supply storage are related missions in that they both involve construction of a dam to create a water reservoir. The Alaska District has constructed a limited number of

hydropower projects in Alaska but this is not a routine mission area. However, the Corps does maintain expertise in hydropower design through the Hydropower Design Center (HDC) located in Portland, Oregon. Water supply is a more common mission, and the Alaska District currently has two projects on-going, Kake Dam and Wrangle water supply.

Coastal Storm Damage is another threat to Alaskan coastal villages, and the Corps is active in this area, designing and constructing erosion protection structures at many communities. The Alaska District is currently involved with erosion protection at Shishmaref, and has designs underway for Unalakleet, Kivalina, Bethel, Newtok and others.

A related mission is emergency streambank protection. Typically the Corps can only provide this service under Section 14 of its continuing authorities, which is limited to protection of public facilities. However, the Alaska District has received congressional direction to provide more extensive streambank protection for some Alaskan communities such as Galena, Dillingham, Bethel, and currently under study, McGrath.

Last, but not least, is the environmental restoration and protection mission. The focus of this mission area is the restoration of degraded ecosystems to produce environmental benefits. These projects are varied including such things as removing debris and other obstructions, opening culverts, improving water quality, and restoration of rearing habitat spawning beds, riparian habitat and woody debris. The Alaska District has projects like this at Chester Creek, Mark Creek, Eklutna, and Black Lake.

One final capability that the Corps has to offer is in delineation, characterization, and clean-up of hazardous and toxic waste. The Corps typically provides this service in the clean-up of active

and formally used defense sites in Alaska, but has done extensive work for the EPA and DOE in other states. The Alaska District recently used this technology to determine if contaminated sediments were likely to be associated with the Port of Anchorage expansion project.

5.0 AUTHORITIES (SLIDE 5)

The Corps must have legal authority for any project that we engage in. Authority is provided by an act of congress which is then signed into law by the administration. Study authority may also be provided through a resolution in either the House or Senate. Federal law requires that all studies and construction projects be cost-shared in accordance with the formulas in WRDA 1986 (P.L. 99-662), unless specifically excepted through legislation. Many Alaskan projects have received exception from the cost-sharing requirements. This trend is likely to change as Alaska's influence in Congress wanes.

Authority is only half of the equation, however. Congress must appropriate funds for the work to begin or continue. The federal budget cycle is a two year process. Funding requirements are generated by the administration the first year and presented to congress in February of the second year. Congress amends the administrations proposed budget, and enacts 13 separate bills appropriation by September 30, the end of the second fiscal year. The Corps typically receives its civil works funding in the Energy and Water Appropriations Bill. (Military funding is a separate appropriation.)

5.1 FEDERAL BUDGET FOR FY2006 (SLIDE 6)

This slide shows the Corps civil works budget for fiscal year 2006, almost \$5.4 billion.. General investigations, which covers most Corps planning studies, consists of only 3% of the budget, while Construction General, which included CAP funding, accounts for 44% of the budget. The "other" category provides funding for emergency response, funding for Corps laboratories,

headquarters administration, etc. As is shown here, operations and maintenance accounts for a large slice of the budget.

5.2 ALASKA DISTRICT BUDGET FY2006 (SLIDE 7)

This slide shows Alaska Districts budget for the same year, \$79.5 million. Our construction, planning, and regulatory programs are a little larger as a percent of budget, than the national budget, while our operations program is a little smaller. You will note the absence of the “Other” category. When a natural disaster occurs, funds are provided directly from headquarters.

As I mentioned in my discussion of Corps Capabilities, we provide disaster clean-up and restoration under FEMA’s oversight. This work is funded 100% by FEMA when it is needed.

5.3 CORPS OF ENGINEERS APPROPRIATIONS AT DISTRICT LEVEL

(SLIDE 8) The General Investigation appropriation funds studies. Typically the pre-construction engineering and design (PED) activities, i.e., PCA development, real estate activities (short of acquisition), design studies if necessary, etc., are begun using remaining GI funds. A variety of current studies are listed on this slide.

The second appropriation category shown on this slide is Construction General. This appropriation completes the PED activities, develops construction documents, awards the construction contract, and administers the construction. The slide shows a variety of current projects. Kake Dam is a water supply project which has recently been completed.

(SLIDE 9) This slide lists the two remaining major appropriation categories, O&M and Regulatory. Operations and Maintenance (O&M) is the post construction operation of Corps projects. This appropriation may also fund limited studies and designs to upgrade and modernize

existing projects. The slide shows the one flood control project that the Corps operates. When signed into law, the WRDA 2007 bill will give the Corps O&M responsibility for the Lowell Creek Flood Diversion Tunnel in Seward. The majority of O&M work in Alaska District is related to navigation projects.

The last major category is the regulatory function. Our Regulatory Branch is responsible for regulating uses of the nation's public navigatable waters in the public interest. As such, they issue permits for construction activities that would impact these public areas, including wetlands. They are also responsible for ensuring compliance with permit requirements, and they delineate wetland boundaries.

5.4 GENERAL AUTHORITIES (SLIDE 10 & 11)

General authorities are programmatic authorities which authorize types of projects. For example, coastal storm damage reduction authority is provided by the 1946 Shore Protection Act; flood damage reduction authority is provided by the 1936 and 1941 Flood Control Acts, and 1986, 1996 and 2000 Water Resource Development Acts, etc. Section 203 of the Water Resources Development Act of 2000 allows the Corps to provide planning and technical assistance to Tribes. AVETA and the Alaska Baseline Erosion Assistance are two Alaskan initiatives carried out under the 203 program.

- Alaska Villages Erosion Technical Assistance (AVETA). AVETA was authorized as a cost shared Tribal Partnership study in the Consolidated Appropriations Resolution of 2003. Section 112 of the Conference Report Energy and Water Development Appropriations Act of 2004 revised funding for this study as 100% Federal. The legislation directed the Corps to investigate and prepare a report for Congress on the

impacts of coastal erosion due to continued climate change and other factors for the (7) communities of Bethel, Dillingham, Shishmaref, Kakatovik, Kivalina, Unalakleet, and Newtok. This is a study authority only.

- Alaska Baseline Erosion Assessment. Authorized by the FY 2005 Consolidated Appropriations Conference Report, the Corps was directed to coordinate and plan the appropriate responses and assistance for Alaska villages in the most need and provide an overall assessment on the priority of which villages should receive assistance. This is a study authority only.

The Rivers and Harbors in Alaska is a study authority based on a House resolution adopted by the U.S. House of Representatives Committee on Public Works on December 2, 1970. We have conducted many studies under this authority, and a few are listed in the slide.

Rivers and Harbors in Alaska study resolution provided authority for study of storm damage reduction measures for Barrow, Alaska. This is a study authority only.

Another general authority is the Planning Assistance to States. The Alaska District has provided relocation planning services to Kivalina and Newtok under this authority.

5.5 SPECIFIC AUTHORITIES (SLIDE 12)

Specific authorities list specific projects in congressional legislation, most commonly in a Water Resources Development Act (WRDA). Specific authorities may be for studies, construction, or, less commonly, both. Typically Congress authorizes the Corps to study a problem and recommend a solution. Congress then authorizes construction of the recommended project.

While Corps authorizations frequently are enacted through a WRDA bill, authorizations may

come through any type of legislation. Section 116 of PL 99-190, for example, was part of a continuing resolution to extend funding for FY1986, while Section 117 was included in an appropriations bill. Some examples of Alaskan specifically authorized projects are listed on the slide.

Section 116 of Public Law (PL) 99-190, enacted in 1986, directed the Corps to study emergency bank stabilization work at Bethel, Dillingham, and Galena, Alaska, at full Federal cost. Construction of these projects was provided in later appropriations.

5.6 CONTINUING AUTHORITIES (SLIDE 13)

The Continuing Authorities Program (CAP) allows the Corps discretion to design and construct small projects. Total federal participation (i.e., planning, design, construction, and maintenance) per project is shown for each authority. Once the federal limit is reached, the local sponsor is responsible for any additional costs. The advantage of these authorities is that specific congressional direction is not necessary, approval to study or construct is delegated to the Division level.

Under the Continuing Authorities Program the Corps can provide emergency stream-bank and shore protection through Section 14 of the 1946 Flood Control Act, storm damage reduction is provided by Section 205 of the 1948 Flood Control Act, and coastal storm damage reduction is provided by Section 103 of the 1962 Rivers and Harbors Act. The CAP program also provides for a variety of environmental restoration projects, and for navigation projects as shown on the slide.

5.7 IMPACTS OF WRDA 2007 (SLIDE 14)

On September 24, 2007, the conference report on the Water Resources Development Act of 2007 was sent to the White House for signing into law. The President has stated that he will veto the bill, however, there appears to be sufficient support in both House and Senate to over ride the threatened veto. When executed, this bill will implement several changes that will be important to Alaska. An overview of these provisions follows:

Section 2006 – Remote and Subsistence Harbors - Allows the Secretary of the Army to recommend a project with out demonstrating that the project is justified solely on national economic benefits. This has application on two levels, both system-wide and project level studies.

Section 2017 – Access to Water Resources Data – Establishes a program for public distribution of water resources data to the public. Subsection (c) directs the development of partnerships and cooperative agreements with State, Tribal, local governments and other Federal agencies to share information.

Sections 2020 through 2024 increase programmatic and individual project limits of CAP authorities. Specifically, Section 14 projects now have a maximum per project Federal contribution of \$1.5 million, up from \$1 million, and Section 107 project limits are raised from \$4 million to \$7 million. In addition there are programmatic limit increases for Section 205, Section 206, and Section 1135 projects.

6.0 CLIMATE CHANGE AND ITS EFFECTS IN ALASKA (SLIDE 14)

Alaskan coastal communities have noted that shore fast ice is forming later in the year, and sea ice cover appears to be diminishing. A recent article in the Anchorage Daily News stated that the

Arctic Sea could be ice free by the year 2040. The National Snow and Ice Data Center reported that, on September 4th, 2007, the polar ice cover had dwindled to 170 million square miles, the smallest coverage in recorded history. These two issues impact subsistence gathering of marine mammals, and contribute to increased coastal storm damage and erosion through the loss of protection provided by shore fast ice. Greater expanses of open water provide greater fetch allowing storms to increase in frequency and severity. Changes in weather patterns may also have an affect on fall storms. A half a century of record shows an increase in North Pacific winter cyclones.

Another effect of climate change could be a rise in sea level, although post-glacier rebound seems to be more dominant in some areas of Alaska. In fact, Southeast Alaska has the greatest rate of rebound in the world, of 10 to 32 mm/year according to the European Geosciences Union, and the University of Alaska, Fairbanks. Rebound is not a significant factor on the west coast of Alaska, the Aleutians, or in the Artic.

Climate change is effecting permafrost and frozen ground. An article in the Anchorage Daily News on February 15, 2004 reported how the decreasing number of days of frozen tundra is affecting the exploration and development of oil resources on the North Slope. The Corps has also had first hand experience with melting frozen ground.

7.0 IMPACTS OF CLIMATE CHANGE ON CORPS PROJECTS IN ALASKA (SLIDE 15)

During a 1995 Corps shore protection project at Bethel, a large ice lens melted leaving a hole up to 200 feet along the shoreline by 150 feet inland, and which cost over \$5 million to bring under control, resulting in a 20% increase in the project cost. Changing foundation conditions are likely to be a significant factor in design and construction during the next 50 to 100 years. Melting

frozen soils and permafrost could require more detailed analysis and/or result in more costly foundation systems. Corps projects on rivers in the interior are more likely to be effected as the Bethel example shows. The majority of the Corps' coastal projects are in-water, or are on the beach where permafrost is not as large a concern.

Corps coastal projects, i.e., harbors, erosion control, etc., are unlikely to require changes to our design criteria as a result of climate change. Due to the lack of historical design data, i.e., stream flow, wind, wave, meteorological, etc, and the high cost of initial construction, Corps flood and erosion prevention projects in Alaska are very conservative. Increased frequency and severity of storms may result in minor adjustment of coastal revetment height, and perhaps larger armor rock.

With the melting of the polar ice, increases in sea level could increase the number of communities that are at risk of storm damage or erosion, increasing the demand for flood/erosion reduction solutions. While predictions of sea level change range from none to one or more feet, any rise in sea level could result in greater coastal storm damage and greater and more frequent flooding. Several Alaskan communities are seeking to relocate due to erosion and flooding problems, and sea level rise certainly needs to be a consideration in the selection of relocation sites.

8.0 BROADER IMPLACATIONS (SLIDE 15)

Climate change is very likely to be costly, effecting communities that are not currently experiencing erosion, flooding, or foundation problems. In addition, budgets are unlikely to keep pace with increasing demand, climate change related or otherwise. State and Federal agencies, as well as NGOs, communities, academia, private industry, and others, need to learn to collaborate.

We need to find a way to share information on what projects are being undertaken. This is a foundational requirement; we need to establish some central database that contains this information, and appoint a responsible individual to keep it current.

Next, we need to share information that reduces data gathering, and design and construction costs. And we need to be open to doing a little extra during our field investigations to obtain information that is useful to others. This requires that we know what information would be useful, and may require that the receiving agency kick in a few dollars to support the data gathering effort.

We need to investigate ways to close the data gaps that exist in Alaska, and be willing to participate physically and financially in this effort. Data gaps such as missing stream flow data, regional wind and wave data, ice condition changes and impacts to name a few.

Last, or perhaps first, we need to appoint a lead agency who will be responsible for coordination of information between agencies and other interested parties.

9.0 CORPS OF ENGINEERS RESEARCH ON CLIMATE CHANGE (SLIDE 16)

Here are some things that the Corps of Engineers is working on regarding climate change:

Shishmaref Erosion Control Project. Thermistors (thermal resistors) to determine the soil temperature behind the revetment were incorporated into the 2007 construction of the erosion control structure at Shishmaref, Alaska. These sensors take readings every 6 hours, and the Corps expects to monitor them over several years. This data is expected to be useful in determining changing soil conditions as a result of climate change.

Long-Term Alaska Wind, Wave and Surge Climatology study. The Corps is currently acquiring data to prepare wind and wave forecasts of the western Alaska coastline including the Bering and Chukchi Seas. The Corps' Coastal Hydraulics Laboratory (CHL) , one of ERDC's Vicksburg, Mississippi laboratories, has been tasked with developing a continuous database of wave height, period and direction, surge and water levels based on a 20 year hindcast. The Long-Term Alaska Wind, Wave and Surge Climatology study (wave climate analysis) will also develop the 50 and 100 year storm event. This work is being conducted as funds become available. State and Federal agencies that have, or know of, data that could be used in this analysis are invited to contribute. Results of this study will be available, when completed, in the Wave Study Database, available on the internet.

Decadal Forecast of Climate Change Impact on Waves in Alaska Waters study. CHL has also developed a proposal to study the decadal forecast of climate change impact on waves in Alaska waters. This study would develop, test and produce long term (decadal) projections of the wave climatology based on future trends of the ice and meteorological conditions in Alaska. Currently this task is low priority work, and would require participation of other state and Federal agencies, in both the data and funding arenas. However, this study would be great benefit in understanding climate change and its impact on Alaska, so get out your checkbooks!

10.0 HANDOFF TO CRREL (SLIDE 17)

In my opening slide I mentioned that the Corps has 7 world class laboratories engaged in engineering research. These laboratories are under the umbrella of the Engineering Research and Development Center (ERDC) whose mission is to provide science, technology, and expertise in engineering and environmental sciences in support of our Armed Forces and the Nation. We have already mentioned CHL. Another of Corps' labs is the Cold Regions Research and

Engineering Laboratory (CRREL), which has been engaged in a number of studies that are applicable to the Alaskan Environment and in climate change. Other ERDC labs are shown on this slide. I would now like to introduce Dr. Jon Zufelt of CRREL. Dr. Zufelt is the science advisor on cold regions engineering to the US ARMY ALASKA (USARAK), at Fort Richardson.

11.0 CRREL PRESENTATION

12.0 QUESTIONS