CECW 14 Nov 2022

MEMORANDUM FOR The Chief of Engineers

SUBJECT: Outcomes from Board on Coastal Engineering Research's 98th Meeting, Anchorage, AK

1. I chaired the 98th Board on Coastal Engineering Research (BCER) meeting from Sep 13-15, 2022, in Anchorage, Alaska. The theme of this meeting was "Coastal Community Resilience Research Needs in Cold Regions under a Changing Climate," and was intended to identify coastal research needs related to this theme including issues of **climate change, social equity, and environmental justice**. The meeting was hosted by the USACE's Alaska District and included a Board-only charter flight and site visit to Bethel, Alaska on September 13th. Discussions were held in Anchorage on September 14-15. Table 1 summarizes BCER Recommendations and Action Items. The remainder of the memo provides a narrative summary associated with each recommendation and action item.

Table 1. Summary of 98th BCER Recommendations and Action Items

NUMBER	BCER RECOMMENDATION	
2022-REC-1	Include supply chain resilience as a key factor in project studies for remote communities.	
2022-REC-2	Allow local communities to provide federal cost-share through in-kind service by sharing their knowledge, culture, assisting with local logistics, and helping co-design solutions. USACE should prioritize including Other Social Effects into the national economic justification formula.	
2022-REC-3	Provide near-term project solutions to reduce immediate risks so that communities have time to plan long-term adaptation options.	
2022-REC-4	Provide training and low-cost methods for communities to participate in local data collection which could serve as in-kind federal cost sharing and build local community resilience.	
2022-REC-5	Fund the Coastal Hazards System (CHS) for the Pacific Basin and provide fundamental baseline coastal terrestrial, bathymetric, and environmental process data.	
NUMBER	**ACTION ITEM**	**DUE**
2022-Full-1	Describe Strategic Focus Areas in clear, easy-to-understand language	2023 Exec BCER
2022-Full-2	USACE expand Arctic coastal international collaborations for civil and military applications	2023 Full BCER

2. The site visit to Bethel provided an opportunity for the Board to visit and learn about challenges facing a remote native community undergoing rapid climate change. The visit included discussions with the Bethel City Manager and local native community representatives and highlighted the critical nature of waterborne shipment of goods to the

region, rapid erosion of permafrost foundations that is threatening critical natural and built infrastructure, and impacts of ice and increasingly energetic winter storms on coastal armoring (Figures 1-2).

Figure 1. Bethel Harbor serves as a critical regional hub (Photo courtesy USACE Alaska District)

Figure 3. BCER Members in Bethel, Alaska, September 13, 2022 (Photo courtesy Dr. Jane Smith, USACE-ERDC)

3. On September 14-15, BCER reviewed observations from the site visit and had briefings on challenges facing the USACE in the region as framed by Administration priorities to address climate change, better serve underserved communities, and ensure supply chain resilience. Issues facing the nation related to Administration priorities are heightened for remote Alaska communities such as Bethel. The Arctic has warmed at more than twice the global rate over the past 50 years, with commensurate permafrost thawing and rapid relative sea level rise (Intergovernmental Panel on Climate Change Sixth Assessment Report, 2022). Coastal erosion is accelerated with a reduction in sea ice and loss of buffering during winter storms, along with rapid subsidence and melting permafrost. Native communities require access to the coast to sustain their livelihood, thus co-development of adaptable solutions requires understanding their cultural needs. **Supply chain resilience must be a key factor in project studies for remote communities** as it is critical to these remote regions to ship and receive goods and maintain fundamental cultures and livelihoods essential to survival. All these small communities lack resources and national economic justification to support cost-sharing solutions with the USACE. The Board suggested local communities could **provide federal cost-share through in-kind service by sharing their knowledge, culture, assisting with local logistics, and helping co-design solutions. In addition, USACE should prioritize including Other Social Effects into the national economic justification formula.**

4. Excellent talks illustrated the complex, interdependent, compounding nature of these problems and the need to include local communities in co-designing solutions to meet challenges. In the USACE Alaska District, revetments with large interlocking armor units such as Core-Loc® are required to withstand extreme wave and storm impacts and reduce coastal erosion where stone of sufficient size is not available, but the capacity of these units to withstand ice loading is unknown. In addition, placement of these heavy concrete units on melting permafrost foundations and potential toe scour are challenges. For some remote communities, these types of large concrete units may not be a viable solution as they may limit access to the coast. The Board discussed a need to **provide near-term solutions to reduce immediate risks so that communities have time to plan long-term adaptation options**.

5. Terrestrial, bathymetric, and environmental process data are lacking in Alaska due to large spatial extents, rapidly changing conditions (e.g., wave energy and direction due to changes in ice cover and storm tracks) and changing datums. The lack of fundamental measurements complicates planning, engineering, construction, and maintenance of coastal solutions. ERDC has an ongoing partnership with the University of Alaska-Fairbanks to map coastal regions of Alaska, develop community resources, and provide fundamental capacity building in Science, Technology, Engineering, and Mathematics (STEM) disciplines for students. The Board discussed **providing training and low-cost methods for communities to participate in local data collection** which could serve as in-kind federal cost sharing and build local community resilience.

6. The Pacific Basin lacks comprehensive Coastal Hazard System (CHS) data that exist in the Atlantic, Gulf, and Great Lakes. In these other regions, significant post-hurricane supplemental funds were used to integrate regional and local coastal models

and create publicly available databases that can be used to rapidly evaluate storm impacts on local communities and be utilized for planning, engineering, design, and maintenance. These types of hazard data would provide local Pacific Basin communities public resources so they can quantify changing hazards and develop adaptable solutions. In addition, these data are critical to evaluate national security and operational requirements within the Pacific Basin. The Board highlighted the lack of data – both measured and numerically calculated such as provided in the CHS – as a huge barrier to comprehensive analysis of solutions for Alaska and Pacific regions. Funding to sustain CHS is proposed in the Fiscal Year (FY) 2024 Civil Works R&D Strategic Program. **The BCER recommended prioritizing R&D investment for the Pacific Basin CHS**, which will be partially supported in FY23 via military funding for Guam with additional Pacific Basin work proposed through both military and civil works initiatives.

7. USACE's six Strategic Focus Areas (SFAs) were presented along with a summary of the 5-year Civil Works R&D Strategic Plan which is targeted to start in Fiscal Year 2024. USACE formulated the SFAs in 2019 to address the Grand Challenges facing the nation: Sustainable Species Management; Next-Generation Water Resources Infrastructure; Innovations in Sediment Management; Comprehensive Water Risk Management; Crisis Mitigation Response and Recovery; and Innovation in Artificial Intelligence, Data Analytics, and Automation. MG Graham gave BCER attendees a homework assignment to suggest **clear, easy-to-understand descriptions of the SFAs**. Submissions from BCER attendees and board members are included in Figure 3. MG Graham also recommended that **USACE expand Arctic coastal international collaborations for civil and military applications**.

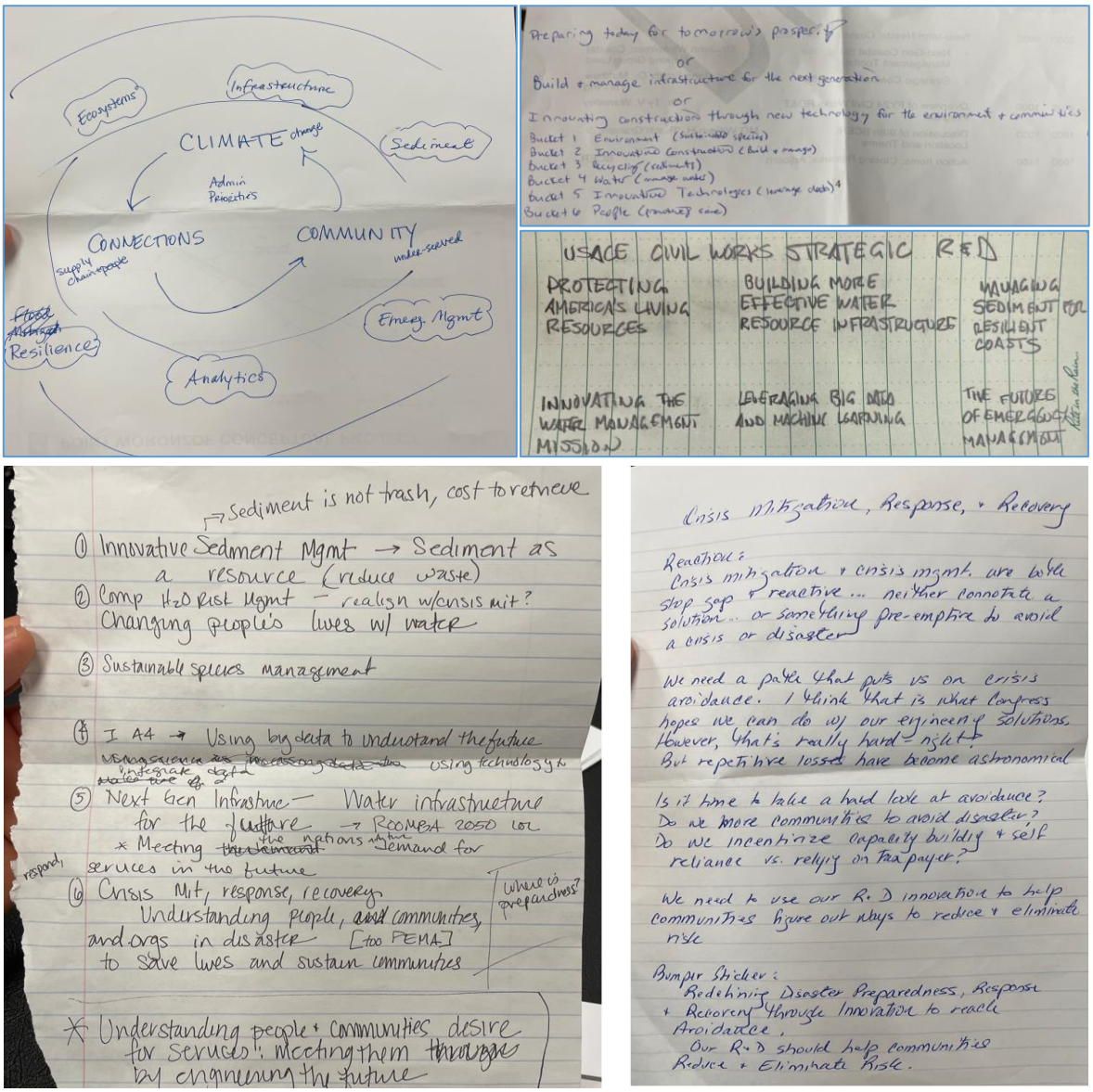

Figure 3. BCER Homework Assignment to clearly describe the USACE Strategic Focus Areas

8. In summarizing observations from the meeting, the Board noted that the Arctic is Ground Zero in experiencing rapid climate change, impacting social equity and supply chain resilience. **Specific research needed for this region includes advancing the Coastal Hazards System for the Pacific Basin and providing the fundamental baseline coastal terrestrial, bathymetric, and environmental process data.** Solutions need to be adaptable in time and space, co-developed with local communities, and such that the communities can sustain the coastal solutions into the future. A focus on R&D integrating Arctic data, processes, models, response, and the resulting impact on environmental justice solutions is a focus of the FY25 Comprehensive Water Risk Management Strategic Focus Area. This integrated predictive capability is required for complex, rapidly changing Arctic processes to evaluate, communicate, and co-develop

low-cost coastal adaptation strategies for Alaska, and must engage across federal agency, academic, non-governmental, and local communities for success.

9. The next BCER Executive Session will be held in Chicago, Illinois, in Winter/Spring 2023 with a critical review of the SFAs, a review of environmental justice research and gaps, and a discussion of non-structural solution research. The 99th BCER will be held in the late summer in Miami, Florida, with a focus on community integration with non-structural and hybrid solutions.

10. For questions about topics discussed herein, please contact the Designated Federal Officer for the BCER, Dr. Julie Rosati, Julie.D.Rosati@usace.army.mil.

WILLIAM "BUTCH" GRAHAM
Major General, US Army
Chair, Board on Coastal Engineering Research

Attachment A: Agenda

Reference:

IPCC. 2022. Climate Change 2022: Impacts, Adaption and Vulnerability. https://www.ipcc.ch/report/sixth-assessment-report-working-group-ii/

Attachment A: Agenda for the 98th Board on Coastal Engineering Research Full Meeting, Anchorage, AK, September 13-15, 2022

98th BOARD ON COASTAL ENGINEERING RESEARCH MEETING

13-15 September 2022
Fireweed Conference Center
725 E. Fireweed Lane, Anchorage, AK 99503

WebEx
https://usace1.webex.com/meet/jason.a.channell
Meeting Number and Access Code: 1992 90 7006

By Phone
US Toll Free: 1-844-800-2712
US Toll: 1-669-234-1177

Draft AGENDA

THEME: Coastal Community Resilience Research Needs in Cold Regions under a Changing Climate

***Meeting Concept*:** *Identify coastal research needs associated with coastal communities in cold regions including issues of climate change, social equity, and environmental justice.*

(All in Alaska Standard Time Zone)

Tuesday September 13, 2022 – Board Members Site Visit, Bethel, AK

0645	Depart Hotel (trying to arrange shuttle service) individual transportation
0730	Meet at Security Aviation, 6121 S Airpark Pl, Anchorage, AK 99502 Charter Flight Site Visit for BCER Board Only
0800	Flight Departure
0900	Arrival and transition to City of Bethel Council Chambers in City Hall, 300 Chief Eddie Hoffman Highway, Bethel, AK
0930	"Community Coastal Resilience & Social Challenges" – Anna Hoffman
1000	Site Visit- (Bring water and snacks) • Meet City Manager Pete Williams at Small Boat Harbor • Discuss float maintenance, removal for ice • Discuss harbor dredging through ice • Move to entrance channel revetment, discuss ice plucking issues with stone armor • Move to east pile bulkhead, discuss retaining wall issues, moorage, USACE tieback project • Move to City Dock, discuss hub transhipment of goods to the region, view docks and landing craft mooring

- Move to First Avenue Bulkhead, discuss thermosyphon issues
- End discussions or move to Mission Road pile and stone revetments to see further ice effects as desired

1600 Return to Anchorage, AK, adjourn or visit Point Woronzof

1630 Anchorage, AK - JABLTCX Lidar Aircraft Tour (30 min tour)

- Joint Airborne Lidar Bathymetric Center of Expertise- Security Aviation

1900 BCER Board Dinner at Crow's Nest (in hotel)

Wednesday 14 September 2022 -- Fireweed Conference Center

Meeting Attire: Military- Cammies/OCP; Civilian-Business Casual

0700 0830 Registration Fireweed Conference Center
0730 0830 Breakfast
0830 **Call to Order**
Dr. Julie Rosati, Designated Federal Officer (DFO)

0830 0900 Welcome and Introductions
MG William H. "Butch" Graham, Jr., Deputy Commanding General for Civil and Emergency Operations, Headquarters (HQ), U.S. Army Corps of Engineers (USACE)

LTC Virginia Brickner, Deputy Commander, Alaska District (POA)

0900 0930 Observations from Site Visits
MG William H. "Butch" Graham, Jr and Board Members

0930 1000 Purpose and History of the BCER
Dr. Ty V. Wamsley, SES, Director Coastal & Hydraulics Laboratory (CHL)

1000 1015 Break

Panel Session #1: Alaska's Coastal Setting and Challenges
Moderator: Mr. Nathan Epps, POA

1015 1045 Alaska District's Coastal shoreline erosion projects and challenges
Mr. Bruce Sexauer, POA

1045 1115 Impacts of Changing Sea Ice on wave climate and shoreline erosion
Dr. Alec Bennett and Dr. Valdimir Alexeev
University of Alaska Fairbanks, International Arctic Research Center

1115 1145 Community Coastal Resilience & Social Challenges
TBD -- Ms. Malinda Chase, Tribal Liaison, International Arctic Research Center

1145	**1245**	**Lunch (Onsite)**
		Panel Session #2: Ongoing Research, Needs and Gaps Moderator: Dr. Jane Smith, ST, CHL
1245	1315	Concrete Armor Units for Coastal Protection in the Arctic Mr. Nathan Epps, POA
1315	1345	Storm selection for design event scenarios, correlating to wind speed, direction, and duration – Case Study at Utquigvik Ms. Rebecca Kloster, POA
1345	1415	Coastal Hazards System for Pacific Basin Dr. Norberto Nadal-Caraballo, CHL
1415	1445	National Coastal Mapping Program Research, Development, and Collaborations in Alaska Ms. Jennifer Wozencraft, CHL, and Dr. Erin Trochim, Alaska Center for Energy and Power (ACEP), University of Alaska Fairbanks
1445	**1500**	**Break**
1500	1530	Summary of Outcomes and Recommendations Aligned with BCER Initiatives Dr. Jane Smith, ST, CHL
1530	1600	Public Comment
1600	1630	Summary of Action Items Dr. Julie Rosati, CHL
1630	1700	Board Closing Remarks Open Discussion Board Members
1700		Adjourn
1745		Dinner Social Haute Quarter Grill

<u>Thursday, 15 September 2022 – Executive Session – Fireweed Conference Center</u>

Meeting Attire: Military- Cammies/OCP; Civilian-Business Casual

0700	0800	Registration Fireweed Conference Center
0730	0830	Breakfast
0830	0900	Comments on Meeting Outcomes MG William H. "Butch" Graham, Jr.

0900	0930	Near-term Needs: Coastal Model R&D
-		Next-Gen Coastal Storm Risk Management Toolbox
-		Strategic Coastal Model R&D Mr. John Winkelman, Coastal Working Group Lead, CHL Dr. Jane Smith/ Dr. Matthew Farthing, CHL
0930	1000	Overview of FY24 Civil Works RD&T Program Dr. Ty V. Wamsley, CHL
1000	1030	Discussion of 99th BCER: Location and Theme MG William H. "Butch" Graham, Jr.
1030	1045	Review Action Items Dr. Julie Rosati, CHL
1045	1100	Closing Remarks.
1100		Adjourn