Presentation to 36th ICCE (2018)

HISTORY OF THE CERB: 50-years of Service to Coastal Engineering (1963-2013)

Joan Pope

US Army Corps of Engineers, Retired

(August 2018)

US Army Corps of Engineers

BUILDING STRONG®

Coastal Engineering Research Board (CERB) Presentation Outline

- Background
- Establishment
- Evolution
- Contributions

Background - USA Coastal Engineering

- **Development of beach resorts in New Jersey (1800-1920's)**
  - ► Summer escape from cities to Cape May, Long Branch, Atlantic City and other NJ beach communities (as early as 1788)
  - ► Leadership from New Jersey in nationalizing shoreline erosion concerns

- **American Shore and Beach Preservation Association (ASBPA) formed 8 December 1926**
  - ► @ invitation of NJ governor, 85 delegates from 16 states met at Asbury Park NJ (October 1926)
  - ► Lead **to formation of ASBPA** to *"…foster sound, far-sighted economic development and preservations of the lands which will aid in placing their benefits within the reach of the largest possible number of our people…."*

Board on Sand Movement and Beach Erosion (BSMBE) established by Chief of Engineers

(January 1929- September 1930)

- **Mission** *"investigate and report on the subjects of sand movement and beach erosion…"*

- **4 Corps officers and 3 Civilians appointed as advisors** (Douglas Johnson, Morrough P. O'Brien, Thorndike Saville)

- **Sponsored coastal field studies** @Long Branch and Seaside Heights, NJ (May 1929-Sept 1930)
  - Measured waves, winds, currents, tides, beach profiles, sand samples and tracer studies
  - Developed field instrumentation
  - **First Federal research on the dynamics of coastal processes conducted in USA**

This coterie of Army engineers and civilian consultants gave birth to USA coastal engineering !

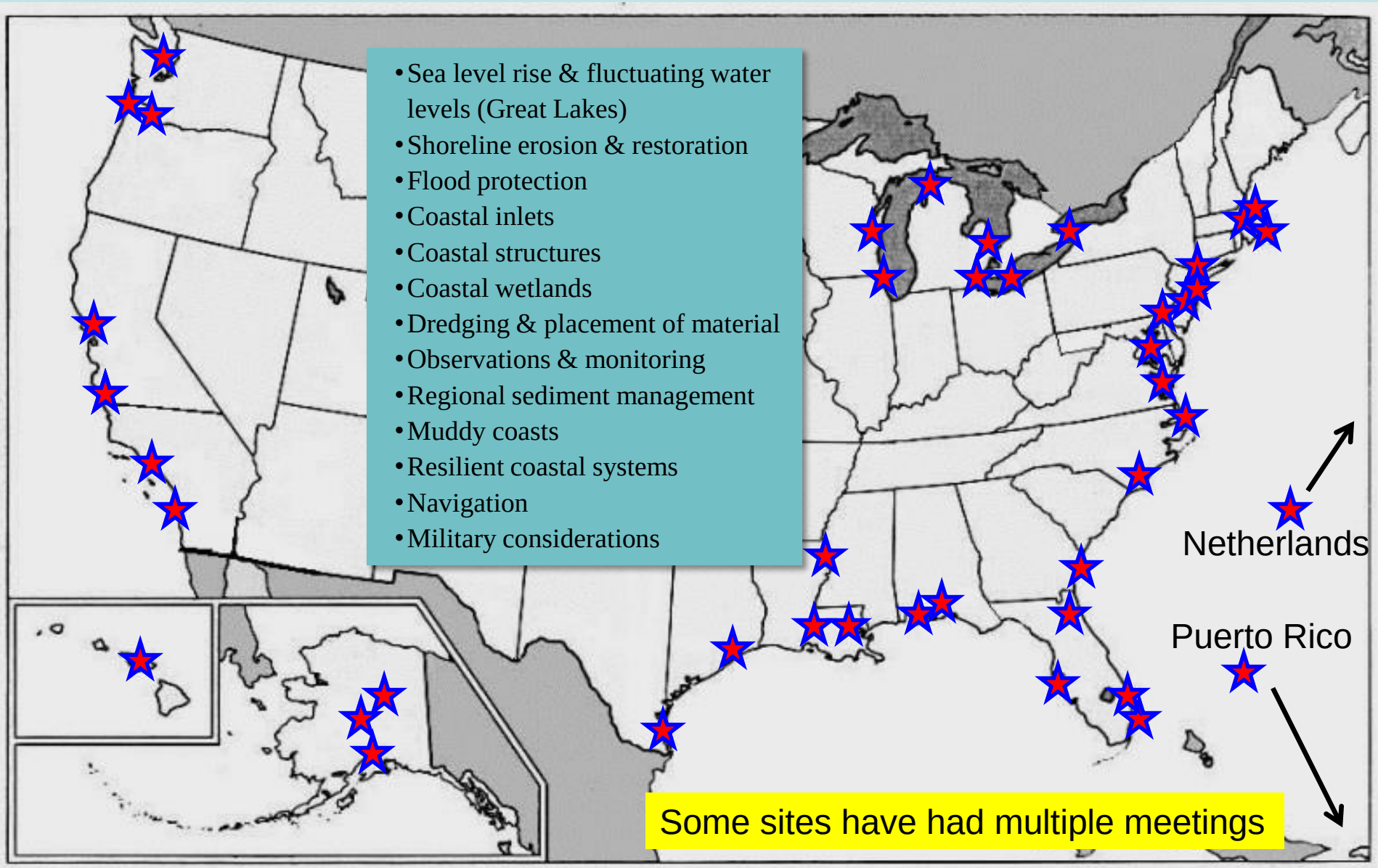
Beach Erosion Board (BEB) (1930-1963)

- **Section 2 of Public Law 520, 71st Congress (3 July 1930)**
  - Advocated by ASBPA
  - Authorized the Corps to conduct investigations and studies aimed at "*…devising effective means of preventing erosion of the shores of coastal and lake waters by waves and currents."*
  - Required a board of 4 Corps officers and 3 civilians from state agencies to provide technical assistance, review of reports, and …"*make firsthand examinations."*
- **BEB established by Chief of Engineers (18 Sept 1930)**
  - Developed staff and research facilities
  - Performed critical coastal analyses during WW2
  - Prepared and released Technical Report No. 4 "*Shore Protection Planning and Design*" (1954)

Coastal Engineering Research Board (1963-present)

- **Public Law no. 172, 88th Congress (7 Nov 1963)**
  - Abolished BEB, established the Coastal Engineering Research Center (CERC)
  - Established CERB "to be constituted by the Chief of Engineers in the same manner as the … BEB" to provide…"guidance and advice" to the CERC.
  - 1st meeting of CERB (13-14 April 1964) at CERC in Washington, DC

CERB Meetings Themes & Locations (1963 - 2016)



Evolution of the CERB

- Early Years (1963-1980)
- Transition Years (1980-1987)
- Theme years (1987-1998)
- Big Picture Years (1998-2013)

CERB: Early Years (1963-1980)

- Limited turn over of Civilian membership
  - (e.g. Dean Morrough P. O'Brien was on BEB and served 17 years on CERB)
- Direct involvement in guiding R&D program at CERC
- Direct involvement in guiding Corps District Projects

Robert Dean
MP O'Brien
Arthur Ippen

1973

Early Years - Outcomes (1963-1980)

- Catalyst for:
  - CERC Coastal Engineering Guidance documents (SPM)
  - CERC international involvement
  - Establishment of the Field Research Facility (FRF)
  - Use of physical models and wave facilities to establish design criteria
  - First research on coastal ecology and dune stabilization
  - Direct involvement with Corps projects (e.g. innovative use of breakwaters, concrete armor units, weirs and spurs)

CERB: Transition Years (1980-1987)

- Shorter appointments for Civilian members (2-year terms, renewable once)
- CERC moved from Ft Belvoir to Vicksburg (WES) (1983)
- CERC conducts both R&D and reimbursable work
- Coastal R&D funding merged with general Corps R&D program
- R&D priority guidance shifted from CERB to Coastal Field Review Groups
- Use of the Field Research Facility (FRF) for large scale experiments (e.g. Super Duck, Sandy Duck)

Willard Bascom
Bernard LeMehaute
Robert Wiegel

1984

Transition Years – Outcomes (1980-1987)

- Catalyst for:
  - Large scale field experiments at FRF
  - Emphasis on field data and monitoring
  - CERC moved from Ft Belvoir to Vicksburg
  - R&D Investment in the development of numerical model technology
  - R&D in sediment transport

CERB: Theme years (1987-1998)

- CERC and WES Hydraulics Lab merge (1996) forming the Coastal and Hydraulics Laboratory (CHL)
- R&D budget cuts and restructuring dissolve identifiable coastal program
- No longer a coastal specific Field Review Group
- Development of continuing R&D programs on dredging and inlets
- Focused Theme meeting-examples
  - Sea Level Rise….Savannah, GA (1987)
  - Field Data Collection
  - Coastal R&D program
  - Coastal Structures, etc.

1991

Fredric Raichlen
Robert Dalrymple
Robert Reid

Theme years -Outcomes (1987-1998)

- Catalyst for:
  - Updating guidance leading to the CEM
  - Establishing long-range R&D goals
  - Strategic research programs focused on dredging and inlets
  - Engagement in sea level rise and climate change issues
  - Advancements in coastal data & mapping (SHOALS – Lidar bathymetric mapping)
  - Programs for training Corps coastal engineers

CERB: Big Picture Years (1998-2013)

- Consolidation of Corps laboratories (ERDC -1999)
- Development of "Strategic" R&D programs
- Change in Civilian CERB membership to include academic, practicing engineer & other government or research professionals
- Expand focus beyond coastal specific R&D
- More non-Corps participation at meetings
- Big issues: RSM, Climate Change, Risk, System Scale

Bruce Taylor
Billy Edge
Joan Oltman-Shay

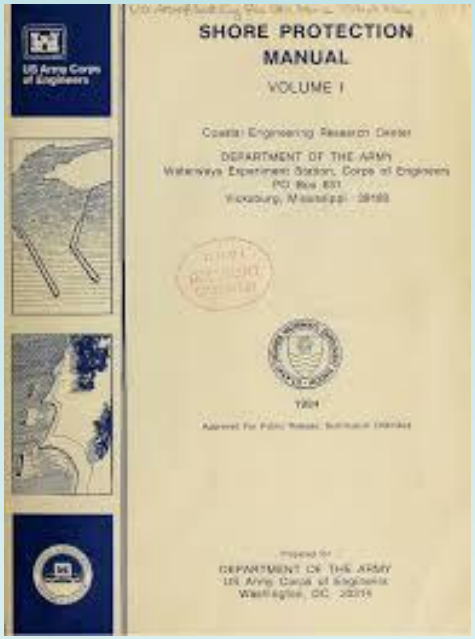
2003

Big Picture Years – Outcomes (1998-2013)

- Catalyst for:
  - Concept of Regional Sediment Management (1999)
  - Importance of Risk and Reliability
  - Corps partnership with Integrated Ocean Observing System (IOOS)……collaborative data!
  - Partnership with other agencies
  - Need to address aging coastal infrastructure
  - Active Hurricane period: e.g. Katrina, Sandy
  - Emphasis on developing System-scale technologies

Contributions: Engineering Guidance

- CERB recommended replacement of TR#4 and developed concept of Shore Protection Manual (SPM)
- Requirements established by CERB, written by CERC researchers
- SPM published 1974, updates 1977, 1984
- Coastal Engineering Manual started 1992
- CERB involved in scoping, writing, and reviewing CEM

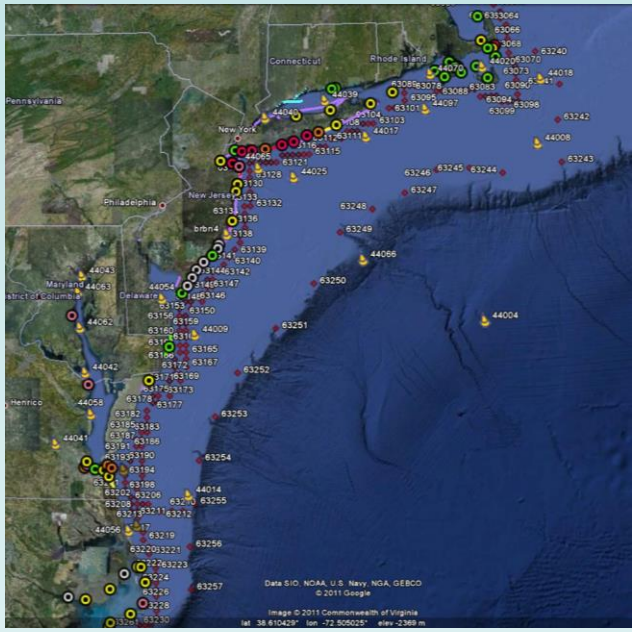


Contributions:
Field Research Facility

- Concept of permanent coastal observation site proposed via CERB 1963
- Constructed in 1977/78, Duck NC
  - 1840 ft pier, 176 acres of property
  - CRAB, LARC
- 8 Meter Directional Wave Array (1986)
- Collaborative research experiments including USA, academic, and international partners
- 40 years of continuous process-response data

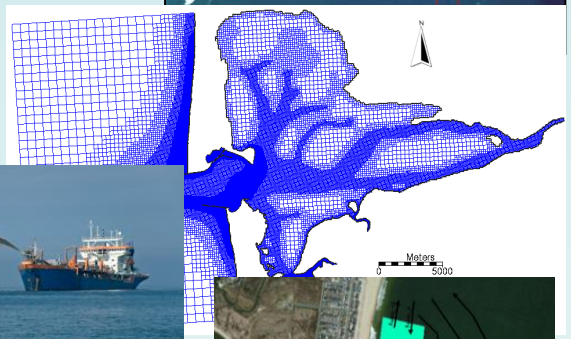
Contributions:
Wave Information Study (WIS)

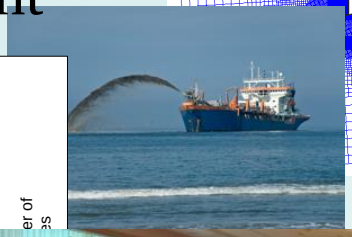
- Methodology to use atmospheric pressure fields to generate wind fields that generate waves
- Developed national historical database (30+ years) of hindcast waves for all waters of USA
- Started in early 1970's, for the Great Lakes, Atlantic 1978, Pacific 1987, and Gulf of Mexico 1989
- 2010's Third Generation models including engineering tools

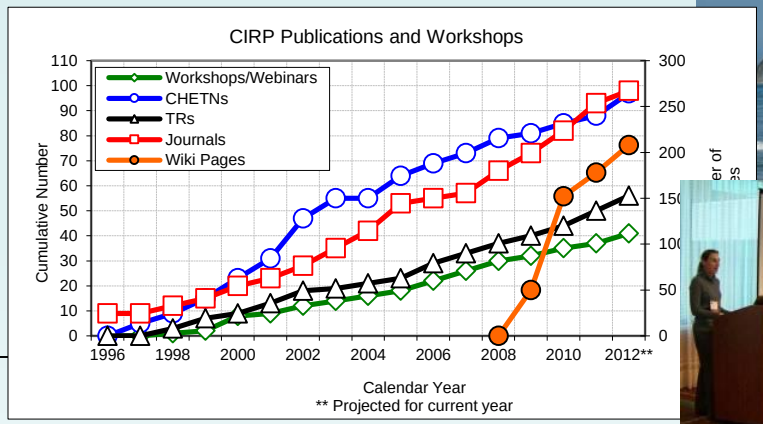


Contributions:
Coastal Inlets Research Program

- 53th CERB, Fort Lauderdale, FL (June 1990) "Coastal Inlets"
- Recommended Coastal Inlet R&D (w/focus on sediment)
- Coastal Modeling System (CMS)
- Waves at Navigation Structures
- Geomorphic Evolution
- Inlet Engineering Toolbox
- Coastal Navigation Portfolio Management
- Tech Transfer







BUILDING STRONG®

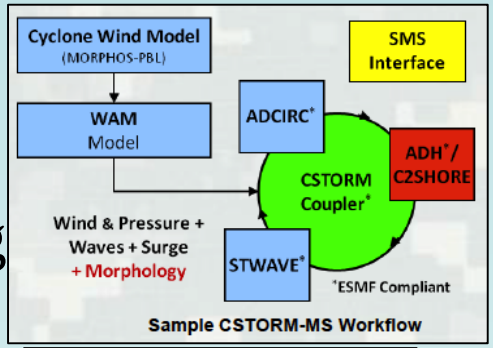
Contributions:
Regional Sediment Management (RSM)

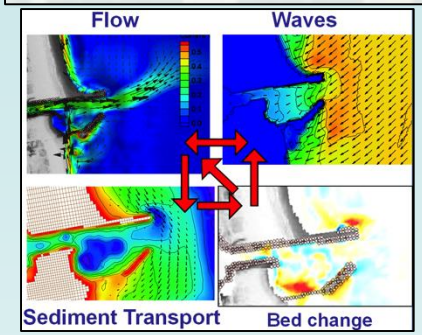
- 60th CERB meeting, 1994, Task Force identified need for "*Systems Approach to Coastal Sediment Management*"
- 67th CERB meeting, Fort Lauderdale, FL, May 1998:
  Theme *"Regional Sediment Management"*
- Change from Project specific focus to Regional interactions
- Through demonstrations and R&D development promote RSM approaches:
  - Generate initial outcomes quickly, and adopt as appropriate
  - Involve multiple agencies & stakeholders
  - Develop Regional-scale tools and technologies
  - Combine Corps authorities

Contributions: Coastal Numerical Modeling

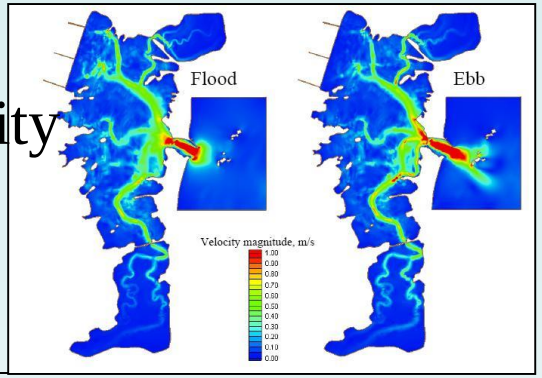
- Since early 1980's CERB has recommended developing numerical model technology (replacing dependence on physical models)

- Provided guidance in:
  - Consolidating modeling technology
  - Developing integrated engineering models
  - Developing open code, community models
  - Developing a business model to enhance numerical capabilities and increase accessibility



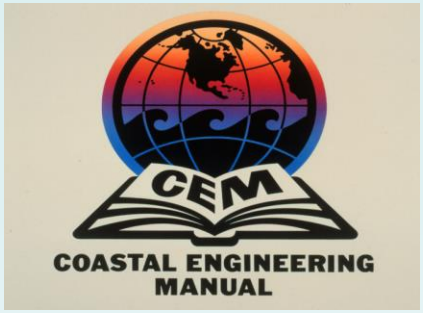


Coastal Modeling System



Summary of Contributions

- Corps Coastal Engineering **guidance** documents
  - Shore Protection Manual (w/revisions) →Coastal Engineering Manual
- Importance of **numerical models**, **monitoring,** and **data**
- Advocacy of **Regional Sediment Management** and **Systems Approach** to watershed management
- **R&D development** programs in inlets, dredging, sediment, monitoring, mapping, and instrument systems, etc
- **Education** of USACE engineers in coastal sciences/engineering/practices
- Early visibility to coastal **Climate Change** issues
- Early advocacy to Corps leadership of the importance of **risk, uncertainty, and resilience** based approaches



CERB: 50 years of service

- Function, Structure, and Mission of CERB has evolved over 50 years responding to changes in National priorities
- CERB has been on the forefront of many areas of Corps advancement
- Important vehicle for providing visibility to R&D and technology potential related to Corps mission.
- Impact to R&D investments and advancements
- Impact to Corps projects
- Promoted Corps capabilities and contributions
- Promoted Corps dialogue with other Federal agencies, State, NGO, and industry.
- Corps leaders better understand technology and hear directly from working level engineers.
- Responsible for promoting and advancing national and international coastal engineering

A remarkable legacy….

….that continues