

**U.S. Army Corps
of Engineers
Coastal and Hydraulics Laboratory**

**Proceedings of the 82nd Meeting of the
Board on Coastal Engineering
Research**

11-13 October 2006 (Long Branch, NJ)

Hosted by: U.S. Army Engineer Division, North Atlantic, and the U.S. Army Engineer District,
New York

Prepared for Headquarters, U.S. Army Corps of Engineers

Contents

Preface	iv
Agenda	v
Attendees	viii
Introduction.....	1
The Board on Coastal Engineering Research	2
Opening Remarks and Welcome MG Don T. Riley, BG Todd T. Semonite, and COL Aniello L. Tortora.....	3
Remarks from American Shore and Beach Preservation Association The Honorable Harry Simmons	4
NAD and NAN Project-Specific Coastal Engineering Challenges (Panel) Mr. Randall A. Wise, Moderator Coastal Engineering Technical challenges of the Fire Island Inlet to Montauk Point Reformulation Study Ms. Lynn M. Bocamazo and Mr. Santiago Alfageme	9
Renourishment Triggers and Emergency Fill Procedures: Technical and Policy Challenges Ms. Monica a. Chasten and Mr. Keith D. Watson	13
Monitoring Challenges Mr. Anthony P. Pratt.....	17
Sea Level Rise: Implications for Coastal Processes in the New York Area Mr. Joseph J. Tanski	20
Surfing Resouces and Corps Shore Protection/Navigation Projects Mr. Michael Walther.....	24
Shore Protection Project Performance (Panel) Mr. William R. Curtis, Moderator	27
Economic Performance of Federal Shore Protection Project, Martin County, FL Mr. Brian K. Harper	29
Shore Protection Project Assessment – Shore Protection Project Design and Formulation Improvement Mr. Stephen Couch	36
Modeling of Relevant Physics of Sedimentation in 3D (MORPHOS 3D) Dr. Donald T. Resio	34
Communication, the Corps and the Coast Ms. Susan E. Durden	36
National Planning Center of Expertise for Coastal Storm Damage Reduction Mr. J. Bailey Smith	38
Regional Sediment Management as it Applies to NAD Dr. Jeffrey P. Waters and Mr. Lawrence J. Cocchieri	39
The Honorable Frank Pallone, Jr., Congressman from the 6 th District of New Jersey	41
Charting the Course for Ocean Science: Development of a National Ocean Research Priorities Plan and Implementation Strategy Dr. Daniel Walker.....	48

Mitigating Erosion along Sheltered Coasts	
Mr. Jeff Benoit	49
Coastal Environmental Restoration Challenges (Panel)	
Ms. Roselle E. Henn, Moderator	
Collaborative Ecosystem Restoration at Jamaica Bay Marsh Islands	
Ms. Patricia Rafferty	51
Collaboration with the Corps on Coastal Initiatives	
Mr. Terry Sullivan	55
Endangered Species Act Biological Opinion Beach Erosion Control Project	
Monmouth County, New Jersey – A Collaborative Partnership to Manage Piper Plover,	
Least Tern, and Seabeach Amaranth	
Mr. Mark H. Burlas, Ms. Stephanie Szerlag, and Mr. Todd Pover.....	56
Public Comment	60
Board Recommendations/Closing Remarks	68
Appendix A: Executive Session/Actions	A1
Appendix B: Response to the Chief’s Charge	B1
Appendix C: Biographies of Board and Speakers/Authors.....	C1

Preface

The Proceedings of the 79th Meeting of the Coastal Engineering Research Board (CERB) was prepared for the Office, Chief of Engineers, by the U.S. Army Engineer Research and Development Center's (ERDC's) Coastal and Hydraulics Laboratory (CHL). These proceedings provide a record of the papers presented, the questions and comments in response to them, and the interaction among program participants and CERB.

The 79th meeting was hosted by the U.S. Army Engineer Division, Pacific Ocean, under the direction of BG Robert L. Davis, and the U.S. Army Engineer District, Alaska, under the direction of COL Timothy J. Gallagher. Acknowledgments are extended to the following from the Alaska District: Messrs. Bruce R. Sexauer and Kenneth J. Eisses for overall coordination and field trip assistance; Meses. Chelan J. Schreifels and Mary T. Wilson for logistical and administrative support; and Mr. Merlin D. Peterson for computer support. Thanks are also extended to all speakers, to Ms. Sharon L. Hanks of CHL for overall coordination and assistance in the setup of the meeting and the assembly of the information for this publication, Mr. Clay W. LaHatte of CHL for placing Proceedings on the Internet, and Mr. Bill Mullen of ERDC's Information Technology Laboratory for editing these Proceedings. Thanks are extended also to Ms. Susan C. Soderberg, Pro/Tech Reporting Services, for taking verbatim dictation of the meeting.

These Proceedings were reviewed and edited for technical accuracy by Mr. Thomas W. Richardson, Director of CHL, and COL James R. Rowan, Executive Secretary of the Board.

The document is approved for publication in accordance with Public Law 166, 79th Congress, approved 31 July 1945, as supplemented by Public Law 172, 88th Congress, approved 7 November 1963.



DON T. RILEY
Major General, U.S. Army
President, Coastal Engineering Research Board

Agenda

THEME: Challenges in Coastal Protection and Restoration

Wednesday, 11 October 2006

- 1000 – 1230 Open Registration (Outside Monmouth III, IV, and V Meeting Room)
- 1000 – 1230 Board Members Field Trip to New Jersey Shoreline
- 1230 – 1300 Return from Field Trip
- 1300 – 1400 Lunch on Own
- 1400 – 1415 Opening Remarks and Welcome (Monmouth III, IV, V)
MG Don T. Riley, President of the Board and Director of Civil Works,
BG Todd T. Semonite, Commander of the North Atlantic Division (NAD), and
COL Aniello L. Tortora, Commander of the New York District (NAN)
- 1415 – 1445 Remarks from American Shore and Beach Preservation Association (ASBPA)
The Honorable Harry Simmons, ASBPA
- 1445 – 1730 NAD and NAN Project-Specific Coastal Engineering Challenges (Panel)
Mr. Randall A. Wise, Philadelphia District (NAP), Moderator
- 1445-1515 Coastal Engineering Technical Challenges of the Fire Island Inlet to Montauk Point
Reformulation Study
Ms. Lynn M. Bocamazo, NAN
Mr. Santiago Alfageme, Moffatt and Nichol
- 1515-1545 Renourishment Triggers and Emergency Fill Procedures: Technical and
Policy Challenges
Ms. Monica A. Chasten, NAP
Mr. Keith D. Watson, NAP
- 1545-1615 Monitoring Challenges
Mr. Anthony P. Pratt, Delaware Department of Natural Resources
and Environmental Control
- 1615 – 1630 Break (Pre-Function Foyer)

- 1630-1700 Sea Level Rise: Implications for Coastal Processes in the New York Area
 Mr. Joseph J. Tanski, New York Sea Grant
- 1700-1730 Surfing Resources and Corps Shore Protection/Navigation Projects
 Mr. Michael Walther, Coastal Tech
- 1730 Adjourn for the Day
- 1900 – 2030 Social with Heavy Hors d’oeuvres and Cash Bar (Mariner’s Lounge) – Attire: Casual

Thursday, 12 October 2006 (Monmouth III, IV, V)

- 0800 – 0815 Opening Remarks
 MG Riley
- 0815 – 1000 Shore Protection Project Performance (Panel)
 Mr. William R. Curtis, Coastal and Hydraulics Laboratory (CHL), Moderator
- 0820-0850 Economic Performance of Federal Shore Protection Project, Martin County, FL
 Mr. Brian K. Harper, Institute for Water Resources (IWR)
- 0850-0915 Shore Protection Project Assessment – Shore Protection Project Design
 and Formulation Improvement
 Mr. Stephen Couch, NAN
- 0915-0940 Modeling of Relevant Physics of Sedimentation in 3D (MORPHOS 3D)
 Dr. Donald T. Resio, CHL
- 0940-1000 Communication, the Corps and the Coast
 Ms. Susan E. Durden, IWR
- 1000 – 1030 Break
- 1030 – 1100 National Planning Center of Expertise for Coastal Storm Damage Reduction
 Mr. J. Bailey Smith, NAP
- 1100 – 1130 Regional Sediment Management as it Applies to NAD
 Dr. Jeffrey P. Waters, CHL
 Mr. Lawrence J. Cocchieri, NAD
- 1130 – 1300 Lunch
- 1300 – 1330 The Honorable Frank Pallone, Jr., Congressman from the 6th District of New Jersey
- 1330 – 1400 Charting the Course for Ocean Science: Development of a National Ocean Research
 Priorities Plan and Implementation Strategy
 Dr. Daniel Walker, Office of Science and Technology Policy
- 1400 – 1430 Mitigating Erosion along Sheltered Coasts
 Mr. Jeff Benoit, SRA International

- 1430 – 1500 Break
- 1500 – 1630 Coastal Environmental Restoration Challenges (Panel)
Ms. Roselle E. Henn, NAN, Moderator
- 1500-1530 Collaborative Ecosystem Restoration at Jamaica Bay Marsh Islands
Ms. Patricia Rafferty, National Park Service
- 1530-1600 Collaboration with the Corps on Coastal Initiatives
Mr. Terry Sullivan, The Nature Conservancy
- 1600-1630 Endangered Species Act Biological Opinion Beach Erosion Control Project
Monmouth County, New Jersey – A Collaborative Partnership to Manage Piper
Plover, Least Tern, and Seabeach Amaranth
Mr. Mark H. Burlas, NAN
Ms. Stephanie Szerlag, U.S. Fish and Wildlife Service
Mr. Todd Pover, New Jersey Department of Environmental Protection
- 1630 – 1700 Public Comment
- 1700 – 1730 Closing Remarks
MG Riley and Board Members
- 1730 Adjourn

Friday, 13 October 2006

- 0800 – 1200 Board Executive Session (Oceanport South)

Attendees

Board Members

MG Don T. Riley
BG Joseph Schroedel
BG Todd T. Semonite
Dr. Joan Oltman-Shay
Dr. Richard J. Seymour
Dr. R. Bruce Taylor

Headquarters, U.S. Army Corps of Engineers

CPT Clay A. Morgan, CECW-ZX
Dr. Dimitra Syriopoulou, CERD-B
Mr. Jerry W. Webb, CECW-CE

Institute for Water Resources

Mr. Charles B. Chesnutt, CEIWR-PD
Ms. Susan E. Durden, CEIWR-GW
Mr. Brian K. Harper, CEIWR-GW

Detroit District

Mr. Nicholas J. Zager, CELRE-HH-E

Mississippi Valley Division

Mr. Charles E. Shadie, CEMVD-PD-WW

North Atlantic Division

Mr. John P. Bianco, CENAD-MT-EC-I)
Mr. Lloyd Caldwell, CENAD-PD
Mr. Lawrence J. Cocchieri, CENAD-CM-PP
Mr. Andrew Petallides, CENAD-MT-EC-W
Mr. Joseph R. Vietri, CENAD-PM
Mr. John S. Wright, CENAD-CM-PP

Baltimore District

Mr. Gregory P. Bass, CENAB-EN-WW

New England District

Mr. John H. Winkelman, CENAE-EP-WM

New York District

Ms. Lynn M. Bocamazo, CENAN-EN-H
Mr. Mark H. Burlas, CENAN-PL-EA
Mr. Anthony Ciorra, CENAN-PP-C
Mr. Arthur J. Connolly, CENAN-EN
Mr. Stephen Couch, CENAN-PL-FC
Mr. Donald E. Cresitello, CENAN-PL-FC
Mr. Daniel Desmet, CENAN-PA
Ms. Roselle E. Henn, CENAN-PL-EA

Ms. Dawn M. Hlad, CENAN-EN-M
Mr. Douglas F. Leite, CENAN-PP-C
Dr. Roy C. Messaros, CENAN-EN-MC
Mr. Stuart Piken, CENAN-PP
Ms. Diane S. Rahoy, CENAN-EN-H
Ms. Christina Rasmussen, CENAN-EN-H
Mr. Bhavesh C. Shah, CENAN-IM-I
Ms. Debra R. Smith, CENAN-PP
COL Aniello Tortora, CENAN-EX

Norfolk District

Mr. Gregory G. Williams, CENAO-TS-OD

Philadelphia District

LTC Gwen E. Baker, CENAP-DC
Ms. Monica A. Chasten, CENAP-EC-H
Dr. Harry C. Friebe, CENAP-EC-H
Mr. Jeffrey A. Gebert, CENAP-PL-PC
Mr. J. Bailey Smith, CENAP-PL-PC
Mr. Keith D. Watson, CENAP-DP-CW
Mr. Randall A. Wise, CENAP-EC-H

Honolulu District

Mr. Thomas D. Smith, CEPOH-EC-T

South Atlantic Division

Mr. Kaiser E. Edmond, CESAD-MT-EW

Jacksonville District

Ms. Candida K. Bronson, CESAJ-PD-PN

Wilmington District

Mr. Gregory L. Williams, CESA-W-TS-EC

South Pacific Division

Mr. George W. Domurat, CESPD-PDS-O

Los Angeles District

Ms. Susan M. Ming, CESPL-PD-WS

Engineer Research and Development Center

Dr. James R. Houston, CEERD-ZA
COL Richard B. Jenkins, CEERD-ZB
Ms. Joan Pope, CEERD-ZB-A

Coastal & Hydraulics Laboratory (ERDC)

Mr. William R. Curtis, CEERD-HV-T
Dr. Jack E. Davis, CEERD-HV-T
Mr. Mark B. Gravens, CEERD-HF-CT
Ms. Sharon L. Hanks, CEERD-HV-Y
Ms. Linda S. Lillycrop, CEERD-HN-C
Dr. Donald T. Resio, CEERD-HV-B
Dr. Jeffrey P. Waters, CEERD

Cold Regions Research and Engineering Laboratory (ERDC)

Mr. James L. Wuebben, CEERD-RV-ZA

Environmental Laboratory

Dr. Elizabeth C. Fleming, CEERD-EV-ZA
Dr. Alfred F. Cofrancesco, CEERD-EE-A
Dr. David J. Tazik, CEERD-EE

Guest Participants

Mr. Santiago Alfageme, Moffatt and Nichol
New York, NY
Mr. Jeff R. Benoit, SRA International,
Arlington, VA
Ms. Linda K. Lent, Chrysalis Consulting,
LLC, Alexandria, VA
The Honorable Frank Pallone, Jr., Congressman,
6th District, Long Branch, NJ
Mr. Todd Pover, New Jersey Department of
Environmental Protection, Woodbine, NJ
Mr. Anthony P. Pratt, Delaware Department of
Natural Resources and Environmental Control,
Dover, DE
Ms. Patricia Rafferty, National Park Service,
Patchogue, NY
The Honorable Harry Simmons, American
Shore and Beach Preservation Association and
Mayor of Caswell Beach, NC
Mr. Terry Sullivan, The Nature Conservancy,
Providence, RI
Ms. Stephanie Szerlag, U.S. Fish and Wildlife
Service (USFWS), Pleasantville, NJ
Mr. Joseph J. Tanski, New York Sea Grant,
Stony Brook, NY

Dr. Daniel Walker, Office of Science and
Technology Policy, Washington, DC
Mr. Michael Walther, Coastal Technology
Corporation, Vero Beach, FL

Guests

Mr. Fred Anders, New York State
Department of State, Albany, NY
Mr. Michael Bilecki, National Park Service,
Patchogue, NY
Mr. Shawn Brennan, Office of Congressman
Frank Pallone, Jr., Long Branch, NJ
Mr. Mark Cohen, Environmental
Commission, Monmouth Beach, NJ
Mr. G. Patrick Emery, Environmental
Commission, Monmouth Beach, NJ
Ms. Mary Foley, National Park Service,
Boston, MA
The Honorable Susan Howard, Mayor,
Monmouth Beach, NJ
Ms. J. Robin Lepore, National Park Service,
Boston, MA
Mr. Howard Marlowe, Marlowe and
Company, Washington, DC
Mr. Matt Munoz, Office of Congressman
Frank Pallone, Jr., Long Branch, NJ
Mr. Gene Nieminen, USFWS, Pleasantville, NJ
Dr. Susan Roberts, Ocean Studies Board,
Washington, DC
Mr. David Rosenblatt, New Jersey Department
of Environmental Protection, Trenton, NJ
Mr. Greg "Rudi" Rudolph, Carteret County,
Emerald Isle, NC
Ms. Dana Shay, Northwest Research Associates,
Bellevue, WA
Mr. William E. Spearman, Woolpert, Inc.,
Columbia, SC
Mr. John Staples, USFWS, Pleasantville, NJ
Mr. Louis Tocci, Environmental Commission,
Monmouth Beach, NJ
Mr. Rich Torraca, Office of Senator Frank
Lautenberg, Newark, NJ
Dr. S. E. (Ed) Veazey, Seament Shoreline
Systems, Inc., King George, VA

Introduction

The 82nd meeting of the Board on Coastal Engineering Research (hereinafter referred to as the Board) was held in Long Branch, NJ, 11-13 October 2006. It was hosted by the U.S. Army Engineer Division, North Atlantic (NAD), under the direction of BG Todd T. Semonite, Commander, and the U.S. Army Engineer District, New York (NAN), under the direction of COL Aniello Tortora, Commander.

The Beach Erosion Board (BEB), forerunner of the Board, was formed by the U.S. Army Corps of Engineers in 1930 to study beach erosion problems. In 1963, Public Law 88-172 dissolved BEB by establishing the Board as an advisory board to the Corps and designating a new organization, the Coastal Engineering Research Center, now ERDC's Coastal and Hydraulics Laboratory (CHL), as the research arm of the Corps. The Board functions to review programs relating to coastal engineering research and development and to recommend areas for particular emphasis or suggest new topics for study. The Board meets twice a year for the following purposes:

- a.* Disseminate information of general interest to Corps coastal Districts or Divisions.
- b.* Obtain reports on coastal engineering projects in the host (local) District or Division; receive requests for research needs.
- c.* Provide an opportunity for state and private institutions and organizations to report on local coastal research needs, coastal studies, and new coastal engineering techniques.
- d.* Provide a general forum for public inquiry.
- e.* Provide recommendations for coastal engineering research and development.

Presentations during the 82nd meeting dealt with challenges in coastal protection and restoration and, in particular, NAD and NAN project-specific coastal engineering challenges, shore protection project performance, National Planning Center of Expertise for Coastal Storm Damage Reduction, Regional Sediment Management as it applies to NAD, charting the course for ocean science, mitigating erosion along sheltered coasts, and coastal environmental restoration challenges. Documented in these proceedings are summaries and/or abstracts of presentations made at the meeting, discussions following these presentations, and recommendations by the Board. Documentation and verbatim transcripts of the 82nd meeting are on file at ERDC's CHL.

Membership

MILITARY MEMBERS

MG Don T. Riley, President
Director of Civil Works
U.S. Army Corps of Engineers
441 G Street, NW
Washington, DC 20314-1000
Phone (202) 761-0099
Fax (202) 761-8992

Don.T.Riley.MG@hq02.usace.army.mil

BG Gregg F. Martin
Commander
U.S. Army Engineer Division, Northwestern
P.O. Box 2870
Portland, OR 97208-2870
Phone (503) 808-3700
Fax (503) 808-3706

Gregg.F.Martin@nwd01.usace.army.mil

BG Joseph Schroedel
Commander
U.S. Army Engineer Division, South Atlantic
60 Forsyth Street, SW, Room 9M15
Atlanta, GA 30303-8801
Phone (404) 562-5006
Fax (404) 562-5002

Joseph.Schroedel.BG@sad01.usace.army.mil

BG Todd T. Semonite
Commander
U.S. Army Engineer Division, North Atlantic
Fort Hamilton Military Community
301 General Lee Avenue
Brooklyn, NY 11252-6700
Phone (718) 765-7000
Fax (718) 491-9979

Todd.T.Semonite@nad02.usace.army.mil

CIVILIAN MEMBERS

Dr. Joan Oltman-Shay
Northwest Research Associates
14508 NE 20th Street
Bellevue, WA 98009-3713
Phone (425) 644-9660, Ext. 314
Fax (425) 644-8422

joan@nwra.com

Dr. Richard J. Seymour
Scripps Institution of Oceanography
9500 Gilman Drive, Mail Code 0214
La Jolla, CA 92093-0214
Phone (858) 534-2561
Fax (858) 455-5575

rseymour@ucsd.edu

Dr. R. Bruce Taylor
Taylor Engineering, Inc.
9000 Cypress Green Drive, Suite 200
Jacksonville, FL 32256
Phone (904) 731-7040
Fax (904) 731-9847

btaylor@taylorengeering.com

EXECUTIVE SECRETARY

COL Richard B. Jenkins, Exec Sec
Commander
U.S. Army Engineer Research and
Development Center
Waterways Experiment Station
3909 Halls Ferry Road
Vicksburg, MS 39180-6199
Phone (601) 634-2513
Fax (601) 634-2388

Richard.B.Jenkins.COL@erdc.usace.army.mil

Opening Remarks and Welcome

MG Don T. Riley
President
Coastal Engineering Research Board
Washington, DC

BG Todd T. Semonite
Commander
U.S. Army Engineer Division, North Atlantic
Brooklyn, NY

COL Aniello L. Tortora
Commander
U.S. Army Engineer District, New York
New York, NY

After calling the meeting to order, *COL Richard B. Jenkins*, Executive Secretary of the Board on Coastal Engineering Research (hereinafter referred to as the Board), turned the meeting over to MG Don T. Riley. *MG Riley* welcomed attendees and thanked BG Todd T. Semonite, Commander of the North Atlantic Division, and COL Aniello Tortora, Commander of the New York District, for hosting the meeting. He noted that the Board was established by Public Law to advise the Chief of Engineers on the guidance of conduct of research and coastal engineering. He introduced the Board members and pointed out that this is a formal meeting and 30 minutes will be set aside for public comment. He stated the goal of the meeting was to develop a strategy for increasing the performance of Corps shore protection projects.

BG Semonite thanked MG Riley and noted that he was a new member of the Board and looked forward to working with the Board. He discussed the history the area and described the regions of the North Atlantic Division.

COL Tortora stated that while the Board was not able to view the area on the field trip due to the weather, the District was happy to show them presentations of the area's projects that stretch from New Jersey to Cape May Point, plus areas of New York. He highlighted a 21-mile success story from Sandy Hook to Manasquan Inlet that succeeded beyond the expectation of the six year renourishment cycle. They are proud of the recognition received from the American Shore and Beach Preservation that selected Sea Bright to Manasquan Inlet beaches as one of the top 2006 restored beaches in the nation for its successful efforts to restore health, ecology and protective benefits of the coastline, as could be seen in Long Branch.

**Mayor Harry Simmons Presentation to the
Board on Coastal Engineering Research
On behalf of the American Shore and Beach Preservation Association**

*Harry Simmons
Mayor
Caswell Beach, NC*

Thank you, General Riley, for giving me this opportunity to present the views of the American Shore and Beach Preservation Association (ASBPA) to this group. We are especially grateful that you have chosen to hold your semi-annual meeting in concert with our 80th Anniversary Conference here in Long Branch, NJ.

The strength of the Corps is its ability to plan and construct water resource projects. Its civil works program is unlike the mission of any other Federal entity. Other agencies produce studies and make recommendations. The Corps does both of these, but it also builds those projects which meet a variety of national interest tests, including a benefit-cost ratio that is unique among Federal programs.

The budget of the Corps is also unique in that nearly every dollar is earmarked by Congress for specific studies and projects. This is not a political aberration. It is the way the Executive Branch and Congress have decided over the years that they want the program to work.

The Board on Coastal Engineering Research (hereinafter referred to as the Board) has begun a number of initiatives over the years which have been helpful to coastal projects, and shore protection projects in particular. Within the past decade, none has been more important than the Board's regional sediment management initiative. Stripped to its core, this initiative will help the nation conserve, and make wiser use of, scarce supplies of sand.

ASBPA proudly sponsored the Regional Sediment Management (RSM) authority language that is in the Senate-passed version of the Water Resources Development Act now in conference. In the fervent hope that WRDA 2006 is enacted into law, we call upon the Board to task an appropriate group of its members as well as stakeholders to develop specific recommendations for implementation both the RSM study and construction authority that WRDA will provide.

A related challenge facing the Corps is how to make shore protection projects function even more effectively than they do now. Simply put, we have to find a way to reduce wave strength and retain more sand in the nearshore system. This is as true for new shore protection projects as it is for existing ones. No matter how much money is appropriated by Congress for shore protection projects, it is important that the Board initiate an effort to make every dollar go further. We ask that you initiate a one-year study that will make recommendations for the steps that must be taken to evaluate and improve the effectiveness of shore protection projects.

One step that we hope the Board will recommend is that greater emphasis be placed on the so-called Section 227 program that tests alternative shore protection technologies under actual conditions. Once again, ASBPA is proud to have assisted the Senate Environment and Public Works Committee in drafting the language that will make this program both permanent and more flexible and give it the level of authorized funding its needs. The Corps' Coastal and Hydraulics Laboratory at Vicksburg has done a marvelous job with the Section 227 program despite a variety of political and fiscal obstacles. Now, it is time for the Corps to make this program a centerpiece of its shore protection initiatives.

Research, especially applied research, is critical to the future health of coastal America. A year ago, ASBPA spoke before this Board and focused on the dwindling number of university-based coastal engineering programs in this country. From beaches to ports and inlets, we have enormous economic, environmental and recreational assets that are at serious risk in the United States. Well-trained scientists working with elected officials and stakeholder interest groups need to address these risks and develop science-based solutions that can achieve broad community support. ASBPA strongly supports more funding for the Corps coastal research and development efforts. However, we believe that an increased level of funding can only be achieved if the Board recommends that the Corps re-institute its cooperative research relationships with universities.

In the wake of the U.S. Ocean Commission report and the President's Ocean Action Plan, ASBPA continues to urge implementation of the National Coastal Data Bank and the Integrated Ocean Observing System. It is critical that the Corps, as well as the nation's coastal management and engineering communities, have access to a centralized database of information that will foster collaboration, robust research, and efficiency. We encourage the Board to support the continued development of this comprehensive data-sharing framework and other efforts that enhance data collection.

Unfortunately, since 1995, shore protection studies and projects have been a low priority budget item at best and unbudgetable at worst. While the Board cannot challenge the attitude of the Office of Management and Budget (OMB) directly, there are actions that can be taken that will make it harder for OMB to sustain its position. I have already referred to two initiatives that the Board can take that will help: (1) Assure the effective implementation of RSM and (2) Institute a program to develop ways to make shore protection projects work more effectively.

In addition, we ask the Board to implement a program of public awareness of coastal systems and the risks our nation faces of losing critical coastal resources. The users and beneficiaries of these resources, the media, and elected officials need to know about the challenges and solutions to coastal issues. The scientific knowledge of the Corps and its private sector allies needs to be conveyed in an understandable manner to the public.

The antipathy of OMB toward shore protection projects is only one part of its gross lack of support for the Corps' civil works program. Of immediate concern to ASBPA is the negative impact on the morale of Corps personnel that OMB's persistent efforts have had. This in turn has led to the retirement of seasoned personnel to plan shore protection projects and manage the overall shore protection program, particularly at the District level. It also has made it extremely difficult to recruit and hold onto new coastal engineering talent.

The Corps has responded to this by dropping the barriers among districts so that key components of a project located in one District are performed by other Districts. However, for a variety of reasons, many proposed shore protection projects appear to be getting harder to analyze and plan. The Corps has wisely established what we refer to in shorthand as the Shoreline Center of Expertise as one of a few such Centers of Expertise. ASBPA urges this Board to recommend that the Shoreline Center of Expertise have the explicit authority and funding to provide Districts and local sponsors with the human resources they need to develop effective solutions to problems encountered during the study as well as PED phases. We are grateful for the recent directive that BG Riley has issued in support of the Centers for Expertise. It is critical that the Corps make use of its experienced personnel, no matter in what Division or District they may be stationed, to study and formulate a project. In addition, we urge the Board to look beyond the Corps to qualified personnel in other federal and state agencies, as well as in other countries, in developing not only new projects but also new approaches to dealing with coastal resource issues.

It is important that the Board realizes how frustrating it is for local sponsors to deal with the Corps during the feasibility study phase. The Corps study process is both overly long and excessively costly. ASBPA is well aware that many issues of both time and money are not within the control of the Corps. However, the future of the Corps' coastal program requires that the Board look at those aspects of the study process that are within the Corps' control to find ways of significantly reducing the length and cost of feasibility studies.

Regrettably, it is common for communities to come to the Corps seeking help only after coastal erosion has become a serious problem. By that time, local elected officials need to respond in a timely manner to valid community concerns about the impact of that erosion. For a Mayor or County Commissioner to learn that it will be at least six years of study and several more years before sand will be placed is a hard pill to swallow. Drawn-out periods between initiation of a study and construction are already leading some communities to seek solutions that do not involve the Federal government. What concerns ASBPA most about these non-federal alternatives is that some may not be done to the quality standards of the Corps and others may not provide the level of public access associated with Federal projects. In addition, coastal property owners in some areas may resort to seawalls that protect property

at the expense of losing a beach. ASBPA urges the Board to take the initiative to streamline the Corps' feasibility study process.

In the formulation of a shore protection project, it is critical that all benefits and risks be fully incorporated into the study process. Since WRDA '86, the Corps' policies have downgraded the importance of recreational benefits. While some say this is required by either legislation or the Principles and Guidelines, there is no barrier to the Corps presenting the full benefits of increasing recreational opportunities by nourishing a beach.

ASBPA views these recreational benefits as far more than the methodology used by the Corps to determine how much beach users value their experience. We view these as economic development benefits since beach users buy food at or near the beach, use automobiles and airplanes to get to the beach, and stay at hotels and motels. These expenditures create direct Federal tax benefits that are not accounted for in the project formulation process.

While storm damage reduction benefits are the basis for determining the benefit-cost ratio of a proposed shore protection project, here again the analysis comes up short. There are a variety of risks that range from public inconvenience to public safety that the Corps process does not take into account adequately. ASBPA recommends that the Board develop a means to take full account of both benefits and risk-based data.

General Riley, to you and your distinguished colleagues on this Board, the American Shore and Beach Preservation Association pledges to provide the scientific and policy expertise at our disposal to help you implement the action items I have cited.

Thank you again for the privilege of addressing this Board.

Discussion

Dr. Richard J. Seymour commented about reducing the intensity of waves in order to make the project last longer. He thought that before we seriously undertake considering that, which has many environmental and social impacts, to take a realistic look at the actual cost benefits of that. Will that actually save money or is it cheaper to renourish more often? *Mayor Simmons* agreed that the cost benefit has to be considered, but there are other societal impacts that nourishing more frequently or less frequently also impacts.

**NAD and NAN Project-Specific Coastal Engineering Challenges
(Panel)**

Randall A. Wise

Moderator

*U.S. Army Engineer District, Philadelphia
Philadelphia, PA*

Lynn M. Bocamazo

*U.S. Army Engineer District, New York
New York, NY*

Santiago Alfageme

*Moffaff and Nichol
New York, NY*

Monica A. Chasten

*U.S. Army Engineer District, Philadelphia
Philadelphia, PA*

Keith D. Watson

*U.S. Army Engineer District, Philadelphia
Philadelphia, PA*

Anthony P. Pratt

*Delaware Department of Natural Resources and Environmental Control
Dover, DE*

Joseph J. Tanski

*New York Sea Grant
Stony Brook, NY*

Michael Walther

*Coastal Tech
Vero Beach, FL*

Coastal Engineering Technical Challenges of the Fire Island Inlet to Montauk Point (FIMP) Reformulation Study

*Lynn M. Bocamazo
U.S. Army Engineer District, New York
New York, NY*

*Santiago Alfageme
Moffatt and Nichol
New York, NY*

The U.S. Army Engineer District, New York (CENAN) is currently conducting a reformulation study of the storm damage reduction project for the south-eastern shore of Long Island, NY. The study area is comprised of 83 miles of Atlantic Ocean shoreline, including the mainland areas from Montauk Point to Southampton and the barrier island chain from Southampton to Fire Island Inlet. In addition to the ocean shoreline, the study area includes over 200 miles of shoreline within the estuary system of Shinnecock, Moriches and Great South Bays. The New York State Department of Environmental Conservation and Department of State are our Non-Federal partners, and the U.S. Department of Interior, U.S. Fish and Wildlife Service, and National Park Service are cooperating Federal agencies.

Exposure to Atlantic Ocean storms such as hurricanes and nor'easters subjects the study area to higher than normal water levels and wave heights, and strong currents. The study is evaluating these impacts along the Atlantic Ocean shoreline and backbay environment. In order to determine the likelihood and size of a justified Federal project to reduce the magnitude, frequency and risk of storm damages, engineering studies were conducted to provide coastal processes analyses and design input. Numerical modeling of physical coastal processes, in support of these analyses and designs, has been undertaken for the full extent of the study area. Formulating a long-term solution for storm damage reduction will identify alternatives that optimize mainland and barrier island benefits by reducing economic losses while preserving important human and ecological habitats. The CENAN is presently preparing a Formulation Report that will describe various alternative features, including storm damage reduction features and environmental restoration features that can be implemented within the study area, to meet the project objectives.

A significant challenge faced by the Project Delivery Team for the FIMP study was to develop the input required to evaluate storm responses, as necessary for the shoreline lifecycle analysis, economic simulation and environmental impact analysis models. These inputs included bayside stage-frequency curves, barrier island breaching risks, and beach profile morphology response during storms under baseline (i.e., existing) and various future conditions. These data were required by the economic damages

model to develop estimates of inundation, erosion, and wave attack damages to impacted barrier island and mainland structures under randomly generated storms during thousands of lifecycle simulations.

Development of bayside stage-frequency curves was particularly challenging due to the need to account for surge propagating not just through the three existing inlets connecting Great South, Moriches and Shinnecock Bays to the ocean, but over and through the existing barrier islands from Fire Island Inlet to Southampton as a result of overwash and breaching. In addition, barrier island overwashing and breaching also contribute to natural habitat changes. Alteration of the beach by FIMP may change these natural processes and affect the environmental resources in the study area. Therefore, estimates of habitat change under various storm conditions were also required as input to the environmental analyses.

No single model or series of models already working together as one modeling “system” are available today that include a sufficiently detailed representation of all the individual atmospheric, ocean, and coastal processes that govern the bayside storm surge problem. Instead, the adopted strategy was to merge, on an ad hoc basis, available atmospheric, hydrodynamic, wave, and sediment transport models. These models included PBL (for hurricane wind fields), ADCIRC (offshore surge), WISWAVE (offshore waves), HISWA (nearshore waves), SBEACH (initial beach profile overwash) and Delft3D (nearshore and by hydrodynamics and morphological processes). This modeling scheme was developed under the review and guidance of a Technical Review Panel.

A suite of historical storms that had impacted the study area was selected to be modeled and was used to develop stage–frequency curves. This storm set application to the models developed increased water levels, up to approximately events with 200-year return intervals, with the use of the Empirical Simulation Technique. While variations of the timing of the storms related to tide phasing were simulated, the modeling did not include synthetic catastrophic storms for the FIMP study area.

This was the first time that these models, which represent the state-of-the-art available for coastal planning and design purposes, were used in combination. It was also the first time that all the processes represented by these models, including wave-induced setup and barrier island overwash and breaching, were simulated and taken into account to develop backbay storm water level estimates. The complexity associated with combining the various model results, calibrating the model to historical tides, storm water levels and morphological impacts, and capturing in sufficient detail the relative large geographical extent of the project area, presented an extraordinary technical challenge that was successfully completed. However, opportunities remain to improve in areas such as storm climate generation and risk assessment, morphological impacts prior to complete barrier inundation, implementation of all the relevant physics, further development of medium- to long-term simulation capabilities, and interface with lifecycle economic and environmental analysis models. Ongoing research and development efforts such as the

MORPHOS-3D (Modeling of Relevant Physics of Sedimentation in Three Dimensions) Project and Beach-fx Project should address many of these needs when complete.

Discussion

MG Don T. Riley asked how long did the process of developing the model and calibrating the model take? *Mr. Alfageme* said it started in 2002. *MG Riley* asked if the District, the Engineer Research and Development Center (ERDC), and Moffatt and Nichol collaborated. *Ms. Bocamazo* answered yes. *Mr. Alfageme* added that there was an effort headed by Dr. Donald T. Resio of ERDC called MORPHOS-3D. *Ms. Joan Pope* stated that Dr. Resio will make a presentation on MORPHOS-3D at this meeting.

Dr. Bruce Taylor complimented Mr. Alfageme on the work done by Moffatt and Nichol. He thought that the use of an advisory group, such as the one that was constituted by the New York District, is a concept that has great value, and suggested that process could help many projects as they get larger and more complex. He felt that the MORPHOS 3-D is an extremely important research initiative of the Corps and hoped funding would be available to get the technology needed.

Dr. Oltman-Shay asked if there was enough similarity between Moffatt and Nichol area of interest and a heavily studied barrier island in North Carolina to gain from the studies, as they experience more breaching. *Mr. Alfageme* said it was a very similar system with regards to overwash and breaching. It might be a different geographical scale, the bays might be bigger, but it is still similar.

BG Joseph Schroedel asked how we track studies within the Corps, in academia, and the private sector so we do not have too much redundancy and make better use of our money and time and find solutions more rapidly. *Dr. Taylor* answered that with the MORPHOS 3-D initiative, we have leading researchers in this country and from Delft working on the development of this new generation of technology and they are very sensitive to not reinvent the wheel.

Dr. Richard J. Seymour stated that there are a finite number of large scale physics based studies that can be undertaken or that we have sufficient data to validate, particularly Katrina. He stated that the most useful output is the conversion of a physics based model into a much simpler approach that can be run for a much less money and in which do large numbers of runs of alternative solutions, not trying to reconstruct something that has already happened, but look at design alternatives for future projects. He was concerned that the interest in working on high tech models results in them being an end in themselves and that the final step is not taken, which is the grubby work of converting a physics based model into a totally empirical thing that can be run by the average engineer. It never comes about. He used SBEACH as an example. *Mr. Alfageme* noted that coming up with conceptual models that would simplify that is a challenge.

Mr. Joseph Vietri stated that what we have here is basically the result of forty years of history, but we need better and cheaper tools that are more transportable across the entire country.

Renourishment Triggers and Emergency Fill Procedures: Technical and Policy Challenges

Monica A. Chasten

and

Keith D. Watson

U.S. Army Engineer District, Philadelphia

Philadelphia, PA

Introduction

Beach nourishment projects have become a significant investment for the U.S. Army Corps of Engineers (USACE), providing valuable shore protection along many portions of our Nation's coastlines. Lessons learned following the 2004 and 2005 Hurricane Seasons have shown that proper maintenance is critical to a beach-fill project's success during a storm event. However, both technical and policy challenges exist that prevent USACE District's from properly maintaining and renourishing these important Hurricane and Storm Damage Reduction projects. Efforts are needed to better integrate the budget process with functional beach-fill design and adaptive management of renourishment actions. Additionally, clear guidance and more research are required for the use of emergency fill procedures when a beach nourishment project critically erodes in advance of a scheduled renourishment cycle.

Renourishment Triggers

Beach-fill projects typically extend over miles of shoreline and are influenced by a range of littoral and hydrodynamic processes. Although renourishment intervals are pre-determined at the feasibility level for the 50 year project-life, most beach-fill projects experience a varied need for renourishment that may be greater than or less than the designed renourishment interval. Influencing factors between renourishment intervals could include storms, local activities, etc. Additionally, large projects and projects adjacent to tidal inlets will typically include both accretive or stable reaches and one or more highly erosive "hot-spot" areas. This variable fill performance can complicate the decision of exactly when and where to initiate a renourishment operation.

The topic of "renourishment triggers" was discussed at previous Coastal Engineering Research Board meetings and proposed as a research area within the Shore Protection Assessment (SPA) Program's Design and Formulation Improvements Focus Area. However, actions taken to pursue renourishment in relation to the designated cycle remain a challenge to USACE Districts with beach nourishment projects, both from a technical/design standpoint and a project management standpoint. Some factors influencing the initiation/cause of a renourishment action include:

- Defined criteria to measure performance: Is design cross-section in-tact? Has project cross-section eroded back to pre-project condition? What criteria/design modifications are used if beach doesn't really need renourishment in some areas?
- Number, size and treatment of hot-spots or other unexpected phenomena.
- Performance of tapers and amount of end losses.
- Number, type, severity of storms impacting area over season/renourishment cycle.
- Constructability issues.
- Regional Sediment Management actions such as material available from nearby channel or inlet.
- Length of time required to prepare/execute plans & specs, construction contract.
- Type of development and land usage that fill protects (i.e., are critical roads threatened, habitat impacted, etc.).
- Local response (proactive stakeholders, capability of local community, no interest from locals? Degree of involvement in maintenance/between cycle activities?).
- Funding/budgetary process constraints.

One of the largest impediments to performance triggered renourishment is the way that beach nourishment construction is funded. The funding process is often initiated so far in advance of the actual nourishment cycle that changes to the process based on actual project performance are difficult. Changes based on performance may include the need to either accelerate or delay the actual scheduled nourishment.

Emergency Fill Procedures

The frequency, type and severity of storms impacting a beach-fill project over a storm season and over a renourishment cycle can cause a project to require renourishment in advance of the scheduled operation. However, the need to replace fill after a storm or multiple storms can also be one of the most restrictive triggers based on existing policy and guidance. Through the SPA Program, the Jacksonville District documented post-storm experiences and lessons learned following the 2004 Hurricane Season. These efforts led to subsequent discussions on emergency fill guidance and procedures relative to other USACE projects that have either been impacted by a major event or a series of minor events.

Within the Philadelphia District, several beach-fill projects have experienced areas of erosion that have compromised the design template and left portions of each project vulnerable to future storm impacts. The Great Egg Harbor Inlet and Peck Beach (Ocean City, NJ) project was initially constructed in 1992 and is due to receive its fifth renourishment operation this fall. Unfortunately, policy and budget constraints have delayed this renourishment operation for the foreseeable future. Since last year, over a

one mile stretch of the Ocean City, NJ, project has been in a severely eroded condition and a renourishment operation is critical. Not only has the erosion critically impacted the design template, it has started to degrade the non-Federal dune system landward of the project. In some areas, these dunes are the only line of defense protecting the infrastructure behind them. A series of minor storm events over the last winter season greatly contributed to this accelerated erosion and the present condition of the beach. Beach nourishment projects in Atlantic City, Ventnor, Stone Harbor, and Avalon were all due for their scheduled periodic nourishments in FY06 but were not budgeted and did not receive any material. In addition, all of these projects were impacted by the same winter storms as Ocean City, and are similarly experiencing areas of erosion that have compromised the design template. The eroded conditions of these projects should trigger potential emergency nourishment along at least some portions of the project shorelines.

The policies and guidance governing emergency fill operations need to be evaluated in terms of beach nourishment projects. These policies are stated in PL 84-99 and guidance is provided in Engineer Regulation 500-1-1 (Emergency Employment of Army and Other Resources, Civil Emergency Management Procedures). Although comparison between Hurricane and Storm Damage Reduction projects and flood control projects can be difficult, valuable lessons learned can be gathered from the frequent use of this guidance for flood control project purposes.

Technical and policy challenges related to emergency fill procedures include:

- Interpretation of the “extraordinary” storm and the “condition of restoration” as defined in Engineer Regulation 500-1-1.
- Flexibility of the budget and budget process to perform restorations in the face of an “emergency” situation. Emergency conditions may not always be defined as post-storm situations.
- If the design template is eroded under minor or non-storm conditions, there is no mechanism to place sand and restore the template to design specifications. This creates a “hole” in the protection system and renders at least portions of the project vulnerable to future storm attack.
- Based on lessons learned since the events of Hurricane Katrina, the system-wide performance of each project needs to be considered. Can one part of the protection system be allowed to fail?
- Who is responsible for emergency maintenance of beach protection once initial construction is turned over to the locals? The difference between completed separable elements of a project and the continuing construction component of the project (periodic nourishment) can be difficult to distinguish.

- Communication of risk for beach fills needs to be properly evaluated and communicated up the chain of command. If the design project is seriously eroded, how do we document and convey risk to locals?
- Annual inspection of beach-fill projects should be conducted and a deficiency report prepared. This process would formalize the inspection of beach projects similar to those done for levees and other flood control projects. Monitoring is conducted, but funding is limited. Who should fund inspections and report?

The Philadelphia District and other USACE Districts continue to deal with technical and policy challenges related to the proper maintenance and renourishment of beach-fill projects. Continued research (such as investigation of hot spots, tapers, end losses, efficient monitoring tools, etc) and further evaluation of the policies that guide renourishment actions would greatly benefit the Districts and improve the performance of these valuable shore projection projects.

Discussion

MG Riley asked what kind of actions the local sponsors were taking. *Ms. Chasten* answered that in Ocean City they put in the Geo tubes, but we were not in favor of that. Avalon has been pro-active, but can only do things on the funding they have available. *Mr. Watson* added that Avalon did some trucking backfill.

Dr. Seymour suggested that they should consider the use of airborne LIDAR in a simpler system than SHOALS because you are interested in measuring the dry beach and not the offshore contours and could locate hot spots and evaluate the overall health of the project.

Monitoring Challenges

*Anthony P. Pratt
Delaware Department of Natural Resources and Environmental Control
Dover, DE*

Over the past few decades, coastal engineers have worked hard to build predictive tools for beach nourishment performance. These tools have aided in the development of nourishment templates for cross shore dune and berm dimensions that are counted upon to protect important infrastructure during storms for years that span between nourishment cycles. Verifying beach performance following nourishment and the accuracy of the model's prediction of that performance should be a cornerstone of sustainable shore protection however, sadly, it is too often the norm that beach projects are not adequately monitored. Interpretations of performance are commonly empirical in nature with little data available to determine sediment pathways and rates, and the relationship of that movement to the forces at work. Even this traditional concept of monitoring is usually not done in full, but there are other monitoring categories that also never looked into.

The National Research Council's (NRC) Committee on Beach Nourishment and Protection release its final report in 1995. They concluded that beach nourishment project performance should be monitored for three separate components; physical, environmental, and economic. The committee broke down these three topics into specific data that should be collected. They are:

Physical Monitoring

- History of site (geologic setting, erosion rates, past projects, storm impacts, etc.)
- Beach profiles
- Waves
- Currents
- Water levels
- Structures
- Sediment characteristics

Biological Monitoring

- Existing site condition (both on the beach and at the borrow site)
- Existing conditions near the project area
- Temporal and spatial variability
- Rate of recovery of species impacted
- Downtide effects

Economic Monitoring

- Recreational threats and benefits
- Property value threats and benefits
- Project costs
- Unanticipated costs or benefits
- Growth stimulus
- Growth stimulus that puts more properties at risk
- Actual distribution of costs and benefits (who pays, who benefits)

The report goes on to make a series of conclusions and recommendations, many of which are linked to data that would come from the recommended monitoring. For instance, a recommendation made on measures of success states, “Sponsors of beach nourishment programs should quantify and report on four measures of performance of beach nourishment projects. The measures are:

- Dry beach width
- Total sand volume remaining
- Poststorm damage assessments, and
- Residual protection capability.”

Eleven years after the NRC report recommendations were made, how would the report card on monitoring look? Are we monitoring projects around the country for these performance measures? Are we tracking economic and environmental issues? In general, the answer is more likely to be no than yes to these questions. The reason is that there is little support for monitoring budgets. Monitoring is an ‘after the fact’ item that potentially diverts very limited funding away from construction activities. Elected officials earn more praise from constituents for getting projects built than they do from analyzing how the project performs once built. Changing this condition requires mandates from the top that maintenance nourishment must be preceded by data acquisition on project performance, environmental impacts (good and bad), and economic issues. The key to achieving this may be linked to another NRC recommendation that project “cost sharing should be determined on a case by case basis and that cost sharing should more accurately reflect the spread of benefits that stem from a project.” Modifying project design based on actual performance, ground truthing model predictions, and consideration of project cost sharing based on accrued benefits would be the result of project monitoring.

An example of one type of project monitoring that Delaware is conducting on the federal project in Rehoboth Beach is the Nearshore Video Imaging Analysis System. The link to this is: <http://www.coastal.udel.edu/faculty/jpuleo/SANDCAM/sandcam.html>. The purpose of this monitoring project is to extract quantitative information on surf zone wave period and direction, and shoreline and sand bar locations. The information provided by the cameras will be combined with beach profile data to

provide cross shore and long shore sediment transport patterns with specific emphasis on looking at the fate of the Rehoboth beach fill sediment.

Discussion

Dr. Joan Oltman-Shay commented that in Italy the coastal managers use the cameras to count umbrellas and blankets as part of their argument of the economic value.

BG Joseph Schroedel commented that when we look at what can a customer do to help, interagency working group, the differences in what benefits you can consider versus what the Federal government can consider and what the Corps can consider, the fundamental underlying question becomes whose responsibility is it and what is the appropriate role of the Federal Government versus the state government? Mr. Pratt was candid in saying that it goes back to the question of we have a shore management program in the Corps of Engineers which has really been a one size fits all. How do you compare Miami Beach to South Bethany, Delaware? But, the same standards apply to both. As long as you can reach the threshold cost benefit ratio, it opens the flood gate. Recreational tourism in Miami completes with the Delaware projects because Delaware projects provide tremendous natural resource benefits that are not counted in the Miami project.

Sea Level Rise: Implications for Coastal Processes in the New York Area

*Joseph J. Tanski
New York Sea Grant
Stony Brook University
Stony Brook, NY*

Sea level in the New York area has been rising since the end of the last glacial period some 18,000 years ago when the ocean was 300 feet below its present level. More recently, long-term tide gauge records indicate the relative rate of rise over the last 100 years has been on the order of 0.09 to 0.15 inches per year with a good deal of temporal variability. About half the observed rate appears due to geologic subsidence and about half is related to warming of the ocean's waters.

In general, the steep, shingle beaches and high glacial bluffs of the northern Long Island Sound coast are less susceptible to the impacts of long term sea level rise than the south shore of Long Island which is comprised predominantly of barrier islands and barrier beaches fronting low lying glacial outwash headlands. Even on the south shore, observed shoreline behavior is not always correlated well with sea level trends indicating other factors may be more important in shaping the coast.

There is evidence that the south shore barriers have migrated landward over the continental shelf in response to rising sea levels over the last 8000 years but available data also indicate that the central portion of Fire Island has remained in the same position for the last 750 to 1350 years.

Average annualized shoreline change rates based on shorelines dating back to the 1800s are variable with much of the coast eroding at rates of 1-2 feet per year while other areas are stable or accreting. However, these rates are comparable to the magnitude of the uncertainty associated with making the measurements. The highest observed accretion and erosion rates can exceed 5 feet per year and are usually associated with inlets or other manmade structures. As early as the 1970's, McCormick (1973) determined long term sea level rise does not appear to play a significant role in controlling erosion compared to loss of sand from the littoral system associated with inlets. As part of the sediment budget study for the south shore, Research Planning Institute, Inc. (1985) used a variation of the Bruun rule to calculate beach volume losses attributable to the measured rise in sea level between 1955 and 1979 and found they were significantly smaller than the actual measured net volume changes. It should be noted the Bruun rule, which is used to estimate shoreline response to sea level rise, may not be applicable in this area (Wolff 1982) due to the rate of longshore transport of sediment in the area and evidence that suggests offshore sources contribute sand to the nearshore sediment budget (McCormick and Toscano 1980; Research Planning Institute, Inc. 1985; Niedoroda et al. 1985; and Williams and Meisburger 1987). If

this is the case, even the relatively small volume losses attributable to sea level in the sediment budget study may be overestimates.

Available data indicate that the percentage of the total erosion occurring along the south shore attributable to sea level rise alone is of secondary importance in comparison to other factors, such as storms, sediment supply and human activities, especially when considered in the context of the planning time frame of 30 to 50 years.

A number of studies indicate that global warming could result in an accelerated rate of sea level rise in the future, although the timing and magnitude of future sea level rise are uncertain. According to most projections, the increase in the rate of sea level rise, if it occurs, will not occur in a linear fashion. Rather, the change will start slowly and increase more rapidly in the distant future. Based on the projections calculated from four scenarios using 2 climate change models done as part of the U.S. Global Change Research Program Metropolitan East Coast (MEC) regional assessment (Rosenzweig and Solecki 2001), accelerated sea level rise could increase present water levels above 2000 elevations in the New York area by 2.2 to 6.6 inches by the 2020s (compared to 1.2 to 3.0 inches if present trends continue), 6.1 to 18.6 inches by the 2050s (compared to 4.3 to 7.5 inches if present trends continue) and 12.1 to 37.4 inches by the 2080s (compared to 7.9 to 12.1 inches if present trends continue). The rate of sea level rise increases more rapidly beyond 2050, but the projections, already subject to a great deal of uncertainty, become less reliable as they are extended further into the future.

In terms of coastal processes, accelerated sea level rise is often cited as a concern because of its potential impacts on coastal erosion, inundation and flooding frequency and magnitude in low lying areas, and the maintenance and health of wetlands. Estimates of future shoreline erosion rates using the Bruun rule show rates doubling by 2020 and increasing 3 to 6 times by 2050 (Rosenzweig and Solecki 2001). However, these may be overestimates because of the previously discussed problems with applying the Bruun rule in this area. In addition, the higher estimates are based on relatively high sea level projections. Using available historical shoreline and sea level data, a panel of coastal experts working on a hazard management plan for the south shore of Long Island (Long Island Regional Planning Board 1989) found that a doubling or tripling of the rate of sea level rise over a similar time period would probably have a relatively small impact on the observed rate of erosion compared to the magnitude of shoreline changes caused by storms and disruptions in the nearshore sediment transport systems resulting from man's activities. However, increasing sea level will contribute to shoreline recession and will continue to make the coast more vulnerable to erosion.

From a planning perspective, submergence and increased flooding of low lying areas around the south shore bays due to possible increases in sea level rise is probably a more critical problem than oceanfront erosion. Flooding is already a major problem because of the low elevations and the level of

development in these areas. Based on a simple inundation model, the increase in the elevation of 100 year storm tides could increase by about 6 percent along Long Island Sound (11.4 to 12.1 feet NGVD), 8 percent in New York City (9.7 to 10.5 feet), 9 percent at Montauk Point (7.7 to 8.4 feet) and 11 percent in the south shore bays (6.9 to 7.7 feet) by 2050. Higher storm tide elevations would be expected to lead to increased flood related damages and exacerbate problems with emergency response and management especially on the bay shorelines.

Sea level rise has been identified as a possible causative factor in the loss of some wetland islands in the area (Rosenzweig and Solecki 2001). Presumably, this loss is due to marsh accretion rates not being able to keep up with sea level. However, a more recent study (Kolker *et al.* in prep) found that accretion rates in these wetlands equaled or exceeded the rates of sea level rise, suggesting other factors may be more important in driving observed marsh loss. Accelerated sea level rise would pose an increased risk to the marshes but it would be difficult to quantify the relative impact based on our present knowledge of these systems. Upland barriers to marsh migration, such as hard structures or steep slopes, would also result in the loss of fringing wetlands, even in those cases where accretion and sea level are in balance. Due to the heavily developed nature of most of the New York shoreline, areas where unimpeded landward retreat would be possible would be severely limited.

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Discussion

Mr. Ed Veazey commented that there was concern that as the seas rise some of the methane and the hydrate in the bottom of the ocean might be released and start coming up as a greenhouse gas, which could exacerbate the CO₂ in the air and cause a runaway increase in temperature and melting of the glacial ice cap. He asked *Mr. Tanski* if he had any data on that. *Mr. Tanski* could not comment as he was not a geochemist, but he would put him in touch with someone. *Dr. Richard Seymour* commented that the stability of the clath rates increases with pressure, so increasing the depth of the ocean makes it less likely to happen, not more likely to happen.

Surfing Resources and Corps Shore Protection/Navigation Projects

*Michael Walther, M.S. P.E.
Coastal Tech
Vero Beach, FL*

According to Webster's dictionary, surfing is the "sport of riding in toward shore on the crest of a wave." Throughout the United States, the number of people who surf is growing. In August 2001, *USA Today* reported that there were about 1.8 million active surfers in the United States and that 400,000 surfboards were sold in the United States in 2000. Sporting Goods Manufacturers Association says that surfing has increased 90 per cent since 2000. Many businesses benefit from or rely upon tourism associated with surfing including surf shops, restaurants, shopping, and hotels. There is economic incentive for the government to maintain good quality waves. In the context of cultural resources, surfing resources are an important cultural resource. For many surfers, surfing is an important and defining element of their lives. It is increasingly common that the passion of surfers for surfing resources is realized when these resources are perceived to be threatened by Corps shore protection and navigation projects.

Surfing resources include natural and man-made features that create desirable breaking wave conditions for surfing. These conditions are usually associated with waves breaking along an irregular shoreline or bottom - resulting in peeling waves, which can be ridden along the moving point-of-breaking or the curl. Natural emergent and submerged headlands commonly create such conditions. In addition, groins and jetties can also create such conditions. Desirable surfing conditions require just the right combination of bottom shape, shoreline planform, weather, swell direction, wave height and wave period. Any modification of these conditions can result in undesirable conditions.

The primary means by which surfing resources are adversely affected by Corps projects include:

- Wave loss via physical destruction of waves or bottom conditions.
- Straightening of the shoreline and bottom via beach fill.
- Increased steepness of the beach profile – sometimes resulting in wave reflection from the beach face.
- Increased turbidity via elevated fines and/or pollutants in fill material.
- Decreased water quality via pollutants in fill material.
- Loss of access to beach.

Corps projects with adverse impacts upon surfing resources include Monmouth County in New Jersey. Example Corps projects with potential adverse impacts upon surfing resources that will be discussed include:

- *Ponce Inlet South Jetty Extension* – Daytona Beach, FL.
- *Long Beach Island Storm Damage Reduction Project* – Long Beach, NY.
- *Ma'alaea Harbor Improvements* – Hawaii

The challenges before the Corps to provide for preservation and avoidance of existing surfing resources include:

- Identification of existing surfing resources.
- Communication with stakeholders to engage them in the planning process.
- Formulation of alternatives to avoid and minimize impacts.
- Mitigation of unavoidable impacts.
- Monitoring of projects and subsequent design modifications – if unforeseen impacts occur.

Planning and design recommendations to meet the above challenges will be presented.

Discussion

MG Riley asked if *Mr. Walther* if he had found any projects in the design of a beach renourishment, where we could have gone ahead, as well as in addition to the beach renourishment, placing groins out to accommodate surfers? *Mr. Walther* answered that in general groins have the effect of creating salience that created an irregular shoreline that would be conducive to surfing, but the structures have to be cost justified. Groins are very expensive and are difficult to justify.

Dr. Oltman-Shay commented that other countries are exploring methods of beach protection that also provide surfing, such as submerged breakwaters. She asked what his community thinks about submerged breakwaters. *Mr. Walther* stated that the surfing community embraces the concept over a simple beach fill project.

**Shore Protection Project Performance
(Panel)**

William R. Curtis
Moderator
Coastal and Hydraulics Laboratory
U.S. Army Engineer Research and Development Center
Vicksburg, MS

Brian K. Harper
Institute for Water Resources
U.S. Army Corps of Engineers
Ft. Belvoir, VA

Stephen Couch
U.S. Army Engineer District, New York
New York, NY

Dr. Donald T. Resio
Coastal and Hydraulics Laboratory
U.S. Army Engineer Research and Development Center
Vicksburg, MS

Susan E. Durden
Institute for Water Resources
U.S. Army Corps of Engineers
Ft. Belvoir, VA

Shore Protection Project Performance Panel

William R. Curtis
Coastal and Hydraulics Laboratory
U.S. Army Engineer Research and Development Center
Vicksburg, MS

In 2004, Congress directed USACE to evaluate how Federal Shore Protection Projects performed following Hurricane's Charley, Frances, Ivan and Jeanne. All storms affected the state of Florida, causing wind, wave, inundation and erosion damage. The fact that these storms made landfall in a short time frame in the same geographic area provides an unprecedented opportunity to assess the performance of the Federal shore protection program within the region. A multidisciplinary and multi-agency team of engineers, scientists and economists are collaborating on the effort known as *Shore Protection Assessment* (SPA). Outcomes of the SPA will be applied by the USACE Flood and Coastal Storm Damage Reduction Program and by coastal engineering and management practitioners to better plan, design, construct and maintain shore protection projects to reduce storm damage to valuable coastal resources and assets.

The overall SPA effort includes four primary components that are executed in coordination and collaboration with representatives of the Coastal Engineering Research Board, the Planning Center of Expertise for Hurricane and Storm Damage Prevention, and the National Shoreline Management Study. The first component is a comprehensive quantification of damages prevented to structures and infrastructure by the shore protection project located at Martin County, FL. The study area is the location of coincident hurricane landfalls within a three week period. The study team is identifying the benefits associated with economic, environmental and social effects to determine how the project affected the national and regional economies, the ecosystem and the community since project construction was completed in 1996. In addition to assessment of shore protection project performance, the affects of the hurricanes on water resource management of the coastal flood plain are evaluated.

The second component of SPA is examining the actions and responses of all aspects of the project over the lifecycle to determine how to most effectively improve existing and future shore protection projects. Based on results of the performance assessment in Martin County, FL as well as an assessment of the Corps' national shore protection practices, recommendations will be made to improve project planning, design, construction and lifecycle maintenance to ensure that a project provides full protection over its authorized life. This design and formulation improvement focus is conducted in collaboration with other ongoing national efforts including development of the Coastal Storm Damage Reduction

Economic Model (Beach-fx), National Shoreline Management Study, and Regional Sediment Management Demonstration Program.

Acting on prior recommendation by the Coastal Engineering Research Board, the third component of SPA is initiating development of an operational and validated physics-based hydrodynamic-sediment transport model called MORPHOS 3-D (MOdeling Relevant PHysics of Sedimentation in 3-D). MORPHOS 3-D will serve as the foundation for improved Corps predictive and assessment capability for shoreline response to hurricanes. Ultimately, the integrated framework of models model will provide improved capability for project planning and design of coastal storm damage reduction projects and other applications. To accomplish this objective, the Corps is leveraging with Office of Naval Research, U.S. Geological Survey, Federal Emergency Management Administration and National Oceanic and Atmospheric Administration and national and international academic communities.

The fourth component of SPA is the development of a pilot coastal databank. The integrated network of coastal data, information and analysis tools centralizes access through an Internet portal providing links to coastal data residing on multiple servers inside and outside the Corps. The framework promotes data sharing, while allowing data custodians to retain local ownership and control of data quality. The prototype is now being tested. Once fully implemented, the relational databank will improve the efficiency of coastal related studies, corporately.

During the panel presentations, the status of selected ongoing activities within SPA will be discussed as well as opportunities for providing improved service by the Corps and its partners to stakeholders in coastal storm damage reduction.

Contact Information

Program Manager: Mr. William Curtis (CHL), William.R.Curtis@usace.army.mil
Performance Assessment: Ms. Sharon Haggitt (CESAW), Sharon.F.Haggitt@usace.army.mil
Formulation and Design: Mr. Stephen Couch (CENAN), Stephen.Couch@usace.army.mil
MORPHOS Development: Dr. Donald Resio (CHL), Donald.T.Resio@usace.army.mil

There was no discussion following this presentation.

Economic Performance of Federal Shore Protection Project, Martin County, FL

*Brian K. Harper
Institute for Water Resources
U.S. Army Corps of Engineers
Alexandria, VA*

and

*Linda K. Lent
Chrysalis Consulting, LLC
Alexandria, VA*

Hurricane Frances, a category 2 storm, made landfall in the Martin County, Florida, vicinity on 5 September 2004, and was followed by Jeanne, category 3, on 25 September. The economic work unit of the Shore Protection Assessment study team is studying the performance of the Federal beach nourishment project in Martin County, Florida during these events to evaluate the impacts the project had on damages in the area.

This presentation will be a first-look at preliminary results of the project assessment and will recap the process used to develop these results. The assessment is being conducted in the standard with- and without-project framework. Damages were first calculated under without project conditions then compared to damage calculations under with-project conditions. The key to this methodology is the identification of the without-project, pre-hurricane shoreline position for the project area. This was done by hindcasting from the date of the hurricanes back to the date of pre-construction beach profile surveys to account for storms during that time period. Using S-Beach, the pre-project shoreline is modeled to identify the without project pre-storm shoreline position. The shoreline condition was also influenced by the application of self-protection decisions by non-Federal stakeholders. With the predicted without project condition in place, S-Beach was then run for the 2004 hurricanes to estimate the without Federal project post-storm shoreline conditions. The Beachfx model was used to bring together the shoreline conditions and the economic data for the study area. Using a regional structure inventory and damage relationship curves, the Beachfx model calculated damage estimates under without-project and with-project conditions.

Discussion

MG Riley stated that one of the important things in their next step is the measurement of economic and other social effects. He asked how the effort was being funded. Mr. Curtis answered that Hurricane Act of 2004, which is an \$11 million effort, which is part of the \$62.4 million appropriated under the CG Program. *MG Riley* asked how much they would get accomplished in the next year with the remaining funds? Mr. Harper answered that their goal was to get it all accomplished. The damage function is the one area that they do not have sufficient funding to accomplish. They will get through the road damage, peer review, and reporting.

Dr. Seymour asked how they establish the recovery? SBEACH does not predict recovery, it only predicts erosion, so what was the basis for putting sand back on the beach after these erosive events? *Mr. Mark Gravens* stated that we are treating beach recovery or post storm recovery in an ad hoc manner, but through calibration, we cause the model to return this long-term shoreline change rate. *Dr. Seymour* suggested that the Peer Review Panel look at this carefully. As a follow-up, *Dr. Bruce Taylor* asked if there were not profile data available from the state or country that could be used to address the problem that *Dr. Seymour* raised? *Mr. Gravens* answered that there are data that give us an indication of recovery, but it is a matter of having a coastal processes modeling tool that has some predictive capability in that realm.

Shore Protection Project Assessment

Shore Protection Project Design and Formulation Improvement

Stephen Couch
U.S. Army Engineer District, New York
New York, NY

The Shore Protection Assessment (SPA) is an effort being undertaken in response to the tropical storm season of 2004 to accomplish three objectives: 1) identify the impact of the 2004 tropical season on the physical performance of beach nourishment projects with an emphasis on damages prevented, 2) identify and recommend beach nourishment formulation and design improvements that could be incorporated into the planning process, and 3) develop a three-dimensional, physics-based model to improve the Corps' capacity for shore protection planning, design and evaluation. Within the SPA Program, three Focus Areas have been established to accomplish these objectives. This presentation is intended as an overview of the Formulation and Design Improvements Focus Area. This presentation focuses on a summary of the efforts underway, and additional, high priority efforts which have been identified, but not undertaken, due to limitations within the study.

Presently, the formulation and design practices for Coastal Storm Damage Reduction (CSDR) Projects vary dramatically by District and region. Some of this variability is inevitable due to different physical, economic, social and environmental conditions, which vary by region, and influence the procedures undertaken. The variability in the formulation and design approach, however, is also likely due to the evolution of regional practices in designing, formulating, constructing, and maintaining CSDR projects.

In 1995, the National Research Council in their report on Beach Nourishment and Protection identified this variability as a "situation [which] results in uneven effectiveness in project design and contributes to less than optimum solutions," and recommended the Corps to "develop and implement a consistent methodology for beach nourishment design, while retaining sufficient flexibility to accommodate regional variations." Today, the need for consistent methods is even more important with the emphasis on Regionalization, Regional and National Business Centers, and the increasing awareness on employing risk-based concepts and updated guidance and policy, as highlighted in the Commanders recent "12 Actions for Change."

In order to scope out efforts to be undertaken by this focus area, a team of planners and engineers was assembled to identify efforts that should be focused on for formulation and design improvements. The effort resulting from this scoping did not include efforts associated with economic studies, or environmental improvements, because these efforts were already being undertaken within SPA as a subset

of project performance. After scoping the necessary efforts, tasks were clustered into 5 categories, which became Work Units within the Focus area, and include three main technical work units, and two additional, procedural units, as shown below.

Technical Work Units:

1. Improvements in the Design of Shore Protection Project Features.
2. Improvements in the Life-Cycle Analysis of Shore Protection Projects.
3. Improvements in Shore Protection Project Implementation, Monitoring and Renourishment.

Procedural Work Units:

4. Improvements in the Design and Formulation Process.
5. Improvements in the Guidance and Regulations governing design and formulation.

As originally scoped, this Focus Area was intended to provide a number of products. These included: 1) A systematic review of the existing, current formulation and design procedures, and recommended changes to these procedures, 2) Risk-based beach-fill design guidelines, 3) Beach-Fx, Operational Guidelines (guidelines for Risk-Based Evaluation), 4) Guidelines for Project Implementation, Monitoring and Maintenance, and 5) Recommendations for incorporation of changes in Corps Guidance and Regulations.

Undertaking an effort of this scope was above and beyond the effort that could be accomplished in the context of the SPA Program, in terms of total funding and study duration. Therefore, the overall scope of study was scaled back to identify the most critical elements for design and formulation, which could serve as the stepping stones for accomplishing these objectives in the long-term. This approach, however, leaves a number of these critical questions unanswered.

The efforts being undertaken within the SPA Program are currently underway and scheduled to be completed in the coming FY. The presentation will provide a specific overview of the work being undertaken, the findings to date, as well as the additional efforts scoped to date, as necessary to meet the objectives of having a unified, risk-based approach for design and formulation of Coastal Storm Damage Reduction Projects.

Discussion

Dr. Taylor commented that Mr. Couch's program in the SPA is one of the most important that we have. When we talk about risk based design and procedures, it is important to clarify what we are talking about. One troubling thing in present practice is that when the engineers design a beach project, they go through all their analysis and use whatever tools are available, but the way it is presented or perceived by the public is a deterministic solution. We say we renourish this project every seven years, and we publish

this, but in reality we are dealing with a highly variable environment and we don't really know when we have to renourish. *Dr. Taylor* thinks it is incumbent to examine the process, whether or not we are able to develop parametric models that are applicable nationwide. It may be difficult, but what is achievable is a sensible process by which the designer goes through so that we can have a project which has a defined spectrum of performance based on variability and climatology that we can present as part of the design to the local sponsors, the public, and to ourselves. That type of guidance would be extremely beneficial to the districts, practitioners, and the public.

Dr. Seymour added that one of the mechanisms they might consider for being able to effectively convey this information to their customers is to use the same technique that scientists have used for a long time, which is every time you applied a curve you show the error bars on it. This would be a much quicker and helpful way to convey the real risks and uncertainties associated with the model.

Dr. Oltman-Shay stated that many here are great proponents of a Corps wide set of procedures and tools and is trying to get a sense of how these tools can be efficiently and effectively distributed around to the different districts. How much time, effort and money will it take to translate the Florida version of Beach-fx to a district? How transportable is this to the other districts? *Mr. Gravens* stated that Beach-fx is transportable, as the Norfolk District is planning to apply it to a project in the mouth of the Chesapeake Bay. Beach-fx is essentially a framework for doing this Monte Carlo lifecycle modeling and throughout the Atlantic and the Gulf, the coastal process models are consistent as they typically involve the application of SBEACH and Genesis type models. Beach-fx is framed such that it relies on data bases of responses, and, so when new technology or alternative technology can provide these responses, then Beach-fx does not have to be modified. Those data bases are populated with the newer or alternative technology. We are not necessarily tied to SBEACH and Genesis, although that is the framework that we are doing now, but it is flexible in that you can populate that database with whatever coastal process models you like. There is much interest in this, and in terms of planning for a five year renourishment cycle, the Beach-fx will allow us to say that there is a 30 percent chance that we will have to renourish within three years. *Mr. Curtis* said that the SPA is augmenting the development of the Beach-fx model through the Beach-fx work unit, it will continue as well as support the tech transfer process and infuse Beach-fx technology within our Corps districts and will use the Planning Center of Expertise to support that tech transfer process. *MG Riley* asked if there was a requirement besides the training requirement, such as hardware and software, that we can direct it to be standard use across the Corps. *Mr. Gravens* stated that we have found that one of the most difficult issues with Beach-fx is managing development of the database. We are working on a closer integration with the GIS environments.

Modeling of Relevant Physics of Sedimentation in 3D (MORPHOS 3D)

*Dr. Donald T. Resio
Senior Scientist
Coastal and Hydraulics Laboratory
U.S. Army Engineer Research and Development Center
Vicksburg, MS*

Environmental risks along U.S. coasts has risen remarkably over past decades in response to the increasing development in coastal areas (increased consequences) and increased coastal vulnerability due to more active hurricanes combined with relative sea level rise (increase hazards). This is not just a problem along sandy beaches to be dealt with via beach fills and beach maintenance but is a problem that affects many critical urban areas and related infrastructure within the United States.

Major catastrophes are often difficult to address because they transcend past experience. In these situations, empirically based models frequently fail since the processes move into a range beyond the conditions for which they have been tuned. Thus, the need for reliable, physics-based models for predicting winds, waves, currents, water levels, and the coastal response during extreme storms has emerged as a critical need that must be met in order to fulfill important Corps' mission needs.

MORPHOS 3D was initiated with a focus on modeling nearshore beach response during hurricanes and other large storms. However, it became clear after just a short while that accurate, physics-based models of storm characteristics, winds, waves, currents, and water levels within storms were of equal if not more importance on their own than just for their role in predicting beach change. For this reason, MORPHOS has evolved into a systems approach for solving general problems related to coastal risk; and over the last year the MORPHOS research and development team was a primary contributor to the Interagency Performance Evaluation Taskforce (IPET) forensic study of Hurricane Katrina.

The MORPHOS team has adopted a spiral development approach, beginning with laying a strong foundation based on open-source community modeling efforts, and including significant incremental advances through time. Significant contributions to date include:

1. Formulation of the modeling technology used in the IPET study.
2. Formulation of a unified Corps-Federal Emergency Management Agency (FEMA)-National Oceanic and Atmospheric Administration (NOAA) methodology for estimating water level probabilities due to hurricanes.
3. Improved understanding of the role of climatic variability in hurricane surges.
4. Improved quantification of the role of waves in coastal surges.
5. Improved methods for coupling complex models to simplified systems.

6. Improved methods for estimating waves in coastal areas.

7. Initiation of working partnerships with NOAA, Office of Naval Research, U.S. Geological Survey and FEMA.

MORPHOS has been recognized as a critical Corps need in past Coastal Engineering Research Board meetings as pointed out by MG Don T. Riley at the recent International Conference on Coastal Engineering. It could be a cornerstone of LTG Carl A. Strock's vision for change within the Corps; however, funding for this effort is still a work in progress, with no firm commitments at this time.

Discussion

Dr. Seymour asked what the plan and the outlook for taking all this marvelous knowledge we have of how the water moves around and converting it to some useful predictors for how the beach moves around. Dr. Resio said that they have been working on it with the Dutch

Communication, the Corps and the Coast

*Susan E. Durden
Institute for Water Resources
U.S. Army Corps of Engineers
Alexandria, VA*

Communication is a tool which is an integral part of project analysis and decision making. It requires talent, inclination and skills. When performed well, it can strengthen program effectiveness, improve the collective impact of related programs, maximize the use of internal and external resources, and clearly demonstrate service to the nation. Communication is a tool which is underutilized in many Federal agencies, particularly those with a strong base in technical fields such as science and engineering. This presentation will cover four topics:

- a. *Communication—the real bottom line, principles and examples.* The role of communication in project teams will be illustrated with real field examples. Effective communications can produce cost savings, better project design and operations as well as promoting valuable long term relationships. With multiple sources of information, we must focus on translating science for the public and decision makers so that it is meaningful and relevant to their lives.
- b. *Risk Communication—how to be successful, measuring success, recognizing limits, i.e., the human dimension.* One of the most successful instances of risk communication occurred during the Black Plague in Europe. The basic principles which made this a success will be related to the current challenges faced in flood control and storm damage reduction. A technique used at meetings with the public in Nashville District to convey probabilities and relate them to flood prone areas will be demonstrated.
- c. *Shore Protection Assessment (SPA) Communication—what has been done, principles in action, importance versus urgency, building for the future.* The human tragedy of Hurricane Katrina has made the 2004 hurricane season a pale memory to most. The 2004 season has many lessons with long term implications for our nation. The SPA team is working to explain and inform those who will benefit from this information.
- d. *Research and Development—needs and opportunities, seamless models for analysis and communication.* Communication is interwoven with analysis and decision making. Tools with outputs which explicitly incorporate and display uncertainties and strive for the most robust solution over a range of uncertainties allow more robust communication with the public also. The total integration of physical and social characteristics in project evaluation highlights regional variations which teams must understand and consider.

The Corps' role on the coast is captured by the phrase, *Many Challenges, One Goal*. The SPA effort is a challenge and will make a positive contribution to achieving our goal.

Discussion

Dr. Oltman-Shay stated that she was excited about Ms. Durden's presentation as it is a much needed asset for the Corps. She hopes the team is large, and she gets as many resources as needed, as this has far reaching positive consequences.

**National Planning Center of Expertise for
Coastal Storm Damage Reduction
(PCX-CSDR)**

*Joseph R. Vietri
National Planning Center of Expertise for Coastal Storm Damage Reduction
U.S. Army Engineer Division, North Atlantic
Brooklyn, NY*

*J. Bailey Smith
U.S. Army Engineer District, Philadelphia
Philadelphia, PA*

The National Planning Center of Expertise for Coastal Storm Damage Reduction (PCX-CSDR) serves as a planning and engineering services support center to support coastal storm damage reduction, regional sediment management, and affiliated ecosystem restoration water resources at both the national and international levels. Since its formation in August 2003, the PCX has offered expertise and made significant progress in its Training and Independent Technical Review (ITR) Mission Areas. The organizational structure of the PCX and these accomplishments will be summarized as a background. Particular emphasis will be placed on the Post-Katrina coastal protection and restoration project ITR and EPR for Louisiana and Mississippi.

Previous PCX efforts including Hurricane Katrina will be analyzed towards highlighting challenges and developing an applied growth plan for the PCX as an organization as well for individual Mission Areas for feedback from the CERB. The presentation of these challenges and growth plan will be made with attention to the goal (and associated objectives and outcomes) of this CERB meeting which is ‘to develop a strategy for increasing performance of the Corps Shore Protection Projects’.

Discussion

MG Riley made a clarification on one of the slides. He noted that the green areas are sediment diversions and that is all about regional sediment management.

North Atlantic Division Regional Sediment Management Initiative

*Lawrence J. Cocchieri
Program Management Directorate
U.S. Army Engineer Division, North Atlantic
Brooklyn, NY*

and

*Dr. Jeffrey P. Waters
Coastal and Hydraulics Laboratory
U.S. Army Engineer Research and Development Center
Vicksburg, MS*

Regional sediment management fits our sediment management actions into the context of a regional plan that takes into consideration the natural dynamics of the sediment transport system. Sediment management actions are activities that affect the erosion, removal, transport, and deposition of sediment and commonly include dredging and placement; building structures that divert or trap sediment; and creating erosion protection for banks, shorelines, seabeds, and channel bottoms. In 2000, the Corps initiated the National Regional Sediment Management (RSM) Demonstration Program. The RSM Demonstration Program is intended to examine, apply and evaluate RSM opportunities, practices, tools, benefits and impediments to implementing the RSM approach. Initially, six Corps District offices were tasked with implementing regional sediment management concepts as part of their District projects. Today, sixteen District and five Division offices are involved in the RSM Demonstration Program efforts and undertaking projects that include: regional sediment budget development and Geographic Information System-based data management; development of sediment management decision support tools; the evaluation of National Economic Development and National Ecosystem Restoration benefits attributable to RSM implementation; and the development of regional sediment management plans for riverine and coastal systems.

The North Atlantic Division (NAD) established its Regional Sediment Management (RSM) Initiative on September 19, 2003. Our objective is to utilize RSM principles to further enhance our watershed planning. To achieve this overarching objective, strategic, operational and tactical goals were instituted for the NAD region. The strategic goal promotes a systems approach for watershed planning, which considers sediment as a resource. The operational goal seeks to improve execution of RSM-related projects by establishing RSM project delivery teams at the district level and a program management team at NAD. The tactical goal is to develop a regional Enterprise Geographic Information System (eGIS) and an RSM website to enhance the population and exchange of sediment data and information. All three goals require the engagement of regional stakeholders, agencies and interest groups. Today, the NAD

RSM Initiative continues to develop as evidenced by our Civil Works Program and associated regional relationships, the Engineering, Research and Development Center (ERDC) RSM Demonstration Program and the progress of eGIS implementation.

There was no discussion following this presentation.

Remarks from Congressman Frank Pallone

*Congressman Frank Pallone
U.S. House of Representatives
New Jersey Sixth Congressional District
Long Branch, NJ*

Thank you. I want to thank Doug Leite and all the others from the Army Corps for inviting me here to speak today. I cannot overemphasize the significance of the Corps, and of the issues you deal with, whether it is beach replenishment, flood control, wetlands, and of course, you even mentioned the issue with regards to ocean disposal. These are all issues that I have been involved with my entire career, and they continue to be very important to me and to the residents of my district and of New Jersey.

To show you the significance of it all, I am going to talk a little bit about my background. I was first elected to the House of Representatives in 1988, and at that time we had maybe a dozen different ocean dumping sites off the coast of New Jersey, everything from sewage sludge to garbage. Even before that, we had acid dump sites and nuclear waste sites.

When I ran in 1988, the only thing that people cared about was the ocean because not only was my district totally along the coast, but we had all the beaches closed in New Jersey. We had garbage slicks and sewage sludge and the beaches were closed. It cost the state of New Jersey billions of dollars in revenue because tourism is the second largest industry in New Jersey and will probably become the first some time in the near future. So, I was elected to Congress because I was perceived as the person who was going to come down and put an end to ocean dumping. We have closed all those sites, but very quickly, I also realized that the other major issue that was important was beach replenishment. My colleagues kid me because I deal with a lot of other issues now such as health care, telecommunications, and others, but people still identify me as the guy who deals with beach replenishment.

Just to point out how true that is, it was just a couple weeks ago, I was campaigning, because, as you know the election is on November 7th, and I met a Republican right here in Monmouth County who I was trying to convince to vote for me, and he said, "Oh, don't worry Congressman, I don't agree with you on anything, but you're the guy that brings the sand, so I'll vote for you, again." You really get that. This is a strange year because it looks like it's going to be a Democratic year. People are more likely to vote Democrat than Republican, but in past years, particularly in this district, it's also been the opposite, the people are more likely to vote Republican, and so as a Democrat, we can say that they're going to bring sand, that's good enough. I'll elect you for that alone, and I get that all the time. In fact, one of my colleagues, Don Paine, who represents Newark, and his district is almost totally an urban district up in the northern part of the state, always kids me. He says, "Well, Pallone, all he does is go on the beach and say, well I'm going bring the sand or there is a crab that's hurt and needs to be fixed, I'm going to take him to

the hospital. That's how he gets elected because he identifies with the sand and with fishing and that's all he does to get elected." So, I just want to tell you that it is a very important part of what I do and what we do here.

The other thing you should know is this hotel probably wouldn't be here if it wasn't for beach replenishment and a lot of the Corps' activities. When I was on the City Council in Long Branch, this whole area that you look at was very much threatened. The bulkhead that you see out there almost disappeared, the Boardwalk, which is now the promenade, was totally destroyed by hurricanes and Northeasterns back in the 1980s. It is only through the efforts of the Corps, in both providing the sand and the bulkheading and everything that's goes along with it, that we have been able to have any kind of redevelopment. This hotel was really in the middle of just vacant land that wasn't being used, so you're actually witnessing today, sitting here, in this revitalized area, not only the hotel, but the other areas around it, the consequences of the Corps and your activities. So I can't drive the point home more than by telling you that.

For our state, we actually have the largest beach replenishment project in the United States from Sandy Hook down to Barnegat Inlet. It was actually authorized by my predecessor, Jim Howard, who was the Congressman for twenty-four years before me. But when I was elected, we still hadn't actually placed the sand. We had it authorized, but we hadn't placed the sand. So the whole process of getting the administration to support beach replenishment, getting the appropriations committees to appropriate the funds, this is what I did from the very beginning when I was elected to Congress, and I know that we went through that whole experience of having to deal with the whole cost benefit analysis, which is very crucial to any shore protection project, flood control project, as well. I've been through this whole process many times, and I wanted to give you my own view and analysis of it.

I've been very disappointed in the last few years because, not only the Bush Administration, but even prior to that, the Clinton administration, and even prior to that, the first Bush Administration, in my opinion, they have not been very supportive of beach replenishment and flood control. Their whole analysis, at the presidential level, and it's only gotten worse in the last few years, is that this is something that should be done by the localities, the state, or the municipalities. I think many of you know that that is just not possible. Long Branch has about thirty thousand people. Just south of here there are towns like Loch Harbor that have three hundred families. That is the whole municipality. So New Jersey is a perfect example of where the municipalities along the coast are very small, some of them have just a few thousand people. It is just not physically possible for them with their budgets and everything to support a massive beach replenishment project. But that's true, I think throughout the country, and, so, I constantly tell the administration that there has to be a Federal role and to the extent that the Federal Government gets out of the business of flood control or beach replenishment, it's probably just not going to be done,

because the states, and particularly the towns that have to contribute to it, are simply not going to be able to afford to do it. I do believe that, and I've been an advocate over the years of explaining, at the Federal level, not only to the Executive Branch, but also to my colleagues in the Congress, as well as to the locals, that when you do this cost benefit analysis that you use, which is directly linked to how much benefit there is in terms of this, the Federal Government saving money because you don't have to come back and re-do the upland infrastructure in the event of a hurricane or a Northeaster, that actually we're saving the Federal Government money, because FEMA doesn't have to come back. You don't have to do the other things.

I really still think that we have to do a better job. I am not putting the onus on you. I think that all of us, collectively, have to do a better job of explaining that the real impact of flood control, of beach replenishment, is to save the Federal Government money, and that there's this very strict cost benefit analysis that is used to achieve that goal.

Most people don't get it. My local guys who are here that deal with the projects, we're now, right now, scheduled to go out in Long Branch to do a refill project here some time in the winter or the spring. It's relatively small when, somewhere between like maybe three and six million dollars, depending on what we get in the next budget, and we just recently had a meeting which I think kind of illustrates a number of things. We had a meeting with the surfers, because the surfers don't like the contour of the proposed project. When we had this meeting, we stressed to them, that not only is surfing not a priority, in terms of this cost benefit analysis, but even bathing isn't.

Many people in the State think that we do the shore protection, the beach replenishment so that they can have a beach to swim in or they can surf or they can do whatever. They look strictly at the recreational uses, and we have a hard time explaining to them that it is all essentially done to prevent storm damage and to save the infrastructure and the upland areas, which is mostly public, certainly in New Jersey. That never ceases, and I would say to you, there is a dual aspect to this. On the one hand, we can't look at the funding that way, because we have to look at the cost benefit analysis that's directly linked to storm damage, but, on the other hand, in order to gain support for beach replenishment, for me, politically, I almost have to do the opposite when I'm out on a campaign, and when I say "campaign," I don't mean my campaign, but I mean the campaign to get the funding and to get support. In other words, I have to try to get all the people that want to use the beach to bathe or to surf or to dive or whatever they want to do, and explain to them that they should be supportive of this because it is going to impact them in a positive way for recreation, for tourism, whatever.

So, you sort of have a dichotomy there, in the one sense, that it's not the reason we do it, but on the other hand, if you want to get the public support for doing it, you have got to get all those groups together, and, so, that's one of the reasons why, when we're trying to do a project, that we try to get that

support. Right now, with, with the surfers group, we're trying to do some things with this project in Long Branch that will make it more conducive for them so they'll be supportive of it, and that's important in a political sense, even if it isn't important in terms of the cost benefit analysis that you all use to justify the project.

A couple of points that I wanted to get across to you, today, I don't think I have to tell you how important these projects are, I think all of you realize that. But I do want you all to know that from my perspective, more needs to be done to convince the administration, whether it's this President or future Presidents, that they should be supportive of these projects, because they do serve a good purpose. They are very important to our tourism, they do save us money. On the other hand, we need to enlist some of these other groups that are maybe not necessarily supportive a hundred percent if we're going to get more money and more support from the administration.

Some of you know that I'm the co-chair of the Congressional Coastal Caucus, which is a bipartisan caucus of members of the House of Representatives that we put together over the years to be more supportive of coastal issues, whether it be shore protection, wetlands protection, whatever that happens to be, so I know that the Corps has worked with us quite a bit on some of these issues over the years, but I would also ask you to do more and work with us. I know you cannot directly petition for money, but you could certainly work with us on some of the ideas and innovations that come along. I think one of the biggest problems I have to mention, because you want to hear from me politically, as I'm a politician, I'm not an engineer, I'm not a scientist. The lack of support by the Bush Administration is not just inked to the lack of knowledge about why these projects are important and save the Federal Government money. I think it also has to do with administration's priorities.

We've now gotten into a deficit situation over the last few years, and, of course, I blame that on the Iraq War and I also blame it on the President's tax cuts. I'm not going to get into that today, but as a result of the administration's policies, there is simply less money available for domestic priorities, and they, I think, figured out that this is a low priority.

So, again, I would say that, if over the next few years you had a change in party, and I'm obviously hoping the Democrats will be in the majority in the Congress, and I think there is a good chance of that happening after November 7th, and we were able, because of the change in the majority in the Congress or two years later, a change with the Presidency, you know, and you were, as a consequence of that, you, for example, got out of Iraq, or you did not continue with the tax cuts of the Bush Administration, and you therefore had a lot more money and could pay down the debt, and have more money for domestic priorities, you know, be it health care, whatever, I think that that might be an opportunity to see a change in terms of the monies available for the Corps as well. Now you can't get into that. I'm being told I'm political and partisan now, but I do believe that it's not only an issue of explaining

to this Administration or future administrations why these projects save money. It is also a fact that if there is a change in terms of the budget priorities, nationally and internationally, that would release more money and we could see some changes, and I could tell you that if we are in the majority, in the next Congress, which I think is going to happen, at least in the House, if not the Senate, I'm certainly going to be out there pushing for significantly more dollars and asking that whatever changes happen with budget priorities, that we shift more money to these projects, and I think there is a lot of support for doing that within the Congress. I've even made that point on the road during the course of campaigns.

The other thing I wanted to mention is the need for innovation and flexibility. When we do the projects, not only the surfers and bathers and other interest groups, but even some of the scientists come up to us and say that they wish that the Corps moved away from a policy of just placing sand, and you've heard this before. In other words, can we do artificial reefs offshore, can we find innovative methods to prevent erosion without just placing sand? Because in a lot of peoples' minds, even though the Corps' position is scientifically based, the best thing is to just place sand and let it flow. In a lot of people's minds, including some scientists and engineers, there should be other alternatives, and, so, we've been pushing, actually, here, off the coast of New Jersey, particularly in Long Branch, we've actually persuaded our State Department of Environmental Protection to build and pay for, because the Corps doesn't pay for it, an artificial reef in conjunction with some of the projects that are going forward, and when we met with the surfers on the Long Branch project, we've even be talking about doing some kind of offshore sandbar, which would be paid for by the state.

At this point, my understanding is when you want to do those kinds of innovative things, you've got to have it paid for by the state or the locals because the Corps can't pay for it Federally. But I would make a pitch today that I really think that you should, if you could. Maybe we need to change the law, I don't know how that works, to look into more innovative methods of doing things, rather than just placing sand, and to the extent that we can get the Corps to do more research and do more pilot projects in that respect, whether it's an offshore reef, whether it's a sandbar, different things with feeder beaches, I think there needs to be more experimentation in that regard, because, again, if you want to get support for Federal funding, I think there needs to be ways of looking at alternatives that would not only, perhaps, come up with better methods, but also would be more exciting and create more political support for what we do.

Another major issue is global warming. From a political perspective, I think that the attitude towards global warming has changed dramatically in the last few years. I've always been out there talking about the problem of global warming and that we need to address it. New Jersey is probably one of the most environmental states, one of the most green states. Because of our legacy of industrial pollution, people are very sensitive to the environment, and so we've always been advocates, both

Democrats and Republicans, of addressing the global warming crisis. I think in the last few years it has become much more widespread. The President now says that global warming is a problem. He's not really doing anything about it, but he still, at least, acknowledges it's a problem. Some professors at Princeton University recently did a report that said three percent of New Jersey could be under water by the end of the century and up to nine percent could be subject to constant flooding.

We have actually had forums, seminars across the state, in the last six months to a year, and the state has actually been working, I think, also, with the Corps, in trying to dramatize the problem. We just recently had a forum at Monmouth University, which is the University right in West Long Branch, which coastal mayors heard directly about what the impacts would be of global warming on their towns in New Jersey, and asked them to start looking at measures that they could take to deal with the problem in the event that we had some of these flooding and other problems that are expected over the next few years. So I think that more needs to be done nationally, I mean, again, this is a very politically partisan issue, because, as you know, for the most part the Bush Administration has not been supportive of doing anything about the problem or spending any money. Again, I would say that I think things are moving in the opposite direction and obviously, if the Democrats win the majority in the next Congress, we'll try to put more of a priority on this.

I actually sponsored an Amendment to one of the appropriations bill, I don't know if it was interior or it was energy and water, to fund a National Academy of Sciences' study of the impacts that sea level rise due to global warming will have on coastal population centers, and there is funding in the House Bill to do that. It has to go to conference and most of these appropriation bills have still not been signed into law. So, I don't know whether this is going to survive the conference. But the fact that I was able to get support for that kind of amendment on a bipartisan basis, because this was voted on by, approved by, you know, Republicans and Democrats, I think it's a strong indication of the fact that the global warming issue and the direct impact on coastal areas is something we can get support for funding and obviously for more work and research into it.

The last thing that I really wanted to mention to all of you is that I really think that many times you probably wonder whether what you do is really getting the attention of the politicians and the attention of the public, and I want to assure you that it does. Sometimes people characterize the Corps as very bureaucratic, which I think to some extent it is, but I also think that there is a lot more opportunity for you, and the issues that you deal with here, not just the Corps, but those issues that we are talking about today, the public is very concerned about all these issues, and there is certainly a lot more opportunity to bring it to the attention of the public and there is tremendous amount of political support for the things that you do. I'm sure that was brought home dramatically with Katrina. But it's only going

to be even more dramatic, I think, as time goes on, because you're dealing with so many issues that are very important to not only me, but I think to the elected officials and to the public as a whole.

They gave me a prepared speech, but I'd rather just talk to you from the heart if I could, and if anybody wants to ask any questions, I'll be glad to take them.

Discussion

Dr. Joan Oltman-Shay commented that for Congressman Pallone's information, he mentioned the need for creative alternative engineering solutions for both protecting the beach and providing recreational beaches. There is a Section 227 piece of work that is under consideration for continuation of funding, and that is an opportunity for testing innovative solutions like submerged breakwaters that have a nice breaking angle but also protect your beaches. *Mr. Charles Chesnutt* added that it is in the WRDA '06. *Congressman Pallone* asked how does it work with the present WRDA or is this in the new bill? *Mr. Chesnutt* said it was authorized in WRDA '96 for a six year life. It was funded first in 2000, and it went through FY 2005. Our authority has expired, but what WRDA '06 does in the House version, it extends its life and gives it new money authority. The Senate version the Senator Lautenberg authored actually expands the authority to really extend how we can look at innovative solutions. In the conference, that will get sorted out. *Congressman Pallone* emphasized that he thought that is very important to look at those kind of innovative ideas, but you have to get the funding for them, too, so even if you get it authorized, we have to make sure we get the money. Otherwise, it won't happen.

MG Riley thanked Congressman Pallone for all he does and his great support of the Corps program.

Charting the Course for Ocean Science: Development of a National Ocean Research Priorities Plan and Implementation Strategy

*Dr. Daniel Walker
Office of Science and Technology Policy
Washington, DC*

Working with the broad ocean science community, the Joint Subcommittee on Ocean Science and Technology (JSOST) developed *Charting the Course for Ocean Science in the United States: Research Priorities for the Next Decade*, a document that outlines the ocean research priorities for the United States for the next ten years. In response to the U.S. Commission on Ocean Policy's report, the Bush Administration issued the U.S. Ocean Action Plan (OAP) outlining the fundamental components that provide the foundation to advance the next generation of ocean, coastal, and Great Lakes policy. Under the new ocean governance structure outlined in the U.S. OAP, the National Science and Technology Council JSOST provides advice and assistance on national ocean science and technology issues. The JSOST is made up of 25 Federal agencies active in ocean science and technology, making it an ideal forum for federal discussion and coordination.

As part of the OAP, the JSOST was tasked with developing an ocean research priorities plan and implementation strategy that describes a vision for U.S. ocean science and technology, highlights key areas of interaction of our society and the ocean, and identifies critical ocean research priorities for these areas. Given the importance of the nation's waterways - including the open ocean, coasts, coastal watersheds, and Great Lakes - to societal well-being, quality of life, and the economy, 21 research priorities were developed along six societal themes: Stewardship of Our Natural and Cultural Ocean Resources, Increasing Resilience to Natural Hazards, Enabling Marine Operations, The Ocean's Role in Climate, Improving Ecosystem Health, and Enhancing Human Health. The development of the research priorities in the six theme areas led to the identification of some common scientific and technical threads or overarching opportunities — understanding and capability to forecast ocean processes, enhanced scientific support for ecosystem-based management, and targeted deployment of an ocean observing system. Four near-term priorities (2-5 years) were derived from the 21 research priorities and incorporated aspects of the three overarching opportunities. The JSOST is currently in the process of developing the implementation strategy to address the priorities outlined in the current document.

Discussion follows Mr. Benoit's presentation.

Mitigating Erosion along Sheltered Coasts

*Jeff R. Benoit
SRA International
Arlington, VA*

Abstract

The National Academies study examines the unique nature of sheltered coasts and the impacts of erosion control measures on the physical features and living resources associated with sheltered coastal environments. The report identifies strategies to minimize potential negative impacts to adjacent or nearby coastal resources and recommends ways to improve the decision making process for shoreline management in sheltered coastal areas.

Discussion from current and previous presentation.

MG Riley noted that many recommendations were made that very rarely we could jump into full bore without some type of a start on a demonstration program. We would look to certainly to OSTP and CQ to help when it's multi agency, pull us together for an effort like that, but there's probably areas around the country such as in Long Island, that would seem to be an example of something like that. I'm sure *Dr. Denise Reed* would like to have a demonstration down in her area, too, in Louisiana. Where we could attack just about all those recommendations through a program like that, we would seek, first, of course, the budget for it, and then talk within the administration and then also inform the Congressional staffs of the need for something like that. He asked this was funded through the agencies? *Dr. Waters* answered that it was. *MG Riley* said in the first step in this process, you made some very long range recommendations. *Dr. Waters* stated that we didn't sort of prioritize these, but, I'll come back into sort of the whole issue of scale. He stated that you can do sort of on a littoral cell area, those small compartments, even, within estuaries, you don't have to pick the entire Chesapeake Bay. You can pick a portion of it, there's a community that's really interested in focusing on a comprehensive shoreline management program for their community, a scale that's workable. He was encouraged to hear that there is work going on in the Chesapeake Bay around the regional sediment management program, and that may be an opportunity to really look at how can some of these recommendations be folded into that which has already happening. There are programs outside, particularly, of the Corps that can fund this kind of work, particularly under the Coastal Zone Management Act, and all it takes is for the community or the state to step up and say, we want to focus on this particular community, and here is what we want to do, and develop what they would call a special area management plan, but it's a shoreline plan like this.

There are opportunities. You can start small and grow from there. And, sort of the national dialog, I don't think that's a protracted kind of exercise, I think it's a matter of having to jump start that two, three day workshop where you get the key players and the Federal agencies together and say, okay, let's walk out of here with some understanding of how we're going to approach this issue.

Dr. Oltman-Shay said she had the pleasure of attending that workshop in Seattle, one of the take-homes came from a presentation from a Corps person who told stories about how long it can take to get permits for a local landowner, three to five years, and the cost out of pocket to the individual landowner for that permitting, not only in dollars, but in time, and possibly absence of protection of their land. And the magic line, I believe, was the mean high water sound for the Puget Sound. For the state of Washington it might have been sort of a state, Federal. The state requires that there is a certain type of permitting below mean high water and a little more freedom above mean high water. So, in the end, there were several homeowners who wanted to do the "right" approach to maintain a nice ecologically friendly foreshore, but in order to do this, it was below mean high water and so, they had to resort to do something they didn't want to do, because they couldn't handle the three to five years and the cost out of pocket for permitting, that they had to do the mean high water bulkhead. She felt a lot could be corrected with permitting process, which is a state and Federal overview. *Dr. Waters* added that it drives a lot of it. Most homeowners aren't dealing directly with the state or Federal permitting process, they usually have someone who will do it for them, a contractor who says we could put a bulkhead in or revetment in for you, and the homeowner is getting advice from the contractor who does work with the permitting systems, and says I can get you this permit in one year if you put a bulkhead or revetment in. If you want to do something that's more ecologically beneficial, it might take you five years.

Collaborative Ecosystem Restoration at Jamaica Bay Marsh Islands

*Patricia S. Rafferty
National Park Service
Patchogue, NY*

Jamaica Bay is located in the Jamaica Bay Unit of Gateway National Recreation Area (GATE), a unit of the U.S. Department of the Interior, National Park Service (NPS). GATE brings the national park experience to residents of the nation's most densely populated city as well as protecting portions of the coastal ecosystem of one of the world's most highly developed commercial and industrial regions. GATE is committed through the NPS mission to "...preserve unimpaired the natural and cultural values of the national park system for the enjoyment, education and inspiration of this and future generations." In Jamaica Bay, the challenge of resource stewardship is compounded by the need for sustainability and reversal of known deteriorated resources.

Jamaica Bay is a complex of marsh islands and shallow brackish water. Historically Jamaica Bay has been an extensive estuarine ecosystem consisting of marsh islands, tidal creeks and flats, and shallow brackish water. The bay was renowned for the abundance and diversity of its shellfish and its ecological importance as a nursery and feeding ground for countless species of birds and fish (JBERRT, 2002). Today the Jamaica Bay ecosystem is located within the highly modified urban landscape of Kings, Queens and Nassau Counties, New York. Urban development has caused widespread changes in the quantity and quality of waters of the Bay. Much of the bay shoreline has been hardened and modified. The natural flow of water and sediment has been altered by channel dredging, storm water runoff diversion, sewage treatment plant operations, and causeway construction. In addition, a jetty on the Rockaway beach, on the Bay's southern shore, has allowed expansion to the west and has constricted flow into the bay (JBERRT, 2002).

Based on aerial photography interpretation, the New York State Department of Environmental Conservation (NYSDEC) estimated that approximately 1,400 acres of tidal salt marsh have been lost from the marsh islands alone since 1924, with the rate of loss rapidly increasing in recent years. Between 1994 and 1999 an estimated 220 acres of salt marsh was lost at an alarming rate of 44 acres per year (NPS, 2001). According to the NYSDEC (2001), Elders Point also lost approximately 77 acres of marsh, or 79 percent.

GATE is dedicated to working with concerned city, state, and Federal agencies, as well as non-governmental organizations as partners in the Jamaica Bay ecosystem restoration. Jamaica Bay has been identified by park managers as a primary park resource, and thus reversing resource deterioration has become critical to achieving park primary goals that are linked to the NPS mission. NPS has partnered

with the New York District Army Corps of Engineers, Port Authority of New York and New Jersey, New York State Department of Environmental Conservation and New York City Department of Environmental Protection to develop and implement restoration plans for intertidal salt marsh islands in Jamaica Bay.

Elders Point Marsh is located in the north-eastern corner of Jamaica Bay and has been the initial focus for restoration by this multi-agency partnership. Prior to construction of the restoration project, Elders Point East (Elders East) comprised 61.8 acres of mudflats, 5.3 acres of low marsh vegetation (dispersed over a 12.3 acres area), and 4.7 acres of upland. The selected plan for Elders East has included restoring the existing vegetated areas and the sheltered and exposed mudflats that are generally above elevation -2 ft (NAVD) up to the 1974 footprint of marsh coverage. Restoration of 39 acres of marsh at Elders East has been initiated to satisfy the mitigation requirements of the Harbor Deepening Project. The restoration of existing bands of fragmented low marsh vegetation is being achieved via the strategic placement of material to an elevation that is suitable for low marsh growth. Fill material is being placed between the hummocks of existing vegetation to avoid or minimize damage to the existing vegetation. Approximately 22 acres were filled and planted to date. *Spartina alterniflora* has been planted throughout the site at a spacing of 18 inches on-center for each plug in the elevation range from 1.5 to 2.25 ft. Along the perimeter of the island, in areas that have been identified as high energy, a 20 foot band of *Spartina alterniflora* has been planted at a spacing of 18 inches on center with quart pots. In the elevation zones between low marsh and upland (2.25 to 3.3 ft), a mixture of *Spartina alterniflora*, *Spartina patens*, and *Distichlis spicata* has been planted. Work on filling the remaining 17 acres continues and that portion of the project will be planted during the spring of 2007.

Elders Point West (Elders West) includes the western portion of the Elders Point Area. This area is comprised of 37.8 acres of mudflats, 2.9 acres of marsh vegetation (dispersed over a 5.7 acre area), and 1.7 acres of upland areas. The design criteria for this portion of the project has been modified to reflect comments provided via external peer review and has incorporated the results of the NPS sponsored restoration of Big Egg Marsh, Jamaica Bay, New York. The Elders West restoration design, and subsequent monitoring program, will provide additional experience regarding planting and fertilization requirements for future marsh restoration projects in Jamaica Bay. Restoration will include test plots to determine the effectiveness of natural recruitment and seeding for the establishment of vegetation as well as vegetation planted without the use of fertilizer.

In conjunction with this project, an interagency team has developed a Monitoring and Adaptive Management Plan to ensure the systematic collection of data to evaluate the restoration project. The goal of the monitoring and adaptive management program is to accurately determine factors contributing to the success or failure of the restoration project, to quickly identify any problems requiring remedial action, and to implement identified remedial actions in a timely manner. A secondary goal is to better understand

factors contributing to marsh loss throughout Jamaica Bay. The Monitoring and Adaptive Management Plan provides for monitoring vegetation, nekton, birds, benthos, insects, biogeochemistry, sediment elevation, habitat and landscape at treatment (restored) islands as well as a reference (JoCo) marsh. Monitoring will continue for five years after restoration to track the response of the treatment marshes to restoration and to assess progress towards the reference condition.

The Monitoring and Adaptive Management Plan also recognizes that project management must be interactive and flexible to maximize project success. Adaptive management is an approach to resource management in which management goals remain the same, but management objectives and techniques may be modified in response to feedback (such as monitoring results) from the system being managed. The Monitoring and Adaptive Management Plan provides quantitative standards for vegetation density, grazing impacts, elevation and landscape, and perimeter changes that serve as guidelines for evaluation. Should the development of the treatment marshes fail to meet these standards, corrective actions may be made if such action can reasonably be expected to assist in the achievement of these standards. A multiagency monitoring and adaptive management team will be responsible for assessing potential adverse conditions impacting restoration progress and overall Jamaica Bay ecosystem health.

While the construction and monitoring of Elders East continues, the construction process has provided important learning experiences that will benefit future restoration efforts within Jamaica Bay. The project design utilized biodegradable coir logs as a sediment stabilization feature in high energy areas along the perimeter of the island. This represents a novel design feature and use of the material in a buried high-salinity environment. This project will allow for the evaluation of the design as well as the materials used. The project is also providing experience with several methods for delivering sand to the marsh islands in Jamaica Bay. In addition, construction at Elders East has also provided experience in conserving the remnant marsh. Existing vegetation was left in place with fill graded between the hummocks and into the surrounding design elevation. In addition, some of the existing hummocks were relocated into areas that had previously been filled to grade; thus the project provides an opportunity to evaluate two distinct methods for conserving existing vegetation.

The restoration of salt marsh islands is only one component of the NPS approach to the restoration of Jamaica Bay. NPS is working with local universities, city, state and federal agencies to conduct research to identify the causes of wetland loss in Jamaica Bay. In addition, GATE is participating in the development of a New York City sponsored watershed management plan for Jamaica Bay. Restoration of the Bay will require a long-term commitment and many partnerships.

References

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Discussion

Dr. Richard Seymour asked if any of the sewers or combined sewers discharge into Jamaica Bay and do they handle heavy rainfall? *Ms. Rafferty* answered that there are four sewage treatment plants and a number of combined sewer outfalls that discharge into Jamaica Bay and it takes less than a half an inch of rain for the New York City sewer system to go to over capacity.

The Nature Conservancy and the U.S. Army Corps of Engineers: Opportunities for Collaboration in Coastal Restoration

*Terry Sullivan
The Nature Conservancy
Providence, RI*

Abstract

This talk will present background on The Nature Conservancy, its mission, and the science-based method called "Conservation by Design" that the organization employs to guide its conservation work in the United States and globally. The presentation will include a look at a few key partnership projects currently underway and make suggestions for how our organizations could collaborate more fully on coastal restoration projects in the future.

Discussion

MG Riley stated that he certainly enjoyed the partnership with TNC, as they are an agency of action.

Mr. Joseph Vietri commented that some of the work that they are doing now, prioritization of some of their ecoregions, shows great promise for some transferability to some of what we do now as we are looking at business line metrics and trying to develop metrics to prioritize what limited resources we have. We have been working with them to integrate that into some of our processes to make some sound decisions on how we should prioritize some of our work.

**Endangered Species Act Biological Opinion
Beach Erosion Control Project
Monmouth County, New Jersey**

**A Collaborative Partnership to Manage Piping Plover, Least Tern, and
Seabeach Amaranth**

*Mark H. Burlas
U.S. Army Engineer District, New York
New York, NY*

*Stephanie Szerlag
U.S. Fish and Wildlife Service
Pleasantville, NJ*

*Todd Pover
New Jersey Department of Environmental Protection
Woodbine, NJ*

The U.S. Army Corps of Engineers (USACE), New York District in partnership with the New Jersey Department of Environmental Protection (NJDEP) received Congressional authority to provide hurricane and storm damage reduction for 21 miles of coastline in northern New Jersey. The constructed plan included elements intended to restore the natural littoral drift and coastal features using beach nourishment and periodic renourishments. Prior to the construction of the project, piping plover (*Charadrius melodus*) and least tern (*Sterna antillarum*) nesting in northern New Jersey was limited to habitat within the Gateway National Park in Sandy Hook, New Jersey, which is immediately north of the project area. In the course of biological monitoring for the project, the presence of the piping plover, least tern and seabeach amaranth (*Amaranthus pumilus*) was confirmed in locations that had received beach nourishment. Pursuant to coordination with the U.S. Fish and Wildlife Service (USFWS) with respect to the Endangered Species Act, an interagency Team (USACE, USFWS and the NJDEP, Endangered and Nongame Species Program (ENSP)) was formed to conduct monitoring and stewardship for these significant resources.

The piping plover has successfully nested within the project area annually from 1997 to this past 2006 nesting season. This represents 10 years of sustained nesting within areas of restored beach. Their 10-year nesting success has resulted in 85 nesting pairs that produced the fledging of 125 piping plover chicks. Their 10-year fledge rate (# fledged chicks/nesting pairs) within the project area is 1.47, which is almost equal to the piping plover Atlantic Coast Population (ACP) recovery goal fledge rate of 1.5, and is above the ACP stable population fledge rate of 1.25 and the NY/NJ region of ~1.19. The highest seasonal fledging rate was 1.83 in 2006 and the second highest fledging rate of 1.78 was achieved during

a beach renourishment operation and was most likely due to additional intensive monitoring and the implementation of expansive (1000 meters) buffer areas as defined in the Programmatic Biological Opinion issued by the USFWS in September 2002. The average annual stewardship cost per fledged piping plover chick is estimated at \$560.00.

The state listed least tern (*Sterna antillarum*) has also successfully nested within the project area annually from 1996 to this past 2006 nesting season. This represents 11 years of sustained nesting within areas of restored beach. Their 11-year nesting success has resulted in ~3400 nesting pairs that produced the fledging of ~2894 least tern chicks. Their 11-year fledge rate within the project area is 0.85.

Seabeach amaranth (*Amaranthus pumilus*), a federally listed threatened species, once grew on Atlantic coastal beaches from Massachusetts to South Carolina but are now found only in six of the nine states. In July 2000, seabeach amaranth was rediscovered on newly created beaches in Monmouth County, New Jersey. In 2001, beach surveys found seabeach amaranth in all four coastal counties of New Jersey (Monmouth, Ocean, Atlantic, and Cape May). As of 2005, seabeach amaranth remained in Monmouth, Ocean, and Cape May counties, with the greatest number of plants in Monmouth County; however, the species has undergone a distinct decline in the project area since its peak in 2002. Recent surveys have documented that a precipitous downward trend continued in 2006, with plant numbers dropping to levels that risk the extirpation of the species from Sea Bright and Monmouth Beach. This same region supported over three-quarters of State-wide total plants for the first 5 years after the species was rediscovered in New Jersey (2000 through 2004).

The habitat has become largely unsuitable to support seabeach amaranth from dune succession without maintenance. The current habitat consists of wide, stabilized, and terraced beaches: a narrow flood-prone lower beach, flooded often enough to prevent the establishment of seabeach amaranth, with a sharp steep incline leading to a heavily vegetated upper terrace of a mature, dune plant community. Suitable listed species habitat consists of gently sloping, sparsely vegetated, unstabilized, upper beach zone that is normally not flooded at high tide.

Even though the habitat has become stabilized within the Project Area, with intervention and maintenance the habitat may again become suitable and may even promote an increase in the occurrence of listed species such as seabeach amaranth. Currently, the Service, the State, and individuals from local NJ universities are making a collaborative effort to formulate management guidelines that promote the maintenance of suitable habitat for listed species on renourished beaches. The Dune and Vegetation Management Guidelines (Guidelines) will serve as a technical reference to assist local beach managers to establish and maintain dunes that are compatible with habitat for listed species. Upon final adoption by all relevant agencies, the Guidelines will assist the Corps in implementing the 2002 Programmatic

Biological Opinion for the BECP by adjusting beach profiles to maximize habitat suitability for listed species.

Although the purpose of the U.S. Army Corps of Engineers (USACE) Sea Bright to Manasquan Inlet Beach Renourishment Project is to provide shore protection, beach replenishment projects also potentially create suitable habitat for federal and state-listed species, including piping plover, least tern, and sea beach amaranth. There are a variety of factors that influence whether and to what extent these species colonize nourished beaches. However, because newly nourished beaches also provide increased recreational opportunities, and increased human usage, in turn, attracts predator species (i.e. red fox, gulls), presence of birds or plants, alone, is not a sufficient measure of whether these projects provide a benefit to species. In order to contribute to the recovery of species, birds (and plants) in the project areas need to achieve sufficient and sustained levels of reproductive success (i.e. productivity). Otherwise, there is the risk that they become population sinks.

There are numerous factors that impact reproductive success, including flooding, predators, changes in habitat conditions, and human disturbance resulting from recreational beach usage and beach management practices. Thus, if birds utilizing sites created through beach replenishment projects are to contribute to species recovery, monitoring and management programs that address and minimize these impacts must be implemented. The framework for achieving this in New Jersey, including in both the New York and Philadelphia Districts of the USACE, has been the development of beach management plans with the municipalities and/or landowners that receive sand. Biological monitoring programs and the development of beach management plans to protect listed species are stipulated as terms and conditions in the programmatic Biological Opinion (BO) for the Sea Bright to Manasquan Inlet project, as well as in the BO for Atlantic coast beaches in the entire USACE Philadelphia District. The New Jersey Department of Environmental Protection, in turn as the local sponsor in these projects, requires management plans as a condition of State Aid Agreements and for issuing federal consistency determinations.

The management plans are comprehensive, addressing the full range of impacts, including, vehicle usage on the beach, beach maintenance (i.e. mechanical beach raking), trash collection, dune maintenance (i.e. snow fence placement and vegetation planting/management), pet regulations, predator management, recreational activities, fireworks, and beach renourishment projects. Biological monitoring requirements and protection of nesting and growing areas through the placement of fence and signage are also important elements of the plans. Other features of the plan are species recovery goals, designation of management zones (species protection vs. recreational focus), and education/outreach.

The plans identify specific roles and actions for the municipality/landowner, U.S. Fish and Wildlife Service (USFWS), and New Jersey Division of Fish and Wildlife – Endangered and Nongame

Species Program (ENSP). In August 2006, a management plans was completed with the Borough of Sea Bright, and a meeting was held with the City of Long Branch and Monmouth County Parks (for Seven President's Oceanfront Park) to begin development of plans for their beaches. The Sea Bright management plan will serve as a template for new plans and as a guide for revisions to existing plans that may now need to be updated.

Management planning and biological monitoring programs, which have involved a successful collaboration between USACE, USFWS, NJDFW-ENSP, and the various local governments and communities, are the foundation for the protection of beach dependent listed species in New Jersey.

Using the USACE project performance measures of scarcity, plan recognition, connectivity, special species status and sustainability, a reasonable conclusion may be reached that beach nourishment with periodic renourishment that includes the formation of a collaborative Federal, State and Local partnership to perform intensive stewardship could be a possible alternative to restore piping plover, least tern and seabeach amaranth habitat, in addition to providing shore protection benefits.

There was no discussion following this presentation.

Public Comment

*Ms. Susan Howard
Mayor
Monmouth Beach, NJ*

Thank you very much. I would like to thank the members the Board for the opportunity to be here today, and to participate. I would like to echo Monmouth Beach's concern for the beach replenishment projects. As was demonstrated in Stephanie's slides, we are already experiencing erosion of our beaches in Monmouth Beach and without our beaches, not only are our birds endangered but so is our town. In the early '90s, the beach was essentially gone in Monmouth Beach and the ocean was lapping at the sea wall. In '92, we had a severe Nor'easter, which I'm sure many of you know about, and the destruction in our town was extreme. As a result, many of our residents were reluctant to reinvest in their properties and we experienced depression of property values, which was pretty significant, but then, with the restoration, reconstruction of our beach in '96, we've had a resurgence of growth in our town. We have had many new homes built, many homes renovated, and there is a definite economic benefit to that and in these days Monmouth Beach is a very desirable place to live. So I would urge the continued support for these projects and we will help in any way that we can, and I do thank you.

*Mr. Howard Marlowe
Marlowe and Company
Washington, DC*

Thank you, General Riley. I appreciate the opportunity. As some of you know, I do lobbying for a number of communities, as well as for the American Shore and Beach Preservation Association on a number of Corps projects, most of which are coastal. I thank you for giving Mayor Simmons an opportunity to be here and emphasize to you that, although he had a number of things in his short statement, he had a lot of stuff to mention to you, I hope that you will take up at least some of his recommendations in your Executive Session.

One thing which I want to concentrate on is that at the moment, through no fault of the Corps, the Corps does not really have a shore protection program. That is due to policies of Office of Management and Budget (OMB), which has spanned more than one administration more than one political party. It is due, also, to various anomalies within the particular appropriations process, both the lack of funds and some ill-chosen policies by a couple of our leaders of the appropriations process. Those are things which you all have no control over, so there's, unfortunately, I don't know who has control over them, but, in any event, it results in a situation in which every member of Congress is on his or her own, in terms of recommending projects, and I'm talking specifically about beach nourishing projects, and at one time I

thought that was a good idea, that we were benefiting from it, because I looked at the bottom numbers and we've done pretty well in the overall funding process, and then as I listened to people at the American Shore and Beach Preservation Association conferences, like the one that was held here earlier this week, I realize that chaos does not sit well with your customers and probably doesn't sit too well with you and your staff either. The bottom line here is that they have no knowledge, let's take those who are already in the process. Mayor Howard and the other people of the communities of this area need to know that if they're scheduled for periodic renourishment every five years, they have a very good likelihood of being able to get Congressional appropriations every five years, but right now you all can't even recommend to Congress, the way things are, the Corps cannot recommend what projects should get funded and when. The same is true for those who are trying to get into the process, their own feasibility studies. Some are needier than others. I am not in a position to recommend that. The only possible agency or entity to do that is the Corps of Engineers. And, yet, you are hamstrung, right now, because going through the process you cannot recommend, certainly in a way that reaches directly. It goes through the process of OMB because they will not let you do that. My hope is that we can together come up with a way so that the Corps Districts, which have been excellent in developing these projects and know about those that need periodic renourishment and when they need periodic renourishment, those that need to be move sooner than the periodic period that was scheduled, those that need to move slower, those studies that are along the way, those that need to move faster, that we can find a way to work together so that we can take the information that the Districts have and get that information into the hands of the Congressional appropriators.

I also want to emphasize something that you obviously know. The coastal processes are very dynamic. The Corps' processes are not necessarily so dynamic. For those in feasibility studies, the process is a long and expensive one, and one of the things that we're finding is that along the way, if they're in an area that gets hit by a storm, right now either they move on their own to repair the damage, which could be very significant that is done by that storm, or they go to FEMA to get help, which will not be much for that storm, or they get a lot of push to come out of the Federal program, which is really what I want to emphasize. There is a lot of enticement to come out of the Federal program and do something now.

As Mayor Simmons emphasized in his presentation, we don't like the idea of folks moving outside of the process when the project could easily move within the Federal process because it doesn't have the same guarantee of quality and public access. For those awaiting periodic renourishment, they may find that a storm such as the one that came recently here, or a more major storm, has created hot spots that need to be tended to. We need to figure out how to work together to get a more dynamic

process that has both the availability of money and the availability of sand and the planning expertise that's able to move in on those particular opportunities, and be there.

Again, my concern is that without that, the current situation is that the end user, your clients, and your potential clients, customers, are the folks, I use clients, and that's our firm's relative terminology, but those people are wondering whether this fifty year commitment is worth waiting for, and, as I said, obviously, we can't control OMB, but we have to be able to do the best we can to show them that there is a program and that we will do our best to meet our collective responsibilities to these folks.

In conclusion I want to thank you again for the regional sediment management initiatives that you -- that was my first contact with CERB and when I saw the regional sediment management initiatives I think that was fantastic and the 227 program with the shoreline demonstration program, I think, has been another thing which we need your support and we need to grow that program. I was on the phone with the supervisor from a town in New York who wants a beach project and who the Corps District will be working with as a new partner, but the second thing he said was, how about that new technology, is there any new technology we can use? Through the 227 program, perhaps we can find something for him.

Thank you very much for giving me this time to talk with you.

*Mr. S.E. (Ed) Veasey
Seament Shoreline Systems, Inc.
King George, VA*

General Riley and members of the Board, audience, participants here, I feel like Susan Durden, it's like a hundred and eighty degrees out when she came before those three hundred fishermen. And here I am, I'm now the public now, speaking to you, the experts, so it's really a hundred and eighty out and I came, decided to do this with much hesitation. But, through the strength of two other naval academy graduates on the Board, I felt emboldened to come before you. I did wear my navy blue and gold. I almost went to West Point, and I might have been one of the engineers, had it not been for it being full that year. Anyway, I'm happy where I ended up, but looking around, I decided I wouldn't give my prognostication of the Army/Navy game results coming up.

Well I really do come from the public, because only about eight or nine years ago did I get interested in this, and it was because necessity was the mother of invention. I had retired from the Naval Academy Department Chairman and moved back to Dillwyn, Virginia, where I've been Deputy Commander on the base, and bought a piece of property in Potomac and built a house and everything was going very smooth, until I woke up one morning and the house was three feet closer to the bank than it was the night before. I checked the foundation, and it was good. A slab had come off the forty foot high bank and like some of the pictures that were shown early to today the Chesapeake Bay region, that's how it looked. Then El Nino came along and it happened again. But this time it was a ten foot slab with a

four foot diameter oak tree that the eagles like to light in all the time, I saw three eagles up there one time when I was mowing the grass, right out in front of it.

So how did I come to, as a novice, end up here. Well I had to go out and get my own permits. I had to come up with some ideas to try to preserve my bank, so it just was an evolutionary process.

And then I found out about the Florida Shore and Beach Association. I went to a meeting and then joined the American Shore and Beach Preservation Association, so if I really say something wrong today it's because the people I talked to, like Bill Curtis, who I met out in Maui at a meeting, Joan Pope, Charley Chestnutt, Dr. Jim Houston and Dr. Bruce Taylor, but all I know I learned from them at going to about one meeting a year. It helped me. It was great listening to what they had to say and what the other members of those societies had to say, to teach me something that I could use on the Potomac for self preservation. I fancy myself an inventor in my fourth career, and it's fun trying to solve a problem and come up with an idea that, perhaps, might be a better mouse trap. But in many of these cases I am not expert enough to decide is it a better mouse trap.

I was so excited to be able to stay over from the American Shore and Beach Preservation Association, and present to you some concepts that I have a feeling may be of some use. I really reformulated everything I was going to say today because of what I heard through the day. And some of the things I want to talk about first is going to be some technical things that may be of interest, and then I want to give you some input from the perspective of the public, coming in and learning to get permits, going through the procedures with the Corps and the state and the local, and even Maryland down where we are, and then, also, trying to come up with a new idea and try to get it heard. And we heard about that from the Congressman today and some other folks that have spoken about innovative technology. I did go down and give a presentation Florida Department of Environmental Protection a couple Februarys ago, and innovative technology thing, and I did give a paper at the American Shore and Beach in Wilmington, North Carolina, which happens to be my home, and that was right after Isabel, and I'll show you some pictures that I think will may be of interest and what I came up with, from an entirely different background, first in Navy and then in nuke submarines, we hardly ever saw the shore, quite frankly, we were more worried about hitting a sea wall or hitting a Soviet submarine under water, that was our big worry, not erosion, I didn't know about erosion until I retired.

Well some of these we figured out wouldn't hide, we'd hide the slide, but it didn't work. I read some of the Louisiana Coastal Protection and Restoration, and lo and behold, after having submitted a proposal back to the Corps in February, and it was about -- what this picture is up there, hollow core levees, and the innovative technology that was in Vicksburg, I guess, in late spring, one of the -- and the -- I guess it was an appendix, and it said that one of the innovative solutions suggested during the engineering technical approaches and innovative workshop was the concept of constructing hollow core

levee. Well that I found interesting because that's what I had just received a patent on. Actually this was still in progress, but imagine, this one inch equals eight feet, and it's essentially a concrete box, in the shape of a hexagon, it's a very prevalent in nature with a hexagonal molecules, ice crystals, the bees making their honeycomb, it's a very prominent in nature, a very strong structure. And it simply took, what Bruce and I used to do in the shipyard, it was very expensive to put a flood and drain valve, and blowing vent valve in a submarine, but I'll show you some pictures that we did that, we did that here in this model, that's all I gotten so far in this one, because this is the third generation system. But having this third generation system generated some thoughts on what one might do with it. You could use a caisson of segments here that if you could put in a core of a levee, one of the problems, I know, is getting enough good material to build a levee out of, but if you used a concrete shell and filled it with water, that would supply the mass, it would satisfy Newton's Law that a lot of this is based on. And then, if it tends to settle and subside, you simply pump some of the water out, just like we did hovering, before we -- be ready to fire a Polaris, a Poseidon or Trident missile, we learned to keep the right, the same level. And if it was too light, it might tend to rise, though we simply flood it with a little bit of water. And this is a concept that might be useful with the levees down in New Orleans. If you had to repair a levee, you could build these and, with them empty, float them down the river, flood one end like the flip ship that the Navy had one time, and Scripps was involved with that, and erect it vertical, fill it with water, get it heavy and then it let it sink in the Mississippi mud or the Louisiana muck. But then get it to hover at the right height that you want. So perhaps that is something that might work, you could put it on the landward side as a repair, on the seaward side or potentially build a new one.

Another concept is to have a flood gate. I know you want to renourish those marshes that have been starved of settlement because of the levees that have been there for a hundred years. So what one could do is have one hexagonal module in the middle there, that's on rails, and it's split at the bottom, and if you want to open a flood gate you simply pump out some water, pump some water out of that and it's, the Mississippi is on the one side, and there is a basin in the middle such that the caisson will float up, very simple gate, and then we can pipe out some of the water into the marshes to try to renourish those marshes with some sediment, and you can control it, river gets high, you can get some water out that way.

And this could still be, the long part here would be the core of a levy that you could put that flood gate in, that would use a very simple way and perhaps less expensive, I don't know, I haven't tried to cost anything like this, but that might be a way that you could use it.

Now right after Katrina, I happened to be down in Wilmington at Wrightsville Beach, where I grew up. And I saw it on the news, what had happened, and I saw about of the levee that had burst, and I called Lt. Col. Ron Stewart, retired Marine Corps helicopter pilot from the Wilmington District, I said, Ron, I see, they want to drop ten bags in there, but here is another way to do it, how to plug that levee in a

hurry, using something that New Orleans has lots of, lots of shipping containers, the Chinese bring them over full of goods, and then it's too expensive to ship them back empty, unfortunately, they should be full of goods going back but they're not, but they sit in New Orleans. Well you could use some of those shipping containers, and here's some concepts to use those shipping containers. Now these particular containers have coated, inside and out, with a coal tar epoxy. As a matter of fact, I had an idea like this with Bill Curtis years ago in the 227 program, when they wanted to raise the height of the levees to four feet, and they were looking for innovative concepts and Bill said, well, you ship-- I'd rather use concrete boxes, the new ones, he said ship them out to Corvallis, Washington, and give us fifty thousand dollars and we'll be glad to test it for you and I checked and there wasn't enough there to do that, Bill, so it ended up waited a little later, got some money and actually bought, brought these containers down to Wilmington and had six of them shipped up to Virginia, where we wanted to test them. Now there's one way you can use them, as we discussed with Bill, years ago, to raise the height of a levee. Bury it in there about two feet and have maybe six feet up or if there is a hot spot, where it may be weakening or if there is a leak, or if there is some tunneling or channeling through the levee, you might be able to block it some that way. There are boxes, I've had six of them made, ready to be tested, bridge connectors to connect them with. This is what I proposed to Ron Stewart, just using a helicopter to lift these containers into the levee, link them together and float them in place. You can bring them by truck, you could bring them by barge, you could bring them by helo, but that's the fastest way to do it.

And I talked to Col. Ray Alexander, that could be a what, when Isabel reached the barrier island we could have gotten something there very quickly before they could use them, some boxes or concrete or shipping containers, even, to experiment with helping to rebuild a barrier island, like the Chandelles.

Real briefly, these are our seawalls that work very well, L-walls. This is in Stamford County, we put them, they're eight thousand pounds, put them in place here, these one was not protected, Isabel came and took away twenty feet of bank.

Later that was done, just like the neighbor. These walls can be set in place such that coming down the bank when it's backfilled here this could be used as non-point source pollution filter, whereby you put sand and gravel on this side of the L-wall, it comes down the slope, fertilizers, herbicides, pesticides and slope force through there and is filtered by the sand and goes up through a beach and reduces some of those pesticides. Dr. Hagerdorn at Virginia Tech and I discussed that and they're trying to look at that as a solution to Fairview Beach.

You can use these reef breakwaters, you can submerge them all the way, you can have low underwater reef break water, semi-submerged, and you could also have the backbone of a sand dune on the back beach to hold that berm together during a hurricane. And, yet, it's above mean high water and it's

nourished over, it's nourished over with sand, and you don't see it, you put some sea oats there, but these act as groins, when the storm gets up that high. But it may save a lot of sand that might otherwise be washed away during a storm, and save some beach renourishment cost.

We had moved boxes in the water for homeowners at, right near Stratford Harbor, Stratford Hall, right where Lee's birthplace was, they got about a hundred foot cliff there, their houses have been condemned because they're right on the bay. For nine thousand dollars, for a ninety foot lot, we've been able to load boxes, push them with a Carolina skiff up river for half a mile, sink them in place and two months later we had Tom Bollows there, collecting the material that's coming off that steep bank, a very cheap way to do it.

At White Sands Harbor at the mouth of the Potomac, there were plans for a riprap revetment, seven and a half foot height, riprap breakwater, and we, for two thirds of the cost we were able to float boxes in place and sink them, and here (indicating), towed them over because the excavator could not lift that eight thousand pound box, which is seven and a half feet tall, sunk them in place, this was one day's effort, a hundred and ten foot breakwater. Two months later, they had four feet of sand in them from the holes in the side and there was growth in them already.

We're making some hexagonal ones right now as we speak, poured them last week to try some other experiments.

I'm sorry it's taking a little long, but there are, one real quick perspective, from the point of view of something that's come into this, the process, the permitting is very difficult, it really is, and it's confusing, and it's time consuming. And the process of trying to get something innovated to be considered is difficult, it's just like the Navy going from sail to steam and steam to nuclear power, it's going from rocks to boxes is difficult, but one of those last slides showed Spartina, it showed eel grass. There's eel grass and wild celery growing in the boxes, and we planted Spartina, first the geese got it and then Ernesto came along and took it away, that's been in there through Hurricane Bertha, Hurricane Fran, Hurricane Isabel, those boxes did not move.

Kathy Anderson from the district in Baltimore came down and first looked at those boxes, all those long years ago, and said you got SAV and I said, I don't think so, then I remember what SAV really was, it wasn't a disease, we've been very proud to protect it and now we have got a nursery for SAV there. And these sill boxes can be used at the fringe of a marsh, you can float them in place, you don't disturb the marsh because you come in from the sea and you can put the boxes down there, and they can flex as the sea rises, and you have to move them in, then you can move them in shore as the sea rises and for the same boxes which would be much harder, the riprap would be difficult to do that.

I'm sorry I went over, I appreciate the time, I hope some of these ideas may be of some use to you in the future, I've had fun learning from the folks here and I'm having fun trying to build a better mouse trap for shoreline erosion.

Thank you very much.

Discussion

MG Riley thanked the public and commented on Mr. Veazey's presentation. He stated that it is a good combination of naval engineering and a little land engineering, as well, so, and those are very innovative ideas, and we appreciate that. One problem we found out in planning for hurricane response, what you may be able to preposition, to close a breach, say, in a levee, certainly helicopters, you're going to get them completely out of the state, it's coming into the Gulf Coast. You're going to move them all the way to northern Louisiana, northern Mississippi, and they won't return until the hurricane passes where they are, so it will be another day before you can get helicopters in. Then we looked at prepositioning barges, and, of course, you saw what happened to barges in New Orleans. Those that were empty were tossed around like beach balls, those that were full, sunk, and, so, when you get, a big, big storm you have a tremendous problem in preparing a response to that, and, so, you have to find something that's stable and won't get tossed around by a storm, and this kind of thing might work, and then, of course, you've got to hurricane-proof your equipment if you preposition equipment, or be ready to move them into the hurricane location right away.

Board Recommendations/Closing Remarks

Dr. Joan Oltman-Shay. First of all, I'd like to thank all the presenters for a remarkable two days. I learned a lot, as usual, and was impressed with the scope of the problems you have to deal with, and your innovative and hard working ways of dealing with it. At the Executive Session, we will develop action items, and I would like to share with you some of the points I hope to bring up if the opportunity presents itself at tomorrow's meeting. From Tuesday's presentation, it really struck home to me the recommendation for a formal inspection procedure policy on beach renourishment projects similar to what we do for now for levee inspections.

MORPHOS-3D is critical to the role of the Corps as the Nation's coastal engineers. We cannot afford, as a Nation, to lose the momentum that they have developed for us. Beach-fx, similarly, is very, very critical for decision making, something that we've needed to do for many years in risk assessment, in making the decision of what projects we need to work on sooner than later because of risk and cost. I asked how difficult is it to bring a tool like that out to the District offices. My concern was the population of the data bases that are needed to run Beach-fx. We were given a presentation of the difficulty populating the data base for economics. However, there are solutions. We have to find innovative and creative efficient mechanisms to populate those data bases, models are only as good as the data. During one of the breaks, I heard that the Mobile Office, District office has been using Beach-fx to test on a very large section of shoreline. In fact, they realize they bit off more than they can chew, it was too large, and for them to develop the economic data base to support Beach-fx, they had to come up with creative solutions, in this case it was using LIDAR to determine elevations of structures and tax records to determine the value of those elevated assets. So there are ways, and we need to make sure the mechanisms are in place, so that Districts can adopt these new methods.

We heard from Susan Durden of IWR on communication, the means of informing, exchanging and integrating. The efforts of Susan and others at IWR and throughout the Corps are really critical to the future of an effective and a proactive Corps. Their efforts fit well with RSM. RSM is a collaborative state and local stakeholders activity with the Corps. It is a mechanism for the Corps to interface with their stakeholders and it's my hope that Susan is able to support the monitoring of our District personnel as they do their RSM outreach.

Finally, the NRC study on mitigating sheltered coastline is a great study, a useful study, but drives home the point that we need to develop or we need to correct our permitting processes, if you like, for making, helping individual landowners make better decisions for their land problems, and they can, right now, with the constraints put on what they can do.

Dr. R. Bruce Taylor. I've sat on this Board for five years and I think every speaker had some good information to share with us and I learned quite a bit.

I divided the program into groups, probably because that's the way you did it, but we heard about the engineering challenges from the North Atlantic Division up here with the engineering and the maintenance of the projects.

We heard about project performance evaluation, a very important program with SPA, the research that's going on embedded in that to provide us with new technologies to move our state of the art forward and our ability to do our job better from an engineering and environmental standpoint.

We heard about programs and policies and we heard about good environmental works that are being done. There are recurring themes in all these talks that we've heard. I've heard these quite a bit during this past year or so, in post Katrina coastal engineering, if you will. The use and importance of bringing in outside advisors early in the process to add quality and to give credibility to our engineering efforts, I think that's a very significant initiative and one that I think has great merit for us to move forward.

The need for resilience in their design and operation and the maintenance of our projects. Bend but don't break, and maybe have a certain amount of redundancy. I think this is extremely important as we move forward and needs to be looked at carefully, I think, in our SPA initiative as we move forward. We hear the words "adaptive management" a lot. We hear it from our environmental colleagues, and we hear it in post IPET or post Katrina reflections on how we did in New Orleans and how we must adapt, as we move forward to provide that resiliency, not only in the initial design, but as our knowledge base expands, our technology expands and our infrastructure ages. So we need to be flexible and adaptive as we move forward.

We talked about risk. It is something that's very, very important, and I applaud the efforts that are moving forward, right now, to improve our capability in determining exactly what the risk levels are as we move into the later stages of a project life, or a program life or a systems life, a systems approach.

The need to communicate all of these is extremely important, not just for collaboration, but, I think, as Susan said, revelation. We are not very good communicators, sometimes, as scientists and engineers, but it is such an important part of our profession and our responsibility to the American public, as we move forward with our infrastructure. We need to be cognizant of that and we need to be effective at it. And I think we have a responsibility, also, as well. We can't just sit by the wayside because things won't happen unless we take that responsibility and move forward and communicate, which gets us down to the bottom line, and that is resources. It is a continuing and frustrating problem for all of us and one we must deal with. Getting the resources, in terms of money and the ability to plan and execute projects over a long period of time, and I know that much of that may be beyond our capabilities, it's the way our

Government works, but we do need to try and look for ways to acquire those researchers, money, so that we can do the research that's needed and execute the projects in a sound manner and maintain them over their life. We need it for public safety and we need it for the good of America.

These are general themes that I've been hearing now over the past year or so, and I assure you, I will bring them up for my colleagues' consideration on the Board as we go through our deliberations tomorrow.

Dr. Richard J. Seymour. I, as the newest civilian member of the Board I get to go last. And I think that in the interest of time, I will say, "Me, too" to the thanks and to the very excellent commentaries that were made by my colleagues on the quality of this meeting and of the presentations. I'd like to take just a very few minutes to talk about some of the recommendations that I will be making tomorrow in the executive session, things that I've, things, as being, I feel, are very important.

Certainly, the MORPHOS-3D model is, perhaps, one of the most important things on the research plate of the Corps of Engineers at this time. But at the same time, I am concerned about the dearth of models, parametric models, not physics based models, that can be usefully run in minutes or hours instead of days, and where it's economical to do Monte Carlo simulations forever, and "what if" scenarios at the predesign or planning level for new projects. It's unfortunate, but the models that are available to us now have been around for twenty-five years or more, and they're not very effective. They really don't work in a number of instances. I feel very strongly that some emphasis must be given to the development from the physical principles proven in big models like MORPHOS to the development of these parametric models. Again, I think it's very encouraging that Delft3D capability is going to be brought into this program because that's the kind of physics we need to establish sediment transport modeling, and the models I'm talking about are really models for cross-shore and long-shore transport of sediment. However, we have to understand that there is a lot of hard work to convert the physics into the parametric models, so this is not going to happen overnight. We have to have proven physics six to begin with, but then it's a big struggle to get to the product we need. I would advocate that a great deal of emphasis be put on that.

Joan discussed the question of annual performance evaluation of projects, and I'd like to just add a few comments to that. One is that if structures are part of the project. I think that the performance of structures ought to be considered in the annual report card for that project. If those structures are not performing, then they ought not to be maintained or perhaps they might even be removed. One of the problems that exists with the concept of risk in conveying this concept to the general public and to the Corps customers is that we use a system that's very deterministic to define the project. You've all seen it, it's a drawing which shows a profile that exists today, the profile that will exist after the construction, the profile that will exist after it equilibrates, and then what it might look like five years from now or seven

years from now or three years from now, and those are all hard lines and people look at those and say, wow, that's the way this thing is really going to perform. We all know that, in fact, those are guesses, because we one, don't really know what kind of sand we're going to get and, therefore, what profile slope will equilibrate, and we certainly don't know what kind of waves this project is going to see. Therefore, I would suggest that a way to convey the risks and uncertainty associated with this is to put two or three lines on there for each one of those lines, perhaps the best guess and max and min. In other words, to put error bars on, on all of these assessments, and this will convey to everybody, at the very beginning, that there is a risk, and that there is certainly uncertainty in these designs.

Lastly, adaptive management of beach processes. Beach projects requires adaptability and funding, and, as I see it, some, some form of a trust fund, perhaps on an RSM regional basis, not a national trust fund like the highway fund, but one which is dedicated to, a group of projects or a region, that would allow for response to unforeseen situations and would not invoke the tremendous delays involved now in reauthorization for additional funds to the project. In the best of worlds, of course, this would be even annualized so that it would be available on a totally continuous basis. I understand that this is a very, very difficult thing, it will require some major changes in thinking, but the pay out to the Corps of Engineers in improving the quality of service and improving the simplicity of operations would be well worth some high level consideration as to how this might be sold to Congress and to the Administration.

BG Joseph Schroedel. First, I am absolutely honored and humbled to be a member of this Board, first from the standpoint of the Board members whom I've gotten to know here in the last couple of days. I will tell you we are all well served, and the comments that we just heard from the civilian expert members of this Board are heartwarming, uplifting, choose your words, but clearly we've got the right people serving all of us here.

Second, I'm honored and humbled to be on this Board from the standpoint of the quality of the presentations given. The presentations underscored for me the sense of and spirit of collaboration and commitment, and, Terry, that's your definition of commitment, of collaboration and commitment that is absolutely underscored by one word, and that's service. What everybody has in common in this room, in the last two days, and what they demonstrated to me is a sense of public service, a willingness and desire to make a difference, a real difference to the American people.

What I vow, as a member of this Board, to everyone in this room, and those outside of earshot, is to be an active participant, to push hard for clearly defining deliverables and pushing to deliver real results. My personal motto has always been deeds, not words. It's great to get together and talk about things, but I'm looking forward to the session tomorrow, and my long list of things, to figure out how can we choose from these lists of things that, requirements, those things that we know we can accomplish,

take on the challenges like, perhaps, one of my favorite pet rocks, changing Corps processes so they are streamlined and more efficient, like the feasibility process, that's one that I will push for at CERB.

At any rate, I think it's not a matter of just more resources. I think in this day and age to serve the American people, it also means finding better ways to make better use of every dollar we do have, and being creative about how we produce real results of what we got and not just waiting until we get more resources. I think it behooves all of us, in this day and age, to kind of keep that azimuth, find creative ways that we can deliver real results to the American people, and it doesn't matter where the taxpayer's dollar comes from or goes to, rather, the Federal Government, State Government, local governments, it is all their money, it's all our money, we're taxpayers. So let's find a way to make best use of everything we've got to produce the best results through a spirit of collaboration and commitment girded by public service, which is what we're all about, and make it happen. I vow my commitment as a member of this Board, to try to make some of those things kind of happen. And, again, deeds, not words.

BG Todd T. Semonite. I will make one comment and then three issues. First of all, great forum, super presentations, and, as I said, in the beginning, the thing that I think we take away from this, in this very, very complex equation of having to do the right thing on the ground, we've got to know all the different pieces of this puzzle, and which one is important, which ones do we do, how do we weigh all these and how do we somehow come up with the best possible solution. No one is going to get a hundred percent solution in one area, but we've got to take all of these and be able to somehow make it deliver, and all of the intellectual conversations we've had, and as General Schroedel said, your commitment to this is going to be able to put this across the finishing line.

A couple issues, though. My perception is there's an awful lot of power point, how do we make this go from power point to action, same thing? How do we somehow have a deliverable here that we can have something happen on the ground? As great people with great experience, you've got to be able to figure out where we have a feasible option of getting something through, and I'll go on the same funding line, it is kind of nice to see all of us on the Board here stressing some of the same themes. We will never get all the funding we need, and as Americans, if we ever did, we'd immediately raise the bar and come up with more initiatives we need to get more funding, we need more things to do. We have to be able to figure out the good enough solution and how do we prioritize these with the funding that we think we're going to be able to get, where do we apply that in a prioritized integrated manner, and then for those problems that we brought up in the last couple of days that we don't think maybe are going to ever meet the cut line. How can we find other people to help contribute to that, other ways of thinking out of the box to have somebody else fund it, or what are the cheaper versions or the good enough solutions to still handle that objective, we've got to be able to handle these issues? It might not be the way we want, it

might be the good enough solution, just barely, and that's what we've got to be ready to do, because sometimes the funding is not going to come.

MORPHOS-3D. I don't know much about it and probably wouldn't know it if I saw it, but from a modeling perspective, I've heard two or three different briefs in the last couple days where we built something that didn't work the way we wanted to, and we had to either fix it earlier, or in one instance we actually went in and started fixing something before we really knew what the proximate cause was. We've got to do a better job at having a good model to do this. It sounds like this is the way, and I'm going to ask the leadership peers, I don't know what the solution is, but the same thing that I said on funding, how can we find a way to make this come to fruition here? Maybe we don't get everything we want, but it's somehow a bite size approach to be able to say let's put some modules on the ground, keep having more options that we buy if more funding becomes available, but let's figure out the modeling piece.

Several of us have talked about communication. I won't repeat what anybody said, but how do you solve that now? What do you we do on training? As engineers and scientists we are terrible communicators. We talk normally in terms nobody knows. I've been writing down acronyms up here for two days because this is another whole different culture, in coastal engineering, acronyms that I have not used. What's the strategic communications plan, what talking points do we have that either the CERB puts out or different agencies put out, so we can all be collectively saying the same message out to the communities.

The last thing is, is there a holistic integrated plan? We had many, many different briefings, not any briefing had every single player involved, some had two thirds, one half, some were only one or two players in it, but a lot of different initiatives, a lot of different briefings. The question is, when you look at where the regions that we're all dealing with, what are the functions we're dealing with, how much redundancy do we have in the things that you're all working, and if we do have a shortage of funding, is there a way that somehow we can even merge some of these things together to say let's focus on the most important ones.

One of my biggest concerns, ever, is not necessarily when we have redundancy, redundancy's good a lot of the times, to have us check and double check. Where's the gaps, where's the one or two things we aren't doing at all? Then, if we figure out what are the goals and objectives are, how we can collectively accomplish what we want to go to be able to meet our vision, somewhere, how do we figure out how to apply your time, your resources, external funding, priorities, leadership, initiative, service, to be able to somehow hit the critical ones and if we need to leave a couple for next year then we need to know what are they and maybe we all get on the same sheet of music and say these are ones we can take some degree of risk in for a short term to focus on those other ones that are priorities, initial perceptions.

MG Don T. Riley. I certainly say Amen to all of that, and what we've heard. A couple of points, certainly our inspection of completed work, which we've requested in our upcoming budget, in '08, there is some additional funding for that, too, for the purpose of initially getting at the levees around the Country, but also there is a major component of our beach, shore beach protection infrastructure that we need to include in that program.

As well, I want to emphasize this idea of risk-based design and the risk-based approach to communications to the public. We've got to figure that out in a way that makes sense to the public and they believe it. In our project formulation, how we develop all our alternatives and we select all our alternatives and we articulate that recommendation to the leadership based on risk and the description of the uncertainty and the consequences that they're there if an alternative is not selected.

Lastly, I think the standardization of procedures throughout the Corps is important. We are getting much better than they were just a handful of years ago when I first commanded the Division, a little more than four years ago. I've seen a lot more standardization and we've got some guidance out there that will be updated even further, and that is, I think that's important, but, to come up to these standard models would be very, very important to us.

Lastly, the Chief and we published the Twelve Actions for Change last August. It has been mentioned a couple times during the presentations. It is heartening to see in our presentations here in the last couple of days that it reinforces a lot of those twelve actions for change. Also, looking at it from the other angle, those twelve actions incorporate nearly all of the recommendations that have been made over the last couple of days. What those are is a priority focus for us, so we've requested funding, we're looking forward in '07, we're requesting funding in '08 in our budget to really put money where our mouth is and not just, not just we need to make change, we've got efforts undergoing to implement those.

BG Riley thanked the participants, the North Atlantic Division, New York District, Joan Pope, Charles Chesnutt, and the ERDC staff for their efforts in putting the conference together.

The 82nd meeting of the Board on Coastal Engineering was adjourned.

Appendix A

**82nd Coastal Engineering Research Board Meeting
Executive Session
Long Branch, NJ
11-13 October 2006**

ACTIONS

Action Items – Activities primarily executed by CERB staff to promote business of the CERB
Just do it – Activities facilitated by CERB staff, but requiring no consequential follow up by CERB.
Strategic Directions – Activities requiring longer term engagement of the CERB.

Number	Action Item Description	“Just Do It” Description	Strategic Directions Description
82-1	Obtain directive from HQ to USACE MSCs/FOAs to promote Regional investment/commitment to engage in IOOS. Promote awareness of Ocean Action Plan.		
82-2	Review USACE practices for all ocean instrumentation, including temporary reimbursable funded gages, for ease of incorporation into IOOS (standards archiving process, general access).		
82-3	Revisit CEM management structure to include a broader advisory team and identify needed updates, including input from CERB.		
82-4	Explore funding operations for FY07 and FY08 to continue MORPHOS 3-D.		
82-5	Develop an appropriate environmental protocol and performance assessment metrics for monitoring beach restoration projects.		
82-6	Present MORPHOS 3-D to other Federal agencies.		
82-7	MG Riley and 1 civilian member to brief Chief on Response to Charge.		
82-8	Issue a permanent invitation for Federal “observer” representative from other related ocean agencies (NOAA, Navy, USGS) to attend each Board meeting.		
82-9	CERB to review Dutch systems approach for coastal flood risk management and make recommendation as to US applications. Spring 2006 CERB Executive Working Session.		

Number	Action Item Description	“Just Do It” Description	Strategic Directions Description
82-10		Review HQ, USACE Guidance Update Management Process (GUMP) and internal management structure. Brief DCW.	
82-11		Examine funding options for monitoring and evaluation of beach restoration projects	
82-12		Provide MG Riley’s staff with MORPHOS slides to incorporate in presentation on Flood Risk.	
82-13		Guarantee Alaska District is investigating energies in IOOS for their areas.	
82-14		Send proposed response to Chief’s Charge to CERB for review.	
82-15		For subsequent meetings, include key maps in books and provide guidelines to presenters.	
82-16		Send out draft set of Action Items to CERB for review and include review of Action Items at beginning of next CERB.	

Number	Action Item Description	“Just Do It” Description	Strategic Directions Description
82-17			CERB should be engaged in reviewing outcomes of IPET and the sequential 12 Actions for Change. Consider adaptive engineering and also project formulation to address the unforeseeable.
82-18			Encourage next version of Ocean Action Plan to define as part of next implementation the idea of watershed demo to manage regulatory and project related interactions in light of National Research Council Sheltered Coast Report.
82-19			Work with Environmental Advisory Board, Council on Environmental Quality, and Subcommittee on the Integration and Management of Ocean Resources to standardize environmental data collection protocols across the government.
82-20			General CERB theme for next few years should be Systems Based Approach. Start by addressing risk and performance. Whittle away on other issues that relate to installing a systems approach in future meetings.

Appendix B

Response to the Chief's Charge to the Coastal Engineering Research Board

This response builds upon our strength, the Regional Sediment Management Program – the expression of the watershed approach in the coastal zone. The U.S. Commission on Ocean Policy recognized this effort in devoting an entire chapter to this comprehensive, holistic, large-scale approach.

As requested, we propose a strategy to guide the Corps support of the President's Ocean Action Plan for implementing some of the recommendations of the Commission: to build a culture of integrated multi-dimensional collaboration throughout of the Corps.

Finally, we look in some detail at what that collaboration looks like within the Corps process of conducting our work in the coastal zone – a process that focuses on the life-cycle of regional sediment management as opposed to the life-cycle of individual projects within the system/region.

Regional Sediment Management

Ecosystems are sustained and controlled to a very large extent by the physical systems that they exist within; namely the meteorological, oceanographic, and hydrogeomorphological systems. Systems of engineering works set within and in some cases modifying those physical systems also have an affect to varying extents on ecosystem sustainability and control. We know that where, to what depth and width, and how we dredge, as well as how we place dredged sediment resources, affects hydrodynamic conditions locally and regionally. The effects can be short-term in duration, but in some cases, long-term.

The Corps and the U.S. Geological Survey (USGS) have worked collaboratively to better define “sediment systems” as part of our Regional Sediment Management (RSM) Demonstration Program and National Shoreline Management Study activities. In fact, perhaps the Corps' greatest contribution to the President's developing Ocean Action Agenda will be to share what we are learning on how to manage sediment on large scales as an analogous concept to managing ecosystems on a large scale.

The development of RSM operating principles regionally and nationally and the measurement of our performance in implementing those principles will greatly advance the RSM concept.

The Coastal Engineering Research Board (CERB) recommends that the Corps aggressively pursue the further development and implementation of RSM concepts and procedures and rapidly increase the number of agencies and stakeholders engaged with us in implementation.

The U.S. Commission on Ocean Policy highlighted the need for other agencies to organize their efforts along the lines of watersheds and ecosystems, as obviously the Corps has done for some time. The Corps is well poised to demonstrate to others the process of “thinking” and “acting” on regional scales.

Collaboration

From the earliest stages in implementing RSM within the Corps, the need for extensive and intensive collaboration was glaringly obvious. Collaboration itself is a multi-dimensional concept that must be studied and applied holistically if we are to manage sediments, watersheds, and ecosystems holistically.

First, we must consider with whom we will be collaborating. How we work with other Federal agencies is different from how we will partner with individual states and more importantly, alliances of state governors. Furthermore, the challenges are even more complicated as we reach out to non-governmental entities. The Corps' formal, corporate partnership with USGS can be used as a model for our relationships with even more Federal agencies. In the coastal zone, such intense relationship-growing needs to occur with the National Oceanographic and Atmospheric Administration (NOAA) and the U.S. Navy (both the operational side, with the Office of the Oceanographer of the Navy, and the research side, with the Office of Naval Research). The National Ocean Service of NOAA has already expressed interest in heavy integration of our programs and our long-term relationship with the Navy could easily be expanded to the next level.

The CERB recommends that the Corps immediately formalize and broaden its corporate involvement with USGS, NOAA and the Navy and follow that with similar programs with Minerals Management Service, Fish and Wildlife Service, National Park Service, Environmental Protection Agency, US Coast Guard, and FEMA.

The CERB recommends that each of the major offices (HQ, MSCs, Districts, Laboratories) of the Corps formalize their collaboration process: setting goals, objectives, and desired outcomes for their collaborative interactions and reviewing their achievement of outcomes periodically. We need to launch a corporate effort to implement collaboration the way we launched the Project Management Business Process – with a strong corporate statement of commitment and an aggressive training program.

The CERB recommends that RSM become embedded in Federal policy, regulations, and guidelines for planning, designing, constructing, operating and maintaining, and adaptive management of our Nation's existing and future water resources programs and projects. We must conduct systematic review of RSM opportunities in these arenas, and proactively establish activities within existing authorities and budgets to deliver RSM products that our Nation values and expects.

The Corps has taken a leadership role in creating and energizing the Committee on Marine Transportation. The Corps and the Assistant Secretary's office have played supportive roles on the policy side of the Ocean Governance Structure as well, with representatives on the Interagency Committee on Ocean Science and Resource Management (ICOSRMI), Joint Subcommittee on Ocean Science and Technology (JSOST), Subcommittee on Integrated Management of Ocean Resources (SIMOR), and the working groups under both JSOST and SIMOR. Furthermore, Corps field offices have actions assigned to them under the President's Ocean Action Plan. These actions are all appropriate, but still require integration of those activities throughout within the Corps.

The CERB recommends that Corps leadership take steps to integrate and coordinate all of its underway activities under the President's Ocean Action Plan to maximize its contributions with the limited resources available for these activities.

One of the emerging phenomena from the Commission on Ocean Policy report is the alliance-forming among governors within a region. Off to the fastest start is the Gulf of Mexico Alliance, supported by a strong support program at the Federal level headed by NOAA and Environmental Protection Agency (EPA). Similar alliances are developing in New England and the Great Lakes besides the fact that in many ways California is a region in itself and is launching bold new initiatives in the ocean. In recent months, talks of similar efforts in the Atlantic southeast and the Pacific northwest have begun.

The CERB recommends that Major Subordinate Command (MSC) commanders aggressively pursue the formation of these alliances and actively lead the Federal support of these alliances. The President and the Congress seem to be especially responsive to what the Nation's Governors are saying and alliances of Governors seem to be driving the National agenda.

There are already a number of outstanding examples of collaboration at the National/corporate level, e.g., the Memorandum of Understanding (MOU) with USGS. The Corps is also a strong supporter of the Gulf of Mexico Alliance of Governors, e.g., Southwest Division (SWD) participated in the meeting of the alliance members in Corpus Christi in March, and the Gulf of Mexico (GoMex) RSM initiative has been an active player at the staff level. Many districts have collaborative projects with The Nature Conservancy. Portland District (NWP) has made collaborative process the foundation of its RSM demonstration effort at the Mouth of the Columbia. The US Army Engineer Research and Development Center (ERDC) is collaborating with Navy, NOAA, USGS, and National Aeronautics and Space Administration (NASA) on coastal mapping and the ERDC Coastal and Hydraulics Laboratory (CHL)/Scripps Wave Gaging Program is a building block for the Integrated Ocean Observing System (IOOS). What is needed is to integrate of all these collaborative efforts so that we achieve synergy internally amongst all the Corps offices.

The CERB recommends that USACE create a corporate mechanism among its Headquarters, Division, District and Laboratory offices to create synergy, increase coordination, and share lessons learned on collaborative processes.

The Life-Cycle of Holistic Management of Coastal Sediment Systems and Watersheds

The systems approach requires that we define an appropriate life-cycle for this large-scale, long-term, holistic analysis of coastal sediment systems and inland watersheds, considering multiple water resources development objectives. Without large data bases of multi-disciplinary information, uncertainties and probabilities of physical, chemical, and biological system variables cannot be properly quantified, models that represent systems can't be run, regional/ecosystem policy can't be developed, large-scale engineering solutions can't be derived, and multi-account benefits analyses and risk assessments can't be calculated.

1. Data Collection, Management, and Archiving

The IOOS offers one of the greatest payoffs to the Corps for its involvement and investment in the interagency activities initiated by the National Oceanographic Partnership Program and now managed through the new ocean governance structure. Our financial contribution is the network of wave gages that our Coastal Field Data Collection program supports. Our 25-year history of data collection, management, and archiving of wave, water level, current, and wind data at our Field Research Facility has established the Corps as a major data technology source. If we are to expand our limited network to support the ten major IOOS regions, we must begin to increase our investment in gages. Further, because the National Weather Service's National Data Buoy Center has substantial wave measurement assets but no perceived mission to provide the high resolution wave energy and direction data required to support effective RSM, the Corps needs to work closely with NOAA leadership and regional associations to make these quality observations part of the IOOS mandate. As the Corps invests in water-related data, the Corps benefits from the other types of data that will be collected by others in the IOOS. We stand to benefit greatly from the data to be collected by others, in that our need to collect such data can be at least minimized, if not eliminated.

The collaborative effort to operate a coastal mapping system with the Navy and NOAA and then to closely coordinate shoreline mapping with USGS and NASA is the best example of the way ahead for

all the programs. This must be continued. Furthermore, the data fusion, management, and archiving activities with NOAA's Coastal Service Center are an outstanding start for collaboration in data management. This needs to be expanded.

The Corps needs to be a leader among the science and resource agencies to implement IOOS and to build linked Geographical Information Systems. As a potential major user of their products, we can make their efforts more relevant to the user communities and more robust in the kind of data we need. The Corps needs to actively support the creation and/or expansion of other agencies' data bases and establish seamless links to those data bases to speed the transfer to Corps engineers, economists, physical scientists, environmental scientists, and program/project managers. To make this occur, the Corps must adopt the systematic integration of field data collection activities within existing and future program and project authorities and budgets, so that on watershed basin scales, data is properly inventoried, organized, and made accessible by practitioners, experts, researchers, academia, and the public.

2. Numerical Modeling of Physical Processes

The Corps has begun development of the MORPHOS three-dimensional (3-D) model, a numerical simulation of nearshore hydrodynamics and beach morphology. This open source modular suite of models and design tools represents the next generation of coastal engineering design and analysis technology that has been desperately needed for many years. In addition, through the National Ocean Partnership Program we are also supporting an interagency-funded study to develop a framework to link our nearshore sediment transport model with those of other agencies and to coordinate our model development so as to avoid duplication and to increase interoperability. These kinds of efforts need to be continued and expanded.

The JSOST has developed a Ten-Year Program for research relevant to all aspects of our nation's ocean activities. This has been heavily coordinated with the Ocean Research and Resources Advisory Panel (ORRAP) and the SIMOR. What is emerging is a clear statement of research needs and priorities for the future. The Corps ocean-related missions could all benefit from this aggressive program, but the Corps needs to play a strong role in guiding that research if it is to be truly relevant to real-world operational needs. The Corps must strategically and corporately engage in fostering and guiding this research program.

3. Science-based, goal-oriented policy development on a National Scale

One of the clear lessons learned out of the Katrina experience is the lack of a comprehensive, coordinated national policy of mitigating and minimizing the flood and coastal storm inundation hazards. Clear policy goals must be established and these goals must be based upon a rational understanding of science and engineering.

The Corps needs to take a proactive role in presenting the science and engineering related to floods and coastal storms to the public and other Federal agencies and to accurately portray the contribution that structural and non-structural engineering works, as well as coastal geomorphological features, can make to reducing and/or managing the risks associated with such events to people, the economy, and environment.

4. Engineering physical systems for optimal use and replenishment

The end of the life-cycle is the engineering application of data, numerical models of physical processes, and rational national policy to the operation of estuarine and coastal sediment systems so as to advance the full utilization of our natural resources and the replenishment of living resources within them.

While this is not separately stated as a Corps mission, it is the obvious summation of all of our seemingly disparate missions. The leadership should proactively seek to infuse this ethic into all of our Civil Works Program.

5. Trade-off Analyses/Risk Assessment/Benefit Optimization

With the strong focus on systems engineering and collaboration, we also need to advance our capability to analyze the disparate risk exposure / risk reduction potential to, and benefits of National Economic Development, Regional Economic Development, Environmental Quality, and Other Social Effects and to achieve this with a focus on a common measure of quality of life as opposed to strictly monetary metrics. This requires that we move quickly to measure and analyze the environmental risk reduction potential and benefits of the broad effects we can achieve under the RSM efforts, which implies that we must be as concerned with environmental protection and conservation as we have been with avoiding negative impacts. Which is to say that our project and system monitoring must be as concerned with risk exposure identification, risk reduction potential, and benefits, as it is with physical performance and that our measurements must include all categories within each account. The research and development program needs to embark deliberately on a course to develop risk assessment and benefits analysis tools which are multi-dimensional if we are to effectively implement a systems engineering approach in coastal sediment systems and inland watersheds.

Implied within a systems approach is the necessity to make adjustments within and among projects in response to changing conditions and new information over the project life. Such flexible and proactive practices are needed to achieve adequate and consistent project performance as well as greater national security, larger economic enhancements, and environmental protection/conservation. This entails Adaptive Engineering to modify physical performance of individual projects and adjacent projects within a system and Adaptive Management to extend and expand economic and environmental benefits. The research and development program needs to quickly move to define and develop methods and tools to promote the use of Adaptive Engineering and Adaptive Management as necessary tools in the expansion of the “Systems Approach” to all aspects of the Corps work.

Appendix C

Biographies of Board and Speakers/Authors

Santiago Alfageme

Mr. Alfageme is a senior coastal engineer with Moffatt & Nichol in their New York office. He holds an M.S. degree in coastal and oceanographic engineering from the University of Florida and a civil engineering degree from the University of Cantabria, Spain. His graduate research centered on modeling of nearshore wave propagation and hydrodynamics. After graduating from the University of Florida, Mr. Alfageme joined Coastal Systems International in Miami, FL, where he worked on numerous coastal engineering projects throughout Florida and the Caribbean. Since joining Moffatt & Nichol in 1998, Mr. Alfageme's work has focused on planning, design, and implementation of coastal protection, navigation, and ecosystem restoration projects. His principal interest is on the development and application of state-of-the-art numerical models.

Jeff Benoit

Mr. Benoit is currently the Director of Coastal and Ocean Programs at SRA International, located in Arlington, VA. He has over 28 years of national and international experience and leadership in coastal management and marine conservation. He served for over seven years as Director of the National Oceanic and Atmospheric Administration's (NOAA) Office of Ocean and Coastal Resource Management (OCRM) from 1993 to 2001. As the OCRM Director, he led three national programs for coastal and marine stewardship including, National Coastal Zone Management, National Estuarine Research Reserves, and National Marine Sanctuaries. During his tenure at NOAA, Mr. Benoit worked closely with senior Administration officials across the Federal government and was often called on to brief Congressional staff and to testify before Congress.

Mr. Benoit has exceptional knowledge and understanding of the coastal management community as a whole with particular emphasis on state programs, having worked for the Massachusetts Coastal Zone Management Program for 15 years, including 4 years as the Director prior to joining NOAA. Since leaving NOAA in 2001, Mr. Benoit has remained involved with coastal management issues as a consultant with clients including the U.S. Commission on Ocean Policy, the World Bank, the Indiana Coastal Management Program, U.S. Marine Mammal Commission, and NOAA. Mr. Benoit is also active with the Coastal and Ocean Policy Roundtable, and served on the National Academy of Sciences, Ocean

Study Board Committee Reviewing the Restoration of Coastal Louisiana (2002-2005) and is currently Chair of the Committee on Mitigation of Erosion of Sheltered Coasts.

Mr. Benoit earned a Bachelor of Science degree in marine geology from Southampton College and a Master's degree in geophysical science from the Georgia Institute of Technology/Skidaway Institute of Oceanography.

Lynn Marie Bocamazo

Ms. Bocamazo is the senior coastal engineer for the U.S. Army Engineer District, New York. Her principal coastal engineering work has been on storm damage reduction and coastal inlet navigation projects on Long Island, New York, and New Jersey. Since 1996, as senior coastal engineer, Ms. Bocamazo assists the Chief, Engineering Division, as the coastal engineering expert for the New York District. Ms. Bocamazo is a member of the American Society of Civil Engineers' Coastal Engineering Practice Committee and is currently the leader of the Corp's Coastal Community of Practice. She is a licensed professional engineer in the state of New York.

Mark H. Burlas

Mr. has 19 years experience with the US Army Corps of Engineers. As a senior wildlife biologist, Mr. Burlas has 15 years experience with the New York District's Planning Division. He is the technical environmental manager of the multi-year, multi-million dollar Biological Monitoring Program that looked at the affects of beach nourishment to biological resources along the Atlantic Coast of New Jersey. This study is one of the largest biological monitoring efforts undertaken by the Corps of Engineers. Mr. Burlas also is responsible for oversight and preparation of Civil Works (Shore Protection, Flood Control, Navigation and Ecosystem Restoration Projects) and Military Construction NEPA documents, studies to assess impacts, regulatory compliance and development of ecological mitigation. In addition, Mr. Burlas served 4 years active duty as a combat engineer with the 27th Engineer Battalion (Combat) (Airborne) Fort Bragg, NC.

Monica A. Chasten

Ms. Chasten is a hydraulic engineer with the U.S. Army Corps of Engineers, Philadelphia District, Engineering and Construction Division in the Hydrology, Hydraulics and Coastal Section. She has over 20 years of experience with hydraulic and coastal engineering projects specializing in such areas

as beach nourishment, inlet analysis, regional sediment management, small boat harbor design, coastal structures, and coastal project monitoring and performance analyses. Ms. Chasten's current responsibilities include evaluating the performance of numerous shore protection projects including the Ocean City, NJ, and Absecon Island, NJ, beach nourishment projects and serving as a technical lead for the District's Regional Sediment Management Program. She began her career with the Philadelphia District in 1983 as an engineering student trainee, was employed as a hydraulic engineer from 1989 to 1993 at the U.S. Army Engineer Waterways Experiment Station, Coastal Engineering Research Center, and returned to the Philadelphia District in 1993. Ms. Chasten received a B.S. degree in civil engineering from Drexel University in 1987 and an M.S. degree in hydraulic and coastal engineering from Lehigh University in 1989.

Lawrence J. Cocchieri

Mr. Cocchieri is the Planning Program Manager in the Program Management Directorate at the North Atlantic Division (NAD) of the U.S. Army Corps of Engineers (USACE). He provides water resources planning and policy guidance to the five civil works districts within NAD. Mr. Cocchieri participated on the Headquarters USACE Planning Capability Task Force which reignited planner training and development Corps wide. Mr. Cocchieri has directed and facilitated Planning Lessons Learned Workshops throughout the NAD region.

Mr. Cocchieri is the Deputy Director of the National Planning Center of Expertise for Coastal Storm Damage Reduction (PCX-CSTRD). He directs the PCX-CSTRD's daily activities and travels Corps wide communicating the PCX's capabilities. Mr. Cocchieri is also the Team Leader of the NAD Regional Sediment Management (RSM) Initiative. He directs NAD's RSM approach and communicates it Corps wide.

Since joining the Corps team in 1986, Mr. Cocchieri has had a long career in Civil Works Water Resources Planning. He has lead, formulated and/or provided policy guidance to a diverse range of efforts including coastal storm damage reduction, navigation, flood damage reduction and environmental restoration.

Mr. Cocchieri is a graduate of Manhattan College, New York, receiving a Bachelor of Engineering degree in chemical engineering in May 1985 and then a Master of Business Administration (MBA) in management in 1993. He completed the Army's Career Program for Engineers and Scientists Leadership Development Program (LDP) in 2002. As part of the LDP, Mr. Cocchieri attended the Army Management Staff College, completing the Sustaining Base Leadership and Management Program in April 2001.

Stephen Couch

Mr. Couch is a team leader within the Coastal Section of the Planning Division, New York District. He has 12 years of experience, working as a planner and project manager for a number of Coastal Storm Damage Reduction Projects, and Coastal Ecosystem Restoration Projects on Long Island, NY. Mr. Couch is also actively involved in the Coastal Storm Damage Reduction Planning Center of Expertise.

William R. Curtis

Mr. Curtis is a Research Oceanographer at the U.S. Army Engineer Research and Development Center's Coastal and Hydraulics Laboratory. He is an Associate Technical Director, where he supports the Technical Programs Office on issues as they relate to the Corps' Flood and Coastal Storm Damage Reduction (FCSDR) business-line, including program management, technology development, technology support, and technology transfer. Mr. Curtis manages the FCSDR R&D and the Shore Protection Shore Protection Assessment programs. Prior to his assignment in the Technical Programs Office in 2005, Mr. Curtis was Group Leader of the Evaluation and Design Group of the Coastal Engineering Branch. Mr. Curtis is a native of Massachusetts and received his Bachelor of Science degree in marine science from Texas A&M University in 1987. He received a Master of Science degree in physical oceanography in 1992.

Susan E. Durden

Ms. Durden currently works as a senior economist with the Institute for Water Resources (IWR) of the Corps of Engineers. IWR is located at the Humphreys Engineering Center in Alexandria, VA. IWR is the social science research organization for the Corps of Engineers. She has degrees in economics and education with post-graduate training in facilitation, environmental issue resolution, strategic planning and communications. Her experience includes working for the Corps of Engineers at Savannah District (South Atlantic Division), Baltimore District (North Atlantic Division) and Nashville District (Lower Rivers Division). She was Chief of Economics in the Baltimore District and worked extensively with the Office of the Assistant Secretary of the Army for Civil Works. In addition to her tenure with the Corps of Engineers, Ms. Durden was the Eastern and Great Lakes U. S. Regional Manager for the National Marine Sanctuary and National Estuarine Research Reserves programs at the National Oceanic and Atmospheric Administration Headquarters. She worked as an economic development and grant specialist at the

Northwest Alabama Council of Local Governments and has taught as an adjunct faculty member at several colleges and universities. Major technical interests include: communicating science to the public, partnerships with non-traditional customers, quality of life as a metric and models as tools in decision making. Ms. Durden serves as a mentor and works with several organizations to promote interest in science and math among girls.

Brian K. Harper

Mr. Harper is a senior economist at the U.S. Army Corps of Engineers, Institute for Water Resources (IWR), and is managing the economic analysis portion of the Shore Protection Assessment (SPA) study. Mr. Harper has been with the Corps for 17 years, working in the Los Angeles, Little Rock, and Alaska Districts prior to his arrival at IWR in 2006. Mr. Harper's current research interests are in the risk and reliability of coastal structures. He is involved in storm damage reduction studies in Louisiana and Florida, as well as an effort to develop modeling tools to evaluate the performance of breakwaters, revetments and jetties. Mr. Harper's other work includes studies of the economic impacts of commercial fishing harbors, coastal erosion projects in an arctic environment, riverine flooding, hydropower, and inland navigation projects.

Roselle Henn

Ms. Henn has over 20 years experience as Section Chief and Environmental Team Leader in the New York District. She is the lead for NEPA and other compliance requirements for coastal Civil Works projects in addition to other ecosystem restoration and multi-purpose projects. She is also District liaison to The Nature Conservancy (TNC) and North Atlantic Division Liaison to TNC's Northeast Region and project manager for New York District's Brownfield Program. Ms. Henn has a MPhD in anthropology/archaeology from the City University of New York, and a B.A. degree in anthropology/archaeology from New York University.

Linda K. Lent

Ms. Lent has more than 25 years of experience in providing economic support to all levels of government as well as in the private sector. With extensive experience in water resource areas, Ms. Lent has traveled nationally both undertaking projects and disseminating information on the measurement of costs and benefits at the Federal, state and local levels. Ms. Lent has directed project efforts for the U.S.

Army Corps of Engineers in the Baltimore, Philadelphia, Los Angeles, and Seattle, and Pacific Divisions from New York to Hawaii. She has undertaken analyses for state and local governments in Delaware, Hampton Roads, Virginia Beach, North Carolina and Florida. She has undertaken projects for the Federal Emergency Management Agency, Health and Human Services, Departments of Commerce, Energy, Transportation and Labor. Ms. Lent is currently involved in several national projects. At the Institute of Water Resources she is the lead researcher in the economic assessment of hurricane project performance in Florida during the '04 hurricane season. For the National Shoreline Management Study, she is co-lead for the Economic Work Unit. She was an adviser in developing the work plan for the post Katrina hurricane system performance analysis and is providing support for the rewrite of the National Economic Development manual for coastal projects. Other recent activities include reassessing the economics of State of Delaware's shore protection plan and developing a system for allocating local nourishment cost shares based on the incidence of economic benefits to local segments of the Delaware economy.

Dr. Joan Oltman-Shay

Dr. Oltman-Shay is a Senior Research Scientist and President of NorthWest Research Associates (NWRA), which is a group of 74 Earth scientists and support staff performing basic and applied research. Dr. Oltman-Shay is also an Affiliate of the School of Oceanography (University of Washington). She received her B.S. degree in Applied Physics/Electrical Engineering from the University of California at San Diego and M.S. and Ph.D. degrees in Applied Ocean Sciences and Oceanography from Scripps Institution of Oceanography (SIO), La Jolla, CA. She studied under William Hodgekiss (Marine Physical Laboratory, SIO) and Dr. Robert T. Guza (Center for Coastal Studies, SIO).

Since graduating from Scripps in 1986, she has spent most of her career performing field and model studies of nearshore (shoreline to nominally 10-m depth) wave and current dynamics and the interplay with morphology and sediment dynamics. Much of her work has centered on the analysis of data from insitu arrays of pressure and current sensors designed to study the surface gravity (wind and infragravity) wave field and the wave-averaged current field. Significant results from those efforts are - the recognition that infragravity waves are ubiquitous with kinematics that agree with theory, and the discovery of shear instability waves of longshore-directed currents. Early in her career, she designed the USACE 8-m-depth wave-directional array and analysis software for the Field Research Facility in Duck, NC, which remains operational today. Her present focus of activity includes remote sensing of nearshore environmental parameters (satellite, airborne, and land-based). She has published over 50 refereed articles, technical reports, and conference papers on these and related topics.

Dr. Oltman-Shay sits on several national and international boards, including the USACE Coastal Engineering Research Board (CERB), the National Academies Ocean Studies Board (OSB), and the Editorial Advisory Board for Elsevier Publications. She has served as Associate Editor for JGR Oceans, and is presently the U.S. Series Editor for the Nearshore and Coastal Oceanography journal (Elsevier Science Publications). Dr. Oltman-Shay is a member of The Oceanography Society, the American Meteorological Society, the Geological Society of America, and the American Geophysical Union. She has additionally served on several national-level committees that develop recommendations on various aspects of coastal science and research. Significant National Academies Press publications from those efforts are – “Enabling Ocean Research in the 21st Century: Implementation of a Network of Ocean Observatories,” (2003) “Science for Decisionmaking: Coastal and Marine Geology at the U.S. Geological Survey,” (1999), “Oceanography and Naval Special Warfare: Opportunities and Challenges,” (1997), “Priorities for Coastal Ecosystem Science,” (1994).

Congressman Frank Pallone, Jr.

On January 4, Frank Pallone, Jr., was officially sworn in for his ninth full term in the U.S. House of Representatives. Pallone represents New Jersey’s Sixth Congressional District, which covers most of Middlesex County, as well as the Bayshore and oceanfront areas of Monmouth County, the township of Plainfield in Union County and Franklin in Somerset County.

As the 109th Congress begins, Pallone continues to serve as a senior member of the House Energy and Commerce Committee, which has jurisdiction over issues pertaining to energy, environment, health care, commerce and telecommunications. Pallone serves on three of the committee’s subcommittees: Health Care, Environment and Hazardous Materials, and Telecommunications and the Internet. Pallone also continues to serve on the House Resources Committee, and as the ranking Democrat on its Fisheries, Wildlife and Oceans Subcommittee.

Pallone holds important leadership positions within the House Democratic Caucus. The New Jersey congressman plays a vital role in developing and implementing the Democratic Party’s message as the Communications Chairman of the Democratic Policy Committee. In this capacity, Pallone coordinates the party’s message on the floor of the House of Representatives. Since 1995, Pallone has been a co-chairman of both the Democratic Task Force on Health Care Reform and the House Democratic Environmental Task Force, playing a major role in shaping the party’s agenda on these issues.

Throughout his tenure in Congress, Pallone’s legislative accomplishments have been geared to the protection and restoration of environmental resources and the creation of new job opportunities. Pallone has successfully worked to stop ocean dumping and offshore oil and gas drilling. He has

obtained millions of dollars for shore protection and beach replenishment work along a large stretch of the Jersey Coast, for dredging of the area's navigation channels and for the maintenance of his district's National Recreation Area, Sandy Hook. He has also championed issues important to the state's commercial and recreational fishing industries. Pallone co-chairs the locally based Save Our Fort Committee, which he helped to form, to have additional Defense technology commands consolidated at Fort Monmouth.

Pallone is recognized as a leader on such issues as expanding health care access and affordability, protecting the integrity of the Medicare and Medicaid programs, ensuring food safety, strengthening the federal Superfund program to clean up toxic waste sites, and strengthening the nation's clean water laws.

Frank Pallone, Jr., was born on October 30, 1951, in Long Branch, New Jersey, where he grew up and where he still resides. The son of a policeman, Pallone attended the local public schools and earned an academic scholarship to Middlebury College. After graduating *cum laude* from Middlebury in 1973, Pallone received his master's degree in international relations at the Fletcher School of Law and Diplomacy at Tufts University. He earned his law degree at Rutgers University in 1978, and has been admitted to the bar in four states: New Jersey, New York, Pennsylvania and Florida.

Pallone began his political career in his home city of Long Branch, getting elected to the City Council in 1982 and winning re-election four years later. In 1983, Pallone was elected to the state Senate, representing the Monmouth County coastline. He was re-elected in 1987. During his tenure in the state Legislature, Pallone distinguished himself as an advocate for environmental issues and senior citizen concerns, and made a major priority of providing constituent services.

On November 8, 1988, at the age of 37, Frank Pallone, Jr., was elected to the House of Representatives from New Jersey's former Third District, encompassing parts of Monmouth and Ocean counties. In March 1992, a new Congressional district map for New Jersey was adopted. Portions of the former Third District were merged with parts of two other districts to create the Sixth Congressional District, taking in large portions of Middlesex and Monmouth counties. Pallone was first elected to the Sixth District seat in November 1992.

Pallone's Central Jersey district is an ethnically diverse area with a wide range of business and industry. Light and heavy manufacturing facilities provide jobs for thousands of area residents. Central Jersey is on the cutting edge of high technology research and development. The district is home to Rutgers, the State University of New Jersey. Tourism, primarily centered in the coastal areas, is vital to the regional economy. The Army's Fort Monmouth, a major civilian employer in its own right, has spurred the growth of the region's significant high technology industry. Naval Weapons Station Earle adds to the important role played by the Defense Department in the area economy. While the district has

a predominantly suburban character, the cities of New Brunswick, Asbury Park and Long Branch are key urban centers.

Todd Pover

Mr. Pover is a biological assistant for the New Jersey Department of Environmental Protection, Division of Fish and Wildlife, Endangered and Nongame Species Program. He has been working for the program for the past 10 years on a variety of coastal projects, including the past 6 years coordinating New Jersey's beach nesting bird project. Mr. Pover lives in Tuckerton, NJ.

Anthony P. Pratt

Mr. Pratt is the Program Administrator of the Shoreline and Waterway Management Section of the Delaware Department of Natural Resources and Environmental Control. He oversees programs related to beach construction regulation, technical engineering services, beach and dune building and maintenance, waterway management and coastal hazards mitigation. He is an Adjunct Assistant Professor in the Marine Policy Program of the Graduate College of Marine Studies, University of Delaware. He has served as Chairman of the Ad Hoc Committee on Beach Management/Sea Level Rise for Delaware's Environmental Legacy and as lead staff for Beaches 2000 Planning Group. He was a member of the National Governor's Association Committee on Global Change, the National Research Council Committee on Beach Nourishment and Protection, and the Delaware Beach Replenishment Task Force. He also served on the National Research Council Committee on Coastal Engineering Research and Education Needs, and the H. John Heinz III Center Panel on Risk Vulnerability and the True Costs of Coastal Hazards. Mr. Pratt serves as a Vice President of the American Shore and Beach Preservation Association, and is a member of the Coastal States Organization Coastal Hazards Committee. He has recently been asked by the U.S. Army Corps of Engineers to co-lead the writing group for the National Shoreline Management Study. He was the Deputy Mayor of the coastal community of Lewes, Delaware from 1992 to 1998. Mr. Pratt holds a Bachelor's degree (1975) from Hampshire College in Amherst, Massachusetts.

Patricia S. Rafferty

Ms. Rafferty is a coastal ecologist with the Northeast Region of the National Park Service (NPS). Ms. Rafferty provides technical expertise to Northeast Region National Park Service units that have coastal resources. In conjunction with Gateway National Recreation Area and Fire Island National Seashore, she has worked with the U.S. Army Corps of Engineers New York District on the restoration of marsh islands in Jamaica Bay and the Fire Island to Montauk Point Reformulation Study. Before joining NPS, Ms. Rafferty worked at the U.S. Geological Survey National Wetlands Research Center in Lafayette, LA, conducting research on plant ecology, salt marsh biogeochemistry and wetland restoration.

Dr. Donald T. Resio

Dr. Resio was appointed to the position of Senior Technologist (ST) in May 1994. This position represents the highest technical rank in the DoD civil service, with less than forty such positions authorized within the Army. Dr. Resio has been involved in performing and directing engineering and oceanographic research for over 30 years. He serves as the technical leader for the Coastal Military Engineering program and is the Technical Manager (TM) for a new Advanced Technology Concept Demonstration (ACTD) for military logistics. He also conducts/directs research that spans a wide range of environmental and engineering areas within the Corps Civil Works Program. In this capacity he directs the MORPHOS project aimed at improving the predictive state of the art for winds, waves, currents, surges, and coastal evolution due to storms. Most recently, Dr. Resio has been selected as the co-leader (with Professor Emeritus Robert Dean of the University of Florida) for the Interagency Performance Evaluation Taskforce (IPET) Task 5a (analysis of wave and surge effects, overtopping and related forces on levees during Katrina) and as the leader of the Risk Analysis team for the South Louisiana Hurricane Protection Project.

Dr. Resio's research areas include the development of innovative marine and coastal structures, meteorology and climatology, specialized environmental statistics (with a focus on extremal and multivariate methods), theoretical studies of surface gravity waves in deep and shallow water, development of numerical models for surface gravity waves in deep and shallow water, and coastal processes. He has published over 30 articles in leading international journals as well as over 100 reports and conference papers in these fields. Dr. Resio's experience includes 20 years of government service, 4 years as a professor at the Florida Institute of Technology, 2 years as a Vice President of Oceanweather, Inc., and 8 years as president of his own consulting company, Offshore & Coastal Technologies, Inc.

Dr. Resio earned his BA, MS, and PhD degrees at the University of Virginia, with the last of these awarded in 1974 in the field of Environmental Science: fluid dynamics. Dr. Resio has twice been a recipient of the Army's Research and Development Award and was the lead author of the Bronze Medallion Paper at the Army Science Conference in 2002. He has also been awarded the Department of Army's Meritorious Civilian Service Award and is on the Board of Directors for Engineering at the Florida Institute of Technology. He is the co-organizer of the annual Seabasing/Force Projection From the Sea R&D Symposium held in Duck, North Carolina. Dr. Resio is a member of several international working groups for waves research and is also the biannual co-organizer of the International Workshop on Wave Prediction and Hindcasting.

MG Don T. Riley

MG Riley assumed duties as the Director of Civil Works, Headquarters, U.S. Army Corps of Engineers on 1 July 2004. MG Riley came to the Directorate of Civil Works following command of the Mississippi Valley Division (MVD) in Vicksburg, MS, where he also served as President-designee of the Mississippi River Commission (MRC). Prior to commanding MVD, MG Riley served as the Deputy Chief of Staff, Engineer, Headquarters, U.S. Army Europe.

As the Director of Civil Works, MG Riley plays a vital role in managing the Corps \$5.0 billion annual Civil Works Program focused on meeting the Nation's water resources challenges.

MG Riley is a graduate of the United States Military Academy at West Point, NY, and was commissioned in the Corps of Engineers in 1973. He earned a master's degree in civil engineering from the University of California, Berkeley, and is a registered professional engineer in the state of California.

He is a graduate of the U.S. Army Command and General Staff College, School of Advanced Military Studies, and the United States Army War College.

MG Riley's troop assignments include duty as platoon leader, assistant, S-3, company executive officer, and company commander, 14th Engineer Battalion, Fort Ord, CA; Assistant Division Engineer and Chief, Plans and Exercises, G3, 3rd Armored Division; S-3, 23rd Engineer Battalion; Deputy G3, 5th Infantry Division; Commander, 7th Engineer Battalion, Fort Polk, LA; Commander, 17th Engineer Battalion, Fort Hood, TX; Chief, Plans and Exercises, G3, I Corps; Commander, 555th Engineer Group, Fort Lewis, WA; Director, Maneuver Support Battle Lab, Fort Leonard Wood, MO; and Executive Officer to the Commanding General, U.S. Army Training and Doctrine Command, Fort Monroe, VA.

In addition, MG Riley has served as Contract Construction Engineer for the Corps' Far East District in Korea. He also held the following positions at the United States Army Engineer Center,

Ft Belvoir, VA: Instructor; Aide-de-Camp to the Commanding General; Chief, Captain's Training Team, Directorate of Training and Doctrine; Instructor/Team Leader, Engineer Officer Advanced Course; and Chief, NCO Training Division, Department of Military Engineering.

BG Joseph Schroedel

BG Schroedel assumed command of the South Atlantic Division (SAD) on 21 August 2006. As SAD Commander, BG Schroedel oversees engineering, construction, and real estate activities for the Army and Air Force in the Southeastern United States, Latin America, and the Caribbean. He is also responsible for water resources development activities, which include management of major harbors, Federal navigable waterways, and multiple-purpose reservoirs.

BG Schroedel was born in Pennsylvania and grew up in an Air Force family. He was commissioned in the U.S. Army Corps of Engineers after graduating from the United States Military Academy in 1975. He holds three masters degrees: in Civil Engineering from the University of Illinois; in Military Art and Science from the School of Advanced Military Studies, U.S. Army Command and General Staff College; and in National Military Strategy from the National War College. He is also a licensed professional engineer in Virginia.

His command assignments include the U.S. Army Corps of Engineers South Pacific Division; the Engineer Brigade, 1st Infantry Division, Germany; the 1st Engineer Battalion, 1st Infantry Division, Ft Riley, Kansas; and A Company, 82d Engineer Battalion, 7th Engineer Brigade, VII Corps, Germany.

His other key assignments include Chief of Staff, U.S. Army Corps of Engineers, Washington, D.C.; Assistant Deputy Director of Operations, Joint Staff, Pentagon; Special Assistant to the Chairman of the Joint Chiefs of Staff; Pentagon; and Executive Officer to the Secretary of the Army, Pentagon.

His key operational assignments include Operation Pro Vida, Guatemala where he helped rebuild highway CA-9 and several bridges after the earthquake of 1976; Operation Allied Force in 1999, Macedonia where he developed the base camp development plans for operations in Kosovo; and Operation Iraqi Freedom in 2004, Baghdad, Iraq where he helped establish the Gulf Region Division that is currently managing the \$12 billion reconstruction program.

BG Todd T. Semonite

BG Semonite is the Commander and Division Engineer of the U.S. Army Corps of Engineers, North Atlantic Division (NAD). He assumed his post on 18 September 2006.

NAD is one of eight Corps of Engineers regions providing engineering and construction services to the nation. It is the Corps' regional business center in the Northeast and 51 other countries, with district offices on Concord, MA; New York City; Philadelphia, PA; Baltimore, MD; Norfolk, VA; and Wiesbaden, Germany.

As Division Commander, BG Semonite oversees the planning, design and construction of projects to support the military, protect America's water resources, and restore and enhance the environment within a 180,000 square mile area along the Atlantic coast, including 13 states from Maine to Virginia and the district of Columbia. He is also responsible for a variety of Division engineering and construction activities for international, Federal, state and local governments, and agencies in the United States and overseas.

Born and raised in Bellows Falls, VT, BG Semonite was commissioned into the Corps of Engineers upon graduation from the United States Military Academy in 1979.

His assignments include service as Company Executive Officer conducting Initial Entry Training, Aide-de-Camp to the Deputy and Commanding General, Platoon Leader, and Assistant S3, 5th Engineer Battalion, Fort Leonard Wood, Missouri; Adjutant, Company Commander, and S4, 94th Engineer Battalion, Darmstadt, Germany; Operations Officer for the Corps of Engineers Office, Fort Drum, New York; S4, 937th Engineer Group, Fort Riley, Kansas; S3 and Executive Officer, 1st Engineer Battalion, Fort Riley, Kansas; Construction and Design Supervisor, 416th ENCOM, Chicago, Illinois; Battalion Commander, 23rd Engineer Battalion, 1st Armored Division, Friedberg, Germany, with a deployment to Bosnia's Posavina Corridor from December 1995 to December 1996; Chief of Military Engineering and Topography, USAREUR-DCSENGR; and Chief of International Operations, DCSOPS-USAREUR. From 2000 to 2002, BG Semonite served as Commander of the 130th Engineer Brigade and the V Corps Engineer in Hanau, Germany, where he conducted preparation, training, and engagement operations for V Corps into Iraq. Following Brigade Command, BG Semonite served one year as Executive Officer to the Commanding General, USAREUR and 7th Army. From September 2003 to March 2004, he deployed to Iraq as the Deputy Commander of Task Force Restore Iraqi Electricity (RIE), responsible for designing and executing a \$1.1 billion reconstruction effort. Upon return, BG Semonite served for one year as Director, Office of the Chief of Engineers, HQDA, at the Pentagon. He assumed responsibility as the Assistant Commandant of the United States Army Engineer School on 25 May 2005.

BG Semonite is a graduate of the Engineer Officer Basic and Advanced Courses, the Combined Arms Services Staff School, the Command and General Staff College, and the United States Army War College. He has a Bachelor of Science degree in civil engineering from the United States Military Academy, a Master of Science in civil engineering from the University of Vermont, and a Masters of

Military Arts and Sciences from Fort Leavenworth. He is a registered professional engineer in Virginia and Vermont.

BG Semonite's awards include the Legion of Merit (3 Awards), Bronze Star, Meritorious Service Medal (7 Awards), Army Commendation Medal (3 Awards), Army Achievement Medal, Army Superior Unit Award (2 Awards), NATO award, Ranger tab, and Parachutist Badge.

Dr. Richard J. Seymour

Dr. Seymour received his B.S. degree from the U.S. Naval Academy in 1951 and his Ph.D. degree in Oceanography from the Scripps Institution of Oceanography of the University of California, San Diego, in 1974. He is currently Head, Ocean Engineering Research Group, University of California, San Diego, Scripps Institution of Oceanography. From 1990 – 1997 and concurrent with his Scripps appointment, which he has held since 1984, Dr. Seymour was Director, Offshore Technology Research Center at Texas A&M University in College Station, TX. Prior to his current position, Dr. Seymour was Staff Oceanographer with the State of California Department of Boating and Waterways and held various positions with the private sector.

Dr. Seymour has consulted on a variety of Corps coastal engineering and water resource projects. He has distinguished himself as a visionary and leader in coastal engineering. In particular, he established the original Coast of California monitoring program, which eventually evolved into the Coastal Data Information Program of today.

Currently, Dr. Seymour is a member of the Ocean Research Advisory Panel (ORAP), and has served on several advisory boards and committees, including the Marine Board, National Research Council; Sea Grant Advisory Committee, California Sea Grant College; and University of Southern California, Institute for Marine and Coastal Studies. He served as a member of the Shoreline Erosion Task Force, San Diego Association of Governments and Trustee, Foundation for Ocean Research, and was a member of an international advisory panel of coastal engineers for the preparation of Chapters 5 and 6 of the Corps of Engineers new *Coastal Engineering Manual*. He has been as associate editor for *Ocean Engineering Journal*, editorial board member of *Estuarine, Coastal and Shelf Science*, and editor, special edition of *Shore and Beach*, v. 57, no. 4. Dr. Seymour has authored over 123 refereed journal articles and technical reports. Dr. Seymour's professional memberships include American Society of Civil Engineers, American Society of Mechanical Engineers, Marine Technology Society, and American Shore and Beach Preservation Association. Dr. Seymour is a registered professional engineer in the state of Texas.

Mayor Harry Simmons

Mayor Simmons will soon begin his 8th year as Mayor of the Town of Caswell Beach, North Carolina. He will begin his 4th year as President of American Shore & Beach Preservation Association during the annual conference in Long Branch, NJ. He is one of eight Coastal Cities members on North Carolina's Coastal Resources Advisory Council and serves as Chairman of the countywide Brunswick Beaches Consortium as well as being executive director of the North Carolina Beach, Inlet & Waterway Association. He has recently formed Simmons Coastal, a broad-based coastal issues consulting firm currently seeking additional clients from among businesses, governments and individuals along America's coast. Find him on the web at www.SimmonsCoastal.com.

Before working on coastal issues, Mayor Simmons owned a music management company, Simmons Management Group, for over 20 years. He was primarily involved with managing record producers. His producer clients were involved in creating projects by such artists as R.E.M., Hootie & the Blowfish, Counting Crows, Kim Carnes and Joe Cocker. Mayor Simmons is a member of the National Academy of Recording Arts & Sciences, which gives him a vote for the music industry's prestigious Grammy Awards each year. A North Carolina native and lifelong resident, Mayor Simmons earned his B.S. degree in business administration from the Kenan-Flagler Business School at the University of North Carolina in Chapel Hill.

J. Bailey Smith

Mr. Smith is a coastal scientist/planner with the Philadelphia District of the U.S. Army Corps of Engineers. Mr. Smith manages beach nourishment and ecosystem restoration projects along the Atlantic Coast of New Jersey utilizing regional sediment management practices to reduce the amount of sand, life-cycle costs, and environmental impacts of New Jersey shore protection projects. He is currently overseeing the Independent Technical Review (ITR) of the Post-Katrina LA and MS coastal protection and restoration project. He previously worked at the USACE Engineer Research and Development Center addressing tidal inlet and inner shoreface processes and sedimentation, and coastal morphodynamic concerns. Mr. Smith holds a Master of Arts degree in geology from Boston University.

Terry Sullivan

Mr. Sullivan is the Regional Director of Government Relations for The Nature Conservancy's Eastern United States Conservation Region. As director, Sullivan works on implementing public policy and funding based strategies and maintaining relations with federal agency regional offices, including the

North Atlantic Division of the U.S. Army Corps of Engineers. As a 14 year veteran of the Conservancy, Mr. Sullivan has served in other positions within the organization including Director of Government Relations for the Florida Chapter, where he worked in support of creation of the 10-year, \$3 billion land and water conservation program known as Florida Forever; on Everglades Restoration funding issues; and to pass county open space ballot initiatives. Mr. Sullivan has also served as State Director of the Rhode Island Chapter and as Director of Government relations in Northeast United States and interior Caribbean.

Stephanie Szerlag

Ms. Szerlag is a fish and wildlife biologist for the U.S. Fish and Wildlife Service (USFWS), New Jersey Field Office, and started her career with the USFWS in July 2006. Ms. Szerlag is responsible for the New Jersey Field Office's "Coastal Beach Management Initiative" projects that involve beach management planning with municipalities (in coordination with the Corps and the state) and seabeach amaranth and beach nesting bird recovery tasks. Prior to her service with USFWS, Ms. Szerlag worked for the New Jersey Department of Environmental Protection, Division of Fish and Wildlife, Endangered and Nongame Species Program, as the 2006 project monitor for Monmouth County for New Jersey's Beach Nesting Bird Program.

Joseph "Jay" Tanski

Mr. Tanski received his B.S. degree in geology from the Pennsylvania State University and his M.S. degree in coastal geology from the Marine Sciences Research Center at the State University of New York (SUNY) at Stony Brook. Following graduate school, he worked as a project supervisor with a South Carolina consulting firm before returning to Long Island as a research associate at SUNY Stony Brook. Since 1983, he has held the position of Coastal Processes Specialist with New York Sea Grant, a marine research, education and technical assistance program run jointly by SUNY and Cornell University. In his position he provides technical information and advisory services to a variety of coastal audiences including Federal, state and local officials and agencies, communities, businesses and the public. He was technical advisor to the State and the Long Island Regional Planning in the development of the Long Island South Shore Hazard Management Program. He has served on the Governor's Coastal Erosion Task Force, New York State's Barrier Island Scientific Advisory Committee, and the Atlantic Coast of New York Erosion Monitoring Study Team, a collaborative effort of the U.S. Army Corps of Engineers, New York State Coastal Management Program and New York Sea Grant.

Dr. R. Bruce Taylor

Upon graduation with distinction from the United States Naval Academy in 1964, Bruce Taylor was commissioned an officer in the U.S. Navy Nuclear Submarine Service. His service included four strategic nuclear deterrent patrols aboard the fleet ballistic missile submarine USS Daniel Webster SSBN 626 (BLUE) followed by two years of Atlantic Fleet operations and one Special Operations patrol aboard USS Haddo SSN 604. In September 1969, he left the naval service to pursue graduate studies in coastal and oceanographic engineering, first at the Rosenstiel School of Marine and Atmospheric Science, University of Miami, and later at the University of Florida where he received his Ph.D. in Civil and Coastal Engineering.

In 1974, Dr. Taylor relocated to Jacksonville to begin his career in the private practice of engineering. For the next nine years, in the employ of two different companies, he consulted on a variety of projects in increasing levels of responsibility. These included the operation of the U.S. Army's 14-acre Chesapeake Bay Model Facility; coastal erosion and shore protection projects in New York, Florida, Alabama, South and North Carolina; flood hazard studies in support of the National Flood Insurance Program; harbor engineering and dredging operations; and the mathematical modeling of coastal hydrodynamics, discharge plumes, and pollutant transport.

In 1983, Dr. Taylor formed Taylor Engineering, Inc., a consulting engineering firm specializing in water resource and coastal engineering. During his presidency, 1983-2005, the company successfully completed over 750 projects. These included, tidal inlet and harbor entrance engineering at Wilmington Harbor, NC, St. Augustine, Ponce Inlet, Destin, and Ft. Pierce Harbor, FL, and Kings Bay, GA; surface and subsurface hydrologic investigations for the Everglades Restoration Program; numerous flood hazard studies for FEMA in the states of Florida, Georgia, Alabama, Texas, Louisiana, Tennessee, and Kentucky; advanced model investigations of waves and coastal hydrodynamics throughout U.S. Atlantic and Gulf coasts; the planning and design of beach restoration and shore protection projects throughout Florida; and the development and implementation of dredged material management programs for 400 miles of federal navigation channels in the AIWW, ICWW, and OWW inland waterways.

In addition to his duties at Taylor Engineering, Dr. Taylor has actively served the engineering profession and society as a member of various professional and civic organizations. These include Chairman of the American Society of Civil Engineers national technical committees on Coastal Engineering and Tidal Hydraulics; Chairman of the Northeast Florida FEEDS Advisory Council for graduate engineering education, Chairman of the Engineering Advisory Council, University of North Florida School of Engineering, Member of the Florida Virtual Campus Board of Directors, Chairman of the University of Florida Coastal and Oceanographic Engineering Visiting Committee,; Member,

Academic Visiting Committee, U.S. Naval Academy Department of Naval Architecture and Ocean Engineering, and President of the Florida Institute of Consulting Engineers, representing all private engineering companies in Florida.

In 2001, he was appointed to the U.S. Army Corps of Engineers Coastal Engineering Research Board. This board, created by Congress in 1963, is made up of the Army's Chief of Civil Works, three additional General Officers, and three civilian members. In this capacity Dr. Taylor serves with his fellow board members to advise the Army's Chief of Engineers on matters pertaining to shore and flood protection, sediment management and navigation, and related issues in support of the army's worldwide engineering mission. In 2003, Dr. Taylor was appointed by Governor Jeb Bush to the Board of Trustees, University of North Florida, one of eleven public institutions of higher learning in the state. Now in his second term, he currently serves as the board's chair.

In recognition for his many accomplishments, Dr. Taylor has received a number of honors and recognitions. These include Honorary Alumnus of the University of North Florida, Distinguished Alumnus of the University of Florida, Distinguished Alumnus of the Baltimore Polytechnic Institute; the Florida Engineering Society's awards for Outstanding Technical Achievement, State Engineer of the Year, and Outstanding Service to the Engineering Profession; the National Society of Professional Engineers' NSPE Award — for leadership in his profession and his lifelong commitment to excellence in engineering, and most recently, the National Society of Professional Engineers' Mentor of the Year Award.

Dr. Taylor has authored refereed journal articles and numerous technical reports during his professional career and is a licensed professional engineer in the states of Florida and Mississippi.

Dr. Daniel Walker

Dr. Walker is a senior policy analyst for Oceans and Climate with the White House Office of Science and Technology Policy (OSTP). He is a co-chair of the Joint Subcommittee on Ocean Science and Technology, a body of 25 Federal agencies with responsibilities for ocean research and technology development. Dr. Walker joined OSTP after 11 years with the National Academies Ocean Studies Board (OSB). Named a National Academies' Scholar in 2005, Dr. Walker staffed nearly two dozen National Academies studies, including *Earth Science and Applications from Space; Evaluating the Sea Grant Review Process; Drawing Louisiana's New Map: Understanding and Reducing Land Loss in Coastal Louisiana;* *Understanding Oil Spill Dispersants: Efficacy and Effects; Oil in the Sea III: Inputs, Fates, and Effects; Future Needs in Deep Submergence Science: Occupied and Unoccupied Vehicles in Basic Ocean Research; Environmental Information for Naval Warfare; Clean Coastal Waters: Understanding*

and Reducing the Effect of Nutrient Pollution; Science for Decisionmaking: Coastal and Marine Geology at the U.S. Geological Survey; and Global Ocean Science: Toward an Integrated Approach. Dr. Walker received his Ph.D. degree in geology from the University of Tennessee in 1990, and prior to joining the National Academies, conducted research focused on the tectonic evolution of rifted continental margins, with an emphasis on natural resource (oil and gas) development and low-level radioactive waste disposal. He also directed OSB's Engineering and Technology Subcommittee, served as a guest investigator at the Marine Policy Center of the Woods Hole Oceanographic Institution, and edited the Marine Technology Society Journal.

Michael Walther

Mr. Walther is President, founder, and Principal Engineer of Coastal Tech, a consulting firm based in Vero Beach, FL. He has extensive practical experience in the arena of beach and inlet management. Coastal Tech commonly assists local governments with the planning, design, permitting and construction of Federal and non-Federal coastal projects. As a *Surfrider Foundation* volunteer, Mr. Walther has advised local chapters from Hawaii to Washington State to New York and Florida as to the potential impacts of Corps Protection and Navigation Projects, and alternatives to address the project purpose while preserving surfing resources. He is a licensed professional engineer in the states of Florida, Texas, Louisiana, North Carolina, and Alabama.

Dr. Jeffrey P. Waters

Dr. Waters is a research physical scientist with the Coastal Engineering Branch at the Coastal and Hydraulics Laboratory of the U.S. Army Engineer Research and Development Center. He is the program manager for the Regional Sediment Management Demonstration Program and the Section 227 National Shoreline Erosion Control Demonstration and Development Program. He also serves as the co-chair for the Shore Processes Workgroup of the National Shoreline Management Study. From 2001 through 2005, Dr. Waters served as a coastal geologist in the Planning Section of the Galveston District where he was the acting project manager for the Sabine Pass to San Luis Pass Shoreline Erosion Feasibility Study as well as the Section 227 National Shoreline Erosion Control Demonstration Project (Jefferson County, Texas).

Dr. Waters received his B.S. degree in geology from the University of Maine, his Masters degree in geology from Northern Arizona University and his Ph.D. degree in geology from the University of New Orleans (UNO). While at UNO, his research interests included sediment transport in coastal

systems and the geochemistry of estuarine sediments. He was awarded a post-doctoral fellowship at the University of Houston/NASA Johnson Space Center where he integrated satellite imagery with astronaut photography to evaluate sediment transport processes in the Texas coastal zone.

Keith D. Watson

Mr. Watson has 19 years experience as a Coastal Engineer and Project Manager with the U.S. Army Corps of Engineers in both the Philadelphia and New York Districts. Prior to joining the Corps, Mr. Watson served as a research associate at the University of Delaware's Center for Applied Coastal Research. He has represented the Philadelphia District as a subject matter expert in coastal engineering and beach-fill field review groups, including the Field Advisory Committee on Technical Standards for Beach-fill Engineering and the National Regional Sediment Management Program. During his career he has designed and managed all aspects of various coastal, tidal hydraulic and hydrologic engineering projects throughout the Philadelphia and New York Districts.

Mr. Watson is currently the Project Manager responsible for the majority of the Philadelphia District Hurricane and Storm Damage Reduction and Eco System Restoration Construction General Projects along the Atlantic Ocean Coastline of New Jersey.

Randall A. Wise

Mr. Wise is a coastal engineer in the Hydrology, Hydraulics and Coastal Section of the U.S. Army Corps of Engineers, Philadelphia District. He also serves as a coastal engineering Regional Technical Specialist for the North Atlantic Division (NAD). His present work involves technical analysis and review in support of planning, design, construction, and monitoring of shore protection projects both within and outside the NAD region. He previously worked at the U.S. Army Engineer Research and Development Center, where he led research focusing on coastal storm erosion modeling, beach profile change analysis, and beach-fill design. He holds Bachelor's and Master's degrees in civil engineering from the University of Delaware and is a licensed professional engineer in the state of Delaware.