

# U.S. Coastal Research Program

## Quarterly Bulletin

December 2018

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For more information on the motivation and goal of the USCRP as well as current initiatives, please see the USCRP website, <https://uscoastalresearch.org/>.

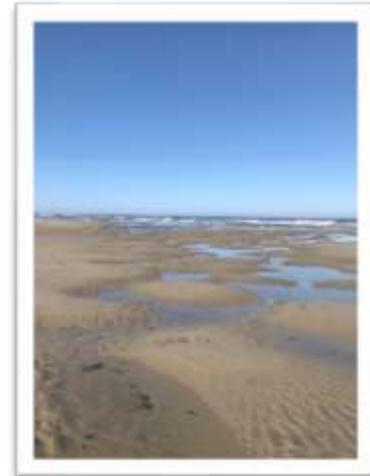
### U.S. Coastal Research Program – Call for Research Proposals

In 2019, the USCRP is providing approximately \$5M in competitive awards for academic proposals addressing the topics described below. Awards will be made with the intent of assisting academic institutions in funding coastal and nearshore processes graduate students to address critical research needs within the coastal community, advancing the state of knowledge, and building the future U.S. workforce.

Two types of awards are available: (1) Academic Research: 2-3-year awards addressing strategic needs; and (2) Student Challenges: 1-2 year awards targeting short-term, focused, student driven initiatives. Proposed funding amounts can vary by year depending on work planned for that year of the project.

Research proposals can range from addressing the USCRP’s primary research themes – (a) Long-term processes, (b) Extreme Events, and (c)

Human & Ecosystem Health – to targeted projects addressing the following topics: (d) Identify and Communicate Coastal Impacts; (e) Coastal Structure Design and Rehabilitation Incorporating Stochastic Risk and Uncertainty; (f) Understanding the Crossroads of Human and Ecosystem Health; (g) Evaluating the Distribution and Geotechnical Properties of Outer Continental Shelf (OCS) Sand Resources and Coupled Environmental Responses to Dredging; (h) Nearshore Sediment Transport and Sediment Budgets over Decadal Scales; (i) Long-term Implications of Coastal



## Call for Research Proposals (cont.)

Restoration; (j) Development of a USCRP Coastal Data Portal; (k) Quantifying and Communicating Numerical Model Uncertainty; (l) Develop Community Resilience Guidance for Recovery & Mitigation and Adaptation; and (m) Applied Storm & Recovery Studies as part of the DURING Nearshore Event Experiment (DUNEX).



In December, the USCRP will advertise Requests for Statements of Interest (rSOI) through the Cooperative Ecosystems Study Unit (CESU) National Network. There will be one rSOI advertised for each research topic described below and in the USCRP Research Awards Flyer. If interested in a particular topic area, academic researchers will submit a two-page statements of interest (SOI) which will be reviewed and ranked by the USCRP team. The 2-page SOI requires: name, organization, and contact information; and a brief statement of qualifications that includes a biographical sketch, relevant past projects and clients with brief descriptions; staff, faculty or students available to work on this project and their areas of expertise; and any brief description of capabilities to successfully complete the project. Top SOIs will then submit full proposals for review, selection, and awarding following the general schedule below.

The following sets out the General Schedule (subject to change):

- 1 Nov 2018: Call for USCRP 2019 Academic Proposals
- 15 Dec 2018: rSOIs advertised
- 19 Dec 2018: Informational webinar on proposal process
- 15 Jan 2019: 2-page SOIs submitted by researchers
- End of Jan 2019: Top selected candidates will be notified to submit full proposals
- End of Feb 2019: Full proposals due
- End of May 2019: Proposals awarded

To provide applicants with more targeted information, the USCRP's Virtual Program Office will host a one hour webinar that will review the timeline for proposals, overview the review process, and answer submitted questions. The webinar will be held **Wednesday, December 19, 2018 from 1:00-2:00PM ET.**

To join the webinar, please use the following information:

**Webinar:** <https://usace.webex.com/meet/julie.d.rosati>

**Call in:** 1-877-873-8017, Access: 9100450; Security (if needed): 1234

For more information on the 2019 Call for Proposals, please go to <https://uscoastalresearch.org/2019-awards-info> or email [proposals@uscoastalresearch.org](mailto:proposals@uscoastalresearch.org).

## Project Spotlight:

### Executive Summary – U.S. CMTS RIAT, The 2017 Hurricane Season: Recommendations for a Resilient Path Forward for the Marine Transportation System

In October 2017, the Coordinating Board of the U.S. Committee on the Marine Transportation System (CMTS) tasked the Marine Transportation System Resilience Integrated Action Team (RIAT) to identify the impacts, best practices, and lessons learned from the 2017 hurricane season. The RIAT is a consortium of Federal agencies that manage, operate, or are stakeholders in the Marine Transportation System (MTS) and have interest in increasing the resilience of the MTS to prepare, respond, recover, and adapt to disruption. To fulfill this request, the RIAT convened the 12 member agencies to discuss some of the challenges, successes, best practices, and recommendations for increasing resilience based upon reported experiences of responding and recovering to three major hurricanes that made landfall in the United States and U.S. territories: Harvey, Irma, and Maria between August and October of 2017.

In order to gather this information, the RIAT held interagency data calls and hosted a workshop at the Department of Transportation in May 2018. This workshop allowed for in-depth discussions and targeted invitations from Federal agency personnel, located in field offices and directly responsible for response and

recovery actions. The Federal perspective provides only a modest percentage of all response and recovery efforts. Most of these efforts occur at state and local levels in primarily coastal communities. However, it is important to acknowledge that a multi-agency perspective is a valuable addition to ongoing and existing “After-Action Reviews.”

Resilience, herein, is defined as the ability to prepare, respond, recover, and adapt to and from future disruptions (Presidential Policy Directive 21, 2013). Utilizing the four-step resilience cycle as a framework to gather input was critical to the success of this work (see Figure A) (Rosati, J.D. et al 2015). By purposefully using these four steps to identify means of improving response and recovery, this report makes recommendations to both advance the understanding of how the MTS can be better prepared for future storms and provide the coastal resilience community of an example where Federal agencies managing the MTS are directly contributing towards enhancing its resilience.



*Satellite image of three hurricanes in the Atlantic at once, photographed on September 8: Katia, Irma, and Jose. (Source: NOAA/NASA).*

**Executive  
Summary – U.S.  
CMTS RIAT (cont.)**

Over the course of the 2017 hurricane season, Hurricanes Harvey, Irma, and Maria affected the operating status of at least 45 ports throughout the lower continental United States and U.S. Caribbean territories. These ports provide critical services to regional economies in the Gulf, Southeastern coast, and the Caribbean, and were confronted with a succession of major storms that impacted a massive geographical region with unique challenges (e.g. major inundation from rainfall, uncertainty in landfall location, crippled energy, water, and transportation infrastructure). The scale and impact of these storms strained the U.S. emergency response community and the ability of MTS agencies to preposition and prioritize recovery efforts. Despite these challenges, the MTS community successfully adjusted in order to communicate and engage across sectors and quickly and efficiently reopen these ports.



Figure A. The Resilience Cycle.

A review of federal agency activities to restore MTS operations in response to all three storms revealed several emergent actions. For pre-storm preparedness, these common actions included hosting early planning meetings, communication between agencies, centralizing information distribution, and maintaining or updating existing response plans. Issues related to telecommunication and the prioritization of assistance to ports or other critical infrastructure were experienced by most MTS agencies. Lastly, the successes shared between agencies included engaging with the private sector to fill gaps in federal response operations, implementing local coordination efforts, and adapting and improving throughout the hurricane season as each storm presented new obstacles to overcome. The following are major findings identified from the RIAT's efforts.

**Best practices for response and recovery:**

- Hurricane season kickoff meeting – held at start of hurricane season
- Full-scale hurricane exercise with Captain of the Port (COTP) Port Coordination Committees
- Pre-and post-storm port assessments
- Prior coordination of interagency efforts for navigation channel reopening and Aid to Navigation verification
- Clear lines of communication

**Opportunities to enhance response and recovery efforts:**

- Tools and protocols for prioritization of recovery efforts at the regional or national level
- Pre-staging of survey teams & equipment
- Evaluating port status vs. channel status

- Develop plans to aid port employees in returning to work

**Recommendations for Increasing MTS resilience:**

*Preparation*

- Participate in yearly trainings and drills to ensure that response and recovery teams and stakeholders are educated with the correct skill sets and credentials
- Incentivize preparedness by promoting proactive maintenance for infrastructure systems
- Maintain pre-established contracting mechanisms for emergency response operations
- Pre-identify staging areas and storage areas for equipment
- Prioritize key infrastructure for directing response and recovery actions
- Establish a multi-agency data sharing platform with a web-based interface

*Response/Recovery*

- Standardize data and information on recovery efforts across public and private stakeholders
- Share data across federal agencies for recovery projects through interagency teams and data-sharing platforms
- Outfit private industry with survey equipment (pilot vessels, private survey vessel, etc.) under guidance of the U.S. Army Corps of Engineers (USACE) and the National Oceanic and Atmospheric Administration (NOAA)
- Utilize surge force and ensure appropriate management continuity
- Embed MTS experts where necessary – U.S. Coast Guard (USCG), Federal Emergency Management Agency (FEMA) field offices, local offices
- Invest in Unmanned Autonomous Vessel technologies for pre-and post-storm surveys

*Adaptation*

- Hold interagency operational after-action reviews with demonstrated commitment to communicating and implementing recommendations
- Develop a common operating picture of the port systems including prioritizations and essential functions
- Hold proactive planning scenario exercises and interagency training sessions where recommendations from the past season are communicated and incorporated
- Hold a Committee on the Marine Transportation System annual workshop to review the hurricane season
- Promote or consider new cutting-edge technologies to improve port services or support

Ports and the marine transportation system are a critical component of the national, regional, and local economies, facilitating the movement of U.S. goods and services within a domestic and global marketplace. They also play a key role in

**Executive  
Summary – U.S.  
CMTS RIAT (cont.)**

the recovery of the surrounding region after disruption, facilitating the mobilization of response and recovery assets (e.g. Maritime Administration Ready Reserve Fleet) and the delivery of life-sustaining commodities for impacted communities. Implementing the best practices and recommendations identified in this report can help to minimize the impact from future storms and other disruptive events, thus enhancing the resilience of the MTS and surrounding coastal regions. This, in turn, supports a stronger, more resilient U.S. economy.

Invited Contribution by Katherine Chambers (USACE) and Josh Murphy (NOAA), RIAT Co-Leads. If you would like to know more information about the RIAT and this report, please contact Katherine Chambers ([Katherine.F.Touzinsky@usace.army.mil](mailto:Katherine.F.Touzinsky@usace.army.mil)).

**Project Spotlight:  
Wind Tunnel Tests  
of How Plants  
Feedback on Dune  
Shape & Wind  
Tunnel  
Improvements for  
Dune  
Ecogeomorphology  
Research &  
Outreach**

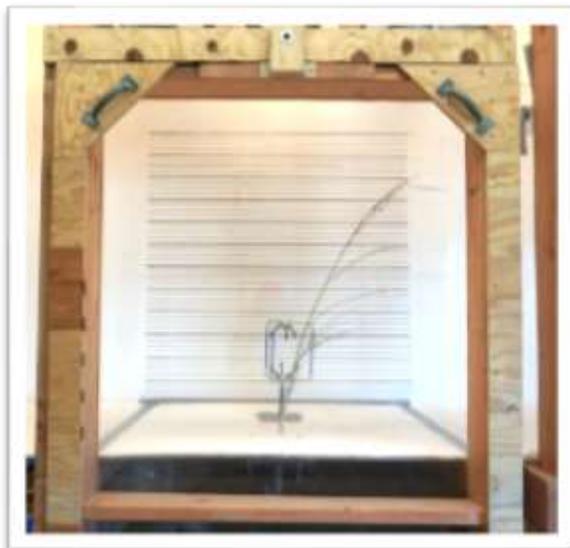
The Waretown wind tunnel has been funded through two separate USACE Engineer Research and Development Center supported BAA contracts, initially for construction to test how plant shape feeds back on coastal dune shape in 2016 (W912HZ-16-P-0088) and again in 2018 (W912HZ-18-BAA-01) to support additional research and improvements for science-based community outreach. The wind tunnel is located in Waretown, NJ on the Ocean County Vocational Technical School grounds.

**Context:** Coastal dunes buffer inherently unstable coastal areas, thereby protecting upland habitats and infrastructure. Dunes grow over time with plants as ecosystem engineers that build, stabilize, and repair the habitat combatting erosive forces during high tides and storms. Management efforts to build or recover dunes generally include planting dune stabilizing plants to trap and stabilize sand to build dunes over time. Along the U.S. East and Gulf coast, *Ammophila breviligulata*, *Carex kobomugi*, *Panicum amarum*, *Uniola paniculata*, and *Spartina patens* are the dominant foredune stabilizing species. Recent studies suggest that plants may differ in their sand capture efficiency and build dunes of varying morphologies, potentially similar to their own stature (i.e. a taller plant builds a taller dune). Similarly, plants interact with the wind and move in response. These interactions have implications for foredune storm recovery time, accretion efficiency, and how we approach planting efforts. However, species-specific data of this nature remains largely unknown.

**Wind Tunnel Quick Specs:** It is a movable bed unilateral flow wind tunnel. Chamber length is 6 m with a 2 m cross section (2 m × 1 m height × width). A test area opening exists in the bed 3.6 m downwind, where a 1.0 m × 1.0 m box (0.3 m deep), can be inserted and sealed into the chamber at bed height via a skid steer loader. These boxes are hollow and can be filled with established plants and sand, loaded with a top to create a continuous bed, or altered for desired purposes; the wind tunnel and its components were designed with adaptability and ease of use in mind. A sand bed can be loaded upwind of the test area for distribution downwind. Wind is created by a 20HP

## Wind Tunnel Tests (cont.)

43,000 cfm duty fan that pulls air into the chamber through a wall of 3.8 cm diameter air straighteners to reduce turbulence towards laminar flow. Maximum wind speed attainable is 27 mph, 12.1 m/s. Wind speed can be monitored and is altered via a variable frequency drive controlling the fan. Objects, such as topography formed around



plants, in the test area can be scanned by a sub-millimeter accurate 3D surface scanner that lowers down from the ceiling of the wind tunnel. More specs can be found at [www.thewindtunnel.weebly.com](http://www.thewindtunnel.weebly.com).

**Progress:** We have included local high school students throughout the course of these contracts, garnering 200+ hours of volunteer research time for which students receive credit for by their school and towards the National Honor Society. Volunteers have been from 9 institutions and we have continued to gain support from over 15 local and national companies

donating time and materials as needed.

- *Summer 2016:* The wind tunnel was built, but not in time before the plants went dormant.
- *Summer/Fall 2017:* The first tests of how plant morphology affects the size and shape of accumulation was carried out in an unstaggered planting design. We tested different planting densities, 18", 12", and 6" with the latter mimicking natural density and former the two most commonly used in densities in planting efforts working with *A. breviligulata*, *C. kobomugi*, and *P. amarum*. Our sample size is N = 40, 4 boxes per species per density, plus a control box of just sand. We measured various morphological parameters of all test plant stand pre-established in boxes and then subjected each to 30 min trials at 18.5 mph, 8.25 m/s. By knowing the morphology of each plant in a box, we are able to link bedform and plant morphology, as well plant biomass after harvesting all plants post-trial.

## Wind Tunnel Tests (cont.)

- *Summer/Fall 2018:* We repeated the 2017 tests holding all variables the same, except changing the planting design to staggered and developing a more effective way of determining if erosive or accretionary processes built the bedforms around plants. In 2017 Ocean County, NJ lent their skid-steer loader for the research. With our second contract, we bought a dedicated loader such that the wind tunnel can now be used without being contingent upon outside parties. A graduate student from Texas A&M working with Dr. Rusty Feagin, Rachel Innocenti, came for a week in October. We altered the test area to install a 3D anemometer as well as a custom force sensor designed to mount plants on, to test the effect of drag on plants at different wind speeds, 5 mph, 12.5 mph, and 25 mph; see image.

**Moving Forward:** We have two main goals:

*Goal 1:* to garner more outside use and collaborations. We advertised the resource to this effect recently at the 2018 ASBPA National Conference in Galveston, TX. We are advertising opportunities for students to build upon the existing research or develop new projects at Bryn Mawr, Stevens, and Stockton Universities via flyers and word of mouth. We have funding built into our second contract to support at least one student this summer researching at the wind tunnel. *Goal 2:* we have preliminary results from the 12" and 18" 2017 data collection, but need to analyze the 6" 2017 data and all 2018 data over winter and spring 2019 to produce publications.



Invited contribution by Bianca Reo Charbonneau of the University of Pennsylvania Biology Department.

## Recent Coastal Engineering & Science Meetings

The following section provides a brief overview of recent meetings held by the coastal research community during the Fall of 2018.

### **Coastlines & People (CoPe) September 26-28, 2018**

In an effort to fully understand the research priorities needed to improve the research community's understanding of coastal environmental variability and natural hazards affecting coastal regions, the University Cooperation for Atmospheric Research (UCAR), with a grant from the National Science Foundation, convened over 400 scientists to develop priority research initiatives over the course of four scoping workshops held in Atlanta, Chicago, San Diego, and a virtual session. The need addressed centered on the nexus existing between coastal

sustainability, human dimensions, and coastal processes as supported by a growing desire to improve the coastal community's understanding of the interactions between natural, human-built, and social systems in coastal environments. Participants discussed issues touching on a full range of scales that linked science, community involvement, broader participation, and education to develop innovating pathways to meet the needs of changing environments. In total, over 100 distinct recommendations were identified by close of the workshops. For more information on the recommendations, please visit the CoPe website and watch the YouTube coverage, <https://coastlinesandpeople.org/>.

### **Security Prosperity in the Coastal Zone**

**November 7-8, 2018**

The 2018 Annual Summit, hosted by the Virginia Academy of Science, Engineering and Medicine, focused on the societal stressors Virginia's 8 million people will experience as a result of environmental changes to the state's coastal areas. Recognizing a need for proactive and smart, science-informed policies, the Summit convened with the goal of holding a holistic conversation about promoting Virginia's prosperity in light of changing coastal dynamics. For more information on the Summit, please visit <http://www.vasem.org/securing-prosperity-in-the-coastal-zone/>.

### **National Science Foundation – Future R&D in Coastal Engineering Workshop**

**November 13-14, 2018**

Members of the coastal engineering community gathered in Washington, D.C. to discuss future research and development (R&D) in coastal engineering. Participants broke into subgroups to identify priority topics for National Science Foundation to pursue. R&D priorities identified included risk-based design and uncertainty; extreme coastal events; development and diversity in the coastal engineering workforce; sea level rise adaptation and innovation; infrastructure in the Arctic; and bolstering coastal engineering education in K-12 and undergraduate programs. The USCRP was also identified a viable vehicle to develop a framework to bring the coastal engineering community together to develop some of these priority topics identified.

If you have a brief update about a recent workshop or meeting of interest to the USCRP coastal community, please contact Kat McIntosh, [Kathryn.H.McIntosh@usace.army.mil](mailto:Kathryn.H.McIntosh@usace.army.mil).

### **Announcements & Upcoming Events**

USCRP Research Awards Informational Webinar, December 19, 2018

1:00PM-2:00 PM ET.

Please email, [proposals@uscoastalresearch.org](mailto:proposals@uscoastalresearch.org), for more information.

AEG, "Coastal Hazards Symposium: Engulfing the Coast," January 7-10, 2019.

The Dauphin Island Sea Lab  
Dauphin Island, AL  
[https://www.aegweb.org/m/event\\_details.asp?id=919339](https://www.aegweb.org/m/event_details.asp?id=919339)

NCSE 2019 Annual Conference, "Sustainable Infrastructure & Resilience," January 7-10, 2019  
Washington, D.C.  
<https://ncseconference.org/>

TBR Annual Meeting 2019, January 13-17, 2019  
Washington, D.C.  
<http://www.trb.org/AnnualMeeting/AnnualMeeting.aspx>

ASBPA 2019 Coastal Summit, "Investing in Resilient Coasts," March 12-14, 2019.  
ASAE Conference Center  
1575 I St NW, Washington, DC  
<http://asbpa.org/conferences/>

Coastal Sediments 2019 (CS19), "Advancing Science & Engineering for Resilient Coastal Systems," May 27-31, 2019.  
Tampa/St. Petersburg, FL.  
<http://coastalsediments.cas.usf.edu/>

ASBPA 2019 National Coastal Conference, "Where Coasts and Rivers Meet,"  
October 22-25, 2019  
Myrtle Beach, SC  
<http://asbpa.org/conferences/past-meetings/>

#### **For More Information**

If you are interested in contributing to the March Quarterly Bulletin, please contact Kathryn McIntosh ([Kathryn.H.McIntosh@usace.army.mil](mailto:Kathryn.H.McIntosh@usace.army.mil)) by February 9, 2018 to be considered for inclusion in the December Bulletin.

USCRP website: <https://uscoastalresearch.org/>  
USCRP email: [info@uscoastalresearch.org](mailto:info@uscoastalresearch.org)

#### **Credits**

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