Coastal Inlets Research Program: Overview

Tanya Beck
Mitchell Brown

Rick Granados
HQ Navigation Business Line Manager

Jeff Lillycrop
Technical Director

Eddie Wiggins
Associate TD

CIRP In Progress Review

AUDIO CONFERENCE ACCESS INFORMATION
Main Conference Room 200 - CHL, Vicksburg, MS
https://usace.webex.com/usace/j.php?MTID=m5292bc8cf4c24c5791577680eff2e827

08:00-08:15 Welcome Jeff Lillycrop, Eddie Wiggins
08:15-08:45 CIRP Overview & Program Management Tanya Beck, Mitch Brown
08:45-09:15 Coastal Navigation Portfolio Management Brandon Scully, Lauren Dunkin
09:15-09:45 Inlet Geomorphology Katie Brutsche, Brian McFall
09:45-10:00 BREAK
10:00-10:30 Inlet Engineering Toolbox Richard Styles, Kate Brodie
10:30-11:00 Waves at Navigation Structures Lihwa Lin, Zeki Demirbilek
11:00-11:30 Coastal Modeling System Honghai Li, Chris Massey
11:30-11:45 Wrap-Up / Closing Remarks Jeff Lillycrop, Eddie Wiggins
Innovative solutions for a safer, better world

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FY18 Tech Transfer Rollup (1 of 4)

University Collaborations - 21
Jackson State University
University of Hawaii
University of Wisconsin
UC Irvine
UC Berkeley
University South Florida
Stevens Inst. Of Technology
University of Michigan
Texas A&M University
University of Mississippi

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Texas A&M University
University of Mississippi

NGO Collaborations - 3
Reed & Reed, Inc. (CMS)
Moffatt & Nichol (CMS)
ASBPA: Dune Management Challenges, Nearshore Processes Research (iETools, PM)

Workshops/Webinars - 17
Galveston CMS & GenCade Training (DOTS)
Jacksonville CMS Training (Sep 2018)
CWG Webinar on SedZLJ in CMS
ASAP webinars – USCG Navigation Center and District 1
CPT webinar - SPN
CSAT webinars – SAC, SAS, SWG, NAO, NAE
CMS Webinars: NWP, NWS, SPL, POH, SWG, LRE, LRB

Interagency Collaborations - 3
USGS - Long-term nearshore morphology change (PM, iETools, CMS, Waves)
EPA - Collaboration on fate of dredged material
NRL - Nearshore Collaboration Effort

Conference Presentations - 21
Probabilistic Shoreline Evolution modeling in Response to Sea Level Changes
EWRI 2018
Coastal Model Test Bed: An Exploration into Nearshore Numerical Modeling at the Field Scale
ASBPA 2017
Nearshore Placement Behavior Elucidated Through a Sediment Trace Field Study and Numerical Modeling
ASBPA 2017
Nearshore Placement Techniques in Southern Lake Michigan
ASBPA 2017
Wave and circulation numerical modeling for breakwater rehabilitation project at Tinian Harbor
ISOPE 2018
Coastal wave modeling for jetty rehabilitation at Coos Bay, Oregon
ICCE 2018
Numerical modeling of alternatives to reduce channel shoaling at Lynnhaven Inlet, Virginia
ICCE 2018
High-resolution lidar scanning of developed and natural beach-dune systems on the Outer Banks
Ocean Sciences
Terrestrial Lidar Observations of Coastal Morphodynamics in Duck, NC, Over Monthly and Decadal Timescales
Ocean Sciences
Observations of Dune Morphological Evolution in Duck, NC, Over Monthly and Decadal Timescales
ASBPA
High-temporal Resolution Observations and Modeling of Dune Erosion in the Collision Region
ASBPA
High-Resolution LiDAR Observations of Developed and Natural Beach-Dune Systems on the Outer Banks
ASBPA
Probabilistic Shoreline Evolution Modeling in Response to Sea Level Changes
ASCE-EWRI 2018
Probabilistic Modeling of Long-term Shoreline Changes in Response to Sea Level Rise and
ICES 2018
Integrated Coastal Process Modeling and Applications in Coasts and Estuaries
ASCE-EWRI 2018
Probabilistic Shoreline Change Modeling and Risk Estimation of Erosion
ICCE 2018
GenCade: Current Status and Future Work/ Presented
CWG Meeting 2017
Vessel wake prediction tool
CERF 2018
Modeling Sediment Pathways Around an Inlet
ICCE 2018
Interaction Between Waves, Current, and Morphology Change at Titianook Inlet
ICCE 2018
Sediment Transport and Shoreline Response to Nearshore Placement of Dredged Sediments
ICCE 2018

FY18 Tech Transfer Rollup (2 of 4)

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EWRI 2018
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FY18 Tech Transfer Rollup (3 of 4)

<table>
<thead>
<tr>
<th>Journal Articles - 9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laboratory experiments on three-dimensional deformable granular landslides on planar and conical slopes. (Landslides - Springer)</td>
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<tr>
<td>Use of numerical modeling and field data for harbor infrastructure modifications. (Book Chapter)</td>
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<tr>
<td>LiDAR and multi-spectral imaging investigations in Lake Superior: migrating tailings threaten Buffalo Reef. (Limnol. Oceanography)</td>
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<tr>
<td>Assessing Structure Sheltering via Statistical Analysis of AIS Data. (JWPCOE)</td>
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<tr>
<td>Sediment Tracer tracking and numerical Modeling at Coos Bay Inlet, Oregon. (JCR)</td>
</tr>
<tr>
<td>A Simplified Physically-Based Model for Coastal Dike and Barrier Breaching by Overtopping Flow and Waves. (Coastal Engineering)</td>
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<tr>
<td>Coastal Modeling. (Encyclopedia of Coastal Science)</td>
</tr>
<tr>
<td>Spatially Variable Dune Erosion. (Submitted to JMSE)</td>
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</tbody>
</table>

FY18 Tech Transfer Rollup (4 of 4)

- **Reimbursables – 15+**

  *Testing, validating, advancing, and transferring CIRP products to Districts and Divisions*

  - **SAM** – Vessel Wake datasets for validation
  - **SAC/SAM** – Validation datasets, test vessel extraction algorithm
  - **SWG** – Matagorda SC widening/deepening and PAs
    - Corpus Christi Ship Channel to design placement areas
    - CSAT analysis for DMMP for HSC, MSC & Corpus Christi
    - Field support, measurements, sed analysis for GenCade
  - **LRB** – Buffalo Harbor, Modeling of Overtopping
  - **LRC** – Waukegan Harbor, Modeling entrance channel shoaling
    - Burns Harbor/Ogden Dunes, Modeling nearshore placement
  - **LRE** – Wisconsin Pt: Estimate ship wake and wind waves
  - **NWP** – Coos Bay, OR, Channel and jetty rehab study
  - **Asset Management** – CPT and CSAT development (w/EndyHydro)
  - **USCG District 1** - AISAP support on Hudson River Study
  - **NAP** – 20+ yrs validation data for GenCade (w/RSM)
  - **USNA** – Dunes validation data, testing, and lab facilities
Technology Transfer: Publications & Workshops

Investment in Products: Web Tools, PC Tools, and SMS
Website Statistics
Aug 2017 - Aug 2018

Website Statistics 2018 (Per Visitor)

Visitor Sessions
(First time visitors)

Page Views per Visitor

FY19 Changes to Work Units

Coastal Modeling WU

Program Management

Coastal & Navigation Portfolio Management WU

Inlet Engineering Tools WU

Geomorphic Evolution WU
**FY19: SoNs and Proponents**

- 23 proposals received: $4.0 M, 50 researchers; FY19: $2.7 M
- 15 SoNs Addressed
- PIs will collaborate with CWG/HH&C proponent

<table>
<thead>
<tr>
<th>Work Unit</th>
<th>Title Description</th>
<th>FY19 Funding Request</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coastal Modeling System</td>
<td>Nearshore Processes (F&amp;C/CODS/CIRP)</td>
<td>Johnson/Cohn $100,000</td>
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<tr>
<td></td>
<td>Inlet and Nearshore Validation W/FRF Datasets</td>
<td>Johnson/Li $215,000</td>
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<td>Disaggregation of mixed sediment in near-bed transport</td>
<td>Smith $170,000</td>
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<td>CMTB &amp; Optical Current Validation</td>
<td>Spicer $100,000</td>
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<td></td>
<td>CMS Tech Transfer</td>
<td>Li/Brown $114,000</td>
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<td></td>
<td>IMS GUI Development</td>
<td>Brown $293,310</td>
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<tr>
<td></td>
<td>Sediment Mapping</td>
<td>Li $74,400</td>
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<td>SLR in CMS</td>
<td>Li $98,000</td>
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<td></td>
<td>2D Barner Island Breaching</td>
<td>Li $42,400</td>
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<td></td>
<td>Modeling with Variable Winds</td>
<td>Li/Demirbilek $150,000</td>
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<td>WaveNet &amp; TidesNet</td>
<td>Li/Demirbilek $132,000</td>
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<td>CMS V&amp;V (FY20 -&gt; CMTB)</td>
<td>Li/Demirbilek $40,000</td>
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<td></td>
<td>EM Procedure for Waves and Structures</td>
<td>Li/Demirbilek $130,000</td>
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<td></td>
<td>Mixed Sediment (Sed/Li in CMS)</td>
<td>Li/Hayter $99,500</td>
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<td></td>
<td>DRESO (DOER/RO/CRP)</td>
<td>Gallani/Ding $60,000</td>
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<td>SUM</td>
<td>$1,814,610</td>
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**Proposed for FY19 Funding (2 of 2)**

**Inlet Engineering Toolbox**

<table>
<thead>
<tr>
<th>Description</th>
<th>Principal Investigator</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tools for Simulating Coastal Foredune Evolution Near Inlets</td>
<td>Brodie/Cohn</td>
<td>$134,000</td>
</tr>
<tr>
<td>Engineering tools to predict vessel wake induced channel erosion</td>
<td>Styles</td>
<td>$175,000</td>
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<tr>
<td>SenCade Model Improvements and Documentation</td>
<td>Styles</td>
<td>$336,300</td>
</tr>
<tr>
<td>Modeled Waves and Currents in Structures Design (e.g. ports)</td>
<td>Jin/Demirblek</td>
<td>$130,000</td>
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<tr>
<td><strong>SUM</strong></td>
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<td><strong>$775,300</strong></td>
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**Inlet Geomorphic Evolution**

<table>
<thead>
<tr>
<th>Description</th>
<th>Principal Investigator</th>
<th>Cost</th>
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<tbody>
<tr>
<td>Nearshore Berms</td>
<td>Brustche/McFall</td>
<td>$339,000</td>
</tr>
<tr>
<td>Effect of inlet modifications on sediment retention by fringing marshes</td>
<td>Boyd/Ding</td>
<td>$133,000</td>
</tr>
<tr>
<td>Morphologic Modeling of Tidal Inlets</td>
<td>Styles</td>
<td>$195,000</td>
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<tr>
<td><strong>SUM</strong></td>
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<td><strong>$667,000</strong></td>
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**CNPM**

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<tr>
<th>Description</th>
<th>Principal Investigator</th>
<th>Cost</th>
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<tbody>
<tr>
<td>Coastal Navigation Portfolio Management</td>
<td>Dunkin/Scully</td>
<td><strong>$550,500</strong></td>
</tr>
</tbody>
</table>

**Program Mngt**

<table>
<thead>
<tr>
<th>Description</th>
<th>Principal Investigator</th>
<th>Cost</th>
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</thead>
<tbody>
<tr>
<td>CIRP Administration &amp; Tech Transfer</td>
<td>Beck</td>
<td><strong>$250,000</strong></td>
</tr>
</tbody>
</table>

**TOTAL FY19 CIRP**

| **$4,057,410** |

**Conclusions - FY19 CIRP**

- Received 23 proposals addressing 15 SoNs
- Technology Infusion Plans
  - Workshops/webinars – Connect Products to Navigation Portal
- New initiatives support
  - Nearshore Coastal Processes R&D
    - CIRP R&D that supports US Nearshore Coastal Research Program
  - Numerical Modeling Transformation Strategy
    - CIRP Modeling that advances NMTS
  - Laboratory & Field Research – Leveraged Multiple Programs
    - FRF Nearshore Berm – Lab Vegetated Berms
  - R&D Direction in FY20 and Beyond
    - New SonS with CWG/HH&C
- FY19 – each R&D WU/initiative:
  - CWG & HH&C proponents and discuss advances quarterly