



U.S. ARMY

# COASTAL INLETS RESEARCH PROGRAM: PROGRAM MANAGEMENT WORK UNIT

Tanya M. Beck, CIRP Program Manager

## COASTAL INLETS RESEARCH PROGRAM FY22 IN PROGRESS REVIEW

**Tiffany Burroughs**

HQ Navigation Business Line Manager

**Eddie Wiggins**

Technical Director, Navigation

**Brian McFall**

Acting Associate Technical Director



### Coastal Inlets Research Program

Publications Tech Transfer Wiki CIRP Find us on Facebook

#### Technical Discussion

Effects on floc settling velocity

McFall (CHL)

May 2023

Central

Email [cirp@usace.army.mil](mailto:cirp@usace.army.mil) for webinars.

#### New

Updated to v2.5.1

allow for newer versions of Python. If you experience any issues.

Review of Tidal Embayment Shoaling in the Context of Future Wetland Placement

Channel narrowing and hardening



#### What's New

##### New Product Pages

We've recently added two new product pages for our work with Aeolian Processes (Also under the Products menu)

- [Aeolis](#)
- [Dune Response Tool](#)



Introductory video on the Coastal Inlets Research Program from ERDC Corporate Communications.

Disclaimer



US Army Corps of Engineers



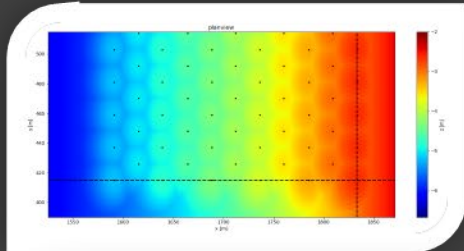
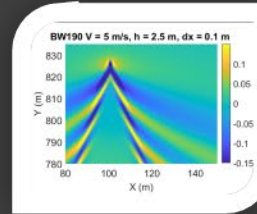
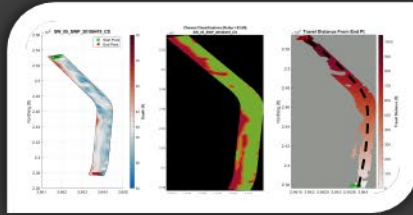
# CHL

COASTAL & HYDRAULICS LABORATORY

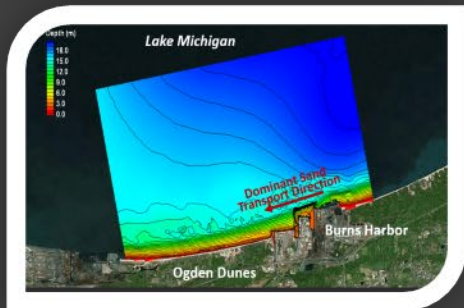


# ERDC

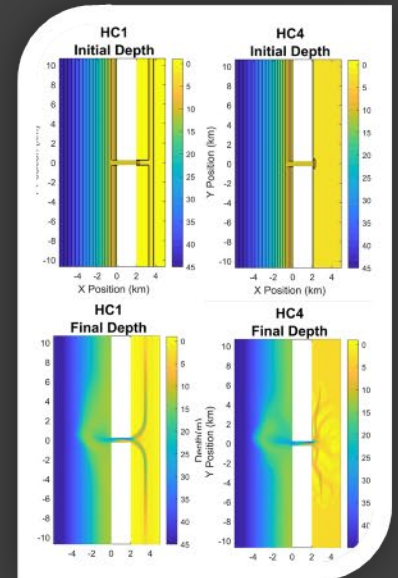
ENGINEER RESEARCH & DEVELOPMENT CENTER



Advancing knowledge and technology to better predict future channel shoaling.



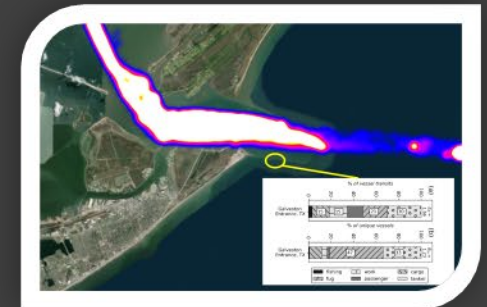
Providing quantitative and practical predictive tools and data analytics to reduce the cost of dredging for Federal navigation projects and to maintain jetties.



Quantifying potential unintended consequences and identifying necessary mitigation.



Understanding future conditions for coastal navigation and providing engineering guidance.





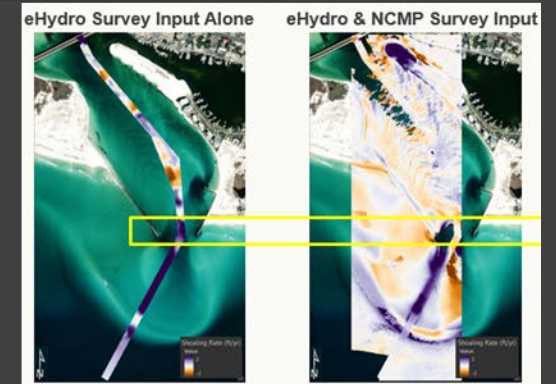
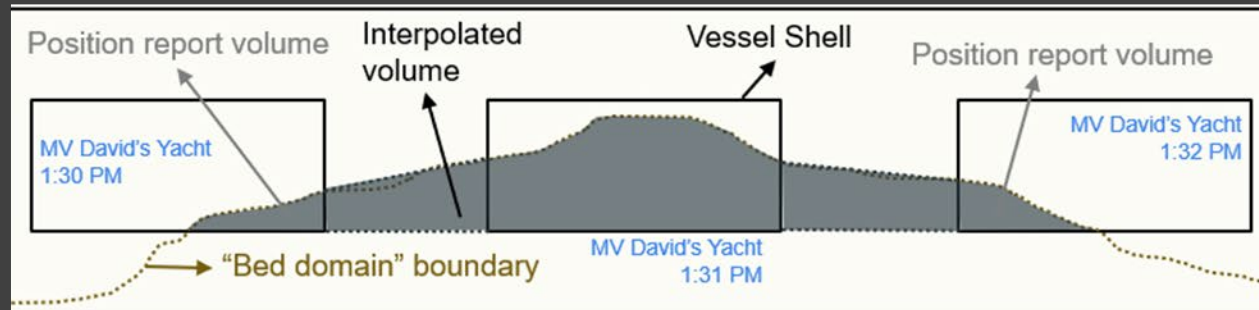
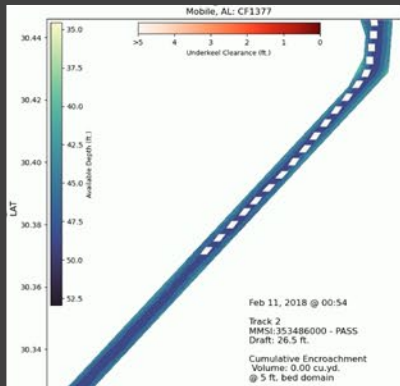
# 2022 CIRP In-Progress-Review (IPR)

19-20 April 2023

Wednesday, 19 April

0815 - 0820	Welcome by Navigation TD	Eddie Wiggins
0820 - 0840	Opening Remarks and CIRP Program Status	Tanya Beck
<b>Decision Support to Marine Transportation and Dredging Systems</b>		
0840 - 0900	Portfolio-scale Vessel Analyses: Applications of Underkeel Clearance in Navigation Channels	David Young Brandan Scully
0900 - 0915	Channel Shoaling and Analysis Toolbox (CSAT) Advancements	Charlene Sylvester Michael Hartman
0915 - 0930	Discussion	
0930 - 0945	<b>BREAK</b>	

**Coastal Navigation Portfolio Management**



# 2022 CIRP In-Progress-Review (IPR)

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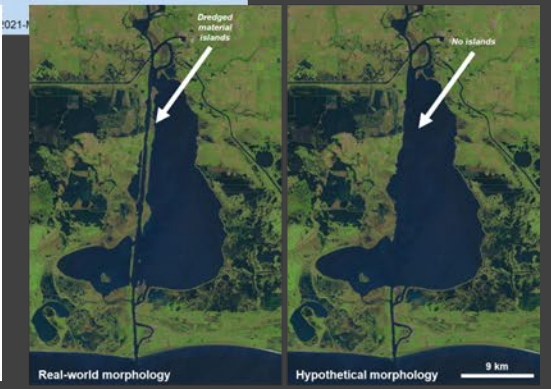
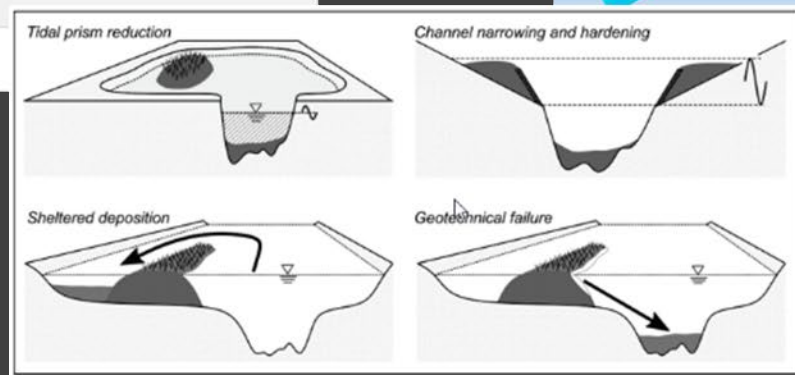
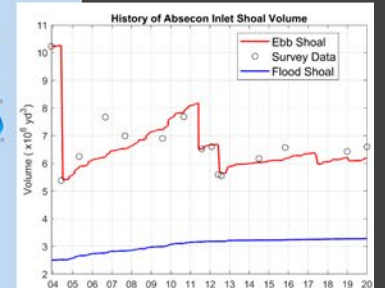
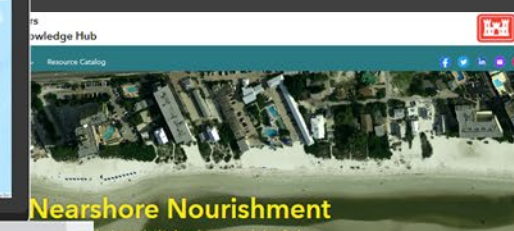
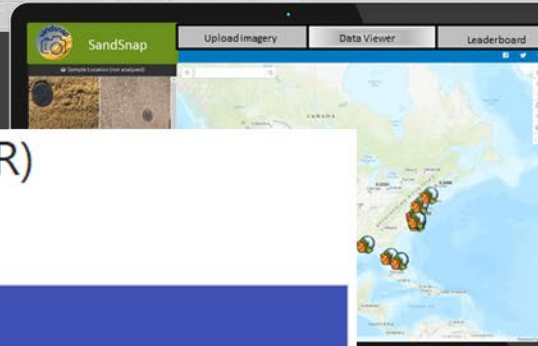
Wednesday, 19 April

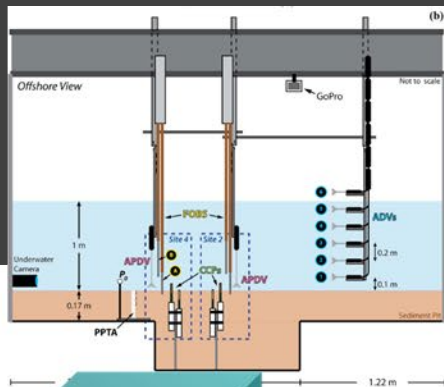
## Tools to Support Natural and Nature-based Features

0945 - 1000	SandSnap: Digital Grain-size Imagery Analysis and Engaging Citizen Scientists	Brian McFall
1000 - 1015	Nearshore Nourishment Website	Douglas Krafft
1015 - 1030	Discussion	
1030 - 1045	<b>BREAK</b>	
1045 - 1100	GenCade Development Updates	Yan Ding
1100 - 1115	Impacts of Wetland Nourishment on Coastal Inlet Processes	Douglas Krafft
1115 - 1130	Discussion	
1130 - 1140	Wrap-Up Day 1	

Inlet  
Geomorphic  
Evolution

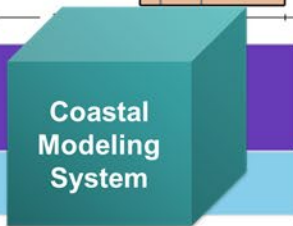
Inlet  
Engineering  
Tools





## 2022 CIRP In-Progress-Review (IPR) 19-20 April 2023

Thursday, 20 April



	Runtime	RMSE (m)	NRMSE (-)
Stockdon	0.18 s	1.01	0.89
CSHORE	25.0 s	0.55	0.34
CMS	4.1 min	0.29	0.13
XB-SB	35.5 hr	0.53	0.30
XB-NH	124.4 hr	0.45	0.23

### Nearshore Processes and Coastal Sediment Transport Model Advancement

0830 - 0845	Advancements in Nearshore Processes: Final Year	Brad Johnson
0845 - 0900	CMS/C2Shore Model Development and Validation	Liz Holzenthal
0900 - 0915	Tools for Simulating Aeolian Sediment Transport and Coastal Foredune Evolution, Dune Response Tool, and Aeolis 1d/2d Development	Nick Cohn
0915 - 0930	Discussion	
0930 - 0945	<b>BREAK</b>	
0945 - 1000	Management of CMS Development, Tech Transfer, and Guidance	Mitch Brown
1000 - 1015	Development of a Satellite-Based District Tool for Quantifying Coastal Evolution and Project Performance at Beaches and Inlets	Ian Conery
1015 - 1030	Discussion	
1030 - 1045	<b>BREAK</b>	





# 2022 CIRP In-Progress-Review (IPR)

19-20 April 2023

New Starts

Thursday, 20 April

Inlet Engineering Tools

## Port and Nearshore Phase-resolved Wave Modeling

1045 - 1100	FUNWAVE-TVD Model Improvements Development	Michael Lam
1100 - 1115	Practical wave response guidance over emergent and submerged coastal structures using FUNWAVE-TVD	Marissa Torres
1115 - 1130	Discussion	
1130 - 1140	Wrap-Up Day 2 / Closing Remarks	Eddie Wiggins

**FUNWAVE-TVD**

**What is FUNWAVE-TVD?**

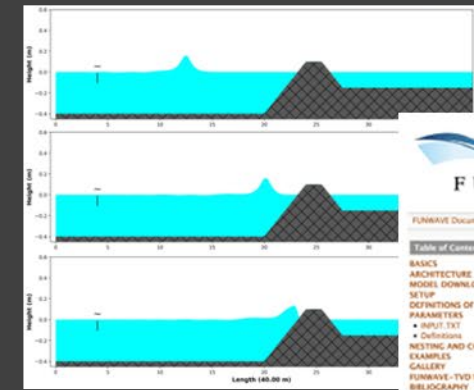
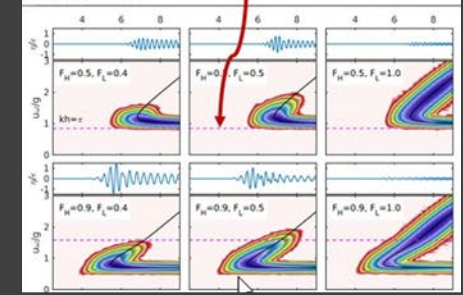
FUNWAVE-TVD is the Total Variation Diminishing (TVD) version of the fully nonlinear Boussinesq wave model (FUNWAVE) developed by Shi et al. (2012). The FUNWAVE model was initially developed by Kirby et al. (1998) based on Iliadis et al. (1992). The development of the present version was motivated by recent needs for modeling of surf-zone-scale optical properties in a Boussinesq model framework, and modeling of Tsunami waves in both a global/coastal scale for prediction of coastal inundation and a basin scale for wave propagation.

This version features several theoretical and numerical improvements, including:

1. A more complete set of fully nonlinear Boussinesq equations;
2. Monocentric Upwind Scheme for Conservation Laws (MUSCL)-TVD solver with adaptive Runge-Kutta time stepping;
3. Shock-capturing wave breaking scheme;
4. Wetting-drying moving boundary scheme.

**FUNWAVE-TVD: A Boussinesq model for simulating nearshore surface waves, currents and bathymetry from inner harbor to nearshore scales.**

$$(kh < \pi)$$



**FUNWAVE**

**MODEL WIKI**

FUNWAVE Documentation • DEFINITIONS OF PARAMETERS • Parameters for Central Module

Table of Contents

- BASICS
- ARCHITECTURE
- MODEL DOWNLOAD AND SETUP
- DEFINITIONS OF PARAMETERS
- INPUT TEXT
- DEFINITIONS
- NESTING AND COUPLING EXAMPLES
- GALLERY
- FUNWAVE-TVD WORKSHOP BIBLIOGRAPHY
- AUTHORS
- ADDITIONAL INFORMATION

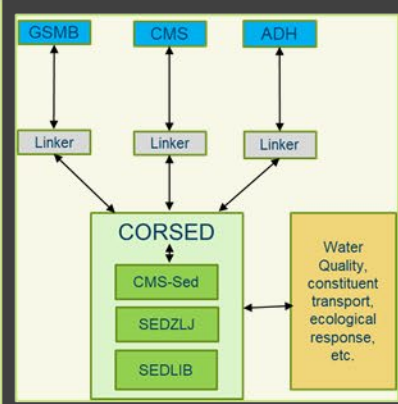
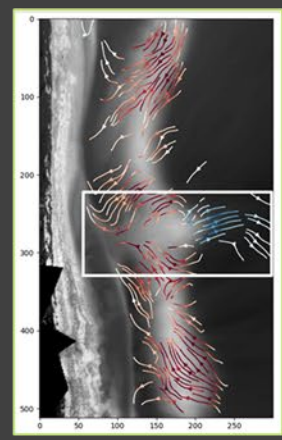
Quick search

**Tide and Surge Boundary Conditions**

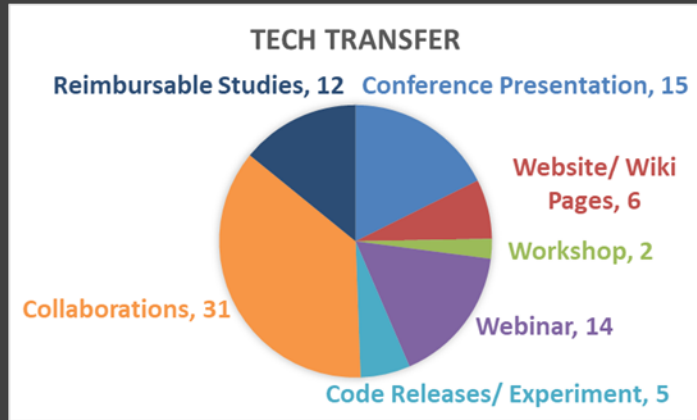
**SPECIFICATION OF TIDE AND SURGE OPEN BOUNDARY CONDITIONS**

- TIDAL\_SC\_ASE: logical parameter for tidal absorbing boundary conditions, T - tide and surge at open boundaries, F - no tide or surge.
- TIDAL\_SC\_SEA\_ASE: logical parameter for the combined tidal and absorbing-generating boundary conditions, T - tide, F - false.
- TidebctType: string parameter for data types. Default: TidebctType = CONSTANT
- Tidebctwv\_0tk: constant eta value at the WEST boundary.
- Tidebctwv\_0: constant eta value at the WEST boundary, default: 0.0.
- Tidebctwv\_0tk: constant eta value at the WEST boundary, default: 0.0.
- Tidebctwv\_0tk: constant eta value at the EAST boundary.
- Tidebctwv\_0: constant eta value at the EAST boundary, default: 0.0.
- Tidebctwv\_0tk: constant eta value at the EAST boundary, default: 0.0.
- Tidebctwv\_0: constant eta value at the SOUTH boundary, default: 0.0.
- Tidebctwv\_0tk: constant eta value at the SOUTH boundary, default: 0.0.
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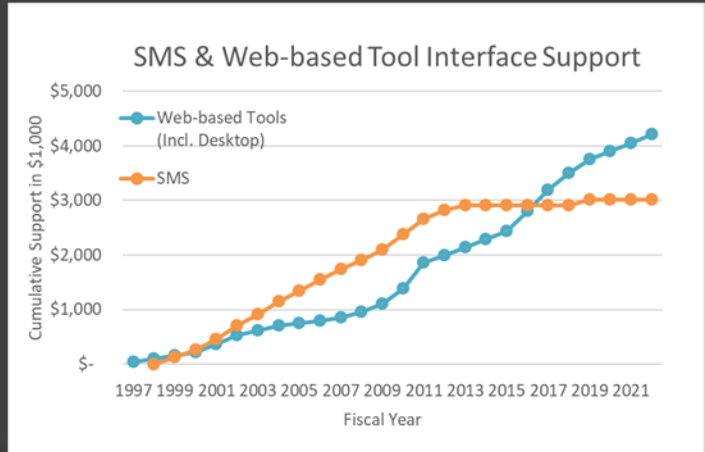
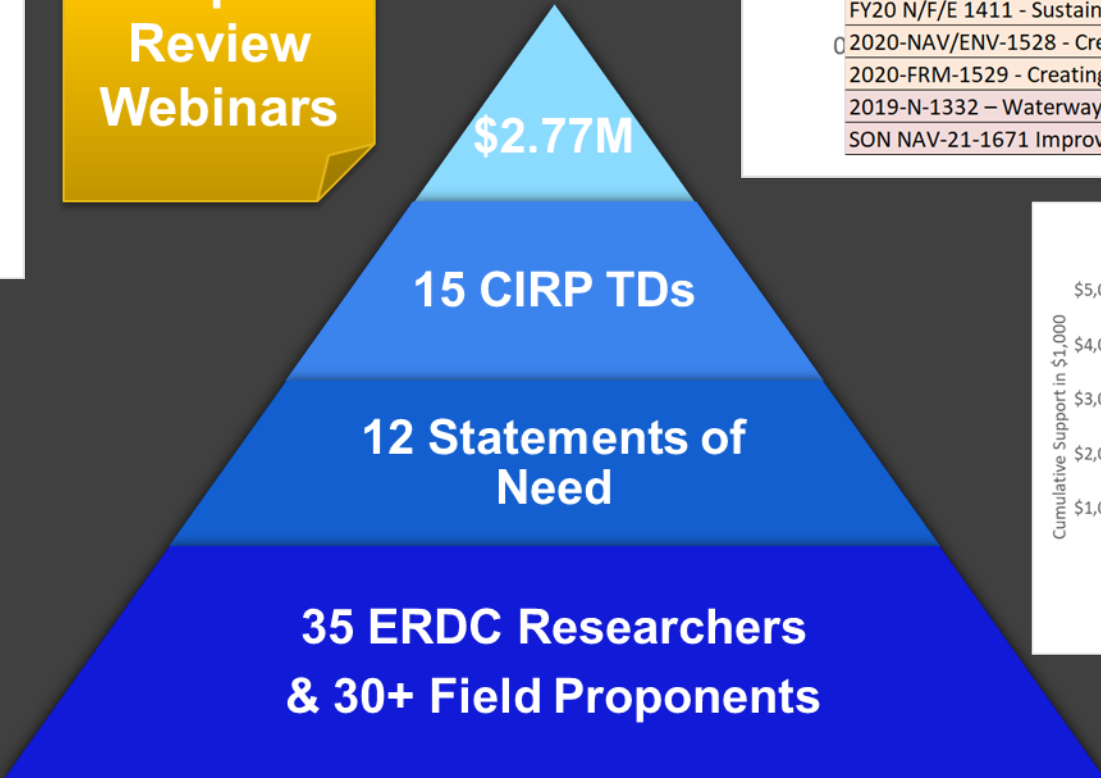
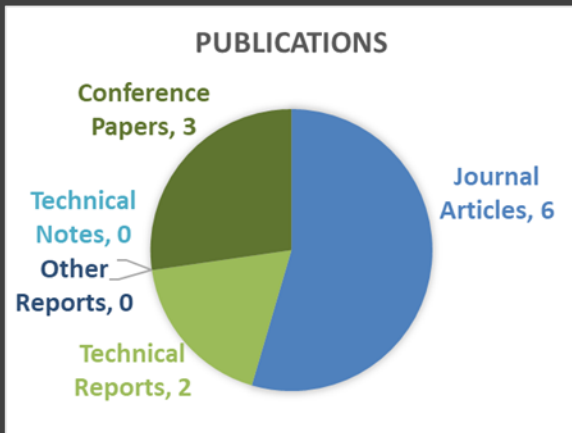
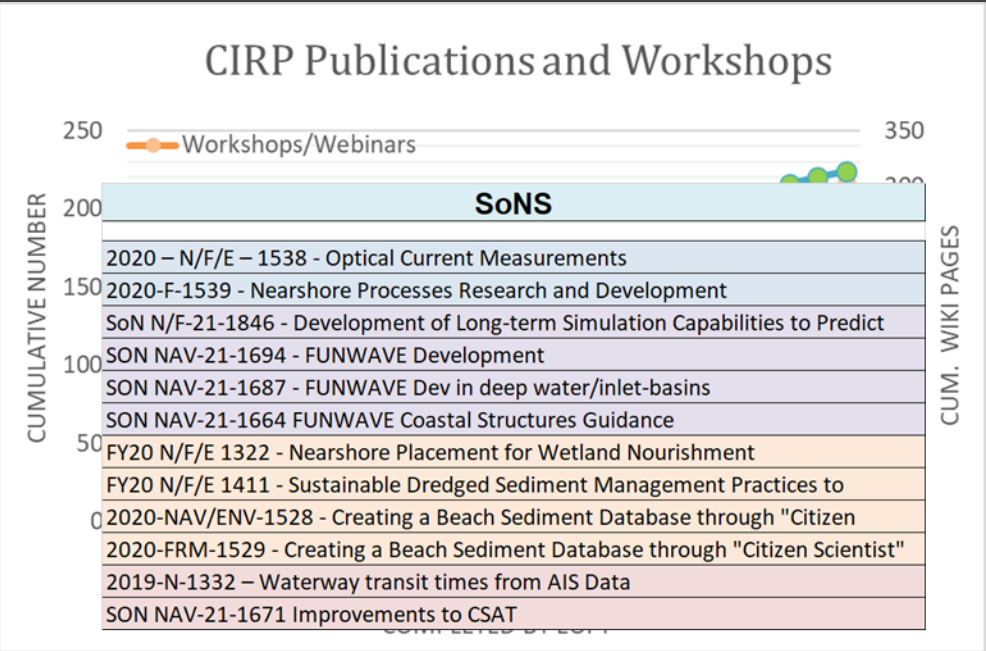
- Missing from IPR:
- Optical Currents (CIRP/CODS) FY20-FY21
  - CORSED (RSM/DOER/CIRP) FY18-FY22



# FY22 Program Metrics



**Mid-point Review Webinars**



# Communicating Technology Transfer Activity



Products

CMS

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AISAP

Aeolian Processes

CIRP Map Portal

CPT

CSAT

Depth of Closure

FUNWAVE

GenCade

Inlet Engineering Tools

Sand Snap

Sediment Budget Analysis

Sediment Mobility Tool

SMS

WaveNet & TideNet

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Navigation Portal

Tool Archive

## Nearshore Nourishment Placement Viewer

### Historic Placement Sites

- South Padre Island, TX**

Year: 2018

Volume: 382000 m<sup>3</sup>
- New Smyrna, FL**

Year: 2018

Volume: 330000 m<sup>3</sup>
- Ogden Dunes, IN**

Year: 2016

Volume: 107000 m<sup>3</sup>
- Fort Myers Beach, FL**

Year: 2016

Volume: 104000 m<sup>3</sup>
- Vilano Beach, FL**

Year: 2015

Volume: 115000 m<sup>3</sup>
- Mouth of Columbia River (MCR) - South Jetty**

Year: 2014-2018

Volume: NaN m<sup>3</sup>
- Fort Myers Beach, FL**

Year: 2009

Volume: 175000 m<sup>3</sup>

### Placement Sites

● 32

Viewing 32 of 35 total placement sites

Last update: 40 seconds ago

◀ 1 of 32 ▶

### Placement Information

<b>Placement Site:</b> Tauranga Bay, New Zealand	
Placement Site	Tauranga Bay, New Zealand
Year	1977-1978
Placement Type	Mound
Placement Volume	2000000
Observed Activity	Stable

Website: <https://cirp.usace.army.mil/>

US Army Corps of Engineers • Engineer Research and Development Center • Coastal and Hydraulics Laboratory

UNCLASSIFIED



# Looking ahead

## FY23

- **New Start Coastal Inlet Resilience Project with 3D geomorphic analyses in GIS**
- **CMS Major Version Release with swash & sandbar closure (C2Shore), and subaerial sand transport (Aeolis)**
- **FUNWAVE-TVD model development for deep water waves and guidance over emergent and submerged coastal structures**
- **New CSAT Guidance on basic and advanced features**
- **Transition CoastSat to USACE for rapid shoreline change analyses**
- **Transition CNPM methodologies to NavPortal and technology to open-source ERDC GIT Repositories (numerical models & tools)**
- **CIRP Tech Discussion webinars and support internal and external workshops at all levels (Engineer, MSCs, Conf.)**
- **Mentoring and growing CIRP teams**



## 2023 NAV SoNs

NAV
1970 - Multi-scale analyses of BUDM impacts on long-term navigation channel maintenance
To include BU alternatives: 1906 – Nearshore Berms/1921 – Eel Grass Habitat/1933 – Wetland Creation
1923 - Improving Prediction and O&M Strategies
1968 - New volume-change tools to improve sediment management
1969 - Incorporating shoaling rates into sediment budget creation to improve sediment management
1987 - Hindcasting Coastal Rubble Mound Reliability

