FY21 RSM IPR
ERDC, SandSnap: Web Application Development

Brian McFall, David Young

BLUF: SandSnap is a research initiative to engage citizen scientists to amass a spatial and temporally varying nationwide beach grain size database.

Challenge/Objectives

- Develop interactive Web Application
- Pilot outreach activities during COVID

Approach

- Coordinate with ~30 Universities & state agencies around the country to collect images & physical samples
- Develop Web App with OP-J
- Innovative solutions to increase public engagement.

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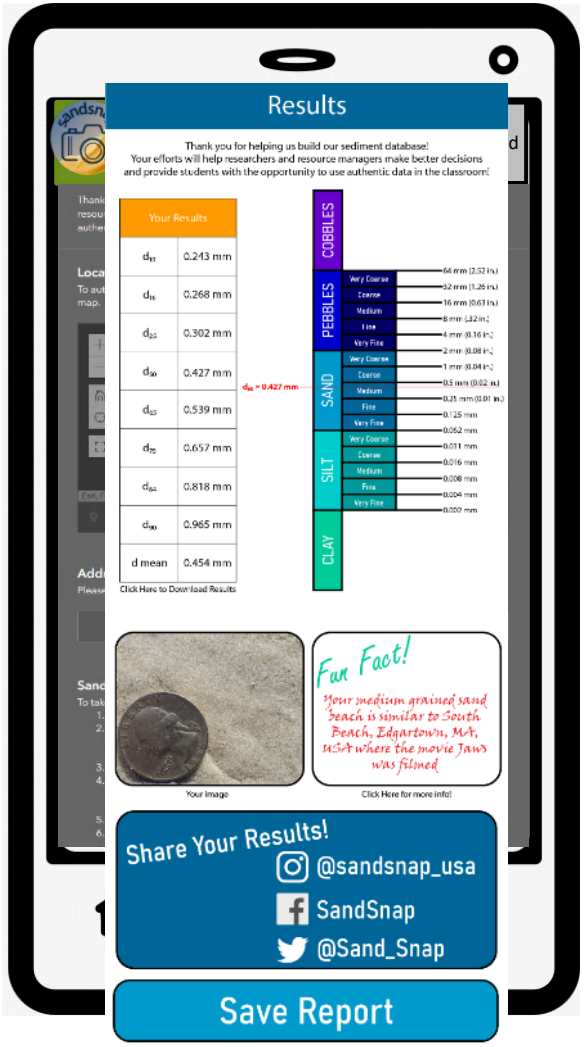
Sample Methodology:

1.

2.

3.



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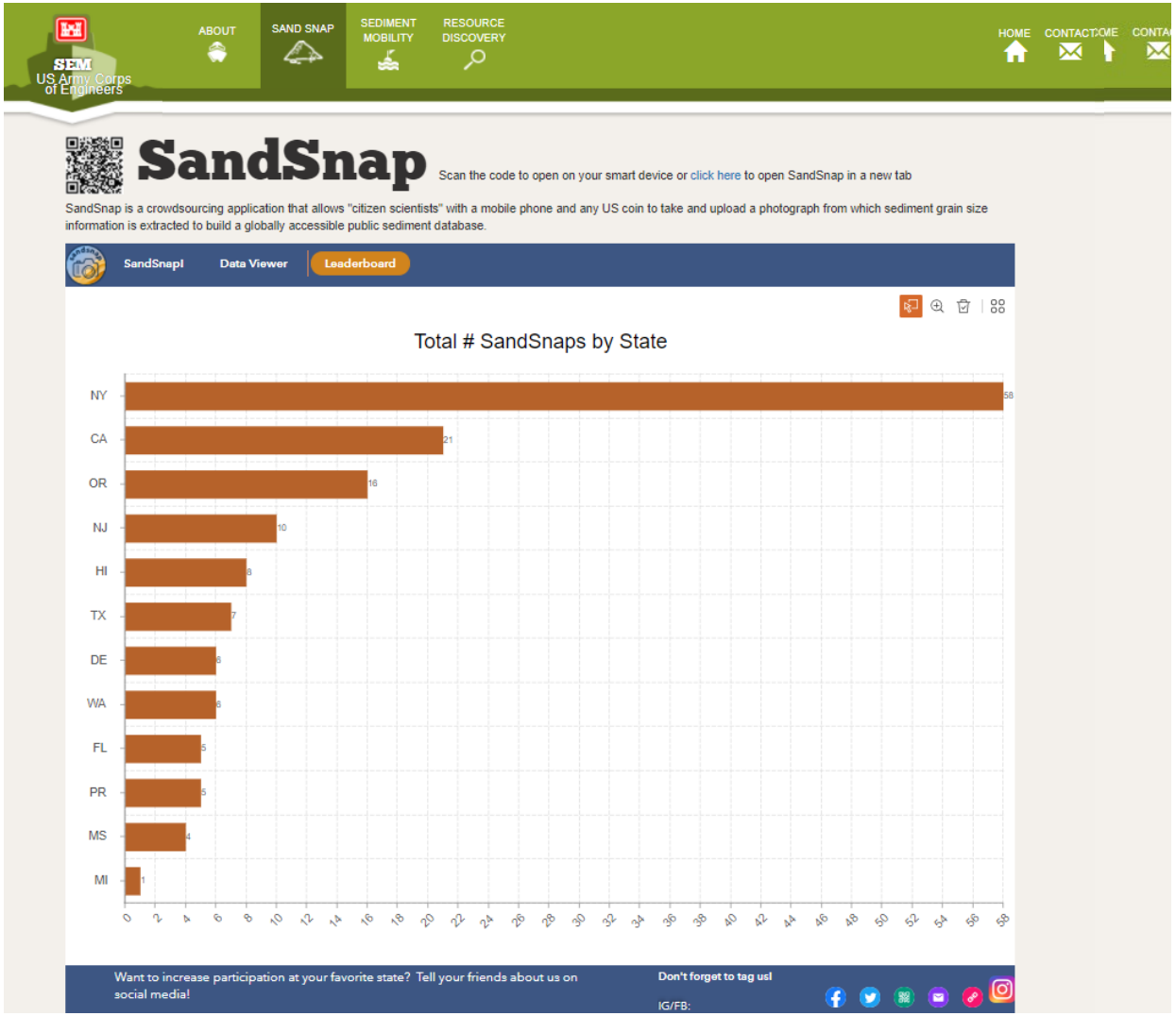

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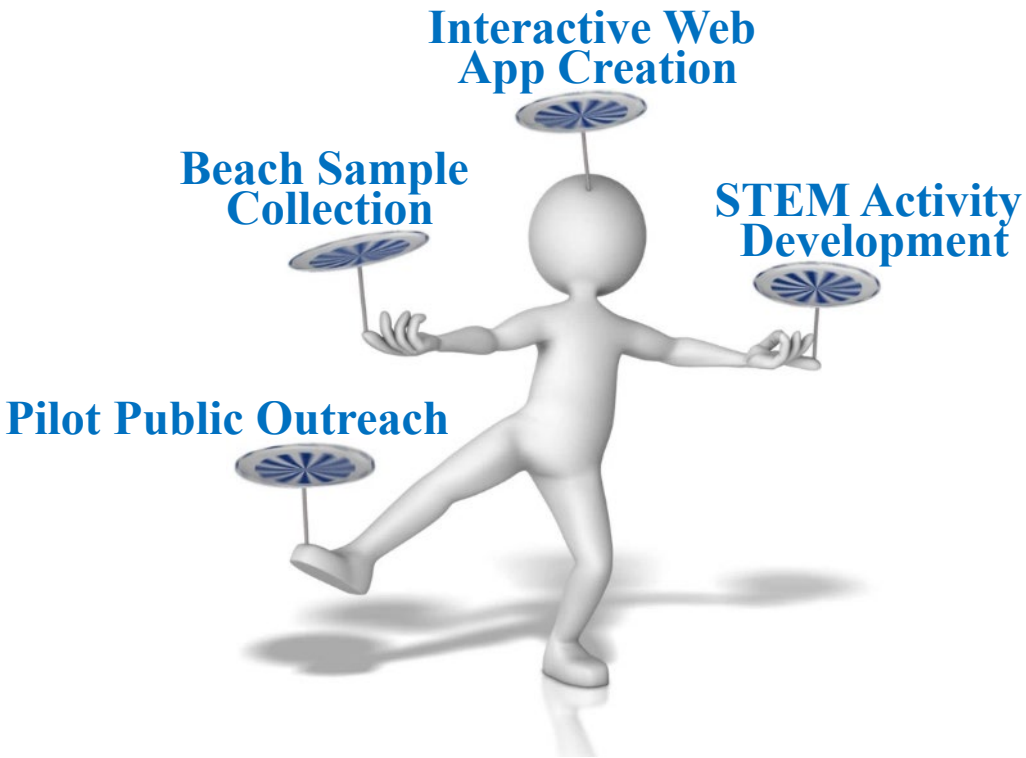
FY21 Activities:



Outreach

- Building Civic Awareness
- Develop STEM Activities
- More Samples from Around Country
- Coordinate with CoastSnap

Technical

- More Samples from Around Country
- Training model on USACE HPC resources (Onyx)
- Web Application Development

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Additional PDT Members:

- Shannon Stever (ERDC)
- Shelley Whitmeyer (James Madison)
- Dan Buscombe (MARDA Science)
- Jon Warrick (USGS-Santa Cruz)

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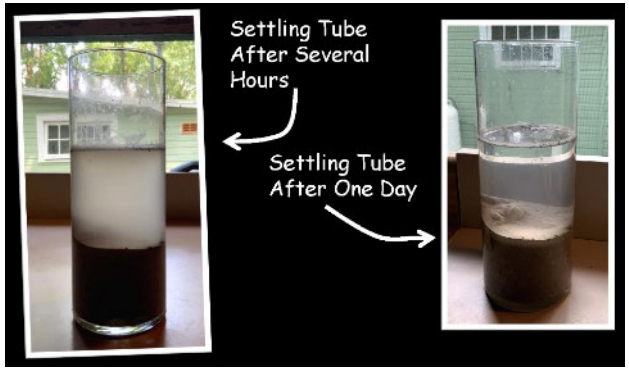
Outreach – With Social Distancing:

Library STEM Activity Bags
"Beach Kits"



STEM Activities:

- "Sorting It Out" (Sieve & Sand Castle)
- "That Settles It" (Settling Tube)
- "Digging In Deeper" (Petri Dish & Hand Lens)
- SandSnap

TEST LOCATIONS:

- John Jermain Memorial Library in Sag Harbor, NY
- Nature Center at Jones Beach State Park in Jones Beach, NY

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Outreach – In Person:

Public Engagement & Girl Scout Event
Jones Beach, NY

Staff:

- 2 James Madison University (JMU) Professors
- 3 JMU Undergraduates
- 2 NAN Engineers
  - Danielle Tommaso
  - Lynn Bocamazo
- 1 Park Employee
- 1 ERDC researcher

Participation:

- 22 Children (18 Girl Scouts) + Parents
- Distributed 80 SandSnap Stickers

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Accomplishments

- Trained Deep-Learning Model on HPC
- Printed another 1,000 Water Bottle Stickers with QR Code
- Collected More than 200 Images
- Collected More than 100 Physical Samples
- Web Application
  - Migrated model to the Cloud
- Tested 4 STEM Activity Bags
- Piloted Public Outreach/Girl Scout Event

Deliverables & Collaborations

- TN: Technical Feasibility of Creating a Beach Grain Size Database with Citizen Scientists
- 2 Conference Presentations (ASBPA, FSBPA)
- 5 Webinars (CWG, ASCE, CHL Symposium, FAU, etc)
- 1 CIRP TD
- Collaborations:
  - Key Collaborators: James Madison University, MARDA Science, LLC., USGS
  - Imagery & Samples: 28 Universities and Gov't Agencies
  - STEM Bags: Library Sag Harbor, NY; Nature Center in Jones Beach, NY
- Leveraged CIRP & RSM Funds

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Planned FY22 Products/Advances:

- Conference Presentations (ASBPA/AGU-OS)
- Create Tutorial Videos
- Promote Web Application
- Install SandSnap Signage with CoastSnap (Spring 2022)
- Journal Manuscript - Education & Outreach (CSR)
- Journal Manuscript – SandSnap Machine Learning Models
- Student Outreach Event (Charleston – Spring 2022)
- Science Fair & Class Lesson Plan Development

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How is this project benefiting the USACE and Nation?

- Crowdsourcing the data collection engages the public and garners public support for USACE projects
- Capturing the critical spatial and temporal variations in the beach sediment grain size will
  - improve project uncertainty analysis
  - potentially make more dredged sediment compatible for beneficial use on beaches.
- This database will massively improve USACE morphology modeling capabilities both in preliminary studies where traditional grain size data is not yet available and in large-scale morphology modeling with large spatial variability in grain size.

Direct cost savings:

$100 per sample x 10,000 samples/year = $1M/year.

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