

# FY21 RSM IPR



## ERDC, Field Implementation of Belowground Biomass (BGB) for Increased Dune Stability and Resiliency, Provost

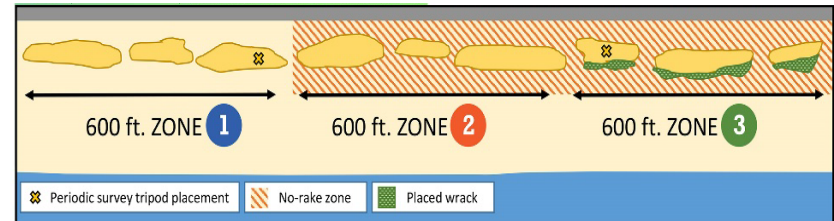
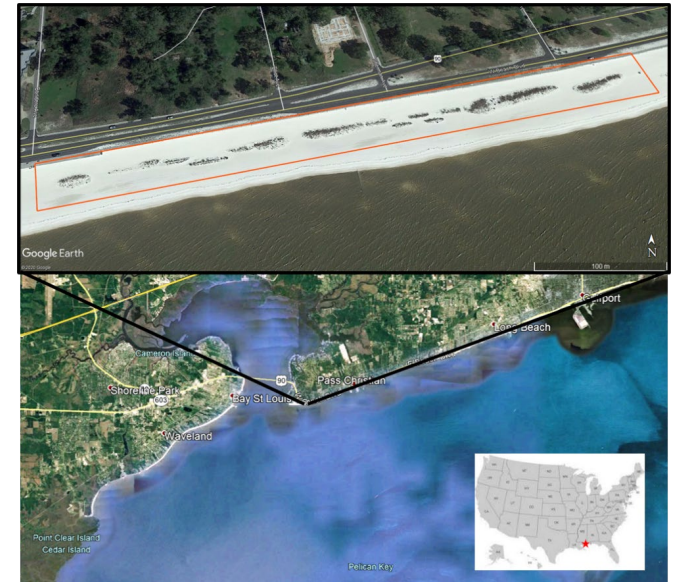
**BLUF:** The aim of this proposed project is to observe and document the response of a man-made dune to incrementally added belowground biomass. Recent research at ERDC shows the value of belowground biomass in dunes, and it is hypothesized that including biomass during the construction project, or adding biomass incrementally as the dunes naturally accrete, will greatly increase the stability of the dune, especially while vegetation is establishing.

### Objectives

- Increase BGB utilizing natural wrack
- Monitor the beach/dune system
- TN summarizing groomed/man-made dune maintenance practices
- Publish findings (Target Shore and Beach)

### Approach

- Site selection & define experimental zones
- Pre-treatment & periodic terrestrial lidar surveys
- Incremental wrack placement at dune toe & adjust beach grooming practices.
- Time-lapse imagery of accretion via field cam
- Field inspection post-storm events (Cristobal, Delta, Zeta, Ida)



# FY21 RSM IPR



## ERDC, Field Implementation of Belowground Biomass (BGB) for Increased Dune Stability and Resiliency, Provost

### District/Other USACE PDT Members

Leigh Provost, CEERD-HFC-S, Res. Hydraulic Eng.  
Eve Eisemann, CEERD-HN-C, Res. Physical Sci.  
Mary Bryant, CEERD-HFC-S, Res. Hydraulic Eng.  
Dr. Duncan Bryant, CEERD-HFC-T, Res. Hydraulic Eng.  
Elizabeth Godsey, CESAM-EN-HH, Coastal Eng.  
Richard Allen, CESAM-EN-HH, Civil Eng.

### Leveraging/Collaborative Opportunities

- Mobile District Mississippi Coastal Improvements Program (MsCIP) re-planting of Harrison County Dunes.
- Harrison County Sand Authority beach maintenance project

### Stakeholders/Partners

#### Mobile District Team

Justin McDonald, CESAM-PD, Coastal Eng.  
Alison Fitzgerald, CESAM-EN-HH, hydraulic engineer,  
[Alison.A.Fitzgerald@usace.army.mil](mailto:Alison.A.Fitzgerald@usace.army.mil)  
Angelia Lewis, CESAM-PD-EC, biologist  
Brian A. Zettle, CESAM-PD-EI, senior biologist

#### Harrison County, MS Sand Authority

Charles V. Loftis, Director, [CLoftis@co.harrison.ms.us](mailto:CLoftis@co.harrison.ms.us)

**WRACK-CYCLING**  
Better Dunes / Better Protection

Why Are Beach Dunes Important?  
Dunes provide a key level of defense that help to keep your homes and infrastructure safe during storm and high water level events.

**What Is Wrack?**  
Wrack is the vegetation that naturally washes up on our beaches and is typically groomed and removed from the coast.

**What Are We Doing With It? Recycling It!**  
By keeping this material in the system and strategically placing the wrack at the base of the dune, we aim to increase trapped sediment, leading to larger, more stable dunes.

Zone	Name	Definition
1	Control	'Status-quo' beach grooming will continue here. This includes raking the beach and around dunes.
2	No Rake	Beach will continue to be raked, but the area around dunes will be left unraked for the duration of the study.
3	No Rake & Treatment	Same raking practices as Zone 2. Wrack removed from the beach within Zone 3 will be placed on dune.

**Keep An Eye Out!**  
As you visit and enjoy the beach you may notice signs posted. These signs are markers for the study areas assigned for this research. Note the image above and its definition to learn more on each zone.

# FY21 RSM IPR



## ERDC, Field Implementation of Belowground Biomass (BGB) for Increased Dune Stability and Resiliency, Provost

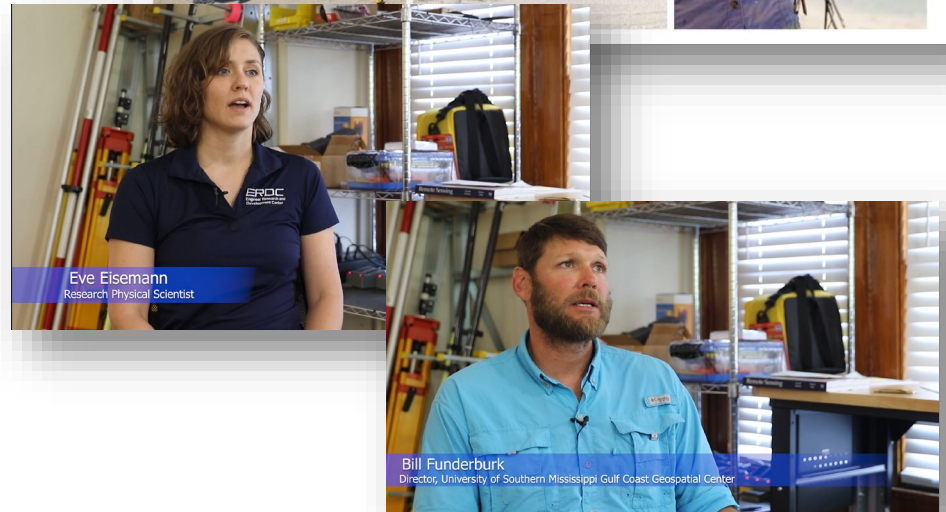
### Accomplishments/Deliverables

- 5 Terrestrial Lidar Surveys, including post-Delta and post-Zeta
- 6 Wrack Placements
- TN summarizing groomed/man-made dune practices [Draft]
- Volume change and profile analysis of terrestrial LIDAR sets
- Promotional video and interview: <https://www.usm.edu/news/2021/release/dune-system-research.php>
- FAU Colloquium Presentation
- ASBPA Presentation (Upcoming)

USM Home / News / 2021 / Working with nature to create a stronger, more resilient dune system

### Working with nature to create a stronger, more resilient dune system

Thu, 06/24/2021 - 15:17pm



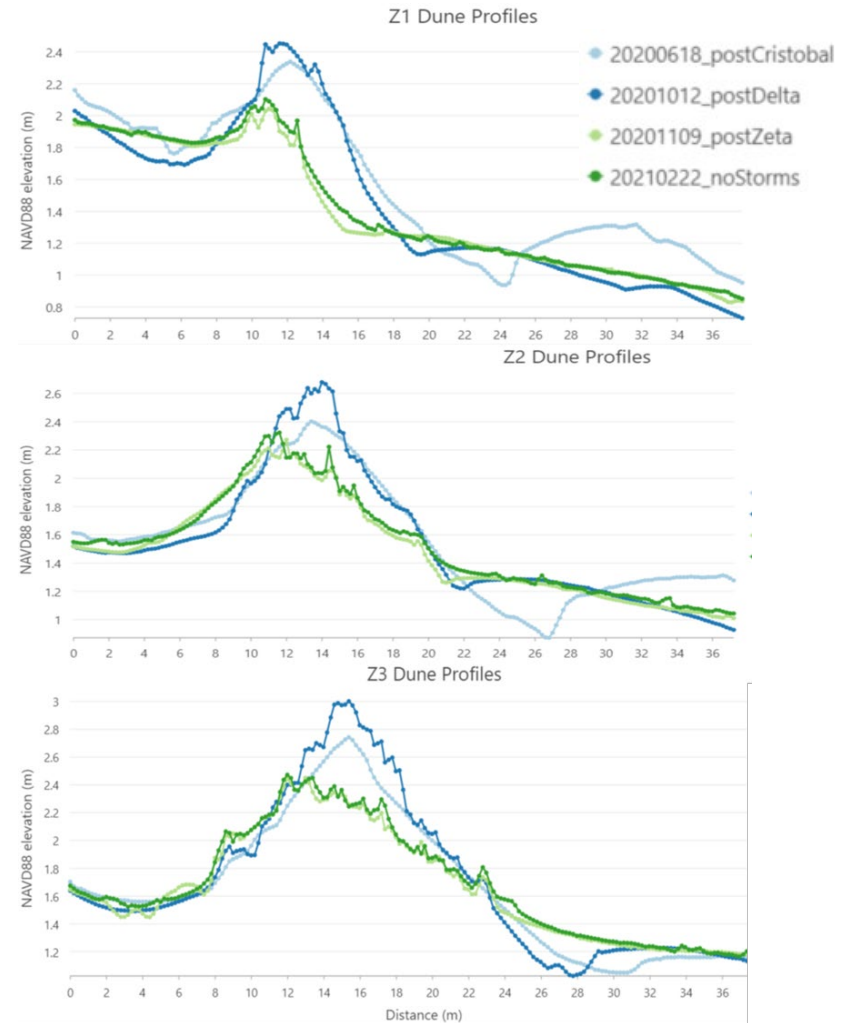
# FY21 RSM IPR



## ERDC, Field Implementation of Belowground Biomass (BGB) for Increased Dune Stability and Resiliency, Provost

### Accomplishments/Deliverables

- 5 Terrestrial Lidar Surveys, including post-Delta and post-Zeta
- 6 Wrack Placements
- TN summarizing groomed/man-made dune practices [Draft]
- Volume change and profile analysis of terrestrial LIDAR sets
- Promotional video and interview: <https://www.usm.edu/news/2021/release/dune-system-research.php>
- FAU Colloquium Presentation
- ASBPA Presentation (Upcoming)



*Dune profile changes*

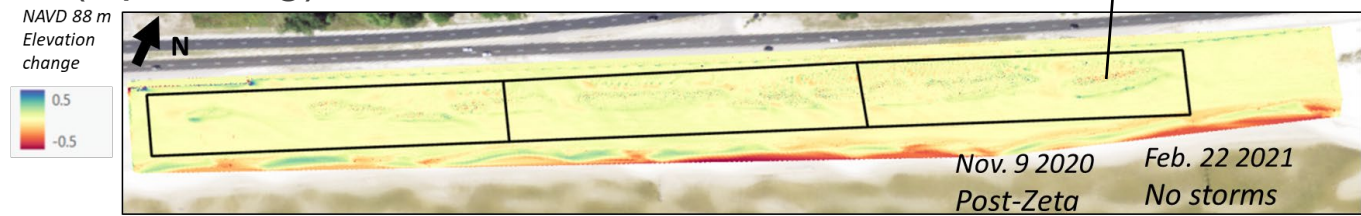
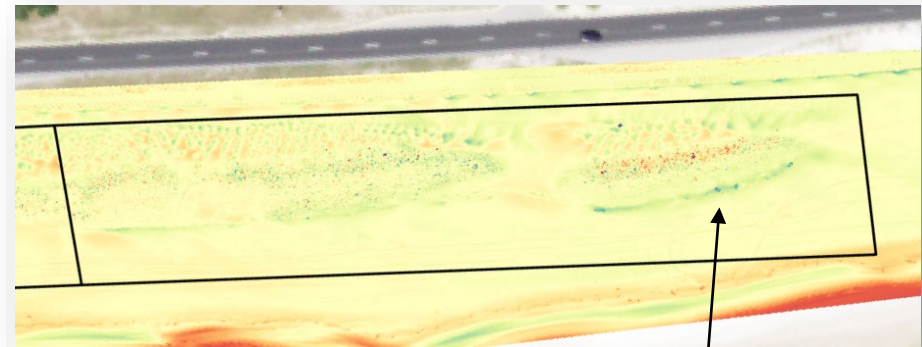
# FY21 RSM IPR



## ERDC, Field Implementation of Belowground Biomass (BGB) for Increased Dune Stability and Resiliency, Provost

### Accomplishments/Deliverables

- 5 Terrestrial Lidar Surveys, including post-Delta and post-Zeta
- 6 Wrack Placements
- TN summarizing groomed/man-made dune practices [Draft]
- Volume change and profile analysis of terrestrial LIDAR sets
- Promotional video and interview: <https://www.usm.edu/news/2021/release/dune-system-research.php>
- FAU Colloquium Presentation
- ASBPA Presentation (Upcoming)



*Elevation change between post-Zeta and a no storm period*

# FY21 RSM IPR

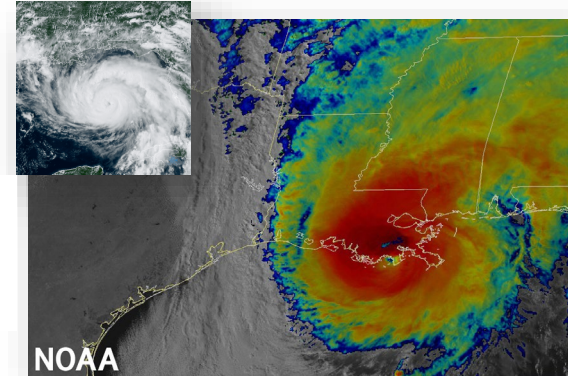


## ERDC, Field Implementation of Belowground Biomass (BGB) for Increased Dune Stability and Resiliency, Provost

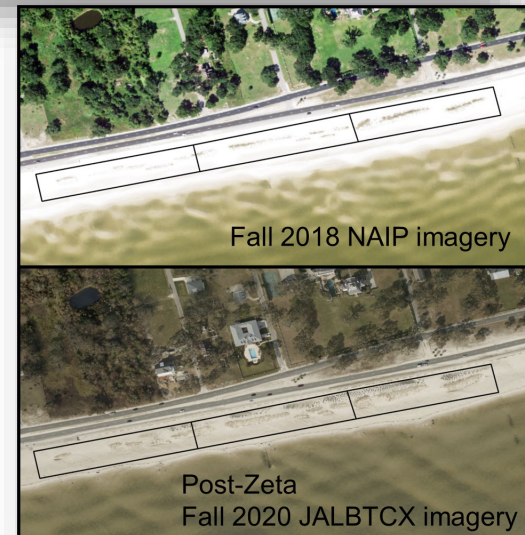
What challenges did you face to get your project to implementation and how did you move past them?

- Changing Covid-19 Guidance
- Detrimental Storm Impacts (Delta, Zeta, Ida)
- Changes in team members
- Changes in treatment methods
- Integrating new technology at the site

*Hurricane Zeta and Ida Impacts  
MS Gulf Coast*



*Time-lapse  
camera disguised  
as a birdhouse  
for theft-  
avoidance*



# FY21 RSM IPR

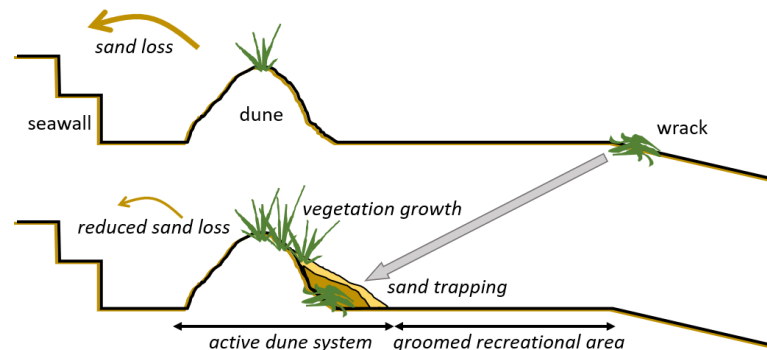


## ERDC, Field Implementation of Belowground Biomass (BGB) for Increased Dune Stability and Resiliency, Provost

### How is this project benefiting the USACE and Nation?

This project has the potential to greatly improve the sediment retention of nourishment projects with man-made dunes by augmenting the dunes' ability to capture and retain sand. This method may be an effective sediment management strategy, improving the efficiency of beach re-nourishments and man-made dunes.

- The use of wrack material for dune improvement will reduce costs to the local stakeholders associated with beach grooming and disposal
- With increased biomass, aeolian sediment trapping will increase, preventing sand loss
- Added biomass may enhance dune vegetation growth (Sigren, Figlus & Armitage, 2014)
- Increased dune stability and resistance to erosion



# Thank you!

Leigh.a.provost@erdc.dren.mil

