

Creating Bird Islands in Coastal Louisiana using Sediments Dredged from Baptiste Collette Bayou

Burton Suedel¹, Michael Guilfoyle¹, Jake Jung¹, Justin Wilkens¹, Jeff Corbino²

¹Research Biologist, US Army Engineer Research and Development Center Environmental Laboratory (ERDC-EL)

²Environmental Resource Specialist, US Army Corps of Engineers, New Orleans District (MVN)

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Photo Credit: PJ Hahn



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Creating Value through Alignment...

- What opportunities are there for achieving better alignment of natural and engineered systems?
 - Can improved alignment reduce risks to life, property and ecosystems?
 - What range of services can be produced through such alignment?
 - What are the science and engineering needs in order to achieve better alignment?



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Sustainable Solutions
To America’s Water Resource Needs
Civil Works Strategic Plan 2014-2018



Engineering With Nature

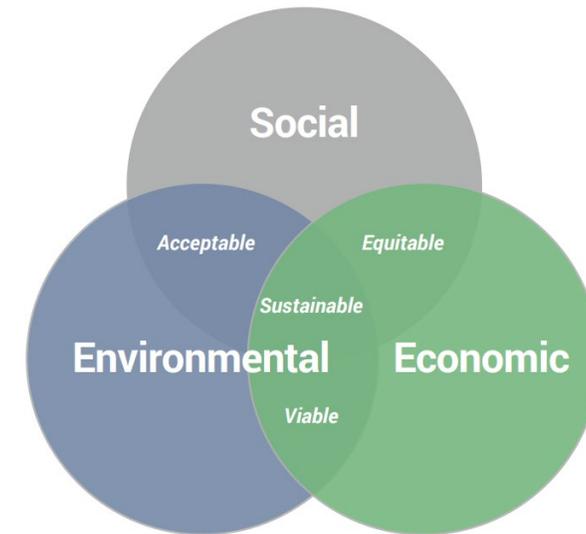


...the intentional alignment of natural and engineering processes to efficiently and sustainably deliver economic, environmental, and social benefits through collaborative processes.

www.engineeringwithnature.org

Key Elements

- Science and engineering that produces operational efficiencies
- Using natural process to maximum benefit
- Broaden and extend the benefits provided by projects
- Science-based collaborative processes to organize and focus interests, stakeholders, and partners



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EWN[®] Across USACE Mission Space

Navigation

- Strategic placement of dredged sediment supporting habitat development
- Habitat integrated into structures
- Enhanced natural recovery

Ecosystem Restoration

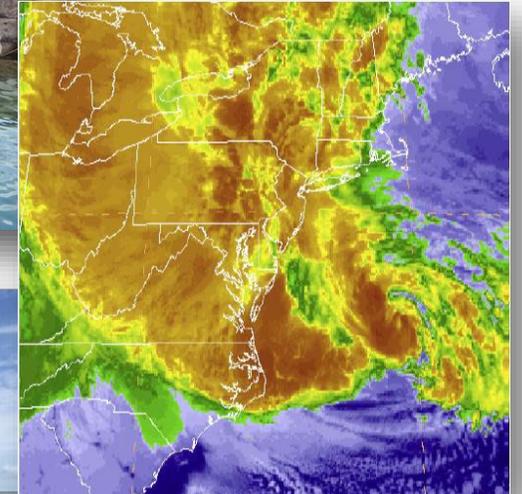
- Ecosystem services supporting engineering function
- “Natural” development of designed features

Flood Risk Management

- Natural and Nature-Based Features to support flood risk management
- Levee setbacks

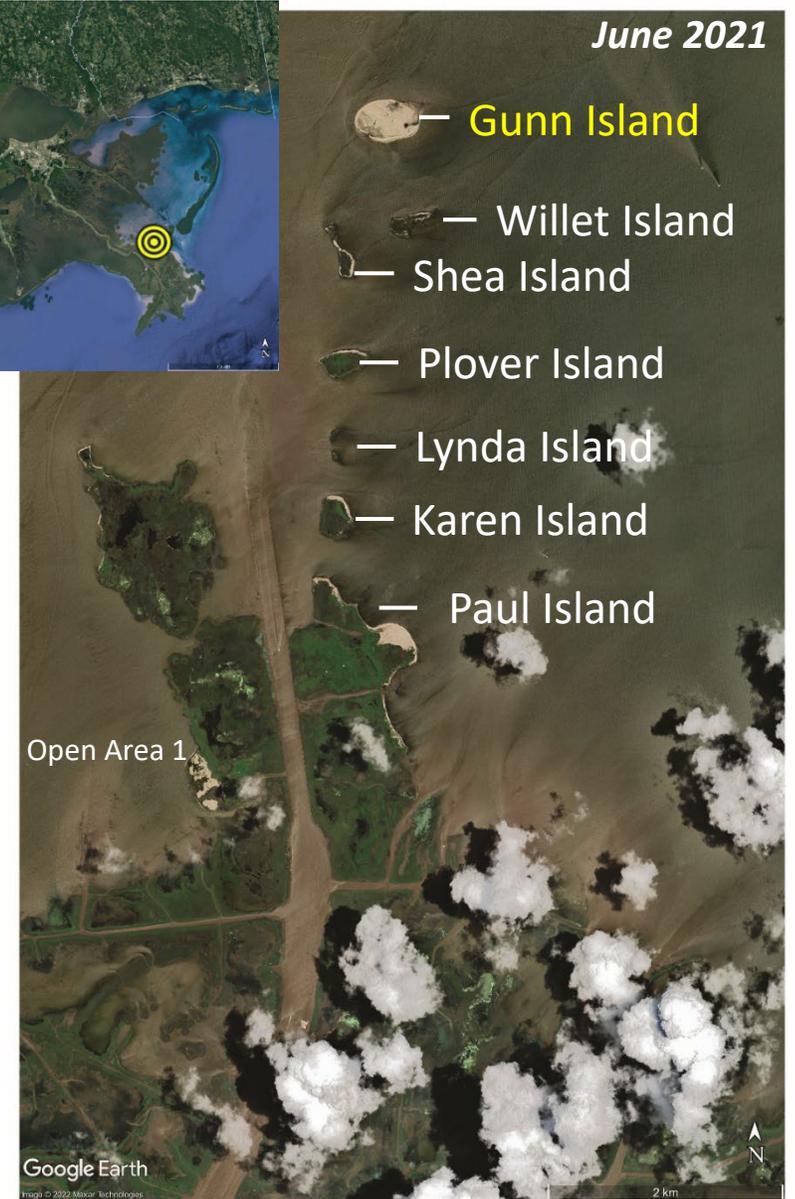
Water Operations

- Shoreline stabilization using native plants
- Environmental flows and connectivity



Baptiste Collette Bayou

- Island construction began in 1978 to maintain the navigation channel for improved access to the Port of New Orleans & ICWW
- Keeping islands relatively small and isolated promotes coastal bird use and reduces mammalian predation
- Six bird islands and two mainland open areas recently received dredged sediment
- From 2018 to 2020, Gunn Island received an additional 1,000,000+ cy dredged sediment during routine maintenance dredging, raising the elevation to >8 ft, providing >12 acres coastal bird nesting habitat



The Science Issue and Relevance

- Suitable coastal habitat is at a premium.
- Coastal engineering can build and maintain coastal infrastructure to sustain wildlife and enhance habitats
- Understand how the construction and maintenance of Baptiste Collette Bayou islands achieves environmental benefits, especially for birds.
- Strike balance between engineering infrastructure/hydrology needs and habitat creation/enhancement to support wildlife
- Conduct bird surveys to observe habitat use

Pipeline transporting dredged sediment to Gunn Island in July 2016.



Methods: Bird Community Monitoring

- ERDC Spring and Summer bird surveys (ongoing)
- USGS conducting Fall and Winter bird surveys
 - TJ Zenzal & Amanda Anderson
- Area search surveys on foot and by boat
- Spotting scope surveys
- Statistical analysis of data



The Least Bittern was uncommon but routinely observed on islands dominated by Phragmites (Photo credit: Jake Jung).

Methods: Unmanned Aerial System (UAS)

UAS mission

- Assess bird habitat and elevation characteristics for islands and sediment placement areas
- Survey performed in June 2021

UAS platform

- Harris Aerial HX8 (Multirotor, octocopter)

UAS Payload

- LiDAR sensor – Riegl miniVUX-2UAV laser scanner
- True color 3-band (Red, Green, and Blue) sensor – Sony Alpha 7R II digital camera, spatial resolution 1.25 cm at ~70 m
- UAS flown at 60-70 m altitude at ~6 m/s
- GPS and Inertial Measurement Unit recorded altitude, flight speed, direction, and sensor(s) positions



Harris Aerial HX8 UAS Platform

Marking Progress

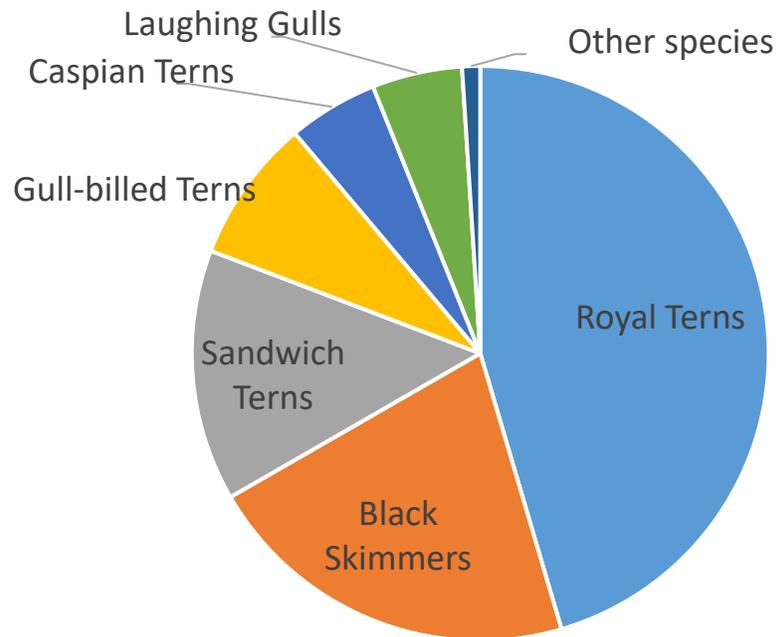
- In August 2020, the Louisiana Department of Wildlife and Fisheries observed >50,000 seabirds on Gunn Island
- In 2020, Gunn Island hosted Louisiana's largest nesting tern colony with an estimated 10,000 breeding individuals



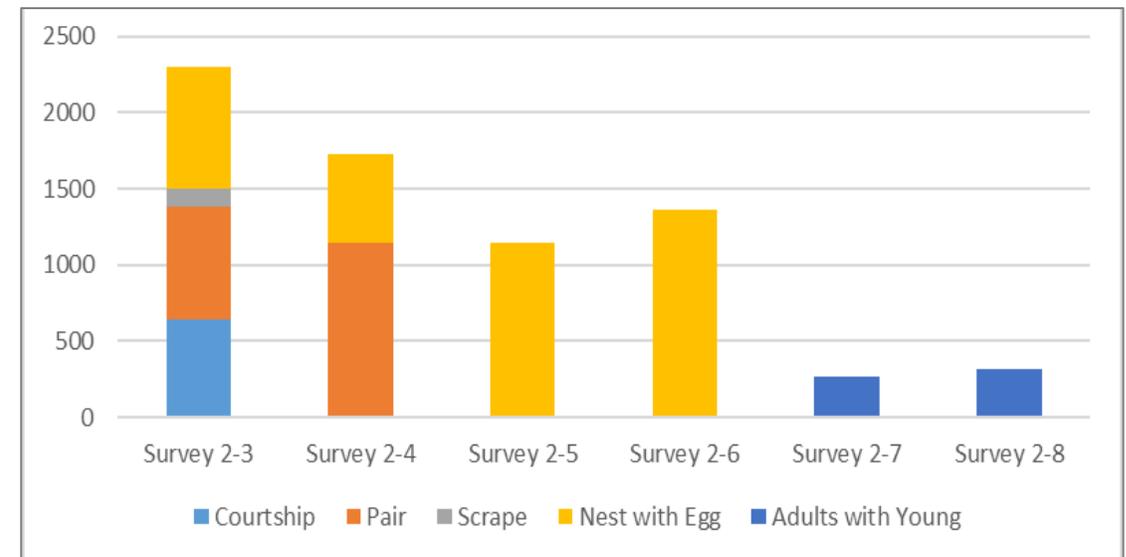
Photo Credit: PJ Hahn

Results: 2021 Gunn Island Bird Survey

Cumulative bird count	Bird species	Mean count (species combined)	Mean breeding count (excluding flyovers)
77,474	68	8,463	8,453



Cumulative breeding behavior phenology of the Black Skimmer on Gunn Island during six surveys conducted between 4 May and 19 Aug 2021.



Results: Gunn Island hybrid image classification

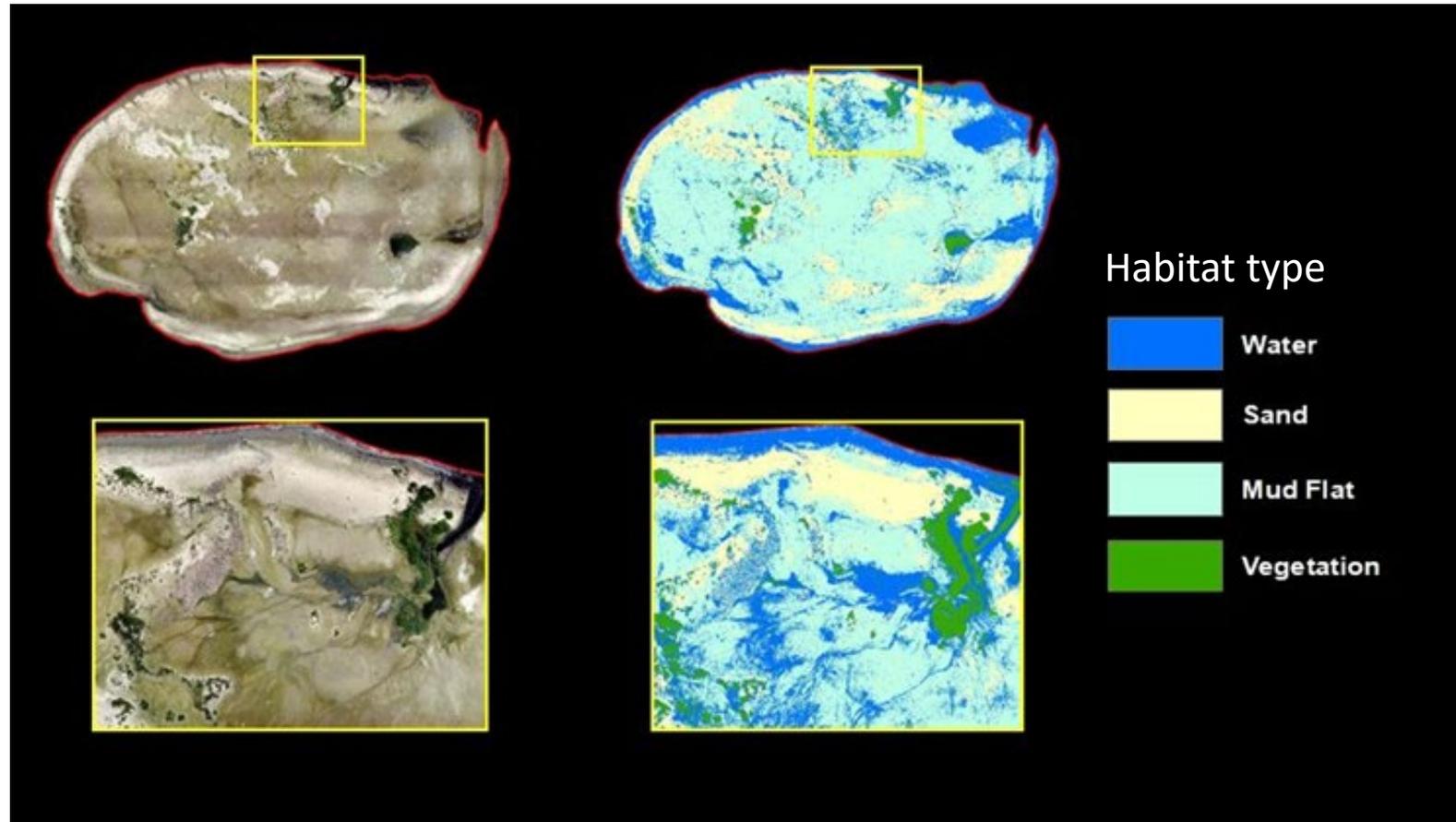
Summary of hybrid image classification area by habitat type.

Island	Habitat type (acres)				<i>Total acres</i>
	Water	Sand	Mud Flat	Vegetation	
Gunn	8.0	7.3	24.7	1.0	<i>41.0</i>
Willet	2.6	0.5	1.2	8.0	<i>12.3</i>
Shea	2.1	1.0	1.4	7.2	<i>11.7</i>
Plover	2.0	1.0	1.3	15.7	<i>20.0</i>
Paul & Area 2	1.5	1.7	12.5	19.1	<i>34.8*</i>
Open Area 1	7.7	1.0	8.2	4.4	<i>21.3</i>

*Does not include 12.5 acres due to missing imagery for Paul Island.

Results: Gunn Island hybrid image classification

Hybrid image classification area by habitat type.



Results: Sediment Management & Beneficial Use

- Over 1,000 ac coastal habitat created by DM placement during routine maintenance
- Annual sediment BU from channel maintenance via placement of dredged sediment in shallow open water on either side of channel
- Unconfined placement designed to create wetland habitat suitable for colonial nesting seabirds
- Allowing dredged sediments to flow outward unconfined from the island creates broad intertidal flats that serve as foraging areas for coastal birds



Results: Sediment Management & Beneficial Use

- To attract seabirds, plant overgrowth (usually *Phragmites*) intentionally covered with dredged sand to create large areas of bare ground necessary for breeding
- Both the intentional smothering of plant overgrowth and creation of tidal flats represent current state-of-the-practice and are management adaptations made from lessons learned over time



*Gunn Island in May 2021 (left) before breeding by coastal birds had begun, and then later in July 2021 (right) showing dominant growth of *Phragmites* during the 2021 breeding season. (Photo Credits: Left, Michael Guilfoyle; Right, Jake Jung).*

Significance: Baptiste Collette Bayou Bird Islands

- Islands identified as a **U.S. Important Bird Areas (IBA)**
- IBA is a global initiative that identifies and aims to conserve areas vital to birds and other biodiversity
- Islands serve as essential habitat for significant numbers of:
 - Breeding Caspian and gull-billed terns and black skimmers
 - Roosting pelicans
 - Breeding for five species of terns



Photo Credit: PJ Hahn

Summary

- Baptiste Collette exemplifies collaborative dredged sediment best management practices to achieve multiple benefits consistent with EWN principles
- We are improving our understanding of how the seabirds respond to the placement activities in Baptiste Collette Bayou so that the broader ecological and other benefits of these best practice strategies can be optimally applied here and elsewhere
- We are documenting ecosystem services at these sites and showing how research can play a meaningful role in determining the efficacy and optimal use of such beneficial use applications in the future
- Coastal Louisiana is poised to invest billions of dollars on restoration, thus lessons learned from NBS projects like Baptiste Collette are critical to inform future work

THANK YOU! QUESTIONS?



Photo Credit: PJ Hahn

Contact Information:

USACE ERDC

Burton Suedel and Justin Wilkens
Research Biologists

Burton.Suedel@usace.army.mil

Justin.L.Wilkens@usace.army.mil

USACE MVN

Jeffrey Corbino

Environmental Resources Specialist

Jeffrey.m.corbino@usace.army.mil

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