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

Burton Suedel

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

Jeff Corbino, USACE New Orleans District
Michael Guilfoyle, ERDC-EL
Jake Jung, ERDC-EL

2022 Dredging Summit & Expo – 27 July 2022

ERDC ENGINEER RESEARCH & DEVELOPMENT CENTER
Innovative solutions for a safer, better world

US Army Corps of Engineers

U.S.ARMY

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?

Sustainable Solutions Vision: "Contribute to the strength of the Nation through innovative and environmentally sustainable solutions to the Nation's water resources challenges."

Engineering With Nature…

Engineering With Nature

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

- **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

USGS science for a changing world

Louisiana Department of Wildlife & Fisheries

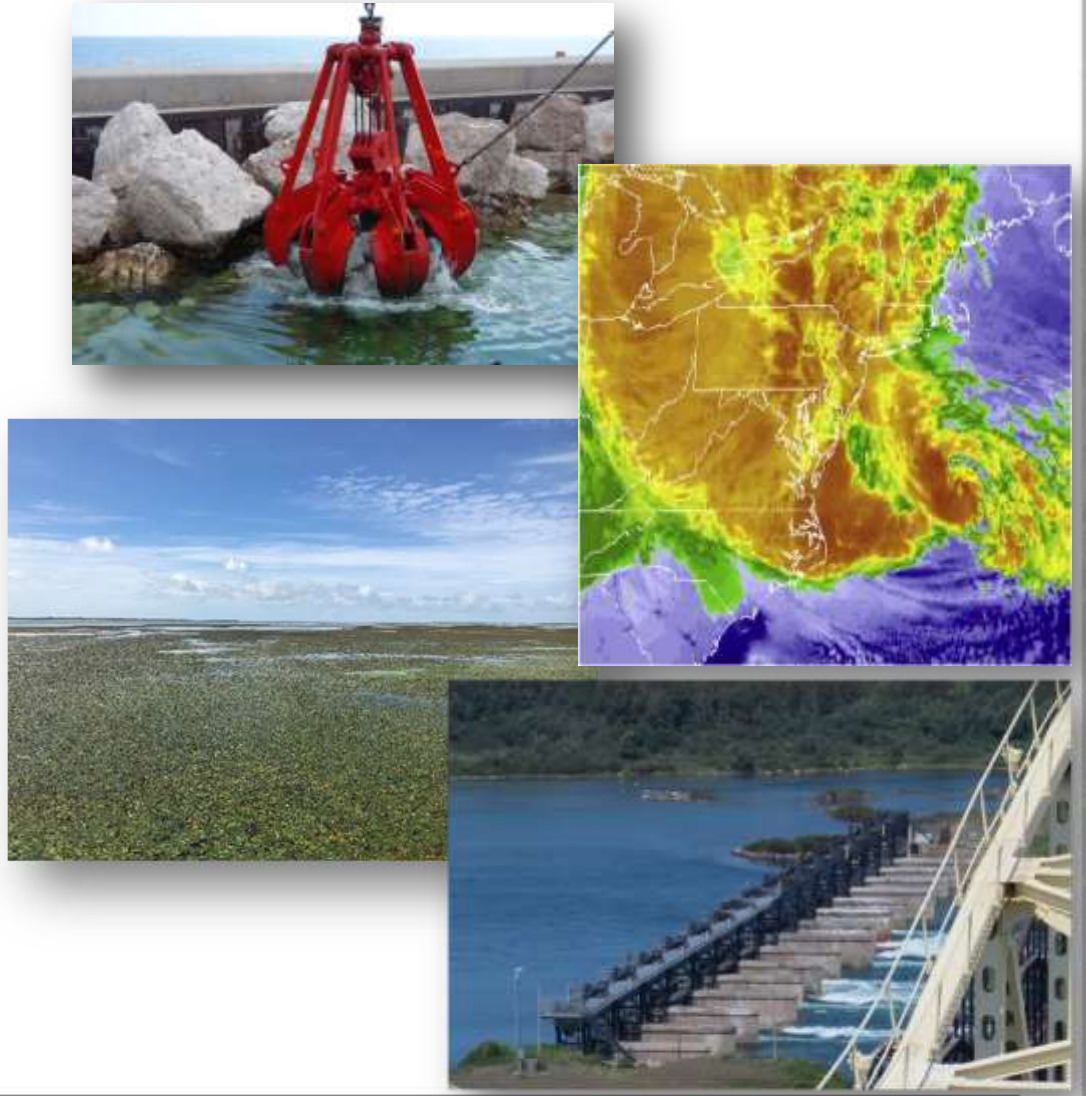
US Army Corps of Engineers
New Orleans District

ERDC

www.engineeringwithnature.org

EWN® Across USACE Mission Space

- **Navigation**
  - Strategic placement of dredged material supporting habitat development
  - Habitat integrated into structures
  - Enhanced natural recovery
- **Flood Risk Management**
  - Natural and Nature-Based Features to support flood risk management
  - Levee setbacks
- **Ecosystem Restoration**
  - Ecosystem services supporting engineering function
  - “Natural” development of designed features
- **Water Operations**
  - Shoreline stabilization using native plants
  - Environmental flows and connectivity



Background

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 receiving dredge material
- 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 ac coastal bird nesting habitat

US Army Corps of Engineers

Introduction

The Science Issue and Relevance

- Suitable coastal habitat at a premium
- Utilize coastal engineering that can build and maintain coastal infrastructure to sustain wildlife and enhance habitats
- Increase our understanding how Baptiste Collette Bayou dredge islands and maintenance program is achieving environmental benefits, especially birds
- Strike balance between engineering for infrastructure/ hydrology needs and to create/enhance critical habitat that can support wildlife populations
- Conduct bird surveys to observe habitat use

Gunn Island under construction in July 2016

Methods: Bird Surveys

Bird Community Monitoring

- ERDC performing Spring and Summer bird surveys
- 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: Jake Jung).

USGS science for a changing world

Methods: Field Surveys

Unmanned Aerial System Field Methods (June 2021)

- Assess bird habitat and elevation characteristics for islands and placement areas
- UAS LiDAR data and true color, 3-band (Red, Green, and Blue) imagery
- UAS flown at 70 m (6 m/s speed) for Gunn Island and 60 m (6 m/s speed) for all other islands
- Multirotor, octocopter UAS platform
- Mounted Sony Alpha 7R II 42.4 mp digital camera and Riegl miniVUX-2UAV laser scanner
- Spatial resolution: 1.25 cm
- Onboard GPS and Inertial Measurement Unit (IMU) to record altitude, flight speed, direction, and sensor(s) position

Harris Aerial HX8 UAS Platform

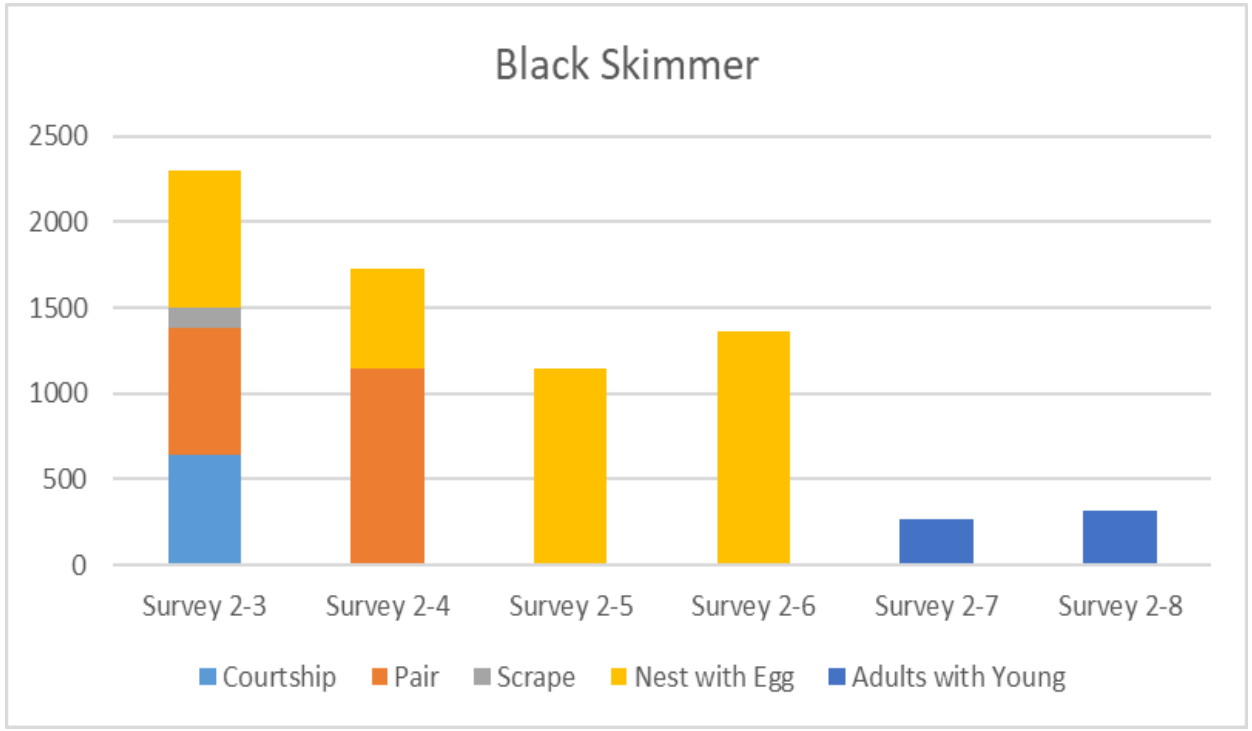
Marking Progress

- In August 2020, the Louisiana Department of Wildlife and Fisheries observed over 50,000 seabirds occurring 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: Bird Surveys

- Cumulative bird count: 77,474
- Bird species: 68
- 2021 Gunn Island seabird colony:
  - Highest mean counts of total species (8,463) and mean breeding species (8,453) (excluding flyovers)
  - 45% Royal Terns
  - 21% Black Skimmers
  - 14% Sandwich Terns
  - 8% Gull-billed Terns
  - 5% Caspian Terns
  - 5% Laughing Gulls
  - 1% 19 other species



Cumulative breeding behavior phenology of the Black Skimmer on Gunn Island during 6 surveys conducted between 4 May and 19 Aug 2021.

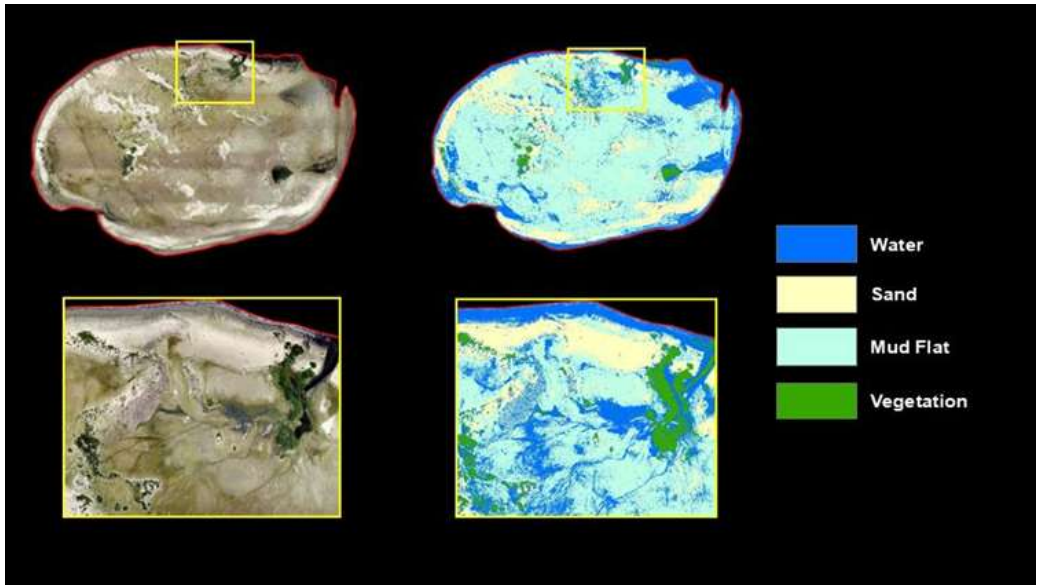
Results: Field Surveys

Summary of hybrid image classification area (acres) by habitat type (cover class).

Island	Water	Sand	Mud Flat	Vegetation	Total
Gunn Island	8.0	7.3	24.7	1.0	41.0
Willet Island	2.6	0.5	1.2	8.0	12.3
Shea Island	2.1	1.0	1.4	7.2	11.7
Plover Island	2.0	1.0	1.3	15.7	20.0
Paul Island/Area2	1.5	1.7	12.5	19.1	34.8*
Open Area 1	7.7	1.0	8.2	4.4	21.3

*Total island area is 47.3 acres (Paul Island) and includes 12.5 acres unclassified as no data due to missing imagery.

Hybrid image classification with broad landcover classes (Water, Sand, Mud Flat, Vegetation) of Gunn Island.



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 adaptions 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

- The islands have been identified as a **U.S. Important Bird Area**
- Essential habitat for significant numbers of:
  - Breeding Caspian and gull-billed terns and black skimmers
  - Roosting pelicans
  - Breeding for five species of terns

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?

Contact Information

Burton Suedel
Research Biologist
USACE ERDC
Burton.Suedel@usace.army.mil

Jeffrey Corbino
Environmental Resources Specialist
USACE MVN
Jeffrey.m.corbino@usace.army.mil

Research Funding:

Engineering With Nature