Adaptive Management of Elevated Nesting Habitats

Provide nesting habitat for birds using dredged material
Monitor, manage, and evaluate
Apply, test, and share what we learn

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Wetlands Institute ~ Since 1969

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Ring Island Elevated Nesting Habitat

- Designed to provide nesting habitat for Black Skimmers
- Longest monitoring history of ENH sites
  - Avian & vegetation monitoring and management
  - Repetitive placement
  - Adaptive management

Construction considerations	NAVD88
Set target above MHHW	2.1 ft
Habitat above spring tide	3.6 ft
Habitat above storm flood elevations	5.5 ft
Allow dewatering, compaction, elevation loss	6.0 ft

2014 2015 2016 2017 2018 2019 2020 2021

AUGUST: Created Elevated Nesting Habitat for Black Skimmer colony

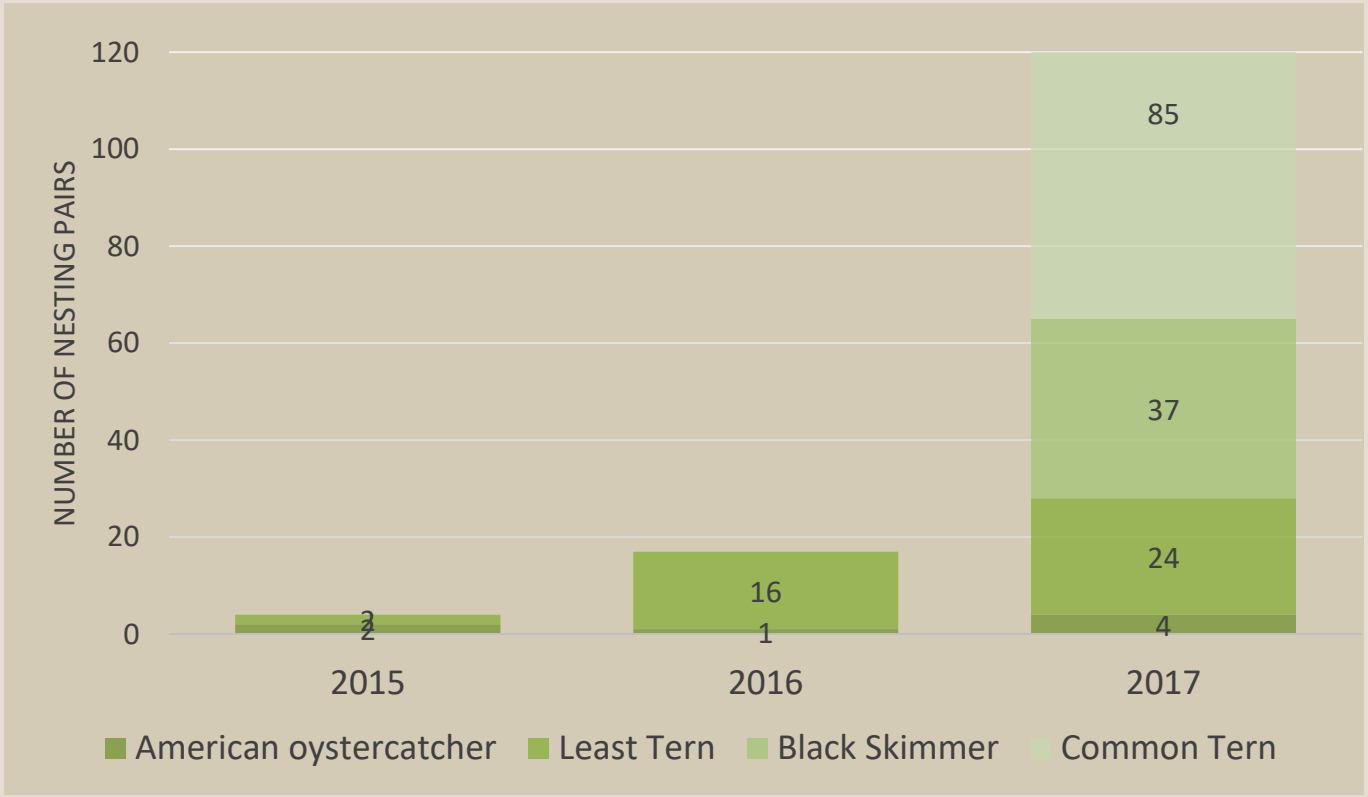
- 96% sand from channel shoal
- Open, sparsely vegetated habitat above spring high tide
- Protected from predation and disturbance

- 6,000 CY dredged material
- ~ 1 acre
- 5.5’ ecological target
- 6.0’ construction target
- Near legacy placement

2014 2015 2016 2017 2018 2019 2020 2021

2015 - 2017: Annual monitoring - AVIAN

- Increase in number of species and nests each year
- American Oystercatchers and Least Terns first to establish
- Black Skimmer and Common Tern colonies by 2017



2014 2015 2016 2017 2018 2019 2020 2021

2015 - 2017: Annual monitoring - AVIAN

- Marsh-nesting species nested in vegetation around perimeter of habitat – Willet, Clapper Rail, Seaside Sparrow
- Shorebirds and other species roost and forage on site
- Horseshoe crab spawning and diamondback terrapin nesting

2014 2015 2016 2017 2018 2019 2020 2021

2015 - 2017: Annual monitoring - VEGETATION

- No formal surveys on ENH but observable increase in vegetation on nesting platform in 2017
- *Distichlis spicata* and *Spartina patens* planting and natural recruitment around perimeter of habitat

2014 2015 2016 2017 **2018** 2019 2020 2021

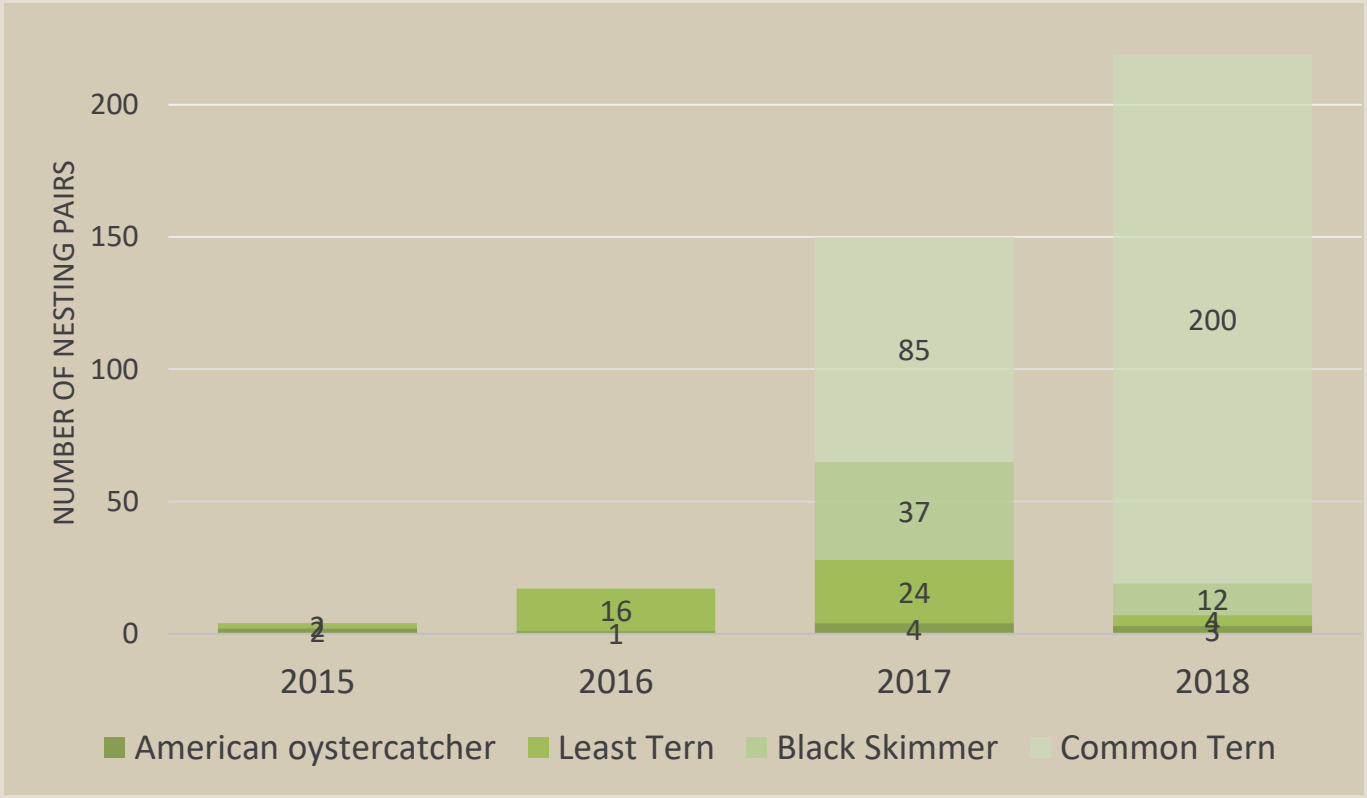
FEB-MARCH: Repetitive placement: resupplied sediment from the same shoal

- Build larger, higher platform for nesting
- Disrupt establishment of vegetation on the platform
- Maintain vegetation around perimeter

- 1,200 CY dredged material
- Berm existing material
- 5.5’ ecological target
- 6.5’ construction target

2014 2015 2016 2017 **2018** 2019 2020 2021

2018: Annual monitoring
- AVIAN: More birds used available habitat
- VEGETATION: Platform vegetation re-established; perimeter vegetation grew



MONITORING EFFORTS

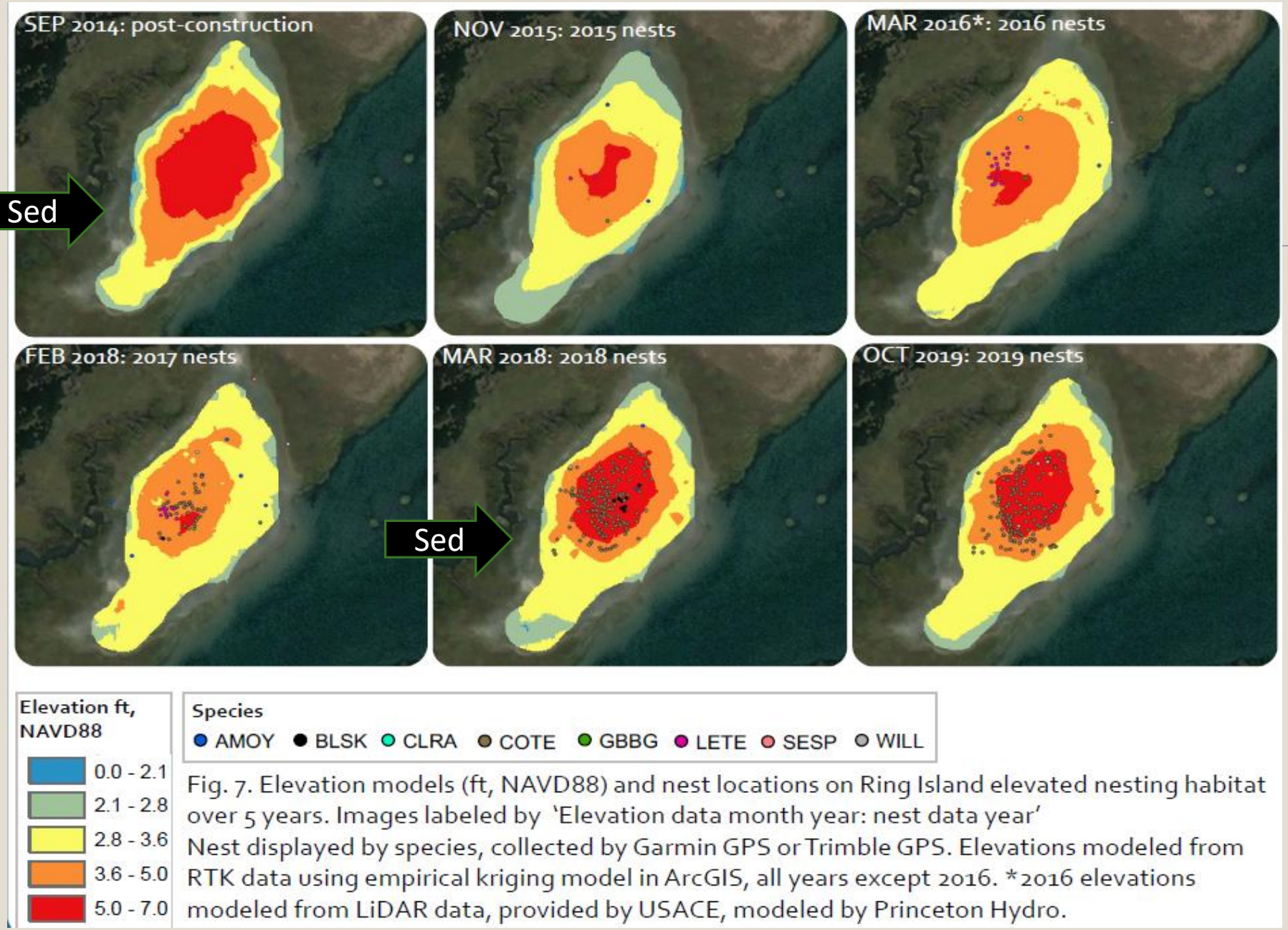


Fig. 7. Elevation models (ft, NAVD88) and nest locations on Ring Island elevated nesting habitat over 5 years. Images labeled by 'Elevation data month year: nest data year'
Nest displayed by species, collected by Garmin GPS or Trimble GPS. Elevations modeled from RTK data using empirical kriging model in ArcGIS, all years except 2016. *2016 elevations modeled from LiDAR data, provided by USACE, modeled by Princeton Hydro.

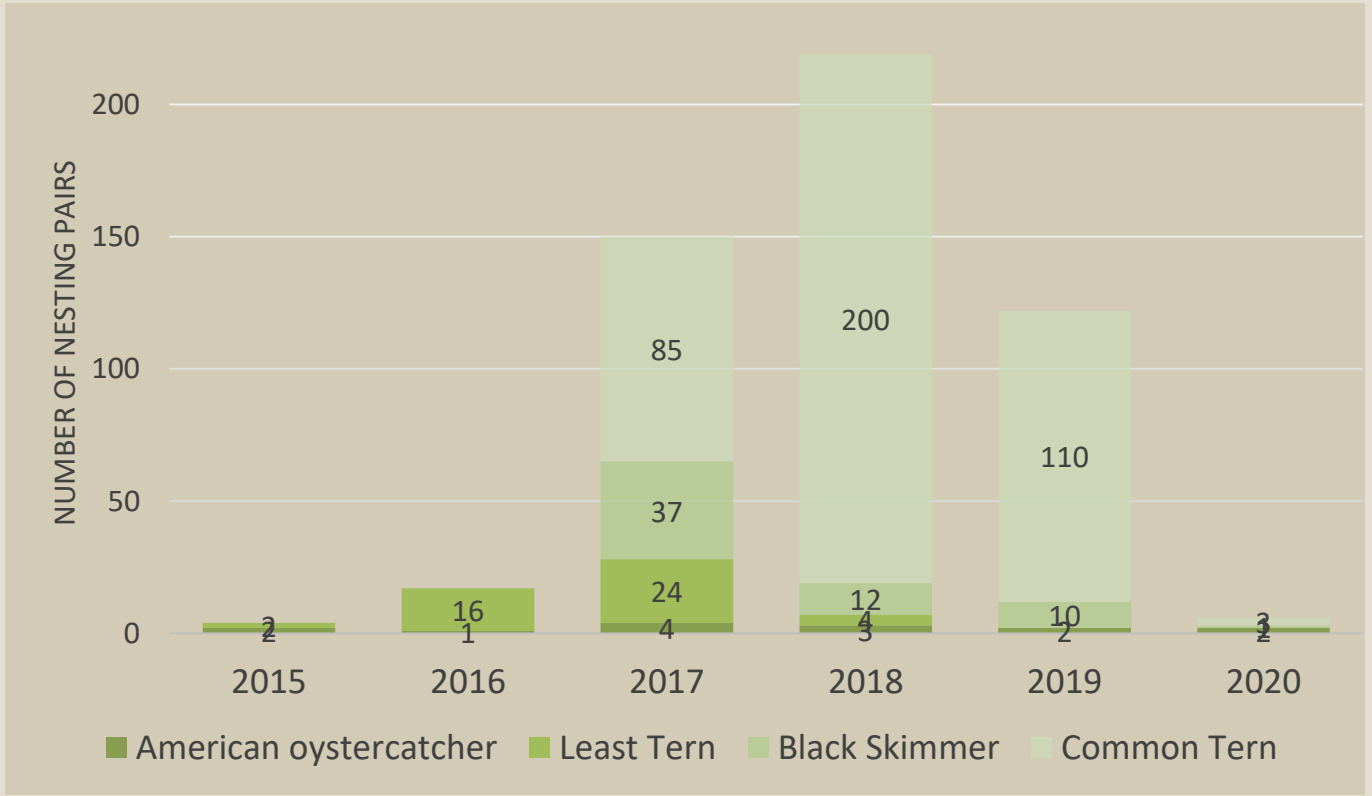
- Documented habitat use and nesting success
- Strong species response to available nesting habitat
- Observed vegetation establishment and reduction in elevated platform

Ferguson, et al, 2019

2014 2015 2016 2017 2018 2019 2020 2021

2019-2020: Annual monitoring - AVIAN

- More habitat management challenges as the ENH matured
- Number and success of nesting species declined



2014 2015 2016 2017 2018 **2019** **2020** **2021**

2019 – 2021: VEGETATION MONITORING
- Management: controlled fire, hand-pulling, concentrated salt treatment
- Minimal management in 2020

2019: 1 m^2 experimental plots

Before: APR	TREATMENT	After: JUL
		
	CONTROL	
		

2021: 140 m^2 experimental plots

Kashi Davis, NJDFW

2014 2015 2016 2017 2018 2019 2020 2021

2021: ADAPTIVE MANAGEMENT AND SITE SUCCESSION

- Early successional phase was most productive for target species
- Vegetation cover limited site use by colonial nesting birds after three years
- 2-3 year dredging and ecosystem maintenance cycle
  - Disruption of vegetation on nesting platform did not provide long-term benefits
- What's next? Refresh nesting platform with additional sand and remove vegetation or manage for colonial wading bird colonies and marsh-nesting species?

2014 2015 2016 2017 2018 2019 2020 2021

Habitat Clusters

Ecologic Value

- Creates network of sites at different stages of succession
- Separates populations for resiliency
- Mimics historic distribution of colonial nesting birds

Dredging Value

- Provides opportunities for repetitive placement
- Creates more volume utilization
- Allows for staggered placement

2018 2019 2020 2021

Great Flats Elevated Nesting Habitat

Created ENH in December 2018 in conjunction with Ring ENH repetitive placement to clear shoaling in channel

Designed for similar suite of species as Ring ENH

- 6,000 CY dredged material
- ~1 acre habitat
- Same shoal as Ring ENH
- Free pumped, bermed, and used hay bales around key features
- 5.5’ ecological target
- 6.0-6.5’ construction target
- Site of legacy placement

2018 2019 2020 2021

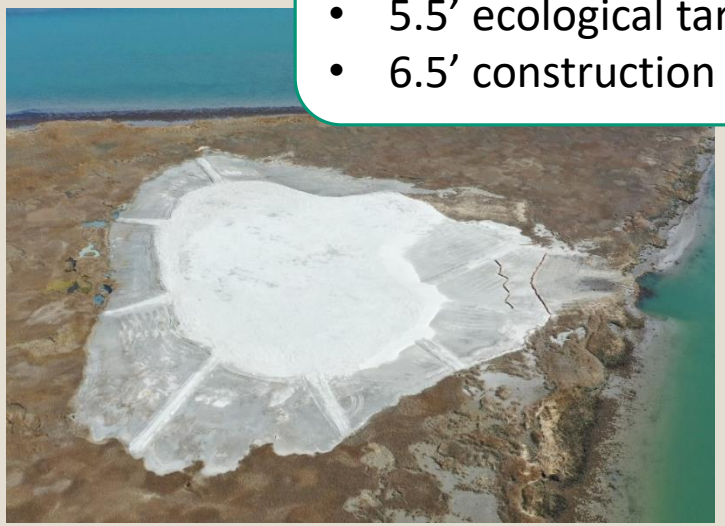
2019-2020: Annual monitoring - AVIAN

- Small number of species and pairs nesting: American Oystercatcher and Great Black-backed Gulls
- No colonial species (terns, skimmers) to date
- Predators (fox in 2019), vegetation, and elevation loss

2018 2019 2020 2021

2021: January repetitive placement to add elevation
- Expand footprint, add and test design features
- Provide early successional habitat as Ring ENH matured
- Monitoring ongoing through 2021

- 3,900 CY dredged material
- Berm existing material
- 5.5’ ecological target
- 6.5’ construction target



2020 2021

Gull and Sturgeon Islands

- Legacy placement sites created important wading bird nesting habitats (98A,B,C in SMIIL)
  - Nesting habitat includes Phragmites, woody shrub, and trees
- Gull and Sturgeon Island colonies support ~27% of colonial nesting wading birds in New Jersey (NJDFW, 2018)
  - Habitat on both islands is degrading: flooding, habitat loss, density-dependent impacts, competition

2020 2021

- Sediment placement to create Elevated Nesting Habitat for wading birds
  - Target Elevation 3.5’ NAVD88; shrub habitat elevation benchmark
    - Repetitive placement to reach target
    - Existing nesting habitat was not impacted
  - Will require habitat monitoring and management to accelerate habitat maturation for wading birds and other marsh-nesting species
    - Initial years may provide habitat for species that prefer early successional habitat

ELEVATED NESTING HABITAT CONSIDERATIONS

Sediment management practices can be tailored to create elevated nesting areas for target species

- Available sediment near proposed site
- Proximity of sites to existing nesting areas or threats

Habitat can provide for multiple species and taxa

- Understand benchmark elevations of ecological targets
- Target species may change with site succession or management

Monitoring is critical

- Understand management needs for target species
- Inform adaptive management practices
- Maximize conservation/restoration potential