

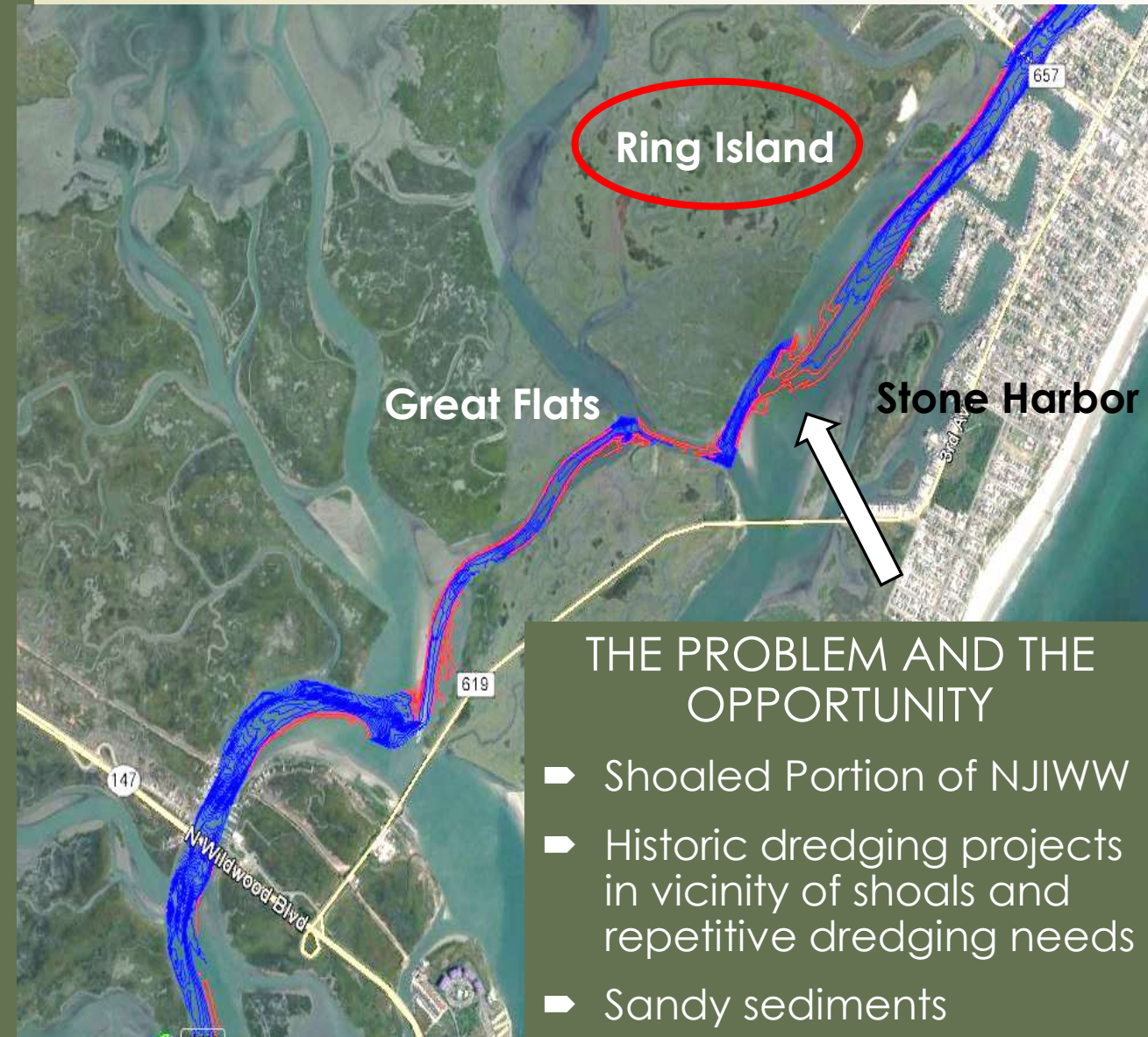
# Vegetation Succession, Avian Response, and Habitat Management Following Beneficial Placement of Dredged Material in a Coastal Marsh Area in New Jersey

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# NESTING HABITAT CLUSTERS



## ❖ Ecologic Value

- ▶ Creates network of nesting sites for beach-nesting birds at different stages of succession
- ▶ Separates populations for resiliency
- ▶ Mimics historic distribution of colonial nesting birds
- ▶ Reduces footprint of marsh disturbance

## ❖ Dredging Value

- ▶ Provides for repetitive placement cycles
- ▶ Creates more volume utilization
- ▶ Minimizes permitting and reduces costs

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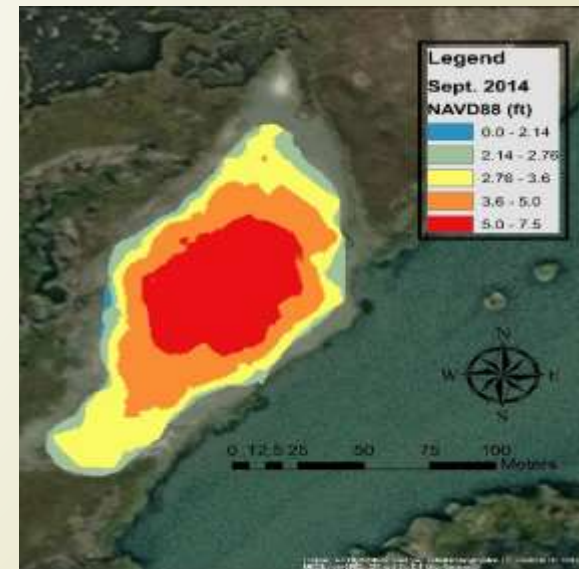
2020

2021

## Ring Island Elevated Nesting Habitat (ENH)

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

- August - created to provide nesting habitat for Black Skimmers
- 1 acre, 6000 cy dredged material
- 96% sand from NJ Intracoastal Waterway shoal
- Near legacy placement
- Open, sparsely vegetated habitat above spring high tide
- Protected from predation and disturbance



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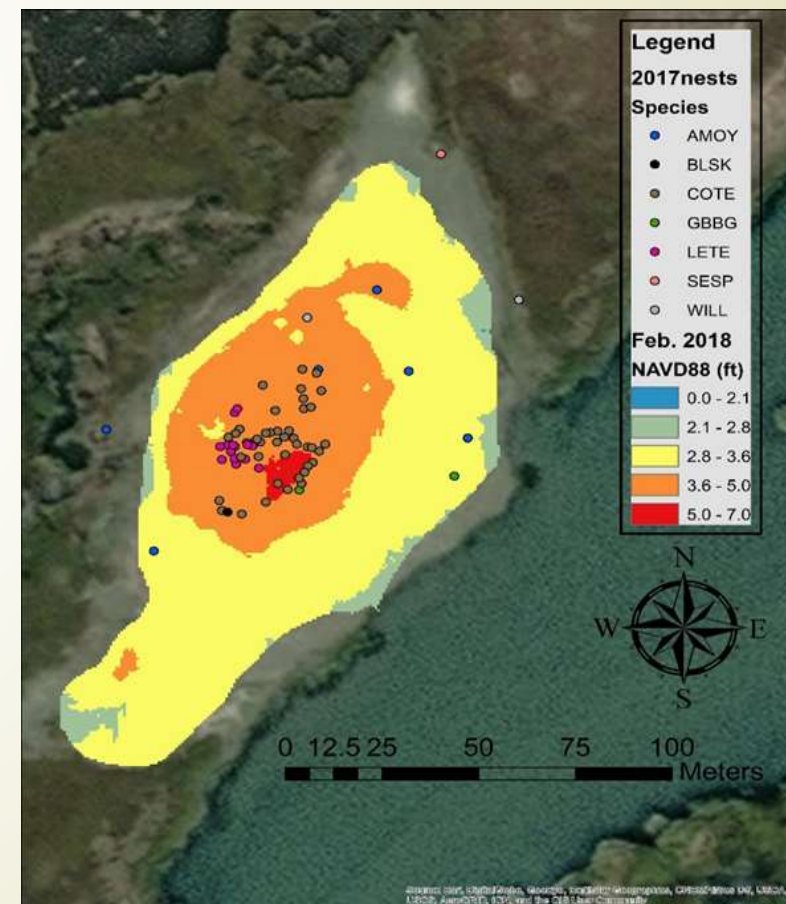
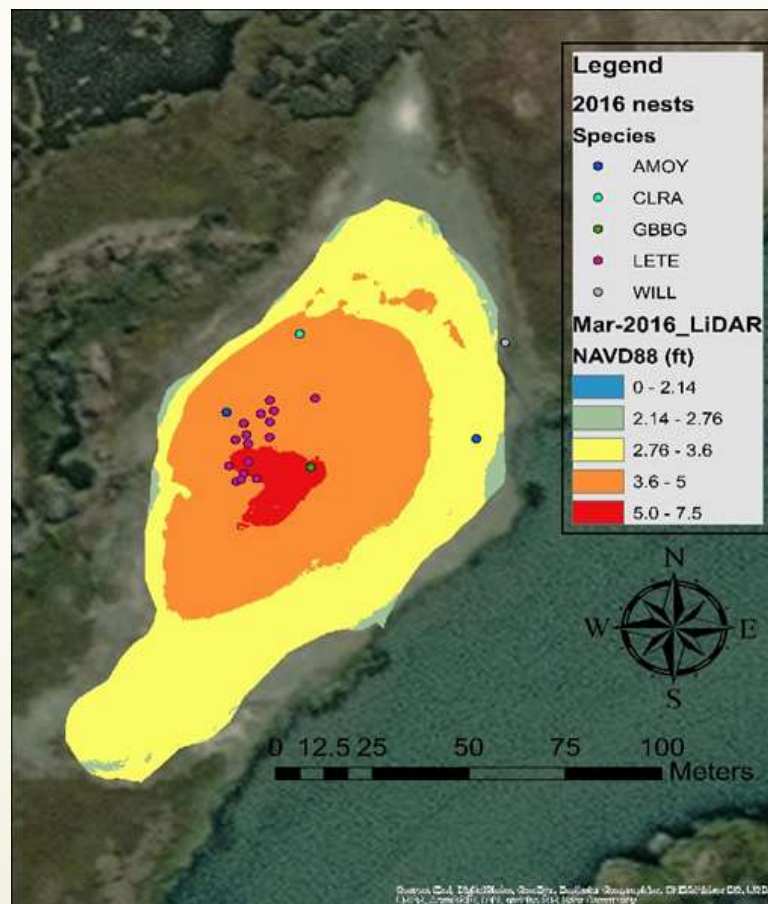
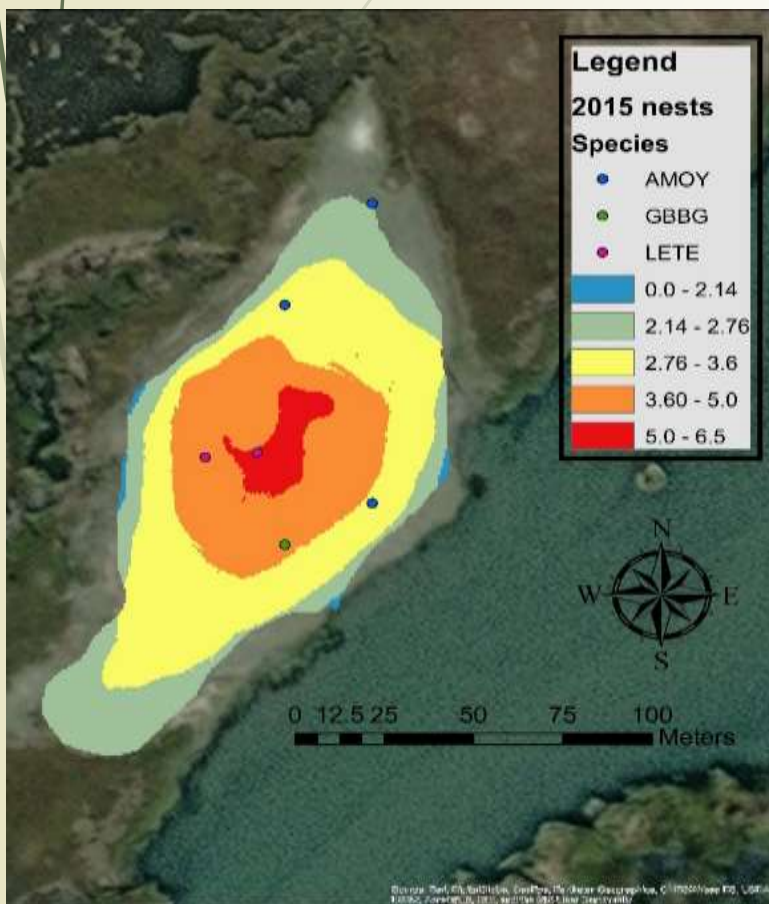
2018

2019

2020

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# Ring Island NEST SITE SELECTION



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Source: U.S. Geological Survey, Digital Data Center, © 2006 USGS, USGS, and the GIS User Community

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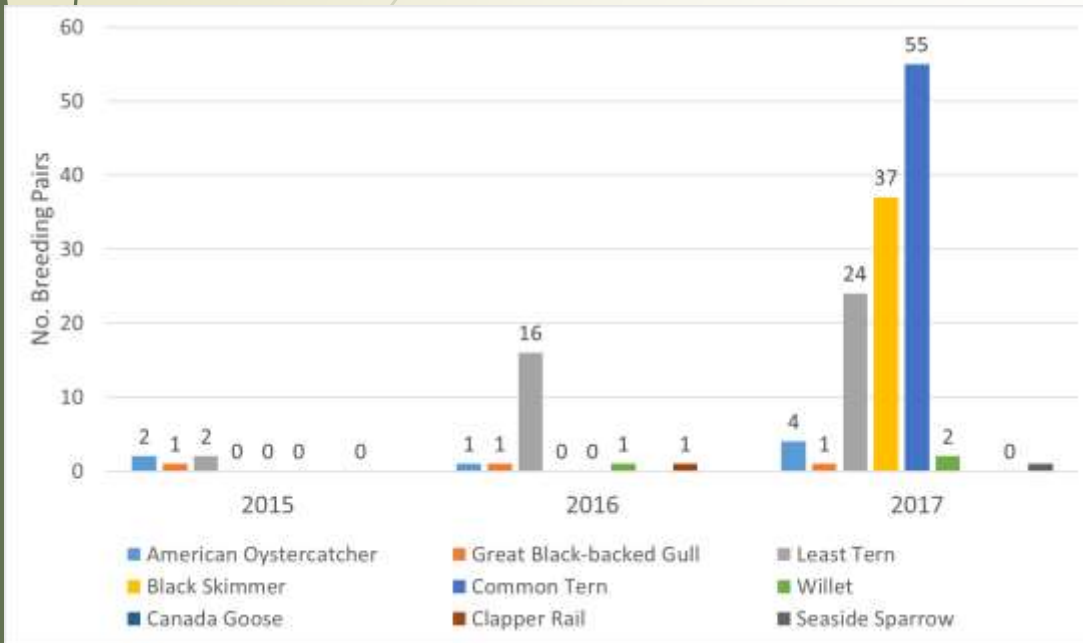
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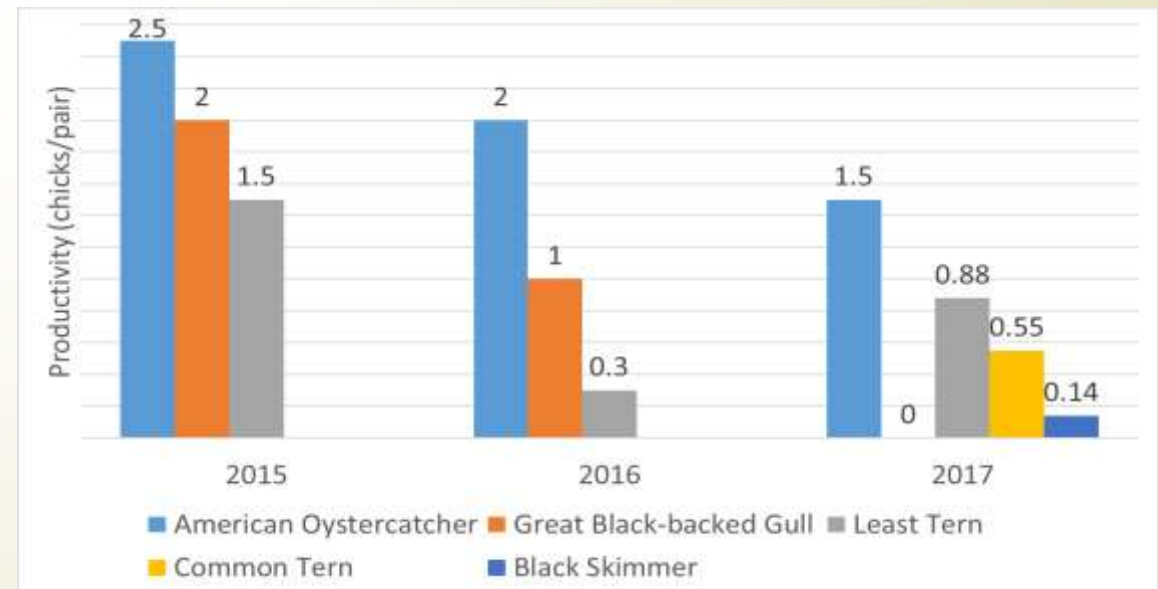
2020

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# Ring Island REPRODUCTIVE SUCCESS



- Highest diversity of nesting species and highest number of breeding pairs in 2017 (~2.5 years after initial placement)
- Lower productivity for nesting species by 2017



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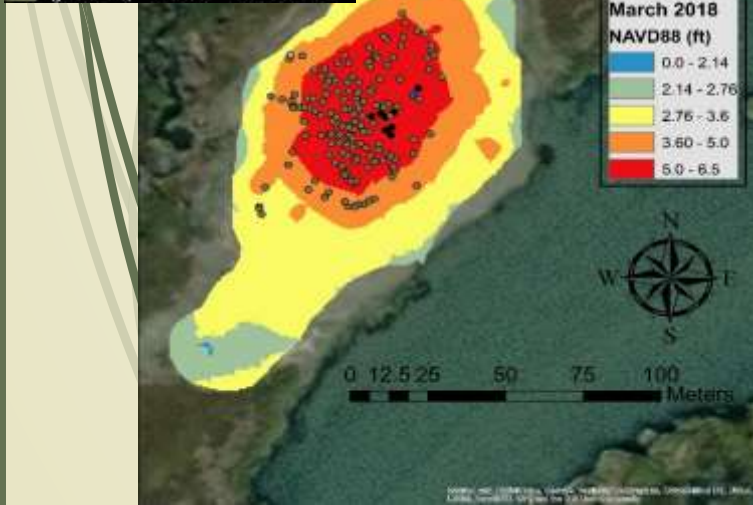
2018

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# Ring Island Elevated Nesting Habitat (ENH)



- Renourishment of ENH habitat – March 2018
  - 1,200cy sandy dredged material, berm existing material
  - 5.5' ecological target, 6.5' construction target
  - ~3.5 years after initial placement
  - Maintain vegetation around perimeter and disturb vegetation establishing on platform of ENH
  - Highest concentration of nesting birds but lower productivity for all species compared to 2017

➤ Small mammals established on habitat

➤ Increased vegetation cover on habitat



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# VEGETATION MANAGEMENT

- Prescribed burn of entire Ring Island habitat (February 27)
- Manual extraction (hand pulling, burr removal) immediately preceding nesting season on Ring Island (March 13 and April 4)
- Control and salt solution treatment (10% salt concentration) plots (1 m<sup>2</sup>) randomly assigned along six transects
  - 23 treatment plots, 25 control plots
  - \* Treatment plots received repeated salt solution spray (12x throughout season), control plots did not receive salt solution spray
- Vegetation metrics measured in each plot before (April/May) and after the treatment period (July/August)
  - Species ID
  - Braun-Blanquet cover classes (total plot and each species)
  - Length of live stems for dominant species



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## VEGETATION MANAGEMENT RESULTS

- Application of salt spray successfully reduced vegetation growth and controlled ground cover
  - Lower species diversity for vegetation within treatment plots compared to control plots at the end of the season (Fig. 1)
  - Reduced vegetation cover within treatment plots compared to control plots at the end of the season (Fig. 2)

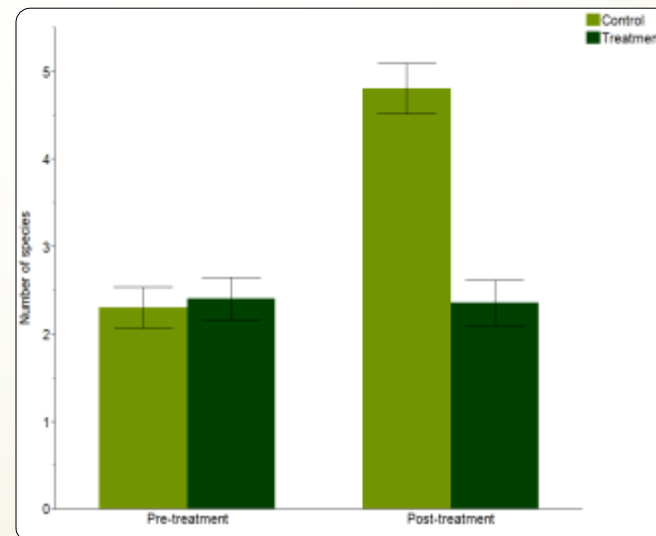


Fig. 1. Mean number of species by phase (pre or post-treatment) and plot (control or treatment) on Ring Island.

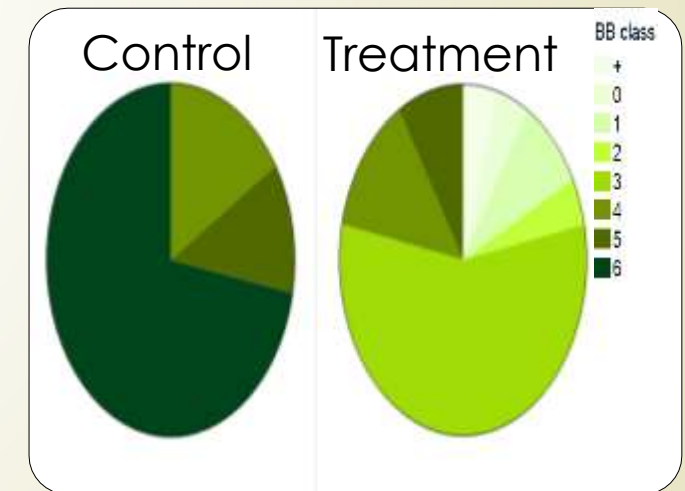


Fig. 2. Live vegetation Braun-Blanquet cover classes post-treatment by plot type on Ring Island.

+= less than 1%, 0= 0%, 1: 1% to 5%, 2: 6% to 10%, 3: 11% to 25%, 4: 26% to 50%, 5: 51% to 75%, 6: 76% to 100%



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# VEGETATION MANAGEMENT

- Prescribed burn of entire Ring Island habitat (January 30)
- No manual removal of vegetation
- Direct placement of salt on the entire Ring Island habitat on two occasions before (February) and during (April) nesting season
- Collected vegetation metrics within 1m<sup>2</sup> plots (n=20) on ENH at the end of the nesting season to allow for comparisons with 2019 control plots (no pre-season metrics)



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## VEGETATION MANAGEMENT RESULTS

- Cover classes observed within ENH plots in 2020 were similar to control plots in 2019 ( $\pm$  SE)
  - $5.56 \pm 0.34$  (2019 control)
  - $5.60 \pm 0.34$  (2020)
- Average ( $\pm$  SD) species richness within all plots was  $4.4 \pm 1.2$  species – slightly lower than observed in control plots on Ring ENH in 2019 ( $5.0 \pm 1.3$  species)
  - **Combination of prescribed burn and spreading salt on Ring ENH habitat was not effective in controlling vegetation**



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## VEGETATION MANAGEMENT

- No prescribed burns
  - Dense vegetation established during the nesting season after burns in 2019 and 2020
- Manual removal of vegetation within two 160m<sup>2</sup> areas prior to nesting season (March/April)
- Repeated spray (n=5) of concentrated salt solution within one of the treatment areas throughout nesting season (April-July)
- Collected vegetation metrics at the start and end of the nesting season within 1m<sup>2</sup> plots
  - ✓ Plots established along transects within treatment areas (n=24 per treatment area)
  - ✓ Plots randomly selected within the ENH control area (n=25)



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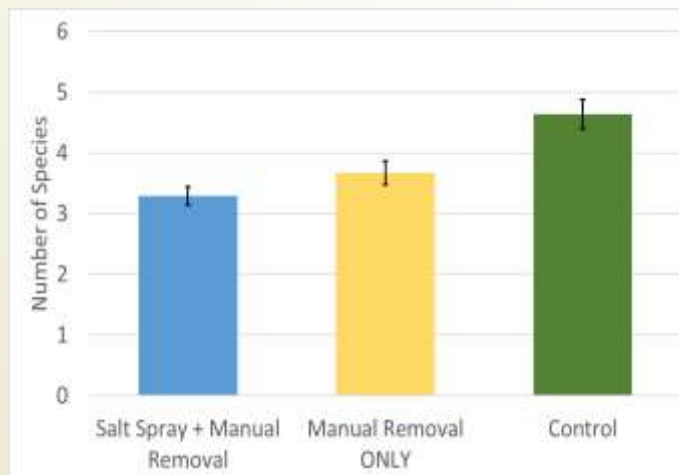
2021

## VEGETATION MANAGEMENT RESULTS

- ▶ Similar vegetation CC and species diversity within both treatment areas pre-season (post-manual removal, pre-salt water treatment)
  - ▶ Average veg CC ( $\pm$  SD) -  $1.3 \pm 0.9$  (Manual+Salt);  $1.0 \pm 0.2$  (Manual only)
  - ▶ Average species diversity ( $\pm$  SD) -  $2.5 \pm 0.7$  (Manual+Salt);  $1.7 \pm 0.8$  (Manual only)
- ▶ Manual removal alone was not effective in reducing vegetation cover but may lower species diversity
- ▶ Manual removal and salt spray treatment was very effective in limiting vegetation cover and species diversity



Imagery provided by Keith Vandersys, University of Pennsylvania



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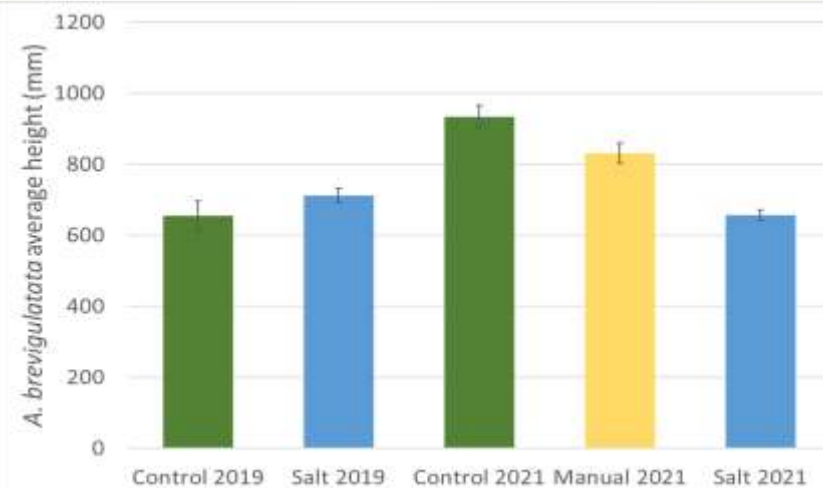
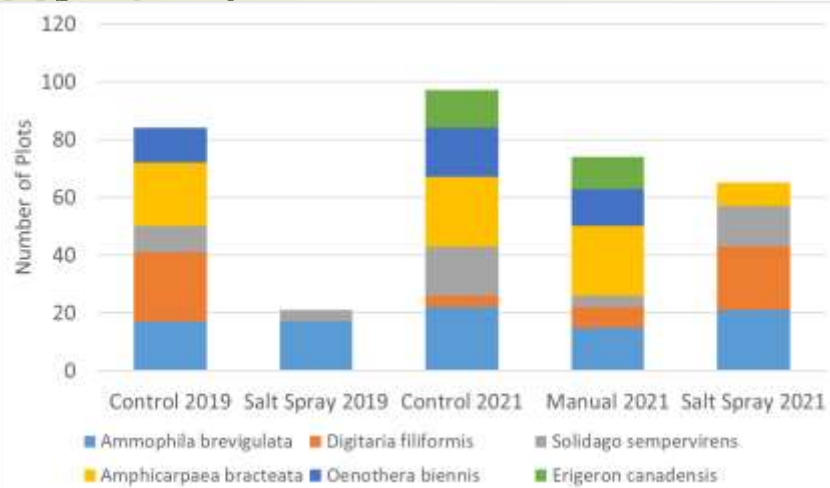
2019

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## SALT SPRAY STUDY COMPARISONS

- Vegetation cover similar within control areas on ENH for all years of the study
- American hog peanut (*Amphicarpaea bracteata*) most dominant species in control and manual removal only plots
- American beachgrass (*Ammophila brevigulata*) most dominant species in salt spray plots
- Salt spray plots in 2021 observed with more crabgrass (*Digitaria filiformis*), Seaside goldenrod (*Solidago sempervirens*), and American hog peanut compared to 2019
- American beachgrass similar height between saltwater and control plots in 2019; significantly lower height in saltwater + manual removal compared to manual and control plots in 2021



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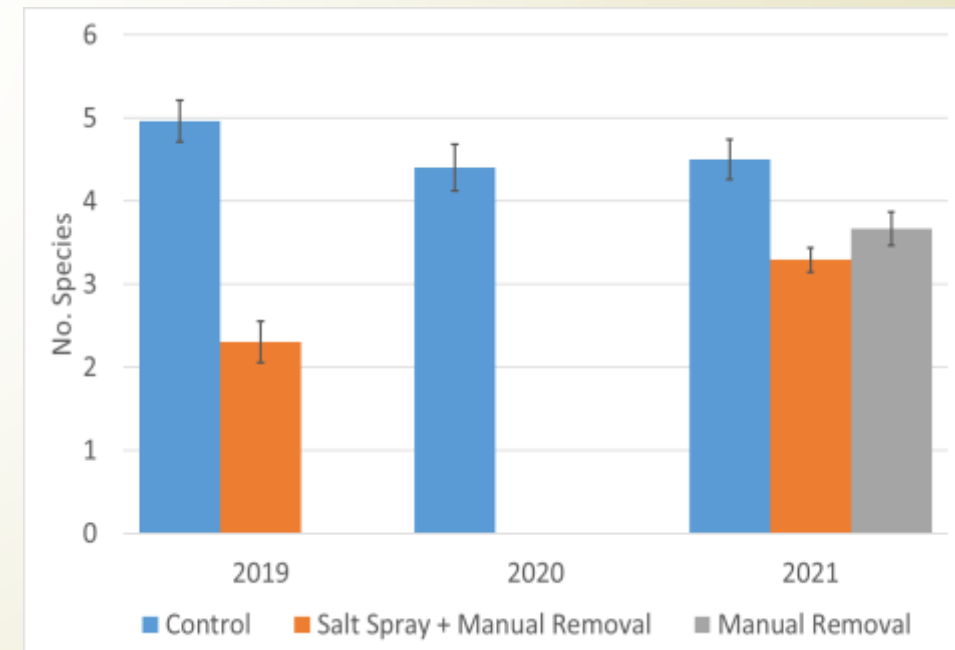
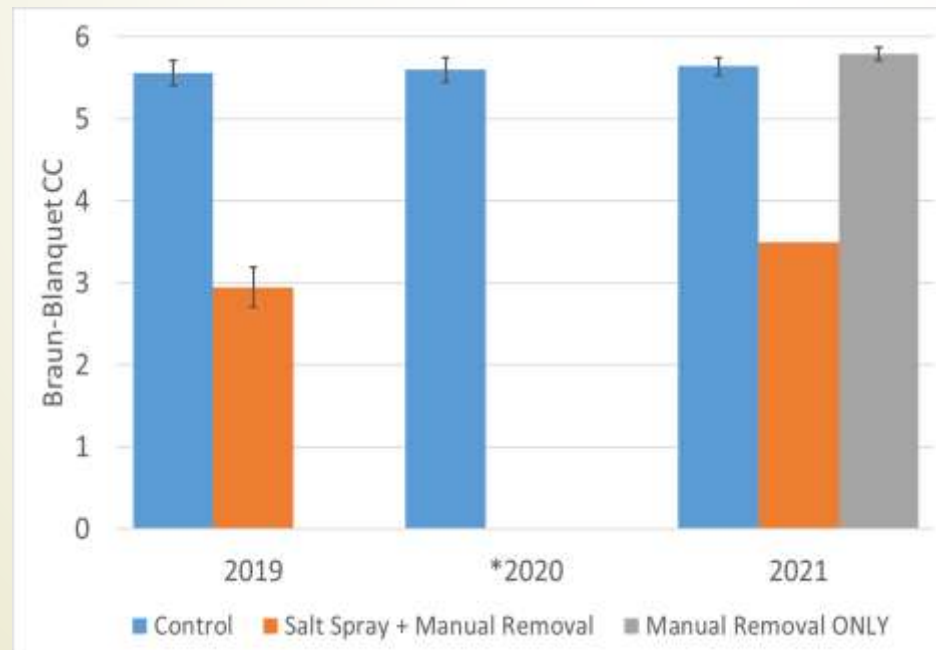
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## VEGETATION MANAGEMENT

- Vegetation cover similar within control areas on ENH for all years of the study (>50%)
- Average number of species similar within control areas on ENH for all years of the study (4-5 species)
- Salt spray plots with significantly lower CC and species diversity both years of the treatment study
- Manual removal only with similar CC to control plots but lower species diversity



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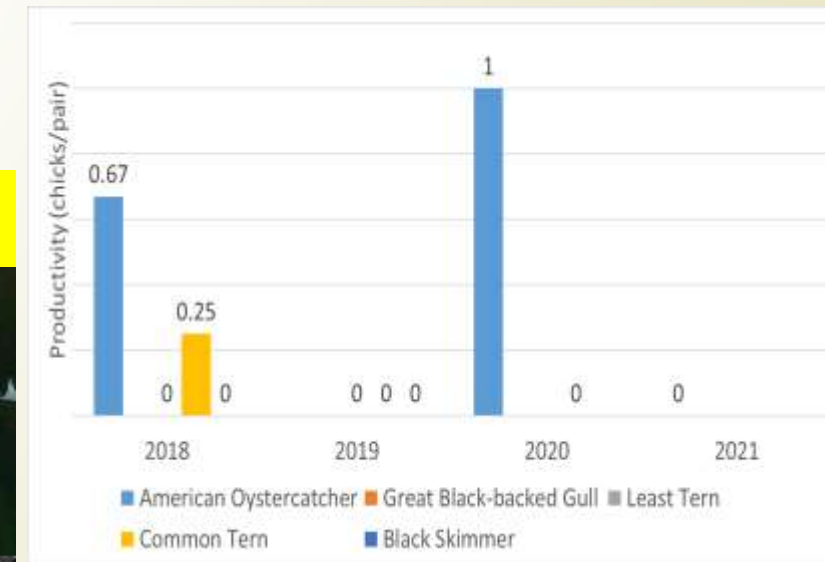
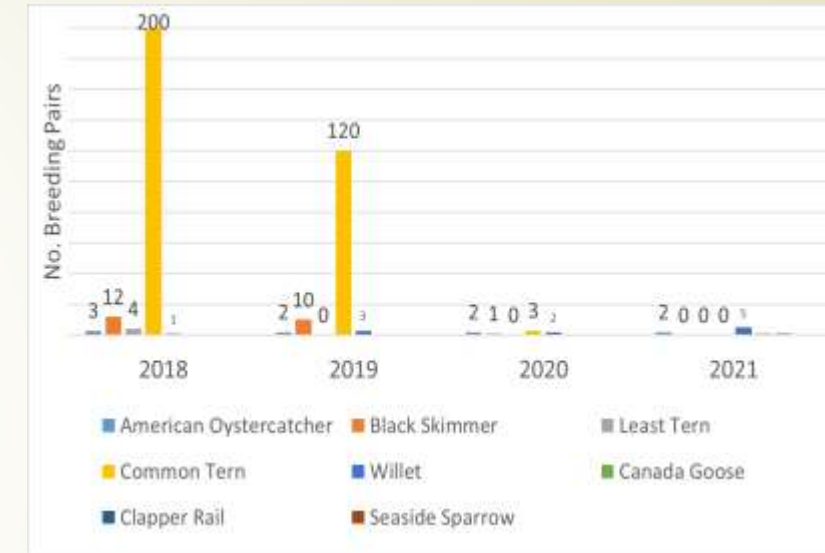
2021

# SUMMARY

## AVIAN RESPONSE TO HABITAT MGMT

- Lower number of Black Skimmer breeding pairs after habitat renourishment
- Highest nesting concentrations of Common Terns following renourishment, few nesting in 2020 and 2021
- No productivity in 2019 and 2021 (high activity for mammalian and avian predators)

### ➤ Increased mammalian and avian predators detected on habitat



# VEGETATION SUMMARY

- ▶ Succession of vegetation on ENH limited nesting for focal species
- ▶ Differences in vegetation communities and species CC between years may be a result of differences in succession or individual species' response to management efforts
- ▶ Salt solution spray was effective in reducing vegetation on ENH but application to entire habitat was not feasible
- ▶ Controlled burns initially removed vegetation from habitat but may have promoted growth for certain vegetation species
- ▶ Avian response to vegetation succession indicates the need for increased efforts to control vegetation at the site to promote and sustain suitable nesting habitat for target species.





# ELEVATED NESTING HABITAT CONSIDERATIONS

- ▶ Important to understand benchmark elevations of ecological targets to provide suitable habitat for species
- ▶ Understand management needs for target species (elevation, sediment, vegetation, predators)
  - Plan for vegetation management or repetitive habitat renourishment, depending on target species and habitat requirements
- ▶ Monitoring plan is needed to understand changes to habitat and species responses
- ▶ Species response to created/restored habitat and vegetation succession may be different at each site



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[ewn.el.ercd.dren.mil/](http://ewn.el.ercd.dren.mil/)
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**THANK YOU!**