

Vegetation response following dredged material placement and management efforts in a coastal marsh area in New Jersey



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Introduction

Sandy materials from dredge operations were used to create an elevated nesting habitat for colonial nesting birds on Ring Island, New Jersey in 2014, and the site was replenished in 2018 (Fig. 1). Succession of vegetation is a management challenge for target species that prefer open areas with sparse vegetation to nest. In summer 2018, dense vegetation grew on the site above the flood tide range (MHHW). Dense vegetation can limit nesting success for focal species but best management practices to control emergent vegetation in this system without chemical herbicides prior to and during the nesting season is relatively unknown. Information on vegetation species present, growth and cover classes, and responses to control methods can help inform management practices to promote and sustain nesting on newly established nesting areas in the marsh.



Fig. 1. Aerial image of Elevated Nesting Habitat, Ring Island (~1 acre). December 2018.



Fig. 2. Locations of control (red) and treatment (green) plots on Elevated Nesting Habitat, Ring Island in 2019.

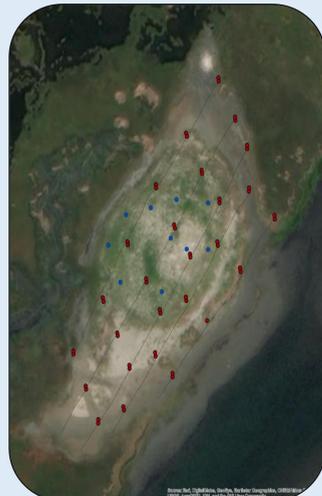


Fig. 3. Locations of vegetation monitoring plots established along transects (red) and random plots (blue) on Ring Island in 2020.

Objectives

- Document vegetation species occurrence and abundance on the elevated nesting habitat at the end of the nesting season.
- Assess response of vegetation by species to control methods (burning, manual extraction, salt solution spray application, salt placement).
- Investigate differences in vegetation communities between years.

Vegetation Monitoring

- In 2019, six transects were established perpendicular to the shoreline and 1m² plots were fixed every 5m (Fig. 2) and randomly selected as treatment (10% salt solution spray; n=23) or control (no salt solution spray; n=25).
- In 2020, 1m² plots were established every 15m along five transects (n = 25) running parallel to the shoreline for long-term monitoring efforts and comparison with pre-placement marsh sites. Additional plots (n = 10) were established using random selection (ArcGIS) within the Elevated Nesting Habitat site (Fig. 3).
- Vegetation metrics (species present, Braun-Blanquet cover classes (CC), and live stem lengths of dominant species) were measured in each plot at the end of the nesting season (July/August).
- Control plots (2019; n = 25) and plots occurring within the Elevated Nesting Habitat site (2020; n = 21) were used for vegetation comparisons at the site between years.
- Standard parametric and non-parametric tests were performed for statistical analyses to investigate differences between years.

Vegetation Management

- Prescribed burn of the entire Elevated Nesting Habitat was conducted in 2019 and 2020 prior to nesting season (April – July).
- Manual extraction (hand pulling, burr removal) was performed before the nesting season in 2019.
- A trial of salt spray to control vegetation was conducted during the nesting season in 2019. Treatment plots were sprayed with 10% salt solution on a weekly basis during the nesting season. All other areas of the Elevated Nesting Habitat were untreated with salt spray.
- Rock salt was spread over the entire nesting habitat prior to (400 lbs) and during (520 lbs) the nesting season (April – July) in 2020.

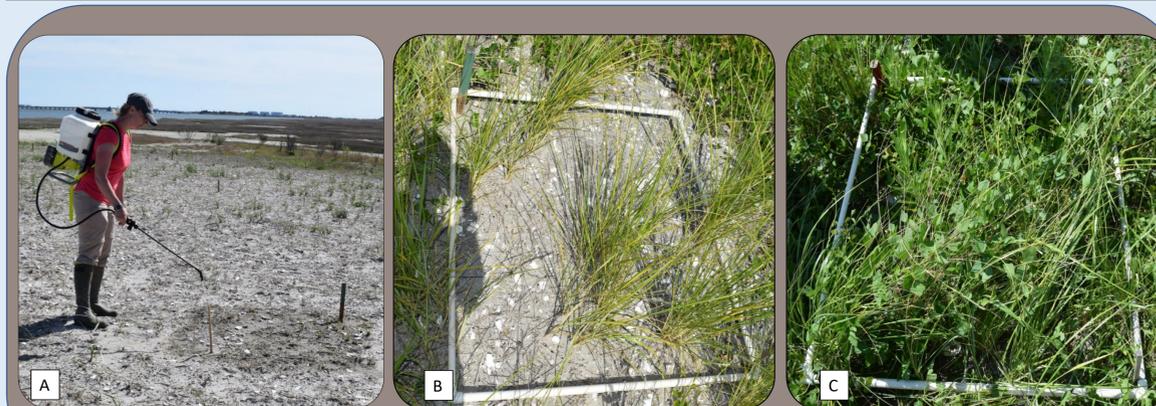


Fig. 4. Application of salt solution spray (A) and vegetation at the end of the nesting season (July- August) for treatment (B) and control (C) plots on the Ring Island Elevated Nesting Habitat.



Fig. 5. Prescribed burn on the Ring Island Elevated Nesting Habitat (A) and vegetation on the site during the nesting in July 2019 (B) and June 2020 (C).

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References: Morey, B., L. Ferguson, S. Collins, and L. Tedesco. 2019. Application of saltwater solution to effectively control vegetation growth and cover in a tern colony during the nesting season. Waterbird Society 43rd Annual Conference and General Meeting.

Vegetation Response and Key Findings

- Prescribed burns did not prevent establishment of vegetation species on Elevated Nesting Habitat during the nesting season.
- Vegetation cover did not differ significantly between years ($P = 0.7$) and was high. The majority of plots had CC > 75% both years (72% of plots in 2019; 67% of plots in 2020).
- Species richness did not differ between years ($P = 0.26$). However, there were observable differences of vegetation species present and frequency of occurrence between years (Fig. 6).

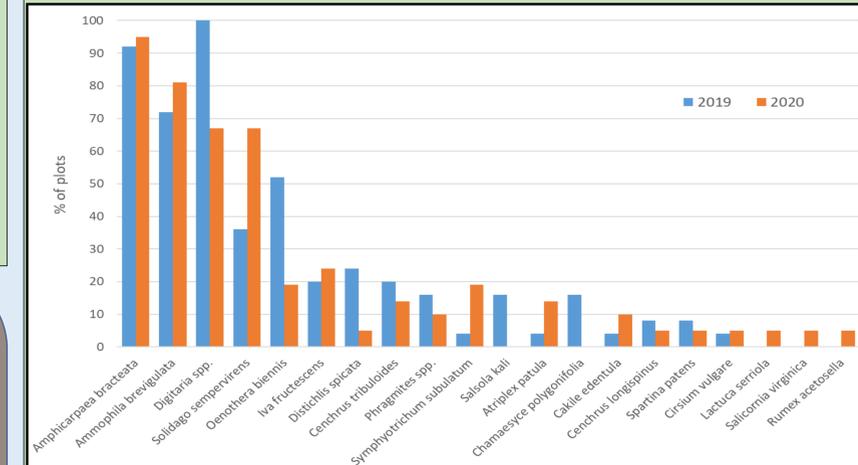


Fig. 6. Frequency of occurrence for vegetation species observed on Elevated Nesting Habitat, Ring Island in control plots (2019, n = 25) and monitoring plots (2020, n = 21).

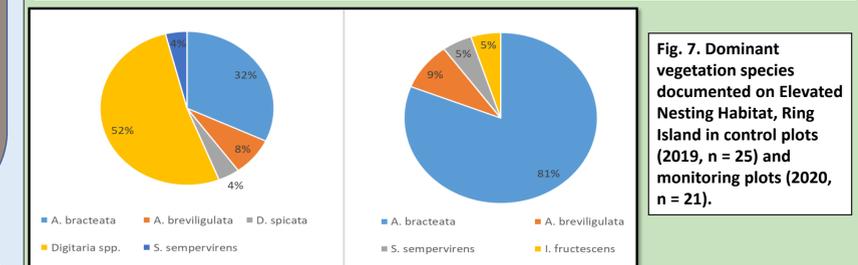


Fig. 7. Dominant vegetation species documented on Elevated Nesting Habitat, Ring Island in control plots (2019, n = 25) and monitoring plots (2020, n = 21).

- Dominant species present within study plots differed between years ($P < .001$; Fig. 7). The top three dominant species included *A. bracteata* (American hog-peanut), *A. brevigulata* (American beachgrass), and *Digitaria spp.* (crabgrass). We found significant differences in CC between years for all three species ($P \leq 0.02$); 2020 had higher CC for *A. bracteata* and *A. brevigulata* but lower CC for *Digitaria spp.*
- Salt solution spray successfully reduced vegetation growth and cover within treatment plots in 2019 (Fig. 4; Morey et al. 2019). Indirect comparison of vegetation growth and cover of 2019 salt spray treatment plots and 2020 monitoring plots suggest that rock salt spread was not as effective as direct salt spray solution in controlling vegetation. We plan to further investigate vegetation management of the Elevated Nesting Habitat using salt spray.