Application of saltwater solution to effectively control vegetation growth and cover in a tern colony during nesting season

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Introduction

Beneficial placement of dredged materials was used to create an elevated nesting habitat for colonial nesting birds on Ring Island, New Jersey in 2014 and replenished with more sand in 2018. Succession of vegetation has been a challenge for species that prefer open areas with sparse vegetation to nest. In summer 2018, dense vegetation grew on site above the flood tide range. Dense vegetation can limit nesting success and options for controlling emergent vegetation during the nesting season. Vegetation species (19 total) included: American Beachgrass (*Ammophila breviligulata*), Spike Cordgrass (*Distichlis spicata*), Seaside Goldenrod (*Solidago sempervirens*), Marsh Elder (*Iva frutescens*), American Searocket (*Cakile edentula*), Common Evening Primrose (*Oenothera biennis*), Crab Grass (*Digitaria sanguinalis*), American Hog Peanut (*Amphicarpaea bracteata*), Russian Thistle (*Salsola kali*), and European Reed (*Phragmities australis*). The goals of this study were to:

1. Determine if vegetation treatment with salt solution spray will reduce vegetation growth and control ground cover.
2. Determine if this method can be used safely and effectively during regular nest check intervals without causing additional disturbances.

Methods

- Prior to nest initiation, six transects were established perpendicular to the shoreline and placed 10m apart.
- Along each transect, 1m^2 plots were fixed every 5m and randomly selected as treatment (10% salt solution spray; n=23) or control (no salt solution spray; n=25).
- Treatment plots were sprayed 12 times (every 7.6 ± 2.5 d, April-July 2019) with a battery-powered backpack sprayer during nest checks (locate, mark, record nest contents).
- Vegetation metrics (Braun-Blanquet cover class, species, live stem lengths of dominant species) were measured in each plot before/after the treatment period; photos were taken.
- Standard parametric and non-parametric tests were performed for statistical analyses.

Fig.1. Common Tern chicks. 2018.

Fig. 2. Black Skimmer adults. 2019

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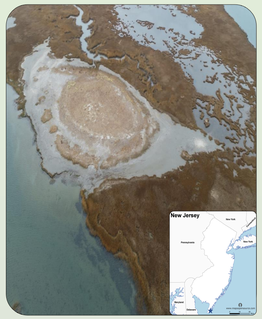


Fig. 3. Aerial image of Elevated Nesting Habitat, Ring Island (~1 acre). December 2018.

Fig. 4. Application of salt solution spray to treatment plot.

Fig. 5. Map of control (red) and treatment (green) plots on Elevated Nesting Habitat, Ring Island.

Results

- Common Tern (*Sterna hirundo*) nest laying peaked in mid-June with a total of 115 nests.
- The number of species did not differ between control and treatment plots prior to treatment or between treated plots before and after the treatment period; significantly more species were documented in control plots following the treatment period (F = 23.6, p<0.01; Fig. 6).
- After the treatment period the percent change in species richness was significantly higher (165.5 ± 30.2%) for control plots compared to treatment plots (3.1 ± 10.1%; Z=-4.5, p <0.01).
- Live vegetation covered the majority of area in 84.0% of control plots and only 8.7% of sprayed plots. Live vegetation cover class was impacted by treatment, with lower percent cover classes in treatment plots and higher percent cover classes in control plots (Fig. 7).
- Spraying reduced or eliminated weedy, invasive species, while rhizomatous species (e.g. *Distichlis spicata*, *Ammophila breviligulata*) tended to be reduced but not eliminated (Fig. 8).
- The mean duration (+/- SD) of treatment spray (31 +/- 2 min.) was shorter than the duration of nest checks (41 +/- 17 min.).

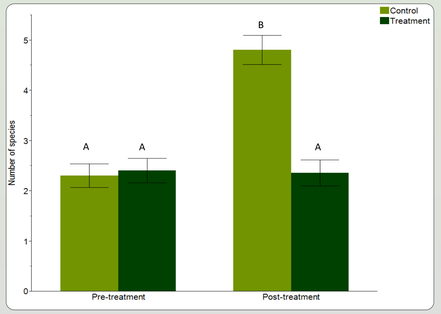


Fig. 6. Mean number of species by phase (pre or post-treatment) and plot (control or treatment).

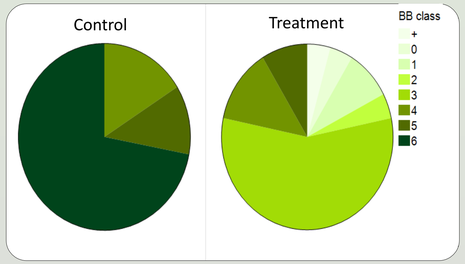


Fig. 7. Live vegetation Braun-Blanquet cover classes post-treatment by plot (control or treatment).
+= less than 1%, 0= 0%, 1: 1% to 5%, 2: 6% to 10%, 3: 11% to 25%, 4: 26% to 50%, 5: 51% to 75%, 6: 76% to 100%

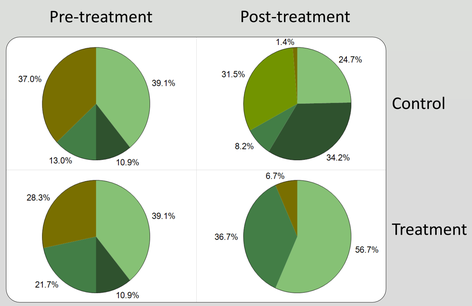
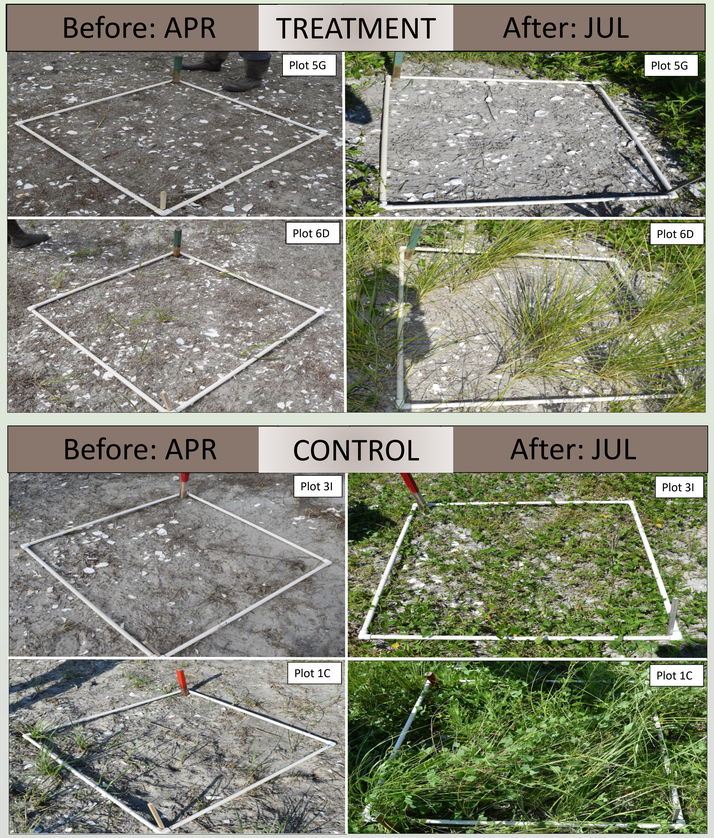


Fig.8. Top 5 occurring vegetation species by phase (pre or post-treatment) and plot (control or treatment).

Species
- American Beachgrass (*Ammophila breviligulata*)
- Crab Grass (*Digitaria sanguinalis)*
- Spike Cordgrass (*Distichlis spicata*)
- American Hog Peanut (*Amphicarpaea bracteata*)
- American Searocket (*Cakile edentula*)

Fig. 9. View of Transect 3 before (Fig. A, April) and after treatment (Fig. B, July). Fig. B shows open areas created by salt solution spray at treatment plots (green posts). Red posts show control plots.



Discussion

- Salt solution spray successfully reduced vegetation growth and controlled ground cover without causing additional disturbance to nesting birds with 1 person spraying while the other 2 performed nest checks, during peak egg-laying.
- This method along with other vegetation management practices (hand pulling, burning) may provide suitable nesting sites when open habitat is not available.
- Results of nest success located in control or treatment plots could not be studied due to failure of colony (i.e. heavy presence of avian and mammalian predators).

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