Impact of Nest Flooding on Salt Marsh Sparrow Incubation and Brooding

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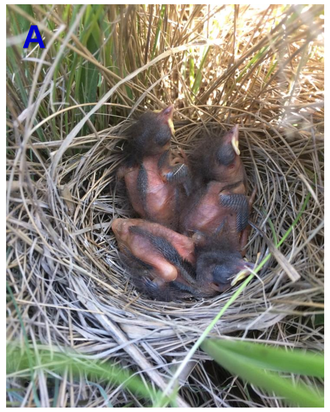
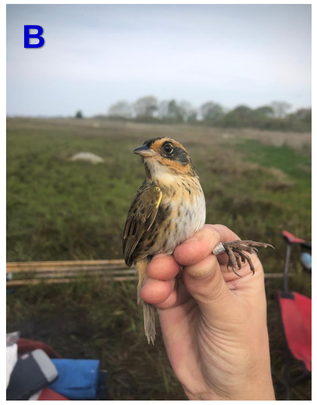
INTRODUCTION

Saltmarsh sparrows are ground nesting species in coastal marshes. They have adapted to withstand periodic nest flooding from extreme high tides that result from spring tides and storms. Due to recent sea level rise, it is harder for adults to fledge chicks because nests are flooding more frequently and at higher magnitudes (Bayard and Elphick 2011, Correll et al. 2017, Field et al. 2017).

The females take full parental responsibility over the young (Greenlaw et al. 2018). This study looks at their behavior during nest flooding events, which are characterized by water entering the nest. It is already known that they incubate very little while the nest is flooded (Apgar et al. unpublished), but this study focuses on their behaviors after flooding.

I think that the females will be more inclined to incubate the nests after a flooding event to regulate the temperature of the eggs/chicks.





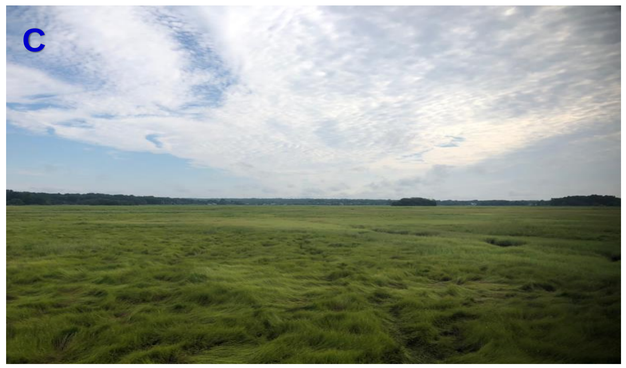


Fig. A. three saltmarsh sparrow nestlings
Fig. B. an adult saltmarsh sparrow
Fig. C. marsh habitat that saltmarsh sparrows nest in

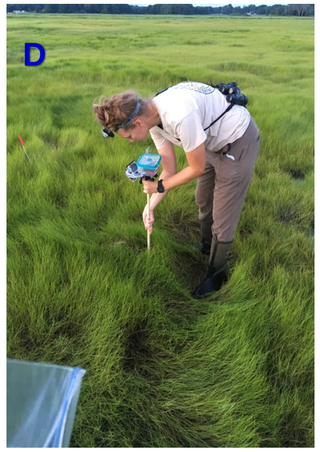
ACKNOWLEDGEMENTS

I'd like to thank Samantha Apgar for teaching me about Saltmarsh Sparrows and for providing me with data and guidance on how to put this project together. I'd also like to thank my AP STAT teacher, Mr. Mirrer, for helping me with my analysis and discussion. Thank you to everyone in NRCA CAP who made this project and program possible; it has truly been an amazing experience and I have learned things that will last me a lifetime.

MATERIALS AND METHODS

Data Collection

- Saltmarsh sparrow nests were found using systematic searches at Hammonasset Beach State Park and East River, Connecticut from May-August of 2017-2019.
- On the days leading up to a new or full moon (when tides are highest), video cameras were placed in front of a subset of nests 0.5-3 hours before a high tide and retrieved 0.5- 3 hours after a high tide.
- Videos were taken with full spectrum POV cameras augmented with infrared radiation lights and an external battery pack purchased from Ghostop.com.



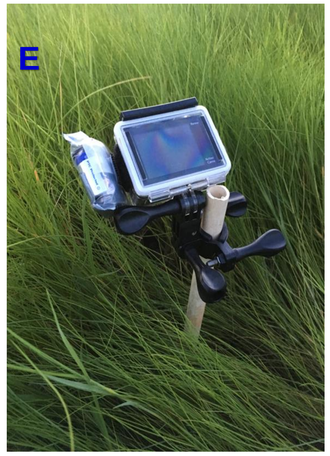


Fig. D. Samantha Apgar placing one of the cameras to record a nest
Fig. E. a close-up of the cameras used to record the nest

Data Analysis

- After the videos were recorded, they were watched and behaviors were coded using a protocol to denote the start and end times for which behaviors occurred and whether the nest was wet or dry during the behavior.
- This study looks at the female's behavior before, during, and after a flooding event.

CONCLUSION

There appears to be a trend between the female visiting the nest during a flooding event and incubating shortly afterwards. The female behavior does not seem to impact nest survivability. In 7/9 nests all the offspring died, 6/9 nests failed due to flooding, 1/9 failed due depredation, 1/9 fledged at least one chick and 1/9 had an unknown fate. The nest that fledged was visited and incubated by the female, however cause and effect is not clear.

To better understand the relationship between flooding and female incubation, more research is warranted. This limited study suggests that there may be some relationship between whether a female checks on the nest during a flooding event and when she comes back to incubate after the flood has receded.

RESULTS / DISCUSSION

- 9/43 videos experienced flooding events
- In 4/9 videos that experienced flooding events the female returned to the nest within 30 minutes after the tide receded. In the other 5/9, the female did not return within 30 minutes of the tide receding
- The goal was to see what caused the variation in the habits of the mother regarding returning to the next after a flooding event
- Also considered was the time spent incubating before a flooding event and the status of the offspring; egg or chick
- Neither the status of the offspring or time spent incubating before a flooding event appeared to impact the return rate of the female

Female salt marsh sparrow nest visit behavior

F

	Return to Nest	No Return to Nest	Total
Visit During the Flooding	4	0	4
No Visit During Flood	0	5	5
Total	4	5	9

Fig. F. The females that visited the nest during a flooding event also returned to their nest within thirty minutes of the tide receding. The females that did not visit during a flooding event did not return to their nest within the duration of the video. All videos fell within a range of one to nine hours after a flooding event.

- 4/4 females that visited their nest during a flooding event also returned to incubate within 30 minutes of the tide fully receding.
- 5/5 of the females that did not visit their nest during a flooding event did not return to incubate after the tide receded within the duration of the video
- There appears to be no association between the females' incubation patterns and nest survival rate.
- Only 1/9 nest resulted in at least one chick fledging

Limitations

- The amount of time on the video after the tide receded varied and in 5/9 videos return status could not be verified because the video length may have been insufficient.
- The sample size of the data was too small to establish reliable patterns.

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