



Bird interactions with novel oyster reef restoration materials using wildlife trail cameras

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Background

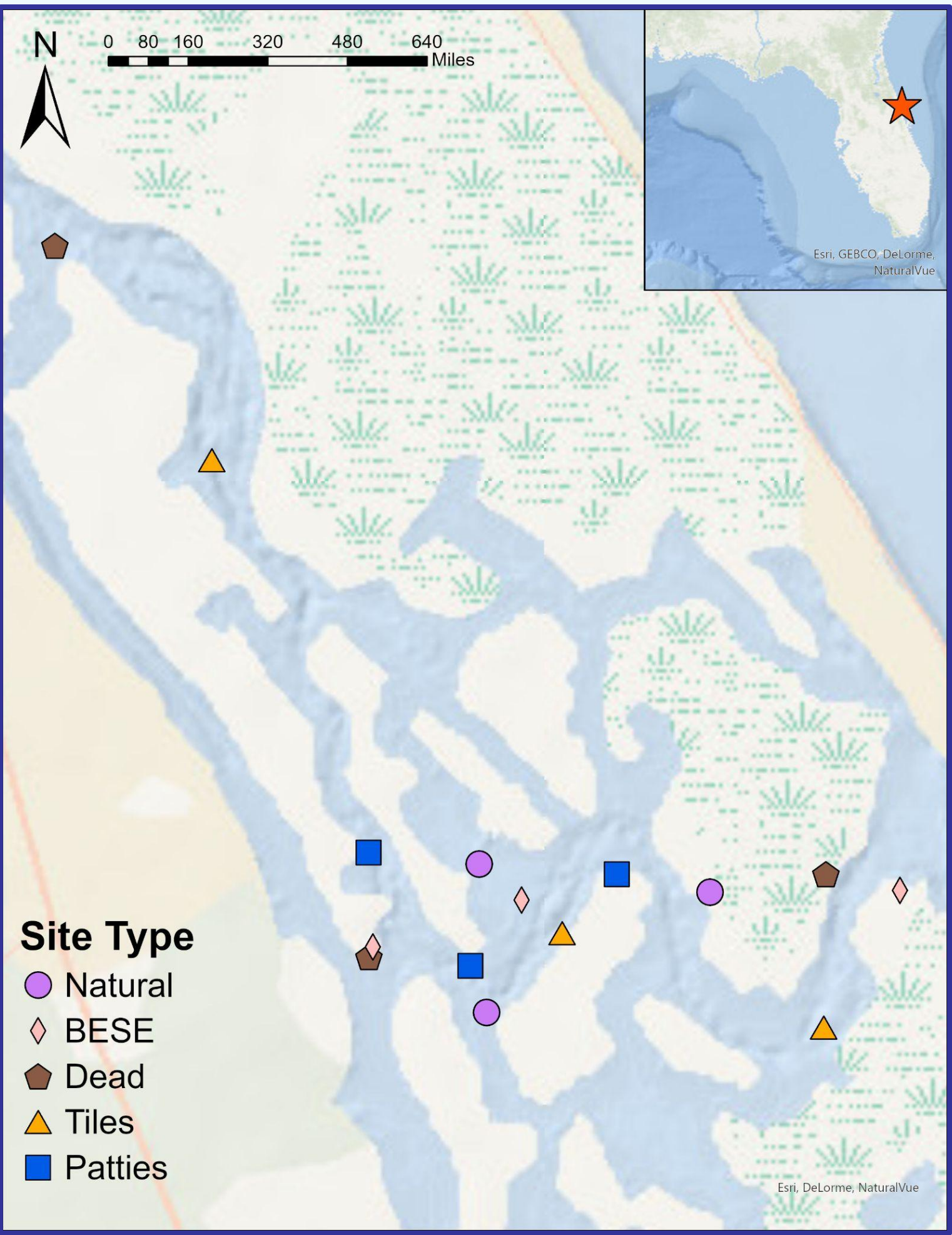
- Estimated 24% loss of eastern oyster reefs (*Crassostrea virginica*) in Mosquito Lagoon (ML) since 1943.*
- Declines due to boat wakes, habitat loss, and invasive or pathogenic species.
- Oyster reef loss reduces habitat availability for resident and migrating birds.
- Restoration efforts focused on increasing oyster populations and bird habitat in ML.
- Novel biodegradable restoration materials include cement-jute rings/tiles and Biodegradable Ecosystem Engineering (BESE) mats made from potato starch and recycled oyster shell.

Research Questions

- What bird species and behaviors are being observed on biodegradable reefs vs controls?
- Are birds interacting with the restoration materials? If so, what kind of interaction(s)?

Study Site

- Mosquito Lagoon is an estuary located in the northernmost region of the Indian River Lagoon system.



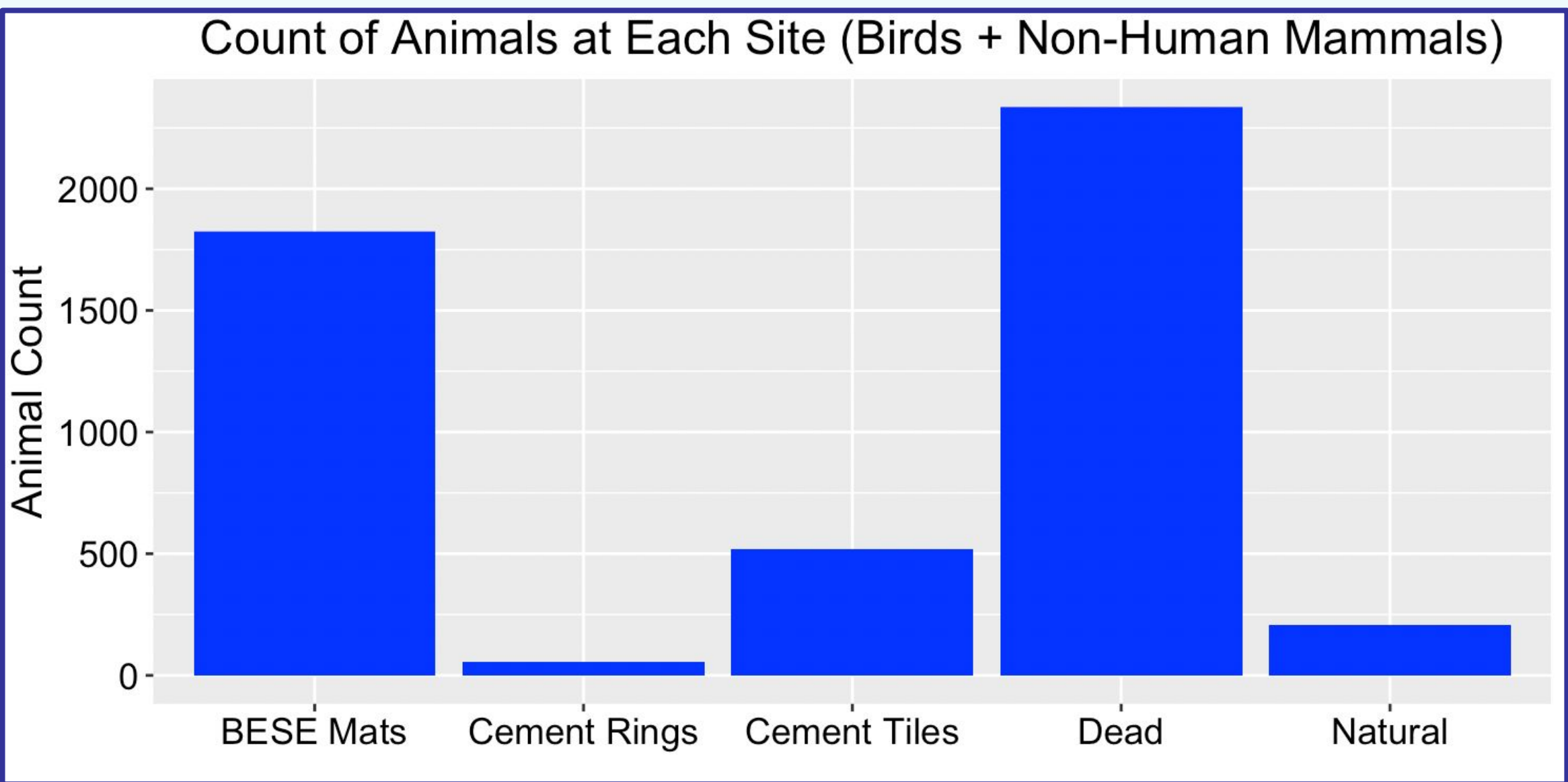
Methods

- Bushnell Trophy Cam HD Model 119876 trail cameras were placed at 15 oyster reefs in Mosquito Lagoon between May and August 2021.
- SD cards and batteries replaced every two weeks.
- Control reefs: Dead and Natural, Reference Reefs.
- Each camera set to record 10-second intervals when it detected motion.
- Collected cameras and analyzed footage to identify bird behaviors and interactions.



Results

- 6,109 out of 27,416 video clips were occurrences of bird, boat, or human activity.
- 26 bird species, 3 mammal species, and humans were identified.
- Animals visited dead reefs the most, cement rings the least.
- Most common birds observed were great blue heron and white ibis.
- 2% of behaviors were direct interactions with the materials.



Bird Observations	
Loafing	1747
Foraging	989
Consumption	118
Mating	4
Grooming	796
Camera Investigation	9
Material Interaction	81
Flying	54
Total	3820

Mammal Observations	
Loafing	12
Foraging	9
Consumption	0
Mating	0
Grooming	0
Camera Investigation	0
Material Interaction	1
Flying	0
Total	22

Human Observations	
Walking	168
Swimming	6
Fishing	48
Boating	411
Camera Investigation	82
Material Interaction	1546
Total	2261

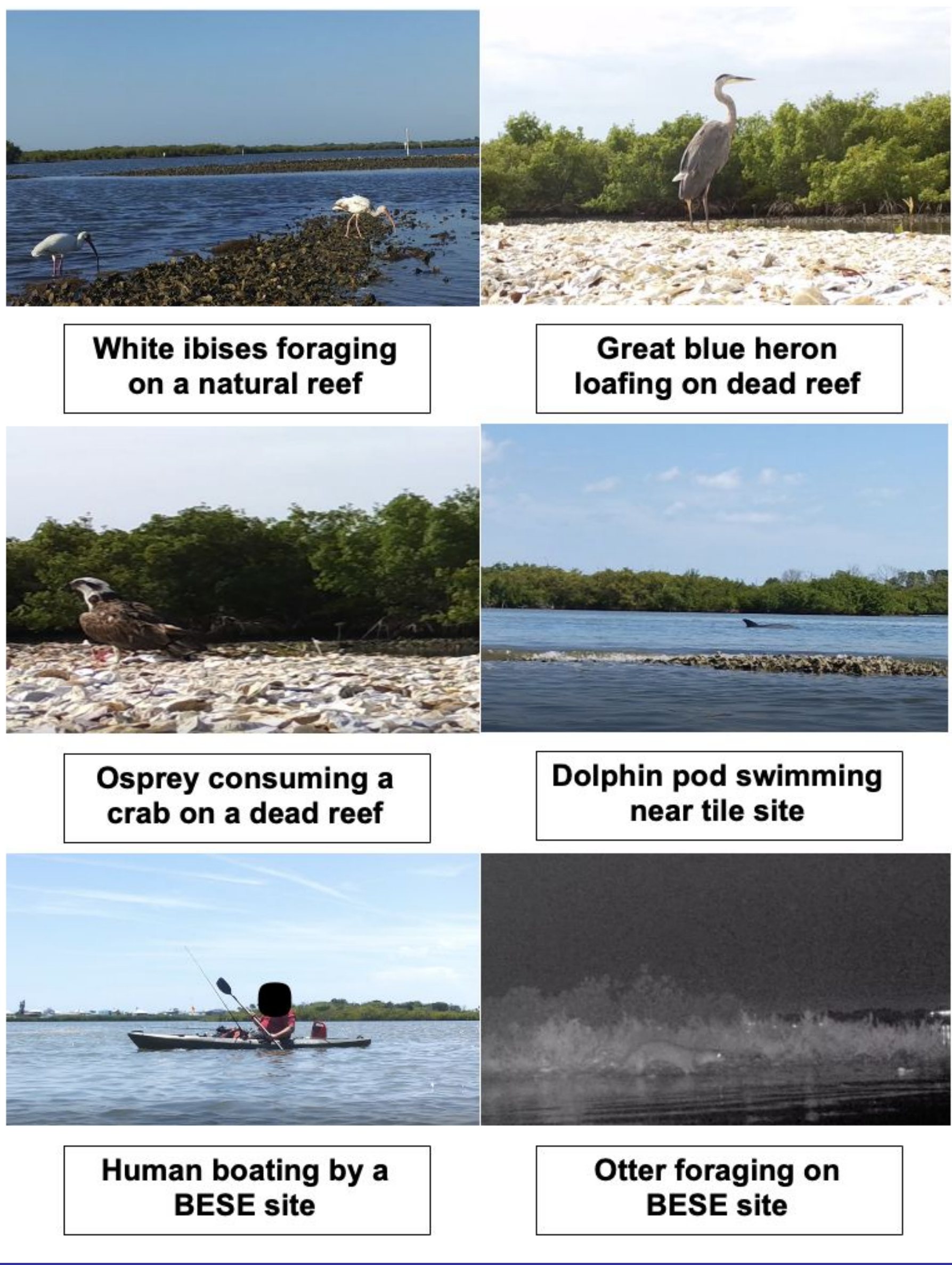
- 5 state-threatened bird species identified: American oystercatcher, Least tern, Roseate spoonbill, Little blue heron, and Wood stork.
- 3 mammal species observed: otters (14% of observations), dolphins (4%), and raccoons (82%).
 - 3 mammal species seen mostly at BESE mat sites.
- 50% of human observations occurred on cement tile sites.
- Most common human behavior was material interactions from oyster monitoring and camera set-up (n=1546).

References

*Garvis S, Sacks P, Walters L. 2015. Assessing the formation, movement, and restoration of dead intertidal oyster reefs over time using remote sensing in Canaveral National Seashore and Mosquito Lagoon, Florida. Journal of Shellfish Research 34:251–258.

Discussion

- Most bird interactions with materials indicated minimal avoidance or little interest in them.
- Loafing was the most common bird and mammal behavior. This suggests material presence does not deter birds from reefs.
- Cement ring sites had the fewest animal and human interactions. This may be because they were submerged most of the time and had the smallest footprint.
- Most human interactions with materials were from volunteers helping with restoration set-up, monitoring, and recreational activities.
- Future studies on restoration interactions should focus on whether migratory, rare, or endangered species interact with materials. This is crucial in determining whether these novel materials are viable long-term solutions for oyster restoration.



Acknowledgements

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