

# Ghost Crab Management



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*Jean Hall*

# Ghost Crab Background

- ~20 species of ghost crab found within the subfamily *Ocypodinae*
- The Atlantic ghost crab (*Ocypode quadrata*)
- Their range extends along the Atlantic Coast from Massachusetts to Brazil
- Found wherever sandy beaches occur
- Are a scavenger and a predator of coastal wildlife



# Ghost Crab Impacts

Ghost crabs interact with nesting shorebirds in a variety of ways and can contribute to failed nesting attempts wherever they co-occur.



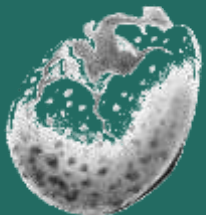
Nest Predation



Harassment & Abandonment



Chick Predation & Injury



Partial Predation



Indirect Predation



Adult Injury & Predation

# Ghost Crab are part of the costal ecosystem



*Jack Rogers*

Scavengers

Predators

*A food resource for wildlife,  
including shorebirds*

The focus of ghost crab management should only be to reduce crab density in locations where predation impacts are known.

# Study Area

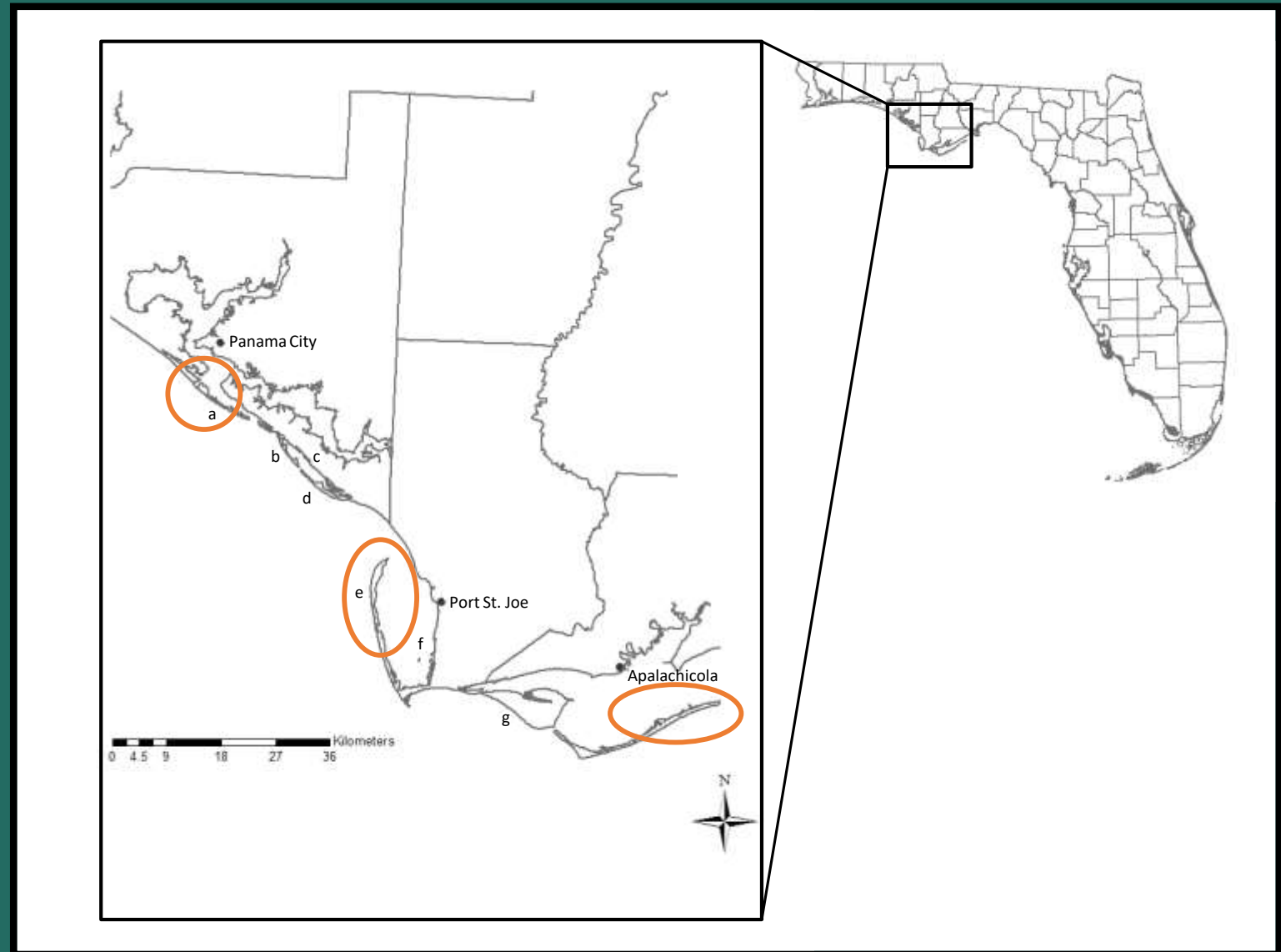
Time Period: 2011-2013

## Florida State Parks :

Shell Island

St. Joseph State Park

St. George Island State Park



148-183 breeding snowy plover adults present in the project area between these 3 sites, ~25-30% of the population

# Acknowledgement

**Ghost crab bios**- Beth Wright, Tyler Brown, Marvin Friel

**Ghost Crab Removal Effort, funded through the USFWS- Coastal Program:** Patty Kelly, Melody Rae-Culp

**Nest & Brood Monitoring** – Holley Short, Paula Muellner

## **Funding provided by:**

FWC- State Wildlife Grant Program, Janell Brush

National Fish and Wildlife Foundation- Power of Flight

American Bird Conservancy- Kacy Ray

## **Support by:**

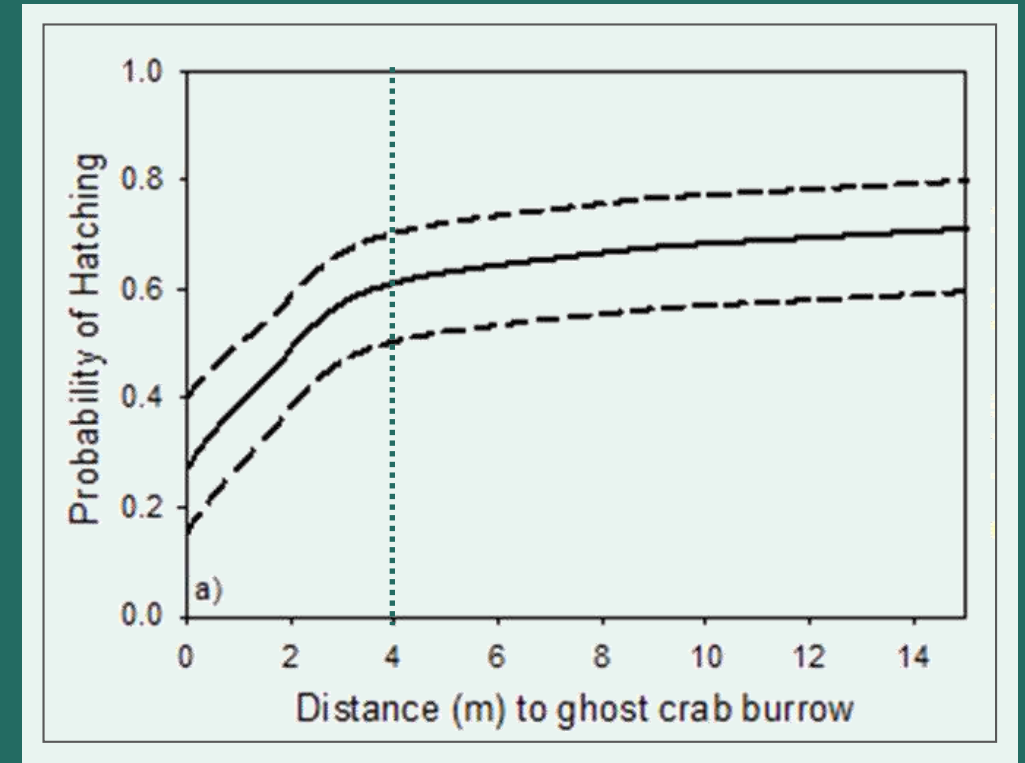
Park Service managers and staff- Brian Addison, Mark Knapke & Josh Hodson

Tyndall Air Force Base- Wendy Jones



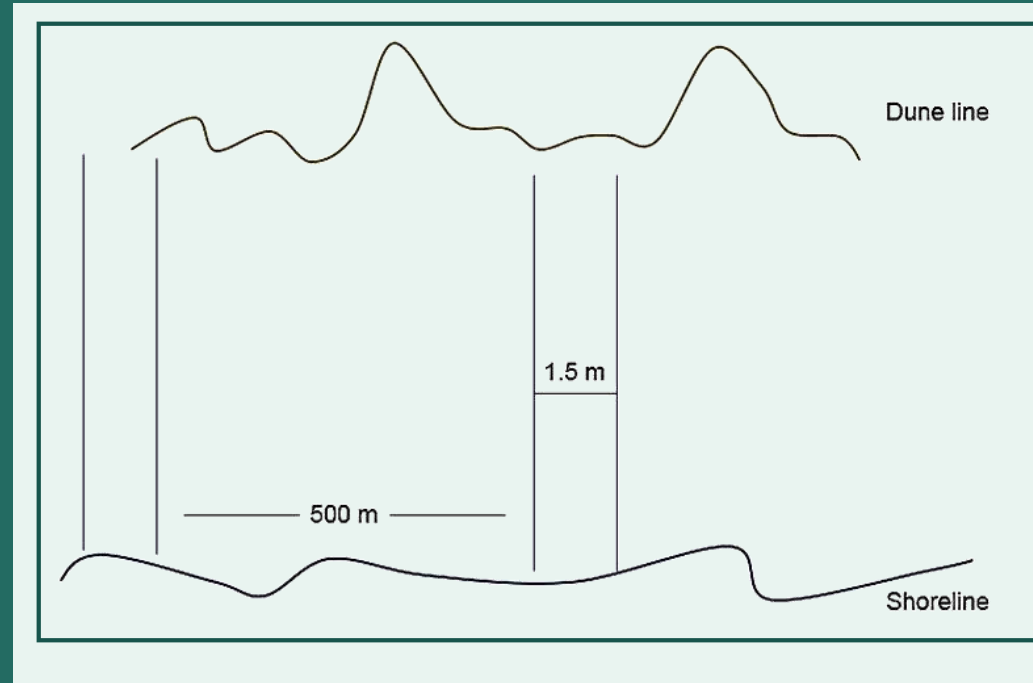
# Study Background

- Snowy plover nests are less likely to hatch when ghost crab burrows are in close proximity
- The closer the ghost crab burrow was to the nest the greater the influence of the ghost crab on nest success.
- Chick survival was influenced by ghost crab density, where chick survival decreases when crab density was high.
- Plovers fledged fewer chicks when ghost crab burrows were directly adjacent to the nest on hatch day.



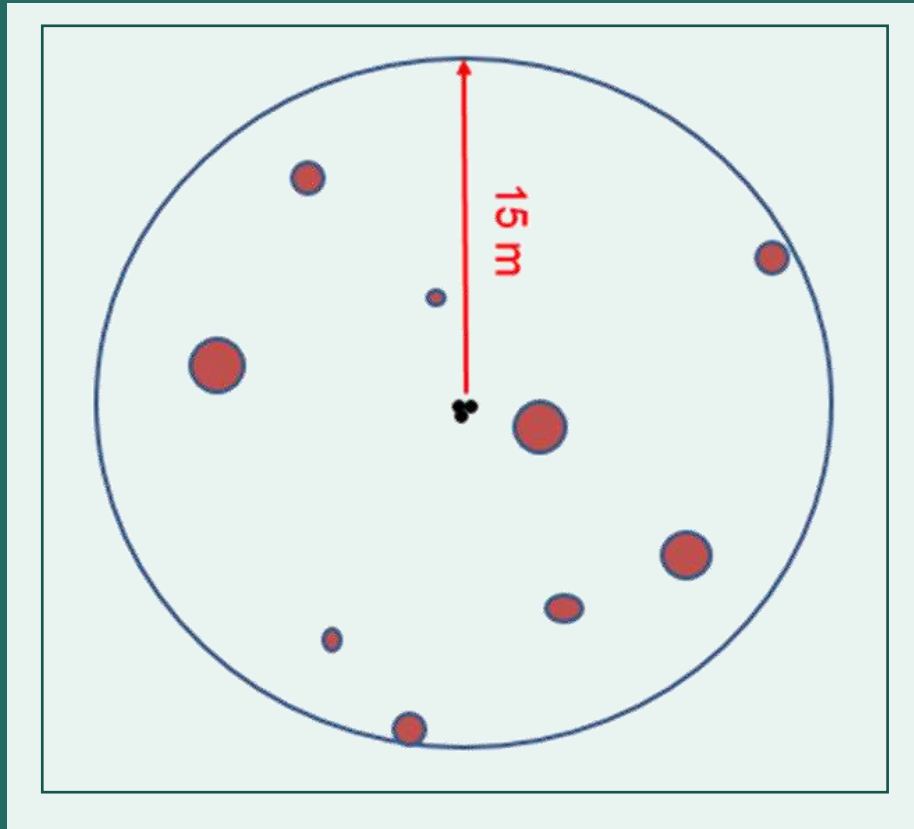
The probability of snowy plover nests hatching related to distance to ghost crab burrow.

# Methods- Ghost Crab Density

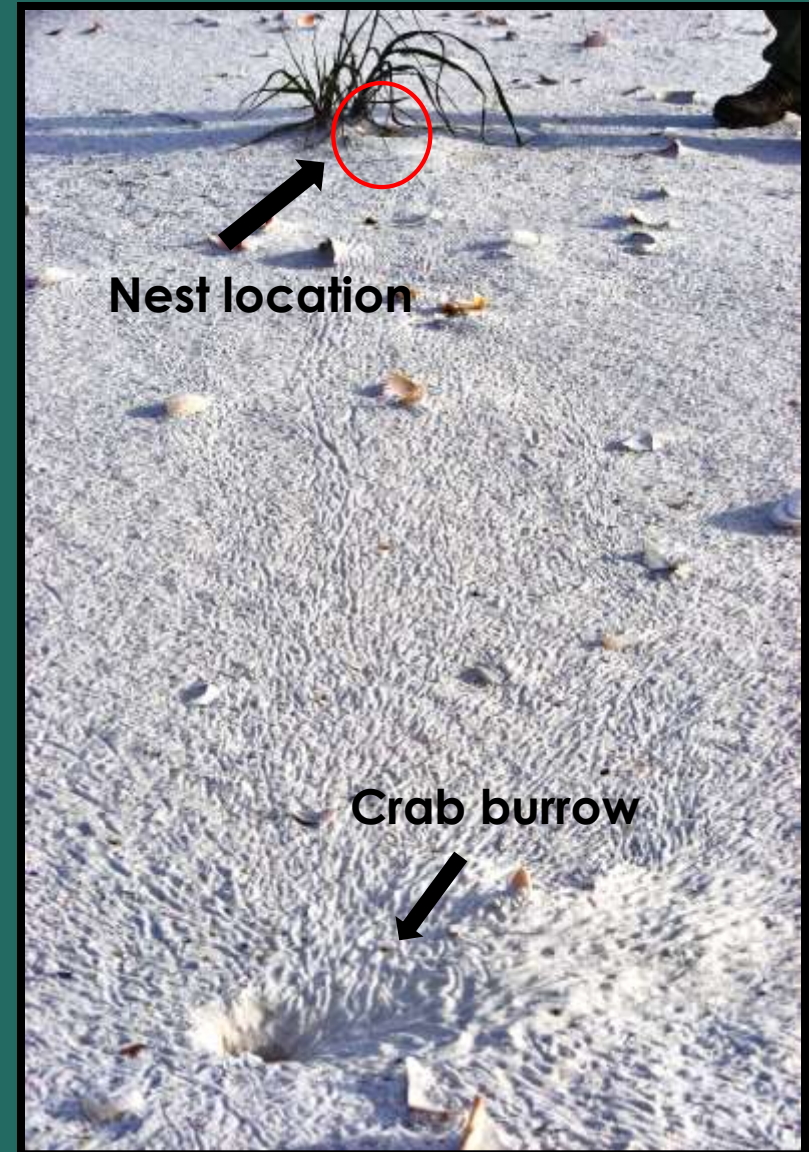




# Methods- Ghost Crab Density



Measured within a 15m radius around each nest



# Experimental Crab Removal

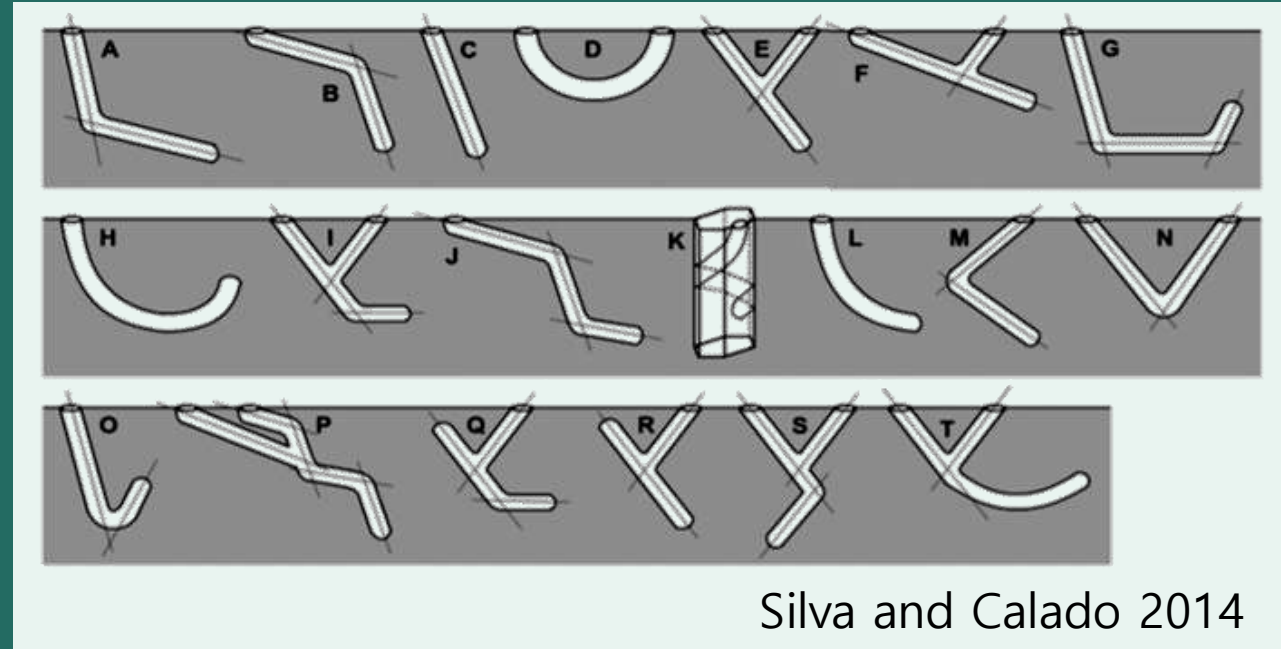
Three treatment groups: 1) Control, 2) 5m removal, 3) 15m removal

Fripp Trap



Set an additional 153 traps at active burrows not associated with nests

# Experimental Crab Removal



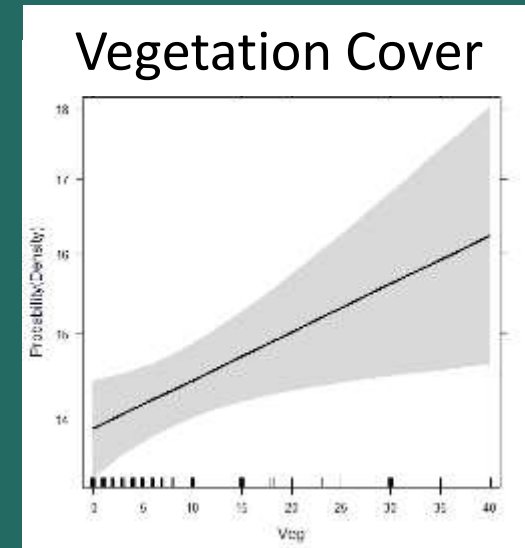
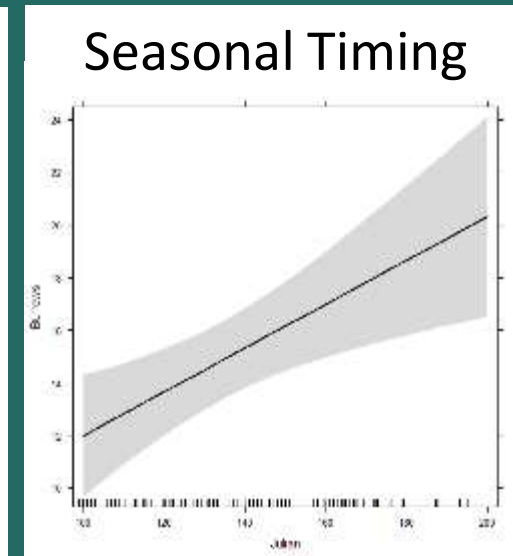
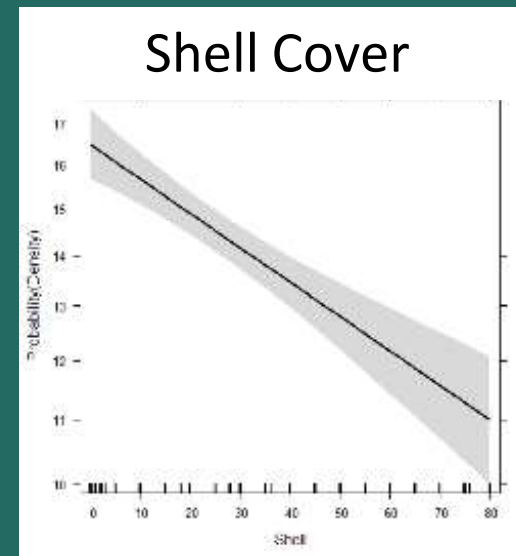
Silva and Calado 2014



Burrow shape made these methods challenging

# Ghost Crab Burrow Counts and Removals

- We counted and measured a total of 4743 burrows
- On average nests had **15** burrows within 15 m (range 0 to 93)
- Ghost crabs were present around **97%** of nests and only 10 nests had no burrows present within 15 m.
- Successfully removed **175** ghost crabs from treatment sites



# Experimental Crab Removal

317 nests located and included in this project

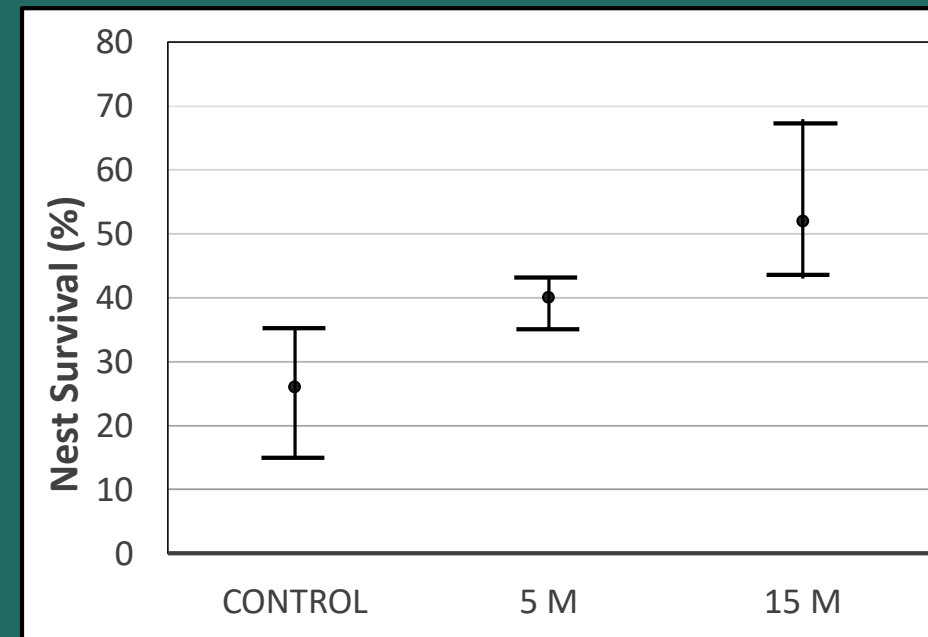
Treatment	# Nests
Control	170
5 m	77
15 m	70
<b>Total</b>	<b>317</b>



Snowy plover daily nest survival increased when ghost crabs were removed from around the nest site and increased as the treatment expanded to 15 meters.

- Lower burrow density across the landscape
- Lower crab density at the nest
- % Vegetative cover

Chick survival was influenced by a combination of human disturbance, crab density, and % vegetative cover (n=196).



# Capture Rate vs Occupancy Rate

Capture rates observed:

- 31.2% at nest sites
- 54.9% randomly selected burrows



Occupancy Rate



14.9% to 60.0%

Pombo and Turra 2013  
Silva and Calado 2013

The probability of capture was influenced by the percent shell and vegetative cover.

Crabs were less likely to be captured

- in dense shell debris
- more likely to be captured in dense vegetation

# Lessons Learned

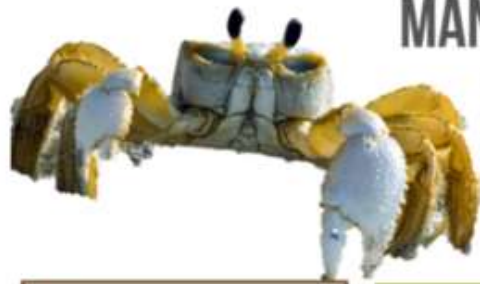
- Targeted ghost crab removal benefits were achievable and effective
- Can be time consuming
- Management is most effective early in the season
- Habitat features can influence the presence of ghost crabs and the capture/occupancy rates



# Continuing to explore options

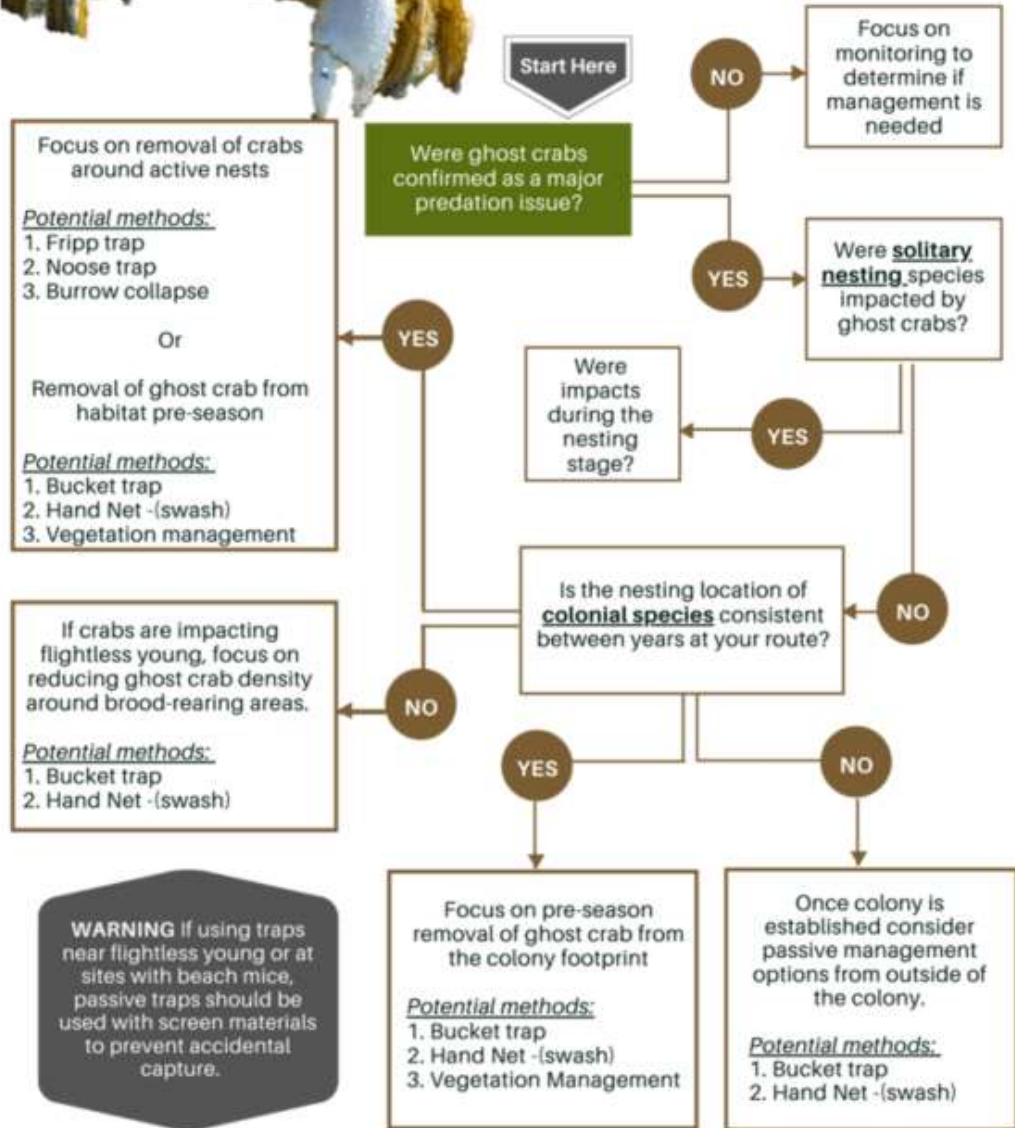






# MANAGEMENT DECISION TREE

There are many management options for ghost crabs. We provide direction for management options based on nesting type and stage.



**WARNING** If using traps near flightless young or at sites with beach mice, passive traps should be used with screen materials to prevent accidental capture.



Nest

## Identifying nests predated by Ghost Crabs

The predation of nests by ghost crabs can be documented by a game camera (see Game Camera Use Guidance) or by evidence left in the sand.

- You will typically see ghost crab tracks at the nest traveling directly from the burrow, burrow facing the nest, and/or a new burrow directly at the nest bowl.
- Ghost crabs tend to build burrows adjacent to food sources and you may see burrows at closer distances progressively during each survey.
- You may see tracking evidence of the shorebird-crab dance, i.e., crab tracks chasing broken-wing tracks in the sand.

### One egg at a time



Crabs eat one egg at a time and partial predation is frequent. At a solitary nest, you may see the egg count drop each survey.

If the crab decides to not eat the egg, you may find whole abandoned eggs in locations away from the nest.

### Jagged Egg Fragments



Ghost crabs pierce the eggs with their cheliped and then tear into them. You might find jagged egg fragments as a result.

### Fluffed Sand

Ghost crabs do an amazing job of cleaning up any split yolk. They sift through the sand removing all particles of yolk in the process. The sand will appear light and fluffy.

## Remember Ghost Crabs are also Scavengers!

Ghost crab predation can be overestimated. This is because they will readily clean-up yolk spilled by other predators.

Recent coyote predation with spilled yolk



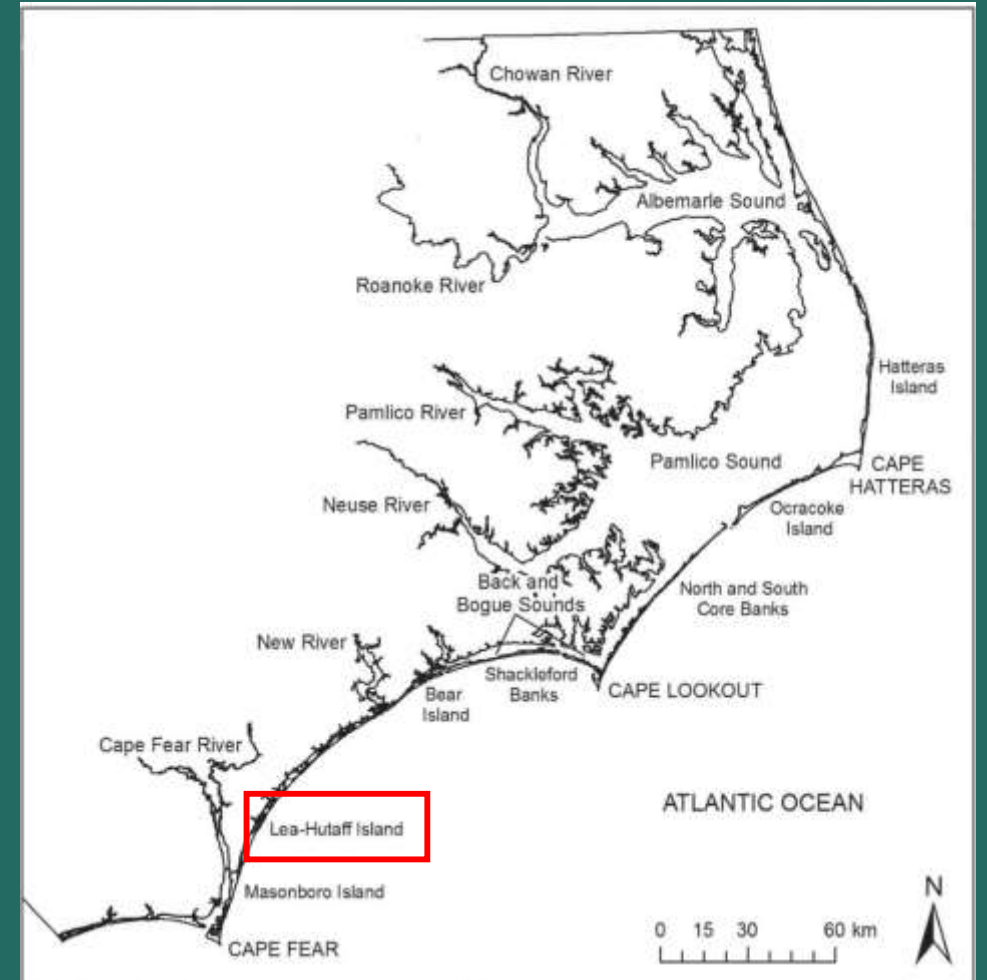
Be sure to pay attention to track evidence and track placement. For example, check to see if the filtered sand is on top of or below another visible predator tracks.

See the Determining Sources of Nest Depredation Guidance Document for more information

# Targeted Ghost Crab Trapping at American Oystercatcher Nests in North Carolina



# Location & Background



# Location & Background



## 2021

- 9 broods failed within ~1 week of hatching
- South end especially affected
- Ghost crabs suspiciously abundant

## 2022

- Could we adapt the protocol Florida used to be feasible in this setting?
- Would targeted trapping improve chick survival and/or reduce burrows near nests?
- Can/should this be part of annual management?

# The Project



- Productivity monitored at all nests
- Treatment nests received trapping and burrow counts
- Control nests received burrow counts
- Used cameras to confirm hatching and minimize disturbance around hatching

# Challenges

- Over-abundance of treatment nests
  - Nests were lost to other types of predation
  - 2022 was a high raccoon predation year
- Logistics
  - A lot of ground to cover, especially in a pandemic
  - Increased use of trail cameras



# Results

## Ideal vs. Actual Treatment

- The groups produced about the same number of nests
- Could not set traps in time
- 2023 goal: improve trapping effort

	Assigned		Actual	
	Pairs	Nests	Pairs	Nests
Treatment	13	21	7	12
Control	12	17	18	26

## Hatching and Fledging

- Productivity on the island was low overall (0.32 f/p)
- Better success from treatment than control nests
- Still summarizing burrow data

	Control	Treatment
Nests Hatched	4 (15%)	5 (42%)
Nests with $1 \leq$ Fledge	1 (4%)	5 (42%)

# Questions

