

Demographic rates of the Eastern Oyster (*Crassostrea virginica*) with the advancing threat of Crown Conch (*Melongena corona*) in the Matanzas River

Dr. Tim Pusack and Dr. David Kimbro



Oyster Reef Ecology



Florida Oyster Reefs

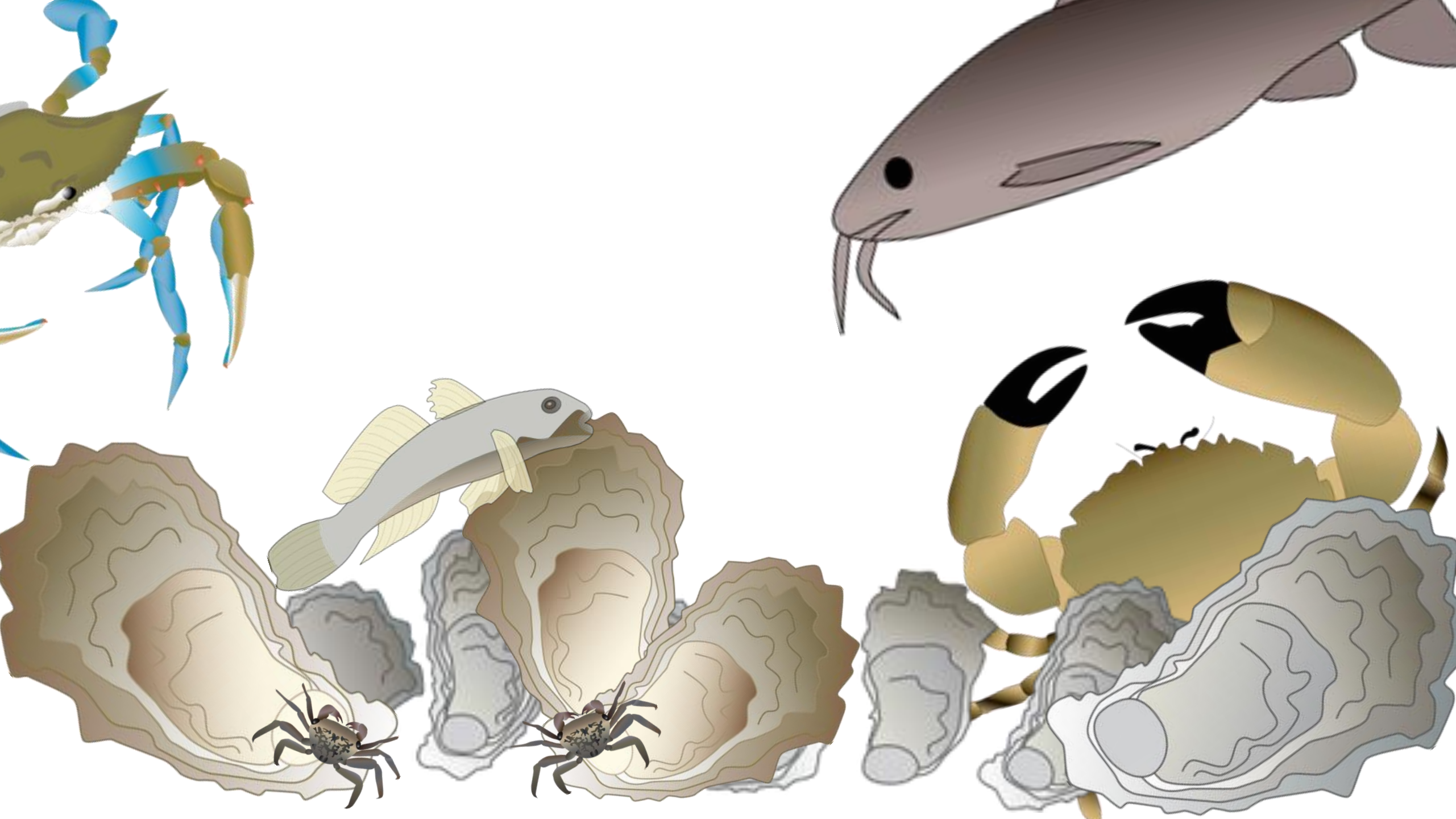
- Apalachicola Bay, FL
- Ochlockonee Bay, FL
- Jacksonville, FL
- Marineland, FL



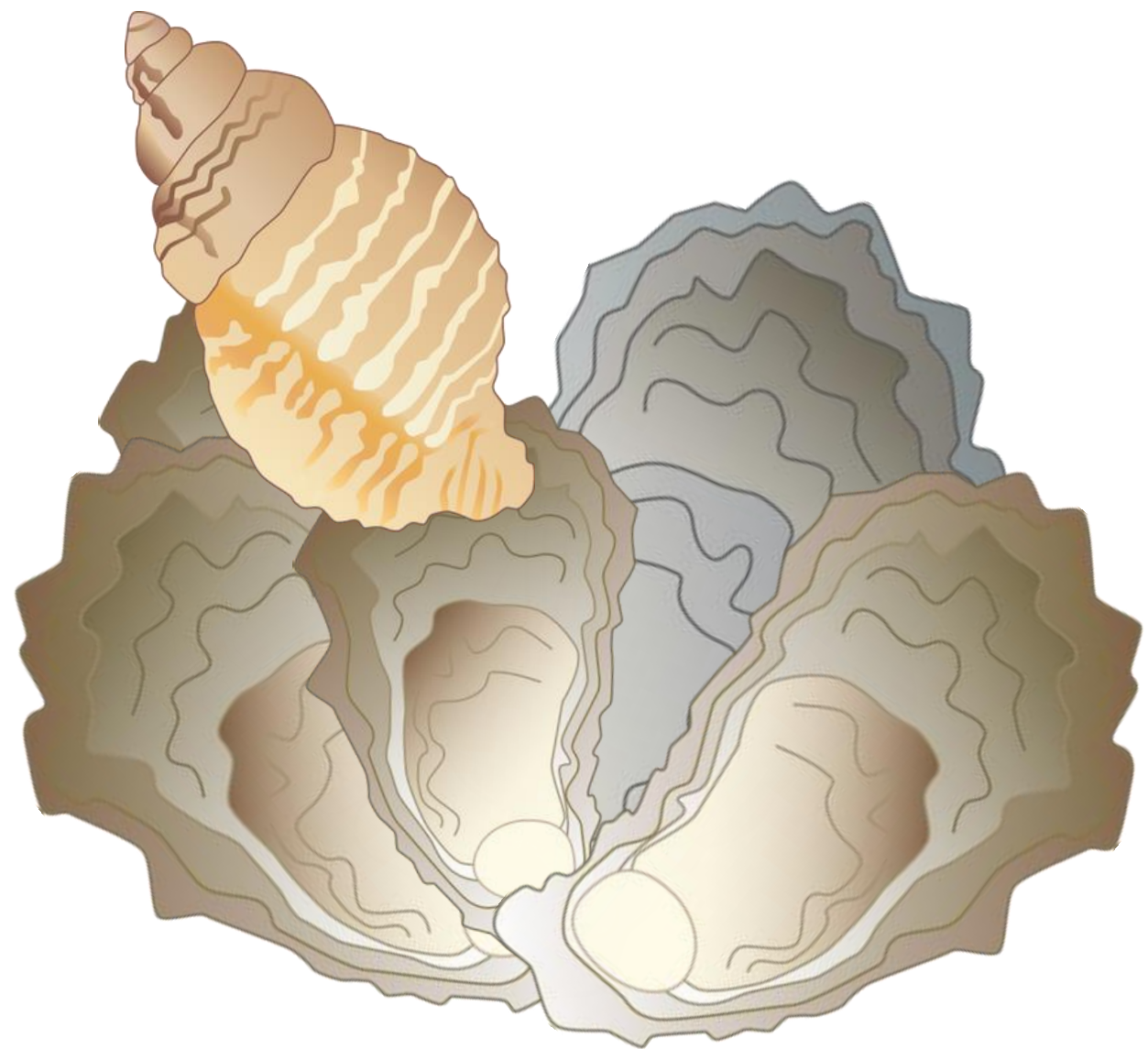
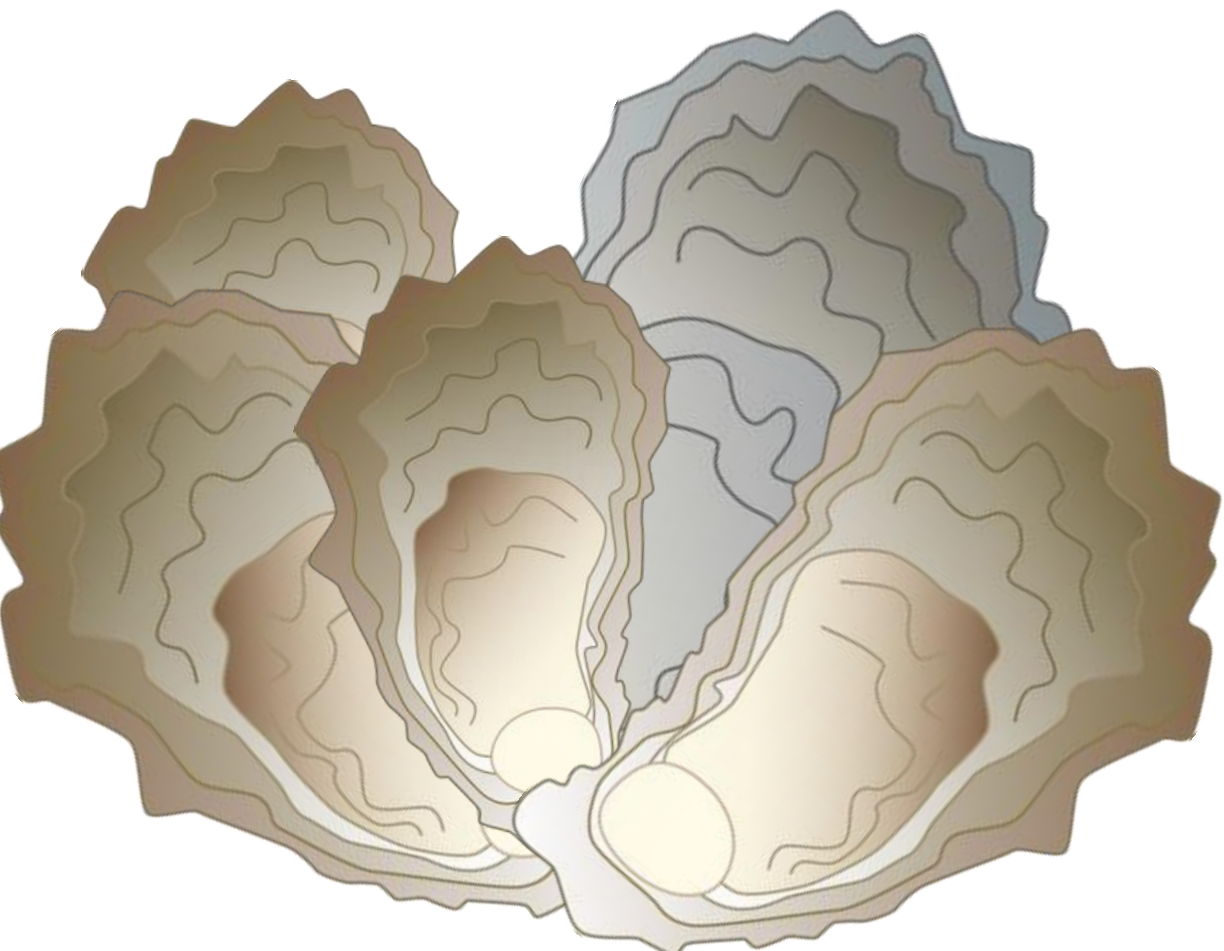
Florida Oyster Reefs

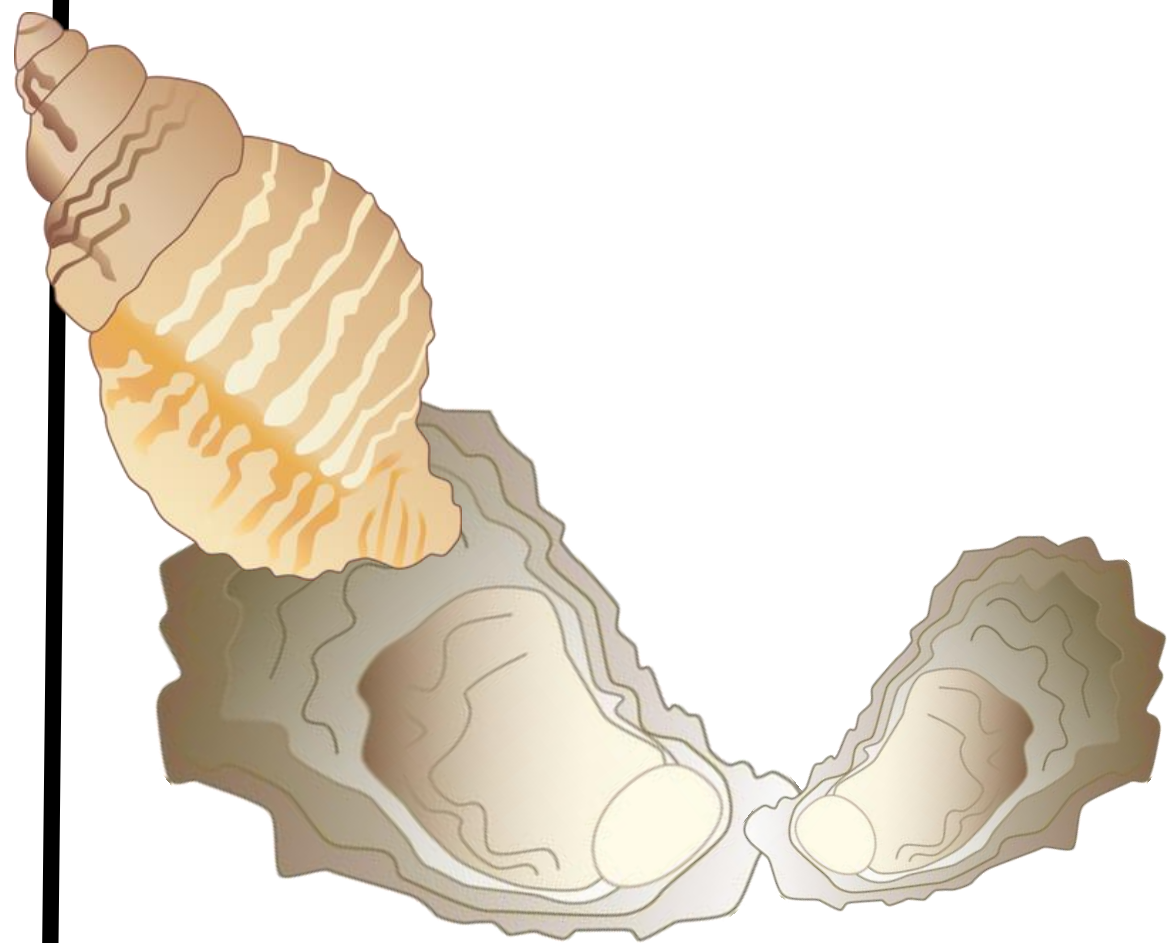
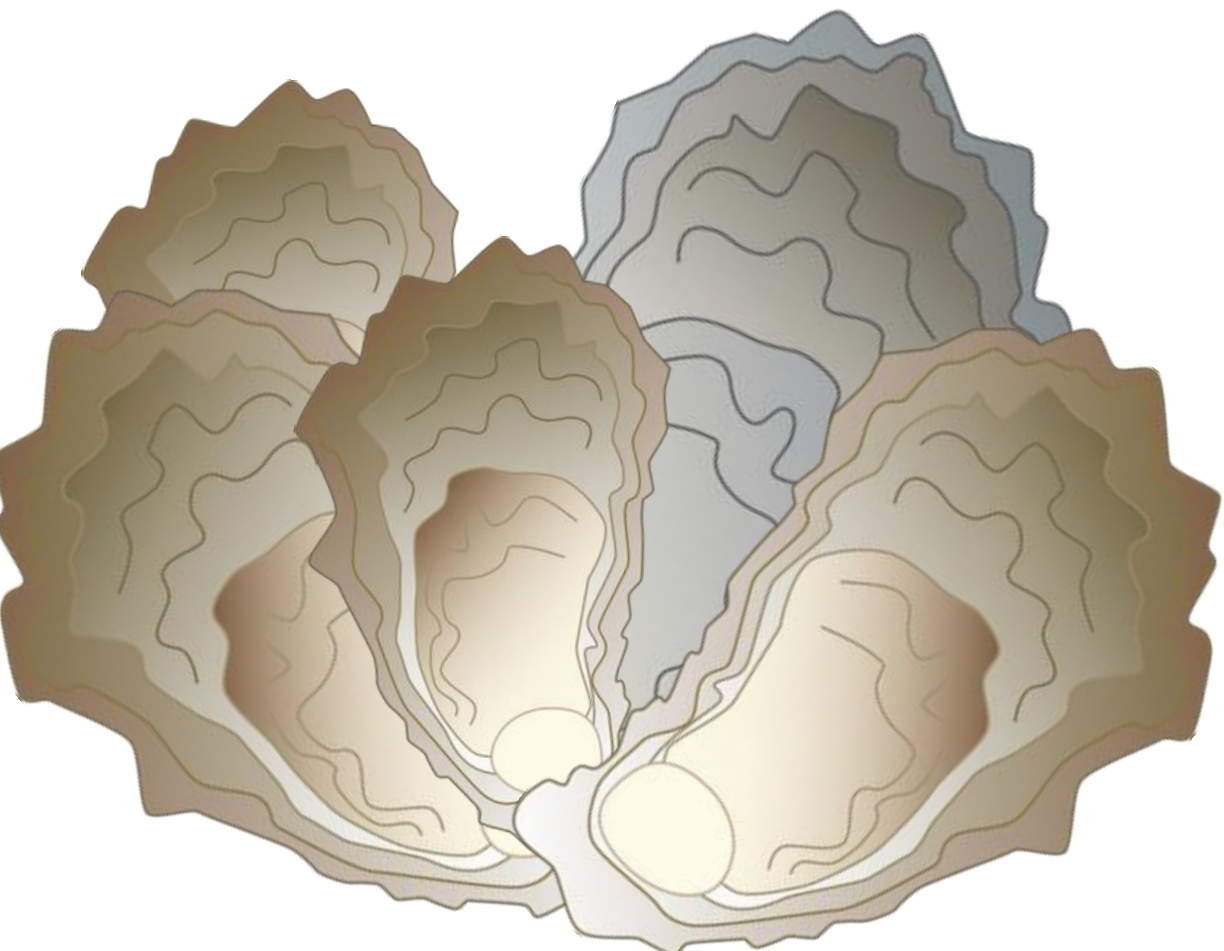
- Apalachicola Bay, FL
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Oyster reefs in the Matanzas River

- Population dynamics
 - Repeated Surveys (2014-2016)
 - Monitor Growth
 - Disease presence
- Predator-prey interactions
 - Manipulative field studies
 - Mesocosm experiments



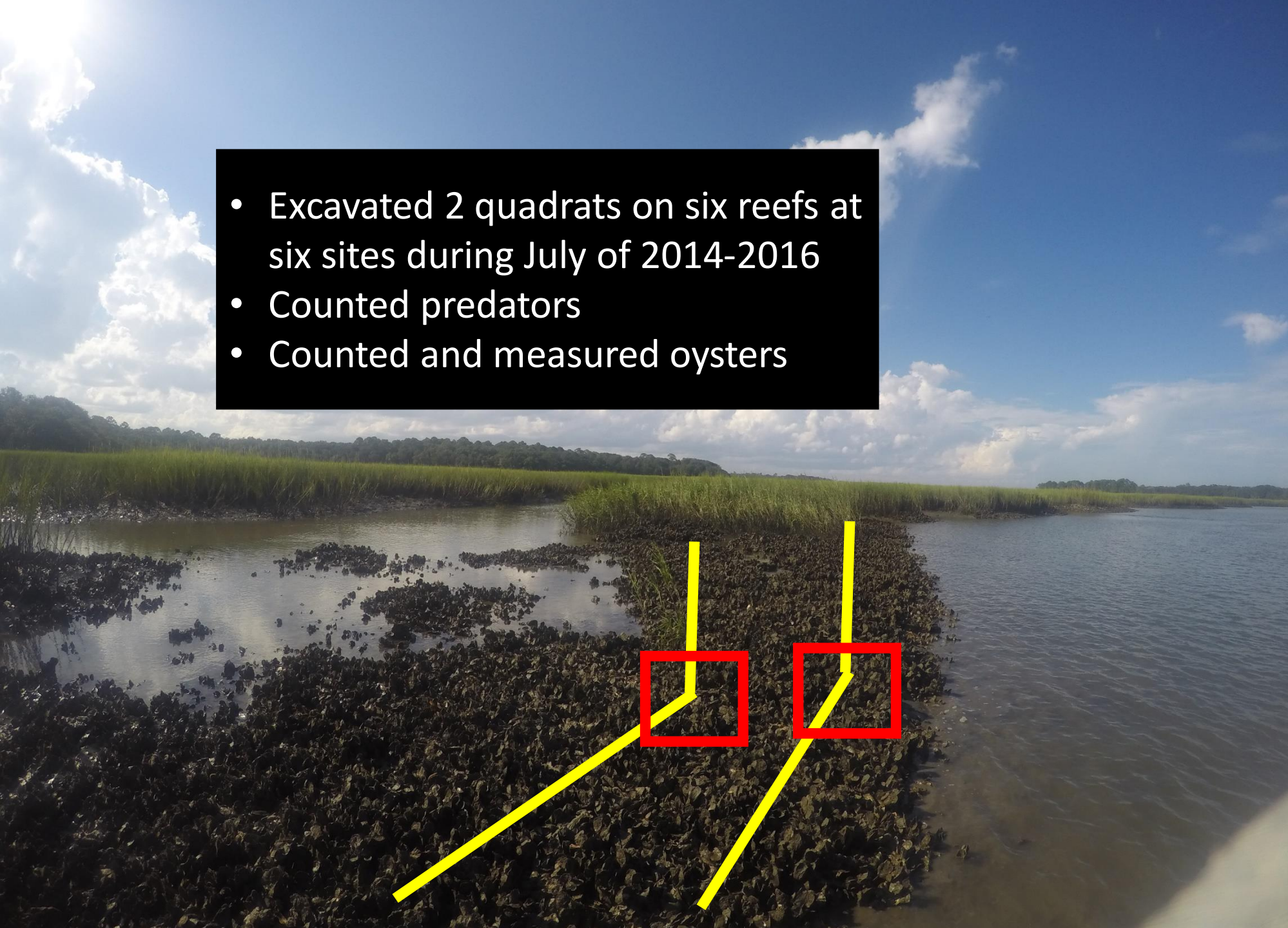
Oyster reefs in the Matanzas River

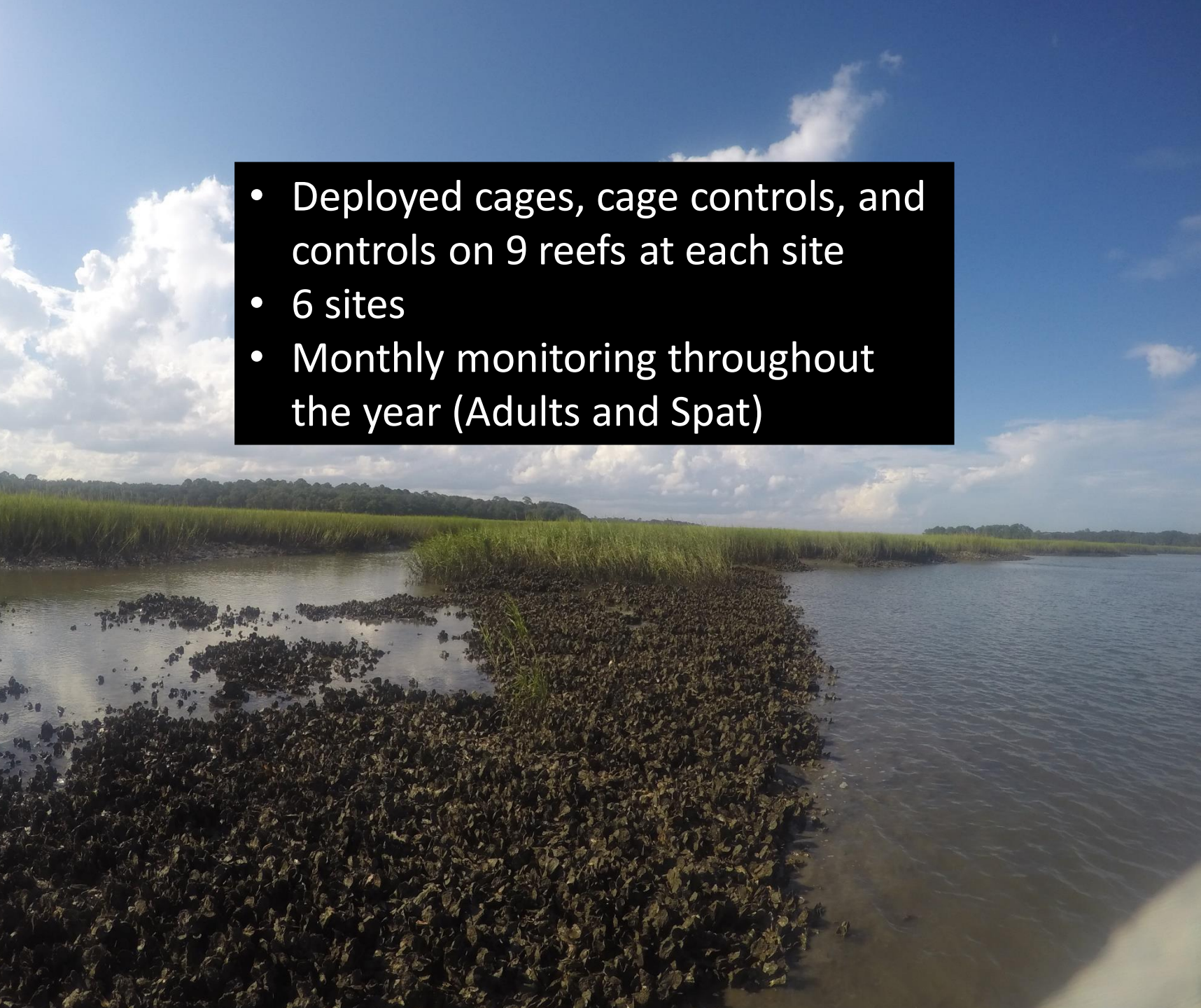
- Population dynamics
 - Repeated Surveys (2014-2016)
 - Monitor Growth
 - Disease presence
- Predator-prey interactions
 - Manipulative field studies
 - Mesocosm experiments



Surveys

- Excavated 2 quadrats on six reefs at six sites during July of 2014-2016
- Counted predators
- Counted and measured oysters



- 
- Deployed cages, cage controls, and controls on 9 reefs at each site
 - 6 sites
 - Monthly monitoring throughout the year (Adults and Spat)

Manipulative Field Experiments

Manipulative Field Experiments

- Deployed cages, cage controls, and controls on 9 reefs at each site
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Manipulative Field Experiments



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Manipulative Field Experiments



Spat

- Deployed cages, cage controls, and controls on 9 reefs at each site
- 6 sites
- Monthly monitoring throughout the year (Adults and Spat)

Manipulative Field Experiments



Adults

Guana Tolomato Matanzas National Estuarine Research Reserve

St. Augustine
Inlet

1B

312

206

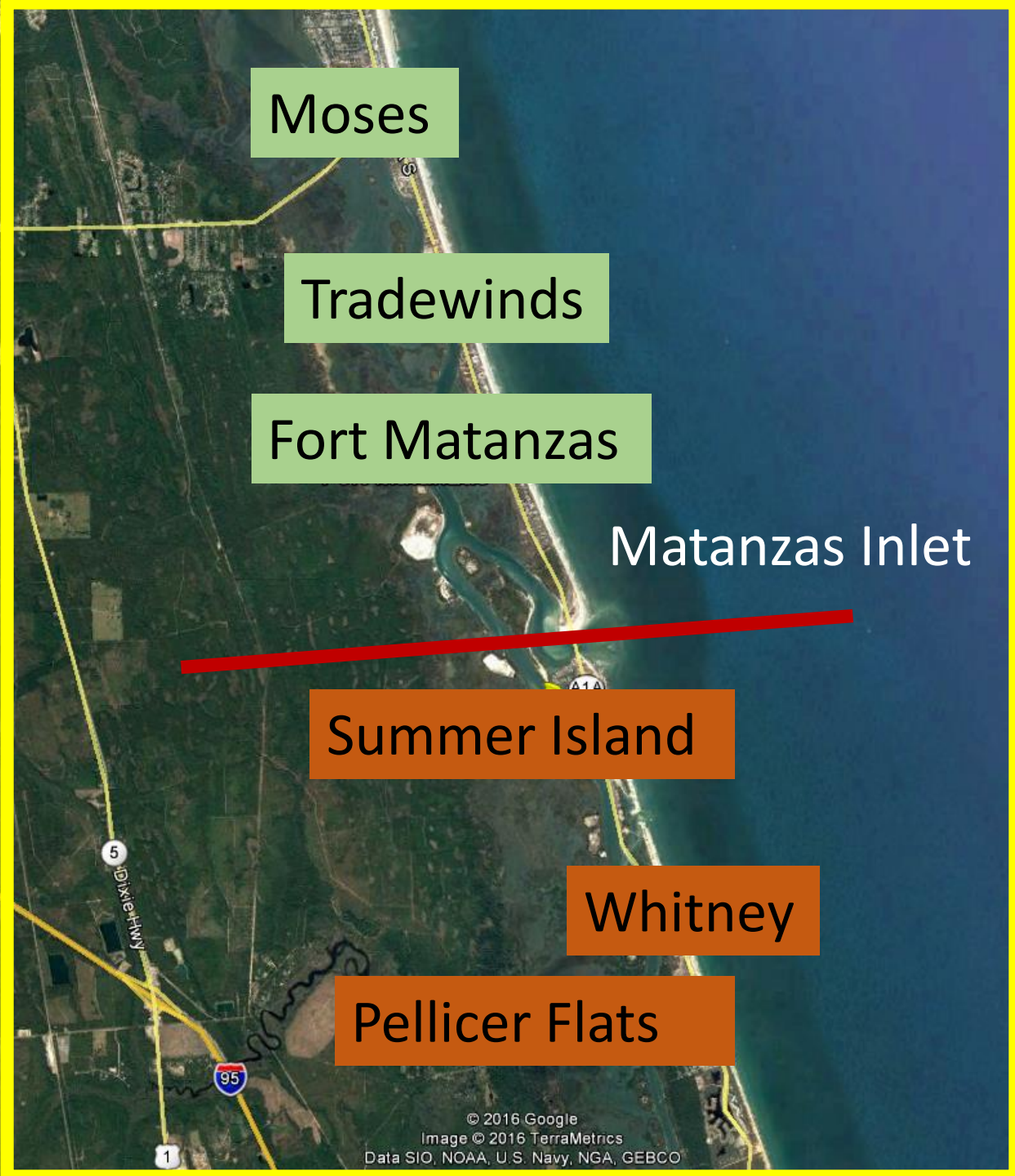
Dixie Hwy

A1A

Matanzas Inlet

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Data SIO, NOAA, U.S. Navy, NGA, GEBCO

Imagery Date: 11/18/2016 29°49'38.62" N 81°14'11.12" W



Guana Tolomato Matanzas National Estuarine Research Reserve

St. Augustine
Inlet

Matanzas Inlet

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Data SIO, NOAA, U.S. Navy, NGA, GEBCO

Imagery Date: 11/18/2016 29°49'38.62" N 81°14'1

Moses

Tradewinds

Fort Matanzas

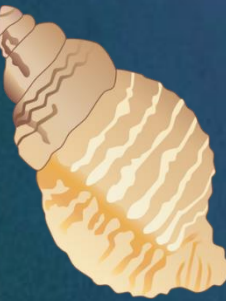


Matanzas Inlet

Summer Island

Whitney

Pellicer Flats



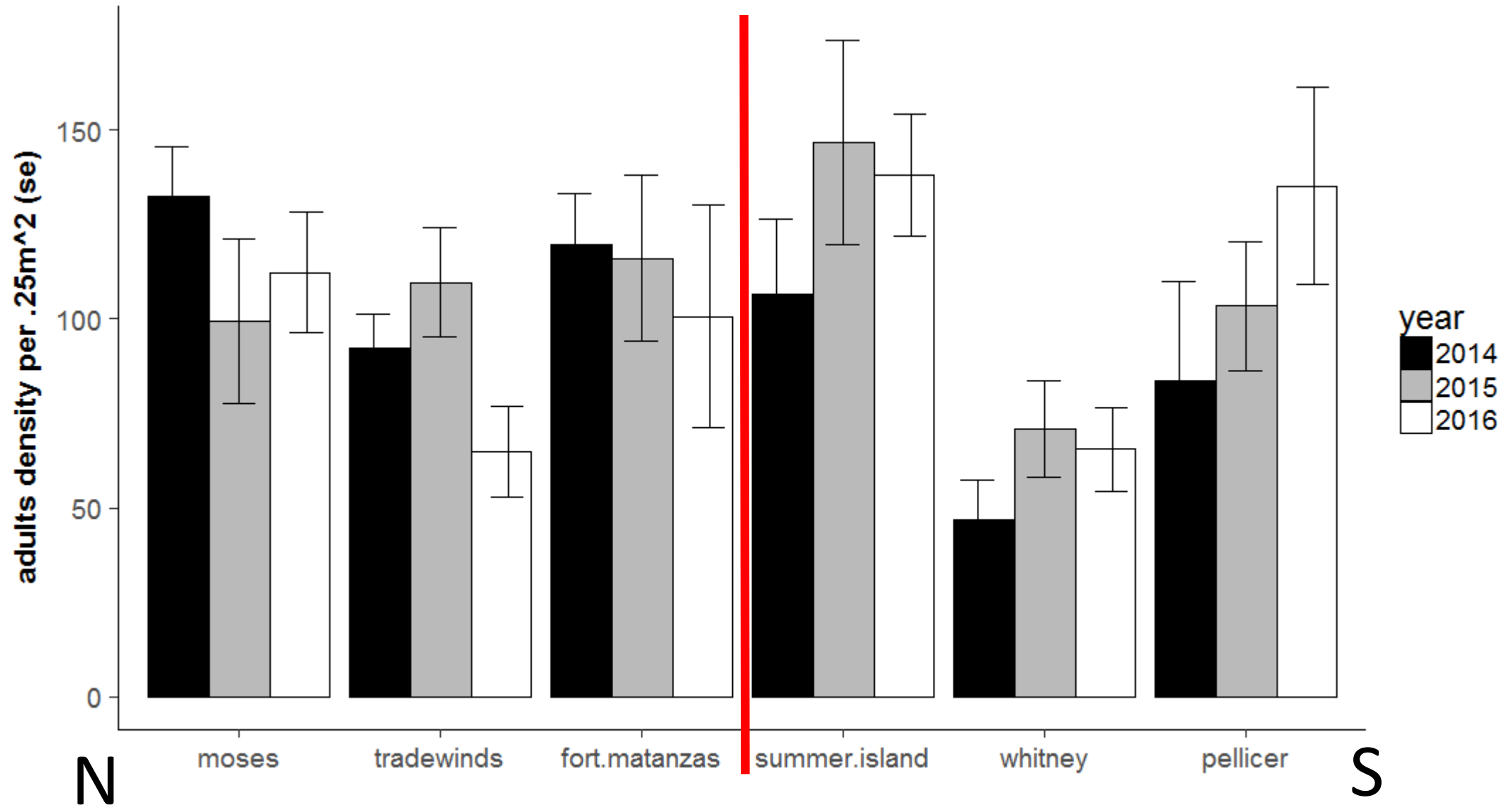
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Image © 2016 TerraMetrics
Data SIO, NOAA, U.S. Navy, NGA, GEBCO

Research Topics

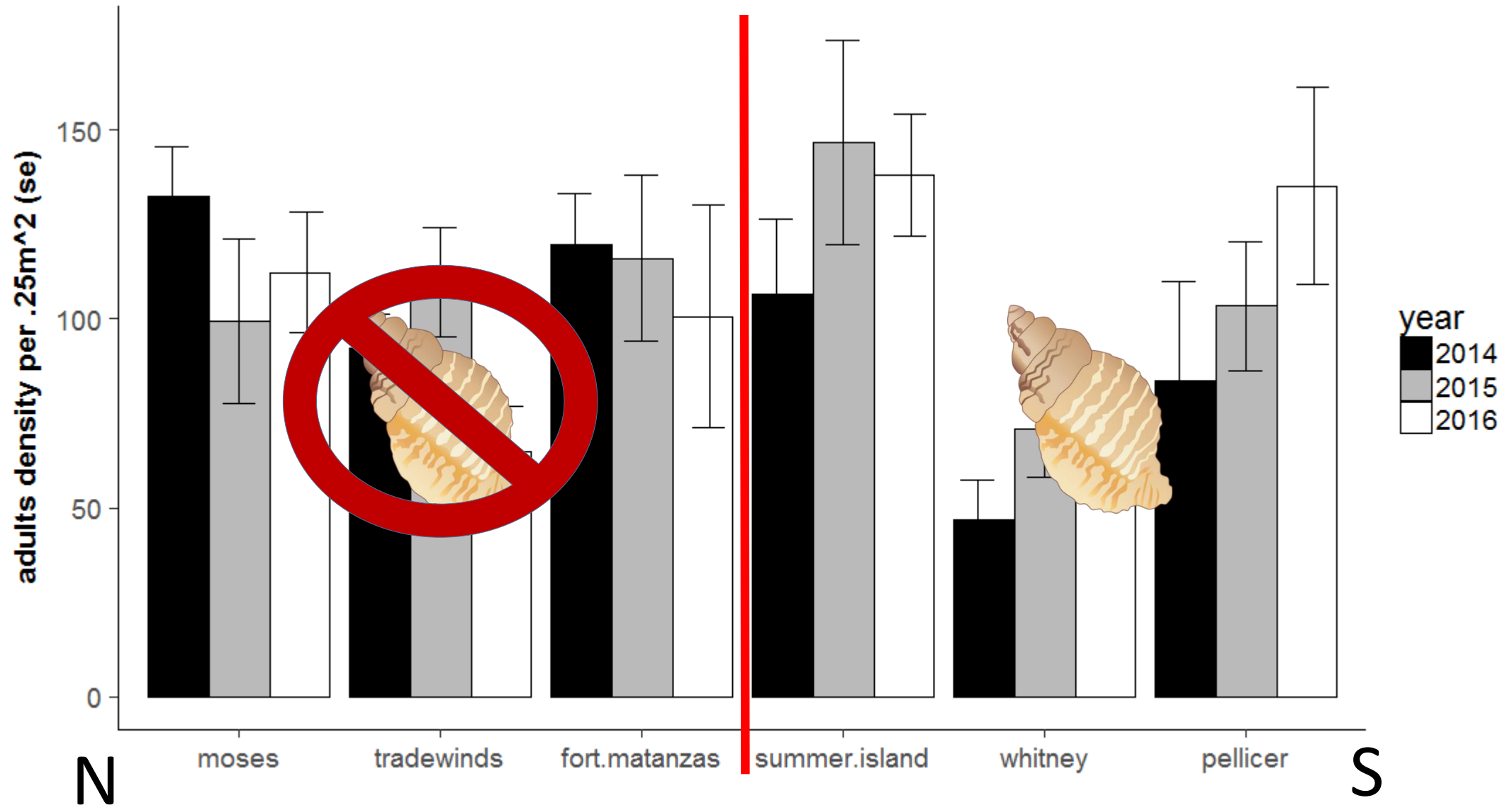
- Adults populations
- Juvenile (Spat) populations
- Growth
- Mortality
- Predator populations
- Predator-Prey Interactions



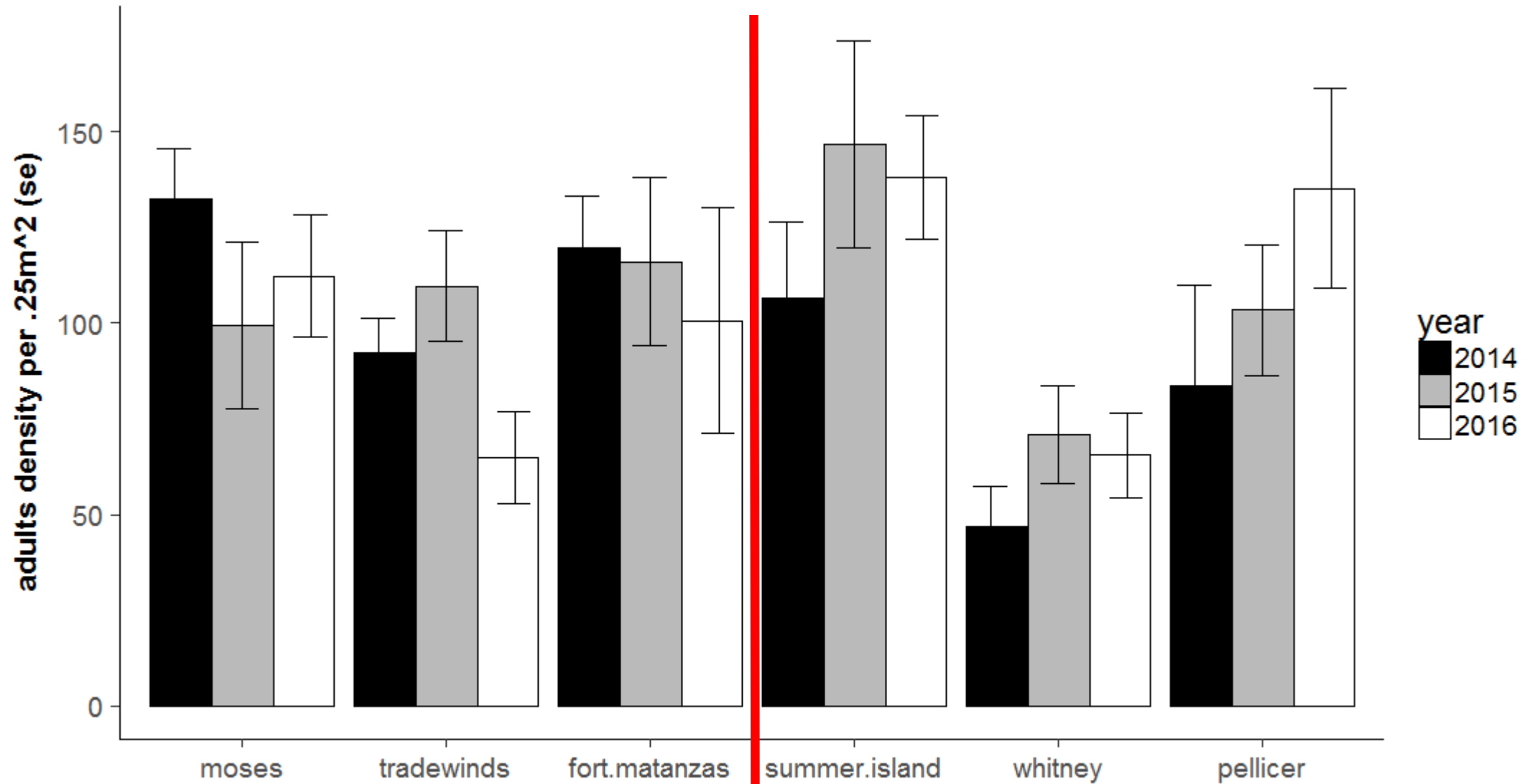
Results: Adult density



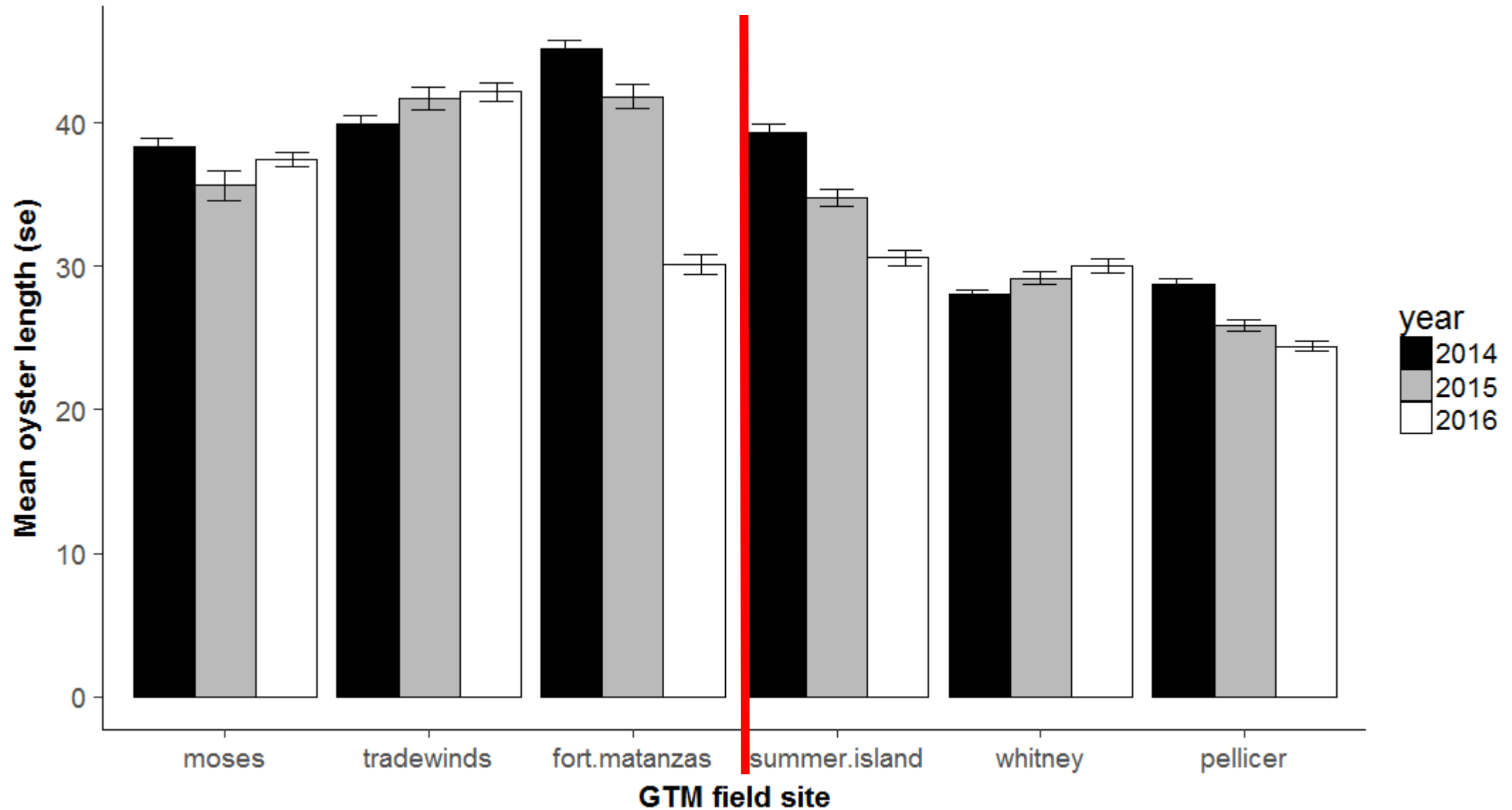
Results: Adult density



Results: Adult density



Results: Oyster Size

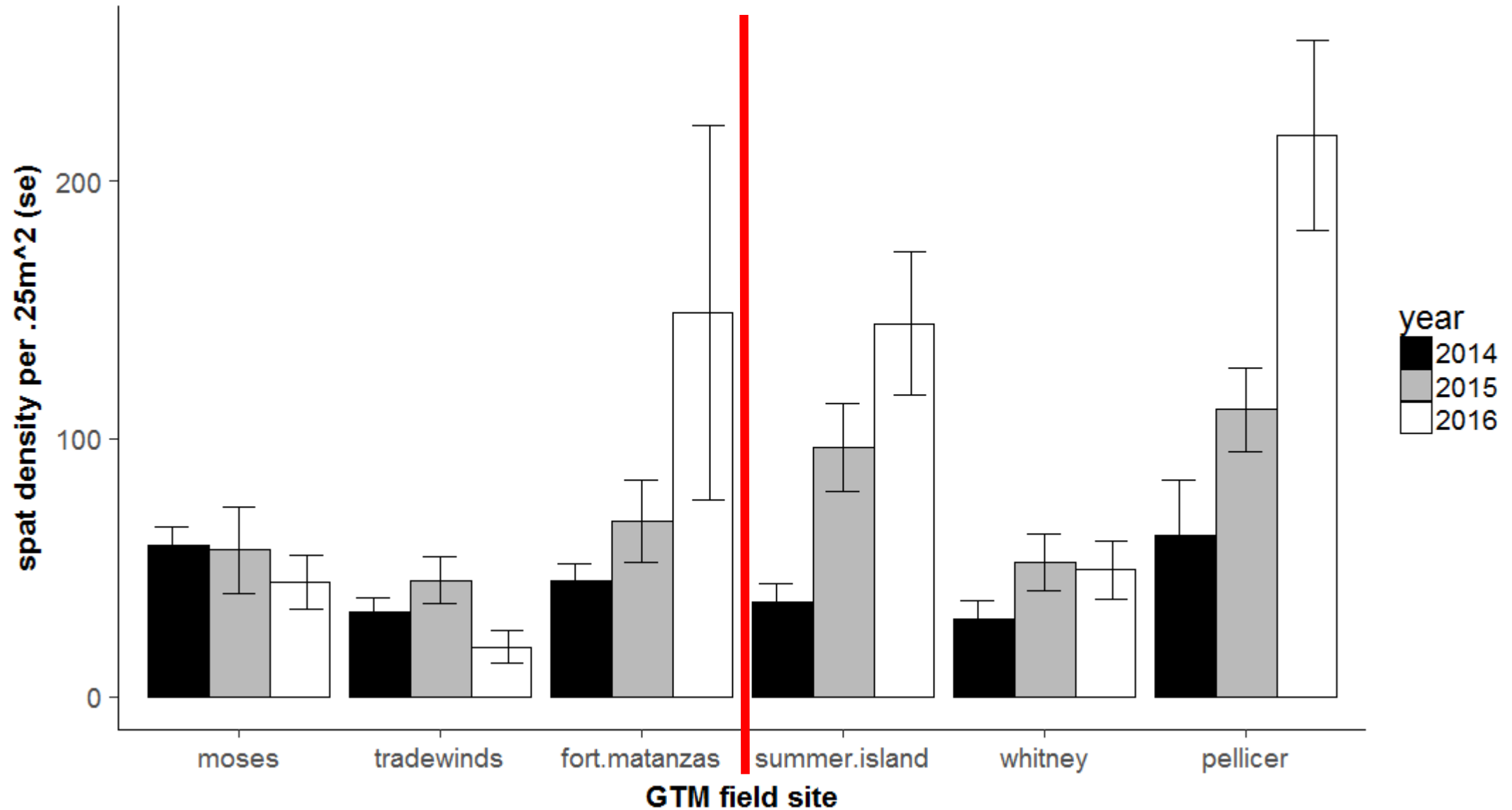


Research Topics

- Adults populations
 - Southern sites have smaller adults and lower densities
- Juvenile (Spat) populations
- Growth
- Mortality
- Predator populations
- Predator-Prey Interactions



Results: Spat density

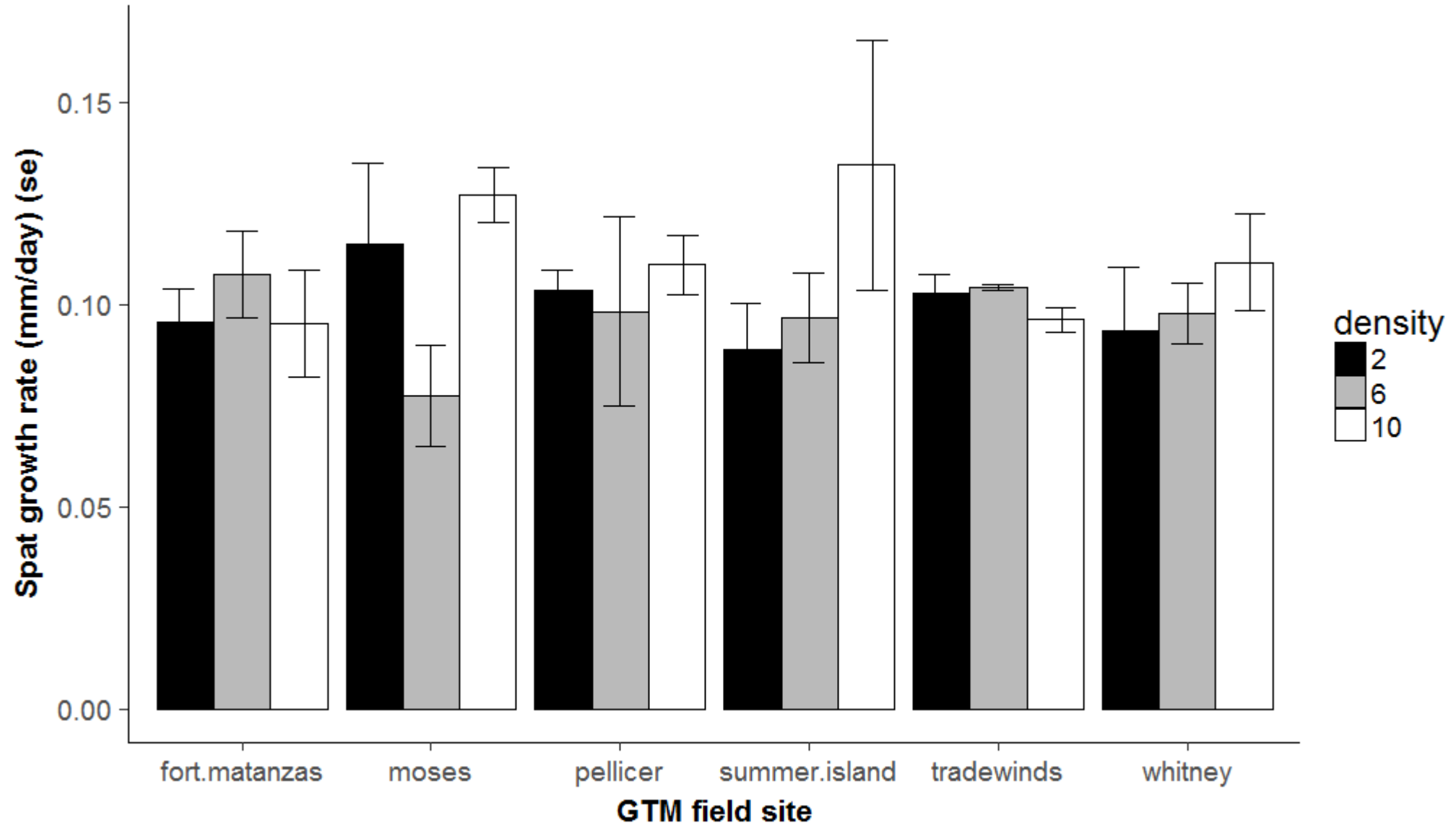


Research Topics

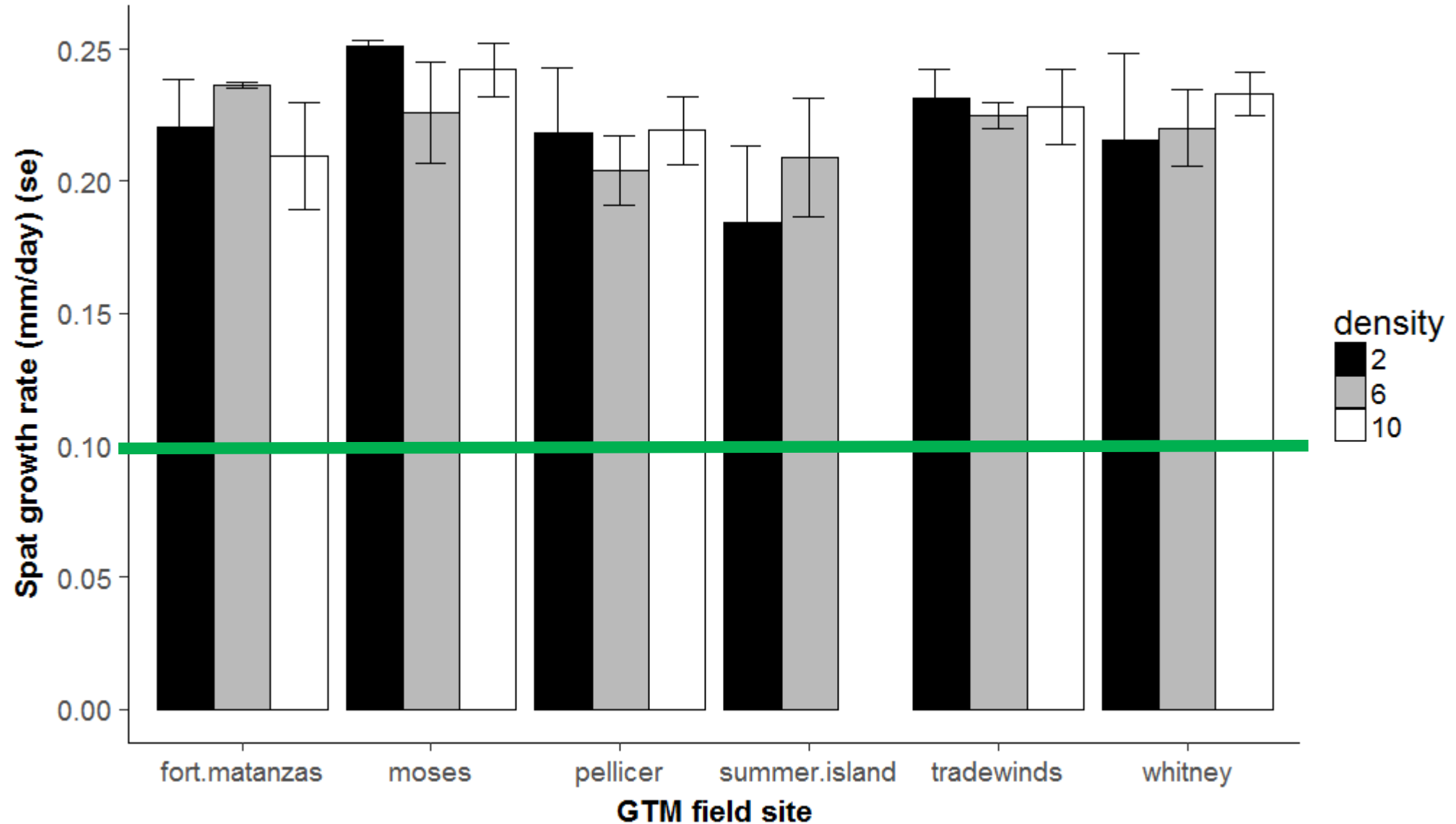
- Adults populations
 - Southern sites have smaller adults and lower densities
- Juvenile (Spat) populations
 - Higher at more southern sites
- Growth
- Mortality
- Predator populations
- Predator-Prey Interactions



Results: Winter spat growth rate



Results: Summer spat growth rate

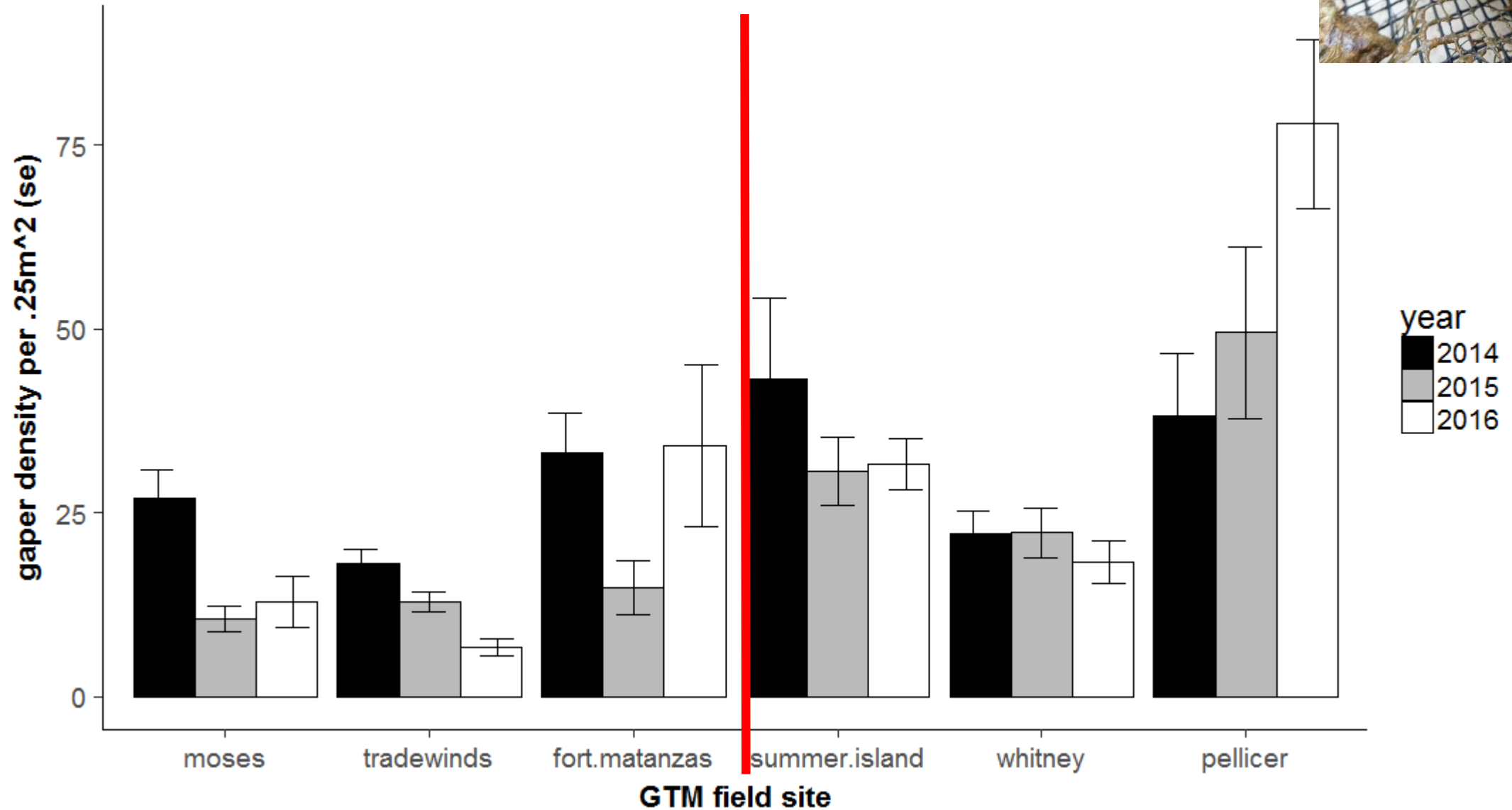


Research Topics

- Adults populations
 - Southern sites have smaller adults and lower densities
- Juvenile (Spat) populations
 - Higher at more southern sites
- Growth
 - Similar among all sites, and higher in the summer
- Mortality
- Predator populations
- Predator-Prey Interactions



Results: Gaper density

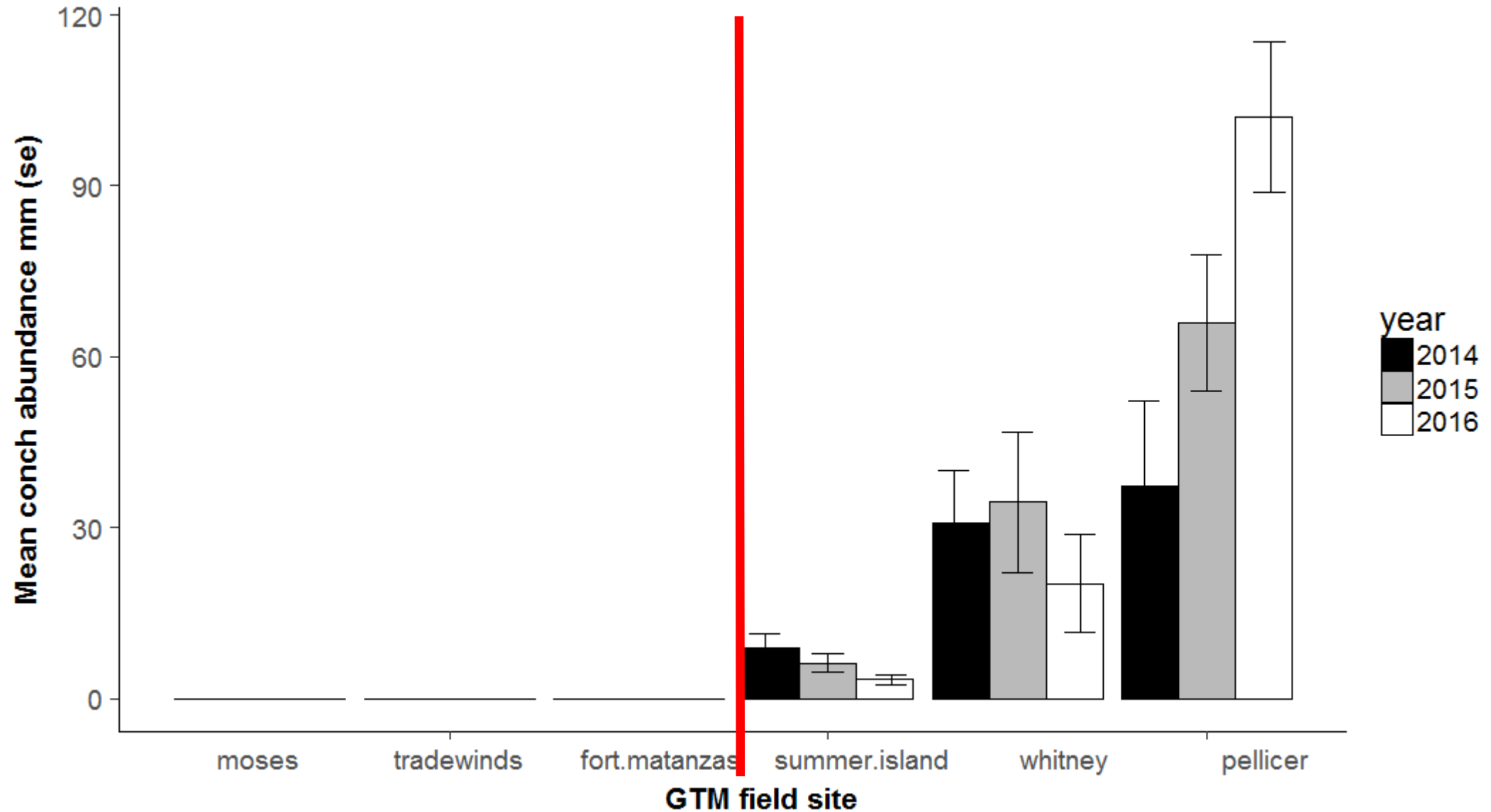


Research Topics

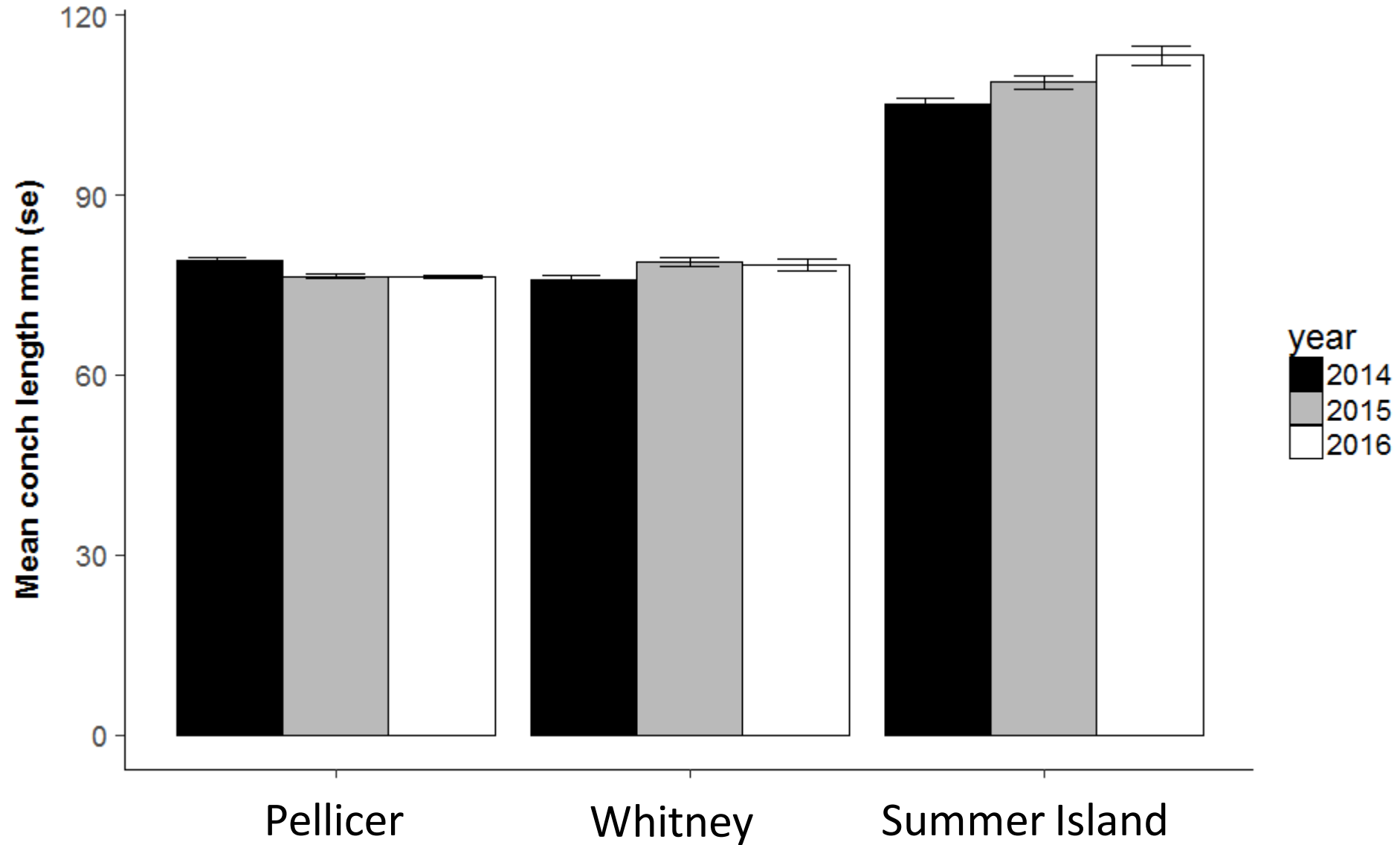
- Adults populations
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- Growth
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- Predator-Prey Interactions



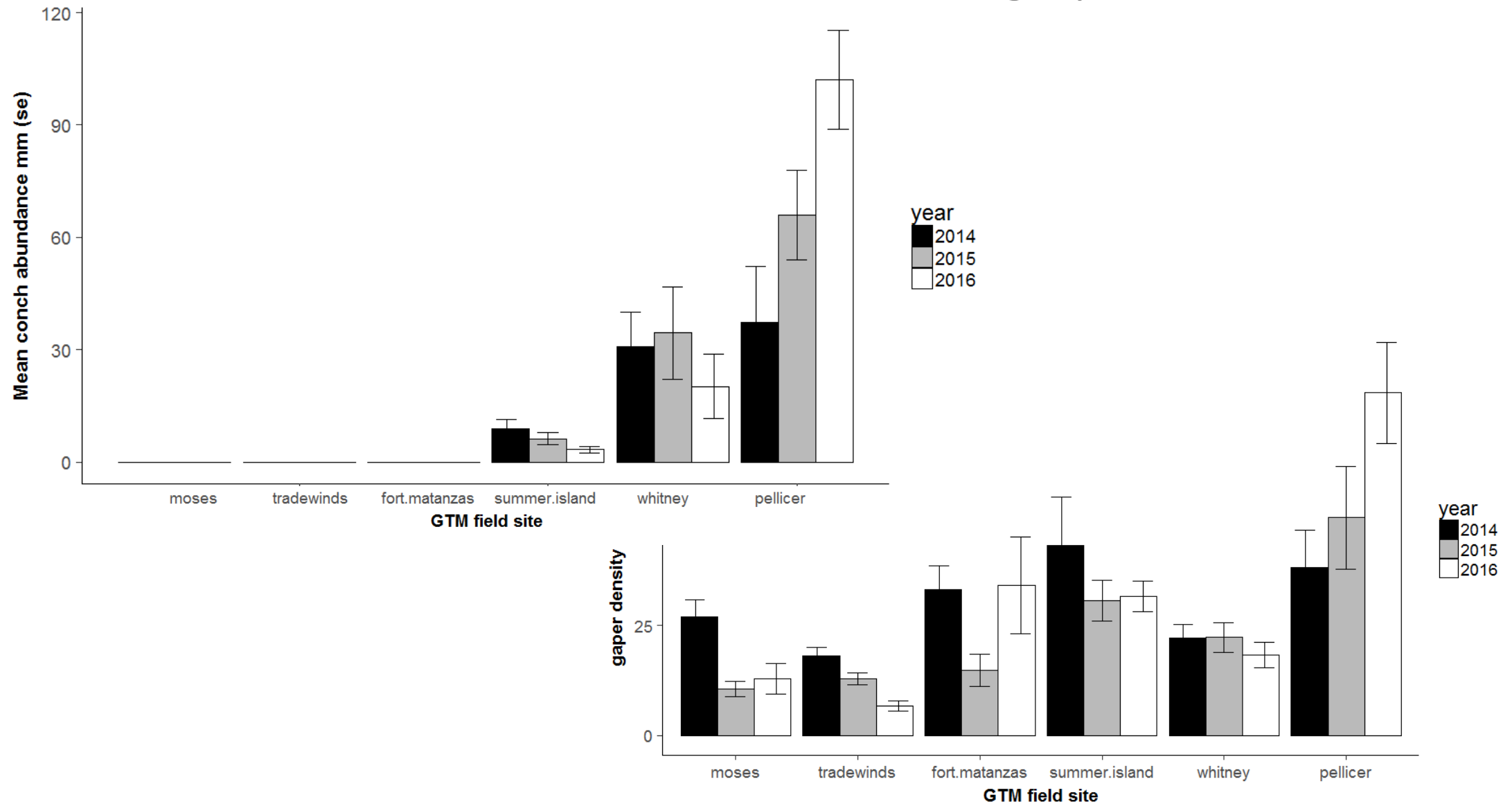
Results: Conch abundance



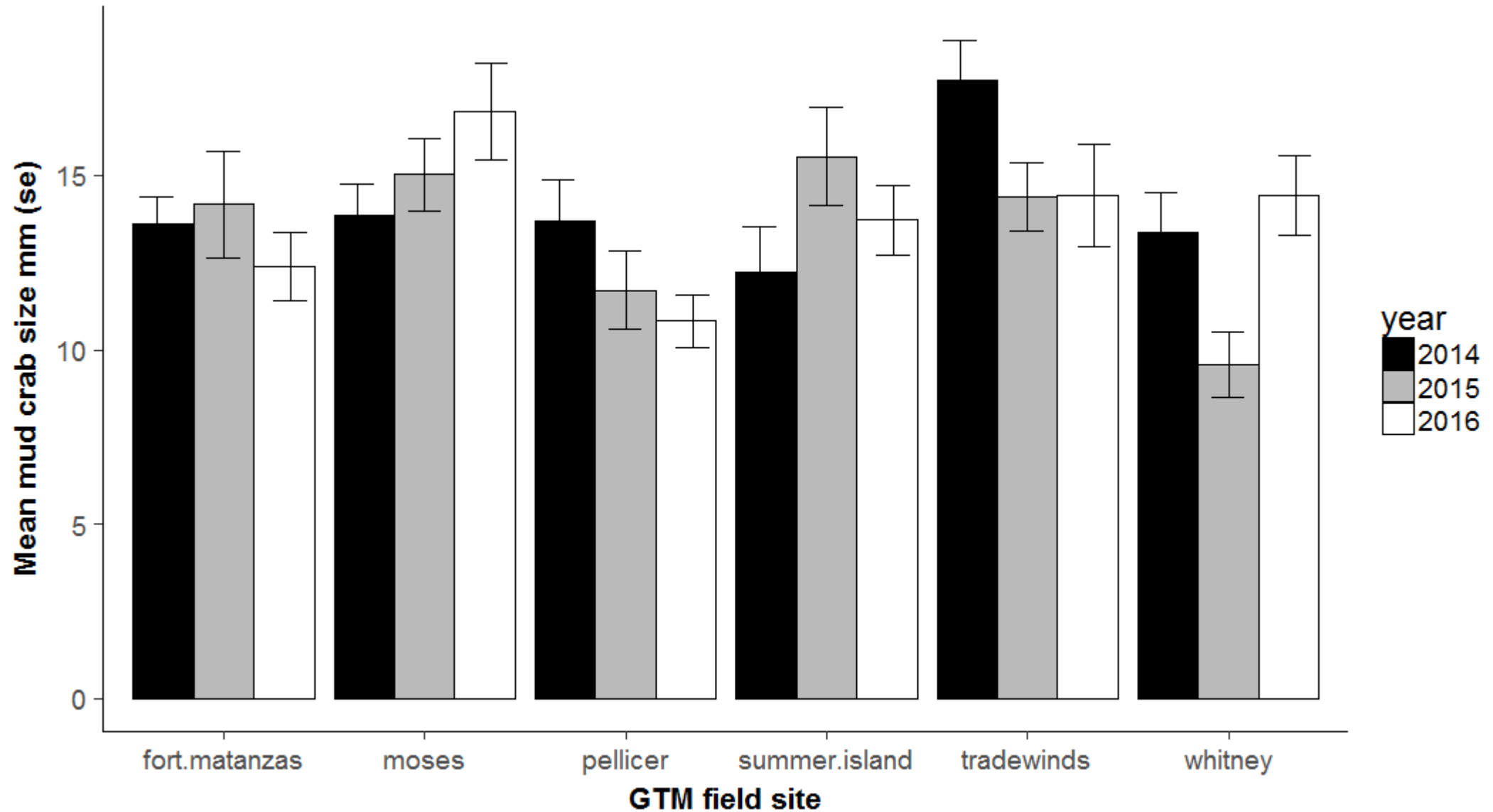
Results: Conch Size



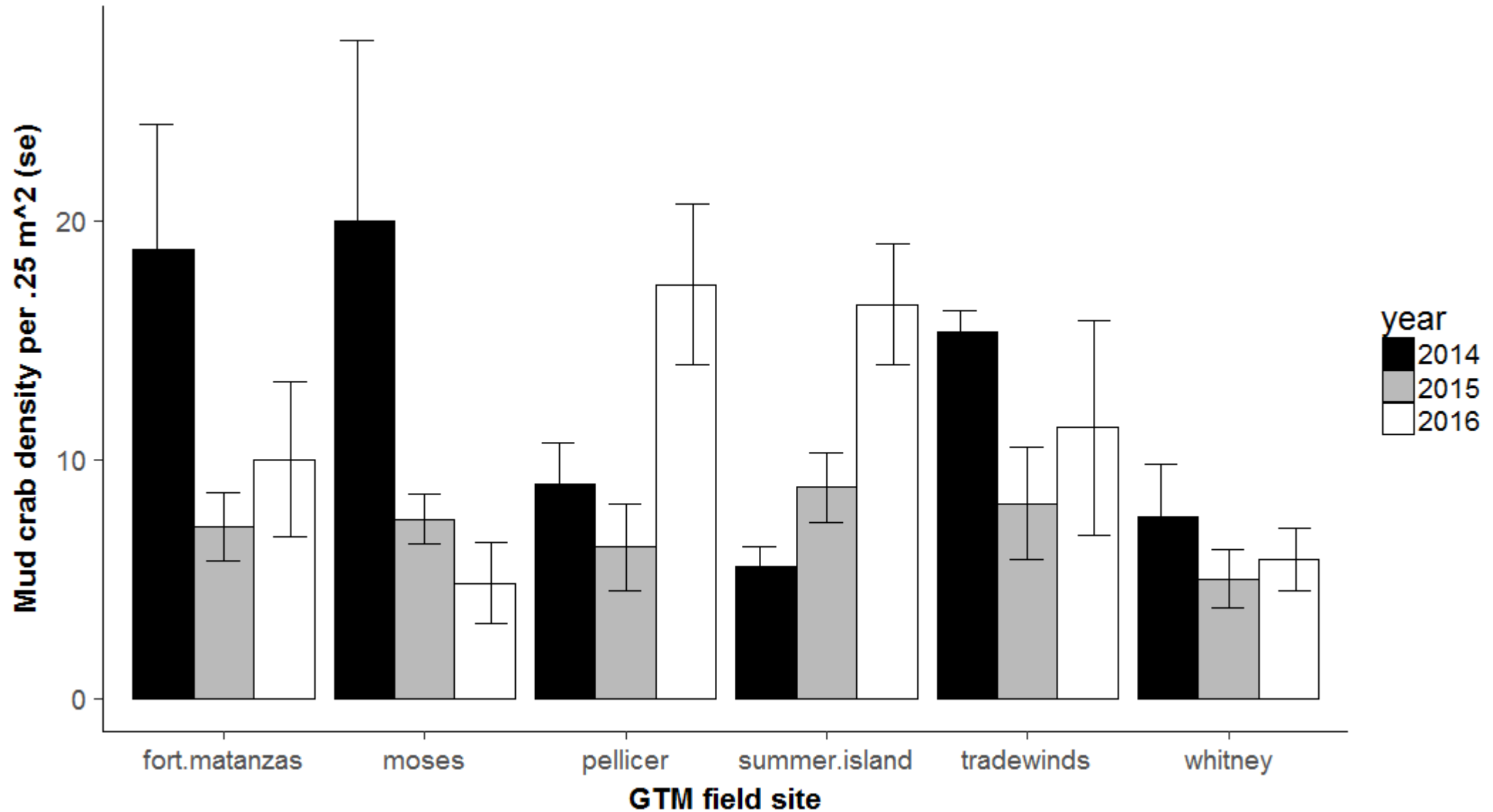
Results: Conch abundance vs. gapers (mortality)



Results: Mud crab size



Results: Mud crab density



Research Topics

- Adults populations
 - Southern sites have smaller adults and lower densities
- Juvenile (Spat) populations
 - Higher at more southern sites
- Growth
 - Similar among all sites, and higher in the summer
- Mortality
 - Higher at southern sites
- Predator populations
 - Mud crabs variation in sites, no N/S pattern
 - Larger conchs closer to Matanzas inlet, southern sites have higher densities (where mortality was higher)
- Predator-Prey Interactions



Predator-Prey Interactions

- Adults

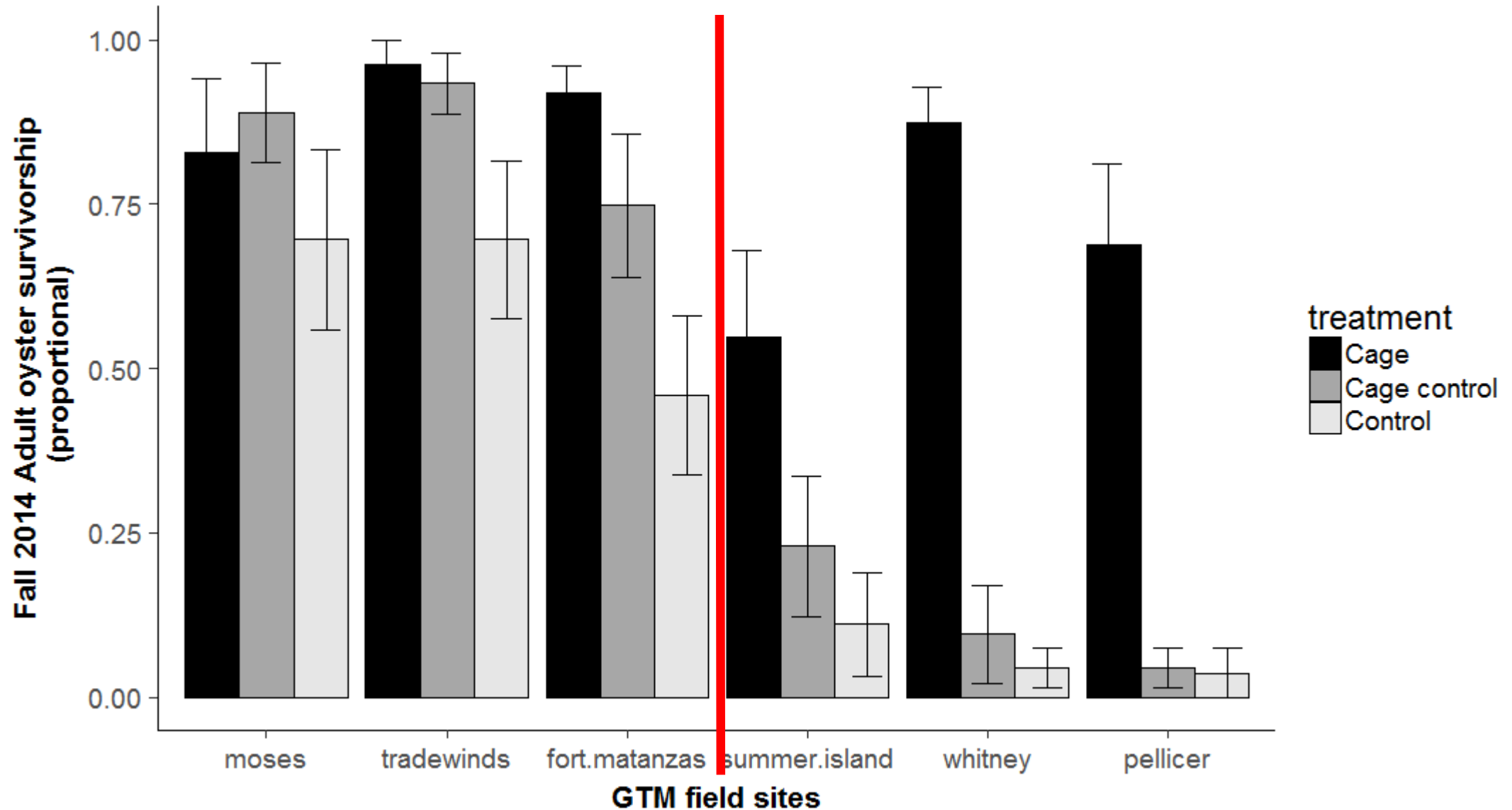
- Fall 2014
- Summer 2015
- Fall 2015
- Spring 2016
- Summer 2016

- Spat

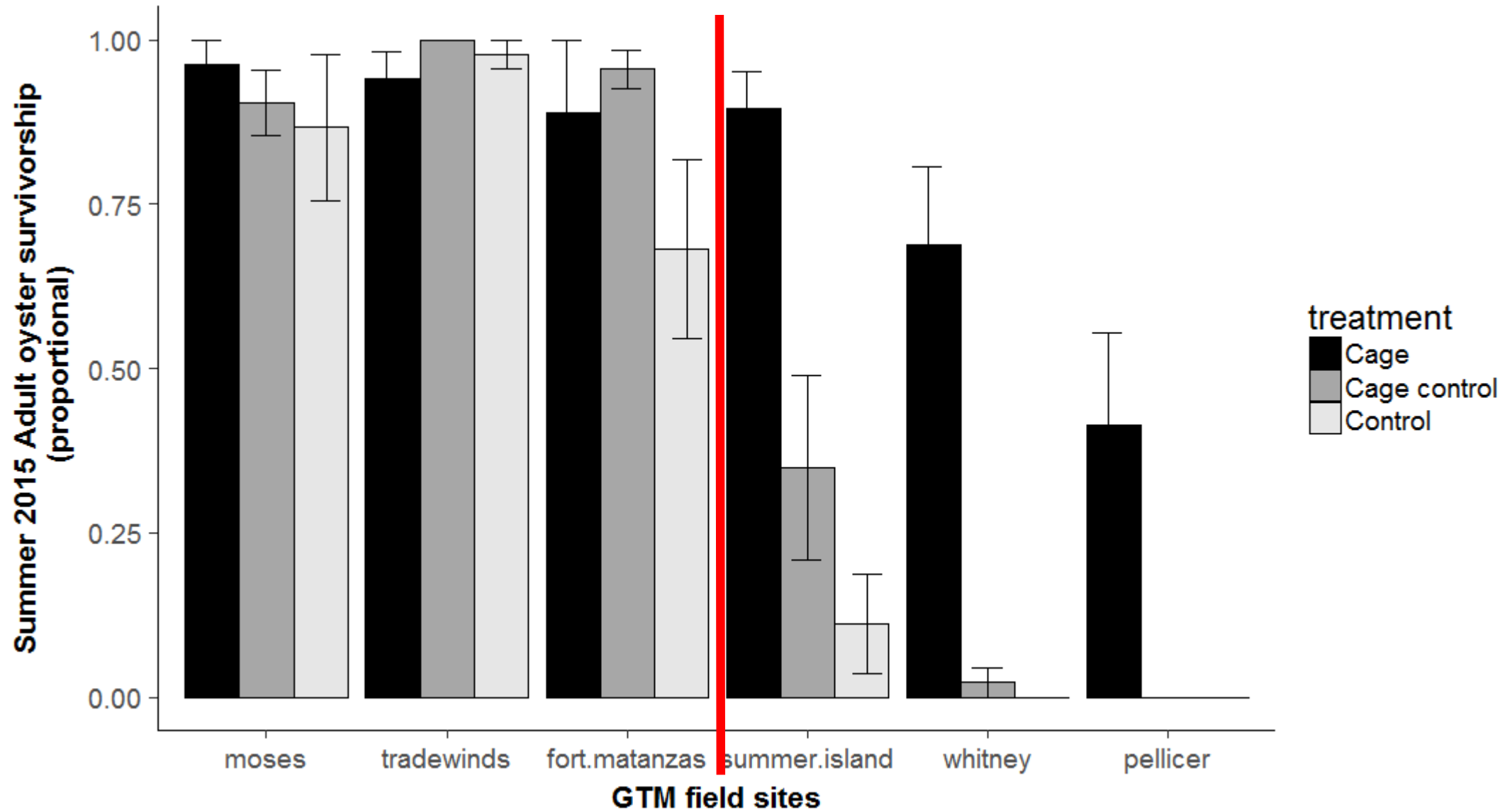
- November 2014
- June 2015



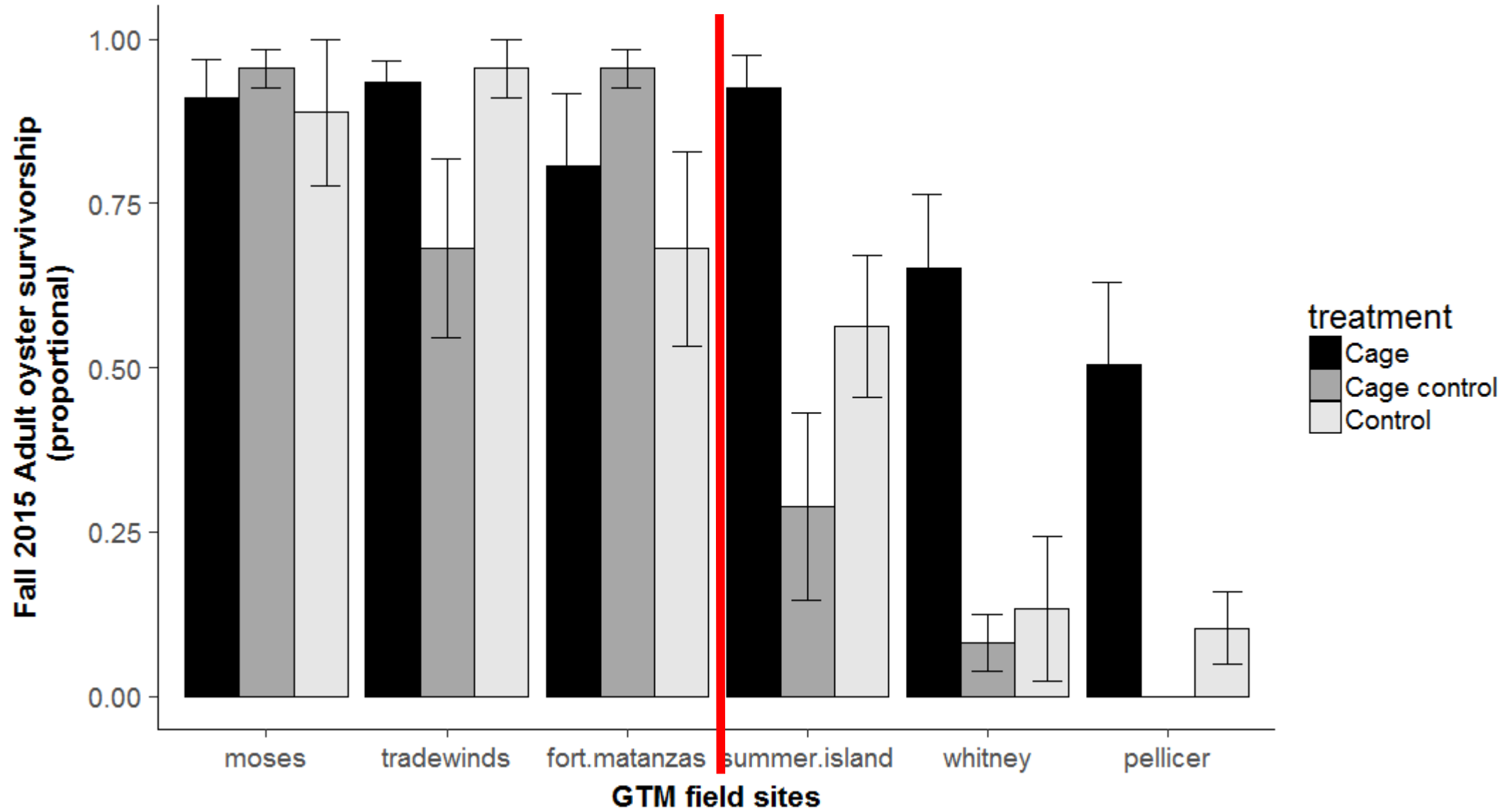
Results: Adult Survival Fall 2014



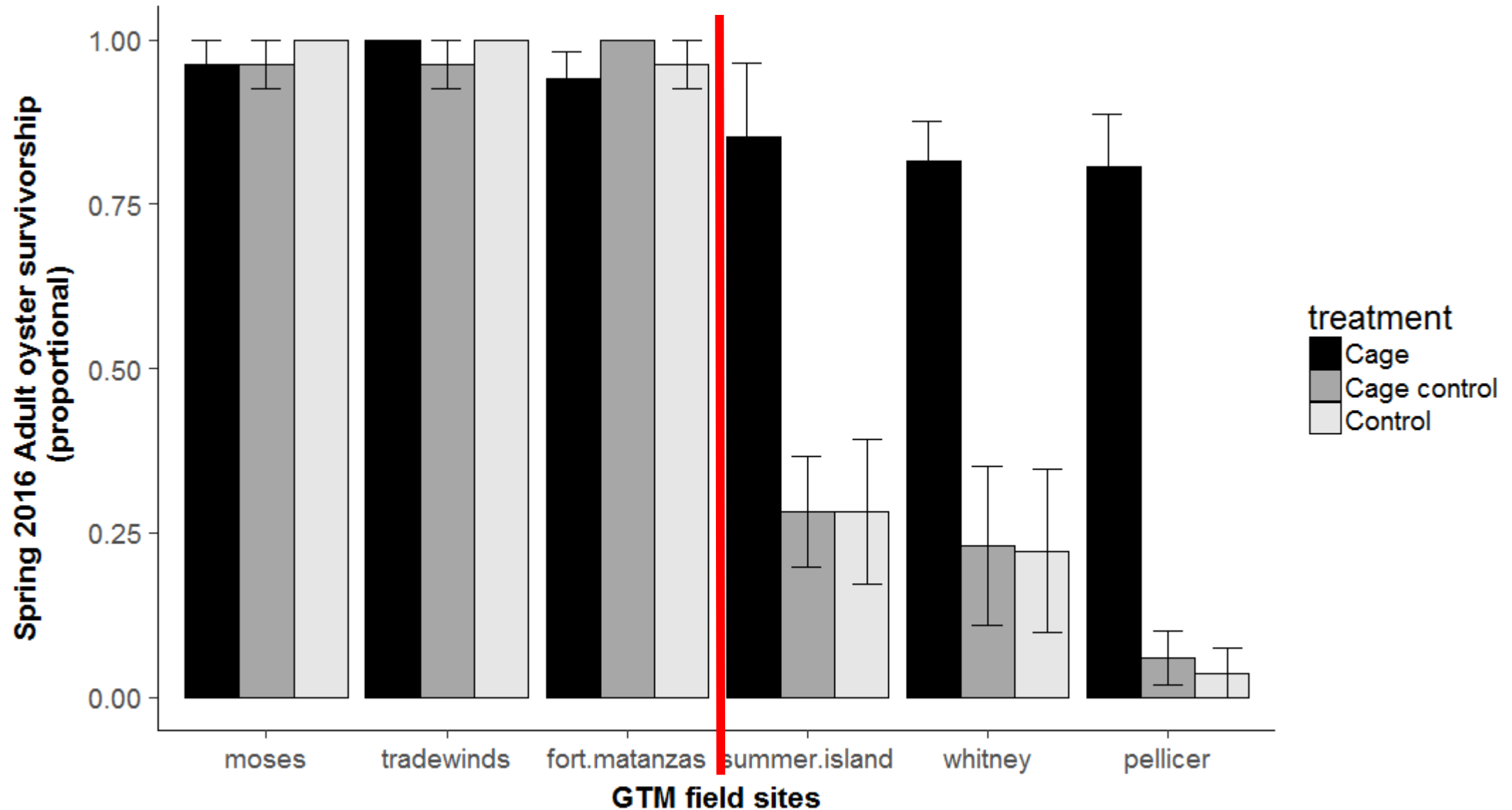
Results: Adult Survival Summer 2015



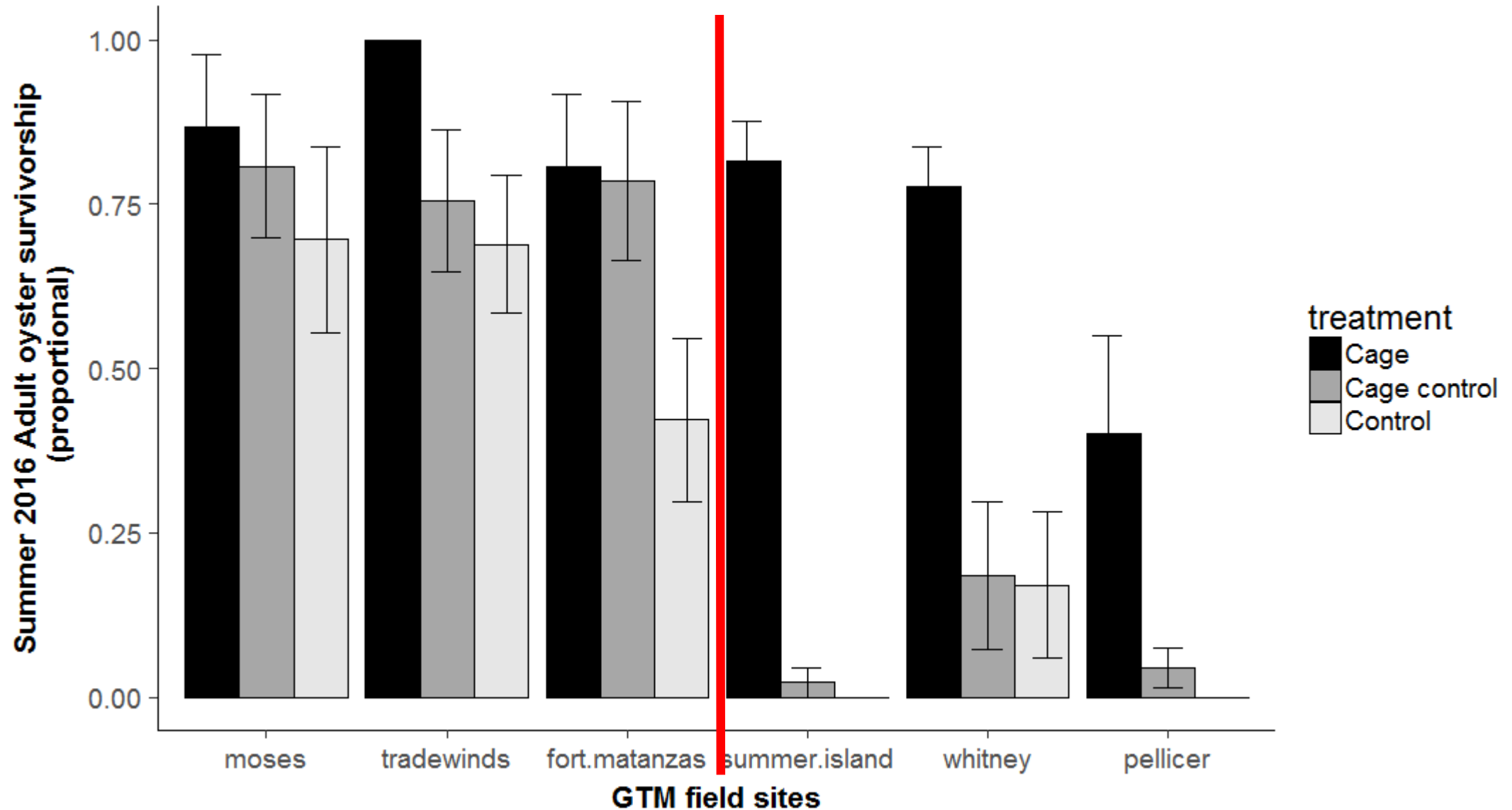
Results: Adult Survival Fall 2015



Results: Adult Survival Spring 2016



Results: Adult Survival Summer 2016



Predator Prey Interactions

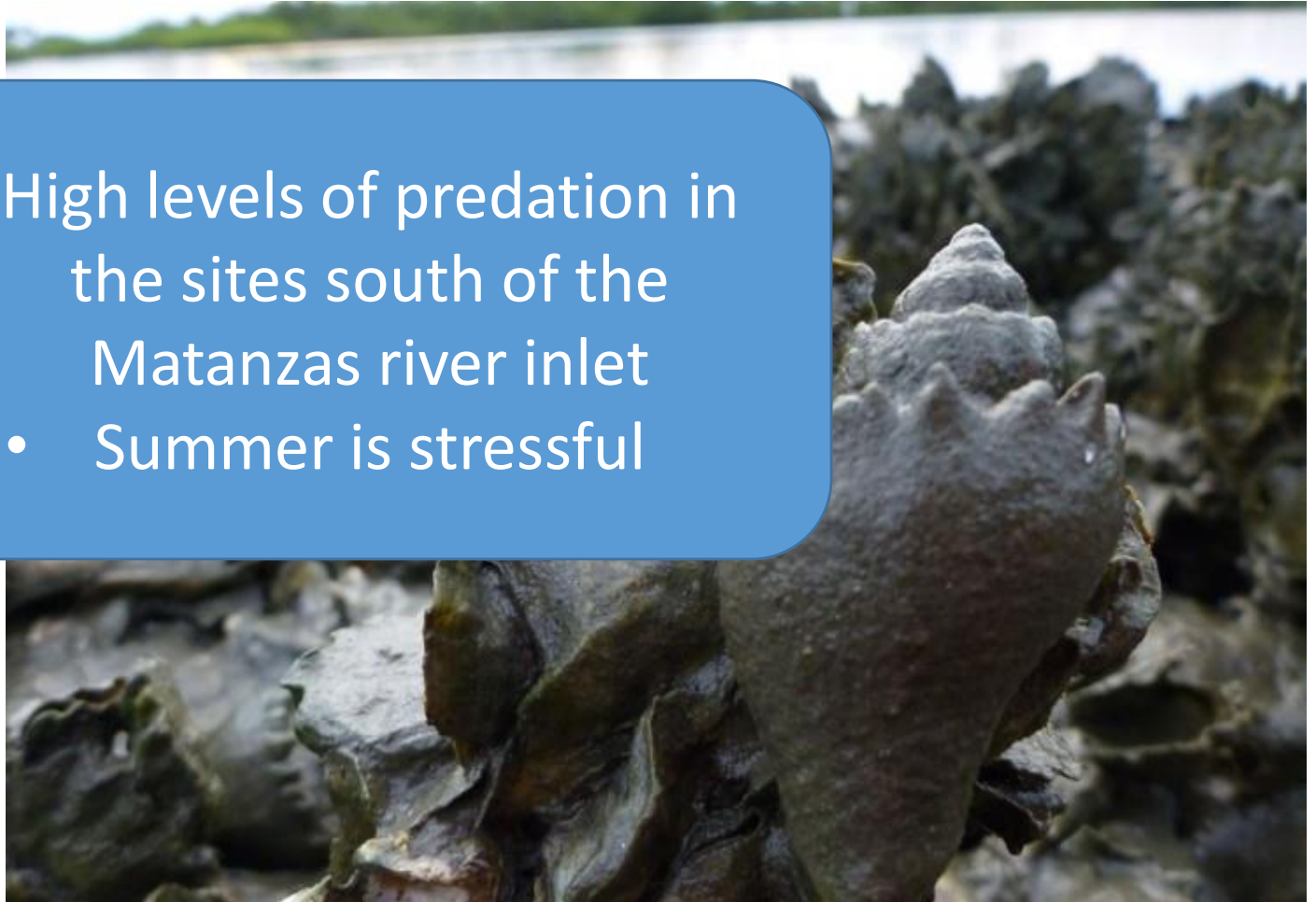
- Adults

- Fall 2014
- Summer 2015
- Fall 2015
- Spring 2016
- Summer 2016

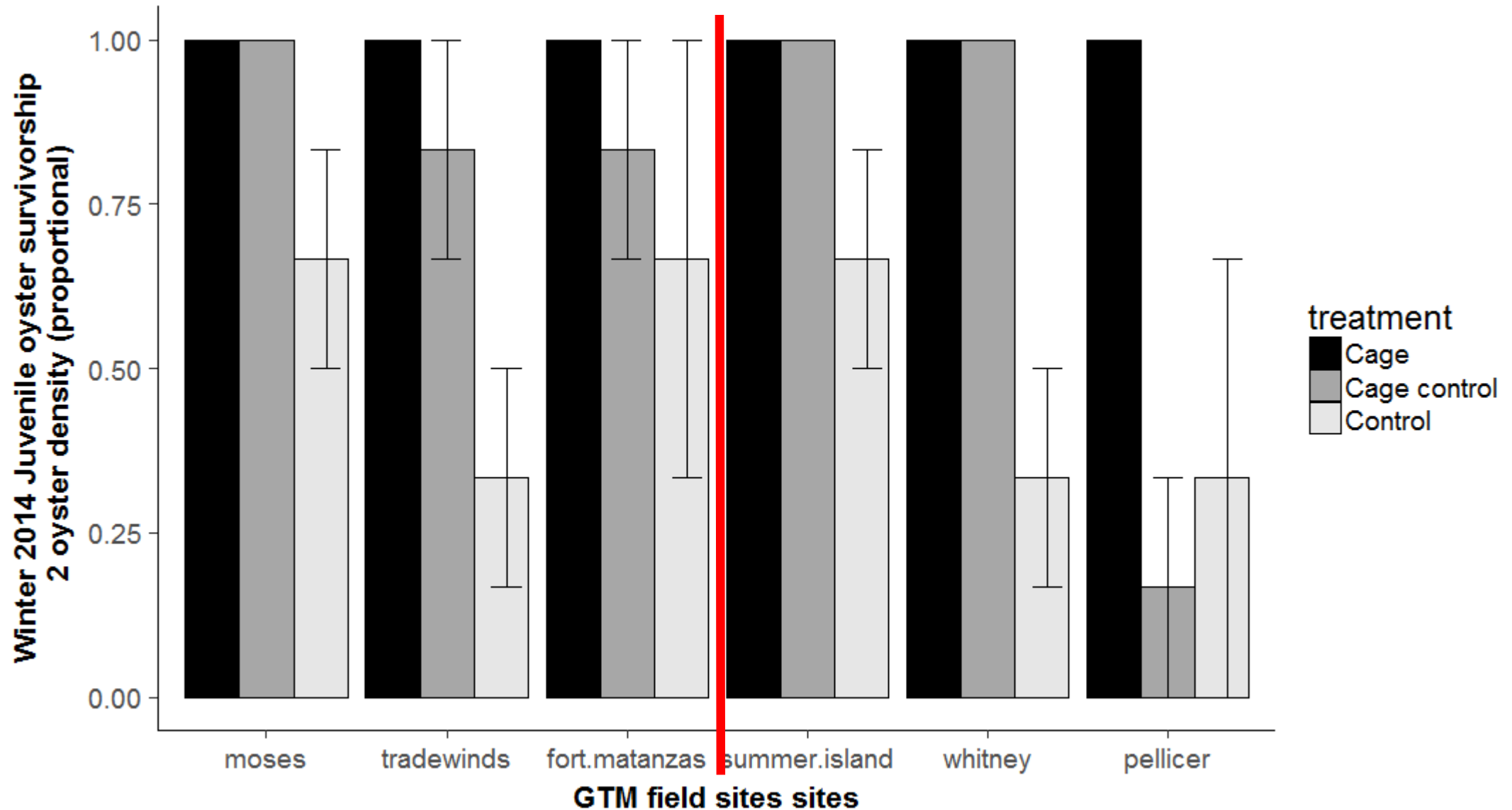
- Spat

- November 2014
- June 2015

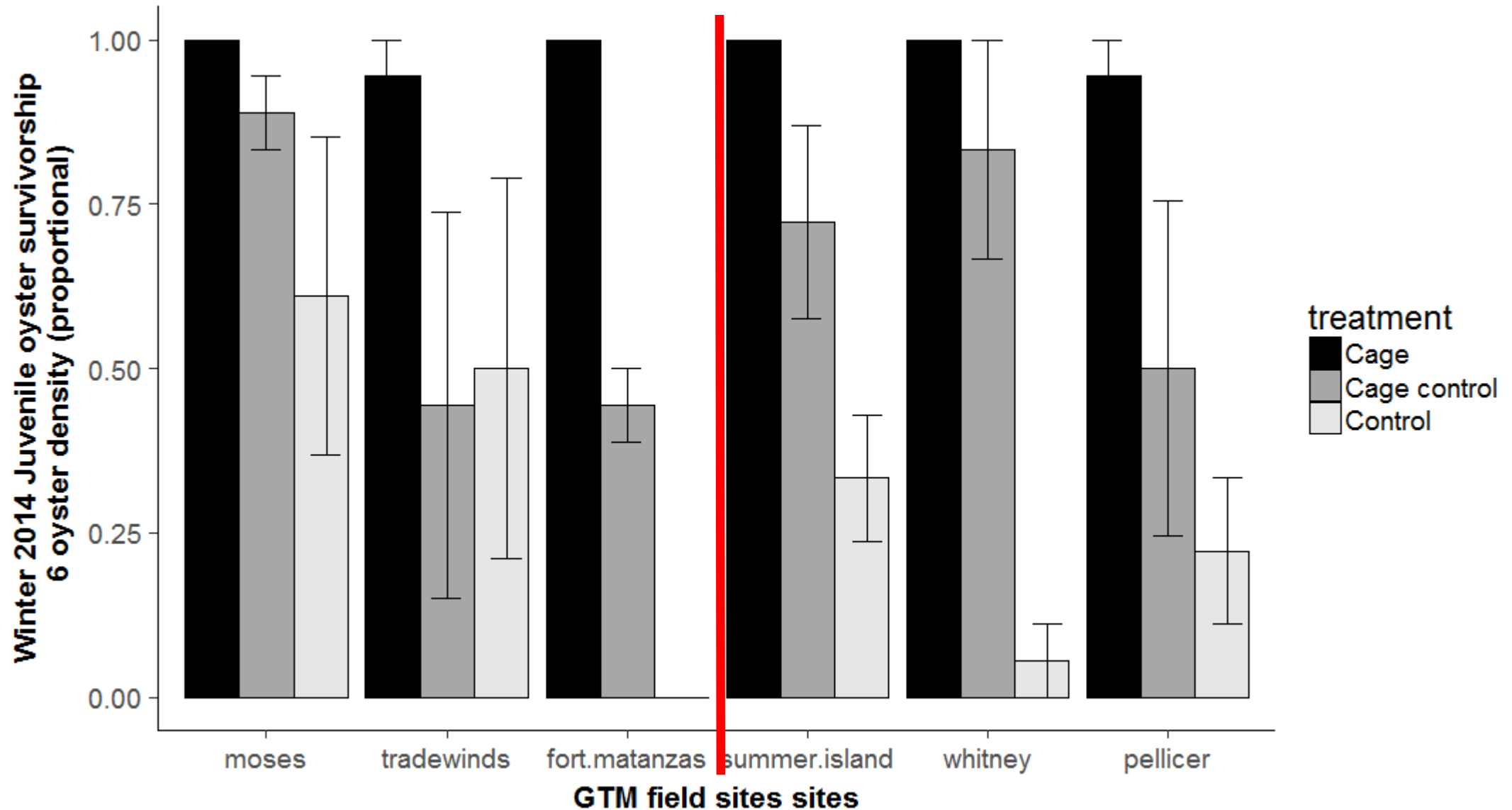
- High levels of predation in the sites south of the Matanzas river inlet
- Summer is stressful



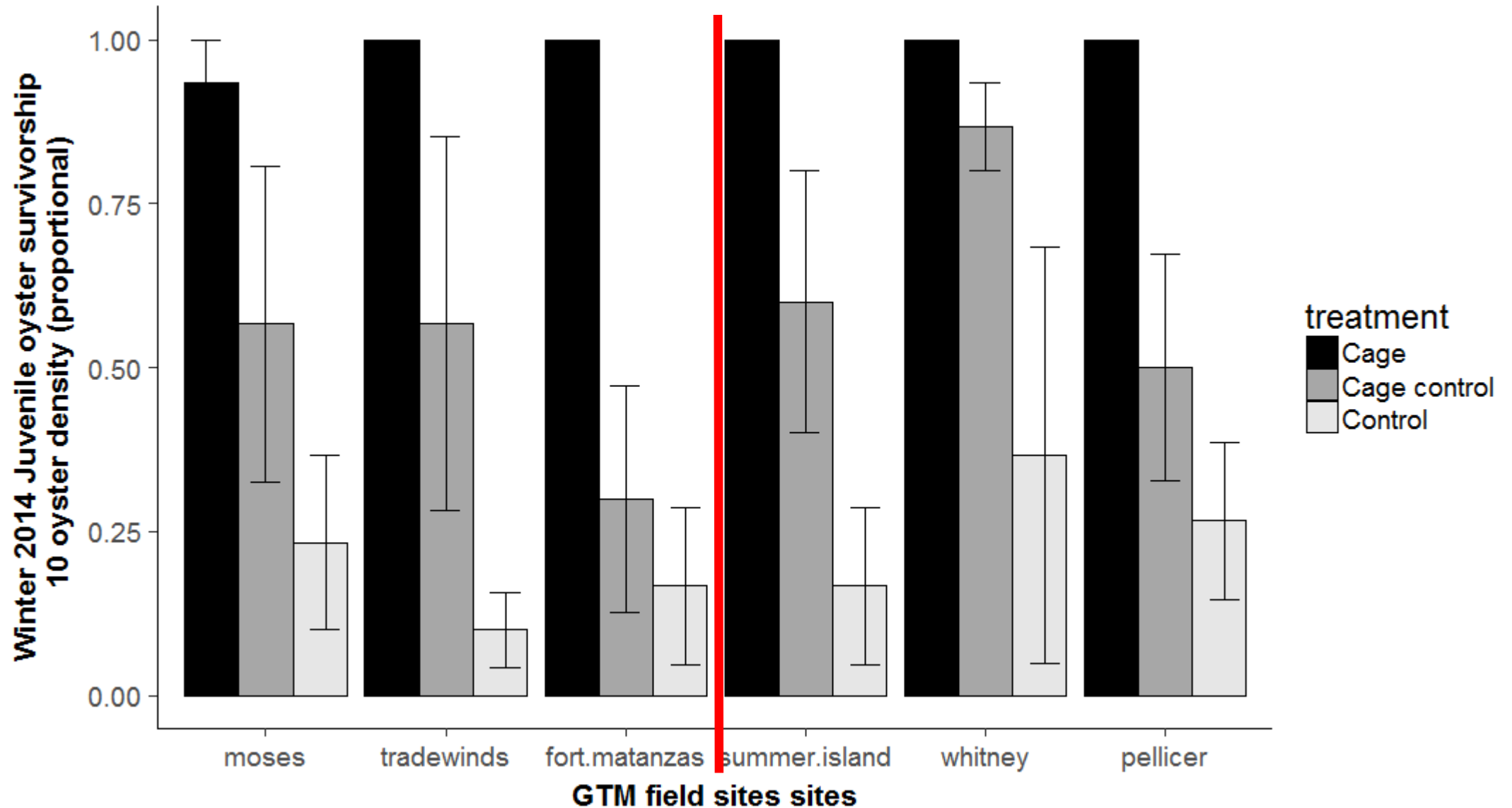
Results: Spat Winter 2014 2 oyster Density



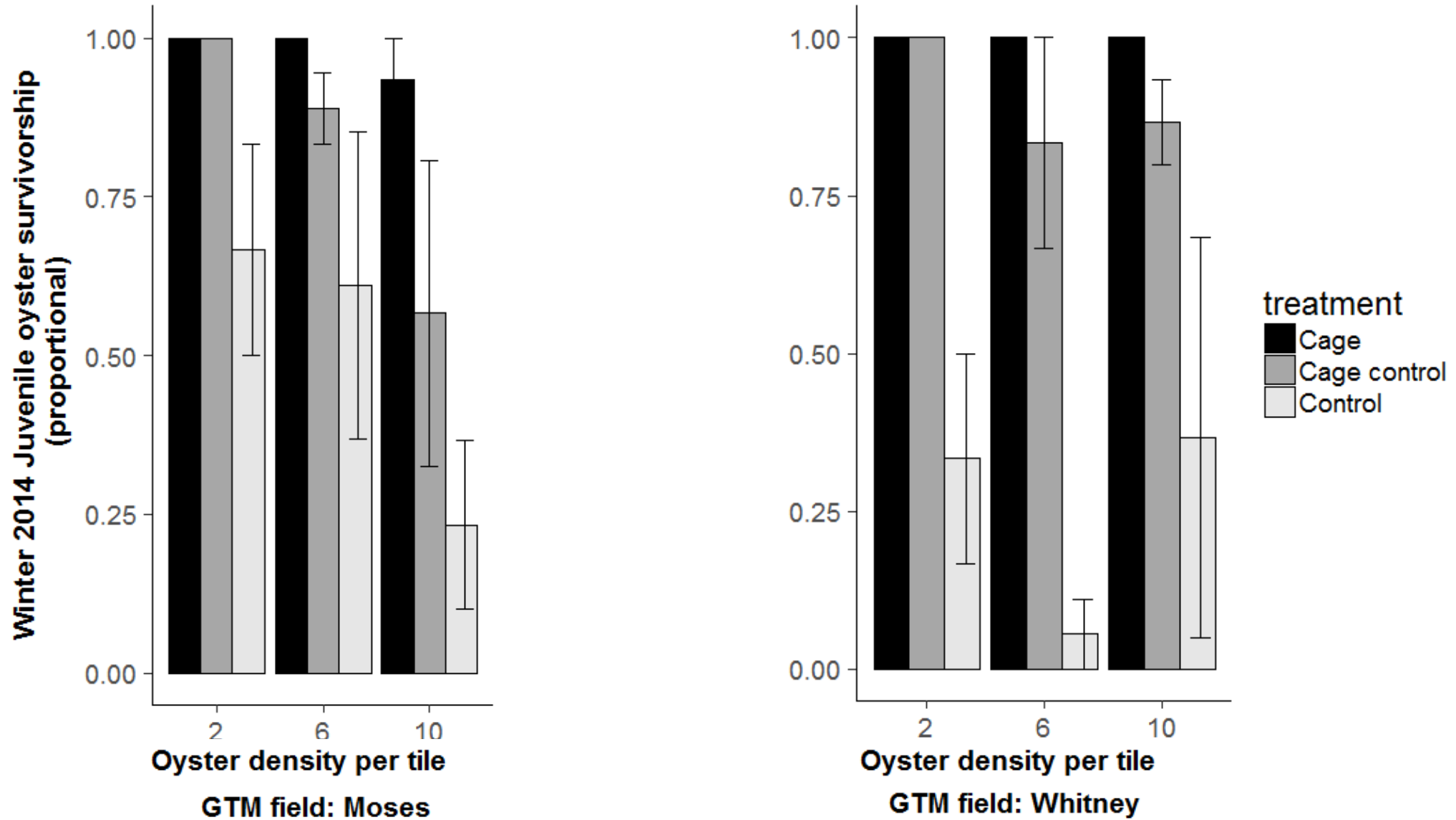
Results: Spat Winter 2014 6 oyster Density



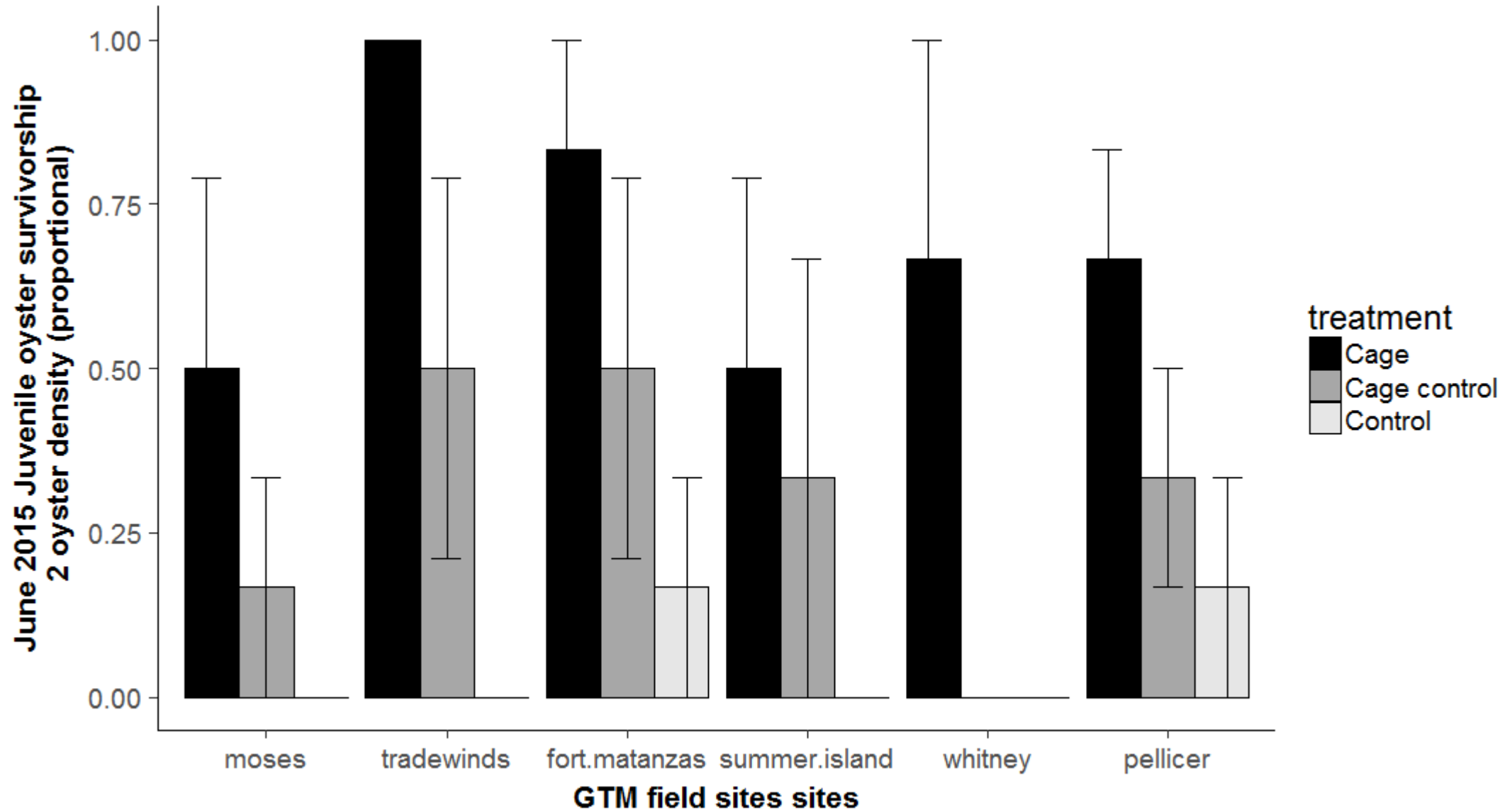
Results: Spat Winter 2014 10 oyster Density



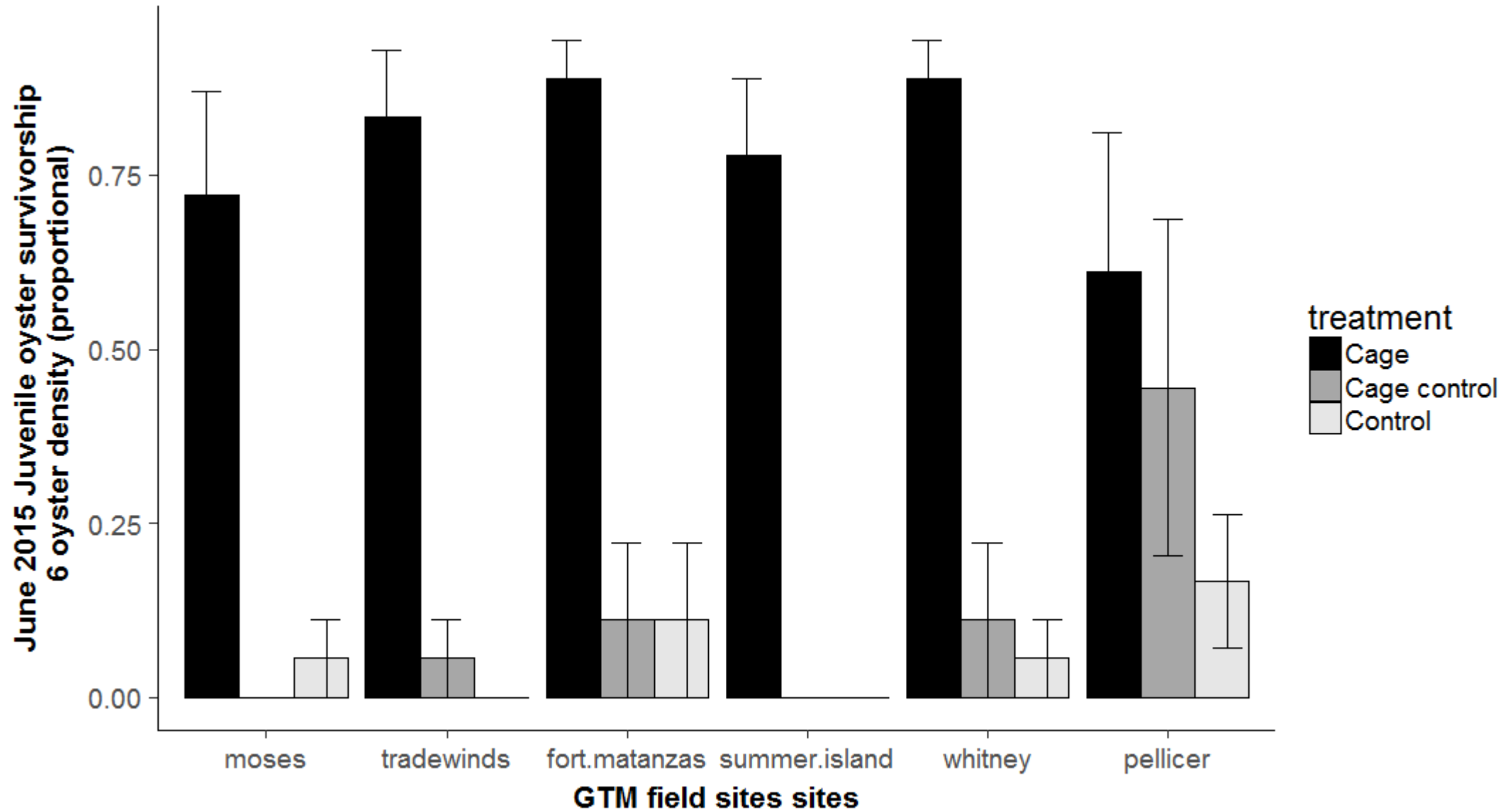
Results: Spat Winter 2014



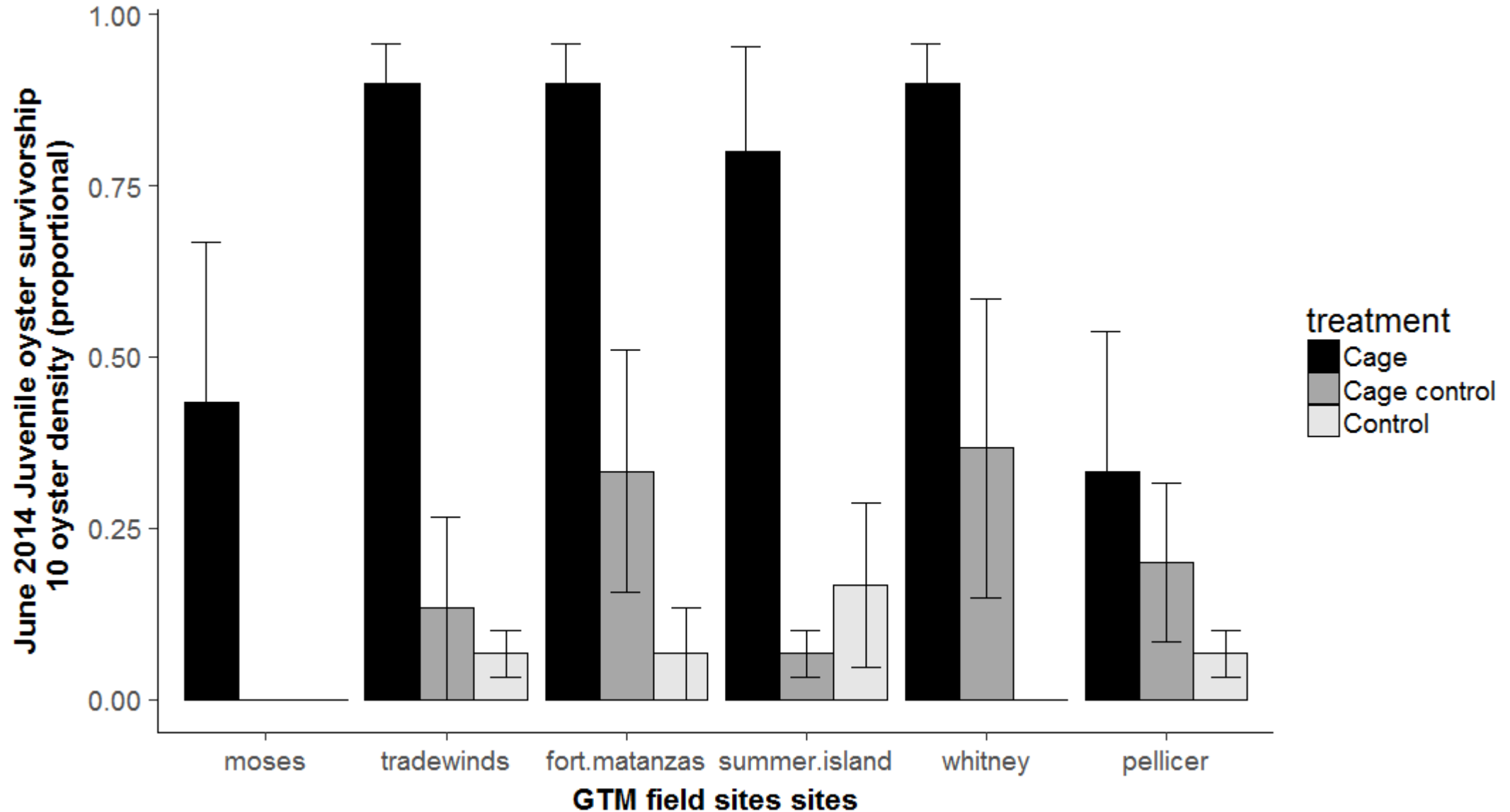
Results: Spat Summer 2015 2 oyster Density



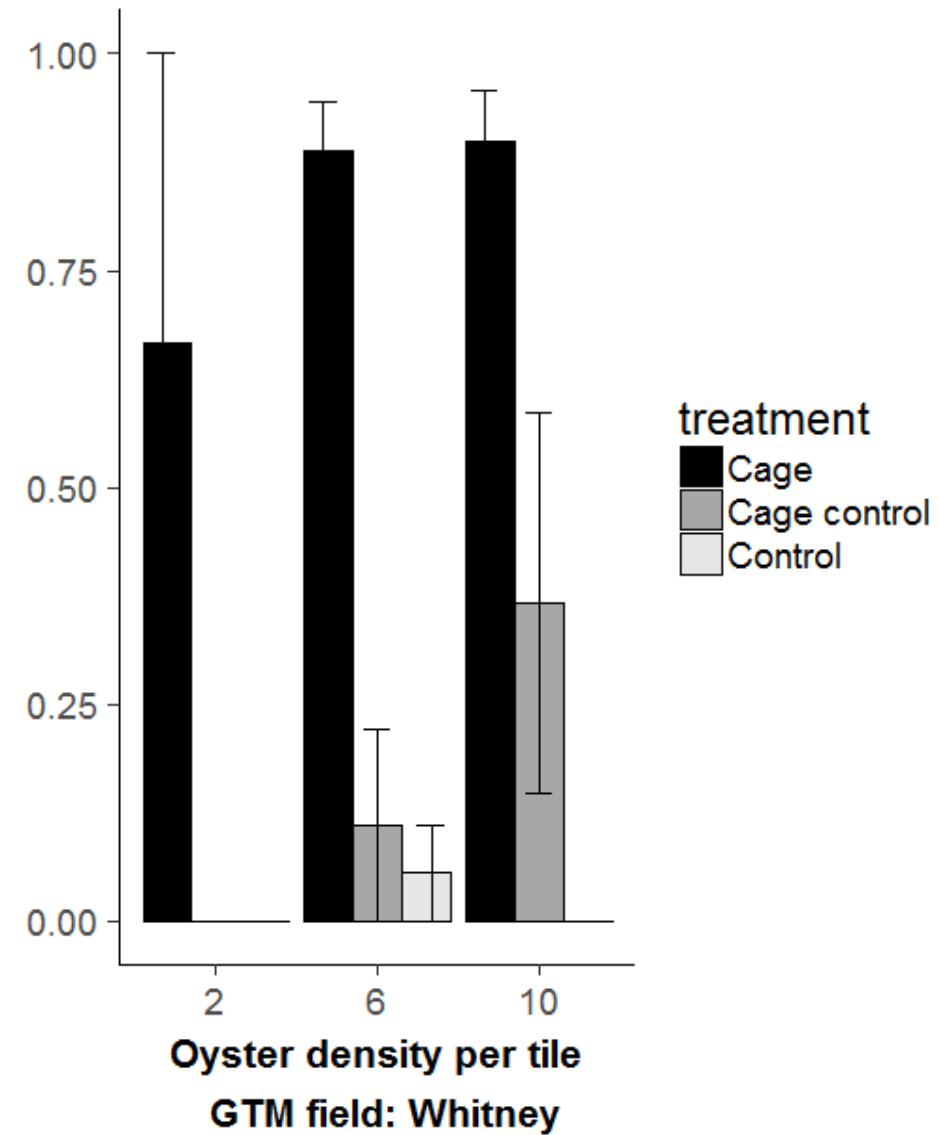
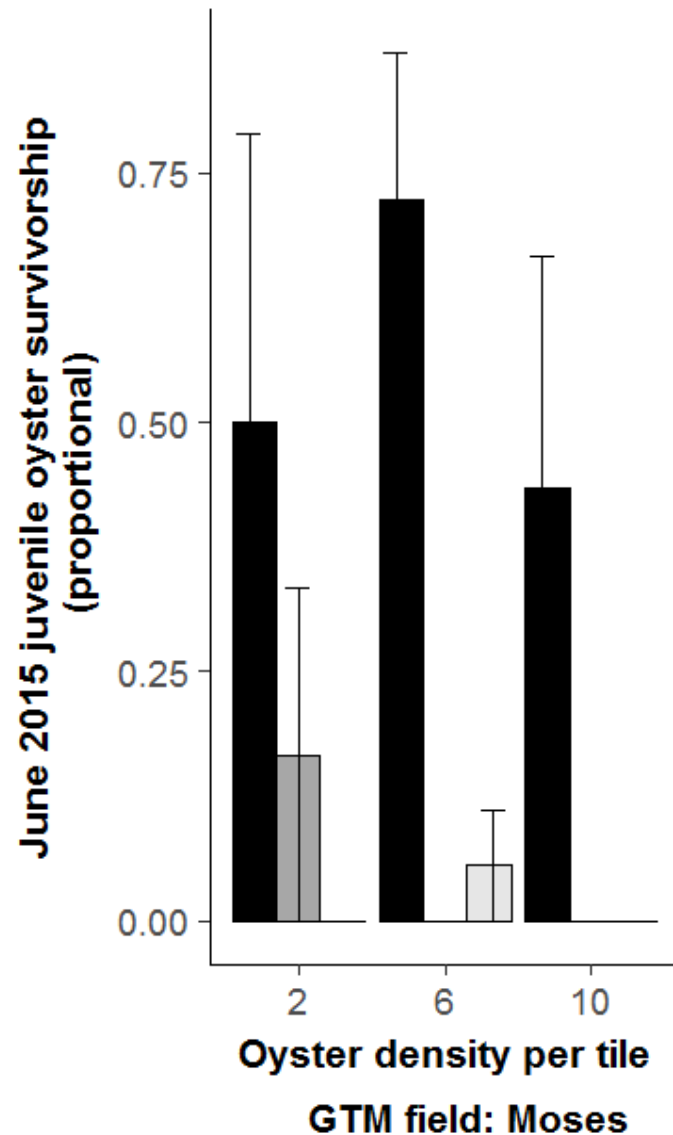
Results: Spat Summer 2015 6 oyster Density



Results: Spat Summer 2015 10 oyster Density



Results: Spat Summer 2015



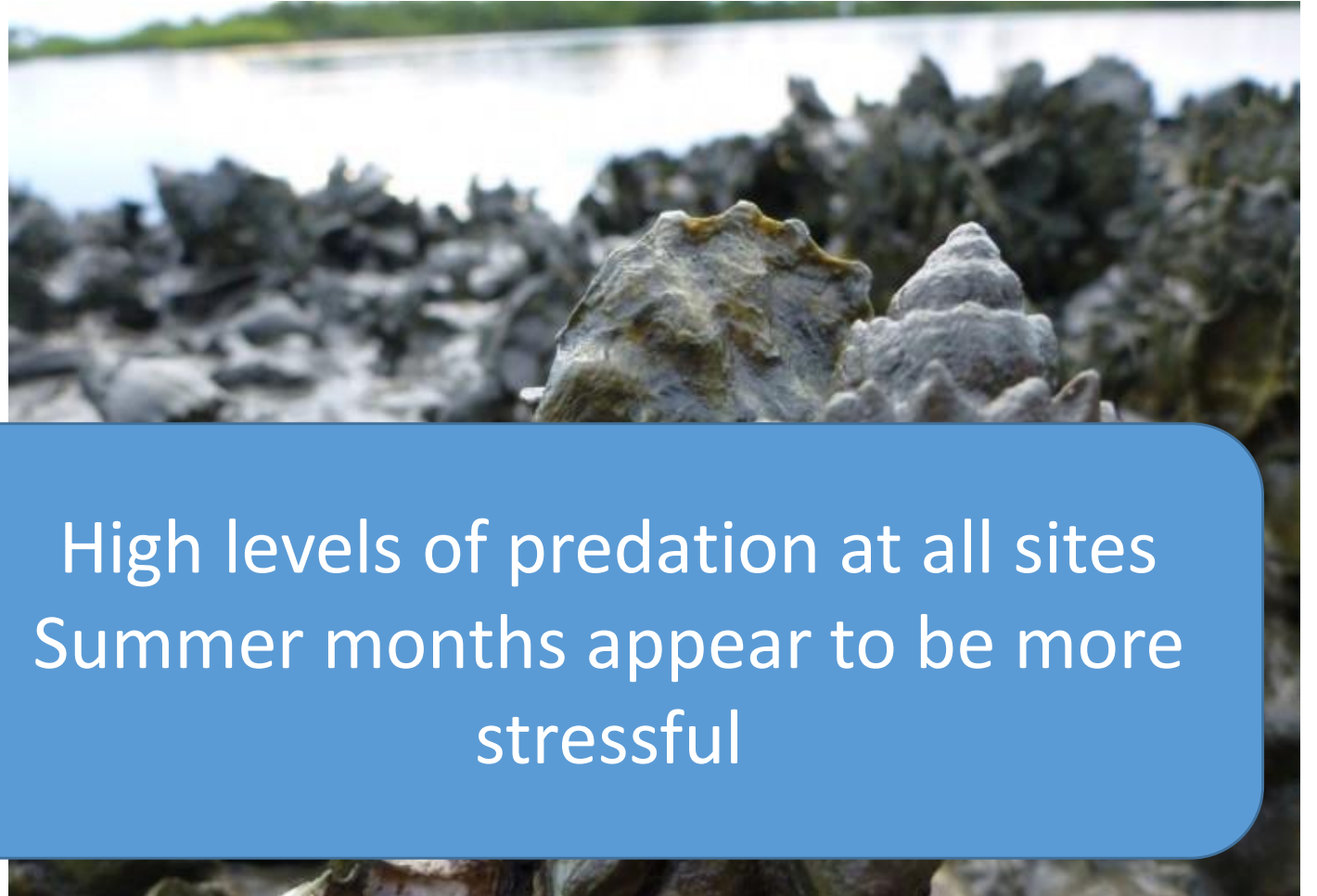
Predator Prey Interactions

- Adults

- Fall 2014
- Summer 2015
- Fall 2015
- Spring 2016
- Summer 2016

- Spat

- November 2014
- June 2015



- High levels of predation at all sites
- Summer months appear to be more stressful

Summary

- Conchs are having a large effect on oysters
- North/South gradients
 - Adult densities and size
 - Mortality
 - Predation rate
- Regional drought (low rainfall, high temps) may be enhanced by crown conch predation





Acknowledgments

- Field Assistants: Matt Farnum, Owen Stokes-Cawley, Dinorah Chacin, Christian Comander, Harriet Booth, Nicole Peckham, Danielle Calini
- Whitney Lab, Jose Nunez, Todd Osborne, Mark Martindale, Leslie Babonis, Adam Pacetti, Barry Pacetti, Jose Saucedo
- GTM NERR, Pam Marcum, Nikki Dix, Joseph Burgess, John Lojacano

Questions?



