

# Interactions Between Invasive Lionfish and Native Nassau Grouper



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# The Indo-Pacific Lionfish (*Pterois volitans*)

- Native to the Indo-Pacific
- Maximum observed size: 38cm
- Maximum observed depth: 55m
- Average density: 80 individuals per hectare
- Eat fish and crustaceans
- First sighted in southern Florida in late 1980's and early 1990's.





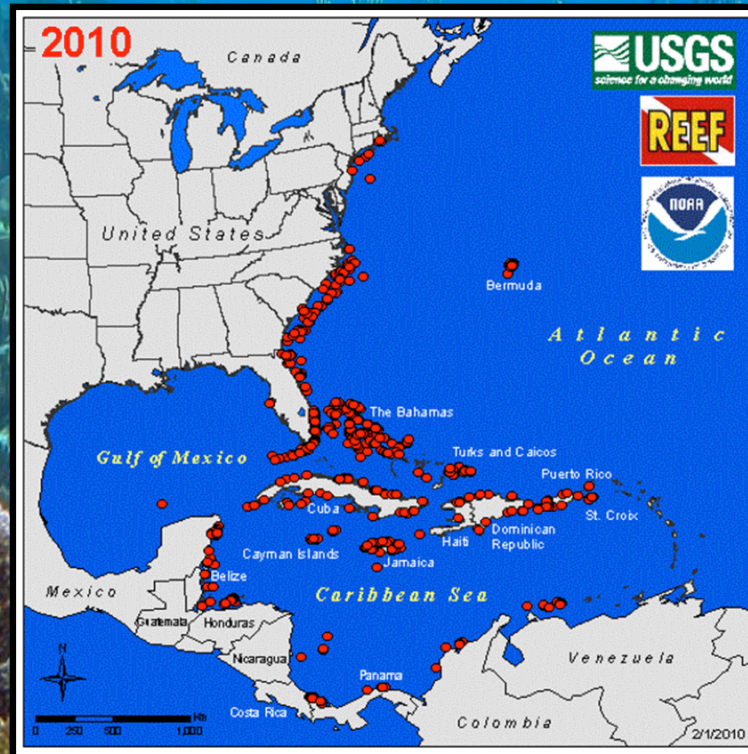






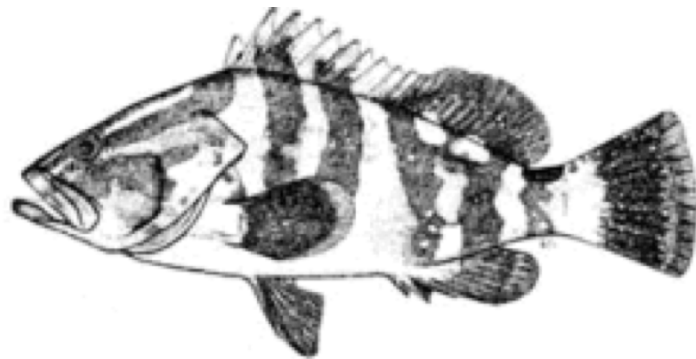
# Lionfish in the Invaded Range

- Maximum observed size: 45cm
- Maximum observed depth: 300m
- Densities range from 21-390 individuals per hectare
- Lionfish can reduce native juvenile reef fish abundances by 79%.

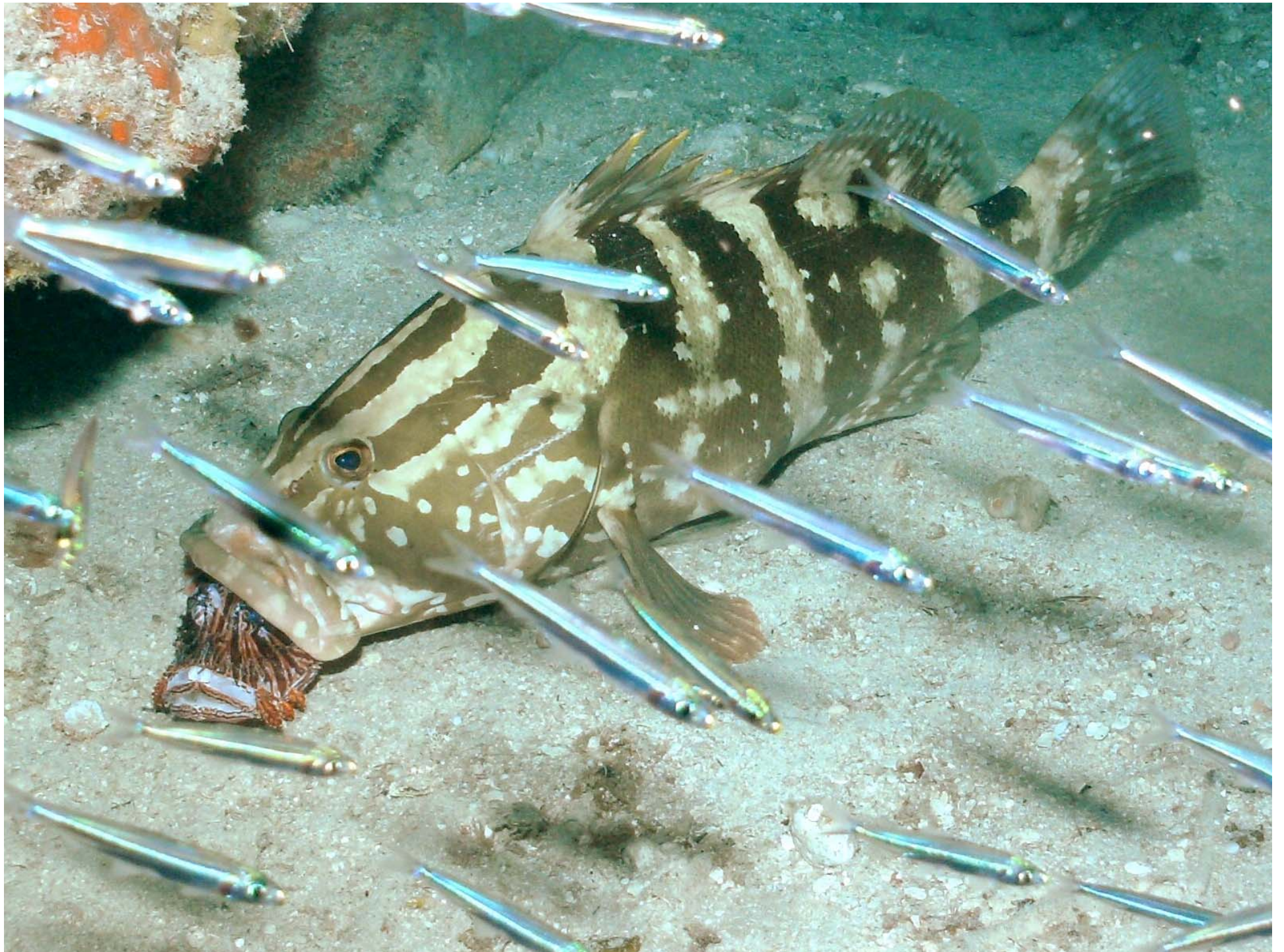


# Nassau Grouper (*Epinephelus striatus*)

- Nassau grouper is a native predator on Atlantic reefs
- Important to commercial and subsistence fisheries
- Little is known of the effects lionfish may have on Nassau groupers and vice versa
- Possible biological control



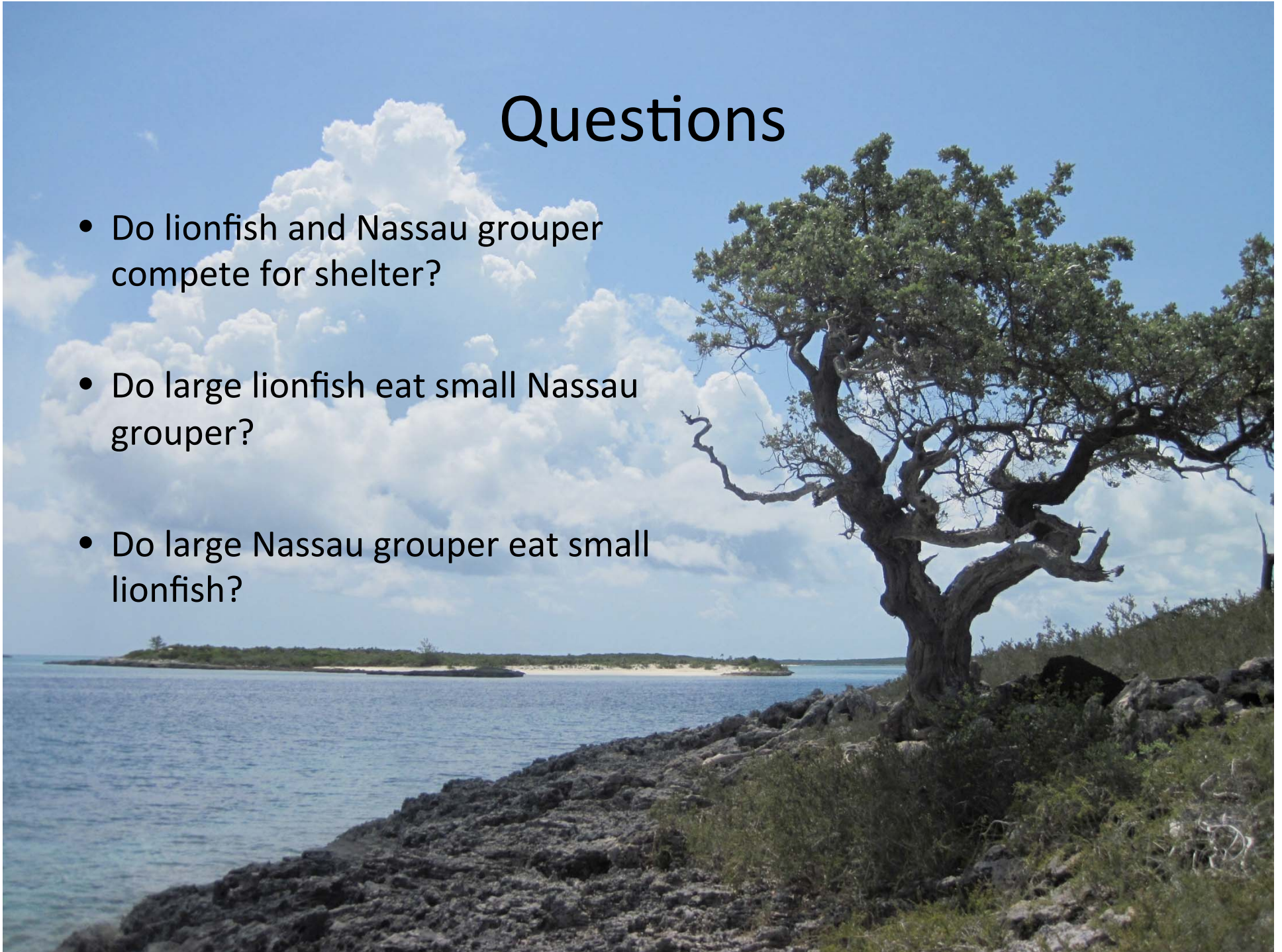






# Questions

- Do lionfish and Nassau grouper compete for shelter?
- Do large lionfish eat small Nassau grouper?
- Do large Nassau grouper eat small lionfish?





# Perry Institute for Marine Science

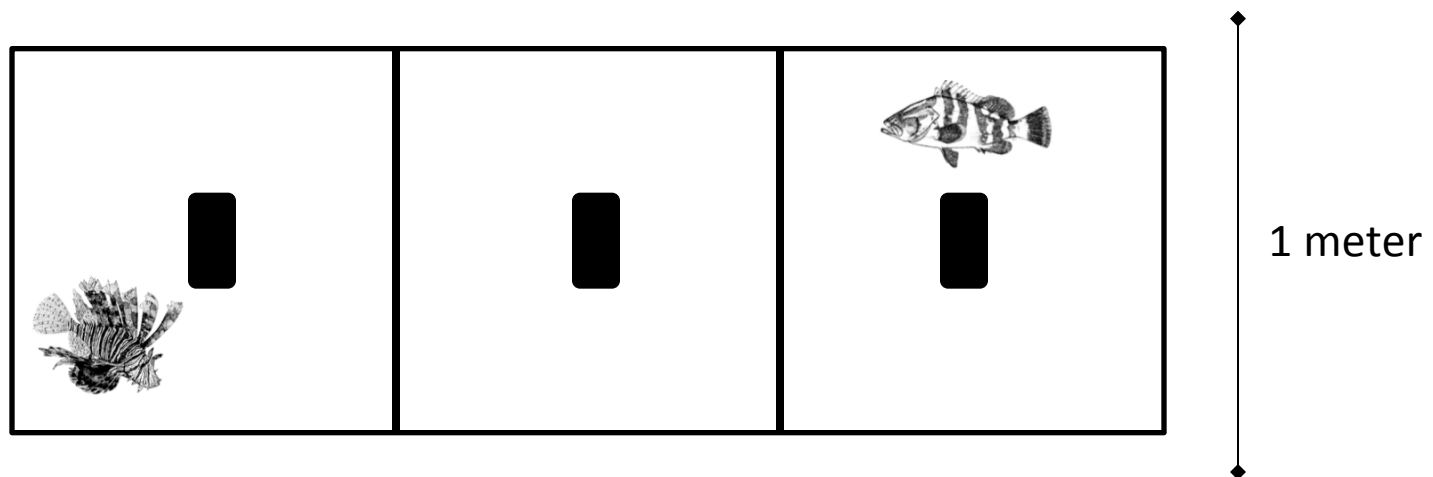
Lee Stocking  
Island





# Methods

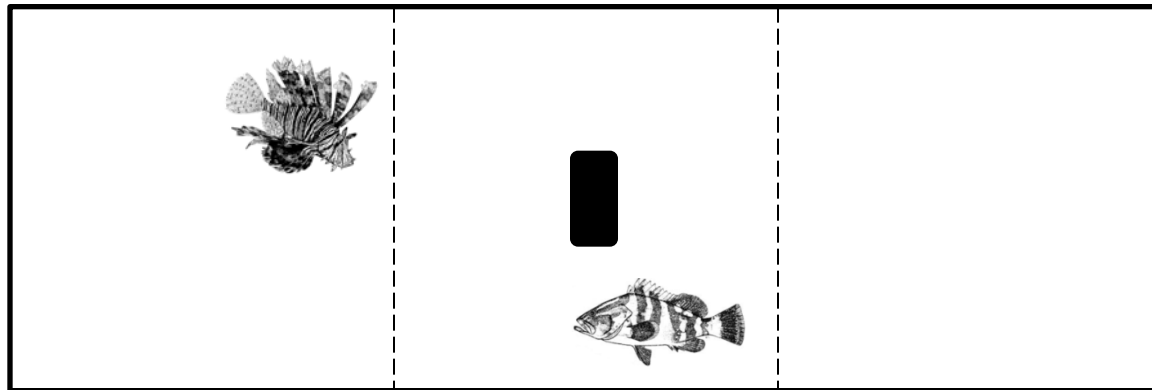
- Experiments were conducted in large in-ground tanks.
- Single lionfish and Nassau grouper were placed in partitioned cage for a 24hr acclimation period.
- Morning, midday and evening, positions were recorded so that distance from shelter could be measured.
- Three treatments at size ratios of **1:1**, **1:4**, **3:1** (lionfish:Nassau grouper).
- Cinderblocks were used for shelter.





# Methods

- After acclimation period, partitions and outer cinderblocks were removed.
- Recorded movements and behavior for 20 min.
- Morning, midday and evening, positions were recorded so that distance from shelter could be measured.





# Data Analysis

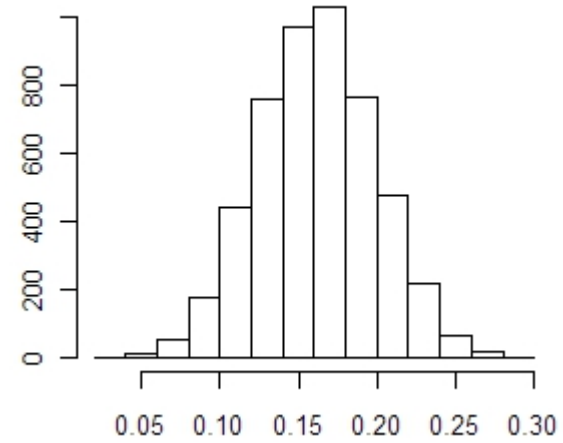
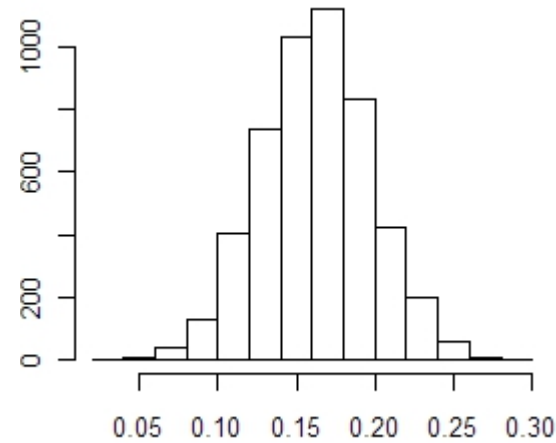
Comparing **random expected distance** to observed distance

1:1

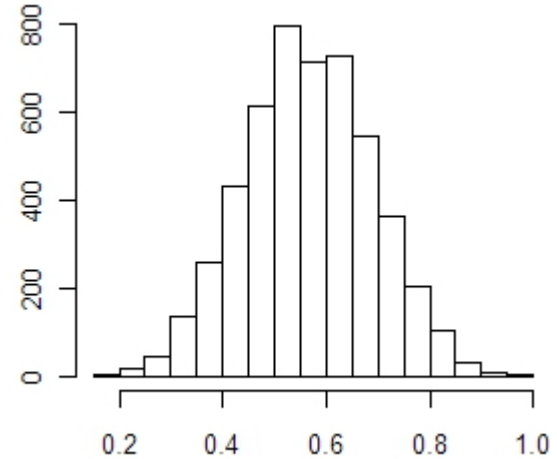
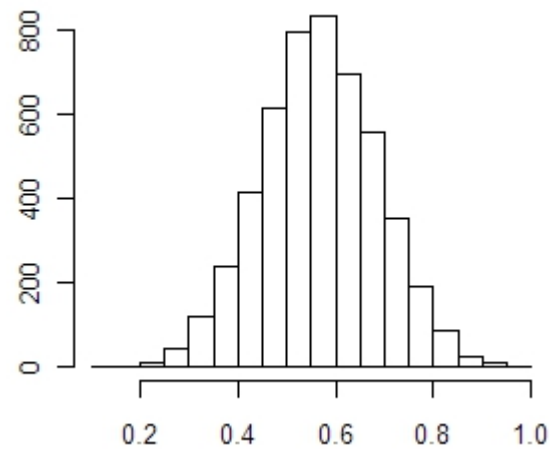
1:4

Before

Frequency



After



Distance From Shelter (m)

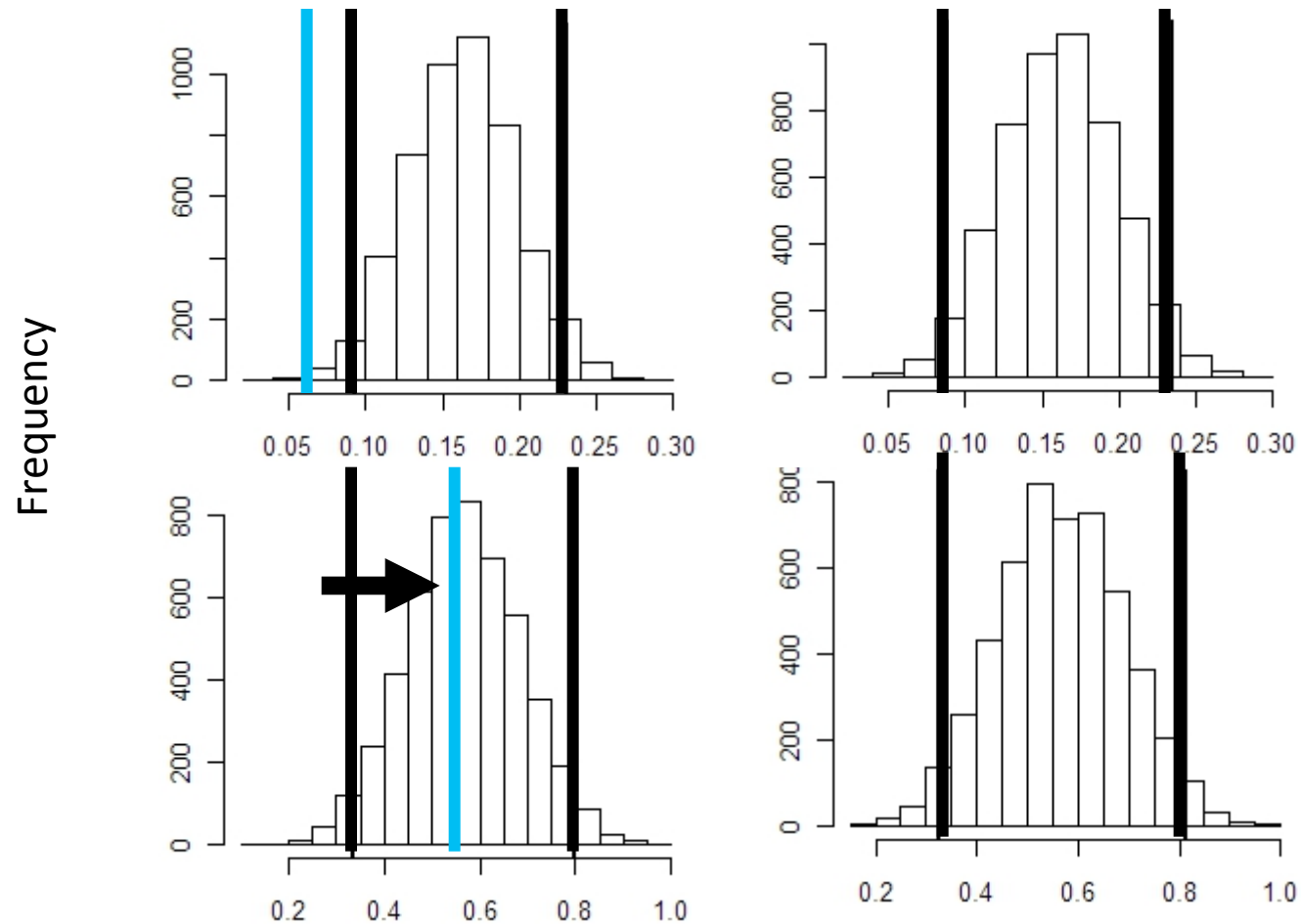
# Data Analysis

Comparing **random expected distance** to observed distance

1:1

1:4

Before



After

Distance From Shelter (m)



# Results

Comparing **random expected distance** to **observed distance**

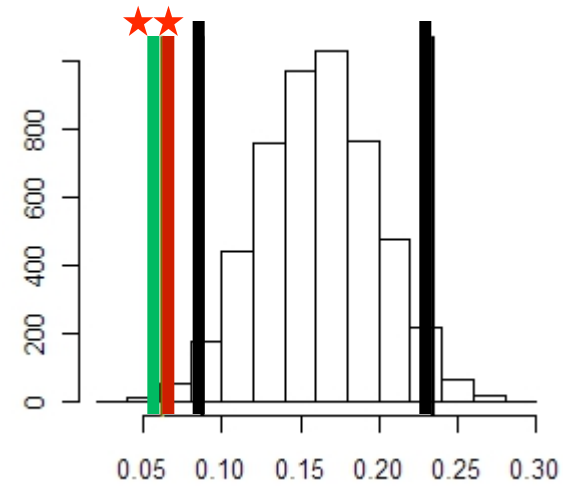
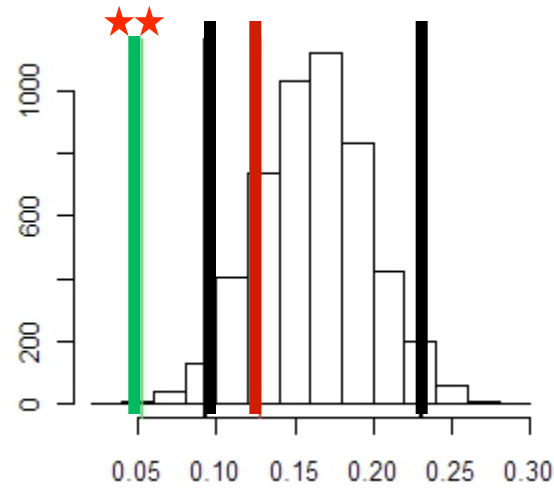


Before

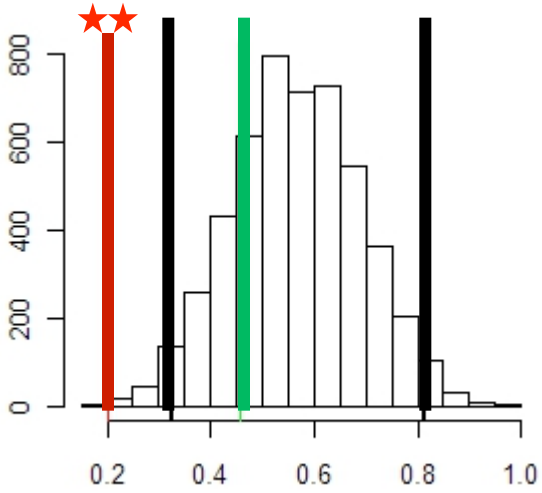
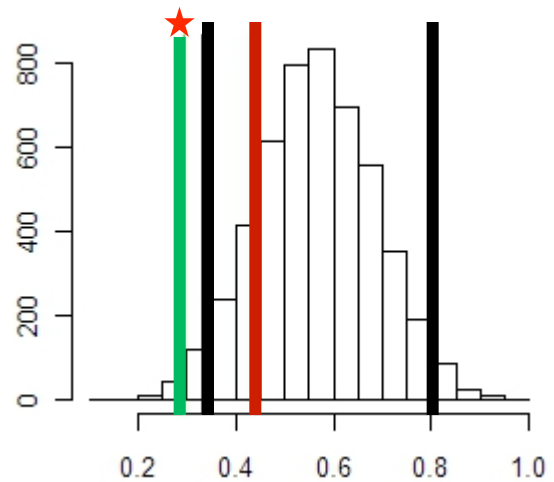
1:1

1:4

Frequency



After



★ p-value <0.05

★★ p-value <0.01

Distance From Shelter (m)

# Results

Comparing before and after percentage of observations in shelter

Percentage of time spent in shelter hole for 1:1 Treatment

	Before		After	p-value
Lionfish	22.2%	>	14.3%	0.310
Nassau Grouper	81.0%	>	63.2%	0.159

Percentage of time spent in shelter hole for 1:4 Treatment

	Before		After	p-value
Lionfish	52.2%	≈	58.9%	0.419
Nassau Grouper	65.6%	>	39.3%	0.137

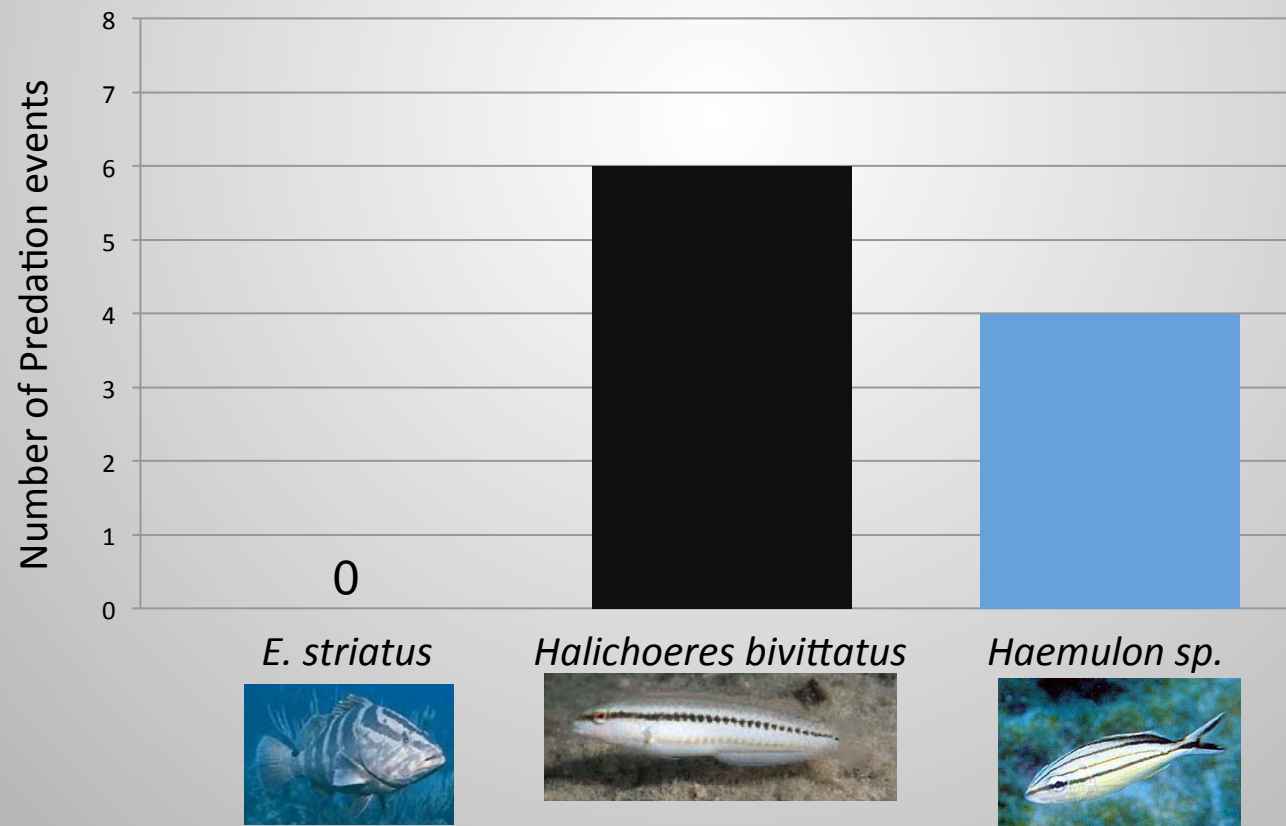


# Results

## Predation



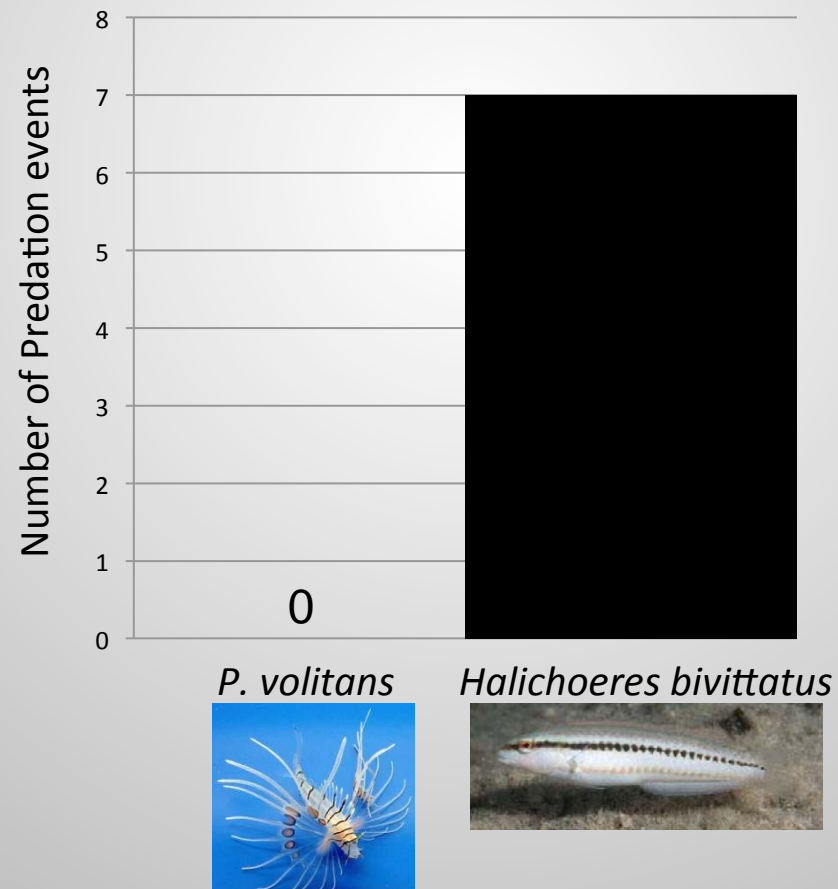
### Large Lionfish with Small Grouper (3:1 Treatment)



# Results

## Predation

Large Grouper with Small  
Lionfish  
(1:4 Treatment)





# Conclusions

- Do lionfish and Nassau grouper compete for shelter?
  - Yes** – Nassau grouper shifted away from shelter in the presence of lionfish
- Do large lionfish eat small Nassau grouper?
  - No** – even though they quickly ate other species
- Do large Nassau groupers eat small lionfish?
  - No** – even though they quickly ate other species



# Future Research

- Growth and persistence of lionfish and Nassau grouper when in the presence vs. absence of each other in the wild.
- Why don't lionfish eat small Nassau groupers?
- Why don't Nassau grouper eat small lionfish?





# Acknowledgments

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Hixon Lab Bahamas Team



Mean Distance From Shelter in 1:4 Treatment

	Lionfish	Nassau Grouper
Before Removal	6.1cm	6.2cm
After Removal	21.0cm	45.6cm