

# ***Invasive Lionfish***

Alex K. Bogdanoff

*Marine Ecologist, NOAA National Ocean Service Affiliate*

*Ph.D. student, North Carolina State University*



Photo by Rich Carey



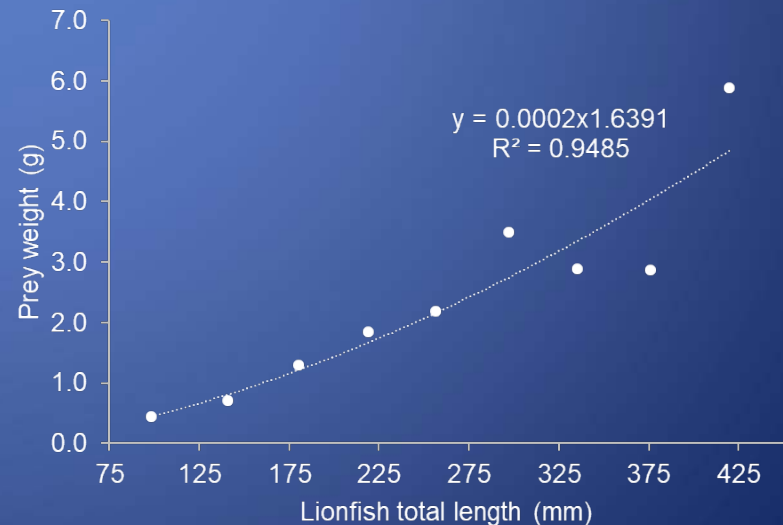
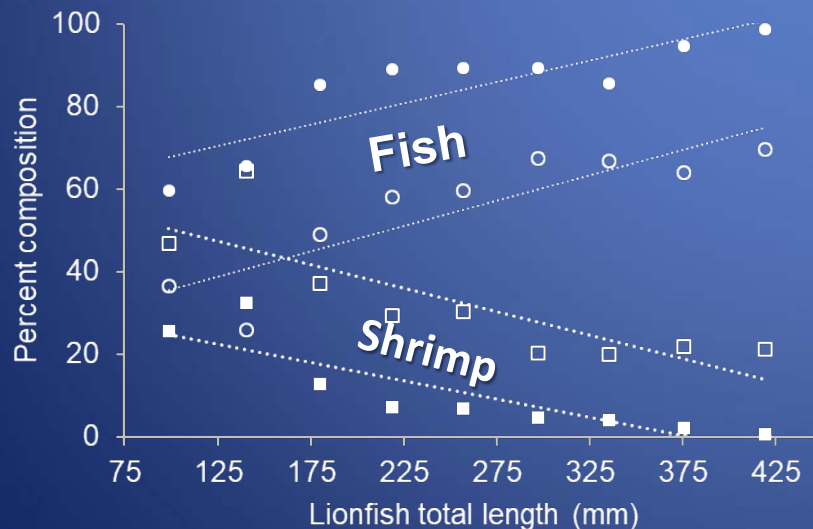
# Feeding Ecology



# Feeding Ecology

## Regional Characteristics

- 1) General opportunistic carnivores that consume at least 167 species across multiple trophic guilds
- 2) Dominated by carnivorous fish and shrimp that are not managed, at risk of extinction, or threatened fishery species
- 3) Size significantly influences diet composition
- 4) Provide a model for prey biomass consumption from length-frequency data

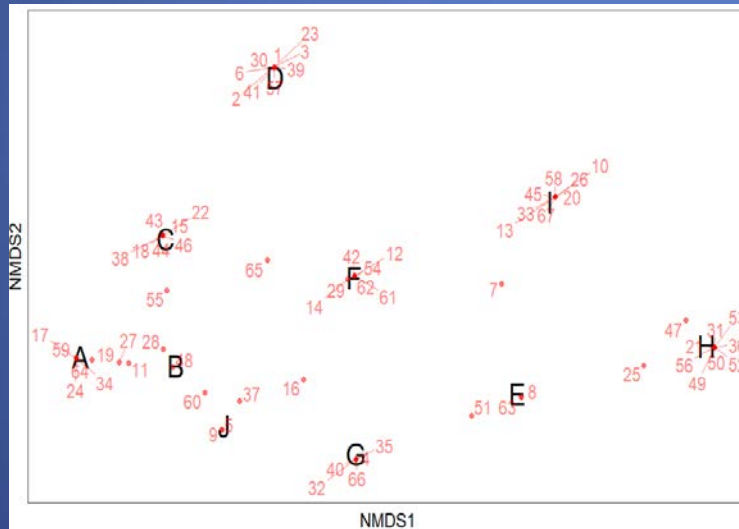


# Feeding Ecology

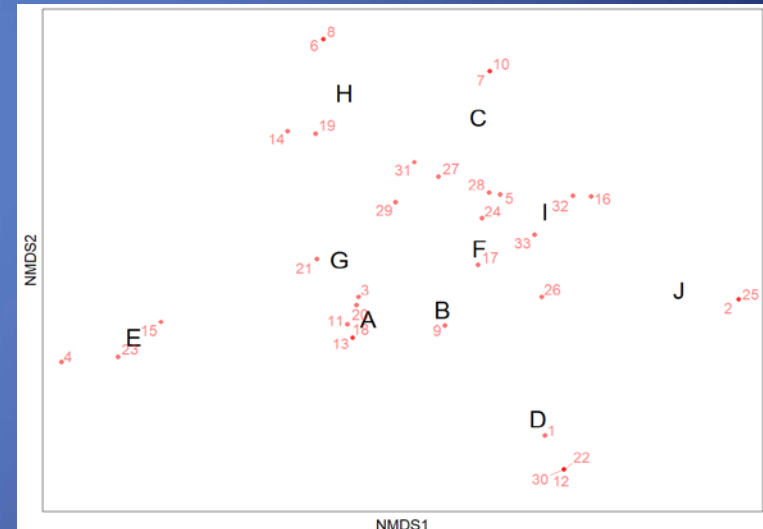
## Locational Comparisons

### 1) Diet varies significantly among locations

- A) Bahamas
- B) Belize
- C) Bermuda
- D) Costa Rica
- E) Florida
- F) nwGoM
- G) Mexico
- H) N. Carolina
- I) neGoM
- J) USVI

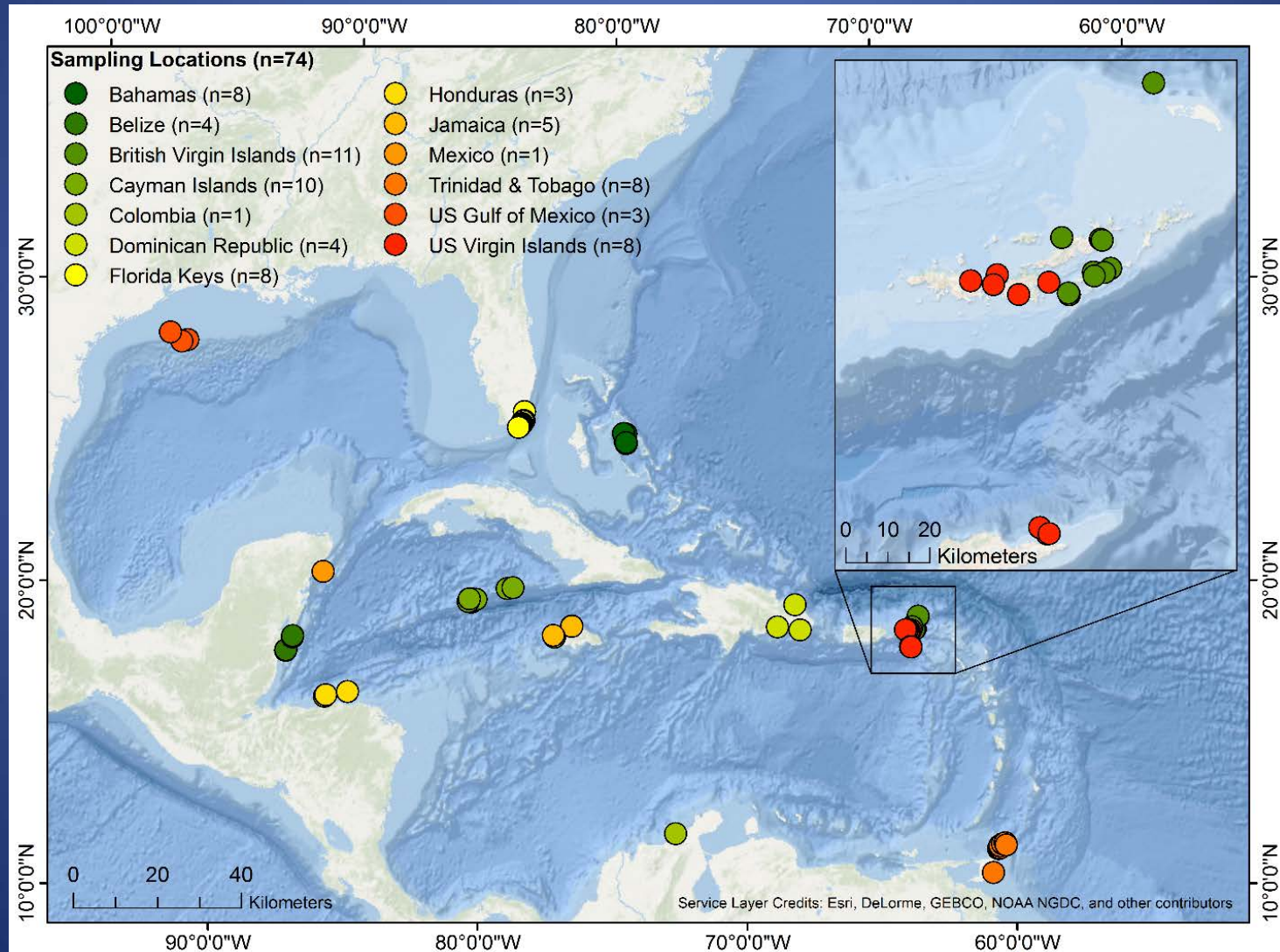


Species



Family

# Ciguatera



# Ciguatera

Location	Analyzed	RBA <sub>f</sub>	CBA-N2a	LC-MS/MS
Bahamas	15	0	0	0
Belize	15	3	0	0
British Virgin Islands	15	9	8	6
Cayman Islands	15	0	0	0
Colombia	15	0	0	0
Dominican Republic	15	2	0	0
Florida Keys	20	5	1	1
Gulf of Mexico	33	0	0	0
Honduras	15	1	0	0
Jamaica	29	1	0	0
Mexico	15	1	0	0
Trinidad and Tobago	76	6	0	0
US Virgin Islands	15	2	0	0
<b>Total survey</b>	<b>293</b>	<b>30</b>	<b>9</b>	<b>7 (2)</b>

- 1) RBA<sub>f</sub> valuable rapid screening tool
- 2) Risk appears low, but is location dependent
- 3) Risk compared to other species also appears relatively low



# Aggregation Structures

## North Carolina

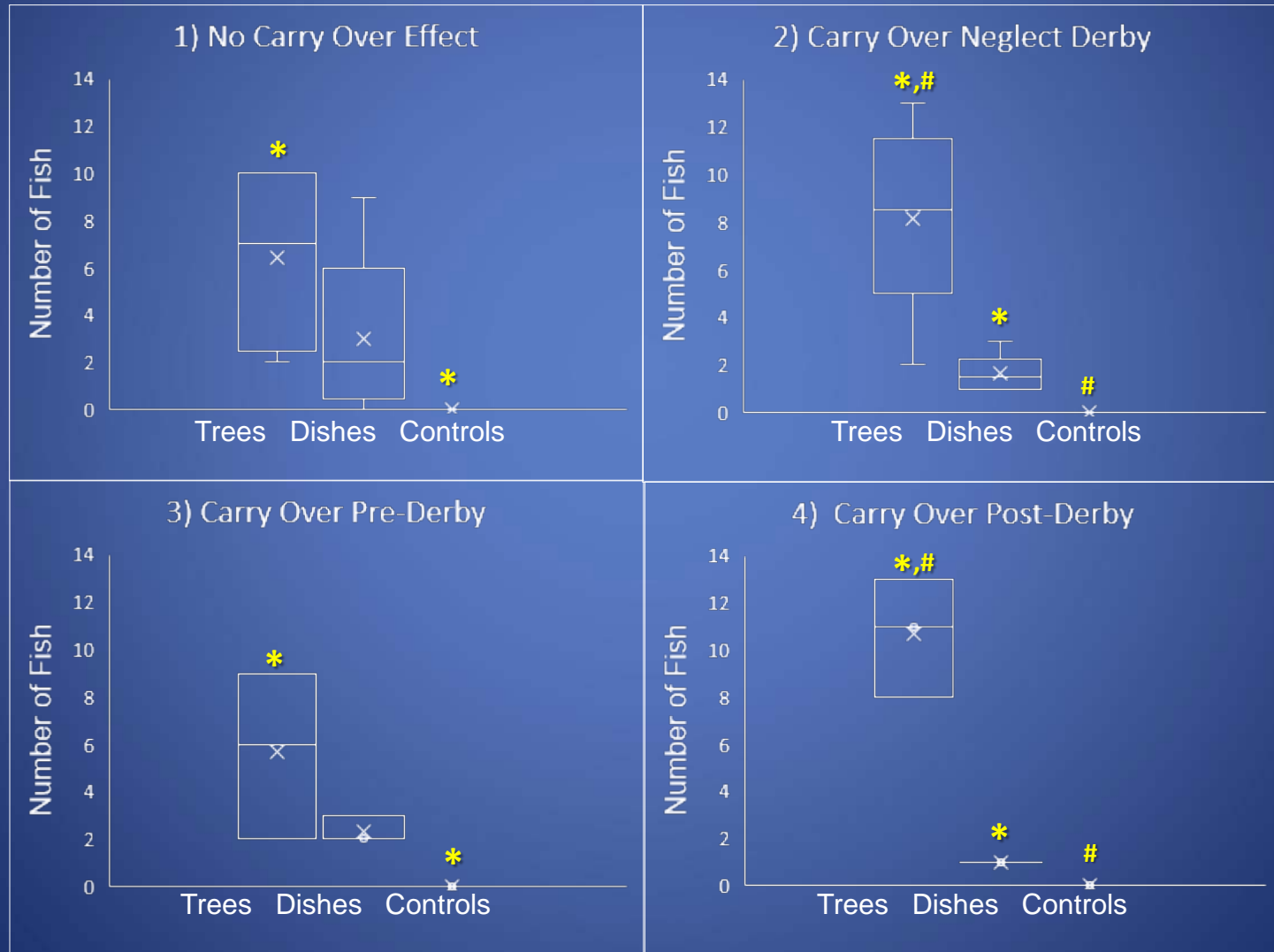
- Deep temperate hard-bottom reef
- 7 replicates + 3 controls
- 5 months
- Monthly removals from devices
- Summary measures with ANOVA

## The Bahamas

- Shallow tropical artificial reef
- 16 replicates + 5 controls
- 6 months
- Lionfish derby half way through
- Summary measures with ANOVA



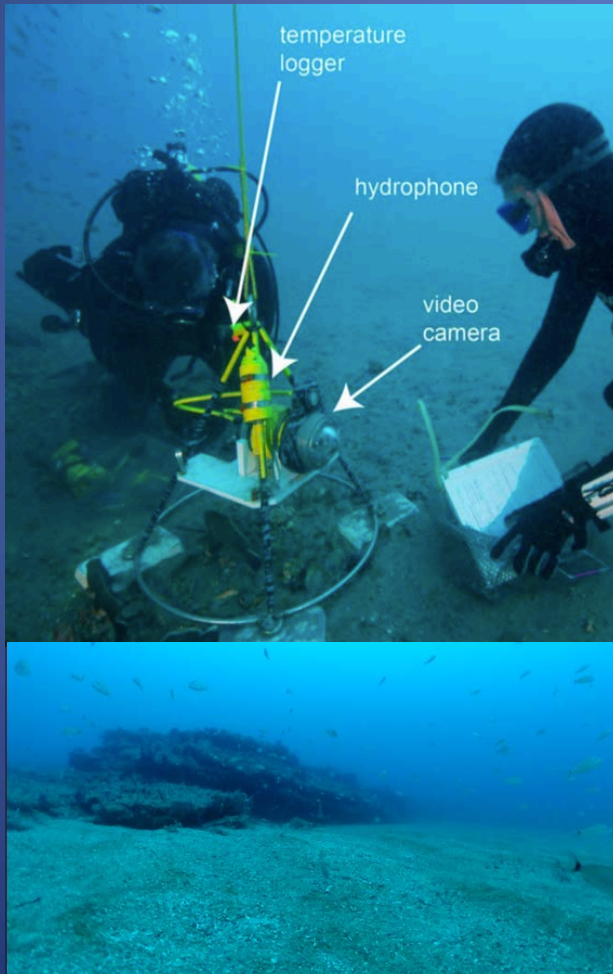
# Aggregation Structures





# Sounds & Passive Acoustics

## In Situ Descriptions



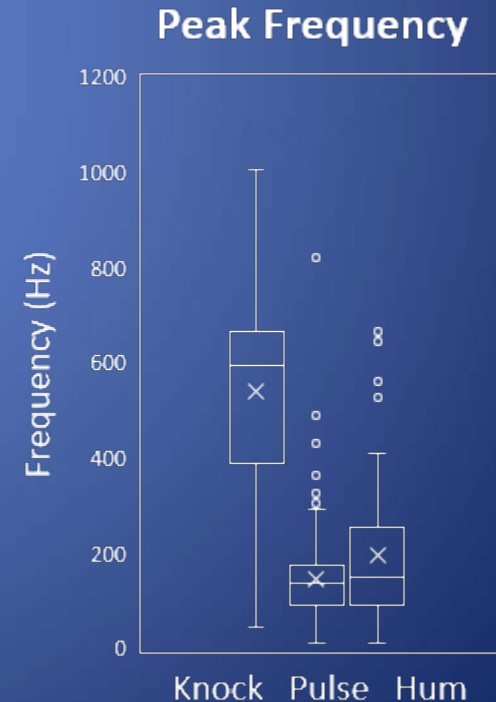
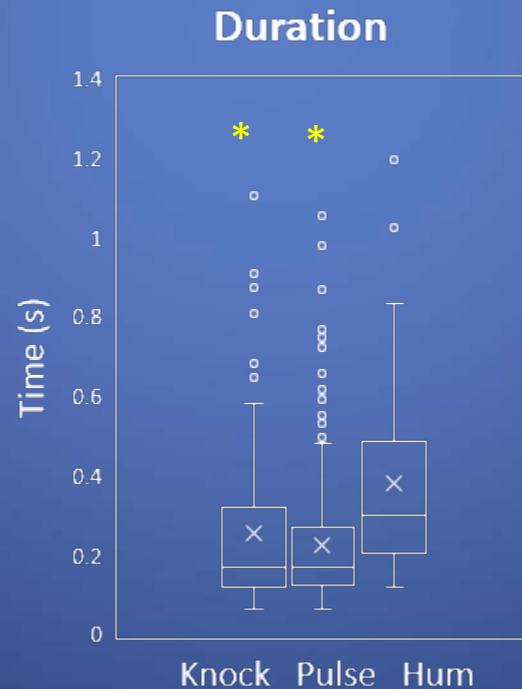
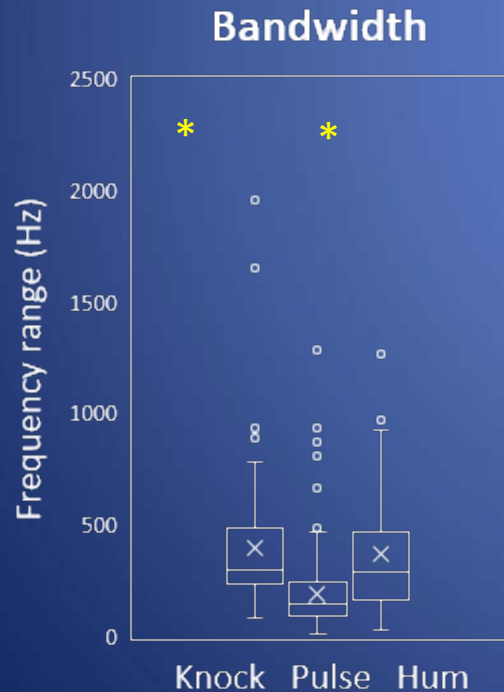
## Tank Descriptions



# Sounds & Passive Acoustics

## In Situ Descriptions

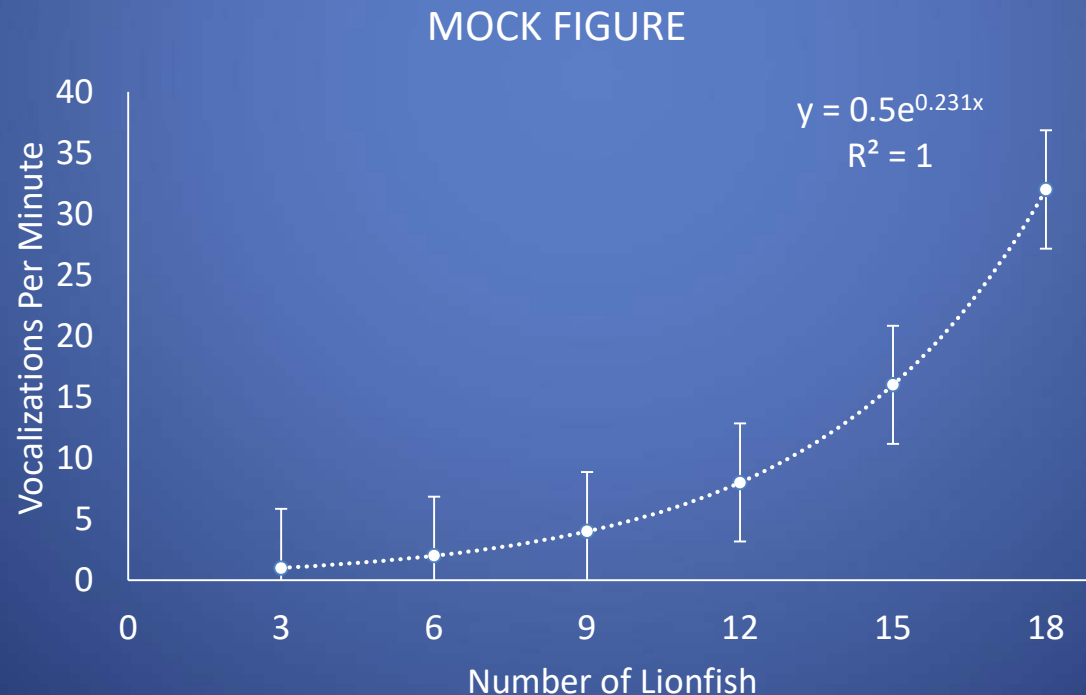
- 1) In situ vocalizations can be identified, isolated, and processed
- 2) In situ vocalization rate = 15 calls per minute
- 3) Three distinct call types identified/confirmed



# Sounds & Passive Acoustics

## Tank Descriptions

- 1) Describe general call characteristics & diel patterns
- 2) Provide a model for estimating abundance from sounds





# Population Modeling

## Belize National Lionfish Management Strategy



# Population Modeling

## Belize National Lionfish Management Strategy



# Population Modeling

A generalized population model for management

```

60
61 - #####
62
63 #choose Growth Characteristics
64 Area="Bel" #Options have been given so a wider range of scenarios can be modeled. The lo
65 if (Area == "Bel")
66 {
67   Linf=441.5 #Asymptotic length from North Carolina length-at-age data
68   K=0.45 #Growth coefficient from North Carolina length-at-age data
69   a0=-0.31 #Theoretical age at size 0 from North Carolina length-at-age data
70   a=0.000007 #Length-weight coefficient estimated for lionfish in Belize in this study
71   b=3.11 #Length-weight exponent estimated for lionfish in Belize in this study
72 } else if (Area == "NC")
73 {
74   Linf=441.5 #Asymptotic length in mm
75   K=0.45 #Growth coefficient
76   a0=-0.31 #Theoretical age at size 0
77   a=7.97e-6 #Length-weight coefficient
78   b=3.12 #Length-weight exponent
79 } else if (Area == "CI")
80 {
81   Linf=349.0 #Asymptotic length in mm
82   K=0.42 #Growth coefficient
83   a0=-1.01 #Theoretical age at size 0
84   a=0.000003 #Length-weight coefficient
85   b=3.24 #Length-weight exponent
86 } else if (Area == "Mex")
87 {
88   Linf=420.0 #Asymptotic length in mm
89   K=0.88 #Growth coefficient
90   a0=-0.107 #Theoretical age at size 0
91   a=0.000005 #Length-weight coefficient
92   b=3.33 #Length-weight exponent
93 } else
94 {
95   print ("Error: Area not specified correctly.")
96 }
97

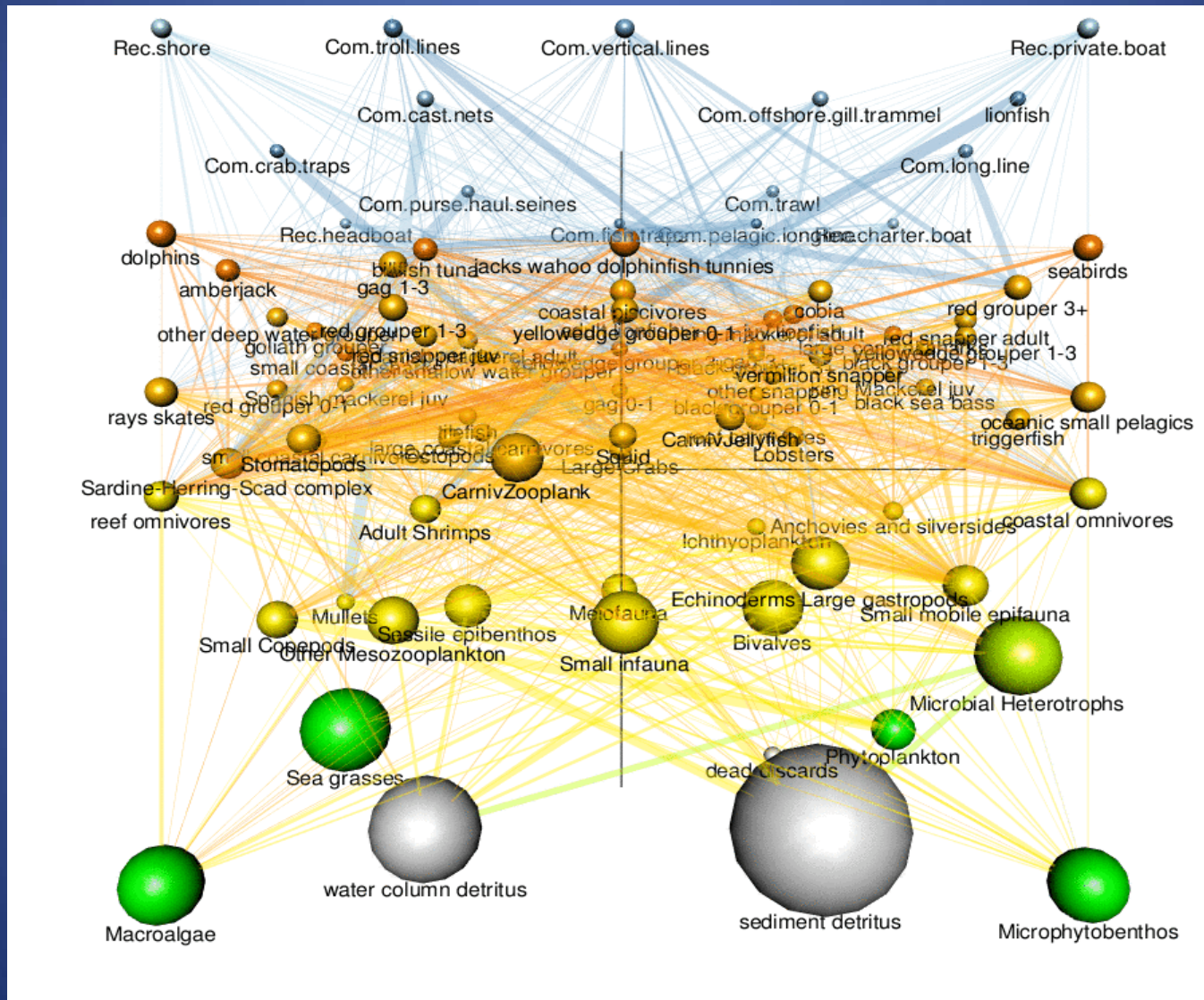
```

Provide options/ranges for

- Age-structure
- Sex structure
- Growth
- Mortality
- Initial abundance
- Length-weight relationship
- Selectivity



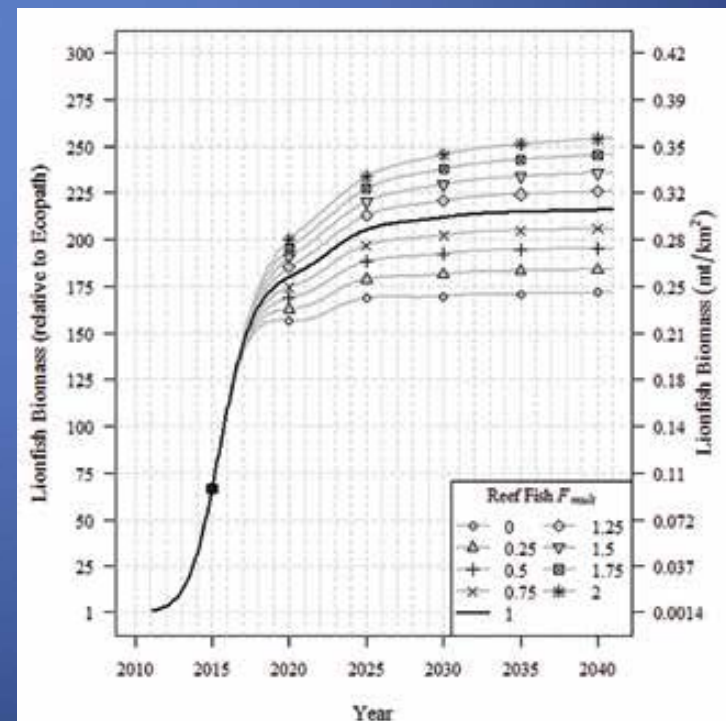
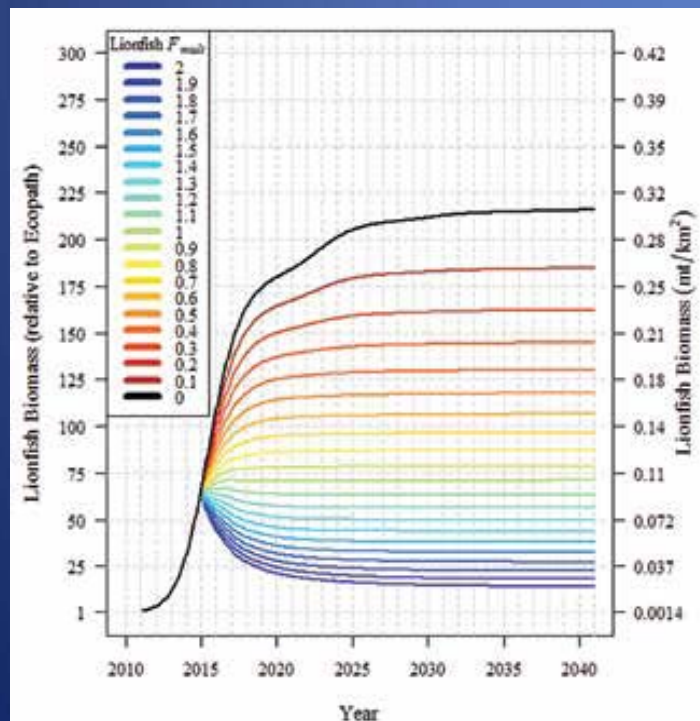




# Ecosystem-Based Modeling

## Model Projections

- 1) Strong positive and negative effects through trophic cascades, competitive release, and predation release
- 2) Small increases in lionfish harvest can translate to large reductions in biomass
- 3) Reducing reef fish harvest may help reduce lionfish biomass (opposite true)



# Invasive Lionfish


Web Portal

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[EDUCATION & OUTREACH](#)
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**IF STUNG** a lionfish delivers a potent venom via its needle-like dorsal fins. Its sting is extremely painful to humans and can cause nausea and breathing difficulties, but is rarely fatal.



#lionfish

Talking Ocean  
@TalkingOcean


All one stage considered to be a potential biocontrol for invasive lionfish, the cool L...  
[pic.twitter.com/cid3Cdapq](#)



Tweet #lionfish

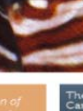
"The invasion of lionfish (*Pterois miles* and *Pterois volitans*) may prove to be on of the greatest threats of this century to warm temperate and tropical Atlantic reefs and associated habitats: As the first marine reef fish invasive species to this region, lionfish are changing the culture of how reef managers view invasive species, the regional connectivity of marine reefs, and their vulnerability to marine invasions". Dr. James A. Morris, Jr. NOAA

**Timeline of the Lionfish Invasion (from USGS)**



**Image Contest**

Lionfish being served at a wedding




Rating:  
☆☆☆☆  
No voters yet

View and vote on all photos.  
[Submit your photo!](#)

**Video Contest**

How to fill a Zookeeper in 75 seconds



Rating:  
☆☆☆☆  
No voters yet

View and vote on all videos  
[Submit your video!](#)

The Gulf and Caribbean Fisheries Institute

**GCFI Symposia**


- GCFI Proceedings
- Tweenschat on Scarily
- Tweens on Scarily

**GCFINET List**


- 67th GCFI Field trips
- 67th GCFI Cateramar Cruising

**Latest Flickr Photos**


American seahorse of spotted a photo



Opa and Peter of spotted a photo



Lionfish of GCFI posted a photo



(C) Robin Gaufr

These images are not reviewed prior to posting

**Latest Forum Topics**

Invasive lionfish control efforts vs. native species enhancement efforts: which one is more beneficial?

Is a commercial market for invasive lionfish a good idea?

**Google News Feed**

Oysters, lion fish, lamb kailipops, peach cobbler served at Alabama Festival of Flavor in Foley

Grand Cayman is the lionfish hunting capital of the world (Bair). It may take a village to control lionfish onslaught.

***The Invasive Lionfish Web Portal at [lionfish.gcfi.org](http://lionfish.gcfi.org)***