



Born in the Wrong Sea... *Lionfish in the tropical Western Atlantic*



Lad Akins - REEF, James Morris - NOAA
Stephanie Green - Simon Fraser University, Pam Schofield - USGS



Atlantic Ocean

North Carolina

South Carolina

Florida

Gulf of Mexico

Mexico

Caribbean Sea

Pacific Ocean

Venezuela

Pamlico Sound

Bathtown

Bermuda

Charleston

St. Augustine

Bahamas

Nassau

New Providence

Strait of Florida

Havana

Cuba

Windward Passage

Tortuga

Puerto del Principe

Cayman Islands

Jamaica

Port Royal

Hispaniola

Santo Domingo

Puerto Rico

St. Thomas

Anguilla

Antigua

St. Kitts

Nevis

Guaadelope

Dominica

Martinique

St. Lucia

Barbados

Tobago

Trinidad

Curocao

Caracus

Riohacha

Santa Marta

Cartagena

Maracaibo

Puerto Bello

Nombre de Dios

Panama

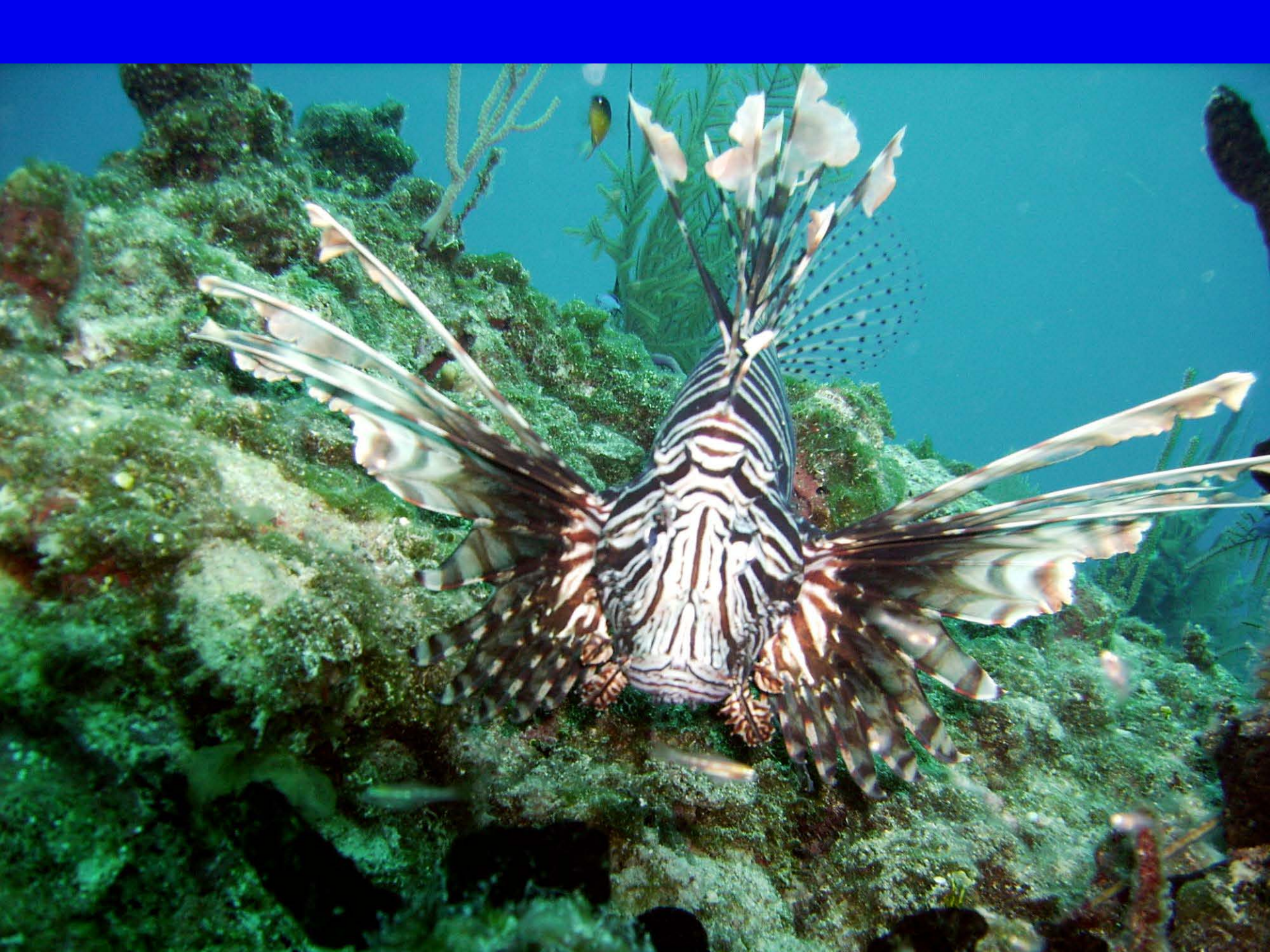
Vera Cruz

Bay of Campeche

Campeche

Belize

Gulf of Honduras





REEF



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Reef Environmental Education Foundation

- REEF HQ in Key Largo with a Pacific office in Seattle
- 40,000+ members
- Conduct monitoring and assessments
- Spawning aggregation projects
- Exotic Species campaign
- Education/Outreach Programs

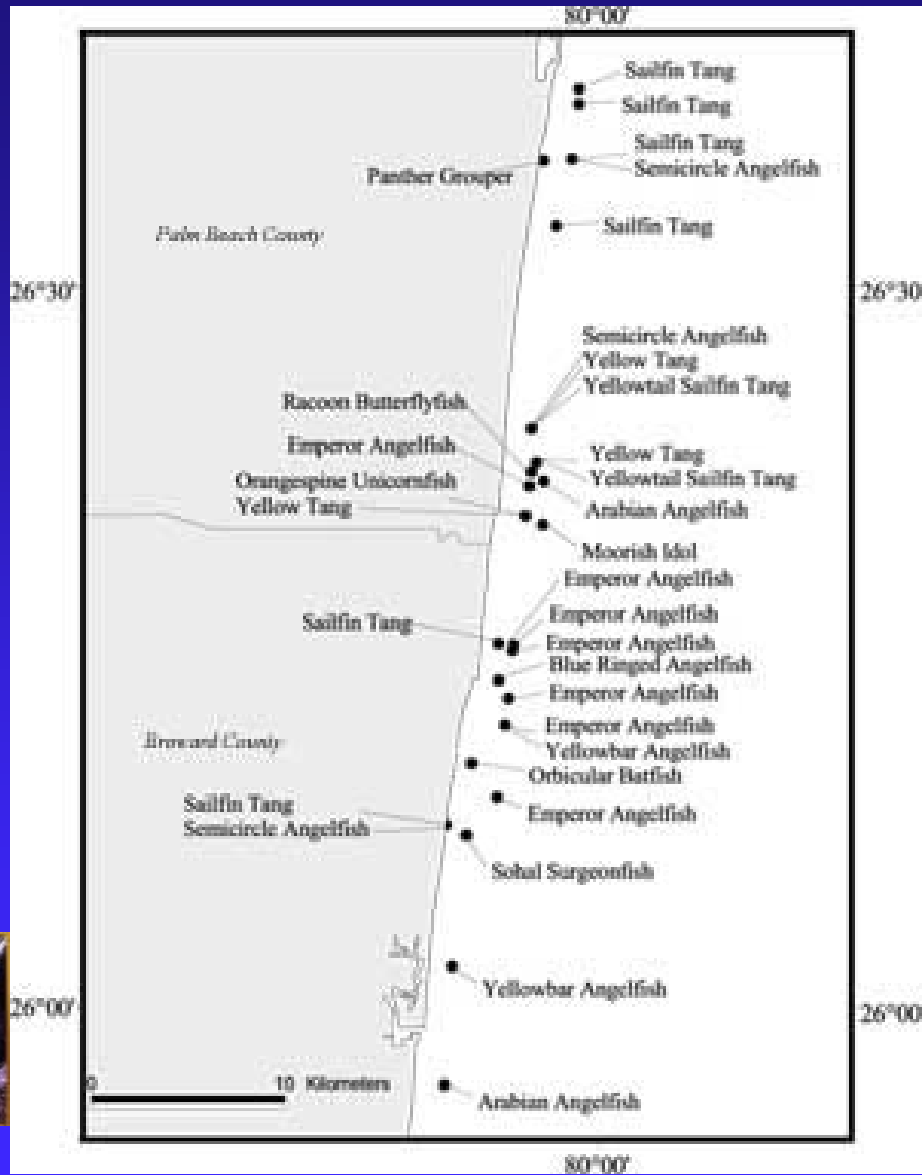


Diver conducting REEF Fish Survey

South Florida marine fish introductions – A unique place....



Panther Grouper Calfo 2003



South Florida marine fish introductions – A unique place...



Lionfish in the Atlantic





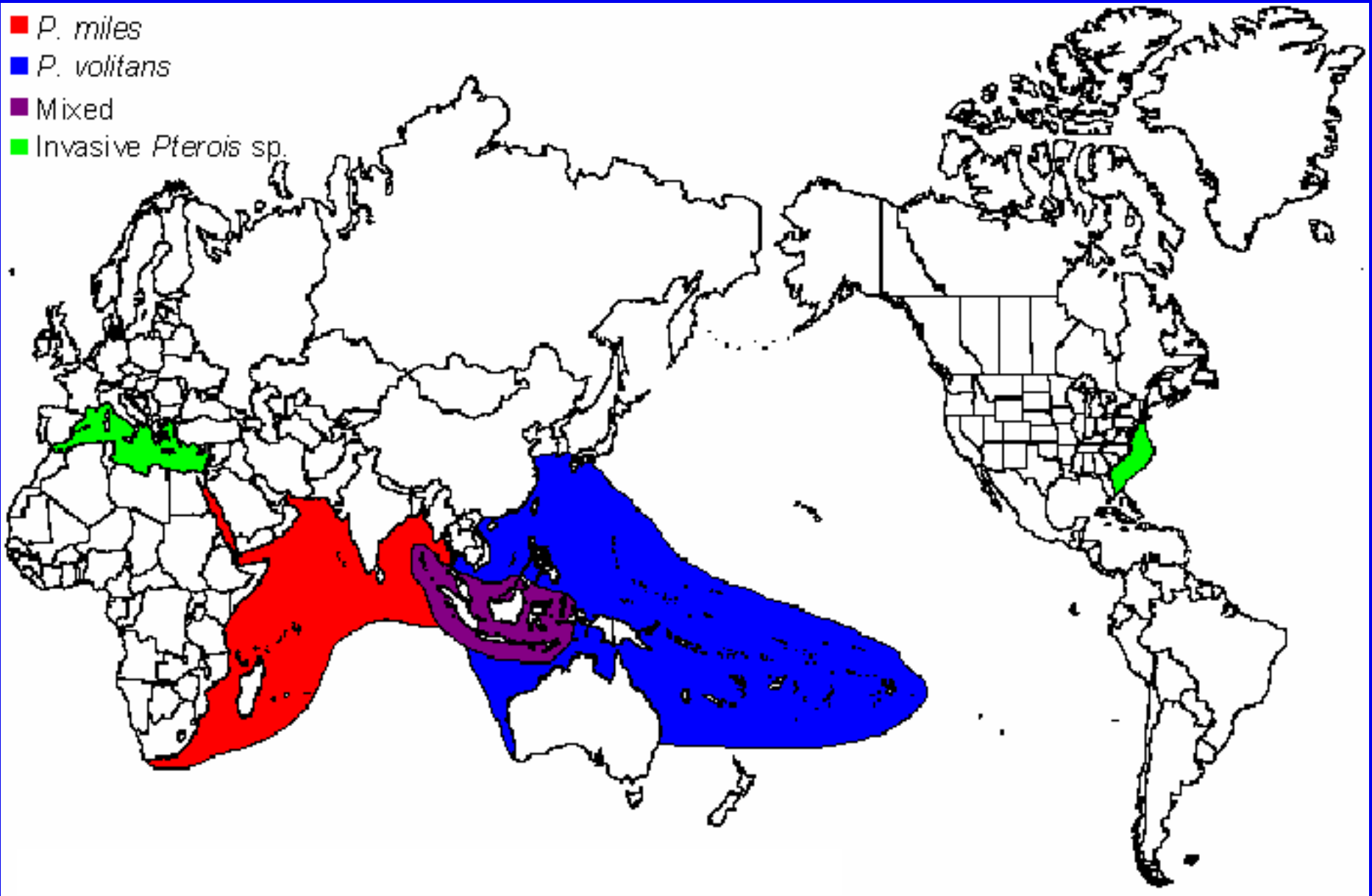
NOAA

Science for Coastal Communities

Center for Coastal Fisheries and Habitat Research

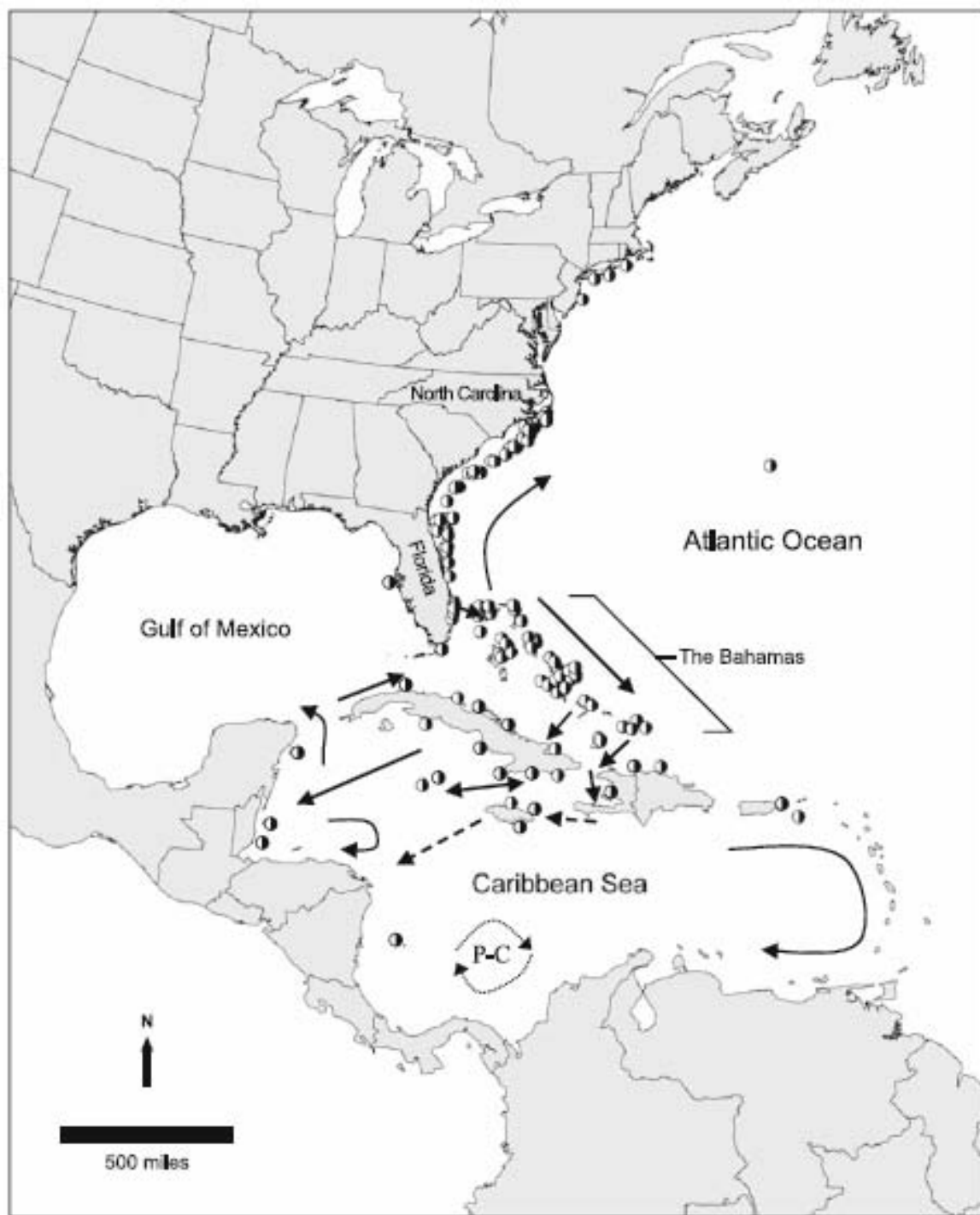
CCFHR

- *P. miles*
- *P. volitans*
- Mixed
- Invasive *Pterois* sp.



1992







Initial Research Questions

- Habitats
- Growth
- Feeding
- Reproduction
- Movement

Even the most basic information... *unknown*



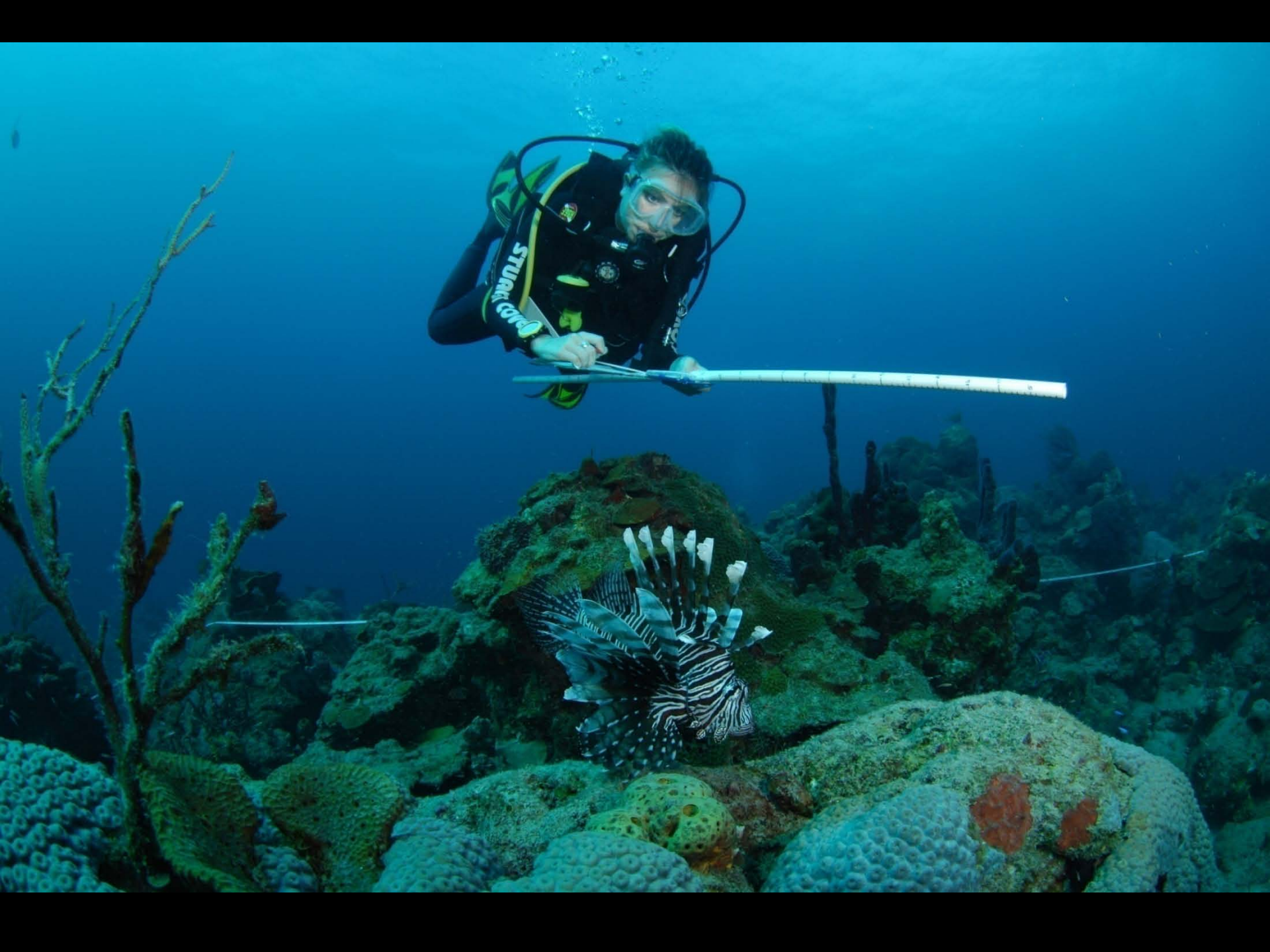
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REEF Lionfish Field Operations

- 20+ projects in the US, Bahamas, Turks and Caicos, Cayman, Belize, Mexico, Bonaire, USVI, Puerto Rico
- 600+ volunteers trained
- Collection/documentation – 4000+ specimens to date







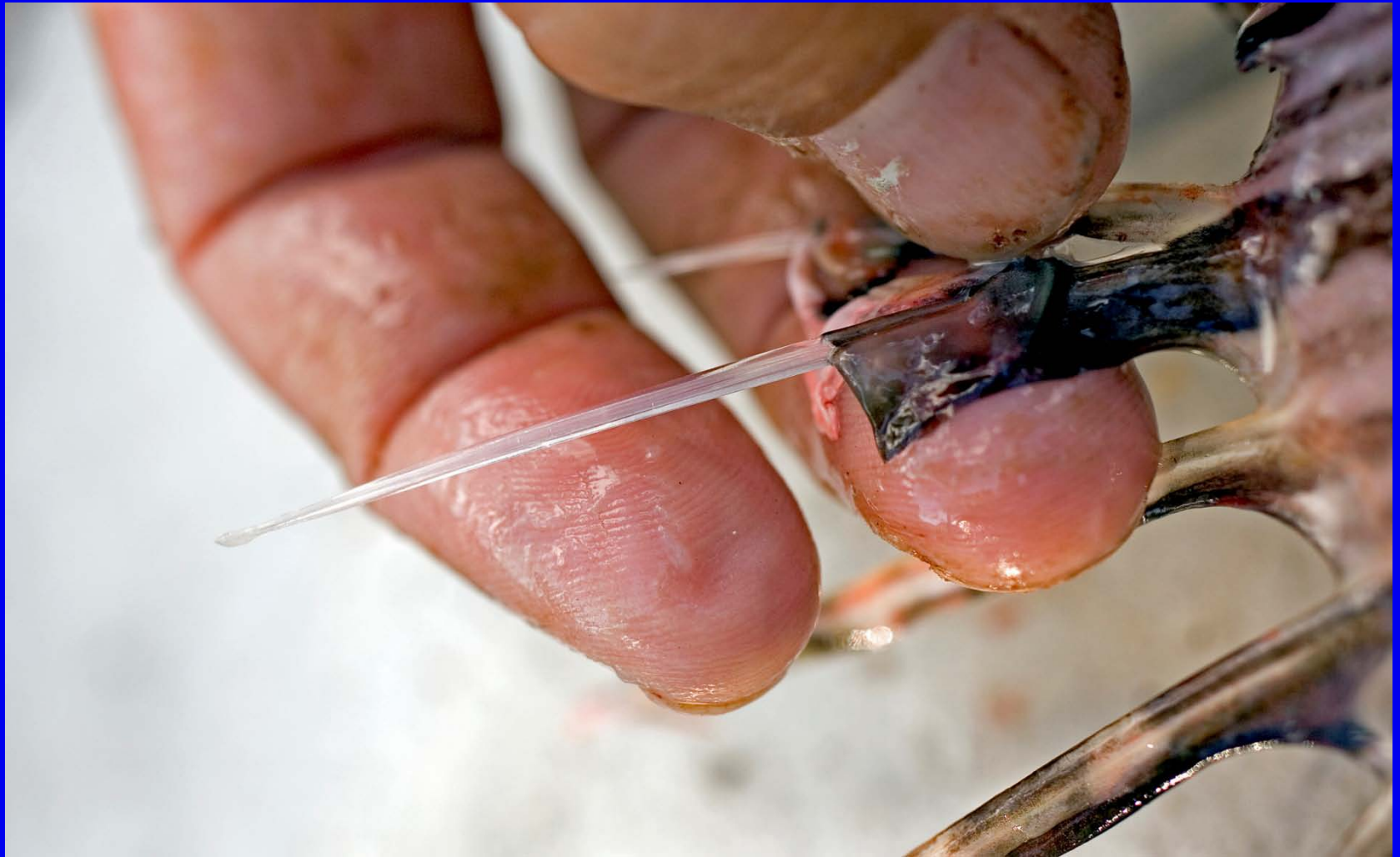






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Lionfish venomology





WYNDHAM NASSAU RESORT™
& CRYSTAL PALACE CASINO

WARNING

Lion Fish in area. Do not touch and if sighted report to Towel Booth. If stung or suspicion of stinging occurs, report immediately.



Lion Fish are brightly colored with venomous elongated dorsal fin spines, enlarged pectoral fins and a zebra stripe pattern. The fish tend to not be alarmed by humans, therefore rarely flee from area. If stung by one of the sharp spines a painful puncture will be felt. Rapid swelling will occur and movement of limbs may be difficult. Fatalities are rare, but can occur if not treated.





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Collection and handling...

a very tricky business!









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Results...





Western Atlantic Sizes

Smallest collected = 28mm

Largest collected = 474mm

Max size in native range ~ 320-350mm



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NOAA

Science for Coastal Communities

Center for Coastal Fisheries and Habitat Research

CCFHR

Daily increments





Collecting

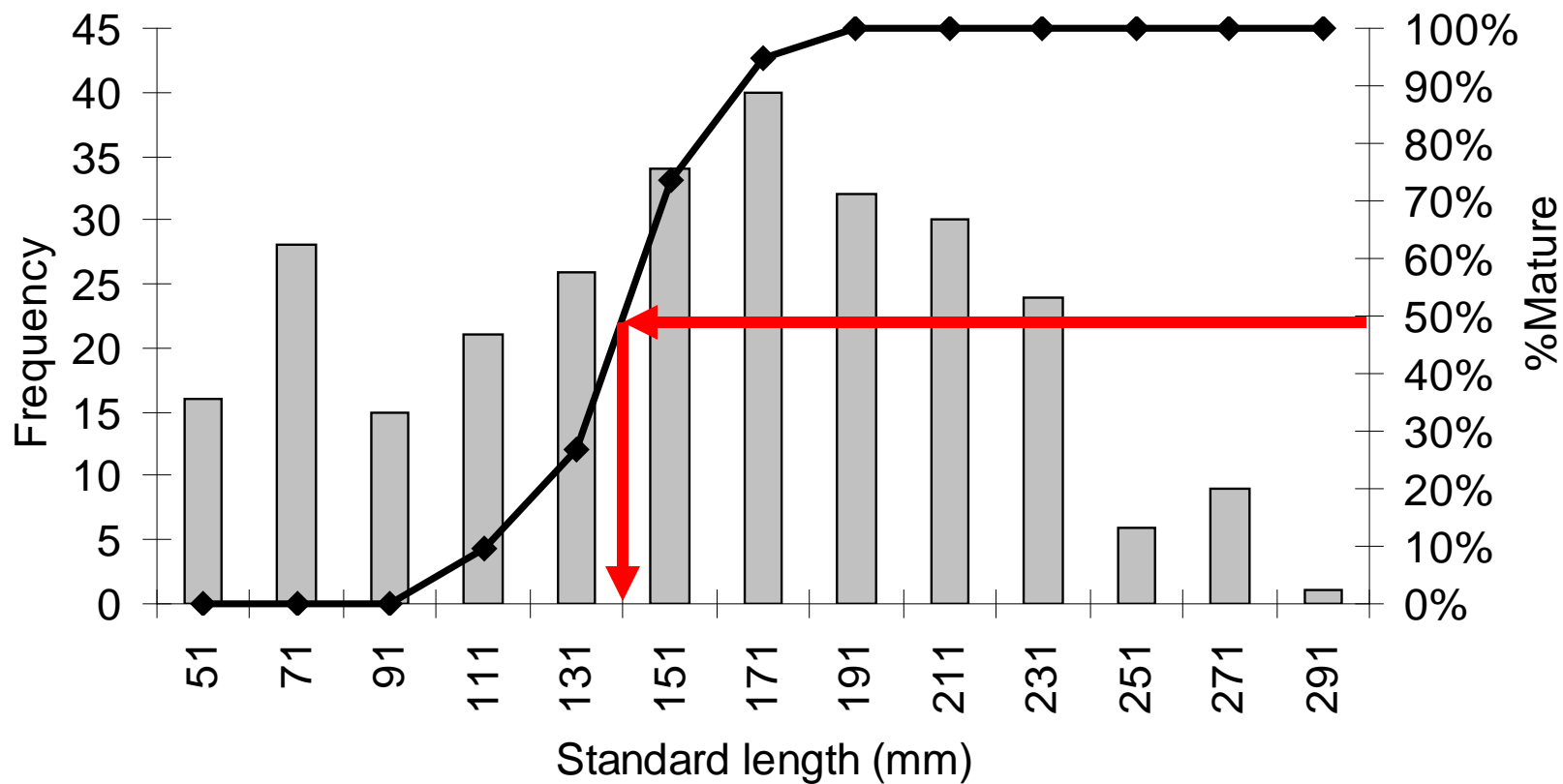
Early tagging data

- 86 fish tagged
- 14 recovered, 16 sighted
- All at same sites (no recovered fish had moved)
- Growth rates up to $.5\text{mm/day} = 197\text{mm/yr}$
- Growth rate is inversely related to size (bigger fish grow slower)

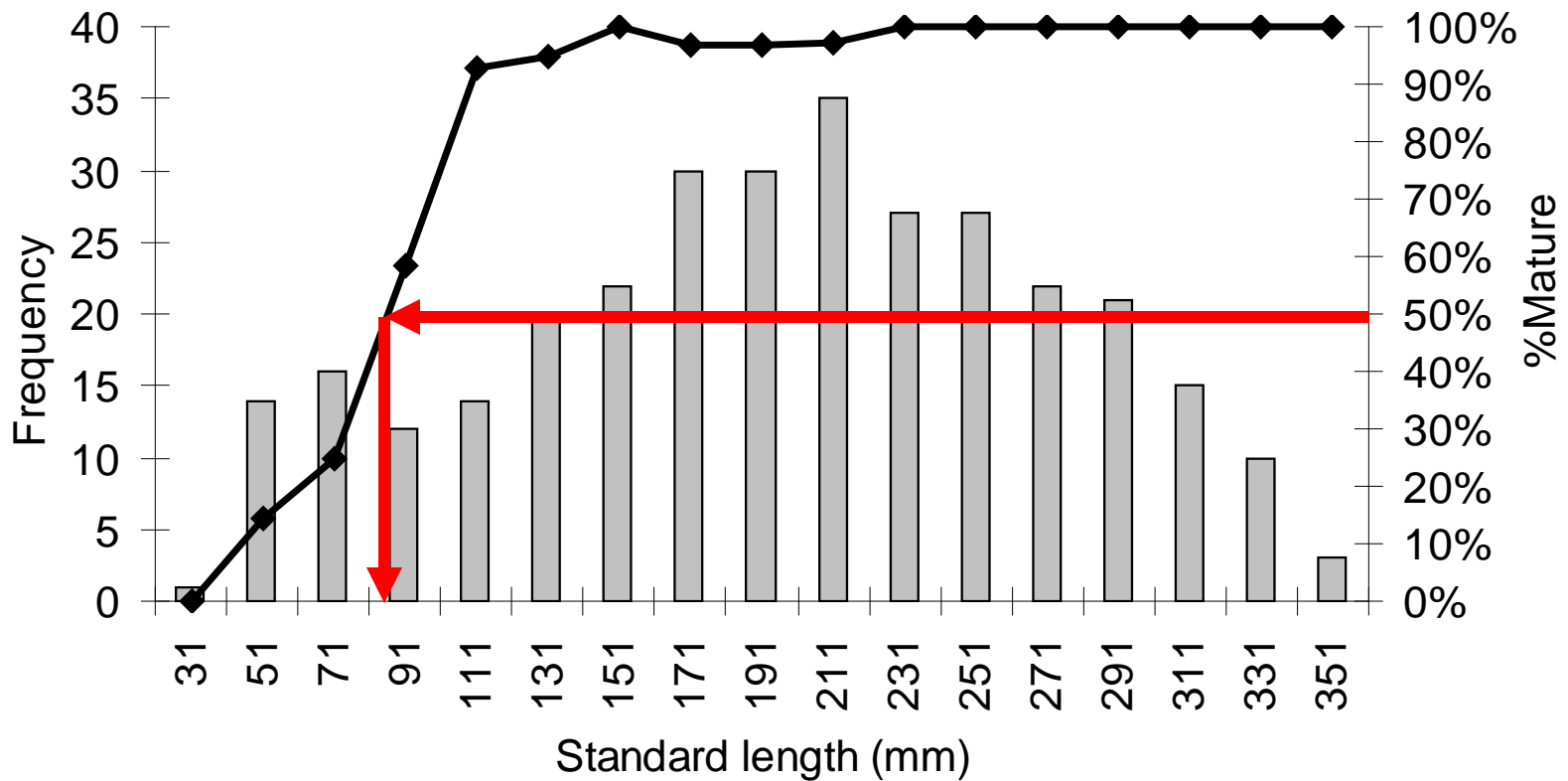
Data collection



Lionfish female length at maturity (n=282)



Lionfish male length at maturity (n=319)





NOAA

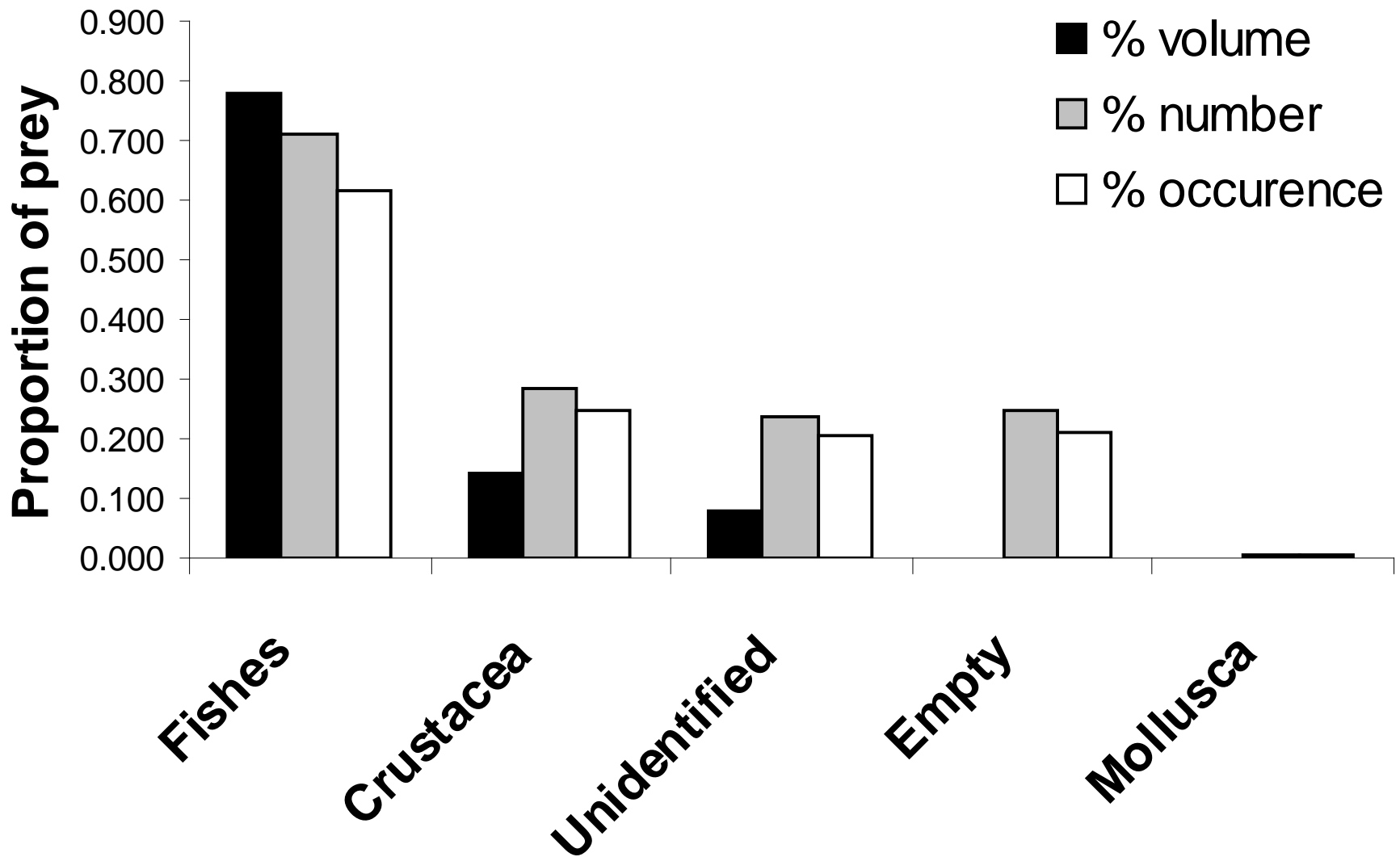
Science for Coastal Communities



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CCFHR

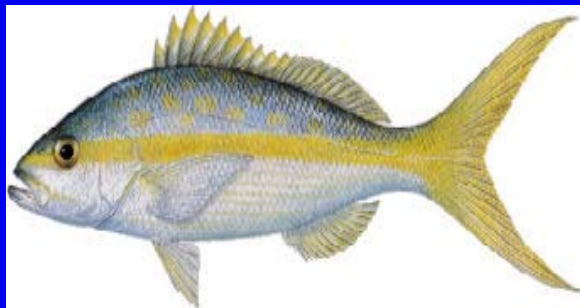
Lionfish stomach content analyses





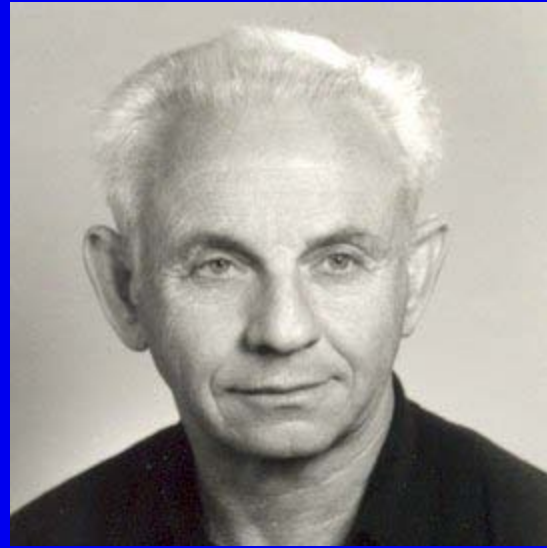
Lionfish Diet

- Over 50 species of reef fish identified from stomach contents
- Consume prey up to half their total length
- Fishes comprise more than 80% of the diet by volume
- Includes commercially and ecologically important species





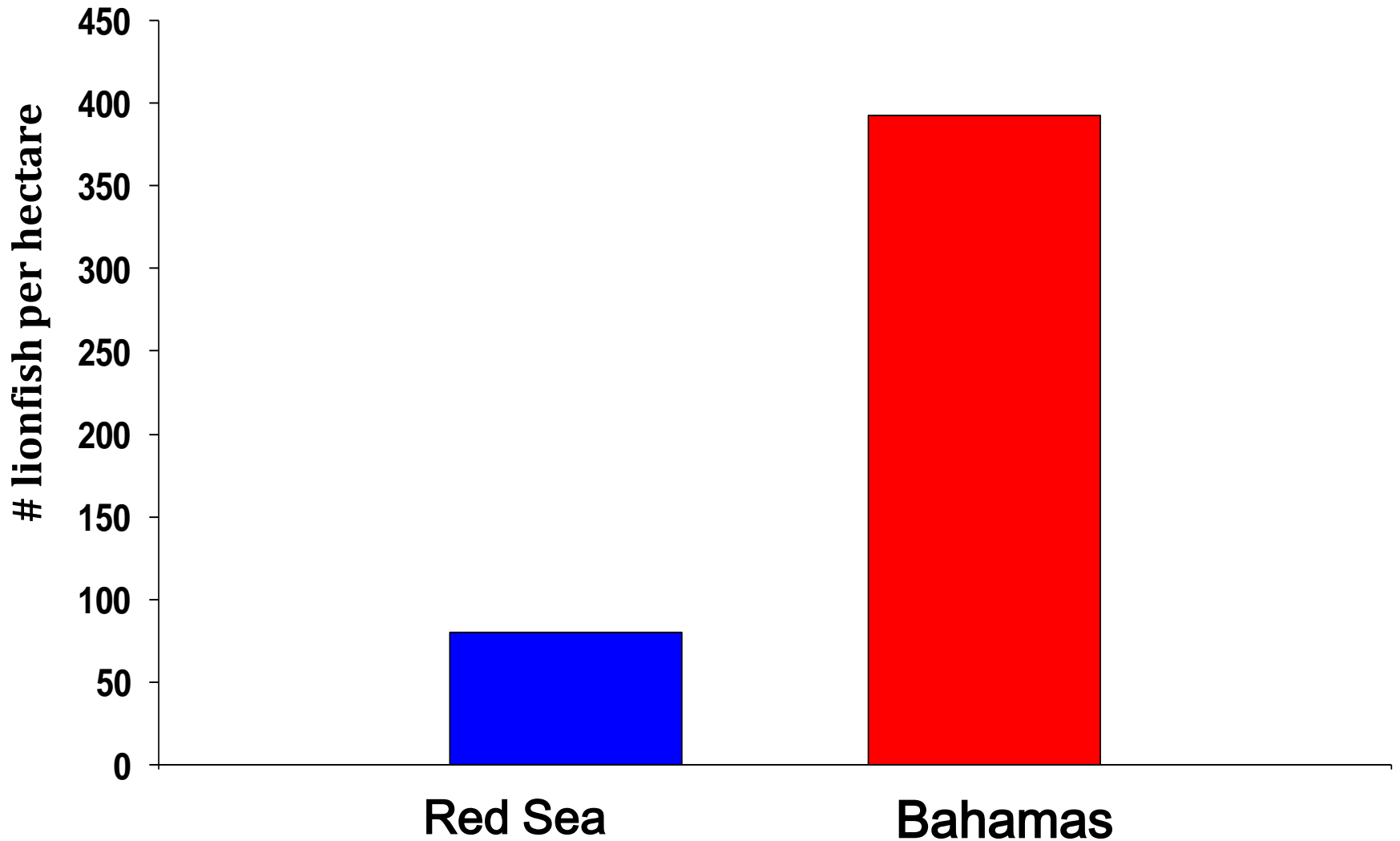
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Lev Fishelson, Tel Aviv University

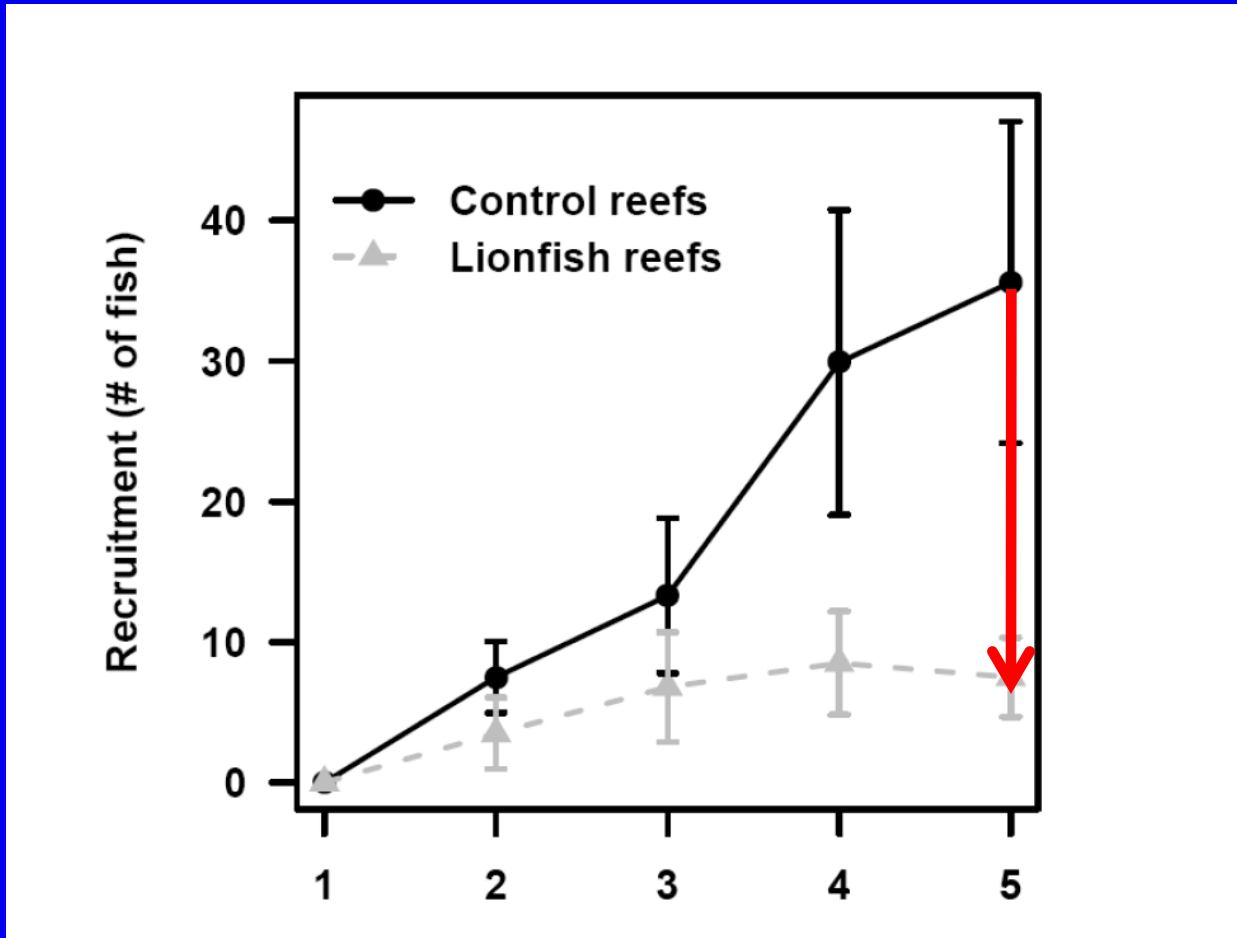
“...it is estimated that... [80 lionfish in 1km of reef] will consume over 50, 000 fish yr⁻¹. “ (625 fish per year or 2.8 kg per year)

Lionfish densities in the invaded range

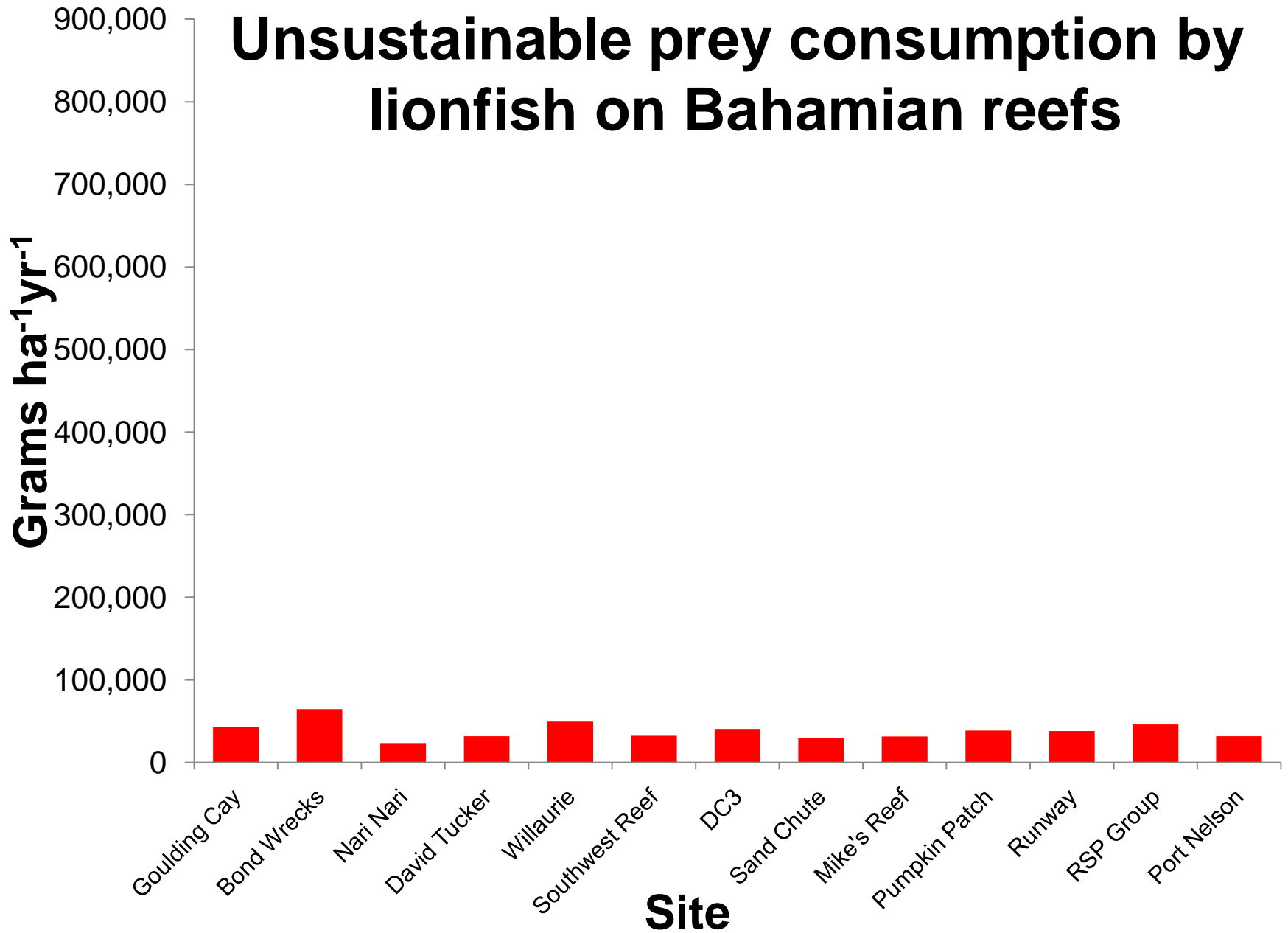


Green & Côté 2009

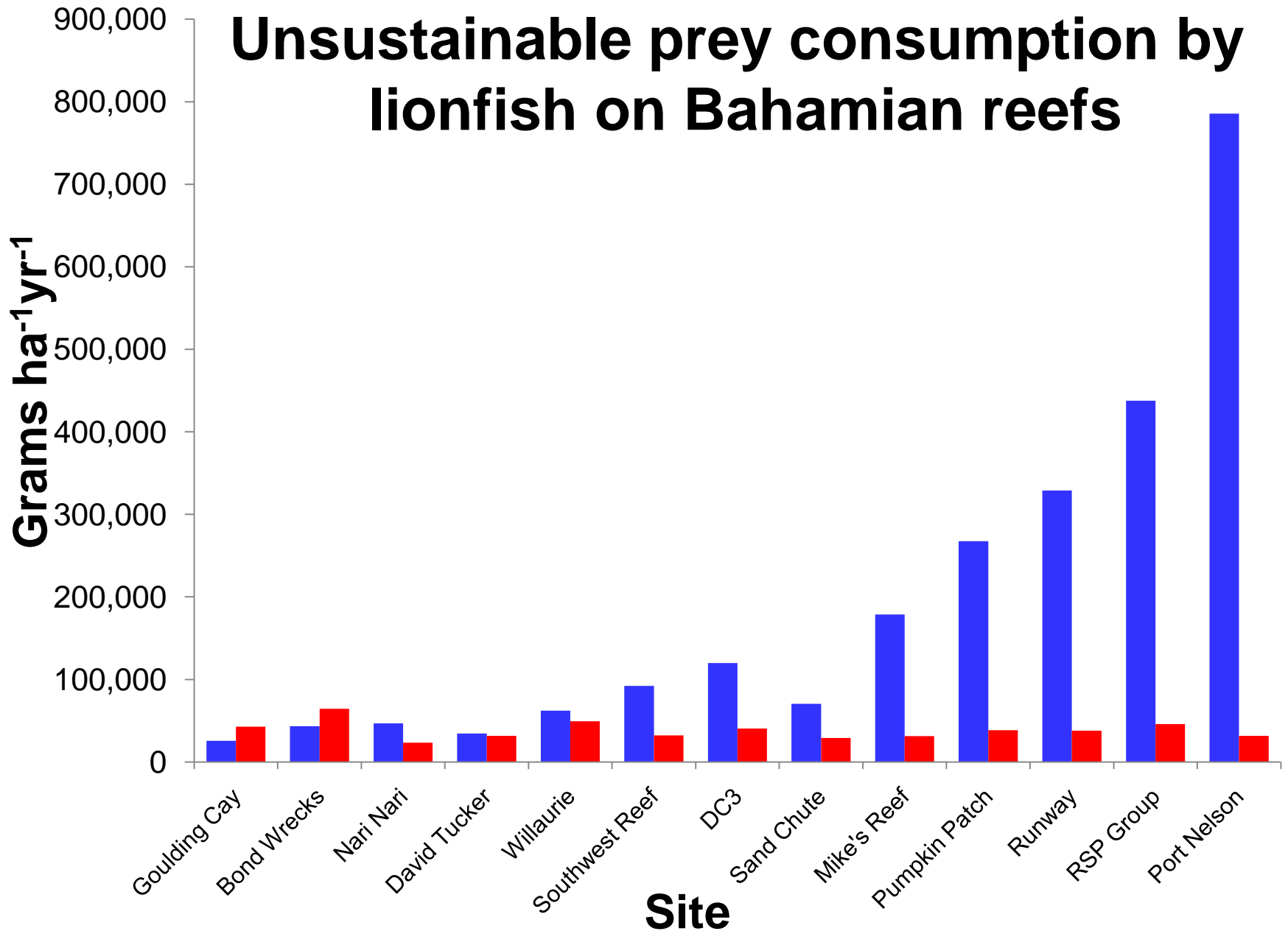
Lionfish reduce recruitment of Bahamian reef fish by 79%



Unsustainable prey consumption by lionfish on Bahamian reefs

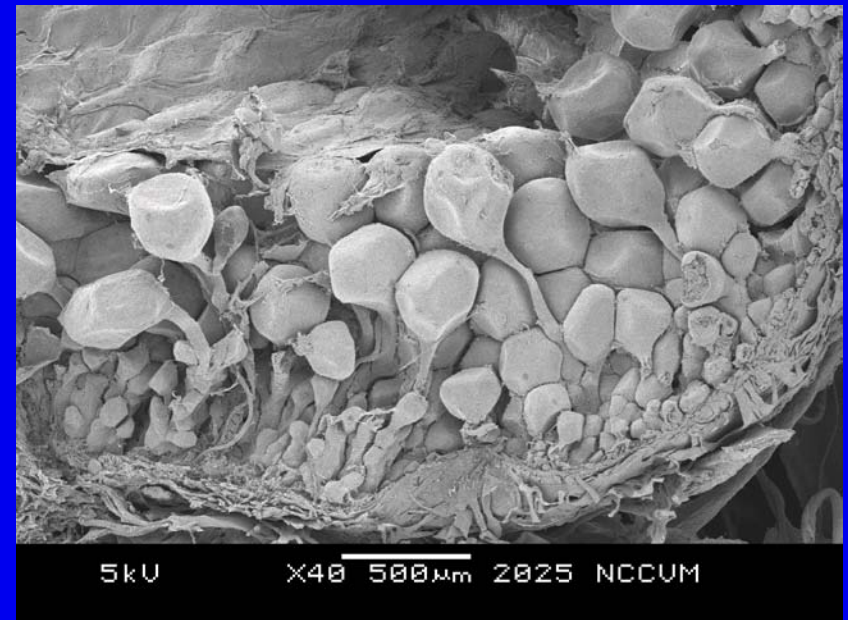


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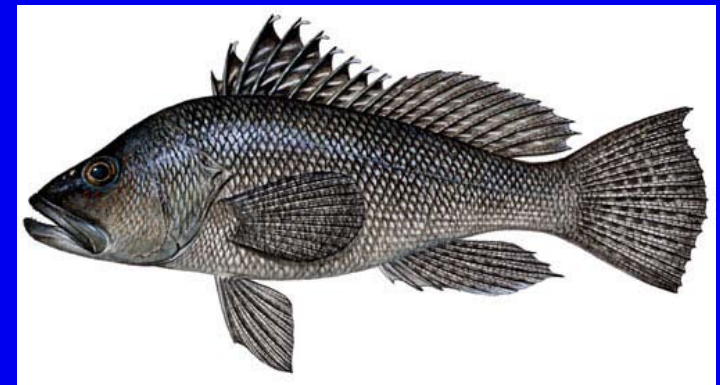
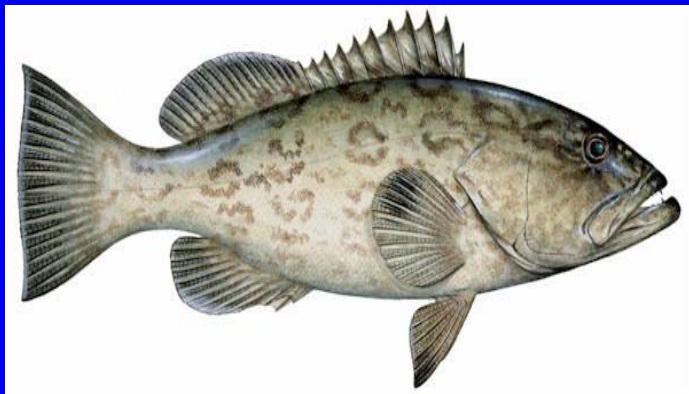
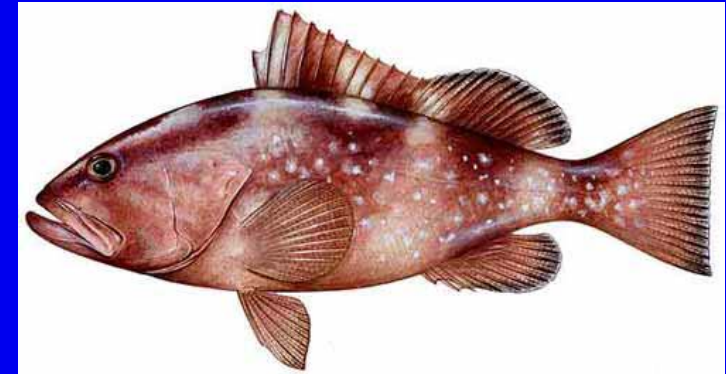


Lionfish reproduction

- Early reproduction
- Spawn in pairs
- Lionfish release two buoyant egg balls
- ~30,000 eggs per spawn

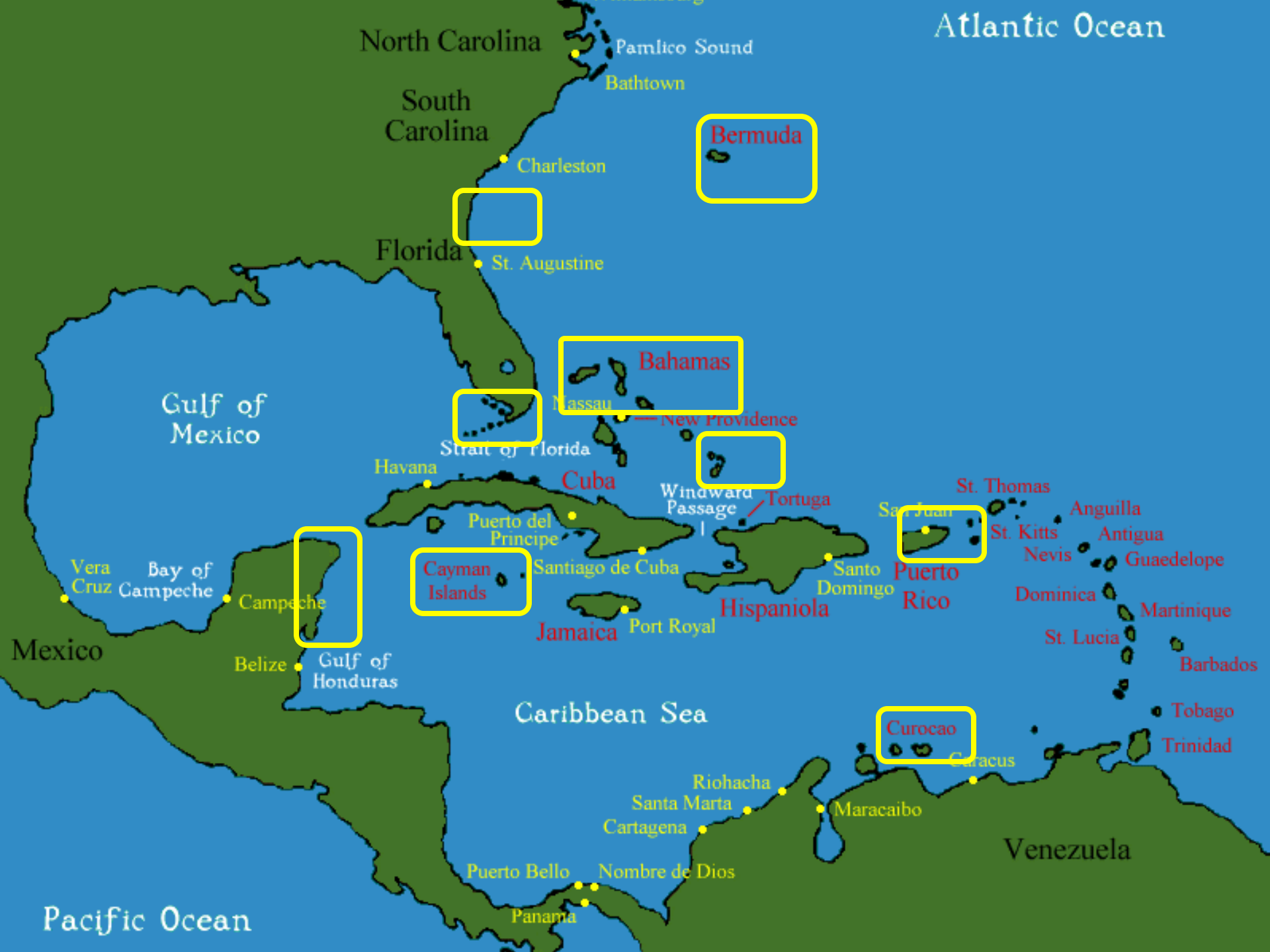


Predation experiments









Atlantic Ocean

North Carolina

Pamlico Sound
Bathtown

South Carolina
Charleston

Bermuda

Florida
St. Augustine

Gulf of Mexico

Bahamas
Nassau
New Providence

Havana
Straits of Florida

Cuba

Windward Passage
Tortuga

St. Thomas

Anguilla
Antigua

Vera Cruz
Bay of Campeche
Campeche

Cayman Islands
Santiago de Cuba

Jamaica
Port Royal

Hispaniola
Santo Domingo

Puerto Rico
San Juan

St. Kitts
Nevis
Guaedelope

Dominica
Martinique

St. Lucia
Barbados

Tobago
Trinidad

Mexico
Belize
Gulf of Honduras

Caribbean Sea

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Venezuela

Puerto Bello
Nombre de Dios

Panama

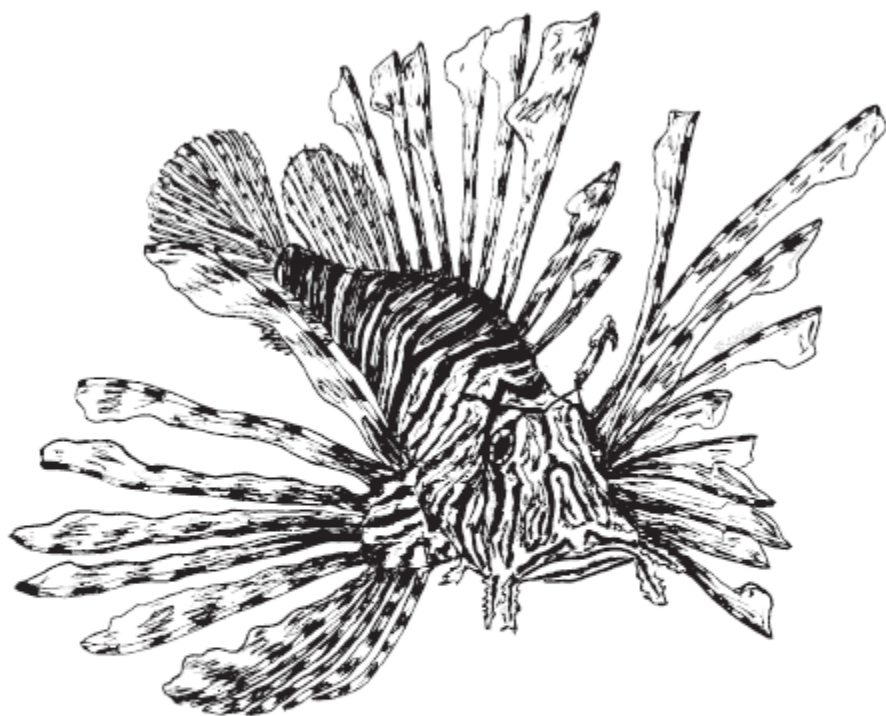
Pacific Ocean

Initial Stages (phase I) of Invasion

Early detection/rapid response framework:

- Awareness and education
- Reporting
- Responding
- Training
- Documenting
- Involvement of the local community





INVASIVE LIONFISH

**Report All
Sightings**
Note Location

REPORT SIGHTINGS TO

DNER (787) 999-2200 x-2690



(305) 852-0030 www.reef.org/lionfish

INVASIVE LIONFISH

REPORT SIGHTINGS AND NOTE LOCATION

PR DNER -(787) 999-2200 x-2690

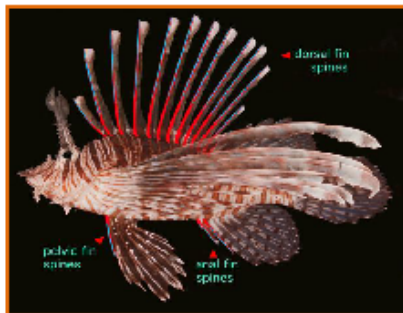


OR

(www.reef.org/lionfish)

Venomous Indo-Pacific lionfish are now regularly observed in waters of the southeast US and northern Caribbean. In November, 2008 the first lionfish sighting was confirmed in Puerto Rico.

Lionfish are not native to Atlantic waters and are having a negative impact on marine life.



HOW TO IDENTIFY LIONFISH

- Distinctive dark or maroon and white vertical stripes
- Fan-like pectoral fins
- 13- long separated dorsal spines
- Fleshy tentacles around mouth
- Adults can grow as large as 18" length

What to do if you sight a lionfish?

Note the location of the fish (including information such as GPS coordinates, dive site name, depth and characteristics of the surrounding habitat) and report to the hotline above.

SPINES ARE VENOMOUS & CAN CAUSE EXTREME PAIN!

DO NOT ATTEMPT TO CAPTURE FISH WITHOUT TRAINING

What to do if you are stung by a lionfish?

Stings from lionfish can be serious, and should not be taken lightly. If stung, immerse wound in non-scalding hot water until pain subsides and seek medical treatment.

Phase II of Invasion (Control)

Involvement of local community:

- **Best and latest information**
- **Training**
- **Permitting**
- **Collection/handling**
- **Reporting**
- **Disposal**



Challenges

“A fire is burning and we are waiting on the study...”

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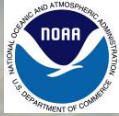
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- **Partnerships** – diverse, alienated, often adversarial groups must work together

Challenges

- **The invasion-** keeping up with the pace and scale





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Thank you!

Invasion Research in PR/USVI

“How effective is lionfish removal in minimizing impacts to native communities?”

- 16 sites
- Quantify fish community
- Characterize habitat
- Monitor for lionfish
- Apply removal treatments
(monthly, quarterly , bi-annually, control)

