#### Atlantic Coastal Fish Habitat Partnership Spring 2015 Meeting Summary

April 20 – 22, 2015 Hyatt Regency Pier Sixty-Six Crystal Room Ft. Lauderdale, FL

ACFHP Staff Present: Lisa Havel, Patrick Campfield (on telephone).

**Guests/Presenters:** Jeff Beal (FL FWCC, also ACFHP Science and Data Committee), David Gilliam (Nova Southeastern University), and Erin McDevitt (FLFWCC), Jessica Coakley (MAFMC), Jessica Graham (SARP), Steve Perry (EBTJV)

**SC Members Present:** Russ Babb (NJ), Lou Chiarella (NMFS-NE), Julie Devers (USFWS-NE), Bob Groskin (International Federation of Fly Fishers), Jimmy Johnson (NC), Wilson Laney (USFWS-SE), Gary Mahon (USGS SE Ecological Science Center, proxy for Rachel Muir), Callie McMunigal (USFWS-NE), January Murray (GA), Cheri Patterson (NH), Chris Powell (RI), Dawn McReynolds (NY), George Schuler (TNC), Kent Smith (FL), Caroly Shumway (Merrimac River Watershed Council), and Marek Topolski (MD).

SC Members On telephone: Ben Lorson (PA).

After introductions, three invited speakers provided presentations to the ACFHP Steering Committee on local fish habitat issues. Dr. Dave Gilliam from Nova Southeastern University gave a presentation on his lab's staghorn coral restoration efforts in South Florida. Erin McDevitt, from Florida FWCC presented on the effects of marine debris (focusing on derelict vessels, abandoned fishing gear, tires, and a case study on an abandoned net) on fish habitat. Jeff Beal, also from Florida FWCC, updated the Committee on lionfish invasion into the local estuaries, and the measures the state is taking to reduce their expansion.

Marek Topolski gave a presentation on estuarine acidification, and the Steering Committee committed to incorporating more of an estuarine acidification-focus both in science and data efforts and in the next Conservation Strategic Plan.

There was an update on the Mid-Atlantic Fishery Management Council habitat work from Jessica Coakley, and Jessica Graham presented the Southeast Aquatic Resources Partnership's current data and restoration projects.

Marek Topolski provided an update on the progress ACFHP and the ASMFC Artificial Reef Committee has made toward developing a proposal for offshore reef restoration and monitoring, and the Steering Committee agreed to continue pursuing these efforts and apply for the Mid-Atlantic Fishery Management Council funding once the Request for Proposals is released later this year.

National, Coastal, and Regional Fish Habitat Partnership updates were provided by Ryan Roberts, Lisa Havel, and Steve Perry, respectively. National updates include details on the status of the 501(c)(3) fund, rebranding and marketing, major items from the November and March Board meetings, and an overview of the NFHP and USFWS reports that were submitted earlier this year. Coastal updates included continued communication via conference calls and a newsletter four times per year, as well as a presentation provided by the ACFHP Coordinator at the 2014 Restore America's Estuaries Meeting on Coastal Fish Habitat Partnership accomplishments. Regional (Whitewater to Bluewater) updates included the status of the 2015 Multi-State Conservation Grant, our intention to participate in the Letter of Intent for the 2016

Multi-State Conservation Grant, and our fish passage and outreach work over the past six months.

Lou Chiarella updated the Committee on the National Marine Fisheries Service's National Recreational Fisheries Implementation Plan, which carried into discussions throughout the rest of the meeting.

The Steering Committee discussed the status of each task in the Implementation Plan, and because a majority of the tasks had been completed, new tasks were added for 2015. This discussion led into the status of the Conservation Strategic Plan, which operates from 2012 – 2016.

Julies Devers presented a review of the projects that were funded through US Fish and Wildlife Service funding (NFHP-USFWS) last year, and discussed the projects that ACFHP has funded since 2009. The projects recommended for funding for this year were discussed, and a subcommittee was formed to deliberate on updating the funding criteria. Julie Devers also gave an update on the North Atlantic Landscape Conservation Cooperative-funded decision support tool to assess aquatic habitats and threats in North Atlantic watersheds. The winter flounder assessment report is in the process of being written, and the river herring assessment is likely going to move forward using The Nature Conservancy's anadromous fish prioritization data.

Caroly Shumway updated the Committee on the river herring habitat restoration strategies final report due to the National Fish and Wildlife Foundation on April 30<sup>th</sup>. She also led the discussion on science and data needs for the year, which will include an in-person meeting in the summer.

Pat Campfield shared a first draft of the ACFHP Business Plan with the Committee, and after the subcommittee reviews it, he will distribute it to the Steering Committee for comments.

The Steering Committee voted the North Carolina Coastal Federation into the Partnership after Christine Miller, Assistant Director, gave a presentation on the history and accomplishments of the Federation.

On the last day of the meeting the Steering Committee visited four restoration sites within the Lake Worth Lagoon, including Grassy Flats, a site that ACFHP endorsed in 2012.

#### Action Items Summary (page numbers refer to the meeting notes)

Page 12

Action item: Lisa will contact Lisa Debruyckere to see if we can discuss OA during the next coastal FHP call, and see if we can bring someone in to talk about it. We could then see if the collective group would want to move forward on this issue.

#### Page 14

Action item: Lisa will like the ACFHP website to the habitat committee papers on offshore wind, dredging, etc.

Action item: Lisa will follow up on the possibility of having Roger Pugliese present at the fall 2015 meeting.

Action item: Kent and Lisa will look into large grants for the coastal FHPs to apply for together.

#### Page 24

Action item: Kent will contact Brad and Margaret to discuss working with ACFHP.

Action item: Lisa will share the link to Lou's presentation with the steering committee.

Action item: Lisa will work with Kent to invite all ACFHP partners to the fall 2015 meeting. A call

will be placed in August to further discuss this.

#### Page 26

Action item: Chris will look into replacing all conservation mooring buoys with the green buoys.

#### Page 27

Action item: The subcommittee on coastal threats action item needs to get together to discuss the desired product. Wilson will contact Lisa to set this up.

Action item: The subcommittee on coastal threat will consider Mark's suggestion, found in the text.

#### Page 28

Action item: Cheri will continue to move forward with the fish passage action items, and get more information, and compile it in a form useful to the committee.

#### Page 30

Action item: Dawn will continue to analyze the data from the survey and will reach out to people who responded to the survey and determine why they gave certain answers to some of the questions.

#### Page 33

Action item: Dawn will reword Restoration Objective 2 Action 1 Task 2 (Compile list of projects by survey of the committee and/or partners (NEP state management plants etc.) on what subregional priority habitats they are focusing and specifics on restoration sites) to reflect the actual work that has been carried out.

#### Page 37

Action item: Lisa will work with Chris on updating the status of the tasks and incorporating the new tasks that are being addressed. Chris will present the updated version at the fall meeting.

#### Page 43

Action item: All Steering Committee members should submit their top 3 answers to the question: What do we need from the Partnership that we can't do well without it? to Lisa at your earliest convenience.

#### Page 45

Action item: Lisa will add links to the one-page description of each project to the map.

Action item: Lisa will update all of the on-the-ground project one-pages to replace plans with accomplishments (including photographs).

#### Page 47

Action item: Lisa will include Russ Babb and January Murray in the reviews this year.

#### Page 49

Action item: Lisa will contact the Evaluation Criteria subcommittee to address the rewriting of the criteria: George, Dawn, Jimmy, Mark, Kent, and Julie.

#### Page 50

Action item: Lisa will work with Caroly and Marek to find the information needed for the Whitewater to Bluewater overlapping areas and common priority areas.

#### Page 56

Action item: Lisa will share the images and branding with the SC after the May 28<sup>th</sup> FHP call.

#### Page 63

Action item: Caroly will contact the Science and Data Committee to see if they are still interested in serving on the Committee.

#### Page 64

Action item: Everyone on the SC should go through the action items from last meeting (Appendix 1) and let Lisa know the status of the ones that you are involved in.

# Why we are here!

From USA Today - TODAY!

Opinion page

"In parched California, the water wars boil over"

Last year, delta (Sacramento-San Joaquin River Delta) overflows for fish habitat totaled 244.4 billion gallons, or enough water for 6.7 million people's annual needs......

A good way to improve supply would be to further reduce environmental diversions...... Moving more water south to parched farms and communities would help save jobs, protect food supplies and preserver groundwater.

Times like these require shared sacrifice, and some smelt might have to make the ultimate one.

**USA Today's View** 

There is an opposing view from the Golden State Salmon Association

# Staghorn Coral Nurseries: Species Recovery and Coral Reef Restoration David Gilliam, PhD and

**CRRAM Lab Past and Present Research Assistants** 





NSU Oceanographic Center





## Florida Reef Tract

- 358 miles: Dry
   Tortugas
   National Park to
   the St. Lucie
   Inlet in Martin
   County.
- Only state in the continental United States to have extensive shallow coral reefs near its coast.

# St. Lucie Inlet / Port St. Lucie Martin Lake Worth Inlet / Port of Palm Beach Palm Beach Palm Beach Broward Fort Lauderdale, Port Everglades Baker's Haulover Inlet Miami-Dade Miami. Government Cut/ Port of Miami Everglades **National Park** National

# Southeast Florida Coral Reefs

- **4 Counties**
- Miami-Dade
- Broward
- Palm Beach
- Martin



Map by B. Walker

# **Threats to Reef Health**













# Why Are Coral Reefs So Important?

Habitat & Fisheries

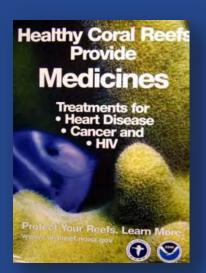
(recreational and commercial)



## **Coastal Protection**



Food & Medicine



## What Can We Do!?

Investigate and Promote Species Recovery & Reef Restoration

NSU Staghorn Coral (*Acropora cervicornis*)

Coral Nursery Project and Initiative













**Nursery establishment** 



Nursery grow-out



Coral Nurseries – species recovery and reef restoration and tool



Outplanting



Reproduction



**Outplanting growth** 

# Staghorn Coral (*Acropora cervicornis*) Importance

Major contributor to Caribbean reef complexity and fisheries habitat

- Branching coral
- High growth rate
- Provides complex living structure



# **Staghorn Coral Reproduction**

### Sexual

- Simultaneous hermaphrodite
- After the full moons of July or August
- Increase genetic diversity

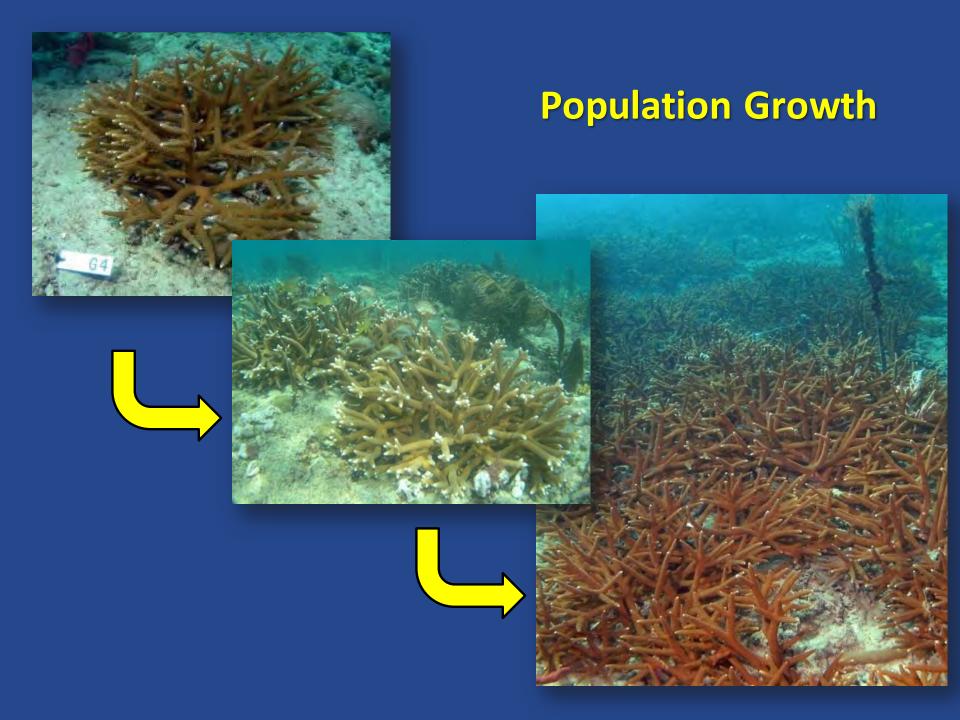
#### Asexual

- Fragmentation (most common)
- Need suitable substrate
- May cause a decline in genetic diversity



Mass Spawning - 15 Aug 2014





# **Species Status**

- Dramatic population decreases in the 1970's and 1980's
- Listed as a Threatened species under the ESA in May 2006 and was petitioned to be up-listed to Endangered status
- Recovery is inhibited by dispersed populations of colonies which prevents successful sexual reproduction





# Why Staghorn Coral Nurseries?

- Reef keystone species fisheries habitat
- Threatened species
- Traits appropriate for nursery efforts
  - Fast growing, branching species
  - Reproduces sexually and asexually (fragmentation)

#### **Restoration Results**

- Reef Community Scale
- Self-sustaining fragmentation & increased sexual reproduction
- Measurable 'See-able'
- Community Involvement



Collect 3- 10 cm donor colony branch clippings from wild colonies







3cm fragments are attached to a nursery structure





# Fragments grow into nursery colonies

Nursery colonies are clipped to create more fragments

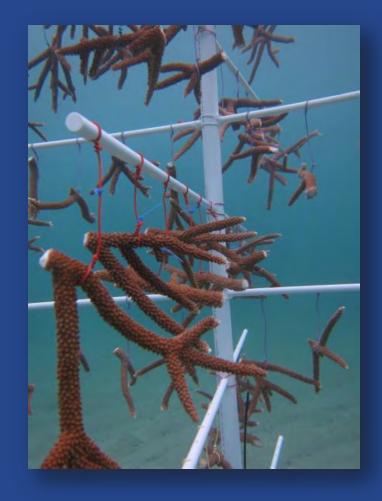


**Photos by Tim Calver ©** 









New nursery fragments are relocated within the nursery to expand the nursery population



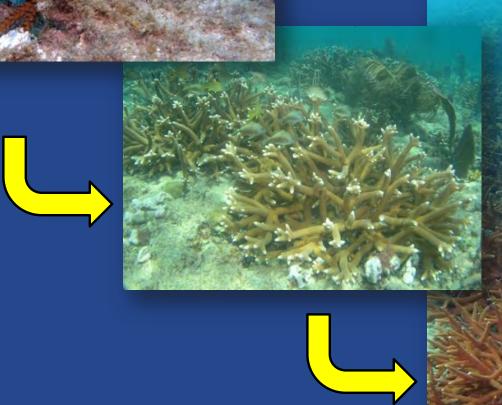
New nursery fragments are outplanted onto the natural reef to promote restoration







# **Population Growth**



# **Nursery Monitoring and Maintenance**

- Monitoring
  - Survival
  - Branching events
  - Linear growth
  - Tissue extension
- Maintenance
  - Cleaning
  - Predator Removal
  - Disease Pruning





# **Nursery Construction**

# Platform Designs

- Modules
- Arrays





# Floating Designs

- Trees
- Lines





# Our history...and where we are today

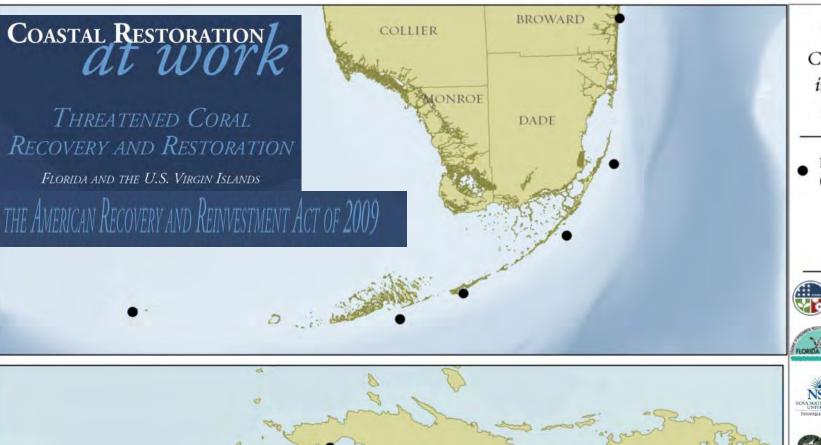
- 2007: Staghorn Restoration Project funded by the TNC-NOAA Community-Based Restoration Project
  - Pilot Nursery establishment and outplanting
- 2009: TNC -ARRA- Threatened Coral Recovery in Florida and the U.S. Virgin Islands
  - Nursery expansion, outplanting, and outreach
- <u>Current</u>: TNC-NOAA Coral Reef Conservation Program; CNI Donations (DiveBar, Indiegogo, and individuals), LBTS

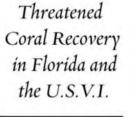
Nursery efforts in Florida and US Caribbean are a partnership











Nursery (Approx. Location)

























Copyright 2009 The Nature Conservancy Prepared by J. E. Knowles Data FL Counties (FGDL) Zones (RSMAS/TNC)

Parks (FNAI)



# **Initial collection**

**30 Donor Colonies** 



270 - 3 cm clippings



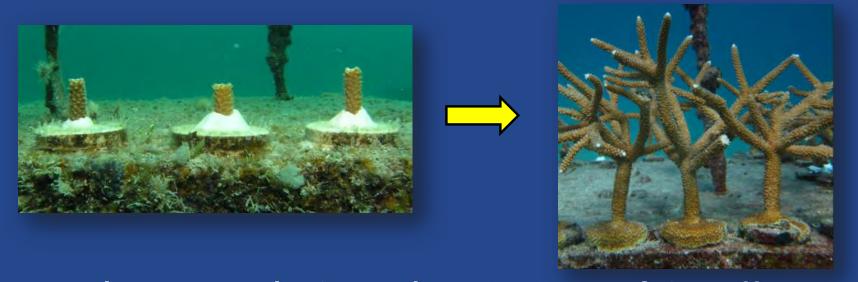




Total linear extension of tissue = 810 cm

# **Nursery production**

Current status = ~2,000 colonies - avg colony = 25 cm of tissue = ~50,000 cm of tissue !! - 6,000% increase



Total = >4500 colonies and >200,000 cm of tissue!! (over 1 mile of tissue!)

1-Year production = ~1,000% increase in tissue

# **Restoration - outplanting**

- Sites = 14 all offshore Broward County
- Colonies = ~4,000
- Area = ~1,200 m² (about ½ a football field)





Annual capacity = >2,000 colonies

# **Nursery production**

(Liz Larson MS, Zach Ostroff MS, Cody Bliss MS, and Kate Correia)

- We can grow staghorn coral!
- Nursery colonies grow / survive similar to natural colonies
- Fragmenting is best when water temps are cooler (late fall-late spring)
- Predator removal increases nursery colony survival and health
- Monthly maintenance is optimal for predator removal, structure upkeep, and colony pruning







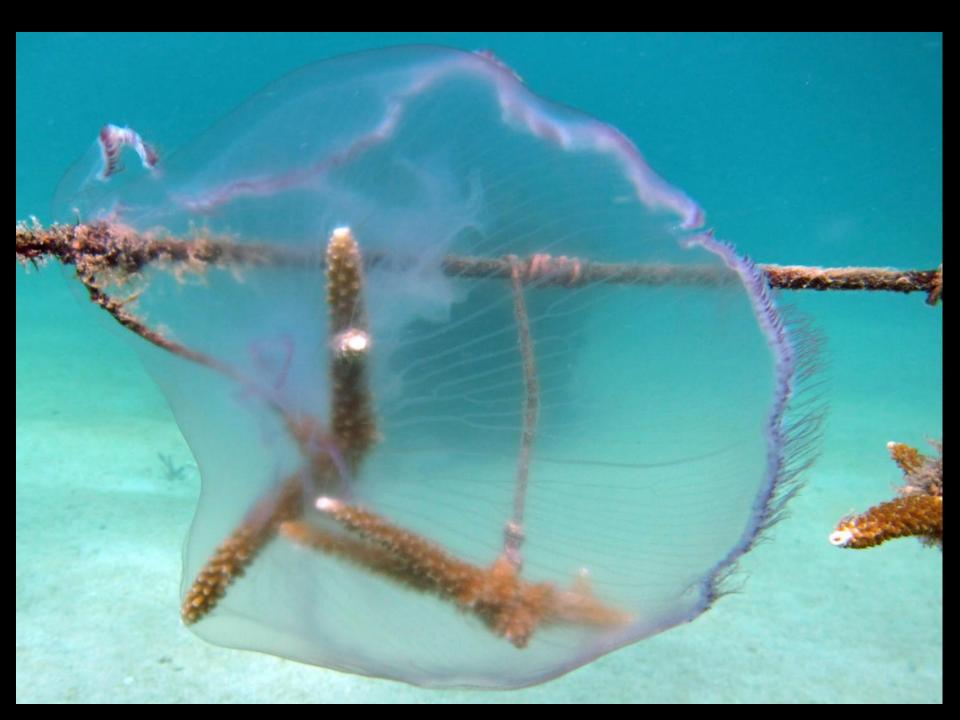
# **Nursery production**

(Liz Larson MS, Zach Ostroff MS, Cody Bliss MS, and Kate Correia)

- Predation and disease are reduced on floating-line platforms
- Nursery colonies can be relocated between nurseries (Broward corals do really well!)
- Nursery colonies can be reproductive (spawning observed 2014)
- Expect the unexpected













### **Restoration - outplanting**

(Liz Larson MS – PhD Candidate)

- Site selection matters
- Outplanted colony survival / growth is similar to natural colonies
- Outplanted colonies quickly create habitat for fish and other reef organisms
- Outplanted colonies often populate surrounding areas through fragmentation
- Predation / disease are present but storms / waves cause most outplanted colony mortality





# Current and future research Nursery production

- Are colony growth rates similar on all nursery structures?
- What is causing disease and does it spread?
- At what size and/or age will outplanted nursery colonies spawn?



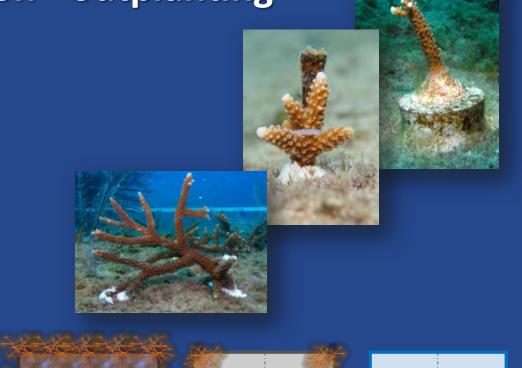


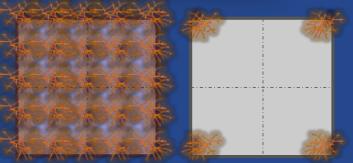




# Current and future research Restoration - outplanting

- What defines good outplant sites?
- How should corals be outplanted? Size?
   Technique? Spacing (density)?
- What is causing disease and does it spread?
- What size and/or age do outplant colonies spawn?







Medium Density 2 m spacing

Low Density
Isolated Colony

### Outreach, education, and media

(Liz Larson MS, Kate Correia, Cody Bliss MS, and Mauricio Lopez-Padierna)

- On-line articles / videos / social media = 15
- Print articles = 11
- TV news stories = 5 (local and national)
- Public and group lectures /
   Outreach events = 25
- Scientific presentations = 15
- Nursery field trips = 7



#### **Future Plans**

- Maintain Nursery Population
- ♠Outplant Population –♠colonies/year and add new sites
  - 2015-2016 = 2,250 colonies within 5 or 6 sites
- Research
  - Improve nursery success and outplant success
  - Evaluate species recovery and restoration benefits
  - Reef restoration ecology and in particular staghorn coral population ecology
- Increase Outreach and Support!!

## The Coral Nursery Initiative



Website: www.nova.edu/ocean/coralnursery/

Facebook: www.facebook.com/NSUCoralNursery

Twitter: twitter.com/NSUCoralNursery

YouTube Video: youtu.be/3vK\_9krsXTY

# Thanks!

# Many hard-working CRRAM Lab Research Assistants!

Non-CRRAM Photo credits: Kirk Kilfoyle MS, Tim Carver,

Heather Weeter









Lauderdale By the Sea





**CNI Donations** 

#### **Marine Debris Threats to SE Florida Habitats**



Atlantic Coast Fish Habitat Partnership Steering Committee Meeting Ft. Lauderdale, FL - April 20, 2015



**Erin McDevitt,** Florida Fish and Wildlife Conservation Commission, Marine and Estuarine Habitat Management

### What is marine debris?

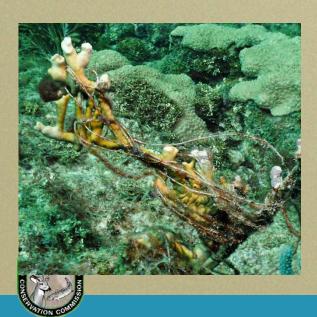
 Marine debris is human-created waste that has deliberately or accidentally been released into the ocean and remains in the ocean or ends-up on beaches and coastlines.





# Types of marine debris

- Consumer debris
- Fishing and Diving
- Household
- Boating
- Microplastics
- Derelict Vessels
- Other









# Harmful impacts of marine debris?



### Threats to Habitats

- Derelict Vessels
- Abandoned Fishing Gear
- Tires
- "Other"- debris posing immediate threats to people, wildlife and/or habitats



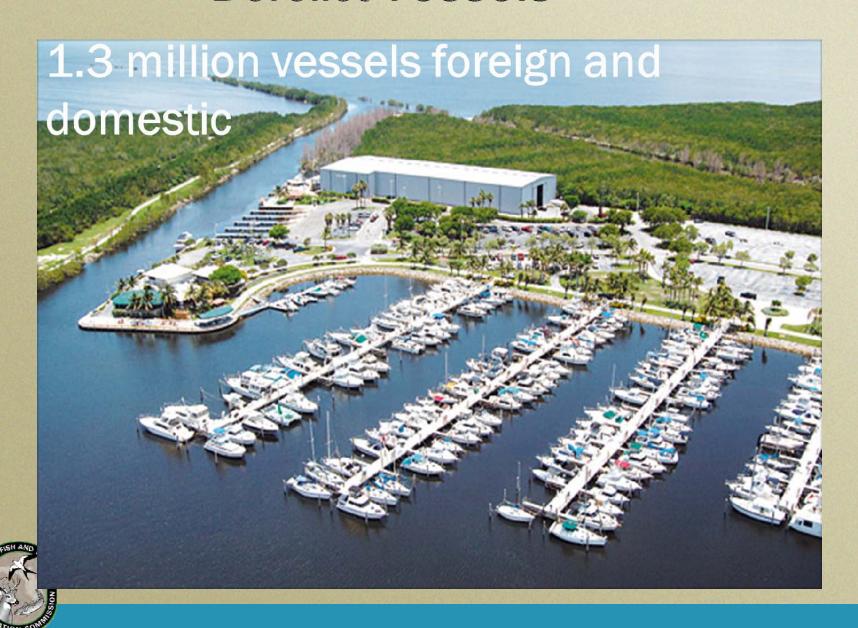
## Threats to Habitats

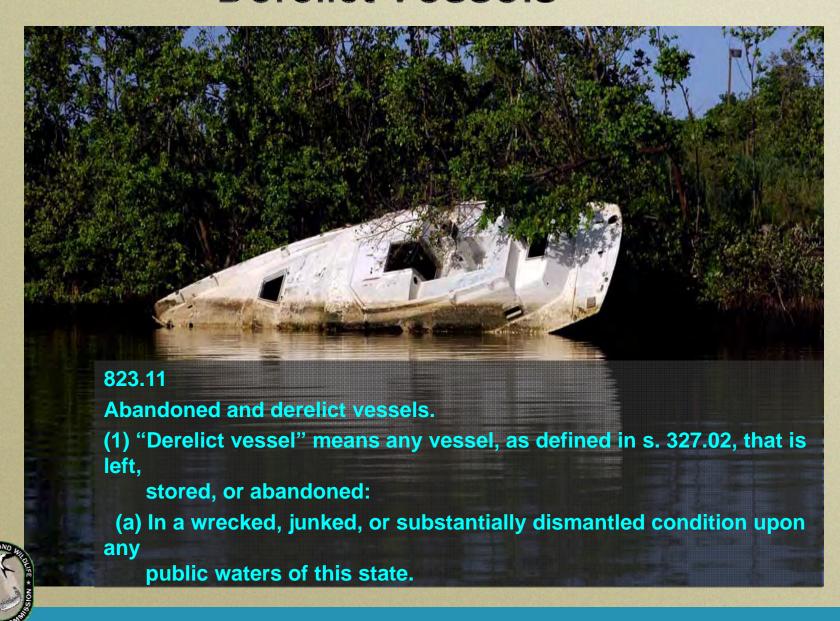
Derelict

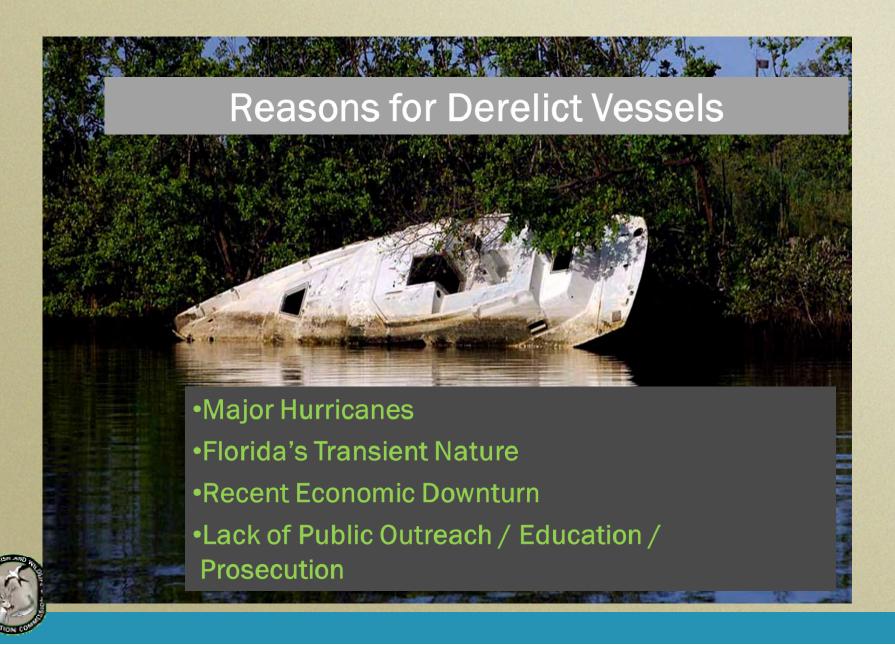




Phil Horning, NOAA Marine Debris Workshop, 2014,St.
Petersburg, FL







#### **Habitat Impacts:**

- Initial impact
- Prolonged presence
- Movement from wind and waves
- Release of hazardous materials (oil, fuel, etc)

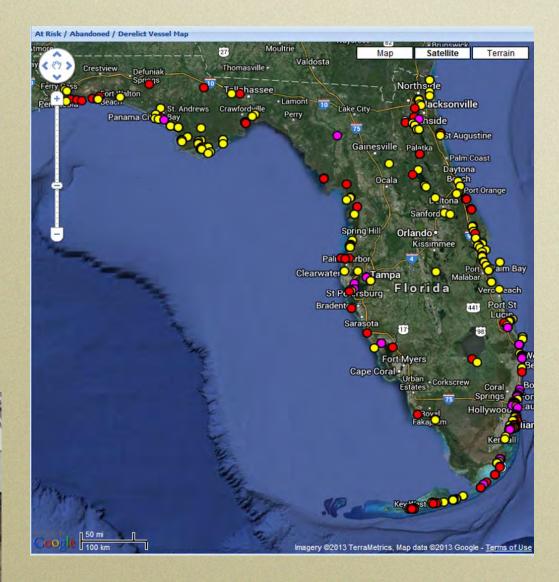




#### Challenges:

- Too many!
  - Currently over 300 known DV's
- Costly
  - Current estimate = \$1.5 million
- Legal issues
  - Multiple jurisdiction
  - > Higher priorities







### Threats to Habitats

Abandoned
 Fishing Gear
 (traps)



abrielle Renchen, FWC, NOAA Marine Debris Workshop, 2014,
St. Petersburg, FL

#### Types:

- Hook and Line
  - > 2.4 million recreational anglers
  - ➤ Commercial anglers (?)
    - o ~10,000 fishermen with SPL



Photo Credit: CSA International, In





- Commercial Trap Fisheries
  - ➤ Lobster (~477,000 traps)
  - ➤ Stone Crab (~1.1 million traps)
  - ➤ Blue Crab (~265,000 traps)





### Examples:

Non-fishing lobster trap



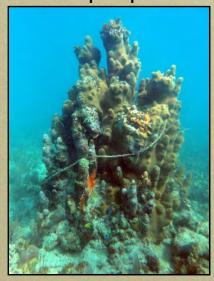
Monofilament



Trap throat/lid



Trap rope



Concrete trap slabs



Ghost fishing stone crab trap



#### Causes:

- Cut-offs
- Hurricanes
- Theft
- Abandoned
- Intentional discard
- Gear degradation



Photo Credit: Hulltruth.com

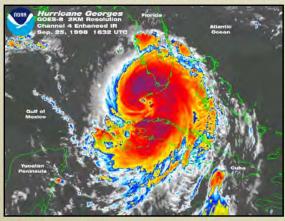


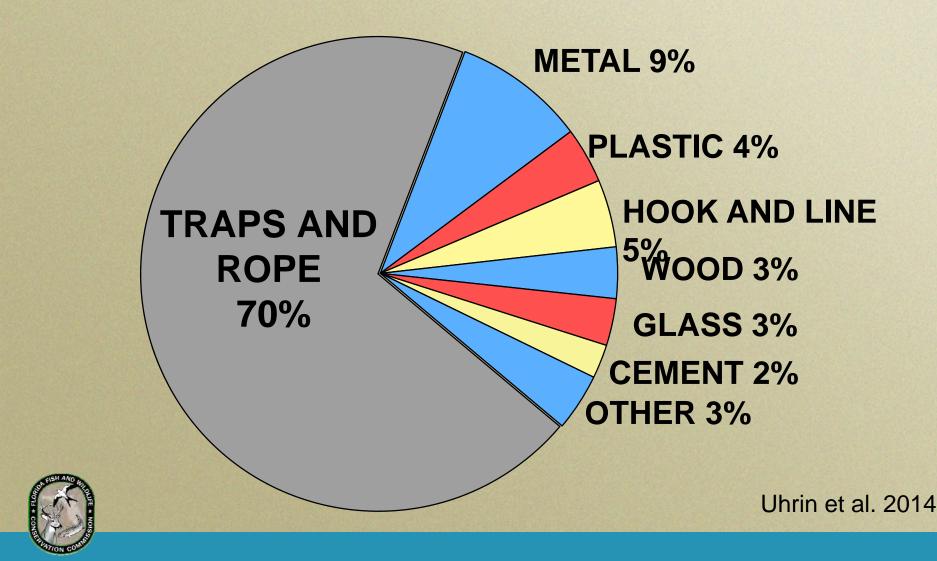
Photo Credit: NOAA



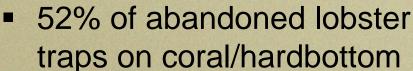




Traps dominate submerged debris in FL Keys



#### Habitat Impacts:



Trap movement causes
 habitat loss in
 coral/hardbottom (Lewis et
 al. 2009) and seagrass
 (Uhrin et al. 2005) habitats







### Wildlife Impacts:

- Ghost fishing- lost traps continue to fish
  - ➤ Estimated 650,000 lobsters killed in ghost traps annually (Butler and Matthews 2015)



Wood: 1.4yrs



Wire: 1.7 yrs





#### Successes:

- FWC Trap Retrieval Program
  - > Established in 1985
  - Allows volunteers or FWC contracted groups to participate
  - > Supported by trap fishery fees:
- Lobster Trap Certificate Progran
  - ➤ Reduced # lobster traps
    - **1991: 939,000**
    - Present: 477,000



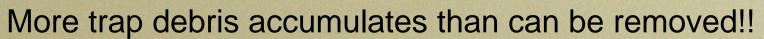


#### Challenges

- Mainly recovers buoyed traps:
  - >~1,700 lobster traps
  - >~2% of lost lobster
- Subfrienderged debris
  - ➤ Location / removal is difficult
  - **▶**Limited funding
  - > Few programs
  - ➤ About 85,000 ghost traps
  - ➤ About 1,000,000 non-fishing traps



os





### Threats to Habitats

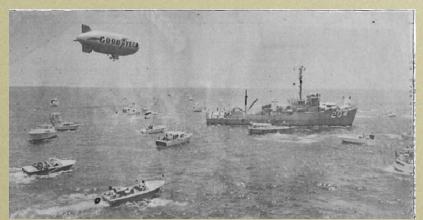
The Osbourne Tire Reef, Ft. Lauderdale





Dr. Pat Quinn, Broward County, Artificial Reef Summit, 2014

Approx. 2 million tires intentionally dumped offshore in 70's and 80's with intent to enhance fisheries.











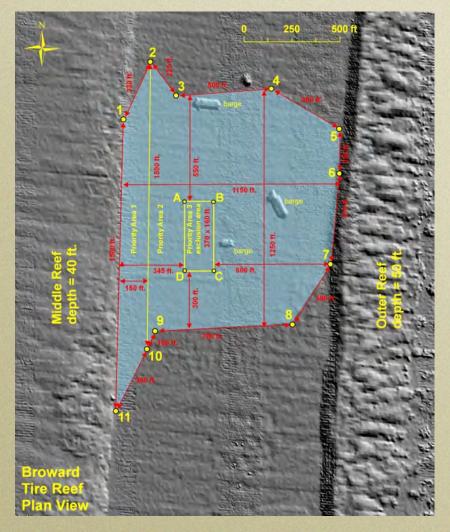
- Tires do not make good habitat
- Corals and other benthic organisms do not readily grown on tires
- Tires are unstable and are now dispersed over large area
- Tires have caused physical damage to reefs





#### **Broward County field surveys:**

- Defined the bounds of the tire field and identified priority clean-up locations
- Approx. 700,000 tires over
   36 acrea area
- Estimated cost to remove
   700,000 tires = \$49 million





#### Removal Effort:

- •Florida Dept. Environmental Protection Division of Waste Management (Florida Legislature=\$2.2 million)
- Broward County Environmental Protection and Growth Management Department, Port Everglades, Parks and Recreation Division, Broward Sheriff's Office
- NOAA Restoration Center, Fisheries Service
- US Dept. of Defense Innovative Readiness
   Training (IRT) program





#### Removal Efforts:

•3 missions: 2007, 2008, 2009 (1 to 2 months

•61 tractor trailer loads of tires removed = 72,000 tires





### Threats to Habitats

 "Other" Marine Debris- Debris that poses immediate threats to people, wildlife and/or habitats





Erin McDevitt, FWC, NOAA Marine Debris Workshop, St. Petersburg, FL May 20-22, 2014

# Other Debris – no established authorities or protocols and poses an immediate threat of harm to humans or the environment

### **Examples:**

- Ghost nets
- -Vessels grounded and unstable on or near sensitive habitats
- -Vessels grounded on public beaches
- -Cargo containers
- -Any debris leaking hazardous materials
- -Etc!!



Photo credit: <a href="http://www.oceannavigator.com/">http://www.oceannavigator.com/</a> March-April-2013/A-legendary-offshore-danger





Photo courtesy of Miami-Dade County



- Initial report by Miami-Dade DERM to FWC on 1/7/13
- One sea turtle and multiple fish dead in the net
- Net in a popular dive location posing a threat to recreational divers
- Net still "fishing"
- No protocols in place





### The Debris:

- Monofilament entangling fish net
- Approx. 30 ft high and 200 ft long
- -- Used legally to "gill" mackerel, sharks, blurunners, jacks in federal waters
- Not legal in state waters.









### The Habitat:

- Popular artificial reef dive location
- Largest AR in SE Florida
- Deployed in 1985
- 5 decommissioned oil production platforms
- Depths 100ft to 190ft
- Near Miami-Dade/Broward Co line approx 2 miles offshore







### Challenges:

- A danger to divers (entanglement!)
- Ghost net- still "fishing"
- Deep water (70' 104')
- Net entangled in the structure
- Net large and heavy
- Winter weather\*
- No protocol in place for emergency debris
- No funding available through existing programs









#### Team:

- •FWC Marine / Estuarine Habitat
- FWC Law Enforcement
- •FDEP Coral Reef Conservation Program
- NOAA Marine Debris Program
- Wildlife Foundation of Florida
- The US Coast Guard
- Miami-Dade County
- Broward County EPGMD
- Broward's Sheriff Office
- Industrial Dive Corporation





















WILDLIFE FOUNDATION OF FLORIDA ESTABLISHED 1994





Funding was a Challenge!

- National Save the Sea Turtle Foundation
- National Fish and Wildlife Foundation
- FDEP Coral Reef Conservation Program
- •NOAA Marine Debris Program
- •FWC Marine Estuarine Habitat
- •US Navy (dock and crane services)
- Covanta Energy (disposal fees)











MARINE DEBRIS PROGRAM LOFFICE OF RESPONSE AND RESTORATIO



## Removal:

- Removed March 5, 2013
- \$11,950









### **Lessons Learned: Tenneco Towers Net**

- Net was removed successful thanks to great cooperation among many partners.
- Incident highlighted definite needs for marine debris response and readiness:
- 1) Need Statewide Regional Working Groups to develop response plans and protocols for marine debris emergencies



# Florida Coastal Zone Management Marine Debris Rapid Response Program

### The Program:

- Statewide network to address "other" debris
- Team coordinated in SE FL
- Debris identified to be a test case

## Challenges:

- Funding not "quick"
- NEPA reviews
- Permits
- State contracting issues





# Questions?





Brownie Troop 30054 cleaning up the Hobe Sound National Wildlife Refuge. Sept. 2014.

# Investigation of the Lionfish Invasion along the Indian River Lagoon Region



Ernie Cowan at St Lucie Inlet State Park, May 2011



Jeff Beal, Marine/Estuarine Habitat Emily Dark, Antioch Univ.



# Indo-Pacific Lionfish

- Scorpaenidae
- 16 Species of lionfish
- Indian Ocean, Central and Western Pacific, Red Sea
- Grow to 18 inches
- Weigh up to 3 lbs.
- Live 15 years
- Tropical to subtropical on reefs, structured habitats

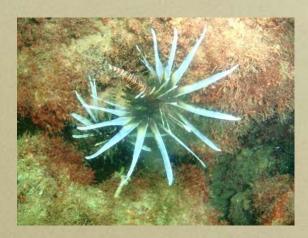




**Photo: REEF** 

# Lionfish Invasion of Space/Treasure Coasts

-Offshore hardbottom: widespread reports summer 2009



St Lucie Reef 2010



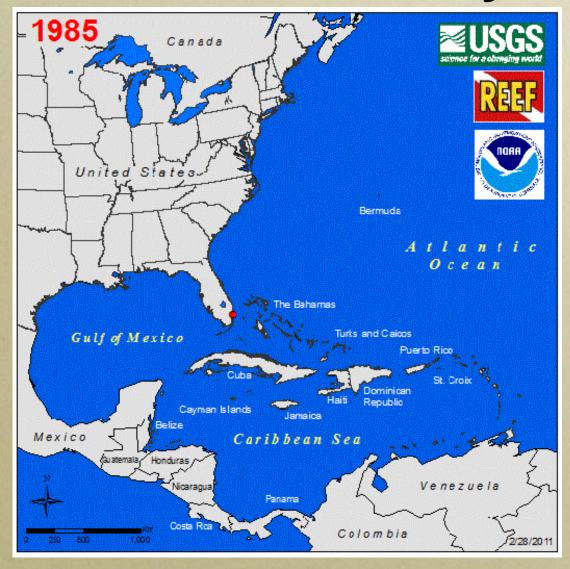
Sebastian reefs 2012

-Inshore reports as early as 2010 (Jupiter, Ft. Pierce);

widespread reports summer 2012



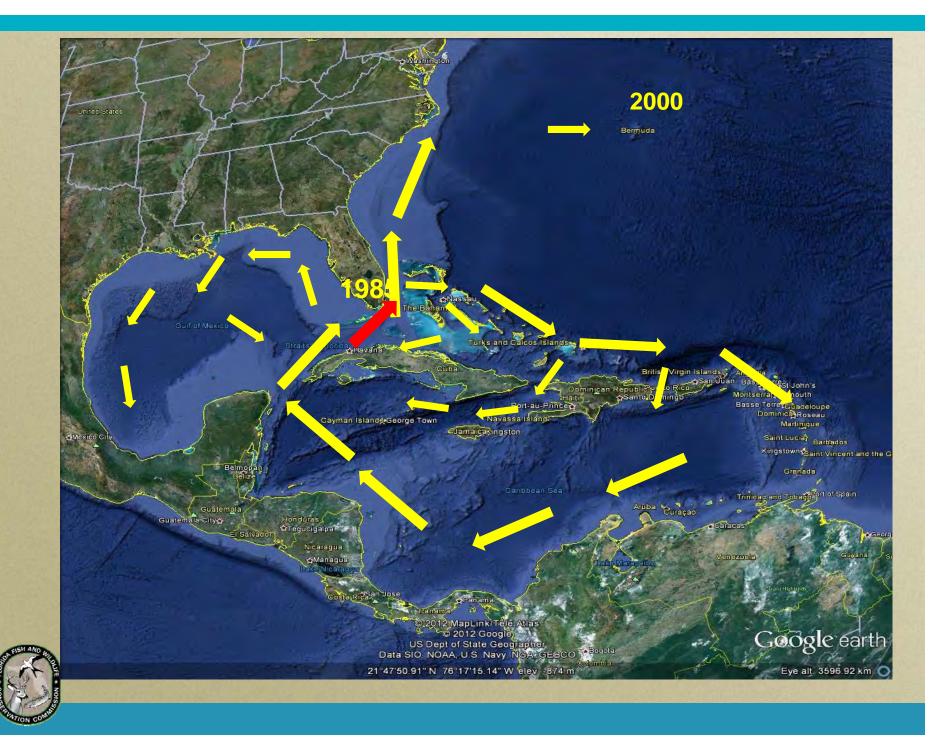
# **Invasion History**







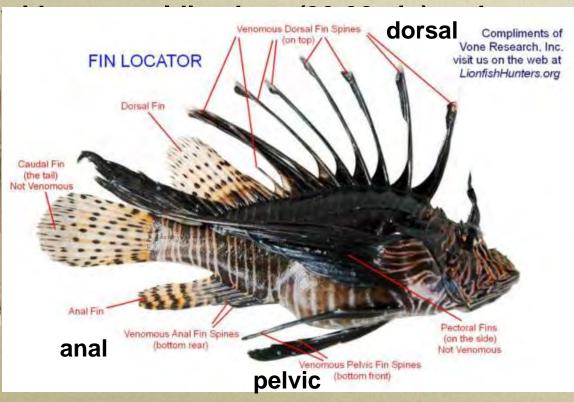




# Key issues

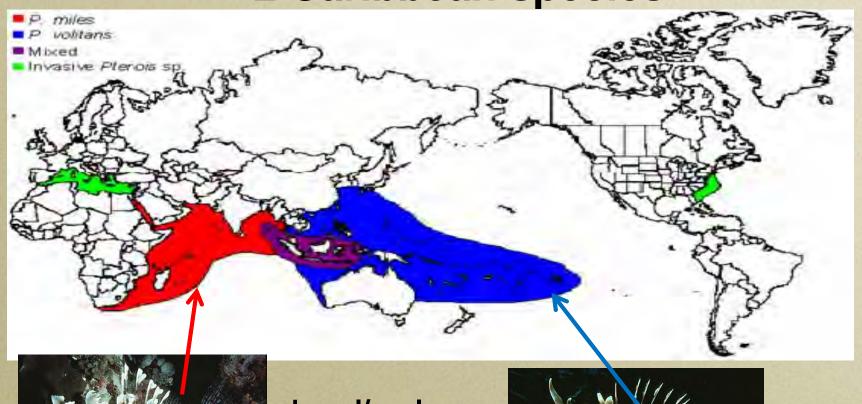
- Venomous vs. poisonous
- Venomous spines on dorsal (13), pelvic (2), anal (3) fins
- Treat wounds painkillers







2 Caribbean species





dorsal/anal rays (10, 6) 7% of Carib popn



(13, 7-8)

93%

Devil Firefish P.

Ailes

Red Lionfish P. volitans

9 female mitochondrial haplotypes of P. volitans

# **Ecology**

- Caribbean-wide, >70 prey species of fishes and invertebrates
- Bahamas reef study: reducing patch reef recruits up to 80%
- NC reef study: small serranids, grunts, parrotfishes, jacks, shrimps
- •Ft. Pierce 80ft reef: 25 found every 100ft
- Bamahas reef study: 75-95% reductio
   required to benefit native species





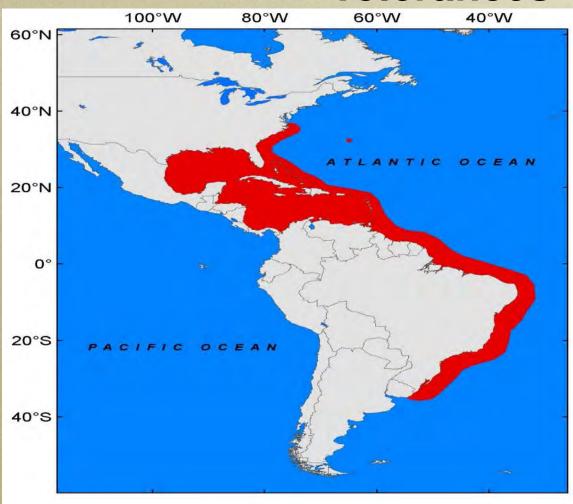
# Reproduction



- Sexually mature at ~1yr (4.3in female; 3.5in male)
- Females spawn as frequently as every 4 days
- Clutch size up to 30,000 eggs
- Unpalatable floating egg mass
- Courtship observed



# **Tolerances**



10C isotherm at Rhode Island (juvenile death)

16C isotherm at NC (feeding stops)



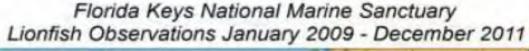


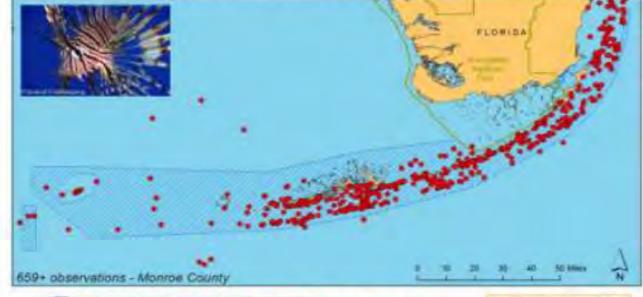


FL to NC at depths 50-100m, 2<sup>nd</sup> most abundant to scaring

## Other issues

- Max. Caribbean size of 22in; native range 15in
- 0.5mm/day growth rate
- Caribbean densities 10x Indo-Pacific (40/100m² of reef)
- Fish surveys (REEF, RVC, FDM, FIM)
- Ciguatera
- Mercury low

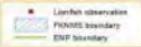


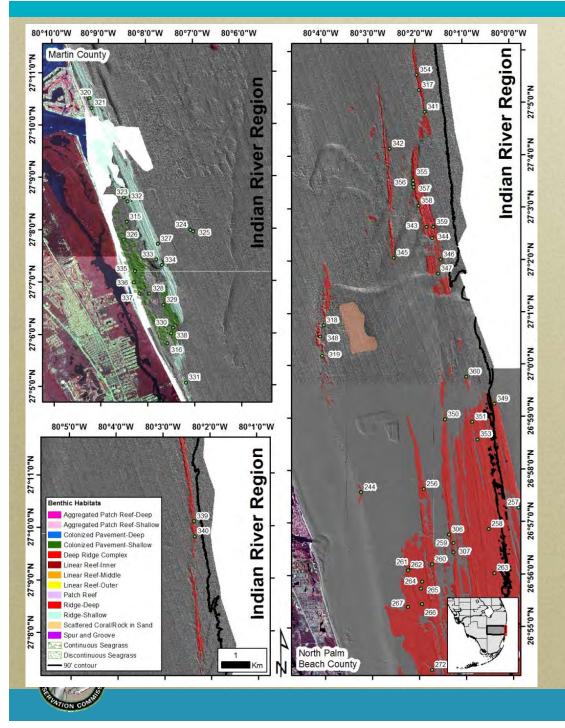




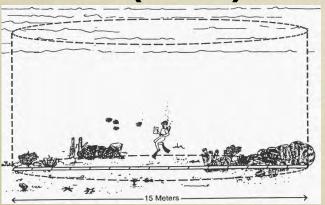






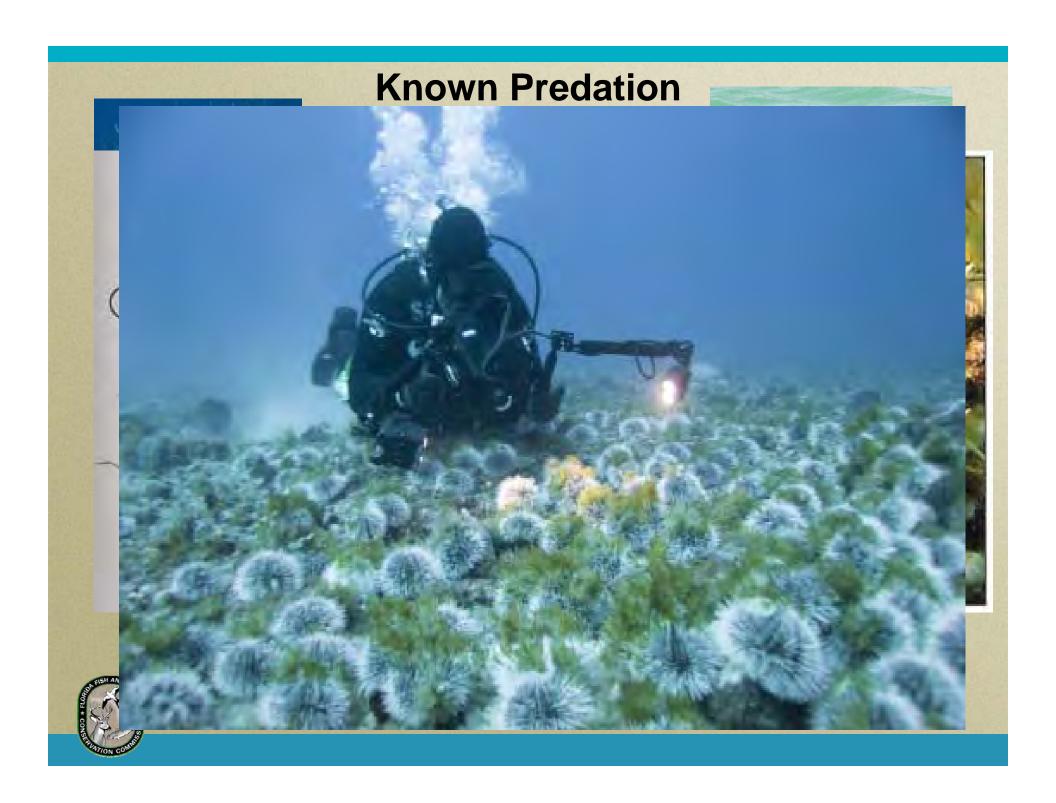


# Reef Visual Census (RVC)

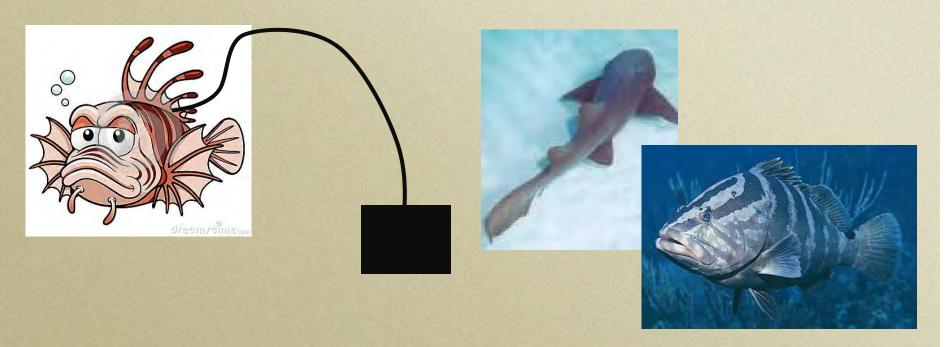




Stuart to Miami reefs in 2012: 870 cylinders showed 8% occurrence of lionfish



# **Cayman Tethering Experiment**



Lionfish on an intensely culled reef

- -13X more likely to be eaten than those on rarely culled r
- -30X more likely to be eaten than those in a seagrass bed Size is important
  - -over 90% of lionfish 12cm or greater were eaten





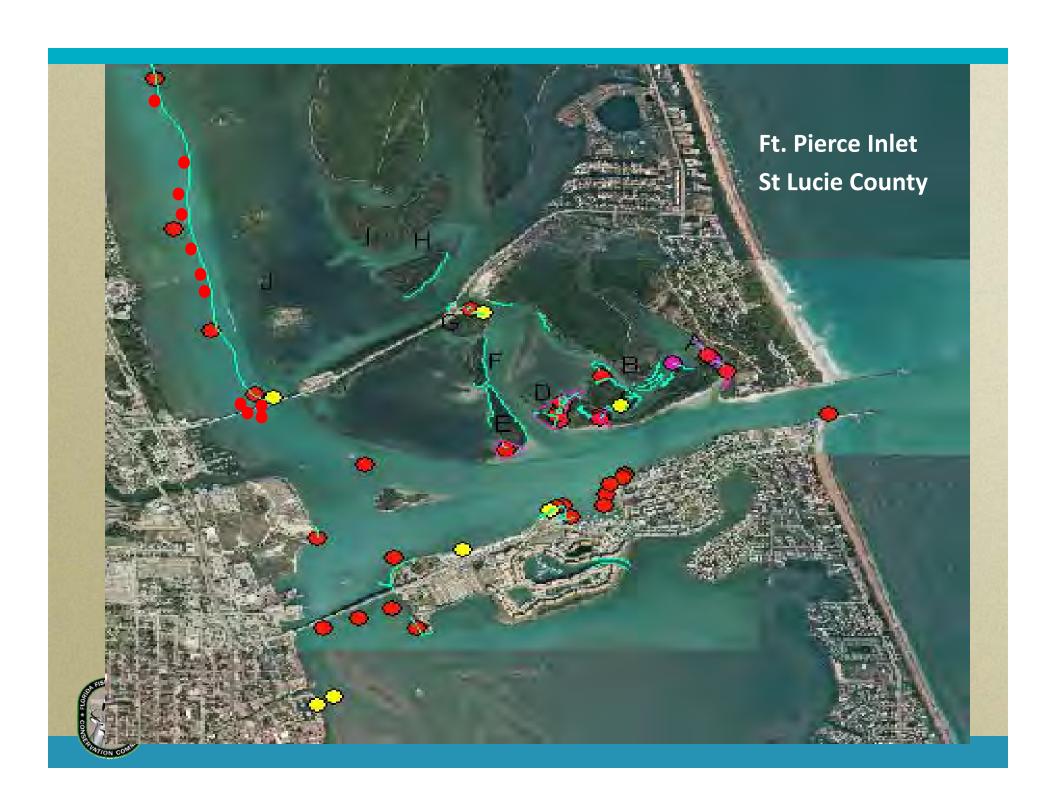


## IRL: Invasion of back reef habitats

- Inlets (outcrops)
- Manmade structures (seawalls, pilings, rip rap)
- Oyster reefs (Loxahatchee, St Lucie)
- Mangroves
- Lagoonal reefs (artificial, channel wall outcrops)
- Seagrass beds?
- Ontogenic shift? (ex.Turks and Caicos)





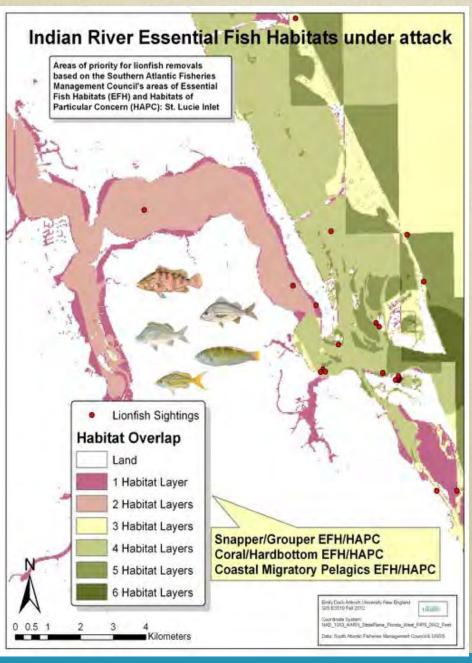




# South Atlantic Fishery Management Council

- -1996 Sustainable Fisheries Act amended Magnuson Act of 1976 becoming law and The Magnuson-Stevens Fishery Conservation and Management Act signed Jan. 1, 2007
  - -Management plans including research/monitoring
- -Ecosystems –based approach to sustainable fisheries management





# Overall Goals for the Indian River Lagoon

"...predation may be a major structuring force shaping shallow water estuarine fish assemblages."

-R.Baker & M. Sheaves (2005)

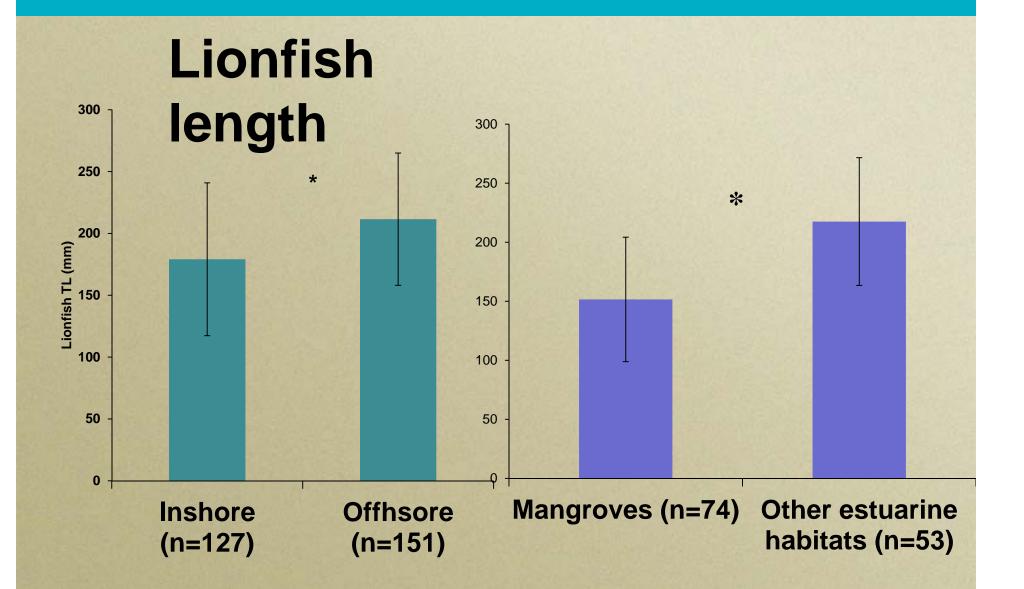
•Knowledge of the population (geography, demographics, dynamics of estuary/habitat use)



- •Understanding their possible ecological effects (concern towards local fisheries, biodiversity)
- •How can we possibly mitigate these effects?

  (ie., develop effective /strategic removal efforts)





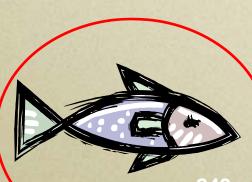


Non-parametric one-way analysis (Wilcoxin Rank-Sums)

### Mangrove lionfish (n=68)



55mm



43mm



Other estuarine lionfish (n=59)

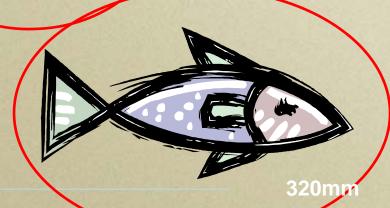


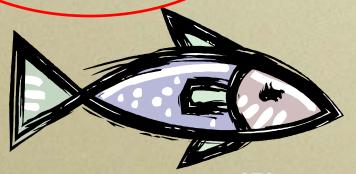
80mm

Offshore lionfish (n=151)



116mm

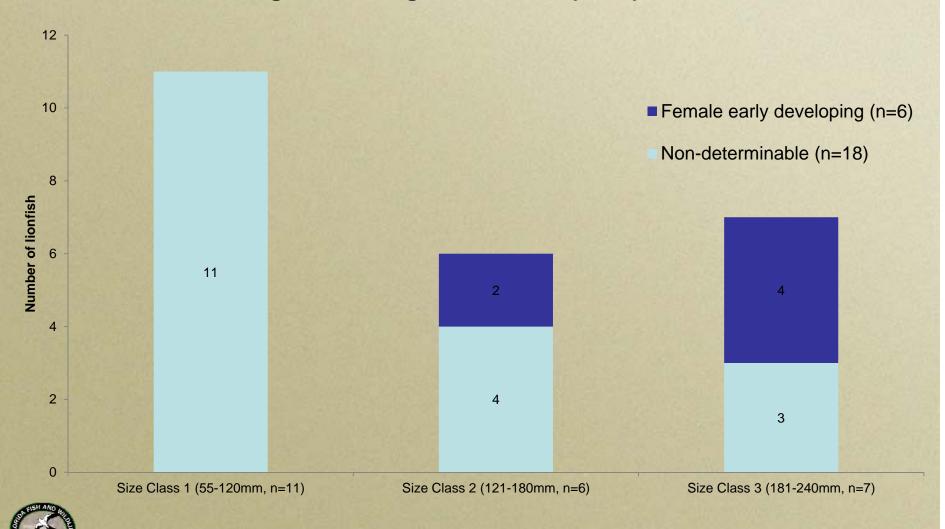


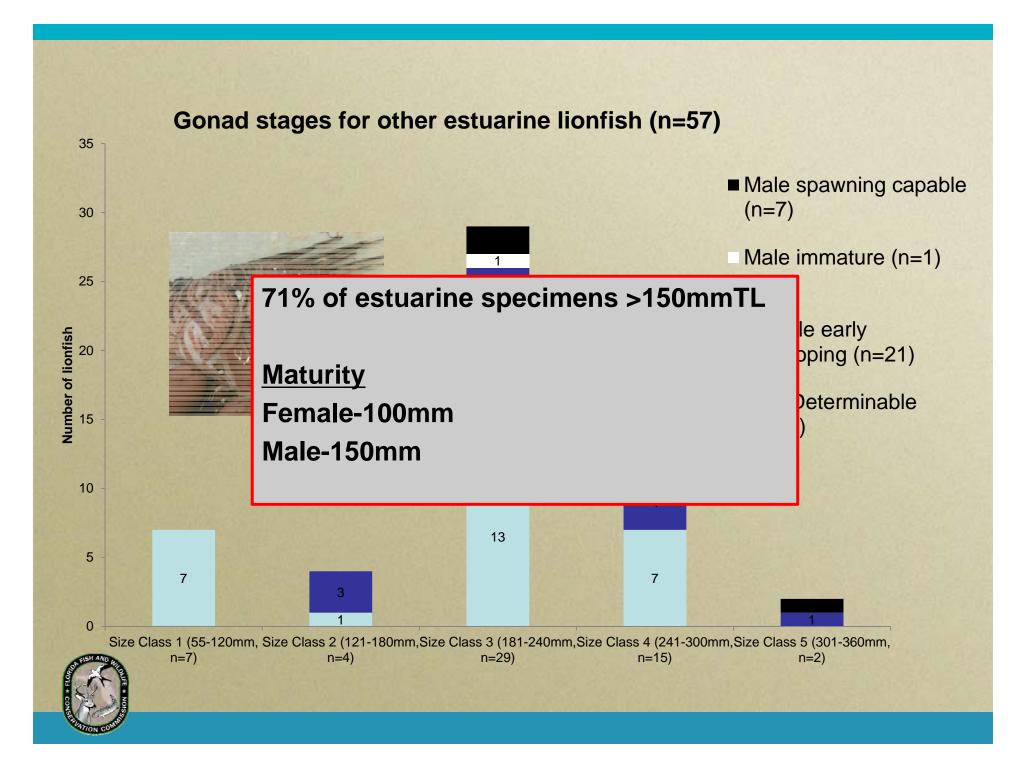


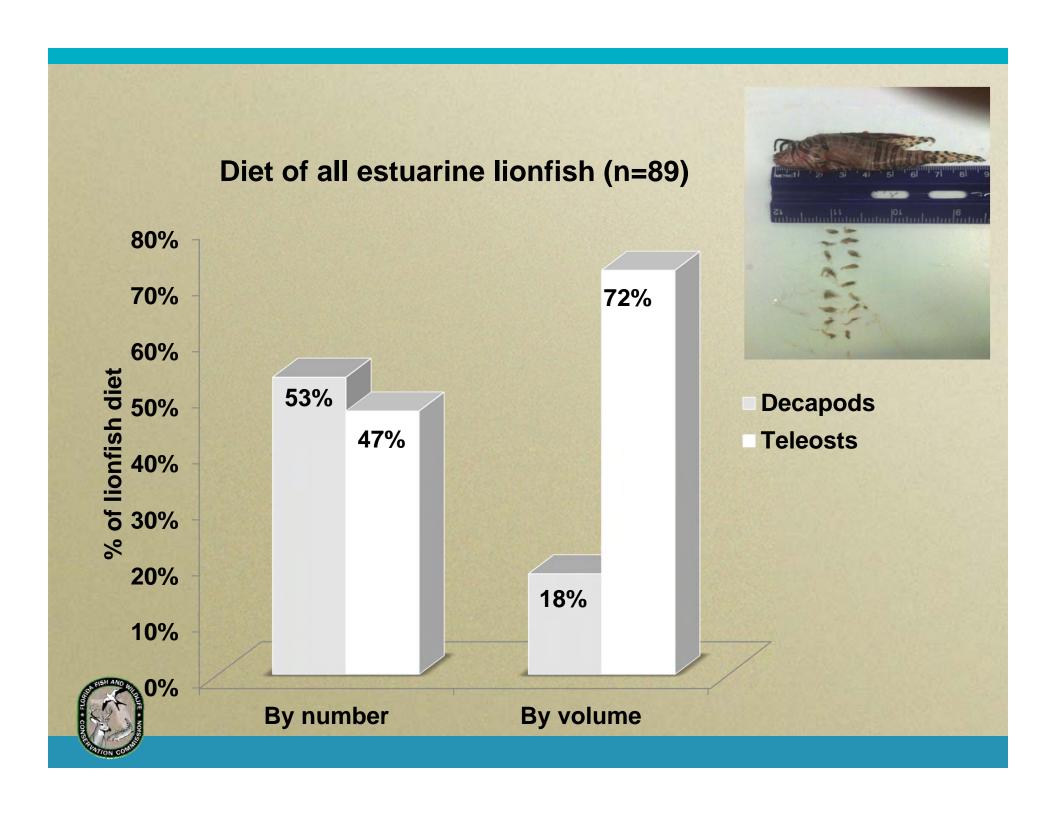


376mm

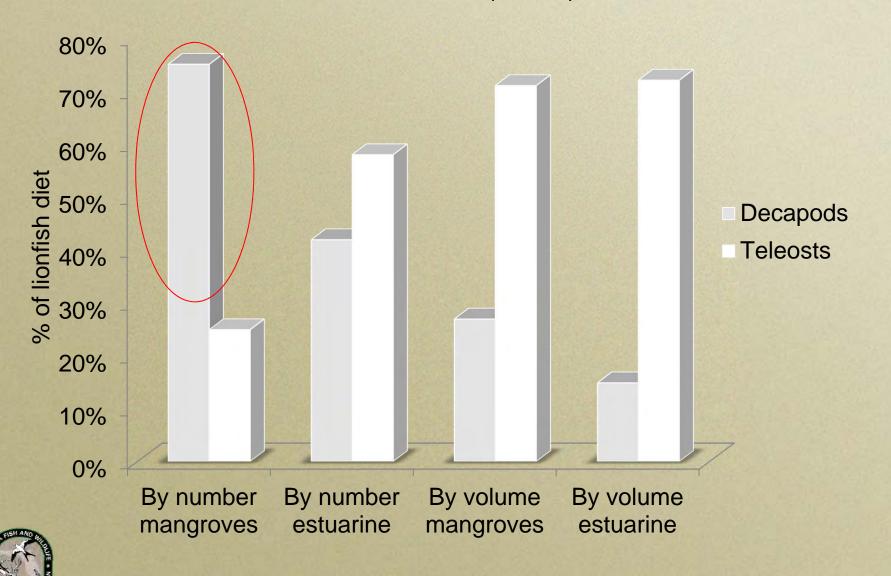
### Gonad stages for mangrove lionfish (n=24)







# Diet of lionfish in mangroves (n= 38) vs. other estuarine habitats (n= 51)

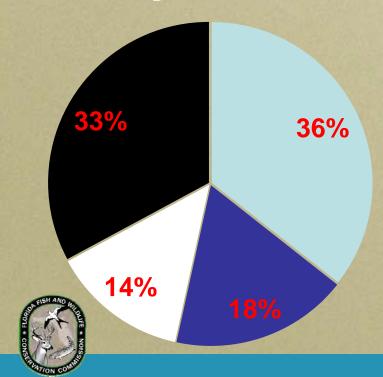


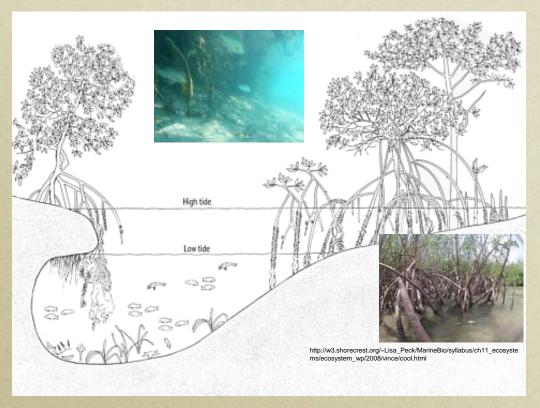


### Habitat



Where did we find the lionfish in the mangroves? (n=73)





- In the roots
- Under peat bank
- ■<1m off roots
- **■>1m off roots**

- •Average depth= 1.6m
- •Within 5km of inlets
- •90% Erosional vs. 10% depositional
- •Average growth for 5 fish was
- .39mm/day (.41 inches /month)

### **Fidelity**

Is it worth it for us to look in the mangroves? YES

27 Tagged fish April-Sept 2013

17 were 'recaptured' at least once (63%)

One fish was seen in same spot for 92 days

7 total fish were seen in same spot for over 50 days

------





Fish1

× Fish3

X Fish4

Fish5

+ Fish6

- Fish7

- Fish8

• Fish9

Fish10

▲ Fish11

× Fish12

Fish13

Fish14

+ Fish15

- Fish16

Fish17

F: 1.40

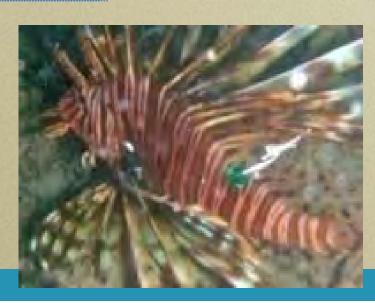
Fish18
Fish19

Fish20

×Fish21

Fish22







# Found at all 5 inlets and 4 of 5 inlet mangroves

Estuarine population increases north to south

>600 IRL specimens (>300 in Loxahatchee)



### The good news

- Early in estuarine invasion
- Strong site fidelity
- Highly motivated IRL natural resource community
- Native predation...a learned behavior

Opportunities for applied research

Round-up events







#### **FWC** Rule for Lionfish

- No recreational fishing license required for pole spear, Hawa sling, lionfish-specific device, hand held net
- Harvest with hook and line or as bycatch in other legal gear commercial or recreational fishing
- No limit for commercial or recreational harvest
- Does not allow spearing in prohibited areas
  - 1. Within 100 yards of a public swimming beach, any commercial or public fishing pier, or any part of a bridge from which public fishing is a
  - 2. Within 100 feet of any part of a jetty that is above the surface of the sea except for the last 500 yards of a jetty that extends more than 1,500
  - yards from the shoreline
    3. Within prohibited areas (eg, State Parks, by county ordinance) or wi
    prohibited gears (explosives, fish traps, certain nets)

### **FWC Lionfish Summit October 2013**



**Major Stakeholder Recommendations:** 

#### Research:

- 1) Continue research on development and application of lionfish specific traps
- 2) What is the effort required to maintain control on managed sites? (e.g. diver return frequency)
- 3) Research on lionfish in estuaries Policeds to be a priority in Florida
- 1) Place a Bounty on lionfish: reward would be increased bag limit on native species for recreational fishers; or a financial reward
- 2) Develop a formal lionfish Management Plan
- 3) Create a protocol to allow private individuals to experiment with lionfish specific



### **Thanks**



### Marine Cleanup Initiative, Inc.





















### Ocean Acidification

# Evolution of Understanding: open ocean to estuarine

#### v1.0 open ocean

pH is driven by atmospheric CO<sub>2</sub> input

#### v2.0 coastal ocean

- + v1.0
- Upwelling of deep sea water
- Geochemical processes
- Decomposition of organic material (CO<sub>2</sub>) exported to deep water



Global carbon dioxide budget

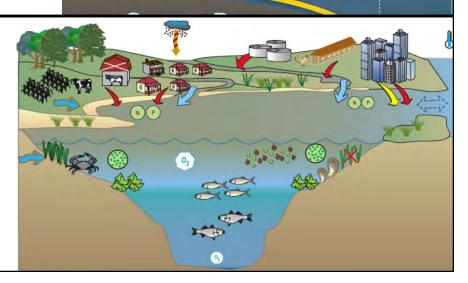
(gigatonnes of carbon per year) 2002-2011

Land sink

1.0 ± 0.5

#### v3.0 estuarine

- + v1.0
- + v2.0
- Input/removal by organisms from respiration and photosynthesis
- Decomposition of organic material (CO<sub>2</sub>) remains in system (shallow water)



## Carbonate Chemistry Refresher

$$CO_2 + H_2O \leftrightarrow H_2CO_3 \leftrightarrow HCO_3^- + H^+ \leftrightarrow CO_3^{2^-} + H^+$$
carbonic acid bicarbonate ion carbonate ion

Adding CO<sub>2</sub> "pushes" → reaction to right = ↓ pH pH buffering removes CO<sub>3</sub><sup>2</sup>

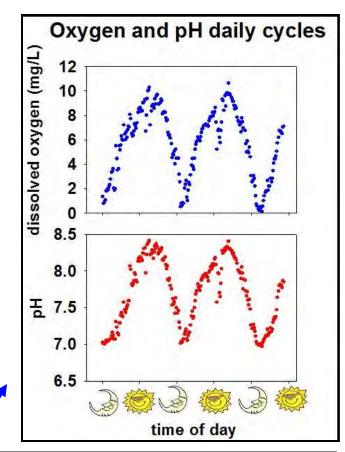
Removing  $CO_2$  "pulls"  $\leftarrow$  reaction to left =  $\uparrow$  pH pH buffering releases  $CO_3^2$ 

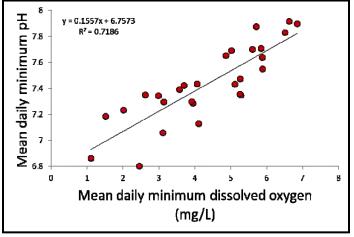
pH changes the CaCO<sub>3</sub> saturation horizon (equilibrium between CaCO<sub>3</sub> formation and dissolution)

↑ CO2 =  $\downarrow$  pH = removal of CO<sub>3</sub><sup>2<sup>-</sup></sup> to buffer pH ↑ energetic cost for organisms to produce CaCO<sub>3</sub>

### **Data Overview**

- CO<sub>2</sub> partial pressure (pCO<sub>2</sub>) preferred metric
- Ocean acidification
  - Annual range of diurnal pCO<sub>2</sub> fluctuation
    - ~125 ppm
  - pH fluctuates <1 unit diurnally</li>
    - Not precise enough to detect trends
- Estuarine acidification
  - Annual range of diurnal pCO<sub>2</sub> fluctuation
    - several thousand ppm
  - pH can fluctuate up to ~3 units in a few hours
    - Sufficient precision to detect trends
    - Correlates with DO trends
      - Relative measure for monitoring





### Focus on v3.0 - Estuarine

## CO<sub>2</sub> drivers vary spatially

- Smithsonian Envir. Research Center (SERC)
- Spatial changes to CO<sub>2</sub> level
  - -2 sites 1 km apart (Rhode River)
    - SERC pier → CO<sub>2</sub> fluctuation driven by temperature
       pH varied between 7.5 & 8.0
    - Upstream marsh → CO<sub>2</sub> fluctuation driven by decomposition/respiration & tidal transport
      - pH varied between 6.5 & 7.5
- Biology is a significant driver of estuarine pH

# Biological response to \CO2

### Oyster & clam

- ↓ growth rate
- Delayed metamorphosis
- Smaller size at metamorphosis
- † shell erosion
   (reduced calcification rates)

#### Red abalone

 Larvae have less tolerance to temperature increase

Talmage & Gobler 2009 Miller et al. 2009 Waldbusser et al. 2010 Zippay & Hofmann 2010

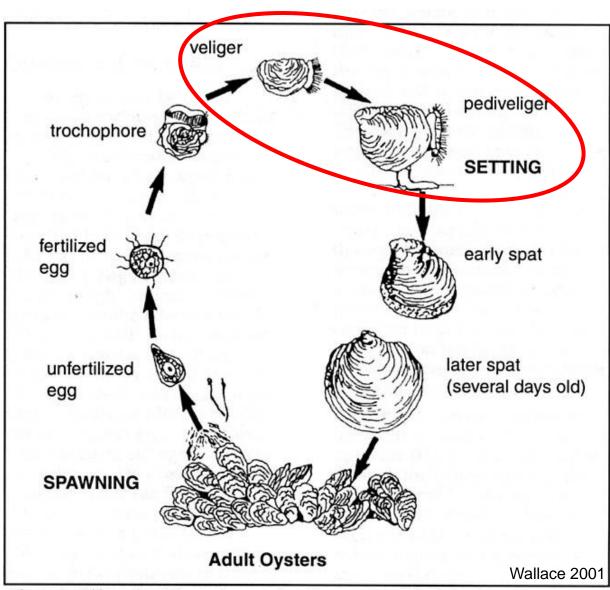
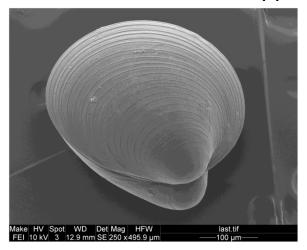


Figure 1. Life cycle of the eastern oyster, Crassostrea virginica.

# Biological response to \CO2

#### Preindustrial - CO2 280 ppm



Year 2100 - CO2 800 ppm



(Miller et al. 2009)

Altered oyster biofouling community pH = 7.9 pH = 7.45



(Keppel et al., unpublished)

# Biological response to \CO2

- Effects to organisms other than Molluscs
  - Blue crab
    - † in shell hardening time (Lane & T. Miller, unpublished)
  - Finfish
    - Atlantic silverside: ↓ larval survival & growth (Murray et al. 2014)
    - Inland silverside: ↓ larval survival (Seth Miller)
    - Summer flounder: 
       | embryo survival, 
       | larval energy reserves, 
       | metamorphosis size, developmental abnormalities (Chambers et al., 2014)
    - Coral reef fish
      - larval olfactory impairment, settlement wrong time day/night (Devine et al., 2012)
      - no behavioral response to common predators (Ferrari et al. 2011)
    - Cobia: ↓ otolith size in juveniles (Bignami et al., 2013)

## Ecosystem response

- Measure acidification at ecologically relevant [spatial] scales
  - Organism
  - Community
  - Discrete habitat
  - Sub-watershed
  - **—** ?
- Effects to ecosystem services?
  - — \( \psi\) oyster biofouling community
     abundance, diversity, and
     ecological processes when \( \p\) H



- Multiple stressors (pH, DO, °C, salinity, calcite saturation, etc.) can have synergistic effects
  - Correlates with DO trends
    - Other relative measures for monitoring?
  - Is there an effect from biological feedback mechanisms (photosynthesis, respiration, etc.)?

The need to address ocean acidification has been largely driven by [shellfish] industry.

### Maryland Task Force species conclusions

#### Oysters

- — ↓ pH threatens ecological oyster restoration efforts.
- → pH threatens wild capture oyster fisheries.
- → pH threatens the economic feasibility of oyster aquaculture.
- Monitoring programs (scale and frequency) are insufficient to assess chemical changes in ways useful to water quality dependent industries like shellfish aquaculture.

#### Crab

Scientific studies are insufficient to assess risks of ↓ pH to blue crab stocks & fisheries

#### Striped Bass

Prior pH experiments did not ↓ pH by ↑ CO<sub>2</sub> so the effects of ocean acidification chemistry is not known.

#### Forage Fish

 There has not been sufficient scientific study of the effects of ↓ pH in Bay & near-shore coastal waters to predict risks to forage fish populations.

#### Finfish in general

- → pH impacts physiology, growth, survival, & behavior in other fish species may be relevant.
- Bay water pH can reach levels harmful to early life stages of some shallow-water species.

# Compiled Task Force recommendations (Washington, Maine, & Maryland)

- Reduce emissions of carbon dioxide.
- Reduce land-based runoff of nitrogen, phosphorus, etc.
- Investigate effects of ocean acidification on a key species and life history stages, biological communities, and various spatial scales of ecosystems.
  - Focus on ecologically and economically important species
- Provide direct support to affected industries.
- Assess socio-economic impacts from ocean acidification.
- Increase capacity to adapt to the impacts of ocean acidification.
- Coordinate with other states and federal government.

# Compiled Task Force recommendations (Washington, Maine, & Maryland)

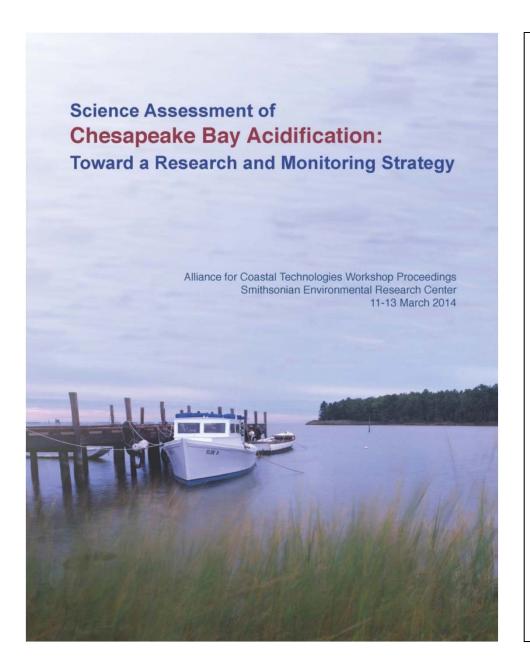
- Leverage and invest in existing programs to monitor acidification and biological responses.
- Create an Ocean Acidification Council to coordinate data streams/monitoring and analysis.
  - Engage various levels of government, industry, environmental groups, and trained citizen scientists to actively monitor ocean acidification parameters (chemical & biological).
  - Identify additional needs and implement necessary programs.
  - Maintain a sustained and coordinated focus on ocean acidification.
- Implement outreach and education programs for stakeholders: decision makers, industries, general public, etc.
- Implement legislation to establish necessary programs and secure funding.

## Federal Programs related to OA

- FOARMA Federal Ocean Acidification Research and Monitoring
  - (http://oceanacidification.noaa.gov/AboutUs/FOARAMAct.aspx)
- IWGOA Interagency Working Group on Ocean Acidification
  - (http://oceanacidification.noaa.gov/IWGOA.aspx)
  - (ftp://ftp.oar.noaa.gov/OA/IWGOA%20documents/IWGOA%20Strategic%20Plan.pdf)
- OAP Ocean Acidification Program
  - (http://oceanacidification.noaa.gov/Home.aspx)
- SECOORA Southeast Coastal Ocean Observing Regional Association
  - (http://secoora.org)
- NE-CAN Northeast Coastal Acidification Network
  - (<u>http://www.neracoos.org/necan</u>)
- California (C-CAN), Northeast U.S. (NE-CAN), and Southeast U.S (SE-CAN)
  - (http://oceanacidification.noaa.gov/EngagementActivities/USRegionalNetworks.aspx).

### State Commissions and Task Force

- Washington State 2012
  - http://www.ecy.wa.gov/water/marine/oceanacidification.html
  - http://www.ecy.wa.gov/water/marine/oa/2012panel.html
- Maine 2014
  - http://www.maine.gov/legis/opla/oceanacidificationmtgmatrls.htm
- Maryland 2014
  - http://mddnr.chesapeakebay.net/mdoatf/index.cfm
- Ocean Science Trust (California, Oregon, Washington, & British Columbia)
  - The West Coast Ocean Acidification & Hypoxia Science Panel
    - http://westcoastoah.org/)





United States Government Accountability Office

Report to Congressional Requesters

September 2014

OCEAN ACIDIFICATION

Federal Response Under Way, but Actions Needed to Understand and Address Potential Impacts

GAO-14-736

# Habitat Pilot Project Update

Ft. Lauderdale, FL April 20, 2015





### **Habitat Project Update**

- Initiated with support from NOAA Fisheries
- Began in Summer of 2014





### **Habitat Project**

- 3 parts
- Review/Report on Habitat Practices
- Policy Statement Development and Objectives for EAFM



Identifying multi-species HAPCs, etc. (which will include EFH-5yr reviews)



### **Oversight Team Formed**

- NOAA Fisheries Habitat Division (Terra Lederhouse and Dr. Howard Townsend)
- NOAA Fisheries Northeast Fisheries Science
   Center (Dr. Vince Guida and Dr. Beth Phelan)
- NOAA Fisheries Greater Atlantic Region (Lou Chiarella and Dr. David Stevenson)
- Council staff (Chair, Jessica Coakley)



### **Contractor Services Identified**

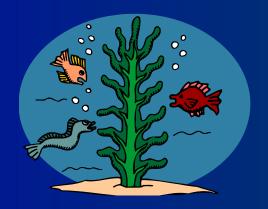
- Fisheries Leadership & Sustainability Forum (aka Fisheries Forum)
- Background/policy draft documents
- Habitat Practices Report





## Habitat Practices Report Under Development

- Provide information on current methods used in the identification of HAPCs and critical fish habitat areas in the U.S.
- Synthesize regional experiences with effective use of the HAPC provision





# Council Background/Policy Documents Under Development

- Energy (petroleum, wind, liquified natural gas)
- Marine Transport (development of infrastructure, maintenance, and dredging)
- Coastal Development & Maintenance (shoreline hardening, wetland and estuarine alteration, dredging and filling, beach renourishment, coastal resiliency)
- Offshore Mining (sand)
- Fishing Impacts (gears and operations)



# Council Background/Policy Documents Under Development

- Provide an overview of the anthropogenic activity,
- Impacts on fish habitat,
- Mechanism of impact,
- Broad overlay of the activity with MAFMC resources, and their habitat, and
- Any indirect impacts.





### **Project Timeline**

- May 2015 wrap up document/report preparation with contractors
- Begin review/work with Ecosystem-Ocean-Planning Advisory Panel (+ some) and Committee on Policy Docs
- Goal to have habitat objectives completed in 2015 to be part of EAFM document
- Other aspects of project will continue; EFH/HAPC development, etc.



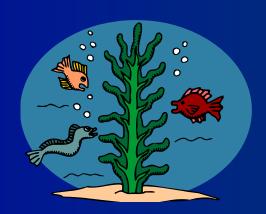
### **Project Timeline**

- Fall 2015 Begin EFH/HAPC technical review
- Meet 5-year EFH review requirements for all species
- Explore use of HAPCs and how to achieve Council habitat objectives
- Move changes into FMPs via Omnibus or individual actions



## Improved Engagement

- Identifying how best to engage with partners
- BOEM, MARCO, MARACOOS, RPB, ACFHP, ASMFC Habitat Ctte.
- NALCC and Urban Waters?
- Other groups?



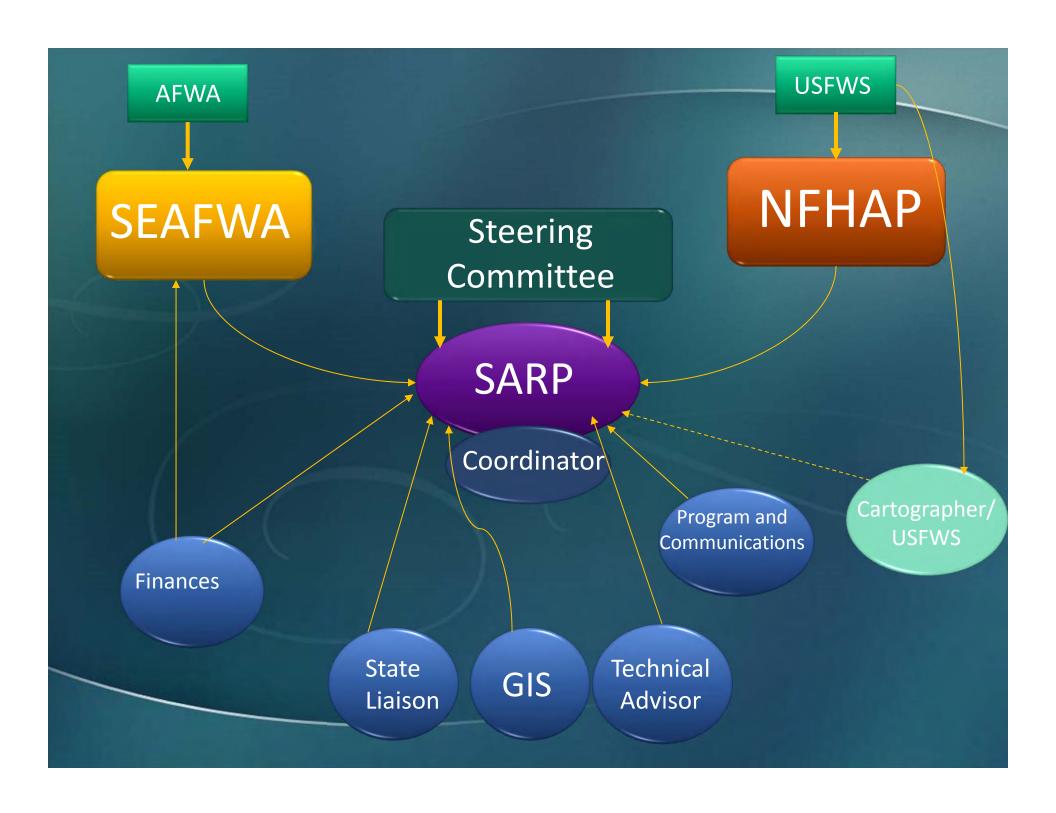


### **Questions?**



# Southeast Aquatic Resources Partnership

Jessica Graham



# Connectivity

Tool to determine which dams have the greatest adverse impact on connectivity.

Gives managers the information to identify dams that would provide the most ecological benefit if fish passage were re-established.

# Connectivity Program

Assessment

Desktop Reconnaissance

**Connectivity Teams** 

**Projects** 

SEACAP (SALCC)

Chesapeake Fish Passage
Prioritization

NC BPT

TN/CU Fish
Barrier Inventory

Region 4
Barrier
Inventory

# Habitat Suitability Models

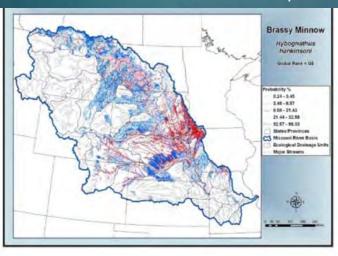
**Habitat Condition** 

**Habitat Location** 

**Habitat A Condition Assessment** 



Habitat A Occurrence Probability



## **Native Black Bass Initiative**







A Business Plan for the Conservation of Native Black Bass Species in the Southeastern US:

A Ten Year Plan



February 2010





# Conserving Fish Habitat from Whitewater to Bluewater







Atlantic Coastal Fish Habitat Partnership
Steering Committee Meeting
April 20, 2015

# **Briefing Overview**

• Whitewater to Bluewater Phase III: 2014 - 2015

• Whitewater to Bluewater Phase IV: 2015

• Whitewater to Bluewater Phase V: 2016

Action 1.1: Advance each partnership's habitat assessments through identification of mutual data needs, data acquisition, and landscape-level-analysis techniques.

- ACFHP and EBTJV collaborated with the North Atlantic LCC and Downstream Strategies to develop decision support tools that would assist in prioritizing conservation actions for Winter Flounder, River Herring, and Brook Trout.
- SARP worked with the Gulf Coast Prairie LCC to complete an Instream Flow Project (http://southeastaquatics.net/) that assists in making management decisions.

Action 1.1: Advance each partnership's habitat assessments through identification of mutual data needs, data acquisition, and landscape-level-analysis techniques.

- SARP is also collaborating with the Gulf Coastal Plain and Ozark LCC to develop Aquatic Species-Habitat Models that support the regional landscape conservation plan and assisted with completing the Southeast Aquatic Connectivity Assessment Project, which provides a decision support tool that prioritizes the removal or bypass of dams (http://maps.tnc.org/seacap/).
- The EBTJV completed its second range-wide assessment of Brook Trout population status and partnered with the Appalachian LCC to complete a web-based project tracking system and an open source mapping platform (http://www.conservationdesign.org/).

Action 2.1: Coordinate ACFHP, EBTJV, and SARP partner engagement and outreach activities to strengthen and expand an already robust base of on-the-ground conservation partners.

- The three eastern FHPs continue to maintain the Whitewater to Bluewater webpage: http://easternbrooktrout.org/groups/whitewater-to-bluewater
- ACFHP, EBTJV, and SARP are also collaborating to develop a fish passage barrier removal informational template.

Action 2.2: Implement strategies developed previously by the Whitewater to Bluewater partnership and via the National Fish Habitat Partnership Excellence Workshop to enhance organizational capacities.

• The EBTJV is implementing its 5-year Business Plan, which is aimed at enhancing its organizational capacities; while ACFHP and SARP continue to address the recommendations that resulted from organizational assessments completed by River Network and Water Words That Work.

Action 3.1: Retain and enhance critical capacity to implement each of the individual FHP's Strategic Plans by facilitating completion of prioritized, on-the-ground, partner-led fish habitat conservation projects that achieve measurable results towards NFHAP goals and strategies.

- The three eastern FHPs each completed the process for submitting their Accomplishment Report and Work Plan to the FWS for 2015 NFHAP funding considerations.
- Our partnerships also worked with the NFH Board to develop a LOI for the 2015 MSCGP funding cycle.

Phase III is supported by a 2014 MSCGP grant, which is in the process of being approved for a 1-year extension, so the expected ending date for this grant is December 31, 2015.

- The eastern FHPs were recently notified that Phase IV of Whitewater to Bluewater was approved for funding under a 2015 MSCGP grant.
- Total funding available from this grant is \$150k, which is being divided equally so that ACFHP, EBTJV, and SARP will each receive \$50k in funding support.

• The eastern FHPs have submitted a scope of work for this phase of Whitewater to Bluewater, which is centered around building on the work we initiated during our previous phases as well as adding an additional focus on addressing aquatic habitat connectivity issues.

- The eastern FHPs are assisting the National Fish Habitat Board with developing a Letter of Intent for the 2016 MSCGP cycle.
- Phase V of Whitewater to Bluewater is intended to build on what our partnerships accomplish during Phase IV.

# Conserving Fish Habitat from Whitewater to Bluewater

**Questions?** 







#### Conservation Mooring Project Update to ACFHP Steering Committee

April 21, 2015 - Ft Lauderdale, FL



Working together to conserve coastal, estuarine-dependent, and diadromous fish habitat

# Conservation Moorings Project "A Quick Review"

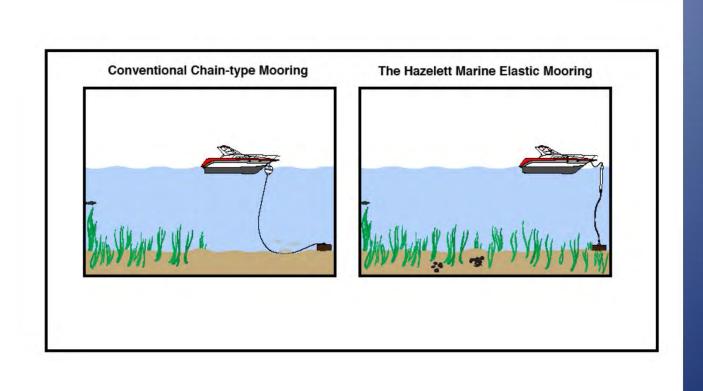
- NOAA Funding agency
- ACFHP Received a \$20,000 grant for this project
- Previous projects: Vinyard Haven & Buzzards Bay
- Project location: Jamestown, Rhode Island on Narragansett Bay

# **Conventional Moorings**



"Haloing" by chain sweep of conventional moorings destroying SAVs

#### Conventional vs Conservation Mooring



#### **Project Partners**

- Atlantic Coastal Fish Habitat Partnership -Lead
- NOAA- Funding
- Town of Jamestown Harbor Commission
- Town of Jamestown Conservation Commission
- RIDEM Div. of Fish & Wildlife Monitoring
- Aquidneck Mooring Service Hardware & Installation
- Conanicut Marine Services 2 moorings
- Clark Boatyard 1 moorings
- Jamestown Boatyard 1 mooring

# Conservation Mooring Ideal - Embedded Helix Mooring

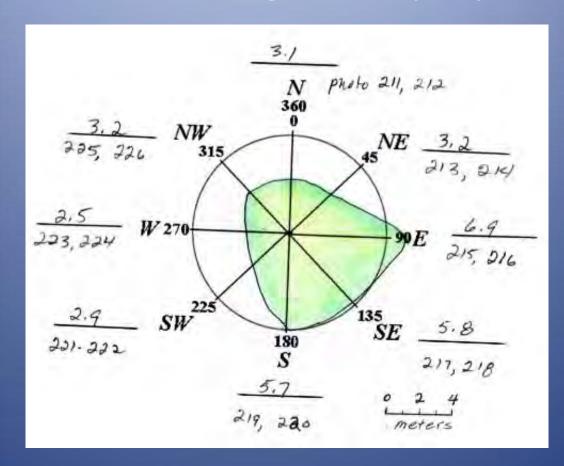


We will install a Helix anchor where possible – otherwise the mooring block will remain in place.

#### Selection of Moorings to Retrofit

- Reviewed 2012 aerial photos of mooring areas
- Selected candidate moorings at three marinas
- Diver survey to confirm candidates June 2014
- Pre-installation eelgrass survey of selected moorings to retrofit - August 2014
- Final selection of four moorings to retrofit May
   2015

# Conservation Mooring Pre-Installation Eelgrass Survey Map



This was done for each candidate mooring in August 2014

#### **Updated Estimated Cost per Conservation Mooring**

Conservation Moorings Hardware & Labor:

Helix Embedded Anchor \$400 (if possible, or use current anchor

if adequate - 2000lb min.)

Conservation Mooring System \$1720

Total \$2120

Labor - Remove old system if necessary \$250-400

Labor - Install Helix embedded anchor \$400

or new 2000lb block

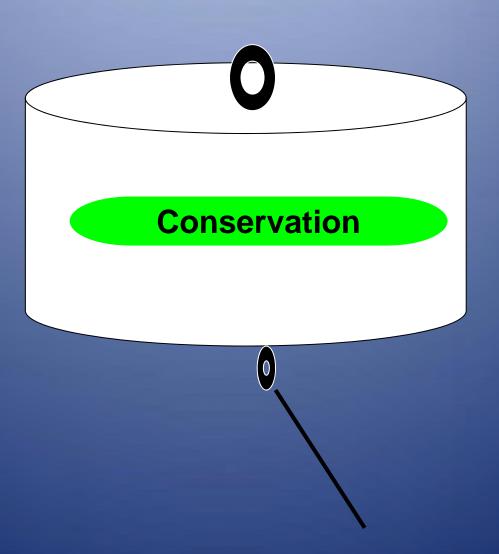
Total \$650 - \$800

**Grand Sub-Total** \$2770 - \$2920

Less Donation (10% discount) \$277 - \$292

Estimated Final Cost/Mooring \$2493 - \$2628

#### Conservation Mooring Buoy Design



# Conservation Mooring Interpretative Sign Draft To be located on the East Ferry waterfront in Jamestown

# Protecting eelgrass fish habitat through the use of conservation moorings

The National Oceanic and Atmospheric Administration has partnered with the Atlantic Coastal Fish Habitat Partnership, the Rhode Island Division of Fish and Wildlife, Town of Jamestown Conservation Commission, Clarks Boat Yard, Conanicut Marine Services Inc., Jamestown Boat Yard, and Aquidneck Mooring Company to protect fish habitat around Conanicut Island (Jamestown). Through this partnership, four traditional boat moorings systems were replaced with alternative conservation moorings that significantly reduce adverse impacts to important eelgrass fish habitat.

#### What are conservation moorings?

A conservation mooring is a mooning. system designed to avoid contact with the seafloor, thereby reducing physical damage to eelgrass. The system uses an elastic connection, akin to a bungee cord to connect the surface buow with: the anchoring device. This eliminates any chain sweep that physically damages or eliminates the eclorass. Depending on the seafloor, helical (i.e. some like anchors may be used to replace traditional concrete mooring blocks. These significantly reduce the environmental footprint within the eelgrass habitat, and allow for eelgrass growth in the previously affected area.

#### Monitoring to assess eelgrass habitat recovery

Prior to installing conservation moorings, the status of eelgrass habitat around each of the existing traditional moorings was documented. After installation, the leve of eelgrass recovery will be monitored and documented. This monitoring effort will help researchers understand the effectiveness of this technology as a coastal resource management sooi.











#### Importance of eelgrass habitat

Eeigrass is an entremely valuable spawing and mussery habitat for a variety of fish and invertebrate species including winter flounder, summer flounder, and bay scallop. It is also an important species at the bottom of the food chain. Eelgrass habitat has been declining throughout the Northeast due to poor water quality, increased turbuilty, and physical elterations such as erodging filling, and brasting related activities.

#### Impacts to eelgrass habitat from moorings

Eelgrass habitat is vuinerable to a number of boating related activities, including prop damage and the use of traditional chain moorings. When placed within or adjacent to eelgrass beds, traditional chain moorings can severely damage habitat through physical removal of the eelgrass shoots, causing a "habiting" effect. Additionally, disturbance to the seaffoor by mooring thams suspends sediment, increasing turbidity which reduces water clarify. This dimmishes the amount of light penetration critically important to eeigrass growth and survival.



















## Estimated Project Budget

Con. Mooring Hdw. & Installation \$2493 - \$2628 each

Estimated Total for Four Moorings \$10,000 - \$11,000

Interpretative Sign \$1500

Workshops (Travel, Materials, Announce) \$1500

Administration & Overhead \$ 4000

Misc. (unknown costs, e.g. new mooring block) \$2000

ESTIMATED TOTAL PROJECT COST \$20,000

### Project Timeline

- Project Cost Estimates Done
- Interpretative Sign Design Final Draft Done
- Final Site Selection Summer 2014
- Pre-SAV Monitoring RI F&W Completed summer 2014
- Approval of MOU language April 2015
- MOU with three boatyards to be signed early May, 2015
- System Installation May 2015
- Order Interpretative Sign May 2015
- Interpretative Sign Installation Summer 2014
- Post-SAV Monitoring RI F&W Summer 2015 & 2016
- Preliminary Report to NOAA Winter 2015
- Final Report to NOAA Winter 2016

### Thank You!



Questions?