Improving fishermen awareness to reduce the presence of lobster traps in MPAs of the Florida Keys

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Project Information

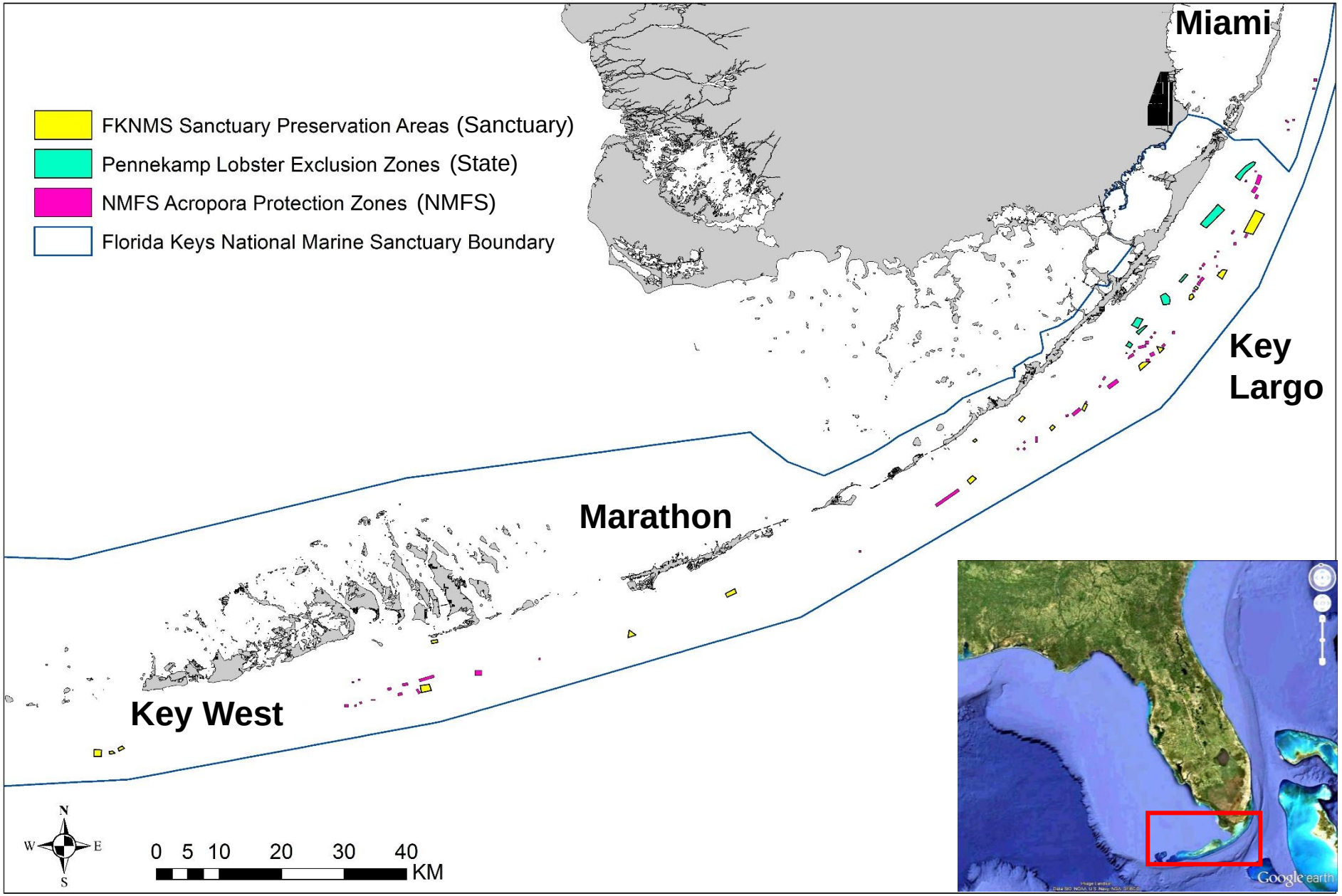
- **Purpose:**
  - Evaluate fishermen compliance with MPAs that prohibit trap fishing
  - Evaluate marine debris accumulation inside MPAs that prohibit trap fishing

- **Funding**:

NOAA CORAL REEF CONSERVATION PROGRAM

NATIONAL FISH AND WILDLIFE FOUNDATION NFWF

Study Location



Florida Keys Coral Reef Decline

- Documented decline since 1970s
  - Live coral cover
    - 1970s: ~40%
    - Present: ~10%
  - *Acropora spp.:* ESA listed as “Threatened” in 2006

- Many natural and anthropogenic stressors
  - Our focus: lobster trap fishing

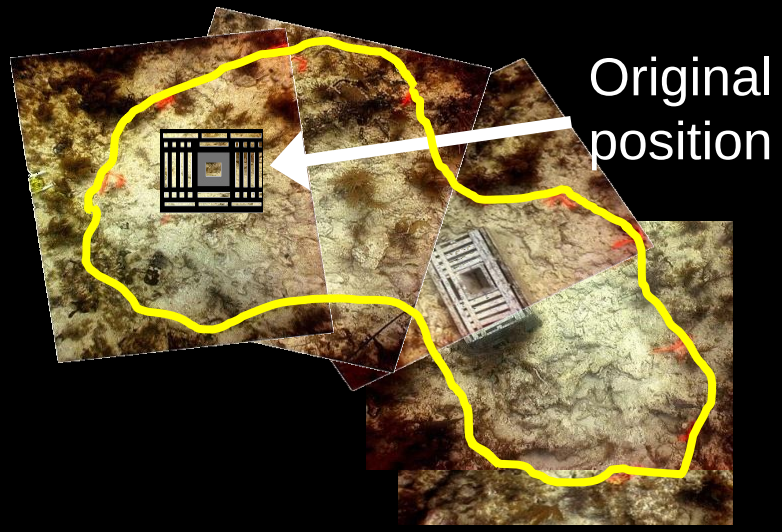
Photo Credits: Phillip Dustan in Jackson et al. 2014

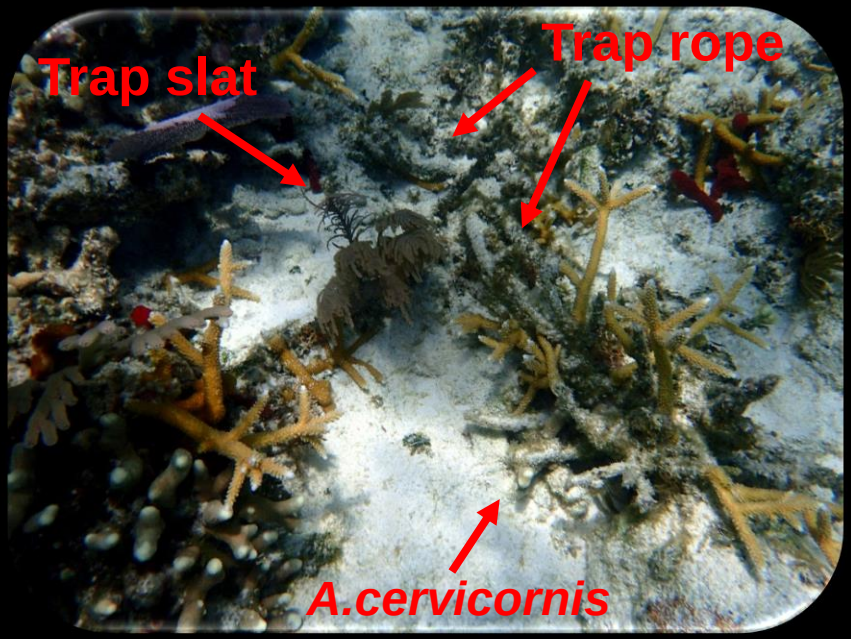
Florida Spiny Lobster Trap Fishery

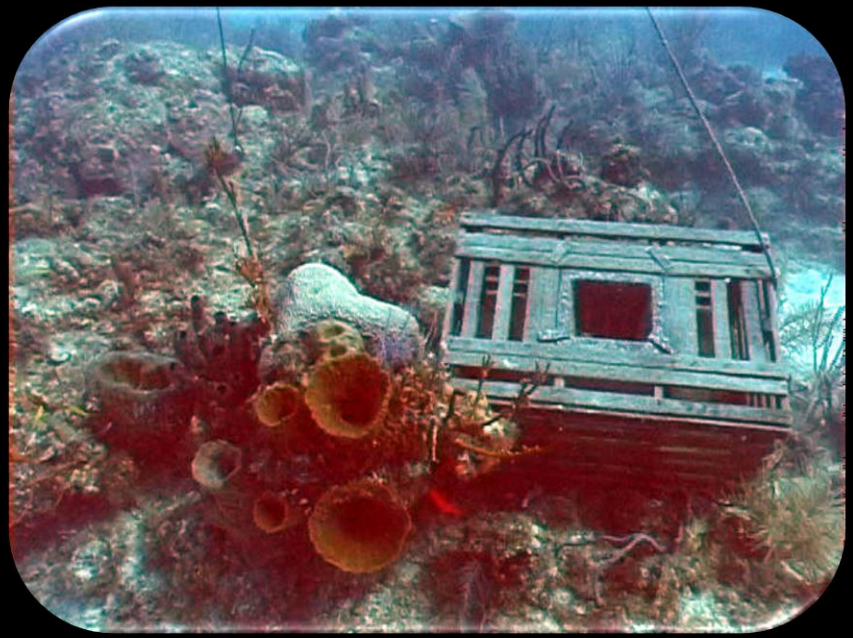
- Trap fishermen: ~540
- Traps: ~475,000
- Landings: ~6.2 million lbs
- Value: ~$53 million ex-vessel

Trap Impacts on Coral Reefs

- Trap hauling
- Wind driven trap movement
- Accumulation of trap debris







See Lewis *et al*. 2009 N.Z. J. of Marine & Freshwater Research

Study Sites

- FKNMS Sanctuary Preservation Areas (Sanctuary)
  - Designated in 1997
  - Marked
  - On navigation charts
  - n = 18

Sanctuary marker buoy

- Pennekamp State Park Lobster Exclusion Zones (State)
  - Designated in 1993
  - Marked
  - Not on navigation charts
  - n = 8

State marker buoy

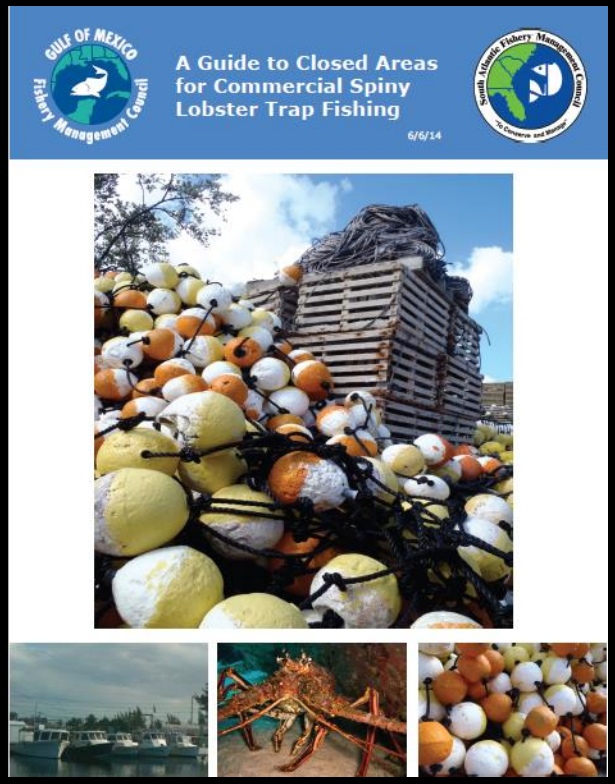
- NMFS *Acropora* Protection Zones (NMFS)
  - Designated in 2012
  - Unmarked
  - Not on navigation charts
  - n = 60

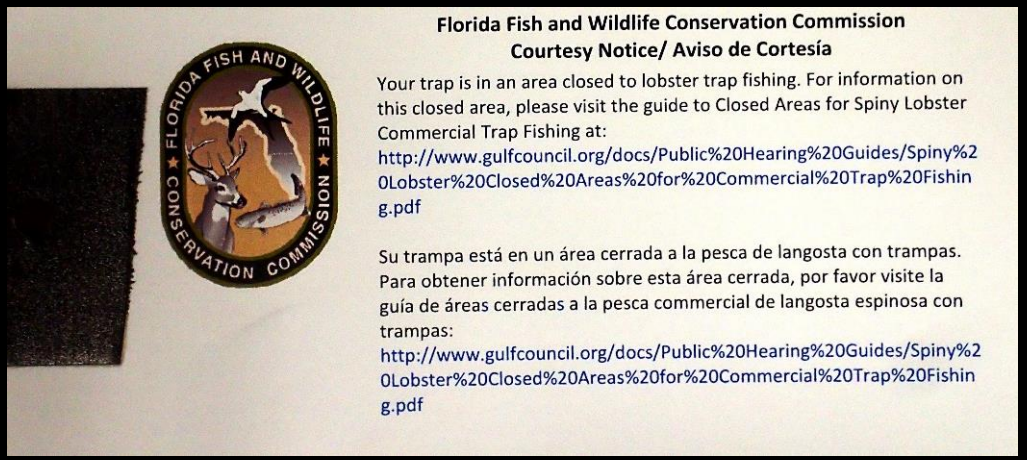
Evaluating Fishermen Compliance

- Methods:
  - Counted the number of traps and trap owners in MPAs
    - Pre and Post Education Effort (Fall 2014, Fall 2015):
      - Sanctuary: n=18 out of 18
      - NMFS: n=18 out of 60
      - State: n=8 out of 8
      - Controls (open fishing areas): n=18
  - Record GPS location of traps

Methods: Educational Effort

- Conducted in Year 1 (Fall 2014)
  - Attached courtesy notice to buoys
  - Mailed information to fishermen
  - Additional contact with fishermen:
    - Interactions on the water
    - Phone calls

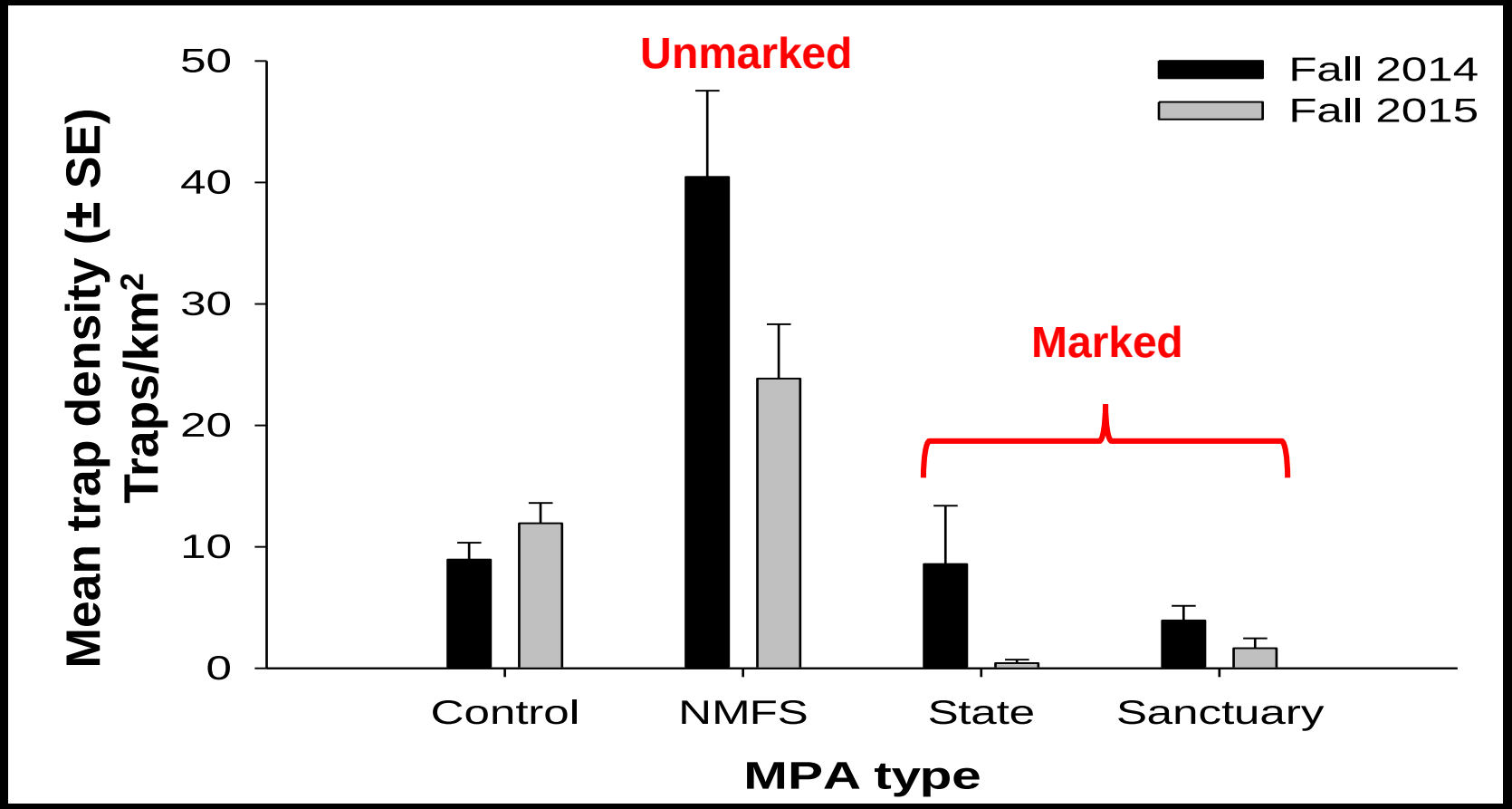




Results

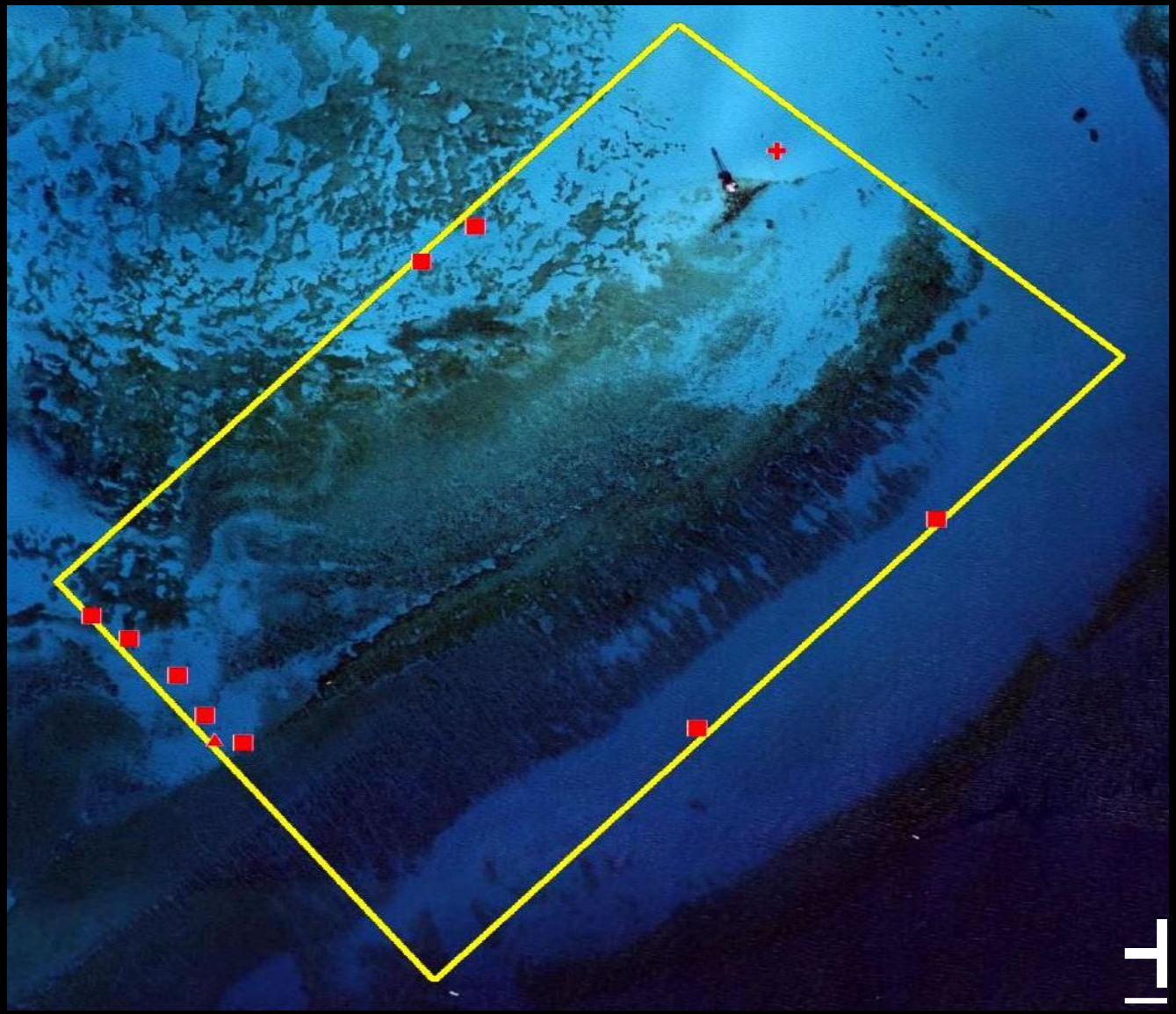

Trap set inside Sanctuary MPA boundary
Sanctuary MPA boundary marker

Density of Traps in MPAs



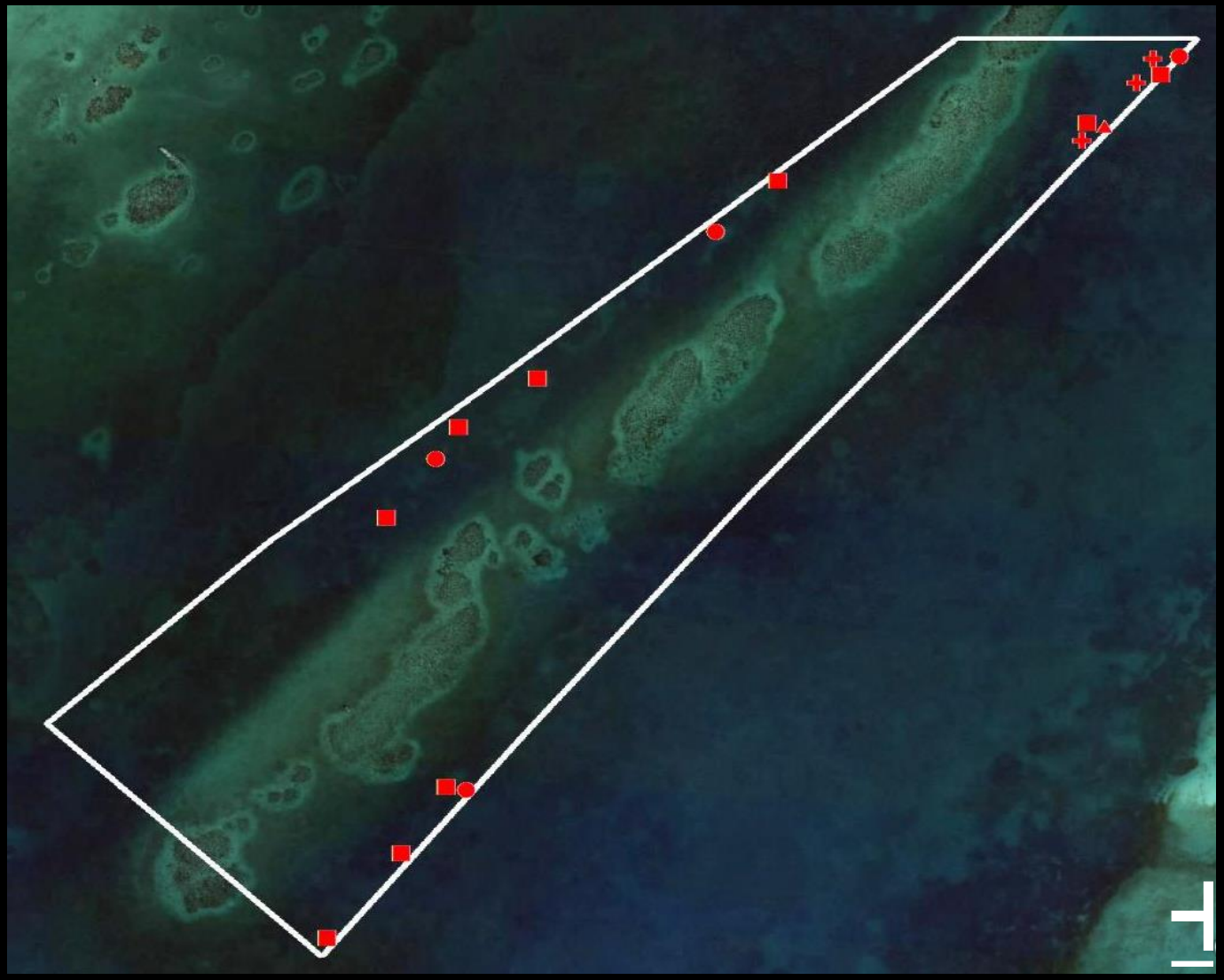
- Unmarked MPAs had highest density of traps
- Density of traps in MPAs decreased post education

Trap Locations in Sanctuary MPAs



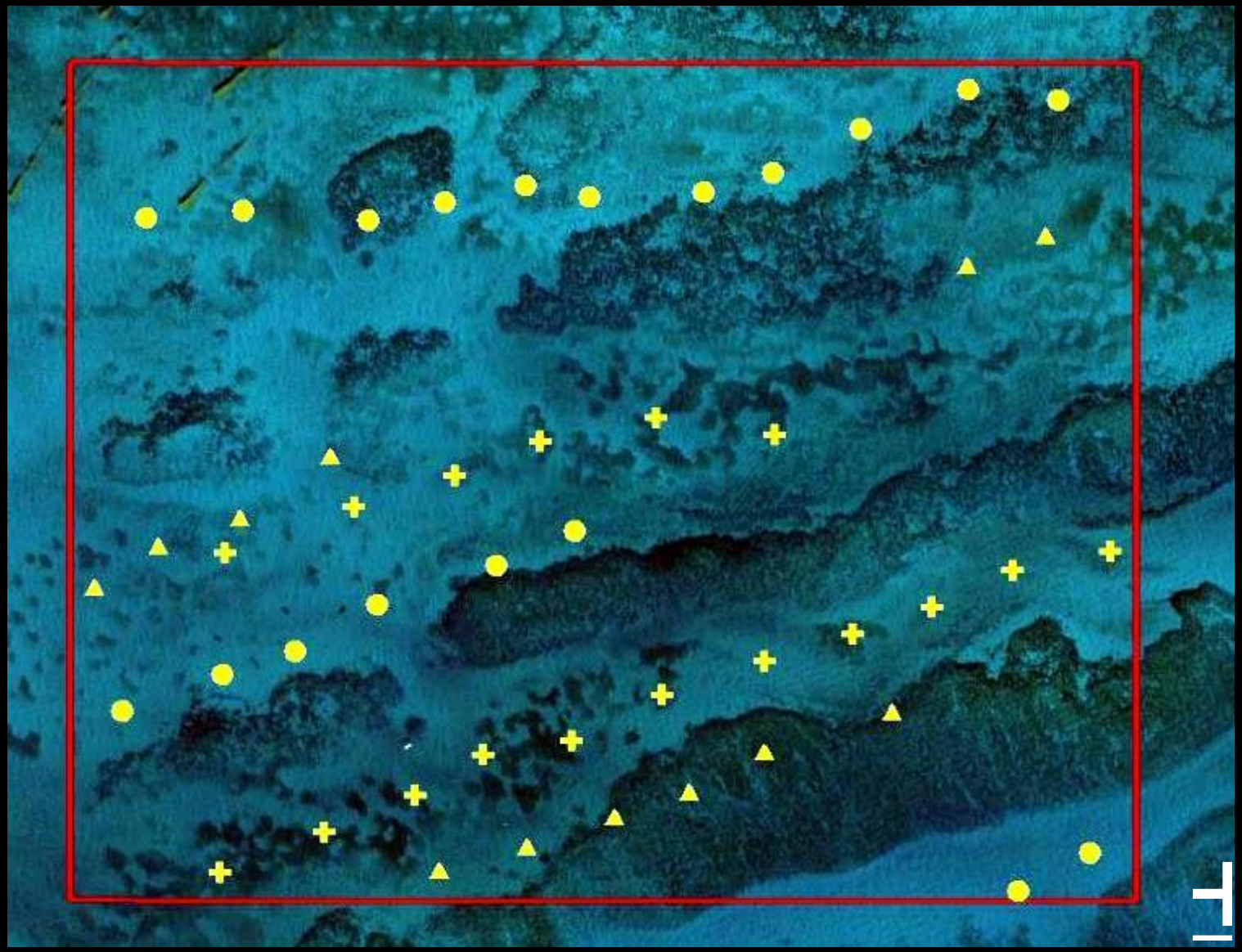
Alligator Reef Size: 0.84 km^2

Trap Locations in State MPAs



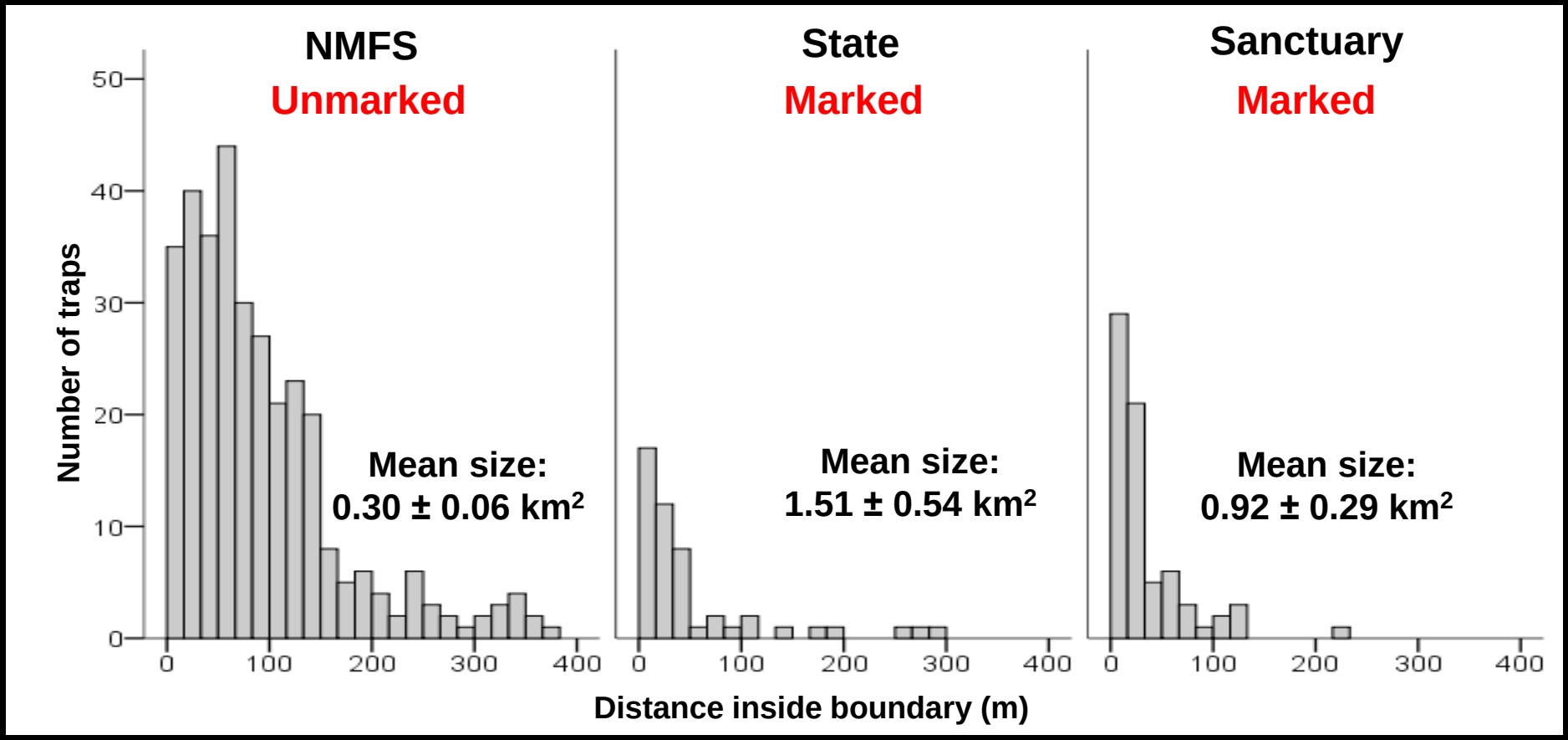
Mosquito Bank South Size: 0.52 km^2

Trap Locations in NMFS MPAs



NMFS 12 (Big Pine Shoal) Size: 0.76 km^2

Traps Inside MPAs: Distance from Boundary



- Traps concentrated near boundaries of marked MPAs
- Traps evenly distributed throughout unmarked MPAs

Trap Fishermen in MPAs

- Number of fishermen
  - Year 1: 32
  - Year 2: 20
    - 13 fishermen from Year 1
    - 7 new fishermen
  - 19 fishermen observed in Year 1 were not observed in Year 2

	Mean number of fishermen (±SE)	
MPA type	**Fall 2014**	**Fall 2015**
NMFS *Acropora* Protection Zones (NMFS)	2.2 ± 0.3	1.7 ± 0.4
Pennekamp Lobster Exclusion Zones (State)	2.0 ± 0.7	0.3 ± 0.2
FKNMS Sanctuary Preservation Areas (Sanctuary)	1.2 ± 0.3	0.4 ± 0.2
Controls	2.3 ± 0.4	3.1 ± 0.4

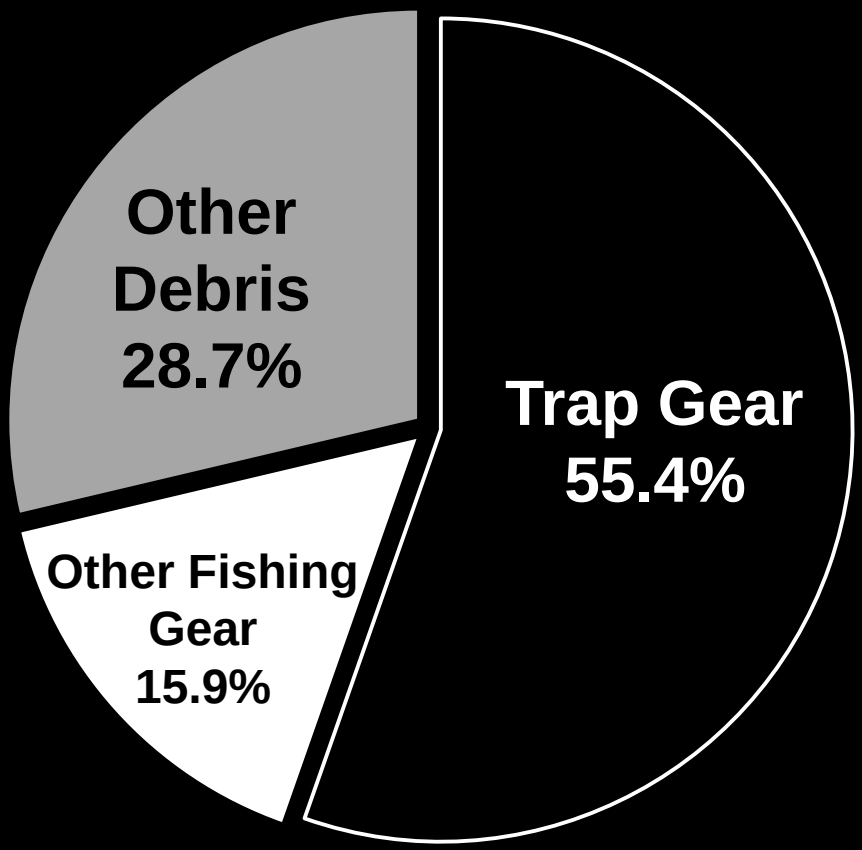
Results Summary

- More traps in unmarked MPAs
- Most traps near boundaries in marked MPAs
- Improved compliance after education
  - 19 out of 32 fishermen removed traps from MPAs (~60%)
  - New fishermen in Year 2

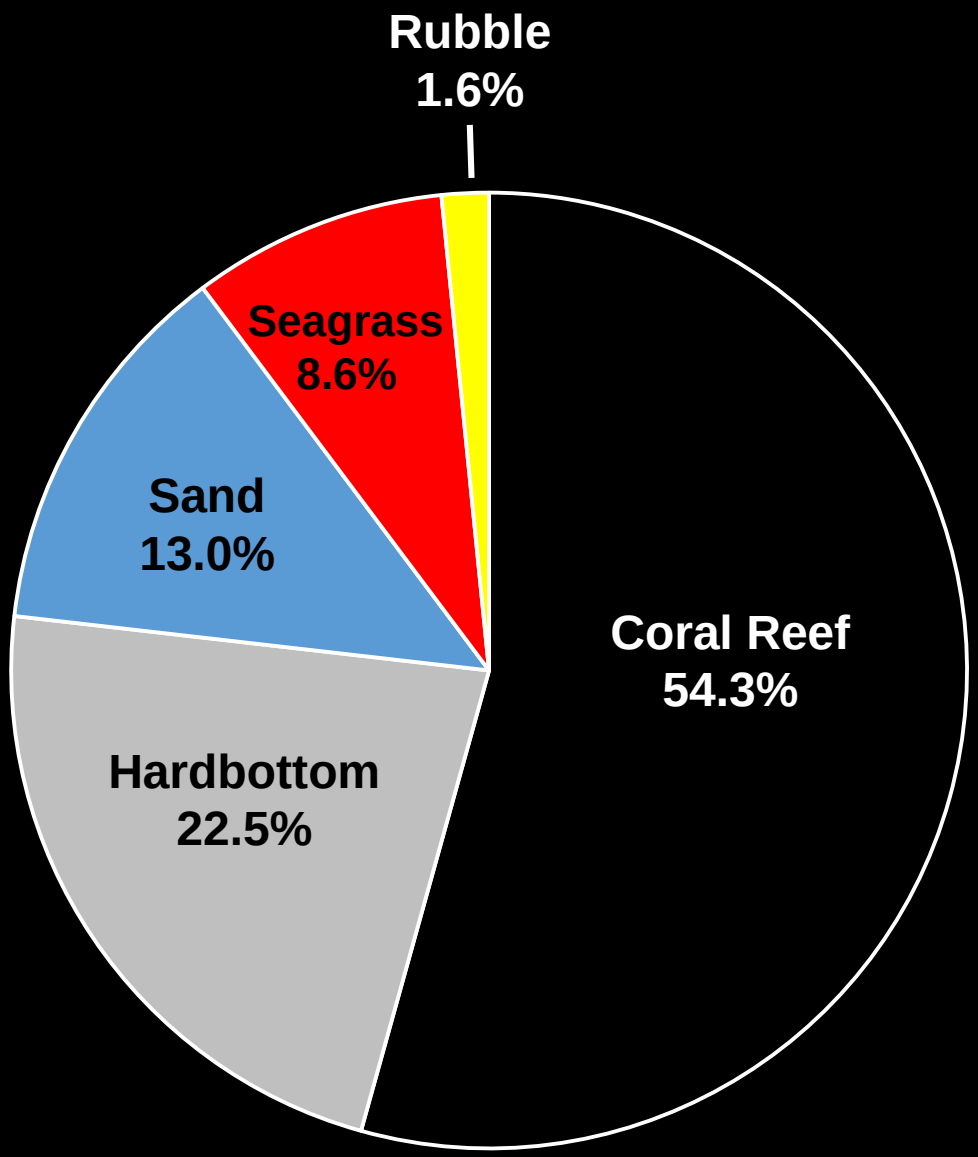
Evaluating Marine Debris Accumulation

- **Methods:**
  - Summer 2015
  - Diver transects: 100 m long x 15 m wide (n=261)
    - Recorded:
      - Debris type
      - Habitat type
      - Distance on transect

Results: Types of Debris



Results: Trap Debris by Habitat



Results Summary

- Trap debris was most prevalent type of marine debris
  - Accumulated in coral reef habitat
  - Found in all types of MPAs

Conclusions

- Education effort improved compliance
- Marked MPAs had better compliance
- Area protected by MPAs is smaller than intended due to traps fished inside boundaries
- MPAs may not protect corals from trap debris because of wind-driven transport of traps

Thank You