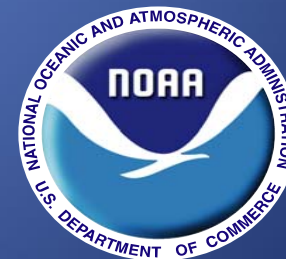


Coral Reef Fishes within the Dry Tortugas National Park: Effects of Three Years of Protection by the Research Natural Area

S.F. Keenan, T.S. Switzer, B. Pittinger, A. Acosta, M.W. Feeley,
and J.H. Hunt (FWC)

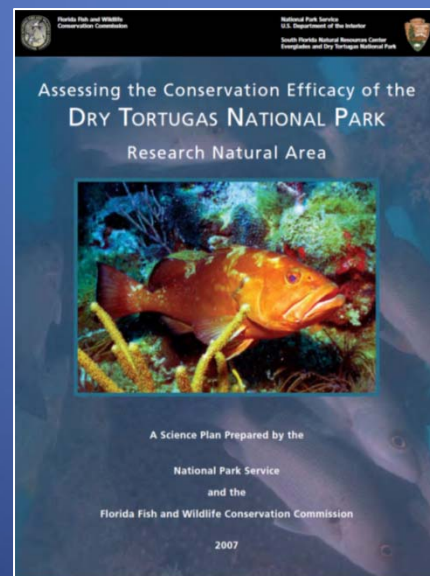
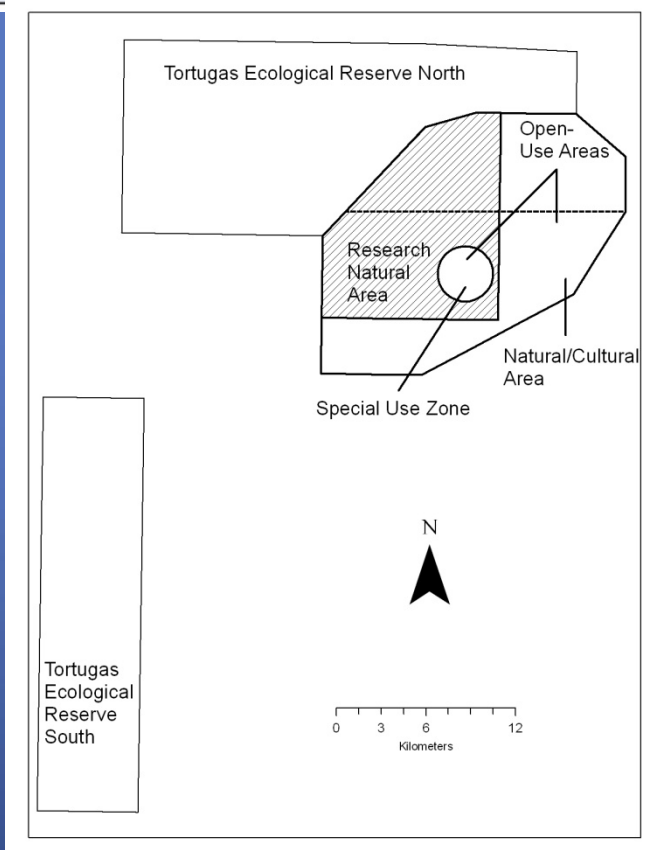
D.E. Hallac and D. Morrison (NPS)

C.C. McIvor (USGS)



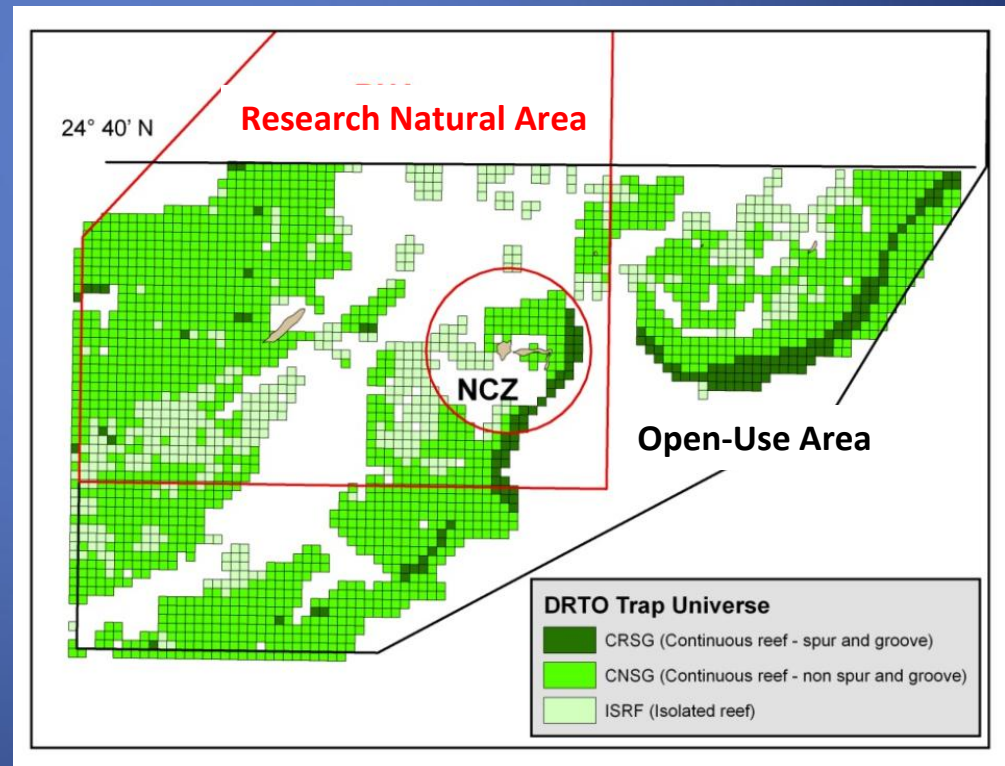
NPS / FWC Science Plan

- Current study objectives:
 - Quantify changes in the abundance and size-structure of exploited species within the RNA relative to adjacent areas
 - Employ fish traps and hook-and-line gears to collect information on selected species
 - Evaluate changes in community structure



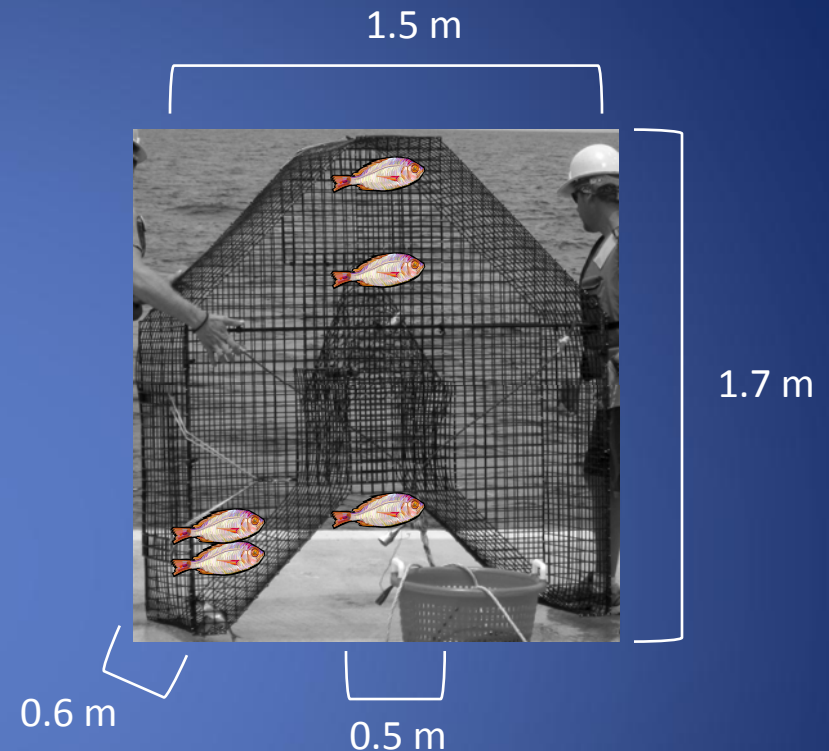
Survey Design

- Conduct seasonal (late spring and early fall) fisheries-independent surveys of structure-oriented fishes – began spring 2008
- Habitat-based allocation of sampling effort – aggregated habitat strata from reef-fish visual census (RVC) design:
 - *Continuous reef – spur and groove*: Low-relief and high-relief spur and groove
 - *Continuous reef – non spur and groove*: low-relief hard bottom, medium-profile reef, and reef terrace
 - *Isolated reef*: patchy hard bottom, rocky outcrops, and pinnacle reef



Sampling – Chevron Traps

- Each trap baited with 3 cut Atlantic mackerel
- Traps deployed over sandy patches adjacent to reef habitat
- Daytime soaks:
 - N = 4 traps per station
 - Soak time ~ 1.5 hours
- Overnight soaks:
 - N = 2 traps per station
 - Soak time ~ 12 hours



Sampling – Hook-and-Line

- Sampling conducted using standardized conventional baitcasting tackle
- Surveys conducted at subset of trapping stations
- Daytime surveys only
- Minimum of 45-minutes of effort per station

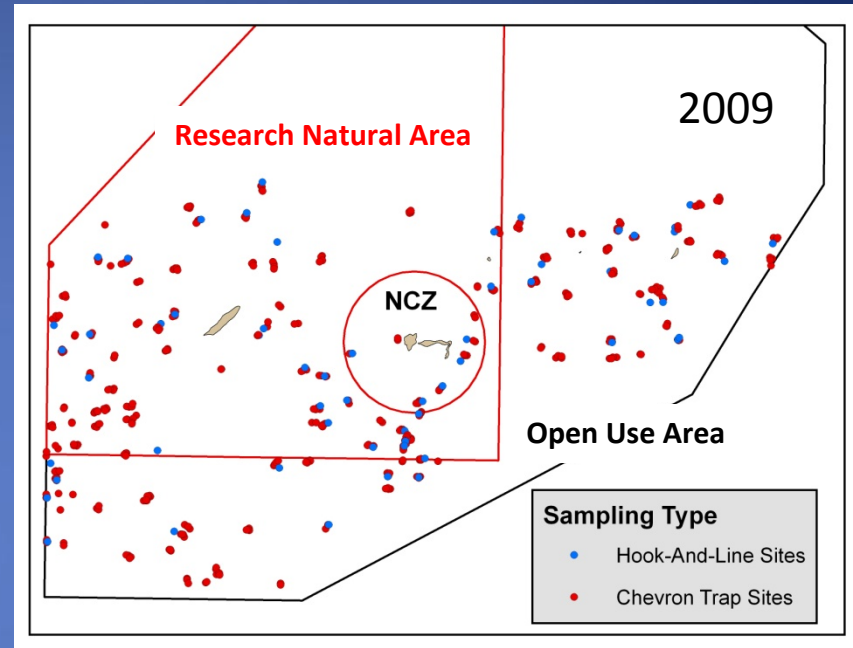
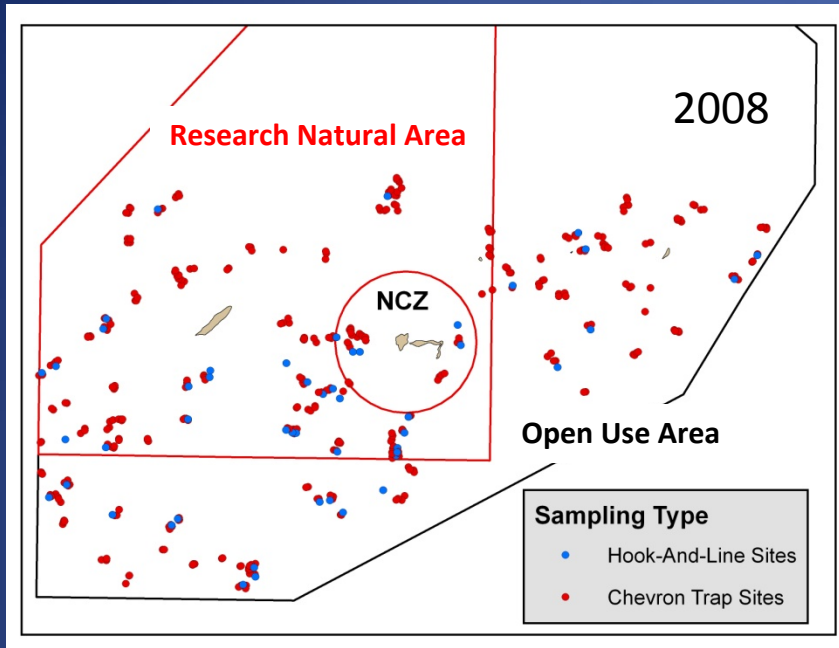


Sample Processing

- All individuals identified / enumerated
- Up to forty individuals per species per sample measured
- Up to ten individuals per family per season retained for life-history studies
- Released individuals:
 - Tagged
 - Dorsal spine removed



Sampling Effort Summary



2008	Number of Stations		
Area	Day-Trap	Night-Trap	Hook & Line
RNA	32	22	30
Open-Use	33	20	28
<i>Total</i>	<i>65</i>	<i>42</i>	<i>58</i>

2009	Number of Stations		
Area	Day-Trap	Night-Trap	Hook & Line
RNA	33	17	31
Open-Use	39	19	27
<i>Total</i>	<i>72</i>	<i>36</i>	<i>58</i>

Chevron Trap Catch Summary

- 3,433 individuals representing 38 taxa in 2008
- 3,811 individuals representing 34 taxa in 2009

Scientific Name	Common Name	2008		2009	
		Day	Night	Day	Night
<i>Ocyurus chrysurus</i>	Yellowtail snapper	1182	711	1788	335
<i>Haemulon plumierii</i>	White grunt	263	493	515	335
<i>Lutjanus synagris</i>	Lane snapper	39	214	77	55
<i>Epinephelus morio</i>	Red grouper	44	62	58	26
<i>Calamus nodosus</i>	Knobbed porgy	38	35	41	2
<i>Lutjanus griseus</i>	Gray snapper	4	65	4	15
<i>Chaetodon ocellatus</i>	Spotfin butterflyfish	5	9	29	1
<i>Caranx ruber</i>	Bar jack	13	13	0	0
<i>Calamus proridens</i>	Littlehead porgy	10	0	14	2
<i>Haemulon sciurus</i>	Bluestriped grunt	0	14	0	2
<i>Mycteroperca bonaci</i>	Black grouper	0	7	1	0
<i>Lutjanus analis</i>	Mutton snapper	0	2	2	0

Hook-And-Line Catch Summary

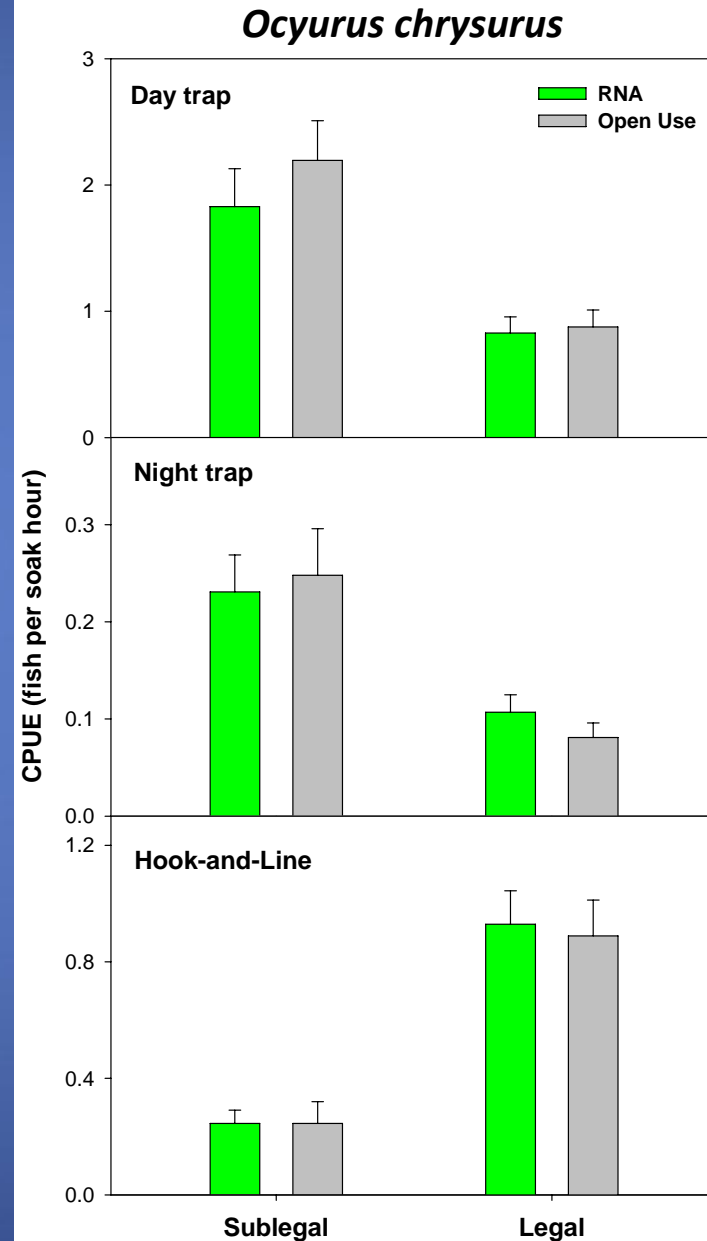
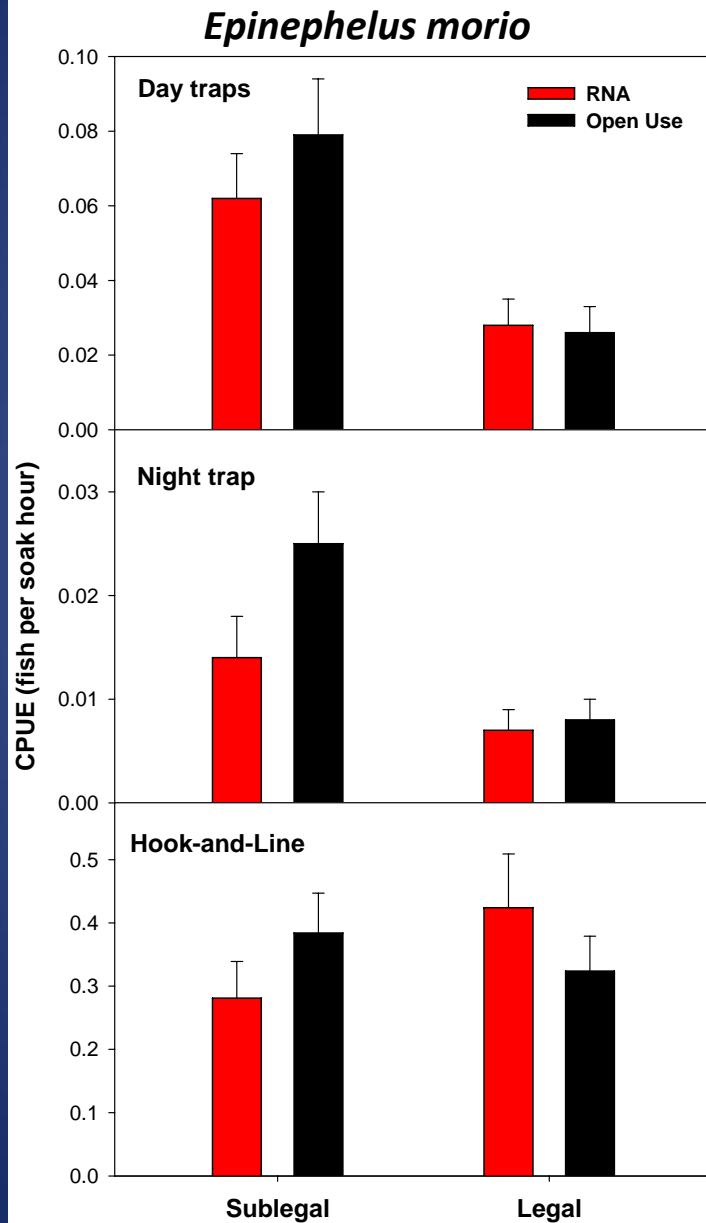
- 520 individuals representing 21 taxa in 2008
- 365 individuals representing 18 taxa in 2009

Scientific Name	Common Name	2008 Total	2009 Total
<i>Ocyurus chrysurus</i>	Yellowtail snapper	271	142
<i>Epinephelus morio</i>	Red grouper	133	117
<i>Lutjanus analis</i>	Mutton snapper	38	31
<i>Lutjanus griseus</i>	Gray snapper	13	31
<i>Haemulon plumierii</i>	White grunt	21	18
<i>Mycteroperca bonaci</i>	Black grouper	15	3





CPUE Summary – RNA vs. Open use

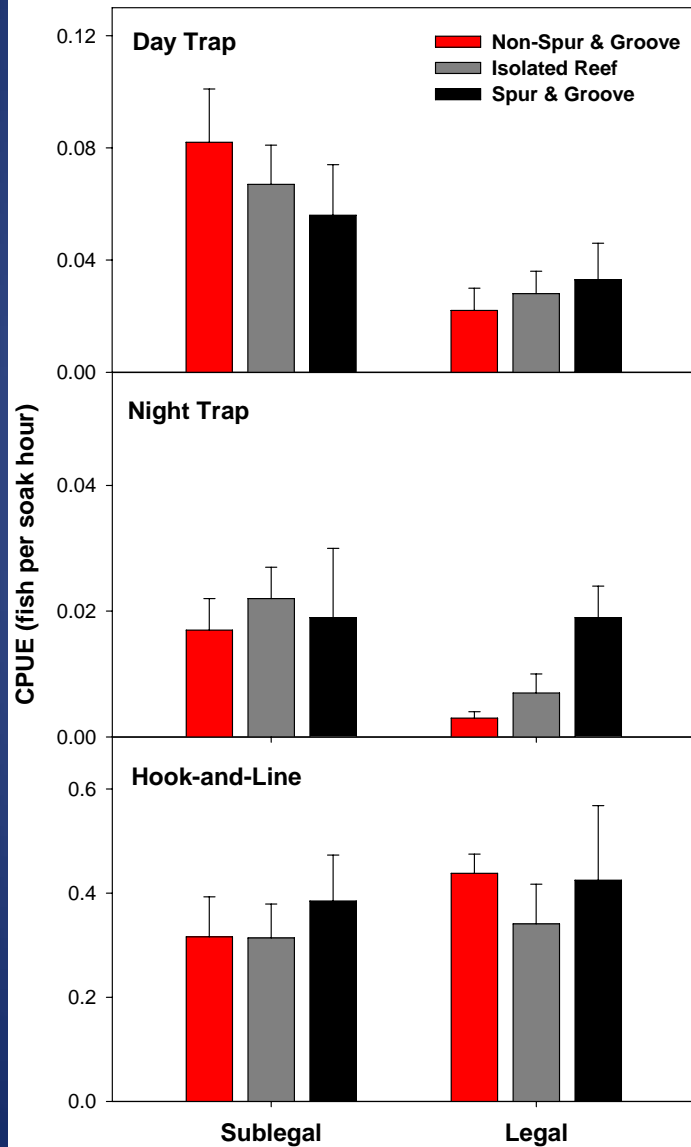




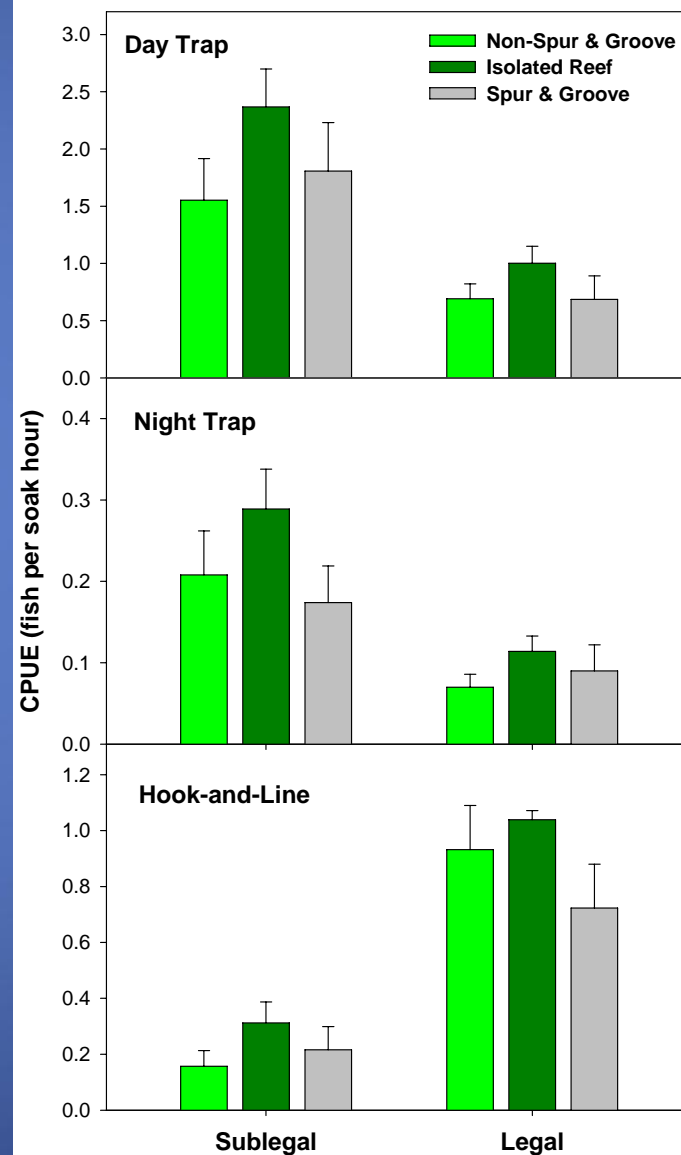
CPUE Summary – Habitat



Epinephelus morio

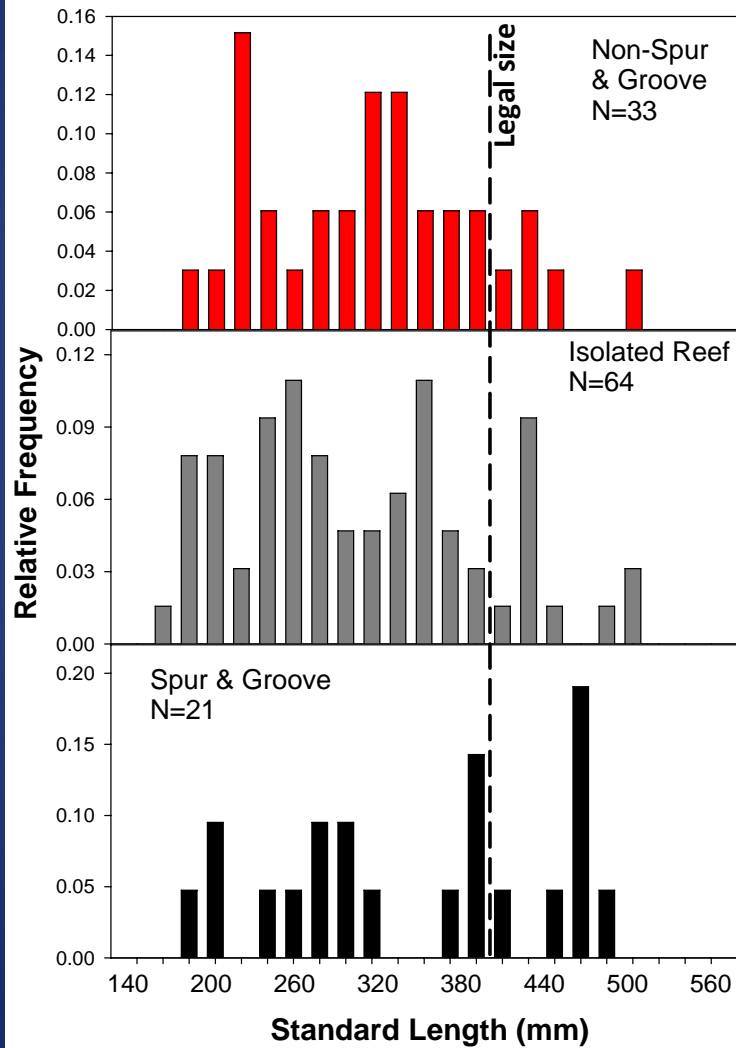


Ocyurus chrysurus

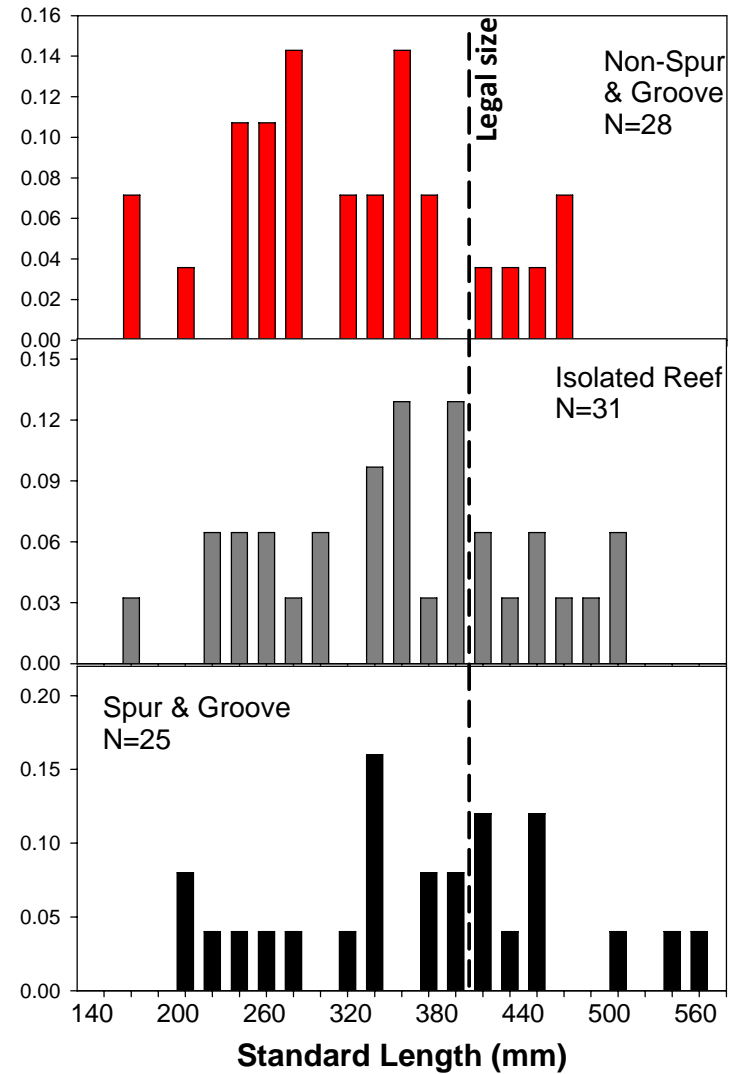


Size Frequency (Day Traps) – *Epinephelus morio*

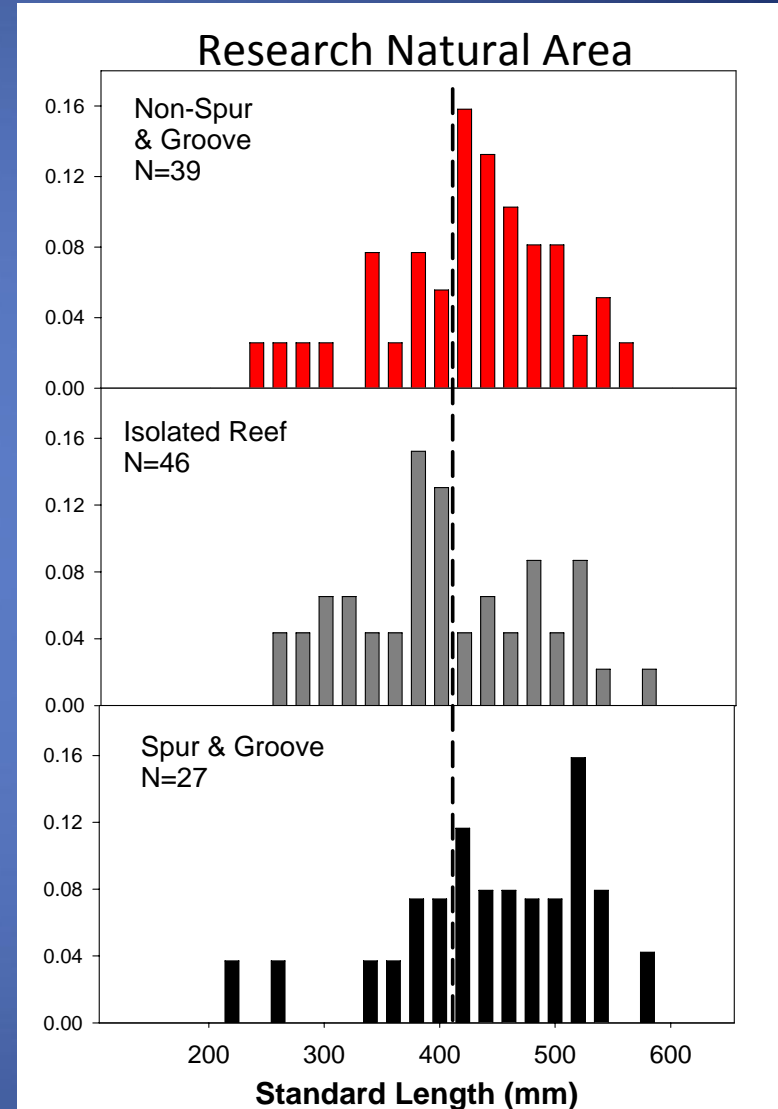
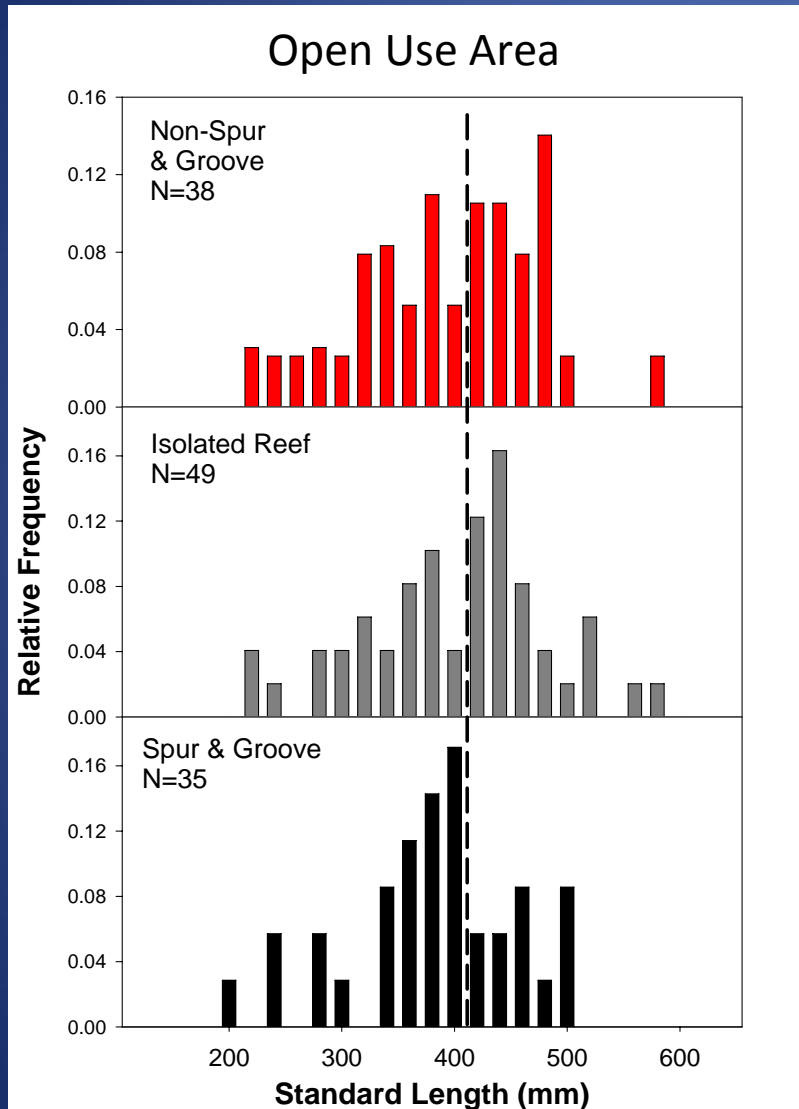
Open Use Area



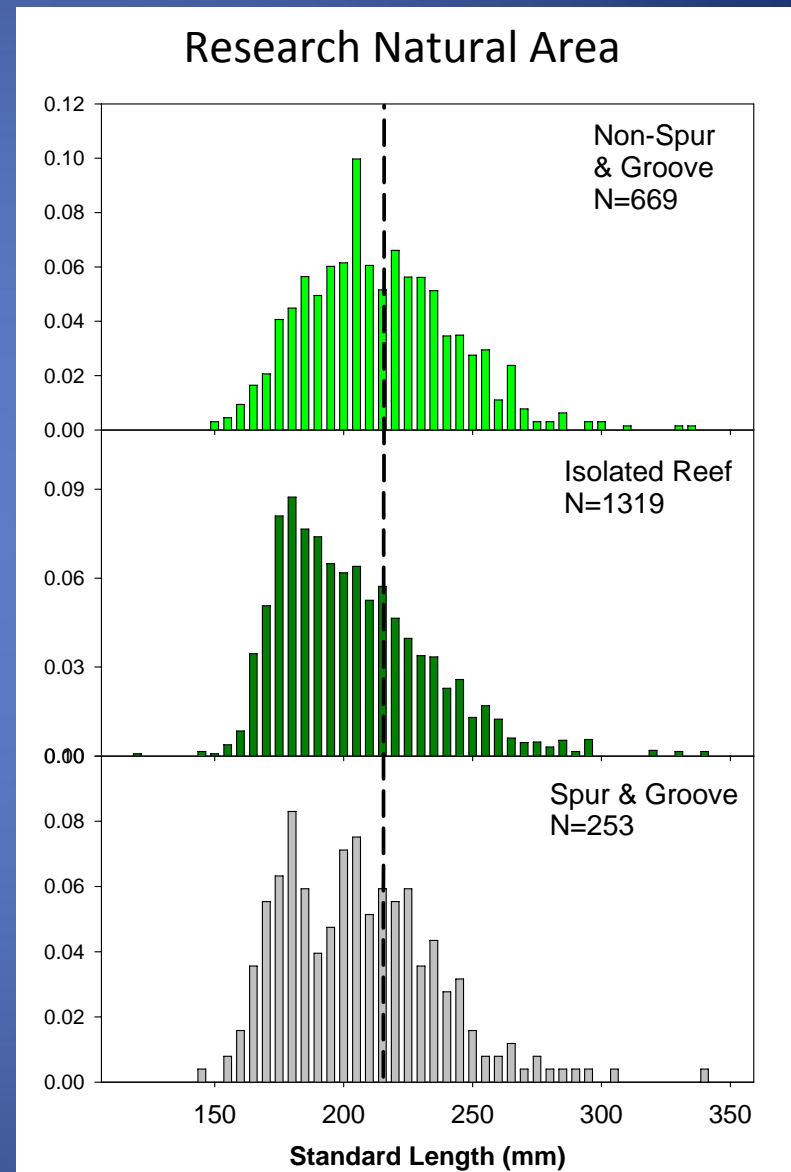
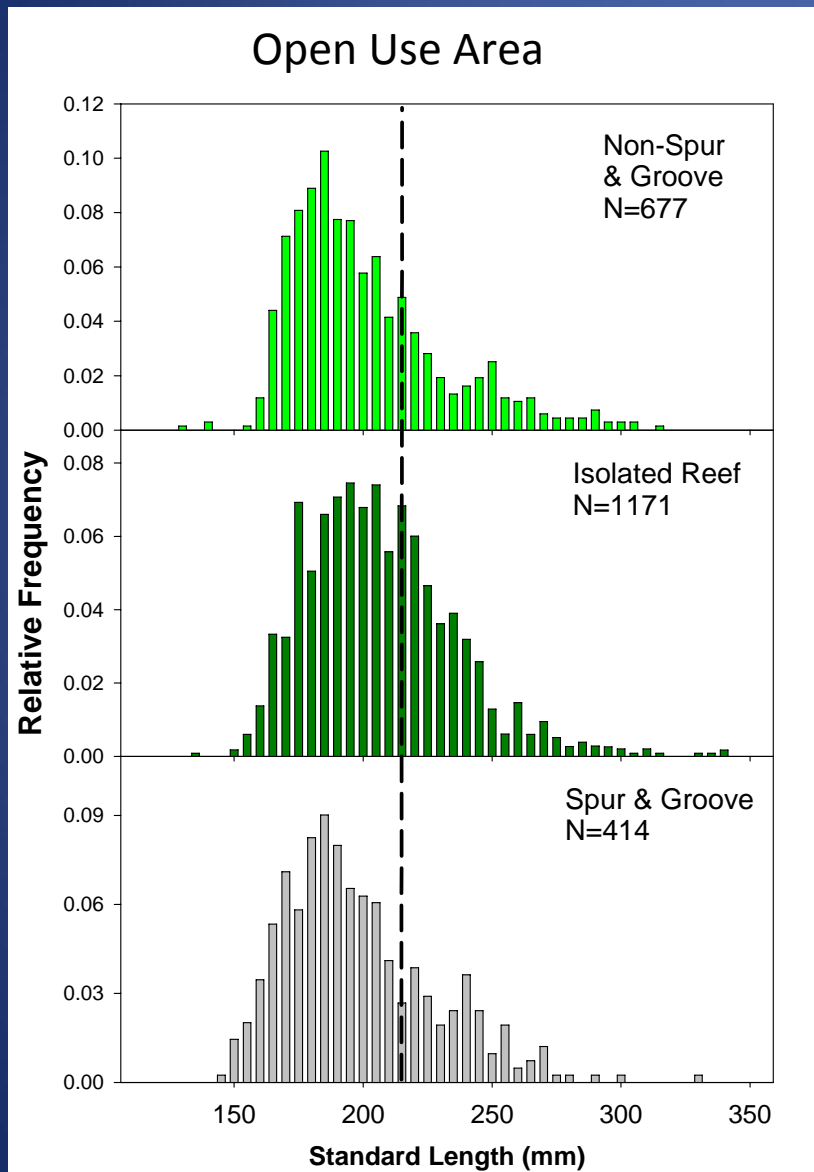
Research Natural Area



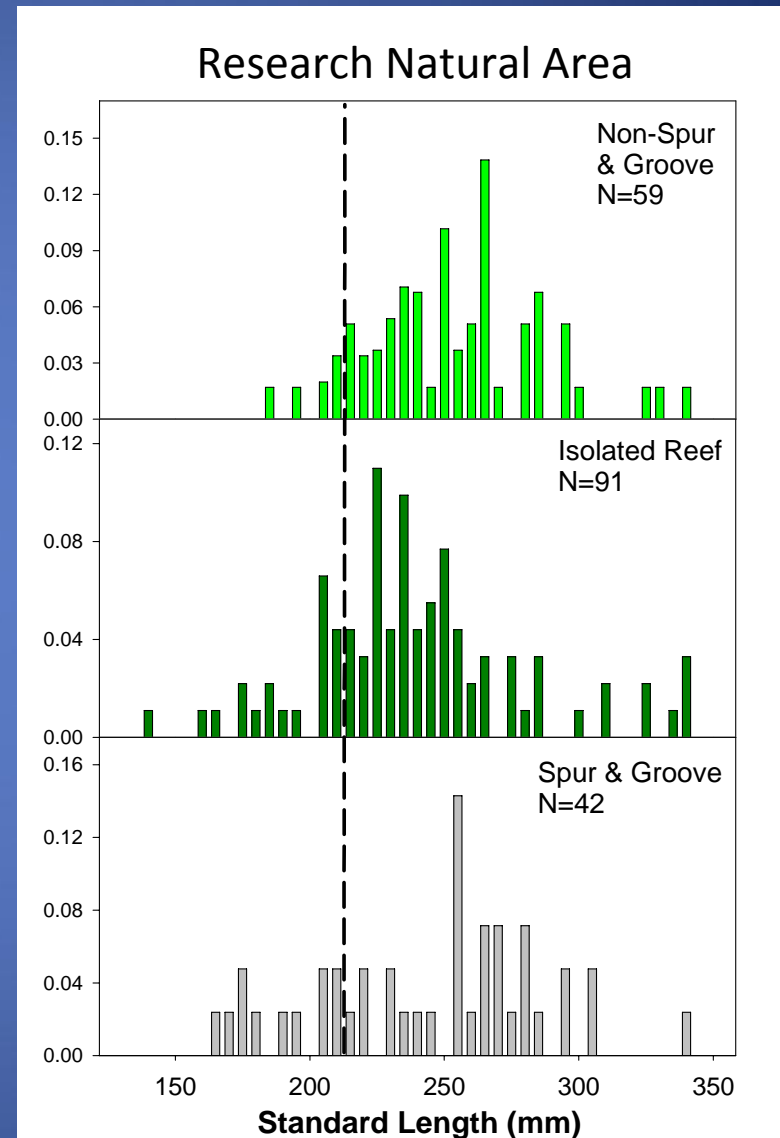
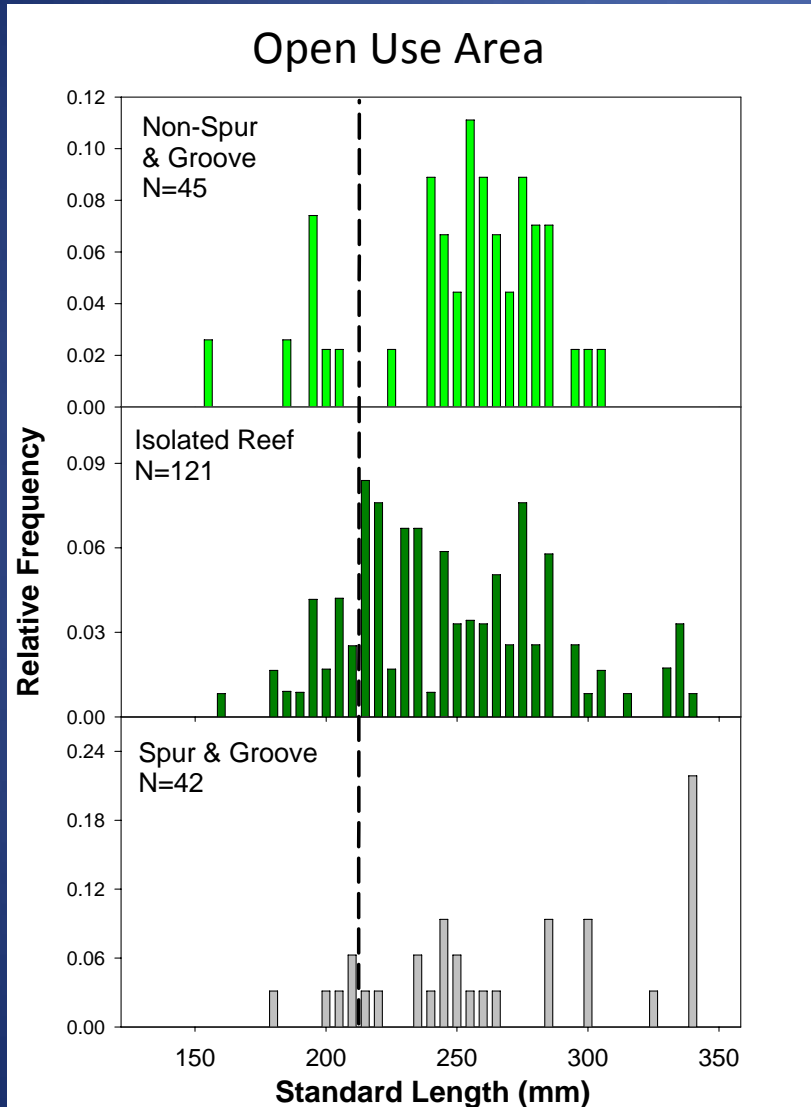
Size Frequency (Hook-and-Line) – *Epinephelus morio*



Size Frequency (Day traps) – *Ocyurus chrysurus*



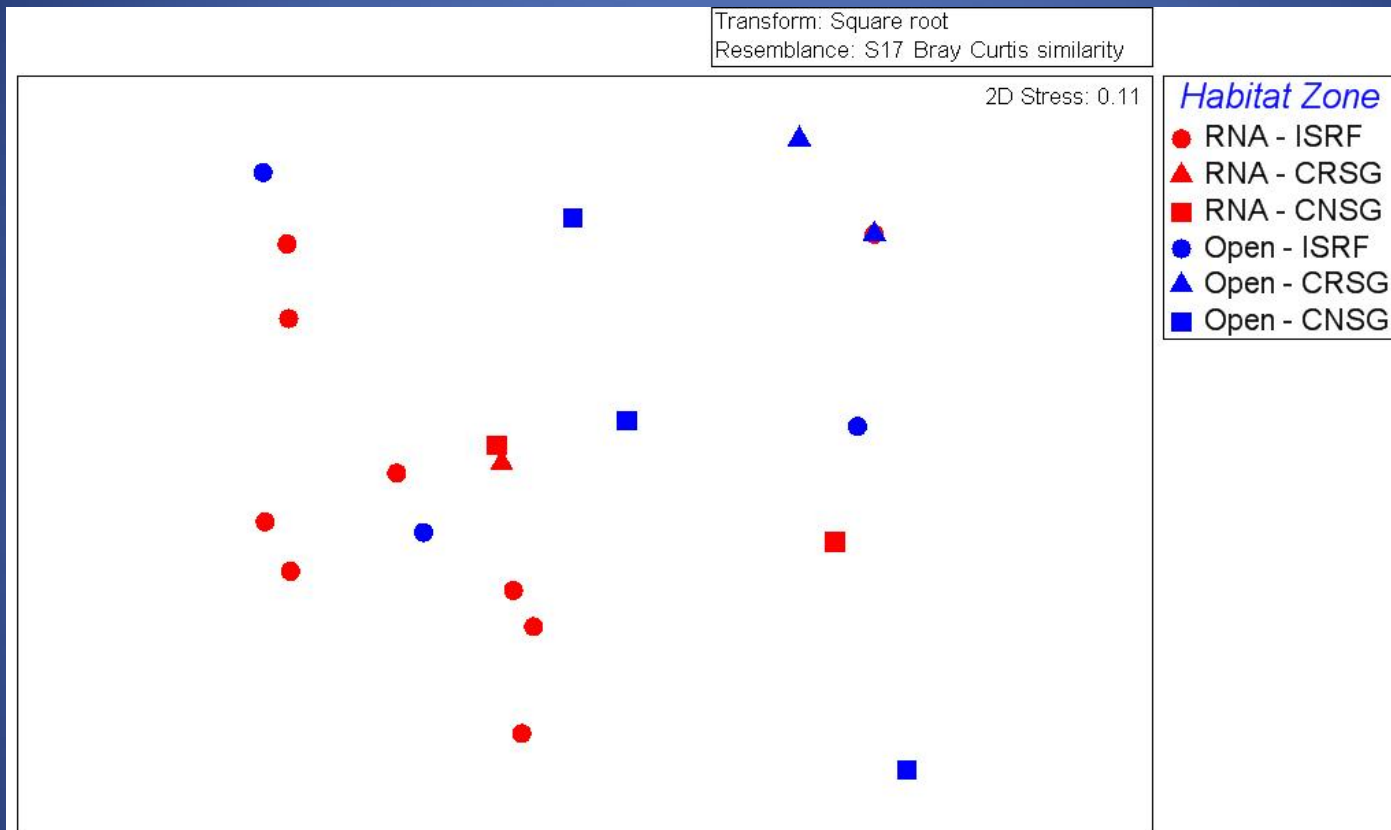
Size Frequency (Hook-and-Line) – *Ocyurus chrysurus*



Community Analyses

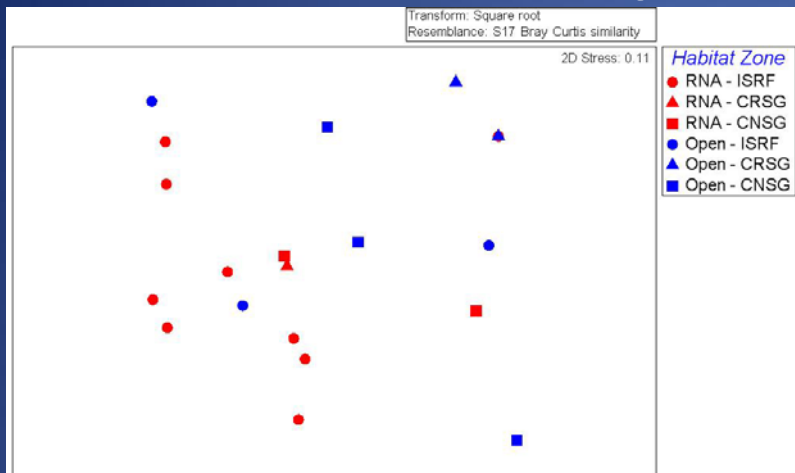
- Analyses conducted in Primer statistical package
- Multi-dimensional scaling of square-root transformed catch data
- Data presented from day trap results

Community Analyses – day traps

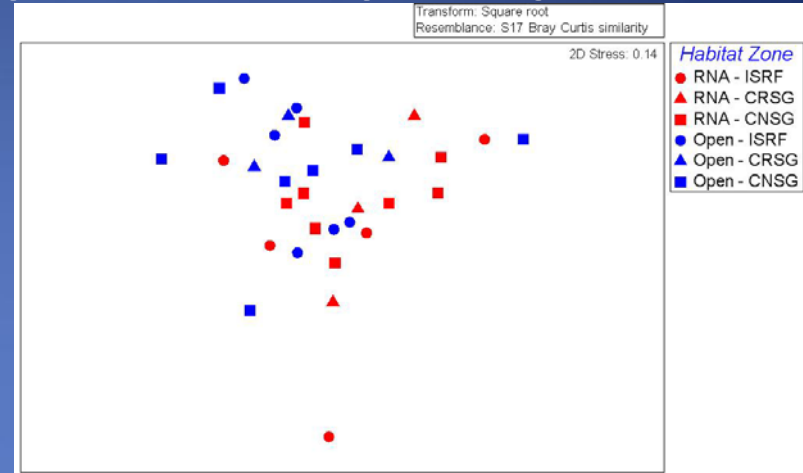


Spring 2008

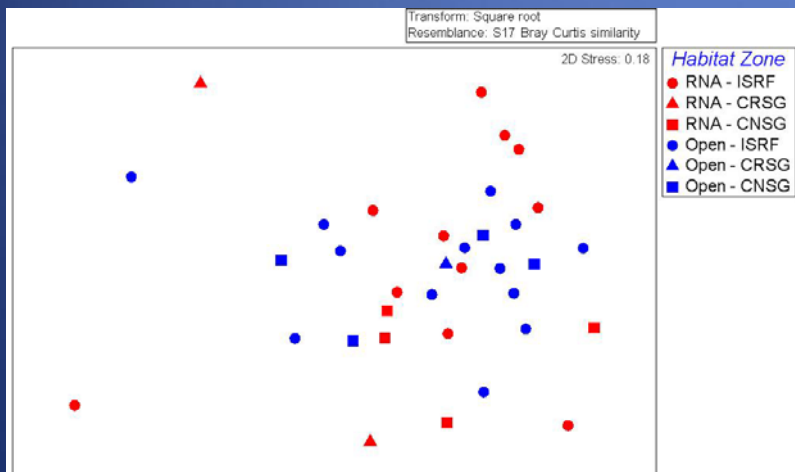
Community Analyses – day traps



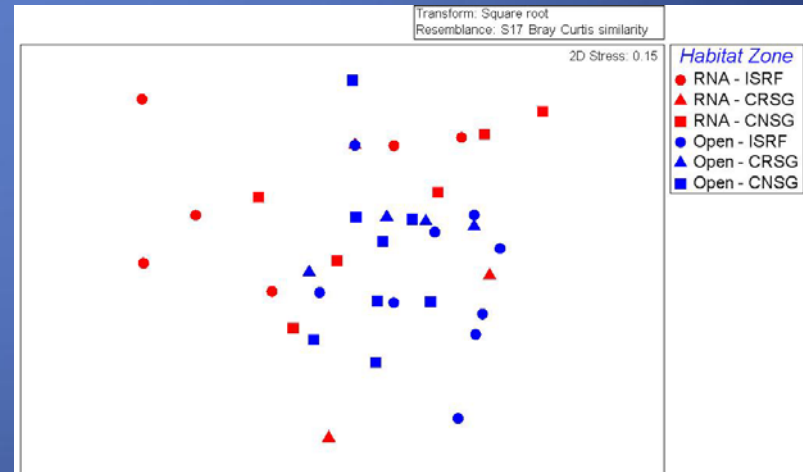
Spring 2008



Spring 2009



Fall 2008



Fall 2009

Summary

- At this point, we do not identify temporal trends / RNA-Open use area differences
 - Sampling completed 2010; planned 2011
- Preliminary evidence suggests habitat differences important for some taxa:
 - Some patterns gear-dependent
 - Ontogeny?
- No significant differences in community structure

Acknowledgements

- Support of NPS personnel, especially Dave & Pat Walton, Tree Gottshall and Blue Douglas
- FWC personnel
- Jerry Ault and Steve Smith
- Gary Brewer
- Funded by USGS – State Partnership Program (NMFS/NFWF) and NPS



Questions?

