



# DISTRIBUTION OF SPECKLED HIND & WARSAW GROUPE IN THE U.S. SOUTH ATLANTIC

Southeast Regional Office

St. Petersburg, Florida

SAFMC Meeting  
Wilmington, North Carolina  
December 3-7, 2012

NOAA FISHERIES





# Outline

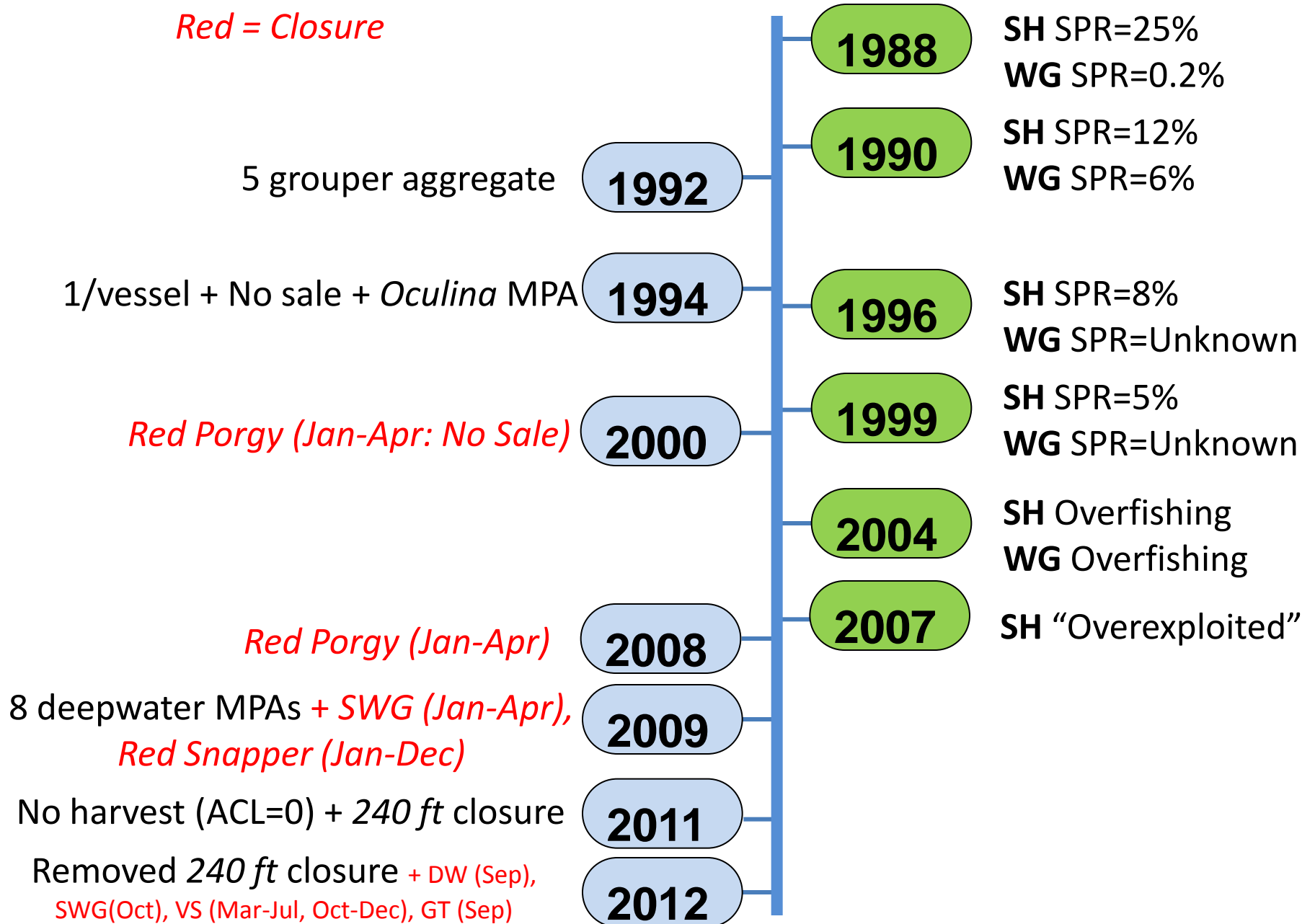
- 1. Management history vs. stock status**
- 2. Landing and discard trends for SH & WG**
- 3. Observed and modeled distribution of SH & WG**
- 4. Theory and description of spatial closures**
- 5. Impacts of spatial closures on SH, WG**
- 6. Impacts on harvest of associated stocks**



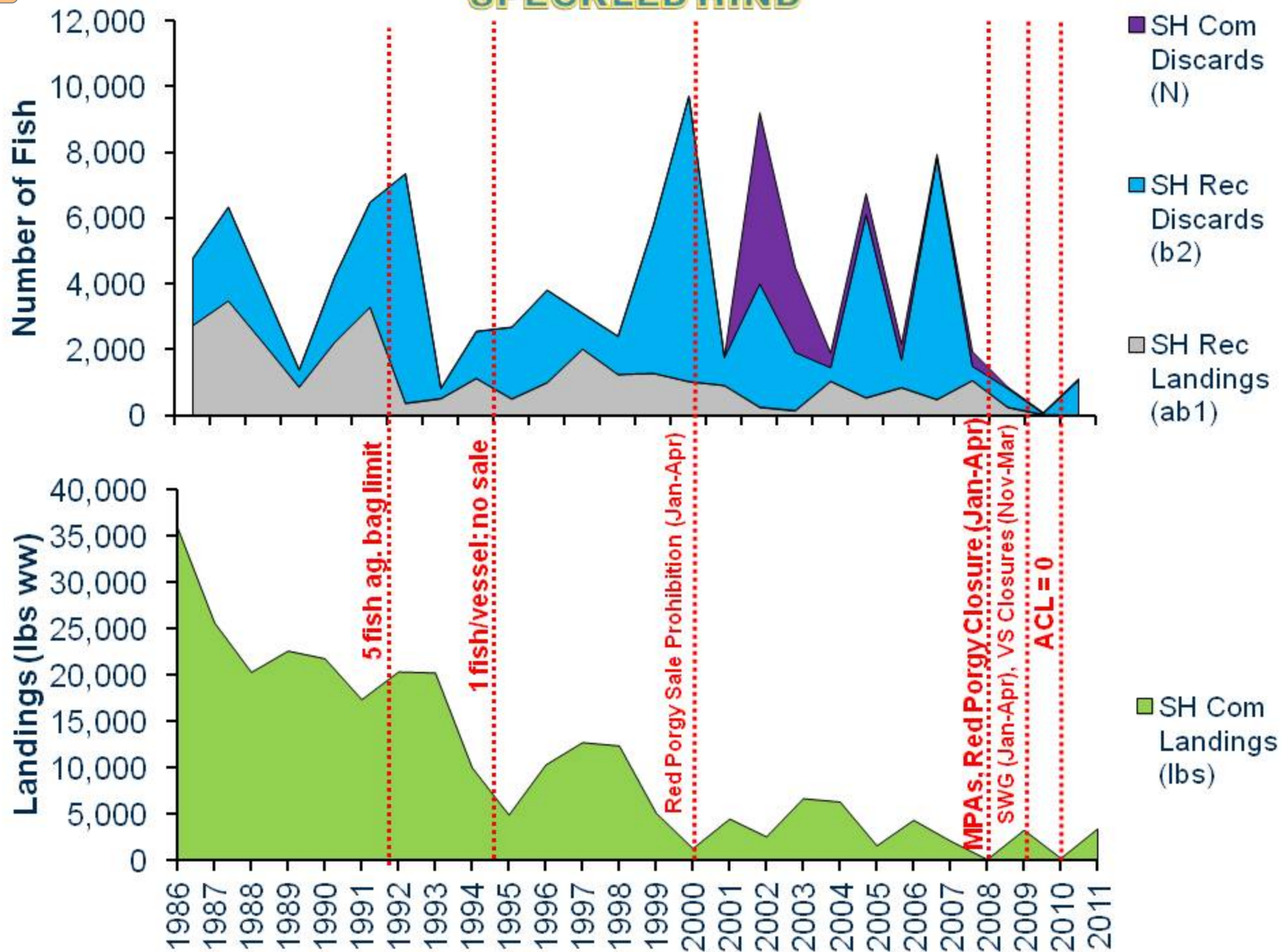


# Management History vs. Stock Status

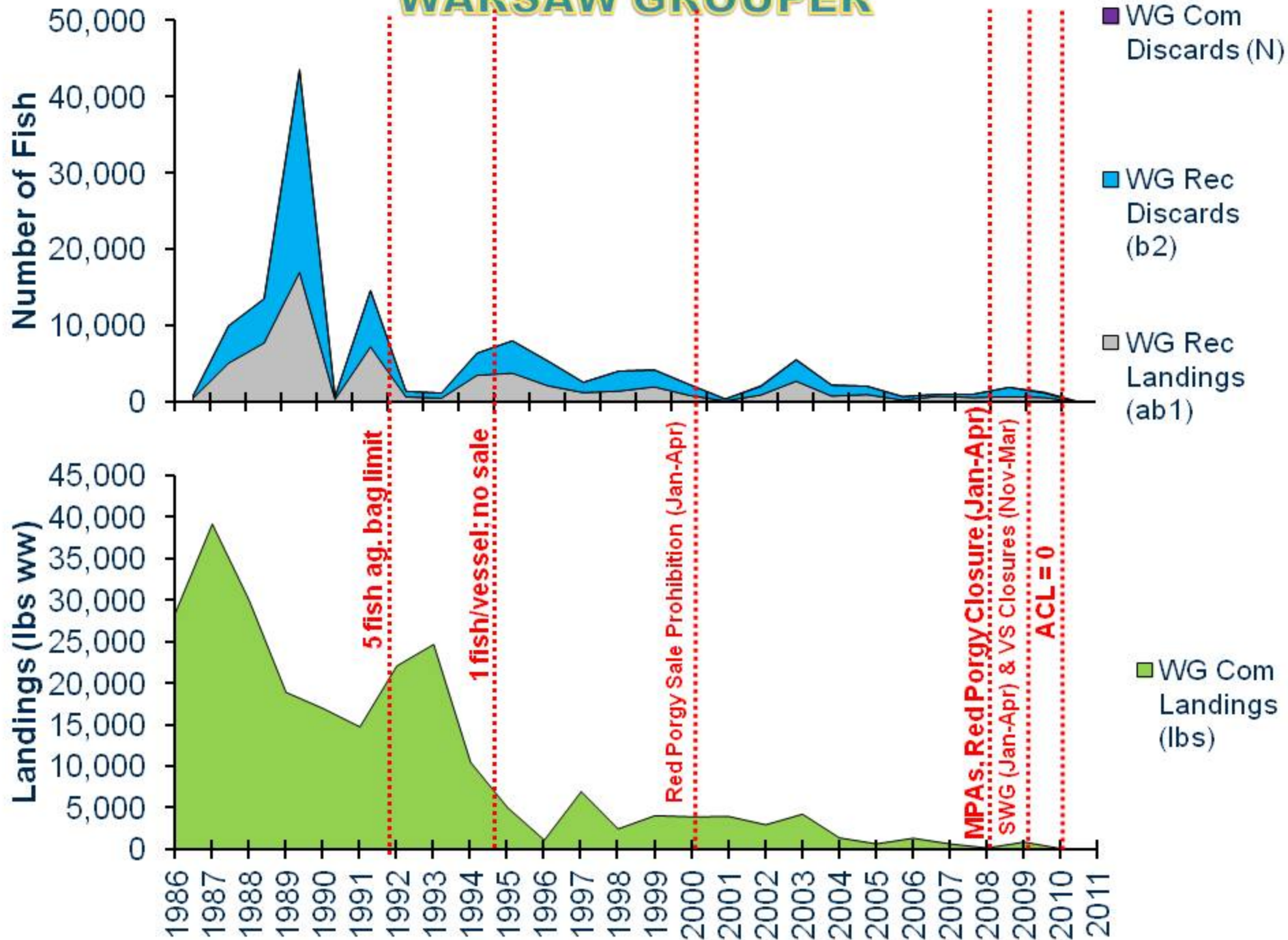
*Red = Closure*

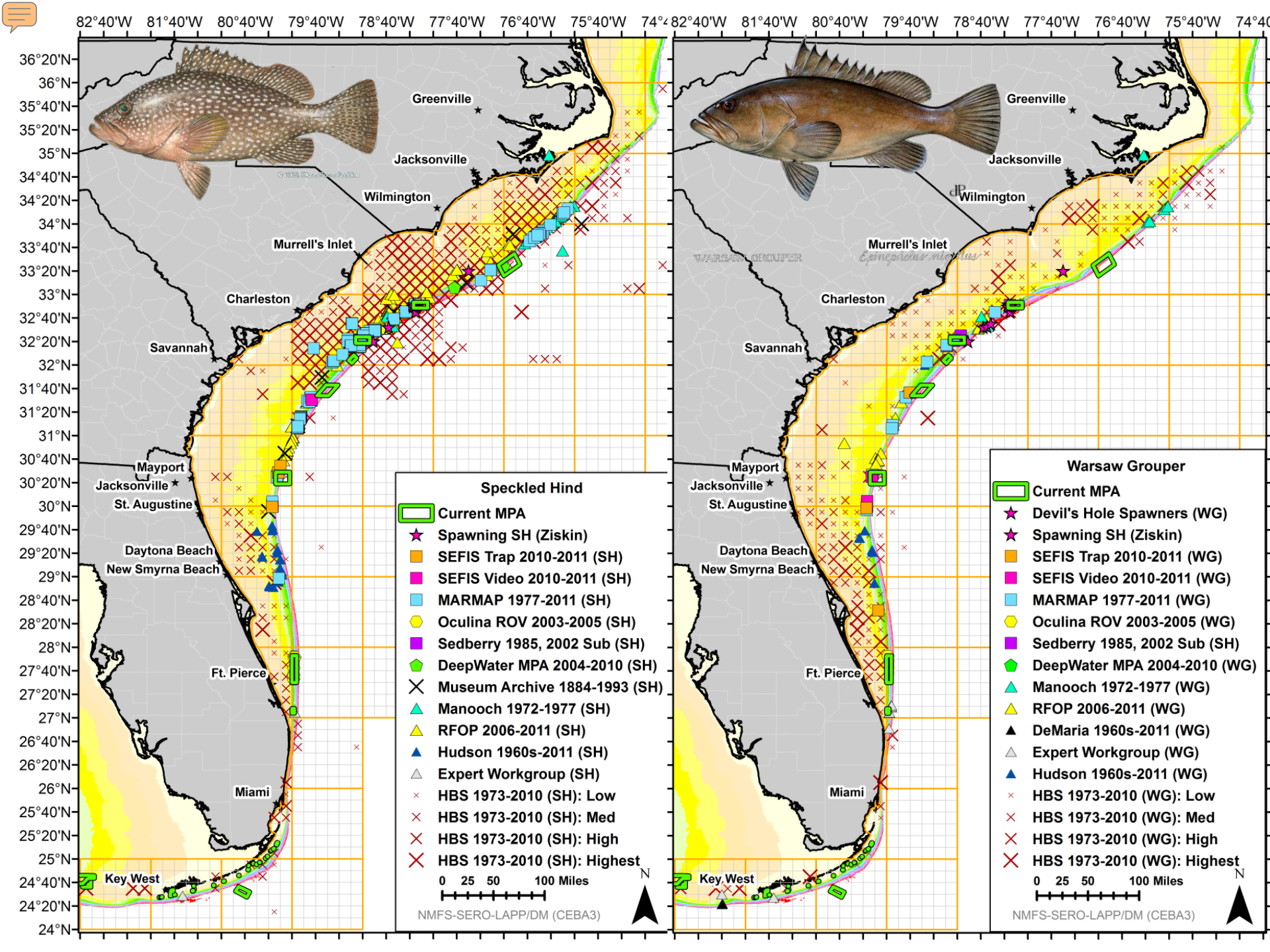


# SPECKLED HIND



# WARSAW GROUPE







# CLOSED AREAS FOR SH & WG

## **Depth: 25-100 fathoms**

Higher probability of encounter

Likely >50% release mortality

> percentage mature fish

## **Alignment and size: Large, Shelf-Edge**

Cover likely foraging and spawning habitats

Efficiency and enforceability

## **Location selection: Source Habitats**

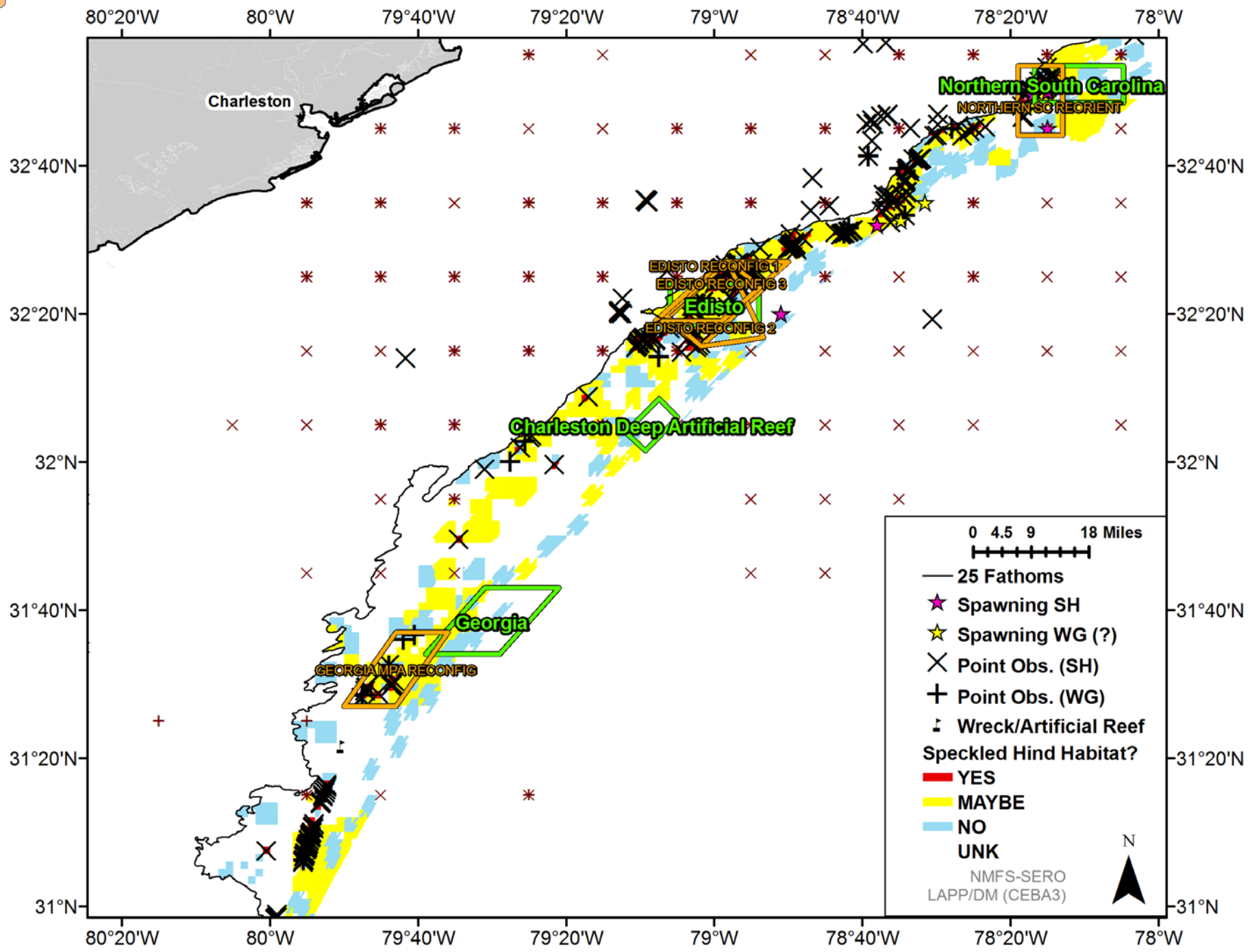
Documented occurrences (i.e., point observations)

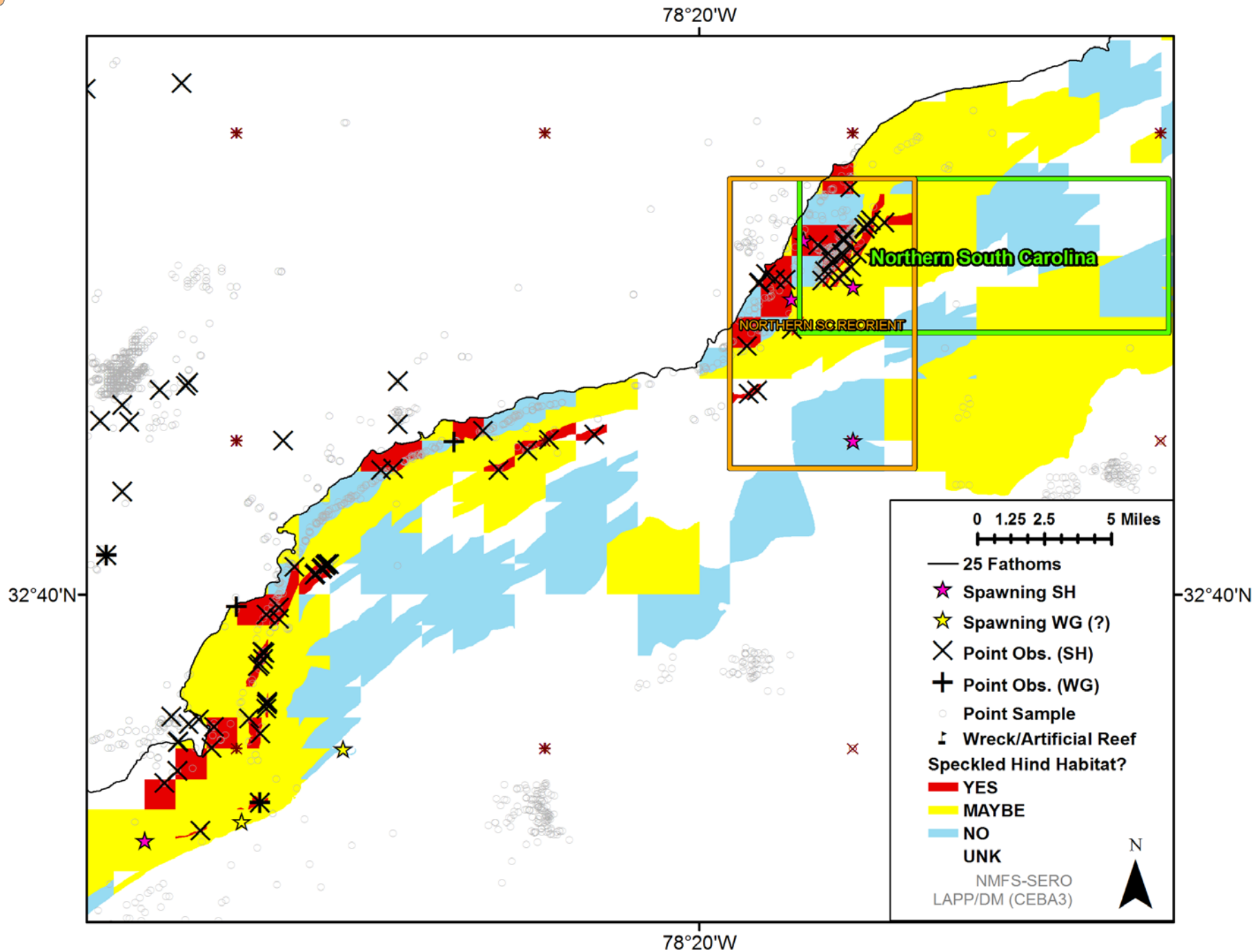
Documented hardbottom habitat

Extend/modify existing MPAs or expand network

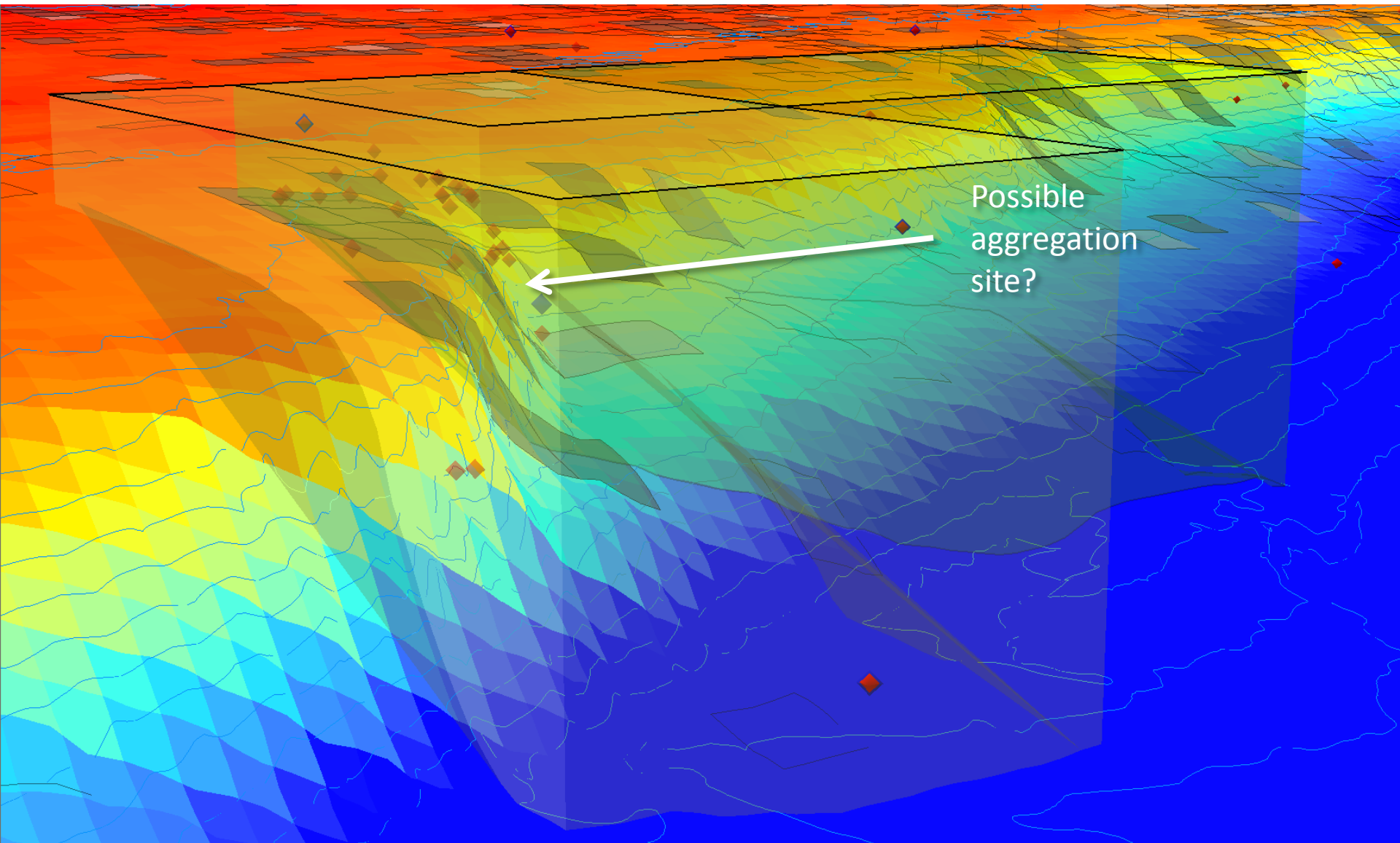
MPA	HABITAT	STOCKS PROTECTED	COMMENTS
Snowy Wreck	Wreck + Deep HB	snowy grouper, <b>speckled hind</b> , gag, red porgy, red grouper, graysby, and hogfish	spawning aggregations of snowy grouper (?)
Northern SC	Shelf Edge HB	snowy grouper, yellowedge grouper, <b>speckled hind</b> , small vermilion snapper, red porgy, triggerfish, and gag	
Edisto	Shelf Edge HB	vermilion snapper, red porgy, gag, scamp, black sea bass, juvenile snowy grouper, <b>speckled hind</b> , and blueline tilefish	may be larval source/sink due to Charleston Gyre
Charleston Deep	No HB		artificial reef never implemented
Georgia	Mud	tilefish	east of popular fishing ground
North Florida	Shelf Edge HB + Mud	snowy grouper, <b>speckled hind</b> , tilefish, vermilion snapper, hogfish, scamp, red porgy, and tomtate	popular fishing grounds to north and south
Oculina ECA	Deepwater Coral	snowy grouper, <b>speckled hind</b> , <b>warsaw grouper</b> , deepwater complex	protect coral from shrimp trawling
St. Lucie Hump	Shelf HB	<b>speckled hind</b> , juvenile snowy grouper, <b>warsaw grouper</b> , black sea bass, red porgy, and red snapper	
East Hump	Deep HB + Mud	snowy grouper, <b>warsaw grouper</b> , tilefish	

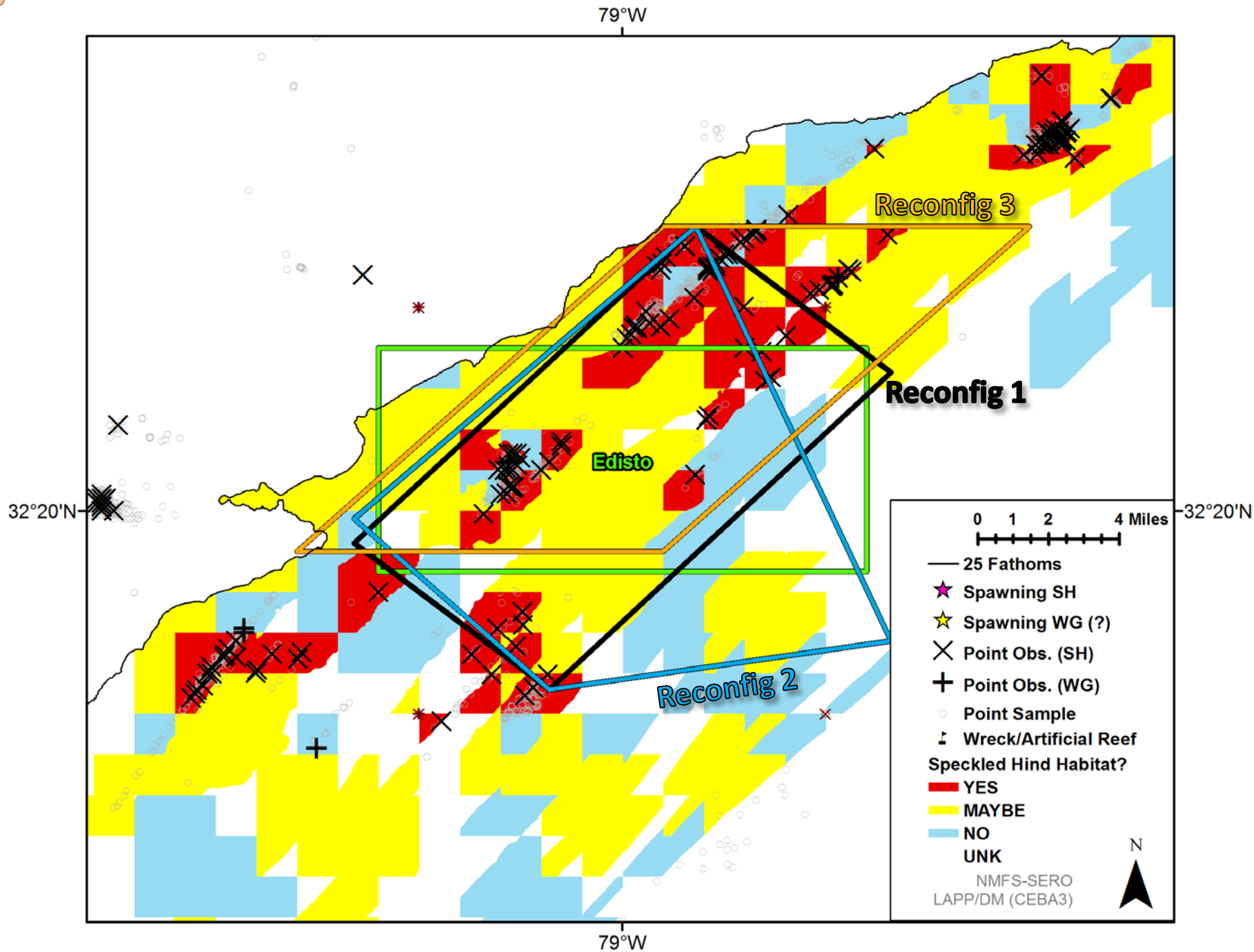




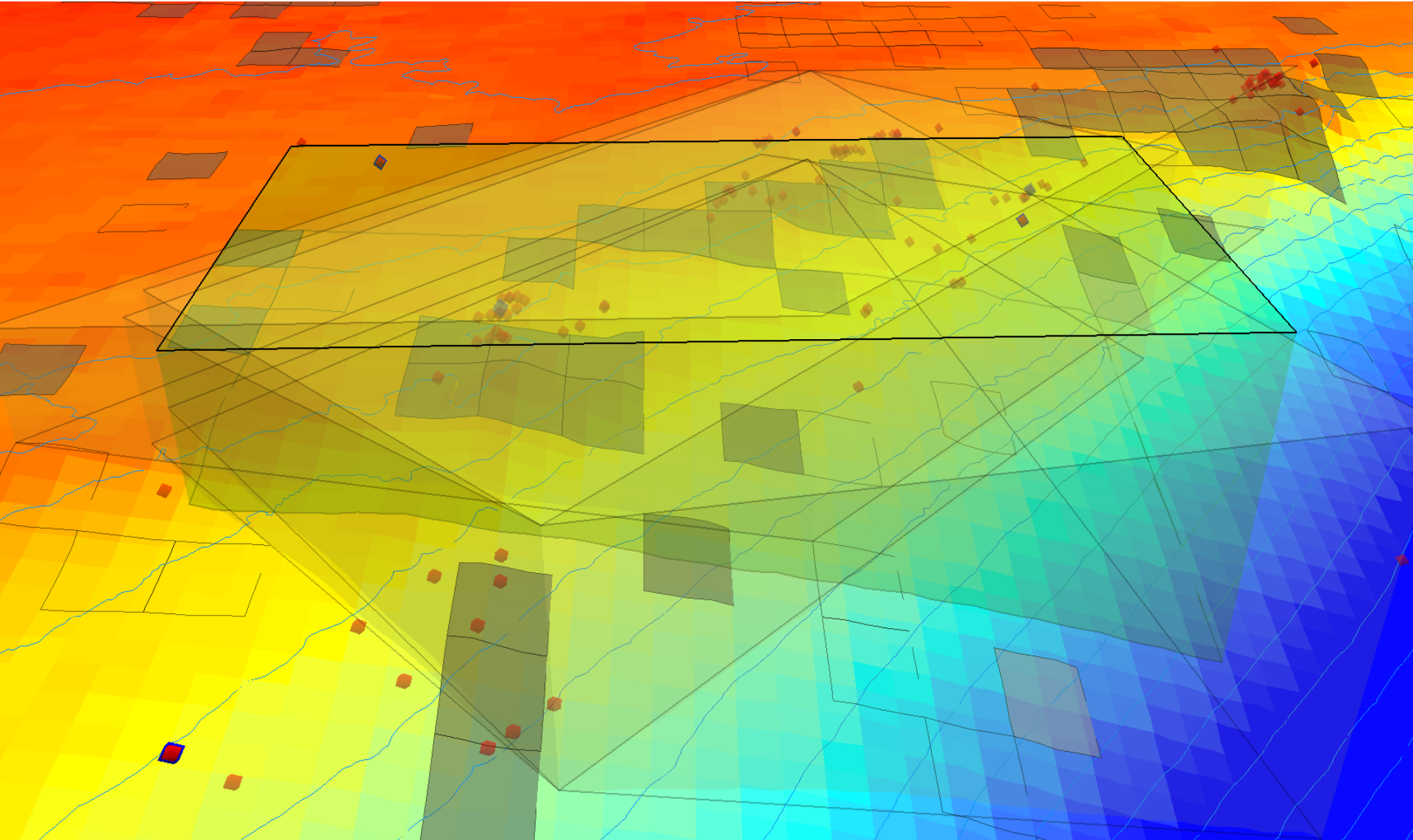


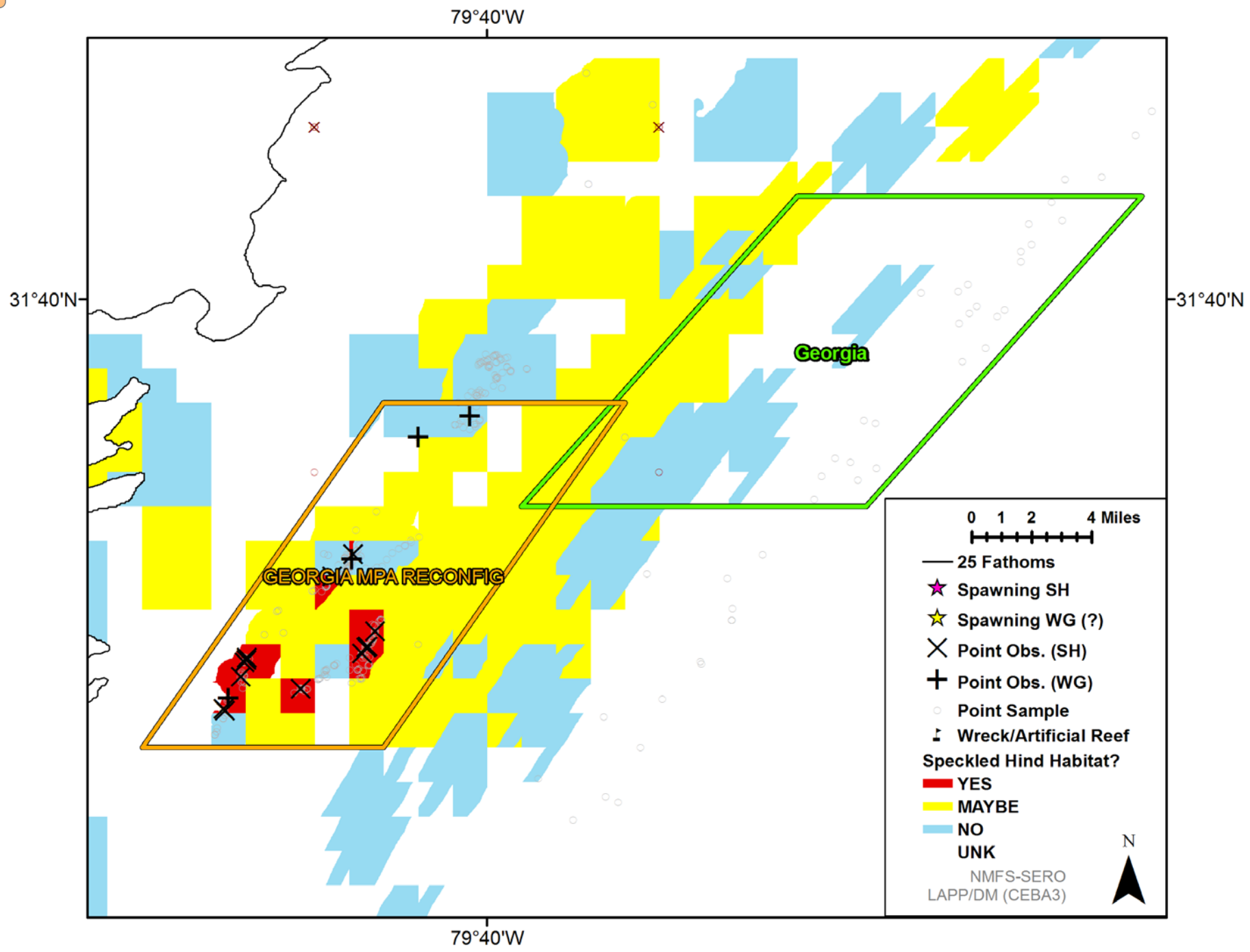
# NORTHERN SC (REORIENT)



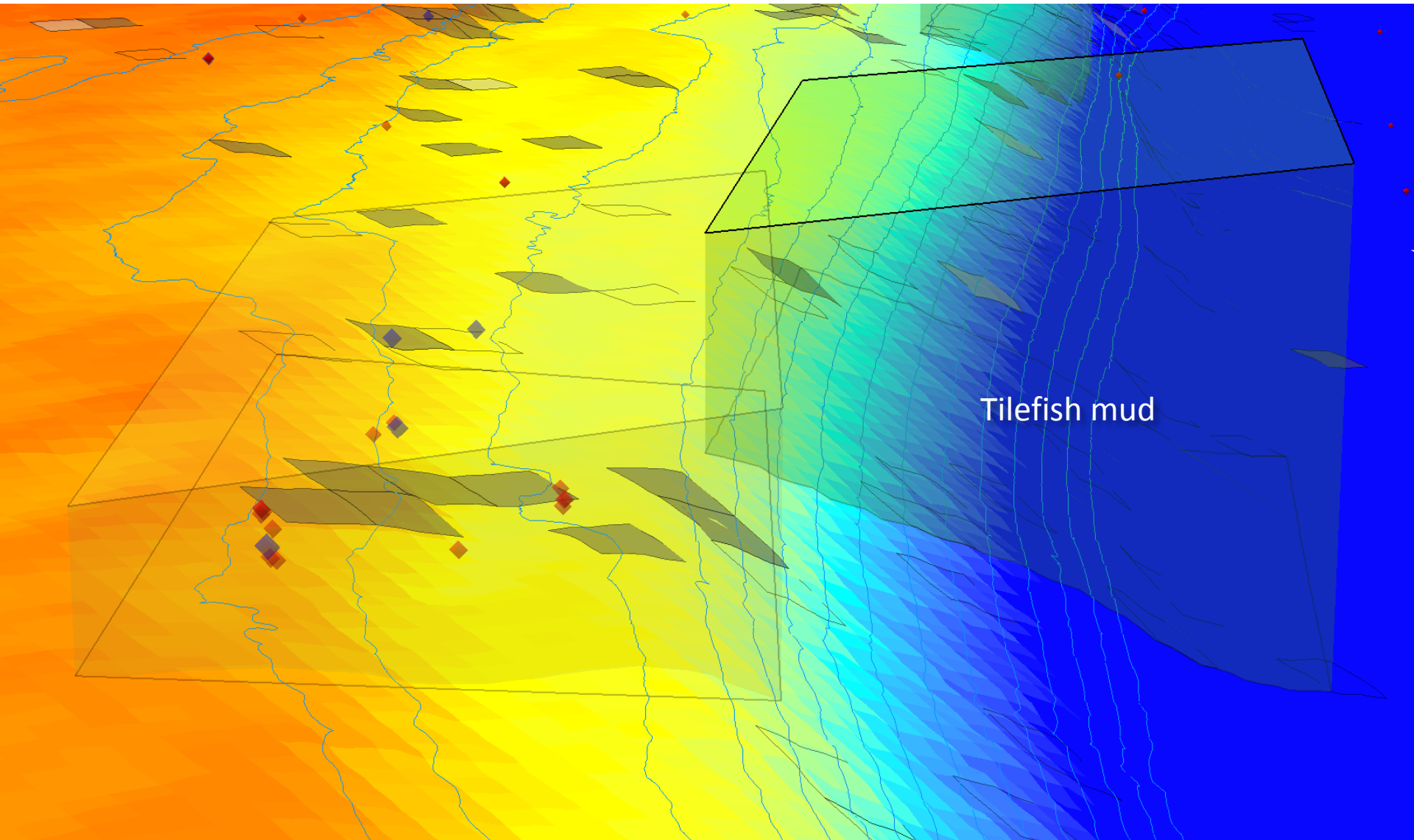


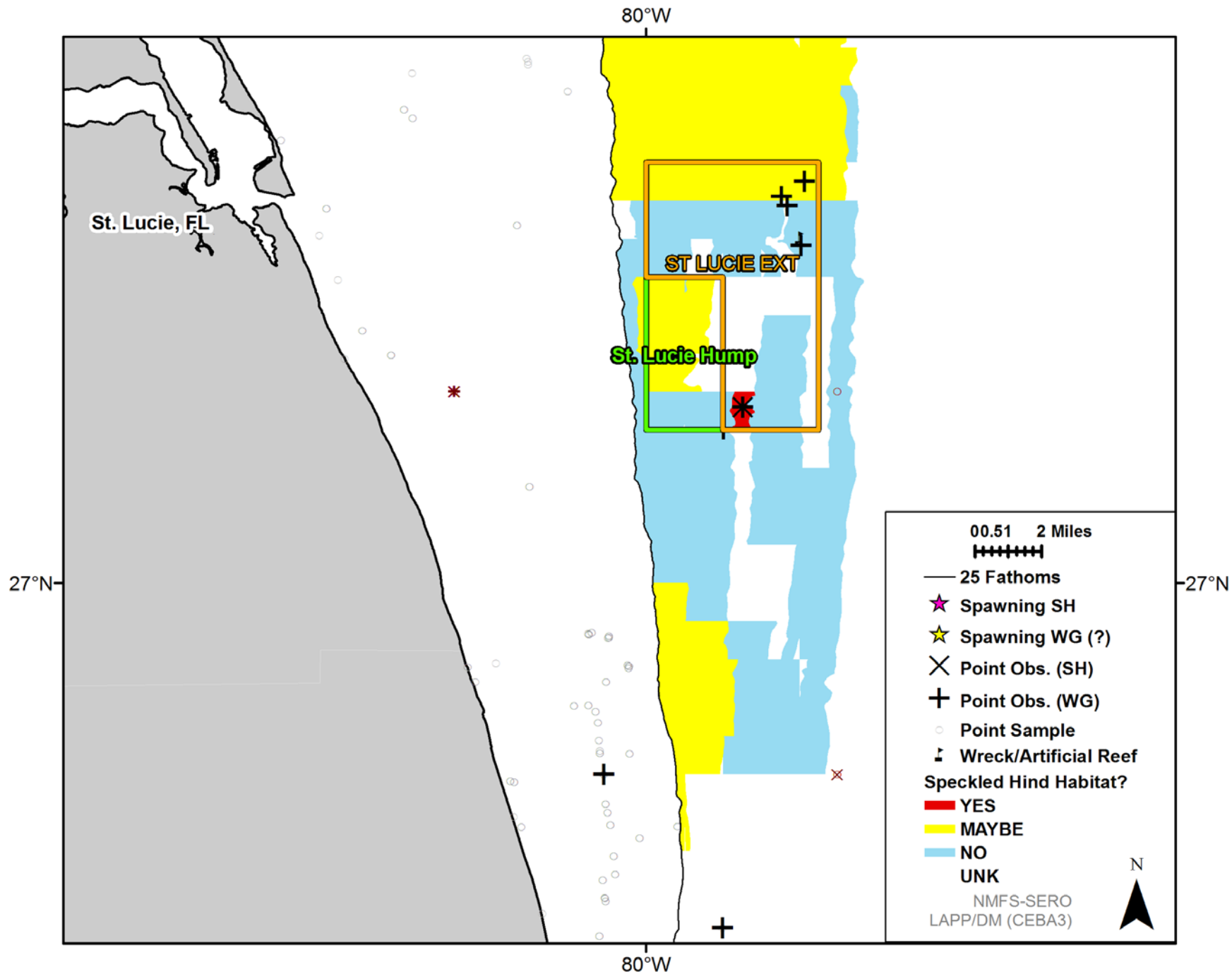
# EDISTO SC (REORIENT/RECONFIGURE)





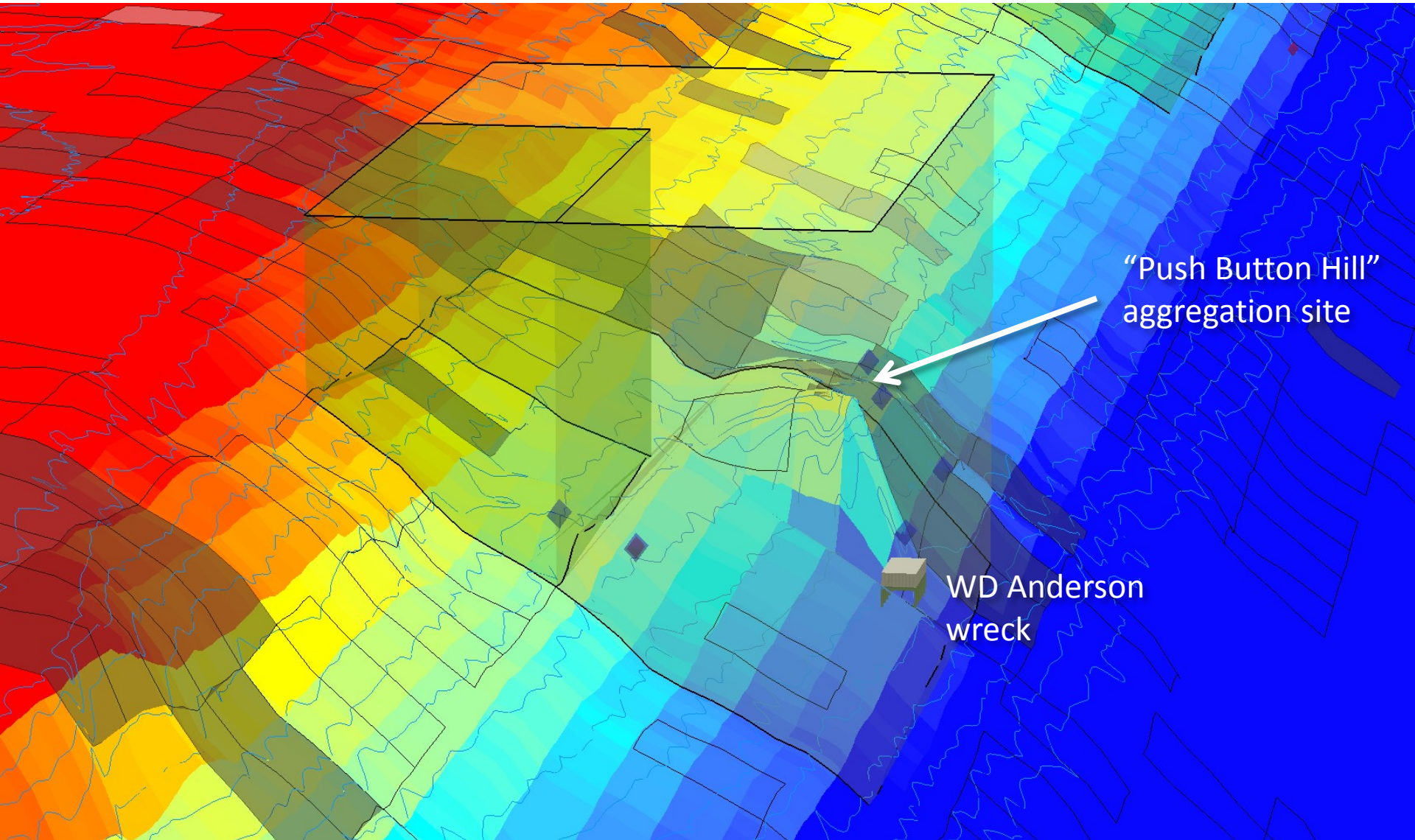
# GEORGIA (RELOCATE)







# ST. LUCIE (RELOCATE/EXTEND)



"Push Button Hill"  
aggregation site

WD Anderson  
wreck

# IMPACTS OF CLOSED AREAS





# IMPACTS OF CLOSED AREAS

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Evaluated existing and proposed closed areas:

## **Qualitative Habitat Suitability**

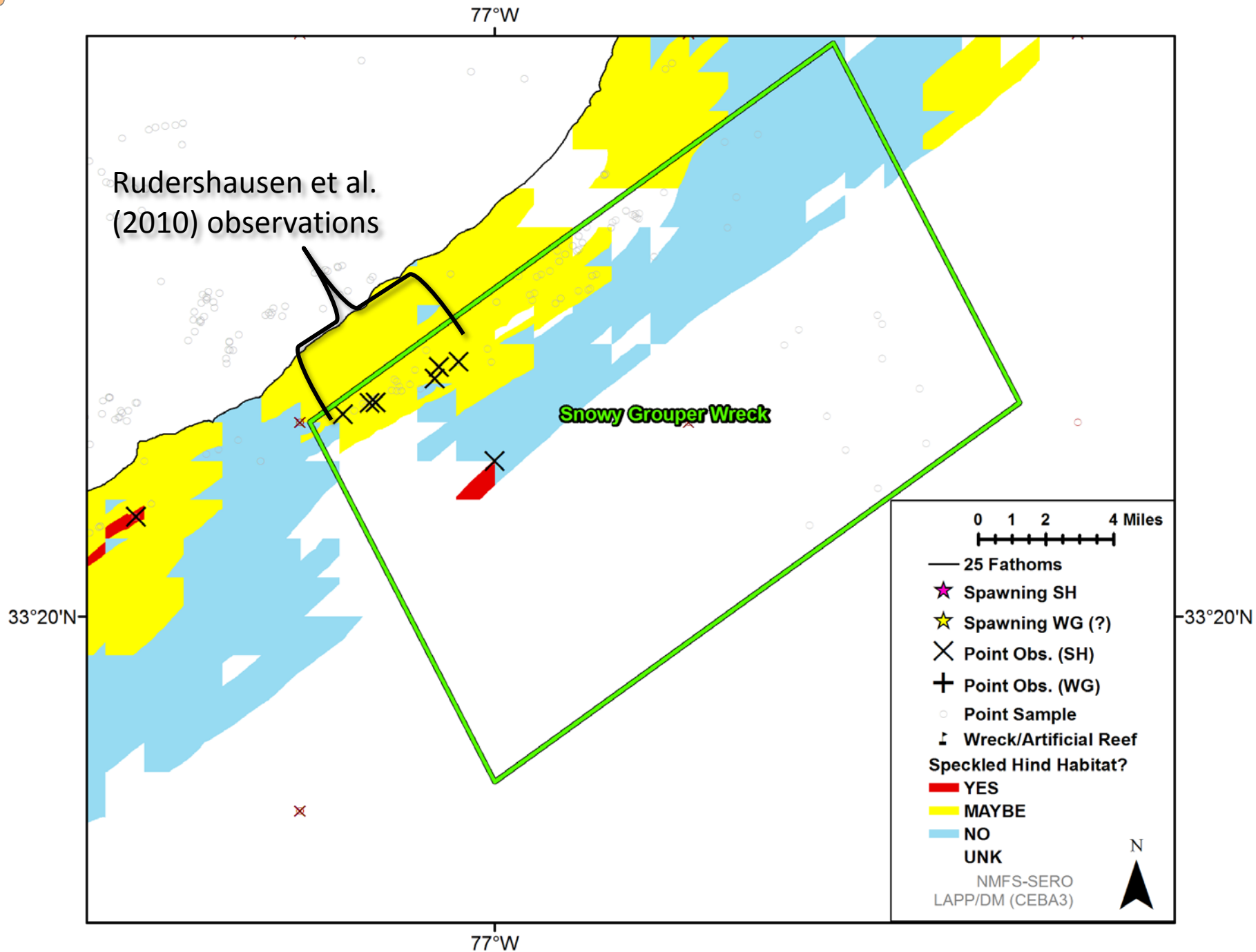
ratio of known and probable areas

## **Quantitative Habitat Suitability**

ratio of area-weighted probabilities

## **Percent Obs./Gear Samples**

fishery-dependent (FD) and fishery-independent (FID) ratios of positive obs. to samples



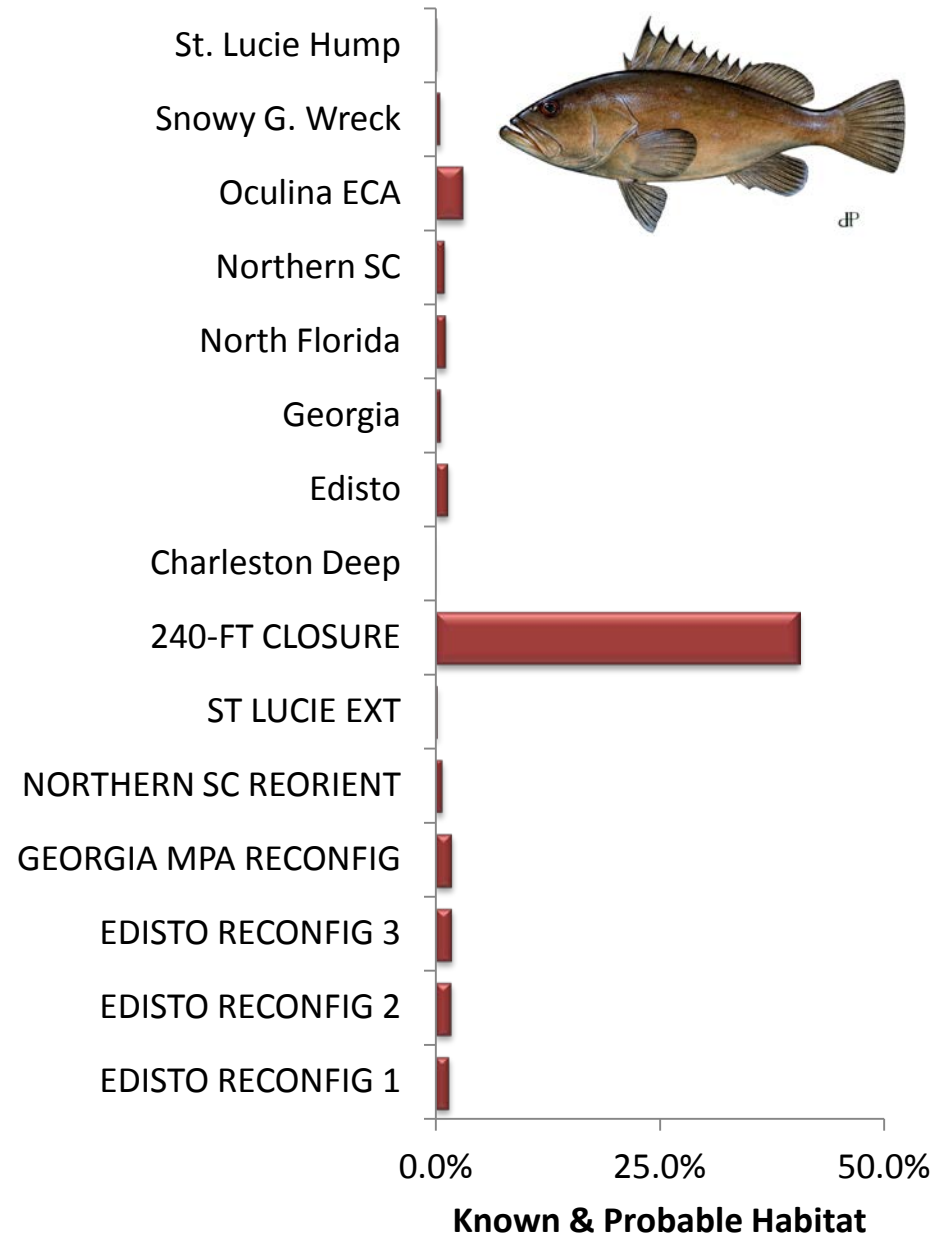
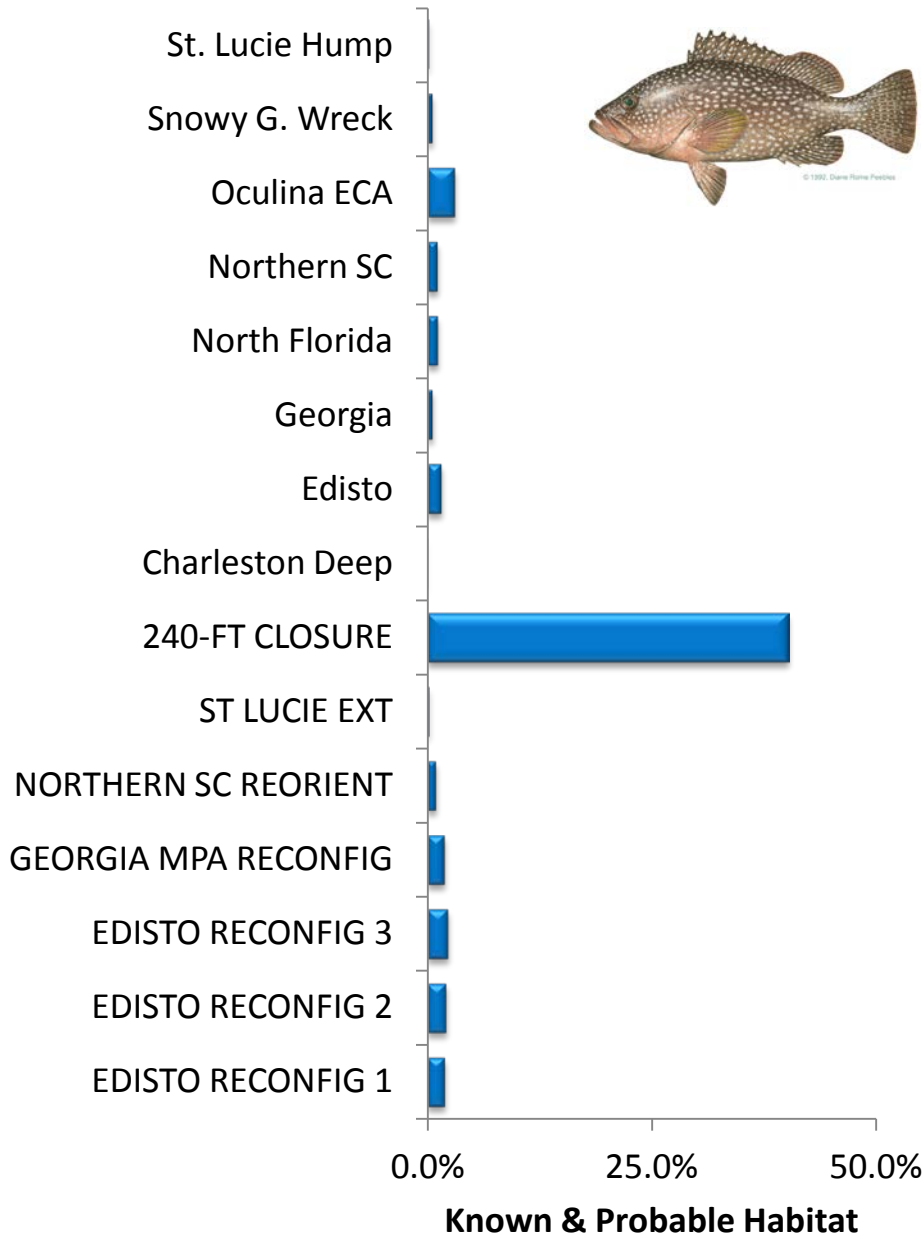


# KNOWN & PROBABLE HABITATS



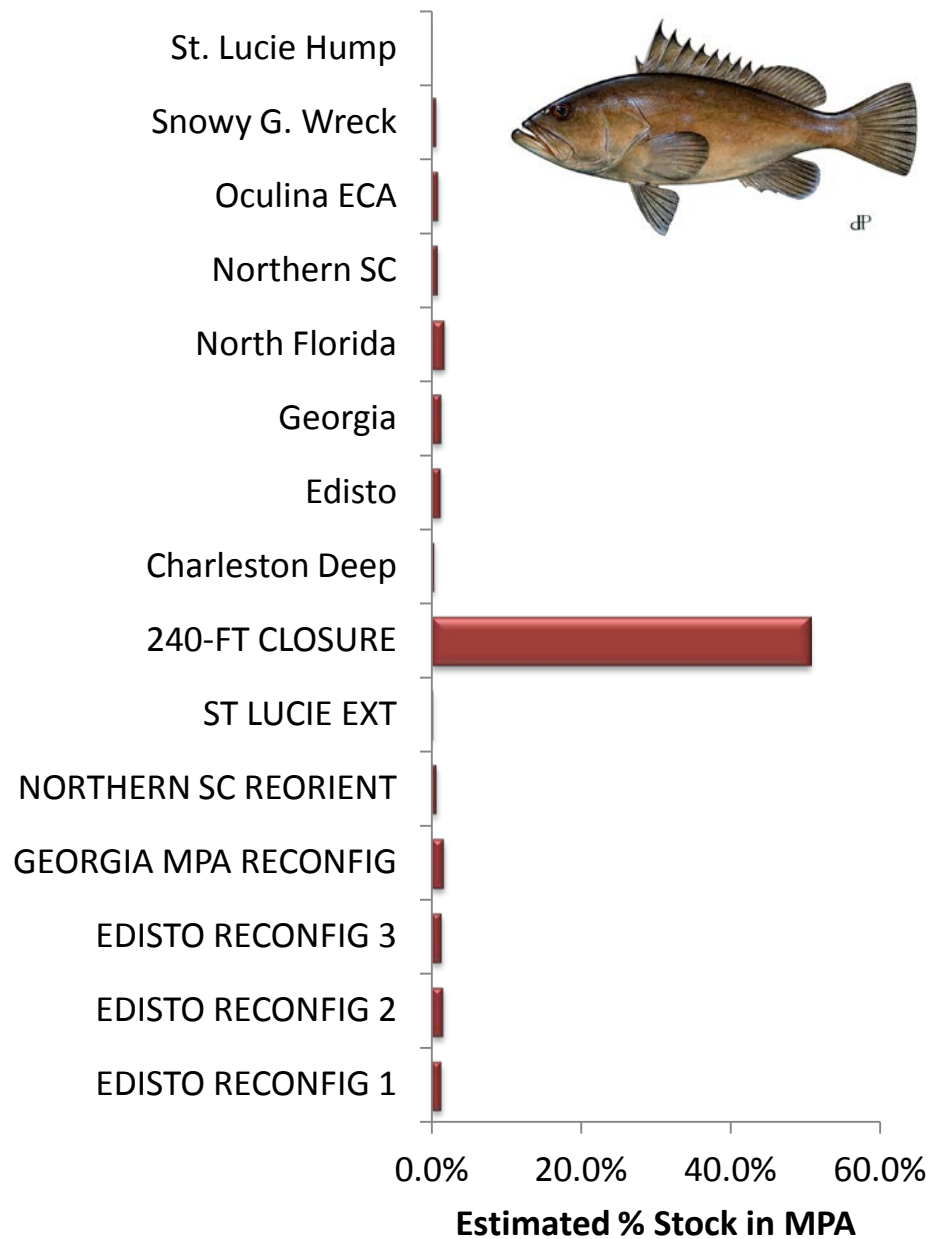
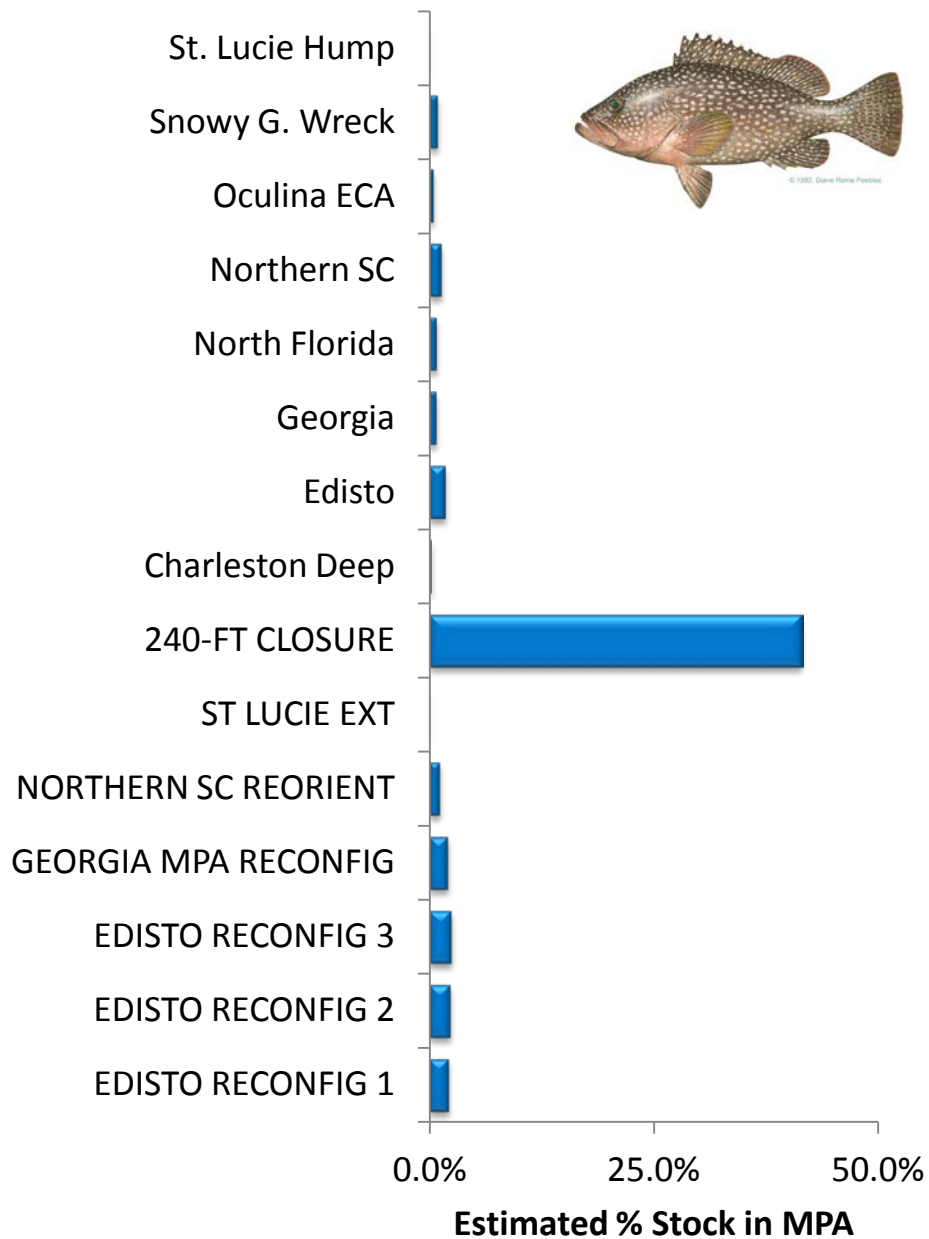
© 1992, Dana Raine Pechen

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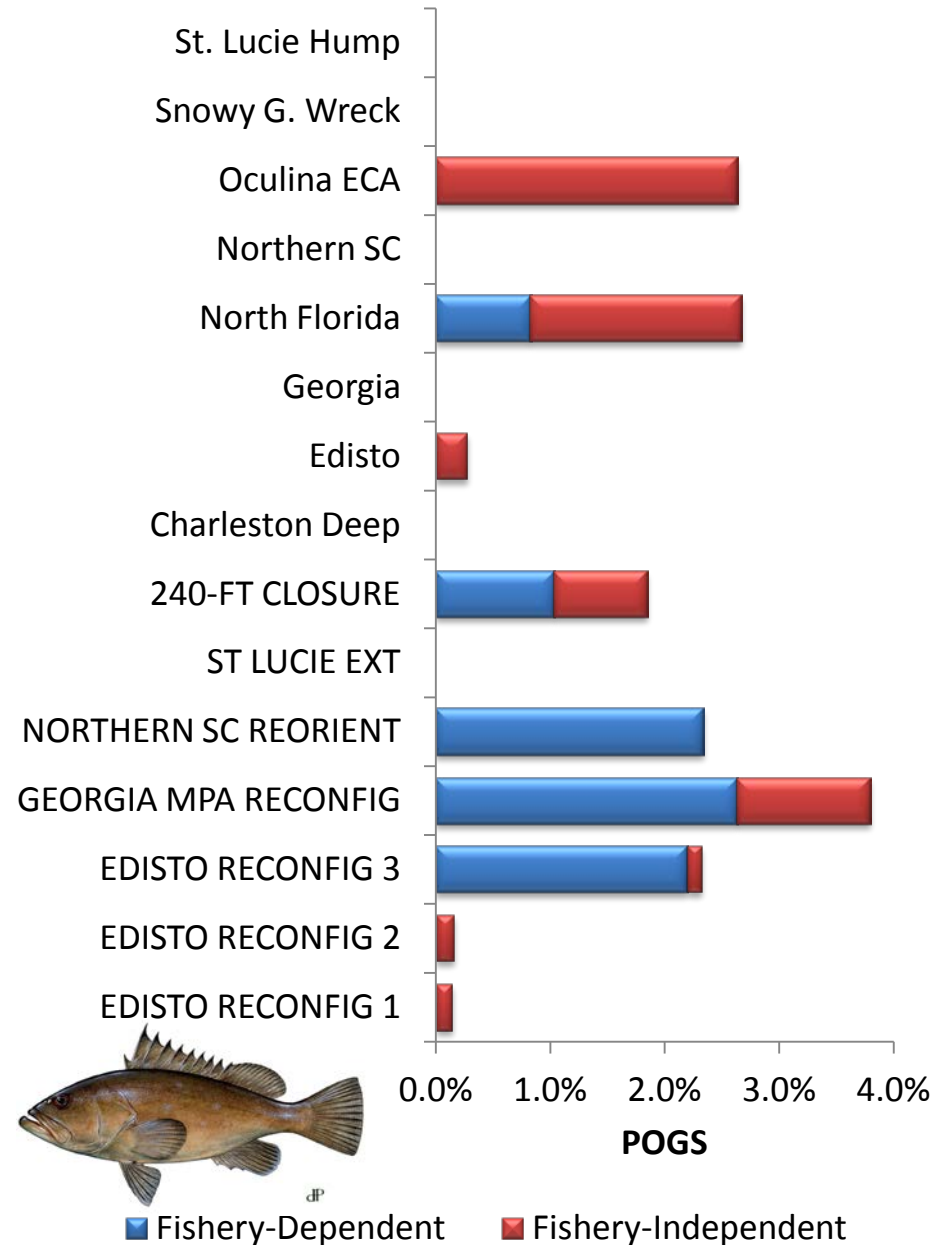
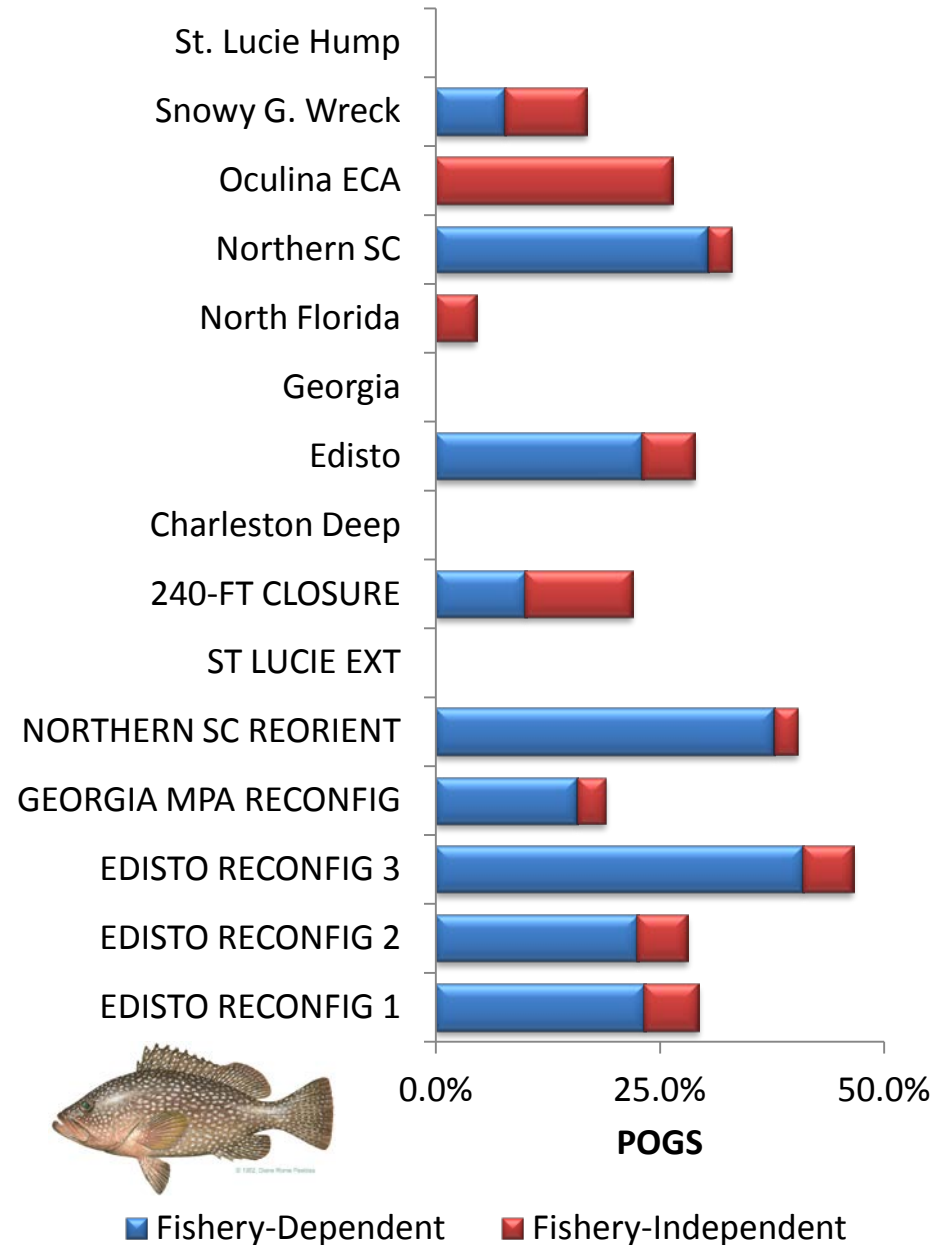




# ESTIMATED PCT. STOCK PROTECTED



# POS. OBSERVATIONS / GEAR SAMPLE



# CLOSURE IMPACTS: SPECKLED HIND

NAME	AREA (km2)	STATE	POS. OBS.	PosObs/Sample		HABITAT SUITABILITY		
				FID	FD	KNOWN	KNOWN & PROB.	% STOCK
<i>EDISTO RECONFIG 1</i>	196.3	SC	68	6.0%	23.2%	16.8%	2.0%	2.2%
<i>EDISTO RECONFIG 2</i>	234.0	NC	57	5.6%	22.5%	14.1%	2.1%	2.4%
<i>EDISTO RECONFIG 3</i>	208.7	SC	253	5.5%	41.0%	17.9%	2.3%	2.5%
<i>GEORGIA MPA RECONFIG</i>	204.7	FL	14	3.1%	15.8%	4.9%	1.9%	2.1%
<i>NORTHERN SC REORIENT</i>	162.8	SC	112	2.6%	37.7%	6.1%	1.0%	1.2%
<i>ST LUCIE EXT</i>	71.7	FL	1	no samp.	no samp.	0.4%	0.2%	0.0%
Charleston Deep	66.0	SC	0	no samp.	0.0%	0.0%	0.0%	0.3%
Edisto	185.6	SC	31	5.7%	23.1%	8.1%	1.6%	1.8%
Georgia	154.8	GA	0	0.0%	0.0%	0.0%	0.6%	0.8%
North Florida	152.3	FL	8	4.3%	0.1%	1.6%	1.2%	0.8%
Northern SC	171.7	SC	22	2.7%	30.3%	3.2%	1.1%	1.3%
Oculina ECA	279.2	FL	10	26.3%	no samp.	3.8%	3.1%	0.5%
Snowy G. Wreck	187.4	NC	2	9.1%	7.7%	0.4%	0.6%	0.9%
St. Lucie Hump	24.4	FL	0	no samp.	no samp.	0.0%	0.2%	0.0%
<b>EXISTING</b>	<b>1221</b>		<b>73</b>			<b>17%</b>	<b>8%</b>	<b>6%</b>
<b>MAX RECONFIG</b>	<b>1333</b>		<b>400</b>			<b>35%</b>	<b>10%</b>	<b>8%</b>
<b>240-FT CLOSURE</b>	<b>13642</b>	<b>EEZ</b>	<b>1545</b>			<b>28.2%</b>	<b>40.2%</b>	<b>41.5%</b>

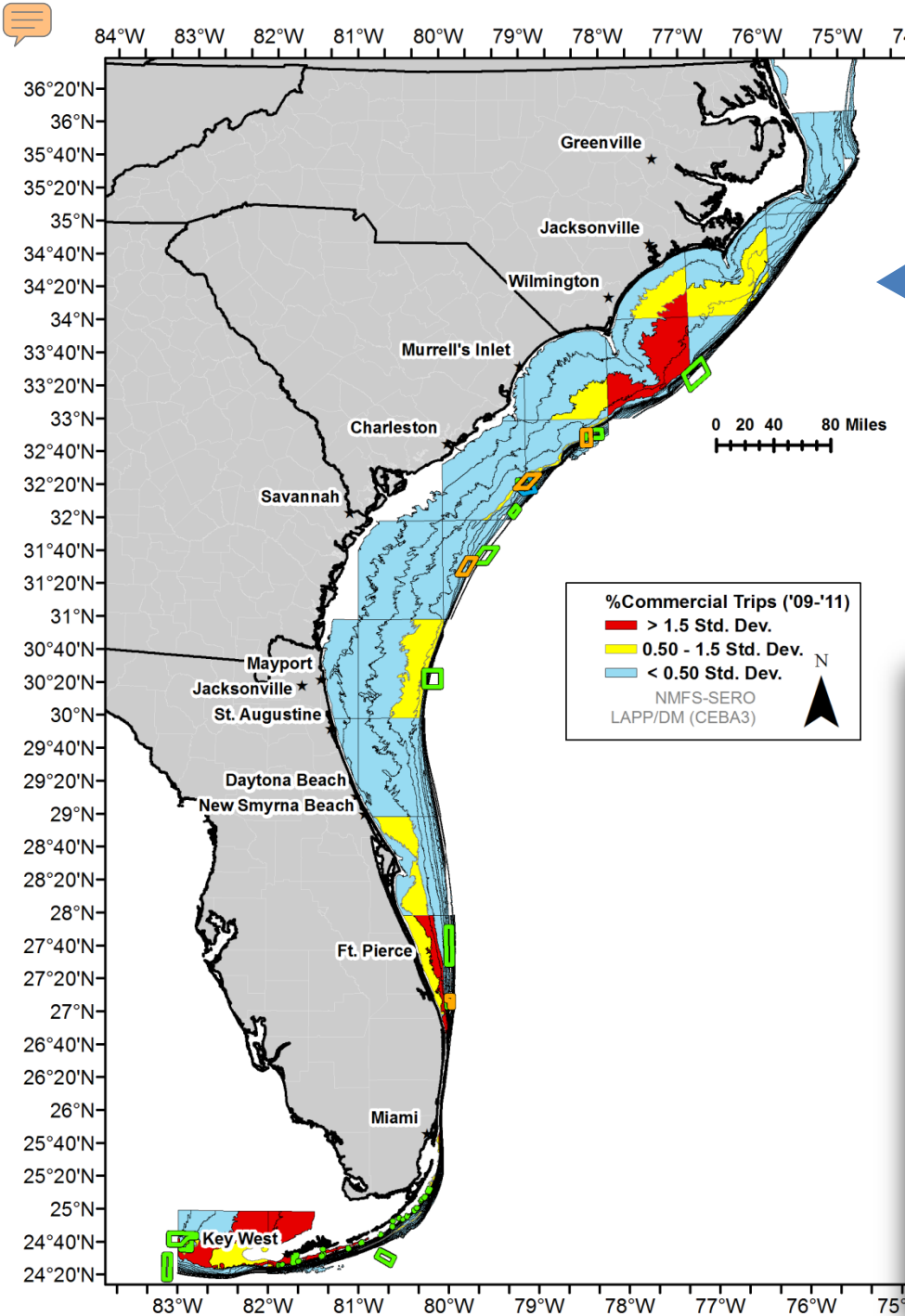


# CLOSURE IMPACTS: WARSAW GROUPER

NAME	AREA (km2)	STATE	POS. OBS.	PosObs/Sample		HABITAT SUITABILITY		
				FID	FD	KNOWN	KNOWN & PROB.	% STOCK
<i>EDISTO RECONFIG 1</i>	196.3	SC	1	0.1%	0.0%	1.2%	1.6%	1.3%
<i>EDISTO RECONFIG 2</i>	234.0	NC	1	0.2%	0.0%	1.2%	1.8%	1.6%
<i>EDISTO RECONFIG 3</i>	208.7	SC	12	0.1%	2.2%	2.4%	1.9%	1.4%
<i>GEORGIA MPA RECONFIG</i>	204.7	FL	4	1.2%	2.6%	11.2%	1.9%	1.7%
<i>NORTHERN SC REORIENT</i>	162.8	SC	7	0.0%	2.3%	2.5%	0.8%	0.7%
<i>ST LUCIE EXT</i>	71.7	FL	6	no samp.	no samp.	6.5%	0.2%	0.2%
Charleston Deep	66.0	SC	0	no samp.	0.0%	0.0%	0.0%	0.4%
Edisto	185.6	SC	1	0.3%	0.0%	1.2%	1.4%	1.2%
Georgia	154.8	GA	0	0.0%	0.0%	0.0%	0.6%	1.3%
North Florida	152.3	FL	11	1.8%	0.8%	4.5%	1.2%	1.7%
Northern SC	171.7	SC	1	0.0%	0.0%	2.5%	1.1%	0.8%
Oculina ECA	279.2	FL	1	2.6%	no samp.	2.6%	3.1%	0.9%
Snowy G. Wreck	187.4	NC	0	0.0%	0.0%	0.0%	0.5%	0.6%
St. Lucie Hump	24.4	FL	0	no samp.	no samp.	0.0%	0.2%	0.0%
<b>EXISTING</b>	<b>1221</b>		<b>14</b>			<b>11%</b>	<b>8%</b>	<b>7%</b>
<b>MAX RECONFIG</b>	<b>1333</b>		<b>41</b>			<b>30%</b>	<b>10%</b>	<b>8%</b>
<b>240-FT CLOSURE</b>	<b>13642</b>	<b>EEZ</b>	<b>173</b>			<b>31.7%</b>	<b>40.5%</b>	<b>50.5%</b>

# SPAWNING AGGREGATIONS?

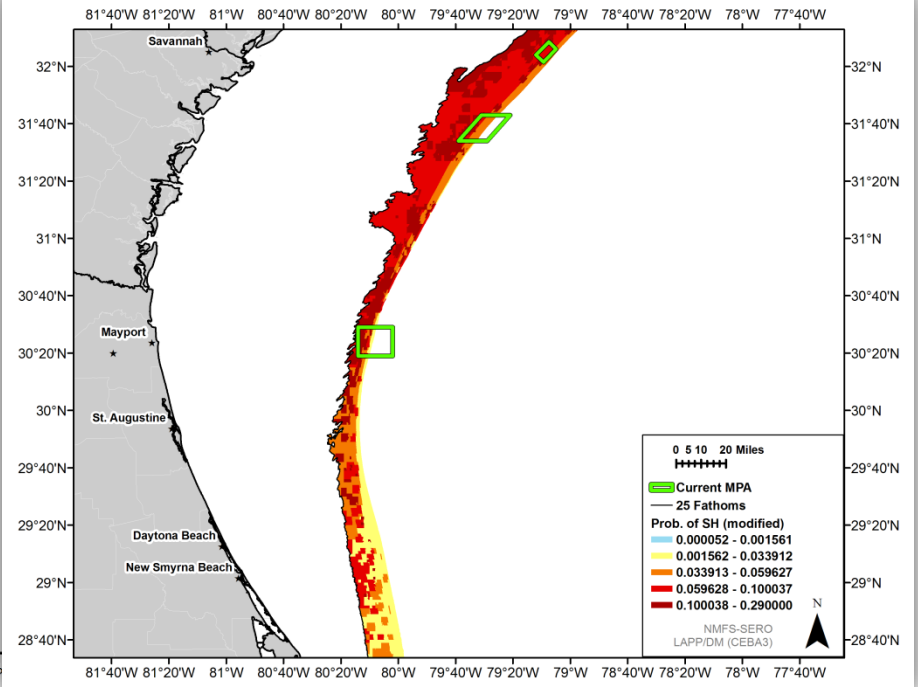
NAME	FISH SPAWNING AGGREGATION SITE?			
	Speckled Hind	Warsaw Grouper	Snapper-Grouper	Geomorphology
Charleston Deep				NOT LIKELY
Edisto	OBSERVED		OBSERVED	POSSIBLE
Georgia				NOT LIKELY
North Florida				POSSIBLE
Northern SC	OBSERVED		OBSERVED	POSSIBLE
Oculina ECA				POSSIBLE
Snowy Grouper Wreck				LIKELY
St. Lucie Hump				POSSIBLE
FKNMS SPAs & Ers			OBSERVED	VERY LIKELY
<i>EDISTO RECONFIGS 1, 2, 3</i>	OBSERVED		OBSERVED	POSSIBLE
<i>GEORGIA MPA RECONFIG</i>				POSSIBLE
<i>NORTHERN SC REORIENT</i>	OBSERVED		OBSERVED	LIKELY
<i>ST LUCIE EXT</i>			ANECDOTAL	VERY LIKELY



# BYCATCH EFFORT

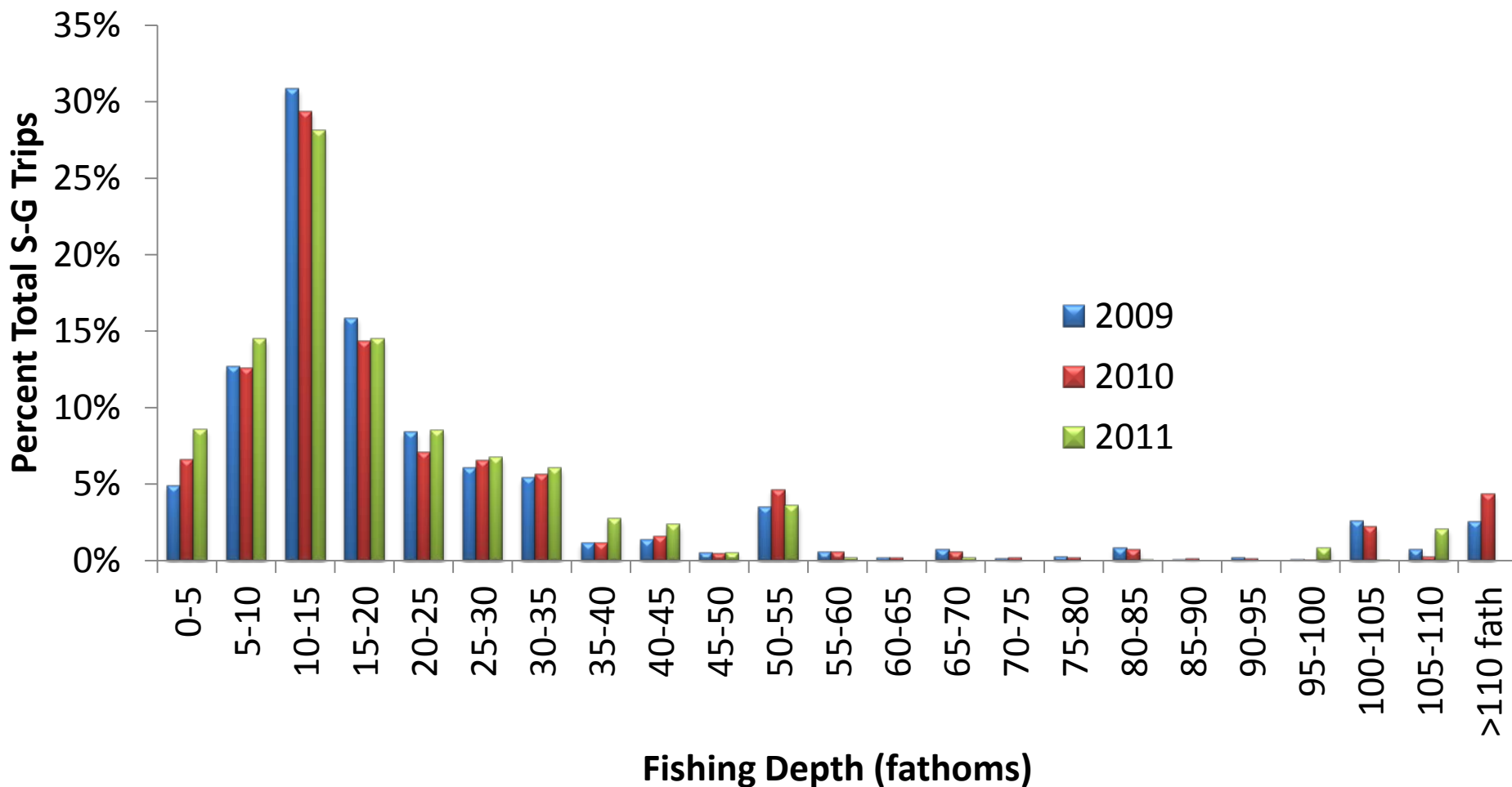
Fishing effort and fish stocks are heterogeneously distributed

Largest bycatch reductions in areas with high concentration of SH & WG and high fishing effort



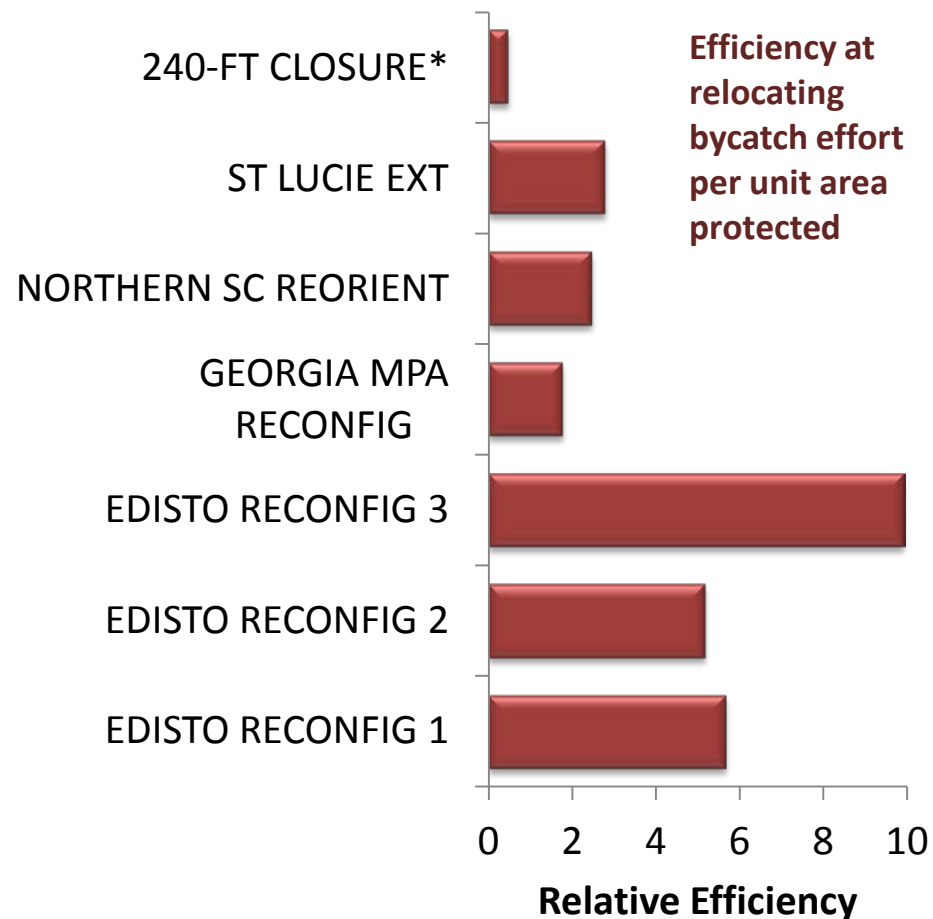
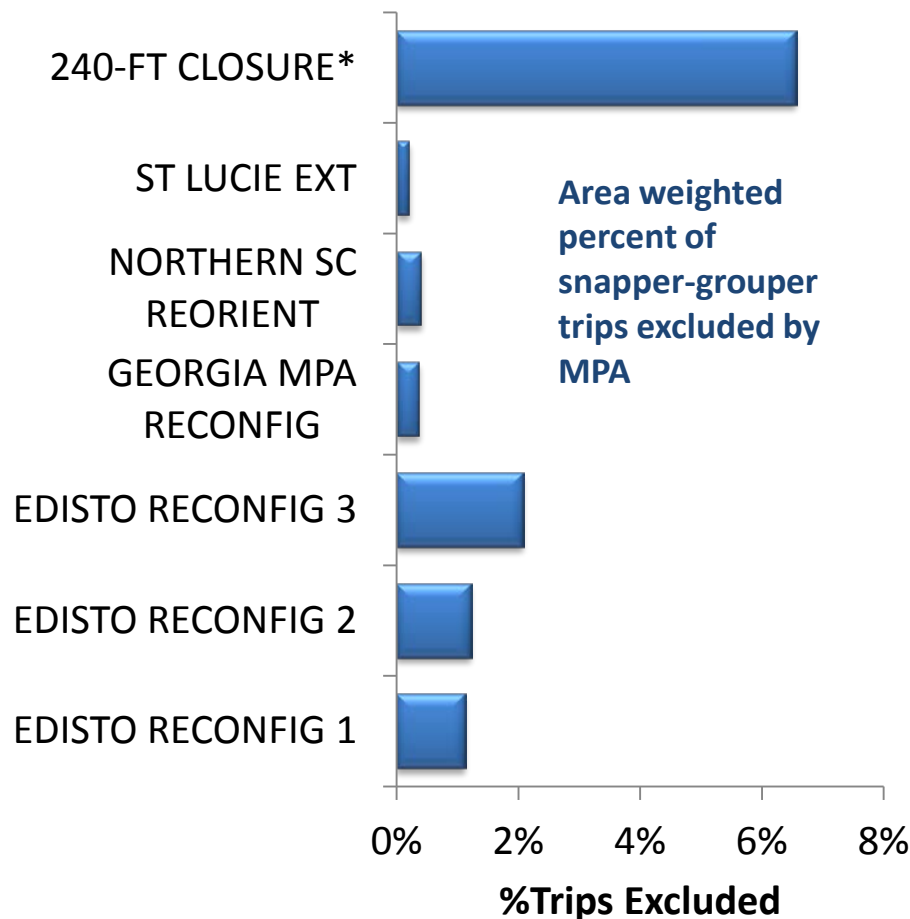
# 240-FT (40-FATHOM) CLOSURE

Year	Trips in >240 ft	Landings > 10,000 lbs (ww)											
2009	15%	blueline tilefish	golden tilefish	greater amberjack	snowy grouper	vermilion snapper	scamp	yellowedge grouper	gag	almaco jack	red grouper	black grouper	
2010	17%	greater amberjack	golden tilefish	blueline tilefish	snowy grouper	vermilion snapper	almaco jack	gray triggerfish	yellowedge grouper	scamp			
2011	10%	golden tilefish	greater amberjack	blueline tilefish	almaco jack	vermilion snapper	gray triggerfish						



# EXCLUDED BYCATCH EFFORT

Using 2010 commercial logbook trips as a baseline, assumed logbook effort uniformly distributed within depth grid, and VL and LL trips between 25-100 fathoms would potentially interact with SH and WG:



\*Based on ratio of percent of 2010 to 2011 trips beyond 40 fathoms

# IMPACTS ON ASSOCIATED STOCKS

Determined species associated with speckled hind and warsaw grouper using percent co-occurrence, hierarchical cluster analysis, and dimension reduction analysis

Overlaid proposed MPAs on commercial (1° tall × 5 fa) and headboat (1/6° × 1/6°) mean landings (2009-2011)

Potential reduction in landings for MPA  $i$  computed as:

$$\%Impact_i = \overline{\%Landings_i^{2009-2011}} * \frac{area_i^{protected}}{area_i^{total}}$$

## Assumptions:

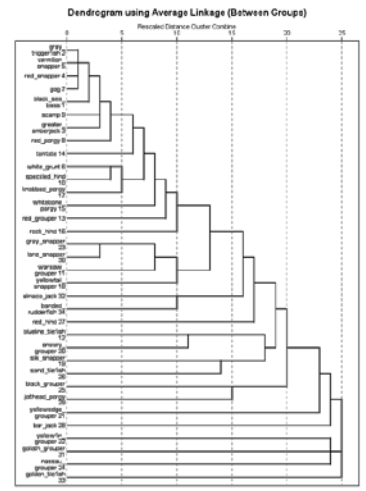
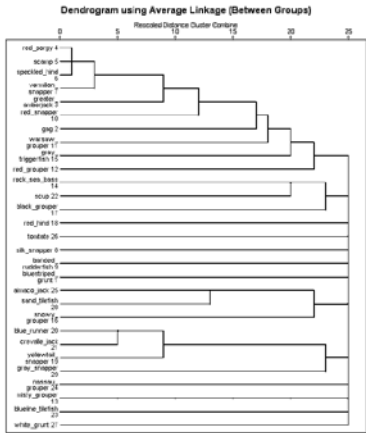
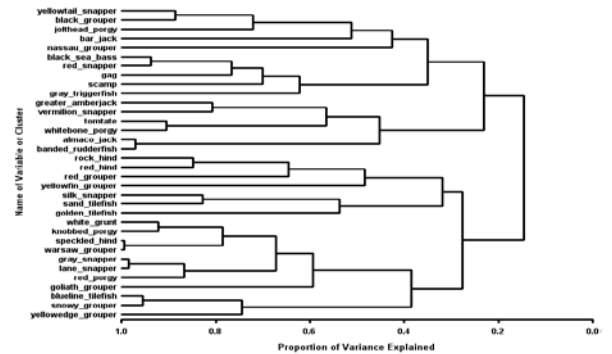
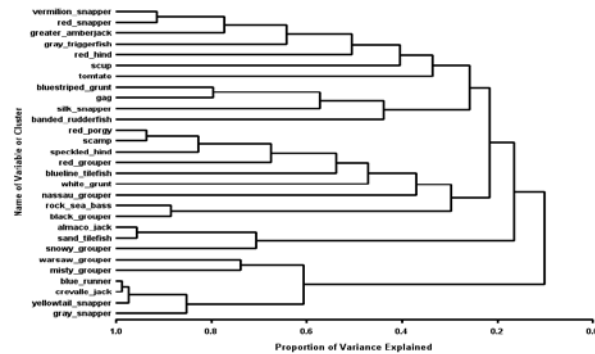
Landings uniformly distributed in logbook-areas

Historical locations are predictive

No effort shifting



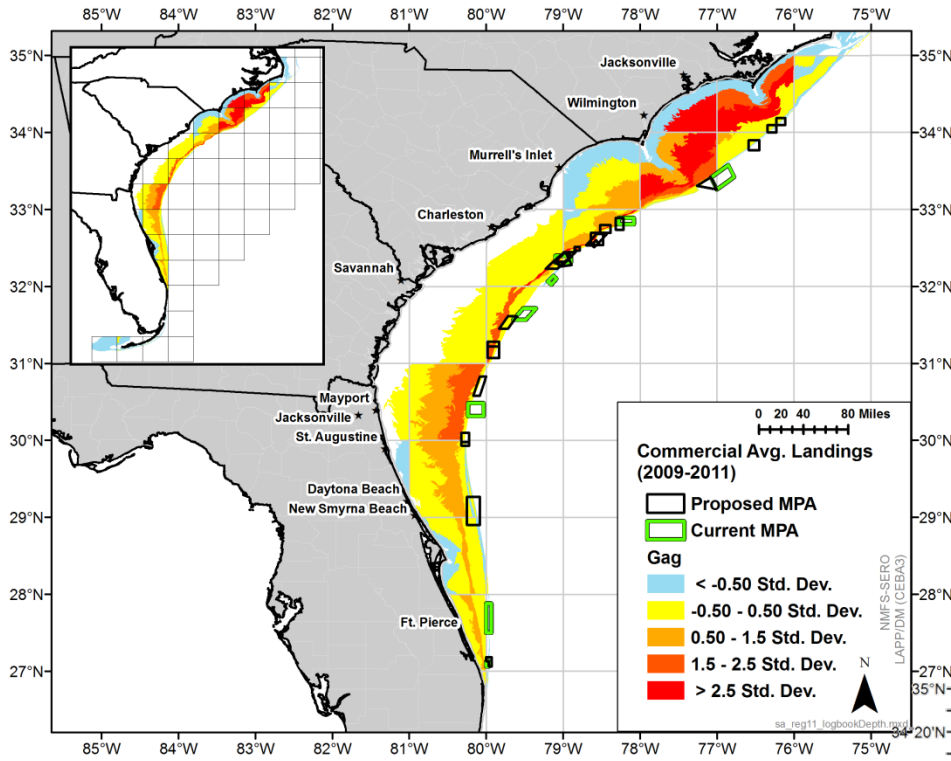
# ASSOCIATED STOCKS



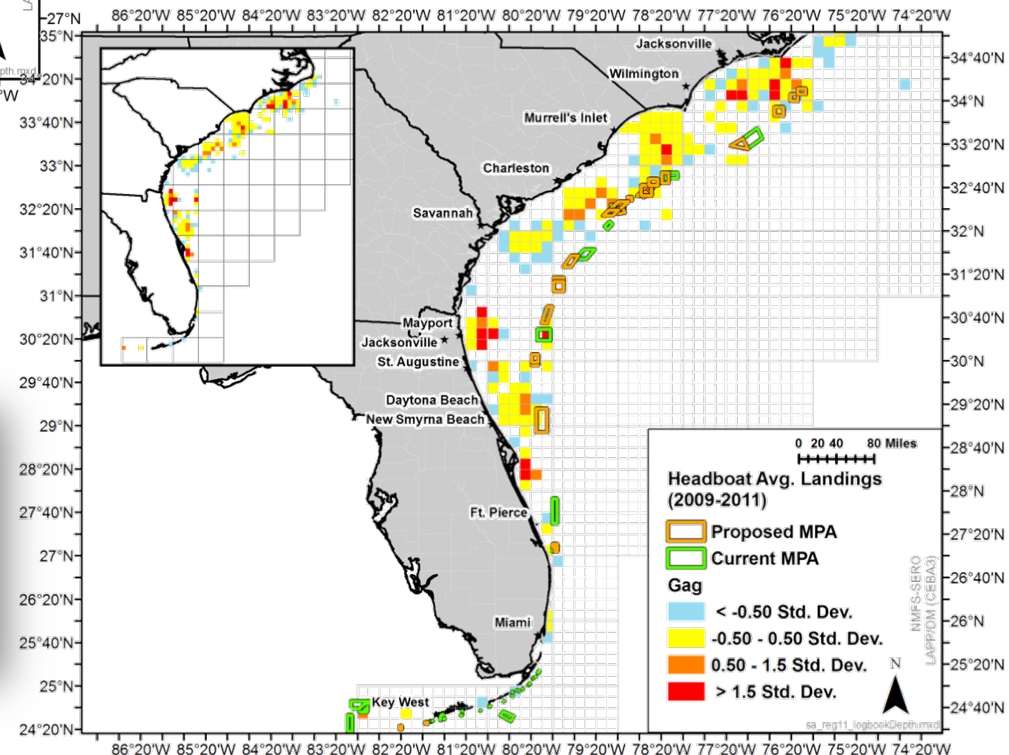
Rank	With Speckled Hind		With Warsaw Grouper	
	Commercial	Headboat	Commercial	Headboat
1	red porgy	vermilion snapper	red porgy	gray triggerfish
2	scamp	gray triggerfish	scamp	black sea bass
3	vermilion snapper	scamp	vermilion snapper	red snapper
4	greater amberjack	red porgy	greater amberjack	gag
5	red snapper	tomtate	<b>speckled hind</b>	gray snapper
6	gag	white grunt	red snapper	lane snapper
7	red grouper	knobbed porgy	gag	vermilion snapper
8	gray triggerfish	greater amberjack	gray triggerfish	tomtate
9	<b>warsaw grouper</b>	gag	red grouper	scamp
10	rock sea bass	red snapper	red hind	whitebone porgy
11	<b>snowy grouper</b>	black sea bass		greater amberjack

# EXAMPLE:

## Possible Closure Impacts on Gag Harvest



**Figure 60.** Average logbook-reported (2009-2011) gag overall (inset top) and core (top) commercial landings, and overall (inset bottom) and core (bottom) headboat landings.

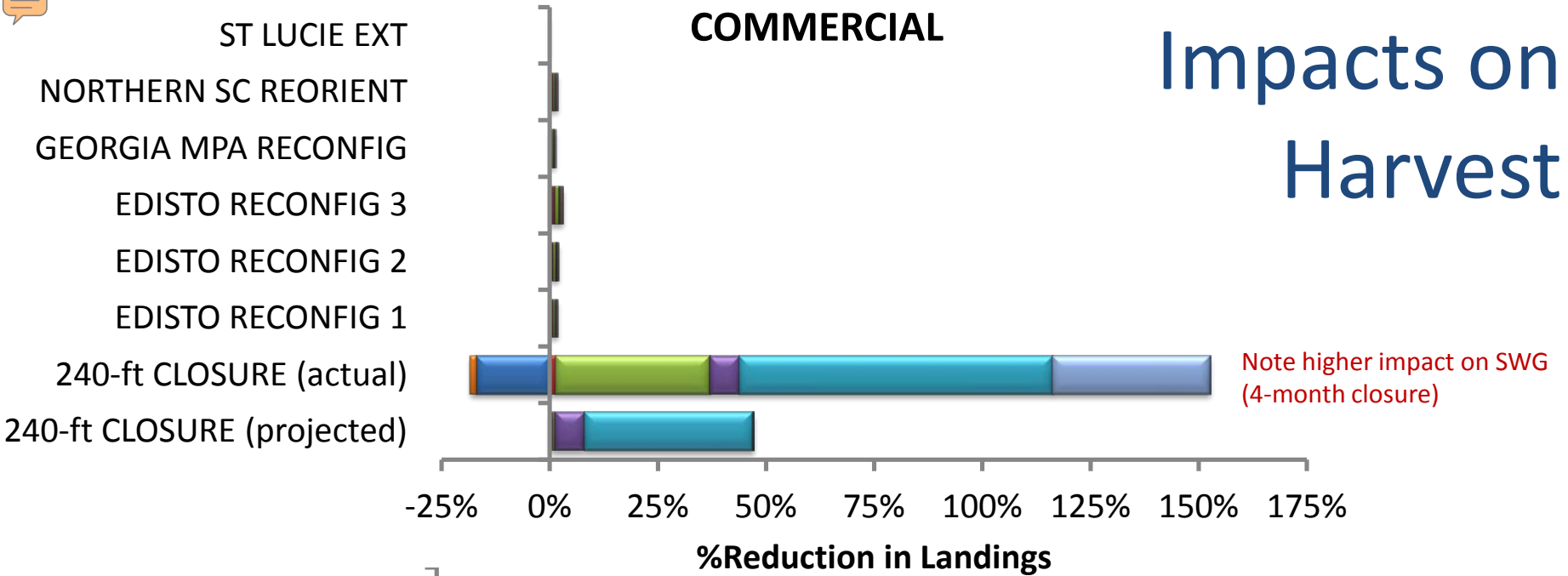




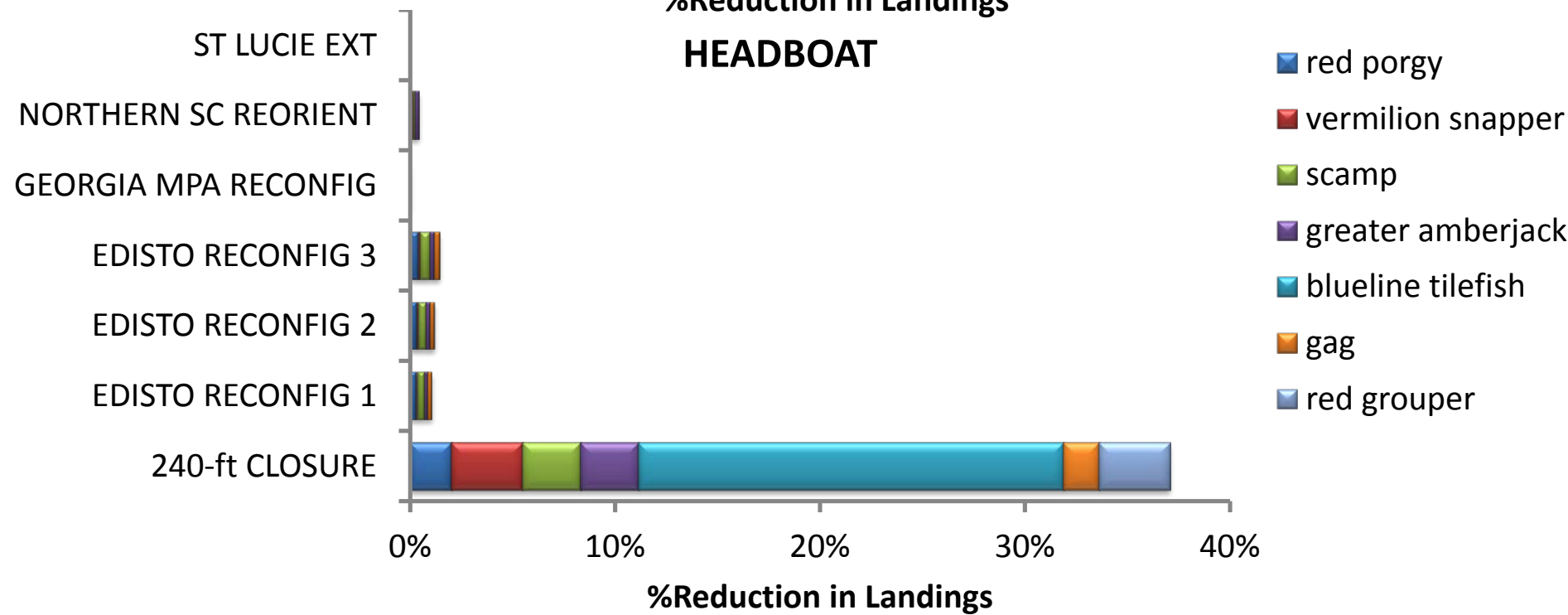


# Impacts on Harvest

## COMMERCIAL



## HEADBOAT





# Discussion: MPA Selection

1. High FD- and FID-Positive Observations / Gear Sample
2. High modeled percent stock
3. High percentage of 'Known & Probable' habitat
4. Low predicted impacts on harvest of associated stocks
5. High efficiency per unit area
6. Contain known spawning locations

# SUMMARY: BEST MPAs

NAME	AREA (km2)	STATE	Fish Spawning Aggregation	SPECKLED HIND						WARSAW GROUPER					
				POS. OBS.	PosObs/ Sample		HABITAT SUITABILITY			POS. OBS.	PosObs/ Sample		HABITAT SUITABILITY		
					FID	FD	Known	Known & Prob.	% STOCK		FID	FD	Known	Known & Prob.	% STOCK
<i>EDISTO RECONFIG 3</i>	209	SC	S-G	253	5.5%	41.0%	17.9%	2.3%	2.5%	12	0.1%	2.2%	2.4%	1.9%	1.4%
<i>GEORGIA MPA RECONFIG</i>	205	FL	?	14	3.1%	15.8%	4.9%	1.9%	2.1%	4	1.2%	2.6%	11.2%	1.9%	1.7%
<i>NORTHERN SC REORIENT</i>	163	SC	SH	112	2.6%	37.7%	6.1%	1.0%	1.2%	7	0.0%	2.3%	2.5%	0.8%	0.7%
<i>ST LUCIE EXT</i>	72	FL	S-G	1			0.4%	0.2%	0.0%	6			6.5%	0.2%	0.2%
North Florida	152	FL	?	8	4.3%	0.1%	1.6%	1.2%	0.8%	11	1.8%	0.8%	4.5%	1.2%	1.7%
Oculina ECA	279	FL	?	10	26.3%		3.8%	3.1%	0.5%	1	2.6%		2.6%	3.1%	0.9%
Snowy G. Wreck	187	NC	?	2	9.1%	7.7%	0.4%	0.6%	0.9%	0	0.0%	0.0%	0.0%	0.5%	0.6%
<b>MAX RECONFIG</b>	<b>1,333</b>			<b>400</b>			<b>35%</b>	<b>10%</b>	<b>8%</b>	<b>41</b>			<b>30%</b>	<b>10%</b>	<b>8%</b>
<b>240-FT CLOSURE</b>	<b>13,642</b>	<b>EEZ</b>		<b>1545</b>			<b>28.2%</b>	<b>40.2%</b>	<b>41.5%</b>	<b>173</b>			<b>31.7%</b>	<b>40.5%</b>	<b>50.5%</b>

Reconfigured MPAs are more efficient (per unit area) than 240-ft closure at excluding effort from areas with high concentrations of SH & WG; however, total percent of stock protected is lower

Predicted maximum of 6% impact on commercial harvest, 2% on headboat harvest

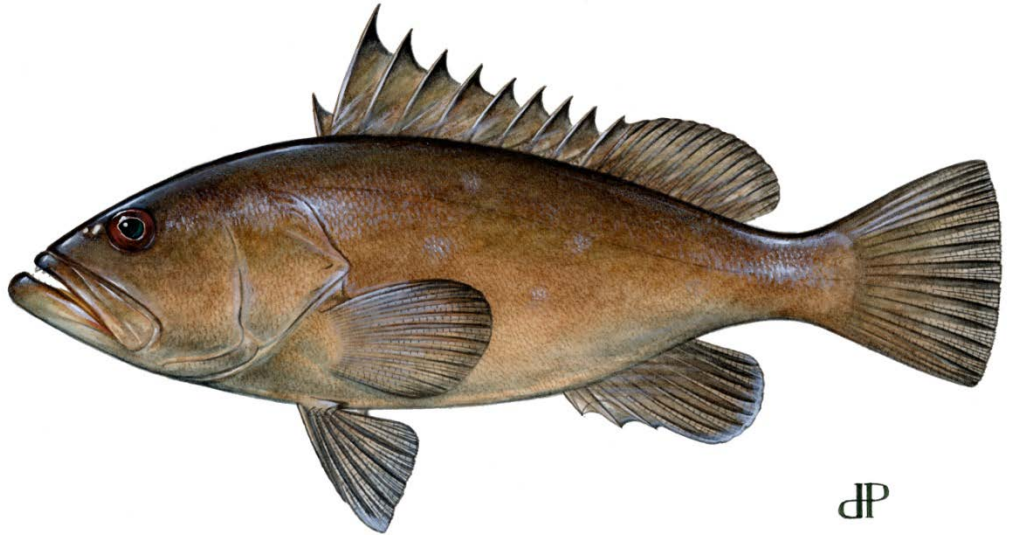
Other areas proposed by Expert Workgroup & SERO likely contain source habitats and spawning sites

Effectiveness of proposed MPAs is reduced if fishing pressure redistributed onto source habitats

# QUESTIONS?



© 1992, Diane Rome Peebles



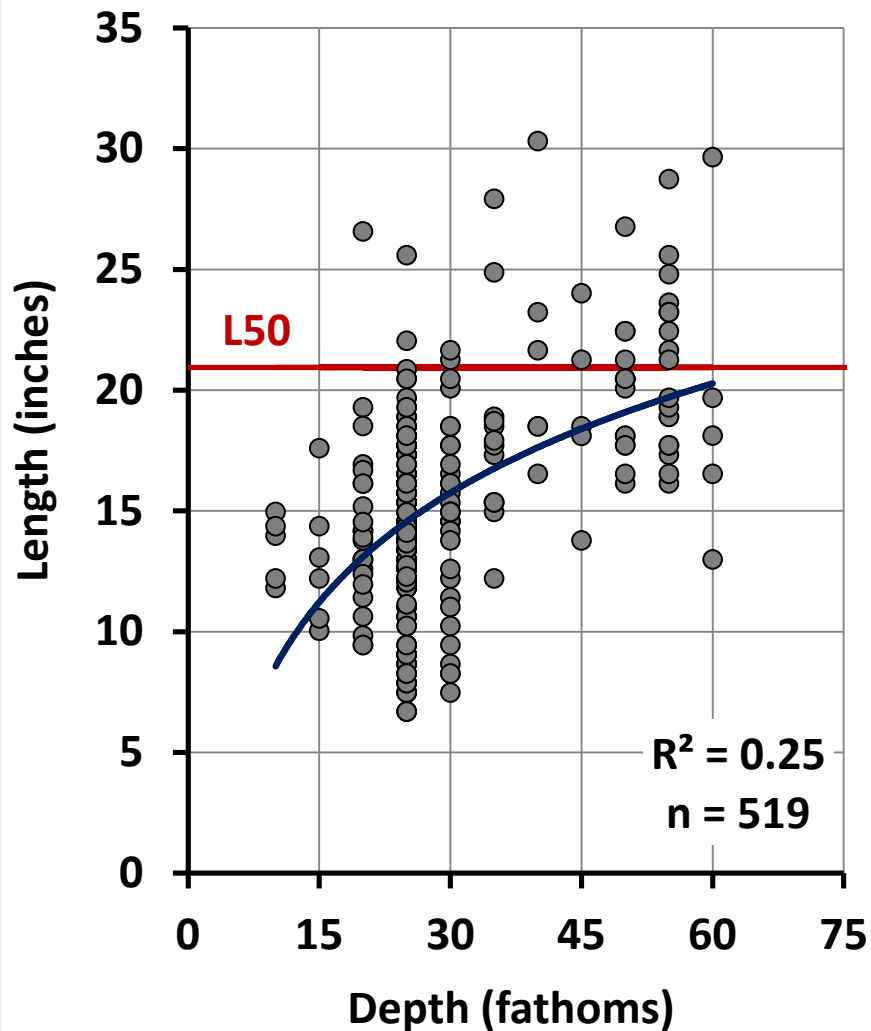
DP



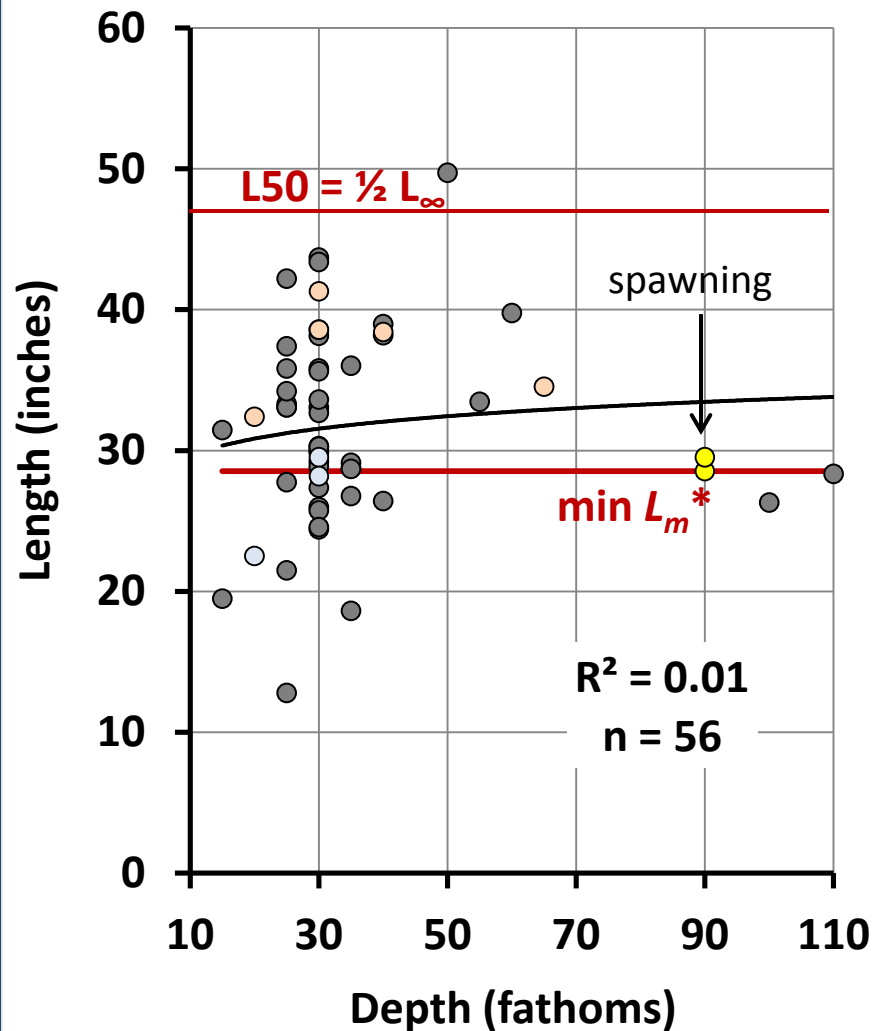
Data Source	Years	Resolution	Discards?	Depth Info
Commercial Log	2001-2011	1° X 1° area	20% of records	2005-present
Headboat Log	1973-2011	Some 0.17° X 0.17°	2004-present	No
Reef Fish Obs.	2006-2011	Lat/Long	Yes	Yes
MARMAP	1977-2011	Lat/Long	Yes	Yes
ALS	1962-2009	State Sub-Regions	No	No
FL Trip Ticket	1986-1992	State Sub-Regions	No	No
GA & SC T. Ticket	1989-2009	State Sub-Regions	No	No
NC Trip Ticket	1994-2010	State Sub-Regions	No	No
DW ROV Survey	2004-2011	Lat/Long	Yes	Not provided
Fisher Reports	1960s-2011	Loran Lat/Long	Yes	Some
SEFIS	2010-2011	Lat/Long	Yes	Yes
REEF	1980s-2011	State Sub-Regions	Yes	No
Oculina ROV	2003-2005	Lat/Long	Yes	Yes
Manooch (FRG)	1972-1977	Lat/Long	Yes	Yes
Sedberry Sub	1985, 2002	Lat/Long	Yes	Yes
Rudershausen et al.	2007	Lat/Long	Yes	Yes
Museum Collections	1884-1991	Lat/Long	Yes	Yes

# MATURITY VS. DEPTH

## Speckled Hind



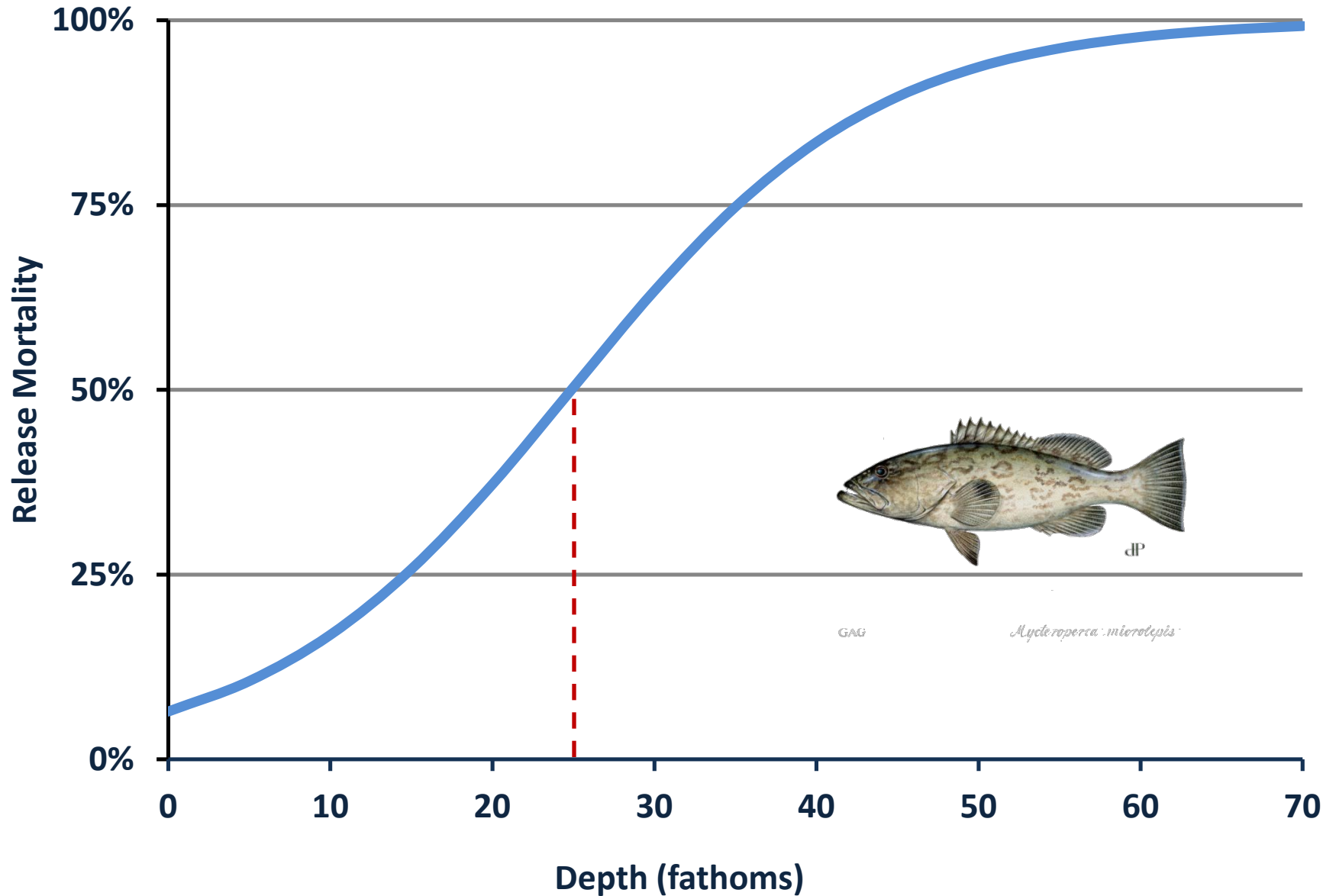
## Warsaw Grouper



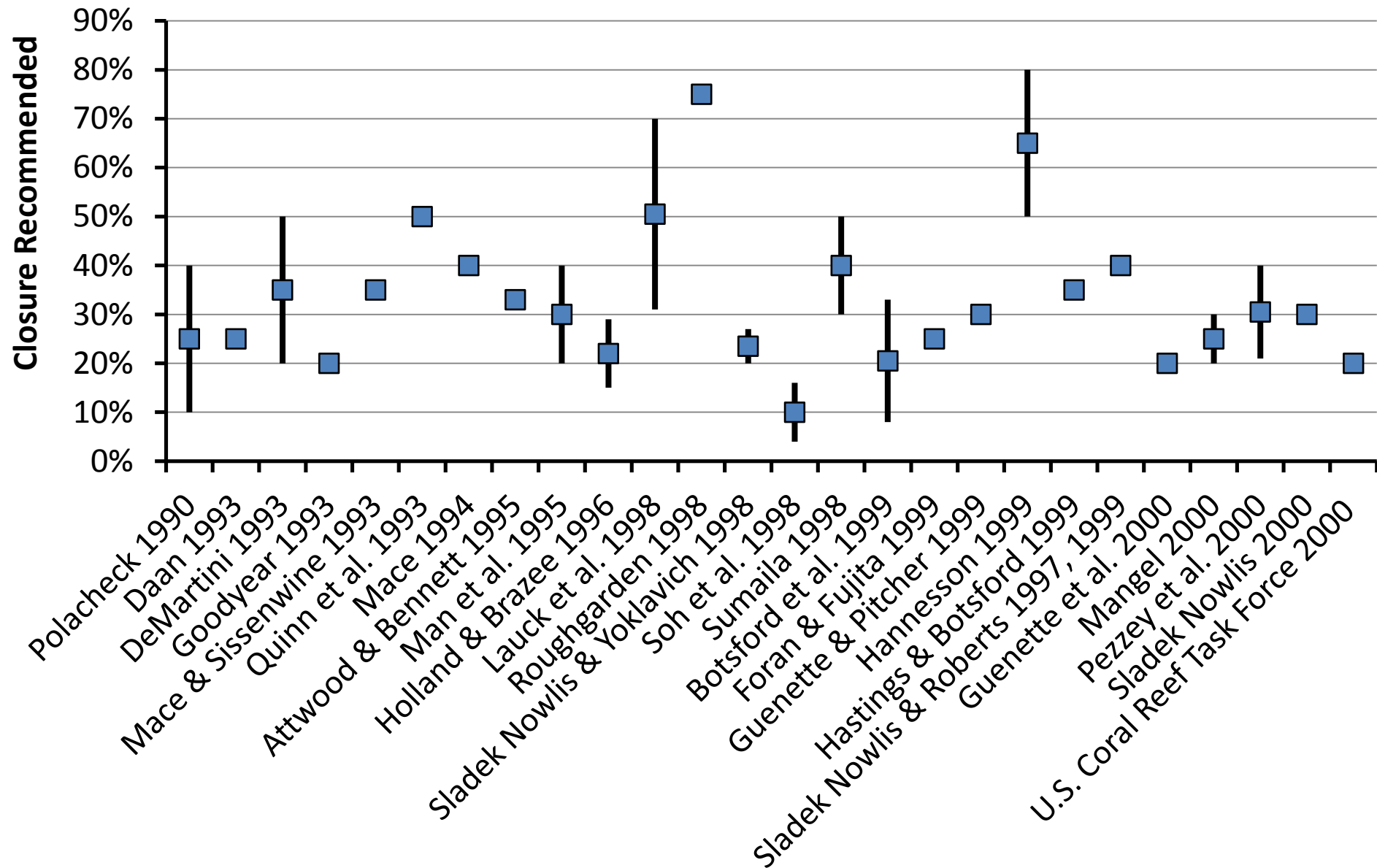
\*min from n=9 mature fish (D. Wyanski, SC-DNR)



# RELEASE MORTALITY



# What level of protection is needed?





# Discussion: MPA Impacts

## Uniform distribution

20% Closed → 20% Protected

## Heterogeneous distribution

20% Selectively Closed → **>20% Protected**

## Meta-analysis:

1. Heterogeneously distributed
2. Hardbottom associated
3. Release mortality likely >50% beyond 25 ftm
4. Mature 25-100 fathoms
5. Spawning 25-100 fathoms





# Discussion: Keys for Success

## Public support

- Involvement in MPA selection*

## Quantitative measures of performance

- Baseline measures of habitat and stock condition in/out*
- Space use and movements*
- Follow-up monitoring, simulation modeling*

## Adequate enforcement

- Simple regulations*
- Mandatory VMS*
- Passive listening devices*

## Adaptive management

- Boundaries and number of MPAs can be modified*
- Collect data for new assessment*