

MPA Design: A Potential Research Area Within Gray's Reef National Marine Sanctuary



April 2009



Outline

- Gray's Reef NMS background
- What's a research area?
- Why an RA at Gray's Reef?
- Research Area Working Group
- General placement criteria
- Boundary placement analysis
- Refined placement criteria
- Six final options
- Socioeconomic impacts
- Public comments
- What's next?



Gray's Reef NMS

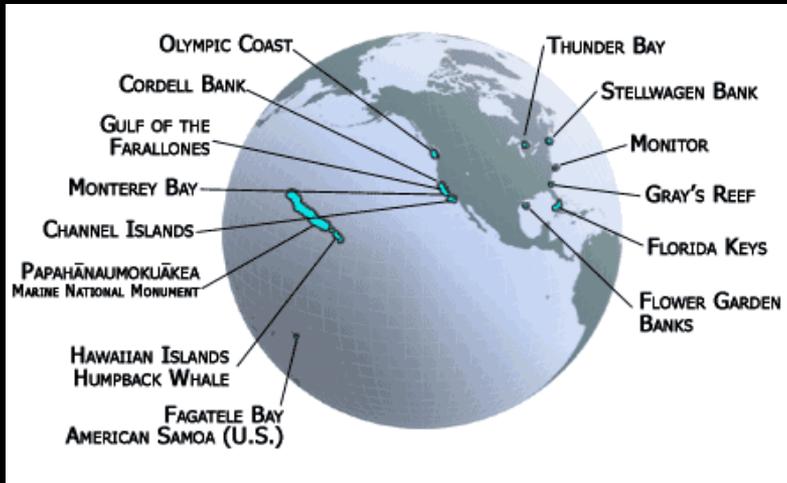
Designated: 1981

Location: 20 miles offshore

Area: 23 sq. miles

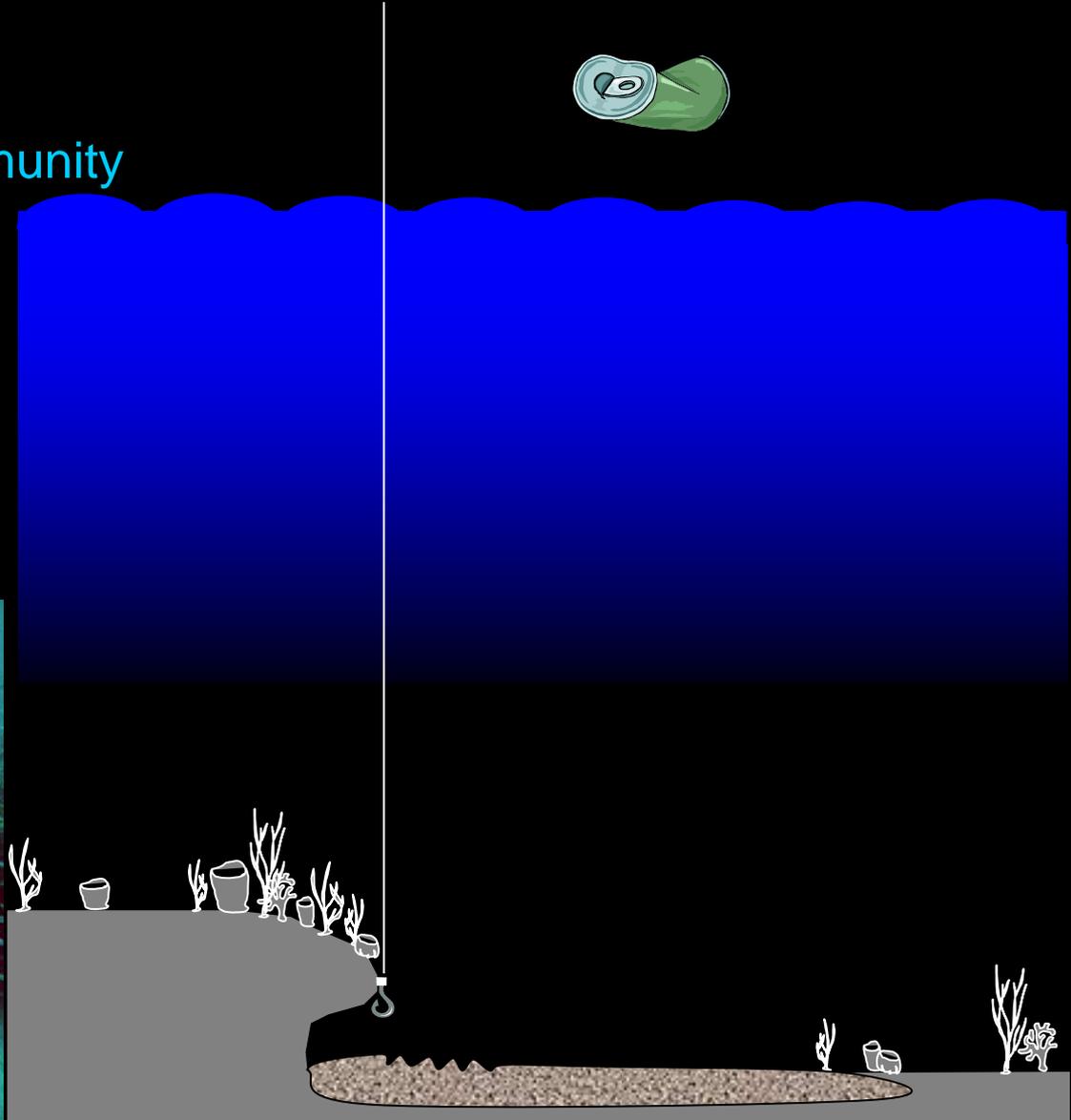
Depth: 20 meters

Formerly known as the Sapelo live bottom, sanctuary is named after Milton B. Gray



Gray's Reef NMS

- Tropical/Temperate reef community
- Limestone ledges
- Flat hard bottom
- Sand plains



What is a research area?

Definition:

Type of MPA or zone within an MPA in which to conduct controlled scientific studies in the absence of confounding factors

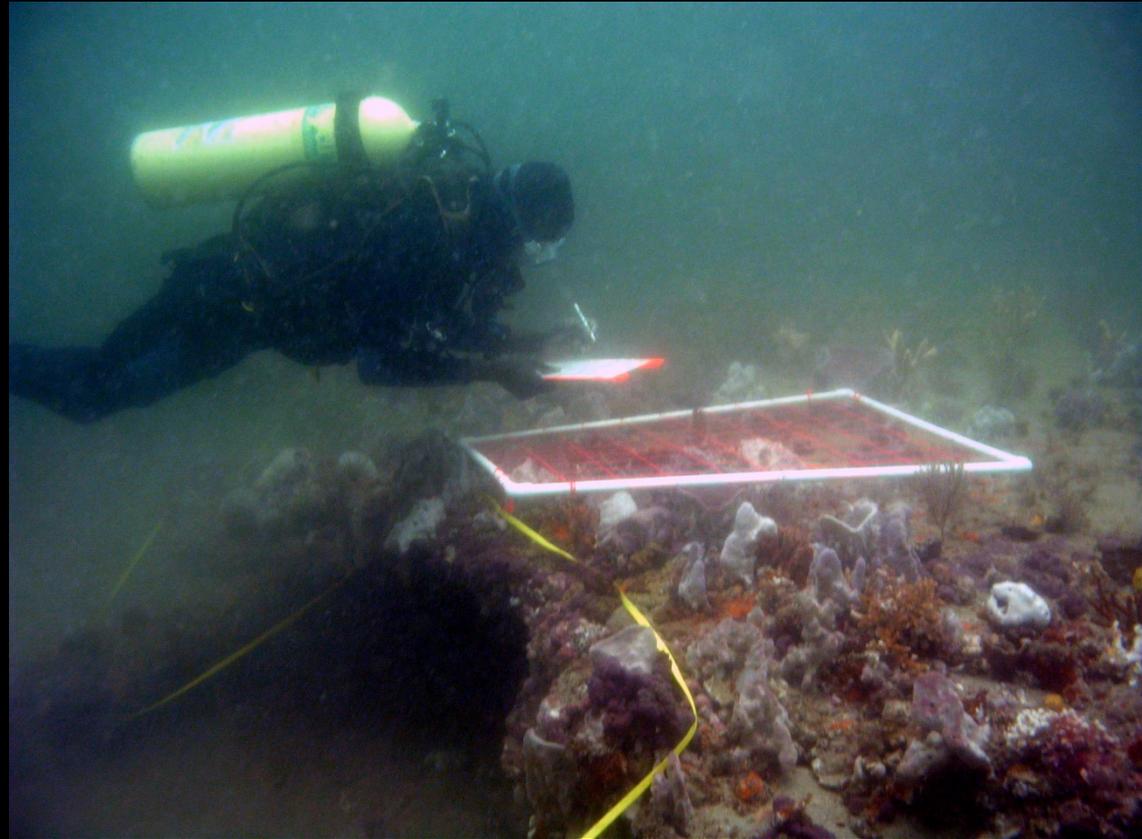
Key attributes:

- Extractive use prohibited
- Entry limited or controlled
- Provides a scientific control
- Manipulative research allowed under permit



Why a research area at GRNMS?

- Suggested during 1999 MPR
- Designation documents stress importance of research
- GRNMS lacks capability to discriminate between natural and human induced change
- GRNMS lacks a site for controlled/manipulative studies in absence of confounding factors
- No areas devoted exclusively to research in the South Atlantic Bight
- A dedicated “research area” with restricted access is needed



Research Area Working Group (RAWG)

- Multidisciplinary, deliberative advisory body
- Consensus driven process
- Representatives from...
 - Recreational Fishing*
 - Commercial Fishing
 - Diving
 - Conservation
 - Science
 - Management
 - Enforcement
 - Recreation
 - Education



RAWG tasks

- Advise SAC
- RA needed?
- Justification?
- Types of studies?
- Necessary attributes?
- Where?

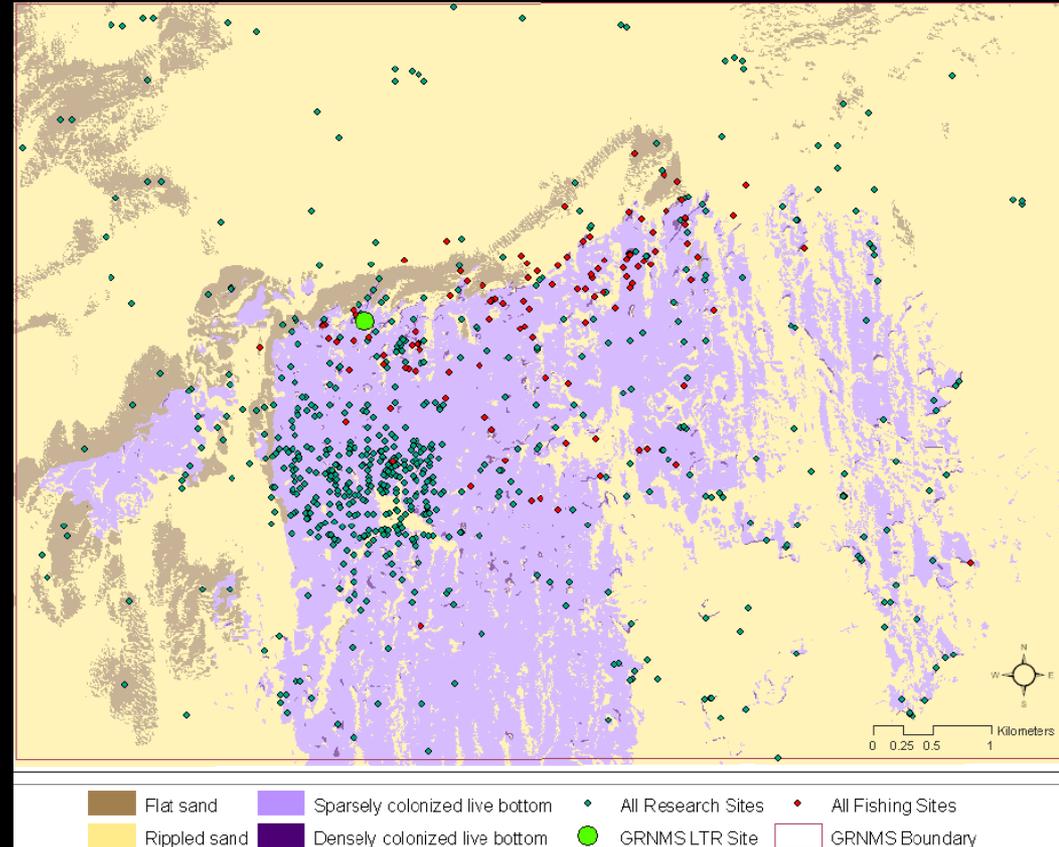


Original Siting Criteria

1. Maximize number and diversity of ledges
2. Include all other bottom types
3. Include lots of prior research
4. Minimize user displacement
5. Exclude comparison sites

Unique Challenges

1. Small space
2. Single area to be designated
3. Specific size and shape options
4. Specific target values unknown
5. Very popular fishing destination

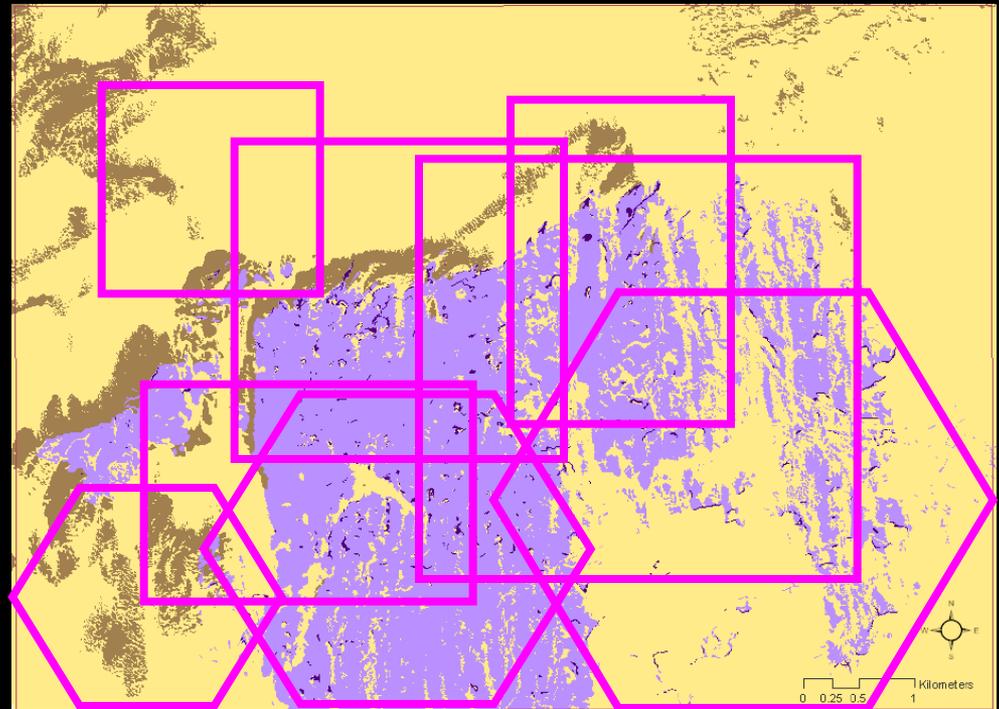


Boundary configurations

| Shape | Size (km) |
|--|-------------------|
| Square – sides parallel to lat/long | 2×2 |
| | 3×3 |
| | 4×4 |
| Square – rotated 30° (counter clockwise) | 2×2 |
| | 3×3 |
| | 4×4 |
| Square – rotated 45° | 2×2 |
| | 3×3 |
| | 4×4 |
| Rectangle – sides parallel to lat/long | 2×3 |
| | 3×2 |
| | 4×2 |
| Rectangle – rotated 30° | 2×3 |
| | 3×2 |
| | 4×2 |
| Rectangle – rotated 45° | 2×3 |
| | 3×2 |
| | 4×2 |
| Hexagon | 4 km ² |
| | 6 km ² |
| | 9 km ² |

18 boundary configurations

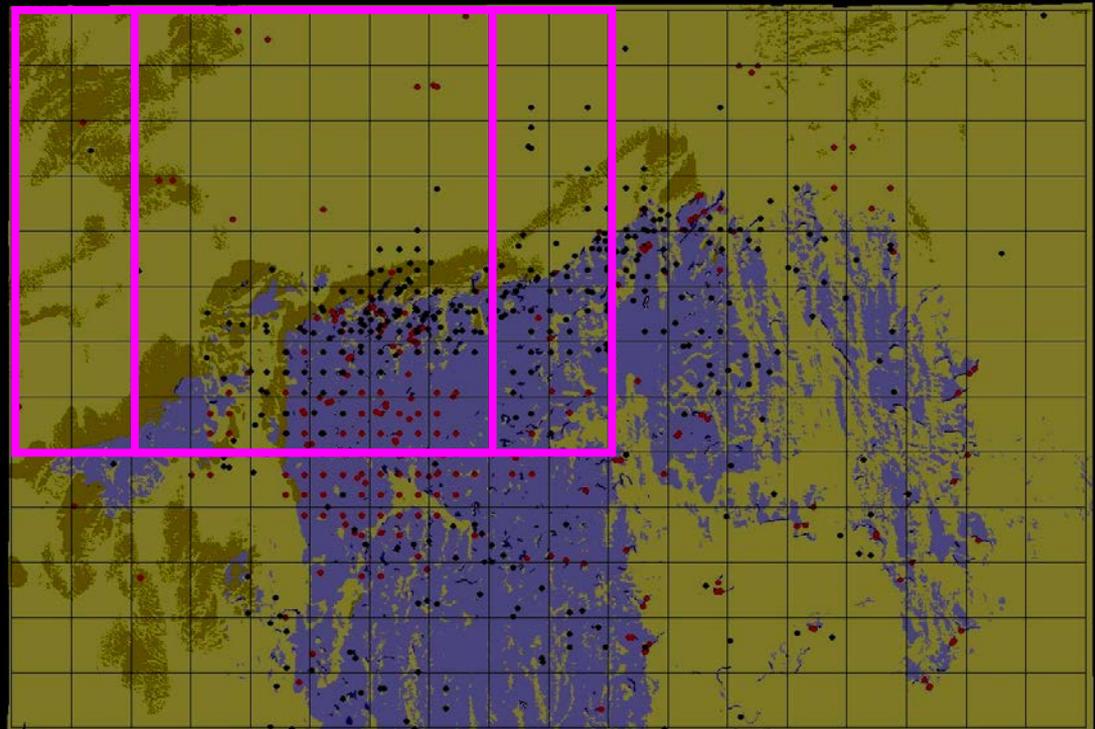
- 3 shapes   
- 4 sizes- 4, 6, 9, and 16 km²
- 3 rotations- 0°, 30°, and 45°



Customized analysis process

“Sliding window” analysis devised to inform the RAWG about the realm of boundary alternatives and the resources within them

| Opt. # | # High ledges | Area H ledges | # Boats | # Res. Sites |
|--------|---------------|---------------|---------|--------------|
|--------|---------------|---------------|---------|--------------|



Resulted in 31,135 options!

RAWG meeting in October 2007

- Explore 30,000 placement options
- Select quantitative criteria
- Identify RA options

Need 30 ledges of each type
(short, medium, tall)

- Includes the diversity of ledge types
- Provides adequate replicates for research
- Approximately 20% of ledges

Original criteria (non-specific)

1. Maximize ledges
2. Include all bottom types
3. Minimize user displacement

Proportional to sanctuary
(flat sand, rippled sand, flat live bottom)

- Less important than #1

Avoid favored fishing areas

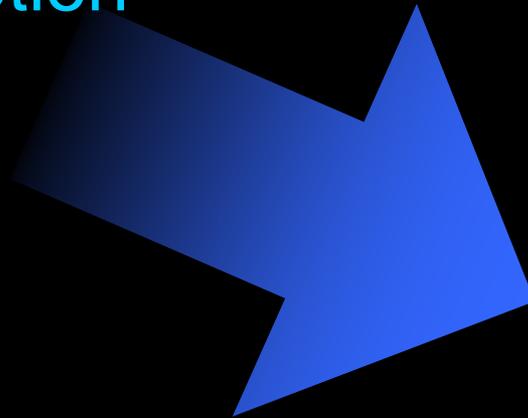
(e.g. data buoy)

- Fewer boats and less marine debris
- Cannot compromise #1



RAWG focused on 3 scenarios

1. Preferred scientific option
2. Minimize fishing displacement
3. Compromise option



For each scenario...

- Selection criteria
- Position
- Characteristics



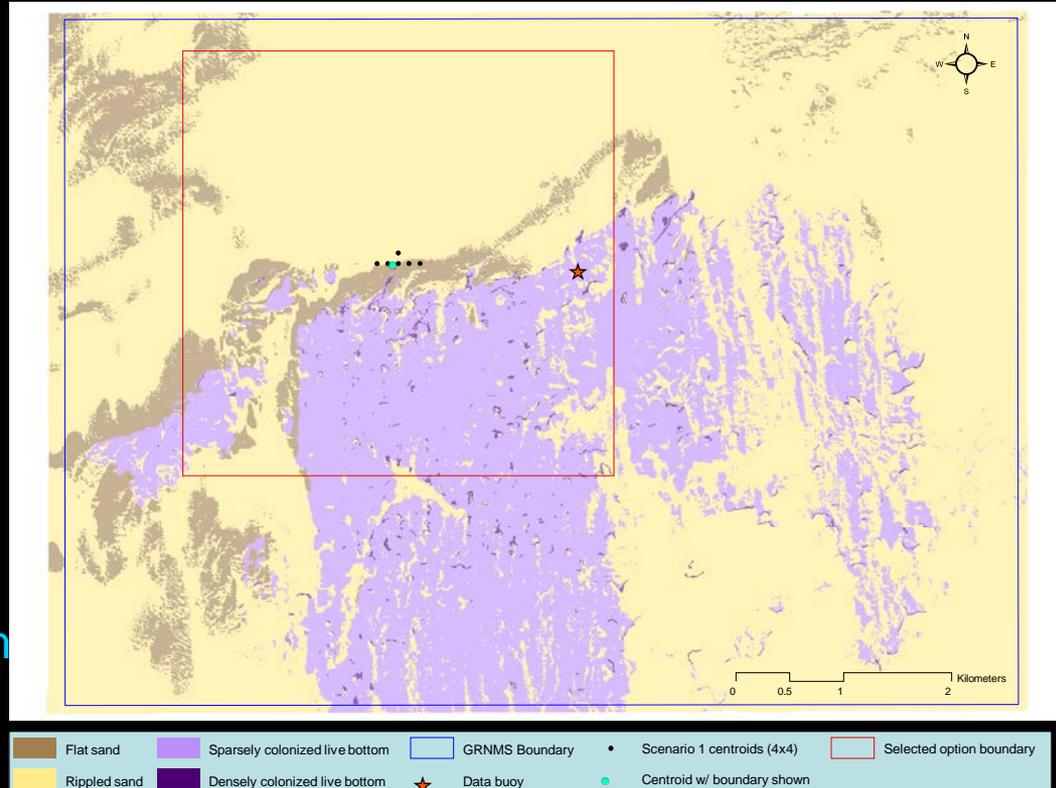
Scenario 1: Preferred scientific option

Selection Criteria:

- 4 by 4 km, unrotated squares
- 30 of each ledge type (S, M, T)
- Representative proportions of other bottom types (85%)

Resulting Characteristics:

- 6 options
- At least 79 of all ledge types are outside the RA and available for fishing and comparative research
- Some of all bottom types are outside
- All include the data buoy
- All include Long Term Mon. site
- Encompass ~2/3 of boat sightings



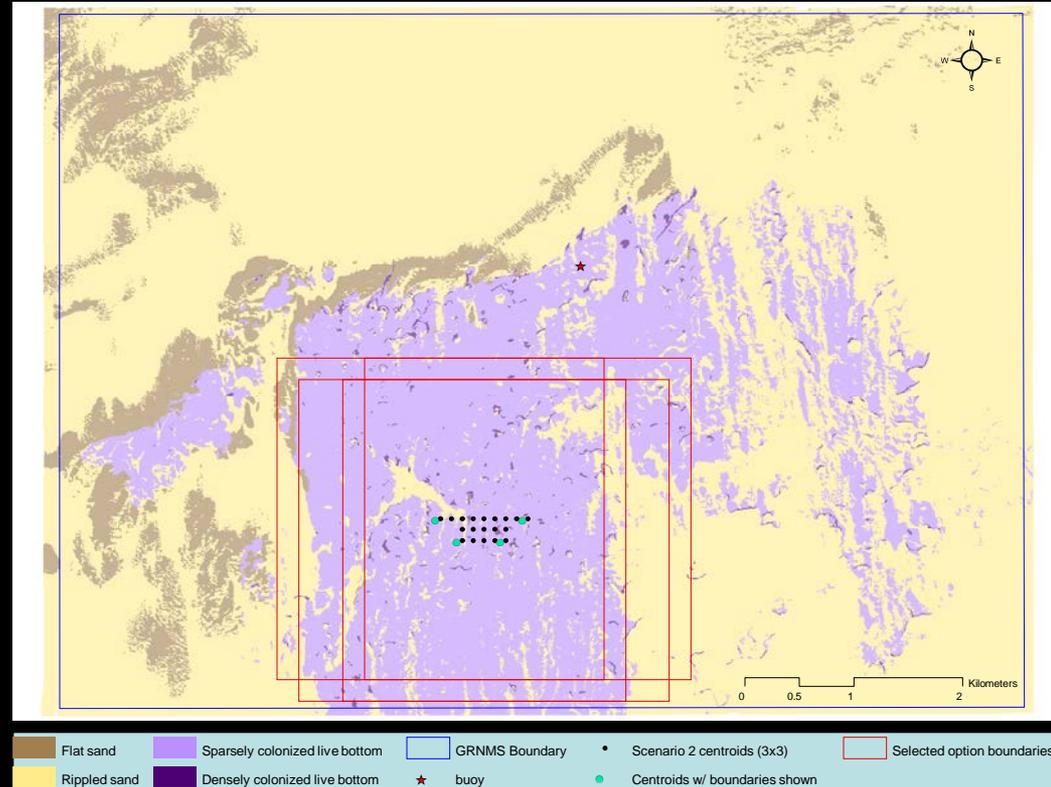
Scenario 2: Minimize fishing displacement

Selection Criteria:

- 3 by 3 km, unrotated squares
- 30 of each ledge type (S, M, T)
- Lowest level of fishing (1 out of 5)

Resulting Characteristics:

- 19 options
- At least 61 of all ledge types are outside the RA and available for fishing and comparative research
- Little if any flat sand included
- Some of all bottom types are outside
- None include the data buoy
- None include Long Term Mon. site
- Encompass ~15% of boat sightings, not in main fishing area



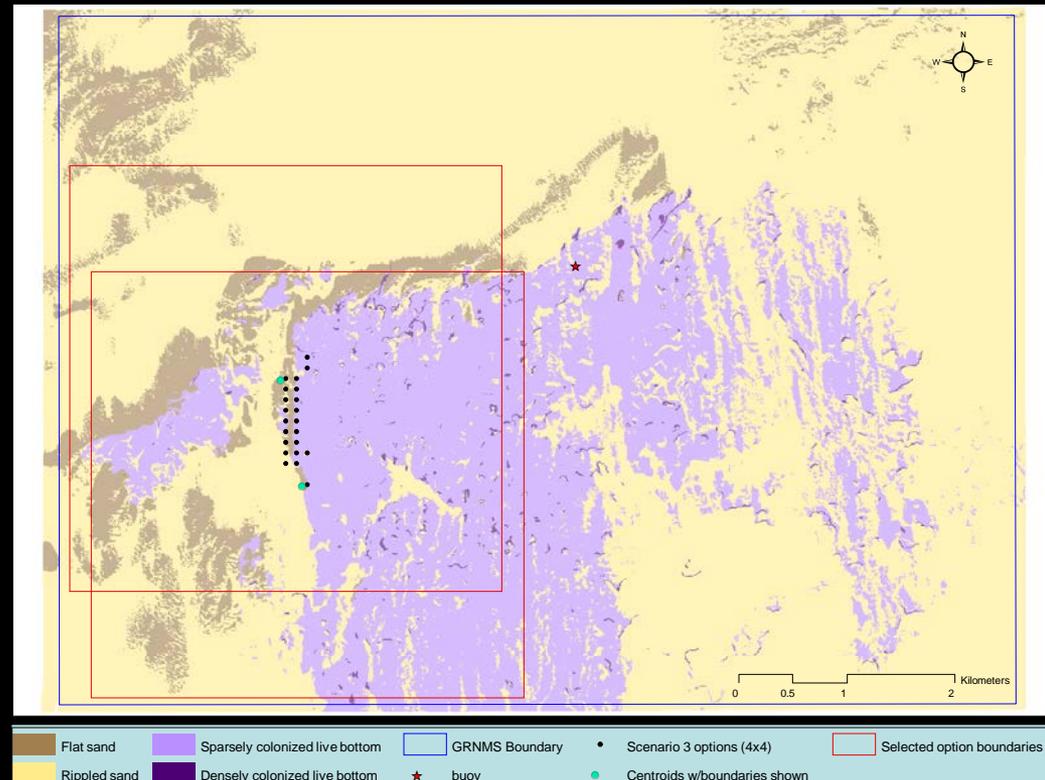
Scenario 3: Compromise option

Selection Criteria:

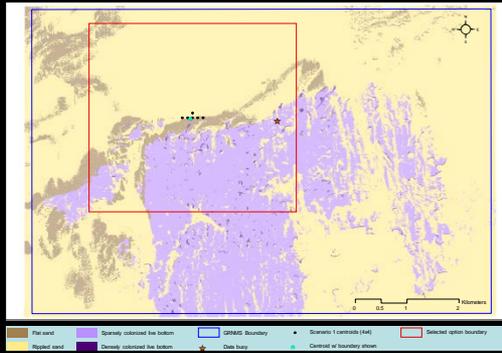
- 4 by 4 km, unrotated squares
- 30 of each ledge type (S, M, T)
- Lowest levels of fishing (≤ 2 of 5)
- Representative proportions of other bottom types (50%)

Resulting Characteristics:

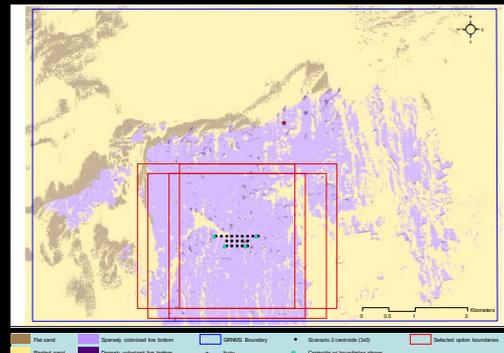
- 22 options
- At least 52 of all ledge types are outside the RA and available for fishing and comparative research
- Some of all bottom types are outside
- None include the data buoy
- All include Long Term Mon. site
- Encompass $\sim 1/3$ of boat sightings



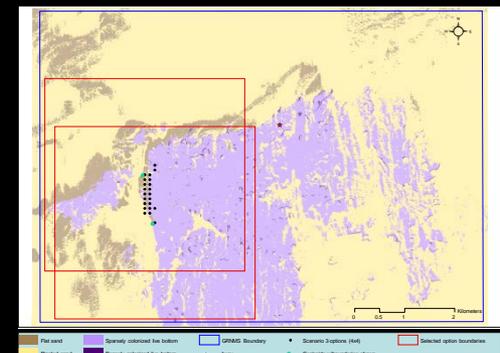
MPA design: GRNMS case study



Preferred scientific option



Minimize fishing displacement



Compromise option

3 public suggestions



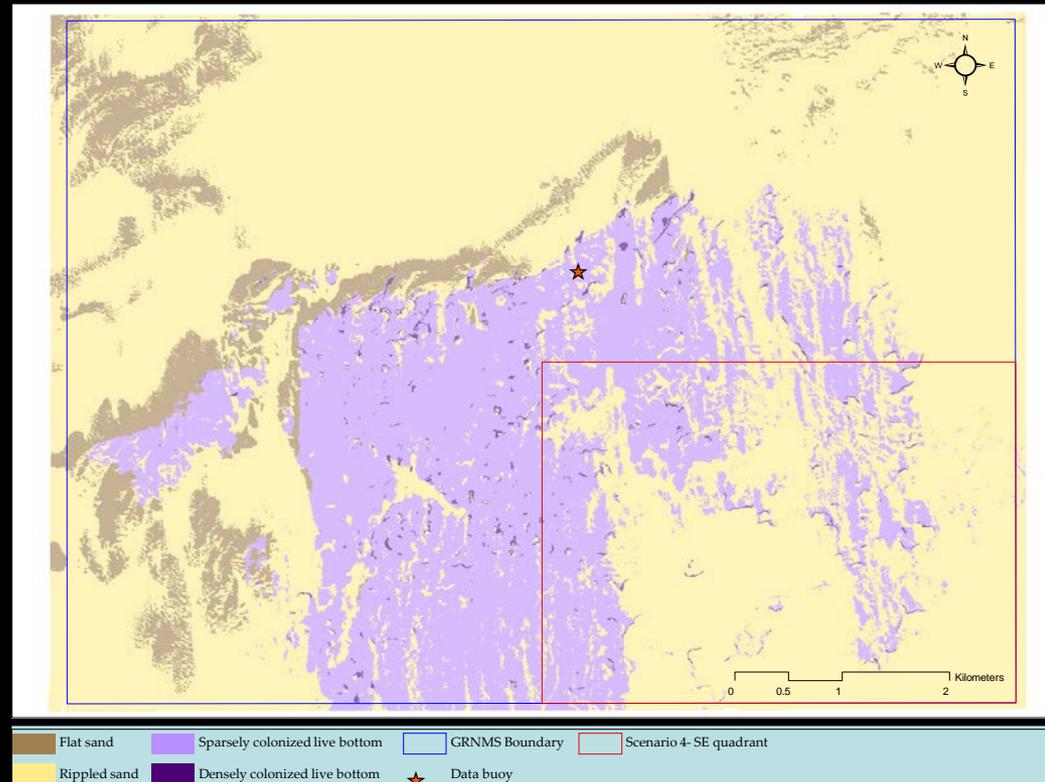
Scenario 4: SE quadrant

Selection Criteria:

- SE quadrant of GRNMS

Resulting Characteristics:

- 1 option
- Insufficient number of short (22), medium (25), and tall (23) ledges
- No flat sand included
- 94 of all ledge types are outside for fishing/comparison
- Long Term Mon. site excluded
- Data buoy excluded
- Encompasses %9 of boats
- Much less prior research



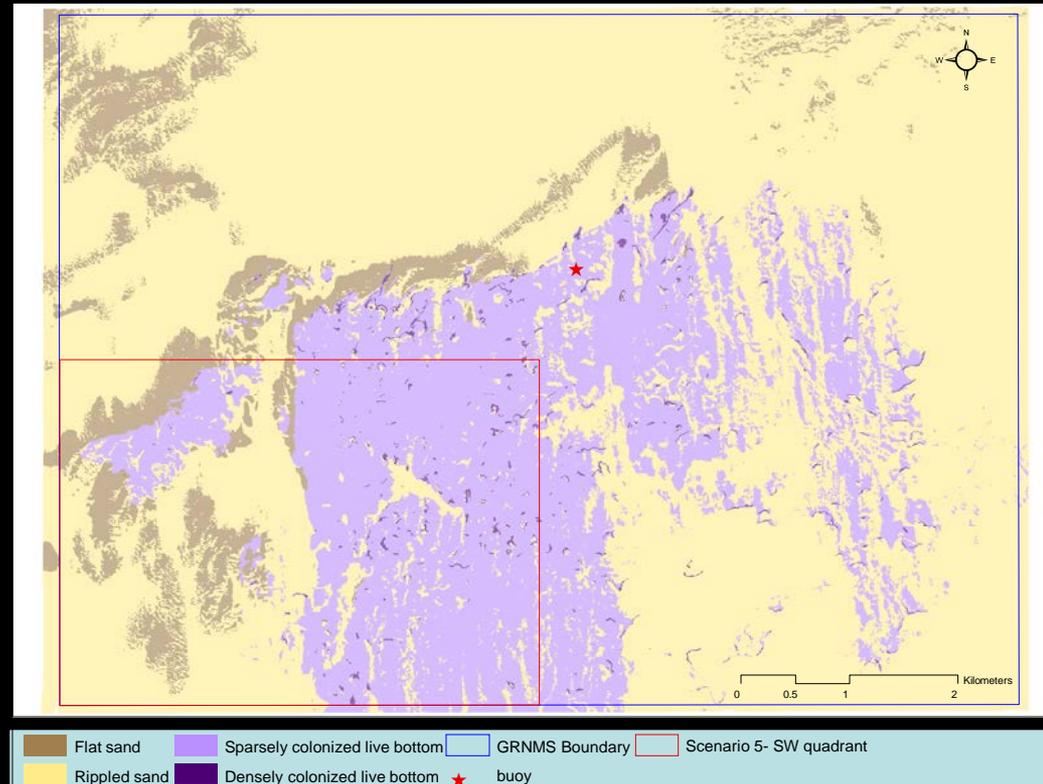
Scenario 5: SW quadrant

Selection Criteria:

- SW quadrant of GRNMS

Resulting Characteristics:

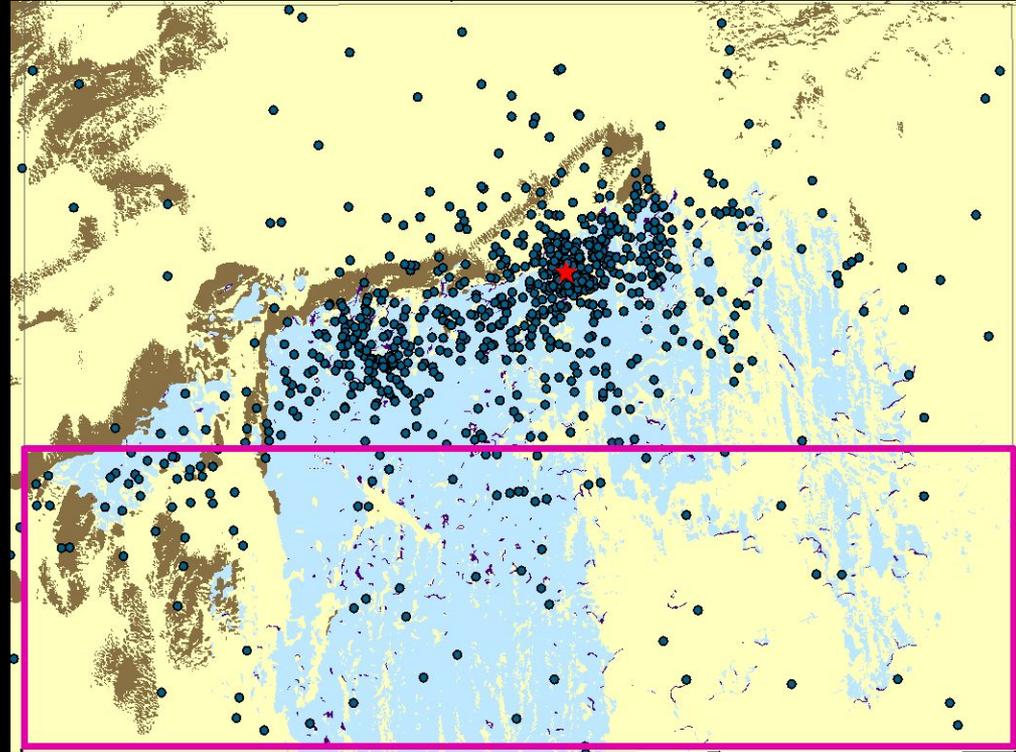
- 1 option
- Insufficient number of tall (21) ledges inside
- All bottom types are included
- 66 of all ledge types are outside for fishing/comparison
- Long Term Mon. site excluded
- Encompasses %10 of boats
- Data buoy excluded



Scenario 6: Southern expansion

Selection Criteria:

- Enlarge from southern border until 30 ledges of each types are included (S, M, T)

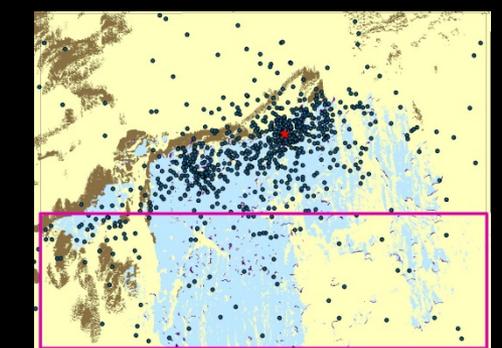
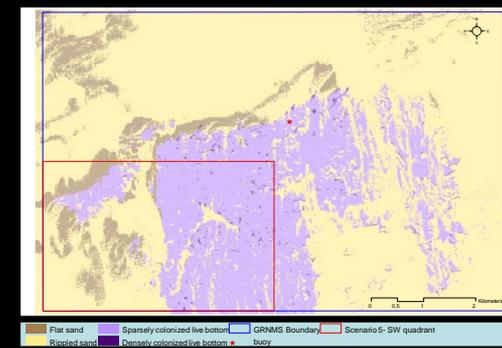
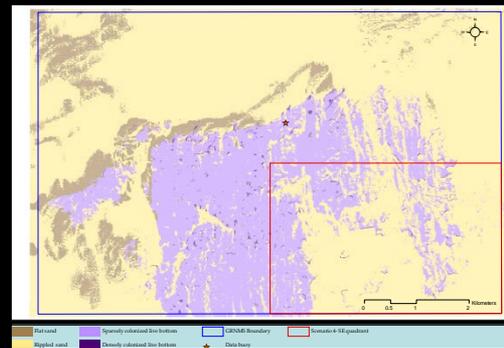
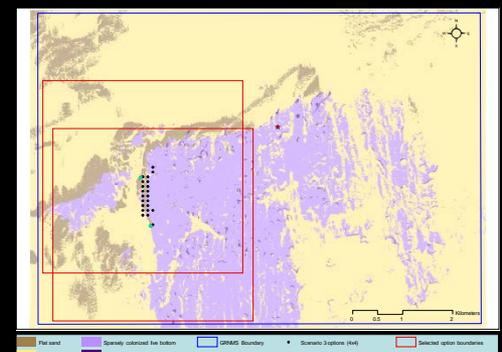
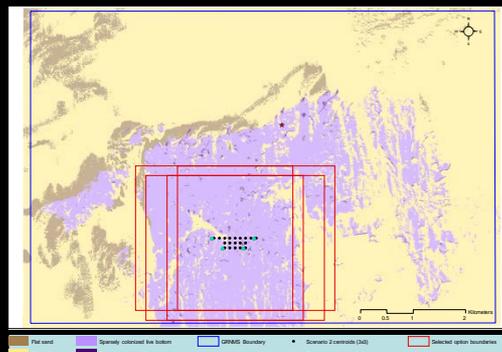
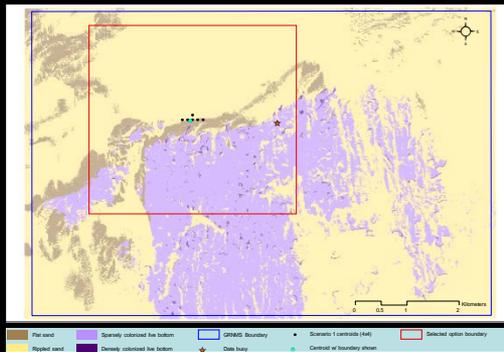


Resulting Characteristics:

- 1 option
- 2.41 by 8.5 km
- 21.28 km²
- 30 short, 52 medium, 36 tall
- All bottom types are included
- 51 of all ledge types are outside for fishing/comparison
- Long Term Mon. site excluded
- Encompasses 8.5% of boats
- Data buoy excluded



MPA design: GRNMS case study



Scenarios subjected to socioeconomic impact analysis



Socioeconomic Analysis: Methodology and Assumptions

- GRNMS boat location data sources: multiple, including aerial photography and on water GRNMS and DNR patrol boat records.
- Boat location data spans 1999 to 2007. 1,266 boat locations identified.
- Approximately 50 percent of these occurred on fishing tournament days. No difference in spatial distribution of kingfish tournament days compared with non-tournament days.
- Assumptions for GRNMS fishing analysis:*
 - All boats identified are fishing
 - Average of 4 fishers per boat
 - Trip expenditure profile of charter boats used for trip expenditure profile of tournament boats
 - 50 percent private/rental and 50 percent charter/tournament
 - 95 percent Georgia resident and 5 percent non-resident
- This analyses assumes that all economic value associated with the areas closed are lost. Any factor that could mitigate or off-set the level of impact is not addressed. The estimated impacts are thought of as “maximum potential losses.” Rarely does society fail to at least mitigate or off-set most losses.



Socioeconomic impact analysis

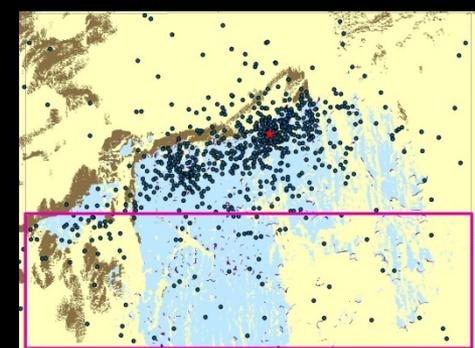
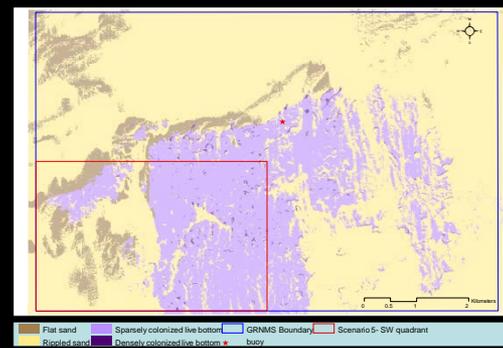
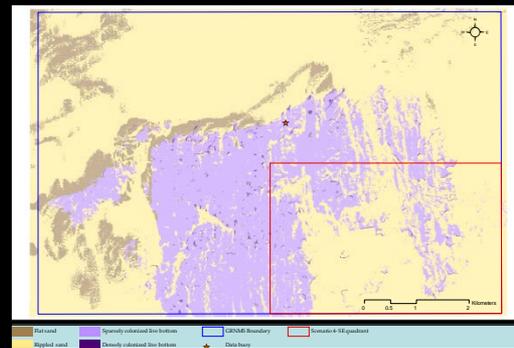
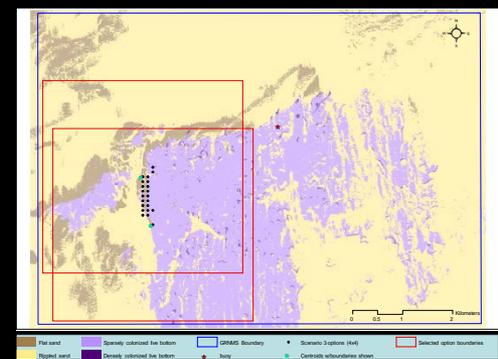
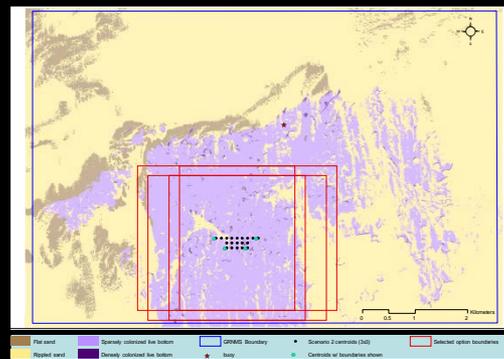
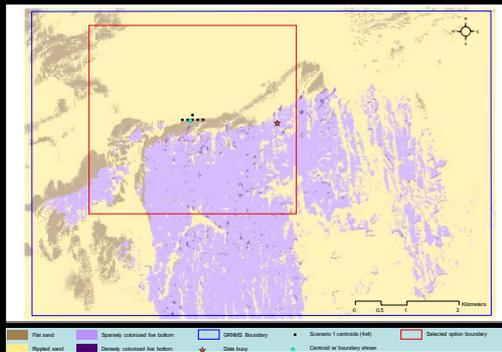
- Estimated “person days” of use for each scenario
- Estimated economic contribution using NMFS Recreational Fishery Stats
- Predicted displacement for each scenario
- Calculated maximum potential economic losses

| Scenario # | Boundary # | % GRNMS Impacted | Impacted GRNMS Person Days | Impacts to GRNMS Saltwater Fishing Expenditures | % Impact to GA Person Days of Saltwater Fishing | % Impact to GA Total Saltwater Fishing Expenditures |
|--------------------|------------|------------------|----------------------------|---|---|---|
| 1 | 1 | 67.0% | 3,145 | \$1,351,651 | 0.18% | 1.13% |
| 2 | 1 | 12.4% | 582 | \$250,055 | 0.03% | 0.21% |
| 2 | 2 | 12.2% | 574 | \$246,676 | 0.03% | 0.21% |
| 2 | 3 | 8.8% | 413 | \$177,404 | 0.02% | 0.15% |
| 2 | 4 | 8.7% | 409 | \$175,715 | 0.02% | 0.15% |
| 3 | 1 | 35.9% | 1,687 | \$724,823 | 0.10% | 0.61% |
| 3 | 2 | 34.6% | 1,624 | \$697,790 | 0.10% | 0.59% |
| 4 | 1 | 6.7% | 315 | \$135,165 | 0.02% | 0.11% |
| 5 | 1 | 14.5% | 680 | \$292,295 | 0.04% | 0.25% |
| Southern Expansion | | 9.2% | 432 | \$185,852 | 0.03% | 0.16% |

Maximum potential loss of statewide (Georgia) saltwater recreational fishing expenditures will be 0.11% (scenario 4) to 1.13% (scenario 1)



MPA design: GRNMS case study



Six scenarios put forward for public comment

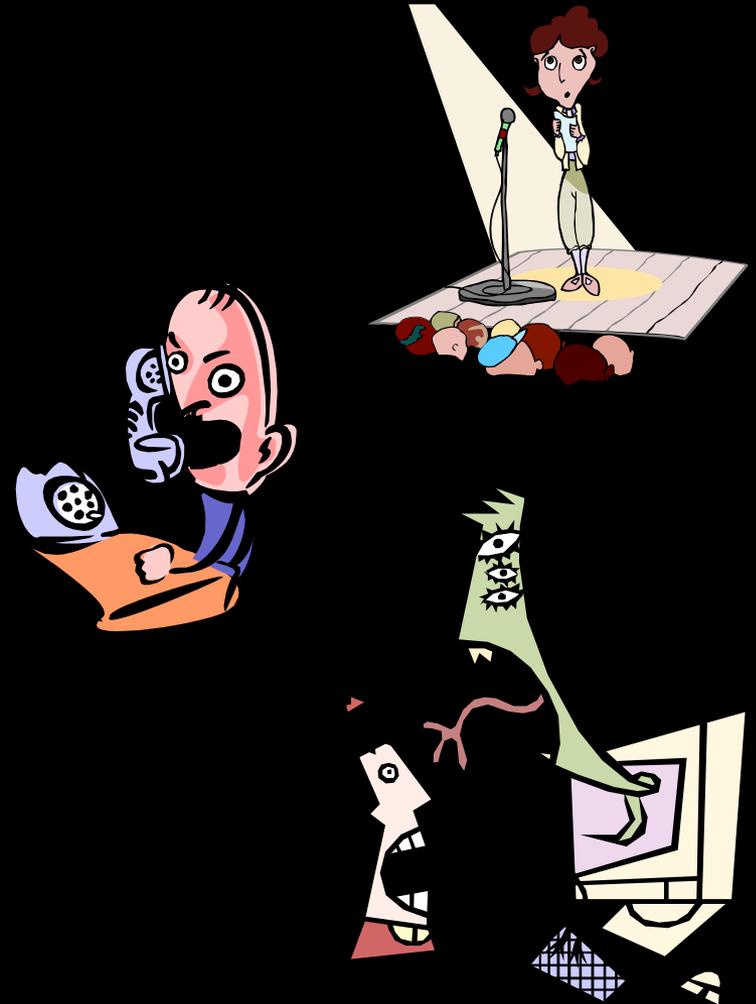


Public comment period March-April 2008

- Diverse media were used
- 4 public meetings
- 118 comments received
- Organized by theme (e.g. pro, con, education, enforcement, terms of closure)

Organizations Commenting:

- Marine Conservation Biology Institute (MCBI)
- Coastal Conservation Association of Georgia (CCAGA)
- Ocean Conservancy
- Sierra Club and Clean Coast (joint comment)
- The Georgia Conservancy
- Ossabaw Island Education Alliance (Board of Regents/University System of GA)
- GADNR, Ossabaw Island Foundation)
- The Nature Conservancy
- Southern Kingfish Association



“Just another plot by a government agency to make up work...”



“Being heavily fished is the
‘natural state’ of Gray’s Reef...”



“Consider mitigation to
replace what is taken away...”



“...clear research plan must be communicated ...”

“...annual report on achievements...”

“...periodic review...”



RAWG Final Recommendations, July 2008

- Scenario 6 is preferred
 - Larger size provides more opportunity for research
 - Meets habitat criteria
 - Farthest from fished areas
 - Three sides align with GRNMS boundaries
 - Minimal displacement of users
 - Most frequently favored in public comments
- Scenarios 1-3 to be considered but not “preferred”
 - User displacement
 - Higher boundary complexity
- Scenarios 4-5 should be eliminated due to insufficient ledges



RAWG Final Recommendations, July 2008

- Terms of Closure
 - Prohibit all fishing except under GRNMS permit
 - Allow recreational diving under GRNMS permit
 - Mark boundaries by line-of-sight buoys
 - Transit allowed with fishing gear stowed
- Annual performance review needed
- Research advisory panel needed
- Incorporate into GRNMS management plan review cycle



Next steps

- RAWG recommendations to the SAC
- SAC recommendations to GRNMS
- GRNMS develops Draft EIS by end of year
- GRNMS to NMSP for clearance
- NMSP to NOS for clearance
- NOS to NOAA for clearance
- NOAA to infinity and beyond
- DEIS for public comment 2009
- ...



Thank you...

