



Ocean Observing Systems for Reef Fisheries of the Southeast U.S. (revisited)

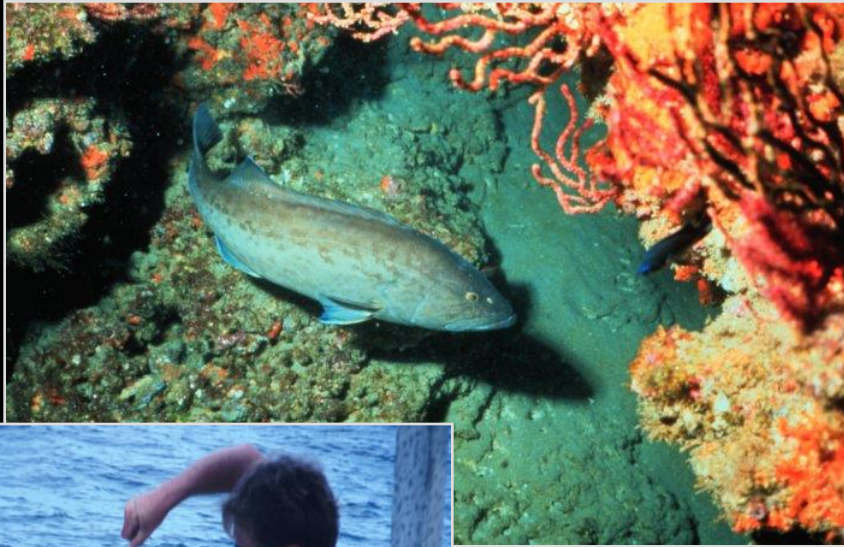
SECOORA Meeting, 14 May 2014

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The Gag Story

This is a fish tale.....



Status of Reef Fish Stocks in the South Atlantic Region

Overfished Stocks

1. Red Porgy
2. Red Snapper
3. Snowy Grouper
4. Blueline Tilefish



Stocks Subject to Overfishing

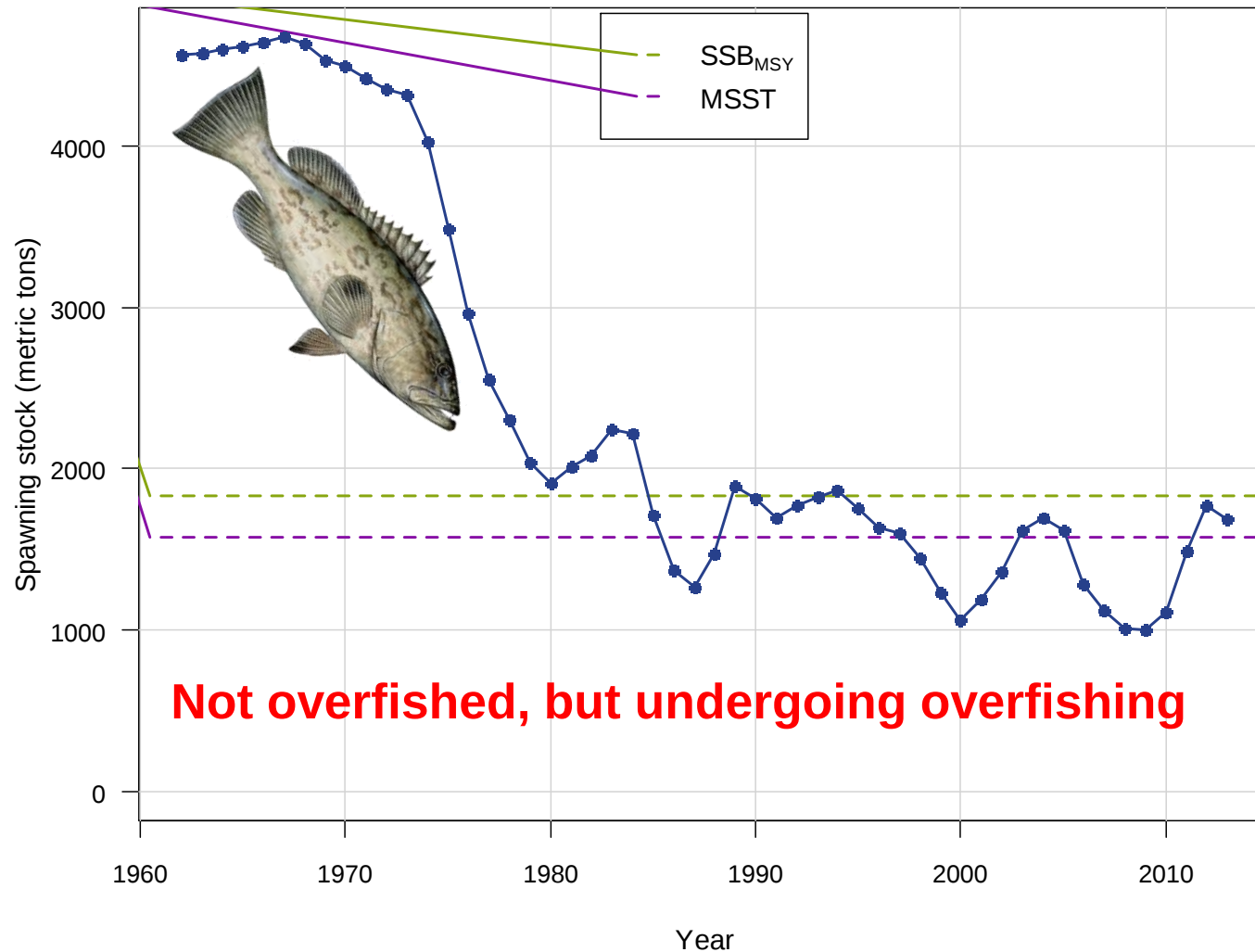
1. Gag
2. Red Snapper
3. Snowy Grouper
4. Speckled Hind
5. Warsaw Grouper
6. Blueline Tilefish

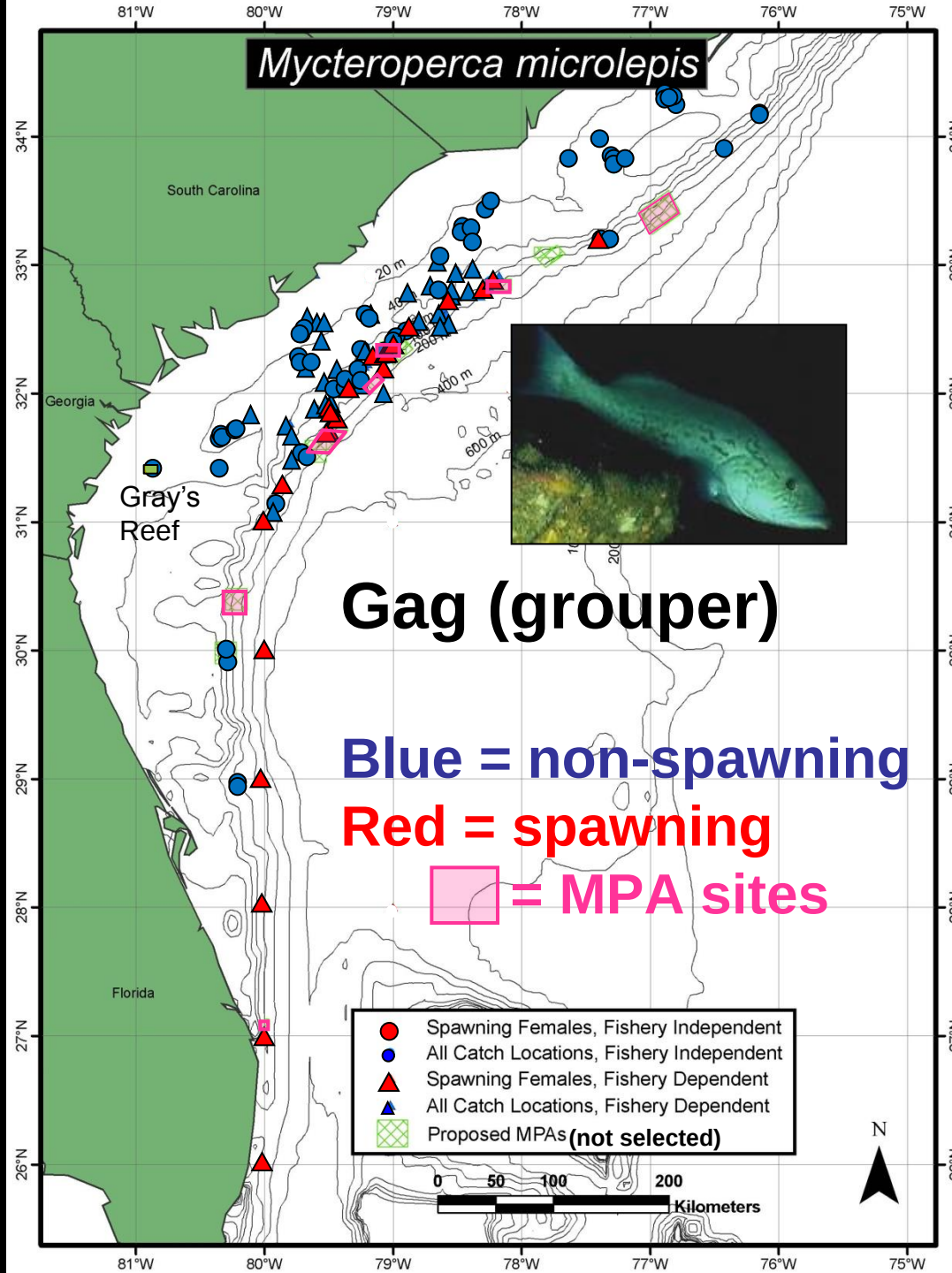


Reef Fishes Only
as of 30 March 2014

BAM base run – SSB

- Spawning Stock Biomass
- SSB for Max. Sustainable Yield
- Minimum Stock Size Threshold





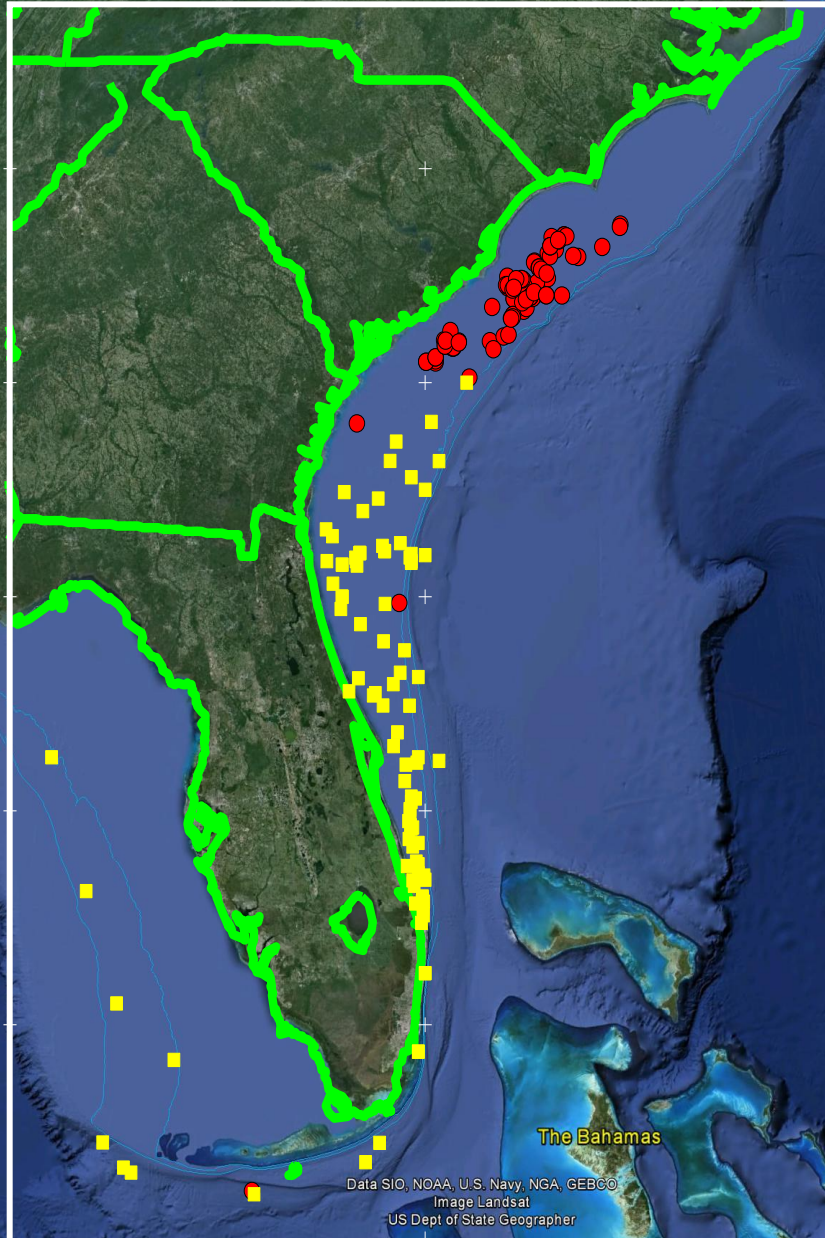
Gonad histology shows that gag spawn at Gulf Stream western edge, in March - April



- Tagging Sites
- Recapture Sites

**Gag That
Moved
South >
185 km**

**WHY go
all the
way to FL
to
spawn??**



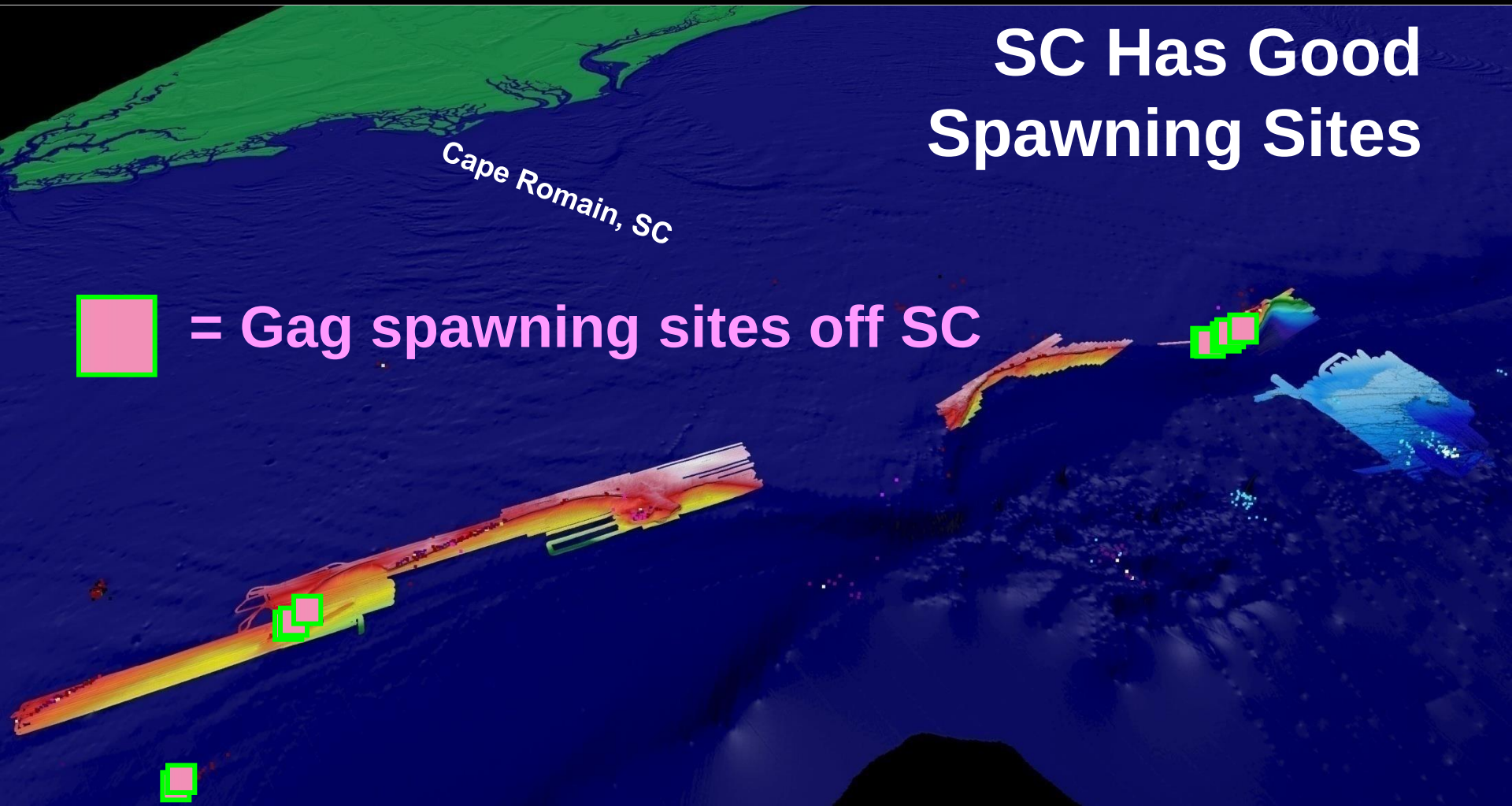
Google earth

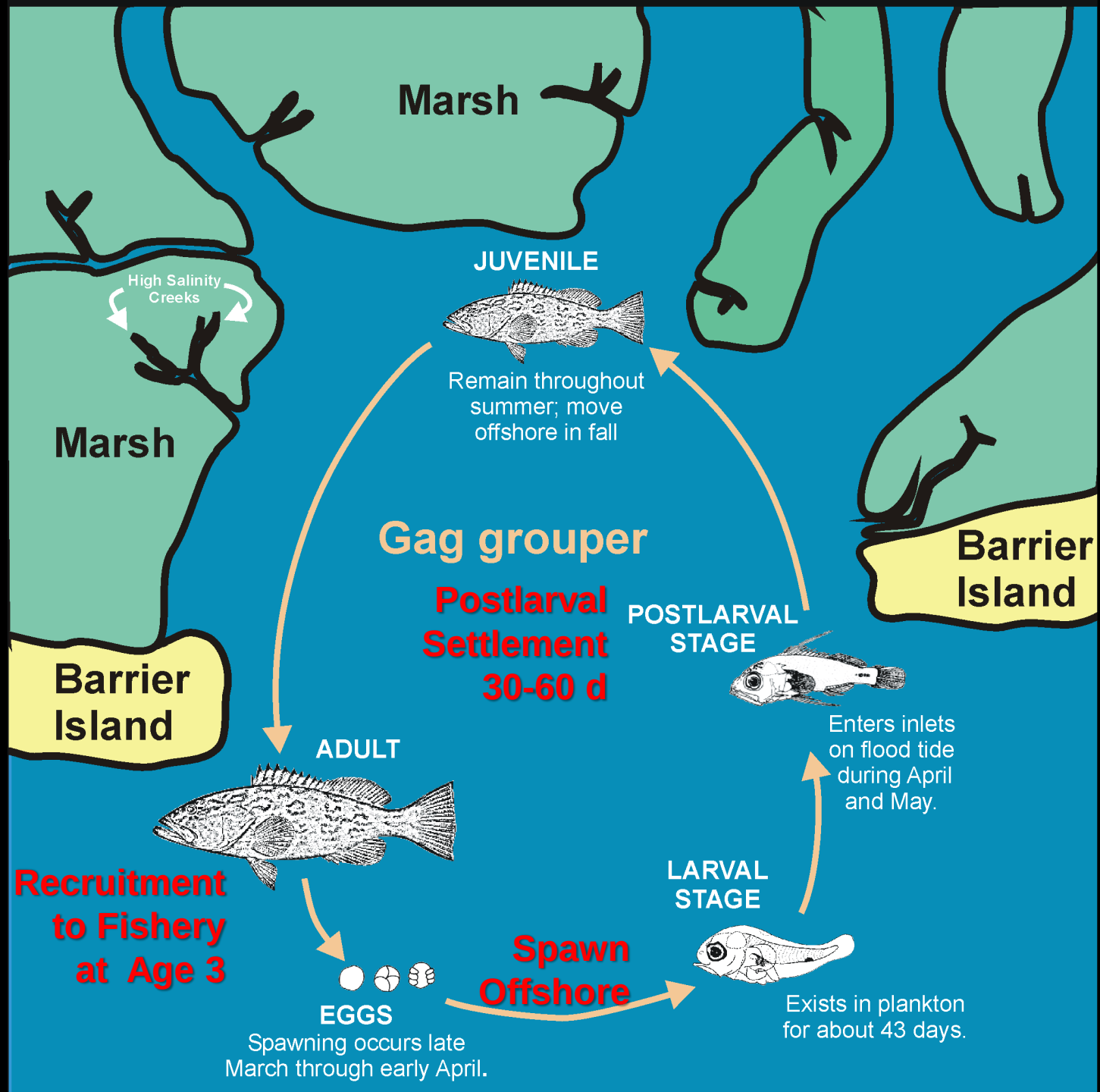
 Gag	 Tilefish	 Rock Hind	 Yellowmouth Grouper
 Tomtate	 Scamp	 Snowy Grouper	 Black Sea Bass
 Red Porgy	 White Grunt	 Red Snapper	 Bank Sea Bass
 Vermillion Snapper	 Blueline Tilefish	 Yellowedge Grouper	
 Knobby Porgy	 Red Grouper		

SC Has Good Spawning Sites

Cape Romain, SC

 = Gag spawning sites off SC



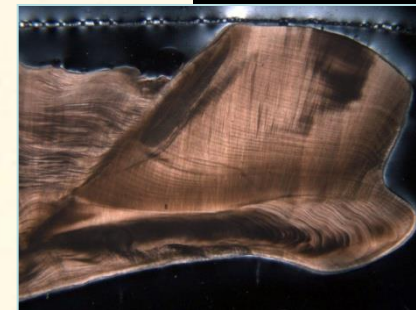
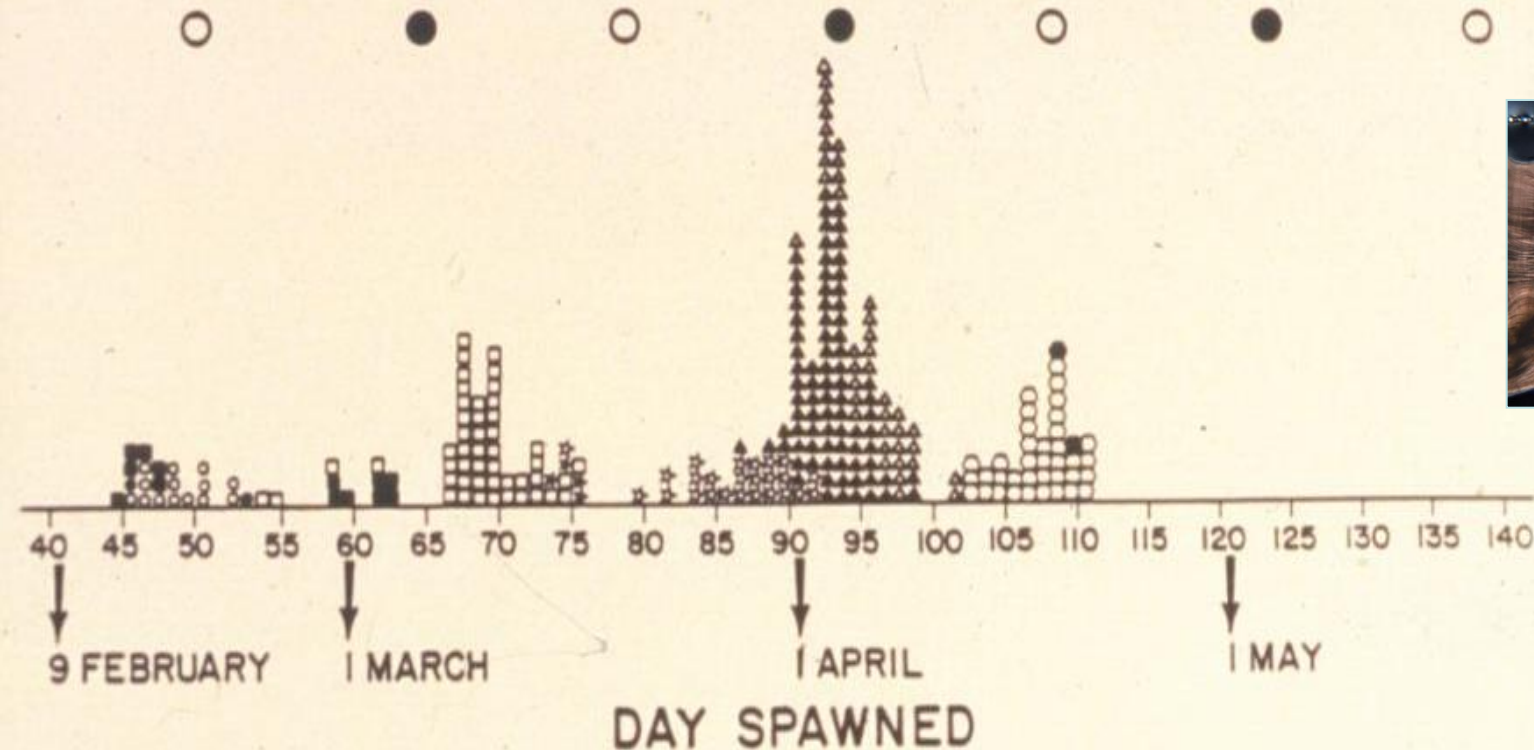


Day Collected	Total # Collected
○ 92-93	16
• 99-100	2
■ 106-107	19
□ 113-114	61
* 120-121	4
* 127-128	32
▲ 134-135	321
△ 141-142	43
○ 148-149	40
● 155-156	3

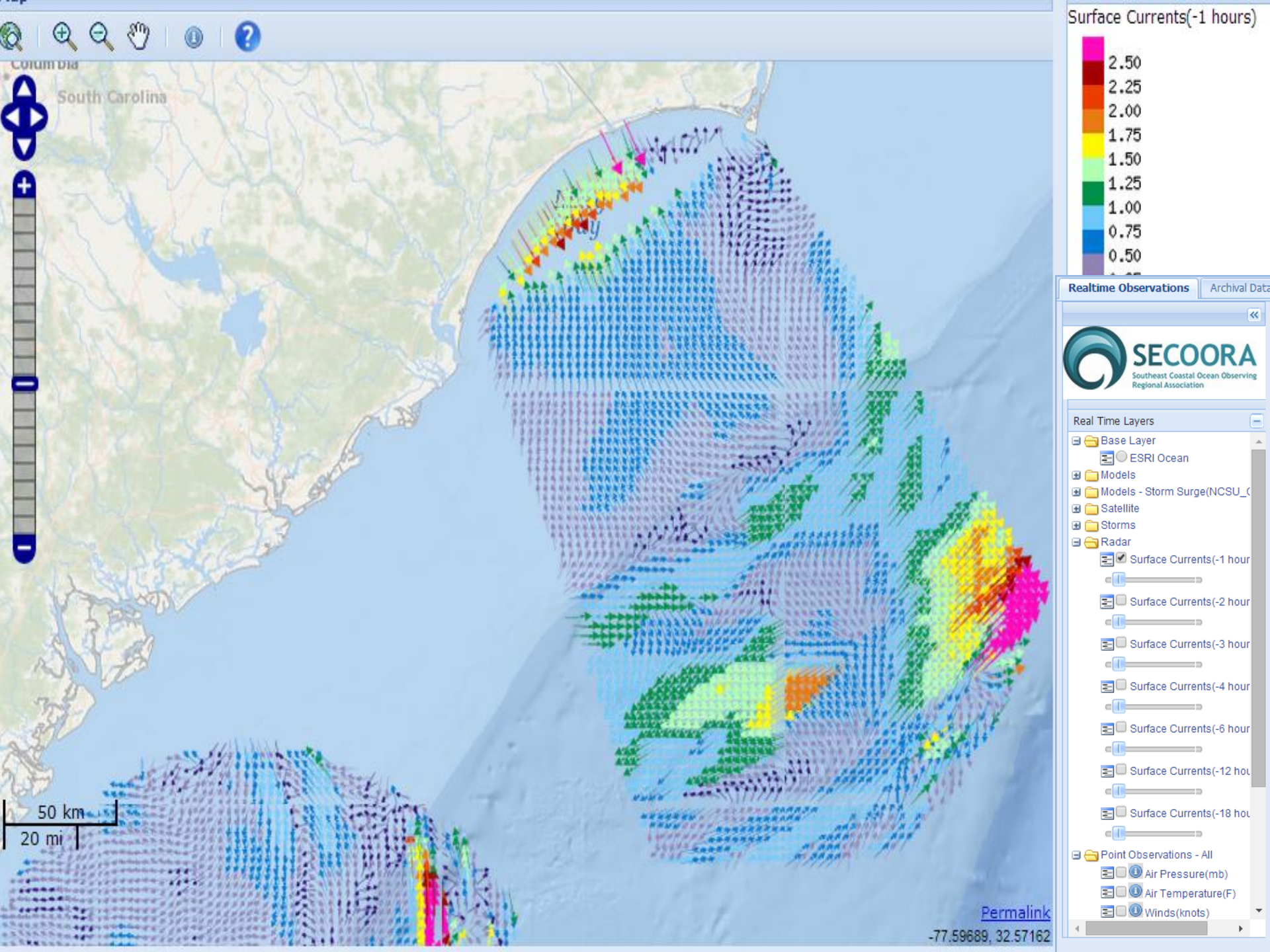
● NEW MOON
○ FULL MOON

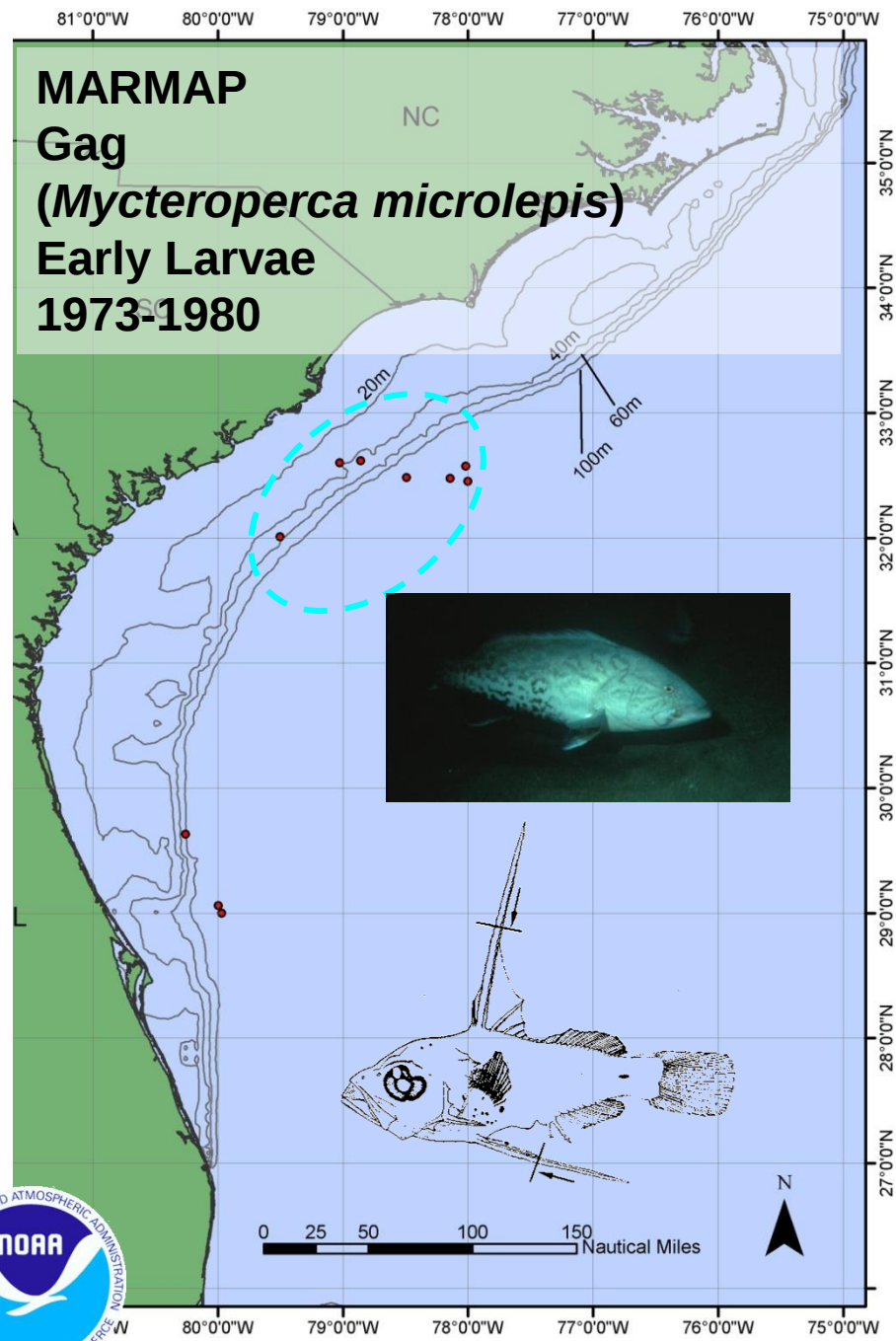
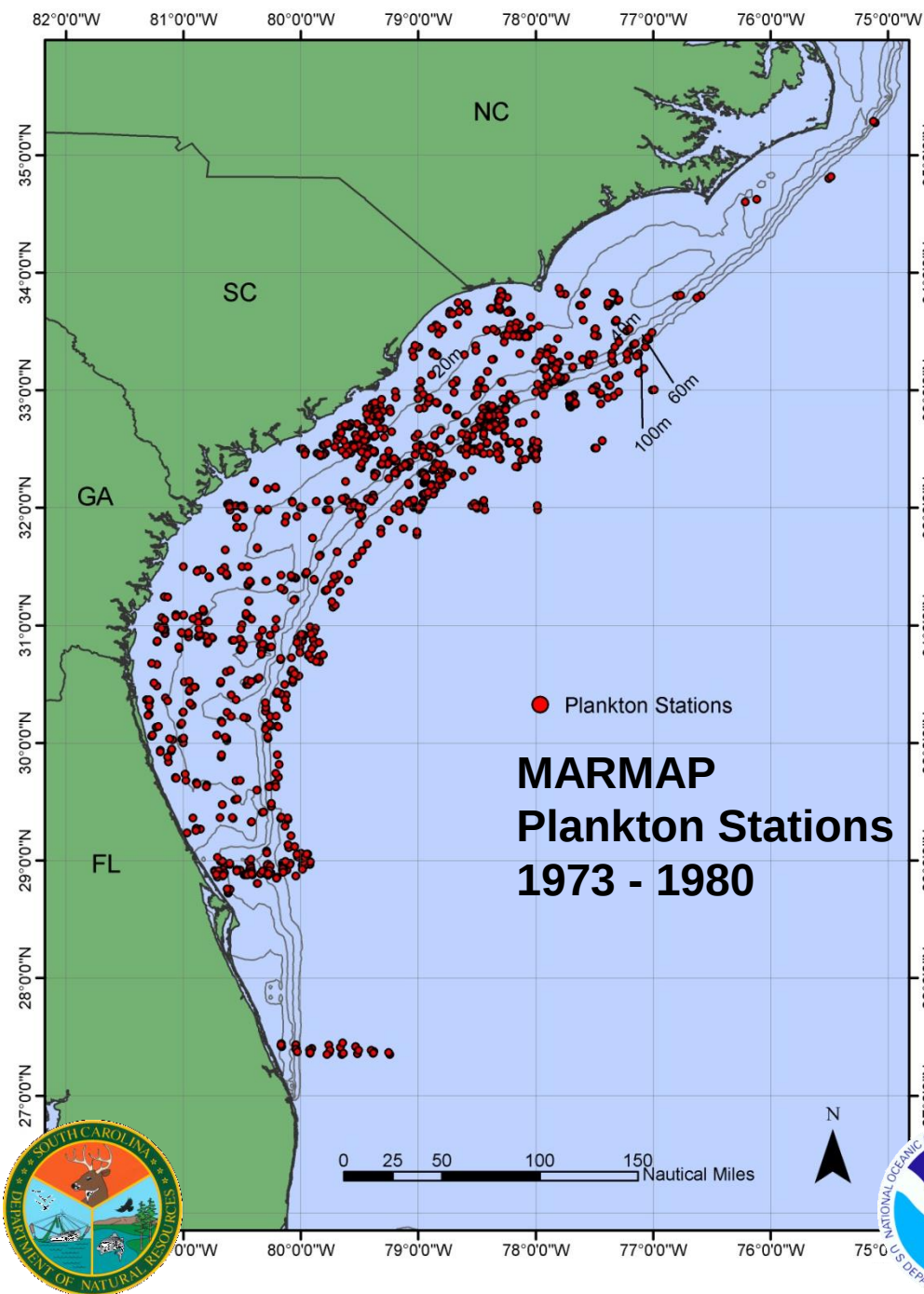
We can catch ingressing postlarval gag and use their otoliths to back-calculate spawning time (Keener *et al.* 1988).

Mean age of ingressing postlarvae = 43 days.

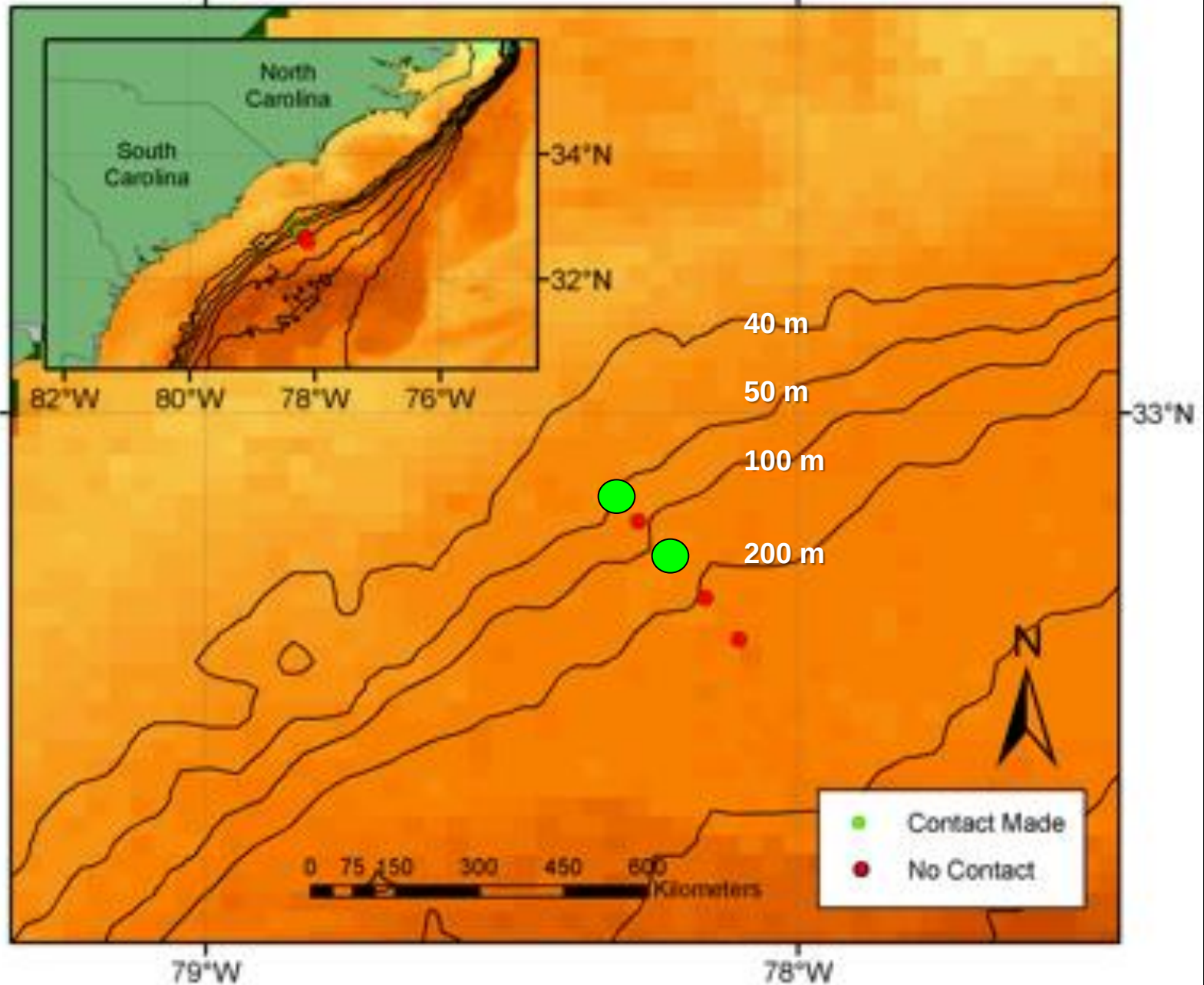


otolith from postlarval gag

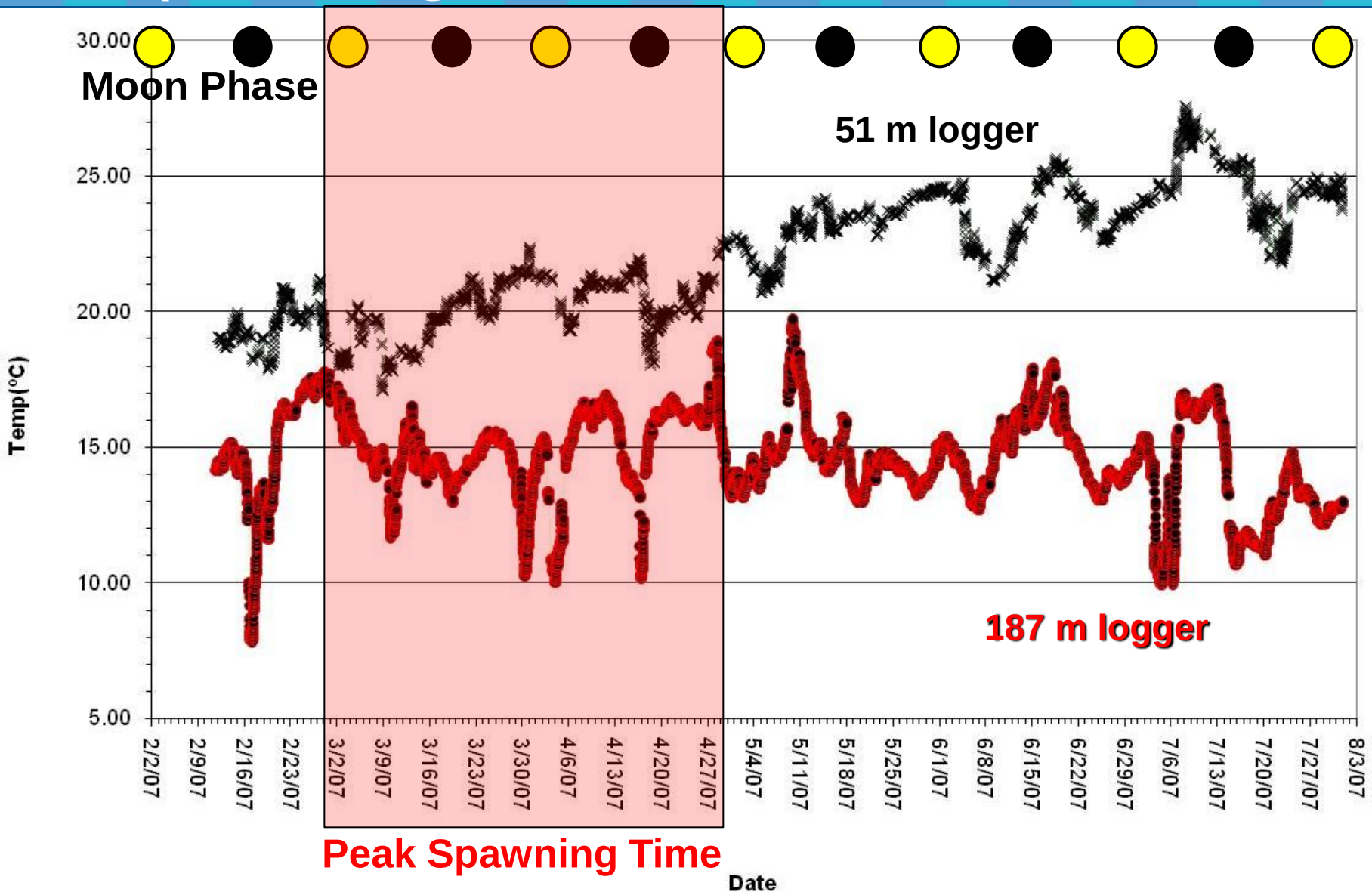




Temperature Monitoring at Gag Spawning Sites

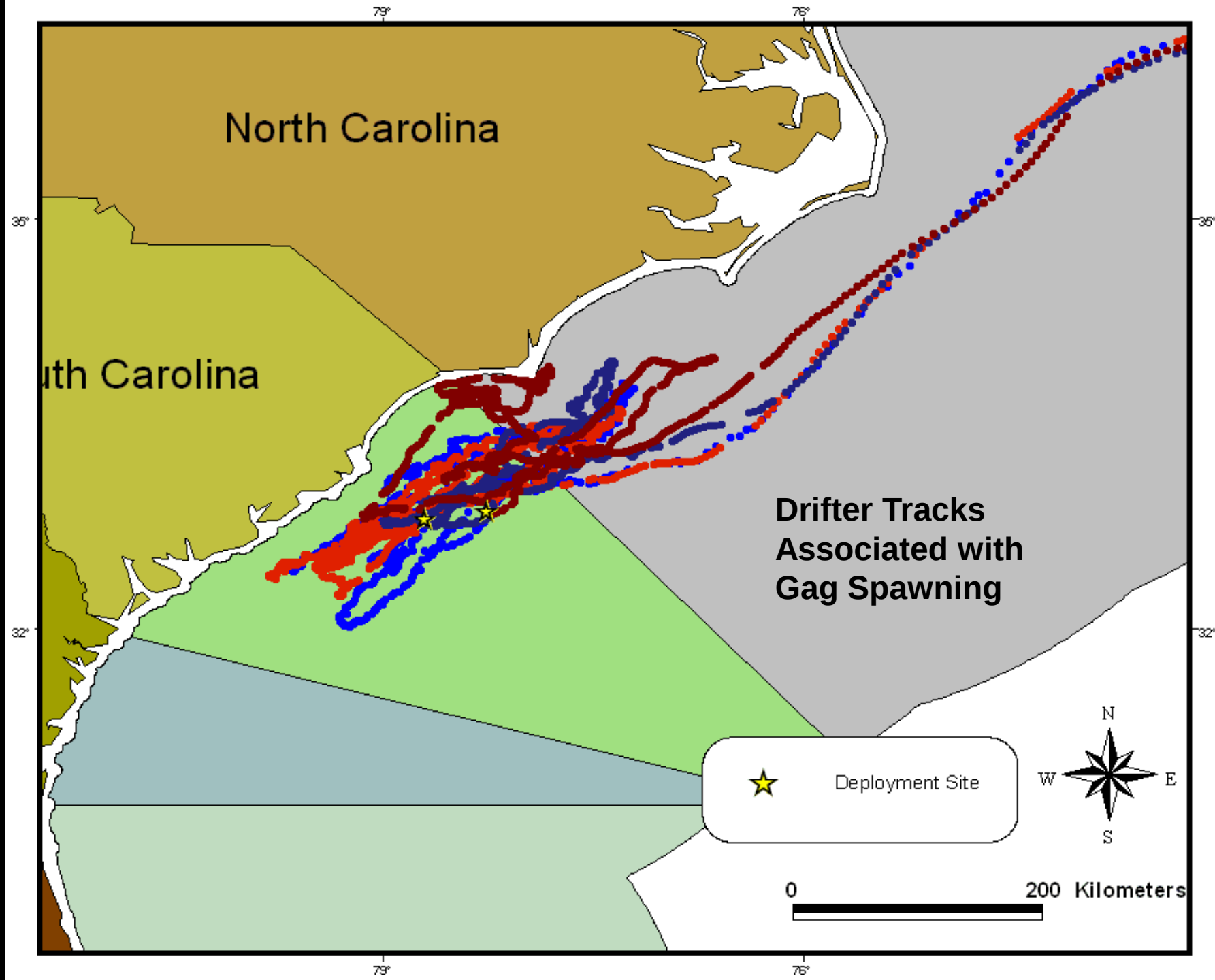


Temperature Monitoring Near Gag Spawning Sites to Predict Success

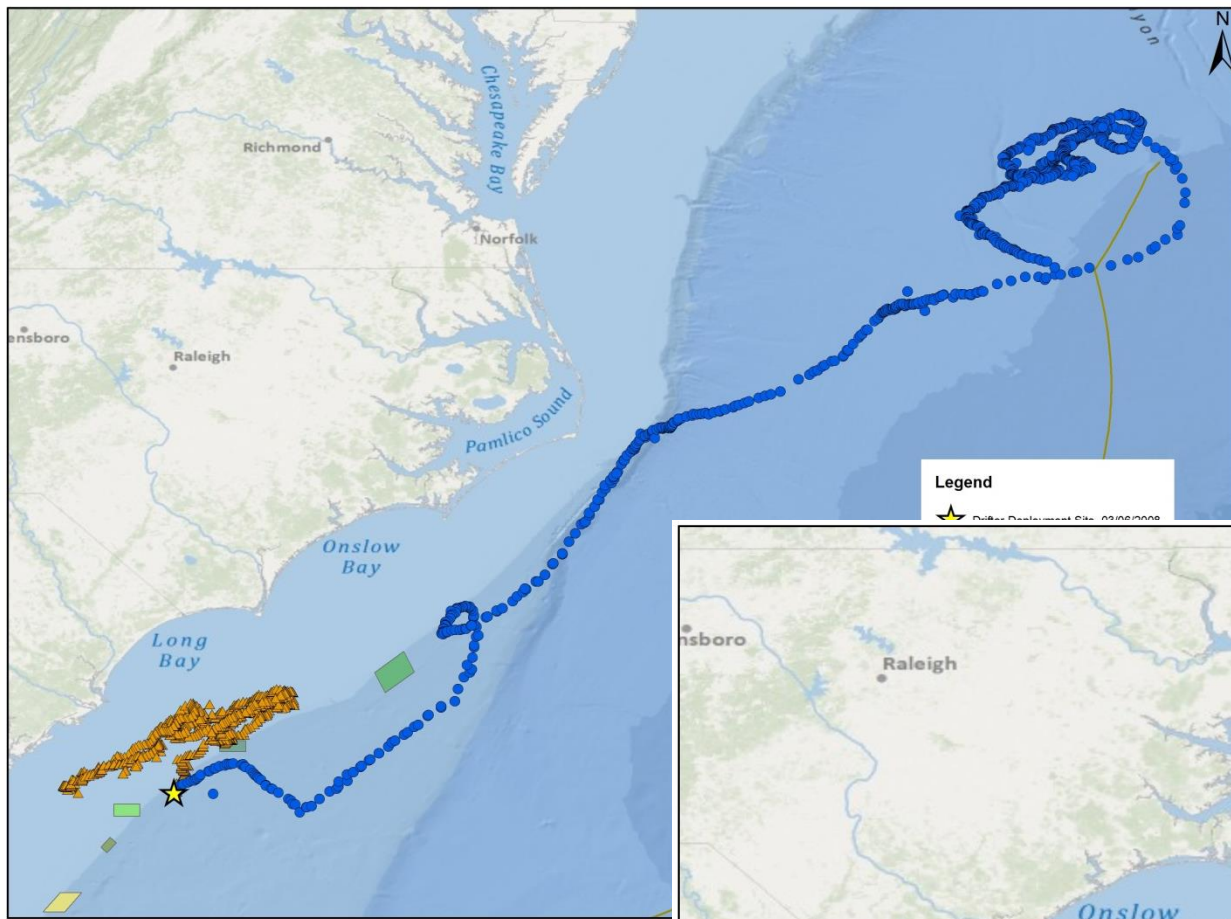


A map of the Azores archipelago in the North Atlantic Ocean. The map shows the outlines of the islands in light purple and the surrounding ocean in light green. Numerous colorful lines (red, orange, yellow, green, blue, purple) represent the tracks of satellite-tracked drifters. These tracks are concentrated in the central and eastern parts of the archipelago, showing a high density of movement. Some tracks extend further west towards the coast of North America. The text 'Azores' is written in a bold, black, sans-serif font in the upper right corner of the map area.

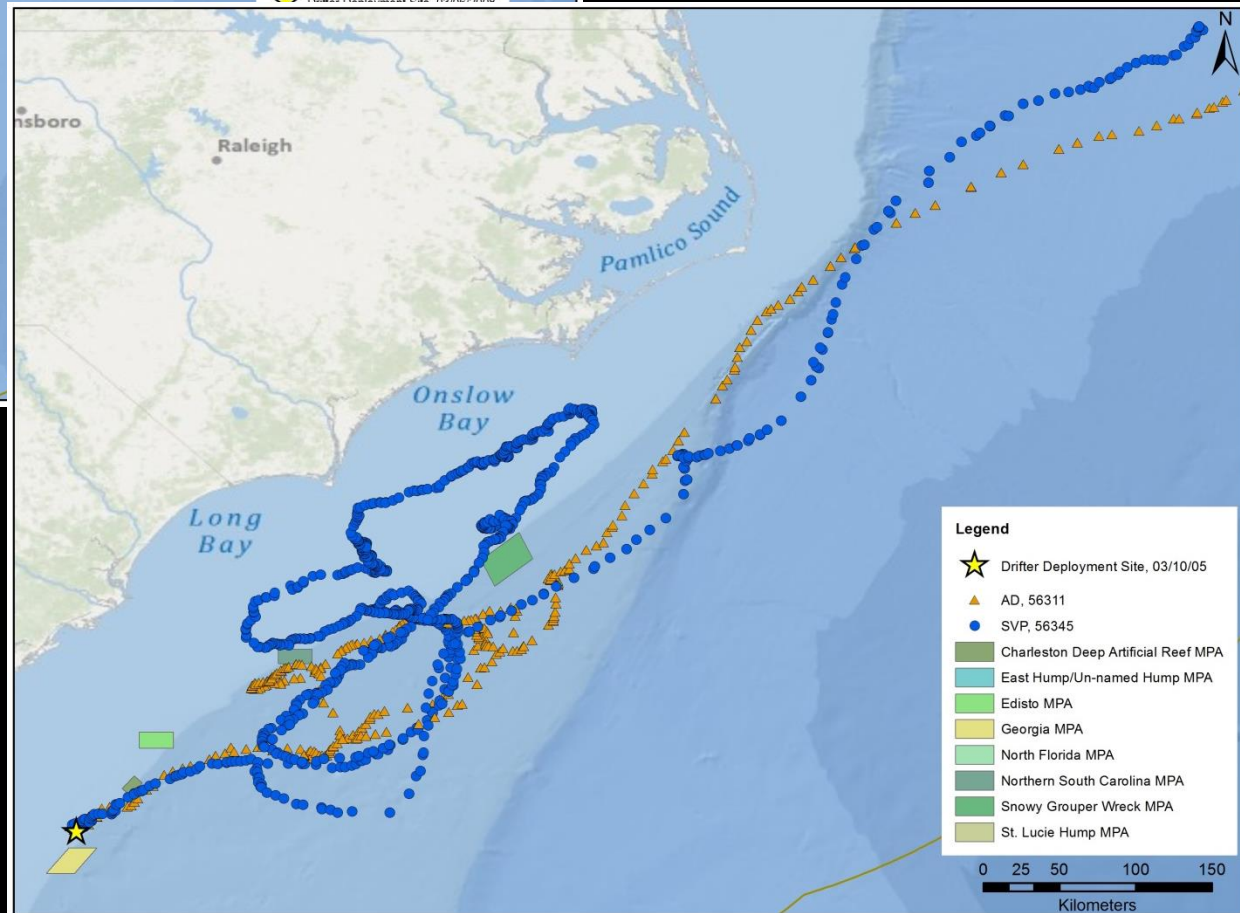
**Tracks of Satellite-Tracked
Drifters Deployed on Spawning
Sites of Reef Fishes
2005-2007**

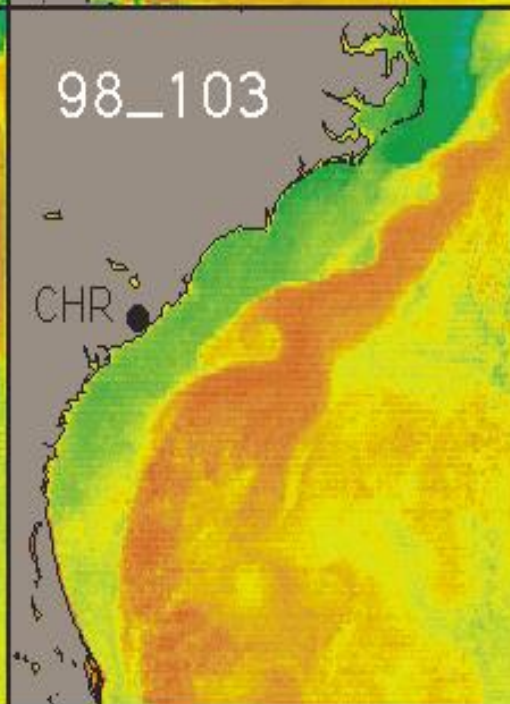
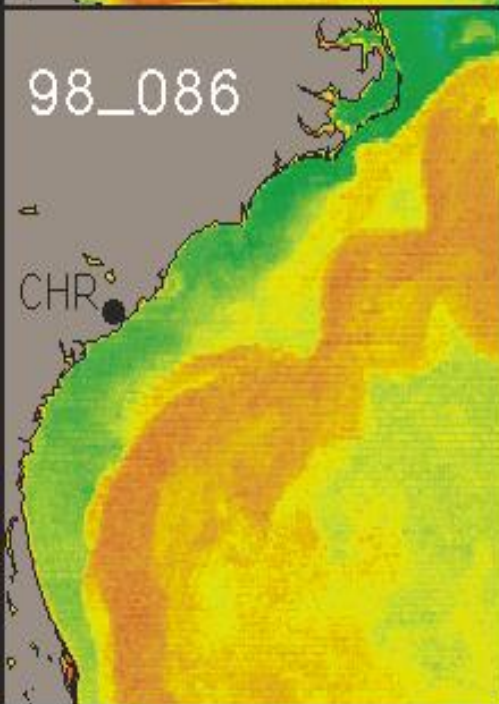
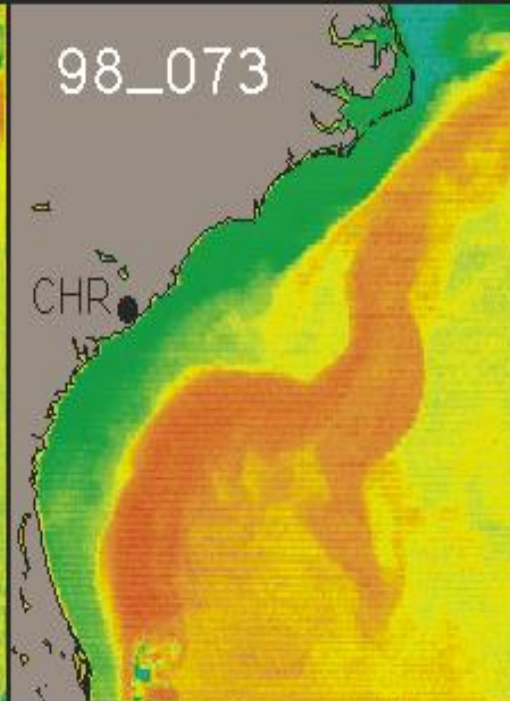
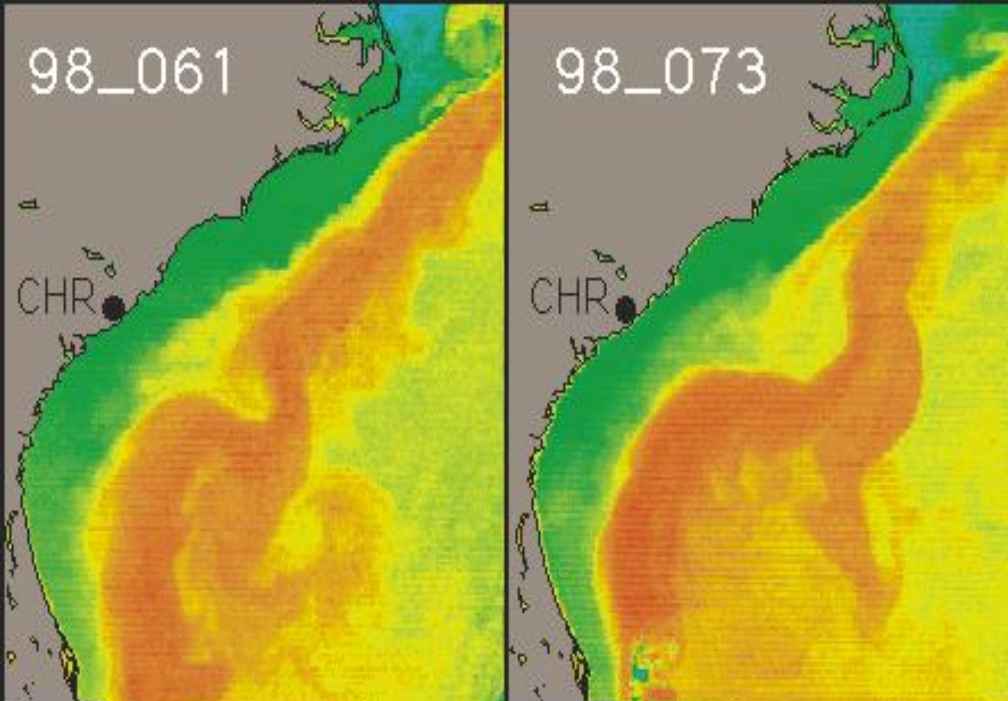


Surface and drogued drifter tracks (60 d) in March-April



Fish larvae may not be passive drifters



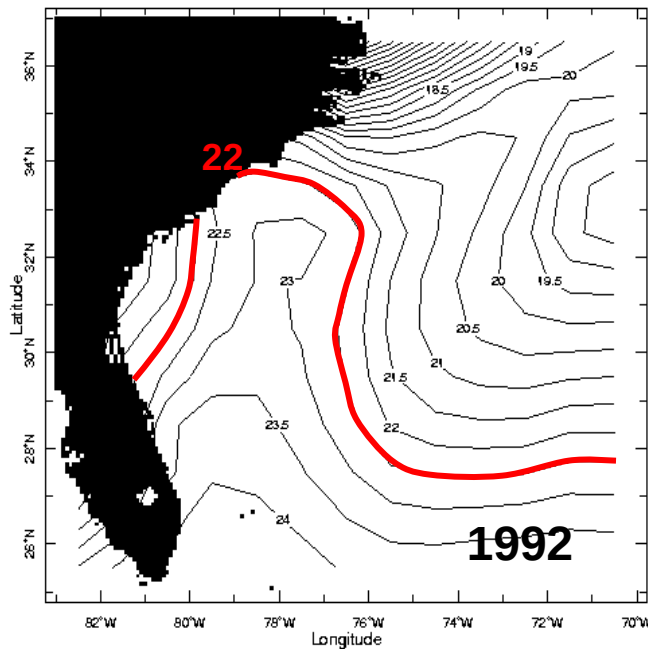
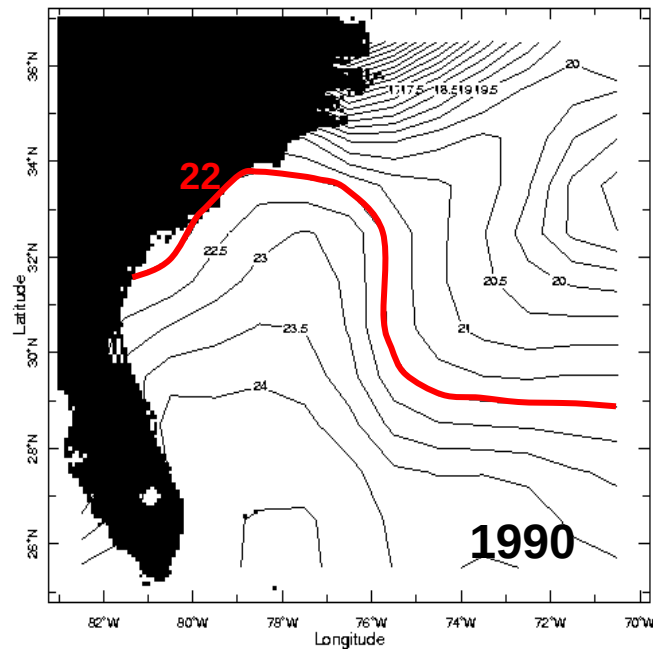
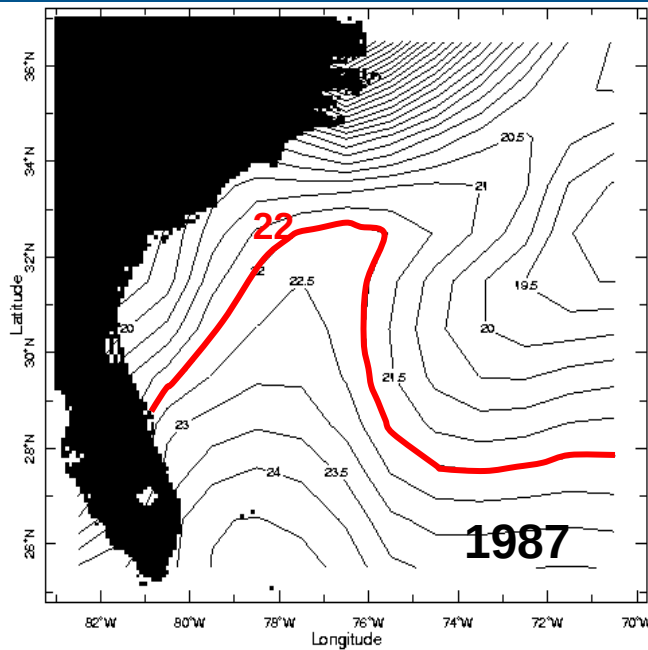
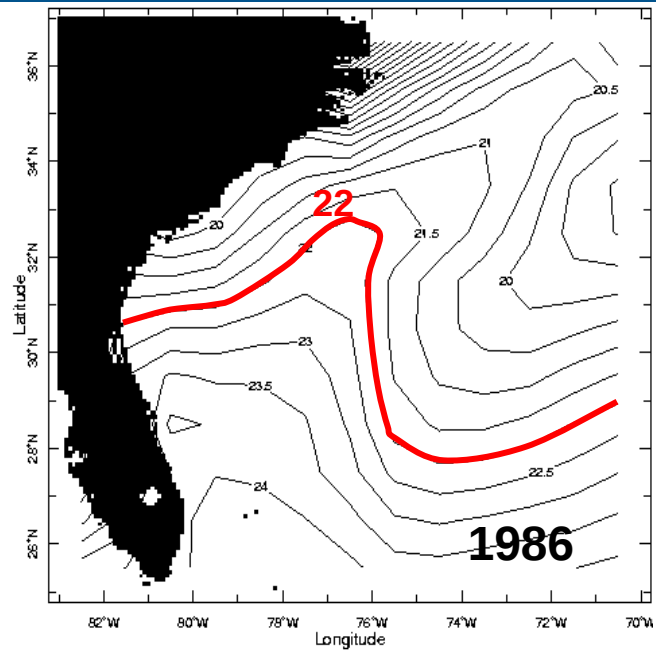


Deflection of the
Gulf Stream at the
Charleston Bump
Sets Up Charleston
Gyre

**Variability in
deflection and
gyre location, size
and strength**

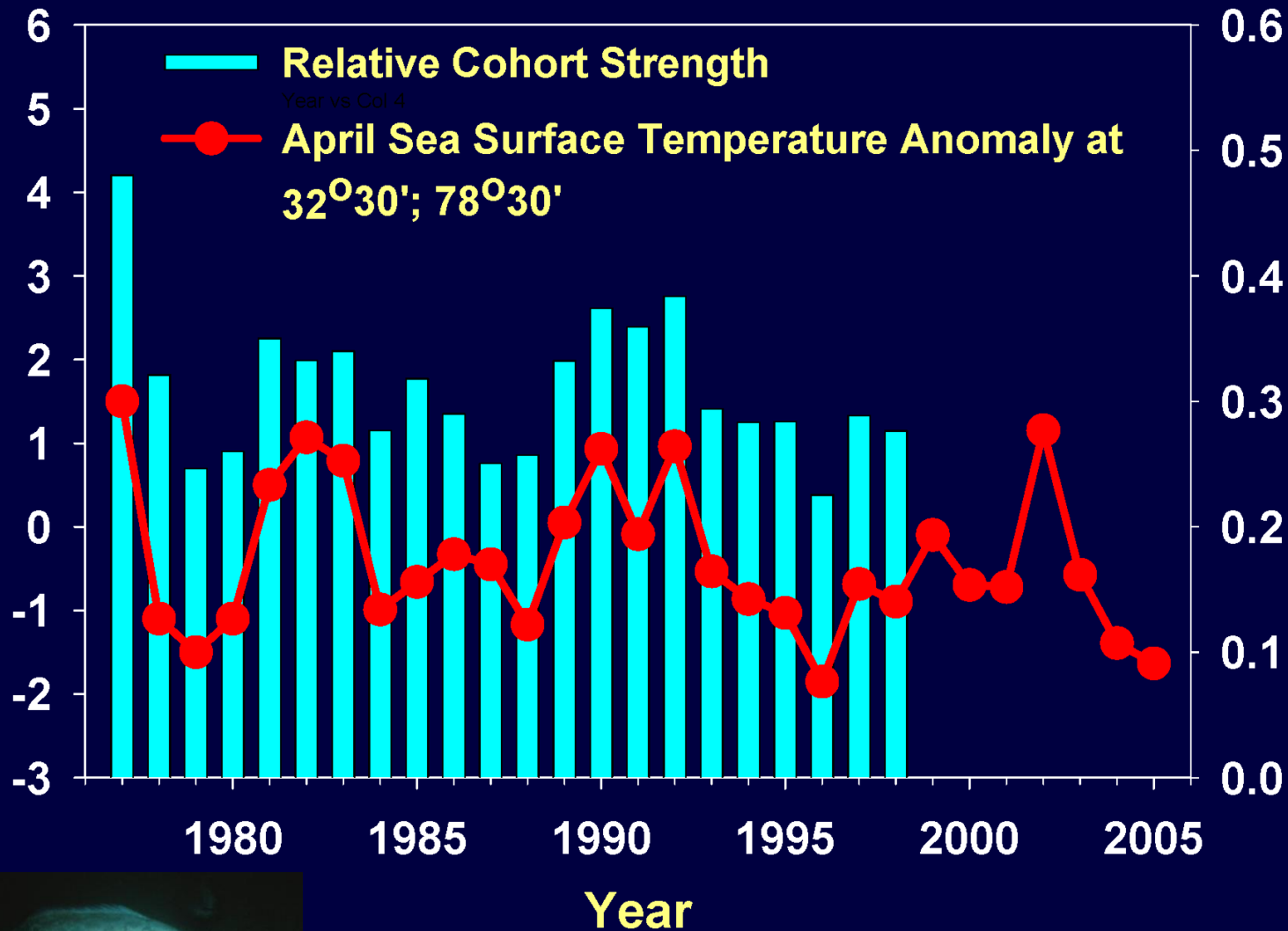
(from Legeckis and Chang, 2000)

Sea Surface Temperature Isotherms in March (a peak of gag spawning)



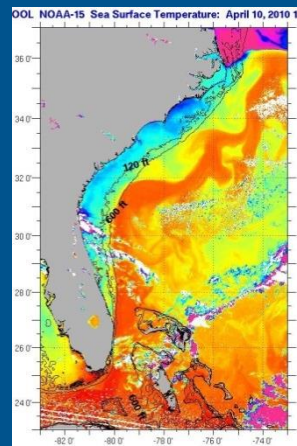
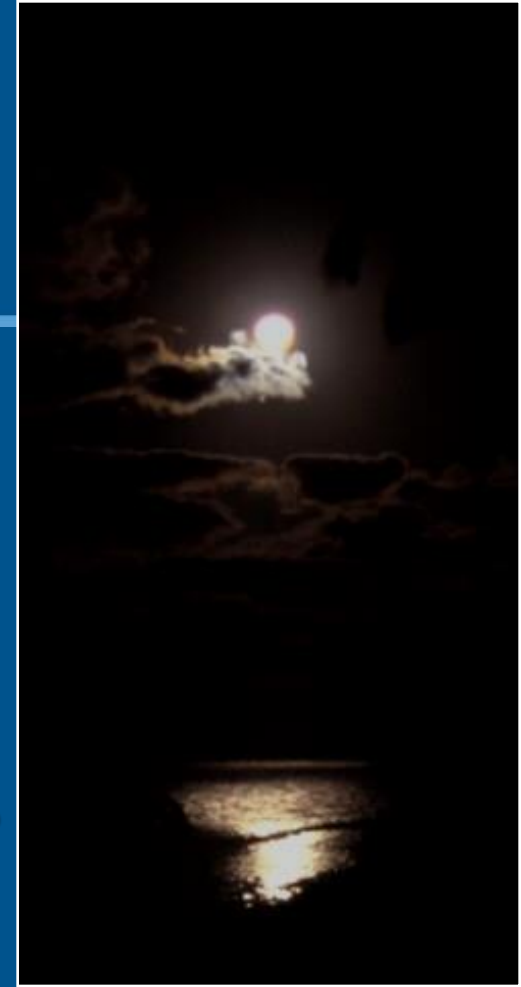
**Note 22°
Isotherm**
NOAA
*Oceanographic
Monthly Summary*

Sea Surface Temperature Anomaly



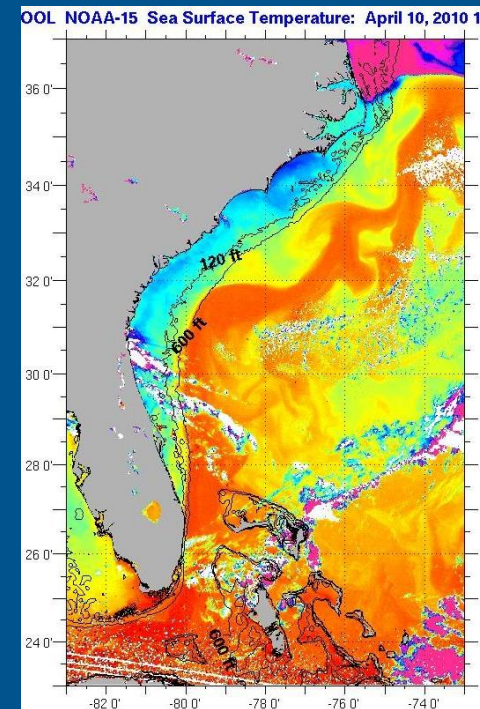
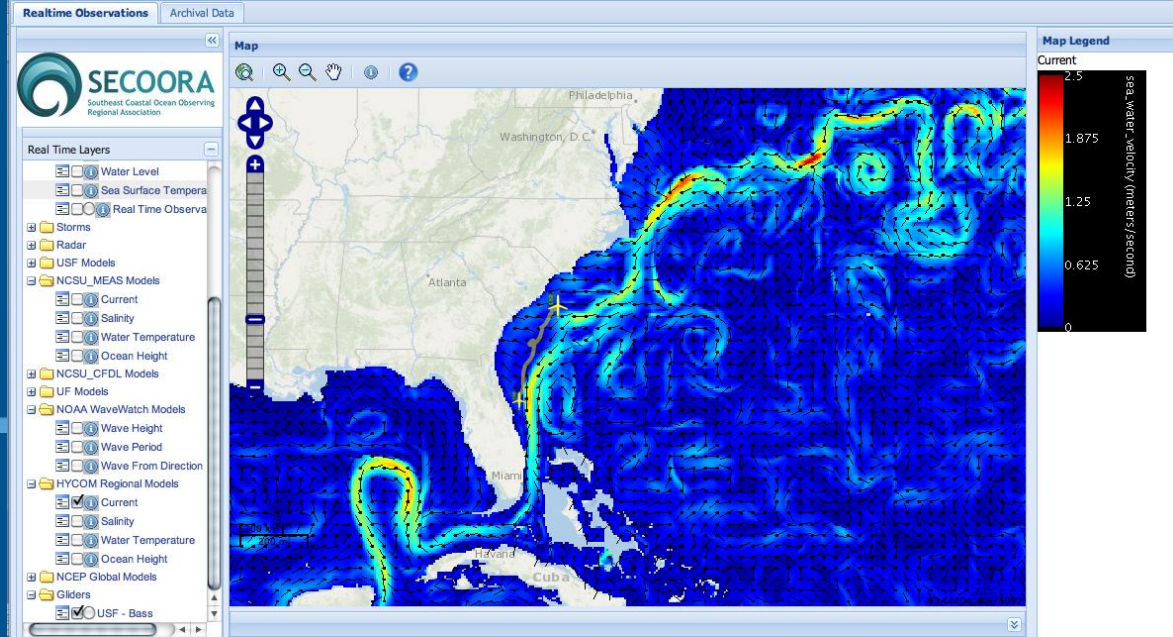
“Conclusions” From Gag Studies

- It takes the right combination of moon phase, water temperature, day length, sex ratio and ocean circulation to produce a good year class of gag.
- Can we predict this combination and adjust regulations if it does not happen?
- We need to connect hydrography, genetics, & fish life history to be able to predict year class strength of gag for better management.
- What can OOS provide?
 - Passive acoustics, hydrography, modeling, etc.



What about other species?

- Shelf spawners?
- Summer spawners?
- Protracted spawners?
- How does behavior of larvae affect recruitment?
- We need to connect hydrography, genetics, & fish life history to be able to predict year class strength



Acknowledgements

SCDNR-NOAA MARMAP Program

NOAA Fisheries

NOAA Sanctuaries

And now.....

