

# Understanding Impacts of the Sea Scallop Fishery on Loggerhead Sea Turtles through Satellite Tagging





# Background - Northeast Sea Turtle Collaborative

Coonamessett Farm Foundation & Northeast Fisheries Science Center

with support from

Sea Scallop Research Set Aside Program, Virginia Aquarium Marine & Science Center, Viking Village Fisheries

Sea Turtle  
Excluder Gear  
Development

Juvenile  
Loggerhead  
Sea Turtle  
Tagging

Remotely  
Operated  
Vehicle  
Operations





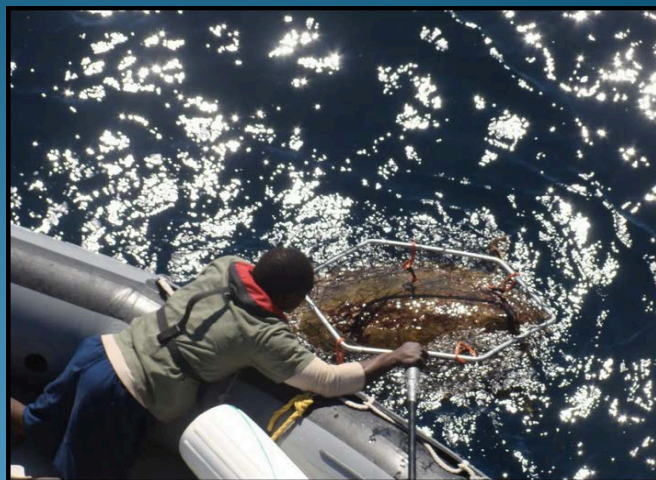
# Satellite Tagging

SMRU 9000x SRDL

Argos Fastloc with GPS Tags

By 2014 – 102 tags

- Sampling procedures
  - Tagging – offshore late-stage juveniles
  - Biological data
- Solar vs. traditional tags
- Variety of data received
  - Frequency –every 4 seconds
  - Locations: 534,000
  - Dive profiles: 167, 000
  - Depth usage: 79,000
  - Surface behavior: 82,000
  - TAD pairs: 290,000



Year	# Tags
2009	2
2010	15
2011	25
2012	30
2013	10
2014	20



2012 Turtle Tracks

$n = 30$

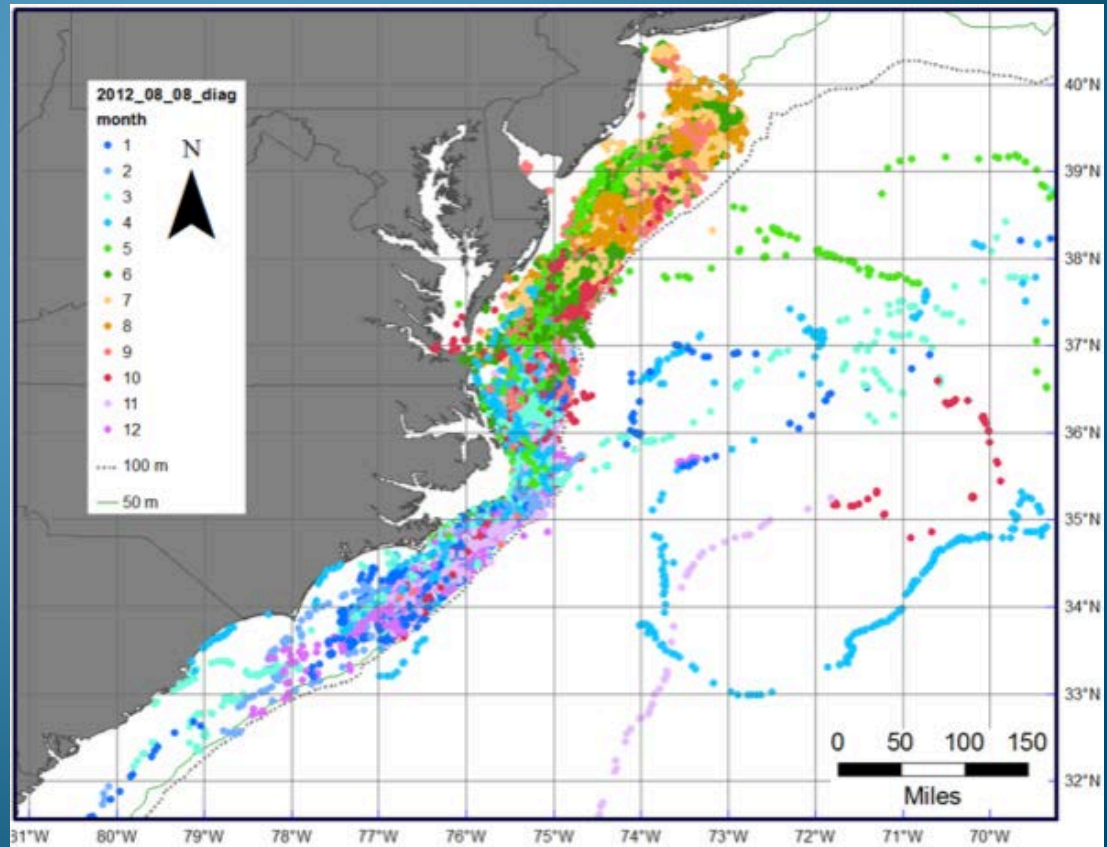
## Satellite Telemetry Key Observations

- Turtles undergo extensive seasonal migrations
  - Summer foraging grounds – “hotspots”
  - Overwintering habitat
- Turtles display distinct movement patterns
  - Repetitive, accurate targeting of foraging grounds
  - Migratory pathway fidelity
- Time at surface greatest during foraging months
- Long, deep dives characteristic of winter
- Oceanographic conditions affect behavior
  - Sea surface temperature
  - Chlorophyll a concentration
  - Gulf Stream position

# Spatially-Explicit Abundance Estimates

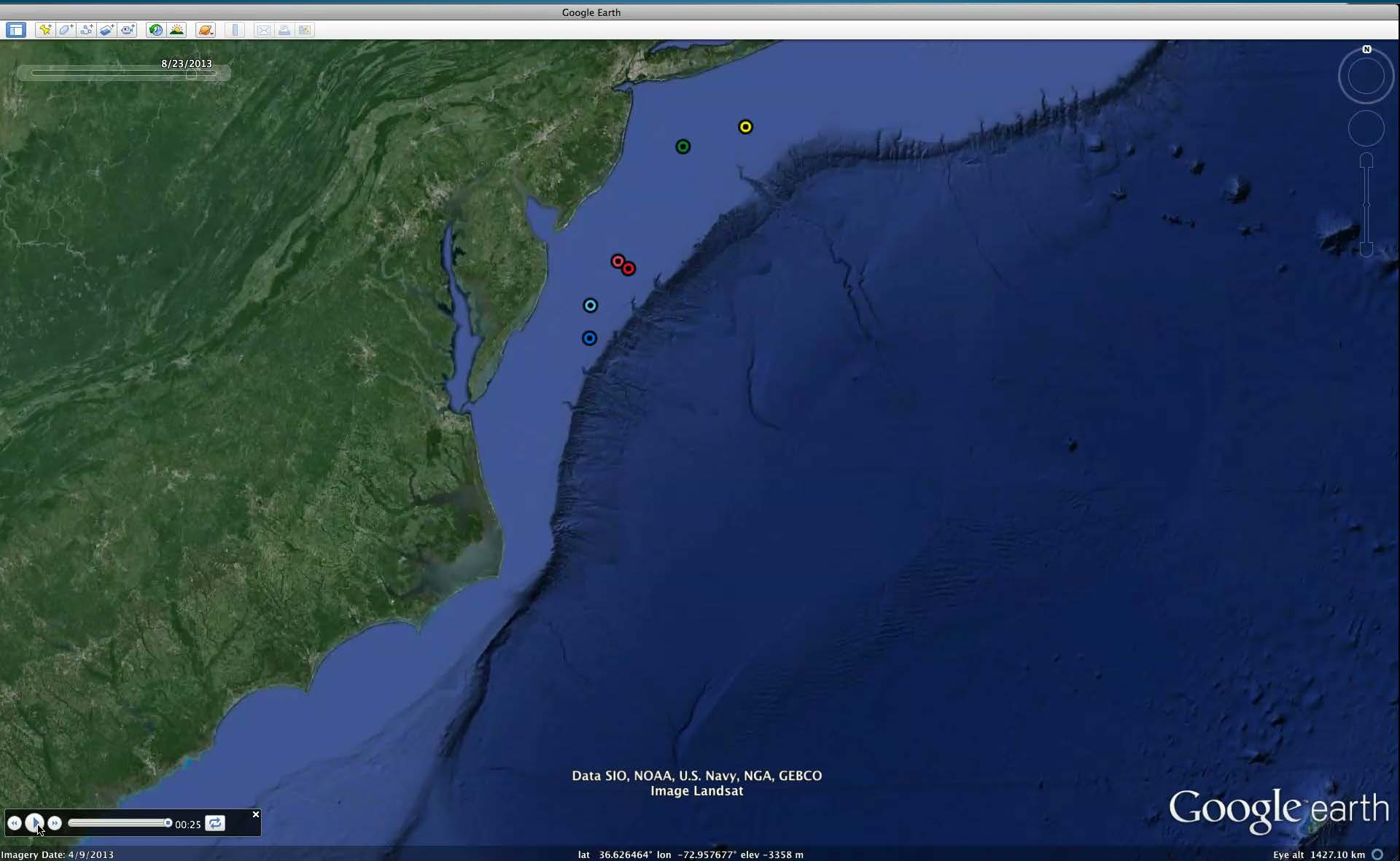
Strata	Abundance, not adjusted for availability bias	Correction factor for availability bias	Abundance, adjusted for availability bias
South Atlantic	38,974	14.29	556,771
Mid-Atlantic South	17,376	1.49	25,896
Mid-Atlantic North	3,873	1.49	5,772

- Mid Atlantic Bight (MAB)
  - High potential for interactions between turtles and fisheries
  - Foraging – June-November
  - Annual migrations
- Abundance estimates
  - Seasonal/spatial distribution
  - Habitat use/frequency
  - Life history
  - Residence time
- Availability and perception bias
  - Telemetry data provides a base
  - **More effective/accurate policies**





# Year-Long Migration

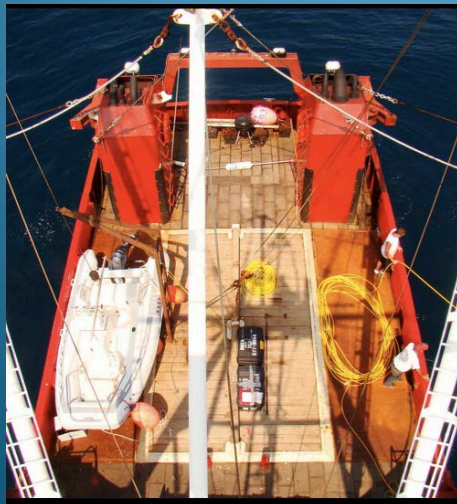


2012 Turtle Tracks  
 $n = 10$

# Teledyne MiniBENTHOS ROV

## What We've Learned

- Diving
  - Deep dives can be predicted by behavior
  - Successive breaths at surface prior to dives
  - Become negatively buoyant at 30 meters
  - Follow consistent heading during deep dives
- Turn their carapace broadside at perceived threats
- Socializing
  - Often found in groups of 2 or more
- Foraging
  - Feed on jellyfish at thermocline (~10 meters)
  - Feed on crabs, scallops on seafloor
  - Can remain for >30 minutes at seafloor (60 meters) with temperatures < 10°C





# Foraging on Jellyfish



# Foraging on Scallops





Future Directions

# 2014 Project Design

## Northward Shift (Sept)

- Foraging farther north (Long Island)
- Record number cold stunning on Cape Cod -
- Tag NE of HCAA in September
- ROV – prey availability

## Early Season Tagging (May)

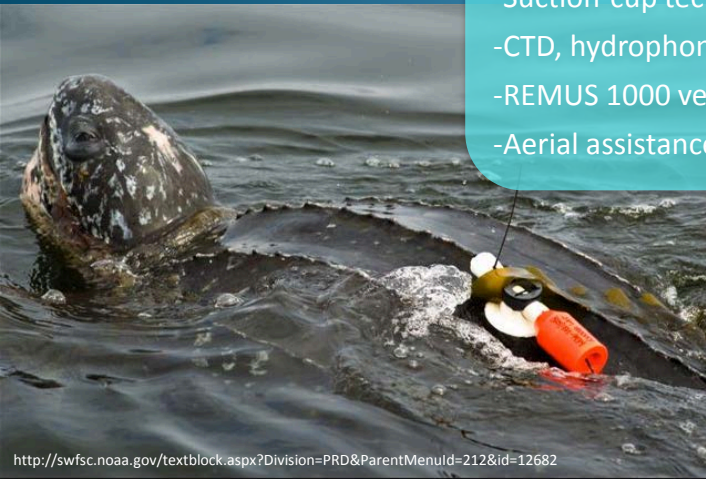
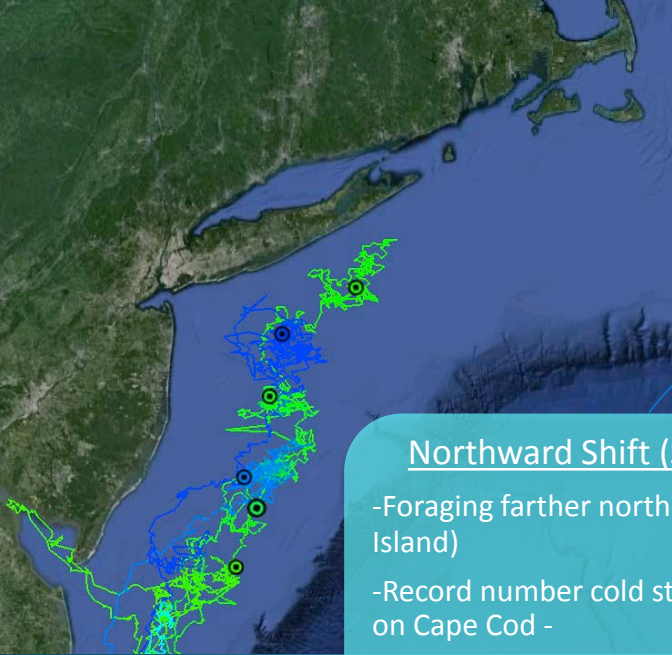
- Tag before northward migration
- From past observation, more widely distributed
- Tag south (VA, NC) late May

## New Sampling (July)

- Short term leatherback tagging
- Suction-cup technology
- CTD, hydrophone tracking
- REMUS 1000 vehicle
- Aerial assistance

## Sargassum Critical Habitat

- Observed numerous juveniles in/around mats previously (NJ)
- Locate mats in September, tag turtles associated
- Is it truly critical for hatchlings?





**Thank You!**  
**Any Questions?**

