

The Role of Gray Seals in Changes in the Abundance, Distribution, and Behavior of White Sharks

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Gregory Skomal, Ph.D., Massachusetts Shark Research Project

John Chisholm, Massachusetts Shark Research Project

Megan Winton, UMass School of Marine Science and Technology

Marine Fisheries
Commonwealth of Massachusetts

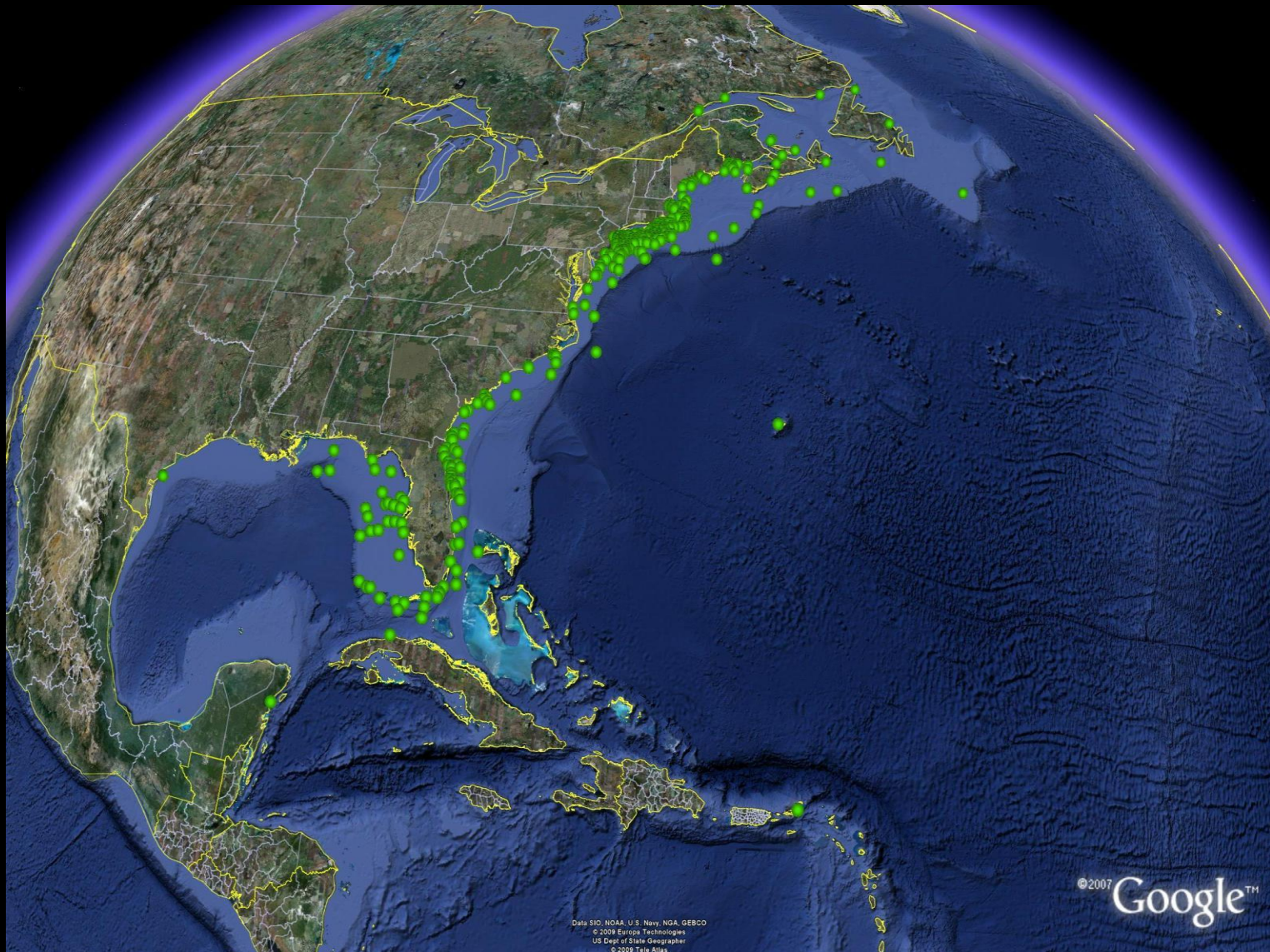


Outline

- Distribution and Abundance
 - North Atlantic
 - Cape Cod
 - Mark-recapture Survey
 - Aerial Survey
 - Acoustic Tagging Data
- Predatory Behavior
 - Observations
 - Seal Tagging



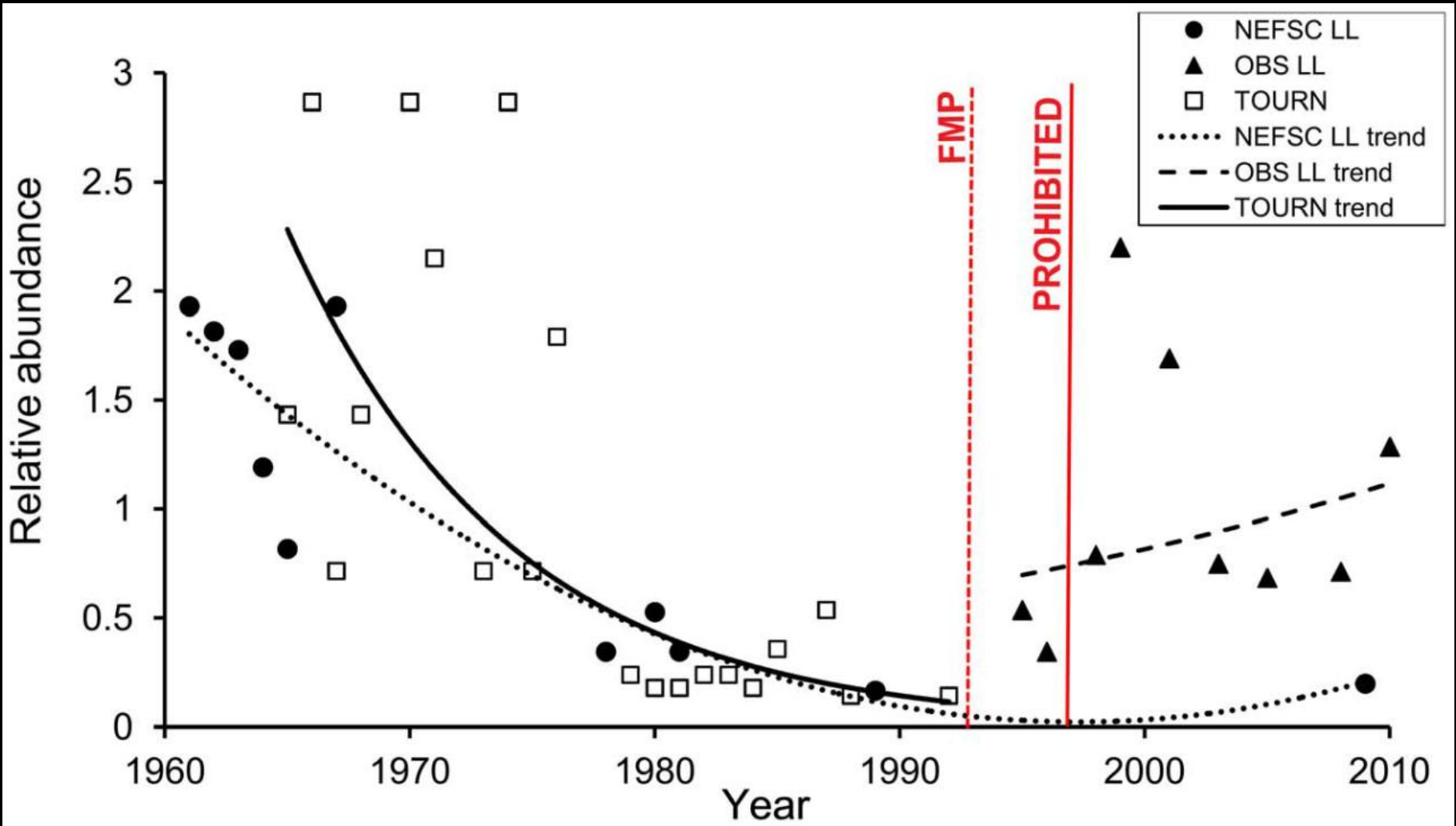
Distribution: Western North Atlantic



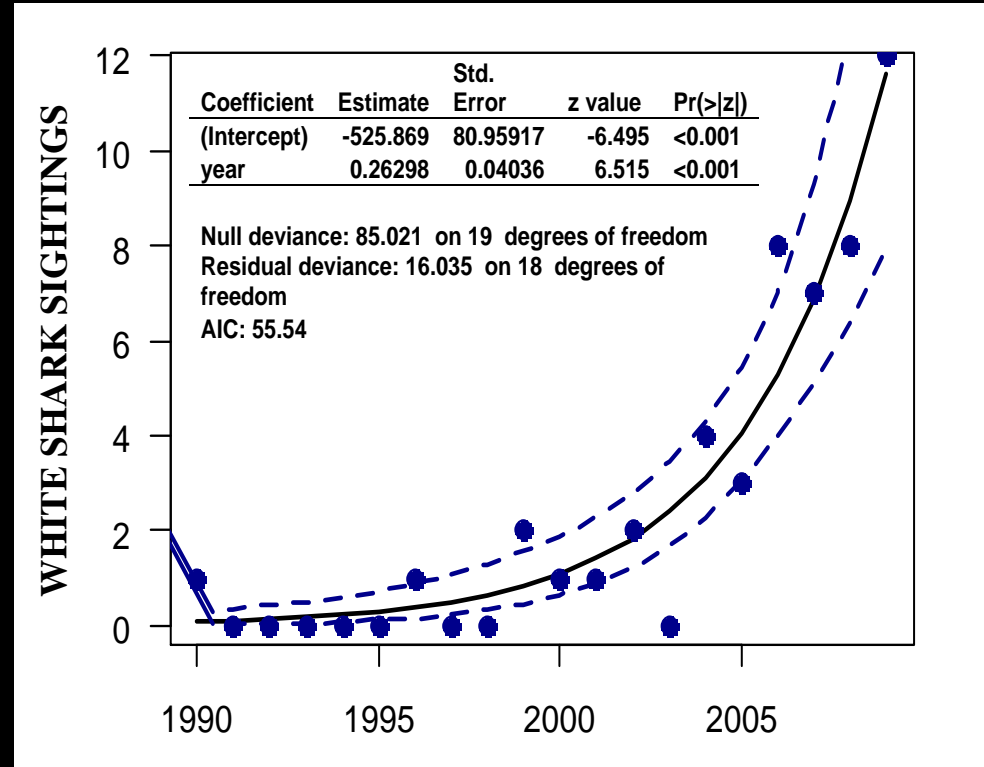
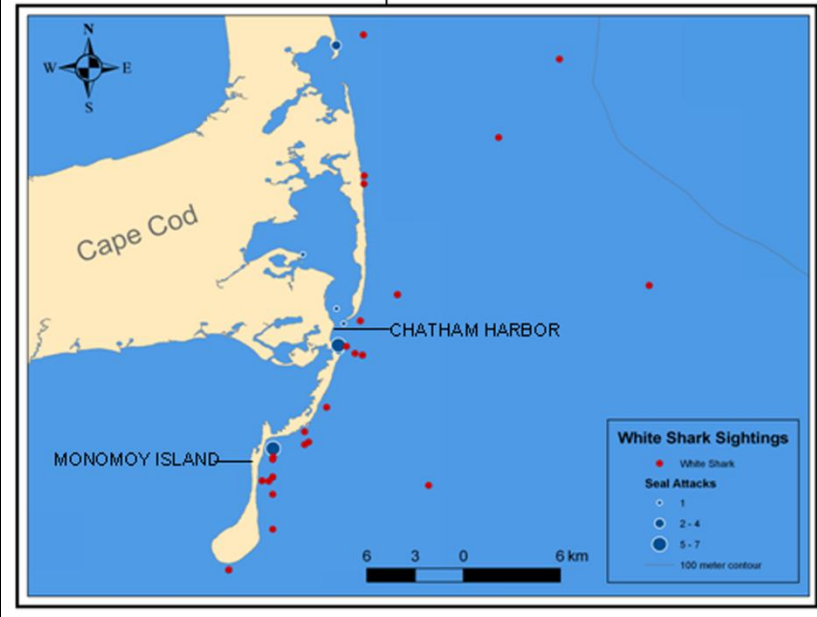
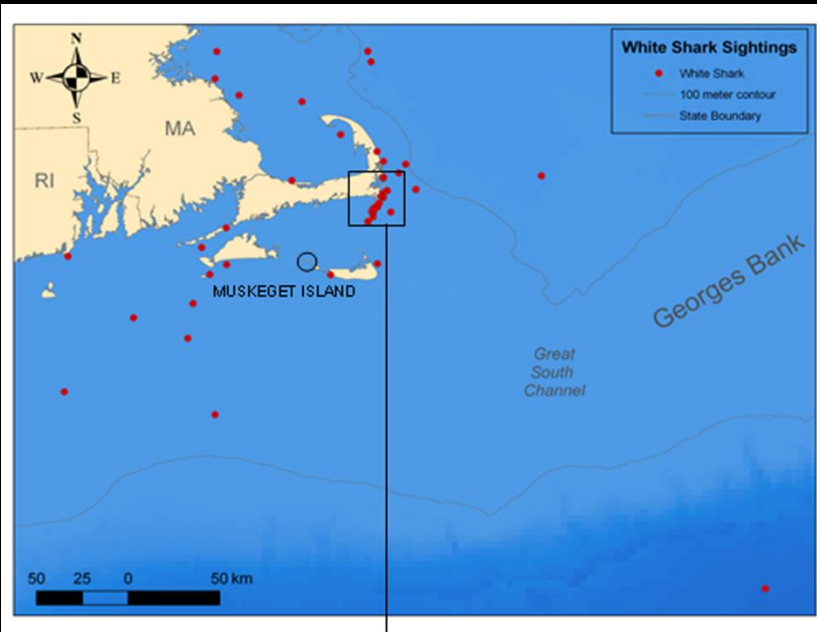
Casey and Pratt, 1985
Curtis et al., 2014

Abundance: NW Atlantic

Population Trends



White Shark Sightings

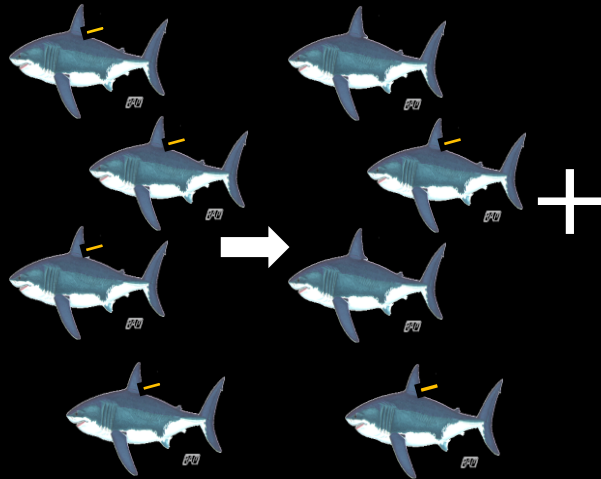


Skomal et al., 2012

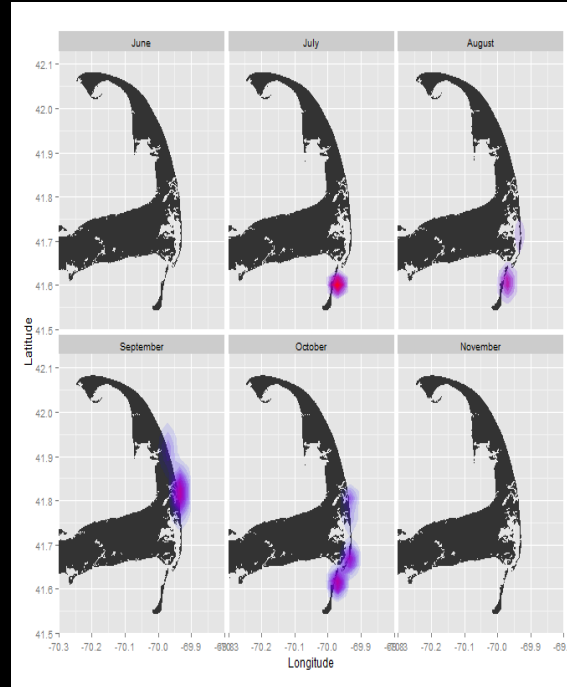
Spatially-explicit Population Model

Integrated assessment

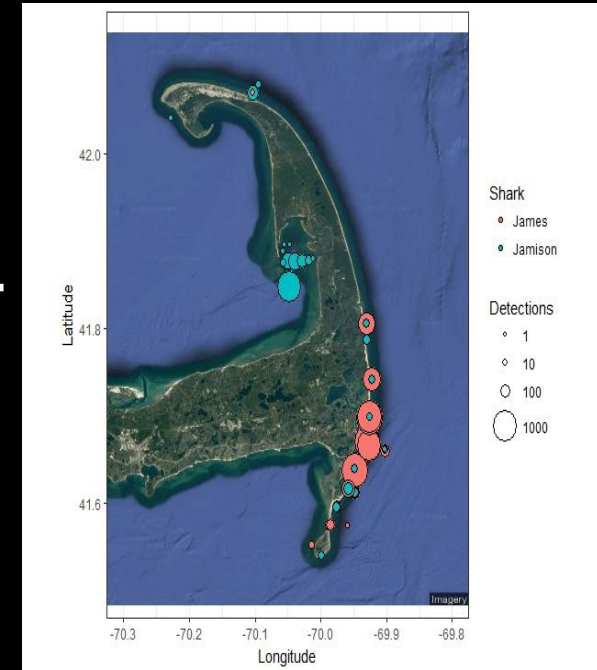
Mark Recapture
Survey



Aerial Survey



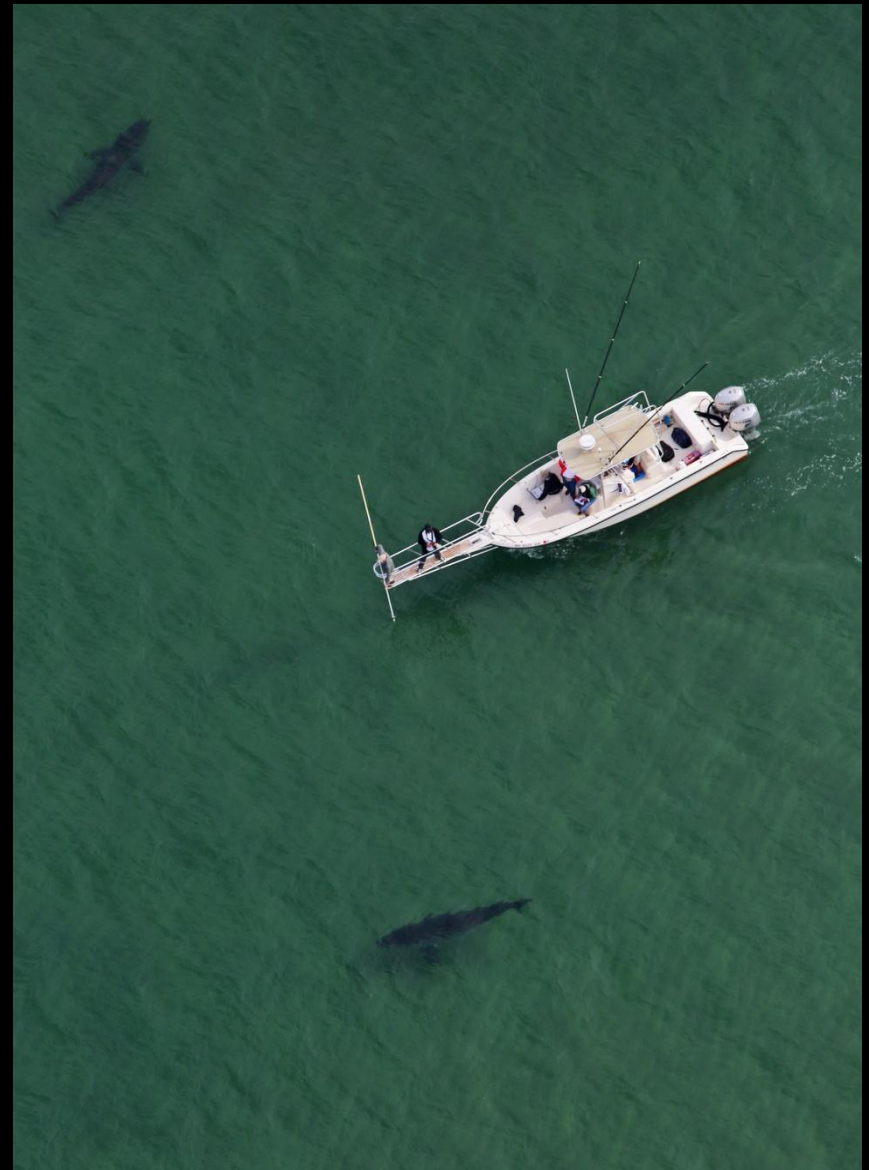
Acoustic
Telemetry



More robust estimate of population size!

Survey Method

Cape Cod, Massachusetts, USA (2014-2016)



Mark-recapture

'Hollywood'
WS 14-19
8-25-2014

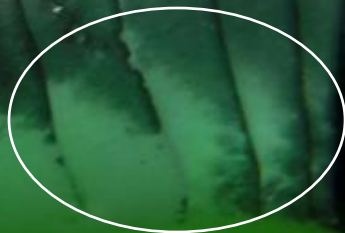


2014

'Hollywood'
WS 14-19
8-25-2014



'Hollywood'
WS 14-19
8-18-2016



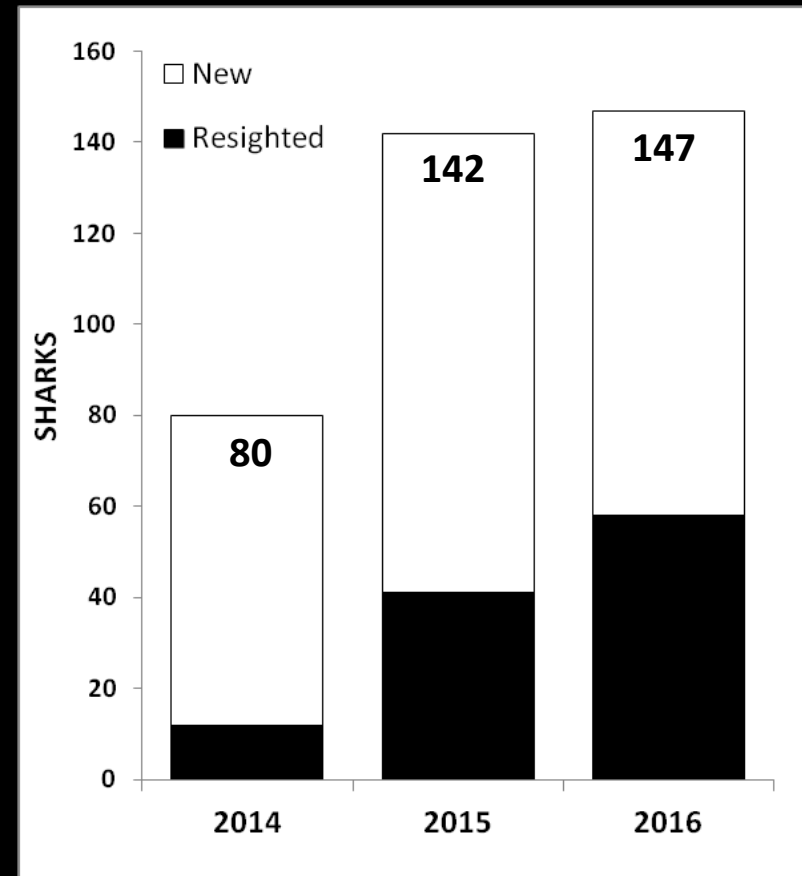
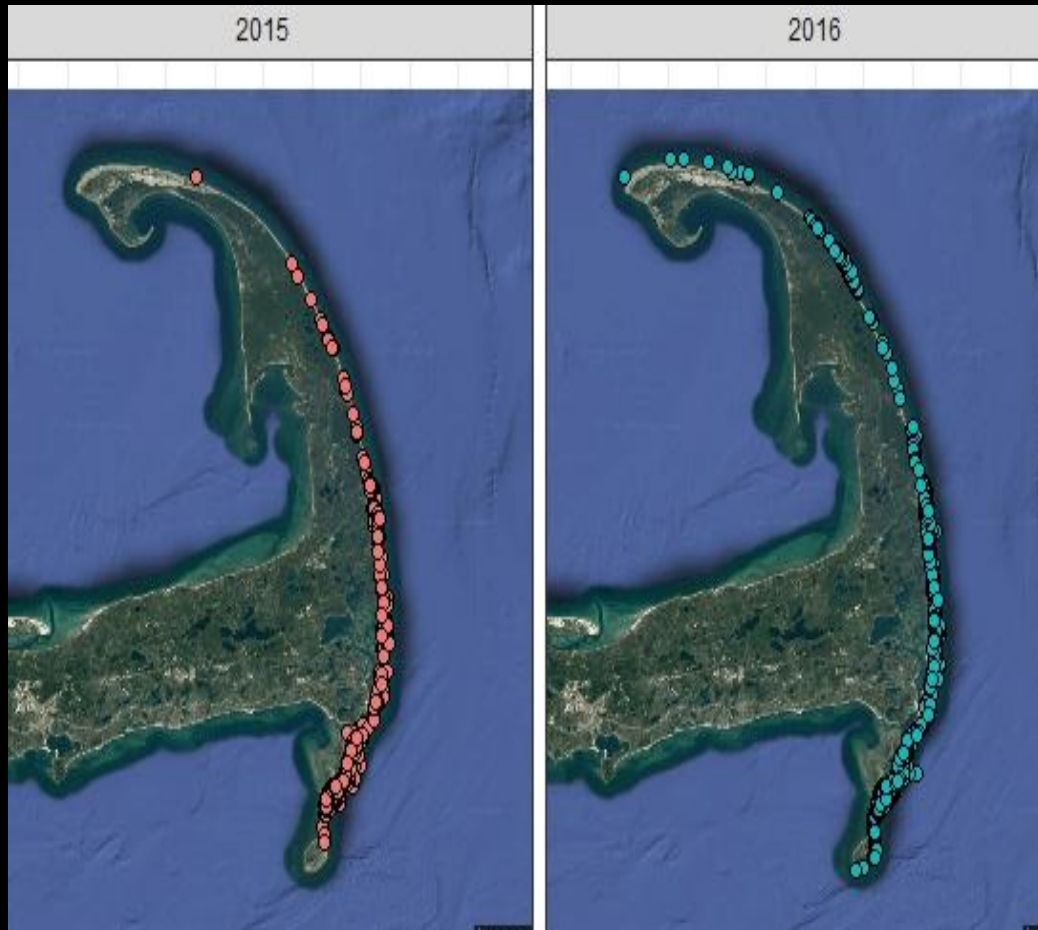
2016

'Hollywood'
WS 14-19
8-18-2016



Mark-recapture Surveys

Total: 279 individual sharks



Tagging to Date

2009 – 2017 (n=105; 32 males, 46 females)

2.4 – 5.5 m (8-17 ft)

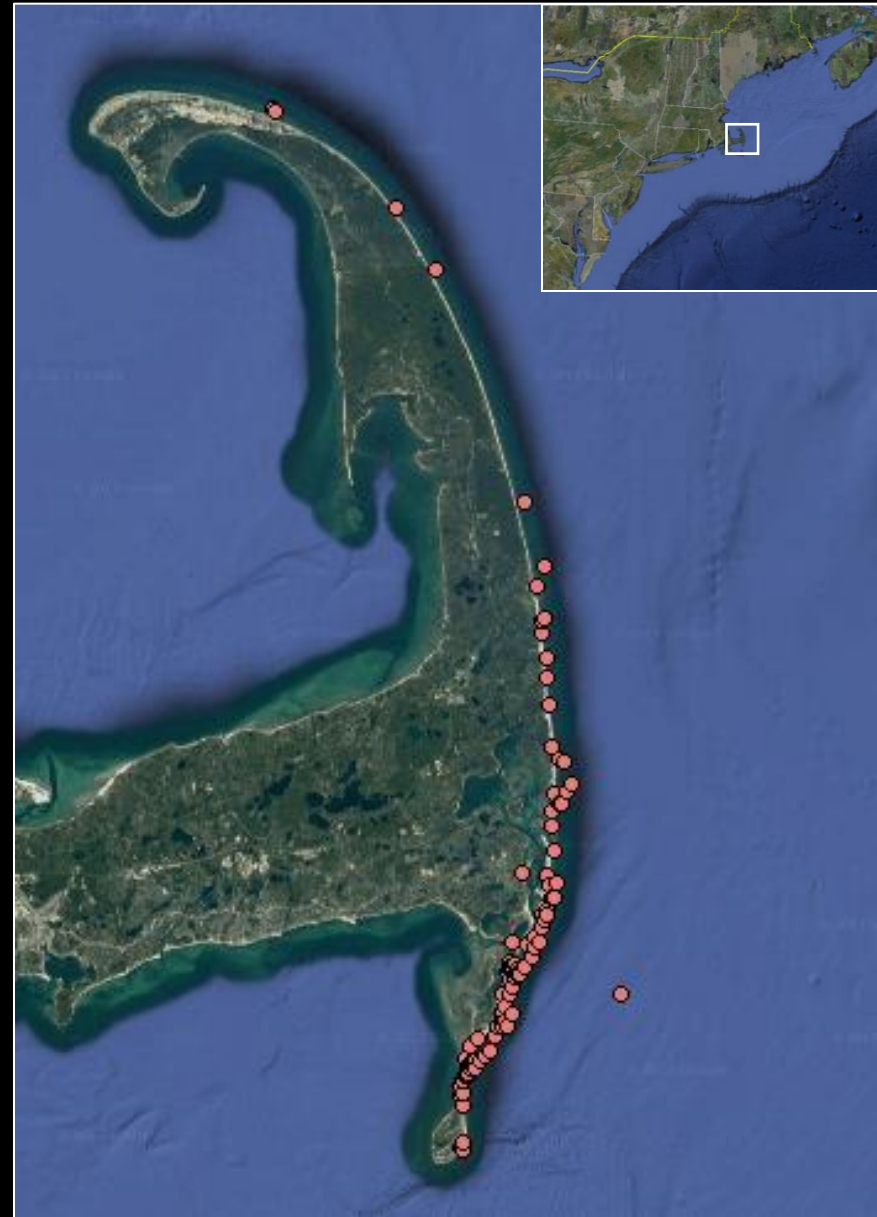
90 Acoustic (V16, Vemco)



32 Pop-up Satellite (PAT, Wildlife Computers)

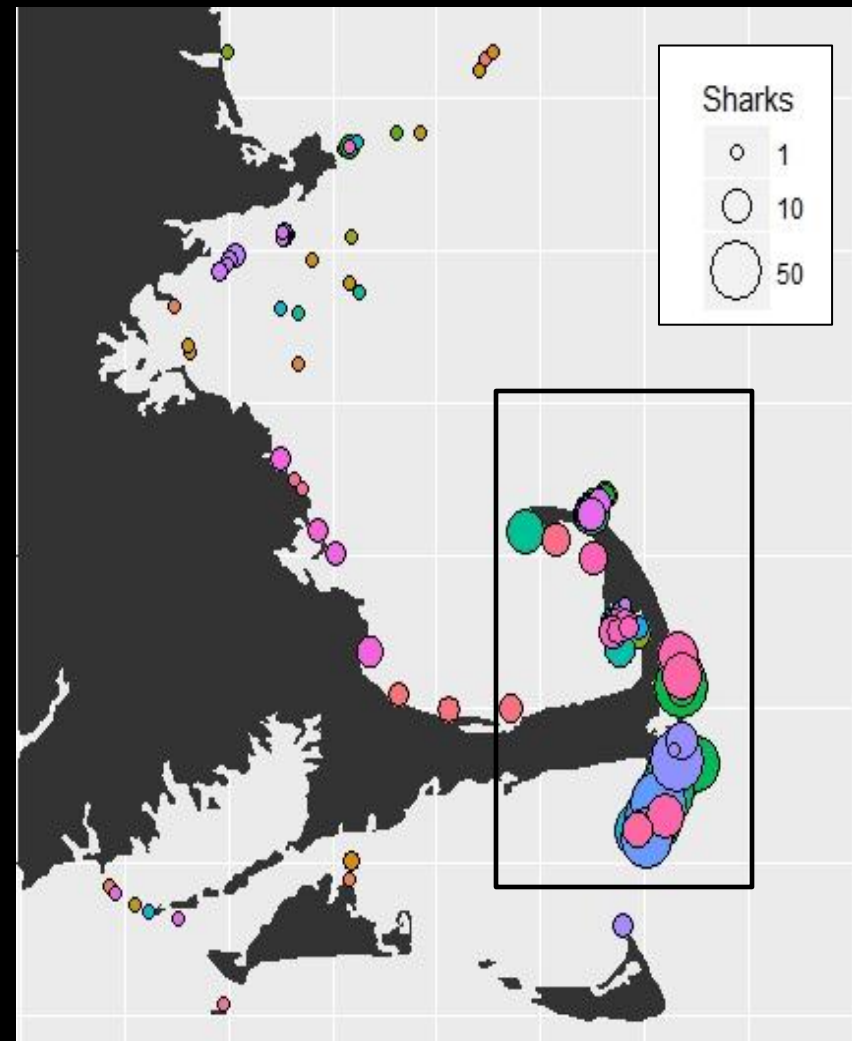


7 Real-time Satellite (SPOT, Wildlife Computers)



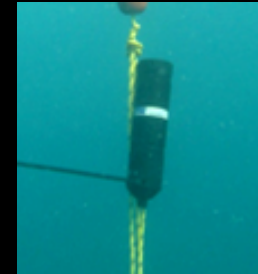
Acoustic Detections

2012-2016: 149,156 detections, 85 sharks

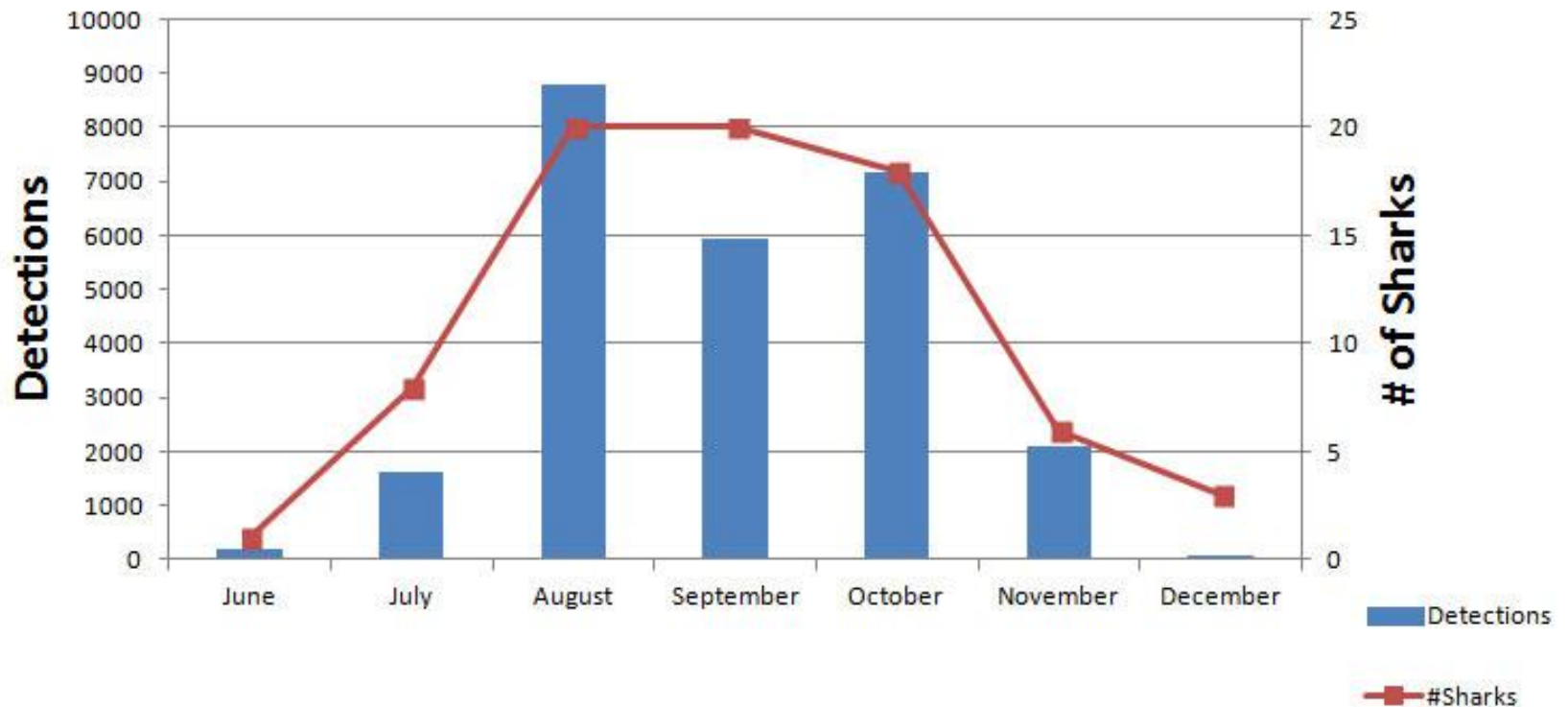


Acoustic Detections

Total: 31,003 from 31 sharks

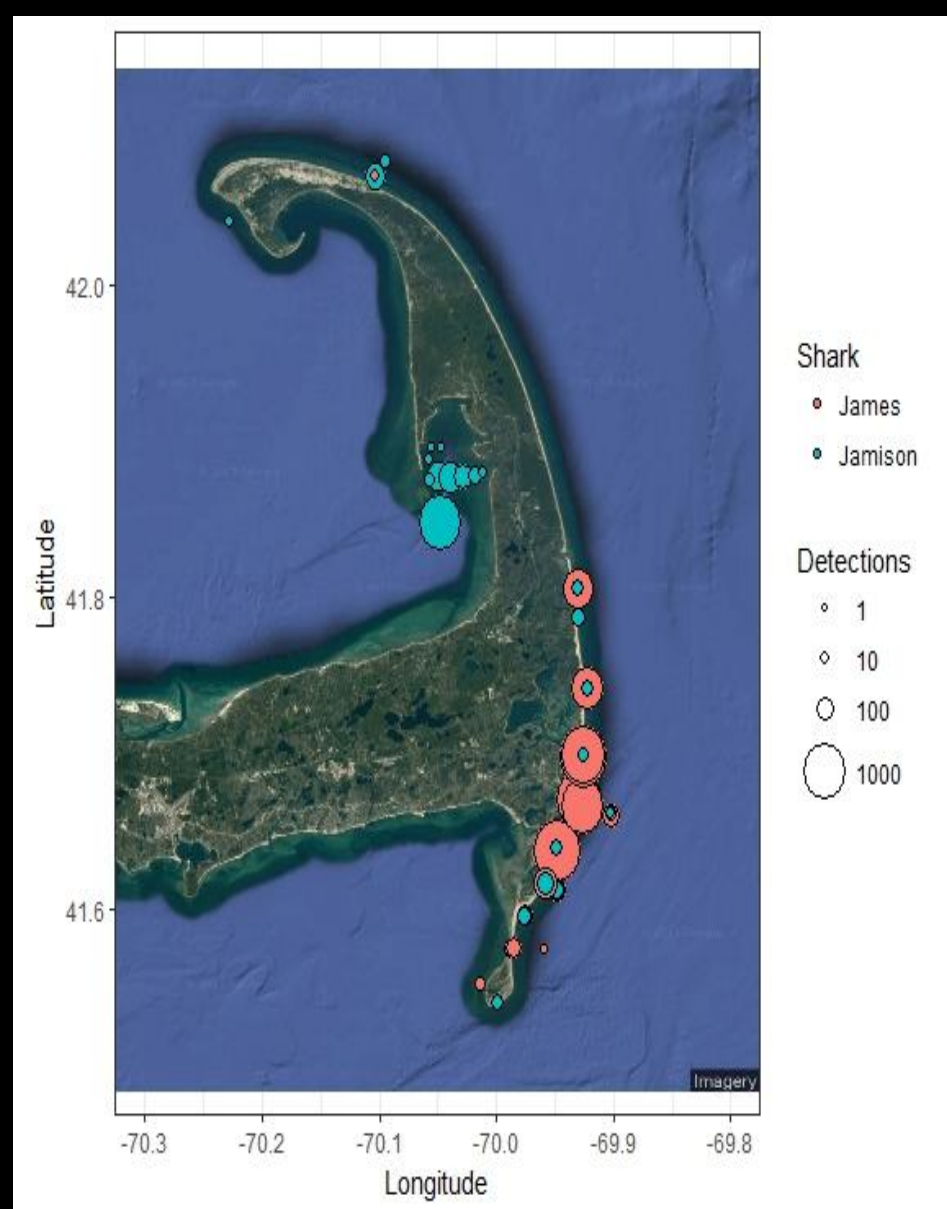
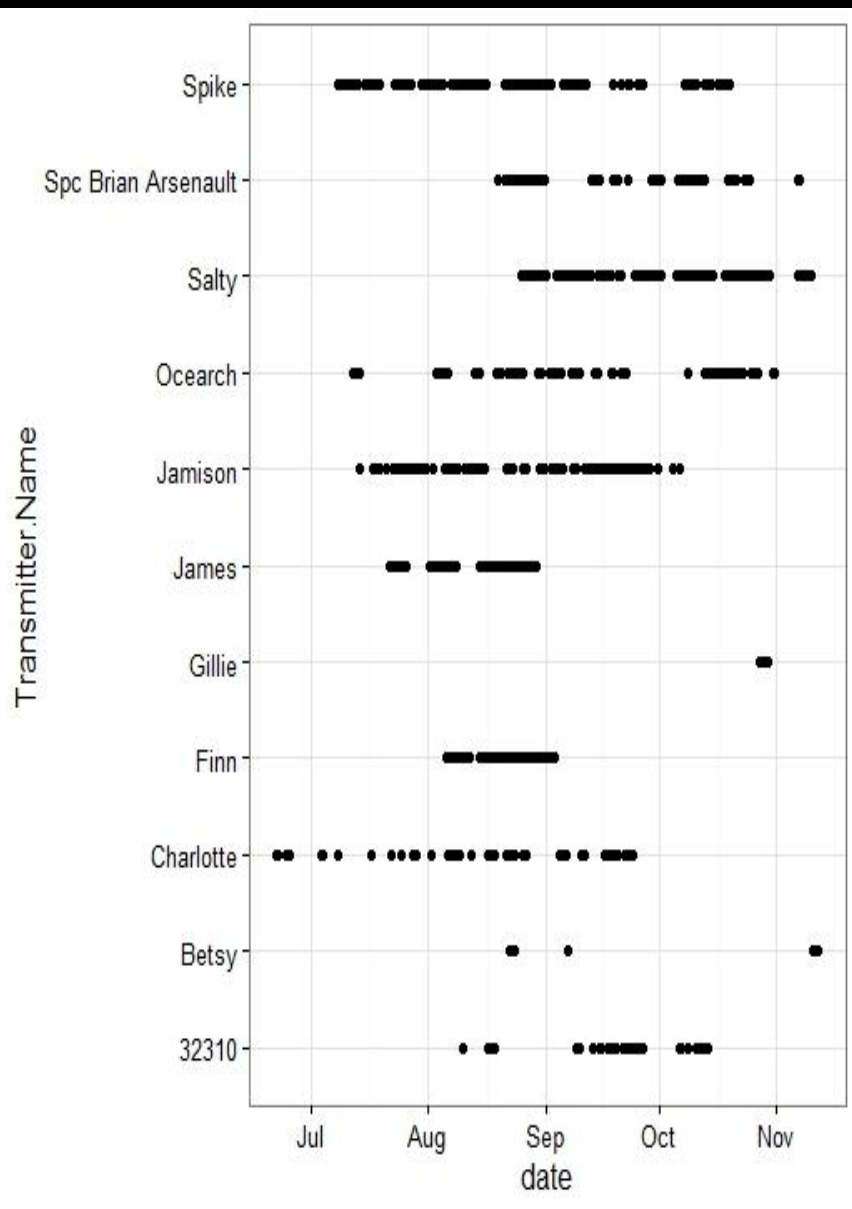


2015 Detections

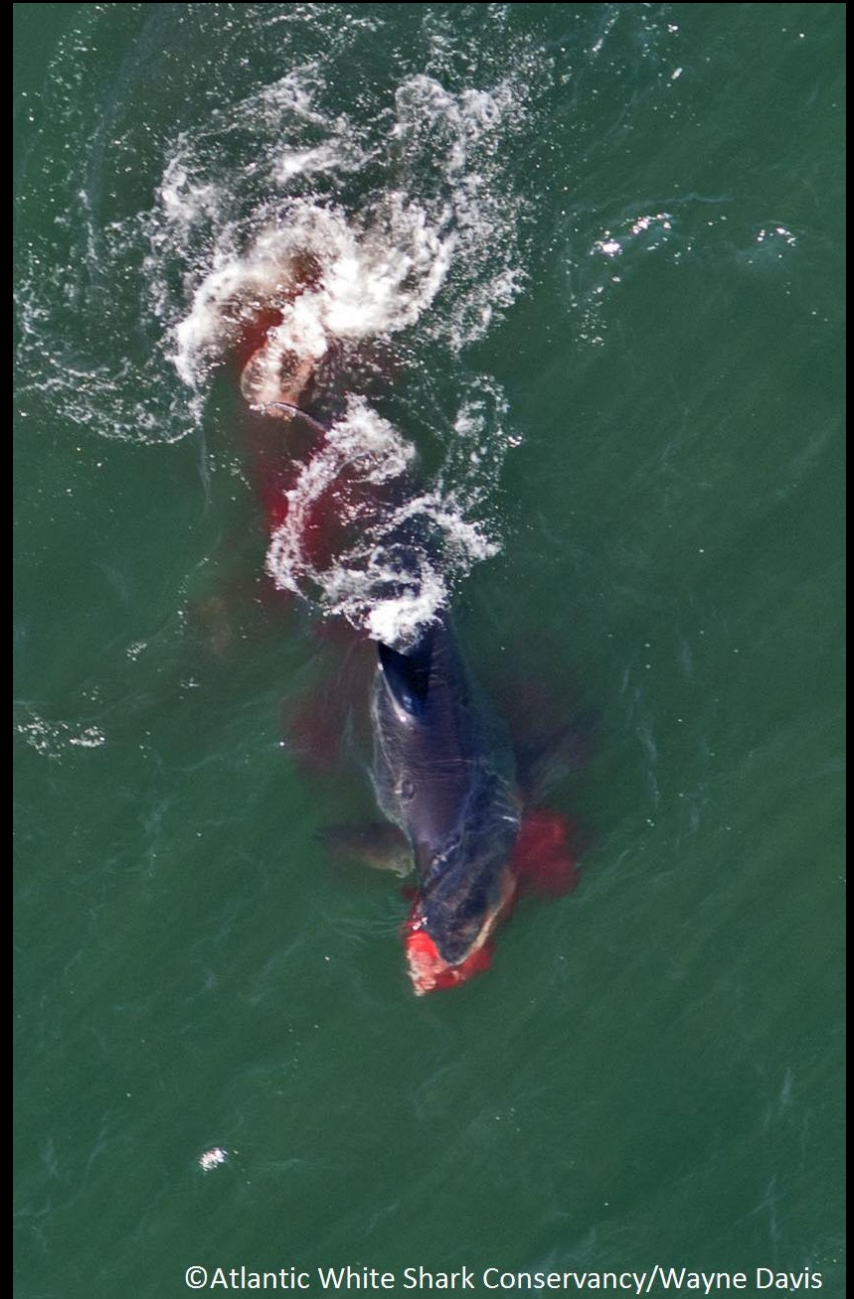
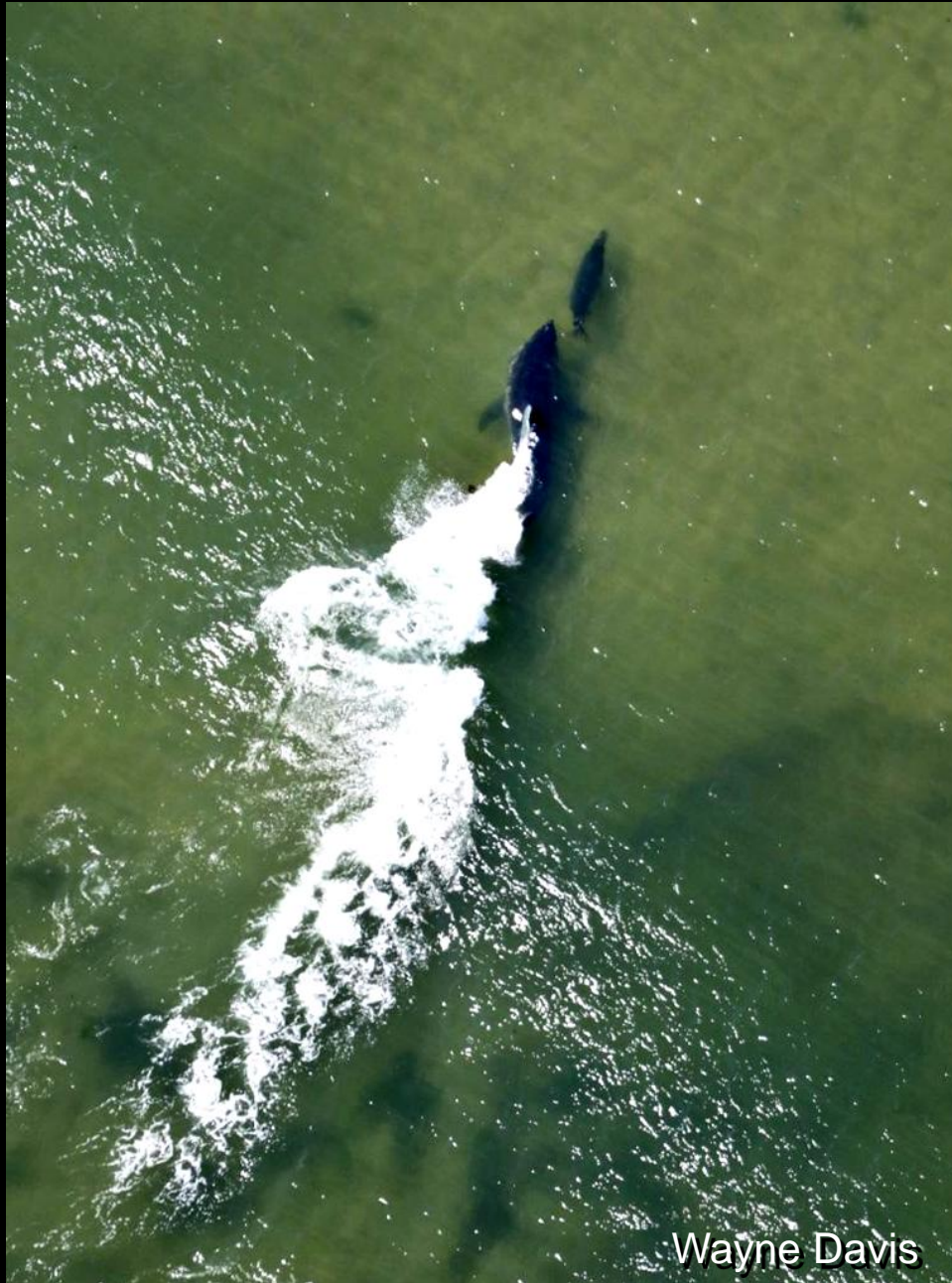


Acoustic Detections

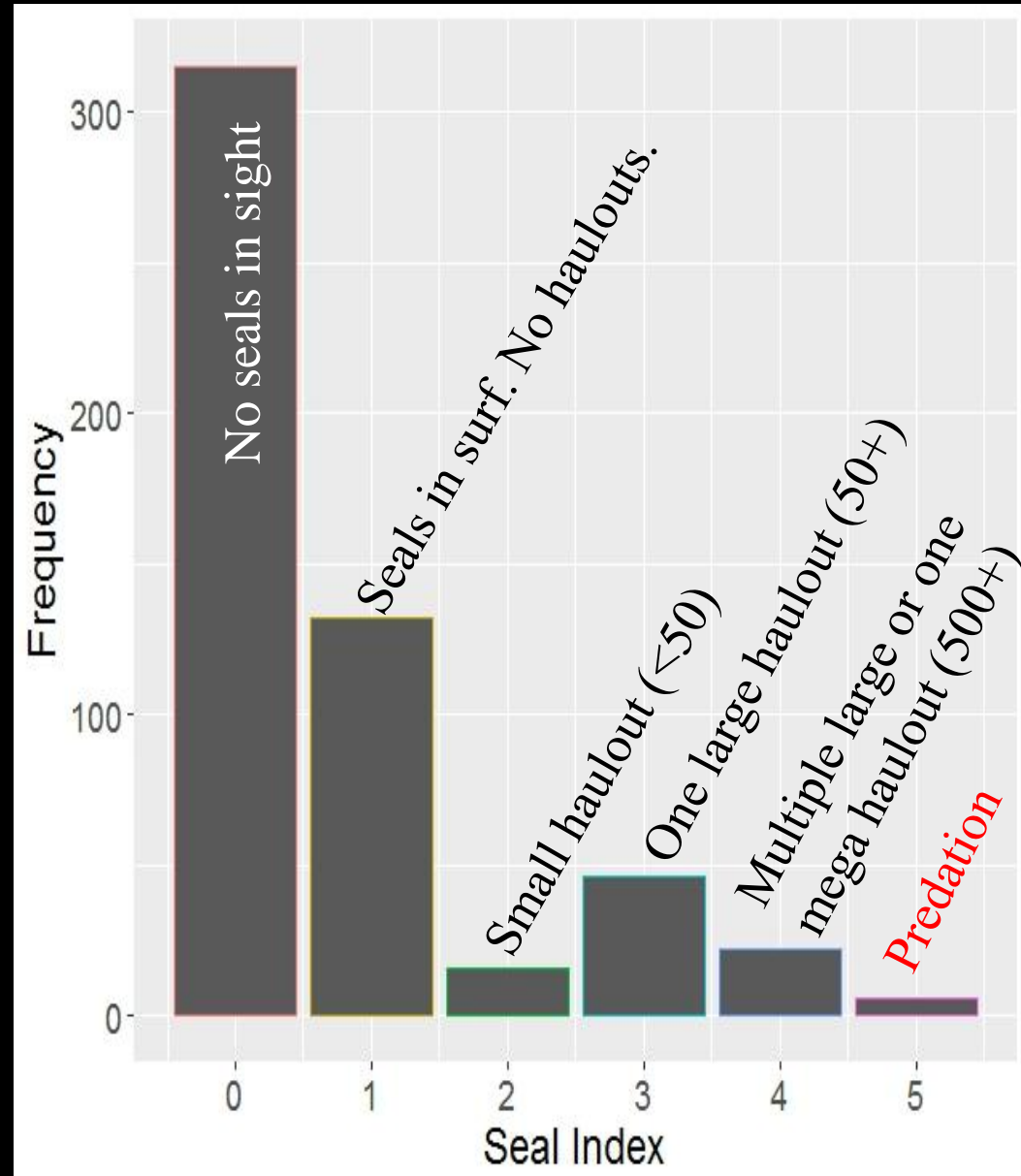
Availability and Individual Trends in Space Use



Predatory Behavior



Do we always see white sharks near seals?



Predation Events: Cape Cod, MA

Gray Seals (n=13)



White sharks:

2.7 – 4.6 m (mean = 3.4 m)

Depth:

2.7 – 9.0 m (mean = 5.4 m)

Water Temperature:

13.4 – 16.9°C (mean = 15.1°C)

Time of Day

9:05 – 13:40

Acknowledgements

- The Atlantic White Shark Conservancy
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 - Discovery Communications
 - National Geographic
 - Capt. Chip Michalove
 - Save Our Seas Foundation
 - M/V Ocearch
 - New England Aquarium
 - Coastal Conservation Association
 - The Atlantic Cooperative Telemetry Network
 - The Ocean Tracking Network
 - Florida Atlantic Coast Telemetry Project
 - iTAG
 - Federal Aid in Sportfish Restoration
- 
- A large white shark is swimming in the ocean, surrounded by a school of smaller fish. The shark is the central focus, swimming towards the left. The water is clear blue, and the background is filled with many small, dark fish swimming in the same direction. The lighting is bright, suggesting a sunny day.