



# Behavior, Seasonality, and Habitat Preferences of Fishes Within a Large Sand Shoal Complex

Marine Minerals Program

Dr. Jennifer Bucatari | FSBPA Technical Conference 2020




# Introduction

- First final report on study examining the impact and recovery of dredging on Canaveral Shoals.
- Project began in 2013 with Hurricane Sandy funding.
- A product of our Environmental Studies Program.
- Joseph Iafrate, Stephanie Watwood, Eric Reyier, Bonnie Ahr, Douglas Scheidt, Karen Holloway-Adkins, Jane Provancha, Eric Stolen
- Report is available on-line here:  
<https://www.boem.gov/BOEM-2019-043/>

OCS Study  
BOEM 2019-043

**Behavior, Seasonality, and Habitat Preferences of Mobile Fishes and Sea Turtles Within a Large Sand Shoal Complex: Insights From Traditional Sampling and Emerging Technologies**

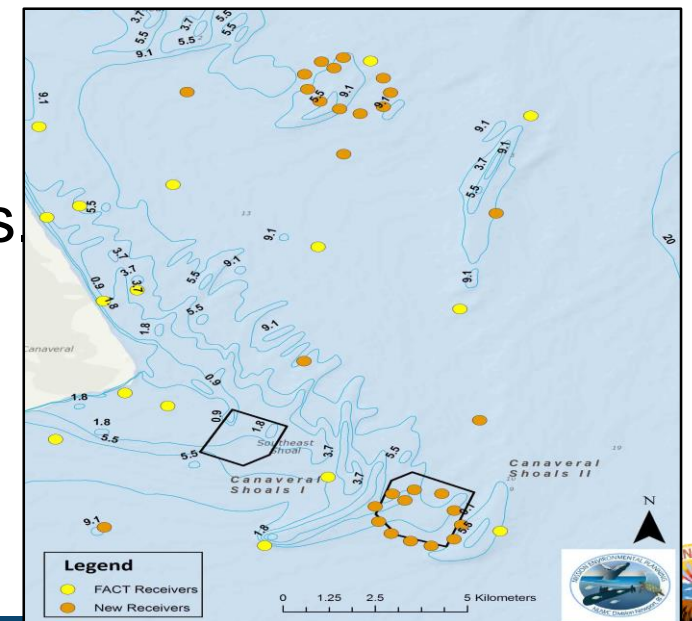


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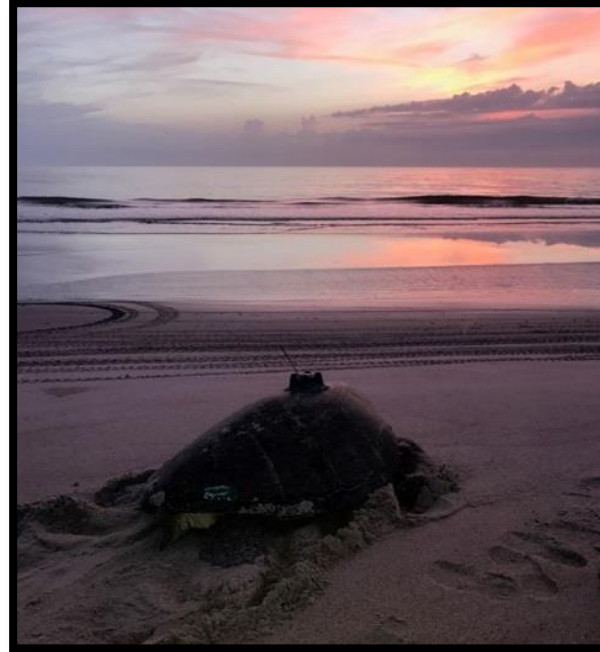
# Study Goals

- Sand shoals are important source of beach-quality sand along Atlantic and Gulf of Mexico.
- Demand for this resource is predicted to grow.
- Sand shoals are also an important habitat.
- The importance of shoals to larger pelagic fish and sea turtles has been harder to define due to their generally high mobility in the open ocean.
- Study goals:
  - to better quantify the habitat preferences and seasonality of federally managed fish and sea turtles.
  - to compare animal use of an active sand borrow area relative to a nearby undisturbed control site.



# Methods

- Traditional longline sampling.
- Tag-recapture techniques with passive acoustic telemetry.
- Tagging of female green (*Chelonia mydas*) and loggerhead (*Caretta caretta*) turtles with satellite transmitters.
- Use of Wave Glider unmanned surface vehicle (USV) to conduct surveys and detect acoustic tagged fish that dispersed outside the core study area.



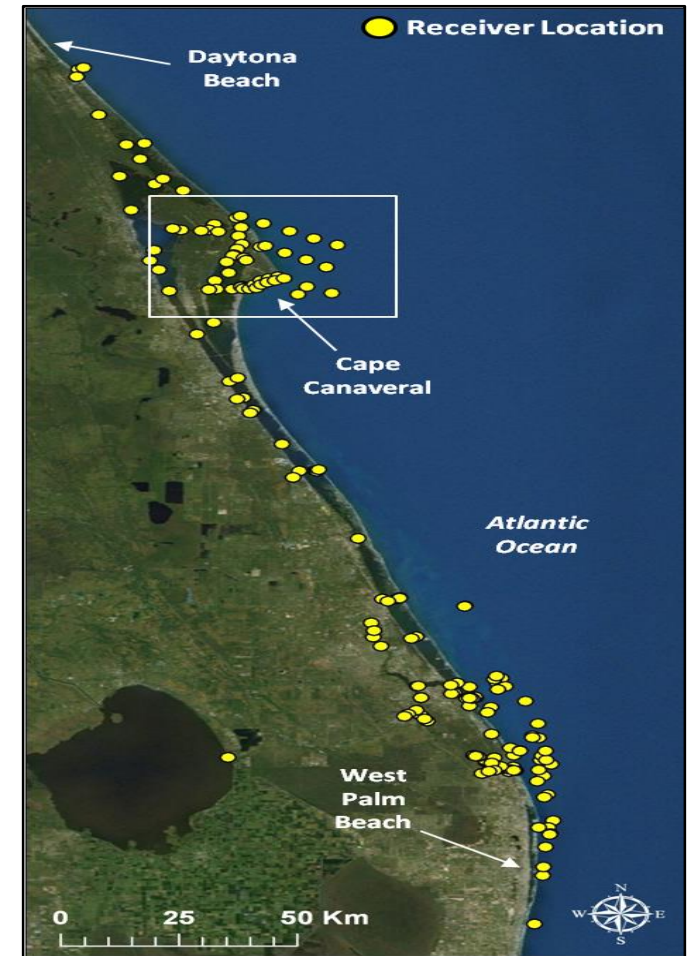
# Methods

- This is different from acoustic monitoring based on natural sounds.
- Sends out a coded 'ping' @ fixed interval.
- Picked up by receivers.
- Receivers then recovered and downloaded, or transmitted in real time.
- Affords an inexpensive way to study residency at a small/medium scales.
- Wave glider also picks up signals.



# Methods

- Cape Canaveral and northern Indian River Lagoon sections of FACT Array (>100 VEMCO acoustic receivers).
- Receivers are located in a variety of habitats including open estuary, coastal rivers, inlets, Port Canaveral, surf zone, and offshore shoals.
- **In total, 747 total animals have been tagged since the study inception in late 2013.**
- Some fish tracked for > 4 years.
- Detections of > 200 tagged animals from other regions as far as S. FL, DE, MA, and NY.



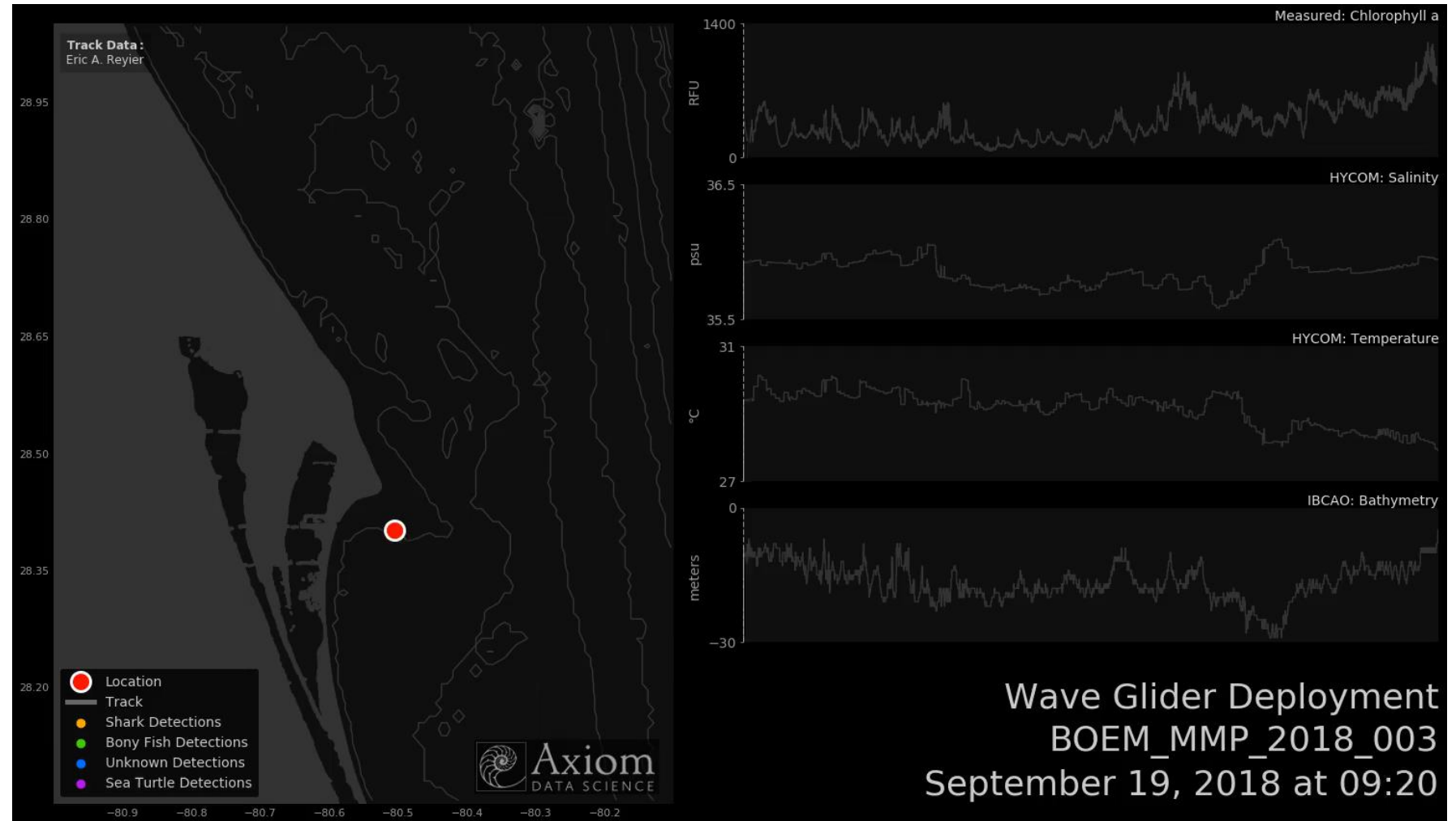
# Methods - Wave Glider

## Uses:

- Defense
- Geophysical
- MPA Enforcement
- Passive acoustic monitoring

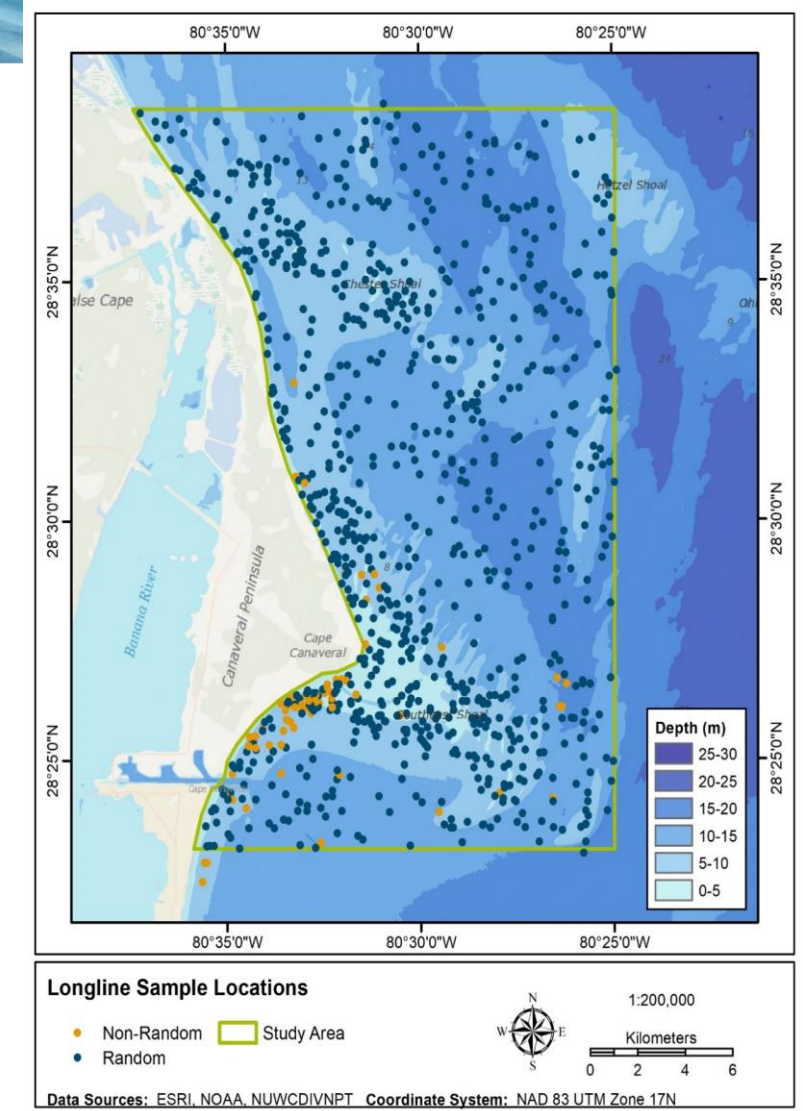
## Our uses:

- Expand fixed receiver arrays
- Acoustic monitoring of fishes
- Basic oceanography



# Results – Longline Sampling

- Longline sampling performed monthly for five years (2012–2017), yielding 2,895 fish in 36 species.
  - Coastal sharks dominant, comprising 90% of total catch.
  - Red drum (*Sciaenops ocellatus*) was the only common fish (7% of catch).
  - Species managed within the snapper-grouper management complex were virtually absent.
- Season was factor influencing both species catch rates and overall community composition.
  - Water clarity important with several common species.
- Catch rates were low on the shallowest shoal ridges.
- No evidence that shallow water or seafloor slope positively influenced catches.





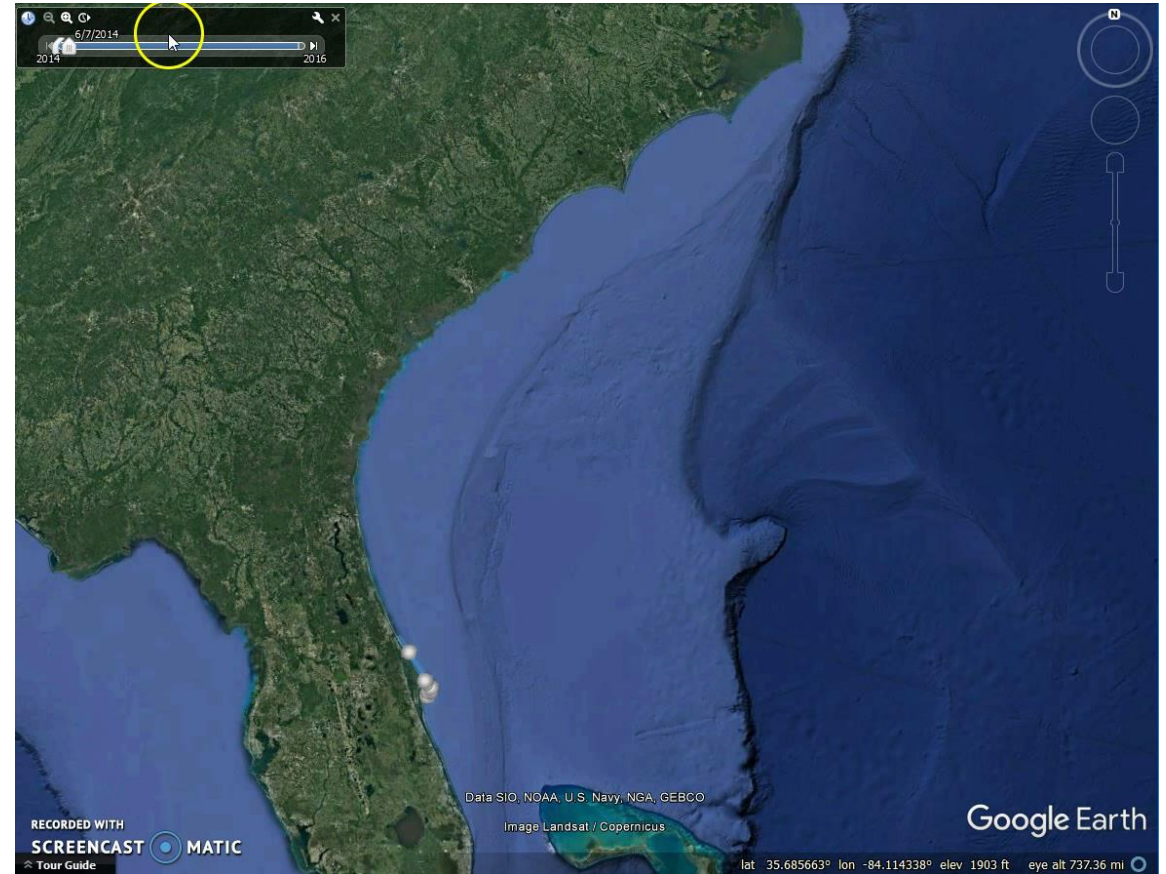
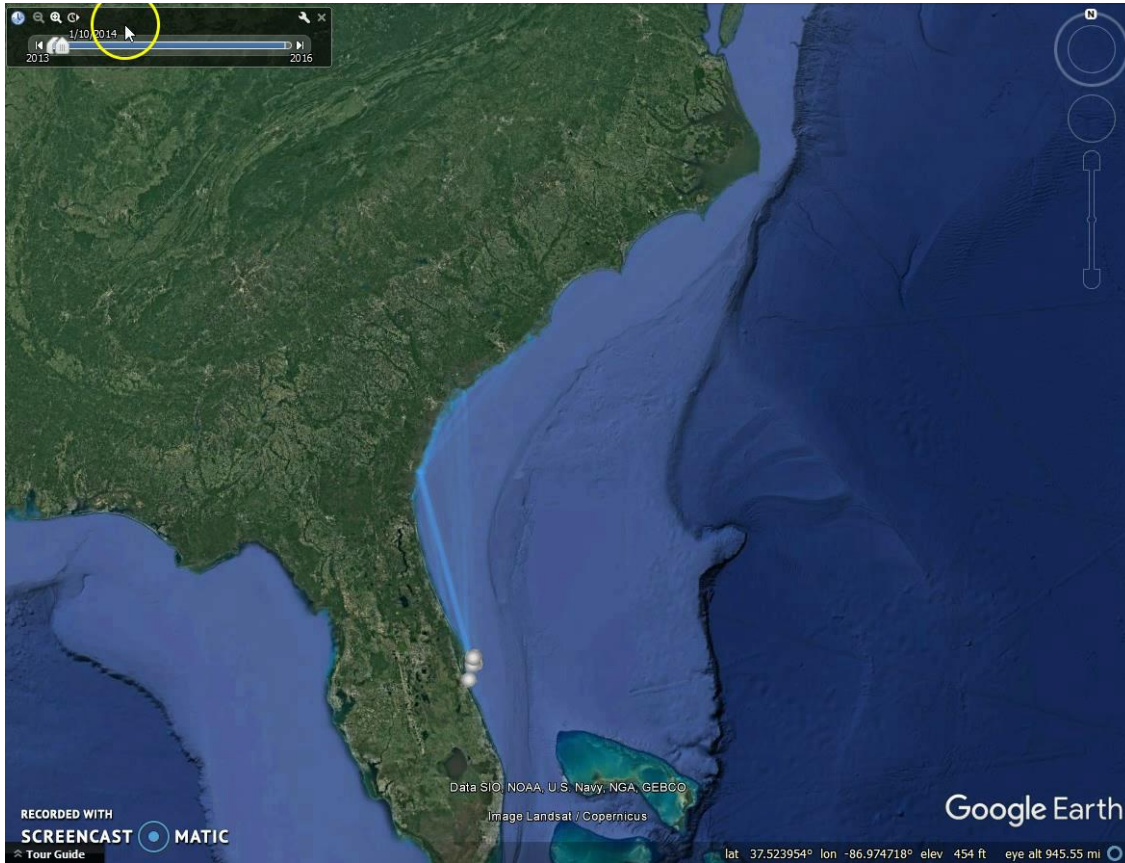
# Results – Acoustic Telemetry

- Acoustic telemetry efforts involved tagging of 747 fishes from 14 target species.
- Over four years of tracking (2013–2018), 923 fish from 39 species (16 teleost fish, 15 sharks, and eight rays) were detected.
  - 28 species released by 32 other research groups.
- Differences in use between the dredge and control sites were insignificant.
  - Comparable numbers of individuals and species detected
  - Tagged fish spending similar amounts of time at each site
- High mobility was consistently observed across species.
- Seasonal presence of Atlantic sturgeon (*Acipenser oxyrinchus*) and smalltooth sawfish (*Pristis pectinata*).



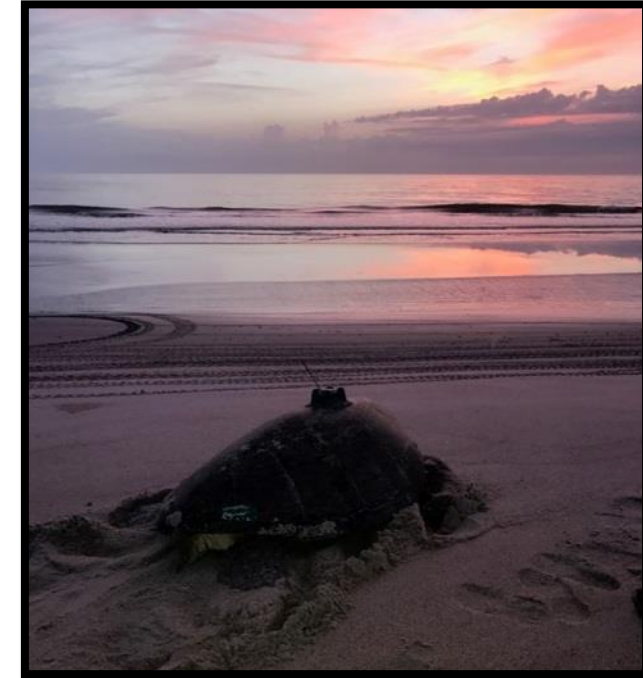
# Results – Acoustic Telemetry

- Coastal migrations of many species - general northward migration in spring and returning to east-central Florida in fall



# Results – Initial Sea Turtle Tagging

- Fourteen loggerhead and 11 green sea turtles were tagged with satellite and acoustic transmitters.
- Time spent in the Canaveral region averaged 13 and 39 days post-tagging, for loggerhead and green turtles, respectively.
- Several renesting events for both species.
- Loggerheads showed a greater affinity for shallow shoal margins although time spent associated with offshore shoals and within the dredge and control sites was very limited.
- After nesting concluded:
  - Loggerheads dispersed widely towards the US mid-Atlantic, Bahamas, Florida Keys, and eastern Gulf of Mexico.
  - Greens moved almost exclusively towards south Florida and the Florida Keys.



# Results – Initial Wave Glider

- Glider surveys are ongoing but have surveyed an expanded operational zone of 812 km<sup>2</sup> on five separate deployments.
- On average, surveys lasted 24 days with the Wave Glider traveling 1,258 km at a mean speed of 2.2 km/hr.
- To date, the platform has recorded 80 unique acoustically tagged fish and sea turtles in 14 species as well as associated environmental conditions (e.g., temperature, dissolved oxygen, chlorophyll, turbidity).
- These early results validate the use of unmanned platforms to supplement and extend passive acoustic telemetry studies on the OCS.



# Summary

- Minimal evidence suggesting that sand shoals at Cape Canaveral served a proportionally more important role for large fish or sea turtles than other adjacent habitats within the study area.
- Shallow shoal ridges may alter conditions in surrounding waters (e.g., elevating turbidity, promoting accumulation of fine-grained sediment) in ways that are favorable for some species.
- The relative impact to managed marine species in sand shoal systems from dredging is likely to be muted by the naturally low site fidelity, high mobility, and seasonal migrations.
- Additional results to be reported from this study next year and on benthic recovery in May 2020.

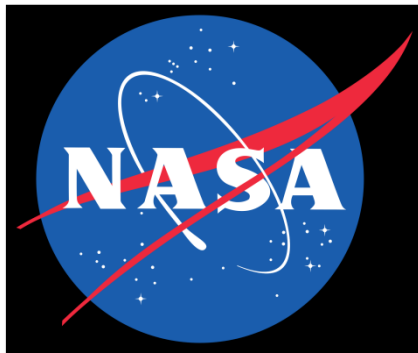


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Visit our website at: <http://www.boem.gov/marinemineralsprogram>



The background of the entire image is an underwater photograph of sand dunes. The dunes are illuminated from above, creating a rhythmic pattern of light and shadow across the sand's surface. The water is a clear, vibrant blue, and the overall scene is serene and natural.

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