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/
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.
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.
• 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
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 a 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.
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*).
Coastal migrations of many species - general northward migration in spring and returning to east-central Florida in fall
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.
Glider surveys are ongoing but have surveyed an expanded operational zone of 812 km$^2$ 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.
Contact Info:
Jennifer Bucatari
Jennifer.Bucatari@boem.gov, 703-787-1742
Visit our website at: http://www.boem.gov/marinemineralsprogram
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