Observations of reproductive behavior of Atlantic tarpon *Megalops atlanticus* using aerial surveys

Julia Saltzman1,2,3, Dr. Catherine Macdonald1,2
1. Field School Scientific Training
2. University of Miami, Rosenstiel School of Marine and Atmospheric Science, Department of Marine Ecosystems and Society
3. University of Miami, Abess Center for Ecosystem Science and Policy

**Abstract**

Due to the logistical and financial challenges of studying migratory marine species, there is relatively limited knowledge of the reproductive biology, behavior, and habitat use of many species of ecologically important migratory megafauna. Atlantic tarpon (*Megalops atlanticus*) is an understudied but economically and ecologically important teleost species. In this study, we present a novel observation utilizing emerging technology (i.e., drones) to observe behaviors of a tarpon aggregation (N=182) over the course of a three-day long fish aggregation event. Following the event, we analyzed and compared observed behaviors with other fish species with well-documented reproductive aggregations, revealing behaviors consistent with courtship. Significantly, this aggregation occurred in highly altered and urbanized habitat, off the coast of South Florida, outside of documented spawning season. This suggests that during this aggregation, tarpon are likely vulnerable to overexploitation by recreational fishers and subject to a wide array of anthropogenic environmental impacts.

**Objectives**

1) Report a previously undescribed aggregation Atlantic tarpon
2) Describe the identified behaviors and their potential reproductive significance
3) Demonstrate the potential of drone research to examine teleost behavior and habitat use

**Methods**

- Drone-based biodiversity surveillance surveys were conducted off the coast of Miami by FAA Part 107 Certified Remote Pilots recording in 4k.
- Each recording was independently analyzed by two different observers who replayed, zoomed in, and viewed footage frame-by-frame.
- For each of the aggregations, each individual fish was counted as they entered the frame, and the presence or absence of other fauna was noted.

**Results**

- We identified and described 7 distinct behaviors: (1) small individuals surrounding large individuals, (2) inactive, clustering, (3) active clustering, (4) parallel stationary, (5) individual, stationary, and (7) individual cruising.

**Conclusion**

- Based on the sizable numbers of behaviors observed which are associated with spawning in other teleosts, this site may be an FSA (Fish Spawning Aggregation)
- FSAs are easily overexploited by targeting of sites and removal of recreationally important individuals from populations (Sadovy de Mitcheson et al. 2008; Sadovy de Mitcheson and Enisman 2012).
- As a migratory spawning, with life history traits characterized by slow growth, large size, long lifespan, late maturity, and seasonal migrations to spawn (Cholet et al. 2020), Atlantic Tarpon FSAs may be especially vulnerable to disturbance.
- Although the tarpon fishery is predominantly catch and release (C&R) in US waters, it may not be sustainable as post-release mortality estimates in C&R fisheries range from near 0% to 90% depending on the species and location (Muoneke and Childress, 1994).
- This aggregation was almost all sexually mature large tarpon (≥1 m fork length) which show greater physiological capture stress than smaller tarpon (≥1 m fork length) (Cudjod, 2011).
- Physiological stress from capture can have adverse effects on reproduction (Bouchard et al. 2021).
- Despite not identifying predators in or around this aggregation, shark predation is a known risk for recreationally angled tarpon (Saltzman and Macdonald. Unpublished data 2021).
- Comprehensive management which recognizes the presence of aggregations is needed to ensure proper management of the Atlantic tarpon fishery.

**Acknowledgements**

This work was funded by the Linda Farmer Award and SURGE award. Thank you to the staff of Field School (Jake Jerome, Christian Pankow, and Nick Perni) and Cliff Hawkins for their assistance in conducting drone surveys. This work would not have been possible without the mentorship of Dr. Catherine Macdonald and guidance of Dr. Julia Wester.