Keeping Up with the Silver King: Connecting the Spatial Ecology of Atlantic Tarpon (*Megalops atlanticus*) to Conservation Strategies

Mantenerse al Día con el Rey de la Plata: Conectando la Ecología Espacial de Sábalo Atlántico (*Megalops atlanticus*) con Estrategias de Conservación

Suivre le Roi d'Argent: Relier l'Écologie Spatiale du Tarpon Atlantique (*Megalops atlanticus*) aux Stratégies de Conservation

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EXTENDED ABSTRACT

Understanding the nature of migratory behaviors within animal populations is critical to develop and refine conservation and management plans. However, tracking migratory marine animals across life stages and over multiple years is inherently difficult to achieve. In this talk, we explore the use of cooperative acoustic telemetry to characterize the spatial ecology of Atlantic tarpon (*Megalops atlanticus*), elucidate the ecology of this poorly studied but economically important species, and ultimately inform conservation and management. We report on the extensive collaboration of agencies, institutions, guides, and anglers who help track and monitor tarpon movements from the Gulf of Mexico to the eastern USA seaboard. Anecdotal information from anglers and fishing guides suggests tarpon populations have declined since the 1930s (Adams et al. 2013). Considering this fishery within the USA is a minimal harvest fishery, it is surprising this suspected population decline has occurred. Habitat degradation and fragmentation at various life stages may be attributing to this decline (Lotze et al. 2006). Tarpon have a complex life cycle and utilize multiple habitats across their life phases, juveniles require nearshore back-water systems and will remain here for multiple years, after emigration from the nursery habitat, sub-adults move into coastal environments and eventually recruit into adult populations (Adams et al. 2013). These sub-adult and adult tarpon are believed to exhibit migratory behaviors to some extent (Luo et al. 2008). Considering these migratory fish may be moving across multiple political and social jurisdictional boundaries, these fish may encounter threats that vary both in space and time. Thus, it is critical to understand their spatial ecology across multiple life stages. To fill this knowledge gap, we have designed and implemented an acoustic telemetry tarpon tracking project. Here, we present on the first three of five years of data collection.

To date, over 100 tarpon were captured and surgically tagged with acoustic transmitters (Vemco V16, 69 kHz, 16 mm diameter, 98 mm length, 17.3 g in air, min and max delay times 60 - 120 s, estimated battery life 1910 days; Vemco Inc., Halifax, NS, Canada) following Griffin et al. (2018) methodologies (Figure 1). Along with our 90 + acoustic receivers

Figure 1. Illustration of acoustic tagged Atlantic Tarpon and acoustic receiver (lower right). Artist: Anneke Wilder

(V2RW receivers, Vemco Inc., Halifax, NS, Canada) placed around the Florida Keys, Florida, USA, we utilized acoustic telemetry collaborative institutional networks (iTAG, FACT, and ACT) to track tarpon outside the Florida Keys.

By tagging tarpon across regions, we found broad and heterogeneous connectivity among individuals as well as diverse spatiotemporal migratory strategies. Some tarpon remained close to their capture location while others migrated hundreds of kilometers. Examining the tracking data from 50 tarpon, we have identified a general movement strategy (Figure 2). Although, inter-individual diversity exists among tagged fish, tarpon generally move south during the onset of Spring to presumably spawn, move North in the Summer towards highly productive estuarine systems, and move South with the onset of Fall and Winter. Tracking data has also highlighted important overwintering locations along the Florida eastern and western coast. Multiple threats may exist for these migrating tarpon, while harvest for consumption is minimal, anglers still practice harvest as trophies individually and in-part with "kill tournaments". We suggest management should be expanded across state lines to meet conservation end points, including adjusting harvest regulations considering individuals move freely over jurisdictional lines. Further, we report on variable seasonal fidelity to specific areas within the lower keys of Florida and thus informing conservation strategies for tarpon in regards to water quality, fishing and boating pressure, and angling-related predation events.

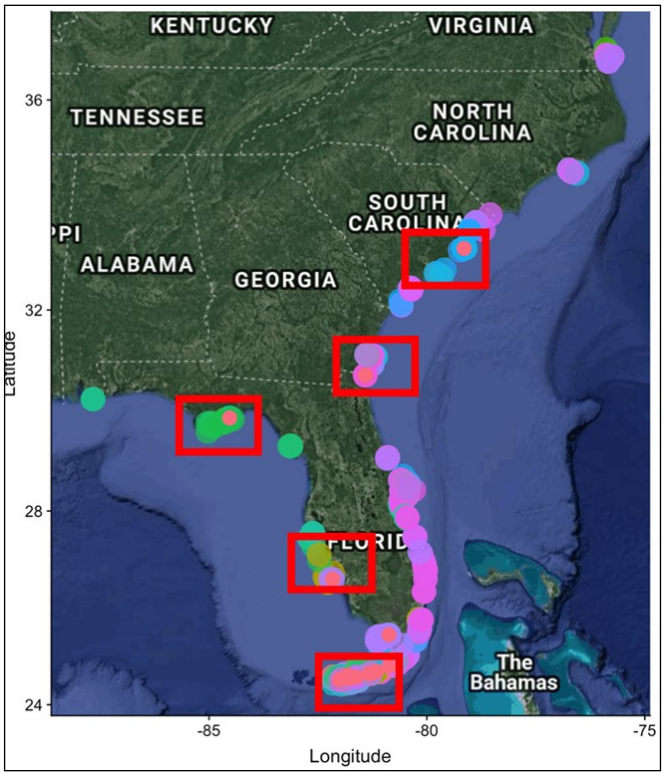

Figure 2. Individual detections for 50 Atlantic Tarpon tagged with acoustic transmitters (unique colors) and tagging locations (red boxes)

KEYWORDS: Acoustic telemetry, Atlantic tarpon, *Megalops atlanticus*, migratory connectivity, movement strategy

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