Preliminary Results of Characterizing Past and Present Mangrove Shorelines to Aid Conservation of the Smalltooth Sawfish, *Pristis pectinata*, along the Southwest Coast of Florida

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Introduction

Historically, the smalltooth sawfish, *Pristis pectinata*, were reported to number in the hundreds, perhaps thousands, on both coasts of Florida in a variety of shoreline habitats (Fig 1). Unfortunately, the population of this species has steadily declined since the nineteenth century possibly due to habitat degradation and/or bycatch (Fig 2). Consequently, *Pristis pectinata* was placed on the Federal Endangered Species List (NMFS 2003) and NOAA National Marine Fisheries Service has initiated recovery efforts. Many questions concerning the biology and ecology of this endangered species remain to be answered. One of the more important questions centers on habitat selectivity and use by juvenile sawfish. Sawfish habitat is thought to consist of inshore, shallow sandbars, sea grass beds, and shallow muddy shorelines with adjacent mangroves (Carlson et al. 2007). Mangrove shorelines are assumed to be especially important for juvenile sawfish, those individuals <2.0 m in length.

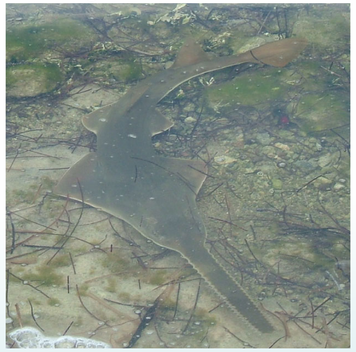

Fig 1. Picture of a juvinile sawfish, *Pristis pectinata.* Photo Credit Diana Godwin

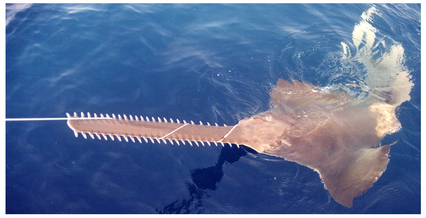

Fig 2. *Pristis pectinata* caught on a commercial bottom longline fishery – bycatch off the coast of GA. Photo credit George H. Burgess, Florida Museum of Natural History

Objective

- Develop a shoreline classification schema for Southwest Florida
- Assess whether juvenile sawfish occur along certain types of shoreline
- Determine if types of shoreline have changed over time

Acknowledgements

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Reference

J.K. Carlson, J. Osborne, T.W. Schmidt (2007) Monitoring the recovery of smalltooth sawfish, *Pristist pectinata*, using standardized relative indices of abundance. Biological Conservation, 136, p 195-202

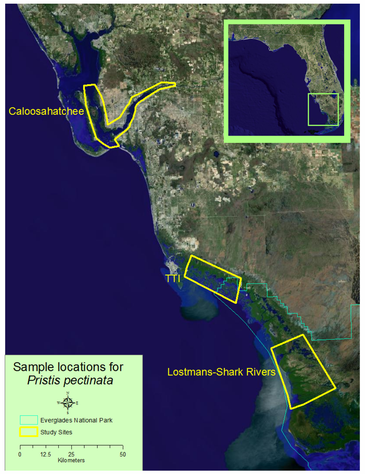

Fig 3. The three sample locations for this study

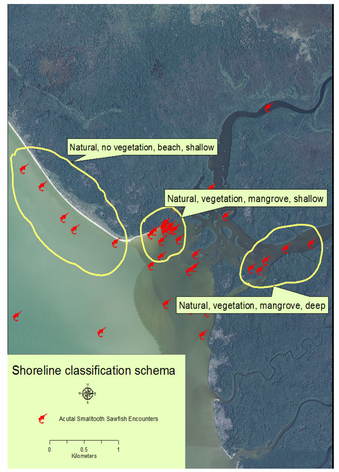

Fig 4. An example of three types of shoreline classifications selected from the Lostmans-Shark Rivers area

Methods

We selected three areas along the southwest coast of Florida for this study (Fig 3). NOAA National Marine Fisheries Service provided *Pristis pectinata* sighting data for this project. The shoreline habitats adjacent to *Pristis pectinata* sightings were classified using a four level classification schema (Table 1 & Fig 4). 300 random points were created in each study area and the shoreline habitats adjacent to each point were classified using the same methodology as used for the *Pristis pectinata* sightings. The categorical count data for the shoreline classification for *Pristis pectinata* and random points were entered into R and the chi-square test was run to examine how *Pristis pectinata* were selecting shoreline habitat (Table 2). The 300 randomly-selected points were used in R to represent the expected probabilities of distribution. The shoreline habitat adjacent to the 300 random points from 1944 and 2004 were compared and the change in habitat was calculated in Excel (Fig 5).

Table 1. Shoreline Classfication Schema

Level 1	natural vs. altered
Level 2	vegetation vs. no vegetation
Level 3	mangrove, marsh, mixed wetland, exotic, upland, beach, reef, spoil, concrete, rubble
Level 3	deep (> 3 ft.) vs. shallow (< 3 ft.)

Table 2. Chi-square results from R for Lostmans-Shark Rivers area

Shoreline classification	sawfish sightings	random probability
natural vegetation mangrove shallow	50	0.6156463
natural vegetation mangrove deep	109	0.3843537

Chi-square test results: X-squared = 60.9522, df = 1, p-value = 5.848e-15

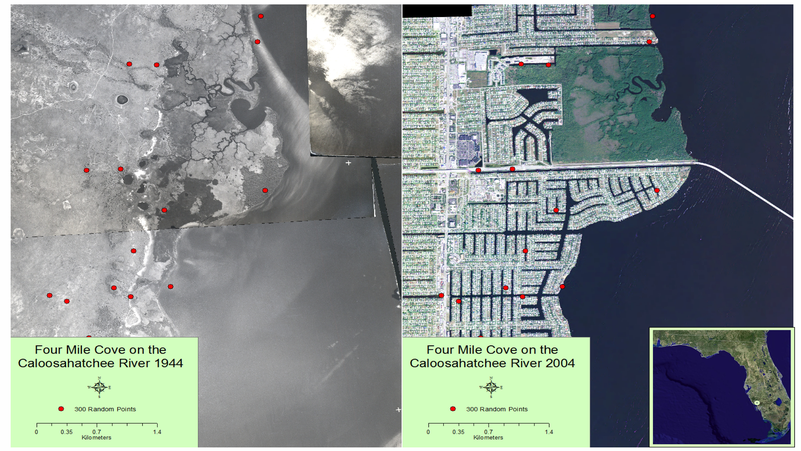

Fig 5. An illustration of how shoreline habitat has changed along the Caloosahatchee River from 1944 to 2004

Results and Discussion

Habitat Selection

The habitats found in the Lostmans-Shark Rivers study area were comprised of natural mangrove shallow, natural mangrove deep and natural beach shallow. After running the chi-square test in R we found that *Pristis pectinata* were associated with shallow mangrove habitats.

Chi-square for beach vs mangrove
X-squared = 38.9134, df = 1, p-value = 4.43e-10
Chi-square for shallow mangrove vs. deep mangrove
X-squared = 60.9522, df = 1, p-value = 5.848e-15

There were more shoreline habitat types in the TTI region. Habitats included: altered concrete deep, altered mangrove deep, altered mangrove shallow, natural beach shallow, natural mangrove deep, natural mangrove shallow, natural reef shallow, natural upland shallow, altered spoil shallow. Again, the chi-square test showed that *Pristis pectinata* are associated with shallow mangrove habitats.

Shoreline Habitat Change

In the TTI area, shoreline habitat change is minimal. In the Lostmans-Shark River area, natural mangrove deep habitat has increased approximately 12%, and that mixed wetland has decreased approximately 18% and analysis for the Caloosahatchee area is not yet complete.