

# Movement of Sub-Adult Striped Bass (*Morone saxatilis*) within an Estuarine Ecosystem

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Is there a spatial separation in adult and sub-adult striped bass populations?



Fig. 1 Striped Bass (*Morone saxatilis*)

## ABSTRACT

We compared the movements of sub-adult striped bass, *Morone saxatilis* with those of adults in the Mullica River-Great Bay estuary in southern New Jersey. We used ultrasonic telemetry, both mobile and fixed listening stations to track fish tagged with acoustic transmitters. The movement of sub-adult bass were not similar to that of adults. Sub-adults occupied different areas of the Mullica River-Great Bay estuary from adults. Movement was sporadic but limited. Occupied areas were similar in both temperature and salinity, differing only in location, suggesting that segregation is based on factors not addressed in this study

## RESULTS

There was minimal movement of the tagged sub-adult striped bass. After release, sub-adults were most frequently detected in an upstream location of the estuary. Tagged adult striped bass also moved very little after release, residing primarily an open water bay portion of the estuary. Figures 8 and 9 shows this age segregation of the adult and sub-adult populations. This spatial separation of the two populations shows no clear preference for either water temperature or salinity (Fig. 10). Water temperature data indicate no age related preference. Salinity data exhibit adult and sub-adult clusters, but with no discernible pattern. There seemed to be no similarity in adult and sub-adults striped bass's movements. The sub-adults were found farther up stream while the adults were more often found out in the bay (Fig. 11)

## INTRODUCTION

The striped bass is keystone species in the Mullica River-Great Bay estuary (Fig. 1). Although they are not commercially harvested in New Jersey, the mid-Atlantic striped bass commercial catch has shown vulnerability to the mismanagement of spawning and nursery habitats. Recreational fishing for striped bass impacts local economies through the sale of fishing tackle and equipment, boat rentals, and motel and restaurant revenues. As an important striped bass spawning and nursery habitat, the coastal rivers of New Jersey make a significant contribution to the mid-Atlantic striped bass stock. A considerable research interest in this species has focused on describing the movements of adult striped bass within an estuarine study area (Tupper & Able 2000). Consequently, there is a large amount of data available for comparative analysis. Young striped bass are frequently observed in shallow, close-to-shore locations (Ng, 2006). To examine the possibility and cause of age-segregated movements, we used a system of stationary wireless hydrophones located strategically throughout the Mullica River-Great Bay estuary as well as mobile hydrophones to track the movements of acoustically tagged fish (Grothues et al. 2005) (Fig. 2).

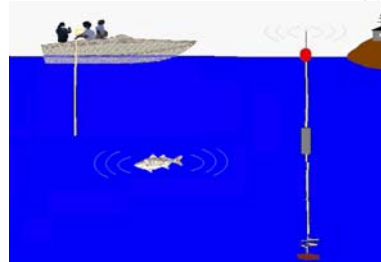


Fig. 2 Stationary and mobile hydrophones

## DISCUSSION

The spatial separation by age with this species seems unrelated to water temperature or salinity. Of examined environmental factors, geography (i.e., river vs. bay) appears to be the most important factor related to age segregation. This suggests a behavioral, rather than physiological explanation of the age separation, in which older, larger fish exclude, smaller, younger fish from prime feeding habitats. Such competitive exclusion based on dominance of prime territory by adults would effectively separate the species into two habitat utilization patterns based on age. Given that the diet of younger bass differs from that of adults and that only after two years are striped bass considered fully piscivorous, spatial separations could have diet related variable as well. Further investigation is warranted.

## METHODS



Fig. 3 Acoustic transmitter, measuring 11x5mm



**Tagging:** We caught six sub-adult striped bass by hook and line. Each fish was placed in a tank containing the anesthetic aminobenzoic acid ethyl ether. We surgically implanted an ultrasonic transmitter (Fig. 3) into the peritoneal cavity of each fish and closed the incision with three sutures (Fig. 4). An injection of oxytetracycline (Liquamycin) was administered into the dorsal musculature to guard against latent infection. The fish were marked with external tags to alert anglers of their status and then released (Fig. 5).

**Fig. 4** Implanting a transmitter into an anesthetized fish. A) making an incision using a sterilized surgical scalpel. B) suturing closed incision after implantation



Fig. 5 Release of acoustically tagged sub-adult striped bass.



Fig. 6 A portable hydrophone (A) coupled with an SRX-400 receiver/processor (B) was used from a boat to track the fine scale movements of sub-adult striped bass.

## REFERENCES

- Grothues, T.M., K.W. Able, J. McDonnell and M.M. Sisk. "An Estuarine Observatory for Real-Time Telemetry of Migrant Macrofauna: Design, Performance and Constraints". *Limnology and Oceanography Methods* 3: 275-289, 2005
- Ng, C.L.H. "Habitat Utilization and Movement Patterns of Adult Striped Bass, *Morone Saxatilis*, in a Southern New Jersey Estuary Using Acoustic Telemetry". A Masters thesis.
- Tupper, M., and K.W. Able "Movement and Food Habits of Striped Bass". *Marines Biology*, 137, 1049-1057, 2000

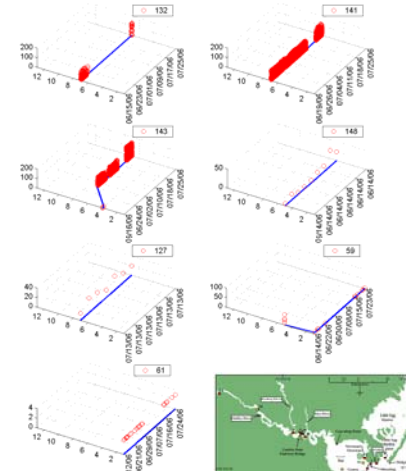


Fig. 8 Time vs. hydrophone vs. number of contacts



Fig. 7 Stationary telemetric infrastructure in the Mullica River-Great Bay estuary.

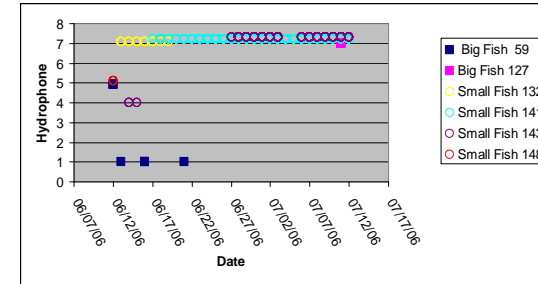


Fig. 9 Time vs. hydrophone graph showing which stationary hydrophone the fish were at over time

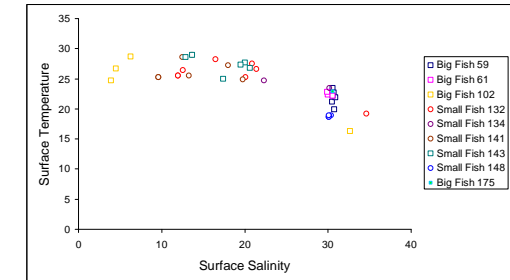


Fig. 10 Temperature vs. salinity graph, showing the environment in which the fish were found



Fig. 11 Locations where large fish (blue dots) and small fish (red dots) were detected by portable hydrophones. Locations of the points routinely checked by portable hydrophone (inset).