

DAY & NIGHT MOVEMENT COMPARISONS OF THE STRIPED BASS OF GREAT BAY/MULLICA RIVER ESTUARY

Fernando Fuentes, Clare Ng, Thomas Grothues, Ken Able
 Marine Field Station, 132 Great Bay Blvd. Tuckerton, NJ
 Institute of Marine and Coastal Sciences, Rutgers University

ABSTRACT

The movements of striped bass inside the Great Bay/Mullica River estuary are currently being studied through the use of acoustic telemetry. This project set out to interpret and identify the difference between day and night time movements of striped bass. Under the Stripertracker project, over 70 striped bass have been caught, tagged, and released since 2002. By using a portable hydrophone and SRX receiver, these tagged fish are located and tracked for a certain period of time. Only one, of many tagged fish are represented here and its movements between day and night were analyzed. It was found that although little movement was observed during the day, there was movement up the bank and into the creek mouth at night, perhaps because of feeding behavior or search for protection from predators.

INTRODUCTION

The striped bass (*Morone saxatilis*) belongs to the family of temperate basses and is an anadromous species. Therefore, by nature, the life history of this fish involves the hatching and early life of young in fresh water followed by migration to estuaries and salt water habitats. It is this ability of striped bass to live in both fresh and salt water systems that allows this species to occur in different types of habitats at different times of the year. The selection of the type of habitat that the species will live in is dependent on various temporal and environmental factors such as oxygen, temperature, and food resources. It is evident then, that the essential fish habitat that striped bass require is delicately affected by the biotic and abiotic conditions of many coastal areas.

This, along with other projects being undertaken at the Rutgers Marine Field Station, are being performed in an attempt to understand how and why fish move in the observed manner. In addition to finding the location and direction of fish movement, this project will investigate the reasons for fish movement between different habitats possibly due to the varying levels of salinity, oxygen, temperature, and light and how this might differ from day to night. Moreover, evidence of increased activity at dusk by certain fishes provides additional incentive to investigate the effects of diurnal light and lack thereof on striped bass movement. Consequently, this project makes comparisons between the day and night time movement of striped bass, and provides new data and statistical analysis on the previously unknown nocturnal behavior of these fish.

METHODS

The procedures that will be carried out in this project will be based on the acoustic tagging system and listening array already established by the Stripertracker project. The true focus of the research project, however, is mobile tracking of striped bass. The procedures in this experiment involve following specific fish by boat and tracking their movement with the aid of a portable hydrophone. By placing the hydrophone in the water and rotating in different directions, a tagged striper swimming nearby can be found. In mobile tracking, the portable hydrophone is placed in the water and the location and orientation of a striped bass is recorded every 15 minutes. This was done both at night and day and the data collected was compared.

LOTEK Acoustic Tag

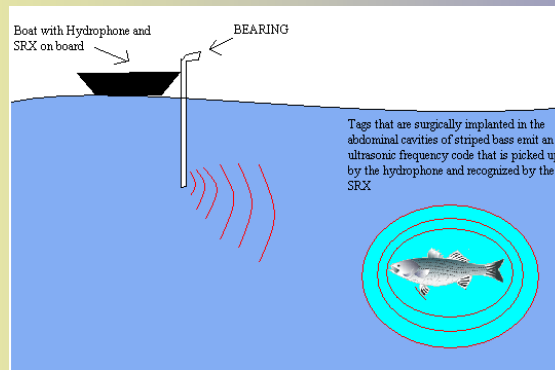
LOTEK SRX 400 Telemetry Receiver



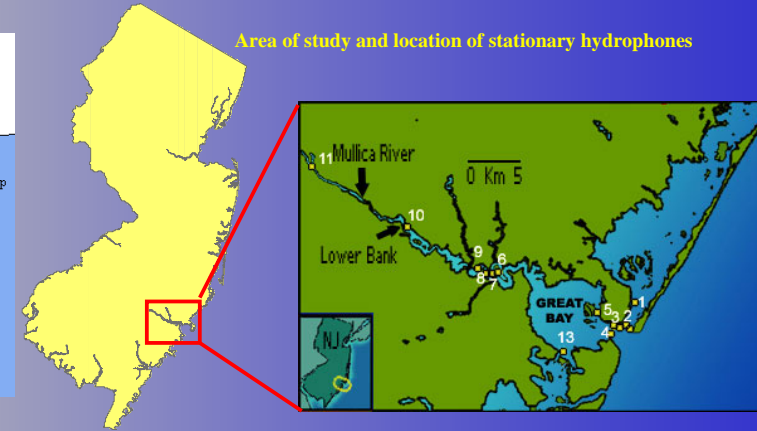
"Nicky"



The Tracking Process



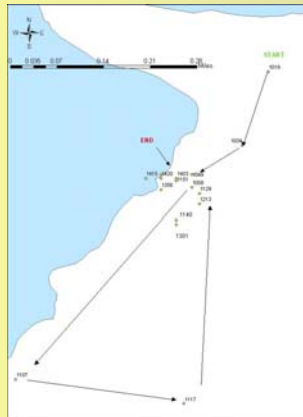
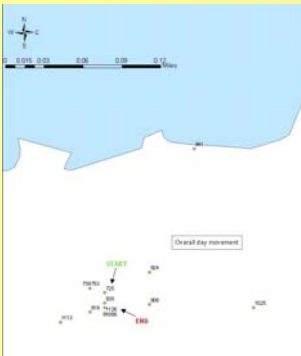
Area of study and location of stationary hydrophones



DAY MOVEMENTS

Figure 1: Nicky's movements on 7/15/2004
 All points are labeled with Eastern Standard times

Figure 2: Nicky's movements on 6/3/2004
 All points are labeled with Eastern Standard times



RESULTS

After many hot days and long nights of tracking Nicky and other stripers the data collected was analyzed and searched for emerging patterns in the movements of these fish. From the two day and two night mobile tracks of Nicky pictured here, it can be seen that this striped bass appears to move in distinct manners between day and night.

Figure 1: Little movement of Nicky between the hours of 7:25am and 11:26am

Figure 2: At 10:19am Nicky was found at the mouth of Little Sheepshead Creek and later moved south closer to the bank. When the last location was taken at 2:20pm, Nicky had moved back towards his original location.

Figures 3 & 4: Both night mobile tracks illustrated to the right show that Nicky starts out farther out into Little Egg Inlet and later moves up towards the bank or into the mouth of Little Sheepshead Creek.

Comparison of Nicky's day and night movements suggest that habitats which are close to land are preferred during the night. The reason for this behavior can be attributed to several factors. For instance, the movements of striped bass can be influenced by the change in tide. Presumably, the fish follow this pattern of movement in order to feed on prey items concentrated in the creek mouths at low tide (Able & Tupper 2000). Alternatively, creek mouths may serve as low energy refuges for fish undergoing the energetically expensive activity of digestion (Able and Szedlmayer 1993). It is well documented that stripers are almost exclusively nocturnal feeders during the summer months when sunlight penetrates deep into the water column. This selection of night time feeding helps explain why Nicky moved up into the creek mouth or next to the bank. Both of these sites are ideal for finding and pursuing prey while also offering protection. During the day, the sunlight becomes damaging to the striper's unprotected retina and encourages movement into deeper water.

NIGHT MOVEMENTS

Figure 3: Nicky's movements on 6/15/2004
 All points are labeled with Eastern Standard times

Figure 4: Nicky's movements on 7/13/2004
 All points are labeled with Eastern Standard times



Tupper, M., Able, K.W. 2000. Movement and Food Habits of Striped Bass. Marine Biology, 137, 1049-1057.
 Szedlmayer, S.T., Able, K.W. 1993. Ultrasonic Telemetry of Age 0 Summer Flounder. Copeia, 3, 728-736.

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