

# The Initial Impact of Acoustic Tagging On Behavior of *Paralichthys dentatus*



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## Introduction

It is difficult to directly observe marine species over long periods, making acoustic telemetry imperative to understand behavior (Hooker et al. 2007). Catch & release biotelemetry can be used to measure behavior, and/or mortality as a result of recreational or commercial by-catch (Donaldson et al. 2008).

It is important to observe the affect of catch & release biotelemetry on transmitter tagged fish's behavior, and determine if mortality occurs (Donaldson et al. 2008). Many studies follow long term behavior, but few study the impact of the tagging process on initial behavior.

This study examined the initial impact of transmitter tagging on summer flounder (*Paralichthys dentatus*). In order to accomplish this we needed to determine a baseline of initial behavior of live transmitter tagged fish to differentiate movement between live and dead tagged fish, for examining latent mortality. We expected tagging stress to result initially in a fright response, such as burying (Olla et al. 1972). Normal behavior would have constituted small scale movements within the habitat, independent of diel periodicity and tidal cycles (Sackett et al. 2007). Further, responsiveness to tidal changes should show the difference between live and dead transmitter tagged fish.

## Materials & Methods



Figure 1 - Immediately upon capture, fish were tagged with Lotek MA-11-18 transmitters and released near the middle of the hydrophone array.



Figure 2 - Transmitter Tagged Fish Ready



Figure 3 - Four Lotek WHS3050 76Khz Wireless Hydrophones were deployed in a thoro-fare in the Great Bay Estuary, NJ for acoustic tracking.



Figure 4 - Fish were actively tracked with a custom apparatus using stereo Lotek LHP\_1 hydrophones and a Lotek MAP 600 RT Re-

## Lotek MAP Acoustic Tracking

The MAP system is Lotek's latest coding system. It works on CDMA signals, utilizing up to 80,000 unique signals. This system requires a minimum of three hydrophones to trilaterate the position of a transmitter tag. Hydrophone clocks are synchronized with beacon tags. See Fig. 3 & 5.



Satellite View of Array  
Figure 5

## Results - Active Acoustic Tracking

This approach allowed us to see transmitter tagged fish's movement outside of the array. Fig. 4

**Fish Tag 60**—Exited the thoro-fare via the northern end into the Great Bay.

**Fish Tag 59**—Showed a similar pattern to tag 60, as it slowly migrated to the northern end of the thoro-fare, which was where it was located on the last day of tracking.

**Fish Tag 54**— Not as much data was collected as other fish, yet there were similar patterns. From active tracking, we could see similar patterns to Tags 59 and 60, but moving to the southern end of the thoro-fare.

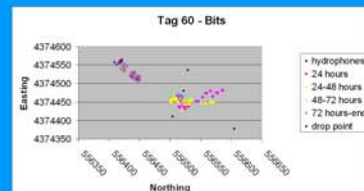
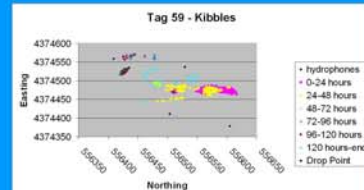
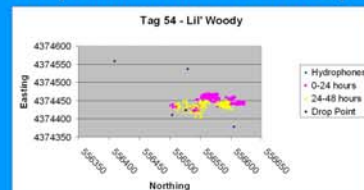
## Further Results

All three transmitter-tagged fish showed similar initial responses. Behavior appeared consistent to Olla et al. (1972) description of a fright response. Hydrophones did not detect transmitter tags until 5-6 hours after release, possibly indicating burying into the sediment. Some time gaps appear in data, possibly from very low tides, or algae (*Ulva*) covering the receiver. The breaks did not cause much disparity, as we still saw a consistent pattern of movement.

Up until about 48-72 hours after release, transmitter tagged fish stayed within the general area of the initial drop point.

48-72 hours after release, all tagged fish showed movement within the channel. After this time period, fish either progressively moved upstream, or downstream, not oscillating as dead transmitter tagged fish did.

## Daily Movement Within The Array



## Conclusions

Data was compared to a similar study (see Crawford et al. poster) where transmitter tagged summer flounder carcasses were tracked in the same thoro-fare. We saw no evidence of short term mortality and movement of live fish differed strongly compared to carcasses. Carcasses had a very short residence time compared to the live tagged fish, due to tidal influence. Most live transmitter tagged fish stayed within the thoro-fare throughout the entire study.

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