

Do Circle Hooks Reduce Release Mortality in Striped Bass?

Ninety percent of all recreationally caught striped bass are released alive. In 2020 alone, anglers released 31 million Atlantic migratory striped bass. However, releasing a fish alive doesn't guarantee that it will survive: the ASMFC's stock assessment estimates that 9% of those fish will die from the stress of being caught and released. Managers and stakeholders alike want to find ways to reduce this release mortality.

One option is using circle hooks, which have been shown to have a lower release mortality than traditional J-hooks for many species, including striped bass.

However, the work on circle hooks and striped bass has been limited. The studies are often conducted in freshwater, where release mortality rates are higher to begin with, and mortality assessed by keeping the fish in a net pen or pond after they are captured. Researchers from Massachusetts Division of Marine Fisheries (MA DMF), including Bill Hoffman, Mical Dean, Ben Gahagan, and Mike Armstrong, have set out to conduct a new study of release mortality in striped bass using the most up-to-date technique of acoustic tagging.

Acoustic tags are small electronic tags that can be attached or implanted in a fish. For this study, the tags record information on the fish's activity level (tail beat frequency). When the fish swims past a receiver that scientists have placed in the ocean, the tag reports the information it has recorded, including the location of the fish, whether it was active and moving around after release, or if it died and sank to the bottom. Unlike keeping the fish in a protected environment like a net or pen, this approach is more realistic, allowing the fish to behave normally in its natural environment.

MA DMF scientists tagged 176 striped bass last summer in Massachusetts waters. The tags were spread over three size categories of fish: undersize fish (less than 28 inches), legal fish in the slot (28-35 inches), and fish larger than the slot (35



inches and greater).

The project is interested in other factors that can affect release mortality, not just hook type, so the researchers recorded information on water temperature, the skill level of the angler that caught the fish, the fight time, handling time, and the time it took to release the fish. Researchers also recorded the size of the fish, where it was hooked, and its condition when it was released (i.e. how

healthy it looked and whether it was bleeding or injured).

The fish were caught and released in Salem Sound just off the coast of Massachusetts where an array of receivers has been set up to detect acoustically tagged fish.

Researchers found that some fish stayed in the area almost the whole summer, while others only stayed in the array for a few minutes before moving on.

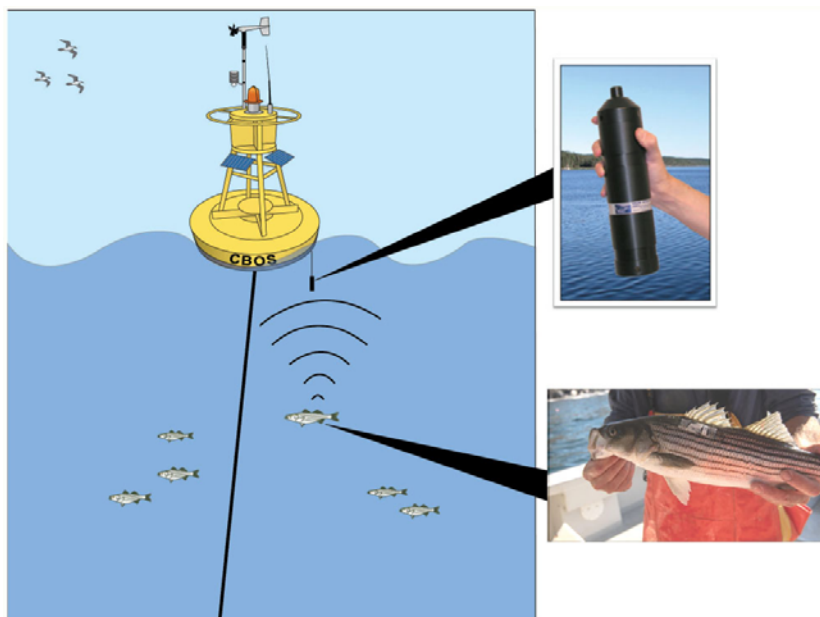
Unfortunately, the tags can be detected by receivers set out by other scientists, and there have been receiver arrays up and down the coast that the tagged fish may swim through.

Of the 176 fish tagged last summer, 14

were confirmed dead based on the tag data: their tags showed their tail beats flatlined and stopped moving. For some fish, this happened almost immediately after they were released; other fish were active for several days before they died.

In addition, 23 fish are currently missing, with unknown status, because of their tags have not been detected by the array. This could be because they survived and swam out of the array, or because they died and sank in an area that doesn't have array coverage. The researchers are trying to track them down by looking for them in data arrays in other locations on the Atlantic coast and by taking a mobile receiver out to search for the tag in the array dead zones.

The results in the back-of-the-envelope mortality rate of 8%-16% (depending on what is assumed about the fate of the missing and unknown fish). **(to page 39)**



When a tagged fish (lower right) swims by an acoustic receiver (upper right), information on the fish's activity level and location are transmitted to the receiver. That information can be retrieved by researchers to determine if the fish has moved from its release location and, therefore, survived after being released. Fish tagged in MA can be detected in arrays managed by other researchers up and down the coast, including in Chesapeake Bay.