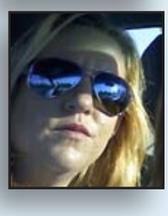
Electronic Tagging Yellowfin Tuna in the Gulf of Mexico – Some Preliminary Observations



Brett Falterman is a Biologist Manager with the Louisiana Department of Wildlife and Fisheries and manages and directs the agency's pelagic research and monitoring projects. Brett has been working on pelagic research projects for almost 20 years and has been addressing issues in fisheries management in the Gulf of Mexico with satellite tags now for 10 years, including projects on billfishes, tunas, coastal and pelagic sharks, and tarpon.

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Yellowfin tuna (*Thunnus albacares*) is a circumglobally distributed fish that supports substantial fisheries in tropical and subtropical waters throughout its range. The fishery in the Atlantic Ocean is managed as a single stock by the International Commission for the Conservation of Atlantic Tunas (ICCAT). While Atlantic stocks of yellowfin tuna have historically been in good shape, the most recent stock assessment indicates that stocks may be falling below target levels. One assumption of the single-stock hypothesis is that yellowfin tuna production in the Atlantic is driven by the spawning grounds in the Gulf of Guinea, off the west-central coast of Africa. However, all life stages of yellowfin tuna are known to occur in the Gulf of Mexico. And while tuna are a highly migratory species, substantial recreational and commercial user groups are based in the state of Louisiana and preliminary tagging studies have suggested a high-degree of site fidelity in the region. Given that the connectivity between the Gulf of Mexico yellowfin tuna resource and the Atlantic-wide population is unresolved, the Louisiana Department of Wildlife and Fisheries (LDWF) has initiated a comprehensive research project in the northern Gulf of Mexico to better understand the Gulf of Mexico yellowfin tuna resource.

The offshore waters adjacent to the Louisiana coast provide a unique and productive habitat for yellowfin tuna and other pelagic fishes. The Mississippi River, North America's largest drainage system, discharges nutrient-rich fresh water into the Gulf of Mexico which then interacts with the offshore Loop Current. This interaction occurs along a narrow continental shelf containing over 4,000 fish-aggregating structures (i.e. oil rigs), resulting in an oceanographically dynamic and productive ecosystem which supports a rich, diverse, and accessible fishery.

A primary objective of our study is to describe long-term movement of yellowfin tuna in the northern Gulf of Mexico. Pop-up satellite tags (PSATs) are great tools for describing horizontal and vertical movements of fishes and have been used extensively on many pelagic species. However, yellowfin tuna are a challenging candidate for this approach, as most researchers to date have experienced poor tag retention. We've made three adjustments to our methodology in order to increase retention and achieve our objective: increase the minimum size for satellite tagging candidates (120 cm curved fork length), improve attachment (described below), and incorporate internal archival (IA) tags.

Our team has been refining our handling and tagging techniques since 2003. Using heavy recreational gear to minimize fight times and optimize release condition, tuna are landed quickly, brought on board with a large landing net, and transferred to a padded cradle where the gills are aerated with seawater. We anchor the tag in the area of the second dorsal pterygiophores where bone density is heaviest using a dart-less attachment method that involves inserting a heavy, hollow splicing needle into the fin base through which we then thread a short section of 300-lb monofilament line. In order to comply with MTI's recommendation about proximity of metals to the tag release wire, our initial tether design had a 1.5-in "pigtail" between the crimp at the rear-margin of the fin and the tag. This tether design and our strict minimum size (120 cm CFL) have resulted in a three-fold increase in the average days-at-large (DAL) when compared to other published studies in the region. We have since moved to a "figure 8" configuration with the crimp anterior to the second dorsal fin, thus completely removing any tether-length between the tag and the fish. Our hope is that this will greatly reduce tag movement during deployment and produce superior retention times.

Photos by B. Falterman, LDWF

The base of the second dorsal fin was targeted for MTI X-Tag attachment in yellowfin tuna, following a "pigtail" (left) and "figure 8" (right) approach in an attempt to improve tag retention.

The incorporation of IA tags has also benefited the scope of our tagging study. While recapture is required to recover the data, the tags we're using can record data for 3-5 years. After just 1.5 years since our first IA deployment, we've experienced a recapture rate of almost 10%. Additionally, IA tags have allowed us to incorporate smaller size classes than PSAT attachment (IA: n=102, range 66-133 cm CFL, mean= 102.1 cm; PSAT: n=16, range 121-150 cm CFL, mean 136.8 cm).

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Photo By L. Kitchens, TAMUG

Yellowfin tuna being netted in preparation for MTI X-Tag attachment.