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| **I/UCRC Executive Summary** | **Date**: April 15, 2020 |
| **Title:** Understanding the utility of archived tag-recapture data for evaluation of movement and mortality estimation | |
| **PI: Robert Leaf** | |
| **Center/Site**: Science Center for Marine Fisheries (SCeMFiS) | |
| **Statement of Problem**: The most recent Gulf Menhaden Stock Assessment report recommended replicating the tagging work performed by NOAA scientists, which were extensive: Ahrenholz tagged 237,000 *B. patronus* from 1970 to 1985. These studies involved tagging juveniles and adults with internal, individually-numbered tags that were recovered by the commercial fisheries. Leaps in the computational power and statistical modeling approaches in has made re-analysis of the previously collected data a very worthwhile endeavor. | |
| **Deliverables**: We have partnered with Dr. Amy Schueller NOAA scientists at the Beaufort Lab to understand the feasibility of a comprehensive reanalysis of the tag and recapture data. Our primary focus will be to catalog, organize, and summarize the paper records held by NOAA at Beaufort. The primary focus will be to evaluate the paper data for completeness for the Gulf of Mexico Menhaden Stock. Milestones include (1) acquisition of necessary, existing data resources, (2) Quality assurance and quality control, (3) Evaluation of utility. | |
| **Status relative to deliverables:** We have completed each of the deliverables and have prepared a report “Gulf-Menhaden-Tag-Recapture-Project-Summary.pdf”, that can be accessed here (<https://github.com/rtleaf/Gulf-Menhaden-Tag-Recapture>). The data are formatted for inclusion into tag-recapture models and have been fully QA/QC’d. | |
| **Summary of results relative to deliverables:** Three primary sources of data were identified: The tag and recapture histories of adult and juvenile individuals, magnet efficiency trials, and tag and recapture histories of adults with fork-length. | |
| **Challenges to project completion and recommendations addressing the same:** In comparison to the magnitude of tagged and recaptured individuals used by Liljestrand et al., the data we have synthesized has fewer number of recaptures (Leaf Report, Fig. 3, 4). However, the overall rate of recapture is generally high (Table 1 and 2) - fewer fish were tagged in the Gulf of Mexico, than in the mid-Atlantic. One difference in the modeling approach we propose to use that contrasts that of Liljestrand et al. is that we will not estimate movement parameters - we don’t have geographic movement parameters in these data. Omitting these parameters in the modeling effort should improve the ability of the model to derive precise estimates of mortality. Having positive rates of recapture (~3%) is a necessary characteristic of using mark and recapture models. Another aspect of the tag-recapture work, that is necessary for using contemporary models for parameter estimation, is to have recapture occurrences at many sampling efforts. Figure 2 indicates that both life stages have times ‘at large’ of less than and greater than 500 days. Mark recapture modeling attempts to determine (at least) two related parameters - survival and probability of recapture. The second parameter (probability of recapture) is in part determined by observation error. The plant- and year-specific capture probability derived from the trial data, different plants have varying ability for tag detection. These modeled parameters, derived from the data, can be incorporated into the model, as Liljestrand et al. has done. In conclusion, the magnitude of the data (number of recaptures, magnet trials) and its structure (varying times ‘at large’, stage specific tagging) are likely appropriate for modeling. I would recommend that this be attempted. | |