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1018-0127 Proposed Information Collection – Horseshoe Crab Tagging Program

Is collection of data necessary; does it have practical utility?

Long-term tagging studies on horseshoe crabs are necessary to evaluate migratory patterns and develop survival and abundance estimates. As important, long-term tagging studies will help resource management agencies properly direct horseshoe crab harvests, and regulate state harvest quotas, to prevent damage to breeding populations and support sustainable levels of horseshoe crab use (including both biomedical and bait) as well as other natural resource values -- especially restoration of the Delaware Bay migratory shorebird stopover and the red knot population.

Tag recovery data could provide important information on the Atlantic Coast distribution of various horseshoe crab breeding populations (that migrate from in-shore breeding areas to the Atlantic Coast during late summer through winter, ~August to ~March). Currently, most horseshoe crab harvests occur off the Atlantic Coast (~August to ~March), but there is little understanding of how many crabs are harvested from different breeding populations or the impacts of these harvests.

Tag return data could be useful to:

- inform managers on the proportional take of various breeding populations in the harvests of states (that occur during the non-breeding period off of the Atlantic Coast)
- understand seasonal movements (from inshore breeding sites to Atlantic Coast sites in fall and winter) that may cause some breeding populations to be harvested in greater number depending upon when and where harvest trawls are conducted
- allow estimates of non-breeding distribution, and degree of overlap along the Atlantic Coast, of the different breeding populations

Benefits of the tagging studies:

- Cost effective, work done mainly by volunteers; can be facilitated by state agencies and NGO's interested in horseshoe crabs and shorebirds.
- A large amount of data can be gained from spawning beach search efforts by volunteers
- Long-term studies are few, and long-term mark-and-recapture studies are extremely valuable for various estimates (survival, population size, breeding origin, migratory movements, proportion of breeding populations harvested annually)

This long-term mark-and-recapture study is most important because:

- Horseshoe crabs take 9 to 10 years to sexually mature, and harvests are focused on breeding-age crabs, particularly females that are favored for both bait and biomedical use.
- Pressure to allow greater bait harvest is increasing, despite evidence that the Delaware Bay breeding population, especially females, has not shown signs of recovery; New England crab populations are also declining creating additional harvest pressure on Delaware Bay crabs.
- Demand for crabs for biomedical bleeding has increased by 47% between 2004 and 2010 (~320,000 to ~550,000 crabs); demand is estimated to increase by an average of 20% annually for the foreseeable future (Eyler et al. 2011).
- Currently, ~92% of the global supply of Limulus Amebocyte Lysate (LAL) comes from the American horseshoe crab population via bleeding labs in MA, NJ, MD, VA, and SC. Asian horseshoe crabs, which currently provide 8% of the global supply of lysate (B. Swann pers comm.), are severely overexploited and are declining or endangered throughout their range.
- The current Delaware Bay region horseshoe crab population is now too small to recover red knots and other migratory shorebirds that use Delaware Bay.
- For these reasons, it is essential to judiciously manage the US horseshoe crab population to ensure a healthy population that can support biomedical use, bait harvest and recovery of red knots.

Recommendations to enhance the quality, utility, clarity of information collected and reduce burden of information collection on respondents:

Difficulties currently exist that if ameliorated would greatly improve our understanding of population distribution and movements (breeding and non-breeding) and improve population size estimates:

1) Currently, about half of all tagging is done by Lysate producers who collect crabs off of the Atlantic Coast during the non-breeding period; therefore, breeding origin is unknown unless these tagged crabs are recovered on spawning beaches.
2) Unfortunately, outside of Delaware Bay, there is little tag recovery effort on spawning beaches especially in MD and VA, in part because some of these beaches may be less accessible (need a boat).
3) The lack of effort on MD and VA spawning areas (i.e., Delmarva Coast), and the inability to compare tag recovery rates between Delaware Bay and other sites (e.g., catch per unit effort), leaves fisheries managers reticent to use the results of tagging studies.
4) Finally, trawls apparently recover few tags overall while spawning beach effort recovers many tags (animals are more concentrated; tags may be more abundant and visible).

Recommendations to Improve Tagging and Tag Recovery Study:

1) Large improvements in data quality could be made by increasing tag recovery effort (and tagging) on spawning beaches in MD, VA (and other regions outside of Delaware Bay) thereby increasing the number of “known breeding origin” crabs available for recovery either by trawl or spawning beach effort.

2) Tagging by lysate producers should continue contingent upon findings of studies by South Carolina and Massachussetts on mortality produced by bleeding and tagging; (anecdotal information suggests that bleeding and tagging may increase mortality over either bleeding or tagging alone). Crabs tagged during non-breeding are still "unknown breeding origin"; however, this tagging effort provides a large marked population available for recovery on spawning beaches.
3) Improvements in tag recoveries via harvest trawls might be achieved through better incentives for fishermen to report tags (develop incentives with input from fishermen). However, trawls apparently produce few tag recoveries per unit effort, so tag recovery effort should be focused more on spawning beaches.
4) Increased effort to have volunteers record amount of time spent searching for tags could allow calculation of Catch Per Unit Effort (CPUE); this would help with comparison of tag return rates from various spawning areas (i.e., breeding populations).
5) The current on-line reporting system seems easy to use and does not seem onerous for respondents; perhaps batch reporting could be facilitated for online reporting or one-on-one interaction with fishermen who report tags could be facilitated through states or volunteers.

Literature Cited:

Eyler, S., S. Michels, D. Brzezinski. 2011 Review of the Fishery Management Plan in 2010 for Horseshoe Crab (Limulus polyphemus). Report to the ASMFC Horseshoe Crab Management Board. March 23, 2011.