American Littoral Society * Conserve Wildlife Foundation of New Jersey * Delaware Riverkeeper Network * New Jersey Audubon Society

January 31, 2012

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The American Littoral Society, Conserve Wildlife Foundation of New Jersey, Delaware Riverkeeper Network, and New Jersey Audubon Society appreciate the opportunity to comment on the Draft Addendum VII to the Interstate Fishery Management Plan for Horseshoe Crabs. The horseshoe crab is of unique value in the biomedical industry and as a bait fishery and is of exceptional importance to many species of migratory birds that are highly dependent on its abundant eggs for refueling during migratory stopovers. To ensure the future of this species and to continue to derive the many benefits it provides over the long term, the horseshoe crab must be managed sustainably through an adaptive framework that is risk-averse and undergoes continued improvement based on ongoing data collection.

The red knot (*Calidris canutus rufa*) is one species that depends heavily on abundant horseshoe crab populations. Horseshoe crab eggs serve as the primary food source of red knots passing through the Delaware Bay. A positive relationship exists between horseshoe crab spawning abundance and the probability of red knots gaining mass during stopover, which is critical for survival (McGowan et al. 2011). While red knot numbers have remained fairly stable since 2003, these numbers are reduced as compared to historic levels and the 2010/2011 count found a decline in red knots by approximately one third as compared to 2009/2010 (Dey et al. 2011). Despite a decade of restrictions on horseshoe crab harvest, evidence of recovery is lacking. The most recent review of the Adaptive Resource Management (ARM) model by the ASMFC's ARM committee estimated the recovery period for horseshoe crabs may be between 60 to 100 years given the management options now in place. Further, the most recent data from the horseshoe crab benthic trawl survey (figure 1) shows no improvement over the last ten years. At reduced numbers and faced with other additional pressures (e.g. increased severity and frequency of tropical storms in the Atlantic Ocean), red knots require a robust horseshoe crab population, and certainly cannot afford greater declines in horseshoe crab abundance. Management of the horseshoe crab must reflect this need and the needs of other dependent species and it must recognize the demonstrated lack of recovery seen under current policies.

The Atlantic States Marine Fisheries Commission's Horseshoe Crab Management Board (Board) requested comments regarding management options outlined in Draft Addendum

VII. We find option #3 to be the most viable approach to managing the horseshoe crab sustainably. The adoption of the ARM model is the preferred approach but there are a number of weaknesses that must be addressed:

1. The ARM model currently assumes all horseshoe crab mortality is represented but it does not account for mortality related to lysate bleeding, bycatch, and illegal harvest. All mortality should be forthrightly reported and included in the ARM model.
2. The allocation of the ARM model harvest relies on the proper definition of boundaries between the Delaware Bay breeding population ("Delaware Bay Origin") and more southerly populations of horseshoe crabs. However, the data used for this purpose are incomplete. Thus, characterizations of the spatial distribution in genetically distinct segments of mid-Atlantic horseshoe crab populations are flawed.
3. Virginia has not reported the sex of 9 to 35% of its annual harvest (mean 18%, 2003-2009) even though sex is easily determined by the presence of claspers on males.
4. Maryland is prohibited from harvest and landing of horseshoe crabs for bait between January 1 and June 7 but this restriction applies to Virginia only in federal waters, thus allowing Virginia to harvest in state waters year round.

If an option other than the ARM option is selected, Maryland should honor its voluntary compliance with harvest sex ratios of 2:1 male:female.

Our comments regarding the implementation of the Adaptive Resource Management Framework (option #3) are as follows:

3a. What option for lambda (λ) best represents how much of each state's horseshoe crab harvest originates in Delaware Bay?

New Jersey and Delaware should have lambda values (λ) equal to one (1.0). Elsewhere, it is not appropriate to assume that all crabs have a Delaware Bay origin, although this would be the most risk-averse and favorable approach with respect to protecting the resource for shorebirds. We support using genetic data for understanding how much of each state's horseshoe crab harvest originates in Delaware Bay. Although the sampling scheme for the genetic analysis was not as robust as we may have liked, these are the best data available for determining origin.

3b. On what basis should the total recommended ARM harvest output be divided among the four states of New Jersey, Delaware, Maryland, and Virginia?

We believe that allocation among the states should be based on the Addendum VI quotas (which have been in place since Addendum IV) because of their risk-averse nature in protecting male Delaware Bay horseshoe crabs. We believe that male horseshoe crabs are still important to the Delaware Bay horseshoe crab population, and the use of Addendum

VI quota offsets some of the devaluation on male horseshoe crabs within the ARM model.

3c. Should there be an overall harvest cap placed on Maryland and Virginia's harvest to protect non-Delaware Bay-origin horseshoe crabs (harvest cap)? If yes, what timeframe or management period should be used to establish the cap?

We support an overall cap on horseshoe crab harvests by Maryland and Virginia, providing protection to non-Delaware Bay-origin crabs. A harvest cap based on Addendum VI allocation levels serves as a precautionary measure against overharvest of non-Delaware Bay crab populations. The Delaware Bay Ecosystem Technical Committee and the Shorebird Advisory Panel indicated that there is no evidence populations of non-Delaware Bay crabs can sustain higher harvest levels.

3d. Should there be an allowable harvest of Delaware Bay-origin horseshoe crabs for Maryland and Virginia if the ARM-recommended harvest option requires a moratorium on one or both genders (Delaware Bay Stock Allowance) and at what level should that harvest be set?

We believe that adhering to the ARM recommendation regarding female harvest is of utmost importance. Implementing a Stock Allowance would mean significant increases in the harvest of females in Maryland and Virginia, many of which would be of Delaware Bay origin. There is consensus from the population biologist community on the importance of females to recover horseshoe crab stocks that allow for healthy shorebird populations and a sustainable harvest. The value of males in sustaining horseshoe crab populations must not be overlooked either, nor the uncertain impacts of skewed harvest to population dynamics. We feel that deviating from the ARM recommendation not only compromises this fundamental purpose, but presents a serious issue for law enforcement and compliance. The ARM process represents a significant transition in horseshoe crab management, and we believe that implementing a Delaware Bay Stock Allowance complicates the interpretation of the management measures' impact and the double loop assessment process.

3e. Should the Delaware Bay Stock Allowance include a 2:1 male:female offset for female crabs below the Addendum VI levels?

We do not support a 2:1 male:female offset to compensate for loss of a female harvest under the ARM management recommendations (female harvest moratorium). We believe that males are undervalued and the impact of a skewed harvest to horseshoe crab population dynamics is unclear. Given the already skewed harvest regime, we believe additional pressure on the male segment of horseshoe crab populations is problematic.

3f. If the data used to implement the ARM Framework becomes unavailable, should the Commission include a fallback option?

The ARM Framework and its ability to contribute to the recovery of horseshoe crabs hinges on the availability of annual data sets. Dependence on a fallback approach would be unacceptable. Without these data, implementation of the ARM Framework would mean poorly informed management decisions and increase challenges to the recovery of this species. Investment in and a strong commitment to this data collection must therefore be a priority. That being said, should an emergency situation make unavailable the necessary annual data to run the ARM model, the Board should consult the Delaware Bay Ecosystem Technical Committee, Shorebird Advisory Panel, and Horseshoe Crab Advisory Panel to review the available data and make recommendations moving forward with the understanding that data collection must resume immediately.

The horseshoe crab is a highly valuable species and its future and the continued benefits of its many uses depend on current and improved efforts to manage it sustainably. The ARM Framework provides an opportunity for an improved approach to the management of the horseshoe crab but its weaknesses must be addressed, the data that are so critical to its use must be collected annually, and the value of a risk-averse approach must not be overlooked. Thank you for considering these comments. Please feel free to contact us with any questions.

Sincerely,

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