



Delaware
Ornithological
Society

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September 30, 2022

Caitlin Starks, Senior FMP Coordinator
1050 N. Highland Street
Suite 200A-N
Arlington, VA 22201
Email: Comments@asmfc.org

RE: Comment on Horseshoe Crab Draft Addendum VIII

Dear Ms. Starks:

The Delaware Ornithological Society (DOS) is an all-volunteer, 501(c)3 nonprofit representing hundreds of members in Delaware and adjacent states. Our mission is the promotion of the study of birds, the advancement and diffusion of ornithological knowledge, and the conservation of birds and their environment. Our small grassroots organization has helped lead collaborative conservation efforts for bird habitat over the past decade, raising well over half a million dollars in private matching funds for habitat acquisition through our annual Delaware Bird-a-Thon fundraiser, working with our State and NGO partners to leverage these funds to help purchase habitat along the Delaware Bayshore.

DOS opposes the adoption of Draft Amendment VIII to the Horseshoe Crab FMP and urges the Horseshoe Crab Management board to adopt the No Action alternative at this time, based on the following concerns:

Inappropriate Management Objectives / Harvest Functions for Ecological Integrity

While we appreciate the tremendous amount of effort that has gone into the ARM Revision process (especially moving the model from a software-package based approach to open source and industry standard R programming environment, which should make public review and future model revision easier), we have significant concerns about the adoption of the Revised ARM to set harvest quotas for horseshoe crabs. The revised ARM model has a number of important flaws, the most critical being that it does not include as a management objective the timely increase of either the horseshoe crab (HSC) or *rufa* Red Knot (REKN) populations toward any metric related to an estimate of ecological carrying capacity, as the original ARM had done.

In fact, rather than estimating carrying capacity (as the previous ARM did, albeit from limited data and literature) and setting as a goal a metric related to that estimate, this model seeks only to achieve a long-term equilibrium in HSC that would actually be significantly *lower* than the current model-based female population estimates for Delaware Bay. (7.3 million female HSC at ARM projected equilibrium vs. the current population estimate of 9.4 million female HSC) (Figure 15 of Supplemental Peer Review Report). This equilibrium point in the projection would have no real relationship to the concept of ecological integrity. While we appreciate that the prior carrying capacity estimate from the original ARM was based on limited data, we find it extremely concerning that the *objective* of meeting 80% of an estimated carrying capacity for DE bay area

HSCs has been abandoned in the Revised ARM and by extension the Proposed Draft Addendum and that this change in objective has been couched in terms of improved science, when it is in fact a change in management philosophy. The Peer Review Panel echoed this when they stated that “The new utility and harvest functions are a representation of values.” The fact that the original ARM model involved a so-called “knife-edge” threshold vs. continuous harvest recommendation is not a valid reason for a major change in the philosophical underpinnings of the model with respect to ecological integrity. In fact, the knife-edge concern is not at all relevant when the Revised ARM projection levels out at over 2 million fewer female crabs than currently estimated.

The Revised ARM model would have allowed female HSC harvest throughout recent years even though female HSC abundance is positively correlated with REKN adult survivorship ($\beta_1 = 0.37$ 95% CRI: 0.12, 0.6) in the model, thereby unnecessarily extending the timeline to REKN population rebound. Given the Red Knot stopover population trend uncertainty described below, and with the increasingly unpredictable effects of climate change on both survival and recruitment, no avoidable delay in recovery of this federally Threatened bird is acceptable.

ARM Model Uncertainties and Narrow Ecological Lens

The valid scientific concerns about the data upon which the model is based have been detailed extensively by others. We remain concerned that the only HSC-specific trawl survey, the VA Tech Swept Area survey, indicates a less robust population rebound than the DE and NJ trawl data. It is also our understanding that the unpublished study by Smith et al. for egg density at a NJ site shows similar general trends to the VA Tech trawl survey for the corresponding time frame (Arnstead per comm.).

Important methodological concerns brought up with the ARM by the peer review panel must be carefully considered prior to adopting the Revised ARM. E.g. “The Panel noted the estimated primiparous and multiparous HSC abundances have large uncertainties for 2012-2015 when the VT data are not available. In particular, the primiparous estimates for these years are not reliable, potentially introducing large uncertainties (and biases) in the projection model and ARM. The Panel agrees that such uncertainty will be reduced when more years of survey catch data become available in future.”

Just as important, while the concept of the ARM model for multi-species adaptive management was a great start a decade ago, that foundation should have been built upon by incorporating into the model available population data for other migratory shorebirds of conservation concern that heavily utilize HSC eggs on migration stopover, including Semipalmated Sandpiper, Sanderling, and Ruddy Turnstone (Tsipoura and Burger 1999). If this is not currently possible a more conservative approach to selecting acceptable HSC population endpoints is warranted to account for the importance of HSC eggs to bird species of concern other than the Red Knot, as well as other important aquatic species in the food web supported by the keystone HSC.

Red Knot Population Uncertainty

Recent shorebird project mark/recapture data has shown extremely wide variance in 95% confidence intervals for the actual REKN population estimates due in part to reduced banding and resighting effort during the COVID pandemic. “While the number of birds detected in 2021 was similar to the number detected in 2020, this number of individuals resighted within a season is

lower than recent (pre-COVID-19) years given the limited use of volunteers for safety reasons. The number of marked birds detected and available for analysis in 2021 was approximately 48% lower than the number in the 2019 analysis (n = 3,072 birds) and 58% lower than the number detected and used for analysis in 2018 (n = 3,820)" (Lyons 2021).

This reduced *n* value for resighted birds, perhaps also due to reduced resighting probability associated with apparently shorter stopover times (Lyons 2021), has resulted in 95% confidence interval widths for the Red Knot stopover population estimate of 16,339 and 19,262 for 2020 and 2021, respectively, the first time since the model began that CI width exceeded 7,000 in two successive years (<7,040 in 7 of the prior 9 years from 2011 to 2019). At the same time, the lower end of the confidence interval for the population estimate dipped well below 40,000 birds for the first time since the initiation of the model (2013 was the only other year with a CI endpoint below 40,000).

The Draft Addendum states that "If Option B is selected, implementation of the ARM Framework Revision would likely occur for the 2023 fishing season" We feel that it is highly imprudent to implement female HSC harvest at a time when we have some of the poorest recent data on the REKN population, with 95% Confidence Intervals spanning 40-45% of the population estimate. This is unacceptable data upon which to base an increase in female HSC harvest under any circumstances.

Failure to Incorporate Climate Change

While the Revised ARM model includes an input for Arctic snow cover on the Red Knot breeding range, it does not include any other climate related inputs (such as trends in water temperature, etc.) and it cannot account for stochastic events related to climate change, such as storm events.

In fact, the Peer Review Panel recommended that the WG "Evaluate the effect of climate change on horseshoe crabs and red knots. This includes the effects of warming temperatures, sea level rise, and storm frequency and intensity on the timing and duration of spawning, movement of crabs into and out of Delaware Bay, and effects on spawning habitat."

With the rapidity of current climate change, harvest should remain appropriately conservative until this research has been initiated and relevant data is available. Opening female harvest while REKN populations are not recovered, and with a known significant possibility of stochastic events that may affect HSC spawning and/or REKN survival is not a conservative approach to managing this sensitive resource.

Limited Stakeholder Engagement


As stated in Draft Addendum VIII, "A goal of the ARM Framework is to transparently incorporate the views of stakeholders along with predictive modeling to assess the potential consequences of multiple, alternative management actions in the Delaware Bay Region." However, this ARM revision was conducted with minimal outreach effort to stakeholders and did not incorporate the views of conservation stakeholders in determining acceptable model endpoints and harvest functions. We agree with Walsh who states in her minority report that "The proposed new utility function [harvest function as corrected by the PRP] substitutes very different values and risk

attitudes under the umbrella of technical updates, outside of a forum for meaningful stakeholder input and absent any process to solicit updated stakeholder viewpoints.”

The Peer Review report states that “the Panel also understands the inability of the WG to convene a truly representative group of stakeholders for this revision, and therefore also recommended the WG use the outcomes of the sensitivity analyses to confirm the harvest function itself does truly represent the previously-articulated desires of stakeholders from the original ARM Framework (2009).” We would argue that revisiting stakeholder desires is a necessary aspect of the ARM Revision, because of turnover in stakeholder representatives and the tremendous amount of additional data and information available to those stakeholders over the past decade. Stakeholder values and opinions change over time and basing harvest functions being presented to the public on stakeholder input from 12 years earlier is questionable at best. There is no reason that the ASMFC HSC WG could not have virtually/remotely convened stakeholders to inform what amounts to major changes in harvest philosophy and values within this revision.

In summary, we urge the ASMFC Horseshoe Crab Management Board to select the No Action alternative at this time. It would be imprudent at present to open a female HSC harvest in Delaware Bay and the ARM should be revisited with broad ecological sustainability and population restoration goals in mind, and with significantly increased public and stakeholder engagement in the process, in keeping with the ARM objectives.

Sincerely,

A handwritten signature in cursive script that reads "Matthew Sarver". The signature is written in black ink on a light-colored background.

Matthew Sarver, DOS Conservation Chair

Literature Cited

Lyons, J.E. 2021. *Red Knot Stopover Population Size and Migration Ecology at Delaware Bay, USA, 2021*. A report submitted to the Adaptive Resource Management Subcommittee and Delaware Bay Ecosystem Technical Committee of the Atlantic States Marine Fisheries Commission. <https://documents.dnrec.delaware.gov/fw/Shorebirds/Lyons-2021-REKN-Stopover-Pop-Size-at-Del-Bay.pdf>

Tsipoura, N., & Burger, J. 1999. Shorebird diet during spring migration stopover on Delaware Bay. *The Condor*, 101(3), 635-644.