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Submitted via email: marine.fish@mass.gov

Re: Comments on MA DMF's Horseshoe Crab Management Proposal

Conservation Law Foundation appreciates the opportunity to comment on this important issue and your Proposal on Horseshoe Crab Management.¹ In the bait fishery, we support the proposed 40,000 crab decrease in this action but urge MA DMF to work with fishermen on bait alternatives that would allow this fishery to be phased out. We do not support the proposed 80,000 crab increase in the biomedical sector. There are alternatives already in use by Eli Lilly and other pharmaceutical companies, and any increase in quota incentivizes the pharmaceutical industry to delay necessary research that would secure FDA approval of alternatives.

For the long-term health of horseshoe crabs and the marine ecosystem, CLF proposes MA DMF move towards prohibiting harvest for all purposes. Horseshoe crabs are integral to ecosystems in the Commonwealth as part of the food web.² Adults and their eggs provide food for migratory birds, such as the red knot and Hudsonian godwit, as well as threatened and endangered species such as endangered loggerhead sea turtles.³ At least nine valuable commercial fish species, including Winter flounder and swordfish, prey on horseshoe crabs.⁴ Horseshoe crabs could play an even larger role in our environment if the population increases and they become a reliable and abundant food source.

Historically, the residents of the Commonwealth used horseshoe crabs in many ways that put pressure on the species including for use as fertilizer, bait for the whelk and eel fisheries, and as a source of *Limulus ameobocyte lysate* (LAL) for the biomedical industry.⁵ Local municipalities considered horseshoe crabs to be a threat to certain shellfish (including soft

¹ MA DMF, Public Hearing Proposal on Horseshoe Crab Quota Management, (Dec. 12, 2025) <https://www.mass.gov/doc/2026-commercial-hsc-quota-reallocation-proposal/download>.

² Jordan Krisfalusi-Gannon et al., *The Role of Horseshoe Crabs in the Biomedical Industry and Recent Trends Impacting Species Sustainability*, 5 *Frontiers Marine Science* (June 4, 2018), (available at <https://www.frontiersin.org/journals/marine-science/articles/10.3389/fmars.2018.00185/full#F3>).

³ *Id.*; Manomet Center for Conservation Sciences, U.S. Shorebird Conservation Plan 2001, Appendix 2 (May 2001), <https://www.shorebirdplan.org/wp-content/uploads/2013/01/USShorebirdPlan2Ed.pdf>; NOAA Fisheries, Loggerhead Turtle (May 29, 2025), <https://www.fisheries.noaa.gov/species/loggerhead-turtle>.

⁴ Jordan Krisfalusi-Gannon et al., *The Role of Horseshoe Crabs in the Biomedical Industry and Recent Trends Impacting Species Sustainability*, 5 *Frontiers Marine Science* (June 4, 2018) (also including sand shrimp, American eel, Atlantic silverside, catfish, devil ray, mullet, northern kingfish, silver perch, summer flounder, striped bass, weakfish, and white perch).

⁵ MA DMF News Second Quarter 2006, Responsible Management Strategies Reduce Horseshoe Crab Take in Massachusetts, 8-9, (2006) <https://www.mass.gov/doc/dmf-news-2nd-quarter-2006/download>.

shelled clams), leading them to set bounties for crabs up until 1970.⁶ As a result of the many historical uses, since the 1950s, hundreds of thousands of horseshoe crabs die each year.⁷

In 1997, the Atlantic States Marine Fisheries Commission (ASMFC) began regulating horseshoe crabs following concerns that the species faced over-exploitation, but due to a lack of data they could not establish biological reference points to define when the species is “overfished” or experiencing “overfishing.” Those definitions still do not exist today.⁸ The ASMFC measures recovery by comparing today’s population size to its size in 1998, the first year of management.⁹ This means that the index-based reference point for managing recovery centers on a population size determined after decades of removal of hundreds of thousands of crabs each year. Despite this low benchmark, a large share of surveys in the Northeast, 34-65%, indicate that the population is more likely than not still below the 1998 level.¹⁰ Horseshoe crabs have not recovered to the reduced abundance level of 1998, let alone the population size that existed before decades of exploitation.

Horseshoe crabs also face threats to recovery due to climate change. The species is experiencing a loss of spawning and nursery areas due to extreme weather, sea level rise, and coastal development.¹¹ Climate change will only increase those risks as severe weather events become more frequent and sea level rise accelerates.¹² With threats to horseshoe crabs growing, now is not the time to increase the horseshoe crab harvest quota. Instead, CLF supports MA DMF beginning to phase out the horseshoe crab harvest.

Harvest of Horseshoe Crabs as Bait Should be Phased Out as Soon as Possible

While MA DMF’s Notice proposes to reallocate 40,000 crabs from the bait quota such that it would decrease from 140,000 to 100,00, the bait quota is still too large.¹³ If MA DMF continues to allow the harvest of horseshoe crabs as bait, CLF urges it to prioritize working with the conch pot fishery to test and facilitate a transition to bait alternatives that eliminates the burden of the bait quota on horseshoe crabs.¹⁴

⁶ *Id.*; Deborah Rutecki, Ruth Carmichael & Ivan Valiela, *Magnitude of Harvest of Atlantic Horseshoe Crabs, Limulus polphemus, in Pleasant Bay, Massachusetts*, 27 *Estuaries* 179 (Apr. 2004).

⁷ MA DMF News Second Quarter 2006, *Responsible Management Strategies Reduce Horseshoe Crab Take in Massachusetts*, 8-9, (2006) <https://www.mass.gov/doc/dmf-news-2nd-quarter-2006/download>.

⁸ ASMFC, *2024 Horseshoe Crab Stock Assessment Update*, iv (Apr. 30, 2024), (*available at* https://asmfc.org/wp-content/uploads/2025/01/HorseshoeCrabStockAssessmentUpdate_April2024.pdf).

⁹ *Id.*

¹⁰ ASMFC, *Stock Assessment Overview: Horseshoe Crab*, 4 (May 2024), (*available at* https://asmfc.org/wp-content/uploads/2025/01/HSC_UpdateAssessmentOverview2024_rev.pdf).

¹¹ Mark L Botton et al., *Horseshoe Crabs: “Living Fossils” Imperiled in the Anthropocene*, *Imperiled: The Encyclopedia of Conservation*, 3-5 (2021), https://progyanfoundation.org/admin/download/Horseshoe%20Crabs_2021.pdf.

¹² *Id.*; David R. Smith et al., *Conservation Status of the American Horseshoe Crab*, 27 *Reviews in Fish Biology and Fisheries*, 135, 155 (2017) <https://link.springer.com/article/10.1007/s11160-016-9461-y>.

¹³ MA DMF, *Public Hearing Proposal on Horseshoe Crab Quota Management*, (Dec. 12, 2025) <https://www.mass.gov/doc/2026-commercial-hsc-quota-reallocation-proposal/download>.

¹⁴ MA DMF News Second Quarter 2006, *Responsible Management Strategies Reduce Horseshoe Crab Take in Massachusetts*, 8-9 (2006), <https://www.mass.gov/doc/dmf-news-2nd-quarter-2006/download>.

There are more sustainable alternatives to using horseshoe crabs as bait. In Massachusetts, horseshoe crabs are largely used as bait in the conch pot fishery which is already concerning because whelk are “depleted” throughout Massachusetts and “overfished and subject to overfishing” in the Nantucket Sound.¹⁵ It is also unnecessary as studies show whelk find bait mixtures consisting of surf or propeller clams and green crabs are just as or more attractive than mixtures using horseshoe crabs.¹⁶ Green crabs are an especially good bait alternative because they are an invasive species with a detrimental impact on eelgrass, coastal marsh health, and native bivalves.¹⁷ A survey of the whelk fishery in Massachusetts shows that the majority of respondents already use some form of a bait mixture, including mixtures with green crab.¹⁸ However, respondents overwhelmingly still use horseshoe crab in those mixtures, even though studies show it is not necessary.¹⁹

CLF urges MA DMF to go farther than the proposed decrease in the bait quota and commit to transitioning to bait alternatives that will allow phasing out the use of horseshoe crabs as bait entirely. In the immediate short-term, MA DMF can minimize the burden of the bait harvest by extending spawning protections through July starting this summer. Data shows horseshoe crabs in Massachusetts historically spawn well into July and August.²⁰ Ending the spawning closure by the beginning of June interferes with the historic spawning period, impeding recovery.

Harvest of Horseshoe Crabs for the Biomedical Sector Should be Phased Out as Soon as Possible

CLF does not support an increase to biomedical quota of 80,000 horseshoe crabs as MA DMF proposes.²¹ There is no need to permit—let alone increase—the harvest of horseshoe crabs

¹⁵ MA DMF, Public Hearing Proposal on Horseshoe Crab Quota Management, (Dec. 12, 2025) <https://www.mass.gov/doc/2026-commercial-hsc-quota-reallocation-proposal/download>; MA DMF, Whelks and Whelk Management, <https://www.mass.gov/info-details/whelks-and-whelk-management> (last visited Mar. 4, 2026).

¹⁶ Mary Kate Munley et al., *Laboratory Investigations into Alternative Baits for the Channeled Whelk Fishery*, 271 Fisheries Research (Mar. 2024) (available at <https://www.sciencedirect.com/science/article/pii/S0165783623003132#sec0045>); Mary Kate Munley & Megan Molinari, *Evaluating Alternative Bait Ingredients for the Channeled Whelk Fishery*, Sea Grant NH, (on file with NOAA Institutional Repository 48497 DS1).

¹⁷ Mary Kate Munley et al., *Laboratory Investigations into Alternative Baits for the Channeled Whelk Fishery*, 271 Fisheries Research (Mar. 2024); Mary Kate Munley & Megan Molinari, *Evaluating Alternative Bait Ingredients for the Channeled Whelk Fishery*, Sea Grant NH, (on file with NOAA Institutional Repository 48497 DS1).

¹⁸ ASMFC, *Horseshoe Crab Technical Committee Report*, 15 (Oct. 17, 2017).

¹⁹ *Id.*

²⁰ Carl N. Shuster, Jr, Observations on the Natural History of the American Horseshoe Crab, *Limulus polyphemus*, Contribution No. 564, Woods Hole Oceanographic Institution (1950); John P. Baptist, R. Smith Osgood & John W. Ropes, Migrations of the horseshoe crab, *Limulus polyphemus*, in Plum Island Sound, Fisheries Report No. 220, Massachusetts, D.C. U.S. Fish and Wildlife Service, (1957); J.W. Widener & R. B. Barlow, Decline of a horseshoe crab population on Cape Cod, 197 The Biological Bulletin, 300-302 (199); Carmichael, Rutecki & Valiela, Abundance and population structure of the Atlantic horseshoe crab *Limulus polyphemus* in Pleasant Bay, Cape Cod, 246 Marine Ecology and Progress Series, 225-239 (2003); Sarah Grady & Ivan Valiela, Stage-structured Matrix Modeling and Suggestions for Management of Atlantic Horseshoe Crab, *Limulus polyphemus*, Populations on Cape Cod, Massachusetts, 29 Estuaries & Coasts, 989 (Aug. 2006).

²¹ MA DMF, Public Hearing Proposal on Horseshoe Crab Quota Management, (Dec. 12, 2025) <https://www.mass.gov/doc/2026-commercial-hsc-quota-reallocation-proposal/download>.

for biomedical use as non-animal derived alternatives can replace reliance on LAL from horseshoe crab blood.

The U.S. Pharmacopeia Microbiology Expert Committee, which includes eight U.S. Food and Drug Administration representatives, authorized non-animal derived reagents for use in endotoxin testing in 2024.²² Even before that, starting in 2018, the FDA began approving drugs that relied on those alternative endotoxin processes.²³ Alternative endotoxin testing reagents are already in use by several large pharmaceutical businesses including Eli Lilly and Company, which has two Boston-based facilities.²⁴ Non-animal derived reagents are sufficiently available and reliable such that CLF supports eliminating the biomedical quota for horseshoe crabs to allow the species to recover.

Any quota increase is a step in the wrong direction. MA DMF originally set the cap at 200,000 in 2023 and it is too soon to increase that cap especially based only on demand from the biomedical industry. As Atlantic coastal states ban harvest—which New York has just done—demand will increase on Massachusetts stocks.²⁵ The biomedical industry already has access to all the bait quota horseshoe crabs through the Rent-a-Crab program, meaning they use well over the 200,000 crabs allotted to biomedical purposes.

MA DMF's proposal to use a new 1:2 reallocation ratio instead of the previously used 1:6 ratio is a step in the right direction, but it is not enough.²⁶ The ratio is applied when moving crabs from the bait quota, where crabs have 100% mortality rate, to the biomedical quota, where crabs are estimated to have between a 15-30% mortality rate.²⁷ The proposed ratio attempts to more appropriately incorporate the sublethal effect of bleeding in management decisions; however, the

²² U.S. Pharmacopeia, Chapter for Endotoxin Testing Using Non-Animal Derived Reagents Published for Early Adoption (Nov. 1, 2024) <https://www.usp.org/news/chapter-for-endotoxin-testing-using-non-animal-derived-reagents-published-for-early-adoption>, Nicola Reid, The Shift from LAL to Recombinant: What Your Lab Should Expect, Life Science Leader (June 10, 2025) <https://www.lifescienceleader.com/doc/the-shift-from-lal-to-recombinant-what-your-lab-should-expect-0001>; Fujifilm, USP's Status Regarding the Pyrogen Test and Endotoxin Animal-Free Test Methods (June 9, 2025) <https://www.wakopyrostar.com/blog/kit-lal/post/usps-status-regarding-the-pyrogen-test-and-endotoxin-animal-free-test-methods/>.

²³ Lonza, FDA Approves First Drug Using the Recombinant Factor C Assay for Endotoxin Testing (Nov. 8, 2018), <https://www.lonza.com/news/2018-11-08-14-00>; Tom Maloney, Ryan Phelan & Naira Simmons, *Saving the Horseshoe Crab: A Synthetic Alternative to Horseshoe Crab Blood for Endotoxin Detection*, 16 PLOS Biology (Oct. 12, 2018).

²⁴ Lilly, Sustainability Scorecard for Endotoxin Testing (Spring 2025), <https://pharmascore.org/lilly/>; Jennifer Tsang, Horseshoe Crabs Break Free from Biomedical Testing (July 29, 2025), <https://www.the-scientist.com/horseshoe-crabs-break-free-from-biomedical-testing-73214>.

²⁵ Jordan Krisfalusi-Gannon et al., *The Role of Horseshoe Crabs in the Biomedical Industry and Recent Trends Impacting Species Sustainability*, 5 Frontiers Marine Science (June 4, 2018) (available at <https://www.frontiersin.org/journals/marine-science/articles/10.3389/fmars.2018.00185/full>); NJ Rev Stat § 23:2B-21 (2024); 13-188 C.M.R. ch. 31, § 10; Conn. Acts 23-6 (2023); Nathan Strout, New York Governor Signs Bill to Phase Out Horseshoe Crab Harvesting (Dec. 23, 2025), <https://www.seafoodsource.com/news/environment-sustainability/new-york-governor-signs-bill-to-phase-out-horseshoe-crab-harvesting>.

²⁶ MA DMF, Public Hearing Proposal on Horseshoe Crab Quota Management, (Dec. 12, 2025) <https://www.mass.gov/doc/2026-commercial-hsc-quota-reallocation-proposal/download>.

²⁷ Rebecca L. Anderson, Winsor H. Watson & Christopher C. Chabot, *Sub-lethal Behavioral and Physiological Effects of the Biomedical Bleeding Process on the American Horseshoe Crab*, 225 U. Chicago Biological Bulletin (July 2, 2014) (available at <https://pmc.ncbi.nlm.nih.gov/articles/PMC4079546/>).

lack of data on the mortality of released crabs makes the reallocation ratio an unreliable tool for management.²⁸ CLF does not support reallocation of horseshoe crabs to the biomedical quota because reallocation does not appropriately consider the burden of biomedical harvest on horseshoe crab recovery.

To safeguard the long-term health of our marine ecosystem, CLF supports the decrease of 40,000 crabs in the bait fishery, but it does not support the 80,000-crab increase in the biomedical sector. Eventually, we would like to see harvesting phased out. As an important part of our ecosystems, horseshoe crabs sustain critical predator-prey relationships, their eggs provide an irreplaceable food source for threatened migratory birds, and with viable non-animal derived alternatives available for medical testing, there is no longer a justification for exploiting a species that has stabilized our coastal waters for over 450 million years.

Thank you for consideration of our comments.

Respectfully submitted,

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²⁸ *Id.*; Tom Maloney, Ryan Phelan & Naira Simmons, *Saving the Horseshoe Crab: A Synthetic Alternative to Horseshoe Crab Blood for Endotoxin Detection*, 16 PLOS Biology (Oct. 12, 2018) (available at <https://pmc.ncbi.nlm.nih.gov/articles/PMC6200278/>).