



The Commonwealth of Massachusetts

Division of Marine Fisheries

251 Causeway Street, Suite 400, Boston, MA 02114
p: (617) 626-1520 | f: (617) 626-1509
www.mass.gov/marinefisheries



MAURA HEALEY
Governor

KIMBERLEY DRISCOLL
Lt. Governor

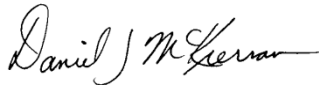
REBECCA TEPPER
Secretary

RONALD S. AMIDON
Commissioner

DANIEL J. MCKIERNAN
Director

MEMORANDUM

TO: Marine Fisheries Advisory Commission (MFAC)

FROM: Daniel J. McKiernan, Director 

DATE: February 8, 2023

SUBJECT: **Proposal to Adjust Commercial Horseshoe Crab Limits for 2023**

Proposal

I am proposing to make several adjustments to the management of the bait and biomedical horseshoe crab fisheries in 2023. The proposals are as follows:

1. Permitting.
 - a. Establish a new biomedical horseshoe dealer permit.
 - b. Establish a new biomedical processor dealer permit. This permit may be limited in issuance.
2. Conservation.
 - a. Adopt a January 1 – May 31 closure to all horseshoe crab harvest and rescind the existing five-day closures around each new and full moon from mid-April through June.
 - b. Establish an annual processor quota for the biomedical fishery of 200,000 horseshoe crabs. This quota will be allocated evenly among biomedical processors.
 - c. Reduce the bait quota by 25,000 horseshoe crabs from 165,000 to 140,000 horseshoe crabs.
3. Bait Fishery Trip Limits
 - a. Consider increasing the trip limits for all permitted bait harvesters up to 500 crabs. Current limits are 300 crabs for permitted trawlers and 400 crabs for permitted hand harvesters.
 - b. Consider re-issuing Letters of Authorization to certain mobile gear fishers who do not hold a horseshoe crab permit to land a full trip limit of horseshoe crabs, not the 75-horseshoe crab incidental limit.
4. Reporting. Beginning in 2024, require daily electronic reporting for all bait and biomedical harvesters.
5. Permit Conditions. Adopt certain existing permit conditions affecting biomedical harvesters, biomedical dealers, and biomedical processors in regulation.

Background on Life History and Management

Horseshoe crabs are a marine arthropod that range along the Atlantic coast from the Gulf of Mexico to the Gulf of Maine. Horseshoe crab populations are rather localized with animals showing site fidelity to their spawning beaches. Juveniles tend to inhabit near shore embayments and estuaries; then, once mature, they move out several miles from shore as adults only to return inshore to spawn (Shuster, 1982; Button and

Ropes, 1987). Spawning occurs throughout the spring—predominantly May through mid-June—with peak activity usually corresponding with lunar tides (both new and full moons). During spawning, the animals will stage nearshore and then lay their eggs along sandy beaches.

Here in Massachusetts, we are near the northernmost extent of the animal’s range with Cape Cod providing a natural geographic barrier. Accordingly, most of our stock (and resulting fishing activity) occurs south and west of Cape Cod, with some notable local populations north of Cape Cod (e.g., Wellfleet Harbor, Barnstable Harbor) and along the outer Atlantic Coast (e.g., Nauset Estuary, Pleasant Bay).

The stock assessment for this species is conducted by the Atlantic States Marine Fisheries Commission (ASMFC), with the most recent being the 2019 benchmark assessment. Given the stock as a whole consists of many localized meta-populations, this stock assessment evaluated the stock status by region based on survey trends; biological reference points to define “overfished” and “overfishing” are not used. Rather, the stock status is relative and determined based on the percentage of surveys within a region having a greater than 50% probability of the final assessment year being below 1998 levels—the year the ASMFC initiated its Horseshoe Crab Fisheries Management Plan (FMP). A region’s stock is considered “poor” if more than 66% of surveys meet this criterion; “good” if less than 33% of surveys meet this criterion; and “neutral” if between 34% and 65% of the surveys meet this criterion.

The northeast region is comprised of Rhode Island, Massachusetts, New Hampshire, and Maine (Figure 1). However, given the species geographic range, it effectively consists of Massachusetts and Rhode Island. The 2019 benchmark assessment indicated our stock status improved from “poor” to “neutral” (see attached 2019 ASMFC Stock Assessment Overview). This was largely due to Massachusetts’ relatively strong survey indices. Both our spring and fall trawl surveys show increasing abundance over the past 10-year stanza in terms of both mean stratified number of horseshoe crabs caught per tow (Figures 2 and 3) and the percentage of tows with horseshoe crabs present (Figures 4 and 5). Additionally, our spawning beach surveys show improving trends for most sites (Figure 6). Given these facts, I am of the view that we have successfully managed our local horseshoe crab populations over the past 10-years, benefiting from steady and predictable harvest rates, lunar spawning closures, and spatial protections afforded by harvest prohibitions within the Monomoy National Wildlife Refuge and the Cape Cod National Seashore and bait harvest protections in Pleasant Bay.

Overview of Horseshoe Crab Fishery in Massachusetts

Here in Massachusetts, we have separate bait and biomedical fisheries for horseshoe crabs. The bait fishery principally provides bait to whelk pot fishers. The biomedical fishery provides horseshoe crabs to biomedical firms to extract limulus ameobocyte lysate (“LAL”) from the animal’s blood; LAL is highly valuable and is FDA-approved to detect and quantify bacterial endotoxins in medical equipment. Biomedical firms may also participate in the so-called “rent-a-crab program” where they lease live horseshoe crabs from bait dealers for bleeding and then return the crabs to the bait dealer for sale as bait. DMF strongly supports the rent-a-crab program as it maximizes the utility of each horseshoe crab harvested.

While each fishery has its own discrete management program, both are subject to the state-wide minimum size of 7” prosomal width (widest part of the horseshoe crab) and to lunar spawning closures. The lunar spawning closures occur during the five-day period around each new and full moon (i.e., two days prior, day of, two days after) from April 16 – June 30.

Bait Fishery

The bait fishery is subject to an annual quota. Our quota was first set by Addendum I to the ASMC FMP (2000) at 339,337 horseshoe crabs annually. DMF was not confident about the accuracy of the data used

to calculate this quota. Subsequently, DMF and the MFAC moved to voluntarily cut the state’s quota to 165,000 horseshoe crabs in 2008 and it remains at this level today.

The bait fishery is principally prosecuted by hand harvesters and trawlers. Hand harvesters collect horseshoe crabs along the shoreline during the spring spawning period; whereas trawlers catch crabs when participating in the mixed species trawl fishery south and west of Cape Cod in Nantucket and Vineyard Sounds, which occurs from the late-spring and into the fall. Participation is generally subject to a limited entry permit regulated fishery permit endorsement for horseshoe crabs (“horseshoe crab endorsement”) with trip limits based on harvest method. Hand harvesters with a horseshoe crab endorsement are subject to a trip limit of 400 horseshoe crabs and trawlers with a horseshoe crab endorsement are subject to a trip limit of 300 horseshoe crabs. While most trawlers participating in the mixed-species fishery in Nantucket and Vineyard Sounds have a horseshoe crab endorsement, a small number do not (typically between two and five annually). To discourage regulatory discarding—and in attempt to retain effort in this important inshore commercial fishery—DMF has established a 75-horseshoe crab open entry trip limit for trawlers who do not have the horseshoe crab endorsement. Additionally, DMF may issue these commercial fisheries Letters of Authorization to retain a more substantial limit of horseshoe crabs, particularly if there is demand from bait dealers or the rent-a-crab program.

The bait fishery is also prohibited within the waters of Pleasant Bay. This closure was implemented on an emergency basis in 2006 and then adopted permanently in 2007. This was done in response to a surge in hand harvest effort coming from Cape Cod shellfish fishers displaced from municipal shellfish fisheries due to extensive red tide closures. This watershed is a unique in that it is likely an isolated population of crabs that can be quickly depleted in response to increases in harvest. For this reason, the area was closed to bait fishing, but remains open to the biomedical harvest given the catch and release nature of this fishery.

Over the past decade (2013 – 2022), the bait fishery has harvested approximately 134,000 crabs per year (Table 1). Over this stanza, annual landings increased above the 10-year mean in 2018—with the fishery exceeding its annual quota in 2019 and nearly achieving the quota again in 2020. Landings returned back towards the mean this past year (2022) with the fishery landing 134,753 crabs.

Since 2010—when DMF first implemented the lunar spawning closures—we have observed a shift in landings away from the hand harvesters towards the mobile gear sector, principally trawlers. In the two years prior to the spawning closure (2008 and 2009), the mobile gear fishery contributed between about 15,000 – 20,000 horseshoe crabs per year, comprising about 12 – 23% of the annual harvest. Then beginning in 2010, we see the mobile gear sector take more crabs annually and become responsible for a greater proportion of annual landings. In 2021, the mobile gear fishery took almost 90,000 crabs and was responsible for more than 60% of that year’s landings. (Table 2).

Year	Landings (ct)
2013	112,056
2014	117,349
2015	106,966
2016	100,095
2017	134,707
2018	145,837
2019	177,252
2020	163,295
2021	155,966
2022	134,753
Data Sources: SAFIS Dealer Data	

This shift was not surprising to DMF. We anticipated landings from hand harvesters would become diminished as spawning closures would limit their seasonal access to the resource. While this may have been the case to some extent, it does not explain the whole picture, as we are not seeing a substantial change in annual landings attributable to hand harvester. Rather, we are observing a sizeable increase in dragger caught landings. This may be because the resource is more available to this gear type given the

improving local population indices and/or because it is becoming a more important component of this trawl fleet’s catch. As we have discussed over the past several years, this trawl fleet is facing a variety of conditions causing attrition and an overall reduction in participation. In order to overcome economic challenges and remain active fishery participants, it is likely that vessels remaining in this inshore trawl fishery are now more inclined to directly target horseshoe crabs to enhance the profitability of the trip.

A consequence of this increase in landings from the mobile gear sector is a change in the size distribution of crabs caught. Our market sampling data shows the average prosomal width of a female Massachusetts bait crab has decreased from a mean of 10.1” from 2008 to 2013 to 9.2” in 2022 (Figure 7). This is a predictable result of the increasing harvest by trawlers. The hand harvest fishery exclusively targets the large adult animals present along spawning beaches, whereas the trawl fishery catches a wider size distribution of animals given the location of the fishery and the size selectivity of trawl nets. With this change in size distribution of catch, we are now harvesting more juvenile animals than we previously were.

Table 2. MA Bait Horseshoe Crab Landings by Count, Gear Type and Year (2008 – 2021)

YEAR	HAND	MOBILE	OTHER	% MOBILE
2008	64,822	20,397	3,706	23%
2009	59,117	18,118	1,527	23%
2010	49,427	21,169	1,428	29%
2011	35,185	37,468	13,750	43%
2012	53,079	56,346	9,128	48%
2013	70,396	85,609	3,856	54%
2014	77,035	50,902	2,567	39%
2015	68,065	45,270	3,065	39%
2016	63,936	46,925	967	42%
2017	68,554	58,588	4,681	44%
2018	70,643	84,378	3,981	53%
2019	79,186	85,606	1,823	51%
2020	66,852	76,721	961	53%
2021	52,546	89,603	2,784	62%

Data Sources: MA ACR and TL Reports, NMFS VTRs

Biomedical Fishery

Before I begin to discuss the biomedical fishery in detail, it is important to discuss data confidentiality rules. G.L. c. 130, §21 prohibits DMF from disclosing any fisheries statistics unless we can do so in summary form. To this, we apply the so-called “rule of three” which requires the summary be comprised of data from at least three dealers, harvesters, or other reporting entities to be considered non-confidential. Much of the data regarding harvest, bleeding activity, and observed mortality is confidential, as there are fewer than three biomedical firms involved in the processing of horseshoe crabs in Massachusetts and reporting these data to DMF. However, for the first time ever in 2022, we can release the total number of biomedical horseshoe crabs sold because this data is coming from three or more dealers and harvesters. This is the product of multiple dealers working on behalf of the biomedical firms. All other 2022 data remains confidential.

At present, the biomedical fishery is not subject to an annual cap on harvest or mortality, nor do we limit entry to participate at the processor, dealer, or harvester level. These are conditions that lend themselves to potentially unconstrained growth. We do manage daily harvest through a 1,000-horseshoe crab trip limit. This is not a biologically based metric, but instead reflects the traditional capacity of biomedical harvesters handling horseshoe crabs for the biomedical industry. Biomedical firms are not limited to Massachusetts’ biomedical fishery for their horseshoe crabs. Existing regulations allow biomedical firms to also source crabs from the rent-a-crab program and from dealers in other states (subject to regulations in that jurisdiction).

At present, any person can participate as a harvester or dealer in this fishery provided they have a working relationship with the biomedical firm. This ensures all biomedical harvesters are working on behalf of a

biomedical firm and the horseshoe crabs being harvested are being sold exclusively for biomedical processing. To permit the biomedical fishery, DMF issues a bait dealer permit to the biomedical firm and any dealer working on behalf of a firm and a special biomedical harvester permit to any person harvesting horseshoe crabs on behalf of a biomedical firm (or their associated dealer). Management of the biomedical fishery principally occurs through annual permit conditions, although there are some nominal regulations governing activities such as the live release of bled crabs. These permit conditions are designed to reduce the potential for mortality and are based on the ASMFC's best management practices for the biomedical harvest, handling, transport, and release of horseshoe crabs. Existing permit conditions include but are not limited to: temperature controls during transport and storage; limits on time-out-of-water; limits on how full containers of horseshoe crabs may be; marking of bled horseshoe crabs to prevent re-bleeding more than once in a season; and post-bleeding live release to harvest area.

Penning of horseshoe crabs is a common practice in the biomedical fishery. This allows biomedical firms (or their associated dealer) to collect horseshoe crabs over a window of time and then provide these animals to the biomedical firms for bleeding in appropriate quantities and when they are staffed to process the animals. It may also be used post bleeding to timely place horseshoe crabs back in the water immediately prior to live release. While penning is not restricted, I have concerns about this activity as lethal and sub-lethal impacts not well understood, and consequently, best management practices are not well informed. Horseshoe crabs are susceptible to injury and mortality in these pens, particularly if the conditions are too dense or environmental conditions change (e.g., large rain event affecting salinity). To this point, DMF is aware of two mortality events in 2022 resulting from the penning of biomedical horseshoe crabs.

Historically, the Massachusetts biomedical fishery only involved one biomedical firm, Associates of Cape Cod. This firm sourced horseshoe crabs from biomedical harvesters (primarily hand harvesters), the rent-a-crab program, and other state sources. This past year (2022), a second firm—Charles River Labs—began to participate in the state's biomedical fishery. Charles River Labs is a longstanding Massachusetts-based biomedical company who was previously active in other biomedical fisheries along the Atlantic coast (e.g., South Carolina). This firm sourced horseshoe crabs from biomedical harvesters (both trawl and hand harvesters) but did not participate in the rent-a-crab program.

While the biomedical fishery is catch and release, there is some amount of mortality associated with it. The ASMFC uses a 15% mortality rate in the stock assessment, meaning they assume 15% of the total number of horseshoe crabs harvested for biomedical purposes will die as a result of the bleeding process.

The use of the rent-a-crab program has historically kept Massachusetts biomedical landings (and resulting mortality) at modest levels. However, with the addition of a second biomedical firm, which does not participate in the rent-a-crab program, caused biomedical landings to increase in 2022, with potential to increase further. While the 15% biomedical mortality rate is much less than the 100% mortality rate of the bait fishery, applying the 15% rate to a rapidly growing fishery could lead to substantial numbers of dead crabs.

In 2022, biomedical horseshoe crab landings approached 175,000 crabs. Using the 15% mortality figure, we can estimate approximate mortality at 26,250 horseshoe crabs post-bleeding in 2022. This was a sizeable increase in harvest and mortality from the biomedical fishery when compared to prior years. It was driven by increased demand for crabs and the second biomedical firm entering the fishery and being exclusively reliant on biomedical harvest to meet their demand. Under status quo management, I would expect biomedical landings to increase in 2023, as Charles River Labs will have the benefit of one year of experience in Massachusetts and both biomedical firms will be competing for horseshoe crabs starting at the beginning of the fishing season this spring.

There is also some level of mortality occurring prior to bleeding that is not being captured in our mortality estimates. This is the mortality that may occur as a result of harvest and penning. Trawling likely produces a higher pre-bleeding mortality rate than hand harvest given the differences in catch and handling practices (e.g., shells being broken from weight of catch in nets, dropped on deck, exposure to conditions at sea). This may be further exacerbated by the biomedical trawl fishery occurring into the early fall during molting when shells are softer and the animal is more vulnerable to physical damage. DMF is particularly concerned about these potential sources of mortality given the above-stated 2022 mortality events due to penning and trawlers contributing more to biomedical harvest in recent years

There are also concerns regarding the sub-lethal impacts of both bleeding and penning. Penning and bleeding likely stress the animal and may negatively impact its reproductive capabilities during that year's spawning event. Therefore, if a horseshoe crab is removed from a spawning beach before it spawns, even if it were returned to the same beach during the spawning season, there exists uncertainty as to whether the animal would be able to successfully reproduce.

Significantly more research is warranted to study the lethal and sub-lethal impacts of the biomedical fishery. DMF intends to make horseshoe crab research a priority if additional resources can be obtained to support it.

Public Hearing Proposals

Horseshoe crabs are an important public resource that provide public health, economic, ecological, and cultural benefits. I am concerned about the potential for continued growth in the exploitation of this resource and the ability for us to capture a stock decline before it occurs, given the various uncertainties in science and management and the fact these are slow growing animals with localized populations.

Accordingly, I support taking a precautionary approach to managing this fishery by attempting to cap exploitation at near recent levels. That available data tends to suggest our horseshoe crab resource can withstand recent levels of exploitation, given total mortality has remained somewhat steady in recent years and we have not seen declining trends in our survey indices. Moreover, our state's horseshoe crab fishery is becoming subject to increasing public scrutiny and I want to manage this fishery in a more transparent way, so that other constituents may better understand how the fishery is managed and why. Absent these proposed management measures, I fear that total harvest and mortality of horseshoe crabs will continue to increase, which may possibly lead to depletion of this very valuable resource, and there will be more user group conflicts and escalations in tensions among the diverse constituent groups.

Permitting

Historically, DMF has issued a "bait dealer" permit to both the biomedical firms and the dealers accepting horseshoe crabs from biomedical harvesters on their behalf. This is a one-size-fits-all approach to permitting to accommodate this activity through an existing dealer permit type. To implement a more transparent and practical management program for the biomedical fishery, I am proposing to establish two new dealer permit types—a biomedical dealer permit and a biomedical processor permit.

The biomedical processor firm will authorize firms to process horseshoe crabs for biomedical purposes, including the bleeding of horseshoe crabs for LAL extraction. It will also allow the firm to purchase horseshoe crabs directly from a biomedical harvester and obtain horseshoe crabs from other approved sources (e.g., associated biomedical dealer, rent-a-crab program, and importation from out of state). These permits may be limited in issuance in any calendar year to prevent the uncontrolled proliferation of new biomedical harvest and prevent the use of satellite firms to gain additional access to horseshoe crabs.

The biomedical dealer permit will allow the named entity to purchase horseshoe crabs from an authorized biomedical harvest for sale to a biomedical processor. These dealer permits will be issued only to entities with an established relationship with a biomedical processor.

These new permits will replace the bait dealer permit type. If an entity has already purchased a bait dealer permit for the 2023 calendar year, we will issue this new permit free of charge this year. Moving forward, these permits will be reclassified as a type of wholesale dealer permit (rather than as a type of bait permit), as they authorize primary purchasing, resale, and processing. Note the existing permit fees set in ANF regulations for Bait Dealer and Wholesale Dealer permits are different, with the Bait Dealer permit having an annual fee of \$65 for residents and \$130 for non-residents and the Wholesale Dealer permit having an annual fee of \$130 for residents and \$260 for non-residents. As a result of this reclassification of the permit type, the annual permit fee for these entities will increase.

Conservation

The following sections address DMF's conservation proposals to enhance spawning protections and cap overall mortality at recent levels.

Spawning Closure

To protect horseshoe crab spawning, DMF has established a series of five-day lunar-based spawning closures around each new and full moon from April 16 – June 30. Although the timing of the closures varies annually based on the lunar calendar, typically about one-third of the days during this time-period are closed to harvest (i.e., there are approximately 25-closed days annually during this 75-day period). For 2023, there will be exactly 25-closed days with closures to occur from April 18 – April 22; May 3 – May 7; May 17 – May 21; June 2 – June 6; and June 16 – June 22.

Moving forward, I am proposing to replace these lunar-based closures with a blanket January 1 – May 31 closure to all horseshoe crab harvest. Given the late timing of this proposal and the anticipated rule making schedule, the implementation of this closure could be postponed until 2024 with the lunar closures remaining in effect for 2023. This blanket closure approach has been requested by conservation groups, including the Horseshoe Crab Conservation Association (see attached petition).

I prefer this closure approach for several reasons. First, it protects horseshoe crabs throughout the peak of the spawning event in May and prevents the harvest of pre-spawning crabs when they begin to stage nearshore for spawning and egg laying. Based on spawning beach survey data (i.e., observations of the presence of female spawning crabs), this closure will protect approximately 80% of all female spawning crabs from harvest both north and south of Cape Cod. Second, a blanket seasonal closure to all harvest is more enforceable than a periodic closure, providing for better compliance. Lastly, it allows for harvest to open in June once a large majority of spawning activity has occurred but when the resource is accessible to both hand harvesters and trawlers. The impact of the closure from January 1 through late April will be negligible given harvest is not occurring at this time of year.

The closure will also apply to all harvest, inclusive of both the biomedical and bait fisheries. The biomedical industry may seek an exemption to this closure, as they live release horseshoe crabs back to harvest areas after bleeding. However, I am generally not disposed to granting this exemption, as I have concerns about the lethal and sub-lethal impacts of penning and bleeding, and how these activities may negatively impact the animal's reproductive capacity during that year's spawning event. Given my preference for a precautionary approach, further research here is likely necessary to warrant such an exemption.

It is notable that closures through June 15 and June 30 will protect 95% and 100% of all female spawning crabs, respectively. However, I do not think extending this closure into June is necessary at this time.

More prolonged closures would substantially constrain harvest opportunities for all user groups, particularly hand harvesters, and possibly result in the state's fishery not meeting all of the demand from the bait and biomedical industries. Given our horseshoe crab stock is currently in good condition, I feel it is reasonable to allow harvest during June as spawning activity wanes and the resource is available to all fishery participants.

Biomedical Processor Quota

As stated above, overall biomedical harvest and mortality is not currently capped. The presence of a second biomedical firm in 2022 demonstrated to DMF how quickly harvest and mortality may increase in this sector if unconstrained. It is my perspective that recent levels of harvest and mortality are likely sustainable, given our available population indices are generally positive with current rates of exploitation. Accordingly, I am seeking to cap harvest in the biomedical fishery to 200,000 horseshoe crabs annually. Once this quota is reached, the biomedical fishery will close for the calendar year. During a quota closure, biomedical processors will still be able to access horseshoe crabs from other approved sources (e.g., rent-a-crab program; other states).

This 200,000 horseshoe crab quota is slightly above harvest in 2022 (~175,000 crabs). This recognizes that Charles River Labs' operation was not fully operable at the start of the season and allows for some additional growth to provide access to this important public health commodity. With a 200,000 horseshoe crab quota, DMF expects mortality would approximate 30,000 horseshoe crabs. This estimate is based strictly on applying 15% post-bleeding mortality figure used by the ASMFC to the annual quota. However, mortality could be higher because that 15% rate does not consider potential sources of pre-bleeding mortality that occur during harvest, handling, and penning.

The establishment of a quota in the biomedical fishery may result in derby style approach to harvest and processing activities, as biomedical firms compete to access as much of the quota as they can. I am concerned this will result in poorer handling practices and increased reliance on penning animals and penning animals longer periods of time. Such changes will likely increase mortality and injury to the animals. I want to avoid this situation, so I am considering allocating the available quota evenly to each of the biomedical processors. This will allow each firm to utilize their access to the biomedical quota in a manner that meets their business practices and prevents a derby approach. This approach may also be untenable should another biomedical firm begin to operate in Massachusetts fishery, which is why I have proposed to potentially limit access to the biomedical processor permit.

Bait Quota Reduction

I am also proposing to reduce the bait quota by 25,000 crabs from 165,000 crabs to 140,000 crabs. This caps bait harvest at just above the 10-year mean and similar to the harvest level this past year (2022). Part of this reduction is to offset expected increasing mortality from the biomedical sector. This is not an animal-for-animal payback of expected mortality should the 200,000 horseshoe crab biomedical quota be adopted, but rather considers expected total mortality moving forward and total mortality figures in recent years (which are confidential).

I feel further reducing the bait quota here is warranted given recent performance of the bait fishery and my preference for a precautionary approach to managing this resource. Moreover, there are anecdotal reports to DMF that bait harvest is currently sufficient to meet local demand. I do not expect this will change given the current status of the state's channeled whelk resource and the likelihood that participation (number of fishermen) and effort (number of pot hauls) will likely continue at current levels (or wane) given anticipated stock conditions for the foreseeable future. Additionally, I am under the impression that other states are beginning to address the poor condition of whelk resources in their waters and in the coming years we may see new management initiatives and reduced whelk fishing effort along the coast. If this is the case out-of-state demand may begin to wane in the coming years.

Trip Limits

The following proposals address bait fishery trip limits. This responds to the public comment received at the December 13 meetings and informal conversations between staff and bait fishers and bait dealers. Additionally, it considers address potential loss of bait harvest due to spawning closures, interest in enhancing the profitability and efficiency of the inshore trawl fishery, and maintaining quota into the early fall when summer flounder trawling is likely still occurring to reduce potential regulatory discarding.

At present, I am not proposing to change the trip limit for the biomedical fishery (1,000 horseshoe crabs). However, should biomedical processors or dealers submit public comment and advocate that a trip limit change is warranted, then I will consider it in my final recommendation to the MFAC.

Bait Fishery Trip Limits

For the bait fishery, I am proposing to increase the regulatorily set trip limit for all permit holders up to 500 horseshoe crabs. The current trip limit is 300 horseshoe crabs for mobile gear and 400 horseshoe crabs for other gear types.

The rationale for the bait fishery trip limit change is two-fold. First, it will recoup landings lost by implementing a January 1 – May 31 closure. May is the peak fishing season for the hand harvest fishery and closing this period to enhance spawning protections will undoubtedly reduce bait fishery landings over the course of the year. With our goal of maintaining bait fishery landings at the 140,000 crab threshold, then we need to accommodate additional landings at other times of the year when the fishery is open. Second, I am concurrently proposing several changes to the commercial summer flounder fishery to enhance summertime access to the quota, including a potential weekly aggregate program or trip limit increases. These changes are likely to increase the trawl fishing effort on a per trip basis (i.e., tows per trip) even if it may not result in a net increase in weekly effort (i.e., tows per week). Accordingly, if these amendments to the summer flounder fishery are approved and enacted, increasing trawler limits for horseshoe crabs is appropriate to prevent regulatory discarding, particularly as I will not be accommodating horseshoe crabs in a weekly aggregate program (i.e., daily trip limits would apply).

I am also willing to consider starting the trip limit out at a lower level (particularly for trawlers) and then building in an automatic trip limit increase at a date certain should a certain quantity of quota remain. We do this for a variety of our quota managed finfish species (e.g., summer flounder, black sea bass) in order to stretch the quota out through the summer period and then utilize whatever remains at the end of the season before inshore fishing conditions worsen and catch rates plummet. This may be of less interest generally for the bait fishery, as catch is frequently frozen for sale at a later date. However, it may be beneficial to the trawl fishery to keep the horseshoe crab quota open throughout the early fall when inshore trawl fishery is active.

Letters of Authorization for Non-Permitted Trawlers

There are a small number of trawlers who are active in the summertime inshore trawl fishery south of Cape Cod who do not hold a horseshoe crab endorsement. For many years, to meet bait demand and demand from the rent-a-crab program, DMF issued Letters of Authorization (LOAs) to these draggers to allow them to retain the same trip limit of horseshoe crabs as a permit holder. This was always a point of contention among certain fishers who held a horseshoe crab endorsement and felt it lessened the benefits obtained by this permit and negatively impacted the equity associated with their capital investment in the permit.

This issue came to a head in 2019 when the bait quota was taken for the first time and the fishery was closed on September 1 when the summer flounder trawling was still occurring in earnest inshore, forcing

participants to discard their horseshoe crab catch. As a result, DMF did not re-issue these LOAs and instead adopted an open entry trip limit (75-crabs) for these draggers. Note that in 2021 and 2022 we did issue LOAs during the late summer to increase the trip limit for all remaining trawl participants to utilize the quota to meet bait and rent-a-crab demands. This resulted in DMF establishing commensurate trip limits for both permit holders and non-permit holders alike.

As we have discussed on numerous occasions, there are a variety of economic, social, and environmental issues affecting the inshore trawl fleet. Effort and participation in the inshore fishery south of Cape Cod has decreased by about 50% over the past 10-years. This worsens already difficult situations affecting commercial fishing infrastructure (e.g., dockage, availability of buyers). As Director, I am dedicated to trying to preserve this important inshore fleet (and its contributions to the state's seafood economy) and want to take reasonable and calculated steps to enhance the efficiency and profitability of its participants. To this end, one area I am investigating is ways to make active operations more whole so that they can retain a greater portfolio of catch. The MFAC's Permitting Sub-Committee has met to discuss potential permitting solutions and will meet again soon to deliberate on potential transferability solutions.

As a stop gap, I am considering reissuing LOAs in 2023 to draggers who have documented summer flounder and horseshoe crab landings in the past three years. Participation in this trawl fishery varies from year to year, but based on recent activity, I suspect there may be between two and five potentially eligible vessels. Given potential concerns about quota utilization at a reduced 140,000 crab quota, I would also consider holding off on issuing these LOAs until a date certain or rescinding the LOA once a certain proportion of the quota is harvested.

Reporting

Currently, as a condition of the commercial fishing permit, all commercial fishers are required to report their catch on a monthly trip level basis with the prior month's report due by the 15th of the next month. These reports may be submitted electronically or on paper forms. Given the emerging management challenges and concerns related to this commercial fishery, as well as the new management measures proposed here (e.g., biomedical quota), more timely reporting is necessary. Accordingly, I am proposing to require all harvesters in the horseshoe crab fishery—both biomedical and bait—report electronically on a daily basis. Given the current rule making timeline, this will not go into effect until 2024, which will provide additional time for outreach and education. Note, it is a strategic DMF goal to implement electronic daily reporting across our commercial fisheries over the next few years, particularly now that the technology is accessible via smart phones.

Biomedical Fishery Permit Conditions

At present, DMF has very few regulations governing the performance of the biomedical fishery. Rather, DMF has relied on its authority to condition permits to manage this fishery. This was done to address the rather nuanced and complicated aspects of the biomedical fishery. Moreover, it allowed DMF to amend these controls in a timely manner, if necessary. However, as the biomedical fishery is maturing, it is appropriate to more deliberately and transparently manage this fishery. Accordingly, I am moving to codify many of the permit conditions affecting biomedical harvesters, biomedical dealers, and biomedical harvesters as regulation. DMF will retain the authority to condition permits and will continue to condition permits as necessary for conservation and management. This includes the following:

- a. Prohibit biomedical harvesters from possessing and harvesting horseshoe crabs for purposes other than sale to a biomedical dealer or processor. Including preventing individuals from holding both the biomedical harvest permit and the bait harvest permit.
- b. Require biomedical processors to mark all processed horseshoe crabs with a distinctly colored mark whose shape changes annually and prohibit the recapture of any horseshoe

- crabs by biomedical harvesters with that year's mark and the and rehandling and reprocessing of any horseshoe crab by biomedical dealers and processors with that year's mark.
- c. Allow for penning of biomedical crabs by biomedical dealers and biomedical processors subject to permit conditions as necessary for conservation and management.
 - d. When biomedical dealers and processors are handling horseshoe crabs, require the crabs remain moist; if stored in containers that the containers are no more than 2/3 full; maintain temperature control in transit (50°F to 60°F) and during storage at the biomedical facility (ambient air temperature not to exceed 70°F); and prohibit horseshoe crabs from being out of the water for a period longer than 36 hours.
 - e. Require horseshoe crabs from different sources be segregated to ensure compliance with live-release standards.
 - f. Require all bled crabs to be live released by the biomedical dealer, biomedical processor, or a vessel under their employ. All hand harvested horseshoe crabs must be returned to the designated shellfish growing area from where they were harvested. All trawl harvested horseshoe crabs must be returned to the body of water adjacent to where they were harvested, which will be further specified by permit condition based on the individual operation and in order to minimize the potential for recapture during the same year.
 - g. For biomedical trawlers, limit tow length to 30 minutes with locked winches, require all harvested crabs be retained in in containers actively fed by sea water, and prohibit containers from being more than 2/3 full.
 - h. Authorize biomedical processors to obtain crabs from bait dealers, as part of the so-called "rent-a-crab" program and from other states provided they were lawfully harvested within that state.

Attachments

ASMFC's 2019 Stock Assessment Overview

January 9, 2023 Petition from Horseshoe Crab Conservation Association

Figure 1. Horseshoe Crab Stock Regions

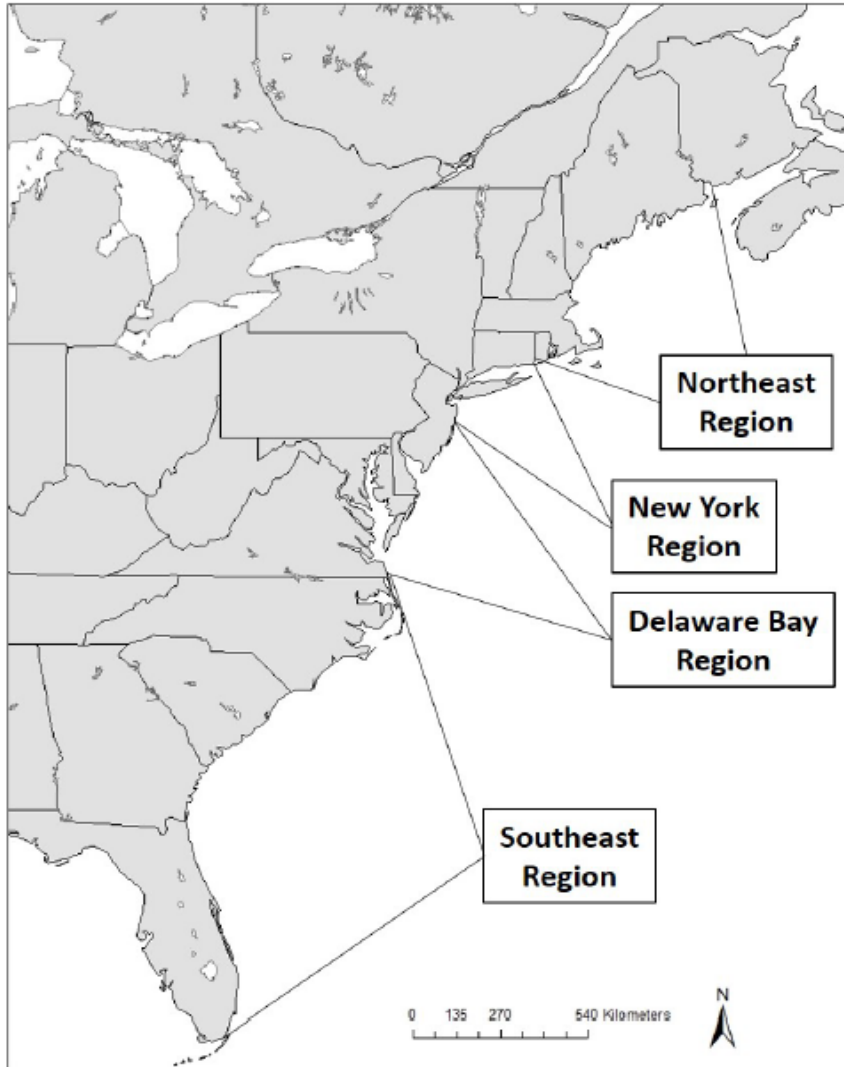


Figure 2. Horseshoe Trawl Survey North of Cape Cod – Stratified Mean Number of Horseshoe Crabs Per Tow

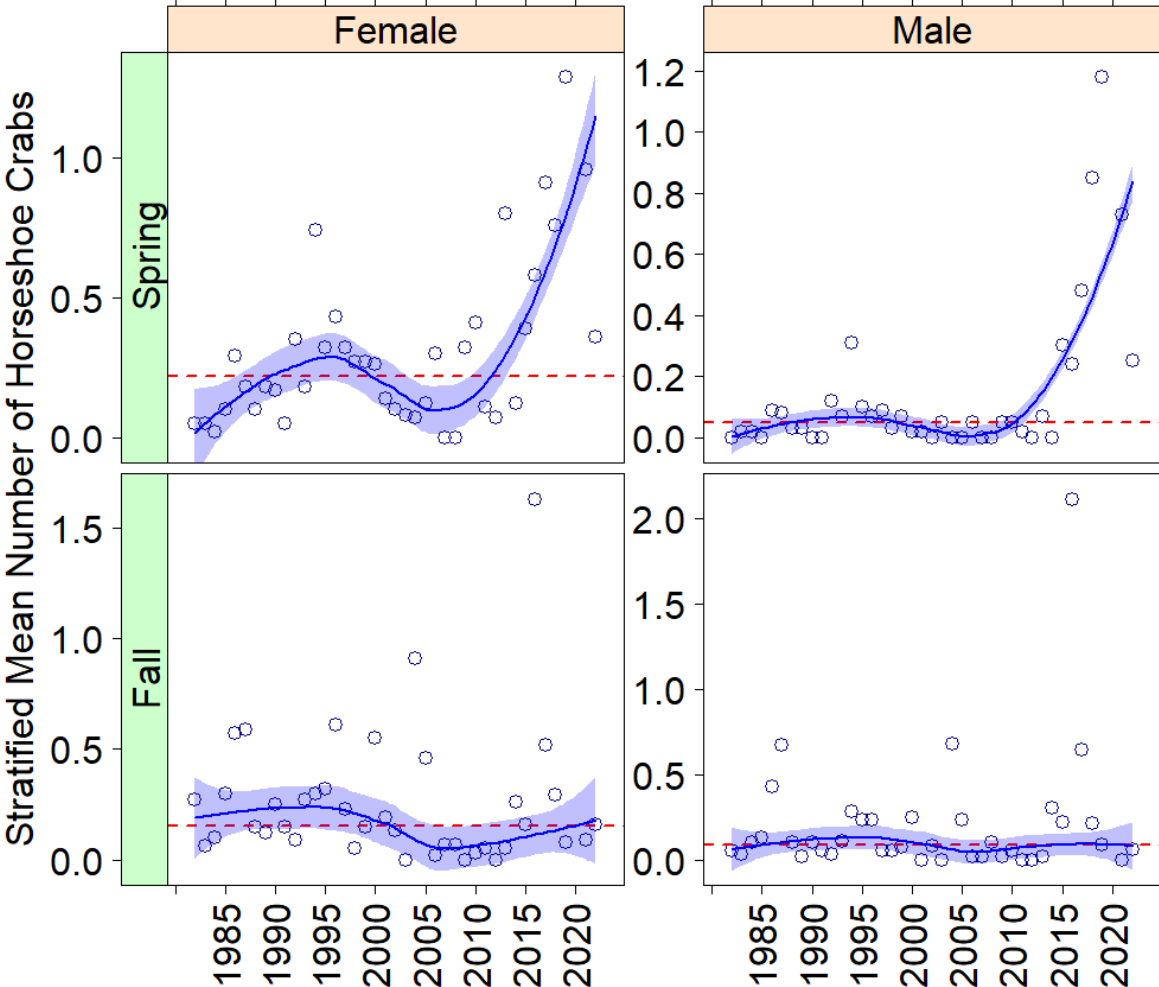


Figure 3. Horseshoe Trawl Survey North of Cape Cod – Stratified Mean Number of Horseshoe Crabs Per Tow

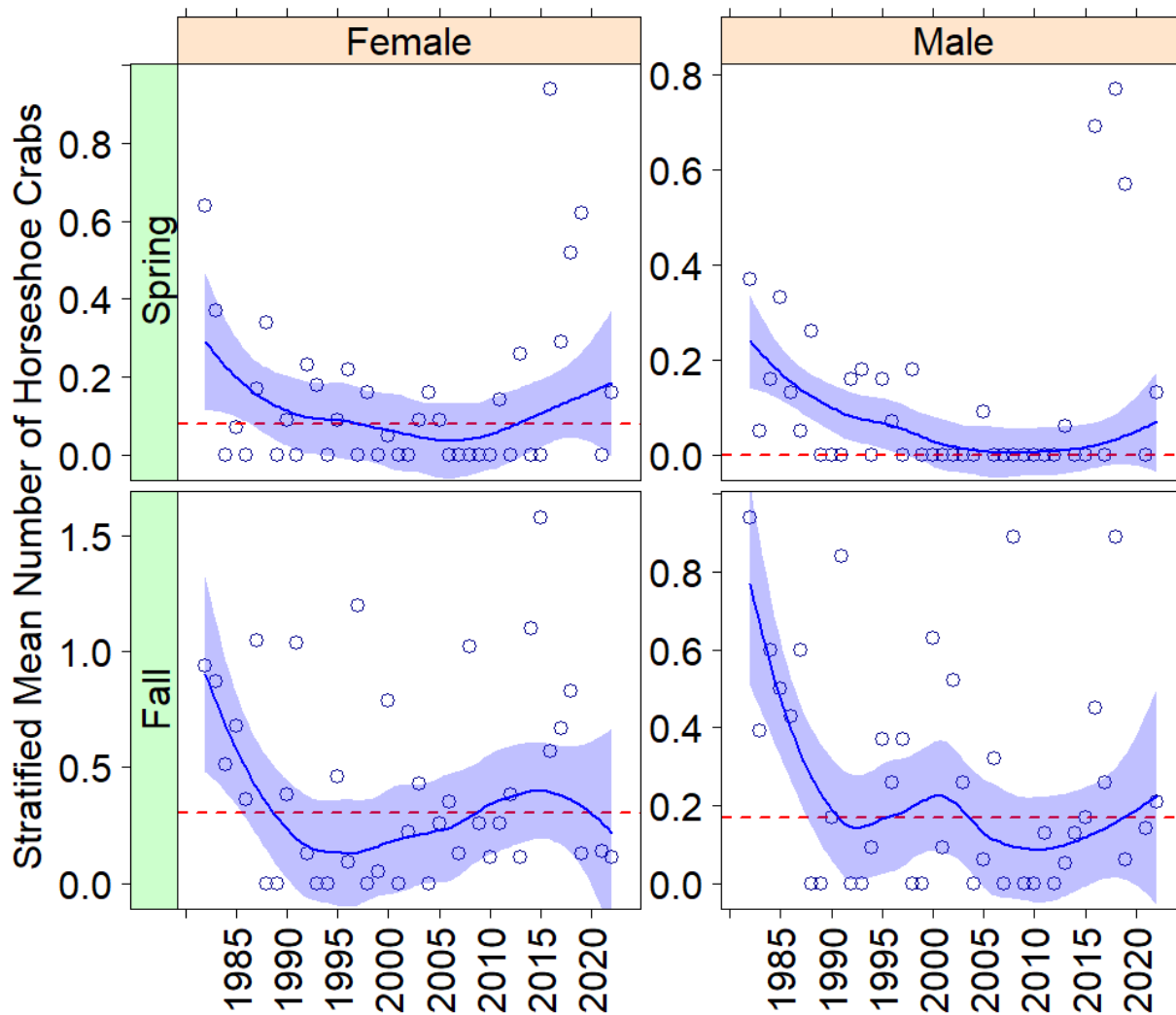


Figure 4. Horseshoe Trawl Survey South of Cape Cod – Proportion of Tows with Horseshoe Crabs

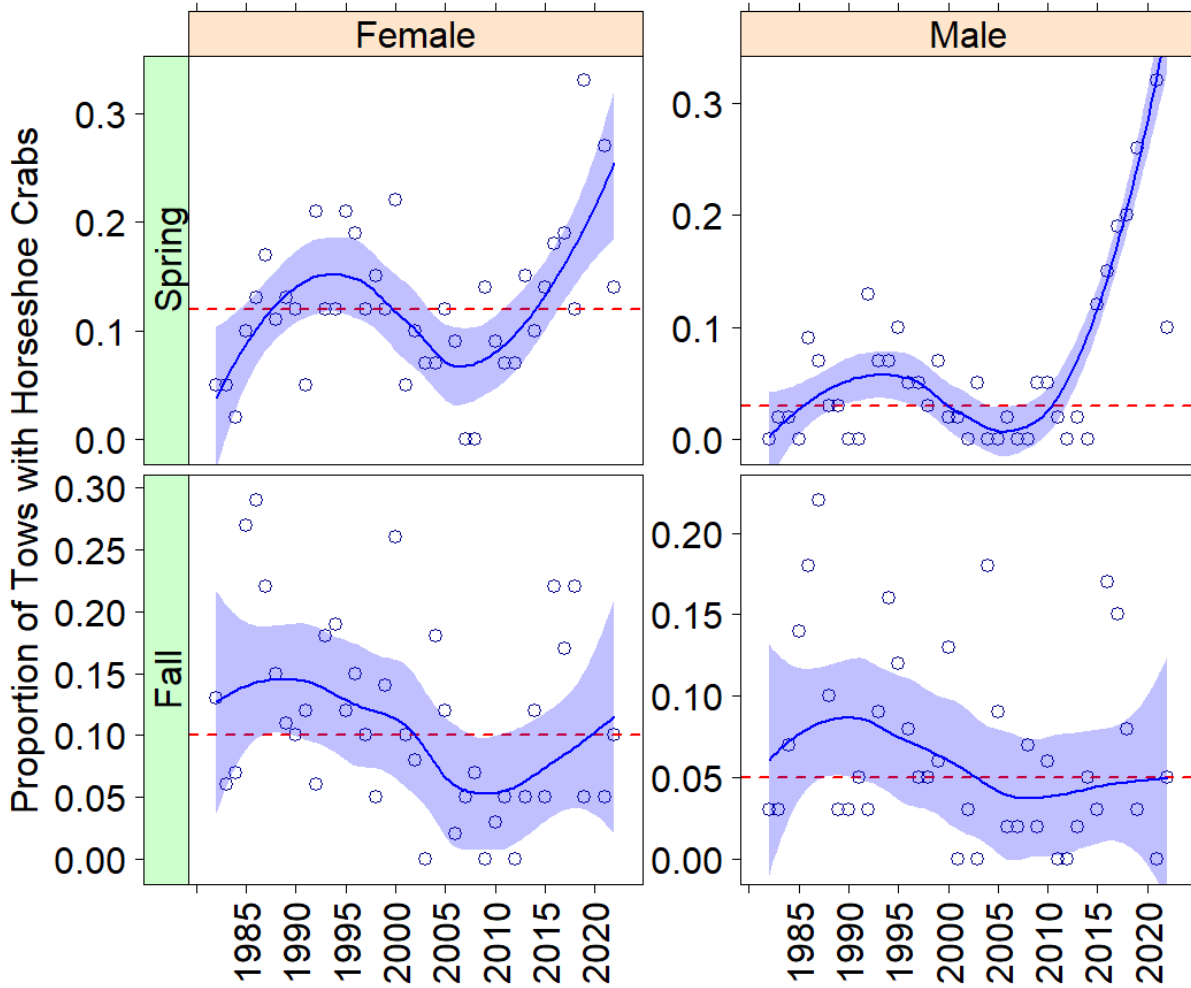


Figure 5. Horseshoe Trawl Survey North of Cape Cod –
Proportion of Tows with Horseshoe Crabs

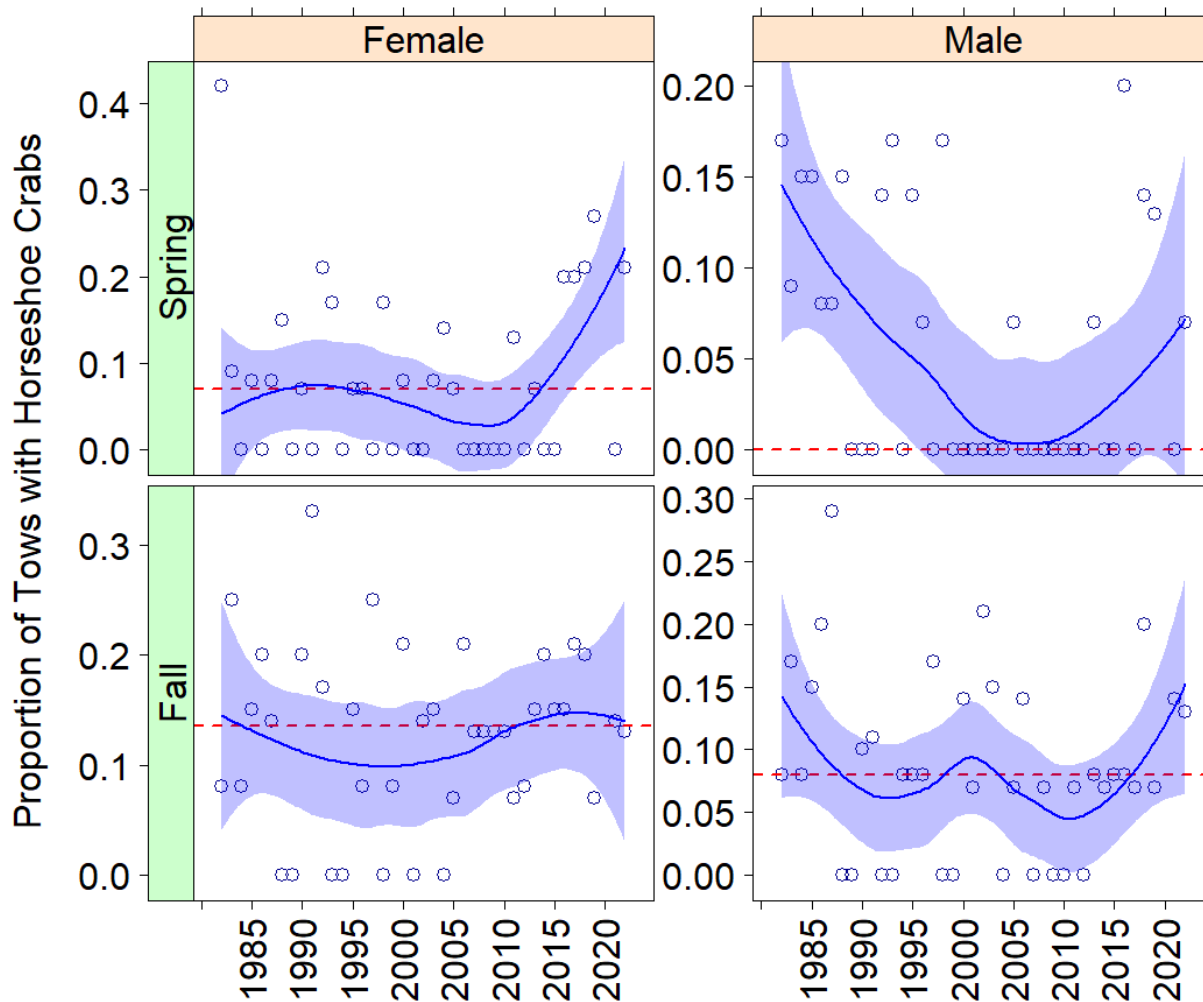
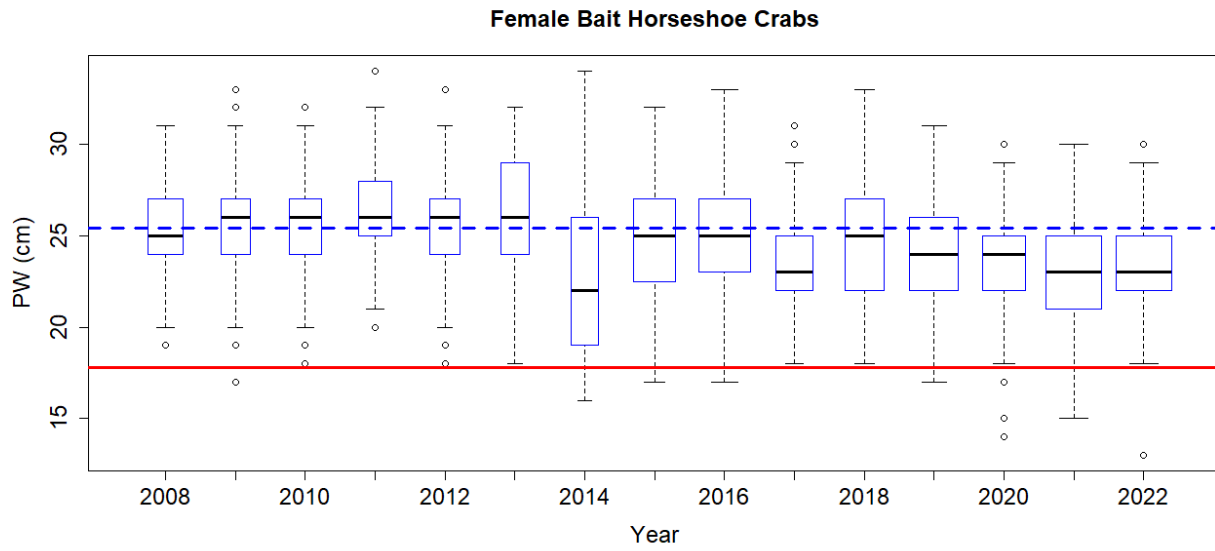


Figure 6. Spawning Beach Survey Trends for 2021 Compared to Median

Beach	Region	Time of Day	2021 vs Median	10-year trend	5-year trend
Duxbury	Cape Cod Bay	Day	equal	mixed	decreasing
Duxbury	Cape Cod Bay	Night	equal	mixed	neutral
Long Beach	Cape Cod Bay	Day	equal	N/A	N/A
Long Beach	Cape Cod Bay	Night	above	N/A	N/A
Millway	Cape Cod Bay	Day	above	mixed	increasing
Millway	Cape Cod Bay	Night	above	mixed	increasing
Long Pasture	Cape Cod Bay	Day	above	mixed	increasing
Long Pasture	Cape Cod Bay	Night	below	N/A	N/A
Sanctuary Beach	Cape Cod Bay	Day	below	decreasing	increasing
Indian Neck	Cape Cod Bay	Day	above	mixed	increasing
Indian Neck	Cape Cod Bay	Night	above	mixed	increasing
Great Island	Cape Cod Bay	Day	above	decreasing	increasing
Priscillas Landing	Outer Cape Cod	Day	above	increasing	increasing
Marsh 2-3	Outer Cape Cod	Day	above	increasing	increasing
Erica's Beach	Outer Cape Cod	Day	above	decreasing	increasing
Bass River	Nantucket Sound	Day	above	N/A	mixed
Bass River	Nantucket Sound	Night	below	N/A	N/A
Warrens Landing	Nantucket Sound	Day	above	increasing	increasing
Warrens Landing	Nantucket Sound	Night	above	increasing	increasing
Tashmoo	Nantucket Sound	Day	above	increasing	increasing
Tashmoo	Nantucket Sound	Night	above	increasing	increasing
Tahanto	Buzzards Bay	Day	equal	mixed	neutral
Tahanto	Buzzards Bay	Night	above	decreasing	increasing
Swifts Beach	Buzzards Bay	Day	equal	decreasing	neutral
Swifts Beach	Buzzards Bay	Night	below	decreasing	decreasing

**Figure 7. DMF Market Sampling for Average Female Bait Crabs
Prosomal Width by Year from 2008 - 2022**





Introduction

This document summarizes the 2019 benchmark stock assessment for horseshoe crab. The horseshoe crab assessment was evaluated by an independent panel of scientific experts through the Atlantic States Marine Fisheries Commission’s External Peer Review process. The horseshoe crab assessment represents the most recent and best information on the status of the coastwide horseshoe crab stock for use in fisheries management.

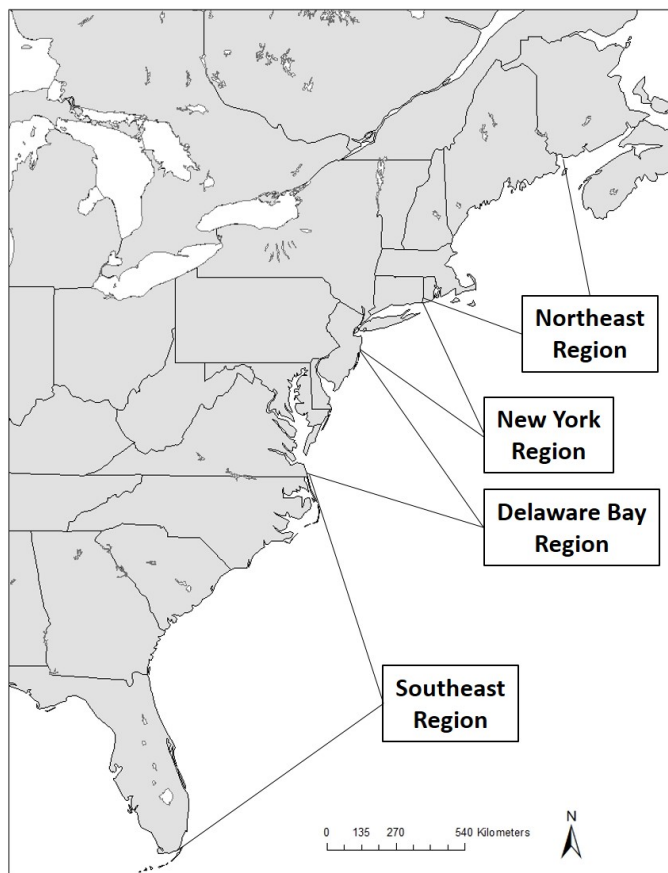
Management Overview

Horseshoe crab fisheries are managed solely by the Atlantic States Marine Fisheries Commission (ASMFC) through the 1998 Horseshoe Crab Fishery Management Plan (FMP). Addendum I (2000) to the FMP established a coastwide, state-by-state annual quota system to further reduce horseshoe crab landings. Addendum II (2001) established criteria for voluntary quota transfers between states.

Addendum III (2004) sought to further conserve horseshoe crab and migratory shorebird populations of red knot in and around the Delaware Bay by reducing horseshoe crab harvest quotas, implementing seasonal bait harvest closures in New Jersey, Delaware, and Maryland, and revising monitoring components for all jurisdictions. Addendum IV (2006) further limited bait harvest in New Jersey and Delaware to 100,000 crabs (male only) and required a delayed harvest in Maryland and Virginia. The provisions of Addendum IV were extended by Addendum V, and VI extended Addendum IV’s measures through the 2013 fishing season.

Addendum VII (2012) implemented the Adaptive Resource Management (ARM) Framework for use during the 2013 fishing season and beyond. The Framework considers the abundance levels of horseshoe crabs and shorebirds in determining the optimal harvest level for horseshoe crabs of Delaware Bay-origin. Since initial implementation in 2013, the ARM Framework has recommended a 500,000 male-only crab harvest in every year.

Based on tagging and genetic studies and the management of the species, the coastwide horseshoe crab stock is assessed as four populations: the Northeast, New York, Delaware Bay and Southeast regions.



What Data Were Used?

The horseshoe crab assessment used both fishery-dependent and independent data, as well as information about horseshoe crab biology and life history. Fishery-dependent data come largely from the commercial bait fishery and estimates of use by the biomedical industry, while fishery-independent data are collected through scientific research and surveys.

Life History

Horseshoe crabs are a long-lived, highly fecund species (meaning they produce a lot of eggs); however, they are subject to high egg and larval mortality due to predation and unfavorable environmental conditions. Horseshoe crabs breed in late spring on Atlantic coast beaches, laying eggs in nests buried in the sand. Larvae typically hatch from the eggs within 2 to 5 weeks, then settle within a week of hatching and begin molting. Juvenile crabs initially remain in intertidal flats, near breeding beaches. Older juveniles move out of intertidal areas to deeper bay and shelf waters and then return as adults to spawn on beaches in the spring. Adults overwinter in the bays or shelf waters. Horseshoe crabs are thought to mature around 10 years of age and may live over 20 years. Horseshoe crabs undergo stepwise growth by periodically shedding their shells (molting) until maturity, with females typically maturing later and attaining larger sizes than males.

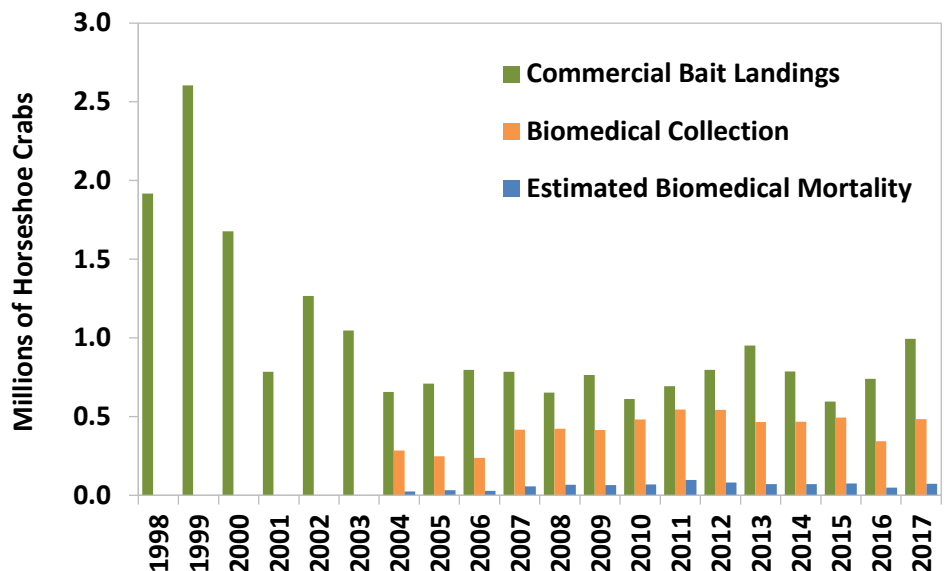
Commercial Data

Since 1998, states have been required to report annual landings to ASMFC through the compliance reporting process and to the Atlantic Coastal Cooperative Statistics Program (ACCSP) Data Warehouse. Landings used in this assessment for 1998 through 2017 were validated by state agencies through ACCSP.

Reported landings data show that commercial harvest of horseshoe crabs was high in the late 1990s, declined in the early 2000s, and has been relatively stable since 2004. The majority of bait harvest comes from the Delaware Bay Region, followed by the New York, New England, and Southeast Regions. The bulk of commercial horseshoe crab bait landings are caught by trawls, hand harvests, and dredges.

Horseshoe crabs are also collected by the biomedical industry to support the production of Limulus ameobocyte lysate (LAL), a clotting agent in horseshoe crab blood cells that is used in the detection of pathogens in health patients, drugs and intravenous devices. Blood from the horseshoe crab is obtained by collecting and

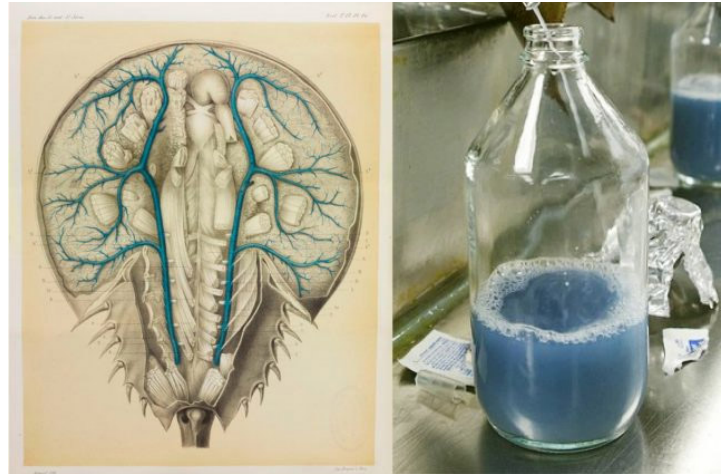
Horseshoe Crab Bait Landings & Biomedical Collection



Please note the following details regarding biomedical collection numbers:

- * Annually reported biomedical collection numbers include all crabs brought to bleeding facilities except those harvested as bait and counted against state quotas.
- * Most collected biomedical crabs are returned to the water after bleeding; a 15% mortality rate is estimated for all bled crabs.

extracting a portion of their blood. As required by the FMP, most crabs collected and bled by the biomedical industry are released alive to the water from where they were collected. However, a portion of these crabs die from the procedure. Crabs harvested for bait are sometimes bled prior to being processed and sold by the bait industry; these crabs are counted against the bait quota. Biomedical use has increased since 2004, when reporting began, but has been fairly stable in recent years. Previous assessments and management documents have applied a mortality rate of 15% to the number of horseshoe crabs bled and released alive to estimate the number of crabs that are presumed dead as a result of the capture and bleeding process. This assessment maintains the 15% mortality rate based on an updated analysis of available literature on this topic.



On the left, venous system of the horseshoe crab from Milne-Edwards's *Recherches sur l'anatomie des Limules* – American Museum of Natural History. On the right, extracted blue blood from horseshoe crabs ([Mark Thiessen](#) – National Geographic)

Horseshoe crabs are also encountered in several other commercial fisheries. Discard mortality occurs in various dredge, trawl and gillnet fisheries and may vary seasonally with temperature, impacting both mature and immature horseshoe crabs. However, the actual rate of discard mortality is unknown. Commercial discards were estimated for the Delaware Bay region as part of this assessment with data from the NOAA Fisheries Northeast Fisheries Science Center's Northeast Fisheries Observer Program. Estimates indicate a significant amount of horseshoe crabs are captured and discarded in other fisheries, possibly on the same scale as the bait fishery, although substantial uncertainty is associated with the estimates and quantifying discards will require further work in future assessments.

Data Confidentiality

The stock assessment was conducted with the inclusion of biomedical data on a regional basis, which are confidential. The report for peer review included confidential data but these data were redacted for the Technical Committee and public report. Biomedical data are not confidential at the coastwide level. Confidential data are data such as commercial landings or biomedical collections that can be identified to an individual or single entity. Federal and state laws prohibit the disclosure of confidential data, and ASMFC abides by those laws. In determining what data are confidential, most agencies use the "rule of 3" for commercial catch and effort data. The "rule of 3" requires three separate contributors to fisheries data in order for the data to be considered non-confidential. This protects the identity of any single contributor. In some cases, annual summaries by state and species may still be confidential because only one or two dealers process the catch. Alternatively, if there is only one known harvester of a species in a state, the harvester's identity is implicit and the data for that species from that state are confidential.

In this assessment, although three biomedical facilities operate in the Delaware Bay region, these data are confidential because only two facilities operate outside this region. Therefore, if Delaware Bay regional collections were released, those with knowledge of confidential collections (such as facility employees) for one of the facilities outside of the Delaware Bay region would, through subtraction from the coastwide total, also know collections for the other facility.

Fishery-Independent Surveys

The horseshoe crab assessment used 17 fishery-independent surveys to characterize trends in abundance of horseshoe crab. Two surveys were located in the Northeast region, 4 in the New York region, 7 in the Delaware Bay region, and 5 in the Southeast region.

What Models Were Used?

Tagging data from the U.S. Fish and Wildlife Service horseshoe crab database were explored by region to estimate survival. The highest survival rates were in the Delaware Bay and coastal Delaware-Virginia regions. The lowest survival rates were in coastal New York-New Jersey and the Southeast.

A trend analysis was used to assess regional and coastwide stocks and an additional stage-based model using pre-recruits and full recruits were used to assess the Delaware Bay region. For the trend analysis, 1998 was used as the benchmark year for comparison of survey trends since it was the first year of FMP implementation. Not all surveys were used in each assessment method. Traditional age-based methods could not be used because there is no technique available to measure the ages of horseshoe crabs.

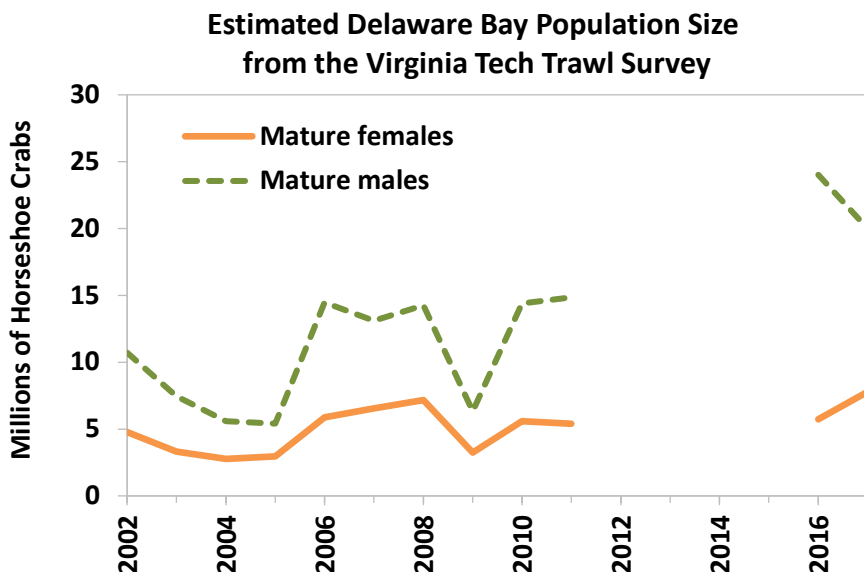
Coastwide and Regional Trend Analysis

Autoregressive Integrated Moving Average (ARIMA). A smooth trend was generated for each survey, then the probability that the most recent year's survey value had dropped below the 1998 level was estimated (see table on next page). In the Northeast Region, 1 out of 2 surveys were likely less than the 1998 reference point. In the New York Region, 4 out of 4 surveys were likely less than the 1998 reference point. In the Delaware Bay Region, 2 out of 5 surveys were likely less than the 1998 reference point. Finally, in the Southeast Region, no survey was below the 1998 reference point. Coastwide, 7 out of 13 surveys were likely less than the 1998 reference point.

Delaware Bay Region Analysis

Catch multiple survey analysis. The catch multiple survey analysis (CMSA) estimated Delaware Bay stock dynamics from 2003-2018 by dividing the population into 1 of 2 life stages (pre-recruits and full recruits to the fishery). It then tracked trends in the relative abundance of these two stages in the Virginia Tech Benthic Trawl Survey and one-stage abundance indices from the New Jersey Ocean Trawl and Delaware Adult Trawl Surveys. The model included commercial bait harvest, regional confidential biomedical data and commercial discard estimates. The CMSA indicated adult abundance in the Delaware Bay was stable from 2003-2012 and then began increasing considerably in the past few years. This finding is consistent

with stock rebuilding due to a period of significantly reduced commercial landings and tight management controls on the fishery beginning in the early 2000s in this region. The results of the model are considered confidential since they included regional biomedical data, but sensitivity runs indicated the mortality attributed to biomedical collection does not have a significant effect on population estimates or fishing mortality.



The Peer Review Panel supported the CMSA as a stock assessment method for horseshoe crab in the Delaware Bay, but did not approve the reference point developed by the Stock Assessment Subcommittee for determining overfished and overfishing status to compare with the model output. Regardless, the Panel indicated population estimates from the CMSA do represent the best current estimates and the ARM Committee should consider using the estimates in the Framework.

What is the Status of the Stock?

To date, no overfishing or overfished definitions have been adopted for management use. For this assessment, biological reference points were developed for the Delaware Bay region horseshoe crab population although not endorsed by the Peer Review Panel for use in management. Stock status was determined on the coastwide and regional stock levels based on the results of the ARIMA and in comparison to similar analysis in past assessments.

Stock status was based on the percentage of surveys within a region (or coastwide) having a >50% probability of the final year being below the ARIMA reference point. **“Poor”** status was >66% of surveys meeting this criterion, **“Good”** status was <33% of surveys, and **“Neutral”** status was 34 – 65% of surveys. Based on this criteria, stock status for the Northeast region was neutral; the New York region was poor; the Delaware Bay region was neutral; and the Southeast region was good. Coastwide, abundance has fluctuated through time with many surveys decreasing after 1998 but increasing in recent years. The coastwide status includes surveys from all regions and indicates a neutral trend, likely due to positive and negative trends being combined.

Applying these stock status criteria to summary ARIMA results from the 2009 benchmark assessment and 2013 assessment update gives a general idea of how status has changed through time. The stock status of the Delaware Bay and Southeast Regions have remained consistently neutral and good, respectively, through time. The status of the Northeast region has changed from poor to neutral. The status of the New York region has trended downward from good, to neutral, and now to poor. These trends should be viewed with caution because the number of surveys in each region has changed in the current assessment and the index values have changed due to a change in methods for developing indices.

**Number of Surveys Below the Index-based 1998 Reference Point
in the Terminal (Final) Year of ARIMA Model**

Region	2009 Benchmark	2013 Update	2019 Benchmark	2019 Stock Status
Northeast	2 out of 3	5 out of 6	1 out of 2	Neutral
New York	1 out of 5	3 out of 5	4 out of 4	Poor
Delaware Bay	5 out of 11	4 out of 11	2 out of 5	Neutral
Southeast	0 out of 5	0 out of 2	0 out of 2	Good
Coastwide	7 out of 24	12 out of 24	7 out of 13	Neutral

Data and Research Needs

Horseshoe crab assessments would be greatly improved by better characterization of commercial discards and resulting mortalities, as well as fishery-independent surveys and landings by fishery, sex, and life stage. Expanding data collection and analysis of current fishery-independent surveys and implementing new surveys that target horseshoe crabs throughout their full range would reduce uncertainty about horseshoe crab stock status. Further development of the CMSA and reference points coastwide as well as considering revisions to the ARM Framework in Delaware Bay are high priorities that will require additional data collection and modeling efforts.

Whom Do I Contact For More Information?

Atlantic States Marine Fisheries Commission
1050 N. Highland Street
Arlington, VA 22201
703-842-0740
info@asmfc.org

Glossary

Adaptive Resource Management (ARM): a structured, iterative process for decision making in the face of uncertainty whereby predictive population or ecosystem models are regularly updated with new information from scientific monitoring programs and associated management plans are adjusted accordingly.

Autoregressive Integrated Moving Average (ARIMA): a data analysis method that generates smooth trends in abundance indices and estimates the probability that an index has dropped below a specified level.

Catch multiple survey analysis (CMSA): a stock assessment method that divides the population into two or more life stages, then uses relative catch of animals in those stages within multiple surveys over time to estimate population abundance and fishing mortality.

References

- ASMFC. 2019. 2019 Horseshoe Crab Benchmark Stock Assessment and Peer Review Report. ASMFC, Arlington, VA. 316 pp.
- ASMFC. 2013. [2013 Horseshoe Crab Stock Assessment Update](#). ASMFC, Arlington, VA. 72 pp.
- ASMFC. 2009. Guide to Fisheries Science and Stock Assessments. Arlington, VA.
<http://www.asmfc.org/uploads/file/GuideToFisheriesScienceAndStockAssessments.pdf>
- ASMFC. 2009. [Horseshoe Crab Stock Assessment for Peer Review: No. 09-02 \(Supplement A\)](#). ASMFC, Washington D.C. 122pp.
- Delaware Bay Adaptive Resource Management Working Group. 2009. [A Framework for Adaptive Management of Horseshoe Crab Harvest in the Delaware Bay Constrained by Red Knot Conservation](#). 81 pages.

Horseshoe Crab Conservation Association

P.O. Box 2334
Orleans, MA 02653-2334



Brenda J. Boleyn
Duxbury

January 9, 2023

Hillary Cressey, DA
Barnstable

Denise Ellis-
Hibbett
Boston

Dan McKiernan, Director
Derek Perry, Invertebrate Fisheries
Mass. Division Marine Fisheries
836 Rodney French Blvd.
New Bedford, MA 02744

Mark Faherty
Harwich

Daniel G. Gibson
III, PhD
Falmouth

Dear Dan and Derek,

Charles "Stormy"
Mayo III, PhD
Provincetown


Thank you for welcoming a petition from the Horseshoe Crab Conservation Association.
We appreciate the complexity of your task and the opportunity to participate.

Thomas J.
Novitsky, PhD
Falmouth

Sincerely,

Sarah Martinez
Barnstable

Erik J. Paus
Brewster



Brenda J. Boleyn
for the HCCA

Robert L. Prescott
Orleans

Maureen A. Ward
Barnstable

Paul J. Ward
Barnstable

The goal of the Horseshoe Crab Conservation Association is to ensure long-term sustainable populations of horseshoe crabs in the coastal estuaries and embayments of Massachusetts through increased regulatory attention and broadened public education.

Horseshoe Crab Conservation Association

P.O. Box 2334
Orleans, MA 02653-2334



Petition to MA DMF to Protect HSC Spawning

09 Jan 2023

Brenda J. Boleyn
Duxbury

Hillary Cressey, DA
Barnstable

Denise Ellis-
Hibbett
Boston

Mark Faherty
Harwich

Daniel G. Gibson
III, PhD
Falmouth

Charles "Stormy"
Mayo III, PhD
Provincetown

Thomas J.
Novitsky, PhD
Falmouth

Sarah Martinez
Barnstable

Erik J. Paus
Brewster

Robert L. Prescott
Orleans

Maureen A. Ward
Barnstable

Paul J. Ward
Barnstable

For information
contact:
Paul Ward at
wardpj@aol.com

The Horseshoe Crab Conservation Association proposes the Massachusetts Division of Marine Fisheries (MA DMF), under their authority to regulate the harvest of the American Horseshoe Crab, *Limulus polyphemus*, modify the current rule by designating June 15 as the earliest start date of each year for both bait and biomedical harvest with exceptions granted only for approved research studies.

On 17 Feb 2016, the International Union for Conservation of Nature and Natural Resources (IUCN) listed the American Horseshoe Crab as "Vulnerable", one level from "Endangered", in their [Red List Assessment of Threatened Species](#). Their report noted, "Continuing decreases were found in... the New England... areas... Thus, *Limulus* is Vulnerable at the species level with potential for assignment to a higher risk category at the regional and sub-regional levels, particularly the... New England area... Specifically, population reductions over 40 years were projected to be... 92% in New England..." In addition, the IUCN 21 July 2022 Green List Assessment of species recovery and the impact of conservation designates *Limulus* as 'Moderately Depleted' and indicates the Population Trend as 'Decreasing'.

With the implementation of this start date, selected as a consensus date where essentially most horseshoe crab spawning in Massachusetts waters is complete, some current MA DMF rules, i.e., the 'lunar closure' and vessel quotas, could be dropped. MA DMF bait harvest quotas, as well as continued monitoring and enforcement of industry Best Management Practices, should be retained.

The proposed rule change aligns with current harvest moratoria and post-spawning start dates in New Jersey, Delaware, Maryland, and Virginia. The abundant spawning activity and successful population on the Monomoy National Wildlife Refuge, where no harvest is allowed, provides an indication of the expected results if this rule change is implemented.

DMF trawl survey data for Nantucket Sound support that commercial fisheries (bait and biomedical) will not be harmed by this change. Since horseshoe crabs harvested for bait are often frozen, collection following a June 15 start date will have no impact on bait availability.

This rule change will, over time, rebuild the diminished stock and ensure the sustainability of horseshoe crabs for all stakeholders.

Supporting Information:

Horseshoe crabs are a public asset and have economic value for biomedical stakeholders and fisheries stakeholders. Just as important, horseshoe crabs have intrinsic value as an essential part of our history, our stories, and as a distinct part of Massachusetts' natural and cultural heritage.

A more robust horseshoe crab population will support endangered birds and various marine species that depend on horseshoe crab eggs and juveniles for food.

This rule change recognizes that horseshoe crab spawning is not rigidly linked to the lunar cycle but is moderated by weather and will occur throughout the spawning season. After 12 years of lunar closures there has been no consistent sign of improved spawning data.

Bait species should be abundant and quick to reproduce. Horseshoe crabs are neither which makes spawning protection even more imperative.