

October 24, 2017

Megan Ware, Fishery Management Plan Coordinator
Atlantic States Marine Fisheries Commission
1050 North Highland Street, Suite 200 A-N
Arlington, Virginia 22201

Re: Menhaden Amendment 3

Dear Ms. Ware, Director Beal, and members of the Menhaden Management Board,

The Pew Charitable Trusts (Pew) supports the adoption of the Atlantic menhaden Fisheries Management Plan (FMP) Amendment 3¹ with the specific management measures recommended below at the November 13/14, 2017 Meeting of the Atlantic States Marine Fisheries Commission (ASMFC). Through Amendment 3, ASMFC is engaging in an historic and potentially precedent-setting initiative. To be successful, Amendment 3 must transition the management of one of the nation's most important forage fish species from a standard "single-species" approach based solely on stock dynamics and the needs of the directed fishery, to a system that is based, instead, primarily on menhaden's critical role in the ecosystem including the contributions to the productivity of other ASMFC-managed fisheries.

We support the following key measures in Amendment 3:

- **Section 2.6.4, Option E – Reference Points:** The Menhaden Management Board (Board) should adopt ecological reference points (ERPs) based on the current best available science (75% target, 40% threshold) and clearly state that management decisions will seek to achieve both biomass- and fishing mortality-based targets while candidate menhaden-specific ERPs are developed.
- **Section 4.3.2.1 – Overage Payback:** Quota overages must be subtracted from the subsequent year's quota on a pound-for-pound basis.
- **Section 4.3.3, Option B – Quota transfers:** Transfers should be unrestricted if completed prior to a state exceeding its quota. But a state receiving a quota transfer after exceeding its quota should be required to take steps to avoid the overage in the following year, and should not be allowed to accept a quota transfer if it exceeds its quota allocation by more than 5% for two years in a row.
- **Section 4.3.4, Option A – Quota Rollovers:** Quota rollovers should not be allowed.
- **Section 4.3.5, Option F – Incidental Catch and Small-Scale Fishery Allowance:** All menhaden caught should be counted towards the total allowable catch (TAC).
- **Section 4.3.6.1, Option C – Episodic Events Set Aside Program:** The episodic events set aside program should be discontinued.
- **Section 4.3.7, Option B with Sub-Option B – Chesapeake Bay Reduction Fishery Cap:** The Board should reduce the Chesapeake Bay reduction fishery cap to 51,000 metric tons (mt) and discontinue the rollover of unused Bay quota.
- **Section 4.4, Habitat Conservation and Restoration Recommendations:** Pew supports the provisions in Section 4.4 to protect and restore menhaden habitat, avoid incompatible activities, and discourage potentially harmful fishery practices.
- **Section 6, Research Needs:** Pew supports the research needs outlined in this section. The Board should prioritize research into: menhaden life history characteristic; migration patterns; historical abundance/biomass and landings; impacts of habitat loss/degradation; socio-economic values of and impacts to "non-consumptive" industries; ecosystem services provided by menhaden; the effects on menhaden and predators of localized depletion; and, food web interactions.

Reference Points

Section 2.6.4, Option E. The Board should select Section 2.6.4, Option E to transition to actionable ERPs based on the best available science, and should specify that all future management actions be geared towards achieving the target biomass and fishing mortality rate. When the Biological/Ecological Reference Points workgroup (BERP) completes menhaden-specific multispecies models, the ERPs they derive should be immediately considered for implementation.

Menhaden play vitally important ecological roles in Atlantic Ocean ecosystems. Yet, the current management system is not designed to adequately conserve menhaden and make the necessary improvements to the condition of the population to enable them to make optimal contributions to the health of the Atlantic ecosystem and related fisheries. Recent science has demonstrated direct negative impacts of large-scale directed menhaden fishing and the resulting low menhaden abundance on many predators, including striped bass, birds, highly migratory species, sharks, and marine mammals.²

A substantial and growing body of science has concluded that key, low-trophic level species like menhaden must be managed using the highest levels of caution.³ Pikitch *et al.* (2012), for example, note that “It is important to manage fisheries that target [forage species] in a precautionary manner that accounts for their high degree of variability and importance to the ecosystem.”⁴ Amendment 3 should follow this science by establishing: 1) a target biomass appropriate for Atlantic menhaden given its role as a key forage species within the Northeast Large Marine Ecosystem; 2) a threshold biomass that defines a “danger zone” that would compromise the reproductive output of the population and limit the availability of menhaden as prey for its many predators; and, 3) a biomass-dependent fishing mortality rate (F) that reduces fishing appropriately to achieve the stock biomass target. Specifically, Pew recommends the following, with further explanation below:

- A biomass-based reference point that sets a target to leave 75 percent of the virgin, unfished biomass in the water ($B_{\text{target}} = 75\%$ unfished biomass, or $75\%B_0$), with a corresponding target F reference point at a level consistent with achieving the target in accordance with the Commission’s risk policies to rebuild and maintain a target population;
- A threshold (limit or “cutoff”) that results in swift and decisive Board action to rebuild the stock if biomass drops to or below 40 percent of unfished biomass ($B_{\text{threshold}} = 40\%$ unfished biomass, or $40\%B_0$), consistent with the best available science for setting catch limits for key forage species which demonstrates that significant ecosystem impacts can and do occur when forage populations drop to or below $40\%B_0$;
- As an alternative to virgin biomass, reference points that are more protective of the spawning component of the population (which includes the age classes targeted by fisheries) could also be used, and might be based on spawners- or fecundity-per-recruit (*i.e.*, SPR); and,
- Implementation policies that ensure management actions will achieve the target biomass and fishing mortality with a high degree of certainty, and strong measures to reverse declines with a high probability of success to prevent the population from falling below the threshold and to correct course if it does.

Fulfilling the ASFMC’s commitment to ecological management of Atlantic menhaden

Options C and E are both consistent with best available science and the Board’s long-standing commitment to ecological management for this species. Pew supports Option E at this time because it should accomplish similar results to Option C, but is less complicated to implement, provides managers with more flexibility, and does not threaten the menhaden fishing industry with the possibility of

moratoria. The primary goal from the outset of the ASFMC's Menhaden FMP Amendment 1 in 2001 was to "Protect and maintain the Atlantic menhaden stock at levels to maintain viable fisheries and the forage base [emphasis added]..."⁵ Previously, the peer reviewers of the 1998 menhaden stock assessment "...recommended that a reference point responsive to menhaden as a forage species be developed to take into account the allocation of fish between fishing and natural mortality (predator-prey interactions)."⁶

Amendment 2 to the FMP, adopted in December 2012, was a long-awaited and significant improvement to Atlantic menhaden conservation and management. The amendment was designed to address ecosystem concerns and balance multiple trade-offs "...to minimize the chance of a population decline due to overfishing, reduce the risk of recruitment failure, reduce impacts to species which are ecologically dependent on Atlantic menhaden [emphasis added], and minimize adverse effects on participants in the fishery."⁷ The external review panel of the 2015 stock assessment "...agree[d] that development of Ecological Reference Points should be a priority for Atlantic menhaden management."⁸

Amendment 3 is the first *formal* endeavor to shift the reference points that guide menhaden management to an ecosystem-based approach. The motion that initiated Amendment 3 and passed the Board 16-1 in May 2015 was intended to implement ERPs and a corresponding quota for the 2017 fishing season.⁹ At the November 2015 meeting, the ASFMC reaffirmed its commitment but delayed implementation until 2018. Given the continuing history of ASFMC commitments, the decline in many predators of menhaden including managed species, the public's overwhelming support of ecological management for this forage species, and the converging scientific consensus supporting an approach that could be adopted immediately, menhaden should be managed using the best available ERPs now.

Pew stresses that ERPs are the most important component of Amendment 3, and should Amendment 3 fail to result in an unequivocal and immediate shift to ERPs, the Commission will have failed to fulfill its commitment to the public, and will risk harm to: 1) the many fisheries and businesses that depend on the stock's abundance from Maine to Florida; 2) the recent improvements in the condition of the population; and, 3) the health of innumerable predators. ERPs are as much a policy decision as they are a scientific one, with the ultimate task being to determine an "allocation" to the ecosystem.

*75 percent of virgin biomass (or an appropriate proxy)
is the right target for Atlantic menhaden*

The growing body of scientific literature from around the world supports Option E for the management of this important forage species, and is thus the best available science,ⁱ while the BERP's models and candidate ERPs are developed. Amendment 3 should establish a new target reference point as the goal of management and the foundation for annual quota-setting and it must protect menhaden's ecosystem role. ERPs that weigh current biomass against virgin conditionsⁱⁱ is in keeping with the biological reference points adopted in Amendment 2, which "...implemented maximum spawning potential (MSP)

ⁱ Under the federal Atlantic Coastal Fisheries Cooperative Management Act (ACFCMA), the Commission prepares and adopts FMPs "to provide for the conservation of coastal fishery resources." 16 U.S.C. § 5104(a)(1). Every plan must "promote the conservation of fish stocks throughout their ranges [] based on the best scientific information available." Id. § 5104(a)(2).

ⁱⁱ B₀ connotes the ecological concept of "carrying capacity," which can be calculated for a fish stock in a variety of ways. Not surprisingly, because carrying capacity is the result of ever-changing reproductive and mortality processes, "...some of which may be affected by prior fishing... it should not be viewed as a constant." Accordingly, then, B should be examined in the longer historical context of the fishery and regularly re-evaluated to update the corresponding values (not the percentages) of the target and threshold reference points. Source: Terrance J.Q. & J.S. Collie (Jan. 2005). [Sustainability in single-species population models](#). *Philos Trans R Soc Lond B Biol Sci*, 360(1453): p. 147-162.

based reference points that relate current stock conditions as a percent of unfished conditions.”¹⁰ In their 2011 paper in *Science*, Smith *et al.* used “... used a range of ecosystem models to explore the effects of fishing low-trophic level species on marine ecosystems, including marine mammals and seabirds, and on other commercially important species.”¹¹ Their findings indicate that the ecological consequences of fishing a key low-trophic level species can be “very severe” even at relatively low levels of depletion, which they define as 25 percent below unfished levels (*i.e.*, 75%B₀). They add that the fishing rates used to meet this target “... may be closer to long-term economic optimum levels,” and could also be of some benefit to other commercially targeted species.

Several other significant works also recommend setting a 75%B₀ target for forage species:

- The Marine Stewardship Council (MSC) utilized the Smith *et al.* findings to recommend setting a “... default biomass target level consistent with ecosystem needs...” at 75%B₀ as a best practice for sustainable fisheries management of key low-trophic level species.¹² (MSC specifically lists menhaden as a key low-trophic level species.) This population level “...is expected to generate yields close to [maximum sustainable yield] and to avoid significant impacts on other ecosystem components.”¹³
- The Food and Agricultural Organization’s Technical Guidelines for Responsible Fisheries suggest that “...maintaining selected prey populations above 75% of the unfished biomass to allow for predator feeding ...”¹⁴
- Froese *et al.* (2011) recommend that a “... precautionary biomass target of 1.5 B_{MSY} (representing 75% of unexploited biomass) is probably needed” for forage fish.¹⁵

A scientific consensus has emerged based on research from around the world that a 75-percent target is the best approach to use for exactly the situation the Board faces until the BERP models are complete.

*40 percent of virgin biomass (or an appropriate proxy)
is the right threshold for Atlantic menhaden*

Reducing fishing pressure when a species is in steep decline is common-sense, standard fisheries policy. Such a safeguard is even more important for menhaden which play such an important role in the ecosystem and success of other fisheries, where a collapse could cascade throughout the ecosystem and harm other fisheries, jobs, seafood, and coastal communities. A collapse of the menhaden population would be a disaster for the east coast ecosystem, so a firm baseline must be established.

Forage fish populations like menhaden are characterized by high annual variation. During down-phases, a forage population and its predators may be most at risk, particularly if intense fishing continues.¹⁶ A biomass threshold of 40%B₀ is recommended in the peer-reviewed study by Pikitch *et al.* (2012) to correspond with a fishing mortality rate of zero (*i.e.*, F = 0) in order to ensure with 95-percent certainty that “... fishing on forage fish will not deplete any dependent predator population to levels that would meet the [International Union for Conservation of Nature] “vulnerable” criteria.”¹⁷ The authors note further that this threshold “... is close to the median values where impacts on vital rates of dependent predators have been found”.¹⁸ In other words, when forage populations fall below that level, there can be widespread harm to predators and ecosystems.

In a study by Kaplan *et al.* (2013), two well-developed models for the California Current ecosystem were used to examine the impacts on other parts of the ecosystem of harvesting forage species. They showed similarly that “... depleting forage fish to 40% [unfished biomass] altered the abundance of 20–50% of the other functional groups by >20%.” These authors also note that maintaining a forage-based reference point of 75%B₀ “... reduces these impacts on the California Current food web.”¹⁹

While multispecies models are being developed, it is important through Amendment 3 to establish a fundamental threshold that protects the broader ecosystem and the many predators (including those managed by the Commission), and associated fishing and seafood businesses that depend on high biomass. Setting the threshold at 40%B₀ is supported by science and the historical record for menhaden.

*How to implement a 75% target/40% threshold
and improve reference point calculations*

The stock biomass in 2016 was at about 47% of B₀, well below the intended 75% target, but above the 40% threshold.²⁰ Based on the BERP-generated F rates that correspond with 75%B₀ and 40%B₀, F in 2016 (0.204) is also between the F target and F threshold. Based on these reference points, current stock status indicates that the population is not overfished nor is overfishing occurring *from an ecosystem perspective*. Accordingly, and as set forth in Amendment 2 and repeated in Amendment 3, “the Board may consider steps to reduce F [and biomass/fecundity] to the target level[s].”²¹ To manage menhaden in such a way that achieves the targets, therefore, the least risky option for the Board to pursue would result in a reduction of F (and thus the total allowable catch). The BERP and Technical Committee (TC) derived a single-year TAC projection of 147,000 metric tons (mt) for 2018 that would result in a 50% probability of achieving the 75%B₀ F-target in one year. While we support the general concept of the Board taking action to achieve this target, we emphasize that Option E leaves the Board significant latitude as to how aggressively and quickly they will work to achieve reference point targets when the stock status is above the thresholds. A static or increased F for 2018 would be more risky and less likely to result in achieving the targets. Although Option E offers managers wide discretion, catch levels must not be set at a level that would impede progress towards achieving F- and biomass-based targets, or undermine the recent and ongoing growth that is evident in the 2017 Atlantic Menhaden Stock Assessment Update (Assessment).²²

Pew is concerned that the BERP’s derivation of reference point numbers for Options C, D, and E (presented in Amendment 3, Table 1) that are based on biomass-weighted fishing mortality rates of all menhaden age classes may make it challenging for the public to effectively weigh in on ERPs during the public comment period and for the Board to make a fully informed decision at its November 13/14, 2017 meeting. The public and Board expect that the intent of ERPs will be to prioritize the role of menhaden as forage. Yet there is great disparity in the calculation of recent biomass as a percent of B₀ (~47%B₀ for 2016) – a number close to 40%B₀ that, based upon multiple studies, suggests the Board should be cautious – and the high biomass-weighted F threshold – which would suggest that massive catch increases could be allowed with very low chances of overfishing. We understand that this discrepancy is in part due to the high percentage of biomass in age-0s and -1s and the selectivity of the fishery primarily for ages 2-4. Therefore, we suggest that calculations based instead on spawners- or fecundity-per-recruit (SPR) as a percentage of an unfished population would be appropriate and address the concerns presented in the BERP’s July 14, 2017 memo to the Board²³ by focusing on the reproductive potential of the stock. “Commonly used SPR F [reference points] have the objective of preserving a fraction of [spawning stock biomass, SSB] compared to unfished SSB when F = 0.”²⁴

At the BERP meetings in April and May, 2017, during which these methods and calculations were discussed, members of the BERP as well as Dr. Ellen Pikitch agreed on multiple occasions that using SPR-based calculations would not only be reasonable as a proxy for total biomass, but would also be more protective of spawning adults (*i.e.*, would not allow excessive fishing pressure on mature fish) and more in line with current, SPR-based single-species reference points. Because these calculations have not yet been completed as of the writing of this comment letter, hereafter we focus on the use of reference points that use total biomass as a percentage of B₀.

Options A and B are the wrong choices for menhaden management

Pew cannot support reference point Option A (use *status quo* single-species reference points) or Option B (use single-species reference points until BERP-derived models and ERPs are available). Option A is counter to the spirit of Amendment 3, is out-of-sync with what the public and Board have deemed is necessary, and runs afoul of the ASMFC Charter requirements to use the best available science.²⁵ We support using the best science available, which these models are intended to produce in a few years, but Option B would delay a necessary transition to ecosystem-based management and *does not in fact guarantee* that the Board will someday adopt robust, menhaden-specific ERPs. The BERP's models are being designed to meet as many management objectives as possible, though when they are ready, they will still require the Board to make hard decisions about tradeoffs. Option E will provide a transition to a new ecosystem-based threshold and target that in the future can be refined and adjusted as needed based on the latest science and information provided by the BERP's models about tradeoffs with other managed fisheries. One of the other benefits that Option E will continue to provide, even when the models are ready, is in how it accounts for predation mortality from less "traditional" menhaden predators, such as humpback whales, osprey, tunas, sharks, cod, and others, which are not among the predator species being modeled in any of the BERP's models.

In 2015, the menhaden TC finalized a benchmark stock assessment, which included recommendations that the Board consider adopting more "conservative" – but still single-species – reference points. Subsequently, the Board adopted those new reference points, with the intention that they be used only in the interim until the BERP's models and model-derived ERPs are available. The Board has used these single-species reference points (revised again in 2017 based on the update assessment), stock status projections by the TC, and anecdotal stories of the recent resurgence of menhaden to justify increases in the TAC for the 2015-16 and 2017 fishing seasons. Because the current reference points that allow these changes do not account for the impacts of catch on predators and the ecosystem, these decisions are counterproductive to what the Board seeks to achieve through Amendment 3. This disconnect is nowhere more evident than in the TC's conclusions that even coastwide catch increases of 40-percent for the previous fishing years would have had zero chance of overfishing²⁶ (*i.e.*, the F threshold) when there is no analysis of the impact of such an increase on striped bass, weakfish, or other species that depend on menhaden, many of which are depleted and could be harmed by such an increase.

The current reference points disregard important negative trends that should be of concern, even from a single-species perspective that focuses on egg production and fishing mortality. There are many other ways to measure the health of a fish population. Based on the 2017 stock assessment, overall menhaden abundance (numbers of fish, a measure especially important to predators) remains near historic lows for the available time series, and abundance during the past two decades has been only about half of the abundance of the prior two decades.²⁷ Recruitment has also been substantially lower for about the last 25 years than it was in the prior 20 years,²⁸ and particularly poor in the primary coastwide nursery in the Chesapeake Bay.^{29,30} The species was historically abundant from Nova Scotia to Florida, but it has largely contracted.³¹ A recently published paper found, further, that average annual weights and lengths of age-0, -4, and -5 Atlantic menhaden have declined at statistically significant levels. The author cautions that "There are consequences of these size changes for the menhaden population, and for the community of its predators, regardless of how well we understand and model them."³² While all these signals are significant and should be considered in totality before setting catch levels, the central problem with the *status quo* biological reference points (Option A) is that they do not account for the impact of management decisions on predators, and Option B may not do so until at least 2020.

A stock assessment that accounts for natural mortality is not enough

Some have incorrectly argued that the *status quo* reference points are equivalent to ERPs based on the results of the most recent stock assessments and the manner in which menhaden natural mortality (M) was calculated therein. M estimates are critical components in evaluating stock status, though they are difficult to measure empirically and are often derived using life history traits as opposed to empirical data.³³ That is, they are usually based on an equation applied in a model, as opposed to directly observed. After evaluating several methods, the 2015 benchmark stock assessment and 2017 update derived natural mortality for each menhaden age (0 – 6+) using a methodology originally offered by Dr. Kai Lorenzen in 1996, and supplemented by menhaden tagging data collected from 1966-1970. The Lorenzen approach³⁴ examines both predation mortality (*i.e.*, consumption by predators) and non-predation mortality (*e.g.*, disease, old age), though predation mortality is effectively back-calculated by subtracting non-predation mortality from total M. Therefore, it neither accounts for predator dynamics nor diet preferences, nor does it account for density dependence of either prey or predator.

The Lorenzen approach was never intended to be used as a tool to implement ecosystem-based fisheries management and it does not allow for decisions to be based on any particular set of management objectives (*e.g.*, maintaining a particular amount of any predator). It only very coarsely measures the impact of predators *on* menhaden, but not the other way around (*i.e.*, impact of menhaden on predators). In other words, it is incapable of uncovering problems caused in other species by catching too many menhaden.

Therefore, under the *status quo* reference points, significant increases in catch have been allowed with no understanding of the consequences to predators. This approach to the management of a public resource that is so important to Atlantic ecosystems and economies must not continue when the best available science and the vast majority of stakeholders support an ERP that is ready to use now.

*Option E provides the best foundation for BERP models
being considered for management use in 2020*

For Amendment 3, the Board should transition to ecosystem-based targets and limits in 2018 based on the best available science and then re-evaluate those reference points when the multispecies/ecosystem models are ready for management use. The BERP's models will be the first of their kind for Atlantic menhaden, will provide more data to examine aspects of the ecosystem services that menhaden provide, and will hopefully be accompanied by explicit explanations of scientific and management risk and uncertainty. Once these models are complete and peer-reviewed, however, the Board will still have to carefully weigh its options to determine how to best use them.

As the 2015 assessment panel wisely noted, "Multispecies models will not provide direct estimates of reference points... [but will instead] give indications of trade-offs between predator abundance and menhaden natural mortality. The information can be used to provide a framework to discuss the trade-off between forage fish exploitation and the exploitation/abundance of their predators."³⁵ The Horseshoe Crab Management Board has established a precedent for making such a policy decision where these invertebrates are managed (in part) in a way that accounts for their ecological role using a model "...that incorporates both shorebird and horseshoe crab abundance levels to set optimized harvest levels ... [with an] allocation based upon multiple decision options..."³⁶

Once the BERP's work is complete, the Board *may* choose to use one or several models to evaluate menhaden management decisions for 2020 or after, though as written, *Amendment 3 does not require this*. However, these models will not explicitly make the policy decision about how much menhaden to allocate to the ecosystem, including every fishery, fishermen, and wildlife-dependent business that depends on menhaden's value in the ocean. Pew recommends using results from and model capabilities of Buchheister *et al.* (2017)³⁷ to: 1) better understand the trophic interactions among menhaden and its predators; 2) compare model outputs with the single-species and multispecies menhaden models; and, 3) evaluate the performance of candidate reference points. See below for further comment on this model.

To conclude, Pew urges the ASMFC to adopt ERPs now by adopting Issue 2.6.4 Option E, which is based on the best available science, provides for the needs of predators, will still permit continued substantial fishery yields, and is a common-sense way to manage this valuable public resource.

The future of menhaden management

In order to operationalize the reference points established by Amendment 3, the Board should consider developing a robust harvest control rule (HCR) that reduces fishing mortality systematically as the stock falls below the biomass target and temporarily halts or significantly diminishes fishing at (or below) the threshold. HCRs serve as pre-agreed-upon guidelines to determine acceptable landings levels based on chosen indicators (*e.g.*, abundance, biomass, recruits) of a stock's status and can be based on empirical data and/or models. Because an HCR would make quota-setting more predictable, it would allow managers to increase market stability, improve the ability of industry to plan ahead, and provide all stakeholders with a straightforward, long-term vision of sustainability. The use of HCRs in fisheries management is common practice and is consistent with best practices recommended by the National Standard Guidelines of the Magnuson-Stevens Fishery Conservation and Management Act, the Food and Agricultural Organization's Code of Conduct for Responsible Fisheries, and the certification standards of both the Marine Stewardship Council and Monterey Bay Aquarium's Seafood Watch program.

Additionally, a transition to the use of a menhaden HCR would be well in line with the work of the ASMFC Risk and Uncertainty Policy working group, which seeks to help ASMFC better account for uncertainty and improve risk-based decision-making.

As recommended by the 2015 stock assessment peer reviewers, the ASMFC should conduct "...a Management Strategy Evaluation [MSE] to evaluate the performance of alternative harvest strategies and possibilities for reference points..."³⁸ in a way that includes broad stakeholder input and builds upon the August 2015 Ecosystem Management Objectives Workshop. An appropriately designed MSE could help to inform and prioritize additional research, as well as test the results of reference points, including those generated by the BERP models.

Pew also encourages ASMFC to utilize the results of the recently published Northwest Atlantic Continental Shelf (NWACS) ecosystem model created using Ecopath with Ecosim.³⁹ This model has been produced with regular feedback from the BERP and as such is well in keeping with recommended best practices and model inputs. The menhaden-centric model incorporates relevant fishing fleets and trophic groups and accounts for the size selectivity of fisheries and of key predators by modeling menhaden, striped bass, bluefish, and weakfish in three age classes. The result is a system-wide picture of how biomass/energy flows through the ecosystem that allows for testing what-if scenarios and accounts for fishing and predator-prey feedbacks. In this way, this model allows the Board to address many questions that neither the single-species Beaufort Assessment Model nor the BERP's models can.

Overage Payback and Quota Transfers:

Section 4.3.2.1 Overage Payback: Any overage of a quota allocation must be subtracted for that specific quota allocation in the subsequent year on a pound-for-pound basis.

Section 4.3.3 Quota Transfers, Option B: Quota transfers are an appropriate mechanism for adaptive management, as long as the overall TAC and Chesapeake Bay cap are not exceeded, and should include accountability measures for overages. In order for the transfer system to be effective, each state must continue to implement timely and comprehensive landings monitoring in order to ensure accountability for its annual quota and minimize the potential for overages. Amendment 3 should improve upon the reporting requirements established under Amendment 2 because some overages are thought to be due to poor oversight. The Menhaden Plan Review Team specifically recommended in mid-2016 that the Board consider improvements to the reporting structures and timing in several states that have had quota overages.⁴⁰

Pew supports accountability measures for quota transfers that would disallow any state or region from receiving a transfer if it exceeds its quota allocation by more than 5% for two years in a row.

Pew also supports the stipulation that a state donating quota through a transfer may require the recipient state to pay back any quota overage incurred in the current fishing year due to the transfer. We would prefer that this provision be *mandatory* for all quota transfers as opposed to voluntary as a means to further reduce the likelihood of quota overages.

Quota Rollovers:

Section 4.3.4, Option A: Unused quota should not be allowed to be rolled over into the subsequent year. Amendment 2 currently allows for uncaught quota to be carried over for use in the next fishing year when the stock is not overfished and overfishing is not occurring. Fishermen may not catch an entire quota in a given year for many reasons, including a population decline that limits availability. Allowing more catch in the subsequent year is the wrong response to such a change and is counter to a precautionary management approach. The ASMFC and TC invest considerable time and effort into determining the optimal sustainable catch level each year, accounting for uncertainty, risk, and many objectives. Amendment 3 will determine the reference points to be used when setting the optimal annual catch level. Allowing rollover of uncaught quota undermines that work.

Rollovers are inconsistent with ecosystem-based management. They ignore the potential impacts of large, natural year-to-year fluctuations in menhaden stock size and predator dynamics. NOAA's 2003 Strategic Guidance for Implementing an Ecosystem-based Approach to Fisheries Management recommends that "No rollover of 'unused' portions of the TAC to the next season should be allowed for Stage I fisheries,ⁱⁱⁱ due to uncertainty about population stability and catch sustainability."⁴¹ Disallowing quota rollovers is not "wasteful," since every menhaden that survives from one year class to the next can contribute to a growing spawning stock, which is important given the recent history of low coastwide recruitment. The potential impacts of reduced menhaden abundance on predators as a result of allowing rollovers cannot be predicted at this time, especially on a localized level (*e.g.*, in estuaries like the Chesapeake Bay), and could be severe in the event of a rapid menhaden population decline.

ⁱⁱⁱ Stage I fisheries: "When ... little or no information is available for demographics, ecological effects of the fishery, or the effects of environmental change on the fishery, precaution should be the primary basis for setting TACs..."

For the same reasons, Amendment 3 should also discontinue the Chesapeake Bay-specific rollover allowance of up to 10,976 mt for the reduction fishery (see below).

Incidental Catch and Small-Scale Fishery Allowance:

Section 4.3.5, Option F. All menhaden caught should be counted towards the TAC. The current bycatch, or incidental catch, “loophole” allows for several million pounds of menhaden to be caught that are not counted toward the quota. In 2015, for example, so-called “bycatch” landings totaled about 6-million pounds, which led to an *actual* exceedance of the TAC by over 4-million pounds.⁴² Additionally, as Amendment 2 identified, “Menhaden taken as bycatch in other commercial fisheries is often reported as ‘bait’ together with other fish species,” and “The ‘over-the-side’ sale of menhaden for bait among commercial fishermen is likely underreported (and may go unreported)...”⁴³ Altogether, despite an increase in states’ efforts to monitor all menhaden landings since 2012, there is likely a substantial amount of catch that remains undocumented or perhaps incorrectly documented. The problems this exemption seeks to address should instead be resolved through allocation.

Episodic Events Set Aside Program:

Section 4.3.6.1, Option C. The episodic events set aside program should be discontinued (i.e., 0% of the TAC is set aside), as it can be better dealt with through adjustments to allocation. Participation in and landings under the program have increased since 2013 (e.g., [New York State Department of Environmental Conservation Memorandum, April 26, 2016](#)) and the Board can likely expect future requests, particular by states in southern New England and the Gulf of Maine, as the northern edge of the stock increases in abundance. The adoption of new state allocations, coupled with the ability for states to transfer quota, can solve this problem.

Chesapeake Bay Reduction Fishery Cap:

Section 4.3.7, Option B with Sub-Option B. The Board should reduce the Chesapeake Bay reduction fishery cap to 51,000 mt (about 112,000,000 pounds) and discontinue the rollover of unused Bay quota. While the 2015 and 2017 stock assessments showed some signs of improvement for menhaden coastwide, there is no evidence of improvement in the Bay. Several Bay-specific menhaden trends are concerning (e.g., recruitment),⁴⁴ and there is no science to suggest any catch increase there is sustainable from either a single-species or ecosystem perspective. A reduction of the cap to 51,000 mt will better protect what is a critical and vulnerable portion of the population, which is likely already stressed by poor Bay habitat and water quality.⁴⁵

Although existing data are limited, it appears that predators are likely very dependent on menhaden in the Bay. For example, analysis of striped bass stomachs from March of 1997 to May of 1998 revealed that menhaden were the most important prey species in terms of both weight and frequency of occurrence, and that menhaden became more important as striped bass size increased.⁴⁶ Recent research confirms that the Bay remains the principal nursery for juvenile menhaden,⁴⁷ yet it is also the area where catch is most concentrated.^{iv} Although only approximate landings values are available, draft Amendment 3 notes that “In recent years, reduction harvest in the Chesapeake Bay has consistently underperformed the 87,216 mt cap, with less than 45,000 mt harvest in 2014 and 2016 and less than 50,000 mt harvested in

^{iv} “Virginia is the center of the extant reduction fishery...” and “... a majority of [net] sets in Virginia waters in recent years have been near the mouth of Chesapeake Bay ...” Source: SEDAR (2015). [SEDAR 40 – Atlantic Menhaden Stock Assessment Report: Addendum to Assessment Report](#). SEDAR, North Charleston SC. pg. 41.

2015.”⁴⁸ It is worth mentioning, too, that the Bay cap applies only to reduction landings, which are but a portion of the total menhaden catch in the Bay: snapper rigs and pound nets also land large quantities of menhaden for use as bait.⁴⁹

The Bay cap, established in 2005, is based on prior catch history and is, therefore, arbitrarily high compared to recent landings. If the entire cap were landed, 100 million additional pounds of menhaden would be removed from the Bay ecosystem, which would risk harming juvenile menhaden and the predators that depend on them. Yet because the last benchmark and updates stock assessments did not explicitly evaluate the population and fishery dynamics of the Bay, the consequences of any level of catch on menhaden and local predators are unknown. Future research should explore ways in which the Bay cap might be set so that it is ecologically sustainable.

Habitat Conservation and Restoration Recommendations

In general, Pew supports the provisions in Sections 4.4.1 through 4.4.4. These sections will only help to further the ecosystem-based approach central to Amendment 3. To effectively implement each of these sections will require close coordination among multiple ASMFC Boards and Committees, federal agencies, states, menhaden fisheries, as well as perhaps less-traditional partners such as the Army Corps of Engineers and the US Department of Agriculture.

Section 4.4.1, Preserve Existing Habitat. States should provide inventories and locations of critical menhaden habitat to other states and federal regulatory agencies, and all involved parties should be kept up-to-speed on threats to the population. Through adaptive management, ASMFC can help states and fisheries avoid, minimize, or eliminate threats to habitat extent or quality. The Board should provide regular updates on the status of threats to menhaden habitat, in partnership with the Habitat Committee. States should also consider submitting updates about habitat condition when submitting their annual state fishery compliance reports.

Section 4.4.2, Restore and Improve Habitat. States and federal agencies should endeavor to restore and improve menhaden habitat, with particular focus on nurseries and near-shore areas where predators are heavily dependent upon an abundant menhaden presence.

Section 4.4.3, Avoid incompatible activities. Federal and state management agencies should endeavor to:

- Limit the introduction of compounds/pollutants that may affect the health of menhaden, its predators, or humans;
- Identify and establish windows of compatibility for activities known or suspected to adversely affect menhaden and their habitat, as well as the habitats of predators that are highly dependent on menhaden;
- Identify and to the extent possible, encourage the mitigation of impacts of projects that may affect nursery habitat (*e.g.*, water withdrawals for power plants, irrigation, water supplies); and,
- Develop, and share publicly, clear water use and flow regime guidelines to protect nursery areas within their jurisdictions.

Section 4.4.4, Fishery practices. Pew agrees that ASMFC should work to prohibit the use of any fishing gear or practices that may have unacceptable impacts on menhaden (*e.g.*, habitat damage, bycatch mortality). Further, and to be consistent with the ecosystem-based approaches sought through Amendment 3, the use of gears or activities that could diminish the availability of menhaden *to its predators* should also be

identified and minimized or prohibited (e.g., industrial scale harvest of menhaden during critical marine mammal and seabird feeding events).

Research Needs:

Section 6.1. Pew supports the list of proposed research needs outlined in this section. We emphasize the importance of conducting a management strategy evaluation (MSE) in order to quantitatively and qualitatively evaluate the effectiveness of the management measures implemented through Amendment 3. We also suggest that ASMFC consider evaluating a suite of possible harvest control rules to implement in the future. Both of these items are in keeping with recommended fishery management practices.

All research should be conducted in a transparent manner and culminate in readily understandable explanations of trends. It should also be as explicit as possible regarding temporal, spatial, and age-based variability (e.g., the calculation of time-varying natural mortality should be a priority).

Habitat Research Needs

Section 6.2. Pew supports the proposed habitat research needs in this section, but encourages the ASMFC to also evaluate the impacts of menhaden habitat loss/degradation on the predators of menhaden to be in keeping with the spirit of Amendment 3.

Socio-Economic Research Needs

Section 6.3. Pew supports the recommended actions in this section. Subcomponent 4 (analyze the “non-consumptive sector, e.g., bird- and whale-watching) is of particular importance given the large impacts that these businesses have on the coastal economy. For example, whale watching in the northeast (New York to Maine) alone is considered “... among the region’s signature recreational industries, generating total direct and indirect expenditures of \$126 million.”⁵⁰ Pew also urges ASMFC and partners to evaluate the socio-economic values of and impacts to the fisheries that target species dependent on menhaden, such as striped bass, tuna, and cod.

* * *

Pew thanks the ASMFC for moving forward with this important action. Please feel free to contact us if you have any questions.

Sincerely,



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The Pew Charitable Trusts



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