ADDITIONAL CORRESPONDENCE

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To the Atlantic Herring PDT and participating stakeholders:

Recently, I attended a herring PDT meeting which focused on the councils approaches to using an MSE for the future management of the Atlantic herring stock in the Gulf of Maine/Georges Bank complex. I'd first compliment the PDT and its participants on undertaking what is proving to be a very complex and challenging direction for the future of Atlantic herring fisheries management. The task before you is by all accounts a very difficult one. On the topic of considering ecosystem requirements, particularly as they relate to predator prey relationships, I was excited to see incorporation of a recent paper my colleagues and I published on the relationships between Atlantic herring and Atlantic bluefin tuna condition in the Gulf of Maine. I was not able to attend the entire workshop but I was able to participate in some of the ecosystem discussions and overhear others. Based on those discussions I'd like to take this opportunity to put the findings from our paper into context, highlighting the main outcomes and providing a more detailed explanation for its limitations as this MSE process moves forward.

Atlantic bluefin tuna are a highly migratory species which utilizes vast regions of the Atlantic to satisfy metabolic and reproductive requirements throughout their life history stages. An elevated metabolic rate and large energetic requirements for reproduction mean bluefin tuna must optimize diet by foraging on energy rich species. Though classified as a generalist predator across their range, on the northwest Atlantic shelf they express a clear preference for small pelagic, high energy species primarily Atlantic herring. Scientists as early as the 1930s (Crane 1936) documented the importance of herring for bluefin tuna in the Gulf of Maine. Since that time, more quantitative evaluations of diet using stomach content and stable isotope analysis have in fact confirmed Atlantic herring are the single most important dietary item for bluefin tuna on the northwest Atlantic shelf (Chase 2002, Pleizier et al. 2012, Logan et al. 2015) often exceeding 50% of total stomach volume by weight.

Historically, the Gulf of Maine has always been an important commercial fishing ground for large (>185cm CFL) bluefin tuna. Catch rates began to decline in the late 1990s and by 2005 fell to the lowest levels in the history of the fishery. Three more years of record low catches followed. My 2007 study (Golet et al. 2007) found that the declines in catch occurred against a backdrop of significant declines in the somatic condition of bluefin tuna. The decline in somatic condition between 1991 and 2004 occurred despite residency of five or more months on the foraging grounds. My more recent study (Golet et al. 2015) increased the sample size (>70,000) and time period (1980-2009) and confirmed a decline in somatic condition. We examined several variables and found that the strongest correlation was between somatic condition and the mean weight of Atlantic herring. At the same time herring mean weight declined and bluefin tuna somatic condition remained low, spawning stock biomass of Atlantic herring was high. This presents an interesting paradox; why would bluefin condition remain low if their preferred prey is abundant even with a decline in mean weight?

To investigate this, we developed an optimal foraging model to simulate the energetic return a bluefin tuna would expect while foraging within a school composed of different size herring. Since bluefin are ram feeders and handling time of prey does not

scale with prey size, the model suggests there is a lower size limit after which it becomes less profitable to consume herring given the energy expenditures to capture it. For example, it may take three smaller herring to equal the same energy of a single large herring, but the bluefin will have to expend additional energy capturing those two extra prey items. While these relationships were strong, it is important to understand the model's limitations. This foraging model is very specific simulating the foraging benefits of tuna within a single school of herring. It is not explicitly considering prey density, number of prey patches, and the distance between those patches, movement dynamics of bluefin or any number of foraging dynamics.

Based on differences of mean herring weight between the Gulf of Maine and the Scotian Shelf/Gulf of St. Lawrence, historically high catch rates of bluefin tuna on the Scotian Shelf/Gulf of St. Lawrence and documented offshore shifts of bluefin tuna in the Gulf of Maine (Golet et al. 2013) we hypothesize that over time, while "sub-optimal" conditions persisted some portion of the bluefin tuna assemblage in the Gulf of Maine shifted to regions with higher foraging profitability. It is important to highlight that although our foraging model provides a size cutoff where foraging becomes less profitable and that bluefin tuna may respond to those changes it does not imply they will no longer forage on smaller herring, no longer utilize or vacate a region simply because herring are below a specific size threshold. Rather, it suggests that bluefin that remain in areas dominated by small fish will not accumulate energy as quickly and a portion of the assemblage may adjust their foraging strategies accordingly. Despite low commercial catches of bluefin tuna in the Gulf of Maine (2005-2008) stomach content and stable isotope data for fish landed during that time period still identified Atlantic herring as the single most important dietary item by weight. Despite the low mean weight of Atlantic herring during that time period, bluefin tuna still consumed herring and accumulated lipid reserves, but the slope of that increase was much lower than the historical average. It should be emphasized that since my 2015 paper, bluefin tuna catch rates have been increasing in the Gulf of Maine, suggesting foraging conditions may be improving. It is my intent that these comments clarify the work we have been doing between bluefin tuna and Atlantic herring and this helps as the council moves forward with the MSE process. As always if any members of the PDT or stakeholders have questions I am always available and more than happy to respond. We are happy our research can be utilized to improve the management process for this very important species and wish you success as this moves forward.

Best,

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MAINE COAST
FISHERMEN'S
ASSOCIATION

Jan 18, 2017

Thomas A. Nies
Executive Director
New England Fisheries Management Council
50 Water St., Mill 2
Newburyport, MA 01950

Dear Mr. Nies,

Please accept these comments on behalf of the Maine Coast Fishermen's Association regarding Framework Adjustment 5 for Atlantic herring.

The Maine Coast Fishermen's Association (MCFA) is an industry-based nonprofit which identifies and fosters ways to restore the fisheries of the Gulf of Maine and sustain Maine's historic fishing communities for future generations. Established and run by Maine fishermen, the objectives of the Association are: to provide a voice for our fishing communities; to rebuild the Gulf of Maine ecosystem; and to help build viable fishing businesses on our coast. With members living in communities from Kittery to Mount Desert Island, our members represent a diverse range of fisheries but have come together as one voice to weigh in on important management issues facing Maine fishermen. As such, we are extremely interested in allowing Maine fishermen to have access to a robust and sustainable herring fishery in the Gulf of Maine, and we hope that the NEFMC will work with us towards that goal.

On the topic of Framework Adjustment 5 to potentially modify Georges Bank (GB) haddock bycatch accountability measures (AMs) in the herring midwater trawl fishery, we strongly oppose the modification of any haddock bycatch AMs or any increase in the percentage of the GB haddock annual catch limit (ACL) allocated to bycatch. For this reason, we support the Herring Committee's suggestion to recommend no action on sections 2.1 and 2.2 in Framework 5, which maintains AMs at status quo.

However, we wish to strongly oppose the Herring Committee's recommendation to increase the GB haddock bycatch sub-ACL in the herring fishery to 1.5%. Haddock has made a remarkable recovery in recent years, and we believe that it is the future for many members of our New England groundfish fleet on Georges Bank. At this moment, if we choose to allow this increase in bycatch, more juvenile haddock will be caught as bycatch than at any time in our recorded

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history. That decision, which we see as a serious mistake, would put the future of this fishery in jeopardy. We also encourage the Council to focus on remediating the lack of monitoring and accountability which is causing the demand by some members of the herring industry for increased bycatch caps.

We support the maintenance of the GB haddock bycatch percentage in the herring fishery at current levels of 1%. We do not believe that giving away the groundfish fishery's quota is the appropriate step to address accountability problems in the herring fishery.

Thank you very much for your attention to this important issue.

Sincerely,

Ben Martens
Executive Director

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