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RH/S Update 2023

August 2023 Council Meeting

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Overview

If the 2023 Atlantic mackerel ("mackerel" hereafter) management track assessment results allow for a directed mackerel fishery in 2024-2025, the Council will set an associated river herring and shad (RH/S) cap for the mackerel fishery. This document reviews several related questions/topics that were previously identified by the Council to help inform RH/S cap setting.

The following 2017 observation from the Mackerel, Squid, and Butterfish (MSB) Monitoring Committee is included for reference as it likely still represents the general sentiment of the Monitoring Committee (a MSB Monitoring Committee meeting will review the RH/S cap performance on July 27, 2023 – see Council website calendar):

> *The MC noted that its perspective has not substantively changed from last year: given the lack of stock abundance information, a variety of cap options are likely justifiable as long as the Council clearly describes its rationale related to controlling incidental RH/S catch/bycatch - in situations like RH/S where biologically-based catch limits are unavailable, setting the cap is a policy choice. The MC noted that for any cap (and especially a constant cap), because it is not directly tied to RH/S abundance, possibilities exist that it may either become very hard for the fishery to avoid RH/S if their abundances increase, or if RH/S abundances decrease the fishery will not have to work hard to avoid RH/S because there will not be many RH/S around. The first situation would suggest that a cap increase may be warranted while the second would suggest a cap reduction may be warranted. Without better assessment information it is not possible to quantitatively determine the appropriateness of such changes however.*

1. Was a cap set and how has the Atlantic mackerel RH/S cap performed?

Table 1 below describes RH/S cap performance for 2014-2023 (2023 partial year to early July). 2014 was the first year of the cap and a partial year of implementation, although the cap was estimated retroactively for the full year. 2018 and 2019 are the only years when cap closures have occurred. The 2023 RH/S cap is 129 metric tons (MT). 129 MT was the amount of RH/S if the ratio of cap to all catch on mackerel trips was about 0.53% and the 2019 mackerel quota was 17,371 MT (or 0.74% applied to just the mackerel quota). (0.0074 * 17,371 MT = 129 MT). The Council has kept the RH/S cap at 129 MT in recent years despite lower mackerel quotas due to concerns about being able to effectively monitor a very small cap, especially since cap estimates may change substantially as initial observer trips occur and data enters the system. This occurred in early 2023: on April 12, 2023 the RH/S cap was estimated to be 118 MT, while currently the cap is at 106 MT despite additional mackerel landings – additional observer data lowered the ratio that is applied against landings for the cap, and lowered initial cap estimates.

Table 1. Mackerel Fishery's RH/S Cap Performance

							KALL is the total catch, which is combined with the RH/S catch rate to calcualte the cap RH/S catch					
Year	**Cap**	**Permit Count**	**Trip Count**	**Rounded RH/S Catch Rate[2]**	**RH/S Catch (mt)**	**Herring (mt)**	**Mackerel (mt)**	**KALL (mt)**	**Rounded Inseason RH/S Catch Rate[3]**	**Observed Trips**	**CV[4]**	**Coverage Percent**
2014	236				6							
2015	89	13	55	0.0014	12	3,564	4,591	8,739	0.0016	4	0.2	7%
2016	82	13	55	0.0015	13	5,682	4,336	10,172	0.0015	13	0.7	24%
2017	82	17	71	0.0033	39	6,477	5,780	12,472	0.0033	17	0.4	24%
2018	82	12	57	0.0089	**109**	4,067	7,927	12,143	0.0101	4	0.3	7%
2019	82	10	31	0.0135	**92**	2,780	3,724	6,506	C	2	C	C
2020	129	15	93	0.0022	23	2,615	7,404	10,177	0.0022	6	0.6	6%
2021	129	11	42	0.0006	3	1,335	4,816	6,299	0.0000	3	1.2	7%
2022	129	10	17	0.0020	7	1,963	1,177	3,144	0.0020	8	0.4	47%
2023[1]	129	11	29	0.0202	106	2,543	2,432	5,093	0.0202	5	0.6	17%

Source: GARFO DMIS, CAMS and OBDBS databases as of May 31, 2023. 'C' denotes confidential data.
[1]2023 data are preliminary.
[2]RHS catch rate used to extrapolate RHS catch. Transition rates are used when < 5 observed trips occur within the catch cap year and are highlighted in grey.
[3]RHS catch rate of observed trips occurring within catch cap year. Rate will be different than RHS CATCH RATE column when transition rates were used.
[4]Coefficient of Variation (CV) of inseason observed trips.

The in-season RH/S cap performance for 2023 through early July is provided in Figure 1 below. It generally aligns with trends in the mackerel fishery (Figure 2 next page), but landings of other species (especially Atlantic herring) on trips landing over 20,000 pounds of mackerel also are used for the cap estimates.

Report Run on: 2023-07-07
Quota Year: **2023** *(January 1, 2023 to December 31, 2023)*

Catch Cap	Quota (mt)	Cumulative Catch (mt)	Percent Quota Caught
Atlantic Mackerel River Herring/Shad	129	105.9	82%

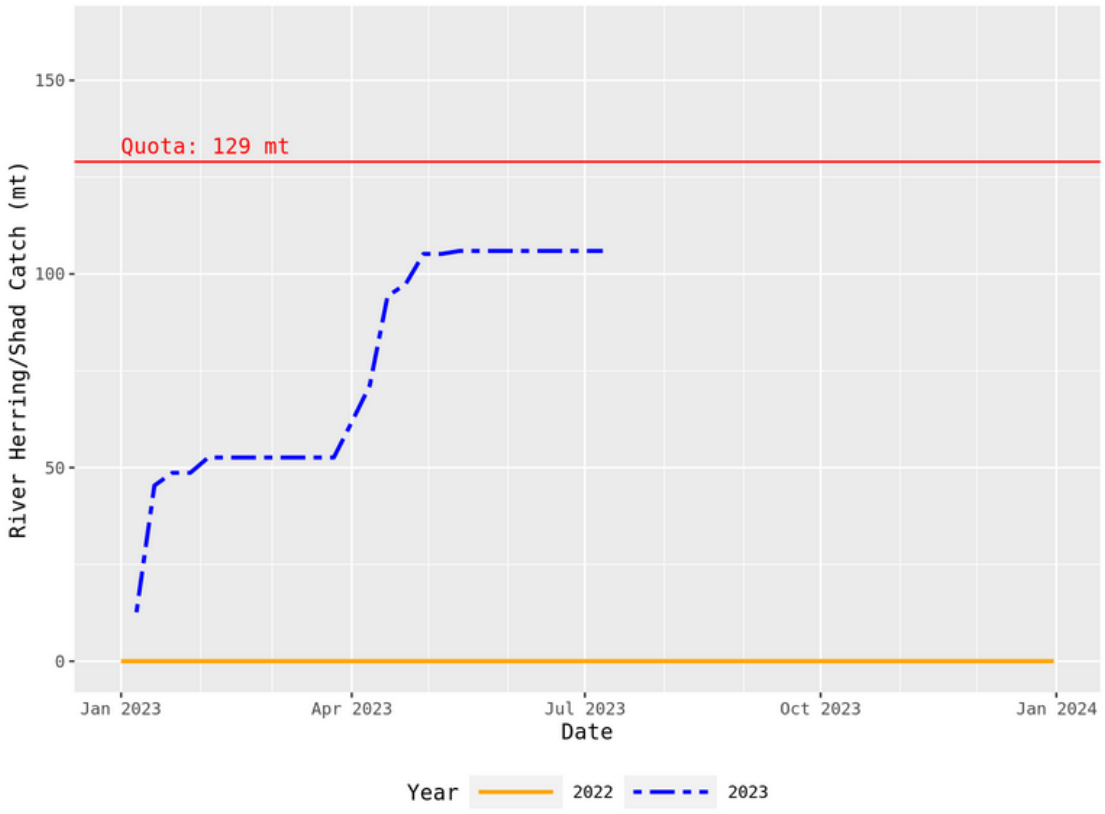

Figure 1. 2023 RH/S Cap Performance as of July 7, 2023

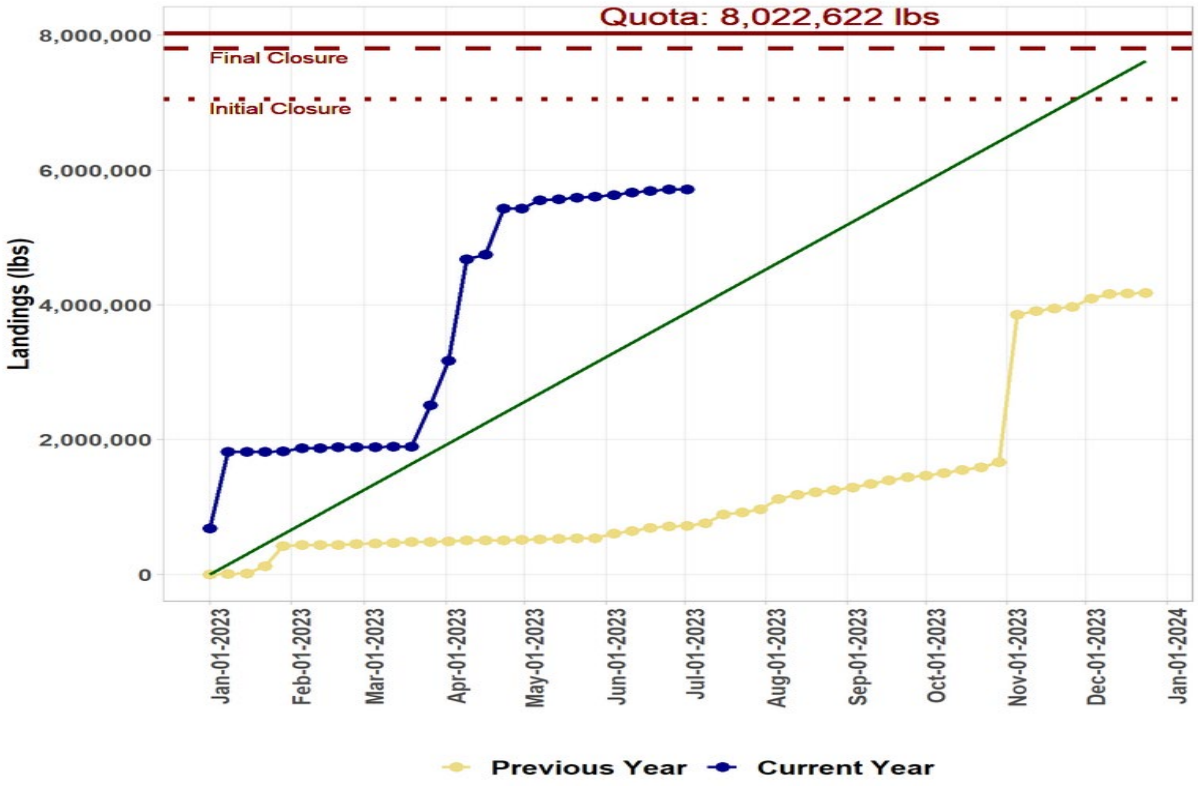

Figure 2. 2023 Atlantic Mackerel Fishery Performance (blue) as of July 6, 2023

As noted in previous updates, due to the overlap in the Atlantic herring and mackerel fisheries, Atlantic herring and Atlantic mackerel RH/S catch cap estimates cannot be summed - this would constitute a misleading double counting. The RH/S on a trip with both Atlantic herring and mackerel can count against both the Atlantic herring and mackerel RH/S caps but because the cap amounts were set considering this circumstance, double counting is not a problem for monitoring. The MSB Monitoring Committee has previously not found any technical/operational issues with the cap, but noted that low observer coverage has the potential to result in imprecise estimates. Portside monitoring, which used to be used as a "double check" on observer rates, has been suspended in recent years due to funding issues.

The Council asked NMFS Greater Atlantic Regional Fisheries Office (GARFO) staff about the recent proportions of RH/S in the mackerel RH/S cap. GARFO staff provided the table below for the inseason observed river herring/shad species proportions used in mackerel RH/S catch cap estimation – the proportions vary substantially year to year.

Table 2. RH/S Species Proportions Used in Mackerel RH/S Cap Estimates

Common Name	2015	2016	2017	2018	2019	2020	2021	2022	2023[1]
Alewife	5%	39%	38%	18%	C	2%	100%	51%	83%
Blueback herring	1%	61%	60%	82%	C	98%	0%	39%	12%
American shad	94%	0%	2%	0%	C	0%	0%	10%	5%

Source: GARFO DMIS, CAMS and OBDBS databases as of June 2, 2023.
[1]2023 data are partial/preliminary. 'C' denotes confidential data.

2. Was the RH/S cap based on recent catch or more directly tied to RH/S population dynamics?

To date, the cap has been tied to historical base (2005-2012) RH/S catch rates in the mackerel fishery, and adjusted based on mackerel quotas to both maintain incentives for the mackerel fishery to reduce RH/S catch and facilitate effective monitoring at low mackerel quotas. See #1 above for the calculations used to set the current 2023 RH/S cap for the mackerel fishery.

RH/S population dynamics have not been utilized to set the cap given the lack of accepted reference points. A river herring assessment is underway by the Atlantic States Marine Fisheries Commission that includes a Term of Reference to "If possible, develop methods to calculate a biologically-based cap or limit on bycatch of river herring in ocean fisheries." A peer review is planned for as early as Nov/Dec 2023 depending on how the assessment progresses.

3. What has recent coastal RH/S catch been? (This analysis was previously based on NMFS observer data expanded based on dealer/VTR data)

Due to challenges with migrating to the new Catch Accounting and Monitoring System (CAMS), the NMFS Northeast Fisheries Science Center (NEFSC) has not yet been able to update the analyses provided in previous years. For data through 2019, please review the 2021 update, available at: https://www.mafmc.org/s/2021-RHS-Update.pdf.

For annual specifications, staff creates tables of incidental catches by fishery definitions, which while not aligned to official catch estimates, do provide information on relative catches of various species for the MSB fisheries. The method used is a custom staff analysis, and is best considered as a relative indicator of species that may be affected rather than precise amounts. The *Illex* fishery does not encounter substantial quantities of RH/S, and the butterfish fishery has been operating at relatively low intensity (butterfish analyses may also overlap with longfin squid), but the longfin squid and mackerel fisheries do regularly encounter RH/S. Staff updated relevant analyses with 2021 and 2022 data for longfin (2020 data would be unbalanced toward trips early in the year) and 2019-2022 data for mackerel (most observed trips would occur early in the year anyway in regards to 2020, and there are few observed trips overall):

> Longfin Squid: 153 observed longfin squid trips (longfin accounted for at least 40% of retained catch) per year on average 2021-2022 versus the 394 average observed trips over 2017-2019. The longfin squid fishery, considering an average of 14,624 MT of landings, annually (2021-2022) caught about 16,559 pounds of American shad, 11,709 pounds of alewife, 2,427 pounds of hickory shad, 2,022 pounds of blueback herring.

Atlantic Mackerel: 3.5 observed mackerel trips (mackerel accounted for at least 50% of retained catch) per year on average 2019-2022 versus the 7 average observed trips over 2017-2019. 2019 and 2020 were included due to the low numbers of observed trips. The mackerel fishery, considering an average of 5,267 MT of landings, annually (2019-2022) caught about 73,124 pounds of blueback herring, 31,608 pounds of alewife, and 1,418 pounds of American shad.

The ASMFC's RH/S annual fishery management plan reviews are available at http://www.asmfc.org/species/shad-river-herring. Summary landings data from 2012-2021 for river herring and American shad from ME-FL are provided below. The reviews have data on hickory shad but landings are relatively low. Most of these landings are in-river but there may be some incidental catch that is overlapped with the tables above, so the numbers cannot be added. Most of the landings in recent years have been outside of the Mid-Atlantic states.

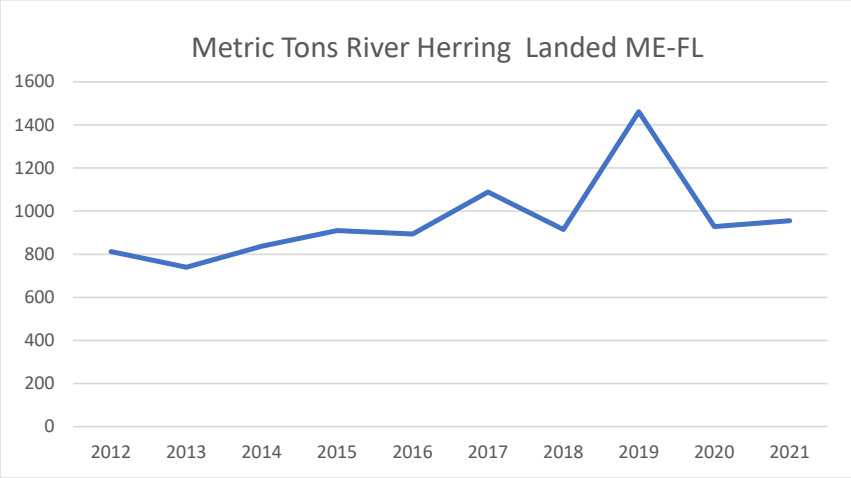

Figure 3. East Coast River Herring Landings

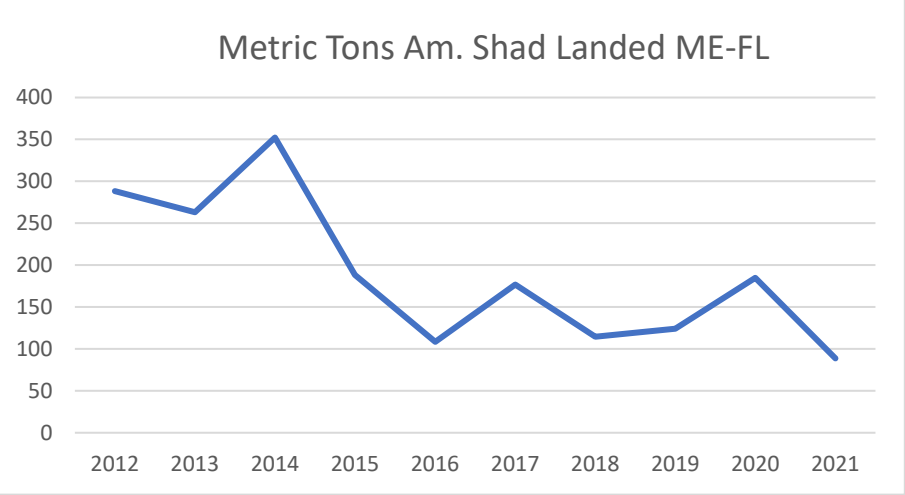

Figure 4. East Coast American Shad Landings

4. What levels of observer coverage have been achieved in relevant fisheries?

Due to CAMS transition issues, the NEFSC was not able to update tables of annual calendar year dealer/VTR trips versus observed trips (Tables 11 (Mid-Atlantic) and 12 (New England) of the previous RH/S update). However, the *Discard Estimation, Precision, and Sample Size Analyses* reports (https://www.fisheries.noaa.gov/resource/data/annual-discard-reports-northeast) prepared by the NEFSC provide similar information, albeit for the July-June calendar used for the Standardized Bycatch Reduction Methodology (SBRM).

Table 3. Recent Observer Coverage

Mid-Atlantic	Small Mesh (< 5.5 inch)		Large Mesh		Mid Water Trawl	
	VTR	Observed	VTR	Observed	VTR	Observed
July 2018 to June 2019	3833	631	2763	210	18	0
July 2019 to June 2020	NA - Covid					
July 2020 to June 2021	2530	58	3587	46	20	0
July 2021 to June 2022	Expected for August Council Meeting					
New England	Small Mesh		Large Mesh		MWT	
	VTR	Observed	VTR	Observed	VTR	Observed
July 2018 to June 2019	3943	392	4866	440	153	7
July 2019 to June 2020	NA - Covid					
July 2020 to June 2021	3109	83	5082	130	71	3
July 2021 to June 2022	Expected for August Council Meeting					

At Council staff's request, the NEFSC is also conducting a "what-if analysis" of what would happen to observer coverage if alewife and blueback herring were included as an additional "species group" in the SBRM seaday allocation process. Including river herring as a prioritized species group may increase coverage important for RH/S, but would draw coverage from other fleets. It is anticipated this analysis will facilitate discussion of related tradeoffs. Implementing such a change would require an action by the Council, which per current regulations appears feasible via specifications (50 CFR 648.22(c)(13)), frameworks, or amendments. The Council has not yet received this analysis but expects to include it in materials for the August Council meeting.

5. What progress has been made on aligning cap operation with the Atlantic herring fishery's cap?

Catches of both Atlantic herring and mackerel are considered in the cap setting and estimation for all the RH/S caps. The Council has previously evaluated the potential to pursue further alignment (for example joint RH/S caps on particular gear types), but decided that given the different policy approaches currently used by each Council, additional alignment would not be the best course of action. Staff notes that the New England Fishery Management Council may, in 2024, revisit the basis of its catch cap and options for RH/S time/area closures. Staff will participate in any related discussions and keep the Council informed of related developments.

6. What other RH/S coordination with other management partners has occurred (NMFS, NEFMC, ASMFC, states, NGOs, academia, River Herring Forum (formally called the TEWG), etc.)?

Council and ASMFC staffs are in regular contact to ensure that each entity remains apprised of current developments, including participation in NOAA's Atlantic Coast River Herring Collaborative Forum (formally called the TEWG -Technical Expert Working Group). See https://www.fisheries.noaa.gov/new-england-mid-atlantic/habitat-conservation/atlantic-coast-river-herring-collaborative-forum for details on the Forum including recent and upcoming meetings. The Council has also entered into a contract for mid-2023 and 2024 with Manomet to build out a portal for centralizing information on river herring runs – besides some runs considered during infrequent assessments, it can be difficult to ascertain trends in river herring runs and the portal would allow much easier sharing of run information. Manomet had been building a portal for Maine runs (https://www.gomriverherringnetwork.org/) and we will build off those efforts. See also discussions below regarding two recent journal publications regarding RH/S bycatch.

7. How has the Scientific and Statistical Committee (SSC) been involved?

The SSC has not been substantially involved over the last two years, but the SSC has previously expressed willingness to review any potential options for biologically-based caps or other relevant work.

8. What other actions have been taken by the Council that could affect RH/S?

The relatively low mackerel quotas implemented for mackerel rebuilding should keep effort for mackerel relatively low. Under 2023 specifications, directed mackerel commercial fishing is curtailed when landings reach 3,196 MT, which is about one fifth of average U.S. commercial landings from 1997-2022.

9. What other information is available on RH/S abundance trends?

The text below is from the ASMFC's website: http://www.asmfc.org/species/shad-river-herring:

American Shad

The 2020 American shad benchmark stock assessment is the most recent assessment for the American shad stock. Similar to the results of the 2007 assessment, the 2020 assessment found coastwide populations to be depleted. Multiple factors, such as overfishing, inadequate fish passage at dams, predation, pollution, water withdrawals, channelization of rivers, changing ocean conditions, and climate change are likely responsible for the decline from historic shad abundance levels. Additionally, the assessment found that shad recovery is limited by restricted access to spawning habitat, with 40% of historic habitat in the U.S. and Canada currently blocked by dams and other barriers. This may equate to a loss of more than a third of spawning adults.

The abundance status of American shad relative to historic levels is unknown for most systems, but was determined to be depleted in the Potomac and Hudson, and not depleted for the Albemarle Sound. Coastwide adult mortality is also largely unknown and juvenile mortality status cannot be determined due to insufficient data collection. The "depleted" determination was used instead of "overfished" because the impact of fishing on American shad stocks cannot be separated from the impacts of all other factors responsible for changes in abundance. The recovery of American shad will need to address multiple threats to shad including anthropogenic (human-caused) habitat alterations, predation by non-native predators, and exploitation by fisheries.

River Herring

The 2017 stock assessment update indicated that river herring remain depleted at near historic lows on a coastwide basis. Total mortality estimates over the final three years of the data time series (2013-2015) were generally high and exceeded region-specific reference points for some rivers. However, there were some positive signs of improvement for some river systems. Total mortality estimates for 2 rivers have fallen below region-specific reference points during the final three years of the data time series, compared to the zero estimates that were below reference points at the end of the 2012 stock assessment data time series. Of the 54 stocks for which data were available, 16 experienced increasing abundance, 2 experienced decreasing abundance, 8 experienced stable abundance and 10 experienced no discernable trend in abundance over the final 10 years of the time series (2006-2015). A benchmark stock assessment is underway by the ASMFC, and should be reviewed in either late 2023 or 2024.

Several indices that the NEFSC, states, or other entities provided are included in Appendix 1, updated with responses based on requests from Council staff.

10. Other Information

Two recent publications seem to have the potential to inform future RH/S management:

10A) Kerry Reid, Jennifer A. Hoey, Benjamin I. Gahagan, Bradley P. Schondelmeier, Daniel J. Hasselman, Alison A. Bowden, Michael P. Armstrong, John Carlos Garza, and Eric P. Palkovacs. 2022. Spatial and temporal genetic stock composition of river herring bycatch in southern New England Atlantic herring and mackerel fisheries. Canadian Journal of Fisheries and Aquatic Sciences. 80(2): 360-374. Full text: https://cdnsciencepub.com/doi/full/10.1139/cjfas-2022-0144

> **Abstract**: Anadromous river herring (alewife and blueback herring) persist at historically low abundances and are caught as bycatch in commercial fisheries, potentially preventing recovery despite conservation efforts. We used newly established single-nucleotide polymorphism genetic baselines for alewife and blueback herring to define fine-scale reporting groups for each species. We then determined the occurrence of fish from these reporting groups in bycatch samples from a Northwest Atlantic fishery over four years. Within sampled bycatch events, the highest proportions of alewife were from the Block Island (34%) and Long Island Sound (22%) reporting groups, while for blueback herring the highest proportions were from the Mid-Atlantic (47%) and Northern New England (24%) reporting groups. We then quantified stock-specific mortality in a focal geographic area (~3500 km^2, including Block Island Sound) of high bycatch incidence and sampling effort,

where the most accurate estimates of mortality could be made. During this period, we estimate that bycatch took about 4.6 million alewife and 1.2 million blueback herring, highlighting the need to reduce bycatch mortality for the most depleted river herring stocks.

Staff note: This study's estimate was about 1.5 million river herrings per year 2012-2015 in the focal area of study. MSB Amendment 14 estimated that about 5 million river herrings were caught total per year 2006-2010 in ocean intercept fisheries (based on 5 fish per pound), and previous updates found that total river herring catches in 2012-2015 (this study's time period) were about half of 2006-2010 (from Amendment 14). So this study's estimates generally align with previous MSB Amendment and RH/S Update findings.

10B) K.E. Roberts, J.E.F. Stepanuk, H. Kim, L.H. Thorne, C. Chong-Montenegro, J.A. Nye. Developing a subseasonal ecological forecast to reduce fisheries bycatch in the Northeast U.S., Progress in Oceanography, Volume 213, 2023, 103021, ISSN 0079-6611, https://doi.org/10.1016/j.pocean.2023.103021, (https://www.sciencedirect.com/science/article/pii/S0079661123000642)

Abstract: Over the past decade, substantial progress has been made in projecting and predicting the spatial distribution of many marine species at seasonal to multidecadal time scales. However, managers and fishers often need to make decisions at much shorter time scales. Subseasonal environmental forecasts, which generate predictions over one to several weeks, can now be combined with species-specific habitat preference data to create ecological forecasts that could facilitate dynamic spatial management. The development of such predictive tools could aid in identifying optimal times and areas for fishers to maximize target catch and avoid nontarget catch. Nontarget catch, or bycatch, can have numerous and potentially severe economic and ecological consequences. Here, we focus on a population of anadromous fish known collectively as river herring (alewife and blueback herring), as they are species of concern and are heavily impacted by bycatch. Using bottom trawl survey data from the Northeast US and subseasonal forecasts of sea surface temperature, we constructed a bycatch risk model to generate probabilistic predictions of river herring distributions in regions frequented by the US mid-water trawl fishery. Assessments of model skill showed that our ecological model performed well in predicting the distribution of river herring and that subseasonal forecasts were effective at 1-week timeframes. There was a clear seasonal effect on forecasted bycatch risk throughout the Northeast US, with particularly high risk in winter and spring months. Importantly, variability in risk was detectable at the weekly timescale and our model identified specific areas and times that fishers should avoid in order to decrease their likelihood of bycatch. The bycatch risk forecast developed in this study is a significant advance from near-real time forecasts and the foundation to build forecast systems by combining species co-occurrence models with subseasonal forecasts. As these subseasonal forecasts are available globally, this approach could be adapted to facilitate the management of other natural resource conflicts around the world.

Staff note: This model showed skill in using subseasonal forecasts of sea surface temperature to predict where the bottom trawl survey would catch river herrings. Staff has had preliminary discussions with one of the authors whether the model could be tested to see what proportion of

bycatch events occurred within the areas of highest modeled risk, or if there are other analyses that could facilitate evaluations of the potential for operationalization of the model.

11. Staff Recommendation for Next Steps

Developing bycatch caps that are more than general deterrents and are meaningfully tied to the biology and status of the identified regional RH/S population structure seems less and less likely given the work on genetic composition of bycatch in recent years. Even if one was able to determine an amount of coastwide biologically acceptable bycatch, the probability seems remote of knowing in real time whether the distribution of annual impacts on the regional populations can be well tolerated by those populations. The RH/S caps have created some incentive to avoid RH/S and have reduced RH/S bycatch because there have been closures for both mackerel and herring due to the RH/S caps. However the risk modeling discussed in 10B above, and identification of times and areas to avoid, seem to hold more promise at the current time.