#4

NEW ENGLAND FISHERY MANAGEMENT COUNCIL

FINAL Herring Plan Development Team (PDT) Report

October 18, 2012

Holiday Inn, Mansfield MA

The Herring Plan Development Team (PDT) met on October 18, 2012 to continue development of the 2013-2015 Atlantic Herring fishery specifications. The Herring PDT members discussed alternatives for the acceptable biological catch (ABC) and ABC control rule, options for dividing the herring annual catch limit (ACL) into management areas, and options for Accountability Measures (AMs).

Meeting Attendance: Lori Steele (Herring PDT Chairman), Rachel Neild, NEFMC Staff; Matt Cieri (Herring TC Chairman), Jon Deroba, Micah Dean, Madeleine Hall-Arber, Carrie Nordeen, Tim Cardiasmenos, Steve Correia, Renee Zobel, Min-Yang Lee (Herring PDT Members);

Mitch McDonald (NOAA General Counsel), Erika Fuller (EarthJustice), Steve Weiner (CHOIR), Steve Cadrin (interested parties in audience);

Mary Beth Tooley (Council), Jamie Cournane (PDT Member), Rob Vincent (NMFS) and other interested parties via GoToMeeting (webinar).

After some general announcements, Ms. Steele provided a brief update to the Herring PDT/TC regarding the development of the 2013-2015 herring fishery specifications. She identified the primary issues to address at this meeting – discussion of the stock assessment and issues regarding the Amendment 4 lawsuit and addressing the October 8, 2012 EarthJustice (EJ) letter regarding Atlantic Herring Fishery Specifications for FY 2013-2015.

Alternatives for ABC/ABC Control Rule

Dr. Deroba provided an overview of the two alternatives presented as possible ABC Control Rules assimilated particularly for forage fish, which are proposed in the October 8, 2012 letter from EarthJustice regarding the Amendment 4 court order and the development of the 2013-2015 specifications:

Proposed Alternative: Lenfest Control Rule ("Little Fish, Big Impact"): Harvest Control Rule (i.e. hockey stick harvest control rule)

Proposed Alternative: Pacific Coast Control Rule. A harvest control strategy for forage fish used by the Pacific Fishery Management Council

The Lenfest Forage Fish Task Force control rule proposes a conservative target F (suggested 50% F_{MSY}) when stock biomass is above a target level and sets ABC as a function of biomass, decreasing catch as biomass decreases (hockey stick control rule) to a cutoff level, at which there would be no fishing. The second alternative is based on a harvest control rule used by the Pacific Fishery Management Council for forage fish. This approach is similar to the 75% F_{MSY} approach in that it suggests that the fishing rate will remain the same regardless of stock biomass, until biomass declines to a cutoff level, at which point fishing is ceased. The F rate, however, would be set more conservative than 75% F_{MSY} based on scientific uncertainty and a

"fraction" (additional buffer) to account for forage/ecosystem considerations. The F rate suggested in the EJ letter is 50% $F_{MSY.}$

The Herring PDT noted that the reference points for both harvest control rules proposed in the EJ letter are derived based on assessments that utilize a static natural mortality rate (M) and, consequently, are traditional MSY-based reference points. In SAW 54, a time-varying M was utilized in the Atlantic herring assessment, based on an apparent increase in predatory consumption in recent years. This approach yields very different reference points than a constant M approach. The suggested reference points and control rules from the EJ letter are largely premised on the Pikitch et al. (2012) and Smith et al. (2011) manuscripts. In summary, these manuscripts conclude that, based on ecosystem models, forage species like Atlantic herring should be exploited less than is suggested by conventional single species assessment estimates of F_{MSY}. For example, a suggested fishing mortality reference point in the EJ letter is $0.5F_{MSY}$ (50% F_{MSY}). Pikitch et al. (2012) and Smith et al. (2011), however, did not allow for the conventional single species assessments to include time varying natural mortality (M), as with the recent Atlantic herring assessment. Consequently, the conclusions and suggested reference points, such as $0.5F_{MSY}$ may not be applicable to Atlantic herring, particularly given the current status of the stock and the use of time-varying M in the assessment to account for predator removals.

Although the calculations to determine the MSY reference points are similar between an assessment with time-invariant (constant M) and one with time-varying M, the subsequent reference points will differ. For example, F_{MSY} from the base Atlantic herring assessment model was 0.27, but F_{MSY} from a modified base model with constant M was 0.41 (Table 1). The F reference point of $0.5F_{MSY}$ from the constant M assessment run equaled 0.21, which is nearly equal to the F reference point of $0.75F_{MSY}$ from the base assessment model and commonly applied in the northeast (Table 1). Thus, the application of control rules or reference points suggested by the EJ letter *may* not be necessary if assessments include time-varying M because the allowance of time varying M affects the reference points in ways not considered by Pikitch et al. (2012) and Smith et al. (2011). Furthermore, Smith et al. (2011) recommended *not* using their suggested reference points for tactical management decisions.

Table 1 Reference Points at time-varying M and constant M

	BASE	"ConstantM"
Fmsy	0.27	0.41
0.5Fmsy	0.14	**0.21**
0.75Fmsy	**0.20**	0.31
SSBmsy	157357	236428
MSY	52589	121580
SSBo	476445	1080930
Steepness	0.53	0.84

Base = current time-varying M; constant M is based off EarthJustice recommendations. Source: NEFSC

Although the reference points between the two approaches outlined in the EJ letter are similar, they remain very different control rules, and whether or not the catches at a given level of population abundance are similar will depend on the control rule applied and the specification of other reference points (e.g., CUTOFF in the Pacific Council alternative). Consequently, broader conclusions about the relative performance of reference points and control rules are best made within the context of a simulation or a management strategy evaluation approach. Further exploration is needed to conduct more relevant analyses. The Herring PDT expressed concern about adopting either control rule in the 2013-2015 specifications package, as it represents a significant change in management strategy. Also, it is unclear at this time whether these approaches can be effectively applied to the herring fishery without specific consideration of the differing biological, physical, and ecological environments. Long-term considerations should be evaluated by the Council.

Herring PDT Recommendations

While the Herring PDT supports further consideration of these two alternatives for ABC control rules, the two approaches are fundamentally different, and the PDT views them as long term strategies that require further evaluation. The reference points and projections required under either alternative should be developed through a scientific assessment and peer-reviewed before adopted for the long-term management of the fishery. These and other alternatives should be evaluated by the Council, in the context of the Council's objectives for the long-term management of this resource and the herring fishery. A change in management approach should include evaluation of a full range of alternatives (including reference points) to be adopted in a long-term harvest control rule for the Atlantic herring fishery. A more applicable solution for the long term will require additional analyses for the appropriate multiple reference points and should be evaluated in a full amendment to the Herring FMP.

However, if the Council desires, the short-term outcome under the alternatives proposed by EJ can be achieved in the upcoming specifications by applying an even more conservative fishing mortality strategy (and specifying a lower ABC) for 2013-2015, to further account for Atlantic herring's role as a forage species. Based on the alternatives in the EJ letter, reducing F to 50% F_{MSY} for 2013-2015 (0.14) as a temporary ecosystem harvest control rule would produce a similar result (it was noted that the F status quo is at 50% F_{MSY}, the projection for which is provided in the SAW 54 Assessment Summary Report). The Herring PDT suggests that the Council receive further guidance from the Scientific and Statistical Committee (SSC) regarding the alternatives proposed in the EJ letter. Given the current status of the herring resource (rebuilt, not overfishing) and the two ABC alternatives endorsed by the SSC for 2013-2015 (constant catch and 75% F_{MSY}), specific consideration should be given to whether a more conservative strategy is warranted for 2013-2015. Short-term considerations should be addressed in the fishery specifications, and long-term considerations should be addressed in a more comprehensive management action.

Possible Options for Sub-ACLs

Ms. Steele presented some possible sub-ACL options to the Herring PDT, which will be reviewed by the Advisory Panel and Committee in early November. She discussed the goals and objectives of the herring management program and the general reason for dividing the ACL into sub-ACLs, one of which is to minimize the risk of overfishing individual stock components. The PDT encouraged the Committee/Council to consider the goals/objectives of the herring management program when selecting the sub-ACL options. The options should be limited to a reasonable range and linked to the goals/objectives and the purpose and need for this action.

The PDT noted that allocating the total ACL to management areas should have a sound reasoning and that ranking the options based on potential exploitation of a stock component could deter from the objectives for dividing the quota, depending on what the objectives may be. The Herring PDT noted that there are no reference points regarding inshore and offshore sub-ACLs because there are limited data, and separate stock assessments cannot be conducted at this time. Two differing objectives could form the basis of the sub-ACL options:

1. Minimize the risk of overfishing the inshore stock component; or
2. Maximize fishing opportunity for the industry within the constraints of the total available yield

Mr. Correia provided an overview of the sub-ACL analysis that the Herring PDT will prepare to provide a basis for comparing sub-ACL options in terms of their potential impacts on individual stock components. While this analysis is necessary to provide a basis for comparing the potential impacts of sub-ACL options, the PDT emphasized the importance of identifying and prioritizing objectives for setting sub-ACLs. The PDT discussed/addressed several issues to set the parameters for the sub-ACL analysis:

1) Monthly Proportions of Catch by Management Area

In the 2010-2012 analysis, the monthly catch proportions that were utilized were based on 1999-2008; the PDT agreed that the assessment for the 2013-2015 specifications will utilize catch proportions from 2007-2011 to account for the changes that the fishery has experienced during the more recent time frame such as the limited access program, the purse seine/fixed gear only area, the recent years affected by significant reductions in the sub-ACLs, and the days out that have been applied by ASMFC.

2) Relative Exploitation Rate for Comparison of Sub-ACL Options

OFL is considered the F_{MSY}-based specifications in the 2013-2015 Atlantic Herring specifications. As a result, the Herring PDT agreed that the ratio of OFL to total stock biomass is an appropriate basis for comparing options in terms of their relative exploitation ratios. The PDT's sub-ACL analysis uses Monte Carlo simulation to project the amount of inshore and offshore stock removals, the ratio of removals to inshore/offshore biomass.

A triangular distribution approach based on the best available science (0.1/0.3/0.13 – see below) was used during the 2010-2012 specifications to estimate the proportion of total herring biomass from the inshore stock component in the model. During the 2006 TRAC assessment, three approaches (commercial acoustic survey biomass estimates, NEFSC autumn survey swept biomass ratios, and morphometric) were used to estimate the proportions by spawning component (Table 2). The mean of the three estimates is 17.7%.

Table 2 Inshore Component as a Percentage of Total Stock by Three Methods

Method	Inshore component as percentage of total biomass
Acoustic Survey (biomass)	10%
Morphometrics (numbers)	13%
NEFSC area swept biomass	30%

The most recent assessment (SAW 54) did not provide new/additional insight regarding the relative proportion of inshore and offshore biomass. The Herring PDT agreed that the estimate of 30%, derived fall trawl survey swept area biomass, should be updated based on more recent trawl survey data. The updated information will be included in the document, and the PDT will revisit this issue.

3) Summer and Winter Mixing Rates

Atlantic herring is assessed as a combined Gulf of Maine and Nantucket shoals/Georges Bank stock complex. The inshore Gulf of Maine and offshore Georges Bank/Nantucket Shoals stock are segregated during spawning season, but mix during feeding and movement during the year. The winter mix in Area 1B is defined as pop mixing from January through December and in Area 2 during the winter months (see Table 3).

The "pop mixing" rate shown in Table 3 was randomly drawn from a triangular distribution with the minimum set to 0.10, maximum set to 0.30, and the mode set to 0.13. This gives an average percentage of 0.17667 and a median percentage of 0.13 as described above. The summer mixing rate was drawn from a uniform distribution with minimum value set at 0.2 and maximum value set at 0.8. This gives a mean and median summer mixing percentage at 0.5.

Table 3. Mixing Percentages (Inshore Component as Percent of Total) by Month and Area

Month	Area 1A	Area 1B	Area 2	Area 3
January	100%	Pop mixing	Pop mixing	0%
February	100%	Pop mixing	Pop mixing	0%
March	100%	Pop mixing	Pop mixing	0%
April	Summer mix	Pop mixing	0%	0%
May	Summer mix	Pop mixing	0%	0%
June	Summer mix	Pop mixing	0%	0%
July	Summer mix	Pop mixing	0%	0%
August	100%	Pop mixing	Pop mixing	0%
September	100%	Pop mixing	Pop mixing	0%
October	100%	Pop mixing	Pop mixing	0%
November	100%	Pop mixing	Pop mixing	0%
December	100%	Pop mixing	Pop mixing	0%

4) New Brunswick (NB) Weir Fishery Catch

The analysis in the 2010-2012 fishery specifications applied NB catch from 1995-2008 based on a random draw for every model run. A discussion about the most appropriate time frame to use in this analysis resulted in agreement about the most recent ten-year period, 2002-2011. It was noted that the 2002-2011 time frame would capture reasonable variability in the fishery, along with the large 2008 herring year class (see Figure 1 and Figure 2).

Figure 1 NB Weir Herring Catch

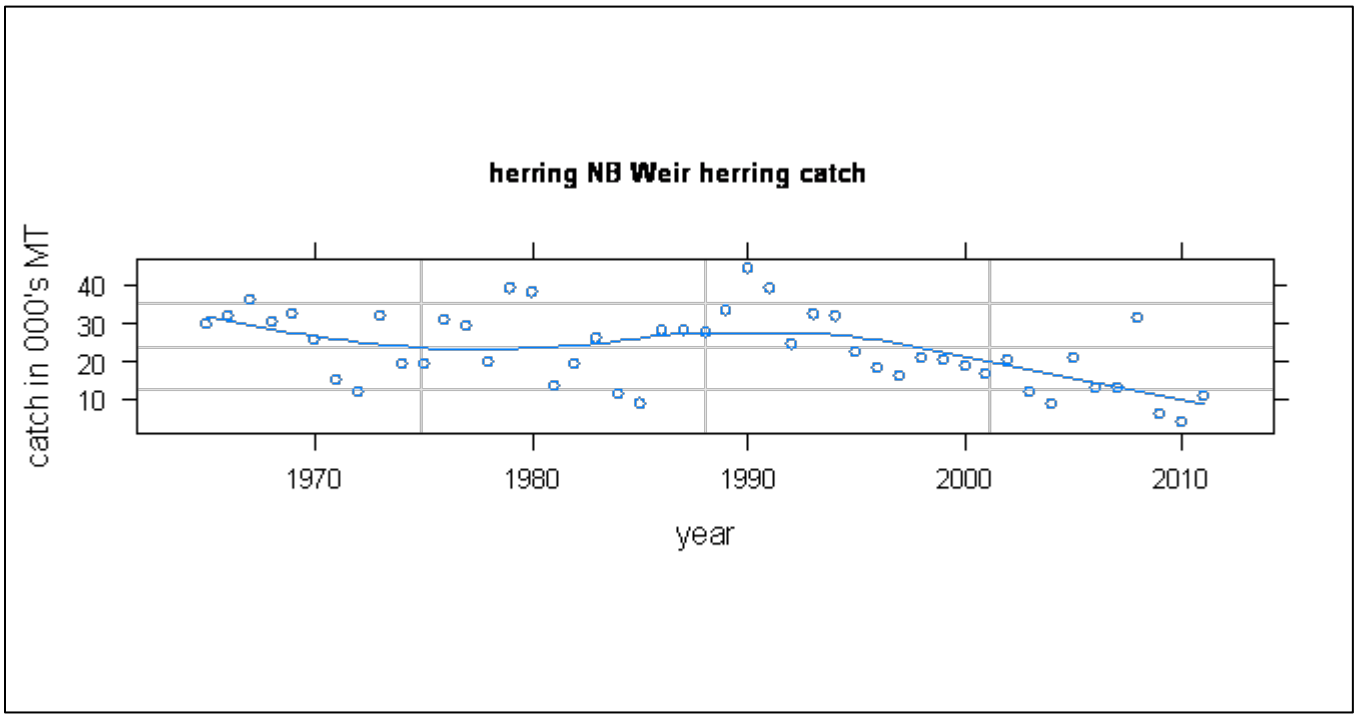
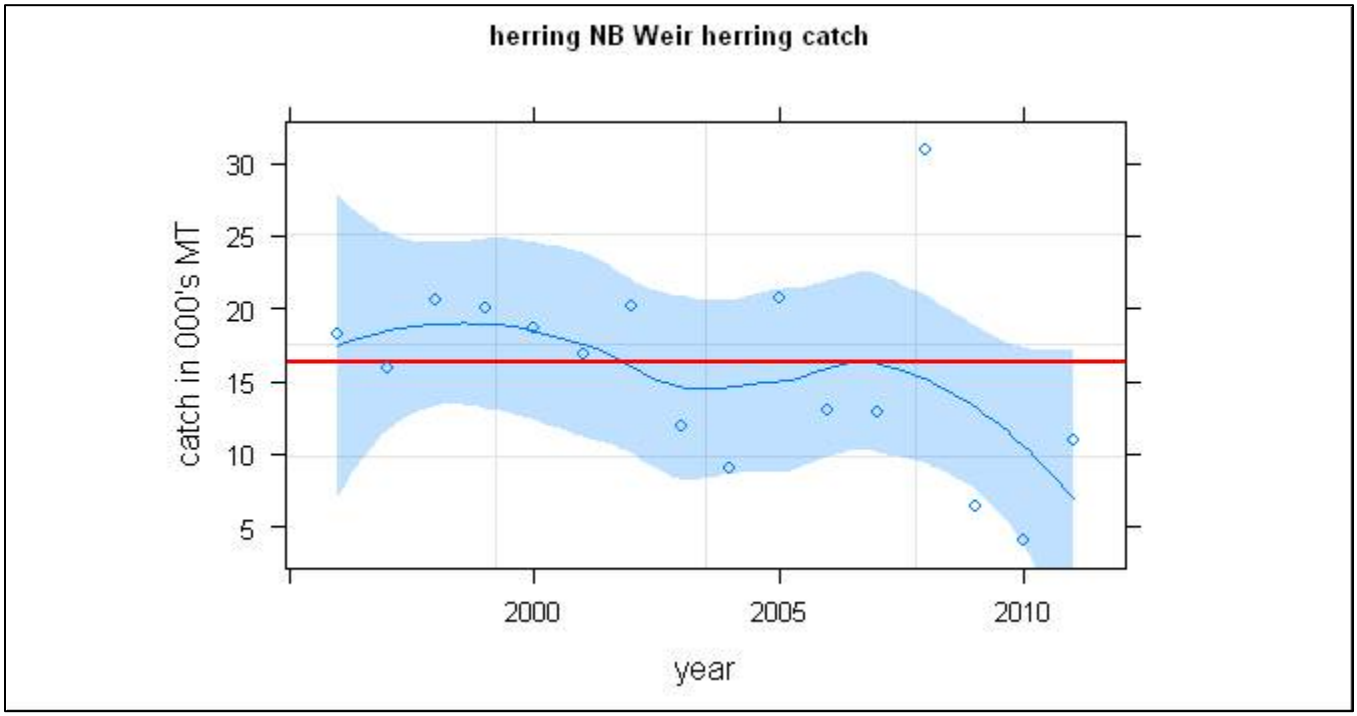


Figure 2 NB Weir Herring Catch (2)



Other Elements of Sub-ACL Analysis

Catch at Age Assessment

Dr. Cieri briefly discussed updating the catch at age (CAA) matrix for the inshore component. He stated that there are some signs of the 2008 year class, especially for age 3. This suggests that size of the 2008 year class is not just an offshore phenomenon. It was requested by the Herring PDT to also update the CAA matrix just for offshore component to provide a more comprehensive evaluation. Dr. Deroba acknowledged that the acoustic survey showed similar results regarding Dr. Cieri's CAA assessment.

Impacts on Fishery-Related Businesses and Communities

Dr. Lee provided a brief overview of economic issues associated with the sub-ACLs, stating that eliminating the directed fishery in Area 1B should be discussed further and may not be the only solution to quota monitoring and overage problems in that area (ex., set-asides or changing the threshold to close the directed fishery). However, reducing the percentage threshold and/or closing an area early does have an economic cost to the fishery. He noted that the majority of herring trips that contribute to the sub-ACL in Area 1B come from limited access herring vessels.

Overview of Alternatives for AMs

Ms. Steele provided an overview of the range of AMs that the Herring Advisory Panel, Herring Committee, and Council will discuss at the upcoming meetings. Ms. Nordeen suggested that the issues/challenges with the overages can be presented by NMFS to the Herring Committee and noted that the last week before 95% of the sub-ACL is projected to be reached tends to be the most difficult to monitor, which results in fishery overages. Management approaches to slow the fishery during this time or reducing the threshold would be ways to decrease the frequency of overages. There is great variability with a high-volume fishery such as herring and considering a lower threshold for a directed fishery closure may be one solution to help slow down the fishery.

The Herring PDT emphasized that although a sub-ACL in a management area may be exceeded and experience an overage, this does not necessarily translate into a stock-wide ACL overage. In fact, to date, the total ACL for herring has not been exceeded, despite sub-ACL overages. The PDT suggests that the legal requirements for accountability measures (AMs) to apply to ACLs versus sub-ACLs should be clarified. It seems that the application of AMs to sub-ACLs for herring management areas may be more precautionary than other fisheries (with AMs that apply only to total ACLs), and legal mandates concerning sub-ACLs are unclear. Further clarification would be appropriate as the AM alternatives are developed by the Council in the 2013-2015 specifications package.

The Herring PDT will schedule its next meeting to continue work on the development of the 2013-2015 herring fishery specifications following the November 2012 SSC Meeting.