New England Fishery Management Council
50 WATER STREET | NEWBURYPORT, MASSACHUSETTS 01950 | PHONE 978 465 0492 | FAX 978 465 3116
John F. Quinn, J.D., Ph.D., *Chairman* | Thomas A. Nies, *Executive Director*

MEMORANDUM

DATE: March 18, 2019

TO: Herring Oversight Committee

FROM: Herring Plan Development Team (PDT)

SUBJECT: Updated projections for 2019-2021

The Herring PDT had a conference call on February 13, 2019 to discuss the specifications package for fishing years 2019-2021. The PDT discussed developing an updated projection for 2019-2021 for two reasons. First, there is more updated information now available for the estimate of 2018 landings, and second, NMFS implemented a 2019 in-season adjustment (February 8, 2019) since the previous projection was completed, so 2019 catch is now more certain than before. The PDT reviewed the updated projection on a conference call on March 15, 2019 and the discussion and recommendations are summarized in this memo.

Estimate of 2018 landings

The previous projections for FY2019-2021 used 49,900 mt as the best estimate of 2018 landings, which is equivalent to the annual catch limit (ACL) that was implemented by the 2018 in-season adjustment. Final 2018 landings will still not be official for a month or so after all final catch data are complete and reviewed for both the US and Canada. However, some updates are now available suggesting that landings for FY2018 are likely closer to 55,000 mt compared to the previous estimate used (49,900 mt, approximately 5,000 mt higher). Canadian landings for 2018 are not officially final either, but updated values are available for the Canadian weir and shut off fishery combined. The current estimate is about 11,500 mt, compared to the estimate of 6,200 mt used in the previous projection. Interestingly, the majority of Canadian catch in 2018 is from the shut off fishery, not the weir fishery. Until 2018, landings in the Canadian shut off fishery has been essentially zero for some time.

Estimate of 2019 landings

When the previous projection was completed the ABC and associated catch limits for 2019 were uncertain. The projection reviewed and approved by the SSC in October 2018 used 21,266 mt as the ABC for 2019, which had an associated 15% probability of overfishing and 88% probability of overfished if the full ABC was harvested. NMFS ultimately implemented a final ABC of 21,266 mt for 2019 and the US ACL equivalent to 15,065 mt, after a reduction of 6,200 mt to account for management uncertainty, or mortality primarily associated with Canadian landings. While Canadian landings were higher in 2018 than recent years, the buffer has been based on a moving average of three years, not just one year. Table 1 summarizes the total New Brunswick Canadian landings from the last ten years. The PDT has included updated 3-year, 5-year, and 10-year moving averages. The current buffer of 6,200 mt is relatively similar

to the updated 3-year moving average of 5,888 mt for 2016-2018. The PDT noted that these data have no trend, total catch bounces around from year to year and anything seems possible from year to year looking at the data from the last ten years. There is more risk for the stock becoming overfished if actual catch is higher than the estimated catch removed from OFL for this source of mortality. The PDT will review this information again this spring when developing recommendations for setting the management uncertainty buffer for fishing years 2020 and 2021.

Table 1 – Canadian weir and shut-off landings from 2009-2018 (preliminary) with possible deductions for management uncertainty based on 3-year, 5-year and 10-year averages.

Year	Canadian Landings (mt)
2009	4,031
2010	10,958
2011	3,711
2012	504
2013	6,431
2014	2,149
2015	146
2016	4,060
2017	2,103
2018	11,502*
3-year (2015-2018)	5,888
5-year (2014-2018)	3,992
10-year (2009-2018)	4,560
Buffer used in 2016-2018	6,200
Buffer used in 2019	6,200

** Preliminary*

Updated projection and PDT recommendation

Projections typically use an estimate of landings for the terminal year (2018 in this case) because final catch data are seldom available. Normally the PDT would make an informed decision about the best estimate of catch before the fishing year has ended, as was done in the original projection completed last year for the SSC (Table 2). However, this is a unique situation because an in-season adjustment was used to set specifications for 2019; therefore, the current three-year specification package (2019-2021) is including the measures set by NMFS in 2019, as well as catch limits for 2020 and 2021. Because the measures for 2019 are known, and the 2018 fishing year is now over, this timing has made it possible to use updated information to improve the projections. In addition, the PDT further discussed that it would be important to review updated projections in this case since herring biomass is relatively low and the original projections have relatively high probabilities of the stock becoming overfished.

Table 2 is the original projection reviewed by the SSC in October 2018. The SSC was prepared to implement the harvest control rule selected through the Amendment 8 MSE process. However, the SSC had reservations about the projections for Atlantic herring and were concerned about the assumptions regarding future recruitment. The SSC noted that age 1 recruitment in the projections for 2019-2021 was

drawn from 1965-2015, and the resulting projected biomass showed a substantial increase over the three-year timeframe. The SSC did not have confidence in the projected increase in biomass in 2021 and expressed concern about setting ABC based on this uncertain value. Following an extensive discussion on this topic, the SSC resolved to make ABC recommendations for 2019 and 2020 based on the ABC control rule but recommended keeping ABC in 2021 the same as 2020 due to the uncertainty in the projections. The SSC recommended the NEFMC request an update assessment in 2020 based on the existing benchmark assessment. They recommended that the objective of this update would be to verify the projected trend in biomass and recruitment with the aim of revising advice for 2021 based on more informed estimates of recent recruitment. The Center has since committed to completing an updated assessment in spring 2020; therefore, updated information would be available to potentially revise catch advice for 2021 and beyond.

Table ***3*** has been developed by the PDT more recently to incorporate updated catch information for FY2018 as well as final catch limits for FY2019. The PDT discussed that it is standard protocol to use the ABC for estimated catch during a "bridge year" (2019) when making projections for future fishing years (2020 and 2021). The effects of updated data can be evaluated by comparing these runs. Specifically, with about 5,000 mt higher catch in 2018 in the updated run compared to the original run, the starting biomass in 2019 for the updated projection is now lower, so the fishing mortality (F) associated with maintaining the same 2019 ABC (21,266 mt) is slightly higher (F of 0.35 compared to F of 0.33 from the original projection). The probability of overfishing in 2019 for the updated projection is slightly higher, about 20% compared to 15%, and the probability of the stock being overfished is essentially the same under both runs (87% or 88%). The PDT discussed that the updated projection suggests that FY2020 ABC should be almost 2,000 mt lower to maintain similar low levels of probability of overfishing (1-2%) and probability of overfished (83-84%).

The Herring PDT recommends the Committee consider recommending the Council modify the OFL and ABC values for FY2020 and FY2021 based on updated projections completed by the PDT (Table 3). For 2021 ABC, the PDT has maintained the same rationale recommended by the SSC to keep 2021 ABC at the same level as 2020 due to concerns about the assumptions regarding future recruitment. These recommendations are identical to the SSC recommendations, just incorporating updated catch data.

Table 2 – Original 2019-2021 OFL and ABC projections reviewed by the SSC in October 2018 (mt)

	2018	2019	2020	2021
ABC	49,900*	21,266	16,131	~~30,659~~** 16,131
F(ages 7-8)	0.51	0.33	0.18	0.21
SSB	79,673	52,874	58,617	126,394
P(overfishing)	0.50	0.15	0.02	0.03
P(overfished)	0.72	0.88	0.84	0.26
OFL	49,900	30,668	38,878	59,788
SSB/SSBmsy	0.42	0.28	0.31	0.67

** For 2018, this value is estimated landings, not ABC. Estimated catch from the terminal year is used to calculate OFL and ABC projections for 2019-2021.*

*** For 2021 the SSC recommended that ABC remain at the 2020 level (16,131 mt) and not increase due to concerns about the assumptions regarding future recruitment. The projected ABC from the model has strike through text (~~30,659 mt~~).*

Table 3 – Updated 2019-2021 OFL and ABC projections (mt)

	2018	2019	2020	2021
ABC	55,286*	21,266	14,265	~~29,835~~*** 14,265
F (ages 7-8)	0.58	0.35	0.16	0.21
SSB	75,488	49,182	56,801	126,054
P(overfishing)	0.69	0.20	0.01	0.03
P(overfished)	0.76	0.87	0.83	0.27
OFL	–	~~29,024~~ ** 30,668	40,574	68,718
SSB/SSBmsy	0.40	0.26	0.30	0.67

** For 2018, this value is estimated landings, not ABC. Estimated catch from the terminal year (2018) is used to calculate OFL and ABC projections for 2019-2021.*

***Note the updated estimate of OFL for 2019 from the projections is 29,024 mt, but the OFL adopted in the 2019 in-season adjustment was based on the original projection that had an OFL estimate of 30,668 mt. Therefore, the OFL in 2019 is 30,668 mt, but for this projection the OFL associated with applying Fmsy to SSB is 29,024 mt. This is a relatively small difference with essentially no difference in terms of probability of overfished.*

**** For 2021 the PDT recommends that ABC remain at the 2020 level (14,265 mt) consistent with previous SSC advice not to increase ABC in 2021 due to concerns about the assumptions regarding future recruitment. The projected ABC from the model has strike through text (~~29,835 mt~~), but the PDT recommendation is to reduce 2021 ABC to be equivalent to 2020 ABC.*