New England Fishery Management Council
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John Pappalardo, *Chairman* | Paul J. Howard, *Executive Director*

MEMORANDUM

DATE: July 13, 2009

TO: Science and Statistical Committee

FROM: Groundfish Plan Development Team

SUBJECT: **2010-2012 Groundfish Acceptable Biological Catches (ABCs)**

1. The Groundfish Plan Development Team (PDT) has calculated the ABCs for groundfish stocks for the years 2010-2012 using the guidance provided by the SSC. This report gives an overview of the process used, highlights issues for specific stocks, and provides specific ABC recommendations for most stocks. Documents attached for reference include:

- Dr. Steve Cadrin memorandum dated June 23, 2009; SSC guidance for setting groundfish ABCs; enclosure (1).
- Transboundary Resource Assessment Committee Status Report (TSR) for Georges Bank Yellowtail Flounder (2009); enclosure (2).
- Summary worksheet of projection results prepared to support ABC development; enclosure (3).
- Groundfish PDT recommended ABCs for 2010 – 2012; enclosure (4).
- While not attached because of their size, SSC members may find the reports of GARM III and the Data Poor Working Group (DPWG) helpful. They are both available online:

  GARM III:

  http://www.nefsc.noaa.gov/nefsc/publications/crd/crd0815/

  DPWG:

  http://www.nefsc.noaa.gov/nefsc/saw/datapoor/Data%20Poor%20-%20Review%20Panel%20Report%20Final-1-20-09.pdf

2. Benchmark assessments for nineteen groundfish stocks were completed during the Groundfish Assessment Review Meetings in 2007 and 2008 (GARM III). For these stocks the terminal year for the benchmark assessments was 2007. With the exception of GB yellowtail flounder, the

benchmark assessments were not updated for this evolution. While in this case the ABCs for almost all stocks are based on these recent benchmark assessments, future ABCs may be set using a combination of benchmark assessments, updated assessments, and other metrics for evaluating stock status.

Projections for Stocks With Age-Based Assessments

3. For the stocks assessed with an age-based assessment, projections were run forward from the terminal year to estimate future stock size and catches. The projections used assumptions for recruits, weight at-age, and partial recruitment patterns recommended by GARM III. An assumption for 2008 and 2009 catch or fishing mortality is needed to run these projections. The catches (commercial landings and discards, and recreational harvest) for 2008 were calculated by the Northeast Fisheries Science Center (NEFSC) using the same methods as used for the GARM. These catches were used in the projection for 2008. There is not enough catch information available for 2009 to reliably predict annual catches. An interim management action was implemented on May 1, 2009. Expected impacts of these measures were analyzed by NMFS using the Closed Area Model (CAM). For most stocks, the expected change in exploitation predicted from the model was applied to the 2008 mortality that results from the updated 2008 catch to get an estimate of the 2009 mortality. This estimate of 2009 mortality was used in the projection. For 2010-2012, the projection used the targeted fishing mortality rate (either 75% of F_{MSY} or Frebuild).

The impact of management measures in 2009 may not be as predicted by the CAM. In early 2009 a court order resulted in several rapid and dramatic changes in measures over the January through April period. The impact of these changes is unclear. The nature of the changes leads the PDT to expect catches would have increased since generally regulations were eased, but preliminary landings information for January – March does not indicate an increase for all stocks.

Table 1 – Preliminary landings information, Jan-Mar, 2008 and 2009

		Calendar Year		
Area	**Stock**	**2008**	**2009**	**Change**
GOM	GOM Cod	1,441	1,113	-23%
	GOM Haddock	168	220	31%
	CC YTF	212	197	-7%
	GOM Winter	78	67	-14%
	Plaice	240	366	53%
	Witch Flounder	316	302	-4%
	White Hake	272	403	48%
	Pollock	2,401	2,153	-10%
	Redfish	363	464	28%
GB	GB Cod	748	793	6%
	GB YTF	170	189	11%
	GB Haddock	1,006	547	-46%
	GB Winter	9	63	600%
SNE/MA	SNEMA Yellowtail	77	98	27%
	SNEMA Winter	69	64	-7%

4. There are two exceptions to the approach for estimating 2009 fishing mortality. The first is for GB yellowtail flounder. Since this stock is managed by a hard TAC, the 2009 TAC of 2100 mt was used in the projection (consistent with the projection approach used by the Transboundary Resource Assessment Committee (TRAC)). The second exception is for GB haddock. The CAM cannot reliably predict GB haddock mortality because much of the catch comes from the Canadian fishery in recent years and this is not affected by U.S. management measures. The Canadian fishery has nearly harvested its TAC in recent years, so the 2009 TAC of 19,000 mt was assumed caught. The 2009 U.S. catch was assumed to be the same as the 2008 catch of 6,000 mt. Total 2009 GB haddock catch assumed was 25,000 mt. The PDT notes that the 2009 catch assumption is not as critical for this stock since recent catches are well below catch projections for future years.

GB Yellowtail Flounder

5. GB yellowtail flounder is currently assessed each year by the Transboundary Resource Assessment Committee (TRAC). As a result an assessment is available with a terminal year of 2008. The full assessment report is not yet published, but the TRAC status report is attached (enclosure 2). This year's TRAC assessment reported results using two different VPA formulations. The primary difference between them is the treatment of the Canadian spring trawl survey in 2008 and 2009. Each of these surveys had one extremely large tow and when these data are included in the assessment it has a strong influence on the results. While the NMFS spring and fall surveys do generally indicate increasing biomass since 2004 the increase is not nearly as dramatic as indicated by the Canadian survey. One TRAC model formulation includes the 2008 and 2009 Canadian spring survey index (labeled "including") and one run does not (labeled "excluding"). The TRAC status report does not state a preference between the two assessment formulations but stated the following regarding the large survey indices: "The preferred approach to deal with these indices would be to down-weight their importance in the VPA tuning by about half relative to other values in the time series. Two runs were considered as a means to bracket the preferred down-weighting approach:...Preliminary investigations confirmed that down-weighting the DDO survey indices gave results between the "Including" and "Excluding" runs."

6. Projections based from the two different assessment results give very different catches in the near term. With a Council-adopted requirement to rebuild by 2014 with a 75 percent probability of success, the "excluding" run gives an Frebuild of 0.02 and a 2010 catch of 450 mt. The Frebuild for the "including" run is 0.085 (lower than Frebuild= 0.107 based on GARM III) and gives a 2010 catch of 2,600 mt.

7. In anticipation that the SSC may consider setting ABC for this stock after considering both models, the PDT prepared projections based on both assessments using a catch of 1,500 mt or 2,100 mt in 2010. The mortality that results from these catches was then used for the following two years. Between work done by the TRAC and the PDT, there are six possible 2010 catches that provide a range of rebuilding results based on the two different assessments. All of these catches are expected to result in a fishing mortality well below 75% of F_{MSY} (0.191), and all are expected to rebuild prior to the maximum rebuilding period with greater than a median probability. Not all of the catches shown will rebuild by 2014 with a 75% probability of success.

Table 2 – Example GB yellowtail flounder projection results for 2010.

	Assessment Model			
	Excluding		Including	
Catch (mt)	F	Rebuilt	F	Rebuilt
450	0.02	2014/75%	NA	NA
1,500	0.068	2015/75%	0.048	2013/75%
2,100	0.097	2016/75%	0.068	2014/75%
2,300	0.107	2014/52%	NA	NA
2,600	NA	NA	0.085	2014/75%
3,300	NA	NA	0.107	2014/69%

8. Several elements of this assessment suggest caution. First, the TRAC cautions that the assessment is less certain than in the past due to the recent Canadian surveys. Second, while both model formulations indicate rapidly increasing stock size since 2005, continued rapid growth is less certain because of poor recruitment in 2007. Third, since the end of the rebuilding period is approaching, projected rebuilding success is sensitive to estimates of recruits. Finally, the assessment may be acquiring a retrospective pattern when estimating fishing mortality, as shown below.

Table 3 – Comparison of recent TRAC estimates of fishing mortality and biomass for GB yellowtail flounder

	Fishing Mortality (4+)			SSB (K mt)		
Assessment Year	2005	2006	2007	2005	2006	2007
2005	1.37	-	-	5.4	-	-
2007	1.22	0.89	-	4.4	5.0	-
2008	1.16	0.89	0.29	4.2	4.4	9.5
2009 – Excl.	1.25	1.06	0.41	3.7	4.4	10.0
2009 – Incl.	1.23	1.01	0.38	3.8	4.7	11.7

9. Management of GB yellowtail flounder is coordinated with Canada through the U.S./Canada Resource Sharing Understanding, an informal understanding between the two management agencies (DFO and NMFS). Catch levels are agreed upon each year by the Transboundary Management Guidance Committee (TMGC) based on the annual assessment conducted by the TRAC. While the PDT is forwarding ABCs for the period 2010-2012, the SSC may want to consider revisiting the ABCs in future years (2011 and beyond) when the TRAC information is available. Canadian members of the TMGC have expressed concerns about the decisions of the SSC limiting the ability of the TMGC to negotiate catch levels. The SSC may choose to recommend a range of TACs that are consistent with the ABC control rule and the TRAC status report in order to facilitate coordinated management with Canada.

SNE/MA Winter Flounder

10. Three projections were run for SNE/MA winter flounder. The first assumes that all catch is eliminated; this is not consistent with the SSC's recommendations for this stock. The second projection uses the estimate of discards from the last benchmark assessment and increases it in rough proportion to increases in stock size. In essence, this projection assumes that the only catches are those that result from discards in non-groundfish fisheries, and it could be considered a lower bound on an ABC consistent with the SSC advice. The third projection uses the fishing mortality expected to result from the proposed measures to determine future catches; since possession is prohibited, these are all discards. This estimate is based on the closed-area model which does not reflect non-groundfish trips, and so it implicitly allows for a reduction in discards. Further reductions in the bycatch rate can be incorporated when the ABCs are set in future years (for example, 2012-2014).

Atlantic Halibut

11. Because halibut is rarely caught it is not included in the CAM. 2009 catch was arbitrarily assumed to be 100 mt, a 40 percent increase from the four year average catch but only a 20 percent increase from the 2007 catch. An increase seems warranted since the Canadian TAC is increasing by 15 percent from 2008 to 2009 (only a small portion of this TAC is taken from the stock area used in the U.S. assessment). ABCs for this stock will be provided at the meeting as the PDT could not complete the projections in time to be included in this memorandum.

Atlantic wolffish

12. Atlantic wolffish was assessed by the Data Poor Working Group in January 2009. According to the review panel: "There is considerable uncertainty in several life history traits critical to the evaluation of BRPs and stock status, including M, maximum age, the maturity schedule and fecundity. Current estimates of maturity patterns used in the model have not been adequately developed for the northwest Atlantic coastal shelf ecosystem and for the Gulf of Maine region in particular." These parameters influence estimates of current stock size and status determination criteria. Given the uncertainty, the PDT calculated ABCs for two different selectivity patterns and three different maturity schedules (see Table 4). ABC values range from 60 mt to 128 mt. The wolffish working group noted that it may be unlikely that wolffish are mature at 40 cm; while this is the value obtained from the NEFSC survey, it may be an artifact of how maturity is determined in the survey since estimates from other areas tend to indicate a larger size at maturity. These estimates, however, are also from areas with colder temperatures so it is possible maturity off New England occurs at a different size.

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Table 4 – Atlantic Wolffish catches based on different assessment runs

Length at maturity	2007 Total Biomass	2007 Exploitable Biomass	Fmsy	75%Fmsy	Fmsy * Exploitable Biomass	75%Fmsy * Exploitable Biomass
Run 1 (slope=0.15)						
40 cm	1118.9	533.8	0.319	0.239	170	128
65cm	1118.9	533.8	0.233	0.175	124	93
75 cm	1118.9	533.8	0.185	0.139	99	74
Run 2 (L50=90)						
40 cm	1008.3	215.3	0.686	0.515	148	111
65cm	1008.3	215.3	0.486	0.365	105	78
75 cm	1008.3	215.3	0.374	0.281	81	60

13. There is no additional information available to inform the choice between the options in Table 4. The PDT calculated the catch that would result should the SSC use an approach similar to that for GOM winter flounder. 75 percent of recent catches produces a catch of 76 mt, within the range of the assessment-based results and well below the MSY estimate of 278-311[1] mt. The review panel for the DPWG advised that "...given the potential for extremely low recruitments indicated in recent survey catches, future catches may have to be lower than MSY until the pattern of incoming recruitment is more precisely known." Amendment 16 includes a measure that, if approved, bans the retention of Atlantic wolffish; Canadian experiments indicate a relatively high survival rate for wolffish discarded from trawls.

Projections for Stocks With Index-Based Assessments

Pollock

14. Pollock is the only stock assessed with an index where the index- projection model was used. Pollock uses a centered three-year average for stock status determinations. Consistent with SSC advice the projection was run using the lowest observed fall survey index for the missing 2009 value in order to get an estimate of the 2008 biomass proxy. 2008 catches were included in the projection, and the 2009 exploitation was estimated from the CAM results. Because 2008 catch was higher than estimated previously due to increases in commercial and recreational components, the exploitation index required to rebuild by 2017 is lower than that reported in Amendment 16. The PDT discussed this change and agreed that in spite of this inconsistency the revised value should be used for setting the ABC.

15. The pollock index projection continues to be troubling. While the pollock survey is highly variable, the projection results imply erratic fall survey indices and a pattern of a large increase in one year followed by two years of decline. As an example, when the lowest observed survey value is used for 2009 as recommended by the SSC, the projection implies the survey value for

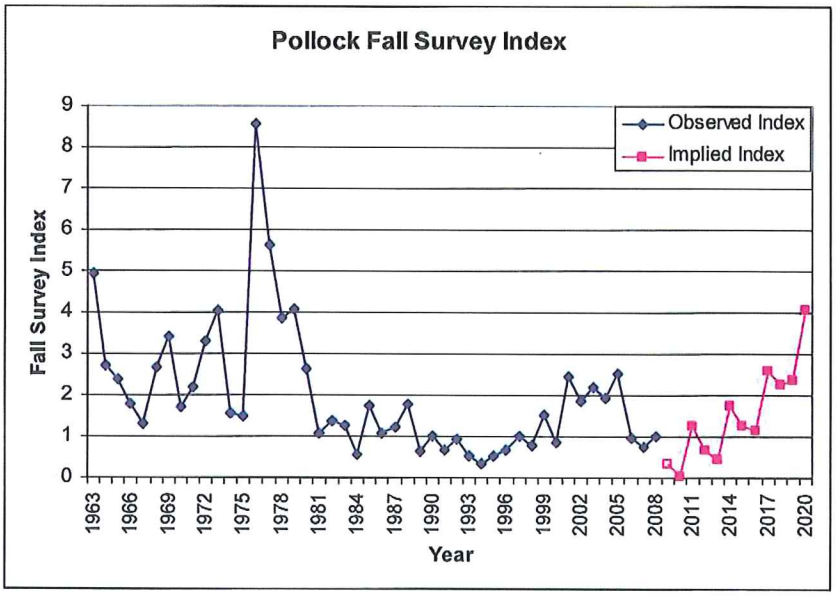
[1] The currently published value of MSY for Atlantic wolffish is 138-150 mt. On July 9, 2009, the PDT was advised a correction to the published report is in review. The revised values are used here.

2010 will be near 0 and will increase by a factor of 37 in 2011(see Table 5; Figure 1). In addition, the projection gives unrealistic results when extended into the future: because it does not incorporate any stock dynamics the projection says the stock will grow without interruption.

Table 5 – Pollock projection results. Cells shaded in yellow represent implied fall survey index generated by the projection. Cell shaded in grey is minimum survey value observed. Clear cells are the observed index.

Year	Relative F	3 yr. Avg. Index	Fall Survey Index (actual or implied)
2006			0.959
2007	10.464	0.898	0.754
2008	16.526	0.688	0.982
2009	13.425	0.451	0.328
2010	3.860	0.543	0.043
2011	3.860	0.655	1.259
2012	3.860	0.789	0.662
2013	3.860	0.950	0.445
2014	3.860	1.144	1.743
2015	3.860	1.378	1.245
2016	3.860	1.660	1.148
2017	3.860	2.000	2.589
2018	3.860	2.409	2.264
2019	3.860	2.902	2.375
2020	3.860	3.496	4.068

Figure 1 – Pollock fall survey index. Implied index in future years is based on rebuilding projection output assuming the lowest observed survey in 2009.



16. The pollock projection is sensitive to the assumption used for the 2009 survey index. Not only does this affect ABC calculations, but it changes the estimated exploitation index in 2008 and thus the reduction needed to meet the rebuilding mortality rate. Table 6 compares the

exploitation indices and catches using two different assumptions for the 2009 survey index. The first assumption uses the lowest observed survey index for 2009, while the second uses the average of 2007 and 2008. Using the lowest observed survey index for 2009 reduces the rebuilding index by 8.5 percent, and reduces the catch in the early years of the rebuilding program by about 30 percent. The differences in catch decline to about ten percent as the stock rebuilds.

Table 6 – Projected exploitation and catch for pollock rebuilding using two different assumptions for the 2009 survey index.

	Relative F		Catch (K mt)	
Year	Lowest Index Observed	Two year Average	Lowest Index Observed	Two year Average
2007	10.464	10.464	9.400	9.400
2008	16.526	13.099	11.370	11.370
2009	13.425	10.641	6.057	6.784
2010	3.860	4.217	2.097	3.101
2011	3.860	4.217	2.527	3.578
2012	3.860	4.217	3.043	4.128
2013	3.860	4.217	3.666	4.762
2014	3.860	4.217	4.416	5.493
2015	3.860	4.217	5.320	6.337
2016	3.860	4.217	6.408	7.311
2017	3.860	4.217	7.719	8.434
2018	3.860	4.217	9.298	9.730

17. By way of comparison to the projection results, applying 75 percent of F_{MSY} (an exploitation index of 4.245) to the most recent biomass estimate gives a catch of 3,813 mt in 2010. Fishing at 75 percent of recent catches gives a catch of 6,856 mt, which is higher than the catch at F_{MSY}.

Windowpane Flounders/Ocean Pout

18. For these three stocks the ABCs are based on the most recent biomass proxy (using updated trawl survey indices through 2008 for index-based stocks) and 75%FMSY.

Gulf of Maine Winter Flounder

19. The ABCs for Gulf of Maine winter flounder are calculated as 75% of the recent catches. The PDT calculated the ABC using the three-year average catch of 2006 – 2008. The PDT also calculated the median catch at 75% of FMSY from the most pessimistic (rejected) VPA as a comparison.

Long-Term Projections

20. As requested by the SSC, the age-based projections were carried out to 50 years. If Frebuild was less than 75%FMSY, then when the stock was predicted to reach SSB_{MSY} the fishing mortality was increased to 75%FMSY. On average, the long-term catches are 92 percent of MSY.

PDT Recommendations

21. The PDT recommendations are shown in enclosure (4). These are based on the results of applying the SSC guidance to each stock. Where there are multiple interpretations possible, the PDT's rationale is given below.

a. GB yellowtail flounder: An ABC in the range of 1,500 mt to 2,100 mt should be considered for 2010. As discussed above, the assessment is uncertain and achieving the Council's objective of rebuilding by 2014 with a high degree of certainty requires a low fishing mortality rate even though current stock size is higher than observed since the mid-1970's.

b. SNE/MA winter flounder: The ABC should be based on the CAM estimate of future fishing mortality. This value recognizes that management measures developed to eliminate targeting this stock in federal waters will not eliminate all catches and may result in additional regulatory discards. At the same time it does not include other discard sources.

c. Atlantic wolffish: The PDT does not have a specific recommendation. Note that the projection results and 75 percent of recent catches give similar values that are well below MSY.

d. Pollock: The PDT is concerned about using the pollock projection for setting the ABC given the projection's sensitivity to the assumption for the 2009 survey index. The SSC may wish to consider using a different approach to setting the ABC for this stock, such as basing it on 75 percent of F_{MSY} applied to the most recent stock size proxy.

e. GOM winter flounder: While the recommendation is based on SSC guidance to use 75 percent of recent catches, the PDT notes that this result is 70 percent of the catch at 75%FMSY applied to the most pessimistic estimate of stock size reviewed at the GARM III meeting. GARM III struggled with the comparison between the base case run which had a severe retrospective pattern (not overfished and overfishing was not occurring) and a split run which resulted in a large shift in the stock status determination (overfished and overfishing was occurring). An implausible change in q was needed to reconcile the conflict within the model between a large change in the catch and the relatively flat survey indices over the time series. The GARM was reluctant to accept the split run given the lack of a declining trend in all four survey indices, but could not accept the base case run because of the retrospective pattern. Using 75% of recent catches results in a lower catch than if the spit run were accepted and a projection was run off it at 75% of F_{MSY}.