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.

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

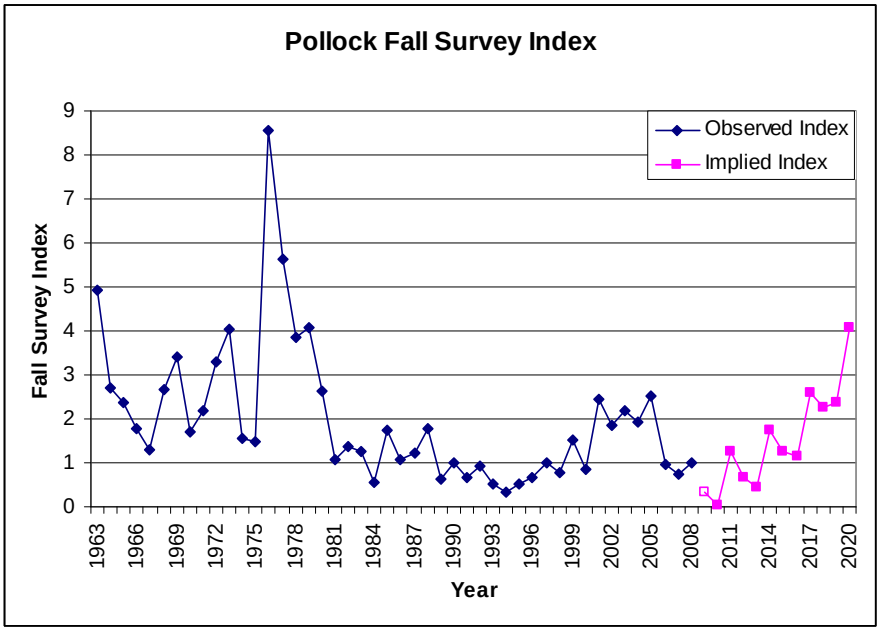
[1] The currently published value of MSY for Atlantic wolffish is 138-150 mt. On July 9, 2009, the PDT was advised a correction to the published report is in review. The revised values are used here.

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}.

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John Pappalardo, *Chairman* | Paul J. Howard, *Executive Director*

To: Paul J. Howard, Executive Director
From: Dr**.** Steve Cadrin, Chairman, Scientific and Statistical Committee
Date: June 23, 2009

Subject: **Amendment 16 to the Northeast Multispecies Fishery Management Plan: Review of Rebuilding Programs for Newly Overfished Stocks and Further Development of ABC Guidance**

The Scientific and Statistical Committee (SSC) was asked to review rebuilding plans and provide guidance on specification of Acceptable Biological Catch (ABC) for all stocks in the Northeast Multispecies Fishery Management Plan. The terms of reference were to:

1. *Review the formal rebuilding strategies for stocks that have been determined to be overfished (witch flounder, GB winter flounder, pollock, Atlantic wolffish, and northern windowpane flounder). Amendment 16 proposes one alternative for each of these stocks. The Council asks that the SSC comment on the reasonableness of these options and the development of rebuilding programs for the stocks that do not have reliable projections (Atlantic wolffish, northern windowpane flounder).*
2. *Develop further guidance for setting groundfish ABCs. Amendment 16 adopts mortality objectives and formal rebuilding strategies but does not specify ABCs or ACLs. The Council is expected to ask the SSC to review ABCs for the multispecies complex this fall and will adopt ACLs based on those recommendations. These decisions will be forwarded to NMFS in a specifications package, similar to the approach used for annual TACs for other species.*

On April 30-May 1, 2009, the SSC reviewed several sources of information and associated presentations by the Mulispecies Plan Development Team (PDT):

1. SSC Overview of Amendment 16 (powerpoint presentation).
2. SSC Amendment 16 Mortality Targets (powerpoint presentation)
3. Groundfish PDT memo dated September 26, 2008 (Amendment 16 mortality reductions)
4. Groundfish PDT memo dated October 24, 2008 (new rebuilding programs)
5. Multispecies ABCs (powerpoint presentation)
6. Draft technical guidance for setting ABCs
7. Stocks Without Projections
8. Examples of applying the Groundfish PDT's proposed ABC rules to several species as assessed at GARM II.
    a. CASE 1: Gulf of Maine Cod
    b. CASE 2: Georges Bank Cod
    c. CASE 3: CC/GOM Yellowtail Flounder

As a basis for providing recommendations on rebuilding plans and ABC specification, the SSC endorses the assessment methodology from the 2008 Groundfish Assessment Review Meeting (NEFSC 2008), including the projection methods approved by the Peer Review Panel. The SSC also

supports the PDT's proposed rebuilding plans for newly overfished stocks (witch flounder, Georges Bank winter flounder, pollock, Atlantic wolffish, and northern windowpane flounder), in which the rebuilding period is determined by age based projections and the maximum net present value.

In July 2008, the SSC reviewed the Multispecies PDT's general approach to specifying ABC. The SSC offered several suggestions for improvement to the general approach including a recommendation that the approach be applied to previous stock assessment results to evaluate performance of the approach. On April 30 2009, the PDT presented its performance evaluation of the proposed approach for three principle groundfish stocks: Gulf of Maine cod, Georges Bank cod and Cape Cod-Gulf of Maine yellowtail flounder. The PDT's approach to specifying ABC produced fishing mortalities that exceeded F_{MSY}, therefore not preventing overfishing nor achieving rebuilding objectives. The PDT concluded that their proposed ABC method would not have ended overfishing if used after the 2005 groundfish assessments. The SSC noted that the PDT evaluation used the results of the 2005 assessments and compared the outcome of the ABC specification approach with the results of the 2008 assessments. Because of a retrospective pattern in the assessments, historical stock sizes estimates in the 2008 assessments are lower than those estimated in the 2005 assessments. The SSC concluded that this unfortunate result is a reflection the fact that the 2005 assessments now appear to have been optimistic. While it is generally assumed that the most recent estimates of stock sizes are the most reliable, simulations based on principle groundfish stocks suggest that this is not always the case (unpublished analyses presented at GARM III; NEFSC 2008).

This situation highlights the following:

1. Medium to long term probabilistic stock projections are highly uncertain,
2. Accurately estimating probabilities at the tails of probability distributions (either high or low probabilities) is particularly difficult,
3. Even if projections are unbaised and probabilities are accurately estimated, some fish stocks will not be rebuilt by the end of the rebuilding period.
4. The available data is inadequate to conduct probabilistic projections for some stocks.

Thus, the SSC recommends that the Council consider ABC methods that are robust to the four points above. Such an approach could be derived from the guidance provided by the National standard guidelines' provision for a stock or stock complex that "… *has not rebuilt by* T_{max} [the end of the rebuilding period], *then the fishing mortality rate should be maintained at* $F_{rebuild}$ *or 75 percent of the MFMT* [maximum fishing mortality threshold; i.e., F_{MSY}], *whichever is less*" (NOAA 2009). Considering that seventeen of the twenty groundfish stocks are currently rebuilding, and many are not achieving the scheduled rebuilding, the SSC anticipates that the prescribed ABC specification will be applicable to many groundfish stocks.

The SSC concluded that in the absence of better information on what an appropriate buffer should be between the OFL and the ABC, a relatively simple ABC and robust specification could be applied to all groundfish stocks, in all stages of rebuilding or long-term maintenance of optimum yield. Given the guidance for specifying ABC as the lesser of $75\%F_{MSY}$ or $F_{rebuild}$, and the definition of optimum yield in the current Multispecies Fishery Management Plan as that associated with $75\%F_{MSY}$, the SSC recommends that the Council consider this ABC specification be applied to all groundfish stocks.

The recommended ABC specification requires the continuation of existing rebuilding plans and the development of new rebuilding plans (including determination of the optimal rebuilding period and

schedule of rebuilding) when 75%F_{MSY} does not allow rebuilding within the desired time period. The recommended ABC specification is intended to decrease the influence of biomass reference points and medium-term projections, both of which have considerable uncertainty (NEFSC 2008).

Management strategies based on 75%F_{MSY} have been evaluated for many worldwide fisheries, and consistently perform well for avoiding overfishing and producing nearly maximum long-term yield (Restrepo et al. 1998, Restrepo and Powers 1999). Specification of optimum yield is based on 75%F_{MSY} for several U.S. fishery resources (GOMFMC 2008, SAFMC 2008). The performance of the recommended ABC specification should be evaluated for each New England groundfish stock. Stock assessments that suffer from a consistent overestimation of biomass will be a challenge for any ABC specification, and rebuilding plans will need to be monitored frequently. For stocks that do not have accepted projection methods (e.g., wolffish, northern windowpane flounder), the SSC recommends that ABC be based on 75%$_{FMSY}$ (or its proxy) and the most recent estimate of exploitable biomass.

Stocks that have unknown stock status with respect to overfishing or overfished will have to be addressed on a case-by-case basis for interim ABC recommendations from the SSC. Unknown status can result from no accepted stock assessment method (e.g., Gulf of Maine winter flounder) or no accepted reference points. For example, the SSC reviewed the most recent stock assessment for Gulf of Maine winter flounder, and recommends a reduction in catch. The 2008 assessment reports states that "*While the Panel was unable to determine the stock's status relative to the BRPs, it agreed that the current trend in the population was very troubling. The Panel generally agreed that it is highly likely that biomass is below B_{MSY}, and that there is a substantial probability that it is below ½ B_{MSY}. The Panel noted that other stocks in the area of this mixed fishery were also at low levels.*" (NEFSC 2008). Therefore, the SSC recommends that an interim ABC for Gulf of Maine winter flounder be based on 75% of status quo catch (defined as average catch of 2005-2007),

The SSC was informed that the recommended ABC specification may impose procedural difficulties for the Council, because Amendment 16 options were developed using F_{MSY} or $F_{rebuild}$ projection scenarios that are somewhat different than the resulting ABC's for some stocks. However, in response to the SSC's terms of reference to provide guidance on new rebuilding programs and ABC specifications, the SSC concludes that these recommendations should be implemented as soon as possible.

SSC Recommendations:

1. **The target date for rebuilding for stocks recently classified as overfished (witch flounder, Georges Bank winter flounder, pollock, Atlantic wolffish, and northern windowpane flounder) should be 2017 based on the results of age-based projections and maximum net present value.**
2. **The Council should consider an Acceptable Biological Catch (ABC) specification that uses the same method for all stocks, similar to guidelines for stocks that have not rebuilt at the end of the required building period:**
    a. **ABC should be determined as the catch associated with 75% of F_{MSY}.**
    b. **If fishing at 75% of F_{MSY} does not achieve the mandated rebuilding requirements for overfished stocks, ABC should be determined as the catch associated with the fishing mortality that meets rebuilding requirements ($F_{rebuild}$).**

c. **For stocks that cannot rebuild to B_{MSY} in the specified rebuilding period, even with no fishing, the ABC should be based on incidental bycatch, including a reduction in bycatch rate (i.e., the proportion of the stock caught as bycatch).**
d. **Interim ABCs should be determined for stocks with unknown status according to case-by-case recommendations from the SSC.**

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NOAA FISHERIES NATIONAL MARINE FISHERIES SERVICE

Transboundary Resources Assessment Committee

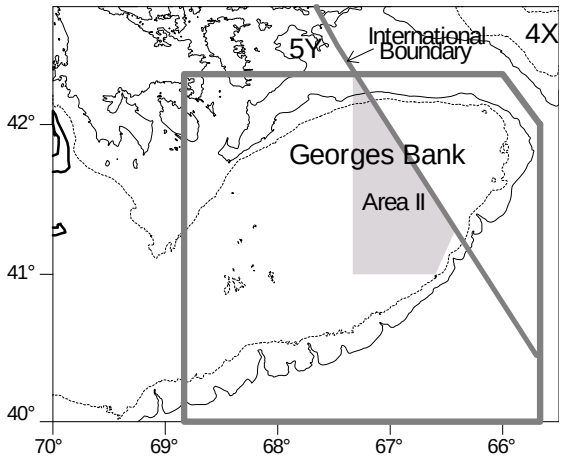
Status Report 2009/03

GEORGES BANK

YELLOWTAIL

FLOUNDER

[5Zhjmn; 522,525,551,552,561,562]



Summary

- Combined Canada and USA catches in 2008 were 1,275 mt.

- Adult biomass (Age 3+) increased from a low of 2,100 mt in 1995 to 11,000 mt in 2003, declined to 3,300 mt in 2006, and increased to 20,600 mt (Excluding the 2008/ 2009 DFO surveys) or 28,000 mt (Including the 2008/2009 DFO surveys) at the beginning of 2009, the highest adult biomass since 1973. Spawning stock biomass in 2008 was estimated to be 17,800 mt (Excluding the 2008/ 2009 DFO surveys) or 22,900 mt (Including the 2008/2009 DFO surveys).

- During 1998-2001 recruitment averaged 22.3 million fish at Age 1 but has since been below 20 million fish, with the exception of the above average 2005 year class estimated at 46.6 million, the strongest year class since the 1980 cohort.

- Fishing mortality for fully recruited ages 4+ was close to or above 1.0 between 1973 and 1995, fluctuated between 0.51 and 0.97 during 1996-2003, increased in 2004 to 1.85, and then declined to 0.09 (Excluding the 2008/2009 DFO surveys) or 0.08 (Including the 2008/2009 DFO surveys) in 2008, below the reference point of F_{ref} = 0.25.

- Assuming a catch in 2009 equal to the 2,100 mt total quota, a combined Canada/USA catch of about 5,000 mt (Excluding the 2008/2009 DFO surveys) or 7,000 mt (Including the 2008/2009 DFO surveys) in 2010 would result in a neutral risk (~50%) that the fishing mortality rate in 2010 will exceed F_{ref}. Fishing at F_{ref} in 2010 will generate a 3% increase in Age 3+ biomass from 21,400 mt in 2010 to 22,000 mt in 2011 (Excluding) or a 2% increase in Age 3+ biomass from 31,300 mt in 2010 to 31,700 mt in 2011 (Including).

Catches, Biomass (thousands mt); Recruits (millions)

		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Avg[1]	Min[1]	Max[1]
Canada	**Quota**	3.0	3.4	2.9	2.3	1.9	1.7	0.9	0.4	0.6	0.5			
	Landed	2.9	2.9	2.6	2.1	0.1	<0.1	<0.1	<0.1	<0.1		0.5	<0.1	2.9
	Discard	0.4	0.8	0.5	0.8	0.4	0.2	0.5	0.1	0.1		0.5	0.1	0.8
USA	**Quota**[2]					6.0	4.3	2.1	0.9	1.9	1.6			
	Catch[2]					5.9	3.8	1.9	1.0	1.6				
	Landed	3.4	3.6	2.5	3.2	5.8	3.2	1.2	1.1	0.7		4.6	0.4	15.9
	Discard	0.7	0.1	0.1	0.4	0.5	0.4	0.4	0.5	0.4		0.6	<0.1	3.0
Total	**Quota**[3]					7.9	6.0	3.0	1.3	2.5	2.1			
	Catch[3,4]					6.4	4.1	2.5	1.1	1.7				
	Catch	7.3	7.4	5.7	6.6	6.8	3.9	2.1	1.7	1.3		6.3	1.1	17.2
Excluding DFO 2008/2009 survey														
	Adult Biomass[5]	10.2	10.4	9.2	11.0	8.7	4.3	3.3	5.8	15.2	20.6	8.0[6]	2.0[6]	26.2[6]
	SSB	10.3	9.3	10.2	10.2	5.7	3.7	4.4	10.0	17.8		7.6	2.2	22.2
	Age 1 Recruits	19.8	22.3	15.4	11.3	8.9	19.6	46.6	20.1	2.8		22.4	2.8	70.6
	Fishing mortality[7]	0.96	0.97	0.65	0.60	1.85	1.25	1.06	0.41	0.09		1.02	0.09	1.85
	Exploitation Rate[7]	57%	57%	44%	41%	79%	66%	60%	31%	8%		59%	8%	79%
Including DFO 2008/2009 survey														
	Adult Biomass[5]	10.2	10.4	9.2	11.0	8.7	4.4	3.4	6.3	18.4	28.0	8.3[6]	2.0[6]	28.0[6]
	SSB	10.3	9.3	10.2	10.2	5.7	3.8	4.7	11.7	22.9		7.8	2.2	22.9
	Age 1 Recruits	19.8	22.3	15.4	11.4	9.2	21.3	58.1	35.6	9.5		23.4	6.6	70.6
	Fishing mortality[7]	0.96	0.97	0.65	0.60	1.84	1.23	1.01	0.38	0.08		1.01	0.08	1.84
	Exploitation Rate[7]	57%	57%	44%	41%	79%	66%	59%	29%	7%		59%	7%	79%

[1]1973 – 2008
[2]for fishing year May 1 – April 30
[3]for Canadian calendar year and USA fishing year May 1 – April 30
[4]sum of Canadian Landed, Canadian Discard, and USA Catch (includes discards)
[5]Jan-1 Age 3+
[6]1973 - 2009
[7]Age 4+ for calendar year

Fishery

Total catches of Georges Bank yellowtail flounder peaked at about 21,000 mt in both 1969 and 1970. Prior to the mid-1990s, the USA fishery accounted for most of the annual catches. The combined Canada/USA catch increased from 1995 through 2001, averaged 6,300 mt during 2002-2004, but declined to 1,275 mt in 2008 (Figure 1) due to restrictive management measures.

The 2008 **Canadian catch** of 158 mt was well below the Canadian quota of 550 mt, with landings of only 41 mt and estimated discards of 117 mt. Since there was no directed Canadian fishery for yellowtail in 2008, landings were incidental to cod and haddock fishing. Discards were due to the sea scallop dredge fishery.

USA catches in 2008 were 1,118 mt, with landings of 748 mt and discards of 370 mt. The USA landings in 2008 were predominantly from the trawl fishery while discards came from both the trawl and scallop dredge fisheries. Preliminary estimates of the USA catches for fishing year 2008-2009 were 83% of the 1,950 mt quota.

Ages 2-4 accounted for most of the **combined Canada/USA fishery** catch in 2008 by number, with few Age 1 fish caught due to mesh regulations. Both the Canadian and particularly the USA fisheries were well sampled to determine length composition of the catch.

Harvest Strategy and Reference Points

The Transboundary Management Guidance Committee has adopted a strategy to maintain a low to neutral risk of exceeding the fishing mortality limit reference, $F_{ref} = 0.25$. When stock conditions are poor, fishing mortality rates should be further reduced to promote rebuilding.

State of Resource

The state of the resource was based on survey observations and the range of results from plausible age structured analytical assessments (Virtual Population Analysis, VPA) that used fishery catch statistics and sampling for size and age composition of the catch for 1973 to 2008. The VPAs were calibrated to trends in abundance from three bottom trawl survey series (NMFS spring, NMFS fall and DFO) and a recruitment index from the NMFS summer sea scallop survey. Two VPA formulations were examined based on recommendations from the 2005 benchmark assessment review: 1) Base Case, the same formulation as used in the 2004 assessment, and 2) Major Change. Splitting each of the survey time series into two sets (i.e., 1973-1994 and 1995-2008) is the only difference between the Base Case and the Major Change VPAs. The Base Case formulation has not been used for management advice for the past few years due to a strong retrospective pattern and a lack of fit to recent indices. The Base Case formulation was examined this year and since it continues to show a strong retrospective pattern, it was not considered adequate for management advice, and only the Major Change formulation is presented here.

There is more uncertainty in this assessment than previous assessments due to the survey data. Specifically, the NMFS spring 2009 survey was conducted with a new vessel and net which does not have conversion coefficients available yet to allow its inclusion in the time series. Additionally, the 2008 and 2009 DFO surveys encountered individual tows that were much larger than any seen previously in the time series (7.5 mt in 2008 and 5.2 mt in 2009) and have a strong influence on the estimates for those years (Figure 2). The uncertainty associated with these values also approximately doubled. 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: "Excluding", which does not include the DFO 2008 or 2009 indices in the fitting process, and "Including", which includes the indices with the same weight as all the other observations in the time series. Preliminary investigations confirmed that down-weighting the DFO survey indices gave results between the "Including" and "Excluding" runs.

Adult population biomass (Age 3+) increased from a low of 2,100 mt in 1995 to 11,000 mt in 2003, declined to about 3,300 mt in 2006, and increased to 20,600 mt (Excluding) or 28,000 mt (Including) at the beginning of 2009, the highest adult biomass since 1973 (Figure 3). Spawning stock biomass in 2008 was estimated to be 17,800 mt (80% Confidence Interval: 14,000-27,300 mt) for the "Excluding" run or 22,900 mt (80% Confidence Interval: 18,700-29,000 mt) for the "Including" run (Figure 4).

During 1998-2001 **recruitment** averaged 22.3 million fish at Age 1 but has since been below 20 million fish, with the exception of the above average 2005 year class estimated at 46.6 million (Excluding) or 58.1 million (Including), the strongest year class since the 1980 cohort (Figure 4). The 2006 year class is about average while the 2007 year class is estimated to be one of the lowest in the time series at 2.8 million (Excluding) or 9.5 million (Including), although this estimate is uncertain.

Fishing mortality for fully recruited ages 4+ was close to or above 1.0 between 1973 and 1995, fluctuated between 0.51 and 0.97 during 1996-2003, increased in 2004 to 1.85, and then declined to 0.41 (Excluding) or 0.38 (Including) in 2007 and 0.09 (Excluding) (80% Confidence Interval: 0.07-0.13) or 0.08 (Including) (80% Confidence Interval: 0.07-0.11) in 2008, below the reference point of $F_{ref} = 0.25$ (Figure 1).

Productivity

Age structure, spatial distribution, and fish growth reflect changes in the productive potential. In both absolute numbers and percent composition, the **population age structure** estimated by the VPA displays a truncated pattern with few old fish. **Spatial distribution patterns** in recent surveys are confounded by the influence of large tows. Truncated age structure in the bottom trawl surveys and changes in distribution indicate current resource productivity is lower than historical levels.

Outlook

This outlook is provided in terms of consequences with respect to the harvest reference points for alternative catch quotas in 2010. Uncertainty about current biomass generates uncertainty in forecast results, which is expressed here as the risk of exceeding $F_{ref} = 0.25$. The risk calculations assist in evaluating the consequences of alternative catch quotas by providing a general measure of the uncertainties. However, they are dependent on the data and model assumptions and do not include uncertainty due to variations in weight at age, partial recruitment to the fishery, natural mortality, systematic errors in data reporting or the possibility that the model may not reflect stock dynamics closely enough.

Due to changes in fishery partial recruitment patterns over time and increasing trends in both survey and fishery weights at age, average values from 2006-2008 were used in the projections. Assuming a catch in 2009 equal to the 2,100 mt total quota, a combined Canada/USA catch of about 5,000 mt (Excluding) or 7,000 mt (Including) in 2010 would result in a neutral risk (~50%) that the fishing mortality rate in 2010 will exceed F_{ref} (Figure 5). Fishing at F_{ref} in 2010 will generate a 3% increase in Age 3+ biomass from 21,400 mt in 2010 to 22,000 mt in 2011 (Excluding) or a 2% increase in Age 3+ biomass from 31,300 mt in 2010 to 31,700 mt in 2011 (Including). The 2005 year class is expected to account for 58-59% of the 2009 catch, 47-51% of the 2010 catch, and 40-44% of the 2010 Age 3+ biomass.

In the USA, there is a requirement to provide rebuilding projections when stocks are overfished. The rebuilding scenario for Georges Bank yellowtail flounder requires solving for a value of F (F_{reb75}) that, when applied in years 2010-2014, results in a 75% probability that SSB in 2014 is greater than SSB_{msy} (43,200 mt). Using the same starting conditions as the projection described above, the F_{reb75} was found through iterative search to be 0.02 (Excluding) or 0.085 (Including),

resulting in a median 2010 catch of 450 mt (Excluding) or 2,600 mt (Including), well below the F_{ref} projection described above. An alternative interpretation of the rebuilding requirements is to continue to project the F_{reb75} found last year according the method described above, which was 0.107. Fishing at F=0.107 in years 2010-2014 results in a median catch of 2,300 mt (Excluding) or 3,300 mt (Including) in 2010, but only a 52% (Excluding) or 69% (Including) probability of SSB_{2014} being greater than the rebuilding target of 43,200 mt.

Special Considerations

In the past, realized fishing mortality rates have been higher than the target F used to set the annual quotas. For example in 2005, a catch of 2,100 mt in 2006 was projected to produce a fishing mortality well below 0.25 using the Base Case model and 0.25 using the Major Change model. The realized 2006 fishing mortality was about 1 according to the current Major Change model. However, in more recent years the realized Fs are closer to the projected values. The 2007 TRAC Status Report used the Major Change model to project that a catch of 3,500 mt in 2008 would have a neutral risk of exceeding Fref=0.25. The observed 2008 catch of 1,275 mt is now estimated to have generated an F in 2008 of 0.09 (Excluding) or 0.08 (Including). The adult (Age 3+) biomass was projected to be 21,400 mt in 2008 and 24,900 mt in 2009, which are greater than the current estimates from the "Excluding" run of 15,200 mt in 2008 and 20,600 mt in 2009 but similar to the estimates from the "Including" run of 18,400 mt in 2008 and 28,000 mt in 2009.

Although the Major Change VPA is recommended for management decisions, the mechanisms for the large changes in survey catchability are not easily explained. These changes in survey catchability are most appropriately thought of as an aliasing of an unknown mechanism that produces a better fitting model. The inability to plausibly explain these survey catchability changes causes increased uncertainty in this assessment relative to other assessments. However, the Major Change VPA results more closely reflect the recent trend in abundance observed in all three surveys than the Base Case VPA, and the Major Change model is the preferred model from which to make management decisions. The Base Case model formulation will not be carried forward in 2010.

Source Documents

Legault, C.M., L. Alade, and K.J. Clark. 2009. Stock Assessment of Georges Bank Yellowtail Flounder for 2009. TRAC Reference Document 2009/03.

Legault, C., L. Alade, H. Stone, S. Gavaris, and C. Waters. 2008. Georges Bank Yellowtail Flounder. *In* Northeast Fisheries Science Center. 2008. Assessment of 19 Northeast Groundfish Stocks Through 2007: A Report of the 3rd Groundfish Assessment Review Meeting (GARM III), Northeast Fisheries Science Center, Woods Hole, Massachusetts, August 4-8, 2008. Northeast Fisheries Science Center Reference Document 08-15. [available at http://www.nefsc.noaa.gov/nefsc/publications/crd/crd0815/]

TRAC. 2005. S. Gavaris, R. O'Boyle, and W. Overholtz, editors. Proceedings of the Transboundary Resources Assessment Committee (TRAC): Benchmark Review of Stock Assessment Models for the Georges Bank Yellowtail Flounder Stock; 25 – 26 January 2005 and 26 – 29 April 2005. TRAC Proceedings 2005/01: 65p.

TRAC. 2008. T. Worcester and L. O'Brien, editors. Proceedings of the Transboundary Resources Assessment Committee (TRAC); 24–26 June and 12-13 August 2008. TRAC Proceedings 2008/01.

Correct Citation

TRAC. 2009. Georges Bank Yellowtail Flounder. TRAC Status Report 2009/03.

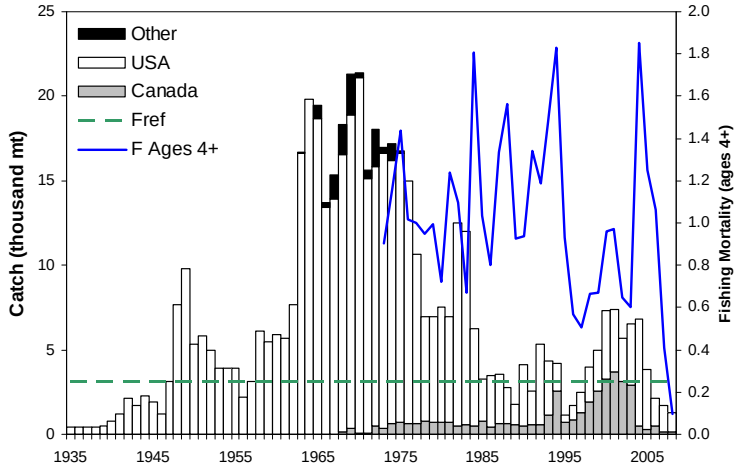


Figure 1. Catches and fishing mortality. Note the two F lines are not distinguishable on this plot.)

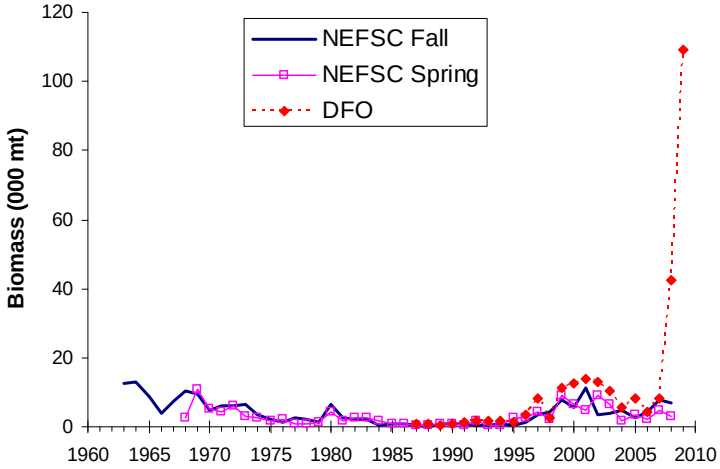


Figure 2. Survey biomass indices (minimum swept area).

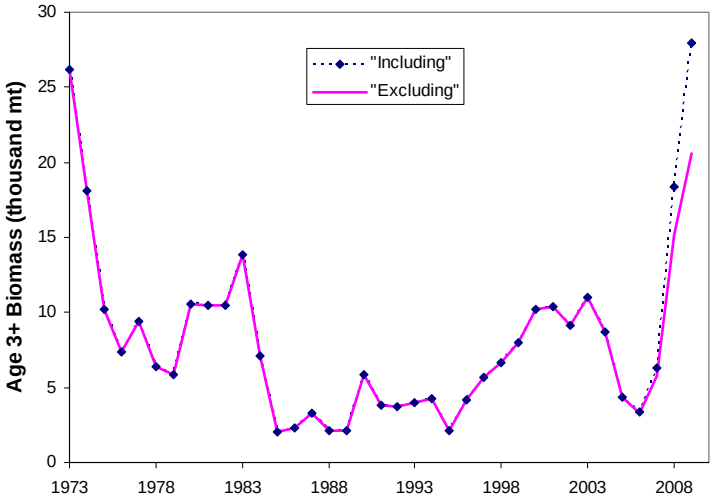


Figure 3. Ages 3+ biomasses.

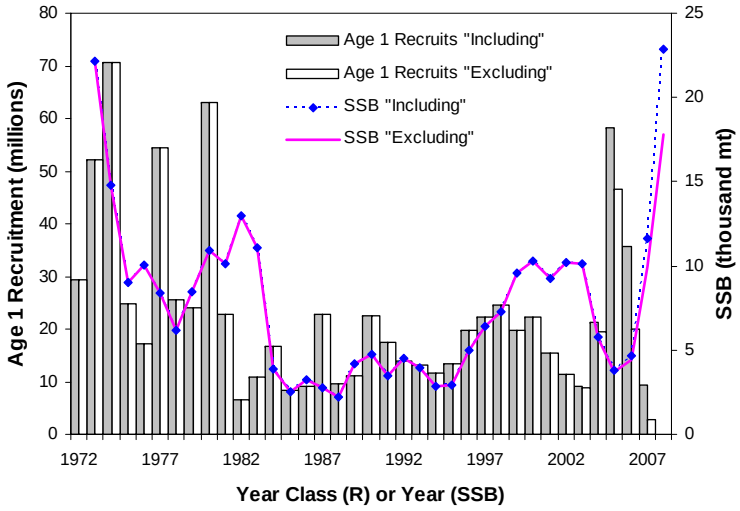


Figure 4. Recruitment and spawning stock biomass.

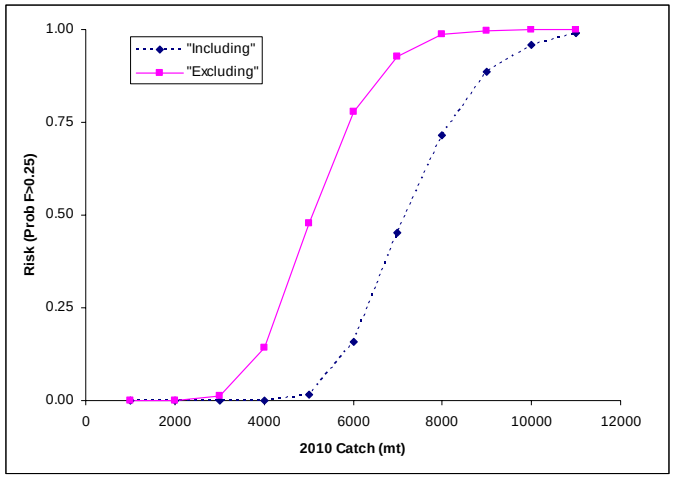


Figure 5. Risk of F exceeding F_{ref}=0.25 for a range of 2010 catch.

Enclosure (3)
Groundfish PDT ABC Worksheet
Stocks With Projections

Species	Stock	F_{msy}	Actual 2008 catch	Projected 2009 catch	2010 catch	2011 catch	2012 catch	msy	50 year catch	% 75Fmsy/msy	2008 F from 2008 catch	2009 F from 2008 catch and CAM	$F_{rebuild}$	75% of FMSY
Cod	**GB**	0.2466	5,134	4,539	4,812	5,616	6,214	31,159	29,483	95%	0.304	0.222	0.186	0.185
Cod	**GOM**	0.237	8,499	11,253	8,530	9,012	9,018	10,014	9,255	92%	0.319	0.263	0.275	0.178
Haddock[1]	**GB**	0.35	20,901	14,806	64,653	48,281	40,914	32,746	31,123	95%	0.064	0.050	n/a	0.263
Haddock[2]	**GB**	0.35	20,901	25,000	62,515	46,784	39,846	32,746	31,123	95%	0.064	0.086	n/a	0.263
Haddock	**GOM**	0.43	1,197	962	1,265	1,206	1,013	1,360	1,282	94%	0.320	0.261	n/a	0.323
Yellowtail Flounder[3]	**GB**	0.254		2,100	2,647	2,940	3,159	9,400	8,203	87%		0.086	0.086	0.191
Yellowtail Flounder[4]	**GB**	0.254		2,100	406	477	555	9,400	8,217	87%		0.113	0.018	0.191
Yellowtail Flounder	**SNE/MA**	0.254	504	366	493	687	1,003	6,100	5,584	92%	0.115	0.070	0.075	0.191
Yellowtail Flounder	**CC/GOM**	0.239	727	571	863	1,041	1,159	1,720	1,559	91%	0.256	0.149	0.238	0.179
American Plaice	**GB/GOM**	0.19	1,348	1,578	3,156	3,444	3,632	4,011	3,638	91%	0.107	0.090	0.22	0.143
Witch Flounder		0.2	1,063	1,073	944	1,369	1,639	2,352	2,173	92%	0.276	0.231	0.159	0.150
Winter Flounder	**GB**	0.26	963	1,213	2,052	2,224	2,543	3,500	3,219	92%	0.178	0.155	0.207	0.195
Winter Flounder	**GOM**	0.283	402	410	339	439	527	917	853	93%	0.390	0.324	n/a	0.212
Winter Flounder	**SNE/MA**	0.248	1,432	623	0	0	0	9,742	8,864	91%	0.335	0.124	0	0.186
Winter Flounder	**SNE/MA**	0.248	1,432	623	218	321	458	9,742	8,864	91%	0.335	0.124	0	0.186
Winter Flounder	**SNE/MA**	0.248	1,432	623	644	897	1,198	9,742	8,864	91%	0.335	0.124	0	0.186
Redfish		0.038	1,364	1,393	7,586	8,356	9,224	10,139	9,160	90%	0.007	0.006	n/a	0.029
White Hake	**GB/GOM**	0.125	1,876	1,881	2,832	3,295	3,638	5,800	4,799	83%	0.084	0.068	0.084	0.094
Pollock[5]	**GB/GOM**	5.66	11,370	6,057	2,097	2,527	3,043	11,320	2,268,539		16.526	13.425	3.86	4.245
Pollock[6]	**GB/GOM**	5.66	11,370	6,784	3,101	3,578	4,128	11,320			13.099	10.641	4.217	4.245

Enclosure (3)
Groundfish PDT ABC Worksheet
Stocks With Projections

Notes:
1. Uses CAM results to estimate 2009 catch.
2. Assumes 25,000 mt catch in 2009.
3. Basis of projection is VPA that includes 2008 and 2009 Canadian survey (“including”).
4. Basis of projection is VPA that excludes 2008 and 2009 Canadian survey (‘excluding”).
5. Projection uses minimum fall survey index observed as assumption for 2009.
6. Projection uses two-year average fall survey index as assumption for 2009.

Enclosure (3)
Groundfish PDT ABC Worksheet
Stocks Without Projections

Stock	2006	2007	2008	average	Fmsy	75%Fmsy	(average index * 75%Fmsy)
N windowpane (Fall)	0.660	0.242	0.447	0.450	0.500	0.375	169
S windowpane (Fall)	0.262	0.191	0.193	0.215	1.470	1.103	237
Ocean pout (spring)	0.526	0.477	0.422	0.475	0.760	0.570	271
Pollock (Fall)	0.959	0.754	0.982	0.898	5.660	4.245	3,813

GOM Winter Flounder	
Year	Catch
2006	247
2007	303
2008	402
avg	317
75%catch	238

Enclosure (3)
Groundfish PDT ABC Worksheet
2008 Catch

Stock	Actual 2008 Catch[1] Landings	Commercial discards[2]	Recreational Landings or Harvest	Rec. discards[2]	Canada	Total 2008 Catch	2008 PDT Estimate[3]	Difference
GB Cod	3,207	366	32		1,529	5,134	***6,657***	30%
GB Haddock	5,744	343			14,814	20,901	***25,726***	23%
GB Yellowtail(1)	748	370			158	1,276	***1,737***	36%
SNE/MA Yellowtail	354	150				504	***525***	4%
CC/GOM Yellowtail	566	161				727	***811***	12%
GOM Cod	5,439	1,356	1,704			8,499	8,028	-6%
Witch Flounder	1,005	58				1,063	***1,129***	6%
Plaice	1,106	242				1,348	1,258	-7%
GOM Winter Flounder	284	12	104	3		402	334	-17%
SNE/MA Winter Flounder	1,247	109	73	3		1,432	1,165	-19%
GB Winter Flounder	824	139				963	722	-25%
White Hake	1,876					1,876	1,461	-22%
Pollock	9,964		912		493	11,370	10,675	-6%
Redfish	1,190	174				1,364	***1,624***	19%
GOM Haddock	575	11	611			1,197	960	-20%
Ocean pout	7	118				125	NA	
Northern window	34	316				350	NA	
Southern window	87	276				363	NA	

Notes:
1. Actual 2008 catch as calculated by NEFSC in July 2009. These numbers are preliminary until incorporated into an assessment.
2. For winter flounder stocks, discards are after application of a 50 percent mortality rate.
3. Values shown in bold italics are instances where PDT estimate exceeded actual catch.

Enclosure (4)

Groundfish Plan Development Team
Recommended ABCs for 2010 - 2012

Species	Stock	Basis for ABC	Actual 2008 catch	2010 ABC	2011 ABC	2012 ABC	msy
Cod [1]	**GB**	75%FMSY	5,134	4,812	5,616	6,214	31,159
Cod	**GOM**	75%FMSY	8,499	8,530	9,012	9,018	10,014
Haddock [1]	**GB**	75%FMSY	20,901	62,515	46,784	39,846	32,746
Haddock	**GOM**	75%FMSY	1,197	1,265	1,206	1,013	1,360
Yellowtail Flounder [1, 2]	**GB**	Frebuild	1,276	1,500 – 2,100	1,689 - 2,379	1,916 – 2,600	9,400
Yellowtail Flounder	**SNE/MA**	Frebuild	504	493	687	1,003	6,100
Yellowtail Flounder	**CC/GOM**	75%FMSY	727	863	1,041	1,159	1,720
American Plaice	**GB/GOM**	75%FMSY	1,348	3,156	3,444	3,632	4,011
Witch Flounder		75%FMSY	1,063	944	1,369	1,639	2,352
Winter Flounder	**GB**	75%FMSY	963	2,052	2,224	2,543	3,500
Winter Flounder	**GOM**	75% Avg. Catch	402	238	238	238	917
Winter Flounder	**SNE/MA**	See text	1,432	644	897	1,198	9,742
Redfish		75%FMSY	1,364	7,586	8,356	9,224	10,139
White Hake	**GB/GOM**	Frebuild	1,876	2,832	3,295	3,638	5,800
Pollock [1, 3]	**GB/GOM**	Frebuild	11,370	2,097	2,527	3,043	11,320
Windowpane	**GOM/GB**	75% FMSY	350	169	169	169	700
Windowpane	**SNE/MA**	75% FMSY	363	237	237	237	500
Ocean Pout		75% FMSY	125	271	271	271	3,754
Atlantic Halibut [1, 4]		Frebuild	84				3,500
Atlantic Wolffish[5]							278 - 311

Notes:

1. All ABCs are for entire stock as assessed by U.S. These values include U.S. and Canadian catch.
2. PDT recommends 2011 and 2012 ABC be revisited when TRAC results available in future years.
3. Based on index-projection. See PDT memo for comments.
4. Will be provided at SSC meeting.
5. No specific PDT recommendation. See PDT memo for range of possible catches.