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

MEMORANDUM

DATE: August 6, 2010

TO: Science and Statistical Committee

FROM: Groundfish Plan Development Team (PDT)

SUBJECT: **Multispecies Acceptable Biological Catches (ABCs) for 2011 - 2014**

1. The attached documents are provided to support the SSC of ABCs for pollock, ocean pout, northern windowpane flounder, southern windowpane flounder, and GB yellowtail flounder. In all instances the ABCs are calculated consistent with the ABC control rules adopted in Amendment 16 and the terms of reference for the SSC.

Attachments:

(1) Pollock

(2) GOM winter flounder

(3) GB yellowtail flounder

(4) Index-based stocks

Attachment 1
Pollock

1. Pollock projections are based on the assessment completed in SAW-50 (June, 2010). The stock was determined to be not overfished and overfishing was not occurring. This is a change in stock status: the previous assessment (using an index-based method, AIM) concluded the stock was overfished and overfishing was occurring in 2007. All projection assumptions for biological parameters are those agreed-upon at the review panel meeting. To place the following catch levels in context, total pollock catches ranged from 4,300 mt to 9,300 mt between 1994 and 2007, increased to 12,200 mt in 2008, and declined back to 8,735 mt in 2009.

The previous pollock assessment was an index-based assessment. OFLs and ABCs were set based on the proxy for 75 percent of F_{MSY} applied to the most recent estimate of biomass. The OFL and ABC values are provided in Table 1. NMFS modified the OFL and ABC for 2010 based on the assessment completed at SAW- 50; the OFL adopted by an emergency action is 25,200 mt and the ABC is 19,800 mt.

Table 1 – Pollock OFL and ABC established by FW 44 to the Northeast Multispecies FMP (2009)

	Year	OFL (mt)	ABC (mt)
Pollock	2010	5,085	3,293
	2011	5,085	3,293
	2012	5,085	3,293

2. ABC control rules for multispecies stocks are specified in Amendment 16. For a stock like pollock that is not overfished, the control rule read as follows:

> "These ABC control rules will be used in the absence of better information that may allow a more explicit determination of scientific uncertainty for a stock or stocks. If such information is available – that is, if scientific uncertainty can be characterized in a more accurate fashion -- it can be used by the SSC to determine ABCs. These ABC control rules can be modified in a future Council action (an amendment, framework, or specification package):
>
> a. ABC should be determined as the catch associated with 75% of FMSY."

This report provides candidate ABCs calculated at 75 percent of F_{MSY} as well as at the risk levels specified by the Council in the terms of reference. OFLs and ABCs are needed for 2011 – 2014.

3. Since the ABC is being calculated for 2011 and beyond and the terminal year of the assessment is 2009, an assumption must be made for the catch in 2010 (the "bridge" year). In the past, the PDT has estimated annual catch for the bridge year using at least six or seven months of preliminary landings data. These landings were expanded to the full year based on the proportion of landings that occurred during the six or seven month period in previous years. This approach is not possible this year for two reasons. First, the preliminary landings data has not been published by NERO. Second, the implementation of sectors on May 1, 2010, creates doubt over whether past temporal landings patterns will persist.

The PDT examined the sensitivity of the 2011 ABC to the 2010 catch assumption. As shown in Figure 1 and Table 2, the 2011 catch at 75 percent of F_{MSY} is not very sensitive to the 2010 catch assumption. Catching only half the ABC in 2010 increases the 2011 catch by only 9 percent, and increases the 2011 SSB_{MSY} by only 7 percent. Given the insensitivity of the projection to the 2010 catch assumption, the PDT used the catch at 75 percent of F_{MSY} for 2010 (19,839 mt) for the short term projections. This is a conservative assumption by the PDT as pollock catches have not exceeded 12,200 mt since 1989.

Figure 1 – Pollock projection sensitivity to 2010 catch assumption.

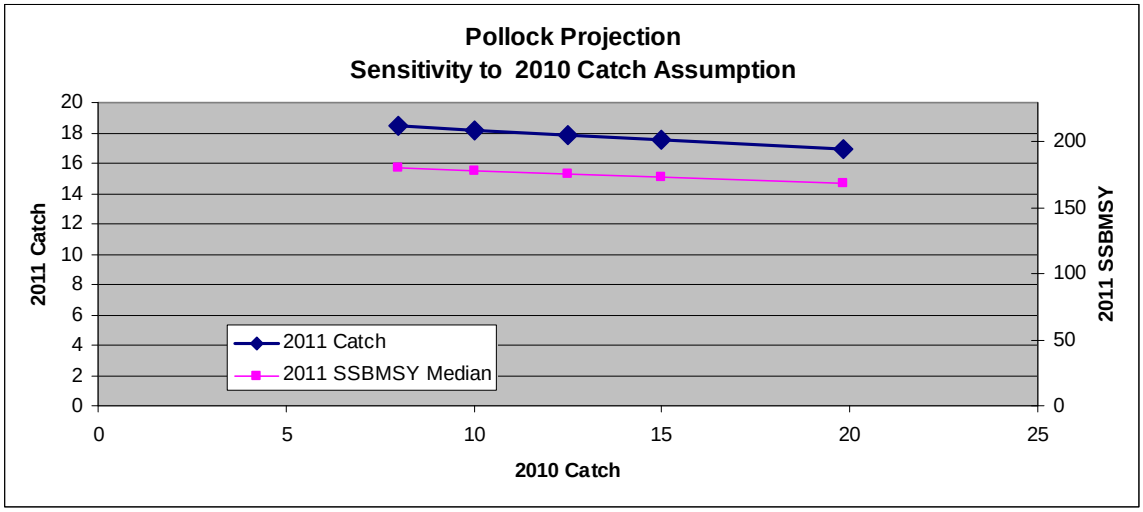


Table 2 – Pollock projection sensitivity to 2010 catch assumption

2010 F	2010 Catch (K mt)	% Change from 19.8K mt	2011 Catch at 75% FMSY	% Change from 16.9K mt	2011 SSBMSY	% change from 168.273
0.31	19.839		16.914		168.273	
0.23	15	-24.4%	17.525	3.7%	173.118	2.9%
0.19	12.5	-37.0%	17.841	5.5%	175.58	4.3%
	10	-49.6%	18.162	7.4%	178.045	5.8%
0.119	8	-59.7%	18.419	9.0%	180.02	7.0%

4. The following table summarizes the OFL and ABC for pollock for 2011, 2012, 2013, and 2014 for fishing at 75% of F_{MSY} in each year. The following process was used to calculate these values:

a) The median catch at 75 percent of F_{MSY} was calculated for the 2011 ABC and at F_{MSY} for the 2011 OFL.
b) The projection was re-run with catch at the control rule F as an input and F_{MSY} as the input for 2012 to get the 2012 OFL, and with 75 percent of F_{MSY} as the input to get the ABC for 2012.
c) The process was repeated for subsequent years.

Table 3 – OFL and ABC using fishing mortality of 75% of F_{MSY}

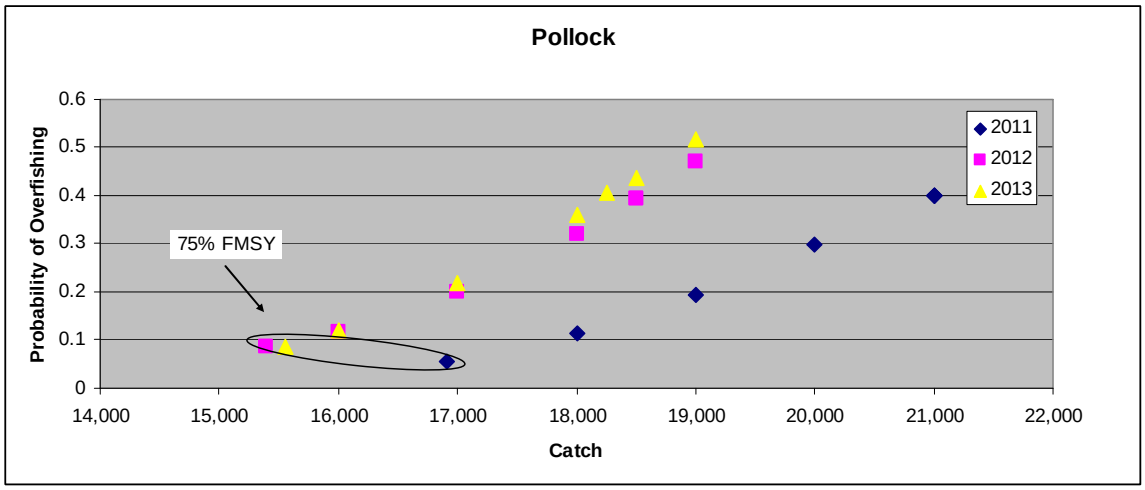
Year	OFL	ABC	Probability of Overfishing at Catch=ABC	Probability of Stock Exceeding SSB_{MSY}	SSB_{MSY} (median)
2011	21.853	16.914	0.054	1	168.366
2012	19.887	15.393	0.073	0.999	151.337
2013	20.060	15.554	0.087	0.991	139.977
2014	20.554	15.970	0.097	0.978	132.814

5. The PDT examined the change in the probability of overfishing as the catch differs from the catch at the control rule. Results are shown in Table 4 and
Figure 2. The three marker colors correspond to years 2011 through 2013. The calculations assume that the higher catch is caught in each year, so at higher catches the results suggest the OFL would have to be recalculated in each year. These results only consider the uncertainty in recruitment and initial starting conditions for the projection and do not reflect other sources of uncertainty. The probability that the stock will be overfished in the short-term is near 0.

Table 4 – Probability of overfishing at different catch levels. Each row is a time series of catches.

2011		2012		2013	
Catch	Prob	Catch	Prob	Catch	Prob
16914	0.054	15393	0.087	15554	0.087
18000	0.115	16000	0.118	16000	0.119
19000	0.193	17000	0.2	17000	0.219
20000	0.299	18000	0.32	18000	0.361
21000	0.401	18500	0.395	18250	0.407
21000	0.401	18500	0.395	18500	0.438
21000	0.401	19000	0.47	19000	0.516

Figure 2 – Probability of overfishing pollock at various catch levels



6. The Council asked the SSC to provide ABCs at two different risk levels: approximately a ten percent risk of overfishing, and approximately a 40 percent risk of overfishing. Results are shown in Table 5. These results are based on the stochastic projection output, which does not account for all sources of scientific uncertainty.

Table 5 – Pollock OFL and ABC at two different risk levels

Year	OFL	ABC	Median Fishing Mortality at ABC	Probability of Overfishing at ABC
Scenario 1 – Approximately 10 percent Probability of Overfishing				
2011	21.853	17.600	0.324	0.094
2012	19.780	15.750	0.320	0.098
2013	19.907	15.750	0.317	0.109
2014	20.388	15.750	0.308	0.094
2015	20.822	16.000	0.306	0.092
Scenario 2 – Approximately 40 percent Probability of Overfishing				
2011	21.853	21.000	0.392	0.401
2012	19.252	18.500	0.392	0.395
2013	18.973	18.250	0.393	0.407
2014	19.130	18.100	0.385	0.397
2015	19.279	18.250	0.385	0.395

7. One source of uncertainty in the assessment highlighted by assessment reviewers is the selectivity in the survey and the fishery: "The ASAP model with dome-shaped survey and fishery selectivity implies the existence of a large biomass (35 – 70% of total) (i.e. cryptic biomass) that neither current surveys nor the fishery can confirm" (NEFSC 2010). Further the review panel advised "The projections of stock biomass are appropriate if the survey and fishery selectivity assumptions are true. However, density dependent influences on recruitment could become an issue if flat-topped survey selectivity is true but a domed selectivity was used to undertake the projections…The Panel recommends that it would be useful when making stock projections to more explicitly formulate the consequences to the pollock stock of different model assumptions in a decision table similar to that employed in risk assessment." (O'Boyle, pers. comm.)

8. At the assessment meeting a sensitivity run was performed that assumed flat-topped selectivity in the survey, but continues to use dome-shaped selectivity in the fishery. This reduces current stock size estimates by about 30 percent. The PDT used this model formulation to examine the impact of the selectivity assumption on the probability of overfishing and the probability of being overfished. *It is important to note this is not the model formulation accepted by the review panel.* Nor does this model account for all elements of model uncertainty; for example, it does not incorporate flat-topped selectivity in the fishery. But it does provide some indication of the effects of the dome-shaped selectivity pattern on catches and future stock size.

9. When evaluating the consequences of different model assumptions, an important issue is how long an incorrect assumption would guide catch advice before an error was detected and could be corrected. Presumably this would not occur until the next benchmark assessment for the stock. While the next pollock assessment has not been scheduled, it is reasonable to assume that it will not be conducted until at least 2015. The following sensitivity analyses assume an incorrect assumption on model structure guides catch advice through 2015 and then is corrected.

10. Another issue is what metric to use for determining if the stock is overfished and if overfishing is occurring under a particular model formulation. The two different formulations

produce different estimates of F_{MSY} and SSB_{MSY}. The value of F_{MSY} for the flat-topped formulation, at F=0.39, is lower than the F_{MSY} =0.41 of the accepted model, and SSB_{MSY} is reduced to 58K mt. The following tables indicate the metric used. "Dome SSB_{MSY}" refers to the value estimated by the approved assessment model, or 91K mt. "Flat $SSSB_{MSY}$" refers to the value estimated by the flat-topped survey selectivity formulation, or 58K mt.

11. The sensitivity runs used the median catch at 75% of F_{MSY} (catches shown in Table 3 extended one year to 2015) and the catch streams in Table 5 in a projection based on the flat-topped survey selectivity assessment. Results are summarized in Table 6. The results indicate that overfishing is likely to occur, but the stock is not likely to be overfished during the period 2011 – 2015 when compared to the SSB_{MSY} estimate from the flat-topped survey selectivity assessment.

12. Given these results, the PDT further examined catches that would result if the status of the stock is as estimated from this (rejected) assessment model. A projection was run at F_{MSY} (F=0.39) to determine the overfishing level for this model. This is referred to as Scenario 3 in subsequent tables.

13. The results can be summarized in a table that compares the risk of overfishing and being overfished between 2011 -2015 under the different catch scenarios. While O'Boyle (2010, pers. comm.) suggests there are four possible scenarios to consider, when applied to the risks associated with a catch stream the results collapse into two possibilities for the model formulations examined. This is because the model formulations are mutually exclusive. Either the dome shaped selectivity is correct (true), or it is incorrect (false) and the flat-topped selectivity model more accurately represents stock status. Table 8 summarizes the risks for the two model formulations. The table is somewhat misleading because this evaluation of risk does not consider the likelihood a particular model is correct. The table implies the two models are equally probable. Clearly this is not the case since only one model was accepted by reviewers.

If the dome shaped selectivity is true, there is little risk of overfishing or being overfished through 2015 under any of the catch scenarios. If the dome is false, all of the catch scenarios are likely to result in overfishing. Scenario 2 has a high probability of reducing the stock below 45K mt (1/2 dome SSB_{MSY}) and a medium probability of reducing the stock below 29K mt (1/2 flat SSB_{MSY}). The other three catch scenarios have a low to medium risk of the stock being less than 45K mt by 2015, but a low risk of the stock being less than 29K mt by 2015.

Table 6 – Results of sensitivity projection assuming flat-topped survey selectivity and Table 3 or Table 5 catches

Year	Catch	Median F	Median SSB_{MSY}	Prob. $F>F_{MSY}(0.39)$	Prob. SSB > ½ Dome SSB_{MSY}	Prob. SSB > ½ Flat SSB_{MSY}
75% of F_{MSY} (Dome)						
2011	16.914	0.595	70.052	0.978	0.974	0.995
2012	15.393	0.641	61.090	0.981	0.880	0.993
2013	15.554	0.668	55.796	0.985	0.781	0.981
2014	15.970	0.701	51.703	0.978	0.678	0.949
2015	16.266	0.780	47.460	0.981	0.553	0.895
Scenario 1 – Approximately 10 percent Probability of Overfishing (From Dome)						
2011	17.600	0.624	70.061	0.991	0.979	0.994
2012	15.750	0.669	60.426	0.994	0.877	0.993
2013	15.750	0.695	54.807	0.993	0.768	0.978
2014	15.750	0.709	50.582	0.978	0.652	0.939
2015	16.000	0.782	46.615	0.980	0.532	0.884
Scenario 2 – Approximately 40 percent Probability of Overfishing (From Dome)						
2011	21.000	0.765	70.650	1	0.995	0.954
2012	18.500	0.869	57.801	1	0.852	0.954
2013	18.250	0.972	49.782	1	0.652	0.928
2014	18.100	1.082	43.304	1	0.434	0.831
2015	18.250	1.364	37.242	1	0.291	0.699

Table 7 – Results of sensitivity projection assuming flat-topped survey selectivity and F_{MSY} =0.39 (Scenario 3).

Year	Catch	Median F	Median SSB_{MSY}	Prob. $F>F_{MSY}(0.39)$	Prob. SSB > ½ Dome SSB_{MSY}	Prob. SSB > ½ Flat SSB_{MSY}
2011	11.703	0.39	69.896	0.500	0.974	1
2012	11.033	0.39	66.137	0.500	0.943	0.998
2013	11.645	0.39	64.769	0.500	0.923	0.996
2014	12.407	0.39	64.112	0.500	0.908	0.995
2015	12.478	0.39	62.948	0.500	0.887	0.992

Table 8 – Summary of risk associated with four catch scenarios. Note that as presented this table implies the two model formulations are equally likely. This is not the case since the review accepted only the dome selectivity model.

Low: < 25 percent
Med: 25 – 50 percent
High: Over 50 percent

Catch Scenario	Dome True/Flat False	Dome False/Flat True
Risk of Being Overfished By 2015		
75% F_{MSY}	Low	Low/Med
Scenario 1	Low	Low/Med
Scenario 2	Low	Med/High
Scenario 3	Low	Low
Risk of Overfishing By 2015		
75% F_{MSY}	Low	High
Scenario 1	Low	High
Scenario 2	Low	High
Scenario 3	Low	High

Attachment 2
Gulf of Maine Winter Flounder

1. ABCs for GOM winter flounder were established by the Council in 2009 (FW 44) based on the recommendations of the SSC. GARM III did not produce an approved assessment for this stock. Reviewers reported stock status as unknown but also provided this statement:

> "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. As a result, the ABC control rule used by the SSC was " Interim ABCs should be determined for stocks with unknown status according to case-by case recommendations from the SSC."

2. Since there was no assessment for this stock, the ABC control rule used by the SSC was "Interim ABCs should be determined for stocks with unknown status according to case-by case recommendations from the SSC." Based on SSC guidance, ABCs were calculated as 75% of the recent catches. The PDT calculated the ABC using the three-year average catch of 2006 – 2008. As a result, the ABC was set as 238 mt for 2010-2012. Since a benchmark assessment is planned for spring 2011, should the SSC decide to revise the ABC a value is needed for 2011 and 2012.

While reviewing the OFLs and ABCs for this stock, the PDT noted an inconsistency in that the OFLs were set using a projection from a rejected assessment. This has no effect on management and the PDT recommends correcting these values only if the SSC recommends revising the ABCs.

3. Concerns have been raised that the low ABC for this stock may limit sector and common pool fishing in the Gulf of Maine. At the June Council meeting the following motion was passed unanimously

> "to ask the SSC to examine any recent fisheries independent and fisheries dependent data collected since GARM 3 for GOM winter flounder and to evaluate whether this new information would affect their current ABC recommendation for GOM winter flounder."

4. Updated survey and catch information is provided for the SSC's review. Catch information includes a summary of FY 2010 sector and common pool catches as of July 27, 2010.

5. If the ABC is changed to 75 percent of the average of the 2007-2009 catch it would increase to 257.8 mt. If OFL is set at the average of the 2007-2009 catch, it would be 343.7 mt.

6. NEFSC survey indices were updated using the overall abundance and biomass conversion coefficients developed by Miller et al. 2010. Winter flounder has an estimated abundance conversion of 2.490 and a biomass conversion coefficient of 2.086 for combined seasons and all stations. Additional uncertainty surrounding the conversion factors exist with the ongoing development of length based factors. The recent updated

TRAC assessments used a newly developed length based conversion coefficients. Comparisons of length frequency distributions between the Albatross and Bigelow suggests that a length based conversion may be more appropriate for many of the flatfishes.

7. Updated catch for 2008 and 2009 show little change from the relatively low catch over the past five years (about 5-10% of the catch from the early 1980s). Overall there is little change in the 2008-2010 survey indices compared to the mid 2000s. Judging from the updated data since GARM III there is little justification for a change in the ABC. However an evaluation of the survey time series still shows little response in abundance with the large change in the catch over time. The high catchability of winter flounder in the spring and fall Mass DMF survey (80 fish per tow average) and the overall tracking of all four survey indices make it difficult to discount the surveys as a good measure of abundance. The conflicting signals between the survey information and the large reduction in the catch resulted in the lack of a reliable population model. However the PDT felt there may be some scope for change in the present ABC calculation considering the conflicting trends in the data, the bounds that result from this conflict within the population models and the relativity high survey area swept estimates.

8. Last year the PDT ABC recommendation included this text:

> "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 split run were accepted and a projection was run off it at 75% of F_{MSY}."

The original split survey GOM winter flounder (which was not accepted at GARM III) produced a 2011 catch of 439 mt and a 2012 catch of 527 mt. An ABC equal to the average catch of the last three years (344 mt for the years 2007 -2009) would approximate the control rule catch from the most pessimistic assessment reviewed (but not approved) at GARM III.

Table 9 – GOM winter flounder catch

Year	Rec Landings	Comm. Landings	Rec. Discards	Comm Discards	Total Catch
1981	2,270				
1982	3,024	2,793	11	350	6,178
1983	817	2,096	2	120	3,035
1984	1,103	1,699	3	79	2,883
1985	1,629	1,582	8	107	3,327
1986	411	1,185	5	91	1,692
1987	1,443	1,140	12	118	2,713
1988	537	1,250	2	137	1,927
1989	1,035	1,253	6	20	2,315
1990	344	1,116	3	48	1,511
1991	86	1,008	1	41	1,136
1992	77	825	1	43	947
1993	134	611	3	30	778
1994	77	543	2	18	640
1995	40	707	1	28	776
1996	52	606	2	15	674
1997	32	569	3	57	660
1998	27	643	1	18	689
1999	34	350	1	14	399
2000	31	535	2	18	587
2001	37	698	3	19	756
2002	35	682	1	22	740
2003	29	754	1	18	801
2004	29	623	0	36	687
2005	24	335	1	26	387
2006	35	199	1	11	247
2007	26	260	0	17	303
2008	104	284	3	12	402
2009	65	244	4	12	326

Table 10 – GOM winter flounder survey indices. Cells highlighted reflect new data since GARM III.

	NEFSC Spring		NEFSC Fall		MA Spring		MA Fall	
year	number	weight	number	weight	number	weight	number	weight
1978					98.556	20.772	59.152	12.741
1979	4.487	1.73	6.003	2.602	71.834	15.787	134.251	32.837
1980	5.586	2.391	13.141	6.553	72.142	19.108	83.805	17.868
1981	6.461	2.122	4.179	3.029	106.341	30.383	50.847	13.595
1982	7.67	3.022	4.201	1.924	61.612	14.713	108.203	24.418
1983	12.367	5.653	10.304	3.519	112.487	28.984	76.658	15.143
1984	5.155	1.979	7.732	3.106	68.949	16.716	39.541	12.212
1985	3.469	1.418	7.638	2.324	54.21	15.302	48.677	8.288
1986	2.342	0.998	2.502	0.938	68.984	16.352	44.646	6.92
1987	5.609	1.503	1.605	0.488	85.18	18.64	54.434	8.018
1988	6.897	1.649	3	1.03	54.039	11.266	38.419	8.237
1989	3.717	1.316	6.402	2.013	64.696	13.94	39.249	8.602
1990	5.415	2.252	3.527	1.177	82.125	14.375	67.661	13.218
1991	4.517	1.436	7.035	1.467	46.63	11.513	101.716	17.58
1992	3.932	1.16	10.447	3.096	79	15.356	87.581	15.089
1993	1.556	0.353	7.559	1.859	78.018	12.051	93.527	15.109
1994	3.481	0.891	4.87	1.319	72.578	9.779	67.789	13.246
1995	12.185	3.149	4.765	1.446	89.361	14.96	76.736	15.092
1996	2.736	0.732	10.099	3.116	70.494	12.082	77.006	13.144
1997	2.806	0.664	10.008	2.95	85.396	12.959	78.402	14.438
1998	2.001	0.527	3.218	0.987	77.771	13.473	98.45	15.454
1999	6.51	1.982	10.921	3.269	80.776	14.957	125.742	23.204
2000	10.383	2.885	12.705	5.065	162.19	34.16	99.953	25.1
2001	5.242	1.663	8.786	3.133	89.743	24.51	81.072	17.743
2002	12.066	3.692	10.691	4.003	91.083	22.391	65.812	16.264
2003	7.839	2.544	10.182	4.315	83.693	17.323	90.477	15.801
2004	3.879	1.103	2.763	0.867	79.115	11.201	107.591	14.091
2005	6.92	2.056	8.807	2.314	94.044	11.98	78.591	11.812
2006	4.173	1.211	7.117	2.346	85.548	14.434	86.985	15.463
2007	2.5	0.717	6.378	1.82	53.583	10.06	76.669	11.599
2008	11.543	2.177	13.319	4.692	46.863	8.424	90.919	18.085
2009	5.732	1.529	9.107	3.162	71.316	12.277	108.996	22.677
2010	5.973	1.178						

Figure 3 - Trends in relative abundance in NEFSC and MADMF trawl surveys. Note that y-scales differ among panels. Redline is time series median

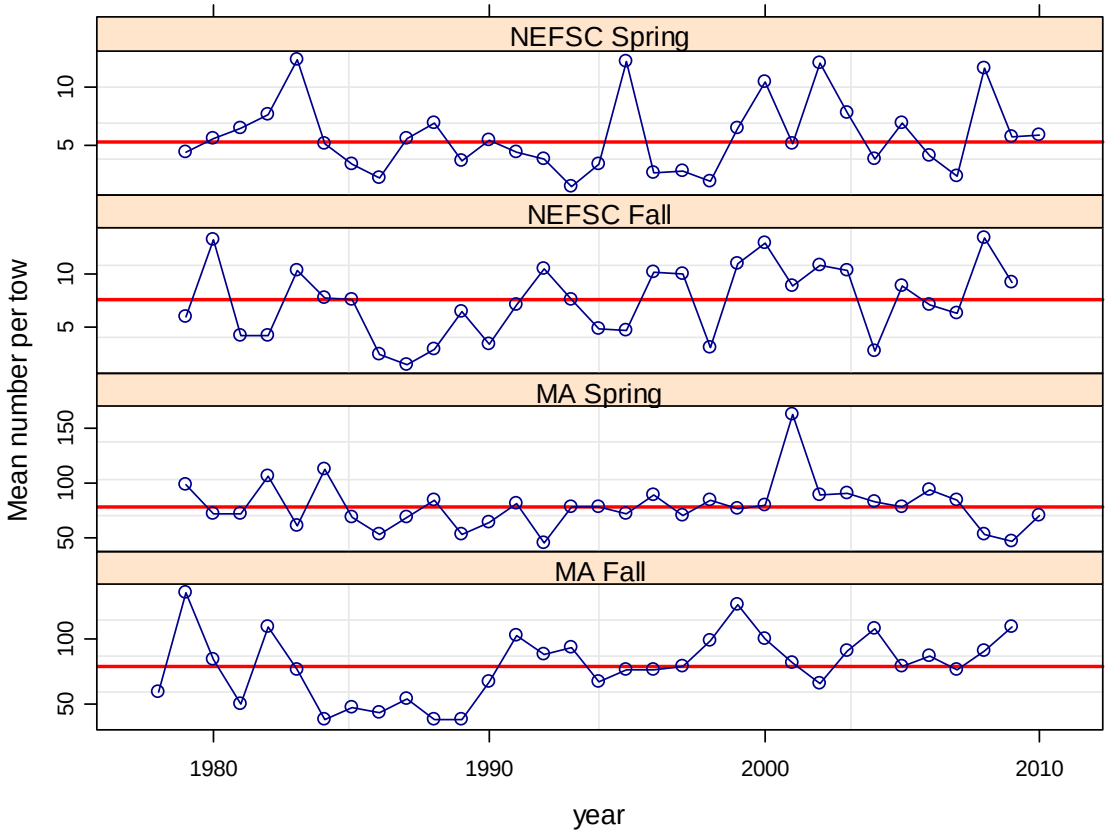


Figure 4 - Trends in relative biomass in NEFSC and MADMF trawl surveys. Note that y-scales differ among panels. Redline is time series median

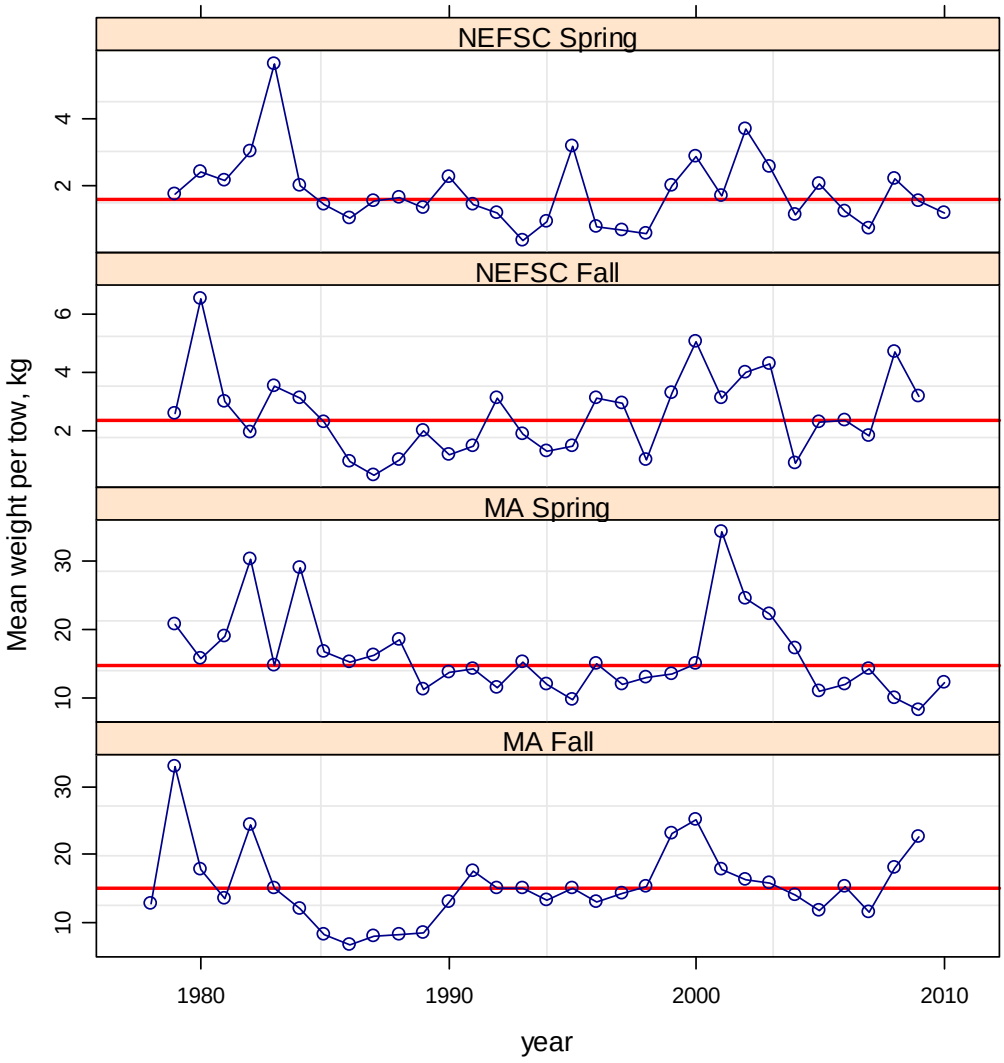


Table 11 – FY 2010 sector catch and ACE, as of July 27, 2010

Summary of Sector ACEs and Usage

Using sector summary reports through the week ended July 17, 2010

Stock	Total Sector ACE* (Metric tons T)	Total Sector ACE Caught (T)	Percent of ACE Caught
EGB Cod	325	81	25.0%
GB Cod	3,302	481	14.6%
GOM Cod	4,327	667	15.4%
American Plaice	2,748	167	6.1%
GB Winter Flounder	1,823	234	12.8%
GOM Winter Flounder	133	9	6.5%
Witch Flounder	827	80	9.7%
CC/GOM Yellowtail	729	37	5.0%
GB Yellowtail	941	123	13.1%
SNE Yellowtail	235	1	0.2%
EGB Haddock	11,913	144	1.2%
GB Haddock	40,186	2,179	5.4%
GOM Haddock	799	37	4.6%
White Hake	2,505	284	11.4%
Pollock	2,686	454	16.9%
Redfish	6,756	436	6.4%

*Total sector allocation as specified in Framework 44, adjusted for final FY2010 sector rosters.

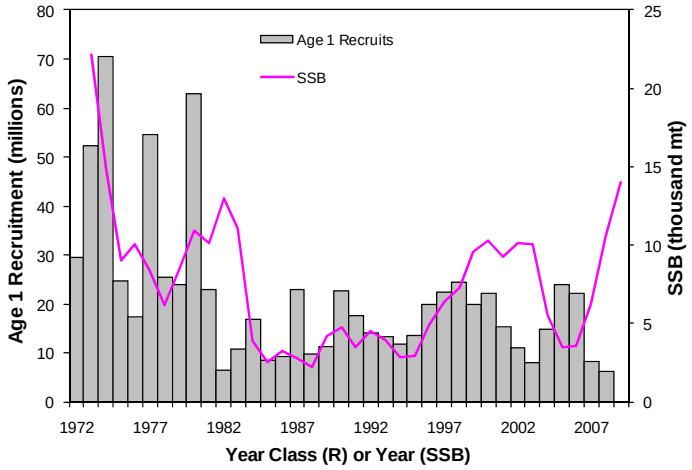
Table 12 FY 2010 common pool catch and ACL, as of July 27, 2010

Stock	Sub-ACL (mt)	Cumulative Catch (mt)	Percent Caught
GB Cod East	12.6	0.0	0.0
GB Cod	128.0	11.1	8.7
GOM Cod	240.0	184.4	76.8
Plaice	100.0	16.8	16.8
GB Winter Flounder	29.0	8.0	27.5
GOM Winter Flounder	25.0	15.6	62.5
Witch Flounder	25.0	19.0	75.9
CC/GOM Yellowtail Flounder	50.0	14.7	29.4
GB Yellowtail Flounder	23.0	16.3	70.9
SNE/MA Yellowtail Flounder	75.0	0.6	0.9
GB Haddock East	75.3	0.0	0.0
GB Haddock	254.0	90.8	35.7
GOM Haddock	26.0	4.7	18.2
White Hake	51.0	23.2	45.5
Pollock	375.0	23.8	6.4
Redfish	90.0	5.0	5.6

Attachment 3
Georges Bank Yellowtail Flounder

1. GB yellowtail flounder was assessed by the TRAC in July, 2010. Two VPA formulations were presented in TRAC 2009 in order to address unusually large tows in the Canadian survey in 2008 and 2009. The two formulations have been replaced by a single formulation that incorporates the large surveys but down weights the survey in those years. There was no similar large tow in 2010. In brief, stock biomass is estimated to be markedly lower than estimated last year and fishing mortality has been below F_{MSY} for the last two years. This revised perception of stock biomass is primarily because the 2005 year class which was thought to be large (60 million age 1 fish) is now estimated to be just above average (23.9 million fish). This assessment has a new source of uncertainty compared to recent assessments due to the re-emergence of a moderate retrospective pattern despite splitting the survey series. The assessment is summarized in the TRAC Status Report (TSR) 2010/03 (attached).

Figure 5 – GB YTF recruitment and SSB (TRAC 2010/03)



2. The ABC control rule for overfished stocks in rebuilding programs was recommended by the SSC and adopted by the Council in Amendment 16: "If fishing at 75% of FMSY 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 (Frebuild)."

3. The Council is considering four rebuilding strategies for this stock:

- Option 1/No Action: Rebuild using a fishing mortality rate needed to rebuild by 2014 with a 75 percent probability o f success.
- Option 2/Sub-Option A: Rebuild by 2016 with a 50 percent probability of success
- Option 2/Sub-Option B: rebuild by 2016 with a 60 percent probability of success
- Option 2/Sub-Option C: Rebuild by 2016 with a 75 percent probability of success

4. Based on the TRAC 2010 assessment, projections were run to determine the fishing mortality rates (Frebuild), spawning stock biomass (SSB) trajectories, and catch streams that correspond to the four rebuilding strategies. Assumption used in the assessment for biological parameters were those approved at TRAC and GARM III. Notably, the recruitment assumption samples from all recruitments observed, including higher recruitments from the period 1963 – 1982. Recruitment

is sampled in two stages with the break at 5,000 mt of SSB. Catch in 2010 was assumed equal to the quotas established by the U.S. and Canada outside the TMGC process. Results of the projections are summarized in Table 13 through Table 15and Figure 6 and Figure 7.

5. Projection results indicate the stock is unlikely to rebuild by 2014 in the absence of fishing mortality, but can rebuild by 2016 under any of the other three rebuilding strategies. Only Option 2/Sub-Option A (median probability of success) will increase catches from current levels.

6. As noted, these projections use the entire recruitment series, including hindcast recruitments. This is the same series used to set the biomass status determination criteria. Median recruitment for the full time series is 24.7 million fish at Age 1. For the period 1983 through 2009, the median Age 1 recruitment is only 14 million fish. TRAC ran several projections using this lower recruitment series and noted using these values would change rebuilding probabilities and future catches.

7. Last year the PDT noted several reasons for caution concerning the 2009 assessment: first, the TRAC cautioned that the assessment was less certain than in the past due to the recent unusual Canadian surveys; second, while both model formulations indicated 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; and fourth, the PDT thought the assessment might have been acquiring a retrospective pattern when estimating fishing mortality.

The PDT reiterates similar concerns this year. The 2010 TRAC results indicate that the stock is not as large as previously thought, the 2005 year class is not as large as previously estimated and the 2007 and 2008 year classes are still estimated as among the poorest in the time series. These two small year classes are driving the low fishing mortality needed to rebuild the stock. Even if the Council extends the rebuilding period to 2016, meeting that timeline is contingent on successful recruitment. The PDT is concerned that the assessment has developed a retrospective pattern that under-estimates fishing mortality and now it appears to also over-estimates stock size (

Table 17).

8. While there are concerns for meeting rebuilding requirements, the assessment also contains positive information. Even with the revised perception of stock size, there have been recent increases and stock size is estimated larger than observed since the early 1980's. Fishing mortality (with the caution that the retrospective pattern introduces uncertainty in the estimates for recent years) has been reduced dramatically from the values seen previously. As a result, the 2005 year class produced more survivors at age 4 in 2009 than have been estimated since 1974 and more age 5 fish at the beginning of 2010 than have been observed in the time series. Assuming mortality remains low, this should lead to expansion of the age structure above age 6 in the near future. The 2006 year class is producing similar numbers at age. These year classes may help sustain the stock as the weak 2007 and 2008 year-classes age and enter the fishery.

9. U.S. and Canadian catches of this stock are coordinated through the Transboundary Resource Management Guidance Committee (TMGC). The TMGC will meet before the SSC and the SSC will be informed of the results of that meeting. TMGC recommendations do not currently exempt the Council from M-S Act rebuilding requirements.

Table 13 – Frebuild for four GB YTF rebuilding options

	F=0	50%	60%	75%
Year	2014	2016	2016	2016
2010	0.142	0.142	0.142	0.142
2011	0	0.138	0.101	0.039
2012	0	0.138	0.101	0.039
2013	0	0.138	0.101	0.039
2014	0	0.138	0.101	0.039
2015	0.191	0.138	0.101	0.039
2016	0.191	0.138	0.101	0.039
2017	0.191	0.191	0.191	0.191
2018	0.191	0.191	0.191	0.191
2019	0.191	0.191	0.191	0.191
2020	0.191	0.191	0.191	0.191

Table 14 – Projected SSB for four GB YTF rebuilding strategies

	F=0	50%	60%	75%
year	2014	2016	2016	2016
2010	15.031	15.031	15.031	15.031
2011	16.817	15.985	16.203	16.575
2012	22.079	19.114	19.865	21.194
2013	29.043	23.925	25.169	27.46
2014	38.008	30.461	32.25	35.592
2015	45.368	37.399	40.005	44.943
2016	47.658	43.189	46.746	53.655
2017	48.269	46.211	49.827	56.944
2018	48.44	47.334	49.93	55.235
2019	48.495	47.744	49.612	53.375
2020	48.455	48.069	49.382	51.916

Table 15 – Median catch/ABC for four GB YTF rebuilding strategies ('000 mt)

	F=0	50%	60%	75%
year	2014	2016	2016	2016
2010	1.956	1.956	1.956	1.956
2011	0	1.998	1.486	0.59
2012	0	2.222	1.699	0.706
2013	0	2.658	2.065	0.884
2014	0	3.431	2.683	1.163
2015	7.447	4.355	3.433	1.512
2016	7.973	5.167	4.135	1.857
2017	8.096	7.72	8.38	9.705
2018	8.124	7.911	8.401	9.378
2019	8.119	7.991	8.338	9.038
2020	8.13	8.052	8.295	8.768

Table 16 – OFL for four GB YTF rebuilding strategies ('000 mt)

	F=0	50%	60%	75%
year	2014	2016	2016	2016
2010	1.956	1.956	1.956	1.956
2011	3.495	3.495	3.495	3.495
2012	4.335	3.901	4.011	4.208
2013	5.541	4.674	4.885	5.274
2014	7.367	6.027	6.347	6.941

Table 17 – Comparison of recent TRAC estimates of fishing mortality and biomass for GB yellowtail flounder

	Year									
	Fishing Mortality (age 4+)					**SSB_{MSY} (K mt)**				
Assessment Year	**2005**	**2006**	**2007**	**2008**	**2009**	**2005**	**2006**	**2007**	**2008**	**2009**
2006	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	0.09	-	3.7	4.4	10.0	17.8	-
2009 – Incl.	1.23	1.01	0.38	0.08		3.8	4.7	11.7	22.9	
2010	1.30	1.18	0.53	0.15	0.15	3.5	3.5	6.2	10.6	14.0

Figure 6 – Projected SSB for four GB YTF rebuilding strategies

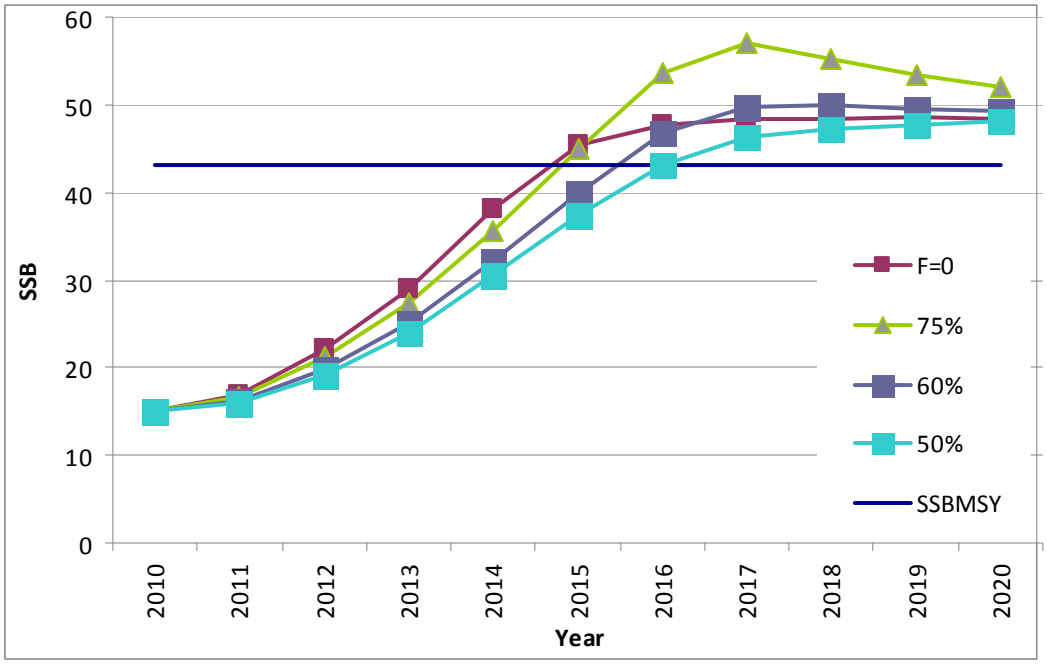
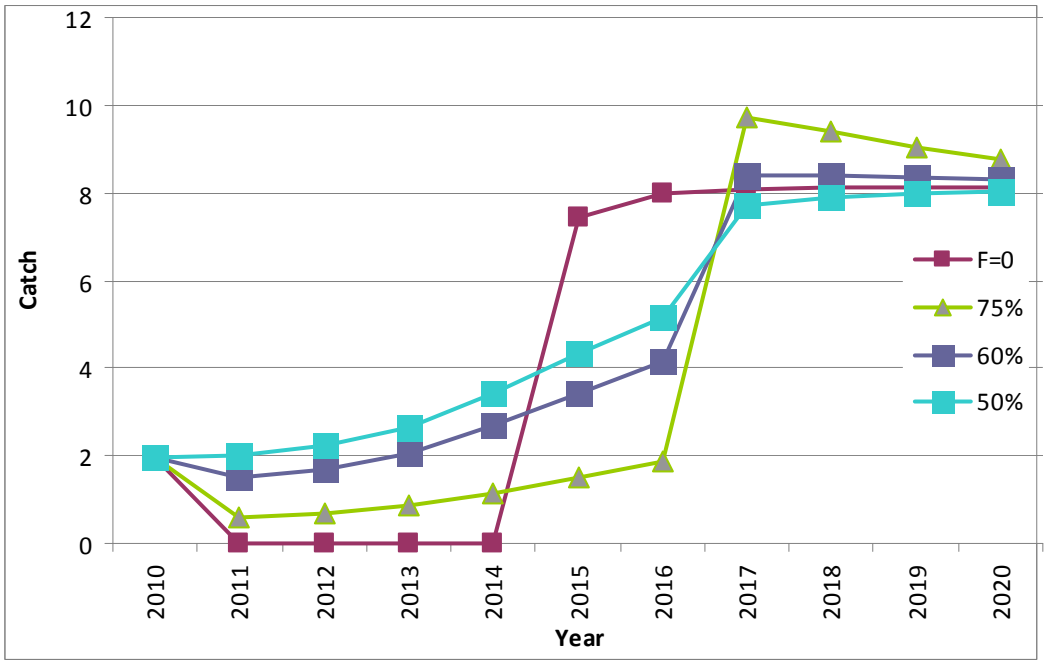


Figure 7 – Projected median catch for four GB YTF rebuilding strategies



Attachment 4
Index-Based Stocks

1. The SSC provided the Council Acceptable Biological Catch (ABC) recommendations for Northeast Multispecies stocks in September, 2009. The SSC recommendation included the following statement:

> "*Index-based Stock Assessments* - All index-based assessments should be reviewed in 2010 to determine if 2011 and 2012 ABC recommendations can be improved upon with Bigelow survey data and the calibration workshop results. If calibration coefficients are accepted by the workshop for use in stock assessment, updated survey indices can be used to derive revised ABC recommendations."

2. Bigelow to Albatross calibration coefficients were calculated by Miller et al. (2010) and peer-reviewed at the Vessel Calibration Meeting, August, 2009. The Miller et al. results were accepted and these calibration coefficients were used to adjust FRV Bigelow survey indices in the following tables and charts. The coefficients used are not length-based because these values have not yet been calculated. This may be an issue for windowpane flounder because the peer review report included the following advice:

> "In the case where Ratio estimator = Beta-binomial estimator or where there was little difference in both estimators based upon the confidence intervals of the ratio estimates, the panel recommends the use of the Beta-binomial estimator. This estimator exhibited superior performance in simulation studies. However, the panel further recommends that length should be added to the Beta-binomial model as a continuous covariate to incorporate length based conversions where appropriate.
>
> > Example 1: cases where length is influencing the relationship such as: yellowtail flounder, American plaice, and winter flounder.
> > Example 2*:* cases where length and season are influencing the relationship such as: window pane and summer flounders..."

3. The calibration review did not address how to estimate survey biomass when the numbers are adjusted using a length-based calibration coefficient.

4. Stocks that have index-based assessments are ocean pout, northern and southern and windowpane flounder. Updated information is provided for these stocks. OFLs were calculated by applying the F_{MSY} proxy to the most recent estimate of stock size, and ABCs were calculated by applying 75 percent of F_{MSY} to the most recent estimate of stock size. SAW-50 replaced the index-assessment for pollock with an age-structured model and so the index methods for pollock have not been updated.

One potential difficulty with using this approach for stocks assessed solely with an index is that the survey index is a proxy for total biomass, not exploitable biomass.

5. For ocean pout and southern windowpane flounder, the updated survey indices reduce the ABCs by between 5 and 10 percent. For northern windowpane flounder the reduction is 24 percent. Current management measures for these stocks prohibit landings by sector and common pool vessels. As a result, the only impact of a change in the ABC is that it affects the

implementation of accountability measures (AMs). For these stocks, a reduction in the ABC makes it more likely that the ACL will be exceeded and therefore AMs would be triggered for the subsequent fishing year.

6. Given the minor changes for two stocks, and the uncertainty resulting from the lack of length-based calibration coefficients, the PDT does not recommend changing the ABCs for these three stocks at this time.

Miller, T. J., Das, C., Politis, P. J., Miller, A. S., Lucey, S. M., Legault, C.M., and Rago, P. J. 2010. Estimation of Albatross IV to Henry B. Bigelow calibration factors. Northeast Fisheries Science Center Reference Document 10-05.

Ocean Pout

GARM III estimated FMSY for this stock as an exploitation index (EI) of 0.76 (catch/3 year lagged average of NMFS spring trawl survey) and B_{MSY} 4.94 kg./tow. MSY is estimated as 3,754 mt.

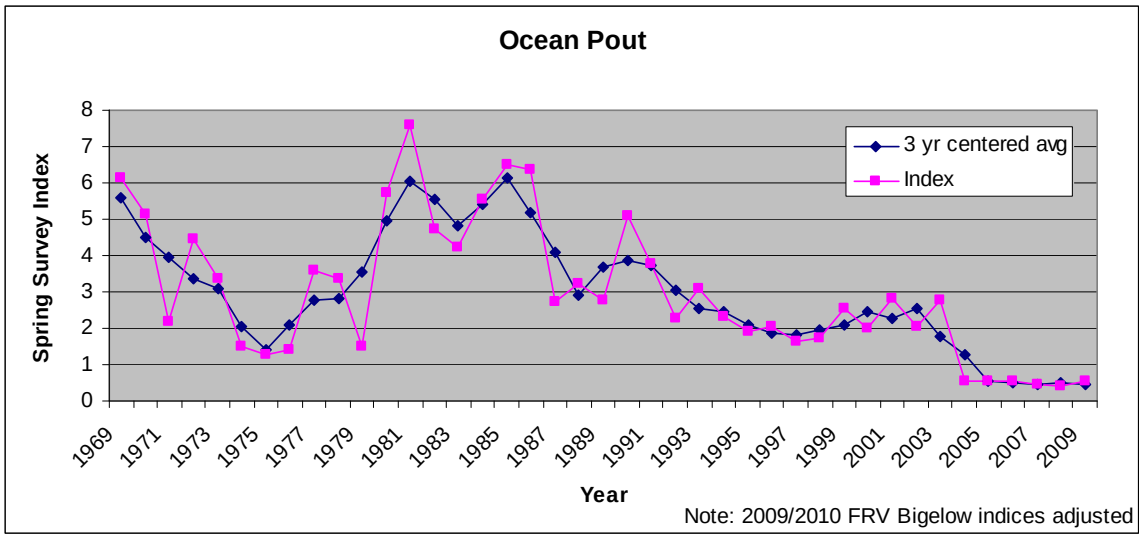
The 2007 exploitation index was 0.375 and the 3-yr. average spring survey index was 0.475 kg./tow, or 10 percent of B_{MSY}. The EI has been below F_{MSY} since 1992 but the biomass proxy declined from 3.041 kg./tow since that year.

Using updated survey information for 2008 through 2010, the 2009 EI is 0.378, well below the F_{MSY} proxy. The 3-year average spring survey index was 0.450 kg./tow, or 9 percent of B_{MSY}. The stock is overfished but overfishing is not occurring. This is the same stock status as previously reported.

The current OFL for ocean pout is 361 mt and the current ABC is 271 mt.

Using the updated survey information, the revised OFL for ocean pout is 342 mt and the ABC is 256 mt. This is a decline of 5 percent from the current values.

Supporting data are on the following pages.



Year	Spring, kg/tow	Total Catch, 000 mt	kg/tow (3 yr avg)	EI (catch/3 yr avg. index)
1968	5.446	16.5379	5.8	2.851
1969	6.154	30.1015	5.581	5.394
1970	5.143	9.9378	4.497	2.21
1971	2.195	7.9315	3.934	2.016
1972	4.463	4.8492	3.344	1.45
1973	3.373	6.6642	3.105	2.146
1974	1.479	4.8659	2.048	2.375
1975	1.293	0.9936	1.391	0.714
1976	1.4	1.2002	2.099	0.572
1977	3.605	1.9871	2.792	0.712
1978	3.371	2.4126	2.823	0.855
1979	1.493	2.1813	3.531	0.618
1980	5.729	2.3659	4.942	0.479
1981	7.605	2.9942	6.026	0.497
1982	4.743	4.7605	5.528	0.861
1983	4.236	4.8967	4.84	1.012
1984	5.54	5.0162	5.423	0.925
1985	6.494	4.665	6.126	0.761
1986	6.345	4.0984	5.181	0.791
1987	2.705	4.8086	4.098	1.173
1988	3.244	4.0546	2.914	1.392
1989	2.792	8.7289	3.703	2.357
1990	5.074	10.746	3.883	2.768
1991	3.783	6.3496	3.704	1.714
1992	2.257	1.994	3.041	0.656
1993	3.084	1.5779	2.55	0.619
1994	2.309	1.4769	2.436	0.606
1995	1.916	0.6385	2.094	0.305
1996	2.058	0.6796	1.869	0.364
1997	1.632	0.5545	1.808	0.307
1998	1.733	0.6899	1.975	0.349
1999	2.561	0.8041	2.103	0.382
2000	2.016	0.3668	2.458	0.149
2001	2.798	0.5492	2.28	0.241
2002	2.025	0.5879	2.527	0.233
2003	2.758	0.4524	1.777	0.255
2004	0.546	0.296	1.277	0.232
2005	0.526	0.2048	0.533	0.384
2006	0.526	0.1875	0.51	0.368
2007	0.477	0.1785	0.475	0.375
2008	0.422	0.125	0.485	0.258
2009	***0.556***	0.17	0.450	0.378
2010	***0.371***			

2008 and 2009 survey values adjusted using the FRV Bigelow calibration factors.

Northern (GOM/GB) Windowpane Flounder

GARM III estimated F_{MSY} for this stock as an exploitation index (EI) of 0.50 (catch/3 year lagged average of NMFS spring trawl survey) and B_{MSY} 1.40 kg./tow. MSY is estimated as 700 mt.

The 2007 exploitation index was 1.96 and the 3-yr. average fall survey index was 0.527 kg./tow, or 37 percent of B_{MSY}.

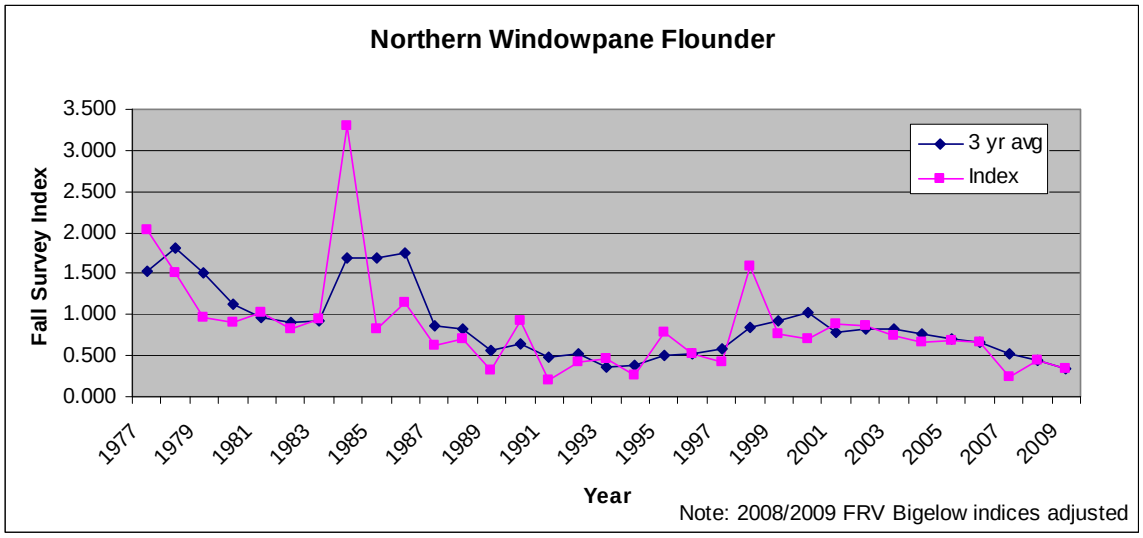
Using updated survey information for 2008 through 2009, the 2009 EI is 1.205, above the F_{MSY} proxy but a decline from 2007. The 3-year average spring survey index was 0.342 kg/tow, or 24 percent of B_{MSY}. The stock is overfished and overfishing is occurring. This is the same stock status as previously reported.

The current OFL for this stock is 225 mt and the current ABC is 169 mt.

Using the updated survey information, the revised OFL for this stock 171 mt and the ABC is 128 mt. This is a decline of 24 percent from the current values.

Supporting data are on the following pages.

FRV Bigelow survey observations have not been adjusted using a length-based calibration coefficient as suggested by the Vessel Calibration Workshop review panel. The adjustment used is solely based on weight.



Year	Catch	kg/tow	relative f(catch/lagged avg survey
1975	1.553	0.629	
1976	1.799	1.91	
1977	1.539	2.033	1.01
1978	1.388	1.505	0.764
1979	1.383	0.958	0.923
1980	0.999	0.899	0.891
1981	1.059	1.022	1.104
1982	1.227	0.82	1.343
1983	1.358	0.94	1.464
1984	1.558	3.305	0.923
1985	2.833	0.828	1.675
1986	2.465	1.143	1.402
1987	2.013	0.629	2.323
1988	2.082	0.712	2.514
1989	2.06	0.323	3.714
1990	2.12	0.925	3.245
1991	3.645	0.193	7.588
1992	1.847	0.429	3.582
1993	1.577	0.464	4.356
1994	0.681	0.263	1.767
1995	1.467	0.79	2.901
1996	1.183	0.513	2.266
1997	1.547	0.423	2.689
1998	0.67	1.588	0.796
1999	0.105	0.759	0.114
2000	0.349	0.708	0.343
2001	0.233	0.891	0.296
2002	0.166	0.856	0.203
2003	0.371	0.742	0.447
2004	0.315	0.669	0.417
2005	0.955	0.68	1.37
2006	0.687	0.66	1.026
2007	1.032	0.242	1.957
2008	***0.35***	0.447	0.778
2009	***0.412***	0.337	1.205

2008 and 2009 survey values adjusted using the FRV Bigelow calibration factors. These factors are not based on length.

Southern (SNE/MA) Windowpane Flounder

This stock is subject to a formal rebuilding program adopted in Amendment 13.

GARM III estimated F_{MSY} for this stock as an exploitation index (EI) of 1.47 (catch/3 year lagged average of NMFS spring trawl survey) and B_{MSY} 0.34 kg./tow. MSY is estimated as 500 mt.

The 2007 exploitation index was 1.85 and the 3-yr. average fall survey index was 0.21 kg./tow, or 62 percent of B_{MSY}.

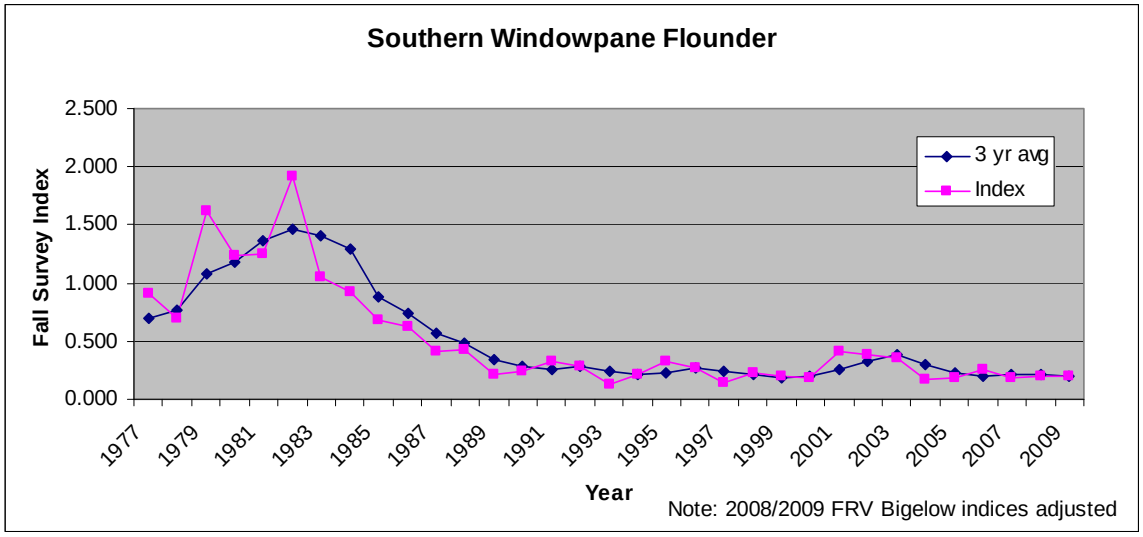
Using updated survey information for 2008 through 2009, the 2009 EI is 2.259, above the F_{MSY} proxy and an increase from 2007. The 3-year average spring survey index was 0.192 kg/tow, or 56 percent of B_{MSY}. The stock is not overfished but overfishing is occurring. This is the same stock status as previously reported.

The current OFL for this stock is 317 mt and the current ABC is 237 mt.

Using the updated survey information, the revised OFL for this stock 283 mt and the ABC is 212 mt. This is a decline of 10 percent from the current values.

Supporting data are on the following pages.

FRV Bigelow survey observations have not been adjusted using a length-based calibration coefficient as suggested by the Vessel Calibration Workshop review panel. The adjustment used is solely based on weight.



Year	Catch	kg/tow	relative f(catch/lagged avg survey	3 yr avg kg/tow
1975	1.169	0.46		
1976	1.192	0.702		
1977	1.23	0.912	1.78	0.691333
1978	1.894	0.7	2.46	0.771333
1979	1.704	1.615	1.58	1.075667
1980	1.524	1.238	1.29	1.184333
1981	1.805	1.25	1.32	1.367667
1982	3.614	1.917	2.46	1.468333
1983	4.478	1.045	3.19	1.404
1984	4.572	0.921	3.53	1.294333
1985	4.903	0.677	5.57	0.881
1986	4.539	0.622	6.13	0.74
1987	3.993	0.405	7.03	0.568
1988	4.324	0.421	8.96	0.482667
1989	4.624	0.217	13.3	0.347667
1990	5.4	0.235	18.56	0.291
1991	3.95	0.329	15.17	0.260333
1992	1.134	0.282	4.02	0.282
1993	0.872	0.124	3.56	0.245
1994	1.175	0.215	5.68	0.207
1995	0.486	0.328	2.19	0.222333
1996	0.605	0.265	2.25	0.269333
1997	0.34	0.145	1.38	0.246
1998	0.524	0.228	2.46	0.212667
1999	0.526	0.194	2.78	0.189
2000	0.263	0.18	1.31	0.200667
2001	0.181	0.406	0.7	0.26
2002	0.247	0.387	0.76	0.324333
2003	0.449	0.35	1.18	0.381
2004	0.381	0.166	1.27	0.301
2005	0.314	0.181	1.35	0.232333
2006	0.461	0.262	2.27	0.203
2007	0.39	0.191	1.85	0.211333
2008	0.363	0.193	1.881	0.215
2009	0.436	0.193	2.259	0.192

2008 and 2009 survey values adjusted using the FRV Bigelow calibration factors. These factors are not based on length.