IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLUMBIA

CONSERVATION LAW FOUNDATION, et al., Plaintiffs	
	CIVIL ACTION NO. 00-1134 (GK)
v.	
DONALD L. EVANS, et al., SECRETARY OF COMMERCE Defendants	

SECOND DECLARATION OF STEVEN A. MURAWSKI, Ph.D.

I, STEVEN A. MURAWSKI, declare as follows:

1. I am the Chief of the Population Dynamics Branch, Northeast Fisheries Science Center, National Marine Fisheries Service, Woods Hole, Massachusetts. In this capacity I supervise the production of stock assessments and related management advice for about four dozen fishery stocks regulated under fishery management plans (FMPs) promulgated by the New England and Mid-Atlantic Fishery Management Councils. I also chaired the *Working Group on Re-Evaluation of Biological Reference Points for New England Groundfish* (the Working Group). The Working Group was established to update the values of biomass required to generate maximum sustainable yield (Bmsy) and fishing mortality required to generate maximum sustainable yield (Fmsy) for the 19 species stocks included in the Northeast Multispecies Fishery Management Plan. Bmsy and Fmsy are sometimes referred to as MSY

reference points. For regulated species, staff of the Population Dynamics Branch routinely apply various quantitative forecasting procedures to fisheries data to advise on fishing mortality rates and catch levels necessary to comply with fishing mortality rate goals and control rules contained within various FMPs.

2. The purposes of this declaration are two-fold. First, I provide the full report of the Working Group, including the supporting technical appendices, to the Court (the attached report is briefly described under the sub-heading **Working Group Report**, in this declaration). Second, consistent with the Court s order of 18 March 2002, I provide TAC calculations for the 2002-2003 fishing year for 19 stocks regulated under the New England Fishery Management Council s Northeast Multispecies Fishery Management Plan (sub-heading **2002-2003 TAC Calculations**, below).

Working Group Report

3. The composition of the Working Group, including names and affiliations of external participants, staff of National Marine Fisheries Service, Northeast Fisheries Science Center, and Council observers are included in section 1.2 of the document. The specific tasks (terms of reference) addressed by the Working Group are detailed in section 1.3. Reasons why this review was deemed necessary from a scientific point of view are discussed in section 1.5.

4. The document recommends changes in the values of Bmsy and/or Fmsy for 15 of the 19 stocks reviewed. In some cases changes are relatively minor, while for some stocks, we

recommended that biomass targets be changed significantly as compared to those listed in Amendment 9. Reasons for these changes and their scientific bases are detailed in the report and supporting technical appendices.

5. Based on the professional judgement of the Working Group members and outside expert panelists, the recommended values of Bmsy and Fmsy are superior (i.e., more scientifically defensible) than the values currently contained in Amendment 9. Therefore, from a scientific point of view, they should be substituted for those currently contained in Amendment 9.

2002-2003 TAC Calculations

6. TAC calculations are made in order to determine the maximum fishery removals from a stock, consistent with meeting the biological objectives of a fishery management plan. For FMPs to be consistent with the Sustainable Fisheries Act (SFA) and Agency guidelines for fulfilling National Standard 1 of the Act, the Plan should strive to attain a biomass of Bmsy, while limiting the fishing mortality rate to Fmsy. Thus, estimates of Bmsy and Fmsy are required. For stocks determined to be in an overfished condition (whenever the stock is below a predetermined biomass, usually specified as a fraction of Bmsy, such as 0.5; however the text of Amendment 9 states that a stock is overfished when the biomass is below Bmsy), rebuilding to Bmsy is required within a time interval specified in the FMP (control rules in Amendment 9 specify rebuilding times of 5 or 10 years, depending on the fish stock and its current condition relative to Bmsy).

7. The re-evaluation of the biological reference points (Bmsy, Fmsy) for all of the groundfish stocks regulated under Amendment 9 was deemed necessary prior to providing TAC estimates to the Court, based on a re-evaluation of biological reference points for the Gulf of Maine cod stock, completed in the spring and summer of 2001. In re-evaluating the Bmsy and Fmsy values for that stock (see the report of the 33rd Northeast Stock Assessment Workshop [SAW], dated September 2001), the peer review scientific panel concluded that the biological reference points for the Gulf of Maine cod stock contained in Amendment 9 were estimated using inappropriate models. The 33rd SAW proposed new revised values of Bmsy and Fmsy based on models deemed to be more scientifically valid. The SAW 33 noted specifically (p. 32) that *In contrast to previous assessments, the SARC decided that it was more appropriate to compute reference points from the age-structured model than from the age-aggregated biomass dynamics model.* The revised values of Bmsy and Fmsy reported by the *Working Group on Re-Evaluation of Biological Reference Points for New England Groundfish* are essentially the same as those proposed by the 33rd SAW. Since many of the stocks regulated under Amendment 9 suffered from the use of inappropriately estimated biological reference points calculated by the age-aggregated biomass dynamics model, when age-structured models were more scientifically valid, scientists undertook a thorough but expedited re-assessment of reference points in order to provide the most scientifically valid TAC calculations for the 2002-2003 fishing year. It should be recognized by the Court that biological reference points are routinely updated in stock assessments of various fisheries.

8. Estimates of TACs appropriate to the 2002-2003 fishing year (beginning 1 May 2002) are provided in the attached Table 1. Projections of TACs are routinely provided on a calendar

year basis. Therefore, calendar year TACs for 2002 and 2003 are computed and averaged to provide an appropriate fishing year (May 2002-April 2003, inclusive) TAC calculation.

9. Table 1 provides, for most stocks, several alternative estimates of TACs for the 2002-2003 fishing year. The alternative TAC calculations (as set forth in different rows under each stock) are provided, in the interest of completeness and for comparative purposes, because the specific values of Bmsy and Fmsy contained in Amendment 9, and the calculation procedures used for advising on TACs for the upcoming fishing year are different from those recommended by the *Working Group on Re-evaluation of Biological Reference Points for New England Groundfish.* The actual values of the biological reference points have changed (see the *Report of the Working Group on Re-evaluation of Biological Reference Points for New England Groundfish*) due both to the use of different methods and the inclusion of more recent data. Estimates of the TACs for the 2002 fishing year also depend on the application of the control rule specifying the maximum re-building times for overfished stocks. Choice of the time-frames specified in the control rules (5- or 10-year strategies for stock re-building) are closely associated with the models used to estimate biological reference points and to forecast TACs, since the procedures employed must advise on fishing strategies that meet SFA goals in specific time frames with a high degree of probability (at least 50%). The Court, in an earlier ruling, allowed consideration of control rules specified in Amendment 9 ($F_{\text{Control Rule}}$) and those applied by the Multispecies Monitoring Committee of the New England Fishery management Council (F_{MSMC}). For these reasons several alternative estimates of 2002 TACs are presented. This declaration provides an evaluation of the scientific validity of the various 2002-2003 fishing year TAC options.

10. Definitions of the columns in Table 1 are as follows:

(a) The column labeled Species/Stock lists each of the 19 stocks regulated under the FMP for which stock status and management advice are routinely provided.

(b) The column labeled Model lists the analytical procedure used to calculate Bmsy or Fmsy and to provide catch forecasts - for most stocks the OLD model refers to the application of an age-aggregated biomass dynamics model (also known as a surplus production model), as described in the *Report of the Overfishing Definition Review Panel*, dated June 17, 1998. The NEW age-based models are those determined to be most scientifically valid, as described in the *Report of the Working Group on Re-Evaluation of Biological Reference Points for New England Groundfish*, dated 19 March, 2001 (see attached). The NEW models used to project TACs are mostly age-based forecast models and index-based methods for stocks lacking sophisticated age-structured data.

(c) The column headed Bmsy-Fmsy Values indicates which set of values are applied to calculate TACs in that particular row. The OLD Bmsy and Fmsy values are those contained in Amendment 9 to the FMP, and are based on analyses documented in the *Report of the Overfishing Definitions Review Panel*, dated June 17, 1998. The NEW values of Bmsy and Fmsy are those listed the *attached Report of the Working Group on Re-Evaluation of Biological Reference Points for New England Groundfish*, dated 19 March 2002.

(d) The column titled Control rule lists the management regime specifying the time

frame applicable to the various calculations. The control rules specified in Amendment 9 (indicated by an entry in the column of A-9") include rebuilding times of either five years or 10 years. The Agency Guidelines for National Standard 1 of the SFA allow for rebuilding periods of 10 years or 10 years plus one mean generation time, and for specifying when fishing mortality should be 0. An entry of rebuild refers to a 10 year rebuilding time, and +1 generation refers to a rebuilding time equal to the time it would take to rebuild with zero fishing mortality rate plus one mean generation time. For example, under Amendment 9 (A-9) the rebuilding time for Georges Bank cod is specified as 5 years when the biomass is between 1/4 and ½ Bmsy, 10 years when biomass is between ½ Bmsy and Bmsy, and F is set to 0 if the biomass is below 1/4 Bmsy. The MSMC option for control rules (indicated by a column entry of MSMC) refers to the rebuilding schedules provided by the Multispecies Monitoring Committee (MSMC) in its reports of 1999-2001. The MSMC computed fishing mortality rates that would, on average, result in stock rebuilding by the specified target dates of 2004 for 5-year rebuilding plans (according to Amendment 9 control rules) and 2009 for 10-year rebuilding plans. In the F_{MSMC} options, TACs were not set to zero when the stocks were judged to be below the minimum biomass threshold (either 1/4 or ½ Bmsy, as opposed to the A-9 options where TACs are zero when either the stock was below the minimum biomass threshold and could not recover to Bmsy in the specified time frame if any fishing was allowed). In this regard, the rebuild option for the control rule applied to NEW models and NEW Bmsy and Fmsy values operates in an equivalent way to the F_{MSMC} control rule option.

(e) The row containing A-9/MSMC in the Control rule column provides TACs as calculated under the F_{MSMC} control rule. The row containing OLD, OLD, A-9" in the first

three columns provides the TACs as calculated under the $F_{control\ rule}$.

(f) The column labeled "2001 Biomass (thousand mt)" provides the most recent estimate of the biomass of the various stocks, using the estimation models specified for the row. There are three units of biomass measurement variously specified in this column (see table footnotes). For most stocks estimated with the OLD biomass dynamics models, biomasses are expressed as total biomass (usually age 1 and older, designated TB). For stocks evaluated with NEW age-based production methods, biomasses are expressed as spawning stock biomass (SSB, e.g., the total mass of all the breeding animals in the population). For index-based stocks, biomass is expressed as the stratified mean catch (in kilograms) per standardized half-hour tow conducted by NOAA research vessels using a research bottom trawl (kg/tow). The 2001 biomass determination is important in relation to the evaluation of the current biomass as a percentage of the Bmsy, since the control rules specify differing F values, depending on whether the stock is above or below the biomass thresholds (e.g. 1/4 or ½ Bmsy). The column "2001% Bmsy" divides the entry in the previous column by the entry in the column "Bmsy (thousand mt)" to determine the 2001 biomass as a percent of the biomass target.

(g) The column headed "Fishing mortality rate" provides the appropriate fishing mortality rate determined by the application of the control rule to the 2001 biomass. For example, using the NEW models and NEW Bmsy values, the 2001 biomass for Gulf of Maine cod is determined to be 23.6% of Bmsy. The A-9 control rule for Gulf of Maine cod specifies that F=0 when the biomass is less than 1/4 Bmsy, thus the 2002-2003 TAC for that row is set to 0. Fishing mortality rates are expressed in three different units. For reference points estimated

with the OLD biomass dynamics models, fishing mortality is expressed as biomass weighted (BW). Alternatively, for Fmsy determined from age-based production models, fishing mortality is expressed as fully-recruited (FR). Fishing mortality rates will generally be lower and more stable in the fully-recruited unit as opposed to the biomass weighted unit (difficulties with biomass-weighted fishing mortalities are discussed below). A third unit of fishing mortality rate, appropriate to stocks assessed with index-based methods, is the ratio of catch divided by survey abundance index (C/I).

(h) The three right-most columns provide the 2002 and 2003 calendar year TACs (expressed in metric tons of catch due to all sources of mortality, including landings, discards, recreational catch, and Canadian catch, if these sources were included in the population assessment) and the 2002-2003 average, consistent with the application of applicable fishing mortality rates, population biomasses, and control rules.

11. For each stock there are one to five rows summarizing the calculated TACs under varying assumptions of the models used (OLD or NEW), reference point set used (OLD or NEW), the applicable control rule applied (the A-9", F_{MSMC} or the Rebuild control rule, as evaluated by the Working Group). For two stocks deemed incapable of rebuilding to the Bmsy targets in 10 years even with F=0, the TACs associated with the option of the rebuilding time when F=0.0 plus one mean generation time is provided as a separate row (e.g., for Georges Bank cod and Acadian redfish). There are varying numbers of rows reported for each stock either because particular control rule options were not provided (e.g. the MSMC did not provide projections for some stocks), or because data and analyses reported in Amendment 9 or by the

Working Group were not sufficient to calculate the particular TAC option.

12. Use of the OLD models and OLD Bmsy values for determining 2002-2003 TACs, the $F_{CONTROL\ RULE}$, is not considered to represent the best and most up to date science. The problematic nature of the application of the OLD models combined with OLD reference points approach is illustrated by two examples. First, note that for Georges Bank cod, application of OLD models and OLD Bmsy/Fmsy values results in a recommended TAC of 48,550 metric tons for the 2002-2003 fishing year. This estimate uses a biomass dynamics model fit to catch and survey data ending in 1997, and using model parameters of the intrinsic growth rate (r) and carrying capacity (K) to forecast the population six years ahead (removing the known catches in 1998-2001). This approach badly and optimistically projects significant cod population growth. In contrast, tuned age-based stock assessments updated last in 2001 estimate that the entire population size available in 2001 is only 34,500 mt. Thus, the OLD-OLD approach forecasts a 2002-2003 catch 1.4 times larger than the entire available population! This result is clearly incredible, especially since the catch forecast under the OLD-OLD model implies a fishing rate of only 0.32 (biomass weighted F). This example illustrates the danger of applying a biomass dynamics approach to multi-year forecasting without updating the population abundance indices or the biological reference points, which are an integral part of the biomass dynamics approach.

A similar incredible example of the blind application of the OLD model-OLD reference point approach is seen in results for witch flounder. The model results based on forecasts starting in 1997 predict that the stock has plummeted in the intervening years to less than 100 metric tons in 2001. Application of the appropriate A-9 control rule then specifies that the TAC

for 2002-2003 should be 0. However, the results of recent age-based stock assessments, incorporating estimates of strong recruitment spawned in the 1990s, combined with relatively low fishing mortality rates result in an actual 2001 total stock biomass of about 30,500 metric tons. The TAC for 2002-2003 using NEW models and reference points should actually be about 4,200 tons. Again, the application of the OLD model and OLD reference points is dramatically inconsistent with the most recent and best evaluation of current stock status.

13. Just as the application of the OLD models and OLD reference points, the F_{MSMC} control rule, results in some inappropriate estimates of 2001 population sizes and 2002 TACs, the application of NEW models combined with OLD reference points is equally scientifically inappropriate and results in cases of poor conservation or unnecessarily restrictive TACs. Again, two examples are used to illustrate the inappropriateness of the application of NEW models with OLD reference points. Consider the example of Gulf of Maine cod. The NEW model-OLD reference point approach results in a projected 2002-2003 TAC of 9,508 metric tons. This TAC results from a biomass-weighted fishing mortality rate of 0.31. However, as noted in the Report of the *Working Group on Re-Evaluation of Biological Reference Points for New England Groundfish*, when large year classes of fish come into the population (as is the case for the 1998 year-class of Gulf of Maine cod), the biomass-weighted fishing mortality rate may appear low as these fish enter the exploitable stock, while overfishing of larger-older animals in the population occurs. In this case the equivalent fully-recruited fishing mortality rate on larger animals is 0.67 nearly three times the Fmsy value of 0.23 as re-estimated for this stock. In this case, the inappropriate use of the biomass-weighted fishing mortality rate resulting from the application of the OLD reference points with the NEW models predicts TACs that will result in significant

overfishing of the stock that will retard rebuilding towards Bmsy. A similar example exists for Georges Bank yellowtail flounder where application of the NEW models and OLD reference points results in TACs that generate fully-recruited fishing mortality rates (0.41) nearly double the revised Fmsy estimate for the stock (0.22), because of the inappropriate reliance on the biomass-weighted fishing mortality rate target. These two examples clearly illustrate that the use of NEW models with OLD biological reference points is inconsistent and is not considered to have a credible scientific basis.

14. Based on the above considerations, it is my scientific opinion, and that shared by all of the members participating (including non-Northeast Fisheries Science Center experts) in the Working Group, that, in light of the recent re-evaluations biological reference points for the New England groundfish resource, the only scientifically defensible approach is to base 2002-2003 TACs on results applying the NEW models and NEW Bmsy and Fmsy values. The results pertaining to the use of OLD models with OLD reference point values and NEW Models with OLD reference point values cannot be considered scientifically defensible. From a scientific point of view, the OLD/OLD and NEW/OLD options do not constitute the best scientific information available.

I declare under penalty of perjury that the foregoing is true and correct.

Executed in Woods Hole, Massachusetts, on this first day of April, 2002.

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Steven A. Murawski, Ph.D.
Chief, Population Dynamics Branch

Table 1. Summary of 2002-2003 Total Allowable Catches (TACs in metric tons [mt]) under various assumptions regarding analytical models, reference point values and control rules applied to the various New England groundfish stocks. Abbreviations as per footnotes.

Species/Stock	Model	Bmsy-Fmsy Values	Control Rule	2001 Biomass (thousand mt)	2001 % Bmsy	Bmsy (thousand mt)	Fishing Mortality rate (F)	TAC 2002 Calendar (mt)	TAC 2003 Calendar (mt)	Avg 2002-2003 Fishing Yr (mt)
Gulf of Maine Cod	OLD	OLD	A-9	18.4 TB	55.8	33.0 TB	0.30 BW	6,043	6,837	6,440
	NEW	OLD	A-9/ MSMC	28.0 TB	84.9	33.0 TB	0.31 BW (0.67 FR)	9,340	9,677	9,508
	NEW	NEW	A-9	19.6 SSB	23.6	82.8 SSB	0	0	0	0
	NEW	NEW	Rebuild	19.6 SSB	23.6	82.8 SSB	0.17 FR	2,884	4,196	3,540
Georges Bank Cod	OLD	OLD	A-9	160.8 TB	148.9	108.0 TB	0.32 BW	51,153	45,580	48,550
	NEW	OLD	A-9/ MSMC	34.5 TB	31.9	108.0 TB	0	0	0	0
	NEW	NEW	A-9	30.5 SSB	14.1	216.8 SSB	0	0	0	0
	NEW	NEW	Rebuild	30.5 SSB	14.1	216.8 SSB	0	0	0	0
	NEW	NEW	+ 1 Gen.	30.5 SSB	14.1	216.8 SSB	0.17 FR	4,503	5,083	4,793
Georges Bank Haddock	OLD	OLD	A-9	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	NEW	OLD	A-9/MSMC	80.6 SSB	76.8	105.0 SSB	0.14 FR	10,474	13,557	12,016
	NEW	NEW	A-9	80.6 SSB	32.2	250.3 SSB	0.00	0	0	0

	NEW	NEW	Rebuild	80.6 SSB	32.2	250.3 SSB	0.21 FR	15,483	19,191	17,337
Gulf of Maine Haddock	NEW	OLD	A-9	9.77	118.4	8.25 kg/tow	0.23 C/I	3,390	3,390	3,390
	NEW	NEW	Rebuild	9.77	44.1	22.17 kg/tow	0.21 C/I	3,135	3,320	3,228
Georges Bank Yellowtail	OLD	OLD	A-9	48.1 TB	98.2	49.0 TB	0.30 BW	14,930	14,090	14,510
	NEW	OLD	A-9/MMC	54.8 TB	111.8	49.0 TB	0.30 BW (0.41 FR)	16,100	14,000	15,050
	NEW	NEW	A-9	46.6 SSB	79.3	58.8 SSB	0.22 FR	9,386	9,402	9,394
	NEW	NEW	Rebuild	46.6 SSB	79.3	58.8 SSB	0.22 FR	9,386	9,402	9,394

SNE Yellowtail (all recruitment in projections for N-N-A-9 & N-N-Rebuild) SNE Yellowtail (just last 10 yrs in projections for N-N-A-9 & N-N-Rebuild)	OLD	OLD	A-9	24.2 TB	47.5	51.0 TB	0	0	0	0
	NEW	OLD	A-9/MSMC	16.7 TB	32.5	51.0 TB	0	0	0	0
	NEW	NEW	A-9	10.4 SSB	23.0	45.2 SSB	0	0	0	0
	NEW	NEW	Rebuild	10.4 SSB	23.0	45.2 SSB	0.22 FR	1,900	3,300	2,600
	OLD	OLD	A-9	24.2 TB	47.5	51.0 TB	0	0	0	0
	NEW	OLD	A-9/MSMC	6.8 TB	13.3	51.0 TB	0	0	0	0
	NEW	NEW	A-9	6.0 SSB	92.3	6.5 SSB	0.26 FR	1,200	1,300	1,250
	NEW	NEW	Rebuild	6.0 SSB	92.3	6.5 SSB	0.26 FR	1,200	1,300	1,250
Cape Cod Yellowtail	OLD	OLD	A-9	11.4 TB	78.9	14.0 TB	0.14 BW	1,570	1,673	1,622
	NEW	OLD	A-9/MSMC	3.0 TB	21.4	14.0 TB	0	0	0	0
	NEW	NEW	A-9	1.1 SSB	12.7	8.4 SSB	0	0	0	0
	NEW	NEW	Rebuild	1.1 SSB	12.7	8.4 SSB	0.15 FR	195	389	292
Mid-Atlantic Yellowtail	NEW	OLD	A-9/MSMC	0.08 kg/tow	0.7	11.69 kg/tow	0.106 C/I	1	3	2
	NEW	NEW	Rebuild	0.08 kg/tow	0.6	12.91 kg/tow	0.104 C/I	1	3	2

American Plaice	OLD	OLD	A-9	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	NEW	OLD	A-9/MSMC	15.9 SSB	65.7	24.2 SSB	0.18 FR	3,185	3,450	3,318
	NEW	NEW	A9=Rebuild	15.9 SSB	55.6	28.6 SSB	0.14 FR	2,437	2,741	2,589
Witch Flounder	OLD	OLD	A-9	<0.1 TB	0.02	21.0 TB	0	0	0	0
	NEW	OLD	A-9/ MSMC	30.5 TB	145.2	21.0 TB	0.14 BW (0.17 FR)	4,009	4,568	4,289
	NEW	NEW	A-9	22.7 SSB	114.2	19.9 SSB	0.16 FR	3,943	4,503	4,223
	NEW	NEW	Rebuild	22.7 SSB	114.2	19.9 SSB	0.16 FR	3,943	4,503	4,223
SNE Winter Flounder	OLD	OLD	A-9	35.1 TB	136.1	25.8 TB	0.32BW	11,160	10,170	10,665
	NEW	OLD	A-9/ MSMC	35.6 TB	138.0	25.8 TB	0.32 BW (0.59 FR)	11,562	11,027	11,295
	NEW	NEW	A-9	16.2 SSB	53.8	30.1 SSB	0.30 FR	5,663	7,599	6,631
	NEW	NEW	Rebuild	16.2 SSB	53.8	30.1 SSB	0.30 FR	5,663	7,599	6,631
Georges Bank Winter Flounder	OLD	OLD	A-9	7.6 TB	80.1	9.4 TB	0.38 BW	3,182	3,134	3,158
	NEW	OLD	A-9/MSMC	7.6 TB	80.1	9.4 TB	0.38 BW	3,182	3,134	3,158

	NEW	NEW	Rebuild	4.1 kg/tow	149.6	2.74 kg/tow	1.18 CI	6,182	6,182	6,182
Acadian Redfish 10 yrs+1 gen. +1 Generation	OLD	OLD	A-9	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	NEW	OLD	A-9	134.6	111.2	121.0	0.07 FR	9,371	9,762	9,567
	NEW	NEW	A-9	119.6	50.5	236.7	0.0127 FR	1,747	1,917	1,832
	NEW	NEW	Rebuild	119.6	50.5	236.7	.0145 FR	1,993	2,184	2,089
White Hake	OLD	OLD	A-9	11.8 TB	80.2	14.7 TB	0.25 BW	5,256	5,338	5,297
	NEW	NEW	Rebuild	4.12 kg/tow	34.3	12.0 kg/tow	0.323 C/I	946	1,157	1,052
Pollock	OLD	OLD	A-9	N/A	N/A	102.0 SSB	N/A	N/A	N/A	N/A
	NEW	NEW	Rebuild	1.07 kg/tow	35.7	3.0 kg/tow	4.21 C/I	4,071	4,786	4,429
N. Windowpane	NEW	OLD/ NEW	A-9	1.296 kg/tow	137.9	0.94 kg/tow	1.11 C/I	1,659	1,452	1,556
S. Windowpane	NEW	OLD	A-9	0.21 kg/tow	51.2	0.41 kg/tow	0.75 C/I	167	182	175
	NEW	NEW	Rebuild	0.21 kg/tow	51.2	0.92 kg/tow	0.53 C/I	118	144	131

Ocean Pout	OLD	OLD	A-9	2.19 kg/tow	44.7	4.9 kg/tow	0	0	0	0
	NEW	NEW	Rebuild	2.19 kg/tow	44.7	4.9 kg/tow	0.003 C/I	7	8	7
Halibut	OLD	OLD	A-9/ MSMC	U/K but low	U/K	5,400 TB	0	0	0	0

C/I = catch/survey Index
FR = fully-recruited (age-based) fishing mortality
BW=biomass-weighted fishing mortality
MSMC=Multispecies Monitoring Committee of the New England Fishery Management Council
TB = total stock biomass
SSB=spawning stock biomass