

3.0 Proposed Action

The Council intends to address a wide range of management issues through this amendment. In order to organize the measures proposed to address these issues, they are discussed in five broad categories:

- Clarification of status determination criteria and adoption of formal rebuilding programs for overfished stocks: The rebuilding programs in this section are the basis for development of management measures to rebuild overfished fisheries and end overfishing.
- Fishery program administration: measures developed to address issues that are primarily administrative in nature, though some may have biological, social, or economic impacts.
- Measures to reduce capacity: measures developed by the Council to control fishing capacity.
- Measures to achieve stock rebuilding: measures designed to comply with M-S Act requirements to rebuild overfished fisheries, and end overfishing where it is occurring.
- Measures that minimize, to the extent practicable, adverse effects of fishing on habitat
- Other issues: measures developed to alter restrictions on two exempted fisheries and one exempted gear.

3.1 Clarification of Stock Status, Status Determination Criteria and MSY Control Rules

This section establishes the underlying basis for the other management measures that are being considered. The criteria used to determine stock status and the target fishing mortality rates that result from the control rules and rebuilding strategies are used to define the biological objectives. Management measures - restrictions on fishing activity - are then designed to achieve those biological objectives. The stock biomass goals and maximum fishing mortality targets ultimately bound the catches that can be taken.

3.1.1 Reasons Clarification Is Necessary

Amendment 9 adopted overfishing definitions for the stocks managed by the Northeast Multispecies Fishery Management Plan (FMP) to bring the FMP into compliance with the requirements of the M-S Act. There has been considerable confusion, however, on the interpretation of the overfishing definitions adopted through Amendment 9. This confusion complicates the determination of stock status.

In brief, the Sustainable Fisheries Act amended the Magnuson-Stevens Act in 1996 to require that fishery management plans specify objective and measurable criteria for when the fishery to which the plan applies is overfished. The Council convened an Overfishing Definition Review Panel (Panel) in 1997 to provide the Council guidance on this requirement. The Panel reviewed existing overfishing definitions and concluded that many did not meet the new legal requirements, so revised overfishing definitions were recommended. The Panel's Overfishing Definition Report (OFD) was provided to the Council in June 1998 (Applegate et al. 1998) and the Council subsequently considered these recommendations for its management plans. The Council's adoption of new overfishing definitions was accomplished through the adoption of new FMPs or amendments to existing FMPs, and not merely by acceptance of the Panel's report. Amendment 9 to the Northeast Multispecies Fishery subsequently adopted overfishing definitions to meet SFA requirements that are based on the report of the Panel.

At the same time that the Panel was meeting, the National Marine Fisheries Service (NMFS) was updating its guidance on the National Standards Guidelines (NSGs) to reflect the changes in the SFA. Proposed guidelines were published on August 4, 1997, and the final guidelines were published on May 1, 1998. As a result of this timing, the Panel was only able to review the final guidelines at its last meeting. As a result, there are differences in terminology and approach between the final NSGs and the OFD. The OFD briefly discussed some of these differences, and also commented on the substance of the guidelines.

As a result of the differences among the first three documents, there has been considerable confusion on the interpretation of the Amendment 9 overfishing definitions and their use to determine stock status. Much of this confusion is because the three documents do not use the same terms, or use them in different ways. The following table lists the major differences.

OFD	Amendment 9
<ul style="list-style-type: none"> • Does not define when a stock is "overfished" • Does not define "overfishing" as when fishing mortality exceeds the threshold defined by the relevant control law • Use of "rebuilding period" differs from "rebuilding program" in NSG1 • "Minimum biomass threshold" is different than NSG1 "minimum stock size threshold" • Incorrectly interprets NSG1 guidance for stocks that cannot rebuild in ten years 	<ul style="list-style-type: none"> • According to a court ruling, defines "overfished" as when biomass is less than the target biomass • Does not define biomass threshold • Uses term "control laws" from OFD rather than "MSY control rules" as used in NSG1 • Does not state when numerical estimates of parameters will be updated • Does not define how index-based proxies are calculated • Maximum rebuilding period for halibut and redfish is not consistent with NSG1

Table 1 – Summary of inconsistencies between Applegate et al (1997), Amendment 9, and NSG1

Further complicating the situation was the application of different analytic techniques in March, 2002 to estimate status determination criteria parameters (NEFSC 2002a). These techniques resulted in suggestions to change both the parameters and numerical estimates of those parameters for all groundfish stocks. In some cases, the revised biomass targets were outside the range of stocks sizes observed during the assessment time horizon (generally since the 1960s). Consternation over these new targets, as well as other concerns over the science underpinning the amendment, led to a formal peer review of the biomass targets, stock assessments, and trawl surveys in February 2003. A formal independent peer review of revised biological reference points, stock assessments, and trawl surveys was conducted in February 2003. The report of that peer review is subject to differing interpretations.

The immediate issues that should be addressed are:

- (1) One sentence in a discussion paragraph in Amendment 9 states that a stock is overfished if the biomass is less than the biomass necessary to produce maximum sustainable yield (B_{MSY}). Since "overfished" is not defined in the report of the Panel, this apparently is an extension of the approach taken by the Panel that suggests fishing mortality should be reduced in order to increase stock size when the stock is at a biomass less than B_{MSY} (Applegate et al. 1998). This definition differs with the definition established by NMFS and published in the NSGs, which defines a stock as overfished when the biomass is less than the minimum biomass threshold.

(2) Amendment 9 defines threshold fishing mortality as less than or equal to the fishing mortality rate that can produce maximum sustainable yield and that varies with stock size. In the text and in Table 2 of Amendment 9, it states that overfishing occurs when the fishing mortality exceeds the threshold fishing mortality for a given stock size. Table 2 thus defines overfishing in terms of a control rule that takes into account the current stock biomass and the propensity of the stock to recover to MSY conditions within a specified time frame. Table 1 identifies the relevant biomass and fishing mortality targets and thresholds that define the key points on the control rules identified in Table 2. Table 1 includes a "threshold" fishing mortality, which is the maximum fishing mortality for a rebuilt stock and is not to be exceeded under any conditions. NMFS interprets the threshold fishing mortality in Table 1 as defining a maximum fishing mortality rate that does not vary with stock size, and uses that criteria to determine if overfishing is occurring.

(3) Amendment 9 defined stock reference points as parameters (such as " $1/2 B_{MSY}$ " or " F_{MSY} ") and listed current numerical estimates of these parameters. The amendment is not clear on when the numerical estimates of the parameters will be re-estimated. Numerical estimates of the parameters are typically re-evaluated during the Stock Assessment Workshops (SAW), and reviewed by the Stock Assessment Review Committee (SARC). There has been confusion over whether these re-estimates replace the values in Amendment 9.

(4) Some of the overfishing definitions in Amendment 9 are index-based proxies. The Council's Overfishing Definition Review Panel (Applegate et al 1998) recommended the use of a three year moving average when estimating stock status using index proxies, however, the Amendment is not clear on how those proxies are calculated – that is, are they based on an average or a one year value.

(5) The maximum rebuilding period for halibut and redfish should be corrected to reflect the NSG guidance for stocks that cannot rebuild in ten years or less in the absence of any fishing pressure.

(6) The *Final report of the Working Group on Re-Evaluation of Biological Reference Points for New England Groundfish* (NEFSC 2002a) applied different methods for evaluating status determination criteria, recommended changes to those criteria, and provided numerical estimates. This information needs to be incorporated into the management plan in some fashion.

In order to minimize confusion, the Council establishes the following status determination criteria and MSY control rules for the Northeast Multispecies Fishery.

3.1.2 When is a stock overfished?

A stock is "overfished" when the actual size of the stock or stock complex in a given year falls below the minimum stock size threshold or reasonable proxy thereof. This is consistent with current guidance in NSG1. If this definition is not consistent with future revisions in NSG1, the Council will make necessary changes through a framework action.

Rationale: This statement clarifies when a stock is overfished and is consistent with current NMFS guidance.

3.1.3 When is overfishing occurring?

"Overfishing" occurs when the fishing mortality rate exceeds the maximum fishing mortality threshold for a period of one year. These maximum fishing mortality thresholds are shown in Table 2. Requirements for Council action are specified in NSG1. If this definition is not consistent with future revisions to NSG1, the Council will make necessary changes through a framework action.

Rationale: Under the proposed definition, overfishing occurs when the fishing mortality rate exceeds the maximum fishing mortality threshold for a period of one year. This value remains constant over the range of possible stock sizes. From a management standpoint, the proposed action is easy to administer, since the point at which overfishing occurs remains constant. In addition, it is consistent with the current NS1 guidelines.

3.1.4 Optimum Yield

No changes are being made to the definition of optimum yield as justified in Amendment 9 and approved by NMFS with approval of that document. Optimum yield for a stock is achieved when fishing at the target fishing mortality for a given stock size.

3.1.5 Maximum Sustainable Yield

Maximum sustainable yield (MSY) is defined by the National Standards Guidelines (NSGs) (50 CFR 600.310) as the largest long-term average catch or yield that can be taken from a stock or stock complex under prevailing ecological and environmental conditions. If possible, MSY must be defined for each stock. The current estimates of MSY shown in Table 4 for groundfish stocks are based on the *Final Report of the Working Group on Re-Evaluation of Biological Reference Points for New England Groundfish* (NEFSC 2002a). These MSY estimates will only be possible if stocks rebuild to the target biomass recommended in the report.

3.1.6 Status Determination Criteria

Discussion: Status determination criteria define appropriate biomass and fishing mortality levels for the stock to insure sustainable harvests. The NSGs (50 CFR 600.310) require specification of two criteria: a minimum stock size threshold (or a proxy), and the maximum fishing mortality threshold (or a proxy). Minimum stock size thresholds are often specified as some fraction of the biomass level that will produce MSY (B_{MSY}). B_{MSY} is commonly referred to as the *biomass target*, though this term is not used or defined in the NSGs and at present there is no explicit requirement to specify this value. According to the NSGs, the minimum stock size threshold should be equal to the greater of the following: one-half the MSY stock size, or the minimum stock size at which rebuilding to the MSY level would be expected to occur within ten years if the stock or stock complex were exploited at the maximum fishing mortality threshold specified. The maximum fishing mortality threshold is frequently based on the fishing mortality rate (F) that produces MSY (F_{MSY}).

These criteria were first defined in Amendment 9 to the Northeast Multispecies FMP. For most stocks, Amendment 9 defined criteria such as BMSY and FMSY based on the results of surplus production models, as developed and explained in Applegate et al (1998). Since adoption of these criteria, a number of technical limitations have emerged that are detailed in the *Final Report of the Working Group on Re-Evaluation of Biological Reference Points for New England Groundfish* (NEFSC 2002a). To briefly summarize the major issues:

- A need to make the reference points as consistent as possible with the age-based assessments used for many groundfish stocks. Reference points based on surplus production models could not be used for stocks with age-based assessments.

- Estimates of B_{MSY} generated by surplus production methods tend to be limited to the range of observed values. For fisheries such as groundfish that have been heavily exploited for a considerable period of time, this may under-estimate the true potential of the stock.
- Several authors have suggested that when estimating management parameters, a wide range of candidate models and approaches should be evaluated.
- Since the adoption of the original status determination criteria, a more thorough understanding of the NSGs has evolved.

Action: As a result of these issues, the Council proposes to amend status determination criteria for multispecies stocks. Status determination criteria are defined as parameters that identify a specific biological element of a stock. The defined parameter should not be confused with the numerical estimate of that parameter. For most stocks with age-based assessments, the parameters are based on spawning stock biomass at MSY (SSB_{MSY}) as a proxy for B_{MSY} , and fully-recruited fishing mortality that produces MSY (F_{MSY}). Estimates for F_{MSY} may be based on proxy fishing mortality rates (such as F40% or F50%). For those stocks without an age-based assessment, trawl survey indices and exploitation indices (landings divided by trawl survey index) are used as proxies for B_{MSY} and F_{MSY} . The proxy for stock size usually uses a three-year average of the survey index; for halibut, a five-year moving average is used. Relative fishing mortality rates are calculated based on the catch divided by the stock size estimate. The calculation of the three-year (or other time period) moving average will be documented in the baseline assessment performed by a SARC. That method will be used until an alternate is approved through a peer reviewed process (SARC or other peer review).

The third element of the status determination criteria is the minimum biomass threshold. Amendment 9 included minimum biomass thresholds that were less than $\frac{1}{2} B_{MSY}$, the recommended lower limit specified in the National Standards Guidelines (NSGs). Applegate et al. (1998) concluded that this was justified because of the rebuilding potential of many groundfish stocks, but also recommended that if a stock falls below this level, fishing mortality be reduced to as close to zero as possible. Minimum biomass thresholds of less than $\frac{1}{2} B_{MSY}$ are not consistent with the NSGs.

The status determination criteria parameters for groundfish stocks are as shown in Table 2. This table reflects changes to the parameters and increases all minimum biomass thresholds to at least half the target biomass.

3.1.6.1 Revisions to status determination criteria

Section 303(a)(10) of the M-S Act assigns the drafter of a fishery management plan the responsibility for specifying the objective and measurable criteria (e.g. status determination criteria) for determining when a fishery is overfished:

"Any fishery management plan which is prepared by any Council, or by the Secretary, with respect to any fishery, shall—

** * **

(10) specify objective and measurable criteria for identifying when the fishery to which the plan applies is overfished (with an analysis of how the criteria were determined and the relationship of the criteria to the reproductive potential of stocks of fish in that fishery)... "

Some confusion has resulted from a failure to adhere to the principle that it is a Council responsibility to establish the criteria for determining stock status. Amendment 9

implemented status determination criteria for groundfish stocks, generally using the parameters of B_{MSY} and biomass-weighted F_{MSY} . Since approval of Amendment 9, various scientific panels have recommended the use of different parameters such as SSB_{MSY} , fully-recruited fishing mortality, or an index-based proxy. While the Council has never formally adopted any of these other parameters, the NMFS has used the scientific recommendation as the basis for determining stock status. As a result, status determinations have been based on criteria that have not been reviewed, subject to public comment, implemented, or even formally approved by the NMFS. This creates considerable uncertainty over exactly what criteria is being used to evaluate performance of the management plan.

Action: Over time, development of new analytic techniques or additional data may result in scientific advice recommending changes to the status determination criteria parameters. In order to comply with M-S Act requirements that status determination criteria be determined by the Council, a Council action is necessary to change the status determination criteria parameters. The types of changes that will require a Council action include:

- Changing the parameter (such as using B_{MSY} instead of SSB_{MSY} , or biomass weighted F instead of fully recruited F , or an index-based measure rather than a B_{MSY} or SSB_{MSY} , or an index based on a different part of the stock)
- Substituting a biomass ratio (such as an ASPIC production output ratio of B/B_{MSY}) rather than using units defined in the parameter (such as metric tons of SSB or total biomass)

If a report is received suggesting a change in the parameters (such as a SARC Advisory Report or other document), the change will be submitted to the Council for review and adoption through a framework or other management action. Determinations of stock status will be based only on approved and implemented criteria – that is, changes suggested by the SARC Advisory Report or other document will not be used to determine stock status until adopted through a Council amendment or framework action. As noted in earlier paragraphs, the parameter should not be confused with its numerical estimate.

This is not a change from the current system as understood by the Council and required by law. It is merely a clear statement on how changes to parameters will be adopted. Changes to the fundamental parameters should not be confused with changes in the numerical estimates of those parameters. In essence, changes to Table 2 require a Council action, but changes to the numerical estimates in Table 4 do not. The exception to the latter will be any changes that result from the 2008 review of status determination criteria (described in section 3.1.7).

Stock	Biomass Target	Minimum Biomass Threshold	Maximum Fishing Mortality Threshold	Fishing Mortality Target
GOM Cod	SSB _{MSY}	½ Btarget	F _{MSY}	75% of F _{MSY}
GB Cod	SSB _{MSY}	½ Btarget	F _{MSY}	75% of F _{MSY}
GB Haddock	SSB _{MSY}	½ Btarget	F _{MSY}	75% of F _{MSY}
GOM Haddock	B _{MSY} Proxy/Fall Trawl Survey Index	½ Btarget	F _{MSY} Proxy/Relative Exploitation Index	75% of F _{MSY}
GB Yellowtail Flounder	SSB _{MSY}	½ Btarget	F _{MSY}	75% of F _{MSY}
Cape Cod/GOM Yellowtail Flounder	SSB _{MSY}	½ Btarget	F _{MSY}	75% of F _{MSY}
SNE/MA yellowtail flounder	SSB _{MSY}	½ Btarget	F _{MSY}	75% of F _{MSY}
American Plaice	SSB _{MSY}	½ Btarget	F _{MSY}	75% of F _{MSY}
Witch Flounder	SSB _{MSY}	½ Btarget	F _{MSY}	75% of F _{MSY}
Gulf of Maine Winter Flounder	SSB _{MSY}	½ Btarget	F _{MSY}	75% of F _{MSY}
GB Winter Flounder	B _{MSY}	½ Btarget	F _{MSY} ⁽¹⁾	75% of F _{MSY}
SNE/MA Winter Flounder	SSB _{MSY}	½ Btarget	F _{MSY}	75% of F _{MSY}
Acadian Redfish	SSB _{MSY}	½ Btarget	F _{50%} proxy for F _{MSY}	75% of F _{MSY}
White Hake	B _{MSY} Proxy/Fall Survey Index (> 60 cm fish)	½ Btarget	F _{MSY} Proxy/Relative Exploitation Index (> 60 cm fish)	75% of F _{MSY}
Pollock	B _{MSY} Proxy/ Fall Survey Index	½ Btarget	F _{MSY} Proxy/ Relative Exploitation Index	75% of F _{MSY}
Windowpane Flounder (North)	B _{MSY} Proxy/Fall Survey Index	½ Btarget	F _{MSY} Proxy/Relative Exploitation Index	75% of F _{MSY}
Windowpane Flounder (South)	B _{MSY} Proxy/Fall Survey Index	½ Btarget	F _{MSY} Proxy/Relative Exploitation Index	75% of F _{MSY}
Ocean Pout	B _{MSY} Proxy/Fall Survey Index	½ Btarget	F _{MSY} Proxy/Relative Exploitation Index	75% of F _{MSY}
Atlantic Halibut	B _{MSY}	½ Btarget	F _{MSY} ⁽¹⁾	75% of F _{MSY}

Table 2 – Proposed status determination criteria parameters for groundfish stocks.

Fully recruited fishing mortality unless otherwise noted. See text for calculation of B_{MSY} proxy based on trawl survey index, and F_{MSY} proxy based on exploitation index.

1. Biomass weighted fishing mortality

3.1.6.2 Numerical Estimates of Status Determination Criteria

3.1.6.2.1 Overview

In order to provide an objective basis for measurement, numerical values of the status determination parameters must be estimated. In addition to suggesting that parameters for most stocks should be based on SSB_{MSY} or fully-recruited fishing mortality, NEFSC 2002a reviewed the technical basis for the status determination criteria and developed point estimates for nineteen of twenty groundfish stocks. There are significant differences in the point estimates for both target biomass and fishing mortality thresholds between NEFSC 2002a and the approach used by Applegate et al. 1997 (as updated). For many stocks, the target biomass increased and the fishing mortality threshold decreased.

With respect to target biomass levels, NEFSC 2002a notes that the new estimates rely on recruitment distributions that are either near the long-term mean or that are correlated with increases in projected spawning stock biomasses. NEFSC 2002a also reported:

"For many of the stocks the proposed biomass reference points are in *terra incognita* – chronic growth overfishing has limited stock biomasses to well below their estimated potential. Given the lack of experience in observing these populations at high biomass, we can only model the expected behavior of the system under varying assumptions. The NEFMC is advised that an adaptive approach to biomass management is a prudent tactic to explore the implications of higher biomasses and to find the point of diminishing returns to yields as a function of increased stock density. The adaptive approach recommended is to build the spawning stock biomasses by reducing fishing mortality (or in some cases maintaining current rates) such that the realized recruitments at high spawning stock biomasses are observed. This will allow direct examination of recruitment associated with maximum sustainable yield and thus the appropriateness of recruitment levels used to set biomass reference points.

Given the histories of most of these stocks, there is likely substantial biomass growth and commensurate increases in catch, before these points are reached. Continued monitoring of vital population rates - including growth, sexual maturity at age, feeding habits to reveal predation and competition among populations, and distribution patterns in relation to abundance – will indicate when biomass production becomes limited by density-dependent factors... Thus, the panel recommends that the NEFSC adopt the revised biological reference points recommended herein, and evaluate the rebuilding process at periodic intervals."

The Council referred NEFSC 2002a to its Science and Statistical Committee (SSC) for review and advice on how to incorporate the reports recommendations into groundfish management. Noting the extensive amount of scientific work represented in the report, the SSC concluded it was the most comprehensive treatment of the subject of overfishing and rebuilding reference points yet produced. The SSC went on to say:

"In general, we believe this report provides useful information for management decision making. Additional work is needed specifically to explore the implications of uncertainty in the stock recruitment relationship."

In February 2003, the proposed reference points were reviewed by a panel of scientists. This panel did not prepare a consensus summary – instead, each panelist prepared an individual report and the chair summarized the key elements in an executive summary (Payne et al 2003). Some common themes concerning the status determination criteria in most of the individual reports include the following:

- The analytic methods used in NEFSC 2002a are generally sound, though some could be improved or were misapplied in specific situations.
- There is considerable uncertainty over the reference points recommended in NEFSC 2002a – particularly biomass targets – partly as a result of available data.
- The current management system places great reliance on accurate biomass targets. The Council should carefully consider the risks of adopting high biomass targets.
- Because of these risks, an adaptive approach should be considered.

The reports are not clear on what is meant by an "adaptive" approach, with at least two different descriptions used by the reviewers. One form suggested is to establish a biomass target that moves towards those suggested by NEFSC 2002a but that lies within, or just above, the range of observed biomass. Another form suggested is to monitor stock increases through identified waypoints and evaluate the accuracy of the biomass targets based on progress through those waypoints.

3.1.6.2.2 Revised Estimates

Discussion: In order to provide an objective basis for measurement, numerical values of the status determination parameters must be estimated. NEFSC 2002a reviewed the technical basis for the status determination criteria and developed recommended point estimates for nineteen of twenty groundfish stocks. There are significant differences in the point estimates for both target biomass and fishing mortality thresholds between NEFSC 2002a and the approach used by Applegate et al. 1997 (as updated). For many stocks, the target biomass increased and the fishing mortality threshold decreased.

Action: The Council will adopt the numerical estimates of the status determination criteria that were determined by NEFSC 2002a. For GOM winter flounder, the criteria were determined by SAW 36, and for white hake, the GARM (NEFSC 2002b) provided additional information. These values are shown in Table 4.

Stock	Biomass Target (B_{MSY} or proxy)		Fishing Mortality Threshold (F_{msy})		Basis for Reference Points
	Amend- ment 9	NEFSC 2002A/ Proposed	Amend- ment 9	NEFSC 2002A/ Proposed	
Gulf of Maine Cod	22,100 ¹	82,800	0.27 ⁴	0.23	Parametric S-R
Georges Bank Cod	83,500 ¹	216,800	0.32 ⁴	0.18	Parametric S-R
Georges Bank Haddock	105,000	250,300	0.26	0.26 (F40%)	Empirical Non-parametric
Gulf of Maine Haddock	8.25 kg/tow	22.17 kg/tow	0.29 (C/I)	0.23 (C/I)	Catch-Survey Proxy
Georges Bank Yellowtail Flounder	35,200 ¹	58,800	0.33 ⁴	0.25 (F40%)	Empirical Non-parametric
Southern New England/Mid-Atlantic Yellowtail Flounder	36,600 (SNE YTF only)	69,500	0.23 ⁴	0.26 (F40%)	Empirical Non-parametric
Cape Cod/GOM Yellowtail Flounder	4,200 ¹ (CC YTF)	12,600	0.40 ⁴	0.17 (F40%)	Empirical Non-Parametric (mean)
American Plaice	24,200	28,600	0.19	0.17 (F40%)	Empirical Non-parametric (mean)

Table 3 – Summary of current, recommended/proposed (NEFSC 2002A) biomass and fishing mortality rate reference points for New England groundfish stocks.

All proposed biomass targets are in spawning stock biomass units or trawl survey indices unless otherwise noted. All recommended fishing mortality thresholds are in fully-recruited fishing mortality unless otherwise noted.

1. Biomass target established based on total biomass; value shown is SSB equivalent, metric tons
2. Total biomass, metric tons
3. Unit is total stock biomass for fish ≥ 60 cm., mt
4. Unit is biomass weighted F

Stock	Biomass Target		Fishing Mortality Threshold (Fmsy)		Basis for Reference Points
	Amendment 9	NEFSC 2002A/ Proposed	Amendment 9	NEFSC 2002A/ Proposed	
Witch Flounder	21,800 ¹	25,240 (SAW 37)	0.106 ⁴	0.23 (F40%)	Empirical Non-Parametric (mean)
Southern New England Winter Flounder	11,800 ¹	30,100	0.37 ⁴	0.32	Parametric S-R
Georges Bank Winter Flounder	2.49 kg/tow	9,400 ²	1.21 (C/I)	0.32 ⁴	Surplus Production
GOM Winter Flounder	NA	4,100	NA	0.43	Parametric S-R
Acadian Redfish	108,000 ¹	236,700	0.116 ⁴	0.04 (F50%)	Empirical Non-Parametric (mean upper Q)
White Hake ⁵	14,700	14,700 ^{3/} 7.70 kg/tow	0.29 ^{4/} 0.55 C/I	0.29 ⁴	Surplus Production
Pollock	102,000	3.0 kg/tow	0.65 ¹	5.88 (C/I)	Catch-Survey proxy
N. Windowpane	0.94 kg/tow	0.94 kg/tow	1.11 (C/I)	1.11 (C/I)	Catch-Survey proxy
S. Windowpane	0.41 kg/tow	0.92 kg/tow	2.24 (C/I)	0.98 (C/I)	Catch-Survey Proxy
Ocean Pout	4.9 kg/tow	4.9 kg/tow	0.31 (C/I)	0.31 (C/I)	Catch-Survey Proxy
Atlantic Halibut	5,400 ²	5,400 ²	0.06	0.06	Catch-YPR proxy

Table 3 (cont.) – Summary of Amendment 9, recommended/proposed (NEFSC 2002A) biomass and fishing mortality rate reference points for New England groundfish stocks.

All proposed biomass targets are in spawning stock biomass units or trawl survey indices unless otherwise noted. All recommended fishing mortality thresholds are in fully-recruited fishing mortality unless otherwise noted.

1. Biomass target established based on total biomass; value shown is SSB equivalent, metric tons
2. Total biomass, metric tons
3. Unit is total stock biomass for fish >= 60 cm., mt
4. Unit is biomass weighted F
5. Survey based equivalents developed by GARM 2002

SPECIES	STOCK	NUMERICAL ESTIMATE OF STATUS DETERMINATION CRITERIA				
		B _{TARGET} (metric tons)	B _{THRESHOLD} (metric tons)	F _{MSY} (Maximum fishing mortality)	F _{target} (at biomass target)	MSY (metric tons)
COD	GB	216,800	108,400	0.18	0.14	35,200
	GOM	82,800	41,400	0.23	0.17	16,600
HADDOCK	GB	250,300	125,150	0.26	.20	52,900
	GOM	22.17 kg/tow	11.09 kg/tow	0.23C/l	0.17 C/l	5,100
YELLOWTAIL FLOUNDER	GB	58,800	29,400	0.25	0.19	12,900
	SNE/MA	69,500	34,750	0.26	0.20	14,200
	CC/GOM	12,600	6,300	0.17	0.13	2,300
AMERICAN PLAICE		28,600	14,300	0.17	0.13	4,900
WITCH FLOUNDER		25,240	12,620	0.23	0.17	4,375
WINTER FLOUNDER	GB	9,400(1)	4,700	0.32	0.24	3,000
	GOM	4,100	2,050	0.43	0.32	1,500
	SNE/MA	30,100	15,050	0.32	0.24	10,600
REDFISH		236,700	118,350	0.04	0.03	8,200
WHITE HAKE ³		14,700(2) 7.70 kg/tow	7,350 3.35 kg/tow	0.29 0.55 C/l	0.22 0.41 C/l	4,200
POLLOCK		3.0 kg/tow	1.5 kg/tow	5.88 C/l	4.41 C/l	17,600
WINDOWPANE FLOUNDER	North	0.94 kg/tow	0.47 kg/tow	1.11 C/l	0.83	1,000
	South	0.92 kg/tow	0.46 kg/tow	0.31 C/l	0.23 C/l	900
OCEAN POUT		4.9 kg/tow	2.95 kg/tow	0.31 C/l	0.23 C/l	1,500
ATLANTIC HALIBUT		5,400(1)	2,700	0.06	0.4	300

Table 4 - Numerical estimates of status determination criteria for the Multispecies FMP.

These estimates will be periodically updated through the assessment process and adopted through Council action. Option. Refer to Table 3 to determine units.

- 1) Biomass level based on total biomass
- 2) > 60 cm fish
- 3) Survey based equivalents from GARM 2002

3.1.7 Review of Status Determination Criteria

Discussion: Regardless which biomass targets are selected, there is a need to plan for review of the targets. Any adaptive approach to the determination of biomass targets for rebuilding stocks requires periodic review of the performance of stock status and changes in vital rates that may influence the attainment of biomass goals. This option sets forth a process to monitor and review the pace of stock rebuilding of overfished resources and some population attributes to be considered in such reviews.

NEFSC 2002a proposed that an adaptive approach be used to periodically evaluate the ability of the stock to attain the target biomass for stocks whose biomass targets are set at levels higher than that observed in the time series of abundance indices. Specifically, information on the following population parameters is available for many of the important groundfish species:

- length and weight at age
- condition factor (weight in relation to length)
- maturity-at-age
- stomach contents
- relative abundance
- recruitment
- spawning biomass
- environmental conditions (temperature, salinity)
- geographic distribution
- ecosystem interactions as a condition of status determinations
- simultaneous achievement of all stocks to the B_{MSY} level

Changes in one or more of these parameters may influence the ability of the stock to reach target spawning biomasses, and the time frame necessary to reach the target. Considerations in conducting such reviews are the ability to discern trends in parameters from normal year-to-year variation (due to sampling variability), and the development of a process to conduct and peer review such analyses. The critical technical issue is the ability to discern if and when density dependence in growth, maturity and natural mortality is occurring, and the implications of density dependence for biomass targets. Likewise, if long-term environmental conditions influence resource productivity, they may also influence target biomasses.

Action: Based on the above considerations, a four to five year review cycle will be used for re-evaluation of biomass reference points for these stocks. This would allow a “mid course” evaluation in 2008, with respect to the 2014 rebuilding time frames for most of the groundfish stocks. If the review is undertaken in 2008, there will be five additional observations of year class strength, and associated population and environmental data (e.g. through 2007). The review of these reference points should be synchronized to the schedule for “benchmark” assessments if possible, so that adequate technical review is afforded to the assessment basis for evaluating reference points.

The structure of such analyses and peer review can take many forms – a working group with integrated external peer review (similar to the structure used for the 2002 re-evaluation), or a two part analyses and peer review process. Because (presumably) there will not be the complicating factors of timing with regards to court orders, the latter process is considered preferable. The working group will include a wide cross section of technical experts, including representatives from the NEFMC and MAFMC staffs and state agencies. The proposed working group could include a wide cross section of experts. A peer review of the WG report could be conducted by NMFS headquarters (Office of Science and Technology), the CIE, or other appropriate scientific entity. Composition of the working group and formation of the peer review

must be approved by the Council and NMFS. For this review, any updated numerical estimates will be adopted through a Council management action (amendment or framework adjustment).

As noted in section 3.4.2.2 below, an assessment update of the groundfish complex will be conducted in 2005 for potential management action in 2006. This assessment will include a full and independent review of an age-structured production model developed by Dr. Doug Butterworth. This assessment update will not update the numerical estimates of status determination criteria unless the review of Dr. Butterworth's work justifies reconsideration. Benchmark assessments, including a review of the status determination criteria, will be conducted in 2008 for implementation in 2009. Both the update assessments in 2005 and the benchmark assessments in 2008 will be subject to peer review by independent scientists.

3.1.8 MSY Control Rules

"MSY control rules" required by the NSGs provide advice to the Council on fishing mortality rates that are likely to achieve MSY in the long-term. During the development of management alternatives, the Council will use these MSY control rules as guidance for determining biological goals for management actions. Management measures, however, will be developed only after consideration of all biological, economic, and social goals of the management plan and consistent with all National Standards. The MSY control rules proposed in this amendment are based on the control rules promulgated in Amendment 9 because development of new MSY control rules were not included in the Terms of Reference for NEFSC 2002a. They will become effective on implementation of the Amendment. The Council will review these control rules in the future and may revise them if necessary through a future management action.

The Council will use the fishing mortality rates in Table 5 as a guide for management actions and will strive to achieve the mortality targets associated with these control rules. At a minimum, the Council will design management measures to lower fishing mortality to less than the fishing mortality defined by the MSY control rule, and will strive to achieve the fishing mortality target specified in Table 2 as applied to the MSY control rule mortality for the current stock biomass. There is no time line associated with achieving the fishing mortality rates associated with these control rules. The Council does not intend that exceeding these thresholds or targets will be classified as overfishing (unless the fishing mortality rate also exceeds the maximum fishing mortality threshold listed in Table 2, consistent with when overfishing occurs). Optimum yield is defined in Amendment 9 as fishing at the target fishing mortality for the current biomass. Fishing mortality rates that exceed the thresholds defined in Table 5 over the long-term will not be consistent with the management plan and will require Council action because optimum yield is not being achieved. For overfished stocks, the Council may implement a mortality reduction and rebuilding plan that differs from the MSY control rule but that achieves the rebuilding objectives of the FMP. This rebuilding plan will be developed in a framework or amendment to achieve biological, economic, and social objectives. Such a plan will rebuild overfished stocks or stock complexes consistent with legal requirements.

Discussion: This measure clarifies the parameters used for status determination criteria, consistent with the definitions that define overfishing and when a stock is overfished. Table 5 treats all groundfish stocks on a consistent basis with respect to MSY control rules, as opposed to Amendment 9, which applied different rebuilding trajectories for stocks that are not overfished.

3.1.9 Maximum Rebuilding Period

Consistent with the NSGs, the maximum rebuilding period for any stock that cannot rebuild in ten years or less in the absence of any fishing mortality will be the time it will take to rebuild in the absence of fishing mortality, plus one mean generation. If necessary to comply with future revisions to the NSGs, this definition will be modified through a future Council action.

Rationale: This change makes the multispecies management plan consistent with the National Standards guidelines.

SPECIES	STOCK	MSY CONTROL RULE
COD	GB	F calculated to rebuild to B_{msy} in 10 years when $\frac{1}{2} B_{msy} < B < B_{target}$
	GOM	F calculated to rebuild to B_{msy} in 10 years when $\frac{1}{2} B_{msy} < B < B_{target}$
HADDOCK	GB	F calculated to rebuild to B_{msy} in 10 years when $\frac{1}{2} B_{msy} < B < B_{target}$
	GOM	F calculated to rebuild to B_{msy} in 10 years when $\frac{1}{2} B_{msy} < B < B_{target}$
YELLOWTAIL FLOUNDER	GB	F calculated to rebuild to B_{msy} in 10 years when $\frac{1}{2} B_{msy} < B < B_{msy}$
	SNE	F calculated to rebuild to B_{msy} in 10 years when $\frac{1}{2} B_{msy} < B < B_{msy}$
	MID-Atl.	F calculated to rebuild to B_{msy} in 10 years when $\frac{1}{2} B_{msy} < B < B_{target}$
	Cape Cod	F calculated to rebuild to B_{msy} in 10 years when $\frac{1}{2} B_{msy} < B < B_{target}$
AMERICAN PLAICE		F calculated to rebuild to B_{msy} in 10 years when $\frac{1}{2} B_{msy} < B < B_{target}$
WITCH FLOUNDER		F calculated to rebuild to B_{msy} in 10 years when $\frac{1}{2} B_{msy} < B < B_{target}$
WINTER FLOUNDER	GB	F calculated to rebuild to B_{msy} in 10 years when $\frac{1}{2} B_{msy} < B < B_{target}$
	GOM	F calculated to rebuild to B_{msy} in 10 years when $\frac{1}{2} B_{msy} < B < B_{msy}$
	SNE/MA	F calculated to rebuild to B_{msy} in 10 years when $\frac{1}{2} B_{msy} < B < B_{msy}$
REDFISH		F calculated to rebuild to B_{msy} in 10 years when $\frac{1}{2} B_{msy} < B < B_{target}$
WHITE HAKE		F calculated to rebuild to B_{msy} in 10 years when $\frac{1}{2} B_{msy} < B < B_{msy}$
POLLOCK		F calculated to rebuild to B_{msy} in 10 years when $\frac{1}{2} B_{msy} < B < B_{target}$
WINDOWPANE FLOUNDER	North	F calculated to rebuild to B_{msy} in 10 years when $\frac{1}{2} B_{msy} < B < B_{target}$
	South	F calculated to rebuild to B_{msy} in 10 years when $\frac{1}{2} B_{msy} < B < B_{target}$
OCEAN POUT		F calculated to rebuild to B_{msy} in 10 years when $\frac{1}{2} B_{msy} < B < B_{target}$
ATLANTIC HALIBUT		F=0 until stock is rebuilt (provisional control law)

Table 5 - MSY control rules

For all stocks, when stock size is less than the threshold biomass the F will be as established by the formal rebuilding program.