Northeast Multispecies Fishery Management Plan
Evolution of Mortality Control Rules

I. Atlantic Groundfish Fishery Management Plan (1978)

No specific control rules adopted. Three mortality targets were discussed: F_{max}, F_{MSY} and $F_{0.1}$ Quotas for cod, haddock, and yellowtail flounder were based on F_{max} and $F_{0.1}$ after taking into account economic concerns. No mortality targets were adopted for other stocks.

II. Northeast Multispecies Fishery Management Plan (1986)

Mortality targets based on MSP. Generally adopted $F_{20\%MSP}$ for most stocks, $F_{30\%MSP}$ for GB haddock and redfish due to depressed stock size. No specific minimum biomass thresholds adopted, but ranges of biomass were categorized as "preferred", "warning", or "danger" zones.

III. Amendment 5 (1994)

Adopted $F_{20\%MSP}$ for pollock, and a three-year moving average of the bottom trawl survey abundance index for red hake, white hake, ocean pout, and windowpane flounder.

IV. Amendment 7 (1996)

Adopted $F_{0.1}$ as the objective for GB cod, haddock, yellowtail flounder, and SNE yellowtail flounder, and F_{max} for GOM cod. Adopted minimum spawning stock thresholds for GB cod, haddock, and yellowtail flounder, and SNE yellowtail flounder.

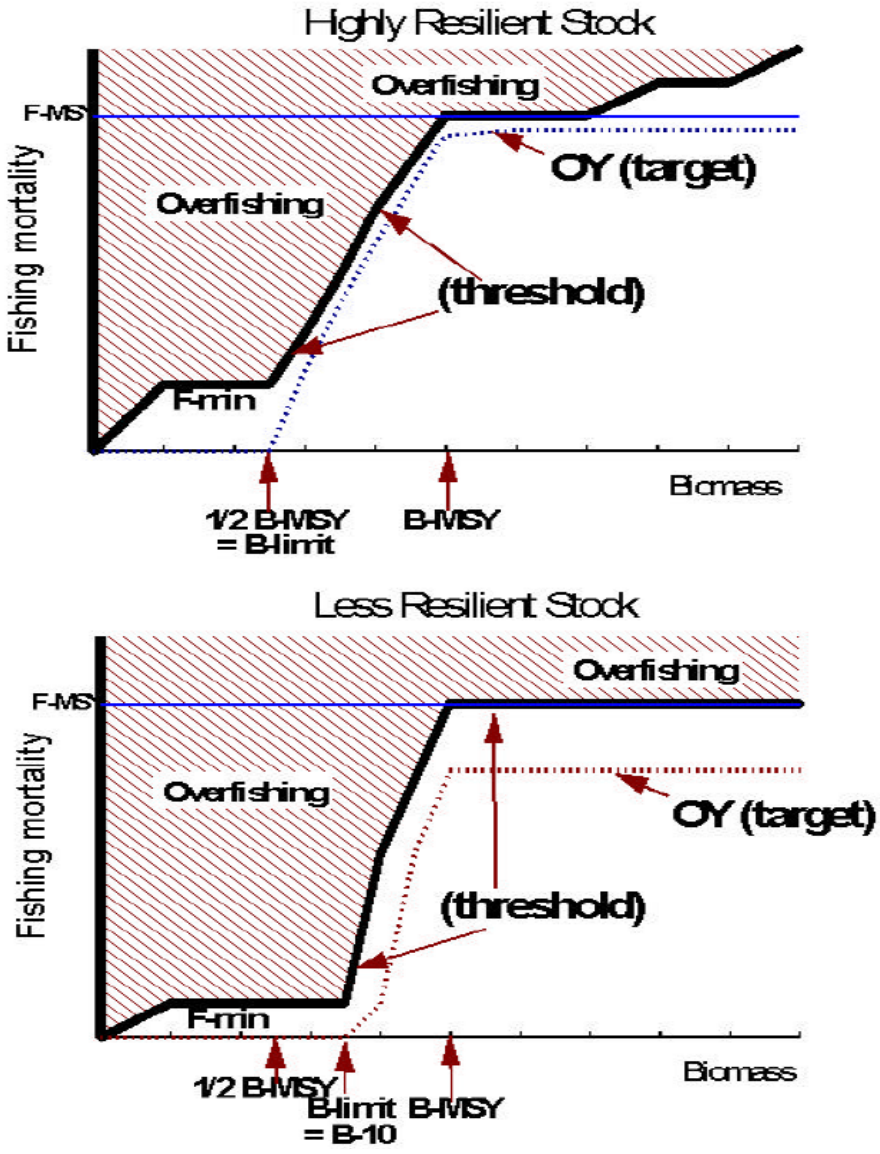
STOCK	SPAWNING STOCK THRESHOLD (metric tons)	SPAWNING STOCK (year) (metric tons)
Georges Bank cod	70,000	25,400 (1994) 37,200 (1993)
Georges Bank haddock	80,000	21,000 (1995)
Georges Bank yellowtail flounder	10,000	4,400 (1994) 3,000 (1993)
Gulf of Maine cod	NA	8,100 (1994) 9,400 (1993)
Southern New England yellowtail flounder	10,000	1,052 (1993) 1,300 (1992)

V. Amendment 9 (1999)

Adopted status determination criteria consistent with Sustainable Fishery Act (SFA) requirements for all groundfish stocks. Fishing mortality limits and biomass targets and thresholds were adopted. MSY control rules were adopted that were based on Applegate et al (1998). The general form of the adopted control rules are shown below for a highly

resilient stock and a less resilient stock. For many stocks these control rules and reference points were based on surplus production models.

A key element of the MSY control rules was that the maximum fishing mortality limit declined as stock size declined from $B_{MSY.}$ The decline was based on rebuilding potential of the stock. Target fishing mortality rates were a percentage of the threshold (usually the lower 80th percentile of the F_{MSY} estimate or a percentage of the fishing mortality limit). Optimum yield was defined as fishing at this target fishing mortality rate. The control rules adopted a different overfishing limit based on stock size, but this was never implemented by NOAA (NOAA considered overfishing as exceeding F_{MSY} , regardless of stock size).



VI. Amendment 13 (2004)
This amendment addressed several issues that developed over the use of the Amendment 9 reference points and control rules. In addition, NEFSC (2002) proposed new fishing mortality limits and biomass reference points that needed to be implemented. NEFSC (2002) did not propose new MSY Control rules or target fishing mortality limits.

With respect to the MSY control rules, Amendment 13 made the following changes:

- Consistent with NSG guidance, overfishing was defined as a mortality exceeding F_{MSY} , regardless of stock size.
- Status determination criteria were (usually) based on SSB_{MSY} and fully-recruited fishing mortality. The exception was for stocks with index-based assessments.
- All minimum biomass thresholds were set at ½ the biomass target.
- Stocks that were not overfished or not in a rebuilding plan were subject to the mortality specified by the MSY control rule. Stocks in a rebuilding plan subject to the mortality specified by the adopted rebuilding plan's mortality schedule. (Because so many stocks were in formal rebuilding programs, the latter requirements outweighed the MSY control rules when it came to the design of effort controls).
- All fishing mortality targets were set at 75 percent of F_{MSY} at B_{MSY} . The target mortality when the stock was less than B_{MSY} was based on the F calculated to rebuild in ten years (with the exception of halibut).

VI. Amendment 16 (2010)
Amendment 16 modified measures to comply with requirements for Acceptable Biological Catch (ABC) control rules and Annual Catch Limits (ACLs). It also adopted revised status determination criteria. The amendment revised the control rules adopted by Amendment 13 and replaced them with interim ABC control rules:

a. ABC should be determined as the catch associated with 75% of FMSY.
b. 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).
c. For stocks that cannot rebuild to BMSY in the specified rebuilding period, even with no fishing, the ABC should be based on incidental bycatch, including a reduction in bycatch rate (i.e., the proportion of the stock caught as bycatch).
d. Interim ABCs should be determined for stocks with unknown status according to case-by case recommendations from the SSC.

Amendment 16 also removed the definition of a target fishing mortality rate and replaced it with the concept that that mortality that results from an adopted ACL is the effective target rate.

Literature Referenced

Applegate, A., S. Cadrin, J. Hoenig, C. Moore, S. Murawski and E. Pikitch. 1998. Evaluation of existing overfishing definitions and recommendations for new overfishing definitions to comply with the Sustainable Fisheries Act. Final Report of the Overfishing Definition Review Panel to the New England Fishery Management Council, 179 p.

Northeast Fisheries Science Center. 2002. Final Report of the Working Group on Re-Evaluation of Biological Reference Points for New England Groundfish**,** CRD 02-04. March 2002.