

Excerpted from NEFSC Reference Document 02-07, 34th Northeast Regional Stock Assessment Workshop (34th SAW) Public Review Workshop

This is one Advisory Report section of the Public Review workshop document used by the SAW/SARC, the Northeast Region's assessment review process. The Stock Assessment Review Committee of the Stock Assessment Workshop uses this standardized format to clearly and concisely report the relevant findings of the stock assessment. The SEDAR6 Review Workshop Panel may wish to adopt a similar format in crafting the Advisory Reports as required under SEDAR.

B. GEORGES BANK WINTER FLOUNDER ADVISORY REPORT

State of Stock: The Georges Bank winter flounder stock was not overfished and overfishing was not occurring in 2000. Stock biomass in 2000 was 92% of the re-estimated B_{MSY} target and fishing mortality in 2000 was 71% of the re-estimated fishing mortality rate target. Fishing mortality rates were very high during 1984-1993, but have been declining since 1994. Stock biomass has been increasing steadily since 1994. US and Canadian research surveys indicate recruitment has been below average since 1994. Research survey indices indicate that the age structure became truncated in the early 1990s but is beginning to broaden.

Management Advice: Fishing mortality rates should not exceed target levels to provide for increasing fishery harvests, while allowing for continued stock rebuilding and broadening of the age structure.

Forecasts: No medium term forecasts were made because of the inability to explicitly model recruitment.

Catch and Status Table (weights in '000 mt): Georges Bank Winter Flounder

Year	1993	1994	1995	1996	1997	1998	1999	2000	Max ¹	Min ²	Mean
U.S. commercial landings	1.7	0.9	0.7	1.3	1.3	1.2	0.9	1.6	3.9	0.7	2.2 ²
Canada commercial landings	<0.1	<0.1	<0.1	<0.1	0.1	0.1	0.1	0.2	0.2	<0.1	<0.1 ²
Total commercial landings	1.7	1.0	0.8	1.3	1.4	1.3	1.0	1.8	4.5	0.8	2.4 ²
Commercial Discards	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Catch used in assessment ³	1.7	1.0	0.8	1.3	1.4	1.3	1.0	1.8	3.9	0.8	2.0
Total Stock Biomass	2.4	2.5	3.2	4.0	4.7	5.8	7.3	8.8	10.8	2.4	6.7 ⁴
F (biomass-based, age1+)	0.69	0.39	0.24	0.34	0.30	0.23	0.14	0.21	0.77	0.14	0.40 ⁴
Relative Biomass Index	0.66	0.58	1.34	1.76	1.53	1.57	2.64	2.66	6.49	0.14	2.05 ⁵
Exploitation Index	2.54	1.68	0.57	0.76	0.93	0.85	0.40	0.69	13.44	0.40	1.94 ⁶

^{1,2} During 1964-2000. ³ During 1982-2000. ⁵ During 1982-1997. ⁴ During 1964-2000, average biomass from ASPIC model results. ⁵ During 1964-2000, U.S. Autumn survey indices (kg/tow) for offshore strata 13-22. ⁶ Exploitation index = (landings (in 000's mt) / 3-year average of autumn survey biomass index (in kg/tow)) as defined in Overfishing Control Rule.

Stock Identification and Distribution: Winter flounder is distributed in the Northwest Atlantic from Labrador to Georgia. Although primarily distributed in shallow inshore waters where estuarine habitat serves as important spawning and nursery areas, the species is also distributed on offshore banks such as Nantucket Shoals and Georges Bank. The winter flounder resource in the U.S. waters of the Northwest Atlantic is currently assessed as three stock complexes: Gulf of Maine, Georges Bank, and Southern New England/Mid-Atlantic. The Georges Bank stock area includes U.S. statistical areas 522, 525, 551, 552, 561, and 562, which correspond approximately to Canadian unit areas 5Zh, j, m, and n. Evidence from tagging data, differences in life history characteristics, and meristic studies provide evidence for a discrete stock of winter flounder residing in the shallower waters of Georges Bank.

Catches: Otter trawl landings, primarily bycatch, account for the majority of landings (92-100%) from this stock with the balance primarily from the sea scallop dredge fishery. Discarding occurs in the otter trawl and sea scallop dredge fisheries. However, data were insufficient to estimate discard numbers at age for inclusion in this assessment.

Recreational landings from this stock are insignificant. U.S. commercial landings have dominated fishery removals from this stock, although landings reported by the former Soviet Union were significant in the early 1970s (Figure B1). Total commercial landings increased sharply in the late 1960s and early 1970s with reported landings by distant water fleets. Landings exceeded 4,000 mt in the early 1970s, but declined to less than 2,000 mt by 1976. Landings increased again, reaching 4,000 mt in 1981, but were less than 2,000 mt during 1989-2000. Due to the implementation of U.S. fishery regulations designed to rebuild groundfish stocks, total landings declined to their lowest levels since 1964, in 1995 (760 mt), then increased to 1,800 mt in 2000.

Data and Assessment: A biomass dynamics model (ASPIC) that incorporated U.S. spring (1968-2001, lagged back one year) and autumn survey (1964-2000) biomass indices and total landings (1964-2000) provided estimates of biomass (age 1+), surplus production, and fishing mortality rates. Stock status was determined based on the results of the ASPIC model. The virtual population analysis approach used as a basis for the SARC 28 assessment was updated (1982-2000) and evaluated, but not adopted. An alternate age-based model with forward projection of the landings at age data (WIN model) was also conducted to derive estimates of biomass and fishing mortality rates.

Biological Reference Points: Amendment 9 biological reference points were re-estimated based on a surplus production model (Figure B7). The Amendment 9 overfishing definition specifies survey-based biological reference points. The re-estimated fishing mortality rate reference points (expressed in exploitation units) are F_{msy} threshold proxy = 1.21, F_{msy} target proxy (75% of F_{msy} threshold proxy) = 0.91 total landings/U.S. autumn survey index), B_{MSY} target proxy = 2.49, and a biomass threshold (50% of B_{MSY} proxy) = 1.24 (all in U.S. autumn survey biomass units: stratified weight (kg) per tow). ASPIC-based absolute values of F_{MSY} and B_{MSY} are recommended for future determinations of stock status (see Special Comments).

Fishing Mortality: Trends in biomass-based fishing mortality rate estimates from the ASPIC model (average biomass for age 1+) were similar to those from the VPA age-based model. Fishing mortality rates were highest during 1984-1993, but have declined since then (Figure B3). ASPIC-based fishing mortality rates ranged between 0.77 and 0.39 during 1984-1993 and were much lower during 1994-1999, ranging between 0.14 and 0.39. The fishing mortality rate in 2000 was 0.21.

Average exploitation indices (3-year average catch/3-year average autumn survey biomass index) were above the threshold F during 1981-1995, but have since declined to 71% of the fishing mortality target. The average exploitation index for 1998-2000 was 0.65 (Figure B2). Absolute values of fishing mortality are recommended for future determinations of stock status, but exploitation indices are used here to be consistent with the method used to calculate reference points for the stock (see Special Comments).

Recruitment: Stratified mean numbers per tow at age indicated that the 1981, 1983, 1984 and 1994 year classes were above average. U.S. and Canadian research surveys indicate recruitment has been below average since 1994 (Figure B6).

Stock Biomass: The ASPIC model indicates that average biomass (age 1+) declined during 1977-1994, then increased from 2,500 in 1994 to 8,800 mt in 2000 (Figure B4).

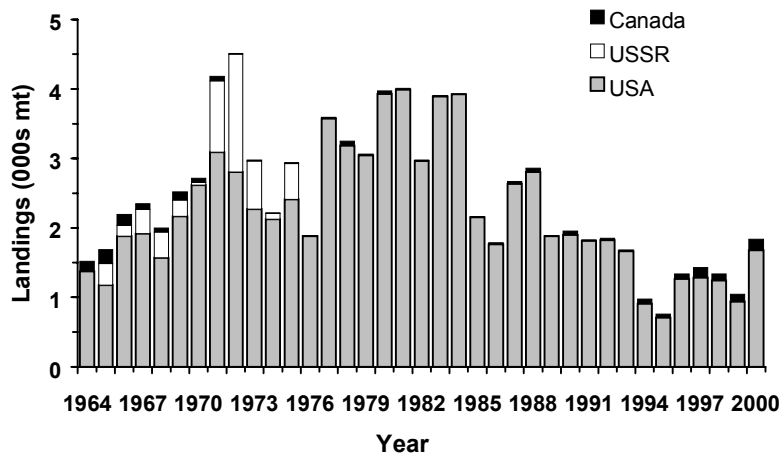
Spring and autumn research surveys indicate a general increase in relative biomass indices since 1994 (Figure B5). The biomass index for 1998-2000 was 2.29 kg/tow. Absolute values of biomass are recommended for future determinations of stock status, but survey biomass indices are used here to be consistent with the method used to calculate reference points for the stock (see Special Comments).

Special Comments: The SARC recommends that the biological reference points be revised to incorporate absolute values of F_{msy} and B_{msy} , as estimated by the ASPIC biomass dynamics model, to resolve some of the difficulties in interpretation of stock status with regard to reference points. The status of this stock and current reference points were defined using a production model (ASPIC) which produces estimates in traditional units of fishing mortality and biomass. However, these units are converted into survey-based units for evaluation purposes.

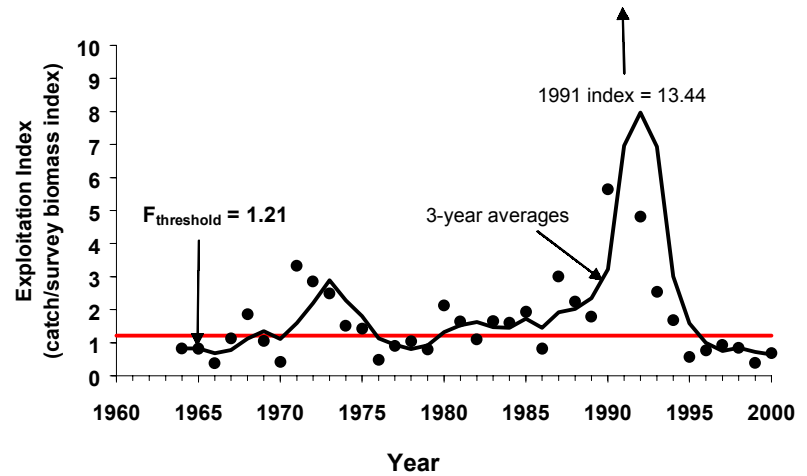
If sampling of the landings for characterization of age and size distribution is improved, it would be preferable to conduct an age-based assessment.

Fishing mortality rates are near the long-term targets for the stock. Given the substantial distribution of winter flounder within the Georges Bank closed areas, managers should carefully consider the impacts on this stock if any portion of these areas is reopened to fishing.

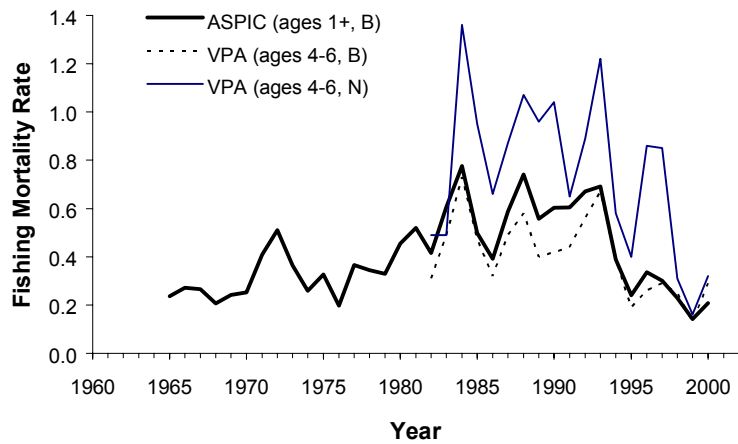
Source of Information: Report of the 34th Northeast Regional Stock Assessment Workshop (34th SAW), Stock Assessment Review Committee (SARC) Consensus Summary of Assessments, NEFSC Ref. Doc. 01-06; Hendrickson *et al.* 2001, Assessment of the Georges Bank Winter Flounder Stock, 1982-2000, in prep.; Report of the 28th Northeast Regional Stock Assessment Workshop (28th SAW), Stock Assessment Review Committee (SARC) Consensus Summary of Assessments, NEFSC Ref. Doc. 99-08; Brown *et al.* 2000, Assessment of the Georges Bank Winter Flounder Stock, 1982-1997, NEFSC Ref. Doc. 00-16. Amendment 9 to the Northeast Multispecies Fishery Management Plan, NEFMC, 1998.



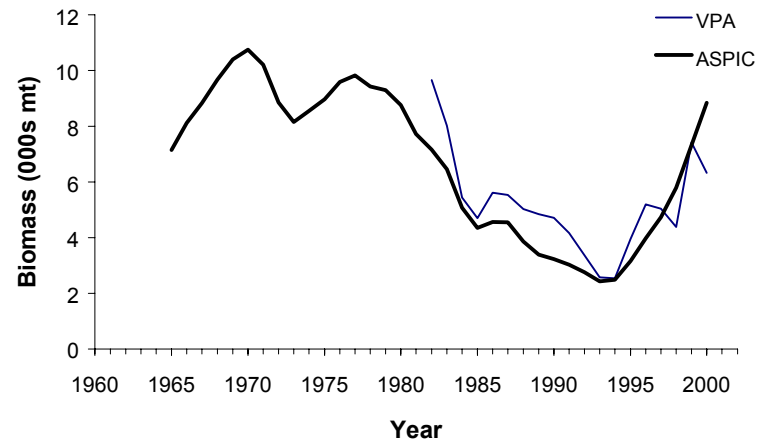
B1 Trends in commercial landings



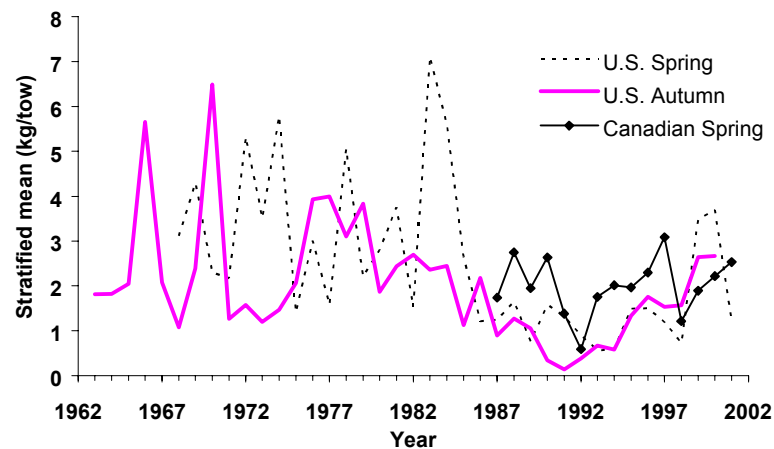
B2 Trends in annual and average relative exploitation indices



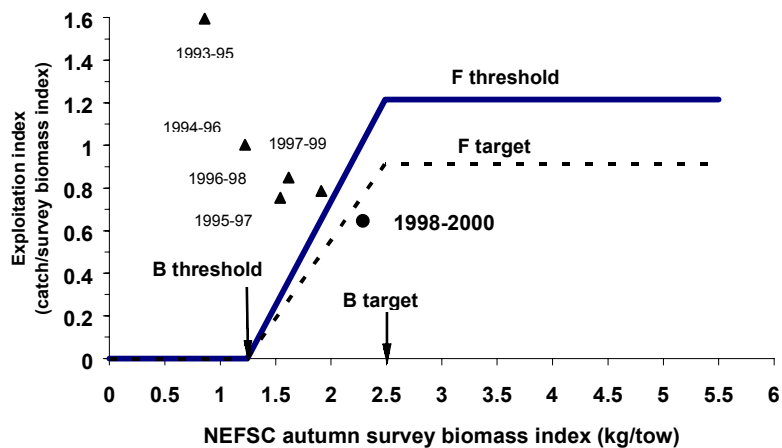
B3 Trends in fishing mortality rates



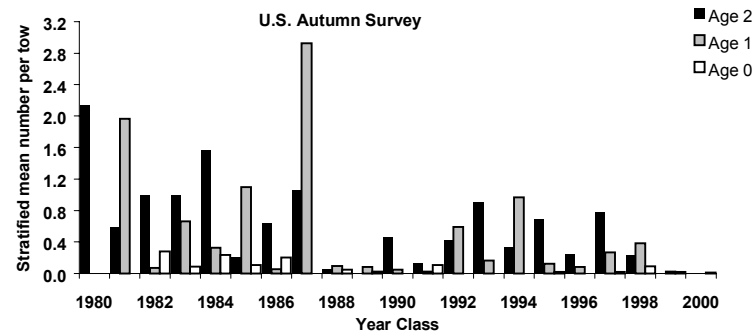
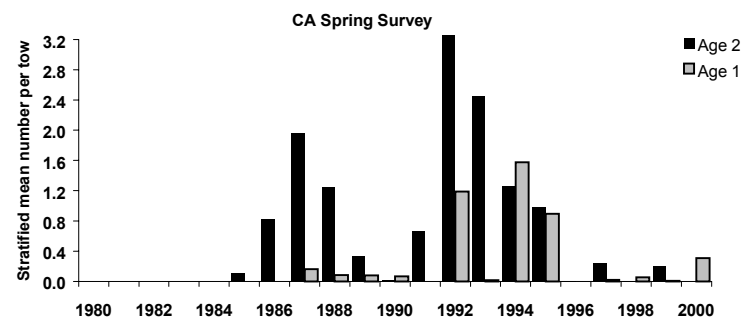
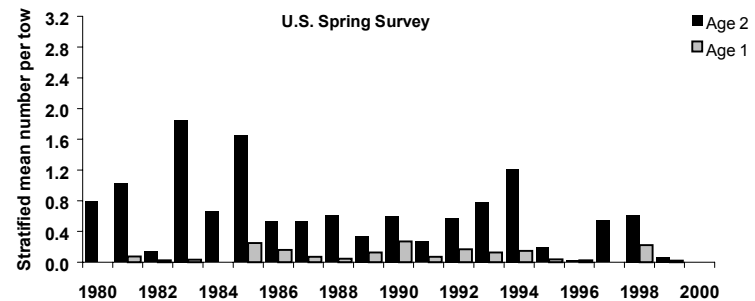
B4 Trends in average stock biomass



B5 Trends relative biomass indices from research vessel surveys



B7 Overfishing Control Rule and three-year average exploitation and survey biomass indices



B6 Trends in recruitment