

REVIEW OF THE
INTERSTATE FISHERY MANAGEMENT PLAN FOR
INSHORE STOCKS OF WINTER FLOUNDER
(Pseudopleuronectes americanus)
2003 FISHING YEAR

Prepared by

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REVIEW OF THE FISHERY MANAGEMENT PLAN FOR WINTER FLOUNDER (*Pseudopleuronectes americanus*)

I. Status of Fishery Management Plan

The Interstate Fishery Management Plan for Inshore Stocks of Winter Flounder was adopted by the Commission in May 1992. An implementation strategy was also adopted at that time and printed separately as Addendum I to the plan. The Winter Flounder Management Board is responsible for monitoring plan implementation.

The plan contains specific fishery management and habitat protection / enhancement measures to meet the following goals: to maintain winter flounder stocks in sufficient abundance to support stable, productive commercial and recreational fisheries; to preserve, maintain, and enhance habitat and environmental quality necessary for optimal growth and reproduction; to the extent possible, minimize incompatibility in management practices between this and other northwest Atlantic management plans, recognizing that winter flounder stocks vary biologically and may justify differing strategies; to the extent possible, minimize conflicts between competing uses of the winter flounder resource.

The designated management unit for the plan includes the state waters of Maine through Delaware. States declaring an interest in the plan include: Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey and Delaware. States required to comply with the plan include all the states identified above and the state of Pennsylvania.

II. Status of Stocks

Two inshore Management Units are identified: **Gulf of Maine** (GOM) - waters north of Cape Cod; **Southern New England/Mid-Atlantic** (SNE/MA) - waters south of Cape Cod to the Delaware-Maryland border. Previously, the SNE and MA areas were considered as separate units but were combined during the 1995 SARC 21 assessment because growth data and tagging studies showed more similarity between the SNE and MA regions. Based on updated catch and age data, which showed the presence of older fish (up to 16 years old) in the exploited population, the technical committee assumed a lower instantaneous natural mortality rate (from $M=0.35$ to $M=0.2$) that is more consistent with a maximum age of 16. These changes were reviewed and accepted by the Stock Assessment Review Committee (SARC 21) in 1995.

The Technical Committee met in September 2002 to assess the status of both the SNE/MA and GOM stock units. The current assessment of the SNE/MA stock complex updates the SARC 28 assessment that was completed in 1998 (NEFSC 1998). The SARC 28 assessment included catch through 1997, research survey abundance indices through 1998, catch at age analyzed by Virtual Population Analysis (VPA) for 1981-1997, and biological reference points based on a production model conditioned on VPA results. The SARC 28 assessment concluded that the stock complex was fully exploited and at a medium level of biomass. Total biomass in 1997 was estimated to be 17,900 mt, spawning stock biomass was estimated to be 8,600 mt, and the fully recruited fishing mortality rate was estimated to be $F=0.31$. Subsequent to the SARC 28

assessment, the status of SNE/MA winter flounder has been evaluated annually by projection methods to provide advice to the New England Fishery Management Council (NEFMC). The last such status update was provided in 2001, and projected the total biomass to be 25,300 mt, spawning stock biomass to be 13,800 mt, and fully recruited $F=0.29$, in 1999 (NEFSC 2001).

The 2002 assessment (NEFSC 2003) indicates that the SNE/MA winter flounder stock complex is overfished and that overfishing is occurring. The fully recruited fishing mortality in 2001 was 0.51 (exploitation rate = 37%), 59% above the Reference Point Working Group (NEFSC 2002) re-estimate of $F_{msy} = 0.32$ (fully recruited). There is an 80% chance that the 2001 F was between 0.44 and 0.58. Spawning stock biomass was estimated to be 7,600 mt in 2001, about 25% of the re-estimate of $B_{msy} = 30,100$ mt. There is an 80% chance that the spawning stock biomass was between 6,800 mt and 8,400 mt in 2001. Spawning stock biomass declined substantially from 13,000-14,000 mt during the early 1980s to only 2,700 mt during 1994-1996, but has since increased since the mid-1990s to about 7,600 mt in 2001 due to reduced fishing mortality rates since 1997. The arithmetic average recruitment from 1981 to 2001 is 23.9 million age-1 fish, with a median of 18.9 million fish. Recruitment to the stock has been below average since 1989. The 2001 year class, at only 5.6 million fish, is the smallest in the 22 year VPA time series. With respect to the ASMFC reference points, fishing mortality rates have been above the $F_{25\%}=0.37$ overfishing definition (intermediate target $F_{30\%}=0.30$ and $F_{40\%}$ target=0.21) for the entire time series. The results of this assessment indicate that fishing mortality rates continue to remain well above the target rates specified in the current FMP, and recruitment to the stock is at record low levels.

The 2002 assessment (NEFSC 2003) concluded that the GOM winter flounder stock complex is not overfished and that overfishing is not occurring. The fully recruited fishing mortality in 2001 was 0.14, about 67% below the empirical estimate of $F_{msy} = 0.43$. There is an 80% chance that the 2001 F was between 0.12 and 0.16. Spawning stock biomass was estimated to be 5,900 mt in 2001, about 44% above the estimate of $B_{msy} = 4,100$ mt. There is an 80% chance that the spawning stock biomass was between 5,200 mt and 6,600 mt in 2001. Spawning stock biomass declined substantially from 4,800 mt in 1982 to only 700 mt in 1995, but has increased to about 5,900 mt in 2001 due to reduced fishing mortality rates since 1996. The arithmetic average recruitment from 1982 to 2001 is 6.7 million age-1 fish: Recruitment to the stock has been above or near average since 1995. With respect to the ASMFC reference points, fishing mortality has been below the ASMFC's $F_{25\%}$ overfishing threshold since 1996, and has been below the $F_{40\%}$ target since 1999. Spawning stock biomass has increased since reaching a time series low in 1996.

III. Status of the Fishery

Commercial landings from the SNE/MA averaged 8,500 mt from 1964-72 before declining to around 4,800 mt throughout the mid to late 1970's. Commercial landings increased in the early 1980's to a record high of 11,176 mt in 1981 and remained at high levels through 1985. Landings rapidly declined after 1985 and reached a record low level of 2,200 mt in 1994. Commercial landings in 2002 were 4,400 mt. Landings by distance from shore (<3 mi; 3-12 mi; >3 mi) were unavailable for 1994-96 because of the switch from the NEFSC's weigh-out system

to the Vessel Trip Reports (logbooks). Commercial landings from the EEZ (>3mi) averaged 86% of total commercial landings from 1989-93. State and federal management measures implemented since 1993 are unlikely to have significantly changed the percentage of total commercial landings from the EEZ.

Recreational landings from the SNE/MA peaked at 5,772 mt in 1984 before declining to a record low of 383 mt in 1992. Landings have fluctuated between 543 and 661 mt in recent years. In 2001, the recreational landings were estimated at 550 mt. Recreational landings as a percentage of total landings increased from 20% in 1982 to 44% in 1988, then declined to 20% in 1990 remaining near that level in recent years. On average, recreational landings have comprised 27% of the total landings (1981-96).

Commercial landings from the GOM stock fluctuated around 1,000 mt from 1964-75. Landings rapidly increased to a peak of 2,703 mt in 1982 and then declined to 534 mt in 1994. Landings have increased slightly since 1994, to 695 mt in 1995 and 698 mt in 1996. In 1999, landings declined to a time series low of 318 mt, which may be attributed to extended spring closures in the Gulf of Maine. Landings have remained near 500 mt since 1999.

Recreational landings from the GOM fluctuated around 2,000 mt during the early 1980's before declining to under 100 mt in 1991. Recreational landings have remained below 100 mt since 1995. On average, recreational landings have comprised 40% (range 25-60%) of the total catch from 1979-90. Recreational landings declined to 9% of total landings in 1991 and have fluctuated from 5-13% of the total landings since 1991.

Table 1. Commercial landings (in pounds) of winter flounder by state, 1960-2002.

(source: Personal communication from the National Marine Fisheries Service, Fisheries Statistics and Economics Division, Silver Spring, MD).

Year	ME	NH	MA	RI	CT	NY	NJ	DE	MD	VA	NC	Total
1960	365,900	0	14,349,900	2,419,300	1,079,300	1,640,300	106,100	14,200	2,700	0	0	19,977,700
1961	18,600	0	14,342,300	2,036,400	980,300	1,694,600	152,600	20,500	2,600	1,300	0	19,249,200
1962	74,600	0	15,282,700	2,037,400	1,010,700	1,626,000	126,200	15,800	6,500	1,700	0	20,181,600
1963	49,800	0	13,743,700	2,924,700	983,500	1,842,500	184,900	37,000	10,100	1,500	0	19,777,700
1964	76,578	0	15,984,500	4,095,100	960,500	1,440,600	357,200	48,000	25,700	41,900	0	23,030,078
1965	70,961	0	18,417,000	3,658,500	727,400	2,244,800	279,200	38,000	61,700	122,300	0	25,619,861
1966	96,300	0	23,099,000	4,309,000	831,200	3,263,100	437,900	50,500	90,700	219,700	0	32,397,400
1967	103,100	0	17,958,700	3,861,600	886,300	2,939,300	366,500	19,400	177,600	798,100	0	27,110,600
1968	59,900	0	13,316,200	3,436,800	1,041,300	1,830,400	421,900	2,900	74,400	824,000	0	21,007,800
1969	95,800	3,500	17,228,800	4,415,000	930,700	1,444,800	268,100	1,600	60,300	393,800	0	24,842,400
1970	301,100	7,900	17,847,000	5,633,300	788,900	1,729,600	153,200	2,800	21,400	122,500	0	26,607,700
1971	146,600	7,300	17,174,800	5,525,600	816,800	1,725,300	86,000	5,200	17,400	45,400	0	25,550,400
1972	281,900	9,500	13,198,600	4,979,900	38,000	1,443,300	94,200	1,900	3,200	20,700	0	20,071,200
1973	209,900	8,000	12,559,400	4,726,400	844,500	1,166,400	159,800	2,400	2,200	2,100	0	19,681,100
1974	239,800	22,000	11,479,500	3,428,800	189,000	557,400	140,200	3,700	1,400	900	0	16,062,700
1975	532,000	23,100	12,953,700	2,831,900	42,000	585,700	105,100	4,100	200	400	0	17,078,200
1976	288,100	26,800	10,932,100	2,610,500	1,002,800	716,300	142,600	4,900	300	1,300	0	15,725,700
1977	427,600	36,500	16,715,500	4,260,100	592,600	1,020,700	128,800	0	1,900	9,200	0	23,192,900
1978	722,800	54,800	18,282,100	6,570,100	805,400	1,302,000	204,400	5,200	600	216,400	4,579	28,168,379
1979	986,000	49,600	17,009,700	6,146,500	539,400	1,487,000	209,000	3,700	1,700	127,500	4,716	26,564,816
1980	1,248,500	58,500	25,909,000	8,754,700	501,600	1,662,900	147,500	0	1,200	55,400	19,608	38,358,908
1981	1,474,400	98,100	25,723,800	9,211,200	1,153,200	2,101,900	519,200	0	4,900	36,700	4,604	40,328,004
1982	1,978,800	229,600	21,262,400	7,672,000	1,134,500	1,845,100	265,400	0	2,800	9,200	0	34,399,800
1983	1,494,000	169,100	22,351,700	680,600	1,171,500	1,457,000	312,300	1,700	7,200	45,800	0	27,690,900
1984	936,600	208,500	20,993,400	7,264,700	1,308,900	1,354,400	193,000	2,500	10,700	18,500	1,921	32,293,121
1985	733,000	165,000	13,960,700	6,368,700	1,193,900	1,271,300	476,900	0	9,500	31,100	12,795	24,222,895
1986	648,100	113,200	10,658,200	4,294,900	569,400	897,100	370,700	0	7,000	49,800	35,594	17,643,994
1987	535,800	210,600	12,414,400	3,861,000	1,424,300	1,226,900	227,600	0	17,300	6,900	1,328	19,926,128
1988	617,200	257,100	12,541,200	2,602,900	749,900	1,538,200	251,900	0	11,500	22,302	1,493	18,593,695
1989	518,000	257,700	10,285,300	2,401,200	553,300	1,041,000	346,900	0	2,700	15,300	0	15,421,400
1990	361,636	184,306	11,129,732	1,774,451	1,063,090	640,445	221,635	0	433	9,345	0	15,385,073

Table 1 (continued). Commercial landings (in pounds) of winter flounder by state, 1960-2002.
 (source: Personal communication from the National Marine Fisheries Service, Fisheries Statistics and Economics Division, Silver Spring, MD).

Year	ME	NH	MA	RI	CT	NY	NJ	DE	MD	VA	NC	Total
1991	367,539	262,841	12,406,600	1,831,971	844,700	884,919	257,544	0	371	11,369	9,606	16,877,460
1992	268,549	125,714	9,982,728	1,852,674	704,300	1,014,807	284,030	0	1,543	11,075	0	14,245,420
1993	127,378	85,869	8,657,466	1,267,796	552,113	683,288	244,164	8,300	1,747	20,517	140	11,648,778
1994	80,670	80,684	5,694,288	941,133	307,000	522,411	310,411	0	3,391	4,999	991	7,945,978
1995	51,998	63,729	6,291,720	1,015,991	356,133	520,202	581,473	0	4,937	8,824	0	8,895,007
1996	16,666	61,857	8,281,798	1,116,477	456,374	516,983	147,200	0	0	748	0	10,598,103
1997	46,054	30,429	9,309,941	1,236,599	426,474	653,227	124,789	0	1,854	971	0	11,830,338
1998	4,391	29,878	8,597,510	1,236,942	360,713	768,821	137,755	2	0	1,411	0	11,137,423
1999	9,811	14,659	7,430,610	1,157,440	377,403	731,634	535,785	0	2,725	790	0	10,260,857
2000	32,854	32,276	8,991,331	1,792,498	445,239	957,152	570,441	0	3,690	748	0	12,826,229
2001	29,065	41,897	11,675,879	1,451,787	489,595	1,107,862	553,616	0	5,303	406	0	15,355,410
2002	69,955	26,528	10,443,724	1,327,164	264,477	608,858	241,732	0	0	211	0	12,982,649

Table 2. Recreational landings of winter flounder (Type A + B1 fish, in numbers of fish) by state, 1981-2003.
 (source: Personal communication from the National Marine Fisheries Service, Fisheries Statistics and Economics Division, Silver Spring, MD).

Year	ME	NH	MA	RI	CT	NY	NJ	DE	MD	VA	GA	Total
1981	69,384	108,401	5,643,405	217,046	655,366	5,979,492	1,012,734	0	0	0	0	13,685,828
1982	4,417	41,556	8,528,921	661,889	1,044,875	2,547,633	2,660,632	0	0	0	0	15,489,923
1983	16,613	82,915	3,037,573	530,708	627,722	4,943,476	1,033,979	0	7,030	1,228	1,029	10,282,273
1984	8,461	121,457	2,511,406	462,369	1,168,713	7,384,229	3,069,974	0	0	0	0	14,726,609
1985	5,434	32,350	3,430,239	1,399,691	1,037,205	5,769,112	4,627,836	0	437	3,998	0	16,306,302
1986	80,654	43,791	897,857	2,044,417	584,858	3,462,414	578,324	0	0	0	0	7,692,315
1987	2,432	21,265	2,488,639	553,724	822,565	4,981,483	338,367	0	0	39,236	0	9,247,711
1988	296,732	29,577	1,031,807	345,050	659,841	4,832,592	992,788	1,544	0	5,732	0	8,195,663
1989	314,373	29,797	2,018,144	219,416	537,817	1,890,647	466,351	0	0	724	0	5,477,269
1990	472,178	11,496	289,647	200,908	417,930	1,262,123	482,475	2,009	0	0	0	3,138,766
1991	39,731	183	161,314	101,281	339,013	1,705,245	615,040	0	0	0	0	2,961,807
1992	25,320	16,605	145,907	8,097	123,382	490,535	136,228	0	0	0	0	946,074
1993	71,477	17,849	262,131	13,431	73,643	629,046	1059-3-	0	0	808	0	1,068,385
1994	4,221	22,847	176,420	28,721	68,343	331,124	714,793	389	0	731	0	1,347,589
1995	375	7,673	112,322	21,261	191,095	659,137	438,557	0	0	0	0	1,430,420
1996	390	8,181	101,973	56,031	90,130	519,015	928,556	0	0	0	0	1,704,276
1997	26,820	10,569	73,138	55,471	163,081	405,507	541,084	0	7,668	630	0	1,283,968
1998	1,032	28,959	96,981	38,260	235,182	78,167	169,094	125	0	0	393	648,193
1999	0	10,895	60,353	73,786	67,311	135,668	375,618	0	0	0	0	723,631
2000	0	7,706	71,653	47,575	9,639	227,451	1,056,144	0	0	0	0	1,420,168
2001	1,176	4,382	53,306	79,682	15,338	232,768	561,865	0	0	0	0	948,517
¹ 2002	377	4,914	48,892	29,708	16,476	153,586	208,387	0	0	0	0	462,340
2003	0	6,638	42,765	7,867	23,607	233,625	301,384	0	0	0	0	615,886

¹Due to data collection problems with MRFSS RDD telephone survey during Waves 2-3, 2002, preliminary estimates for this period are based upon pooled data from the previous three years (1999-2001).

Table 3. Winter flounder recreational landings (Type A + B1 fish, in pounds) by state, 1981-2003.

(source: Personal communication from the National Marine Fisheries Service, Fisheries Statistics and Economics Division, Silver Spring, MD).

Year	ME	NH	MA	RI	CT	NY	NJ	DE	MD	VA	GA	Total
1981	98,327	121,956	5,708,951	153,958	668,097	5,079,368	593,648	0	0	0	0	12,424,305
1982	3,988	45,263	10,331,655	578,421	1,044,875	2,372,467	2,180,072	0	0	0	0	16,556,741
1983	24,478	79,945	2,939,395	431,196	627,722	5,049,755	794,207	0	12,399	1,120	1,814	9,962,031
1984	12,956	153,952	3,179,937	445,034	1,168,713	6,794,610	3,349,973	0	0	0	0	15,105,175
1985	9,530	60,836	4,414,224	1,176,901	1,037,205	4,856,599	3,905,233	0	368	2,886	0	15,463,782
1986	248,410	45,362	1,343,419	1,792,093	609,506	3,137,441	458,685	0	0	0	0	7,634,916
1987	2,822	32,229	4,131,517	493,449	1,002,593	5,009,931	247,191	0	0	47,452	0	10,967,184
1988	460,118	34,266	1,422,933	433,621	891,997	4,553,908	967,021	2,412	0	13,629	0	8,779,905
1989	435,752	44,196	1,693,594	284,270	721,890	1,775,197	407,591	0	0	869	0	5,363,359
1990	584,459	12,333	374,601	244,944	434,690	1,106,590	396,189	2,568	0	0	0	3,156,374
1991	50,311	238	215,592	142,038	360,717	1,608,428	522,155	0	0	0	0	2,899,479
1992	36,374	28,230	204,027	10,181	151,419	520,010	121,299	0	0	0	0	1,071,540
1993	95,843	20,031	344,343	14,852	84,176	667,716	901,505	0	0	1,199	0	2,129,665
1994	5,512	27,527	219,953	40,133	99,463	422,642	680,637	463	0	631	0	1,496,961
1995	445	8,576	121,238	26,942	257,070	704,074	411,250	0	0	0	0	1,529,595
1996	507	11,111	13,569	81,387	116,961	469,739	947,793	0	0	0	0	1,641,067
1997	38,122	12,672	132,091	80,794	237,116	476,903	516,965	0	19,211	765	0	1,514,639
1998	1,325	25,523	111,789	57,606	275,467	98,091	147,203	110	0	0	650	717,764
1999	0	13,611	62,679	107,335	69,090	140,305	375,036	0	0	0	0	768,056
2000	0	8,347	85,470	44,709	13,177	293,472	1,522,351	0	0	0	0	1,967,526
2001	1,426	6,038	67,452	117,763	23,256	297,733	765,426	0	0	0	0	1,279,094
¹ 2002	511	6,047	76,268	43,823	25,154	189,849	231,353	0	0	0	0	573,005
2003	0	7,264	52,368	9,098	25,803	317,264	354,017	0	0	0	0	765,814

¹Due to data collection problems with MRFSS RDD telephone survey during Waves 2-3, 2002, preliminary estimates for this period are based upon pooled data from the previous three years (1999-2001).

IV. Status of Assessment Advice

The current stock assessments for both the SNE/MA stock complex and the GOM stock complex were reviewed at the 36th SAW/SARC in December of 2002. The current assessment (NEFSC 2003) for the SNE/MA stock complex includes estimated and projected total catch for 1981-2002, survey indices through 2002, estimates of fishing mortality and stock size by VPA for 1981-2001/2002, and biological reference points estimated by yield per recruit and stock-recruitment analyses (including information through 2002). The current assessment for the GOM stock complex includes estimated and projected total catch for 1982-2002, survey indices through 2002, estimates of fishing mortality and stock size by VPA for 1982-2001/2002, and biological reference points estimated by yield per recruit and stock-recruitment analyses.

The current stock assessment notes that an unusually high proportion of the commercial landings for the SNE/MA stock complex were reported from the NEFSC statistical area 521 in 1997 and 2001 (62% in 1997 and 56% in 2001, compared to the 1989-1996 average of 43%). When considered along with the distribution of survey catches, this factor indicates that the commercial fishery has increasingly focused on winter flounder along the western side of the Great South Channel. The assessment notes that the VPA for the SNE/MA stock complex exhibits a severe retrospective pattern of underestimating F and overestimating SSB in the terminal years during the late 1990s. The most likely cause of this pattern is the underestimation of total catch. The pattern reversed for 2000 (i.e., F was overestimated), indicating that survey variability may also contribute to the retrospective pattern of the SNE/MA winter flounder VPA.

The SNE/MA winter flounder stock complex is overfished and overfishing is occurring. Fully recruited fishing mortality in 2001 was 0.51 (exploitation rate=37%), about 60% above $F_{msy} = 0.32$ and 142% higher than the ASMFC F_{40} target of 0.21. The current VPA indicates that there is an 80% chance that the 2001 F was between 0.44 and 0.58. Spawning stock biomass was estimated to be 7,600mt in 2001, about 25% of $SSB_{msy}=30,100$ mt. There is an 80% chance that the spawning stock biomass was between 6,800mt and 8,400mt in 2001. Recruitment to the stock has been below average since 1989, and early indications are that the 2001 year class is the smallest in 22 years. Managers should recognize that given the estimation uncertainty in the assessment, current fishing mortality rates are likely much higher than the 2001 estimate of 0.51, potentially by nearly 100%. Current SSB may in turn be substantially overestimated. Forecasts indicate that it will be necessary to reduce the fishing mortality rate to $F_{reb} = 0.24$ in 2003 and later years to rebuild the spawning stock to the target by 2013 with 50% probability.

For the GOM stock complex, Age-1 stock size is not well estimated by the VPA ($cv = 50\%$). NEFSC survey ages were used to age the MADMF fall survey. The NEFSC survey catches a larger size distribution of fish than the MADMF survey. Precision of age-1 estimates may improve if the MADMF fall survey fish are aged using MADMF keys.

The GOM stock complex is not overfished and overfishing is not occurring. Fully recruited fishing mortality in 2001 was 0.14, about 67% below $F_{msy} = 0.43$. There is an 80% chance that the F_{2001} was between 0.12 and 0.16. Spawning stock biomass was estimated to be 5,900 mt in 2001, about 44% above $B_{msy} = 4,100$ mt. There is an 80% chance that spawning stock biomass

was between 5,200 mt and 6,600 mt in 2001. Spawning stock biomass declined substantially from 4,800 mt in 1982 to 700 mt in 1995, but has increased to about 5,900 mt in 2001 as a consequence of reduced fishing mortality since 1996. Recruitment to the stock has been near or above average since 1995. Forecasts indicate that fishing mortality should be maintained at a target level below $F_{msy} = 0.43$ to ensure that SSB remains near B_{msy} .

V. Status of Research and Monitoring

Several states (MA, RI, CT, NY, NJ, DE) and NMFS conduct trawl surveys in which winter flounder are taken. Indices of abundance and estimates of fishing rate are produced from most surveys. Separate young-of-the-year surveys in several states provide early indices of recruitment within each management area.

VI. Status of Management Measures and Issues

The FMP calls for harvest control strategies which will achieve the target management reference point (F_{40}) in three steps. All states were initially required to have implemented measures to achieve F_{25} and achieve this goal one year after adoption of the Plan. By January 1, 1995 measures to achieve F_{30} were in place, and by January 1, 1999, the plan required that F_{40} be achieved. All states currently have plans that were approved by the Winter Flounder Management Board in 1995, however, changes in the most recent stock assessment (1995) concluded that none of the states were achieving a fishing mortality rate corresponding to F_{30} at that time. Subsequent analyses in early January 1997, including a preliminary projection analysis, indicated that fishing mortality on a coastwide basis was slightly higher than the F_{30} target for the Southern New England/Mid-Atlantic stock complex. Fishing mortality in the GOM was presumed to be higher and the spawning stock biomass was at a low level, indicating that the GOM unit may be in greater need of rebuilding than the SNE/MA unit.

The New England Fishery Management Council's Amendment 5 of the Groundfish Plan included winter flounder and required a 12" minimum size and 5.5" (S. of Cape Cod) or 6" (GOM) mesh for directed groundfish trips. Vessels fishing with smaller mesh in the regulated mesh areas while in an exempted small mesh area were limited to 10% groundfish species, by weight, up to a maximum of 500 lbs. The Plan also called for a 50% reduction in fishing effort in 10% increments over five years. Effort reduction under the Groundfish Plan was initiated in May 1994. At the end of 1994, the Council passed emergency regulations that closed prime fishing areas on Georges Bank (Areas I & II), Nantucket Shoals (Nantucket Lightship) and addressed redirection of effort into the GOM and SNE. At the same time, development of Amendment 7 started. Amendment 7 extended days at sea controls and required that any fishing by an EEZ-permitted vessel be conducted with not less than 6" mesh (diamond or square) in SNE waters east of 72° 30'. Although Amendment 7 attempted to reduce F on winter flounder through days at sea controls and larger minimum mesh, these efforts were insufficient to reduce F to the target. Amendment 13 includes controls on days-at-sea (DAS) allocations, changes to the minimum mesh size, and various closures to attempt to reduce F to target levels in the SNE/MA stock.

VII. Current State-by-State Implementation of FMP Compliance Requirements as of 2004

By January 1, 1995, the states of ME, NH, MA, RI, CT, NY, NJ, PA, and DE were required to: 1) report to ASMFC concerning habitat protection efforts with other in-state agencies; and 2) implement an approved plan to achieve a minimum 30% MSP. Since Pennsylvania does not have a winter flounder fishery, they were not included in the following table of fishery restrictions. Habitat protection measures however, were required of all states including Pennsylvania.

By July 1, 1997, the above mentioned states excluding Pennsylvania, were required to submit a plan to achieve a minimum 40% MSP. Addendum 2 to the FMP (approved in February 1998) revised this date to August 1, 1998 and changed the implementation date to May 1, 1999.

VIII. Recommendations of Plan Review Team

Regulatory Recommendations

To address the continuing failure of both the ASMFC's FMP and the NEFMC's Groundfish Plan to restore winter flounder stocks, the PRT recommends the following actions:

(1) All states should be required to immediately implement the F40 target as required under the current ASMFC FMP, that is, to require each state to reduce F to 0.21 immediately

(2) The NEFMC should implement the most recent SARC advice: fishing mortality in the EEZ should immediately be reduced to $F_{EB} = 0.21$

In addition, the most recent stock assessment provides evidence that the commercial fishery in the EEZ has increasingly focused on winter flounder in statistical area 521, particularly along the western side of the Great South Channel. In 2001 for example, more than half the commercial landings of winter flounder (approximately 8.5 million pounds) were reported taken from this one statistical area. Considering the results of the most recent stock assessment, the New England Fishery Management Council should implement additional controls to reduce the targeting of winter flounder in area 521, including consideration of restrictive trip limits or area closures.

Amendments

Amendment 1 to the Interstate Fishery Management Plan for Inshore Stocks of Winter Flounder is currently in development. Addendum 2 was approved on February 3, 1998 and revised the implementation schedule laid out in Addendum 1. The Gulf of Maine and Southern New England/Mid-Atlantic Winter Flounder stock assessments were reviewed at SARC 36 in 2002.

Amendment 1 is being developed based upon the current stock assessment to reflect the updated information, to update fishing mortality targets, and to revise the overfishing definitions for the GOM and SNE/MA stocks, and to develop recreational and commercial management measures that are may reduce F on winter flounder in state waters and assist with recovery of winter flounder stocks..

Research and Monitoring Recommendations

The research needs for winter flounder have been re-prioritized as a result of the 2002 stock assessment of the Gulf of Maine and the Southern New England/Mid-Atlantic stocks.

Prioritized Research Needs

Coastwide

1. Expand sea sampling for estimation of commercial discards.
2. Increase the intensity of commercial fishery discard length sampling.
3. Conduct gear study to determine selectivity of diamond and square mesh sizes 6 inches on winter flounder (and other groundfish species).
3. Focus research on quantifying mortality associated with habitat loss and alteration, contamination by toxics and power plant entrainment and impingement. Examine the implications of these anthropogenic mortalities on estimation of yield per recruit, if feasible.
4. Provide reliable estimates of anthropogenic mortality from sources other than fishing. Both mortality sources should then be incorporated into fisheries yield/recruit models to simultaneously evaluate these dual mortality factors.
5. Conduct studies of flounder populations in impacted areas to fully quantify physiological adaptation to habitat alteration, and interactive effects, on an individual and population level.
6. Evaluate the maturity at age of fish sampled in the NEFSC fall and winter surveys.
7. Develop mortality estimates from the American Littoral Society tagging data, if feasible.

Southern New England - Mid-Atlantic Stock Complex

1. Maintain or increase sampling levels and collect age information from MRFSS samples. Incorporate state samples (e.g. NY DEC Party Boat Survey and CT DEP Volunteer Angler Survey) in the estimation of recreational fishery landings and discards, if possible.
2. Expand sea sampling for estimation of commercial discards.
3. Develop a geographically more comprehensive data set to calculate maturity at age, reflecting any differential availability of mature fish to inshore and offshore surveys. Re-examine the maturity ogive to incorporate any recent research results.
4. Conduct studies to delineate all major substocks in terms of geographic spawning area and seasonal offshore movements (e.g. exposure to fishing pressure).
5. Further examine the comparability of age length keys from different areas within the stock (current comparisons are based on two years and three ages). Conduct an age structure comparison between NEFSC, CT DEP and MADMF, to ensure consistency in ageing protocol (work in progress).
6. Examine the sources of differences between NEFSC, MA, and CT survey maturity (validity of evidence for younger size/age at 50% maturity in NEFSC data). Compare NEFSC inshore versus offshore strata for differences in maturity. Compare confidence intervals for maturity ogives. Calculate annual ogives and investigate for progression of maturity changes over time. Examine maturity data from NEFSC strata on Nantucket

- Shoals and near George's Bank separately from more inshore areas. Consider methods for combining maturity data from different survey programs.
7. Consider field work to record ovary weights along with maturity stage data from 20-30 cm fish in the NEFSC and state agency surveys for 1-2 years to help resolve age/size at maturity differences between state and NEFSC surveys.
 8. Conduct periodic maturity staging workshops involving state and NEFSC trawl survey staff.
 9. Examine the implications of stock mixing from data from the Great South Channel region.
 10. Compare commercial fishery discard estimates from the survey mesh ogive method with those from VTR data for comparable time periods.
 11. Evaluate the utility of MA DMF sea sample data for winter flounder in estimation of commercial fishery discards.
 12. Revise the recreational fishery discard estimates by applying a consistent method across all years, if feasible (i.e., the Gibson 1996 method).
 13. Age archived MA DMF survey age samples for 1978-1989.
 14. Examine the implications of anthropogenic mortalities caused by pollution and power plant entrainment in estimation of yield per recruit, if feasible.
 15. Estimate/evaluate effects of catch-and-release components of recreational fishery on discard at age (i.e. develop mortality estimates from the American Littoral Society tagging database, if feasible).
 16. Explore the feasibility of stratification of commercial fishery discard estimation by fishery (e.g., mesh, gear, area).
 17. Consider post stratification of NEFSC survey offshore stratum 23, to facilitate the inclusion of survey catches from this stratum (east of Cape Cod) in the SNE/MA winter flounder assessment.

Gulf of Maine Stock

High Priority

- Improve sampling for biological data (particularly hard parts for ageing) of commercial landings of winter flounder.
- Expand sea sampling in order to validate commercial discard estimates from Vessel Trip Reports (logbooks).
- Maintain or increase sampling levels and collect age information from MRFSS samples.
- Update or conduct regional maturity studies. This may require a maturity workshop to ensure the use of standardized criteria among regional studies.
- Evaluate size-selectivity performance of survey gear compared to typical commercial gear, and implications for estimation of commercial discards from research survey length frequency information.

Medium Priority

- Examine growth variations within the Gulf of Maine, using results from the Gulf of Maine Biological Sampling Survey (1993-94).

Low Priority

- Further examine the stock boundaries to determine if Bay of Fundy winter flounder should be included in the Gulf of Maine stock complex.
- Estimate/evaluate effects of catch-and-release components of recreational fishery on discard at age.

List of References

Northeast Fisheries Science Center (NEFSC). 1999. Report of the 28th Northeast Regional Stock Assessment Review Committee (SARC) consensus summary of assessments. NEFSC Ref. Doc. 99-08. 304 p.

Northeast Fisheries Science Center (NEFSC). 2002. Final Report of the Working Group on Re-Evaluation of Biological Reference Points for New England Groundfish. NEFSC Ref. Doc. 02-04 123 p.

Northeast Fisheries Science Center (NEFSC). 2003. Report of the 26th Northeast Regional Stock Assessment Review Committee (SARC) consensus summary of assessments. NEFSC Ref. Doc. Xx-xx. Xxx p.

Secor, D.H., and J.R. Rooker. 2000. Is otolith strontium a useful scalar of life cycles in estuarine fish? Fisheries Res. 46: 359-371.

Notes: Drs. Tom Miller and Ed Houde have a new CBSAC (Chesapeake Bay Stock Assessment Committee) project to develop multispecies fish surveys in the Bay by synthesizing Trophic Interactions in Estuarine Ecosystems (TIES): <http://www.chesapeake.org/ties/>

Table 4. Current state regulations for winter flounder as of Fall 2003.

Commercial			
State	Minimum Size Limit	Cod-end Mesh	Seasons and/or Area Restrictions
ME	12"	6.5"	General spawning closure in state waters for all groundfish species from April 1 st - June 30 th
NH	12"	6.5" (to take, transport or possess winter flounder or other groundfish)	No mobile gear allowed in state waters Harvest by gill net during April, May, and June is prohibited.
MA ¹	12"	6.5" (diamond) 6.0" (square) 100 lb limit for all flounder species for mesh < 6.0";	Year round night closure to mobile gear; Gulf of Maine spawning closure and inshore net areas closed to all gear from: February 1 st - May 31 st ; Year round prohibition of commercial netting in inshore net area and Buzzards Bay; Year round prohibition of commercial harvest of winter flounder in Mount Hope Bay; at least 12 other seasonal/area/gear closures
RI	12"	6.0" (except fyke nets)	Open March 1 st in CMLMA ² until 1/2 quota (89,000 lbs. in 1997) is reached; reopens October 1 st to November 15 th , or until quota is met; 100 - 300 lb. trip limit in CMLMA
CT	12"	5.5" (diamond) 6" (square)	Closed, trawling prohibited: March 1 st - April 14 th ; 100 lb limit for small-mesh fisheries (<5.5"); Scup (May 15 - November 14): 4 1/2" (5" square) Squid (May 15 - July 31): 1 7/8"
NY	12"	5.5" (diamond) 6.0" (square) 100 lb. mesh trigger	Fyke nets: October 1 - March 22; Pound and trap nets: July 26 - June 14; All other comm. gear: December 1 - June 13; Year round prohibition of gill or trammel nets
NJ	12"	5.0"	Trawling prohibited < 2 miles; Fyke nets closed: February 20 th - September 30 th ; All other comm. gear closed: June 1 st - November 30
DE	10"	None	Trawling prohibited

¹ Massachusetts also has a maximum vessel size limit of 72 feet length overall.

² Coastal Marine Life Management Area - Narragansett Bay, coastal salt ponds, and Little Narragansett Bay; quota varies yearly and was proposed to be 53,900 for 1998.

Table 4 (continued). State regulations for winter flounder as of Fall 2003.

Recreational				
State	Minimum Size Limit	Bag Limit	Season and/or Area Restrictions	Last Update
ME	12"	None	None	9/13/01
NH	12"	None	None	9/04/01
MA	12"	4 in Mt. Hope Bay during open season	Mt. Hope Bay only: closed May 20 th - September 27 th and October 29 th - April 12 th	9/04/01
RI	12"	4 ³	Open: 4/12/98 to 5/18/98; and 9/27/98 to 10/27/98	3/6/98
CT	12"	8	None	9/5/01
NY ⁴	11"	15	Open: 3 rd Saturday in March - June 30 th and September 15 th - November 30 th	10/23/01
NJ	11"	None	Closed: January 1 st - February 28 th and June 1 st - September 14 th	9/7/01
DE	10"	None	None	8/31/01

³ Unlawful to sell recreational catch.

⁴ Winter flounder may not at any time be taken for commercial purposes aboard party and charter vessels.

Table 5. Numbers of recreational releases (B2 fish) of Winter Flounder by state, 1981-2003.

(source: Personal communication from the National Marine Fisheries Service, Fisheries Statistics and Economics Division, Silver Spring, MD).

Year	ME	NH	MA	RI	CT	NY	NJ	DE	MD	VA	GA	Total
1981	2,276	69,959	826,176	39,526	108,488	2,539,397	187,756	0	0	0	0	3,773,578
1982	0	7,468	1,011,549	53,039	177,780	640,546	1,206,227	0	0	0	0	3,096,609
1983	912	17,445	408,148	156,544	148,770	1,680,369	468,296	0	0	0	0	2,880,484
1984	719	20,810	251,653	151,767	156,808	3,780,800	795,762	0	1,335	0	0	5,159,654
1985	4,887	0	598,305	200,803	244,579	2,539,456	1,670,782	0	0	701	0	5,259,513
1986	2,844	3,916	321,363	660,518	62,027	1,412,179	128,936	0	0	0	0	2,591,783
1987	0	3,192	776,258	152,791	159,090	1,807,054	77,190	268	0	45,731	0	3,021,574
1988	0	2,744	277,963	110,222	178,173	1,755,862	597,447	0	0	0	0	2,922,411
1989	131,352	10,483	334,932	72,037	166,502	1,790,974	70,451	0	4,455	9426	0	2,590,612
1990	75,318	2,595	116,602	74,952	154,317	680,449	386,341	0	2,450	0	0	1,493,024
1991	0	4041	80,664	37,381	85,140	835,673	556,729	273	0	0	0	1,599,901
1992	0	1,249	59,890	11,400	21,463	222,239	281,513	0	0	0	0	597,754
1993	47,056	5,227	135,422	11,352	13,824	727,803	513,787	0	0	0	0	1,454,471
1994	1,965	6,251	136,855	14,518	25,381	333,203	433,484	332	0	0	0	951,989
1995	0	5,629	96,780	28,704	27,387	476,976	222,632	1257	0	0	0	859,365
1996	0	4,661	112,981	17,097	15,957	711,664	271,065	0	0	627	0	1,134,052
1997	0	10,866	158,586	32,870	22,925	209,399	37,363	263	20,682	0	0	492,954
1998	0	11,662	57,052	17,119	85,199	104,065	193,406	147	0	0	393	469,043
1999	943	5,670	46,097	32,200	24,810	151,850	190,971	0	0	3469	0	456,010
2000	0	7,632	96,359	15,878	10,843	228,992	431,153	128	0	0	0	790,985
2001	2,782	2,610	88,783	17,423	32,063	285,801	188,443	260	0	0	0	618,145
¹ 2002	0	4,257	32,155	19,990	9,187	141,344	124,462	64	0	0	0	331,459
2003	1,367	2,491	26,517	1,007	5,619	72,888	106,360	0	0	0	0	216,249

¹Due to data collection problems with MRFSS RDD telephone survey during Waves 2-3, 2002, preliminary estimates for this period are based upon pooled data from the previous three years (1999-2001).