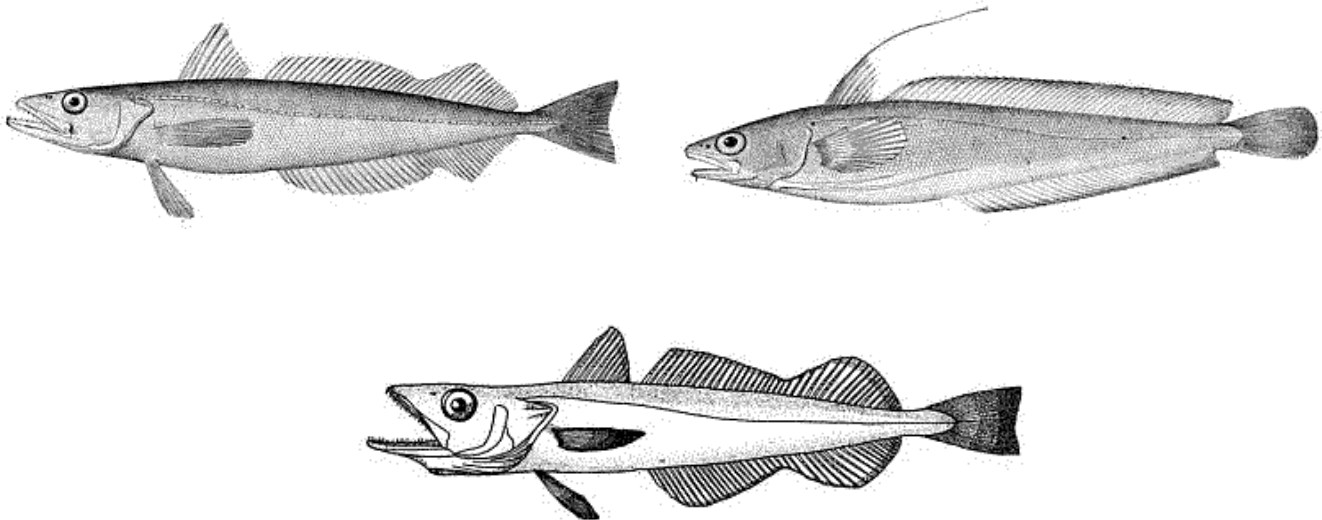


FINAL
2002 STOCK ASSESSMENT AND FISHERY EVALUATION
(SAFE) REPORT
for
SMALL MESH MULTISPECIES
(Whiting, Red Hake, and Offshore Hake)



Prepared by the
New England Fishery Management Council

Final Version: September 3, 2002

EXECUTIVE SUMMARY

This Stock Assessment and Fishery Evaluation (SAFE) Report was prepared by the New England Fishery Management Council's Whiting Monitoring Committee (WMC). It updates available biological and socioeconomic information for the northeast region's small mesh multispecies complex (silver hake/whiting, red hake/ling, and offshore hake) and its associated fisheries.

In this SAFE Report, the WMC updates NEFSC trawl survey information and evaluates each of the small mesh multispecies stocks according to their current (Amendment 12) overfishing definitions. Overall, the status of the small mesh multispecies resources has improved since the implementation of Amendment 12 at the beginning of the 2000 fishing year. None of the five stocks of small mesh multispecies are considered to be in an overfished condition at this time according to their current overfishing definitions. Based on available information, overfishing does not appear to be occurring on any of the small mesh multispecies stocks (relative exploitation indices are evaluated for whiting stocks because reliable fishing mortality estimates are not available). The WMC notes concern about trends in the autumn survey biomass index and mean fish weight for the southern stock of red hake. A benchmark assessment for red hake is needed to thoroughly evaluate the status of this stock.

The WMC evaluates progress towards the Amendment 12 objectives based on trends in relative exploitation indices for silver hake since estimates of fishing mortality are not available. The language from Amendment 12 states that the default measure is to be applied on a stock-specific basis and implemented at the beginning of Year 4 if the plan is not meeting its objectives, as determined in the third year review by the WMC. In this review, the WMC has determined that the fishing mortality objectives of Amendment 12 appear to have been achieved, based on the evaluation of relative exploitation indices as a proxy for fishing mortality.

The WMC concludes that the default measure is *not* necessary to further reduce effort in either the northern or southern stock area. The WMC supports cautious increases in effort in the northern stock area and recommends several management options to achieve these increases. Management options for the northern area include adjustments to the restrictions in the Cultivator Shoal Whiting Fishery, modifications to allowances for bait transfers at sea, and consideration of new exempted fisheries in the northern area where data exist to support them (based on the 5% groundfish bycatch standard).

Uncertainties related to the improving biological status of southern whiting and the status of southern red hake lead the WMC to recommend that effort not increase in the southern stock area. The WMC recommends that a new control date for small mesh multispecies be adopted and followed by a limited access program as soon as possible to prevent an influx of effort into the fishery, especially in the southern stock area. The WMC identifies limited access as a high priority issue for the small mesh multispecies stocks. Significant concerns exist about the potential for effort to shift into the small mesh multispecies fisheries as a result of increasing restrictions in the groundfish fishery and Amendment 13 to the Multispecies FMP. As a result, the WMC establishes a baseline of entry and exit patterns in the small mesh multispecies fisheries that can be monitored in the future.

This SAFE Report also updates available fishery information, including landings, revenues, other economic information, and information related to fishing patterns (areas) and entry/exit patterns in the fishery. It includes complete data for fishing year 2000 (May 1, 2000-April 30, 2001) and preliminary data for fishing year 2001. Updated information relating to protected species, ecological factors, the recreational fishery, and the Canadian whiting fishery are also provided.

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1.0 INTRODUCTION

This Stock Assessment and Fishery Evaluation (SAFE) Report was prepared by the New England Fishery Management Council's Whiting Monitoring Committee (WMC), which met three times from June-August 2002. This document updates available biological, economic, and social information for the northeast region's small mesh multispecies and its associated fisheries, and supplements Amendment 12 to the Northeast Multispecies Fishery Management Plan (FMP). This Report also includes recommendations for the Council to consider in the upcoming framework adjustment for small mesh multispecies (Framework 37 to the Multispecies FMP).

The Northeast region's "small mesh multispecies" includes the following species:

Table 1 General Information for Small Mesh Multispecies Identification

SPECIES COMMON NAME	SPECIES SCIENTIFIC NAME	GENERAL DISTRIBUTION	STOCK DELINEATION	OTHER COMMON NAMES
Silver Hake	<i>Merluccius bilinearis</i>	Newfoundland to South Carolina, found both inshore and offshore	2 stocks assumed to exist: GOM/northern GB and southern GB/MA	<ul style="list-style-type: none"> • Whiting
Red Hake	<i>Urophycis chuss</i>	Gulf of St. Lawrence to North Carolina inshore and offshore, most abundant between GB and New Jersey	2 stocks assumed to exist, divided similarly to silver hake	<ul style="list-style-type: none"> • Ling • Mud Hake
Offshore Hake	<i>Merluccius albidus</i>	Co-occur with silver hake in deeper waters, found primarily offshore along Continental Shelf	Unknown, currently assumed to be one stock	<ul style="list-style-type: none"> • Blackeye Whiting • Bigeye Whiting

Abbreviations are for Gulf of Maine (GOM), Georges Bank (GB), and the Mid-Atlantic (MA) regions.

2.0 STOCK ASSESSMENT INFORMATION

The most recent stock assessments for small mesh multispecies are:

SAW 32, Autumn 2000 Most recent silver hake assessment, fishing mortality estimates not accepted

SAW 11, Autumn 1990 Most recent silver hake assessment with accepted VPA

SAW 11, Autumn 1990 Most recent red hake assessment

Offshore hake has never been assessed through the SAW process.

The results of SAW 32 are summarized in the 2001 SAFE Report for small mesh multispecies and are not included in this document. No new stock assessments have been conducted in the past year. In the following section of this SAFE Report, the Whiting Monitoring Committee updates NEFSC trawl survey information through autumn 2001 and evaluates the status of each stock relative to its current overfishing definition. To the extent possible, the WMC also

provides an assessment of the status of the small mesh multispecies resources relative to the objectives of Amendment 12 to the Northeast Multispecies FMP.

In addition, at the 35th Stock Assessment Workshop (SAW 35) in the spring of 2002, the Stock Assessment Review Committee (SARC) reviewed a status report on a cooperative research project examining whiting stock structure and the relationship between whiting and bottom water temperatures. The SARC's comments on this project are summarized in Section 2.6 of this document.

2.1 WMC UPDATED STATUS DETERMINATIONS FOR SILVER HAKE (WHITING)

The Whiting Monitoring Committee updated stock status relative to the current overfishing definitions for both stocks of silver hake (whiting) through the autumn 2001 NEFSC trawl survey. Information for whiting is presented below. For red hake and offshore hake, see Sections 2.2 and 2.3 respectively.

The current overfishing definition for silver hake (whiting) is as follows:

*Silver hake is overfished when the three-year moving average of the autumn survey weight per tow is less than **3.31 kg/tow and 0.89* kg/tow for the northern and southern stocks respectively**, one half of the B_{MSY} proxy (the average observed from 1973 – 1982). If an analytical assessment (e.g. VPA) for silver hake is available, the three-year moving average will be replaced with the terminal year biomass estimate and compared with the mean biomass estimated for 1973 – 1982.*

*Overfishing occurs when fishing mortality, derived from the latest three years of survey data, exceeds $F_{0.1}$ (**0.41 and 0.39 for the northern and southern stocks of silver hake respectively**). If an analytical assessment is available, then the terminal year fishing mortality rate will be compared to $F_{0.1}$.*

*The survey time series was recalculated during SAW 32, which changed the biomass target for the southern stock of whiting from 1.56 to 1.78 and the biomass threshold from 0.78 to 0.89. See the 2001 SAFE Report for a full discussion.

Table 2 Current Overfishing Definition Reference Points for Silver Hake

STOCK	THRESHOLDS	TARGETS
Northern Silver Hake	$F_{0.1} = (0.41)$ $B = \frac{1}{2} B_{MSY}$ proxy = 3.31 kg/tow	F below $F_{0.1}$ B = 1973-1982 weight per tow = 6.63 kg/tow
Southern Silver Hake	$F_{0.1} = (0.39)$ $B = \frac{1}{2} B_{MSY}$ proxy = 0.89 kg/tow**	F below $F_{0.1}$ B = 1973-1982 weight per tow = 1.78 kg/tow**

** The biomass target and threshold for the southern stock were recalculated at SAW 32 to be 1.78 kg/tow and 0.89 kg/tow respectively. See 2001 SAFE Report for a full discussion.

2.1.1 Northern Silver Hake

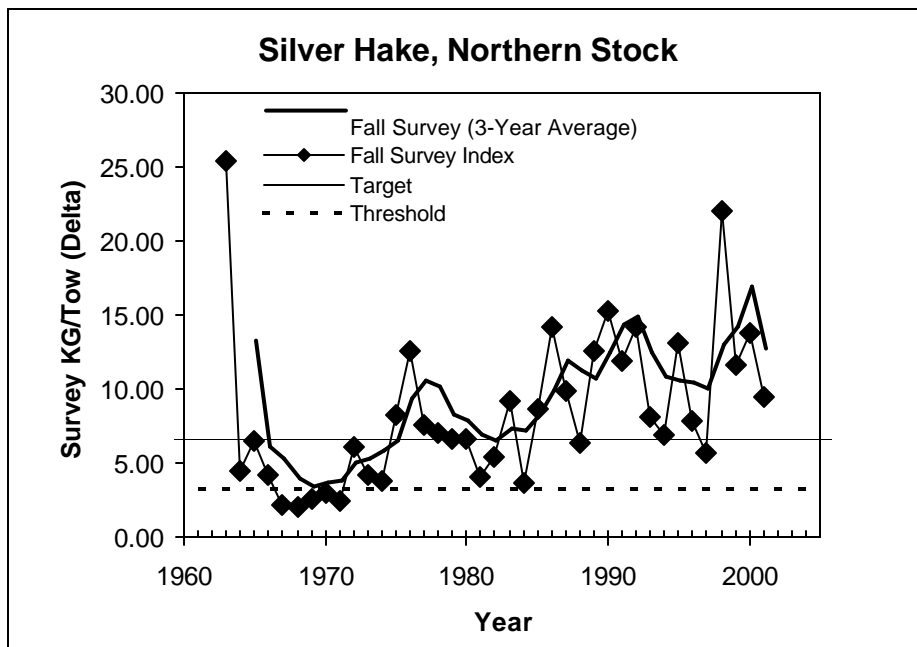
The WMC updated the status of the northern stock of whiting through the 2001 autumn trawl survey. According to the information presented in Table 3, the northern stock of whiting is not considered to be in an overfished condition and is above its biomass target (rebuilt). The current three-year average of the autumn survey index is 176% of the biomass target. The current fishing mortality rate for the northern stock of whiting remains unknown.

Table 3 WMC Updated Status Determination for the Northern Stock of Silver Hake

Northern Biomass Target = 6.63 kg/tow Northern Biomass Threshold = 3.31 kg/tow				
YEAR	Autumn Survey Index (kg/tow)	Autumn Index 3-Year Moving Average (kg/tow)	3-Year Average Above Biomass Threshold?	3-Year Average Above Biomass Target?
1997	5.64	8.90	YES	YES
1998	21.97	11.83	YES	YES
1999	11.64	13.08	YES	YES
2000	13.79	15.80	YES	YES
2001	9.53	11.65	YES	YES
Stock Status: Not Overfished, Rebuilt, fishing mortality unknown				

Figure 1 illustrates trends in the autumn survey biomass index for the northern stock of whiting. Over the time series, the biomass index for northern silver hake has gradually increased. The three-year moving average as well as most individual survey points have remained above the biomass target since the mid-1980s. The 1998 survey point is the highest of the time series.

Figure 1 Trends in Survey Indices for the Northern Stock of Silver Hake



Additional information about the northern stock of whiting, including time series of survey data, landings data, and relative exploitation rates, is presented in Section 2.5 of this document (p. 26-28).

2.1.2 Southern Silver Hake

According to the information presented in Table 4, the southern stock of whiting is not considered to be in an overfished condition. While the stock is not yet rebuilt, the three-year average of the autumn survey index is 71% of the biomass target. The current fishing mortality rate for the southern stock of whiting remains unknown.

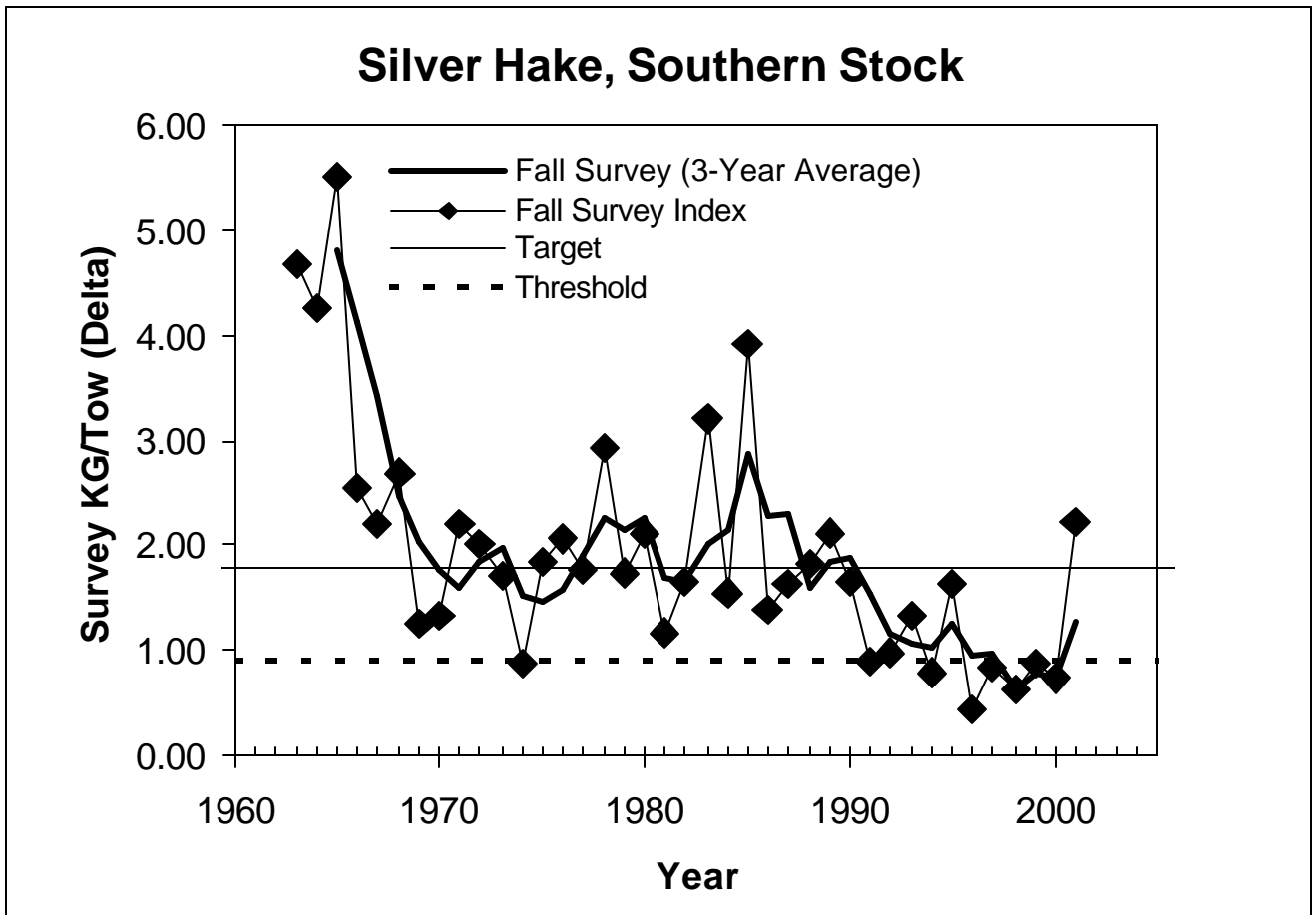
Table 4 WMC Updated Status Determination for the Southern Stock of Silver Hake

Southern Biomass Target = 1.78 kg/tow* Southern Biomass Threshold = 0.89 kg/tow*				
YEAR	Autumn Survey Index (kg/tow)	Autumn Index 3-Year Moving Average (kg/tow)	3-Year Average Above Biomass Threshold?	3-Year Average Above Biomass Target?
1997	0.84	0.97	YES	NO
1998	0.62	0.63	NO	NO
1999	0.87	0.78	NO	NO
2000	0.72	0.74	NO	NO
2001	2.23	1.27	YES	NO
Stock Status: Not overfished, 71% of biomass target, fishing mortality unknown				

**The survey time series was recalculated during SAW 32, which changed the biomass target for the southern stock of whiting from 1.56 to 1.78 and the biomass threshold from 0.78 to 0.89. See 2001 SAFE Report for discussion.*

Figure 2 illustrates trends in the autumn survey biomass index for the southern stock of whiting. Over the time series, the biomass index for southern silver hake gradually decreased to levels indicating that the stock was in an overfished condition in the and late-1990s. This trend has recently reversed, and the 1999-2001 survey average increased above the biomass threshold. The 2001 autumn survey point was the highest since the mid-1980s.

Figure 2 Trends in Survey Indices for the Southern Stock of Silver Hake



Additional information about the southern stock of whiting, including time series of survey data, landings data, and relative exploitation rates, is presented in Section 2.5 of this document (p. 26-28).

2.2 WMC UPDATED STATUS DETERMINATION FOR RED HAKE

The Whiting Monitoring Committee updated stock status determinations relative to the current overfishing definitions for both stocks of red hake through the autumn 2001 NEFSC trawl survey.

2.2.1 Northern Red Hake

The current overfishing definition for northern red hake reads as follows:

The northern stock of red hake is overfished when the three-year moving average of stock biomass, derived from the autumn survey, is below 1.6 kg/tow. If an analytical assessment is available for northern red hake, then the three-year moving average will be replaced with the terminal year biomass estimate and compared with the biomass reference points.

Overfishing occurs when the ratio between catch and survey biomass exceeds **0.65**, the proxy for F_{MSY} . When biomass is less than 3.1 kg/tow (the biomass target), the stock is overfished when fishing mortality is above a rate that declines linearly to zero when biomass equals the minimum biomass threshold (1.6 kg/tow).

Table 5 Overfishing Definition Reference Points for the Northern Stock of Red Hake

	THRESHOLD	TARGET
Maximum Sustainable Yield	2,000 mt	
Fishing Mortality (catch/survey biomass)	0.65	0.39
Stock Biomass (kg/tow)	1.6	3.1

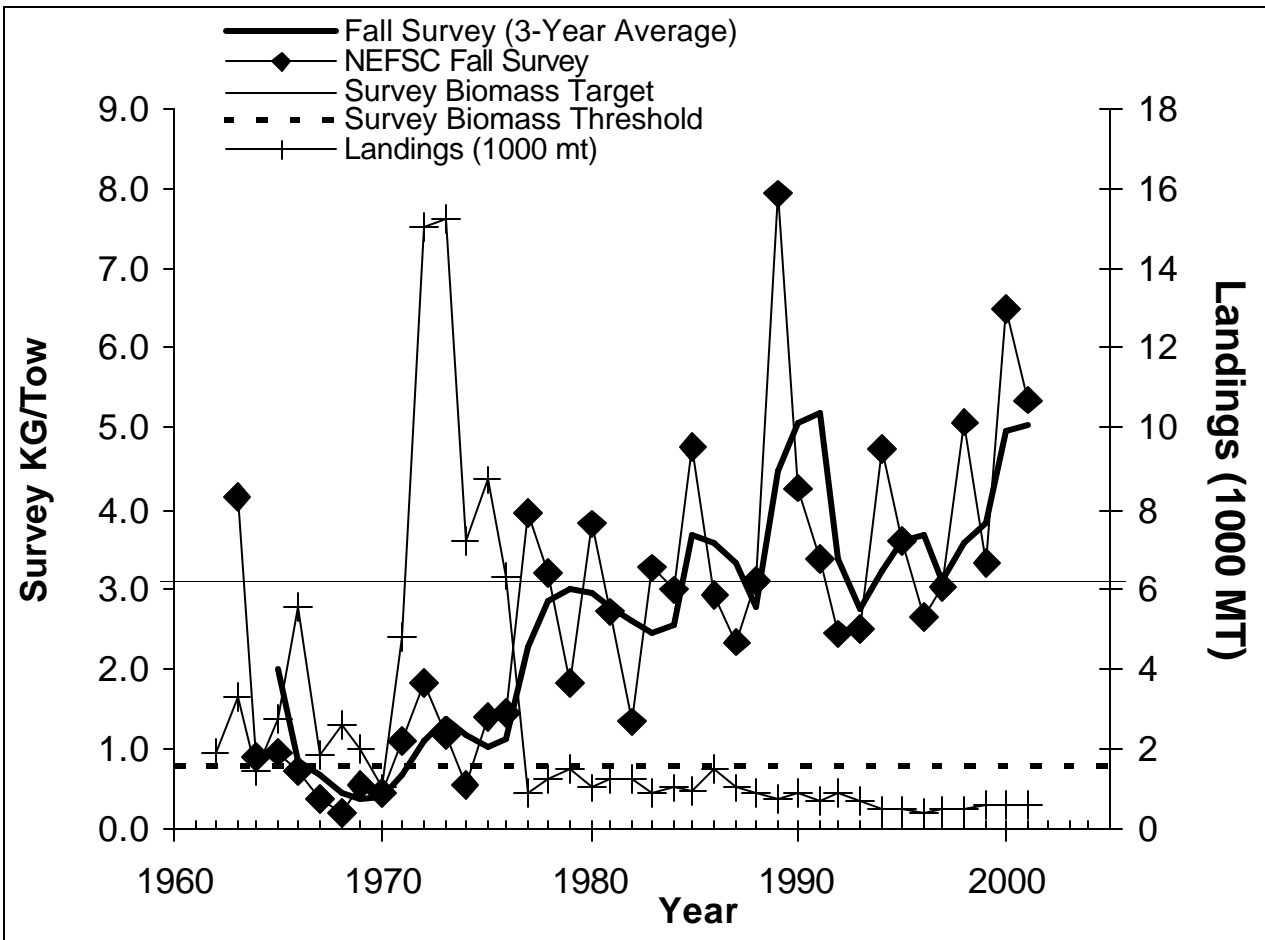
According to the information presented in Table 6, the northern stock of red hake is not considered to be in an overfished condition and is above its biomass target (rebuilt). The current three-year average of the autumn survey index is 165% of the biomass target.

Table 6 WMC Updated Status Determination for the Northern Stock of Red Hake

Northern Biomass Target = 3.1 kg/tow Northern Biomass Threshold = 1.6 kg/tow				
YEAR	Autumn Survey Index (kg/tow)	Autumn Index 3-Year Moving Average (kg/tow)	3-Year Average Above Biomass Threshold?	3-Year Average Above Biomass Target?
1997	3.0	3.1	YES	AT TARGET
1998	5.1	3.6	YES	YES
1999	3.3	3.8	YES	YES
2000	6.5	5.0	YES	YES
2001	5.4	5.1	YES	YES
Stock Status: Not Overfished, Rebuilt, fishing mortality unknown				

Figure 3 illustrates trends in the autumn survey biomass index for the northern stock of red hake relative to the biomass target and threshold in the current overfishing definition as well as trends in northern red hake landings. The survey index has been gradually increasing since the mid-1970s as landings declined considerably with the elimination of the distant water fleets. Landings have remained below 2,000 mt (the estimated MSY level) since prior to 1980. The three-year moving average of the survey biomass has remained above the overfishing definition biomass threshold since the mid-1970s and above the biomass target since the late-1990s.

Figure 3 Trends in Autumn Survey Indices for the Northern Stock of Red Hake



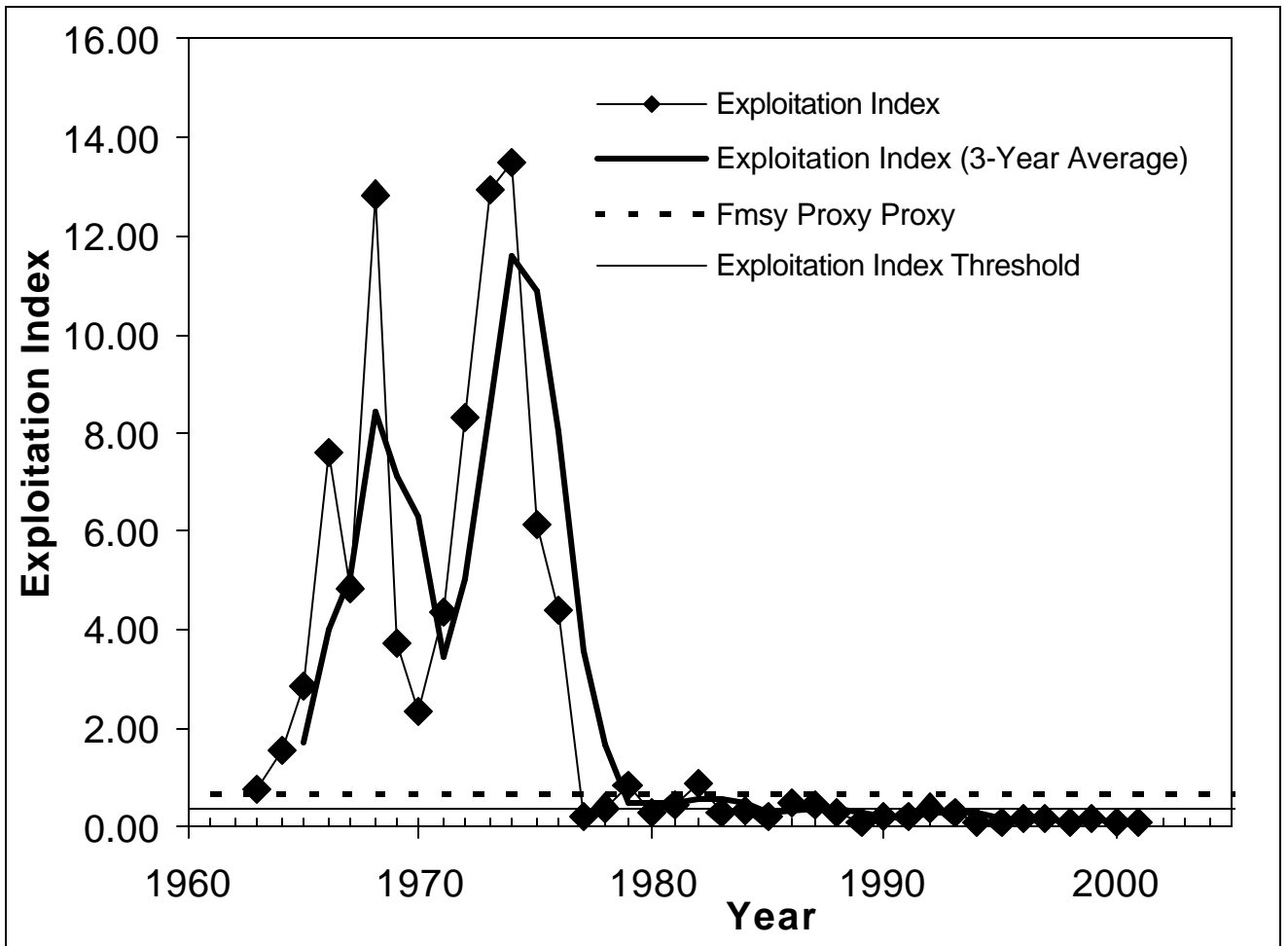
The fishing mortality rate for the northern stock of red hake remains unknown. The current overfishing definition for northern red hake specifies a relative exploitation rate (catch/survey) as a proxy for fishing mortality. The proxy for F_{MSY} , the fishing mortality threshold, is **0.65**; the fishing mortality target is specified at 60% of the F_{MSY} value, or **0.39**. Table 7 provides a time series of the autumn survey indices (including three-year averages), mean survey fish weights, landings, and relative exploitation indices (including three-year averages) for the northern stock of red hake. Note that the landings data differ from those reported in the 2001 SAFE Report. The landings data reported in Table 7 include a prorated amount of “unspecified hake” as well as a small amount of recreational catch.

According to the information presented in Table 7 and illustrated in Figure 4, the relative exploitation index for the northern stock of red hake has not exceeded the 0.65 threshold since 1978 and has remained below the 0.39 target in almost all years since the mid-1980s. Recent landings and relative exploitation rates are the lowest of the time series. As previously noted, landings of northern red hake never exceeded the MSY estimate (2,000 mt) since the elimination of the distant water fleets in the late-1970s. The information in Table 7 suggests that overfishing is not occurring on the northern stock of red hake.

Table 7 Autumn Survey, Catch, and Relative Exploitation Indices for the Northern Stock of Red Hake, 1962-2001

Year	Autumn Survey (Mean kg/tow)	Autumn Survey (3-Year Average)	Mean Fish Weight (kg)	Landings (1000 mt)	Exploitation Index	Exploitation Index (3-Year Average)
1962				1.91		
1963	4.2		0.50	3.28	0.79	
1964	0.9		0.31	1.41	1.55	
1965	1.0	2.0	0.47	2.73	2.85	1.73
1966	0.7	0.9	0.40	5.58	7.59	4.00
1967	0.4	0.7	0.37	1.86	4.86	5.10
1968	0.2	0.4	0.26	2.63	12.81	8.42
1969	0.5	0.4	0.17	2.02	3.72	7.13
1970	0.4	0.4	0.13	1.03	2.34	6.29
1971	1.1	0.7	0.22	4.81	4.38	3.48
1972	1.8	1.1	0.25	15.01	8.32	5.01
1973	1.2	1.4	0.22	15.28	12.95	8.55
1974	0.5	1.2	0.24	7.22	13.48	11.58
1975	1.4	1.0	0.22	8.70	6.12	10.85
1976	1.4	1.1	0.24	6.34	4.40	8.00
1977	3.9	2.3	0.34	0.89	0.23	3.58
1978	3.2	2.9	0.28	1.22	0.38	1.67
1979	1.8	3.0	0.32	1.52	0.83	0.48
1980	3.8	2.9	0.29	1.03	0.27	0.50
1981	2.7	2.8	0.19	1.25	0.46	0.52
1982	1.3	2.6	0.23	1.21	0.91	0.55
1983	3.3	2.4	0.40	0.90	0.27	0.55
1984	3.0	2.5	0.35	1.06	0.36	0.51
1985	4.8	3.7	0.27	0.99	0.21	0.28
1986	2.9	3.6	0.34	1.49	0.51	0.36
1987	2.3	3.3	0.26	1.00	0.43	0.38
1988	3.1	2.8	0.38	0.86	0.28	0.41
1989	7.9	4.5	0.21	0.77	0.10	0.27
1990	4.3	5.1	0.29	0.90	0.21	0.20
1991	3.4	5.2	0.24	0.70	0.21	0.17
1992	2.4	3.4	0.21	0.90	0.37	0.26
1993	2.5	2.8	0.21	0.70	0.28	0.29
1994	4.7	3.2	0.17	0.51	0.11	0.25
1995	3.6	3.6	0.13	0.46	0.13	0.17
1996	2.6	3.7	0.19	0.39	0.15	0.13
1997	3.0	3.1	0.23	0.46	0.15	0.14
1998	5.1	3.6	0.23	0.51	0.10	0.13
1999	3.3	3.8	0.20	0.62	0.19	0.15
2000	6.5	5.0	0.23	0.59	0.09	0.13
2001	5.4	5.1	0.22	0.65	0.12	0.13

Figure 4 Trends in Relative Exploitation Indices for the Northern Stock of Red Hake



2.2.2 Southern Red Hake

The current overfishing definition for southern red hake reads as follows:

*The southern stock of red hake is in an overfished condition when the three-year moving average weight per individual in the autumn survey falls below the 25th percentile of the average weight per individual from the autumn survey time series 1963-1997 (0.12) AND when the three-year moving average of the abundance of immature fish less than 25 cm falls below the median value of the 1963-1997 autumn survey abundance of fish less than 25 cm (4.72).**

*Similar to last year's review, the WMC notes problems associated with the overfishing definition for southern red hake. The Monitoring Committee recommends that this overfishing definition be revisited. A benchmark stock assessment for red hake is needed.

Table 8 Overfishing Definition Reference Points for the Southern Stock of Red Hake

	THRESHOLD	TARGET
Maximum Sustainable Yield	Not estimable	
Fishing Mortality (F)	Not specified	Not specified
Stock Biomass (B)	Weight distribution less than 0.12 AND recruitment less than 4.72	Not specified

According to the information presented in Table 9, the southern stock of red hake is not considered to be in an overfished condition, although the WMC notes that it is more appropriate to conclude that overfishing is not occurring on the southern stock of red hake. The current fishing mortality rate for the southern stock of red hake remains unknown.

Table 9 WMC Updated Status Determination for the Southern Stock of Red Hake

Southern Threshold for Overfishing = 0.12 kg and 4.72 fish						
YEAR	Mean Fish Weight (kg)	3-Year Average Mean Fish Weight	Recruitment Index (# of fish < 25 cm)	3-Year Average Recruitment Index	3-Year Average Weight Above 0.12 kg?	3-Year Average Recruitment Above 4.72 Fish?
1997	0.15	0.11	1.37	3.36	NO	NO
1998	0.13	0.13	1.82	1.53	YES	NO
1999	0.03	0.10	14.91	6.03	NO	YES
2000	0.18	0.11	0.74	5.82	NO	YES
2001	0.05	0.09	8.91	8.18	NO	YES
Stock Status: Not Overfished/Overfishing, fishing mortality unknown						

Figure 5 and Figure 6 illustrate trends in the recruitment index and mean fish weight, respectively, for the southern stock of red hake since 1963. The recruitment index for this stock, measured from the autumn trawl survey, has fluctuated around the overfishing definition threshold value and currently remains above the threshold. Mean fish weight, on the other hand, has been quite variable but has decreased over time and currently remains at levels below the overfishing definition threshold. In order for the stock to be considered in an overfished condition (or more appropriately, in order for overfishing to be occurring), both the recruitment index and the mean fish weight must be below their threshold values.

Figure 5 Trends in the Recruitment Index for the Southern Stock of Red Hake

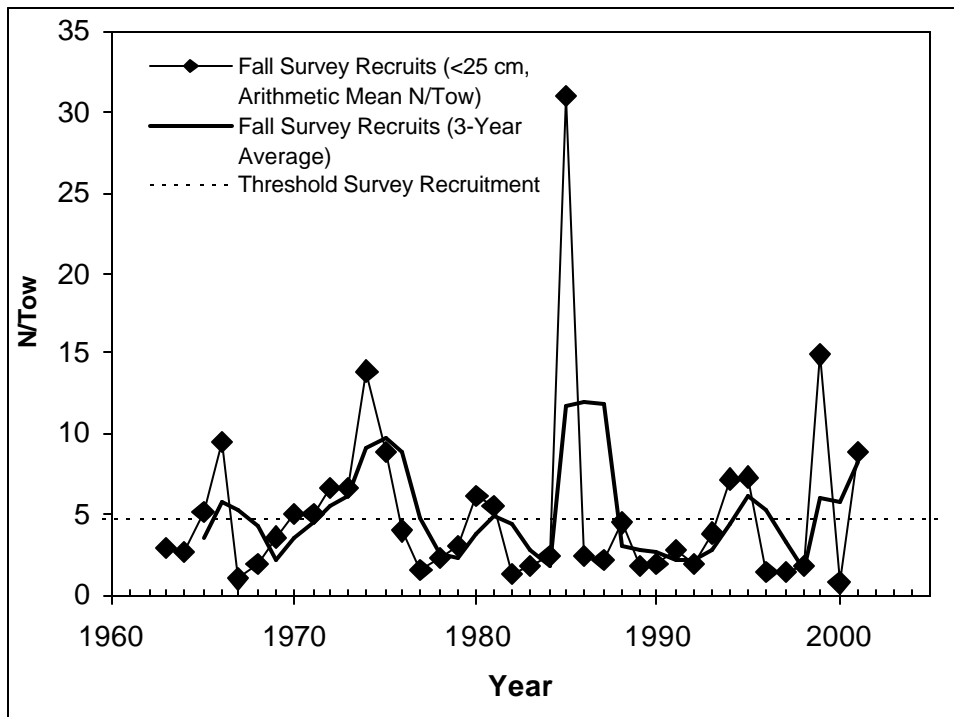


Figure 6 Trends in Mean Fish Weight for the Southern Stock of Red Hake

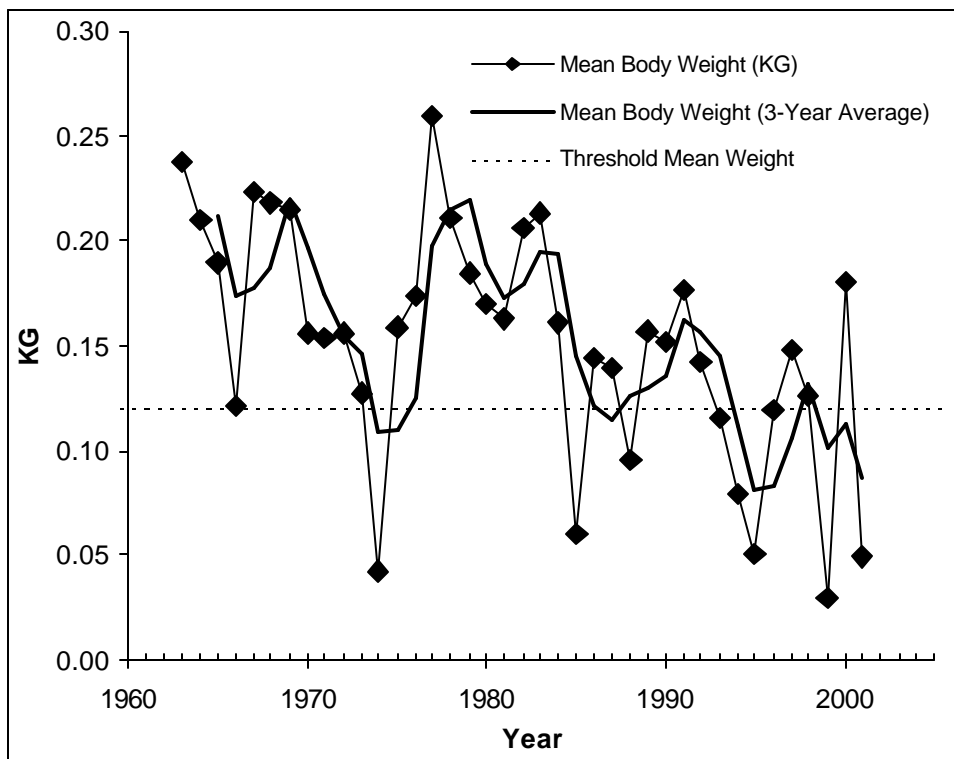


Table 10, Figure 7, and Figure 8 present time series of autumn survey biomass indices, survey recruits, survey fish weights, landings, and relative exploitation indices for the southern stock of red hake. Autumn survey biomass indices were relatively stable through the 1970s and early 1980s, but then gradually declined. In recent years, survey biomass has again stabilized, although at lower levels than previously observed. Overall, average survey biomass indices for southern red hake were lower from 1990-2000 than they were from 1980-1990 (1.98 from 1980-1990 compared to 0.83 from 1990-2000). The WMC notes concerns about this trend as well as the trend in mean fish weight for this stock. A benchmark stock assessment is needed to thoroughly evaluate the status of this stock.

The relative exploitation of southern red hake has increased slightly in recent years but remains well below levels seen in the 1960s and 1970s when distant water fleets were prosecuting the fishery. Landings have remained consistent and low at less than 2,000 mt in almost every year since 1980. The fishing mortality rate for the southern stock of red hake remains unknown.

Table 10 Autumn Survey, Recruitment, Fish Weight, and Relative Exploitation Indices for the Southern Stock of Red Hake

Year	Autumn Survey (Mean kg/tow)	Autumn Survey (3-Year Average)	Autumn Survey Recruits (<25 cm, mean #/tow)	Fall Survey Recruits (3-Year Average)	Mean Fish Weight (kg)	Mean Fish Weight (3-Year Average)	Landings (1000 mt)	Exploitation Index	Exploitation Index (3-Year Average)
1963	8.79		2.91		0.24		32.67	3.72	
1964	3.74		2.76		0.21		44.22	11.83	
1965	4.43	5.65	5.18	3.62	0.19	0.21	93.62	21.15	12.23
1966	2.47	3.54	9.48	5.81	0.12	0.17	108.02	43.80	25.59
1967	1.34	2.74	1.09	5.25	0.22	0.18	58.95	43.99	36.31
1968	2.48	2.09	1.98	4.18	0.22	0.19	18.71	7.56	31.78
1969	2.54	2.12	3.64	2.24	0.22	0.22	53.42	21.01	24.19
1970	1.80	2.27	5.04	3.55	0.16	0.20	11.86	6.59	11.72
1971	2.05	2.13	4.99	4.56	0.15	0.18	35.42	17.26	14.95
1972	3.04	2.30	6.72	5.58	0.16	0.16	61.37	20.19	14.68
1973	1.86	2.32	6.67	6.13	0.13	0.15	51.68	27.83	21.76
1974	0.71	1.87	13.89	9.09	0.04	0.11	26.83	37.85	28.62
1975	4.11	2.22	8.84	9.80	0.16	0.11	20.03	4.88	23.52
1976	2.65	2.49	4.01	8.91	0.17	0.13	23.11	8.73	17.15
1977	2.52	3.09	1.53	4.79	0.26	0.20	7.81	3.10	5.57
1978	1.89	2.35	2.32	2.62	0.21	0.22	5.40	2.86	4.90
1979	2.39	2.27	3.05	2.30	0.19	0.22	7.85	3.28	3.08
1980	3.15	2.48	6.23	3.87	0.17	0.19	4.23	1.34	2.50
1981	2.33	2.62	5.56	4.95	0.16	0.17	2.58	1.11	1.91
1982	2.46	2.64	1.28	4.36	0.21	0.18	3.17	1.29	1.25
1983	4.80	3.19	1.81	2.88	0.21	0.19	1.57	0.33	0.91
1984	0.94	2.73	2.48	1.85	0.16	0.19	2.74	2.92	1.51
1985	2.43	2.72	31.03	11.77	0.06	0.14	0.93	0.38	1.21
1986	1.07	1.48	2.48	11.99	0.14	0.12	1.10	1.02	1.44
1987	0.76	1.42	2.17	11.89	0.14	0.11	1.86	2.46	1.29
1988	0.77	0.87	4.52	3.05	0.10	0.13	1.21	1.57	1.68
1989	1.49	1.01	1.76	2.81	0.16	0.13	1.38	0.92	1.65
1990	1.54	1.27	1.93	2.73	0.15	0.14	1.30	0.84	1.11
1991	2.04	1.69	2.84	2.18	0.18	0.16	1.30	0.64	0.80
1992	0.63	1.40	1.94	2.24	0.14	0.16	1.50	2.38	1.29
1993	1.14	1.27	3.82	2.87	0.12	0.14	1.10	0.96	1.33
1994	0.80	0.86	7.27	4.34	0.08	0.11	1.30	1.62	1.66
1995	0.46	0.80	7.29	6.13	0.05	0.08	1.20	2.59	1.72
1996	0.39	0.55	1.41	5.32	0.12	0.08	0.70	1.79	2.00
1997	0.60	0.49	1.37	3.36	0.15	0.11	1.00	1.67	2.02
1998	0.50	0.50	1.82	1.53	0.13	0.13	0.90	1.80	1.76
1999	0.54	0.55	14.91	6.03	0.03	0.10	0.89	1.65	1.71
2000	0.48	0.50	0.74	5.82	0.18	0.11	0.99	2.08	1.84
2001	0.55	0.52	8.91	8.18	0.05	0.09	1.04	1.87	1.87

Figure 7 Trends in Autumn Survey Biomass and Landings for the Southern Stock of Red Hake

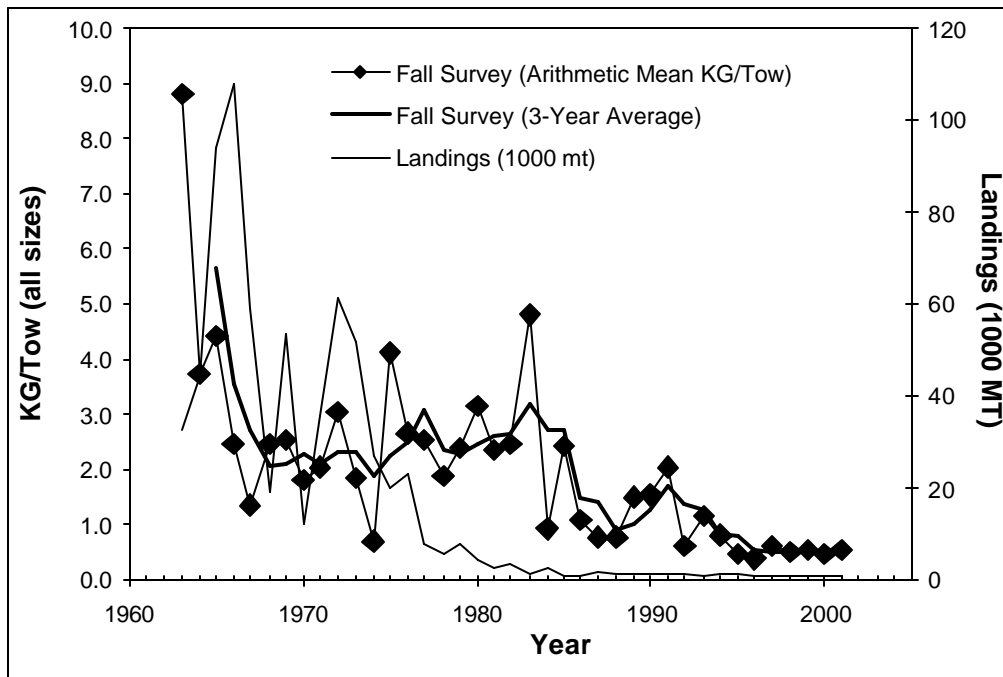
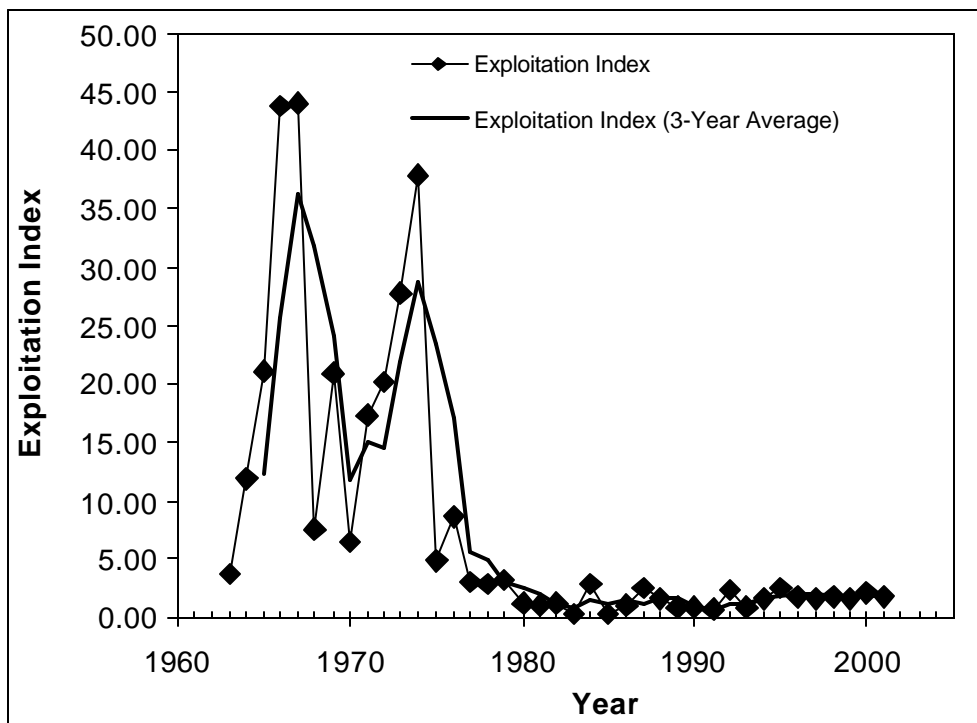


Figure 8 Trends in Relative Exploitation Rates for the Southern Stock of Red Hake



2.3 WMC UPDATED STATUS DETERMINATION FOR OFFSHORE HAKE

The current overfishing definition for offshore hake reads as follows:

Offshore hake is in an overfished condition when the three year moving average weight per individual in the autumn survey falls below the 25th percentile of the average weight per individual from the autumn survey time series 1963-1997 (0.236) AND when the three year moving average of the abundance of immature fish less than 30 cm falls below the median value of the 1963-1997 autumn survey abundance of fish less than 30 cm (0.33).

*Similar to last year's annual review and the southern red hake overfishing definition, the Whiting Monitoring Committee notes problems associated with the overfishing definition for offshore hake. The Monitoring Committee recommends that this overfishing definition be revisited. A benchmark stock assessment for offshore hake is needed.

Table 11 Overfishing Definition Reference Points for Offshore Hake

	THRESHOLD	TARGET
Maximum Sustainable Yield	Not estimable	
Fishing Mortality (F)	Not specified	Not specified
Stock Biomass (B)	Weight distribution less than 0.24 AND recruitment less than 0.33	Not specified

According to the information presented in Table 12, offshore hake is not considered to be in an overfished condition, although the WMC notes that it is more appropriate to conclude that overfishing is not occurring on offshore hake. The fishing mortality rate for offshore hake remains unknown.

Table 12 Whiting Monitoring Committee Updated Status Determination for Offshore Hake

Offshore Hake Threshold for Overfishing = 0.24 kg and 0.33 fish						
YEAR	Mean Fish Weight (kg)	3-Year Average Mean Fish Weight	Recruitment Index (# of fish < 30 cm)	3-Year Average Recruitment Index	3-Year Average Weight Above 0.24 kg?	3-Year Average Recruitment Above 0.33 Fish?
1997	0.38	0.31	0.08	0.15	YES	NO
1998	0.14	0.28	0.56	0.22	YES	NO
1999	0.13	0.22	0.13	0.26	NO	NO
2000	0.21	0.16	0.06	0.25	NO	NO
2001	0.18	0.18	1.86	0.68	NO	YES
Stock Status: Not Overfished/Overfishing, fishing mortality unknown						

Figure 9 and Figure 10 illustrate trends in the recruitment index and mean fish weight, respectively, for offshore hake since 1963. The recruitment index for this stock, measured by fish greater than 30 cm sampled in the autumn trawl survey, increased and fluctuated around the overfishing definition threshold value until it decreased considerably in the mid-1990s. Since then, recruitment has been gradually increasing, and the 2001 value is the highest on record. With the exception of the earliest years in the time series, mean fish weight fluctuated at or above the overfishing definition threshold for most of the time series. Currently, mean fish weight is below the overfishing definition threshold. In order for the stock to be considered in an overfished condition (or more appropriately, in order for overfishing to be occurring), both the recruitment index and the mean fish weight must be below their threshold values.

Figure 9 Trends in the Recruitment Index for Offshore Hake

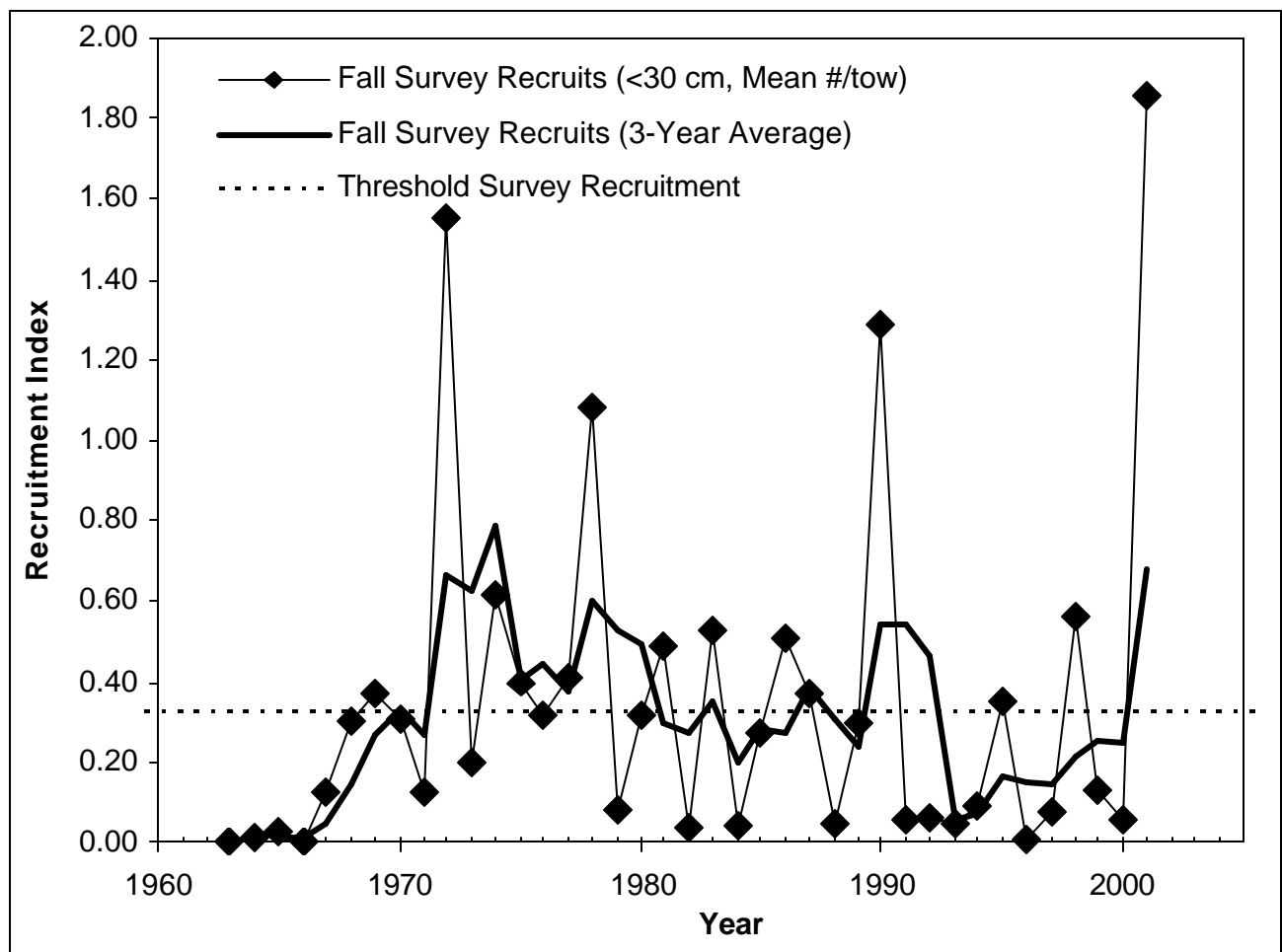


Figure 10 Trends in Mean Fish Weight for Offshore Hake

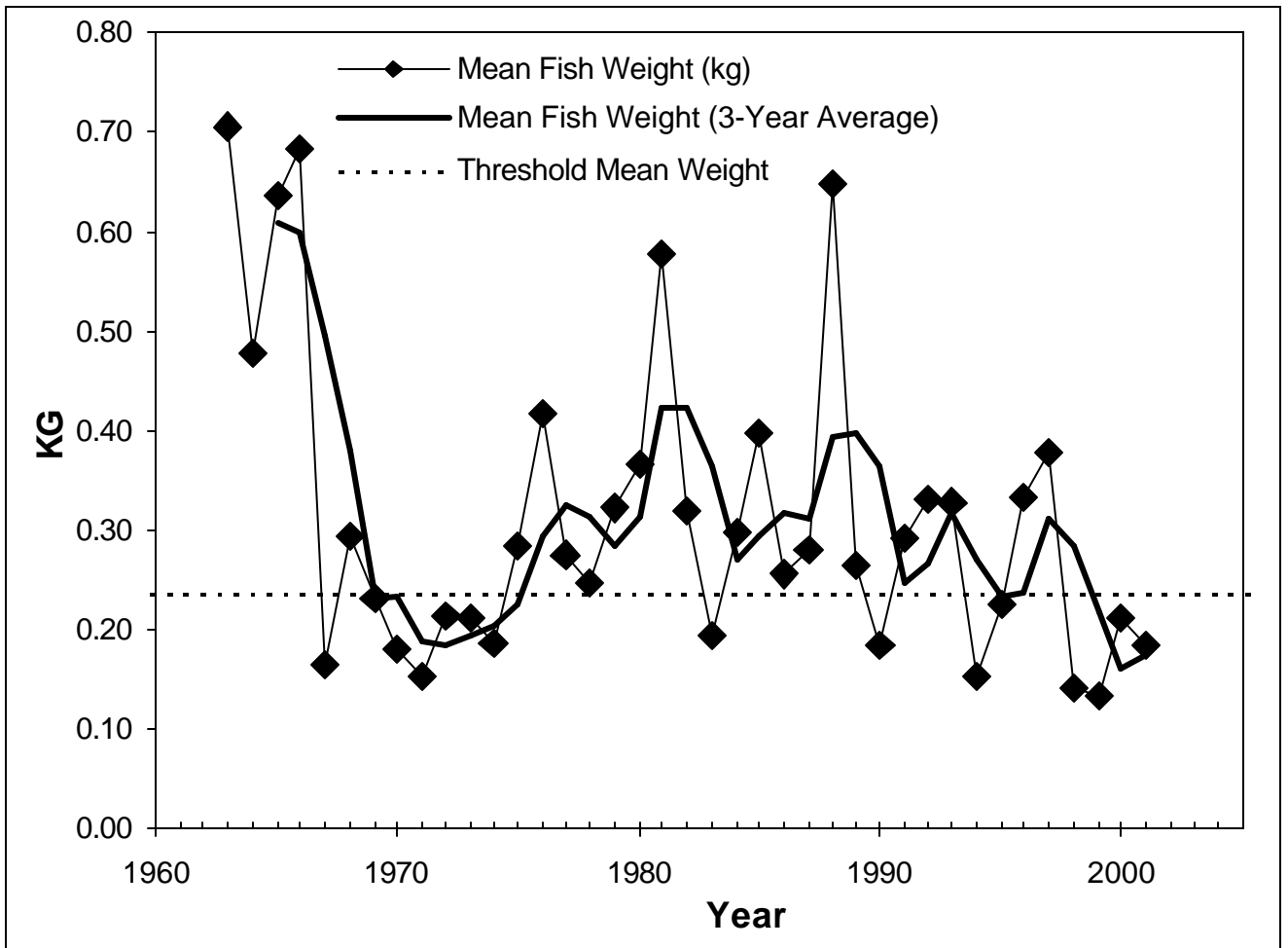
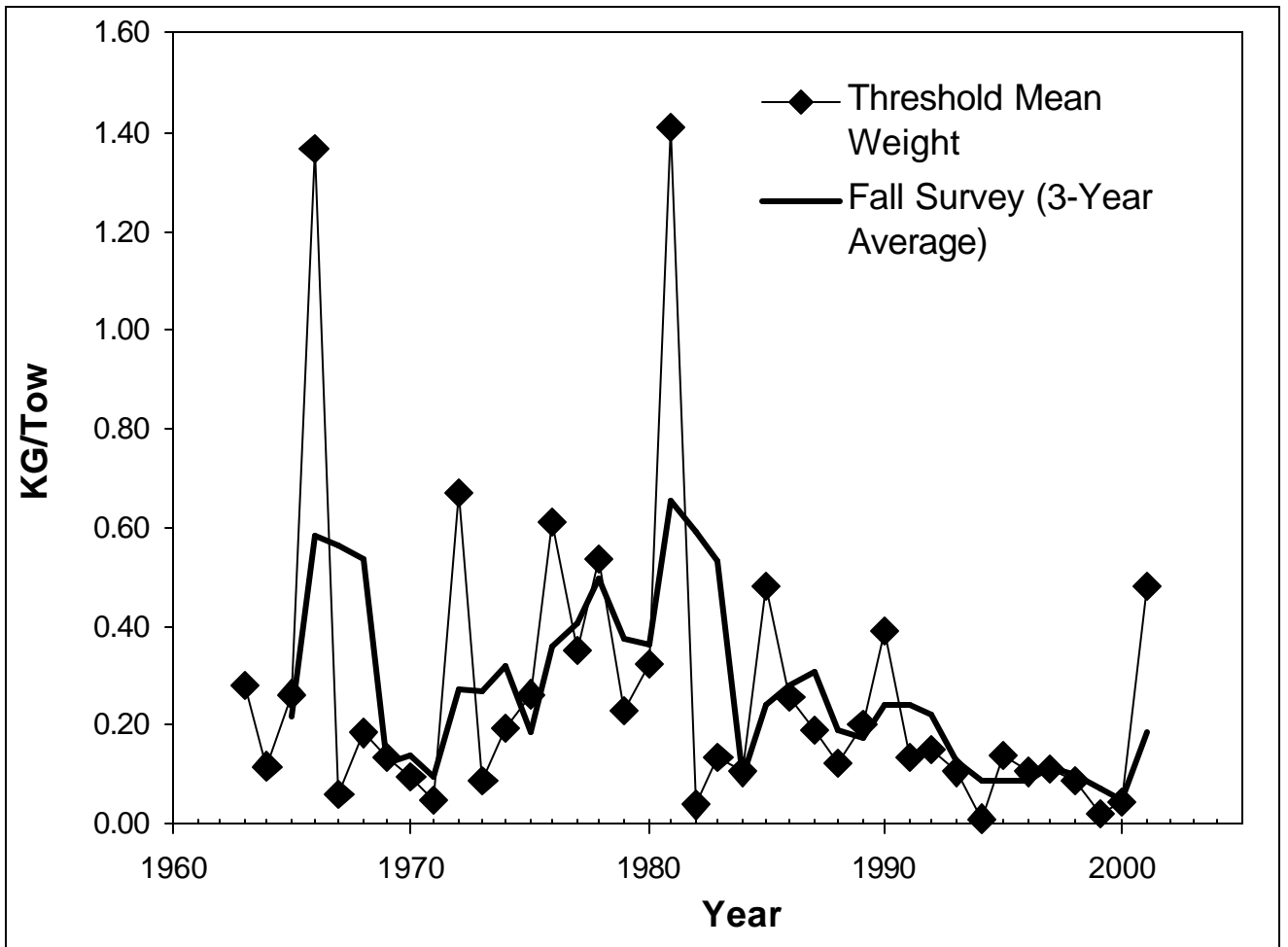


Table 13 provides a time series of mean autumn survey indices, survey recruits, and survey fish weights, for offshore hake since 1980. Figure 11 illustrates trends in the autumn survey biomass index for offshore hake. Overall, the survey biomass index for offshore hake has been low and variable. Offshore hake is known to be a deep-water species, and it is believed that the survey may not sample the species' entire range. The 2001 autumn survey is the highest since the early 1980s, and the current three-year survey average is the highest since the early 1990s. The fishing mortality rate for offshore hake remains unknown.

Table 13 Autumn Survey, Recruitment, and Fish Weight Indices for Offshore Hake

Year	Autumn Survey (Mean kg/tow)	Autumn Survey (3-Year Average)	Autumn Survey Recruits (<30 cm, Mean #/tow)	Autumn Survey Recruits (3-Year Average)	Mean Fish Weight (kg)	Mean Fish Weight (3-Year Average)
1963	0.28		0.00		0.71	
1964	0.12		0.02		0.48	
1965	0.26	0.22	0.03	0.01	0.64	0.61
1966	1.37	0.58	0.00	0.01	0.68	0.60
1967	0.06	0.56	0.12	0.05	0.17	0.50
1968	0.18	0.54	0.30	0.14	0.29	0.38
1969	0.13	0.13	0.37	0.27	0.23	0.23
1970	0.10	0.14	0.31	0.33	0.18	0.23
1971	0.05	0.09	0.12	0.27	0.15	0.19
1972	0.67	0.27	1.55	0.66	0.22	0.18
1973	0.09	0.27	0.20	0.63	0.21	0.19
1974	0.20	0.32	0.62	0.79	0.19	0.20
1975	0.26	0.18	0.40	0.41	0.28	0.23
1976	0.61	0.36	0.32	0.44	0.42	0.29
1977	0.35	0.41	0.41	0.38	0.28	0.32
1978	0.54	0.50	1.08	0.60	0.25	0.31
1979	0.23	0.37	0.08	0.52	0.32	0.28
1980	0.33	0.37	0.32	0.49	0.37	0.31
1981	1.41	0.66	0.48	0.29	0.58	0.42
1982	0.04	0.59	0.03	0.28	0.32	0.42
1983	0.14	0.53	0.53	0.35	0.19	0.36
1984	0.11	0.09	0.04	0.20	0.30	0.27
1985	0.48	0.24	0.27	0.28	0.40	0.30
1986	0.26	0.28	0.51	0.27	0.26	0.32
1987	0.19	0.31	0.37	0.38	0.28	0.31
1988	0.12	0.19	0.05	0.31	0.65	0.39
1989	0.20	0.17	0.29	0.24	0.27	0.40
1990	0.39	0.24	1.29	0.54	0.18	0.36
1991	0.14	0.24	0.05	0.54	0.29	0.25
1992	0.15	0.23	0.06	0.47	0.33	0.27
1993	0.11	0.13	0.05	0.06	0.33	0.32
1994	0.01	0.09	0.09	0.07	0.15	0.27
1995	0.14	0.09	0.35	0.16	0.22	0.23
1996	0.11	0.09	0.01	0.15	0.33	0.24
1997	0.11	0.12	0.08	0.15	0.38	0.31
1998	0.09	0.10	0.56	0.22	0.14	0.28
1999	0.03	0.07	0.13	0.26	0.13	0.22
2000	0.04	0.05	0.06	0.25	0.21	0.16
2001	0.48	0.18	1.86	0.68	0.18	0.18

Figure 11 Trends in the Autumn Survey Biomass Index for Offshore Hake



2.4 SUMMARY OF STATUS DETERMINATIONS

Table 14 summarizes the biomass status of each stock of small mesh multispecies relative to its current overfishing definition. The table describes the type of biomass targets and thresholds specified in the current overfishing definitions and provides a conclusion as to whether or not the stock in question is currently considered to be in an overfished condition. As shown in Table 14, none of the five small mesh multispecies stocks are currently considered to be in an overfished condition. Of the three stocks with specified biomass targets (B_{MSY} proxies), two are above their targets, indicating that they are rebuilt.

Table 14 Summary of Biomass Status Determinations Based on Current Overfishing Definitions for Small Mesh Multispecies

	Whiting-North	Whiting-South	Red Hake-North	Red Hake-South	Offshore Hake
Biomass Target Type	B_{MSY} proxy: Delta Mean KG/Tow 1973-82 (SAW 32)	B_{MSY} proxy: Delta mean KG/Tow 1973-82 (SAW 32)	B_{MSY} proxy: Mean KG/Tow 1978-96 (Am. 12)	Not defined	Not defined
Biomass Target Value	6.63	1.78	3.1	Not defined	Not defined
Biomass Threshold Type	1/2 B_{MSY} proxy (SAW 32)	1/2 B_{MSY} proxy (SAW 32)	1/2 B_{MSY} proxy (Am. 12)	Avg. fish weight in fall survey > 25th %ile from 1963-97 AND fall survey #/tow for immature (< 25 cm) fish < median from 1963-1997	Avg. fish weight in fall survey > 25th %ile from 1963-97 AND fall survey #/tow for immature (< 30 cm) fish < median from 1963-1997
Biomass Threshold Value	3.31	0.89	1.6	0.12 kg/fish and 4.72 fish/tow	0.24 kg/fish and 0.33 fish/tow
Evaluation Criteria Type	3-year Avg. Delta Fall Survey	3-year Avg. Delta Fall Survey	3-year Avg. Delta Fall Survey	3-year Avg. Fall Survey Values	3-year Avg. Fall Survey Values
Evaluation Criteria Value	11.65	1.27	4.6	0.1 KG/Fish and 8.2 Fish/Tow	0.2 KG/Fish and 0.7 Fish/Tow
Overfished?	NO	NO	NO	NO	NO

Table 15 summarizes the fishing mortality status of each stock of small mesh multispecies relative to its current overfishing definition. The table describes the type of fishing mortality targets and thresholds specified in the current overfishing definitions and provides a conclusion as to whether or not overfishing is thought to be occurring on the stock in question. As shown in Table 15, current fishing mortality estimates are not available, and conclusions cannot be drawn as to whether or not overfishing is occurring on most of these stocks. The relative exploitation index for northern red hake was calculated, however, and remains well below the overfishing threshold.

Because fishing mortality rates for whiting are not available, the Whiting Monitoring Committee evaluated relative exploitation indices (landings/survey) for the two stocks of whiting in order to evaluate progress towards the Amendment 12 objectives; this discussion is presented in Section 2.5 of this document (p. 23).

Table 15 Summary of Fishing Mortality Status Determinations Based on Current Overfishing Definitions for Small Mesh Multispecies

	Whiting-North	Whiting-South	Red Hake-North	Red Hake-South	Offshore Hake
F Threshold Type	F0.1 (Am. 12)	F0.1 (Am. 12)	Fmsy proxy, avg. ratio landings and fall survey kg/tow from 1978-1996 (Am. 12)	Not defined	Not defined
F Threshold Value	0.41	0.39	0.65	Not defined	Not defined
Evaluation Criteria Type	3-year avg. F from survey data	3-year avg. F from survey data	3-year avg. ratio landings and fall survey kg/tow (Am. 12)	Not defined	Not defined
Evaluation Criteria Value	Not available	Not available	0.13	Not defined	Not defined
Overfishing?	Unknown	Unknown	NO	Unknown	Unknown

2.5 WMC EVALUATION OF PROGRESS TOWARDS AMENDMENT 12 OBJECTIVES

2.5.1 Amendment 12 Objectives

The primary objective of Amendment 12 to the Northeast Multispecies FMP is:

To reduce fishing mortality (F) on silver hake and red hake over three years to levels that will rebuild and sustain stocks capable of producing MSY on a continuing basis. For the silver hake stocks, this means reducing fishing mortality to a level that will increase the percent maximum spawning potential (%MSP) for the southern and northern stocks to 31% and 42% respectively (the current overfishing definition threshold). The fishing mortality rate corresponding to the %MSP is 0.36 for the northern stock and 0.34 for the southern stock.

Table 16 Target Silver Hake Fishing Mortality Rates and Reductions from Amendment 12

Stock Area	Time Period	Current Fishing Mortality Rate (F)	Current Exploitation Rate (U)	Current Overfishing Definition Target F	Overfishing Definition Exploitation Rate	Target Reduction in Exploitation
Northern	1992-1995	1.53	0.68	$F_{31\% \text{ MSP}} = 0.36$	0.25	63 %
	1993-1995	1.79	0.73	$F_{31\% \text{ MSP}} = 0.36$	0.25	66 %
Southern	1992-1995	1.42	0.65	$F_{42\% \text{ MSP}} = 0.34$	0.25	62 %
	1993-1995	1.51	0.67	$F_{42\% \text{ MSP}} = 0.34$	0.25	63 %

At the time of Amendment 12 (1999), fishing mortality rates for whiting were estimated by pooling age data collected during the NEFSC autumn trawl survey. Multiple years of survey data were used to account for survey variability. These estimates were generated by the Whiting Plan Development Team because an updated stock assessment was not available, and the last SARC-accepted fishing mortality rates for whiting dated back prior to 1990. Total mortality was estimated from the survey age data, and natural mortality was subtracted to generate an estimate of current fishing mortality. Current exploitation rates were calculated through a formula based on the current fishing mortality estimate and the estimate of natural mortality. Comparing the current estimated exploitation rate to the exploitation rate associated with the Amendment 12 F targets resulted in a need for a 63% reduction in exploitation.

At SAW 32 in November 2000, the SARC explored several possible approaches for estimating fishing mortality and ultimately concluded that fishing mortality estimates for whiting are not reliable.

- Estimates of total mortality were generated using survey age data. Results from this approach suggested that fishing mortality increased and is currently very high. The increases in F resulting from this approach contradict the decreasing trend in relative exploitation indices.

- A VPA model was applied to conduct age-structured analyses of the combined silver hake population using derived input data for catch at age, survey numbers at age, catch weight at age, and assumed natural mortality of 0.4. Results from two models were closely examined at SAW 32. Both models were ultimately discounted by the SARC. The baseline model exhibited a very poor fit to the data, and the best-fit model produced results that were inconsistent with the long-term trend in exploitation.
- In one analysis of a VPA-based approach, the Northern Demersal Working Group noted that the reconstruction of the population showed F to be very high in recent years when catches have been at very low levels, and to be only moderate in earlier years when catches were extremely high.

The SARC identified many additional factors precluding reliable estimation of fishing mortality for these stocks:

- Whiting stock structure remains a significant source of uncertainty. Evidence was presented at SAW 32 that the entire area might be treated as a single stock, and the Northern Demersal Working Group recommended such an approach. No agreement was reached at SAW 32 regarding this issue.
- Concern was raised over whether the estimate of natural mortality (0.4) is appropriate, and it was noted that existing methods to estimate M should be examined to determine whether 0.4 is consistent with the life history of this species.
- Concern was raised about the lack of older fish caught in the NEFSC trawl survey. Catches of whiting are often high in the deepest strata of the survey on the shelf edge, suggesting that a component of the population may not be adequately sampled by the survey. If large fish move to the deeper water and are not sampled, interpretation of the survey data becomes quite complicated. Recent high mortality rates calculated from the survey samples may be directly related to the problem sampling older fish in the population.
- There is uncertainty regarding how historical catches were apportioned between the two stocks. In addition, information about discards is incomplete.

For the above reasons, the SARC rejected fishing mortality estimates for both stocks of whiting at SAW 32.

The Whiting Monitoring Committee has determined that the objectives of Amendment 12, as written, cannot be evaluated at this time because technical problems with recent stock assessments for silver hake preclude the estimation of fishing mortality. Instead, to conduct the annual review, the WMC evaluated progress towards the Amendment 12 objectives based on a relative exploitation index for silver hake, which serves as a proxy for the exploitation rates that correspond to the fishing mortality rates in Amendment 12. The relative exploitation index is a ratio of whiting landings to mean fall survey biomass, a time series for which is available since 1963. The logic behind the WMC's approach is consistent with Amendment 12 in that comparisons are made between current exploitation and the exploitation corresponding to the overfishing definition for whiting in Amendment 12. The methodology that the Whiting Monitoring Committee utilized is described below.

2.5.2 WMC Evaluation Methodology

To conduct this year's review, the WMC developed criteria to evaluate progress towards the Amendment 12 objectives based on a relative exploitation index for silver hake as a proxy for exploitation rates and fishing mortality. The relative exploitation index was calculated for each year by dividing landings by mean autumn survey biomass (landings/survey). In this context, *the distinction between the relative exploitation index and the exploitation rate is important.* The **relative exploitation index** is a robust, simple measure computed as the ratio of catch and relative survey biomass. An **exploitation rate** is an explicit or absolute measure of fishery removal rates computed through a formula that relies on estimates of fishing mortality and natural mortality. The exploitation index is a relative measure that shows trends.

The following series of tables and figures presents indices of survey biomass, landings, and relative exploitation from 1963-2001 for the northern and southern stocks of silver hake, respectively (Table 17, Figure 12, and Figure 13 for the northern stock; Table 18, Figure 14, and Figure 15 for the southern stock). The exploitation index is serving as a proxy for fishing mortality; it is a relative indicator of removals and provides a basis for comparison over the time series. Three-year averages are used to account for annual survey variability.

Table 17 Survey Biomass, Landings, and Relative Exploitation Indices for the Northern Stock of Silver Hake, 1963-2001

Year	Fall Survey (kg/tow)	Fall Survey (3-Year Average)	Landings (1000 mt)	Exploitation Index	Exploitation Index (3-Year Average)
1963	25.42		73.92	2.91	
1964	4.42		94.46	21.40	
1965	6.48	12.10	45.24	6.99	10.43
1966	4.12	5.00	47.72	11.57	13.32
1967	2.16	4.25	33.37	15.46	11.34
1968	2.05	2.78	41.38	20.20	15.75
1969	2.64	2.28	23.96	9.09	14.92
1970	3.03	2.57	27.53	9.07	12.79
1971	2.47	2.71	36.40	14.76	10.98
1972	6.09	3.86	25.22	4.15	9.33
1973	4.15	4.23	32.08	7.73	8.88
1974	3.76	4.67	20.68	5.49	5.79
1975	8.23	5.38	39.87	4.84	6.02
1976	12.63	8.21	13.63	1.08	3.81
1977	7.59	9.49	12.46	1.64	2.52
1978	7.07	9.10	12.61	1.78	1.50
1979	6.65	7.11	3.42	0.51	1.31
1980	6.66	6.79	4.73	0.71	1.00
1981	4.06	5.79	4.42	1.09	0.77
1982	5.45	5.39	4.66	0.85	0.88
1983	9.21	6.24	5.31	0.58	0.84
1984	3.62	6.09	8.29	2.29	1.24
1985	8.58	7.14	8.30	0.97	1.28
1986	14.19	8.80	8.50	0.60	1.28
1987	9.84	10.87	5.66	0.58	0.71
1988	6.31	10.11	6.77	1.07	0.75
1989	12.55	9.57	4.65	0.37	0.67
1990	15.25	11.37	6.38	0.42	0.62
1991	11.89	13.23	6.05	0.51	0.43
1992	14.25	13.79	5.30	0.37	0.43
1993	8.12	11.42	4.36	0.54	0.47
1994	6.93	9.76	5.72	0.83	0.58
1995	13.16	9.40	3.03	0.23	0.53
1996	7.89	9.32	3.20	0.41	0.49
1997	5.64	8.90	2.59	0.46	0.37
1998	21.97	11.83	2.26	0.10	0.32
1999	11.64	13.08	4.04	0.35	0.30
2000	13.79	15.80	2.42	0.18	0.21
2001	9.53	11.65	3.45	0.36	0.29

Figure 12 Trends in Landings and Autumn Survey Biomass for the Northern Stock of Silver Hake

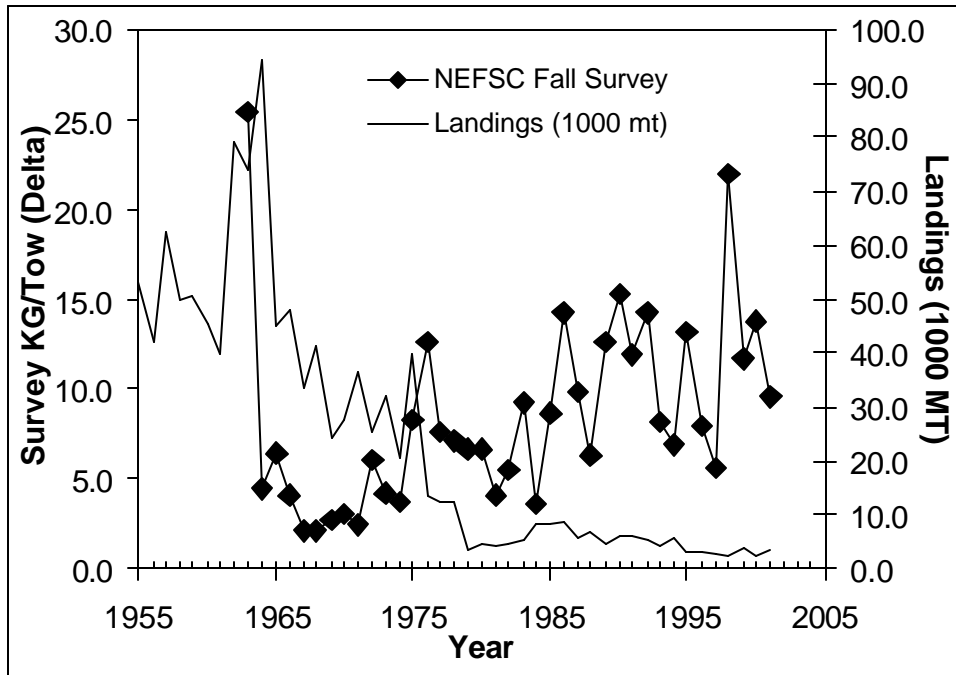


Figure 13 Trends in the Relative Exploitation Index for the Northern Stock of Silver Hake

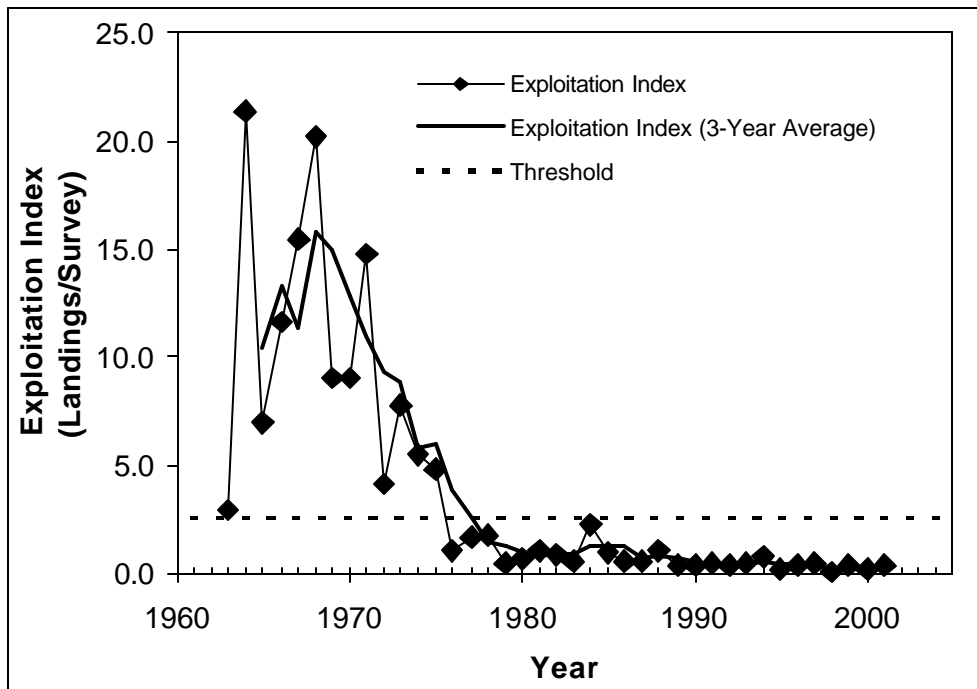


Table 18 Survey Biomass, Landings, and Relative Exploitation Indices for the Southern Stock of Silver Hake, 1963-2001

Year	Fall Survey (kg/tow)	Fall Survey (3-Year Average)	Landings (1000 mt)	Exploitation Index	Exploitation Index (3-Year Average)
1963	4.66		93.38	20.04	
1964	4.27		153.55	35.99	
1965	5.52	4.82	307.13	55.62	37.21
1966	2.56	4.12	211.27	82.62	58.08
1967	2.19	3.42	91.25	41.74	60.00
1968	2.69	2.48	58.50	21.72	48.70
1969	1.26	2.05	75.56	60.16	41.21
1970	1.33	1.76	27.51	20.65	34.18
1971	2.21	1.60	71.89	32.53	37.78
1972	2.00	1.85	94.35	47.18	33.45
1973	1.70	1.97	104.59	61.56	47.09
1974	0.86	1.52	109.86	127.45	78.73
1975	1.84	1.47	74.25	40.35	76.46
1976	2.06	1.59	68.74	33.34	67.05
1977	1.77	1.89	59.31	33.45	35.71
1978	2.93	2.26	27.13	9.26	25.35
1979	1.74	2.15	18.38	10.55	17.75
1980	2.12	2.26	13.55	6.38	8.73
1981	1.17	1.68	14.83	12.72	9.88
1982	1.65	1.65	14.56	8.82	9.31
1983	3.20	2.01	12.14	3.79	8.44
1984	1.56	2.14	13.14	8.44	7.02
1985	3.91	2.89	13.16	3.37	5.20
1986	1.39	2.28	10.12	7.29	6.37
1987	1.62	2.30	10.12	6.25	5.64
1988	1.83	1.61	9.20	5.02	6.19
1989	2.12	1.86	13.17	6.21	5.83
1990	1.65	1.87	13.62	8.28	6.50
1991	0.91	1.56	10.09	11.13	8.54
1992	0.98	1.18	10.29	10.52	9.97
1993	1.33	1.07	12.91	9.72	10.45
1994	0.80	1.04	10.33	12.93	11.06
1995	1.64	1.26	11.69	7.13	9.92
1996	0.43	0.96	13.00	30.16	16.74
1997	0.84	0.97	12.99	15.43	17.57
1998	0.62	0.63	12.70	20.49	22.03
1999	0.87	0.78	9.97	11.46	15.79
2000	0.72	0.74	9.76	13.50	15.15
2001	2.23	1.27	8.69	3.90	9.62

Figure 14 Trends in Landings and Autumn Survey Biomass for the Southern Stock of Silver Hake

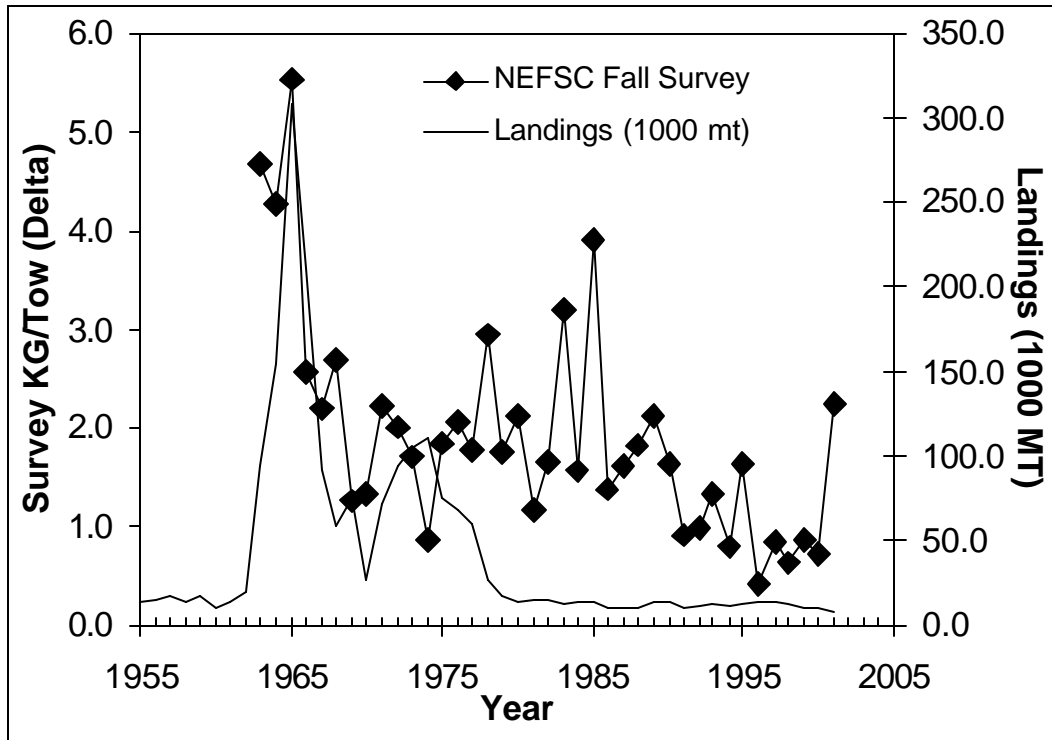
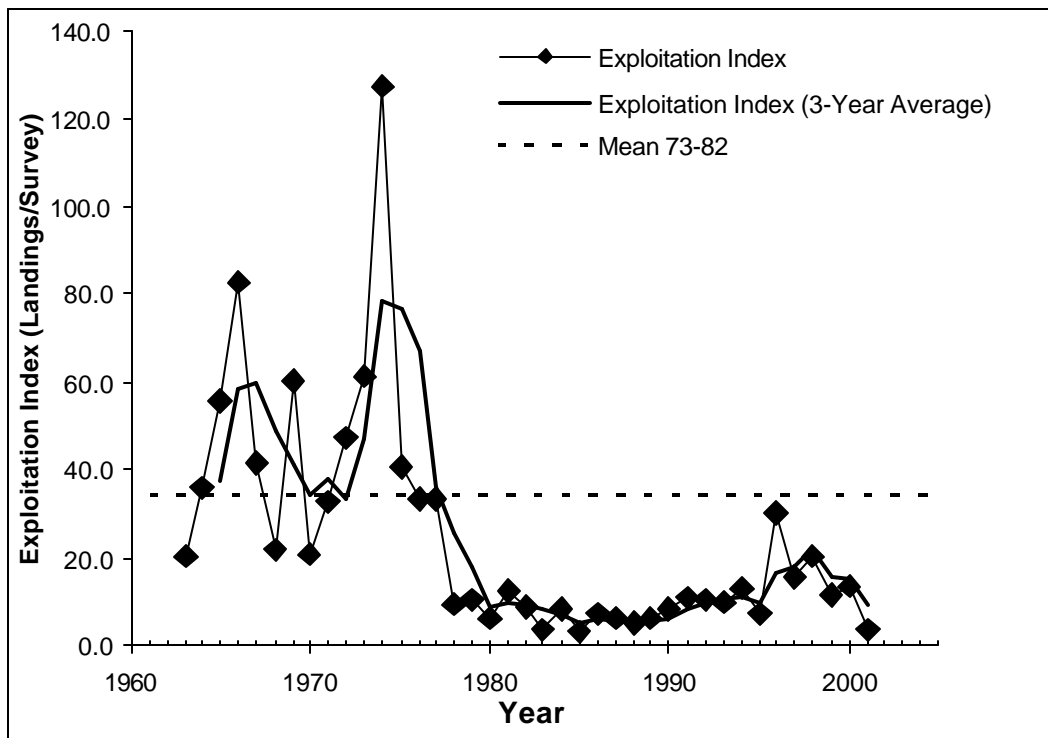


Figure 15 Trends in the Relative Exploitation Index for the Southern Stock of Silver Hake



The Whiting Monitoring Committee's evaluation approach is analogous to the logic used in Amendment 12. The biomass target (B_{MSY} proxy) in the current overfishing definition for silver hake is derived from the autumn trawl survey and is expressed as the mean survey biomass observed from 1973-1982 (6.62 and 1.56 kg/tow for the northern and southern stocks, respectively). Since the stock is considered to have been at B_{MSY} from 1973-1982, fishing mortality should have been at or near F_{MSY} levels. Using the relative exploitation index as a proxy for fishing mortality, the WMC calculated the relative exploitation index corresponding to the Amendment 12 F_{MSY} proxy as the average from 1973-1982 (2.57 for the northern stock and 34.39 for the southern stock, see Table 19).

The F_{MSY} proxy in Amendment 12 serves as a threshold for fishing mortality. As Amendment 12 specifies, to rebuild to a target biomass level, the target fishing mortality should be lower than F_{MSY} . Amendment 12 does not provide guidance as to how much lower the target fishing mortality should be for stocks that are not yet rebuilt. The Whiting Monitoring Committee sought precedent on the selection of targets for its evaluation:

- At SAW 32, the Northern Demersal Working Group (NDWG) proposed a target harvest rate that is 60% of the median of the distribution of exploitation rate that would produce maximum surplus production for whiting. A value of 60% was chosen by the NDWG to account for uncertainties related to the level of discarding and the potential misallocation of catch to stock unit, as well as the importance of silver hake within the continental shelf food web.
- The target fishing mortality rate for northern red hake, also based on a relative exploitation index, is set at 60% of the F_{MSY} proxy level.

For whiting stocks that are not yet rebuilt, the Whiting Monitoring Committee used the same approach and established a target relative exploitation index of 60% the F_{MSY} proxy – 1.54 for the northern stock and 20.63 for the southern stock.

The northern stock of silver hake is considered rebuilt, or above its target biomass (B_{MSY}) level. For the purposes of this review, therefore, the target exploitation index for the northern stock can equal the threshold, which is the F_{MSY} proxy level (2.57). The southern stock of silver hake is not overfished, but it has not yet rebuilt to its target biomass level. Therefore, for this review, the WMC set a target exploitation index for the southern stock at 60% of the F_{MSY} exploitation index (20.63 or less). The lower exploitation index is intended to allow the stock to rebuild to its long-term MSY level.

2.5.3 Results

Table 19 summarizes the WMC's evaluation of progress towards the Amendment 12 objectives. Current relative exploitation indices remain low as they have over the past two decades. Higher relative exploitation indices during the 1970s (when the stocks were assumed to be at B_{MSY}) are due to large catches by foreign fleets, which exceeded 100,000 mt in some years (see Table 17 and Table 18, Figure 12 and Figure 14). The current relative exploitation indices for both stocks of whiting are well below the Whiting Monitoring Committee's evaluation criteria.

Table 19 Summary of WMC Evaluation of Progress Towards Amendment 12 Objectives

	NORTHERN STOCK	SOUTHERN STOCK
Amendment 12 B_{MSY}	Survey biomass average from 1973-1982	
Amendment 12 F_{MSY}	Fishing mortality rates based on %MSP	
	0.36	0.34
WMC F_{MSY} proxy	Relative exploitation index from 1973-1982	
	2.57	34.39
WMC Target Exploitation Index	F_{MSY} proxy	60% of F_{MSY} proxy
	2.57	20.63
Current 1999-2001 Average Exploitation Index	0.29	9.62
Result	Exploitation under target level	Exploitation under target level

Please see Section 4.0 of this document for a discussion of the Whiting Monitoring Committee's recommendations based on this evaluation.

2.6 SAW 35 – SILVER HAKE STOCK IDENTITY ADVISORY REPORT

At SAW 35 (Spring 2002), the Stock Assessment Review Committee (SARC) reviewed the preliminary results arising from a whiting research study (Phoel et al., not yet published). Although a formal stock assessment for whiting was not undertaken at SAW 35, the SARC reviewed the project because it utilizes a microsatellite DNA analysis to investigate an issue of considerable relevance to the management of the whiting fishery, i.e., a determination of whether the assemblages of silver hake throughout the Northeast region could be considered as representing different stocks.

This study started by assessing microsatellite primers developed for European whiting (*Merlangius merlangus*). Additional genera-specific microsatellite loci were found in *Merluccius* having been developed for the European hake, *Merluccius merluccius* (Moran et al., 1999). These microsatellite loci have proven to be highly informative and have been used to differentiate population structure in the European hake (Lundy et al., 1999; Lundy et al., 2000).

2.6.1 Relationship Between Whiting Abundance and Bottom Water Temperature

Preliminary results of the study suggest that there is no evidence to support the hypothesis that the abundance of silver hake is related to bottom water temperatures. In both spring and fall, observed temperatures lie well within the range of preferred temperatures for silver hake, as recorded in published reports.

2.6.2 Stock Identity of Different Assemblages

Preliminary results of the study indicate that assemblages in each site were drawn from stocks that were statistically distinct. However, the SARC identified several problems with the experimental and statistical methods employed in the study thus far. As the investigators had advised and the SARC determined, no valid conclusions can be drawn from these preliminary results.

The investigators advised that, in their ongoing research, they plan to address the problems identified by the SARC at SAW 35.

3.0 FISHERY EVALUATION INFORMATION

The purpose of this section is to provide updated information about the fisheries in which small mesh multispecies are caught. This information supplements and updates the information contained in Amendment 12 to the Multispecies FMP and the 2001 SAFE Report for small mesh multispecies.

3.1 TRENDS IN THE COMMERCIAL FISHERY

Information in this section is presented for calendar years (January 1 – December 31), and 2001 information is considered to be complete.

3.1.1 General Trends

The following tables summarize general fishery information and provide updates to some of the tables presented in Amendment 12 and the 2001 SAFE Report.

3.1.1.1 Total Landings and Revenues

Table 20 presents annual silver hake landings and revenues by area from 1982-2001. Total landings of silver hake in 2001 were close to those in 2000, although revenues increased 7.8%. Total landings from the northern stock area increased from 2000 levels; landings from the Cultivator Shoal Whiting Fishery more than doubled, but decreased from other fisheries in the northern area. Landings from the southern stock area continued to decrease in 2001 and are down 31.6% since 1998.

Table 20 Annual Silver Hake Landings and Revenues, 1982-2001

Calendar Year	Northern Landings (mt)	Cultivator Landings (mt)	Southern Landings (mt)	Total Landings (mt)	Total Revenues (million \$\$)
1982	3,494	1,166	14,560	19,220	8.6
1983	5,029	281	12,140	17,450	6.6
1984	7,525	765	13,140	21,430	6.5
1985	7,962	338	13,160	21,460	8.1
1986	7,997	503	10,120	18,620	8.6
1987	5,558	102	10,120	15,780	11.6
1988	4,304	2,466	9,200	15,970	8.5
1989	2,204	2,446	13,170	17,820	9.4
1990	3,405	2,975	13,620	20,000	11.1
1991	2,546	3,504	10,090	16,140	10.9
1992	2,305	2,995	10,290	15,590	10.5
1993	1,866	2,494	12,910	17,270	13.9
1994	4,403	1,317	10,330	16,050	13.7
1995	2,305	725	11,690	14,720	14.0
1996	1,565	1,635	13,000	16,200	13.6
1997	1,239	1,351	12,990	15,580	15.1
1998	1,065	1,195	12,700	14,960	13.3
1999	1,716	2,324	9,970	14,010	14.2
2000	1,568	852	9,760	12,180	11.5
2001	1,465	1,985	8,690	12,140	12.4

Table 21 presents annual red hake landings and revenues by area from 1982-2001. Note that the landings data include some prorated “unspecified hake” and small amounts of recreational catch that are not reflected in the revenues. Total landings increased slightly in 2001 but remain at very low levels. Revenues have been stable for many years.

Table 21 Annual Red Hake Landings and Revenues, 1982-2001

Calendar Year	Northern Landings (mt)	Cultivator Landings (mt)	Southern Landings (mt)	Total Landings (mt)	Total Revenues (million \$\$)
1982	1,205	5	3,170	4,380	1.4
1983	892	3	1,574	2,469	0.6
1984	1,057	2	2,739	3,798	0.8
1985	990	1	929	1,920	0.5
1986	1,488	1	1,099	2,588	0.8
1987	996	4	1,864	2,864	1.2
1988	804	58	1,208	2,070	0.7
1989	666	109	1,378	2,153	0.9
1990	795	105	1,300	2,200	0.8
1991	659	41	1,300	2,000	1.0
1992	814	86	1,500	2,400	1.2
1993	637	63	1,100	1,800	1.0
1994	448	59	1,300	1,807	1.0
1995	437	23	1,200	1,660	1.0
1996	389	5	704	1,098	0.7
1997	436	25	1,000	1,461	0.9
1998	451	57	900	1,408	0.8
1999	553	68	891	1,512	0.9
2000	555	38	988	1,581	0.9
2001	568	82	1,036	1,687	0.9

3.1.1.2 Landings and Revenues by State

Table 22 presents silver hake and red hake landings by state as a percentage of total state landings from 1997-2001 and updates Table 26 from the 2001 SAFE Report and E.18 from the Amendment 12 document.

It is important to note that because the landings in Table 22 are summarized from the dealer weighout database, they do not include any fish that were transferred at sea for use as bait. Whiting and red hake are popular bait fish, and vessels are currently allowed to transfer up to 500 pounds per trip. Receiving vessels are not licensed dealers, so while these fish appear in the transferring vessels' logbooks, they are not accounted for in the dealer weighout data. To the extent that these transfers are occurring, the landings presented in Table 22 may underestimate total small mesh multispecies activity.

Overall, changes in landings by state in 2001 were not significantly different than 2000. The states of Massachusetts, Maine, and New Jersey experienced slight increases in landings above 2000 levels, while New York experienced a more significant increase. The increases in Maine and particularly Massachusetts are likely due to increasing abundance of whiting in the northern area and increased participation in experimental and exempted fisheries for whiting in the north. Landings decreased from 2000 levels in Connecticut and Rhode Island.

Table 22 Silver/Offshore Hake and Red Hake Landings by State as a Percentage of Total State Landings, 1997-2001

State	Calendar Year	Silver Hake Landings (mt)	Red Hake Landings (mt)	Total Landings (mt)	Silver Hake % of Total	Red Hake % of Total
Maine	1997	564.3	0.0	120,346.1	0.47	0.00
	1998	73.6	0.2	93,642.8	0.08	0.00
	1999	64.4	0.0	113,322.9	0.06	0.00
	2000	9.8	0.0	117,016.4	0.01	0.00
	2001	15.2	0.8	131,082.6	0.01	0.00
New Hampshire	1997	148.5	0.0	4,540.8	3.27	0.00
	1998	49.0	0.0	4,283.5	1.14	0.00
	1999	110.6	0.6	4,765.6	2.32	0.01
	2000	162.5	0.0	7,648.0	2.13	0.00
	2001	135.7	0.3	7,883.4	1.72	0.00
Massachusetts	1997	1,292.8	312.7	92,030.5	1.40	0.34
	1998	1,191.6	143.4	102,667.7	1.16	0.14
	1999	1,928.6	184.3	78,621.3	2.45	0.23
	2000	2,239.6	179.6	75,445.6	2.97	0.24
	2001	2,511.6	169.6	97,800.5	2.57	0.17
Rhode Island	1997	5,263.9	435.5	61,811.6	8.52	0.70
	1998	4,675.7	553.8	58,320.0	8.02	0.95
	1999	4,388.1	652.5	55,028.8	7.97	1.19
	2000	4,770.0	683.6	52,585.2	9.07	1.30
	2001	4,187.6	728.5	50,758.3	8.25	1.44
Connecticut	1997	1,888.8	174.8	8,062.3	23.43	2.17
	1998	1,761.6	119.8	7,409.0	23.78	1.62
	1999	2,943.8	164.0	8,034.1	36.64	2.04
	2000	2,813.1	172.9	8,390.4	33.53	2.06
	2001	2,579.5	162.7	8,757.9	29.45	1.86
New York	1997	5,434.5	285.1	26,351.3	20.62	1.08
	1998	6,413.5	393.6	24,821.5	25.84	1.59
	1999	4,250.8	439.9	21,520.8	19.75	2.04
	2000	2,002.3	390.2	18,466.8	10.84	2.11
	2001	3,341.8	468.1	18,715.9	17.86	2.50
New Jersey	1997	997.2	106.5	77,551.8	1.29	0.14
	1998	701.1	111.5	87,427.1	0.80	0.13
	1999	335.7	112.5	75,381.8	0.45	0.15
	2000	299.0	153.8	77,076.9	0.39	0.20
	2001	358.7	144.4	75,241.5	0.48	0.19

Table 23 presents silver hake and red hake revenues by state as a percentage of total state landings from 1997-2001 and updates Table 27 from the 2001 SAFE Report. Revenues from silver and red hake in 2001 are similar to those in 2000. Even for states that experienced changes in landings, revenues tended to be somewhat more stable. The state that experienced the most significant increase in landings and revenues in 2001 was New York. Since total landings from the southern stock area have decreased in recent years, increases in New York could be due to changes in ports of landing for some vessels, or relocation of some vessels.

Similar to Table 22, the revenues reported in Table 23 are summarized from the dealer weighout database and do not include any fish that were transferred at sea for use as bait. To the extent that these transfers are occurring, the revenues may underestimate the total economic benefit of small mesh multispecies to the states in the Northeast Region.

The states with the most significant economic interest in small mesh multispecies are Rhode Island, Connecticut, and New York. New York's economic dependence on whiting increased in 2001 to 7.67% of total state fishery revenues, making New York the state most dependent on whiting in 2001. Connecticut fell to a close second at 7.28% of total state fishery revenues. Rhode Island's dependence on whiting increased in 2001 to 5.51% of total state fishery revenues. All other states in Table 23 generally rely on small mesh multispecies for less than 1% of their total fishery revenues.

Table 23 Silver/Offshore Hake and Red Hake Revenues by State as a Percentage of Total State Revenues, 1997-2001

State	Calendar Year	Silver Hake Revenues (thousand \$)	Red Hake Revenues (thousand \$)	Total Revenues (thousand \$)	Silver Hake % of Total	Red Hake % of Total
Maine	1997	319.3	0.0	274,719.3	0.12	0.00
	1998	47.7	0.1	277,449.8	0.02	0.00
	1999	49.8	0.0	323,786.8	0.02	0.00
	2000	13.3	0.0	348,129.9	0.00	0.00
	2001	12.0	0.4	367,863.2	0.00	0.00
New Hampshire	1997	112.7	0.0	12,570.9	0.90	0.00
	1998	41.2	0.0	11,186.3	0.37	0.00
	1999	107.6	0.1	12,537.9	0.86	0.00
	2000	130.3	0.0	16,197.2	0.80	0.00
	2001	121.4	0.1	17,865.1	0.68	0.00
Massachusetts	1997	1,141.7	145.1	224,365.8	0.51	0.06
	1998	1,327.3	93.1	205,711.6	0.65	0.05
	1999	2,624.3	134.1	260,249.7	1.01	0.05
	2000	2,175.4	98.2	290,922.8	0.75	0.03
	2001	2,648.4	117.3	281,058.6	0.94	0.04
Rhode Island	1997	4,499.8	234.8	78,313.2	5.75	0.30
	1998	3,492.7	219.3	71,958.7	4.85	0.30
	1999	3,485.5	284.1	85,995.7	4.05	0.33
	2000	3,644.2	268.5	80,974.5	4.50	0.33
	2001	3,608.5	263.3	65,456.7	5.51	0.40
Connecticut	1997	1,740.0	96.2	33,082.0	5.26	0.29
	1998	1,448.6	68.0	34,359.4	4.22	0.20
	1999	3,119.1	81.3	38,090.4	8.19	0.21
	2000	2,754.7	101.0	31,227.1	8.82	0.32
	2001	2,424.1	95.9	33,304.7	7.28	0.29
New York	1997	6,337.5	232.5	89,614.7	7.07	0.26
	1998	6,273.3	299.2	84,283.4	7.44	0.36
	1999	4,563.0	338.9	76,801.2	5.94	0.44
	2000	2,535.4	317.6	60,167.3	4.21	0.53
	2001	4,218.8	339.8	55,038.4	7.67	0.62
New Jersey	1997	912.7	76.4	99,947.5	0.91	0.08
	1998	630.3	80.7	97,235.1	0.65	0.08
	1999	305.2	80.5	97,864.6	0.31	0.08
	2000	311.2	116.9	107,162.5	0.29	0.11
	2001	400.5	90.3	109,820.3	0.36	0.08

3.1.1.3 Landings and Revenues by Port

Table 24 provides information on whiting landings by port for ports where the vast majority of small mesh multispecies are landed and updates Table 28 from the 2001 SAFE and Tables E.21 and E.22 from Amendment 12. The ports listed in Table 24 generally account for more than 95% of total whiting landings. Some interesting and important changes have occurred:

- Stonington CT and New Bedford MA have become increasingly important ports of landing for whiting and both appear in the top five ports in 2001. Some industry members speculate that at least part of the increases in these ports are due to the relocation of some larger whiting vessels to these ports for various reasons. Industry representatives on the WMC emphasized how much of a difference it can make if one or two large vessels that target whiting relocate to another port.
- Greenport NY has fallen dramatically in terms of its importance as a port of landing for whiting. Hampton Bays and Freeport NY have also experienced decreases in whiting activity. As mentioned above, this may be due, in part, to the relocation of some larger whiting vessels.
- Increases in whiting landings in the state of New York are reflected in the port of Montauk, which became the second largest port of landing for whiting in 2001.

Despite decreases in landings, Point Judith RI remains the top port of landing for whiting in 2001, as it was in all years from 1997-2000.

Table 24 Silver Hake and Offshore Hake Landings and Revenues for the Top Whiting Ports Based on Quantity Landed, 1997-2001

LAND represents silver/offshore hake landings in metric tons.

REVS represents silver/offshore hake revenues in thousands of dollars.

PORT	1997			1998			1999			2000			2001		
	RANK	LAND	REVS	RANK	LAND	REVS	RANK	LAND	REVS	RANK	LAND	REVS	RANK	LAND	REVS
Point Judith, RI	1	4,936.8	4,265.3	1	4,420.8	3,356.4	1	4,177.7	3,349.8	1	4,298.1	3,300.1	1	3,610.3	3,186.1
Montauk, NY	5	1,654.6	2,117.4	4	1,702.5	1,894.9	4	1,265.7	1,617.8	5	972.9	1,239.9	2	2,356.9	3,050.8
New London, CT	2	1,796.5	1,650.2	5	1,592.1	1,324.1	2	1,776.7	1,921.3	3	1,302.5	1,202.0	3	1,253.5	1,196.7
Stonington, CT	14	92.3	89.8	12	169.5	124.5	6	1,167.0	1,197.7	2	1,510.6	1,552.7	4	1,209.7	1,113.5
New Bedford, MA	18	9.8	4.4	16	27.8	14.5	13	77.6	54.6	8	452.4	381.0	5	1,080.1	896.3
Hampton Bays, NY	4	1,722.0	2,125.6	3	2,231.3	2,224.9	5	1,186.4	1,249.2	7	626.7	771.3	6	883.5	1,030.2
Provincetown, MA	9	423.5	337.0	8	302.7	400.8	8	758.9	1,297.1	6	633.3	518.1	7	711.5	899.6
Gloucester, MA	6	805.2	743.4	6	838.8	886.9	7	1,008.8	1,191.4	4	1,082.1	1,212.6	8	619.3	726.4
Newport, RI	10	333.0	249.2	9	236.6	127.0	11	163.1	102.6	9	381.2	290.2	9	576.7	421.9
Pt. Pleasant, NJ	7	627.5	538.2	7	418.0	335.0	10	239.4	209.7	10	223.3	229.0	10	296.6	345.1
Freeport, NY	11	270.9	328.8	10	231.2	243.2	9	279.7	301.2	12	124.8	170.9	14	79.3	113.5
Cape May, NJ	13	144.0	135.8	13	75.0	43.1	18	23.6	17.7	21	8.9	6.3	15	33.3	19.8
Belford, NJ	12	218.5	228.1	11	199.4	243.4	14	68.8	73.1	15	65.4	74.2	16	19.9	27.7
Portsmouth, NH	15	71.6	54.4	19	7.3	5.2	20	15.6	12.2	16	58.0	40.1	17	17.7	11.9
Greenport, NY	3	1,791.8	1,771.7	2	2,247.3	1,909.2	3	1,507.5	1,382.9	11	163.4	161.0	18	14.0	15.6
Portland, ME	8	561.3	317.6	14	68.6	46.5	15	63.2	48.3	22	8.5	12.5	19	13.1	10.9

3.1.2 Economic Factors

During the 2001 annual review, industry representatives on the WMC identified several impacts that may have been attributable to the regulatory measures that were implemented during the 2000 fishing year, Year 1 of the whiting management program. Specifically noted were: (1) greater stability in whiting ex-vessel prices; (2) a reduction in prices for the king whiting market category (with a corresponding increase in landed quantities); and (3) differential distributive impacts of the trip limits on vessels of different sizes.

To the extent possible, the WMC updated information pertaining to these economic factors for this SAFE Report. Some updates only include complete FY2000 information, as information from this fishing year was preliminary in the 2001 SAFE Report. Where possible, the WMC has included preliminary FY2001 information, although it should be noted that this information is incomplete. Updated information for the economic factors identified in the 2001 SAFE Report as well as some additional factors are discussed in the subsections below.

3.1.2.1 Increased Price Stability

This section updates Section 3.1.2.1 of the 2001 SAFE Report. Preliminary data are available for the 2001 fishing year (May 1, 2001-April 30, 2002), but are incomplete.

Whiting prices have been known to be relatively volatile with local markets being particularly sensitive to changes in supplies. As Amendment 12 was being developed, there was some speculation that trip limits would “even out” supplies which would, in turn, makes prices relatively more stable.

Changes in market stability may be reflected in several different ways. For example, with increased stability, the calculated standard deviation around mean price is expected to be lower. Another example would be a reduction in the difference between specific percentiles of the distribution of prices (i.e., 75th-25th percentile).

Average whiting price for the round market category was computed for all trips landing any amount of whiting as reported in the NMFS dealer database. Table 25 summarizes the average ex-vessel price for whiting (round market category only) from fishing years 1997-2001 (fishing year 2001 is preliminary). Only the round market category is included because the king whiting market is discussed separately in Section 3.1.2.2 of this document. The average ex-vessel price for round whiting increased slightly in fishing year 2001 above the average for fishing year 2000, but is within the range of observations prior to Amendment 12.

The data presented in Table 25 summarize average price for whiting on a given trip, region-wide across all trips (excluding those landing in CT and DE). Trips landing in CT and DE are assumed to reflect similar ex-vessel prices for the round market category of whiting. If prices have become more stable since the implementation of Amendment 12 at the beginning of fishing year 2000, then the variance around average prices should be lower in FY2000 and FY2001. The standard deviation of average prices remains similar in FY2001 to previous years. The

range of prices is smaller in FY2000 and FY2001 than in previous years. At an industry-wide level, however, there is not a lot of evidence to suggest that variability in prices for round whiting has changed significantly since the implementation of Amendment 12.

The effect of whiting imports on the market is an important industry concern. There is insufficient information available to accurately measure the magnitude of whiting imports and their impacts on the domestic market. Information provided by the industry representatives on the WMC suggests that amounts of imported whiting on domestic markets (New York, Philadelphia) are increasing and having a substantial effect on prices for locally-caught whiting. This issue should be investigated further.

Table 25 Summary of Ex-Vessel Whiting Price for Round Market Category, Fishing Years 1997-2001*

Fishing Year	1997	1998	1999	2000	2001*
Number of Trips	12,176	11,443	9,797	10,350	8,783
Mean	\$0.44	\$0.48	\$0.51	\$0.43	\$0.48
Standard Deviation	0.24	0.27	0.26	0.24	0.27
10th Percentile	\$0.19	\$0.20	\$0.20	\$0.17	\$0.17
25th Percentile	\$0.26	\$0.29	\$0.31	\$0.25	\$0.27
Median	\$0.38	\$0.42	\$0.45	\$0.39	\$0.43
75th Percentile	\$0.55	\$0.62	\$0.66	\$0.54	\$0.65
90th Percentile	\$0.80	\$0.94	\$0.93	\$0.80	\$0.92
Range	\$3.42	\$2.00	\$3.25	\$1.68	\$1.99
75th-25th Percentile	\$0.29	\$0.33	\$0.35	\$0.29	\$0.38

Source: NMFS Dealer Weighout Database, excludes DE and CT

*FY 2001 data are preliminary.

3.1.2.2 Changes in King Whiting Markets

During the 2001 review, king whiting markets were described by industry representatives on the Whiting Monitoring Committee as being sensitive to overall supplies with dealers only willing to handle somewhat limited quantities. Consequently, concern was expressed over an observed decline in king whiting market price during the 2000 fishing year. The Whiting Monitoring Committee examined king whiting prices during the 2001 fishing year to update the discussion in the 2001 SAFE Report.

Prices paid to vessels for whiting in the king market category were calculated for all trips or occasions where king whiting was reported as being landed in the NMFS dealer data for fishing years 1997-2001. The market appears to have shown a response to an increased supply of king whiting since the 2000 fishing year. Total revenues have not changed much, indicating that prices have decreased as landings have increased. Mean prices for king whiting have decreased 33% (Table 26 and Figure 16). Figure 16 reflects these trends as king whiting landings increased considerably in FY2000.

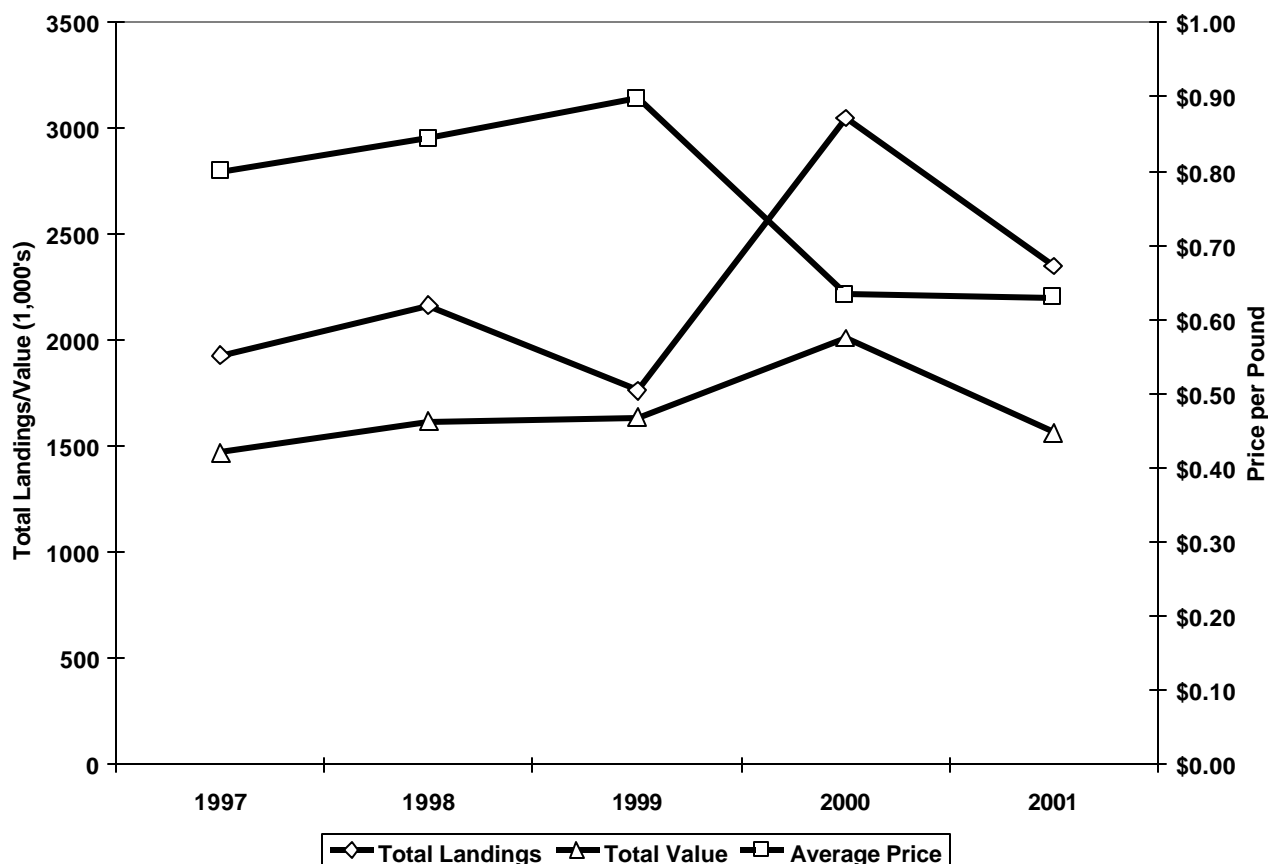
Table 26 Descriptive Statistics for Price/Pound for King Whiting, Fishing Years 1997-2001

	1997	1998	1999	2000	2001*
Number of Trips	4,227	3,786	4,436	4,679	4,381
Mean	\$0.80	\$0.84	\$0.90	\$0.63	\$0.63
Std Dev	0.299	0.268	0.286	0.264	0.35
10th Percentile	\$0.45	\$0.50	\$0.50	\$0.32	\$0.17
25th Percentile	\$0.55	\$0.67	\$0.70	\$0.45	\$0.33
Median	\$0.76	\$0.82	\$0.91	\$0.60	\$0.60
75th Percentile	\$1.00	\$1.00	\$1.10	\$0.80	\$0.93
90th Percentile	\$1.25	\$1.20	\$1.25	\$1.00	\$1.10
75th-25th Percentile	\$0.45	\$0.33	\$0.40	\$0.35	\$0.60

Source: NMFS Dealer Weighout Database, excludes DE and CT

*FY 2001 data are preliminary.

Figure 16 King Whiting Average Price, Total Whiting Landings, and Total Value for Fishing Years 1997-2001*



Data for fishing year 2001 are preliminary.

3.1.2.3 Differential Impacts

The Whiting Monitoring Committee identified the issue of differential distributive effects as being an important consequence of the Amendment 12 trip limits. These distributive effects included the general effect of the trip limits on different vessel size classes as well as the loss of specific offshore areas to larger vessels because the trip limits made these areas economically unattractive. Size classes were defined as follows:

- Small vessels < 60 feet
- Medium vessels 60-80 feet inclusive
- Large vessels are greater than 80 feet.

Further investigation of these issues requires a combination of VTR and dealer data. Dealer data were used to assign prices to VTR landings records. Specifically, monthly average price by state and species were calculated and merged with VTR records to provide an estimate of total trip value from small mesh multispecies and all other species combined. Use of the VTR records was necessary to examine patterns of fishing effort by areas. These data represent between 94 and 91 percent of landings in the dealer records from 1997 to 1999, but only 88% of records for fishing year 2000 and almost all records for the most recent fishing year to date. Table 27 below updates Table 33 from the 2001 SAFE Report, as data for fishing year 2000 were incomplete when the 2001 SAFE Report was developed. Similarly, data for fishing year 2001 are incomplete at this time.

Table 27 Combined Aggregate Landings for Silver, Red, and Offshore Hake (pounds, landed weight)

Landings	1997	1998	1999	2000	2001*
Dealer Data	36,565,480	36,155,746	32,558,525	31,473,237	26,050,939
VTR Records	35,308,044	33,725,659	30,885,488	27,817,121	25,791,707
VTR records as a Percent of Dealer Data	96.6%	93.3%	94.9%	88.4%	99.0%

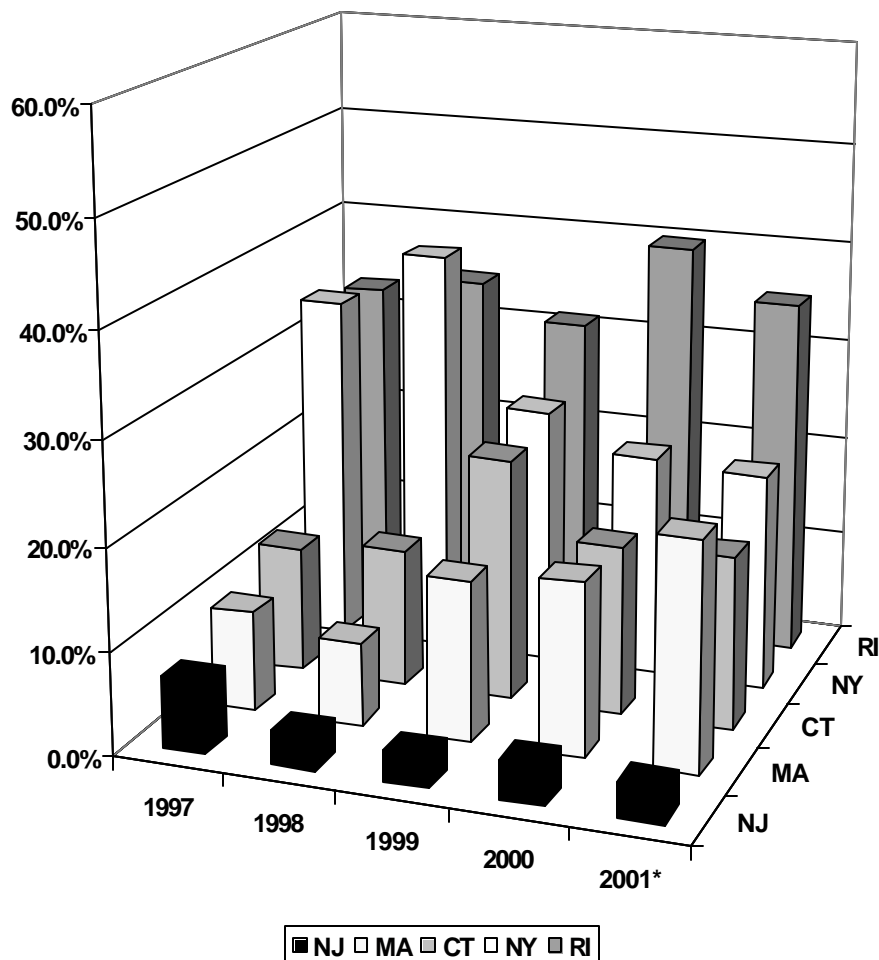
1997-1999 numbers are different from the 2001 SAFE Report because the data have been "cleaned" for some reporting and coding errors.

Data for fishing year 2001 are preliminary.

VTR records were also required to assess the impacts on vessels that work out of ports in Connecticut and Delaware. Dealer data from these states only provide summary information and do not provide the information necessary at an individual vessel level.

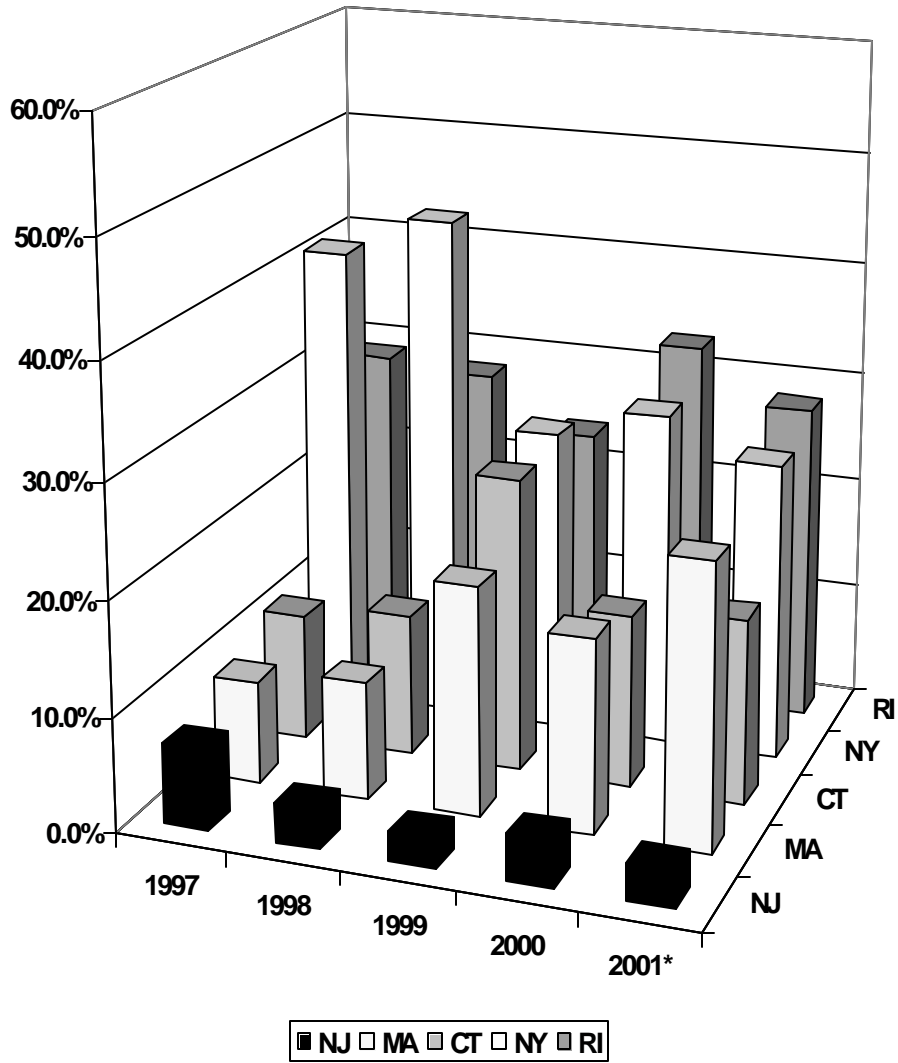
Shares of landings and revenues across states have been updated from the 2001 SAFE Report, as data for fishing year 2000 were incomplete at the time of the 2001 SAFE. Figure 17 updates landings shares by states, and Figure 18 updates revenue shares by states. Although the numbers are slightly different than those in the 2001 SAFE (because the data are more complete), the trends are the same. Data from FY2001 also reflect similar trends; losses have been experienced in New York, with corresponding increases in shares for CT, MA, and to a lesser extent, RI. Industry representatives on the WMC suggested that the shifts in shares could be due to: (1) a dredging project in Montauk that made access to the port too dangerous for some large vessels and (2) shifts in ports of landing for some larger vessels as a response to the Amendment 12 trip limits (to reduce steaming time to whiting grounds). These factors also may have influenced some of the changes apparent in Table 24, p. 40. Trends in Figure 17 are consistent with the trends observed in Table 24.

Figure 17 Landings Shares by States (Dealer Data)



Data for fishing year 2001 are preliminary.

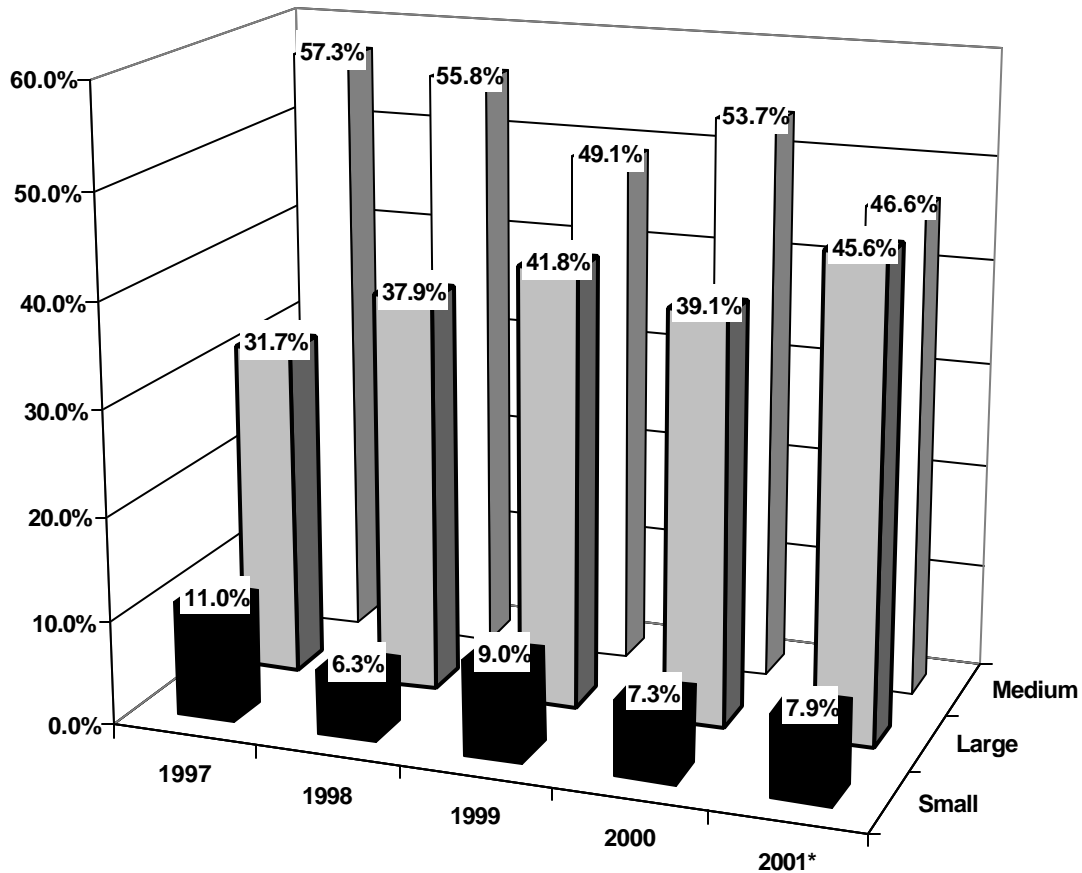
Figure 18 Revenue Shares by States (Dealer Data)



Data for fishing year 2001 are preliminary.

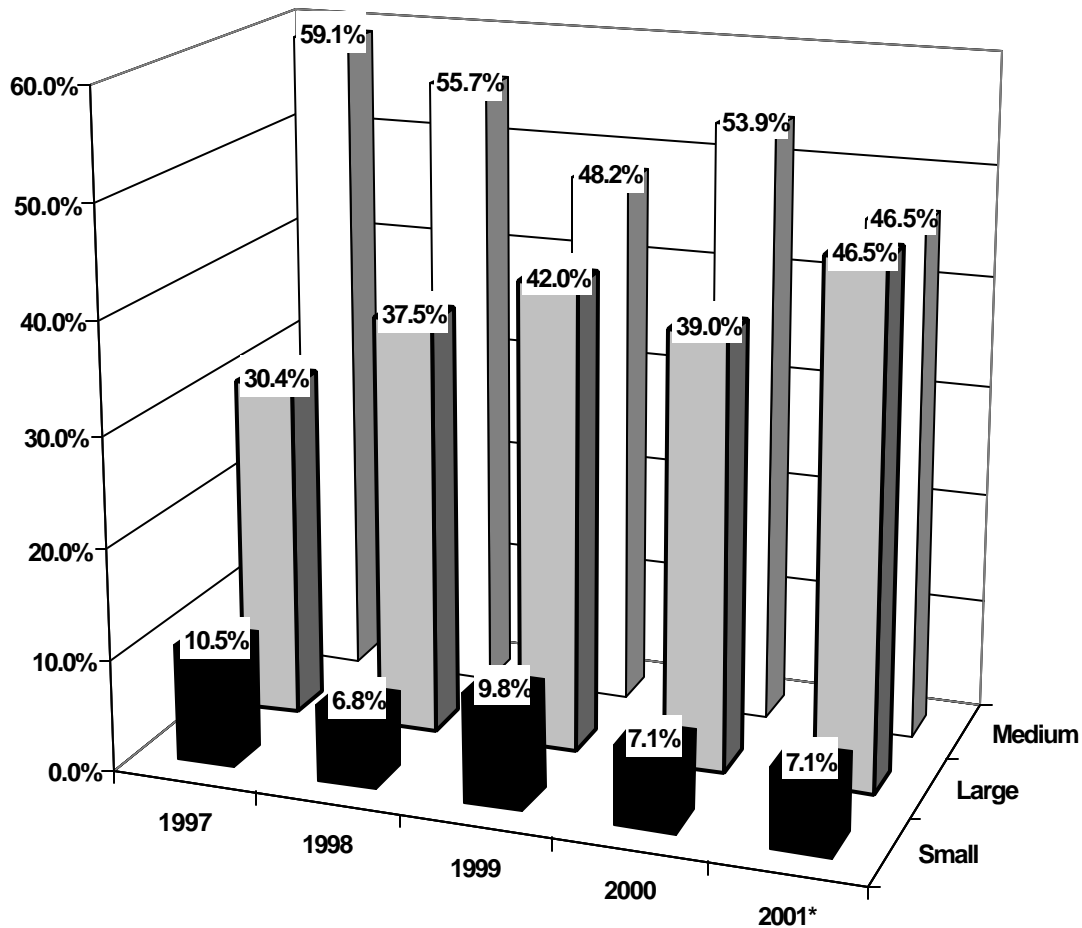
Shares of landings and revenues by vessel size category have been updated from the 2001 SAFE Report, as data for fishing year 2000 were incomplete at the time of the 2001 SAFE (see Figure 19 and Figure 20, note that FY2001 data are preliminary). While most shifts across size categories are within the range of recent observations, shares of landings and revenues by large vessels (>80 feet) appear to be increasing with a corresponding decrease in shares for medium-sized vessels. Currently, large vessels have the largest share of landings and revenues since prior to FY1997, while medium-sized vessels (60-80 feet) have the smallest share of landings and revenues for the time period. Shares of landings and revenues for small vessels (<60 feet) remained relatively constant from FY2000 to FY2001 and are down slightly since FY1997. Since fishing year 2001 data are preliminary, it is difficult to determine at this time if these are “real” trends; additional years of data will be necessary to better measure the changes occurring across the fishery.

Figure 19 Landings Shares for Small (<60 feet), Medium (60-80 feet), and Large (>80 feet) Vessels (VTR Data)



Data for fishing year 2001 are preliminary.

Figure 20 Revenues Shares for Small (<60 feet), Medium (60-80 feet), and Large (>80 feet) Vessels (VTR Data)



Data for fishing year 2001 are preliminary.

3.1.2.4 Area Fished – All Trips and Targeted Trips

Aggregate landings or revenue shares may remain relatively unchanged even though there may be other important underlying changes occurring. In 2001, the industry representatives on the Whiting Monitoring Committee suggested that the trip limits have placed large vessels at a comparative disadvantage as compared to medium sized vessels in terms of where they normally prefer to fish and in terms of their profitability. For this year’s review, the Whiting Monitoring Committee updated the information from the 2001 SAFE Report with complete information for the 2000 fishing year and examined trends in area fished for vessels that are targeting small mesh multispecies (trips that landed 75% or more small mesh multispecies).

All Trips

Table 28 and Figure 21 present small mesh multispecies fishing activity in the top ten statistical areas fished for small mesh multispecies in 2000, according to Vessel Trip Report (VTR) data (see chart of statistical areas, Figure 22, p. 51). The preliminary rankings and pounds landed for these areas also are presented for fishing year 2001 in Table 28 and Figure 21. These ten areas represent more than 90% of small mesh multispecies landings reported in the VTRs (excluding data for fishing year 2001, which are preliminary). Statistical area 537 has ranked first for small mesh multispecies fishing in every year since 1997. Areas 525, 616, and 613 are also important areas. Area 522 represents the Cultivator Shoal Whiting Fishery.

Table 28 Summary of Rank and Landings for Top Statistical Areas Fished for Small Mesh Multispecies

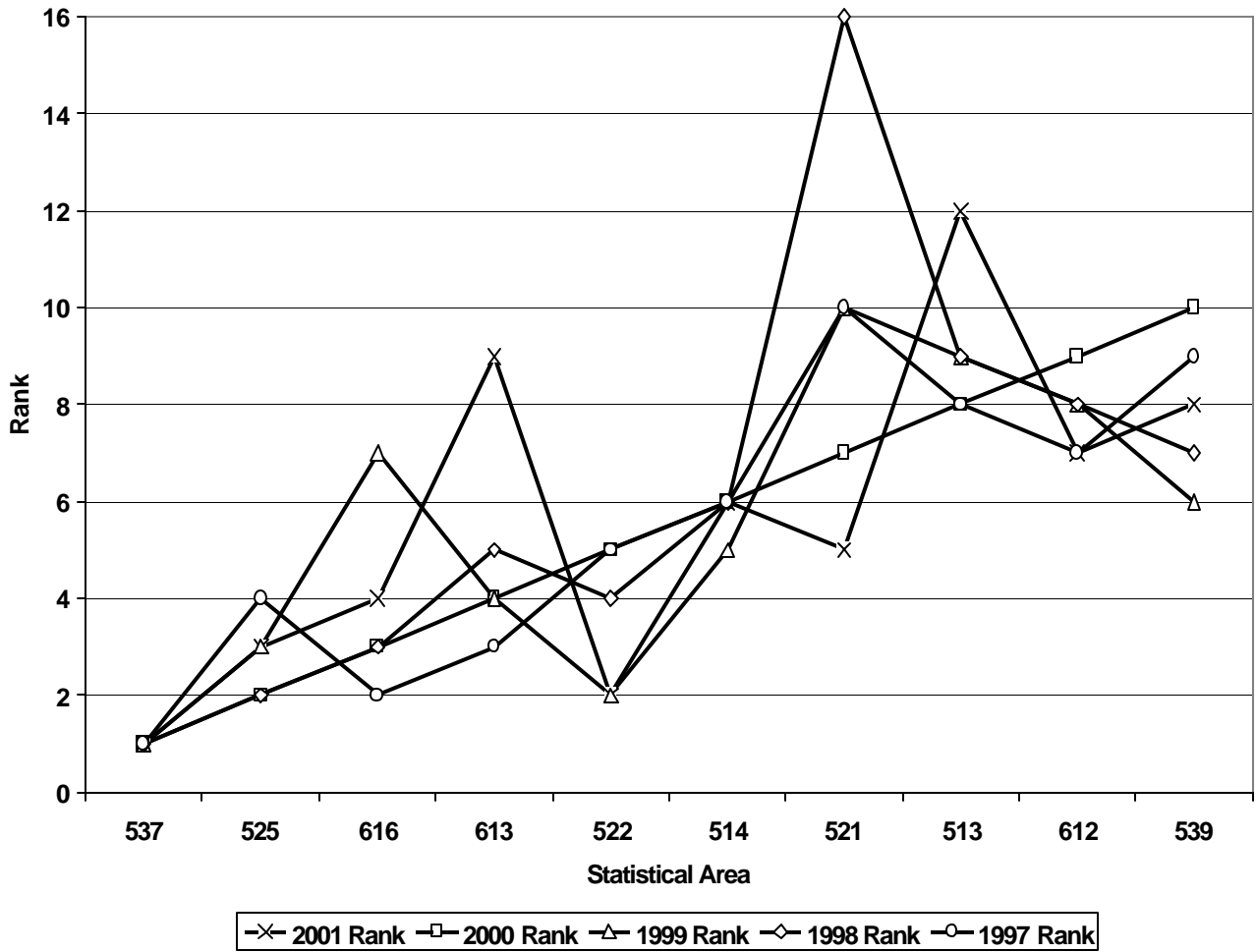
Statistical Area	1997 Rank	Pounds	1998 Rank	Pounds	1999 Rank	Pounds	2000 Rank	Pounds	2001 Rank	Pounds
537 S	1	8,626,127	1	9,391,618	1	7,072,376	1	8,540,539	1	7,222,432
525 S	4	3,443,063	2	8,429,214	3	5,316,173	2	4,625,282	3	3,434,734
616 S	2	7,034,842	3	3,474,622	7	1,584,091	3	3,556,115	4	2,313,439
613 S	3	3,756,643	5	2,068,027	4	2,605,214	4	2,304,232	9	680,246
522 N	5	3,110,660	4	3,150,627	2	5,831,972	5	2,219,079	2	4,724,617
514 N	6	2,370,282	6	1,723,006	5	2,593,029	6	1,771,326	6	1,643,945
521 N	10	605,787	16	100,347	10	457,089	7	1,152,852	5	1,778,624
513 N	8	1,311,277	9	678,049	9	1,041,783	8	982,449	12	594,599
612 S	7	1,700,468	8	1,098,919	8	1,230,171	9	859,770	7	750,986
539 S	9	1,163,362	7	1,722,169	6	1,612,506	10	853,411	8	715,189
Total in Selected Areas		33,122,511		31,836,598		29,344,404		26,865,055		23,858,811
Percent of Total Landings		92.0%		91.7%		91.9%		92.5%		88.7%

“N” refers to the northern stock area for whiting, and “S” refers to the southern stock area for whiting.

See chart of statistical areas, Figure 22, p. 51

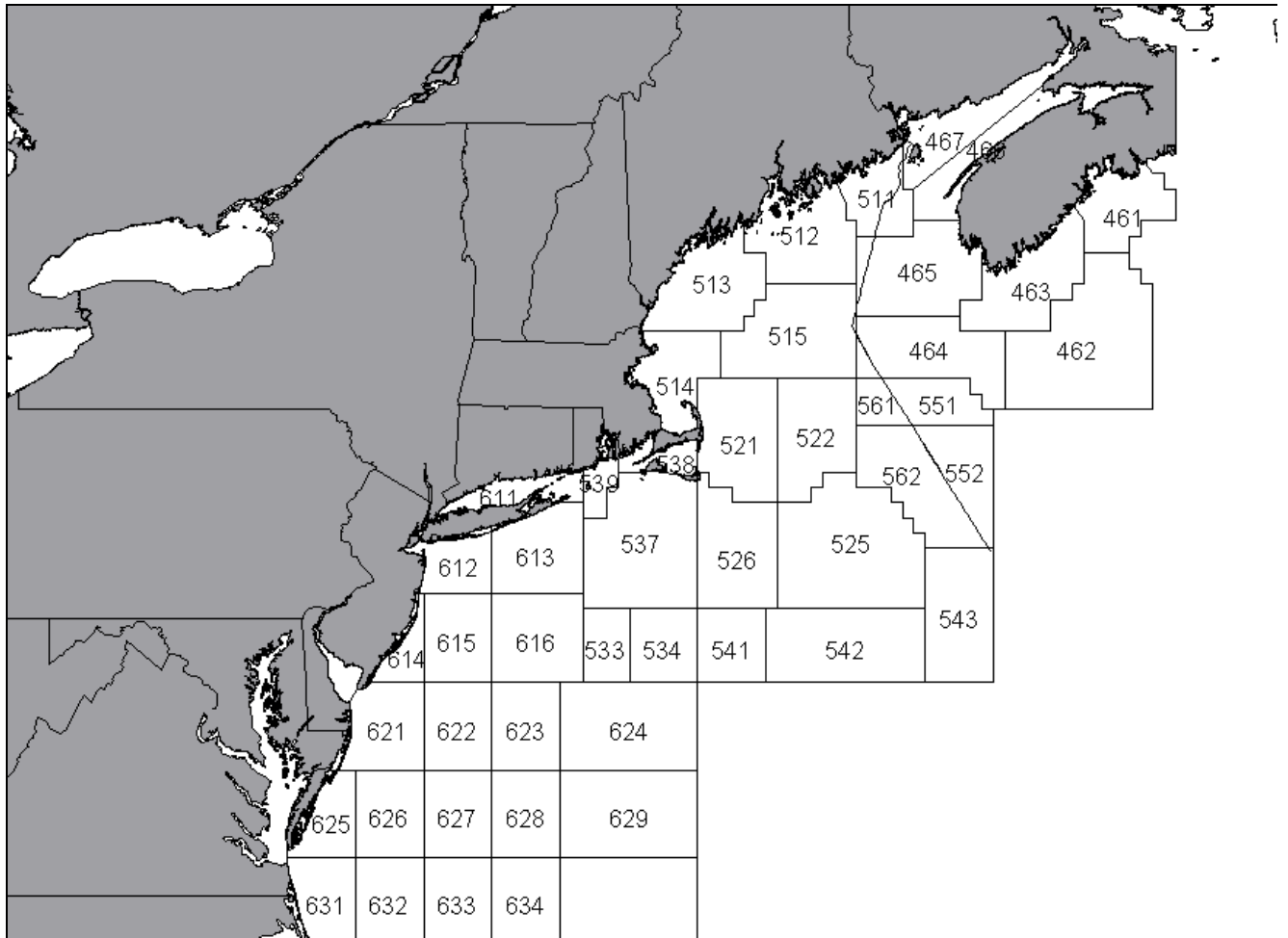
Data for fishing year 2001 are preliminary.

Figure 21 Area Fished: Statistical Area Rankings in Terms of Combined Small Mesh Multispecies (Fishing Years 1997-2001, VTR Data)



Data for fishing year 2001 are preliminary.

Figure 22 Statistical Areas in the Northeast Region



The dark line indicates the biological boundary between the northern and southern stocks of whiting.

Targeted Trips

Targeted trips are defined as those in which 75% or more of the landings on the trip consist of small mesh multispecies. Table 29 and Table 30 compare the numbers of trips and landings from all trips landing small mesh multispecies to targeted trips landing small mesh multispecies. According to Table 30, about 16% of trips that land small mesh multispecies are considered targeted trips under the 75% threshold, and these trips land about 2/3 of all small mesh multispecies. Both the total number of trips and the total number of targeted trips landing small mesh multispecies have decreased considerably since the 1997 fishing year (Table 29).

Table 29 indicates that small and medium-sized vessels have decreased their numbers of targeted trips for small mesh multispecies, while large vessels have increased their numbers of targeted trips for small mesh multispecies. The changes in the proportion of trips targeting small mesh multispecies have been most significant for small and large vessels. This is also reflected in the percentages reported in Table 30. Small mesh multispecies landings, however, have not increased substantially from the increasing number of targeted trips on large vessels. In fact, large vessels took 356 targeted trips to land 8.8 million pounds of small mesh multispecies in fishing year 2001 (preliminary) compared to 244 targeted trips to land 9.58 million pounds of small mesh multispecies in fishing year 1999. Also, the total number of small mesh multispecies trips on large vessels decreased, while the number of targeted trips increased. This changes may be reflective of some distributive impacts of the Amendment 12 trip limits, as industry representatives have reported that large vessels are having to make more trips to land the same amount of fish as they were prior to the Amendment 12 trip limits.

Table 29 Comparison Between Targeted Trips (>75%) Landing Small Mesh Multispecies and All Trips Landing Small Mesh Multispecies by Vessel Size Category

Summary of Targeted Trips and Landings										
Vessel Size	FY1997		FY1998		FY1999		FY2000		FY2001*	
	# Trips	Landings	# Trips	Landings	# Trips	Landings	# Trips	Landings	# Trips	Landings
Large	247	7.67	257	8.93	244	9.58	341	8.40	356	8.80
Medium	1,290	13.17	1,035	12.37	792	9.68	806	9.78	741	8.43
Small	1,030	2.43	447	0.90	569	1.39	387	1.18	347	1.00
Totals	2,567	23.27	1,739	22.20	1,605	20.65	1,534	19.37	1,444	19.37
Summary of Total Trips and Landings										
Vessel Size	FY1997		FY1998		FY1999		FY2000		FY2001*	
	# Trips	Landings	# Trips	Landings	# Trips	Landings	# Trips	Landings	# Trips	Landings
Large	1,076	11.24	1,065	12.94	942	12.94	903	10.91	886	12.14
Medium	4,919	20.65	4,331	19.47	3,910	15.70	3,796	15.64	3,138	12.57
Small	6,132	4.10	5,583	2.27	6,012	3.28	5,353	2.47	4,816	2.17
Totals	12,127	35.99	10,979	34.68	10,864	31.91	10,052	29.02	8,840	29.02

Landings are expressed in millions of pounds of combined small mesh multispecies.

Small vessels are <60 feet, medium vessels are 60-80 feet, and large vessels are >80 feet.

**FY2001 data are preliminary.*

Table 30 Percentage of Total Small Mesh Multispecies Trips and Landings from Targeted Trips (>75% of Trip Landings are Small Mesh Multispecies)

Percentage of Total Trips and Landings From Targeted Trips ($\geq 75\%$ Small Mesh Multispecies)										
Vessel Size	FY1997		FY1998		FY1999		FY2000		FY2001*	
	Trips	Landings	Trips	Landings	Trips	Landings	Trips	Landings	Trips	Landings
Large	23.0%	68.3%	24.1%	69.0%	25.9%	74.1%	37.8%	77.0%	40.2%	72.5%
Medium	26.2%	63.8%	23.9%	63.6%	20.3%	61.6%	21.2%	62.5%	23.6%	67.1%
Small	16.8%	59.2%	8.0%	39.5%	9.5%	42.5%	7.2%	48.0%	7.2%	45.8%
Totals	21.2%	64.7%	15.8%	64.0%	14.8%	64.7%	15.3%	66.7%	16.3%	66.7%

Small vessels are <60 feet, medium vessels are 60-80 feet, and large vessels are >80 feet.

Data for FY2001 are preliminary.

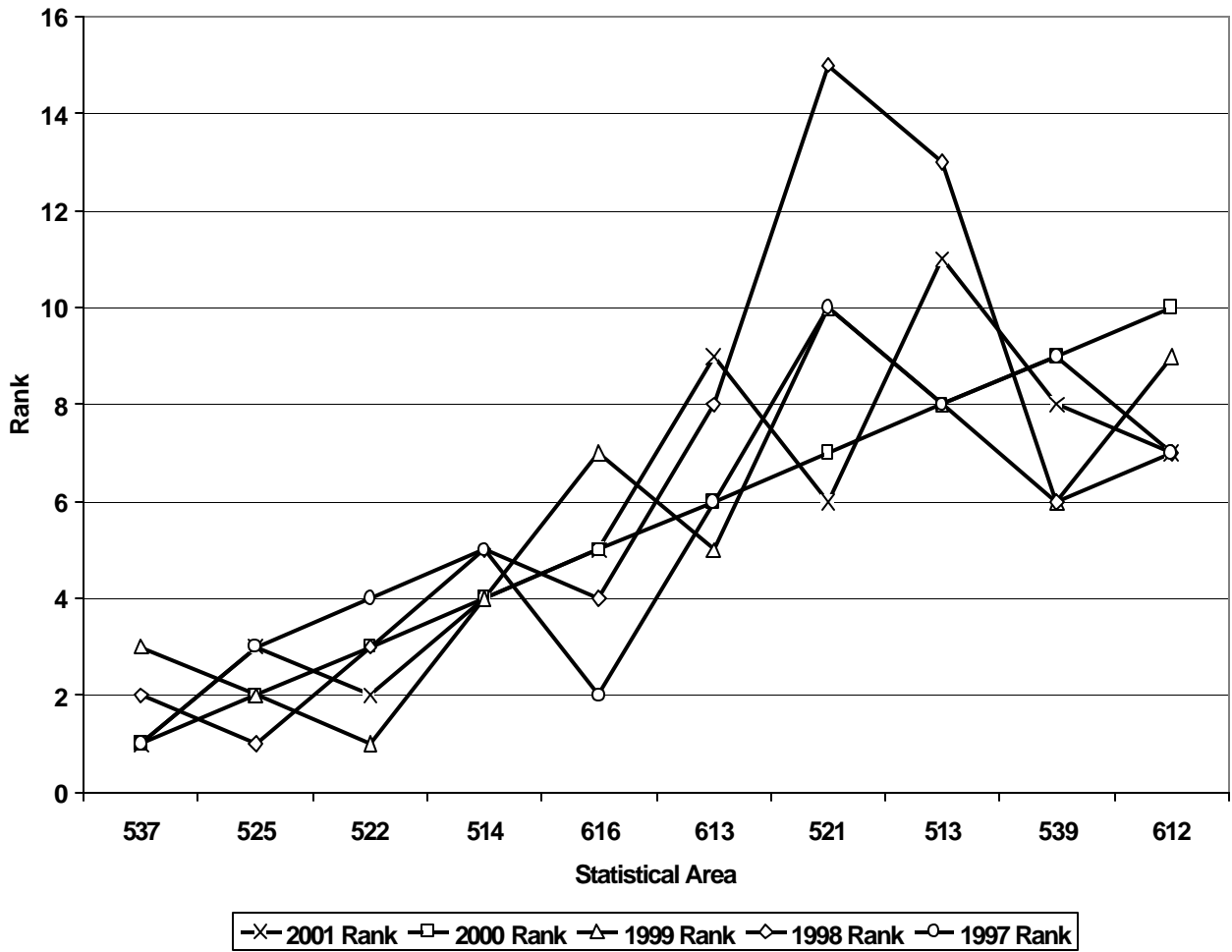
Table 31 and Figure 23 present small mesh multispecies fishing activity in the top ten statistical areas fished on targeted trips ($\geq 75\%$) for small mesh multispecies in FY2000, according to Vessel Trip Report (VTR) data (see chart of statistical areas, Figure 22, p. 51). The preliminary rankings and pounds landed for these areas also are presented for fishing year 2001 in Table 31 and Figure 23. The areas are similar as those for all trips (Table 28). These ten areas represented about 95% of fishing activity on targeted trips for small mesh multispecies in fishing year 1999 - 2001. Area 522 ranked higher for targeted trips than for all trips, which is expected, as Area 522 represents the Cultivator Shoal Whiting Fishery.

Table 31 Summary of Rank and Landings for Top Statistical Areas Fished on Targeted Small Mesh Multispecies Trips

Statistical Area	1997 Rank	Pounds	1998 Rank	Pounds	1999 Rank	Pounds	2000 Rank	Pounds	2001 Rank	Pounds
537	1	5,055,541	2	5,128,624	3	3,674,814	1	6,155,170	1	4,621,684
525	3	3,308,910	1	7,007,283	2	4,893,020	2	4,195,289	3	2,895,086
522	4	3,039,577	3	3,054,174	1	5,295,689	3	2,048,616	2	4,401,945
514	5	2,085,677	5	1,303,170	4	1,858,261	4	1,551,310	4	1,487,122
616	2	3,578,816	4	1,580,410	7	813,590	5	1,475,278	5	1,467,143
613	6	1,555,078	8	567,263	5	889,787	6	1,061,516	9	291,868
521	10	372,739	15	45,664	10	252,549	7	719,135	6	1,018,319
513	8	751,336	13	192,104	8	674,019	8	631,520	11	259,755
539	9	682,190	6	1,026,710	6	889,502	9	385,377	8	427,065
612	7	1,313,098	7	658,494	9	573,518	10	289,076	7	430,524
Total in Selected Areas		21,742,962		20,563,896		19,814,749		18,512,287		17,300,511
Total Landings On Targeted Trips		23,271,522		22,204,212		20,649,403		19,365,317		18,229,195
Percent of Total Targeted Landings		93.40%		92.60%		96.00%		95.60%		94.90%

Data from fishing year 2001 are preliminary.

Figure 23 Area Fished: Statistical Area Rankings in Terms of Combined Silver, Red, and Offshore Hake (Fishing Years 1997-2001, VTR Data) on Targeted Trips

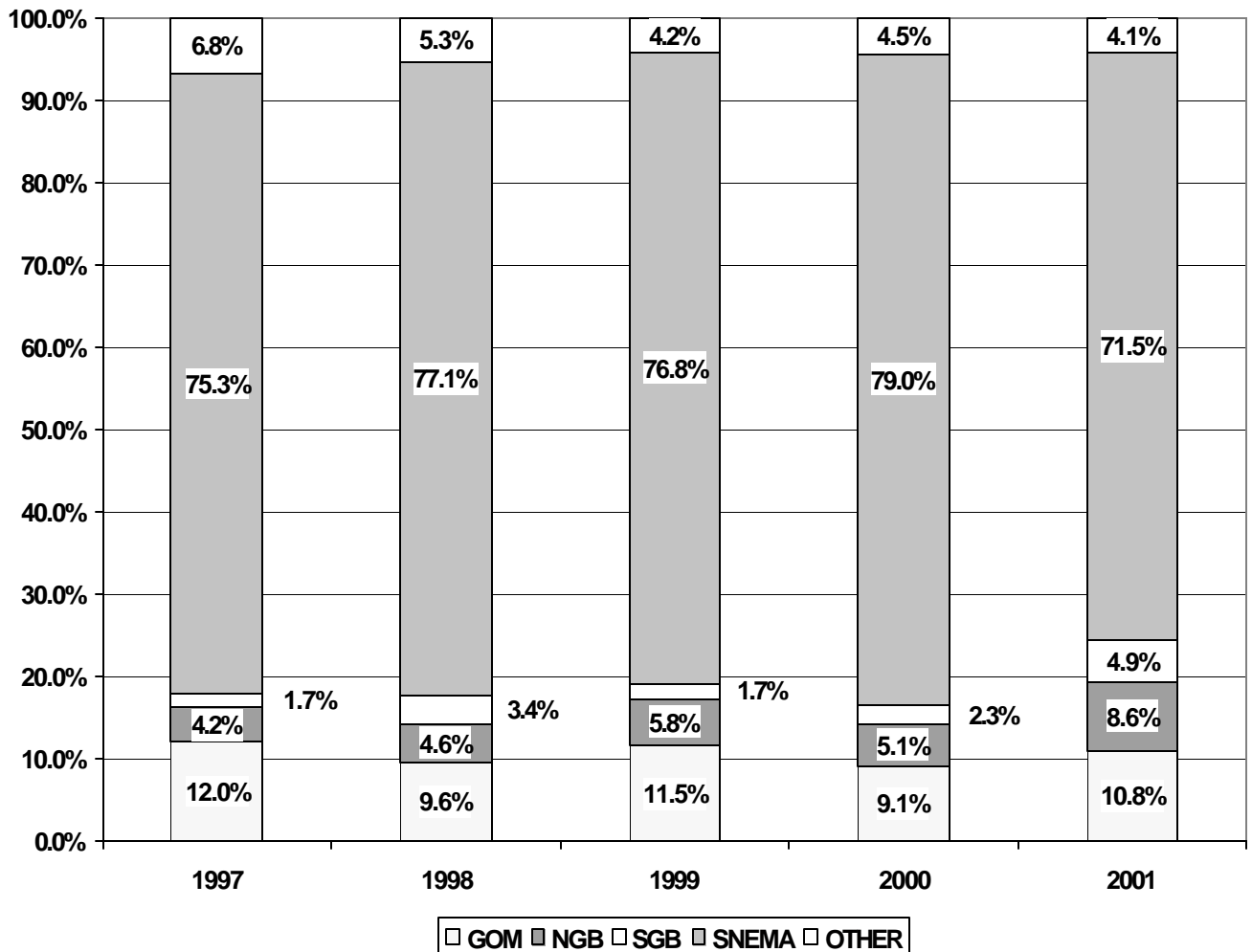


Data from fishing year 2001 are preliminary.

All Trips

Figure 24 illustrates the distribution of all trips for small mesh multispecies among areas for medium-sized vessels (60-80 feet) and updates Figure 32 from the 2001 SAFE Report. Overall, there has been very little change in where medium-sized vessels are taking trips to catch small mesh multispecies. To a small degree, these vessels appear to be making fewer trips that catch small mesh multispecies in the Southern New England/Mid-Atlantic area and slightly more trips in the Gulf of Maine, Northern Georges Bank, and Southern Georges Bank areas. The shifts in fishing patterns for medium-sized vessels that catch small mesh multispecies since the 1997 fishing year do not appear to be significant. See Figure 26 (p. 57) for the distribution of medium-sized vessel targeted trips ($\geq 75\%$) among areas.

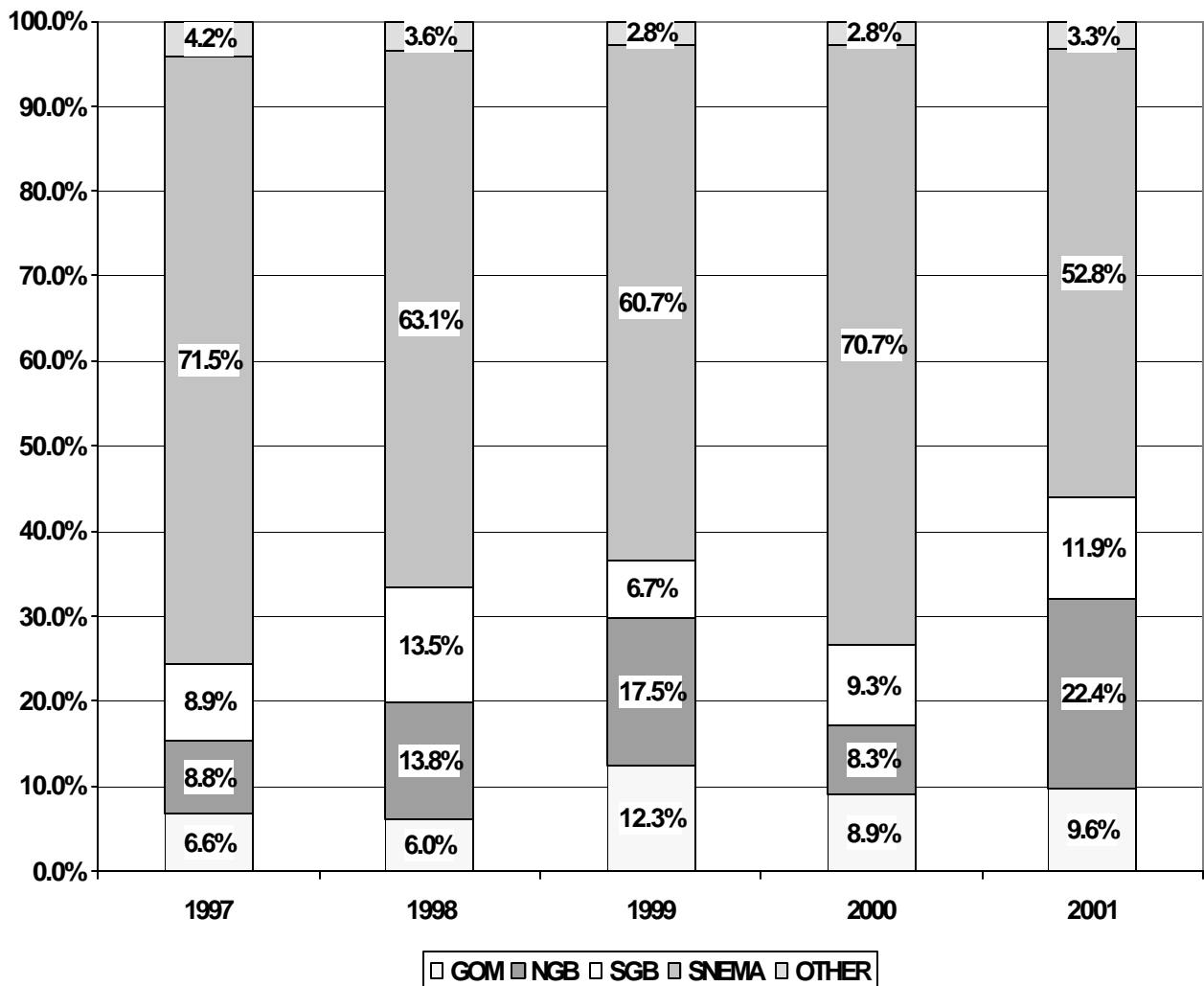
Figure 24 Distribution of Medium-Sized Vessel Trips Among Areas (Fishing Years 1997-2001, VTR Data)



Data from fishing year 2001 are preliminary.

Figure 25 illustrates the distribution of landings of small mesh multispecies from medium-sized vessels (60-80 feet) on all trips catching small mesh multispecies by area and updates Figure 33 from 2001 SAFE Report. Shifts in landings reflect the shifts in fishing areas (Figure 24), although it appears that catch-per-unit-effort (CPUE) in these areas has been variable. Preliminary information from FY2001 suggests that there may be a shift in the amount of small mesh multispecies harvested away from the southern New England/Mid-Atlantic area and to the Northern Georges Bank area. Additional years will be necessary to better measure real changes in fishing patterns.

Figure 25 Distribution of Medium-Sized Vessel Landings of Silver, Red, and Offshore Hake Among Areas (Fishing Years 1997-2001, VTR Data)

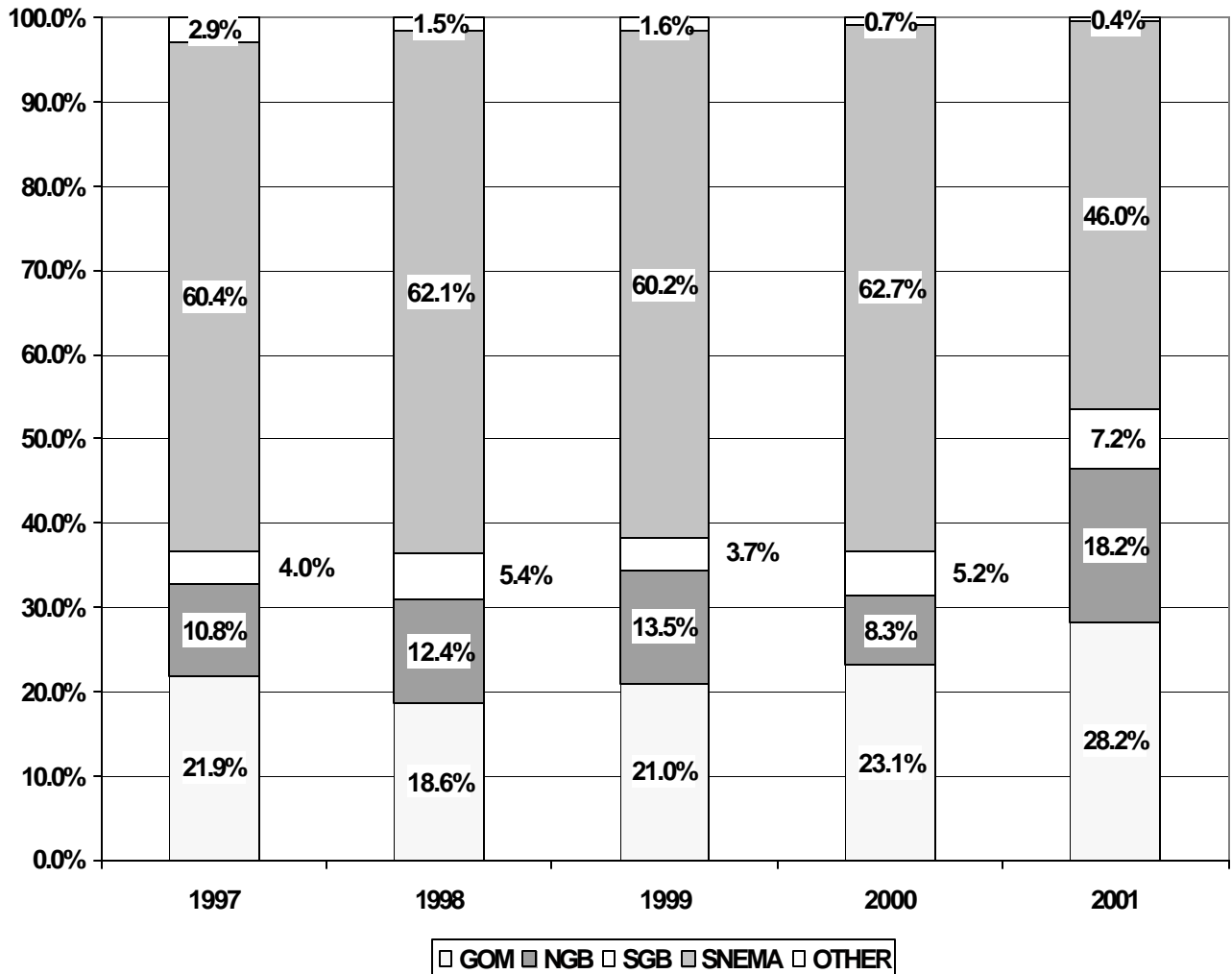


Data from fishing year 2001 are preliminary.

Targeted Trips

Figure 26 illustrates the distribution of targeted trips for small mesh multispecies among areas for medium-sized vessels (60-80 feet). Targeted trips are defined as those with small mesh multispecies landings greater than or equal to 75%. Compared to all small mesh multispecies trips by medium-sized vessels (Figure 24), shifts in targeted trips exhibited similar patterns. Preliminary data from fishing year 2001 suggests that some shifts may be occurring. Targeted small mesh multispecies trips by medium-sized vessels in the Southern New England/Mid-Atlantic area decreased considerably in FY2001, with a corresponding increase in the proportion of targeted trips in the Gulf of Maine and Northern Georges Bank areas.

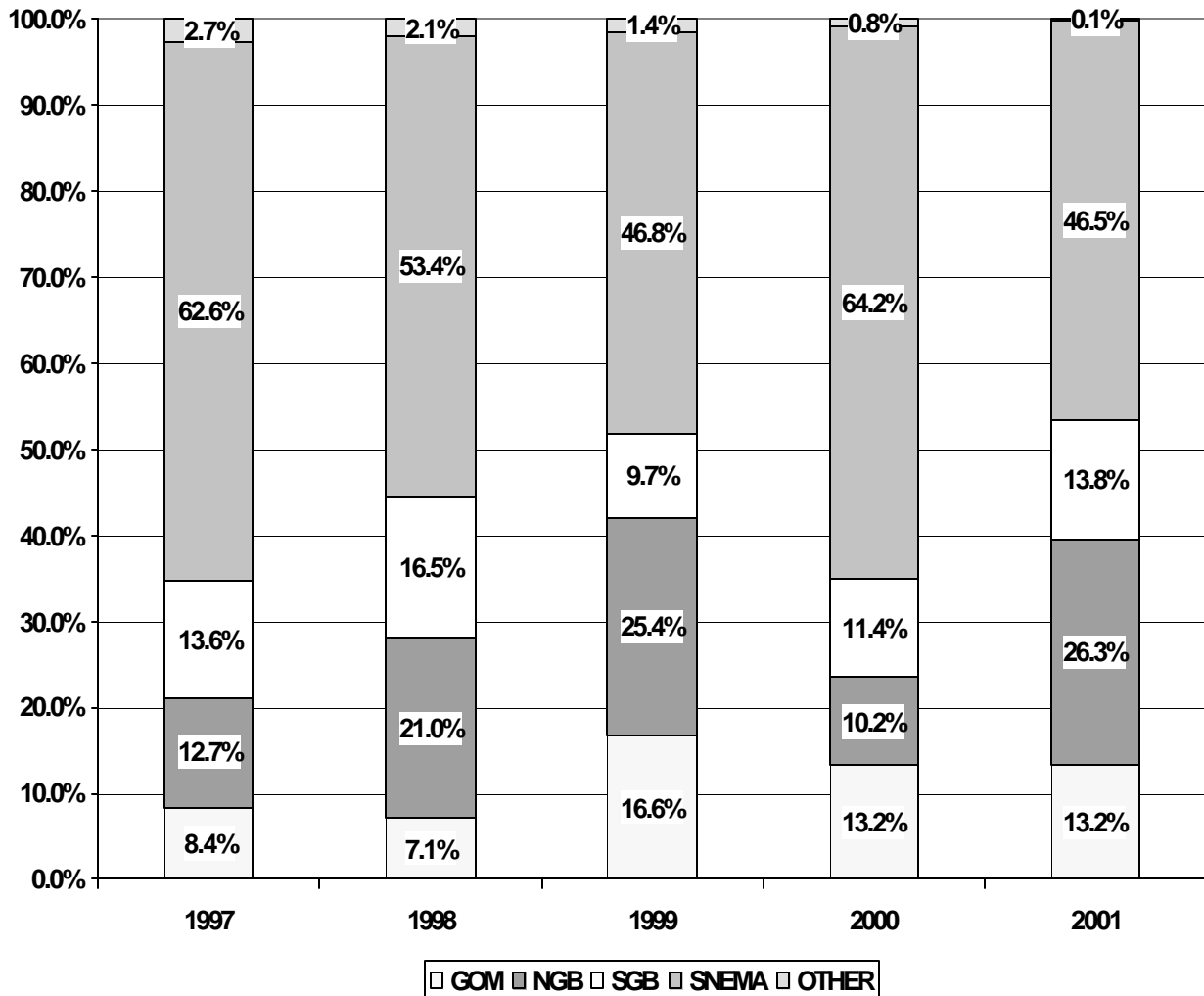
Figure 26 Distribution of Medium-Sized Vessel Targeted Trips Among Areas (Fishing Years 1997-2001, VTR Data)



Data from fishing year 2001 are preliminary.

Figure 27 illustrates the distribution of landings of small mesh multispecies on targeted trips by medium-sized vessels (60-80 feet) by area. Targeted trips are defined as those with small mesh multispecies landings greater than or equal to 75%. The proportion of landings of small mesh multispecies on targeted trips by medium-sized vessels exhibited similar trends as the number of trips (Figure 26), with the exception of the Gulf of Maine area. An increase in the percentage of targeted trips by medium-sized vessels in the Gulf of Maine from FY2000 to FY2001 did not increase the proportion of small mesh multispecies landed from this area. Note that FY2001 data are still preliminary, so it is not possible to conclude whether or not the increase in trips in the Gulf of Maine or Northern Georges Bank areas reflect true shifts in fishing patterns. Additional years of data will be necessary to better measure the changes that have occurred.

Figure 27 Distribution of Medium-Sized Vessel Landings of Silver, Red, and Offshore Hake Among Areas on Targeted Trips (Fishing Years 1997-2001, VTR Data)

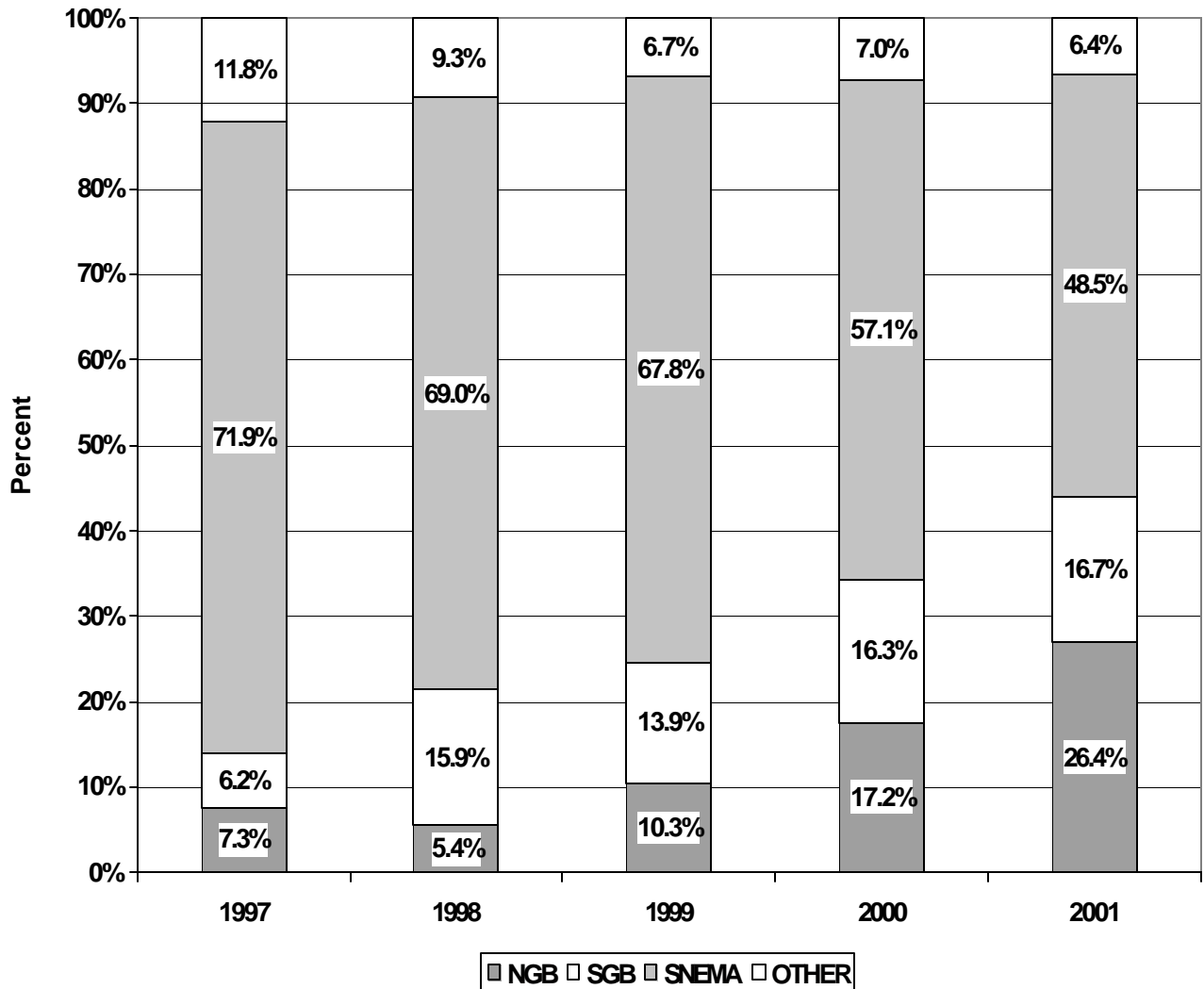


Data from fishing year 2001 are preliminary.

All Trips

Figure 28 illustrates the distribution of all trips catching small mesh multispecies by large vessels (>80 feet) among different areas and updates Figure 34 from the 2001 SAFE Report. Trends in shifting fishing patterns for some areas are becoming apparent, and the trends appear to be more persistent over time. The proportion of small mesh multispecies trips by large vessels in the Southern New England/Mid-Atlantic area has decreased considerably since the 1997 fishing year, while the proportion of trips by large vessels in the Northern Georges Bank and Southern Georges Bank areas has increased. These changes are consistent with the recent increase in landings from the Cultivator Shoal Whiting Fishery and corresponding decrease in landings from the southern stock area (Table 20, p. 33). Note that there are no small mesh multispecies trips taken by large vessels in the Gulf of Maine.

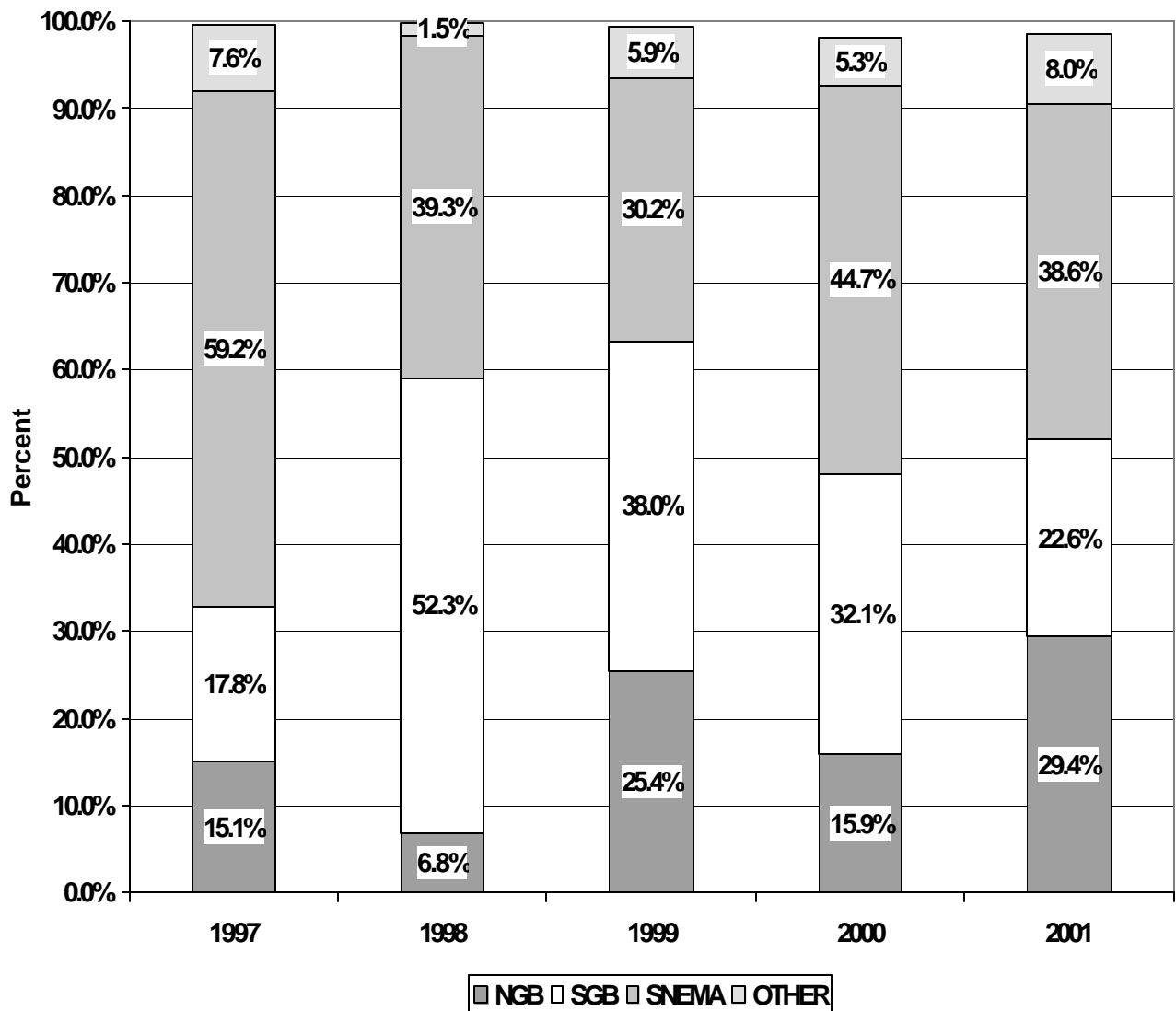
Figure 28 Distribution of Large Vessel Trips Among Areas (Fishing Years 1997-2001, VTR Data)



Data from fishing year 2001 are preliminary.

Figure 29 illustrates the distribution of small mesh multispecies landings from large vessels (>80 feet) among areas and updates Figure 35 from 2001 SAFE Report. Trends in the proportion of small mesh multispecies landings by large vessels in these areas have been more variable over time, suggesting that catch rates have also been variable. For example, as Figure 28 indicates, the proportion of trips in the Southern Georges Bank area has increased since the 1999 fishing year. The proportion of small mesh multispecies landings from this area, however, has decreased over the same time period. See Figure 30 (p. 61) for the distribution of large vessel targeted trips ($\geq 75\%$) among areas.

Figure 29 Distribution of Large Vessel Landings of Silver, Red, and Offshore Hake Among Areas (Fishing Years 1997-2001, VTR Data)

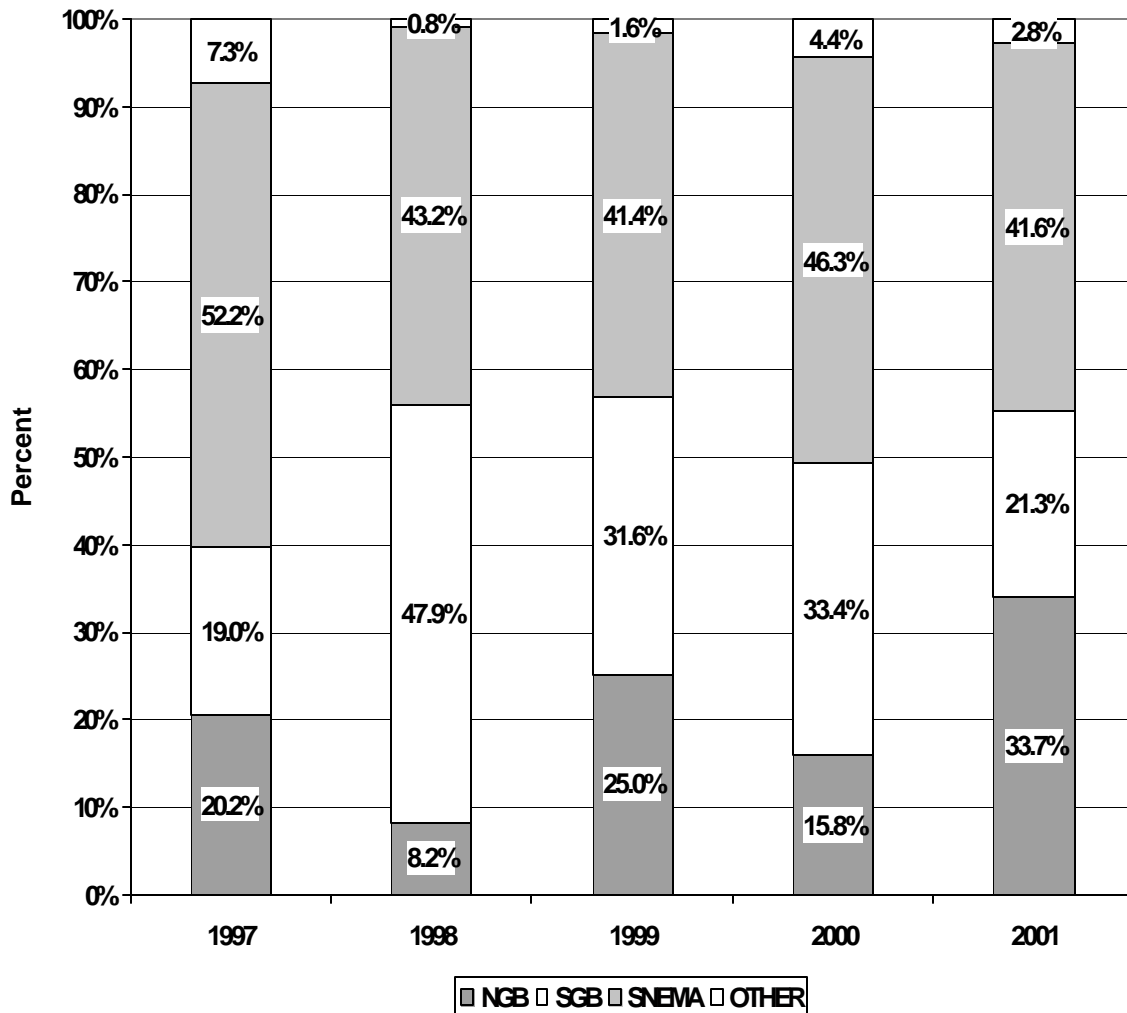


Data from fishing year 2001 are preliminary.

Targeted Trips

Figure 30 illustrates the distribution of targeted trips by large vessels (>80 feet) catching small mesh multispecies among different areas. Targeted trips are defined as those with small mesh multispecies landings greater than or equal to 75%. The distribution of targeted small mesh multispecies trips by large vessels has been variable. The proportion of targeted trips in the Southern Georges Bank area decreased considerably in FY2001, although the changes are within the range of recent experience (FY1997). Targeted trips in the Northern Georges Bank area increased in FY2001 to the highest proportion of the time series. This suggests that large vessels may be shifting away from Southern Georges Bank and to Northern Georges Bank to target small mesh multispecies. Additional years of information will be necessary to better measure true shifts in fishing patterns.

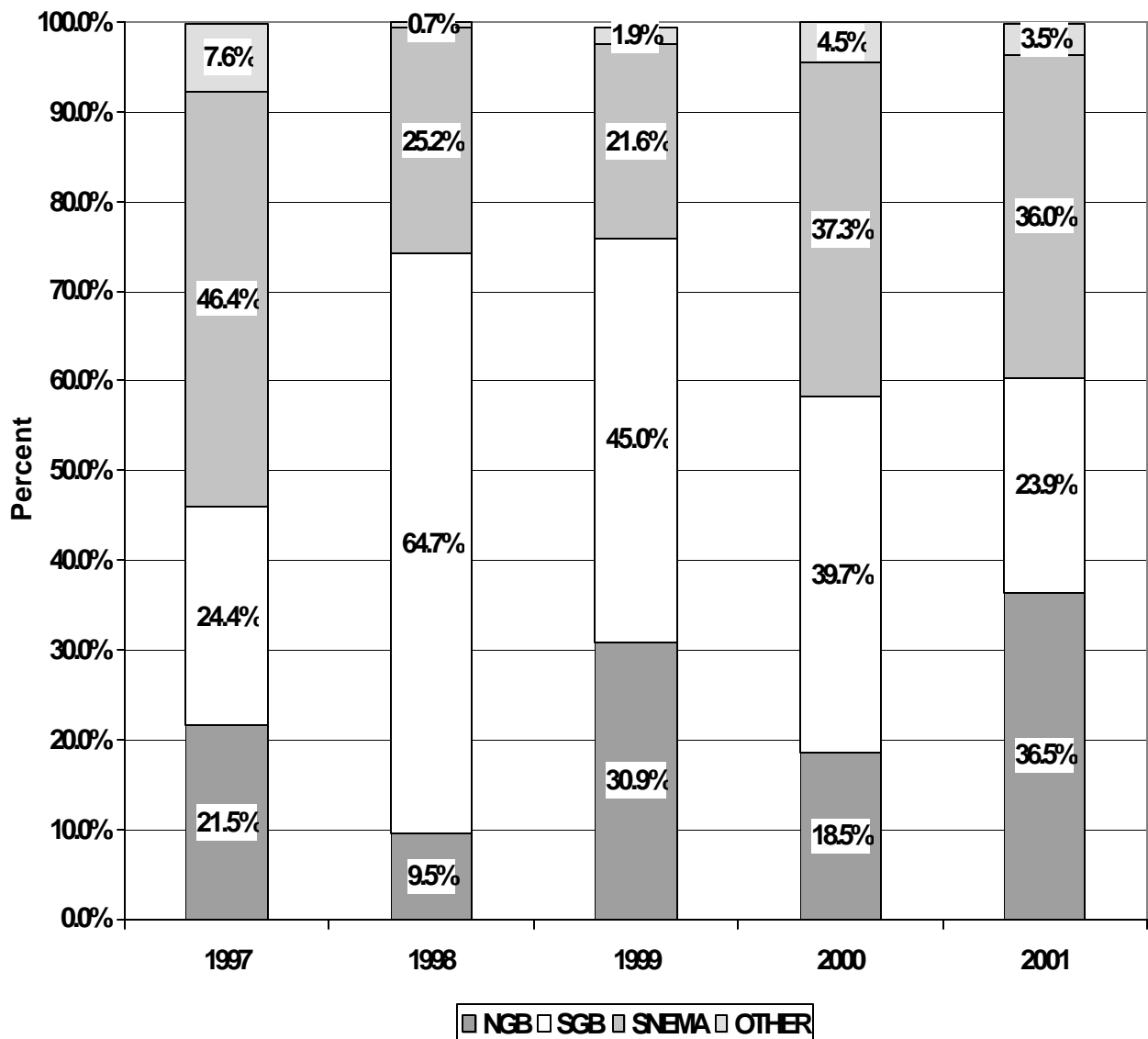
Figure 30 Distribution of Large Vessel Targeted Trips Among Areas (Fishing Years 1997-2001, VTR Data)



Data from fishing year 2001 are preliminary.

Figure 31 illustrates the distribution of small mesh multispecies landings on targeted trips by large vessels (>80 feet) among areas. Targeted trips are defined as those with small mesh multispecies landings greater than or equal to 75%. Trends in the distribution of small mesh multispecies landings on targeted trips by large vessels are similar to trends in the proportion of trips (Figure 30).

Figure 31 Distribution of Large Vessel Landings of Silver, Red, and Offshore Hake Among Areas on Targeted Trips (Fishing Years 1997-2001, VTR Data)



3.1.2.5 Updated Profitability and Dependence Information

To examine any potential differential impacts of the trip limits by vessel size category, a relative measure of profitability of *targeted* small mesh multispecies trips was constructed in a manner similar to that of the 2001 SAFE Report. However, the analysis was updated using a revised criterion for small mesh multispecies targeting, a revised method for estimating days absent from the VTR data and revised producer price indices.

For this SAFE Report, targeted trips were defined as those in which small mesh multispecies represented 75% or more of the total landed weight. As before, “days absent” was used as a proxy for operating costs, and total trip revenues were calculated by multiplying monthly average prices by state and species by VTR landings and summing the revenues together. Days absent is assumed to be correlated with operating costs because longer trips generally require more inputs. Further, as long as technology remains constant, inter-annual changes in days absent on fishing trips will reflect changes in trip costs that can be used to compare changes across fishing years.

For the 2001 SAFE Report, days absent were calculated as the elapsed time between the start and end time for each trip. For purposes of analysis, trips that were less than 24 hours in duration were set equal to 24 hours. As a proxy for operating costs, this adjustment introduced an upward bias in average costs and would misrepresent profitability of day boats. To correct this bias in this SAFE Report, days absent were estimated simply as elapsed time with no adjustment made for trips less than 24 hours.

Comparison of relative profitability over time requires that cost and revenues be converted to constant dollars using producer price indices. In this manner, inflationary effects are removed and sources of change profitability may be properly accounted for. For the 2001 SAFE Report, cost and revenue data were converted to constant 1982 dollars using producer price indices for Finished Energy Goods (cost) and Processed Food and Feeds (revenue). For this SAFE Report, producer price indices for #2 diesel fuel and unprocessed finfish were used. These indices better represent inflationary impacts on input and output prices in commercial fisheries and were obtained from the U.S. Department of Labor’s Bureau of Labor Statistics (www.bls.gov; Series ID WPU057303 and WPU022301 for #2 diesel fuel and unprocessed finfish respectively).

Assuming fixed costs remain constant, profitability change was estimated by subtracting the percent change in operating costs from the percent change in total trip revenue. Note that profitability change should be interpreted as the relative change in profit margin (total revenues less total costs). For example, a 50% change in a 10% profit margin means that the new profit margin would be 15%. This does not mean that profits increased by 50%. Change in profitability will be positive if revenues go up proportionally more than costs; if costs go down proportionally more than revenues decline; or if both trip costs decline and revenues increase. By contrast, profit change will be negative if revenues decline proportionally more than costs decline; if costs increase proportionally more than revenues increase; or if costs increase and revenues decrease.

Estimated days absent per trip remained relatively constant for both small and medium vessels in all fishing years but has declined for large vessels in fishing year 2000 and 2001 (Table 32). Converted to constant dollars, operating costs were generally higher for all vessels from 1997 to 1999 as compared to 2000 and 2001. These differences were partly due to inter-annual differences in days absent but were primarily due to changes in the real price of diesel fuel. By contrast, the real price of finfish did not fluctuate as much as diesel fuel, so the changes in constant dollar revenues were primarily due to changes in average landings value.

Inter-annual changes in per-trip profitability have been positive for small vessels in every fishing year since 1998. For example, costs declined by 27% in FY1999 while revenues increased 50% for a net change of 77%. In FY2000, small vessel trip revenues declined 25%, but costs went down by one-third so profitability increased by nearly 9%. In FY2001, small vessel profitability increased again as the percent change in revenue (+39%) was greater than percent increase in operating costs (21%). By contrast, relative profitability for both medium and large vessels declined in FY2001 as the proportional increase in operating cost exceeded that of the proportional increase in per-trip revenue.

Table 32 Relative Change in Average Profit for Trips Targeting Small Mesh Multispecies by Vessel Size Class

	Small Vessels					Medium Vessels					Large Vessels				
Nominal Dollars	1997	1998	1999	2000	2001	1997	1998	1999	2000	2001	1997	1998	1999	2000	2001
Mean Operating Cost (DA)	0.53	0.53	0.47	0.51	0.55	1.59	1.86	1.63	1.58	1.64	3.28	3.63	3.14	2.71	3.02
Mean Small Mesh Value	761	690	1196	846	1137	3621	4063	5060	4271	4710	9878	11928	16485	9048	10060
Mean Other Value	50	64	73	63	81	536	657	766	840	508	1422	1955	1382	1319	1203
Mean Total Value	811	754	1269	909	1218	4157	4720	5826	5111	5218	11300	13883	17867	10367	11263
Constant Dollars															
Mean Operating Cost (DA)	0.82	1.12	0.82	0.55	0.66	2.47	3.92	2.84	1.69	1.97	5.09	7.66	5.48	2.90	3.62
Mean Small Mesh Value	459.26	404.22	623.89	463.82	645.66	2185.27	2380.20	2639.54	2341.56	2674.62	5961.38	6987.70	8599.37	4960.53	5712.66
Mean Other Value	30.18	37.49	38.08	34.54	46.00	323.48	384.89	399.58	460.53	288.47	858.18	1145.28	720.92	723.14	683.13
Mean Total Value	489.44	441.71	661.97	498.36	691.65	2508.75	2765.08	3039.12	2802.08	2963.09	6819.55	8132.98	9320.29	5683.66	6395.80
Change in Cost	NA	36.1%	-26.6%	-33.4%	20.6%		59.2%	-27.5%	-40.5%	16.1%		50.6%	-28.4%	-47.0%	24.7%
Change in Revenue	NA	-9.8%	49.9%	-24.7%	38.8%		10.2%	9.9%	-7.8%	5.7%		19.3%	14.6%	-39.0%	12.5%
Relative Change in Profit															
Target Trip	NA	-45.8%	76.5%	8.6%	18.1%		-49.0%	37.4%	32.7%	-10.4%		-31.3%	43.0%	8.0%	-12.1%

Data for fishing year 2001 are preliminary.

Table 33 updates “dependence” information by vessel size class. Dependence is defined annually by the percentage of a vessel’s gross income that is derived from small mesh multispecies (note that gross revenues were estimated as the product of VTR landings and monthly average price by species by state). Relative to fishing years 1997-1999, the degree of dependence on small mesh multispecies declined for small and medium vessel size classes in FY2000/FY2001 but was relatively unchanged for large vessels (Table 33). Note that this reduction is reflected in mean dependence as well as the 75th and 90th percentiles of the dependence distribution (comparing FY97-99 averages with FY2000-2001 averages).

The data in Table 33 indicate that vessels have shifted some of their effort to other species. However, the relative degree or impact on vessels is likely to have depended on the relative reliance on small mesh multispecies for total annual income. To examine these effects, change in relative total income were estimated by vessel size class and for vessels that relied on small mesh multispecies for 25% or more of gross annual income. This information is presented in Table 34 and updates Table 36 from the 2001 SAFE Report.

Although the magnitude of change differed, the general trends in profitability were similar within vessel size classes regardless of dependence on small mesh multispecies. Note that FY2001 contains incomplete information, so the relative change from FY2000 results in negative profitability change because FY2000 data contains a full 12 months of fishing income while FY2001 data does not. Compared to FY1999, relative profit margins increased approximately 50% for all vessel size classes for vessels that relied on small mesh multispecies for less than 25% of fishing income. Medium vessels with greater reliance on small mesh multispecies also increased profitability by about 50%, but increases in profitability were more modest (15% and 18% respectively) for small and large vessels.

Table 33 Estimated Gross Revenue Dependence on Small Mesh Multispecies (Percentage of Total Gross Revenues Represented by Small Mesh Multispecies)

	Large Vessel					Medium Vessel					Small Vessel				
	1997	1998	1999	2000	2001*	1997	1998	1999	2000	2001*	1997	1998	1999	2000	2001*
Number	61	76	65	67	60	189	188	163	168	157	424	416	401	395	353
Mean	11.4%	13.3%	12.8%	11.1%	12.3%	13.1%	11.3%	11.3%	9.0%	9.6%	4.1%	3.4%	4.1%	2.1%	1.8%
Std. Dev	0.22	0.24	0.25	0.22	0.2	0.2	0.17	0.19	0.14	0.15	0.12	0.12	0.12	0.07	0.07
Median	1.3%	0.7%	1.1%	0.6%	1.9%	3.7%	4.4%	3.5%	2.4%	2.0%	0.3%	0.2%	0.2%	0.2%	0.1%
75th Percentile	7.3%	14.1%	11.4%	9.0%	16.8%	17.2%	14.4%	10.9%	11.8%	13.5%	1.4%	1.0%	2.2%	0.7%	0.5%
90th Percentile	43.9%	63.4%	48.9%	45.6%	47.6%	41.6%	48.7%	35.7%	28.3%	31.5%	9.7%	6.5%	9.1%	4.0%	2.8%

Table 34 Estimated Change in Annual Vessel Returns Above Operating Costs

	Small Vessels					Medium Vessels					Large Vessels				
	1997	1998	1999	2000	2001	1997	1998	1999	2000	2001	1997	1998	1999	2000	2001
Vessels < 25% Dependence															
Nominal Dollars															
Number of Vessels	403	403	385	387	345	156	157	138	147	129	52	61	55	57	48
Mean Operating Cost (DA)	50.7	48.9	51.5	51.7	52.3	117.4	112.3	111.2	106.3	99.5	169.2	165.4	148.3	141.6	127.4
Mean Total Value	104,935	95,980	110,789	119,589	111,338	294,253	252,529	315,529	312,159	283,994	601,757	571,551	604,417	650,895	554,135
Constant Dollars															
Mean Operating Cost (DA)	78.5	103.1	89.9	55.4	62.8	181.9	237.0	194.1	113.9	119.3	262.3	348.9	258.8	151.8	152.7
Mean Total Value	63,328	56,227	57,793	65,564	63,224	177,582	147,937	164,595	171,140	161,269	363,161	334,828	315,293	356,850	314,671
Change in Cost		31.3%	-12.8%	-38.4%	13.4%		30.3%	-18.1%	-41.3%	4.7%		33.0%	-25.8%	-41.4%	0.6%
Change in Revenue		-11.2%	2.8%	13.4%	-3.6%		-16.7%	11.3%	4.0%	-5.8%		-7.8%	-5.8%	13.2%	-11.8%
Relative Change in Profit		-42.5%	15.6%	51.8%	-16.9%		-47.0%	29.4%	45.3%	-10.5%		-40.8%	20.0%	54.5%	-12.5%
Vessels >= 25% Dependence															
Nominal Dollars															
Number of Vessels	21	13	16	8	8	33	31	25	21	28	9	15	10	10	12
Mean Operating Cost (DA)	49.7	23.4	40.5	39.4	55.7	115.3	141.0	114.9	143.4	107.3	136.1	115.2	107.2	142.7	176.1
Mean Total Value	81,840	31,971	98,270	69,503	128,948	330,632	391,512	366,832	446,018	304,373	569,067	405,523	603,359	572,058	702,510
Constant Dollars															
Mean Operating Cost (DA)	77.1	49.3	70.6	42.3	66.8	178.8	297.5	200.5	153.7	128.7	211.0	243.1	187.2	152.9	211.1
Mean Total Value	49,390	18,729	51,262	38,105	73,224	199,537	229,357	191,357	244,527	172,841	343,432	237,565	314,741	313,628	398,927
Change in Cost		-36.1%	43.3%	-40.1%	58.1%		66.4%	-32.6%	-23.3%	-16.3%		15.2%	-23.0%	-18.3%	38.1%
Change in Revenue		-62.1%	173.7%	-25.7%	92.2%		14.9%	-16.6%	27.8%	-29.3%		-30.8%	32.5%	-0.4%	27.2%
Relative Change in Profit		-26.0%	130.4%	14.5%	34.1%		-51.4%	16.0%	51.1%	-13.0%		-46.0%	55.5%	17.9%	-10.9%

3.1.3 Market Information

3.1.3.1 Industry Perspective

Industry representatives on the WMC provided the following information to update whiting market conditions. In general, the WMC agreed that there is no new information available to indicate that whiting market conditions have changed substantially over the past year. However, the tragic events of September 11, 2001 had some significant short-term impacts on the market that the WMC agreed should be acknowledged.

At the time of the September 11 attacks, Fulton Fish Market in New York City closed. Operations were moved to Hunt's Point. The week of the attacks essentially brought the market to a halt. The markets for whiting and other low-priced fish suffered the most from the events of 9/11 because as airports were closed and trucks were backed up for miles at the Canadian border, most low-priced fish were given away or left to rot as cold storage space was used for high priced lobster, groundfish, and monkfish.

When things began to stabilize, most boats in the northern area went groundfishing because groundfish can be sold more easily in the area. The boats that did remain in the whiting fishery shipped fish through Canada, even to get to US buyers, in order to avoid problems with East Coast airports and New York City. This added a great amount of shipping costs, which, when combined with the low demand for the fish in general, caused many boats in the north to stop fishing for whiting by early October.

Industry representatives from the southern area confirmed the effects of the 9/11 attacks on Fulton Fish Market and the market for whiting. When the market moved back to New York City, the industry indicated that sales of whiting were slower. Canadian product still tends to flood the market during some times of the year, which has a significant effect on price.

3.1.4 Other Factors

3.1.4.1 Potential Shifts in Effort

3.1.4.1.1 Background

Industry representatives on the WMC expressed concerns about the potential for effort to increase in the whiting fishery, especially as a result of increasing groundfish restrictions and the upcoming Amendment 13 to the Northeast Multispecies FMP. Allocated Multispecies days-at-sea (DAS) were recently reduced in an interim action resulting from the Framework 33 lawsuit and may be reduced again in Amendment 13. DAS allocations for many vessels may become so low that groundfishing is no longer a viable option for these vessels. Because whiting is an open access fishery, many participants fear that either the stock condition or their future ability to prosecute the fishery (or both) will be compromised by an influx of vessels as a response to additional groundfish restrictions.

Effort could increase in the whiting fishery as a result of increasing groundfish restrictions through:

1. effort from new entrants in the whiting fishery;
2. re-activation of effort from historical participants in the fishery; and/or
3. increased effort by current participants in the fishery.

Most of the WMC members believe that because of market conditions, new entrants in the fishery may encounter difficulty generating profits in the fishery, as the market is very limited, and most vessels have established relationships with buyers for whiting. An influx of new entrants, therefore, may only be a short-term occurrence. However, an influx of effort into the fishery could compromise the health of the resource, even if it is only a short-term response to Amendment 13.

The potential loss of market share for current participants is also a significant issue. Because whiting markets are so limited, there is concern that an influx of effort in the fishery will decrease the price of whiting for all vessels. Current participants worry that their very small market share will be divided between an increasing number of vessels, reducing profits in the fishery across the board.

In documenting these concerns, the Whiting Monitoring Committee established a baseline of entry and exit patterns in small mesh multispecies fisheries for further investigation in the future. This baseline is discussed in the following subsection.

3.1.4.1.2 Baseline Entry and Exit Patterns in Small Mesh Multispecies Fisheries

Amendment 13 to the Northeast Multispecies Fishery Management Plan is currently under development. At this time, the potential magnitude of reductions in groundfish fishing effort may cause vessels to seek alternative fisheries. The small mesh multispecies fishery is one of several fisheries to which vessel owners may turn to make up for lost revenues in the groundfish fishery. The extent of this potential displacement is not known, but may be significant. The purpose of this section is to establish a baseline period of study for entry and exit patterns in small mesh multispecies fisheries against which future observed entry and exit rates may be compared.

The number of vessels landing at least one pound of small mesh multispecies has fluctuated by less than 50 vessels from FY1995 to FY2000 (FY2001 is incomplete, so the apparent drop in participation in FY2001 cannot be confirmed until FY2001 VTR data is complete) (Table 35). The stability in number of participating vessels is consistent across vessel size classes, although the variability in number of participating vessels was greater for large vessels than for either medium or small vessels.

FY1995 to FY2001 was selected because this is the time period over which complete fishing years are covered by VTR records. Between FY1995 and FY2001, there were approximately 1,300 vessels that reported landings of small mesh multispecies in at least one year, but there were only 200 vessels (24 large, 75 medium, and 101 small) that landed small mesh multispecies in every year. Thus, even though the number of participating vessels has been stable over time,

inter-annual changes in the number of vessels that remain in the fishery, i.e., “new” entrants and vessels that “exit” the fishery, have been significant.

Table 35 Number of Vessels Landing Small Mesh Multispecies 1995-2002 (VTR)

	Large Vessels	Medium Vessels	Small Vessels	Total
FY1995	57	174	417	648
FY1996	54	177	445	676
FY1997	55	187	431	673
FY1998	75	187	415	677
FY1999	59	163	409	631
FY2000	66	172	408	646
FY2001*	55	156	356	567

**Data for fishing year 2001 are incomplete.*

For purposes of analysis, entry and exit patterns were estimated on an annual basis. This means that an entrant is defined as any vessel that fished in a given year and did not fish in the previous year. An exiting vessel is defined as any vessel that fished in a given year and does not fish during the subsequent year. Remaining vessels are defined as being vessels that fished in both the given year and the previous year. In this manner, any given vessel could be classified as an entrant or an exiting vessel on more than one occasion during the period of analysis. Entry rates are calculated as the number of new entrants in a given year divided by the total number of participating vessels in that year. Similarly, exit rates are calculated as the number of exiting vessels in a given year divided by the total number of participating vessels in that year. The net change is the difference between the entry and exit rate where a positive difference means that the proportion of entrants was greater than the proportion of exiting vessels and vice versa.

Exit rates for the small mesh multispecies fishery as a whole have exceeded entry rates in every year from FY1998 to FY2000 by an average of 3.4% (Table 36). Both entry and exit rates were 25% or greater in every year, meaning that less than one half of the small mesh multispecies fleet participants in any given year participated in the fishery for two consecutive years.

Entry and exit patterns differ among vessels of different sizes. For example, contrary to the fleet-wide trend, numbers of small vessel entrants has exceeded exiting vessels in every year since FY1996, with the largest net change of 9.1% occurring in FY2000. Turnover in terms of numbers of vessels fishing for at least two consecutive years is higher for small vessels than the fleet average. The opposite is true for medium vessels. About 60% of participating medium vessels fished in at least two consecutive years. The rate of new entrants exceeded that of exiting vessels until FY2000 for large vessels. In FY1999, the proportion of exiting large vessels exceeded entering vessels by almost 14%. This was the largest single year reduction for any vessel size class or year and corresponds with implementation of Amendment 12 in the following year (i.e., a comparatively higher proportion of vessels that fished in FY1999 did not fish in FY2000).

Table 36 Small Mesh Multispecies Entry and Exit Rates Across Vessel Size Classes

All Vessels	Remain in Fishery	Entry	Exit	Total	Entry Rate	Exit Rate	Net Change
FY1995	648	0	172	648			
FY1996	278	200	198	676	29.6%	-29.3%	0.3%
FY1997	302	195	176	673	29.0%	-26.2%	2.8%
FY1998	288	180	209	677	26.6%	-30.9%	-4.3%
FY1999	292	163	176	631	25.8%	-27.9%	-2.1%
FY2000	239	191	216	646	29.6%	-33.4%	-3.9%
FY2001	430	137		567			-3.4%
Large Vessels	Remain in Fishery	Entry	Exit	Total	Entry Rate	Exit Rate	Net Change
FY1995	57	0	16	57			
FY1996	28	13	13	54	24.1%	-24.1%	0.0%
FY1997	32	14	9	55	25.5%	-16.4%	9.1%
FY1998	23	29	23	75	38.7%	-30.7%	8.0%
FY1999	37	7	15	59	11.9%	-25.4%	-13.6%
FY2000	22	22	22	66	33.3%	-33.3%	0.0%
FY2001	44	11		55			
Medium Vessels	Remain in Fishery	Entry	Exit	Total	Entry Rate	Exit Rate	Net Change
FY1995	174	0	36	174			
FY1996	106	39	32	177	22.0%	-18.1%	4.0%
FY1997	110	42	35	187	22.5%	-18.7%	3.7%
FY1998	99	35	53	187	18.7%	-28.3%	-9.6%
FY1999	103	29	31	163	17.8%	-19.0%	-1.2%
FY2000	83	40	49	172	23.3%	-28.5%	-5.2%
FY2001	125	31		156			
Small Vessels	Remain in Fishery	Entry	Exit	Total	Entry Rate	Exit Rate	Net Change
FY1995	417		120	417			
FY1996	158	148	139	445	33.3%	-31.2%	2.0%
FY1997	162	153	116	431	35.5%	-26.9%	8.6%
FY1998	156	132	127	415	31.8%	-30.6%	1.2%
FY1999	147	133	129	409	32.5%	-31.5%	1.0%
FY2000	185	130	93	408	31.9%	-22.8%	9.1%
FY2001	211	145		356			

*Small vessels are <60 feet, medium vessels are 60-80 feet, and large vessels are >80 feet.
Data for FY2001 are preliminary.*

The proportion of exiting small mesh multispecies vessels exceeded entering vessels in every year except FY2000 in the northern stock area (Table 37). Over this time period, about 70% of all vessels landing small mesh multispecies from the northern stock area were either new entrants or exited the fishery in the same year, leaving only 30% of vessels that fished in at least two consecutive years. In the southern stock area, entry rates exceeded exit rates in FY1996 and FY1997, but the reverse has occurred in every year thereafter. Compared to the northern stock area, a larger proportion (about 40%) of vessels from the southern stock area have landed small mesh multispecies in at least two consecutive years.

Table 37 Small Mesh Multispecies Entry and Exit Rates by Stock Area

Northern Stock Area	Remain in Fishery	Entry	Exit	Total	Entry Rate	Exit Rate	Net Change
1995	349		110	349			
1996	89	141	150	380	37.1%	-39.5%	-2.4%
1997	115	107	115	337	31.8%	-34.1%	-2.4%
1998	82	131	140	353	37.1%	-39.7%	-2.5%
1999	98	103	115	316	32.6%	-36.4%	-3.8%
2000	82	128	119	329	38.9%	-36.2%	2.7%
2001	210	112		322			
Southern Stock Area	Remain in Fishery	Entry	Exit	Total	Entry Rate	Exit Rate	Net Change
1995	330		88	330			
1996	163	97	79	339	28.6%	-23.3%	5.3%
1997	158	126	102	386	32.6%	-26.4%	6.2%
1998	185	90	99	374	24.1%	-26.5%	-2.4%
1999	169	96	106	371	25.9%	-28.6%	-2.7%
2000	139	92	126	357	25.8%	-35.3%	-9.5%
2001	331	63		394			

Data for FY2001 are preliminary.

Entry and exit patterns were also examined for vessels that depend more on small mesh multispecies (Table 38). The total number of vessels that relied on small mesh multispecies for at least 25% of their total fishing year landings has declined in every year since FY1996 (Table 38). In FY1996, 106 vessels had total landings of at least 25% small mesh multispecies. Of these 106 vessels, 11 also had at least 25% landings in FY1995. Forty nine (49) of these vessels landed 25% or more small mesh multispecies in FY1996 but did not in FY1995, while 46 landed 25% or more in FY1996 but did not in FY1997. Note that in this context (Table 38), an exiting vessel is defined as one that did not continue to rely on small mesh multispecies for 25% or more of its total landings, but this does not necessarily mean that the exiting vessel did not participate in the small mesh multispecies fishery at all. Compared to the industry as a whole (see previous tables), entry and exit rates were greater for vessels with reliance on small mesh multispecies for 25% or more of total landings. In any given year, less than 20% of all vessels had 25% reliance

on small mesh multispecies in two consecutive years. In FY1999, there were no vessels with 25% or more reliance on small mesh multispecies for both FY1999 and FY1998.

Table 38 Entry and Exit Rates for Vessels With 25% or Greater Small Mesh Multispecies Landings

Fishing Year	Remain in Fishery	Entry	Exit	Total	Entry Rate	Exit Rate	Net Difference
1995			31	88			
1996	11	49	46	106	46.2%	-43.4%	2.8%
1997	18	31	42	91	34.1%	-46.2%	-12.1%
1998	4	30	45	79	38.0%	-57.0%	-19.0%
1999	0	35	36	69	50.7%	-52.2%	-1.4%
2000	13	16	20	49	32.7%	-40.8%	-8.2%
2001				56			

Data for fishing year 2001 are preliminary.

3.1.4.2 Mid-Atlantic Fishery Regulations

Indirect effects of Mid-Atlantic Council (MAFMC) management actions on the whiting fishery (including red hake, silver hake, and offshore hake) were evaluated by looking for re-direction of participant effort from Mid-Atlantic fisheries to the whiting fishery following MAFMC actions. In order to construct a realistic list of MAFMC actions to be evaluated, NMFS commercial landings data for calendar year 2001 were used to identify the relative importance of Mid-Atlantic species to whiting fishery participants.

A total of 484 unique vessels were reported to have landed whiting in calendar year 2001. These vessels were categorized into one of nine “whiting landings classes” according to the total weight (lbs) of whiting landings per vessel in 2001 (1000-5000 lbs; 5000-10,000 lbs; 10,000-25,000 lbs; 25,000-50,000 lbs; 50,000-100,000 lbs; 100,000-250,000 lbs; 250,000-500,000 lbs; 500,000-1,000,000 lbs; 1,000,000+ lbs). Total 2001 landings (lbs) of MAFMC-managed species (bluefish, spiny dogfish, summer flounder, scup, black sea bass, Atlantic herring, monkfish, surf clams, ocean quahogs, golden tilefish, Loligo and Illex squid, Atlantic mackerel, and butterfish) by vessels in each landings class were then tabulated. The ratio of median, per-vessel mid-Atlantic landings to whiting landings identified the relative importance of these species to whiting fishery participants (Table 39). The count of vessels landing both whiting and Mid-Atlantic species was also calculated for each landings class (Table 40). Note that among Mid-Atlantic species, monkfish and Loligo squid stand out as consistently important (median landings per vessel > 10% of median whiting landings per vessel). Additionally, while the relative importance of Loligo squid to whiting fishery participants is greatest for vessels landing greater than 250,000 lbs of whiting, the relative importance of monkfish appears to be inversely related to whiting landings per vessel.

Table 39 Median Landings (lbs) of Mid-Atlantic-Managed Species in 2001 as a Percent of Whiting Landings for Each Whiting Landings Class

Whiting Landings Class (lbs)	1,000,000+	500,000 - 1,000,000	250,000 - 500,000	100,000 - 250,000	50,000 - 100,000	25,000 - 50,000	10,000 - 25,000	5,000 - 10,000	1,000 - 5,000
# Vessels	4	15	14	53	58	71	75	50	144
Bluefish	0.2%	0.6%	1.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%
Clam, Surf	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dogfish, Spiny	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Flounder, Summer	0.6%	3.0%	3.5%	0.7%	0.1%	0.0%	0.0%	0.0%	0.0%
Herring, Atlantic	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Mackerel, Atlantic	0.1%	0.4%	0.4%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%
Monkfish	5.5%	4.9%	12.5%	22.9%	85.9%	153.4%	232.9%	318.9%	587.9%
Quahog, Ocean	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Scup	0.0%	0.7%	2.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Sea Bass, Black	0.1%	1.0%	1.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Squid, Illex	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Squid, Loligo	26.0%	31.0%	42.4%	8.5%	0.0%	0.0%	0.0%	0.0%	0.0%
Tilefish, Golden	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Whiting	1,406,098	646,502	386,734	133,783	73,447	34,854	16,217	7,179	2,009

“Whiting landings class” groups vessels by total 2001 whiting landings (lbs) reported for each vessel.

Shaded cells indicates median catch of a given species is >10 % of median whiting catch.

Median whiting landings within each class are provided on the bottom row of the table.

Table 40 Number of Vessels in 2001 Within Each Whiting Landings Class That Also Landed Mid-Atlantic Managed Species

Whiting Landings Class (lbs)	1,000,000+	500,000 - 1,000,000	250,000 - 500,000	100,000 - 250,000	50,000 - 100,000	25,000 - 50,000	10,000 - 25,000	5,000 - 10,000	1,000 - 5,000
# Vessels	4	15	14	53	58	71	75	50	144
Bluefish	1 = N = 3	15	12	27	27	30	24	20	74
Clam, Surf	0	0	0	0	1 = N = 3	0	1 = N = 3	0	0
Dogfish, Spiny	1 = N = 3	6	1 = N = 3	17	8	15	12	10	58
Flounder, Summer	4	14	12	33	29	27	30	17	50
Herring, Atlantic	1 = N = 3	6	4	7	7	7	7	0	8
Mackerel, Atlantic	1 = N = 3	15	13	37	37	29	31	18	47
Monkfish	4	15	14	53	58	71	74	50	137
Quahog, Ocean	0	0	0	0	0	0	0	0	0
Scup	1 = N = 3	15	12	25	24	20	22	14	39
Sea Bass, Black	4	14	12	26	27	21	26	13	42
Squid, Illex	0	1 = N = 3	0	1 = N = 3	1 = N = 3	1 = N = 3	4	0	4
Squid, Loligo	4	14	13	31	28	23	28	15	40
Tilefish, Golden	1 = N = 3	5	1 = N = 3	6	5	4	1 = N = 3	0	8
Whiting	4	15	14	53	58	71	75	50	144

“Whiting landings class” groups vessels by total 2001 whiting landings (lbs) reported for each vessel. Shaded cells indicates median catch of a given species is >10 % of median whiting catch (see Table 39). Cells corresponding to 1-3 vessels are indicated as “1 = N = 3” in order to ensure confidentiality.

Quantitative analysis of the indirect effects of MAFMC management on the whiting fishery was initially considered for both Loligo squid and monkfish due to their relative importance (Table 39). The relative complexity, however, of the monkfish management system as well as the fact that monkfish and whiting are harvested with different gear types eliminated monkfish management actions from evaluation. Loligo squid, on the other hand, which are harvested with the same gear as whiting and are managed under a simple, quota-based system allowed for a more straightforward evaluation of whiting fishery responses.

A closure of the Loligo squid fishery occurred from 29May-01Jul 2001 (66 FR 29238), essentially for the month of June 2001. In order for this action to have indirectly affected the whiting fishery, either directed whiting trips (whiting were >25% of total trip landings) or overall whiting landings (or both) should have changed in June 2001 relative to the time immediately before the action (for example, the month of May). Whiting landings and trips were tabulated for May and June from 1994 – 2001 in order to determine whether the proportions in May and June 2001 were atypical. Separate comparisons were done for vessels in the over 250,000lb per year whiting landings class and for all vessels landings whiting.

Compared to the 1994-2000 average, the proportion of directed whiting *trips* in June vs. May 2001 decreased both for vessels landing over 250,000lb per year and for all vessels combined (Table 41). The proportion of directed trips in June, however, is quite variable (range 77% in 1994 to 40% in 1999). It is unclear whether the proportional trips in 2001 reflect a response to the Loligo closure. Vessels that typically harvest both whiting and Loligo squid in the same trip may have suspended effort until they were free to harvest both species again; however, the data were not tested for support of this explanation.

Whiting *landings* in May and June 2001 were consistent with the 1994-2000 average (Table 42). This suggests that the ability of the fleet to harvest whiting was not reduced by the Loligo closure, and, in fact, results in increased landings per vessel per trip, on average.

Table 41 Proportional Distribution of Directed Whiting Trips in May and June from 1994-2001 for Vessels in the Over 250,000 lb per year Whiting Class (left) and for All Vessels Landing Whiting (right)

Whiting Landings Over 250,000 lb per year			All Vessels		
Year	May	June	Year	May	June
1994	23%	77%	1994	48%	52%
1995	51%	49%	1995	55%	45%
1996	55%	45%	1996	51%	49%
1997	62%	38%	1997	58%	42%
1998	44%	56%	1998	49%	51%
1999	60%	40%	1999	61%	39%
2000	45%	55%	2000	50%	50%
2001	57%	43%	2001	59%	41%
Avg. 94-00	49%	51%	Avg. 94-00	53%	47%

Table 42 Proportional Distribution of Whiting Landings in May and June from 1994-2001 for Vessels in the Over 250,000 lb per year Whiting Class (left) and for All Vessels Landing Whiting (right)

Whiting Landings Over 250,000 lb per year			All Vessels		
Year	May	June	Year	May	June
1994	32%	68%	1994	46%	54%
1995	34%	66%	1995	49%	51%
1996	55%	45%	1996	50%	50%
1997	57%	43%	1997	51%	49%
1998	37%	63%	1998	43%	57%
1999	54%	46%	1999	53%	47%
2000	50%	50%	2000	48%	52%
2001	46%	54%	2001	49%	51%
Avg. 94-00	46%	54%	Avg. 94-00	49%	51%

Fisheries data were also examined to identify effects of scup Gear Restricted Areas (GRAs) on the whiting fishery. Two gear-restricted areas (Southern GRA: 1Jan – 30Apr; Northern GRA: 1Nov – 31Dec) were established that went into effect Nov 1, 2000 (65 FR 33486). The percent of total annual catch taken within GRA time/area specifications (**pGRA**) was calculated from vessel trip report (VTR) data for 1996 – 2001. This was done to compare catch in areas affected by GRAs before and after the GRAs went into effect. A noticeable downward shift in catch coming from areas where compliance requires modification of gear would suggest that compliance is driving effort away from the affected area. Because the GRAs are seasonal, the Southern (Jan-Apr) and Northern (Nov-Dec) areas were examined separately. Although GRAs have been in effect since November 2000, VTR data for 2002 are not yet available. Therefore, for the Southern GRA, only the 2001 catch was compared to previous years catch, and for the Northern GRA, the 2000 and 2001 catch was compared to previous years.

Landings by the whiting fishery were highest in the Northern GRA; however, pGRA was quite low overall (range: 0.01% -1.09%; Table 43). For the Southern GRA, increased pGRA occurred in 2000 relative to previous years. The most noticeable decrease in pGRA in the time series occurred between 1998 and 1999, before the first GRA rule went into effect (Nov 2000). Whiting catch in the Northern GRA was consistently higher than in the Southern GRA, suggesting that the Northern GRA is historically more important to this fishery than the Southern GRA. Although a downward shift in pGRA is present in the whiting time series from 2000 to 2001 (0.26% to 0.06%; Table 5), pGRA throughout the time series is marginal. The absence of a significant negative shift in pGRA suggests that the establishment of the scup GRAs has little effect on the whiting fishery with regard to harvest in the affected areas.

Table 43 VTR-Reported Landings of Whiting from 1996 - 2001 in the Southern and Northern GRAs and for the Entire Year

GRA	Year	VTR landings (lbs)	pGRA
Southern 1Jan – 30Apr	1996	54,379	0.12%
	1997	126,659	0.30%
	1998	83,928	0.20%
	1999	2,159	0.01%
	2000	3,706	0.01%
	2001	67,779	0.18%
	Year	VTR landings (lbs)	pGRA
Northern Nov-Dec	1996	14,405	0.03%
	1997	414,321	0.98%
	1998	447,581	1.09%
	1999	60,425	0.15%
	2000	94,586	0.26%
	2001	22,742	0.06%
	Year	VTR landings (lbs)	
Entire Year	1996	45,573,249	
	1997	42,277,732	
	1998	41,209,309	
	1999	40,349,698	
	2000	36,937,927	
	2001	37,894,872	

3.1.4.3 Status of the Canadian Whiting Fishery – Scotian Shelf Silver Hake

This information was obtained from the most recent stock status update for Scotian Shelf silver hake, provided by the Canadian Department of Fisheries and Oceans (DFO). A reference for the stock status document can be found in Section 6.0.

Scotian Shelf silver hake are generally found between 7 and 10°C, in deeper water on the shelf edge and in the Emerald and LaHave Basins. Seasonal movements occur during the summertime, as silver hake move into shallow water on Sable and Western Banks to spawn.

Prior to 1977, fishing on the Scotian Shelf was unrestricted in terms of area, mesh size, and season. During this period, fishing was conducted over the entire shelf, and use of trawl mesh as small as 40 mm (1.6-inches) was common. In 1977, fishing for whiting was restricted to the seaward side of the Small Mesh Gear Line (SMGL), west of 60°W longitude, with a minimum mesh for the offshore fishery of 60 mm (2.4-inches). In 1994, further restrictions were introduced to minimize the incidental catch of groundfish in the whiting fishery. These included a repositioning of the SMGL to prevent fishing in depths less than 190m and the mandatory use of a separator grate in the lengthening piece of the trawl. Since 1995, a fishery has been

conducted by Canadian tonnage class 3 vessels (<65 feet) in and around Emerald and LaHave Basins (inshore).

Landings of Scotian Shelf silver hake for the 2000 fishing year (April 1 – March 31) were 12,900 tons.

Table 44 summarizes the current status of the Scotian Shelf silver hake resource based on “attributes” evaluated by DFO scientists. Attributes include abundance and biomass from research surveys, measures of recruitment and stock condition, indices of length-at-age and length at 50% maturity, etc.

Table 44 DFO Evaluation of the Status of Scotian Shelf Silver Hake

ATTRIBUTE	RECENT TREND	CURRENT STATUS
Biomass (survey age 1+, 1997-2001)	Increasing slightly since 1999	At low level
Recruitment (survey age 1, 1979-2001)	None	1999 year class above average, 2000 year class below average
Total Mortality (survey ages 2-4, 1983-1999)	Increasing since 1995	F is above $F_{0.1}$ if $M=0.4$
Condition (1970-2001)	Declining since 1995	Low relative to long-term average
Length at Age (1971-2000)	Stable	Low relative to long-term average
Length at Maturity (1970-2001)	Stable	Low relative to long-term average
Resource Concentration (1970-2001)	Increasing	Widely distributed
Area Occupied (1970-2001)	Stable	Widely distributed

Overall, survey biomass remains low and total mortality on this stock remains high. Some indicators like condition, length at age, and size at maturity also raise concerns. DFO recommends no increase in catches of Scotian Shelf silver hake above 1997-1999 levels.

3.2 TRENDS IN THE RECREATIONAL FISHERY

Table 45 presents recent trends in the recreational harvest of silver hake and red hake in the northeast region. The recreational harvest of whiting and red hake remains at relatively low levels, although the catch of red hake appear to have increased in recent years according to the Marine Recreational Fishing Statistics Survey (MRFSS). Recreational harvest includes both fish that are brought back to the dock by recreational anglers (landings) and those that are released dead, filleted, or used for bait (A+B1 catch). It is reported in numbers of fish because weights from the MRFSS are generally less reliable.

Table 45 Trends in the Recreational Fishery for Silver Hake (Whiting) and Red Hake (Ling) from the Marine Recreational Fishing Statistics Survey

Calendar Year	Red Hake (Numbers of Fish)	Silver Hake (Numbers of Fish)
1990	9,956	38
1991	5,232	2,242
1992	1,920	0
1993	2,357	1,220
1994	5,464	254
1995	3,047	53,918
1996	10,503	2,826
1997	2,067	237
1998	2,537	748
1999	1,891	1,258
2000	4,306	908
2001	6,515	723

3.3 SOCIAL FACTORS

There are no social factors to update in this SAFE Report. Amendment 13 to the Northeast Multispecies FMP is under development and will include updated information about many of the ports and communities involved in small mesh multispecies fisheries.

3.4 ECOLOGICAL FACTORS

The following was noted in last year's SAFE Report:

Silver hake are an important component of the northeast continental shelf food web. Silver hake diet primarily consists of shrimp, small fish, and other hakes (Garrison and Link 2000a,b). Smaller silver hake feed intensively on euphausiids. Silver hake undergo an ontogenetic shift to increased piscivory (Garrison and Link 2000b,c). Fish has been a consistent component of silver hake diet through time, although fish consumption by silver hake was relatively lower in the 1980s. There has been a shift in diet in recent years from sand lance to herring (Pers. comm. Jason Link, NEFSC, unpublished

data). Silver hake exhibit a higher frequency of cannibalism than other gadids in the northwest Atlantic, with medium-sized adults (age-2 and age-3) preying heavily upon age-0 and age-1 juveniles (Pers. comm., Jason Link, NEFSC and unpublished data). Predation by silver hake on groundfish is also substantial and may be on the order of 100 kt per year (Overholtz et al. 1999, Overholtz et al. 2000).

Recent updates to Bigelow and Schroeder's *Fishes of the Gulf of Maine* notes the following ecological considerations, among others, for small mesh multispecies:

- Silver hake are crustacean/fish predators with a size-dependent shift in predation from crustaceans to fishes at about 20-25 cm. When silver hake reach about 20 cm, they begin to depend more on fishes and squid for food, which together make up about 80% of their diet. Cannibalism is common, especially in the Mid-Atlantic area.
- From the point of view of total food consumption, silver hake represent one of the most important predators in the Mid-Atlantic Bight.
- Examination of stomach contents of 1,482 red hake shows crustaceans to be the major component of the diet (63.3% by weight) followed by fishes (21.4%). The most important prey of 681 red hake trawled in the Gulf of Maine were euphausiids, pandalid shrimps, haddock, and silver hake.

3.4.1 Habitat

There is no new habitat information to update in this SAFE Report.

3.4.2 Threatened, Endangered, and Other Protected Species

Volume I, Section E.7.2.4 of Amendment 12 to the Northeast Multispecies Fishery Management Plan (whiting, red hake and offshore hake) described the threatened and endangered species and other marine mammals that inhabit the whiting management unit and discussed their potential interaction with the fishery, as well as the impacts of the whiting management measures. The impacts of the most recent changes to the management measures for whiting were discussed in Framework Adjustments 32 and 35.

The status of the relevant marine mammal stocks was updated in the sixth of the series, *U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments - 2001* (Waring et al. 2001). The report contains updated assessments for Atlantic strategic stocks and also includes those Atlantic stocks for which significant new information was available. A strategic stock is one listed as threatened or endangered under the Endangered Species Act, designated as depleted under the Marine Mammal Protection Act, or for which human-caused mortality and serious injury exceed the potential biological removal (PBR) level calculated for the stock. The report lists PBR levels and also constitutes the most recent information on marine mammal fishery-related serious injury and mortality for fisheries managed by the Council, including the whiting fishery.

Information on sea turtle status can be found in a number of published documents, including

several sea turtle status reviews (NMFS and USFWS 1995; Turtle Expert Working Group (TEWG), 1998, 2000) and biological reports (USFWS 1997), as well as recovery plans for the Kemp's ridley (USFWS and NMFS 1992a), leatherback (NMFS and USFWS 1992b), Atlantic green (NMFS and USFWS 1998), and loggerhead sea turtles (NMFS and USFWS 1998).

In June 2001, NMFS issued a Biological Opinion for the Northeast Multispecies, FMP that additionally provided relatively current information. According to the Opinion, the best available information indicates there have been no observed takes of sea turtles in the multispecies (whiting) fishery, although the document notes the potential for interactions exists.

These updated resources do not indicate any new or significant interactions between the whiting fishery and any threatened, endangered or other protected species.

4.0 WMC CONCLUSIONS AND RECOMMENDATIONS

4.1 STOCK STATUS RELATIVE TO AMENDMENT 12

Overall, the status of the small mesh multispecies resources has improved since the implementation of Amendment 12 at the beginning of the 2000 fishing year. None of the five stocks of small mesh multispecies are considered to be in an overfished condition at this time according to their current overfishing definitions. Based on available information, overfishing does not appear to be occurring on any of the small mesh multispecies stocks (relative exploitation indices were examined for whiting stocks because reliable fishing mortality estimates are not available). The WMC notes concern about trends in the autumn survey biomass index and mean fish weight for the southern stock of red hake. A benchmark assessment for red hake is needed to thoroughly evaluate the status of this stock.

4.1.1 Gulf of Maine/Northern Georges Bank Silver Hake

The northern stock of whiting (as well as the northern stock of red hake) is considered to be "rebuilt," or above its target biomass level according to the Amendment 12 overfishing definition. The relative exploitation of northern whiting is far below the target value that the WMC set as a proxy for F_{MSY} , so overfishing is not thought to be occurring (see Table 19, p.31). The current relative exploitation index is only 11% of the Whiting Monitoring Committee's F_{MSY} proxy. With respect to management thresholds, targets, and biological objectives, exploitation of the northern stock of whiting could increase. **The Whiting Monitoring Committee concludes, therefore, that the Year 4 default measure is not necessary to further reduce effort on the northern stock of whiting.**

As discussed in Section 3.1.4.1, concerns still exist about potential shifts of effort into the whiting fishery, especially as a result of increasing restrictions in the groundfish fishery. Concerns about shifts of effort into the northern area are not as significant as concerns about the southern area because of the already restricted nature of whiting fishing in the northern area. Fishing for whiting is only allowed in small, seasonal exempted fisheries that have documented a bycatch of large-mesh groundfish that is less than 5%. In addition, observations from the

industry and very stable levels of landings for two decades suggest that whiting market conditions will likely continue to limit some effort in the fishery. **Because of the healthy condition of the resource, the Whiting Monitoring Committee believes that some increased effort can be absorbed in the northern area.**

Increases in exploitation of the northern stock of whiting should proceed with caution. Relative exploitation indices should not increase above the F_{MSY} proxy level. Since the current relative exploitation index of 0.29 is far below the F_{MSY} proxy level of 2.57, there is certainly opportunity for additional whiting fishing in the northern area. **If there are data to support new exempted fisheries for whiting in the northern area (certified as having less than 5% groundfish bycatch), then the WMC recommends consideration of such fisheries in the upcoming framework adjustment for small mesh multispecies (see Section 4.4).**

4.1.2 Southern Georges Bank/Mid-Atlantic Silver Hake

The southern stock of whiting is not considered to be in an overfished condition according to the Amendment 12 overfishing definition. The three-year moving average of the trawl survey increased from 0.63 in 1998 to 1.27 in 2001. Currently, the stock is at 71% of its biomass target. The relative exploitation of southern whiting is below the target value that the WMC set as a proxy for a target fishing mortality rate (see Table 19, p.31), so overfishing is not thought to be occurring on the southern stock. The current relative exploitation index is 47% of the WMC's target for this stock.

While the information that the WMC evaluated suggests that exploitation could increase in the southern area, this stock has not yet rebuilt to its target level, so increases are not recommended. Perceptions about the current biomass status of the southern stock hinge on a very high autumn 2001 survey value, which increased the three-year moving average above the overfishing definition biomass threshold. It is too early to conclude whether the high survey value in autumn 2001 is a product of survey variability or a true indication of increasing biomass in the southern area. Several additional survey points will be necessary to make such a determination. **In light of this uncertainty, the Whiting Monitoring Committee does not support increasing whiting exploitation in the southern area.**

In addition, trends in survey biomass and mean fish weight for the southern stock of red hake are of concern. Even though southern red hake is not overfished, the WMC recommends that the Council be precautionary and not increase effort on this stock until a benchmark stock assessment can be completed to thoroughly review its status, especially considering the problems associated with the current overfishing definition for southern red hake.

Although the Whiting Monitoring Committee does not support increasing exploitation in the southern area, the Committee agrees that the Year 4 default measure is not necessary to further reduce effort. The language from Amendment 12 states that the default measure is to be applied on a stock-specific basis and implemented at the beginning of Year 4 if the plan is not meeting its objectives, as determined in the third year review by the Whiting Monitoring Committee. In this review, the Whiting Monitoring Committee has determined that the fishing

mortality objectives of Amendment 12 appear to have been achieved, based on the evaluation of relative exploitation indices as a proxy for fishing mortality (see Section 2.5).

The Year 4 default measure was predicted to have significant negative economic impacts on many fisheries and ports in the Southern New England and Mid-Atlantic regions (see Amendment 12). Given the current status of the southern stock of whiting relative to the Amendment 12 objectives and the potential negative impacts of Amendment 13 (groundfish), the WMC does not support implementing the default measure. **To ensure that the stock will rebuild to its biomass target, however, the Whiting Monitoring Committee recommends maintaining exploitation on this stock as close to current levels as possible.**

See Section 4.4 for a discussion of the WMC's recommendations relative to the southern stock of whiting for the upcoming framework adjustment for small mesh multispecies.

4.2 FISHERY STATUS AND EFFECTIVENESS OF REGULATIONS

The biological impacts of the Amendment 12 management measures (mesh sizes and possession limits) are unclear. Landings of whiting decreased in 2000 and 2001 when the management measures became effective, but the trend in landings was downward for several years prior. It is difficult to predict what landings would have been without the mesh regulations and possession limits. Silver hake stock abundance has recently increased in the southern area and has remained high in the northern area. The trend in abundance in the northern area was upward for many years prior to the implementation of Amendment 12, and uncertainty exists regarding the increases recently observed in the southern stock. Therefore, it is difficult to predict how stock abundance would have changed without the mesh regulations and possession limits.

While the biological impacts are unclear, the Amendment 12 management measures, especially the possession limits, appear to have had some distributional impacts and may have affected entry and exit patterns in the fishery. Large vessels in particular appear to have been most affected by the possession limits, as exhibited through shifts in fishing patterns and entry/exit patterns in the fishery (Sections 3.1.2.3 and 3.1.4.1 respectively). However, only two fishing years of data exist under Amendment 12, so it is difficult to measure the specific impacts of the management measures. These trends should be monitored and more closely evaluated in the next amendment for small mesh multispecies.

4.3 AMENDMENT ISSUES

This section describes the WMC's recommendations for consideration in an amendment to the Northeast Multispecies FMP to address small mesh multispecies. Similar to last year's review, the WMC recommends that an amendment for small mesh multispecies be identified as a priority for the Council in the upcoming year. Timing is even more critical in order to address concerns about potential shifts of effort due to the impacts of increasing restrictions in the groundfish fishery. The WMC believes that addressing the issues identified in this section is essential to ensuring the long-term viability of the small mesh multispecies fisheries.

4.3.1 Overfishing Definitions

- **The Whiting Monitoring Committee recommends that all overfishing definitions for small mesh multispecies be revisited in the next amendment.**

In retrospect, the overfishing definitions for the small mesh multispecies stocks seem difficult to evaluate and appear to be of uncertain technical merit (Table 14 and Table 15, p. 21 and 22). The overfishing definitions for southern red hake and offshore hake are problematic. No fishing mortality reference points or proxies are included in these overfishing definitions, and the current biomass threshold reference points actually serve as a more appropriate metric for fishing mortality than biomass status. Both red hake and offshore hake are in need of a benchmark stock assessment so that more appropriate reference points can be developed.

The Whiting Monitoring Committee recommends that reconsideration of the small mesh multispecies overfishing definitions focus on consistency and establish criteria that can be evaluated even in the event that fishing mortality and biomass estimates are not available for these stocks. Evaluating the Amendment 12 objectives without any estimates of fishing mortality was a difficult obstacle for the WMC to overcome in this year's review. The WMC relied on the best available information for these stocks, which consists primarily of data from the autumn trawl survey and existing fishery data.

4.3.2 Stock Structure

4.3.2.1 Biological Issues

- **Similar to last year's review, the WMC has identified whiting stock structure and stock boundaries as fundamental biological issues that must be addressed.**

Stock identification and boundaries are biological issues that have important management consequences. The WMC is aware of conflicting opinions regarding biological stock boundaries for whiting. The traditionally accepted boundary is a straight line drawn over southern Georges Bank. However, it seems likely that whiting mix to a considerable degree across the biological boundary.

As noted in Section 2.1.3 of the 2001 SAFE Report, during SAW 32, the Northern Demersal Working Group modeled biomass dynamics based on two stocks and one combined stock and ultimately recommended that a combined silver hake analysis be used for management advice given the changes in spatial distribution of the resource and the potential misallocation of catches to the northern and southern components.

4.3.2.2 Management Issues

Related to the whiting stock structure issue is the inconsistency between the stock boundary used for assessment purposes and the stock boundary identified in Amendment 12 for management purposes. The current north/south stock boundary set by the Council for management purposes (if stock-specific management becomes necessary) is based on 70°, while the stock boundary used for assessment purposes is based on the dividing line between the Gulf of Maine/Georges

Bank Regulated Mesh Area. The Council's stock boundary was established based on differences between fisheries for small mesh multispecies in the northern and southern regions (east and west of 70°). While this may be an appropriate management boundary, it is not an appropriate boundary to use to evaluate the status of the northern and southern stocks because it is not consistent with the boundary used for stock assessment or trawl survey purposes. It should be noted that the WMC used the dividing line between the Gulf of Maine/Georges Bank Regulated Mesh Area to evaluate the status of the northern and southern stocks and to develop its recommendations in this SAFE Report. The WMC's approach is consistent with the stock assessment and the NEFSC trawl survey.

It should be acknowledged, however, that considerable mixing of whiting occurs on Georges Bank, and it is unclear whether the GOM/GB Regulated Mesh Area line is the true stock boundary if two stocks of whiting do exist. This highlights the uncertainties associated with whiting stock structure and the dynamic nature of the distribution of the whiting resource over time.

- **The WMC recommends that the stock identification line for management purposes be revisited in the next amendment for small mesh multispecies.** It may be more appropriate to establish consistency between the stock assessment line and the management line if a two-stock approach is maintained, especially if the biological status of the two stocks differs. If a one-stock approach is adopted, dividing management areas based on fisheries may be appropriate.

See Section 4.2.1.1 of the 2001 SAFE Report for a detailed discussion of issues related to whiting stock structure.

4.3.3 Limited Access/Control Date

- **The WMC has identified limited access as a high priority issue for small mesh multispecies and recommends that a limited access program be developed as soon as possible through an amendment to the Northeast Multispecies FMP.**
- **The Whiting Monitoring Committee recommends that the Council consider establishing a new control date for small mesh multispecies as soon as possible.**

Both of these recommendations are discussed in more detail below.

The Council submitted Amendment 12 with a limited access program for small mesh multispecies that ultimately was not implemented as part of the whiting management program. In combination with the market limitations of small mesh multispecies fisheries, the WMC believes that a limited access management program could provide necessary controls on effort in the fishery and exploitation of the small mesh multispecies resources at this time.

Because of biological concerns related to potential shifts of effort into the small mesh multispecies fisheries (see Section 3.1.4.1), a limited access program for these fisheries should be implemented as soon as possible. Uncertainties related to the improving biological status of southern whiting and the status of southern red hake lead the WMC to recommend that effort not

increase in the southern stock area. The WMC believes that a limited access program is an essential component of sustainability in the small mesh multispecies fisheries. Absent this action, stock condition in the southern area could rapidly be compromised.

Economic viability and the opportunity for current/historical participants to continue to fish for whiting as an alternative to groundfishing are also important reasons to implement a limited access program as soon as possible. Whiting markets are quite limited in terms of the amount of product they can support, so an influx of vessels into the fishery is likely to drive the price of whiting down, reducing profits for most vessels, including both historical participants and new entrants. Amendment 13 is scheduled for implementation in August 2003 and is likely to include additional restrictions for the groundfish fishery. Establishing a new control date for small mesh multispecies and utilizing it in a limited access program as soon as possible could help to discourage an influx of new participants in small mesh multispecies fisheries as a short-term response to Amendment 13 restrictions. This could prevent rapid stock declines and keep the fishery viable for historical participants, providing some of them with an alternative to groundfishing after the implementation of Amendment 13.

The Council established a control date for small mesh multispecies (and ocean pout) on September 9, 1996. This control date was intended to discourage new entry into the fisheries for these species during the Council's deliberations on Amendment 12 and development of a limited access program. A longer qualifying period for landings was chosen in Amendment 12, however, because whiting fishing in the northern area had been severely curtailed by groundfish restrictions in Amendment 5 (1994). It took several years after the implementation of Amendment 5 to develop experimental and exempted fisheries in the northern area that provided reasonable opportunities to fish for small mesh multispecies.

So much has changed, especially in the northern area, since the establishment of the 9/9/96 control date that the Whiting Monitoring Committee recommends consideration of a new control date for small mesh multispecies. Experimental and exempted fisheries for small mesh multispecies in the northern area have evolved in recent years through cooperative experimentation, gear research, and gear technology that significantly reduces bycatch of non-target species, especially regulated groundfish species. Establishing a new control date could allow for participants in the new exempted fisheries to be included in a limited access program. From a biological perspective, the northern stock should continue to support the effort in these relatively small, seasonal fisheries in the northern area.

The Whiting Monitoring Committee believes that establishing a limited access program for small mesh multispecies as soon as possible is a crucial and necessary step towards ensuring the long-term sustainability of this fishery and supports consideration of a new control date.

4.3.4 Future Management of the Fishery

While the biological impacts of the Amendment 12 management measures are unclear, the possession limits appear to have had some distributional impacts and may have affected entry and exit patterns in the fishery. Large vessels in particular appear to have been most affected

(see sections 3.1.2.3 and 3.1.4.1). Large vessels are the most dependent on small mesh multispecies and land almost 50% of all small mesh multispecies.

As discussed in the 2001 SAFE Report, there is a core fleet that consists of a small number of vessels that are catching the vast majority of small mesh multispecies. The Council may want to consider a management approach for small mesh multispecies that addresses the concerns, interests, and needs of the 50-200 vessels that represent the core fleet instead of maintaining a management approach tailored to the 700-800 vessels that may land small amounts of small mesh multispecies occasionally. Developing an amendment presents the opportunity to evaluate the current management approach to small mesh multispecies fisheries while incorporating all biological and economic considerations. Is there another approach that may produce clearer biological impacts and fewer unintended socioeconomic impacts? The WMC recommends that these issues be explored in the next amendment for small mesh multispecies as time permits.

4.4 SHORT-TERM ISSUES – RECOMMENDATIONS FOR FRAMEWORK 37

This section describes the WMC's recommendations for consideration in the upcoming framework adjustment to the Northeast Multispecies FMP to address small mesh multispecies. At the March 19-20, 2002 meeting, the Council passed the following motion:

That the Council initiate a framework process to develop a management strategy to replace the Year 4 management measures contained in the whiting plan and allow for potential development of new whiting fishing areas.

The WMC followed the Council's guidance and focused its recommendations for the framework adjustment based on the Council's March 2002 motion. As indicated in Section 4.0 of this document (p. 83), the WMC has concluded that the Year 4 default measure is not necessary in either the northern or southern stock area. The regulatory process requires the Council to take a framework action to eliminate the default measure in either area if it chooses to do so. Additional recommendations related to action for this framework are discussed in the subsections below.

4.4.1 Northern Stock Area

The WMC recommends cautious increases in exploitation in the northern stock area. The WMC recommends that the Council consider the following options in Framework 37:

I. Increase Opportunities in the Cultivator Shoal Whiting Fishery (CSWF)

The Cultivator Shoal Whiting Fishery is a seasonal exempted fishery in the northern area and is a directed whiting fishery with minimal bycatch of non-target species. Participants in the Cultivator Shoal Whiting Fishery use 3-inch mesh and are currently limited to 30,000 pounds of whiting.

A. Extend the season of the CSWF through October 31

Prior to Amendment 12, the season for the Cultivator Shoal Whiting Fishery was June 15 – October 31. Amendment 12 shortened the season to September 30. Data from both the experimental Cultivator Shoal Whiting Fishery in the late

1980s and the exempted Cultivator Shoal Whiting Fishery throughout the 1990s are available to support extension of the season. For example, in the 1989 experimental Cultivator Shoal Whiting Fishery, regulated species bycatch averaged 0.56% of the total catch during the month of October. More recent data show similar bycatch rates for regulated species. This measure could shift effort from the southern stock area to the northern stock area during the month of October.

B. Increase the trip limit in the CSWF

The WMC recommended consideration of this action last year as well. Increasing the trip limit in the Cultivator Shoal Whiting Fishery could increase yield from the highly productive northern stock of whiting. Some industry members have suggested that with a higher trip limit, vessels may make fewer trips to the Cultivator, reducing their costs and allowing them to spend less time at sea. Whiting market conditions are important to consider; increasing the trip limit too much could affect the market and reduce the price.

C. Eliminate or increase the red hake bycatch allowances in the CSWF

Currently, vessels participating in the Cultivator Shoal Whiting Fishery are limited in terms of the amount of northern red hake they can possess to 10% by weight of total catch on board. Other seasonal exempted fisheries in the northern area (raised footrope trawl fishery, Small Mesh Areas 1 and 2) do not have restrictions on red hake catches. It is likely that the market will continue to provide some limitations as it has in the past. In addition, this provision may cause discards, as whiting and red hake are often caught in combination with each other, and these can be high-volume fisheries.

II. Eliminate or increase the transfer at sea allowance for small mesh multispecies

Currently, vessels are allowed to transfer up to 500 pounds of combined small mesh multispecies at sea for use as bait. The transferring vessel is required to obtain a letter of authorization from the Regional Administrator and automatically receives a 500-pound deduction from its whiting possession limit on every trip, no matter whether or not the transfer occurs. The Council may want to consider the following:

A. Eliminate all restrictions on bait transfers of small mesh multispecies at sea

B. Increase the amount of small mesh multispecies that can be transferred at sea for bait and eliminate the corresponding deduction in the vessel's whiting possession limit on every trip

C. Increase the amount of small mesh multispecies that can be transferred at sea for bait and increase the corresponding deduction in the vessel's whiting possession limit on every trip (for example, 1,000 pounds with a 1,000-pound deduction)

III. Consider establishing new seasonal exempted fisheries for whiting in the northern area

If data exists to support the establishment of new exempted fisheries for whiting in the northern area, the WMC supports consideration of these fisheries in Framework 37. Exempted status is achieved in fisheries that have documented groundfish bycatch levels less than 5%.

4.4.2 Southern Stock Area

- I. The most critical element to ensure the continued rebuilding of the southern stock of whiting is to control the expansion of effort into small mesh fisheries in this region. Market limitations should help to control the expansion of effort into the whiting fishery to some degree. **While the WMC recommends the elimination of the default measure in Framework 37, it recommends establishment of a new control date and a limited access program for small mesh multispecies in an amendment as soon as possible. Limited access should be a high priority. The Whiting Monitoring Committee also recommends careful monitoring of effort in fisheries for small mesh multispecies in the southern area.**

- II. One issue that the WMC discussed for consideration in this framework adjustment is a mechanism to mitigate the differential impacts of the possession limits to some degree (see Section 3.1.2.3 for a discussion of differential impacts). Some larger vessels are experiencing difficulty profiting from fishing for whiting under the 30,000-pound possession limit. Operating costs (for example, fuel) have increased, and the general low price for whiting make it difficult for large vessels to prosecute these fisheries in some offshore areas. This segment of the industry is interested in taking fewer trips to catch the same amount of whiting, thereby reducing their operating expenses and increasing their profits. Industry representatives on the WMC believe that the larger vessels that fish offshore take two trips per week, approximately 3-4 days each, to catch 30,000 pounds of whiting. They could significantly reduce their expenses if they could take one trip per week for 60,000 pounds of whiting.

The intent of this measure would be to establish a “conservation-neutral” enrollment program that increases the possession limit for vessels targeting whiting using 3-inch mesh in offshore areas while limiting the number of trips these vessels are allowed to take to fish for whiting. This program would apply for vessels fishing in the southern stock area, east of 70°. For example:

- Vessels that enroll in this program to fish east of 70° in the southern stock area with 3-inch mesh would be required to enroll for a minimum of 30 days and would be limited to fishing only with three-inch mesh during this time period.
- Participants would be allowed to take one trip per week for 60,000 pounds of whiting in the southern area east of 70°.

It is likely that the number of participants in this kind of program would be very small because of the restrictive nature of the program, but they may be the large vessels that depend on whiting

most and have been most impacted from the possession limits. Proponents believe that this could alleviate some of the impacts of the Amendment 12 measures and provide a more viable opportunity for these vessels in the future. There may also be some indirect benefits of reducing the number of trips and the overall effort in this area. Opponents of this measure cite the sensitivity of whiting markets and the potential to drive the price of whiting down and affect many vessels with large volumes of product. These issues should be explored further if the Council decides to consider this measure in either Framework 37 or a future amendment for small mesh multispecies.

5.0 WHITING MONITORING COMMITTEE MEMBERSHIP

The Whiting Monitoring Committee includes:

1. Lori L. Steele, NEFMC Staff, Whiting PDT Chairman, WMC Co-Chairman
2. David Goethel, Hampton NH (industry representative), WMC Co-Chairman
3. Larry Jacobson, NEFSC Population Dynamics
4. Eric Thunberg, NEFSC Social Sciences
5. Dan McKiernan, MA Division of Marine Fisheries
6. Dan Schick, ME Department of Marine Resources
7. Marty Jaffe, NMFS Northeast Regional Office
8. Jim Armstrong, Mid-Atlantic Fishery Management Council staff
9. Gary Yerman, New London CT (industry representative)
10. Dan Farnham, Montauk, NY (industry representative)

Tom Swim from New London, CT also participated as an industry representative when Gary Yerman was not available.

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