NEW ENGLAND FISHERY MANAGEMENT COUNCIL

Small Mesh Multispecies Amendment:

Discussion Paper for Optimum Yield and TAC-Based Management

This document describes the range of alternatives under development for specifying optimum yield (OY) and considering management based on total allowable catches (TACs) in an upcoming amendment to address the management of small mesh multispecies (whiting, red hake, and offshore hake). Recommendations from the Whiting Plan Development Team (PDT) are included in this document for discussion purposes at the May 3, 2007 Pelagics (Whiting) Committee meeting.

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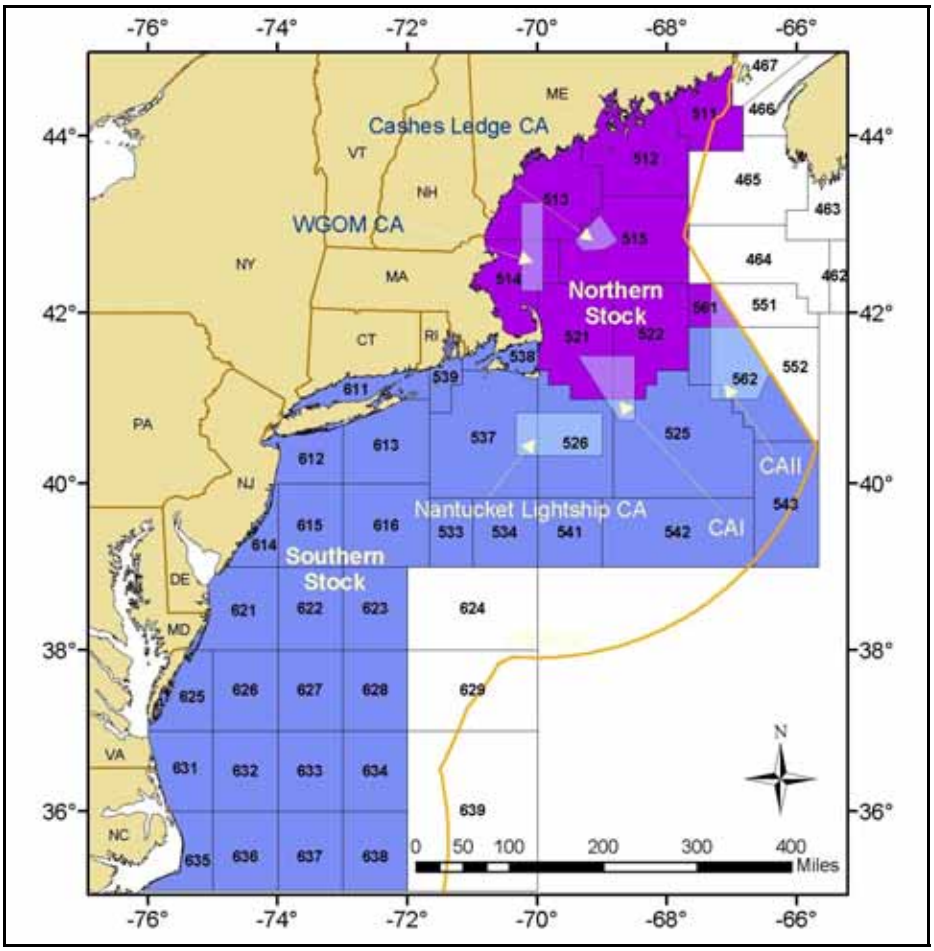
1.0 SMALL MESH MULTISPECIES MANAGEMENT AREAS

If OY and TACs are to be established for small mesh multispecies on a stock-specific basis, it will be important to establish management areas that are consistent with the whiting and red hake stock areas. To more effectively monitor TACs and manage the affected fisheries, the Whiting PDT recommends that the Council establish a "Northern Small Mesh Multispecies Management Area" and a "Southern Small Mesh Multispecies Management Area." These areas would facilitate the monitoring of catch quotas for each of the small mesh multispecies stocks. The Whiting PDT recommends that the Northern and Southern Areas be established based on the best available scientific information about small mesh multispecies stock delineation, illustrated in Figure 1. The management area boundaries proposed in Figure 1 also are consistent with the boundaries that have been utilized to separate small mesh multispecies landings by stock.

Figure 1 Proposed Management Areas for Small Mesh Multispecies (Northern and Southern Management Areas)



2.0 RECENT SMALL MESH MULTISPECIES LANDINGS

2.1 SILVER HAKE (WHITING) LANDINGS AND REVENUES

Table 1 presents annual silver hake landings and revenue by area from 1982-2006, updating Table 16 from the 2003 SAFE report. Landings and revenues are also reported for the Cultivator Shoals Whiting Fishery. For the Cultivator Shoals fishery, landings are those reported by participants on their vessel trip reports, while the revenues are calculated using these reported landings and the average annual price for silver hake from dealer reports.

Silver hake landings data from 1994-2006 that did not have a statistical area designation were assigned to the northern or southern stock by proration. Total catches, by market category, were allocated to stock based on a matched subset of trips between the dealer and VTR-logbook databases. Both databases were stratified by calendar quarter, port group and gear group to form a pool of observations from which proportion of catch, by stock, could be allocated to market category with the matched subset. The cross products of the market category by stock proportions derived from the matched subset were employed to compute the total catch by stock, market category, calendar quarter, port group, and gear group in the full dealer database.

Cultivator Shoals silver hake landings and revenue for the period 1981-1993 were calculated using dealer weighout data. For each year, the sum of silver hake landings from statistical area 522 and the revenue from those landings was calculated. Since the statistical area is not reported in dealer data after 1994, letter of authorization records and vessel trip reports were used to identify vessels participating in the Cultivator Shoals Whiting Fishery Exemption program and to calculate the silver hake landings of these vessels when fishing in the Cultivator Shoals Exemption Area. The revenue from these landings is then the reported landings from the vessel trip reports multiplied by the average price for silver hake in that year.

Total landings of silver hake rebounded slightly in 2003 and 2004 from the sharp decline experienced in 2002. However, landings decreased in both 2005 and 2006, and are now at the lowest level of the time series. Though average prices have increased slightly in recent years, revenues are also at the lowest level of the time series. Landings and revenues from the Cultivator Shoal Whiting Fishery are currently about 50% of the levels observed during the 1990s.

Table 1 Annual Silver Hake Landings and Revenues, 1982-2006*

Calendar Year	Northern Landings (mt)	Southern Landings (mt)	Total Landings (mt)	Total Revenue (million $)	Cultivator Shoals	
					Landings (mt)	Revenue (million $)
1982	4,660	14,560	19,220	8.6	1,166	0.5
1983	5,310	12,140	17,450	6.6	281	0.1
1984	8,290	13,140	21,430	6.5	765	0.2
1985	8,300	13,160	21,460	8.1	338	0.1
1986	8,500	10,120	18,620	8.6	503	0.2
1987	5,660	10,120	15,780	11.6	102	0.1
1988	6,770	9,200	15,970	8.5	2,466	1.3
1989	4,650	13,170	17,820	9.4	2,446	1.3
1990	6,380	13,620	20,000	11.1	2,975	1.7
1991	6,050	10,090	16,140	10.9	3,504	2.4
1992	5,300	10,290	15,590	10.5	2,995	2.0
1993	4,360	12,910	17,270	13.9	2,494	2.0
1994	5,720	10,330	16,050	13.7	1,317	1.1
1995	3,030	11,690	14,720	14.0	725	0.7
1996	3,200	13,000	16,200	13.6	1,635	1.4
1997	2,590	12,990	15,580	15.1	1,351	1.3
1998	2,260	12,700	14,960	13.3	1,195	1.1
1999	4,040	9,970	14,010	14.2	2,324	2.4
2000	2,420	9,760	12,180	11.5	1,076	1.0
2001	3,450	8,690	12,140	12.4	1,383	1.4
2002	2,840	5,150	7,990	7.5	1,449	1.4
2003	1,730	6,920	8,650	9.3	1,076	1.2
2004	560	7,890	8,450	10.3	449	0.5
2005	240	6,570	6,810	8.2	410	0.5
2006	580	4,260	4,840	6.1	544	0.7

**Landings from 1994 forward are preliminary and are based on a north/south area pro-ration program. These landings will be further investigated and re-calculated in the small mesh multispecies amendment (under development).*

2.2 RED HAKE LANDINGS AND REVENUES

Table 2 presents annual red hake landings and revenue by area from 1982-2006, updating Table 17 from the 2003 SAFE report. While landings increased slightly in 2006 from 2005 levels, they remain near the low point of the time series, with total revenue at its low point.

Red Hake landings data from 1994-2006 that did not have a statistical area designation were prorated to stock area based on the 1991-1993 average proportion of landings from the northern and southern stocks.

Cultivator Shoals silver hake landings and revenue for the period 1981-1993 were calculated using dealer weighout data. For each year, the sum of silver hake landings from statistical area 522 and the revenue from those landings was calculated. Since the statistical area is not reported in dealer data after 1994, letter of authorization records and vessel trip reports were used to identify vessels participating in the Cultivator Shoals Whiting Fishery Exemption program and to calculate the silver hake landings of these vessels when fishing in the Cultivator Shoals Exemption Area. The revenue from these landings is then the reported landings from the vessel trip reports multiplied by the average price for silver hake in that year.

Table 2 Annual Red Hake Landings and Revenues, 1982-2006

Calendar Year	Northern Landings (mt)	Southern Landings (mt)	Total Landings (mt)	Total Revenue (million $)	Cultivator Shoals	
					Landings (mt)	Revenue (million $)
1982	1,210	3,170	4,380	1.4	5	0.0016
1983	900	1,570	2,470	0.6	3	0.0007
1984	1,060	2,740	3,800	0.8	2	0.0004
1985	990	930	1,920	0.5	1	0.0003
1986	1,490	1,100	2,590	0.8	1	0.0003
1987	1,000	1,860	2,860	1.2	4	0.0017
1988	860	900	1,760	0.6	58	0.0206
1989	770	780	1,550	0.6	109	0.0442
1990	900	1,000	1,900	0.7	105	0.0403
1991	700	1,100	1,800	0.9	41	0.0201
1992	900	1,300	2,200	1.1	86	0.0422
1993	700	900	1,600	0.9	63	0.0345
1994	510	1,190	1,700	0.9	59	0.0325
1995	460	1,140	1,600	1.0	23	0.0140
1996	400	700	1,100	0.7	5	0.0032
1997	470	860	1,330	0.8	25	0.0149
1998	510	830	1,340	0.8	57	0.0328
1999	630	880	1,510	0.9	68	0.0402
2000	600	980	1,580	0.9	53	0.0304
2001	660	1,030	1,690	0.9	49	0.0269
2002	330	590	920	0.7	60	0.0443
2003	260	550	810	0.6	81	0.0557
2004	200	470	670	0.5	27	0.0222
2005	130	190	320	0.4	14	0.0157
2006	150	220	370	0.3	63	0.0510

3.0 OPTIMUM YIELD (OY) AND TAC-BASED MANAGEMENT

At its February 28, 2007 meeting, the Pelagics Committee passed a motion recommending that alternatives for optimum yield (OY) be developed for consideration by stock using a method based on catch divided by the three-year survey index (relative exploitation).

The Whiting PDT developed and considered several alternatives for specifying OY for the small mesh multispecies stocks based on relative exploitation indices. The time periods that the Whiting PDT investigated included:

- **1973-1982:** This is the time frame on which the silver hake overfishing definition reference points are based. In theory, the reference points are associated with a time period when stock biomass was considered to be at a level to produce maximum sustainable yield (MSY). Since OY is a management reference point often derived from MSY, it may be reasonable to consider OY specifications based on a consistent time period. However, exploitation of the resource during this period was also high and included foreign fishing. Resulting decline in biomass after this period suggests that the exploitation during this time frame may not have been sustainable. This time period may not accurately reflect the current fishery, which may be influenced by changes in the ecosystem and environmental conditions. The Whiting PDT expressed concern about basing OY specifications on a time frame that includes a period of heavy foreign fishing on the stocks as there is some uncertainty about the accuracy and completeness of catch data from the historical foreign fishery.
- **1980-2006:** This time period was selected for consideration by the Whiting PDT because it does not include years with foreign fishing, when both accuracy of landings and species identification may be questionable. It does include the more recent years, which may better reflect current ecological and environmental conditions affecting these stocks.
- **1973-2006:** This time period was selected for comparison purposes because it encompasses most of the survey time series, including both the historical period from which overfishing definition reference points were derived and the more recent time period during which catch in the fishery is substantially less than what it was historically. **This time period was ultimately eliminated from consideration by the Whiting PDT** because of concerns about including catch from foreign fishing vessels (data may be incomplete, and there may be species identification issues). In addition, the earlier years in this time period have the same potential problems associated with the 1973-1982 time period.

Alternatives for specifying OY for each stock are provided in the following subsections for the 1973-1982 and 1980-2006 time periods. For reasons discussed above, the Whiting PDT strongly recommends that the Committee/Council select alternatives for OY based on the 1980-2006 time period. As discussed in the following subsections, the PDT recommends basing OY specifications as well as TACs for the small mesh multispecies stocks on either the median value or the 25th percentile of relative exploitation for the 1980-2006 time period.

Throughout this document, the relative exploitation used for the OY calculations is defined as a three-year average of landings divided by the survey index. Credible measures of discarding in both the directed and non-directed fisheries are not available for much of the time period utilized to develop these alternatives. As a result, relative exploitation can only be measured using landings, an underestimate of total fishery removals from these stocks. However, the PDT recommends that the Council establish the catch measures in this amendment as *total allowable catches*, with the intent of including bycatch (discards) as better information becomes available. The Council may want to consider a conservative approach for

setting TACs at this time to account for bycatch, which represents exploitation of the stock outside of the fishery landings.

It also should be noted that all of the options recommended for each of these stocks would result in an increase in landings when compared to recent years, should those OYs be realized. This reflects the fact that relative exploitation in recent years, as measured using landings, has been below the 25th percentile for the time series for many of these stocks. Despite this low level of exploitation, all of the stocks in the small mesh multispecies group have been experiencing a downward trend in abundance, as measured by the NEFSC fall survey during the 1980-2006 time period.

As such, managers may wish to take a more precautionary approach then the alternatives outlined in this document. Further reductions in the initial OY could account for bycatch, changes in ecosystem variables effecting recruitment, predation impacts, as well as survey variability.

3.1 NORTHERN SILVER HAKE (WHITING)

While the survey data are quite variable over the time series, the fall survey weight per tow for the northern stock of whiting has been trending downward since 2000, when the three-year average reached a record high value for the time series (the highest survey value for the time series occurred in 1998). Survey points for 2004-2006 were particularly low and more consistent with trends observed during the late 1960s and early 1970s. Based on the best available information, the northern stock of silver hake is **not overfished**; however, trawl survey trends in the northern area are declining, and the three-year moving average is very close, only 2.3% higher than the biomass threshold. This stock is approaching an overfished condition, and the Whiting PDT remains concerned about the recent downward trend in the bottom trawl survey.

Figure 2 and Figure 3 illustrate trends in relative exploitation (landings/survey) and the NEFSC bottom trawl survey for northern silver hake for the entire survey time series, and for 1980-2006 only, to better show variability. The points depicted in the figures are based on three-year moving averages of relative exploitation and survey biomass, consistent with the Pelagics Committee recommendation for developing alternatives for optimum yield.

Figure 2 Time Series of Three-Year Average Relative Exploitation (Landings/Survey) and Bottom Trawl Survey Indices (kg/tow) for the Northern Stock of Silver Hake

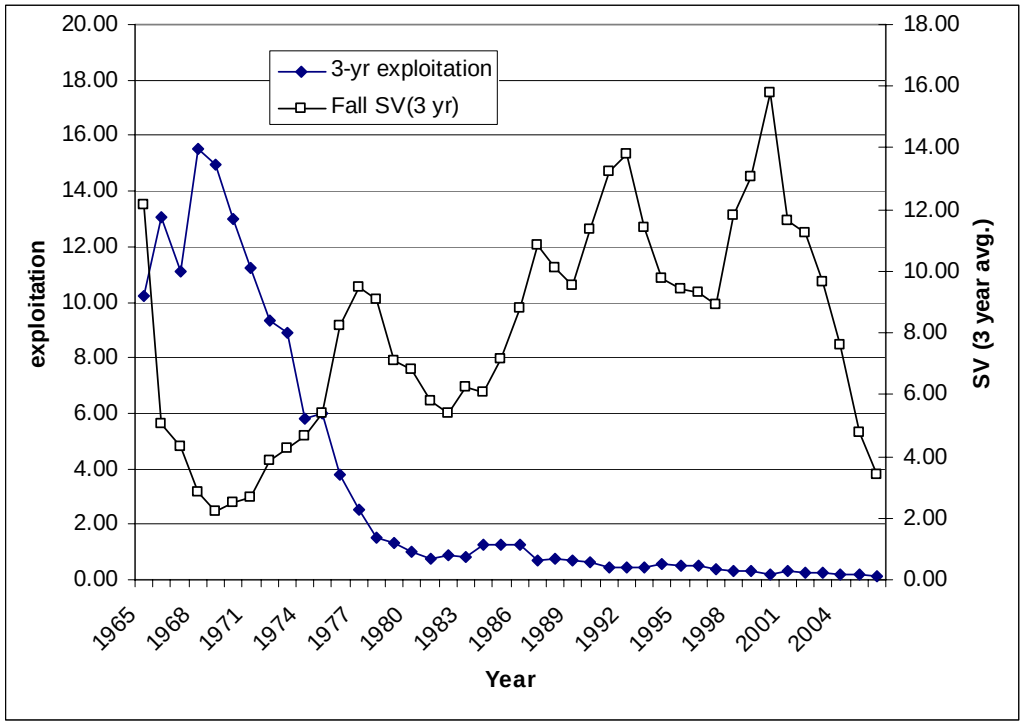


Figure 3 Three-Year Average Relative Exploitation (Landings/Survey) and Bottom Trawl Survey Indices (kg/tow) for the Northern Stock of Silver Hake During 1980-2006

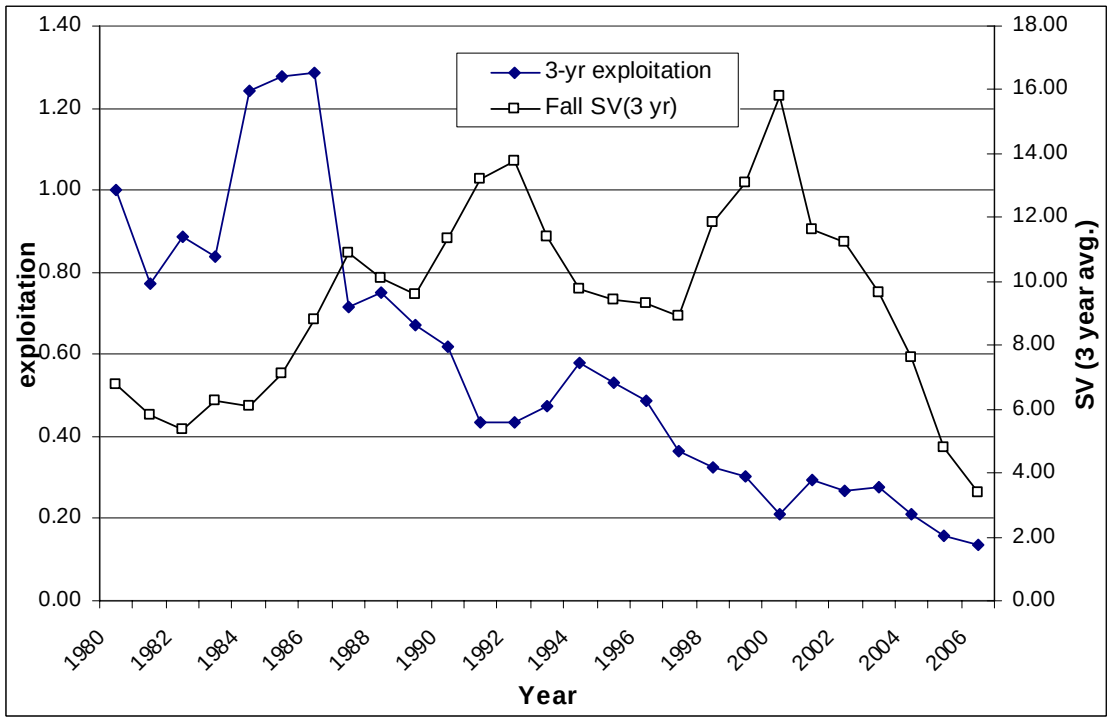
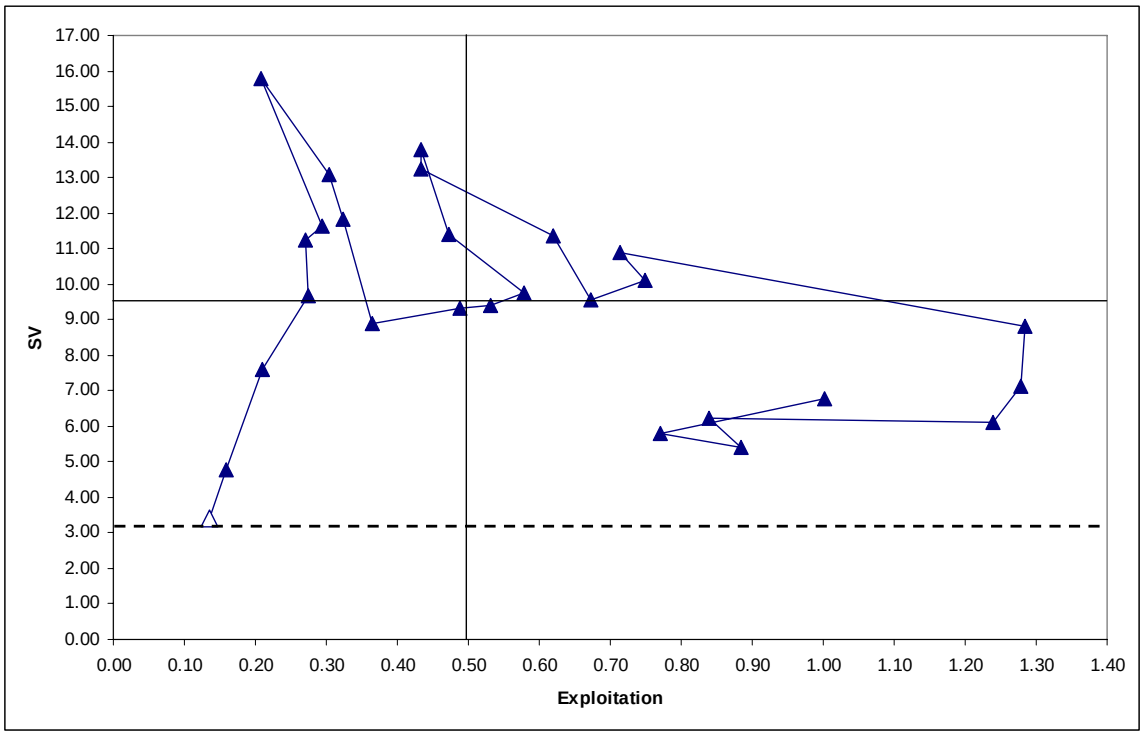


Figure 4 represents a "control plot" for the northern stock of silver hake based on three-year averages of survey biomass and relative exploitation. Survey biomass (three-year kg/tow) is plotted on the vertical axis, and relative exploitation (three-year landings/survey) is plotted on the horizontal axis. The horizontal dashed line in Figure 4 depicts the biomass threshold, below which the stock would be considered "overfished." The preferred placement of the most recent points would be in the top left quarter of the graph, indicating that stock biomass from the survey is high while relative exploitation of the stock is low when compared to historical values.

The control plot for northern silver hake illustrates the downward trend in the trawl survey in recent years, despite very low levels of relative exploitation. The 2006 three-year average for both the trawl survey and relative exploitation were the lowest of the time series shown in Figure 4. Trawl survey biomass for this stock has continued to decline, despite the fact that relative exploitation has been well below the 25th percentile of the time series since at least 1999.

Figure 4 "Control Plot" of Three-Year Average Relative Exploitation (Landings/Survey) and Bottom Trawl Indices (kg/tow) for the Northern Stock of Silver Hake from 1980-2006



**Solid horizontal and vertical lines represent median values. The dashed horizontal line depicts the current biomass threshold for the stock. The open triangle represents the most recent (2006) point estimate.*

Table 3 provides the Whiting PDT's preliminary alternatives for establishing optimum yield for the northern stock of whiting based on the three-year moving average relative exploitation rate (landings/survey). The shaded values in Table 3 show the Whiting PDT's current recommendation for establishing an OY value and determining an appropriate total allowable catch (TAC) for the northern stock of whiting. As discussed in Section 2.0 of this document, the Whiting PDT recommends basing these specifications on relative exploitation during the 1980-2006 time period, as it better reflects current fishery conditions (versus the 1973-1982 time period on which the current overfishing definition reference points are based).

Because the northern stock of whiting is approaching an overfished condition, the Whiting PDT recommends a more precautionary approach for setting OY and TACs for this stock and suggests considering an initial OY based on the 25th percentile of the time series. The Council may also want to consider being even more conservative than the 25th percentile for this stock, as specifications based on the 25th percentile could still allow for fishing mortality to increase above current levels, despite the stock being very close to the biomass threshold. An OY specification based on the 25th percentile of the time series (0.30) could allow for landings up to about 1,000 mt; nearly a 74% increase when compared with 2006.

Table 3 Preliminary Alternatives/Options for Establishing OY and TACs for Northern Silver Hake Based on Three-Year Average Relative Exploitation

Northern Silver Hake	**Relative Exploitation**				**Optimum Yield ('000s mt)**		
		Current (04-06)	0.14			Current (2006)	0.58
Time Frame		**1973-1982**	**1980-2006**	**Time Frame**		**1973-1982**	**1980-2006**
%ile	**75th**	5.29	0.76	**%ile**	**75th**	17.94	2.57
	median	2.01	0.49		**median**	6.81	1.65
	25th	1.08	0.30		**25th**	3.66	1.01

**Shaded values represent the Whiting PDT's recommendation for OY for this stock at this time.*

3.2 SOUTHERN SILVER HAKE (WHITING)

Overall, survey trends for the southern stock of whiting have improved. Recent survey indices have increased from record low levels since the middle and late 1990s when the stock was considered "overfished" and a rebuilding program was implemented in Amendment 12 to the Multispecies FMP. Based on the best available information, the southern stock of silver hake is not overfished. The stock actually increased above its target biomass value in 2003, at which point it was considered ***"rebuilt"*** under the Amendment 12 rebuilding program. The survey has since declined below the biomass target, but not as low as the threshold; the stock is therefore not considered to be in an overfished condition.

Figure 5 and Figure 6 illustrate trends in relative exploitation (landings/survey) and the NEFSC bottom trawl survey for southern silver hake for the entire survey time series, and for 1980-2006 only, to better show variability. The points depicted in the figures are based on three-year moving averages of relative exploitation and survey biomass, consistent with the Pelagics Committee recommendation for developing alternatives for optimum yield.

Figure 5 Time Series of Three-Year Average Relative Exploitation (Landings/Survey) and Bottom Trawl Survey Indices (kg/tow) for the Southern Stock of Silver Hake

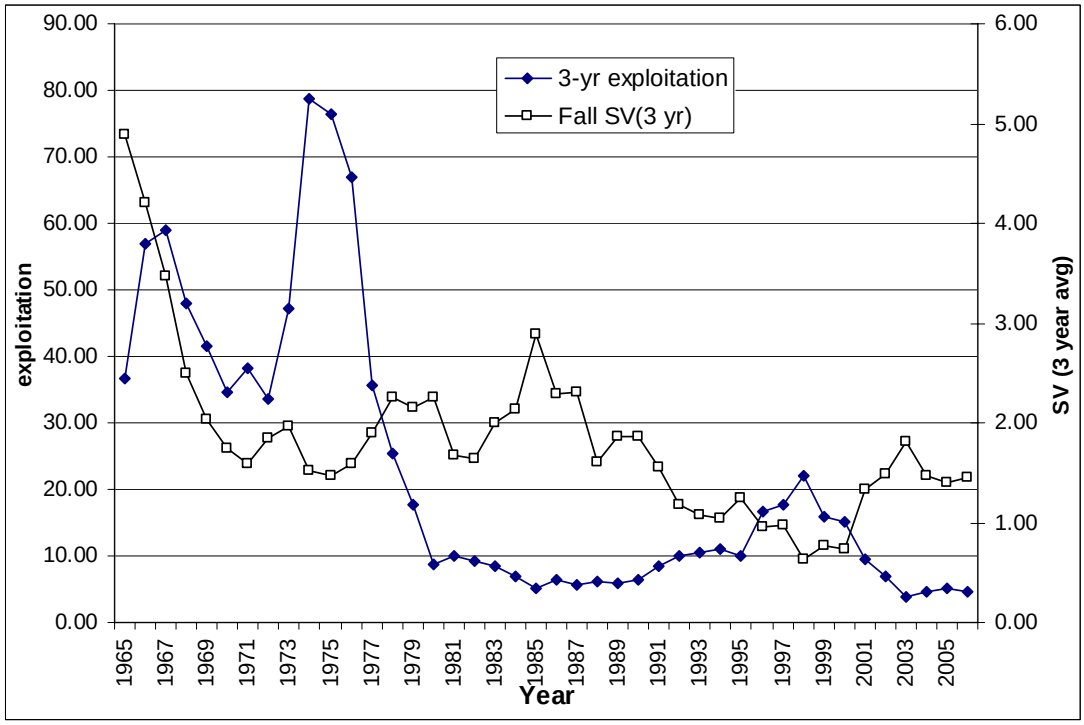


Figure 6 Three-Year Average Relative Exploitation (Landings/Survey) and Bottom Trawl Survey Indices (kg/tow) for the Southern Stock of Silver Hake During 1980-2006

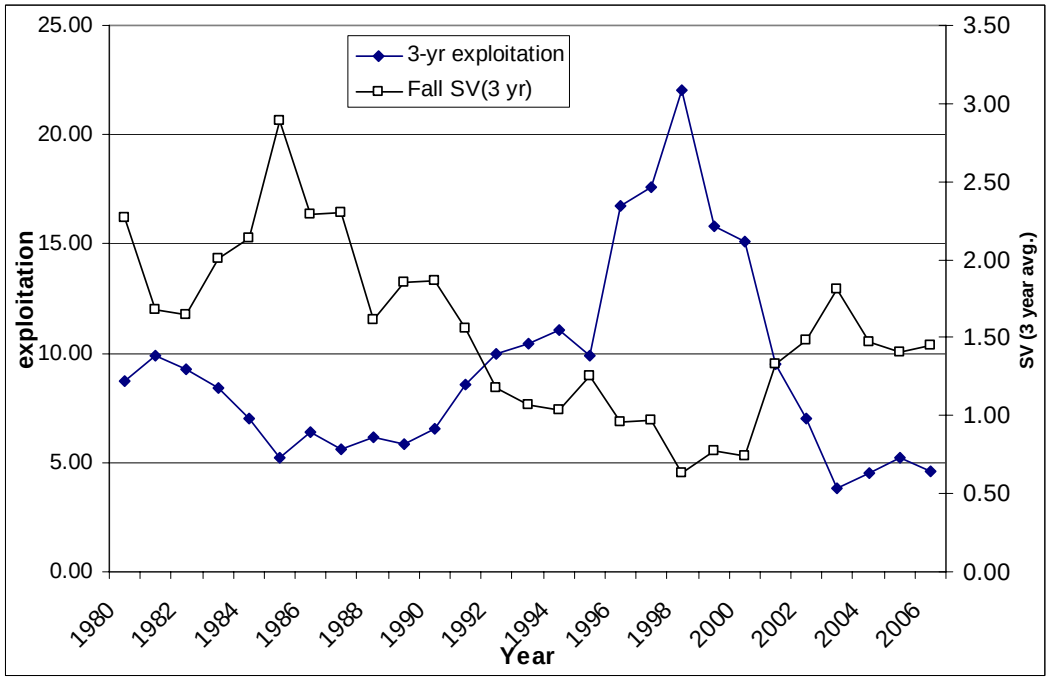
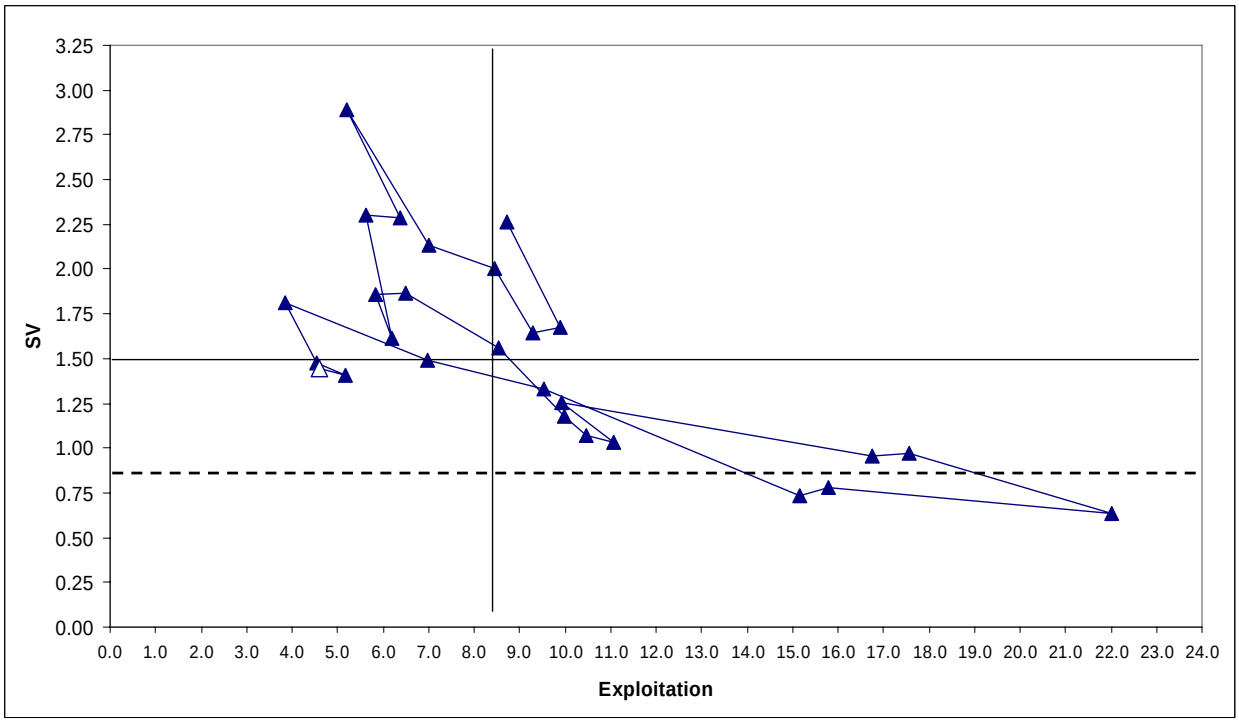


Figure 7 represents a "control plot" for the southern stock of silver hake based on three-year averages of survey biomass and relative exploitation. Survey biomass (three-year kg/tow) is plotted on the vertical axis, and relative exploitation (three-year landings/survey) is plotted on the horizontal axis. The horizontal dashed line in Figure 7 depicts the biomass threshold, below which the stock would be considered "overfished." The preferred placement of the most recent points would be in the top left quarter of the graph, indicating that stock biomass from the survey is high while relative exploitation of the stock is low when compared to historical values.

The "control plot" for southern whiting shows a considerable amount of variability in the relationship between the survey and relative exploitation of the stock. In recent years, exploitation has been below the median while survey measures of abundance have hovered about the median for this time period; this suggests that the stock has been relatively stable since about 2002.

Figure 7 "Control Plot" of Three-Year Average Relative Exploitation (Landings/Survey) and Bottom Trawl Indices (kg/tow) for the Southern Stock of Silver Hake from 1980-2006



**Solid horizontal and vertical lines represent median values. The dashed horizontal line depicts the current biomass threshold for the stock. The open triangle represents the most recent (2006) point estimate.*

Table 4 provides the Whiting PDT's preliminary alternatives for establishing optimum yield for the southern stock of whiting based on the three-year moving average relative exploitation rate (landings/survey). The shaded values in Table 4 show the Whiting PDT's current recommendation for establishing an OY value and determining an appropriate total allowable catch (TAC) for the southern stock of whiting. As discussed in Section 2.0 of this document, the Whiting PDT recommends basing these specifications on relative exploitation during the 1980-2006 time period, as it better reflects current fishery conditions (versus the 1973-1982 time period on which the current overfishing definition reference points are based).

Because this stock is not overfished and biomass has been trending upwards since the implementation of Amendment 12, the PDT recommends basing the OY and TAC specifications on the median value of relative exploitation for the time series. A more conservative specification could be based on the 25th percentile as well. In either case, the corresponding TACs would not constrain the current fishery. Using the median value would allow for landings of about 12,000 mt from the southern stock, which is almost three times the amount that was landed in 2006. Landings from the southern stock have not been at this level since the late 1990s. A TAC based on the 25th percentile of the time series would still allow for landings to almost double from 2006 levels. Therefore, managers may wish to consider a more precautionary approach for setting an initial OY, particularly to account for bycatch, changes in ecosystem variables affecting recruitment, predation impacts, and survey variability.

Table 4 Preliminary Alternatives/Options for Establishing OY and TACs for Southern Silver Hake Based on Three-Year Average Relative Exploitation

Southern Silver Hake	**Relative Exploitation**				**Optimum Yield ('000s mt)**		
		Current (04-06)	4.61			Current (2006)	4.26
Time Frame		**1973-1982**	**1980-2006**	**Time Frame**		**1973-1982**	**1980-2006**
%ile	**75th**	62.07	10.21	**%ile**	**75th**	89.94	14.80
	median	30.53	8.54		**median**	44.24	12.37
	25th	11.85	6.01		**25th**	17.17	8.71

**Shaded values represent the Whiting PDT's recommendation for OY for this stock at this time.*

3.3 NORTHERN RED HAKE

Based on the best available information for recent years, the northern stock of red hake is not overfished at this time. Overall, the survey indices suggest that stock biomass has increased considerably over time, especially since the stock was at low levels during the late 1960s and early 1970s. However, the fall survey has been trending downward in recent years, and reasons for the decline are unclear given the low levels of landings.

Figure 8 and Figure 9 illustrate trends in relative exploitation (landings/survey) and the NEFSC bottom trawl survey for northern red hake for the entire survey time series, and for 1980-2006 only, to better show variability. The points depicted in the figures are based on three-year moving averages of relative exploitation and survey biomass, consistent with the Pelagics Committee recommendation for developing alternatives for optimum yield.

Figure 8 Time Series of Three-Year Average Relative Exploitation (Landings/Survey) and Bottom Trawl Survey Indices (kg/tow) for the Northern Stock of Red Hake

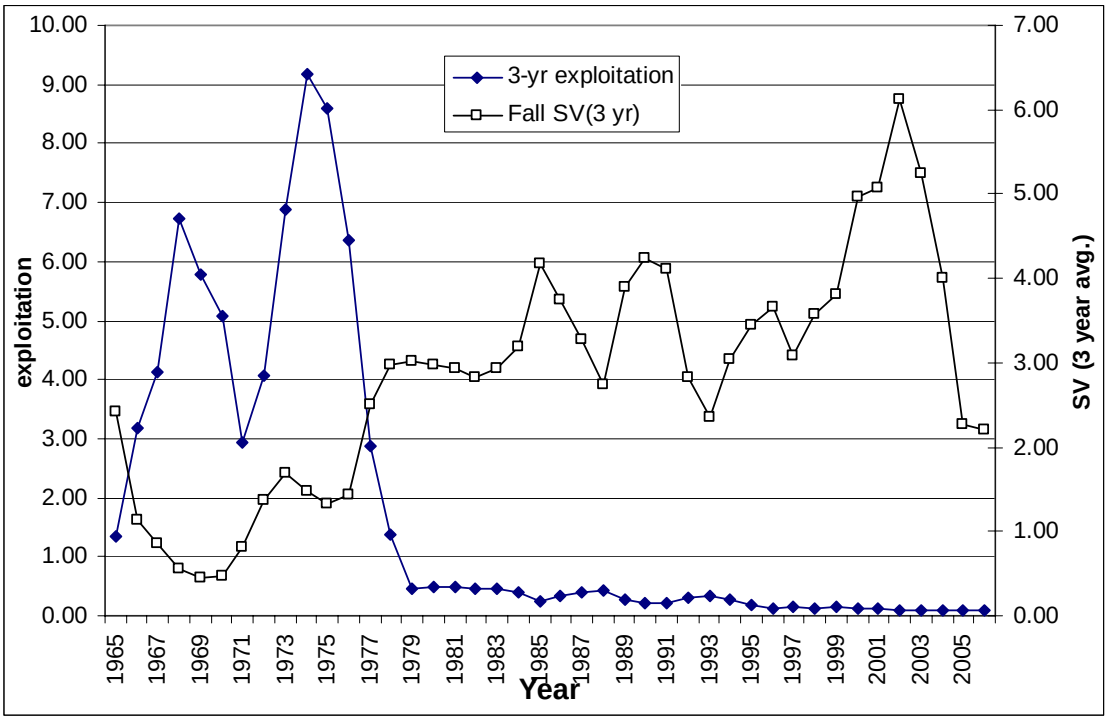


Figure 9 Three-Year Average Relative Exploitation (Landings/Survey) and Bottom Trawl Survey Indices (kg/tow) for the Northern Stock of Red Hake During 1980-2006

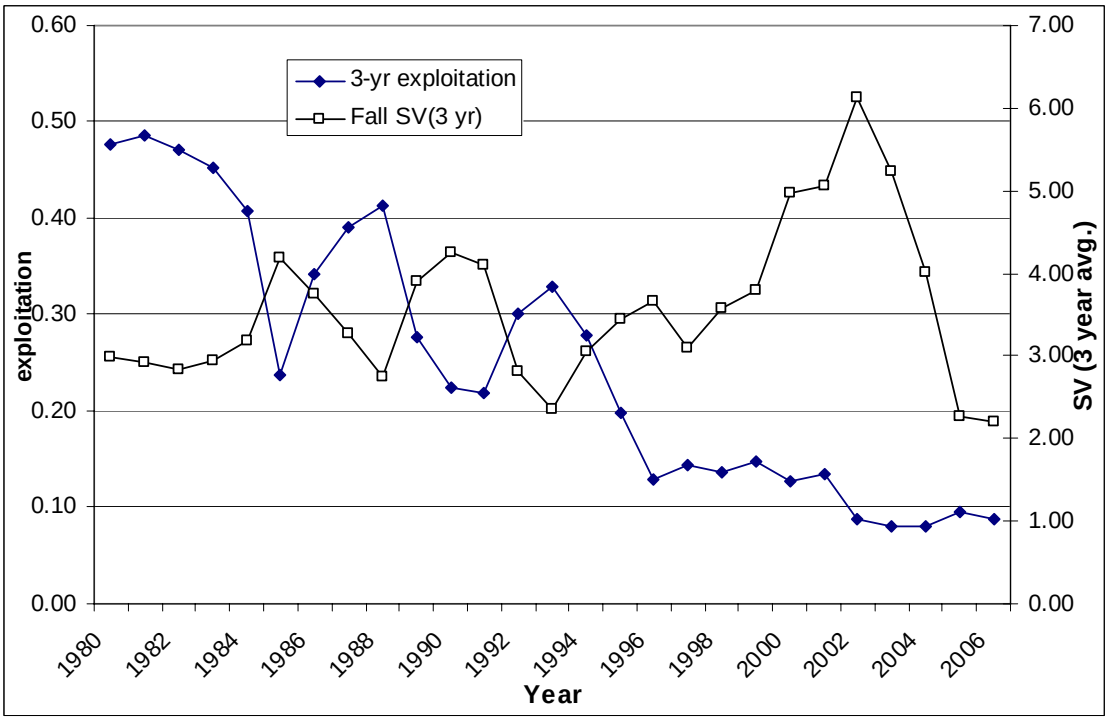
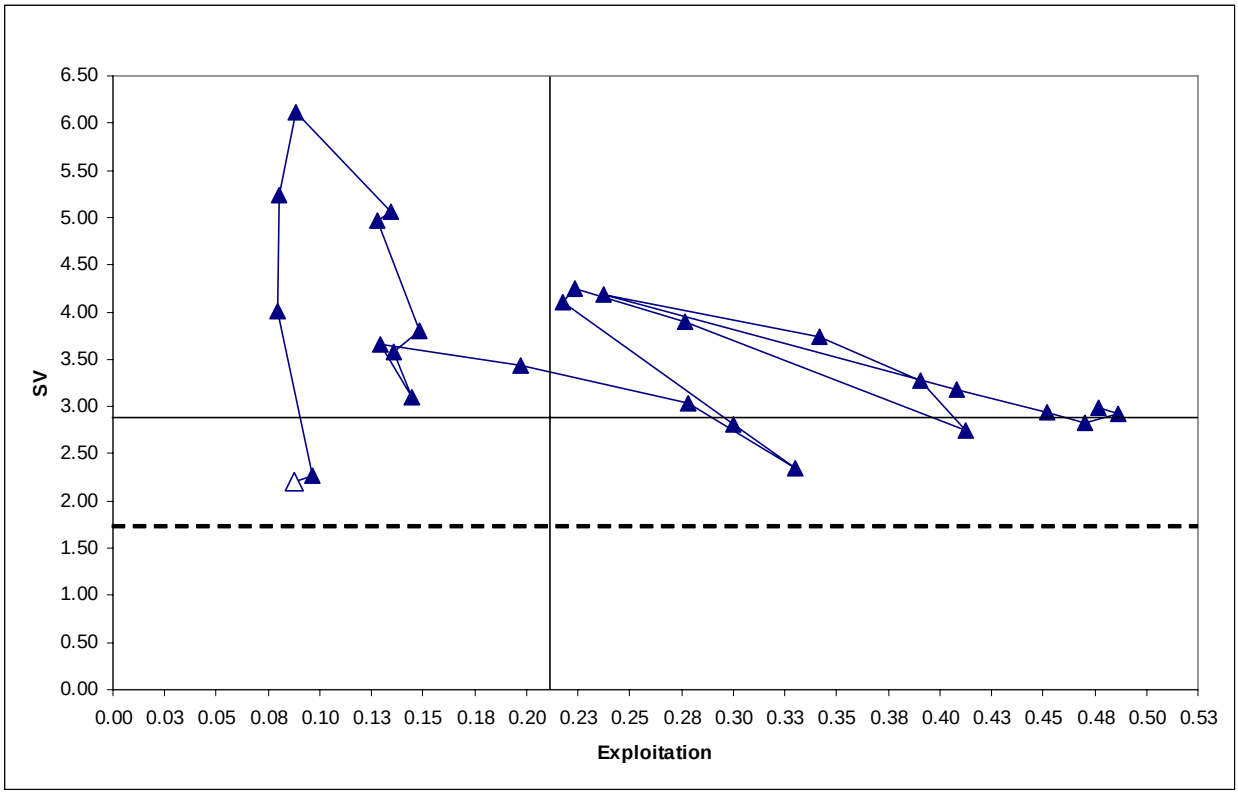


Figure 10 represents a "control plot" for the northern stock of red hake based on three-year averages of survey biomass and relative exploitation. Survey biomass (three-year kg/tow) is plotted on the vertical axis, and relative exploitation (three-year landings/survey) is plotted on the horizontal axis. The horizontal dashed line in Figure 10 depicts the biomass threshold, below which the stock would be considered "overfished." The preferred placement of the most recent points would be in the top left quarter of the graph, indicating that stock biomass from the survey is high while relative exploitation of the stock is low when compared to historical values.

Relative exploitation of the northern stock of red hake has decreased significantly over time and has remained below the 25th percentile for the 1980-2006 time period over the last six years. However, survey biomass also has declined during this time period; a rapid decline in the three-year survey since 2002 is notable.

Figure 10 "Control Plot" of Three-Year Average Relative Exploitation (Landings/Survey) and Bottom Trawl Indices (kg/tow) for the Northern Stock of Red Hake from 1980-2006



**Solid horizontal and vertical lines represent median values. The dashed horizontal line depicts the current biomass threshold for the stock. The open triangle represents the most recent (2006) point estimate.*

Table 5 provides the Whiting PDT's preliminary alternatives for establishing optimum yield for the northern stock of red hake based on the three-year moving average relative exploitation rate (landings/survey). The shaded values in Table 5 show the Whiting PDT's current recommendation for establishing an OY value and determining an appropriate total allowable catch (TAC) for the northern stock of red hake. As discussed in Section 2.0 of this document, the Whiting PDT recommends basing these specifications on relative exploitation during the 1980-2006 time period, as it better reflects current fishery conditions (versus the 1973-1982 time period on which the current overfishing definition reference points are based).

When the overfishing definition was developed for northern red hake, available data suggested that 2,000 mt would approximate MSY for this stock (see Amendment 12 discussion). MSY was chosen at a level that appeared to cause declines in stock size when landings exceeded it. Conversely, increases in stock biomass were also apparent when landings were less than the chosen value. A B_{MSY}-proxy value was chosen based on the survey biomass trends and the exploitation history. When stock biomass was greater than the chosen value, it was attributed to short-term fluctuations or sampling variability when the relative exploitation rate was at a low relative to average levels. If the relative exploitation rate was extremely low, the B_{MSY}-proxy value was chosen at a lower level than the survey biomass levels during that time because stock biomass would be expected to be between B_{MSY} and the carrying capacity. The stock assessment for northern red hake has not been updated, however, and the values in the overfishing definition should be re-evaluated and revised at the next opportunity, as it is unclear at this time whether 2,000 mt is an appropriate value for MSY.

Landings of northern red hake never exceeded 2,000 mt during the 1980-2006 time period. For various reasons, the Council may want to consider specifying OY for this stock at a value less than MSY. Using the relative exploitation approach suggested by the Pelagics Committee, the Whiting PDT recommends that OY for this stock be based on either the median value or the 25th percentile for the 1980-2006 time period. Neither approach would constrain the current fishery for northern red hake and could allow landings to increase significantly above 2006 levels.

Because the abundance of northern red hake appears to have been declining in the most recent years, managers may wish to be more conservative in setting OY for this stock, by setting the initial OY using the 25th percentile of the relative exploitation. The Council also may want to consider being more conservative than the 25th percentile for this stock, as specifications based on the 25th percentile could still allow for fishing removals to nearly double when compared to current levels, despite declining abundance.

Table 5 Preliminary Alternatives/Options for Establishing OY and TACs for Northern Red Hake Based on Three-Year Average Relative Exploitation

Northern Red Hake	**Relative Exploitation**				**Optimum Yield ('000s mt)**		
		Current (04-06)	0.09			Current (2006)	0.15
Time Frame		**1973-1982**	**1980-2006**	**Time Frame**		**1973-1982**	**1980-2006**
%ile	**75th**	6.74	0.37	**%ile**	**75th**	14.86	0.81
	median	2.12	0.22		**median**	4.66	0.49
	25th	0.48	0.13		**25th**	1.06	0.29

**Shaded values represent the Whiting PDT's recommendation for OY for this stock at this time.*

3.4 SOUTHERN RED HAKE

The current overfishing definition for southern red hake is different than the other small mesh multispecies previously addressed in this document. However, there is no reason that the Council cannot use an approach for setting OY for this stock based on relative exploitation, as the Pelagics Committee has suggested; there is no MSY value at this time for southern red hake, and the proposed approach for setting OY would be appropriate to consider, as it still provides a link between survey biomass and relative exploitation.

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 fall survey falls below the 25th percentile of the average weight per individual from the fall 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 fall survey abundance of fish less than 25 cm (4.07).*

**NOTE: The overfishing definition reference points were re-calculated by the Whiting PDT using the updated survey time series that is presented in this document.*

In previous SAFE Reports, the Whiting Monitoring Committee (WMC) noted problems associated with the overfishing definition for southern red hake. **Although the current definition is intended to identify "overfished" (i.e. low biomass) stock conditions, it is a better indication of "overfishing" (high exploitation rate) conditions.** The WMC recommends that the overfishing definition for the southern stock of red hake be revisited after a benchmark stock assessment is completed. The next stock assessment for red hake has not been scheduled at this time.

Based on the best available information, the southern stock of red hake is not overfished, and overfishing is not occurring. A benchmark stock assessment is needed to fully evaluate the status of this stock and develop a more appropriate and useful overfishing definition.

Figure 11 and Figure 12 illustrate trends in relative exploitation (landings/survey) and the NEFSC bottom trawl survey for southern red hake for the entire survey time series, and for 1980-2006 only, to better show variability. The points depicted in the figures are based on three-year moving averages of relative exploitation and survey biomass, consistent with the Pelagics Committee recommendation for developing alternatives for optimum yield.

Figure 11 Time Series of Three-Year Average Relative Exploitation (Landings/Survey) and Bottom Trawl Survey Indices (kg/tow) for the Southern Stock of Red Hake

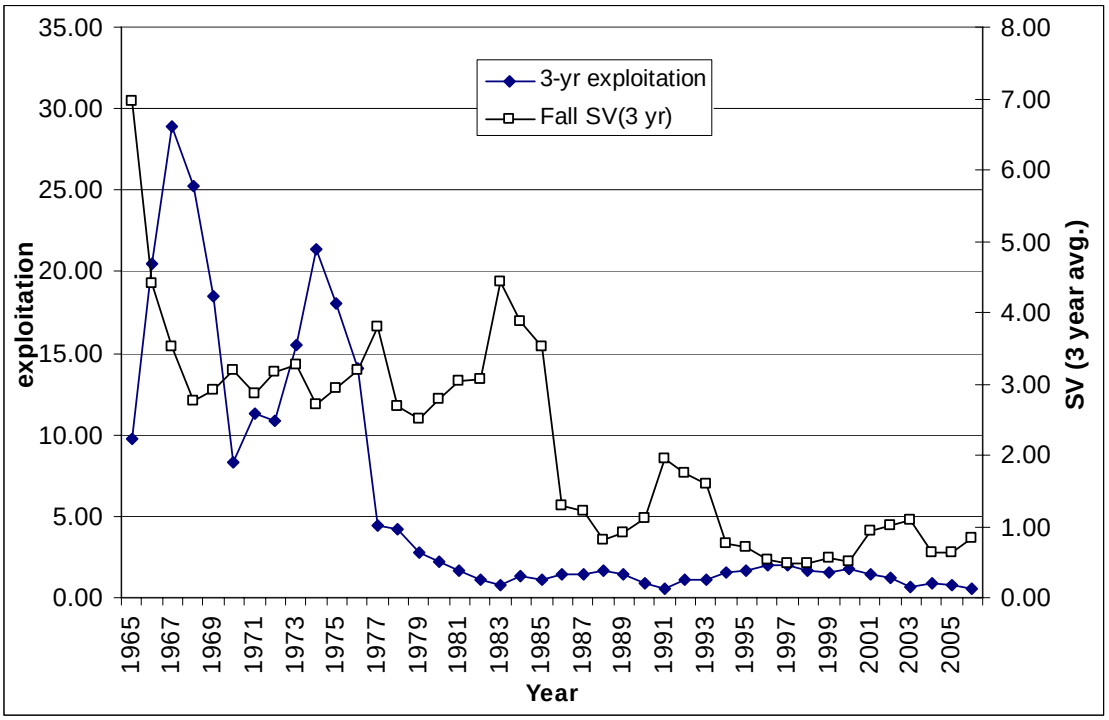


Figure 12 Three-Year Average Relative Exploitation (Landings/Survey) and Bottom Trawl Survey Indices (kg/tow) for the Southern Stock of Red Hake During 1980-2006

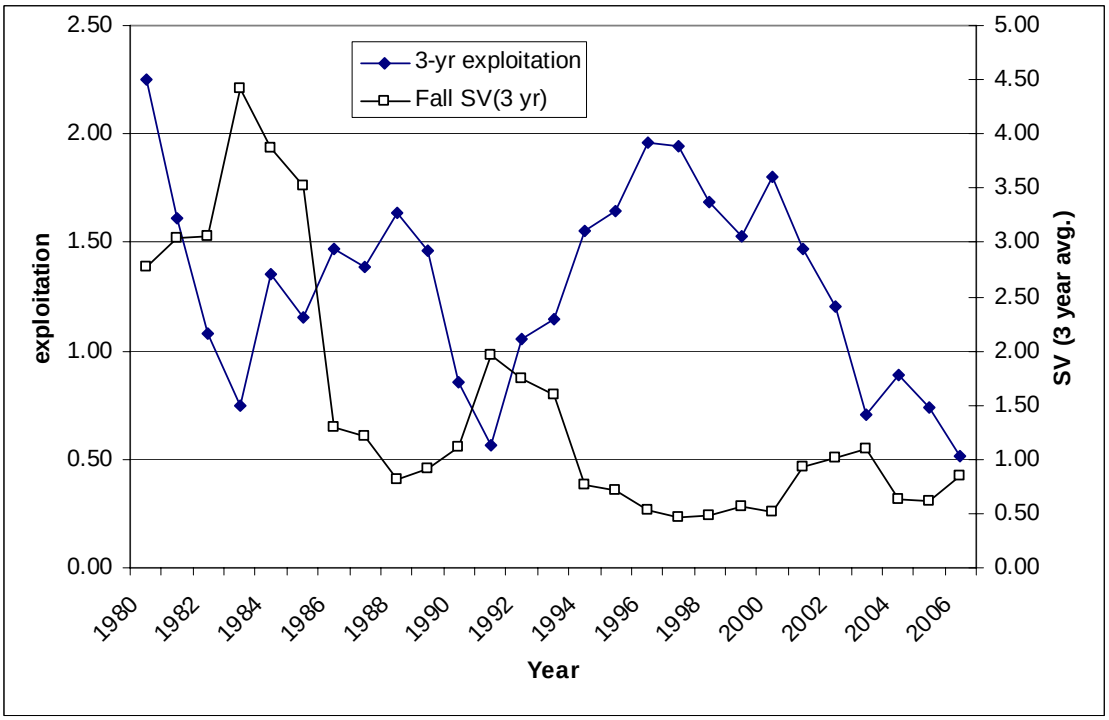
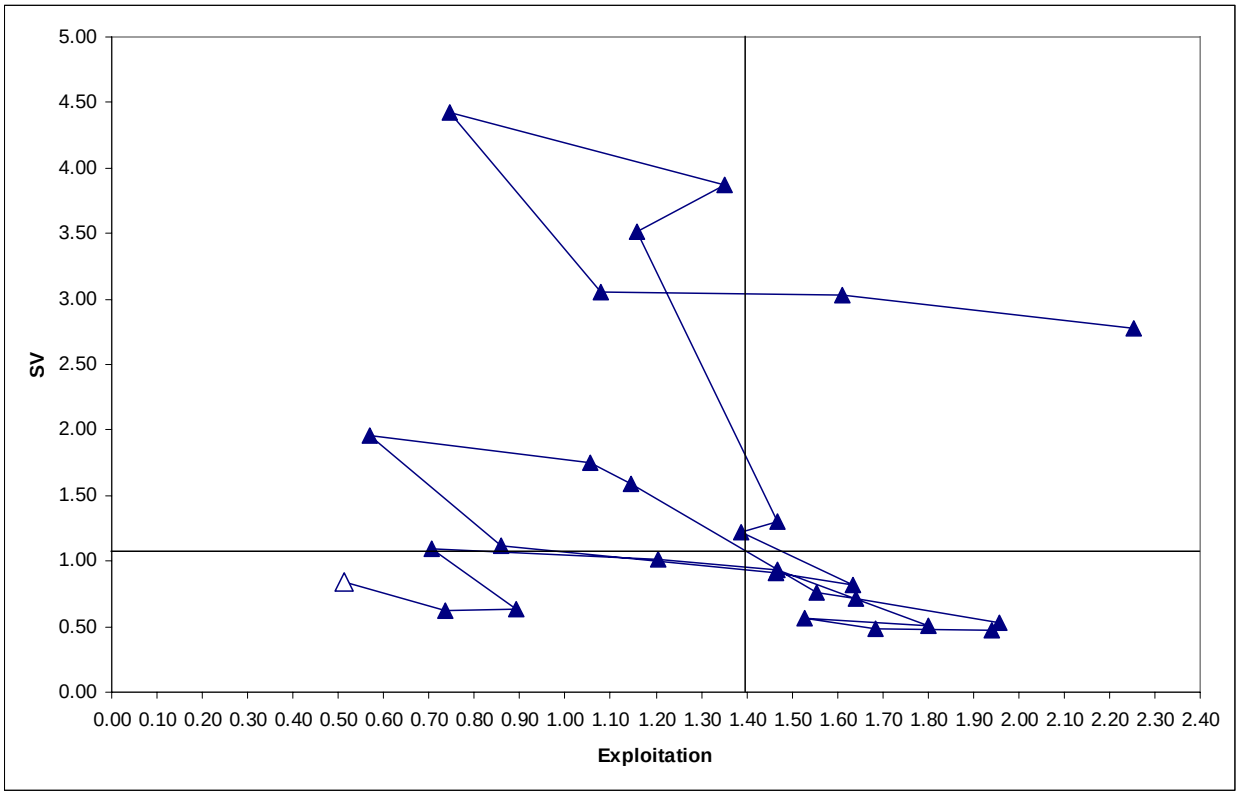


Figure 13 represents a "control plot" for the southern stock of red hake based on three-year averages of survey biomass and relative exploitation. Survey biomass (three-year kg/tow) is plotted on the vertical axis, and relative exploitation (three-year landings/survey) is plotted on the horizontal axis. The horizontal dashed line in Figure 13 depicts the biomass threshold, below which the stock would be considered "overfished." The preferred placement of the most recent points would be in the top left quarter of the graph, indicating that stock biomass from the survey is high while relative exploitation of the stock is low when compared to historical values.

The relationship between survey biomass and relative exploitation has been quite variable for the southern stock of red hake over the time series. Exploitation has been below the 25th percentile in the most recent years of the time series while the survey index also has declined.

Figure 13 "Control Plot" of Three-Year Average Relative Exploitation (Landings/Survey) and Bottom Trawl Indices (kg/tow) for the Southern Stock of Red Hake from 1980-2006



**Solid horizontal and vertical lines represent median values. The open triangle represents the most recent (2006) point estimate.*

Table 6 provides the Whiting PDT's preliminary alternatives for establishing optimum yield for the southern stock of red hake based on the three-year moving average relative exploitation rate (landings/survey). The shaded values in Table 6 show the Whiting PDT's current recommendation for establishing an OY value and determining an appropriate total allowable catch (TAC) for the southern stock of red hake. As discussed in Section 2.0 of this document, the Whiting PDT recommends basing these specifications on relative exploitation during the 1980-2006 time period, as it better reflects current fishery conditions (versus the 1973-1982 time period on which the current overfishing definition reference points are based).

For this stock, the PDT recommends that the OY and TAC specifications be based on the median value or 25th percentile of the 1980-2006 time series. Neither of these approaches would constrain the current fishery, and both would allow landings to increase above current (2006) levels. An OY based on the median value of the time series could allow for about 1,180 mt of landings; landings have not been at this level since the early 1980s.

Table 6 Preliminary Alternatives/Options for Establishing OY and TACs for Southern Red Hake Based on Three-Year Average Relative Exploitation

Southern Red Hake	**Relative Exploitation**				**Optimum Yield ('000s mt)**		
		Current (04-06)	0.51			Current (2006)	0.22
Time Frame		**1973-1982**	**1980-2006**	**Time Frame**		**1973-1982**	**1980-2006**
%ile	**75th**	15.12	1.62	**%ile**	**75th**	12.80	1.37
	median	4.31	1.39		**median**	3.65	1.18
	25th	2.39	0.97		**25th**	2.03	0.82

**Shaded values represent the Whiting PDT's recommendation for OY for this stock at this time.*

3.5 SUMMARY OF PDT RECOMMENDATIONS FOR SILVER HAKE AND RED HAKE

The Whiting PDT recommends using a percentile approach to setting initial OYs for the small mesh multispecies stocks. As discussed in this document, the time frame recommended by the Whiting PDT to utilize for this approach is 1980-2006. Therefore, the PDT recommends basing initial OY specifications either the median value or the 25th percentile of relative exploitation for the 1980-2006 time period. However some stocks, particularly northern whiting and northern red hake, are experiencing declines in abundance that are of concern to the PDT; in turn, managers may wish to consider the 25th percentile or something even more precautionary for setting the initial OY for these particular stocks.

Relative exploitation is calculated using the three-year average of landings divided by the survey index. Because bycatch data are unavailable for the time periods examined the relative exploitation may underestimate actual total exploitation. Managers may wish to further reduce OY from the initial PDT recommendations to account for bycatch, as well as changes in ecosystem variables effecting recruitment, predation impacts, as well as survey variability.

Specifically:

- Northern Whiting: The PDT recommends an initial OY set at the 25th percentile of the 1980-2006 time period; a 74% increase when compared to 2006 landings.
- Southern Whiting: The PDT recommends an initial OY set at either the median or the 25th percentile of the 1980-2006 time period; a 190% or 104% increase, respectively, when compared to 2006 landings.
- Northern Red Hake: The PDT recommends an initial OY set at either the median or the 25th percentile of the 1980-2006 time period; a 226% or 93% increase, respectively, when compared to 2006 landings. The PDT also recommends that the Council consider a more conservative approach for this stock, given survey declines in the most recent years.
- Southern Red Hake: The PDT recommends an initial OY set at either the median or the 25th percentile of the 1980-2006 time period; a 436% or 272% increase, respectively, when compared to 2006 landings.

3.6 OFFSHORE HAKE

The situation with offshore hake is more complicated. It may be very difficult to develop a separate specification for OY for this stock. The PDT is investigating this issue.

4.0 PROCESS FOR ESTABLISHING OY AND TACS

In this amendment, the Council may want to consider establishing a process for small mesh multispecies "specifications" similar to the specifications process in the Atlantic herring fishery. During a specifications process, values for optimum yield (OY) and total allowable catches (TACs) could be established and/or modified for each of the small mesh multispecies stocks. The specifications process for the small mesh multispecies fishery would be relatively straightforward, as only OY and TACs would need to be set as part of this process; no other specifications would be required at this time.

4.1 NO ACTION ALTERNATIVE

Under the no action alternative, there would be no process for setting specifications in the small mesh multispecies fishery. OY for these stocks would remain at the levels established in this amendment until they are changed through a future Council action. Similarly, if TACs are established in this amendment, adjustments to the TACs would require Council action. If the no action alternative is selected, the Council may want to consider adding OY and TAC modifications to the list of measures that could be implemented through a fwa to the FMP so that a complete amendment would not be necessary to make these adjustments. A framework adjustment process generally takes about six months to complete, from the beginning of development to implementation of the management measures.

4.2 ALTERNATIVE: ANNUAL SPECIFICATIONS PROCESS

Under this measure, OY and TACs for the applicable small mesh multispecies stocks would be established through an annual specifications process. The TACs would be based on the multispecies fishing year (May 1 – April 30). The process for setting specifications for the small mesh multispecies fishery is summarized generally below:

- The Whiting PDT will meet to review the status of the stocks and the fishery annually. This usually involves preparation of an annual Stock Assessment and Fishery Evaluation (SAFE) Report.
- The PDT will report to the Pelagics Committee and Council no later than November with recommendations for the specifications for the following fishing year (May 1 start).
- Specifications and TACs will be implemented by the Regional Administrator once approved by the Council. An Environmental Assessment (EA) is prepared for the annual specification process.
- If the specifications will not be changed, this will be announced through a notice action in the *Federal Register*.

4.3 ALTERNATIVE: MULTI-YEAR SPECIFICATIONS (THREE YEARS)

Under this measure, OY and TACs for the applicable small mesh multispecies stocks would be established for three fishing years through the specifications process. The process for setting three-year specifications for the small mesh multispecies fishery is summarized generally below:

- The Whiting PDT will meet to review the status of the stocks and the fishery and prepare a SAFE Report every three years. While a SAFE Report will only be prepared every three years, the Whiting PDT will meet at least once on alternate years to review the status of the stocks relative to the overfishing definitions if information is available to do so.
- When conducting a three-year review and preparing a SAFE Report, the PDT/TC will report to the Pelagics Committee and Council no later than November with recommendations for the specifications for the following three fishing years (May 1 start).
- Specifications and TACs will be implemented by the Regional Administrator once approved by the Council. Specifications will be set for three fishing years. An Environmental Assessment (EA) will be prepared for the multi-year specification process and will address impacts for all of the applicable years.
- This measure maintains flexibility to adjust the fishery specifications in the interim years. If the Council determines that the specifications should be adjusted during the three-year time period, it can do so through the same process during one or both of the interim years.
- If the specifications will not be changed for the upcoming three fishing years, this will be announced through a notice action in the *Federal Register*.

5.0 NORTHEAST REGION IN-SEASON FISHERY MONITORING PROGRAMS AND CAPABILITIES

5.1 INTRODUCTION

The monitoring programs in the Northeast Region can be placed in one of three major categories used for in-season management of fisheries: Dealer reported landings data; vessel reported at-sea data; and vessel reported data prior to and/or following completion of trips. Fishing Vessel Trip Reports (VTRs) containing vessel reported catch, effort, and location data are submitted on a monthly basis and are not timely enough for in-season monitoring of fisheries. Similarly, observer collected data are not currently available quickly enough to be of assistance in managing fisheries on an in-season basis, in most fisheries.

The following provides a brief summary of each of the major in-season management program categories; how the data are collected, transmitted, and used for management; as well as the strengths, limitations, and other issues that should be considered when contemplating how the small-mesh multispecies (SMM) in the region are to be monitored. For side-by-side comparison of several key features of the three programs, refer to Table 7 at the end of this section.

New monitoring programs may be concurrently developed to monitor the large-mesh multispecies as part of Amendment 16 or as part of other amendments being developed for *Illex* and *Loligo* squids; however, such programs are only conceptual in nature at this time and will require substantial conceptual refinement, technical development, and personnel support from the Regional Office before being implemented for any fisheries in the region. It is also uncertain what additional in-season monitoring methods may be necessary to assist in monitoring Annual Catch Limits (ACLs).

5.2 DEALER-REPORTED LANDINGS DATA

Summary: Several Mid-Atlantic and some New England FMP fisheries are prosecuted under a "hard" Total Allowable Catch (TAC) or Total Allowable Landings (TAL) ACL. The fisheries that fall under this system of management and in-season monitoring are as follows: Atlantic bluefish, Atlantic mackerel, black sea bass, golden tilefish, *Illex* squid, *Loligo* squid, scup, spiny dogfish, certain multispecies programs, Atlantic herring, and summer flounder. Dealer reported landings data are used to monitor the progress of landings toward the overall TAC/TAL, specified period TAC/TAL (e.g., scup Winter I, Summer, or Winter II quota periods), or action point within the TAC/TAL (e.g., when 80 percent of the *Loligo* Period I quota is reached and a 2,500-lb possession limit is implemented). When landings are projected to have reached the specified level, fisheries are closed or a regulatory possession and/or trip limit change is made effective.

Monitoring may be performed on a coastwide basis (e.g., black sea bass, *Loligo* squid) or on a state-by-state basis (e.g., summer flounder, bluefish).

Type of Data; Periodicity: Dealers are required to report for each purchase made within a reporting week (Sunday through Saturday): Dealer identification information, vessel identification information from which fish were purchased, trip identifier, dates purchased, amount of species landed, price paid, and disposition of the fish. These data are submitted electronically to NMFS on a weekly basis. Data must be received by midnight Tuesday following the end of the reporting week; therefore, there may be up to a 9-day delay for the oldest data contained in a report before landings information is received by NMFS for analysis. Late or non-reporting dealers are subject to enforcement action by the Office of Law Enforcement (OLE).

Dealer reported landings data are assumed to be the best source for comprehensive estimates of total landings. They are used by the submitters for tax preparation purposes and other legal documents. Dealer reported data do not include information on effort, harvest location, or fish discarded at sea.

Data Use: NMFS uses the reported data to project when quotas or FMP action points will be reached. When projections are made, the most recent data available may be up to a week old and several factors such as fleet behavior, weather, and fish availability may influence the harvest rates being projected. Projections are well suited to capture the trend of recent landings and are particularly well suited to fisheries with a large number of participants that make landings of consistent sizes on a fairly regular basis (i.e., those constrained by landing limits or weekly possession limits). This method has proven to be reasonably effective for managing fisheries wherein catch accounting of a large quota is the primary means of ACL. Dealer reported landings data can be used to track quotas on a state-by-state or coastwide basis. Some fisheries, such as *Loligo* squid, have proven to be challenging to project future landings based on dealer reported data because of the large number of participating vessels and the unpredictable landing size and patterns that follow the ebb and flow of squid congregations. In addition, fisheries with relatively few vessels, such as tilefish fishery, may undergo surges or periods of inactivity that inhibit the ability to accurately project forward landings. Discussions have been held regarding daily reporting of dealer landings data to improve the timeliness and precision of projections for such fisheries; however, there are no current plans to implement such a change. Doing so would require modification of the regulations, as well as changes to the data systems and staffing levels at the Regional Office to accommodate the change.

Limitations: Dealer reported landings data are not sufficient to manage discrete areas because they lack harvest location data. Some input measures, such as trip or possession limits, can be well managed in a fairly timely manner by using dealer reported landings information. However, input measures such as DAS or number of trips to specific areas are not well suited for monitoring and management using dealer reported landings data. The limitations for so doing include the lack of location data, the data lag that occurs from submission to analysis, and the lack of effort data. The time from collection, submission, and subsequent analysis is not real-time; therefore, dealer reported landings data are not suitable for monitoring real-time programs or very small quotas.

SMM Applicability: Dealer reported landings data would be useful in monitoring SMM ACLs set coastwide by species or stock complex (i.e., silver and red hake combined). Stand-alone dealer reported landings data would not be sufficient to manage by stock or exemption program areas such as Cultivator Shoal, for the reasons outlined above. The data network, reporting, and monitoring infrastructure for dealer reported landings data are well established and would require some modification by dealers or the Regional Office to incorporate specific SMM reporting requirements, should they differ from the current requirements (i.e., if daily reporting were required as opposed to weekly).

5.3 AT-SEA VESSEL-REPORTED DATA

Summary: There are two types of programs in the Northeast Region that utilize information reported by vessels while at sea. Both rely on submission of information via electronic means. The study fleet, which uses a custom built electronic logbook to record and transmit specified information, is a project under continuing development by the Northeast Fishery Science Center. The electronic submissions made by the study fleet are not currently required by regulation and do not currently have technical, analytical, and personnel support at the Regional Office for large-scale implementation to other fleets or fisheries.

There are several programs that require vessels to declare intent to participate in specific fisheries or management areas through Vessel Monitoring Systems (VMS), to report catch and bycatch information on a daily basis while participating in specific management programs, or both. Examples of these programs are:

Program	VMS Declarations	VMS Reported Data
Atlantic Sea Scallop Open Area Fishery	Yes; intent to fish under open area Day-at Sea(DAS)	None required
Atlantic Sea Scallop Rotational Closed Area Fishery Programs	Yes, intent to fish in specific closed area program	Daily report of Yellowtail Flounder catch and discard (lb)
U.S./Canada Resource Understanding Area	Yes, intent to fish within specific sub-areas within of US/Canada area	Daily report of specified species catch and discard (lb)

Because the study fleet is not an established Northeast Region regulatory program, the remainder of this section will focus on the use of VMS reported data. Other study fleet type electronic reporting programs may be developed in the future or even as part of the SMM amendment, but it is important to note that the infrastructure for such systems would need to be developed and supported by both industry and NMFS. Analysis of suitability for the desired capabilities, costs, reliability, and beta testing would be essential aspects of any new electronic reporting program developed for use through this or other amendments.

Type of Data; Periodicity: The type of data submitted through VMS by vessels at-sea is very broad and has been designed to meet specific management needs. The original design of VMS was to monitor vessel location and activity in relation to closed areas or designated fishing areas. VMS has expanded greatly in recent years and is now used to indicate position and to send and receive text messages. These messages are used to declare a vessel's intent to participate in a discrete management areas or specific management programs and to report daily catch and discard information of selected species. The existing Northeast Region programs reflect varying degrees of complexity exhibiting the range of VMS capabilities: From simple location monitoring in the proposed surf clam/ocean quahog VMS requirements to the very complex NE Multispecies VMS programs.

VMS provides near-real time positional information on the vessel while it is underway and differences in speed can be used, in most instances, to distinguish vessel travel from fishing activities. Some fishery declaration programs allow, as part of their regulatory structure, vessels to change to another fishing area by sending a message to NMFS via VMS while others constrain participation to the originally declared fishery. VMS location data are used to monitor and enforce vessel participation within the specified area(s) and to ensure that permanent or temporarily closed areas are not fished.

For example, the Atlantic sea scallop rotational closed area fishery program allocates a specific number of trips to rotational closed areas within a given year. Vessels declare their intent to participate within such an area before leaving port. While underway and fishing within the area, location information is relayed by VMS. Depending on the area, vessels may be required to submit daily information on the catch and discard of yellowtail flounder. This information, along with observer estimates, is used to monitor yellowtail flounder bycatch TACs for these management areas.

Data Use: Vessel supplied data can be used to monitor the number of trips taken, the area of intended participation, the area fished (VMS positional data), and vessel reported catch and discard of selected species. For best results, catch and discard information must be constantly validated over the course of the season by observer catch and discard estimates for the fishery, management program, or management area. However, vessel supplied estimates can be used for in-season management decisions when other data sources are not available or have yet to be verified. This approach ensures that the majority of the data used to make in-season management decisions is verified against independent reporting sources (i.e., observers or dealer reported landings) and, at any time an action is taken, only a small portion of the data is vessel reported. These data (vessel and observer estimates) can be used to monitor target and non-target species TACs or other regulatory action points (e.g., trip limit change following attainment of specified level of catch).

Limitations: There are numerous limitations that apply to VMS systems and some limitations to the use of self-reported catch and discard information. VMS systems in the Northeast Region are developed and supplied by third party contractors that must meet specific performance standards. Any changes in requirements to the operating systems require modifications or updates to software supplied by the contractors. While some contractors are able to upload new software directly to units to achieve updates, others must install the updates from a CD or the internet. Compliance with updates by vessel operators can have serious implications on the programs for which VMS has been designed. The costs of VMS units, the supporting hardware and software, transmission, and other operational costs have been borne by individual vessels. Periodic reimbursement programs for the purchase of VMS equipment have been administered. There should be no expectation that these programs will continue or be renewed in the future.

Though the transmission of positional data is near real-time, VMS units are subject to periodic satellite signal loss, dropped transmissions, or delays in sending and receiving data. These issues can have serious implications for fishery participants and management programs that require the timely submission of data.

VMS related enforcement requires substantial administrative support. Incorrectly entered declaration codes and missing or incorrectly entered catch and discard information can have substantial impacts to fishery participants and monitoring programs alike. The cost to NMFS of managing and maintaining the VMS system is very high.

Vessel reported catch and discard data transmitted via VMS or other electronic means must be paired with observer estimates for management use. Existing programs where data must be reported by vessels often differs substantially from observer estimates. This may be the result of vessels not using the same level of precision in their estimates as observers or unintentional or intentional under reporting. Observer data must undergo edit and review, and so are not available as quickly as vessel estimates.

SMM Applicability: VMS positional, submitted declaration, or other electronically transmitted data could be used monitor participation in specified stock or management areas (e.g., Cultivator Shoal). If individual stock or management area target or incidental species TACs are developed, the positional or declaration data could be paired with dealer reported data, vessel submitted data, or observer estimates to manage the ACLs. Vessel submitted catch or discard data would, as previously indicated, require verification by dealer data or observer estimates. VMS functions best as a means to monitor position and activity for enforcement (such as proposed in Amendment 1 to the Surf Clam/Ocean Quahog FMP). VMS systems are not as well suited for transmission and receipt of text related messages; however, an alternate means of sending and receiving text messages has not been developed specifically for monitoring use in the Northeast Region.

5.4 CALL-IN SYSTEM MONITORING PROGRAMS

Summary: The Atlantic deep-sea red crab (red crab), tilefish, Atlantic herring, and all DAS fisheries make use of the telephone-based Interactive Voice Response (IVR) system for various components of their monitoring programs. The system, similar to an automated credit card toll free number, prompts users through a series of responses using custom voice prompts and allows the recording of information entered through the telephone keypad.

The IVR system tracks DAS use, records vessel supplied landings data at the end of fishing trips for the red crab and tilefish fisheries, and weekly vessel supplied landings by management area data for herring.

Type of Data; Periodicity: Vessels participating in the DAS fisheries (i.e., NE multispecies, monkfish, sea scallop, red crab) use the IVR system to initiate a DAS trip. Vessel operators call a designated toll-free number and provide a unique identifier code. The system then records the start of the DAS trip and supplies a confirmation code. Vessel operators call back into the system to end their DAS trip and the total time at-sea is deducted, according to the fishery plan's counting method, from the vessels DAS allocation. Some programs also require declarations to be made by VMS in addition to calling IVR.

The red crab and tilefish fisheries also supply end-of-trip landings information through IVR at the completion of trips. These data are used to monitor landings by permit category for tilefish and against the total soft TAC for red crab. These data are available more quickly than dealer reported landings data; however, vessel supplied landings data recorded in the IVR system are matched to dealer data once that information is available.

Limited access herring vessels are required to submit weekly reports of herring catch and discard by management areas. Limited access vessels must supply reports even if no herring are caught in the previous reporting period (negative reports). In addition, open access permit herring vessels vessel that catches more than 2,000 lb of herring are required to report catch and discard, by area, weekly via IVR.

Data Use: Current IVR data can be used to track DAS use against individual vessel DAS allocations and to monitor quotas on both a coastwide and permit level division. IVR can be used to record catches by area as is done in the herring fishery. The IVR system could also be used to track declarations into stock or area management programs.

Limitations: The IVR system performs best for reporting a limited number of species and a small amount of data, because the IVR system can be error prone while entering a large amount of data. IVR is computer based system with a telephone interface for data entry. It is subject to periodic interruptions of service in the event of power loss or failure of back up systems; these disturbances are typically minimal and protocols have been established so that vessels are able to sail under a DAS or record landings information to alternate voice mail numbers even if IVR is offline. User input errors can occur while providing information over the telephone keypad or responding to voice prompts. Transmission quality of cellular telephones has caused periodic problems with the system's ability to recognize the keypad tones that accompany data entry. Dropped cellular telephone calls may also result in partial data loss. If used for area declarations or for reports of catches from stock or management areas, there would not be any at-sea monitoring component unless VMS was also required. Addition of new fisheries such as SMM or new parameters such as area declarations would require additional programming and testing of those new modules, as well as the addition Regional Office support staff.

SMM Applicability: IVR may be used to capture end of trip vessel reported landings information by stock or management area, as is done in the herring fishery, or independently of stock or management area as a means to track harvest against a coastwide quota. IVR could be used to allow vessels to declare trips into either stock or specific management areas (e.g., Cultivator Shoals).

Typically, vessels are given 24 hours to enter landings information into IVR; therefore, IVR data are available for analysis more quickly than electronic dealer reported data submitted weekly and VTRs which are submitted monthly. Because IVR data are self reported by vessels, the landings information supplied could be used for in-season management but would need to be verified against dealer reported data and/or VTRs when those data are available. If IVR were configured so that vessels enter the trip identifier number from VTRs while submitting landings information, effort and location data from VTRs could easily be linked at a later date to the IVR and dealer reported landings data.

Table 7 Comparison of Northeast Region In-season and Annual Catch Limit Monitoring Programs

Method	Data Examples	Fishery Examples	Uses
Dealer Reported Landings Data	Electronic transmission or landings via SAFIS	Summer flounder, *Loligo*, dogfish, scup	Weekly monitoring of hard TAC/TAL fisheries; monitoring for in-season actions to adjust trip and possession limits
At-Sea Vessel Reported Data	VMS; declaration to management area or programs; daily vessel reported catch and discard estimates	NE multispecies, Atlantic sea scallop	Declare into mgt. areas; provide near real-time vessel reported catch and discard estimates; near real-time position data; at-sea messaging system
Call-in System Reported Data	DAS sailing confirmation provided through IVR; weekly herring catch by area recorded in IVR	Monkfish (DAS only), tilefish, red crab, herring	Track DAS use against vessel DAS allocation; track vessel reported landings information (end of trip); track vessel reported catch by management area