

4.1.1.1.4 Option 2 additional area closures

Option 2 contained two additional area closure proposals to insure that that target fishing mortality rate is not exceeded. One option (the proposed action) would implement closures of the Cashes Ledge area in November and Blocks 124 and 125 in January if 50 percent of the target TAC is landed by July 31. A second option (rejected) would have closed the northern half of Block 124 year-round.

Impact of the triggered closure of Cashes Ledge and Blocks 124 and 125: The 1999 landings of GOM cod for the May – July period were approximately 385 metric tons, under trip limits of 200 pounds per day and 30 pounds per day (after May 28, 1999). These landings cannot be used to project 2000 landings under a 400 pound per day trip limit, as there is insufficient discard information. However, the following analysis can illustrate the impact of the proposed closures if they were to take effect.

In previous analyses, the method used to calculate the Cashes Ledge Closed Area impact was to use one-half of the landings of blocks 129 and 130. Using 1997 data, from before the closure was implemented, the November closure of this area would affect 40 metric tons of cod. While this is less than one percent of the total GOM cod landings, it is the highest single month of cod landings from that area. For comparison, the July – October period accounted for 113 metric tons. November landings are likely to be significantly higher following the reopening of the area that has been closed for four months, both in absolute terms and as a percentage of the total. Therefore, the closure of this area for one additional month should have a positive impact on cod conservation, protecting aggregated fish during the peak landings month. The December landings in 1997 declined by nearly 50 percent from November, therefore, it is unlikely this measure will simply delay by one month the high level of catch expected in November if the area were to remain open.

The January closure of Blocks 124 and 125 would start the spawning period closure of this area one month early. These blocks would be closed for four months, until May 1, and then for two additional months in the fall, October and November. While January accounted for only seven percent of the landings from this area in 1997, the month is important to protecting spawning aggregations of cod. The low level of total landings is partially attributable to reduced levels of effort during this time, due to weather, and does not reflect a lower importance of this month in protecting concentrations of spawning fish.

Impact of a year round closure of the northern half of Block 124: Option 2 contained a proposal to close the northern half of Block 124 year-round. Based on NMFS bottom trawl survey data, observer data and VTR data, the northern half of 124 has the highest concentration of cod and accounts for the greatest portion of the catch compared to the southern half. As a portion of the total GOM cod catch in 1998, based on VTR data prorated to the dealer database landings, approximately 26 percent of all GOM cod landings came from the northern half of Block 124.

This area, which encompasses the northern part of Stellwagen Bank, is heavily fished due to its resource abundance and proximity to Massachusetts fishing ports from Gloucester to Provincetown. Both large and small boats, of all gear types are able to fish this area. A year round closure of this area would likely significantly reduce the landings of GOM cod, but since DAS data cannot be distributed at the precision of 1/2 blocks, the amount of effort that would be displaced cannot be calculated. The displaced effort would have the effect of reducing the net impact of the closure. However, since this area has some of the highest cod catch rates, the effect of a year round closure would likely be that total discard levels would be reduced somewhat.

4.1.1.1.5 Options 1 and 2 exemption for the raised footrope trawl

Since NMFS disapproved the MA DMF proposal for an exempted fishery for the raised footrope trawl, the Council deferred discussion of any area closure exemption until it considers the overall exempted fishery. The two raised footrope trawl alternatives that the Council considered for Framework 33 only apply to Options 1 and 2, as Options 3 and 4 do not affect the operation of the fishery. The closure of Block 124 in Option 3 is specific to the northern half of the block where the raised footrope trawl fishery will not occur. In addition, the timing of the Option 3 closures does not overlap with the timing for the raised footrope trawl fishery. None of the closures proposed in Option 4 interfere with the raised footrope trawl fishery either; the year-round closures are north of 42° 15', and the seasonal closures do not conflict with the fishery in terms of timing. Therefore, this analysis should be considered only in the context of Framework 33 Options 1 and 2.

Options: The Council is considering two options for exempting the whiting raised footrope trawl fishery from the Gulf of Maine closed areas proposed in Framework 33: (1) allowing the raised footrope trawl fishery to occur within the Gulf of Maine closed areas and (2) closing only the northern half of Blocks 124 and 125 during the times when the closure of these blocks overlaps with the raised footrope trawl fishery.

Fishery Background: The raised footrope trawl fishery is an experimental fishery conducted in the southern Gulf of Maine that primarily targets whiting and red hake as well as dogfish. Since 1995, the Massachusetts Division of Marine Fisheries (DMF) has sought to establish a small mesh exemption area in northern Cape Cod Bay to provide an opportunity for small mesh (whiting) fishing under groundfish regulations. This requires compliance with the 5% groundfish bycatch standard. To establish compliance, DMF developed the raised footrope trawl and has tested it through NMFS' experimental fishery program for four years. The raised footrope trawl is designed to fish 1-2 feet above the ocean floor, and when combined with a 2.5-inch or 3-inch codend, it retains larger sizes of whiting, red hake, and dogfish. The net design capitalizes on fishes' variable habitat preferences and swimming behaviors and is designed to avoid the catch of flatfish. The trawl's most innovative feature is a chain sweep that is longer than the footrope. The chain sweep contacts the seafloor after the footrope has already passed. Therefore, slow-swimming demersal fishes and most invertebrates, if disturbed by the sweep, are not able to enter the mouth of the net because it has already passed over them.

Although DMF is interested in exploring its viability during the summer months, the raised footrope trawl experimental fishery is primarily a fall fishery. From 1996-1999, the experimental

fishery was conducted from September-November with some limited participation during December. The most productive months for the fishery are October and November. Most vessels engaged in the raised footrope trawl fishery are from Provincetown (MA), Chatham (MA), and Gloucester (MA). For Provincetown, this fishery represents the fleet's "bread and butter" for the fall and early winter.

Massachusetts DMF has worked closely with the fishing industry to explore different areas in the Gulf of Maine for this experimental fishery. Over time, participants in the fishery have helped DMF to streamline some of the experimental areas and eliminate areas where the bycatch of groundfish, especially cod, could present a problem. From this cooperative work, DMF and the industry have identified specific areas where the majority of the raised footrope trawl fishery can be effectively conducted with minimal regulated species bycatch. These areas are illustrated as Areas 2B and 4 in Figure 28 and are of particular interest to participants in the raised footrope trawl fishery. Areas 2B and 4 fall entirely within the southern half of Blocks 124 and 125 (south of 42° 15').

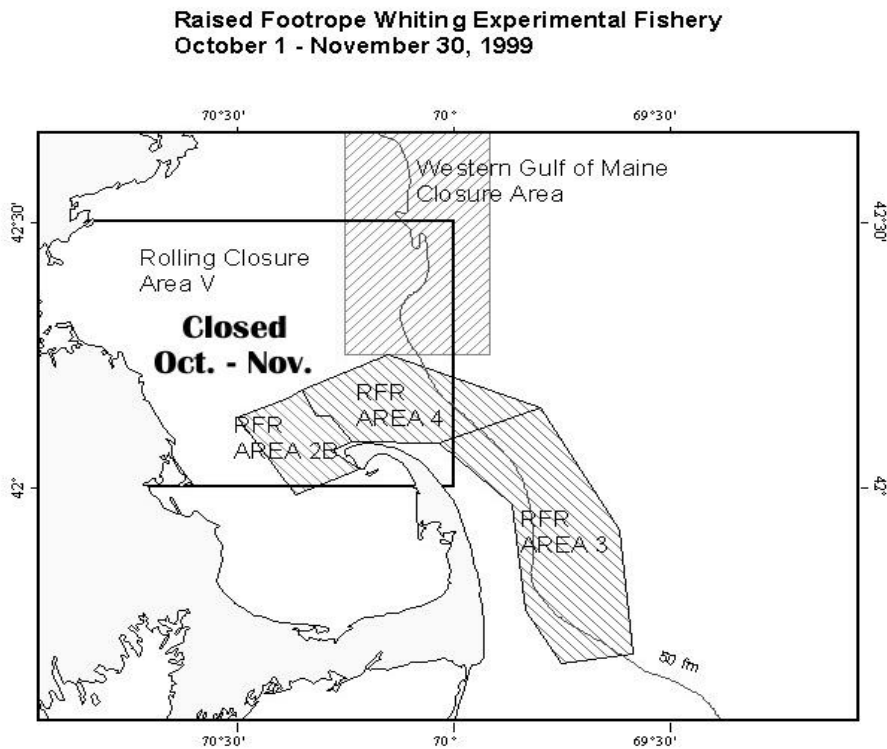


Figure 28 Raised Footrope Trawl Experimental Fishery Areas and Rolling Closure Area V (Blocks 124 and 125). Note: Areas 2B and 4 are of primary concern for raised footrope trawl fishery participants.

For more information about the raised footrope trawl fishery background and design, see the annual reports (1996-1998, 1999 pending) on the southern Gulf of Maine raised footrope trawl experimental whiting fishery, available through the Massachusetts DMF.

Supporting Information: The following information characterizes the amount and type of groundfish bycatch that has been observed in the raised footrope trawl fishery between 1996 and 1999. These data confirm that the raised footrope trawl has operated effectively in Areas 2B and 4 with less than 5% groundfish bycatch. Additional information provided in this section supports the notion that Atlantic cod is more concentrated in the northern half of Block 124 (where the raised footrope trawl fishery does not occur) and that protection of the northern half of the block is more critical for the recovery of the Gulf of Maine cod stock than protection of the southern half of the block.

Groundfish Bycatch Information: DMF has conducted sea sampling trips in the raised footrope trawl fishery for four years in hopes of obtaining adequate data to meet the 5% groundfish bycatch standard for an exempted fishery. In 1996, DMF conducted 20 sea sampling trips in Area 2B. For those 20 trips, cod bycatch was reported to comprise 0.04% of the total catch. In addition, total regulated species bycatch was well below 5% for those 20 observed trips in 1996.

Table 23 reports catch and bycatch information for about 24 sea sampling trips during the 1997 experimental fishery. For both areas, regulated species catch averaged less than 5%. Most groundfish that were caught were flatfish species (winter flounder, plaice), but overall, the fishery operated in these areas with very little bycatch during 1997.

| | AREA 2B | AREA 4 |
|---|----------------|---------------|
| Sampling Period | 9/14-11/19 | 10/24-11/20 |
| Total Catch (pounds) | 79,322 | 6,145 |
| Regulated Species Catch | 3,396 | 19 |
| PERCENT REGULATED SPECIES | 4.3% | 0.3% |
| Catch Rates (Lbs./Hour): | | |
| Whiting | 268 | 219 |
| Red Hake | 87 | 22 |
| Winter Flounder | 13 | 0 |
| American Plaice | 9 | 0 |
| Yellowtail Flounder | <1 | <1 |
| Atlantic Cod | 2 | 1 |
| White Hake | 2 | 0 |
| Haddock | 0 | 0 |
| Pollock | 0 | 0 |
| Total Flatfish Catch Rate (lbs./hr) | 24 | <1 |
| Total Roundfish Catch Rate (lbs./hr) | 4 | 1 |

Table 23 Data from 24 Sea Sampling Trips in 1997 Raised Footrope Trawl Fishery

Table 24 reports catch and bycatch information for about 43 tows observed on sea sampling trips during the 1998 experimental fishery in Areas 2B and 4. For both areas, regulated species catch averaged well below 5%. While cod comprised the largest percentage of regulated species

bycatch, overall, the raised footrope trawl operated successfully in these areas with minimal interaction with regulated multispecies.

| | AREA 2B | AREA 4 |
|---|----------------|---------------|
| Sampling Period | 10/5-11/12 | 10/5-11/19 |
| Total Catch (pounds) | 39,785 | 20,932 |
| Regulated Species Catch | 1,107 | 295 |
| PERCENT REGULATED SPECIES | 2.8% | 1.4% |
| Catch Rates (Lbs./Hour): | | |
| Whiting | 569 | 796 |
| Red Hake | 19 | 0 |
| Winter Flounder | 4 | 3 |
| American Plaice | 2 | 0 |
| Yellowtail Flounder | 2 | 2 |
| Atlantic Cod | 6 | 6 |
| White Hake | 0 | 0 |
| Haddock | 0 | 0 |
| Pollock | 0 | 0 |
| Total Flatfish Catch Rate (lbs./hr) | 9 | 5 |
| Total Roundfish Catch Rate (lbs./hr) | 6 | 6 |

Table 24 Data from 43 Sea Sampling Tows in 1998 Raised Footrope Trawl Fishery

The 1999 experimental fishery has been completed, and DMF is currently assimilating and summarizing the data. Sea sampling and data collection from this fishery was at a high during the 1999 season, and DMF anticipates having more and better information than ever on both whiting catches and groundfish bycatch. The 1999 experimental fishery information should be available for inclusion in the final Framework 33 document.

Cod Distribution in Block 124: The Northeast Fisheries Science Center provided the Council with an analysis of Atlantic cod distribution in Block 124 (Wigley and Brown, NEFSC). The Science Center reviewed information from spring and autumn research vessel surveys, domestic sea sampling data, and commercial logbook data (VTR) with an emphasis on 1998.

Tows were made at a total of 30 stations during the autumn survey (1995-1999) and 24 stations during the spring survey (1994-1998) in Block 124. The overall catch rate of cod in the northern half of Block 124 was 10.4 times greater than it was in the southern half (21.9 kg/tow vs. 2.1 kg/tow) during the spring survey. During the autumn survey, the overall catch rate in the northern half was 5.1 times greater than it was in the southern half (12.8 kg/tow vs. 2.5 kg/tow). Distribution plots show that cod are most concentrated in the northwest and west-central portions of Block 124.

Three gear types accounted for all cod catch examined in the sea sampling database: gillnet, otter trawl, and scallop dredge. A total of 24,802 pounds of cod were caught on these observed trips,

primarily by gillnet vessels. Of the total observed cod catch, about 3% came from the southern half of Block 124.

In 1998, a total of 11,120 metric tons of Atlantic cod were reported as landings in the dealer weighout database (all stocks and all areas). Of this total, only 6,875.5 mt (62%) can be accurately cross-referenced with VTRs to obtain information on “area fished.” Eleven percent of this VTR data was reported to have been caught in Block 124 during 1998. About 14% of the landings from Block 124 came from the southern half of the block. If these landings are expanded to the dealer database total, then the landings in the southern half of Block 124 would account for about 2% of all cod landings and about 4% of the total landings for the Gulf of Maine cod stock.

Comparative Analysis of Framework 33 Options: The following two options for the raised footrope trawl fishery were compared and evaluated based on potential biological impacts, potential economic impacts, administration, enforcement, bycatch, and data acquisition:

- (1) Exempting participants in the raised footrope trawl fishery from the Gulf of Maine closed areas that overlap with the timing of the fishery (during the fall in Blocks 124 and 125)
- (2) Closing only the northern half of Blocks 124 and 125 (where applicable) so that the raised footrope trawl fishery area would remain open to all types of fishing.

Table 25 compares the two framework options and characterizes the differences in their potential impacts. A “+” denotes that the option is likely to produce a *more positive* benefit than the other option for the category under consideration. A “-“denotes that the option is likely to produce a *more negative* benefit than the other option for the category under consideration. Additional comments are provided to help characterize the differences between the likely impacts of the two alternatives under consideration.

| | Biological Impact | Economic Impact | Administration | Enforcement | Bycatch | Data Acquisition |
|---|---|---|--|--|--|---|
| Option 1: Exempt from Closed Area | + prevents other vessels from fishing in area and targeting reg. spp | + provides opportunity for small mesh boats to remain viable in the GOM during fall and winter- offers alternative fishery for boats that can catch whiting | - would likely require a call-in program and exemption certificates, similar to the Cultivator Shoal whiting fishery – increases administrative burden | - difficult to identify rft vessels from a distance – would require increased monitoring to distinguish rft vessels from other vessels in the area | + more positive than Option 2- reg. spp bycatch with rft unlikely to exceed 5% - overall catch of reg. spp will be lower | + exemption program could allow for better info on vessels in the rft fishery – no. and type of vessels and better time-specific data |
| Option 2: Move boundary of closed area | - allows all boats to access the area and potentially target reg. spp– does not offer the same protection to reg. spp as Option 1 | + provides more opportunity for all vessels that historically fish in that area (for all species) to remain viable in the GOM during fall and winter | + eliminates necessity to monitor which vessels are in the area – would not require a certification program | + does not require additional monitoring to distinguish rft vessels from other vessels fishing in the area | - more negative than Option 1–likely to result in greater overall catch of reg. spp | - no mechanism to monitor the activities of vessels in the rft fishery or in other fisheries in the area-no chance to get better data through the program |

Table 25 Comparative Analysis of Raised Footrope Trawl Options Under Consideration

* “reg. spp” refers to the ten regulated groundfish species; “rft” refers to the raised footrope trawl fishery

Summary and Conclusions: The raised footrope trawl significantly reduces the bycatch of most regulated groundfish species while not compromising the catch of target small mesh species, an accomplishment for which the Council commends the fishing industry and the Massachusetts DMF. The Council believes that the development of the raised footrope trawl demonstrates the creativity and innovation that will keep the small mesh fishing fleet in the Gulf of Maine viable now and in the future. In turn, the Council wants to provide these vessels with an opportunity to catch whiting in the Gulf of Maine during the fall and winter. The Provincetown dayboats in particular are critically dependent on nearshore access to whiting fishing grounds.

The Council already formally voiced its support for the continuation of the raised footrope trawl fishery on several occasions (discussion at Committee and Council meetings, letters to NMFS). The two options under consideration in this framework adjustment confirm the Council's intent to allow the raised footrope trawl fishery to occur in Areas 2B and 4. Supporting data suggest that Options 1 and 2 are both reasonable alternatives for allowing continued access to small mesh resources in the Gulf of Maine. If the Council selects Options 1 or 2 for Framework 33, then it should compare the two raised footrope trawl alternatives and weigh their individual costs and benefits to select the final option for inclusion in this framework adjustment.

4.1.1.2 Impact of Option 3

The Council rejected Option 3 because it did not meet the biological objectives of the FMP.

4.1.1.2.1 Impact of area closures and trip limits

This option shares many of the same elements as Option 4. Consequently, analysis of the impacts faces the same difficulties as described in the following section (Option 4 analysis of impacts). This option does not benefit from the 25 DAS/trips limitation during February – May that is in Option 4. Also, this option proposes a closure of the northern half of Block 124 March-August instead of the Area III closure (year-round) in Option 4. The impact of this measure on cod catches would be less than what is calculated for the Option 4 closure because the analysis of Option 4 is based on landings from the entire northern half of Block 124 (due to data limitations), and the duration of the closure is less. The third main difference between the two options is that this option proposes to increase the minimum size of cod from 19 inches to 21 inches (which would apply to all cod not just in the Gulf of Maine). The impact of the increase in the cod minimum size is discussed in Section 4.1.3 below.

Based on the analysis of Option 4 and the other elements described above, this option would not meet the plan objectives and restrain cod landings to below the TAC.

4.1.1.3 Impact of Option 4

The Council rejected Option 4 because it did not meet the biological objectives of the FMP. Option 4 proposed to modify current area closures in the Gulf of Maine and limit the number of DAS or trips a vessel can take in the western Gulf of Maine during February – May. Like the other options, this option also proposed a 400 pounds per day cod trip limit, however it would reinstate the running clock (except during the February – May period).

4.1.1.3.1 Analysis of February – May DAS/trips limitation

Option 4 includes a proposal to limit vessels fishing in the Western Gulf of Maine Restricted Fishery Program (see Figure 4) to 25 DAS or trips (call in/out cycles), whichever is less, during February through May (actually, in the fishing year, the restriction would apply during May and February – April, and is analyzed as such). Initially, this proposal applied to all multispecies vessels and subsequently, as an option in Framework 31, it applied to the Gulf of Maine. The following section includes both the original analysis, covering all multispecies vessels, as well as the analysis done excluding vessels that did not fish in the Gulf of Maine during the months of February – May. The impact of the current proposal would be less than that calculated for the entire Gulf of Maine because it would apply to a smaller area and would allow vessels to continue to fish outside of the area, and catch Gulf of Maine cod, when not enrolled in the exemption program. The difference between the impacts of the current proposal and the whole Gulf of Maine proposal have not been analyzed. While the current proposal has less than a 5-7 percent impact on GOM cod landings, the PDT agreed that the concept of seasonal DAS reductions, at some level, should be explored as a strategy for reducing fishing effort during the period of highest landings-per-unit effort on a target stock, especially if overall DAS reductions are not an acceptable approach.

The number of days-at-sea (DAS) used by vessels with limited access multispecies permits is summarized below. Data is based on those vessels that called into the DAS system during the 1997 and 1998 fishing years. Buyout vessels are included in the 1997 fishing year data. There are minor differences in this data and data included in the 1998 Multispecies Monitoring Committee Report; the reason for the differences have not been determined, but are likely due to revisions to the databases that are made over time. There are also minor differences between the annual summaries in the overview and the monthly breakdowns. These differences total 28 DAS in the 1998 fishing year and 16 DAS in the 1997 fishing year.

In this data, a trip is defined as one call-in/call-out cycle, regardless of the number of landings made during that period. DAS were allocated to the month actually used. For trips that extended over the end of a month, the DAS were calculated for each month and the resulting proportion used to allocate part of the trip to each month.

Overview

Table 26 summarizes multispecies days-at-sea (DAS) used in fishing years 1996 through 1998. Data for 1996 is from the 1998 Multispecies Monitoring Committee (MSMC) Report. Data for 1997 and 1998 was generated using DAS information provided by NMFS Northeast Region Law Enforcement staff. The data for 1997 shown here differs slightly from that in the 1998 MSMC report.

In 1998, the number of permits allocated DAS declined to 1,636 from 1,715 in 1997. Even with the decline in permits, the number of DAS allocated to these permits increased by just over 1%. Allocated DAS can increase for a number of reasons. Vessels are allowed to carry-over up to ten DAS into the following year; the number of permits that exercise this option can change from year to year. History permits that are activated contribute to an increase. Finally, DAS sanctions resulting from enforcement actions can change the allocation from one year to the next. Allocated DAS can also decrease from year to year for similar reasons.

1,062 permits called-in to report DAS in 1998, a decline of 29 vessels from 1997. DAS allocated to vessels that called-in increased by 4.4% in 1998. Figure 29 and Figure 30 illustrate DAS allocated and used for the years 1996 through 1998, by permit categories. The number of DAS used by vessels that called-in was 52,935 DAS, an increase of 7% from 1997 and an increase of 1.6% from 1996. Overall, the total percentage of allocated DAS used by all permitted vessels increased to 34%, while the percentage of allocated DAS used by vessels that called-in increased to 50%. The percentage of allocated DAS used by vessels that called-in increased for all permit categories. The greatest number of unused DAS is in the fleet DAS permit category. Hook gear permits use the smallest percentage of allocated DAS.

Table 27 through Table 29 summarize the use of DAS by permit categories. Vessels that did not call-in DAS are not included in these tables. The percentage of DAS used increased for all permit categories. Individual DAS permits used most of the DAS they were allocated. Nearly 95% of individual DAS permits used over half the DAS allocated, and over 90% used more than 70% of the DAS allocated. By comparison, in 1997 87% of individual DAS permits used over half the DAS allocated. For fleet DAS permits that called-in, 43% of the permits used more than half their allocated DAS. Just over one-quarter of the permits used more than 70% of the allocated DAS. These percentages increased from 1997 as well, when only 38% of the permits used over half the DAS allocated. Hook category permits used the smallest percentage of DAS allocated (18% overall). Only 10% of hook gear permits that called-in used more than half the DAS allocated.

In addition to the permits allocated DAS in 1997 and 1998, there are "history" permits that are not assigned a DAS allocation until they are re-activated. As of April, 1999, there were 72 multispecies history permits. The minimum number of DAS that could be allocated to these vessels, if re-activated, is 6,336 DAS (based on 88 fleet DAS). 15 of these permits were converted to history permits during fishing year 1998 and were allocated, and in some cases used, DAS.

Monthly DAS Use, All Areas: Table 31 compares monthly DAS used in fishing years 1997 and 1998 in all areas. Only permits that called-in to use a DAS are included. Fishing year 1997 data includes permits that were removed through the capacity reduction program. The DAS totals in this table differ slightly from those shown in Table 26.

The overall distribution of DAS used over the course of the fishing year, as a percentage of annual DAS used in a given fishing year, shows little variation from 1997 to 1998. For eleven months of the fishing year, the percentage of DAS used is either constant or changed by no more than 1%. The percentage of DAS used in April 1999 was 2% lower than the percentage used in April 1998. Individual permit categories show more variation. Individual DAS permits used their DAS in a similar fashion in 1997 and 1998. For fleet DAS permits, the percentage of DAS declined by 4% in April 1999 and increased by 2% in May 1998. For hook gear vessels, DAS used declined by 2% in October 1998 and April 1999, but increased by 4% in July 1998 compared to the previous year. Combination and large mesh fleet DAS vessels showed considerable year to year variation based on percentage of DAS used.

Overall, the number of DAS used increased by about 3,500 DAS from 1997 to 1998. Most of the increase can be attributed to the fleet DAS, hook gear, and combination permit categories. (The

hook gear permit category does not include vessels that choose to use hook gear in the individual and fleet DAS permit categories). The largest absolute increase came in the fleet DAS category, which used about 3,300 more DAS in 1998 than in 1997, a 10% increase. DAS used by fleet permits increased during every month except October, February, and April. For hook gear vessels, DAS use increased every month except October. The absolute increase in DAS was 365 DAS for hook gear permits, a 24% increase. Combination vessels increased DAS every month of the year except October.

Table 32 summarizes the number of call-in/call-out cycles made by multispecies vessels during fishing years 1997 and 1998. The table refers to each complete cycle as a "trip." It's important to note that a vessel may land fish more than once during one cycle since there isn't a regulatory requirement that a vessel stop its DAS clock when it lands its catch or moors. While the number of DAS increased from 1997 to 1998, the number of complete cycles decreased.

The changes in the percentage distribution over the year of these cycles is similar to the changes in DAS distribution noted earlier. For example, the percentage of annual trips used in April by fleet DAS vessels decreased by 5% from 1997 to 1998, similar to the 4% decrease in DAS. In terms of actual numbers of trips, individual DAS and fleet DAS vessels decreased the number of call-in/call-out cycles from 1997 to 1998, while the other permit categories increased the number of cycles. For the 1998 fishing year, fleet DAS permits decreased the number of trips by 1,684 cycles (from 27,622 in 1997 to 25,938 in 1998). For the period of May 1998 and February through April 1999, fleet DAS decreased the number of call-in/call-out cycles by 2,238 (from 10,507 in fishing year 1997 to 8,269 in fishing year 1998). Individual DAS vessels decreased their total number of trips from 3,418 in 1997 to 3,229 in 1998. Note that while individual DAS vessels also decreased their DAS used from 1997 to 1998, fleet DAS vessels increased their DAS used while decreasing the number of trips. This could either indicate vessels spending more time at sea, vessels "running the clock" because of the Gulf of Maine cod trip limit, or vessels making multiple voyages without stopping the DAS clock.

Impact Of Option 4 Das/Trip Caps: Option 4 proposed to reduce fishing mortality on Gulf of Maine cod, in part, by limiting all vessels to 25 DAS or trips during May, February, March, and April of each fishing year. The analysis assumes that the cap applies to these four months in the same fishing year (for example, May 2000 and February/March/April 2001, not February through May, 2001).

In order to estimate the impacts of this option, fishing activity by multispecies vessels was examined in fishing years 1997 and 1998. The impacts of the proposed cap on the actual fishing activity in those years were then evaluated. The number of DAS and trips that would have been "lost" if the cap were in place was calculated. In addition, the number of DAS and trips that could be "gained" if every permit that used DAS fished to the limit can also be calculated. This approach is similar to the "bag limit" approach used to estimate the impact of limits. Several assumptions in using this method should be noted.

- (1) The analysis does not account for any changes in fishing behavior that may result from the DAS/trip cap. The analysis assumes fishermen would fish at the same times of

year as they actually fished, in the same areas, and at the observed levels of effort. It assumes they would be limited by the cap but makes no attempt to model changes in the levels or distribution of effort.

(2) The analysis assumes there will be a connection between actual voyages (defined as a vessel leaving and returning to port, whether fish are landed or not) and a complete call-in/callout cycle, or trip (as defined in the analysis). If this is not the case, some vessels (those that use a small percentage of their annual DAS allocation but make more than 25 trips during the period) could reduce the impact of the cap by letting their DAS clock run while making multiple voyages.

(3) The analysis assumes the months in question are in the same fishing year (two different calendar years) and do not overlap two fishing years.

(4) No allowance is made for permits that did not use groundfish DAS. If the effort represented by these permits were to enter the fishery, the impacts of any proposed cap, would be significantly reduced.

(5) No estimate is made of cod that may be caught during other times of the year as a result of fishermen shifting DAS or trips capped by the limit into another month of the year.

(6) The results of this analysis, based on observed fishing effort in the 1997 fishing year, may not be transferable to existing conditions. Changes in regulations, the markets, and conditions of the resource may result in changes in fishing behavior that reduce the reliability of these estimates.

(7) The analysis does not show the impact of a cap on DAS or number of trips on other species or on total revenues for any of the permit categories.

The Vessel Trip Report (logbook) database includes information on fishing locations. There is no direct link between the DAS database and the logbook database. This prevents a particular trip from being directly tied to a specific DAS cycle, making it difficult to analyze exactly how many DAS were used by a vessel in the Gulf of Maine during a given period. For this reason, DAS used and trips taken were first summarized over all areas for all vessels for a four month period in the fishing year. This gives an accurate baseline count of the number of DAS used and trips taken. A further analysis, described below, attempted to identify the vessels that fished in the Gulf of Maine and calculated the impact of the proposed cap on this smaller group of vessels. Fishing year 1997 was examined since additional inshore closures in the Gulf of Maine were in place in fishing year 1998.

The impact of the proposed 25 DAS/25 trip limit was calculated for all vessels in all areas by calculating the number of DAS or trips that would have been "lost" if the cap were in place (subject to the assumptions listed above). The possible increase in DAS or trips if vessels that fished below the cap increased their activity is also calculated. When calculating the increase in DAS, the annual allocation of DAS to each permit was considered – a vessel that fished less than 25 DAS during the

period, but used all its DAS over the course of the year, was assumed to be unable to increase its DAS to the cap. This ignores the possibility a vessel may shift its fishing effort from one part of the year to another.

Table 33 and Table 34 summarize this information for the 1997 fishing year with a proposed cap of 25 DAS/25 trips, if these limits were applied to all vessels in all management areas. 19% (3,425) of the DAS used during May, February, March and April in fishing year 1997 would have been limited by a 25 DAS cap. Generally, the DAS cap impacts individual DAS vessels while the trip cap impacts other permit categories. A 25 DAS cap would have impacted 73% (109) of the individual DAS vessels that used DAS in 1997 if it was applied to all management areas. By comparison, 19% (161) of fleet DAS vessels, 4% (4) hook gear, and 0% of the combination or large mesh fleet DAS vessels would have been constrained by the limit. The impacts of the proposed trip cap, however, are different: 17% (2,074) of the trips taken in the four month period in fishing year 1997 would have been limited by a 25 trip cap. For individual DAS vessels, a 25 trip cap would have constrained 2% (3) of the vessels. 18% (145) of fleet DAS vessels, 5% (5) hook gear vessels, and none of the combination or large mesh fleet DAS vessels would have been constrained by the trip cap.

In order to estimate the impact of the proposed caps on vessels fishing in the Gulf of Maine, the vessel logbook database was queried to identify all trips from the Gulf of Maine during the four month period. Reported cod landings were obtained for the vessels that made these trips. For the analysis, vessels that reported landings from the Gulf of Maine in a month the cap would be effective were assumed to make all their trips and use all their DAS in the Gulf of Maine during that month. This assumption may introduce errors into the analysis because vessels may have fished in other areas on some trips. The alternative, however, is a trip by trip analysis that cannot be performed because, as mentioned earlier, there is no direct link between the DAS data and the logbook database. This assumption overestimates the number of DAS and trips used in the Gulf of Maine and overestimates the impacts of the proposed cap. A lack of time prevents these results from being compared to the list of vessels that applied for an exemption to the Gulf of Maine cod trip limit.

Table 35 and Table 36 summarize the number of DAS and call-in/call-out cycles used in the Gulf of Maine during the months of May 1997, and February through April 1998. 9,523 DAS were used in this area during this time period, roughly 20% of total annual DAS used. The most DAS and the most trips were used in April of 1998. There were 7,217 call-in/call-out cycles in this area during the period, or about 22% of the total number of cycles for the year.

Using the same approach used for all areas, the impact of a 25 DAS and 25 trip limit on Gulf of Maine effort was calculated. Table 37 and Table 38 summarize these impacts. A 25 DAS limit imposed on observed effort in fishing year 1997 would have reduced the number of DAS used by 1,786, or 18.7% of the total during the four-month period. The impact of the DAS limit varies by permit category. Individual DAS vessels would have lost 778 DAS, or 31% of the DAS used during this period. Fleet DAS permits would have lost 978 DAS, or 14.7%. With respect to the 25 trip cap, 1,528 trips (21% of the total in the period) would have been lost if the limit was in effect in fishing year 1997. Individual DAS vessels would have lost only 18 trips (3%). Fleet DAS vessels would have lost 1,491 trips, or 23.8% of the total trips taken.

The number of DAS constrained was calculated for various DAS limits and plotted in Figure 31. The number of vessels that would be constrained by a given number of DAS was also plotted on the same graph. By choosing a DAS limit on the bottom axis, the impact on DAS used in the Gulf of Maine in fishing year 1997 can be estimated. At the same time, the number of vessels that would be constrained by the limit can be determined by using the right hand axis and the vessel curve. Figure 32 shows the impact of various limits on the number of trips (call-in/call-out cycles) on the number of trips in the Gulf of Maine, based on observed effort in the 1997 fishing year.

Estimated Impact of Limits on Cod Landings: The impact on the Gulf of Maine cod catch of the various trip and DAS limits was estimated based on observed activity and landings in fishing year 1997. The vessel trip report database was queried to identify vessels with landings of any species from statistical areas 464, 465, and 510 through 515. Vessels with landings reported in the months of May 1997 and February through April 1998 were then combined with information on monthly DAS usage from the NMFS Office of Enforcement. A database was constructed that combined these two datasets, focusing on cod landings from these statistical areas.

The monthly Gulf of Maine cod landings identified in this fashion differ from the landings reported by the Northeast Region's Office of Statistics. This is because NMFS uses a combined dealer and vessel logbook database, while the analysis in this section relied entirely on vessel logbook data. The differences between the two sets of data are summarized in Table 39. Because of these differences, the cod landings in the following analysis cannot be directly compared to other data in this document. For this reason, in this section the landings information, and the impact of the proposed limits, are reported as percentages of the analyzed landings.

Table 40 and Table 41 summarize the percentage of analyzed Gulf of Maine cod landings by permit category. From these tables, it can be seen that in the four months examined in the 1997 fishing year, fleet category permits landed 66% of the Gulf of Maine cod analyzed. Individual DAS vessels landed 31%, and hook gear permitted vessels landed 3%. Combination and large mesh fleet DAS vessels landed an insignificant amount of the analyzed landings. 51% of the cod was landed by vessels that used 30 DAS or less, 65% by vessels that used 35 DAS or less, and 75% by vessels that used 40 DAS or less during the four-month period. With respect to number of trips (call-in/call-out cycles), 43% was landed by vessels that used 10 trips or less, 52% by vessels that used 15 trips or less, and 74% by vessels that used 35 trips or less.

The impact of various limits on DAS or number of trips was estimated by assuming that for a given vessel, cod landings would decline by the same percentage as trips or DAS constrained. That is, there is an assumed uniform catch rate on all trips in the period. For example, a 10% loss in DAS equated to a 10% loss in cod landings; a 10% decline in number of trips is assumed to result in a 10% decline in cod landings. The results should be considered the maximum decline in landings for the following reasons. First, if a trip or DAS limit is imposed, fishermen are likely to use their effort when they will maximize their profits. This may mean focusing on days with high cod catch rates. Second, they may shift some of their effort to other times of the year and catch Gulf of Maine cod. While vessels that are not presently using all their DAS may be unlikely to do so, those vessels currently using all or most of their DAS are likely to use up the DAS in some month without a limit. Both of these reactions would reduce the impact of any limit on DAS or number of trips.

The results of these estimates are shown in Table 42 for the DAS cap and in Table 43 for the various trip caps. The percentages in these tables, as noted above, refer to the percentage of analyzed landings (during the four-month period) that would be foregone under the proposed limits. The proposed 25 DAS cap would have constrained 20% of the analyzed landings, with 9% contributed by individual DAS permits and 11% by fleet DAS permits. Because each of these permit categories caught different amounts of cod, this means individual permit vessels would have lost about 30% of their cod landings, and fleet DAS vessels would have lost 17% of their cod landings. Under the proposed 25 trip limit, 13% of the landings would have been constrained; 12% (equal to 18% of the cod landings by this sector) would be contributed by fleet DAS permits, while the other permit categories combined contributed 1%.

During the 1997 and 1998 fishing years, approximately 37 percent and 35 percent, respectively, of cod was landed during the four months, May and February-April. Thus, approximately five to seven percent of the total cod landings for the year would be constrained, not considering effort shifts to other parts of the year.

Figure 33 summarizes the "savings" in analyzed cod landings under various DAS limits for three permit categories. By choosing a particular DAS limit, the percentage of analyzed landings constrained from each permit category can be estimated. The total amount is the sum of the percentages for all three permit categories. Figure 34 is a similar illustration of the impact on the analyzed landings of various limits on the number of trips. (The lines on these figures are smoothed lines connecting the datapoints for clarity, and are not the result of a regression analysis of the data).

Table 44 and Table 45 summarize the number of DAS constrained by various DAS or trips limits, based on permit categories. These two tables show that the impact of DAS and trip limits differs between the three permit categories that landed most Gulf of Maine cod. While not an explicit measure of the impacts of the limits on other activities of these vessels, these tables do give a sense of the possible impacts on vessel activities. The proposed 25 DAS limit, for example, constrains 31% of the DAS used by individual DAS vessels during the four month period in the 1997 fishing year, but only 15% of the DAS used by fleet category permits and 9% of the DAS used by hook gear permits. This would indicate the proposed DAS limit would affect overall landings and revenues of individual DAS vessels more than the other permit categories. In a similar fashion, Table 45 summarizes the number of groundfish trips constrained by various trip limits based on observed effort in the 1997 fishing year. The proposed 25 trip limit would only constrain 3% of the trips taken by individual DAS vessels in fishing year 1997, while constraining 6% of the hook gear trips and 24% of the fleet DAS trips. Figure 35 and Figure 36 illustrate the data in these tables.

Discussion: The data presented indicates that a restriction on DAS used and trips taken in the Gulf of Maine during the months of May, February, March and April of a fishing year may reduce cod landings during this period. The information presented must be evaluated with a clear understanding of the assumptions listed previously. Shifts in effort to other times of the year or even in-season changes in the distribution of DAS could reduce the estimated impacts of this approach.

It is clear that the proposed limits have different impacts on different permit categories. For an equitable use of this method, different restrictions may need to be adopted for different permit categories. The information in the figures in this analysis can be used as a starting point for discussion. For example, if the goal is to have each permit category reduce its effort on groundfish in the Gulf of Maine by a similar percentage, Figure 35 and Figure 36 can be examined together. A 35 DAS limit would reduce individual DAS effort by about 15% but would have a much smaller impact on fleet DAS and hook gear permits. A 30-trip limit on fleet DAS vessels during the proposed four month period would reduce effort by 17%, or roughly the same impact as a 30 DAS limit on individual vessels. Lower limits would need to be set for hook permits, but because of this category's low analyzed cod catches, the savings would be negligible.

Using these limits to enter the graphs in Figure 33 and Figure 34, the 35 DAS limit on individual DAS vessels would "save" about 4% of the analyzed Gulf of Maine cod landings observed in 1997. This is about 13% of the cod landings by this sector. A 30 trip limit on fleet DAS vessels would "save" 9% of the cod landings by this sector. This is about 15% of the analyzed cod landings by fleet permits. Total estimated "savings" with these two measures is about 13% of the analyzed cod landings. As noted, this estimate should be viewed with caution because it does not account for changes in behavior or the redirecting of effort to other times of the year. In addition, the limit on trips will only be effective if a trip is defined as each time a vessel returns to port. If a trip is defined as a call-in/call-out cycle (as defined in this analysis), vessels that use a small percentage of their DAS will be able to avoid the impact of a limit on trips by running their clock and making multiple trips during each cycle.