

The following tables show the monthly DAS usage by gear sector and vessel size class (Table 46) and the percentage of DAS used by gear sector and vessel size class (Table 47) in the 1998-1999 fishing year (all multispecies vessels). Table 47 results are also shown graphically in Figure 37 - Figure 40. These figures indicate that different gear sectors have noticeably different DAS usage patterns, with otter trawls vessels using a greater percentage of DAS in the spring, gillnet vessels in the summer, and hook vessels in the winter. Effort usage patterns in 1999 are likely to be significantly different as vessels in the Gulf of Maine and Georges Bank anticipated or responded to changes in the management plan under Frameworks 27 and 30.



GEAR SECTOR & VESSEL CLASS (GRT)		MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	TOTAL	
														DAS Usage	Vessels
Otter Trawl	< 5	93	69	34	14	12	21	39	28	9	5	18	15	358	8
	5 - 25	756	586	388	233	202	170	293	253	227	115	285	587	4,094	121
	26 - 50	876	843	664	477	477	428	526	584	514	390	511	813	7,102	148
	51 - 75	507	471	377	293	336	294	391	417	372	350	386	439	4,635	72
	76 - 100	358	321	372	364	346	352	303	421	290	281	367	501	4,276	65
	101 - 150	1,155	1,127	1,023	936	1,120	875	635	800	637	562	1,029	1,115	11,012	124
	150+	534	500	470	472	663	540	397	466	459	370	628	549	6,048	62
	<b>SUM</b>	<b>4,280</b>	<b>3,916</b>	<b>3,327</b>	<b>2,790</b>	<b>3,156</b>	<b>2,680</b>	<b>2,583</b>	<b>2,969</b>	<b>2,508</b>	<b>2,073</b>	<b>3,224</b>	<b>4,019</b>	<b>37,525</b>	<b>600</b>
Gillnet	< 5	14	11	11	11	10	8	8	7	2	0	0	0	81	2
	5 - 25	418	666	613	448	566	460	397	309	255	126	178	308	4,744	94
	26 - 50	298	321	240	172	239	206	228	217	231	97	106	291	2,646	43
	51 - 75	16	40	49	47	58	66	42	51	46	39	44	56	553	6
	<b>SUM</b>	<b>746</b>	<b>1,039</b>	<b>912</b>	<b>677</b>	<b>872</b>	<b>739</b>	<b>676</b>	<b>584</b>	<b>534</b>	<b>261</b>	<b>328</b>	<b>655</b>	<b>8,024</b>	<b>145</b>
	Hook	< 5	2	0	0	1	0	0	2	4	9	7	3	3	31
5 - 25		40	85	104	127	140	70	64	186	232	153	172	180	1,553	38
26 - 50		36	61	65	74	54	24	34	54	60	38	61	68	629	8
51 - 75		14	17	18	0	0	0	2	7	0	9	9	17	93	2
76 - 100		0	0	0	0	0	0	0	0	8	13	2	10	34	2
101 - 150		0	11	16	12	3	0	0	0	8	11	13	0	75	1
<b>SUM</b>		<b>92</b>	<b>175</b>	<b>202</b>	<b>214</b>	<b>198</b>	<b>93</b>	<b>102</b>	<b>252</b>	<b>317</b>	<b>231</b>	<b>260</b>	<b>279</b>	<b>2,414</b>	<b>53</b>
Other Gear		< 5	50	47	35	63	49	26	37	49	19	18	34	35	463
	5 - 25	358	335	218	161	155	86	186	368	441	281	309	441	3,340	173
	26 - 50	39	37	45	18	33	3	7	39	35	38	67	109	469	23
	51 - 75	29	4	3	1	0	0	0	27	17	43	53	46	224	4
	76 - 100	6	9	1	0	1	0	6	6	48	38	49	58	222	5
	101 - 150	34	26	13	17	27	8	5	21	8	15	22	55	250	5
	150+	51	17	33	40	70	63	54	95	93	70	95	86	766	12
	<b>SUM</b>	<b>568</b>	<b>474</b>	<b>348</b>	<b>300</b>	<b>334</b>	<b>186</b>	<b>295</b>	<b>605</b>	<b>662</b>	<b>503</b>	<b>628</b>	<b>830</b>	<b>5,734</b>	<b>257</b>
All Gears	< 5	159	127	79	89	71	55	86	87	39	30	56	54	933	47
	5 - 25	1,573	1,672	1,323	970	1,063	786	939	1,116	1,156	675	943	1,517	13,732	426
	26 - 50	1,248	1,262	1,014	740	803	661	796	895	841	562	745	1,280	10,847	222
	51 - 75	566	533	446	342	394	360	435	503	434	441	492	558	5,504	84
	76 - 100	364	330	373	364	346	352	309	427	346	333	419	569	4,532	72
	101 - 150	1,189	1,163	1,052	964	1,149	883	640	821	653	588	1,063	1,169	11,336	130
	150+	586	517	502	512	733	603	451	561	552	440	723	635	6,814	74
	<b>SUM</b>	<b>5,685</b>	<b>5,604</b>	<b>4,790</b>	<b>3,981</b>	<b>4,560</b>	<b>3,699</b>	<b>3,655</b>	<b>4,410</b>	<b>4,022</b>	<b>3,069</b>	<b>4,440</b>	<b>5,782</b>	<b>53,697</b>	<b>1,055</b>
Unknown Gear	28	22	32	12	27	11	36	67	9	27	13	36	319	30	
Sources:	Enforcement DAS Call-in Database, Vessel Trip Report Database & Permit Database														
1. Limited Access Vessels with Multispecies DAS allocations that did not call in their trips to the call-in database during the 98/99 FY (a total of 572 vessels) have been excluded from this data.															
2. Trips in the "unknown" category have data in the DAS database but not the Vessel or Permit databases. Reasons unknown.															

**Table 46 Monthly DAS Utilization by gear sector and vessel size class, May 1998 – April 1999**

GEAR SECTOR & VESSEL CLASS		MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	TOTAL DAS Usage
Otter Trawl	< 5	26	19	9	4	3	6	11	8	3	1	5	4	100
	5 - 25	18	14	9	6	5	4	7	6	6	3	7	14	100
	26 - 50	12	12	9	7	7	6	7	8	7	5	7	11	100
	51 - 75	11	10	8	6	7	6	8	9	8	8	8	9	100
	76 - 100	8	8	9	9	8	8	7	10	7	7	9	12	100
	101 - 150	10	10	9	9	10	8	6	7	6	5	9	10	100
	150+	9	8	8	8	11	9	7	8	8	6	10	9	100
	<b>SUM</b>	<b>11</b>	<b>10</b>	<b>9</b>	<b>7</b>	<b>8</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>8</b>	<b>7</b>	<b>6</b>	<b>9</b>	<b>11</b>
Gillnet	< 5	17	14	13	13	12	10	10	8	2	0	0	0	100
	5 - 25	9	14	13	9	12	10	8	7	5	3	4	6	100
	26 - 50	11	12	9	6	9	8	9	8	9	4	4	11	100
	51 - 75	3	7	9	8	10	12	8	9	8	7	8	10	100
	<b>SUM</b>	<b>9</b>	<b>14</b>	<b>11</b>	<b>8</b>	<b>11</b>	<b>9</b>	<b>8</b>	<b>7</b>	<b>7</b>	<b>3</b>	<b>4</b>	<b>8</b>	<b>100</b>
Hook	< 5	5	0	0	4	0	0	7	13	28	23	10	10	100
	5 - 25	3	5	7	8	9	4	4	12	15	10	11	12	100
	26 - 50	6	10	10	12	9	4	5	9	10	6	10	11	100
	51 - 75	15	19	19	0	0	0	2	7	0	10	9	19	100
	76 - 100	0	0	0	0	0	0	0	0	23	40	7	30	100
	101 - 150	0	15	22	16	4	0	0	0	11	15	17	0	100
	<b>SUM</b>	<b>4</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>8</b>	<b>4</b>	<b>4</b>	<b>10</b>	<b>13</b>	<b>10</b>	<b>11</b>	<b>12</b>	<b>100</b>
	Other Gear	< 5	11	10	7	14	11	6	8	10	4	4	7	8
5 - 25		11	10	7	5	5	3	6	11	13	8	9	13	100
26 - 50		8	8	10	4	7	1	2	8	7	8	14	23	100
51 - 75		13	2	1	1	0	0	0	12	8	19	24	21	100
76 - 100		3	4	1	0	0	0	3	3	22	17	22	26	100
101 - 150		14	10	5	7	11	3	2	8	3	6	9	22	100
150+		7	2	4	5	9	8	7	12	12	9	12	11	100
<b>SUM</b>		<b>10</b>	<b>8</b>	<b>6</b>	<b>5</b>	<b>6</b>	<b>3</b>	<b>5</b>	<b>11</b>	<b>12</b>	<b>9</b>	<b>11</b>	<b>15</b>	<b>100</b>
All Gears	< 5	17	14	9	10	8	6	9	9	4	3	6	6	100
	5 - 25	11	12	10	7	8	6	7	8	8	5	7	11	100
	26 - 50	12	12	9	7	7	6	7	8	8	5	7	12	100
	51 - 75	10	10	8	6	7	7	8	9	8	8	9	10	100
	76 - 100	8	7	8	8	8	8	7	9	8	7	9	13	100
	101 - 150	10	10	9	9	10	8	6	7	6	5	9	10	100
	150+	9	8	7	8	11	9	7	8	8	6	11	9	100
	<b>SUM</b>	<b>11</b>	<b>10</b>	<b>9</b>	<b>7</b>	<b>9</b>	<b>7</b>	<b>7</b>	<b>8</b>	<b>8</b>	<b>6</b>	<b>8</b>	<b>11</b>	<b>100</b>
Unknown Gear	9	7	10	4	8	3	11	21	3	8	4	11	100	
Sources:	Enforcement DAS Call-in Database, Vessel Trip Report Database & Permit Database													
1. Limited Access Vessels with Multispecies DAS allocations that did not call in their trips to the call-in database during the 98/99 FY (a total of 572 vessels) have been excluded from this data.														
2. Trips in the "unknown" category have data in the DAS database but not the Vessel or Permit databases. Reasons unknown.														

**Table 47 Percent of monthly DAS utilization by gear sector and vessel class, May 1998-April, 1999**

### PERCENT DAS UTILIZATION FOR OTTER TRAWL VESSELS: FY 1998-1999

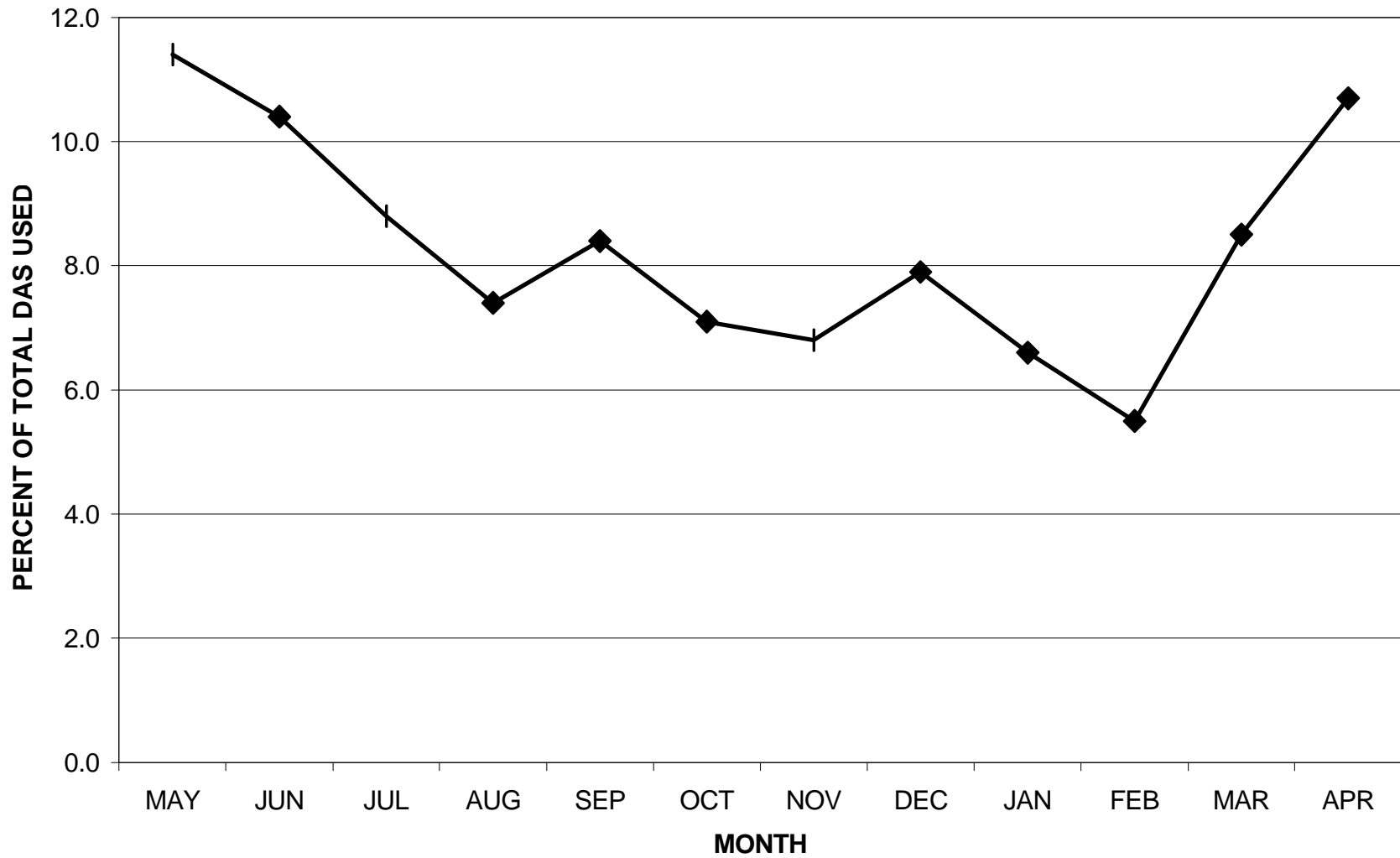


Figure 37 Percent DAS utilization by month by otter trawl vessels, May 1998-April 1999

### PERCENT DAS UTILIZATION FOR GILLNET VESSELS: FY 1998-1999

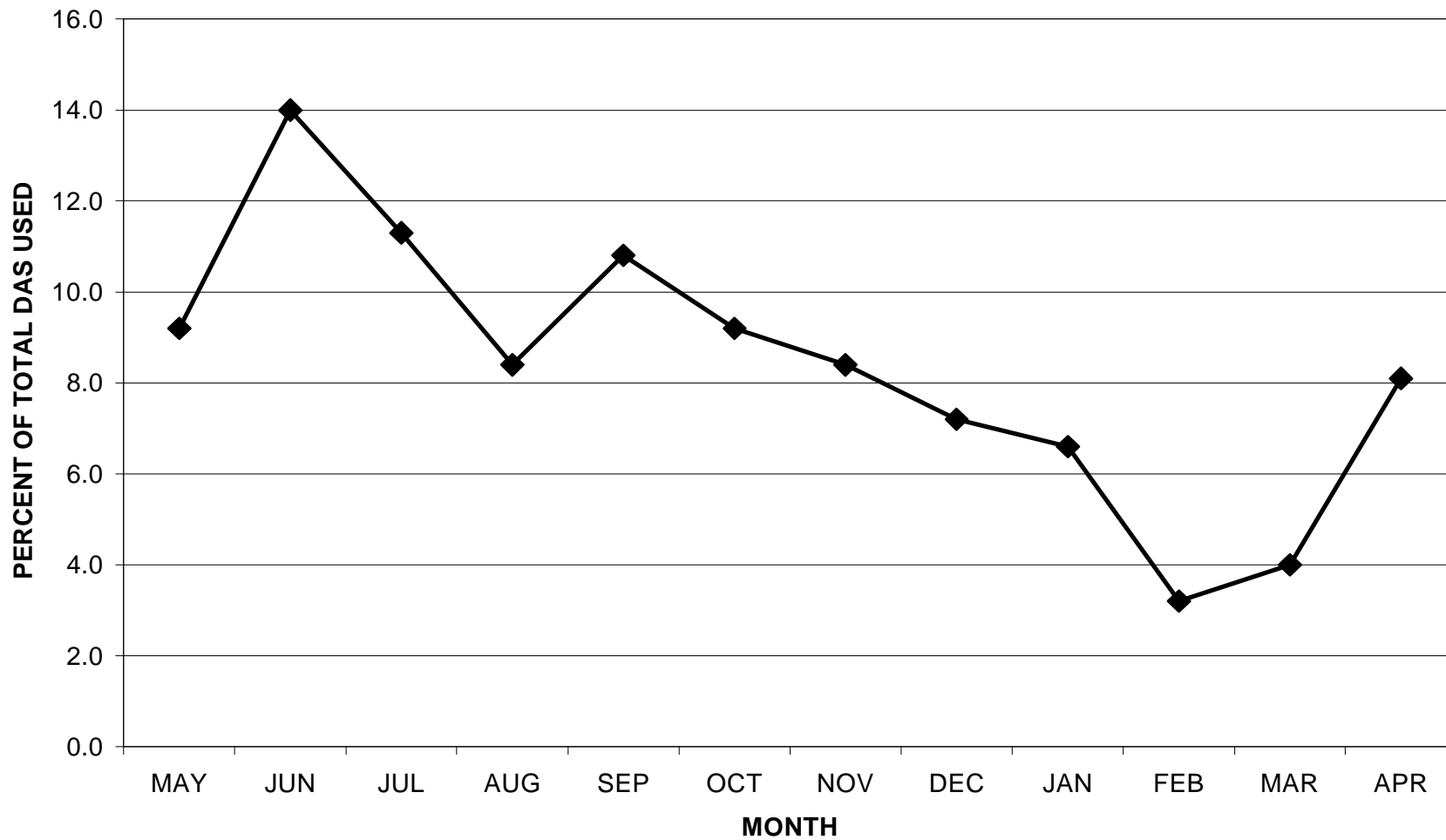


Figure 38 Percent DAS utilization by month by gillnet vessels, May 1998-April 1999

### PERCENT DAS UTILIZATION FOR HOOK VESSELS: FY 1998-1999

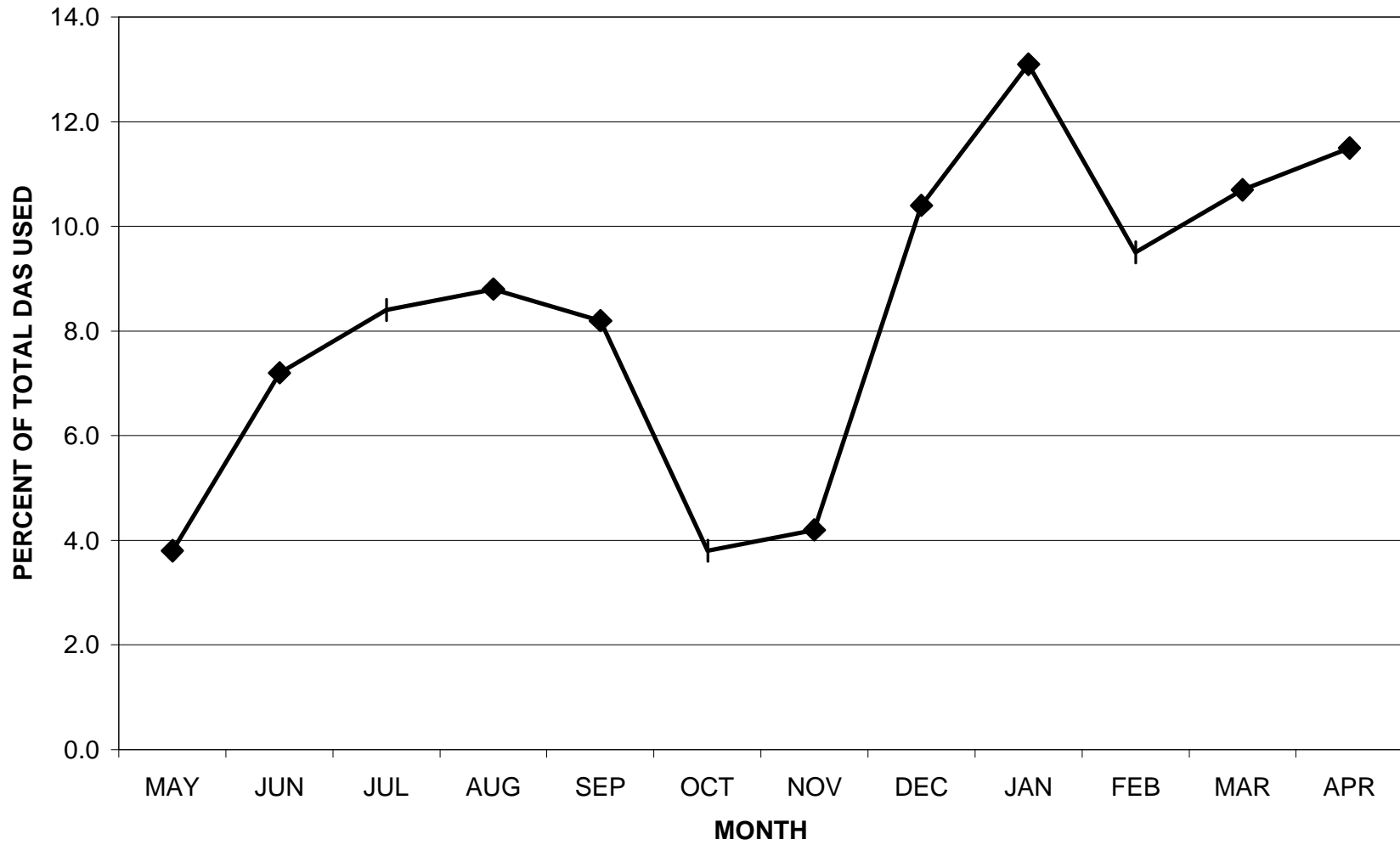


Figure 39 Percent DAS utilization by month by hook vessels, May 1998-April 1999

### PERCENT DAS UTILIZATION FOR OTHER GEAR SECTORS: FY 1998-1999

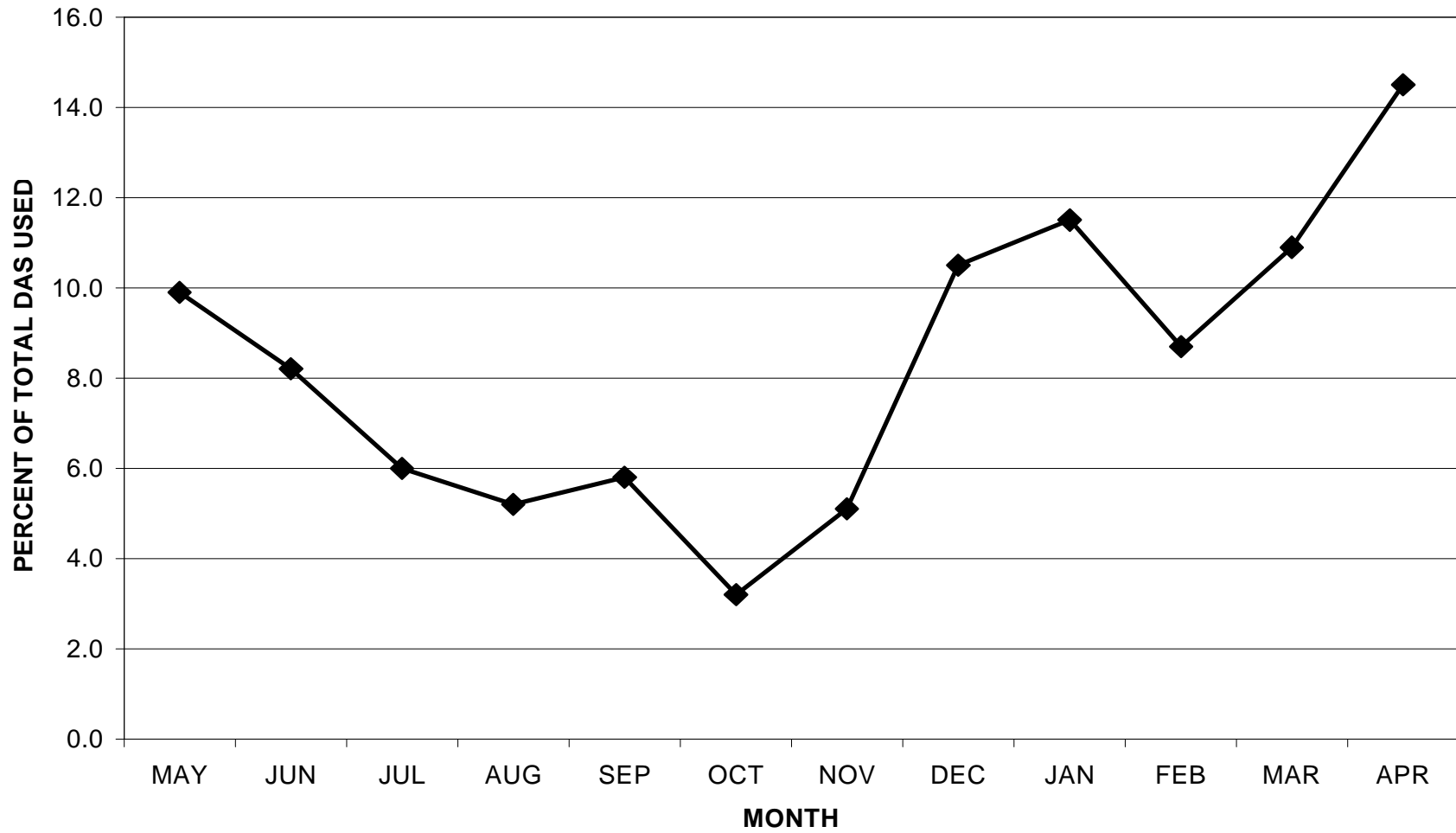


Figure 40 Percent DAS utilization by month by other gear vessels, May 1998-April 1999

#### 4.1.1.3.2 Analysis of combined effect of Option 4 measures

The size and configuration of the area closures in Options 3 and 4 prevents the use of the standard method of modeling effort shifts from closed to open areas to calculate the resulting catch expectation. The VTR and observer data is insufficient to determine catch and effort to the level of precision that would allow such an analysis. The following analysis results should be compared to the GOM target TAC to evaluate its efficacy in achieving the plan objectives. Furthermore, the analysis results are not comparable to the analysis of Options 1 and 2 that is based primarily on observed landings in 1999.

To analyze this option, the PDT first calculated the baseline catch by averaging fishing year 1998 landings with calendar year 1998 landings, resulting in a baseline of 3,500 metric tons. The PDT used this approach because in fishing year 1998 the Framework 25 rolling closures (one month closures contained in Options 3 and 4) were in effect and the trip limit with a running clock, which started at 700 pounds per day was reduced to 400 pounds per day in late June (as proposed here). On the other hand, during the 1998 fishing year, the Western GOM Closed Area was closed (and it would be re-opened under this proposal) while in the first half of calendar year 1998, a higher trip limit was in effect than is proposed here. The PDT averaged the two landings figures in an attempt to balance these differences. This calculation yielded a baseline landings of 3,500 mt.

The PDT proceeded to reduce the baseline catch by the expected impact of measures proposed in this option. Three factors are considered in the analysis of this Option. These are: (1) a 25 DAS/Trip limitation, (2) closure of 3 GOMFA –defined areas in the western Gulf of Maine, and (3), either year-round or partial closure of Cashes Ledge.

**DAS/Trip Limitation.** Analyses indicated that this measure could reduce expected landings by 7% if applied across the entire Gulf of Maine. However, the provision only applies to a portion of the Gulf of Maine. Without sufficient information to predict the outcome of a partial application of this measure, the PDT applied the simplest assumption of 1/2 of the 7% (3.5%) to account for a more realistic impact of this measure.

**Area Closures.** The PDT equated the proposed Area I and II closures with the May – December closure of the Western GOM Closed Area that was incorporated into the baseline calculation. Therefore, no additional reduction in expected landings was attributed to these area closures. The PDT then calculated the preliminary expected impact of the Area III closure. This approach assumes that Area III would be equivalent to closing the entire northern half of Block 124. It was first calculated that the northern half of Block 124 accounted for 1,065 metric tons of cod landings in 1998. This landings estimate was first reduced by 3.5% (so as not to double-count reductions already attributed to 25 DAS/trips limitation which was already applied to the baseline), and by an additional 50% (to offset double-counting of the portion of the Western Gulf of Maine Closure that is in block 124, which would be re-opened under this Option). The resulting expected reduction, if all of the landings were saved (that is, there was no effort displacement) would be 514 metric tons.

To account for uncertainty in the degree to which effort from this area would be either displaced or forfeited, the PDT considered three possible scenarios. Again, given the relatively small size of Area III and the lack of information at this level of spatial resolution, the PDT considered the most likely outcome would be halfway between a no-effort displacement and a full-effort displacement assumption, i.e. the calculated reduction in landings of 514 mt attributed to this area was reduced by 50%. To bracket the outcome, the PDT also applied a more conservative approach (25% reduction, assuming greater effort displacement and less effort forfeiture), and a more liberal approach (75% reduction, assuming lesser effort displacement and greater effort forfeiture).

Clearly, not all of the effort from this area will be displaced to other areas, nor will all of the effort be forfeited. The PDT therefore concluded that the 25% and 75% brackets represent the outer bounds of the more likely effort displacement outcomes. The areas which are being proposed for closure to replace the Western Gulf of Maine area are relatively small and, in one case, seasonal. Therefore, effort is likely to be displaced, spatially and/or temporally, to a considerable extent.

Option 4 initially included the current July – October closure of Cashes Ledge, but the designers of this measure indicated to the PDT that a year-round closure should be considered if needed to achieve the plan objectives. The PDT, therefore, analyzed both options. The total landings attributed to the Cashes Ledge Closed Area are 114 metric tons for July – October, and 254 metric tons for the full year, based on attributing one-half of the landings of blocks 129 and 130, as done in Framework 27. Reducing these savings by 3.5%, again, to avoid double counting of the 25 DAS/trips limitation measure, produces expected savings of 110 and 245 metric tons, for the part-year and full-year closure, respectively. The same 25%, 50% and 75% assumptions regarding effort displacement were also applied to these closure provisions.

1. Applying the 3.5% reduction due to the 25 DAS/Trips provision to the 3,500 mt baseline landings results in an adjusted baseline landings of 3,378 mt to be applied to the area closure provisions
2. Applying the 3.5% adjustment due to the 25 DAS/Trips provision and the 50% adjustment to the 1,065 mt landings estimate used as a basis to evaluate the proposed closure of area III results in a reduction of 514 mt, assuming no effort displacement. This value was adjusted further to account for the three more likely effort displacement scenarios.
3. Applying the 3.5% adjustment due to the 25 DAS/Trips provision to the 114 mt and the 254 mt landings estimate used as a basis to evaluate the proposed July-October and the year-round closures of Cashes Ledge results in reductions of 110 mt and 245 mt, respectively. These values were also adjusted further to account for the three more likely effort displacement scenarios.

Applying each of the above adjustments sequentially to the baseline landings estimate results in expected landings of 3,066 mt and 2,998 mt under the 50% effort displacement assumption, depending on whether Cashes Ledge is closed from July-October or year-round. When these projections are bounded by the 25% and 75% effort displacement assumptions, the expected landings range from 2,808 mt to 3,221 mt.

These results compare to an  $F_{max}$  target TAC of 1,918 metric tons. The projected landings under Option 4, therefore, are considerably greater than those corresponding to the  $F_{max}$  objective for Gulf of Maine cod. Also, this analysis did not take into consideration any biomass increase from 1998 to 2000, which would have the effect of increasing catch rates and, therefore, expected landings.

The following table summarizes the adjustments applied to this analysis.

<b>Baseline Landings</b>	3,500 mt
25 DAS/Trips adjustment 3.5% Reduction Factor = 0.965	3,378 mt

<b>Area III Closure</b>			
Base landings = 1,065 mt Adjustments: 25 DAS/trips factor = 0.965 WGOM Overlap factor = 0.5 Reduction = 514 mt	<b>Effort Displacement Assumptions</b>		
	<b>0.25</b>	<b>0.5</b>	<b>0.75</b>
	3,249 mt	3,121 mt	2,992 mt

<b>Cashes Ledge Closure July - October</b>			
Base landings = 114 mt Adjustment: 25 DAS/trips factor = 0.965 Reduction = 110 mt	<b>Effort Displacement Assumptions</b>		
	<b>0.25</b>	<b>0.5</b>	<b>0.75</b>
	3,221 mt	3,066 mt	2,910 mt

<b>Cashes Ledge Closure Year-round</b>			
Base landings = 254 mt Adjustment: 25 DAS/trips factor = 0.965 Reduction = 245 mt	<b>Effort Displacement Assumptions</b>		
	<b>0.25</b>	<b>0.5</b>	<b>0.75</b>
	3,188 mt	2,998 mt	2,808 mt

**Table 48 Summary of Option 4 projected GOM cod landings considering February – May DAS limitations and area closure proposals under a range of effort displacement scenarios.**

#### **4.1.1.3.3 Reinstating the running clock**

Options 3 and 4 proposed to reinstate the running clock that was in effect prior to August 3, 1999, and add a requirement for a 2-day layover on any trip landing an overage of GOM cod. On several occasions, the Council has debated the pros and cons of various versions of the running clock. In Framework 27, the Council considered a proposal to eliminate the running clock but did not adopt this in the final proposal because it was concerned for the impact on discards and safety. The running clock measure remained unchanged until the NMFS Regional Administrator implemented the interim rule on August 3, 1999. Under this rule, which is contained in Framework 31 and continued in Options 1 and 2 in this framework, vessels on trips less than 24 hours may not land an overage and vessels on trips over 24 hours may land an overage equal to one per-day limit for a partial day provided it runs the DAS clock for the remainder of the 24-hour period. In Framework 31, the Council also considered eliminating the running clock, but instead opted to retain the limited overage provision.

The running clock lowers the cost and/or risk for fishermen who must decide whether to discard trip limit overages, remain at sea and continue fishing to account for the overages, or return to port and allow the DAS clock to run. The current proposal in both Options 3 and 4 would reinstate the running clock, except Option 4 would eliminate it during February - May. A qualitative, comparative analysis of the running clock options considered by the Council is summarized in Table 49.

The running clock was first proposed in Framework Adjustment 20 to allow vessels to land cod in excess of the trip limit and minimize the potential for discard associated with the GOM cod trip limit. The vessel's DAS allocation is reduced by the amount of time required to account for the trip's excess cod landings. Framework 24 adjusted the running clock by mandating that vessels reporting an overage in allowed (based on the length of the trip) landings of cod remain in port until the sufficient DAS have passed to equate to the cod landings. Framework 24 also required a 14-day call-in for vessels not in the GOM trip limit exemption program (that is, vessels either had to call the hail line or the DAS line within 14 days of the initial DAS call-in to start the trip). Framework 24 closed a loophole that potentially allowed vessels to direct effort on cod and while the DAS clock continued to run to account for the excess cod, continue to fish for other species.

The running clock was initially considered conservation neutral because the intent was to change discard of legal size cod into yield (no increase in mortality) while accounting for excess cod landings. The conservation neutral aspect of this measure was predicated on the assumption that fishermen would use the running clock to land excess cod overages and not use the running clock to direct on GOM cod. When the running clock was first used in the management plan, the trip limit was 1,000 lbs. per day for the first four days and 1,500 lbs. per day thereafter for vessels not enrolled in the cod trip limit exemption program. An analysis by the MSMC (1997) showed that only 8% of the cod trips in the Gulf of Maine would have exceeded these limits in May-August 1996, if they had been in place. These relatively high trip limits appeared to provide little incentive for behavioral

shifts that would increase mortality on GOM cod by combining the running clock with an increased utilization of latent effort to direct on cod.

Framework 25 lowered the GOM cod trip limit to 700 lbs. per day until 50% of the Gulf of Maine cod TAC was taken, at which time the Regional Administrator could reduce the trip limit to between 400 and 700 lbs. The 700 lbs. trip limit went in effect on May 1, 1998 and was subsequently reduced to 400 lbs. on June 25, 1998. An MSMC analysis indicated that the 23 percent of trips of 1997 cod trips in the Gulf of Maine would have exceeded these limits in June 25 through August, 1997 if they had been in place rather than the 1000/1,500 lbs. trip limit with the running clock. These more restrictive trip limits may have provided more incentive to use the running clock to target cod. Some vessels were reportedly utilizing the running clock to target cod.

The effectiveness of trip limits and running clock is predicated on behavior response of the fishermen. Excess catch may not be caught if operators move away from areas with high concentrations (avoidance behavior) or shift to other fisheries with little cod bycatch (displacement). The running clock may be used to retain excess catch (conservation neutral by converting discards into landings). However, the running clock can also be combined with latent effort (unused DAS) to maintain or increase effort on cod (maintains or increases mortality on cod).

The MSMC (1998) examined the impact of a 400 lbs. possession limit and running clock on cod landings from June 25, 1998 through August 1998. The analysis covered a range of options from totally eliminating the running clock to capping a trip limit at 10 times the daily trip limit (4,000 lbs. per trip for a 400 lbs. per day possession limit) but did not make any assumptions about discarding. Possession limits of 400 lbs. (no running clock) yielded 15.8% reduction in cod landings and the 4,000 lbs trip limit yielded only a 1.4% reduction in landings.

The impact of the running clock under the very low trip limits in the current fishing year (30 or 100 pounds per day, pending NMFS implementation of Framework 31) cannot be assessed, even if all of the landings data were available up to the current date. Under these low trip limits, the incentive to use the running clock is minimized, because the returns (in terms of allowed cod landings) do not offset the cost (in terms of DAS consumed by the running clock). Therefore, more vessels are likely discarding overages, and since those discards are not accounted for, the actual catch rates are not known.

At the vessel level, there are two basic responses to exceeding the trip limit without the running clock: extend the trip and fish for other species, or discard cod. Discarding excess cod catch negates the effectiveness of the trip limit and/or eliminating running clock. Deciding to extend the trip (remain at sea) to account for the cod overages rather than discard, on the other hand, raises safety concerns. If the proposed area closures capture the areas of high cod catch rates (in excess of the per-day trip limit), then a running clock is not needed because of the low frequency that catches would exceed the limit. On the other hand, if areas are open where there is an expectation of cod catches in excess of the

trip limit, a running clock would reduce the amount of discards, thereby increasing yield and improving the accounting of catch in the database.

During February through April, 1999, vessels operated under a 400 pound per day trip limit with no maximum possession limit, and no restrictions on the use of the running clock. Framework 31 contained an analysis of the landings during that period. Based on the VTR data, ninety-one percent of trips landing Gulf of Maine cod were below the trip limit. However, the 9 percent of trips over the limit accounted for 39 percent of the GOM cod landings. Twenty-three percent of the total landings in that period were in excess of the per-day limit (total landings minus allowed landings with no overages). As noted, the impact of eliminating or restricting the ability to land overages under the running clock depends on whether fishermen are targeting cod (and will avoid catching it if they cannot land it) or whether they are catching it incidental to other activities, resulting in discards of the overage. If the former is true, then the Option 4 proposal to suspend the running clock will greatly reduce the catch of GOM cod during this period. If the latter is true, then compared to the 1999 period the modification to the running clock will result in increased discards.

PROS	CONS
<b>ELIMINATE THE RUNNING CLOCK:</b> Not an option under consideration in Framework 33	
<ul style="list-style-type: none"> <li>+ Minimizes opportunity for directed fishing depending on trip limit level</li> <li>+ Increases effectiveness and enforceability of trip limit</li> <li>+ Increases ability to accurately estimate true fishing effort through DAS usage (no “frontloading” trips and no running the clock after landing means that DAS reported are closer to actual DAS fished)</li> </ul>	<ul style="list-style-type: none"> <li>- May cause discards depending on trip limit level</li> <li>- Vessels with overages must choose between discarding remaining at sea (safety concerns)</li> <li>- Limits flexibility to plan fishing trips</li> </ul>
<b>OPTION 1 AND 2 RUNNING CLOCK:</b> 10-day cap on trip limit; running clock limited to one day’s overage; trips less than 24 hours may not land overages and may not start another trip until 24 hours have elapsed	
<ul style="list-style-type: none"> <li>+ Reduces opportunity for directed fishing depending on trip limit level</li> <li>+ Prevents dayboats from making more than one trip per 24-hour period</li> <li>+ Promotes safety at sea (somewhat) by allowing vessels to return to port with one day’s cod overage</li> </ul>	<ul style="list-style-type: none"> <li>- May cause discards depending on trip limit level, especially on trips longer than five days</li> <li>- Five-day cap unfair to vessels on longer trips</li> <li>- Decreases ability to accurately estimate true fishing effort through DAS usage</li> <li>- Difficult to interpret for compliance and enforcement</li> <li>- Very difficult to enforce trip limits with any running clock</li> </ul>
<b>OPTION 3 and 4 RUNNING CLOCK:</b> “old” running clock with an additional two-day layover requirement following any trip landing an overage	
<ul style="list-style-type: none"> <li>+ Prevents vessels from making back-to-back trips during periods of high catch rates (spreads concentrations of fishing effort out across time)</li> <li>+ Promotes safety at sea by allowing vessels to return to port with a cod overage</li> <li>+ Running clock provides flexibility</li> </ul>	<ul style="list-style-type: none"> <li>- May not prevent directed fishing if two-day layover requirement does not discourage vessels</li> <li>- High cost to vessels (DAS + layover days) may cause vessels to discard rather than land overages</li> <li>- Layover requirement limits ability to plan fishing trips</li> <li>- Decreases ability to accurately estimate true fishing effort through DAS usage</li> <li>- Very difficult to enforce trip limits with any running clock</li> </ul>
<b>FRAMEWORK 27 RUNNING CLOCK WITH TEN-DAY MAXIMUM POSSESSION LIMIT:</b> “old” running clock with a ten-day cap; not an option in Framework 33	
<ul style="list-style-type: none"> <li>+ Reduces the potential for high levels of discards depending on trip limit level</li> <li>+ Promotes safety at sea by allowing vessels to return to port with a cod overage</li> <li>+ Provides some flexibility in planning fishing trips</li> </ul>	<ul style="list-style-type: none"> <li>- Ten-day cap may not prevent directed fishing depending on trip limit level</li> <li>- Decreases ability to accurately estimate true fishing effort through DAS usage</li> <li>- Very difficult to enforce trip limits with any running clock</li> </ul>
<b>FRAMEWORK 27 RUNNING CLOCK WITH NO MAXIMUM POSSESSION LIMIT:</b> “old” running clock with no cap; not an option in Framework 33	
<ul style="list-style-type: none"> <li>+ Reduces the potential for high levels of discards</li> <li>+ Promotes safety at sea by allowing vessels to return to port with a cod overage</li> <li>+ Provides maximum flexibility in planning fishing trips</li> </ul>	<ul style="list-style-type: none"> <li>- Will not prevent directed fishing</li> <li>- Decreases ability to accurately estimate true fishing effort through DAS usage</li> <li>- Very difficult to enforce trip limits with any running clock</li> </ul>

## **Table 49 Comparative, qualitative analysis of running clock options**

### **4.1.1.4 Biological Impacts of Requirement for Party/Charter Vessels to Obtain an Exemption Certificate to Fish in any or all of the Gulf of Maine Closed Areas**

This provision would require any vessels carrying passengers for hire in any or all of the Gulf of Maine closed areas to obtain an exemption certificate. The Council considered three options under the exemption certificate would be issued for a specified time period, either three months, six months, or one year. While enrolled in the exemption program and while in possession of an exemption certificate, a vessel would be prohibited from using a Multispecies DAS regardless of whether or not it is carrying passengers for hire and regardless of whether or not it fishes in the Gulf of Maine closed areas. It is proposing the three-month alternative based on this analysis, public comment and the recommendation of the Industry Advisory Panel.

The analysis of the potential impacts of this provision is presented in Section 4.2.2.3. Eight different certification duration periods were evaluated, including a one-year duration, two six-month periods, and five three-month periods. Table 74 projects the likely number of passengers, catch of cod, catch of other groundfish species, and discards under each of the above scenarios. Under each of the various scenarios, the expected number of recreational passengers in the Gulf of Maine is close to the 1998 baseline. (Number of passengers is a good way to characterize recreational fishing effort.) The one-year certification alternative is the only alternative that is likely to produce results significantly different than the baseline. Recreational party/charter groundfish effort in the Gulf of Maine may be reduced under the one-year alternative, as the analysis projects a 2.5% decrease in the number of passengers and a 6.3% decrease in the number of cod kept. However, the one-year alternative negatively affects more vessels in terms of potential loss of revenue than any other option.

The five three-month alternatives produce results (in terms of anglers and expected cod catch) that are all very similar to the baseline. The analysis projects very little difference between the baseline and any of the three-month alternative in terms of expected numbers of passengers and numbers of cod kept. The three-month alternatives can be assumed to have no biological impact on the stocks. Furthermore, these results should be interpreted as worst-case scenarios, as the analysis was conducted under the assumption that the exemption certificate would be required for the entire Gulf of Maine instead of just in the closed areas. At most, this provision is projected to affect 17 vessels (under the one-year alternative).

The most significant benefit of this provision will likely be in the form of better recreational party/charter fishing information for the Gulf of Maine. The Council wants to improve its understanding of what kind and how much recreational fishing activity occurs in the Gulf of Maine closed areas. The exemption certification program should allow NMFS and the Council to document how many and which party/charter vessels fish in the

closed areas and when. Furthermore, a three-month certification time period would help the Council to identify important party/charter months or “seasons” for fishing in the closed areas. This information could be useful to the Council in the future for streamlining or modifying exemptions to the closed areas for party/charter vessels.

**Potential for Redirection of Effort into Recreational Fisheries:** Given that any vessel choosing to enroll in the proposed party/charter certification program would be unable to call in a DAS during the enrollment period, some concern has been expressed that the certification program could provide an incentive for vessels to increase party/charter activity and consequently increase effort in the Gulf of Maine closed areas. The certification program was demonstrated to have little effect on vessels that already are heavily engaged in the party/charter business and for vessels that take passengers for hire on an infrequent basis. Vessels that engage in a mix of commercial and recreational activities will be faced with a choice of giving up one or the other sources of business income. At issue is which of the two activities holds the greater promise to make up for foregone income.

A survey of party/charter operators operating in the state of Maine was conducted during 1996. The survey collected data on operating and fixed costs for these vessels. A break-even analysis based on these data indicate that, on average, the Maine party/charter fleet was just barely covering all costs (McCay and O;Neil, 1998). Therefore, the party/charter industry may not be a particularly attractive alternative, especially when one considers the fact that in order to increase passenger revenues, it would be necessary to either increase fees or increase passengers.

The party/charter industry operates in a competitive market so that any one operator may not be able to increase passenger fees without losing customers to other carriers. Further, based on logbook records, the number of passengers taken on Gulf of Maine recreational fishing trips has declined from 88.7 thousand in 1996 to 60.7 thousand in 1998. In the face of declining demand for Gulf of Maine trips, any vessel that wants to increase market share must do so by competing for the existing pool of passengers with other established businesses. In effect, passenger demand alone provides a constraint on the ability for expansion of effort in the recreational party/charter fishery.

Although commercial fishing may not be any more profitable than party/charter fishing, there would be no need to compete for a limited number of passengers. Foregone passenger income may be more readily mitigated by increased activity in commercial fishing. Therefore, the certification program may be more likely to cause a shift to greater dependence on commercial fishing than recreational party/charter fishing. However, it is very unlikely that any shifts caused by the exemption program will significantly impact Gulf of Maine groundfish stocks or the effectiveness of the multispecies rebuilding program.

#### **4.1.2 Impacts on Georges Bank Cod**

The Council proposes to continue the current 2,000 pounds per day, 20,000 pounds maximum GB cod trip limit and add one of five area closure options to prevent catches from exceeding the TAC. It is also resubmitting a proposal that NMFS disapproved in Framework 31 that would eliminate the authority of the Regional Administrator to reduce the trip limit when 75 percent of the TAC has been landed.

##### **4.1.2.1 Trip Limits**

A bag limit analysis was used to evaluate the potential effects of trip limit regulations for cod in the Georges Bank stock area in Framework 27 and subsequently in Framework 30. The Council incorporated the GB cod trip limit into the management plan in Framework 30. The Framework 30 analysis has been updated to reflect stock conditions in fishing year 2000 as projected by the MSMC, including a 36 percent increase in biomass from 1997 – 2000, as well as the updated assessment of fishing mortality in 1997-1999.

A trip-by-trip analysis of the distribution of cod landings from Georges Bank occurring during calendar year 1997 was conducted to evaluate the potential effects of trip limit regulations during the 2000-2001 fishing year. There were 9,076 trips reported in the 1997 VTR (logbook) data base that caught (landed or discarded) at least one pound of cod on a trip occurring in the Georges Bank stock area (statistical areas 521, 522, 525, 526, 561, 562). Days absent were estimated relative to the current trip limit regulations, which allow one day of trip limit for each whole or partial day fished. For example, a vessel on a day trip, fishing for up to 24 hours, is permitted one day of trip limit, while a vessel fishing for 24 hours and 1 minute is permitted 2 days of trip limit (1 whole day and one partial day).

The use of the 1997 calendar year data to estimate the effectiveness of trip limit regulations during the 2000-2001 fishing year required that the 1997 trips be scaled to account for the projected increase in stock biomass that occurred between 1997 and 2000/2001. As stock biomass increases or declines, a given trip limit regulation becomes relatively more or less effective because catch rates change as some function of stock size.

Projections for the Georges Bank cod stock contained in the 1998 MSMC report had an 11 percent increase in exploitable biomass between 1997 and 1999. The 1999 MSMC report, which incorporated the updated assessments, indicated a projected 36 percent increase between 1997 and 2000. As noted in Framework 27 for GOM cod, the relationship between LPUE and stock size is unknown, but it was assumed that LPUE would increase as a linear function of stock size. Therefore, cod catch rates (catch/day) were increased by 11 percent (adjustment factor = 1.11) in the Framework 30 analysis, and by 36 percent (adjustment factor = 1.36) in the current analysis to account for the expected increase in catch rates due to the projected increase in stock size.

For Framework 30, the PDT referenced the trip limit analysis that was done for Framework 27. In Framework 27, the table of expected 1999 landings of Georges Bank cod at various trip limit intervals represented landings projected forward from 1997 based

on an 11% increase in exploitable biomass between 1997 and 1999. This approach assumed that  $F$  remained constant at the 1997 level (0.26) in 1998 and 1999. In Framework 30, based on the 1998 MSMC report, the trip limit analysis was revised to reflect the projection that  $F$  declined from 0.26 in 1997 to 0.22 in 1998 and for TAC calculation purposes, landings in 1999 were projected at  $F_{0.1}$  (0.18). The 1999 MSMC report, however, contained a revised 1997  $F$  (indicating a retrospective pattern in the assessment) from 0.26 to 0.53, and indicated that the  $F$  in 1998 was 0.28.

Landings were determined by summing the minimum of actual landings and the calculated trip limit (trip length (days) \* trip limit/day) from each trip during the year. For trips with landing rates below the trip limit regulation, all catch was assumed to be landed. For trips with landing rates exceeding the trip limit, landings were assumed to be the maximum level allowed under the trip limit regulation being modeled. Landings within each trip limit interval were then summed over all trips in the VTR database. Because logbook landings represent a subset of the total reported (dealer) landings, the VTR landings were adjusted proportionately to equal the total reported landings of Georges Bank cod.

Because of the changes in  $F$  between 1997 and 1999, the expected landings under the trip limit intervals must be adjusted downward from those in the Framework 27 document. In Framework 30, the adjustment was accomplished by first computing the ratio of total 1998 landings /total 1997 landings (stock-wide landings include Canadian catch). This is:  $8,243/10,453 = 0.79$ . This factor was then multiplied by the row of numbers in the Framework 27 GB cod trip limit table to produce the corrected landings adjusted for the change in  $F$  between 1997 and 1998, as shown in the second row of Table 50.

In the updated assessment in August, 1999, the change in fishing mortality rates between 1997 and 1998 was determined to be 53 percent (from  $F=0.53$  to 0.28). The 1999 fishing mortality rate was assumed to be equal to the 1998 rate (there was no change in the management regulations until the 2,000 pound trip limit was implemented in August, 1999). The current analysis, therefore, applies a reduction factor of 0.53 to the landings predicted after adjusting for the change in biomass. The two changes (in biomass and  $F$ ) would explain the differences in the trip limit analyses results in Table 50 from Frameworks 27, 30 and the current proposal.

The U.S. landings associated with the target  $F$  (0.18) in 2000 is 4,145 metric tons (U.S.), assuming 1,900 tons Canadian catch. A trip limit of 1,500 pounds per day would approximately achieve the TAC with no additional area closures. The difference between the re-computed landings at the various trip limits and the 4,145 mt TAC represent the required reductions that must be obtained from other measures such as closed areas.

The PDT discussed the potential impact of the 20,000 pound cap on the total landings when it was proposed in Framework 30. Since the GB cod trip limit only took effect on August 15, 1999, there is no more recent data by which to measure the impact of the rule. Under a trip limit of 2,000 pounds per day, only trips over 10 days that also landed more than 20,000 pounds of cod would be affected. Without having the trip-length data

available, the PDT could not quantify the impact, but qualitatively, it concluded that there would probably not be a significant reduction over what was already attributed to the 2,000 pound per day limit. Analysis provided by the Regional Office following the PDT meeting substantiated this conclusion (see Table 51).

<i>Landings in metric tons</i>	Trip Limit (Pounds/Day)										No Limit
	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	
<b>1999 Landings (mt) FW 27</b>	3958	5891	6955	7528	7854	8038	8156	8234	8285	8312	8366
<b>1999 Landings Revised FW 30</b>	3127	4654	5494	5947	6205	6350	6443	6505	6545	6566	6609
<b>2000 Landings Updated 12/99</b>	2229	3435	4170	4625	4900	5076	5186	5260	5313	5350	5433

**Table 50 Comparison of Framework 27 and Framework 30 revised projected GB cod landings for the 1999/2000 fishing year (mt), and current revised projected landings for the 2000/2001 fishing year, estimated under trip limit regulations ranging from 500 pounds/day to 5000 pounds/day. The target TAC for GB cod in FY 2000 is 4,145 mt.**

	Number of Trips	Total Kept	Average Kept	Total DA	Avg. DA	Avg. Kept per DA
<b>Trips with Landings of Cod</b>	8,636	12,934,851	1,498	16,429	2	787
<b>Trips with Cod landings &gt;= 20,000 pounds.</b>	52	1,292,937	24,864	371	7	3,484
<b>Trips &gt;= 10 days.</b>	179	500,225	2,795	2,153	12	232
<b>Trips &gt;= 10 days and landed &gt;= 20,000 pounds of Cod</b>	2	42,725	21,363	20	10	2,114

Source: VTR database

**Table 51 Commercial cod landings in the 1997-1998 fishing year for trips landing over 20,000 pounds and/or ten days or more in duration.**

Vessels fishing on GB cod under a trip limit are also fishing under the haddock trip limit. Having two limits on a vessel that catches both species, often simultaneously, creates a dilemma for the operator who must decide when the first of the two limits is reached whether to stop fishing or to continue fishing to catch the allowable limit of both species. In the second instance, the vessel would have to discard the overages of the first limit. Even if the vessel moves to a different location, there is no assurance that additional cod (or haddock, as the case may be) would not be caught. Since the outcome of this situation depends on the choices individual operators must make, the tools are not available to quantitatively predict the impact with any reasonable certainty.

Reducing the trip limit to prevent exceeding the target TAC will only exacerbate the problem of discards, and will not necessarily produce the desired result of preventing catches from exceeding the target. Thus, the PDT recommended against relying on incremental reductions in the trip limit to backstop a failed trip limit. As more haddock and other species in the Georges Bank stock area are available to fishermen, the level of discarding under a restrictive trip limit will likely increase.

NMFS did not approve a Framework 31 proposal to eliminate the authority of the Regional Administrator to reduce the trip limit when landings reach 75 percent of the TAC. NMFS stated that “removal of this ‘backstop’ in order to reduce the risk of discards without any compensating conservation measures to address fishing mortality is not justified”. In the current proposal, the Council proposes additional area closures as a substitute for the potential reduction in the trip limit.

#### **4.1.2.2 Area closure analysis**

The Council considered five area closure options to be combined with the trip limit. It is proposing Option 5 based on the following analysis that indicates will keep landings near or below the TAC with a 2,000 pounds per day trip limit. As with Framework 27, each of the area closure configurations corresponding to the draft framework options was analyzed using the 2-bin effort displacement model utilizing 1997 VTR data. This model accumulates the landings and effort (days absent) associated with each month/block combination specified in each area closure proposal to form a single closure (bin 1). The landings and effort associated with the remaining (open) month-blocks are then accumulated to form a single open area (bin 2). The landings rate (landings per day absent, LPUE) corresponding to the open area is then applied to the total effort in the system to compute the expected landings under the specified closure scheme. In effect, the 2-bin model retains all of the effort in the system, and the expected landings are the product of the total system effort and the LPUE from all of the open month-block combinations. In other words, the analytical model assumes that all of the effort displaced by closing areas continues to fish in the open areas at the average catch rate for the entire open area.

The PDT analyzed the options for area closures, both area closures alone, and in combination with various trip limits initially in Framework 30. It updated the analysis for this framework as discussed in the previous section (trip limit analysis). In Framework 30, Option 1 was based on incrementally picking the block-month combinations with the highest landings. Both Options 1 and 2 were designed meet the 1999 TAC targets without a trip limit. Option 3, based on the Council request to specifically analyze closure of blocks 109-114, would have to be a year-round closure, along with a 2,000 pound per day trip limit to stay below the TAC. Option 4 was originally developed by starting with a 2,000 pound per day trip limit and incrementally closing the blocks with the highest cod catch until the projected landings were below the target TAC. The updated analysis shows similar results for Options 3 and 4, relative to the 2000 TAC. The closure in Option 5 for May was initially proposed by an industry group for Framework 30 but due to the timing of Framework 30 could not be considered. Instead the Council considered a 30-day

closure following implementation, and the Framework 30 document analyzed both June and July closures of the same area. The options are described in Table 52.

The analysis results shown in Table 53 are based on the two-bin model. This analysis indicates that landings under Option 1 would remain below the TAC under a trip limit of between 3,000 and 3,500 pounds per day, and under Option 2 between 3,500 and 4,000 pounds per day. Options 3 and 4 would remain below the TAC with a trip limit of 2,000 pounds per day, while Option 5 would require a trip limit between 1,500 and 2,000 pounds per day.

If, in contrast to the analysis assumptions about effort displacement, all effort is not displaced to open areas or does not catch cod at the average rate for the open areas, the calculated landings for a given area closure or closure/trip limit option would be lower. Put another way, a higher trip limit would achieve the goal (of landings at or below the TAC). Furthermore, for options that include both area closures and trip limits, the lower the trip limit is, the greater likelihood is that discards will replace landings, and the result (in fishing mortality) will not be as low as expected.

Modeling these two contingencies, however, involves highly subjective assumptions about behavior, such as predicting the point at which individual fishermen will stop fishing rather than discarding cod, or predicting how fishermen will redirect effort displaced from closed areas. Table 54 shows the percent change in catch attributed to each closure option, without a trip limit, if all the catch from the block/months that are closed were saved compared to the percent change resulting from the 2-bin model.

OPTIO N	BLOCKS	MONTHS
1	98	6, 7, 8, 9
	111	4, 5
	109	5
	110	5
	113	6, 7, 9
	114	5, 6
2	98, 99, 113	year-round
	114	5, 6
3	109-114	year-round
4	98	7, 8
	110	5
	111	4, 5
	113	7
	114	6
5	109-114, 98, 99	5

**Table 52 Georges Bank cod area closure options**

Trip Limit (Lbs/Day)	No new closures	Option 1	Option 2	Option 3	Option 4	Option 5
<b>No Trip Limit</b>	5433	4400	4292	4835	4835	4944
<b>5000</b>	5350	4334	4227	4762	4762	4869
<b>4500</b>	5313	4303	4197	4729	4729	4835
<b>4000</b>	5260	4260	4155	4681	4681	4786
<b>3500</b>	5186	4200	4097	4615	4615	4719
<b>3000</b>	5076	4112	4010	4518	4518	4619
<b>2500</b>	4900	3969	3871	4361	4361	4459
<b>2000</b>	4625	3746	3654	4116	4116	4209
<b>1500</b>	4170	3377	3294	3711	3711	3794
<b>1000</b>	3435	2782	2714	3057	3057	3126
<b>500</b>	2229	1806	1761	1984	1984	2029

**Table 53 Results from the two-bin model for area closure options, showing the effect of various trip limits on Georges Bank cod. Options must show landings at or below 4,145 mt to achieve the 2000 TAC.**

	Option 1	Option 2	Option 3	Option 4	Option 5
<b>% Reduction 2-bin model</b>	19	21	11	11	9
<b>% of total catch attributed to closed blocks</b>	37	45	52	24	17

**Table 54 Comparison of percent change in catch resulting from area closures under the 2-bin model to the percent of catch attributed to each block/month combination.**