



New England Fishery Management Council

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MEMORANDUM

DATE: October 30, 2006
TO: Council and Patricia Kurkul, Regional Administrator
FROM: Scallop Plan Development Team (PDT)
SUBJECT: **Updated exploitable biomass estimate for Elephant Trunk Area (ETA)**

A rulemaking procedure was adopted under Framework 18 that gives the Regional Administrator the authority to reduce the number of trips that can be taken in the Elephant Trunk Area if the exploitable biomass estimated from surveys conducted during 2006 suggests that the allocated number of trips is too high. This procedure was adopted because there was considerable uncertainty in the projected scallop biomass in the ETA because a substantial majority of the scallops were young; true abundance of young scallops is difficult to estimate with a high degree of precision. If a change is necessary based on an updated estimate prepared by the Scallop PDT, the downward adjustment would be published by Notice Action as final rule before January 1, 2007. This memo from the Scallop PDT serves as the updated estimate.

Framework 18 required that survey data and analyses of updated exploitable biomass estimates for the area must be available before December 1, because NMFS is required to publish revised trip allocations on or about December 1. The Elephant Trunk area is a 1,565 square nautical mile area southeast of Delaware Bay. The western boundary is about 35 nautical miles from shore (east of the Delaware/Virginia border) (Figure 1). The framework allocated five ETA trips for full-time limited access vessels, up to three trips for part-time vessels, up to one trip for occasional vessels, and 1,360 trips for the general category fleet. These allocations were made with the understanding that the number of trips could be reduced by notice action if the updated exploitable biomass estimate was lower than projected using survey data from 2006. If the biomass is higher than projected, no upward adjustments in trip allocations will be made. If ETA biomass is somewhat less than projected and would not cause ETA fishing mortality to exceed 0.32 or overfishing of the resource to occur, then the initial allocations would not need adjustment. However, if the ETA biomass is *considerably* less than projected so that the initial trip allocation causes ETA fishing mortality to exceed 0.32 or overfishing of the resource to occur, then the regulatory action would reduce the ETA trip allocations to a level consistent with achieving the area rotation fishing mortality target ($F=0.32$). To achieve this, Framework 18 included specific thresholds that the updated biomass estimate would need to meet in order to trigger a reduction in trip allocations (Table 1). The thresholds in Table 1 reflect the estimated exploitable biomass values and associated number of trips that were not expected to cause the fishing mortality in the ETA to exceed $F=0.32$ and that would achieve the target fishing mortality

in the ETA ($F = 0.16$). To ensure that an abbreviated regulatory action was possible, the regulations implementing Framework 18 adopted the table and allow an adjustment of trips based only on the updated biomass estimate.

Figure 1 – Boundary of the Elephant Trunk Area

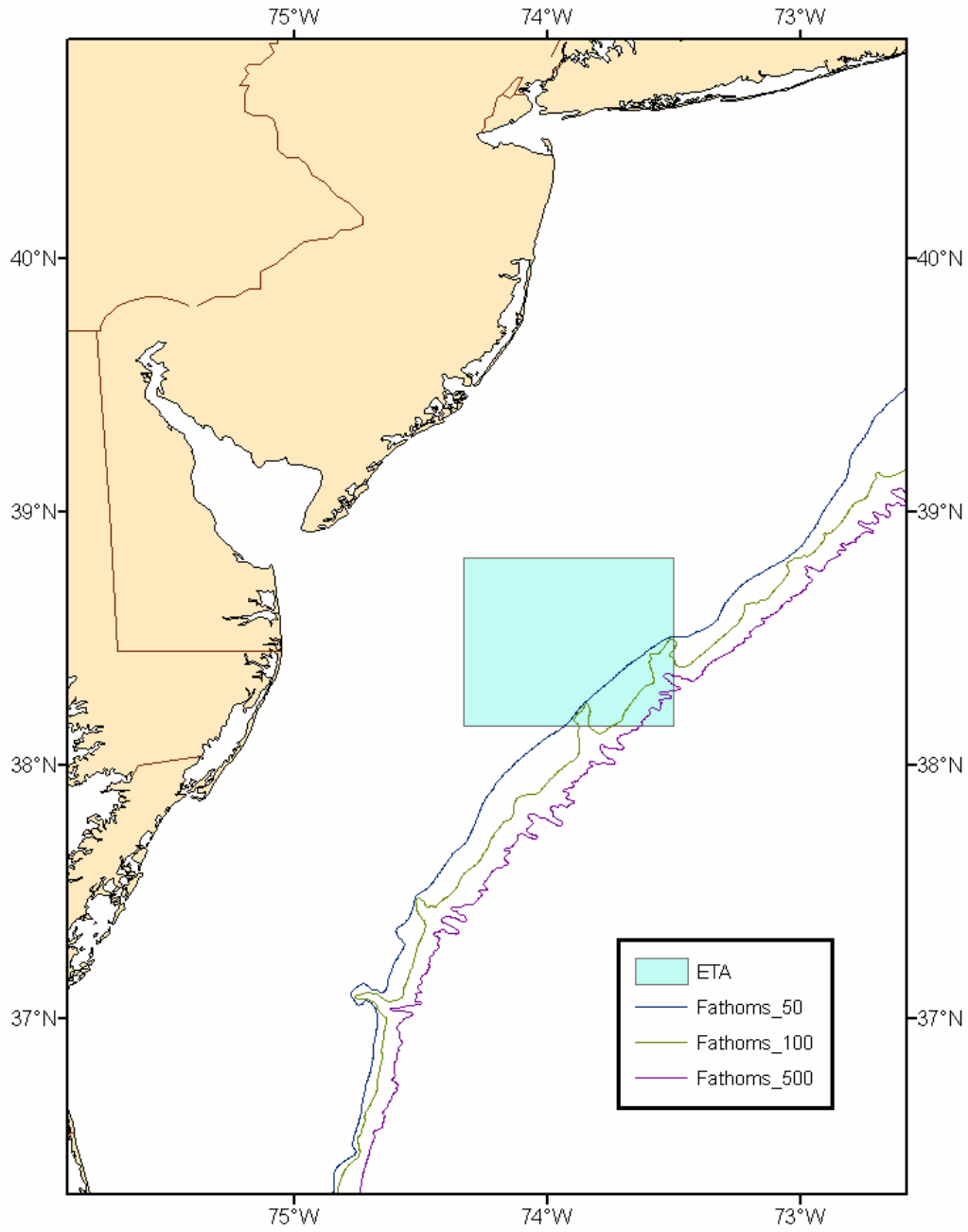


Table 1 - Estimated 2006 ETA exploitable biomass associated with the initial TAC and trip allocations in Framework 18.

Biomass triggers in 2006 represent cut points at which the allocation at the next higher trip allocation would cause ETA fishing mortality to exceed $F=0.32$.

Projected 2006 ETA exploitable biomass (mt)	2007 TAC (mt) @ $F=0.16$	2007 TAC (million lbs.) @ $F=0.16$	Number of Elephant Trunk Area trips
55,130	12,229	26.96	5
ETA exploitable biomass triggers (mt)	Adjusted 2007 TAC (mt)	Adjusted 2007 TAC (million lbs.)	Adjusted number of Elephant Trunk Area trips
< 22,920	5,234	11.54	2
22,920 – 28,650	7,851	17.31	3
28,651 – 34,380	10,468	23.08	4
34,381 – 64,230	13,085	28.85	No Adjustment $0.16 \leq F \leq 0.32$
64,231 – 74,860	15,702	34.62	No upward adjustment
74,861 – 85,500	18,319	40.39	No upward adjustment
> 85,500	20,936	46.16	No upward adjustment

The updated estimate should be based on all available scientific surveys of scallops within the Elephant Trunk Area. In 2006, three surveys were conducted in the area: the NMFS scallop dredge survey, a dredge survey by the Virginia Institute of Marine Science (VIMS), and a video survey by UMass Dartmouth, School of Marine Science and Technology (SMAST). **The updated biomass estimates from these three surveys are very consistent and none of them suggest a reduction in the number of trips that should be allocated in the ETA based on the defined thresholds (Table 2).**

Before reviewing the updated estimate it is important to define the methods and assumptions used in the original estimate of exploitable biomass in Framework 18. The model used in Framework 18 is an updated version of the SAMS model (Scallop Area Management Simulator). The model used a preliminary estimate of the selectivity of 4-inch rings in order to calculate exploitable biomass. Other important model assumptions include a 60% dredge efficiency, 90 mm cull size and 20% discard mortality. The later assumption may be an underestimate during the summer months in Elephant Trunk, when surface water temperatures are above the thermal tolerance of sea scallops. The model originally used the “July shell height:meat weight relationship” approved by the SARC based on data collected by the federal survey. This PDT report also analyzes a shell height:meat weight (SH:MW) relationship from data observed in October. The PDT decided to examine both values because SH:MW relationships vary with season, and since July is when the ratio is the highest, that result may overestimate biomass. This report also considers two survey areas. The NMFS data has one area (the standard area) that has been used in the SARC for scallop assessments, but additional stations were added inshore of this area because scallops are known to be found in areas within the ETA west of the “standard area”. This area is called “expanded strata” within this report. Biomass estimates are higher for the expanded strata since there is additional biomass in waters west of the standard area.

The Scallop PDT met on September 6 and reviewed preliminary data from all three surveys. The federal scallop dredge survey is conducted every summer. During the 2006 NMFS sea scallop

survey, 66 stations were sampled within the boundaries of the Elephant Trunk Area, 61 of them within the standard survey strata boundaries, with the remaining five as part of the expanded survey. The VIMS research team also surveyed ETA in June 2006 with both the dredge used by the NMFS survey as well as a commercial dredge. Approximately 82 stations were sampled in the VIMS data set. Both the federal survey and the VIMS survey covered a geographical area of 1,277 square nautical miles. In terms of the area covered per station, or the footprint area of each station, the mean dredge path covered per station for the VIMS commercial survey was about 8,081 squared meters and about 4,310 squared meters for the survey dredge; both based on a fifteen minute tow at 3.8 kts. The video survey conducted by SMAST included about 900 stations on a 1.2 nm grid within the ETA. While this survey had more stations, the total geographical area sampled was approximately 1,118 square nautical miles, similar to the total geographical area sampled by the dredge surveys.

Framework 18 projected that exploitable biomass in ETA would be about 55,130 mt. (Table 1). None of the surveys conducted in the area in 2006 project that exploitable biomass is at the level projected in the framework document (that was based on data through 2004). With lower biomass, fishing mortality is expected to be higher than Framework 18 projected ($F=0.16$); initial projections estimate a level closer to 0.22 for 2007 within the ETA. Initial results from the NMFS dredge survey using the standard strata were about 30% lower than the biomass estimates in Framework 18, but were above the threshold to indicate a reduction in trip allocations was necessary. Expanding the survey to include the inshore areas increased the estimated biomass by about 20%. The VIMS survey with the survey dredge was very consistent with the expanded federal survey. The estimated biomass from the commercial dredge on the VIMS survey is higher, probably because commercial dredges with 4-inch rings have a higher efficiency than smaller ring dredges such as the survey dredge. Initial results from the video survey were lower, but after the researchers had time to finalize their data set and include the same assumptions used in the dredge surveys, the estimates increased and all three are now compatible with each other.

The preliminary SMAST estimates increased because of 4 factors; 1) the counts of numbers of scallops per quadrat presented in September were preliminary, recorded on the bridge of the vessel, and when the video tapes were replayed in the laboratory the total number of scallops per m² increased from 0.58 to 0.62; 2) in September a random sample of shell height measurements from the June (3x3 nm) survey was used, and since then the team finished measuring the scallops observed in the 1.2 nm September survey and this increased the size of the scallops over 4" from 40% to 55%; 3.) in September a shell height/meat weight relationship from a dissection on 8 November 2001 was used, this provided a smaller meat weight than the dissections collected in July 2006 by 18%; 4.) in September a knife-edge selectivity for a 4" ring was used in the estimate, and based on the first PDT meeting it was decided that the selectivity curve provided by the NMFS should be used in all estimates, and this increased the estimate of harvestable scallops by 15% (from 1.5 to 1.8 billion). Just as standardizing these equations increased the SMAST estimate it also reduced the VIMS and NMFS estimates presented in September by about 16% and 21%, respectively. These variations reflect the importance of the assumptions used to calculate the exploitable biomass and the associated uncertainties.

The PDT met again on October 25 after the researchers had time to finalize their data and develop a consistent presentation of results. Table 2 summarizes the result of that work and

includes the exploitable biomass estimates from the three surveys for both SH:MW values, and for both survey areas (for the NMFS survey only). When compared to the thresholds identified in Framework 18, none of the survey results trigger a reduction in trips (<34,380 mt. is the threshold for reducing five full-time trips to four). The column titled “JulExpBms” is the appropriate column to compare with the assumptions used in Framework 18 and all three survey results range from 38,565 - 62,236 mt., above the 34,380 mt. threshold that would suggest reducing the trips allocations from five to four for full-time vessels. Framework 18 projected that the exploitable biomass would be 55,130 mt. (about 122 million pounds). While there is a range of about 20,000 mt. between all three surveys, the estimates are consistent and are within the 10-20 percent error contained within each estimate. Furthermore, the total number of scallops estimated from each survey is very consistent.

In terms of using this information for management, all three survey methods have been reviewed. The data collection and validation methods of data for the federal survey have essentially been the same since 1982. The model used to run these estimates and the assumptions used in the model were reviewed at SARC-39 in 2004 and by the SSC in 1999. Similarly, the methods used on the VIMS dredge survey have been reviewed and are compatible with standards used on the federal survey. Lastly, the methods used by the video survey have also been reviewed and the methods and findings from this research have been published in several research journals. The data from the video survey was combined with the same assumptions from the dredge surveys; therefore, all three sources are valid and appropriate to use for management purposes.

Table 2 – Updated biomass estimates from all three surveys for Elephant Trunk Area

	Number (millions)	ExpINum (millions)	JulyBms (mt)	OctBms (mt)	JulExpIbms (mt)	OctExpIbms (mt)	MeanExpIbms (mt)
NMFS R/V Standard Strata	2774	1700	52006	41833	38565	31394	34979
NMFS R/V Expnd. Strata	3224	2088	64967	52534	49768	40702	45235
VIMS F/V Survey Dredge	3173	2067	64814	52608	50539	41491	46015
VIMS F/V Com. Dredge	N/A	2547	N/A	N/A	62236	51079	56658
SMAST Video Fine Scale	2887	1872	57325	46355	45406	37307	41357

While the PDT prepared this report several important issues were identified related to why it is critical to use precaution when managing the scallop resource in this area. First, there is increasing evidence that growth in the Mid-Atlantic in general, and in the Elephant Trunk Area specifically, is slower than that assumed in Framework 18. This issue was discussed within the Scallop PDT during the development of Framework 18, but it was felt that the evidence was too preliminary on which to base management. The data from the Elephant Trunk Area over the last two years is consistent with the assumption of slower growth, and reduced growth is likely the main reason why the 2006 biomass is below what was projected. A benchmark assessment is scheduled for June 2007 and the panel will review new estimates of growth that may reduce this potential for overestimation of growth in the Mid Atlantic. Secondly, preliminary projections suggest that overfishing may occur for the entire stock in FY2007. If this is the case the PDT recommends that the Council and NMFS be especially precautionary with the resource in this area since scallop growth and recruitment may not be as high in other areas. Third, all three surveys were conducted in the summer of 2006 and the resource will not have a full year to grow in that area since the area is projected to open in January rather than June. The PDT does not

expect growth rates to be very high for the scallops in this area from the time they were assessed until the date the area is slated to open (approximately 5-6 months only).

Fourth, the TAC of exploitable biomass is based on a distribution curve of all scallops expected to be caught with 4-inch gear. The PDT believes that an even more precautionary approach would be to only include biomass expected to be caught with that gear size as well as an additional cull size. For example, exploitable biomass could also include scallops 90 mm and above since it is known that some smaller scallops are caught in the gear. Including a cull size cutoff in the estimate would produce an even more conservative estimate, thus a more precautionary TAC for the area. The projections in Framework 18 did use a cull size of 90mm, but the estimates in Table 2 did not. Fifth, the data used for the SH:MW relationship is from scallops caught in July when scallops have better yield in terms of meat weight at a given shell size. Therefore, using the SH:MW from this period of time will produce a more robust estimate of biomass. The PDT is going to investigate using SH:MW estimates from other times during the year to prevent an overly optimistic estimate of biomass based on a July number only. For example, scallop yields are typically at their worst in the later part of the year and during the first few months of the year. In addition, the model assumes a 20% discard mortality rate, and while that is a reasonable estimate for scallops region wide, in areas like the Elephant Trunk access area, a higher discard mortality rate may be justified, especially in warmer months when air and water temperatures are higher. The PDT recognizes that discard mortality rates from the Hudson Canyon area may have been higher than projected and this could be a source of underestimation of fishing mortality. Last, Framework 18 estimates are based on the standard strata area, but scallop beds do exist in waters west of the strata boundary, so it may be more accurate to include additional stations from the expanded strata.

Aside from the last point, all of these issues suggest that serious precaution be taken not to overestimate the exploitable biomass in the Elephant Trunk Area. Furthermore, the PDT acknowledges the concerns the industry has raised related to access to this area including the potential for derby fishing. There may be justification to reduce the number of trips or space the trips out based on the additional issues raised in this report as well as input from the public about safety, preventing overfishing and maximizing yield from the resource. Since there is no flexibility in the rulemaking procedure approved under Framework 18 to use anything other than the updated biomass estimate, the PDT urges the industry to explore voluntary ways to promote responsible fishing practices. For example, spreading trips out, taking shorter tows, no deckloading, and not discarding viscera and scallop shells in the same place.