

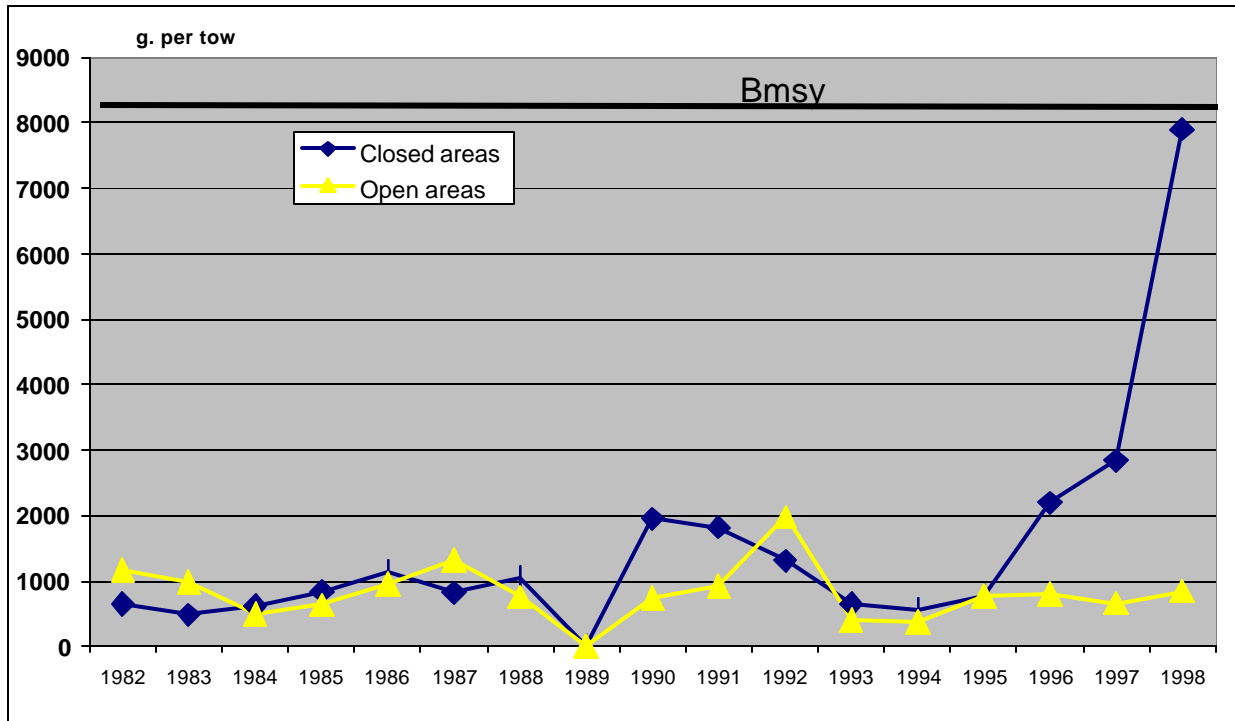
Figure 6. Change in biomass of recruits and exploitable scallops for Closed Area II from 1994 (left bar) and 1998 (right bar). The hatched bar indicates the ratio of the biomass in 1998 to the biomass in 1994. Recruitment increased about six times compared with 1994 while the biomass of exploitable scallops increased by 8.5 times.

## 4.0 ISSUES OF CONCERN

### 4.1 Sustainability

The goal the Council adopted in Amendment 7 to the Atlantic Sea Scallop FMP is to rebuild the resource to levels capable of producing maximum sustainable yield (MSY) and then fish the stock at a level that will produce MSY from that point forward. As of 1998, scallop biomass in the groundfish closed areas (Closed Area I, Closed Area II, and the Nantucket Lightship Area) has increased to 7.9 kg/tow, very close to the biomass target for the Georges Bank stock of 8.2 kg/tow (Figure 7). At the time of analysis, the 1999 survey data was not yet available for analysis, but projections of catch indicate that biomass continued to grow in 1999. Except for the southern half of Closed Area II, which has been fished near target levels in 1999, significant increases in biomass are expected. This projection has been corroborated by experimental fishery surveys in the Nantucket Lightship Area and Closed Area I during August and September of 1999. This latter data was analyzed for this framework action, however, more intensive analyses are continuing for the next stock assessment, scheduled for fall 2000.

In addition, there are four distinct year classes, ages 2 to 5, which are abundant due to the low fishing mortality since the closure. In contrast, the high scallop mortality in the open areas significantly reduces the abundance of 4-year-old scallops and 5-year-old scallops are nearly absent (Figure 8).



**Figure 7. Mean meat weight per tow from the NMFS scallop survey (1982 to 1998), stratified into closed and open areas of Georges Bank.**

Since the stock biomass in the closed areas is near MSY conditions, the Council’s goal for the closed areas is to harvest scallops at a rate that will produce MSY, consistent with the overall goal for the total resource. Since growth and natural mortality for scallops in the closed areas appear to be similar to the estimates for the entire resource, the scallops should be fished at a level that will not exceed the overfishing threshold,  $F_{max}$ . The Overfishing Definition Review Panel recommended this reference point as a proxy for  $F_{MSY}$ . The exploitation pattern for the fishery where large scallops occur is unknown, so the value of  $F_{max}$  for the Georges Bank stock is appropriate. This value is 0.24, or about a 20 percent exploitation rate. If the fishery in the re-opened closed areas is able to avoid catching three-year old scallops (by changes in culling practices or through selective area closures), the value of  $F_{max}$  could increase.

Although the exploitation rate within portions of the three closed areas may be locally higher than  $F_{max}$ , scallops in the closed areas are considered to be one stock and therefore the exploitation rate on the stock will not exceed 20 percent. If only portions of the closed areas are re-opened by this action are available and the fishing mortality reaches  $F_{max}$ , it implies that more areas would have to re-open in future years to maintain a maximum sustainable yield from the closed areas.

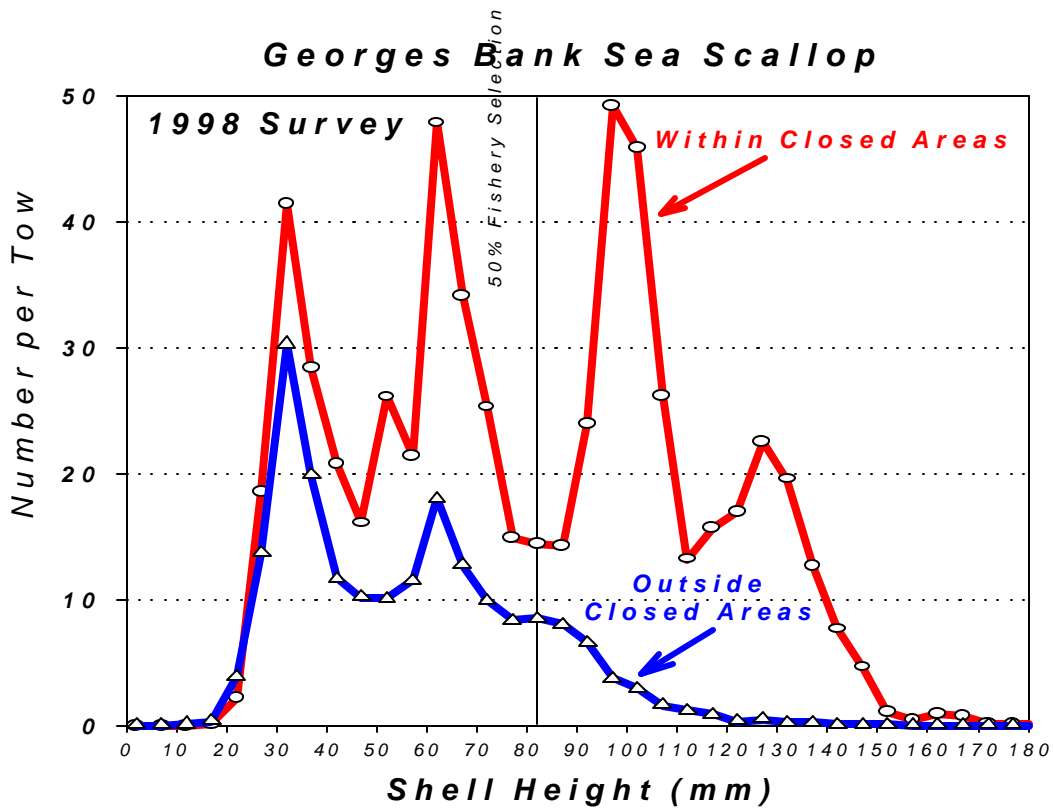


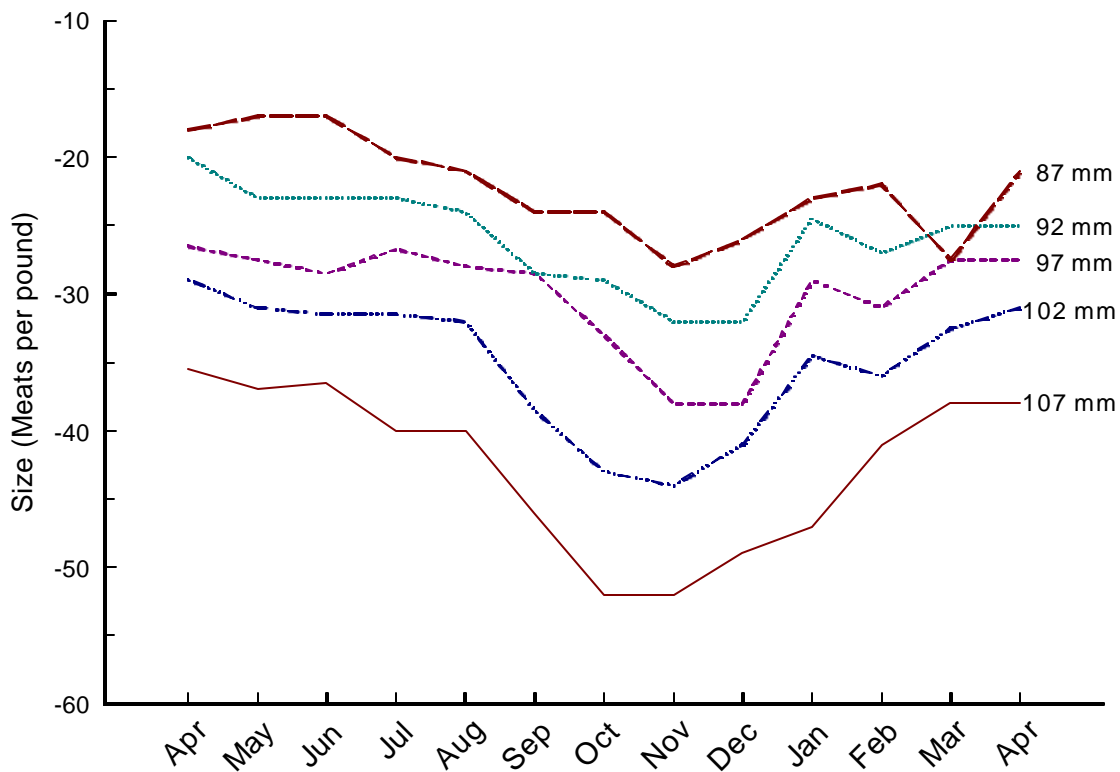
Figure 8. Size frequency of shell heights of scallops captured by the NMFS scallop survey in 1998, comparing the size distribution within the open areas to the size distribution in the three groundfish closed areas.

#### 4.2 Optimum yield

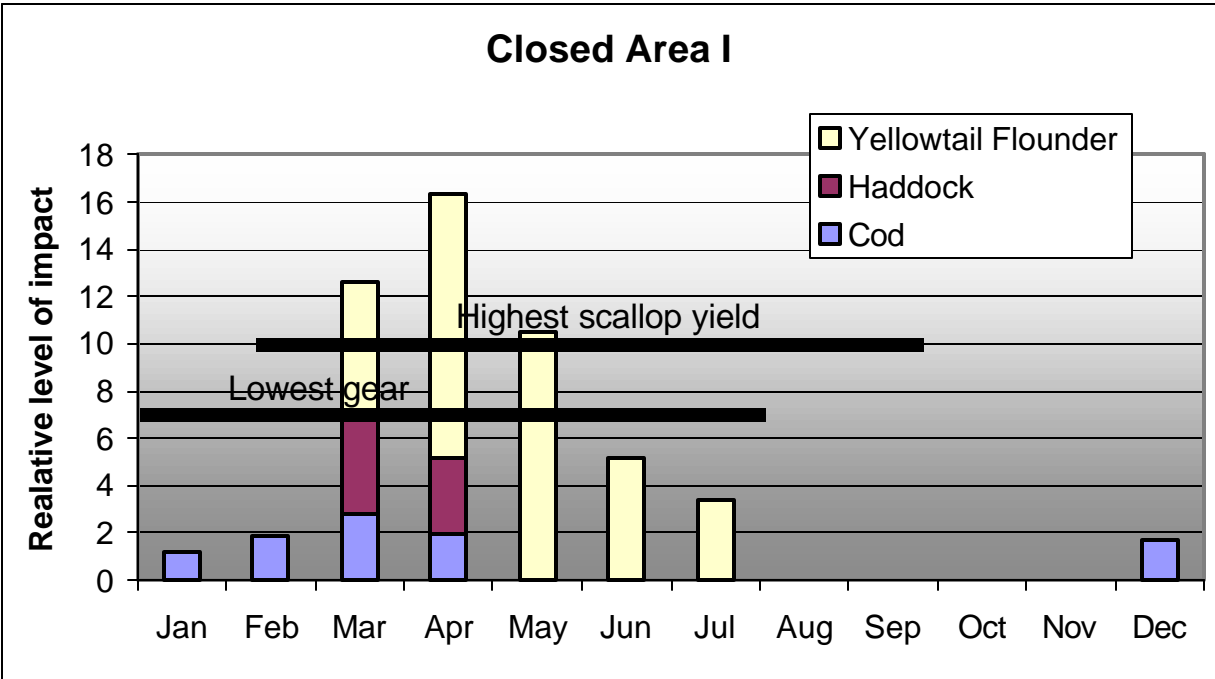
Optimum yield for scallops varies seasonally because of changes in the meat weight – shell height relationship and due to other factors, such as weather and market demand. Meat yield is cyclic and related to spawning activity. The maximum meat yield occurs in the spring and early summer (NEFMC 1999a), and then declines through the late summer and early autumn as scallops divert energy to spawning. Another factor to account for is weather, affecting the costs of scallop fishing especially when weather forces vessels to port on trips counted against day-at-sea limits. Imports tend to keep price relatively stable through the year (NEFMC 1999b), especially in markets where frozen product is an acceptable substitute.

These factors (high meat yield in the spring and early summer), weather (the threat of hurricanes and northeasters in late summer and early fall), and markets (preventing conditions that would oversupply

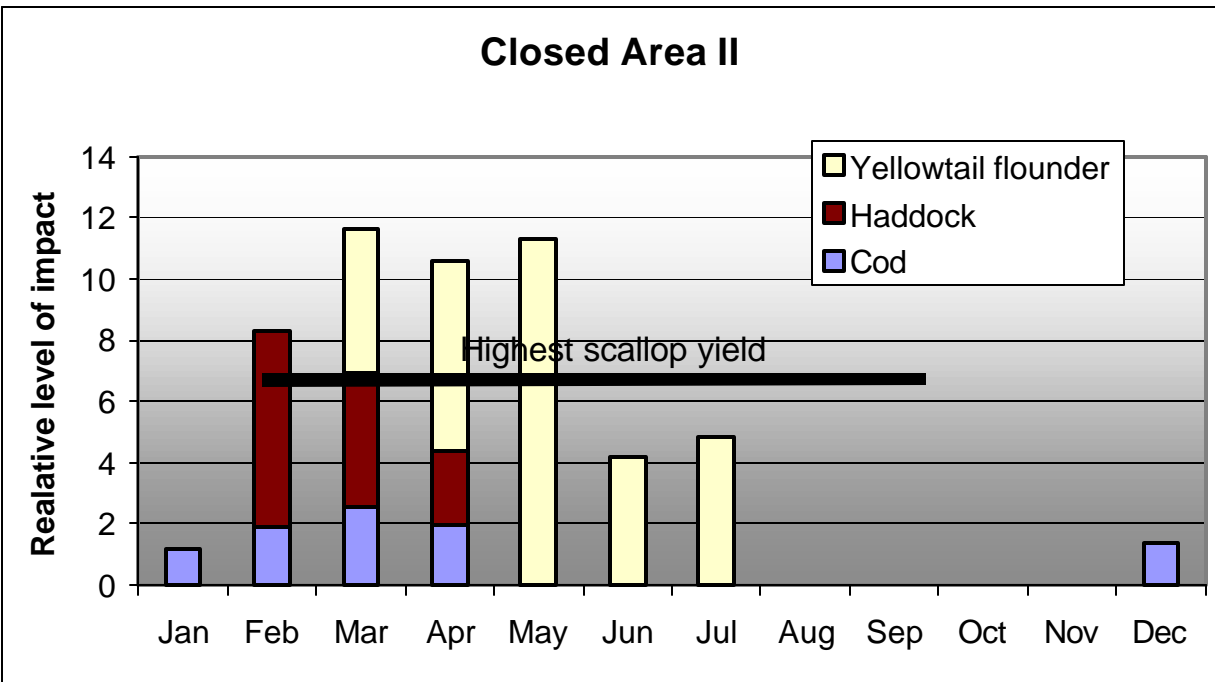
the market and push prices down) were taken into account by the Scallop PDT when it developed the area access recommendations. The relationship between the optimum time to fish for scallops, the potential for high bycatch, and gear conflict were compared for each area (Figure 10 to Figure 12). While avoiding bycatch appears to be an overriding priority, there are some yield losses that occur by fishing in the fall rather than the spring and summer. Since the fishing mortality targets and conservation neutrality are counted in terms of number of scallops caught, rather than weight, more landings and revenue could be generated during optimum seasons. Diverting effort from the fall when scallops spawn to the spring with the highest meat yields occur could also boost spawning activity, delay mortality to larger scallops, and improve yield-per-recruit.



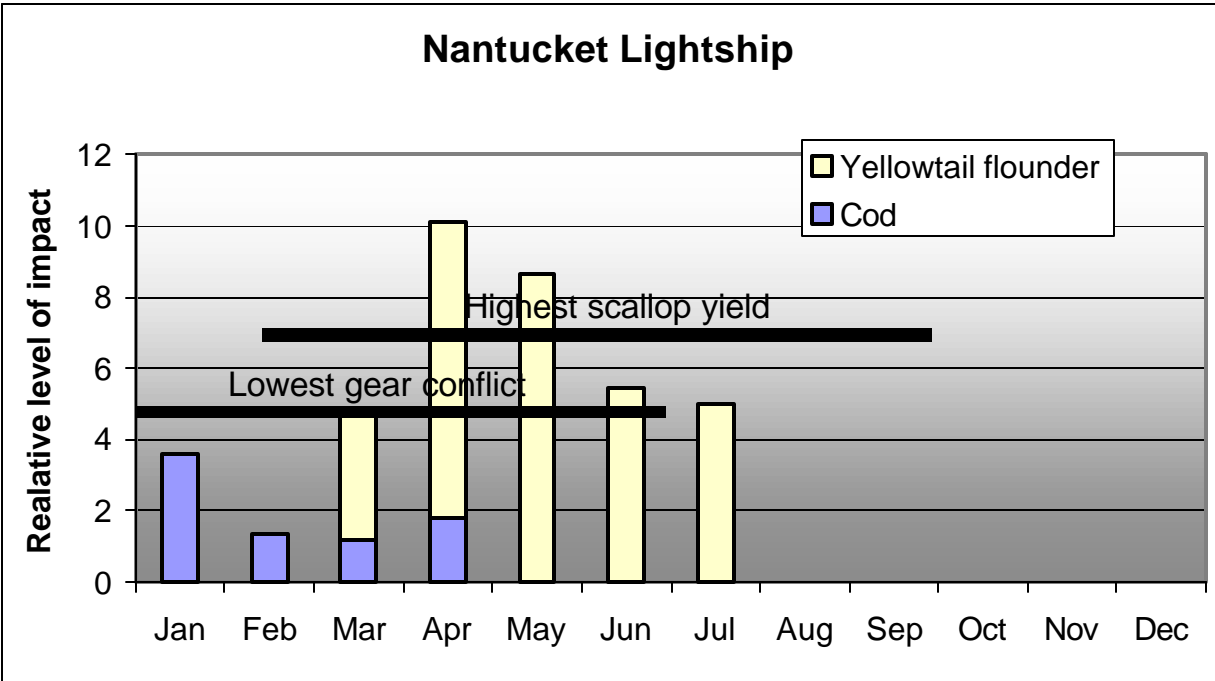
**Figure 9.** Seasonal change in meat weight for shell-heights ranging from 87 to 107 mm.



**Figure 10.** Seasonal relationship between scallop yield, gear conflict, and interactions with spawning and juvenile groundfish in Closed Area I.



**Figure 11.** Seasonal relationship between scallop yield, gear conflict, and interactions with spawning and juvenile groundfish in Closed Area II.



**Figure 12.** Seasonal relationship between scallop yield, gear conflict, and interactions with spawning and juvenile groundfish in Nantucket Lightship Area.

### 4.3 Conservation neutrality

The target fishing mortality rate for 2000 is 0.34. Conservation neutrality means that fishing mortality for the scallop resource should not rise above the annual mortality target set by Amendment 7 (NEFMC 1998). Also implied in the day-at-sea management system is that a day-at-sea is equivalent to some unit of fishing mortality. Since this action contemplates the fishery will catch larger scallops (Figure 13), it is anticipated that landings would increase but the number of scallops caught would remain the same or possibly decline.

The numbers of caught scallops for various options were calculated in Section 6.2.6.1.10, and the recommended minimum day-at-sea accumulation was estimated as the amount that would result in no net change. This methodology included in the estimate the decline in the number of small scallops harvested in the currently open areas because of the expected effort shift. Other factors and mechanisms that could affect total fishing mortality are explained below. One important factor, taken into account by the analysis, is the availability of unused day-at-sea allocations, by either active or inactive permits. An active permit is one in which a permitted vessel used one or more days-at-sea during the 1998 fishing year. The analysis is conservative in that it assumes that all eligible vessels will utilize unused days-at-sea (including carry forward days estimated from the 1999 fishing year) to account for the accumulation of days-at-sea in the closed areas. In other words, the analysis assumes that vessels would reduce days-at-sea in currently open areas only if they would run out of days-at-sea by continuing their 1999 fishing effort in the open areas. In Closed Area II, the vessels that actually participated in the 1999 fishery were assumed to fish in Closed Area II during 2000. Since there is no historical basis to estimate future participation in Closed Area I and the Nantucket Lightship Area, the analysis assumes that all eligible vessels will take the six allocated 10-day trips including active and inactive vessels. Confirmation of Permit Histories (CPH) were not included, although NEFMC (1999b) estimated that eight of the CPH

permits were activated during the 1999 fishing year. Any increase in CPH activation will be offset in these two areas by the less than 100 percent participation by inactive vessels with limited access scallop permits.

Production limits on board the vessel (i.e. shucking capacity) is expected to cut the actual time that fishing gear is on the bottom, compared with the fishing activity in the currently open areas where dredges usually catch fewer scallops than can be processed by the vessel and crew. This decreased fishing time is expected to reduce fishing mortality on the entire stock (inside and outside the closed areas), but the dense beds of scallops within the closed areas could increase dredge efficiency. The increase efficiency could translate into higher total fishing mortality on the stock if the total number of days actually used to fish remains the same. To counteract this potential change in efficiency, the framework adjustment includes a provision to accumulate more days-at-sea than those actually used when efficiency is high and the vessel reaches the trip limit in a short period of time.

Conservation neutrality with respect to scallop management with the 2000 fishing year day-at-sea allocations<sup>1</sup> means that the total number of scallops caught by limited access scallop vessels will not increase relative to the amount expected without groundfish closed area access (i.e. status quo). For the alternatives considered and rejected by the Council, the number of scallops caught would decline from two to five percent relative to status quo (Table 31). For the proposed action, the analysis (Section 6.2.6.1.10) estimates that the number of harvested scallops would decline from 827 million for the status quo to 817 million for the proposed action, a one-percent decline. Conservation neutrality is therefore achieved without a formal day-at-sea reduction or additional closed areas by shifting fishing effort onto larger scallops, by the vessel's production constraints (explained above), and by the day-at-sea accumulation (i.e. "tradeoff") relative to the amount of time estimated to catch and land 10,000 pounds of scallop meats.

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<sup>1</sup> According to Framework Adjustment 12, a vessel with a full-time limited access scallop permit will receive 120 days plus up to 10 carry forward days to fish during the year beginning March 1, 2000.