

Evaluation of Crew Size Limits and  
Dredge Ring Size Restriction  
in the Atlantic Sea Scallop Fishery

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Seven-Man Crew Limit

Assessing the potential impacts of the seven man crew restriction is quite difficult for several reasons. First, we lack detailed information about size of scallops caught, discarded, and retained relative to crew sizes. Second, crew size typically varies in accordance with resource levels, size of scallops available, meat yields of scallops, weather, and economic conditions. A preliminary analysis, however, does suggest that the seven man crew limit has affected the level of harvest and the associated rate of mortality.

In 1992, the average crew size per trip was 8.49. In response to declining resource levels and other factors, industry reduced crew size in 1993; the average crew size was 7.25. In 1994, average crew size increased to 7.84 per trip. The average crew size in 1995 has not yet been fully determined because available data include several split trips in which crew size was 7 but 9 or more different individuals worked the trip at different times; the unadjusted average crew size was 7.25 in 1995 (Figure 1).

Traditionally, crew size has seasonally varied in accordance with the biological characteristics of scallops and market conditions. During the first two quarters of the year, crew sizes are typically highest; crew size declines during the last two quarters of the year. Using simplistic Poisson and ordered logit models, crew size in response to pre and post

Amendment #4 was examined. A preliminary analysis indicated that the seven man crew was quite restrictive in the second and third quarter of 1994 and between February and June of 1995. There is, however, no evidence to suggest that the seven man crew limit substantially affected crew sizes between September and December in either 1994 or 1995. Crew sizes actually declined to 5 and 6 individuals per vessel in the last quarter of 1995.

The seven man crew, other regulations, and quite possibly resource abundance and size distribution does appear to have had some other affects on vessel operations. For one thing, it appears that by late 1994, vessels were having more split trips or trips in which crew members were changed. Vessels would start a trip with seven men and offload at ports other than their traditional ports. Two or more individuals would leave the boat and be replaced with fresh crew; this would happen several times over a six to eight week period. Presently, it is not known with certainty that the crew restrictions caused this behavior or whether or not other factors were responsible.

It is important to note that the 7 man crew size restriction has only been fully implemented for 1996. During both 1994 and 1995, there were periods of time when the 9 man crew restriction was in place, namely during the first 9 months (January - August) of 1994 and during the first 6 months (January - June) of 1995. These periods correspond to the same time when the new year class (age 3+) was recruiting to the fishery. At this time, the new recruits to the fishery are between 70 and 80 mm and yield

55-60 MPP and are more likely to be retained by scallop vessels with larger crews with concomitant greater shucking capacity. The results of these two factors may be evidenced by the high meat count scallops landed during the first quarter of 1994 and 1995 (Figure 2).

It is not known with any precision how the seven man crew affected fishing mortality. It is known that crew limits did limit landings during the second quarter of 1994 and the first and second quarter of 1995. Given that some vessels reduced crew size to six individuals during the last two quarters of 1994 and 1995, it is unlikely that the seven man crew limit had any affect on catch during these periods. Industry was simply responding to resource and economic conditions. A more comprehensive analysis is warranted and should be pursued in the near future.

The data on crew size represents information pertaining to 314 scallop trips in the mid-Atlantic region.

#### Dredge Ring Size Restriction

Previous research on ring size selectivity indicated that a maximum average meat count resulting from 3.5" ring dredges would be approximately between 50 and 55 MPP. This upper estimate was the result of the selectivity by the dredge and the culling practices of the crew. Data on landed meat counts taken from vessel trip tickets in the mid-Atlantic

region indicate that the maximum average meat count landed by vessels using 3" and 3.25" dredge rings reached 56.6 MPP in April 1994. At this time, only some vessels had converted to use 3.25" rings while others were still using pre-Amendment #4 dredges. The average landed meat count again peaked in January 1995 when it reached 55.1 MPP. At that time, all vessels were using 3.25" rings. As mentioned previously, during both these periods of time, crew size was not limited by the 7 man restriction as vessels were allowed a crew size of 9. The maximum average landed meat count for 1996 was 44.9 MPP in March when vessels were using 3.5" dredge rings. These seasonal peaks in landed meat count generally corresponds to the availability of the recruiting year class. In addition, it must be remembered that landed meat counts are different from meat counts determined at-sea or from shell height:meat weight relationships. Landed meat counts would be 5-10% lower due to increases in weight from ice melt during storage aboard vessels. With this in mind, the predicted maximum meat count using 3.5" rings (50-55 MPP) was fairly close to what we observed from vessel trip tickets.

The decline in yearly maximum average meat count values from 1994 through 1996 can be attributed to two factors: (1) changing resource conditions; and (2) increases in minimum ring size. In order to differentiate between these two factors, more detailed analysis is needed. However, from examining landed meat count data for about 25% of the scallop landings in the mid-Atlantic, a downward trend in the landed meat count is evident.

Part of the difficulty is assessing the impacts of larger dredge rings is the lack of data on the size composition of landed scallop meats prior to January 1994. During the period of time when the scallop fishery was regulated by a maximum meat count restriction, little data if any is available as to the size composition of the catch. In other words, we have little information relative to the extent of mixing various size scallop meats on-board vessels to comply with meat count regulations.

In order to better assess the impact of 3.5" dredge rings, we need to expand the database on landed meat counts to include more vessels in the mid-Atlantic and vessels operating out of New Bedford, Massachusetts and Cape May, New Jersey for 1995, 1996 and into 1997. The data should include meat counts in 10 MPP increments in order to quantify the portion of the harvest that is made-up of scallops greater than 50 MPP. Our present data set includes total landings by month, the number of trips and landings in 10 MPP increments. We have preliminary information for a limited number of scallop trawl vessels. We will continue to expand our database and conduct a more detailed examination of the data.

## Conclusion and Recommendations

The SARC<sup>1</sup> concluded that the expected shifts in size distribution of the landings, as a result of the increased dredge ring size and decreased maximum crew size, did not occur. The authors (we) do not fully concur with this conclusion since the data presented in this report and circumstances within the fishery during 1994-1996 (the years under evaluation) are subject to further interpretation and analysis. Furthermore, the “expectations” mentioned in the SARC report have never been fully articulated or quantified and therefore the conclusions reached by the SARC need further clarification. In addition, we believe that these conclusions may be premature, as the full implementation of Amendment #4 had only been in effect for the calendar year of 1996. We base our comments on the fact that:

1. The 7 man maximum crew size was not fully implemented during 1994 and 1995.
2. During 1994, 3" rings were in place until June, and from March to June, the meat count restriction was eliminated as a management measure.
3. During 1995, the 3.25" rings were in place, but in effect, the ring size restriction was only an interim measure to placate certain parts of the scallop industry that were apprehensive of the 3.5" ring.

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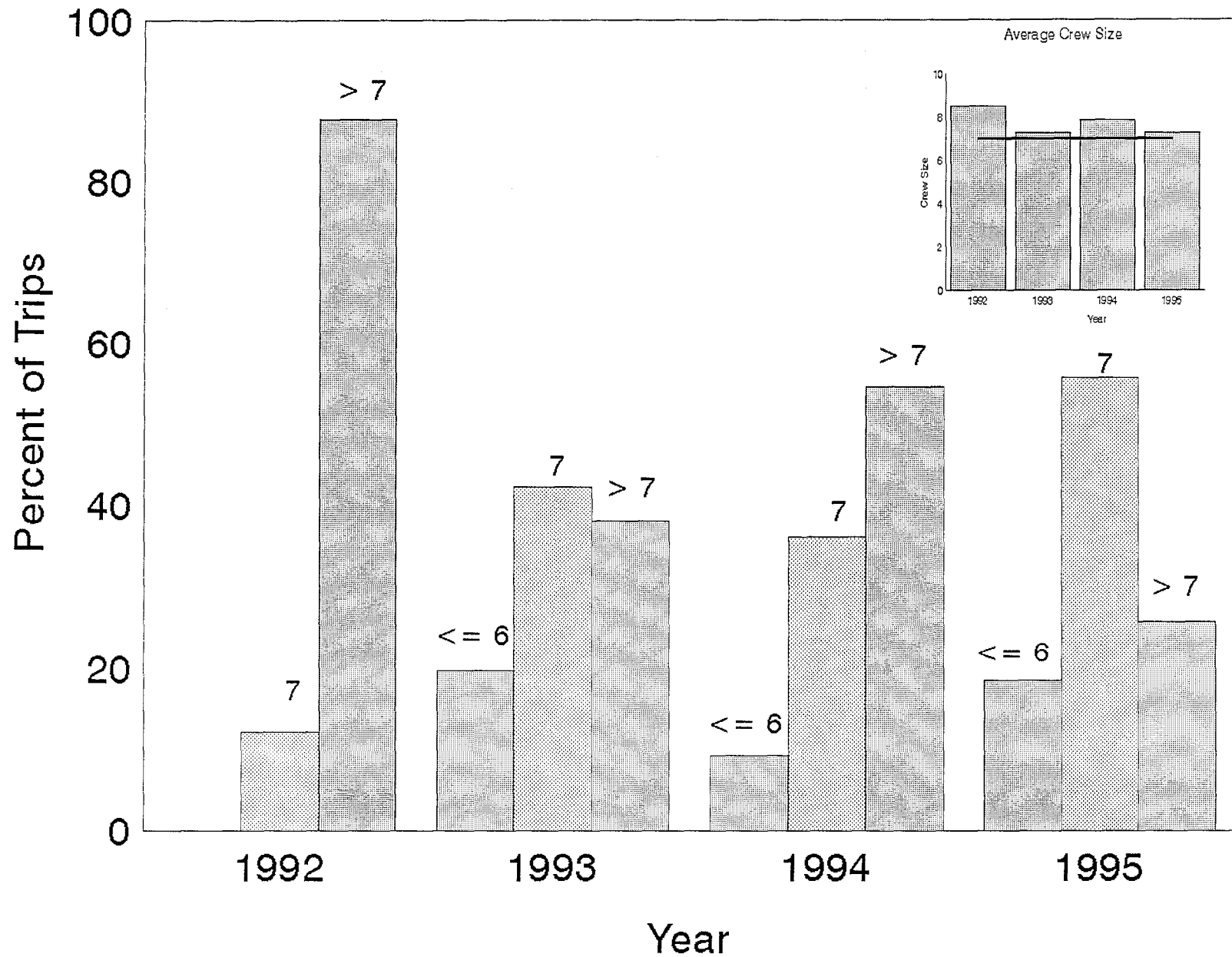
<sup>1</sup>Report of the 23<sup>rd</sup> Northeast Regional Stock Assessment Workshop: Stock Assessment Review Committee; Consensus Summary of Assessments. NOAA/NMFS/Northeast Fisheries Science Center, Woods Hole, Massachusetts. January, 1997.

4. The scallop dredge ring size increase to 3.5" was implemented in January 1996.

Consequently, the authors (we) make the following recommendations:

1. Continuation of the 7 man maximum crew size.
2. Continuation of the 3.5" minimum ring size restriction and existing restrictions on chafing gear.
3. Conduct additional analysis on data relative to crew size and landed meat count. We propose to expand our database to include vessels from Cape May, New Jersey, New Bedford, Massachusetts and additional vessels from Virginia.
4. To evaluate the possibility for additional changes in scallop dredge configuration relative to bycatch reduction and scallop size selectivity.

Figure 1. Percentage of Trips Given Crew Size, 1992-1995  
 (Number of Trips = 314)



# Figure 2

## Monthly average landed meat counts 1/93 - 12/96 Mid-Atlantic

Number of Trips = 1105

