

SIZE DISTRIBUTIONS AND DISCARDING RATES
IN THE ATLANTIC SURF CLAM FISHERY - AUGUST 1984

S. A. MURAWSKI

<input checked="" type="checkbox"/>	APPROVED FOR DISTRIBUTION
<i>Vanya Antler</i>	
(APPROVING OFFICIAL)	
<i>August 29, 1984</i>	
(DATE)	

National Marine Fisheries Service
Northeast Fisheries Center
Woods Hole Laboratory
Woods Hole, Massachusetts 02543

August 1984

SUMMARY

Size distribution data collected from Atlantic surf clam landings during 1984 indicate that about 35% are below the $5\frac{1}{2}$ -inch minimum legal size established for the Middle Atlantic Fishery Conservation Zone. Average discarding rates (as a percentage of landings) of small sublegal clams was 26% for the Middle Atlantic FCZ fishery as a whole; slightly lower off New Jersey (24%) and higher off the Delmarva Peninsula (32%). Current management policy for this fishery is to maintain the discarding rate at or below 30%. If all landings were to conform to the current $5\frac{1}{2}$ -inch minimum size (with an approximate 20% tolerance) it is likely that the discarding objective could not be achieved.

A reduction in the minimum size from $5\frac{1}{2}$ inches to $5\frac{1}{4}$ inches is likely to achieve the discarding goal and result in an acceptable portion of the catch being under minimum size if current size grading and discarding practices are followed. During 1984, 21% of the clam landings were in the $5\frac{1}{4}$ to $5\frac{1}{2}$ -inch size range, with only 14% below $5\frac{1}{4}$ inches. This slight reduction in minimum size will not negatively influence yield potential from cohorts of clams as yield per recruit is maximized in the $4\frac{3}{4}$ to 5 -inch size range.

INTRODUCTION

The Fishery Management Plan for the Surf Clam and Ocean Quahog Fisheries (FMP) currently contains a 5.5-inch minimum shell length provision for surf clams harvested from the Fishery Conservation Zone (FCZ) in the Mid-Atlantic management area. A tolerance on this size limit of about 20% undersized clams in an individual trip catch is provided to minimize discarding of small clams taken incidentally during fishing operations. Discarding is considered wasteful as mortality of discarded clams is believed to be high.

At present, the Mid-Atlantic Fishery Management Council and NMFS/Northeast Region are reevaluating the current 5.5-inch size limit provision since discard rates of up to 50% have occurred in the Mid-Atlantic fishery. Current management policy considers discard rates in excess of 30% of trip catch as undesirable. Accordingly, the Regional Director, NMFS Northeast Region has been empowered under emergency regulatory authority to adjust the minimum size limit to constrain discard rates to 30% or less.

Discarding in the surf clam fishery is largely influenced by the size composition of the surf clam resource and on-deck vessel sorting and culling practices. This report reviews recent discarding trends in the Mid-Atlantic FCZ surf clam fishery, and examines resource and landings size frequency data obtained during 1984 to assess possible adjustments in the surf clam size limit to attain discarding rates at or below 30%.

DATA RESOURCES

Discard estimates from the FCZ surf clam fishery have been collected since 1982 as part of the Northeast Fisheries Center (NEFC) Tier 2 data collection system. NMFS port agents acquire these data through interviews with vessel captains during which information on trip catch, effort, area

fished and amount of discard is solicited. Vessel captains are asked to estimate the total quantity of small (sub-legal) clams discarded during their trip as a percentage of trip landings. For example, if 100 bushels of clams were discarded from a trip landing 1,000 bushels, the discard rate would be 10%.

In excess of 600 interviewed trips reporting discard data were analyzed, covering the period January 1982 to early August 1984. Interviewed trips for which no discards were reported were excluded from the analysis since it was impossible to determine, a posteriori, whether the lack of discard data reflected no discards or a failure to report discards. Average discard rates were determined, by calendar quarter for both the New Jersey and Delmarva FCZ fishery assessment areas, by calculating the arithmetic mean of the available discard estimates over all vessel size categories combined. These average discard rates are depicted in Figure 1.

Surf clam size frequency data were obtained from both commercial and research vessel samples using the procedures described by Murawski and Serchuk, 1984. Length frequency distributions from commercial landings samples collected during January-August 1984 from the entire Mid-Atlantic FCZ fishery and from the 1984 NMFS Mid-Atlantic surf clam research vessel survey (New Jersey to Southern Virginia) are presented in Figure 2.

To evaluate the adequacy of minimum size limits in meeting management discarding requirements and undersized clam tolerance limits, the 1984 commercial landings size frequency data were grouped into English measure categories of interest to managers:

- 0 - 5.00 inches shell length
- 5 - 5.25 inches shell length
- 5.25 - 5.50 inches shell length
- ≥ 5.50 inches shell length

These grouped data were assessed in conjunction with discarding information and research vessel survey results to delineate a minimum size limit compatible with management objectives and policy.

RESULTS AND IMPLICATIONS

Trends in average discard rates in the New Jersey and Delmarva FCZ fisheries have been similar during 1982-1984 (Figure 1). Discarding peaked at about 50% in the fourth quarter of 1982 and has subsequently declined to current levels of between 25-35%. Quarterly fluctuations in discarding rates generally reflect changes in fishery culling practices (i.e., landing differential proportions of undersized clams) rather than changes in resource size composition (Murawski and Serchuk 1984).

Average discard rates during January-early August 1984 for the New Jersey and Delmarva fisheries were 24% and 32%, respectively. Overall, the Mid-Atlantic fishery discard rate has averaged 26% during 1984; individual trip discards, however, have ranged from 2 to 223% of landings.

Although present fishery discard rates are near the 30% level, a substantial portion of the 1984 landings have been of sub-legal sized clams (Figures 2 and 3). Approximately 35% of the 1984 landings sampled to date have been below 5.5 inches in shell length. Given an approximate 20% tolerance on undersized clams, at least 15% of the landings were illegal. The largest proportion of landed clams less than 5.5 inches occurred in the 5.25-5.50 inch size interval (21% of total). Smaller clams in the 5-5.25 inch and less than 5 inch categories comprised only 10% and 5%, respectively, of the 1984 landings.

The Mid-Atlantic FCZ surf clam resource has until 1984 been dominated by the 1976 and 1977 year classes. These cohorts have sustained the FCZ fisheries in recent years. Size frequency data for the Mid-Atlantic resource derived from the 1984 research vessel survey (Figure 2) indicate that two additional year classes are now present in the offshore populations (modal sizes between 60 and 90 mm). These year classes are located in inshore areas off the Virginia-Maryland border and north of Atlantic City, New Jersey. The distribution of these cohorts is spatially discrete from those of the 1976 and 1977 year classes, however. The overlap in the 1984 commercial and research survey size frequency distributions (at shell lengths 100 mm and larger: Figure 2) implies that present fishery discards are comprised almost exclusively of the 1976 and 1977 year classes, and is attributable to differential growth of individuals within these cohorts. The newest year classes revealed in the 1984 survey have not yet recruited to the exploitable size range in the fishery, although they may begin to substantially contribute to fishery yields a year or two in the future.

Currently, average discard rates in the Mid-Atlantic surf clam fishery are within the range considered as acceptable ($\leq 30\%$) by the Mid-Atlantic Fishery Management level. If, however, the minimum size limit was enforced absolutely, discarding rates would markedly increase since substantial quantities of sub-legal clams are now landed rather than culled overboard at sea. Such a response by the fishery to more rigorous enforcement of the size limit regulations occurred during the fourth quarter of 1982 when discard rates approached 50% of the landings.

Although surf clams of the 1976 and 1977 year classes presently support the bulk of fishery yields, a substantial portion of both cohorts currently is within the 4.75-5.5 inch shell length range. Complete recruitment of these strong year classes to the 5.5 inch size limit level will probably not occur for at least several years. Hence, if the minimum size limit were incrementally reduced, it is probable that the fishery would maintain average discard rates at or below 30% since a larger component of the landings would be of legal size. Slight reductions in the minimum size would moreover have a salutary effect since yield per recruit is maximized at shell lengths between 4.5 and 5.0 inches (Murawski and Serchuk 1981). Had the minimum size been 5.25 inches in 1984, an additional 21% of the landings would have been legal sized (Figure 3) with only 14% of the landings below the size limit. This presupposes that culling and discarding practices would not have changed under the reduced minimum size limit. If an additional proportion of under 5.25 inch clams were retained by the fishery under the lowered size limit, discard rates would decrease further but the proportion of sub-legal sized clams in the landings might be unacceptable (i.e., exceed the tolerance). A 5.0 inch minimum size would result in only 4% of the 1984 landings below minimum size, well below the approximate 20% tolerance.

It should be recognized that evaluation of fishery discarding rates relies primarily on the veracity of discard estimates reported by vessel captains. Any systematic attempts by fishermen to alter their discard reports will, to some extent, bias the evaluation of discarding behavior by the fleet.

Literature Cited

- Murawski, S. A., and F. M. Serchuk. 1981. Assessment and current status of offshore surf clam, *Spisula solidissima*, populations off the Middle Atlantic coast of the United States. Nat. Mar. Fish. Serv. Woods Hole Lab. Ref. Doc. 81-33, 49 pp.
- Murawski, S. A., and F. M. Serchuk. 1984. Assessment update for Middle Atlantic offshore surf clam, *Spisula solidissima*, populations - winter 1983-1984. Nat. Mar. Fish. Serv. Woods Hole Lab. Ref. Doc. 84-07, 42 pp.

SURF CLAM DISCARD DATA 1982-1984

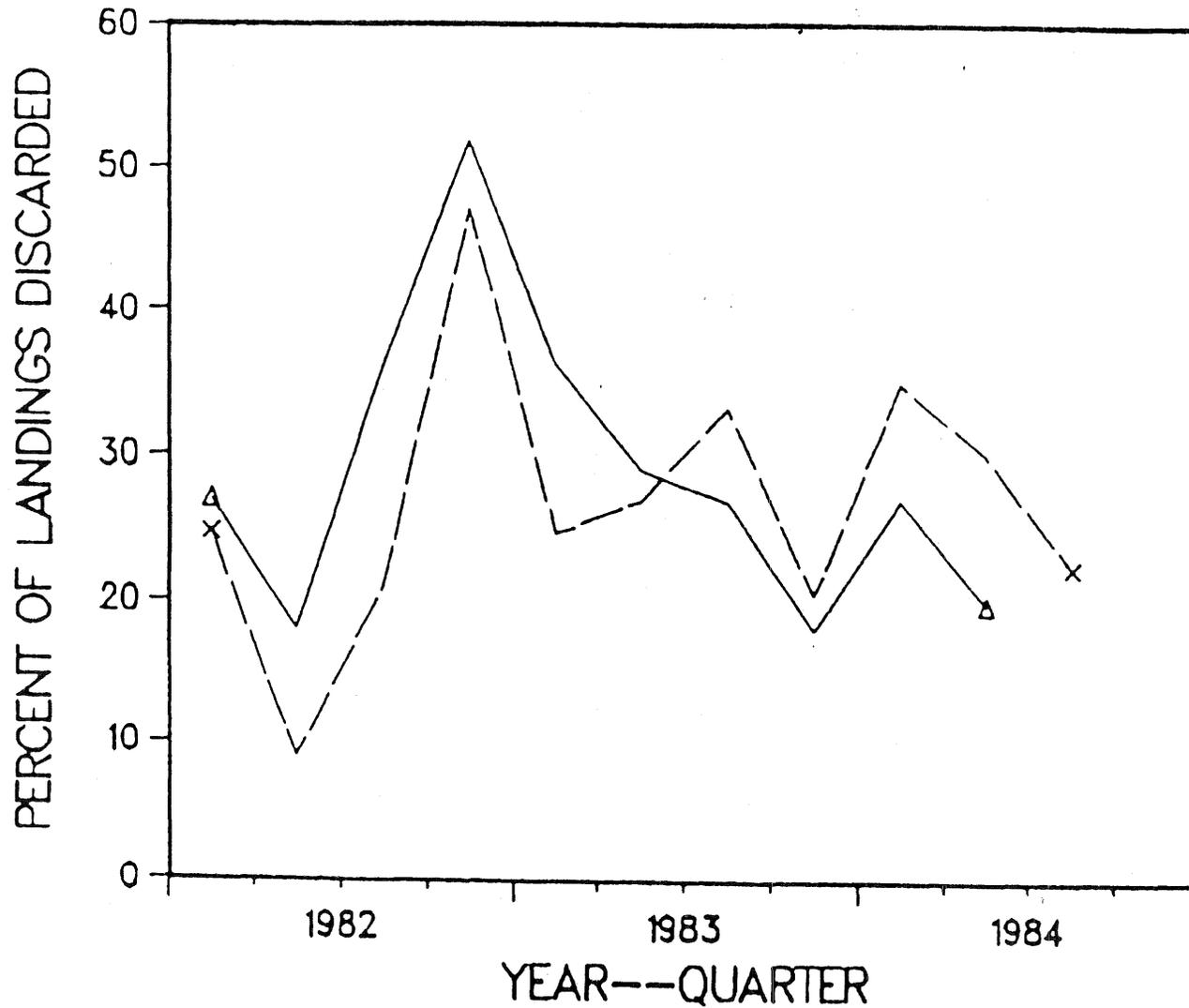


Figure 1. Average discard rates (as a percentage of landings) of small clams, the FCZ surf clam fisheries off New Jersey (solid line), and the Delmarva Peninsula (dashed line), 1982-1984. Data are given on a quarterly basis.

SURF CLAM LENGTH DISTRIBUTIONS--1984

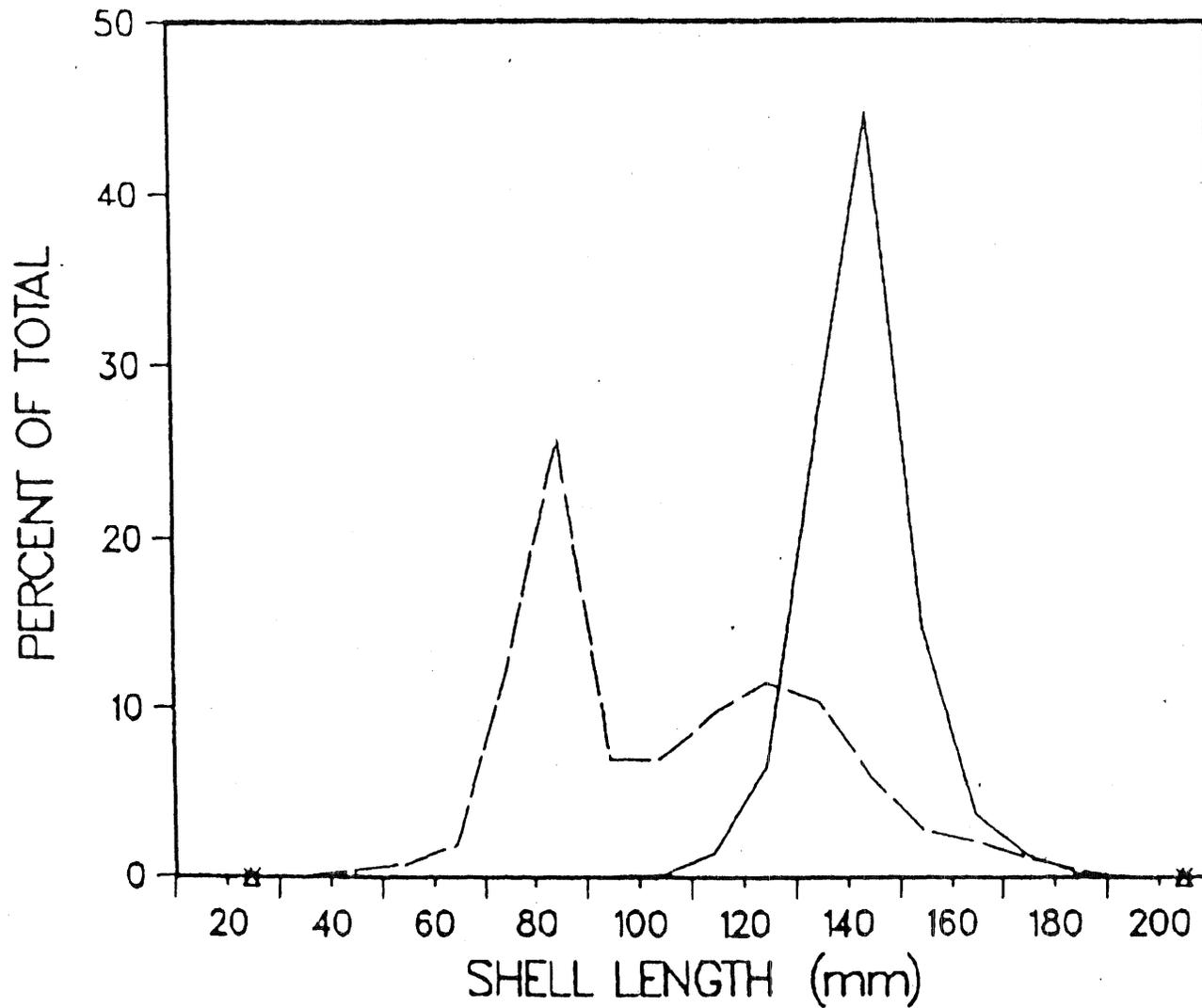


Figure 2. Middle Atlantic surf clam size frequency distributions for commercial catches (solid line), and research survey catches (dashed line) during 1984. Research survey data are for the NOAA R/V Delaware II survey, 9 July-1 August 1984.

SURF CLAM LENGTH DISTRIBUTIONS--1984

COMMERCIAL CATCHES

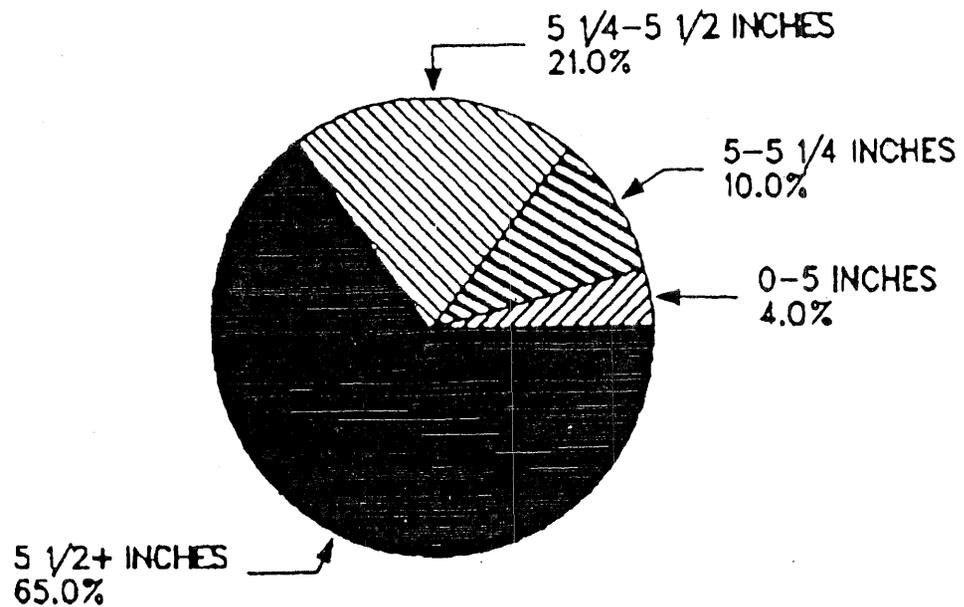


Figure 3. Percentages of Middle Atlantic commercial catches of surf clams in various size groupings during 1984. Data are from NMFS port agent samples from January through early August.