COMMERCIAL FISHERIES REVIEW

October 1961 Washington 25, D. C. Vol. 23, No. 10

AN INTERIM REPORT OF THE CAPE CANAVERAL CALICO SCALLOP BED

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ABSTRACT

The commercial potential of the large bed of calico scallops (Pecten gibbus) recently delimited by the U. S. Bureau of Commercial Fisheries off Cape Canaveral, Fla., was further investigated during four cruises of the Bureau exploratory fishing vessel Silver Bay between June 1960 and February 1961. Live scallops were found in depths varying from 8 to 40 fathoms, but commercial concentrations were found only between 16 and 28 fathoms. Catch rates during simulated commercial production trials with 8- to 10-foot Georges Bank scallop dredges averaged 20 to 40 bushels of scallops an hour over the entire length of the bed in depths of 17 to 23 fathoms. With the exception of heavy mortality and consequent low catches in the northern two-thirds of the bed in February, no seasonal or north-south geographic trends in catch rate were noticed. The vast size and interrupted nature of the currents of the area make the possibility of simultaneous mass mortalities affecting the entire bed unlikely. Moreover, the eddying currents around Cape Canaveral seem to assure the resettling of scallop larvae in the area, and, therefore, assure a permanent resource. Scallops measuring $2\frac{1}{4}$ to $2\frac{1}{2}$ inches in shell diameter made up the bulk of exploratory catches. Larger scallops were scarce and often in poor condition; smaller scallops, indicative of commercial-size individuals in the near future, were found in all seasons. Meat yields varied from $3\frac{1}{2}$ to $6\frac{1}{2}$ pints per 75-pound bushel of shell stock. Fluctuations in yield were local in nature, closely connected with the physiological condition of the scallops, and could not be correlated with either season or broad aspects of geographical distribution. Prognosis for future commercial development of the bed is good. An early deterrent to commercial development was removed with the appearance of mechanical shucking machines.

INTRODUCTION

Announcement by the U. S. Bureau of Commercial Fisheries in May 1960 of an immense scallop bed off Cape Canaveral, Fla. (Bureau of Commercial Fisheries 1960), immediately created great interest in rapidly developing the resource. So many requests were received by the Bureau for a more comprehensive evaluation of the commercial potential, particularly of year-round production levels and yields, that the exploratory cruise schedule of the Silver Bay was altered to include four additional dredging cruises in the following year.

Principal objectives of the additional cruises were to (a) more closely delineate areas of commercial scallop concentration within the general outline of the bed, (b) obtain data on seasonal catch rates, and (c) investigate geographical and seasonal fluctuations in yield. The cruises were conducted in June (Cruise No. 24), August (Cruise No. 25A), and October-November (Cruise No. 26) 1960, and January-February 1961 (Cruise No. 28). Results were outlined in the reports issued for those cruises.

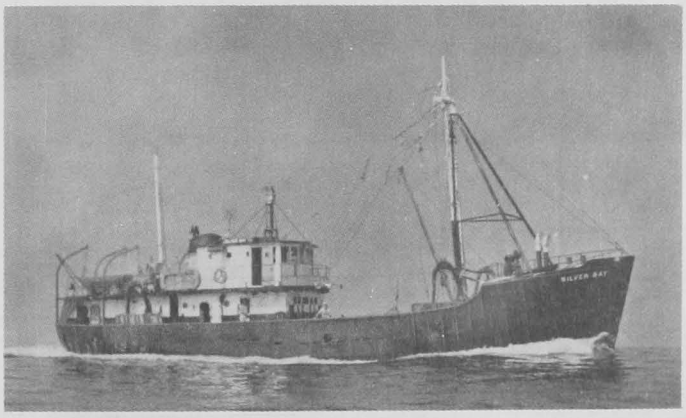

Fig. 1 - The Silver Bay, Bureau exploratory fishing vessel used to explore the Cape Canaveral calico scallop bed.

This report provides a general year-round picture of production by summarizing the results of 526 dredge hauls made on the Cape Canaveral bed from May 1960 to February 1961 in depths ranging from 7 to 65 fathoms.

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Fig. 2 - Hauling back a Georges Bank scallop dredge.

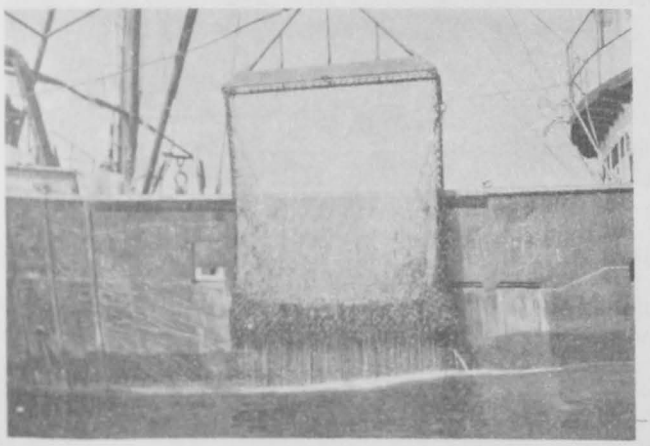

Fig. 3 - Hoisting the Georges Bank dredge aboard.

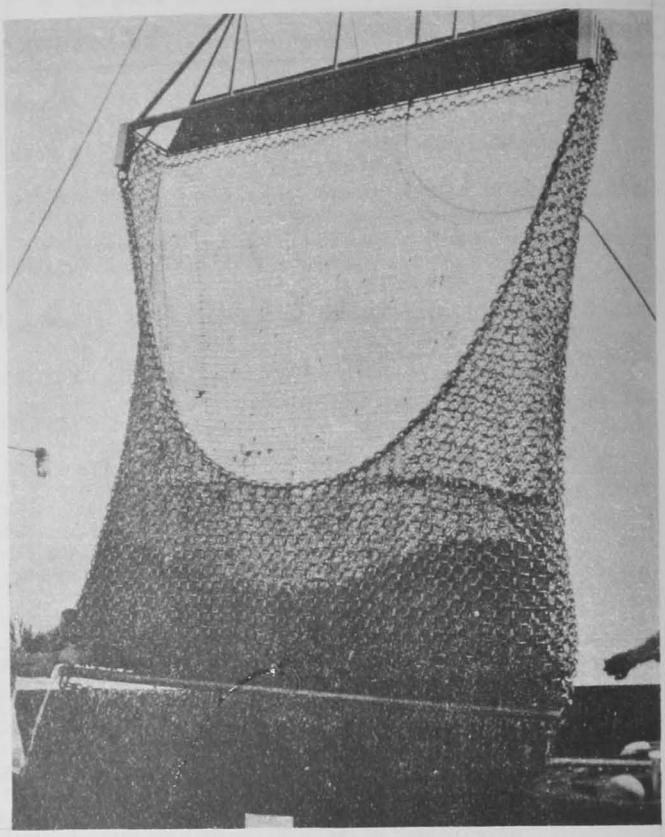

Fig. 4 - Close up of dredge prior to dumping the catch.

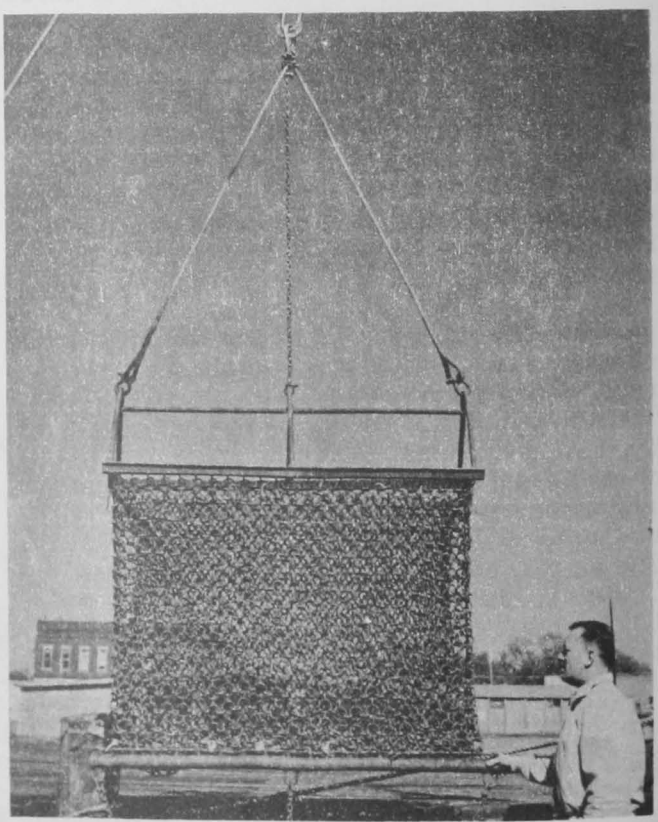

Fig. 5 - A 6-foot tumbler dredge for calico scallop fishing.

FISHING GEAR AND METHODS

The Silver Bay, a New England trawler used for the explorations (fig. 1), is chartered by the Bureau for exploratory fishing off the southeast coast of the United States. The vessel has been described by Bullis and Rathjen (1959) and Captiva and Rivers (1960). Operational port for the Silver Bay and the South Atlantic Exploratory Fishing Station is Brunswick, Ga.

All exploratory dredging in the Cape Canaveral area to date has been accomplished with modified 8- and 10-foot Georges Bank sea-scallop dredges rigged with 2-inch rings and 42-thread, $1\frac{1}{2}$-inch-stretched-mesh cotton liners (figs. 2, 3, and 4). Tests now in progress indicate that a modified 6-foot tumbler dredge (figs. 5 and 6) will produce larger and cleaner catches of calico scallops than the Georges Bank dredges, even though the latter fish a somewhat greater area. Further information on comparative efficiencies of these dredges will be issued when results are complete.

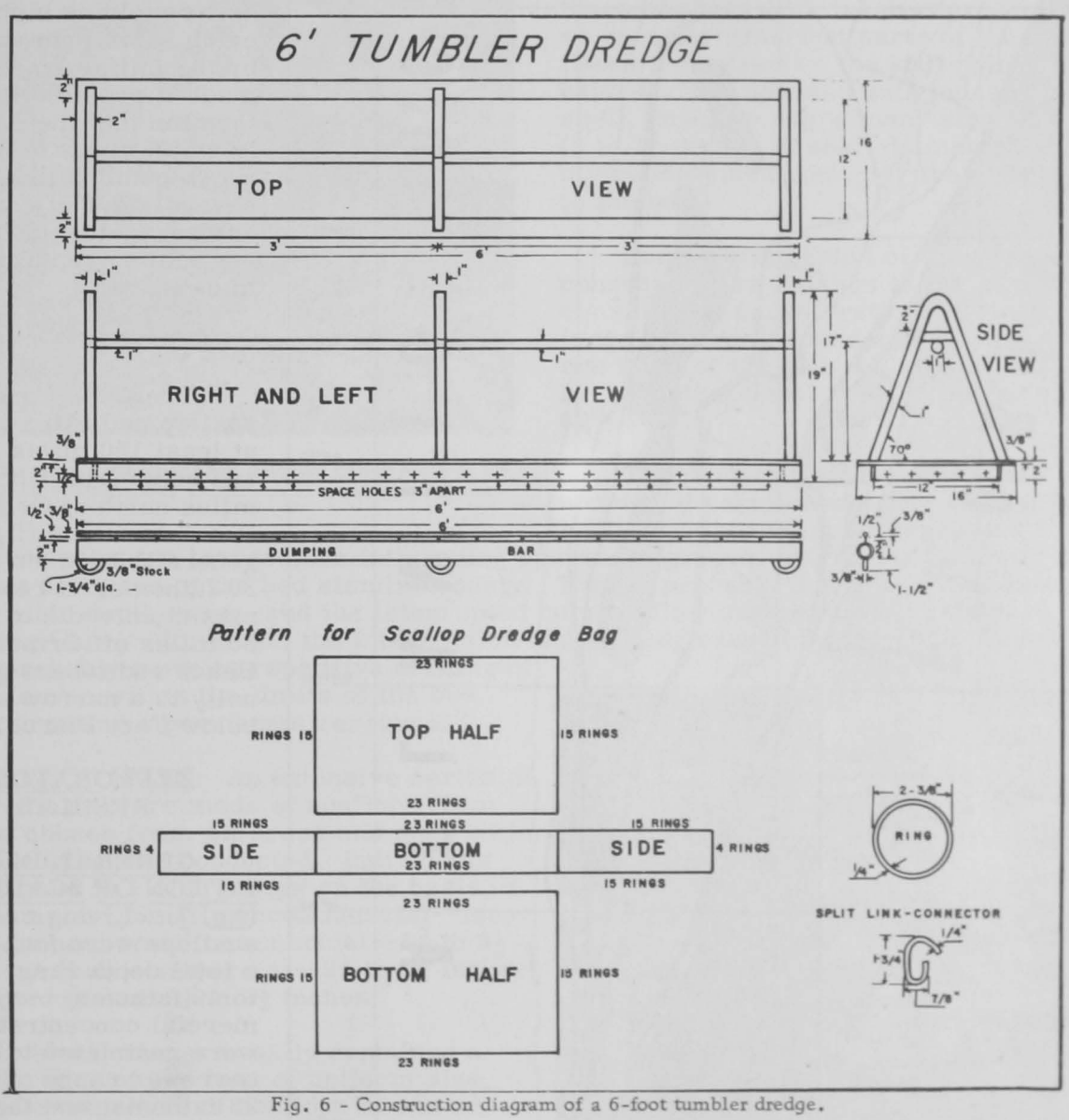

Fig. 6 - Construction diagram of a 6-foot tumbler dredge.

Normally drags were 30 minutes long, but depending on the concentration of scallops and the rate of accumulation of debris, individual drags varied in "on-bottom" time from 10 to 40 minutes. For comparative purposes, therefore, catch figures have been projected to catch rates expressed as bushels per hour.

Owing to the irregular distribution of calico scallops on the bed and to their apparent tendency to occur in long narrow bands, single-vessel exploration of the resource presented some difficulty. This was resolved by dropping marker buoys at the end points of preliminary drags. When the catch from these marked drags equaled or exceeded 5 bushels of scallops an hour--considered the minimum indication of the presence of commercial concentrations--additional drags were made back and forth over the initial course, but at slightly divergent angles. This practice had two advantages: It usually made possible delineation of areas yielding higher catch rates than shown by the initial drag; and made it possible to determine that the relatively small areas between 2 buoys could withstand several days of continuous round-the-clock fishing with no apparent drop in catch rate.

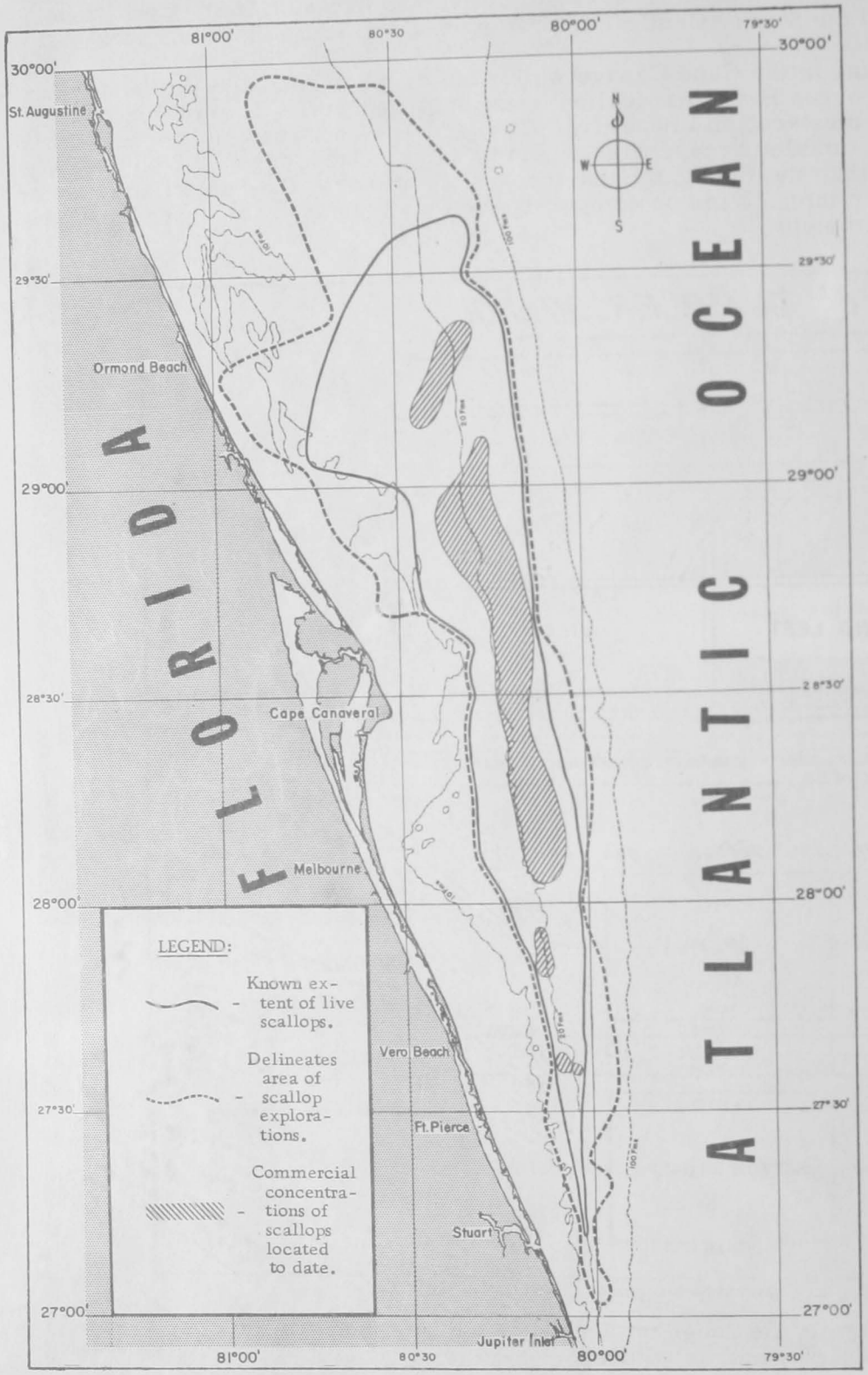

Fig. 7 - Chart of the known reaches of the Cape Canaveral scallop bed.

REGION COVERED

The Cape Canaveral scallop bed extends for at least 150 miles north and south from about 20 miles north of Ormond Beach to Stuart (fig. 7), generally between 15 and 30 fathoms. It reaches a maximum width of about 30 miles off Ormond Beach and tapers gradually to a narrow strip below Fort Pierce.

EXPLORATORY RESULTS

GENERAL DISTRIBUTION OF SCALLOPS (fig. 7): Living calico scallops were found over a total depth range of 8 to 40 fathoms, but commercial concentrations were restricted to the narrower range of 16 to 28 fathoms, and the heaviest catches were found between 17 and 23 fathoms. Although scallops can be found in most

portions of the more restricted ranges, distribution of the heavy concentrations is irregular. This has been shown also for the sea scallop and bay scallop fisheries of other areas, and points out the desirability of working scallop grounds with several vessels rather than with isolated units. Exploratory drags resulting in large catches of dead shell were often followed by catches of 10 to 20 bushels of live scallops suitable for processing. With several vessels working a bed simultaneously, the limits of local areas of heavy scallop concentration could be delineated quickly and precisely, and shifts in the location of the concentrations could be perceived more readily.

CATCH RATES: Catch rates as high as 78 bushels per hour were made, although rates of 20 to 40 bushels per hour represented average production during simulated commercial production trials over the length of the bed between 17 and 23 fathoms. Neither seasonal nor geographic trends in catch rate were apparent except on Cruise No. 28 in late winter when very heavy scallop mortality was observed on the northern two-thirds of the bed. Vast quantities of shell were taken representing scallops so recently dead that parts of the mantle rim (flesh) remained on the still-joined shell halves. Interspersed with much of the dead shell, however, were many small live scallops ($\frac{1}{2}$ to $1\frac{1}{2}$ inches in shell diameter) which possibly represented young-of-the-year additions to the bed.

Fig. 8 - The crew of the Silver Bay shucking calico scallops for technological examination, experimental cooking, and information on yield.

During this period of heavy mortality and consequent low catches in the northern portion, commercial concentrations of medium and large scallops remained available in the southern third of the bed, with the highest catches in the Bethel Shoal area (centered at 27°42' N., 80°11' W.).

The period of investigation has been too short to determine whether widespread mortality is of annual occurrence, but observations made point out that factors influencing spawning, growth, and mortality apparently do not affect all areas of the bed simultaneously. This is probably due to the vast extent of the bed, its wide depth range, and the interrupted current flow created by the existence of the projecting Cape. Moreover, the interruption and eddying caused by the Cape Canaveral projection probably permits repetitive settling of scallop larvae within the limits of the bed, thereby creating a permanent resource.

SCALLOP SIZES: An extensive series of measurements were made of scallops from samples chosen from all areas and seasons in which dredging was conducted. Individuals were classed in 1 of 4 groups on the basis of shell diameter: Small noncommercial--less than $1\frac{3}{4}$ inches; small commercial--$1\frac{3}{4}$ to $2\frac{1}{8}$ inches; medium commercial--$2\frac{1}{4}$ to $2\frac{1}{2}$ inches; and large--greater than $2\frac{1}{2}$ inches.

Individual catches usually contained a preponderance of scallops of uniform size, but smaller numbers of scallops of one or more additional size classes were also invariably present. Grouping the catches by depth interval or north-south progression showed no trends in size distribution, and

Fig. 9 - A clean catch of medium-size scallops (Pecten gibbus).

grouping by seasons showed only that all sizes greater than $1\frac{1}{2}$ inches are present in approximately the same proportion throughout the year.

Scallops of less than $2\frac{1}{8}$ inches are probably of marginal (small commercial size class) or no (small noncommercial size class) commercial importance, but their appearance in large numbers is usually a good prediction of large concentrations of medium scallops within a month or two in the same area. Medium scallops have provided the bulk of exploratory catches over the entire bed and will undoubtedly provide the basic stock for the commercial fishery. Meat size does not increase proportionately with shell diameter beyond the medium class, and large individuals are not only relatively scarce, but are usually in poor condition and unfit for commercial use. The largest shells taken measured about 3 inches in diameter.

FLUCTUATIONS IN YIELD: Meat yields were determined volumetrically from samples taken on each cruise. Using a 75-pound bushel as a standard unit, the yield was measured and expressed as the number of pints of meats per bushel. Figures obtained varied from $3\frac{1}{2}$ to $6\frac{1}{2}$ pints per bushel, and, although no long series of figures for individual meat count are available, pints varied in content from about 50 to 200 meats.

Fig. 10 - A calico scallop meat or eye--the adductor muscle with the viscera removed.

Fluctuations in yield showed no discernible trends and could not be correlated with depth, north-south progression, or season. Extensive variation in yield was found among different areas of the bed in the same season, and in the same areas in different seasons, but with an apparently random pattern. The lowest yield measured was obtained in the spring (April) and the highest in fall (October), but other catches in those seasons show that the extreme catches are not indicative of a trend.

Yield can apparently be correlated best with the physiological condition of the scallops in each area, and condition varies with factors that have yet to be fully investigated.

Size of scallops cannot be considered a major factor influencing yield (the highest and lowest yields measured involved equal-size scallops), but extremely large scallops are often in poor condition and are indicative of low yield for that reason. Possibly these large scallops are at the end of their life span. They are present in all seasons, and the meat (which is actually the adductor muscle) of these large individuals is often so weak that it is incapable of completely closing the shells. The meats are also small, discolored, and unpalatable in appearance. Fortunately, the condition occurred, during the explorations, in small areas only, and a catch composed entirely of large individuals in poor condition would frequently be followed in adjacent drags by catches comprised of individuals of another size group in excellent condition.

COMMERCIAL SIGNIFICANCE

One year of exploratory dredging has not provided sufficient coverage to more than generally delineate the limits of the more promising commercial concentrations of scallops within the boundaries of the Cape Canaveral bed. Nothing is known of annual fluctuations or variations in the fishing concentrations or of the size of the total population of the bed. The enormous size of the bed and the great volume of dead shell in varying conditions of disintegration in-

dicate heavy continuous scallop production over the areas explored to date. Even this, however, needs the confirmation that additional exploratory effort and commercial utilization can provide.

Industry response to previous Bureau delineations of calico scallop beds has been less than enthusiastic, and for the most part such response as has been shown has been short-lived. One early attempt to develop a fishery for these scallops in the Gulf of Mexico has been described by Bullis and Ingle (1958). Another attempt was made on beds investigated off Core Banks, N. C., by the Silver Bay. This attempt resulted in limited utilization in the winters of 1959/60 and 1960/61 by vessels out of the nearby ports of Beaufort and Atlantic, but interest was not widespread.

In contrast, public and industry response to the Canaveral scallop bed has developed rapidly and not only has it been highly enthusiastic, but it has also been sustained. In addition to broad newspaper coverage, many magazine and trade-journal articles have appeared dealing with the delineation and commercial evaluation of the bed. In chronological order, some of these are: Seafood Merchandising, May 1960, p. 11, September 1960, p. 26; The Fish Boat, June 1960, p. 21, July 1960, pp. 41-43, and September 1960, p. 8; World Fishing, August 1960, p. 30; The All Florida Magazine (The Florida Times-Union) August 7, 1960; Florida Business and Opportunity, October 1960, pp. 13-15; Business Week, February 1961, pp. 142-146; Fishing Gazette, April 1961, pp. 34-35, & 56; Florida Journal of Commerce, May 1961, p. 26.

An early inhibitive factor to the quickly-generated commercial interest in fishing the new resource was the problem of shucking. Some research has been devoted to this problem and at least 3 automatic or partially-automatic commercial shucking machines have been privately developed to the pilot-testing stage. Limited work has also been conducted by the Bureau (Bullis and Love 1961) and there are indications that a number of mechanical processing techniques will be forthcoming as the fishery develops beyond the preliminary stages. Tests of samples from exploratory work show that the calico scallop meats withstand vigorous processing methods and freezer storage with no apparent reduction in quality.

Fig. 11 - Rinsing a sample of scallop meats with sea water.

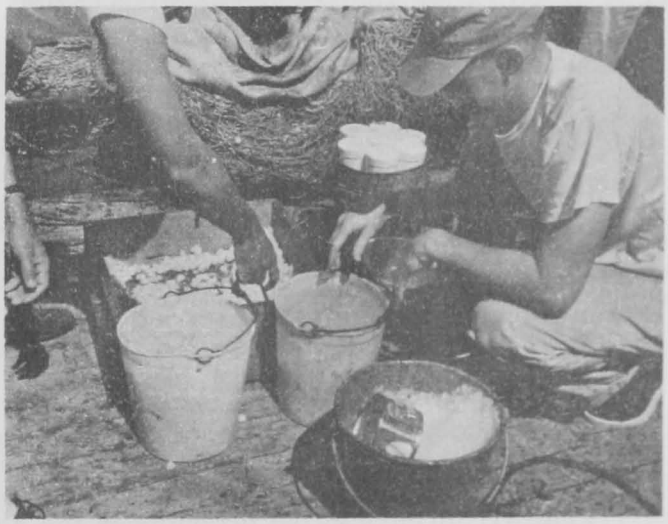

Fig. 12 - Packaging the scallop meats in 1-pint containers prior to freezing.

The resource is readily accessible to the large fleet of shrimp trawlers based along the south Atlantic coast of the United States, and the deep-water ports of Fort Pierce and Port Canaveral are within a few hours' running time from the bed.

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FISH CURING IMPORTANT FACTOR IN DEVELOPMENT OF MARITIME NATIONS

"Fish curing has been an important factor in the development of all great maritime nations. From the Middle Ages until well into the nineteenth century agricultural methods were poor. Livestock were wintered with difficulty, and meat-curing methods were so poor that there was little meat during the winter, also, other protein foods were scarce. Canning and freezing had not yet been developed. The people needed a fairly low-priced protein food which would remain in good condition for some time. Dried, salted, and smoked fish supplied this need. Before the beginning of the industrial age, international commerce was largely in natural products. The wine of Spain was exchanged for the dried and salt fish of England, the Netherlands, and Norway. The smoked herring of England was traded throughout central Europe. Even in the sixteenth century, when England was fighting Spain, her trade in dried fish with Spain was continued. It had been reported that England gained more wealth from cured-fish products in the sixteenth century than Spain obtained in gold from the Americas."

--Principles and Methods in the Canning of Fishery Products, Research Report No. 18 (page 1), U. S. Fish and Wildlife Service.