THE ATLANTIC COAST SURF CLAM -
with a partial bibliography

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF COMMERCIAL FISHERIES

Circular 288
THE ATLANTIC COAST SURF CLAM -
with a partial bibliography

By

ROBERT M. YANCEY and WALTER R. WELCH
# CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>1</td>
</tr>
<tr>
<td>History of the fishery</td>
<td>1</td>
</tr>
<tr>
<td>Early period - 1870's to 1942</td>
<td>2</td>
</tr>
<tr>
<td>Developmental period - 1943-49</td>
<td>2</td>
</tr>
<tr>
<td>Recent period - 1950-65</td>
<td>2</td>
</tr>
<tr>
<td>Handling, processing, and marketing</td>
<td>3</td>
</tr>
<tr>
<td>Biology</td>
<td>4</td>
</tr>
<tr>
<td>Classification and range</td>
<td>5</td>
</tr>
<tr>
<td>Morphological variation</td>
<td>5</td>
</tr>
<tr>
<td>Habitat</td>
<td>5</td>
</tr>
<tr>
<td>Reproduction</td>
<td>6</td>
</tr>
<tr>
<td>Growth</td>
<td>7</td>
</tr>
<tr>
<td>Relative abundance</td>
<td>7</td>
</tr>
<tr>
<td>Mortality and pathology</td>
<td>7</td>
</tr>
<tr>
<td>Partial bibliography</td>
<td>9</td>
</tr>
</tbody>
</table>
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THE ATLANTIC COAST SURF CLAM -
with a partial bibliography

By

ROBERT M. YANCEY, Fishery Biologist
Bureau of Commercial Fisheries Biological Laboratory
Oxford, Md. 21654

and

WALTER R. WELCH, Fishery Biologist
Bureau of Commercial Fisheries Biological Laboratory
West Boothbay Harbor, Maine 04575

ABSTRACT

The surf clam, Spisula solidissima solidissima (Dillwyn), supports an important commercial fishery along the coasts of the Middle Atlantic States. The major portion of the catch has been taken off New Jersey since 1949. Surf clam fishing vessels, equipped with hydraulic jet dredges, take the clams from depths of 100 feet or less and land them the same day. Most of the catch is processed for use as food; a minor portion is used as bait for fish. The total catch in 1965 was 44.1 million pounds of meat.

Surf clams are found in waters of oceanic salinity and sand or gravel bottoms from the low-tide line to depths of 480 feet. They range from the Gulf of Saint Lawrence to Cape Hatteras, N.C. The sexes are separate. Spawning usually occurs twice a year. Eggs, under experimental conditions, failed to develop in salinities below 23 parts per thousand. Young clams may reach a length of 1 3/4 inches in 1 year. Mature clams are commonly 6 to 7 inches long. Surf clams are very abundant in some areas. Populations of 1 to 2 million juvenile clams per mile of beach have been found at Wallops Island, Va., and Sandy Hook, N.J. As many as 5 million mature clams per mile of beach have been washed up on Long Island, N.Y., by a storm.

INTRODUCTION

The surf clam, Spisula solidissima solidissima (Dillwyn), is an important shellfish resource in the United States. In recent years (1949-65) the commercial fishery for surf clams has grown rapidly. The adoption of advanced technology in fishing and processing has enabled the fishery to harvest increasingly greater amounts each year—reaching 44.1 million pounds of clam meats in 1965.

A basic life history study of the surf clams was made in New England by Belding (1910). Many subsequent reports have been concerned with faunal surveys and aspects of physiology and taxonomy where the surf clam was of secondary importance.

Truly intensive studies of biology and population dynamics were first established in New Jersey where most of the catch since 1949 has been taken by highly efficient gear. Questions of sustained yield, growth, and recruitment to the fishery must be answered to provide information for the management of the fishery.

This report summarizes existing information about the surf clam fishery and its history as well as information about the distribution, abundance, and biology of the species. A partial bibliography is included.

HISTORY OF THE FISHERY

The history of the fishery for surf clams is divided into three periods: the early period, when the fishery was small; the developmental period, when it was growing rapidly; and the recent period, when it is well-developed.
Early Period -- 1870's to 1942

Large quantities of surf clams, thrown up on the beaches by storms, were gathered and eaten by the Indians in precolonial days. Early settlers on our Atlantic coast from Cape Cod, Mass., to New Jersey occasionally used the clams for food in times of hardship, but more often used them for fertilizer or food for swine and poultry.

The first organized fishery began on Cape Cod during the 1870's. Clams were raked or tonged up by hand, shucked, and salted down in barrels to be used as bait in the handline fishery for cod. In a good year (1877), 3,000 barrels, worth about $18,000, were produced (Ingersoll, 1887). Although early catch statistics are scanty, it appears that the fishery continued at a level below that of 1877 until 1929, when power dredging with scrape-type dredges began at Long Island, N.Y. Dredging began at Sheepshead Bay and spread to areas of Rockaway Inlet and Jones Inlet and southern New Jersey. The development and use of scrape-type dredges facilitated the taking of larger quantities of clams and the use of beds in deeper waters, although tongs continued to be used.

The fisheries in New York and New Jersey developed equally from 1929 to 1942, and irregular landings were made in Massachusetts and Rhode Island. The peak year for this early period was 1938, when 1.6 million pounds of meats were landed.

Developmental Period -- 1943-49

Before 1943 many attempts were made by private industry to promote surf clams for food. All attempts failed, mainly because of inability to rid the clam meats of sand. In 1943, wartime demands for protein foods brought about a renewed interest in the surf clam resource. The F. H. Snow Canning Company of Pine Point, Maine, using clams landed at Freeport, Long Island, N.Y., solved the problem of sand removal with a drum washer and soon increased use of surf clams from small experimental quantities to 1,500 bushels per day. By the end of 1943 other processors had become interested and were preparing for 1944 production (fig. 1).

The resulting increase in landings for food occurred mainly in New York. By late summer of 1945, the area between East Rockaway Inlet and Fire Island Inlet was being dredged for surf clams and continued to be the most important area through 1949. Freeport and West Sayville, Long Island, N.Y., were ports where clams were landed. New Jersey clams were used mainly for bait, and the landings there dropped sharply owing to wartime restrictions on party boat (sport) fishing. In the Long Island, N.Y., area, the increased demand for more clams of better quality made the industry realize that fishing gear and methods needed improving. Late in 1945, when the forerunner of the modern hydraulic jet dredge was developed by the industry, catch per unit of effort and quality of clams increased markedly. Landings increased fourfold in 1945 because (1) the fleet increased to 50 boats by the end of the year, (2) the new hydraulic jet dredge doubled the efficiency of gear, and (3) boats could successfully dredge areas formerly considered to have too few clams. New York landings had reached nearly 5.0 million pounds of clam meats by 1949, but those of Massachusetts, Rhode Island, and New Jersey were far less.

Recent Period -- 1950-65

Industry found that the yield of meats per bushel of clams was 12 pounds in New York and 17 pounds in New Jersey. Because this greater yield and the increased demand for surf clam meats for food, the industry began exploring for clams in 1949 off the coasts of New Jersey, Delaware, and Maryland in 90 to 100 feet of water. Beds of clams were found. These beds were much more extensive than the Long Island beds, and the clams yielded more meat per bushel. In this middle Atlantic area a fishery subsequently developed for surf clams to be used as food. New Jersey landings increased from 0.4 million pounds of clam meats in 1949 to 6.9 million pounds in 1953, and Maryland landings reached 2.5 million pounds by 1953 (June and Reintjes, 1957; Reintjes and Roithmayr, 1960). The fishery in

Figure 1.--Surf clam landings 1943-65. The important growth of the fishery came after 1943.

Maryland was short-lived, however, as the New Jersey grounds proved to be more productive. By 1957, most of the Maryland clam dredging fleet had moved to New Jersey. Since 1958, nearly all the Atlantic coast clam landings used for food have been taken off New Jersey. The total landings rose from 16.0 million pounds of clam meats in 1956 to 44.1 million pounds in 1965. New Jersey contributed 96 percent of the total landings in 1965. The major part of the New Jersey landings has come from the area between Point Pleasant and Beach Haven; some clams are taken off Cape May and landed there. The New York fishery has been unable to meet the competition of the New Jersey fleet which dredges densely populated beds; New York landings dropped from 2.4 million pounds of clam meats in 1956 to 1.5 million pounds in 1965.

The hydraulic jet dredge and accessory equipment were continuously evaluated and improved during this period of increase. The gear now is so efficient that the boats of the fleet generally work a 5-day week and are often on daily quotas that are met within a 12- to 14-hour workday (including sailing time). Daily quotas frequently have been imposed because the capacity of the processing plants is limited.

About 100 boats were dredging in 1957, and most of them were privately owned and operated; now the fleet has about 60 boats, of which nearly all are company-owned and operated. The present boats are generally larger than those in use 10 years ago.

HANDLING, PROCESSING, AND MARKETING

The clams are handled and processed by various methods. As the clams are dumped on deck from the dredge (fig. 2), they are separated from sand and dead shell by hand picking or are shoveled directly into a 1-bushel measure if the haul is clean. When full, the measure is dumped into a burlap bag, and the filled bags are stacked on deck. One company fills 30-bushel wire cages (fig. 3) rather than 1-bushel bags and stores them on deck. Clams are landed the same day they are taken. A dock hoist unloads six bags or one cage at a time. Most clams are then trucked to nearby shucking plants, but some are hauled as far as Delaware or Maine. Clams are usually unloaded in the afternoon, wetted down, and stored overnight in refrigerated rooms, or trucked overnight to Maine in refrigerated trucks. Next morning the clams, still in bags or cages,

Figure 2.--A dredge load of clams about to be dumped on deck.
are dipped in hot fresh water (150°F.) for 30 or 40 seconds to open the shells slightly so the meats will be easier to shuck, and then cooled in fresh water to prepare them for the shuckers. Meats are shucked by hand (fig. 4) and placed in a washer to remove sand and pieces of shell.

Washed clam meats are packed in 130-gallon stainless steel tanks, lightly iced, and taken to the processing plant. The gonad and the visceral mass are squeezed out by hand (fig. 5), leaving the mantle strap, siphons, foot, and adductor muscles. The clam meats are washed again, and pieces of shell and the black edge of the mantle are stripped off. At this point the meat may be minced (1/4-inch pieces), chopped (1/2-inch pieces), or sliced into strips, depending upon what product is desired. The juices and wash water from this operation are sometimes saved, concentrated, clarified, salted, and packed as clam juice. Meats may be canned, made into chowder or clam cakes, refrigerated, or frozen and shipped to other processors of specialty products.

Surf clam meats compete with other clam meats because they are cheaper and make an acceptable product when processed. None are sold as food on the fresh market. The landed value of surf clams used for food is low and stable at about 7 cents per pound of meat. The wholesale value of the processed meats is about five times the landed value. Industry must operate at peak efficiency and depends on the continued availability of clams in heavily populated, easily accessible beds.

The surf clam fishery for bait has a limited market among sport and commercial fishermen. The landed value per pound of bait clams is higher than that of clams for food because of the demand for a special product. The landings in New York (practically all bait clams) in 1961-64 had an average value of $0.09 per pound of meats.

**BIOLOGY**

Knowledge of the biology of the surf clam has previously been based mostly on the work
of Belding (1910) and Verrill (1873) in Massachusetts. The questions of growth, distribution, and reproductive patterns in the area of greatest abundance in the Middle Atlantic Bight need to be answered by further research. Personnel at the B.C.F. (Bureau of Commercial Fisheries) Biological Laboratory, Oxford, Md., are now studying surf clam biology and population dynamics, with the ultimate goal of providing information to industry. The B.C.F. Exploratory Fishing and Gear Research Base, Gloucester, Mass., is surveying the distribution of the species.

Classification and Range

The surf clam belongs to the family Mactridae, which includes over 200 species found in most of the world's shallow seas. It is separated into two subspecies: Spisula solidissima solidissima (Dillwyn, 1817), the large commercial form which is found along our Atlantic coast from the Gulf of Saint Lawrence to Cape Hatteras, N.C., and Spisula solidissima raveneli (Conrad, 1831), a diminutive form found from Cape Hatteras, N.C., south to northern Mexico (Merrill and Webster, 1964). North of Cape Cod, Spisula polynyma (Stimpson, 1860), may be confused with S. solidissima, but no problem should arise along the Middle Atlantic Bight where S. polynyma is represented by only one record of a juvenile found between Cape Cod and the Hudson River Canyon (Chamberlin and Stearns, 1963). Common names that have been applied to the surf clam are sea clam, bar clam, hen clam, skimmer, dipper, beach clam, and giant clam. The commercially important S. s. solidissima is the only species reported on here.

Morphological Variation

The form of surf clams dredged from 40 to 200 feet of water between Montauk Point, Long Island, N.Y., and Cape Hatteras, N.C., appears to vary slightly from place to place. Some clams have an oblong or elliptical outline and a swollen or compressed thickness. All intermediate conditions occur. Verrill (1873) found similar differences in form for Massachusetts clams. Valves of clams from inshore waters, less than 40 feet deep, often have prominent check marks which are probably the result of environmental disturbances. Clams from one sample usually are of uniform shape and length.

Habitat

The surf clam inhabits the Continental Shelf from the lower edge of the intertidal zone to a depth of about 480 feet. South of Chesapeake Bay clams are not common in the shallower

Figure 4.--Workers shucking surf clams.
Figure 5.--Women eviscerating shucked clams.

waters; but in more northern waters of the Gulf of Saint Lawrence, the Bay of Fundy, Maine, and Massachusetts Bay, they live immediately below the low-tide line. Clams have been found at depths of 480 feet along the Middle Atlantic Bight, and at a depth of 250 feet off Digby Gut, Nova Scotia.

Surf clams require waters of near oceanic salinity. They are usually found on open beaches and open ocean bottom, and are generally absent from enclosed bays and estuaries. We have found surf clams at Chincoteague Inlet, Va. (1.5 miles from the open ocean at Chincoteague Point), where records show a minimum salinity of 29 p.p.t. (parts per thousand) (McGary and Steling, 1953). Preliminary experiments with adults held at 50°F, indicate that salinities as low as 15 p.p.t. are lethal.

Surf clams live in sand or gravel bottoms. Shells, shell fragments, and fine sediments may be mixed with the basic bottom types. Clams are most common in a bottom of coarse sand and gravel.

Animals commonly associated with surf clams in dredge samples taken between Long Island, N.Y., and Cape Hatteras, N.C., at depths to 180 feet are: crabs (Cancer, Ovalipes, Ocellatus, and Libinia); moonsnails (Polinices heros and Lunatia duplicata); razor clams (Ensis directus); mahogany quahogs (Arctica islandica); southern quahog (Mercenaria campechiensis); and various echinoderms of the classes Holothuroidea, Asteroidea, Echinoidea, and Ophiuroidea.

Reproduction

Reproduction of surf clams is poorly known (studies are in progress). The sexes of surf clams are separate—only one hermaphrodite has been found in 2,000 clams (John W. Ropes, personal communication). Some Massachusetts clams have been reported to be sexually mature when 1.9 inches long and to spawn

2 John W. Ropes, B.C.F. Biological Laboratory, Oxford, Md. 21654.
at 2.0 inches (Belding, 1910). The gametes are extruded into the water, where fertilization takes place. Clams spawn during June and July in Massachusetts; essentially the same period was reported for Long Island, N.Y. (see footnote 1). Our preliminary studies of the reproductive cycle show that New Jersey clams usually spawn from mid-July through mid-August; then they rapidly redevelop gametes and spawn again from mid-October through early December (John W. Ropes, personal communication). The clams again begin gametogenesis in February, followed by rapid development of mature gametes in March and April. Westman and Bidwell (see footnote 1) reported that Long Island, N.Y., populations of clams begin to spawn at 590 F. Fecundity of the clams is unknown.

Experiments on the rearing of larvae were performed at the B.C.F., Biological Laboratory, Boothbay Harbor, Maine. Eggs failed to develop normally at salinities below 23 p.p.t. at any temperature used (Alden P. Stickney, personal communications). At 32 p.p.t. the optimum temperature range for development was 570 to 680 F.—mortality increased at higher and lower temperatures. Some larvae, reared on the unicellular alga Dicrateria inornata, survived and grew at salinities as low as 16 p.p.t., and could survive brief exposure (24 hours) to salinities as low as 8 p.p.t., if temperatures were sufficiently low (460 F.). At 32 p.p.t. growth was optimum at 680 F., but was somewhat inhibited at higher and lower temperatures. The larvae metamorphosed 18 to 30 days after fertilization when held at 680 F.

Growth

Studies of growth of surf clams are essential for practical resource management. The time required for clams to reach commercial length (5 inches) must be known to estimate rate of replacement of clams taken by the fishery. Figure 6 compares the information available from two published sources (Kerswill, 1944; Belding, 1910), one unpublished report (Westman and Bidwell, see footnote 1), and data obtained at the B.C.F., Biological Laboratory, Boothbay Harbor, Maine. Clams propagated during the summer at Boothbay Harbor averaged 0.04 inch (maximum 0.4 inch) long by late fall. Studies at the B.C.F. Biological Laboratory at Oxford, Md., showed that clams in a natural environment can reach a length of 1 inch by the end of their first 6 months and 1 3/4 inches by the end of their first year.

Relative Abundance

Surf clams are extremely abundant in some areas. From Maine to Maryland, tremendous quantities of clams have been reported washed ashore by wave action of winter storms (fig. 7). Jacot (1920) gave an estimate of 5 million clams washed ashore per mile of beach at Rockaway Beach, Long Island, N.Y., in the winter of 1919-20. Sampling for young clams at Wallops Island, Chincoteague, Va., in 1965 by the B.C.F., Biological Laboratory, Oxford, Md., indicated a density of 1 to 2 million live clams per mile between low- and high-tide marks; densities were similar in that year at Sandy Hook, N.J. (fig. 7).

The relative abundance of surf clams from Montauk Point, Long Island, N.Y., to Cape Hatteras, N.C., in depths from 40 to 480 feet has been determined from recent surveys with a jet dredge and a grab. The area of greatest abundance extends from Barnegat, N.J., to Cape May, N.J. Abundance is moderate in a narrow strip along the south shore of Long Island at depths to 100 feet and an offshore strip 70 to 90 feet deep off Chincoteague, Va. The present middle Atlantic fishery is dependent upon the continued availability of extensive and densely populated beds off New York, New Jersey, Delaware, and Maryland.

Mortality and Pathology

Small surf clams are subject to many types of predation. Bottom-feeding fish, diving ducks, and gulls feed on the clams. Moon snails of the genera Lunatia and Polinices bore holes through the shells and eat the meats. About one-half of the empty paired shells taken from a beach windrow at Wallops Island, Va., had been bored. As previously mentioned, storms often wash enormous numbers of surf clams ashore, where most die. The impact of predation and storms on surf clam populations is unknown.

No diseases of the surf clam are known, and records list only one parasite, Proboscisodaccus enigmaticus (of uncertain taxonomic position), in the related Spisula solida (L)---Gallien (1949). Gonads of some New Jersey surf clams taken in 1962-65 have been infested with an unidentified trematode. The effect of this parasite on the clam is not known.

3 Alden P. Stickney, B.C.F. Biological Laboratory, West Boothbay Harbor, Maine 04575.
Figure 6.--Growth of surf clams, estimates from four sources.

Figure 7.--Surf clams washed upon the beach by a winter storm. Lighter objects are surf clams.
PARTIAL BIBLIOGRAPHY OF THE SURF CLAM

(Asterisks indicate citations in text)


GLANCY, JOSEPH B.

GONSE, PIERRE H.

GOULD, AUGUSTUS A.

GRAY, JOSEPH.

HAGEMAN, DWAIN D., FREDERICA M. WELINGTON, and CLAUDE A. VILLEE.
1959. The possible role of the DNA content of spermatozoa for the activation process of the egg of the clam Spisula solidissima. Chromosoma 7: 328-339.

JACOBSON, MORRIS K.

JACOT, ARTHUR.

*JUNE, FRED C., and JOHN W. REINTJES.

JOHNSON, CHARLES W.


*KERSWILL, C. J.

KEITH, M. L., G. M. ANDERSON, and R. EICHLER.

KELLY, JOHN W.

KENNEDY, DONALD.


*KIVY-ROSENBERG, EVELYN, and FRANCES RAY.

KIVY-ROSENBERG, EVELYN, JOSEPH CASCARANO, and G. MERSON.
KIVY-ROSENBERG, EVELYN, KAREN STEEL KAGEY, and JOSEPH CASCARANO.

KRANE, STEPHEN M., and ROBERT K. CRANE.

KRANE, STEPHEN M., and LEONARD LASTER.

LOOSANOFF, VICTOR L.

LOVE, ROBERT, and LAURENCE H. FROMMHAGEN.

*McGARY, JAMES W., and FRED W. SIELING.
1953. Chemical and physical data, Chincoteague Bay area, July 1943 to June 1953. Chesapeake Bay Institute, Johns Hopkins Univ., Data Rep. 15, Ref. 53-10, 49 pp. [Mimeo.]

MEDCOF, J. C.

MEDCOF, J. C., and J. S. MacPHAIL.

*MERRILL, ARTHUR S., and JOHN R. WEBSTER.

METZ, CHARLES B., and JOANNE E. DONOVAN.

MITCHELL, SAMUEL.

MORSE, EDWARD S.

NAGABUSHANAM, R.

NATIONAL FISHERMAN combined with MAINE COAST FISHERMAN (newspaper).

NOLAND, JERRE L.

PACKARD, ALPHEUS S.

RAPPORT, MAURICE M.

REHBUN, LIONEL I.
1956b. Electron microscopy of basophilic structures of some invertebrate


THOMAS, LYELL JAY, JR.-Con.

TOBIAS, JULIAN M.

TURNER, HARRY J., JR.

[U.S.] FISH AND WILDLIFE SERVICE.

U.S. FISH AND WILDLIFE SERVICE.

*VERRILL, A. E.

WELSH, JOHN H., and MERILYN MOORHEAD.

WENTWORTH, E. F.

WESTMAN, JAMES R.

WIERCINSKI, FLOYD J., and JAMES K. TAYLOR.

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Table 1.--Surf clam catch for the Atlantic coast of the United States, in pounds of meats, and value in dollars
(Absence of catch data may mean lack of either catch or data)\(^1\)

\(^1\) Data for 1901-61 from personal communication, Walter R. Welch, BCF Biological Laboratory, Boothbay Harbor, Maine.
\(^2\) No survey in New Jersey, Delaware, or Maryland in 1946.
\(^3\) Ocean quahogs and surf clams combined and listed as surf clams in Rhode Island in 1954.
\(^4\) Ocean quahogs and surf clams combined and listed as ocean quahogs in Rhode Island in 1955.
\(^5\) Less than 500 pounds or 500 dollars.
\(^6\) Data from U. S. Fish and Wildlife Service Statistical Digest Nos. 57, 58, and 59.
\(^7\) Data from Current Fishery Statistics publications for the respective states.