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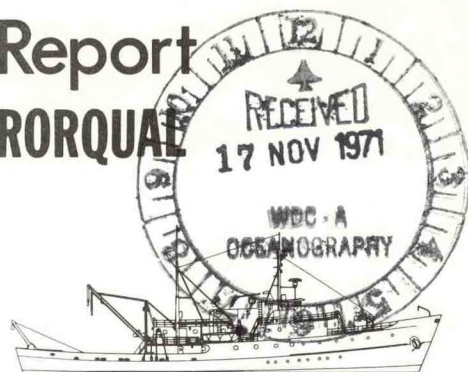
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# Research Vessel Cruise Report

## OCEAN QUAHOG SURVEY—R/V RORQUAL

Aug. 16 - 30, 1971

U.S. DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration  
National Marine Fisheries Service  
North Atlantic Fisheries Research Center  
Woods Hole, Massachusetts 02543



In August 1971, the National Marine Fisheries Service completed the ocean quahog survey of Ipswich Bay, Massachusetts. This survey began in April when the 57-foot wooden Gloucester, Massachusetts trawler, Jo-Ann, outfitted by the Exploratory Fishing and Gear Research Base, was used under a cooperative NMFS-Economic Development Administration-Industry agreement for limited survey work in areas around Cape Ann, Massachusetts. As indicated in an earlier report, the Jo-Ann succeeded in taking up to 30 bushels of ocean quahogs (Arctica islandica) per hour from certain areas fished in Ipswich Bay.

During June, the NMFS research vessel Delaware II surveyed an expanded area including Ipswich Bay as one part of an extensive ocean quahog survey of Atlantic coastal waters from the Isles of Shoals, New Hampshire to New Jersey. The 165-foot stern trawler Delaware II, though towing a larger dredge than the Jo-Ann, experienced a generally lower catch rate than did the Jo-Ann. To resolve the discrepancy between catch rates of the Jo-Ann and the Delaware II, a third cruise was scheduled. The NMFS research vessel, Rorqual, a 65-foot steel hulled vessel (whose home port is Boothbay Harbor, Maine), was used. The Rorqual arrived in Gloucester during the last week of July and subsequently underwent modification for clam dredging. Vessel preparation and gear trials were completed on August 13 and the clam survey began on August 16.

Fishing effort was concentrated first in lower Ipswich Bay in those areas which had previously produced good catches of clams during the Jo-Ann cruise. A number of new stations were also fished along three depth contours in an effort to determine the northward extent and distribution of these clams. At two locations known to contain clams, tows were made to find the optimum ratio of towing line length to water depth (tow rope scope). At each station, catch data and individual lengths were recorded (Figure 1) from a representative subsample of clams.

### Gear

A hydraulic jet dredge with a 32-inch fixed blade was fished (Figure 2). Water under pressure (80 psi on deck) was supplied to the dredge manifold and jets through a 5-inch diameter rubber hose from a below-deck, diesel powered, centrifugal pump. A two drum hydraulic winch containing 1/2-inch wire rope was located on the afterdeck. One winch drum was used to haul the dredge from the bottom and to reset it after emptying the catch. The other winch drum was used to bring the dredge bag inboard for emptying once the dredge had been hauled up.



Figure 1. -- Determining the lengths of the quahogs. A subsample of 1/4 to 1/2 bushel was measured at each station.

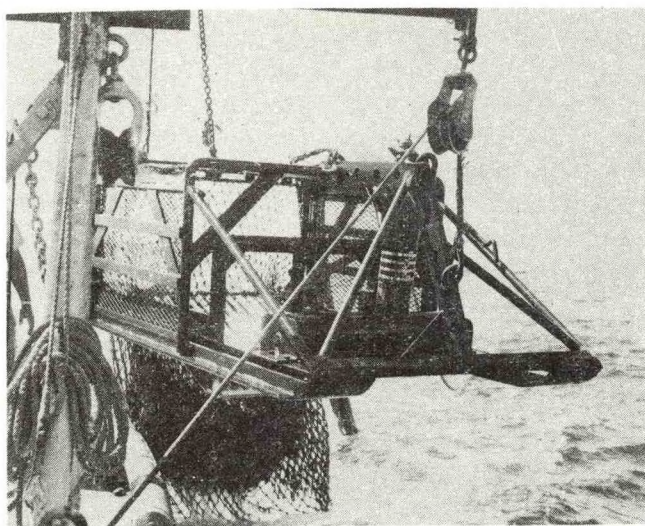


Figure 2. -- Hydraulic jet dredge containing several bushels of ocean quahogs alongside the rail of R/V Rorqual. The largest catch was 5.6 bushels in 4 minutes towing time.

### Fishing Procedure

The fishing procedure was as follows: (1) The dredge hose was let out over the stern. (2) On the first set, the dredge was lifted over the port rail and lowered to the ocean bottom by means of 1/2-inch wire rope which passed through a block on the end of an adjustable-length boom. At the same time, a 1-inch polypropylene towing rope was payed out through a four roller chock located at the center of the stern. This rope was then tied off to a post on the winch housing. (3) The centrifugal pump was started to supply water to the dredge while setting out. (4) During the actual dredging operation, the wire rope was

slackened and the dredge was towed by the 1-inch polypropylene rope. (The elasticity of the polypropylene rope aids in reducing the shock from minor hang-ups and helps to prevent serious damage to the dredge.) (5) The dredge was hauled back at the end of the tow by the 1/2-inch wire rope. Once removed from the water, the dredge was swung inboard to allow the catch contained in the bag to be emptied at the port rail. After removing the catch, the empty dredge was then positioned outboard where it rested against the port rail until the next set was ready to begin. (6) The dredge hose remained in the water during the hauling and setting procedures and was taken aboard only at the end of a day's fishing or when the boat moved to a distant area.

### Area of Operation

The majority of the tows in Ipswich Bay were made between the R2 buoy at the mouth of the Ipswich River and the R2 buoy at the mouth of the Annisquam River, where the bottom was primarily hard sand and relatively rock-free.

A series of tows, approximately 1-mile apart, was made along the 5, 7 1/2, and 10 fathom depth contours between the mouth of the Ipswich River and south of the entrance to the Merrimack River. A clay-rock bottom was encountered only at the northern end of this area; a sandy bottom generally prevailed over the remainder of this area.

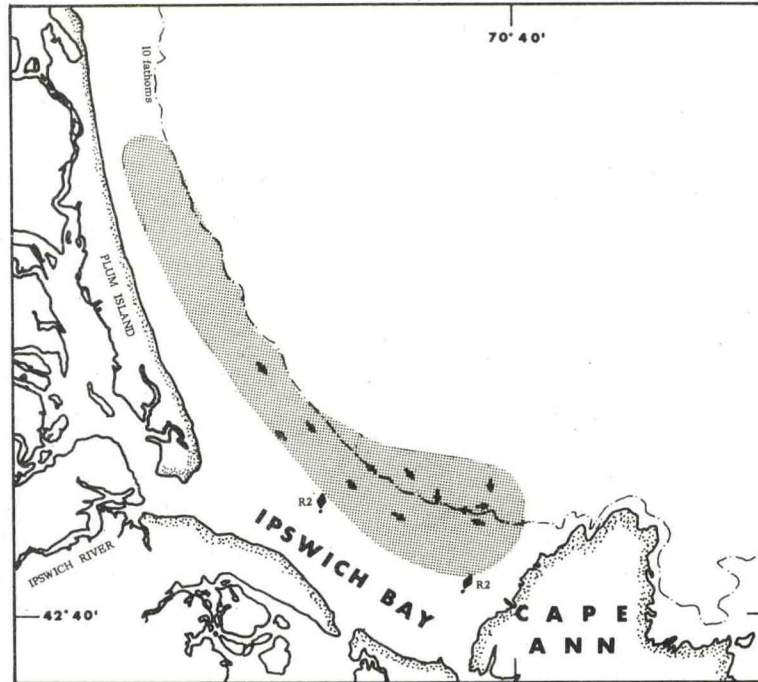


Figure 3. -- Ocean quahog survey area fished by R/V Rorqual. Arrows indicate tows producing two or more bushels of quahogs per 4-minute tow.

On August 30 (the final day of the cruise), the Rorqual fished the western edge of Stellwagen Bank near the intersection of Loran Lines 3H5-1300 and LH3-3480, where the clam Spisula polynyma, a close relative of the surf clam (Spisula solidissima), had been taken earlier by the Delaware II during June. Fishery Biologists were interested in collecting additional samples of this species for experimental processing to be conducted by scientists of the NMFS Atlantic Fishery Products Technology Center in Gloucester, Massachusetts.

### Results

During this survey thirty eight 4-minute tows were completed. Of these tows, 12 produced two or more bushels each of ocean quahogs. Catches of this size are generally considered to be large enough to have commercial significance. (These catches are listed in Table 1 and their locations are indicated in Figure 3.) Like the Jo-Ann, the Rorqual produced many catches of one bushel or more (Jo-Ann: 13 out of a total of 37 tows; Rorqual: 15 out of a total of 38 tows; and Delaware II: 1 out of a total of 35 tows). Comparative tows were of four minutes duration. These were timed from when the dredge reached the bottom until the start of haulback. The average number of ocean quahogs per bushel was determined to be 160 individuals.

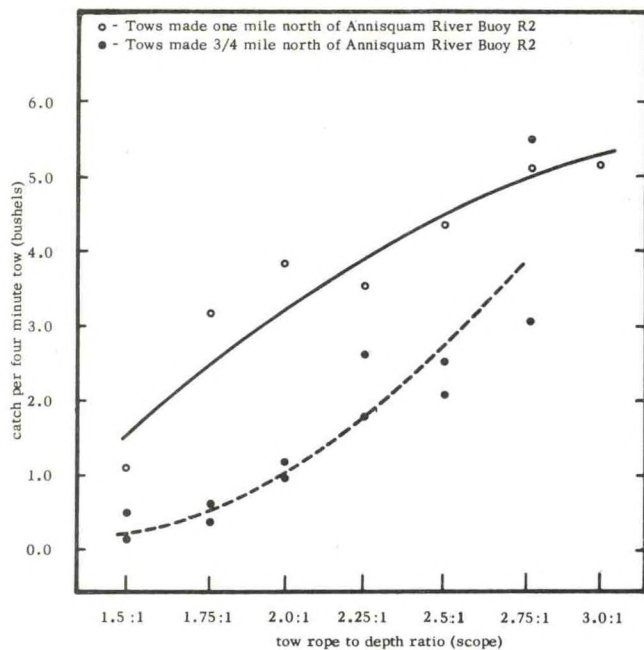


Figure 4. -- Size of catch in relation to ratio of tow rope length to water depth (scope).

Figure 4 shows the effect of varying the ratio of tow rope lengths to water depth (scope) and the effect this had on the size of the resulting catch. Of the seven scopes fished, 2.75 and 3.0 yielded the highest catches. Catches dropped off rapidly as the scope was reduced. The smallest scope (1.5) produced less than 25 percent of the catch realized with a scope of 2.75.

The Rorqual completed eight tows on Stellwagen Bank. Five of these caught Spisula polynyma in quantities ranging from one clam to one bushel for an eight minute tow. The average catch of S. polynyma for these five tows was 0.3 bushel.

Ocean quahogs caught on Stellwagen Bank displayed tan-colored shells in contrast to the generally black-shelled appearance normally found elsewhere along the Atlantic coast.

The Atlantic Fishery Products Technology Center has processed both types of ocean quahogs and found that the tan-shelled variety yielded twice the amount of edible meats per bushel of whole clams as did the black-shelled variety.

#### Participants

Warren D. Handwork	-	Field Party Chief
Donald D. Flescher	-	Fishery Biologist
Warren F. Rathjen	-	Fishery Biologist
J. Gordon Trask	-	Captain
George Toneatti	-	Skilled Fisherman
Pasquale Vadala	-	Cook

TABLE 1

TOWS PRODUCING MORE THAN 2.0 BUSHEL  
OF OCEAN QUAHOGS PER 4 MINUTE TOW

Set	Longitude	Latitude	Depth (fathoms)	Catch (bushels)
5	70° 40. 7'	42° 41. 4'	8	4. 0
6	70° 40. 7'	42° 42. 1'	10	3. 2
11	70° 42. 2'	42° 42. 2'	11	2. 9
13	70° 41. 5'	42° 41. 8'	10	3. 0
14	70° 40. 8'	42° 41. 6'	10	2. 9
15	70° 40. 5'	42° 42. 0'	12	2. 7
90	70° 44. 7'	42° 42. 7'	5	3. 4
99	70° 45. 1'	42° 43. 7'	7. 5	2. 8
100	70° 44. 1'	42° 42. 8'	7. 5	2. 3
101	70° 43. 3'	42° 42. 0'	7. 5	5. 6
102	70° 42. 4'	42° 41. 5'	7. 5	2. 1
106	70° 41. 3'	42° 41. 2'	6	2. 5

Sets 1-3 were gear trials.

Sets 57-82 were scope comparisons.

Sets 4-16 and 83-111 were survey tows.

Sets 17-56 were "scope" comparisons (Fig. 4).