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The shellfish resource in the vicinity of the proposed bridge-tunnel for I-664

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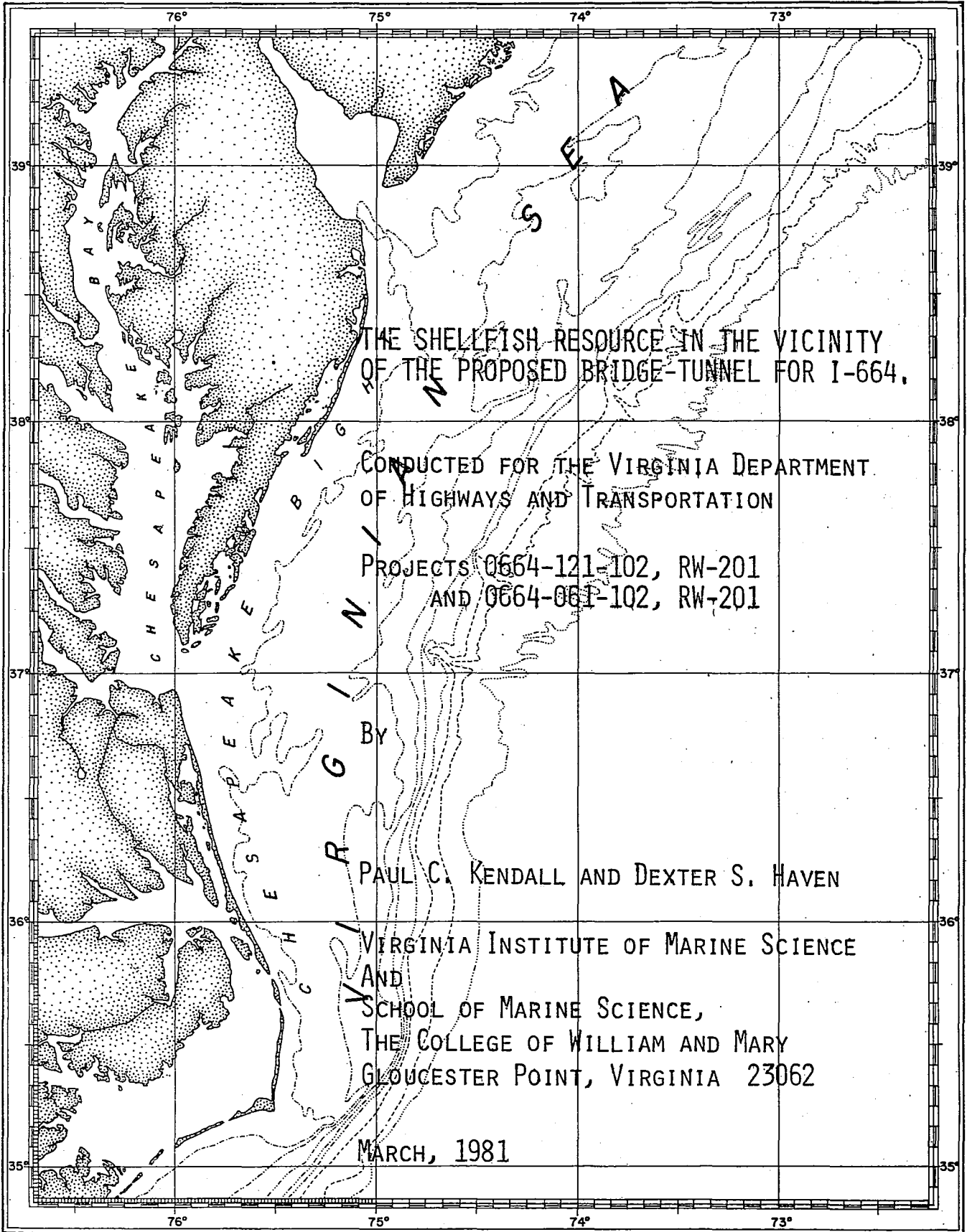
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ABSTRACT

A study of the shellfish resource near the proposed site of the I-664 bridge-tunnel across Hampton Roads was conducted by the Virginia Institute of Marine Science in September 1980. Bottom samples collected with patent tongs in a corridor surrounding the proposed site indicated the following:

1. The oyster population was negligible;
2. Medium and high densities of hard clams occurred in the Northern part of the study area, generally between Newport News Point and Middle Ground; and,
3. Density South of Middle Ground was low.

Value of all the hard clams was estimated to be slightly in excess of one million dollars if they were all harvested.

One private oyster planting ground, a part of Public Oyster Ground Number 1, Nansemond County, and some public clamming ground were included in the area under study.

INTRODUCTION

Background

In September 1980 a survey of oyster and hard clam density was conducted by the Virginia Institute of Marine Science in the areas described below. The work was done at the request of the Virginia Department of Highways and Transportation in relation to the proposed construction of I-664, Projects 0664-121-102, RW-201 and 0664-061-102, RW-201. The objective of this study was to determine the extent and value of the shellfish resource in the vicinity of the proposed construction across Hampton Roads. Results of the present study can be used as a basis when comparing results of sampling after construction.

Description of the Area

The proposed bridge-tunnel would cross Hampton Roads at its Western end, where the James and Nansemond rivers empty. For this study a broad area on either side of the proposed route was selected as being the zone where any possible effect of construction on the shellfish resource would be seen. The area selected formed a corridor about 1,400 yards wide (1,280 m) which stretched from Newport News Point to the opposite shoreline, just West of Craney Island (Figure 1).

Most of the bottom under study lies in an area (Condemned Shellfish Area 7 - see Figure 1) where the taking

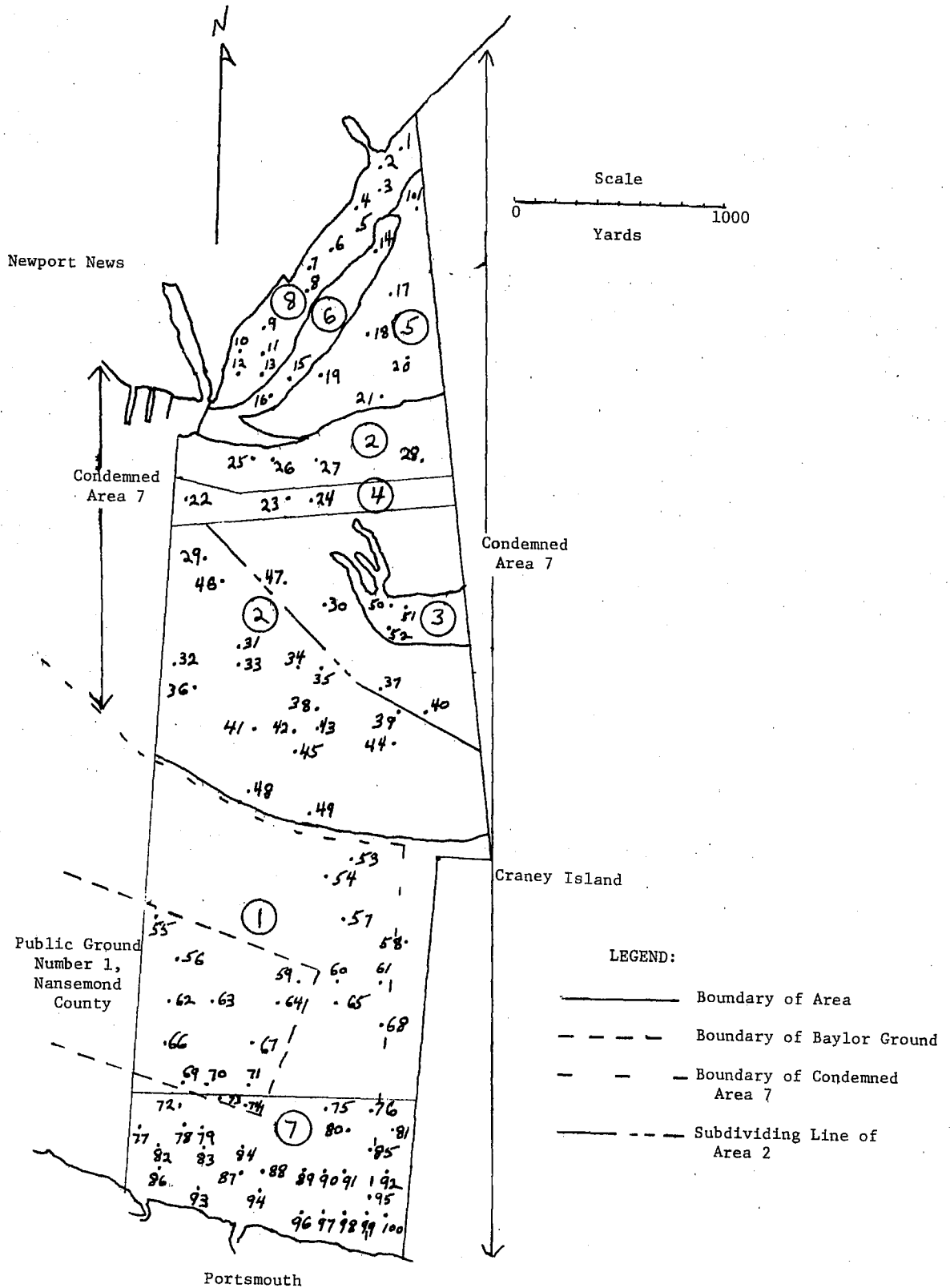


Figure 1. Corridor between Newport News Point and Craney Island showing areas and stations sampled in September 1980 by VIMS.

of shellfish has been restricted by the State Department of Health to the months of May, June, July and August. Clams harvested from this restricted area must be relaid in State-approved waters for a minimum of 15 days with water temperatures over 50°F before they can be marketed. Even with these restrictions commercial harvesting with patent tongs occurs to a major extent in the area. The additional costs involved in relaying (and reharvesting) mean that clams harvested from Hampton Roads bring a lower price (currently half that of clams from waters which meet public health standards).

METHODS

Several areas of very different types of bottom and different hydrographic conditions exist within the corridor between Newport News Point and Craney Island. As it was desired to take samples from each set of conditions, the Corridor was divided into areas as follows:

Area 1: Just downriver of the Mouth of the Nansemond River

8-18 ft depth at MLW

Soft mud bottom

Area 2: Anchorage area

18-30 ft depth at MLW

Soft mud bottom

- Area 3: Middle Ground Bar
14-18 ft depth at MLW
Hard sand bottom
- Area 4: Newport News Channel
43-45 ft depth at MLW
Soft mud bottom
- Area 5: Newport News Bar
6-12 ft depth at MLW
Hard sand bottom
- Area 6: Slough inshore of Newport News Bar
12-21 ft depth at MLW
Sand and mud bottom
- Area 7: Inshore area on Portsmouth side
1-12 ft depth at MLW
Mud and sand bottom
- Area 8: Inshore area of Newport News side
1-6 ft depth at MLW
Mud and sand bottom

The corridor was then gridded into squares (200 yards on a side). Because it was desired to sample each area separately and to conduct the same level of sampling in all the areas, the location of squares to be sampled was chosen

randomly for each area; the number chosen was based on the size of that area. The plan called for ten samples to be collected around the center of each square; patent tongs were chosen to do the major portion of the sampling because of their efficiency at taking quantitative samples. Hand tongs had to be used in the shallower areas (7 and 8); here, five samples were taken at each station.

Each square sampled was considered to be one station; ten samples were taken per station.¹ In the field, stations were located with the aid of a sextant.

Patent tong samples were taken from a 42 ft boat by an experienced patent tonger. Each lick or grab of the tongs (i.e. each sample) covered an area of 10.2 square feet of bottom; the boat was moved after each grab so that a different area of bottom was covered by successive grabs. Hand or shaft tong sampling was conducted from a small boat by an experienced hand tonger; these tongs covered 4.5 square feet of bottom per lick.²

Each sample collected was examined and the following data were collected:

¹This is a reduction from the twenty which were proposed, but still provided accurate observations of the area.

²The heads were tied so that they always opened the same distance.

Bottom type;

Vegetation;

Numbers of hard clams and oysters;

Measurements of the length of hard clams and oysters;

Depth of the water; and,

Other animals present.

The percentage of the catch which was Littleneck, Cherrystone and Chowder was calculated from the length measurements.

The following guidelines were used for the different size categories:

Littleneck or nick	< 60 millimeters (mm) (\leq 2.4 inches)
Cherrystone	61 mm to 80 mm
Chowder	>80 mm (>3.1 inches)

Prices paid to commercial tongers were determined by talking with several dealers in hard clams. From them, the following prices for clams from Hampton Roads were obtained:

Littleneck (or nick) and Cherrystone sizes - 5¢ each;

Chowder size - 2¢ each³

From these prices, a dollar value for the clams was estimated.

³For the purpose of this report chowders are slightly overvalued at 2¢ each. Often they sell for 1¢, and sometimes there is no market at all for that size.

To convert numbers of clams to bushels a factor of 300 clams per bushel was used.

RESULTS

Only one oyster was recorded in the entire study although many oyster shells were found. This was expected because the oyster pathogen, MSX, has been active in the area for the last twenty years.

Numbers of hard clams caught during sampling are shown on Table 1 and 2. Hard clam distribution within the area sampled varied from 0.7 to zero per square foot. The clams were found almost entirely in the Northern half of the corridor (see Figure 2).

Results will be discussed by area, as shown on Figure 1, beginning with the area closest to Newport News.

Area 8 (Hand Tong)

This area included bottoms from the Newport News shoreline out to a depth of six feet (MLW). Hand tongs were used to collect all samples. At twelve of the thirteen stations a sand bottom was found; mud was found at one station. At the thirteen stations in this area fourteen hard clams were collected for an average of 0.04 clam per square foot. Sixty-four percent of the clams caught were Cherrystone size or smaller. This low number of hard clams is to be expected in this area which is exposed to wave action that shifts sand.

Table 1

Results of Patent Tong Sampling Conducted in September 1980, in a Corridor
Between Newport News Point and Craney Island.

Area	Station			Hard Clams		
	Number	Depth (ft)	Bottom Type	Total Number	Avg. No. Per Ft ²	Percent Littlenecks & Cherrystones
6	14	5.0	M	129	0.63	67
	15	16.0	SM	44	0.43	84
	16	19.0	S	55	0.54	77
Total				228		
Averages			SM		0.56	73
5	101	12.0	SM	44	0.43	45
	17	12.0	S	13	0.13	77
	18	11.0	S	36	0.39	63
	19	10.0	S	26	0.25	80
	20	12.0	S	17	0.17	65
	21	10.0	M	50	0.49	79
Total				186		
Averages			S		0.31	67
4	22	48.0	M	69	0.68	98
	23	50.0	SM	15	0.15	93
	24	48.0	M	30	0.29	96
Total				114		
Averages			M		0.37	97

Table 1 (Contd.)

Station				Hard Clams		
Area	Number	Depth (ft)	Bottom Type	Total Number	Avg. No. Per Ft ²	Percent Littlenecks & Cherrystones
2	25	23.0	S	4	0.04	100
	26	23.0	SM	71	0.70	78
	27	22.0	SM	51	0.50	78
	28	20.0	S	51	0.50	57
	29	29.0	M	3	0.03	100
	30	20.0	SM	76	0.74	56
	31	24.0	M	1	0.01	100
	32	21.5	M	0	0.00	--
	33	23.0	M	0	0.00	--
	34	24.0	M	2	0.02	50
	35	24.0	M	0	0.00	--
	36	22.0	M	0	0.00	--
	37	23.0	M	13	0.13	38
	38	26.0	M	3	0.03	33
	39	24.0	SM	3	0.03	67
	40	24.0	SM	14	0.14	77
	41	25.0	M	0	0.00	--
	42	24.0	M	0	0.00	--
	43	24.0	M	0	0.00	--
	44	25.0	SM	1	0.01	100
	45	24.0	M	0	0.00	--
	46	29.0	M	1	0.01	100
	47	25.0	SM	58	0.57	65
	48	--	M	1	0.01	0
	49	21.0	M	0	0.00	--
Total				353		
AVERAGES			M		0.14	66
3	50	18.0	S	108	0.50	62
	51	18.0	S	96	0.47	53
	52	17.0	S	83	0.41	62
Total				287		
Averages			S		0.46	59

Table 1 (Contd.)

Area	Station			Hard Clams			
	Number	Depth (ft)	Bottom Type	Total Number	Avg. No. Per Ft ²	Percent Littlenecks & Cherrystones	
1	53	17.0	M	3	0.03	100	
	54	14.0	M	0	0.00	--	
	55	13.0	M	0	0.00	--	
	56	12.0	M	0	0.00	--	
	57	12.0	M	0	0.00	--	
	58	10.0	M	0	0.00	--	
	59	9.0	M	1	0.01	100	
	60	8.0	M	0	0.00	--	
	61	8.0	M	0	0.00	--	
	62	10.0	M	0	0.00	--	
	63	10.0	M	0	0.00	--	
	64	9.0	M	0	0.00	--	
	65	8.0	M	0	0.00	--	
	66	10.0	M	1	0.01	100	
	67	10.0	M	0	0.00	--	
	68	9.0	M	0	0.00	--	
	69	11.0	SM	3	0.03	100	
	70	12.0	SM	6	0.06	83	
	71	11.0	SM	8	0.08	100	
	Total				22		
	Averages			M		0.01	95

Notes on Bottom Type: S = Sand; M = Mud; SM = Sandy Mud.

Table 2

Results of Hand Tong Sampling Conducted in September 1980 in a Corridor
Between Newport News Point and Craney Island.

Area	Station			Hard Clams		
	Number	Depth (ft)	Bottom Type	Total Number	Avg. No. Per Ft ²	Percent Littlenecks & Cherrystones
8	1	--	S	0	0.00	--
	2	2.5	SM	0	0.00	--
	3	9.0	M	0	0.00	--
	4	1.5	S	0	0.00	--
	5	4.0	S	1	0.04	0
	6	1.5	S	0	0.00	--
	7	1.5	S	0	0.00	--
	8	3.5	S	1	0.04	100
	9	3.5	S	3	0.13	100
	10	4.0	S	0	0.00	--
	11	3.5	S	2	0.09	100
	12	4.0	S	4	0.18	25
	13	4.0	S	3	0.13	67
Total			14			
Averages					0.04	64
7	72	4.0	S	0	0.00	--
	73	6.0	S	0	0.00	--
	74	6.0	S	0	0.00	--
	75	11.0	M	0	0.00	--
	76	11.0	M	0	0.00	--
	77	6.0	S	0	0.00	--
	78	5.0	S	0	0.00	--
	79	5.0	S	0	0.00	--
	80	11.0	M	0	0.00	--
	81	15.0	M	0	0.00	--
	82	3.5	S	0	0.00	--
83	5.0	S	0	0.00	--	

Table 2 (Contd.)

<u>Area</u>	<u>Station</u>			<u>Hard Clams</u>		
	<u>Number</u>	<u>Depth (ft)</u>	<u>Bottom Type</u>	<u>Total Number</u>	<u>Avg. No. Per Ft²</u>	<u>Percent Littlenecks & Cherrystones</u>
7	84	6.0	S	0	0.00	--
	85	7.0	S	0	0.00	--
	86	4.0	S	0	0.00	--
	87	13.0	M	0	0.00	--
	88	5.0	S	0	0.00	--
	89	4.0	S	0	0.00	--
	90	4.0	S	0	0.00	--
	91	4.0	S	0	0.00	--
	92	19.0	M	0	0.00	--
	93	4.5	S	0	0.00	--
	94	4.0	S	0	0.00	--
	95	13.0	M	0	0.00	--
	96	2.5	S	0	0.00	--
	97	2.5	S	0	0.00	--
	98	2.5	S	0	0.00	--
	99	2.5	S	0	0.00	--
	100	3.0	S	0	0.00	--
Total				0		
Averages			S		0.00	--

Notes on Bottom Type: S = Sand; M = Mud; SM = Sandy Mud.

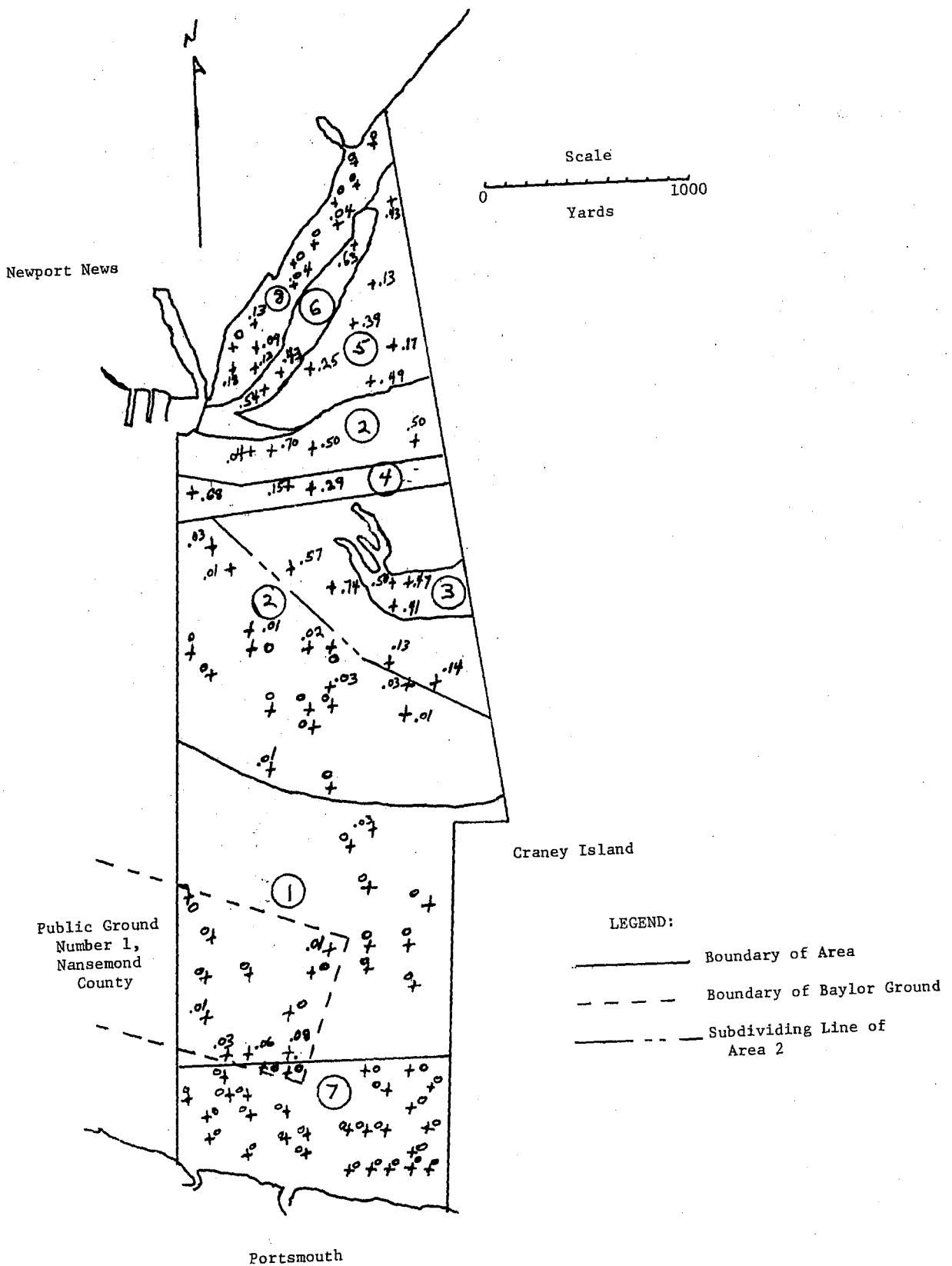


Figure 2. Results of sampling in 1980. Figures show the average number of hard clams per square foot.

Area 6 (Patent Tong)

Most of this area is a deep slough which separates the inshore, shallow area and the Newport News Bar offshore; depths range from 12 to 21 feet with a small area six to twelve feet deep. The bottom was a mixture of mud and sand. Patent tong sampling at three locations recovered 228 hard clams for a calculated average density of 0.56 clam per square foot. Almost three-fourths (73%) of the clams caught were Littlenecks and Cherrystones.

Area 5 (Patent Tong)

This area is the Western end of Newport News Bar. Here sixty samples from six stations were taken with patent tongs. Sand was present at every station; water depth ranged from six to twelve feet.

Catch per station varied from 13 to 50 hard clams; the total number was 186. Catch of clams per square foot varied among stations from 0.13 to 0.49, while the average was 0.31. Littleneck and Cherrystone clams made up 67 percent of the catch.

Area 4 (Patent Tong)

Area 4 is located where the Newport News Channel crosses the corridor. The muddy bottom was 48 to 50 feet deep. Here a total of 114 hard clams (97 percent of which were Littlenecks and Cherrystones) were found at three stations for an average density of 0.37 per square foot.

Area 2 (Patent Tong)

This area is in the mid-section of the corridor and includes bottom from the 18 foot contour on the North side of Hampton Roads to the 18 foot contour on the South side. It is broken by Area 4, the dredged channel, and it surrounds Area 3 which is part of Middle Ground.

Clam distribution in this area of bottom is highly variable; sample catches at stations in the area ranged from none to 76 (0.74 clam/ft²). Stations where most clams were found were located North of the Newport News Channel and adjacent to Middle Ground on its West and South. If a line were drawn roughly Northwest and Southeast through the middle of Area 2 (see dashed line in Figure 2), then the high density stations would fall to the Northeast of this line and low density stations would be to the Southwest of the line.

In the Southwest part of Area 2, 15 clams were found at 17 stations for an average density of 0.01 clam per square foot. By contrast, the eight stations in the Northeastern part yielded 338 hard clams for an average of 0.41 per square foot. Average density for all of Area 2 was 0.14.

Area 3 (Patent Tong)

This is part of a sand shoal in the middle of Hampton Roads. Depths in the area vary from fourteen to eighteen feet. At three stations quantities of clams caught

were fairly uniform, varying from 83 to 108 (0.41 to 0.50 clam/ft²). Twenty patent tong licks were taken at each station here, which is twice as many as were taken at other patent tong stations. Average catch for the three stations was 0.46 clam per square foot. More than half (59%) of the clams caught were Cherrystone or smaller size.

Area 1 (Patent Tong)

This area is just outside the mouth of the Nansemond River and adjacent to the Western side of Craney Island Disposal Area. Depths in this area of mud bottom ranged from 6 to 18 feet. Twenty-two clams were tonged here (95% of them Cherrystones and Littlenecks); the area had a density, on the average of 0.01 clam per square foot.

Area 7 (Hand Tong)

This area is next to the Portsmouth shore and adjacent to Craney Island Disposal Area. Sampling was carried out with hand tongs due to depths less than three feet. Twenty-nine stations covering 697.5 square feet of bottom were sampled; no clams were found.

DISCUSSION

Hard clam distribution within the corridor was highly variable; most of the clams occurred in the Northern part of the corridor, roughly between Newport News and Middle

Ground. Densities of clams were high (over 56 bushels per acre) in Areas 3 and 6 and the Northeastern part of 2. Areas 4 and 5 had medium densities (24-55 bushels per acre) based on our samples. The estimated densities in the remaining areas were low (less than 24 bushels per acre). Medium and high densities would be considered commercially harvestable if this were an area with no health restrictions. Oysters were almost non-existent; only one was found within the corridor.

One piece of private oyster planting ground lies mainly in the Southwestern half of Study Area 6 with a slight overlap into areas 8 and 5. It is 48.37 acres in size and is leased by W. D. Melzer. Sampling was conducted here independently of this study and was reported on separately.⁴

Except for a small portion which is leased, all of Area 8 has been designated as public clamming ground by the Virginia Marine Resources Commission.

Part of Public Oyster Ground Number 1, Nansemond County, extends into the corridor area; its location is shown in Figure 1. The part of the Public Ground that lies in the corridor is 483 acres in area. The average density and estimated quantity of hard clams was 0.02 clam per

⁴Haven, D. S. and Lowell W. Fritz. Sep. 1980. A Resurvey of the Hampton Roads Corridor Area Adjacent to the Proposed Site of the I-664 Bridge-Tunnel. VIMS.

square foot and 342,545 clams, respectively; an estimated 95 percent were Cherrystones and Littlenecks.

When the results of sampling in September 1980 were compared with results of sampling conducted in April 1972⁵, close similarities were seen in the distribution of the clams and in the size composition of the catch. Most of the clams found in both years occurred in the same place, and the percentage of Littleneck and Cherrystone size clams which was reported in 1972 as 71% was found to be 69% in 1980.

Regarding the quantity of clams, however, a marked difference was apparent in the two sets of data. Overall, the quantity of clams found in the later sampling was less than half of what was found in 1972. The reason(s) for this decline is not known; harvesting may account for part of the difference.

Oysters were negligible in 1972 also.

Estimates of Quantity and Value of Clams

The quantity and value of hard clams in each area within the corridor has been estimated and is shown in Table 3. The basis for our estimates of value were the prices paid by some clam buyers to the harvesters; these prices

⁵Haven, D. S. and J. G. Loesch. 1972. Hampton Roads Tunnel Corridor Survey Report for the Virginia Department of Highways. VIMS.

Table 3

Estimated Quantities and Values of Hard Clams in Corridor by Area.

<u>Area</u>	<u>Size (Acres)</u>	<u>Estimated Numbers of Clams</u>			<u>Estimated Value</u>	
		<u>Total Quantity</u>	<u>Littlenecks & Cherrystones</u>	<u>Chowders</u>	<u>Littlenecks & Cherrystones</u>	<u>Chowders</u>
8	212	410,432	262,676	147,756	13,134	2,955
6	136	3,310,560	2,416,709	893,851	120,835	17,877
5	390	5,250,652	3,517,937	1,732,715	175,897	34,654
4	144	2,336,866	2,266,760	70,106	113,338	1,402
2	1,892	11,408,894	7,529,870	3,879,024	376,494	77,580
3	119	2,391,039	1,410,713	980,326	70,536	19,606
1	1,494	738,767	701,829	36,938	35,091	739
7	645	--	--	None	--	--
Totals	5,032	25,847,210	18,106,494	7,740,716	905,325	154,813
					\$1,060,138	

were 5¢ a clam for Cherrystones and Littlenecks and 2¢ each for Chowder clams. Estimated value of all the clams was \$1,060,138.

The estimated value of hard clams in the area of public oyster ground in the corridor was \$16,613. In Area 8, which is almost entirely public clamming ground the estimated value of all hard clams was \$16,089.

The values of hard clams shown in this report are maximal. In certain areas where densities are as low as .02 clam/ft² harvest would be economically impractical. In other areas (even high densities) it would be impractical to harvest more than about 75% of the crop.