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A Survey of Leased Oyster Ground in Hampton River
in the Vicinity of the I-64 Bridge.

Conducted for the
Virginia Department of Highways and Transportation
Project 0064-114-103

by

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INTRODUCTION

Background

In 1975 a study was completed by the Virginia Institute of Marine Science (VIMS) entitled "An Environmental Assessment of the Hampton River and Vicinity." This was for federal project I-64 (142)240 - State Project 0064-114-103. It was completed for Sverdrup and Parcel Consulting Engineers, St. Louis, Missouri. A part of this report consisted of an evaluation of the molluscan resource in a zone 600 feet wide on either side of the existing bridge. Leased as well as public bottoms were studied.

This report concluded that "the present level of production and the potential productivity (of the area) are low." Since construction is again planned on I-64, a resurvey of the area was again indicated.

The Present Study - Its Objectives

In this report the area surveyed extends 600 feet on either side of I-64; the same area covered in the earlier study. The study differs from the 1975 study in that only riparian and leased bottoms are considered.

The objectives of the 1979 survey are to: 1) determine the magnitude of hard clam and oyster populations; 2) determine quantities of shell in the surface layer; 3) determine bottom type; and 4) determine the value of the oysters, clams and shell in the area.

The field aspects of this study were completed in April 1979.

A Description of the Area

I-64 crosses the mid-section of Hampton Creek just above the heavily industrialized shore areas of Hampton and Phoebus. Located in this area are marinas, docking facilities for many types of fishing vessels, and several industrial plants. As a result of vessel activity and other possible sources of pollution, the area is restricted for the direct harvest of shellfish by the Virginia Bureau of Shellfish Sanitation. Shellfish harvested from such restricted areas can not be sold directly for human consumption. They may be marketed, however, if they are harvested during a designated season and then replanted on State approved bottoms for a period of 15 days. This cultural practice adds greatly to the final cost of raising oysters since it means a double harvest; seldom is it economically feasible to recover more than 70% of those originally planted. Therefore, relaying oysters from restricted areas is regarded as economically impractical by most commercial growers.

Bottom Type

The study area is shallow and most of the leased bottom range from 2 to 6 feet MLW. Except for areas where oysters occur the bottom is typically soft mud, with a few areas of sandy mud.

Oyster Diseases

The oyster pathogens MSX Minchinia nelsoni and "Dermo", Perkinsus marinus are endemic in Hampton Creek. These diseases are capable of causing extensive mortalities during years of high salinity.

Hydrographic Information

Salinities in the area are satisfactory for oyster and hard clam growth. They average from about 20^o/oo in fall to 18^o/oo in spring.

METHODS

The leased bounds were located with the aid of surveyors plats and by boundary stakes set out by the Virginia Marine Resources Commission (Figure 1).

For the purpose of sampling, the study area was gridded into 50 foot squares. The 50 foot interval was measured with the aid of a floating 50 foot rope. The bounds of the squares were located with temporary stakes, and by reference to fixed locations on the bridge (Figure 2). Squares cited in the various tables in this report may be located by reference to numbers and letters shown on Figure 2.

Samples of the bottom were taken by an experienced waterman using ordinary hand tongs. Measurements of the distance the tong head covered, at depths encountered in this

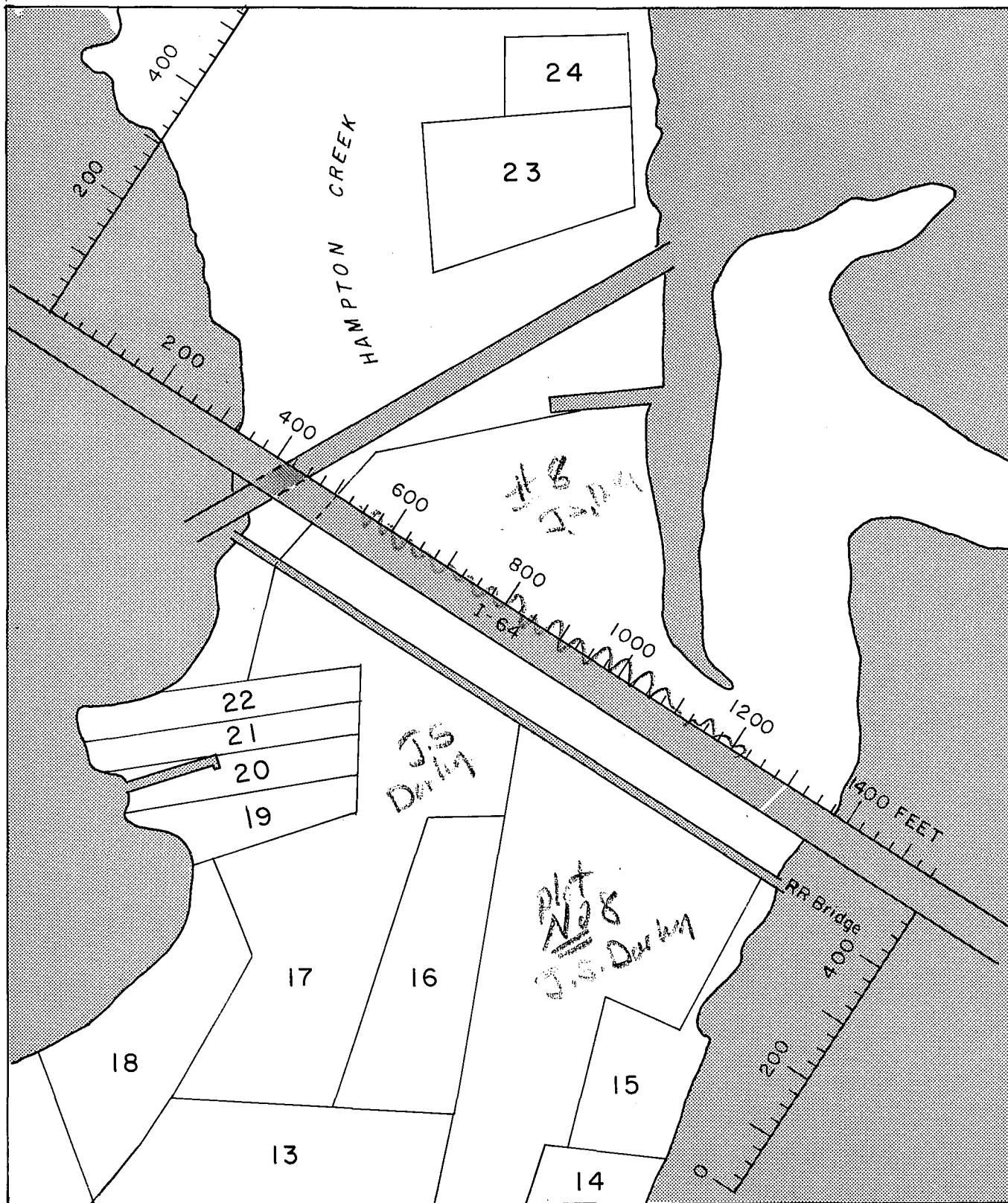


Figure 1

Location and numbers of leased bottoms.

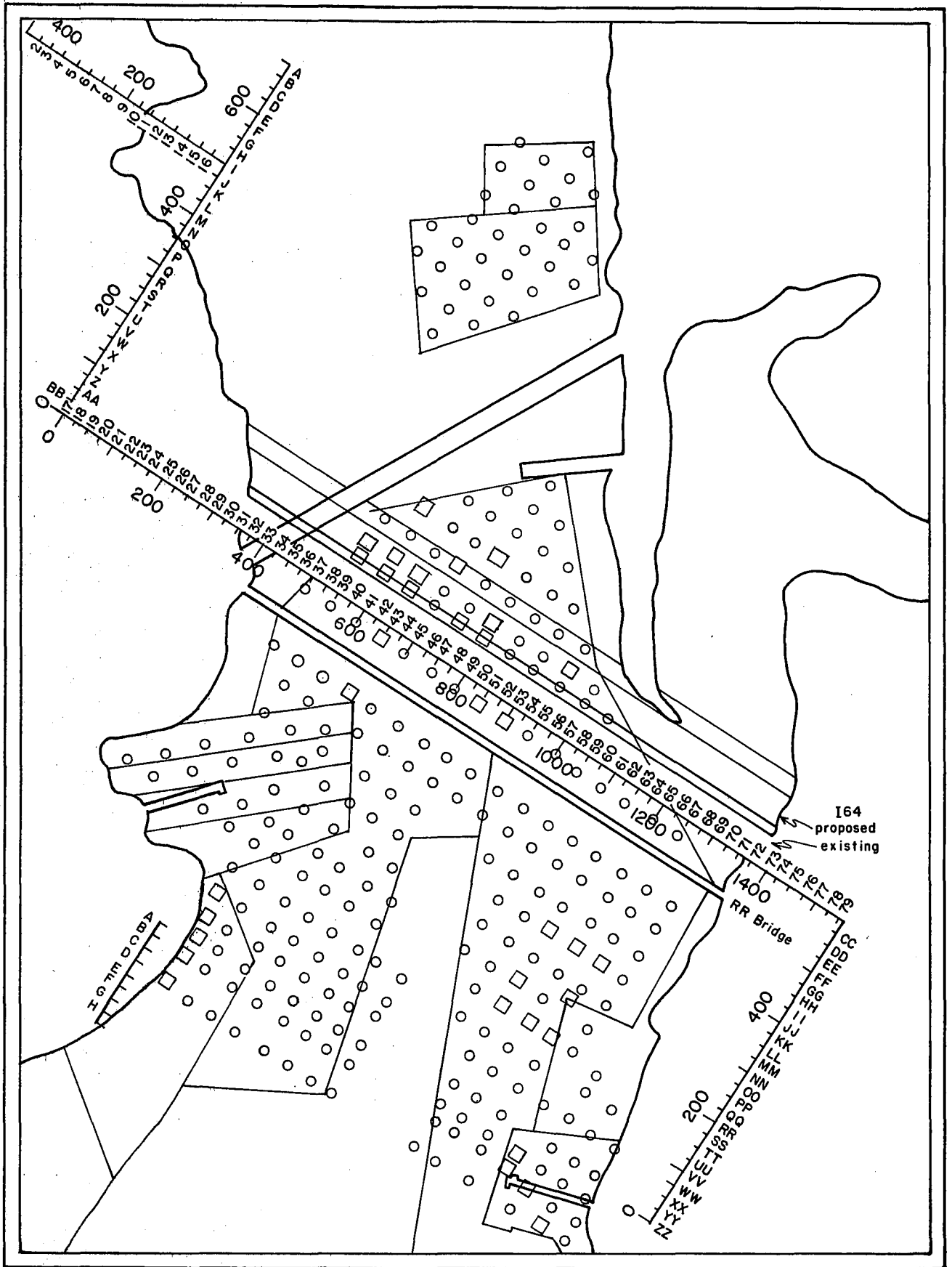


Figure 2

Locations where samples were taken.
 (o = no oysters; □ = oysters present.)

area established that the tongs covered on the average 2.5 ft² of bottom. This figure was used in all calculations of oyster and shell density.

If the first tonged sample in any square showed a shell or an oyster, then a second sample was taken. If the first sample was devoid of shells or oysters, then no more samples were collected in that square.

In each tonged sample the following counts were made and recorded: numbers of clams, oysters and shell; and numbers of boxes (hinged valves). Bottom type was determined with the aid of tongs.

Using the preceding data, the density of oysters, clams and shells was determined using methods outlined in Table 1.

RESULTS

General

The overall concentration of oysters and shells on the leases covered by this study was low. The total oysters on the 16.04 acres surveyed was estimated at 613.5 bushels; the total shell was 1,010 bushels. For oysters the density ranged from 0 to 167 bu/acre; for shells density ranged from 0 to 230 bu/acre. Scattered concentrations of moderate density occurred in only two locations. Almost all the oysters were classed as large (market-sized); about 13% were smaller than three inches. No set had occurred in 1978.

Table 1

Calculations

I. Our calculations of oyster and shell density on the leases are based on the following parameters:

1. Average area covered by tong head in collecting one sample	2.5 ft ²
2. Average area covered by tongs in two samples	5.0 ft ²
3. Size of a 50 foot square	2,500 ft ²
4. Therefore, in taking the two samples we sample 1/500 of the square (2500 ÷ 5)	
5. Average count of Hampton Creek oysters per bushel	230 oysters
6. Average number of Hampton Creek shells in one quart	13 shells
7. Square feet in one acre	43,560 ft/sq
8. Qts of shell in a Virginia bushel	50 qts
9. Value of oysters from restricted waters	\$6.00/bu
10. Value of shells placed on the bottom	\$0.32/bu

II. The following example serves to show how the various density values are calculated in this paper.

Example:

Two quarts of shell and 6 oysters were taken in 50 ft²

OYSTER DENSITY

A. 6 oysters in 5 ft² or 6 x 500 = 3000 oysters in the 2500 ft²

B. 3000 ÷ 230 oysters = 13.0 bushels

C. 43,560 ÷ 2,500 x 13.0 = 226 bushels per acre

Table 1 (Contd.)

SHELL DENSITY

- A. 2 qts of shell in 5 ft² or 2 x 500 = 1000 qts of shell in the 2,500 ft² plot.
- B. 1000 ÷ 50 qt = 20 bushels
- C. 43,560 ÷ 2,500 x 20 = 348 bushels/acre

III. If 20 live oysters and 6 boxes were collected then the percent mortality is calculated as follows:

$$20 + 6 = 26$$

$$6 \div 26 = 23\% \text{ mortality}$$

Oyster mortality on the leases ranged from 6 to 18% which is about normal for the area.

Hard clams were lacking on most leases or occurred in very low densities. Approximately 20 were collected on plot 8. Because of their low density the resource is considered of no commercial value.

Individual Leases and Riparian Plots

A summary of the sampling on each lease is given in Table 2.

Lease No. 8 - J. S. Darling

For survey purposes, the lease was divided into three parts: above I-64, between the railway and I-64, and below I-64 (Tables 3, 4, and 5). Our survey gave an estimate of 384 bushels of oysters and 650 bushels of shell in the 7.0 acre lease. Only 20 hard clams were found.

Mortalities for the three areas ranged from 6 to 18%.

The substrate was typically soft mud, except where oysters were locally abundant.

Riparian Lease No. 14 - Willard Smith

On this lease there was an estimated 56 bushels of oysters and 145 bushels of shell (Table 6). Expressed in terms of bushels per acre, values for oysters and shells respectively were, 90 and 230 bushels. These are regarded as

Table 2

Summary of Number of Bushels of Shell and Oysters and Their Dollar Value on the Leases 600 feet on Either Side of I-64, Hampton Creek, Virginia.

Leased and Riparian Areas	Total Acres Surveyed ¹	OYSTERS			Bushels Oysters on Lease	Value (\$)	SHELL			Value (\$)
		Unproductive Areas (No Oysters) Acres	Productive Areas (Oysters) Acres	Total Acres Lacking Shell			Total Acres Having Shell	Total No. Bushels of Shell		
Lease # 8	7.23	5.68	1.55	384.0	2,304	3.96	3.27	650	208	
Riparian #14	0.63	0.46	0.17	56.0	336	0.34	0.29	145	46	
Riparian #15	0.5	0.5	0.0	0.0	0	0.46	0.06	10	3	
Lease #17	3.5	3.4	0.1	2.2	13	3.27	0.23	24	8	
Lease #18	0.75	0.46	0.29	167.0	1,002	0.46	0.29	120	38	
Riparian #19	0.46	0.46	0.0	0.0	0	0.23	0.23	10	3	
Riparian #20	0.34	0.34	0.0	0.0	0	0.34	0.0	0	0	
Riparian #21	0.40	0.40	0.0	0.0	0	0.40	0.0	0	0	
Riparian #22	0.34	0.34	0.0	0.0	0	0.34	0.0	0	0	
Lease #23	1.32	1.21	0.10	4.3	26	1.09	0.23	50	16	
Lease #24	0.57	0.57	0.0	0.0	0	0.52	0.06	1	1	
Total	16.04	13.83	2.21	613.5	3,681	11.41	4.66	1,010	323	

Note:

1. The total area covered by the 50 x 50 ft squares.

Table 3

Summary of leased plot no. 8 above the I-64 bridge in Hampton Creek, Virginia. Data derived from Table A, Appendix.

I. BARREN AND PRODUCTIVE AREAS

1. Total squares sampled = 46 (2.64 acres)
2. Productive squares with oysters¹ = 13 (0.75 acres)
3. Barren squares lacking oysters = 33 (1.89 acres)
 - a. With shell = 15 (0.86 acres)
 - b. Mud or sandy mud bottom = 18 (1.03 acres)

II. BOTTOM TYPE (Predominant)

1. On bottom with oysters - sandy mud and shell.
2. On bottoms without oysters - sandymud and widely scattered shell.

III. OYSTERS

1. On the 13 squares with oysters 48 oysters were taken.

Therefore, in this area our estimate is:

$$500 \times 48 = 24,000 \text{ oysters}$$

2. Bushels:

- a. Total on squares = 104 bushels
- b. Bushels per acre on plot = 39 bushels/acre

IV. SHELL

1. On the 21 squares having shell 14.9 qts were taken. Therefore, in this area our estimate is:

$$14.9 \times 500 = 7,450 \text{ qts}$$

Table 3 (Contd.)

2. Bushels:

a. Total on squares = 149 bushels ✓

b. Bushels per acre on plot = 56 bushels/acre

3. Percent surface shell = 47%

V. PERCENT MORTALITY

1. Collected 48 live oysters and 3 boxes

$3 \div 51 = 6\%$ mortality

¹Shell was taken in all but one of these squares.

Table 4

Summary of small corridor of bottom which is a part of leased plot no. 8 located between the railroad bridge and I-64 in Hampton Creek, Virginia. Data derived from Table B, Appendix.

I. BARREN AND PRODUCTIVE AREAS

1. Total squares sampled = 16 (0.92 acres)
2. Productive squares with oysters¹ = 3 (0.17 acres)
3. Barren squares lacking oysters = 13 (0.75 acres)
 - a. With shell = 5¹ (0.29 acre)
 - b. Mud or sandy mud bottom = 8 (0.46 acre)

II. BOTTOM TYPE (Predominant)

1. On bottoms with oysters - sandy mud and shell.
2. On bottoms without oysters - soft mud or sandy mud with widely scattered shells.

III. OYSTERS

1. On the 3 squares with oysters 23 oysters were taken. Therefore, in this area our estimate is:

$$23 \times 500 = 11,500 \text{ oysters}$$

2. Bushels:

- a. Total on the squares = 50 bushels
- b. Bushels per acre on plot = 5.4 bushels

IV. SHELL

1. On the 7 squares with shell 5.3 qts of shell was taken. Therefore, in this area our estimate is:

$$5.3 \times 500 = 2,650 \text{ qts}$$

Table 4 (Contd.)

2. Bushels:

a. Total for plots = 53 bushels

b. Bushels per acre on plot = 58 bushels

3. Percent surface shell = 77%

V. PERCENT MORTALITY

1. Collected 23 live and 2 boxes

$2 \div 25 = 8.0\%$ mortality

¹One oyster plot had no shell.

Table 5

Summary of leased plot no. 8 below I-64 bridge in Hampton Creek, Virginia. Data derived from Table C, Appendix.

I. BARREN AND PRODUCTIVE AREAS

1. Total squares samples = 64 (3.67 acres)
2. Productive squares (with oysters) = 11 (0.63 acres)
3. Barren squares lacking oysters = 53 (3.04 acres)
 - a. With shell = 18 (1.03 acres)
 - b. Mud bottom = 35 (2.01 acres)

II. BOTTOM TYPE (Predominant)

1. On bottoms with oysters - sandy mud and shell-mud.
2. On bottoms without oysters - mud or sandy-mud with local areas of shelly-mud bottoms.

III. OYSTERS

1. On the 11 squares with oysters 106 oysters were taken. Therefore, in this area our estimate is:

$$106 \times 500 = 53,500 \text{ oysters}$$

2. Bushels:
 - a. Total on squares = 230 bushels
 - b. Bushels per acre on plot = 63.5 bushels

IV. SHELL

1. On the 29 squares having shell 44.6 qts of shell were taken. Therefore, in this area our estimate is:

$$44.6 \times 500 = 22,400 \text{ qts}$$

Table 5 (Contd.)

2. Bushels:

a. Total on squares = 448 bushels

b. Bushels acre on plot = 122 bushels

3. Percent surface shell = 44%

V. PERCENT MORTALITY

1. Collected 100 live oysters and 22 boxes

$22 \div 122 = 18\%$ mortality

Table 6

Summary of leased plot no. 14 below I-64 bridge in Hampton Creek, Virginia. Data derived from Table D, Appendix.

I. BARREN AND PRODUCTIVE AREAS

1. Total squares sampled = 11 (0.63 acres)
2. Productive squares with oysters = 3 (0.17 acres)
3. Barren squares lacking oysters = 0.46 acres
 - a. With shell = 5 (0.29 acres)
 - b. Mud bottom = 6 (0.34 acres)

II. BOTTOM TYPE (Predominant)

1. On bottoms with oysters - mud-shell.
2. On bottoms without oysters - mud.

III. OYSTERS

1. On the 4 squares with oysters 26 oysters were taken. Therefore, in this area our estimate is:

$$26 \times 500 = 13,000 \text{ oysters}$$

2. Bushels:

- a. Total on squares = 56.5 bushels
- b. Bushels per acre on plot = 90 bushels

IV. SHELL

1. On the 5 squares with shell 14.5 qts of shell was taken. Therefore, in this area our estimate is:

$$14.5 \times 500 = 7,250 \text{ qts}$$

Table 6 (Contd.)

2. Bushels:

a. Total on squares = 145 bushels

b. Bushels per acre on plot = 230 bushels

3. Percent surface shell = 62%

V. PERCENT MORTALITY

1. Collected 26 live oysters and 5 boxes

$5 \div 31 = 16\%$ mortality

Table 7

Summary of leased plot no. 15 below the I-64 bridge in Hampton Creek, Virginia. Data derived from Table E, Appendix.

I. BARREN AND PRODUCTIVE AREAS

1. Total squares sampled = 9 (0.52 acres)
2. Productive squares with oysters = 0 (0.0 acres)
3. Barren squares lacking oysters = 9 (0.52 acres)
 - a. With shells = 0 (0.0 acres)
 - b. Mud bottom = 9 (0.52 acres)

II. BOTTOM TYPE (Predominant)

1. Soft mud

III. OYSTERS

1. No oysters

IV. SHELL

1. On the one square with shell 1 qt was taken. Therefore, in is area our estimate is:

$$1 \times 500 = 500 \text{ qts}$$

2. Bushels:
 - a. Total on the square = 10 bushels
 - b. Bushels per acre on plot = 5 bushels

Table 8

Summary of leased plot no. 17 in Hampton Creek, Virginia
below I-64 bridge. Data derived from Table F, Appendix.

I. BARREN AND PRODUCTIVE AREAS

1. Total squares sampled = 61 (3.51 acres)
2. Productive squares with oysters = 1 (0.06 acres)
3. Barren squares lacking oysters = 60 (3.44 acres)
 - a. With shells = 6 (0.34 acres)
 - b. Mud or sandy-mud bottom = 54 (3.10 acres)

II. BOTTOM TYPE (Predominant)

1. On bottoms with oysters - mud.
2. On bottoms without oysters - mud, or sand-mud with widely scattered shells.

III. OYSTERS

1. On the (1) square with oysters, 1 oyster was taken. Therefore,
in this area our estimate is:

$$500 \times 1 = 500 \text{ oysters}$$

2. Bushels:
 - a. Total on squares = 2.2 bushels
 - b. Bushels per acre on plot = 1 bushel

IV. SHELL

1. On the 4 squares with shell 2.4 qts of shell was taken. Therefore,
in this area our estimate is:

$$2.4 \times 500 = 1200 \text{ qts}$$

Table 8 (Contd.)

2. Bushels:

a. Total on squares = 24 bushels

b. Bushels per acre on plot = 7 bushels

3. Percent surface shell = 50%.

V. PERCENT MORTALITY

1. Data is insufficient to calculate mortality.

Table 9 (Contd.)

2. Bushels:

a. Total on the squares = 120 bushels

b. Bushels per acre on plot = 164 bushels.

3. Percent surface shell = 79%

V. PERCENT MORTALITY

1. Collected 77 live oysters and 11 boxes

$$11 \div 88 = 12.5\%$$

¹All squares had shell.

Riparian Lease No. 19 - Booker

Sampling showed this lease to be without oysters or significant quantities of shell. The bottom was soft mud (Table 10).

Riparian Lease No. 20 - Chisman

The same as lease #19 (Table 10).

Riparian Lease No. 21 - Hudgins

The same as lease #19 (Table 10).

Lease No. 23

Sampling showed this 1.32 acre area to be without significant quantities of oysters. Shells were estimated as 50 bushels (a rate of 38 bushels/acre), Table 11.

Riparian Lease No. 24

The same as for lease #19 (Table 12).

SUMMARY AND DISCUSSION

The leases surveyed had a total acreage of 16.04 acres. Only about 614 bushels of oysters was estimated to occur in the area. This is regarded as a low density area (38 bu/acre). Shell (1,010 bushels) occurred at the rate of 62 bu/acre which is also regarded as low. Most of the oysters and shell occurred on lease #8 and riparian plots 14 and 18. Only on plots 14 and 18, however, did oyster density approach moderate concentrations (Table 2).

Table 10

Summary of riparian leases 19, 20, 21 and 22 below I-64 bridge, Hampton Creek, Virginia. Data derived from Table H, Appendix.

Riparian Lease 19

I. BARREN AND PRODUCTIVE AREAS

1. Total squares sampled = 8 (0.46 acres)
2. Productive squares with oysters = 0 (0.0 acres)
3. Barren squares without oysters = 8 (0.46 acres)
 - a. With shells only = 4 (0.23 acres)
 - b. Mud bottoms = 4 (0.23 acres)

II. BOTTOM TYPE (Predominant)

1. Soft mud

III. OYSTERS

1. None collected

IV. SHELLS

1. On the 4 plots with shells 1 qt of shells was taken. Therefore, our estimate in this area is:

$$4 \times 500 = 2,000 \text{ qts}$$

2. Bushels:
 - a. Total in four squares = 40 qts.
 - b. Bushels per acre on plot = 87 bushels/acre
3. Percent surface shell = 0%.

V. PERCENT MORTALITY

1. Insufficient data.

Table 10 (Contd.)

Riparian Leases 20, 21, 22

These leases were barren with a soft mud bottom.

Table 11

Summary of leased plot no. 23 in Hampton Creek, Virginia
above the I-64 bridge. Data derived from Table I, Appendix.

I. BARREN AND PRODUCTIVE AREAS

1. Total squares sampled = 23 (1.32 acres)
2. Productive squares with oysters = 2 (0.11 acres)
3. Barren squares lacking oysters = 21 (1.21 acres)
 - a. With shells = 4 (0.23 acres)
 - b. Soft mud bottoms = 17 (0.98 acres)

II. BOTTOM TYPE (Predominant)

1. On bottoms with oysters - soft mud.
2. On bottoms without oysters - soft mud.

III. OYSTERS

1. On the two squares with oysters 2 oysters were taken. Therefore,
in this area our estimate is:
$$2 \times 500 = 1,000 \text{ oysters}$$
2. Bushels:
 - a. Total on the squares = 4.3 bushels
 - b. Bushels per acre on plot = 3.2 bushels

IV. SHELLS

1. On the 6 squares with shell 5 qts were taken. Therefore, our
estimate is:
$$5 \times 500 = 2,500 \text{ qts}$$
2. Bushels:
 - a. Total on squares = 50 bushels
 - b. Bushels per acre on plot = 38 bushels

Table 11 (Contd.)

3. Percent surface shell = 0%.

V. PERCENT MORTALITY

1. Insufficient data.

Table 12

Summary of leased plot no. 24 in Hampton Creek, Virginia
above the I-64 bridge. Data derived from Table J, Appendix.

I. BARREN AND PRODUCTIVE AREAS

1. Total squares sampled = 10 (0.57 acres)
2. Productive squares with oysters = 0 (0.0 acres)
3. Barren squares lacking oysters = 10 (0.57 acres)
 - a. With shell only = 1 (0.06 acres)
 - b. Soft mud = 9 (0.52 acres)

II. BOTTOM TYPE (Predominant)

1. Soft soupy mud at all stations.

III. OYSTERS

1. There were no oysters taken on this lease.

IV. SHELLS

1. There was only 1 shell taken at this lease.
2. Bushels:
 - a. Total on lease <1 bushel.
 - b. Bushels per acre <1 bushel per acre.

Riparian leases 15, 19, 20, 21, 22 and 24 may be considered barren.

The value of the oysters and shell at today's wholesale market were calculated from Table 2. For oysters, the total value is \$3,681; for shell it is \$323.

In respect to the values just quoted it is important to note several points. 1) The values given are maximal and assume total harvest of the oysters. Seldom is it economically practical to harvest more than 70% of a standing crop; 2) The area is restricted; 3) Shells recovered in the study represented in the upper 2 to 3 inches of bottom.

It is concluded that only three small areas on leases 8, 14 and 18 have significant quantities of oysters.

ADDENDUM

The 1979 study agreed with the 1975 study in that both showed low oyster densities in the area. The 1975 study showed about 184 bushels of oysters in the area and only about 56% were over three inches long. The 1979 study indicated an overall density of about 616 bushels. Most of the oysters obtained in 1979 were marked-sized (over three inches). Possibly the slight increase in numbers over the five year period was due to the growth of the small oysters observed in 1975.

APPENDIX

Table A

Leased plot no. 8 above I-64 Bridge, Hampton Creek, Virginia. Data shows numbers of oysters and shells, bottom type, boxes and number of samples per 50 ft square.

Location of Sample	Live Oysters			Shells		No. Boxes	No. Samples	Bottom Type
	Large	Small	Spat	Buried	Surface			
Q47	0	0		4	0	0	2	Soft mud
Q45	0	0		3	0	0	2	Soft mud
Q47	0	0		0	0	0	1	Soft mud
Q49	0	0		0	0	0	1	Soft mud
S43	0	0		0	0	0	1	Soft mud
S45	0	0		5	0	0	2	Soft mud
S47	0	0		0	0	0	1	Soft mud
S49	0	0		0	0	0	1	Soft mud
S51	0	0		0	0	0	1	Soft mud
U41	0	0		2	0	0	2	Soft mud
U43	0	0		0	0	0	1	Soft mud
U45	0	0		3	0	0	2	Soft mud
U47	0	3		0	0	0	1	Soft mud
U49	0	0		0	0	0	1	Soft mud
U51	0	0		0	0	0	1	Soft mud
U53	0	0		0	0	0	1	Soft mud
W39	0	0		0	0	0	1	Sandy mud
W41	0	1		0	0	0	1	Sandy mud
W43	0	0		0	0	0	1	Sandy mud
W45	0	0		6	0	0	2	Sandy mud
W47	8	0		(1 qt)	(1 qt)	0	2	Sandy mud
W49	0	0		4	0	0	2	Sandy mud
W51	0	0		0	0	0	1	Sandy mud
W53	0	0		0	0	0	1	Sandy mud
W55	0	0		6	0	0	2	Sandy mud
Y39	0	1		(2 qts)	(2 qts)	3	2	Sandy mud
Y41	4	1		0	0	0	2	Sandy mud
Y43	0	1		3	0	0	2	Sandy mud

No 1978 Spat

Table A, (Contd.)

Location of Sample	Live Oysters			Shells		No. Boxes	No. Samples	Bottom Type
	Large	Small	Spat	Buried	Surface			
Y45	0	0		4	0	0	2	Sandy mud
Y47	0	0		7	0	0	2	Sandy mud
Y49	0	1		0	0	0	2	Sandy mud
Y51	0	0		0	0	0	1	Sandy mud
Y53	0	0		6	0	0	2	Sandy mud
Y55	5	0		2	0	0	2	Sandy mud
Y57	0	0		5	0	0	2	Sandy mud
Z39	3	0		0	0	0	2	Sandy mud
Z41	6	0		0	(1 qt)	0	2	Sandy mud
Z43	11	0		0	0	0	2	Sandy mud
Z45	0	0		0	0	0	1	Sandy mud
Z47	2	0		0	(2 qts)	0	2	Sandy mud
Z49	1	0		0	0	0	2	Sandy mud
Z51	0	0		0	0	0	1	Sandy mud
Z53	0	0		0	7	0	2	Sandy mud
Z55	0	0		0	7	0	2	Sandy mud
Z57	0	0		2	0	0	2	Sandy mud
Z59	0	0		2	0	0	2	Sandy mud
Totals	40	8	0	7.9 qts	7 qts	3		

No 1978 Spat

4
1/2

Table B

Small corridor of bottom between I-64 and the railroad bridge (a part of leased plot no. 8). Data shows numbers of oysters and shells, bottom type, boxes and number of samples per 50 ft square.

Location of Sample	Live Oysters			Shell		No. Boxes	No. Samples	Bottom Type
	Large	Small	Spat	Buried	Surface			
CC37	0	0		0	0	0	1	Soft mud
CC39	0	0		0	0	0	1	Soft mud
CC41	0	0		0	0	0	2	Sandy mud
CC43	5	0		0	0	0	2	Sandy mud
CC45	0	0		3	3	0	2	Sandy mud
CC47	0	0		4	16	1	2	Sandy mud
CC49	0	0		1	4	0	2	Sandy mud
CC51	3	0	No 1978 Spat	0	8	0	2	Sandy mud
CC53	9	6		4	20	1	2	Sandy mud
CC55	0	0		0	0	0	1	Sandy mud
CC57	0	0		1	2	0	2	Sandy mud
CC59	0	0		2	0	0	2	Sandy mud
CC61	0	0		0	0	0	1	Sandy mud
CC63	0	0		0	0	0	1	Sandy mud
CC65	0	0		0	0	0	1	Sandy mud
CC67	0	0		0	0	0	1	Soft mud
Total	17	6		0	(1.2 qts)	(4.1 qts)	2	

Table C

Leased plot no. 8, below I-64 bridge, Hampton Creek, Virginia. Data shows numbers of oysters and shells, bottom type, boxes and number of samples per 50 ft square.

Location of Sample	Live Oysters			Shells		No. Boxes	No. Samples	Bottom Type	
	Large	Small	Spat	Buried	Surface				
GG55	0	0		0	0	0	1	Mud	
GG57	0	0		1	0	0	2	Mud	
GG59	0	0		6	0	0	2	Mud	
GG61	0	0		0	0	0	1	Mud	
GG63	0	0		0	0	0	1	Mud	
GG65	0	0		0	0	0	1	Mud	
GG67	0	0		5	2	2	2	Mud	
GG69	0	0		0	0	0	1	Mud	
II57	0	0		0	0	0	1	Mud	
II59	0	0		0	0	0	1	Mud	
II61	0	0		3	0	0	2	Mud	
II63	0	0		4	0	0	2	Mud	
II65	0	0		0	0	0	1	Mud	
II67	0	0		0	0	0	1	Mud	
II69	0	0		0	0	0	1	Mud	
KK57	0	0	No. 1978 Spat	0	0	0	1	Mud	
KK59	0	0		0	0	0	1	Mud	
KK61	0	0		0	0	0	1	Mud	
KK63	0	0		7	0	0	2	Sandy Mud	
KK65	0	0		2	0	0	2	Mud	
KK67	0	0		0	0	0	1	Mud	
KK69	0	0		1	0	0	2	Mud	
MM59	0	0		0	0	0	1	Mud	
MM61	0	0		0	0	0	1	Mud	
MM63	8	0			(1 qt)	($\frac{1}{2}$ qt)	3	2	Mud
MM65	13	7			(1 qt)	(3 qts)	3	2	Sandy mud
MM67	15	6			(2 qts)	(3 qts)	1	2	Sandy mud
MM69	0	0			0	0	0	1	Sandy mud
0059	0	0			0	0	0	1	Mud
0061	0	0			0	0	0	1	Mud
0063	10	0		(2 qts)	0	2	2	Mud	
0065	0	0		10	0	0	2	Mud	
0067	0	0		4	0	0	2	Mud	
0069	0	0		0	0	0	1	Mud	

Table C, Contd.

Location of Sample	Live Oysters			Shells		No. Boxes	No. Samples	Bottom Type
	Large	Small	Spat	Buried	Surface			
QQ59	0	0		0	0	0	1	Mud
QQ61	0	0		6	0	0	1	Mud
QQ63	4	0		(5 qts)	0	2	2	Shelly
QQ65	0	0		5	0	0	2	Mud-shell
SS61	0	0		0	0	0	1	Mud
SS63	12	0		(1 qt)	(7 qts)	6	2	Shelly
SS65	2	0		3	4	0	2	Mud-shell
SS67	10	0		(2½ qts)	(½ qt)	1	2	Shell-mud
UU61	0	0		0	0	0	0	Mud
UU63	0	0		(1½ qts)	(1½ qts)	0	2	Mud
UU65	0	0		6	0	0	2	Shell-mud
UU67	0	0		7	0	0	1	Shell-mud
WW63	0	0		0	0	0	1	Mud
WW65	0	0		3	0	0	2	Mud
WW67	0	0	No 1978 Spat	(1½ qts)	(1½ qts)	0	2	Shelly
YY63	0	0		0	0	0	1	Mud
YY65	0	0		0	0	0	1	Mud
YY67	0	0		0	0	0	1	Mud
YY69	0	0		0	0	0	1	Mud
ZZ69	0	0		2	0	0	2	Mud
ZZ67	2	0		(1 qt)	(1 qt)	0	2	Shelly
ZZ65	7	0		(½ qt)	(2½ qts)	0	2	Shelly
A65	0	0		0	0	0	1	Mud
A67	0	0		0	0	0	1	Mud
C65	0	0	0	0	0	1	Mud	
C67	0	0	0	0	0	1	Mud	
C69	10	0	(3 qts)	(1 qt)	2	2	Shelly	
E65	0	0	0	0	0	1	Mud	
E67	0	0	0	0	0	1	Mud	
E69	0	0	0	0	0	1	Mud	
Total	93	13	0	(27.8 qts)	(22.0 qts)	22		

Table D

Leased plot no. 14 below I-64 bridge, Hampton Creek, Virginia. Data shows numbers of oysters and shell, number of boxes and number of samples per 50 ft square.

<u>Location of Sample</u>	<u>Live Oysters</u>			<u>Shell</u>		<u>No. Boxes</u>	<u>No. Samples</u>	<u>Bottom Type</u>
	<u>Large</u>	<u>Small</u>	<u>Spat</u>	<u>Buried</u>	<u>Surface</u>			
YY71	0	0	0	0	0	0	1	Soft mud
YY73	0	0	0	0	0	0	1	Soft mud
A69	1	0	0	4	0	0	2	Soft mud
A71	0	0	0	0	0	0	0	Soft mud
A73	0	0	0	0	0	0	1	Soft mud
C71	12	0	0	(1 qt)	(5 qts)	3	0	Soft mud
C73	0	0	0	0	0	0	1	Soft mud
C69	10	0	0	(3 qts)	(3 qts)	2	2	Soft mud
E71	0	0	0	0	0	0	0	Soft mud
E73	0	0	0	4	0	0	2	Soft mud
E74	3	0	0	(1 qt)	(1 qt)	0	2	Soft mud
Total	26	0	0	(5.5 qts)	(9 qts)	5		

Table E

Leased plot no. 15 below I-64 bridge, Hampton Creek, Virginia. Data shows numbers of oysters and shells, number of boxes and number of samples per 50 ft square.

<u>Location of Sample</u>	<u>Live Oysters</u>			<u>Shell</u>		<u>No. Boxes</u>	<u>No. Samples</u>	<u>Bottom Type</u>
	<u>Large</u>	<u>Small</u>	<u>Spat</u>	<u>Buried</u>	<u>Surface</u>			
QQ69							1	
QQ71							1	
SS69				8			2	
SS71							1	
UU69	None	None	None	4	None	None	2	ALL SOFT MUD
UU71	None	None	None				1	
UU73	None	None	None				1	
WW71							1	
WW73							1	
WW69				4				
Total	0	0	0	(1 qt)	0	0		

Table F

Leased plot no. 17, Hampton, Virginia. Data shows numbers of oysters and shells, bottom type, boxes and number of samples per 50 ft square.

Location of Sample	Live Oysters			Shell		No. Boxes	No. Samples	Bottom Type
	Large	Small	Spat	Surface	Buried			
GG37	0	0		2	0	0	2	Mud
GG39	0	0		2	4	0	2	Mud
GG41	0	0		(2 qts)	(1 qt)	0	2	Sandy mud
GG43	1	1		0	0	0	2	Mud
GG45	0	0		0	0	0	1	Mud
GG47	0	0		0	0	0	1	Mud
GG49	0	0		0	0	0	1	Mud
GG51	0	0		1	0	0	2	Mud
GG53	0	0		0	0	0	1	Mud
II39	0	0		0	0	0	1	Mud
II41	0	0		Sunken boat here		0	1	Mud
II45	0	0		0	0	0	1	Mud
II47	0	0		0	0	0	1	Mud
II49	0	0		0	0	0	2	Mud
II51	0	0		0	0	0	1	Mud
II53	0	0		0	0	0	1	Mud
II55	0	0		0	0	0	1	Mud
KK39	0	0		0	0	0	1	Mud
KK47	0	0		0	0	0	1	Mud
KK49	0	0		0	0	0	1	Mud
KK51	0	0		0	0	0	1	Mud
MM47	0	0		0	0	0	2	Mud
MM49	0	0		0	0	0	1	Mud
MM51	0	0		0	0	0	1	Mud
OO49	0	0		0	0	0	1	Mud
OO51	0	0		0	0	0	1	Mud
QQ47	0	0		0	0	0	2	Mud
QQ49	0	0		0	0	0	1	Mud
QQ51	0	0		0	0	0	1	Mud
QQ53	0	0		0	0	0	2	Mud

No 1978 Spat

Table F, Contd.

Location of Sample	Live Oysters			Shell		No. Boxes	No. Samples	Bottom Type
	Large	Small	Spat	Surface	Buried			
SS45	0	0		0	1	0	2	Mud
SS47	0	0		0	0	0	1	Mud
SS49	0	0		0	3	0	2	Mud
SS51	0	0		0	0	0	1	Mud
SS53	0	0		0	0	0	2	Mud
UU45	0	0		0	0	0	1	Mud
UU49	0	0		0	0	0	1	Mud
UU51	0	0		0	0	0	1	Mud
UU53	0	0		0	0	0	1	Mud
WW45	0	0		0	0	0	1	Mud
WW47	0	0		0	1	0	1	Mud
WW49	0	0		0	0	0	1	Mud
WW51	0	0		0	0	0	1	Mud
WW53	0	0		0	0	0	1	Mud
YY47	0	0		0	0	0	1	Mud
YY49	0	0		0	0	0	1	Mud
YY51	0	0		0	0	0	1	Mud
YY53	0	0		0	0	0	1	Mud
YY55	0	0		0	0	0	1	Mud
A49	0	0		0	0	0	1	Mud
A51	0	0		0	0	0	1	Mud
A53	0	0		0	0	0	1	Mud
A55	0	0		0	0	0	1	Mud
C49	0	0		0	0	0	1	Mud
C51	0	0		0	0	0	1	Mud
C53	0	0		0	0	0	1	Mud
C55	0	0		0	0	0	1	Mud
E49	0	0		0	0	0	1	Mud
E51	0	0		0	0	0	1	Mud
E53	0	0		0	0	0	1	Mud
E55	0	0		0	0	0	1	Mud
Total	1	0	0	2.4	2.4	0		

No 1978 Spat

Table G

Leased plot no. 18, Hampton Creek, Virginia. The data shows numbers of oysters and shells, bottom type, boxes, and number of samples per 50 ft square.

Location of Sample	Live Oysters			Shell		No. Boxes	No. Samples	Bottom Type	
	Large	Small	Spat	Buried	Surface				
WW43	10	6	No 1978 Spat	($\frac{1}{2}$ qt)	($1\frac{1}{2}$ qts)	3	2	Shelly	
YY44	10	8		($\frac{1}{2}$ qt)	($1\frac{1}{2}$ qts)	4	2	Shelly	
A43	16	0		($\frac{1}{2}$ qt)	($3\frac{1}{2}$ qts)	1	2	Shelly	
C43	18	0		($\frac{1}{2}$ qt)	($1\frac{1}{2}$ qts)	1	2	Shelly	
E43	9	0		($\frac{1}{2}$ qt)	($1\frac{1}{2}$ qts)	2	2	Shelly	
YY43	0	0		0	0	0	1	Mud	
WW43	0	0		0	0	0	1	Mud	
A45	0	0		0	0	0	1	Mud	
C45	0	0		0	0	0	1	Mud	
E45	0	0		0	0	0	1	Mud	
H45	0	0		0	0	0	1	Mud	
C47	0	0		0	0	0	1	Mud	
E47	0	0		0	0	0	1	Mud	
Total	63	14		0	$2\frac{1}{2}$ qts	$9\frac{1}{2}$ qts	11		

Table H

Riparian tracts 19, 20, 21 and 22 (50 x 50), Hampton, Virginia, below the I-64 bridge. Data shows numbers of oysters, shell, bottom type, boxes and number of samples per 50 ft square.

Location of Sample	Riparian Tract 22			No. Boxes	No. Samples	Bottom Type	
	Live Oysters		Shell				
	Large	Small	Surface Buried				
SS33					1	Mud	
QQ35					1	Mud	
0037	Nothing but mud at all stations				1	Mud	
MM39					1	Mud	
KK41					1	Mud	
II43					1	Mud	
Riparian Tract 21							
SS35	0				0	1	Mud
QQ37	0				0	1	Mud
MM41	0	None	None	None	0	1	Mud
0041	1	None	None	None	5	2	Mud
KK43	0	None	None	None	0	1	Mud
MM43	0				0	1	Mud
KK45	0				0	1	Mud
Total	1	0	0	0	5	0	
Riparian Tract 20							
SS39	0			0		1	Mud
UU37	0			0		1	Mud
QQ39	0	None	None	0	None	1	Mud
QQ41	0	None	None	0	None	1	Mud
MM45	1	None	None	2	None	2	Mud
0043	0			0		1	Mud
0045	0			0		1	Mud
Total	1	0	0	2	0	0	

Table H, Contd.

<u>Location of Sample</u>	Riparian Tract 19						<u>Bottom Type</u>						
	<u>Live Oysters</u>			<u>Shell</u>		<u>No. Boxes</u>		<u>No. Samples</u>					
	<u>Large</u>	<u>Small</u>	<u>Spat</u>	<u>Surface</u>	<u>Buried</u>								
VV39					0		1	Mud					
SS41					0		1	Mud					
VV41					3		2	Mud					
QQ43	None	None	None	None	5	None	2	Mud					
SS43					1		2	Mud					
UU43					0		1	Mud					
QQ45					3		2	Mud					
OO47					0		1	Mud					
Total					0		0	0	0	1 qt	0		

Table I

Leased plot no. 23, Hampton Creek, Virginia. Data shows numbers of oysters and shell, bottom type, boxes and number of samples per 50 ft square.

Location of Sample	Live Oysters			Shell		No. Boxes	No. Samples	Bottom Type
	Large	Small	Spat	Buried	Surface			
YY39	0	0		3	0	0	2	Soft mud
A37	0	0		0	0	0	1	Soft mud
A39	0	0		0	0	0	2	Soft mud
A41	0	0		0	0	0	2	Soft mud
C33	0	0		0	0	0	1	Soft mud
C35	0	0		0	0	0	1	Soft mud
C37	0	0		0	0	0	1	Soft mud
C39	0	0		1	0	0	2	Soft mud
C41	0	0		5	0	0	2	Soft mud
E31	0	0		3	0	0	2	Soft mud
E33	0	0	No 1978 Spat	0	0	0	1	Soft mud
E35	0	0		0	0	0	1	Soft mud
E37	0	0		0	0	0	1	Soft mud
E39	1	0		(3 qts)	0	0	2	Soft mud
G31	0	0		0	0	0	1	Soft mud
G33	0	0		0	0	0	1	Soft mud
G35	0	0		0	0	0	1	Soft mud
G37	0	0		0	0	0	1	Soft mud
G39	1	0		11	0	0	2	Soft mud
I33	0	0		0	0	0	1	Soft mud
I35	0	0	0	0	0	1	Soft mud	
I37	0	0	0	0	0	1	Soft mud	
K35	0	0	0	0	0	1	Soft mud	
Total	2	0	0	5 qts	0	0		

Table J

Leased plot no. 24, Hampton Creek, Virginia. Data shows numbers of oysters and shells, bottom type, boxes, number of samples per 50 ft square.

<u>Location of Sample</u>	<u>Live Oysters</u>			<u>Shell</u>		<u>No. Boxes</u>	<u>No. Samples</u>	<u>Bottom Type</u>
	<u>Large</u>	<u>Small</u>	<u>Spat</u>	<u>Buried</u>	<u>Surface</u>			
VV35	0	0		0	0	0	1	
VV37	0	0		0	0	0	2	
WW33	0	0		0	0	0	1	
WW35	0	0		0	0	0	1	
WW37	0	0		0	0	0	2	
YY33	0	0		0	0	0	1	
YY35	0	0		0	0	0	1	
YY37	0	0		1	0	0	2	
A33	0	0		0	0	0	1	
A35	0	0		0	0	0	1	
Total	0	0	0	1	0	0		