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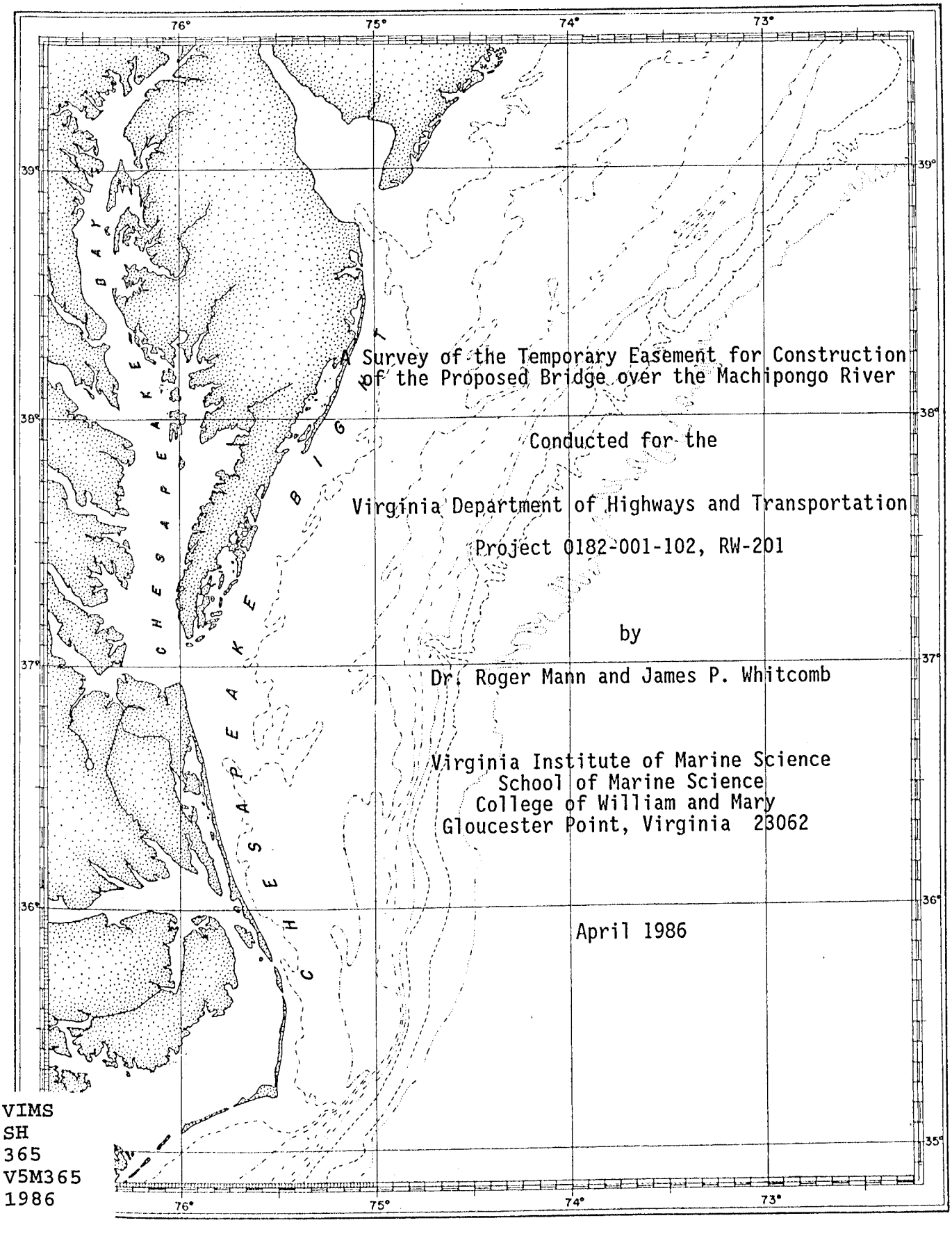

A Survey of the Temporary Easement for Construction of the Proposed Bridge over the Machipongo River

Conducted for the

Virginia Department of Highways and Transportation

Project 0182-001-102, RW-201

by

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INTRODUCTION

Background

On April 23 and 24, 1986 a survey was conducted by the Virginia Institute of Marine Science (VIMS) on the temporary easement (3.248 acres) for the construction of the proposed bridge over the Machipongo River in Accomack County, Virginia (Figure 1). The study was done at the request of the Virginia Department of Highways and Transportation, Suffolk, Virginia for Project 0182-001-102, RW-201.

The objective of this study was to determine the extent and value of the molluscan resource in the temporary easement.

Description of the Area

The Route 182 bridge over the Great Machipongo River is located in an oyster seed rock area. This area is characterized by maintained intertidal seed rocks. The oysters set in a zone 1.5 to 3.0 feet above low water (Loosanoff, 1931). The seed growths are discrete areas visible at low water and are surrounded by sandy-mud or mud bottom. On the margins of the seed growths and on the oyster bottoms hard clams set and survive. This means the salinity does not fall below 10 $^{o}/oo$ except for short periods of time.

The oyster seed growths are dense and are harvested by hand at low water. The oyster seed are the primary resource and the hard clams are a secondary resource. There is not a commercial fishery for hard clams in this area.

None of the intertidal seed growths lie within the temporary easement for construction activity. Therefore, the shellfish resource within the construction area consists of hard clams.

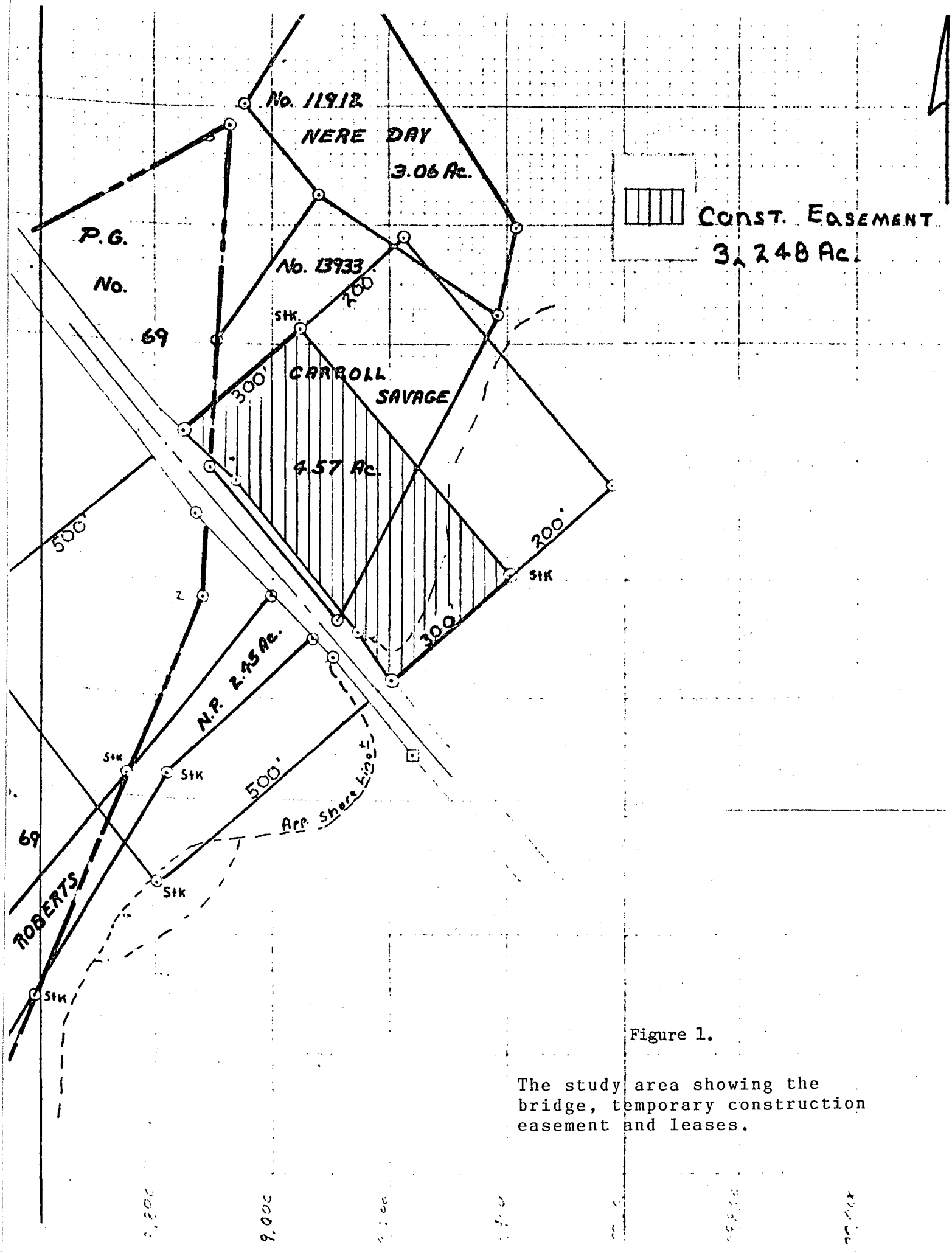


Figure 1.

The study area showing the bridge, temporary construction easement and leases.

METHODS

The construction area was the temporary easement for construction which was located on the north side of the bridge and extended upstream three hundred (300) feet from the center line of the bridge. On the north side of the bridge the study area was extended to five hundred (500) feet upstream of the margin of the bridge. Downstream the study area was extended five hundred (500) feet from the center line of the bridge. The leased areas either side of the bridge were platted by the Marine Resource Commission Engineering Section (see Fig. 1).

Working from surveyed stakes established by the Marine Resource Commission and buoys, the study area was marked off into a grid with one hundred (100) foot segments. The sampling devices consisted of a pair of eighteen (18) foot shaft tongs bridled so that they would open exactly three feet, and equipment necessary to take a hand sample of a measured area on the intertidal oyster growths. The bottom profile was recorded with a portable fathometer that produced a paper record of the bottom features (see Figs. 2a, b, c and d).

The hand tongs had teeth two inches in length and measured twenty-four inches across the head. Each sample covered six square feet of the bottom and the head was worked into the bottom far enough to sample the hard clams. On locations where the depth exceeded the lengths of the shaft tongs it was assumed that construction activity would have no impact upon on the shellfish resource.

The contents of each grab was examined and the following data recorded:

1) number of clams collected in each grab;

2) bottom type - mud, sand, shell or rocks;

3) number of oysters in each grab;

4) number of clam or oyster shells;

5) number of boxes; and

6) depth of the water.

All of the clams and oysters were retained for examination and the lengths were measured to the nearest tenth of one millimeter.

RESULTS

Fathometer Traces

Transect I is fifty feet upstream of the bridge while Transect II is two hundred and seventy feet upstream of the bridge. Within one hundred feet of the upriver boundary of the study area there are additional intertidal seed oyster growths. The deepest water upstream is in the channel adjacent to the fenders.

Transect III is fifty feet downstream of the bridge while Transect IV is two hundred feet downstream of the bridge. The deepest water downstream is on either side of the intertidal seed oyster growth which occurs on Hurley Roberts lease. See Fig. 3.

Numbers and Value of Clams on Carroll Savage Lease

Within the temporary easement Savage's lease totals 2.03 acres. Eighty-nine and three-tenths (89.3) percent of the clams are over 2 3/4" in length and the market value is 4 cents per clam. The remaining clams have a market value of 9 cents per clam. The total value of the clams on this portion of Savage's lease is five hundred and one dollars and twenty-five cents (501.25) (see Table 1 for data and calculations).

Outside the construction easement but within the area of study Savage's lease totals 1.40 acres and the clams are more dense, particularly on the margins of the study area. The value of clams in this portion of Savage's lease is eight hundred and fifty-six dollars and three cents (856.03) (see Table 2 for data and calculations).

Number and Value of Seed Oysters on Hurley Roberts Lease

The intertidal growth of seed oysters between one hundred and two hundred feet below the bridge on Hurley Roberts lease measures 2484 feet^2. Mr. Roberts has sold seed oysters within the past twelve months for one dollar per bushel on site. The growth contained an estimated two hundred and ninety-five and forty-nine hundredths bushels. The value of these seed oysters is two hundred and ninety-five dollars and forty-nine cents (295.49) (see Table 3 for data and calculations).

Number and Value of Clams on Hurley Roberts Lease

The numbers of clams on Hurley Roberts lease within the study area based upon sampling on the lease and the surrounding unassigned bottom is two thousand-three hundred and ninety-six (2396) clams. The total value of the clams is one hundred and eight dollars and sixty-five cents (108.65) (see Table 4 for data and calculations).

DISCUSSION

The study area was enlarged beyond the construction easement to accommodate any potential for damage to shellfish due to a flume (of sedimentation) produced by construction activity. Subsequent evaluation by VIMS staff members was that the sedimentation would damage neither hard clams nor the oyster seed growth on adjacent maintained rocks. Therefore, the potential for damage would be confined to wheel damage within the construction easement. The total value of clams within the 2.03 acres of Savage's lease contained within the construction easement is five hundred and one dollars and twenty-five cents (501.25). Oysters collected on two stations near the bridge in the upstream side do not, in our opinion, represent a resource. They represent an incidental occurrence related to setting on the bridge rather than the bottom. We would not place any value on such oysters on Carroll Savage's lease within the construction easement. There is no possibility of harvesting one bushel of oysters on Carroll Savage's lease within the construction area.

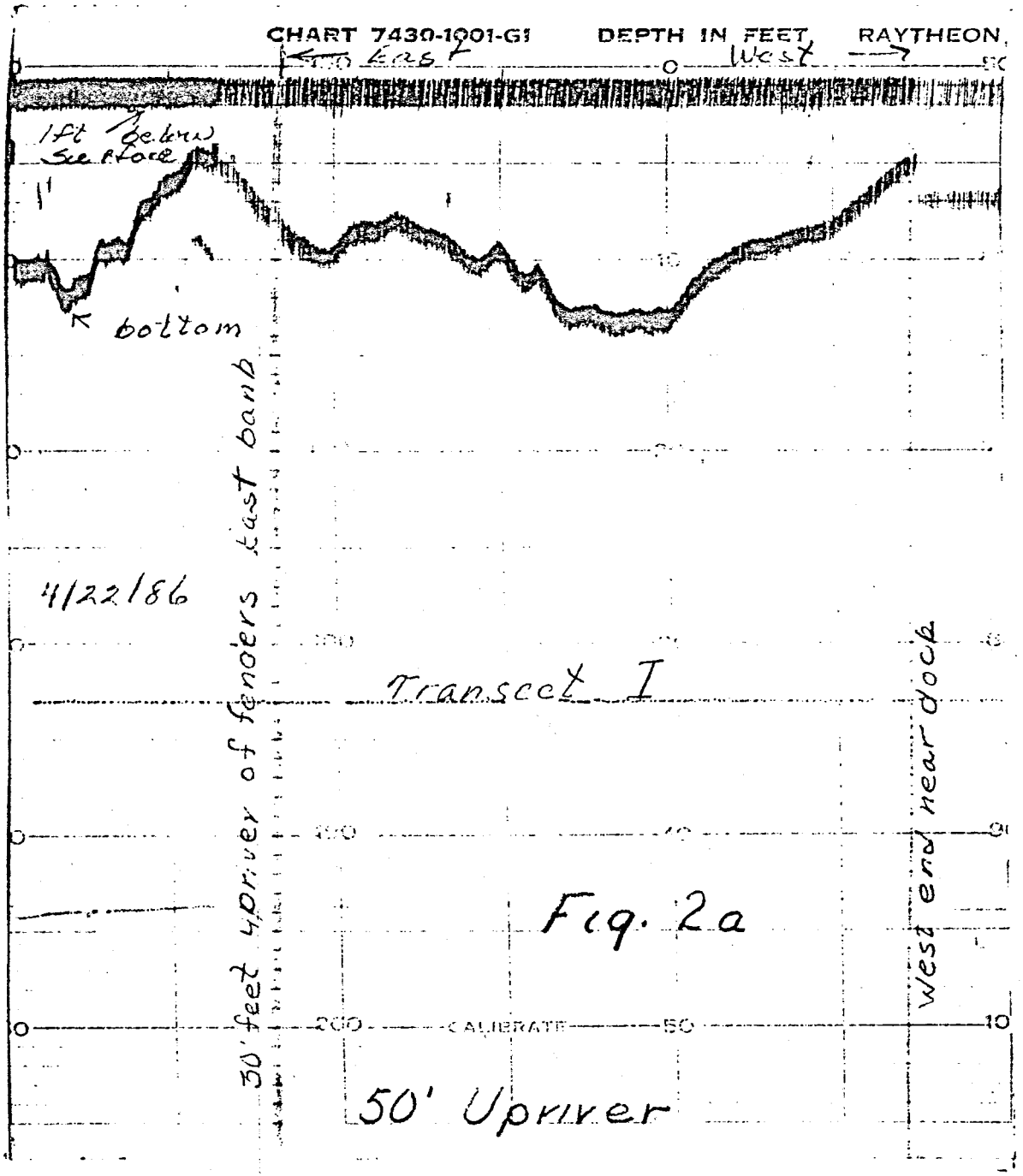
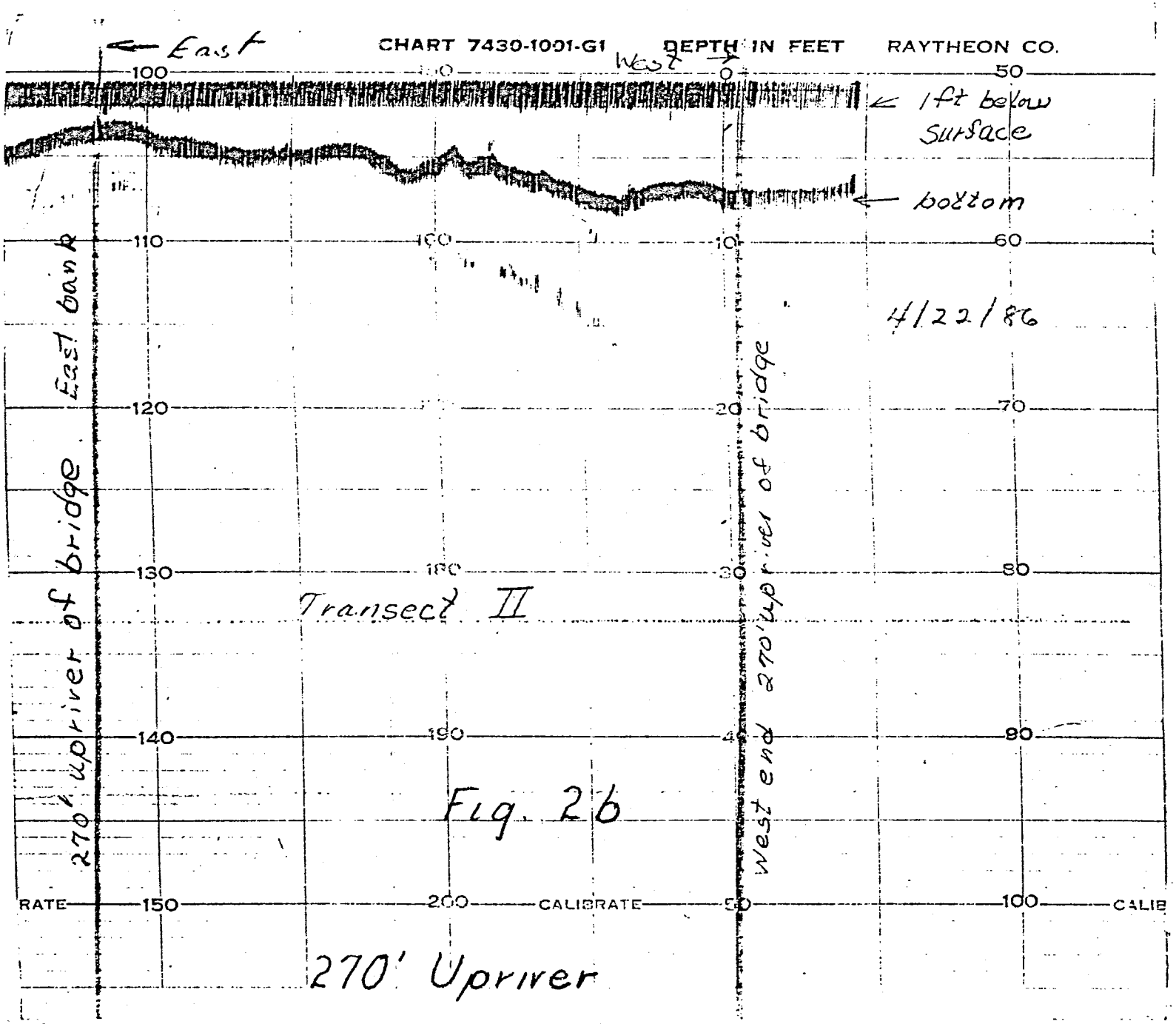


CHART 7430-1001-G1
DEPTH IN FEET
RAYTHEON
East
West
1ft below Surface
bottom
4/22/86
Transect I
30' feet upriver of fenders east bank
West end near dock
CALIBRATE
50' Upriver

Fig. 2a


East
CHART 7430-1001-G1 DEPTH IN FEET RAYTHEON CO.
West
1 ft below surface
bottom
4/22/86
East bank
270' upriver of bridge
Transect II
West end 270' upriver of bridge
Fig. 26
RATE
CALIBRATE
CALIBRATE
CALIB
270' Upriver

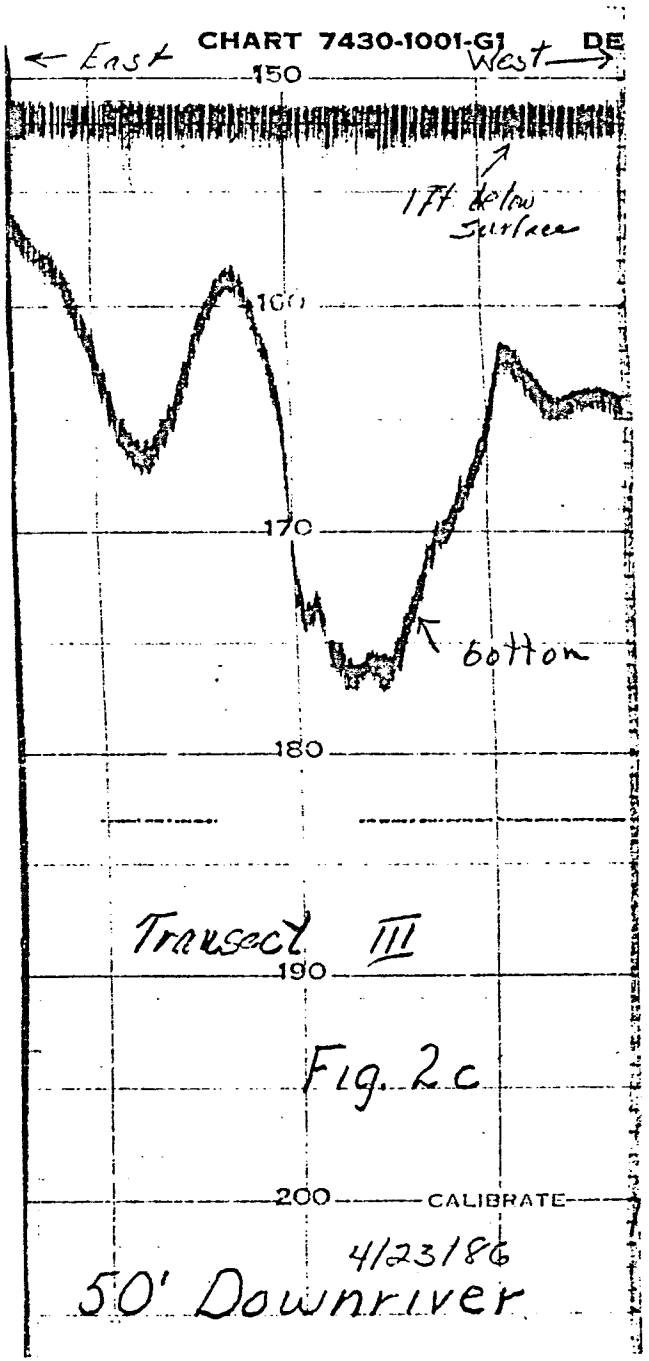
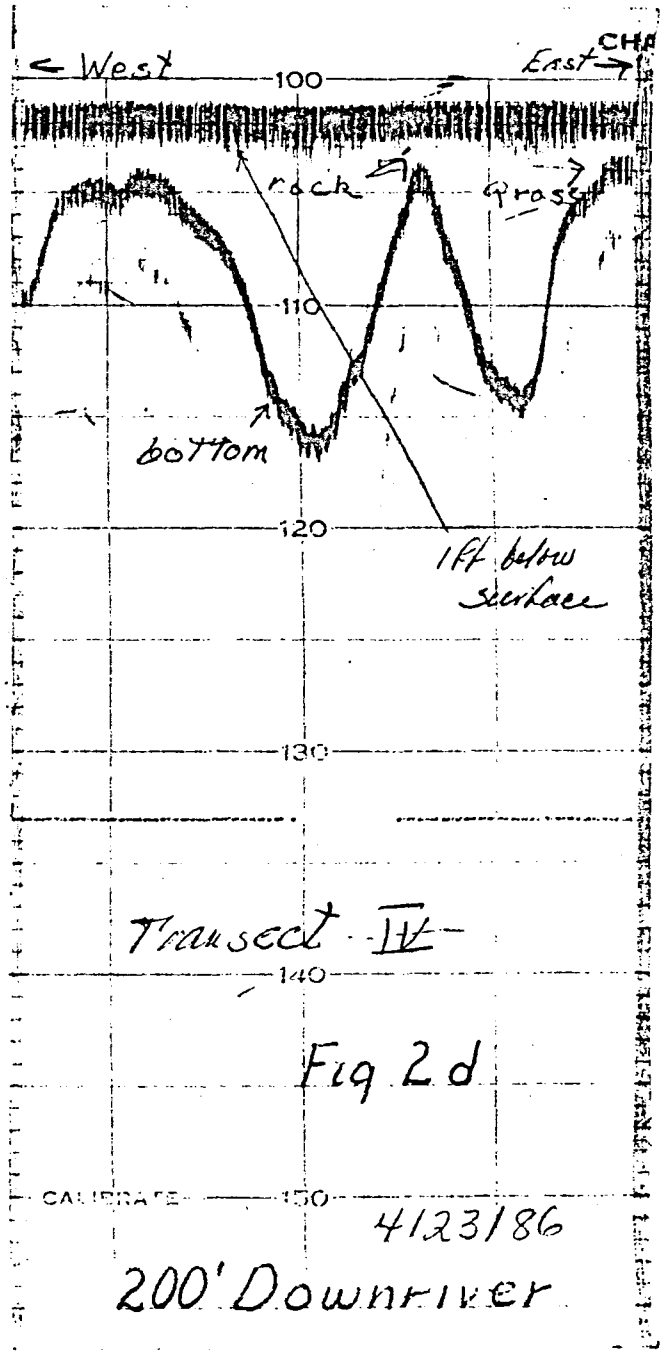


CHART 7430-1001-G1 DE
← East
West →
150
177 ft below surface
160
170
bottom
180
Transect III
190
Fig. 2c
200
CALIBRATE
4/23/86
50' Downriver


← West
East →
100
rock
grass
110
bottom
120
1ft below surface
130
Transect IV
140
Fig 2d
CALIBRATE
150
4123186
200' Downriver

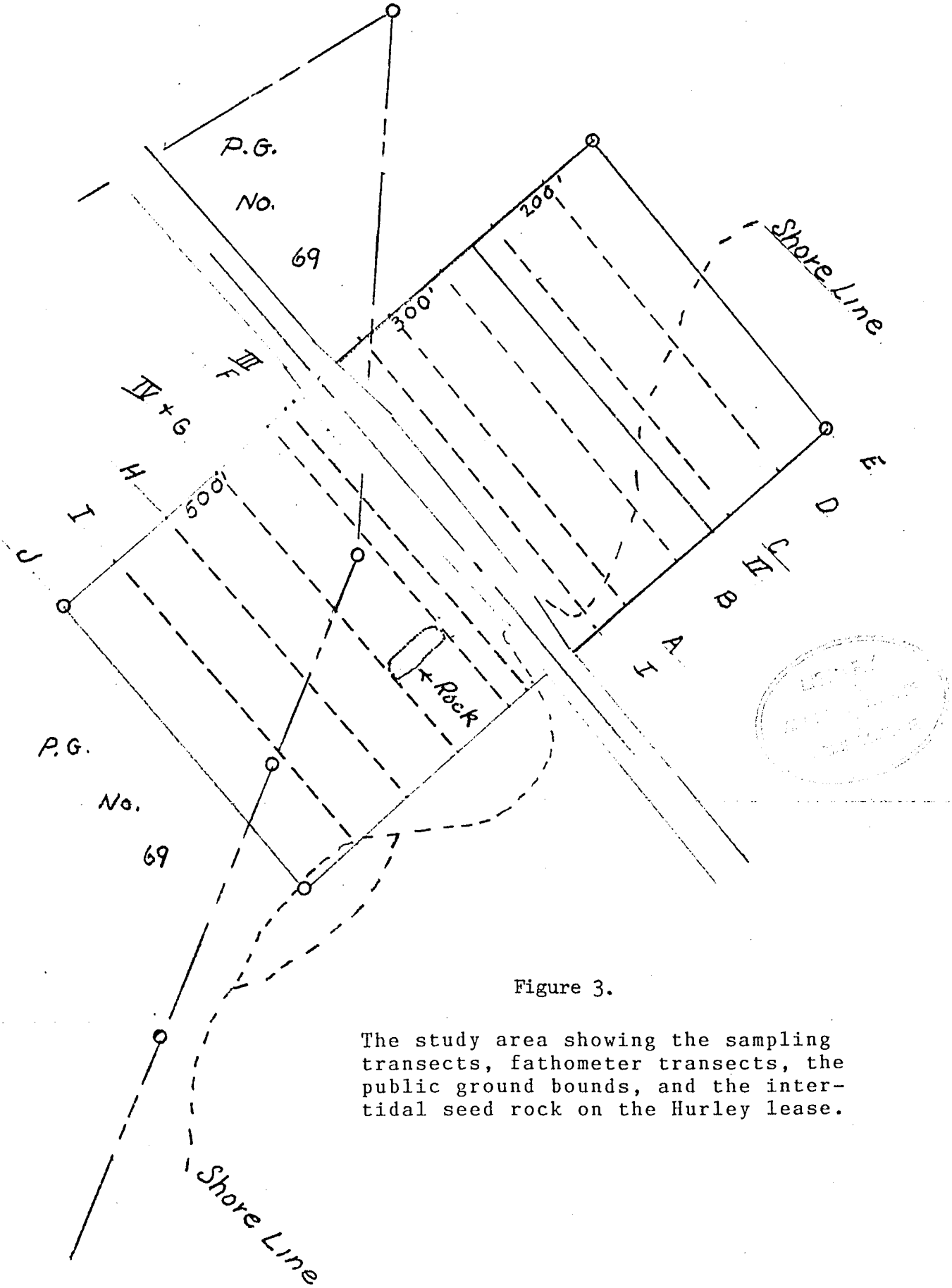


Figure 3.

The study area showing the sampling transects, fathometer transects, the public ground bounds, and the intertidal seed rock on the Hurley lease.

TABLE 1

Samples on Carroll Savage's Lease within Construction Easement.

Transect	Station	Depth in feet	No. Oysters	No. Clams	No. Shells	Qts. Shells	Substrate	Remarks
50 ft	1	7	0	1	-	2	hard sand	
Upstream	2	5	4	0	-	2/3	hard sand	1 clump small oysters
	3	9	1	3	0	-	hard sand	
	5	15	0	3	0	-	mud	
	6	3	0	0	0	-	mud	
A	1	9	0	1	2	-	mud	
	2	10	0	1	2	-	sand-mud	
	3	12	0	0	3	-	hard sand	
	4	14	0	2	2	-	hard sand	
	5	10	0	0	0	-	hard sand, rocks	
B	1	4 1/2	0	1	0	-	hard sand	
	2	8	0	0	-	1	hard sand	
	3	10	0	0	3	-	hard sand	
	4	11	0	0	2	-	sand, shell	
	5	6 1/2	0	1	0	-	hard sand	
C	1	9	0	1	2	-	hard sand	
	2	9	0	0	1	-	hard sand	
	3	8	0	0	0	-	hard sand	
	4	6	0	1	0	-	sand	
	5	5	0	0	0	-	sand-mud	

Value of resource

Area of tongs 6 ft^2

No. of clams 15

No. of samples 20

Area of subsection 2.03 acres

Price of clams

Over 2 3/4" = 4¢ each

Under 2 3/4" = 9¢ each

Calculations:

15 clams / (6 ft^2 x 20 samples) x 2.03 acres x 43,560 ft^2 = 11,053 clams

Over 2 3/4" [0.893 x 11,053 clams x 0.04] = $394.81

Under 2 3/4" [0.107 x 11,053 clams x 0.09] = 106.44

Total $501.25

TABLE 2

Samples on Carroll Savage's lease Outside Construction Easement.

Transect	Station	Depth in feet	No. Oysters	No. Clams	No. Shells	Qts. Shells	Substrate	Remarks
D	1	8	0	1	2	-	sand	
	2	9	0	1	2	-	sand	
	3	6	0	0	1	-	sand	
	4	4	0	4	0	-	mud	
E	1	11	0	1	0	-	hard sand	
	2	4	0	1	0	-	mud	
	3	5	0	5	0	-	soft mud	

Value of resource
Area of tongs 6 ft^2
No. of clams 13
No. of samples 7
Area of subsection 1.4 acres
Calculations:

Price of clams
Over 2 3/4" = 4¢ each
Under 2 3/4" = 9¢ each

13 clams / (6 ft^2 x 7 samples) x 1.4 acres x 43560 ft^2 = 18,876 clams

Over 2 3/4" [0.893 x 18,876 clams x 0.04] = $674.25
Unver 2 3/4" [0.107 x 18,876 clams x 0.09] = 181.78

Total $856.03

TABLE 3

Sample of Seed Oysters on Hurley Roberts' Lease

Dimension of Growth 69' x 36'
Area 2484 ft^2
Sample size 2.69 ft^2
No. of oysters 128 including spat
Vol. of sample 16 quarts

Value of Resource
Total volume of growth 295.49 bushels
Price 1.00/bushel
Calculations:

[(69 ft x 36 ft) / 2.69 ft^2 x 16 qts.] / 50 qts = 295.49 bushels x 1.00 each = $295.49

TABLE 4

Samples on Hurley Roberts Lease and Unassigned Bottom.

Transect	Station	Depth in feet	No. Oysters	No. Clams	No. Shells	Qts. Shells	Substrate	Remarks
F	3	10	0	0	small frags.	-	hard sand	fragments of shells
	5	7	0	1	-	3	edge of rock	fragments of shells
G	4	14	0	0	2	-	hard sand	
	5	4	-	0	-	-	seed rock	see Table 3
H	5	6 1/2	0	0	-	1	hard sand	
I	5	8	0	2	4 frags.	-	hard sand	fragments of shells
J	5	6	0	0	-	1	sticky mud	

Value of resource
Area of tongs 6 ft^2
No. of clams 3
No. of samples 7
Area of sub section 0.77 acres
Calculations:

Price of clams
Over 2 3/4" = 4¢ each
Under 2 3/4" = 9¢ each

3 clams / (6 ft^2 x 7 samples) x 0.77 acres x 43560 ft^2 = 2396 clams

Over 2 3/4" [0.893 x 2396 x 0.04] = $85.58
Under 2 3/4" [0.107 x 2396 x 0.09] = 23.07

Total $108.65

TABLE 5

Composition of Clams Collected in Big Machipongo River Study.

4/23/86

Lengths in mm

76.8	79.0	74.9
62.5	79.4	76.2
89.2	62.8	74.0
75.8	73.4	70.2
77.2	79.0	77.0
77.8	75.0	80.8
67.2	73.8	77.3
69.0	78.2	87.2
79.2	74.8	74.3
74.8	79.5	70.5
79.5	70.8	83.2
71.5	77.2	78.5
79.3	76.3	70.3
77.8	74.8	
82.0	77.3	N = 75
73.2	74.0	
78.0	76.2	Over 2 3/4" 89.3%
78.3	70.5	Under 2 3/4" 10.7%
73.2	80.4	No evidence of mortalities.
71.4	71.0	Sampling gear: Hand tongs
82.5	87.8	
81.8	74.4	
82.6	67.8	
69.5	79.0	
75.4	71.6	
76.8	68.5	
78.0	68.6	
72.3	86.3	
70.8	70.0	
78.5	82.8	
75.5	86.4	

TABLE 6

Composition of Oysters Collected on Hurley Roberts Seed Oyster Growth.

4/23/86

Lengths in mm

80.0	57.2	69.0	85.3	13.4
77.2	39.0	52.3	67.0	14.2
35.0	39.2	52.5	61.5	17.0
54.2	57.2	54.0	85.0	11.3
60.5	62.3	29.8	88.2	
75.0	79.0	24.2	36.3	30 boxes
48.0	55.2	27.8	73.8	1 gaper
69.8	38.3	29.0	66.0	4 spat
94.5	54.2	34.2	57.2	
69.0	54.0	44.2	87.3	
64.5	47.2	60.5	45.0	N = 128
41.0	69.3	52.3	52.3	Vol. 16 qts.
78.8	68.0	52.0	80.8	Sampled by hand.
67.3	46.5	65.5	66.2	
76.8	68.8	31.3	83.2	
71.0	43.6	39.0	64.8	
47.8	46.0	36.2	59.3	
32.7	58.2	49.0	77.8	
61.0	77.2	45.2	72.4	
73.2	83.8	74.5	66.3	
64.0	77.0	65.2	48.2	
57.2	43.2	38.8	34.8	
48.5	80.8	18.4	54.2	
46.8	72.4	91.3	64.3	
81.0	90.2	64.8	38.4	
80.8	36.5	70.2	85.3	
43.6	50.5	54.3	73.0	
47.0	57.0	82.4	69.8	
34.8	86.0	54.2	61.2	
74.0	75.2	47.8	39.3	
54.2	46.0	96.2	51.0	