4-1974

Survey of cultchless spat planted by the VMRC in Nomini and lower Machodoc Creek

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by

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INTRODUCTION

As part of a major repletion activity by the VMRC, cultchless spat were planted in Lower Machodoc Creek and Nomini Creek in October and November 1973. The Virginia Institute of Marine Science surveyed these plantings on 10 and 11 December, 1973. The areas planted and surveyed are shown in figures 1 and 2.

In Lower Machodoc Creek, 5.35 acres were planted with 240.5 bushels of cultchless spat during October, 1973. Within this area, five sub-areas were seeded, each with about one million spat. In Nomini Creek there were two planting areas. The largest was located in Nomini Cut, and seven one acre sub-areas were delimited here; each receiving about one million spat. One area (15) was planted up-river from Nomini Cut.

Planting by VMRC

The cultchless spat was sold to the Commission by the Windmill Point Oyster Company and was planted by Commission personnel. The planting period

extended from 24 October to 31 November 1973. During planting, records were kept by the VMRC on quantity, size, counts per bushel, and density of seed planted on each sub-area. In their program (among other aspects) they recorded:

1. Location of each sub-area and the date it was seeded.
2. The numbers of bushels and counts per bushel of each "lot" of oysters planted on each sub-area. Note: From 1 to 4 "lots" of oysters were planted over a period of 2-3 days in each sub-area, (1 acre). These oyster "lots" often varied in size and quantity.

The determination of the quantity of oysters and their size (counts per bushel) planted on each sub-area was accomplished by the VMRC as follows: For each of the "lots" of oysters planted a representative sample was collected, and counts made as to numbers of oysters; 1) In a standard quart measure (Qt.); or 2) In a small plastic beaker (B). Naturally the counts per (Qt.) or (B) varied with seed size. Determinations were also made for each lot as to the number of quarts or beakers of seed oysters there were in a standard U. S. bushel. This latter measure also varied with oyster size. For example depending on the spat size it took from 22 to 24 beakers of spat to fill a bushel measure; the quart measures showed a similar variation. Therefore, the VMRC used these varying factor in calculating numbers of spat per bushel. These data showing numbers of spat per bushel and numbers planted in each sub-area are shown in Tables 1 and 2.

During planting by the VMRC each "lot" of oysters was scattered at random over the approximately 1 acre surface or each sub-area (Figures 1 and 2).

Samples Sent to VIMS

During the planting of the cultchless spat the VMRC sent samples to VIMS so that we might determine their initial size and how many were dead prior to their being placed in the water. These data form the basis of our estimate of initial size, etc. on which we estimate subsequent growth and mortalities (Tables 3, 4, 5, and 6). Unfortunately, as will be discussed later, data were not obtained on some lots.

Data obtained from these initial samples were:

1. Mean lengths of living oysters in mm
2. " " " dead oysters (boxes)* in mm
3. " " " single shells in mm
4. Length frequency data of live oysters and dead oysters which are expressed as percent of total.
5. The percent mortality - this was calculated as follows:

$$\% \text{ mortality} = \frac{\text{No. boxes} + \frac{1}{2} \text{ total no. of single shells}}{\text{No. alive} + \text{no. boxes} + \frac{1}{2} \text{ total no. single shells}}$$

The sub-areas, for which we have a complete set of samples are shown by an asterisk in Tables 1 and 2. An inspection indicates that in many instances insufficient samples were available to obtain a valid initial mean length or the length frequency of the living or dead oysters planted on each sub-plot. For example, as shown in Table 1, in Area 3 we obtained samples from only three out of four "lots" and since counts and mean size varied among the four lots, an estimate based on only three (even when weighed by numbers of bushels) would be biased.

Sufficient data were available, however, in several instances to obtain valid mean lengths and length frequency distributions.

* a "box" consists of two shells joined by their hinge

In this report (Tables 3, 4, 5, and 6) we have presented mean lengths and length frequencies vased on incomplete data but have marked them with a double asterisk (**). These data are shown only as estimates. Data not so marked is considered valid. It is on this latter information that we have based our conclusions concerning lengths.

In calculating the percent mortality of the oysters planted in Nomini and Lower Machodoc Creek were faced with the same problem as outlined for mean length and length frequencies. That is, complete data were not available for all lots. However, an inspection of mortalities of individual lots planted within the few days of each other, indicate that the variation among the lots was low. Consequently, we assume that the available data accurately affects mortality rates in the planting.

METHOD OF SAMPLING BY VIMS

The areas planted in Lower Machodoc and Nomini Creek by the VMRC in October and November 1973 were sampled by VIMS on 10 and 11 December 1973 with the assistance of VMRC personnel. Samples of the planted oysters were obtained with a "suction sampler" which collects oysters, shell and dead oysters in a mesh bag from a known area of the bottom. This apparatus collects from about .13 square feet each time it is applied to the bottom. On each of the sub-plot we took from 10 to 30 samples at random. Later on in the laboratory counts and measurements were made of all living and dead oysters. This data was used to calculate mean lengths and percent mortality;

length frequency curves were based on measures of all the living and dead oysters collected.

Lower Machodoc Creek

When the VMRC received the cultchless spat from the Windmill Point Company it contained significant numbers of dead oysters (boxes and single shells). As outlined in the introduction the percent mortality was calculated for those planted on each sub-area. This varied from 1 to 21% with an over all average of 13%. When we sampled the same sub-area in December 1973 percent mortility ranged from 5 to 39% with an overall average of 20% (Table 3). Therefore we estimate that since planting there has been a mortality of only 7% (20-13). We feel that this mortality is quite low.

The density of oysters on the bottom in Lower Machodoc Creek was about 38 per square foot. This estimate was based on the fact that in our total sampling effort in the creek in December we obtained 605 spat in 120 sets of the samples (Table 3).

Analysis of the length frequency data (Table 4) shows an important fact. The oysters which were dead when they were planted were the smaller ones in the population; mortalities below 15mm (9/16 inch) were, in several instances, over 50%. Data are insufficient at this time to clearly indicate what size fraction of the population died from October to December due to the low mortality (7%) but an inspection suggests that it was the smaller sizes which died after planting.

The bottom in the planting area in Lower Machodoc Creek was firm, with a shell substrate. In December the planted seed was not fouled with marine growth such as tunicates or barnacles and they showed no evidence of being covered with silt. The "boxes" showed no evidence of crab damage. Oyster drills do not occur in this area.

Nomini Creek

The oysters in this area were planted in Nomini Cut which is one of the best oyster growing areas in Virginia. The current in this location, however, is quite swift.

The average size of oysters (based on the valid samples) planted on the sub-plots in Nomini Cut varied from 14 to 22 mm (1/2" to about 3/4") (Table 5). An almost identical range was indicated in December when sampled by VIMS. An inspection of the same sub-areas in December show an increase in mean size of 0 to 4 mm (0-1/4")

The spat planted in Nomini Creek contained significant numbers of dead oysters. The range was from 1 to 17% with an overall average of 8% (Table 5). When sampled by VIMS in December 1973 the range was 4 to 29% with a mean of 15%. This was a difference of only 7% (15-8) since the spat was planted. It is of interest that the mortality shown for Nomini was identical to that shown for Machodoc. We consider that this mortality (7%) was quite low for recently planted spat.

The density of oysters in December 1973 in Nomini Cut was much lower than in Machodoc despite the fact that the original planting density was about the same in each area (Tables 1 and 2). Our data shows (Table 5) that 221 spat were taken in 140 sets of the sampler (18.2 square feet). This gives a density on the bottom of about 12 spat per square foot . This is only about one-third the density found in Lower Machodoc Creek. Rapid currents may have swept the small spat from the planting area in Nomini Cut onto the surrounding bottoms.

The spat on the bottom showed no evidence of crab damage; none appeared to be covered with silt. Fouling by tunicates or barnacles was very light,

the bottom was very hard.

As was the case in the Machodoc Creek, it was the smaller ones in the populations which were dead at planting time(Table 6).

CONCLUSION

The results to date of the plantings in Lower Machodoc Creek and Nomini Creek are considered as most encouraging. However, the real test of this repletion activity will be in the summer of 1974 when the blue crabs return. It is hoped that at this time the oysters will have grown enough to escape damage.

Table 1

Quantities of Cultchless Spat Planted in Lower Machodoc

Data obtained from Virginia Marine Resources Commission

October 1973

Date	Area	No. Bu.	Number of Spat Qt.or B.	Number of Spat /bu.	Total Spat in Planting
10-24-73	1	19	791 Qt.	24,000	456,000
10-24-73	1	11½	791 Qt.	25,000	287,500
10-25-73	1	10	791 Qt.	25,000	250,000
10-25-73	2	23	1332 Qt.*	43,200	993,600
10-26-73	3	22	232 B.*	6,269	137,918
10-26-73	3	11	490 B.*	12,280	135,080
10-29-73	3	36	657 B.*	15,744	566,784
10-30-73	3	5	458 B.	11,867	59,335
10-30-73	4	24	485 B.	11,867	284,808
10-30-73	4	7	657 B.*	15,744	110,208
10-30-73	4	36	492 B.*	10,080	362,880
10-31-73	4	36	536 B.	12,576	452,736
--	5	No Data			

* Samples received by VIMS

B = measured in Beaker; Qt. = measured in Quart

Table 2

Quantity of Cultchless Spat Planted in Nomini Creek

Data obtained from Virginia Marine Resources Commission

October 1973

Date Planted	Area	No. Bu.	Number of Spat Qt.or B.	Number of Spat /bu.	Total Spat in Planting
10-31-73	1	36 *	589 B	13,200	475,200
11-11-73	1	5	589 B	13,200	66,000
11-1-73	1	31	571 B	11,587	359,197
11-1-73	2	32 *	564 B	15,818	506,176
11-2-73	2	37	782 B	16,928	626,336
11-2-73	3	36 *	799 B	17,952	646,272
11-5-73	3	24 *	745 B	17,660	423,840
11-5-73	4	12	745 B	17,660	211,920
11-7-73	4	36	872 B	17,600	633,600
11-7-73	4	12	717 B	17,625	211,500
11-7-73	5	24	717 B	17,625	423,000
11-8-73	5	4	737 B	17,778	71,112
11-8-73	5	32	737 B	13,846	443,072
11-8-73	15	21 *	930 B	19,581	411,201
11-8-73	15	15 *	535 B	12,452	186,780
11-9-73	6	23 *	1153 Qt.	434,435	9,992,005
11-9-73	6	13	535 B	12,452	161,876
11-12-73	7	4-3/4 *	1216 Qt.	28,896	137,256
11-12-73	7	8-3/4 *	2624 Qt.	90,464	791,560
Total		406.5			

* Samples received by VIMS

B = measured in Beaker; Qt = measured in quart

Table 3

Lower Machodoc Creek

Summary of Lengths of Live Oysters and Percent Dead

When Planted in October and in December 1973

Numbers Live and Dead are Those Obtained in Our Samples

	Oct. 1973	Dec. 1973
Plot 1		
No. live	No Data	237
No. sets		20
Avg. length live mm		19.2
No. dead		12
Avg. length dead mm		13.7
Percent dead		5%
Plot 2		
No. live	1,433	56
No. sets		30
Avg. length live mm	13.9	15.6
No. dead	19	6
Avg. length dead mm	12.0	15.1
Percent dead	1	10%
Plot 3		
No. live	585 **	109
No. sets		20
Avg. length live mm	24.7	24.8
No dead	114	69
Avg. length dead mm	23.3	18.8
Percent dead	16	39%
Plot 4		
No. live	578 **	89
No. sets		30
Avg. length live mm	23.8	29.0
No. dead	158	34
Avg. length dead mm	19.5	22.0
Percent dead	21	28%
Plot 5		
No. live	No Data	114
No. Sets		20
Avg. length live mm		25.3
No. dead		38
Avg. length dead mm		18.2
Percent dead		25%

Table 3 cont.

Lower Machodoc Creek

	Oct. 1973	Dec. 1973
Overall Mortality - all plots	13	20%

6mm = 1/4"
10mm = 3/8"
13mm = 1/2"
19mm = 3/4"
25mm = 1 "

** mean based on partial data

Table 5

Nomini Creek

Summary of Lengths of Live Oysters and Percent Dead

When Planted in October and in December 1973

Numbers Live and Dead are Those Obtained in Our Samples

Plot 1

	Oct. 1973	Dec. 1973
No. live	832	35
No. sets		30
Avg. length live mm	21.9	22.0
No. dead	145	14
Avg. length dead mm	14.4	18.6
Percent dead	15	29

Plot 2

No. live	437**	2
No. sets		10
Avg. length live mm	21.5	
No. dead	89	1
Avg. length dead mm	16.4	
Percent dead	17	

Plot 3

No. live	873	36
No. sets		10
Avg. length live mm	20.2	21.5
No. dead	68	13
Avg. length dead mm	16.2	18.8
Percent dead	7	26

Plot 4

No. live		52
No. sets	Not	20
Avg. length live mm		20.2
No. dead	Data	3
Avg. length dead mm		17.2
Percent dead		5

Plot 5

No. live		30
No. sets	Not	20
Avg. length live mm		21.1
No. dead	Data	4
Avg. length dead mm		21.2
Percent dead		12

Table 5 cont.

Plot 6

	Oct. 1973	Dec. 1973
No. live	989**	15
No. sets		20
Avg. length live mm	16.6	13.6
No. dead	10	2
Avg. length dead mm	9.2	19.0
Percent dead	1	12

Plot 7

No. live	1677	51
No. sets		10
Avg. length live mm	13.6	17.4
No. dead	10	2
Avg. length dead mm	N.D.	
Percent dead	1	4

Plot 15

No. live	926	
No. sets		
Avg. length live mm	18.9	No
No. dead	38	
Avg. length dead mm	18.0	Data
Percent dead	4	

Overall mortality all plots 8% 15%

** means based on partial data

t data lost at VIMS

6mm = 1/4 "

10mm = 3/8 "

13mm = 1/2 "

19mm = 3/4 "

25mm = 1 "

Table 4

Length Frequency Distribution (mm) of Living and Dead Cultchless Spat

In Lower Machodoc Creek, Virginia

data shown as % of total

I. When planted in October 1973

II. When sampled by VIMS in December 1973

	October 1973		December 1973	
	Live % of Total	Dead % of Total	Live % of Total	Dead % of Total
			Area 1	
6 -10			1.3	22.2
11-15	No		12.2	72.2
16-20			61.3	5.6
21-25	Data		20.2	
26-30			5.0	
31-35				
Total			238	18
			Area 2	
1 - 5			1.8	
6 -10	16.0	60.0	5.4	9.1
11-15	51.0		42.9	54.5
16-20	33.0	40.0	44.6	36.4
21-25			5.4	
Total	100	5	56	11
			Area 3	
1 - 5				2.9
6 -10	1.3 **	3.4 **	0.8	7.8
11-15	13.3	13.8	7.6	30.1
16-20	28.0	19.0	22.7	31.1
21-25	22.0	25.9	31.1	21.4
26-30	14.7	22.4	21.8	4.9
31-35	6.0	6.9	10.1	1.0
36-40	6.0	6.9	4.2	1.0
41-45	3.3	1.7	1.7	
46-50	1.3			
51-55	1.3			
56-60	1.3			
61-65	0.7			
66-70	0.7			
Total	150	58	119	103

Table 4 cont.

Lower Machodoc Creek

	October 1973		December 1973	
	Live % of Total	Dead % of Total	Live % of Total	Dead % of Total
			Area 4	
6 -10		2.1	0.7	
11-15	6.4	23.4	6.2	31.1
16-20	27.0	42.6	20.5	22.2
21-25	32.6	14.9	26.7	31.1
26-30	18.4	8.5	14.4	11.1
31-35	9.9	8.5	18.5	2.2
36-40	5.7		8.2	2.2
41-45			2.7	
46-50			1.4	
51-55			0.7	
Total	141	47	146	45
			Area 5	
6 -10			0.9	
11-15			10.5	37.0
16-20	No		21.9	33.3
21-25			23.7	22.2
26-30	Data		16.7	7.4
31-35			15.8	
36-40			8.8	
41-45			0.9	
46-50			0.9	
Total			114	54

** % total based on partial data

Table 6

Length Frequency Distribution (mm) of Living and Dead Cultchless Spat

in Nomini Creek, Virginia
data shown as % of totals

I. When planted by the VMRC in October 1973

II. When sampled by VIMS in December 1973

	October 1973		December 1973	
	Live % of Total	Dead % of Total	Live % of Total	Dead % of Total
		Area 1		
6 -10		15.9		
11-15	14.1	54.0	17.1	26.3
16-20	30.3	22.2	34.3	42.1
21-25	24.2	1.6	17.1	21.1
26-30	27.3	6.3	22.9	10.5
31-35	2.0		5.7	
36-40	2.0		2.9	
Total	99	63	35	19
		Area 2		
6 -10		6.9 **		
11-15	10.9 **	37.9		
16-20	36.4	37.9	No	
21-25	36.4	13.8		
26-30	5.4	3.4	Data	
31.35	9.1			
36-40	1.8			
Total	29	29		
		Area 3		
6 -10	1.0	5.9		
11-15	21.8	47.1	5.6	30.8
16-20	38.6	29.4	36.1	38.5
21-25	18.8	11.8	41.7	23.0
26-30	11.9	5.9	11.1	7.7
31-35	5.9		5.6	
36-40	2.0			
Total	101	17	36	13

Table 6 cont.

Nomini Creek

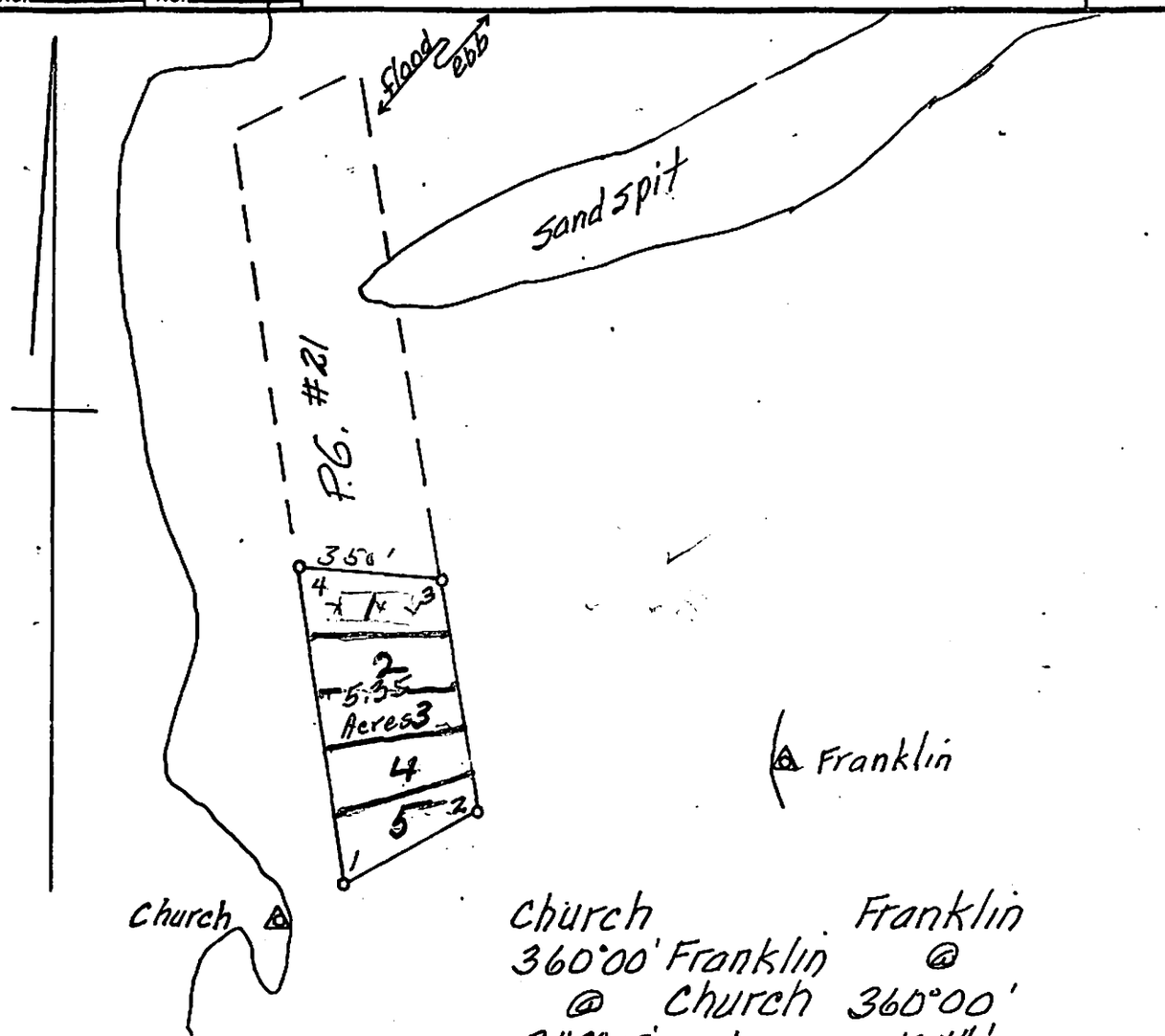
	October 1973		December 1973	
	Live % of Total	Dead % of Total	Live % of Total	Dead % of Total
			Area 4	
11-15			13.5	50.0
16-20			51.9	25.0
21-25	No		26.9	25.0
26-30			3.8	
31-35	Data		1.9	
36-40				
41-45			1.9	
Total			52	4
			Area 6	
6 -10	2.2**	100**		(1)
11-15	37.6			
16-20	45.2			
21-25	15.1			
Total	93	3		(1)
			Area 7	
6- 10	25.0	No Data	2.7	
11-15	57.0		35.1	
16-20	18.0		45.9	
21-25			16.2	(1)
Total	100		37	(1)
			Area 15	
6 -10		8.3		
11-15	24.0	41.7	Not	
16-20	39.0	16.7		
21-25	21.0	16.7	Sampled	
26-30	11.0	8.3		
31-35	5.0	8.3		
Total	100	12		

( ) = actual number

** % totals based on partial data

Figure 1

DATE OF APPLICATION	COMMONWEALTH OF VIRGINIA MARINE RESOURCES COMMISSION:	FOR OFFICE USE
DATE OF ASSIGNMENT		PLAT NO. PG #21
COUNTY RECORDED IN		MAP NO. 790
BOOK No. / PAGE No.		FILE NO.



Church		Franklin
360°00' Franklin @ Church		360°00'
348°55'	1	1°44'
348°55'	2	8°28'
313°57'	3	46°01'
290°21'	4	39°08'

For refrence Ls to stations see Plat Files 12277, 12310 & 12466

Note: This 5.35 Acres is the South end of Public Ground #21 Westmoreland County.

COMMONWEALTH OF VIRGINIA J.K. SINCLAIR CERTIFICATE No. 495 CERTIFIED LAND SURVEYOR

OYSTER PLANTING GROUND

1973 Seed Planting OF Area IN Lower Machodoc Creek

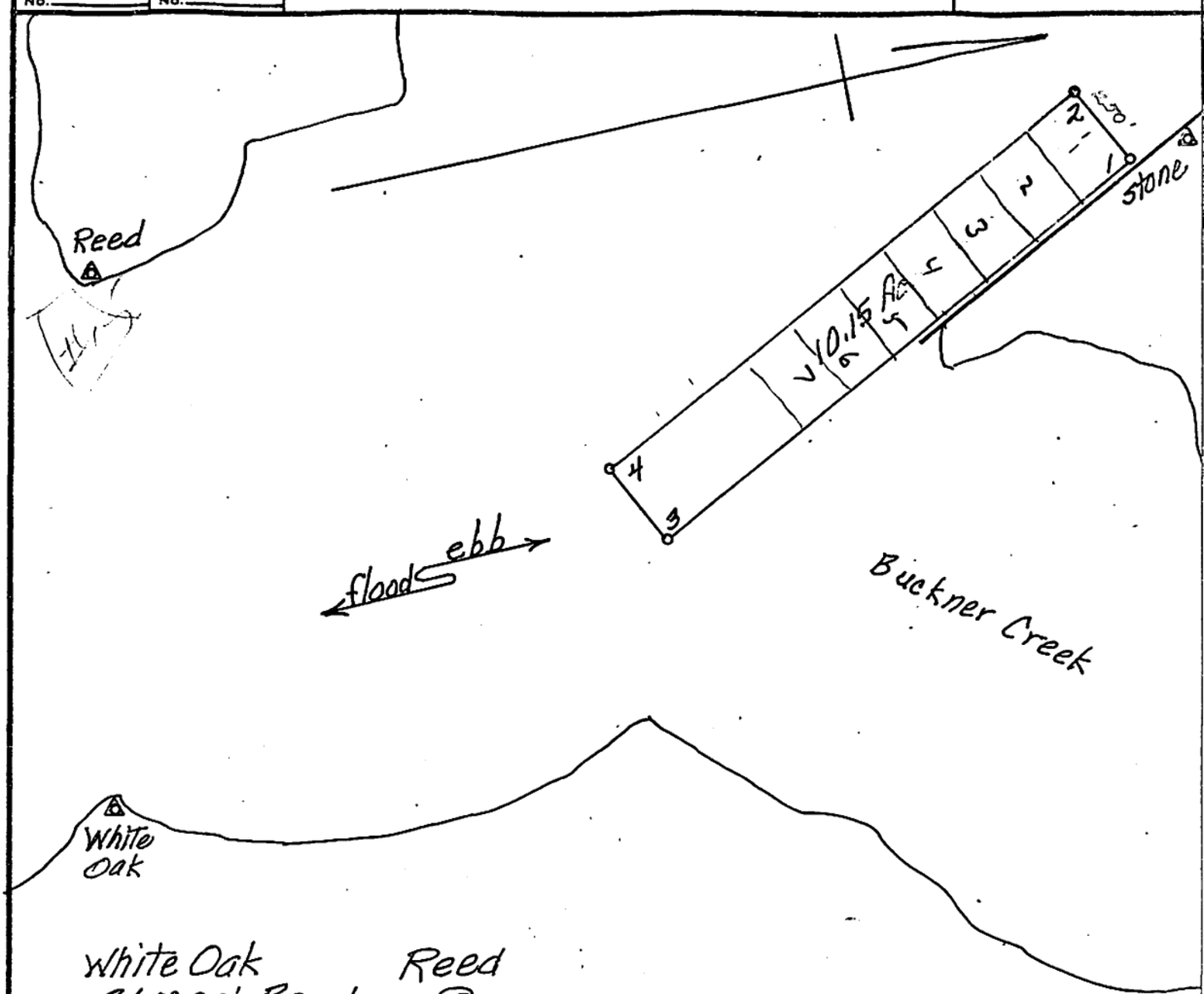
District No. 2 Westmoreland COUNTY

Scale 1/5,000 Oct 4 1973

Surveyed by J.K. Sinclair CERTIFIED SURVEYOR

Figure 2

DATE OF APPLICATION	COMMONWEALTH OF VIRGINIA MARINE RESOURCES COMMISSION:	FOR OFFICE USE
DATE OF ASSIGNMENT		PLAT NO.
COUNTY RECORDED IN		MAP NO. 238
BOOK No. / PAGE No.		FILE NO.



White Oak @		Reed @
360°00'	Reed	
	White Oak	360°00'
60°06'	1	266°26'
56°02'	2	262°09'
66°57'	3	297°08'
58°14'	4	292°59'

COMMONWEALTH OF VIRGINIA
J. K. SINCLAIR
CERTIFICATE No.
495
CERTIFIED LAND SURVEYOR

OYSTER PLANTING GROUND

Seed Plant Area OF 1973

Nomini Creek IN

District No. 1 Westmoreland COUNTY

Scale 1/5000 Oct 4 1973

Surveyed by J. K. Sinclair CERTIFIED SURVEYOR