1975

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

Dexter Haven
Virginia Institute of Marine Science

Paul Kendall
Virginia Institute of Marine Science

draft 3 April 1975

Survival and Growth of Cultchless Spat Planted by the VMRC in Nomini and Lower Machodoc Creek.

by

Dexter Haven and Paul Kendall

Virginia Institute of Marine Science
Gloucester Point, Virginia 23062

March, 1975

INTRODUCTION AND SUMMARY

This report briefly summaries previous data and describes the survey for 22 October 1974. We have submitted reports to the Commission on the status of these plantings in April, 1974, and again in August, 1974. These data will not be repeated in detail, but pertinent aspects will be reviewed.

The cultchless spat plantings made by the VMRC have been successful from a biological aspect. In October, 1974 in Lower Machodoc Creek some 32% to 50% of the oysters remained one year after planting. In Nomini Creek in October, 1974, survival was between 32 to 64%. In both areas densities of seed in the center of the plots are high; growth has been satisfactory and average size now ranges from 1.7 to 1.9 inches.

The study indicates that plantings of this type offer a promising technique for increasing oyster production in low salinity regions. The mortality to date is not excessive when we consider those experienced by growers who plant James River seed. Prior to 1960 oyster growers

typically planted James River seed with a count of 1500 spat and small oysters per bushel. About two or three years later in the Potomac region, they might harvest two bushels with a total count of about 500. This was a survival rate of about 33%. It is true that the present population of cultchless spat still needs about two years to reach maturity, and more are expected to die, but only further studies will establish the final figure.

The densities shown in October, 20 spat/ft^2 in Machodoc and 9 spat/ft^2 in Nomini are high. If all lived to maturity they would theoretically yield 3,484 bu/acre in Machodoc and 1,568 bu/acre in Nomini. However, it is emphasized that these densities do not exist at all locations in each plot since the central portions of the plots were more heavily planted than the margins.

A study is planned in late July, 1975, which will be designed to study the overall densities of spat on the plots, and to estimate again, percentage survival.

RESULTS

Review of the Project and Initial Results

The samples of cultchless spat on which density and size studies were based, were collected with a benthic suction sampler in the central portions of each plot. This apparatus has been discussed in previous reports. As outlined, the data indicated that the spat had not been planted evenly on the bottom.

In Lower Machodoc Creek about 5 million oysters were planted mostly toward the central portions of the plots 1 through 5; the eastern portions received few if any spat (Figure 1). For example, shortly after planting the sampling indicated a density in the central part of the plots of 39 spat/ft^2. Had the five million spat been spread equally over the entire five acres the theoretical density would be 28/ft^2 (Table 1). This uneven density was confirmed by a diver survey in July 1974. This showed that even in small areas (8 to 10 feet across) spat occurred in patches. A typical study in October, 1974, showed densities in 10 samples varying from 0 to 63 spat/ft^2.

In Nomini Creek, about 7 million spat were distributed over 7 acres (Figure 2). Again, we found the overall distribution to be uneven with the plot margins having minimal numbers of spat. An added aspect in this area was that the newly planted spat had apparently been swept from the area by currents. As a result the initial density of spat in the central portion of each square on October 1973 was only 14/ft^2 contrasted to the theoretical density of 28 spat/ft^2 (Table 2).

We have cited the preceding information on unequal planting density since they have caused us problems not anticipated earlier in estimating survival rates based on our sampling techniques. That is, as will be shown later, the July 1974 and October 1974 estimates vary over wide limits. Consequently, the survival rates shown in this report must be regarded as tentative pending a more extensive sampling program which will be conducted in July 1975.

Review of Mortality - October 1973 to July 1974

The over-winter mortality from December 1973 to March 1974 was fairly low for Lower Machodoc Creek and Nomini Creek. In July, 1974, the data indicated that a sharp mortality had occurred in both areas, probably in late spring, and numbers had declined to less than half of the December level (Tables 1 and 2). However, in July the shells and boxes of oysters commonly noted in March were no longer present and mortalities (percent dead) could no longer be estimated on ratios of live to dead oysters. Therefore, on this date and in later samples mortalities were based solely on changes in density. These data showed that in Lower Machodoc Creek and in Nomini Creek 32% were still alive.

Results - October 1974 Sampling

The October samples in Lower Machodoc Creek showed a density of 20 spat/ft^2 which indicated that above 50% of those present in December 1973 were still alive. This rate of survival was higher than that observed in July (12 spat/ft^2 and 32% survival) Table 1. This difference was thought to be associated with the uneven and clumped distribution of spat on the bottom. The oysters grew rapidly last summer. Average length in October was 1.7 inches with a range from 1.2 to 2.6 inches. The oysters had sharp bills which indicated rapid growth; fouling was light.

In Nomini Creek density on the bottom in October was 9.1 spat/ft^2 which indicated that 64% of these present in December 1973 were still alive (Table 2). This estimate was higher than for July (5 spat/ft^2,

32% survival); again we attribute the difference to the uneven distribution of the oysters. Average length was slightly longer than in Lower Machodoc Creek, 1.9 inches, but the range was about the same, 1.2 to 2.6 inches.

In October few dead oysters (shell or empty boxes) were observed in Nomini and Lower Machodoc. The few we did see showed no evidence of having been eaten by crabs, since the shells were usually intact with no chipped or broken edges.

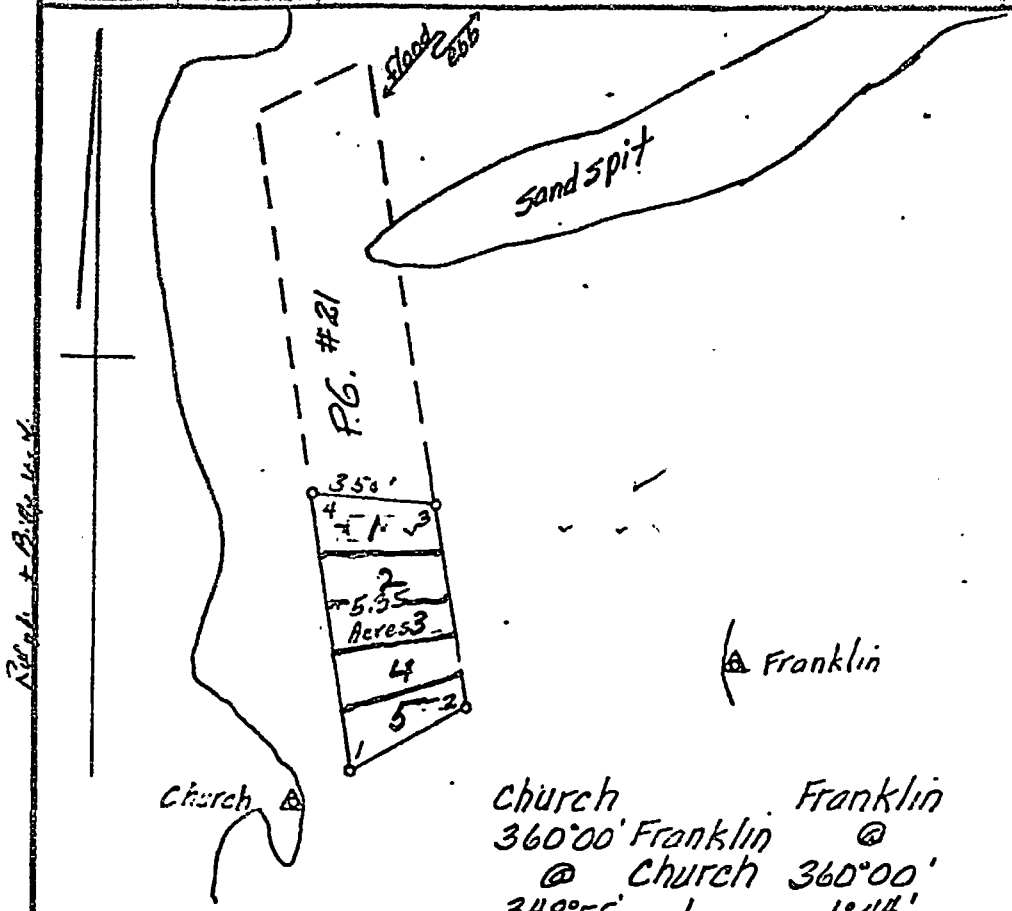
A study is planned in July 1975 in which density of oysters over the entire area of each plot will be sampled rather than locations in the central portion. This study will indicate total quantities of spat in the plots and may also indicate percentage survival with a greater degree of reliability than previously.

Figure 1

DATE OF APPLICATION
DATE OF ASSIGNMENT
COUNTY RECORDED IN
BOOK | PAGE
NO | NO

COMMONWEALTH OF VIRGINIA
MARINE RESOURCES COMMISSION:

PLAT NO. PG #21
MAP NO. 790
FILE NO.



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

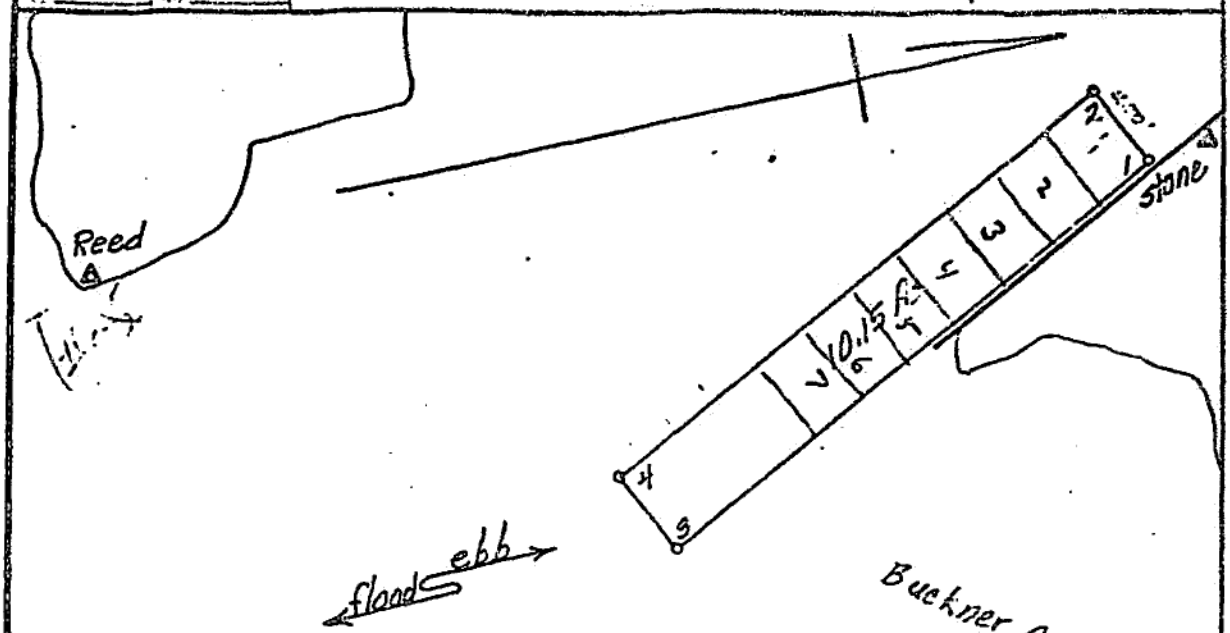
For refrence Lo To stations see Plat Files 122 77, 123 108 12466

Note: This 5.55 Acres is the South end of Public Ground #21 Westmoreland County.

OYSTER PLANTING GROUND

Lying and being in the
Lower Machodoc Creek
District No. 2 Westmoreland County
Scale 1/5000 Oct. of
Surveyed by D. K. Smith

DATE OF APPLICATION		COMMONWEALTH OF VIRGINIA MARINE RESOURCES COMMISSION:	FOR OFFICE USE
DATE OF ASSIGNMENT			PLAT NO
COUNTY RECORDED IN			MAP NO 256
BOOK	PAGE		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'

J. K. SINCLAIR
405

OYSTER PLANTING GROUND

Seed Plant Area of 1935

Nansini Creek

District No. 1 Westmoreland County

Scale 1/5000 Oct 4 1935

Surveyed by [signature]

Table 2

Nomini Creek

Summary of Lengths of Live Oysters and Percent Dead

Numbers Live and Dead Are Those Obtained in Our Samples

Plot 1

	Oct. 1973	Dec. 1973	March 1974	July 1974	Oct. 1974
No. live	832	35	54	13	4
No. sets		30	10	10	10
Avg. length live mm	21.9	22.0	20.0	32.2	34.2
No. dead	145	14	25	3	2
Avg. length dead mm	14.4	18.6	15.6	25.0	18
Percent dead	15	29	32		

Plot 2

No. live	437*	2	32	16	8
No. sets		10	10	10	10
Avg. length live mm	21.5		20.8	27.0	44.3
No. dead	89	1	24	6	4
Avg. length dead mm	16.4		16.1	19.2	19.7
Percent dead	17	--	43		

Plot 3

No. live	873	36	28	6	44
No. sets		10	10	10	10
Avg. length live mm	20.2	21.5	20.0	38.0	43.2
No. dead	68	13	28	3	22
Avg. length dead mm	16.2	18.8	15.5	32.0	24.6
Percent dead	7	26	42		

Table 2 (contd.)

	Oct. 1973	Dec. 1973	March 1974	July 1974	Oct. 1974
Plot 4					
No. live		52	13	5	6
No. sets	Not	20	10	10	10
Avg. length live mm		20.2	28.8	23.0	50.5
No. dead	Data	3	3	80	8
Avg. length dead mm		17.2	20.0	20.5	27.6
Percent dead		5	19		
Plot 5					
No. live		30	24	3	0
No. sets	Not	20	10	10	10
Avg. length live mm		21.1	20.7	27.7	
No. dead	Data	4	11	6	9
Avg. length dead mm		21.2	15.5	20.6	17.0
Percent dead		12	31.0		
Plot 6					
No. live	989*	15	12	3	20
No. sets		20	10	10	10
Avg. length live mm	16.6	13.6	21.3	33.0	42.0
No. dead	10	2	2	2	2
Avg. length dead mm	9.2	19.0	21.8	34.7	28.0
Percent dead	1	12	14.3		
Plot 7					
No. live	1677	51	25	4	1
No. sets		10	10	10	10
Avg. length live mm	13.6	17.4	16.0	24.0	38.0
No. dead	10	2	2	2	5
Avg. length dead mm	N.D.	-	19.3	21	28
Percent dead	1	4	7.4		

Table 1

Lower Machodoc Creek

Summary of Lengths of Live Oysters and Percent Dead

Numbers Live and Dead Are Those Obtained in Our Samples

Plot 1

	Oct. 1973	Dec. 1973	March 1974	10 July 1974*	17 July 1974*	22 Oct. 1974
No. live		237	123	52		104
No. sets	No	20	20	20		20
Avg. length live mm		19.2	19.7	30.4		48.7
No. dead	Data	12	5	6		17
Avg. length dead mm		13.7	16.9	20.5		24.5
Percent dead		5	4			

Plot 2

No. live	1,433	56	53	11	38	32
No. sets		30	20	20	20	20
Avg. length live mm	13.9	15.6	17.3	23.0		42.8
No. dead	19	6	14	3		8
Avg. length dead mm	12.0	15.1	14.5	23.0		21.6
Percent dead	1	10	30			

Plot 3

No. live	585	109	34	31		36
No. sets		20	20	20		20
Avg. length live mm	24.7	24.8	26.2	35.6		40.2
No. dead	114	69	30	6		5
Avg. length dead mm	23.3	18.8	19.7	27.2		27.5
Percent dead	16	39	53			

Table 1 (Contd.)

Plot 4

	Oct. 1973	Dec. 1973	March 1974	10 July 1974	17 July 1974	22 Oct. 1974
No. live	578	89	37	6	55	28
No. sets		30	20	20	20	20
Avg. length live mm	23.8	29.0	26.5	33.8		47.2
No. dead	158	34	8	1		2
Avg. length dead mm	19.5	22.0	22.4	15.5		24.2
Percent dead	21	28	18			

Plot 5

No. live		114	124	34		54
No. sets	No	20	20	20		20
Avg. length live mm		25.3	22.4	32.6		42.7
No. dead	Data	38	103	8		10
Avg. length dead mm		18.2	18.9	24.0		23.7
Percent dead		25	55			
Combined mortality all plots	13	20	30.1			
Avg. density sq/ft	----	38.7	28.5	12.5		19.5
Avg. length inches	0.8	0.9	0.9	1.2		1.7

The value of 19.5 sq/ft for October 1974 indicates that as of October there exists 50% of those present in December 1973.

* Data combined for 10 and 17 July 1974 for average density. No measurements of oysters or boxe counts, 17 July 1974 and on.

Conversion = mm to inches (6 mm = 1/7; 10 mm = 3/8; 13 mm = 1/2; 19 mm = 3/4; 25 mm = 1; 52 mm = 2; 63 mm = 2-1/2).

Table 2 (contd.)

	Oct. 1973	Dec. 1973	March 1974	July 1974	Oct.1974
Combined mortality all plots %	8	15	13.6		
Avg. density sq/ft		14.2	20.6	5.5	9.1
Mean length inches	0.7	0.8	0.8	1.2	1.9

The valve of 9.1 in Nov. 1974 indicates that on this date there exists on the bottom 64% of those originally present.

* Mean based on partial data.

Conversion mm to inches: 6 mm = 1/4; 10 mm - 3/8; 13 mm = 1/2; 19 mm = 3/4; 25 mm = 1; 52 mm = 2; 63 mm = 2-1/2.