

Oyster Shoal Survey, Fall 1986

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Oyster Shoal Survey

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The survey of oyster shoals in the fall attempts to measure mortalities in the summer months, recruitment in the current setting period, and condition of market and seed oysters on selected shoals.

The sample unit was three samples on each station with a twenty-four inch (opening) dredge with three inch teeth, running either downcurrent or upcurrent on parallel tracks, and retention of a one-half bushel measured sample representative of each haul. An additional sample was taken if the relationship between the variance and the mean bushel counts fell outside an acceptable range. The acceptable range in variance was based upon experiential knowledge and principle. The principle has been described in a memo dated April 2, 1986 (see VMR Report No. 86-6).

The data collection included: the count of market oysters (over 3" in length), the count of small oysters (less than 3" in length but larger than the most recent set), the count of spat, the count of new boxes, count of old boxes, count of gapers, list of predators, a description of fouling, bottom temperature, bottom salinity and observations of the condition of the oysters. The data summary for each shoal included: the average count of oysters per bushel, the percent mortality based upon the numbers of gapers and all boxes except the current year's set, a list of predators retained in the dredge, a description of fouling, and a characterization of the reef as a seed or market reef.

In the past fifty years approximately 75% of the seed planted on private leases in Virginia came from the James River (Haven et al. 1981).

All of the shoals in the James River are characterized as seed areas. The value of a bushel of seed to the industry is correlated to the potential for converting it into one or more bushels of market oysters at harvest time. If the count per bushel of small oysters in the seed equals the count of market oysters per bushel at harvest time, approximately 220-300 oysters, the bushel of seed would be described as good. In addition, if the count of spat in the bushel of seed exceeded the high count of small oysters, for example 300-400 spat, then there is an additional potential to convert the bushel of seed into more than one bushel of market oysters at harvest time. The latter bushel would be described as excellent.

The condition or quality of oysters from a shoal which is utilized as a source of market oysters can be measured in pints of oyster meat per bushel of live oysters. Since the sample unit did not provide this data, the condition of the shoal was measured in numbers of markets, numbers of boxes (dead oysters), and numbers of weak oysters (including gapers) in a bushel of dredgings.

Primarily, the James River is a source of oyster seed. The Horsehead samples averaged 692 oysters per bushel and contained 600 small oysters per bushel and would be classified as excellent seed oysters. The Point O Shoals seed contained 350 small oysters and averaged 560 oysters per bushel and would be classified as satisfactory seed. The remaining shoals would be termed as below average sources of seed.

However, the James River is being utilized, temporarily, as a source of market oysters. This is possible because of the large number of markets above the James River Bridge. The average number of markets per bushel at shoals above the bridge is 68. No gapers were counted in the samples but mortality rates above the bridge ranged between 2 and 45 percent.

Recruitment in the entire river was approximately the same as in Pocomoke Sound, or, very low.

In the York River only Aberdeen Rock was sampled because of the extremely low level of oysters, spat and high mortalities. This shoal would be described as below average as a market area. The terms "depleted" or "barren" would apply to this shoal.

The mortalities in the Piankatank River ranged from 18 to 35 percent with the size of mortalities being inversely proportional to the distance upriver. Although the spatfall on shellstrings at each of four stations exceeded the spatfall at each station for any of the past four years, the spat settlement on the bottom ranged from 121 spat/bushel to 481 spat/bushel with Palace Bar having the highest spat count. In spite of the vigorous recruitment in the Piankatank in the 1980's, the limited size of the rocks plus the death of larger oysters make the three shoals surveyed marginal as market areas. Probably "skiff type" harvesting with hand tongs is possible at Ginney Point. Palace Bar has been a source of seed oysters and the bushel count is satisfactory for seed but the average bushel count is down from 1,184 to 720 oysters since the fall of 1985. There were gapers in the Burton Point collection and at Ginney Point and samples at Burton Point gave clear evidence of oyster drills.

The Rappahannock River is a market area with poor setting upriver and moderate to good setting downriver in recent years. Below Towles Point mortality ranged from 39 percent to 70 percent. Above Towles Point mortality ranged from 1 to 15 percent. Hog House bar was the upper limit of high mortalities in the lower river and, in spite of the 39 percent mortality, provided 61 markets per bushel of bottom dredgings. From Hog House shoal to Bowler's Rock the percentage of markets ranged from 48 to 73

percent of the total bushel count. Mud crabs and sagartians were abundant throughout the river except at Bowler's Rock but no turbellarians were observed. Fouling was usually light except for a heavy set of *Molgula* at Bowler's Rock and a heavy set of mussels at Morattico. Above Towles Point the condition of the oysters was good.

There was a single station in the Corrotoman River at Middle Ground. The mortality was 44 percent and each sample had over 100 boxes. The market oyster count averaged 20 per bushel. Most of the "markets" were barely 3" and the Middle Ground is a below average market oyster area.

Although the Great Wicomico River has been suggested as a source of seed, it is utilized as a market oyster source. The spat counts were the highest in Virginia waters but only the Haynie Point station had a high count of small oysters (502). Mortalities ranged between 13 and 49 percent. Number of markets per bushel ranged between 10 and 15 oysters. One gaper was counted as Fleet Point. None of the shoals sampled would be satisfactory for market oyster yields, but Haynie Point oysters could be termed excellent for seed.

Pocomoke Sound stations appear in the survey for the first time. The locations are on old rocks or shoals, rather than shell plants, both within and outside the management area. Public Ground no. 9 station and Public Ground no. 10 station are outside the management area while the remaining stations are inside the management area. Mortalities ranged from 12 to 62 percent with the only mortality rate below 31 percent occurring on Public Ground no. 10. Recruitment averaged 41 spat per bushel in all samples combined. Gapers were present in the samples on Public Ground no. 9, no. 10 and Marshall Rock. Public Ground no. 9 station supports market oyster

harvesting with hand tongs. The remaining areas are below average sources of market oysters.

Table 1. Summary, Fall 1986 Oyster Bar Survey.¹

Bar	Oysters			Bu Count	\bar{x} Count	Capr	Boxes		Pred.	Fouling	Bottom		Time	Tide	\bar{x} Depth	Loran Coord.	Observations Sample Proc., etc.
	Mkt	Sm	Spat				Rec.	Old			°C	‰					
<u>James R.</u>																	
Horsehead	48	588	42	678		0	2	6	Mud crab	Barn.,light	23.5	13.4	1053	Early	7-15'	27346.0	Sea - 1 ft.
	82	586	14	682		0	10	8	-	Molgula,light				flood		41333.2	Wind 10-15K
	72	626	18	716	692	0	12	10	-	Mussel,light							Barnacles dominant
Point O Shoals	84	440	116	640		0	10	8	-	Barn.,light	23.0	14.8	1300	Early	7-8'	27344.0	Sea - 1 ft.
	178	320	50	548		0	12	10	-	Barn.,light				flood		41310.6	Wind 10-15K
Wreck Shoals	96	334	94	524		0	0	4	Mud crab	Barn.,light							
	140	304	84	528	560	0	2	2	Mud crab	Barn.,light							
	20	136	58	214		0	26	60	Mud crab	Barn.,light	24.0	20.1	1500	Max.	10'	27326.0	Sea calm
Thomas Rock	36	98	44	178		0	14	42	Ditto	Cliona				flood		41301.8	Wind calm
	26	150	62	238		0	24	46	Ditto	Algae(brown)							
	30	126	42	198	207	0	10	38	Ditto	Microciona							
Ridge	44	164	26	234		0	62	122	Mud crab	Barn.,light	18.2	22.4	1040	Late	12'	27302.7	Sea calm
	56	214	24	294		0	74	150	Ditto	Mussels,light				ebb		41288.4	Wind calm
	60	216	28	304		0	96	86	Ditto								Mud crabs numerous
Ridge	46	148	20	214	262	0	90	90	Ditto								
	36	54	32	122		0	8	52	Mud crab	Barn.,light	18.4	22.2	1310	Late	10'	27280.6	Sea calm
	26	48	30	104		0	6	68	Ditto	Anomia				ebb		41218.8	Wind calm
	18	48	28	94	107	0	4	40	Ditto	Cliona Microciona Crepidula							Mud crabs numerous Microciona dominant
<u>York R.</u>																	
Aberdeen Rock	6	2	12	20		0	4	6	Mud crab	Anomia,Cliona	24.0	21.2	1055	Max.	7'	27368.3	Sea 2 ft.
	2	4	4	10		0	2	10	Urosal. egg case	Crepidula				Flood		41501.2	Wind 10-20K
	6	6	2	14	15	0	10	6		Microciona							Microciona dominant
<u>Mohjack Bay</u>																	
Pultz Bar	24	38	2	64		1	70	90	Mud crab	Barn.,light	24.0	22.0	1445	Late	13'	27310.6	Sea 3-4 ft.
	32	18	2	52		1	86	88	Ditto	Crepidula, Cliona				flood		41534.6	Wind 20K
	20	38	2	60	59	1	62	102	Ditto	Hydroids							Hydroids dominant
<u>Piankatsank R.</u>																	
Burton Point	14	82	56	152		1	24	56	Urosal. egg case	Microciona, mod.	23.0	20.6	1330	Late	11'	27326.0	Sea calm
	8	106	198	312		0	58	36	Mud crab	Hydroides, crepidula				flood		41650.9	Wind calm
	10	190	284	484		2	52	46	Urosalpinx	Algae							Hydroides dominant
	12	292	414	718	417	0	84	36		Mussels							Cinder abundant
Palace Bar	22	226	480	728		0	34	50	Mud crab	Microciona, light	-	20.3	1130	Max.	10'	27338.1	Sea Calm
	26	208	570	804		0	56	58	Callinectes	Barn.,light				flood		41658.3	Wind calm
	32	208	312	552		0	28	28		Molgula,mod.							
	38	196	562	796	720	0	56	56		Hydroides, mod.							
Ginney Point	28	204	114	346		1	12	56	Mud crab	Molgula,heavy	22.2	20.0	1025	Max.	10'	27347.4	Sea calm
	34	244	124	402		1	18	34	Mud crab	Microciona, light				flood		41659.7	Wind calm
	46	242	126	414	387	0	14	40	Mud crab	Barn.,mod. Mussels-mod.							Molgula dominant

Table 1 (Continued)

Bar	Oysters			Bu Count	\bar{x} Count	Capex	Boxes		Pred.	Fouling	Bottom C	D/100	Time	Tide	\bar{z} Depth	Loran Coord.	Observations Sample Prec., etc.
	Mt	Sm	Spst				Rec.	Old									
<u>Kappa E.</u>																	
Broad Creek	16	50	232	298		0	98	24	Mud crab	Mussels, mod.	23.0	20.2	1030	Low	15-20'	27329.5	Sea calm
	22	102	190	314		0	62	48	Sagartia	Barn., mod.				slack		41696.3	Wind calm
	6	118	328	452		0	66	64		Molgula, few							
Parrots	14	164	284	462	382	1	110	98		Blood clams, few							
	38	52	164	254		0	30	22	Mud crab	Barn., light	23.2	19.9	1255	Early flood	8'	27361.9	Sea calm
	14	46	228	288		0	26	44	Ditto	Molgula, light						41710.4	Wind calm
Drumming Ground	16	92	268	376		0	44	40	Ditto	Mussels, light							Eroded shell abundant
	8	56	120	184	276	1	16	50	Ditto	Blood clams, few							
	6	50	184	240		0	26	112	Mud crab	Barn., light	23.2	19.8	1415	Max. flood	12'	27378.9	Sea calm
Hog House	0	62	198	260		0	20	74	Ditto	Molgula-light						41738.0	Wind calm
	14	28	166	208	236	0	14	116	Ditto	Mussels-mod.							
	56	12	6	74		0	14	42	Mud crab	Barn., light	18.0	19.2	1240	Late flood	21'	27398.3	Sea calm
Smokey Point	74	22	14	110		0	12	40	Ditto	Mussels, light						41725.8	Wind calm
	52	40	4	96	93	0	16	42	Ditto	Anemones, light							
	72	28	22	122		0	4	12	-	Molgula, light	18.8	18.9	1030	Late flood	21'	27417.8	Sea calm
Morattico	50	32	4	86		0	4	6	-	Mussels, mod.							
	68	14	2	84	97	0	0	6	-	Anemones, light						41779.0	Wind calm
	88	22	2	112		0	2	12	-	Barn., light							Mussels dominant
Bowlers Rock	58	24	0	82		0	4	16	-	Mussels, heavy							Sea calm
	70	32	0	102	99	0	2	14	-	Molgula, mod.						41819.5	Wind calm
	38	16	0	54		0	0	2	-	Anemones, light							Mussels dominant
Rock	30	50	2	82		0	0	2	-	Molgula, heavy	18.0	16.5	1440	Early ebb	10'	27472.4	Sea calm
	32	40	0	72	69	0	0	0	-	Barn., light						41847.3	Wind calm
									-	Mussels, light							Molgula dominant
<u>Corrotoman E.</u>																	
Middle Ground	14	104	114	232		0	42	62	Mud crab	Microciona, light	23.5	19.3	1510	High slack	14'	27386.2	Sea calm
	14	116	242	372		0	26	78	Callinectes	Molgula, light						41763.0	Wind calm
	16	156	238	410		0	18	108	Ditto	Mussels, light							
	36	122	248	406	355	0	26	90	Ditto	Barn., light							
<u>Great Micomico</u>																	
Fleet Point	6	106	636	748		0	34	110	Mud crab	Barn., light	18.0	19.4	1115	Late flood	12-17'	27358.3	Sea 1-2'
	14	166	1296	1476		0	54	128	-	Mussels, light						41868.9	Wind 10-15K
	2	94	1364	1460		0	40	82	-	Hydroides, light							
Whaley's E.	16	248	1160	1424	1277	1	40	134	Mud crab	Blood clams, few							
	16	324	860	1200		0	30	108	Mud crab	Barn., light	19.0	19.3	1400	Early ebb	12-15'	27361.6	Sea calm
	2	200	482	684		0	54	58	-	Mussels, light						41867.3	Wind < 10K
Haynie Point	28	258	786	1072		0	28	114	-	Hydroides, light							
	10	66	244	320	819	0	28	52	Mud crab								
	16	442	942	1400		0	18	50	-	Barn., light	19.0	19.1	1530	Max. ebb	7-18'	27366.9	Sea calm
Point	16	558	424	998		0	42	42	-	Gracilaria						41881.6	Wind calm
	12	462	668	1142		0	20	44	-								
14	552	518	1084	1156	0	30	74	-									
<u>Pocomoke Sound</u>																	
P.C. #9	42	58	16	116		1	12	46	Callinectes	Barn., light	18.0	19.4	1300	Max. ebb	8-10'	27222.6	Sea calm
	44	44	36	124		0	6	28		Molgula, light						42011.3	Wind < 10K
	24	42	20	86	109	0	6	18		Anemones, few							
P.C. #10	12	196	48	256		1	10	2	Callinectes	Molgula, light	19.0	20.3	1400	Max. ebb	8-10'	27230.8	Sea calm
	34	200	76	310		0	12	28		Hydroids, mod.						41999.3	Wind < 10K
	36	92	48	176		0	4	20		Mussels, light							
	20	178	84	282	256	0	14	16		Enc. bryozoans, light Sabellidae, mod.							

Table 1 (Continued)

Bar	Oysters			Bu Count	\bar{x} Count	Gaper	Boxes		Pred.	Fouling	Bottom		Time	Tide	\bar{x} Depth	Loran Coord.	Observations Sample Prec., etc.
	Mkt	Sm	Spst				Rec.	Old			°C	‰					
<u>Pocomoke Sound (continued)</u>																	
Marshall Rock	12	126	70	208		1	0	68	Mud crab	Enc. bryo- zoans, heavy	19.2	21.2	1530	Late ebb	14'	27246.8	Sea calm
	20	160	42	222		0	16	72	Ditto	Hydroids, light						41957.2	Wind calm
	8	94	28	130		0	10	64	Ditto	Mussels, light							Encrusting
	12	130	44	186	187	0	6	66	Ditto	Sponge, light							bryozoans dominant
Bird Rock	6	16	30	52		0	4	18	Mud crab	Crepidula, many	20.0	21.2	1215	Early ebb	19-21'	27237.8	Sea calm
	2	8	10	20		0	0	18	Oyster drill	Anomia, light Hydroids, light						41939.1	Wind calm
	0	6	8	14	29	0	2	22		Blood clams, few Cliona							Crepidula dominant
Robin Hood	18	7	114	139		0	7	32	Mud crab	Sabellidae, light	20.5	21.2	1400	Max. ebb	20-25'	27234.0	Sea calm
	6	16	78	100		0	10	16	Oyster drill	Anomia, light						41921.9	Wind calm
Island Rock	10	14	62	86	108	0	2	18									
	14	16	2	32		0	4	6	Mud crab	Molgula, light	20.5	21.2	1500	Low slack	12-17'	27227.9	Sea calm
	12	28	0	40		0	4	38	Callinectes	Crepidula, many Microciona, light						41935.3	Wind calm
	12	20	4	36	36	0	2	38									

¹ Volume of each sample is 1 Virginia bushel (50 quarts).

Table 2. Bushel count and condition of oyster on each bar.

<u>Bar</u>	<u>Average Bu. Count</u>	<u>Percent Mortality</u>	<u>Evidence of Predation</u>	<u>Fouling</u>	<u>Classification</u>
<u>James R.</u>					
Horsehead	692	2	Mud crabs	Barnacles, Molgula, Mussels; light	Seed; excellent
Point O Shoals	560	2	Mud crabs	Barnacles; light	Seed; satisfactory
Wreck Shoals	207	29	-	Barnacles, Cliona, Microciona; light	Seed; below average
Thomas Rock	262	45	-	Barnacles, Mussels; light	Seed; below average
Ridge	107	44	Mud crabs	Barnacles, Anomia; Cliona; light	Seed; below average
<u>York R.</u>					
Aberdeen Rock	15	59	Mud crabs, Drill egg cases	Microciona, Anomia, Cliona, Crepidula; light	Market; below average
<u>Mobjack Bay</u>					
Pultz Bar	59	74	Mud crabs	Barnacles, Crepidula, Cliona; light	Market; below average
<u>Piankatank R.</u>					
Burton Point	417	35	Mud crabs, Oyster drills	Hydroides, Crepidula, Mussels; light	Market; 3% markets
Palace Bar	720	28	Mud crabs	Microciona; mod. Microciona, Barnacles; light Molgula, Hydroides; light	Market; 4% markets

Table 2 (Continued)

Bar	Average Bu. Count	Percent Mortality	Evidence of Predation	Fouling	Classification
<u>Piankatank R. (continued)</u>					
Ginney Point	387	18	Mud crabs	Microciona; light Barnacles, Mussels; light Molgula; heavy	Market; 9% markets
<u>Rappa. R.</u>					
Broad Creek	382	54	Mud crabs, Sagartians	Molgula, Blood clams; light Barnacles, Mussels; mod.	Market; 4% markets
Parrots	276	46	Mud crabs	Barnacles, Molgula, Mussels, Blood clams; light	Market; 7% markets
Drumming Ground	236	70	Mud crabs	Barnacles, Molgula; light Mussels, mod.	Market; below average
Hog House	93	39	Mud crabs, Anemones	Barnacles, Mussels; light	Market; 66% markets
Smokey Point	97	11	Anemones	Barnacles, Mussels; light	Market; 65% market
Morattico	99	15	Anemones	Barnacles; light Molgula; mod. Mussels; heavy	Market; 73% markets
Bowlers Rock	69	1	-	Barnacles, Mussels; light Molgula; heavy	Market; 48% markets
<u>Corrotoman R.</u>					
Middle Ground	355	44	Mud crabs	Barnacles, Mussels, Molgula, Microciona; light	Market; 6% markets

Table 2 (Continued)

<u>Bar</u>	<u>Average Bu. Count</u>	<u>Percent Mortality</u>	<u>Evidence of Predation</u>	<u>Fouling</u>	<u>Classification</u>
<u>Great Wicomico</u>					
Fleet Point	1277	49	Mud crabs	Barnacles, Mussels, Hydroides, Blood clams; light	Market; below average
Whaley's E.	819	34	Mud crabs	Barnacles, Mussels, Hydroides; light	Market; below average
Haynie Point	1156	13	-	Barnacles; light Gracilaria; heavy	Market; below average (1%)
<u>Pocomoke Sound</u>					
P. G. #9	109	31	Callinectes, Anemones	Barnacles, Molgula; light	Market; 34% markets
P. G. #10	256	12	Callinectes	Molgula, Mussels, Enc. bryozoan; light Hydroides, Sabellidae; mod.	Market; 10% markets
Marshall Rock	187	35	Mud crabs	Hydroides, Mussels, Sponge; light Enc. bryozoan; heavy	Market; 7% markets
Bird Rock	29	62	Oyster drill	Anomia, Hydroides, Cliona; Blood clams; light Crepidula; many	Market; below average
Robin Hood	108	54	Mud crabs, Oyster drill	Anomia, Sabellidae; light	Market; 10% markets
Island Rock	36	48	Mud crabs, Callinectes	Molgula, Microciona; light Crepidula; heavy	Market; 36% markets

Appendix

Locations of stations in the fall survey, 1986











