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STATUS OF THE PUBLIC OYSTER FISHERY OF VIRGINIA - FALL 1990

Bruce J. Barber, Ph.D.

Virginia Institute of Marine Science
College of William and Mary
Gloucester Point, VA 23062

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INTRODUCTION

Oysters have been harvested from Virginia waters as long as humans have inhabited the area. Depletion of natural stocks in the late 1880's led to the establishment of regulations by public fisheries agencies. A survey of bottom areas in which oysters grew naturally was completed in 1896 under the direction of Lt. Baylor, USN. These areas (over 243,000 acres) were set aside by legislative action for public use and have come to be known as the Baylor Survey Grounds or Public Oyster Grounds of Virginia (Figure 1), and are presently administered by the Virginia Marine Resources Commission (VMRC).

Twice a year the Virginia Institute of Marine Science (VIMS) conducts a survey of selected public oyster bars (shoals) in Virginia waters for the purpose of assessing the status of the resource. Surveys conducted in the spring provide information about over-winter mortality and relative fishing pressure from the current harvesting season[1]. Surveys conducted in the fall provide information about spatfall or recruitment, summer (disease) mortality, and the status of each shoal as a source of seed or market oysters prior to the beginning of the harvesting season.

This report summarizes the findings of the Fall 1990 Oyster Shoal Survey, conducted between 25 September and 3 October, 1990.

METHODS

Two or three 0.5 bushel (25 quart) samples of bottom material were taken at each shoal using a 24 inch dredge having 4 inch teeth. The shoals sampled are shown in Figure 1. Loran coordinates and the date each location was sampled are given in Table I.

The following data were obtained for each sample: number of market (>3" in shell height) oysters, number of small (submarket sized) oysters, number of spat (1990 recruits), number of recent boxes (inside of shells clean; dead a month or less), and number of old boxes (inside of shells dirty; dead a month or more). Bottom water samples were obtained at each location for temperature (°C) and salinity (ppt) determination. Where possible, 25 oysters were collected for disease analysis (prevalence of Perkinsus marinus)[2]. In addition, observations were made regarding the condition of the bottom at each shoal: bottom material, predators, and fouling

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[1]Oysters may be harvested from public shoals in Virginia between 1 October and 1 June with the exception of the seaside of the Eastern Shore, where harvesting is restricted to the period from 1 November to 1 April.

[2]More complete disease data, including prevalence and intensity of both MSX and Perkinsus in Virginia waters, are available from the VIMS disease monitoring program.

organisms.

Data were summarized for each shoal as the average number of market, small, spat, and total oysters per bushel and percent mortality, calculated as : [recent boxes and gapers/oysters + recent boxes and gapers] x 100.

RESULTS (Refer to Table II)

James River

Seven shoals were sampled in the James River. Bottom temperature ranged from 20.0 °C at Thomas Rock to 21.8 °C at Dry Shoal. Salinity increased in a downriver direction, from 12.0 ppt at Horsehead to 19.0 ppt at Nansemond Ridge.

Market oysters (>3") were most numerous at Point of Shoals where 27 per bushel were found. Average counts per bushel were 22 at Horsehead, 19 at Long Rock, 3 at Dry Shoal, and 1 at Wreck Shoal. No market oysters were found at either Thomas Rock or Nansemond Ridge. The number of small oysters was also greatest at Point of Shoals where 280 per bushel were recovered. At Horsehead, Long Rock, Dry Shoal and Wreck Shoal, small oysters averaged between 100 and 200 per bushel, while average counts of 34 and 52 were found at Thomas Rock and Nansemond Ridge, respectively. Recruitment was greatest at Horsehead, where 1091 spat per bushel were found. About 300 spat per bushel occurred at Point of Shoals, Long Rock, and Wreck Shoal, but only 73 were found at Thomas Rock, and 117 at Nansemond Ridge.

The number of old boxes ranged from 4 per bushel at Thomas Rock to 15 per bushel at Long Rock, while the number of new boxes ranged from 6 per bushel at Nansemond Ridge to 11 per bushel at both Long Rock and Horsehead. Recent mortality was 6% or less at all stations.

Prevalence of Perkinsus was 88% at Horsehead and 100% at Wreck Shoal, the only stations examined.

York River

Temperature on the bottom was 20.5 °C at both the stations sampled in the York River. Salinity was 12.5 ppt at Bell Rock, the upriver station, and 17.0 ppt at Aberdeen Rock, the downriver station.

No market oysters were found at either station. There were 17 small oysters per bushel at Bell Rock and 12 at Aberdeen Rock. No spat were found at either station.

One old box per bushel occurred at Bell Rock along with one new box per bushel at both Bell Rock and Aberdeen Rock. Recent mortality was therefore 6% at Bell Rock and 8% at Aberdeen Rock.

No samples were collected for disease analysis.

Mobjack Bay

Bottom temperature was 21.0 °C at Pultz Bar and 21.3 °C at Tow Stake, and salinity was 20.0 ppt at both locations.

No market oysters were recorded at Pultz Bar and only 3 per bushel were found at Tow Stake. There were 55 small oysters per bushel at Pultz Bar and 2 per bushel at Tow Stake. No spat were found at either station.

At Pultz Bar there were 3 old and 3 new boxes per bushel, and at Tow Stake 11 old boxes and 0 new boxes per bushel were found. Resultant recent mortality was 5% at Pultz Bar and 0% at Tow Stake.

Perkinsus was found in 24% of the oysters examined from Pultz Bar and 100% examined from Tow Stake.

Piankatank River

At the three stations sampled in the Piankatank River, bottom temperature was between 20.2 °C (Burton Point) and 21.5 °C (Ginney Point) and salinity was either 16.0 ppt (Ginney Point and Palace Bar) or 16.5 ppt (Burton Point).

No market oysters were found at any of the stations. There were 87 small oysters per bushel at Ginney Point and Palace Bar and 157 per bushel at Burton Point. Spat counts per bushel averaged 661 at Ginney Point, 629 at Palace Bar, and 1222 at Burton Point.

The number of old boxes per bushel ranged from 5 at Burton Point to 25 at Palace Bar, and the number of new boxes per bushel varied from 31 at Palace Bar to 39 at Burton Point. Most of the new boxes were spat that had been preyed upon by crabs. Recent mortality was 3% at Burton Point, 4% at Palace Bar, and 5% at Ginney Point.

Prevalence of Perkinsus was 100% at both Ginney Point and Palace Bar but only 16% at Burton Point.

Rappahannock River

At the eight stations surveyed in the Rappahannock River, bottom temperature ranged from 20.0 °C at Broad Creek to 21.2 °C at both Parrot Creek and Bowlers Rock. Salinity generally increased in a downriver direction, from 10.0 ppt at Ross Rock to 18.0 ppt at both Drumming Ground and Broad Creek.

Counts of market oysters per bushel were 29 at Bowlers Rock, decreasing to 19 at Smokey Point, 13 at Morattico Bar, 9 at Ross Rock, 4 at Hog House, 3 at Broad Creek, 1 at Parrot Creek, and 0 at Drumming Ground. Small oysters were most numerous at Broad Creek (166 per bushel) and at Ross Rock (124 per bushel), decreasing to 45 per bushel at Smokey Point, 43 per bushel at Bowlers Rock, 33

per bushel at Parrot Creek, 31 per bushel at Morattico, 14 per bushel at Hog House, and 6 at Drumming Ground. The number of spat per bushel increased in a downriver direction, from 0 at Ross Rock, Bowlers Rock, and Morattico Bar to 2 at Smokey Point, 18 at Hog House, 44 at Drumming Ground, 96 at Parrot Creek, and 499 at Broad Creek.

The number of old boxes per bushel ranged from 0 at Hog House and Drumming Ground to 16 at Morattico Bar, and the number of new boxes per bushel ranged from 0 at Ross Rock and Bowlers Rock to 17 per bushel at Broad Creek (mostly spat). Recent mortality was thus 0% at Ross Rock, Bowlers Rock, and Hog House, 1% at Smokey Point and Parrot Creek, 2% at Broad Creek, 6% at Morattico Bar, and 11% at Drumming Ground.

Prevalence of Perkinsus ranged from 0% at Ross Rock to 100% at both Parrot Creek and Morattico Bar. There were not enough oysters to collect a sample at Drumming Ground.

Corrotoman River

At the Middle Ground station in the Corrotoman River, temperature on the bottom was 21.5 °C and salinity was 17.5 ppt.

There were 0 market oysters per bushel, 97 small oysters per bushel, and 20 spat per bushel.

An average of 5 old boxes and 5 new boxes per bushel were found. Recent mortality was thus 4%.

Perkinsus was found in 84% of the oysters sampled.

Great Wicomico River

Temperature on the bottom at the three stations sampled in the Great Wicomico River ranged from 20.8 °C at Fleeton Point to 22.2 °C at Haynie Point. Bottom salinity was 17.5 ppt at both Haynie Point and Fleeton Point and 18.0 at Whaleys East.

There was an average of 1 market oyster per bushel at both Haynie Point and Whaleys East and 11 market oysters per bushel at Fleeton Point. The number of small oysters per bushel ranged from 141 at Haynie Point to 297 at Fleeton Point. Spat counts were 44 per bushel at Whaleys East, 397 at Haynie Point, and 473 at Fleeton Point.

The average number of old boxes per bushel was 5 at Haynie Point, 13 at Whaleys East, and 16 at Fleeton Point. The average number of new boxes per bushel was 15 at Haynie Point, 25 at Fleeton Point, and 37 at Whaleys East. Recent mortality was 3% at both Haynie Point and Fleeton Point and 10% at Whaleys East.

The prevalence of Perkinsus was 80% at Haynie Point, 84% at Fleeton Point, and 92% at Whaleys East.

DISCUSSION

Market Oysters

Market oysters represent the harvestable portion of the population. The greatest concentration of market oysters is presently in the upper James River (Horsehead, Point of Shoals, and Long Rock) and in the upper Rappahannock River (Bowlers Rock, Morattico Bar, and Smokey Point). An average of about 20 market oysters per bushel is similar to that found in these areas a year ago, but considerably lower than that in years prior to 1989 (Figures 2 and 3). Based on these results, market oyster harvest from public grounds in Virginia for the 1990-91 harvest season should be similar to the total from 1989-90, if harvest effort is similar. Effort will be determined to a large extent by market economics.

Small Oysters

Small oysters are oysters that are over 1 year old but too small to be harvestable. They represent oysters that are potentially harvestable next year or the year after, depending on survival and growth rates. Only three stations sampled had over 200 small oysters per bushel: Point of Shoals in the James River and Whaleys East and Fleeton Point in the Great Wicomico. Thus these areas are presently the best "seed"[3] areas in the state and have the best chance of producing market oysters in the next two years.

Movement of seed oysters has to be done with careful consideration of the potential for transporting disease along with seed. In general, seed oysters should never be moved to an area of lower Perkinsus prevalence than from where they came. Also, the survival rate of seed oysters to market size will be determined to a large extent by disease activity at the growout site.

Spat

Spat are oysters that have been recruited into the population within the last spawning season (few months). They are potentially important as seed oysters (in 1-3 years) and market oysters (in 3-5 years), depending on growth and survival. Good counts of spat were found in the James River at Horsehead, at all three shoals in the Piankatank River, Broad Creek in the Rappahannock River, and in the Great Wicomico River at Haynie Point and Fleeton Point. This was the best spatfall seen in the James River in recent years. It is noteworthy, however, that the area of heavy spatfall was not very extensive, as adjacent shoals (Point of Shoals and Long Rock) had considerably fewer spat. The Piankatank and Great Wicomico Rivers continue to be good spat collection areas, and good candidates for shell planting. Broad Creek near the mouth of the Rappahannock

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[3]Seed oysters are small oysters that are moved to other areas (usually private grounds) for growout.

River is also a likely candidate for shell planting, especially considering its hard sand bottom.

Mortality and Disease

Prediction of future seed and market harvests is difficult due to differential mortality rates caused by predators such as crabs and the pathogen Perkinsus. Much of the recent mortality seen in this survey was due to spat that had recently been killed by crabs. Mortality caused by predators is usually quite high for small oysters (spat), but decreases as oysters become larger. Mortality caused by disease becomes important in the second and third years of growth, usually just as oysters are reaching market size. The two shoals at which recent mortality was 10% or over (Drumming Ground in the Rappahannock River) and Whaleys East in the Great Wicomico River) had relatively few spat, indicating that recent mortality in these areas was probably disease related. No sample for disease analysis was obtained at Drumming Ground, but prevalence of Perkinsus at Whaleys East was 92%.

The distribution of Perkinsus among the various shoals is worth noting. The 88% prevalence at Horsehead in the James River was the highest yet recorded for that shoal. Since the cases were all light, however, no mortality due to disease had occurred. In some instances, there are highly variable prevalences within the same systems. The relatively low prevalence of 24% at Pultz Bar in Mobjack Bay may be due to the fact that only small (young) oysters were present, and as stated before, Perkinsus does not become established until oysters are 2-3 years old. A similar explanation may be given for the 16% prevalence at Burton Point in the Piankatank River. In the Rappahannock River, the low 4% prevalence at Hog House may be caused by the fact that there were so few oysters there and they were dispersed too far apart to allow transmission from one oyster to another. Prevalence at Morattico Bar has been 100% for the last two years, in spite of the fact that shoals upstream (Bowlers Rock) and downstream (Smokey Point) have lower prevalences. Even though Perkinsus was found at Ross Rock last year, it has not become more prevalent within the last year.

SUMMARY

1. The greatest number of market oysters were found at Horsehead, Point of Shoals, and Long Rock in the James River and Bowlers Rock, Morattico Bar, and Smokey Point in the Rappahannock River. Concentrations of market oysters in these commercially harvested areas (upper James River and upper Rappahannock River) are similar to numbers found a year ago. Thus if effort is comparable, harvest should be comparable to last year's as well.

2. Point of Shoals in the James River and Whaleys East and Fleeton Point in the Great Wicomico River had the greatest number of small oysters and thus represent the best sources of seed oysters at present.

3. Spatfall in the James River was the greatest seen in recent years. The extent of heavy spatfall, however, was relatively small, being concentrated around Horsehead. Other areas of good spatfall included Ginney Point, Palace Bar and Burton Point in the Piankatank River, Broad Creek in the Rappahannock River, and Haynie Point and Fleeton Point in the Great Wicomico River. These areas should be good sources of seed oysters next year and are good candidates to receive shell planting.

4. The oyster pathogen Perkinsus was found on all shoals sampled except for Ross Rock in the Rappahannock River. The prevalence of Perkinsus at Horsehead in the James River was the highest ever recorded at that location, but since all the cases were light, no mortality has resulted. Relative disease prevalences must be considered prior to movement of seed oysters.

ACKNOWLEDGEMENTS

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TABLE I

Station Locations and Dates Sampled - Fall 1990

Station	Date	Loran Coordinates	
James River			
Horsehead	28 September	27346.0	41333.2
Pt. of Shoals	28 September	27344.0	41310.6
Long Rock	28 September	27338.4	41312.9
Dry Shoal	28 September	27332.5	41302.3
Wreck Shoal	26 September	27326.0	41301.8
Thomas Rock	26 September	27302.7	41218.8
Nansemond Ridge	26 September	27280.6	41218.8
York River			
Bell Rock	25 September	27424.7	41596.8
Aberdeen Rock	25 September	27368.3	41501.2
Mobjack Bay			
Pultz Bar	25 September	27310.6	41534.6
Tow Stake	25 September	27316.9	41521.5
Piankatank River			
Ginney Point	27 September	27347.2	41659.6
Palace Bar	27 September	27338.0	41658.0
Burton Point	27 September	27326.4	41652.3
Rappahannock River			
Ross Rock	3 October	27496.8	41897.8
Bowlers Rock	3 October	27472.4	41847.3
Morattico Bar	3 October	27447.0	41820.0
Smokey Point	3 October	27418.1	41779.9
Hog House	2 October	27398.3	41725.8
Drumming Ground	2 October	27377.8	41738.1
Parrot Creek	2 October	27361.9	41710.4
Broad Creek	2 October	27329.0	41698.0
Corrotoman River			
Middle Ground	2 October	27386.2	41763.0
Great Wicomico River			
Haynie Point	1 October	27366.4	41881.4
Whaleys East	1 October	27361.0	41866.7
Fleeton Point	1 October	27358.2	41868.1

TABLE II

Results of Public Oyster Shoal Survey - Fall 1990

STATION	TEMP. (°C)	SAL. (ppt)	AVERAGE NO. OYSTERS PER BUSHEL Market	Small	Spat	Total	BOXES Old	New	% RECENT MORTALITY	Perkinsus (% Prev.)
James River										
Horsehead	21.3	12.0	22	182	1091	1295	5	11	<1	88
Pt. of Shoals	21.1	13.0	27	280	311	618	10	7	1	---
Long Rock	21.4	12.0	19	125	273	417	15	11	3	---
Dry Shoal	21.8	14.0	3	135	87	225	10	7	3	---
Wreck Shoal	21.1	13.5	1	102	269	372	14	9	2	100
Thomas Rock	20.0	16.0	0	34	73	107	4	7	6	---
Nansemond Rdg	21.0	19.0	0	52	117	169	7	6	3	---
York River										
Bell Rock	20.5	12.5	0	17	0	17	1	1	6	---
Aberdeen Rock	20.5	17.0	0	12	0	12	0	1	8	---
Mobjack Bay										
Pultz Bar	21.0	20.0	0	55	0	55	3	3	5	24
Tow Stake	21.3	20.0	3	2	0	5	11	0	0	100
Piankatank River										
Ginney Point	21.5	16.0	0	87	661	748	23	37	5	100
Palace Bar	21.0	16.0	0	87	629	716	25	31	4	100
Burton Point	20.2	16.5	0	157	1222	1379	5	39	3	16

TABLE II, continued

STATION	TEMP. (°C)	SAL. (ppt)	AVERAGE NO. OYSTERS PER BUSHEL Market	Small	Spat	Total	BOXES Old	New	% RECENT MORTALITY	Perkinsus (% Prev.)
Rappahannock River										
Ross Rock	21.0	10.0	9	124	0	133	2	0	0	0
Bowlers Rock	21.2	13.5	29	43	0	72	10	0	0	84
Morattico Bar	21.0	15.5	13	31	0	44	16	3	6	100
Smokey Point	20.9	16.0	19	45	2	66	7	1	1	56
Hog House	21.1	17.5	4	14	18	36	0	0	0	4
Drumming Gnd	20.8	18.0	0	6	44	50	0	6	11	---
Parrot Creek	21.2	17.5	1	33	96	130	1	1	1	100
Broad Creek	20.0	18.0	3	166	499	668	7	17	2	96
Corrotoman River										
Middle Ground	21.5	17.5	0	97	20	117	5	5	4	84
Great Wicomico River										
Haynie Point	22.2	17.5	1	141	397	539	5	15	3	80
Whaleys East	21.5	18.0	1	275	44	320	13	37	10	92
Fleeton Point	20.8	17.5	11	297	473	781	16	25	3	84

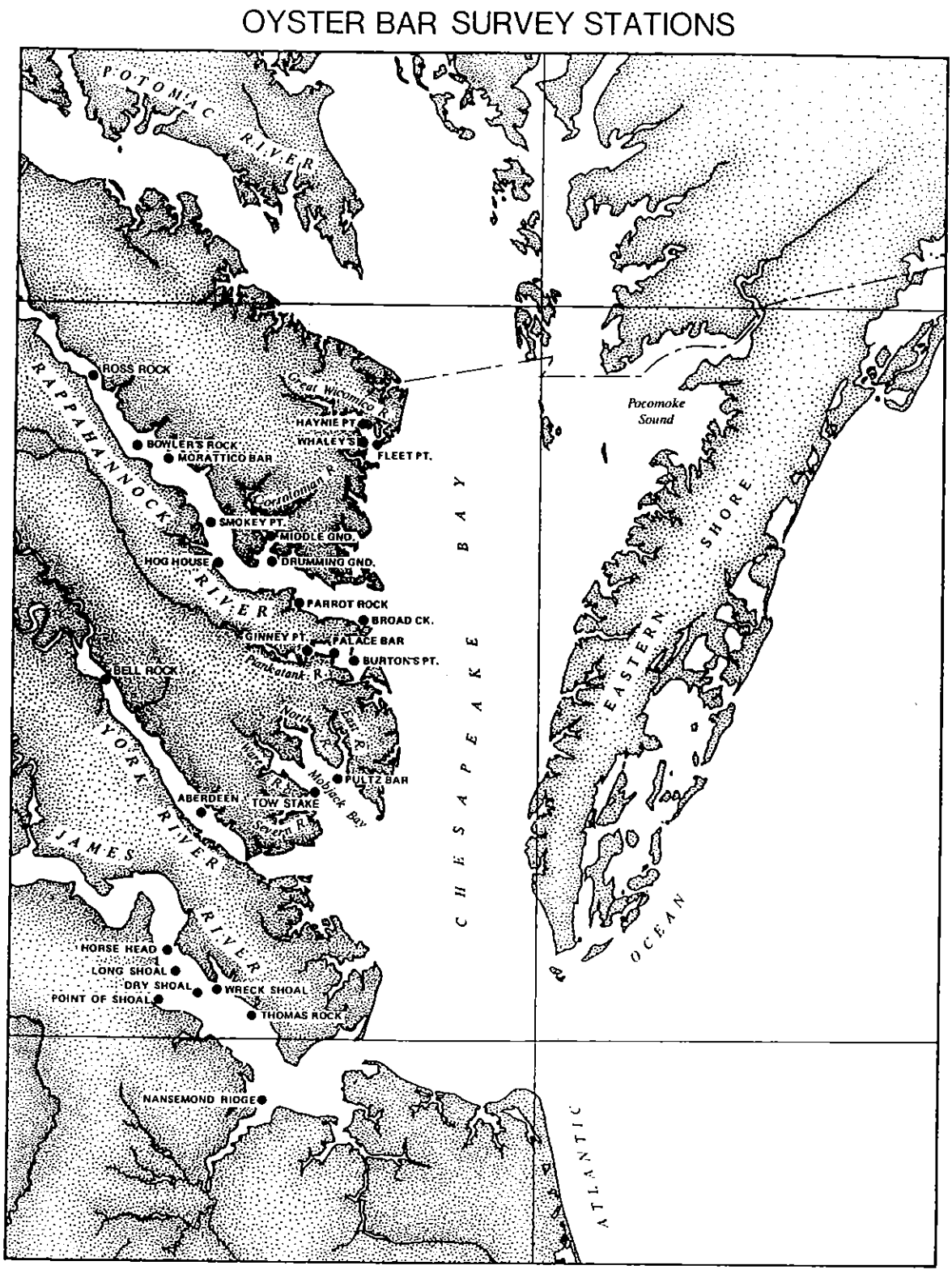

Figure 1. Location of shoals sampled during the Fall 1990 Oyster Shoal Survey

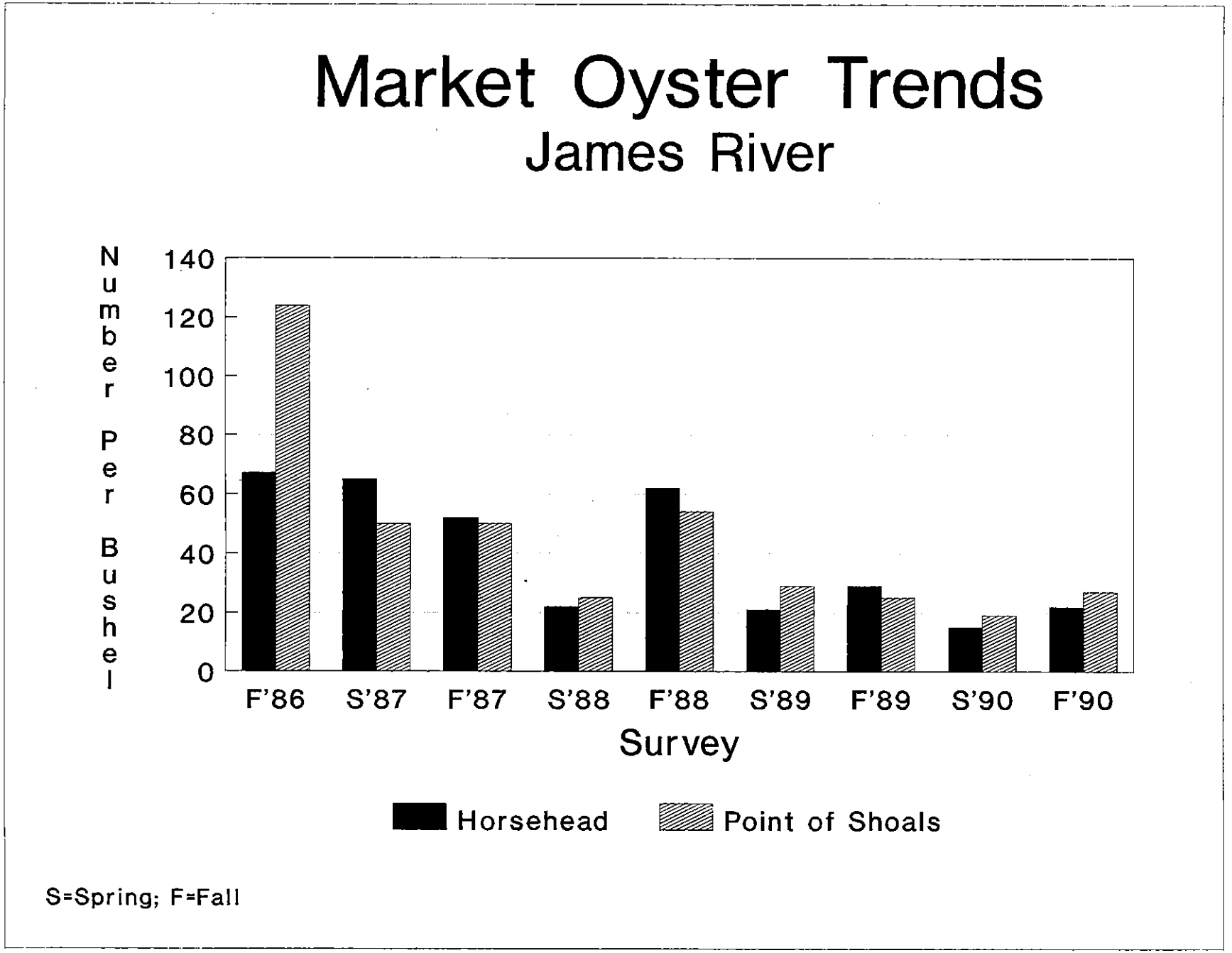

Figure 2. Trends in market oyster counts from 1986 to present at Horsehead and Point of Shoals, in the James River.

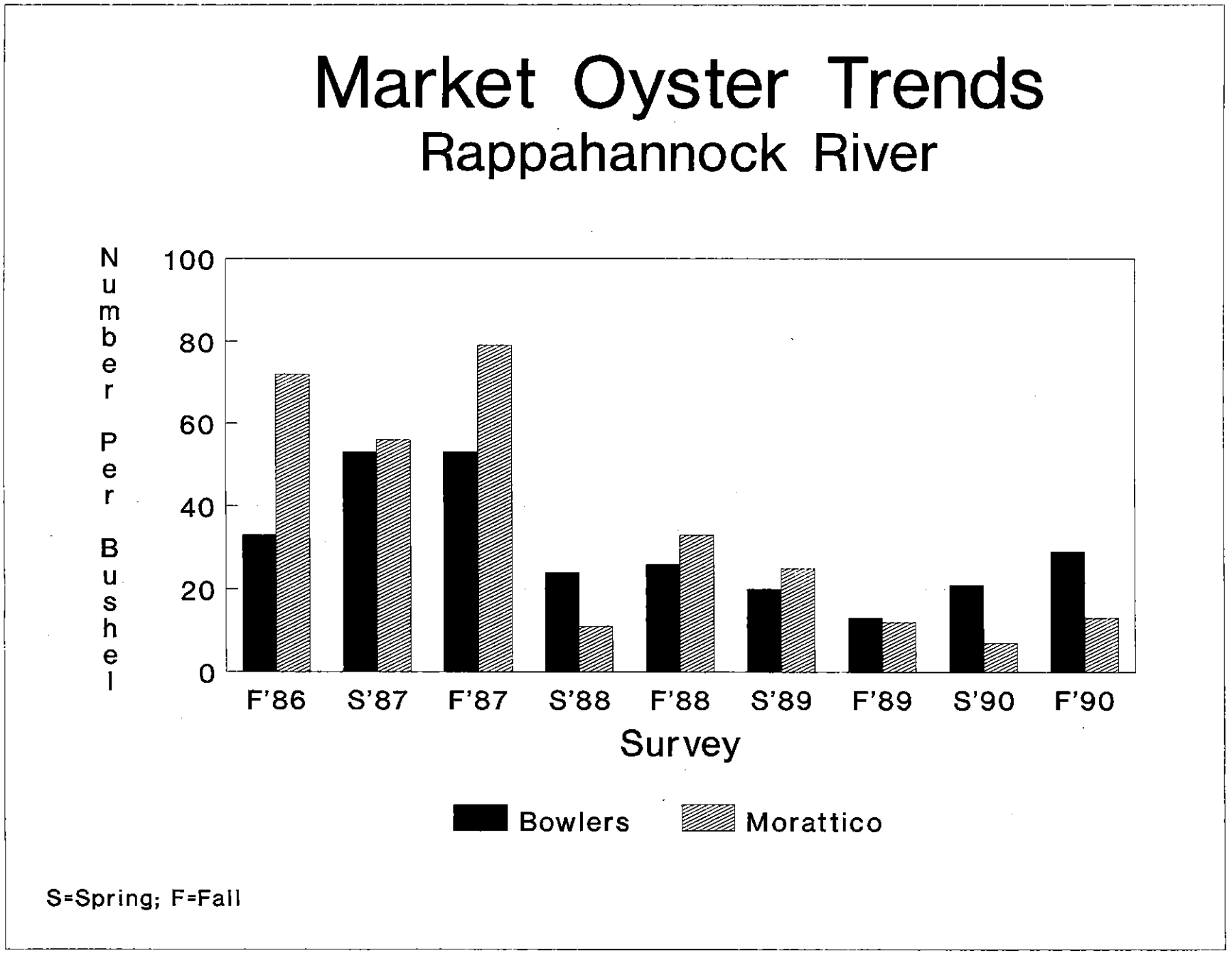

Figure 3. Trends in market oyster counts from 1986 to present at Bowlers Rock and Morattico Bar, in the Rappahannock River.