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PUBLIC OYSTER SHOAL SURVEY - SPRING 1990

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## SUMMARY

The entire commercial public oyster fishery of Virginia (exclusive of some areas on the Eastern Shore) is presently confined to a few shoals in the upper James and Rappahannock Rivers. These areas are being fished intensely at present. Within the last year the number of total oysters (market, small, spat) has declined by 38%. Appreciable declines in the number of market oysters have occurred over the last several harvest seasons. Continuing removal of market oysters might in turn be reducing the potential for recruitment to these populations. The future of the public oyster fishery in Virginia will depend largely on the balance between harvest pressure, disease mortality, and the recruitment of young oysters into the populations. Steps to protect what is left of the resource are urgently needed.

## INTRODUCTION

Twice a year the Virginia Institute of Marine Science conducts a survey of selected public oyster bars (shoals) in Virginia waters for the purpose of assessing the status of the fishery. Surveys conducted in the spring provide information about over-winter mortality and relative fishing pressure from the current harvesting season. 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 and/or market oysters prior to the beginning of the harvesting season.

There are over 243,000 acres of designated public oyster grounds in Virginia. Since about 1960, when oyster diseases began having an impact, the area of productive oyster ground has been drastically reduced. Presently, only the upper James and Rappahannock Rivers are being fished commercially. The spring survey focuses (by sampling more intensively) on the areas that are commercially productive, and the fall survey provides a broad overview of the status of the entire area designated as public oyster ground.

## METHODS

Eight shoals in the upper James River (Figure 1) and five shoals in the upper Rappahannock River (Figure 2) were sampled between May 14 and May 17, 1990 (Table I). At least three 0.5 bushel samples (1 bushel = 50 quarts) of bottom material were taken at each shoal using a 24 inch dredge having four inch teeth.

The following data were recorded for each sample: number of market oysters (>3" in shell height), number of small (submarket oysters), number of yearlings (recruits from 1989), number of recent boxes (inside of shells clean), and number of old boxes (dead for a month or more). Bottom water temperature and salinity were obtained at each location. The data were summarized for each shoal as the average number of market, small, yearling, and total oysters per bushel and percent recent mortality, calculated as:  $[\text{recent boxes and gapers} / \text{oysters} + \text{recent boxes and gapers}] \times 100$ .

Samples of 25 live oysters were collected from selected locations and returned to the laboratory for determination of the prevalence of Perkinsus marinus.

## RESULTS

### James River (See Table II)

Bottom water temperature ranged from 19.2 C to 20.8 C at the eight locations sampled in the James River. Salinity on the bottom was lowest at the upriver locations (Mulberry Point and Horsehead, 2.10 ppt) and highest at the downriver locations (Dry Shoal, 10.2 ppt and East End, 5.8 ppt).

The total number of living oysters per bushel generally increased in an upriver direction, averaging 75 at Dry Shoal and 360 at Mulberry Point. Counts of market oysters ranged from an average of 4 per bushel at Dry Shoal to 40 per bushel at Mulberry Point and 37 per bushel at Swash. Dry Shoal also had the fewest small oysters (59 per bushel) while Mulberry Point had the most (257 per bushel). Yearlings were most numerous at Mulberry Point (63 per bushel) and Point of Shoals (37 per bushel) but almost non-existent at East End (2 per bushel) and Swash (6 per bushel).

The fewest old boxes were found at Point of Shoals (5 per bushel) while the greatest number occurred at Swash (43 per bushel) and East End (37 per bushel). The average number of new boxes ranged from 0 per bushel at Dry

Shoal to 9 per bushel at Rainbow Rock. No gapers (dying oysters) were found. Percent recent mortality was lowest at Dry Shoal (0.0%) and highest at Rainbow Rock and East End (both 4.5%).

Perkinsus was found in 16% of the oysters sampled at Horsehead and 28% at Point of Shoals. All of these were "light" (non-lethal) cases.

#### Rappahannock River (See Table II)

Bottom water temperature at the five shoals sampled in the Rappahannock River ranged from 19.5 C to 21.5 C. Salinity varied from 2.2 ppt at Ross Rock to 11.0 ppt at Smokey Point.

The number of total oysters averaged 47 per bushel at Smokey Point and 207 per bushel at Long Rock, increasing in an upriver direction. Market oysters averaged 25 per bushel at Long Rock and 21 at Bowler's Rock. Counts of small oysters ranged from an average of 35 per bushel at Smokey Point to 125 per bushel at Long Rock. Yearlings averaged less than 10 per bushel at all locations except Long Rock, where the count was 57 per bushel.

The average number of old boxes per bushel was highest at Long Rock (15 per bushel) and lowest at Smokey Point (2 per bushel). There were 2 or fewer new boxes at all locations, with no gapers being found. Recent mortality was below 2% at all locations.

Prevalence of Perkinsus was 0% at Ross Rock and Bowler's Rock and 4% at Long Rock and Morattico Bar. All infections were "light" (non-lethal).

#### DISCUSSION

The portions of the upper James and upper Rappahannock Rivers that were surveyed comprise the entire area of commercially harvested public oyster ground in Virginia exclusive of the seaside of the Eastern Shore. In fact, about 90% of all oysters landed from public grounds are presently coming from the upper James River. Production in other areas has been severely curtailed since about 1960 due to the action of two oyster pathogens, Haplosporidium nelsoni and Perkinsus marinus. With the public fishery concentrated almost entirely in these two relatively small areas, it is questionable as to how long commercial production can be sustained.

The results of this survey show that there were slight increases in market oysters over a year ago at three of the shoals in the James River (East End, Swash, and Mulberry Point) and two of the shoals in the Rappahannock River (Bowler's Rock and Long Rock). More importantly, however, is that there were fewer total living oysters (market, small, and yearlings) at 12 of the 13 locations. Overall, there was a 38% decrease in the number of living oysters at these locations between May 1989 and May 1990. Since most of this decline was in the smaller size classes, market production in the next few years is not likely to improve.

Percent recent mortality was below 5% in the James River and below 2% in the Rappahannock River, indicating that mortality due to predation, low salinity, and disease in these areas has been negligible in the recent past. Although Perkinsus was present in both rivers, the intensities of infections were not sufficient to cause mortality. The decrease in total numbers of oysters can best be explained by 1) removal of market oysters by harvesting and 2) a lack of recruitment (production of young oysters) in recent years.

Recent trends in the number of market oysters per bushel are illustrated for the James River (Point of Shoals and Horsehead) and the Rappahannock River (Bowler's Rock and Morattico Bar) in Figures 3 and 4, respectively. Since the harvest season extends from October through May, harvesting is reflected as a decrease in market oysters between fall and spring surveys. Especially large (statistically significant) decreases were

seen at Point of Shoals between fall 1986 and spring 1987 (t-test,  $P < 0.05$ ) and at Horsehead, Point of Shoals, and Morattico Bar between fall 1987 and spring 1988 (t-test,  $P < 0.05$ ). Growth of oysters is reflected as an increase in market oysters between spring and fall surveys. Good recoveries occurred at Point of Shoals in 1986 and 1988, Horsehead in 1988, and Morattico Bar in 1987 and 1988. Nonetheless, if just the spring (post-harvest) averages are considered, Horsehead, Point of Shoals, and Morattico Bar all show a decrease in market oysters over the last four harvest seasons. In both rivers, this decrease was most notable between 1987 and 1988. For the last three harvest seasons, the decline has continued to the point where three of the four major oyster-producing shoals in the state have fewer than 20 market oysters per bushel.

The decline in larger (market) oysters may in turn be affecting recruitment by effectively reducing the reproductive potential of the population. Market oysters, because of their size, are more important as broodstock (spawners) than smaller oysters. The relationship between number of broodstock and number of spat the following fall is unclear because there are so many other factors affecting the recruitment process. It is obvious, however, that fewer oysters produce fewer eggs, thus reducing recruitment potential, with all other factors being equal. This is especially critical in small (now) isolated areas such as the upper James and Rappahannock Rivers that are unlikely to receive recruitment from other regions.

All of the shoals sampled in this survey are presently marginal from a commercial standpoint. Fewer oysters are being harvested by fewer watermen. Continued depletion of the remaining productive areas can only exacerbate recent recruitment failures. Serious consideration should be given to conserving what is left of the resource.

#### ACKNOWLEDGEMENTS

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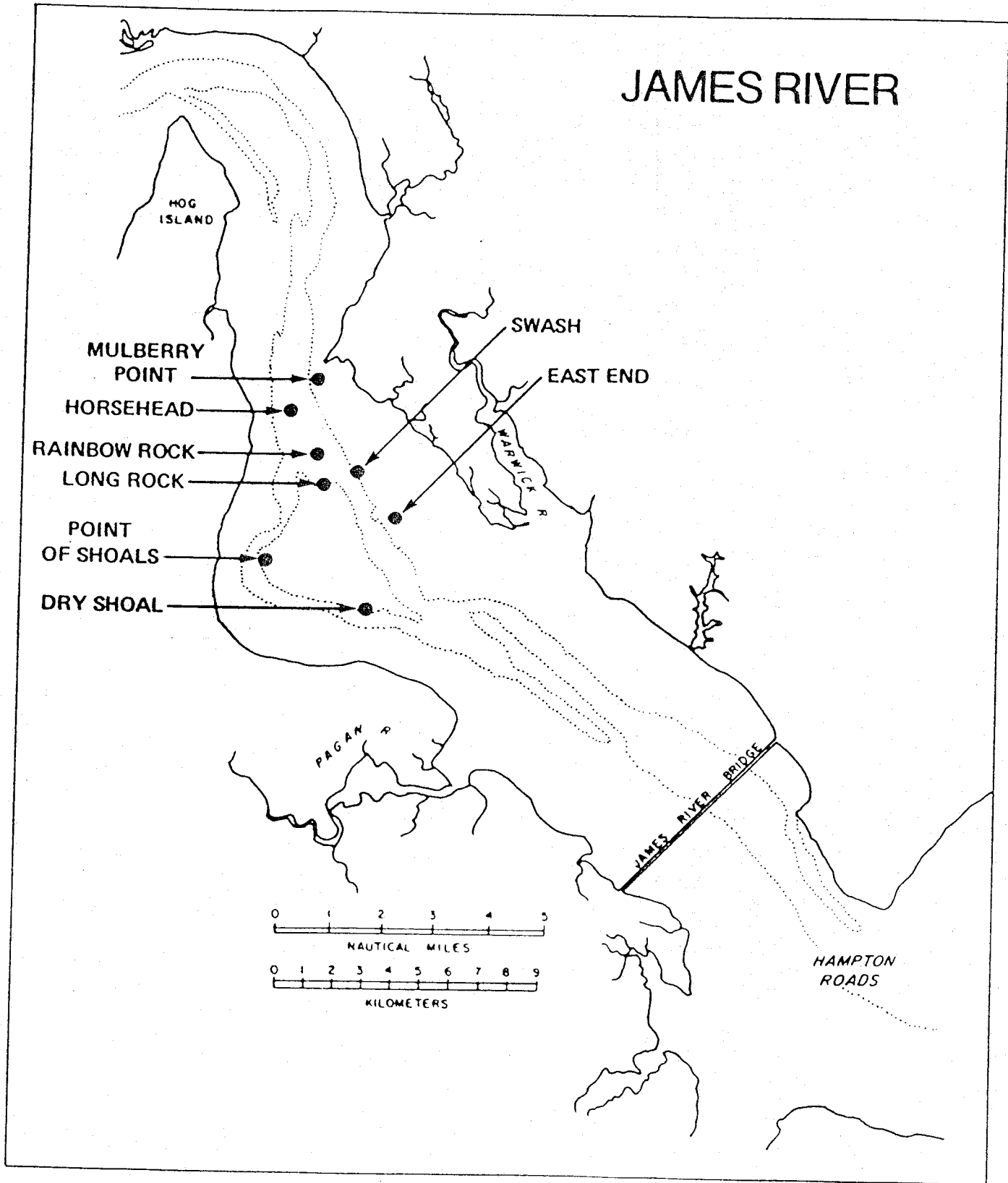


Figure 1. Map of James River showing locations of oyster shoals sampled.

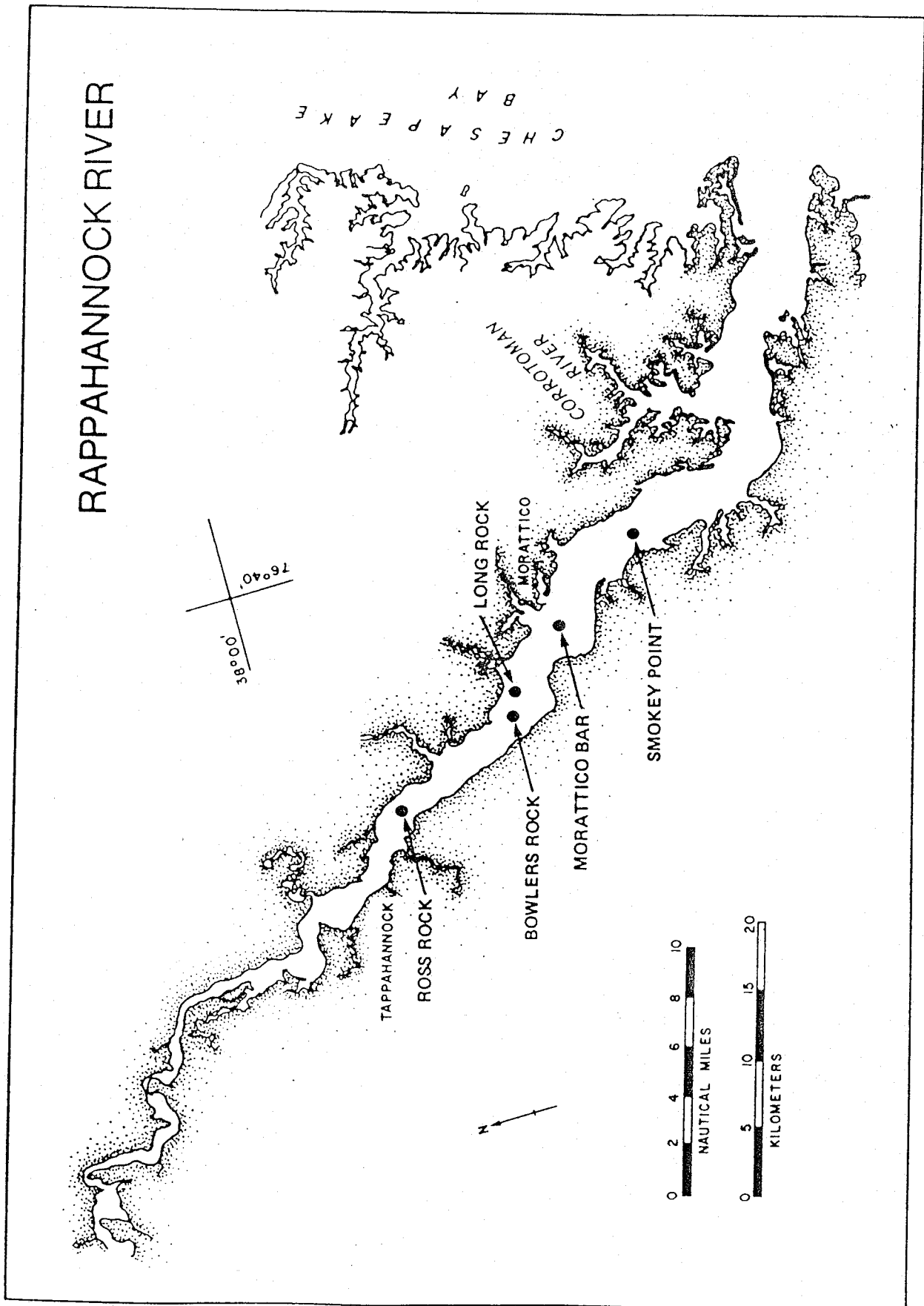


Figure 2. Map of Rappahannock River showing locations of oyster shoals sampled.



TABLE I

Station locations and dates sampled - Spring 1990

Station	Date	Loran Coordinates	
<u>James River</u>			
East End	15 May	27331.0	41315.0
Swash	15 May	27339.4	41327.5
Mulberry Pt.	14 May	27336.9	41330.8
Horsehead	14 May	27346.0	41333.2
Rainbow Rock	14 May	27340.9	41323.9
Long Rock	15 May	27338.4	41312.9
Pt. of Shoals	14 May	27344.0	41310.3
Dry Shoal	15 May	27332.5	41302.3
<u>Rappahannock River</u>			
Ross Rock	17 May	27497.8	41898.1
Bowlers Rock	16 May	27473.2	41848.3
Long Rock	16 May	27465.6	41841.2
Morattico Bar	16 May	27446.7	41822.5
Smokey Point	16 May	27418.5	41780.1

TABLE II

## Results of Public Oyster Shoal Survey - Spring 1990

STATION	TEMP.	SAL. (ppt)	AVERAGE NO. OYSTERS PER BUSHEL				BOXES		RECENT MORT.	Perkinsus
	( C )		Market	Small	Yearlings	Total	Old	New	(%)	(% prev.)
<u>James River</u>										
East End	19.2	5.8	22	61	2	85	37	4	4.5	--
Swash	19.5	4.3	37	199	6	242	43	6	2.4	--
Mulberry Pt.	19.7	2.1	40	257	63	360	35	7	1.9	--
Horsehead	20.3	2.1	15	90	21	126	14	4	3.1	16
Rainbow Rock	20.4	3.4	28	151	14	193	29	9	4.5	--
Long Rock	20.3	5.5	14	104	12	130	30	2	1.5	--
Pt. of Shoals	20.8	3.1	19	175	37	231	5	2	0.9	28
Dry Shoal	19.6	10.2	4	59	12	75	24	0	0.0	--
<u>Rappahannock River</u>										
Ross Rock	21.5	2.2	6	114	3	123	8	1	0.8	0
Bowlers Rock	21.1	4.2	21	76	5	102	6	0	0.0	0
Long Rock	20.4	5.1	25	125	57	207	15	2	1.0	4
Morattico Bar	20.4	7.7	7	44	8	59	4	1	1.7	4
Smokey Point	19.5	11.0	3	35	9	47	2	0	0.0	--

# JAMES RIVER

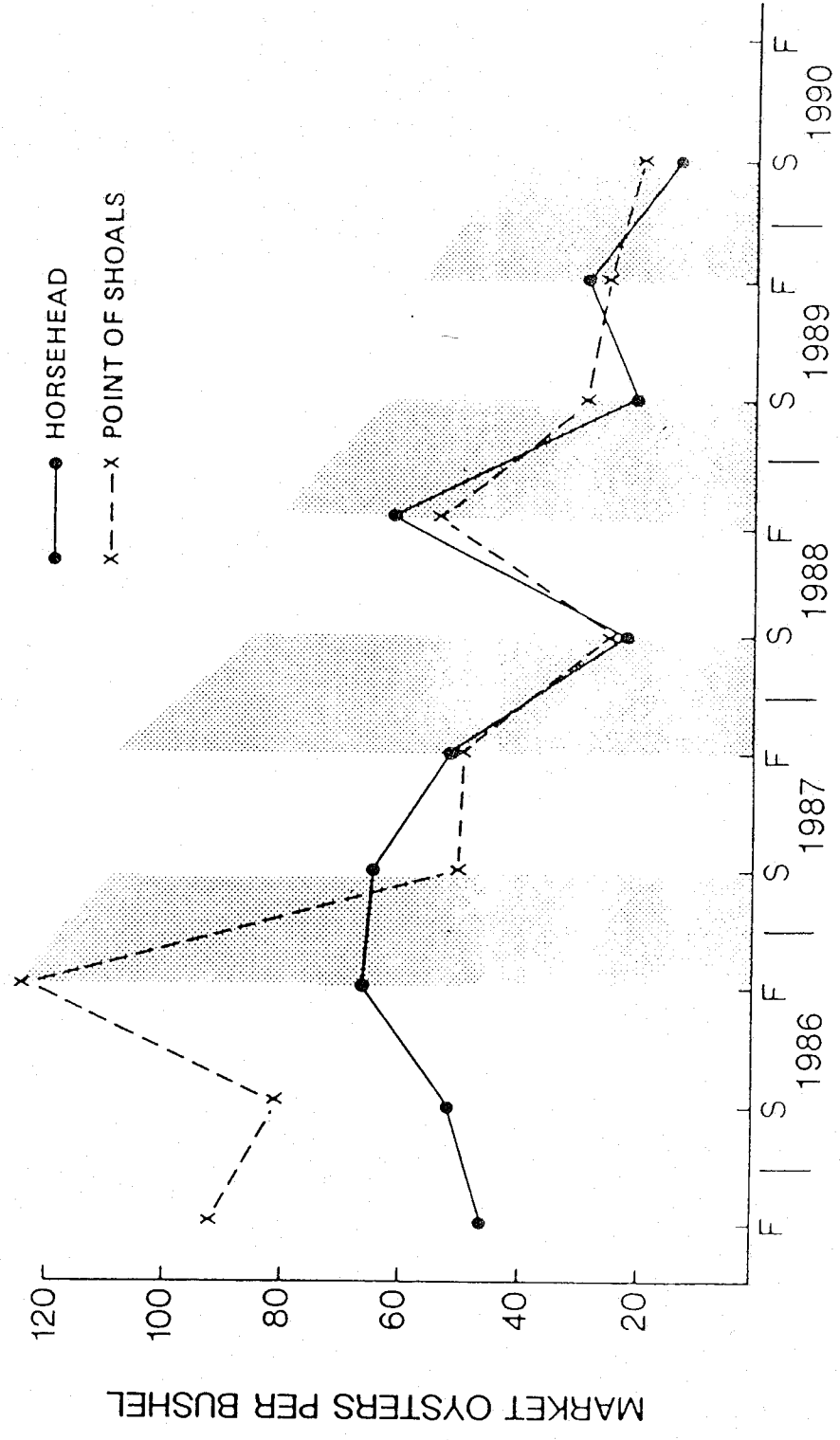


Figure 3. Average number of market oysters per bushel on Horsehead Bar and Point of Shoals (James River), Fall 1985 to Spring 1990.

# RAPPAHANNOCK RIVER

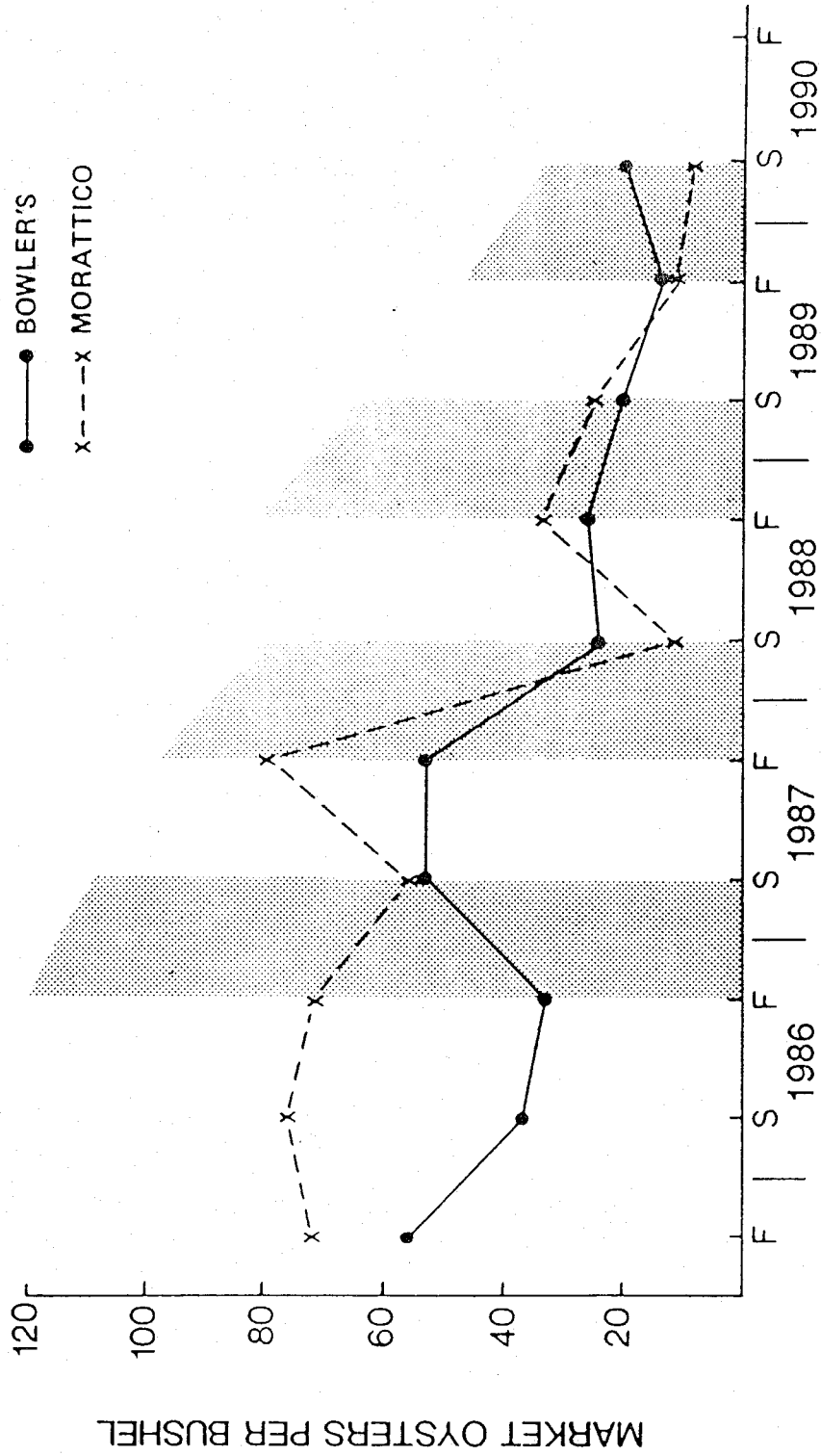


Figure 4. Average number of market oysters per bushel on Bowler's Rock and Morattico Bar (Rappahannock River), Fall 1985 to Spring 1990.