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1989

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Recommended Citation

Barber, B. (1989) Public Oyster Shoal Survey - Spring 1989. Virginia Marine Resource Report No. 89-6. Virginia Institute of Marine Science, College of William and Mary. <https://doi.org/10.21220/V5N01N>

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FILE

PUBLIC OYSTER SHOAL SURVEY - SPRING 1989

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July 1, 1989

**Virginia Marine Resource
Report No. 89-6**

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 as to over-winter mortality and relative fishing pressure from the current harvesting season. Surveys conducted in the fall provide information as to 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.

In recent years both spring and fall surveys attempted to cover the entire 243,000 acres of designated public oyster grounds in Virginia. However, 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. Thus it is no longer worthwhile to sample all areas twice a year. Beginning this year, the spring survey will focus (by sampling more intensively) on the areas that are commercially productive and the fall survey will (as before) provide 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 15 and May 22, 1989. 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 previous year), 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: [recent boxes and gapers/ oysters + recent boxes and gapers] x 100.

RESULTS

James River

Bottom water temperature was between 17.5 °C and 18.0 °C at the eight locations sampled in the James River (Table I). Salinity on the bottom was lowest at the upriver locations (Mulberry Point, 0.4 ppt and Horsehead 0.3 ppt) and highest at the downriver locations (Dry Shoal, 2.6 ppt and East End, 2.7 ppt).

The total number of living oysters per bushel generally increased in an upriver direction, averaging 148 at Dry Shoal and 459 at Mulberry Point. Counts of market oysters ranged from an average of 8 per bushel at Dry Shoal to 34 per bushel at Rainbow Rock and 35 per bushel at Swash. Dry Shoal also had the fewest small oysters (114 per bushel) while Mulberry Point had the most (403 per bushel). Yearlings were most numerous at Mulberry Point (30

per bushel) and Point of Shoals (32 per bushel) but almost non-existent at East End and Swash (an average of 1 per bushel).

The fewest old boxes were found at Point of Shoals (16 per bushel) while the greatest number occurred at East End (168 per bushel). The average number of new boxes ranged from 5 per bushel at both Mulberry Point and Point of Shoals to 30 per bushel at Rainbow Rock. Gapers (dying oysters) were found at both Rainbow Rock and Long Rock. Percent recent mortality was lowest at Mulberry Point (1.1%) and highest at Rainbow Rock (7.8%).

Rappahannock River

Bottom water temperature at the five shoals sampled in the Rappahannock River (Table I) ranged from 18.0 °C to 21.2 °C. Salinity varied from 2.9 ppt at Ross Rock to 12.3 ppt at Morattico Bar.

The number of total oysters averaged 59 per bushel at Smokey Point and 444 per bushel at Long Rock. Market oysters averaged 20 or more per bushel at all locations except Smokey Point, where there were only 6 per bushel. Counts of small oysters ranged from an average of 18 per bushel at Morattico Bar to 133 per bushel at Long Rock. Yearlings were least numerous at Morattico Bar (average of 5 per bushel) and most numerous at Long Rock (288 per bushel).

The average number of old boxes per bushel increased downriver from 2 at Ross Rock to 27 at Smokey Point. New boxes were least numerous at Ross Rock (1 per bushel) and most numerous at Long Rock (17 per bushel). Gapers were found at Morattico Bar. Recent mortality was 0.7% at Ross Rock and steadily increased (in a downstream direction) to 14.5% at Smokey Point.

DISCUSSION

All of the shoals sampled in this survey are presently marginal from a commercial standpoint. This is especially true for the most downriver shoals sampled, Dry Shoal in the James River and Smokey Point in the Rappahannock River. Excluding these two shoals, market-sized oysters average between 19 and 35 per bushel. There are encouraging numbers of small oysters (311-403 per bushel) at Swash, Mulberry Point, and Rainbow Rock in the James River. Only Long Rock in the Rappahannock has substantial numbers of yearlings (288 per bushel). So the potential for substantial short-term improvement in market harvest appears to be limited to these shoals. Whether or not a commercially acceptable yield of market oysters can be sustained will depend on the balance between recruitment and growth of oysters to market size, and harvest pressure. (Disease is not yet a factor in these areas).

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. In fact, well over 90% of all oysters landed from public grounds are presently coming from the upper James River, an area that prior to the 1986-87 season was harvested only for seed. With the entire public fishery concentrated in these two relatively small areas, it is questionable as to how long commercial production can be sustained. This is especially true of the upper James River, where even though recruitment has been historically good, growth of oysters is quite slow.

The removal of market oysters results in a decrease in broodstock (reproductively competent) oysters from the population. 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 River that are unlikely to receive recruitment from other regions.

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 three harvest seasons, indicating a net removal of oysters over this period. In both rivers, this decrease was most notable between 1987 and 1988. For the last two years, the post-harvest number of market oysters has been about 20 per bushel.

Besides human influences (primarily harvesting and water quality), the future of the upper James and Rappahannock Rivers as productive public oyster grounds will depend on the influence of disease. The upper James and Rappahannock Rivers are currently productive public oyster grounds because

they represent low salinity refuges from the oyster diseases MSX and Perkinsus that have decimated oyster stocks in all other areas of Virginia. Last summer Perkinsus was found in both of these regions, probably the result of drought conditions and above average salinities. During this survey salinities were low (too low for disease development) because of recent rainfall, but not unusually low for these areas at this time of year.

Low salinity, while favorable from a disease standpoint, can be detrimental to oysters if it remains too low for too long. Although gapers were found during the survey, there was no apparent mass mortality related to low salinity. In fact, recent mortality was highest in both rivers at the shoals that were located the farthest downriver (Dry Shoal and Smokey Point), suggesting some cause other than low salinity.

SUMMARY

The entire commercial public oyster fishery of Virginia is presently confined to a few shoals in the upper James and Rappahannock Rivers, which are being fished intensely at present. Appreciable declines in the number of market oysters have occurred over the last two harvest seasons. Continued removal of market oysters (broodstock) might also reduce the potential for recruitment to these populations. Whether or not disease spreads into these areas will depend on rainfall and prevailing salinity. The future of the oyster fishery in these areas (and others) will depend largely on the balance between harvest pressure, disease mortality, and the recruitment of young oysters into the populations.

ACKNOWLEDGEMENTS

Sampling assistance was provided by Ken Walker, Chris Horner, Ray Morales, and Curtis Roegner.

TABLE I

Results of Public Oyster Shoal Survey - Spring 1989

STATION	DATE	TEMP. (°C)	SAL. (ppt)	AVERAGE NO. OYSTERS PER BUSHEL			BOXES		% RECENT MORT.	
				Market	Small	Yearlings	Total	Old		New
<u>James River</u>										
East End	5/15	18.0	2.7	19	147	1	167	168	11	6.1
Swash	5/15	17.5	2.0	35	342	1	378	92	10	2.6
Mulberry Pt.	5/15	18.0	0.4	26	403	30	459	35	5	1.1
Horsehead	5/15	18.0	0.3	21	189	21	231	26	3	1.3
Rainbow Rock	5/16	17.8	1.6	34	311	10	355	72	30	7.8
Long Rock	5/16	17.8	1.6	25	169	29	223	65	17	7.1
Pt. of Shoals	5/16	17.8	0.6	29	262	32	323	16	5	1.5
Dry Shoal	5/16	17.7	2.6	8	114	26	148	80	20	11.9
<u>Rappahannock River</u>										
Ross Rock	5/22	21.0	2.9	20	112	14	146	2	1	0.7
Bowlers Rock	5/19	18.5	9.3	20	118	88	226	3	2	0.9
Long Rock	5/19	18.0	11.0	23	133	288	444	7	17	3.7
Morattico Bar	5/19	18.2	12.3	25	18	5	48	18	2	4.0
Smokey Point	5/22	21.2	10.0	6	36	17	59	27	10	14.5

FIGURE LEGENDS

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

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

Figure 3. Average number of market oysters per bushel on Horsehead Bar and Point of Shoals (James River), Fall 1985 to Spring 1989.

Figure 4. Average number of market oysters per bushel on Bowler's Rock and Morattico Bar (Rappahannock River), Fall 1985 to Spring 1989.

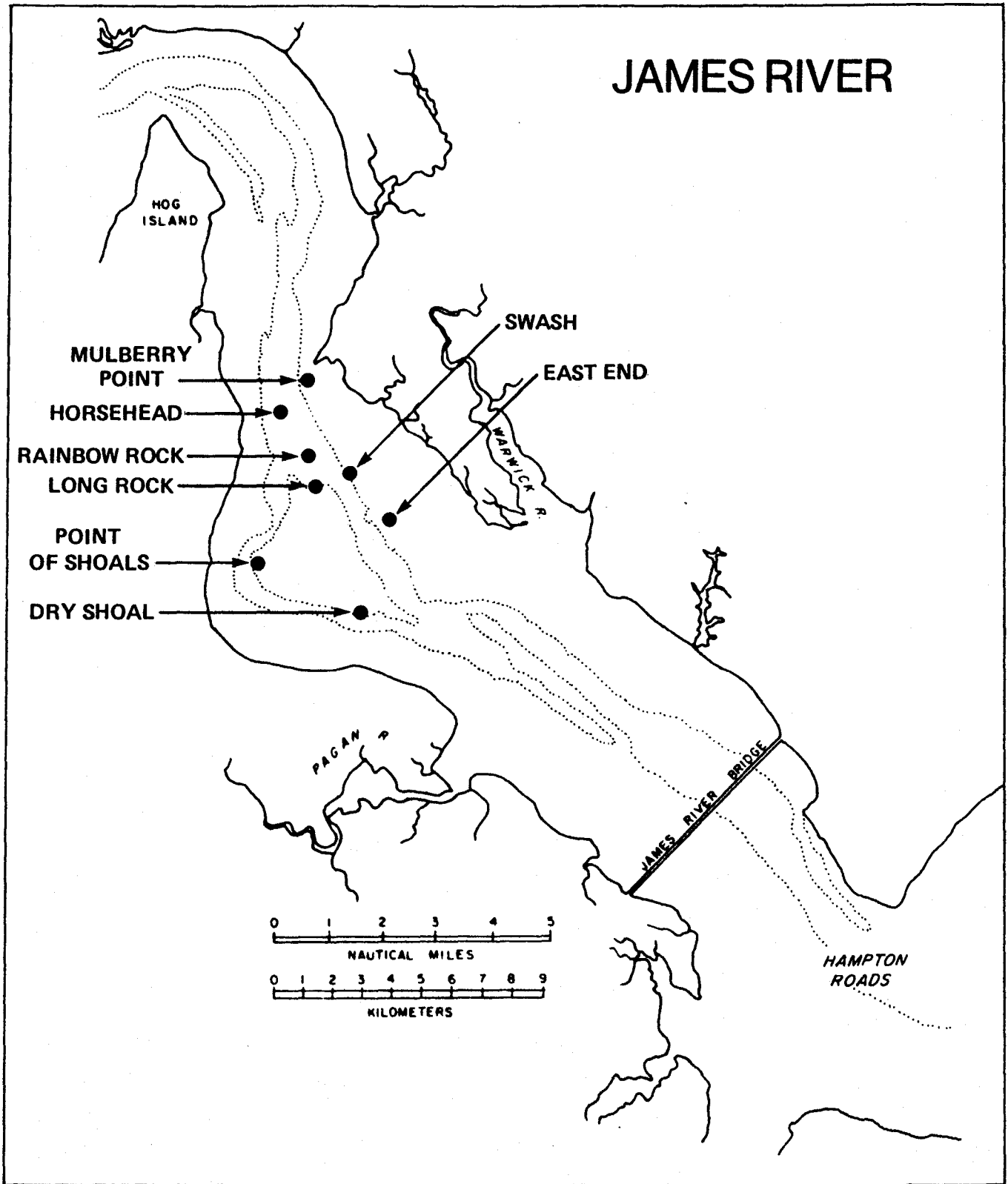


Figure 1

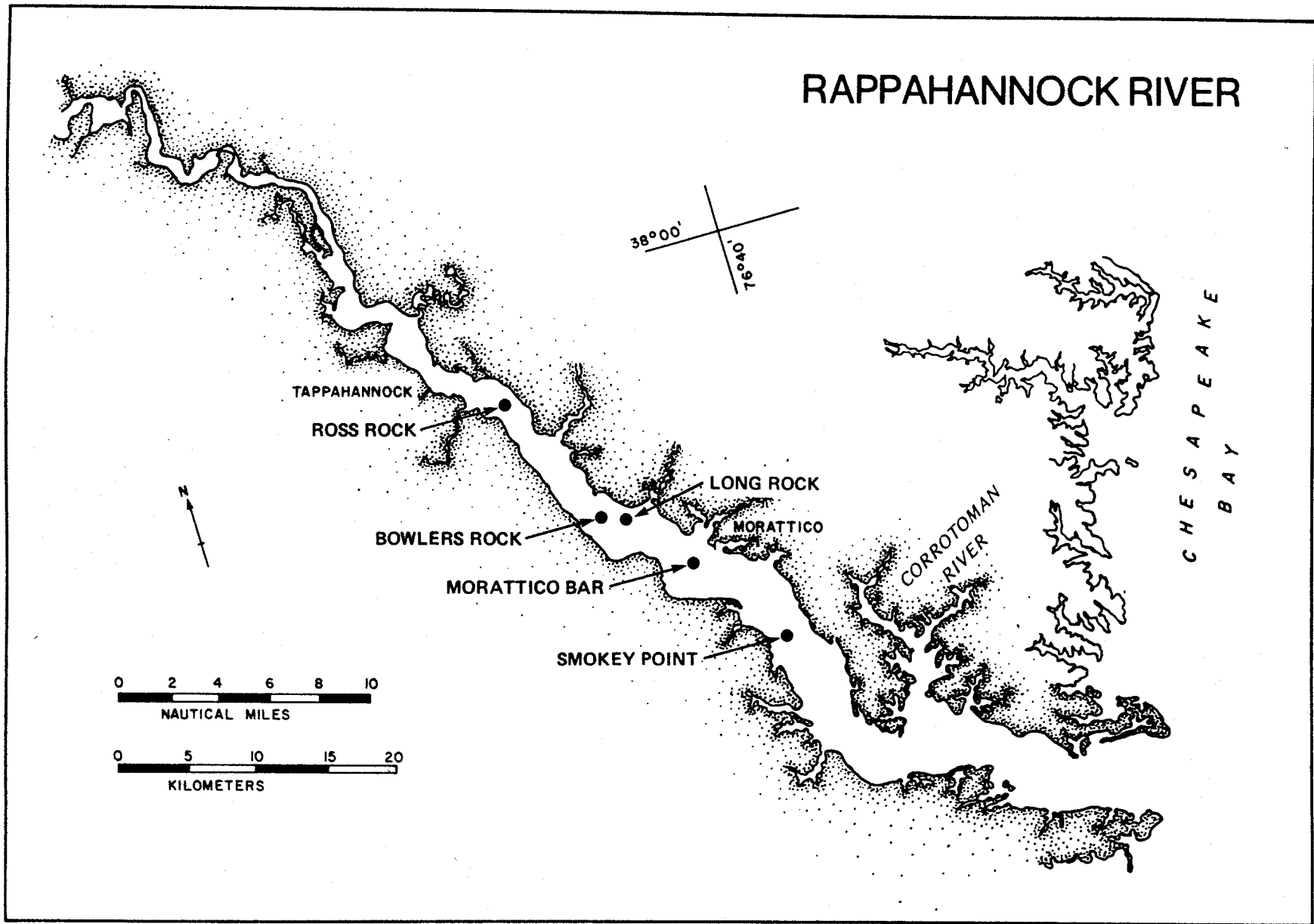


Figure 2

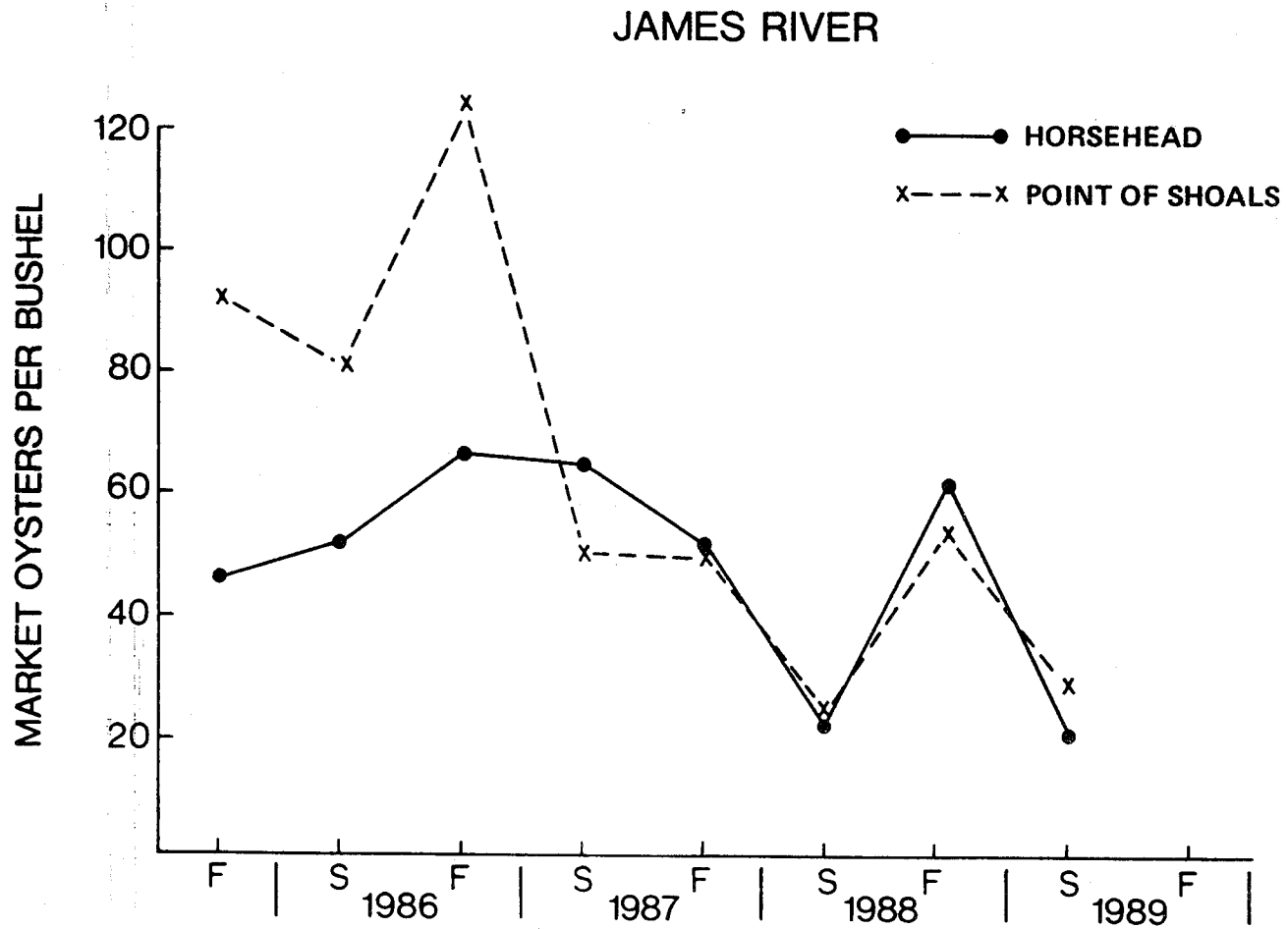


Figure 3

RAPPAHANNOCK RIVER

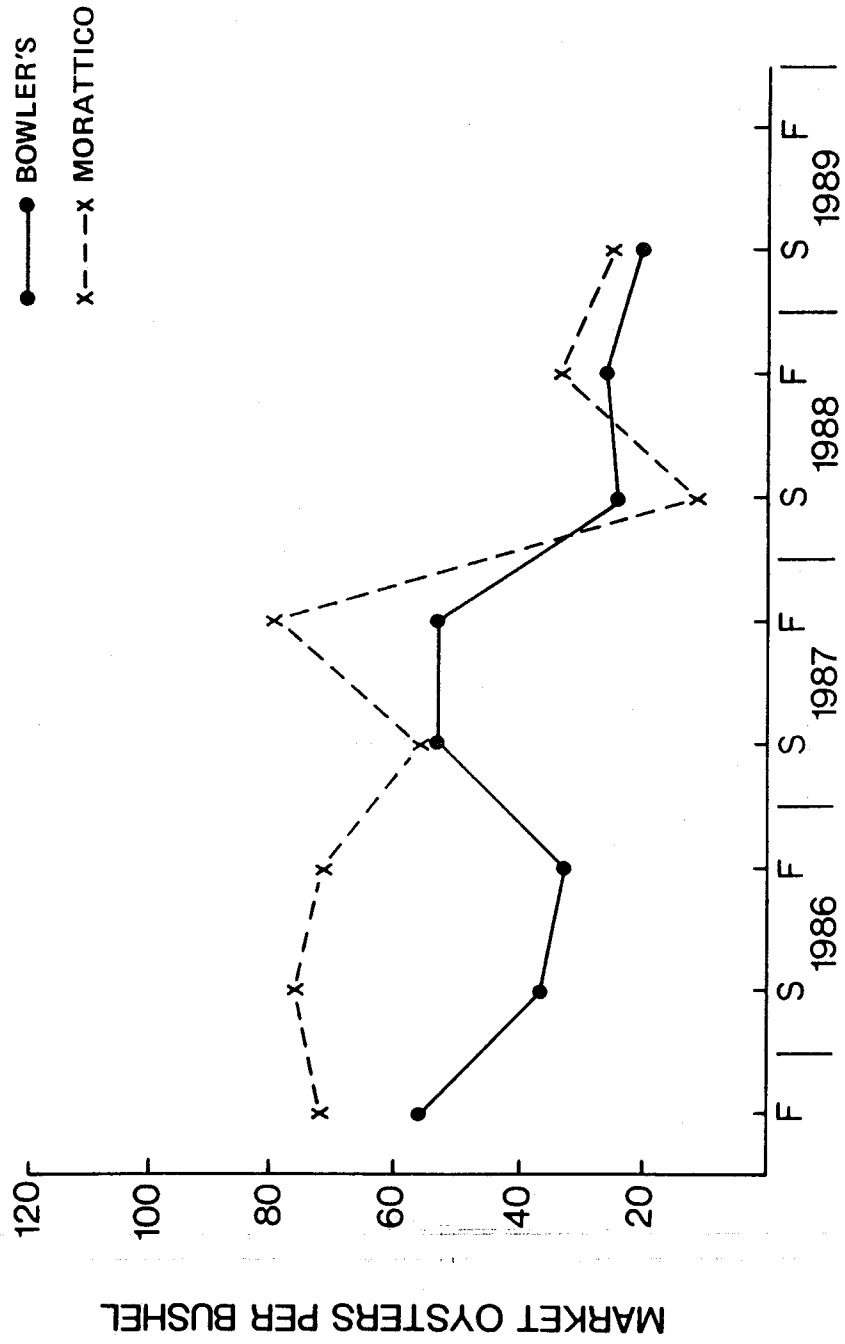


Figure 4