Maryland Oyster Spat Survey Fall 1979

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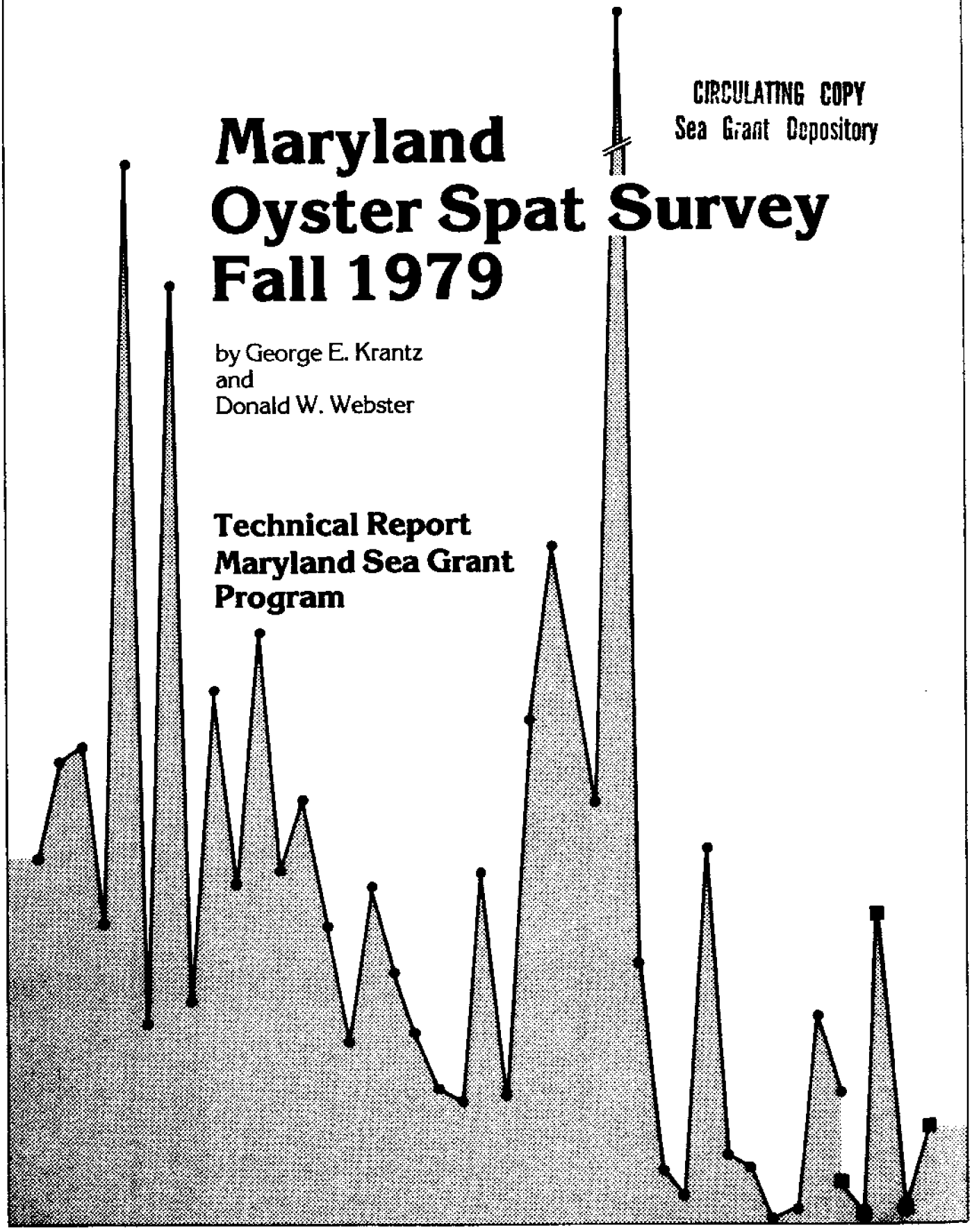
Donald W. Webster

**Technical Report
Maryland Sea Grant
Program**



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PREFACE

Bringing millions of dollars into Maryland annually, the oyster industry represents a rich resource--but erratic harvests continue to cause concern. Since 1975, the University of Maryland Sea Grant has sponsored an annual oyster spat survey cruise aimed at monitoring recruitment trends for Chesapeake Bay oyster populations. This year the cruise attracted more participants than ever and served the vital function of bringing together watermen, researchers and state agents in a single effort. Covered closely by the news media, the 1979 spat cruise brought the Maryland oyster industry into the spotlight of public interest.

Annual spat studies have taken place since 1939, when they were initiated by the Chesapeake Biological Laboratory in Solomons Island, Maryland. New data assembled by Sea Grant result from a more streamlined methodology which bases its statistics on consistently monitored key bars in order to achieve a quick, accurate report on spat levels--a kind of barometer of Bay oyster production.

Since the survey helps identify optimum growout areas for seed oysters, the data collected will aid the Department of Natural Resources and others in making important management decisions. In the Patuxent River, for example, concerned authorities and citizen groups benefited from scientists' explanations of the river's hydrography, seeing first hand how poor water quality can harm oyster beds. By encouraging the participation of watermen, organizers of the survey cruise have helped to create confidence in their sampling methodology, while increasing general awareness of the physical and chemical factors affecting the American oyster in the Chesapeake Bay.

The survey provided a picture of irregular recruitment. Results showed a concentration of oyster spat in the area of Tangier Sound, where researchers found as many as 204 spat per bushel per bar. But, with the exception of the Potomac River, the western shore made a poor showing: out of 38 sites sampled, only 5 yielded any spat at all. Many bars were deemed dead.

Though slightly better than spat set statistics for 1978, numbers for the 1979 survey put recruitment below levels for 1977, 1974 and 1968--the years which produced most oysters now harvested. Relatively speaking, 1979 was a poor year for oyster spat in the Maryland portion of the Chesapeake.

INTRODUCTION

The 1979 survey of natural oyster bars in the Maryland portion of the Chesapeake Bay gave fishery biologists a "pulse beat" on Bay oyster populations. By sampling certain key bars, those for which historical records of population structure exist, the spat survey can monitor trends in recruitment, growth and mortality. The survey employed the same techniques used since this valuable data base began in the mid 1930's, but this year's project also included public relation efforts aimed at clearing up issues and convincing various skeptics of the experiment's validity.

In the past, the Fall Oyster Bar Survey has been criticized by persons who were not familiar with the methodology or the capabilities of those involved. Invariably questions arose concerning the timing and length of the cruise and the ability to locate and harvest oysters with the gear as rigged on the R/V Aquarius. The 1979 cruise was scheduled on a daily basis so that members of the Department of Natural Resources (DNR), Maryland Watermen's Association and representatives of local and county governments could accompany the research team and observe the survey procedures (see Appendix 4 for schedule). Capt. Martin O'Berry and Mate Mike Reussing of the research vessel R/V Aquarius and Horn Point employees Morgan Bennett and Donald Meritt, with the technical assistance of a biologist representing the Department of Natural Resources, took samples from 146 oyster bars in the Maryland portion of the Chesapeake Bay. At each sample site, an oyster dredge collected bottom material from natural oyster bars, or from locations chosen by guests aboard the vessel. Following procedures used by the Fisheries Administration of the Maryland Department of Natural Resources, researchers sorted a random sample of one half of a Maryland bushel of material from the oyster bar to determine the number of market oysters, small oysters, oyster spat, shell, recently or long deteriorated oysters--or boxes--and oyster meat condition. Representatives of the Maryland Department of Natural Resources recorded all field observations made on oyster bars in Maryland waters, placing the data on file in their department. Appendix 1 summarizes the pertinent observations from these data sheets. Elgin Dunnington of the Chesapeake Biological Laboratory recorded data on Potomac River oyster bars, and his notes are summarized in Appendix 2.

BIOLOGICAL DATA

The 1979 cruise provided the biological data necessary to continue the monitoring of spat fall on natural oyster bars that was begun in 1939 at the Chesapeake Biological Laboratories. Samples were also taken to describe the geographic extent and prevalence of oyster diseases and parasites in the Maryland portion of the Chesapeake Bay. The National Oceanic and Atmospheric Administration (NOAA) began surveys of oyster diseases in 1958, and surveys

are continuing as a cooperative 88-309 project with the Maryland Fisheries Administrations. The Maryland Department of Health and Mental Hygiene availed themselves of this opportunity to conduct a survey for the presence of heavy metals and chlorinated hydrocarbons in oysters over the entire range of the Maryland portion of the Chesapeake Bay. This data will provide an invaluable reference point for future environmental monitoring. Concurrent with the examination of oyster bars, selected samples were collected for other investigators in the University of Maryland who are studying the distribution of barnacles, the distribution of sea nettle polyps and the variation of glycogen levels in oyster tissue (a Sea Grant funded project).

The observations made in the field are summarized by date and show most of the oyster population data that are collected and recorded on the Department of Natural Resources' data sheets (Appendices 1 and 2). In this summary of observations, some pertinent notes were made, and unusual phenomena have been underlined to attract the reader's attention.

The primary research task was to monitor oyster spat recruitment during 1979 in the Maryland portion of the Chesapeake Bay. Figure 1 is a spatial representation of spat fall on most of the 146 sites sampled during this cruise. The distribution of spat fall is obviously clumped in Tangier Sound and at the mouth of the Potomac River. Therefore, the frequency and location of samples could greatly influence the mathematical mean for spat fall over the entire Bay. This type of sampling bias can be reduced by using the same set of key locations for all historical and present analyses of oyster spat set. These "key sites" (Figure 2) were chosen to be uniformly distributed over the entire range of natural oyster bars in the Chesapeake Bay. The "key site" data base permits a rapid (4-5 day) assessment of the annual reproductive potential of natural oyster bars on a yearly basis. The key bar approach, though, may produce a different data base than investigators have used in the past. One part of Figure 3 compares five years of "key bar" data to the data presented by Krantz and Meritt in 1977. There is a difference between the key bars and the average of all data collected over the Bay for the year 1975. We plan to do computer analyses of the data for key sites from 1939 to the present time in order to develop a more complete understanding of the fluctuations in spat set observed on the key bars.

The average spat fall on the key bars in 1979 was greater than in 1978, but substantially lower than spat fall in 1977, 1974 and 1968, years which produced most of the oysters being harvested at the present time (Figure 3). By this comparison, then, 1979 was not a year of successful recruitment for Maryland oyster populations.

Statistical averages for spat samples show the highest numbers grouping in and around Tangier Sound. The average sample for Tangier Sound (including the Pocomoke Sound area) yielded over 69 spat per bushel per bar

for the 15 sites tested. The Potomac River, because of fairly good concentration near its mouth, averaged a little less than 15 spat per bushel per bar for 44 sample sites. The Eastern Shore, not including the fertile Tangier Sound area, averaged only about two spat per bushel per bar for 51 samples, and the western shore showed an average of only .3 spat per bushel for 38 samples--all but 5 samples yielding no spat at all.

BENEFITS OF THE FIELD SAMPLING METHOD

During the field sampling activities, representatives of the various agencies and associations had ample opportunity to observe techniques, ask questions and discuss the relationship of natural phenomena to existing and future oyster management practices.

There were several additional "social needs" satisfied by inviting the different groups to attend:

1. Watermen, because they know local waters and because they are on the Bay daily, are among the first to recognize areas of good spat set or problems with unusual mortality. Many, however, are suspicious of scientists. This generally stems from not being involved with the research and from seeing little application of information derived from research. Specifically, some have criticized the Fall Oyster Bar Survey for not having a proper dredge, towing a dredge from too high a point, and not being at the right spot to find oysters.

2. The Department of Natural Resources conducts a comprehensive survey of state seed oyster areas each year in mid-winter. The University cruise has been criticized by some as a duplication of effort, and misunderstood with regard to the early fall schedule.

3. The news media, mostly local papers, have relied on secondhand information in previous years to report on the reproductive success or failure of oysters, both in their areas and Bay wide. These news reports, of great interest to Maryland citizens and resource managers looking to the future of the oyster fishery, have been viewed with suspicion by some who looked upon the recent University findings of low spat set as academic "doomsaying."

4. There has been a great proliferation of citizen advisory committees concerned with the productivity of the Bay or problems in local tributaries. Sometimes these groups are hampered by an inability to see these problems firsthand and have them explained on the scene by knowledgeable scientific personnel.

The extension-education function lengthened the cruise from six to nine days and increased the distance traveled by the research vessel from approximately 550 nautical miles during previous cruises to 868 nautical miles in 1979. The increased effort was well rewarded by the intense interest and warm expression of appreciation extended to the crew by all of our visitors. The extension concept of the 1979 cruise was undoubtedly a success.

Each day of the cruise covered a specific geographic area such as the Potomac River, Upper Tangier Sound, or the Choptank system. Invitations and cruise itineraries were sent to the presidents of local watermen's associations, to all of the members of the oyster tongers and dredgers committees, and to any representatives of other groups or agencies that might have an interest in the cruise. In all, over 100 invitations went out to industry and related groups (see Appendix 3). Ms. Barbara MacLeod, UMCEES public information officer, provided contact with the press, and there was daily news coverage throughout the state. Appendix 6 summarizes some of the news coverage distributed throughout the Chesapeake Bay region.

The cruise agenda (Appendix 4) provided information concerning departure time, meals provided, areas to be surveyed, where the guests would disembark, and the transportation which would be provided back to the point of original departure. A van from Horn Point returned guests to their vehicles on days when it was not possible to return by boat. Sufficient time was planned each day to permit watermen and other guests to request the sampling of specific bars. These were areas where they thought that there had been a recent spat set, seed areas which might have oysters to be moved in the spring, or areas in which they had noted recent mortality. Over the course of the cruise, 106 guests came aboard the R/V Aquarius (Appendix 5). They represented industry, several state management agencies, education and research institutions, citizen advisory groups, news media and others.

As a result of this field experiment, it was noted that:

1. Interaction among individuals of all groups was at a fairly high level. Specifically, many of the watermen were able to see that the harvesting gear (i.e., dredge) was valid and the position fixing equipment and the capabilities of the captain and crew in finding oyster bars was excellent. A great deal of information changed hands regarding the location of good harvesting areas.

2. Many watermen are astute natural history observers. This cruise offered them the chance to have some of their observations explained by scientific specialists, especially with regard to ecology of benthic organisms and oyster diseases.

3. The cooperation of the Maryland Department of Natural Resources personnel was outstanding. Several high-ranking officials of the DNR participated in the cruise, seeing the oyster bars first hand with the watermen, DNR biologists, and University scientists.

4. News reporters were able to see and have interpreted for them the condition of the oyster bars. Many of the resulting news reports were laced with a great deal of human interest as well as scientific and lay observations through the interactions of the different groups.

5. This cruise allowed agencies involved with problem areas to meet on the water, where they could observe conditions firsthand. The Patuxent River, which passes through several highly urbanized counties before it reaches the rural areas near the Bay, serves as an example. Here officials and watermen both learned something of the general hydrography of the river and what is causing present changes in oyster bars.

This method of "on the water" observation, along with the interaction between various groups and individuals, provides a useful tool for increased cooperation among scientists, resource managers, and industry members. Environmental science thus becomes "de-mystified" and the various individuals seem to develop a better understanding of each other's point of view. The sheer numbers of participants on this cruise attest to the interest which exists for the Bay and its problems. This "field seminar method" should be evaluated for other types of marine research where it may find applicability.

FURTHER OBSERVATIONS

During the cruise, we were requested to report observations of any unusual phenomena and, if possible, to provide advice to the Fisheries Administration on site specific management strategies. The following paragraphs summarize some of these observations:

1. Spat fall in 1979 was low throughout the entire Bay with the exception of the mouth of the Potomac River and the open waters of Tangier Sound. The distribution of spat fall was very similar to that found in 1978 (compare Figure 4 to Figure 1). During 1977 (Figure 5) the heaviest recruitment of spat occurred in approximately the same geographical area, but spat fall was found at other locations in the Little Choptank, the Choptank and Eastern Bay systems.

2. Recruitment on Potomac River oyster bars up-river from St. Clements Island has been non-existent since Hurricane Agnes. It is suggested that oyster management in the lower Potomac be given greater consideration to capitalize on the natural spat fall and survival in that area. The upstream bars may return naturally in the future if summer salinity increases and if down-river stocks are increased.

3. The Maryland Department of Natural Resources should consider establishing a seed area in the mouth of Potomac River at Cornfield Harbor, Chickencock, or even increasing the existing seed area on Jones' Shore. This area has experienced consistent spat fall annually for the past five years. Members of the Potomac River Fisheries Commission were receptive to the idea of greater seed production from the Potomac River system.

4. Spat fall in Tangier Sound is now more consistent than in other areas of the Bay. Therefore, more and larger seed areas should be established in Tangier Sound.

5. Shell planting along the western shore, in the Patuxent River, in the open Bay, and in up-river portions of the middle Eastern Shore, should be eliminated because of the continual pattern of poor spat fall at these locations. More effort should be directed toward developing seed areas in Eastern Bay, the mouth of the Miles River and in the Little Choptank River.

6. During collection of field data, specific observations were made on the number of small, illegal oysters that were attached to market oysters. A recent and controversial cull law has intensified the watermen's efforts to remove small oysters from market oysters. The small oysters that are removed are damaged and practically all will die when returned to the water. Several natural bars had an abundance of market oysters to which numerous small oysters were attached. During the cruise, Fisheries Administration staff contemplated temporary closure of these bars so as to eliminate the risk of arrest of watermen and also to protect the small oysters. An unusual abundance of small oysters attached to market oysters was observed on the following bars:

   a. Eastern Bay: Sawmill Creek, Parson's Island, Richneck

   b. Miles River: Hambleton's, Hambletons Hill, Scotland

   c. Honga: Normans

   d. Harris Creek: Gillespies

   e. Broad Creek: Deep Neck

   f. Little Choptank: McKeils, Town Point

7. Several natural bars in the Chesapeake Bay are densely populated with small, slow growing oysters. These oysters could be moved to other locations where their growth rate would be accelerated and their meat condition would improve. At the present time, these

oysters rarely enter the market nor will they do so if left in their existing location. Deep Neck Bar in Broad Creek is an excellent example of this condition. The majority of oysters on this bar set there in 1968. A second set in 1977 has covered the few legal market oysters with small oysters.

McKeil's Bar and Town Point Bar in the Little Choptank are further examples of this phenomenon. The heavy density of small oysters in the upper portions of Eastern Bay may be a borderline case for translocation. Perhaps it would be wise to use the Deep Neck, Town Point, and McKeil's bars in a carefully controlled study to determine the beneficial or adverse effects before moving small oysters from these densely populated bars. The oysters on these three bars could be replanted in the same river system--within county boundaries--if required by local watermen.

8. The status of the Patuxent River attracted a tremendous response from the public and local government officials. We restricted attendance on the cruise to 20 selected individuals, who were able to discuss important biological phenomena that could affect resource management decisions. Among the points made during this cruise was the demonstration that the upper river oyster bars are below population levels for profitable economic harvest. Oysters on several of the bars that have been closed by the health department are dying of old age. Several upstream oyster bars, especially above Broom's Island, suffer from water quality problems. Oysters in deep water above the present patent tong line are also dying before they enter the harvest. Field sampling of these spots helped mediate an excellent exchange of ideas that resulted in several new management concepts. It appears biologically feasible and economically important to attempt to salvage the remaining oyster resources in the Patuxent River. Changes could be made in the patent tong lines so that all deep water bars in the river could be exploited by this technique. Bars designated for hand-tonging are located in the upper Patuxent River where there has been virtually no spat fall for fifteen years (see Figure 6). These bars have experienced severe mortality from the harsh winters of 1977 and 1978 as well as from poor water quality conditions. Any management decision aimed at restoring these upstream bars should be carefully weighed so valuable seed oysters would not be wasted, nor would dredge shell be placed on bars receiving no spat fall.

9. Oyster bars in the St. Mary's River system have continued to have an unusually high mortality. In the past year, Seminary Bar has ceased to yield marketable quantities of live oysters and the number of live oysters on Thompson Creek bar has declined. There are no obvious biological clues to the cause of this decline, nor

to the precipitous decline in spat fall in this river that occurred in 1971.

10. Oyster bars in the Chester River have remained unchanged in density for the past three years. Parson's Island seed planted on Ebb Point in 1977 (Spaniard Point area) have survived and grown well. Adult oysters that survived the recent mortality on Piney Point bar still have gross signs of stress (i.e., poor meat condition, greenish tint, recessive shell growth). Any additional management effort should be directed toward enhancing natural spat fall between Buoy Rock and Hell's Delight bars before consideration is given to upstream oyster bars. Oyster bars in the lower region of the river have a greater probability of receiving a spat fall than those in the upper region. Salinity in the lower region is also more conducive to good oyster growth.

In the weeks following the cruise we frequently received requests to conduct the same type of activity in the fall of 1980. Several personnel from the Maryland Department of Natural Resources found the data to be valuable in current management planning and have indicated a desire to provide some financial support for this activity in future years. The spat cruise clearly succeeded in its double function of measuring a valuable resource and providing a wide and influential audience with insights into the present status of the American oyster in the Chesapeake Bay.

Figures

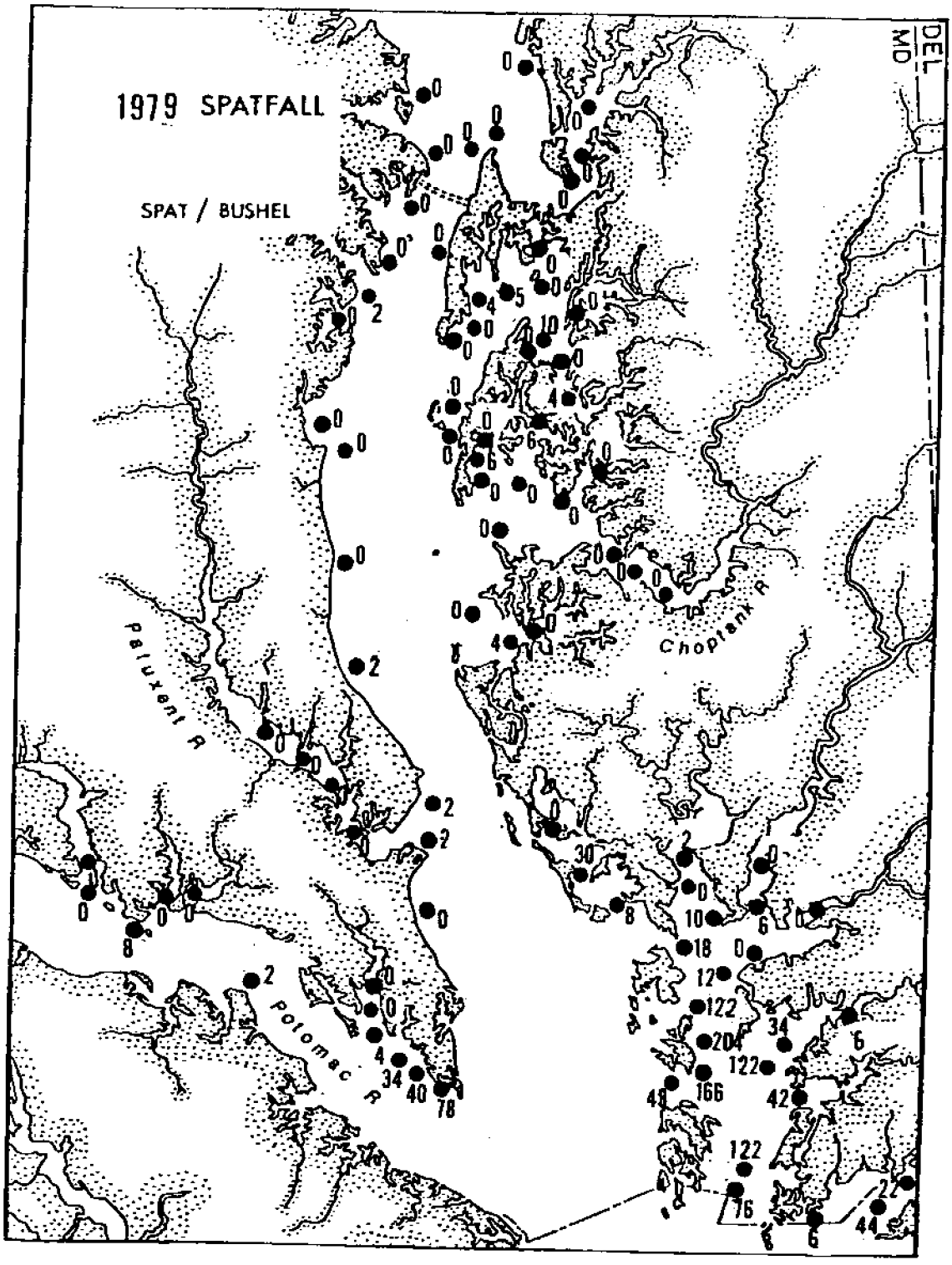

Figure 1. Spat set per bushel of material collected from natural oyster bars during Fall 1979.

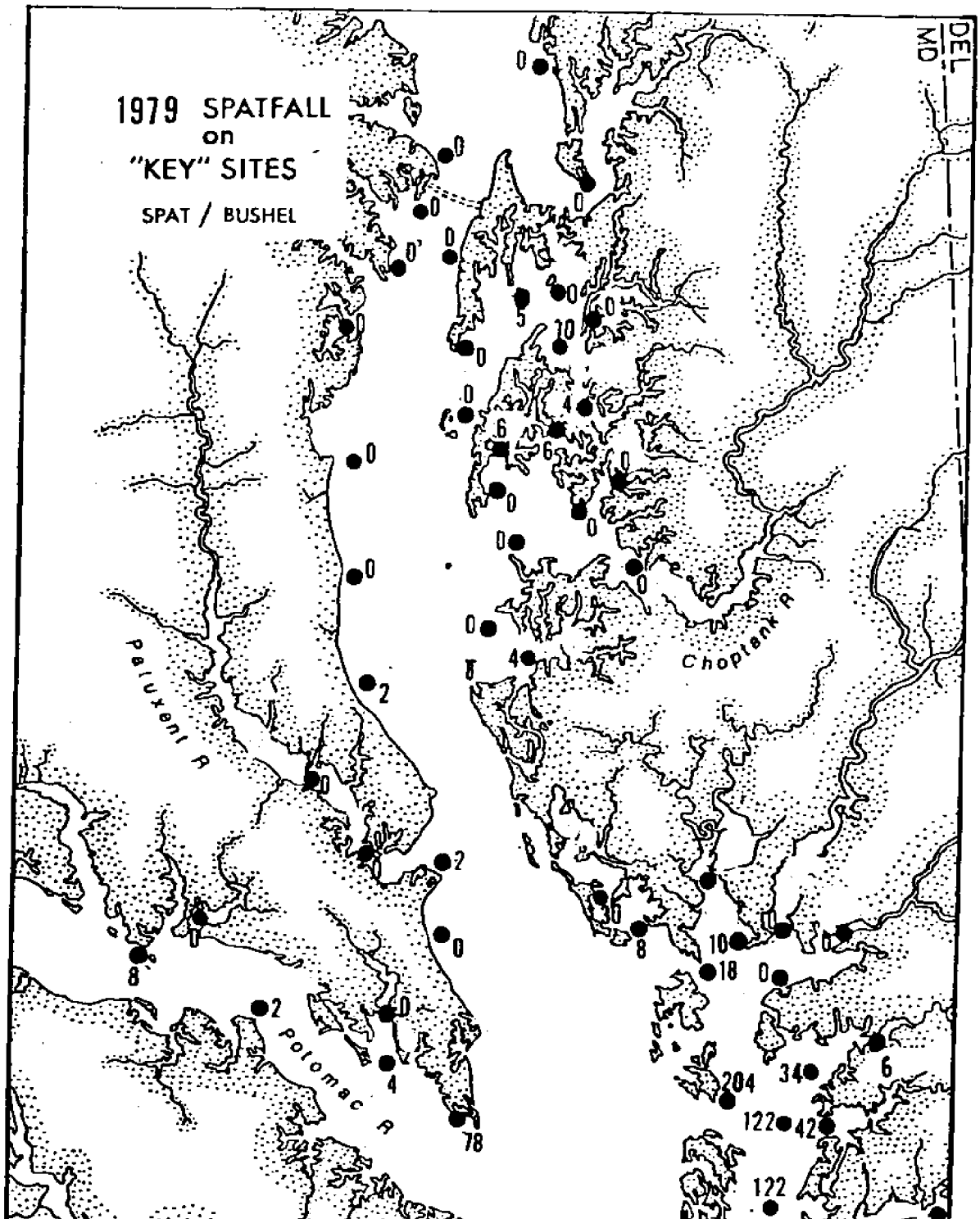

Figure 2. Spat set per bushel of material collected from selected natural oyster bars during Fall 1979.

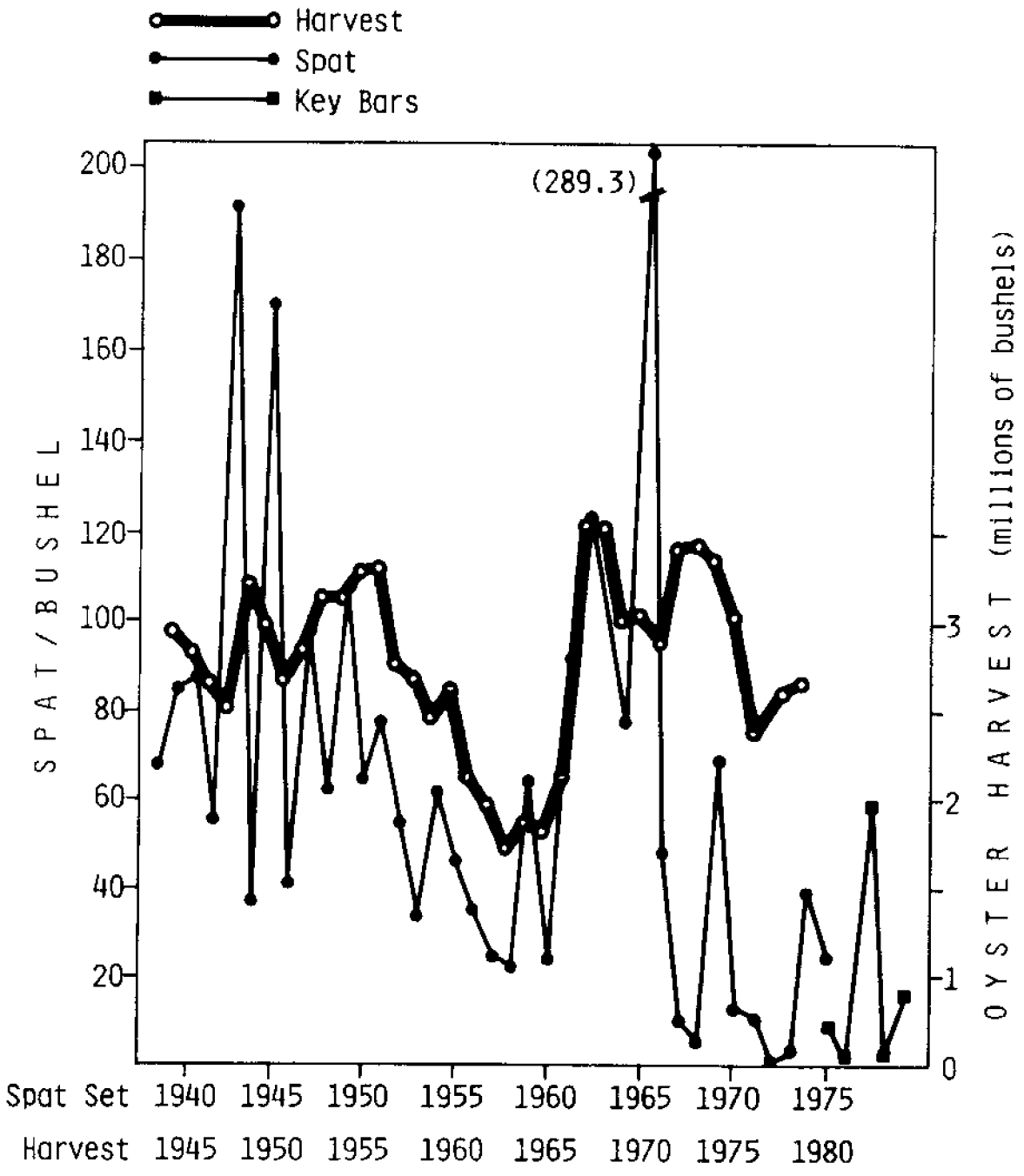

Figure 3. Comparison of oyster spat set on natural cultch (lighter line) to commercial harvest statistics adjusted to 5 years in time (heavier line). Data from key bars are indicated by squares on spat line, 1975 through 1979.

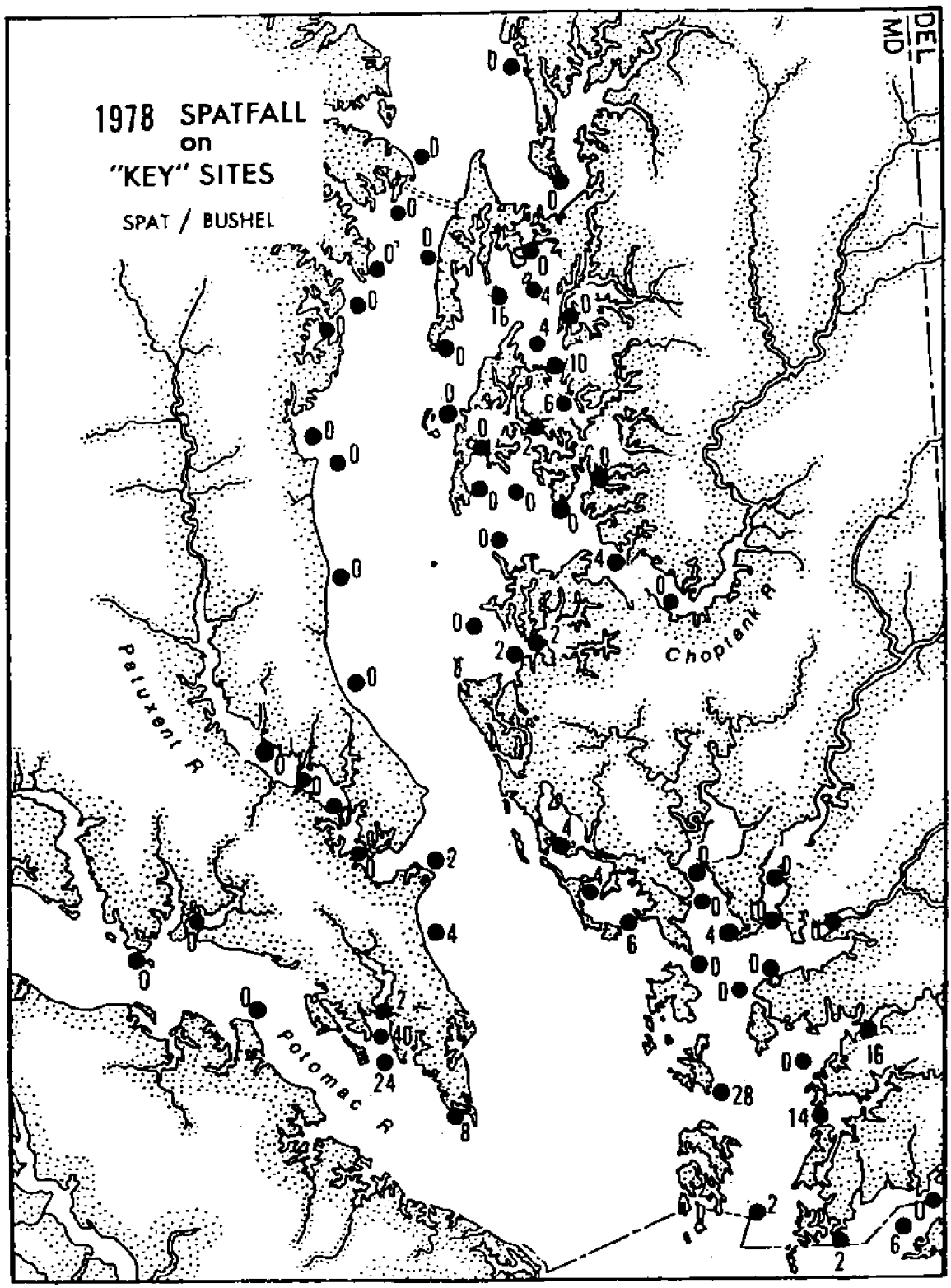

Figure 4. Spat set per bushel of material taken from natural oyster bars during early October, 1978.

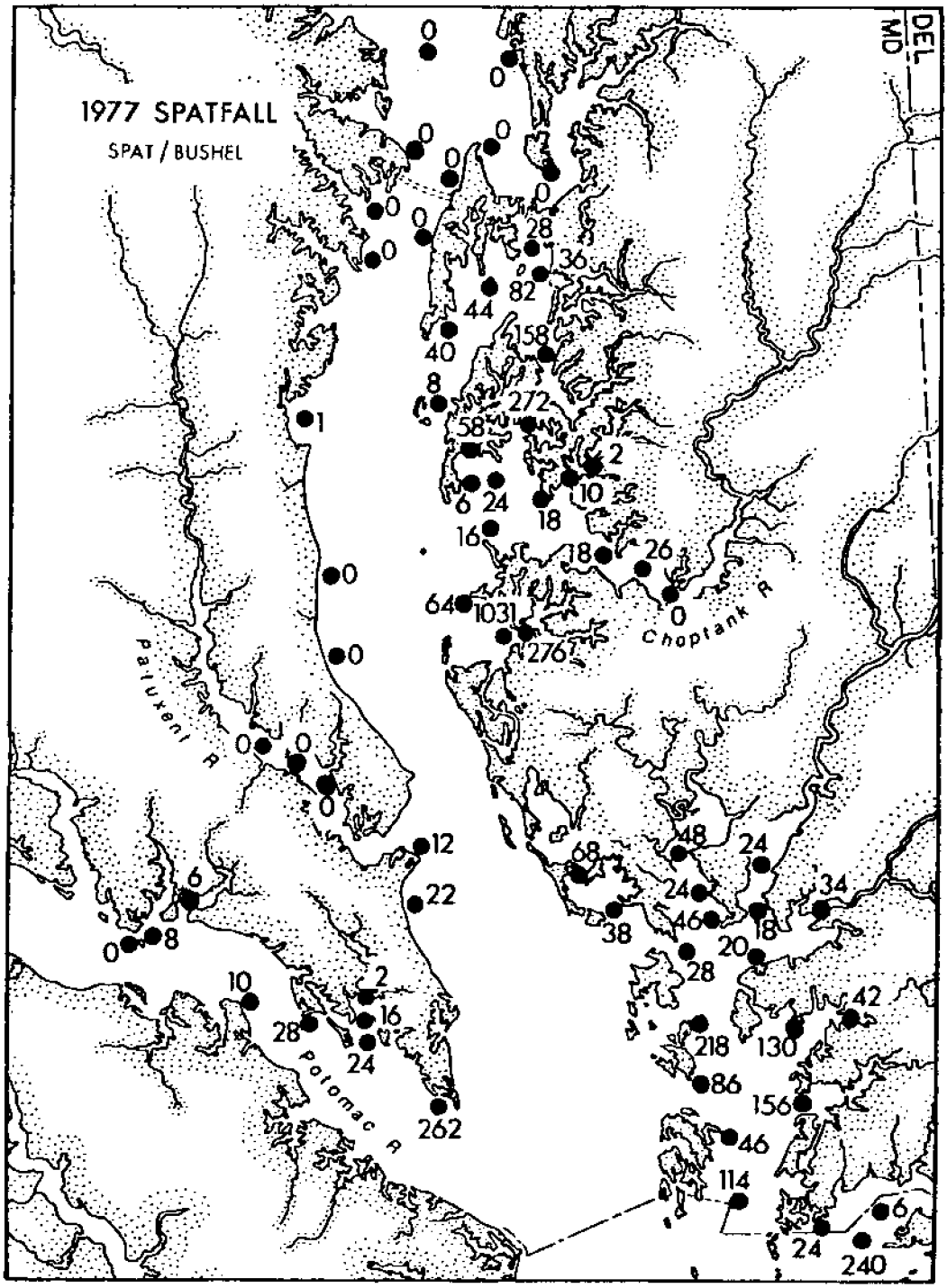

Figure 5. Spat set per bushel of material taken from natural oyster bars during early October 1977.

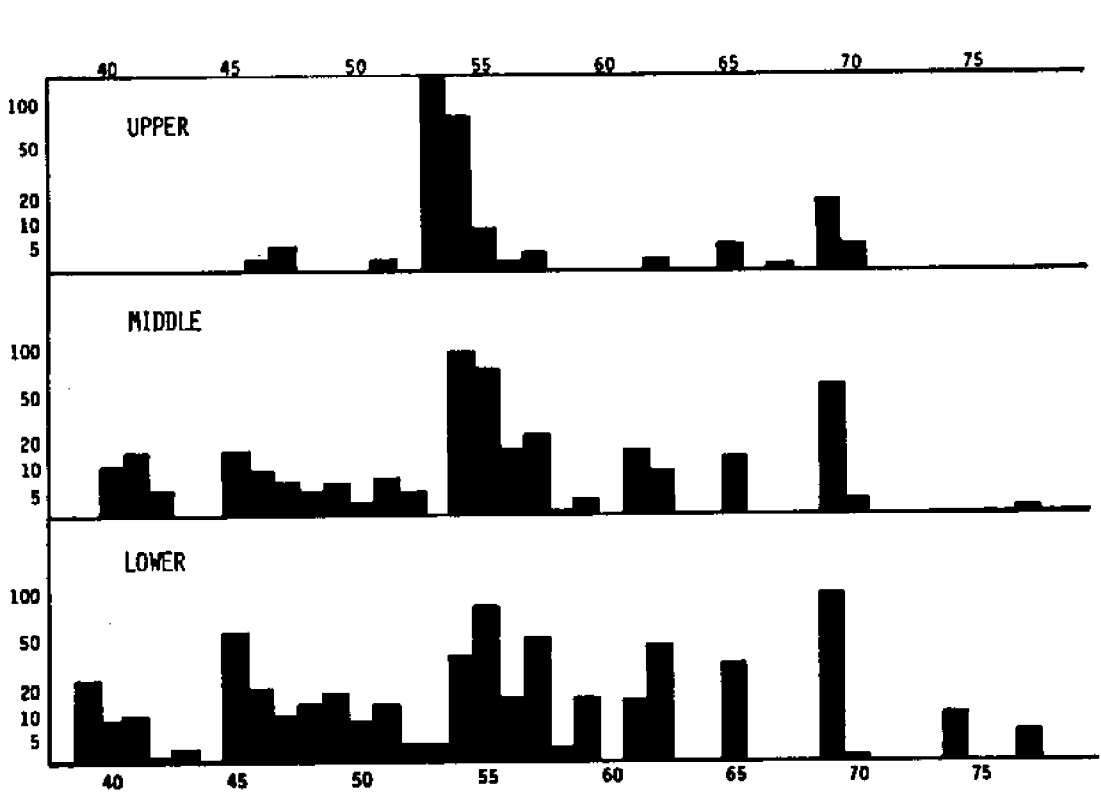

Figure 6. Oyster spat fall on natural cultch in the Patuxent River, 1939 to 1979.

Appendices

APPENDIX I

FIELD OBSERVATIONS September 26, 1979

Breton Bay, Mouldy Creek, 7.9 ppt, 20.3°C.
Oysters - No live oysters in samples

Breton Bay, Lovers Point, 7.7 ppt, 20.3°C.
Oysters - No live oysters in samples

Breton Bay, Blackwalnut, 8.8 ppt, 20.2°C.
Oysters; Market 58 (10%), Small 58 (7%), Spat 0, Shell 83%
Boxes; 0, Condition 1.6.

St. Clements Bay, Newtown Flats, 8.2 ppt, 20.1°C.
Oysters - No live oysters in samples.

St. Clements Bay, Bluffs Woods, 8.2 ppt, 20.2°C.
Oysters; Market 37 (5%), Small 24 (1%), Spat 0, Shell 94%
Boxes; 0, Condition 1.75.

St. Clements Bay, Chapel Point, 8.1 ppt, 20.2°C.
Oysters; Market 40 (15%), Small 0, Spat 0, Shell 85%
Boxes; Old 8, Condition 1.5.

St. Clements Bay, Old Wreck, 8.4 ppt, 20.3°C.
Oysters; Market 88 (20%), Small 108 (18%), Spat 0, Shell 56%
Boxes; Old 1, New 1, Condition 1.8.

St. Mary's Point, Chickencock, 13.2 ppt, 21.7°C.
Oysters; Market 130 (35%), Small 86 (12%), Spat 4/bu., Shell 49%
Boxes; Old 13 (4%), New 2, Condition 1.8
NOTE: Dredge material (2.5 bushels) yielded ± 15% boxes by volume.

St. Mary's River, Thompson's Creek, 12.2 ppt, 20.7°C
Oysters; Market 74 (12%), Small 124 (9%), Spat 0, Shell 65%
Boxes; Old 46 (14%), New 2, Condition 2.2

St. Mary's River, Gravelly Run, 11.8 ppt, 21.2°C.
Oysters; Market 0, Small 0, Spat 0, Shell 80%
Boxes; Old 72 (20%)

St. Mary's River, Seminary, 13.1 ppt, 22.1°C.
Oysters; Market 6 (3%), Small 2 (1%), Spat 0, Shell 84%
Boxes; Old 38 (12%), Condition 1.1

Smith Creek, Smith Creek Bar, 12.9 ppt, 21.0°C.
Oysters; Market 40 (8%), Small 62 (10%), Spat 0, Shell 72%
Boxes; 20 (10%), Condition 2.1.

Kedges Strait, Oyster Creek, 13.2 ppt, 19.0°C.
Oysters; Market 102 (38%), Small 88 (12%), Spat 48/bu., Shell 27%
Boxes; Old 46 (22%), New 4 (1%), Condition 2.1

FIELD OBSERVATIONS September 27, 1979

Pocomoke Sound, Bouy 8, 14.0 ppt, 20.2°C.
Oysters; Market 16 (5%), Small 6 (1%), Spat 6/bu., Shell 93%
Boxes; Old 4 (1%), Condition 2.8
Note: Bar has been dredged, shell buried

Pocomoke Sound, Marumsco, 13.1 ppt, 19.8°C.
Oysters; Market 44 (12%), Small 54 (10%), Spat 22/bu., Shell 76%
Boxes; Old 4 (1%), Condition 2.7, Spat size 6-23 mm

Pocomoke Sound, Gunby, 13.9 ppt, 19.9°C.
Oysters; Market 78 (40%), Small 54 (4%), Spat 44/bu., Shell 48%
Boxes; Old 10 (3%), Condition 2.3, Spat size 4-26 mm

Big Annemessex, Flat Cap, 15.8 ppt, 20.6° C.
Oysters; Market 48 (7%), Small 68 (8%), Spat 42/bu., Shell 81%
Boxes; Old 6 (1%), Condition 2.0

Manokin River, Georges, 10.4 ppt, 20.3°C.
Oysters; Market 24 (9%), Small 20 (3%), Spat 6/bu., Shell 87%
Boxes; Old 1, Condition 2.5, Spat size 4-12 mm

Manokin River, Marshy Island, 14.9 ppt, 20.3°C.
Oysters; Market 40 (15%), Small 32 (4%), Spat 34/bu., Shell 68%
Boxes; Old 18 (5%), Condition 2.1, Spat size 4-30 mm

Tangier Sound, Great Rock. 17.1 ppt, 16.9°C.
Oysters; Market 30 (12%), Small 28 (9%), Spat 76/bu., Shell 70%
Boxes; Old 12 (9%), Spat size 2-24 mm

Tangier Sound, Great Rock (deep), 17.1 ppt, 16.9°C.
Oysters; Market 28 (11%), Small 2 (4%), Spat 122/bu., Shell 68%
Boxes; Old 4 (1%), Condition 1.6, Spat size 5-35 mm

Tangier Sound, Piney Island West, 15.2 ppt, 20.7°C.
Oysters; Market 30 (10%), Small 38 (6%), Spat 122/bu., Shell 70%
Boxes; Old 8 (3%), Condition 2.1, Spat size 4-36 mm

FIELD OBSERVATIONS October 1, 1979

Lower Bay West, Chinese Muds, 10.4 ppt, 21.5°C
Oysters; Market 82 (45%), Small 22 (4%), Spat 2/bu., Shell 50%
Boxes; Old 8 (1%), Condition 2.6, Spat size 20 mm
Small oysters on markets: 14/82 (17%)

Lower Bay West, Flag Pond, 10.7 ppt, 22.7°C.
Oysters; Market 82 (20%), Small 8 (3%), Spat 2/bu., Shell 66%
Boxes; Old 18 (11%), Condition 2.4

Lower Bay West, Governors Run, 11.9 ppt, 21.4° C.
Oysters; Market 90 (40%), Small 40 (4%), Spat 0, Shell 56%
Boxes; 0, Condition 2.5

Lower Bay West, Plum Point, 9.2 ppt, 21.2°C
Oysters; Market 22 (10%), Small 2 (1%), Spat 0, Shell 80%
Boxes; Old 10 (8%)

Lower Bay West, Old Rock, 8.8 ppt, 20.9°C.
Oysters; Market 52 (15%), Small 6 (1%), Spat 0, Shell 83%
Boxes; Old 4 (1%), Condition 2.9

Lower Bay West, Holland Point, 9.2 ppt, 20.9°C.
Oysters; Market 100 (60%), Small 46 (10%), Spat 0, Shell 30%
Boxes; 0, Condition 2.5, Small oysters on Markets 2/100 (2%)

Upper Bay West, Herring Bay, 8.9 ppt, 20.2°C.
Oysters; Market 122 (90%), Small 6 (1%), Spat 0, Shell 1%
Boxes; Old 12 (8%), Condition 1.9, Small oysters on markets 2/122 (1.6%)

West River, Saunders, 8.4 ppt, 21.2°C.
Oysters; Market 20 (11%), Small 0, Spat 2, Shell 90%
Boxes; Old 2, Condition 2.3

West River, Cheston Point, 8.3 ppt, 20.9°C.
Oysters; Market 2 (1%), Small 0, Spat 0, Shell 98%
Boxes; Old 6 (1%)
Note: Bar is dead

Upper Bay West, Tolleys, 10.7 ppt, 21.3°C.
Oysters; Market 76 (20%), Small 36 (8%), Spat 0, Shell 62%
Boxes; 0, Condition 2.4, Small oysters on markets 2/76 (3%)

Upper Bay West, Hackett's , 10.4 ppt, 21.5°C.
Oysters; Market 70 (20%), Small 28 (4%), Spat 0, Shell 75%
Boxes; Old 6 (1%), Condition 2.7

Upper Bay West, Sandy Point, 9.8 ppt, 21.1°C.
Oysters; Market 30 (11%), Small 6 (1%), Spat 0, Shell 88%
Boxes; Old 2, Condition 2.3

Upper Bay East, Swan Point, 11.4 ppt, 21.4°C.
Oysters; Market 52 (18%), Small 2 (1%), Spat 0, Shell 80%
Boxes; Old 18 (1%), Condition 2.5 (Gonad), Small oysters on markets 2/52 (4.5%)

Upper Bay East, Love Point, 10.9 ppt, 21.0°C.
Oysters; Market 76 (32%), Small 8 (1%), Spat 0, Shell 66%
Boxes; Old 6 (1%), Condition 2.5

Upper Bay East, Brickhouse, 12.0 ppt, 21.3°C.
Oysters; Market 44 (20%), Small 20 (3%), Spat 0, Shell 77%
Boxes; 0, Condition 2.7

FIELD OBSERVATIONS October 2, 1979

Chester River, Buoy Rock, 8.9 ppt, 20.5°C.
Oysters; Market 42 (30%), Small 24 (4%), Spat 0, Shell 56%
Boxes; Old 18 (10%), Condition 1.9, (Heavy mussel fouling)

Chester River, Piney Point, 8.9 ppt, 20.6° C.
Oysters; Market 18 (8%), Small 1, Spat 0, Shell 90%
Boxes; Old 10 (2%), Condition 1.2 (Native oysters with stress)

Chester River, Ebb Point (Parsons Is. Seed-77), 8.1 ppt, 20.3°C.
Oysters; Market 14 (10%), Small 10 (2%), Spat 0, Shell 87%
Boxes; Old 2, Condition 1.9

Eastern Bay, Sawmill Creek, 8.5 ppt, 20.3°C.
Oysters; Market 166 (45%), Small 82 (8%), Spat 0, Shell 37%
Boxes; Old 36 (10%), Condition 1.3, Small oysters on markets 32/166 (19%)

Eastern Bay, Parsons Island, 12.3 ppt, 20.9°C.
Oysters; Market 190 (80%), Small 66 (9%), Spat 0, Shell 6%
Boxes; Old 14 (5%), Condition 2.5, Small oysters on markets 22/190 (11.5%)

Eastern Bay, Bugsby (Inside), 12.0 ppt, 21.1° C.
Oysters; Market 164 (45%), Small 74 (10%), Spat 0, Shell 27%
Boxes; Old 44 (18%), Condition 3.0, Small oysters on markets 20/164 (12%)

Eastern Bay, Parson's Island Seed Area D, 12.0 ppt, 20.9°C.
Oysters; Market 48 (12%), Small 316 (32%), Spat 10/bu., Shell 66%
Boxes; New, Spat 10, Condition 2.4, Small oysters on markets 14/48 (30%)
Note: Count of small oysters is high enough to move.

Eastern Bay, Richneck, 11.8 ppt, 20.9°C.
Oysters; Market 128 (60%), Small 106 (11%), Spat 0, Shell 25%
Boxes; Old 10 (4%), Condition 2.6, Small oysters on markets 68/128 (53%)
Note: Problem area for cull law.

Eastern Bay, Wildground, 11.6 ppt, 20.9°C.
Oysters; Market 112 (30%), Small 48 (8%), Spat 4/bu., Shell 61%
Boxes; Old 4 (1%), New 1, Condition 2.8, Small oysters on markets 8/112 (7%)

Eastern Bay, Longwoods, 12.0 ppt, 21.5°C.
Oysters; Market 156 (50%), Small 24 (4%), Spat 0, Shell 21%
Boxes; Old 18 (15%), Condition 3.1, Small oysters on markets 6/156 (4%)
Note: Surf clam shell 10%, planted bar

Eastern Bay, Hollicutts Noose, 12.0 ppt, 20.9°C.
Oysters; Market 110 (45%), Small 30 (5%), Spat 0, Shell 35%
Boxes; Old 14 (10%), Condition 2.7, Small oysters on markets 2/110 (2%)

Poplar Island, Helsinki, 12.4 ppt, 21.8°C.
Oysters; Market 94 (45%), Small 36 (5%), Spat 0, Shell 22%
Boxes; Old 50 (27%), Condition 3.2, Small oysters on markets 10/94 (11%)

Poplar Island, Shell Hill, 12.3 ppt, 21.4°C.
Oysters; Market 94 (30%), Small 36 (18%), Spat 0, Shell 41%
Boxes; Old 24 (11%), Condition 3.2, Small oysters on markets 4/94 (4%)

Miles River, Herring Island (West) 11.9 ppt, 20.6°C.
Oysters; Market 140 (50%), Small 92 (11%), Spat 10/bu., Shell 29%
Boxes; Old 34 (10%), Condition 2.1, Small oysters on markets 50/140 (38%)

Miles River, Hambletons Hill, 11.9 ppt, 20.9°C.
Oysters; Market 130 (65%), Small 208 (26%), Spat 0, Shell 9%
Boxes; Old 4, Condition 1.9, Small oysters on markets 112/130 (86%)
Note: Problem area for cull law. No spat. Next year all legal.

Miles River, Hambleton's Hill, 11.9 ppt, 20.9°C.
Oysters; Market 56 (22%), Small 202 (16%), Spat 0, Shell 62%
Boxes; Old 2, Condition 1.8, Small oysters on markets 50/56 (89%)
Note: Problem area for cull law. Next year all legal.

Miles River, Scotland, 11.7 ppt, 20.9°C.
Oysters; Market 26 (15%), Small 120 (14%), Spat 0, Shell 69%
Boxes; Old (Small 9) (2%), Condition 1.6, Small oysters on markets 14/26 (54%)

Miles River, Ashcraft, 11.5 ppt, 21.0°C.
Oysters; Market 74 (40%), Small 140 (18%), Spat 4/bu., Shell 37%
Boxes; Old 6 (5%), New spat 1, Condition 2.1, Small oysters on markets 16/74 (22%)

Wye River, Bruffs Island, 11.7 ppt, 20.9°C.
Oysters; Market 104 (50%), Small 114 (20%), Spat 0, Shell 25%
Boxes; Old 8 (5%), Condition 2.4, Small oysters on markets 16/104 (15%)

Wye River, Winders Bank (South), 11.2 ppt, 20.9°C.
Oysters; Market 74 (35%), Small 68 (10%), Spat 0, Shell 55%
Boxes; 0, Condition 2.3, Small oysters on markets 14/74 (19%)

FIELD OBSERVATIONS October 3, 1979

Harris Creek, Bald Eagle, 11.2 ppt, 21.3°C.
Oysters; Market 106 (20%), Small 150 (20%), Spat 6/bu., Shell 59%, Spat size 15-20mm
Boxes; Old 8 (1%), Condition 2.6, Small oysters on markets 46/106 (43%)

Harris Creek, Gillespies, 11.2 ppt, 21.2°C.
Oysters; Market 160 (50%), Small 160 (24%), Spat 0, Shell 25%
Boxes; Old 6 (1%), New 1, Condition 1.8, Small oysters on markets 66/160 (41%)

Harris Creek, Mill Bar, 11.4 ppt, 21.4°C.
Oysters; Market 112 (25%), Small 26 (3%), Spat 0, Shell 71%
Boxes; Old 10 (1%), New 1, Condition 1.2, Small oysters on markets 8/112 (7%)

Harris Creek, Seed Area, 11.4 ppt, 21.4°C.
Oysters; Market 82 (10%), Small 54 (8%), Spat 0, Shell 81%
Boxes; Old 10 (1%), Condition 1.9, Small oysters on markets 10/82 (12%)
Note: Number of oysters not sufficient to move.

Harris Creek, Turkey Neck, 11.5 ppt, 21.3°C.
Oysters; Market 116 (40%), Small 74 (20%), Spat 0, Shell 40%
Boxes; Old 1, Condition 2.1, Small oysters on markets 38/116 (33%)

Broad Creek, Deep Neck, 10.9 ppt, 21.1°C.
Oysters; Markets 192 (45%), Small 348 (45%), Spat 6/bu., Shell 9%
Boxes; Old 2 (1%), Condition 1.5, Small oysters on markets 174/192
Note: 1977 spat set on markets oysters created problem with cull law. This bar could be moved, oysters are stunted and poor.

Broad Creek, Mulberry Point Seed Area, 10.9 ppt, 21.3°C.
Oysters; Market 12 (4%), Small 178 (14%), Spat 4/bu., Shell 81%
Boxes; Old 2, New 2 (1%), Condition 2.0, Spat size 15 mm

Tred Avon, Fox Hole, 11.0 ppt, 21.1°C.
Oysters; Market 78 (20%), Small 10(1%), Spat 0, Shell 77%
Boxes; Old 38 (12%), Condition 1.1, Classical Snappy Oyster.

Tred Avon, First Tilghman, 10.6 ppt, 21.1°C.
Oysters; Market 66 (10%), Small 68 (10%), Spat 0, Shell 75%
Boxes; Old 14 (5%), Condition 2.2

Tred Avon, Double Mills (10/9/79) 8.0 ppt, 16.5°C.
Oysters; Market 31 (60%), Small 2 (1%), Spat 0, Shell 37%
Boxes; Old 5 (2%), Condition 1.7

Choptank, France, 12.0 ppt, 20.8°C.
Oysters; Market 74 (10%), Small 24 (3%), Spat 0, Shell 86%
Boxes; Old 4 (1%), Condition 2.1

Choptank, Benoni's Light, 11.6 ppt, 20.1°C.
Oysters; Market 152 (80%), Small 8 (1%), Spat 0, Shell 14%
Boxes; Old 10 (5%), New 2, Condition 2.8

Choptank, Howells Point. 10.6 ppt, 21.1°C.
Oysters; Market 74 (10%), Small 84 (15%), Spat 0, Shell 75%
Boxes; 0, Condition 2.7
Note: 1977 set = 84 small

Choptank, Sandy Hill, 10.6 ppt, 21.2°C.
Oysters; Market 54 (20%), Small 80 (14%), Spat 0, Shell 66%
Boxes; Old 2, New 2, Condition 2.5

Choptank, Dawsons (Deep), 12.4 ppt, 21.8°C.
Oysters; Market 26 (20%), Small 2 (1%), Spat 0, Shell 77%
Boxes; Old 2 (1%), new 2 (1%), Condition 2.8

Choptank, Cook's Point, 12.4 ppt, 21.8° C.
Oysters; Market 44 (15%), Small 4 (1%), Spat 0, Shell 83%
Boxes; Old 4 (1%), Condition 3.8

Little Choptank, McKeil's Point, 11.5 ppt, 22.0°C.
Oysters; Market 116 (36%), Small 414 (20%), Spat 4/bu., Shell 40%
Boxes; Old 12 (2%), New 12 (2%), Condition 2.5
Small oysters on markets 234/116 (100%) with 2-5 on some
Note: Growth of small oysters is poor. Bar should be moved.

Little Choptank, Town Point Seed Area, 11.8 ppt, 22.3°C.
Oysters; Market 160 (45%), Small 478 (38%), Spat 0, Shell 15%
Boxes; Old 10 (2%), New 10 (2%), Condition 1.8
Small oysters on markets 222/160 (100%)
Note: Growth poor. Bar should be moved.

Little Choptank, Ragged Point, 12.5 ppt, 21.9°C.
Oysters; Market 74 (30%), Small 34 (6%), Spat 0, Shell 64%
Boxes; Old 10 (2%), Condition 4.0
Note: Good growing area close to Town Point

FIELD OBSERVATIONS October 4, 1979

Wicomico, Evans, 10.0 ppt, 21.2°C.
Oysters; Market 22 (10%), Small 2.2 (5%), Spat 0, Shell 85%
Boxes; 0, Condition 2.6

Wicomico, Mt. Vernon Wharf, 1.4 ppt, 21.4°C.
Oysters; Market 54 (22%), Small 2 (1%), Spat 0, Shell 62%
Boxes; Old 36 (15%), Condition 1.6, Gonad in 7/10

Nanticoke, Middleground, 10.1 ppt, 21.6°C.
Oysters; Market 82 (40%), Small 30 (8%), Spat 6/bu., Shell 51%
Boxes; Old 12 (1%), Condition 2.8, Spat size 20 mm

Fishing Bay, Clay Island, 12.6 ppt, 21.6°C.
Oysters; Market 132 (30%), Small 160 (15%), Spat 10/bu.
Boxes; Old 4 (1%), Condition 2.2, Spat size 6-30 mm
Small oysters on markets 4/132 (3%)

Fishing Bay, Duck Island, 11.0 ppt, 21.6°C.
Oysters; Market 144 (45%), Small 80 (12%), Spat 0, Shell 42
Boxes; Old 8 (1%), Condition 2.4, Small oysters on markets 24/144 (16%)

Fishing Bay, Goose Creek, 10.1 ppt, 21.8° C.
Oysters; Market 82 (42%), Small 20 (5%), Spat 0, Shell 52%
Boxes; Old 6 (1%), Condition 2.2

Fishing Bay, Elliotts Island, 9.0 ppt, 21.9°C.
Oysters; Market 98 (25%), Small 64 (10%), Spat 2/bu.
Boxes; Old 4 (1%), Condition 1.7, Small oysters on market 10/98 (10%)

Honga, Norman's, 13.4 ppt, 21.9°C.
Oysters; Market 38 (55%), Small 90 (12%), Spat 8/bu., Shell 31%
Boxes; Old 18 (2%), New 2, Condition 3.3, Small oysters on markets 58/38 (100%)
Spat size 4-10 and 25-30 (2 groups)

Honga, Windmill Point, 13.6 ppt, 21.5 °C.
Oysters; Market 112 (25%), Small 92 (12%), Spat 30/bu., Shell 49%
Boxes; Old 6 (3%), New 4 (1%), Condition 2.8, Small oysters on markets 14/112 (19%)
Spat size 8-40 mm (2 groups)

Tangier Sound, Sharkfin Shoal, 14.3 ppt, 21.9 °C.
Oysters; Market 106 (30%), Small 36 (8%), Spat 18/bu., Shell 57%
Boxes; Old 14 (3%), New 4 (1%), Condition 2.4, Small oysters on markets 8/106 (8%)
Spat size 20-30 mm

Tangier Sound, Haines Point, 15.0 ppt, 21.7 °C.
Oysters; Market 26 (10%), Small 5 (2%), Spat 12/bu., Shell 88%
Boxes; 0, Condition 2.0, Spat size (2 groups) 10-15 mm and 30-40 mm

Tangier Sound, Long Bar, 15.4 ppt, 21.9°C.
Oysters; Market 30 (10%), Small 98 (18%), Spat 166/bu., Shell 55%
Boxes; Old 4 (1%), New 4 (1%), Condition 2.0
Spat size 2-40 mm (recent set)

Tangier Sound, Huddle Rock, 15.4 ppt, 21.9 °C.
Oysters; Market 54 (15%), Small 88 (13%), Spat 204/bu., Shell 54%
Boxes; Old 14 (2%), New 10 (1%)
Spat size 2-35 mm (recent set)

Tangier Sound, Turtle Egg Island, 14.7 ppt, 21.9° C.
Oysters; Market 26 (12%), Small 22 (2%), Spat 122/bu., Shell 65%
Boxes; Old 10 (6%), New 2, Condition 2.2
Spat Size 2 groups 2-10 mm and 20-35 mm

FIELD OBSERVATIONS October 5, 1979

Patuxent, Teagues, 2.5 ppt, 21.0 °C.
Oysters; all dead

Patuxent, Holland Point (Planted), 3.7 ppt, 21.1°C.
Oysters; Market 24 (12%), Small 0, Spat 0, Shell 83%
Boxes; Old 2, Condition 1.7 (Recessive growth 8/10)

Patuxent, Buzzard Island, 5.6 ppt, 21.0°C.
Oysters; Market 22 (11%), Small 0, Spat 0, Shell 88%
Boxes; Old 6 (2%), Condition 2.4, Gonad present in 5/10

Patuxent, Thomas, 7.3 ppt, 21.4°C.
Oysters; Market 14 (10%), Small 0, Spat 0, Shell 85%
Boxes; Old 8 (5%), Condition 2.2, Mussels heavy and dying

Patuxent, Jack's Bay, 8.7 ppt, 21.2°C.
Oysters; Market 32 (55%), Small 0, Spat 0, Shell 40%
Boxes; Old 8 (5%), Condition 1.5, Mussels heavy

Patuxent, Gatton (Deep), 10.1 ppt, 21.5°C.
Oysters; Market 12 (6%), Small 0, Spat 0, Shell 92%
Boxes; Old 4 (2%), Condition 2.7, Shell black and 50% buried

Patuxent, Gatton (Shoal), 10.1 ppt, 21.5°C.
Oysters; Market 38 (20%), Small 0, Spat 0, Shell 70%
Boxes; Old 10 (10%), Condition 2.0, Gonad present in 3/10
Note: Mussels heavy on shell and dying

Patuxent, Broomes Island, 9.7 ppt, 21.4°C.
Oysters; Market 40 (40%), Small 14 (3%), Spat 0, Shell 52%
Boxes; Old 8 (5%), Condition 1.7
Note: Mussels heavy and dying. Oysters open easily

Patuxent, Peterson (above Patent tong), 9.7 ppt, 21.5°C.
Oysters; Market 24 (16%), Small 4 (1%), Spat 0, Shell 61%
Boxes; Old 34 (22%), Condition 1.2
Note: Oysters poor with recent (summer of 1979?) high mortality

Patuxent, Hellen's Bar, 10.6 ppt, 21.4°C.
Oysters; Market 26 (15%), Small 6 (1%), Spat 0, Shell 83%
Boxes; Old 2 (1%), Condition 1.9
Note: Heavy patent tong area

Patuxent, Hungerford Hollow, 11.3 ppt, 22.6°C.
Oysters; Market 110 (35%), Small 14 (1%), Spat 0, Shell 63 %
Boxes; Old 4 (1%), Condition 2.7
Note: Only good bar in samples from river

Patuxent, Back of Island, 11.3 ppt, 21.5°C.
Oysters; Market 44 (20%), Small 14 (2%), Spat 0, Shell 76%
Boxes; Old 6 (2%), Condition 2.5

Patuxent, Hog Island, 12.4 ppt, 21.5°C.
Oysters; Market 64 (20%), Small 16 (3%), Spat 2/bu., Shell 76%
Boxes; Old 6 (1%), Condition 3.0

Lower Bay West, Ten Acres, 12.5 ppt, 20.1°C.
Oysters; Market 28 (12%), Small 16 (4%), Spat 0, Shell 84%
Boxes; 0, Condition 2.8
Note: 80% shells buried, clam shell present. Bar destroyed!

APPENDIX 2

FALL 1979 POTOMAC RIVER OYSTER BAR SURVEY

Elgin Dunnington and George Krantz

At the request of the Potomac River Fisheries Commission, we sampled representative oyster bars in the Potomac River on 24 and 25 September 1979 for a pre-harvest evaluation of the condition of the bars and for a preliminary indication of 1979 oyster reproduction. Samples were collected by commercial dredge aboard the R/V Aquarius. One-half bushel of the dredged material was examined, and standard bar composition data were recorded. CEES, VIMS, MDDNR and PRFC personnel participated in the survey. A summary of the collected data is attached.

Salinities continue to be low. The finding of Congeria (a small bivalve which resembles a mussel) at Ragged Point indicates a relatively permanent shift in animal associations as they adapt to the prolonged (since the fall of 1971) period of below normal salinity. At Ragged Point Congeria, which is adapted to low salinity, is 25 miles downstream of its normal range! And as a further reflection of these conditions, shell growth of oysters is poor throughout the river.

Thus far only light spat fall has been observed near the mouth of the river. However, September is really too early to gauge the season's reproduction.

SUMMARY, POTOMAC RIVER OYSTER BAR SURVEY 24, 25 SEPTEMBER 1979

Bar	Market Oysters	Volume % Markets	Small Oysters	Volume % Smalls	Year-lings*	Spat	Old Market Boxes	Old Small Boxes	Recent Market Boxes	Recent Small Boxes	Volume % Blank Shells	% Cinder	Remarks
Beacon (hatchery stock)	2	<1	0	0	-	28	0	0	0	0	20	80	Four 2 cm. right valves found.
Horseshoe	0	0	0	0	-	0	0	0	0	0	50	50	
Cedar Pt. (upper portion, natural)	0	0	0	0	-	2	0	0	0	0	85	15	
Cedar Pt. (brood stock planting)	68	18	4	1	-	2	14	0	2	0	35	34	
Cedar Pt. (hatchery seed planting)	12	5	0	0	-	0	2	0	0	0	85	15	Oysters very poor; not feeding.
Swan Pt. (brood stock planting)	56	45	0	0	-	0	14	0	0	0	45	2	15% of volume is mussels. Condition good; some not spawn out yet.
Swan Pt. (outside, natural)	8	3	0	0	-	0	0	0	0	0	35	60	
Bluff Pt. (brood stock planting)	20	10	10	2	-	0	6	0	0	0	40	40	Four licks. Gonads full in all but one Most could be strip Oysters feeding, bu shell growth is poo One pre-Agnes oyste found.
Gum Bar	78	15	14	4	-	0	46	0	0	0	40	15	
Yellow Bank	20	15	0	0	-	0	2	0	0	0	20	50	30% of volume is mussels.

Bar	Market Oysters	Volume % Markets	Small Oysters	Volume % Smalls	Year-lings*	Spat	Old Market Boxes	Old Small Boxes	Recent Market Boxes	Recent Small Boxes	Volume % Blank Shells	% Cinder	Remarks
Old Farm	6	5	0	0	-	0	0	0	0	0	45	50	Over half of volu is mussels.
Old Farm	2	<1	0	0	-	0	4	0	0	0	10	85	" "
Kingcopsico	72	22	2	<1	-	0	14	2	0	0	20	23	Trashy sample. M mussels dead.
Wright's Pt.	64	30	14	3	-	2	16	0	2	0	30	3	Old blunt billed oysters, covered with byssus threa 15% of sample was stone.
Peach Orchard	116	45	20	3	-	0	16	0	0	0	15	20	Trashy sample. Many dead mussels Oysters very poor
Dole's Pt.	144	65	16	3	-	0	6	4	0	0	20	10	Several Congeria indicate permanen change in range o animals since Agn
Dobb Bar ('79 Jones Shore seed)	90	50	14	3	-	0	2	0	0	0	15	5	20% of volume is mussels.
Peanut Hill	20	5	12	2	-	0	0	0	0	0	60	25	Oysters in excell condition for thi time of year.
Sheepshead	48	30	2	<1	-	0	12	0	0	0	45	10	
Dukehart Channel	80	30	40	7	-	0	2	0	0	0	25	23	
Heron Is.	168	55	76	14	-	0	8	0	8	10	30	0	
Huggins	148	50	42	7	-	0	18	0	4	0	13	8	
Ragged Pt. (east)	104	35	98	10	-	2	0	0	0	0	40	5	

Bar	Market Oysters	Volume % Markets	Small Oysters	Volume % Smalls	Year-lings*	Spat	Old Market Boxes	Old Small Boxes	Recent Market Boxes	Recent Small Boxes	Volume % Blank Shells	% Cinder	Remarks
Ragged Pt. (west)	84	30	32	5	-	0	12	0	0	0	50	0	Congeria found he is 25 miles below normal range.
Red Bar	122	65	6	5	22	0	6	0	2	0	15	10	
Bonum Cr.	96	65	26	5	-	2	8	0	2	0	20	10	
Lynch Pt.	2	<1	2	<1	-	6	2	2	0	0	95	0	
Thicket Pt.	52	20	0	<1	6	0	2	0	4	0	70	0	
Hog Is. (upper)	82	18	46	8	-	0	0	0	0	0	10	42	
Hog Is. (middle)	48	15	22	3	-	6	48	0	0	2	40	20	
Great Neck	62	20	34	10	-	6	14	2	2	0	65	3	
Great Neck (inside)	2	<1	8	1	-	2	0	0	0	0	95	3	
Piney Pt. Hollow	32	20	26	5	-	14	36	4	0	4	60	0	Oysters slender. Heavy sedimentatic
St. George's Is. ('78 shells)	2	<1	386	50	-	28	4	0	0	6	48	0	
St. George's Is. ('79 shells)	2	<1	4	<1	-	8	4	8	0	0	98	0	
Kitt's Pt. ('79 planting)	2	<1	2	<1	-	42	0	0	0	6	90	0	
Jones Shore (plots 1 & 2 down middle)	124	50	156	25	-	52	18	2	0	0	15	0	
Jones Shore (plot 4 inshore, '79 shells)	0	0	0	0	-	30	0	0	0	0	98	0	

Bar	Market Oysters	Volume % Markets	Small Oysters	Volume % Smalls	Year-lings*	Spat	Old Market Boxes	Old Small Boxes	Recent Market Boxes	Recent Small Boxes	Volume % Blank Shells	% Cinder	Remarks
Jones Shore (natural, offshore of plots 6 & 7)	124	43	104	12	-	32	36	2	4	8	25	0	
Jones Shore (plot 8 inshore)	124	25	300	40	-	72	14	8	8	8	20	0	
Jones Shore (plot 11 inshore)	48	35	64	10	-	32	6	0	2	2	35	0	
Cornfield Harbor ('79 shells)	104	30	24	10	-	114	2	0	4	6	30	8	
Cornfield Harbor (outside)	150	75	64	15	-	150	2	2	0	0	10	0	Oysters far apart. Oysters are the onl cultch. Half of blanks are buried.
Cornfield Harbor (inshore)	124	50	80	30	-	12	0	0	8	4	10	0	Oysters are almost the only cultch.

*Yearlings were tallied only when they could be clearly identified. Percent smalls includes yearlings.

APPENDIX 3

UNIVERSITY OF MARYLAND-COLLEGE PARK — UNIVERSITY OF MARYLAND-EASTERN SHORE
COOPERATIVE EXTENSION SERVICE

Center of Environmental & Estuarine Studies
University of Maryland
P.O. Box 775
Cambridge, MD
21613

September 12, 1979

For the past several years, the University of Maryland's research vessel AQUARIUS has been used to conduct a Fall Oyster Bar Survey. Taking about two weeks, approximately 100 bars in the Bay and almost all of its tributaries are checked for spat and small and market oysters. Samples are also taken for checking on diseases which kill oysters.

The oyster bars checked are those for which a record of spat set exists back to 1939. The Survey is not meant to count every spat in the Bay but to get, in a short period of time, a pulse beat on bars. Basically, we are looking at the overall spat set in different areas and the Bay as a whole to compare with past years.

This year we have lengthened the cruise by a few days in order to invite you to come with us and participate. Please be our guest on board on any day or days which you can. We would like you to see the AQUARIUS, meet the crew and research personnel, check the key bars with us, and help us to locate areas which you know has had a spat set or a die-off of oysters. The input of watermen is extremely important in this work, and we hope that you or any of your friends can make it.

Please check the attached schedule to find the day or days that would be important to you in your work. Give me a call either at the Horn Point Environmental Lab at Cambridge (228-8200) during the day, or at home in McDaniel, Talbot County, (745-5239) any evening in the next couple of weeks to let me know if you can make it. I would be glad to answer any questions you may have about the cruise also.

I hope that you or your friends can make it and look forward to working with you.

Sincerely,

Donald Webster

Donald Webster
Marine Advisory Agent

DW/jk
Enclosure

MARYLAND SEA GRANT PROGRAM

APPENDIX 4

1979 Fall Oyster Bar Survey Cruise

PLEASE NOTE:

1. AQUARIUS will leave the dock at 7 a.m. each day. Coffee and snacks will be available.
2. AQUARIUS is not equipped with Citizens Band (CB) radio. Contact may be made either by VHF-FM on Channel 16 or through ship-to-shore telephone hookup by contacting your local marine operator. Vessel call sign is WQ-4267.
3. In most cases AQUARIUS will return to drop you off at the place you boarded. On days when this is not possible, please note that transportation will be provided to take you back to the starting point.
4. We invite you to be our guest for lunch.

24 September (Monday) - Potomac River. Leave from yacht club in Colonial Beach. Work upstream on Virginia side to Rt. 301 bridge, then downstream on Maryland side to Cobb Island. Return to Colonial Beach.

25 September (Tuesday) - Potomac River. Leave from yacht club in Colonial Beach. Work downstream on Virginia side, then upstream on Maryland side from Jones shore. Return to Colonial Beach.

26 September (Wednesday) - Potomac River. Leave from Leonardtown (dock by Wharf Restaurant). Work Brannock's Bay, remainder of St. Mary's shoreline and tributaries. Arrive at St. Mary's College. Transportation provided back to Leonardtown. AQUARIUS proceeds to Crisfield.

27 September (Thursday) - Lower Tangier Sound. Leave from Somers Cove Marina, Crisfield. Survey Pocomoke Sound, Lower Tangier Sound including Manokin River. Return to Crisfield.

1 October (Monday) - Western Shore. Leave from Chesapeake Biological Lab (Solomons Lab) boat dock. Work western shore of Chesapeake Bay and tributaries to Sandy Point, Swan Point and Kent Shore. Arrive in Annapolis (City Dock). Transportation provided back to Solomons.

2 October (Tuesday) - Chester River/Eastern Bay. Leave from Piney Narrows Marina gas dock (Kent Narrows). Survey Chester River, Eastern Bay, Wye River, Miles River. Arrive in St. Michaels. Transportation provided back to Kent Narrows.

3 October (Wednesday) - Choptank Drainage. Leave from Bridge Restaurant, Tilghman. Survey Harris Creek, Broad Creek, Tred Avon, Choptank, and Little Choptank. Arrive back at Tilghman. AQUARIUS proceeds to Deal Island.

4 October - (Thursday) Upper Tangier Sound. Leave from Dept. of Natural Resources facility at Deal Island (formerly Richard Webster's plant). Survey Upper Tangier Sound, Honga River, Fishing Bay, Manokin and Wicomico Rivers. Arrive back at Deal Island. AQUARIUS returns to Solomons dock.

5 October - (Friday) Patuxent River. Leave from CBL dock at Solomons. Survey Patuxent River downstream of Rt. 231 bridge at Benedict. Arrive back at Solomons.

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APPENDIX 5

Groups Represented Oyster Cruise '79

Industry:	Maryland Watermen's Association (3) Calvert County Watermen's Association (4) Virginia Watermen's Association (1) independent watermen (9) Chesapeake Bay Seafood Industries Association (1) Maryland Seafood Marketing Authority (1) Sealife Automation Corporation (1)
Regulatory:	Department of Natural Resources (21) Tidewater Administration (Fisheries; Coastal Zone Management) Extension Service Potomac River Fisheries Commission (4) Department of Health and Mental Hygiene (8) Prince Georges County Health Department (1) Washington Suburban Sanitary Commission (1) National Capital Parks and Planning Commission (2) Northern Neck Planning District Commission (1)
Educational:	Project QUEST (Dorchester science students) (10) Salisbury State College (graduate students) (2) Md. Cooperative Extension Service (Administration; 4-H; Marine Sci.) (7) Virginia Institute of Marine Science (2) Univ. of Md. Center for Environmental & Estuarine Studies (5)
Media:	Sunpapers (1) National Geographic (2) Star-Democrat (Easton, MD) (1) Md. Sea Grant (1)
Other:	Calvert Marine Museum (2) County Commissioners (3) Prince Georges County Citizens Advisory Committee (1) Patuxent River Advisory Committee (2) Local Delegate (1) Conference Coordinator, White House, Washington D.C. (1) interested citizens (7)

APPENDIX 6

1979 SPAT SURVEY

NEWS COVERAGE

A general news release on the 1979 oyster spat survey and an itinerary of RV AQUARIUS was sent to 21 newspapers, 16 radio and 8 television stations.

In reading the response to the release, one must bear in mind that our total media return is monitored by a clipping service in Baltimore as well as by the office of public information. However, the clipping service does miss coverage of smaller papers. Our office receives the Baltimore Sun, Washington Post, Easton Star-Democrat and Cambridge Daily Banner.

Coverage was provided in all listed papers but the best coverage in terms of placement and potential audience was the half page feature, with photograph, by Tom Horton in the Sunday, October 7 edition, Baltimore Sun.

The Cambridge Banner's Bill Radcliffe did a four part series which included two four-column photos placed, on all four editions, on the lower front page. This coverage totaled 252 column inches. This paper has a fairly wide distribution throughout the mid Eastern Shore area as does the Easton Star-Democrat. In that paper there were 64 column inches of copy. Photo coverage included two four-column, three three-column and four two-column pictures. Through Ann Stinson of the Star-Democrat, additional coverage was provided in the Stevensville Bay Times and Denton Record.

One radio station called CEES for an over-the-telephone interview. Two television stations in Washington attempted to arrange coverage. Their efforts were foiled by union regulations in one case and personnel changes in another. In the latter, PM Magazine was approached about a feature and the program director was quite keen on it but then left for another job and left the idea there as well.

Total column inches of copy:	514.5 inches
Total column inches, photos:	200 inches

Again, these figures reflect actual published material that this office has documented. While the total was sizeable, the "best" coverage was, as stated earlier, probably that of the Baltimore Sun.

Media List for the 1979 Spat Survey

Newspapers:

St. Mary's Beacon
Leonardstown

The Enterprise
Lexington Park

The Calvert Independent
Prince Frederick

The Recorder
Prince Frederick

Evening Capital
Annapolis

The Sun
Baltimore

Sun Papers Bureau
Salisbury

Star-Democrat
Easton

Bay Times
Stevensville

County Record
Denton

Charles County Leaf
La Plata

Times Crescent
La Plata

Maryland Independent
Waldorf

Queen Anne's Record-Observer
Centreville

Crisfield Times
Crisfield

Dorchester News
Cambridge

County Messenger
Worcester

Times
Federalsburg

Anne Arundel Times
Annapolis

Radio stations:

Washington:
WMAL

Baltimore:
WBAL
WCAO
WMAR-FM

WBOC, WJDY
Salisbury

WCEM and WESP
Cambridge

WCTD
Federalsburg

WDMV
Pocomoke

WKIK
Leonardtown

WMDM
Lexington Park

WMJS
Prince Frederick

WOLC
Princess Anne

Annapolis:
WANN
WFSI
WYRE

Television stations:

WRC, WTTG, WJMD
Washington

WBAL, WMAR, WJZ
Baltimore

WBOC
Salisbury

WAPB
Annapolis