

1980 Annual Summary

OYSTER SPATFALL IN VIRGINIA RIVERS

BY

Dexter Haven and Paul Kendall

The Virginia Institute of Marine Science (VIMS) conducts weekly surveys from June through early October to obtain oyster spatfall information. Spat counts are made from oyster shells strung on wire and suspended from stakes on public and private beds. The number of spat on shells are counted each week of the spawning season to determine the potential of a particular area for receiving a strike and to predict the most likely period the strikes will occur. Shells planted just before the period of maximum set have the best chance of getting a good strike.

A moderate or heavy strike on shellstrings usually indicates a significant strike on exposed bottom cultch. However, a good strike on shellstrings in some locations may not always be accompanied by good spatfall on shells on the bottom. Bottom shells are sometimes so fouled by other marine life that no room is left for small spat to attach. Even with a reasonable spatfall, survival on the bottom in saltier waters may be extremely low due to predators such as drills and blue crabs which eat the small spat.

Usually a light set of spat on shellstrings indicates a poor set on bottom cultch. During certain exceptional years, for reasons only partially understood, a light set on our shellstrings results in an exceptional set on the natural bottom.

The average number of spat which set in one week on the smooth side of 10 shells is tabulated in this report; it is reported as spat-per-shell-per-week. Weekly set is arbitrarily rated as follows: fair, 0.1 to 1.0; moderate, 1.1 to 10; heavy, 10.1 to 100. As an index of total seasonal spatfall, the weekly sets are summed in this report for each station. In evaluating setting levels, it should

be recognized that in certain rivers, such as the Rappahannock and Potomac, the set is typically zero in many sections and only fair in others. Other systems, including the lower James and Piankatank rivers, Mobjack Bay and Seaside of the Eastern Shore, typically receive a moderate or heavy set and, as a result, often produce quantities of seed oysters or market oysters.

The shellstring study is supplemented each year by counts of spat on natural bottom cultch. This study is made after seasonal setting has stopped and it indicates how many spat have survived. Half-bushel samples of bottom cultch were collected from selected locations with a dredge during the fall and winter of 1980-81. Numbers of oyster spat setting on cultch were counted. The data are expressed as number of spat per bushel.

If shells are to be planted in any region, it is important to plant a week or two prior to peak setting. If shells are planted much earlier, they may become so fouled with marine organisms that larvae will not set. For further information on setting seasons and time to plant shells, contact Dexter Haven, Head, Department of Applied Biology, VIMS.

SUMMARY OF SETTING IN 1980

General Summary for the Individual Systems

The oyster spatfall throughout Virginia's portion of the Chesapeake Bay generally was much higher in 1980 than in the previous three years. Of 52 locations in Chesapeake Bay tributaries where setting was monitored with shellstrings in 1980 40 received greater spatfall than in 1979; often the increase was several times greater. Of the same total, 38 locations received more set than in either 1979 or 1978; 32 received more set than in either 1979, 1978 or 1977. Setting in 1980 was the highest during the past nine year period at 16 of 29 locations where continuous records exist.

At two locations on the Seaside of the Eastern Shore, setting was less than in the previous year.

In contrast with the record high weekly setting rates were the low numbers of spat seen in samples of bottom cultch taken in the fall. We have no explanation of this disparity.

James River - Setting began in the first week in July with Hampton Roads; at Deep Water Shoal the first spat were seen in the last week in July. At most stations numbers of spat per week increased until mid-August and then declined through September. The level of peak

set ranged from fair to heavy with the highest weekly set (51.0 spat per shell) being observed in mid-August at Naseway Shoal.

Total seasonal set (the sum of the weekly sets at a station) ranged from 222.7 at Naseway Shoal to 5.2 at Deepwater Shoal, which is the most upriver station. In the central oyster region of the James the highest weekly set and the total seasonal set were as follow: Naseway Shoal - 51.0/222.7; Brown Shoal - 10.1/43.3; Miles Watch House - 5.6/18.9; White Shoal - 7.8/39.6; Days Point - 4.8/17.7; Wreck Shoal - 2.8/16.4; Point of Shoal - 23.4/55.8; Mulberry Swash - 7.4/20.3; Horsehead - 9.1/20.7; and Deepwater Shoal - 1.8/5.2. Total seasonal set at Hampton Flats, Brown Shoal, Miles Watch House, Wreck Shoal, Point of Shoal and Horsehead was higher in 1980 than in any year during the past nine years.

Samples of bottom material or cultch dredged in Fall 1980 from public rocks adjacent to the shellstring stations indicated that the numbers of spat surviving on natural bottom in late fall were lower than in recent years for all but the three upriver stations. The numbers of spat per bushel follow: Nansemond Ridge - 40; Naseway Shoal - 36; Brown Shoal - 36; White Shoal - 42; Gun Rock - 20; Thomas' Rock - 24; Wreck Shoal (inshore) - 9; Wreck Shoal (offshore) - 22; Mulberry Island Swash - 96; Point of Shoal - 154; Horsehead - 518; and Deepwater Shoal - 1,040. We do not know what caused the great disparity between the larger-than-usual weekly sets and the lower-than-usual portion of the set surviving over most of the seed area.

York River - Setting was much higher at two out of the three stations than it was during the preceding three years. At the VIMS Ferry Pier, the heaviest set in nine years was recorded; there setting peaked sharply in the last week of August at 21.8 spat per shell. A moderate set occurred at Aberdeen Rock, about mid-way up the river. Foxes Creek, near the head of the river, had a light peak set.

Counts of spat per bushel of bottom material dredged in Fall 1980 showed very low sets as follows: Green Rock - 2; Pages Rock - 0; Aberdeen Rock - 10; and Bell Rock - 12.

Mobjack Bay - At two stations in Mobjack Bay the set in 1980 was the highest in the six years that spatfall has been monitored there. The highest weekly set in the State (171.6) occurred on a shellstring hung off Brown's Bay in the third week of August. The other shellstring in Mobjack Bay - at Two Stake - had the third highest weekly set (81.0) also during the third week of August.

Ware River - At a station opposite the mouth of Wilson's Creek setting was down from the last two years. As in past years, there were two periods of setting - one in July and the other in late August; this year the second peak was higher (8.0) than the first (3.2).

North River - Setting at all three stations in the North River has trended downward since 1977. Limited setting occurred early in July; however, most occurred in August and September. The highest weekly set occurred during the third week of August at all three locations.

East River - There are two stations in the East River. At the Gulf Oil Dock, approximately 2.4 miles inside the mouth of the river, ^{the} setting, as in the North and Ware rivers, was down from the past ~~two~~ years. At the other station, in Mobjack Bay approximately 3/4 mile beyond the mouth of the river, setting was higher than usual. The latter station experienced its highest set ~~of any~~ in our records.

New Point Comfort Area - At both stations in 1980 spatfall was much higher than during the past three years. Even though the two locations were in different bodies of water the duration and pattern of setting was similar. Setting at the public landing in Winter Harbor peaked the third week in August at 81.0 spat/shell. In Pepper Creek a peak set of 36.6 spat/shell occurred during the second week of August.

Piankatank River - Setting was generally much higher in this estuary than in any year since 1971. This occurred at three of the four stations. At the fourth station, Burton Point, setting occurred at a similar level as the preceding year. Heavy sets occurred in the third week of August at Three Branches and Burton Point; these levels were respectively 22.3 and 24.0 spat/shell. Setting peaked two weeks earlier at two stations farther upriver.

Spat on dredged samples numbered 104 spat per bushel at Three Branches; 22 - Burton Point; 254 - Island Bar; 40 - Cape Tune; 90 - Palace Bar; and 12 - Ginney Point; this was much lower than in the preceding year. This set was recorded on old fouled shells. Much higher sets were reported on shells planted in 1980.

Rappahannock River - Stations below the mouth of the Corrotoman River experienced heavy seasonal sets; at those four stations spat began attaching to the shell the second week of July, hit moderate and high peaks the third week in August, and continued for a short time thereafter. Setting at three upriver stations began later, lasted a shorter time, and was much lighter.

Numbers of spat surviving on bottom cultch were much lower in 1980 than in 1979 with the exceptions of Morratico and Bowler's which were zero. Numbers were: Drumming Ground - 16; Parrott Rock - 2; Hogg House - 2; Smokey Point - 0; Morratico Bar - 0; and Bowler Rock - 0. As in the Piankatank River, heavy sets were reported on shell planted in 1980.

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Great Wicomico River - In the Great Wicomico River setting in 1980 at all but the ~~weekly set~~ of the upriver-most station was higher than in any year during the past nine. Generally, stations showed light to moderate peak sets; the one exception was at Hudnall's Dock where a heavy set of 28.0 spat per shell was counted. At each station there were two peaks of setting - one in late July or early August and another 4 to 5 weeks later; at all but the Fleet Point station the initial period of setting was heavier.

Of the five rivers where bottom cultch dredged in the fall was examined for spat, the Great Wicomico was the only system where numbers greater than 1979's were seen. Numbers in 1980 were as follow: Dameron Marsh - 246; Whaley's - 72; Fleet Point - 448; Haynie Point - 108; and Rogue Point - 274. Figures for 1979 were 200, 278, 430, 220, and 126, respectively. Higher sets were reported on shells planted in 1980.

Potomac River - At Jones Shore and Cornfield, where shellstrings have been monitored for seven and six years, respectively, the total seasonal sets were the highest in our records. Heavy peak sets occurred in mid-July at these two downriver stations on the North side. At four other stations light to moderate peak sets occurred at times varying from mid-July to early September. No spat were seen on shells from the upper-most stations (i.e. above the Yeocomico River).

Eastern Shore, Bayside - At two stations near Saxis where setting was monitored moderate peak sets were seen in the middle of August. Records for the station nearest Saxis show that 1980's set was the best in four years and the second best in the nine years that our records go back.

Eastern Shore, Seaside - As is typical of the Seaside moderate and heavy peak sets were seen at two widely separated stations. Total seasonal set, however, was lower than last year's. Setting peaked twice, first in mid-July and again in the first week of September, at both stations.

Acknowledgments - Much of the work of putting out and collecting the shellstrings and shellbags was done by Inspectors, Police Boat Captains and Mates of the Virginia Marine Resources Commission. Their cooperation and the assistance of their supervisors is gratefully acknowledged.

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two stations
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VIRGINIA INSTITUTE OF MARINE SCIENCE
AND
SCHOOL OF MARINE SCIENCE,
THE COLLEGE OF WILLIAM AND MARY
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Spatfall on Shellstrings*
Annual Summary
1977-1980

JAMES RIVER

Dates Exposed**	Hampton Flats		Nansemond Ridge		Newport News Tax Office			
	1977	1978	1979	1980	1977	1978	1979	1980
Jun 16-23	—	—	—	—	0.0	0.0	0.0	—
Jun 23-30	0.0	—	—	0.0	0.0	0.0	0.0	0.0
Jun 30-Jul 7	—	—	—	0.0	—	—	—	—
Jul 7-14	—	0.0	0.7	0.1	—	—	—	—
Jul 14-21	1.0	0.0	—	0.2	0.3	0.0	0.1	0.0
Jul 21-28	—	0.0	4.0	0.5	0.0	0.0	0.0	0.0
Jul 28-Aug 5	0.2	0.1	0.4	0.0	—	—	—	—
Aug 5-11	0.6	0.0	3.6	1.4	—	—	—	—
Aug 11-19	0.8	0.1	7.6	1.8	0.1	0.8	0.1	0.1
Aug 19-25	0.7	0.3	1.7	10.6	0.0	0.2	1.8	0.2
Aug 25-Sep 3	0.5	1.3	0.0	13.6	0.1	0.9	0.4	0.8
Sep 3-8	2.5	0.7	1.3	5.9	1.6	0.1	0.6	1.3
Sep 8-15	0.2	0.0	2.5	1.3	—	—	—	—
Sep 15-22	—	0.0	0.8	0.3	0.2	0.9	0.2	0.2
Sep 22-29	2.7	1.2	—	—	0.1	0.0	0.8	0.2
Sep 29-Oct 3	—	1.5	—	1.0	0.1	0.4	0.5	0.1
Oct 3-9	—	—	—	—	—	—	—	—
Oct 9-14	—	—	—	—	—	—	—	—
TOTALS	9.2	5.2	22.6	36.7	2.5	3.3	7.4	5.7
					6.2	0.7	3.5	5.6

* Shows spat per shell (smooth side only)

** Dates shown are for 1980. Dates in other years were approximately the same.

● Not sampled in previous years.

General Guide to Setting:

0.1 to 1.0 spat per shell = fair

1.1 to 10.0 spat per shell = moderate

10.1 to 100 spat per shell = heavy

Dates Expc	Brown Shoal			Miles Watch House			White Shoal		
	1977	1978	1979	1977	1978	1979	1977	1978	1979
Jun 16-23	0.0	0.0	--	0.0	0.0	--	--	0.0	--
Jun 23-30	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Jun 30-Jul 7	0.0	0.0	0.3	0.0	0.5	0.0	0.1	0.0	0.0
Jul 7-14	0.0	0.0	0.5	0.0	0.1	0.0	0.0	0.1	0.6
Jul 14-21	0.0	0.0	0.4	0.0	0.7	0.2	0.0	0.7	0.0
Jul 21-28	0.1	0.1	0.4	0.0	0.1	0.2	0.0	0.0	1.6
Jul 28-Aug 5	0.0	0.2	0.2	0.0	0.3	0.4	0.1	0.1	2.7
Aug 5-11	0.5	0.2	2.0	0.5	0.1	2.9	3.0	0.0	2.0
Aug 11-18	0.7	0.1	0.0	0.5	0.2	0.0	0.6	0.0	0.5
Aug 18-25	0.3	0.1	0.4	0.5	--	0.1	6.0	0.2	4.0
Aug 25-Sep 3	0.6	0.0	0.5	0.2	0.9	0.2	4.1	0.3	5.7
Sep 3-8	0.5	0.5	1.5	0.3	0.3	0.0	0.4	0.2	0.1
Sep 8-15	0.4	0.7	1.3	1.0	0.8	0.6	0.0	0.9	0.8
Sep 15-22	0.5	0.3	0.0	0.7	0.0	0.0	0.7	0.6	0.0
Sep 22-29	0.1	0.0	0.0	0.0	0.0	0.7	0.8	0.0	1.7
Sep 29-Oct 3	--	0.0	0.2	--	--	0.0	--	--	0.5
Oct 3-9	--	--	--	--	--	--	--	--	--
Oct 9-14	--	--	--	--	--	--	--	--	--
TOTALS	3.7	2.2	7.6	1.9	3.6	5.9	15.8	2.4	9.0

Dates Exposed**	Naseway Shoal 1980	Wreck Shoal			Point of Shoal			Days Point 1980
		1977	1978	1979	1977	1978	1979	
Jun 16-23	--	0.0	0.0	--	--	0.0	--	--
Jun 23-30	--	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jun 30-Jul 7	0.0	0.0	0.3	0.0	0.0	0.1	0.0	0.0
Jul 7-14	0.4	0.0	--	0.0	0.0	0.0	0.0	0.0
Jul 14-21	0.3	0.0	0.5	0.0	0.1	0.0	0.0	1.9
Jul 21-28	2.7	0.0	1.2	0.3	0.0	0.4	0.3	Lost
Jul 28-Aug 5	51.0	0.4	1.8	1.8	5.7	0.4	0.4	5.2
Aug 5-11	50.5	0.7	1.5	2.0	2.6	1.0	1.0	23.4
Aug 11-18	37.2	1.5	0.2	2.7	2.6	0.0	0.0	17.9
Aug 18-25	9.4	1.1	0.2	1.3	3.5	0.1	0.1	1.1
Aug 25-Sep 3	34.5	0.1	0.1	2.8	1.6	0.0	0.0	0.4
Sep 3-8	24.0	0.1	0.5	1.7	0.8	0.0	0.0	2.2
Sep 8-15	9.2	0.1	0.7	1.0	0.1	0.1	0.2	3.1
Sep 15-22	3.5	0.0	0.1	0.4	0.1	0.1	0.0	0.3
Sep 22-29	--	0.2	0.4	0.1	0.1	0.1	0.0	--
Sep 29-Oct 3	--	0.0	0.2	0.0	0.1	0.1	0.0	--
Oct 3-9	--	0.0	0.2	0.0	0.1	0.1	0.0	0.3
Oct 9-14	--	--	--	--	--	--	--	--
Oct 14-27	--	--	--	--	--	--	--	--
TOTALS	222.7	4.1	1.9	6.9	14.9	0.9	2.2	55.8

Dates Exposed *	Mulberry Swash			Horsehead Shoal			Deepwater Sh-			
	1977	1978	1979	1977	1978	1979	1977	1978	1979	1980
Jun 16-23	--	0.0	--	--	0.0	--	--	0.0	--	--
Jun 23-30	--	0.0	--	--	0.0	--	--	0.0	--	--
Jun 30-Jul 7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jul 7-14	0.0	0.0	0.6	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Jul 14-21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jul 21-28	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jul 28-Aug 5	0.0	0.0	0.6	0.0	0.0	0.6	0.0	0.0	0.0	0.8
Aug 5-11	0.2	0.1	0.7	0.0	0.0	0.6	0.0	0.4	0.5	0.3
Aug 11-18	4.0	0.4	1.2	1.1	0.0	0.7	0.6	0.0	0.3	0.6
Aug 18-25	0.0	0.3	0.5	0.5	0.1	0.0	0.4	0.0	0.7	1.8
Aug 25-Sep 3	1.7	0.3	0.3	2.3	0.0	0.2	1.5	0.0	0.3	1.2
Sep 3-8	2.4	1.1	0.0	0.4	0.5	0.0	0.4	0.4	0.4	0.0
Sep 8-15	0.1	0.7	0.1	0.2	0.2	0.0	0.2	0.0	0.0	0.1
Sep 15-22	0.0	0.7	0.0	0.1	--	0.0	0.3	0.0	0.0	0.1
Sep 22-29	0.1	0.4	0.0	0.0	0.1	0.0	0.1	0.3	0.0	0.1
Sep 29-Oct 3	0.0	0.7	0.0	0.0	0.2	0.0	0.0	0.3	0.0	0.1
Oct 3-9	--	0.2	0.0	--	--	0.0	--	0.2	0.0	0.0
Oct 9-14	--	--	0.0	--	--	0.0	--	--	0.0	0.0
TOTALS	8.5	3.9	4.0	4.6	1.0	3.0	3.5	2.2	2.6	5.2

YORK RIVER

Dates Exposed**	VIMS Ferry Pier			Aberdeen Rock			Off Foxes Creek			
	1977	1978	1979	1977	1978	1979	1977	1978	1979	1980
Jun 19-26	0.0	0.0	0.0	0.0	--	0.0	0.0	0.0	0.0	--
Jun 26-Jul 3	1.0	0.0	0.0	0.0	--	0.0	0.1	0.0	0.0	0.0
Jul 3-10	1.2	0.0	0.0	0.0	--	0.0	0.0	0.0	0.0	0.0
Jul 10-17	0.0	0.0	0.0	0.0	--	0.1	0.0	0.0	0.0	0.0
Jul 17-24	1.0	0.1	0.3	1.1	--	0.0	0.0	0.0	0.1	0.0
Jul 24-31	1.0	0.1	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Jul 31-Aug 7	0.0	0.3	0.6	0.0	0.0	0.2	0.0	0.0	0.0	0.0
Aug 7-14	0.4	0.1	0.0	0.3	0.2	0.1	0.0	0.0	0.0	0.0
Aug 14-20	0.3	0.6	0.3	1.0	0.0	0.3	0.5	0.0	0.0	0.6
Aug 20-27	0.9	0.9	1.3	0.5	0.0	0.2	0.2	0.0	0.1	0.2
Aug 27-Sep 3	6.7	0.1	0.0	7.0	0.0	0.0	0.5	0.0	--	0.1
Sep 3-10	6.6	0.3	1.6	0.0	0.0	0.2	1.1	0.2	0.0	0.0
Sep 10-17	3.8	0.1	0.0	0.0	0.1	0.2	0.4	0.1	0.0	0.0
Sep 17-25	1.0	0.1	0.0	0.0	0.1	0.2	0.4	0.1	0.0	0.0
Sep 25-Oct 2	--	--	0.1	--	0.1	--	0.4	--	0.0	0.1
Oct 2-6	--	--	--	--	0.1	--	--	--	0.0	0.0
Oct 6-19	--	--	--	--	0.1	--	--	--	0.0	0.0
TOTALS	22.9	3.1	5.2	9.9	0.4	1.3	3.2	0.3	0.2	1.2

Off Brown's Bay
Station 14

Tow Stake
Station 13

Off Wilson's Creek
Station 1

Dates Exposed**	Station 14			Station 13			Station 1			
	1977	1978	1979	1977	1978	1979	1977	1978	1979	
Jun 20-27	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Jun 27-30	0.0	--	0.0	0.0	0.0	0.0	0.2	0.0	0.0	
Jun 30-Jul 7	0.0	--	0.0	8.8	0.1	0.1	11.5	1.7	1.7	
Jul 7-14	0.0	1.0	0.0	0.6	0.6	0.6	30.8	6.5	3.2	
Jul 14-21	2.3	0.1	0.1	1.0	1.0	1.0	3.0	25.6	0.1	
Jul 21-28	0.2	1.1	1.0	9.9	0.6	0.6	0.4	102.2	0.7	
Jul 28-Aug 5	0.7	2.8	1.3	6.4	0.3	0.3	2.4	0.9	0.0	
Aug 5-11	0.0	0.7	1.3	49.6	0.4	0.4	0.7	0.0	1.0	
Aug 11-19	0.0	--	5.7	35.9	0.0	4.3	1.0	27.6	8.0	
Aug 19-25	--	0.9	--	171.6	0.0	7.4	5.1	0.2	4.8	
Aug 25-Sep 3	--	2.2	--	13.0	0.1	0.0	12.0	0.2	2.1	
Sep 3-8	--	0.9	--	27.0	1.4	0.2	0.0	0.0	3.4	
Sep 8-15	--	0.6	--	6.5	0.2	0.6	6.4	0.2	0.0	
Sep 15-22	--	--	--	8.8	0.1	0.4	0.0	0.0	0.2	
Sep 22-29	--	--	--	2.2	0.0	0.4	5.0	0.0	0.2	
Sep 29-Oct 6	--	--	--	--	0.2	0.4	0.0	0.1	0.2	
Oct 6-15	--	--	--	--	--	--	--	--	--	
TOTALS	3.2	10.3	9.4	332.6	16.1	22.2	13.0	73.5	165.2	25.1

NORTH RIVER

Cedar Point
Station 3

Blackwater Creek
Station 2

Head
Station 1

Dates Exposed**	Station 3			Station 2			Station 1			
	1977	1978	1979	1977	1978	1979	1977	1978	1979	
Jun 16-23	0.0	0.0	0.0	0.0	--	0.0	0.0	0.0	0.0	
Jun 23-Jul 1	0.0	0.9	0.0	0.1	0.0	0.0	0.0	0.7	0.0	
Jul 1-8	0.0	0.9	0.0	0.0	2.7	0.0	0.0	1.2	6.2	
Jul 8-15	0.1	3.6	12.3	0.0	11.8	3.2	0.0	3.0	1.9	
Jul 15-22	0.0	3.3	1.8	0.0	1.7	23.7	--	0.1	31.0	
Jul 22-29	0.0	0.0	0.0	0.0	0.0	0.2	--	0.0	0.0	
Jul 29-Aug 6	0.6	0.3	0.5	0.0	0.1	0.1	0.0	0.3	0.0	
Aug 6-12	0.1	0.2	0.0	0.0	0.0	0.3	0.1	0.4	0.0	
Aug 12-19	0.2	1.7	3.3	1.0	0.8	0.4	0.0	0.6	0.9	
Aug 19-26	0.2	0.0	18.8	5.6	0.2	0.5	2.7	0.0	0.1	
Aug 26-Sep 2	0.6	0.4	0.6	0.1	0.0	0.0	0.0	0.2	0.2	
Sep 2-8	0.0	0.0	1.1	0.1	0.2	0.2	0.1	0.2	0.9	
Sep 8-15	0.0	0.7	0.4	0.0	0.3	0.1	0.0	0.7	0.3	
Sep 15-23	0.0	0.0	0.0	0.0	0.2	0.0	1.1	0.1	0.0	
Sep 23-30	1.4	0.0	0.1	0.3	0.4	0.0	1.2	0.0	0.0	
Sep 30-Oct 7	--	0.4	0.0	0.1	0.0	0.0	--	0.0	0.1	
TOTALS	3.2	12.4	38.9	7.3	0.7	28.7	5.2	7.5	41.6	8.8

Dates Exposed	Station 6			Station 11		
	1977	1978	1979	1977	1978	1979
Jun 16-23	--	0.0	0.0	0.0	0.0	0.0
Jun 23-30	--	1.2	0.0	0.0	6.8	0.4
Jun 30-Jul 7	--	0.5	0.0	0.0	69.4	1.6
Jul 7-14	--	0.0	1.3	0.0	31.5	15.6
Jul 14-21	0.0	0.0	1.3	0.0	2.0	14.6
Jul 21-28	3.0	5.4	2.2	12.0	10.0	17.7
Jul 28-Aug 5	3.0	1.6	4.6	0.0	9.2	13.4
Aug 5-12	3.0	26.6	1.3	0.0	112.2	2.0
Aug 12-19	3.0	1.2	8.4	2.8	48.8	12.1
Aug 19-26	3.0	1.2	0.2	11.6	62.7	0.8
Aug 26-Sep 2	4.5	2.8	0.1	1.6	0.7	0.7
Sep 2-9	4.5	--	0.2	0.2	0.7	0.7
Sep 9-15	4.5	--	1.6	1.7	2.0	0.8
Sep 15-22	4.5	--	0.6	1.6	0.1	0.0
Sep 22-29	7.6	--	0.0	3.6	0.0	0.0
Sep 29-Oct 7	7.6	--	0.3	--	0.0	0.0
Oct 7-14	--	--	--	--	0.0	0.0
TOTALS	15.1	39.5	22.1	35.1	356.1	80.4

EAST RIVER

NEW POINT COMFORT AREA

Dates Exposed**	Winter Harbor - Public Landing - Station 10			Pepper Creek Station 7			Three Branches Station D		
	1977	1978	1979	1977	1978	1979	1977	1978	1979
Jun 16-23	0.0	--	0.0	--	0.0	0.0	0.0	0.0	0.0
Jun 23-Jul 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jul 1-8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jul 8-15	0.0	0.1	0.1	0.0	0.0	0.0	0.2	0.0	7.1
Jul 15-22	0.0	0.0	3.2	0.0	2.9	2.7	0.0	0.0	7.8
Jul 22-29	0.1	0.1	0.5	0.1	0.9	4.0	0.1	0.0	--
Jul 29-Aug 6	7.0	1.5	0.2	0.0	3.2	4.9	0.0	0.0	1.7
Aug 6-12	--	0.3	0.0	0.0	0.3	19.6	4.3	0.0	1.6
Aug 12-20	3.8	0.9	3.4	1.6	8.1	36.6	0.1	0.0	2.5
Aug 20-26	2.0	6.3	10.9	3.1	2.7	32.3	0.0	0.0	6.5
Aug 26-Sep 2	3.7	2.4	2.3	0.0	2.3	12.7	0.0	0.0	1.0
Sep 2-8	4.2	0.5	6.2	0.0	2.1	6.2	0.0	0.0	0.1
Sep 8-15	3.6	0.4	2.4	--	4.9	3.8	0.7	2.2	0.4
Sep 15-22	2.8	0.2	3.7	--	--	2.5	--	--	--
Sep 22-29	7.8	4.3	0.2	0.1	0.6	0.8	--	--	0.0
Sep 29-Oct 7	--	8.2	0.0	--	--	--	--	--	--
Oct 7-14	--	--	--	--	--	--	--	--	--
TOTALS	35.0	25.2	33.1	4.9	28.0	126.3	3.4	2.2	28.7

PIANKATANK RIVER

Incomplete Data

Dates Exposed**	Burton Point Station F			Palace Bar Station J			1978	1979	1980
	1977	1978	1979	1977	1978	1979			
Jun 16-23	0.0	0.0	--	0.0	0.0	0.0	0.0	0.0	0.0
Jun 23-Jul 1	0.0	0.0	--	0.0	0.0	0.3	0.0	0.0	0.0
Jul 1-8	0.0	0.0	0.0	6.9	0.0	0.0	0.0	0.0	0.0
Jul 8-15	--	0.0	7.9	0.4	0.0	9.9	0.0	48.0	0.0
Jul 15-22	--	0.1	9.9	0.3	1.0	145.1	0.0	3.0	0.0
Jul 22-29	--	0.2	12.9	22.8	0.1	11.6	0.0	2.0	0.0
Jul 29-Aug 6	--	0.1	0.5	5.6	0.0	0.6	0.8	30.6	5.9
Aug 6-12	64.0	0.2	0.9	23.1	0.0	3.5	1.5	0.1	84.9
Aug 12-20	0.4	0.5	0.5	0.3	0.0	5.5	28.2	0.0	23.0
Aug 20-26	0.0	0.5	29.5	0.0	0.8	1.4	0.0	20.1	15.7
Aug 26-Sep 2	0.0	1.3	1.4	0.0	3.0	3.0	0.0	0.3	36.0
Sep 2-8	0.0	5.2	0.1	0.0	3.4	1.9	0.2	0.0	3.4
Sep 8-15	0.0	0.0	Lost	0.1	0.6	0.9	0.0	1.6	0.4
Sep 15-22	0.0	--	Lost	0.1	--	0.0	0.0	0.1	0.4
Sep 22-29	--	0.0	Lost	0.1	0.0	0.0	0.0	0.0	0.3
TOTALS	64.4	6.3	64.0	59.6	5.3	183.4	30.7	100.8	175.1

RAPPAHANNOCK RIVER

Dates Exposed**	Lawson's Bay Near Mosquito Point			Cedar Bar			Parrott Bar		
	1977	1978	1979	1977	1978	1979	1977	1978	1979
Jun 17-24	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jun 24-Jul 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jul 3-8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jul 8-15	0.0	0.0	1.8	0.0	0.0	0.0	0.0	0.0	1.7
Jul 15-22	0.2	0.0	5.4	0.0	0.0	3.7	0.0	0.7	0.0
Jul 22-29	0.0	0.0	0.5	0.0	0.0	0.1	0.0	0.5	0.0
Jul 29-Aug 5	0.1	0.0	0.4	0.0	0.0	1.9	0.0	0.0	0.7
Aug 5-12	2.0	0.0	0.0	0.0	0.0	1.8	0.0	0.8	0.0
Aug 12-19	1.8	0.0	0.6	0.0	0.0	4.6	0.0	0.6	0.1
Aug 19-26	1.2	3.1	2.6	0.0	0.0	8.6	0.0	0.6	14.7
Aug 26-Sep 2	3.0	4.5	2.7	0.0	0.0	0.0	0.0	1.1	4.5
Sep 2-9	0.4	0.7	1.6	0.2	0.0	0.3	0.0	0.5	0.0
Sep 9-16	--	0.0	0.0	0.0	0.0	0.0	5.6	0.0	0.0
Sep 16-23	--	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sep 23-30	--	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sep 30-Oct 6	--	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTALS	8.7	8.5	15.6	0.2	0.2	21.0	5.6	4.2	21.7

Dates Expose	Corrotoman Point v			Off Greenvale Creek			Smokey Point					
	1977	1978	1979	1980	1977	1978	1979	1980	1977	1978	1979	1980
Jun 17-24	0.0	0.0	0.0	--	0.0	0.0	0.0	--	0.0	0.0	0.0	--
Jun 24-Jul 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	--
Jul 3-8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Lost	0.0	0.0	0.0	0.0
Jul 8-15	0.0	0.0	0.3	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	--
Jul 15-22	0.0	0.0	0.2	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	--
Jul 22-29	0.0	--	0.0	Lost	0.0	--	0.0	0.0	0.0	0.0	0.0	0.0
Jul 29-Aug 5	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0
Aug 5-12	18.9	0.0	0.2	1.2	0.2	0.0	0.0	0.0	0.0	0.0	--	0.0
Aug 12-19	14.7	0.0	0.2	4.4	0.0	0.0	--	0.0	0.0	0.0	0.0	0.0
Aug 19-26	3.9	0.5	0.3	21.3	0.2	0.0	--	2.9	0.0	0.0	0.0	0.1
Aug 26-Sep 2	3.0	1.4	0.7	2.2	0.7	0.0	0.3	5.9	0.2	0.0	0.3	0.3
Sep 2-9	0.4	0.0	0.0	--	0.2	0.0	--	0.0	0.6	0.0	1.3	0.0
Sep 9-16	--	0.0	0.0	--	0.2	0.0	--	0.0	1.3	0.0	0.6	--
Sep 16-23	--	0.0	0.0	--	--	0.0	--	0.0	0.2	--	0.0	--
Sep 23-30	--	0.0	0.0	0.0	--	0.0	--	0.0	--	--	0.0	--
Sep 30-Oct 6	--	0.0	0.0	0.0	--	0.2	--	0.1	--	--	0.6	--
TOTALS	41.0	1.9	1.9	30.5	1.3	0.2	0.7	9.2	2.3	0.0	2.2	0.4

RACE-A-WIDE RIVER

GREAT WICOMICO RIVER

Dates Exposed**	Punch Bowl			Dameron Marsh v			Cranes Creek					
	1977	1978	1979	1980	1977	1978	1979	1980	1977	1978	1979	1980
Jun 16-23	0.0	0.0	0.0	--	0.0	0.0	0.0	--	0.0	0.0	0.0	--
Jun 23-30	0.0	0.0	0.0	--	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jun 30-Jul 7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jul 7-15	--	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.7
Jul 15-21	0.0	0.0	0.1	--	0.0	0.0	0.1	4.5	0.1	0.0	0.0	5.2
Jul 21-28	0.0	0.0	0.4	0.0	0.1	0.0	0.5	5.1	0.0	0.0	0.0	5.7
Jul 28-Aug 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.0	0.0	0.0	0.7
Aug 4-11	0.1	0.0	--	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
Aug 11-18	0.0	--	--	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Aug 18-26	0.3	0.0	0.0	0.4	0.0	0.3	0.0	0.7	0.0	0.0	0.0	1.0
Aug 26-Sep 3	0.3	0.0	0.0	0.5	0.4	--	0.1	0.5	0.1	0.1	0.0	0.7
Sep 3-8	0.0	0.0	0.2	0.0	0.4	0.4	0.3	0.1	0.4	0.0	0.0	0.2
Sep 8-15	7.0	0.0	0.2	0.0	--	--	--	0.2	1.6	0.0	0.1	0.1
Sep 15-22	--	--	--	--	--	--	--	0.1	0.0	0.0	0.0	0.0
Sep 22-29	--	--	--	--	0.0	--	--	0.0	0.0	0.0	0.0	0.0
Sep 29-Oct 6	--	--	--	--	0.0	--	--	0.0	0.0	0.0	0.0	0.0
TOTALS	7.7	0.0	0.9	0.9	0.7	0.7	1.0	13.7	2.2	0.1	0.1	14.8

Dates Exposed**	Fleet Point Station c		Whaley Flats Station b		Haynie Point Station e			
	1977	1978	1979	1980	1977	1978	1979	1980
Jun 16-23	--	0.0	0.0	--	--	0.0	0.0	--
Jun 23-30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jun 30-Jul 7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jul 7-15	0.0	0.0	0.0	0.8	0.0	0.0	0.8	1.4
Jul 15-21	0.0	0.0	0.5	2.0	0.0	0.1	0.0	1.3
Jul 21-28	0.2	--	0.7	--	0.2	0.0	0.6	6.2
Jul 28-Aug 4	0.2	0.0	0.0	0.0	0.1	0.0	0.5	1.8
Aug 4-11	0.0	0.4	0.0	1.3	0.0	0.0	0.0	0.4
Aug 11-18	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0
Aug 18-26	0.0	0.1	--	2.6	0.0	0.1	0.0	0.4
Aug 26-Sep 3	0.7	0.5	0.0	0.7	0.0	0.7	0.1	0.7
Sep 3-8	0.2	--	0.0	0.1	0.4	0.0	--	0.1
Sep 8-15	0.5	0.2	0.1	0.0	0.2	0.2	0.0	0.4
Sep 15-22	0.0	0.8	0.1	0.0	0.4	0.0	0.0	0.0
Sep 22-29	--	0.2	0.0	--	0.0	0.0	0.1	0.0
Sep 29-Oct 6	--	--	--	--	--	--	--	0.0
TOTALS	1.8	2.2	1.4	9.0	1.1	1.1	2.1	12.7

Dates Exposed**	Shell Bar Station f		Hudnall's Dock Station f		Glebe Point Station g			
	1977	1978	1979	1980	1977	1978	1979	1980
Jun 16-23	--	0.0	0.0	--	--	0.0	0.0	--
Jun 23-30	0.0	0.0	0.0	0.0	--	0.0	0.0	0.0
Jun 30-Jul 7	0.0	0.0	0.0	0.0	0.0	0.0	--	0.0
Jul 7-15	0.0	0.0	0.6	3.4	0.0	0.2	0.0	2.1
Jul 15-21	0.0	0.0	4.5	8.3	0.0	0.0	0.0	1.9
Jul 21-28	0.0	0.0	10.5	--	0.0	--	6.3	0.6
Jul 28-Aug 4	0.0	0.0	0.0	2.6	0.0	0.0	0.0	3.1
Aug 4-11	0.5	0.0	0.0	3.5	0.0	0.1	0.0	1.4
Aug 11-18	0.0	0.0	0.1	0.0	--	--	0.0	0.0
Aug 18-26	0.0	0.0	0.3	0.1	0.0	0.2	0.0	0.1
Aug 26-Sep 3	0.1	0.6	0.0	1.0	0.3	0.4	0.1	1.2
Sep 3-8	0.7	0.1	0.0	0.5	0.1	0.1	0.1	0.1
Sep 8-15	0.0	0.3	0.1	0.8	0.5	0.1	0.0	0.0
Sep 15-22	0.2	0.0	0.0	0.0	0.1	0.4	0.0	0.0
Sep 22-29	0.0	0.0	0.0	0.1	0.0	0.4	0.0	0.0
Sep 29-Oct 6	--	--	--	0.0	--	--	--	0.0
TOTALS	1.5	1.0	16.1	20.3	1.0	1.9	6.5	10.5

POTOMAC RIVER

Dates Exposed**	Cornfield		Jones Shore		Great Neck	
	1977	1978	1977	1978	1977	1978
Jun 16-23	0.0	--	--	--	--	--
Jun 23-Jul 1	0.0	0.0	0.0	0.0	0.0	0.0
Jul 1-8	--	0.0	0.0	0.0	0.0	0.0
Jul 8-14	--	0.0	0.0	0.0	0.0	0.0
Jul 14-21	0.0	0.0	0.0	0.0	0.0	0.0
Jul 21-28	0.0	0.0	0.0	0.0	0.0	0.0
Jul 28-Aug 4	--	0.0	0.0	0.0	0.0	0.0
Aug 4-11	0.0	0.0	0.0	0.0	0.0	0.0
Aug 11-19	0.0	0.0	0.0	0.0	0.0	0.0
Aug 19-25	0.1	--	0.1	0.0	0.0	0.0
Aug 25-Sep 1	1.9	0.3	0.6	0.1	0.0	0.0
Sep 1-8	0.1	0.2	0.7	0.0	0.0	0.0
Sep 8-16	0.0	0.5	0.1	0.0	0.0	0.0
Sep 16-23	0.0	0.3	0.1	0.0	0.0	0.0
Sep 23-29	0.0	0.0	0.0	0.0	0.0	0.0
Sep 29-Oct 7	--	--	0.0	--	--	0.0
TOTALS	2.1	1.3	1.5	0.8	0.1	0.0

33.6

1.2

Dates Exposed**	Coan		Hog Island		Thickett Point	
	1977	1978	1977	1978	1977	1978
Jun 16-23	0.0	--	--	--	--	--
Jun 23-Jul 1	0.0	0.0	0.0	0.0	0.0	0.0
Jul 1-8	0.0	0.0	0.0	0.0	0.0	0.0
Jul 8-14	0.0	0.0	0.0	0.0	0.0	0.0
Jul 14-21	0.0	0.0	0.0	0.0	0.0	0.0
Jul 21-28	0.0	--	0.0	0.0	0.0	0.0
Jul 28-Aug 4	0.0	0.0	0.0	0.0	0.0	0.0
Aug 4-11	0.0	0.0	0.0	0.0	0.0	0.0
Aug 11-19	0.0	0.0	0.0	0.0	0.0	0.0
Aug 19-25	0.0	0.0	0.0	0.0	0.0	0.0
Aug 25-Sep 1	0.0	0.0	0.0	0.0	0.0	0.0
Sep 1-8	0.1	0.0	0.0	0.0	0.0	0.0
Sep 8-16	0.0	0.0	0.0	0.1	0.0	0.0
Sep 16-23	0.0	0.0	0.0	0.1	0.0	0.0
Sep 23-29	0.0	0.0	0.0	2.0	0.0	0.0
Sep 29-Oct 7	--	--	0.0	0.0	0.0	0.0
TOTALS	0.1	0.0	0.0	2.1	0.7	0.0

1.3

0.3

Dates Exposed**	Yeocomico		Ragged Point		King Copsico Point			
	1977	1978	1979	1980	1977	1978	1979	1980
Jun 16-23			0.0	--				
Jun 23-Jul 1			--	--				
Jul 1- 8			0.0	--		0.0		
Jul 8-14			0.0	--				0.0
Jul 14-21			0.0	--				0.0
Jul 21-28			0.0	0.0				0.0
Jul 28-Aug 4			0.0	0.0				0.0
Aug 4-11			0.0	0.0				0.0
Aug 11-19			0.0	0.0				0.0
Aug 19-25			0.0	0.0				0.0
Aug 25-Sep 1			0.1	0.0				0.0
Sep 1- 8			0.0	0.0				0.0
Sep 8-16			0.2	0.0				0.0
Sep 16-23			--	0.0				0.0
Sep 23-29			--	0.0				0.0
Sep 29-Oct 7			--	0.0				0.0
TOTALS			0.3	0.0		0.1		0.0

EASTERN SHORE, BAYSIDE

Dates Exposed**	Public Ground 9 Lower Swash		PG 10		
	1977	1978	1978	1979	1980
Jun 23-30	0.0	0.0			
Jun 30-Jul 5	--	0.0		0.0	0.1
Jul 5-11	--	0.0		0.0	0.1
Jul 11-18	0.0	0.0		0.0	0.0
Jul 18-25	0.1	0.0		0.0	0.0
Jul 25-Aug 1	0.0	0.0		0.0	0.0
Aug 1- 8	0.2	0.0		0.0	1.1
Aug 8-15	0.3	0.1		0.0	2.5
Aug 15-25	0.1	0.0		0.0	0.5
Aug 25-Sep 1	--	0.0		0.0	0.4
Sep 1- 9	1.4	0.0		0.0	0.0
Sep 9-17	0.2	0.0		0.0	--
Sep 17-26	--	--		--	--
Sep 26-Oct 6	--	--		--	--
TOTALS	2.3	0.1	0.1	0.0	4.7

EASTERN SHORE, SEASIDE

Dates Exposed**	Machipongo River at Quinby Bridge			VIMS Pier at Wachapreague		
	1977	1978	1979	1978	1979	1980
Jun 24-30	44.1	0.0	0.0	0.0	0.0	0.3
Jun 30-Jul 7	0.0	0.0	0.0	0.0	0.0	0.2
Jul 7-15	44.3	0.2	1.5	0.0	66.4	1.8
Jul 15-25	0.6	0.3	6.2	6.4	42.4	2.3
Jul 25-Aug 4	0.7	1.3	3.9	72.4	59.2	0.6
Aug 4- 8	0.0	3.0	44.2	21.6	1.2	0.7
Aug 8-15	8.4	12.3	1.4	4.1	180.2	0.7
Aug 15-25	2.4	8.4	0.6	0.5	18.6	0.0
Aug 25-Sep 2	1.8	1.0	0.0	0.2	0.3	6.5
Sep 2-10	0.1	0.0	13.4	14.3	0.3	9.0
Sep 10-18	0.0	0.1	0.1	2.0	0.2	2.3
Sep 18-25	0.0	0.0	0.1	1.2	0.0	—
Sep 25-Oct 2	—	—	—	0.0	—	—
Oct 2- 9	—	0.0	—	0.0	—	—
Oct 9-Nov 1	—	—	—	—	—	—
TOTALS	102.4	26.6	58.0	122.7	368.5	24.4