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## Oyster Spatfall in Virginia Rivers: 1983 Annual Summary

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# MARINE RESOURCE SPECIAL REPORT



## A Marine Advisory Service Publication of the VIRGINIA SEA GRANT PROGRAM

Virginia Institute of Marine Science Gloucester Point, Virginia 23062

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### 1993 Annual Summary

#### OYSTER SPATFALL IN VIRGINIA RIVERS

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BY

James L Whitcomb

The Virginia Institute of Marine Science (VIMS) conducts weekly surveys from June through early October to obtain oyster spatfall information. Spat counts are made on 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.

A moderate or heavy strike on shellstrings usually indicates a significant strike on exposed bottom cultch. This is especially true for cultch planted a week or two prior to the peak set.

However, a good strike on shellstrings in some localities may not always be accompanied by a good spatfall on naturally occurring bottom shell material or on shells planted too early or too late in the season. Bottom shells are often so fouled by other marine life that no room is left for small spat to attach. Moreover, even with a reasonable spatfall, survival of spat on the bottom in saltier waters may be extremely low due to predators such as oyster drills which eat the small spat.

Usually a light set of spat on shellstrings indicates a poor set on bottom cultch. During certain exceptional years, due probably to the absence of predators and fouling, a light set on our shellstrings may be accompanied by an above average set on the natural bottom.

The number of spat which set in one week on the smooth side of 10 shells is determined by microscopic examination; the average of the 10 shells is shown in this report 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 (total seasonal set). In evaluating setting levels, it should be recognized that in certain rivers, such as the Rappahannock, York and Potomac, the set is typically very low or 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 in late fall by counts of spat on natural bottom cultch. This study is made after seasonal setting has stopped and indicates how many spat have survived. Half-bushel samples of bottom cultch were collected from selected locations with a dredge during the fall of 1983. Numbers of oyster spat setting on cultch were counted. The data are expressed as number of spat per bushel.

The tabular summaries of spat-per-shell-per-week were produced by a computer program which approximates more closely one week periods. Therefore, the values shown in previous annual reports are not recaptured exactly in this report.

#### Acknowledgements

We wish to express appreciation to the Virginia Marine Resources Commission personnel who did the work of putting out and collecting the shellstrings in the Mobjack Bay area, in the Piankatank River, Great Wicomico River and the Potomac River. Samples were collected by VIMS personnel at Wachapreague. The cooperation and assistance of all the above and their supervisors is gratefully acknowledged.

Drafts and final copy of this report were prepared by the VIMS Report Center.

#### Summary of Setting for 1983

The above average sets of the past three years in the James River continued in 1983. Similarly, in most of the other locations monitored the 1983 setting was close to the 1980, 1981 and 1982 average. Exceptions to this summary was the station at the mouth of the East River, the station at Tow Stake in Mobjack Bay and the station at VIMS. These stations were well below the average for the past three years.

#### James River

Setting on most stations began during the first week and second week of July and ended during the first or second week of October. All the stations reached their peak of setting during the last half of July or early in August averaging 29.1 spat per shell. Another

secondary, or smaller, peak occurred at each station between the middle of August or the middle of September averaging 6.6 spat per snell. The total set on shellstrings in the James River in 1983 was very high when compared with all years since 1960.

Samples of bottom cultch from areas adjacent to the shellstring stations showed that the set on natural bottom was approximately the same as in 1982 below Wreck Shoal but upriver, and, on Wreck Shoal the set was fifty-three per higher than in 1982. Fouling at all stations was light and consisted of encrusting bryozoans, ribbed mussels, and barnacles.

Following is a summary of the number of spat counted in a bushel sample of bottom material: Nansemond Ridge - 84; Naseway Shoal - 346; Brown Shoal - 126; White Shoal - 184; Thomas Rock - 230; Gun Rock - 150; Wreck Shoal Offshore - 885; Wreck Shoal inshore - 746; Pt. of Shoal - 472; Horsehead Bar - 952; and Deepwater Shoal - 410.

#### York River

The total seasonal set at the VIMS pier was lower than in any year since 1979. Setting began during the last week of June and peaked the second week of September. Most of the set occurred in the month of September.

Samples of bottom cultch showed the set on natural bottoms in the York River was very low. Following is a summary of the number of spat counted in a bushel sample of bottom material: Green Rock - 0; Pages Rock - 0; Aberdeen Rock - 0; and Bell Rock - 4.

#### Mobjack Bay

Setting at Browns Bay and Tow Stake stations began the first week in July and continued until the first week of October, or until the station was removed. In comparison with the past three years setting was below the average for Brown's Bay, but better than either of the previous two years. Setting at the Tow Stake station was low.

#### Ware River

Setting at the Wilson's Creek station began the first week of July and continued until the second week of September. Setting was low throughout the season and the total set was the lowest since 1979.

#### East River

Setting began in the first week of July and continued through the fourth week in September. The peak in setting occurred during the first week in August but a second similar peak occurred the second week in September. The set was the lowest since the year 1979.

### Pepper Creek

Setting began the second week in July and continued through the second week of October, when the station was discontinued. The first two weeks in September were the peak setting period. In previous years the peak set has frequently occurred on this station in the middle of August. The total set was the highest since 1980.

### Piankatank River

Setting began the last week of June in the river and continued to the last week of September. The peak of setting at all four stations occurred during the last two weeks of July averaging 43.2 spat per shell. A second lower peak occurred at all stations during the first two weeks of September averaging 15.5 spat per shell. Comparing the past three years the total set downriver was below average while the set upriver was either average or above average.

Samples of bottom cultch showed that the numbers of spat surviving on natural bottom was up to ninety four per cent lower on three stations than in 1982. The uppermost sample, or Ginney Point, was, however, eighty per cent higher than in 1982. Following is a summary of spat counts per bushel; Burton Point - 24; Palace Bar - 138; Island Bar - 248; and Ginney Point - 590.

### Rappahannock Rock

There were no shellstring stations in the Rappahannock River in 1983. Samples on the bottom cultch had the following counts: Bowlers Rock - 0; Morattico Bar - 0; Smokey Point Inshore - 40; Hog House Bar - 106; Parrotts Island Rock - 4; and Drumming Ground - 118. The counts on Hog House Bar and Drumming Ground would be termed fair for this river; the remaining counts are low.

### Great Wiconico River

Setting in the river began the first week of August and was finished on most stations the second week of September. The setting in 1983 was for a shorter period and at a lower level than setting in 1982, averaging 7.0 - 7.5 spat per shell. All of the stations were below the last three years average except Fleet Point and Shell Bar. The latter two stations were average or slightly above average in the three year period.

The bushel samples of bottom cultch near the shellstring stations showed much lower counts than in 1982. The counts per bushel were as follows; Dameron Marsh East - 132; Fleet Point - 124; Whaleys East - 74; Cranes Creek - 56; Haynie Point - 78; and Rogue Point - 34.

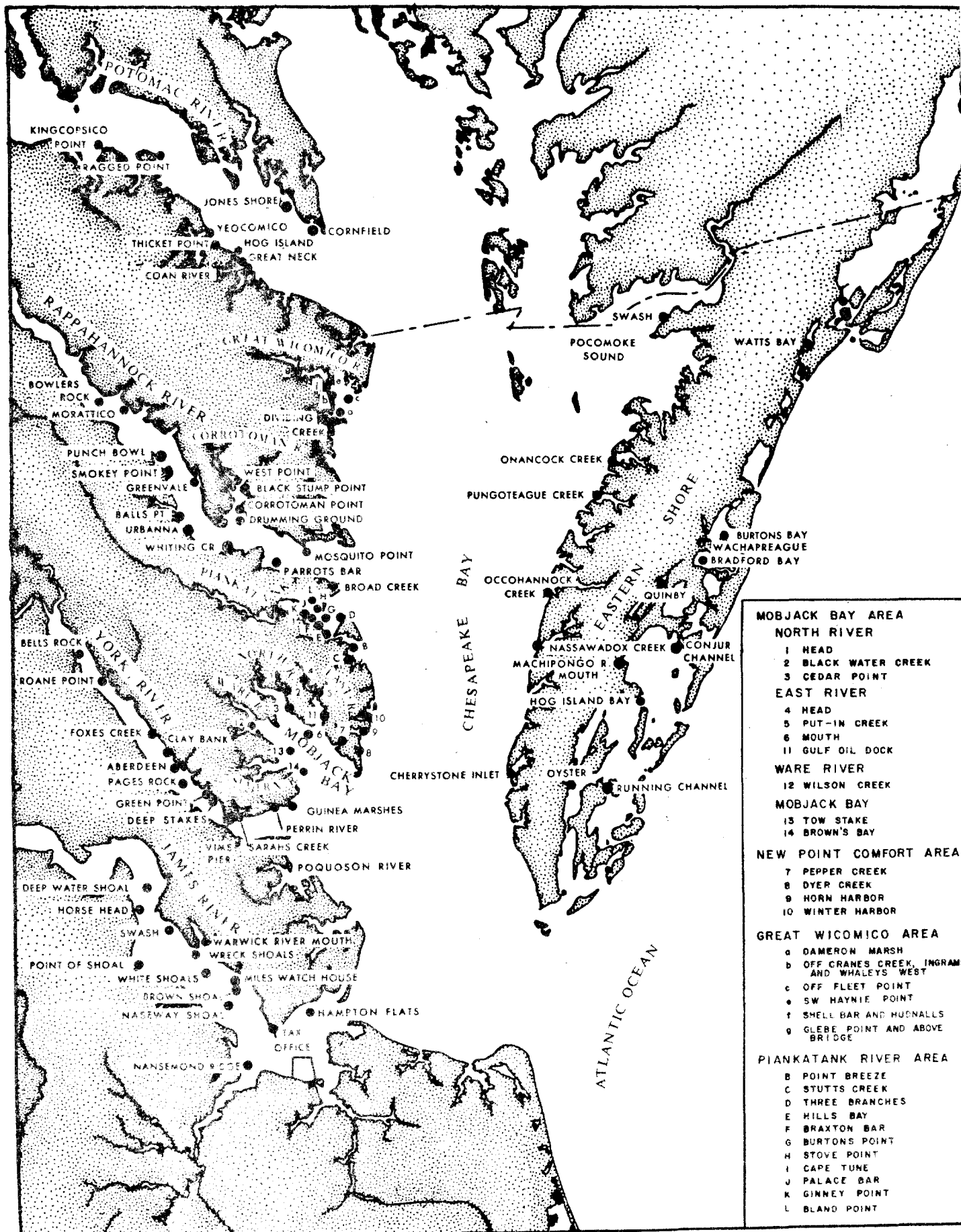
### Potomac River

Light setting began in August and continued until the first week of October. Set at Jones Shore and Cornfield reached moderate levels in September. Although the 1983 set was much lower than the record 1982 set, it was average for this river.

### Eastern Shore Seaside

The setting extended from the first week in July through the third week in September. There was a peak in set at the end of July and a second peak the first week in September. The total seasonal set was the highest on shellstrings since 1979.

# SHELLSTRING SURVEY STATIONS



- MOBJACK BAY AREA**
- NORTH RIVER**
- 1 HEAD
- 2 BLACK WATER CREEK
- 3 CEDAR POINT
- EAST RIVER**
- 4 HEAD
- 5 PUT-IN CREEK
- 6 MOUTH
- 11 GULF OIL DOCK
- WARE RIVER**
- 12 WILSON CREEK
- MOBJACK BAY**
- 13 TOW STAKE
- 14 BROWN'S BAY
- NEW POINT COMFORT AREA**
- 7 PEPPER CREEK
- 8 DYER CREEK
- 9 HORN HARBOR
- 10 WINTER HARBOR
- GREAT WICOMICO AREA**
- a DAMERON MARSH
- b OFF CRANES CREEK, INGRAMS AND WHALEYS WEST
- c OFF FLEET POINT
- d SW HAYNIE POINT
- e SHELL BAR AND HUDNALLS
- f GLEBE POINT AND ABOVE BRIDGE
- PIANKATANK RIVER AREA**
- B POINT BREEZE
- C STUTTS CREEK
- D THREE BRANCHES
- E HILLS BAY
- F BRAXTON BAR
- G BURTONS POINT
- H STOVE POINT
- I CAPE TUNE
- J PALACE BAR
- K GINNEY POINT
- L BLAND POINT

VIRGINIA INSTITUTE OF MARINE SCIENCE  
AND  
SCHOOL OF MARINE SCIENCE,  
THE COLLEGE OF WILLIAM AND MARY  
GLOUCESTER POINT, VIRGINIA 23062

Spatfall on Shellstrings\*  
Annual Summary  
1980-1983

JAMES RIVER

Dates Exposed**	Nansemond Ridge				Naseway Shoal				Brown Shoal			
	1980	1981	1982	1983	1980	1981	1982	1983	1980	1981	1982	1983
Jun 13-20	--	--	0.0	0.0	--	--	0.0	0.0	--	--	0.0	0.0
Jun 20-27	0.0	--	0.0	0.0	--	2.4	0.0	0.0	--	0.1	0.0	0.0
Jun 27-Jul 4	0.0	0.4	0.4	0.0	0.0	6.4	0.9	0.2	0.0	1.6	0.3	0.0
Jul 4-11	0.1	0.3	1.8	1.5	0.0	28.7	5.3	7.7	0.1	3.6	4.1	1.6
Jul 11-13	0.1	11.7	1.2	2.4	0.4	61.8	19.6	7.7	0.0	2.9	5.1	4.2
Jul 18-25	0.1	7.3	3.4	9.4	0.3	14.3	20.6	57.8	0.4	1.1	1.2	10.0
Jul 25-Aug 1	0.1	8.2	2.7	14.5	2.4	114.2	21.6	41.1	0.0	3.0	3.3	8.5
Aug 1-8	0.1	1.9	3.3	10.4	59.5	47.5	8.9	39.2	2.9	5.9	1.6	2.1
Aug 8-15	1.6	1.6	2.8	0.1	44.2	23.8	10.2	4.8	6.8	1.7	3.3	0.3
Aug 15-22	0.9	--	1.7	1.2	43.4	3.5	3.9	19.4	7.1	1.1	1.0	1.3
Aug 22-29	--	--	1.7	0.6	7.3	2.7	2.6	5.1	7.9	0.2	3.6	0.5
Aug 29-Sep 5	0.5	--	1.7	2.5	48.3	0.7	2.6	20.4	11.6	0.2	0.6	0.7
Sep 5-12	1.5	--	0.6	2.6	24.0	1.0	1.3	18.1	5.8	0.3	2.6	0.7
Sep 12-19	--	0.0	0.6	0.6	9.2	0.3	3.1	2.1	3.6	0.1	0.5	1.2
Sep 19-26	1.0	0.1	0.3	0.4	2.5	0.5	1.7	0.6	1.4	0.0	1.3	0.1
Sep 26-Oct 3	0.8	--	1.0	0.3	2.0	0.5	1.3	0.3	1.2	0.0	0.5	0.1
Oct 3-10	--	--	0.0	0.2	--	0.3	0.2	0.2	0.1	0.0	0.0	0.0
Oct 10-17	--	--	0.1	0.0	--	0.0	0.0	0.0	--	--	0.0	0.0
Oct 17-24	--	--	0.1	0.0	--	--	0.0	0.0	--	--	0.0	0.0
Oct 24-31	--	--	0.0	--	--	--	0.0	--	--	--	--	--
TOTALS	6.8	31.5	23.4	46.7	243.5	308.6	103.8	224.7	48.9	21.8	29.0	31.3

\* Shows spat per shell (smooth side only).

\*\* Dates shown are for 1983. 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



JAMES RIVER

Dates Exposed**	Miles Watch House				White Shoal				Wreck Shoal Offshore			
	1980	1981	1982	1983	1980	1981	1982	1983	1980	1981	1982	1983
Jun 13-20	--	--	0.0	0.0	--	--	0.0	0.0	--	--	0.0	0.0
Jun 20-27	--	0.3	0.0	0.0	--	1.0	0.0	0.0	--	0.7	0.0	0.0
Jun 27-Jul 4	0.0	1.2	0.5	0.0	0.0	1.3	0.8	0.0	0.0	0.0	1.0	0.0
Jul 4-11	0.0	2.1	0.7	4.2	0.1	11.1	2.5	1.8	0.2	5.3	2.9	4.0
Jul 11-18	0.0	7.8	1.9	8.5	0.6	17.9	1.5	7.7	0.3	24.4	3.5	10.0
Jul 18-25	0.2	0.8	2.3	5.4	0.0	7.4	5.9	15.3	0.8	5.5	4.3	13.3
Jul 25-Aug 1	0.0	5.0	1.7	16.3	0.2	11.8	5.2	35.7	0.3	8.1	6.6	55.2
Aug 1-8	0.8	2.3	4.4	6.3	2.8	15.0	2.5	11.6	2.3	3.4	4.1	12.3
Aug 8-15	1.3	0.7	0.4	0.3	6.8	4.0	2.8	1.2	2.4	2.3	2.2	0.1
Aug 15-22	6.5	0.5	1.1	1.5	4.0	2.6	2.2	3.3	1.5	1.6	1.9	3.5
Aug 22-29	2.0	1.6	3.6	1.0	3.1	0.7	2.4	2.5	2.2	0.1	6.2	2.2
Aug 29-Sep 5	7.3	0.0	0.7	1.0	8.0	0.3	2.6	2.9	3.8	0.0	0.7	2.3
Sep 5-12	1.8	0.1	0.0	2.1	9.3	0.2	0.3	1.6	1.7	0.5	0.6	1.3
Sep 12-19	0.6	0.0	0.0	0.2	3.9	0.1	1.0	0.3	1.0	0.0	0.2	0.1
Sep 19-26	0.6	0.1	0.0	0.0	1.3	0.0	0.1	0.4	0.4	0.1	0.1	0.3
Sep 26-Oct 3	0.3	0.1	0.0	0.0	0.9	0.2	0.2	0.2	0.2	0.3	0.0	0.2
Oct 3-10	--	0.2	--	0.0	0.3	0.0	0.0	0.1	0.0	0.1	0.0	0.0
Oct 10-17	--	0.0	--	0.0	--	--	0.0	0.0		--	--	0.0
TOTALS	21.4	22.8	17.3	46.8	41.3	73.6	30.0	84.6	17.1	52.4	34.3	104.8

JAMES RIVER

Dates Exposed**	Horsehead Bar				Mulberry Swash				Point of Shoal			
	1980	1981	1982	1983	1980	1981	1982	1983	1980	1981	1982	1983
Jun 13-20	--	--	0.0	0.0	--	--	0.0	0.0	--	--	0.0	0.0
Jun 20-27	--	1.3	0.0	0.0	--	2.2	0.0	0.0	--	0.4	0.0	0.1
Jun 27-Jul 4	0.0	2.1	1.6	0.0	0.0	2.1	0.1	0.0	0.0	2.5	0.5	0.0
Jul 4-11	0.0	10.1	0.6	5.7	0.0	11.9	3.7	0.0	0.0	6.4	0.3	4.4
Jul 11-18	0.0	40.3	1.3	15.5	0.0	51.2	3.7	15.5	0.0	40.1	1.6	18.3
Jul 18-25	2.7	3.9	4.8	8.3	0.6	1.7	7.6	15.9	1.9	3.2	1.9	9.0
Jul 25-Aug 1	0.0	5.3	2.2	36.2	0.2	4.9	16.4	218.0	4.0	10.1	2.6	10.9
Aug 1-8	3.0	4.5	1.7	14.1	5.7	8.2	7.3	49.8	6.1	2.6	2.7	9.1
Aug 8-15	8.0	2.2	0.7	1.4	6.5	2.4	2.1	2.5	20.5	3.3	0.3	1.7
Aug 15-22	0.2	2.6	0.0	8.8	3.0	1.9	1.3	15.2	20.9	4.1	0.2	10.2
Aug 22-29	1.4	0.7	1.6	2.4	1.6	0.5	12.1	7.5	0.9	1.3	4.4	3.2
Aug 29-Sep 5	0.1	0.1	0.2	2.6	1.4	0.0	0.8	7.8	0.6	0.1	1.3	7.6
Sep 5-12	3.2	0.1	0.1	1.1	0.8	0.2	0.1	0.5	2.2	0.0	1.3	2.5
Sep 12-19	1.0	0.1	0.0	0.5	0.5	0.0	0.4	1.1	3.1	0.0	0.7	0.4
Sep 19-26	0.0	0.0	0.2	0.0	--	0.4	0.0	0.0	0.3	0.0	0.1	0.0
Sep 26-Oct 3	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.2	0.0	0.2	0.0
Oct 3-10	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Oct 10-17	--	--	--	0.0	--	--	--	0.0	--	--	--	0.0
Oct 17-24	--	--	--	0.0	--	--	--	0.0	--	--	--	0.0
TOTALS	19.6	73.3	15.0	96.6	20.6	87.6	55.6	333.8	60.8	74.1	18.1	77.4

JAMES RIVER

Dates Exposed**	Deepwater Shoal			
	1980	1981	1982	1983
Jun 13-20	--	--	0.0	0.0
Jun 20-27	--	2.6	0.0	0.0
Jun 27-Jul 4	0.0	3.5	0.3	0.0
Jul 4-11	0.0	12.0	0.8	9.0
Jul 11-18	0.0	21.5	0.7	17.9
Jul 18-25	0.8	9.4	2.4	7.8
Jul 25-Aug 1	0.3	2.5	2.2	6.4
Aug 1-8	0.7	6.1	1.9	9.2
Aug 8-15	1.6	2.8	0.4	0.2
Aug 15-22	1.4	3.9	0.3	7.7
Aug 22-29	0.2	1.5	2.2	0.6
Aug 29-Sep 5	0.0	0.1	0.5	2.2
Sep 5-12	0.1	0.3	0.1	0.5
Sep 12-19	0.1	0.1	0.0	0.5
Sep 19-26	0.1	0.0	0.0	0.0
Sep 26-Oct 3	0.0	0.1	0.0	0.0
Oct 3-10	0.0	0.0	0.0	0.0
Oct 10-17	--	--	--	0.0
Oct 17-24	--	--	--	0.0
TOTALS	5.3	66.4	11.8	62.0

Dates Exposed**	YORK RIVER				WARE RIVER				EAST RIVER			
	VIMS Ferry Pier				Off Wilson's Creek Station 12				Mouth Station 6			
	1980	1981	1982	1983	1980	1981	1982	1983	1980	1981	1982	1983
Jun 13-20	--	--	--	0.0	--	--	0.0	0.0	--	--	0.0	0.0
Jun 20-27	--	--	--	0.0	1.1	0.8	0.0	0.0	1.7	0.5	0.1	0.0
Jun 27-Jul 4	0.0	0.1	0.3	0.2	0.3	5.6	20.1	0.1	0.9	2.8	1.7	3.5
Jul 4-11	0.0	0.0	1.3	0.1	3.2	0.1	2.2	0.1	0.2	2.2	0.6	0.5
Jul 11-18	0.0	0.0	0.9	0.0	0.1	0.8	0.3	0.1	1.2	10.3	5.7	1.2
Jul 18-25	0.1	0.2	0.5	0.0	0.7	89.4	0.8	0.7	0.0	3.6	6.1	2.7
Jul 25-Aug 1	0.2	0.0	0.2	0.1	0.0	40.0	0.3	0.9	0.2	2.6	2.3	2.5
Aug 1-8	0.5	0.3	1.6	0.0	1.2	11.2	0.8	7.0	12.1	5.5	0.5	6.5
Aug 8-15	6.3	0.9	3.7	0.0	6.2	17.0	0.1	0.0	60.9	67.3	11.8	0.7
Aug 15-22	12.0	1.6	0.3	0.1	5.4	2.0	0.0	0.2	46.9	3.6	2.0	1.1
Aug 22-29	21.8	0.6	1.8	0.6	1.8	3.8	0.0	0.3	0.0	1.9	1.0	1.0
Aug 29-Sep 5	7.1	0.0	2.8	1.5	4.8	1.0	0.0	1.0	0.8	0.1	1.0	0.6
Sep 5-12	4.3	0.4	1.4	2.4	0.0	0.0	0.0	0.6	0.2	0.1	0.7	4.1
Sep 12-19	4.2	--	0.0	0.0	0.2	0.2	0.0	0.0	2.4	0.0	0.2	1.4
Sep 19-26	1.7	1.4	0.0	0.7	0.0	0.0	0.0	0.0	1.2	0.0	0.2	1.0
Sep 26-Oct 3	0.8	0.8	0.0	0.5	--	0.0	--	0.0	--	0.1	--	0.0
Oct 3-10	0.6	0.1	0.0	0.0	--	0.0	--	0.0	0.0	0.0	--	0.0
Oct 10-17	--	0.0	0.1	0.0	--	--	--	--	--	--	--	--
Oct 17-24	--	--	0.1	0.0	--	--	--	--	--	--	--	--
Oct 24-31	--	--	0.1	--	--	--	--	--	--	--	--	--
TOTALS	59.6	6.4	15.1	6.2	25.0	171.9	24.6	11.0	128.7	100.6	33.9	26.8

Dates Exposed**	PEPPER CREEK				MOBJACK BAY				MOBJACK BAY			
	Mouth				Off Brown's Bay				Tow Stake			
	Station 7				Station 14				Station 13			
	1980	1981	1982	1983	1980	1981	1982	1983	1980	1981	1982	1983
Jun 13-20	--	--	0.0	0.0	--	--	0.0	0.0	--	--	0.0	0.0
Jun 20-27	0.0	0.1	0.1	0.0	--	0.0	0.4	0.0	4.2	0.4	0.0	0.0
Jun 27-Jul 4	0.0	0.6	0.1	0.0	0.1	0.3	0.9	0.2	0.0	3.0	17.5	0.9
Jul 4-11	0.2	0.3	0.4	6.5	0.6	1.1	1.2	0.7	1.4	0.4	12.5	1.4
Jul 11-18	2.7	0.0	1.8	1.8	1.0	0.7	3.5	1.9	0.0	0.0	7.3	0.5
Jul 18-25	4.0	10.9	2.8	1.6	9.9	0.0	1.5	1.0	0.6	0.0	2.7	1.2
Jul 25-Aug 1	4.3	1.3	5.9	1.2	5.6	0.3	5.8	1.0	0.0	3.0	9.5	1.9
Aug 1-8	22.9	0.8	0.6	0.8	57.9	2.8	0.8	3.5	0.3	77.5	0.5	6.4
Aug 8-15	28.5	2.6	10.0	1.0	31.4	2.7	4.7	0.0	7.9	9.4	5.8	0.5
Aug 15-22	37.7	0.3	5.6	0.7	200.2	1.5	5.4	0.4	9.4	1.3	1.5	0.5
Aug 22-29	12.7	1.4	6.5	0.2	10.1	0.2	2.3	1.0	2.2	0.9	1.0	0.3
Aug 29-Sep 5	7.2	0.7	3.6	21.8	37.8	0.1	6.2	30.5	0.1	0.7	0.1	1.6
Sep 5-12	3.8	0.7	3.0	47.8	6.5	0.2	1.4	31.3	0.6	0.1	1.8	2.9
Sep 12-19	2.5	0.5	5.1	3.5	8.8	0.8	1.0	0.6	0.4	1.5	0.2	0.6
Sep 19-26	0.8	0.0	0.6	0.2	2.2	0.2	0.9	--	0.4	0.0	0.2	0.0
Sep 26-Oct 3	--	0.3	--	0.2	--	0.0	--	--	--	0.1	--	0.1
Oct 3-10	--	0.1	--	0.2	--	0.4	--	--	--	0.0	--	0.0
Oct 10-17	--	--	--	--	--	--	--	--	--	--	--	--
Oct 17-24	--	--	--	--	--	--	--	--	--	--	--	--
TOTALS	127.3	20.6	46.1	87.5	372.1	11.3	36.0	71.1	27.5	98.3	60.6	18.8

Dates Exposed**	PIANKATANK RIVER Burton Point Station G				PIANKATANK RIVER Three Branches Station D			
	1980	1981	1982	1983	1980	1981	1982	1983
Jun 13-20	--	--	0.1	0.0	--	--	0.0	0.0
Jun 20-27	--	0.0	0.3	0.0	--	0.1	0.7	0.0
Jun 27-Jul 4	--	0.0	1.5	0.1	0.5	0.0	2.4	0.0
Jul 4-11	--	2.0	2.4	0.1	11.1	5.2	5.2	0.0
Jul 11-18	--	5.2	1.4	0.0	22.9	10.9	1.3	6.9
Jul 18-25	0.0	8.4	1.1	9.3	20.6	6.9	0.3	3.1
Jul 25-Aug 1	16.4	20.7	0.8	3.9	18.3	1.7	1.6	6.6
Aug 1-8	18.7	12.3	0.7	1.1	7.2	7.3	28.6	0.4
Aug 8-15	21.0	4.0	0.6	1.7	19.5	1.4	1.9	1.2
Aug 15-22	18.7	2.0	0.7	1.6	2.0	0.6	1.4	1.2
Aug 22-29	1.2	0.0	14.0	0.9	0.2	0.2	0.5	2.0
Aug 29-Sep 5	0.1	0.0	0.5	4.2	0.0	0.1	0.8	4.2
Sep 5-12	--	0.0	0.1	4.0	0.0	0.1	0.0	1.4
Sep 12-19	--	0.0	0.0	0.2	0.0	0.0	0.1	0.2
Sep 19-26	--	0.1	0.0	0.0	0.0	0.6	0.0	0.0
Sep 26-Oct 3	--	0.0	0.0	0.0	--	0.4	0.0	0.0
Oct 3-10	--	--	--	0.0	--	--	--	0.0
Oct 10-17	--	--	--	--	--	--	--	--
Oct 17-24	--	--	--	--	--	--	--	--
TOTALS	76.1	54.7	24.2	27.1	102.3	35.5	44.8	27.2

Dates Exposed**	PIANKATANK RIVER Palace Bar Station J				PIANKATANK RIVER Ginney Point Station K			
	1980	1981	1982	1983	1980	1981	1982	1983
Jun 13-20	--	--	0.0	0.0	--	--	0.1	0.0
Jun 20-27	--	0.0	0.1	0.0	--	0.0	0.1	0.2
Jun 27-Jul 4	0.0	0.0	3.4	0.4	0.0	0.0	3.2	0.3
Jul 4-11	29.1	6.3	6.4	0.4	3.0	4.4	6.2	0.2
Jul 11-18	70.5	12.6	4.0	1.0	2.0	21.0	15.1	2.5
Jul 18-25	5.0	46.8	1.7	24.3	5.9	2.5	4.2	34.9
Jul 25-Aug 1	82.1	2.9	9.6	89.3	84.9	2.7	11.0	67.3
Aug 1-8	71.3	9.2	23.7	2.6	23.0	2.9	0.8	7.5
Aug 8-15	--	3.0	4.5	1.2	13.7	3.6	6.6	1.4
Aug 15-22	0.7	1.0	2.1	1.2	4.2	--	2.1	1.3
Aug 22-29	4.4	0.5	6.5	6.7	3.0	--	9.1	15.8
Aug 29-Sep 5	1.3	0.5	0.7	17.8	0.5	--	0.5	35.8
Sep 5-12	0.9	0.0	0.5	0.3	0.4	--	0.3	2.2
Sep 12-19	0.0	0.1	0.2	0.7	0.3	-	0.2	2.2
Sep 19-26	0.0	0.2	0.0	0.2	0.1	0.1	0.0	0.1
Sep 26-Oct 3	--	0.2	0.0	0.0	--	0.1	0.0	0.0
Oct 3-10	--	--	--	0.1	--	--	--	0.0
Oct 10-17	--	--	--	--	--	--	--	--
Oct 17-24	--	--	--	--	--	--	--	--
TOTALS	265.3	83.3	63.4	146.2	141.0	37.3	59.5	171.7

GREAT WICOMICO RIVER

Dates Exposed**	Dameron Marsh Station a				Cranes Creek Station b				Fleet Point Station c			
	1980	1981	1982	1983	1980	1981	1982	1983	1980	1981	1982	1983
Jun 13-20	--	--	0.0	0.0	--	--	0.0	0.0	--	--	0.0	0.0
Jun 20-27	0.0	0.0	0.0	0.0	0.0	0.0	2.4	0.0	0.0	0.0	0.0	0.0
Jun 27-Jul 4	0.0	0.4	2.6	0.0	0.0	0.2	1.9	0.0	0.0	0.2	0.2	0.0
Jul 4-11	0.8	0.4	0.4	0.0	0.6	1.1	2.3	0.0	0.7	0.2	1.5	0.0
Jul 11-18	5.3	1.8	8.2	0.0	6.1	2.6	8.9	0.0	2.3	0.4	4.5	0.0
Jul 18-25	5.1	0.2	6.4	0.0	5.7	1.2	19.3	0.0	1.2	0.1	0.7	0.1
Jul 25-Aug 1	1.6	0.0	4.5	0.0	0.7	0.0	10.1	0.3	0.0	0.2	2.5	0.1
Aug 1-8	0.0	0.0	0.7	0.0	0.4	0.0	1.0	0.0	1.3	0.0	1.2	0.4
Aug 8-15	0.0	0.4	6.9	0.6	0.1	0.0	12.9	0.7	1.3	0.0	18.8	0.0
Aug 15-22	0.6	0.2	0.9	0.5	1.0	0.0	8.3	0.0	2.6	1.0	5.3	1.6
Aug 22-29	0.4	0.0	3.4	9.2	0.6	0.1	3.8	1.9	0.6	0.0	9.4	14.3
Aug 29-Sep 5	0.1	0.0	1.7	0.0	0.3	0.1	1.4	0.3	0.1	0.0	4.9	11.3
Sep 5-12	0.2	0.0	0.3	2.4	0.1	0.1	0.1	2.5	0.0	0.0	1.6	14.3
Sep 12-19	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.0	1.1	0.2
Sep 19-26	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	--	0.2	1.1	0.4
Sep 26- Oct 3	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	--	0.0	0.6	0.0
Oct 3-10	--	--	--	0.0	--	--	--	0.0	--	--	--	0.0
Oct 10-17	--	--	--	--	--	--	--	--	--	--	--	--
Oct 17-24	--	--	--	--	--	--	--	--	--	--	--	--
TOTALS	14.2	3.4	36.1	12.7	14.9	5.5	72.6	6.7	10.1	2.3	53.4	42.7



GREAT WICOMICO RIVER

Dates Exposed**	Whaley Flats Station b				Haynie Point Station e				Shell Bar Station f			
	1980	1981	1982	1983	1980	1981	1982	1983	1980	1981	1982	1983
Jun 13-20	--	--	0.0	0.0	--	--	0.0	0.0	--	--	0.1	0.0
Jun 20-27	0.0	0.0	0.2	0.0	0.0	0.0	2.4	0.0	0.0	0.0	0.6	0.0
Jun 27-Jul 4	0.0	0.2	2.3	0.0	0.0	0.2	16.2	0.0	0.0	0.0	25.1	0.0
Jul 4-11	0.2	0.0	1.8	0.0	1.2	1.9	3.8	0.0	3.0	2.2	3.9	0.0
Jul 11-18	1.8	0.9	12.4	0.0	1.5	19.2	13.9	0.0	9.7	16.5	18.9	0.0
Jul 18-25	3.4	0.7	3.5	0.0	6.2	3.8	10.9	0.0	6.1	30.7	10.3	0.0
Jul 25-Aug 1	1.0	0.0	2.9	0.0	1.8	0.0	8.0	0.1	2.6	0.0	47.8	0.0
Aug 1-8	0.0	0.0	0.3	0.0	0.4	0.0	6.6	0.1	3.5	0.0	6.4	0.0
Aug 8-15	0.0	0.2	5.3	0.0	0.0	0.0	2.6	0.4	0.0	0.0	1.6	0.9
Aug 15-22	0.3	0.7	1.2	0.2	0.3	0.1	7.9	0.1	0.1	0.0	5.2	1.1
Aug 22-29	0.3	0.0	3.3	2.0	0.6	0.1	10.0	2.6	0.9	0.3	0.3	23.3
Aug 29-Sep 5	0.1	0.0	2.7	0.0	0.1	0.0	1.7	5.0	0.7	0.4	0.1	8.0
Sep 5-12	0.1	0.1	0.3	2.0	0.4	0.0	1.3	4.5	0.8	0.2	0.0	23.0
Sep 12-19	0.0	0.0	0.3	0.0	0.0	0.0	0.3	0.1	0.0	0.1	2.7	1.2
Sep 19-26	0.0	--	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	1.3	0.0
Sep 26-Oct 3	0.0	--	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.2
Oct 3-10	--	--	--	0.0	--	--	--	0.0	--	--	--	0.0
Oct 10-17												
Oct 17-24												
TOTALS	7.2	2.8	36.5	4.2	12.5	25.3	85.7	12.9	27.5	50.3	124.3	57.7

GREAT WICOMICO RIVER

Dates Exposed**	Hudnall's Dock Station f				Glebe Point Station g			
	1980	1981	1982	1983	1980	1981	1982	1983
Jun 13-20	--	--	0.0	0.0	--	--	0.0	--
Jun 20-27	0.0	0.0	21.9	0.0	0.0	0.0	76.2	0.0
Jun 27-Jul 4	0.0	0.5	9.5	0.0	0.0	0.3	49.8	0.0
Jul 4-11	6.4	1.0	11.0	0.0	1.8	0.7	11.1	0.0
Jul 11-18	11.4	22.3	20.7	0.0	2.2	18.8	24.7	0.0
Jul 18-25	28.0	6.0	23.5	0.0	0.6	62.2	61.8	0.0
Jul 25-Aug 1	6.3	0.3	16.0	0.0	3.1	31.1	123.0	0.0
Aug 1-8	2.1	0.0	8.5	0.0	1.4	0.0	3.3	0.0
Aug 8-15	0.0	0.0	13.3	0.5	0.0	0.0	3.9	0.0
Aug 15-22	0.8	0.0	3.6	0.0	0.1	0.0	4.3	0.0
Aug 22-29	1.0	0.1	8.6	2.1	1.0	0.1	5.3	0.3
Aug 29-Sep 5	1.5	0.3	1.1	9.8	0.1	1.6	0.8	0.2
Sep 5-12	0.2	0.1	0.3	3.8	0.0	3.4	0.0	0.1
Sep 12-19	0.0	0.0	2.0	0.1	0.0	1.8	0.5	0.0
Sep 19-26	0.0	0.0	1.0	0.0	0.0	0.2	0.3	0.0
Sep 26-Oct 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oct 3-10								0.0
Oct 10-17								
Oct 17-24								
TOTALS	57.7	30.6	141.0	16.3	10.3	120.2	365.0	0.6

POTOMAC RIVER

Dates Exposed**	Cornfield				Jones Shore				Great Neck			
	1980	1981	1982	1983	1980	1981	1982	1983	1980	1981	1982	1983
Jun 13-20	--	--	0.0	0.0	--	--	0.0	0.0	--	--	0.0	0.0
Jun 20-27	--	0.0	0.5	0.0	--	0.0	0.0	0.0	--	0.0	0.0	0.0
Jun 27-Jul 4	--	2.0	0.2	0.0	--	1.3	0.2	0.0	0.0	0.3	0.0	0.0
Jul 4-11	0.0	1.0	0.2	0.0	0.0	0.7	0.2	0.0	0.0	0.0	0.0	0.0
Jul 11-18	0.7	0.0	0.4	0.0	0.6	2.0	0.3	0.0	0.3	0.1	0.0	0.0
Jul 18-25	12.8	0.0	0.3	0.0	37.7	0.0	0.7	0.0	0.0	0.0	0.0	0.0
Jul 25-Aug 1	11.1	0.0	4.8	0.0	5.7	0.0	1.6	0.2	0.1	0.0	0.2	0.0
Aug 1-8	1.8	1.3	7.9	0.0	4.2	3.8	4.1	0.0	0.1	0.0	0.2	0.0
Aug 8-15	1.7	7.9	12.2	0.0	2.7	1.6	5.7	0.0	0.0	0.0	0.0	0.0
Aug 15-22	2.0	7.9	66.9	0.4	1.2	1.6	45.8	0.2	0.0	0.0	0.9	0.0
Aug 22-29	1.0	3.9	117.3	3.0	0.6	2.5	177.8	0.0	0.2	0.0	0.7	1.4
Aug 29-Sep 5	6.5	0.0	21.1	5.7	0.1	0.1	12.2	3.1	0.1	0.0	1.0	0.2
Sep 5-12	0.0	2.0	6.4	9.0	0.5	0.0	68.8	6.3	0.4	0.0	0.0	0.2
Sep 12-19	0.0	0.6	7.2	3.1	0.0	1.8	62.6	3.8	0.0	0.0	0.0	0.0
Sep 19-26	0.1	--	0.5	1.6	0.0	0.0	1.0	0.5	0.0	0.1	0.1	0.1
Sep 26-Oct 3	0.0	--	0.0	0.1	0.0	--	0.1	0.4	0.0	--	0.0	0.0
Oct 3-10	--	--	0.1	0.0	--	--	0.0	0.0	--	--	0.0	0.0
Oct 10-17												
Oct 17-24												
TOTALS	37.7	26.6	246.0	22.9	53.3	15.4	381.1	14.5	1.2	0.5	3.1	1.9

POTOMAC RIVER

Dates Exposed**	Coan				Hog Island				Thicket Point			
	1980	1981	1982	1983	1980	1981	1982	1983	1980	1981	1982	1983
Jun 13-20	--	--	0.0	0.0	--	--	0.0	0.0	--	--	0.0	0.0
Jun 20-27	--	0.0	0.0	0.0	--	0.0	0.0	0.0	--	0.0	0.0	0.0
Jun 27-Jul 4	0.0	0.0	0.1	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0
Jul 4-11	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Jul 11-18	1.2	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0
Jul 18-25	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.4	0.0
Jul 25-Aug 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aug 1-8	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.2	0.0
Aug 8-15	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.0	0.0	0.0	0.0	0.0
Aug 15-22	0.0	0.0	0.3	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Aug 22-29	0.1	0.2	1.1	0.2	0.2	0.1	0.4	0.0	0.6	0.3	0.0	0.0
Aug 29-Sep 5	0.0	0.1	0.9	0.6	0.0	0.0	0.3	1.0	0.0	0.0	1.1	0.1
Sep 5-12	0.0	0.0	0.0	0.1	0.0	0.3	0.2	0.1	0.0	0.0	--	0.2
Sep 12-19	0.0	0.0	0.2	0.0	0.0	0.6	0.0	0.0	0.0	0.0	--	0.0
Sep 19-26	0.0	0.0	0.0	0.0	0.0	0.1	0.4	0.4	0.1	0.4	--	0.8
Sep 26-Oct 3	0.0	--	0.0	0.0	0.0	--	0.0	0.0	0.0	--	-	0.0
Oct 3-10	--	--	0.0	0.0	--	--	0.0	0.0	--	--	--	0.0
Oct 10-17												
Oct 17-24												
TOTALS	1.3	0.3	4.2	0.9	0.3	1.7	1.9	1.5	0.8	0.9	1.8	1.1

## EASTERN SHORE, SEASIDE

Dates Exposed**	VIMS Pier at Wachapreague			
	1980	1981	1982	1983
Jun 13-20	--	--	--	0.0
Jun 20-27	0.3	1.0	--	0.0
Jun 27-Jul 4	0.2	0.5	--	0.5
Jul 4-11	1.8	1.2	0.9	2.0
Jul 11-18	1.7	2.2	4.9	23.1
Jul 18-25	1.3	--	2.1	12.5
Jul 25-Aug 1	0.4	1.4	4.9	33.0
Aug 1-8	1.2	0.1	19.7	1.6
Aug 8-15	0.7	0.0	13.2	1.1
Aug 15-22	0.0	0.1	4.7	2.6
Aug 22-29	5.7	0.0	0.4	2.7
Aug 29-Sep 5	--	0.0	0.4	30.7
Sep 5-12	7.9	0.0	1.5	9.9
Sep 12-19	2.0	0.0	0.6	0.7
Sep 19-26	--	0.0	1.3	0.6
Sep 26-Oct 3	--	--	1.2	0.0
Oct 3-10	--	--	--	0.0
Oct 10-17	--	--	--	0.0
Oct 17-24				
TOTALS	23.2	6.5	55.8	121.0



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