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Oyster Spatfall in Virginia Rivers: 1986 Annual Summary

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MARINE RESOURCE SPECIAL REPORT

VIMS

A Marine Advisory Service Publication of the VIRGINIA SEA GRANT PROGRAM

Virginia Institute of Marine Science Gloucester Point, Virginia 23062

1986 Annual Summary

OYSTER SPATFALL IN VIRGINIA RIVERS
by
James 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 is 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 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. Shellstrings were collected by VIMS personnel at Wachapreague. The cooperation and assistance of all the above and their supervisors is gratefully acknowledged.

Summary of Setting for 1986

The setting on shellstrings was moderate to high in every area monitored except the James River and the Potomac River. Setting in Potomac River was light to moderate and in the James River, with the exception of one week of high settlement at Naseway Shoal, the setting was also light to moderate.

James River

The level of setting in the James River 1986 was the lowest for the past seven years and similar to the level of setting in the previous decade. Setting on shellstrings began the third week of June and ninety-eight percent occurred during the eleven weeks ending September 13th. The peak of setting was, except on the two uppermost stations, in the second and third week of August. At Horsehead the setting was bimodal with a peak the third week of July and another the third week of August.

The monitoring at Deepwater Shoals was interrupted by sportsfishing activity.

York River

The setting at the VIMS Ferry Pier was the highest recorded in twenty-five years. Setting began the third week of June and continued to October. Ninety-three per-cent of the set was from the third week in July through the second week in August.

Probably many of the larvae setting at the VIMS Ferry Pier came from the overflow pipe at the adjacent hatchery operated by VIMS.

Mobjack Bay

Setting on shellstrings at Tow stake began the third week in June and continued for eleven weeks. The settlement at Brown's Bay began two weeks later and continued two weeks longer. The total set at Tow Stake was below the average for the previous four year period while at Brown's Bay the set was the highest in the past twenty-five years.

Ware River

There was a light set on the shellstring at Wilson Creek from the third week of June through the second week in September. The set reached 1.0 spat-per-shell-week in just one weekly period and the total set was the second lowest since 1978.

East River

Setting began during the third week in June and continued for eleven weeks peaking the last week in July. The level was above the average of the previous four years.

Pepper Creek

Setting began on shellstrings the first week in July and continued for eleven weeks peaking the final week in July. It was the highest in twenty five years.

Pfankatank River

Setting began on shellstrings during June at all stations and continued ten to twelve weekly periods, peaking either the second or third week in July. All stations had high set, exceeding any set at each station in the previous six years.

Rappahannock River

The set at Locklies began the fourth week in June and continued for eleven weeks peaking the fourth week in July. The set was moderate for six weeks beginning the second week in July.

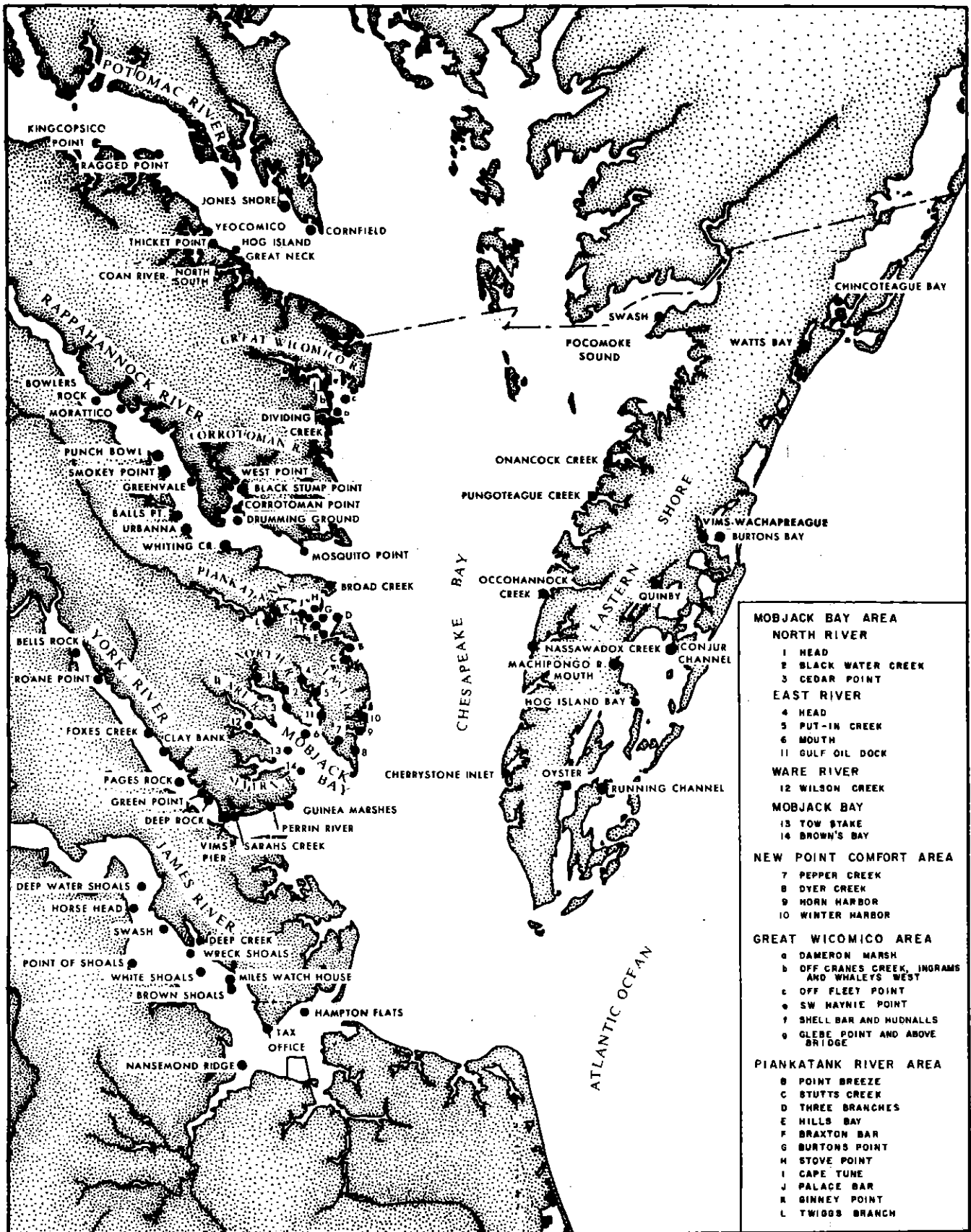
Potomac River

Beginning the second week in July ninety-six per-cent of the setting on shellstrings fall in a nine week period. The setting on the Virginia side in the lower river was light but above the average for the previous four years. On the Maryland side the set was light to moderate but below average for the same period.

Eastern Shore

Setting began at the VIMS station in Wachapreague the third week in June and peaked the last week in July. Setting was high and above average when compared with the previous four years.

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
- f SHELL BAR AND MUDNALLS
- g 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 SINNEY POINT
- L TWIGGS BRANCH

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
1983-1986

JAMES RIVER

Dates Exposed**	Nansemond Ridge				Naseway Shoal				Brown Shoal			
	1983	1984	1985	1986	1983	1984	1985	1986	1983	1984	1985	1986
Jun 16-23	0.0	0.0	0.0	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	0.1
Jun 30-Jul 7	0.0	0.4	0.0	0.0	0.2	0.1	1.3	0.5	0.0	0.3	0.4	0.2
Jul 7-14	1.5	0.4	5.1	0.6	7.7	0.0	29.8	1.9	1.6	0.1	2.1	0.7
Jul 14-21	2.4	0.7	50.9	1.0	7.7	1.2	292.3	2.6	4.2	0.2	8.8	0.7
Jul 21-28	9.4	0.6	2.5	0.7	57.8	1.9	104.6	2.9	10.0	1.2	5.1	0.2
Jul 28-Aug 4	14.5	0.6	2.5	0.7	41.1	0.7	10.8	2.8	8.5	1.1	0.9	1.6
Aug 4-11	10.4	0.2	0.9	0.5	39.2	0.4	0.0	0.8	2.1	0.3	0.3	3.9
Aug 11-18	0.1	3.0	0.6	2.0	4.8	5.5	2.2	8.2	0.3	1.1	0.7	4.7
Aug 18-25	1.2	3.5	0.1	2.0	19.4	13.3	0.0	11.2	1.3	6.2	0.1	3.5
Aug 25-Sep 1	0.6	3.4	0.0	0.6	5.1	13.3	2.2	3.3	0.5	6.0	0.8	1.8
Sep 1-8	2.5	2.0	5.5	0.3	20.4	4.4	15.9	3.4	0.7	2.2	2.5	0.9
Sep 8-15	2.6	0.1	0.3	0.1	18.1	0.1	3.1	1.5	0.7	0.0	0.1	0.1
Sep 15-22	0.6	0.1	0.1	0.1	2.1	0.1	0.3	0.3	1.2	0.0	0.1	0.1
Sep 22-29	0.4	0.1	0.1	0.1	0.6	0.0	0.1	0.4	0.1	0.0	0.0	0.1
Sep 29-Oct 6	0.3	0.0	0.3	0.1	0.3	0.0	0.1	0.2	0.1	0.0	0.2	0.1
Oct 6-13	0.2	0.0	0.2	—	0.2	0.0	0.4	0.0	0.0	0.0	1.1	0.1
Oct 13-20	0.0	0.0	0.3	—	0.0	0.0	2.6	—	0.0	0.0	2.8	0.1
Oct 20-27	—	—	0.2	—	—	—	0.1	—	—	—	0.3	—
Oct 27-Nov 3	—	—	0.1	—	—	—	0.1	—	—	—	0.3	—
TOTALS	46.7	15.1	69.7	8.8	224.7	41.0	465.9	40.0	31.3	18.7	26.6	18.9

* Shows spat per shell (smooth side only).

** Dates shown are for 1986. Dates in other years were approximately the same.

— Data not received.

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			
	1983	1984	1985	1986	1983	1984	1985	1986	1983	1984	1985	1986
Jun 16-23	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Jun 23-Jun 30	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Jun 30-Jul 7	0.0	0.1	0.4	0.1	0.0	0.1	—	0.3	0.0	0.1	0.7	0.2
Jul 7-14	4.2	0.0	5.3	0.1	1.8	0.0	0.5	0.5	4.0	0.1	3.9	0.2
Jul 14-21	8.5	0.2	4.9	0.1	7.7	1.8	4.9	0.6	10.0	0.9	10.0	0.2
Jul 21-28	5.4	0.2	1.8	0.4	15.3	0.9	4.4	0.6	13.3	1.9	3.9	—
Jul 28-Aug 4	16.3	1.0	2.0	0.8	35.7	1.2	0.6	0.8	55.2	1.8	0.6	0.1
Aug 4-11	6.3	0.7	0.7	1.2	11.6	1.0	0.4	1.2	12.3	0.4	0.1	0.6
Aug 11-18	0.3	2.8	0.5	2.4	1.2	1.4	0.4	1.9	0.1	2.2	0.4	1.7
Aug 18-25	1.5	5.7	0.1	2.6	3.3	6.3	0.0	3.9	3.5	5.5	0.1	2.0
Aug 25-Sep 1	1.0	5.6	0.6	1.2	2.5	6.3	0.2	5.8	2.2	5.5	0.1	1.2
Sep 1-8	1.0	0.3	1.4	0.5	2.9	1.4	1.1	2.5	2.3	2.2	3.6	1.0
Sep 8-15	2.1	0.0	0.2	0.0	1.6	0.0	0.2	0.1	1.3	0.3	1.1	0.3
Sep 15-22	0.2	0.0	0.0	0.0	0.3	0.0	0.2	0.0	0.1	0.2	0.1	0.0
Sep 22-29	0.0	0.0	0.8	0.2	0.4	0.1	0.0	0.0	0.3	0.0	0.0	0.2
Sep 29-Oct 6	0.0	0.1	0.4	0.2	0.2	0.0	0.1	0.0	0.2	0.1	0.1	0.2
Oct 6-13	0.0	0.0	1.6	0.0	0.1	0.0	0.3	—	0.0	0.0	1.6	0.0
Oct 13-20	0.0	0.0	0.1	0.0	0.0	0.0	0.4	—	0.0	0.0	0.0	0.0
Oct 20-27	—	—	0.0	—	—	—	0.4	—	—	—	0.0	—
Oct 27-Nov 3	—	—	0.1	—	—	—	—	—	—	—	—	—
TOTALS	46.8	16.7	20.9	9.8	20.6	20.4	14.3	18.2	104.8	21.2	26.3	7.9

JAMES RIVER

Dates Exposed**	Horsehead Bar				Mulberry Swash				Point of Shoal			
	1983	1984	1985	1986	1983	1984	1985	1986	1983	1984	1985	1986
Jun 16-23	0.0	0.0	0.0	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	0.1	0.0	0.0	0.0
Jun 20-Jul 7	0.0	0.0	1.0	0.1	0.0	0.0	0.5	0.2	0.0	0.1	1.7	0.1
Jul 7-14	5.7	0.0	2.4	1.0	0.0	0.0	1.7	1.2	4.4	0.0	6.1	0.3
Jul 14-21	15.5	0.0	17.7	1.4	15.5	0.7	27.1	1.4	18.3	0.3	14.7	0.4
Jul 21-28	8.3	2.9	9.1	0.2	15.9	10.3	0.9	0.5	9.0	2.7	3.9	0.1
Jul 28-Aug 4	36.2	2.2	2.5	0.1	218.0	1.8	3.2	0.6	10.9	2.2	2.7	0.0
Aug 4-11	14.1	1.1	0.3	0.3	49.8	3.6	2.2	0.8	9.1	4.0	0.1	0.4
Aug 11-18	1.4	2.3	0.3	0.7	2.5	2.5	2.2	1.9	1.7	4.1	0.5	1.2
Aug 18-25	8.8	9.0	0.0	1.1	15.2	7.6	0.0	1.4	10.2	4.8	0.0	1.4
Aug 25-Sep 1	2.4	9.0	0.0	1.4	7.5	7.6	0.0	0.7	3.2	4.8	0.3	0.1
Sep 1-8	2.6	0.8	1.1	0.7	7.8	2.6	0.0	0.3	7.6	0.2	0.6	0.2
Sep 8-15	1.1	0.4	0.3	0.1	0.5	0.3	0.0	0.0	2.5	0.1	0.1	0.1
Sep 15-22	0.5	0.0	0.0	0.1	1.1	0.2	0.0	0.0	0.4	0.0	0.0	0.1
Sep 22-29	0.0	0.0	0.2	0.1	0.0	0.0	0.1	0.1	0.0	0.2	0.0	0.1
Sep 29-Oct 6	0.0	0.4	0.2	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1
Oct 6-13	0.0	0.0	0.9	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.5	0.0
Oct 13-20	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Oct 20-27	—	—	0.0	—	—	—	0.0	—	—	—	0.0	—
Oct 27-Nov 3	—	—	0.0	—	—	—	0.0	—	—	—	0.0	—
TOTALS	96.6	28.1	36.0	7.3	333.8	37.2	38.1	9.2	77.4	23.5	31.2	4.6

JAMES RIVER

Dates Exposed**	Deepwater Shoal			
	1983	1984	1985	1986
Jun 16-23	0.0	0.0	0.0	0.0
Jun 23-30	0.0	0.0	0.0	0.0
Jun 30-Jul 7	0.0	0.0	0.2	0.1
Jul 7-14	9.0	0.0	—	0.4
Jul 14-21	17.9	0.0	—	0.5
Jul 21-28	7.8	0.3	0.5	0.0
Jul 28-Aug 4	6.4	0.1	—	—
Aug 4-11	9.2	0.0	0.1	0.2
Aug 11-18	0.2	0.3	0.0	0.2
Aug 18-25	7.7	1.0	0.0	0.3
Aug 25-Sep 1	0.6	1.0	0.0	—
Sep 1-8	2.2	0.0	0.0	0.2
Sep 8-15	0.5	0.0	0.0	0.1
Sep 15-22	0.5	0.0	0.0	0.0
Sep 22-29	0.0	0.0	—	0.0
Sep 29-Oct 6	0.0	0.0	0.0	—
Oct 6-13	0.0	0.0	0.3	—
Oct 13-20	0.0	0.0	—	—
	—	—	—	—
TOTALS	62.0	2.7	1.1	2.0

YORK RIVER

VIMS Ferry Pier

WARE RIVER
Off Wilson's Creek
Station 12EAST RIVER
Mouth
Station 6

Dates Exposed**	YORK RIVER				WARE RIVER				EAST RIVER			
	1983	1984	1985	1986	1983	1984	1985	1986	1983	1984	1985	1986
Jun 16-23	0.0	0.0	0.0	0.1	0.0	0.0	0.3	0.4	0.0	0.0	0.1	0.9
Jun 23-Jun 30	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.4	0.1	0.2
Jun 30-Jul 7	0.2	0.0	0.0	0.1	0.1	0.1	0.0	0.3	3.5	0.3	0.0	0.2
Jul 7-14	0.1	0.0	0.1	0.4	0.1	1.2	0.0	0.2	0.5	1.1	0.0	1.2
Jul 14-21	0.0	0.0	0.1	3.8	0.1	31.4	0.1	0.5	1.2	3.6	1.6	1.1
Jul 21-28	0.0	0.1	0.1	16.6	0.7	2.0	0.2	0.5	2.7	3.6	1.2	0.8
Jul 28-Aug 4	0.1	0.1	0.1	56.5	0.9	0.7	0.1	1.1	2.5	1.2	3.1	14.2
Aug 4-11	0.0	0.2	0.2	52.9	7.0	0.1	0.0	0.8	6.5	0.3	0.7	6.4
Aug 11-18	0.0	0.6	0.0	26.8	0.0	0.2	1.0	0.8	0.7	1.0	0.0	2.4
Aug 18-25	0.1	0.6	3.2	4.2	0.2	2.6	0.0	0.7	1.1	2.0	0.2	1.6
Aug 25-Sep 1	0.6	0.3	4.2	2.4	0.3	0.6	0.0	0.1	1.0	0.5	0.8	0.2
Sep 1-8	1.5	0.0	4.1	0.2	1.0	0.3	0.0	0.1	0.6	0.1	1.4	0.0
Sep 8-15	2.4	0.3	0.5	0.5	0.6	0.0	0.0	0.1	4.1	0.0	0.0	0.0
Sep 15-22	0.0	0.0	1.7	0.2	0.0	0.0	0.0	0.0	1.4	0.0	0.0	0.0
Sep 22-29	0.7	0.0	3.2	0.1	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0
Sep 29-Oct 6	0.5	0.0	1.2	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.2	0.0
Oct 6-13	0.0	0.0	1.1	0.1	0.0	—	0.0	—	0.0	0.0	0.0	0.0
Oct 13-20	0.0	0.0	0.3	0.1	—	—	—	—	—	—	—	—
Oct 20-27	0.0	—	0.2	—	—	—	—	—	—	—	—	—
Oct 27-Nov 3	—	—	0.1	—	—	—	—	—	—	—	—	—
Nov 3-10	—	—	0.1	—	—	—	—	—	—	—	—	—
TOTALS	6.2	2.2	20.5	165.2	11.0	39.3	1.7	5.7	26.8	14.1	9.4	29.2

Dates Exposed**	PEPPER CREEK				MOBJACK BAY				MOBJACK BAY			
	Mouth				Off Brown's Bay				Tow Stake			
	Station 7	Station 7	Station 7	Station 7	Station 14	Station 14	Station 14	Station 14	Station 13	Station 13	Station 13	Station 13
	1983	1984	1985	1986	1983	1984	1985	1986	1983	1984	1985	1986
Jun 16-23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.8
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	2.6
Jun 30-Jul 7	0.0	0.0	0.0	0.4	0.2	0.0	0.1	0.3	0.9	0.0	0.0	0.7
Jul 7-14	6.5	0.0	0.0	0.1	0.7	0.0	0.0	1.4	1.4	0.3	0.0	0.4
Jul 14-21	1.8	0.3	5.5	3.8	1.9	1.0	1.0	4.2	0.5	2.6	0.3	0.8
Jul 21-28	1.6	0.2	8.9	6.1	1.0	0.5	0.5	10.2	1.2	5.4	0.1	0.5
Jul 28-Aug 4	1.2	2.1	19.6	184.4	1.0	0.1	1.2	83.3	1.9	2.9	0.0	0.6
Aug 4-11	0.8	4.9	36.1	59.0	3.5	0.4	0.3	95.3	6.4	0.5	0.0	1.5
Aug 11-18	1.0	1.3	2.6	5.6	0.0	0.0	0.1	28.1	0.5	0.0	0.0	4.0
Aug 18-25	0.7	5.7	3.7	3.3	0.4	1.5	0.2	17.1	0.5	1.8	0.0	2.7
Aug 25-Sep 1	0.2	0.3	5.4	1.3	1.0	0.0	0.3	0.6	0.3	0.0	1.1	0.1
Sep 1-8	21.8	2.8	21.0	0.3	30.5	0.7	2.1	0.2	1.6	0.7	0.6	0.0
Sep 8-15	47.8	0.7	2.7	0.1	31.3	0.2	0.3	0.1	2.9	0.0	0.0	0.0
Sep 15-22	3.5	0.0	1.7	0.0	0.6	0.2	0.4	0.0	0.6	0.0	0.0	0.0
Sep 22-29	0.2	0.0	1.9	0.0	—	0.0	0.2	0.1	0.0	0.0	0.0	0.0
Sep 29-Oct 6	0.2	0.0	3.4	0.1	—	0.0	0.2	0.1	0.1	0.1	0.0	0.0
Oct 6-13	0.2	—	0.0	0.1	—	—	0.2	0.1	0.0	—	—	—
Oct 13-20	—	—	—	—	—	—	—	—	—	—	—	—
TOTALS	87.5	18.3	112.5	264.6	71.1	4.6	7.1	241.1	18.8	14.3	2.5	15.7

Dates Exposed**	PIANKATANK RIVER Burton Point Station G				PIANKATANK RIVER Three Branches Station D			
	1983	1984	1985	1986	1983	1984	1985	1986
Jun 16-23	0.0	0.0	0.0	0.7	0.0	0.0	—	0.0
Jun 23-30	0.0	0.0	0.1	0.1	0.0	0.0	—	0.0
Jun 30-Jul 7	0.1	0.0	1.5	60.6	0.0	0.0	—	14.1
Jul 7-14	0.1	0.2	3.9	124.2	0.0	0.0	—	58.0
Jul 14-21	0.0	12.1	66.0	29.7	6.9	1.8	—	14.1
Jul 21-28	9.3	1.3	—	14.5	3.1	2.1	—	5.1
Jul 28-Aug 4	3.9	9.6	12.7	15.3	6.6	1.6	—	2.7
Aug 4-11	1.1	9.5	0.9	4.5	0.4	9.4	—	1.5
Aug 11-18	1.7	5.0	0.2	1.8	1.2	1.7	—	1.2
Aug 18-25	1.6	0.5	0.0	1.1	1.2	0.6	—	0.9
Aug 25-Sep 1	0.9	0.4	0.4	0.2	2.0	0.0	—	0.2
Sep 1-8	4.2	0.1	0.0	0.1	4.2	0.2	—	0.1
Sep 8-15	4.0	0.1	0.0	0.0	1.4	0.2	—	0.0
Sep 15-22	0.2	0.0	0.0	0.0	0.2	0.0	—	0.0
Sep 22-29	0.0	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	—	0.0
Oct 6-13	—	0.0	0.0	0.0	0.0	0.0	—	0.0
TOTALS	27.1	38.8	85.7	252.8	27.2	17.6	—	97.9

Dates Exposed**	PLANKATANK RIVER Palace Bar Station J				PLANKATANK RIVER Ginney Point Station K				RAPPAHANNOCK RIVER Locklies
	1983	1984	1985	1986	1983	1984	1985	1986	1986
Jun 16-23	0.0	0.0	0.2	0.1	0.0	0.0	0.1	0.0	0.0
Jun 23-30	0.0	0.0	0.6	0.1	0.2	0.0	0.6	0.2	0.1
Jun 30-Jul 7	0.4	0.0	4.5	108.0	0.3	0.0	3.0	7.4	0.1
Jul 7-14	0.4	0.4	16.0	169.5	0.2	0.4	29.7	46.2	2.1
Jul 14-21	1.0	9.2	87.8	57.0	2.5	0.3	27.8	117.3	5.4
Jul 21-28	24.3	25.5	—	21.2	34.9	65.6	—	24.8	6.0
Jul 28-Aug 4	89.3	12.3	5.5	10.4	67.3	19.6	12.7	3.0	5.9
Aug 4-11	2.6	1.5	7.1	2.7	7.5	4.8	2.1	2.7	5.9
Aug 11-18	1.2	3.8	0.3	3.2	1.4	7.4	0.4	1.7	1.4
Aug 18-25	1.2	2.2	0.2	3.7	1.3	11.2	0.0	0.8	0.5
Aug 25-Sep 1	6.7	3.4	0.5	0.4	15.8	3.6	0.2	0.1	0.2
Sep 1-8	17.8	0.2	0.0	0.1	35.8	3.1	0.1	0.0	0.1
Sep 8-15	0.3	0.1	0.0	0.1	2.2	3.1	0.0	0.0	0.0
Sep 15-22	0.7	0.1	1.5	0.0	2.2	3.1	3.4	0.0	0.0
Sep 22-29	0.2	0.5	0.3	0.0	0.1	2.6	2.6	0.0	0.0
Sep 29-Oct 6	0.0	0.5	0.0	0.0	0.0	1.8	0.0	0.0	0.0
Oct 6-13	0.1	0.0	0.0	0.0	0.0	—	0.0	0.0	0.0
TOTALS	146.2	59.7	124.5	376.5	171.7	126.6	82.7	204.2	27.7

Dates Exposed**	GREAT WICOMICO RIVER											
	Dameron Marsh Station a				Cranes Creek Station b				Fleet Point Station c			
	1983	1984	1985	1986	1983	1984	1985	1986	1983	1984	1985	1986
Jun 16-23	0.0	0.0	0.0	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	1.5	0.0	0.0	0.0	4.7	0.0	0.0	0.1	2.1
Jul 7-14	0.0	0.3	0.1	20.4	0.0	0.0	0.4	50.4	0.0	0.0	0.1	2.1
Jul 14-21	0.0	0.0	1.3	4.0	0.0	0.0	0.2	21.0	0.0	0.1	0.1	1.1
Jul 21-28	0.0	0.0	1.5	2.5	0.0	0.0	0.8	8.1	0.1	0.0	9.2	4.5
Jul 28-Aug 4	0.0	0.1	3.1	6.1	0.3	0.1	2.8	19.9	0.1	0.1	68.3	10.7
Aug 4-11	0.0	0.4	2.4	6.6	0.0	0.3	1.5	5.9	0.4	0.1	0.2	12.0
Aug 11-18	0.6	0.0	0.0	1.6	0.7	0.2	—	3.4	0.0	0.7	0.0	7.0
Aug 18-25	0.5	0.0	0.0	0.5	0.0	0.0	0.0	6.0	1.6	0.5	0.2	2.6
Aug 25-Sep 1	9.2	0.0	0.2	0.1	1.9	0.2	0.6	2.1	14.3	0.0	0.0	0.6
Sep 1-8	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.1	11.3	0.2	0.1	0.1
Sep 8-15	2.4	0.1	0.0	0.0	2.5	0.5	0.0	0.0	14.3	0.0	0.1	0.0
Sep 15-22	0.0	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.2	0.0	0.0	0.0
Sep 22-29	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.4	0.0	0.0	0.0
Sep 29-Oct 6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oct 6-13	—	—	—	0.0	—	—	—	0.0	—	—	—	0.0
TOTALS	12.7	0.9	8.6	43.3	6.7	1.3	6.3	121.6	42.7	1.7	78.4	42.8

Dates Exposed**	GREAT WICOMICO RIVER											
	Whaley Flats Station b				Haynie Point Station e				Shell Bar Station f			
	1983	1984	1985	1986	1983	1984	1985	1986	1983	1984	1985	1986
Jun 16-23	0.0	0.0	0.0	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	0.0
Jun 30-Jul 7	0.0	0.0	0.0	1.5	0.0	0.0	0.0	5.1	0.0	0.0	—	15.3
Jul 7-14	0.0	0.0	0.0	21.8	0.0	0.0	1.8	92.8	0.0	0.5	7.6	51.9
Jul 14-21	0.0	0.0	0.5	8.8	0.0	0.2	0.2	28.0	0.0	2.3	4.4	17.5
Jul 21-28	0.0	0.0	1.0	5.5	0.0	0.0	0.4	17.6	0.0	0.9	2.6	3.1
Jul 28-Aug 4	0.0	0.0	0.3	5.4	0.1	0.0	3.8	10.8	0.0	0.2	1.8	13.2
Aug 4-11	0.0	0.1	0.3	4.1	0.1	0.0	1.1	8.1	0.0	0.1	6.8	11.6
Aug 11-18	0.0	0.1	0.1	2.5	0.4	0.1	0.0	3.3	0.9	0.1	1.5	5.4
Aug 18-25	0.2	0.2	0.0	0.6	0.1	0.0	0.0	3.5	1.1	0.5	0.9	5.6
Aug 25-Sep 1	2.0	0.0	0.1	0.1	2.6	0.0	0.2	1.3	23.3	0.6	2.4	1.9
Sep 1-8	0.0	0.0	0.0	0.1	5.0	0.2	0.1	0.1	8.0	0.0	0.0	0.0
Sep 8-15	2.0	0.0	0.0	0.0	4.5	0.2	0.0	0.0	23.0	0.3	0.1	0.0
Sep 15-22	0.0	0.0	0.0	0.0	0.1	0.0	0.0	—	1.2	0.2	0.0	0.1
Sep 22-29	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.2	0.0	0.1
Sep 29-Oct 6	0.0	—	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.0	0.0	0.2
Oct 6-13	—	—	—	0.0	—	—	—	0.0	—	—	—	0.2
TOTALS	4.2	0.4	2.3	50.7	12.9	0.7	7.6	170.8	57.7	5.9	28.1	126.1

GREAT WICOMICO RIVER

Dates Exposed**	Rudnall's Dock Station f				Glebe Point Station g			
	1983	1984	1985	1986	1983	1984	1985	1986
Jun 16-23	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
Jun 30-Jul 7	0.0	0.0	0.0	33.9	0.0	0.0	0.0	24.0
Jul 7-14	0.0	0.1	1.8	73.2	0.0	0.1	3.3	84.2
Jul 14-21	0.0	0.7	3.0	30.8	0.0	0.2	2.3	94.5
Jul 21-28	0.0	0.6	1.0	20.1	0.0	1.3	1.7	45.1
Jul 28-Aug 4	0.0	0.6	1.6	146.1	0.0	0.2	1.2	79.0
Aug 4-11	0.0	0.4	6.0	16.2	0.0	0.3	1.6	19.6
Aug 11-18	0.5	0.3	0.3	7.6	0.0	0.0	0.4	2.8
Aug 18-25	0.0	0.1	0.1	7.0	0.0	0.1	0.2	9.0
Aug 25-Sep 1	2.1	0.3	0.3	2.5	0.3	0.0	0.0	5.5
Sep 1-8	9.8	0.0	0.0	0.2	0.2	0.0	0.2	0.8
Sep 8-15	3.8	0.0	0.1	0.0	0.1	0.0	0.0	0.1
Sep 15-22	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Sep 22-29	0.0	0.0	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	0.0	0.0
Oct 6-13	—	—	—	0.0	—	—	—	0.0
TOTALS	16.3	3.3	14.2	237.6	0.6	2.2	10.9	364.6

Dates Exposed**	POTOMAC RIVER											
	Cornfield				Jones Shore				Great Neck			
	1983	1984	1985	1986	1983	1984	1985	1986	1983	1984	1985	1986
Jun 16-23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
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	0.1
Jun 30-Jul 7	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5
Jul 7-14	0.0	0.0	0.0	0.3	0.0	0.0	0.1	0.6	0.0	0.0	0.0	0.4
Jul 14-21	0.0	0.1	0.1	0.5	0.0	0.2	0.2	2.4	0.0	0.0	0.0	0.5
Jul 21-28	0.0	0.0	15.8	0.3	0.0	0.1	5.8	0.6	0.0	0.0	0.4	0.8
Jul 28-Aug 4	0.0	0.0	12.1	0.3	0.2	0.0	5.4	1.3	0.0	0.0	0.2	0.4
Aug 4-11	0.0	0.0	0.6	0.6	0.0	0.3	7.2	3.4	0.0	0.0	0.8	2.3
Aug 11-18	0.0	0.0	0.0	0.6	0.0	0.0	0.0	2.8	0.0	0.0	0.1	0.4
Aug 18-25	0.4	0.1	0.0	0.6	0.2	0.0	0.0	1.5	0.0	0.0	0.0	0.3
Aug 25-Sep 1	3.0	0.0	0.8	0.2	0.0	0.1	1.1	2.4	1.4	0.0	0.5	0.3
Sep 1-8	5.7	0.0	0.0	0.0	3.1	0.0	0.0	1.2	0.2	0.0	0.0	0.1
Sep 8-15	9.0	0.0	0.0	0.0	6.3	0.0	0.0	0.0	0.2	0.0	0.0	0.0
Sep 15-22	3.1	0.0	0.0	0.0	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sep 22-29	1.6	0.0	0.0	0.0	0.5	0.0	0.8	0.0	0.1	0.0	3.2	0.0
Sep 29-Oct 6	0.1	0.0	0.1	0.0	0.4	0.0	—	0.0	0.0	0.0	0.0	0.0
Oct 6-13	0.0	—	0.0	0.0	0.0	0.0	—	0.0	0.0	0.0	0.0	0.0
TOTALS	22.9	0.2	29.5	3.6	14.5	0.7	20.6	16.2	1.9	0.0	5.2	6.4

Dates Exposed**	Coan				POTOMAC RIVER Hog Island				Thicket Point			
	1983	1984	1985	1986	1983	1984	1985	1986	1983	1984	1985	1986
Jun 16-23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
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	0.1
Jun 30-Jul 7	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Jul 7-14	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Jul 14-21	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.4
Jul 21-28	0.0	0.0	0.0	6.0	0.0	0.0	0.7	0.3	0.0	0.0	0.0	0.7
Jul 28-Aug 4	0.0	0.0	0.0	3.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	1.4
Aug 4-11	0.0	0.0	0.0	0.5	0.0	0.0	0.5	0.1	0.0	0.1	0.0	0.2
Aug 11-18	0.0	0.0	0.0	0.1	0.0	0.0	0.0	1.2	0.0	0.0	0.0	0.5
Aug 18-25	0.0	0.0	0.0	0.2	0.0	0.0	0.1	2.1	0.0	0.0	0.1	0.9
Aug 25-Sep 1	0.2	0.0	0.0	0.1	0.0	0.1	0.3	0.4	0.0	0.0	0.0	0.2
Sep 1-8	0.6	0.0	0.0	0.1	1.0	0.1	0.0	0.1	0.1	0.0	0.0	0.2
Sep 8-15	0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.1	0.2	0.0	0.0	0.1
Sep 15-22	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Sep 22-29	0.0	0.0	0.0	0.0	0.4	0.0	0.1	0.0	0.8	0.0	0.1	0.0
Sep 29-Oct 6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oct 6-13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTALS	0.9	0.0	0.0	10.8	1.5	0.3	1.7	4.8	1.1	0.1	0.2	4.9

EASTERN SHORE, SEASIDE
VIMS Pier at
Wachapreague

Dates Exposed**	1983	1984	1985	1986
Jun 16-23	0.0	0.0	0.0	0.1
Jun 23-30	0.0	0.0	0.0	0.1
Jun 30-Jul 7	0.5	0.1	0.0	0.2
Jul 7-14	2.0	0.3	0.2	0.5
Jul 14-21	23.1	0.0	0.2	1.0
Jul 21-28	12.5	0.0	0.1	8.7
Jul 28-Aug 4	33.0	1.7	0.5	21.8
Aug 4-11	1.6	0.8	0.5	19.4
Aug 11-18	1.1	2.2	0.4	10.8
Aug 18-25	2.6	5.1	5.5	2.0
Aug 25-Sep 1	2.7	15.2	2.6	0.7
Sep 1-8	30.7	24.8	13.0	0.2
Sep 8-15	9.9	4.4	2.7	0.2
Sep 15-22	0.7	0.3	5.3	0.1
Sep 22-29	0.6	0.3	0.0	0.7
Sep 29-Oct 6	0.0	1.2	0.4	0.2
Oct 6-13	0.0	0.0	0.3	0.0
Oct 13-20	0.0	0.0	0.2	0.0
TOTALS	121.0	56.4	31.9	66.7