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Virginia Marine Resource Bulletin

Virginia Sea Grant

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11-1-1969

## Marine Resource Information Bulletin Vol. 1, No. 4

Virginia Sea Grant

Virginia Institute of Marine Science

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## MARINE RESOURCE INFORMATION

# BULLETIN

## VIRGINIA INSTITUTE of MARINE SCIENCE

Vol. I No. 4

November 1969

### BLUE CRAB STOCKS AT ALL TIME HIGH

Blue crabs are now more abundant in Chesapeake Bay than at any time in the past 90 years. Not since commercial fishing was started in the 1870's have so many crabs been reported or remembered. This bountiful supply is the product of the successful hatch of crabs in 1968, first reported by Virginia and Maryland scientists in the fall of 1968. It follows two years of relative scarcity. The year 1968 and the first two-thirds of 1969 will be well-remembered throughout the Chesapeake as times when production of crabs fell to less than one-half former levels and scarcity forced prices to previously unknown highs.

Potential magnitude of the crop was predicted in October 1968 by W. A. Van Engel of VIMS and Robert L. Lippson of the Chesapeake Biological Laboratory (CBL), Solomons, Maryland, following intensive cooperative Bi-state field studies of the new crop. Crab potters this fall have already taken twice the catch of the fall of 1968.

Virginia and Maryland crab fishermen should be able to supply almost every demand for crabs during the next twelve months. At the start of winter dredge fishing on December 1, Virginia vessels should be able to obtain their catch limits in record time. This year the Marine Resources Commission has set the vessel limit to 25 barrels per boat per day.

The combined Virginia and Maryland crab catch from September 1969 through August 1970 could exceed 100 million pounds, topping the previous 12 month high in 1966 of 97 1/2 million pounds, if Chesapeake Bay crabbers are allowed to work with the minimum of interference from weather, market and labor forces.

The catch could also remain high through December 1970. Many crabs hatched in 1968 became mature size by September 1969 and will support the commercial fishery from now until early next summer. But some crabs were hatched late in 1968 and will not reach mature size until early summer of 1970. These crabs should support the fishery until the end of 1970.

Despite all these good signs, crabbers are warned that Hurricane Camille may have had effects on blue crab stocks in Virginia that may not be seen until this winter or next summer. Torrential rains and high run-off substantially reduced river and bay salinities and resulted in some freshwater kill of crabs on the James and York rivers this fall. More crabs might have been killed than has been apparent. Recent experimental trawl and dredge surveys made by VIMS and CBL have not located as many crabs as was expected.

There is also a pessimistic note about the crab crop hatched in 1969 which must support the commercial fishery from September 1970 through August 1971. Surveys made this fall in Virginia by Dr. Mark Chittenden, an associate of Van Engel, and in Maryland by Lippson as part of the cooperative Bi-state program of

crab research, have failed to locate more than a few small crabs. Only small numbers of crabs one-third to one and a half inches wide have been found, about the same number seen in the fall of 1966 and the fall of 1967. The small numbers of young crabs those years were responsible for the recent two-year, 1968-69 scarcity of crabs.

Chittenden, who is in charge of crab field studies in Virginia, and Lippson expect to keep a close watch during 1970 on the new crop of small crabs. VIMS will advise industry early next summer of the prospects for either a good or poor commercial catch starting in September 1970.

SALINITY AND TEMPERATURE REPORT\*  
JAMES, YORK AND RAPPAHANNOCK RIVER SYSTEMS  
NOVEMBER 1969

Salinity and water temperature measurements taken during the second and third weeks in November 1969 were much lower than those recorded during the first week in November 1968.

SALINITIES were within the normal range for this time of year. At Wreck Shoals in the James River the salt content was fifteen parts per thousand as compared to twenty parts per thousand in 1968. In the York River the salinity was ten parts per thousand at West Point, whereas it had been fifteen parts per thousand in 1968. The ten parts per thousand line in the Rappahannock River was approximately five miles below the Tappahannock Bridge in 1969, but in 1968 the line was about five miles above the bridge.

Higher salinities in 1968 than 1969 resulted from salt water intruding farther upstream than normal during November last year due to severe drought conditions in the Virginia watershed area. At that time salt water in the James River extended to an area above Windmill Point, which is approximately 57 miles upstream from Fort Wool. In the York River system, sea salt advanced to a point above Southern Railway Bridge at White House on the Pamunkey River. In the Rappahannock River, salt water was found almost to Port Royal.

WATER TEMPERATURES in the three rivers were in the low 50's at all stations this month. Rapid changes in water temperature occur in November and this year's reading represent slightly below normal conditions when compared with the ten-year average at the VIMS pier station. These records show an average daily high temperatures of 61° on the 1st of November, 56° on the 15th, and 50° on the 30th. The lowest temperatures recorded during this ten-year period (1953-62) were 55.5° on the 1st in 1957 and 1962, 50° on the 15th in 1954, and 43° on the 30th in 1955.

November 1968 water temperatures were near 60°, approximately five degrees above the ten-year average for the first week in November and much higher than this year's.

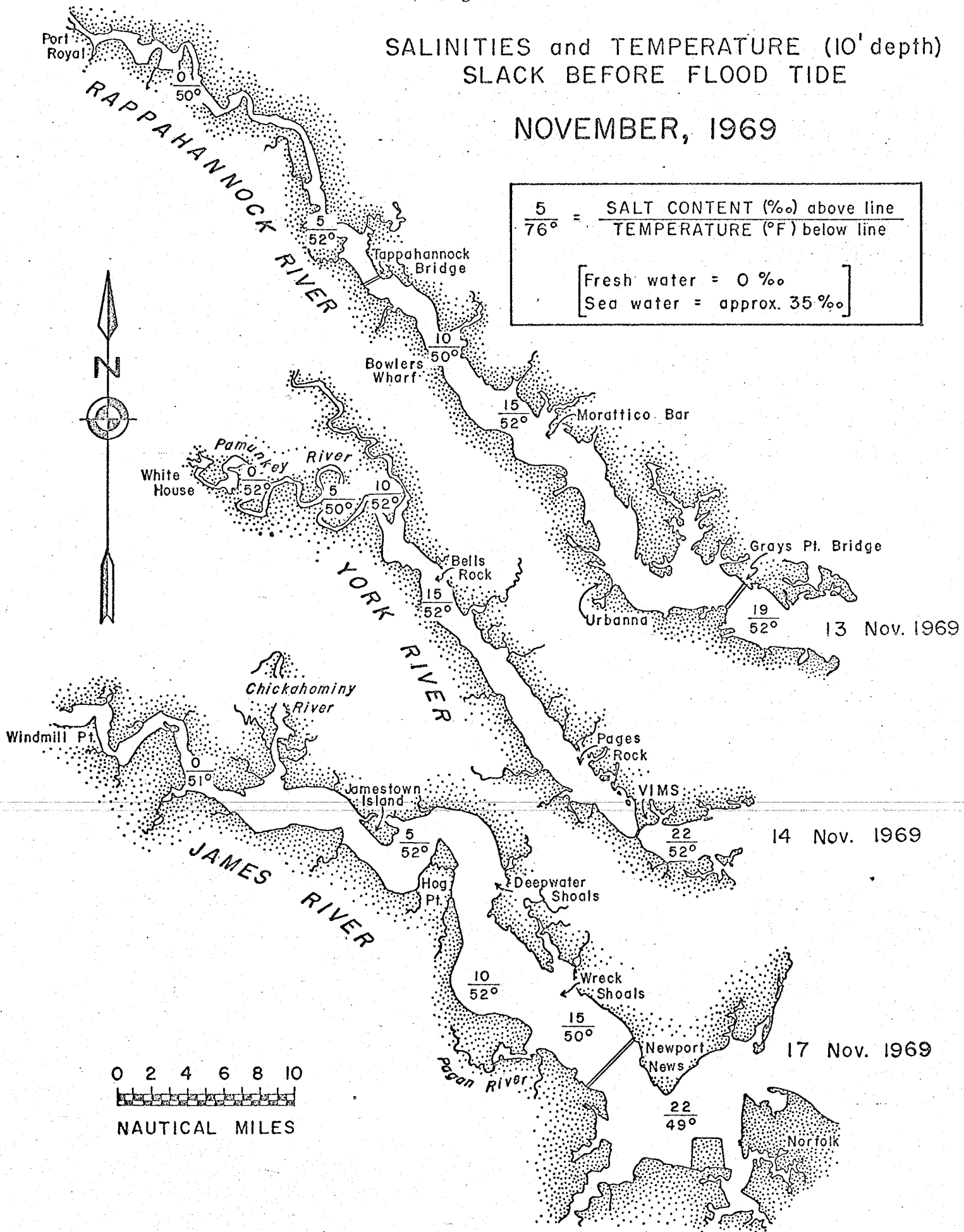
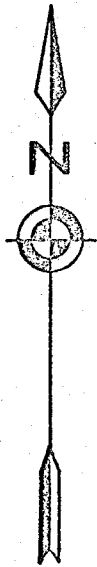
\*The Ecology-Pollution Department of the Division of Applied Marine Science and Ocean Engineering (DAMSOE) at VIMS conducts regular monthly cruises up Virginia rivers to gather the information reported here. Measurements are made at channel depths of ten feet from the mouth of each river system to the transition zone between fresh and salt water. This research is partially funded by OWRR Contract B-003 Va.

# SALINITIES and TEMPERATURE (10' depth) SLACK BEFORE FLOOD TIDE

## NOVEMBER, 1969

$$\frac{5}{76^\circ} = \frac{\text{SALT CONTENT (\%)} \text{ above line}}{\text{TEMPERATURE (}^\circ\text{F)} \text{ below line}}$$

[ Fresh water = 0 ‰  
Sea water = approx. 35 ‰ ]

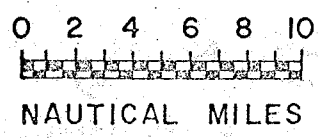
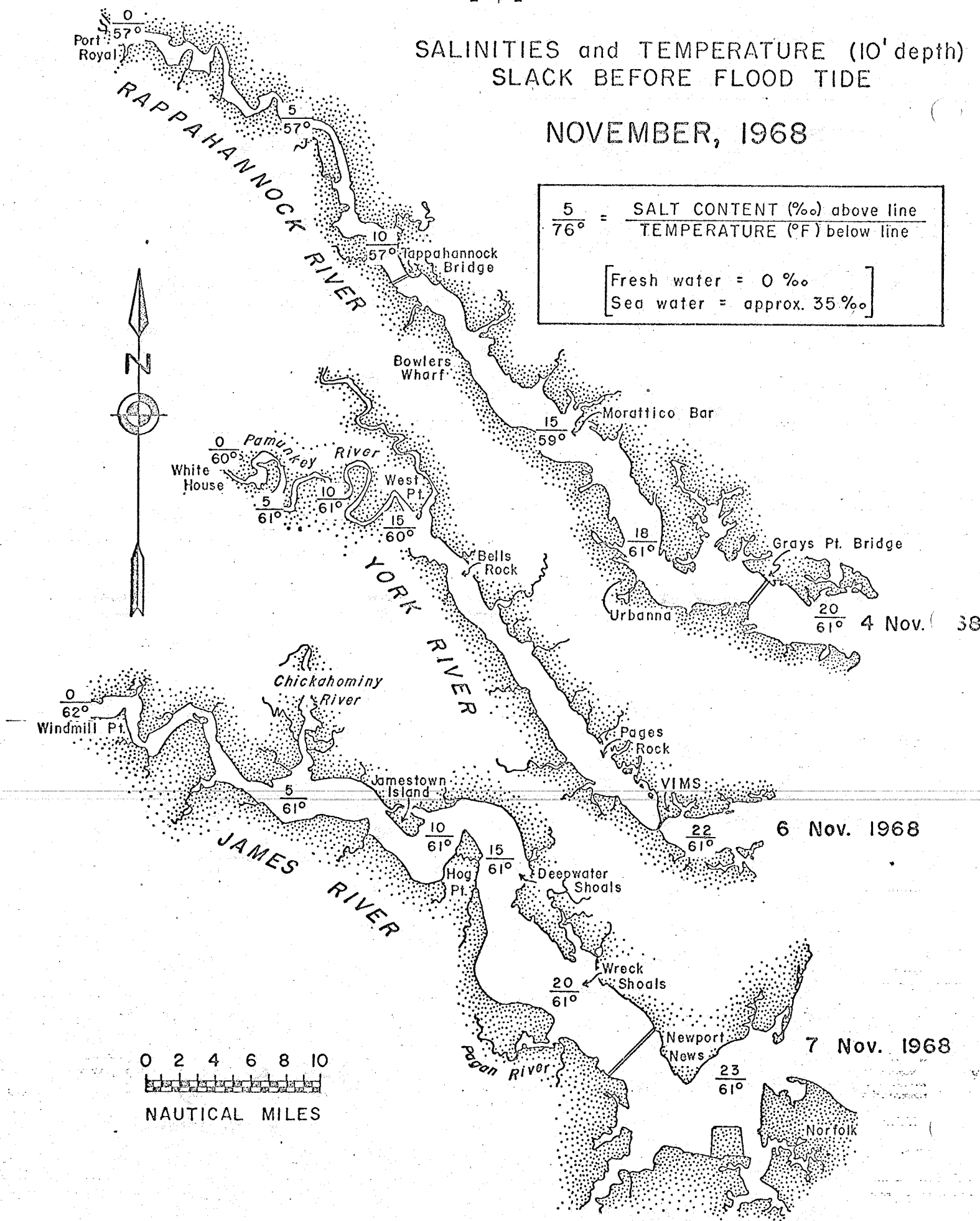
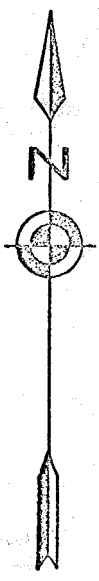


# SALINITIES and TEMPERATURE (10' depth) SLACK BEFORE FLOOD TIDE

## NOVEMBER, 1968

$$\frac{5}{76^\circ} = \frac{\text{SALT CONTENT (\%)} \text{ above line}}{\text{TEMPERATURE (}^\circ\text{F)} \text{ below line}}$$

[ Fresh water = 0 ‰  
Sea water = approx. 35 ‰ ]



Annual Summary for 1969

OYSTER SPATFALL ON SHELLSTRINGS IN VIRGINIA RIVERS

Prepared by the Virginia Institute of Marine Science  
at Gloucester Point, Virginia 23062

NOVEMBER 1969

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Explanation

The Applied Biology Department in the Division of Applied Marine Science and Ocean Engineering at VIMS conducts regular surveys of oyster "setting" in Virginia rivers. These surveys are made weekly from the end of May through the beginning of October each year. Beginning at the mouth of each river and proceeding upstream to the limits of oyster setting, collecting areas are established on public and private beds. Counts of the number of oysters setting are obtained from a string of 15 oyster shells strung on wire and suspended from stakes at these locations. The number of spat which set in one week on the smooth side of each shell on the string are tabulated.

This information is valuable to the Virginia Marine Resources Commission, which is charged with managing the public oyster resources; to those in industry who buy or sell oysters for planting; and marine scientists studying shellfish.

Use of Information

Using the numbers of spat counted on shells during each week of the spawning season, it is possible to estimate 1) the potential of a particular area for receiving a "strike" or set of oysters, and 2) the weeks when the strike occurs. This information is useful because shells planted just before the period of ~~maximum set have the best chance of getting a good strike.~~ For example, spatfall counts indicated that in the Great Wicomico River optimum time for planting shells and shellbags was the last week in June during the past year; cultch planted later than mid-July had little chance for receiving a strike.

A good strike on shellstrings usually indicates that a strike has taken place on bottom shells. However, a good strike on shellstrings in some locations may not be accompanied by good spatfall on the rock. One reason for such a failure is that bottom shells can be so fouled by other marine life -- much of which cannot even be detected with the naked eye -- that no room is left for small spat to attach. Even with a reasonable spatfall, survival may be extremely low due to predators such as screw borers in the saltier waters, which kill many small oysters soon after attachment.

To provide information on the actual situation on the rocks a companion survey of spatfall on bottoms, which will be issued later, was carried out but is not yet analyzed. This will help in determining the success of this year's strike on bottom shells and can be compared to the information presented in the series of tables attached to this report.

### Key

Total = the number of spat that have set on the smooth side (one side only) of 15 oyster shells.

Spat per Shell = a derived figure denoting the average number of spat set on the smooth side (one side only) of a shell.

To obtain approximate number of sets on both sides of oyster shells on shellstrings, total and spat per shell counts may be doubled. Figures are presented here for one side only because it is difficult to accurately count spat on the rough side of an oyster shell.

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### Index

0 to 1 spat per shell = poor set  
2 to 10 spat per shell = fair set  
11 to 100 spat per shell = good set

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### Summary of Strike on Shellstrings for 1969

(see tables)

James: Fair to poor at most locations. Two setting peaks: First one in mid-July when a heavy strike occurred in the upper part of the river near Horsehead; second one in late September when a heavy strike occurred near Wreck Shoals. This is the best set on James River shellstrings for the past several years.

Nansemond: Poor through season at most locations.

York: Poor to fair at most locations. Most of the strike occurred in September after the runoff from Hurricane Camille.

Piankatank: Poor to fair strike. Most in June and July at all locations. However, no single location received what might be characterized as a good strike. Heaviest setting upriver.

Great Wicomico: Fair to good at most locations during late June and early July. Almost no setting after August.

Rappahannock: Only occasional spatfall scattered throughout the season.

QUESTIONS CONCERNING SETTING AND SPATFALL MAY BE ADDRESSED TO DEXTER HAVEN, HEAD, DEPARTMENT OF APPLIED BIOLOGY.

James River--1969

Spatfall on Shellstrings\*

Virginia Institute of Marine Science

|                  | <u>Hampton Roads</u> |                   | <u>Brown Shoals</u> |                   | <u>Wreck Shoals</u> |                   |
|------------------|----------------------|-------------------|---------------------|-------------------|---------------------|-------------------|
|                  | <u>Total</u>         | <u>Spat/shell</u> | <u>Total</u>        | <u>Spat/shell</u> | <u>Total</u>        | <u>Spat/shell</u> |
| June 11-19       | 0                    | 0                 | 0                   | 0                 | 0                   | 0                 |
| June 19-July 3   | 0                    | 0                 | 0                   | 0                 | 0                   | 0                 |
| July 3-10        | 6                    | 0.4               | 1                   | 0.1               | 1                   | 0.1               |
| July 10-17       | 0                    | 0                 | 2                   | 0.1               | 1                   | 0.1               |
| July 17-24       | 1                    | 0.1               | 14                  | 0.9               | 83                  | 5.5               |
| July 24-31       | 0                    | 0                 | 0                   | 0                 | Lost                | Lost              |
| July 31-Aug. 7   | 0                    | 0                 | 0                   | 0                 | 7                   | 0.5               |
| Aug. 7-15        | 0                    | 0                 | 0                   | 0                 | 3                   | 0.2               |
| Aug. 15-21       | 2                    | 0.1               | 0                   | 0                 | 1                   | 0.1               |
| Aug. 21-27       | 0                    | 0                 | 0                   | 0                 | 69                  | 4.6               |
| Aug. 27-Sept. 3  |                      |                   | 1                   | 0.1               | 0                   | 0                 |
| Aug. 27-Sept. 24 | 108                  | 7.2               |                     |                   |                     |                   |
| Sept. 3-10       |                      |                   | 12                  | 0.8               | 316                 | 21.1              |
| Sept. 10-18      |                      |                   | 26                  | 1.7               | 85                  | 5.7               |
| Sept. 18-26      |                      |                   |                     |                   | 28                  | 1.9               |
| Sept. 26-Oct. 1  | 10                   | 0.7               | 15                  | 1.0               | 15                  | 1.0               |
| Oct. 1-10        |                      |                   | 8                   | 0.5               | Lost                | Lost              |
| Oct. 1-17        | 9                    | 0.6               |                     |                   |                     |                   |
| Oct. 10-17       |                      |                   | 0                   | 0                 | 0                   | 0                 |

continued



## James River continued

|                  | Horsehead |            | Point of Shoals |            | Deepwater Shoals |            |
|------------------|-----------|------------|-----------------|------------|------------------|------------|
|                  | Total     | Spat/shell | Total           | Spat/shell | Total            | Spat/shell |
| June 11-19       | 0         | 0          | 0               | 0          | 0                | 0          |
| June 19-July 3   | 0         | 0          | 0               | 0          | 0                | 0          |
| July 3-10        | 1         | 0.1        | 0               | 0          | 2                | 0.1        |
| July 10-17       | 0         | 0          | 0               | 0          | 0                | 0          |
| July 17-24       | 227       | 15.1       | 263             | 17.5       | 37               | 2.4        |
| July 24-31       | 29        | 1.9        | 24              | 1.6        | 37               | 2.4        |
| July 31-Aug. 7   | 6         | 0.4        | 1               | 0.1        | 0                | 0          |
| Aug. 7-15        | 3         | 0.2        | 0               | 0          | 0                | 0          |
| Aug. 15-21       | 0         | 0          | 0               | 0          | 0                | 0          |
| Aug. 21-27       | 0         | 0          | 0               | 0          | 0                | 0          |
| Aug. 27-Sept. 3  | 0         | 0          | 0               | 0          | 0                | 0          |
| Aug. 27-Sept. 24 |           |            |                 |            |                  |            |
| Sept. 3-10       | 12        | 0.8        | 2               | 0.1        | 2                | 0.1        |
| Sept. 10-18      | 13        | 0.9        | 13              | 0.9        | 4                | 0.3        |
| Sept. 18-26      | 5         | 0.3        | 1               | 0.1        | 1                | 0.1        |
| Sept. 26-Oct. 1  | 2         | 0.1        | 1               | 0.1        | 0                | 0          |
| Oct. 1-10        | 0         | 0          | 2               | 0.1        | 3                | 0.2        |
| Oct. 1-17        |           |            |                 |            |                  |            |
| Oct. 10-17       | 0         | 0          | 0               | 0          | 0                | 0          |

\*Data given: Total = spatfall on 15 shells (smooth surface only).  
Spat/shell = spat per shell (to nearest 0.1 spat).

James River--1969

Spatfall on Shellstrings\*

Virginia Institute of Marine Science

|                 | <u>Newport News Point</u> |                   |                 | <u>Miles Watch House</u> |                   |
|-----------------|---------------------------|-------------------|-----------------|--------------------------|-------------------|
|                 | <u>Total</u>              | <u>Spat/shell</u> |                 | <u>Total</u>             | <u>Spat/shell</u> |
| June 25-July 2  | 0                         | 0                 | Sept. 10-24     | 6                        | 0.4               |
| July 2-9        | 13                        | 0.9               | Sept. 24-Oct. 1 | 5                        | 0.3               |
| July 9-16       | 2                         | 0.1               | Oct. 1-10       | 1                        | 0.1               |
| July 16-23      | 0                         | 0                 | Oct. 10-17      | 0                        | 0                 |
| July 23-30      | 3                         | 0.2               |                 |                          |                   |
| July 30-Aug. 6  | 7                         | 0.5               |                 |                          |                   |
| Aug. 6-13       | 0                         | 0                 |                 |                          |                   |
| Aug. 13-20      | 2                         | 0.1               |                 |                          |                   |
| Aug. 20-27      | 9                         | 0.6               |                 |                          |                   |
| Aug. 27-Sept. 4 | 0                         | 0                 |                 |                          |                   |
| Sept. 4-12      | 46                        | 3.1               |                 |                          |                   |
| Sept. 12-17     | 27                        | 1.8               |                 |                          |                   |
| Sept. 17-Oct. 3 | 77                        | 5.1               |                 |                          |                   |

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\*Data given: Total = spatfall on 15 shells (smooth surface only).  
Spat/shell = spat per shell (to nearest 0.1 spat).

Nansemond River--1969

Spatfall on Shellstrings\*

Virginia Institute of Marine Science

|                  | <u>Nansemond Ridge</u> |                   | <u>Half Pone</u> |                   | <u>Larkens Rock</u> |                   |
|------------------|------------------------|-------------------|------------------|-------------------|---------------------|-------------------|
|                  | <u>Total</u>           | <u>Spat/shell</u> | <u>Total</u>     | <u>Spat/shell</u> | <u>Total</u>        | <u>Spat/shell</u> |
| June 5-11        | 0                      | 0                 | 0                | 0                 |                     | Lost              |
| June 11-19       | 0                      | 0                 | 0                | 0                 |                     | Lost              |
| June 19-27       | 0                      | 0                 | 1                | 0.1               |                     | Lost              |
| June 27-July 3   | 0                      | 0                 | 4                | 0.3               | 0                   | 0                 |
| July 3-10        | 11                     | 0.7               | 52               | 3.4               | 29                  | 1.9               |
| July 10-25       | 11                     | 0.7               | 6                | 0.4               | 9                   | 0.6               |
| July 31- Aug. 21 | 4                      | 0.3               | 0                | 0                 | 5                   | 0.3               |
| Aug. 21-Sept. 1  | 3                      | 0.2               | 0                | 0                 | 0                   | 0                 |
| Aug. 30-Sept. 8  | 11                     | 0.7               |                  | Lost              | 4                   | 0.3               |

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\*Data given: Total = spatfall on 15 shells (smooth surface only).  
Spat/shell = spat per shell (to nearest 0.1 spat).

York River--1969

Spatfall on Shellstrings\*

Virginia Institute of Marine Science

|                 | VIMS Pier |            | Clay Bank |            | Foxes Creek |            |
|-----------------|-----------|------------|-----------|------------|-------------|------------|
|                 | Total     | Spat/shell | Total     | Spat/shell | Total       | Spat/shell |
| June 25-July 2  | 0         | 0          | 0         | 0          | 0           | 0          |
| July 2-9        | 1         | 0.1        | 0         | 0          | 0           | 0          |
| July 9-16       | 0         | 0          | 0         | 0          | 0           | 0          |
| July 16-23      | 0         | 0          | 0         | 0          | 0           | 0          |
| July 23-30      | 1         | 0.1        | 0         | 0          | 0           | 0          |
| July 30-Aug. 6  | 0         | 0          | 0         | 0          | 0           | 0          |
| Aug. 6-13       | 0         | 0          | 0         | 0          | 0           | 0          |
| Aug. 13-20      | 1         | 0.1        | 0         | 0          | 0           | 0          |
| Aug. 20-27      | 0         | 0          | 0         | 0          | 0           | 0          |
| Aug. 27-Sept. 4 | 0         | 0          | 0         | 0          | 0           | 0          |
| Sept. 4-12      | 1         | 0.1        | 0         | 0          | 0           | 0          |
| Sept. 12-17     | 11        | 0.7        | 4         | 0.3        | 7           | 0.5        |
| Sept. 17-29     | 7         | 0.5        | 1         | 0.1        |             |            |
| Sept. 17-Oct. 3 |           |            |           |            | 3           | 0.2        |
| Sept. 29-Oct. 3 | 16        | 1.1        | 2         | 0.1        |             |            |
| Oct. 3-13       | 1         | 0.1        | 3         | 0.2        | 1           | 0.1        |
| Oct. 13-20      | 0         | 0          | 0         | 0          | 0           | 0          |

\*Data given: Total = spatfall on 15 shells (smooth surface only).  
Spat/shell = spat per shell (to nearest 0.1 spat).

Piankatank River--1969

Spatfall on Shellstrings\*

Virginia Institute of Marine Science

|                 | <u>Milford Haven</u> |            | <u>NE Buoy<br/>Three Branches</u> |            | <u>Ward B Point<br/>East Side</u> |            | <u>SE Corner<br/>Cape Tune</u> |            |
|-----------------|----------------------|------------|-----------------------------------|------------|-----------------------------------|------------|--------------------------------|------------|
|                 | Total                | Spat/shell | Total                             | Spat/shell | Total                             | Spat/shell | Total                          | Spat/shell |
| May 31-June 9   | 0                    | 0          | 0                                 | 0          | 0                                 | 0          | 0                              | 0          |
| June 9-16       | 0                    | 0          | 0                                 | 0          | 0                                 | 0          | Lost                           | Lost       |
| June 16-23      | 2                    | 0.1        | 0                                 | 0          | 8                                 | 0.5        | 5                              | 0.3        |
| June 23-30      | 11                   | 0.7        | 2                                 | 0.1        | 17                                | 1.1        | 20                             | 1.3        |
| June 30-July 5  | 2                    | 0.1        | Lost                              | Lost       | Lost                              | Lost       | 1                              | 0.1        |
| July 5-14       | 9                    | 0.6        | 5                                 | 0.3        | 1                                 | 0.1        | 57                             | 3.8        |
| July 14-21      | 7                    | 0.4        | 16                                | 1.0        | 17                                | 1.1        | 9                              | 0.6        |
| July 21-28      | 7                    | 0.4        | 13                                | 0.8        | 16                                | 1.0        | 15                             | 1.0        |
| July 28-Aug. 4  | 2                    | 0.1        | 1                                 | 0.1        | 9                                 | 0.6        | 47                             | 3.1        |
| Aug. 4-11       | 1                    | 0.1        | 0                                 | 0          | 0                                 | 0          | 1                              | 0.1        |
| Aug. 11-18      | 0                    | 0          | 0                                 | 0          | Lost                              | Lost       | 0                              | 0          |
| Aug. 18-25      | 0                    | 0          | 0                                 | 0          | 0                                 | 0          | 0                              | 0          |
| Aug. 25-Sept. 1 | 0                    | 0          | 0                                 | 0          | 0                                 | 0          | 0                              | 0          |
| Sept. 1-8       | 0                    | 0          | 0                                 | 0          | 1                                 | 0.1        | 0                              | 0          |
| Sept. 8-15      | 2                    | 0.1        | 0                                 | 0          | 0                                 | 0          | 0                              | 0          |
| Sept. 15-22     | 17                   | 1.1        | 22                                | 1.5        | 0                                 | 0          | 1                              | 0.1        |
| Sept. 22-29     | 0                    | 0          | 0                                 | 0          | 0                                 | 0          | 0                              | 0          |

continued

Piankatank River continued

|                 | 1969 Planting<br>Palace Bar |            | NE Corner<br>Genny Point |            | Ferry Flats |            |
|-----------------|-----------------------------|------------|--------------------------|------------|-------------|------------|
|                 | Total                       | Spat/shell | Total                    | Spat/shell | Total       | Spat/shell |
| May 31-June 9   | 0                           | 0          | 0                        | 0          | Lost        | Lost       |
| June 9-16       | 0                           | 0          | 1                        | 0.1        | Lost        | Lost       |
| June 16-23      | 23                          | 1.5        | 11                       | 0.7        | 12          | 0.8        |
| June 23-30      | 18                          | 1.2        | 8                        | 0.5        | 0           | 0          |
| June 30-July 5  | 8                           | 0.5        | 13                       | 0.9        | 1           | 0.1        |
| July 5-14       | 19                          | 1.2        | 143                      | 9.5        | 25          | 1.6        |
| July 14-21      | 26                          | 1.7        | 32                       | 2.1        | 27          | 1.8        |
| July 21-28      | 81                          | 5.4        | 67                       | 4.4        | 16          | 1.0        |
| July 28-Aug. 4  | 4                           | 0.2        | 110                      | 7.3        | 67          | 4.3        |
| Aug. 4-11       | 0                           | 0          | 19                       | 1.3        | 2           | 0.1        |
| Aug. 11-18      | 0                           | 0          | 0                        | 0          | 3           | 0.2        |
| Aug. 18-25      | 0                           | 0          | 0                        | 0          | 0           | 0          |
| Aug. 25-Sept. 1 | 0                           | 0          | 0                        | 0          | 0           | 0          |
| Sept. 1-8       | Lost                        | Lost       | 10                       | 0.7        | 1           | 0.1        |
| Sept. 8-15      | 4                           | 0.3        | 0                        | 0          | 0           | 0          |
| Sept. 15-22     | 1                           | 0.1        | 3                        | 0.2        | 1           | 0.1        |
| Sept. 22-29     | 0                           | 0          | 0                        | 0          | 0           | 0          |

\*Data given: Total = spatfall on 15 shells (smooth surface only).  
Spat/shell = spat per shell (to nearest 0.1 spat).

Great Wicomico River--1969

Spatfall on Shellstrings\*

Virginia Institute of Marine Science

|                 | Dameron EAST<br>Dameron WEST |            | Mill WEST |            | Whaley's EAST &<br>Ingrams |            | Whaley's WEST |            |
|-----------------|------------------------------|------------|-----------|------------|----------------------------|------------|---------------|------------|
|                 | Total                        | Spat/shell | Total     | Spat/shell | Total                      | Spat/shell | Total         | Spat/shell |
| June 2-9        | 0                            | 0          | 0         | 0          | 0                          | 0          | 0             | 0          |
| June 9-16       | 0                            | 0          | 1         | 0.1        | 0                          | 0          | 0             | 0          |
| June 16-23      | 0                            | 0          | 27        | 1.8        | 7                          | 0.5        | 5             | 0.3        |
| June 23-30      | 3                            | 0.2        | 7         | 0.5        | 5                          | 0.3        | 0             | 0          |
| June 30-July 7  | 113                          | 7.5        | 422       | 28.1       | 1077                       | 71.8       | 704           | 46.9       |
| July 7-14       | 11                           | 0.7        | 123       | 8.2        | 84                         | 5.6        | 33            | 2.2        |
| July 14-21      | 17                           | 1.1        | 15        | 1.0        | 17                         | 1.1        | 9             | 0.6        |
| July 21-28      | 0                            | 0          | 1         | 0.1        | 2                          | 0.1        | Lost          | Lost       |
| July 28-Aug. 4  | 0                            | 0          | 0         | 0          | 1                          | 0.1        | 3             | 0.2        |
| Aug. 4-11       | 0                            | 0          | 0         | 0          | 0                          | 0          | 0             | 0          |
| Aug. 11-18      | 0                            | 0          | 0         | 0          | 0                          | 0          | 0             | 0          |
| Aug. 18-25      | Lost                         | Lost       | 0         | 0          | 0                          | 0          | 0             | 0          |
| Aug. 25-Sept. 1 | Lost                         | Lost       | 0         | 0          | 0                          | 0          | 0             | 0          |
| Sept. 1-8       | Lost                         | Lost       | 0         | 0          | 0                          | 0          | 0             | 0          |
| Sept. 8-15      |                              |            | 0         | 0          | 0                          | 0          | 0             | 0          |
| Sept. 15-21     |                              |            | 0         | 0          | 0                          | 0          | 0             | 0          |
| Sept. 21-29     |                              |            | 0         | 0          | 0                          | 0          | 0             | 0          |

continued

## Great Wicomico River continued

|                 | Cranes Creek |            | Fleets Point |            | Cockrells |            | Haynies |            |
|-----------------|--------------|------------|--------------|------------|-----------|------------|---------|------------|
|                 | Total        | Spat/shell | Total        | Spat/shell | Total     | Spat/shell | Total   | Spat/shell |
| June 2-9        | 0            | 0          | 0            | 0          | 0         | 0          | 0       | 0          |
| June 9-16       | 4            | 0.3        | 0            | 0          | 0         | 0          | 1       | 0.1        |
| June 16-23      | 21           | 1.4        | 1            | 0.1        | 6         | 0.4        | 75      | 5.0        |
| June 23-30      | 3            | 0.2        | 5            | 0.3        | 7         | 0.5        | 70      | 4.7        |
| June 30-July 7  | 1077         | 71.8       | 385          | 25.7       | 728       | 48.5       | 2630    | 175.3      |
| July 7-14       | 10           | 0.7        | 10           | 0.7        | 24        | 1.6        | 49      | 3.3        |
| July 14-21      | 12           | 0.8        | 2            | 0.1        | 7         | 0.4        | 15      | 1.0        |
| July 21-28      | 10           | 0.6        | 1            | 0.1        | 0         | 0          | 3       | 0.2        |
| July 28-Aug. 4  | 0            | 0          | 0            | 0          | 0         | 0          | 1       | 0.1        |
| Aug. 4-11       | 0            | 0          | Lost         | Lost       | 0         | 0          | 3       | 0.2        |
| Aug. 11-18      | 0            | 0          | Lost         | Lost       | 0         | 0          | 0       | 0          |
| Aug. 18-25      | 0            | 0          | Lost         | Lost       | 0         | 0          | 0       | 0          |
| Aug. 25-Sept. 1 | 0            | 0          | Lost         | Lost       | 0         | 0          | 1       | 0.1        |
| Sept. 1-8       | 0            | 0          | Lost         | Lost       | 0         | 0          | 0       | 0          |
| Sept. 8-15      | 0            | 0          |              |            | 0         | 0          | 0       | 0          |
| Sept. 15-21     | 0            | 0          |              |            | 0         | 0          | 0       | 0          |
| Sept. 21-29     | 0            | 0          |              |            | 0         | 0          | 0       | 0          |

continued



## Great Wicomico River continued

|                 | Shell Bar |            | Hudnall Dock |            | Glebe Point |            |
|-----------------|-----------|------------|--------------|------------|-------------|------------|
|                 | Total     | Spat/shell | Total        | Spat/shell | Total       | Spat/shell |
| June 2-9        | 0         | 0          | 0            | 0          | 0           | 0          |
| June 9-16       | 0         | 0          | 0            | 0          | 0           | 0          |
| June 16-23      | 170       | 11.3       | 141          | 9.4        | 137         | 9.1        |
| June 23-30      | 46        | 3.1        | 42           | 2.8        | 286         | 19.1       |
| June 30-July 7  | 3140      | 209.3      | 2021         | 134.7      | 516         | 34.4       |
| July 7-14       | 25        | 1.7        | 31           | 2.1        | 64          | 4.3        |
| July 14-21      | 10        | 0.6        | 19           | 1.2        | 2           | 0.1        |
| July 21-28      | 3         | 0.2        | 10           | 0.6        | 0           | 0          |
| July 28-Aug. 4  | 1         | 0.1        | 1            | 0.1        | 2           | 0.1        |
| Aug. 4-11       | 2         | 0.1        | 2            | 0.1        | 0           | 0          |
| Aug. 11-18      | 0         | 0          | 0            | 0          | 0           | 0          |
| Aug. 18-25      | 0         | 0          | 0            | 0          | 0           | 0          |
| Aug. 25-Sept. 1 | 0         | 0          | 0            | 0          | 0           | 0          |
| Sept. 1-8       | 0         | 0          | 0            | 0          | 0           | 0          |
| Sept. 8-15      | 3         | 0.2        | 0            | 0          | 1           | 0.1        |
| Sept. 15-21     | 0         | 0          | 0            | 0          | 0           | 0          |
| Sept. 21-29     | 1         | 0.1        | 0            | 0          | 0           | 0          |

\*Data given: Total = spatfall on 15 shells (smooth surface only).  
Spat/shell = spat per shell (to nearest 0.1 spat).

Rappahannock River--1969

Spatfall on Shellstrings\*

Virginia Institute of Marine Science

|                 | <u>Grays Point Bridge</u> |                   |                | <u>Hog House Bar</u> |                   |
|-----------------|---------------------------|-------------------|----------------|----------------------|-------------------|
|                 | <u>Total</u>              | <u>Spat/shell</u> |                | <u>Total</u>         | <u>Spat/shell</u> |
| June 24-July 1  | 6                         | 0.4               | June 28-July 7 | 8                    | 0.5               |
| July 1-8        | 1                         | 0.1               | July 7-18      | 41                   | 2.7               |
| July 8-15       | 0                         | 0                 | July 18-29     | 1                    | 0.1               |
| July 15-22      | 0                         | 0                 | July 29-Aug. 5 | 0                    | 0                 |
| July 22-29      | 0                         | 0                 | Aug. 5-18      | 0                    | 0                 |
| July 29-Aug. 5  | 0                         | 0                 |                |                      |                   |
| Aug. 5-12       | 0                         | 0                 |                |                      |                   |
| Aug. 12-19      | 0                         | 0                 |                |                      |                   |
| Aug. 19-26      | 0                         | 0                 |                |                      |                   |
| Aug. 26-Sept. 4 | 0                         | 0                 |                |                      |                   |
| Sept. 4-9       | 0                         | 0                 |                |                      |                   |
| Sept. 9-16      | 0                         | 0                 |                |                      |                   |
| Sept. 16-23     | 12                        | 0.8               |                |                      |                   |
| Sept. 23-30     | 0                         | 0                 |                |                      |                   |

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\*Data given: Total = spatfall on 15 shells (smooth surface only).  
Spat/shell = spat per shell (to nearest 0.1 spat).

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