1982

Monthly Report on the State of Rivers 1982

Albert Kuo
Virginia Institute of Marine Science

Monthly Report on the State of Rivers - June 1982

Sponsored by

Virginia Institute of Marine Science

and

Virginia State Water Control Board

Summary of Field Surveys

(1) Slackwater Runs

James: June 15, temperature, salinity and DO were measured in saline portion of the river.

York and Pamunkey: June 16, temperature, salinity and DO were measured in saline portion of the river.

Rappahannock: June 14, salinity, temperature, DO were measured, and samples were collected for nutrient analysis at stations throughout the tidal portion of the river.

Salinity and temperature distributions are attached. Data for other parameters will be available later, and may be provided upon request.

(2) Crab-fish Joint Trawl Surveys - by Willard VanEngel

James River: June 9
York River: June 7
Rappahannock: June 11
Little Creek and Lynnhaven: June 9

Surface and bottom temperatures, salinities, DO and Secchi depth were measured at designated stations.

(3) NOS (National Ocean Survey) Support Project - by Christopher Welch

This project has been conducting field surveys bi-weekly since January, 1982. Temperature, salinity and DO profiles were measured at 15 stations in a Chesapeake Bay transect north of Wolf Trap.

For further information, make request to Dr. Albert Kuo, Virginia Institute of Marine Science, Gloucester Point, Virginia 23062, (804)642-2111

Lesser Neap Tide: June 13

Comments on Slackwater Run Data

Salinities were suppressed throughout the three rivers because of heavy rainfall preceeding the survey. The head of salt intrusion (defined hereby as 1 °/oo isohaline) was pushed downstream about 20 km in the James and Rappahannock Rivers, and 10 km in the Pamunkey.

Scheduled Surveys

(1) Slackwater Runs

James: July 13, Aug. 25
York and Pamunkey: July 14, Aug. 26
Rappahannock: July 12, Aug. 23

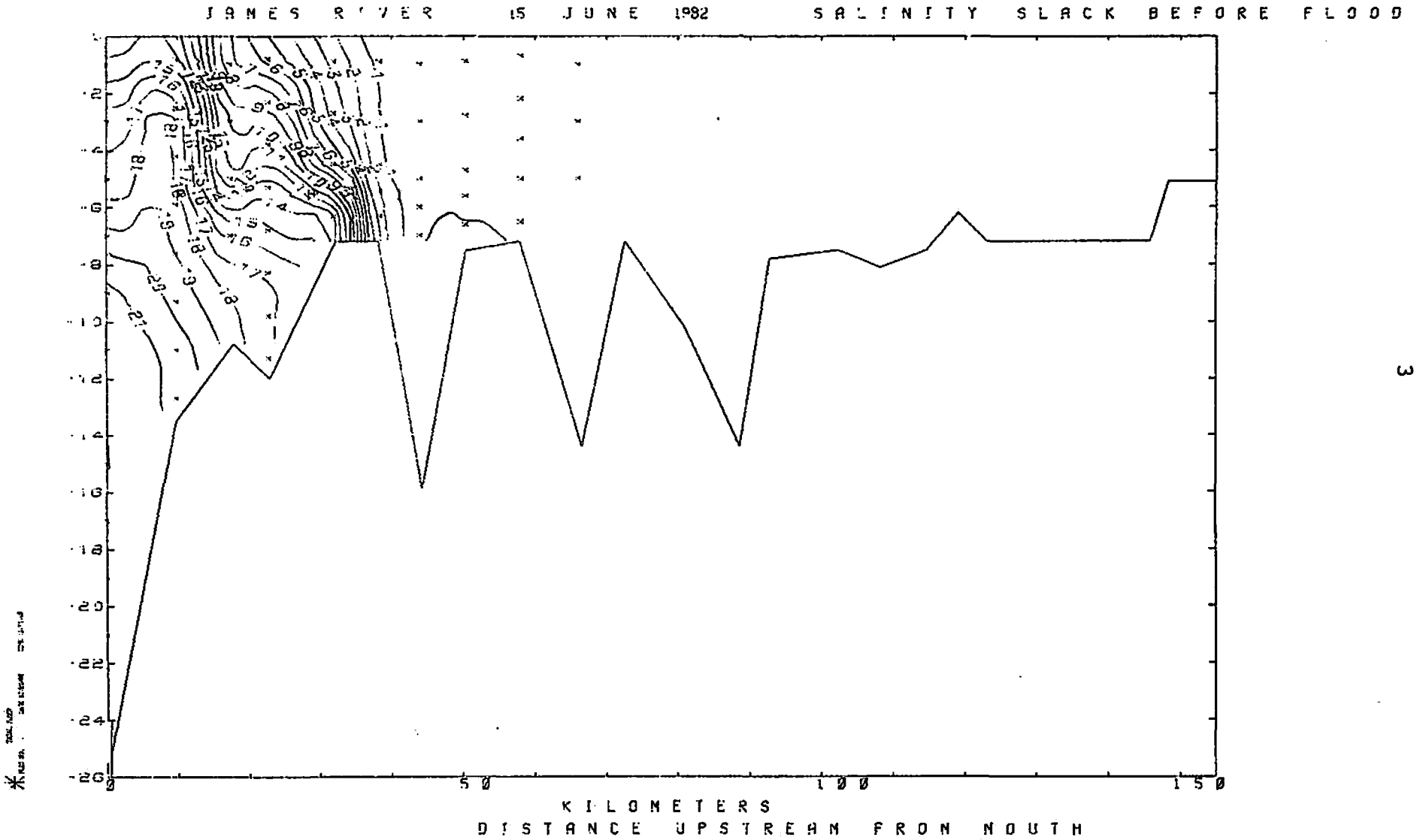
(2) Joint Crab-Fish Trawl Surveys

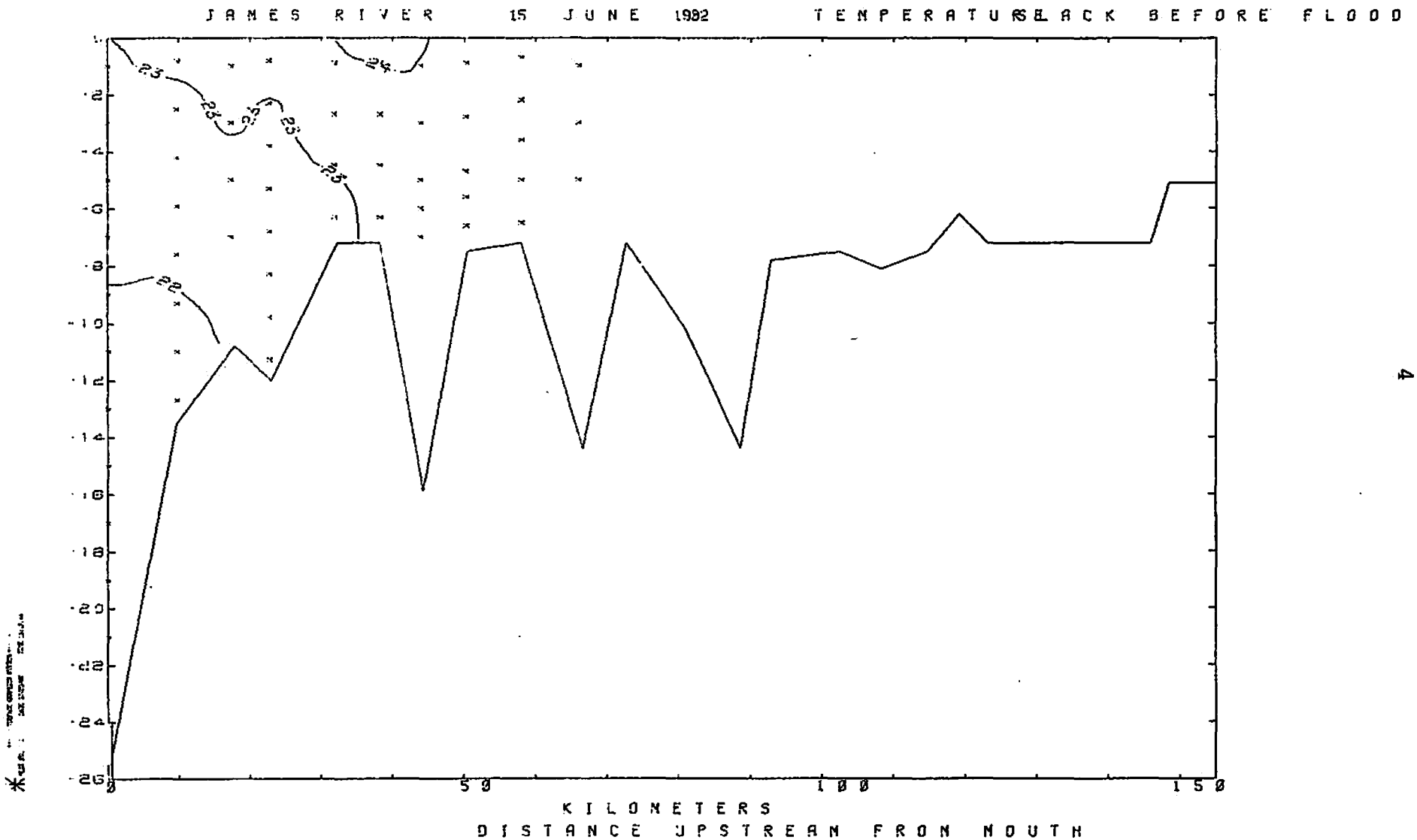
York: July 12
James: July 14
Rappahannock: July 19
Potomac: July 21

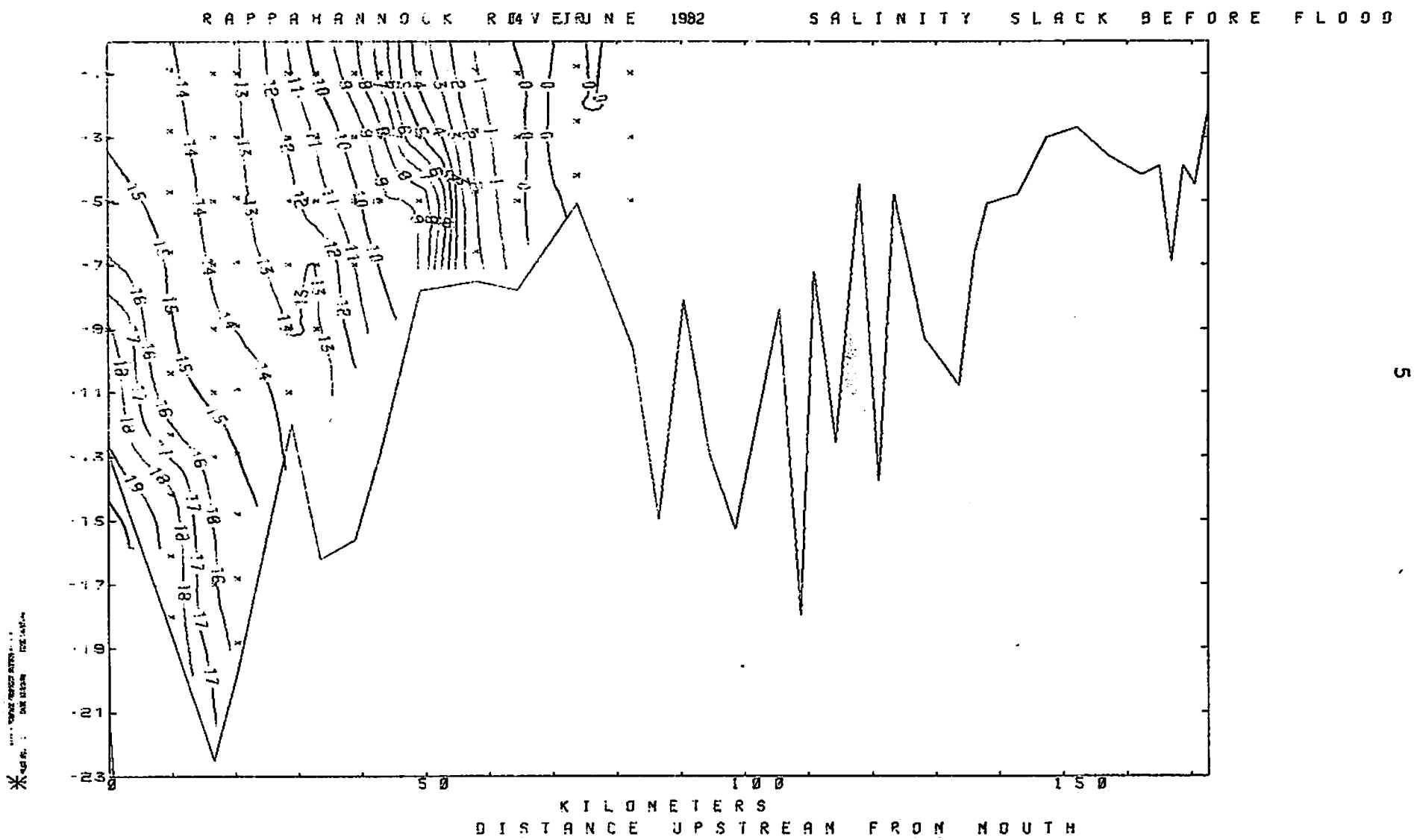
(3) Zooplankton Monitoring Program

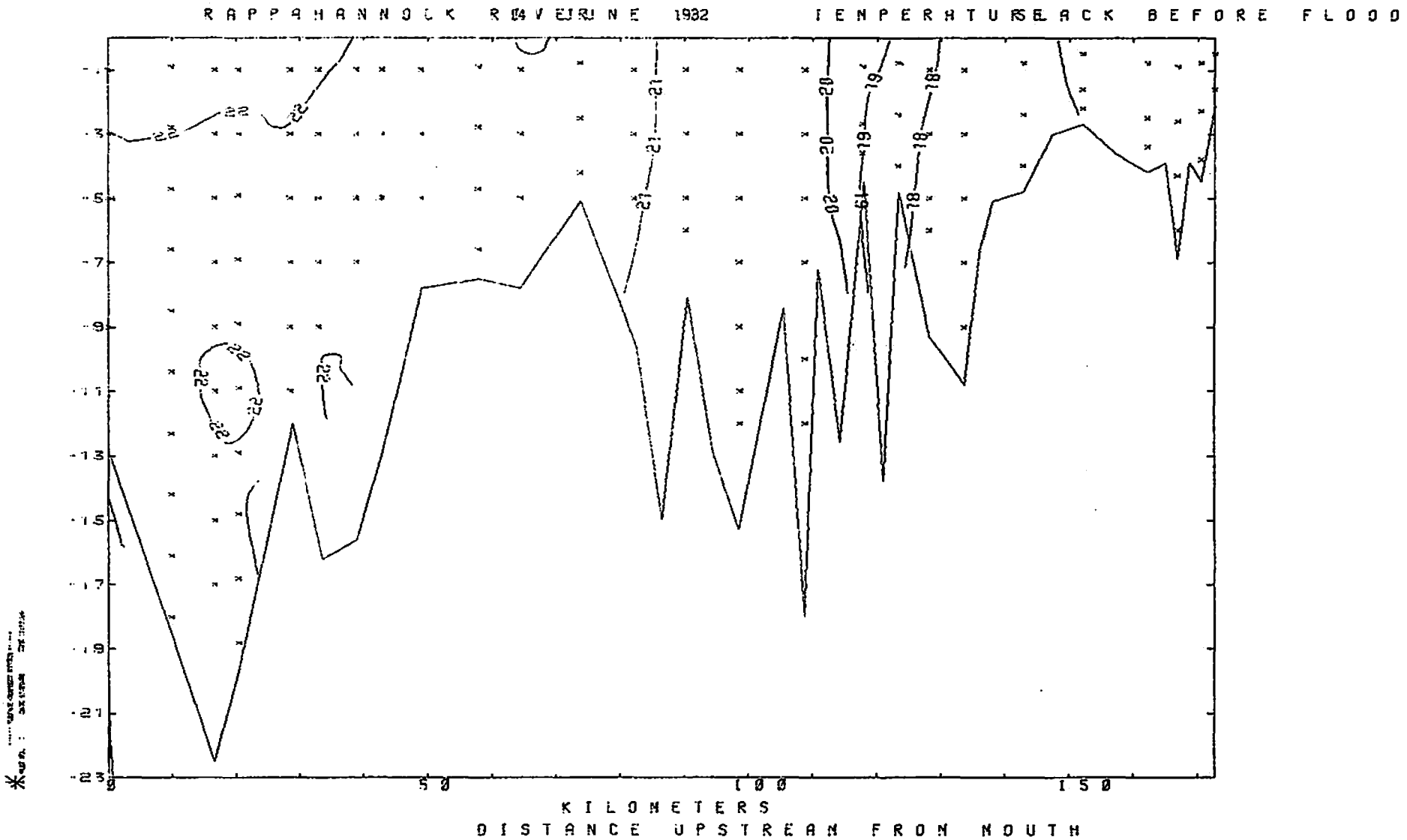
July 26-28, salinity, temperature and dissolved oxygen will be measured at about 20 stations in the lower Bay.

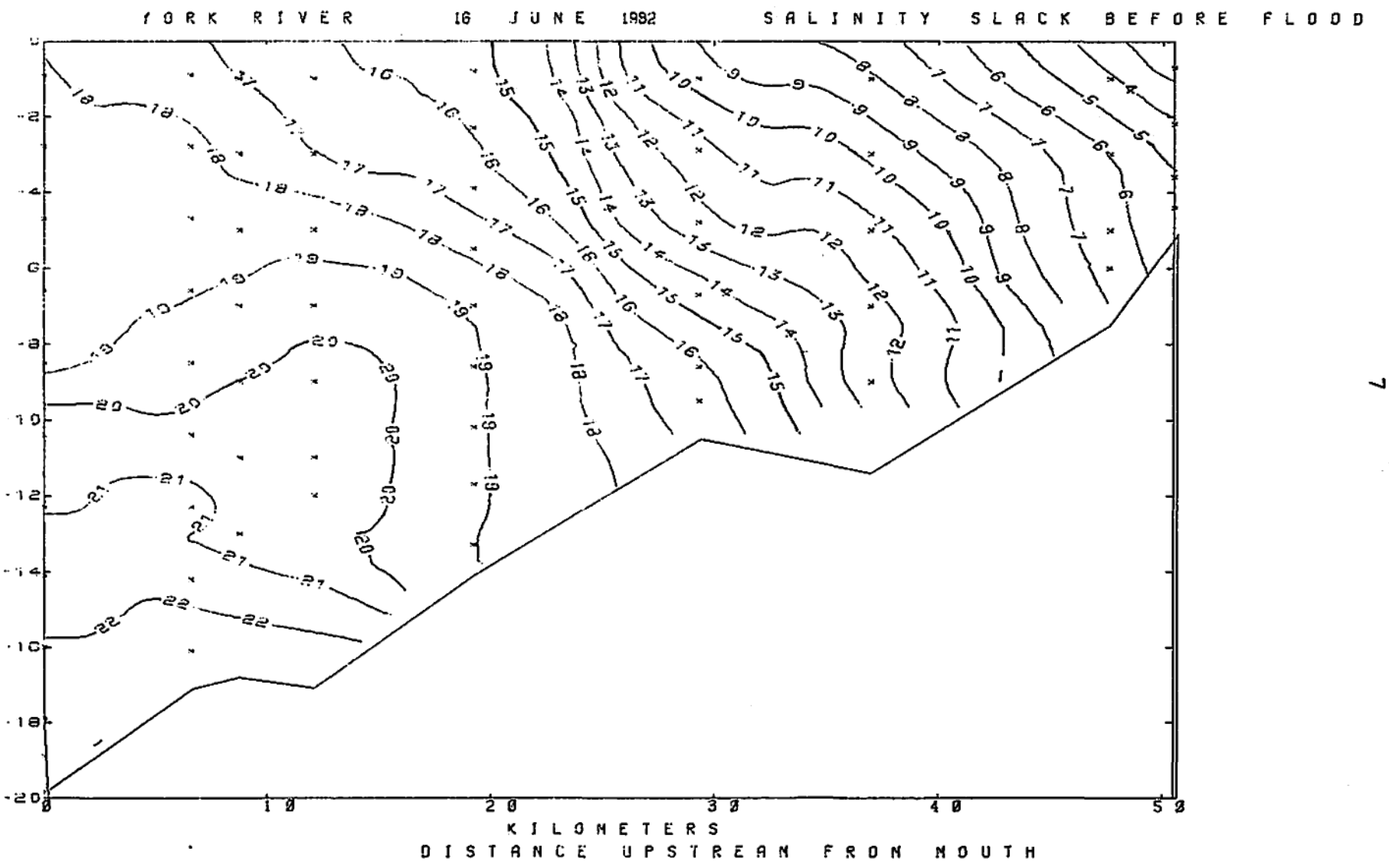
Note: The attached contour plots are of poorer quality than usual because of breakdown of the hard copy equipment attached to the computer graphics output. The plotting program was modified to use pen-plotting machine. Effort is being made to have the hard copy machine repaired.

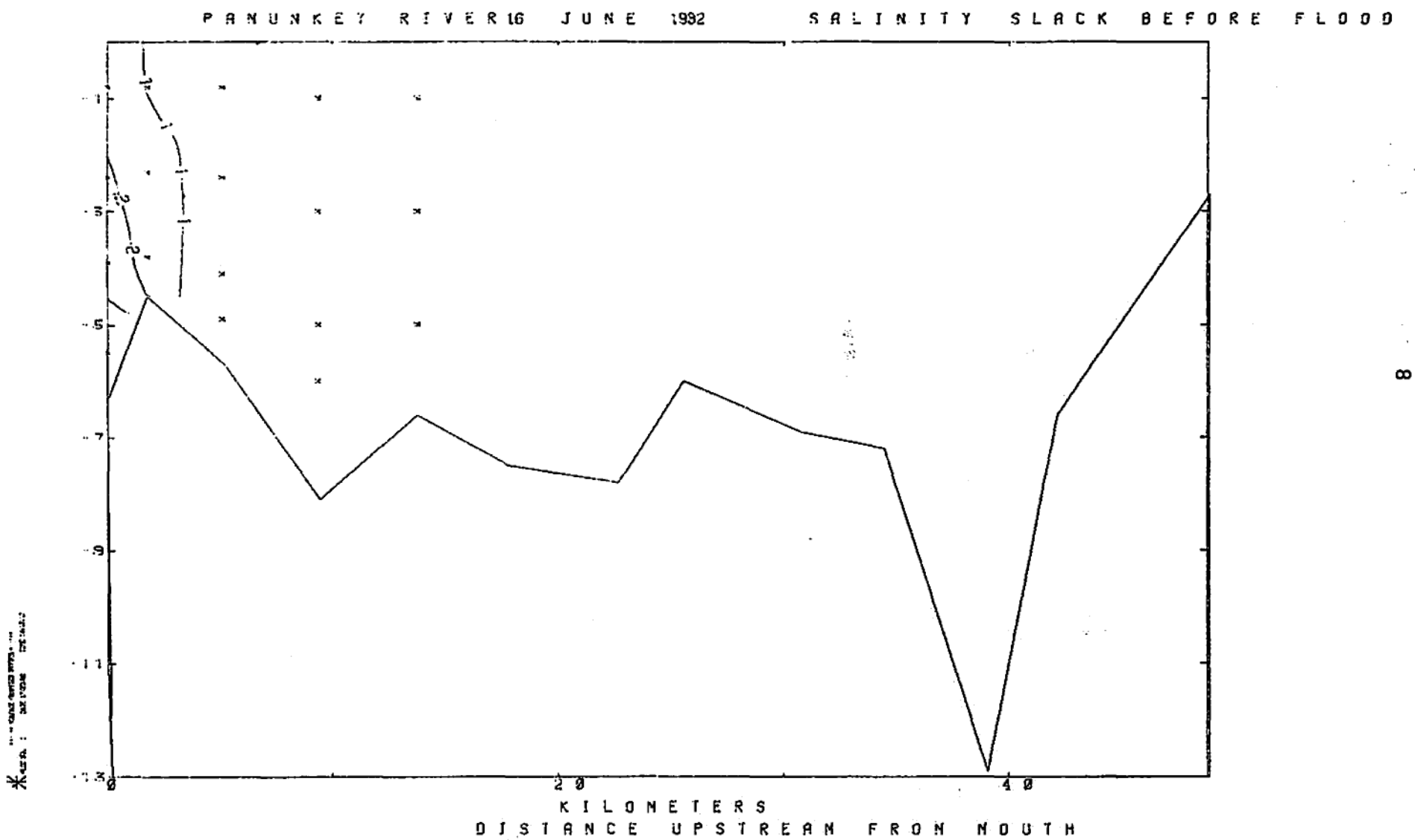

JAMES RIVER 15 JUNE 1982 SALINITY SLACK BEFORE FLOOD
0
50
100
150
KILOMETERS
DISTANCE UPSTREAM FROM MOUTH

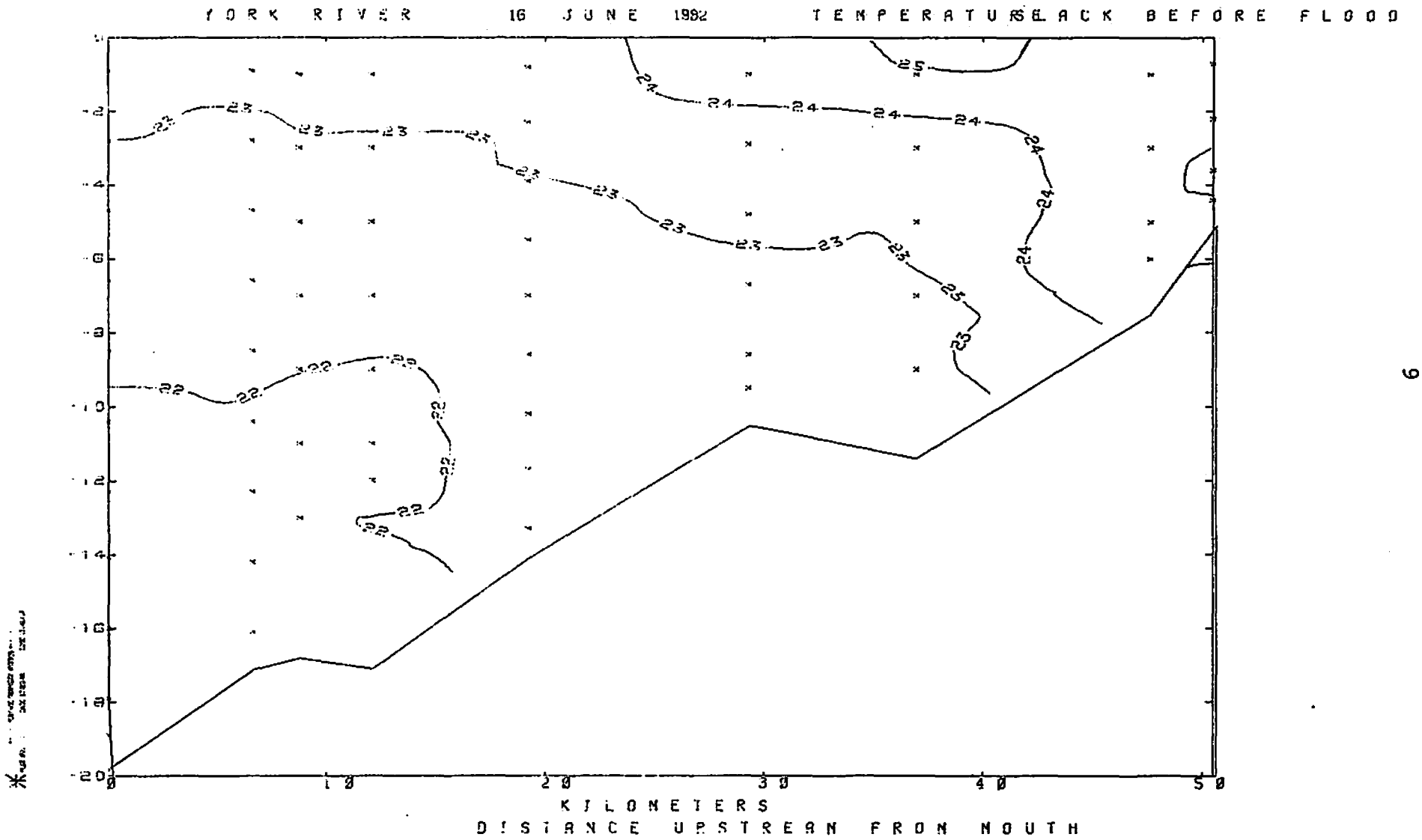

JAMES RIVER 15 JUNE 1982 TEMPERATURE BLACK BEFORE FLOOD
22
23
24
25
0
2
4
6
8
10
12
14
16
18
20
22
24
26
50
100
150
KILOMETERS
DISTANCE UPSTREAM FROM MOUTH

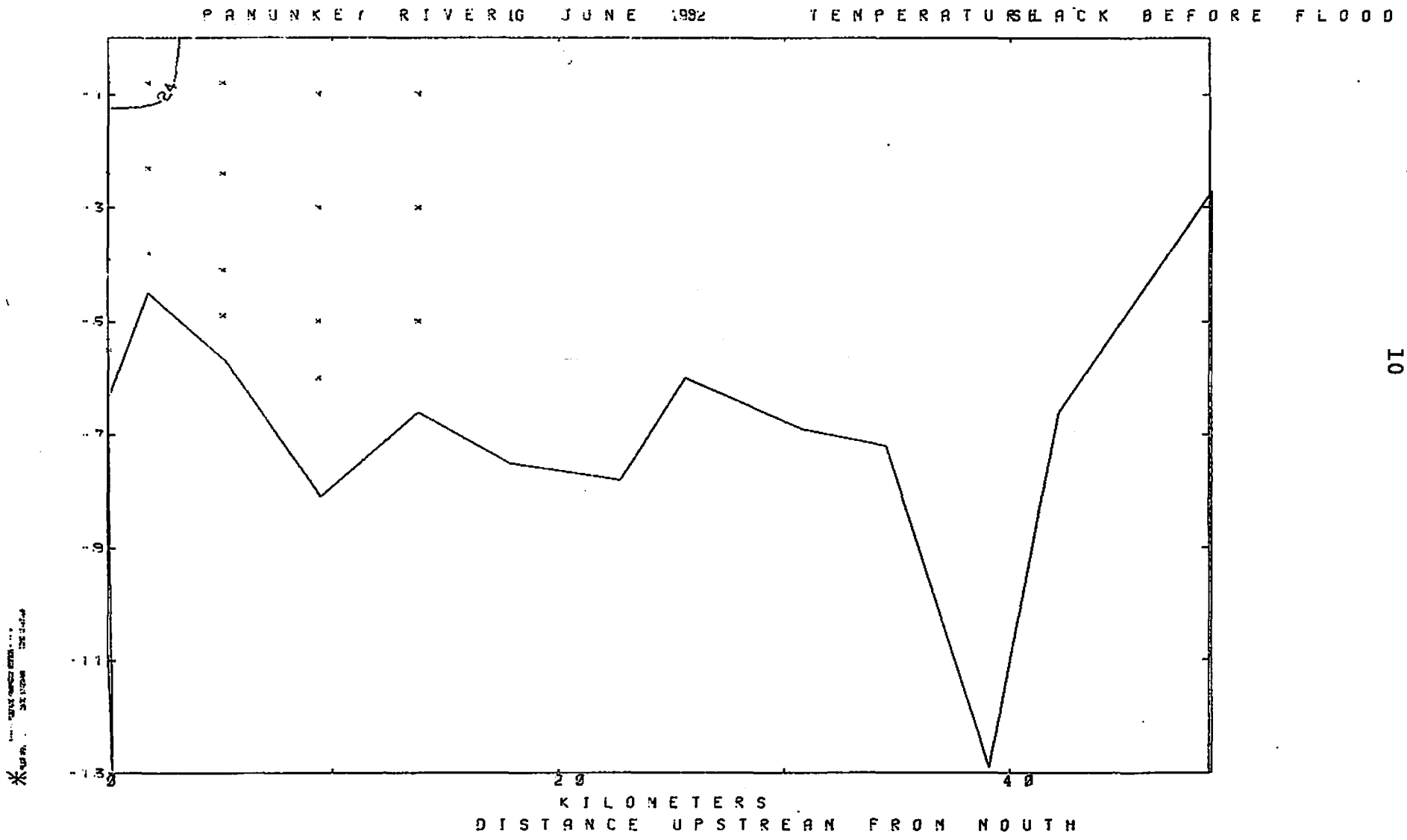

RAPPAHANNOCK RIVER JUNE 1982 SALINITY SLACK BEFORE FLOOD
0
50
100
150
KILOMETERS
DISTANCE UPSTREAM FROM MOUTH


RAPPAHANNOCK RIVER/RUNE 1982 TEMPERATURE BACK BEFORE FLOOD
50
100
150
KILOMETERS
DISTANCE UPSTREAM FROM MOUTH


YORK RIVER 16 JUNE 1982 SALINITY SLACK BEFORE FLOOD
0
10
20
30
40
50
KILOMETERS
DISTANCE UPSTREAM FROM MOUTH


PANUNKEY RIVER 16 JUNE 1992 SALINITY SLACK BEFORE FLOOD
1
3
5
7
9
11
13
0
20
40
KILOMETERS
DISTANCE UPSTREAM FROM MOUTH


YORK RIVER 16 JUNE 1982 TEMPERATURE BACK BEFORE FLOOD
25
24
23
22
0
10
20
30
40
50
KILOMETERS
DISTANCE UPSTREAM FROM MOUTH


PAMUNKEY RIVER 10 JUNE 1992 TEMPERATURE BLACK BEFORE FLOOD
24
-1
-3
-5
-7
-9
-11
-13
0
20
40
KILOMETERS
DISTANCE UPSTREAM FROM MOUTH

Dr. Hargis

Monthly Report on the State of Rivers - July 1982

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Summary of Field Surveys

(1) Slackwater Runs

James: July 13, temperature, salinity and DO were measured in saline portion of the river. The survey was scheduled to cover the entire tidal river. However, it was cut short by the storm.

York and Pamunkey: July 14, temperature, salinity and DO were measured throughout the tidal portion of the river.

Rappahannock: July 12, salinity, temperature, and DO were measured, and samples were collected for nutrient analysis at stations throughout the tidal portion of the river.

Salinity, temperature and DO (except Rappahannock River) distributions are attached. Data for other parameters will be available later, and may be provided upon request.

(2) Crab-fish Joint Trawl Surveys - by Willard Van Engel

James River:	July 14
York River:	July 12
Rappahannock:	July 19
Little Creek and Lynnhaven:	July 14
Potomac:	July 21

Surface and bottom temperatures, salinities, DO and Secchi depth were measured at designated stations.

(3) NOS (National Ocean Survey) Support Project - by Christopher Welch

This project has been conducting field surveys bi-weekly since January, 1982. Temperature, salinity and DO profiles were measured at 15 stations in a Chesapeake Bay transect north of Wolf Trap.

For further information, make request to Dr. Albert Kuo, Virginia Institute of Marine Science, Gloucester Point, Virginia 23062, (804)642-2111

(4) Zooplankton Monitoring Program - by George Grant

July 27-28, salinity, temperature and dissolved oxygen were measured at 13 stations in the lower Bay.

Lesser Neap Tide: July 29 (other neap tide on July 13)

Comments on Slackwater Run Data

After the depression of salinity by high river discharge in mid-June, the normal trend of increasing salt intrusion in the summer months has been restored. The salt intrusions in all three rivers have recovered to the states approaching those that existed in mid-May.

The strong DO stratification and low DO at the bottom still persist in the York River.

Scheduled Surveys

(1) Slackwater Runs

James: Aug. 25, September 22
York and Pamunkey: Aug. 26, September 23
Rappahannock: Aug. 23, September 20

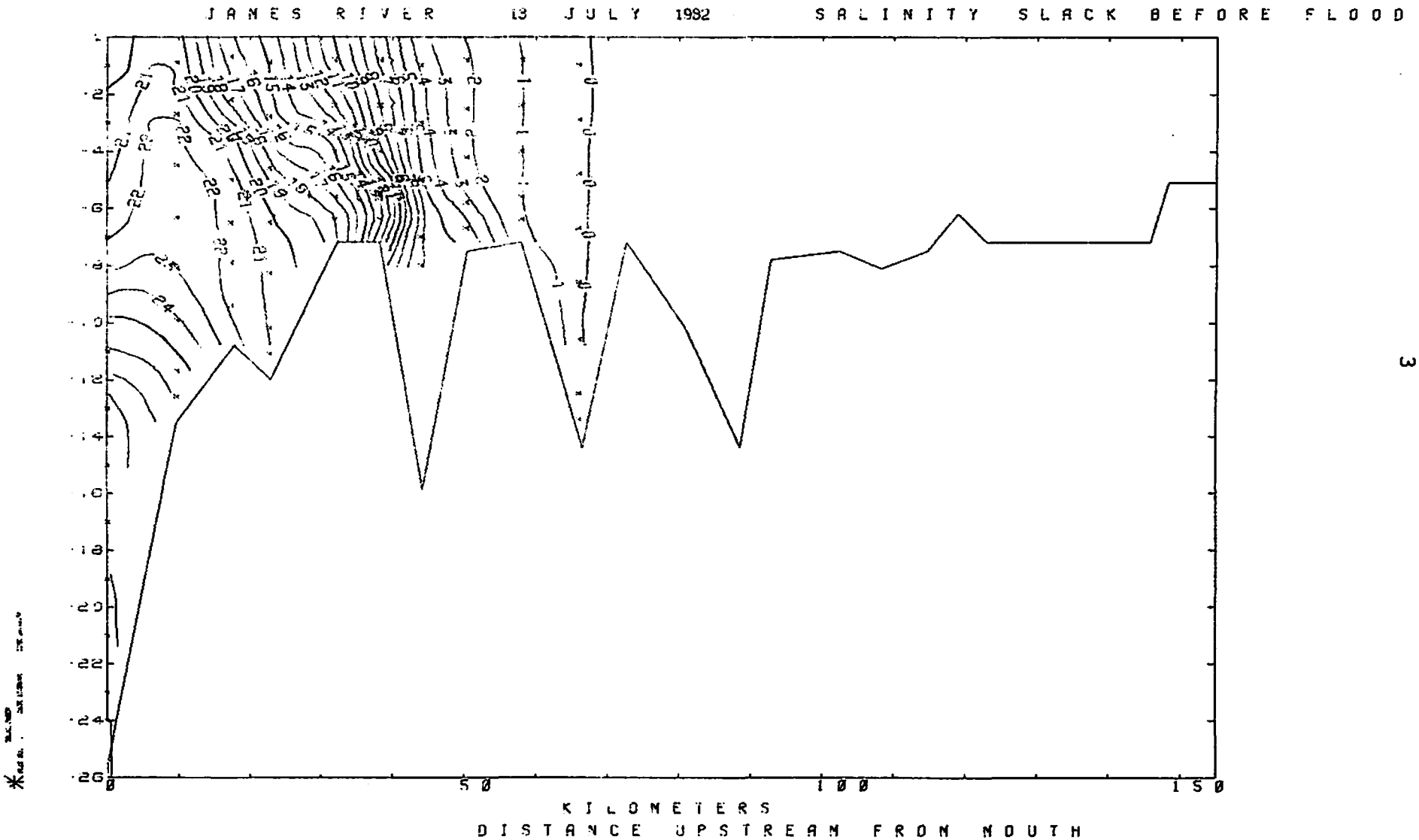
(2) Joint Crab-Fish Trawl Surveys

York: Aug. 18 or 19 or 20
James: Aug. 17
Rappahannock: Aug. 24
Elizabeth River: Aug. 16
Lynnhaven and Little Creek: Aug. 17

(3) Zooplankton Monitoring Program

One survey will be conducted in August. Salinity, temperature and dissolved oxygen will be measured at about 20 stations in the lower Bay.

Note: The attached contour plots are of poorer quality than usual because of breakdown of the hard copy equipment attached to the computer graphics output. The plotting program was modified to use pen-plotting machine. Effort is being made to have the hard copy machine repaired.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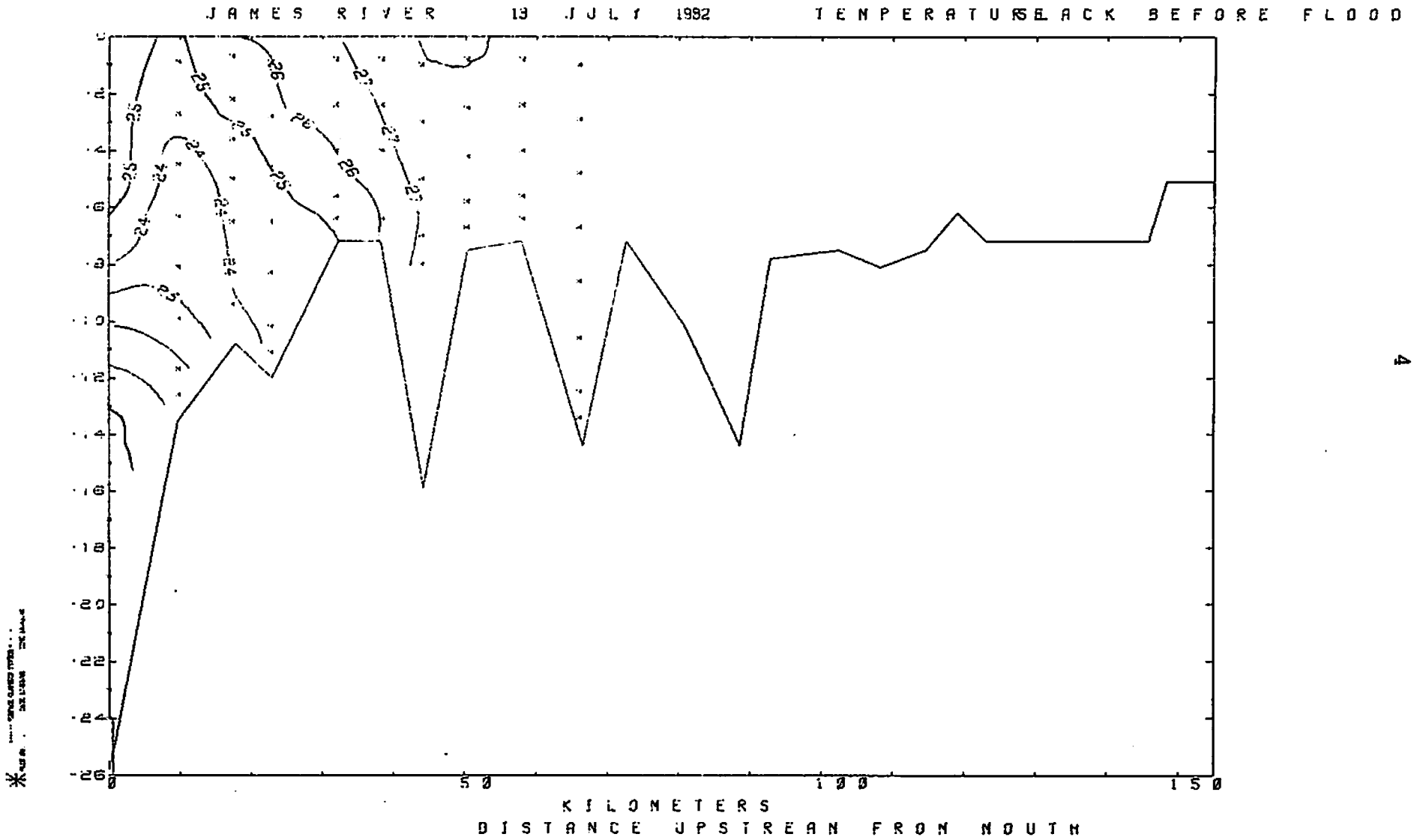
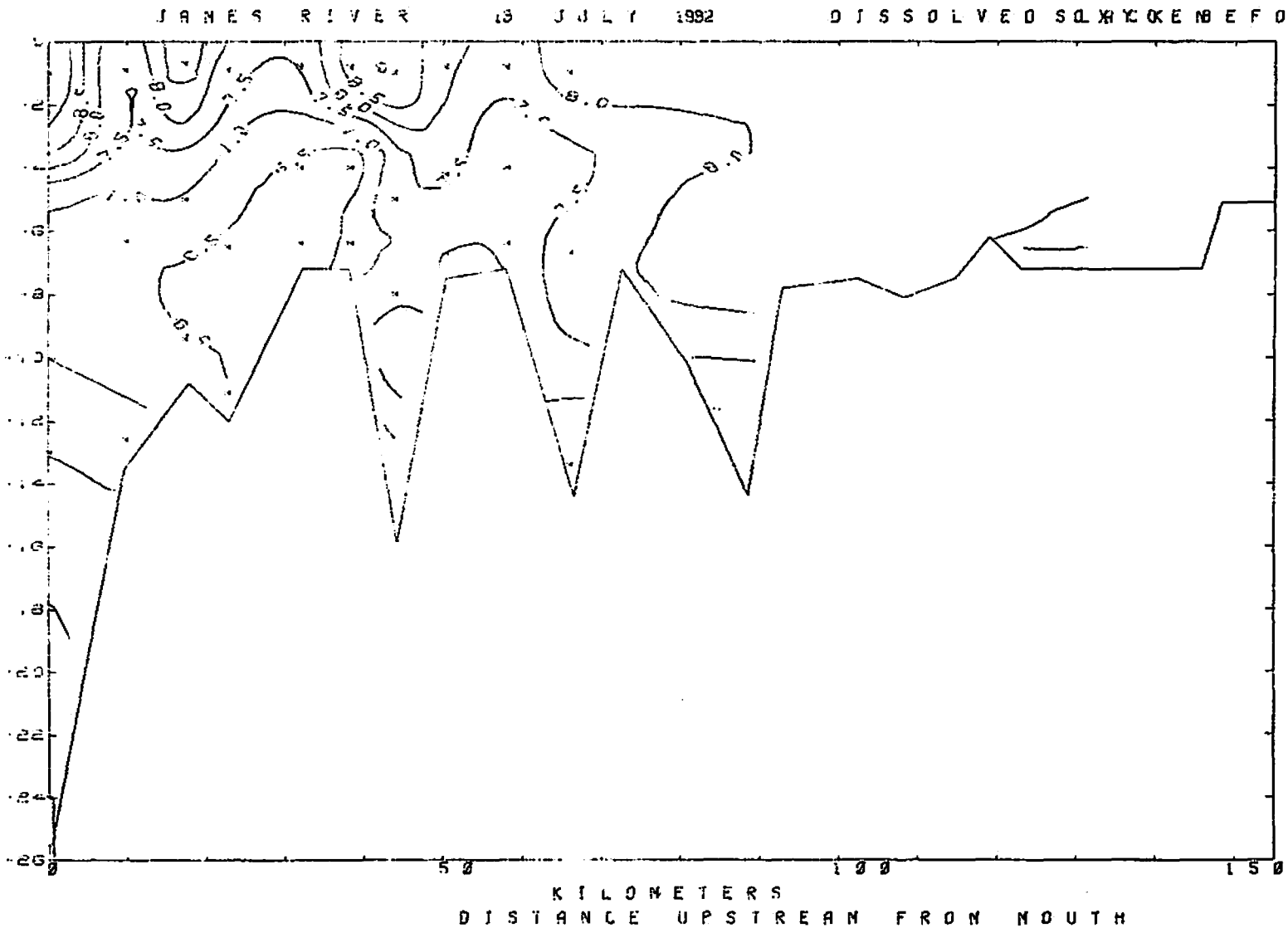
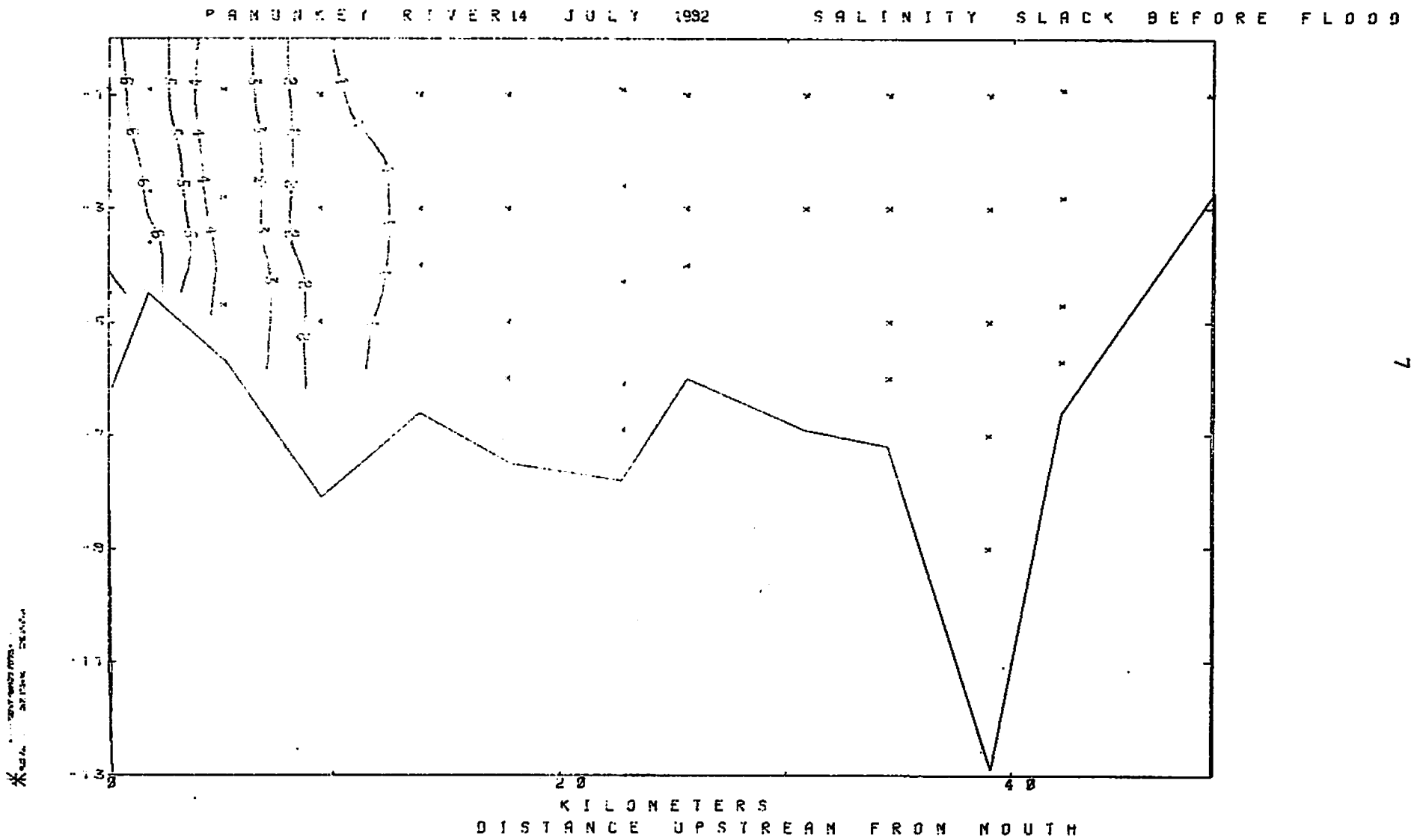
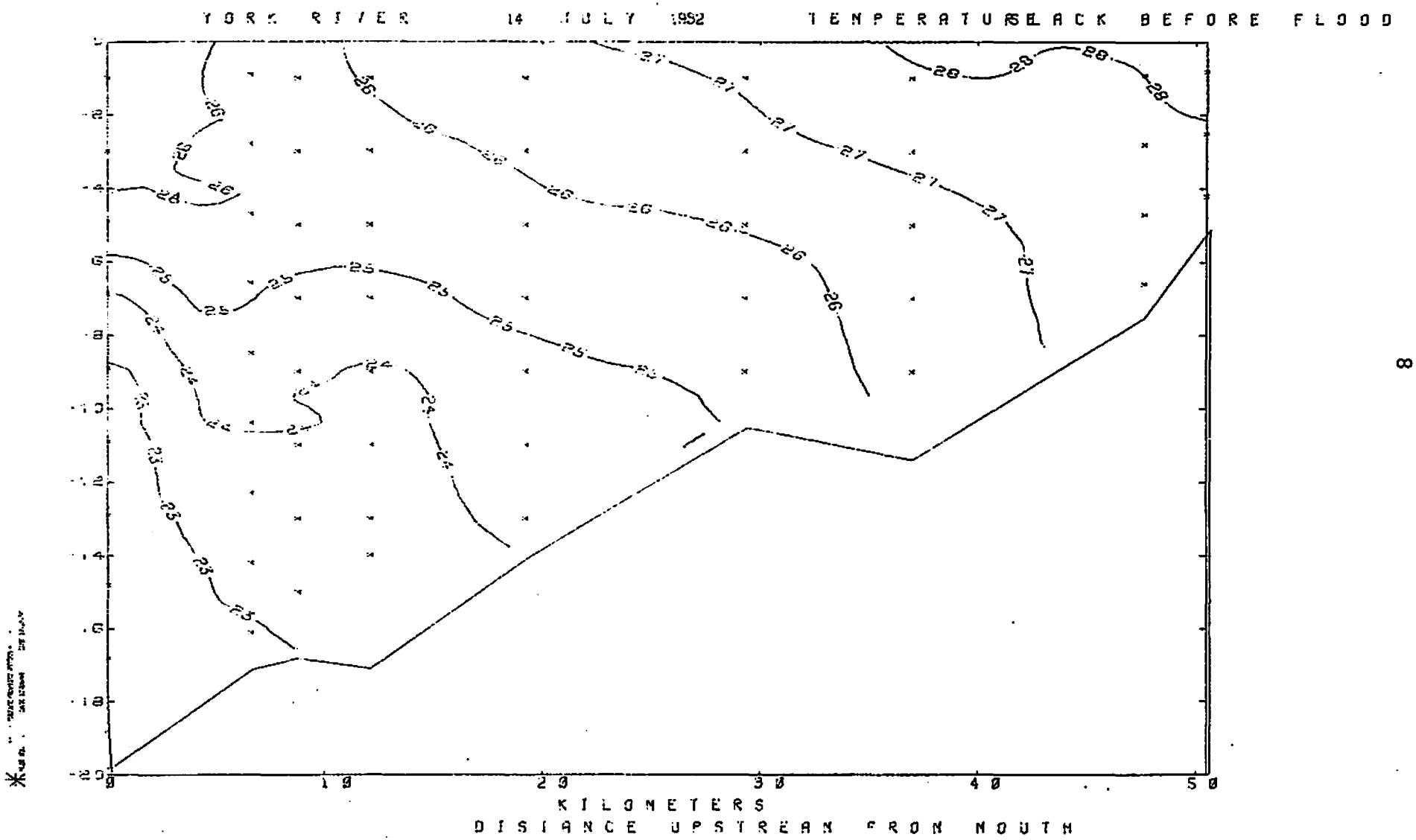
0
50
100
150
KILOMETERS
DISTANCE UPSTREAM FROM MOUTH

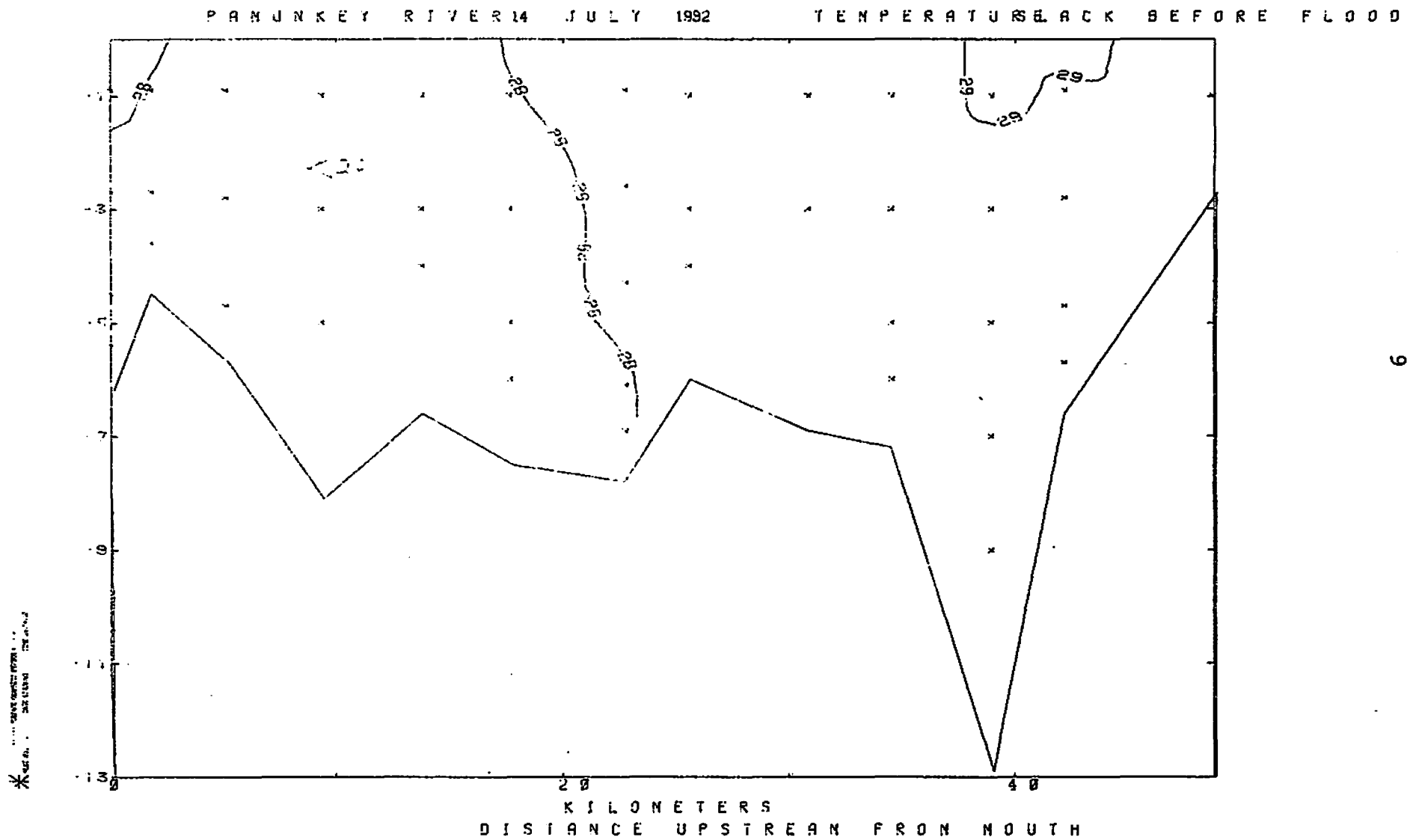

JAMES RIVER 13 JULY 1982 TEMPERATURE BACK BEFORE FLOOD
0
50
100
150
KILOMETERS
DISTANCE UPSTREAM FROM MOUTH

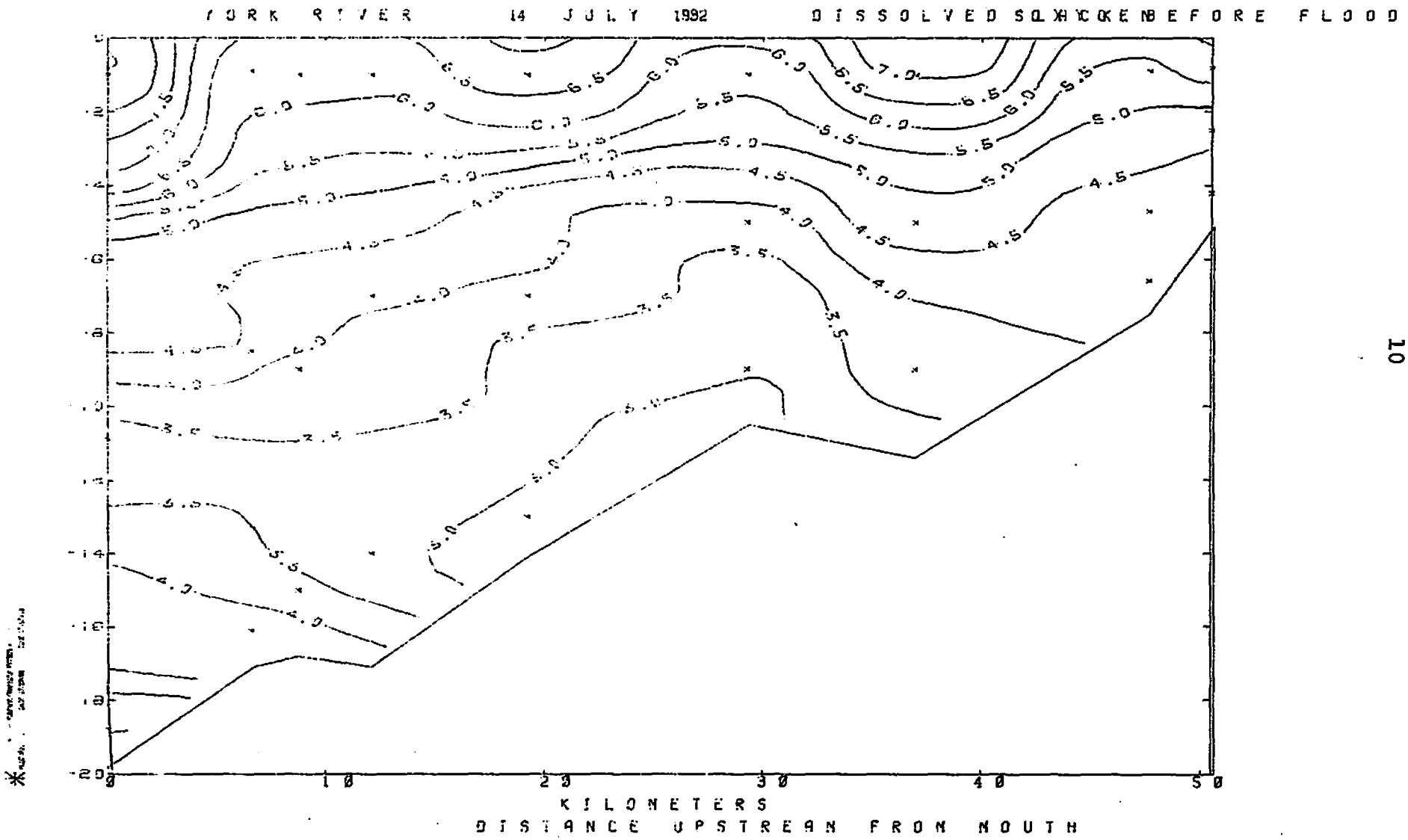

JAMES RIVER 13 JULY 1992 DISSOLVED OXYGEN BEFORE FLOOD
0
50
100
150
KILOMETERS
DISTANCE UPSTREAM FROM MOUTH

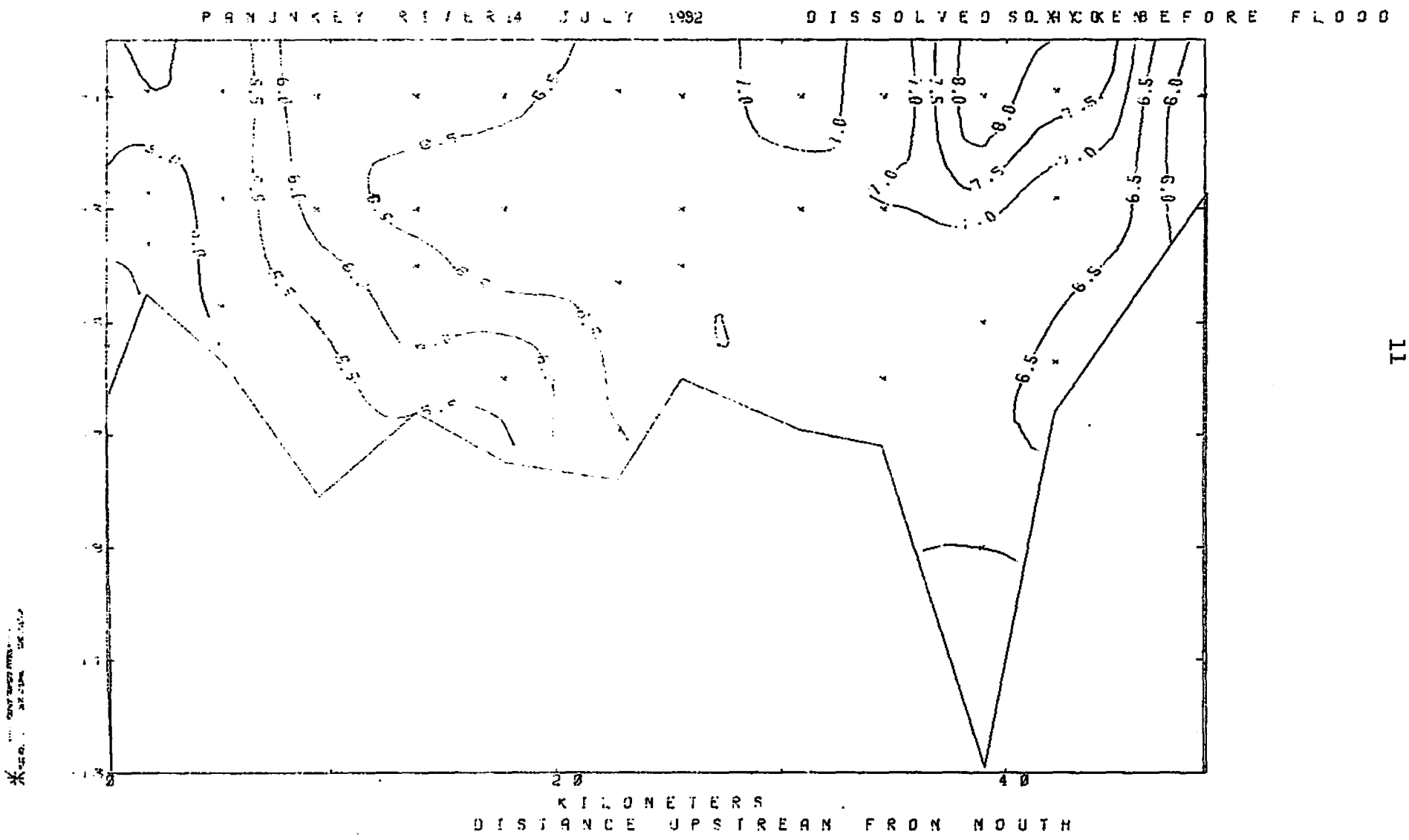
YORK RIVER 14 JULY 1992 SALINITY SLACK BEFORE FLOOD
KILOMETERS
DISTANCE UPSTREAM FROM MOUTH

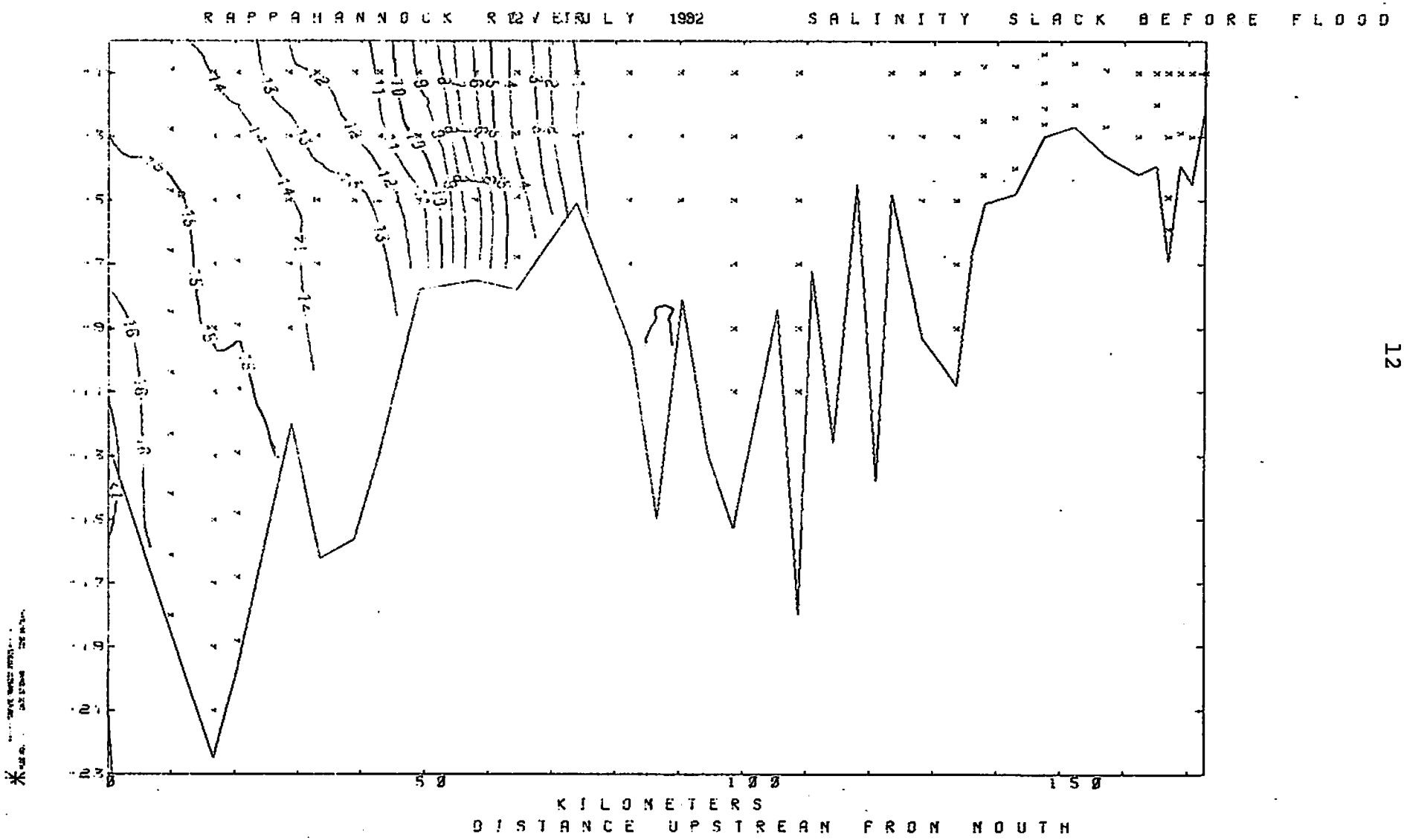

PAMUNKEY RIVER 14 JULY 1992 SALINITY SLACK BEFORE FLOOD
0
20
40
KILOMETERS
DISTANCE UPSTREAM FROM MOUTH

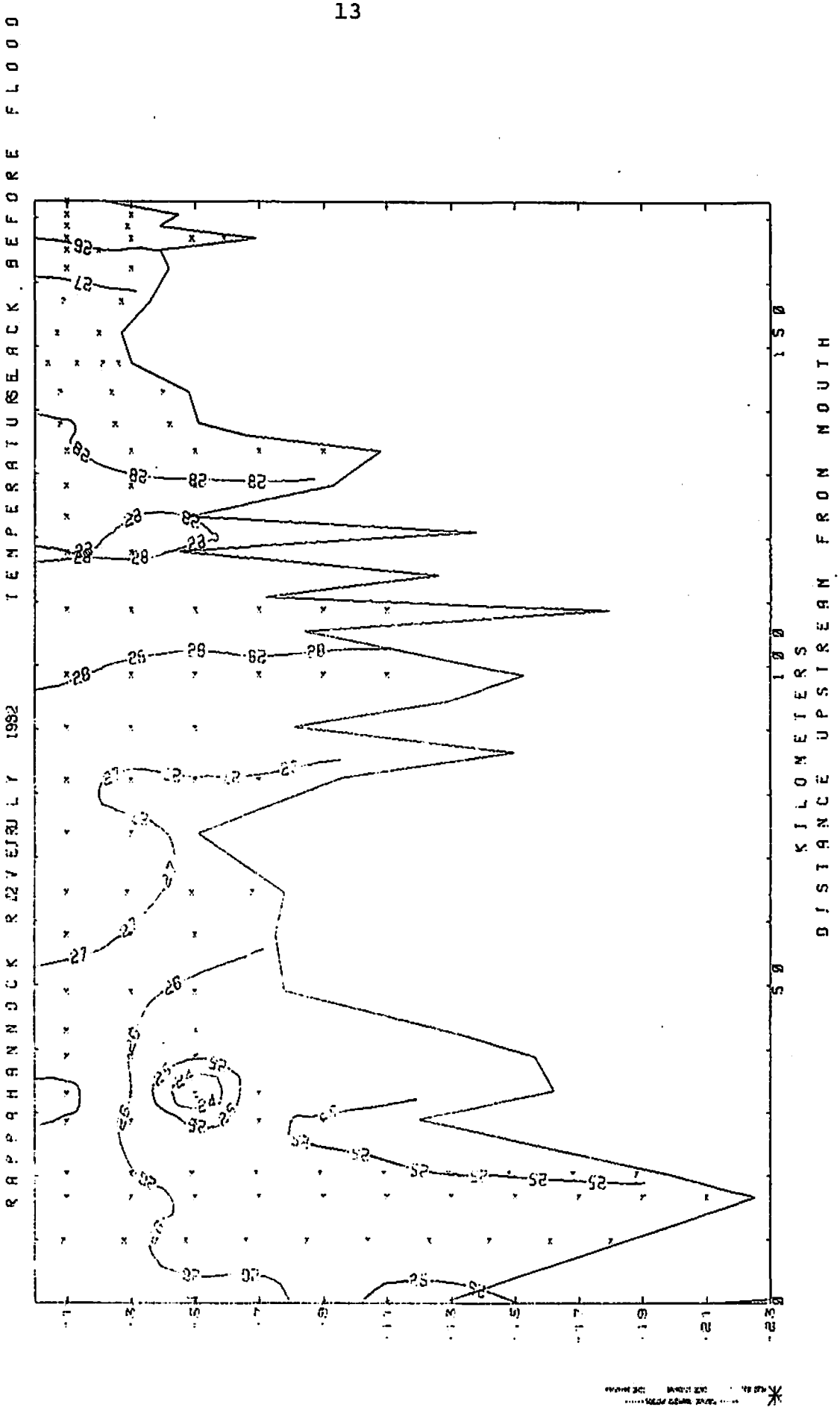

YORK RIVER 14 JULY 1952 TEMPERATURE BACK BEFORE FLOOD
28
27
26
25
24
23
0
10
20
30
40
50
KILOMETERS
DISTANCE UPSTREAM FROM MOUTH


PANUNKEY RIVER 14 JULY 1992 TEMPERATURE BACK BEFORE FLOOD
28
28
28
29
29
29
-1
-3
-5
-7
-9
-11
-13
0
20
40
KILONETERS
DISTANCE UPSTREAM FROM MOUTH


YORK RIVER 14 JULY 1992 DISSOLVED OXYGEN BEFORE FLOOD
0
10
20
30
40
50
KILOMETERS
DISTANCE UPSTREAM FROM MOUTH


PAMUNKEY RIVER 14 JULY 1992 DISSOLVED OXYGEN BEFORE FLOOD
0.1
1.0
5.5
6.0
6.5
7.0
7.5
8.0
0
20
40
KILOMETERS
DISTANCE UPSTREAM FROM MOUTH


RAPPAHANNOCK RIVER JULY 1992 SALINITY SLACK BEFORE FLOOD
0
50
100
150
KILOMETERS
DISTANCE UPSTREAM FROM MOUTH


RAPPAHANNOCK RIVER JULY 1982
TEMPERATURE BACK BEFORE FLOOD
DISTANCE UPSTREAM FROM MOUTH
KILOMETERS
150
100
50
0

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Summary of Field Surveys

(1) Slackwater Runs

James: September 22, temperature, salinity and DO were measured throughout the tidal portion of the river.

York and Pamunkey: September 23, temperature, salinity and DO were measured throughout the tidal portion of the river.

Rappahannock: September 20, salinity, temperature, and DO were measured, and samples were collected for nutrient analysis at stations throughout the tidal portion of the river.

Salinity, temperature and DO distrubutions are attached. Data for other parameters will be available later, and may be provided upon request.

(2) Crab-fish Joint Trawl Surveys - by Willard Van Engel

James River:	September 15
York River:	September 13
Rappahannock River:	September 17
Little Creek, Lynnhaven:	September 22
Elizabeth River:	September 23

Surface and bottom temperatures, salinities, DO and Secchi depth were measured at designated stations.

(3) NOS (National Ocean Survey) Support Project - by Christopher Welch

This project has been conducting field surveys every two to four weeks since January, 1982. Temperature, salinity and DO profiles were measured at 15 stations in a Chesapeake Bay transect north of Wolf Trap.

For further information, make requests to Dr. Albert Kuo, Virginia Institute of Marine Science, Gloucester Point, VA 23062, (804)642-2111.

(4) Zooplankton Monitoring Program - by George Grant

No survey was conducted in September.

Lesser Neap Tide

September 25

Comments on Slackwater Run Data

The data indicate that salt intrusion in all three rivers has advanced upstream by 15-20 kilometers since the August survey. The increased salt intrusion is a direct result of month-long steady low freshwater inflow into the river systems. The vertical stratification is weak in all three rivers, typical of low flow, near spring-tide condition.

The low DO situations, which persisted throughout the summer at bottom waters in the lower Rappahannock and York Rivers, have largely dissipated.

Scheduled Surveys

(1) Slackwater Runs

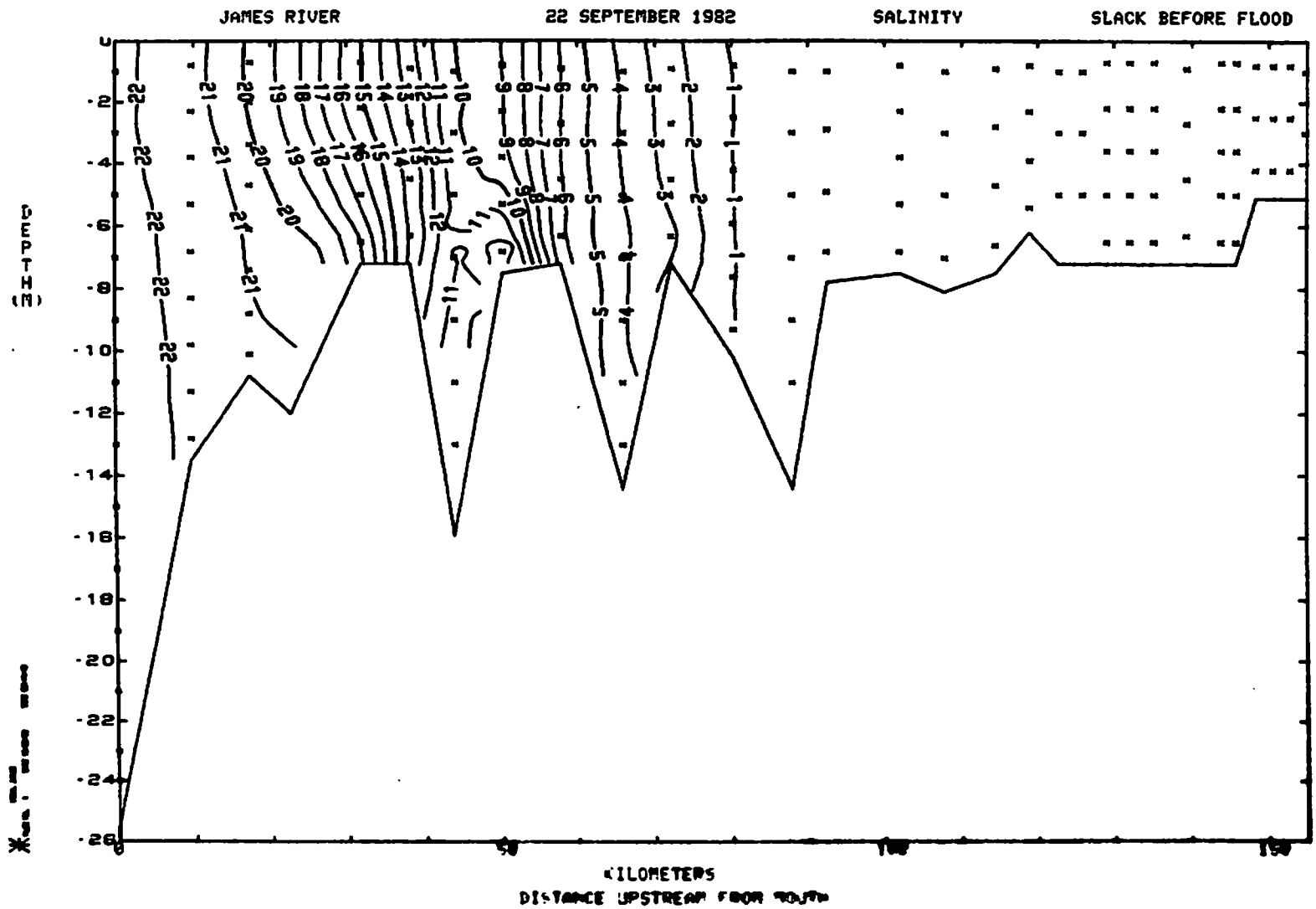
James:	October 21, November 22
York and Pamunkey:	October 22, November 23
Rappahannock:	October 20, November 18

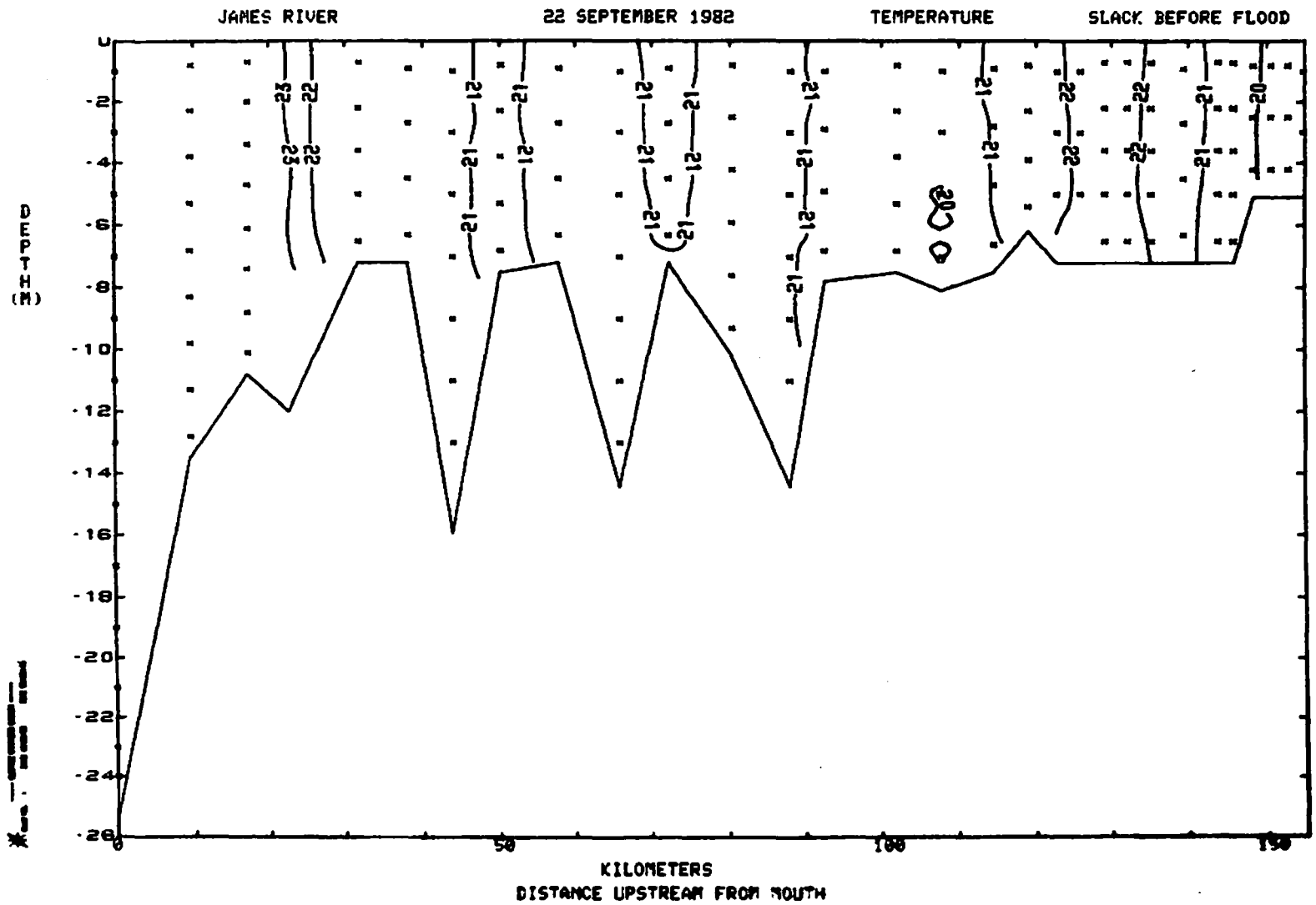
(2) Joint Crab-Fish Trawl Surveys

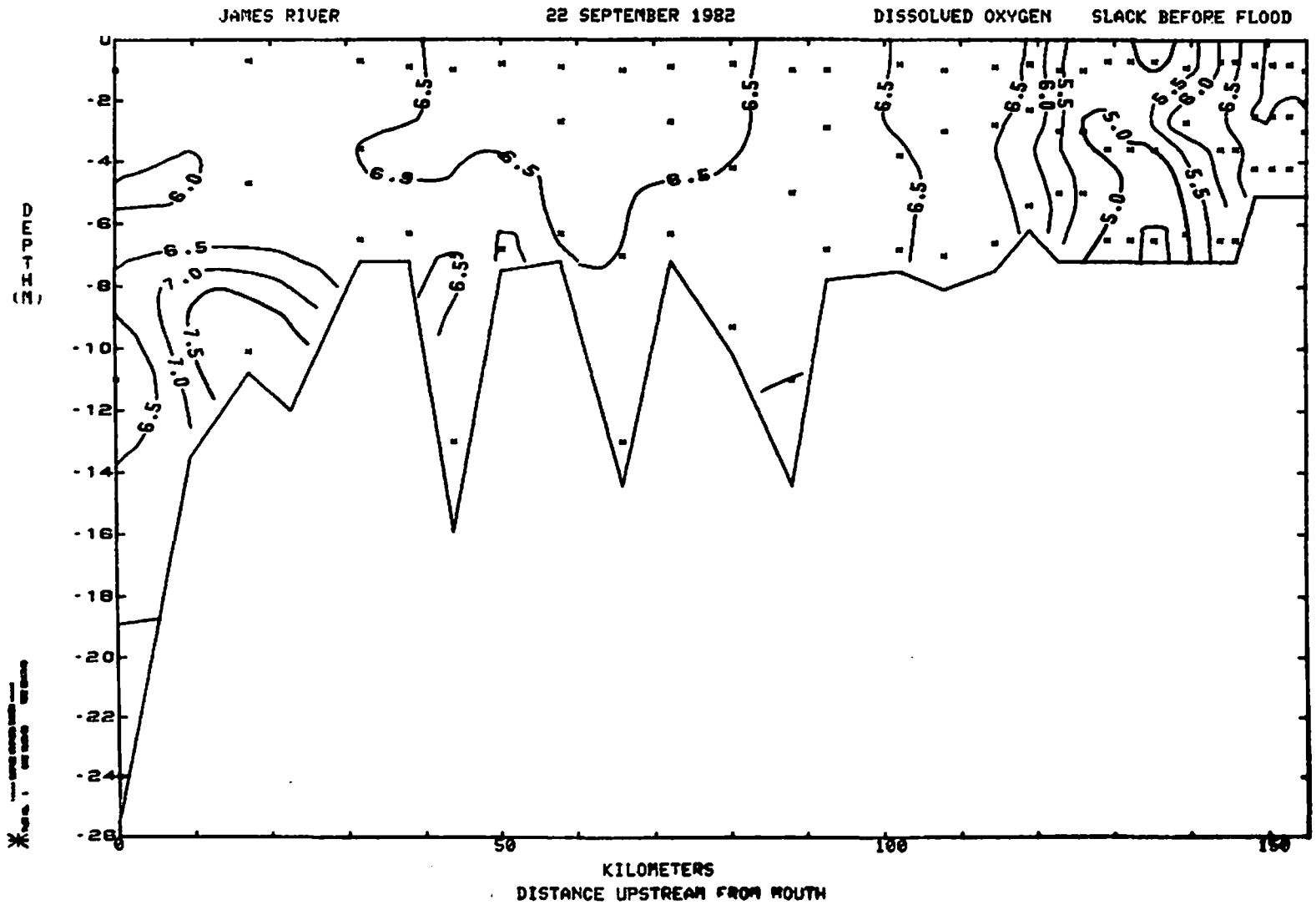
York:	October 11
James:	October 22
Rappahannock:	October 8
Elizabeth:	October 14, 15
Ware River:	October 13

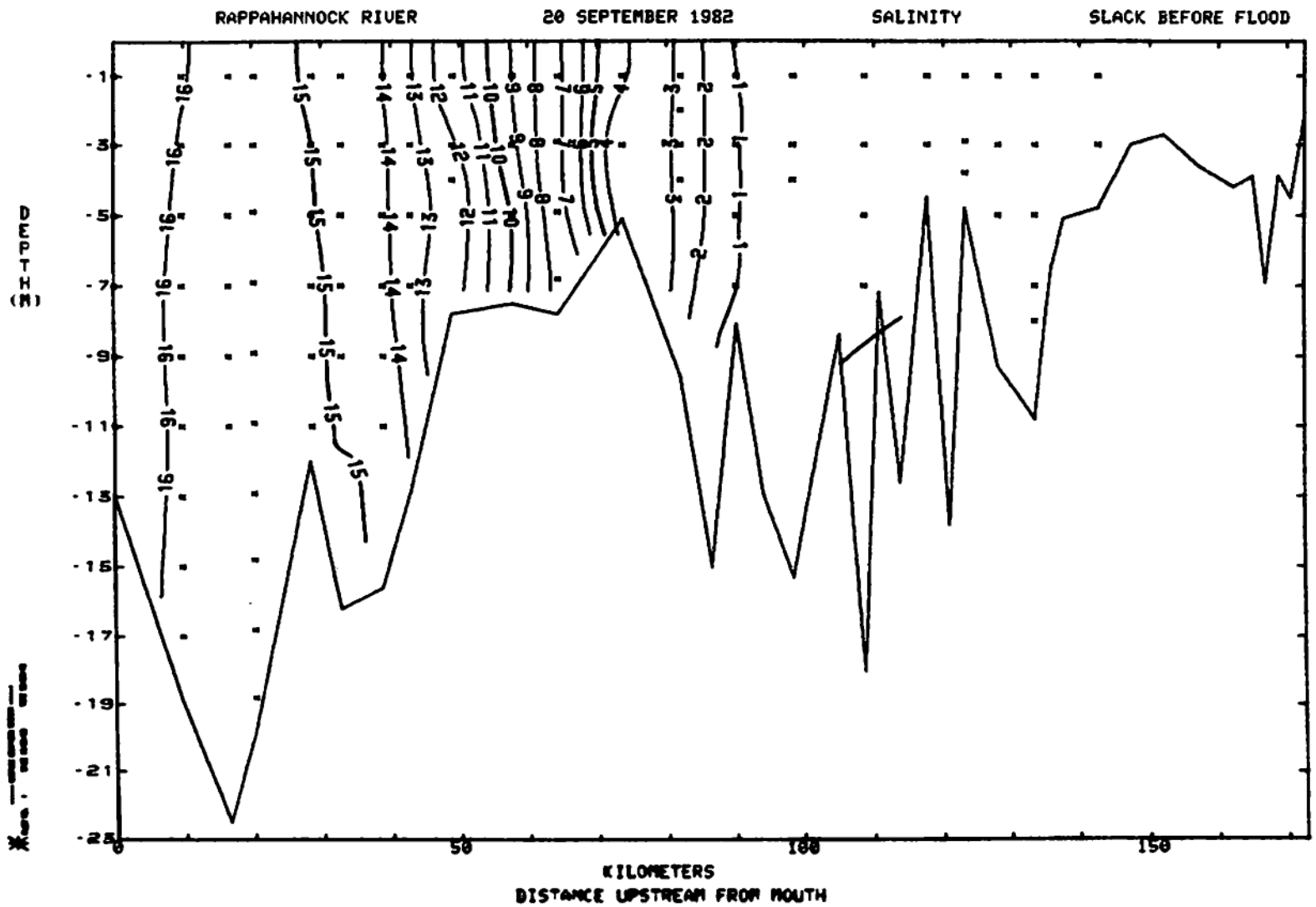
(3) Zooplankton Monitoring Program

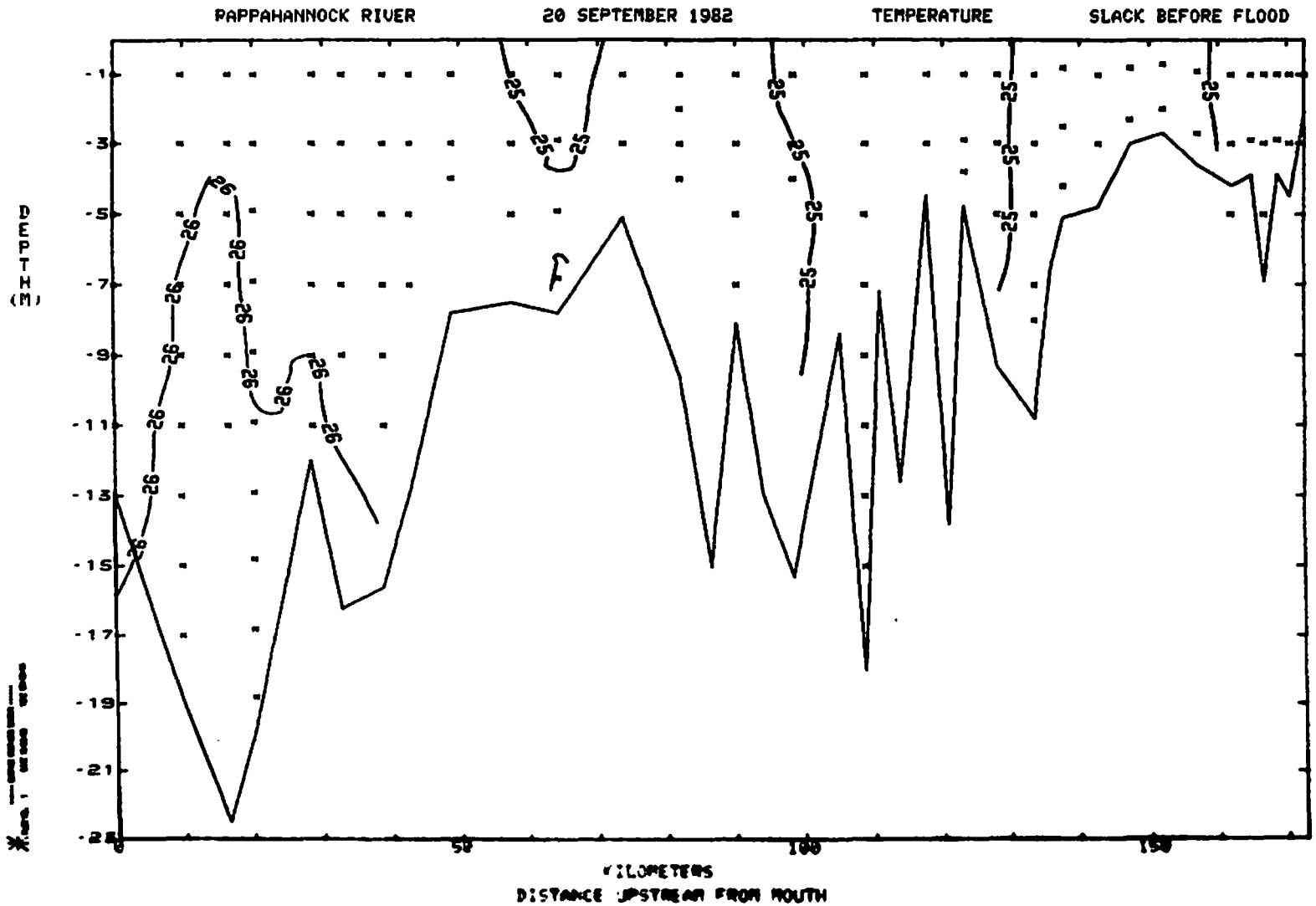
One survey is scheduled in October.

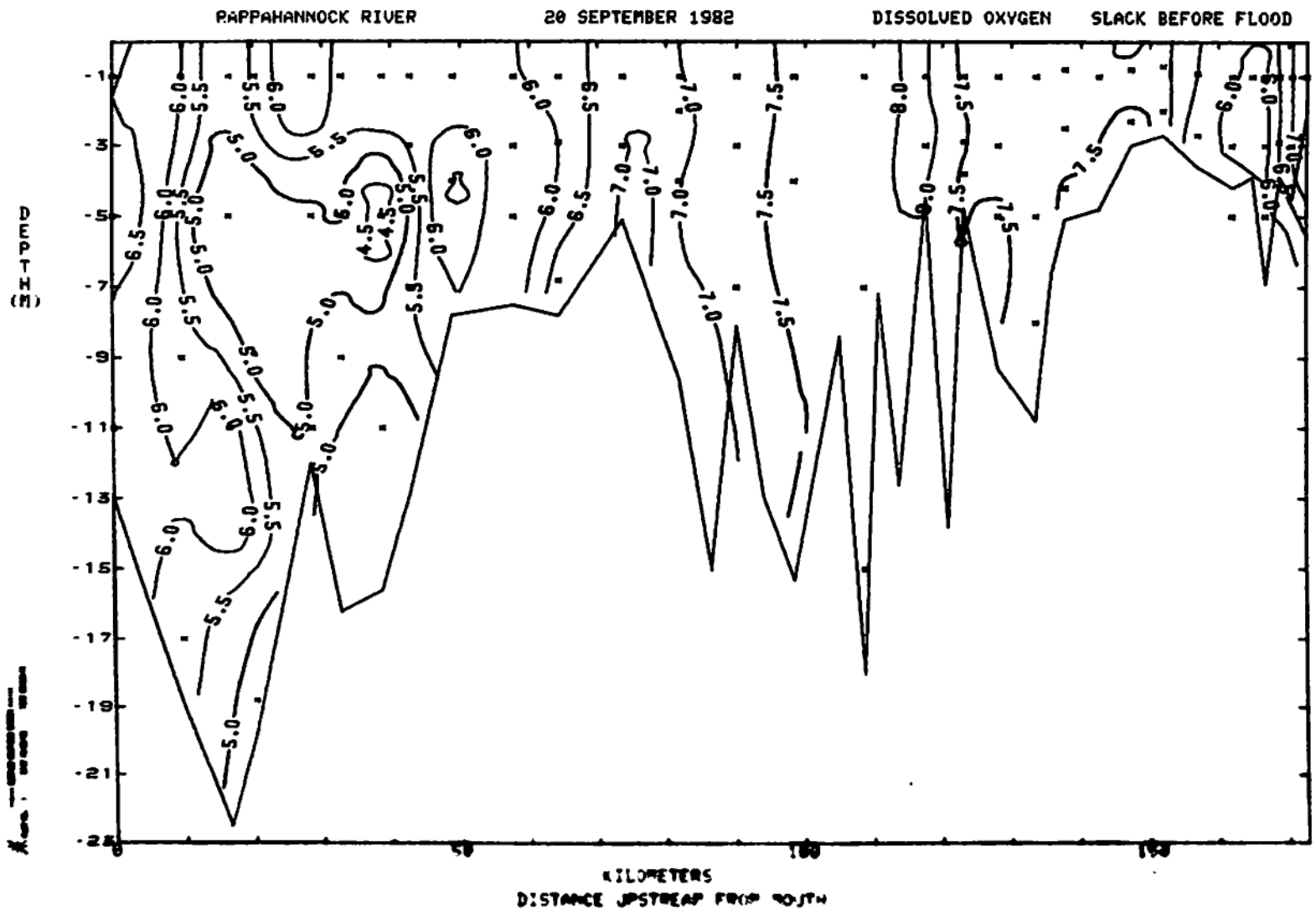

JAMES RIVER
22 SEPTEMBER 1982
SALINITY
SLACK BEFORE FLOOD
DEPTH (M)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
50
100
150
KILOMETERS
DISTANCE UPSTREAM FROM MOUTH

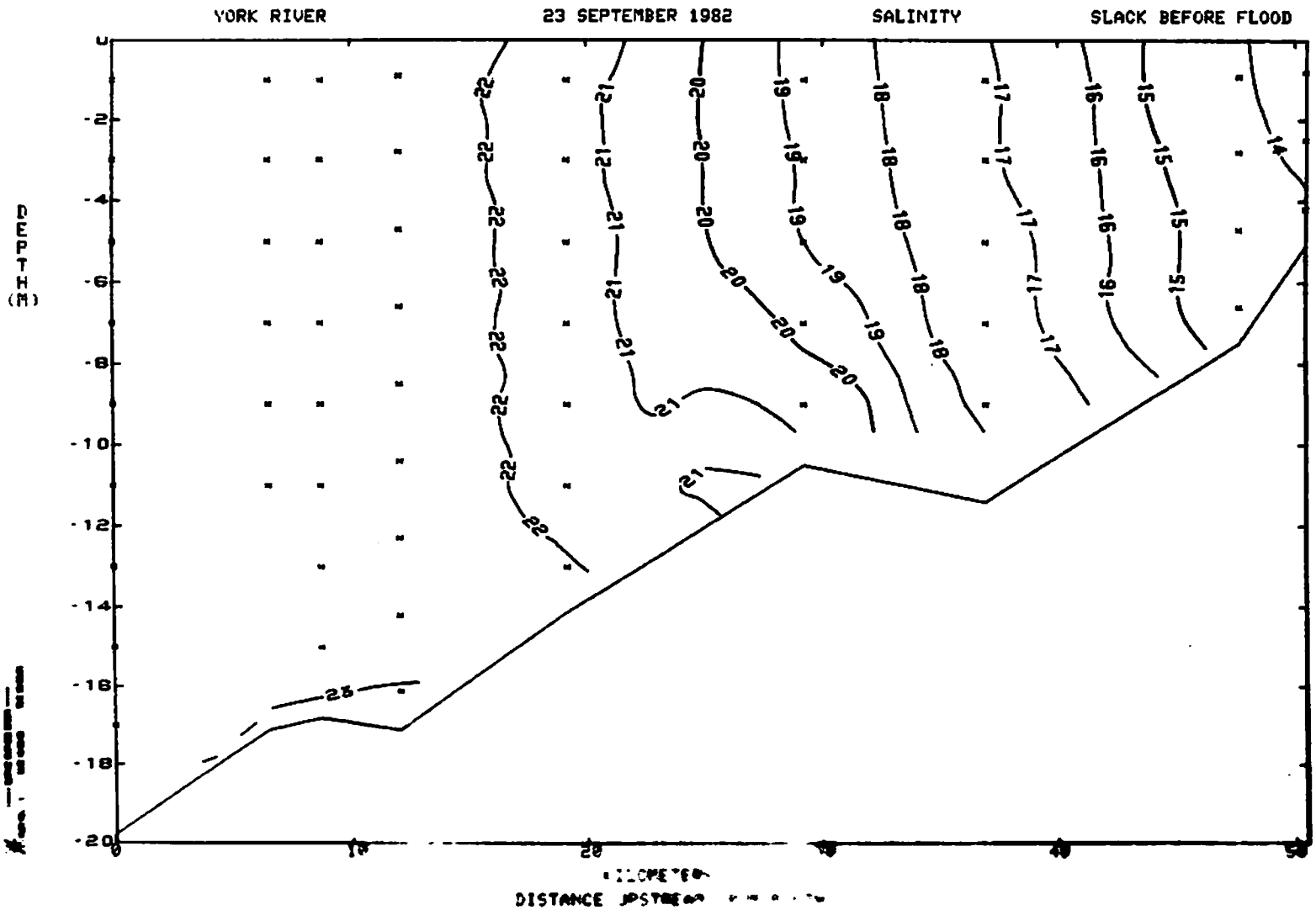

JAMES RIVER
22 SEPTEMBER 1982
TEMPERATURE
SLACK BEFORE FLOOD
DEPTH (M)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
0
50
100
150
KILOMETERS
DISTANCE UPSTREAM FROM MOUTH

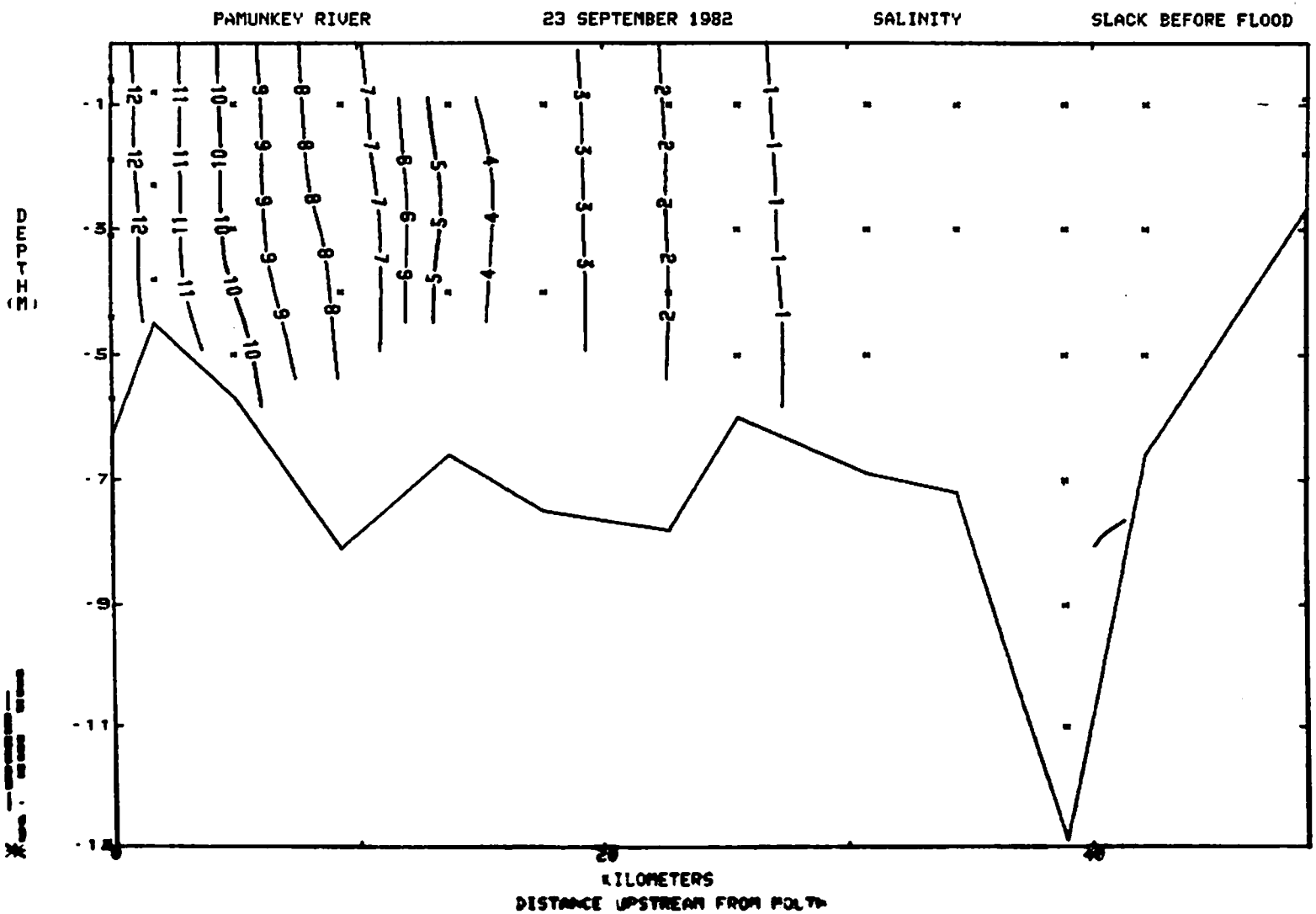

JAMES RIVER
22 SEPTEMBER 1982
DISSOLVED OXYGEN
SLACK BEFORE FLOOD
DEPTH (M)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
6.0
6.5
6.9
7.0
7.5
5.0
5.5
0
50
100
150
KILOMETERS
DISTANCE UPSTREAM FROM MOUTH

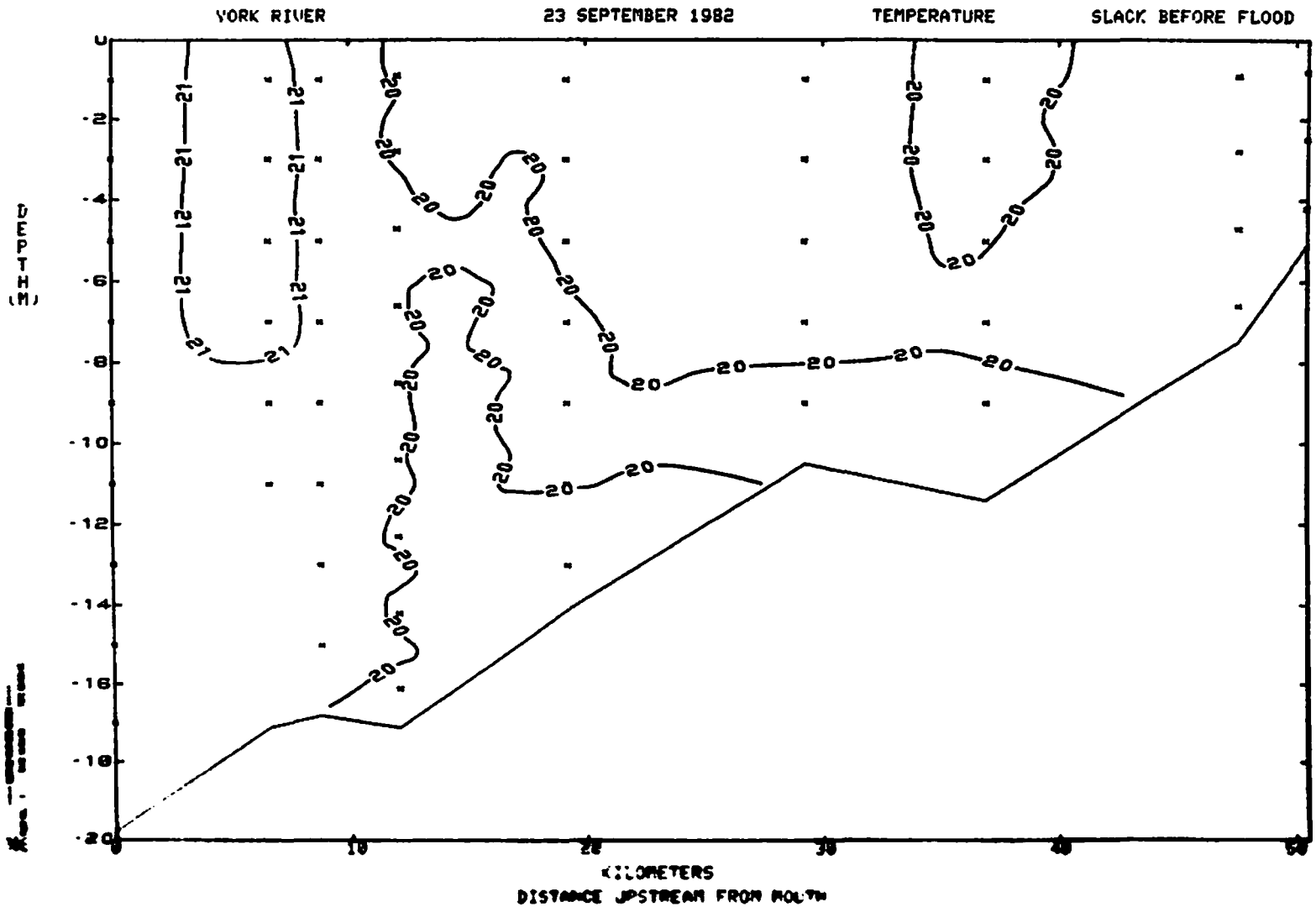

RAPPAHANNOCK RIVER
20 SEPTEMBER 1982
SALINITY
SLACK BEFORE FLOOD
DEPTH (M)
-1
-3
-5
-7
-9
-11
-13
-15
-17
-19
-21
-25
0
50
100
150
KILOMETERS
DISTANCE UPSTREAM FROM MOUTH

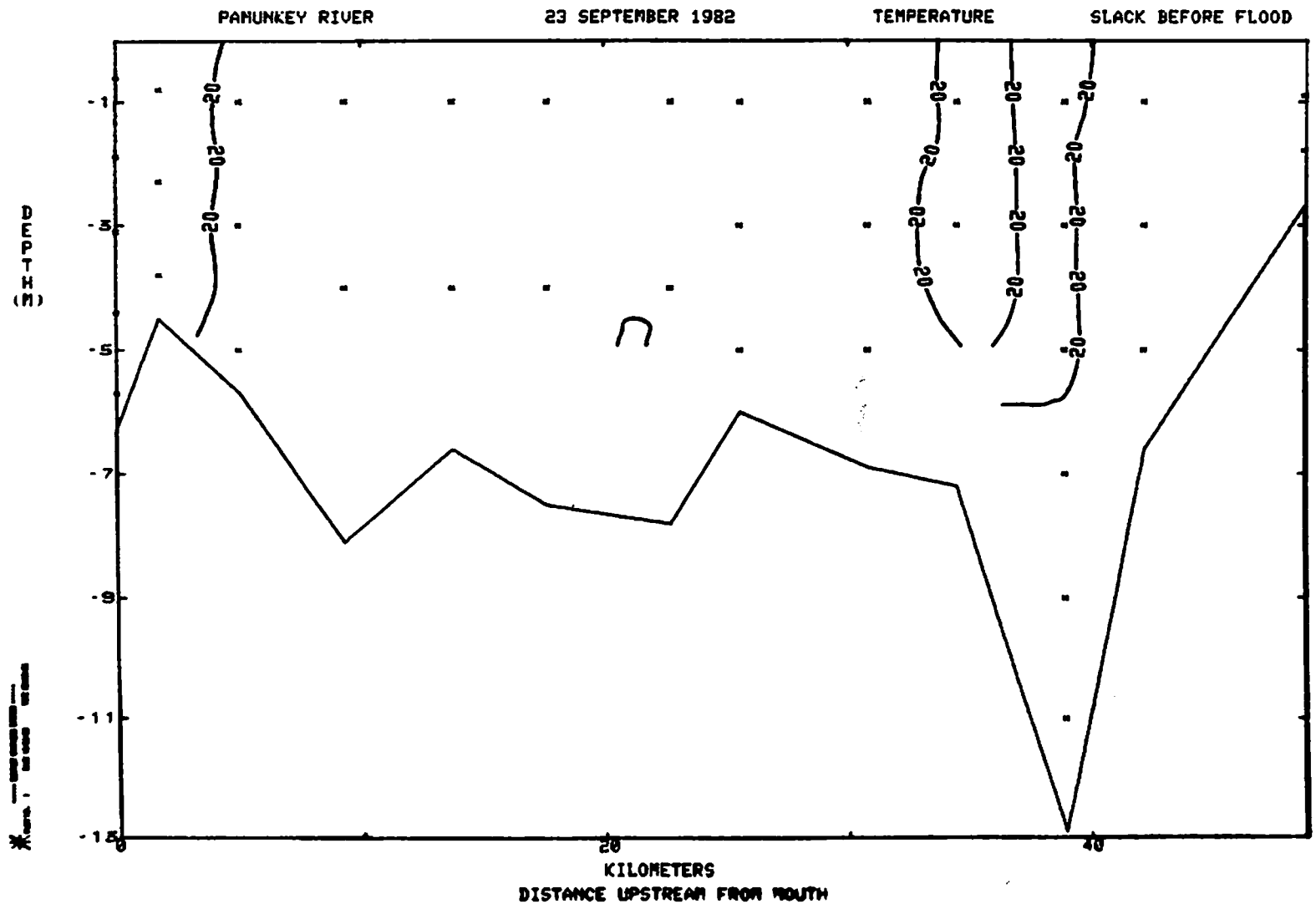

PAPPAHANNOCK RIVER
20 SEPTEMBER 1982
TEMPERATURE
SLACK BEFORE FLOOD
DEPTH (M)
-1
-3
-5
-7
-9
-11
-13
-15
-17
-19
-21
-25
0
50
100
150
KILOMETERS
DISTANCE UPSTREAM FROM MOUTH

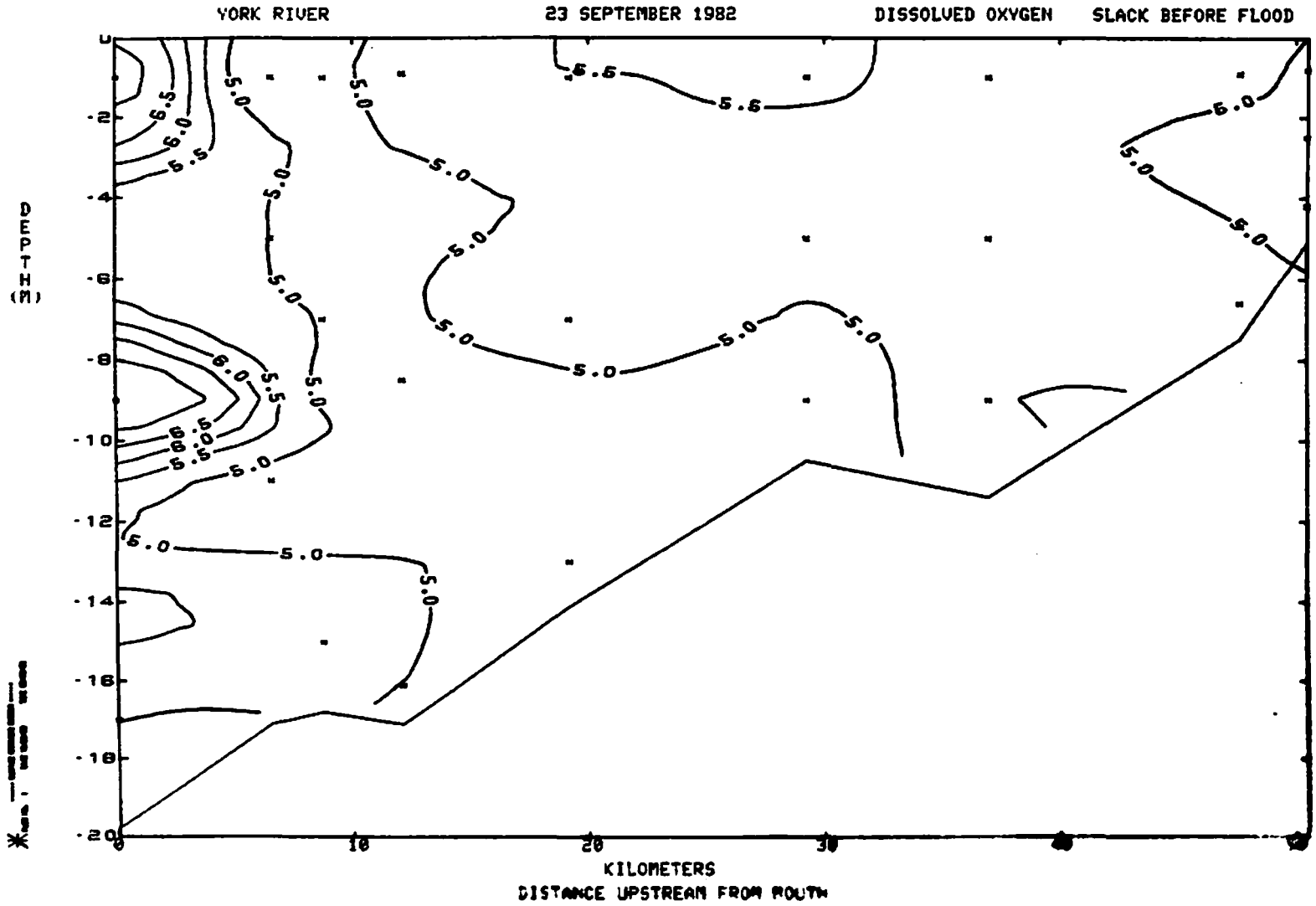

RAPPAHANNOCK RIVER
20 SEPTEMBER 1982
DISSOLVED OXYGEN
SLACK BEFORE FLOOD
DEPTH (M)
KILOMETERS
DISTANCE UPSTREAM FROM MOUTH

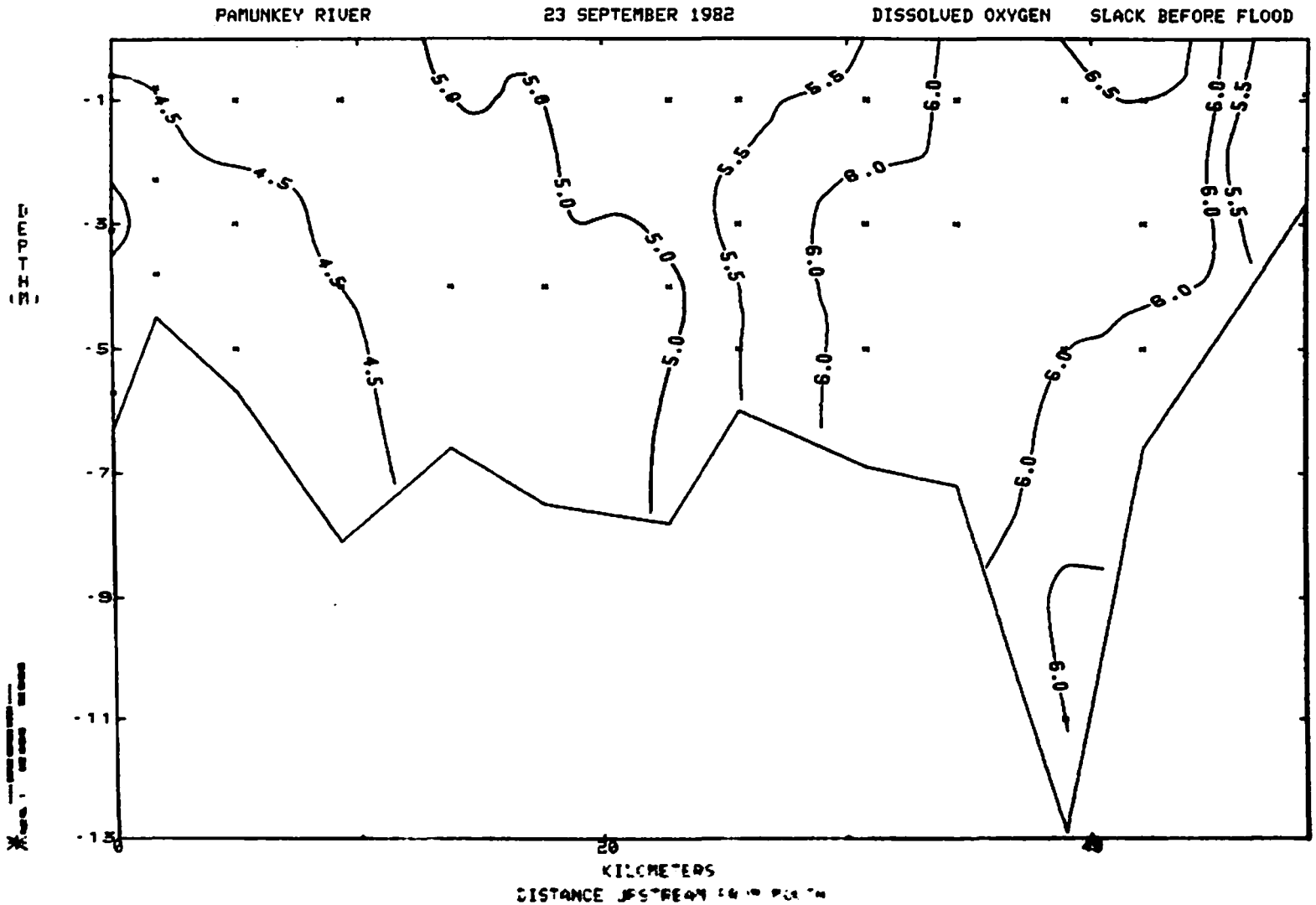

YORK RIVER
23 SEPTEMBER 1982
SALINITY
SLACK BEFORE FLOOD
DEPTH (M)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
0
14
28
42
56
DISTANCE UPSTREAM
22
21
20
19
18
17
16
15
14
25


PAMUNKEY RIVER
23 SEPTEMBER 1982
SALINITY
SLACK BEFORE FLOOD
DEPTH (
-1
-3
-5
-7
-9
-11
-13
20
40
KILOMETERS
DISTANCE UPSTREAM FROM MOUTH


YORK RIVER
23 SEPTEMBER 1982
TEMPERATURE
SLACK BEFORE FLOOD
DEPTH (M)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
10
20
30
40
50
KILOMETERS
DISTANCE UPSTREAM FROM MOUTH


PAMUNKEY RIVER
23 SEPTEMBER 1982
TEMPERATURE
SLACK BEFORE FLOOD
DEPTH (M)
-1
-3
-5
-7
-9
-11
-13
0
20
40
KILOMETERS
DISTANCE UPSTREAM FROM MOUTH
20


YORK RIVER
23 SEPTEMBER 1982
DISSOLVED OXYGEN
SLACK BEFORE FLOOD
DEPTH (M)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
10
20
30
KILOMETERS
DISTANCE UPSTREAM FROM MOUTH


PAMUNKEY RIVER
23 SEPTEMBER 1982
DISSOLVED OXYGEN
SLACK BEFORE FLOOD
DEPTH (M)
-1
-3
-5
-7
-9
-11
-13
0
20
40
KILOMETERS
4.5
5.0
5.5
6.0
6.5

Monthly Report on the State of Rivers - October 1982

Sponsored by

Virginia Institute of Marine Science

and

Virginia State Water Control Board

Summary of Field Surveys

(1) Slackwater Runs

James: October 21, temperature, salinity and DO were measured throughout the tidal portion of the river.

York and Pamunkey: October 22, temperature, salinity and DO were measured throughout the tidal portion of the river.

Rappahannock: October 20, salinity, temperature, and DO were measured, and samples were collected for nutrient analysis at stations throughout the tidal portion of the river.

Salinity, temperature and DO distributions are attached. Data for other parameters will be available later, and may be provided upon request.

(2) Crab-fish Joint Trawl Surveys - by Willard Van Engel

James River:	Oct. 27, Nov. 19,22,23
York River:	Oct. 11, Nov. 12
Rappahannock River:	Oct. 8 , Nov. 16
Little Creek, Lynnhaven:	- , Nov. 11
Elizabeth River:	Oct. 14,15, Nov. 18
Ware River:	Oct. 13

Surface and bottom temperatures, salinities, DO and Secchi depth were measured at designated stations.

(3) NOS (National Ocean Survey) Support Project - by Christopher Welch

This project has been conducting field surveys every two to four weeks since January, 1982. Temperature, salinity and DO profiles were measured at 15 stations in a Chesapeake Bay transect north of Wolf Trap.

For further information, make requests to Dr. Albert Kuo, Virginia Institute of Marine Science, Gloucester Point, VA 23062, (804)642-2111.

(4) Zooplankton Monitoring Program - by George Grant

No survey was conducted in October.

Lesser Neap Tide

October 24

Comments on Slackwater Run Data

Salinities remain relatively high in all three rivers because of the continuing low freshwater inflow. The vertical stratification is very weak throughout all three rivers.

The dissolved oxygen concentrations are high, mostly close or even above saturation values.

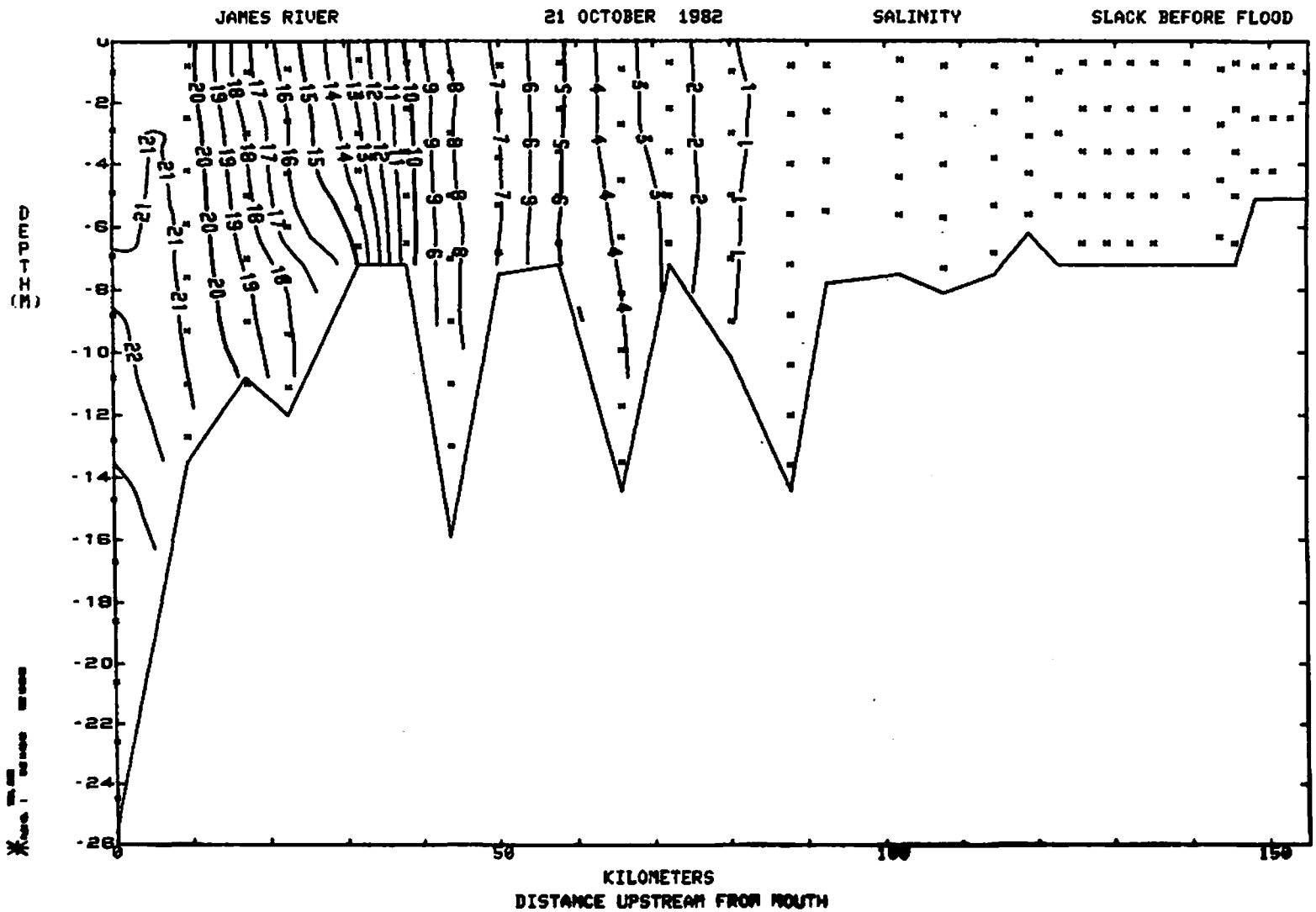
Scheduled Surveys

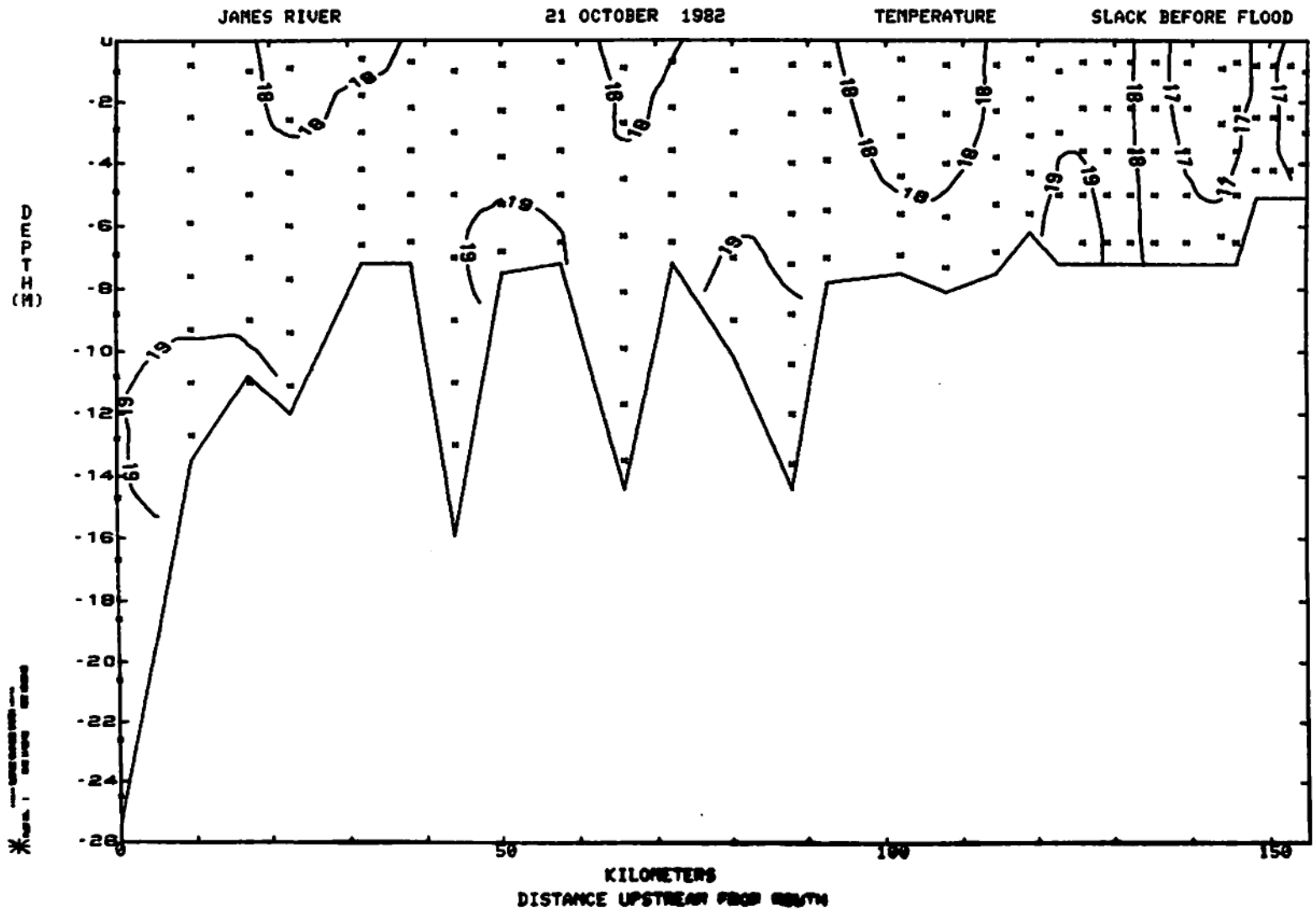
(1) Slackwater Runs

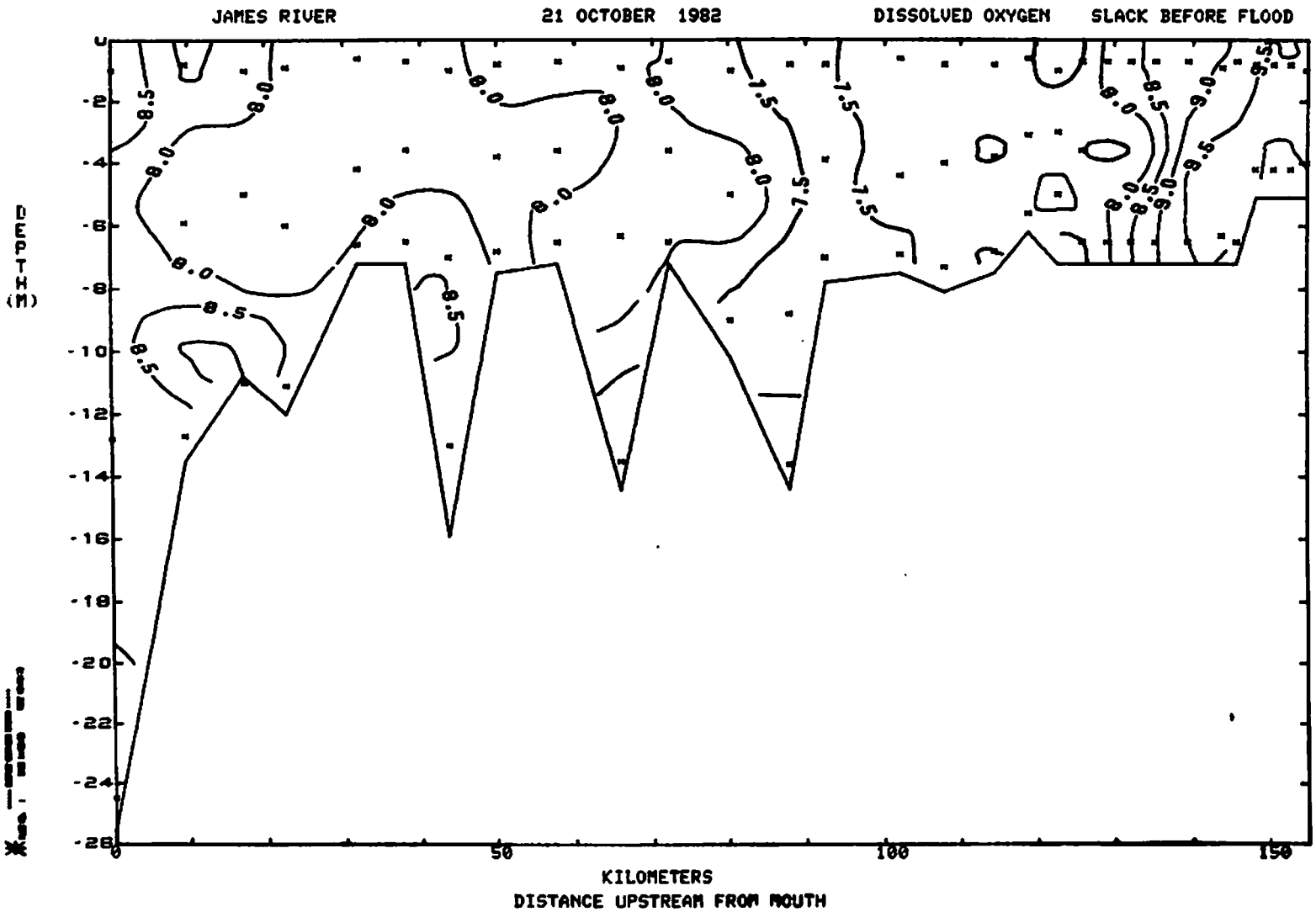
James:	November 22
York and Pamunkey:	November 23
Rappahannock:	November 18

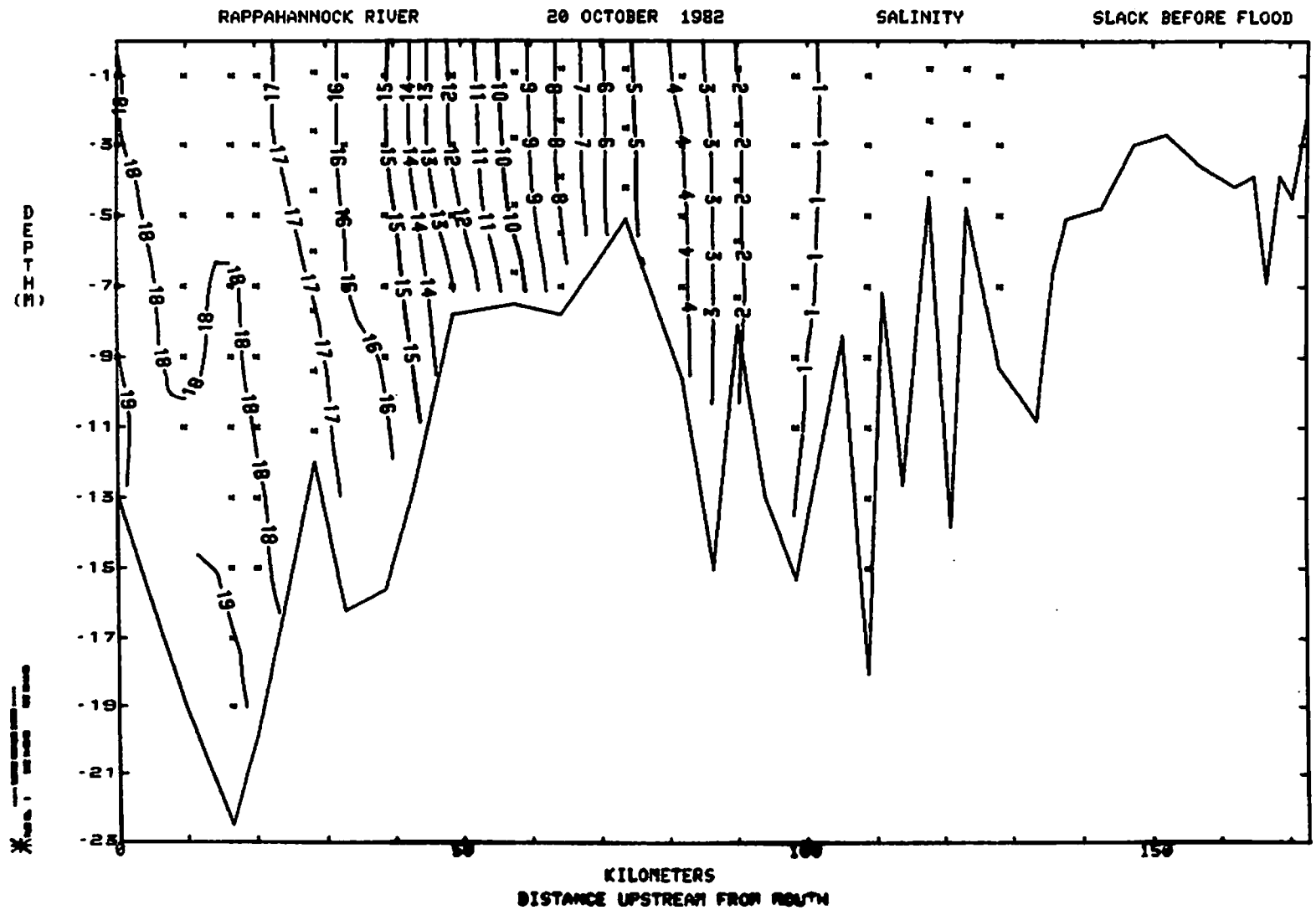
(2) Joint Crab-Fish Trawl Surveys - by Frank Wojcik

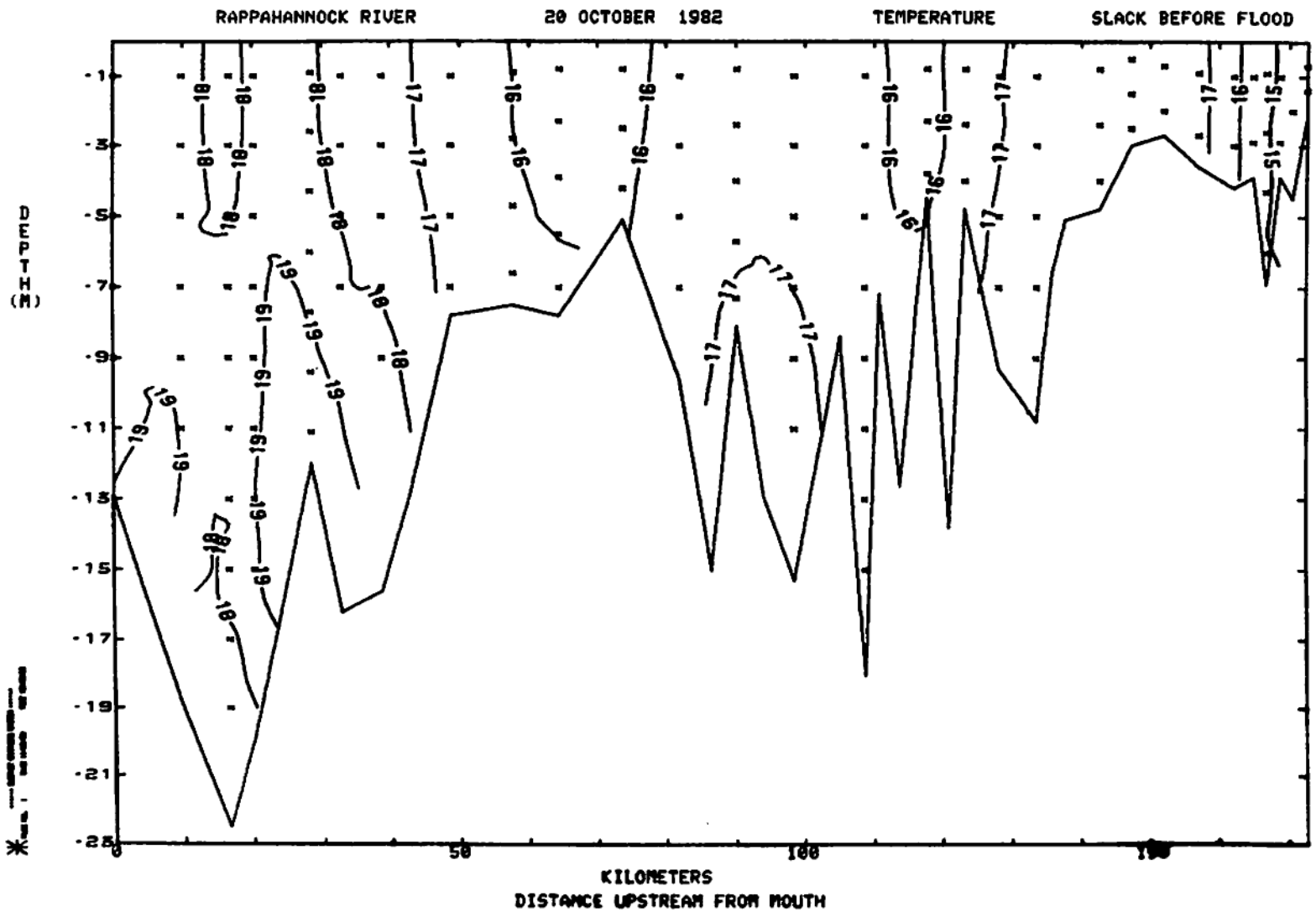
York:	Dec. 3
James:	Dec. 10
Rappahannock:	Dec. 7
Elizabeth:	Dec. 9
Little Creek, Lynnhaven River:	Dec. 8

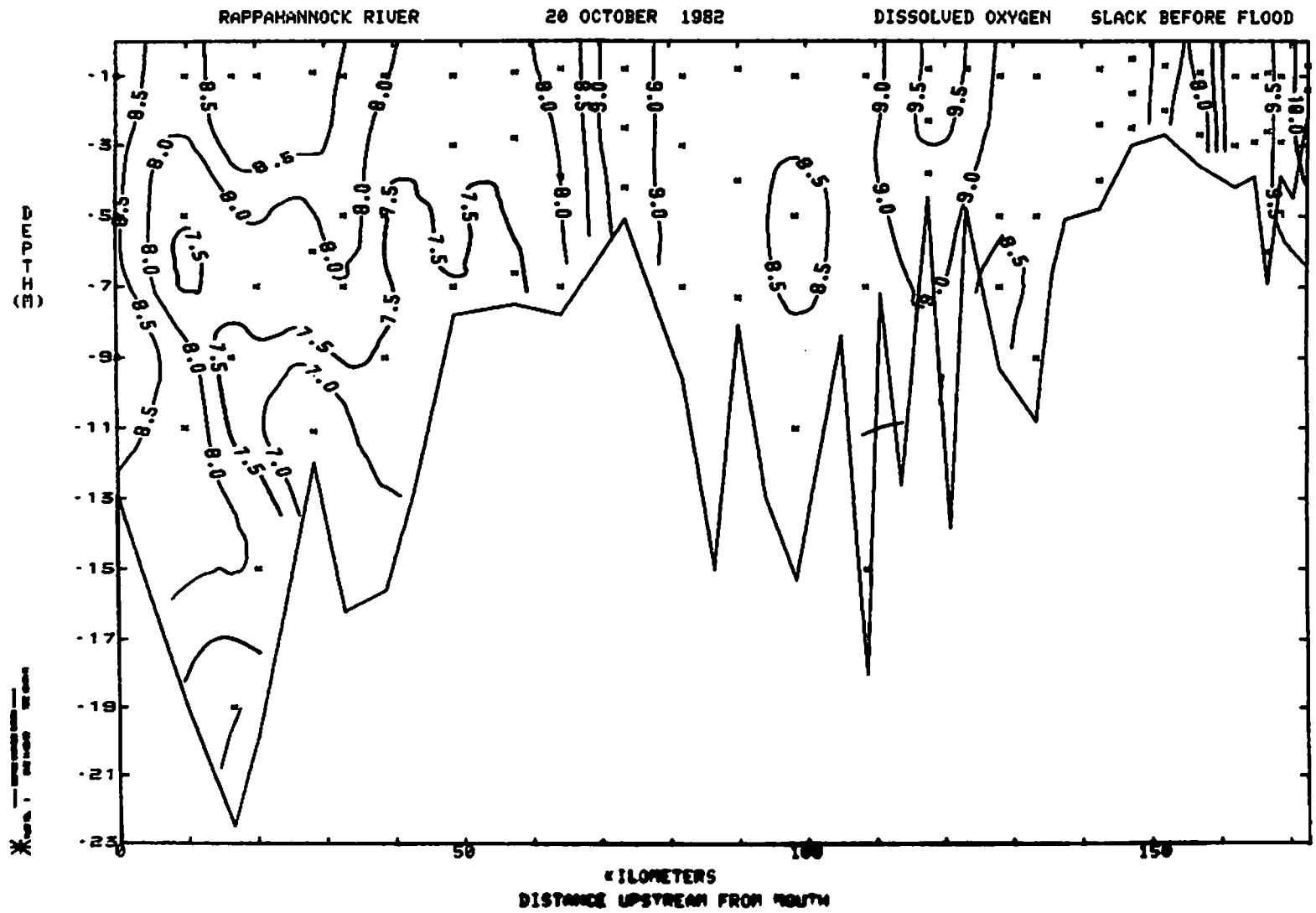

JAMES RIVER
21 OCTOBER 1982
SALINITY
SLACK BEFORE FLOOD
DEPTH (M)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
0
50
100
150
KILOMETERS
DISTANCE UPSTREAM FROM MOUTH

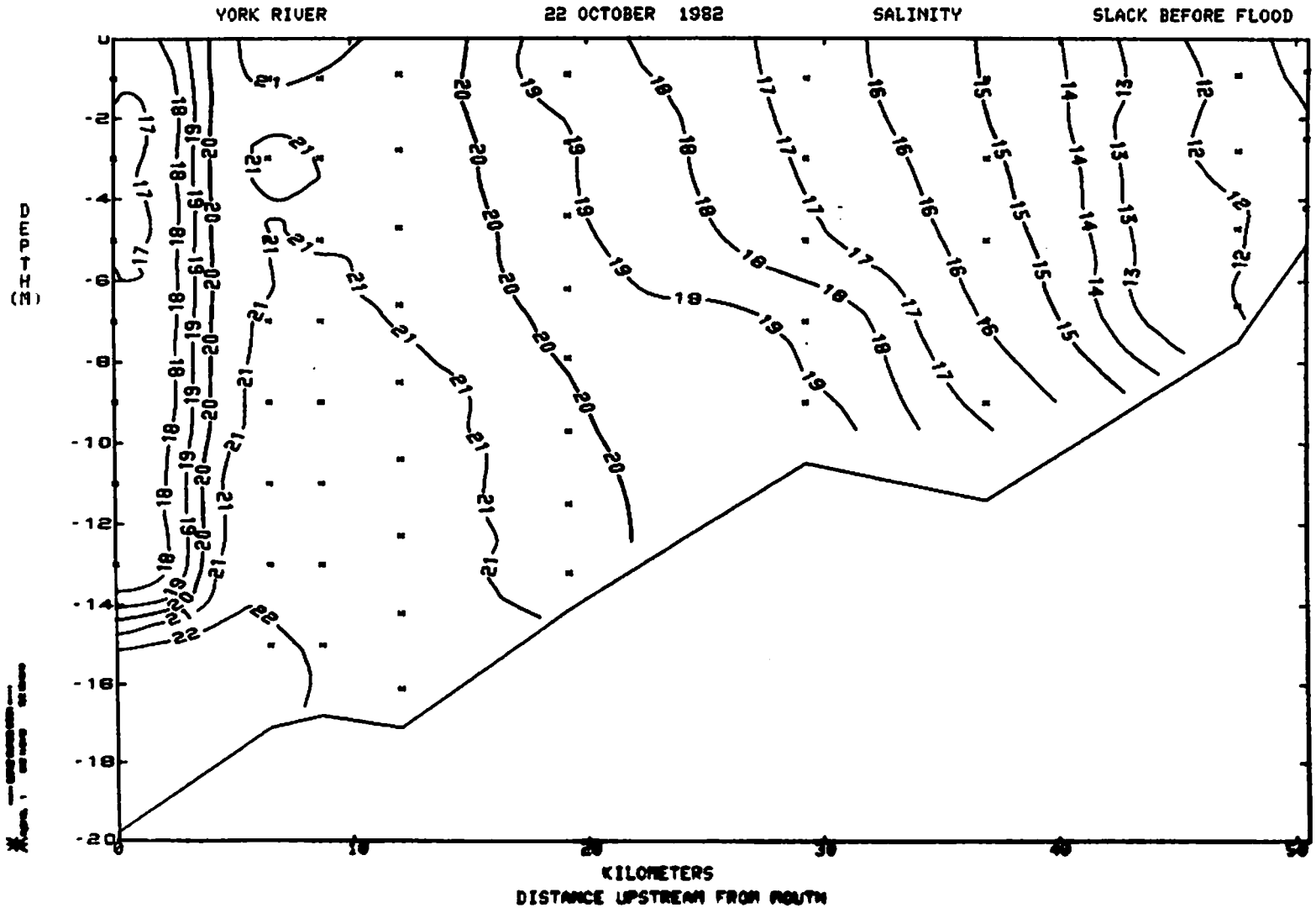

JAMES RIVER
21 OCTOBER 1982
TEMPERATURE
SLACK BEFORE FLOOD
DEPTH (M)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
0
50
100
150
KILOMETERS
DISTANCE UPSTREAM FROM MOUTH

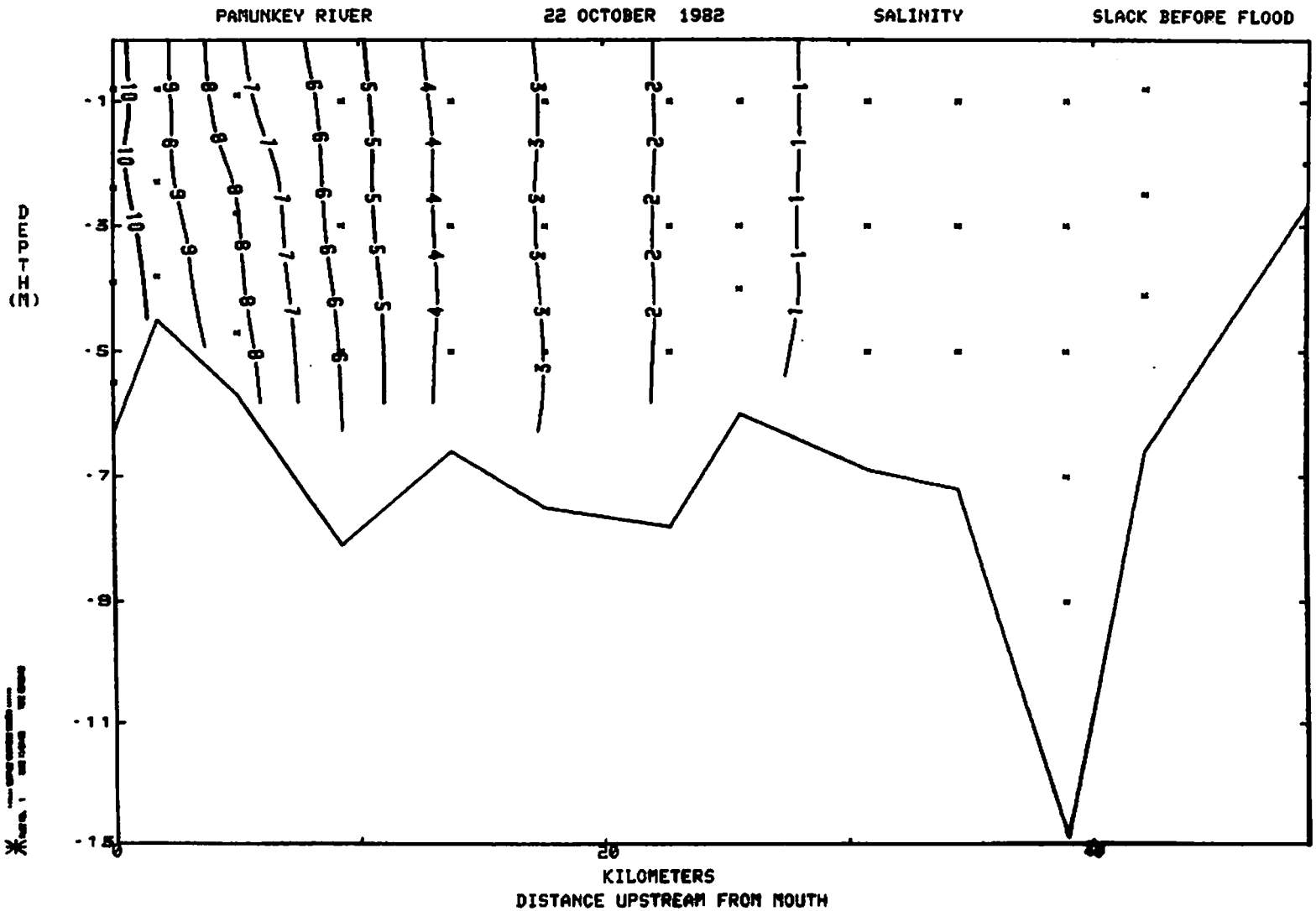

JAMES RIVER
21 OCTOBER 1982
DISSOLVED OXYGEN
SLACK BEFORE FLOOD
DEPTH (M)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
8.5
8.0
7.5
9.0
9.5
0
50
100
150
KILOMETERS
DISTANCE UPSTREAM FROM MOUTH

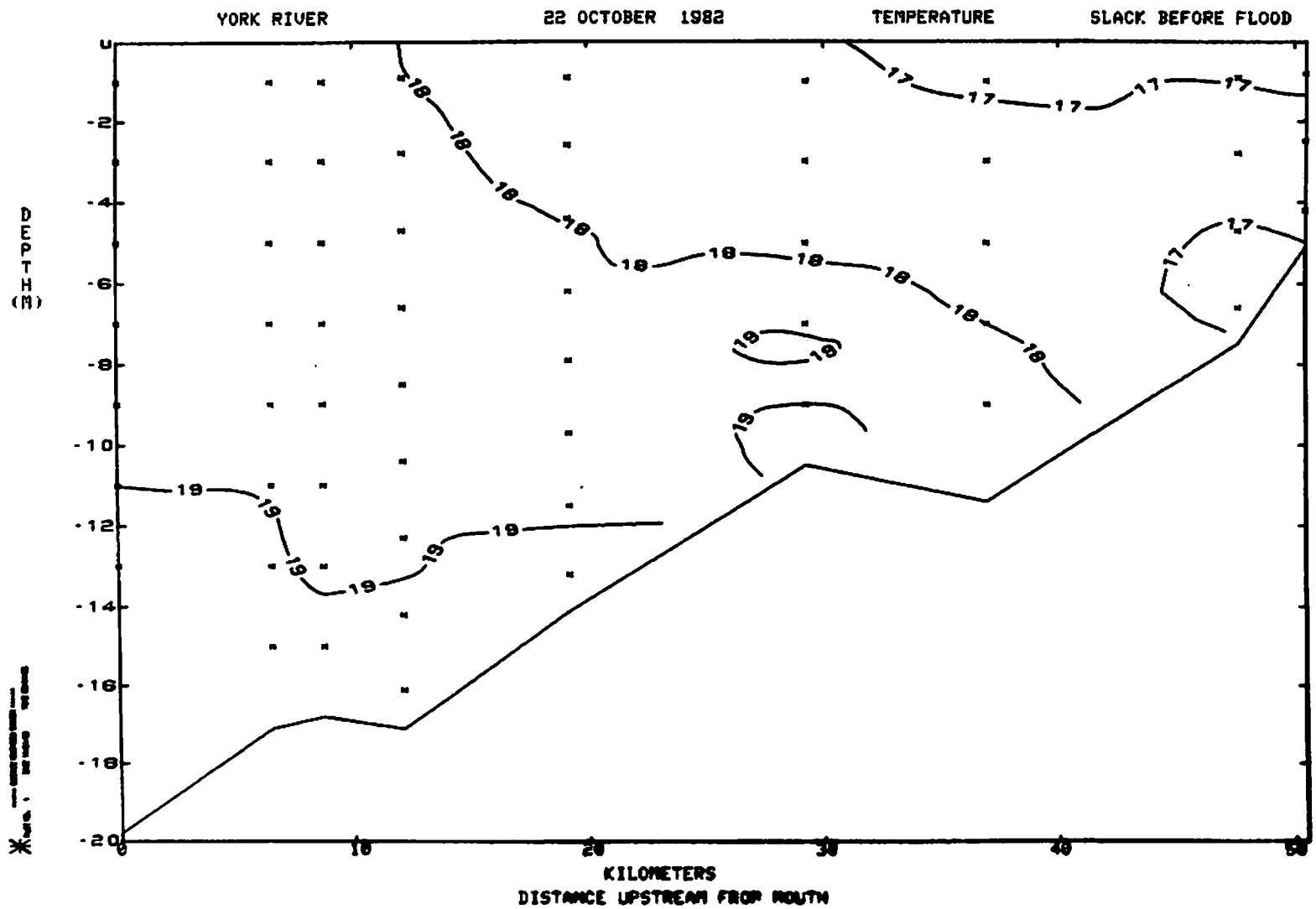

RAPPAHANNOCK RIVER
20 OCTOBER 1982
SALINITY
SLACK BEFORE FLOOD
DEPTH (M)
-1
-3
-5
-7
-9
-11
-13
-15
-17
-19
-21
-25
0
50
100
150
KILOMETERS
DISTANCE UPSTREAM FROM MOUTH

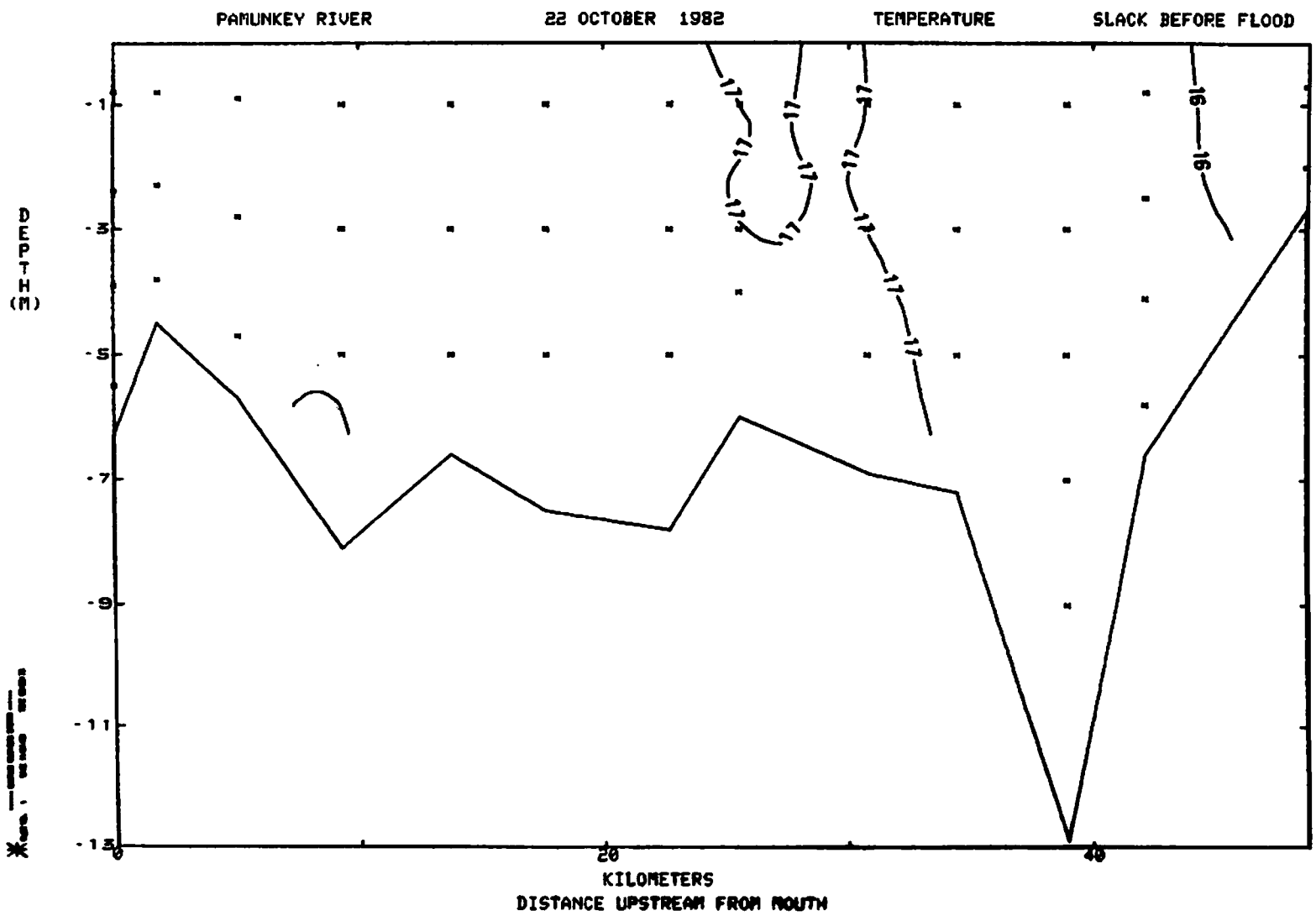

RAPPAHANNOCK RIVER
20 OCTOBER 1982
TEMPERATURE
SLACK BEFORE FLOOD
DEPTH (M)
-1
-3
-5
-7
-9
-11
-13
-15
-17
-19
-21
-23
0
50
100
KILOMETERS
DISTANCE UPSTREAM FROM MOUTH

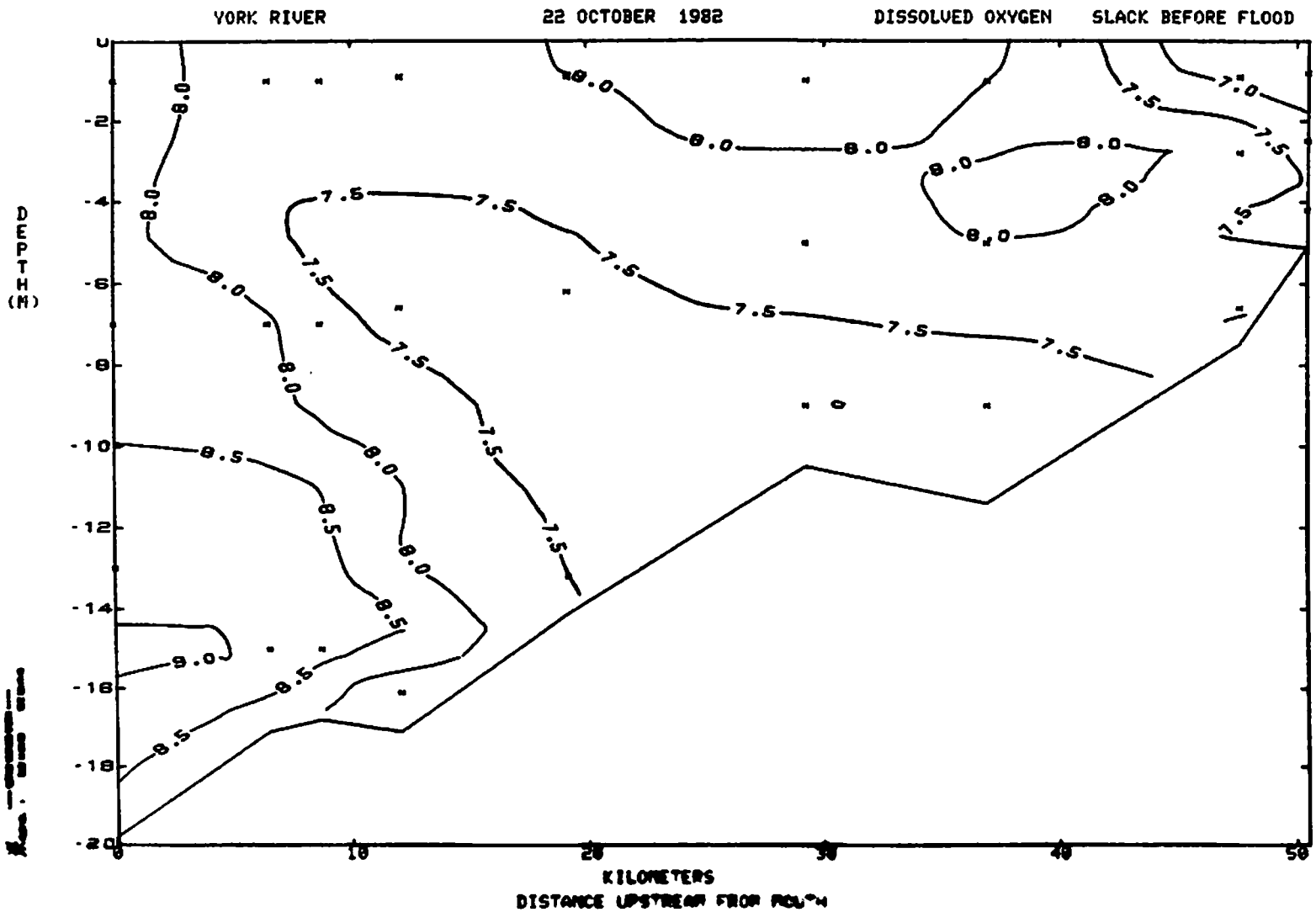

RAPPAHANNOCK RIVER
20 OCTOBER 1982
DISSOLVED OXYGEN
SLACK BEFORE FLOOD
DEPTH (M)
-1
-3
-5
-7
-9
-11
-13
-15
-17
-19
-21
-23
0
50
100
150
KILOMETERS
DISTANCE UPSTREAM FROM MOUTH

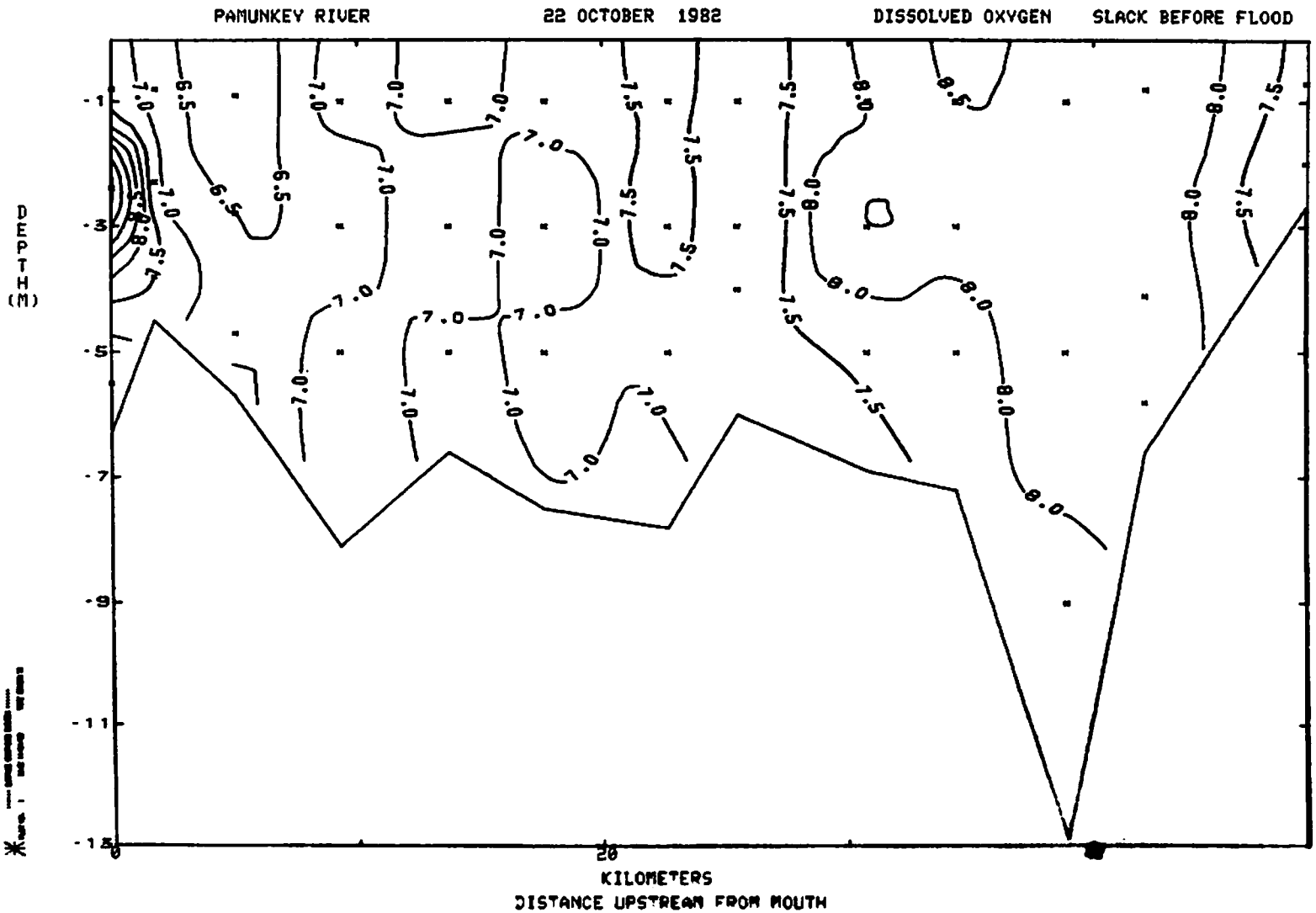

YORK RIVER
22 OCTOBER 1982
SALINITY
SLACK BEFORE FLOOD
DEPTH (M)
KILOMETERS
DISTANCE UPSTREAM FROM MOUTH


PAMUNKEY RIVER
22 OCTOBER 1982
SALINITY
SLACK BEFORE FLOOD
DEPTH (M)
-1
-3
-5
-7
-9
-11
-13
0
20
KILOMETERS
DISTANCE UPSTREAM FROM MOUTH


YORK RIVER
22 OCTOBER 1982
TEMPERATURE
SLACK BEFORE FLOOD
DEPTH (M)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
0
10
20
30
40
50
KILOMETERS
DISTANCE UPSTREAM FROM MOUTH
17
18
19


PAMUNKEY RIVER
22 OCTOBER 1982
TEMPERATURE
SLACK BEFORE FLOOD
DEPTH (M)
-1
-3
-5
-7
-9
-11
-13
17
17
17
17
17
17
17
16
16
0
20
40
KILOMETERS
DISTANCE UPSTREAM FROM MOUTH


YORK RIVER
22 OCTOBER 1982
DISSOLVED OXYGEN
SLACK BEFORE FLOOD
DEPTH (M)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
8.0
7.5
8.5
9.0
0
10
20
30
40
50
KILOMETERS
DISTANCE UPSTREAM FROM MOUTH


PAMUNKEY RIVER
22 OCTOBER 1982
DISSOLVED OXYGEN
SLACK BEFORE FLOOD
DEPTH (M)
-1
-3
-5
-7
-9
-11
-13
0
20
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DISTANCE UPSTREAM FROM MOUTH

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Little Creek, Lynnhaven:	Nov. 11, Dec. 8
Elizabeth River:	Nov. 18, Dec. 9

Surface and bottom temperatures, salinities, DO and Secchi depth were measured at designated stations.

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For further information, make requests to Dr. Albert Kuo, Virginia Institute of Marine Science, Gloucester Point, VA 23062, (804)642-2111.

Lesser Neap Tide

November 23

Comments on Slackwater Run Data

The salinity data show that limits of salt intrusion have been pushed downstream (by 5 to 10 km) in all three rivers as a result of seasonal increase in freshwater runoff.

Dissolved oxygen concentrations (data not attached) are high throughout the rivers, above 8.0 mg/l except the bottom water at York River mouth where the DO is about 7.0 mg/l.

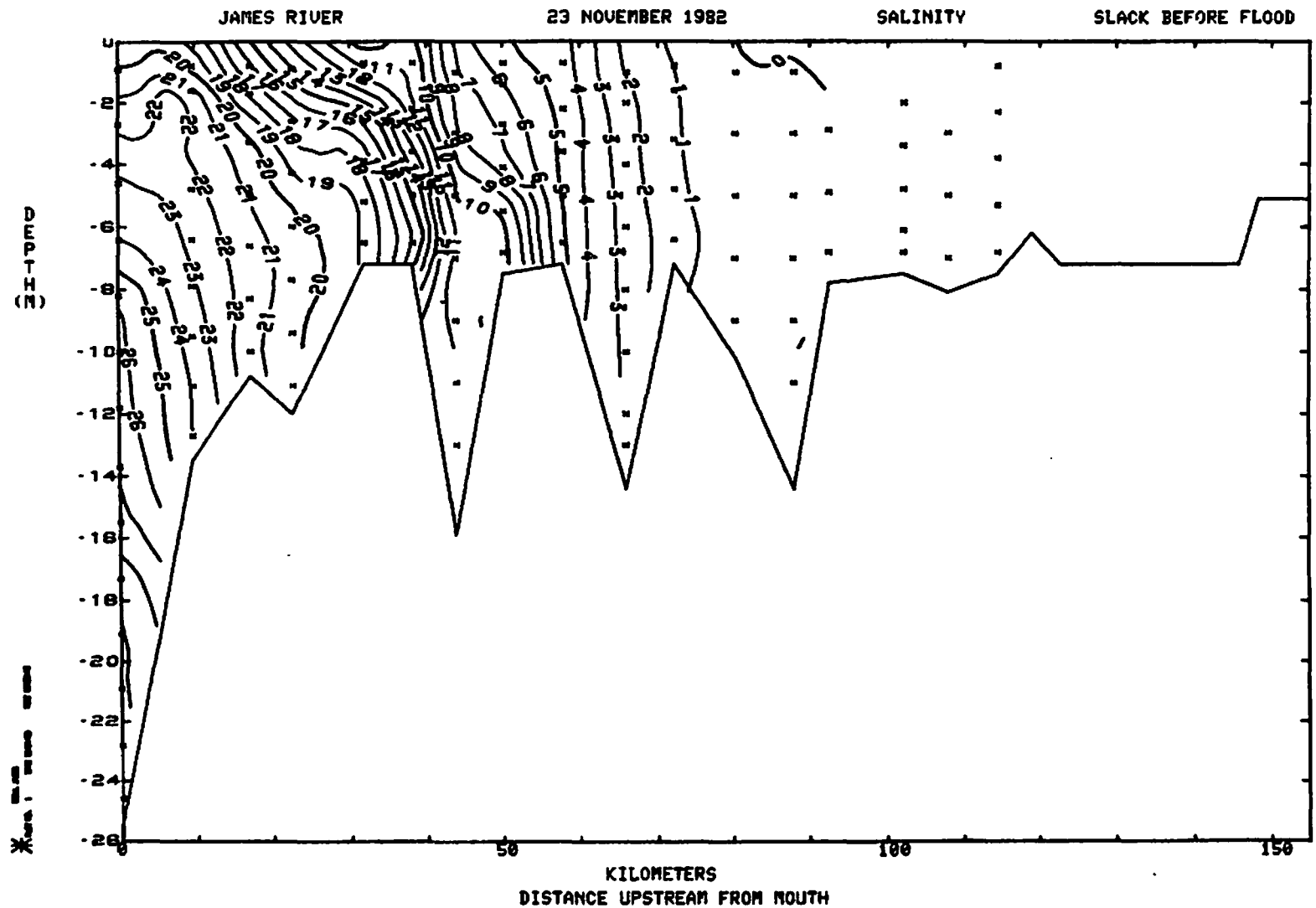
Scheduled Surveys

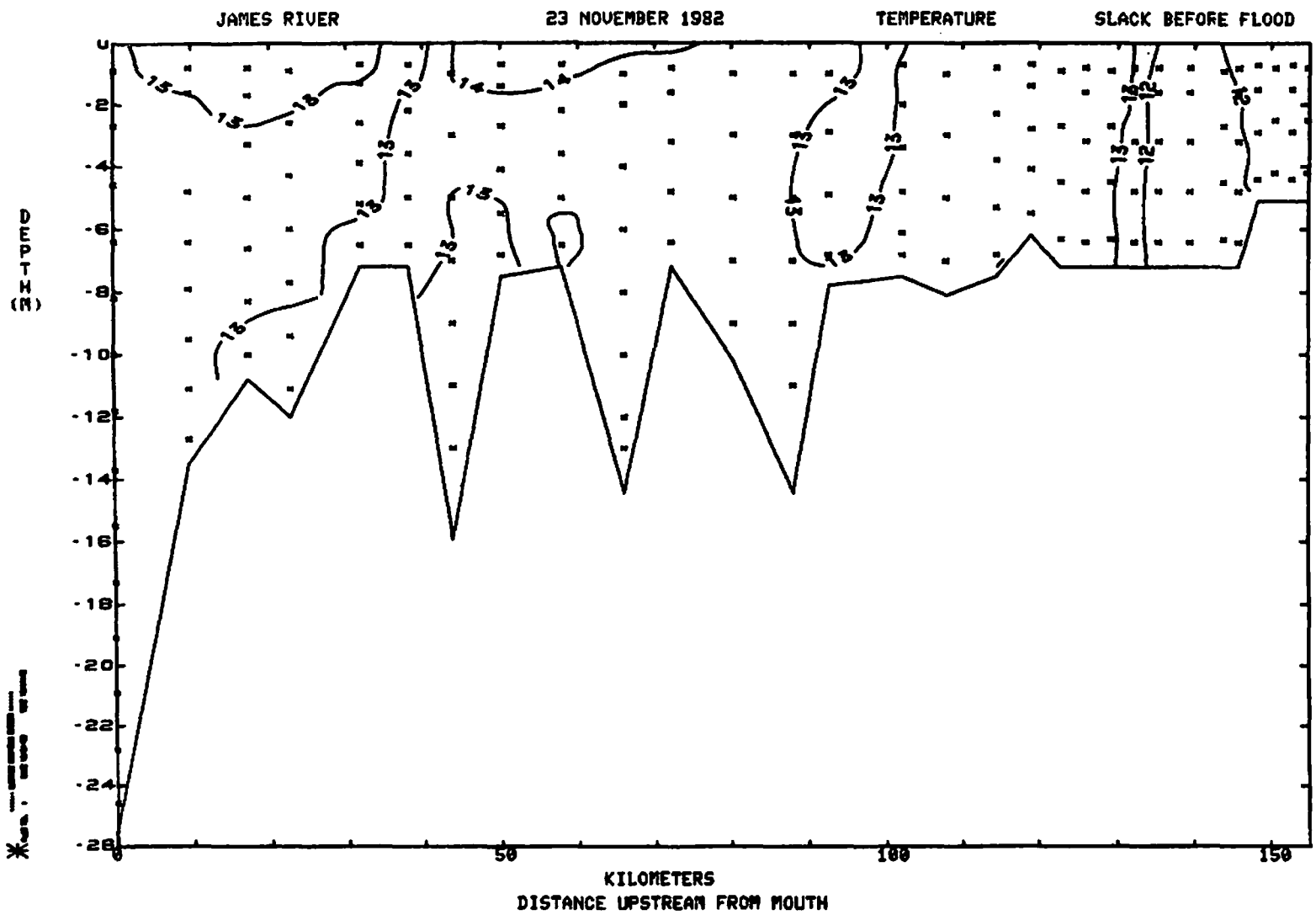
(1) Slackwater Runs

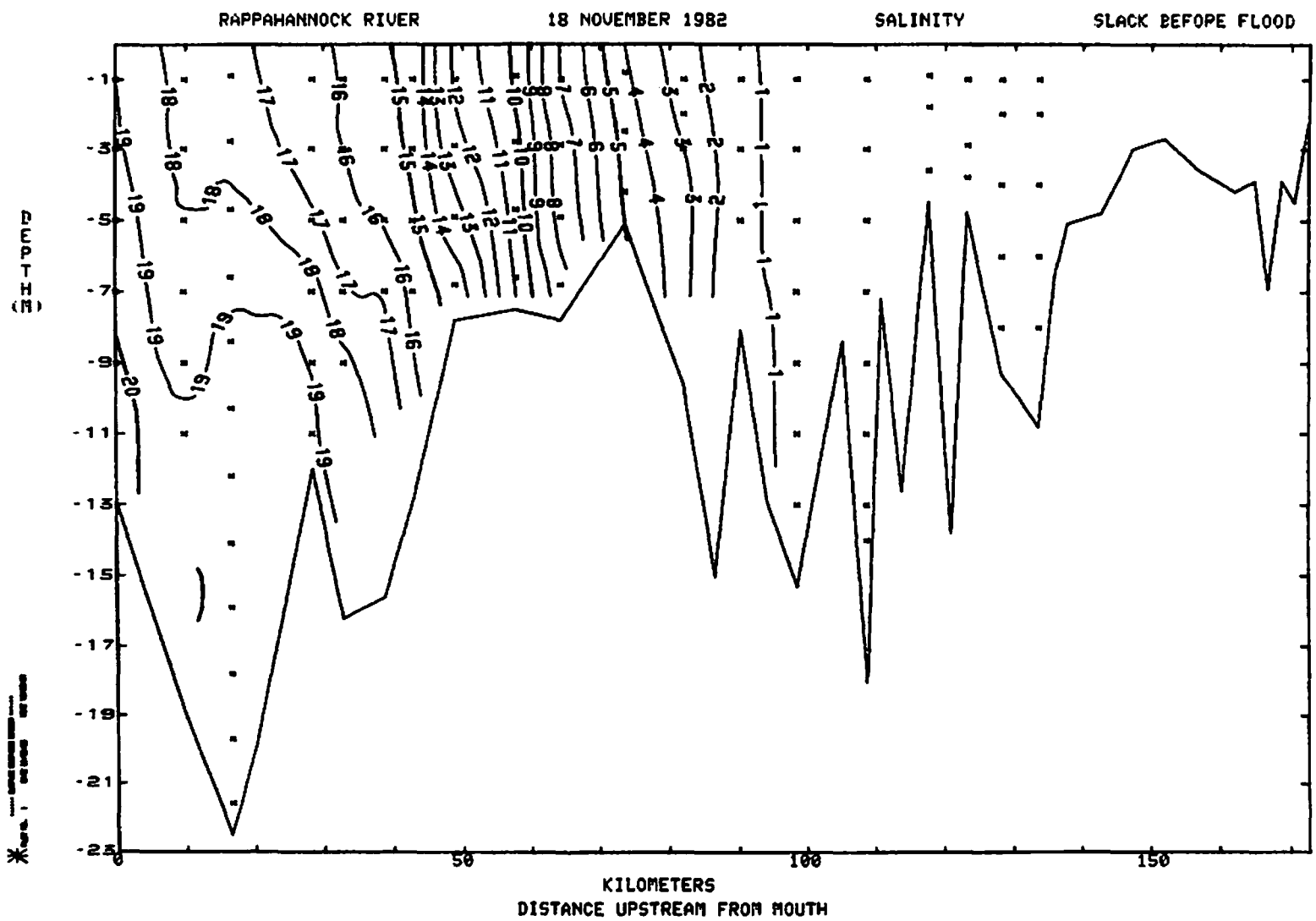
No slackwater runs will be scheduled until March 1983. No report will be issued for the months of December, January and February.

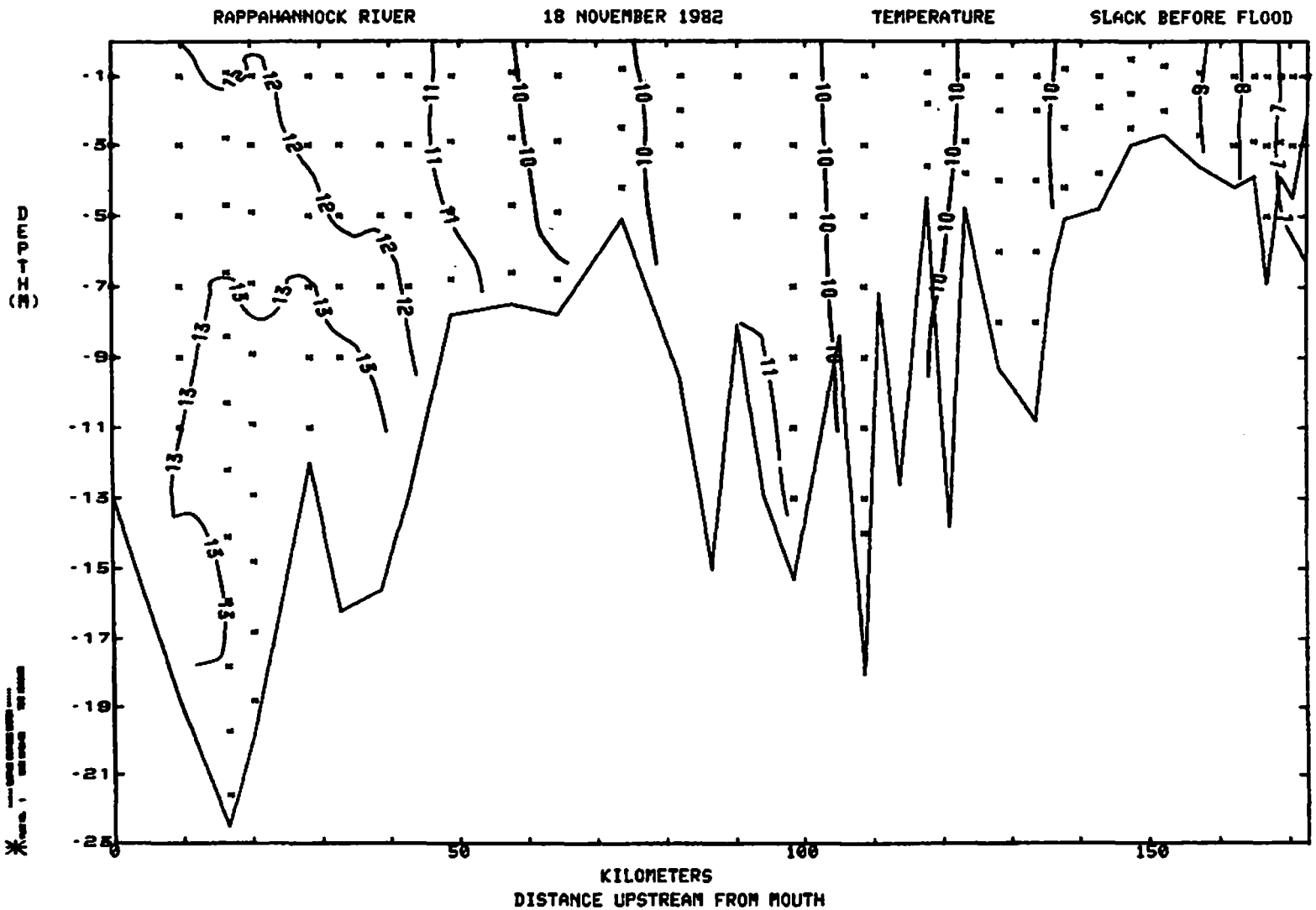
(2) Joint Crab-Fish Trawl Surveys - by Frank Wojcik

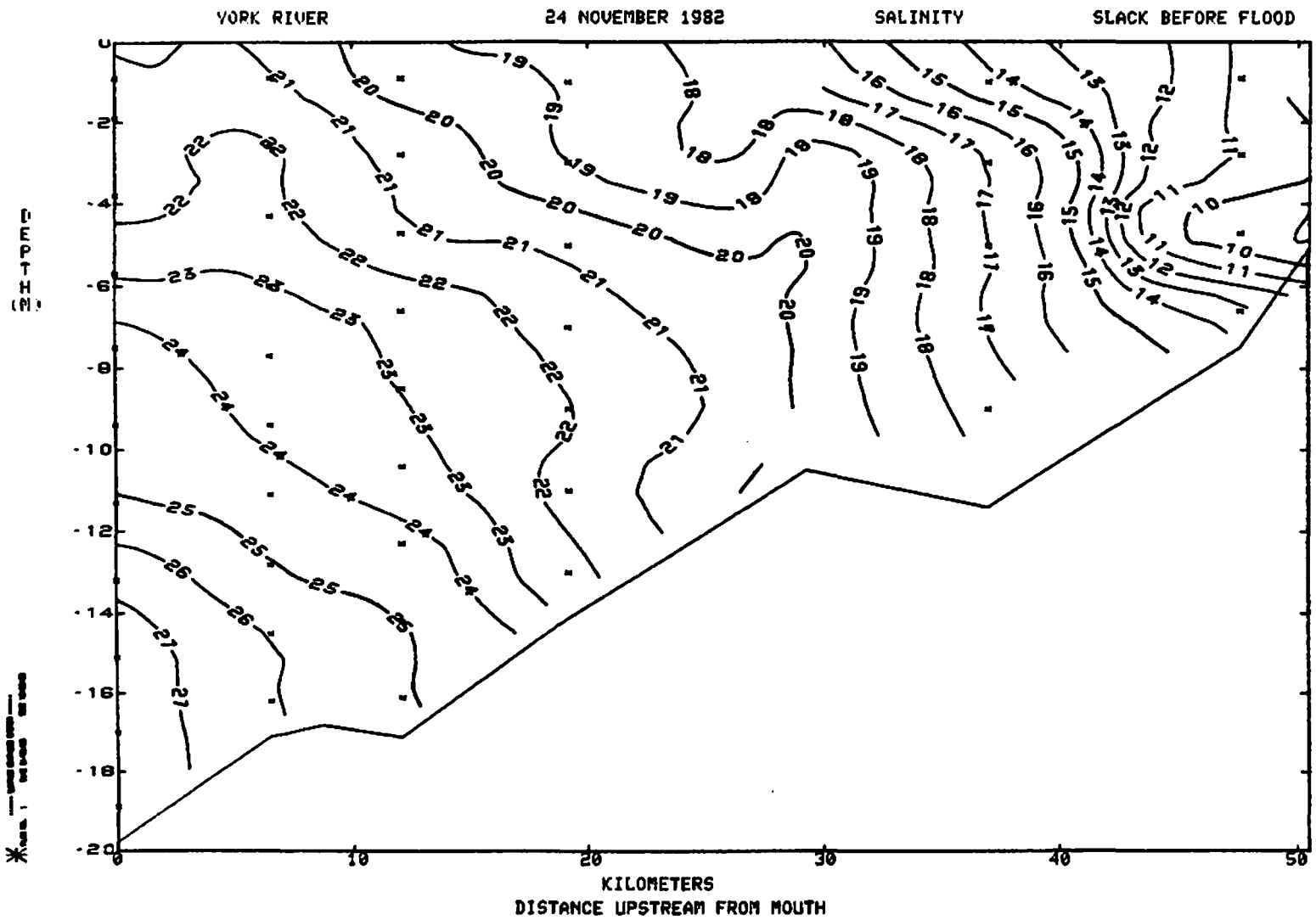
The survey will be conducted once a month, including January and February.

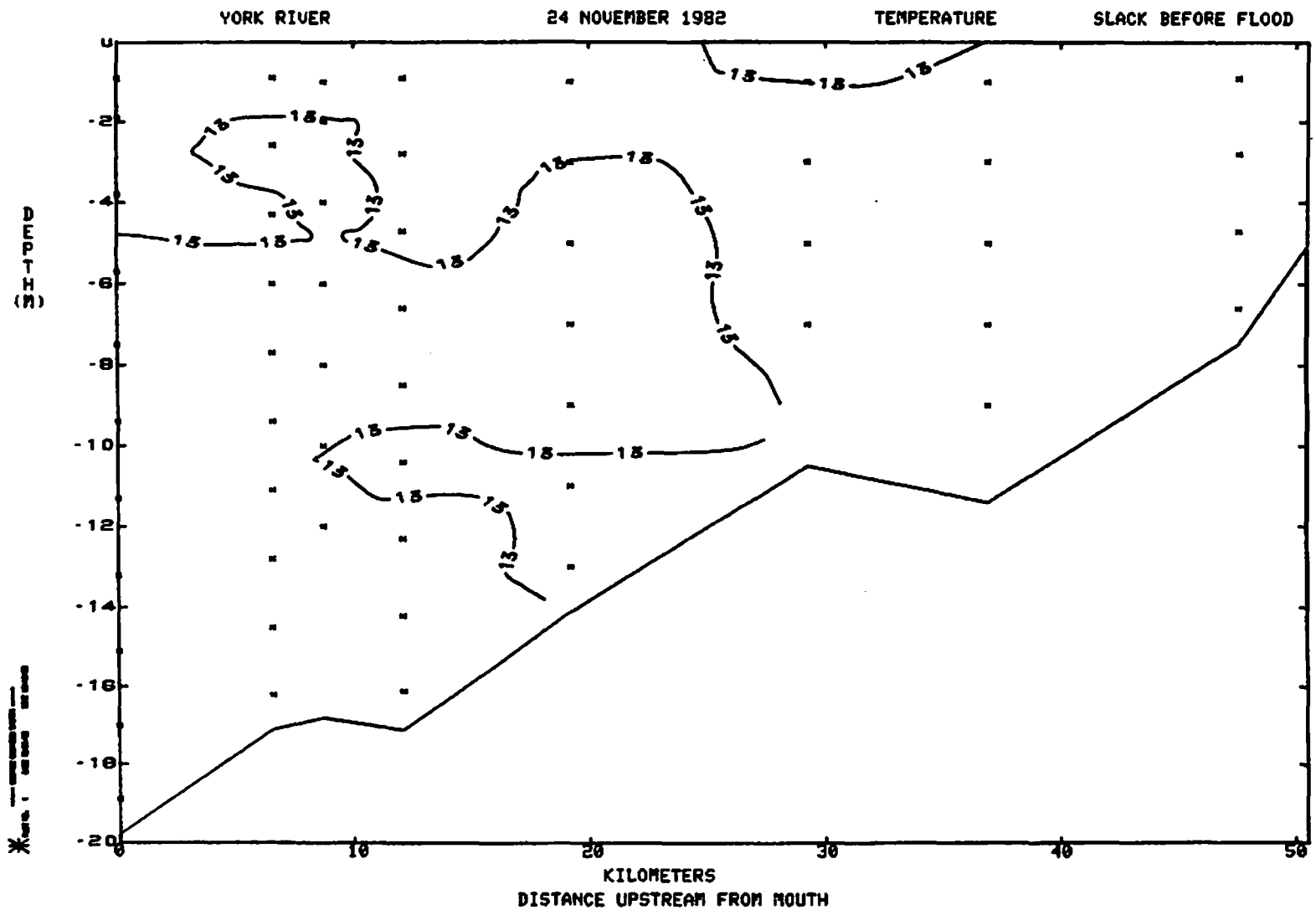

JAMES RIVER
23 NOVEMBER 1982
SALINITY
SLACK BEFORE FLOOD
DEPTH (M)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
0
50
100
150
KILOMETERS
DISTANCE UPSTREAM FROM MOUTH

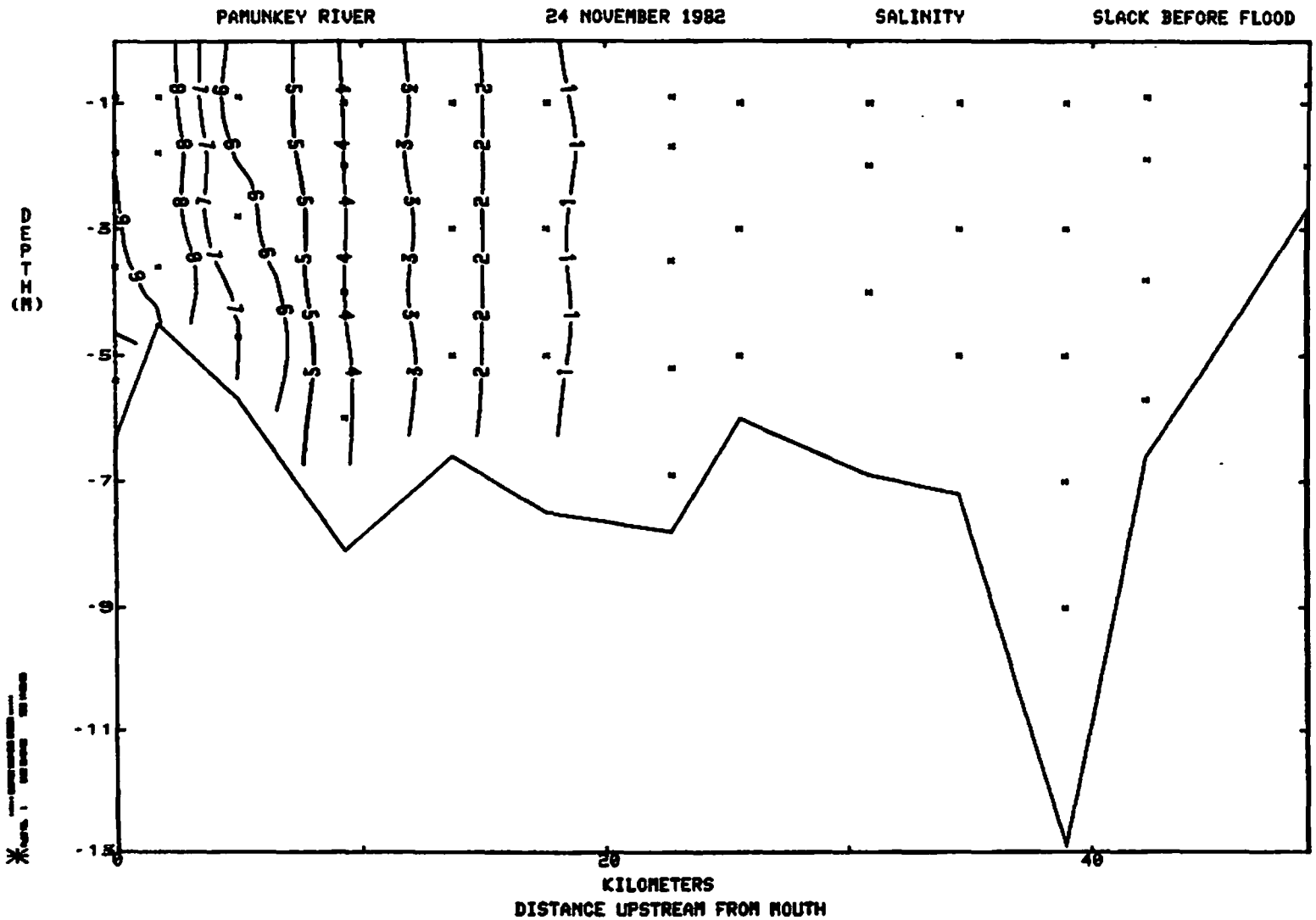

JAMES RIVER
23 NOVEMBER 1982
TEMPERATURE
SLACK BEFORE FLOOD
DEPTH (M)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-28
0
50
100
150
KILOMETERS
DISTANCE UPSTREAM FROM MOUTH

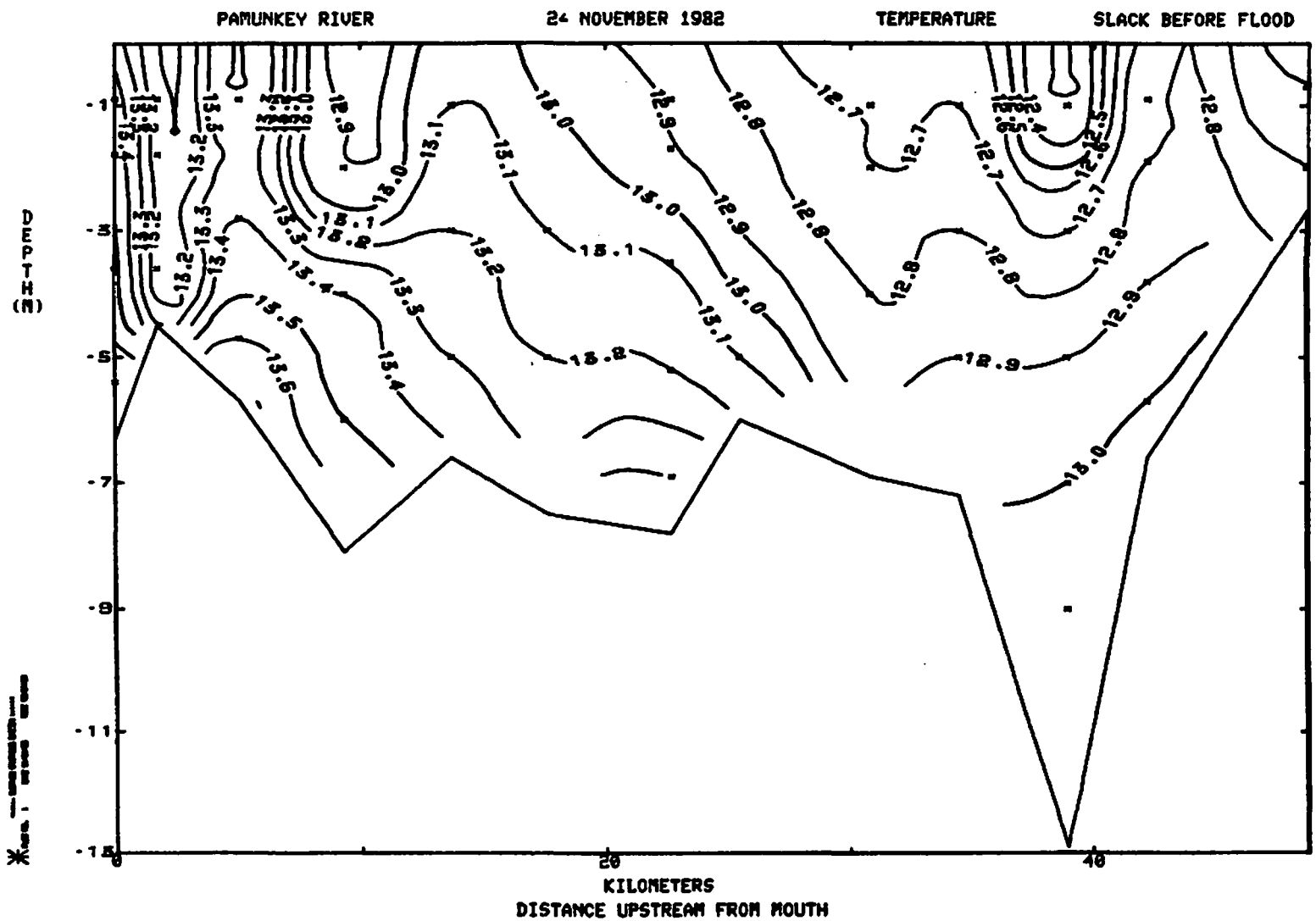

RAPPAHANNOCK RIVER
18 NOVEMBER 1982
SALINITY
SLACK BEFORE FLOOD
DEPTH (M)
-1
-3
-5
-7
-9
-11
-13
-15
-17
-19
-21
-25
0
50
100
150
KILOMETERS
DISTANCE UPSTREAM FROM MOUTH


RAPPAHANNOCK RIVER
18 NOVEMBER 1982
TEMPERATURE
SLACK BEFORE FLOOD
DEPTH (M)
-1
-5
-7
-9
-11
-13
-15
-17
-19
-21
-25
0
50
100
150
KILOMETERS
DISTANCE UPSTREAM FROM MOUTH


YORK RIVER
24 NOVEMBER 1982
SALINITY
SLACK BEFORE FLOOD
DEPTH (M)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
0
10
20
30
40
50
KILOMETERS
DISTANCE UPSTREAM FROM MOUTH


YORK RIVER
24 NOVEMBER 1982
TEMPERATURE
SLACK BEFORE FLOOD
DEPTH (M)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
15
13
0
10
20
30
40
50
KILOMETERS
DISTANCE UPSTREAM FROM MOUTH


PAMUNKEY RIVER
24 NOVEMBER 1982
SALINITY
SLACK BEFORE FLOOD
DEPTH (M)
-1
-3
-5
-7
-9
-11
-13
0
20
40
KILOMETERS
DISTANCE UPSTREAM FROM MOUTH


PAMUNKEY RIVER
24 NOVEMBER 1982
TEMPERATURE
SLACK BEFORE FLOOD
DEPTH (M)
-1
-3
-5
-7
-9
-11
-13
0
20
40
KILOMETERS
DISTANCE UPSTREAM FROM MOUTH