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A BIOLOGICAL AND CHEMICAL STUDY OF THE NANSEMOND RIVER, VIRGINIA

by

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This paper constitutes a final contract report from the Virginia Institute of Marine Science to the Federal Water Pollution Control Administration on work performed under Contract WA 66-12.

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SUMMARY AND RECOMMENDATIONS

This study was initiated to measure the physical, chemical, and biological parameters of the Nansemond River system. Twenty-three cruises were conducted during the twelve-month period. Supplementary data were provided by the Annapolis Field Station, F.W.P.C.A., the cities of Suffolk, Norfolk, and Portsmouth, and other Virginia state agencies.

The Nansemond River, a small tributary of the James River, has been grossly modified by man's activities. Domestic water supply reservoirs on the main stream above Suffolk and on the Western Branch collect runoff for eventual discharge into other drainage systems. Nutrient loadings from sewage treatment plant effluents produce over-enrichment levels capable of supporting aesthetically undesirable phytoplankton populations. Organic loadings from the Suffolk area exceed the assimilation capacity of the system and subminimal dissolved oxygen levels are produced. Also, the bacterial count in the water of the upper reach exceeds the recommended levels for the direct marketing of shellfish or for water contact sports (Virginia Health Department and Water Control Board Data).

The modified freshwater inflow patterns are responsible for the reduction in assimilation capacity of the upper reaches. The data indicate that dilution rates are minimal and that the "time of passage" is primarily due to tidal diffusion and advection. The volume of "new water" available on each tidal cycle is insufficient to satisfy the

oxygen demand of the organic loadings or dilute the nutrient and bacterial loadings to acceptable levels. The two uses now being made of the upper reach are incompatible if the water quality is to be suitable for the other intended uses.

The lower reach of the Nansemond River from Hollidays Point to the mouth is heavily influenced by water from Hampton Roads. Although this section is extremely vulnerable to degradation from the by-products of man's activities, the present loadings do not appear to be seriously affecting the water quality. The data indicate that the heaviest loadings would occur shortly after a freshet overflow at the head of the system when the organic accumulation in the upper reach would be flushed into the lower section.

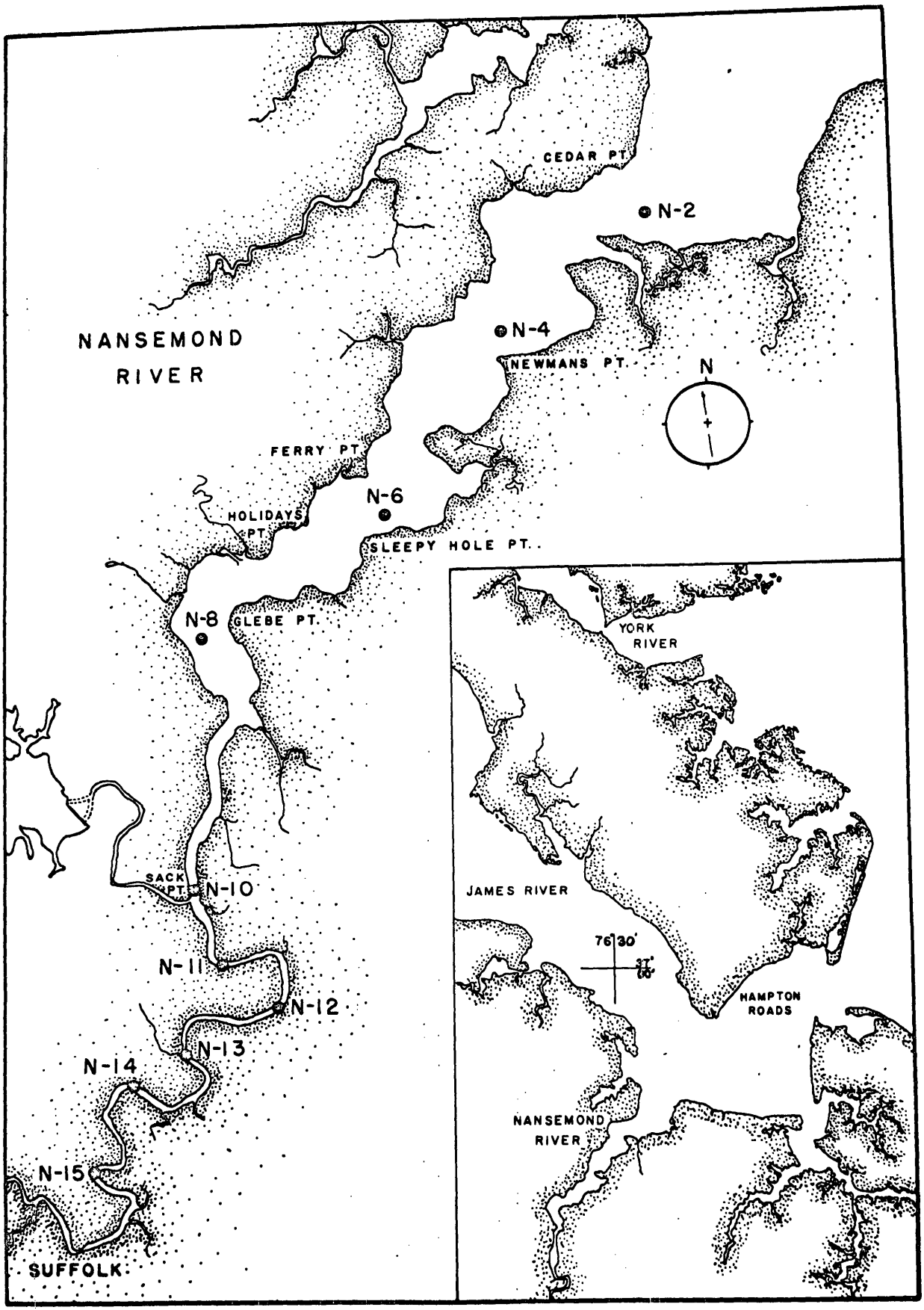
The Nansemond River provides an ideal environment for specific detailed field studies. Although the freshwater inflow volume is low, it can be described quite accurately. Also, the nutrient source can be quantified.

We, therefore, recommend that additional studies be conducted on the Nansemond River to gather data which will add to our knowledge of nutrient dynamics in the natural environment. The data presented are insufficient to accurately describe the particulate organic $\longrightarrow$ soluble organic $\longrightarrow$ ammonia $\longrightarrow$ nitrite $\longrightarrow$ nitrate $\longrightarrow$ particulate organic nitrogen cycle. Also, additional valuable information could be obtained on the phosphorus cycle in the estuarine environment. More detailed information on the freshwater inflow would be required to augment the chemical data.

Additional data on nutrient cycles in estuarine environments are required to aid water management agencies in preserving the multi-use characteristics of these systems.

Figure 1--THE NANSEMOND RIVER.

(Numbers indicate station locations in miles from mouth.)


NANSEMOND
RIVER
CEDAR PT.
N-2
N-4
NEWMANS PT.
N
FERRY PT.
N-6
HOLIDAYS PT.
SLEEPY HOLE PT.
N-8
GLEBE PT.
SACK PT.
N-10
N-11
N-12
N-13
N-14
N-15
SUFFOLK
YORK
RIVER
JAMES RIVER
76°30'
37°00'
HAMPTON
ROADS
NANSEMOND
RIVER

GENERAL HYDROGRAPHY

The Nansemond River is a small 16-mile tributary of the James River. It originates in the Suffolk-Dismal Swamp area and discharges into Hampton Roads eight miles upstream from Chesapeake Bay (Fig. 1). The freshwater discharge into the system is modified by a series of domestic water supply reservoirs on the tributary streams. The water withdrawn from these impoundments is utilized by the cities of Suffolk, Portsmouth, Norfolk, and Virginia Beach, and all but a small percentage is discharged as waste water into other watersheds. Data provided by the reservoir owners indicate that the daily base flow probably averaged approximately 1 m.g.d. and freshet discharges were measured on only 35 days during the study period (Table 1).

The modified freshwater inflow patterns are reflected in the salinity distributions in the estuary (Appendix A). Only base flow discharges entered the system from 27 August 1966 to 9 January 1967. A salinity gradient of approximately 15 ‰ from the mouth to the station 15 miles upstream (N-15) was measured on the 6 September cruise but the gradient decreased to less than 6 ‰ in December. Salinity values near the mouth reflect the values in Hampton Roads as influenced by runoff into the James River system and the Chesapeake Bay. Surface to bottom gradients are usually less than 1 ‰, indicating that very little stratification occurs in the water column. Except during periods of high runoff, a condition encountered only during January, February, and

TABLE 1--SUMMARY OF FRESHET FLOWS OVER THE RESERVOIR SPILLWAYS INTO THE NANSEMOND RIVER FOR PERIOD 1 JULY 1966 THROUGH 30 JUNE 1967.[1]

Western Branch--No Discharge During Period

Headwater Dam

Period	Total Freshwater Discharged
1 July 1966-12 August 1966	No Discharge
13 August 1966-14 August 1966	122,434,000 gallons
23 August 1966-26 August 1966	236,800,000 gallons
27 August 1966-9 January 1967	No Discharge
10 January 1967-13 January 1967	387,157,000 gallons
14 January 1967-17 January 1967	No Discharge
18 January 1967-29 January 1967	715,200,000 gallons
30 January 1967-6 February 1967	No Discharge
7 February 1967-9 February 1967	125,668,000 gallons
10 February 1967-16 February 1967	No Discharge
17 February 1967-24 February 1967	592,051,000 gallons
25 February 1967-1 March 1967	No Discharge
2 March 1967-4 March 1967	278,800,000 gallons
5 March 1967-21 March 1967	No Discharge
22 March 1967-27 March 1967	298,000,000 gallons
28 March 1967-30 June 1967	No Discharge

[1]Source of Data--Water Division, City of Norfolk
Water Department, City of Portsmouth

March 1967, salinities exceeding 5 ‰ were found at all stations from the mouth to the head of the estuary at Suffolk.

Water temperatures in the system ranged from 29°C in August to 3°C in March. Temperature values near the head of the system were modified by the upstream impoundments which served to decrease the longitudinal gradient produced by freshwater runoff.

DISSOLVED OXYGEN

Water samples were collected at 2-meter intervals through the water column on each cruise for dissolved oxygen determinations. The chemicals required for fixing the samples were added in the field and the analytical titrations were made in the laboratory. The results are given in Appendix A.

The data indicate that the organic loadings at the head of the estuary exceed the assimilation capacity of the system. Dissolved oxygen values of less 4 mgl^{-1} were measured throughout the estuary in July 1966 and at all stations upstream from N-8 during August and September. Water temperatures decreased after September and the dissolved oxygen values increased accordingly. However, subminimal levels were recorded at N-15 in November when the water temperature was 11°C. The dissolved oxygen levels in the system increased as the water temperatures reflected winter temperatures and "k" rates decreased. Oxygen levels exceeding the minimum requirements were measured through the spring freshet period through 14 June 1967.

NUTRIENTS

The nutrient balance in the Nansemond River system was determined during the monthly cruises. Water samples were iced and returned to the laboratory for analyses. Four forms of phosphorus--soluble reactive (SRP), soluble unreactive (SUP), particulate reactive (PRP), and particulate unreactive (PUP) levels--were determined. In addition, the soluble organic nitrogen (SON), ammonia, nitrite, nitrate, and particulate organic nitrogen (PON) levels were measured. The values found are given in tabular form in Appendix A and graphically in Appendix B.

Sewage treatment plant effluents from the city of Suffolk are the primary source of nutrient elements into the Nansemond River. This city, with a population of 13,000, discharges approximately 1.5×10^{-2} metric tons of phosphorus compounds and approximately 4.5×10^{-2} metric tons of nitrogen compounds into the headwater reach each day. The sewage treatment plant outfall is located just downstream from a reservoir dam, thus eliminating significant upstream transport by flood tide currents.

PHOSPHORUS--The data indicate that from 50-90% of the phosphorus introduced into the headwater reach of the Nansemond River was in the soluble reactive ($PO_4^{\equiv}$) form. Phosphate phosphorus is immediately available to aquatic plants and, if no other environmental factors are limiting, is utilized within a short time period. After incorporation into biological material, the phosphorus would be measured as the particulate unreactive form. Grazing by herbivores and abiotic factors would remove a fraction of the phosphorus from the system during each theoretical regeneration cycle.

Phosphorus levels and dynamics of uptake and/or removal and regeneration were best demonstrated in the Nansemond River during the period September 1966 through January 1967 when freshwater discharges were at base flow. The SRP levels exceeded 10 ug.at l^{-1} at Station N-15 just downstream from the sewage treatment plant outfall. A rapid reduction in SRP concentrations occurred through Stations N-14, N-13, and N-12, followed by a lower rate of loss or conversion in the downstream reach. A similar pattern of removal from solution or suspension was noted for the PRP, SUP, and PUP levels. Regeneration or resuspension was not detected at any station along the 16-mile system at any time during this period.

The spring freshwater runoff period was demonstrated by a dilution and a more rapid transport of the phosphorus forms into the downstream areas but the data indicate that the system approaches steady-state conditions within a very short time after the freshet flows cease.

NITROGEN--Sewage treatment plant effluents contain nitrogen in many organic and inorganic forms. The efficacy of the treatment plant determines the ratio of particulate and reduced forms to the oxidized forms. However, in the upper Nansemond River the data indicate that the assimilation capacity is exceeded and reducing conditions occur in the receiving stream.

The nitrogen data collected from the ten stations during the study period indicate the high level of enrichment in the headwater reach and the incomplete oxidation of nitrogeneous compounds. The total nitrogen in suspension or solution exceeded 150 ug.at l^{-1} during most cruises.

Ammonia plus soluble organic nitrogen and particulate organic nitrogen were the predominant forms present within the system. Values at N-15 always exceeded the values found at the downstream stations because of its proximity to the sewage treatment plant outfall; however, the rate of reduction of nitrogen in solution or suspension was not as high as was found for phosphorus. Nitrite nitrogen was found in significant concentrations in the upper reach during the period when dissolved oxygen levels were minimal but the levels decreased to less than 1 ug.at l^{-1} at the aerobic downstream stations. Nitrate nitrogen, the final oxidation product, was present in significant quantities at all stations during the sampling period. The levels decreased progressively downstream but the data indicate that the levels were constantly being augmented by the oxidation of the more reduced forms.

DISCUSSION--Nutrient element transport in the Nansemond River is dependent upon the base flow into the system from the sewage treatment plant outfall, the discharge from Shingle Creek, ground water inflow, and on freshet discharges over the reservoir spillway. Since freshet discharges were measured on only 35 days during the study period, the base flows and tidal diffusion and advection provided the predominant transport mechanism. The influence of the base flows can be evaluated from the salinity data more accurately than from the non-conservative substances within the system.

No significant freshet discharges were measured from 27 August 1966 to 9 January 1967. Salinity values from N-2 to N-15 ranged from 20.3 ‰ at the mouth to 5.5 ‰ at the head. On the cruise operated 5 December

1966, salinity values at N-2 had decreased to 17.4 ‰ due to the influence of Hampton Roads salinities but the salinities at N-15 had increased to 11.6 ‰. The salinity gradient through the system was only 5.8 ‰, indicating that near steady-state conditions had been established. The data, therefore, indicate that base flows provide a very weak mechanism for nutrient transport.

Nutrient data collected during the fall and early winter are interpreted as being indicative of near steady-state conditions. Values which were extremely high at Station N-15 decreased through the narrow reach through Station N-11 and then tended to remain fairly constant through Station N-2. The wide lower reach appears to be more characteristic of an embayment in which the influence of the inflow is a minor factor and only the upper reach is affected by the nutrient enrichment.

NUTRIENT-SEDIMENT RELATIONSHIPS--A sediment analyses program was conducted to determine the nitrogen and phosphorus content of the top 1 cm of benthic material. Samples were collected from outside the navigation channel with a grab-type dredge. The contents were carefully discharged into a tray and a top 1 cm core removed. The sample was cooled to 0°C and returned to the laboratory. Sub-samples of the dried sediment were analyzed for total reactive and total unreactive phosphorus and for ammonia plus organic, nitrite, and nitrate nitrogen. The data were calculated as $ug.g^{-1}$ dry weight of sample and are presented in Appendix C.

Sediment phosphorus data from the Nansemond River indicate a gradual decrease in both reactive and unreactive forms from the head to the mouth.

The source of the phosphorus is at the head of the river but distribution is probably the result of direct sedimentation and estuarine hydrodynamics. The weak net upstream current which is present in the lower layer of the system would tend to transport phosphorus-bearing organic and inorganic particles towards the head of the system. This mode of action is substantiated by the nearly equal values and proportion of reactive and unreactive phosphorus in Hampton Roads area.

The nitrogen levels in the sediments also indicated the influence of the source of enrichment. Ammonia plus organic nitrogen was the predominant form at all stations, but the ratio to the oxidized forms was the highest at Station N-15. A reduction in the concentration of the reduced forms was noted at N-11 but the oxidized forms did not increase accordingly. All forms increased in the vicinity of the Western Branch tributary at N-10, decreased at Station N-8, then remained nearly constant to the mouth.

Nitrogen compound dynamics are difficult to evaluate in estuarine sediments because of the high solubilities of a few organic forms and of all inorganic forms. The nitrification of insoluble organic nitrogeneous material results in the production of water soluble ions which may diffuse into the overlying water mass.

Although the nutrient levels in the sediments were 10^3 to 10^4 higher than usually measured in the overlying column, the data did not establish that the sediments served as a nutrient sink. The higher phosphorus levels in the upper 3 miles of the river were probably due in part to the source of enrichment but even in this area the sediment levels did not reflect the degree of enrichment.

PHYTOPLANKTON

The nutrient data indicate that the Nansemond River would be capable of supporting phytoplankton populations of sufficient densities to destroy the aesthetic value of the stream and produce environmental degradation. Population levels, as indicated by chlorophyll "a" concentrations in the water, show that aquatic nuisance conditions developed only during one period (July 1967) of the investigation. The data are presented in Appendices A, B, and D.

Water samples were collected at each station during the 12-month sampling period for qualitative phytoplankton analysis and for chlorophyll "a" determinations. The qualitative samples were preserved and returned to the laboratory for dominant genera determinations and the chlorophyll levels were determined by standard fluorometric techniques.

The data indicate that Peridinium trochoideum was the dominant organism in the atypical populations in the headwater region during the summer months, whereas Thalassiosira nordenskioldii and Peridinium triquetrum were the dominant forms during the winter months. Population levels capable of degrading the environment were not observed from Station N-10 to the mouth.

Phytoplankton levels, as indicated by chlorophyll "a" concentration, did not indicate distinctive seasonal patterns. With the exception of the levels found at the upstream stations in July 1967, the values were within the limits expected for an estuarine environment. However, the absence of a distinct increase in chlorophyll concentrations during the winter months was unexpected. Usually a winter or spring pulse due to

cold water diatom forms can be measured in the estuaries of the mid-Atlantic region.

Aesthetically undesirable conditions produced by "Red Tide" organisms did not develop in the Nansemond River during the period of the investigation.

APPENDIX A

BIOLOGICAL, CHEMICAL, AND PHYSICAL DATA FROM TEN STATIONS ON THE NANSEMOND RIVER

DATA SHEET

RIVER Nansemond CRUISE DATE 21 July 1966

STATION	DEPTH (M)	TEMP (C)	SALINITY (‰)	DO (mgl^{-1})	TRANS. (M.SD)	pH	ALK ($meql^{-1}$)	SS (mgl^{-1})	LOI (mgl^{-1})	FR (mgl^{-1})
N-2	1	26.1	19.45	4.00	0.6	7.61	1.61	24.3	3.8	20.5
	3	26.0	19.55	3.79		7.52				
	5	25.7	19.68	3.73		7.40				
	7	25.7	19.71	3.93		6.90	1.65	128.4	22.4	106.0
N-4	1	26.1	19.14	3.98	0.6	7.60	1.62	37.0	8.3	28.7
	3	25.8	19.20	4.28		7.55	1.65	217.0	20.0	197.0
N-6	1	26.0	18.57	3.63	0.5	7.49	1.63	47.6	7.2	40.4
	3	25.7	18.53	3.77		7.50	1.66	79.0	16.5	62.5
N-8	1	26.1	17.57	3.29	0.4	7.30	1.75	59.6	8.0	51.6
	3	26.1	17.58	3.29		7.30	1.75	86.0	13.5	72.5
N-10	1	26.2	15.84	3.53	0.6	7.20	1.79	47.5	5.5	42.0
	3	26.2	16.07	3.21		7.20	1.77	68.5	10.5	58.0
N-11	1	27.0	14.87	2.66	0.6	7.35	1.85	47.0	6.5	40.5
	3	26.9	15.24	2.22		7.25				
N-12	1	27.4	14.27	5.71	0.6	7.50	1.82	33.5	8.5	25.0
	3	28.1	13.56	4.06		7.35				
N-13	1	27.3	12.22	4.99	0.6	7.40	1.80	33.0	6.0	27.0
	3	28.3	12.34	4.62		7.45				
N-14	1	27.4	10.85	5.09	0.5	7.40	1.84	30.0	10.0	20.0
	3	27.3	11.14	4.02		7.30				
	5	27.4	11.14	4.28		7.30				
N-15	1	27.6	9.47	4.30	0.6	7.25	1.90	31.2	6.8	24.4
	3	28.0	9.50	4.10		7.35				

DATA SHEET

RIVER Nansemond CRUISE DATE 21 July 1966

STATION	DEPTH (M)	TOT. P (ug.at l^{-1})	SRP (ug.at l^{-1})	PRP (ug.at l^{-1})	SUP (ug.at l^{-1})	PUP (ug.at l^{-1})	NH_4^+ + SON.N (ug.at l^{-1})	NO_2^-.N (ug.at l^{-1})	NO_3^-.N (ug.at l^{-1})	PON (ug.at l^{-1})	TN (ug.at l^{-1})	Chl.a (ugl^{-1})
N-2	1	5.00	2.86	0.18	0.61	1.35	14.8	0.15	3.80	11.2	30.0	9.5
	7	7.80	2.35	0.84	0.40	4.21	8.0	0.15	3.80	24.4	36.4	12.6
N-4	1	6.32	3.15	0.24	0.67	2.26	13.0	0.20	4.00	16.5	33.7	11.0
	3	12.70	2.98	0.31	0.52	8.89	13.0	0.20	3.80	16.5	33.5	14.9
N-6	1	6.83	3.55	0.31	0.57	2.40	11.3	0.10	3.80	13.2	28.4	11.2
	3	7.80	3.50	0.78	0.50	3.02	13.0	0.15	3.80	25.8	42.8	12.9
N-8	1	8.00	3.80	0.26	0.36	3.58	12.2	0.10	4.30	17.8	34.4	14.3
	3	9.10	3.71	1.04	0.41	3.94	13.0	0.10	4.70	27.5	45.3	15.3
N-10	1	9.20	4.00	0.56	0.78	3.86	12.2	0.10	6.20	15.9	34.4	15.3
	3	9.90	4.21	1.13	0.57	3.99	12.0	0.10	5.90	31.0	49.0	15.8
N-11	1	10.40	4.80	0.44	0.70	4.46	19.5	0.10	6.40	19.9	45.9	26.7
N-12	1	11.33	5.60	0.46	1.10	4.17	4.5	0.10	6.60	19.9	31.1	45.2
N-13	1	12.90	6.42	0.62	1.10	4.76	23.2	0.10	7.60	37.0	67.9	76.7
N-14	1	15.47	7.40	0.51	0.80	6.76	4.0	0.20	8.00	42.8	55.0	95.9
N-15	1	19.04	11.80	0.80	0.90	5.54	40.5	1.00	17.40	30.8	89.7	97.6

DATA SHEET

RIVER Nansemond CRUISE DATE 22 August 1966

STATION	DEPTH (M)	TEMP (C)	SALINITY (‰)	DO (mgl^{-1})	TRANS. (M.SD)	pH	ALK ($meql^{-1}$)	SS (mgl^{-1})	LOI (mgl^{-1})	FR (mgl^{-1})
N-2	1	28.3	19.32	5.69	0.8	7.8	1.67	25.3	3.0	22.3
	3	28.1	19.51	5.56		7.6				
	5	28.0	19.57	5.46		7.0	1.68	31.1	6.0	25.1
N-4	1	28.3	18.44	5.58	0.7	7.8	1.68	35.3	7.0	28.3
	3	28.3	18.66			7.8	1.68	56.4	9.6	46.8
N-6	1	28.7	17.21	6.03	0.5	7.7	1.70	54.0	13.6	40.4
	3	28.8	17.86	6.47		7.8	1.70	52.0	14.0	38.0
N-8	1	28.4	13.30	4.05	0.6	7.3	1.69	40.0	9.0	31.0
	3	28.4	14.67	3.63		7.4	1.69	137.5	13.5	124.0
N-10	1	28.3	10.41	2.30	0.5	7.1	1.65	63.0	6.5	56.5
	3	28.3	10.69	2.42		7.2	1.67	67.0	11.5	55.5
N-11	1	28.5	9.00	1.98	0.6	7.2	1.50	32.4	6.4	26.0
	3	29.4	10.36	2.18		7.1				
N-12	1	28.3	5.20	1.53	0.5	7.0	1.32	22.0	1.5	20.5
	3	28.5	7.49	2.20		7.0				
N-13	1	27.9	3.94	0.99	0.5	7.1	1.20	23.5	6.5	17.0
	3	28.3	5.77	1.11		6.9				
N-14	1	28.9	2.72	0.93	0.5	6.9	1.09	20.0	6.5	13.5
	3	29.5	3.19	0.52		6.8				
N-15	1	28.2	1.69	0.52	0.6	6.7	0.97	10.5	1.5	9.0
	3	28.7	2.00	0.30		6.8				

DATA SHEET

RIVER Nansemond CRUISE DATE 22 August 1966

STATION	DEPTH (M)	TOT. P (ug.at l^{-1})	SRP (ug.at l^{-1})	PRP (ug.at l^{-1})	SUP (ug.at l^{-1})	PUP (ug.at l^{-1})	NH_4^+ + SON.N (ug.at l^{-1})	NO_2^-.N (ug.at l^{-1})	NO_3^-.N (ug.at l^{-1})	PON (ug.at l^{-1})	TN (ug.at l^{-1})	Chl.a (ugl^{-1})
N-2	1	4.22	2.23	0.08	0.57	1.34	91.0	2.70	12.90	5.8	112.4	11.4
	5	4.31	2.30	0.23	0.48	1.30	35.0	2.40	9.20	7.2	53.8	11.4
N-4	1	4.82	2.50	0.24	0.52	1.56	14.0	2.70	9.90	9.0	35.6	14.8
	3	5.42	2.46	0.25	0.44	2.27	12.0	2.70	9.90	13.8	38.4	12.9
N-6	1	5.80	2.63	0.29	0.56	2.32	14.0	2.55	9.00	15.2	40.8	20.2
	3	5.50	2.50	0.27	0.52	2.21	9.5	2.60	11.20	10.0	33.3	17.2
N-8	1	6.88	3.30	0.25	0.60	2.73	20.0	1.80	8.40	16.8	47.0	19.2
	3	10.30	3.35	1.38	0.45	5.12	31.0	2.05	8.00	25.5	66.5	21.6
N-10	1	9.40	4.00	0.82	0.32	4.26	29.0	1.50	9.00	8.5	48.0	14.3
	3	8.70	3.92	0.58	0.28	3.92	30.0	1.55	9.00	15.5	56.1	14.6
N-11	1	8.20	4.10	0.39	0.50	3.21	31.0	1.60	11.00	14.0	57.6	12.4
N-12	1	9.60	5.31	0.64	0.59	3.06	31.0	1.50	14.00	12.0	58.5	9.5
N-13	1	11.52	7.00	0.39	0.90	3.23	45.5	1.45	17.60	10.2	74.8	7.5
N-14	1	14.70	9.52	0.42	1.20	3.56	50.8	1.25	20.60	9.5	82.2	9.0
N-15	1	15.64	10.40	0.30	1.41	3.53	58.0	1.10	23.40	14.0	96.5	10.9

DATA SHEET

RIVER Nansemond CRUISE DATE 6 September 1966

STATION	DEPTH (M)	TEMP (C)	SALINITY (‰)	DO (mgl^{-1})	TRANS. (M.SD)	pH	ALK ($meql^{-1}$)	SS (mgl^{-1})	LOI (mgl^{-1})	FR (mgl^{-1})
N-2	1	26.9	20.23	5.90	0.8	7.9	1.68	31.7	8.4	23.3
	3	26.8	20.27	5.82		7.8				
	5	26.6	20.38	5.66		7.5	1.70	97.5	13.0	84.5
N-4	1	27.2	19.55	5.40	0.6	7.9	1.68	47.2	12.4	34.8
	3	27.0	20.27	5.50		7.9	1.72	99.5	16.5	83.0
N-6	1	27.2	17.70	6.36	0.5	8.0	1.73	51.5	6.0	45.5
	3	27.0	18.01	6.22		8.0	1.74	82.5	17.0	65.5
N-8	1	27.4	16.50	5.19	0.6	7.8	1.70	75.5	15.0	60.5
	3	27.2	16.66	5.23		7.8	1.74	96.0	18.0	78.0
N-10	1	27.2	11.78	4.47	0.5	7.5	1.69	82.5	19.0	63.5
	3	27.2	13.67	4.69		7.6	1.70	72.0	20.5	51.5
N-11	1	27.4	13.11	3.96	0.4	7.4	1.67	42.5	11.0	31.5
	3	27.8	13.01	4.09		7.4				
N-12	1	27.8	8.41	3.42	0.5	7.3	1.48	41.5	17.0	24.5
	3	27.9	11.60	3.46		7.4				
N-13	1	27.8	7.14	1.98	0.5	7.0	1.32	19.5	6.0	13.5
	3	28.2	9.13	2.61		7.1				
N-14	1	27.2	5.58	1.54	0.5	7.0	1.29	20.5	5.5	15.0
	3	28.0	7.58	1.50		7.0				
N-15	1	27.3	5.61	0.20	0.5	6.7	1.12	21.5	9.0	12.5
	3	28.0	5.36	0.79		6.8				

DATA SHEET

RIVER Nansemond CRUISE DATE 6 September 1966

STATION	DEPTH (M)	TOT. P (ug.at l^{-1})	SRP (ug.at l^{-1})	PRP (ug.at l^{-1})	SUP (ug.at l^{-1})	PUP (ug.at l^{-1})	NH_4^+ + SON.N (ug.at l^{-1})	NO_2^-.N (ug.at l^{-1})	NO_3^-.N (ug.at l^{-1})	PON (ug.at l^{-1})	TN (ug.at l^{-1})	Chl.a (ugl^{-1})
N-2	1	4.35	2.10	0.11	0.82	1.32	15.0	0.70	5.70	12.0	33.4	11.9
	5	6.25	2.15	0.49	0.77	2.84	16.0	0.65	5.90	29.0	51.6	12.9
N-4	1	4.80	2.31	0.21	0.79	1.49	10.0	0.45	5.10	14.5	30.1	11.4
	3	6.80	2.39	0.68	0.71	3.02	14.0	0.50	5.50	20.0	40.0	14.8
N-6	1	6.20	2.68	0.22	0.76	2.54	8.0	0.15	5.30	20.5	34.0	20.6
	3	6.92	2.68	0.49	0.70	3.05	14.0	0.20	5.30	30.5	50.0	20.6
N-8	1	7.70	3.08	0.59	0.83	3.20	20.0	0.20	6.10	17.5	43.8	18.2
	3	8.42	3.15	0.90	0.83	3.54	20.0	0.20	6.40	25.0	51.6	16.8
N-10	1	10.02	3.80	1.43	0.85	3.94	28.0	0.75	10.40	20.5	59.6	19.2
	3	8.58	3.54	0.44	0.76	3.84	27.5	0.35	8.20	23.5	59.6	20.6
N-11	1	8.90	4.15	0.27	0.90	3.58	33.5	0.75	10.40	17.5	62.2	15.3
N-12	1	10.40	5.45	0.29	1.55	3.11	36.5	1.30	15.40	22.5	75.7	31.6
N-13	1	11.64	7.32	0.22	1.48	2.62	39.5	1.45	18.80	17.5	77.2	13.8
N-14	1	13.30	8.25	0.32	1.15	3.58	59.5	1.40	20.70	12.0	93.6	9.0
N-15	1	16.48	10.06	0.42	1.64	4.36	71.0	1.20	24.00	9.5	105.7	9.0

DATA SHEET

RIVER Nansemond CRUISE DATE 6 October 1966

STATION	DEPTH (M)	TEMP (C)	SALINITY (‰)	DO (mgl^{-1})	TRANS. (M.SD)	pH	ALK ($meql^{-1}$)	SS (mgl^{-1})	LOI (mgl^{-1})	FR (mgl^{-1})
N-2	1	17.3	19.17	6.63	0.8	7.5	1.55	47.0	9.5	37.5
	3	17.2	19.17	6.75		7.2	1.56	39.5	10.0	29.5
N-4	1	18.3	19.25	6.33	0.7	7.4	1.66	45.5	8.0	37.5
	3	17.9	19.29	7.08		7.5	1.67	182.0	29.0	153.0
N-6	1	18.4	18.95	6.19	0.6	7.6	1.75	46.5	8.5	38.0
	3	18.4	19.05	6.07		7.6	1.77	39.8	9.0	30.8
N-8	1	18.8	17.71	5.77	0.6	7.6	1.87	37.6	8.0	29.6
	3	18.3	18.06	5.44		7.6	1.85	61.0	9.5	51.5
N-10	1	19.2	14.98	4.82	0.6	7.5	1.94	34.4	10.4	24.0
	3	18.9	15.05	4.90		7.5	1.92	37.0	8.0	29.0
N-11	1	19.4	13.49	4.60	0.6	7.4	1.93	33.5	2.5	31.0
	3	19.2	14.95	5.81		7.4				
N-12	1	19.4	12.13	3.87	0.6	7.3	1.83	27.5	6.0	21.5
	3	19.7	13.46	3.75		7.3				
N-13	1	19.6	12.24	3.49	0.7	7.2	1.83	22.7	8.4	14.3
	3	19.9	12.88	3.69		7.3				
N-14	1	19.7	8.68	2.70	0.7	7.1	1.66	16.0	5.6	10.4
	3	19.7	10.06	2.52		7.2				
N-15	1	19.2	7.58	2.84	0.6	7.1	1.63	29.5	6.0	23.5
	3	19.6	8.41			7.2				

DATA SHEET

RIVER Nansemond CRUISE DATE 6 October 1966

STATION	DEPTH (M)	TOT. P (ug.at l^{-1})	SRP (ug.at l^{-1})	PRP (ug.at l^{-1})	SUP (ug.at l^{-1})	PUP (ug.at l^{-1})	NH_4^+ + SON.N (ug.at l^{-1})	NO_2^-.N (ug.at l^{-1})	NO_3^-.N (ug.at l^{-1})	PON (ug.at l^{-1})	TN (ug.at l^{-1})	Chl.a (ugl^{-1})
N-2	1	4.00	2.27	0.13	0.48	1.12	40.6	3.00	26.00	5.3	74.9	4.6
	3	6.00	2.06	0.27	0.92	2.75	44.6	2.00	23.60	4.7	74.9	4.4
N-4	1	4.45	2.53	0.11	0.45	1.36	46.5	3.35	25.20	TLTM	75.0	4.4
	3	8.00	2.10	1.48	0.52	3.90	43.5	2.80	21.20	3.6	71.1	7.3
N-6	1	4.38	2.66	0.12	0.44	1.16	48.5	3.40	25.20	2.9	80.0	4.6
	3	4.49	2.57	0.30	0.43	1.19	47.6	3.25	21.20	1.6	73.6	4.2
N-8	1	4.20	2.70	0.13	0.52	0.85	48.5	3.15	18.40	3.6	73.6	4.7
	3	5.40	2.62	0.29	0.44	2.05	52.5	3.10	18.00	2.4	76.0	4.4
N-10	1	5.60	3.37	0.16	0.53	1.54	61.8	3.00	21.50	9.3	95.6	3.9
	3	5.50	3.20	0.30	0.60	1.40	58.6	2.90	37.60	3.6	102.7	3.6
N-11	1	6.90	4.18	0.92	0.64	1.16	61.8	3.20	17.90	5.3	88.2	4.1
N-12	1	7.60	5.00	0.39	0.79	1.42	69.0	3.40	19.60	7.0	99.0	3.2
N-13	1	8.35	5.80	0.61	0.75	1.19	74.5	3.55	21.80	3.6	103.4	2.5
N-14	1	11.60	7.70	0.61	2.20	1.09	88.5	3.10	27.40	17.2	136.2	3.7
N-15	1	15.91	11.00	1.50	1.10	2.31	117.7	2.30	32.20	3.6	155.8	3.2

DATA SHEET

RIVER Nansemond CRUISE DATE 7 November 1966

STATION	DEPTH (M)	TEMP (C)	SALINITY (‰)	DO (mgl^{-1})	TRANS. (M.SD)	pH	ALK ($meql^{-1}$)	SS (mgl^{-1})	LOI (mgl^{-1})	FR (mgl^{-1})
N-2	1	11.0	17.21	9.22	1.7	8.0	1.35	13.8	3.8	10.0
	3	11.0	17.22	9.16		7.9				
	5	11.0	17.23	9.08		7.7	1.36	20.8	4.8	16.0
N-4	1	11.0	17.24	8.90	1.5	8.0	1.45	19.5	4.7	14.8
	3	11.0	17.25	8.86		8.0	1.44	22.0	5.5	16.5
N-6	1	10.5	17.20	8.90	1.2	8.0	1.55	16.5	1.7	14.8
	3	10.5	17.22	8.94		8.0	1.52	13.8	2.8	11.0
N-8	1	10.5	16.75	8.22	1.1	7.9	1.73	15.5	4.3	11.2
	3	10.5	16.83	8.22		7.9	1.70	16.2	2.4	13.8
N-10	1	11.1	15.36	8.26	0.8	7.8	1.92	18.0	7.8	10.2
	3	11.1	15.86	7.52		7.8	1.88	16.8	2.6	14.2
N-11	1	11.5	14.46	6.75	0.8	7.6	1.95	15.8	4.6	11.2
	3	11.1	15.29	6.95		7.7				
N-12	1	12.0	14.08	6.33	0.8	7.6	1.97	12.8	1.3	11.5
	3	12.0	14.30	6.37		7.6				
N-13	1	12.0	13.05	5.55	0.7	7.4	1.97	16.0	6.7	9.3
	3	12.0	13.02	5.57		7.4				
N-14	1	12.8	11.63	4.95	0.7	7.4	1.98	14.3	3.3	11.0
	3	12.0	12.34	4.65		7.4				
N-15	1	12.0	10.97	2.83	0.6	7.3	2.11	15.0	6.3	8.7
	3	12.2	11.49	3.27		7.4				

DATA SHEET

RIVER Nansemond CRUISE DATE 7 November 1966

STATION	DEPTH (M)	TOT. P (ug.at l^{-1})	SRP (ug.at l^{-1})	PRP (ug.at l^{-1})	SUP (ug.at l^{-1})	PUP (ug.at l^{-1})	NH_4^+ + SON.N (ug.at l^{-1})	NO_2^-.N (ug.at l^{-1})	NO_3^-.N (ug.at l^{-1})	PON (ug.at l^{-1})	TN (ug.at l^{-1})	Chl.a (ugl^{-1})
N-2	1	2.52	1.41	0.29	0.37	0.45	11.0	1.10	24.00	4.2	40.3	4.5
	5	2.43	1.13	0.38	0.28	0.64	16.1	1.05	28.00	4.1	49.2	3.7
N-4	1	2.63	1.61	0.26	0.34	0.42	21.2	1.35	20.60	6.4	49.6	5.4
	3	2.67	1.45	0.29	0.29	0.64	15.4	1.30	18.60	6.9	42.2	4.2
N-6	1	2.80	1.70	0.23	0.53	0.34	15.4	1.45	19.40	3.9	40.1	7.0
	3	2.87	1.57	0.30	0.35	0.65	15.4	1.40	24.80	6.0	47.6	3.9
N-8	1	3.32	2.03	0.33	0.57	0.39	23.5	1.80	16.80	5.2	47.3	5.1
	3	3.27	1.90	0.34	0.37	0.66	13.2	1.70	25.60	4.9	45.4	3.9
N-10	1	5.68	2.78	0.44	0.62	1.84	29.5	2.50	18.20	13.7	63.9	25.8
	3	4.10	2.46	0.42	0.57	0.65	27.5	2.40	18.30	5.0	53.2	4.4
N-11	1	5.70	3.55	0.54	0.56	1.05	23.5	3.70	24.00	10.8	62.0	6.6
N-12	1	6.20	4.10	0.40	0.70	1.00	43.5	4.05	21.60	7.9	77.0	4.6
N-13	1	8.05	5.30	0.63	0.80	1.32	58.6	5.30	25.60	5.4	94.9	4.9
N-14	1	11.70	8.40	0.72	0.86	1.72	71.5	6.50	32.80	10.6	121.4	10.5
N-15	1	17.24	12.80	1.15	1.39	1.90	122.0	6.20	27.20	14.4	169.8	9.3

DATA SHEET

RIVER Nansemond CRUISE DATE 5 December 1966

STATION	DEPTH (M)	TEMP (C)	SALINITY (‰)	DO (mgl^{-1})	TRANS. (M.SD)	pH	ALK ($meql^{-1}$)	SS (mgl^{-1})	LOI (mgl^{-1})	FR (mgl^{-1})
N-2	1	3.0	17.39	13.45	1.3	8.3	1.42	28.0	8.5	19.5
	3	3.5	17.48	11.66		8.2				
	5	3.7	17.49	11.46		7.9	1.40	28.0	7.5	20.5
N-4	1	4.0	17.66	11.24	1.1	8.5	1.49	28.5	10.0	18.5
	3	3.9	17.71	11.22		8.5	1.48	27.0	10.5	16.5
N-6	1	4.4	17.38	11.36	1.1	8.5	1.52	29.5	9.5	20.0
	3	4.5	17.53	11.52		8.6	1.53	83.5	16.0	67.5
N-8	1	4.2	16.90	11.22	0.8	8.5	1.59	36.0	10.0	26.0
	3	4.2	16.96	11.10		8.5	1.46	30.5	8.5	22.0
N-10	1	5.2	15.70	12.22	0.8	8.4	1.83	40.0	10.0	30.0
	3	4.9	16.07	11.34		8.3	1.79	57.0	12.5	44.5
N-11	1	6.0	14.89	12.08	0.6	8.3	1.91	52.5	13.5	39.0
	3	5.4	15.38	11.20		8.3				
N-12	1	6.4	14.21	11.66	0.7	8.2	1.89	43.5	13.0	30.5
	3	6.2	14.54	10.99		8.2				
N-13	1	6.7	13.18	11.28	0.6	8.1	2.02	39.0	17.0	22.0
	3	6.5	13.60	10.33		8.0				
N-14	1	7.0	12.26	8.80	0.6	7.7	2.07	37.5	11.0	26.5
	3	7.0	12.53	8.94		7.9				
N-15	1	6.8	11.60	6.49	0.7	7.5	2.19	32.5	10.5	22.0
	3	6.8	11.69	7.04		7.6				

DATA SHEET

RIVER Nansemond CRUISE DATE 5 December 1966.

STATION	DEPTH (M)	TOT. P (ug.at l^{-1})	SRP (ug.at l^{-1})	PRP (ug.at l^{-1})	SUP (ug.at l^{-1})	PUP (ug.at l^{-1})	NH_4^+ + SON.N (ug.at l^{-1})	NO_2^-.N (ug.at l^{-1})	NO_3^-.N (ug.at l^{-1})	PON (ug.at l^{-1})	TN (ug.at l^{-1})	Chl.a (ugl^{-1})
N-2	1	1.73	0.30	0.08	0.60	0.75	9.0	0.25	9.40	7.6	26.2	8.7
	5	1.64	0.17	0.06	0.48	0.93	19.2	0.20	7.40	10.0	36.8	10.7
N-4	1	1.93	0.22	0.09	0.68	0.94	13.2	0.10	3.30	9.2	25.8	9.5
	3	1.64	0.13	0.06	0.47	0.98	15.2	0.10	3.90	9.5	28.7	9.5
N-6	1	2.10	0.43	0.12	0.60	0.95	12.0	0.10	4.50	16.6	33.2	9.5
	3	3.25	0.35	0.16	0.46	2.28	11.0	0.10	3.10	11.0	25.2	9.8
N-8	1	2.90	0.69	0.14	0.63	1.44	8.0	0.10	5.30	6.2	19.6	14.3
	3	2.19	0.43	0.13	0.55	1.08	9.0	0.10	5.10	8.0	22.2	10.2
N-10	1	4.60	0.85	0.15	0.61	2.99	10.0	0.30	5.30	21.6	37.2	39.3
	3	4.80	0.81	0.16	0.61	3.22	12.0	0.15	6.10	21.6	39.8	21.1
N-11	1	6.50	1.55	0.27	0.68	4.00	20.2	1.55	11.00	20.6	53.4	49.6
N-12	1	6.40	2.40	0.24	0.85	2.91	20.2	2.70	17.10	19.7	59.7	53.5
N-13	1	9.95	4.20	0.20	1.00	4.55	42.5	4.40	31.60	39.2	117.7	78.9
N-14	1	12.20	6.80	0.34	1.10	3.96	67.0	5.25	29.60	26.9	128.8	47.4
N-15	1	16.40	10.60	0.39	1.30	4.11	123.5	6.10	37.60	30.4	197.6	25.5

DATA SHEET

RIVER Nansemond CRUISE DATE 5 January 1967

STATION	DEPTH (M)	TEMP (C)	SALINITY (‰)	DO (mgl^{-1})	TRANS. (M.SD)	pH	ALK ($meql^{-1}$)	SS (mgl^{-1})	LOI (mgl^{-1})	FR (mgl^{-1})
N-2	1	4.4	16.83	11.34	1.6	7.9	1.46	13.5	3.5	10.0
	3	4.3	16.93	11.33		7.6				
	5	4.5	16.98	11.65		7.5	1.46	23.0	8.5	14.5
N-4	1	4.3	16.41	11.33	1.2	8.3	1.49	13.5	1.5	12.0
	3	4.3	16.47	11.34		8.3	1.52	37.0	8.5	28.5
N-6	1	4.5	16.10	11.08	0.9	8.2	1.53	20.5	1.5	19.0
	3	4.4	16.14	10.72		8.3	1.53	31.0	6.0	25.0
N-8	1	4.6	14.93	10.40	0.7	8.1	1.67	45.0	4.5	40.5
	3	4.5	15.09	10.40		8.2	1.66	48.5	12.5	36.0
N-10	1	4.8	13.20	9.62	0.7	7.9	1.72	44.5	13.5	31.0
	3	4.7	13.42	10.14		8.0	1.74	39.5	12.5	27.0
N-11	1	4.8	11.70	8.61	0.7	7.8	1.74	34.0	11.5	22.5
	3	4.7	11.95	8.59		7.8				
N-12	1	5.0	10.58	7.85	0.9	7.5	1.76	30.0	8.0	22.0
	3	4.7	10.82	7.93		7.7				
N-13	1	5.0	9.36	6.69	0.9	7.5	1.72	23.5	9.0	14.5
	3	4.7	10.61	6.87		7.5				
N-14	1	5.3	8.01	5.34	0.6	7.4	1.70	21.0	8.5	12.5
	3	5.0	8.55	6.06		7.4				
N-15	1	5.5	7.40	4.02	0.6	7.3	1.67	22.5	12.5	10.0
	3	5.4	7.58			7.2				

DATA SHEET

RIVER Nansemond CRUISE DATE 5 January 1967

STATION	DEPTH (M)	TOT. P (ug.at l^{-1})	SRP (ug.at l^{-1})	PRP (ug.at l^{-1})	SUP (ug.at l^{-1})	PUP (ug.at l^{-1})	NH_4^+ + SON.N (ug.at l^{-1})	NO_2^-.N (ug.at l^{-1})	NO_3^-.N (ug.at l^{-1})	PON (ug.at l^{-1})	TN (ug.at l^{-1})	Chl.a (ugl^{-1})
N-2	1	1.45	0.31	0.05	0.33	0.76	11.0	0.25	12.30	7.6	31.2	7.3
	5	1.45	0.27	0.06	0.28	0.84		0.30	12.40	5.3		7.1
N-4	1	1.61	0.31	0.09	0.44	0.77	13.2	0.25	7.60	8.0	29.0	9.2
	3	2.15	0.35	0.16	0.37	1.27	12.0	0.25	8.00	9.3	29.6	8.8
N-6	1	2.00	0.47	0.13	0.39	1.01	14.0	0.30	6.10	8.0	28.4	8.6
	3	2.10	0.44	0.11	0.38	1.17	13.2	0.30	6.35	5.2	25.0	9.2
N-8	1	3.48	0.88	0.29	0.43	1.88	19.2	0.50	6.35	8.4	34.4	12.6
	3	3.85	0.80	0.19	0.45	2.41	21.2	0.45	6.00	12.3	40.0	11.5
N-10	1	4.00	2.07	0.19	0.58	1.16	35.2	1.20	9.40	15.5	61.3	15.8
	3	4.80	1.83	0.33	0.64	2.00	33.5	1.00	10.60	21.2	66.3	15.8
N-11	1	6.80	3.45	0.36	0.70	2.29	53.5	1.95	15.50			13.8
N-12	1	8.05	4.40	0.46	0.85	2.34	76.5	2.30	20.40	13.3	112.5	11.9
N-13	1	9.68	6.15	0.44	1.35	1.74	100.0	2.95	25.20			8.8
N-14	1	14.40	9.52	0.72	1.18	2.98	137.0	3.20	32.90			6.6
N-15	1	17.60	11.50	0.51	1.10	4.49	148.0	3.10	40.80			5.8

DATA SHEET

RIVER Nansemond CRUISE DATE 1 February 1967

STATION	DEPTH (M)	TEMP (C)	SALINITY (‰)	DO (mgl^{-1})	TRANS. (M.SD)	pH	ALK ($meql^{-1}$)	SS (mgl^{-1})	LOI (mgl^{-1})	FR (mgl^{-1})
N-2	1	6.8	15.00	11.78	1.0	8.3	1.41	20.0	5.0	15.0
	3	6.7	15.06	11.51		8.1				
	5	6.7	15.24	11.55		8.2	1.39	21.0	7.0	14.0
N-4	1	7.0	14.43	11.53	0.8	8.4	1.40	23.0	7.0	16.0
	3	7.4	14.52	11.37		8.4	1.39	27.5	6.5	21.0
N-6	1	7.4	13.52	10.99	0.8	8.3	1.35	26.0	6.0	20.0
	3	7.4	13.77	11.01		8.3	1.37	36.5	9.0	27.5
N-8	1	7.6	10.77	10.14	0.6	8.2	1.26	31.0	8.5	22.5
	3	7.6	12.26	10.44		8.2	1.30	49.5	11.5	38.0
N-10	1	8.5	5.88	8.61	0.5	7.9	0.93	27.0	6.5	20.5
	3	9.8	9.86	9.66		8.0	1.19	42.5	8.0	34.5
N-11	1	8.0	7.45	8.89	0.5	7.5	1.06	36.0	6.5	29.5
	3	7.8	8.12	9.01		7.4				
N-12	1	8.5	4.20	8.46	0.5	7.5	0.83	28.0	6.5	21.5
	3	8.4	6.44	7.78		7.5				
N-13	1	9.0	2.20	7.98	0.4	7.2	0.83	43.5	11.5	32.0
	3	10.4	4.92	7.74		7.1				
N-14	1	8.8	2.38	6.02	0.5	7.0	0.56	20.5	4.0	16.5
	3	9.4	2.45	8.24		6.8				
N-15	1	8.2	1.00	4.77	0.3	6.8	0.52	21.5	6.0	15.5
	3	9.9	1.02	5.13		6.6				

DATA SHEET

RIVER Nansemond CRUISE DATE 1 February 1967

STATION	DEPTH (M)	TOT. P (ug.at l^{-1})	SRP (ug.at l^{-1})	PRP (ug.at l^{-1})	SUP (ug.at l^{-1})	PUP (ug.at l^{-1})	NH_4^+ + SON.N (ug.at l^{-1})	NO_2^-.N (ug.at l^{-1})	NO_3^-.N (ug.at l^{-1})	PON (ug.at l^{-1})	TN (ug.at l^{-1})	Chl.a (ugl^{-1})
N-2	1	1.83	0.21	0.15	0.49	0.98	19.2	0.60	11.20	16.5	47.5	19.2
	5	1.70	0.06	0.10	0.41	1.13	10.0	0.65	12.30	11.0	34.0	17.7
N-4	1	1.95	0.13	0.16	0.54	1.12	16.2	0.60	10.10	12.5	39.4	18.2
	3	2.02	0.10	0.13	0.50	1.29	10.0	0.60	9.00	9.6	29.2	16.8
N-6	1	2.19	0.23	0.17	0.52	1.27	15.2	0.60	13.60	18.3	47.7	15.8
	3	2.35	0.18	0.18	0.44	1.55	10.0	0.60	11.60	5.0	27.2	14.2
N-8	1	2.67	0.88	0.18	0.53	1.08	22.5	0.75	18.40	12.4	54.0	11.7
	3	3.07	0.51	0.17	0.54	1.85	16.2	0.65	15.00	11.0	42.8	13.2
N-10	1	5.70	2.35	0.21	0.65	2.49	24.5	0.85	26.40	10.0	61.8	11.7
	3	3.60	1.13	0.17	0.41	1.89	25.5	0.75	19.00	11.9	57.2	8.6
N-11	1	4.70	1.98	0.34	0.49	1.89	38.5	0.85	21.40	7.4	68.2	6.4
N-12	1	6.14	2.63	0.30	0.85	2.36	50.5	0.85	22.50	11.8	85.6	5.9
N-13	1	6.90	3.03	0.45	0.77	2.65	56.8	0.95	24.60	1.1	83.4	5.8
N-14	1	10.60	5.92	0.44	1.58	2.66	68.8	0.85	29.00	20.6	119.2	6.6
N-15	1	13.20	7.12	0.30	1.83	3.95	84.5	0.85	29.80	20.6	135.8	8.5

DATA SHEET

RIVER Nansemond CRUISE DATE 2 March 1967

STATION	DEPTH (M)	TEMP (C)	SALINITY (‰)	DO (mgl^{-1})	TRANS. (M.SD)	pH	ALK ($meql^{-1}$)	SS (mgl^{-1})	LOI (mgl^{-1})	FR (mgl^{-1})
N-2	1	3.5	11.44	11.72	0.6	7.8	1.18	59.5	10.5	49.0
	3	3.5	11.47	11.64		7.6				
	5	3.5	11.49	11.66		7.2	1.22	78.0	11.0	67.0
N-4	1	3.8	10.58	11.32	0.5	7.9	1.17	62.0	10.5	51.5
	3	4.8	11.18	11.58		8.0	1.22	54.5	5.5	49.0
N-6	1	4.1	10.73	11.46	0.4	7.9	1.20	65.0	5.0	60.0
	3	5.5	10.56	11.38		7.9	1.28	227.5	25.0	202.5
N-8	1	4.8	8.26	10.96	0.3	7.9	1.08	83.5	5.0	78.5
	3	4.9	8.99	10.81		8.0	1.09	104.5	10.0	94.5
N-10	1	5.0	3.53	10.41	0.3	7.6	0.72	49.5	7.0	42.5
	3	5.0	4.78	10.23		7.7	0.83	76.5	5.0	71.5
N-11	1	4.7	4.24	10.15	0.3	7.4	0.73	41.0	4.5	36.5
	3	4.9	3.94	10.73		7.4				
N-12	1	5.5	1.39	10.01	0.3	8.0	0.35	41.5	5.0	36.5
	3	5.8	1.99	9.99		7.5				
N-13	1	5.7	0.86	9.95	0.3	7.2	0.30	36.0	6.0	30.0
	3	5.0	1.43	9.71		7.2				
N-14	1	6.0	0.55	9.51	0.3	7.1	0.30	37.5	10.0	27.5
	3	7.0	0.95	9.59		7.0				
N-15	1	6.3	0.37	7.22	0.3	6.6	0.43	18.5	4.5	14.0
	3	7.8	0.39	7.30		6.8				

DATA SHEET

RIVER Nansemond CRUISE DATE 2 March 1967

STATION	DEPTH (M)	TOT. P (ug.at l^{-1})	SRP (ug.at l^{-1})	PRP (ug.at l^{-1})	SUP (ug.at l^{-1})	PUP (ug.at l^{-1})	NH_4^+ + SON.N (ug.at l^{-1})	NO_2^-.N (ug.at l^{-1})	NO_3^-.N (ug.at l^{-1})	PON (ug.at l^{-1})	TN (ug.at l^{-1})	Chl.a (ugl^{-1})
N-2	1	3.38	0.24	0.16	0.21	2.77	44.5	1.00	25.20	14.0	84.7	14.6
	5	3.55	0.24	0.31	0.26	2.74	48.5	0.95	23.60	13.0	86.0	14.8
N-4	1	3.00	0.36	0.19	0.22	2.23	42.5	0.90	19.80	20.8	84.0	13.8
	3	2.95	0.45	0.21	0.25	2.04	46.5	0.85	20.60	7.0	75.0	13.8
N-6	1	3.08	0.36	0.18	0.39	2.15	46.5	0.85	19.60	27.5	94.4	12.4
	3	7.50	0.48	0.92	0.35	5.75	52.5	0.85	25.80	17.5	96.6	15.8
N-8	1	4.40	0.73	0.26	0.22	3.19	153.0	0.80	17.00	30.0	200.8	11.0
	3	4.80	0.57	0.69	0.38	3.16	197.0	0.80	20.80	19.0	237.6	12.0
N-10	1	4.50	0.81	0.31	0.52	2.86	56.5	0.45	22.60	9.0	88.6	6.8
	3	5.00	0.85	0.37	0.52	3.26	54.5	0.50	23.20	14.0	92.2	7.7
N-11	1	4.10	0.97	0.25	0.65	2.23	64.8	0.45	26.60	13.2	105.0	7.1
N-12	1	5.50	0.97	0.24	0.65	3.64	64.8	0.20	27.50	17.5	110.0	8.5
N-13	1	5.70	1.13	0.22	1.00	3.35	52.5	0.15	27.50	14.0	94.2	10.7
N-14	1	6.20	1.18	0.19	0.82	4.01	61.8	0.15	27.80	14.8	104.6	11.0
N-15	1	13.40	6.74	0.48	2.76	3.42	124.0	0.20	50.00	28.3	202.5	8.5

DATA SHEET

RIVER Nansemond CRUISE DATE 17 April 1967

STATION	DEPTH (M)	TEMP (C)	SALINITY (‰)	DO (mgl^{-1})	TRANS. (M.SD)	pH	ALK ($meql^{-1}$)	SS (mgl^{-1})	LOI (mgl^{-1})	FR (mgl^{-1})
N-2	1	17.4	14.27	6.77	0.8	7.5	1.27	31.0	9.0	22.0
	3	16.1	15.00	6.69		7.5				
	5	16.2	16.84	6.85		7.4	1.44	41.5	8.0	33.5
N-4	1	18.0	13.80	6.69	0.6	7.5	1.25	35.5	6.5	29.0
	3	18.6	14.15	6.30		7.4	1.27	40.8	10.4	30.4
N-6	1	18.5	12.79	6.47	0.6	7.6	1.19	28.4	6.4	22.0
	3	19.7	13.16	6.12		7.6	1.15	36.8	5.2	31.6
N-8	1	19.3	10.90	6.20	0.6	7.6	1.13	31.2	6.4	24.8
	3	20.4	11.25	5.80		7.6	1.14	37.2	8.4	28.8
N-10	1	19.4	8.57	6.04	0.5	7.6	1.10	28.8	6.8	22.0
	3	20.3	8.90	5.98		7.6	1.12	37.6	8.8	28.8
N-11	1	19.7	7.10	5.25	0.5	7.5	1.10	28.0	8.0	20.0
	3	19.6	9.25	7.05		7.4				
N-12	1	19.0	6.56	5.13	0.5	7.6	1.04	26.0	8.5	17.5
	3	21.5	8.14	5.64		7.7				
N-13	1	19.5	6.68	6.02	0.6	7.4	1.04	28.5	10.0	18.5
	3	19.5	6.49	4.87		7.8				
N-14	1	20.1	5.79	3.88	0.6	7.5	1.01	19.6	10.0	9.6
	3	20.3	4.74	5.33		7.5				
N-15	1	19.6	4.54	2.77	0.5	7.5	1.11	20.5	12.5	8.0
	3	21.5	3.61	3.07		7.6				

DATA SHEET

RIVER Nansemond CRUISE DATE 17 April 1967

STATION	DEPTH (M)	TOT. P (ug.at l^{-1})	SRP (ug.at l^{-1})	PRP (ug.at l^{-1})	SUP (ug.at l^{-1})	PUP (ug.at l^{-1})	NH_4^+ + SON.N (ug.at l^{-1})	NO_2^-.N (ug.at l^{-1})	NO_3^-.N (ug.at l^{-1})	PON (ug.at l^{-1})	TN (ug.at l^{-1})	Chl.a (ugl^{-1})
N-2	1	2.14	0.44	0.11	0.41	1.18		0.65	7.40	10.3		7.0
	5	2.18	0.27	0.15	0.40	1.36		0.55	6.60	11.0		9.6
N-4	1	1.97	0.47	0.16	0.20	1.14		0.65	6.00	9.9		6.8
	3	2.30	0.47	0.14	0.33	1.36		0.70	6.00	6.9		5.3
N-6	1	1.90	0.52	0.10	0.23	1.05		0.65	6.10	4.5		7.8
	3	2.14	0.55	0.14	0.25	1.20		0.65	6.10	6.6		4.7
N-8	1	2.50	0.67	0.13	0.29	1.41		0.60	6.10	15.0		11.0
	3	2.42	0.72	0.17	0.28	1.25		0.60	5.90	8.4		5.4
N-10	1	3.60	1.25	0.13	0.32	1.90		0.70	8.40	13.8		13.9
	3	3.50	1.08	0.18	0.29	1.95		0.60	8.10	23.0		11.0
N-11	1	5.30	2.18	0.22	0.60	2.30		0.80	11.90	18.6		11.9
N-12	1	6.00	2.83	0.24	0.77	2.16		0.95	12.00	10.4		6.3
N-13	1	11.20	5.50	0.41	1.40	3.89		1.10	15.90	21.6		12.9
N-14	1	14.80	9.60	0.29	2.00	2.91		1.30	17.00	19.7		18.2
N-15	1	21.50	15.60	0.52	1.50	3.88		1.50	20.20	23.5		11.9

DATA SHEET

RIVER Nansemond CRUISE DATE 15 May 1967

STATION	DEPTH (M)	TEMP (C)	SALINITY (‰)	DO (mgl^{-1})	TRANS. (M.SD)	pH	ALK ($meql^{-1}$)	SS (mgl^{-1})	LOI (mgl^{-1})	FR (mgl^{-1})
N-2	1	18.1	16.18	6.75	0.8	7.4	1.41	26.8	4.8	22.0
	3	18.1	16.26	7.03		7.4				
	5	18.2	16.26	6.59		7.3	1.42	56.0	5.0	51.0
N-4	1	18.3	15.93	6.97	0.6	7.4	1.40	28.4	3.6	24.8
	3	18.9	15.93	6.79		7.5	1.41	73.0	3.5	69.5
N-6	1	18.6	15.26	6.97	0.6	7.1	1.38	26.8	4.4	22.4
	3	18.6	15.52	6.91		7.2	1.33	61.5	9.5	52.0
N-8	1	18.7	14.15	6.59	0.6	7.3	1.39	51.0	6.5	44.5
	3	18.9	14.40	6.71		7.2	1.36	59.2	14.8	44.4
N-10	1	19.2	11.15	6.42	0.5	7.4	1.38	59.5	17.0	42.5
	3	18.7	12.79	6.02		7.4	1.39	67.6	13.2	54.4
N-11	1	18.9	10.05	5.56	0.5	7.4	1.38	50.5	5.5	45.0
	3	19.0	12.05	6.24		7.4				
N-12	1	19.4	10.93	5.17	0.3	7.5	1.38	44.5	8.5	36.0
	3	19.5	10.25	5.17		7.5				
N-13	1	20.2	8.12	5.01	0.3	7.5	1.40	42.0	6.7	35.3
	3	20.3	7.94	5.62		7.5				
N-14	1	20.2	7.25	4.99	0.3	7.4	1.45	33.5	6.5	27.0
	3	20.0	7.14	5.27		7.5				
N-15	1	20.1	5.93	3.33	0.4	7.4	1.54	41.0	14.0	27.0
	3	19.8	6.87	5.86		7.4				

DATA SHEET

RIVER Nansemond CRUISE DATE 15 May 1967

STATION	DEPTH (M)	TOT. P (ug.at l^{-1})	SRP (ug.at l^{-1})	PRP (ug.at l^{-1})	SUP (ug.at l^{-1})	PUP (ug.at l^{-1})	NH_4^+ + SON.N (ug.at l^{-1})	NO_2^-.N (ug.at l^{-1})	NO_3^-.N (ug.at l^{-1})	PON (ug.at l^{-1})	TN (ug.at l^{-1})	Chl.a (ugl^{-1})
N-2	1	2.02	1.00	0.19	0.37	0.46	42.5	1.50	27.60	8.0	79.6	4.1
	5	2.18	1.04	0.18	0.24	0.72	34.5	1.60	52.40	4.6	93.1	3.0
N-4	1	2.18	1.04	0.10	0.29	0.75	49.0	1.65	28.80	8.0	87.4	4.1
	3	2.83	1.00	0.29	0.28	1.26	40.5	1.60	32.80	8.9	83.8	3.9
N-6	1	1.98	0.96	0.10	0.28	0.64	40.5	1.60	27.20	5.1	74.4	4.9
	3	2.83	0.93	0.19	0.24	1.47	42.5	1.60	31.40	4.0	79.5	4.4
N-8	1	2.87	0.93	0.15	0.31	1.48	38.5	1.45	22.00	13.7	75.6	4.4
	3	2.87	0.88	0.21	0.32	1.46	49.0	1.40	27.50	15.2	93.1	4.9
N-10	1	4.30	1.17	0.18	0.28	2.67	57.0	1.20	15.20	10.0	83.4	10.9
	3	3.60	1.00	0.24	0.17	2.19	42.5	1.20	19.60	13.2	76.5	4.9
N-11	1	4.20	1.45	0.18	0.25	2.32	42.5	1.20	18.60	12.9	75.2	7.3
N-12	1	4.60	1.57	0.27	0.33	2.43	61.0	1.30	21.20	16.7	100.2	8.1
N-13	1	8.10	2.70	0.33	0.73	4.34	73.0	1.50	25.60	18.0	118.1	12.9
N-14	1	12.40	4.60	0.52	0.70	6.58	26.5	1.60	26.80	29.6	84.5	22.1
N-15	1	18.80	9.60	0.72	1.40	7.08	73.0	1.90	26.80	28.8	130.5	36.4

DATA SHEET

RIVER Nansemond CRUISE DATE 14 June 1967

STATION	DEPTH (M)	TEMP (C)	SALINITY (‰)	DO (mgl^{-1})	TRANS. (M.SD)	pH	ALK ($meql^{-1}$)	SS (mgl^{-1})	LOI (mgl^{-1})	FR (mgl^{-1})
N-2	1	25.7	15.32	6.44	0.6	7.8	1.38	22.5	4.0	18.5
	3	25.5	15.39	6.28		7.7				
	5	25.1	15.44	6.34		7.6	1.41	31.2	2.4	28.8
N-4	1	25.9	15.19	6.26	0.6	7.7	1.39	39.0	1.5	37.5
	3	25.6	15.21	6.18		7.7	1.42	36.5	3.5	33.0
N-6	1	26.4	15.10	6.14	0.6	7.7	1.39	29.5	2.5	27.0
	3	25.4	15.12	6.20		7.7	1.41	31.0	2.5	28.5
N-8	1	26.0	14.76	5.21	0.6	7.5	1.46	32.5	3.0	29.5
	3	25.3	14.72	5.21		7.5	1.46	31.5	3.0	28.5
N-10	1	26.3	14.02	5.27	0.6	7.4	1.51	25.0	3.5	21.5
	3	25.5	14.05	5.17		7.4	1.51	40.5	5.0	35.5
N-11	1	26.0	13.55	4.86	0.6	7.4	1.54	24.0	3.5	20.5
	3	25.7	14.04	4.88		7.4				
N-12	1	26.2	12.03	4.56	0.6	7.6	1.59	35.0	5.0	30.0
	3	25.7	12.47	5.57		7.4				
N-13	1	26.0	11.17	4.97	0.6	7.5	1.60	24.0	4.0	20.0
	3	25.9	11.13	4.20		7.4				
N-14	1	26.3	10.12	5.63	0.6	7.5	1.68	32.0	3.0	29.0
	3	26.4	10.12	6.72		7.4				
N-15	1	26.0	9.06	6.04	0.5	7.5	1.79	56.0	25.0	31.0
	3	26.3	9.11	6.32		7.5				

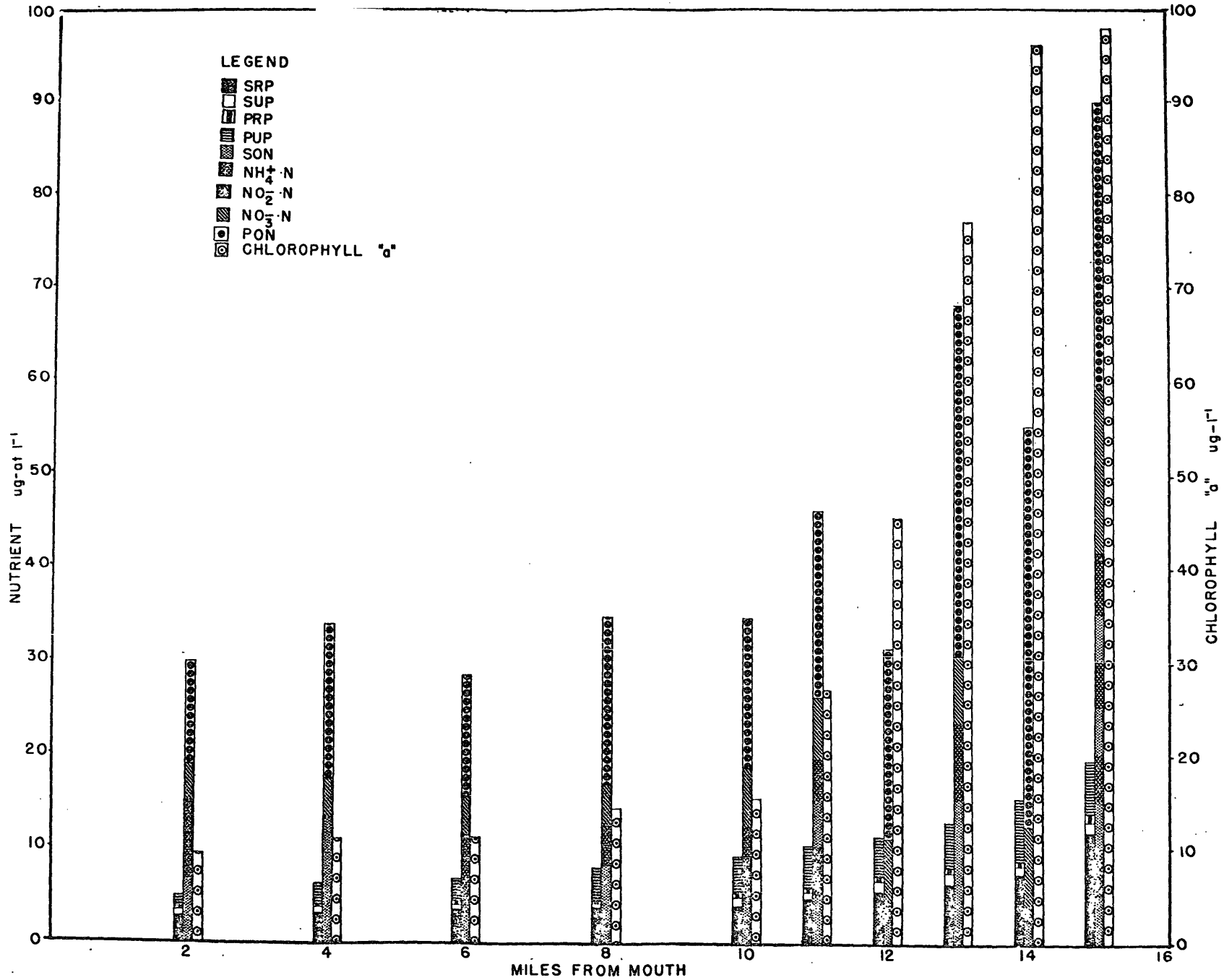
DATA SHEET

RIVER Nansemond CRUISE DATE 14 June 1967

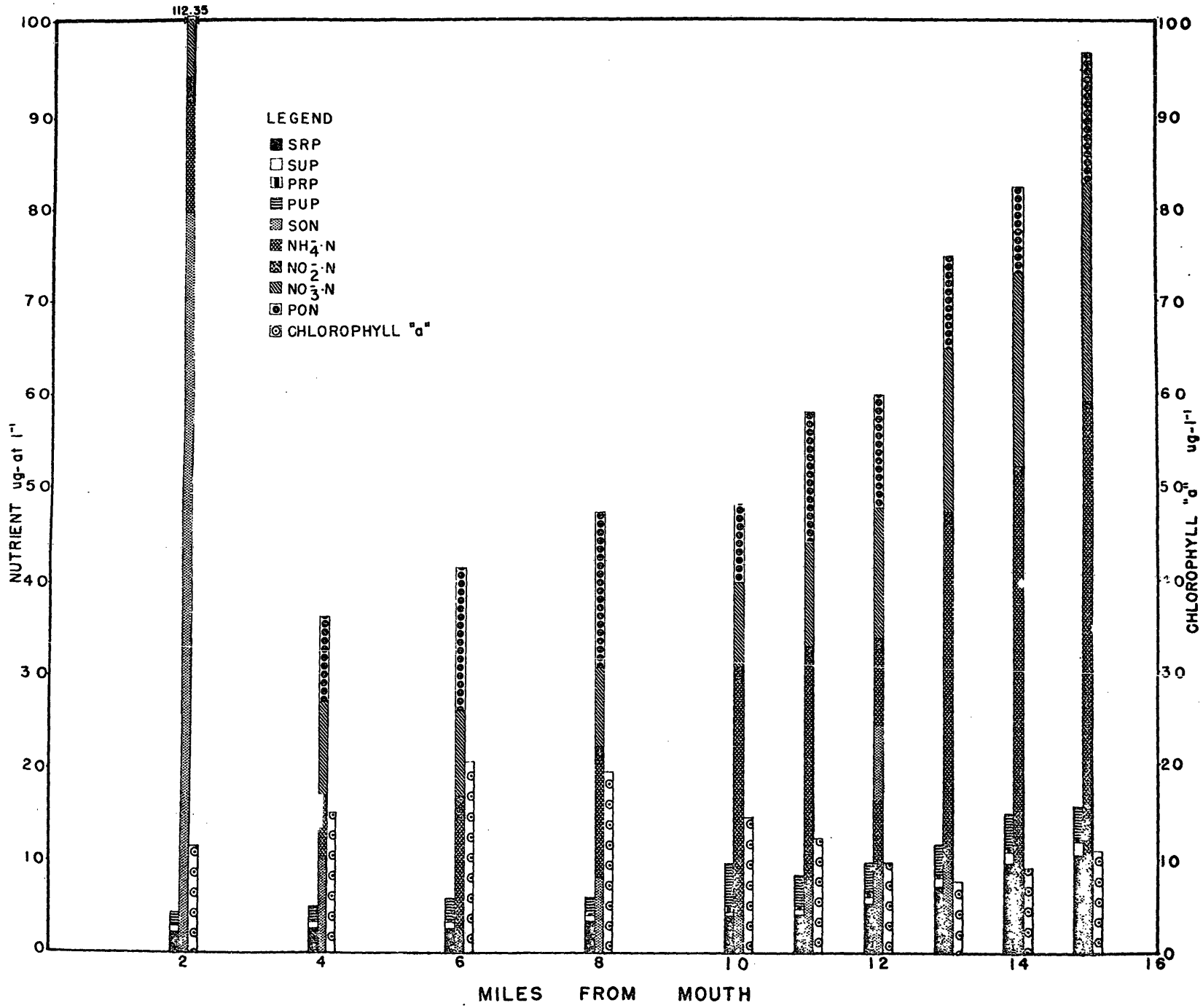
STATION	DEPTH (M)	TOT. P (ug.at l^{-1})	SRP (ug.at l^{-1})	PRP (ug.at l^{-1})	SUP (ug.at l^{-1})	PUP (ug.at l^{-1})	NH_4^+ + SON.N (ug.at l^{-1})	NO_2^-.N (ug.at l^{-1})	NO_3^-.N (ug.at l^{-1})	PON (ug.at l^{-1})	TN (ug.at l^{-1})	Chl.a (ugl^{-1})
N-2	1	2.50	0.58	0.10	0.47	1.35	30.5	0.40	7.35	4.6	42.8	10.9
	5	2.75	0.54	0.08	0.38	1.75	28.5	0.35	6.70	14.3	49.8	8.7
N-4	1	2.62	0.58	0.10	0.47	1.47	24.5	0.30	7.00	15.3	47.1	10.0
	3	2.54	0.58	0.08	0.47	1.41	30.5	0.35	6.70	13.8	51.4	8.0
N-6	1	2.62	0.54	0.07	0.46	1.55	28.5	0.25	5.80	16.0	50.6	11.9
	3	2.58	0.54	0.10	0.46	1.48	26.5	0.25	8.00	13.8	48.6	11.5
N-8	1	3.00	0.83	0.24	0.37	1.56	32.5	0.15	5.60	22.0	60.2	13.4
	3	3.26	0.79	0.12	0.29	2.06	29.5	0.15	4.50	20.6	54.8	13.2
N-10	1	3.80	1.17	0.11	0.45	2.07	37.5	0.10	4.20	20.8	62.6	12.4
	3	3.22	0.95	0.10	0.37	1.80	26.5	0.10	4.40	15.2	46.2	5.6
N-11	1	5.10	1.87	0.19	0.63	2.41	32.5	0.05	4.70	26.8	64.0	18.2
N-12	1	6.40	3.05	0.16	0.45	2.74	34.5	0.05	5.20	23.5	63.2	14.3
N-13	1	8.60	4.10	0.31	0.70	3.49	34.5	0.05	5.60	33.5	73.6	8.5
N-14	1	14.30	7.00	0.76	0.70	5.84	32.5	0.05	6.00	52.7	91.2	33.5
N-15	1	23.70	12.05	1.05	1.55	9.05	38.5	0.05	6.70	116.0	161.2	130.0

APPENDIX B

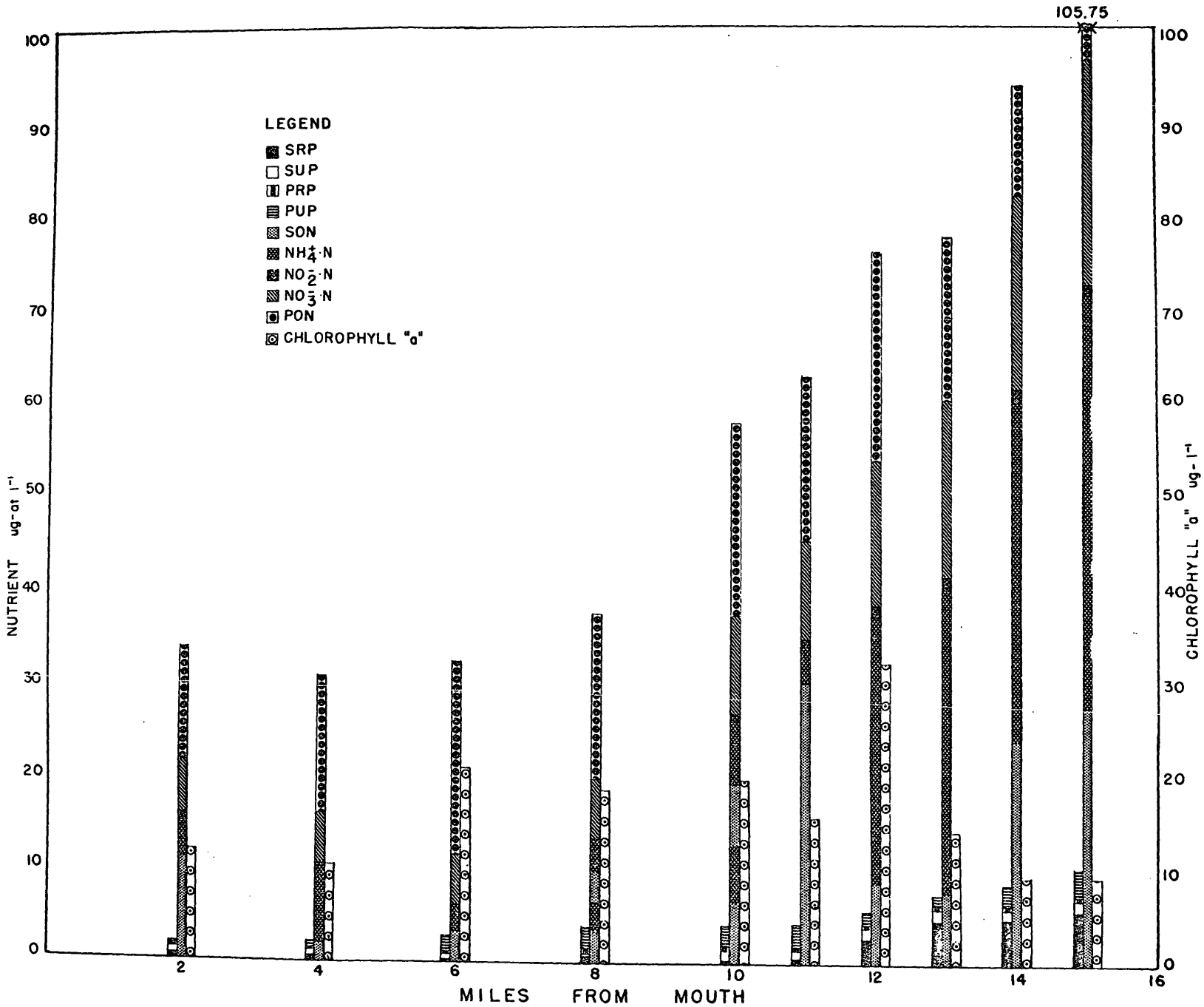
GRAPHICAL PRESENTATION OF BIOLOGICAL AND CHEMICAL DATA FROM TEN STATIONS ON THE NANSEMOND RIVER


LEGEND
SRP
SUP
PRP
PUP
SON
NH_4^+-N
NO_2^--N
NO_3^--N
PON
CHLOROPHYLL "a"
NUTRIENT ug-at l⁻¹
CHLOROPHYLL "a" ug-l⁻¹
MILES FROM MOUTH
0
10
20
30
40
50
60
70
80
90
100
2
4
6
8
10
12
14
16

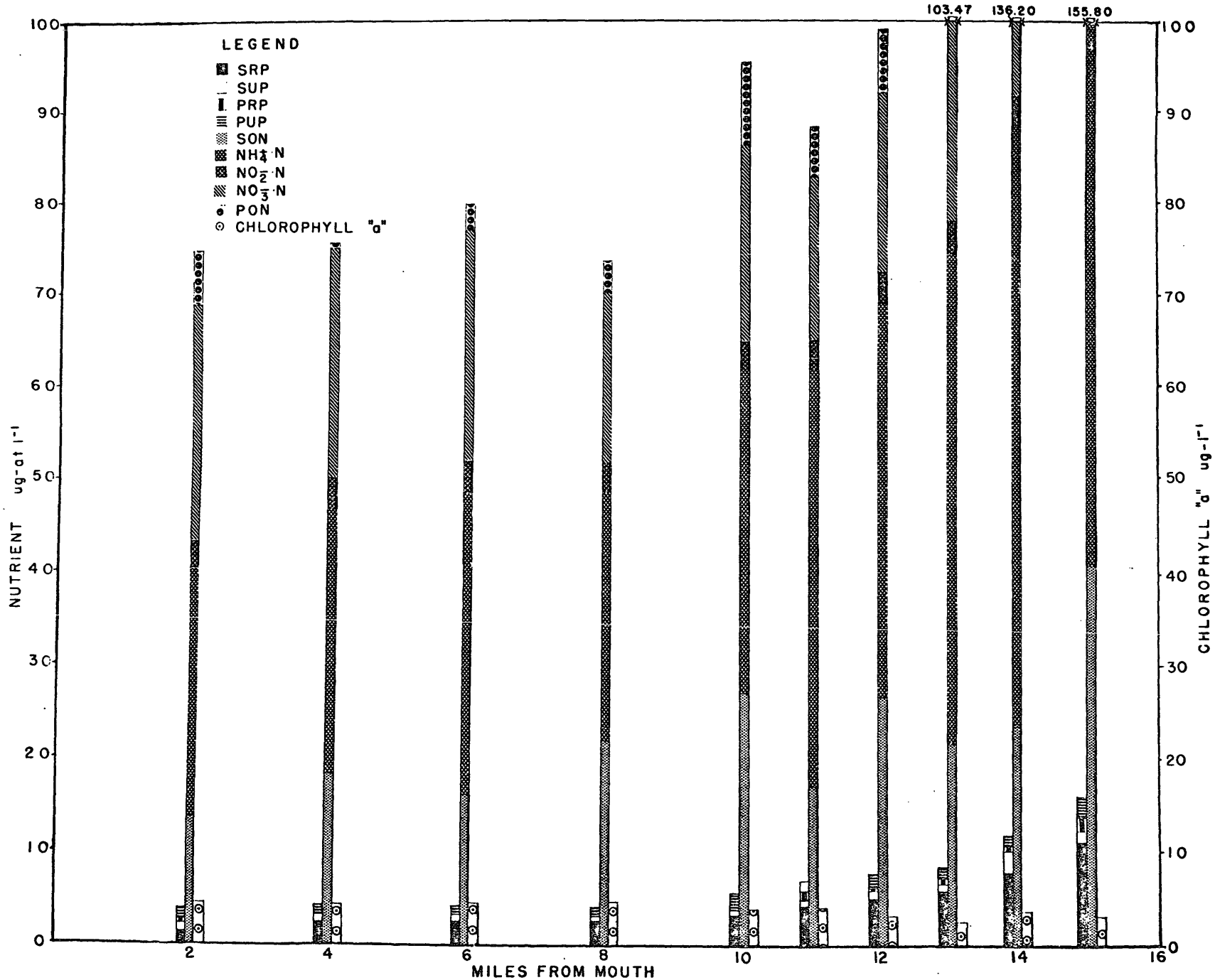
21 July 1966



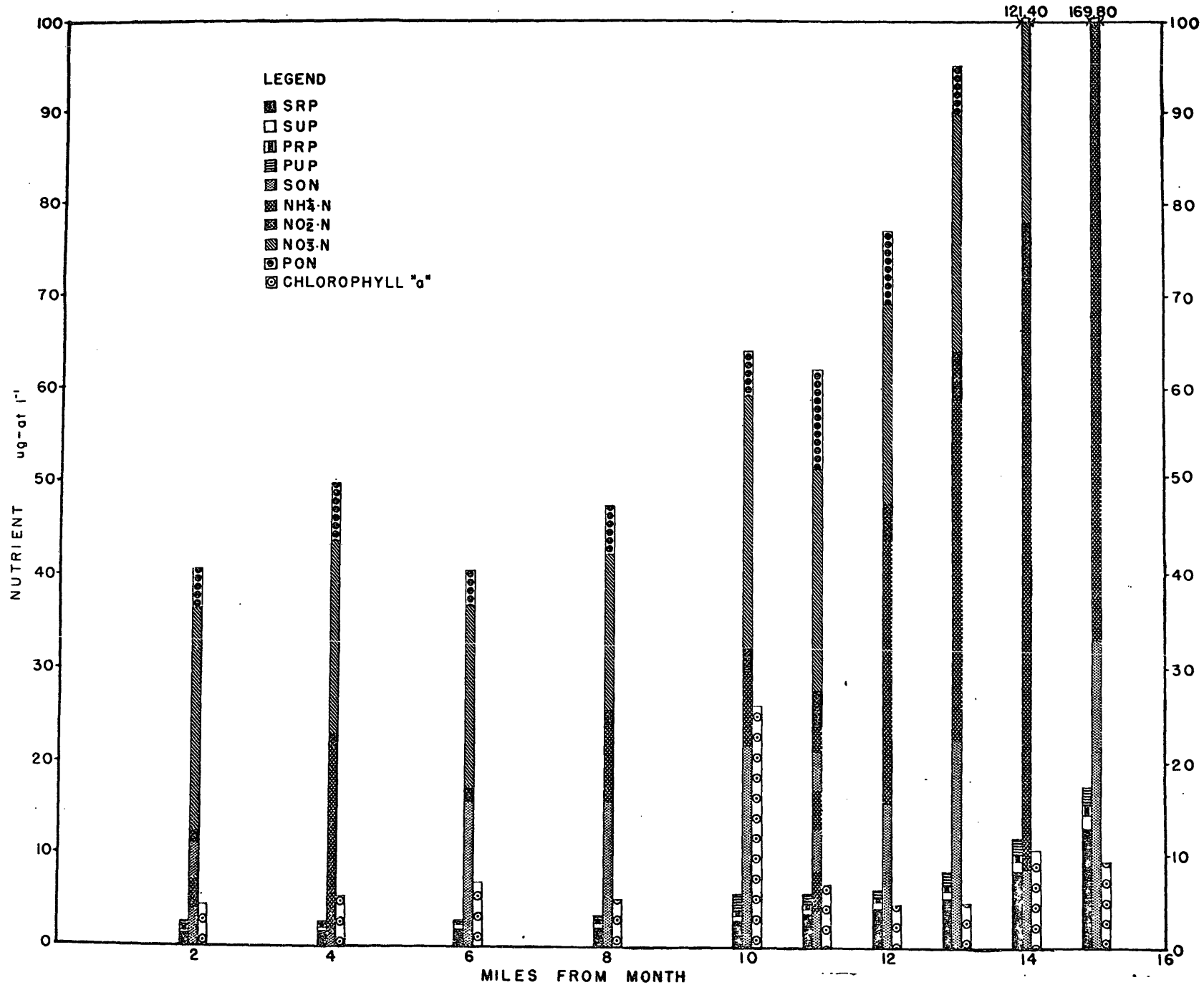
22 August 1966



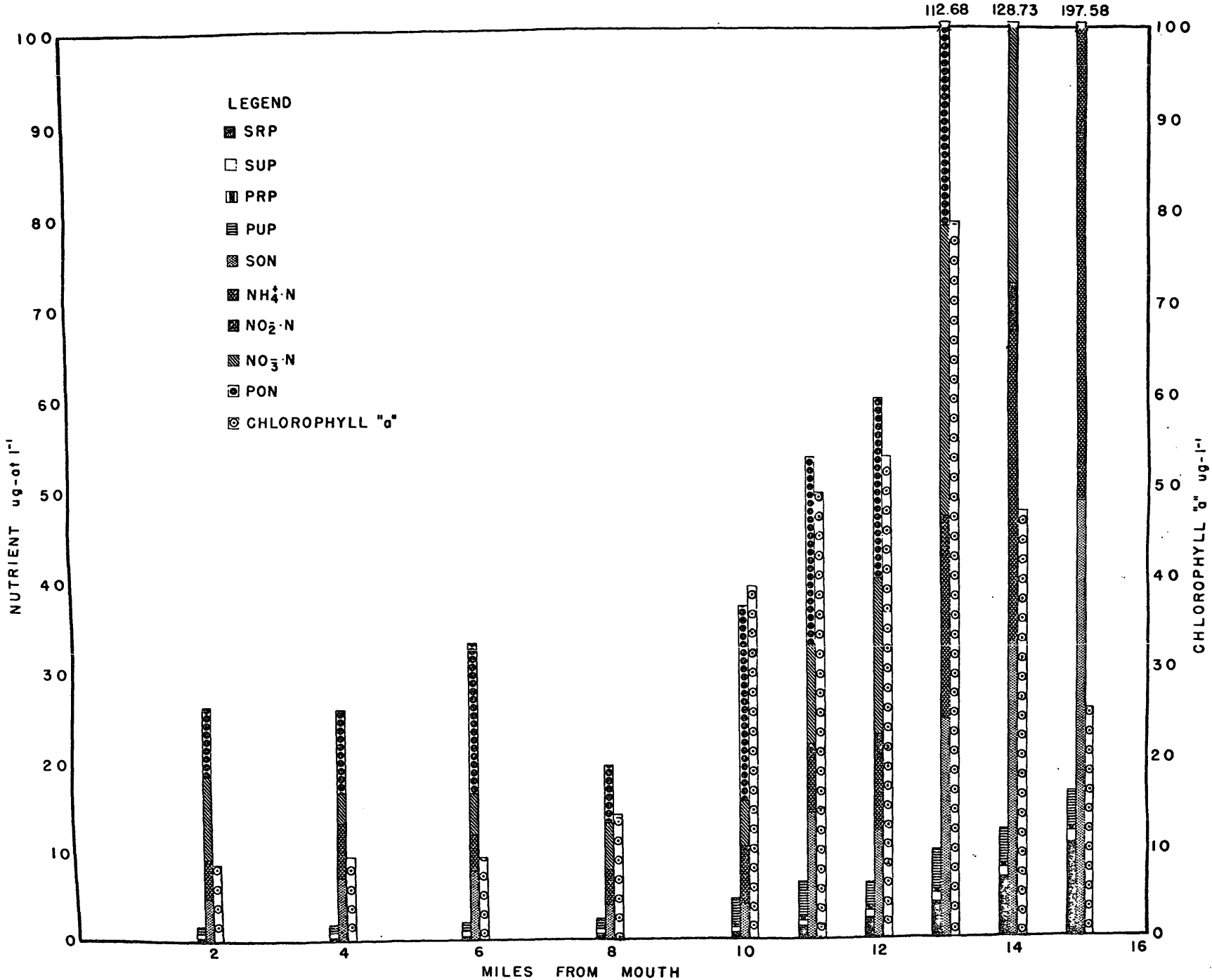
6 September 1966



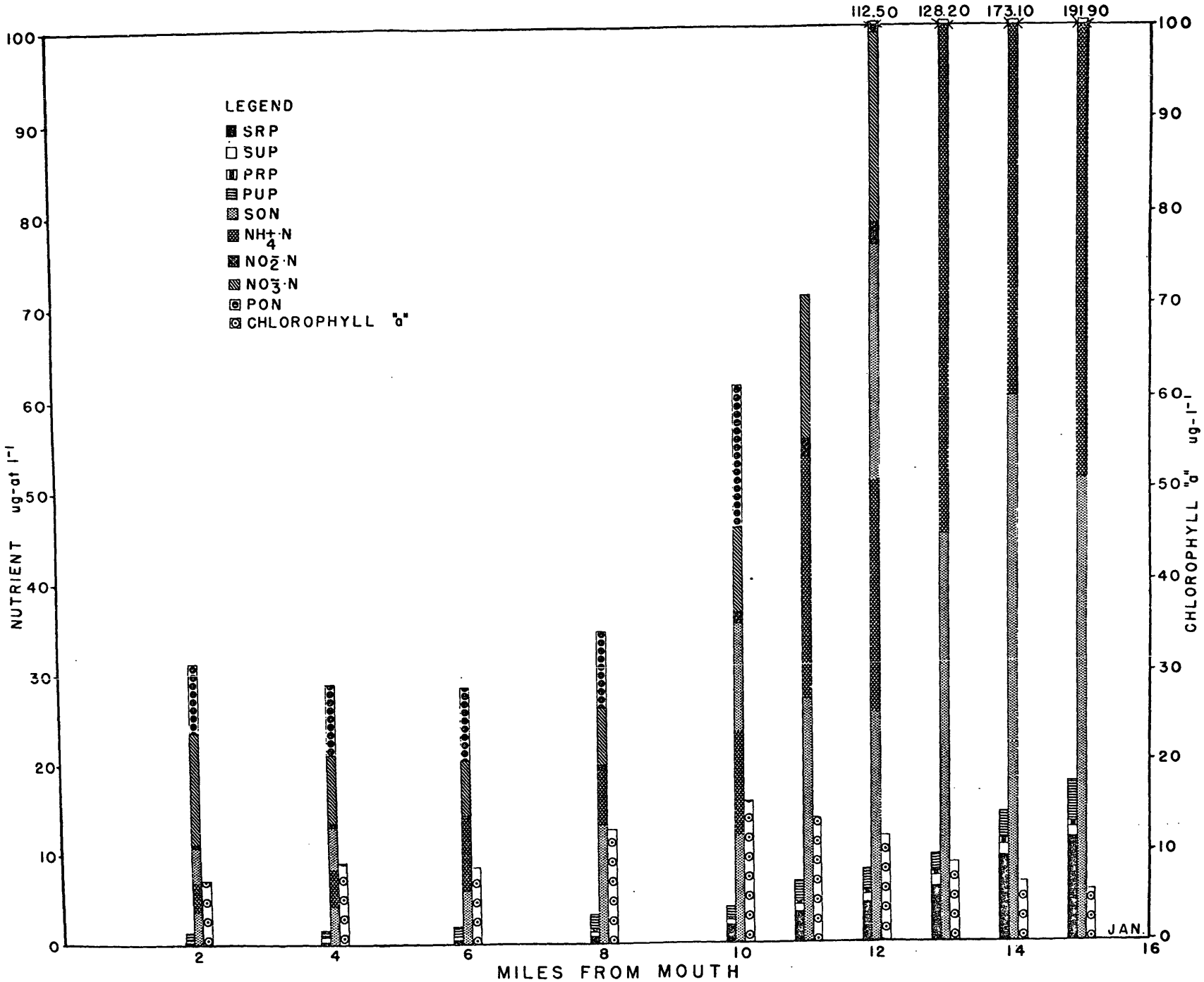
6 October 1966



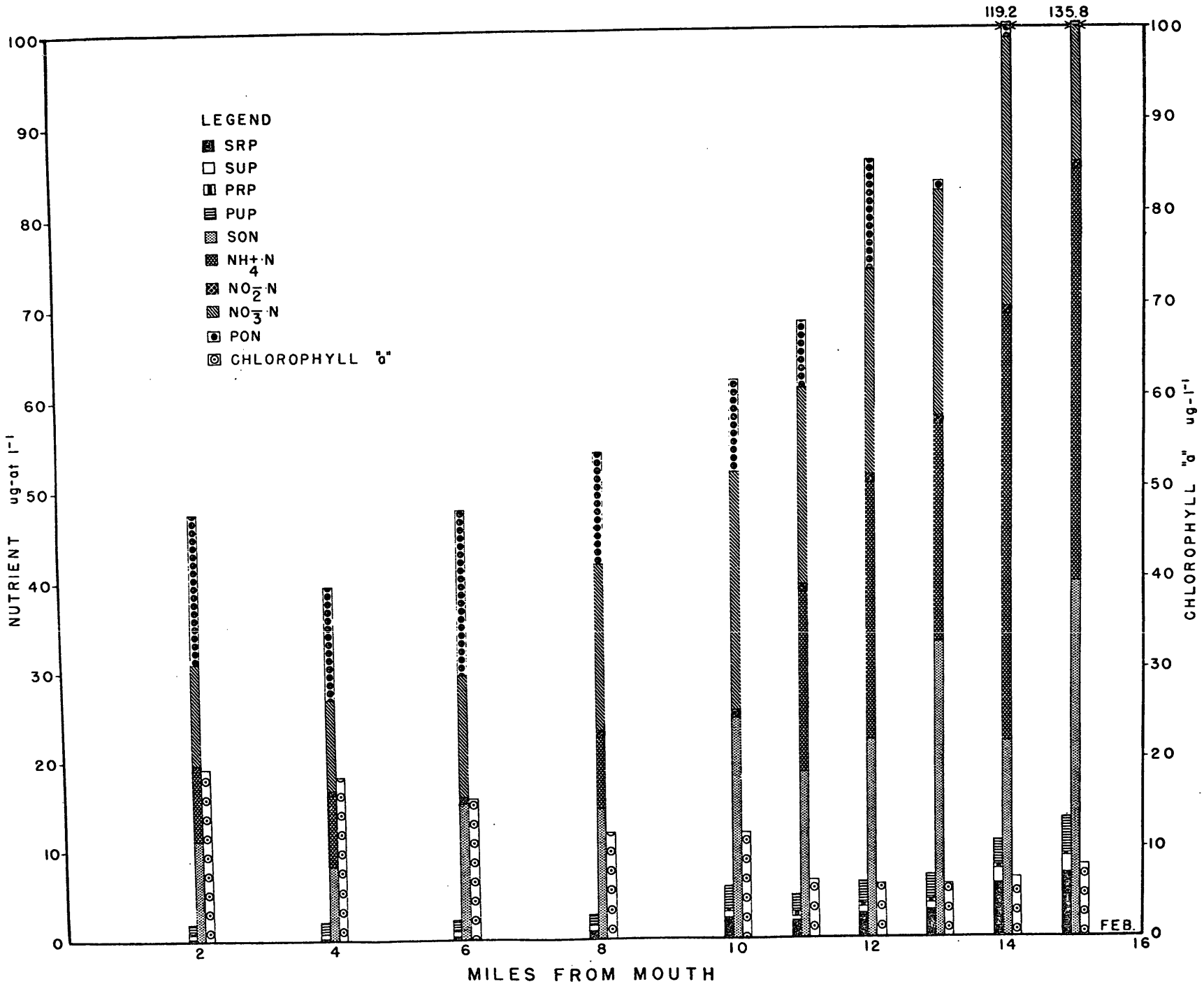
7 November 1966



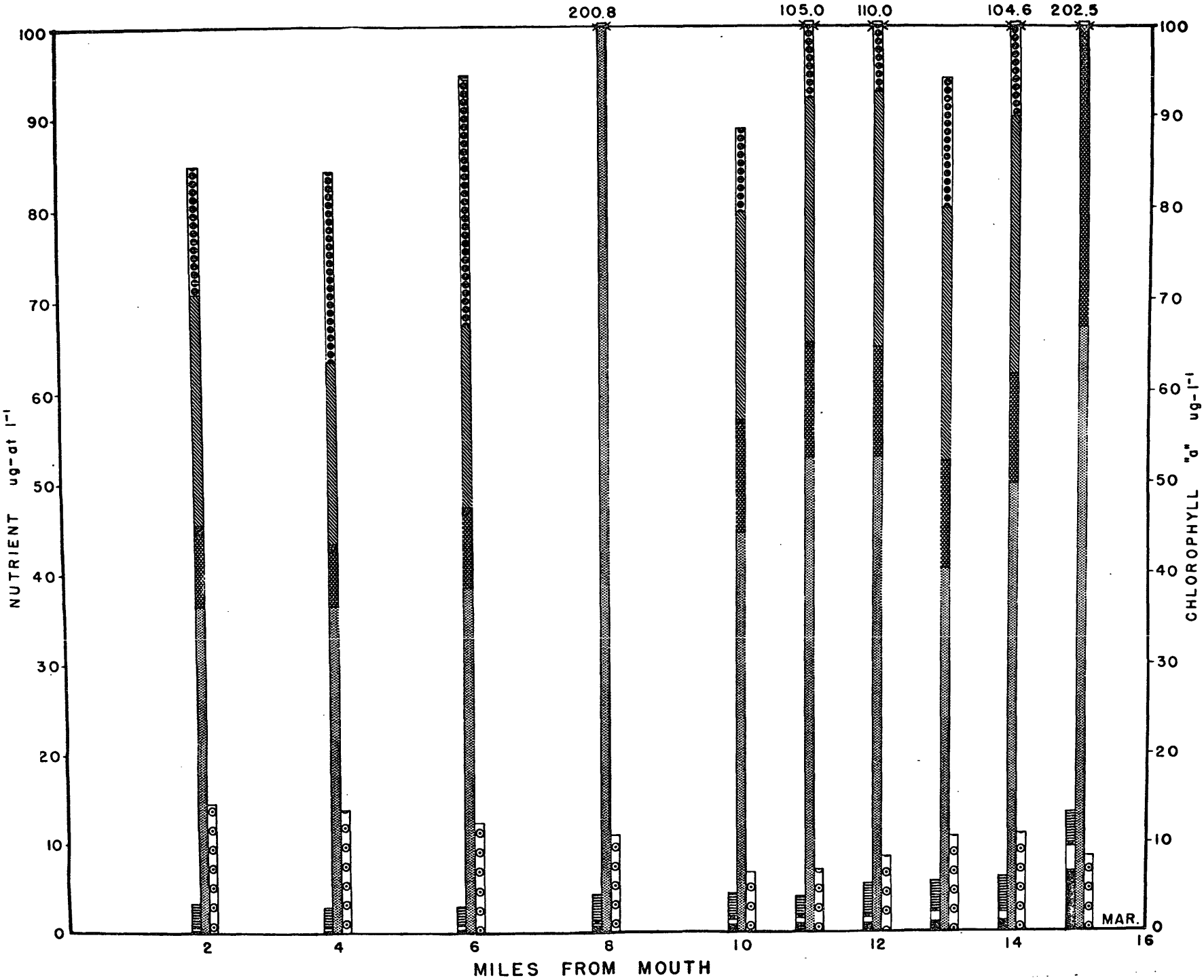
5 December 1966



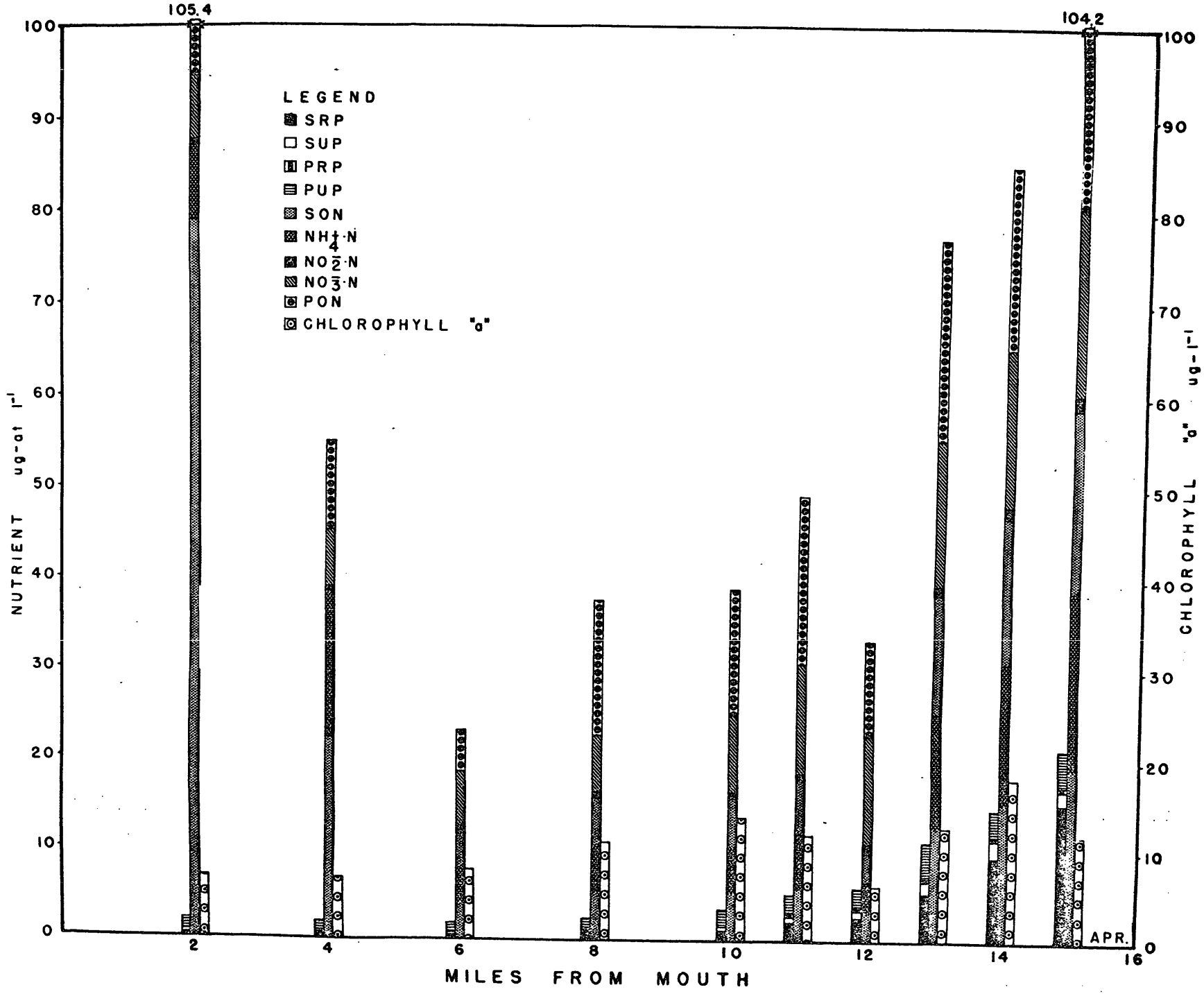
5 January 1967



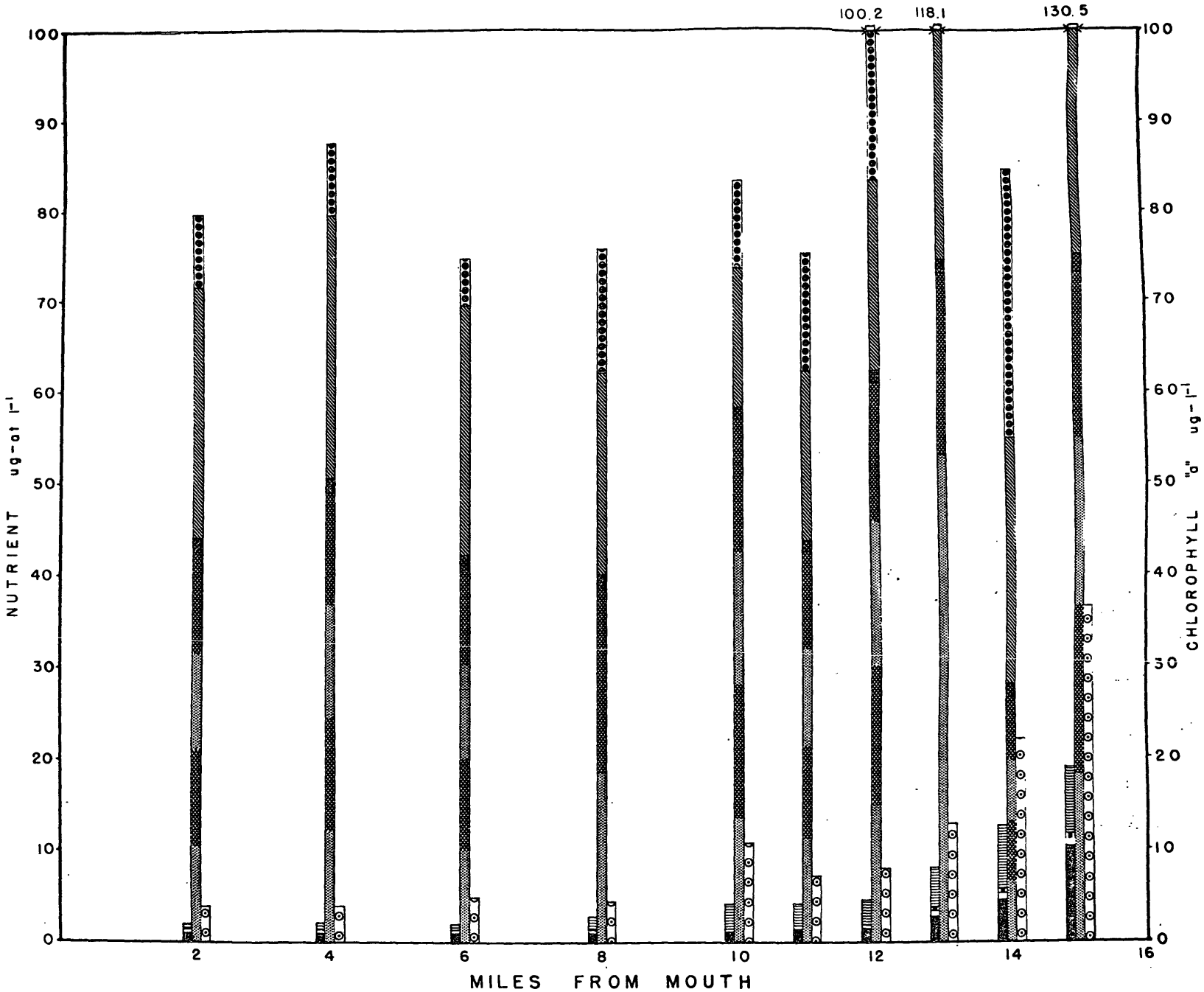
1 February 1967


200.8
105.0
110.0
104.6
202.5
NUTRIENT ug-at l⁻¹
CHLOROPHYLL "a" ug-l⁻¹
MILES FROM MOUTH
MAR.
0
10
20
30
40
50
60
70
80
90
100
2
4
6
8
10
12
14
16

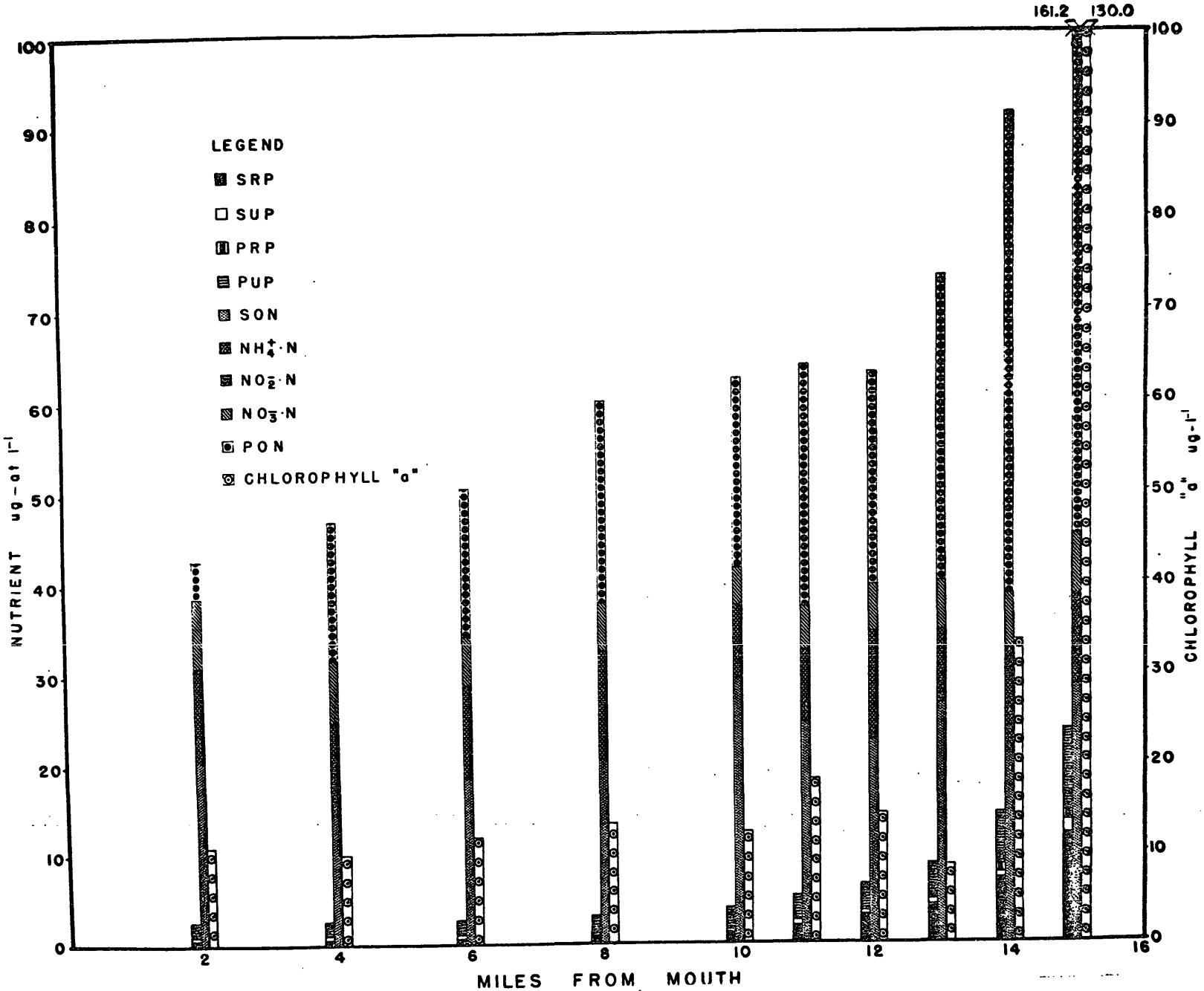
2 March 1967



17 April 1967


100.2
118.1
130.5
NUTRIENT ug-at l⁻¹
CHLOROPHYLL "a" ug-l⁻¹
MILES FROM MOUTH
0
10
20
30
40
50
60
70
80
90
100
2
4
6
8
10
12
14
16

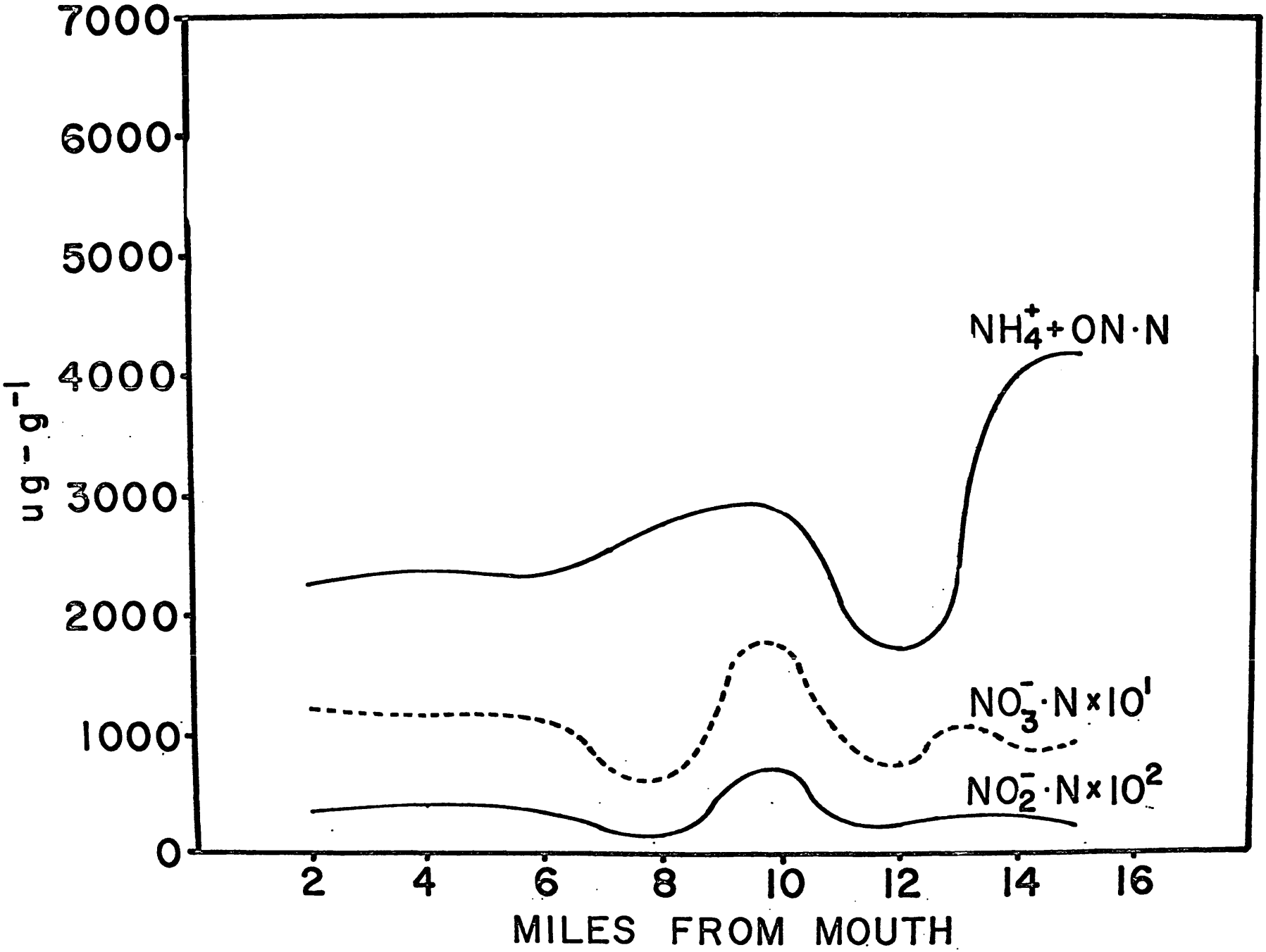
15 May 1967


161.2
130.0
LEGEND
SRP
SUP
PRP
PUP
SON
NH_4^+-N
NO_2^--N
NO_3^--N
PON
CHLOROPHYLL "a"
NUTRIENT ug-at l⁻¹
CHLOROPHYLL "a" ug-l⁻¹
MILES FROM MOUTH
0
10
20
30
40
50
60
70
80
90
100
2
4
6
8
10
12
14
16

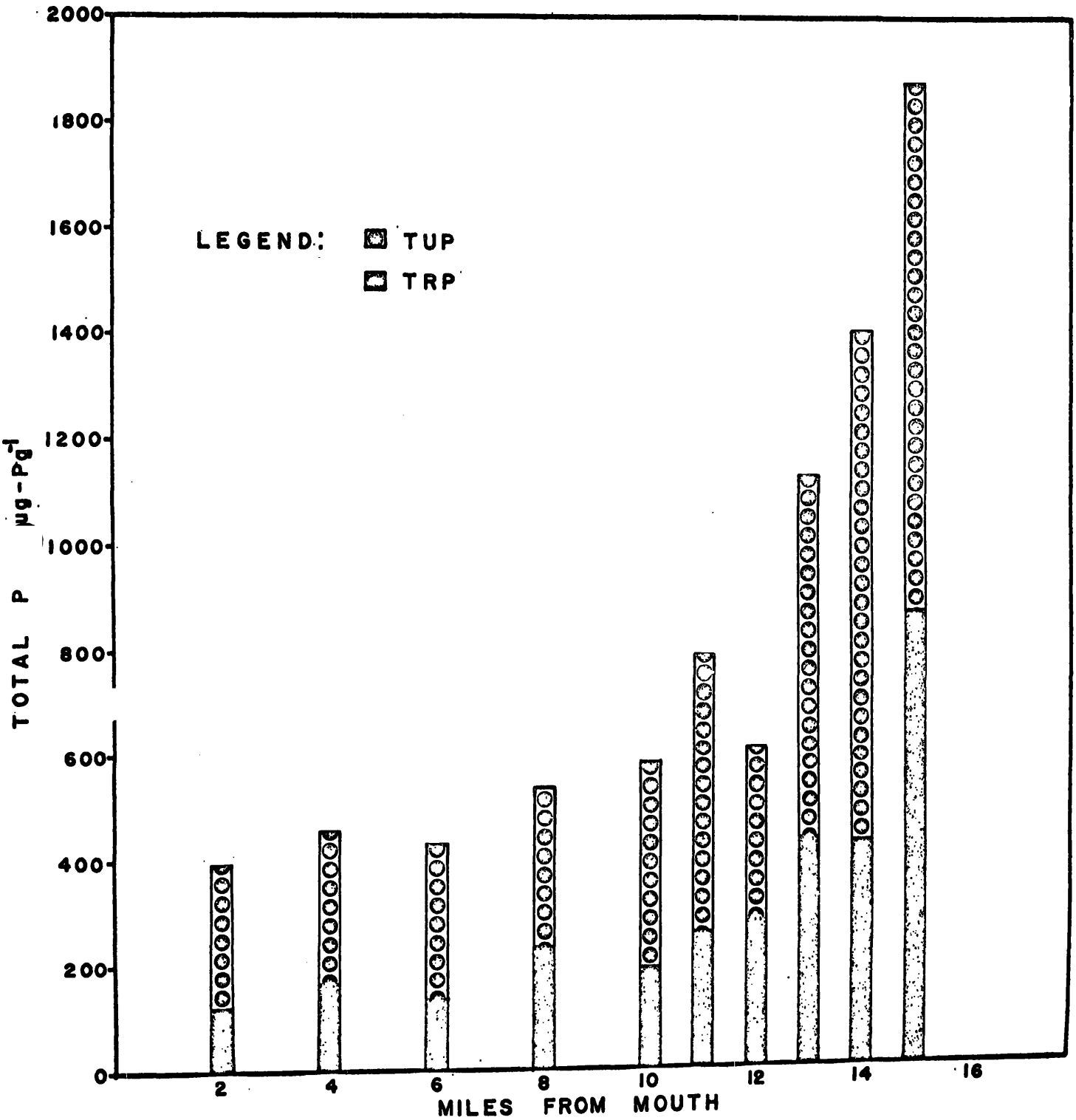
14 June 1967

APPENDIX C

NITROGEN AND PHOSPHORUS FORMS IN TOP 1 CM OF NANSEMOND RIVER SEDIMENTS



NITRITE, NITRATE, AND AMMONIA PLUS ORGANIC NITROGEN IN TOP 1 CM OF NANSEMOND RIVER SEDIMENTS



TOTAL UNREACTIVE AND REACTIVE PHOSPHORUS IN TOP 1 CM OF NANSEMOND RIVER SEDIMENTS

APPENDIX D

PHYTOPLANKTON FORMS FOUND AT FOUR STATIONS ON THE NANSEMOND RIVER

Legend

A - Abundant Genera

C - Common Genera

O - Occasional Genera

R - Rare Genera

NANSEMOND RIVER PHYTOPLANKTON

- Chrysophyta
  - Bacillariophyceae
    - Asterionella
    - Chaetoceros
    - Coscinodiscus
    - Cyclotella
    - Gyrosigma
    - Melosira
    - Navicula
    - Nitzschia
    - Skeletonema
    - Thalassiosira
- Pyrrophyta
  - Cryptophyceae
    - Cryptomonas
  - Cesmophyceae
    - Prorocentrum
  - Dinophyceae
    - Peridinium
- Chlorophyta
  - Oocystaceae
    - Actinastrum
    - Ankistrodesmus
    - Closterium
    - Selenastrum
  - Scenedesmaceae
    - Scenedesmus
- Cyanophyta
  - Chroococcaceae
    - Anacystis
    - Gomphosphaeria
- Euglenophyta
  - Euglenaceae
    - Trachelomonas

Phytoplankton Data

River Nansemond

Cruise Date 13 July 1966

Station	Generic Order of Abundance	
N-2	Skeletonema	O
	Thalassiosira	O
	Nitzschia	R
	Navicula	R
	Peridinium	R
N-6	Skeletonema	O
	Thalassiosira	O
	Peridinium	R
	Cyclotella	R
	Nitzschia	R
N-10	Skeletonema	O
	Thalassiosira	R
	Actinastrum	R
	Peridinium	R
	Nitzschia	R
N-14	Peridinium	A
	Skeletonema	R
	Thalassiosira	R
	Trachelomonas	R
	Cyclotella	R

Phytoplankton Data

River Nansemond Cruise Date 22 August 1966

Station	Generic Order of Abundance	
N-2	Thalassiosira	C
	Skeletonema	0
	Ankistrodesmus	R
N-6	Thalassiosira	C
	Skeletonema	0
	Closterium	0
	Coscinodiscus	R
N-10	Thalassiosira	0
	Peridinium	0
	Skeletonema	0
	Ankistrodesmus	R
N-14	Peridinium	0
	Cyclotella	0
	Thalassiosira	0
	Scenedesmus	R
	Nitzschia	R

Phytoplankton Data

River Nansemond Cruise Date 6 September 1966

Station	Generic	Order of Abundance
N-2	Thalassiosira	O
	Skeletonema	R
N-6	Thalassiosira	C
	Skeletonema	R
	Peridinium	R
	Ankistrodesmus	R
N-10	Thalassiosira	A
	Peridinium	C
	Skeletonema	O
N-14	Thalassiosira	O
	Skeletonema	R
	Peridinium	R
	Scenedesmus	R
	Nitzschia	R

Phytoplankton Data

River Nansemond Cruise Date 6 October 1966

Station	Generic Order of Abundance	
N-2	Skeletonema	R
	Thalassiosira	R
	Peridinium	R
N-6	Skeletonema	R
	Peridinium	R
N-10	Skeletonema	R
	Thalassiosira	R
N-14	Skeletonema	R
	Peridinium	R
	Thalassiosira	R

Phytoplankton Data

River Nansemond — Cruise Date 7 November 1966

Station	Generic	Order of Abundance
N-2	Thalassiosira	R
	Nitzschia	R
	Skeletonema	R
N-6	Thalassiosira	C
	Nitzschia	O
	Navicula	O
	Coscinodiscus	R
	Trachelomonas	R
N-10	Trachelomonas	O
	Cyclotella	R
	Thalassiosira	R
	Nitzschia	R
	Navicula	R
N-14	Cryptomonas	A
	Navicula	C
	Skeletonema	O
	Cyclotella	O
	Nitzschia	O

Phytoplankton Data

River Nansemond

Cruise Date 5 December 1966

Station	Generic	Order of Abundance
N-2	Thalassiosira	A
	Chaetoceros	0
	Nitzschia	R
	Navicula	R
	Cyclotella	R
N-6	Thalassiosira	A
	Peridinium	0
	Navicula	0
	Nitzschia	R
	Chaetoceros	R
N-10	Thalassiosira	A
	Peridinium	A
	Navicula	0
	Chaetoceros	0
	Nitzschia	R
N-14	Thalassiosira	A
	Skeletonema	0
	Navicula	0
	Chaetoceros	0
	Peridinium	0

Phytoplankton Data

River Nansemond Cruise Date 5 January 1967

Station	Generic Order of Abundance	
N-2	Peridinium	O
	Thalassiosira	O
	Chaetoceros	O
N-6	Peridinium	O
	Thalassiosira	R
	Ankistrodesmus	R
	Skeletonema	R
	Gyrosigma	R
N-10	Peridinium	C
	Thalassiosira	O
	Prorocentrum	R
N-14	Thalassiosira	O
	Anacystis	R

Phytoplankton Data

River Nansemond — Cruise Date 1 February 1967

Station	Generic	Order of Abundance
N-2	Thalassiosira	A
	Cryptomonas	A
	Peridinium	C
	Chaetoceros	O
	Nitzschia	O
N-6	Thalassiosira	A
	Peridinium	A
	Cryptomonas	A
	Nitzschia	O
	Cyclotella	R
N-10	Peridinium	A
	Thalassiosira	O
	Ankistrodesmus	O
	Scenedesmus	R
	Skeletonema	R
N-14	Ankistrodesmus	C
	Navicula	O
	Nitzschia	O
	Scenedesmus	O
	Cyclotella	O

PHYTOPLANKTON DATA

River Nansemond — Cruise Date 2 March 1967

Station	Generic	Order of Abundance
N-2	Peridinium	0
	Thalassiosira	0
	Asterionella	R
	Nitzschia	R
	Skeletonema	R
N-6	Thalassiosira	0
	Peridinium	R
	Skeletonema	R
	Asterionella	R
	Nitzschia	R
N-10	Thalassiosira	R
	Ankistrodesmus	R
	Selenastrum	R
N-14	Scenedesmus	R
	Thalassiosira	R
	Ankistrodesmus	R
	Navicula	R
	Cyclotella	R

Phytoplankton Data

River Nansemond Cruise Date 17 April 1967

Station	Generic Order of Abundance	
N-2	Thalassiosira	R
N-6	Peridinium	R
	Thalassiosira	R
	Nitzschia	R
N-10	Peridinium	R
	Thalassiosira	R
	Ankistrodesmus	R
N-14	Thalassiosira	A
	Ankistrodesmus	A
	Peridinium	C
	Navicula	O

Phytoplankton Data

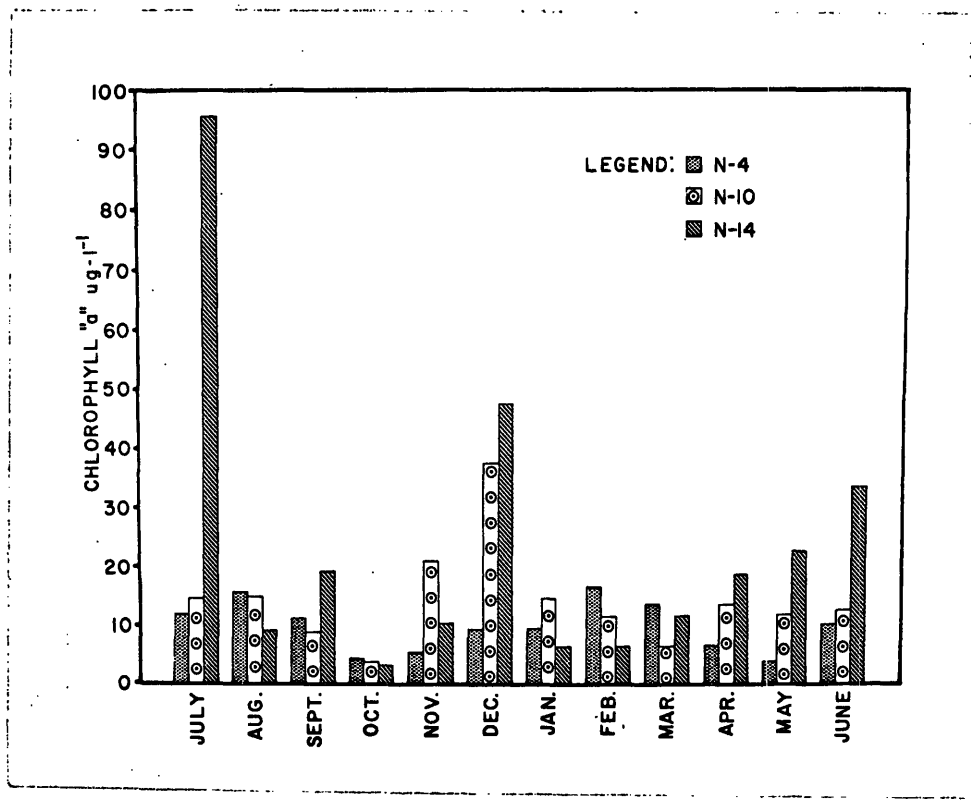
River Nansemond Cruise Date 15 May 1967

Station	Generic	Order of Abundance
N-2	Thalassiosira	R
N-6	Thalassiosira	R
N-10	Thalassiosira	R
	Ankistrodesmus	R
	Trachelomonas	R
N-14	Thalassiosira	A
	Gomphosphaeria	A
	Cyclotella	A
	Cryptomonas	A
	Scenedesmus	O

Phytoplankton Data

River Nansemond — Cruise Date 14 June 1967

Station	Generic	Order of Abundance
N-2	Thalassiosira	R
	Cyclotella	R
	Skeletonema	R
	Peridinium	R
N-6	Thalassiosira	O
	Gomphosphaeria	R
	Trachelomonas	R
	Skeletonema	R
	Peridinium	R
N-10	Gomphosphaeria	A
	Trachelomonas	O
	Thalassiosira	R
	Skeletonema	R
	Peridinium	R
N-14	Anacystis (Chrooc.)	A
	Gomphosphaeria	C
	Thalassiosira	R
	Melosira	R
	Navicula	R



PHYTOPLANKTON LEVELS AT THREE STATIONS ON THE NANSEMOND RIVER AS INDICATED BY CHLOROPHYLL "a" LEVELS