

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL EUTROPHICATION SURVEY
WORKING PAPER SERIES**



REPORT
ON
LAKE JAMES
BURKE AND McDOWELL COUNTIES
NORTH CAROLINA
EPA REGION IV
WORKING PAPER No. 383

PACIFIC NORTHWEST ENVIRONMENTAL RESEARCH LABORATORY

An Associate Laboratory of the

NATIONAL ENVIRONMENTAL RESEARCH CENTER - CORVALLIS, OREGON

and

NATIONAL ENVIRONMENTAL RESEARCH CENTER - LAS VEGAS, NEVADA

REPORT
ON
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WITH THE COOPERATION OF THE
NORTH CAROLINA DEPARTMENT OF NATURAL AND ECONOMIC RESOURCES
AND THE
NORTH CAROLINA NATIONAL GUARD
JUNE, 1975

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F O R E W O R D

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to fresh water lakes and reservoirs.

OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impact on selected freshwater lakes as a basis for formulating comprehensive and coordinated national, regional, and state management practices relating to point-source discharge reduction and non-point source pollution abatement in lake watersheds.

ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

- a. A generalized representation or model relating sources, concentrations, and impacts can be constructed.
- b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin, and related nutrients.
- c. With such a transformation, an assessment of the potential for eutrophication control can be made.

LAKE ANALYSIS

In this report, the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin is documented. The report is formatted to provide state environmental agencies with specific information for basin planning [§303(e)], water quality criteria/standards review [§303(c)], clean lakes [§314(a,b)], and water quality monitoring [§106 and §305(b)] activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

Beyond the single lake analysis, broader based correlations between nutrient concentrations (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's fresh water lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export, and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by EPA and to augment plans implementation by the states.

ACKNOWLEDGMENT

The staff of the National Eutrophication Survey (Office of Research & Development, U. S. Environmental Protection Agency) expresses sincere appreciation to the North Carolina Department of Natural and Economic Resources for professional involvement and to the North Carolina National Guard for conducting the tributary sampling phase of the Survey.

Lewis R. Martin, Director of the Division of Environmental Management; Darwin L. Coburn, Chief of the Water Quality Section; and Julian R. Taylor, Supervisor of the Monitoring Program Unit; provided invaluable lake documentation and counsel during the Survey, reviewed the preliminary reports, and provided critiques most useful in the preparation of this Working Paper series.

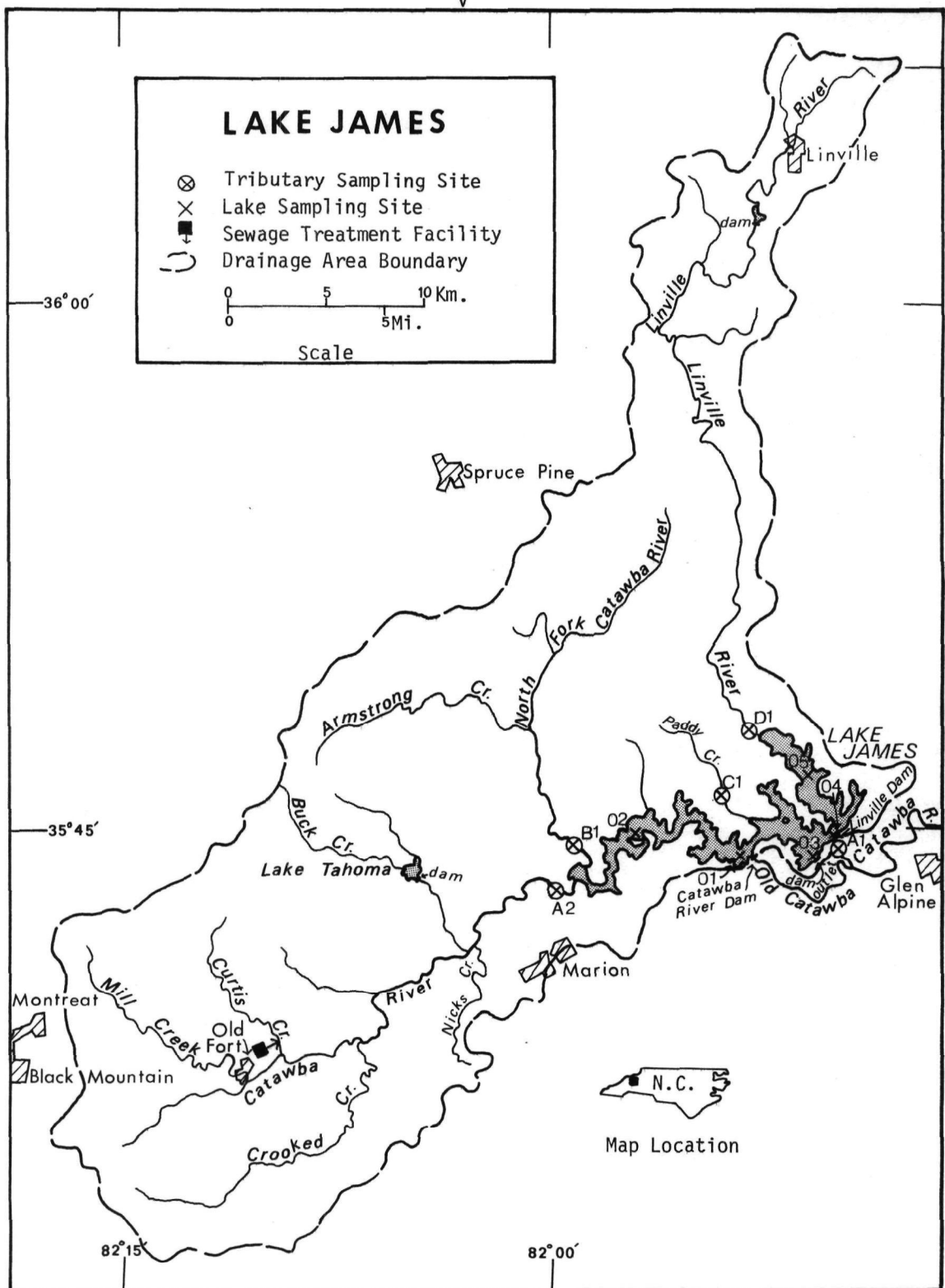
Major General William M. Buck, formerly Adjutant General of North Carolina, and Project Officer Colonel Arthur J. Bouchard, who directed the volunteer efforts of the North Carolina National Guardsmen, are also gratefully acknowledged for their assistance to the Survey.

NATIONAL EUTROPHICATION SURVEY

STUDY LAKES

STATE OF NORTH CAROLINA

<u>LAKE NAME</u>	<u>COUNTY</u>
Badin	Montgomery, Stanly
Blewett Falls	Anson, Richmond
Chatuge	Clay, NC; Towns, GA
Fontana	Graham, Swain
Hickory	Alexander, Caldwell, Catawba
High Rock	Davidson, Rowan
Hiwassee	Cherokee
James	Burke, McDowell
John H. Kerr (Nut Bush Creek)	Granville, Vance, Warren, NC; Halifax, Mecklenburg, VA
Junaluska	Haywood
Lookout Shoals	Alexander, Catawba, Iredell
Mountain Island	Gaston, Mecklenburg
Norman	Catawba, Iredell, Lincoln, Mecklenburg
Rhodhiss	Burke, Caldwell
Santeetlah	Graham
Tillery	Montgomery, Stanly
Waccamaw	Columbus
Waterville	Haywood
Wylie	Gaston, Mecklenburg, NC; York, SC



LAKE JAMES
STORET NO. 3708

I. CONCLUSIONS

A. Trophic Condition:

Survey data indicate Lake James is eutrophic. It ranked seventh in overall trophic quality when the 16 North Carolina lakes sampled in 1973 were compared using a combination of six parameters as an index*. Nine of the lakes had greater and one had the same median total phosphorus; 11 had greater and one had the same median dissolved phosphorus; 13 had greater and one had the same median inorganic nitrogen; and, while only three lakes had greater mean Secchi disc transparency, only one had greater mean chlorophyll a. Marked depression of dissolved oxygen with depth occurred at all five sampling stations in July and September.

During their visits to the lake, Survey limnologists did not observe any nuisance conditions.

B. Rate-Limiting Nutrient:

The algal assay results indicate that Lake James was phosphorus limited at the time the sample was collected (03/24/73). These results are substantiated by the lake data; i.e., the mean N/P ratios at all sampling times were 17/1 or greater.

* See Appendix A.

C. Nutrient Controllability:

1. Point sources--The phosphorus contribution of point sources amounted to 5.8% of the total load reaching the lake. The Old Fort wastewater treatment plant contributed 5.4% of the total load.

Survey data indicate a total phosphorus loading rate of $1.12 \text{ g/m}^2/\text{yr}$ which is slightly above the rate ($0.94 \text{ g/m}^2/\text{yr}$) proposed by Vollenweider (Vollenweider and Dillon, 1974) as a eutrophic loading rate (see page 13). Therefore, every effort should be made to minimize phosphorus inputs to the lake.

2. Non-point sources--Non-point sources accounted for 94.2% of the total phosphorus input to the lake during the sampling year. The Catawba River accounted for 45.6%, and the North Fork Catawba River accounted for 38.5% of this total.

The North Fork Catawba River had a phosphorus export rate of $51 \text{ kg/km}^2/\text{yr}$, which is much higher than the rates of the other Lake James tributaries (see page 12). This may have been due to unknown and unsampled point sources impacting this river or its tributaries; e.g., wastes from North Cove, Ashland, or other communities upstream. If such phosphorus sources exist and are controllable, a reduction of the North Fork export rate to the same level as the Catawba River rate ($29 \text{ kg/km}^2/\text{yr}$) would result in lowering the lake loading rate to well below the eutrophic rate and should result in improved water quality. The phosphorus load to downstream Rhodhiss Lake (Working Paper No. 388) would be reduced as well.

II. LAKE AND DRAINAGE BASIN CHARACTERISTICS[†]

A. Lake Morphometry^{††}:

1. Surface area: 26.35 kilometers².
2. Mean depth: 13.5 meters.
3. Maximum depth: 43 meters.
4. Volume: $356 \times 10^6 \text{ m}^3$.
5. Mean hydraulic retention time: 208 days.

B. Tributary and Outlet: (See Appendix C for flow data)

1. Tributaries -

<u>Name</u>	<u>Drainage area (km²)*</u>	<u>Mean flow (m³/sec)*</u>
Catawba River	463.6	9.5
North Fork, Catawba River	221.7	3.5
Paddy Creek	16.3	0.3
Linville River	174.0	4.0
Minor tributaries & immediate drainage -	<u>84.8</u>	<u>2.5</u>
Totals	960.4	19.8

2. Outlet -

Catawba River	986.8**	19.8**
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C. Precipitation***:

1. Year of sampling: 155.7 centimeters.
2. Mean annual: 129.0 centimeters.

[†] Table of metric conversions--Appendix B.

^{††} Park, 1975.

* For limits of accuracy, see Working Paper No. 175, "...Survey Methods, 1973-1976".

** Includes area of lake; outflow adjusted to equal sum of inflows.

*** See Working Paper No. 175.

III. LAKE WATER QUALITY SUMMARY

Lake James was sampled three times during the open-water season of 1973 by means of a pontoon-equipped Huey helicopter. Each time, samples for physical and chemical parameters were collected from five stations on the lake and from a number of depths at each station (see map, page v). During each visit, a single depth-integrated (4.6 m to surface) sample was composited from the five stations for phytoplankton identification and enumeration; and during the first visit, a single 18.9-liter depth-integrated sample was composited for algal assays. Also each time, a depth-integrated sample was collected from each of the stations for chlorophyll a analysis. The maximum depths sampled were 30.5 meters at station 1, 15.2 meters at station 2, 36.6 meters at station 3, 35.1 meters at station 4, and 16.8 meters at station 5.

The lake sampling results are presented in full in Appendix D and are summarized in the following table.

A. SUMMARY OF PHYSICAL AND CHEMICAL CHARACTERISTICS FOR LAKE JAMES
STORET CODE 3708

PARAMETER	1ST SAMPLING (3/24/73)				2ND SAMPLING (7/ 5/73)				3RD SAMPLING (9/24/73)			
	5 SITES				5 SITES				5 SITES			
	RANGE	MEAN	MEDIAN		RANGE	MEAN	MEDIAN		RANGE	MEAN	MEDIAN	
TEMP (C)	7.1 - 13.0	10.4	10.4		8.2 - 29.4	21.6	23.4		8.3 - 27.5	21.6	24.9	
DISS OXY (MG/L)	9.2 - 11.5	10.0	9.9		2.1 - 10.5	6.5	5.9		0.0 - 8.6	3.3	1.6	
CNDCTVY (MCROMO)	50. - 65.	57.	58.		50. - 70.	58.	58.		41. - 86.	59.	55.	
PH (STAND UNITS)	7.1 - 8.4	7.7	7.8		6.3 - 9.4	7.5	6.6		6.2 - 8.6	6.6	6.4	
TOT ALK (MG/L)	10. - 21.	15.	16.		10. - 19.	14.	14.		10. - 26.	15.	14.	
TOT P (MG/L)	0.016 - 0.080	0.040	0.031		0.008 - 0.042	0.018	0.016		0.012 - 0.038	0.021	0.018	
ORTHO P (MG/L)	0.003 - 0.033	0.014	0.010		0.002 - 0.030	0.006	0.004		0.004 - 0.015	0.009	0.009	3
NO2+NO3 (MG/L)	0.030 - 0.320	0.187	0.180		0.040 - 0.460	0.147	0.070		0.020 - 0.420	0.063	0.030	
AMMONIA (MG/L)	0.020 - 0.090	0.045	0.040		0.040 - 0.120	0.066	0.060		0.020 - 0.660	0.123	0.050	
KJEL N (MG/L)	0.200 - 0.600	0.275	0.200		0.200 - 0.900	0.381	0.300		0.200 - 1.100	0.400	0.300	
INORG N (MG/L)	0.060 - 0.380	0.233	0.220		0.080 - 0.520	0.213	0.155		0.050 - 0.700	0.186	0.090	
TOTAL N (MG/L)	0.250 - 0.690	0.462	0.485		0.240 - 0.980	0.528	0.500		0.220 - 1.140	0.463	0.425	
CHLORPYL A (UG/L)	0.7 - 12.9	6.2	5.3		5.3 - 16.1	9.8	9.1		4.2 - 8.8	7.0	7.7	
SECCHI (METERS)	0.5 - 1.5	1.1	1.1		1.2 - 2.7	1.9	1.8		1.9 - 2.7	2.4	2.5	

B. Biological characteristics:

1. Phytoplankton -

<u>Sampling Date</u>	<u>Dominant Genera</u>	<u>Algal units per ml</u>
03/24/73	1. Melosira	556
	2. Asterionella	111
	3. Cyclotella	87
	4. Pennate diatoms	37
	5. Cryptomonas	37
	Other genera	<u>137</u>
	Total	965
07/05/73	1. Tabellaria	821
	2. Anabaena	640
	3. Melosira	181
	4. Cryptomonas	85
	5. Flagellates	85
	Other genera	<u>84</u>
	Total	1,896
09/24/73	1. Lyngbya	1,528
	2. Chroococcus	1,510
	3. Flagellates	588
	4. Raphidiopsis	549
	5. Anabaena	353
	Other genera	<u>1,389</u>
	Total	5,917

2. Chlorophyll a -

<u>Sampling Date</u>	<u>Station Number</u>	<u>Chlorophyll a (µg/l)</u>
03/24/73	01	5.3
	02	0.7
	03	12.9
	04	7.9
	05	4.1
07/05/73	01	7.6
	02	5.3
	03	16.1
	04	11.1
	05	9.1
09/24/73	01	8.8
	02	8.2
	03	4.2
	04	5.9
	05	7.7

C. Limiting Nutrient Study:

1. Autoclaved, filtered, and nutrient spiked -

<u>Spike (mg/l)</u>	<u>Ortho P Conc. (mg/l)</u>	<u>Inorganic N Conc. (mg/l)</u>	<u>Maximum yield (mg/l-dry wt.)</u>
Control	0.010	0.164	0.4
0.010 P	0.020	0.164	2.9
0.020 P	0.030	0.164	2.8
0.050 P	0.060	0.164	3.4
0.025 P + 0.5 N	0.035	0.664	10.7
0.050 P + 1.0 N	0.060	1.164	17.8
1.0 N	0.010	1.164	0.4

2. Discussion -

The control yield of the assay alga, Selenastrum capricornutum, indicates that the potential primary productivity of Lake James was moderate at the time of sample collection (03/24/73).

The assay data also indicate that James Lake was phosphorus limited at that time. Note the increased yields with the addition of the first orthophosphorus spike but the lack of a significant increase in yield with the addition of only nitrogen. The lake data indicate phosphorus limitation at all sampling times; the mean inorganic nitrogen to orthophosphorus ratios were 17 to 1 or greater, and phosphorus limitation would be expected.

It should be noted that with the initial addition of orthophosphorus, the sample became nitrogen limited (N/P ratio = 8/1). Therefore, no significant increases in yields resulted from further additions of orthophosphorus.

IV. NUTRIENT LOADINGS (See Appendix E for data)

For the determination of nutrient loadings, the North Carolina National Guard collected monthly near-surface grab samples from each of the tributary sites indicated on the map (page v), except for the high runoff months of January and February when two samples were collected. Sampling was begun in March, 1973, and was completed in February, 1974.

Through an interagency agreement, stream flow estimates for the year of sampling and a "normalized" or average year were provided by the North Carolina District Office of the U.S. Geological Survey for the tributary sites nearest the lake.

In this report, nutrient loads for sampled tributaries were calculated using mean annual concentrations and mean annual flows. Nutrient loads shown are those measured minus point-source loads, if any.

Nutrient loads for unsampled "minor tributaries and immediate drainage" ("ZZ" of U.S.G.S.) were estimated using the means of the nutrient concentrations in Paddy Creek and the Linville River at stations C-1 and D-1 and the mean annual ZZ flow.

The operator of the Old Fort wastewater treatment plant provided monthly effluent samples and corresponding flow data.

A. Waste Sources:

1. Known municipal -

<u>Name</u>	<u>Pop. Served</u>	<u>Treatment</u>	<u>Mean Flow (m³/d)</u>	<u>Receiving Water</u>
Old Fort*	1,000	act. sludge	924.3	Curtis Creek
Linville**	variable	septic tanks	?	Linville River

2. Known industrial - None

* Byrd, 1973; more than 25% of the waste load is contributed by industry.

** Wiseman, 1975.

B. Annual Total Phosphorus Loading - Average Year:

1. Inputs -

<u>Source</u>	<u>kg P/ yr</u>	<u>% of total</u>
a. Tributaries (non-point load) -		
Catawba River	13,500	45.6
North Fork, Catawba River	11,390	38.5
Paddy Creek	100	0.3
Linville River	1,505	5.1
b. Minor tributaries & immediate drainage (non-point load) -	925	3.1
c. Known municipal STP's -		
Old Fort	1,600	5.4
Linville (septic tanks)	110	0.4
d. Septic tanks* -	15	<0.1
e. Known industrial - None	-	-
f. Direct precipitation** -	<u>460</u>	<u>1.6</u>
Total	29,605	100.0

2. Outputs -

Lake outlet - Catawba River 48,705

3. Net annual P loss - 19,100 kg.

* Estimate based on 44 lakeshore dwellings; see Working Paper No. 175.

** See Working Paper No. 175.

C. Annual Total Nitrogen Loading - Average Year:

1. Inputs -

<u>Source</u>	<u>kg N/ yr</u>	<u>% of total</u>
a. Tributaries (non-point load) -		
Catawba River	172,040	40.3
North Fork, Catawba River	73,685	17.3
Paddy Creek	4,850	1.1
Linville River	90,270	21.1
b. Minor tributaries & immediate drainage (non-point load) -	49,675	11.6
c. Known municipal STP's -		
Old Fort	3,820	0.9
Linville (septic tanks)	4,050	0.9
d. Septic tanks* -	470	0.1
e. Known industrial - None	-	-
f. Direct precipitation** -	<u>28,445</u>	<u>6.7</u>
Total	427,305	100.0

2. Outputs -

Lake outlet - Catawba River 375,270

3. Net annual N accumulation - 52,035 kg.

D. Mean Annual Non-point Nutrient Export by Subdrainage Area:

<u>Tributary</u>	<u>kg P/km²/yr</u>	<u>kg N/km²/yr</u>
Catawba River	29	371
North Fork, Catawba River	51	332
Paddy Creek	6	298
Linville River	9	519

* Estimate based on 44 lakeshore dwellings; see Working Paper No. 175.

** See Working Paper No. 175.

E. Yearly Loading Rates:

In the following table, the existing phosphorus loading rates are compared to those proposed by Vollenweider (Vollenweider and Dillon, 1974). Essentially, his "dangerous" rate is the rate at which the receiving water would become eutrophic or remain eutrophic; his "permissible" rate is that which would result in the receiving water remaining oligotrophic or becoming oligotrophic if morphometry permitted. A mesotrophic rate would be considered one between "dangerous" and "permissible".

Note that Vollenweider's model may not be applicable to water bodies with short hydraulic retention times.

	Total Phosphorus		Total Nitrogen	
	Total	Accumulated	Total	Accumulated
grams/m ² /yr	1.12	loss*	16.2	2.0

Vollenweider loading rates for phosphorus
(g/m²/yr) based on mean depth and mean
hydraulic retention time of Lake James:

"Dangerous" (eutrophic rate)	0.94
"Permissible" (oligotrophic rate)	0.47

* There was an apparent loss of phosphorus during the sampling year. This may have been due to non-representative sampling resulting in an under-estimation of the phosphorus load (septic tanks in camps and parks, unknown point sources, etc.) or to hypolimnetic drawdown carrying phosphorus solubilized from bottom sediments. The lake data indicate a slight increase in total phosphorus concentration in the deeper samples at station 04 (above Linville Dam), especially during the July and September samplings.

V. LITERATURE REVIEWED

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- Weiss, Charles M., 1972. A proposal to the Water Resources Research Institute of the University of North Carolina. The trophic state of North Carolina lakes, covering the period July 1, 1972 to June 30, 1973. U. of North Carolina, Chapel Hill.
- Wiseman, Robert C. (Avery County Mgr.), 1975. Personal communication (population estimates of Linville, NC: 3,000 per month for three summer months, and 200 per month the remainder of the year). Linville.

VI. APPENDICES

APPENDIX A

LAKE RANKINGS

LAKES RANKED BY INDEX NOS.

RANK	LAKE CODE	LAKE NAME	INDEX NO
1	3719	LAKE WACCAMAW	534
2	3716	SANTEELAH LAKE	446
3	3711	MOUNTAIN ISLAND LAKE	419
4	3707	HIWASSEE LAKE	414
5	3704	FONTANA LAKE	392
6	3713	LAKE NORMAN	346
7	3708	LAKE JAMES	334
8	3710	LOOKOUT SHOALS	327
9	3715	RHODHISS LAKE	296
10	3705	LAKE HICKORY	283
11	3717	LAKE TILLERY	246
12	3709	LAKE JUNALUSKA	220
13	3702	BLEWETT FALLS LAKE	200
14	3718	WATERVILLE RESERVOIR	140
15	3701	BADIN LAKE	124
16	3706	HIGH ROCK LAKE	76

PERCENT OF LAKES WITH HIGHER VALUES (NUMBER OF LAKES WITH HIGHER VALUES)

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500- MEAN SEC	MEAN CHLORA	15- MIN DO	MEDIAN DISS ORTHO P	INDEX NO
3701	BADIN LAKE	33 (5)	7 (1)	27 (4)	27 (4)	3 (0)	27 (4)	124
3702	BLEWETT FALLS LAKE	7 (1)	13 (2)	7 (1)	73 (11)	93 (14)	7 (1)	200
3704	FONTANA LAKE	100 (15)	33 (5)	93 (14)	100 (15)	3 (0)	63 (9)	392
3705	LAKE HICKORY	27 (4)	60 (9)	53 (8)	13 (2)	80 (12)	50 (7)	283
3706	HIGH ROCK LAKE	13 (2)	20 (3)	0 (0)	0 (0)	23 (2)	20 (3)	76
3707	HIWASSEE LAKE	87 (13)	80 (12)	87 (13)	47 (7)	50 (7)	63 (9)	414
3708	LAKE JAMES	60 (9)	87 (13)	80 (12)	7 (1)	23 (2)	77 (11)	334
3709	LAKE JUNALUSKA	47 (7)	27 (4)	43 (6)	20 (3)	50 (7)	33 (5)	220
3710	LOOKOUT SHOALS	53 (8)	47 (7)	60 (9)	67 (10)	60 (9)	40 (6)	327
3711	MOUNTAIN ISLAND LAKE	73 (11)	73 (11)	43 (6)	53 (8)	87 (13)	90 (13)	419
3713	LAKE NORMAN	67 (10)	53 (8)	73 (11)	40 (6)	23 (2)	90 (13)	346
3715	RHODHISS LAKE	20 (3)	67 (10)	33 (5)	93 (14)	70 (10)	13 (2)	296
3716	SANTEELAH LAKE	93 (14)	93 (14)	100 (15)	60 (9)	23 (2)	77 (11)	446
3717	LAKE TILLERY	40 (6)	40 (6)	13 (2)	33 (5)	70 (10)	50 (7)	246
3718	WATERVILLE RESERVOIR	0 (0)	0 (0)	20 (3)	80 (12)	40 (6)	0 (0)	140
3719	LAKE WACCAMAW	80 (12)	100 (15)	67 (10)	87 (13)	100 (15)	100 (15)	534

LAKE DATA TO BE USED IN RANKINGS

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500- MEAN SEC	MEAN CHLORA	15- MIN DO	MEDIAN DISS ORTHO P
3701	BADIN LAKE	0.042	0.680	466.750	7.190	14.900	0.012
3702	BLEWETT FALLS LAKE	0.090	0.655	476.889	4.167	10.800	0.034
3704	FONTANA LAKE	0.011	0.550	392.650	3.438	14.900	0.007
3705	LAKE HICKORY	0.047	0.320	461.000	7.275	13.400	0.008
3706	HIGH ROCK LAKE	0.090	0.580	477.454	14.283	14.800	0.017
3707	HIWASSEE LAKE	0.015	0.240	420.555	5.678	14.200	0.007
3708	LAKE JAMES	0.020	0.160	428.866	7.660	14.800	0.006
3709	LAKE JUNALUSKA	0.031	0.560	462.000	7.233	14.200	0.009
3710	LOOKOUT SHOALS	0.026	0.370	459.167	4.200	13.800	0.008
3711	MOUNTAIN ISLAND LAKE	0.018	0.270	462.000	5.580	12.800	0.005
3713	LAKE NORMAN	0.019	0.330	446.667	5.807	14.800	0.005
3715	RHODHISS LAKE	0.061	0.305	462.111	3.578	13.600	0.019
3716	SANTEELAH LAKE	0.011	0.160	366.400	5.360	14.800	0.006
3717	LAKE TILLERY	0.040	0.470	468.600	6.827	13.600	0.008
3718	WATERVILLE RESERVOIR	0.103	0.860	468.333	3.817	14.400	0.041
3719	LAKE WACCAMAW	0.018	0.120	455.667	3.583	9.800	0.004

APPENDIX B

CONVERSIONS FACTORS

CONVERSION FACTORS

Hectares x 2.471 = acres

Kilometers x 0.6214 = miles

Meters x 3.281 = feet

Cubic meters x 8.107×10^{-4} = acre/feet

Square kilometers x 0.3861 = square miles

Cubic meters/sec x 35.315 = cubic feet/sec

Centimeters x 0.3937 = inches

Kilograms x 2.205 = pounds

Kilograms/square kilometer x 5.711 = lbs/square mile

APPENDIX C

TRIBUTARY FLOW DATA

TRIBUTARY FLOW INFORMATION FOR NORTH CAROLINA

10/21/75

LAKE CODE 3708 LAKE JAMES

TOTAL DRAINAGE AREA OF LAKE(SQ MI) 381.00

TRIBUTARY	SUB-DRAINAGE AREA(SQ MI)	NORMALIZED FLOWS(CFS)												
		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
3708A1	381.00	848.00	612.00	650.00	579.00	581.00	765.00	691.00	673.00	808.00	730.00	850.00	886.00	723.36
3708A2	179.00	349.00	442.00	485.00	456.00	344.00	294.00	267.00	276.00	272.00	276.00	276.00	313.00	336.78
3708B1	85.60	147.00	162.00	188.00	168.00	116.00	90.00	85.00	110.00	101.00	103.00	102.00	115.00	123.70
3708C1	6.30	12.00	14.00	16.00	15.00	11.00	8.70	8.10	9.10	8.90	9.10	8.90	10.00	10.88
3708D1	67.20	167.00	184.00	212.00	190.00	133.00	103.00	99.00	126.00	114.00	119.00	115.00	132.00	140.93
3708Z2	42.90	96.00	114.00	128.00	118.00	85.00	69.00	65.00	72.00	70.00	72.00	71.00	81.00	86.58

SUMMARY

TOTAL DRAINAGE AREA OF LAKE = 381.00
SUM OF SUB-DRAINAGE AREAS = 381.00

TOTAL FLOW IN = 8402.79
TOTAL FLOW OUT = 8673.00

MEAN MONTHLY FLOWS AND DAILY FLOWS(CFS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
3708A1	3	73	1830.00	25	1720.00				
	4	73	1560.00	15	263.00				
	5	73	1910.00	20	509.00				
	6	73	1150.00	23	117.00				
	7	73	1040.00	24	832.00				
	8	73	550.00	12	46.00				
	9	73	1100.00	15	2040.00				
	10	73	767.00	14	100.00				
	11	73	664.00	10	540.00				
	12	73	452.00	8	390.00				
	1	74	1480.00	6	2110.00	20	114.00		
	2	74	1220.00	2	664.00	16	1620.00		
3708A2	3	73	960.00	25	635.00				
	4	73	660.00	15	435.00				
	5	73	780.00	20	370.00				
	6	73	515.00	23	450.00				
	7	73	360.00	24	370.00				
	8	73	365.00	12	415.00				
	9	73	235.00	15	260.00				
	10	73	325.00	14	235.00				
	11	73	300.00	10	155.00				
	12	73	640.00	8	440.00				
	1	74	645.00	6	675.00	20	420.00		
	2	74	620.00	2	635.00	16	515.00		

TRIBUTARY FLOW INFORMATION FOR NORTH CAROLINA

10/21/75

LAKE CODE 3708 LAKE JAMES

MEAN MONTHLY FLOWS AND DAILY FLOWS(CFS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
3708B1	3	73	550.00	25	280.00				
	4	73	380.00	15	210.00				
	5	73	500.00	20	185.00				
	6	73	250.00	23	210.00				
	7	73	78.00	24	185.00				
	8	73	100.00	12	140.00				
	9	73	54.00	15	200.00				
	10	73	95.00	14	62.00				
	11	73	88.00	10	39.00				
	12	73	250.00	8	180.00				
	1	74	350.00	6	205.00	20	135.00		
	2	74	315.00	2	180.00	16	126.00		
3708C1	3	73	40.00	25	22.00				
	4	73	30.00	15	16.00				
	5	73	30.00	20	14.00				
	6	73	18.00	23	16.00				
	7	73	11.00	24	14.00				
	8	73	12.00	12	13.00				
	9	73	7.20	15	12.00				
	10	73	10.00	14	7.70				
	11	73	26.00	10	5.00				
	12	73	26.00	8	16.00				
	1	74	26.00	6	22.00	20	14.00		
	2	74	22.00	2	21.00	16	16.00		
3708D1	3	73	450.00	25	220.00				
	4	73	300.00	15	165.00				
	5	73	370.00	20	145.00				
	6	73	135.00	23	165.00				
	7	73	90.00	24	145.00				
	8	73	118.00	12	110.00				
	9	73	67.00	15	160.00				
	10	73	107.00	14	74.00				
	11	73	102.00	10	48.00				
	12	73	267.00	8	202.00				
	1	74	326.00	6	238.00	20	143.00		
	2	74	232.00	2	206.00	16	147.00		
3708Z2	3	73	300.00						
	4	73	190.00						
	5	73	220.00						
	6	73	125.00						
	7	73	70.00						
	8	73	80.00						
	9	73	50.00						
	10	73	70.00						
	11	73	65.00						
	12	73	180.00						
	1	74	150.00						
	2	74	145.00						

APPENDIX D

PHYSICAL and CHEMICAL DATA

STORET RETRIEVAL DATE 75/10/20

370801
J5 44 02.0 081 53 31.0
LAKE JAMES
37111 NORTH CAROLINA

11EPALES
3

2111202
0105 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00350 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CONDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CAC03 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/03/24	15 05	0000	12.4		38	63	7.60	11	0.050	0.300	0.240	0.026
	15 05	0006	10.3	10.8		60	7.50	11	0.050	0.200	0.230	0.024
	15 05	0015	10.3	10.0		63	7.40	12	0.040	0.200K	0.230	0.027
	15 05	0045	8.5	9.4		63	7.40	11	0.040	0.200K	0.290	0.030
	15 05	0075	7.3	9.2		63	7.20	13	0.040	0.200K	0.310	0.032
	15 05	0100	7.1	9.2		63	7.20	13	0.050	0.200	0.320	0.030
73/07/05	16 10	0000	29.4		48	65	9.40	11	0.070	0.700	0.060	0.004
	16 10	0005	29.4	10.2		60	9.30	11	0.050	0.300	0.040	0.002
	16 10	0010	27.9	9.7		60	9.20	14	0.060	0.200	0.040	0.004
	16 10	0018	21.8	4.7		70	6.90	15	0.060	0.200	0.160	0.005
	16 10	0035	12.6	5.1		60	6.70	10K	0.070	0.200K	0.310	0.007
	16 10	0060	8.6	5.9		65	6.60	19	0.050	0.200K	0.390	0.030
	16 10	0085	8.2	5.0		68	6.60	18	0.050	0.200K	0.430	0.025
73/09/24	15 15	0000	26.2		84	69	7.20	15	0.040	0.400	0.030	0.006
	15 15	0005	25.2	7.2		65	6.90	13	0.030	0.300	0.020	0.009
	15 15	0015	23.3	1.0		76	6.40	18	0.040	0.300	0.030	0.010
	15 15	0025	17.1	0.4		41	6.20	13	0.040	0.300	0.190	0.014
	15 15	0045	9.2	4.6			6.20	13	0.050	0.300	0.390	0.014
	15 15	0065	8.6	4.4			6.20	14	0.040	0.200	0.420	0.015
	15 15	0090	8.3	0.5			6.30	26	0.660	1.100	0.040	0.010

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/10/20

370801
35 44 02.0 081 53 31.0
LAKE JAMES
37111 NORTH CAROLINA

11EPALES 2111202
3 0105 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00669 PHOS-TOT MG/L P	32217 CHLORPHYL A UG/L
73/03/24	15 05	0000	0.063	5.3
	15 05	0005	0.062	
	15 05	0015	0.056	
	15 05	0045	0.055	
	15 05	0075	0.051	
	15 05	0100	0.057	
73/07/05	15 10	0030	0.021	7.5
	16 10	0005	0.015	
	16 10	0010	0.024	
	16 10	0018	0.018	
	16 10	0035	0.018	
	16 10	0050	0.030	
73/09/24	15 15	0000	0.036	8.8
	15 15	0005	0.021	
	15 15	0015	0.024	
	15 15	0025	0.017	
	15 15	0045	0.024	
	15 15	0055	0.023	
	15 15	0090	0.036	

STORET RETRIEVAL DATE 75/10/20

370802
35 44 46.0 081 57 20.0
LAKE JAMES
37111 NORTH CAROLINA

11EPALES
3

2111202
0055 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CONDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CAC03 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-015 ORTHO MG/L P
73/03/24	15 40	0000	12.8		18	50K	7.30	10K	0.070	0.400	0.290	0.019
	15 40	0003	11.0	10.0		50K	7.30	10K	0.080	0.200	0.300	0.015
	15 40	0015	10.5	9.8		50K	7.20	10K	0.080	0.200	0.290	0.017
	15 40	0030	10.2	10.0		55	7.10	10K	0.090	0.200	0.280	0.020
	15 40	0050	8.3	9.6		50K	7.10	10	0.070	0.200	0.310	0.033
73/07/05	15 15	0000	28.7	10.5	72	69	9.20	14	0.120	0.600	0.060	0.008
	15 15	0004	27.3	10.1		55	8.80	10	0.100	0.600	0.050	0.005
	15 15	0010	24.4	9.2		61	7.70	14	0.060	0.300	0.060	0.004
	15 15	0025	19.1	4.0		60	6.60	14	0.080	0.200K	0.290	0.014
	15 15	0035	12.9									
	15 15	0050	9.6	2.1		70	6.40	17	0.060	0.200K	0.460	0.011
73/09/24	14 45	0000	25.8		75	86	8.60	18	0.050	0.700	0.030	0.011
	14 45	0005	25.1	8.6		75	7.90	16	0.040	0.500	0.020	0.010
	14 45	0015	23.5	5.2		81	6.80	18	0.060	0.300	0.070	0.012
	14 45	0025	17.8	0.2		52	6.40	15	0.170	0.400	0.130	0.012
	14 45	0035	10.6	0.8			6.30	18	0.250	0.500	0.150	0.008
	14 45	0050	9.4	0.7			6.30	23	0.470	0.900	0.020	0.007

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/10/20

370802
35 44 46.0 081 57 20.0
LAKE JAMES
37111 NORTH CAROLINA

11EPALES 2111202
3 0055 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLORPHYL A UG/L
73/03/24	15 40	0000	0.067	0.7
	15 40	0003	0.068	
	15 40	0015	0.080	
	15 40	0030	0.075	
	15 40	0050	0.072	
73/07/05	15 15	0000	0.020	5.3
	15 15	0004	0.027	
	15 15	0010	0.030	
	15 15	0025	0.042	
	15 15	0050	0.040	
73/09/24	14 45	0000	0.034	8.2
	14 45	0005	0.030	
	14 45	0015	0.038	
	14 45	0025	0.037	
	14 45	0035	0.030	
	14 45	0050	0.038	

STORET RETRIEVAL DATE 75/10/20

370803
35 44 02.0 081 51 02.0
LAKE JAMES
37623 NORTH CAROLINA

11EPALES 2111202
3 0104 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CONDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACU3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/03/29	09 45	0000	13.0		56	60	8.40	16	0.050	0.600	0.030	0.003
	09 45	0004	12.1	11.5		58	8.20	15	0.020	0.200	0.050	0.003
	09 45	0015	11.7	10.4		58	8.10	16	0.030	0.300	0.080	0.010
	09 45	0045	10.3	9.8		58	7.90	16	0.040	0.300	0.170	0.016
	09 45	0075	8.6	9.9		62	7.80	17	0.040	0.300	0.190	0.011
	09 45	0100	7.8	9.6		62	7.80	18	0.030	0.300	0.190	0.007
73/07/06	09 45	0000	28.7	9.1	70	63	9.20	15	0.050	0.900	0.060	0.007
	09 45	0007	28.1	9.4		55	9.10	13	0.040	0.300	0.040	0.005
	09 45	0018	24.0	7.8		50K	6.50	16	0.070	0.200	0.050	0.005
	09 45	0040	19.1	4.5		55	6.50	15	0.070	0.300	0.080	0.003
	09 45	0070	17.2	5.0		58	6.40	16	0.060	0.600	0.230	0.003
	09 45	0095	16.1	4.6		60	6.40	16	0.070	0.200K	0.280	0.006
	09 45	0120	12.8	2.2		63	6.30	18	0.070	0.200	0.370	0.005
73/09/24	14 00	0000	26.2		108	56	6.90	14	0.050	0.400	0.030	0.009
	14 00	0005	26.1	1.8		55	6.70	14	0.050	0.200	0.020	0.011
	14 00	0020	25.8	6.4		54	6.50	12	0.050	0.300	0.020	0.010
	14 00	0040	25.2	1.4		63	6.40	14	0.070	0.200	0.030	0.010
	14 00	0060	23.5	0.4		64	6.30	17	0.020K	0.200	0.060	0.010
	14 00	0080	21.8	0.4		61	6.30	17	0.120	0.300	0.020	0.009
	14 00	0100	18.0	0.6		55	6.20	16	0.200	0.400	0.030	0.006

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/10/20

370803
35 44 02.0 081 51 02.0
LAKE JAMES
37523 NORTH CAROLINA

11EPALES 2111202
3 0104 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00565 PHOS-TOT MG/L P	32217 CHLORPHYL A UG/L
73/03/29	09 45	0000	0.037	12.9
	09 45	0004	0.032	
	09 45	0015	0.028	
	09 45	0045	0.037	
	09 45	0075	0.024	
	09 45	0100	0.019	
73/07/06	09 45	0000	0.020	16.1
	09 45	0007	0.013	
	09 45	0018	0.018	
	09 45	0040	0.010	
	09 45	0070	0.013	
	09 45	0095	0.016	
	09 45	0120	0.019	
73/09/24	14 00	0000	0.016	4.2
	14 00	0005	0.016	
	14 00	0020	0.014	
	14 00	0040	0.013	
	14 00	0060	0.013	
	14 00	0080	0.015	
	14 00	0100	0.020	

STORET RETRIEVAL DATE 75/10/20

370804
35 44 42.0 081 50 24.0
LAKE JAMES
37023 NORTH CAROLINA

			11EPALES 3 2111202 0120 FEET DEPTH										
DATE	TIME	DEPTH	00010	00300	00077	00094	00400	00410	00610	00625	00630	00671	
FROM	OF		WATER	DO	TRANSP	CONDUCTVY	PH	T ALK	NH3-N	TOT KJEL	NO2&NO3	PHOS-DIS	
TO	DAY	FEET	TEMP	MG/L	SECCHI	FIELD	SU	CAC03	TOTAL	N	N-TOTAL	ORTHO	
			CENT		INCHES	MICROMHO		MG/L	MG/L	MG/L	MG/L	MG/L P	
73/03/29	10 00	0000	12.5		44	55	8.10	15	0.030	0.500	0.040	0.006	
	10 00	0004	12.4	11.5		55	8.30	17	0.020	0.400	0.040	0.006	
	10 00	0020	11.2	10.2		55	8.10	19	0.040	0.400	0.110	0.004	
	10 00	0045	10.2	9.8		60	7.90	20	0.040	0.300	0.170	0.013	
	10 00	0080	8.6	9.8		62	7.90	19	0.040	0.200	0.170	0.005	
	10 00	0115	7.7	9.3		65	7.70	21	0.050	0.200	0.180	0.005	
73/07/06	10 55	0000	28.7	9.1	78	57	9.10	13	0.060	0.700	0.050	0.004	
	10 55	0001	28.7	9.1		55	9.00	12	0.050	0.400	0.040	0.003	
	10 55	0007	28.6	9.3		55	9.00	15	0.060	0.300	0.060	0.003	
	10 55	0020	23.4	5.8		62	6.50	18	0.080	0.300	0.080	0.004	
	10 55	0030	20.8	3.5		53	6.50	18	0.070	0.300	0.100	0.003	
	10 55	0075	16.8	4.9		53	6.60	16	0.050	0.300	0.250	0.003	
	10 55	0110	14.9	3.3		57	6.40	11	0.070	0.300	0.280	0.004	
73/09/24	16 15	0000	27.1		100	54	6.70	13	0.050	0.400	0.020	0.005	
	16 15	0005	26.2	8.0		53	6.70	11	0.040	0.300	0.020	0.005	
	16 15	0020	25.8	6.2		49	6.70	10K	0.040	0.300	0.020	0.004	
	16 15	0040	25.1	1.6		56	6.40	11	0.080	0.200	0.030	0.005	
	16 15	0065	23.1	1.0		59	6.30	14	0.090	0.200	0.030	0.005	
	16 15	0090	21.0	0.0		55	6.40	15	0.260	0.500	0.020	0.013	
	16 15	0105	16.0	0.0		73	6.60	16	0.640	0.700	0.020	0.008	

K VALUE KNOWN TO BE
LESS THAN INDICATED

STOMET RETRIEVAL DATE 75/10/20

370804
35 44 42.0 U81 50 24.0
LAKE JAMES
37023 NORTH CAROLINA

11EPALES
3

2111202
0120 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/03/24	10 00	0000	0.031	7.9
	10 00	0004	0.027	
	10 00	0020	0.022	
	10 00	0045	0.031	
	10 00	0049	0.021	
	10 00	0115	0.016	
73/07/06	10 55	0000	0.012	11.1
	10 55	0001	0.013	
	10 55	0007	0.011	
	10 55	0020	0.011	
	10 55	0030	0.011	
	10 55	0075	0.016	
73/09/24	16 15	0000	0.014	5.9
	16 15	0005	0.013	
	16 15	0020	0.012	
	16 15	0040	0.013	
	16 15	0065	0.016	
	16 15	0090	0.020	
	16 15	0105	0.021	

STORET RETRIEVAL DATE 75/10/20

370805
35 46 23.0 081 51 17.0
LAKE JAMES
37023 NORTH CAROLINA

11EPALES
3

2111202
0059 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CONDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CAC03 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/03/29	12 00	0000	12.1		60	50K	7.90	18	0.030	0.400	0.130	0.004
	12 00	0004	12.0	10.6		50K	7.80	19	0.030	0.200	0.130	0.003
	12 00	0015	11.4	10.1		50K	7.80	17	0.040	0.200K	0.150	0.005
	12 00	0030	10.7	10.1		50K	7.80	18	0.040	0.200K	0.150	0.006
	12 00	0055	9.6	9.6		50K	7.80	17	0.040	0.200	0.180	0.004
73/07/06	13 28	0000	28.6	8.7	108	55	8.30	12	0.060	0.900	0.050	0.005
	13 28	0005	28.2	8.7		50K	8.60	11	0.050	0.400	0.040	0.002
	13 28	0010	27.5	8.9		50K	8.20	10	0.040	0.400	0.040	0.002
	13 28	0020	23.4	6.1		50K	6.50	11	0.060	0.400	0.060	0.002
	13 28	0035	20.0	2.9		50K	6.30	12	0.100	0.500	0.090	0.004
	13 28	0049	18.4	3.6		50K	6.30	12	0.100	0.400	0.110	0.004
73/09/24	15 45	0000	27.5		108	45	6.90	11	0.040	0.600	0.020	0.006
	15 45	0005	26.4	8.0		46	7.00	10	0.040	0.500	0.020	0.005
	15 45	0020	25.9	6.6		47	6.80	11	0.030	0.300	0.020	0.005
	15 45	0035	25.4	5.4		46	6.50	11	0.050	0.300	0.020	0.005
	15 45	0045	24.8	3.0		44	6.30	11	0.080	0.300	0.030	0.005

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/10/20

370805
35 46 23.0 081 51 17.0
LAKE JAMES
37023 NORTH CAROLINA

11EPALES
3

2111202
0059 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/03/29	12 00	0000	0.019	4.1
	12 00	0004	0.021	
	12 00	0015	0.019	
	12 00	0030	0.017	
	12 00	0055	0.025	
73/07/06	13 28	0000	0.013	9.1
	13 28	0005	0.008	
	13 28	0010	0.009	
	13 28	0020	0.014	
	13 28	0035	0.010	
	13 28	0049	0.014	
73/09/24	15 45	0000	0.014	7.7
	15 45	0005	0.015	
	15 45	0020	0.015	
	15 45	0035	0.016	
	15 45	0045	0.021	

APPENDIX E

TRIBUTARY and WASTEWATER TREATMENT PLANT DATA

STORET RETRIEVAL DATE 75/10/20

3708A1 LS3708A1
 35 44 30.0 081 50 00.0
 CATAWBA RIVER
 37039 7.5 GLEN ALPINE
 O/LAKE JAMES
 RD 1223 BRDG .25 DOWNSTREAMLINVILLE DAM
 11EPALES 2111204
 4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/25	11 45		0.250	0.200	0.016	0.012	0.035
73/04/15	13 35		0.176	0.310	0.048	0.019	0.050
73/05/20	12 02		0.110	0.605	0.042	0.014	0.040
73/06/23	12 50		0.170	0.210	0.046	0.021	0.055
73/07/24	09 30		0.147	0.960	0.033	0.039	0.090
73/08/12	10 40		0.160	0.480	0.038	0.040	0.055
73/10/14	14 45		0.130	0.200	0.023	0.054	0.095
73/11/10	12 20		0.064	0.400	0.028	0.136	0.180
73/12/08			0.200	0.300	0.016	0.068	0.115
74/01/06	12 30		0.294	1.000	0.072	0.028	0.055
74/01/20	11 15		0.232	0.100	0.036	0.024	0.035
74/02/02	12 00		0.200	0.300	0.025	0.055	0.105
74/02/16	12 20		0.216	0.400	0.050	0.060	0.110

STORET RETRIEVAL DATE 75/10/20

3708A2 LS3708A2
 35 43 00.0 042 00 00.0
 CATAWBA RIVER
 37 15 MARION
 1/LAKE JAMES
 SECONDARY RD BRDG 2 MI N OF MARION
 11EPALES 2111204
 4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/25	10	10	0.168	0.230	0.025	0.009	0.030
73/04/15	12	10	0.154	0.842	0.038	0.018	0.035
73/05/20	13	45	0.176	0.630	0.033	0.013	0.035
73/06/23	10	30	0.220	0.340	0.040	0.042	0.110
73/07/24	07	30	0.189	0.860	0.050	0.013	0.035
73/08/12	13	00	0.198	0.560	0.024	0.062	0.080
73/10/14	12	30	0.098	0.250	0.052	0.026	0.055
73/11/10	13	00	0.056	0.290	0.040	0.032	0.055
73/12/08			0.208	1.000	0.056	0.040	0.095
74/01/06	13	15	0.144	0.100	0.040	0.008	0.020
74/01/20	12	00	0.208	0.100	0.028	0.032	0.050
74/02/02	13	30	0.208	0.100K	0.005	0.015	0.025
74/02/16	12	45	0.192	0.200	0.025	0.015	0.030

K VALUE KNOWN TO BE
 LESS THAN INDICATED

STORET RETRIEVAL DATE 75/10/20

3708B1 LS3708B1
 35 44 30.0 081 59 30.0
 NORTH FORK CATAWBA RIVER
 37 MAP MCDOWELL CO
 T/LAKE JAMES
 RD 1552 BRUG 5 MI NNE OF MARION
 11EPALES 2111204
 4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/25	11 30		0.270	0.160	0.030	0.026	0.050
73/04/15	13 15		0.180	0.390	0.110	0.039	0.055
73/05/20	11 15		0.120	0.880	0.022	0.040	0.072
73/06/23	12 00		0.210	0.320	0.026	0.027	0.065
73/07/24	21 00		0.290	1.540	0.081	0.115	0.280
73/08/12	11 15		0.140	0.115	0.015	0.036	0.045
73/10/14	14 15		0.096	0.700	0.048	0.064	0.105
73/11/10	12 30		0.168	0.400	0.056	0.368	0.420
73/12/08			0.216	1.000	0.052	0.036	0.050
74/01/06	11 45		0.276	0.100K	0.036	0.008	0.020
74/01/20	11 45		0.208	0.100K	0.012	0.016	0.050
74/02/02	11 20		0.216	0.100K	0.005	0.025	0.040
74/02/16	11 45		0.184	0.300	0.010	0.045	0.090

K VALUE KNOWN TO BE
 LESS THAN INDICATED

STORED RETRIEVAL DATE 75/10/20

3708C1 LS3708C1
 35 46 00.0 081 52 30.0
 PAUDY CREEK
 37 MAP BURKE CO
 T/LAKE JAMES
 HWY 126 BRDG .3 MI SW OF LONGTOWN
 11EPALES 2111204
 4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS URTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/25	11 00		0.042	0.120	0.036	0.005K	0.005K
73/04/15	14 07		0.026	0.140	0.033	0.005K	0.005K
73/05/20	10 35		0.013	0.270	0.015	0.005K	0.005K
73/06/23	13 30		0.023	0.440	0.037	0.005K	0.010
73/07/24	20 30		0.058	1.760	0.066	0.007	0.010
73/08/12	10 00		0.058	0.200	0.035	0.006	0.015
73/10/14	13 30		0.029	0.500	0.069	0.005K	0.005K
73/11/10	10 00		0.012	0.900	0.032	0.012	0.060
73/12/04			0.052	0.800	0.068	0.005K	0.005K
74/01/06	10 45		0.084	0.500	0.064	0.005K	0.005K
74/01/20	11 00		0.044	0.100K	0.016	0.005K	0.005K
74/02/02	10 00		0.036	0.100K	0.010	0.005K	0.005K
74/02/16	10 30		0.056	0.300	0.020	0.005K	0.005K

K VALUE KNOWN TO BE
 LESS THAN INDICATED

STORET RETRIEVAL DATE 75/10/20

3708D1 LS3708D1
 35 47 30.0 081 52 30.0
 LINVILLE RIVER
 37 MAP BURKE CO
 T/LAKE JAMES
 HWY 126 BRDG 2.5 MI NNE OF LONGTOWN
 11EPALES 2111204
 4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/25	10 35		0.220	0.180	0.029	0.006	0.015
73/04/15	14 20		0.115	0.210	0.058	0.005K	0.005K
73/05/20	10 00		0.044	0.600	0.024	0.005K	0.010
73/06/23	13 45		0.100	0.320	0.030	0.005K	0.015
73/07/24	20 00		0.120	2.300	0.077	0.005K	0.035
73/08/12	09 35		0.048	2.300	0.110	0.008	0.010
73/10/14	13 05		0.022	0.200	0.018	0.009	0.025
73/11/10	09 20		0.010K	0.200	0.024	0.008	0.010
73/12/08			0.160	0.600	0.048	0.008	0.010
74/01/06	10 25		0.240	0.400	0.024	0.005K	0.007
74/01/20	10 20		0.188	0.100K	0.008	0.005K	0.005K
74/02/02	14 45		0.176	0.300	0.020	0.005K	0.005K
74/02/16	10 00		0.168	0.400	0.020	0.005	0.015

K VALUE KNOWN TO BE
 LESS THAN INDICATED

STORET RETRIEVAL DATE 75/10/20

3708XA AS3708XA P001000*
35 38 43.0 082 09 43.0
OLD FORT S.T.P.
37039 15 MARION N.C.
T/LAKE JAMES
CURTIS CREEK
11EPALES 2141204
4 0000 FEET DEPTH

DATE	TIME	DEPTH	00630	00625	00610	00671	00665	50051	50053
FROM	OF	DEPTH	N-TOTAL	TOT KJEL	NH3-N	PHOS-DIS	PHOS-TOT	FLOW	CONDUIT
TO	DAY	FEET	MG/L	N	TOTAL	ORTHO	MG/L P	RATE	FLOW-MGD
				MG/L	MG/L	MG/L P	MG/L P	INST MGD	MONTHLY
74/08/07	00	00							
CP(T)-					0.650	1.100			
74/08/07	24	00							