U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL EUTROPHICATION SURVEY

WORKING PAPER SERIES

REPORT

ON

LAKE HARDING

HARRIS COUNTY, GEORGIA

AND

CHAMBERS AND LEE COUNTIES, ALABAMA

EPA REGION IV

WORKING PAPER No. 282

PACIFIC NORTHWEST ENVIRONMENTAL RESEARCH LABORATORY

An Associate Laboratory of the

NATIONAL ENVIRONMENTAL RESEARCH CENTER - CORVALLIS, OREGON

and

NATIONAL ENVIRONMENTAL RESEARCH CENTER - LAS VEGAS, NEVADA

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WITH THE COOPERATION OF THE

GEORGIA DEPARTMENT OF NATURAL RESOURCES

AND THE

GEORGIA NATIONAL GUARD

JUNE, 1975

CONTENTS

FOREWORD

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 Georgia Department of Natural Resources for professional involvement and to the Georgia National Guard for conducting the tributary sampling phase of the Survey.

J. Leonard Ledbetter, Director of the Environmental Protection Division; Ralph S. Howard, Jr., Environmental Affairs Coordinator; Gene B. Welsh, Chief of the Water Protection Branch; Edward T. Hall, Jr., Unit Coordinator; and Broughton A. Caldwell, R. Marshall Gaddis, William D. Kennedy, and Kenneth W. Martin, Environmental Specialists, provided invaluable lake documentation and counsel during the Survey, reviewed the preliminary lake reports, and provided critiques most useful in the preparation of this Working Paper series.

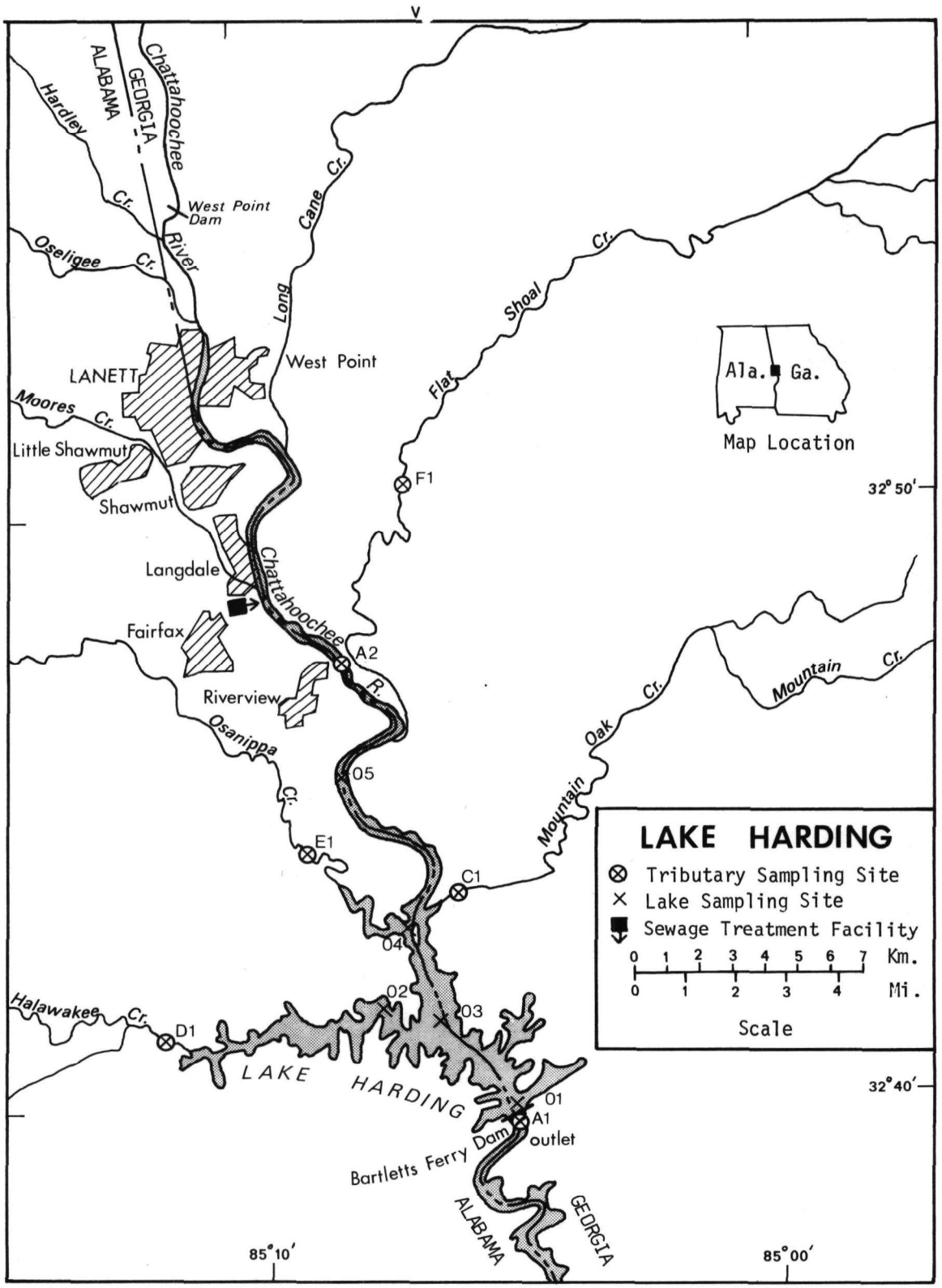
Major General Joel B. Paris, III, then the Adjutant General of Georgia, and Project Officer Lt. Colonel John R. Ranier, who directed the volunteer efforts of the Georgia National Guardsmen, are also gratefully acknowledged for their assistance to the Survey.

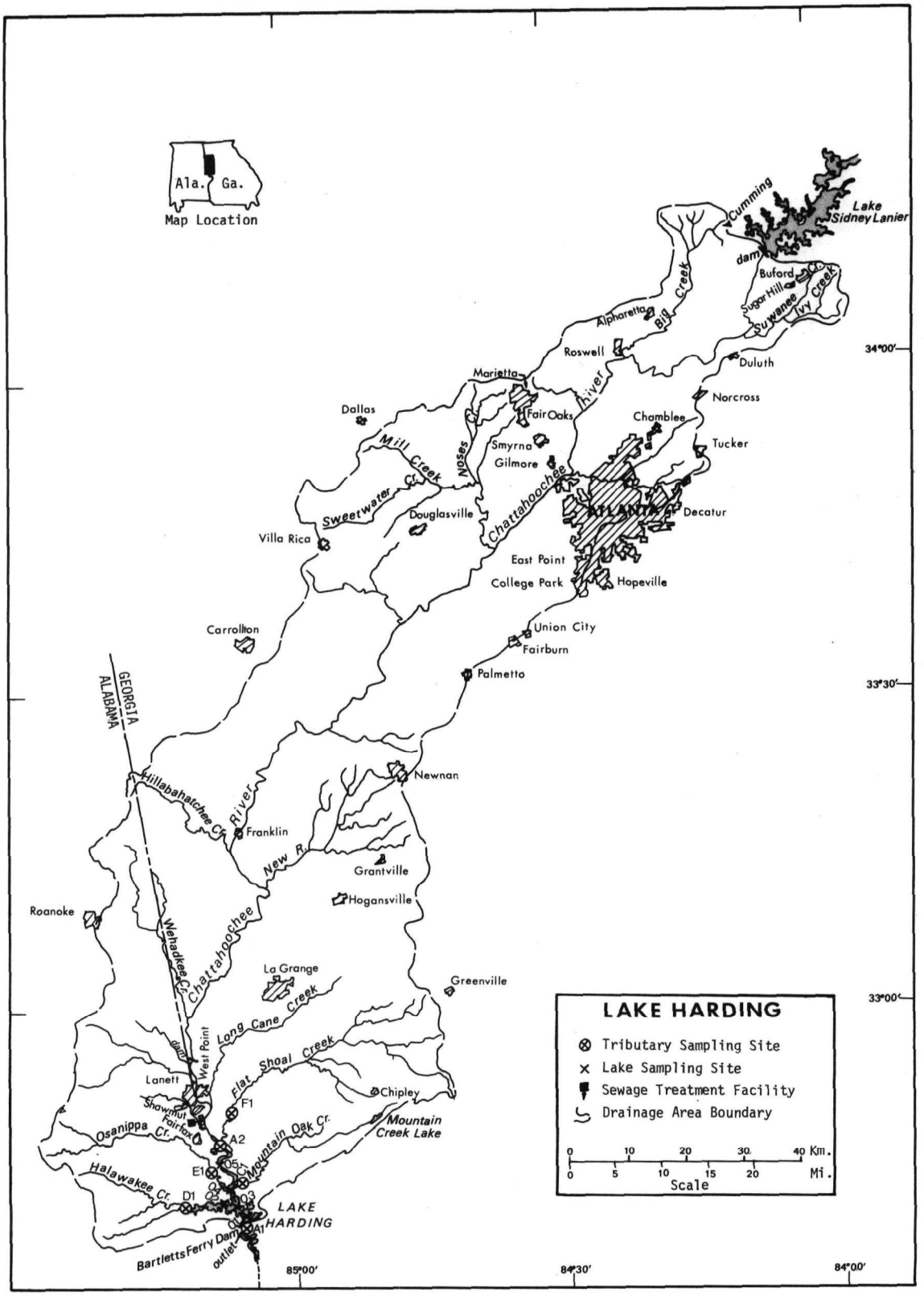
NATIONAL EUTROPHICATION SURVEY

STUDY LAKES

STATE OF GEORGIA

LAKE NAME	COUNTY
Allatoona	Bartow, Cherokee, Cobb
Blackshear	Crisp, Dooly, Lee, Sumpter
Blue Ridge	Fannin
Burton	Rabun
Chatuge	Towns, GA; Clay, NC
Clark Hill	Columbia, Elbert, Lincoln, McDuffie, Wilks, GA; Abbeville, McCormick, SC
Harding	Harris, GA; Chambers, Lee, AL
Hartwell	Franklin, Hart, Stephens, GA; Anderson, Oconee, Pickens, SC
High Falls	Butts, Lamar, Monroe
Jackson	Butts, Jasper, Newton
Nottely	Union
Seminole	Decatur, Seminole, GA; Jackson, FL
Sidney Lanier	Dawson, Forsyth, Gwinnett, Hall, Lumpkin
Sinclair	Baldwin, Hancock, Putnam
Walter F. George	Clay, Quitman, Stewart, GA; Barbour, Henry, Russell, AL


ALABAMA
GEORGIA
Chattahoochee River
Hardley Cr.
Oseligee Cr.
West Point Dam
Long Cane Cr.
Flat Shoal Cr.
LANETT
West Point
Moores Cr.
Little Shawmut
Shawmut
Langdale
Fairfax
Riverview
Chattahoochee R.
Osanippa Cr.
Oak Mountain Cr.
Mountain Cr.
F1
A2
05
E1
C1
04
02
03
D1
Halawakee Cr.
LAKE HARDING
01
A1
outlet
Bartletts Ferry Dam
ALABAMA
GEORGIA
Ala.
Ga.
Map Location
32°50′
32°40′
85°10′
85°00′
LAKE HARDING
Tributary Sampling Site
Lake Sampling Site
Sewage Treatment Facility
0 1 2 3 4 5 6 7 Km.
0 1 2 3 4 Mi.
Scale


Ala.
Ga.
Map Location
Lake Sidney Lanier
dam
Cumming
Buford
Sugar Hill
Suwanee
Ivy Creek
Big Creek
Alpharetta
Roswell
Duluth
Norcross
Chamblee
Tucker
Decatur
ATLANTA
Marietta
Fair Oaks
Smyrna
Gilmore
Dallas
Mill Creek
Noses River
Sweetwater Cr.
Douglasville
Villa Rica
Chattahoochee
East Point
College Park
Hopeville
Union City
Fairburn
Palmetto
Carrollton
GEORGIA
ALABAMA
Hillabahatchee Cr.
Newnan
Franklin
New R.
Grantville
Hogansville
Roanoke
Wehadkee Cr.
Chattahoochee
La Grange
Greenville
Long Cane Creek
Flat Shoal Creek
West Point
dam
Lanett
Shawmut
Fairfax
Chipley
F1
Osanippa Cr.
A2
Mountain Oak Cr.
Mountain Creek Lake
E1
Halawakee Cr.
D1
LAKE HARDING
Bartletts Ferry Dam
outlet
A1
34°00'
33°30'
33°00'
85°00'
84°30'
84°00'
LAKE HARDING
Tributary Sampling Site
Lake Sampling Site
Sewage Treatment Facility
Drainage Area Boundary
0 10 20 30 40 Km.
0 5 10 15 20 Mi.
Scale

LAKE HARDING*

STORET NO. 1317

I. CONCLUSIONS

A. Trophic Condition:

Survey data show that Lake Harding is eutrophic. This lake ranked last in overall trophic quality when the 14 Georgia lakes sampled in 1973 were compared using a combination of six parameters**. None of the lakes had higher median total phosphorus, median dissolved phosphorus, and median inorganic nitrogen; 12 of the lakes had greater mean Secchi disc transparency; and eight had less mean chlorophyll a. Hypolimnetic dissolved oxygen was depressed to less than 1.0 mg/l at station 1 in August and at station 2 in June and August, 1973.

Survey limnologists observed algal blooms in progress at stations 1 and 3 in August and noted the occurrence of small beds of rooted aquatic vegetation in the shallows near stations 2 and 4.

B. Rate-Limiting Nutrient:

Because of signficant losses of phosphorus in both algal assay samples between the time of collection and the beginning of the assays, the results are not representative of conditions in the lake at the time the samples were taken (06/11/73). The

* Table of metric conversions--Appendix A.
** See Appendix B.

lake data indicate stations 1, 2, and 3 were phosphorus limited, and stations 4 and 5 (sampled only once) were nitrogen limited in June; stations 1, 2, and 4 were phosphorus limited, and station 3 was nitrogen limited in August; and all stations were nitrogen limited in October, 1973.

C. Nutrient Controllability:

Attention is called to a significant change in the Chattahoochee River system following completion of the Survey. West Point Dam (see map, page v) was nearing completion by the end of the Survey sampling year; and, at the time of preparation of this Working Paper, at normal pool level the West Point Impoundment of the Chattahoochee River is a water body of 93.08 km^2 with a volume of 682.120 x 10^6 m^3 (Hall, 1975); the calculated mean hydraulic retention time is 48 days. The construction of this nutrient trap between Lake Harding and the upstream phosphorus sources (see page 12) undoubtedly has resulted in a much altered phosphorus loading to Lake Harding. Therefore, the Lake Harding phosphorus loading data obtained during the Survey sampling year are now more of historical interest than of management significance.

For example, if the phosphorus retention of the new reservoir is similar to that of Lake Harding during the Survey sampling

year, about 50% of the point and non-point phosphorus load of the Chattahoochee River above West Point (one-half of 1,318,550 kg/yr) will be retained; and, in effect, this will lower the overall phosphorus loading to Lake Harding by about 47% and reduce the loading rate from 58.7 $g/m^2/yr$ (see page 16) to 30.9 $g/m^2/yr$. The reduced loading rate will still be about 10 times the eutrophic rate, but some improvement of the trophic condition of Lake Harding should occur with a phosphorus reduction of that magnitude, particularly in view of the short mean hydraulic retention time of 14 days.

On the other hand, it appears inevitable that West Point Reservoir will become eutrophic rather quickly. On the basis of the morphometric data given above and the normalized Chattahoochee River flow, it is calculated that the eutrophic phosphorus loading rate of the reservoir is 1.4 $g/m^2/yr$. With the total phosphorus load measured in the Chattahoochee River during the Survey sampling year (1,318,550 kg), the reservoir will receive phosphorus at a rate of about 14.2 $g/m^2/yr$ or more than 10 times the eutrophic rate.

Futhermore, if the proposed diversion to the Chattahoochee River drainage basin of the Atlanta metro wastes now discharged

to three wastewater treatment plants in the South River drainage basin is implemented (Franzmathes, 1974), Survey data indicate that if the diverted wastes are not treated to remove phosphorus, the Chattahoochee River total phosphorus load will be increased to 1,575,725 kg/yr, and the loading rate to West Point reservoir will be increased from 14.2 $g/m^2/yr$ to 16.9 $g/m^2/yr$. Even if an effluent limit of 1 mg/l total phosphorus is applied to the diverted wastes, about 39,000 kg of phosphorus per year will be added to the load. Since that load is already excessive, any amount of added phosphorus will be too much.

While the proposed diversion would be expected to benefit Jackson Lake to some degree*, the merits of the trade-off would seem to be questionable whether phosphorus removal is provided or not.

* See Working Paper No. 290, "Report on Jackson Lake".

II. LAKE AND DRAINAGE BASIN CHARACTERISTICS

A. Lake Morphometry†:

1. Surface area: 23.67 kilometers^2.
2. Mean depth: 9.4 meters.
3. Maximum depth: 33.8 meters.
4. Volume: 222.498 x 10^6 m^3.
5. Mean hydraulic retention time: 14 days.

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

1. Tributaries -

Name	Drainage area (km^2)	Mean flow (m^3/sec)
Chattahoochee River	9,479.4	165.2
Mountain Oak Creek	178.7	2.5
Halawakee Creek	199.4	2.8
Osanippa Creek	318.6	4.4
Flat Shoal Creek	577.6	8.0
Minor tributaries & immediate drainage -	204.6	2.9
Totals	10,958.3	185.8

2. Outlet -

Chattahoochee River	10,982.0**	185.8

C. Precipitation***:

1. Year of sampling: 143.6 centimeters.
2. Mean annual: 136.2 centimeters.

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† Hall, 1974.
* For limits of accuracy, see Working Paper No. 175, "...Survey Methods, 1973-1976".
** Total drainage area adjusted to equal sum of subdrainage areas plus lake area.
*** See Working Paper No. 175.

III. LAKE WATER QUALITY SUMMARY

Lake Harding 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 four stations on the lake (five in June) and from a number of depths at each station (see map, page v). During each visit, a single depth-integrated (4.6 m or near bottom to surface) sample was composited from the stations for phytoplankton identification and enumeration; and during the first visit, two 18.9-liter depth-integrated samples were composited for algal assays (stations 1, 2, and 3 were combined, and stations 4 and 5 were combined). Also each time, a depth-integrated sample was collected from each of the stations for chlorophyll a analysis. The maximum depths sampled were 31.4 meters at station 1, 14.9 meters at station 2, 13.7 meters at station 3, 8.2 meters at station 4, and 3.4 meters at station 5 (station 5 was omitted after the first sampling due to insufficient depth).

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

A. SUMMARY OF PHYSICAL AND CHEMICAL CHARACTERISTICS FOR LAKE HARDING
STORET CODE 1317

PARAMETER	1ST SAMPLING (6/11/73) 5 SITES RANGE	MEAN	MEDIAN	2ND SAMPLING (8/29/73) 4 SITES RANGE	MEAN	MEDIAN	3RD SAMPLING (10/31/73) 4 SITES RANGE	MEAN	MEDIAN
TEMP (C)	20.0 - 195.0	28.8	21.4	21.1 - 29.3	26.7	26.6	15.6 - 19.3	18.1	18.6
DISS OXY (MG/L)	0.6 - 9.6	6.6	7.5	0.1 - 13.0	5.5	4.9	5.8 - 8.2	7.3	7.4
CNDCTVY (MCROMO)	45. - 69.	52.	52.	64. - 212.	77.	69.	50. - 63.	59.	60.
PH (STAND UNITS)	5.5 - 8.6	6.5	6.3	6.6 - 9.8	7.5	6.8	6.7 - 7.0	6.9	6.8
TOT ALK (MG/L)	10. - 23.	16.	16.	16. - 85.	23.	19.	11. - 27.	17.	16.
TOT P (MG/L)	0.052 - 0.169	0.112	0.115	0.037 - 0.192	0.097	0.095	0.089 - 0.203	0.137	0.123
ORTHO P (MG/L)	0.003 - 0.050	0.034	0.038	0.008 - 0.091	0.036	0.026	0.050 - 0.116	0.075	0.071
NO2+NO3 (MG/L)	0.080 - 0.480	0.373	0.425	0.080 - 0.650	0.384	0.485	0.530 - 0.690	0.597	0.595
AMMONIA (MG/L)	0.070 - 0.500	0.148	0.110	0.050 - 6.060	0.564	0.165	0.020 - 0.150	0.117	0.120
KJEL N (MG/L)	0.200 - 1.400	0.400	0.400	0.400 - 7.700	1.175	0.700	0.200 - 0.500	0.328	0.300
INORG N (MG/L)	0.180 - 0.710	0.521	0.555	0.160 - 6.160	0.949	0.715	0.570 - 0.810	0.714	0.715
TOTAL N (MG/L)	0.580 - 1.530	0.773	0.745	0.880 - 7.800	1.559	1.170	0.750 - 1.190	0.925	0.910
CHLRPYL A (UG/L)	1.4 - 11.3	5.1	3.8	5.2 - 19.4	12.5	12.6	4.2 - 6.5	5.4	5.4
SECCHI (METERS)	0.2 - 1.2	0.5	0.3	0.6 - 1.3	1.0	1.1	0.9 - 1.2	1.0	0.9

B. Biological characteristics:

1. Phytoplankton -

Sampling Date	Dominant Genera	Algal Units per ml
06/11/73	1. Cyclotella	168
	2. Oscillatoria	152
	3. Melosira	92
	4. Cryptomonas	76
	5. Nitzschia	61
	Other genera	248
	Total	797
08/29/73	1. Raphidiopsis	6,110
	2. Anabaenopsis	710
	3. Merismopedia	494
	4. Scenedesmus	494
	5. Oscillatoria	370
	Other genera	1,913
	Total	10,091
10/31/73	1. Melosira	445
	2. Scenedesmus	380
	3. Merismopedia	254
	4. Chroococcus	233
	5. Dactylococcus	212
	Other genera	508
	Total	2,032

2. Chlorophyll *a* -

Sampling Date	Station Number	Chlorophyll *a* (µg/l)
06/11/73	01	11.3
	02	6.9
	03	3.8
	04	1.9
	05	1.4
08/29/73	01	19.4
	02	9.5
	03	15.8
	04	5.2
10/31/73	01	5.3
	02	4.2
	03	5.5
	04	6.5

C. Limiting Nutrient Study:

There was a loss of about 28% of the total phosphorus in one assay sample and over 50% in the other sample, and the algal assay results are not representative of conditions in the lake at the time the samples were taken (06/11/73).

The lake data indicate a somewhat unusual temporal and spatial combination of limiting nutrients, although it will be noted that the stations nearest the nutrient point sources tended toward nitrogen limitation while the stations further away tended toward phosphorus limitation.

Following is a tabulation of the mean inorganic nitrogen to orthophosphorus ratios for each of the stations and sampling

times with the indicated limiting nutrient in parentheses.

Station	06/11/73	08/29/73	10/31/73
01	18/1 (P)	48/1 (P)	12/1 (N)
02	23/1 (P)	33/1 (P)	13/1 (N?)
03	14/1 (P)	10/1 (N)	9/1 (N)
04	12/1 (N)	14/1 (P)	7/1 (N)
05	12/1 (N)	-	-

Nitrogen limitation, as indicated by in-lake nitrogen to phosphorus ratios, does not necessarily suggest that the trophic condition of the lake can be improved by controlling nitrogen inputs. The apparent condition of nitrogen-limitation in Lake Harding resulted from excessive point-source phosphorus inputs as indicated by the proximity of the N-limited stations to the point sources. The reversal of the enriched condition, therefore, depends upon phosphorus control, not nitrogen control.

IV. NUTRIENT LOADINGS
(See Appendix E for data)

For the determination of nutrient loadings, the Georgia National Guard collected monthly near-surface grab samples from each of the tributary sites indicated on the map (page vi), 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 Georgia District Office of the U.S. Geological Survey for the tributary sites nearest the lake.

In this report, nutrient loads for sampled tributaries were determined by using a modification of a U.S. Geological Survey computer program for calculating stream loadings*. Nutrient loads for unsampled "minor tributaries and immediate drainage" ("ZZ" of U.S.G.S.) were estimated using the means of the nutrient loads, in $kg/km^2/year$, at stations C-1, D-1, and E-1 and multiplying the means by the ZZ area in km^2.

Nutrient loads for the Langdale, AL, and Pine Mountain, GA, wastewater treatment plants were estimated at 1.134 kg P and 3.401 kg N/capita/year. Loads in the untreated wastes from the communities of Lanett and Little Shawmut, AL, and West Point, GA, were estimated at 1.587 kg P and 4.263 kg N/capita/year.

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* See Working Paper No. 175.

The nutrient loads given for tributaries are those measured minus the point-source loads within the 40-kilometer limit of the Survey*, if any.

In addition to the waste sources listed below, recent Georgia Water Quality Control Board publications (Anonymous, 1972b and 1972c) identify 33 major domestic and 11 major industrial wastewater discharges to the Chattahoochee River or its tributaries in the 172 or so stream kilometers from the Atlanta Water Works intake to West Point Impoundment. All of these sources are outside the 40-kilometer limit of the Survey, but their impact on Lake Harding during the Survey sampling year is evident in the very high phosphorus export rate of the Chattahoochee River at station A-2 (see page 16).

* See Working Paper No. 175.

A. Waste Sources†:

1. Known muncipal -

Name	Pop. Served	Treatment	Mean Flow (m^3/d)*	Receiving Water
Langdale, AL**	7,298	aer. pond	2,762.3	Chattahoochee River
Lanett, AL	6,908	none	2,614.7	Chattahoochee River
Little Shawmut, AL	2,682	none	1,015.1	Chattahoochee River
Pine Mountain, GA	862	Imhoff	326.3	Turkey Creek to Flat Shoal Creek
West Point, GA	4,232	none	1,601.8	Chattahoochee River

2. Known industrial -

Name	Type Waste	Treatment	Design Flow (m^3/d)	Receiving Water
Deering-Milliken Service Corp., Pine Mtn. (textile) Mill	domestic	stab. pond	39.7	Polecat Creek to Flat Shoal Creek
Coca-Cola Bottling Co., West Point	domestic & soft drink wastes	aer. pond & stab. ponds	124.9	Long Cane Creek
South Highland Washerette, LaGrange	wash water	none	unknown	Long Cane Creek
West Point Mfg. Co., Lanett	textile	none	unknown	Chattahoochee River

† Chitwood, 1974; Anonymous, 1971b & 1971c.
* Estimated at 0.3785 m^3/capita/day.
** Plant serves Langdale, Riverview, Shawmut, and Fairfax, Alabama, plus two textile mills.

B. Annual Total Phosphorus Loading - Average Year:

1. Inputs -

Source	kg P/ yr	% of total
a. Tributaries (non-point load) -		
Chattahoochee River	1,318,550	94.8
Mountain Oak Creek	3,440	0.2
Halawakee Creek	3,660	0.3
Osanippa Creek	22,100	1.6
Flat Shoal Creek	7,230	0.5
b. Minor tributaries & immediate drainage (non-point load) -	3,480	0.3
c. Known municipal STP's -		
Langdale	8,275	0.6
Lanett	10,965	0.8
Little Shawmut	4,255	0.3
Pine Mountain	980	0.1
West Point	6,715	0.5
d. Septic tanks* -	325	<0.1
e. Industrial - Unknown	?	-
f. Direct precipitation** -	415	<0.1
Total	1,390,390	100.0

2. Outputs -

Lake outlet - Chattahoochee River 648,575

3. Net annual P accumulation - 741,815 kg.

* Estimate based on 1,142 lakeshore dwellings; see Working Paper No. 175.
** See Working Paper No. 175.

C. Annual Total Nitrogen Loading - Average Year:

1. Inputs -

Source	kg N/ yr	% of total
a. Tributaries (non-point load) -		
Chattahoochee River	6,324,785	90.1
Mountain Oak Creek	52,840	0.8
Halawakee Creek	80,250	1.1
Osanippa Creek	184,660	2.6
Flat Shoal Creek	185,740	2.6
b. Minor tributaries & immediate drainage (non-point load) -	69,975	1.0
c. Known municipal STP's -		
Langdale	24,820	0.4
Lanett	29,450	0.4
Little Shawmut	11,435	0.1
Pine Mountain	2,930	<0.1
West Point	18,040	0.3
d. Septic tanks* -	12,170	0.1
e. Industrial - Unknown	?	-
f. Direct precipitation** -	25,555	0.4
Total	7,022,650	100.0

2. Outputs -

Lake outlet - Chattahoochee River	6,026,685

3. Net annual N accumulation - 995,965 kg.

* Estimate based on 1,142 lakeshore dwellings; see Working Paper No. 175.
** See Working Paper No. 175.

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

Tributary	kg P/km^2/yr	kg N/km^2/yr
Chattahoochee River	139	667
Mountain Oak Creek	19	296
Halawakee Creek	18	402
Osanippa Creek	69	580
Flat Shoal Creek	13	322

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	58.74	31.34	296.7	42.1

Vollenweider loading rates for phosphorus (g/m^2/yr) based on mean depth and mean hydraulic retention time of Lake Harding:

"Dangerous" (eutrophic rate)	3.00
"Permissible" (oligotrophic rate)	1.50

V. LITERATURE REVIEWED

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VI. APPENDICES

APPENDIX A

CONVERSION 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 B

LAKE RANKINGS

LAKES RANKED BY INDEX NOS.

RANK	LAKE CODE	LAKE NAME	INDEX NO
1	1316	BLUE RIDGE LAKE	524
2	1318	BURTON LAKE	523
3	1303	CHATUGE LAKE	424
4	1311	NOTTELY RESERVOIR	393
5	1310	LAKE SIDNEY LANIER	385
6	1304	CLARK HILL RESERVOIR	309
7	1301	ALLATOONA RESERVOIR	286
8	1302	BLACKSHEAR LAKE	284
9	1313	SINCLAIR LAKE	254
10	1312	LAKE SEMINOLE	253
11	1319	HIGH FALLS LAKE	192
12	1314	LAKE EUFAULA	184
13	1309	JACKSON LAKE	116
14	1317	LAKE HARDING	77

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 P	INDEX NO
1301	ALLATOONA RESERVOIR	62 (8)	54 (7)	46 (6)	31 (4)	31 (0)	62 (7)	286
1302	BLACKSHEAR LAKE	38 (5)	31 (4)	0 (0)	100 (13)	100 (13)	15 (2)	284
1303	CHATUGE LAKE	85 (11)	85 (11)	92 (12)	69 (9)	31 (0)	62 (7)	424
1304	CLARK HILL RESERVOIR	54 (7)	62 (8)	62 (8)	54 (7)	31 (0)	46 (6)	309
1309	JACKSON LAKE	8 (1)	8 (1)	15 (2)	8 (1)	69 (9)	8 (1)	116
1310	LAKE SIDNEY LANIER	69 (9)	46 (6)	77 (10)	77 (10)	31 (0)	85 (10)	385
1311	NOTTELY RESERVOIR	77 (10)	69 (9)	69 (9)	62 (8)	31 (0)	85 (10)	393
1312	LAKE SEMINOLE	31 (4)	15 (2)	38 (5)	46 (6)	92 (12)	31 (4)	253
1313	SINCLAIR LAKE	46 (6)	38 (5)	54 (7)	23 (3)	31 (0)	62 (7)	254
1314	LAKE EUFAULA	15 (2)	23 (3)	31 (4)	15 (2)	77 (10)	23 (3)	184
1316	BLUE RIDGE LAKE	92 (12)	92 (12)	85 (11)	85 (11)	85 (11)	85 (10)	524
1317	LAKE HARDING	0 (0)	0 (0)	8 (1)	38 (5)	31 (0)	0 (0)	77
1318	BURTON LAKE	100 (13)	100 (13)	100 (13)	92 (12)	31 (0)	100 (13)	523
1319	HIGH FALLS LAKE	23 (3)	77 (10)	23 (3)	0 (0)	31 (0)	38 (5)	192

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 P
1301	ALLATOONA RESERVOIR	0.020	0.150	443.167	7.489	14.900	0.005
1302	BLACKSHEAR LAKE	0.035	0.250	468.091	1.855	11.700	0.014
1303	CHATUGE LAKE	0.014	0.110	382.778	6.339	14.900	0.005
1304	CLARK HILL RESERVOIR	0.024	0.150	439.250	6.715	14.900	0.007
1309	JACKSON LAKE	0.094	0.530	461.385	14.577	14.800	0.027
1310	LAKE SIDNEY LANIER	0.016	0.180	396.417	5.431	14.900	0.004
1311	NOTTELY RESERVOIR	0.015	0.130	405.667	6.656	14.900	0.004
1312	LAKE SEMINOLE	0.040	0.405	456.133	6.760	11.800	0.010
1313	SINCLAIR LAKE	0.028	0.230	440.667	8.006	14.900	0.005
1314	LAKE EUFAULA	0.048	0.345	457.667	9.083	14.400	0.011
1316	BLUE RIDGE LAKE	0.010	0.105	394.889	3.078	13.000	0.004
1317	LAKE HARDING	0.114	0.640	467.538	7.438	14.900	0.045
1318	BURTON LAKE	0.007	0.100	363.889	2.733	14.900	0.003
1319	HIGH FALLS LAKE	0.047	0.115	459.444	15.075	14.900	0.009

APPENDIX C

TRIBUTARY FLOW DATA

TRIBUTARY FLOW INFORMATION FOR GEORGIA 01/06/76

LAKE CODE 1317 HARDING LAKE

TOTAL DRAINAGE AREA OF LAKE(SQ KM) 10981.6

TRIBUTARY	SUB-DRAINAGE AREA(SQ KM)	NORMALIZED FLOWS(CMS) JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
1317A1	10981.6	214.78	276.63	314.85	296.87	201.28	143.37	132.98	133.26	108.23	116.95	130.99	165.57	185.75
1317A2	9479.4	182.79	227.78	266.04	249.53	180.89	137.53	131.16	126.01	105.48	103.38	125.33	150.50	165.15
1317C1	178.7	3.09	4.33	4.93	4.56	2.55	1.50	2.12	1.27	0.99	1.10	1.73	2.44	2.54
1317D1	199.4	3.45	4.84	5.52	5.10	2.83	1.67	2.38	1.44	1.10	1.25	1.93	2.72	2.84
1317E1	318.6	5.80	8.58	9.32	7.59	3.91	2.58	2.55	1.98	1.53	1.81	2.52	4.98	4.40
1317F1	577.6	10.53	15.55	16.79	13.76	7.08	4.64	4.62	3.57	2.78	3.31	4.56	9.06	7.98
1317ZZ	204.6	3.54	4.96	5.66	5.21	2.92	1.73	2.44	1.47	1.13	1.27	1.98	2.78	2.91

SUMMARY

TOTAL DRAINAGE AREA OF LAKE = 10981.6
SUM OF SUB-DRAINAGE AREAS = 10958.3
TOTAL FLOW IN = 2235.75
TOTAL FLOW OUT = 2235.76

NOTE *** LAKE AREA=9 SQ MI, NOT INCLUDED IN SUM OF SUB-DRAINAGE AREAS

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
1317A1	3	73	339.80	10	204.16				
	4	73	487.05	14	336.97				
	5	73	317.15	5	276.94				
	6	73	291.66	2	334.14				
	7	73	175.28	15	167.92				
	8	73	136.20	11	118.08				
	9	73	108.17	15	144.13				
	10	73	111.29	13	24.55				
	11	73	128.84	10	99.39				
	12	73	160.27	8	172.17				
	1	74	413.43	9	334.14	23	334.14		
	2	74	410.59	6	215.21	20	351.13		
1317A2	3	73	318.00	10	167.64				
	4	73	429.57	10	1008.08				
	5	73	330.46	16	169.62				
	6	73	299.31	6	220.31				
	7	73	178.11	11	126.58				
	8	73	137.05	8	94.01				
	9	73	119.78	12	79.85				
	10	73	115.53	11	71.64				
	11	73	133.09	10	143.85				
	12	73	152.63	18	136.77				
	1	74	370.95	14	252.02	23	359.62		
	2	74	356.79	16	605.98	28	242.11		

TRIBUTARY FLOW INFORMATION FOR GEORGIA 01/06/76

LAKE CODE 1317 HARDING LAKE

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
1317C1	3	73	6.54	10	2.86				
	4	73	8.47	14	4.67				
	5	73	2.66	16	1.67				
	6	73	1.47	2	2.01				
	7	73	1.27	15	2.69				
	8	73	1.22	11	1.13				
	9	73	0.85	15	1.13				
	10	73	0.96	13	0.85				
	11	73	1.16	10	1.22				
	12	73	2.15	8	1.95				
	1	74	5.21	9	3.14	23	4.45		
	2	74	5.89	6	3.40	20	6.23		
1317D1	3	73	7.33	10	3.17				
	4	73	9.49	10	9.17				
	5	73	2.94	16	1.87				
	6	73	1.64	6	1.42				
	7	73	1.42	11	1.19				
	8	73	1.36	8	1.98				
	9	73	0.93	12	1.16				
	10	73	1.08	11	0.99				
	11	73	1.30	15	1.05				
	12	73	2.41	18	1.36				
	1	74	5.83	1	13.96				
	2	74	6.60	16	7.76	28	3.79		
1317E1	3	73	12.40	10	4.67				
	4	73	14.10	10	16.99				
	5	73	4.08	16	2.52				
	6	73	2.52	6	2.24				
	7	73	1.53	11	4.39				
	8	73	1.87	8	2.58				
	9	73	1.30	12	1.10				
	10	73	1.27	11	1.10				
	11	73	1.64	15	1.25				
	12	73	3.40	18	1.67				
	1	74	9.63	9	5.38	23	8.07		
	2	74	11.04	16	13.88	28	5.80		
1317F1	3	73	22.34						
	4	73	25.60	15	13.31				
	5	73	7.36	5	8.78				
	6	73	4.56	2	5.95				
	7	73	2.78	15	8.21				
	8	73	3.40	11	3.11				
	9	73	2.35	15	3.09				
	10	73	2.61	13	2.27				
	11	73	3.31	10	3.34				
	12	73	6.31	8	5.66				
	1	74	16.99	9	9.63	23	14.16		
	2	74	19.26	6	10.62	20	20.95		

TRIBUTARY FLOW INFORMATION FOR GEORGIA 01/06/76

LAKE CODE 1317 HARDING LAKE

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
1317ZZ	3	73	7.53						
	4	73	9.68						
	5	73	3.03						
	6	73	1.70						
	7	73	1.47						
	8	73	1.39						
	9	73	0.96						
	10	73	1.36						
	11	73	1.61						
	12	73	2.80						
	1	74	6.23						
	2	74	7.02						

APPENDIX D

PHYSICAL and CHEMICAL DATA

STORET RETRIEVAL DATE 74/11/26

131701
32 39 52.0 085 05 29.0
LAKE HARDING
13145 GEORGIA

11EPALES 2111202
3 0107 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 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
73/06/11	11 30	0000	25.5		30	50	8.00	16	0.100	1.400	0.130	0.019
	11 30	0006	24.6	8.6		52	7.10	16	0.100	0.400	0.300	0.022
	11 30	0015	22.9	7.4		56	6.30	17	0.110	0.300	0.450	0.042
	11 30	0030	22.1	6.6		56	6.20	14	0.130	0.300	0.420	0.038
	11 30	0050	21.4	5.8		52	6.10	13	0.170	0.400	0.410	0.037
	11 30	0070	21.1	5.1		54	6.00	13	0.220	0.400	0.420	0.032
	11 30	0090	20.8	3.8		56	5.80	16	0.300	0.600	0.400	0.030
	11 30	0103	20.5	2.3		59	5.50	16	0.360	0.600	0.350	0.027
73/08/29	10 20	0000	29.1	13.0	48	81	9.80	23	0.070	1.100	0.090	0.014
	10 20	0005	28.7			79						
	10 20	0015	26.9	4.8		69	7.10	23	0.160	0.500	0.490	0.061
	10 20	0030	26.4	4.2		68	6.80	17	0.190	0.400	0.590	0.063
	10 20	0050	26.2	4.1		67	6.70	17	0.200	0.500	0.600	0.040
	10 20	0058	26.1			67						
	10 20	0075	25.9	1.8		69	6.60	16	0.340	0.700	0.610	0.012
	10 20	0092	24.5			84						
	10 20	0100	21.1	0.1		212	6.80	85	6.060	7.700	0.100	0.008
73/10/31	10 35	0000	19.2		48	63	6.90	16	0.120	0.500	0.690	0.066
	10 35	0010	19.3	8.0		63	6.90	16	0.120	0.300	0.670	0.069
	10 35	0020	19.3	6.6		63	6.90	14	0.120	0.200	0.670	0.070
	10 35	0040	18.6	7.4		59	6.90	16	0.110	0.300	0.600	0.076
	10 35	0060	17.9	8.0		55	6.90	14	0.140	0.400	0.600	0.084
	10 35	0075	17.6	7.9		55	6.80	12	0.140	0.400	0.600	0.081
	10 35	0096	17.4	6.0		55	6.70	11	0.150	0.400	0.590	0.081

STORET RETRIEVAL DATE 74/11/26

131701
32 39 52.0 085 05 29.0
LAKE HARDING
13145 GEORGIA

11EPALES 2111202
3 0107 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/06/11	11 30	0000	0.093	11.3
	11 30	0006	0.084	
	11 30	0015	0.126	
	11 30	0030	0.115	
	11 30	0050	0.105	
	11 30	0070	0.115	
	11 30	0090	0.124	
	11 30	0103	0.169	
73/08/29	10 20	0000	0.065	19.4
	10 20	0015	0.084	
	10 20	0030	0.098	
	10 20	0050	0.111	
	10 20	0075	0.085	
	10 20	0100	0.093	
73/10/31	10 35	0000	0.111	5.3
	10 35	0010	0.112	
	10 35	0020	0.115	
	10 35	0040	0.132	
	10 35	0060	0.160	
	10 35	0075	0.172	
	10 35	0096	0.187	

STORET RETRIEVAL DATE 74/11/26

131702
32 41 25.0 085 08 42.0
LAKE HARDING
13 GEORGIA

11EPALES 2111202
3 0053 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 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
73/06/11	12 30	0000	27.4		48	47	8.60	16	0.100	0.500	0.080	0.008
	12 30	0006	25.2	9.6		50	8.20	18	0.100	0.500	0.110	0.012
	12 30	0015	22.4	7.0		58	6.30	18	0.140	0.400	0.430	0.038
	12 30	0025	21.8	5.5		52	6.20	17	0.160	0.400	0.390	0.035
	12 30	0036	20.9	3.2		48	5.90	16	0.190	0.400	0.300	0.018
	12 30	0049	19.5	0.6		69	5.90	23	0.500	0.700	0.150	0.003
73/08/29	11 15	0000	29.3	10.0	50	67	9.10	19	0.130	1.100	0.100	0.008
	11 15	0015	26.8	1.0		64	6.80	18	0.220	0.600	0.280	0.015
	11 15	0018	26.6			65						
	11 15	0025	26.3	1.3		64	6.70	17	0.280	0.600	0.480	0.020
	11 15	0040	25.8	0.2		73	6.70	26	0.660	1.200	0.080	0.025
73/10/31	11 00	0000	19.0		36	61	6.90	12	0.140	0.400	0.560	0.051
	11 00	0005	19.1	5.8		63	6.80	15	0.140	0.300	0.560	0.050
	11 00	0015	19.0	6.2		61	6.80	16	0.140	0.300	0.560	0.053
	11 00	0035	18.7	7.0		57	6.80	17	0.140	0.300	0.580	0.071

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/06/11	12 30	0000	0.052	6.9
	12 30	0006	0.062	
	12 30	0015	0.113	
	12 30	0025	0.099	
	12 30	0036	0.066	
	12 30	0049	0.073	
73/08/29	11 15	0000	0.041	9.5
	11 15	0015	0.037	
	11 15	0025	0.056	
	11 15	0040	0.068	
73/10/31	11 00	0000	0.095	4.2
	11 00	0005	0.089	
	11 00	0015	0.106	
	11 00	0035	0.134	

STORET RETRIEVAL DATE 74/11/26

131703
32 41 22.0 085 06 57.0
LAKE HARDING
13 GEORGIA

11EPALES 2111202
3 0044 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 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
73/06/11	14 40	0000	26.7		12	55	6.60	20	0.080	0.400	0.390	0.033
	14 40	0006	23.3	7.8		54	6.40	19	0.100	0.200	0.440	0.040
	14 40	0015	21.8	7.5		56	6.70	20	0.120	0.300	0.440	0.041
	14 40	0027	21.4	7.8		54	5.60	19	0.110	0.200	0.440	0.042
	14 40	0040	21.2	7.8		57	5.60	18	0.120	0.300	0.450	0.041
73/08/29	12 55	0000	29.1	12.3	36	73	9.40	19	0.100	1.100	0.160	0.028
	12 55	0005	27.8	10.2		70	9.00	18	0.050	0.700	0.260	0.051
	12 55	0015	26.9	6.2		68	7.10	18	0.160	0.600	0.490	0.058
	12 55	0025	26.6			68						
	12 55	0029	26.5	5.0		69	6.80	19	0.170	0.700	0.520	0.062
73/10/31	11 25	0000	19.0		38	62	6.90	19	0.110	0.300	0.630	0.071
	11 25	0010	18.9	7.0		61	6.80	19	0.100	0.300	0.610	0.067
	11 25	0025	18.4	7.4		59	6.80	20	0.100	0.200	0.590	0.074
	11 25	0045	16.6	8.0		52	6.80	19	0.130	0.300	0.610	0.100

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/06/11	14 40	0000	0.107	3.8
	14 40	0006	0.121	
	14 40	0015	0.120	
	14 40	0027	0.143	
	14 40	0040	0.101	
73/08/29	12 55	0000	0.097	15.8
	12 55	0005	0.115	
	12 55	0015	0.100	
	12 55	0029	0.140	
73/10/31	11 25	0000	0.121	5.5
	11 25	0010	0.115	
	11 25	0025	0.125	
	11 25	0045	0.203	

STORET RETRIEVAL DATE 74/11/26

131704
32 43 08.0 085 07 18.0
LAKE HARDING
13 GEORGIA

11EPALES 2111202
3 0031 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 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
73/06/11	15 40	0000	20.8		8	47	6.50	11	0.080	0.200	0.440	0.047
	15 40	0006	20.6	8.5		46	6.50	11	0.110	0.200	0.450	0.046
	15 40	0015	20.6	8.6		46	6.30	10	0.090	0.200	0.440	0.046
	15 40	0027	20.3	8.5		45	5.90	19	0.100	0.300	0.460	0.045
73/08/29	13 30	0000	27.3	6.8	24	68	6.80	16	0.120	0.800	0.650	0.019
	13 30	0005	27.0	6.6		69	8.60	21	0.120	0.500	0.650	0.091
73/10/31	12 00	0000	16.1		36	63	7.00	27	0.100	0.500	0.530	0.106
	12 00	0005	15.6	8.2		50	7.00	22	0.090	0.300	0.550	0.116
	12 00	0010	15.8	8.2		58	6.80	20	0.020	0.200	0.550	0.061

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/06/11	15 40	0000	0.136	1.9
	15 40	0006	0.125	
	15 40	0015	0.124	
	15 40	0027	0.128	
73/08/29	13 30	0000	0.192	5.2
	13 30	0005	0.168	
73/10/31	12 00	0000	0.189	6.5
	12 00	0005	0.187	
	12 00	0010	0.114	

STORET RETRIEVAL DATE 74/11/26

131705
32 45 37.0 085 08 35.0
LAKE HARDING
13145 GEORGIA

11EPALES
3

2111202
0015 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 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
73/06/11	16	15 0000	20.0		8	46	6.60	17	0.100	0.400	0.470	0.050
	16	15 0006	20.0	8.6		47	6.60	16	0.070	0.200	0.460	0.049
	16	15 0011	20.0	8.7		46	6.50	16	0.090	0.200	0.480	0.045

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/06/11	16	15 0000	0.126	1.4
	16	15 0006	0.112	
	16	15 0011	0.167	

APPENDIX E

TRIBUTARY DATA

STORET RETRIEVAL DATE 76/01/06

1317A1 01X1A1
32 39 30.0 085 05 30.0
CHATTAHOOCHEE RIVER
13 7.5 BARTLETTS FE
0/HARDING LAKE
POWER PLANT SUBSTA BELO DAM ALABAMA SIDE
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
73/03/10	09 50		0.410	1.150	0.720	0.048	0.105
73/04/14	14 18		0.310	0.480	0.147	0.044	0.102
73/05/05	11 15		0.378	0.820	0.066	0.042	0.115
73/06/02	14 50		0.290	0.370	0.080	0.052	0.115
73/07/15	10 06		0.410	0.540	0.115	0.056	0.100
73/08/11	10 00		0.410	0.780	0.200	0.058	0.130
73/09/15	09 50		0.378	0.630	0.130	0.075	0.125
73/10/13	10 00		0.530	0.575	0.086	0.071	0.120
73/11/10	09 30		0.560	1.050	0.071	0.060	0.060
73/12/08	09 15		0.510	1.400	0.128	0.080	0.145
74/01/09	19 18		0.410	0.400	0.060	0.050	0.125
74/01/23	19 00		0.320	0.300	0.030	0.065	0.130
74/02/06	21 00		0.310	0.400	0.135	0.045	0.100
74/02/20	19 00		0.320	0.400	0.055	0.040	0.115

STORET RETRIEVAL DATE 76/01/06

1317A2 01X1A2
32 47 30.0 085 08 30.0
CHATTAHOOCHEE RIVER
13 7.5 S LANNET
I/HARDING LAKE
E BANK OF ISLAND E OF RIVER VIEW
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
73/03/10	15 30		0.350	1.050	0.231	0.066	0.150
73/04/10	10 00		0.280	1.300	0.072	0.050	0.200
73/05/16	15 00		0.490	1.000	0.050	0.065	0.190
73/06/06	13 50		0.570	1.890	0.620	0.058	0.185
73/07/11	14 15		0.510	0.310	0.042	0.073	0.163
73/08/08	15 25		0.530	0.480	0.030	0.110	0.270
73/09/12	14 00		0.600	0.500	0.044	0.176	0.220
73/10/11	11 20		0.660	0.300	0.042	0.160	0.200
73/11/10	10 20		0.690	0.925	0.350	0.218	0.400
73/12/18	18 30		0.450	0.600	0.144	0.112	0.200
74/01/14	19 20		0.470	0.300	0.042	0.065	0.260
74/01/23	18 30		0.140	0.900	0.075	0.015	0.050
74/02/28	13 20		0.730	0.700	0.085	0.940	1.000

STORET RETRIEVAL DATE 76/01/06

1317C1 1317C1
32 43 30.0 085 05 30.0
MOUNTAIN OAK CREEK
13 7.5 BARTLETTS FE
T/HARDING LAKE
BRDG ON LICK SKILLET RD
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
73/03/10	11 00		0.147	0.580	0.027	0.011	0.025
73/04/14	14 40				0.005K	0.005K	0.045
73/05/16	13 25		0.189	1.320	0.044	0.010	0.030
73/06/02	13 27		0.198	0.180	0.032	0.008	0.020
73/07/15	11 40		0.220	0.660	0.044		0.110
73/08/11	11 30		0.035	0.360	0.010	0.024	0.050
73/09/15	11 30		0.189	0.540	0.058	0.008	0.060
73/10/13	11 24		0.126	0.350	0.050	0.017	0.040
73/11/10	11 00		0.033	0.650	0.054	0.013	0.025
73/12/08	10 30		0.160	0.500	0.024	0.012	0.031
74/01/09	19 35		0.176	0.200	0.030	0.015	0.050
74/01/23	20 00		0.140	0.100K	0.015	0.010	0.025
74/02/06	22 00		0.132	0.700	0.135	0.010	0.230
74/02/20	21 00		0.176	0.100K	0.020	0.007	0.025

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/01/06

131701 01X101
34 41 00.0 085 12 30.0
HALAWAKEE CREEK
13 7.5 BEULAH
1/HARDING LAKE
COVERED BRDG .8 MI SW TILLERY XRD SEC RD
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
73/03/10	16	30	0.097	0.540	0.250	0.010	0.020
73/04/10	11	00	0.150	0.930	0.088	0.018	0.045
73/05/16	15	10	0.160	0.910	0.025	0.012	0.025
73/06/06	14	25	0.210	2.600	0.940	0.017	0.035
73/07/11	14	50	0.147	0.460	0.134	0.011	0.030
73/08/08	15	55	0.190	0.340	0.016	0.024	0.085
73/09/12	14	50	0.140	0.440	0.032	0.013	0.055
73/11/15	11	05	0.027	0.250	0.019	0.024	0.045
73/12/18	17	20	0.232	0.200	0.028	0.012	0.020
74/02/28	14	30	0.048	0.400	0.010	0.030	0.030

STORET RETRIEVAL DATE 76/01/06

1317E1 01X1E1
32 44 00.0 085 09 00.0
OSANIPPA CREEK
13 7.5 BEULAH
T/HARDING LAKE
HWY BRDG 2 MI N OF MCCULLOH
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
73/03/10	16	10	0.058	1.380	0.066	0.021	0.070
73/04/10	10	30	0.086	0.300	0.024	0.018	0.055
73/05/16	15	45	0.038	0.810	0.034	0.011	0.055
73/06/06	14	10	0.018	0.840	0.019	0.016	0.080
73/07/11	14	35	0.023	1.300	0.023	0.080	0.210
73/08/08	15	45	0.013	1.100	0.008	0.110	0.220
73/09/12	14	30	0.020	2.600	0.019	0.330	0.540
73/10/11	11	50	0.011	1.600	0.032	0.147	0.280
73/11/15	10	40	0.014	1.250	0.012	0.168	0.260
73/12/18	18	50	0.820	0.200	0.020	0.005K	0.010
74/01/09	19	45	0.132	0.300	0.017	0.035	0.085
74/01/23	20	55	0.072	1.000	0.055	0.015	0.030
74/02/28	14	00	1.120	1.000	0.050	0.035	0.057

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/01/06

1317F1
32 50 15.0 085 07 15.0
FLAT SHOAL CREEK
13 7.5 WHITEVILLE
T/SEMINOLE LAKE
GA HWY 103 BRDG
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
73/04/15	11 05		0.200	0.930	0.231	0.007	0.025
73/05/05	12 52		0.230	0.660	0.015	0.020	0.020
73/06/02	13 50		0.260	1.050	0.420	0.006	0.015
73/07/15	11 00		0.189	1.100	0.037	0.027	0.040
73/08/11	11 10		0.260	0.260	0.007	0.013	0.040
73/09/15	13 00		0.210	0.360	0.019	0.007	0.025
73/10/13	10 55		0.176	0.150	0.023	0.015	0.015
73/11/10	10 30		0.060	0.350	0.039	0.009	0.045
73/12/08	10 00		0.160	0.200	0.036	0.008	0.025
74/01/09	20 30		0.276	0.200	0.025	0.015	0.035
74/01/23	21 15		0.184	0.300	0.025	0.015	0.035
74/02/06	22 55		0.200	0.500	0.065	0.010	0.160
74/02/20	20 00		0.224	0.400	0.020	0.010	0.045