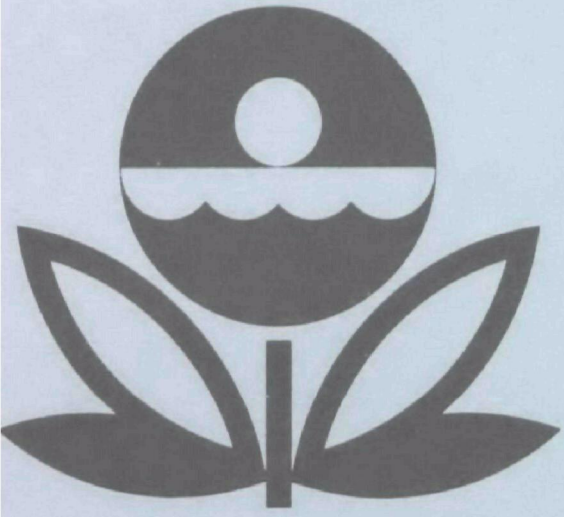
U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL EUTROPHICATION SURVEY
WORKING PAPER SERIES



REPORT

ON

CARRY FALLS RESERVOIR

ST. LAWRENCE COUNTY

NEW YORK

EPA REGION II

WORKING PAPER No. 151

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

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

AND THE

NEW YORK NATIONAL GUARD

NOVEMBER, 1974

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 New York Department of Environmental Conservation for professional involvement and to the New York National Guard for conducting the tributary sampling phase of the Survey.

Henry L. Diamond, Commissioner of the New York Department of Environmental Conservation, and Leo J. Hetling, Director, and Italo G. Carcich, Senior Sanitary Engineer, Environmental Quality Research, Department of Environmental Conservation, provided invaluable lake documentation and counsel during the Survey.

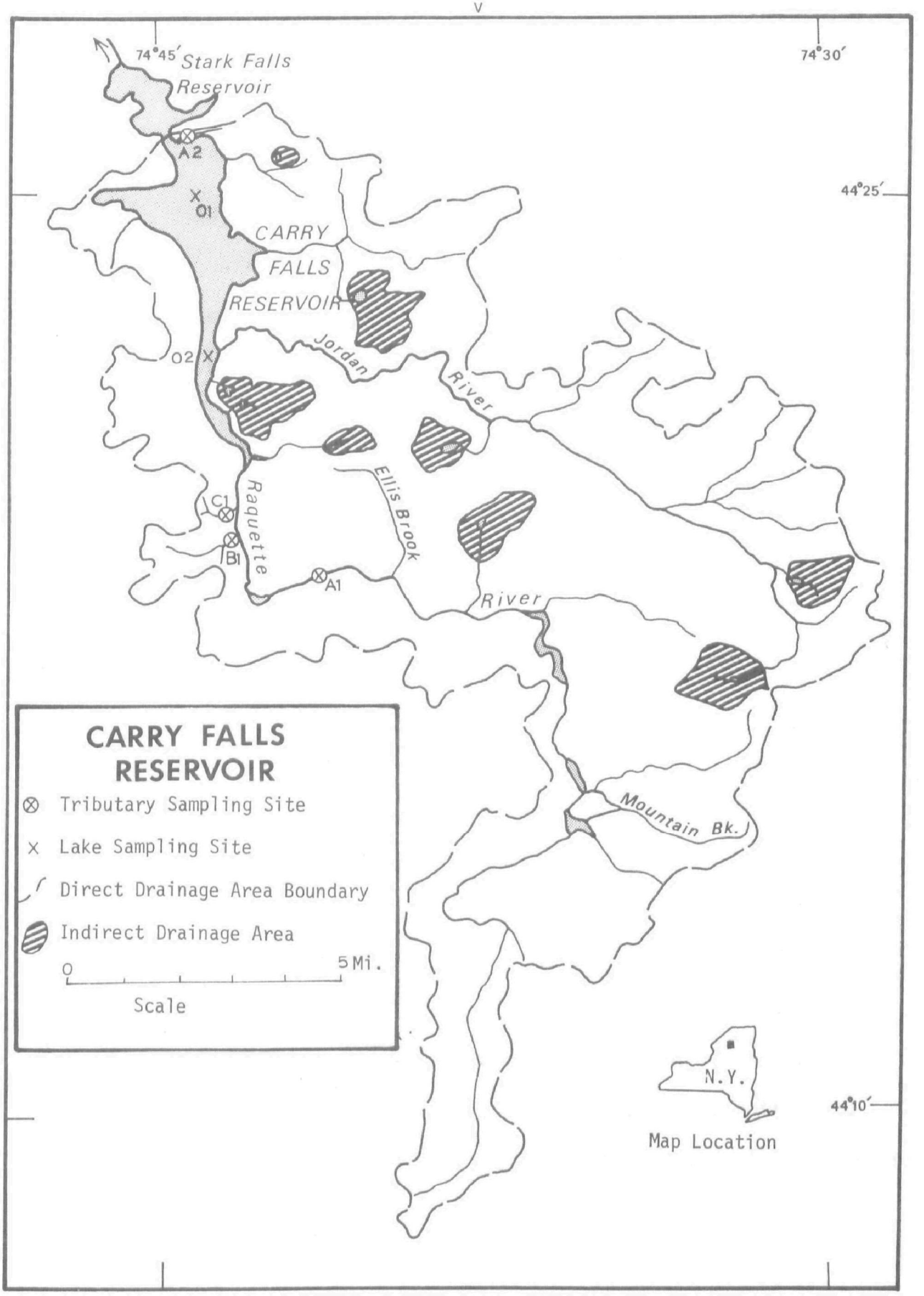
Major General John C. Baker, the Adjutant General of New York, and Project Officer Lieutenant Colonel Fred Peters, who directed the volunteer efforts of the New York National Guardsmen, are also gratefully acknowledged for their assistance to the Survey.

NATIONAL EUTROPHICATION SURVEY

STUDY LAKES

STATE OF NEW YORK

LAKE NAME	COUNTY
Allegheny Reservoir	Cattaraugas, NY; McLean, Warren, PA
Black	St. Lawrence
Canandaigua	Ontario
Cannonsville	Delaware
Carry Falls	St. Lawrence
Cassadaga	Chautauqua
Cayuga	Seneca, Tompkins
Champlain	Clinton, Essex, NY; Addison, Chittenden, Franklin, VT
Chautauqua	Chautauqua
Conesus	Livingston
Cross	Cayuga, Onondaga
Goodyear	Otsego
Huntington	Sullivan
Keuka	Ontario
Long	Hamilton
Lower St. Regis	Franklin
Otter	Cayuga
Owasco	Cayuga
Raquette Pond	Franklin
Round	Saratoga
Sacandaga Res.	Fulton, Saratoga
Saratoga	Saratoga
Schroon	Essex, Warren
Seneca	Seneca, Schyler, Yates
Swan	Sullivan
Swinging Bridge Res.	Sullivan


74°45′
Stark Falls Reservoir
74°30′
44°25′
A2
O1
CARRY FALLS RESERVOIR
Jordan River
O2
A3
Ellis Brook
Raquette River
C1
B1
A1
Mountain Bk.
CARRY FALLS RESERVOIR
Tributary Sampling Site
Lake Sampling Site
Direct Drainage Area Boundary
Indirect Drainage Area
0
5 Mi.
Scale
N.Y.
Map Location
44°10′

CARRY FALLS RESERVOIR

STORET NO. 3606

I. CONCLUSIONS

A. Trophic Condition:

Survey data show that Carry Falls Reservoir is mesotrophic. Of the 26 New York lakes sampled in the fall of 1972, when essentially all were well-mixed, 17 had more mean total phosphorus, 16 had more mean dissolved phosphorus, and 12 had more mean inorganic nitrogen. For all New York data, only 2 lakes had less mean chlorophyll a, and 12 lakes had greater mean Secchi disc transparency.

B. Rate-Limiting Nutrient:

Algal assay results show that Carry Falls Reservoir was phosphorus limited at the time the assay sample was collected. Lake data show phosphorus limitation at the other sampling times as well (N/P ratios were never less than 41/1, and phosphorus limitation would be expected).

C. Nutrient Controllability:

1. Point sources--During the sampling year, Carry Falls Reservoir received a total phosphorus load at a rate less than that proposed by Vollenweider (in press) as "dangerous" (eutrophic rate) but more than his suggested "permissible" (oligotrophic) rate; i.e., a mesotrophic rate (see page 12). However, as far as is known,

the septic tanks serving shoreline dwellings were the only point sources of phosphorus during the sampling year, and the load from these sources is considered to be insignificant.

2. Non-point sources (see page 12)--The phosphorus exports of the streams tributary to the Reservoir were similar to those of other unimpacted streams studied elsewhere in New York.

In all, it is estimated that non-point sources contributed almost all of the phosphorus load to Carry Falls Reservoir during the sampling year.

II. LAKE AND DRAINAGE BASIN CHARACTERISTICS

A. Lake Morphometry†:

1. Surface area: 6,458 acres.
2. Mean depth: 17.7 feet.
3. Maximum depth: unknown.
4. Volume: 114,300 acre/feet.
5. Mean hydraulic retention time: 38 days.

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

1. Tributaries -

Name	Drainage area*	Mean flow*
Raquette River	783.0 mi^2	1,357.7 cfs
Unnamed Brook (B-1)	1.9 mi^2	3.3 cfs
Unnamed Brook (C-1)	1.4 mi^2	2.5 cfs
Minor tributaries & immediate drainage -	76.6 mi^2	150.2 cfs
Totals	862.9 mi^2	1,513.7 cfs

2. Outlet -

Raquette River	873.0 mi^2**	1,513.7 cfs

C. Precipitation:

1. Year of sampling***: 44.5 inches.
2. Mean annual: 35.6 inches.

† Greeson and Robison, 1970.
* Drainage areas are accurate within ±5%, except for small basins (±10%); mean daily flows are accurate within ±5% to 25%; and normalized mean monthly flows are accurate within ±15%.
** Includes area of lake.
*** See Working Paper No. 1, "Survey Methods".

III. LAKE WATER QUALITY SUMMARY

Carry Falls Reservoir was sampled three times during the open-water season of 1972 by means of a pontoon-equipped Huey helicopter. Each time, samples for physical and chemical parameters were collected from two stations on the lake and from a number of depths at each station (see map, page v). During each visit, a single depth-integrated (15 feet to surface) sample was collected from the stations for phytoplankton identification and enumeration; and during the last visit, a single five-gallon depth-integrated sample was collected 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 27 feet at station 1 and 40 feet at station 2.

The results obtained are presented in full in Appendix B, and the data for the fall sampling period, when the lake essentially was well-mixed, are summarized below. Note, however, the Secchi disc summary is based on all values.

For differences in the various parameters at the other sampling times, refer to Appendix B.

A. Physical and chemical characteristics:

Parameter	Minimum	FALL VALUES (10/10/72) Mean	Median	Maximum
Temperature (Cent.)	11.9	12.2	12.2	12.6
Dissolved oxygen (mg/l)	7.7	8.3	8.3	9.0
Conductivity (μmhos)	50	50	50	50
pH (units)	6.3	6.5	6.5	6.7
Alkalinity (mg/l)	10	10	10	10
Total P (mg/l)	0.011	0.011	0.011	0.012
Dissolved P (mg/l)	0.005	0.007	0.006	0.008
NO_2 + NO_3 (mg/l)	0.180	0.184	0.180	0.190
Ammonia (mg/l)	0.100	0.105	0.105	0.110
		ALL VALUES		
Secchi disc (inches)	72	89	81	117

B. Biological characteristics:

1. Phytoplankton -

Sampling Date	Dominant Genera	Number per ml
05/20/72	1. Dinobryon	994
	2. Anabaena	551
	3. Cyclotella	208
	4. Synedra	163
	5. Chroococcus	145
	Other genera	317
	Total	2,378
07/25/72	1. Dinobryon	709
	2. Schroederia	173
	3. Pediastrum	152
	4. Cryptomonas	152
	5. Cyclotella	108
	Other genera	152
	Total	1,446
10/10/72	1. Dinobryon	816
	2. Flagellates	766
	3. Melosira	477
	4. Schroederia	188
	5. Chroococcus	176
	Other genera	640
	Total	3,063

2. Chlorophyll a -
(Because of instrumentation problems during the 1972 sampling, the following values may be in error by plus or minus 20 percent.)

Sampling Date	Station Number	Chlorophyll a (µg/l)
05/20/72	01	10.0
	02	2.0
07/25/72	01	1.1
	02	1.3
10/10/72	01	2.1
	02	1.9

C. Limiting Nutrient Study:

1. Autoclaved, filtered, and nutrient spiked -

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc. (mg/l)	Maximum yield (mg/l-dry wt.)
Control	0.005	0.192	0.2
0.010 P	0.015	0.192	5.5
0.020 P	0.025	0.192	4.0
0.050 P	0.055	0.192	4.6
0.050 P + 5.0 N	0.055	5.192	18.9
0.050 P + 10.0 N	0.055	10.192	20.6
10.0 N	0.005	10.192	0.1

2. Discussion -

The control yield of the assay alga, Selenastrum capricornutum, indicates that the primary productivity was low at the time the assay sample was collected. The significant increase in yield with the initial phosphorus spike (0.010 mg/l P), indicates that the sample was phosphorus limited. Note that a further increase in yield did not occur until

nitrogen and phosphorus were added together (indicating that nitrogen became limiting at phosphorus levels somewhat less than 0.015 mg/l). Also, note that the yield was not significantly different from the control yield when only nitrogen was added.

The lake data indicate that phosphorus was the limiting nutrient on all three sampling trips (N/P ratios were greater than 41/1 on all occasions , and phosphorus limitation would be expected).

IV. NUTRIENT LOADINGS
(See Appendix C for data)

For the determination of nutrient loadings, the New York 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 month of May when two samples were collected. Sampling was begun in November, 1972, and was completed in October, 1973.

Through an interagency agreement, stream flow estimates for the year of sampling and a "normalized" or average year were provided by the New York 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 Suvey computer program for calculating stream loadings*. Nutrient loadings for unsampled "minor tributaries and immediate drainage" ("ZZ" of U.S.G.S.) were estimated by using the means of the nutrient loads, in lbs/mi^2/year, at stations B-1 and C-1 and multiplying the means by the ZZ area in mi^2.

There are no known waste treatment plants impacting Carry Falls Reservoir.

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* See Working Paper No. 1.

A. Waste Sources:

1. Known municipal - None

2. Known industrial - None

B. Annual Total Phosphorus Loading - Average Year:

1. Inputs -

Source	lbs P/ yr	% of total
a. Tributaries (non-point load) -		
Raquette River	34,750	84.5
Unnamed Brook (B-1)	120	0.3
Unnamed Brook (C-1)	100	0.2
b. Minor tributaries & immediate drainage (non-point load) -	5,110	12.4
c. Known municipal - None	-	-
d. Septic tanks* -	10	<0.1
e. Known industrial - None	-	-
f. Direct precipitation** -	1,010	2.5
Total	41,100	100.0

2. Outputs -

Lake outlet - Raquette River 29,670

3. Net annual P accumulation - 11,430 pounds

* Based on 15 shoreline dwellings; see Working Paper No. 1.
** See Working Paper No. 1.

C. Annual Total Nitrogen Loading - Average Year:

1. Inputs -

Source	lbs N/ yr	% of total
a. Tributaries (non-point load) -		
Raquette River	2,248,670	85.5
Unnamed Brook (B-1)	7,530	0.3
Unnamed Brook (C-1)	5,630	0.2
b. Minor tributaries & immediate drainage (non-point load) -	305,470	11.6
c. Known municipal	-	-
d. Septic tanks* -	350	<0.1
e. Known industrial - None	-	-
f. Direct precipitation** -	62,220	2.4
Total	2,629,870	100.0

2. Outputs -

Lake outlet - Raquette River 3,035,940

3. Net annual N loss - 406,070 pounds

* Based on 15 shoreline dwellings; see Working Paper No. 1.
** See Working Paper No. 1.

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

Tributary	lbs P/mi^2/yr	lbs N/mi^2/yr
Raquette River	44	2,872
Unnamed Brook (B-1)	63	3,963
Unnamed Brook (C-1)	71	4,021

E. Yearly Loading Rates:

In the following table, the existing phosphorus loading rates are compared to those proposed by Vollenweider (in press). Essentially, his "dangerous" rate is the rate at which the receiving waters 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".

	Total Phosphorus		Total Nitrogen	
Units	Total	Accumulated	Total	Accumulated
lbs/acre/yr	6.4	1.8	407.2	loss*
grams/m^2/yr	0.71	0.20	45.6	-

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

"Dangerous" (eutrophic rate)	1.36
"Permissible" (oligotrophic rate)	0.68

* There was an apparent loss of nitrogen during the sampling year. This may have been due to nitrogen fixation in the lake, solubilization of previously sedimented nitrogen, recharge with nitrogen-rich ground water, unknown and unsampled point sources discharging directly to the lake, or underestimation of the nitrogen loads from septic tanks. Whatever the cause, a similar nitrogen loss has occurred at Shagawa Lake, Minnesota, which had been intensively studied by EPA's National Eutrophication Research and Lake Restoration Branch.

V. LITERATURE REVIEWED

Greeson, Phillip E., and F. Luman Robison, 1970. Characteristics of New York Lakes. Part 1: Gazetteer of lakes, ponds, and reservoirs. Bull. 68, U.S. Dept. of Int. and N. Y. Dept. of Env. Cons., 124 pp.

Vollenweider, Richard A (in press). Input-output models. Schweiz. A. Hydrol.

VII. APPENDICES

APPENDIX A

TRIBUTARY FLOW DATA

TRIBUTARY FLOW INFORMATION FOR NEW YORK 11/26/74

LAKE CODE 3606 CARRY FALLS RESERVOIR

TOTAL DRAINAGE AREA OF LAKE 873.00

TRIBUTARY	SUB-DRAINAGE AREA	NORMALIZED FLOWS JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
3606A1	783.00	1080.00	1040.00	1260.00	3390.00	3130.00	1430.00	761.00	571.00	590.00	783.00	1070.00	1190.00	1357.66
3606A2	873.00	1200.79	1160.77	1400.93	3782.50	3492.31	1591.05	849.56	636.42	658.43	873.58	1200.79	1320.87	1513.68
3606B1	1.88	2.58	2.51	3.02	8.14	7.52	3.43	1.83	1.37	1.42	1.88	2.58	2.85	3.26
3606C1	1.45	1.99	1.93	2.33	6.28	5.80	2.65	1.41	1.06	1.09	1.45	1.99	2.20	2.51
3606ZZ	86.67	119.00	116.00	139.00	375.00	347.00	158.00	84.20	63.20	65.30	86.70	119.00	131.00	150.25

SUMMARY

TOTAL DRAINAGE AREA OF LAKE = 873.00
SUM OF SUB-DRAINAGE AREAS = 873.00
TOTAL FLOW IN = 18167.66
TOTAL FLOW OUT = 18167.98

MEAN MONTHLY FLOWS AND DAILY FLOWS

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
3606A1	11	72	560.00	5	921.00				
	12	72	1860.00	2	1660.00				
	1	73	1610.00	6	2090.00				
	2	73	1720.00	3	1630.00				
	3	73	3150.00	3	1040.00				
	4	73	3340.00	15	3220.00				
	5	73	2560.00	5	2320.00	19	2390.00		
	6	73	1910.00	2	3030.00				
	7	73	865.00	7	1260.00				
	8	73	553.00	19	497.00				
	9	73	638.00	8	543.00				
	10	73	642.00	13	753.00				
3606A2	11	72	1750.00	5	939.00				
	12	72	2060.00	2	1550.00				
	1	73	1790.00	6	2890.00				
	2	73	1910.00	3	2120.00				
	3	73	3500.00	3	1980.00				
	4	73	3720.00	15	4230.00				
	5	73	2850.00	5	2270.00	19	2640.00		
	6	73	2130.00	2	2930.00				
	7	73	965.00	7	2870.00				
	8	73	616.00	19	431.00				
	9	73	712.00	8	240.00				
	10	73	716.00	13	959.00				

LAKE CODE 3606 CARRY FALLS RESERVOIR

MEAN MONTHLY FLOWS AND DAILY FLOWS

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
3606B1	11	72	3.76	5	2.15				
	12	72	4.44	2	3.87				
	1	73	3.86	6	4.91				
	2	73	4.14	3	3.82				
	3	73	7.55	3	2.43				
	4	73	8.01	15	11.40				
	5	73	6.14	5	7.00	19	7.26		
	6	73	4.59	2	8.80				
	7	73	2.08	7	2.97				
	8	73	1.33	19	1.30				
	9	73	1.54	8	1.38				
	10	73	1.54	13	1.83				
3606C1	11	72	2.90	5	1.98				
	12	72	3.43	2	3.54				
	1	73	2.98	6	4.48				
	2	73	3.18	3	3.47				
	3	73	5.82	3	2.22				
	4	73	6.18	15	7.40				
	5	73	4.74	5	4.90	19	5.10		
	6	73	3.55	2	6.00				
	7	73	1.60	7	2.30				
	8	73	1.03	19	1.12				
	9	73	1.18	8	1.20				
	10	73	1.19	13	1.50				
3606Z7	11	72	174.00	5	102.00				
	12	72	204.00	2	184.00				
	1	73	178.00	6	232.00				
	2	73	191.00	3	180.00				
	3	73	348.00	3	115.00				
	4	73	369.00	15	357.00				
	5	73	283.00	5	257.00	19	264.00		
	6	73	211.00	2	335.00				
	7	73	95.70	7	139.00				
	8	73	61.20	19	55.00				
	9	73	70.70	8	60.10				
	10	73	71.10	13	83.30				

APPENDIX B

PHYSICAL and CHEMICAL DATA

STORET RETRIEVAL DATE 74/11/26

360601
44 25 00.0 074 40 00.0
CARRY FALLS RESERVOIR
36089 NEW YORK

11EPALES 2111202
6 0018 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	00630 NO2&NO3 N-TOTAL MG/L	00610 NH3-N TOTAL MG/L	00665 PHOS-TOT MG/L P	00666 PHOS-DIS MG/L P
72/05/20	13 40	0000	10.9	14.3	117	50	5.90	10K	0.360	0.050	0.009	0.006
	13 40	0010	10.8	14.8		50	5.90	10K	0.370	0.150	0.009	0.009
	13 40	0020	10.8	16.4		50	5.80	10K	0.350	0.040	0.009	0.006
72/07/25	08 30	0000			78	50K	7.40	10K	0.200	0.100	0.100	0.008
	08 30	0004	22.0	10.0		50K	7.40	10K	0.200	0.090	0.008	0.006
	08 30	0015	22.0	9.8		50K	7.20	10K	0.200	0.100	0.008	0.007
72/10/10	11 25	0000			72	50K	6.35	10K	0.190	0.110	0.012	0.006
	11 25	0004	12.6	7.7		50K	6.30	10K	0.190	0.110	0.011	0.007
	11 25	0015	12.5	7.7		50K	6.50	10K	0.190	0.110	0.011	0.008
	11 25	0027	12.4	7.7		50K	6.45	10K	0.180	0.100	0.011	0.007

DATE FROM TO	TIME OF DAY	DEPTH FEET	32217 CHLRPHYL A UG/L
72/05/20	13 40	0000	10.0J
72/07/25	08 30	0000	1.1J
72/10/10	11 25	0000	2.1J

K VALUE KNOWN TO BE LESS THAN INDICATED

J VALUE KNOWN TO BE IN ERROR

STORET RETRIEVAL DATE 74/11/26

360602
44 25 00.0 074 40 00.0
CARRY FALLS RESERVOIR
36089 NEW YORK

11EPALES 2111202
6 0032 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	00630 NO2&NO3 N-TOTAL MG/L	00610 NH3-N TOTAL MG/L	00665 PHOS-TOT MG/L P	00666 PHOS-DIS MG/L P
72/05/20	14 14	0000	13.7	12.3	108	50	6.30	10K	0.320	0.030	0.009	0.004
	14 14	0010	11.8	12.9		50	5.70	10K	0.340	0.050	0.009	0.004
	14 14	0040	7.8	13.5		50	5.70	10K	0.400	0.020	0.008	0.005
72/07/25	08 50	0000			84	50K	7.60	10K	0.200	0.100	0.012	0.008
	08 50	0004	23.3	7.4		50K	7.60	10K	0.200	0.100	0.009	0.006
	08 50	0015	23.3	7.4		50K	7.50	10K	0.210	0.100	0.010	0.008
	08 50	0028	19.8	7.0		50K	7.30	10K	0.200	0.100	0.009	0.007
72/10/10	11 00	0000			74	50K	6.60	10K	0.180	0.110	0.012	0.008
	11 00	0004	12.0	9.0		50K	6.70	10K	0.180	0.100	0.011	0.006
	11 00	0015	11.9	9.0		50K	6.60	10K	0.180	0.100	0.011	0.005
	11 00	0021	11.9	8.9		50K	6.60	10K	0.180	0.100	0.012	0.006

DATE FROM TO	TIME OF DAY	DEPTH FEET	32217 CHLRPHYL A UG/L
72/05/20	14 14	0000	2.0J
72/07/25	08 50	0000	1.3J
72/10/10	11 00	0000	1.9J

K VALUE KNOWN TO BE LESS THAN INDICATED

J VALUE KNOWN TO BE IN ERROR

APPENDIX C

TRIBUTARY DATA

STORET RETRIEVAL DATE 74/11/26

3606A1 LS3606A1
44 19 00.0 074 41 30.0
RAQUETTE RIVER
36 15 CHILDWOLD
I/CARRY FALLS RESERVOIR
ALOND RD OFF ST HWY 56 N OFSEVEY
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
72/11/05	10 30		0.208	0.300	0.081	0.005K	0.015
72/12/02	09 30		0.220	0.500	0.029	0.006	0.018
73/01/06	11 30		0.410	0.310	0.018	0.005K	0.005K
73/02/03	10 28		0.490	0.400	0.088	0.026	0.030
73/03/03	10 00		0.520	0.100K	0.046	0.005K	0.005K
73/03/31	10 30		0.378	0.460	0.108	0.005K	0.010
73/04/15	09 35		0.378	1.260	0.033	0.005K	0.010
73/05/05	10 45		0.280	0.390	0.016	0.005K	0.015
73/05/19	12 10		0.240	1.050	0.024	0.005K	0.015
73/06/02	09 30		0.180	0.440	0.008	0.005K	0.010
73/07/07	11 30		0.273	3.000	0.092	0.009	0.020
73/08/19	12 45		0.250	0.750	0.058	0.006	0.010
73/09/08	12 30		0.210	0.560	0.019	0.005K	0.010
73/10/13	11 30		0.210	0.440	0.110	0.005K	0.010

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 74/11/26

3606A2 LS3606A2
44 26 00.0 077 45 00.0
RAQUETTE RIVER
36 15 CHILDWOLD
O/CARRY FALLS RESERVOIR
NEAR DAM WHERE ACCESSIBLE
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
72/11/05	12	30	0.170	0.275	0.075	0.005K	0.012
72/12/02	10	55	0.200	0.350	0.019	0.005K	0.014
73/01/06	12	45	0.260	0.400	0.034	0.005K	0.008
73/02/03	11	48	1.420	0.270	0.093	0.005K	0.010
73/03/03	11	15	0.350	0.200	0.052	0.005K	0.005K
73/03/31	10	50	0.420	0.390	0.048	0.005K	0.010
73/04/15	10	30	0.350	0.380	0.013	0.005K	0.010
73/05/05	11	45	0.315	0.860	0.044	0.005K	0.015
73/05/19	13	30	0.294	1.760	0.072	0.005K	0.015
73/06/02	10	15	0.240	1.180	0.026	0.005K	0.010
73/07/07	12	30	0.210	2.200	0.075	0.005K	0.010
73/08/19	13	30	0.180	0.210	0.035	0.005K	0.005K
73/09/08	13	15	0.147	0.500	0.026	0.005K	0.005K
73/10/13	13	00	0.140	0.560	0.170	0.005K	0.010

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 74/11/26

360681 LS360681
44 19 30.0 074 43 30.0
UNNAMED BROOK
36 15 CHILDWOLD
T/CARRY FALLS RESERVOIR
ST HWY 56 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
72/11/05	11 00		0.114	0.460	0.075	0.005K	0.015
72/12/02	09 15		0.156	1.200	0.073	0.007	0.017
73/01/06	11 45		0.168	0.400	0.050	0.005K	0.010
73/02/03	10 45		1.100	0.400	0.084	0.005K	0.015
73/03/03	10 30		0.220	0.250	0.105	0.005K	0.005K
73/03/31	09 50		0.154	0.420	0.048	0.005K	0.015
73/04/15	09 40		0.154	0.520	0.028	0.005K	0.010
73/05/05	10 55		0.078	0.690	0.023	0.005K	0.020
73/05/19	12 30		0.058	1.700	0.046	0.005K	0.015
73/06/02	09 50		0.056	2.800	0.084	0.008	0.020
73/07/07	12 00		0.075	2.400	0.082	0.008	0.050
73/08/19	13 15		0.086	0.980	0.050	0.007	0.040
73/09/08	12 45		0.062	0.750	0.034	0.005K	0.015
73/10/13	11 50		0.084	0.860	0.290	0.005K	0.010

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 74/11/26

3606C1 LS3606C1
44 20 00.0 074 43 30.0
UNNAMED BROOK
36 15 CHILDWOLD
T/CARRY FALLS RESERVOIR
ST HWY 56 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
72/11/05	11	00	0.140	0.400	0.095	0.006	0.017
72/12/02	10	00	0.169	0.730	0.052	0.005K	0.015
73/01/06	12	00	0.360	0.460	0.078	0.005K	0.022
73/02/03	11	00	0.750	0.440	0.115	0.005K	0.015
73/03/03	10	45	0.410	0.460	0.100	0.005K	0.010
73/03/31	10	00	0.350	2.300	0.147	0.005K	0.020
73/04/15	09	50	0.273	0.900	0.063	0.005K	0.025
73/05/05	11	05	0.200	0.230	0.023	0.005K	0.015
73/05/19	12	40	0.110	1.760	0.069	0.005K	0.015
73/06/02	09	55	0.080	1.050	0.042	0.005K	0.025
73/07/07	12	10	0.084	1.100	0.048	0.006	0.022
73/08/19	13	20	0.154	1.470	0.095	0.030	0.105
73/09/08	12	50	0.130	0.520	0.025	0.005K	0.010
73/10/13	12	15	0.126	0.730	0.100	0.005K	0.060

K VALUE KNOWN TO BE
LESS THAN INDICATED