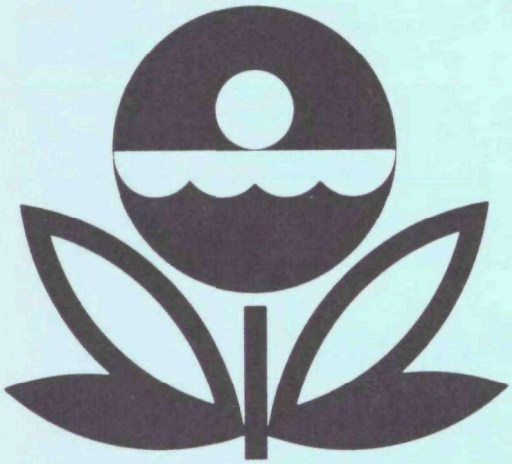
U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL EUTROPHICATION SURVEY

WORKING PAPER SERIES



REPORT

ON

DWORSHAK RESERVOIR

CLEARWATER COUNTY

IDAHO

EPA REGION X

WORKING PAPER No. 779

CORVALLIS ENVIRONMENTAL RESEARCH LABORATORY - CORVALLIS, OREGON

and

ENVIRONMENTAL MONITORING & SUPPORT LABORATORY - LAS VEGAS, NEVADA

☆G.P.O. 699-440

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WITH THE COOPERATION OF THE

IDAHO DEPARTMENT OF HEALTH AND WELFARE

AND THE

IDAHO NATIONAL GUARD

JULY, 1977

REPORT ON DWORSHAK RESERVOIR

CLEARWATER COUNTY, IDAHO

EPA REGION X

by

National Eutrophication Survey

Water and Land Quality Branch
Monitoring Operations Division
Environmental Monitoring & Support Laboratory
Las Vegas, Nevada

and

Special Studies Branch
Corvallis Environmental Research Laboratory
Corvallis, Oregon

Working Paper No. 779

OFFICE OF RESEARCH AND DEVELOPMENT
U.S. ENVIRONMENTAL PROTECTION AGENCY

July 1977

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FOREWORD

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to freshwater 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 nonpoint 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 freshwater 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 the U.S. Environmental Protection Agency and to augment plans implementation by the states.

ACKNOWLEDGMENTS

The staff of the National Eutrophication Survey (Office of Research and Development, U.S. Environmental Protection Agency) expresses sincere appreciation to the Idaho Department of Health and Welfare for professional involvement, to the Idaho National Guard for conducting the tributary sampling phase of the Survey, and to those Idaho wastewater treatment plant operators who provided effluent samples and flow data.

The staff of the State of Idaho Department of Health and Welfare, Division of Environment, 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.

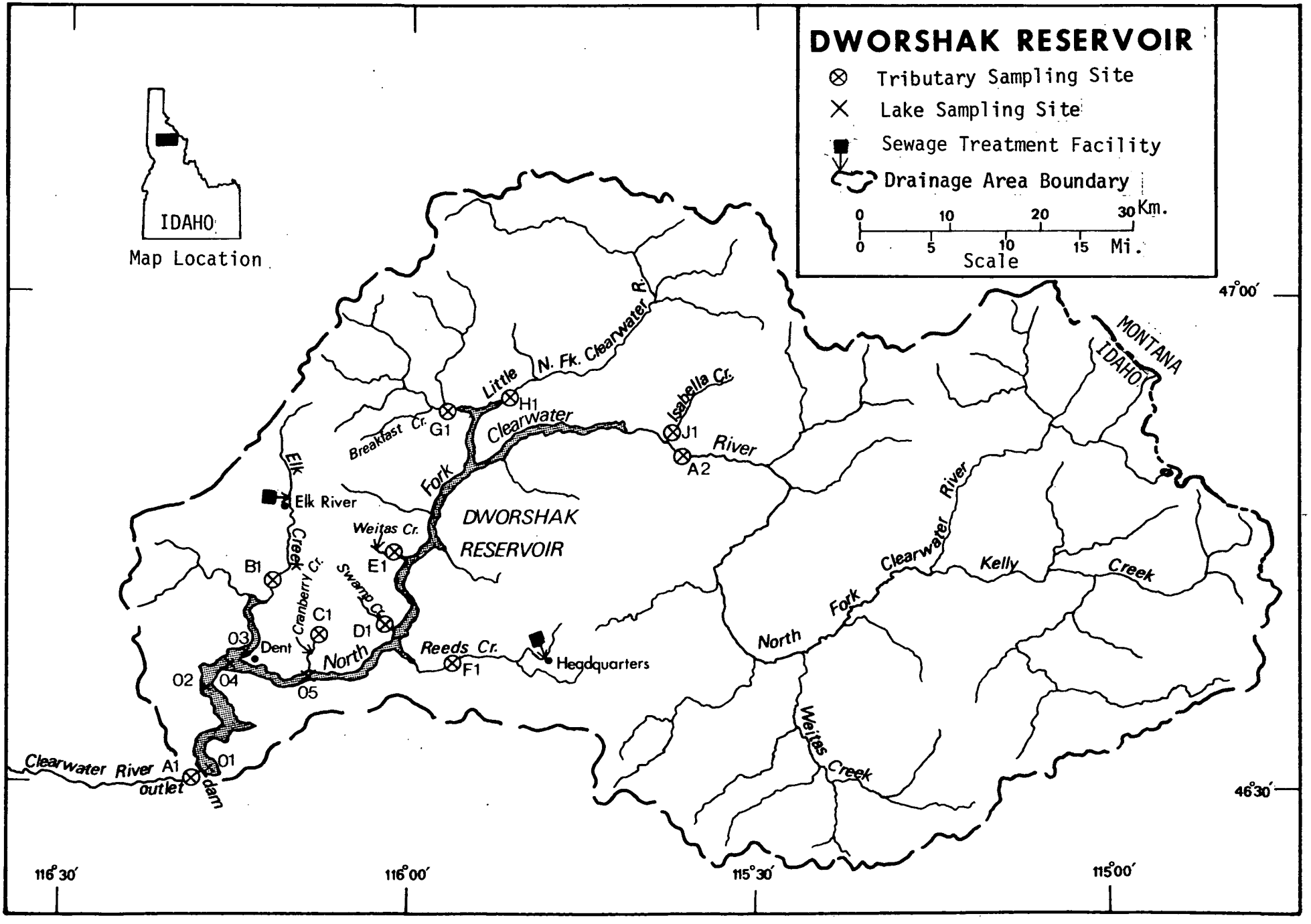
Major General James S. Brooks, Adjutant General of Idaho, and Project Officer Major Vestal L. Baker, who directed the volunteer efforts of the Idaho National Guardsmen, are also gratefully acknowledged for their assistance to the Survey.

NATIONAL EUTROPHICATION SURVEY

STUDY LAKES

STATE OF IDAHO

LAKE NAME	COUNTY
American Falls Reservoir	Bannock, Bingham, Power
Cascade Reservoir	Valley
Coeur d'Alene Lake	Benewah, Kootenai
Dworshak Reservoir	Clearwater
Hauser Lake	Kootenai
Hayden Lake	Kootenai
Island Park Reservoir	Fremont
Lake Lowell (Deer Flat Reservoir)	Canyon
Magic Reservoir	Blaine, Camas
Palisades Reservoir	Bonneville (Lincoln in WY)
Payette Lake	Valley
Lower Twin Lake	Kootenai
Upper Twin Lake	Kootenai


DWORSHAK RESERVOIR
Tributary Sampling Site
Lake Sampling Site
Sewage Treatment Facility
Drainage Area Boundary
0 10 20 30 Km.
0 5 10 15 Mi.
Scale
IDAHO
Map Location
47°00'
46°30'
116°30'
116°00'
115°30'
115°00'
MONTANA
IDAHO
N. Fk. Clearwater R.
Little
Clearwater
River
Isabella Cr.
Breakfast Cr.
Elk
Creek
Elk River
Fork
DWORSHAK
RESERVOIR
Weitas Cr.
Cranberry Cr.
Swamp Cr.
North
Fork
Clearwater River
Kelly
Creek
Reeds Cr.
Headquarters
Dent
Weitas Creek
Clearwater River
outlet
dam
H1
G1
J1
A2
B1
E1
C1
D1
F1
A1
01
02
03
04
05

REPORT ON DWORSHAK RESERVOIR, IDAHO

STORET NO. 1604

I. CONCLUSIONS

A. Trophic Condition:*

Based upon Survey data and field observations Dworshak Reservoir is considered oligotrophic. Chlorophyll a values ranged from 0.5 µg/l to 6.7 µg/l in the lake with a mean of 2.4 µg/l. Potential for primary production as measured by algal assay control yields was low. Of the 13 Idaho lakes sampled in 1975, 11 had higher median total phosphorus, 1 had higher median inorganic nitrogen and 5 had higher median orthophosphorus levels than Dworshak Reservoir.

Field limnologists reported Dworshak Reservoir was a clean and beautiful lake. The Idaho Department of Water Resources et al. (1975) has noted that the lake is of high water quality and low productivity, but that it will be a future site for heavy subdivision and recreational development, and should be watched closely for any deleterious changes.

*See Appendix E.

B. Rate-Limiting Nutrient:

The algal assay results indicate Dworshak Reservoir was limited by available phosphorus at the times the samples were collected (04/07/75, 09/11/75). The reservoir data suggest primary limitation by nitrogen on all three sampling occasions.

C. Nutrient Controllability:

1. Point Sources -

During the sampling year point sources were estimated to contribute only 0.4% of the total phosphorus loading to Dworshak Reservoir. The towns of Headquarters and Elk River each contributed 0.2% of the total phosphorus load.

The annual phosphorus loading to Dworshak Reservoir of 1.50 g $P/m^2/yr$ is less than Vollenweider's (1975) proposed loading for "eutrophic" lakes but greater than his proposed "oligotrophic" level on the basis of lake mean depth and hydraulic retention time. Any future nutrient inputs to the lake should be carefully evaluated as to their effect on the high water quality of the reservoir.

2. Nonpoint Sources -

Nonpoint sources, including precipitation, were found to contribute 99.6% of the total phosphorus loading to Dworshak Reservoir during the sampling year. The North Fork Clearwater River contributed 53.4% of the total phosphorus load, the Little

North Fork Clearwater River contributed 10.4%, and ungaged drainage areas were estimated to have contributed 19.3%. The Idaho Department of Health and Welfare has also indicated that nutrient contributions to the lake can be expected from bank instability and associated slumping resulting from fluctuations of the reservoir surface elevation (A.E. Murrey, personal communication).

The Elks Creek and Reeds Creek had slightly higher annual phosphorus nutrient exports than would be expected from strictly nonpoint contributions (Section IV-D). The Idaho Department of Water Resources, et al. (1975) report that both of these creeks are effected by upstream sewage and mining contributions, and the U.S. Army District Engineer (1974) states that man-related nonpoint contributions, such as agricultural runoff, are insignificant in terms of their effect on water quality in the reservoir. Additional investigation is needed to determine the extent of these upstream mining and sewage sources before any recommendations on their controllability can be made.

II. LAKE AND DRAINAGE BASIN CHARACTERISTICS

Lake and drainage basin characteristics are itemized below. Lake surface area, mean and maximum depth were provided by Herman Ray (personal communication). Tributary flow data were provided by the Idaho District Office of the U.S. Geological Survey (USGS). Outlet drainage area includes the lake surface area. Mean hydraulic retention time was obtained by dividing the lake volume by mean flow of the outlet. Precipitation values are estimated by methods as outlined in National Eutrophication Survey (NES) Working Paper No. 175. A table of metric/English conversions is included as Appendix A.

A. Lake Morphometry:

1. Surface area: 76.89 km^2.
2. Mean depth: 55.5 meters.
3. Maximum depth: ? meters.
4. Volume: 4,267.875 x 10^6 m^3.
5. Mean hydraulic retention time: 305 days.

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

1. Tributaries -

Name	Drainage area (km^2)	Mean flow (m^3/sec)
A-2 North Fork Clearwater River	3,522.4	106.92
B-1 Elk Creek	240.4	7.30
F-1 Reeds Creek	161.6	4.90
G-1 Breakfast Creek	334.1	11.00
H-1 Little North Fork Clearwater River	678.6	23.00
Minor tributaries and immediate drainage -	1,306.2	43.66
Totals	6,243.3	196.78

2. Outlet - A-1 Clearwater River 6,319.6 161.71

C. Precipitation:

1. Year of sampling: 64.9 cm.
2. Mean annual: 66.2 cm.

III. LAKE WATER QUALITY SUMMARY

Dworshak Reservoir was sampled three times during the open-water season of 1975 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, depth-integrated samples were collected from each station for chlorophyll a analysis and phytoplankton identification and enumeration. During the first and last visits, 18.9-liter depth-integrated samples were composited for algal assays. The maximum depth sampled at all lake stations was 64.0 meters (the maximum line depth on the helicopter sampling probe). For a more detailed explanation of NES methods, see NES Working Paper No. 175.

The results obtained are presented in full in Appendix C and are summarized in III-A for waters at the surface and at the maximum depth for each site. Results of the phytoplankton counts and chlorophyll a determinations are included in III-B. Results of the limiting nutrient study are presented in III-C.

DWORSHAK RESERVOIR
STOPET CODE 1604

PHYSICAL AND CHEMICAL CHARACTERISTICS

PARAMETER	(4/ 7/75) S*** = 5 N*	RANGE	MEDIAN	MAX DEPTH RANGE (METERS)	(7/23/75) S*** = 5 N*	RANGE	MEDIAN	MAX DEPTH RANGE (METERS)	(9/11/75) S*** = 5 N*	RANGE	MEDIAN	MAX DEPTH RANGE (METERS)
TEMPERATURE (DEG CENT)												
0.-1.5 M DEPTH	8	2.7- 4.5	4.0	0.0- 1.5	10	21.4- 24.2	22.6	0.0- 1.5	10	15.4- 16.6	16.0	0.0- 1.5
MAX DEPTH**	4	2.5- 4.2	3.6	33.5- 64.0	5	5.0- 5.2	5.1	53.3- 53.3	5	1.9- 2.2	2.1	64.0- 64.0
DISSOLVED OXYGEN (MG/L)												
0.-1.5 M DEPTH	9	10.6- 11.8	11.2	0.0- 1.5	10	7.8- 8.8	8.4	0.0- 1.5	10	8.2- 9.4	8.9	0.0- 1.5
MAX DEPTH**	5	8.8- 11.4	11.0	33.5- 64.0	5	9.4- 10.8	10.4	53.3- 53.3	5	9.0- 10.2	9.6	64.0- 64.0
CONDUCTIVITY (UMHOS)												
0.-1.5 M DEPTH	10	15.- 24.	23.	0.0- 1.5	10	30.- 34.	30.	0.0- 1.5	10	16.- 27.	21.	0.0- 1.5
MAX DEPTH**	5	13.- 25.	23.	33.5- 64.0	5	15.- 20.	16.	53.3- 53.3	5	1.- 9.	6.	64.0- 64.0
PH (STANDARD UNITS)												
0.-1.5 M DEPTH	10	6.7- 7.1	7.0	0.0- 1.5	10	7.3- 8.6	8.0	0.0- 1.5	10	6.6- 7.2	6.7	0.0- 1.5
MAX DEPTH**	5	6.7- 7.0	6.8	33.5- 64.0	5	6.9- 8.4	7.1	53.3- 53.3	5	6.4- 6.6	6.6	64.0- 64.0
TOTAL ALKALINITY (MG/L)												
0.-1.5 M DEPTH	10	12.- 22.	19.	0.0- 1.5	10	10.- 28.	16.	0.0- 1.5	10	10.- 30.	15.	0.0- 1.5
MAX DEPTH**	5	17.- 23.	17.	33.5- 64.0	5	12.- 29.	17.	53.3- 53.3	5	14.- 27.	21.	64.0- 64.0
TOTAL P (MG/L)												
0.-1.5 M DEPTH	10	0.013-0.028	0.016	0.0- 1.5	10	0.009-0.014	0.010	0.0- 1.5	10	0.009-0.016	0.010	0.0- 1.5
MAX DEPTH**	5	0.015-0.034	0.018	33.5- 64.0	5	0.007-0.010	0.008	53.3- 53.3	5	0.010-0.014	0.011	64.0- 64.0
DISSOLVED ORTHO P (MG/L)												
0.-1.5 M DEPTH	10	0.004-0.013	0.009	0.0- 1.5	10	0.004-0.017	0.011	0.0- 1.5	10	0.002-0.004	0.003	0.0- 1.5
MAX DEPTH**	5	0.006-0.012	0.007	33.5- 64.0	5	0.013-0.014	0.013	53.3- 53.3	5	0.005-0.008	0.006	64.0- 64.0
NO2+NO3 (MG/L)												
0.-1.5 M DEPTH	10	0.050-0.080	0.070	0.0- 1.5	10	0.020-0.030	0.020	0.0- 1.5	10	0.020-0.020	0.020	0.0- 1.5
MAX DEPTH**	5	0.060-0.110	0.070	33.5- 64.0	5	0.060-0.090	0.070	53.3- 53.3	5	0.040-0.080	0.060	64.0- 64.0
AMMONIA (MG/L)												
0.-1.5 M DEPTH	10	0.020-0.030	0.020	0.0- 1.5	10	0.020-0.030	0.020	0.0- 1.5	10	0.020-0.020	0.020	0.0- 1.5
MAX DEPTH**	5	0.020-0.030	0.020	33.5- 64.0	5	0.020-0.020	0.020	53.3- 53.3	5	0.020-0.030	0.020	64.0- 64.0
KJELDAHL N (MG/L)												
0.-1.5 M DEPTH	10	0.200-0.400	0.200	0.0- 1.5	10	0.200-0.200	0.200	0.0- 1.5	10	0.200-0.300	0.200	0.0- 1.5
MAX DEPTH**	5	0.200-0.200	0.200	33.5- 64.0	5	0.200-0.200	0.200	53.3- 53.3	5	0.200-0.200	0.200	64.0- 64.0
SECCHI DISC (METERS)												
	5	1.7- 2.3	1.8		5	2.1- 3.9	3.0		5	1.8- 3.0	2.4	

* N = NO. OF SAMPLES
** MAXIMUM DEPTH SAMPLED AT EACH SITE
*** S = NO. OF SITES SAMPLED ON THIS DATE

B. Biological Characteristics:

1. Phytoplankton -

Sampling Date	Dominant Genera	Algal Unit per ml
04/07/75	1. Melosira	1,036
	2. Chroomonas	192
	3. Cryptomonas	154
	Other genera	---
	Total,	1,382
07/23/75	1. Mallomonas	286
	2. Oocystis	239
	3. Ankistrodesmus	95
	4. Melosira	48
	Other genera	---
	Total	668
09/11/75	1. Coelosphaerium	579
	2. Melosira	241
	3. Aphanizomenon	96
	4. Ankistrodesmus	48
	5. Asterionella	48
	Other genera	97
	Total	1,109

2. Chlorophyll *a* -

Sampling Date	Station Number	Chlorophyll *a* (µg/l)
04/07/75	01	2.2
	02	0.9
	03	1.7
	04	0.6
	05	0.5
07/23/75	01	6.7
	02	4.4
	03	3.0
	04	1.3
	05	3.0
09/11/75	01	2.8
	02	2.8
	03	3.5
	04	1.0
	05	1.9

C. Limiting Nutrient Study:

1. Autoclaved, filtered, and nutrient spiked -

a. 04/07/75 Stations 01-03

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc. (mg/l)	Maximum Yield (mg/l-dry wt.)
Control	0.008	0.104	0.9
0.05 P	0.058	0.104	3.9
0.05 P + 1.0 N	0.058	1.104	18.9
1.00 N	0.008	1.104	0.6

Stations 04 and 05

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc. (mg/l)	Maximum Yield (mg/l-dry wt.)
Control	0.008	0.072	0.2
0.05 P	0.058	0.072	2.4
0.05 P + 1.0 N	0.058	1.072	18.9
1.00 N	0.008	1.072	0.2

b. 09/11/75 Stations 01-03

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc. (mg/l)	Maximum Yield (mg/l-dry wt.)
Control	0.005	0.050	0.3
0.05 P	0.055	0.050	4.4
0.05 P + 1.0 N	0.055	1.050	18.9
1.00 N	0.005	1.050	0.3

Stations 04 and 05

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc. (mg/l)	Maximum Yield (mg/l-dry wt.)
Control	0.005	0.055	0.4
0.05 P	0.055	0.055	4.0
0.05 P + 1.0 N	0.055	1.055	18.6
1.00 N	0.005	1.055	0.4

2. Discussion -

The control yield of the assay alga, Selenastrum capricornutum, indicate that the potential primary productivity in Dworshak Reservoir was low to moderate at the times assay samples were collected (04/07/75, 09/11/75). In all assays, a significant increase in yield occurred when phosphorus was added alone and in combination with nitrogen indicating phosphorus limitation. The addition of only nitrogen resulted in a yield which was not significantly greater than that of the control.

The mean inorganic nitrogen to orthophosphorus ratios (N/P) in the lake data were less than 12/1 on all sampling occasions, suggesting nitrogen limitation (a mean N/P ratio of 14/1 or greater generally reflects phosphorus limitation).

IV. NUTRIENT LOADINGS
(See Appendix D for data)

For the determination of nutrient loadings, the Idaho 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 June when two samples were collected. Sampling was begun in October 1974, and was completed in September 1975.

Through an interagency agreement, stream flow estimates for the year of sampling and a "normalized" or average year were provided by the Idaho 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 the U.S. Geological Survey computer program for calculating stream loadings. Nutrient loads indicated for tributaries are those measured minus known point source loads, if any.

Nutrient loadings for unsampled "minor tributaries and immediate drainage" ("ZZ" of USGS) were estimated by using the mean annual nutrient loads, in $kg/km^2/yr$, in North Fork Clearwater River, Breakfast Creek and Little North Fork Clearwater River at Stations A-2, G-1 and H-1 and multiplying the means by the ZZ area in km^2.

Nutrient loads for the Headquarters and Elk River wastewater treatment plants were estimated at 1.134 kg P and 3.401 kg N/capita/year.

A. Waste Sources:

1. Known municipal -

Name	Pop.* Served	Treatment*	Mean Flow ($m^3/d \times 10^3$)	Receiving Water
Headquarters	250	Stabilization Pond	0.095**	Reeds Creek
Elk River	250	Stabilization Pond	0.095**	Elk Creek

2. Known industrial - None

*U.S. EPA, 1971.
**Estimated at 0.3785 m^3/capita/day.

B. Annual Total Phosphorus Loading - Average Year:

1. Inputs -

Source	kg P/yr	% of total
a. Tributaries (nonpoint load) -		
A-2 North Fork Clearwater River	61,540	53.4
B-1 Elk Creek	6,505	5.6
F-1 Reeds Creek	5,405	4.7
G-1 Breakfast Creek	5,735	5.0
H-1 Little North Fork Clearwater River	12,010	10.4
b. Minor tributaries and immediate drainage (nonpoint load) -	22,205	19.3
c. Known municipal STP's -		
Headquarters	285	0.2
Elk River	285	0.2
d. Septic tanks - None known		
e. Known industrial - None		
f. Direct precipitation* -	1,345	1.2
Totals	115,315	100.0%

2. Output - A-1 Clearwater River 84,025

3. Net annual P accumulation - 31,290

*Estimated (See NES Working Paper No. 175).

C. Annual Total Nitrogen Loading - Average Year:

1. Inputs -

Source	kg N/yr	% of total
a. Tributaries (nonpoint load) -		
A-2 North Fork Clearwater River	1,880,085	57.9
B-1 Elk Creek	55,420	1.7
F-1 Reeds Creek	42,320	1.3
G-1 Breakfast Creek	190,205	5.9
H-1 Little North Fork Clearwater Creek	313,375	9.6
b. Minor tributaries and immediate drainage (nonpoint load) -	681,835	21.0
c. Known municipal STP's -		
Headquarters	850	<0.1
Elk River	850	<0.1
d. Septic tanks - None known		
e. Known industrial - None		
f. Direct precipitation* -	83,010	2.6
Totals	3,247,950	100.0%

2. Outputs - A-1 Clearwater River 1,892,860

3. Net annual N accumulation - 1,355,090

*Estimated (See NES Working Paper No. 175).

D. Mean Annual Nonpoint Nutrient Export by Subdrainage Area:

Tributary	kg P/km^2/yr	kg N/km^2/yr
North Fork Clearwater River	17	534
Elk Creek	27	230
Reeds Creek	33	262
Breakfast Creek	17	569
Little North Fork Clearwater River	18	462

E. Mean Nutrient Concentrations in Ungaged Streams:

Tributary	Mean Total P (mg/l)	Mean Total N (mg/l)
C-1 Cranberry Creek	0.031	0.643
D-1 Swamp Creek	0.029	0.532
E-1 Weitas Creek	0.033	0.393
J-1 Isabella Creek	0.013	0.516

F. Yearly Loadings:

In the following table, the existing phosphorus loading is compared to the relationship proposed by Vollenweider (1975). Essentially, his "eutrophic" loading is that at which the receiving waters would become eutrophic or remain eutrophic; his "oligotrophic" loading is that which would result in the receiving water remaining oligotrophic or becoming oligotrophic if morphometry permitted. A "mesotrophic" loading would be considered one between "eutrophic" and "oligotrophic."

Note that Vollenweider's model may not be applicable to water bodies with very short retention times or in which light penetration is severely restricted from high concentrations of suspended solids in the surface waters.

	Total Yearly Phosphorus Loading ($g/m^2/yr$)
Estimated loading for Dworshak Reservoir	1.50
Vollenweider's "eutrophic" loading	1.56
Vollenweider's "oligotrophic" loading	0.78

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

TRIBUTARY FLOW DATA

TRIBUTARY FLOW INFORMATION FOR IDAHO 08/23/76

LAKE CODE 1604 DWORSHAK RESERVOIR

TOTAL DRAINAGE AREA OF LAKE(SQ KM) 6319.6

TRIBUTARY	SUB-DRAINAGE AREA(SQ KM)	NORMALIZED FLOWS(CMS) JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
1604A1	6319.6	85.80	96.28	143.00	353.39	516.22	324.79	100.24	44.17	38.51	52.67	83.25	100.81	161.71
1604A2	3522.4	62.58	79.00	96.56	150.93	362.46	270.43	76.74	30.58	30.30	36.25	43.89	42.76	106.92
1604B1	240.4	4.28	5.38	6.60	10.31	24.72	18.46	5.24	2.10	2.07	2.46	3.00	2.92	7.30
1604F1	161.6	2.86	3.62	4.42	6.91	16.62	12.40	3.51	1.39	1.39	1.67	2.01	1.95	4.90
1604G1	334.1	6.09	7.08	12.49	17.47	39.64	24.04	7.87	3.06	2.69	3.00	3.85	4.45	11.00
1604H1	678.6	10.02	13.22	20.33	29.17	84.95	65.70	19.03	6.63	5.41	5.83	7.42	7.82	23.00
1604Z7	1383.1	23.56	29.73	41.34	62.30	152.91	110.44	32.28	12.40	11.58	13.42	16.54	16.93	43.66

SUMMARY

TOTAL DRAINAGE AREA OF LAKE = 6319.6
SUM OF SUB-DRAINAGE AREAS = 6320.1
TOTAL FLOW IN = 2359.44
TOTAL FLOW OUT = 1939.14

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
1604A1	10	74	74.190	19	63.430				
	11	74	155.743	17	207.279				
	12	74	100.242	26	60.032				
	1	75	140.735	27	239.277				
	2	75	367.836	19	431.265				
	3	75	312.618	20	287.133				
	4	75	108.170	15	155.743				
	5	75	156.875						
	6	75	230.499	15	76.455	29	586.159		
	7	75	137.054	14	107.604				
	8	75	96.730	17	146.681				
	9	75	211.810	15	252.020				
1604A2	10	74	22.172	20	21.294				
	11	74	25.882	17	22.653				
	12	74	22.370	23	24.013				
	1	75	36.161	27	34.263				
	2	75	26.929	19	27.184				
	3	75	45.024						
	4	75	76.739	12	60.881				
	5	75	299.875						
	6	75	406.063	24	334.139				
	7	75	139.715	19	90.331				
	8	75	48.507	17	37.945				
	9	75	31.885	13	30.582				

TRIBUTARY FLOW INFORMATION FOR IDAHO 08/23/76

LAKE CODE 1604 DWORSHAK RESERVOIR

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
1604B1	10	74	1.501	19	1.444				
	11	74	1.756	17	1.557				
	12	74	1.529	26	1.501				
	1	75	2.464	27	2.350				
	2	75	1.841	19	1.869				
	3	75	3.058	20	3.228				
	4	75	5.239	12	4.163				
	5	75	20.445						
	6	75	27.694	16	28.883	28	17.811		
	7	75	9.543	19	6.173				
	8	75	3.313	16	2.520				
	9	75	2.180	13	2.095				
1604F1	10	74	6.428	19	6.145				
	11	74	7.504	16	7.164				
	12	74	6.485	26	6.371				
	1	75	10.477	27	9.939				
	2	75	7.815	19	7.872				
	3	75	13.026	20	13.705				
	4	75	22.229	12	17.641				
	5	75	86.933						
	6	75	117.515	15	127.992	28	75.606		
	7	75	40.493	19	26.165				
	8	75	14.045	16	10.760				
	9	75	9.231	13	8.863				
1604G1	10	74	2.322	19	2.209				
	11	74	2.690	16	2.577				
	12	74	2.322	26	2.294				
	1	75	3.794	27	3.596				
	2	75	2.803	19	2.832				
	3	75	4.729	20	4.955				
	4	75	8.099	12	6.400				
	5	75	31.998						
	6	75	43.608	15	47.289	28	27.835		
	7	75	14.810	19	9.543				
	8	75	5.097	16	3.879				
	9	75	3.341	13	3.200				
1604H1	10	74	5.040	19	4.814				
	11	74	5.918	16	5.635				
	12	74	5.069	26	4.984				
	1	75	8.353	27	7.900				
	2	75	6.145	19	6.230				
	3	75	10.506	20	11.044				
	4	75	18.293	12	14.385				
	5	75	75.606						
	6	75	103.640	15	112.984	28	65.412		
	7	75	34.263	19	21.691				
	8	75	11.327	16	8.580				
	9	75	7.334	13	7.023				

APPENDIX C

PHYSICAL AND CHEMICAL DATA

STORET RETRIEVAL DATE 76/08/25
NATL EUTROPHICATION SURVEY
EPA-LAS VEGAS

160401
46 31 06.0 116 17 25.0 3
DWORSHAK RESERVOIR
16035 IDAHO

130891

11EPALES 2111202
0999 FEET DEPTH CLASS 00

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
75/04/07	12 00	0000		11.2	90	22	7.10	22	0.020K	0.200	0.050	0.006
	12 00	0005		11.2		23	7.00	21	0.020K	0.200K	0.050	0.011
	12 00	0015		11.0		24	7.00	22	0.020K	0.200K	0.060	0.015
	12 00	0025		10.6		23	7.10	22	0.020K	0.200K	0.060	0.011
	12 00	0050		10.2		23	6.80	22	0.020	0.200K	0.070	0.013
	12 00	0100		8.6		24	7.00	18	0.020	0.200K	0.090	0.009
	12 00	0150		7.6		25	6.90	18	0.020K	0.200	0.110	0.017
	12 00	0210		8.8		25	7.00	17	0.020	0.200K	0.110	0.012
75/07/23	16 40	0000	24.2	8.0	84	30	8.65	16	0.020	0.200K	0.020	0.012K
	16 40	0005	22.9	8.4		32	8.40	15	0.020	0.200K	0.020K	0.013K
	16 40	0020	13.2	9.8		23	7.70	14	0.020	0.200K	0.020K	0.012K
	16 40	0030	11.3	9.6		20	7.50	16	0.020K	0.200K	0.020K	0.010K
	16 40	0060	7.3	10.4		18	7.30	15	0.040	0.200K	0.030	0.012K
	16 40	0100	6.1	10.6		17	7.20	15	0.020	0.200K	0.070	0.012K
	16 40	0140	5.8	10.8		20	7.30	17	0.020	0.200K	0.070	0.013K
	16 40	0175	5.2	9.4		18	8.45	17	0.020K	0.200K	0.060	0.014K
75/09/11	14 10	0000	16.6	9.0	72	23	7.00	24	0.020K	0.200	0.020K	0.004
	14 10	0005	16.6	8.8		16	6.95	20	0.020K	0.300	0.020K	0.003
	14 10	0025	16.3	9.0		12	7.00	23	0.030	0.300	0.020K	0.005
	14 10	0034	10.7	8.8		6	6.65	17	0.020K	0.200	0.020K	0.002
	14 10	0060	5.1	10.0		1	6.55	22	0.020K	0.200	0.060	0.005
	14 10	0110	4.1	10.4		3	6.40	17	0.020K	0.200	0.060	0.005
	14 10	0160	3.1	10.8		5	6.50	22	0.020K	0.200	0.060	0.005
	14 10	0210	2.2	9.8		9	6.60	27	0.020K	0.200K	0.060	0.007

K VALUE KNOWN TO BE LESS
THAN INDICATED

STORET RETRIEVAL DATE 76/08/25
NATL EUTROPHICATION SURVEY
EPA-LAS VEGAS

160401
46 31 06.0 116 17 25.0 3
DWORSHAK RESERVOIR
16035 IDAHO
130891

11EPALES 2111202
0999 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L	00031 INCDT LT PEMNING PERCENT
75/04/07	12 00	0000	0.028	2.2	
	12 00	0005	0.018		
	12 00	0015	0.017		
	12 00	0025	0.017		
	12 00	0050	0.016		
	12 00	0100	0.018		
	12 00	0150	0.018		
	12 00	0210	0.018		
75/07/23	16 40	0000	0.011	6.7	
	16 40	0005	0.013		
	16 40	0020	0.009		
	16 40	0030	0.007		
	16 40	0060	0.007		
	16 40	0100	0.007		
	16 40	0140	0.007		
	16 40	0175	0.010		
75/09/11	14 10	0000	0.016	2.8	
	14 10	0005	0.011		
	14 10	0025	0.010		
	14 10	0034	0.007		
	14 10	0060	0.007		
	14 10	0110	0.008		
	14 10	0160	0.010		
	14 10	0210	0.010		

STORET RETRIEVAL DATE 76/08/25
NATL EUTROPHICATION SURVEY
EPA-LAS VEGAS

160402
46 35 50.0 116 17 18.0 3
DWORSHAK RESERVOIR
16035 IDAHO

130891

11EPALES 2111202
0999 FEET DEPTH CLASS 00

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
75/04/07	12	45 0000	2.7	11.2	78	24	7.10	19	0.030	0.400	0.080	0.013
	12	45 0005	3.2	11.4		24	7.00	18	0.020K	0.200K	0.070	0.013
	12	45 0015	3.2	11.6		24	7.10	18	0.020K	0.200K	0.070	0.008
	12	45 0025	3.0	11.4		24	7.10	18	0.020	0.100	0.070	0.011
	12	45 0050	2.9	11.2		24	6.80	18	0.020	0.200K	0.070	0.015K
	12	45 0100	2.8	11.0		23	7.10	19	0.020K	0.200K	0.070	0.012
	12	45 0150	2.5	11.2		24	7.00	20	0.020	0.200K	0.070	0.015
	12	45 0210	2.5	11.2		25	7.00	21	0.020K	0.200	0.070	0.006
75/07/23	14	15 0000	24.0	8.2	114	32	7.95	15	0.030	0.200K	0.020	0.017K
	14	15 0005	21.6	8.8		30	8.00	15	0.030	0.200K	0.020K	0.013K
	14	15 0025	17.8	10.0		29	7.95	16	0.020	0.200K	0.020K	0.012K
	14	15 0030	11.6	9.6		21	7.55	15	0.020	0.200K	0.020K	0.011K
	14	15 0060	7.2	11.4		19	7.50	15	0.020	0.200K	0.040	0.015K
	14	15 0100	6.4	11.0		19	7.40	15	0.020	0.200K	0.070	0.013K
	14	15 0140	5.7	11.0		15	7.40	14	0.020K	0.200K	0.080	0.013K
	14	15 0175	5.0	10.0		16	7.15	15	0.020K	0.200K	0.070	0.013K
75/09/11	11	45 0000	16.1	9.4	120	19	6.60	10K	0.020K	0.200K	0.020K	0.004
	11	45 0005	16.1	8.6		17	6.60	10K	0.020K	0.200K	0.020K	0.003
	11	45 0020	15.6	8.6		10	6.60	10K	0.020K	0.200K	0.020K	0.003
	11	45 0030	11.6	9.0		5	6.50	10K	0.020K	0.200K	0.020K	0.002
	11	45 0060	5.7	10.2		1	6.50	10K	0.020K	0.200K	0.020K	0.004
	11	45 0110	4.0	10.2		1	6.50	10K	0.020K	0.200K	0.070	0.005
	11	45 0160	3.1	10.4		2	6.50	19	0.020K	0.200	0.080	0.011
	11	45 0210	1.9	9.4		7	6.60	19	0.020K	0.200	0.040	0.006

K VALUE KNOWN TO BE LESS
THAN INDICATED

STORET RETRIEVAL DATE 76/08/25
NATL EUTROPHICATION SURVEY
EPA-LAS VEGAS

160402
46 35 50.0 116 17 18.0 3
DWORSHAK RESERVOIR
16035 IDAHO
130891

11EPALES 2111202
0999 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L	00031 INCDT LT REMNING PERCENT
75/04/07	12 45	0000	0.017	0.9	
	12 45	0005	0.013		
	12 45	0015	0.016		
	12 45	0025	0.013		
	12 45	0050	0.012		
	12 45	0100	0.013		
	12 45	0150	0.015		
	12 45	0210	0.015		
75/07/23	14 15	0000	0.012	4.4	
	14 15	0005	0.010		
	14 15	0025	0.014		
	14 15	0030	0.007		
	14 15	0060	0.006		
	14 15	0100	0.006		
	14 15	0140	0.007		
	14 15	0175	0.010		
75/09/11	11 45	0000	0.014	2.8	
	11 45	0005	0.010		
	11 45	0020	0.012		
	11 45	0030	0.008		
	11 45	0060	0.007		
	11 45	0110	0.009		
	11 45	0160	0.013		
	11 45	0210	0.010		

STORET RETRIEVAL DATE 76/08/25
NATL EUTROPHICATION SURVEY
EPA-LAS VEGAS

160403
46 38 10.0 116 14 03.0 3
DWORSHAK RESERVOIR
16035 IDAHO

130891

11EPALES 2111202
0125 FEET DEPTH CLASS 00

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
75/04/07	13	25 0000	3.8	11.8	72	24	7.10	21	0.020K	0.400	0.060	0.004
	13	25 0005	3.7			24	7.00	20	0.020	0.200	0.060	0.010
	13	25 0015	3.7	11.4		24	7.20	22	0.020K	0.200	0.060	0.010
	13	25 0025	3.7	11.6		24	7.00	21	0.020K	0.200K	0.060	0.011
	13	25 0050	3.4	11.4		24	7.00	20	0.020	0.200K	0.070	0.017K
	13	25 0110	3.1	11.4		23	6.80	17	0.020	0.200K	0.070	0.007
75/07/23	15	40 0000	22.4	8.6	118	30	7.75	10	0.030	0.200K	0.020K	0.011K
	15	40 0005	21.4	8.6		30	7.90	12	0.020	0.200K	0.020K	0.010K
	15	40 0015	16.5	10.0		23	7.50	10	0.020K	0.200K	0.020K	0.006K
	15	40 0030	11.6	10.2		21	7.10	10K	0.020	0.200K	0.040	0.010K
	15	40 0070	7.1	10.8		18	6.95	10K	0.020	0.200K	0.050	0.011K
	15	40 0120	6.1	10.6		19	6.90	11	0.020	0.200K	0.060	0.012K
	15	40 0175	5.1	10.4		20	6.95	12	0.020	0.200K	0.060	0.014K
75/09/11	11	15 0000	15.9	9.2	96	20	6.70	14	0.020K	0.200K	0.020K	0.002
	11	15 0005	15.6	9.0		16	7.20	13	0.020K	0.200K	0.020K	0.002
	11	15 0020	15.3	8.8		14	7.40	14	0.020K	0.200	0.020K	0.004
	11	15 0030	11.5	7.6		6	7.10	12	0.020K	0.200K	0.020	0.003
	11	15 0060	5.2	10.0		1	6.90	12	0.020K	0.200K	0.060	0.004
	11	15 0110	4.1	10.2		2	6.70	13	0.020K	0.200K	0.060	0.005
	11	15 0160	3.2	10.2		3	6.75	21	0.020K	0.300	0.060	0.007
	11	15 0210	2.1	9.0		6	6.55	21	0.020K	0.200K	0.060	0.008

K VALUE KNOWN TO BE LESS
THAN INDICATED

STORET RETRIEVAL DATE 76/08/25
NATL EUTROPHICATION SURVEY
EPA-LAS VEGAS

160403
46 38 10.0 116 14 03.0 3
DWORSHAK RESERVOIR
16035 IDAHO

130891

11EPALES 2111202
0125 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L	00031 INCDT LT REMNING PERCENT
75/04/07	13 25	0000	0.023	1.7	
	13 25	0005	0.014		
	13 25	0015	0.014		
	13 25	0025	0.013		
	13 25	0050	0.015		
	13 25	0110	0.034		
75/07/23	15 40	0000	0.009	3.0	
	15 40	0005	0.010		
	15 40	0015	0.009		
	15 40	0030	0.005		
	15 40	0070	0.006		
	15 40	0120	0.006		
	15 40	0175	0.008		
75/09/11	11 15	0000	0.011	3.5	
	11 15	0005	0.010		
	11 15	0020	0.012		
	11 15	0030	0.007		
	11 15	0060	0.009		
	11 15	0110	0.009		
	11 15	0160	0.013		
	11 15	0210	0.014		

STORET RETRIEVAL DATE 76/08/25
NATL EUTROPHICATION SURVEY
EPA-LAS VEGAS

160404
46 38 35.0 116 01 35.0 3
DWORSHAK RESERVOIR
16035 IDAHO

130891

11EPALES 2111202
0999 FEET DEPTH CLASS 00

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
75/04/07	12 20	0000	4.3	11.0	66	15	6.90	13	0.020	0.200	0.080	0.008
	12 20	0005	4.2	10.6		17	6.70	12	0.030	0.200K	0.070	0.007
	12 20	0015	4.2	11.0		17	6.60	14	0.020	0.200K	0.060	0.010
	12 20	0065	4.1	11.0		17	6.50	13	0.020	0.200K	0.060	0.010
	12 20	0120	4.1	10.6		17	6.70	14	0.020	0.200K	0.060	0.004
	12 20	0170	4.1	11.0		20	6.70	17	0.030	0.200K	0.060	0.008
75/07/23	14 30	0000	22.9	8.6	154	30	7.40	16	0.020	0.200K	0.020K	0.008
	14 30	0005	21.7	8.4		30	7.35	17	0.020K	0.200K	0.020K	0.004
	14 30	0015	15.7	8.2		24	7.60	15	0.020K	0.200	0.020K	0.009
	14 30	0030	11.6	9.4		19	7.40	25	0.030	0.200K	0.020K	0.018K
	14 30	0060	7.3	10.6		17	7.20	22	0.020	0.200K	0.060	0.013K
	14 30	0100	6.5	8.2		16	7.10	23	0.030	0.200K	0.060	0.014K
	14 30	0140	5.8	10.8		15	7.10	23	0.020K	0.200K	0.080	0.013K
	14 30	0175	5.2	10.8		16	7.05	25	0.020K	0.200K	0.080	0.013K
75/09/11	10 10	0000	16.0	8.2	120	27	6.90	25	0.020K	0.200K	0.020K	0.004
	10 10	0005	16.0	8.4		22	6.70	30	0.020K	0.200K	0.020K	0.003
	10 10	0033	11.0	8.2		13	6.70	20	0.020K	0.200K	0.020K	0.003
	10 10	0050	7.7	9.2		1	6.65	22	0.020K	0.200K	0.030	0.004
	10 10	0090	4.3	10.4		1K	6.60	19	0.020K	0.200K	0.060	0.004
	10 10	0130	3.7	10.6		1	6.50	25	0.020K	0.200K	0.080	0.006
	10 10	0170	2.9	10.2		3	6.50	22	0.020K	0.200K	0.080	0.006
	10 10	0210	2.1	9.6		6	6.40	23	0.020K	0.200K	0.080	0.006

K VALUE KNOWN TO BE LESS
THAN INDICATED

STORET RETRIEVAL DATE 76/08/25
NATL EUTROPHICATION SURVEY
EPA-LAS VEGAS

160404
46 38 35.0 116 01 35.0 3
DWORSHAK RESERVOIR
16035 IDAHO
130891

11EPALES 2111202
0999 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L	00031 INCDT LT REMNING PERCENT
75/04/07	12 20	0000	0.016	0.6	
	12 20	0005	0.015		
	12 20	0015	0.014		
	12 20	0065	0.016		
	12 20	0120	0.021		
	12 20	0170	0.020		
75/07/23	14 30	0000	0.014	1.3	
	14 30	0005	0.012		
	14 30	0015	0.013		
	14 30	0030	0.008		
	14 30	0060	0.007		
	14 30	0100	0.006		
	14 30	0140	0.007		
	14 30	0175	0.007		
75/09/11	10 10	0000	0.009	1.0	
	10 10	0005	0.009		
	10 10	0033	0.013		
	10 10	0050	0.007		
	10 10	0090	0.008		
	10 10	0130	0.008		
	10 10	0170	0.011		
	10 10	0210	0.011		

STORET RETRIEVAL DATE 76/08/25
NATL EUTROPHICATION SURVEY
EPA-LAS VEGAS

160405
46 36 42.0 116 08 30.0 3
DWORSHAK RESERVOIR
16035 IDAHO

130891

11EPALES 2111202
0999 FEET DEPTH CLASS 00

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
75/04/07	13 00	0000	4.5	11.0	66	17	6.90	17	0.020	0.200K	0.070	0.011
	13 00	0005	4.3	11.8		16	6.80	16	0.020	0.200K	0.070	0.006
	13 00	0015	4.3	11.2		16	6.70	18	0.020	0.200K	0.070	0.005
	13 00	0065	4.2	11.2		16	6.60	18	0.030	0.200K	0.080	0.005
	13 00	0120	4.1	11.0		15	6.50	22	0.030	0.200K	0.070	0.004
	13 00	0170	4.2	11.0		13	6.70	23	0.030	0.200K	0.070	0.007
75/07/23	15 00	0000	22.8	8.2	126	34	8.05	26	0.020	0.200K	0.030	0.011K
	15 00	0005	22.5	7.8		30	8.00	28	0.020K	0.200K	0.020K	0.010K
	15 00	0015	17.5	9.0		25	7.40	26	0.020K	0.200K	0.020K	0.012K
	15 00	0030	11.5	9.6		20	7.20	26	0.040	0.200K	0.030	0.013K
	15 00	0060	7.1	10.8		18	7.10	25	0.020K	0.200K	0.040	0.013K
	15 00	0100	6.3	11.0		18	7.20	28	0.020K	0.200K	0.080	0.012K
	15 00	0140	5.2	10.8		18	7.20	28	0.020	0.200K	0.090	0.014K
	15 00	0175	5.1	10.6		15	7.20	29	0.020K	0.200K	0.090	0.013K
75/09/11	10 40	0000	15.4	9.0	96	22	6.60	15	0.020K	0.200K	0.020K	0.003
	10 40	0005	15.8	8.3		21	6.65	13	0.020K	0.200K	0.020K	0.002
	10 40	0025	14.8	8.6		17	6.60	14	0.020K	0.200K	0.020K	0.003
	10 40	0032	11.9	8.0		8	6.60	10K	0.020K	0.200K	0.020K	0.002
	10 40	0060	5.5	10.0		1	6.60	15	0.020K	0.200K	0.040	0.003
	10 40	0110	4.0	10.4		1	6.60	18	0.020K	0.200K	0.080	0.005
	10 40	0160	3.2	10.2		1	6.70	18	0.020K	0.200K	0.080	0.005
	10 40	0210	2.1	10.2		1K	6.60	14	0.030	0.200K	0.070	0.005

K VALUE KNOWN TO BE LESS
THAN INDICATED

STORET RETRIEVAL DATE 76/08/25
NATL EUTROPHICATION SURVEY
EPA-LAS VEGAS

160405
46 36 42.0 116 08 30.0 3
DWORSHAK RESERVOIR
16035 IDAHO
130891

11EPALES 2111202
0999 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L	00031 INCDT LT REMNING PERCENT
75/04/07	13 00	0000	0.017	0.5	
	13 00	0005	0.016		
	13 00	0015	0.015		
	13 00	0065	0.015		
	13 00	0120	0.017		
	13 00	0170	0.018		
75/07/23	15 00	0000	0.009	3.0	
	15 00	0005	0.009		
	15 00	0015	0.011		
	15 00	0030	0.005		
	15 00	0060	0.005		
	15 00	0100	0.006		
	15 00	0140	0.006		
	15 00	0175	0.007		
75/09/11	10 40	0000	0.011	1.9	
	10 40	0005	0.010		
	10 40	0025	0.010		
	10 40	0032	0.009		
	10 40	0060	0.008		
	10 40	0110	0.008		
	10 40	0160	0.009		
	10 40	0210	0.011		

APPENDIX D

TRIBUTARY AND WASTEWATER TREATMENT PLANT DATA

STORET RETRIEVAL DATE 76/08/25
NATL EUTROPHICATION SURVEY
EPA- LAS VEGAS

1604A1
46 30 50.0 116 17 45.0 4
CLEARWATER RIVER
16 15 AHSAHKA
O/DWORSHAK RESERVOIR 130A91
BELO DWORSHAK DAM 1.5 MI NE OF AHSAHKA
11EPALES 2111204
0000 FEET DEPTH CLASS 00

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
74/10/19	09	20	0.072	0.100K	0.025	0.005	0.010
74/11/17	17	00	0.080	0.100	0.025	0.005	0.010K
74/12/26	08	00	0.070	0.300	0.020	0.005	0.010K
75/01/27	10	00	0.088	0.100	0.016	0.016	0.016
75/02/19			0.083	0.300	0.016	0.008K	0.010K
75/04/15	10	10	0.060	0.500	0.010	0.005	0.010K
75/06/15	11	00	0.050	0.650	0.020	0.005K	0.020
75/06/29	20	00	0.045	0.550	0.030	0.010	0.020
75/07/14	10	00	0.020	0.150	0.020	0.010	0.020
75/08/17	18	30	0.015	0.450	0.015	0.005K	0.040
75/09/15	13	30	0.045	0.200	0.010	0.005	0.020

K VALUE KNOWN TO BE LESS
THAN INDICATED

STORET RETRIEVAL DATE 76/08/25
NATL EUTROPHICATION SURVEY
EPA- LAS VEGAS

1604A2
46 50 28.0 115 37 10.0 4
N FK CLEARWATER RIVER
16 7.5 SHEEP MTN
T/DWORSHAK RESERVOIR 130891
PVD RD BRDG .2 MI W OF AQUARIUS CAMPGRND
11EPALES 2111204
0000 FEET DEPTH CLASS 00

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
74/10/20	10 30		0.016	0.100K	0.010	0.005K	0.005K
74/11/17	10 45		0.016	0.100K	0.020	0.005K	0.010K
75/04/12	12 35		0.015	1.600	0.025	0.005	0.020
75/06/24	13 00		0.020	0.800	0.015	0.005	0.010
75/07/19	17 05		0.005	0.150	0.015	0.005	0.020
75/08/17	15 20		0.005	1.100	0.010	0.005K	0.030
75/09/13	16 00		0.003	0.200		0.002	0.040

K VALUE KNOWN TO BE LESS
THAN INDICATED

STORET RETRIEVAL DATE 76/08/25
NATL EUTROPHICATION SURVEY
EPA- LAS VEGAS

160481
46 42 20.0 116 11 55.0 4
ELK CREEK
16 7.5 ELK CRK FALS
T/DWORSHAK RESERVOIR 130891
JEEP TRL 2 MI NW OF ELK CRK PICNIC AREA
11EPALES 2111204
0000 FEET DEPTH CLASS 00

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
74/10/19	12	15	0.018	0.300	0.007	0.005	0.010
74/11/17	15	00	0.008	0.100K	0.015	0.010	0.010
75/06/16	16	35	0.005	0.200	0.010	0.020	0.040
75/06/28	15	45	0.005	0.200	0.005	0.010	0.020
75/07/19	13	00	0.010	0.225	0.027	0.010	0.030
75/08/16	10	30	0.005	0.400	0.030	0.005K	0.060
75/09/13	10	30	0.010	0.150	0.025	0.020	0.045

K VALUE KNOWN TO BE LESS
THAN INDICATED

STORET RETRIEVAL DATE 76/08/25
NATL EUTROPHICATION SURVEY
EPA- LAS VEGAS

1604C1
46 39 20.0 116 07 50.0 4
CRANBERRY CREEK
16 7.5 ELK CRK FALS
T/DWORSHAK RESERVOIR 130891
UNPVD RD BRDG 3 MI N OF FIVE CORNERS JCT
11EPALES 2111204
0000 FEET DEPTH CLASS 00

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
74/10/19	13 05		0.016	0.300	0.010	0.020	0.025
74/11/16	14 00		0.024	0.100K	0.015	0.025	0.025
74/12/26	09 00		0.096	1.400	0.165	0.020	0.040
75/06/16	19 10		0.005	0.500	0.020	0.015	0.030
75/06/28	11 15		0.010	0.900	0.020	0.015	0.015
75/07/19	10 45		0.010	0.250	0.030	0.010	0.040
75/08/16	13 00		0.005	0.800	0.010	0.005K	0.020
75/09/13	09 00		0.010	0.200	0.020	0.015	0.050

K VALUE KNOWN TO BE LESS
THAN INDICATED

STORET RETRIEVAL DATE 76/08/25
NATL EUTROPHICATION SURVEY
EPA- LAS VEGAS

1604D1
46 40 00.0 116 01 40.0 4
SWAMP CREEK
16 7.5 LITL GRN MTN
T/DWORSHAK RESERVOIR 130891
UNPVD RD BRDG 2.5 MI N OF BARTLETT POINT
11EPALES 2111204
0000 FEET DEPTH CLASS 00

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
74/10/19	14 00		0.016	0.600	0.010	0.025	0.025
74/11/16	12 00		0.016	0.100K	0.010	0.005	0.005
74/12/26	11 00		0.024	0.500	0.050	0.020	0.030
75/06/16	20 30		0.005	0.100	0.010	0.030	0.050
75/06/28	11 50		0.010	1.000	0.020	0.025	0.030
75/07/19	11 15		0.015	0.150	0.020	0.020	0.020
75/08/16	13 30		0.005	1.000	0.020	0.005K	0.040
75/09/13	09 35		0.002	0.300	0.025	0.015	0.030

K VALUE KNOWN TO BE LESS
THAN INDICATED

STORET RETRIEVAL DATE 76/08/25
NATL EUTROPHICATION SURVEY
EPA- LAS VEGAS

1604E1
46 44 05.0 116 01 20.0 4
WEITAS CREEK
16 7.5 LITL GRN MTN
T/DWORSHAK RESERVOIR 130891
RNK 200 FT. N UNPVD RD 3.4 M E LTTL GR MT
11EPALES 2111204
0000 FEET DEPTH CLASS 00

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
74/10/19	14	30	0.016	0.400	0.005	0.010	0.035
74/11/16	10	30	0.024	0.200	0.015	0.010	0.010
74/12/26	15	00	0.024	0.500	0.030	0.005	0.010K
75/06/15	18	15	0.005	0.200	0.010	0.010	0.020
75/06/28	14	30	0.010	0.750	0.020	0.005	0.010K
75/07/19	12	30	0.010	0.100	0.015	0.005	0.010K
75/08/16	13	00	0.005	0.700	0.015	0.005K	0.020
75/09/13	10	00	0.002	0.200	0.025	0.020	0.080

K VALUE KNOWN TO BE LESS
THAN INDICATED

STORET RETRIEVAL DATE 76/08/25
NATL EUTROPHICATION SURVEY
EPA- LAS VEGAS

1604F1
46 37 20.0 116 56 30.0 4
REEDS CREEK
16 15 HEADQUARTERS
T/DWORSHAK RESERVOIR 130891
UNPVD RD BRDG 3.2 MI W OF HWY 11 JCT
11EPALES 2111204
0000 FEET DEPTH CLASS 00

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
74/10/19	13	35	0.032	0.400	0.010	0.025	0.025
74/11/16	13	00	0.024	0.100K	0.010	0.020	0.025
74/12/26	11	30	0.016	0.800	0.025	0.020	0.020
75/06/15	21	05	0.007	0.125	0.017	0.010	0.015
75/06/28	20	15	0.005	0.450	0.015	0.025	0.025
75/07/19	18	00	0.005	0.150	0.020	0.035	0.050
75/08/16	16	20	0.005	0.250	0.005K	0.040	0.060
75/09/13	17	00	0.002	0.050	0.030	0.065	0.065

K VALUE KNOWN TO BE LESS
THAN INDICATED

STORET RETRIEVAL DATE 76/08/25
NATL EUTROPHICATION SURVEY
EPA- LAS VEGAS

1604G1
46 53 00.0 115 56 20.0 4
BREAKFAST CREEK
16 15 BOEHLS BUTTES
T/DWORSHAK RESERVOIR 130891
BNK FRM TRL .7 MI E OF FRZEOUT TRL LKOUT
11EPALES 2111204
0000 FEET DEPTH CLASS 00

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
74/10/19	16	37	0.024	0.200	0.015	0.020	0.022
74/11/16	11	00	0.016	0.100K	0.010	0.005K	0.005
74/12/26	12	00	0.008	0.500	0.015	0.015	0.020
75/06/15	17	45	0.010	0.400	0.020	0.030	0.030
75/06/28	17	50	0.040	1.050	0.025	0.010	0.010
75/07/19	14	30	0.030	0.350	0.015	0.010	0.020
75/08/16	12	00	0.005	0.400	0.010	0.005K	0.010
75/09/13	11	15	0.002	0.200	0.020	0.010	0.020

K VALUE KNOWN TO BE LESS
THAN INDICATED

STORET RETRIEVAL DATE 76/08/25
NATL EUTROPHICATION SURVEY
EPA- LAS VEGAS

1604H1
46 54 15.0 115 50 55.0 4
LTTL N FK CLRWATER RIV
16 15 BOEHLS BUTTES
T/DWORSHAK RESERVOIR 130891
TRAIL BRDG .5 MI NW OF FINNS CABIN
11EPALES 2111204
0000 FEET DEPTH CLASS 00

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
74/10/19	15	45	0.048	0.300	0.030	0.005K	0.005
74/11/16	11	00	0.056	0.100K	0.020	0.005K	0.010K
74/12/26	14	00	0.040	1.000	0.035	0.005K	0.010
75/06/15	15	30	0.005	0.650	0.015	0.015	0.050
75/06/28	19	00	0.005	0.150	0.005	0.005	0.010K
75/07/19	15	20	0.005	0.150	0.015	0.005K	0.010
75/08/16	14	00	0.005	0.450	0.005	0.020	0.020
75/09/13	12	10	0.002	0.400	0.002	0.005	0.030

K VALUE KNOWN TO BE LESS
THAN INDICATED

STORET RETRIEVAL DATE 76/08/25
NATL EUTROPHICATION SURVEY
EPA- LAS VEGAS

1604J1
46 51 00.0 115 37 47.0 4
ISABELLA CREEK
16 7.5 THOMPSON PT
T/DWORSHAK RESERVOIR 130891
TRAIL BRDG OFF PVD RD AT ISABELLA LNDING
11EPALES 2111204
0000 FEET DEPTH CLASS 00

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
74/10/20	10 15		0.040	0.100K	0.010	0.005K	0.005K
74/11/17	11 00		0.040	0.400	0.035	0.005K	0.010K
75/04/12	14 00		0.065	1.100	0.025	0.010	0.010
75/06/15	11 30		0.040	0.650	0.035	0.005K	0.010
75/06/29	13 05		0.030	0.500	0.030	0.005	0.020
75/07/19	17 00		0.015	0.100	0.015	0.005K	0.010K
75/08/16	12 30		0.025	0.550	0.010	0.005K	0.010K
75/09/13	16 10		0.045	0.050	0.002	0.002	0.010

K VALUE KNOWN TO BE LESS THAN INDICATED

APPENDIX E

PARAMETRIC RANKINGS OF LAKES SAMPLED BY NES IN 1975

STATE OF IDAHO

Mean or median values for six of the key parameters evaluated in establishing the trophic conditions of Idaho lakes sampled are presented to allow direct comparison of the ranking, by parameter, of each lake relative to the others. Median total phosphorus, median inorganic nitrogen and median dissolved orthophosphorus levels are expressed in mg/l. Chlorophyll a values are expressed in µg/l. To maintain consistent rank order with the preceding parameters, the mean Secchi disc depth, in inches, is subtracted from 500. Similarly, minimum dissolved oxygen values are subtracted from 15 to create table entries.

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
1601	AMERICAN FALLS RESERVOIR	0.105	0.080	463.800	15.379	14.700	0.035
1602	CASCADE LAKE	0.032	0.060	415.067	8.081	14.800	0.009
1603	LAKE COEUR D'ALENE	0.017	0.040	380.348	10.391	12.200	0.005
1604	DWORSHAK RESERVOIR	0.010	0.080	401.866	2.420	7.400	0.009
1605	HAUSER	0.028	0.075	366.286	11.112	14.800	0.013
1606	HAYDEN LAKE	0.010	0.040	243.500	2.787	11.800	0.003
1607	ISLAND PARK RESERVOIR	0.034	0.050	391.778	9.322	12.800	0.012
1608	LAKE LOWELL	0.070	0.070	477.111	25.389	14.600	0.015
1609	MAGIC RESERVOIR	0.062	0.130	400.750	7.322	14.700	0.020
1610	PALISADES RESERVOIR	0.024	0.080	345.428	2.067	12.800	0.007
1611	LOWER PAYETTE	0.013	0.060	234.000	4.600	9.600	0.007
1612	LOWER TWIN LAKES	0.016	0.050	370.000	2.318	13.600	0.009
1613	UPPER TWIN LAKES	0.017	0.045	369.143	4.986	8.200	0.004

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
1601	AMERICAN FALLS RESERVOIR	0 (0)	17 (1)	8 (1)	8 (1)	21 (2)	0 (0)
1602	CASCADE LAKE	33 (4)	54 (6)	17 (2)	42 (5)	4 (0)	50 (5)
1603	LAKE COEUR D'ALENE	67 (8)	96 (11)	50 (6)	25 (3)	67 (8)	83 (10)
1604	DWORSHAK RESERVOIR	96 (11)	17 (1)	25 (3)	83 (10)	100 (12)	50 (5)
1605	HAUSER	42 (5)	33 (4)	75 (9)	17 (2)	4 (0)	25 (3)
1606	HAYDEN LAKE	96 (11)	96 (11)	92 (11)	75 (9)	75 (9)	100 (12)
1607	ISLAND PARK RESERVOIR	25 (3)	71 (8)	42 (5)	33 (4)	54 (6)	33 (4)
1608	LAKE LOWELL	8 (1)	42 (5)	0 (0)	0 (0)	33 (4)	17 (2)
1609	MAGIC RESERVOIR	17 (2)	0 (0)	33 (4)	50 (6)	21 (2)	8 (1)
1610	PALISADES RESERVOIR	50 (6)	17 (1)	83 (10)	100 (12)	54 (6)	75 (9)
1611	LOWER PAYETTE	83 (10)	54 (6)	100 (12)	67 (8)	83 (10)	67 (8)
1612	LOWER TWIN LAKES	75 (9)	71 (8)	58 (7)	92 (11)	42 (5)	50 (5)
1613	UPPER TWIN LAKES	58 (7)	83 (10)	67 (8)	58 (7)	92 (11)	92 (11)