U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL EUTROPHICATION SURVEY

WORKING PAPER SERIES

REPORT

ON

TRINIDAD LAKE

HENDERSON COUNTY

TEXAS

EPA REGION VI

WORKING PAPER No. 665

CORVALLIS ENVIRONMENTAL RESEARCH LABORATORY - CORVALLIS, OREGON

and

ENVIRONMENTAL MONITORING & SUPPORT LABORATORY - LAS VEGAS, NEVADA

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REPORT
ON
TRINIDAD LAKE
HENDERSON COUNTY
TEXAS
EPA REGION VI
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WITH THE COOPERATION OF THE
TEXAS WATER QUALITY BOARD
AND THE
TEXAS NATIONAL GUARD
MARCH, 1977

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 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 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.

ACKNOWLEDGEMENT

The staff of the National Eutrophication Survey (Office of Research & Development, U. S. Environmental Protection Agency) expresses sincere appreciation to the Texas Water Quality Board for professional involvement, to the Texas National Guard for conducting the tributary sampling phase of the Survey, and to those Texas wastewater treatment plant operators who voluntarily provided effluent samples.

Hugh C. Yantis, Jr., Executive Director of the Texas Water Quality Board, and John B. Latchford, Jr., Director, and the staff of the Field Operations Division 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 Thomas Bishop, the Adjutant General of Texas, and Project Officer Colonel William L. Seals, who directed the volunteer efforts of the Texas National Guardsmen, are also gratefully acknowledged for their assistance to the Survey.

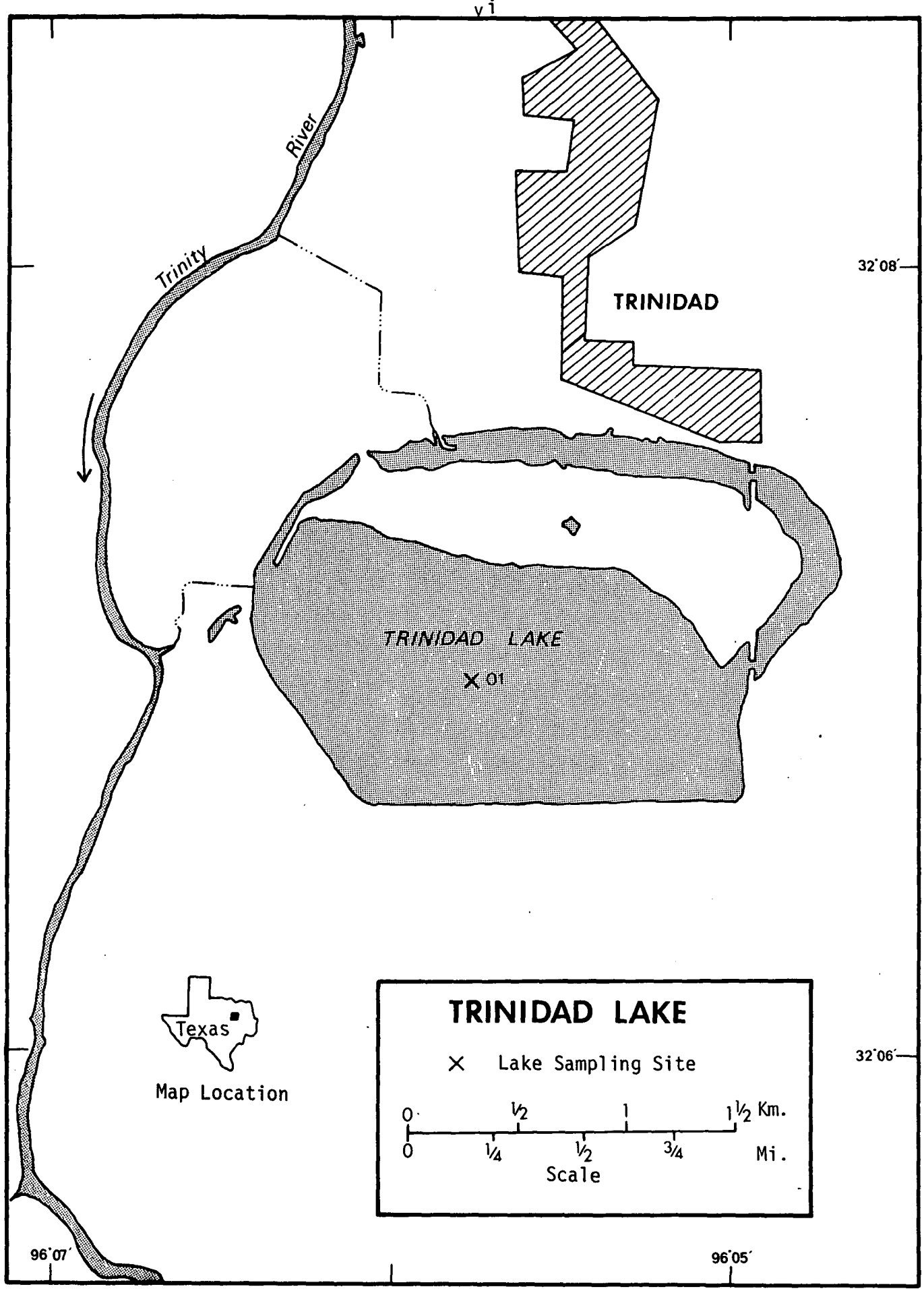
NATIONAL EUTROPHICATION SURVEY

STUDY RESERVOIRS

State of Texas

NAME	COUNTY
Amistad	Val Verde
Bastrop	Bastrop
Belton	Bell, Coryell
Braunig	Bexar
Brownwood	Brown
Buchanan	Burnet, Llano
Caddo	Harrison, Marion, TX; Caddo Parish, LA
Calaveras	Bexar
Canyon	Comal
Colorado City	Mitchell
Corpus Christi	Jim Wells, Live Oak, San Patricio
Diversion	Archer, Baylor
Eagle Mountain	Tarrant, Wise
Fort Phantom Hill	Jones
Houston	Harris
Kemp	Baylor
Lake O'The Pines	Camp, Marion, Morris, Upshur
Lavon	Collin
Lewisville (Garza-Little Elm)	Denton
Livingston	Polk, San Jacinto, Trinity, Walker

Lyndon B. Johnson	Burnet, Llano
Medina	Bandera, Medina
Meredith	Hutchinson, Moore, Potter
O. C. Fisher (San Angelo)	Tom Green
Palestine	Anderson, Cherokee, Henderson, Smith
Possum Kingdom	Palo Pinto, Stephens, Young
Sam Rayburn	Angelina, Jasper Nacogdoches, Sabine, San Augustine
Somerville	Burleson, Lee, Washington
E. V. Spence	Coke
Stamford	Haskell
Stillhouse Hollow	Bell
Tawakoni	Hunt, Rains, Van Zandt
Texoma	Cooke, Grayson TX; Bryan, Johnston, Love, Marshall, OK
Travis	Burnet, Travis
Trinidad	Henderson
Twin Buttes	Tom Green
White River	Crosby
Whitney	Bosque, Hill
Wright Patman (Texarkana)	Bowie, Cass


Trinity River
TRINIDAD
TRINIDAD LAKE
X 01
32°08'
32°06'
96°07'
96°05'
Texas
Map Location
TRINIDAD LAKE
X Lake Sampling Site
0 ½ 1 1½ Km.
0 ¼ ½ ¾ Mi.
Scale

TRINIDAD LAKE

STORET NO. 4836

I. INTRODUCTION

Trinidad Lake was included in the National Eutrophication Survey as a water body of interest to the Texas Water Quality Board. Tributaries and nutrient sources were not sampled, and this report relates only to the lake sampling data.

Trinidad Lake, built in 1925, is owned by the Texas Power and Light Company. Located immediately south of Trinidad, Texas, it is used as a source of cooling water for power generation. The lake level is maintained by diversion of water from the Trinity River (Wyatt, 1975).

II. CONCLUSIONS

A. Trophic Condition:

Survey data indicate that Trinidad Lake is eutrophic; i.e., well supplied with nutrients and quite productive. Whether nutrient enrichment is beneficial or deleterious depends on the actual or potential effect on the uses of the lake. In this regard, no nuisance conditions are known to personnel of the Texas Water Quality Board and there is little or no impairment of the designated beneficial uses of this water body.

Trinidad Lake ranked thirty-fifth in overall trophic quality when the 39 Texas reservoirs sampled in 1974 were compared using a combination of six parameters*. All of the other water bodies had less median total and dissolved phosphorus, 14 had less and two had the same median inorganic nitrogen, 36 had less mean chlorophyll a, and 34 had greater mean Secchi disc transparency.

* See Appendix A.

Survey limnologists noted that the lake was extremely turbid in March and reported emergent macrophytes in the shoreline shallows in November.

B. Rate-Limiting Nutrient:

The algal assay results indicate that primary productivity in Trinidad Lake was nitrogen-limited at the times the samples were collected (03/11/74 and 11/01/74). The lake data indicate nitrogen limitation at all sampling times.

III. LAKE CHARACTERISTICS†

A. Lake Morphometry††:

1. Surface area: 2.99 kilometers^2.
2. Mean depth: 3.1 meters.
3. Maximum depth: >2.4 meters.
4. Volume: 9.269×10^6 m^3.

B. Precipitation*:

1. Year of sampling: 120.8 centimeters.
2. Mean annual: 117.4 centimeters.

† Table of metric equivalents--Appendix B.
†† Latchford, 1975.
* See Working Paper No. 175, "...Survey Methods, 1973-1976".

IV. LAKE WATER QUALITY SUMMARY

Trinidad Lake was sampled four times during 1974 by means of a pontoon-equipped Huey helicopter. Each time, samples for physical and chemical parameters were collected from two or more depths at one station on the lake (see map, page vi). During each visit, a single depth-integrated (near bottom to surface) sample was collected for phytoplankton identification and enumeration; and a similar sample was taken for chlorophyll a analysis. During the March and November visits, single 18.9-liter depth-integrated samples were collected for algal assays. The maximum depth sampled was 2.4 meters.

The sampling results are presented in full in Appendix C and are summarized in the following table (nutrient samples collected in August were not preserved properly and were not analyzed).

A. SUMMARY OF PHYSICAL AND CHEMICAL CHARACTERISTICS FOR TRINIDAD
STORET CODE 4836

PARAMETER	1ST SAMPLING (3/11/74) 1 SITES RANGE	MEAN	MEDIAN	2ND SAMPLING (5/17/74) 1 SITES RANGE	MEAN	MEDIAN	3RD SAMPLING (8/12/74) 1 SITES RANGE	MEAN	MEDIAN
TEMP (C)	22.7 - 23.6	23.1	23.1	26.8 - 26.9	26.9	26.9	30.4 - 32.0	31.3	31.5
DISS OXY (MG/L)	7.0 - 7.0	7.0	7.0	5.0 - 5.0	5.0	5.0	7.4 - 10.8	9.5	10.2
CNDCTVY (MCROMO)	965. - 965.	965.	965.	1037. - 1038.	1038.	1038.	1227. - 1260.	1246.	1252.
PH (STAND UNITS)	8.8 - 8.9	8.8	8.8	8.4 - 9.0	8.7	8.7	8.9 - 9.1	9.0	9.1
TOT ALK (MG/L)	199. - 200.	200.	200.	203. - 203.	203.	203.	****** -**********		
TOT P (MG/L)	0.282 - 0.295	0.288	0.288	0.382 - 0.467	0.424	0.424	****** -**********		
ORTHO P (MG/L)	0.087 - 0.095	0.091	0.091	0.225 - 0.304	0.264	0.264	****** -**********		
NO2+NO3 (MG/L)	0.070 - 0.090	0.080	0.080	0.050 - 0.090	0.070	0.070	****** -**********		
AMMONIA (MG/L)	0.060 - 0.070	0.065	0.065	0.040 - 0.070	0.055	0.055	****** -**********		
KJEL N (MG/L)	1.700 - 2.000	1.850	1.850	1.900 - 2.100	2.000	2.000	****** -**********		
INORG N (MG/L)	0.130 - 0.160	0.145	0.145	0.090 - 0.160	0.125	0.125	****** -**********		
TOTAL N (MG/L)	1.790 - 2.070	1.930	1.930	1.950 - 2.190	2.070	2.070	****** -**********		
CHLRPYL A (UG/L)	2.3 - 2.3	2.3	2.3	34.9 - 34.9	34.9	34.9	27.4 - 27.4	27.4	27.4
SECCHI (METERS)	0.3 - 0.3	0.3	0.3	0.4 - 0.4	0.4	0.4	0.8 - 0.8	0.8	0.8

A. SUMMARY OF PHYSICAL AND CHEMICAL CHARACTERISTICS FOR TRINIDAD
STORET CODE 4836

4TH SAMPLING (11/ 1/74)

1 SITES

PARAMETER	RANGE	MEAN	MEDIAN
TEMP (C)	26.5 - 26.6	26.6	26.6
DISS OXY (MG/L)	8.4 - 9.0	8.7	8.7
CNDCTVY (MCROMO)	1031. - 1033.	1032.	1032.
PH (STAND UNITS)	8.9 - 8.9	8.9	8.9
TOT ALK (MG/L)	201. - 236.	219.	219.
TOT P (MG/L)	0.396 - 0.457	0.426	0.426
ORTHO P (MG/L)	0.255 - 0.321	0.288	0.288
NO2+NO3 (MG/L)	0.020 - 0.030	0.025	0.025
AMMONIA (MG/L)	0.050 - 0.060	0.055	0.055
KJEL N (MG/L)	1.600 - 1.800	1.700	1.700
INORG N (MG/L)	0.070 - 0.090	0.080	0.080
TOTAL N (MG/L)	1.620 - 1.830	1.725	1.725
CHLRPYL A (UG/L)	32.6 - 32.6	32.6	32.6
SECCHI (METERS)	0.6 - 0.6	0.6	0.6

B. Biological characteristics:

1. Phytoplankton -

Sampling Date	Dominant Genera	Algal Units per ml
03/11/74	1. Scenedesmus sp.	13,306
	2. Cosmarium sp.	11,416
	3. Centric diatoms	10,926
	4. Golenkinia sp.	7,214
	5. Nitzschia sp.	3,082
	Other genera	11,415
	Total	57,359
05/17/74	1. Dactylococcopsis sp.	3,752
	2. Golenkinia sp.	2,047
	3. Scenedesmus sp.	1,933
	4. Cyclotella sp.	1,402
	5. Merismopedia sp.	1,213
	Other genera	5,229
	Total	15,576
08/12/74	1. Merismopedia sp.	7,025
	2. Lyngbya sp.	6,818
	3. Nitzschia sp.	4,821
	4. Scenedesmus sp.	3,720
	5. Cyclotella sp.	3,444
	Other genera	14,395
	Total	40,223
11/01/74	1. Ankistrodesmus sp.	6,583
	2. Scenedesmus sp.	5,596
	3. Nitzschia sp.	3,950
	4. Merismopedia sp.	3,456
	5. Kirchneriella sp.	3,127
	Other genera	12,014
	Total	34,726

2. Chlorophyll a -

Sampling Date	Station Number	Chlorophyll a (µg/l)
03/11/74	1	2.3
05/17/74	1	34.9
08/12/74	1	27.4
11/01/74	1	32.6

C. Limiting Nutrient Study:

1. Autoclaved, filtered, and nutrient spiked -

a. March sample -

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc. (mg/l)	Maximum yield (mg/l-dry wt.)
Control	0.015	0.059	6.0
0.050 P	0.065	0.059	6.9
0.050 P + 1.0 N	0.065	1.059	21.9
1.0 N	0.015	1.059	19.1

b. November sample -

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc. (mg/l)	Maximum yield (mg/l-dry wt.)
Control	0.270	0.113	4.4
0.050 P	0.320	0.113	4.2
0.050 P + 1.0 N	0.320	1.113	22.7
1.0 N	0.270	1.113	22.1

2. Discussion -

The control yields of the assay alga, Selenastrum capricornutum, indicate that the potential primary productivity

of Trinidad Lake was moderately high at the times the assay samples were collected (03/11/74 and 11/01/74). Also, the increase in yield when nitrogen alone was added and the lack of significant increase when only orthophosphorus was added indicate the lake was nitrogen limited at those times.

The lake data also indicate nitrogen limitation; i.e., the mean inorganic nitrogen/orthophosphorus ratios were 2/1 or less at all sampling times, and nitrogen limitation would be expected.

V. LITERATURE REVIEWED

Latchford, John B., Jr., 1974. Personal communication (lake morphometry). TX Water Qual. Bd., Austin.

Wyatt, Linda B., 1975. Personal communication (general lake information). TX Water Qual. Bd., Austin.

VI. APPENDICES

APPENDIX A

LAKE RANKINGS

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
4801	AMISTAD LAKE	0.013	0.500	371.474	2.042	14.900	0.009
4802	BASTROP LAKE	0.022	0.090	419.917	12.392	15.000	0.007
4803	BELTON RESERVOIR	0.016	0.185	378.312	8.025	15.000	0.007
4804	BRAUNIG LAKE	0.134	0.150	461.625	22.762	14.800	0.062
4805	BROWNWOOD LAKE	0.027	0.100	470.375	4.887	14.400	0.007
4806	LAKE BUCHANAN	0.036	0.250	437.625	8.606	15.000	0.012
4807	CADDO LAKE	0.055	0.070	463.333	14.808	11.400	0.013
4808	CALAVERAS LAKE	0.038	0.060	461.667	22.500	13.000	0.007
4809	CANYON RESERVOIR	0.010	0.450	384.812	2.500	14.800	0.006
4810	LAKE COLORADO CITY	0.042	0.090	473.625	12.675	10.200	0.012
4811	CORPUS CRISTI LAKE	0.113	0.130	475.187	19.756	14.000	0.050
4812	DIVERSION LAKE	0.025	0.080	470.111	15.867	9.000	0.009
4813	EAGLE MOUNTAIN LAKE	0.024	0.070	469.625	5.662	11.000	0.008
4814	FT PHANTOM HILL LAKE	0.060	0.105	474.909	6.317	9.800	0.022
4815	GARZA LITTLE ELM RESERVO	0.045	0.380	475.782	14.156	14.600	0.018
4816	KEMP LAKE	0.023	0.110	455.000	10.217	10.400	0.007
4817	HOUSTON LAKE	0.097	0.260	486.187	16.650	12.400	0.036
4818	LAKE OF THE PINES	0.031	0.090	440.000	12.919	15.000	0.011
4819	LAVON RESERVOIR	0.063	0.180	485.333	5.400	8.800	0.018
4820	LIVINGSTON LAKE	0.196	0.555	465.469	16.112	15.000	0.128
4821	LYNDON B JOHNSON LAKE	0.042	0.420	456.500	8.100	14.900	0.013
4822	MEDINA LAKE	0.010	0.600	403.562	12.944	15.000	0.004
4823	LAKE MEREDITH	0.021	0.070	439.312	3.037	14.900	0.009
4824	PALESTINE LAKE	0.031	0.180	442.625	10.619	14.800	0.010
4825	POSSUM KINGDOM RESERVOIR	0.023	0.070	419.045	9.495	15.000	0.009
4826	SAN ANGELO RESERVOIR	0.098	0.140	481.000	24.675	10.200	0.011
4827	SAM RAYBURN RESERVOIR	0.029	0.150	439.458	6.267	15.000	0.009
4828	E V SPENCE RESERVOIR	0.036	0.080	462.583	11.775	15.000	0.008

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
4829	SOMERVILLE LAKE	0.053	0.115	473.833	24.491	13.000	0.013
4830	STAMFORD LAKE	0.073	0.060	482.714	18.457	10.600	0.012
4831	STILLHOUSE HOLLOW RESERV	0.018	0.160	406.250	3.917	15.000	0.010
4832	TAWAKONI LAKE	0.046	0.100	466.417	18.246	13.200	0.013
4833	TEXARKANA LAKE	0.106	0.120	478.500	19.119	12.400	0.030
4834	TEXOMA LAKE	0.042	0.160	451.321	12.493	15.000	0.018
4835	TRAVIS LAKE	0.018	0.250	389.913	5.595	15.000	0.007
4836	TRINIDAD	0.389	0.110	479.500	24.300	10.000	0.240
4837	TWIN BUTTES RESERVOIR	0.029	0.250	454.917	8.708	14.800	0.009
4838	WHITE RIVER RESERVOIR	0.020	0.110	434.500	4.333	15.000	0.009
4839	WHITNEY LAKE	0.028	0.120	430.500	6.912	15.000	0.008

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

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS ORTHO P	INDEX NO
4801	AMISTAD LAKE	95 (36)	5 (2)	100 (38)	100 (38)	39 (14)	63 (21)	402
4802	BASTROP LAKE	79 (30)	76 (28)	82 (31)	47 (18)	17 (0)	92 (34)	393
4803	BELTON RESERVOIR	92 (35)	26 (10)	97 (37)	68 (26)	17 (0)	84 (31)	384
4804	BRAUNIG LAKE	5 (2)	42 (16)	50 (19)	8 (3)	49 (17)	5 (2)	159
4805	BROWNWOOD LAKE	66 (25)	70 (26)	29 (11)	87 (33)	58 (22)	84 (31)	394
4806	LAKE BUCHANAN	47 (18)	21 (7)	74 (28)	63 (24)	17 (0)	39 (14)	261
4807	CADDO LAKE	26 (10)	91 (33)	42 (16)	32 (12)	76 (29)	30 (10)	297
4808	CALAVERAS LAKE	45 (17)	100 (38)	47 (18)	11 (4)	67 (25)	92 (34)	362
4809	CANYON RESERVOIR	99 (37)	8 (3)	95 (36)	97 (37)	49 (17)	97 (37)	445
4810	LAKE COLORADO CITY	39 (14)	76 (28)	26 (10)	42 (16)	88 (33)	39 (14)	310
4811	CORPUS CRISTI LAKE	8 (3)	47 (18)	18 (7)	13 (5)	61 (23)	8 (3)	155
4812	DIVERSION LAKE	68 (26)	83 (31)	32 (12)	29 (11)	97 (37)	63 (21)	372
4813	EAGLE MOUNTAIN LAKE	71 (27)	91 (33)	34 (13)	79 (30)	79 (30)	76 (28)	430
4814	FT PHANTOM HILL LAKE	24 (9)	66 (25)	21 (8)	74 (28)	95 (36)	16 (6)	296
4815	GARZA LITTLE ELM RESERVO	34 (13)	13 (5)	16 (6)	34 (13)	55 (21)	21 (7)	173
4816	KEMP LAKE	76 (29)	61 (22)	55 (21)	55 (21)	84 (32)	92 (34)	423
4817	HOUSTON LAKE	16 (6)	16 (6)	0 (0)	24 (9)	72 (27)	11 (4)	139
4818	LAKE OF THE PINES	54 (20)	76 (28)	66 (25)	39 (15)	17 (0)	46 (17)	298
4819	LAVON RESERVOIR	21 (8)	29 (11)	3 (1)	84 (32)	100 (38)	21 (7)	258
4820	LIVINGSTON LAKE	3 (1)	3 (1)	39 (15)	26 (10)	17 (0)	3 (1)	91
4821	LYNDON B JOHNSON LAKE	39 (14)	11 (4)	53 (20)	66 (25)	39 (14)	30 (10)	238
4822	MEDINA LAKE	99 (37)	0 (0)	89 (34)	37 (14)	17 (0)	100 (38)	342
4823	LAKE MEREDITH	82 (31)	91 (33)	71 (27)	95 (36)	39 (14)	63 (21)	441
4824	PALESTINE LAKE	54 (20)	32 (12)	63 (24)	53 (20)	49 (17)	51 (19)	302
4825	POSSUM KINGDOM RESERVOIR	74 (28)	91 (33)	84 (32)	58 (22)	17 (0)	63 (21)	387
4826	SAN ANGELO RESERVOIR	13 (5)	45 (17)	8 (3)	0 (0)	88 (33)	46 (17)	200
4827	SAM RAYBURN RESERVOIR	59 (22)	39 (15)	68 (26)	76 (29)	17 (0)	63 (21)	322
4828	E V SPENCE RESERVOIR	50 (19)	83 (31)	45 (17)	50 (19)	17 (0)	76 (28)	321

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

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS ORTHO P	INDEX NO
4829	SOMERVILLE LAKE	29 (11)	55 (21)	24 (9)	3 (1)	67 (25)	30 (10)	208
4830	STAMFORD LAKE	18 (7)	97 (37)	5 (2)	18 (7)	82 (31)	39 (14)	259
4831	STILLHOUSE HOLLOW RESERV	88 (33)	37 (14)	87 (33)	92 (35)	17 (0)	51 (19)	372
4832	TAWAKONI LAKE	32 (12)	70 (26)	37 (14)	21 (8)	63 (24)	30 (10)	253
4833	TEXARKANA LAKE	11 (4)	51 (19)	13 (5)	16 (6)	72 (27)	13 (5)	176
4834	TEXOMA LAKE	39 (14)	34 (13)	61 (23)	45 (17)	17 (0)	21 (7)	217
4835	TRAVIS LAKE	88 (33)	21 (7)	92 (35)	82 (31)	17 (0)	84 (31)	384
4836	TRINIDAD	0 (0)	61 (22)	11 (4)	5 (2)	92 (35)	0 (0)	169
4837	TWIN BUTTES RESERVOIR	59 (22)	21 (7)	58 (22)	61 (23)	49 (17)	63 (21)	311
4838	WHITE RIVER RESERVOIR	84 (32)	61 (22)	76 (29)	89 (34)	17 (0)	63 (21)	390
4839	WHITNEY LAKE	63 (24)	51 (19)	79 (30)	71 (27)	17 (0)	76 (28)	357

LAKES RANKED BY INDEX NOS.

RANK	LAKE CODE	LAKE NAME	INDEX NO
1	4809	CANYON RESERVOIR	445
2	4823	LAKE MEREDITH	441
3	4813	EAGLE MOUNTAIN LAKE	430
4	4816	KEMP LAKE	423
5	4801	AMISTAD LAKE	402
6	4805	BROWNWOOD LAKE	394
7	4802	BASTROP LAKE	393
8	4838	WHITE RIVER RESERVOIR	390
9	4825	POSSUM KINGDOM RESERVOIR	387
10	4835	TRAVIS LAKE	384
11	4803	BELTON RESERVOIR	384
12	4831	STILLHOUSE HOLLOW RESERV	372
13	4812	DIVERSION LAKE	372
14	4808	CALAVERAS LAKE	362
15	4839	WHITNEY LAKE	357
16	4822	MEDINA LAKE	342
17	4827	SAM RAYBURN RESERVOIR	322
18	4828	E V SPENCE RESERVOIR	321
19	4837	TWIN BUTTES RESERVOIR	311
20	4810	LAKE COLORADO CITY	310
21	4824	PALESTINE LAKE	302
22	4818	LAKE OF THE PINES	298
23	4807	CADDO LAKE	297
24	4814	FT PHANTOM HILL LAKE	296
25	4806	LAKE BUCHANAN	261
26	4830	STAMFORD LAKE	259
27	4819	LAVON RESERVOIR	258
28	4832	TAWAKONI LAKE	253

LAKES RANKED BY INDEX NOS.

RANK	LAKE CODE	LAKE NAME	INDEX NO
29	4821	LYNDON B JOHNSON LAKE	238
30	4834	TEXOMA LAKE	217
31	4829	SOMERVILLE LAKE	208
32	4826	SAN ANGELO RESERVOIR	200
33	4833	TEXARKANA LAKE	176
34	4815	GARZA LITTLE ELM RESERVO	173
35	4836	TRINIDAD	169
36	4804	BRAUNIG LAKE	159
37	4811	CORPUS CRISTI LAKE	155
38	4817	HOUSTON LAKE	139
39	°4820	LIVINGSTON LAKE	91

APPENDIX B

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 C

PHYSICAL and CHEMICAL DATA

STORET RETRIEVAL DATE 76/02/11

483601
32 06 55.0 096 05 45.0
TRINIDAD
48213 TEXAS

11EPALES 2111202
3 0012 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
74/03/11	14 15	0000	23.6		12	965	8.90	200	0.060	2.000	0.070	0.095
	14 15	0008	22.7	7.0		965	8.80	199	0.070	1.700	0.090	0.087
74/05/17	10 05	0000	26.9		17	1038	9.00	203	0.070	2.100	0.090	0.304
	10 05	0007	26.8	5.0		1037	8.40	203	0.040	1.900	0.050	0.225
74/08/12	15 05	0000	32.0	10.8	30	1260	8.95					
	15 05	0003	31.5	10.2		1252	9.07					
	15 05	0007	30.4	7.4		1227	9.06					
74/11/01	16 15	0000	26.6	9.0	23	1033	8.91	236	0.060	1.800	0.030	0.321
	16 15	0005	26.5	8.4		1031	8.90	201	0.050	1.600	0.020	0.255

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L	00031 INCDT LT REMNING PERCENT
74/03/11	14 15	0000	0.295	2.3	
	14 15	0008	0.282		
74/05/17	10 05	0000	0.467	34.9	
	10 05	0007	0.382		
74/08/12	15 05	0000		27.4	
	15 05	0005			1.0
74/11/01	16 15	0000	0.457	32.6	
	16 15	0005	0.396		