U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL EUTROPHICATION SURVEY

WORKING PAPER SERIES

REPORT

ON

LAKE BROWNWOOD

BROWN COUNTY

TEXAS

EPA REGION VI

WORKING PAPER No. 635

CORVALLIS ENVIRONMENTAL RESEARCH LABORATORY - CORVALLIS, OREGON

and

ENVIRONMENTAL MONITORING & SUPPORT LABORATORY - LAS VEGAS, NEVADA

☆G.P.O. 699-440

REPORT

ON

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WORKING PAPER No. 635

WITH THE COOPERATION OF THE

TEXAS WATER QUALITY BOARD

AND THE

TEXAS NATIONAL GUARD

FEBRUARY, 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.

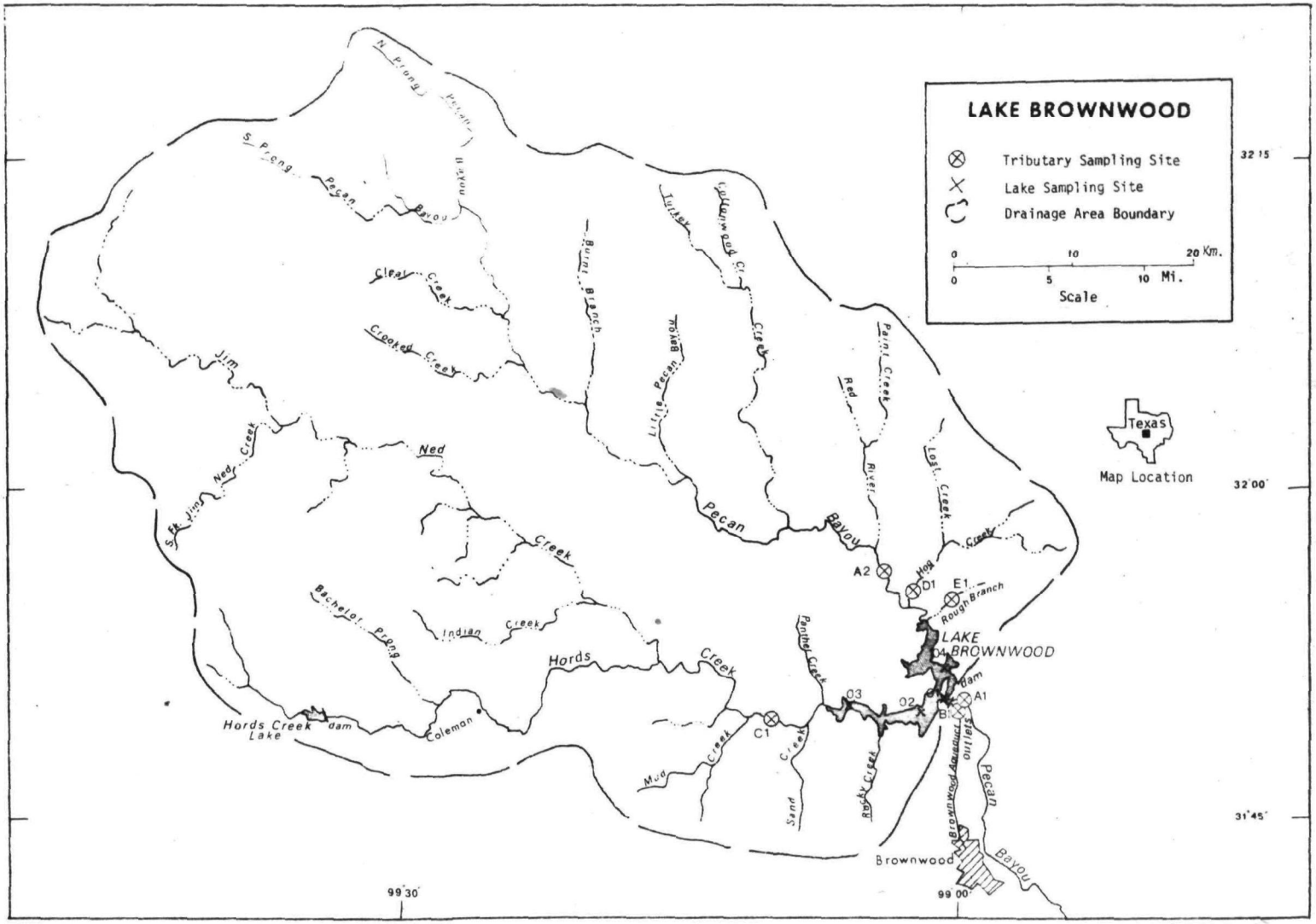
NATIONAL EUTROPHICATION SURVEY

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


LAKE BROWNWOOD
Tributary Sampling Site
Lake Sampling Site
Drainage Area Boundary
0 10 20 Km.
0 5 10 Mi.
Scale
Texas
Map Location
32°15'
32°00'
31°45'
99°30'
99°00'
N. Prong Pecan Bayou
S. Prong Pecan Bayou
Clear Creek
Crooked Creek
Jim Ned Creek
S. Fk. Jim Ned Creek
Ned Creek
Bachelor Prong
Indian Creek
Hords Creek Lake
dam
Coleman
Hords Creek
Mud Creek
Sand Creek
Rocky Creek
Panther Creek
Burnt Branch
Little Pecan Bayou
Coleman Co. Creek
Red River
Point Creek
Lost Creek
Hog Creek
Rough Branch
Pecan Bayou
A2
D1
E1
D4
LAKE BROWNWOOD
dam
A1
B
D3
D2
C1
Brownwood Municipal Reservoir
Brownwood
Pecan Bayou

LAKE BROWNWOOD

STORET NO. 4805

I. CONCLUSIONS

A. Trophic Condition:

Survey data indicate that Lake Brownwood 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, the Texas Water Quality Board has indicated that there is little or no known impairment of the designated beneficial uses of this lake.

Lake Brownwood ranked sixth in overall trophic quality when the 39 Texas reservoirs sampled in 1974 were compared using a combination of six parameters*. Thirteen of the reservoirs had less median total phosphorus, two had less and five had the same median dissolved phosphorus, eleven had less and one had the same median inorganic nitrogen, five had less mean chlorophyll a, and 27 had greater mean Secchi disc transparency. Marked depression of dissolved oxygen with depth occurred at station 1 in August.

Survey limnologists did not observe algal concentrations or macrophytes during their sampling visits.

B. Rate-Limiting Nutrient:

The results of the algal assay indicate phosphorus was the rate-limiting nutrient at the time the sample was collected (03/07/74).

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* See Appendix A.

The lake data indicate phosphorus limitation in March and May but nitrogen limitation in August and October.

C. Nutrient Controllability:

1. Point sources--No known municipal or industrial point sources impacted Lake Brownwood during the sampling year. Septic tanks serving lakeshore dwellings and recreation areas were estimated to have contributed 2% of the total phosphorus load to the lake, but a shoreline survey would be needed to determine the significance of those sources.

The present phosphorus loading of 0.29 $g/m^2/yr$ is less than that proposed by Vollenweider (Vollenweider and Dillon, 1974) as a eutrophic loading but is more than his suggested oligotrophic loading (see page 12).

2. Non-point sources--The non-point phosphorus load, including precipitation, amounted to 98.0% of the total load reaching the lake. Jim Ned Creek contributed 53.2% of the total, Pecan Bayou added 22.6%, and ungaged tributaries contributed an estimated 16.2% of the total.

The non-point phosphorus exports of Jim Ned Creek and Pecan Bayou were 3 and 1 $kg/km^2/yr$, respectively (see page 11). These export rates are quite comparable to the rate of a tributary of nearby Lake Colorado City* (1 $kg/km^2/yr$) but higher than a tributary of O. C. Fisher Reservoir** (<1 $kg/km^2/yr$).

* Working Paper No. 640.
** Working Paper No. 656.

II. LAKE AND DRAINAGE BASIN CHARACTERISTICS†

A. Lake Morphometry††:

1. Surface area: 29.54 kilometers^2.
2. Mean depth: 6.0 meters.
3. Maximum depth: >16.8 meters.
4. Volume: 177.240 x 10^6 m^3.
5. Mean hydraulic retention time: 1.5 years (based on outflow).

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

1. Tributaries -

Name	Drainage area (km^2)*	Mean flow (m^3/sec)*
Pecan Bayou	1,623.9	2.000
Jim Ned Creek	1,634.3	2.003
Minor tributaries & immediate drainage -	687.9	0.890
Totals	3,946.1	4.893

2. Outlet -

Brownwood Aqueduct	0.0	0.750
Pecan Bayou	3,975.6	2.894
Totals	3,975.6**	3.644

C. Precipitation***:

1. Year of sampling: 74.2 centimeters.
2. Mean annual: 69.6 centimeters.

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† Table of metric conversions--Appendix B.
†† Latchford, 1974.
* For limits of accuracy, see Working Paper No. 175, "...Survey Methods, 1973-1976".
** Includes area of lake.
*** See Working Paper No. 175.

III. LAKE WATER QUALITY SUMMARY

Lake Brownwood 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 four stations on the lake and from two or more depths at each station (see map, page vi). During each visit, a single depth-integrated (4.6 m or near bottom to surface) sample was composited from the stations for phytoplankton identification and enumeration; and during the first visit, a single 18.9-liter depth-integrated sample was composited for algal assays. Also each time, a depth-integrated sample was collected from each of the stations for chlorophyll a analysis. The maximum depths sampled were 16.8 meters at station 1, 8.2 meters at station 2, 3.0 meters at station 3, and 9.1 meters at station 4.

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

A. SUMMARY OF PHYSICAL AND CHEMICAL CHARACTERISTICS FOR BROWNWOOD LAKE
STORET CODE 4805

	1ST SAMPLING (3/ 7/74) 4 SITES			2ND SAMPLING (5/16/74) 4 SITES			3RD SAMPLING (8/ 6/74) 4 SITES		
PARAMETER	RANGE	MEAN	MEDIAN	RANGE	MEAN	MEDIAN	RANGE	MEAN	MEDIAN
TEMP (C)	11.7 - 18.1	14.9	15.0	21.3 - 25.9	24.5	24.7	24.3 - 26.5	25.9	26.1
DISS OXY (MG/L)	8.1 - 10.1	9.3	9.4	4.4 - 7.6	6.4	7.0	0.6 - 6.8	5.1	6.0
CNDCTVY (MCROMO)	470. - 548.	506.	500.	625. - 695.	649.	634.	669. - 699.	691.	694.
PH (STAND UNITS)	8.2 - 8.4	8.3	8.3	7.9 - 8.3	8.2	8.2	7.7 - 8.3	8.0	8.1
TOT ALK (MG/L)	121. - 131.	125.	125.	117. - 123.	120.	119.	116. - 132.	122.	121.
TOT P (MG/L)	0.010 - 0.071	0.026	0.023	0.017 - 0.083	0.036	0.024	0.014 - 0.074	0.029	0.021
ORTHO P (MG/L)	0.004 - 0.015	0.007	0.006	0.005 - 0.010	0.007	0.007	0.002 - 0.013	0.006	0.006
NO2+NO3 (MG/L)	0.050 - 0.090	0.065	0.070	0.030 - 0.080	0.052	0.040	0.020 - 0.060	0.024	0.020
AMMONIA (MG/L)	0.020 - 0.040	0.032	0.030	0.020 - 0.060	0.043	0.040	0.020 - 0.130	0.045	0.040
KJEL N (MG/L)	0.300 - 0.700	0.446	0.400	0.300 - 0.900	0.520	0.500	0.200 - 0.800	0.354	0.300
INORG N (MG/L)	0.070 - 0.130	0.097	0.100	0.050 - 0.140	0.095	0.080	0.040 - 0.150	0.068	0.060
TOTAL N (MG/L)	0.360 - 0.760	0.512	0.470	0.340 - 0.980	0.572	0.540	0.220 - 0.820	0.378	0.320
CHLRPYL A (UG/L)	0.6 - 2.2	1.1	0.8	1.4 - 4.7	3.2	3.4	6.1 - 12.9	9.3	9.0
SECCHI (METERS)	0.5 - 1.5	1.0	1.0	0.1 - 0.9	0.6	0.7	0.3 - 1.5	0.8	0.6

A. SUMMARY OF PHYSICAL AND CHEMICAL CHARACTERISTICS FOR BROWNWOOD LAKE
STORET CODE 4805

4TH SAMPLING (10/29/74)

PARAMETER	4 SITES RANGE	MEAN	MEDIAN
TEMP (C)	18.4 - 19.4	19.1	19.1
DISS OXY (MG/L)	2.6 - 7.4	6.4	6.6
CNDCTVY (MCROMO)	312. - 420.	395.	413.
PH (STAND UNITS)	7.8 - 8.1	8.1	8.1
TOT ALK (MG/L)	97. - 106.	102.	102.
TOT P (MG/L)	0.027 - 0.080	0.042	0.036
ORTHO P (MG/L)	0.008 - 0.032	0.016	0.014
NO2+NO3 (MG/L)	0.050 - 0.200	0.095	0.090
AMMONIA (MG/L)	0.040 - 0.100	0.070	0.070
KJEL N (MG/L)	0.400 - 0.800	0.513	0.500
INORG N (MG/L)	0.110 - 0.300	0.165	0.160
TOTAL N (MG/L)	0.450 - 0.940	0.608	0.590
CHLRPYL A (UG/L)	3.8 - 8.8	5.9	5.5
SECCHI (METERS)	0.3 - 0.9	0.6	0.7

B. Biological characteristics:

1. Phytoplankton -

Sampling Date	Dominant Genera	Algal Units per ml
03/07/74	1. Chroomonas sp.	618
	2. Flagellates	172
	3. Ankistrodesmus sp.	137
	4. Nitzschia sp.	137
	5. Cryptomonas sp.	103
	Other genera	240
	Total	1,407
05/16/74	1. Nitzschia sp.	919
	2. Cryptomonas sp.	238
	3. Chlamydomonas sp.	204
	4. Chroomonas sp.	170
	5. Lyngbya sp.	136
	Other genera	410
	Total	2,077
08/06/74	1. Lyngbya sp.	1,277
	2. Oscillatoria sp.	998
	3. Raphidiopsis sp.	399
	4. Nitzschia sp.	399
	5. Cryptomonas sp.	319
	Other genera	599
	Total	3,991
10/29/74	1. Chlamydomas sp.	204
	2. Chroomonas sp.	204
	3. Cryptomonas sp.	204
	4. Cyclotella sp.	58
	5. Gymnodinium sp.	58
	Other genera	291
	Total	1,019

2. Chlorophyll *a* -

Sampling Date	Station Number	Chlorophyll *a* (µg/l)
03/07/74	1	0.7
	2	0.6
	3	2.2
	4	1.0
05/16/74	1	2.2
	2	1.4
	3	4.6
	4	4.7
08/06/74	1	6.1
	2	10.6
	3	12.9
	4	7.5
10/29/74	1	6.5
	2	3.8
	3	8.8
	4	4.6

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	0.112	0.1
0.050 P	0.055	0.112	2.8
0.050 P + 1.0 N	0.055	1.112	15.3
1.0 N	0.005	1.112	0.1

2. Discussion -

The control yield of the assay alga, *Selenastrum capricornutum*, indicates that the potential primary productivity

of Lake Brownwood was low when the sample was taken in March, 1974. Also, the significant increase in yield when orthophosphorus was added and the lack of response to nitrogen added alone indicate phosphorus limitation.

The lake data indicate phosphorus limitation in March and in May (the mean inorganic nitrogen/orthophosphorus ratio was 14/1 at those times). However, nitrogen limitation is indicated in August and October; i.e., the mean N/P ratios were 11/1 and 10/1, respectively, and nitrogen limitation would be expected.

IV. NUTRIENT LOADINGS
(See Appendix E for data)

For the determination of nutrient loadings, the Texas National Guard collected monthly near-surface grab samples from each of the tributary sites indicated on the map (page vi), except for the high runoff months of April and May when two samples were collected. Sampling was begun in September, 1974, and was completed in July, 1975.

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

In this report, nutrient loads for sampled tributaries were determined by using a modification of a U.S. Geological Survey computer program for calculating stream loadings*.

Nutrient loads for unsampled "minor tributaries and immediate drainage" ("ZZ" of U.S.G.S.) were estimated using the means of the nutrient loads, in kg/km^2/year, at stations A-2 and C-1 and multiplying the means by the ZZ area in km^2.

No known wastewater treatment plants impacted Lake Brownwood during the sampling year.

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* See Working Paper No. 175.

A. Waste Sources:

1. Known municipal - None

2. Known industrial - None

B. Annual Total Phosphorus Loading - Average Year:

1. Inputs -

Source	kg P/yr	% of total
a. Tributaries (non-point load) -		
Pecan Bayou	1,925	22.6
Jim Ned Creek	4,530	53.2
b. Minor tributaries & immediate drainage (non-point load) -	1,375	16.2
c. Known municipal STP's - None	-	-
d. Septic tanks* -	170	2.0
e. Known industrial - None	-	-
f. Direct precipitation** -	515	6.0
Total	8,515	100.0

2. Outputs -

Lake outlet -	Brownwood Aqueduct	500
	Pecan Bayou	2,475
	Total	2,975

3. Net annual P accumulation - 5,540 kg.

* Estimate based on 575 lakeshore dwellings, 2 campgrounds, and 1 park; see Working Paper No. 175.
** See Working Paper No. 175.

C. Annual Total Nitrogen Loading - Average Year:

1. Inputs -

Source	kg N/yr	% of total
a. Tributaries (non-point load) -		
Pecan Bayou	88,985	37.8
Jim Ned Creek	74,065	31.4
b. Minor tributaries & immediate drainage (non-point load) -	34,395	14.6
c. Known municipal STP's -- None	-	-
d. Septic tanks* -	6,305	2.7
e. Known industrial - None	-	-
f. Direct precipitation** -	31,890	13.5
Total	235,640	100.0

2. Outputs -

Lake outlet -	Brownwood Aqueduct	12,865
	Pecan Bayou	73,050
	Total	85,915

3. Net annual N accumulation - 149,725 kg.

D. Non-point Nutrient Export by Subdrainage Area:

Tributary	kg P/km^2/yr	kg N/km^2/yr
Pecan Bayou	1	55
Jim Ned Creek	3	45

* Estimate based on 575 lakeshore dwellings, 2 campgrounds, and 1 park; see Working Paper No. 175.
** See Working Paper No. 175.

E. Mean Nutrient Concentrations in Ungaged Streams:

Tributary	Mean Total P Conc. (mg/l)	Mean Total N Conc. (mg/l)
Hog Creek	0.063	1.122
Rough Branch	0.021	1.014

F. Yearly Loads:

In the following table, the existing phosphorus loadings are compared to those proposed by Vollenweider (Vollenweider and Dillon, 1974). Essentially, his "dangerous" loading is one at which the receiving water would become eutrophic or remain eutrophic; his "permissible" 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 "dangerous" and "permissible".

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

	Total Phosphorus		Total Nitrogen	
	Total	Accumulated	Total	Accumulated
grams/m^2/yr	0.29	0.19	8.0	5.1

Vollenweider phosphorus loadings ($g/m^2/yr$) based on mean depth and mean hydraulic retention time of Lake Brownwood:

"Dangerous" (eutrophic loading)	0.40
"Permissible" (oligotrophic loading)	0.20

V. LITERATURE REVIEWED

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

Vollenweider, R. A., and P. J. Dillon, 1974. The application of the phosphorus loading concept to eutrophication research. Natl. Res. Council of Canada Publ. No. 13690, Canada Centre for Inland Waters, Burlington, Ontario.

Yost, I. D., 1976. Personal communication (estimate of evaporation at Brownwood Reservoir). U.S. Geol. Surv., 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

TRIBUTARY FLOW DATA

TRIBUTARY FLOW INFORMATION FOR TEXAS 03/16/76

LAKE CODE 4805 BROWNWOOD

TOTAL DRAINAGE AREA OF LAKE(SQ KM) 3975.6

TRIBUTARY	SUB-DRAINAGE AREA(SQ KM)	NORMALIZED FLOWS(CMS) JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
4805A1	3975.6	8.070	1.246	5.040	2.407	7.929	3.766	0.198	0.085	0.085	4.304	0.340	0.934	2.894
4805A2	1623.9	1.08	0.93	1.33	3.74	5.32	2.49	2.01	0.79	2.55	2.27	0.74	0.74	2.00
4805B1	0.0	0.45	0.51	0.62	0.82	0.68	0.93	1.27	1.25	0.85	0.65	0.51	0.45	0.75
4805C1	1634.3	1.10	0.93	1.39	3.82	5.41	2.52	2.04	0.79	2.55	2.29	0.74	0.76	2.03
4805ZZ	717.4	0.48	0.42	0.59	1.67	2.35	1.10	0.88	0.34	1.13	0.99	0.31	0.34	0.89

SUMMARY

TOTAL DRAINAGE AREA OF LAKE = 3975.6
SUM OF SUB-DRAINAGE AREAS = 3975.6
TOTAL FLOW IN = 67.96
TOTAL FLOW OUT = 34.40

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
4805A1	9	74	1.133	7	0.003				
	10	74	19.822	5	4.248				
	11	74	19.822	2	113.267				
	12	74	1.416	7	1.982				
	1	75	1.416	4	1.416				
	2	75	14.158	1	28.317				
	3	75	1.416	1	2.549				
	4	75	1.982	5	0.142	21	0.850		
	5	75	4.531	5	0.283	17	5.663		
	6	75	1.982	7	2.549				
	7	75	0.142	26	0.142				
	8	75	0.057	16	0.0				
4805A2	9	74	33.980	7	0.0				
	10	74	42.475	5	6.796				
	11	74	18.406	2	39.644				
	12	74	2.832	7	2.265				
	1	75	2.832	4	2.265				
	2	75	8.495	1	28.317				
	3	75	0.708	1	1.133				
	4	75	0.850	5	0.283	21	0.453		
	5	75	1.699	5	0.311	17	1.133		
	6	75	0.425	7	0.510				
	7	75	0.142	26	0.085				
	8	75	0.003	16	0.0				

LAKE CODE 4805 BROWNWOOD

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
4805B1	9	74	0.453	7	0.566				
	10	74	0.340	5	0.283				
	11	74	0.425	2	0.481				
	12	74	0.538	7	0.566				
	1	75	0.566	4	0.623				
	2	75	0.566	1	0.566				
	3	75	0.453	1	0.481				
	4	75	0.481	5	0.708	21	0.538		
	5	75	0.680	5	0.793	17	0.623		
	6	75	0.963	7	0.595				
	7	75	1.076	26	0.934				
	8	75	1.133	16	1.076				
4805C1	9	74	7.079	7	0.0				
	10	74	14.158	5	7.079				
	11	74	11.327	2	36.812				
	12	74	1.133	7	1.416				
	1	75	1.133	4	1.416				
	2	75	5.097	1	4.248				
	3	75	0.566	1	1.133				
	4	75	0.142	5	0.014	21	0.085		
	5	75	0.142	5	0.006	17	0.057		
	6	75	0.057	7	0.028				
	7	75	0.014	26	0.0				
	8	75	0.0	16	0.0				
4805ZZ	9	74	8.495						
	10	74	16.990						
	11	74	4.248						
	12	74	0.850						
	1	75	0.850						
	2	75	2.832						
	3	75	0.227						
	4	75	0.057						
	5	75	0.057						
	6	75	0.023						
	7	75	0.006						
	8	75	0.0						

APPENDIX D

PHYSICAL and CHEMICAL DATA

STORET RETRIEVAL DATE 76/02/11

480501
31 50 20.0 099 00 16.0
BROWNWOOD LAKE
48049 TEXAS

11EPALES 2111202
3 0051 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
74/03/07	16 30	0000	14.7		60	495	8.30	123	0.040	0.700	0.060	0.012
	16 30	0005	14.3	10.1		500	8.30	121	0.030	0.400	0.070	0.007
	16 30	0015	13.1	9.4		485	8.20	122	0.030	0.300	0.070	0.004
	16 30	0030	12.6	9.4		500	8.20	123	0.030	0.300	0.070	0.004
	16 30	0046	11.7	9.3		470	8.20	123	0.040	0.400	0.090	0.006
74/05/16	11 00	0000	24.6		35	634	8.30	119	0.040	0.500	0.060	0.006
	11 00	0005	24.7			695	8.30	118	0.030	0.300	0.040	0.007
	11 00	0015	24.3	7.2		688	8.20	119	0.030	0.400	0.030	0.008
	11 00	0035	21.5	4.4		672	7.90	121	0.060	0.400	0.080	0.010
	11 00	0041	21.3	4.4		677	7.90	122	0.060	0.300	0.060	0.008
74/08/06	13 50	0000	26.3		60	698	8.00	121	0.050	0.800	0.020	0.011
	13 50	0015	26.2	4.0		694	7.70	119	0.040	0.300	0.020	0.007
	13 50	0030	26.0	1.8		699	7.70	127	0.040	0.200	0.020K	0.009
	13 50	0055	25.5	0.6		699	7.70	132	0.130	0.300	0.020K	0.007
74/10/29	14 45	0000	19.3	7.4	36	418	8.15	103	0.040	0.500	0.090	0.008
	14 45	0005	19.3	7.4		420	8.10	101	0.040	0.500	0.090	0.008
	14 45	0015	19.0	6.8		416	8.05	102	0.040	0.400	0.090	0.008
	14 45	0032	18.8			406	7.95	100	0.060	0.400	0.130	0.013
	14 45	0048	18.5	2.6		372	7.75	101	0.100	0.400	0.200	0.020

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/02/11

460501
31 50 20.0 099 00 16.0
BROWNWOOD LAKE
48049 TEXAS

11EPALES 2111202
3 0051 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L	00031 INCDT LT REMNING PERCENT
74/03/07	16	30 0000	0.022	0.7	
	16	30 0005	0.013		
	16	30 0015	0.013		
	16	30 0030	0.010		
	16	30 0046	0.027		
74/05/16	11	00 0000	0.027	2.2	
	11	00 0005	0.021		
	11	00 0015	0.021		
	11	00 0035	0.036		
	11	00 0041	0.037		
74/08/06	13	50 0000	0.021	6.1	
	13	50 0015	0.014		
	13	50 0030	0.015		
	13	50 0055	0.034		
74/10/29	14	45 0000	0.030	6.5	
	14	45 0005	0.032		
	14	45 0015	0.027		
	14	45 0032	0.031		
	14	45 0048	0.061		

STORET RETRIEVAL DATE 76/02/11

480502
31 49 42.0 099 03 05.0
BROWNWOOD LAKE
48049 TEXAS

11EPALES
3

2111202
0024 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
74/03/07	17 20	0000	15.1		48	500	8.40	125	0.040	0.400	0.070	0.010
	17 20	0005	15.0	9.7		500	8.30	125	0.020	0.300	0.060	0.005
	17 20	0020	13.6	9.7		485	8.20	125	0.030	0.300	0.080	0.004
74/05/16	11 15	0000	24.7		29	632	8.30	123	0.030	0.500	0.040	0.006
	11 15	0005	24.6	7.0		633	8.25	120	0.040	0.300	0.040	0.006
	11 15	0015	24.3	7.0		628	8.20	119	0.060	0.600	0.060	0.009
	11 15	0020	24.1	7.0		625	8.20	120	0.030	0.300	0.040	0.006
74/08/06	14 30	0000	26.5	6.8	24	695	8.10	121	0.030	0.300	0.020K	0.004
	14 30	0005	26.2	6.4		696	8.10	121	0.030	0.300	0.020K	0.004
	14 30	0010	26.1	6.6		694	8.10	123	0.020	0.300	0.020K	0.002
	14 30	0018	26.0	6.4		692	8.15	120	0.020	0.200	0.020K	0.005
74/10/29	14 20	0000	19.4	6.2	24	415	8.15	104	0.090	0.600	0.080	0.012
	14 20	0005	19.3	6.4		416	8.10	106	0.090	0.600	0.090	0.015
	14 20	0015	19.3	6.2		415	8.10	103	0.090	0.600	0.080	0.014
	14 20	0027	19.0	6.2		410	8.05	104	0.080	0.600	0.080	0.011

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L	00031 INCDT LT REMNING PERCENT
74/03/07	17 20	0000	0.018	0.6	
	17 20	0005	0.016		
	17 20	0020	0.024		
74/05/16	11 15	0000	0.023	1.4	
	11 15	0005	0.021		
	11 15	0015	0.034		
	11 15	0020	0.024		
74/08/06	14 30	0000	0.019	10.6	
	14 30	0005	0.020		
	14 30	0010	0.020		
	14 30	0018	0.028		
74/10/29	14 20	0000	0.036	3.8	
	14 20	0003			5.0
	14 20	0005	0.039		1.0
	14 20	0015	0.039		
	14 20	0027	0.040		

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/02/11

480503
31 50 05.0 099 05 58.0
BROWNWOOD LAKE
48049 TEXAS

11EPALES 2111202
3 0011 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
74/03/08	09 20	0000	18.1		18	548	8.30	129	0.040	0.600	0.050	0.015
	09 20	0007	17.6	8.1		542	8.20	131	0.040	0.600	0.080	0.005
74/05/16	11 25	0000	25.9		5	634	8.20	117	0.060	0.900	0.080	0.007
	11 25	0005	25.8	6.2		634	8.10	118	0.060	0.800	0.080	0.009
	11 25	0009	25.5	6.2		630	8.10	119	0.050	0.800	0.060	0.008
74/08/06	15 05	0000	25.0		11	681	8.30	122	0.020	0.400	0.020K	0.005
	15 05	0005	24.3	6.0		669	8.20	125	0.040	0.300	0.020	0.004
74/10/29	14 00	0000	18.6	5.8	12	312	8.05	105	0.090	0.800	0.140	0.029
	14 00	0005	18.6	6.0		322	8.00	104	0.080	0.700	0.130	0.032
	14 00	0010	18.4			318						

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L	00031 INCDT LT REMNING PERCENT
74/03/08	09 20	0000	0.042	2.2	
	09 20	0007	0.071		
74/05/16	11 25	0000	0.079	4.6	
	11 25	0005	0.083		
	11 25	0009	0.076		
74/08/06	15 05	0000	0.058	12.9	
	15 05	0005	0.074		
74/10/29	14 00	0000	0.079	8.8	
	14 00	0001			5.0
	14 00	0002			1.0
	14 00	0005	0.080		

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/02/11

480504
31 52 00.0 099 01 19.0
BROWNWOOD LAKE
48049 TEXAS

11EPALES 2111202
3 0021 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
74/03/08	10 00	0000	16.2		30	520	8.20	127	0.030	0.600	0.050	0.008
	10 00	0005	16.2	8.8		519	8.25	127	0.020	0.500	0.050	0.004
	10 00	0017	16.0	9.3		512	8.25	127	0.020	0.400	0.050	0.006
74/05/16	12 00	0000	25.4		25	655	8.30	120	0.040	0.700	0.040	0.005
	12 00	0005	25.3	7.6		653	8.30	121	0.020	0.500	0.030	0.005
	12 00	0017	25.3	7.2		650	8.30	119	0.030	0.500	0.040	0.005
74/08/06	09 40	0000	26.1	6.0	27	691	8.10	116	0.070	0.500	0.060	0.013
	09 40	0010	26.2	6.0		688	8.05	116	0.050	0.300	0.030	0.006
	09 40	0019	26.2	5.8		688	8.05	117	0.040	0.400	0.020	0.006
74/10/29	15 10	0000	19.4	7.0	30	412	8.15	99	0.060	0.400	0.060	0.012
	15 10	0005	19.4	7.0		413	8.10	97	0.060	0.400	0.060	0.021
	15 10	0015	19.4	7.4		414	8.10	98	0.060	0.400	0.050	0.019
	15 10	0017	19.4			413						
	15 10	0024	19.0			409						
	15 10	0030	18.9	6.8		410	8.00	99	0.070	0.400	0.050	0.021

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L	00031 INCDT LT REMNING PERCENT
74/03/08	10 00	0000	0.029	1.0	
	10 00	0005	0.024		
	10 00	0017	0.023		
74/05/16	12 00	0000	0.022	4.7	
	12 00	0005	0.019		
	12 00	0017	0.017		
74/08/06	09 40	0000	0.038	7.5	
	09 40	0010	0.024		
	09 40	0019	0.017		
74/10/29	15 10	0000	0.035	4.6	
	15 10	0003			5.0
	15 10	0005	0.036		1.0
	15 10	0015	0.035		
	15 10	0030	0.037		

APPENDIX E

TRIBUTARY DATA

STORET RETRIEVAL DATE 76/03/10

4805A1
31 50 20.0 099 00 06.0 4
PECAN BAY J
48029 7.5 OWENS
O/BROWNWOOD LAKE
BANK SAMPLE 1000 FT DOWNSTREAM FROM DAM
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
74/09/07	10 30		0.028	0.850	0.040	0.005	0.040
74/10/05	11 40		0.272	0.800	0.015	0.020	0.090
74/12/07	10 00		0.152	0.500	0.028	0.025	0.030
75/03/01	10 00		0.075	0.650	0.045	0.005	0.020
75/04/05	11 35		0.065	0.750	0.040	0.005K	0.020
75/04/21	15 30		0.065	0.400	0.030	0.010	0.020
75/05/17	11 05		0.030	0.400	0.020	0.005K	0.010K
75/06/07	14 30		0.012	0.700	0.032	0.005K	0.010K
75/07/26	11 30		0.010	0.750	0.020	0.005	0.040

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/03/10

4805A2
31 57 12.0 099 03 55.0 4
PECAN BAYOU
48 7.5 BYRDS
T/BROWN#000 LAKE
BANK SAMPLE OFF SEC RD 1.7 MI NW OF BYRD
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
74/10/05	10	15	0.104	0.800	0.005	0.010	0.060
74/11/02	10	30	0.136	1.000	0.035	0.010	0.020
74/12/07	10	40	0.384	0.800	0.016	0.018	0.020
75/01/04	10	00	0.400	0.500	0.016	0.005	0.020
75/02/01	10	30	0.271	4.000	0.072	0.032	
75/03/01	10	00	0.330	0.850	0.030	0.005	0.020
75/04/05	10	00	0.085	0.650	0.045	0.005K	0.020
75/05/05	15	30	0.015	0.850	0.020	0.010	0.040
75/05/17	09	40	0.145	0.750	0.030	0.010	0.050
75/07/26	09	45	0.290	2.100	0.105	0.015	

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/03/10

480581
31 49 40.0 099 00 06.0 4
BROWNWOOD AQUEDUCT
48 7.5 OWENS
0/BROWNWOOD LAKE
SEC RD 2125 BRDG .4 MI E OF SEC RD 2632
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
74/09/07	10	50	0.012	0.600	0.020	0.005K	0.025K
74/10/05	11	00	0.176	1.000	0.015	0.015	0.045
74/11/02	10	00	0.216	0.500	0.050	0.015	0.040
74/12/07	10	20	0.176	0.800	0.024	0.020	0.030
75/01/04	10	00	0.136	0.600	0.024	0.005	0.020
75/02/01	10	00	0.088	0.900	0.032	0.008K	0.020
75/03/01	09	00	0.080	0.500	0.020	0.005K	0.010
75/04/05	11	15	0.070	0.600	0.025	0.005K	0.020
75/04/21	15	00	0.055	0.350	0.040	0.005	0.020
75/05/05	16	30	0.035	0.500	0.020	0.005	0.010K
75/05/17	10	50	0.035	0.550	0.030	0.005K	0.010K
75/06/07	15	15	0.005	0.450	0.010	0.005K	0.010K
75/07/26	11	00	0.005	0.400	0.020	0.005	0.020

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/03/10

4505C1
31 51 15.0 099 11 50.0 4
JIM NED CREEK
48 7.5 THRIFTY
T/BROWNWOOD LAKE
AT BLACKWILL XING 1.8 M SW FAIRVIEW CMTY
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
74/10/05	10 00		0.016	0.600	0.010	0.005	0.040
74/11/02	09 45		0.104	0.800	0.050	0.015	0.130
74/12/07	13 00		0.160	1.300	0.096	0.050	0.060
75/01/04	09 30		0.528	1.000	0.032	0.080	0.110
75/02/01	09 30		0.384	1.400	0.072	0.072	
75/03/01	09 35		0.375	0.850	0.025	0.045	0.100
75/04/05	10 45		0.005	0.700	0.025	0.010	0.010
75/04/21	14 30		0.010	0.525	0.030	0.010	0.070
75/05/05	16 00		0.005	0.800	0.015	0.015	0.040
75/05/17	10 15		0.200	0.650	0.040	0.040	0.100
75/06/07	14 15		0.020	1.100	0.020	0.010	0.090
75/07/26	10 30		0.165	0.775	0.025	0.020	0.140

STORET RETRIEVAL DATE 76/03/10

480501
31 55 25.0 099 02 10.0 4
HOG CREEK
48 7.5 BYRDS
T/BROWNWOOD LAKE
SEC RD 2273 BRDG .5 MI E OF SEC RD 2259
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME	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
74/12/07	1[illegible]	15	0.008	0.700	0.024	0.035	0.040
75/02/01	1[illegible]	15	0.064	1.700	0.040	0.032	
75/04/21	1[illegible]	30	0.005	0.600	0.030	0.005K	0.040
75/05/05	1[illegible]	10	0.005	1.550	0.020	0.030	0.100
75/05/17	0[illegible]	20	0.005	0.900	0.017	0.011	0.050
75/06/07	1[illegible]	25	0.010	1.550	0.025	0.015	0.090
75/07/26	0[illegible]	00	0.010	0.750	0.050	0.015	0.060

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/03/10

4805E1
31 55 10.0 099 00 30.0 4
ROUGH BRANCH
48 7.5 BYRDS
T/BROADWOOD LAKE
SEC RD 227[illegible] PROG 2.5 M W OF SEC RD 2259
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
74/10/05	09 50		0.024	0.500	0.010	0.005K	0.020
74/11/02	10 00		0.016	0.400	0.020	0.015	0.050
74/12/07	10 00		0.008	0.800	0.016	0.005	0.010K
75/01/04	09 40		0.040	0.700	0.016	0.010	0.010
75/02/01	09 45		0.096	2.200	0.032	0.032	
75/03/01	09 50		0.015	0.500	0.025	0.005K	0.010
75/04/05	09 30		0.005	0.750	0.030	0.005K	0.010
75/05/05	15 00		0.015	2.700	0.065	0.020	0.035
75/05/17	09 15		0.005	0.350	0.010	0.005	0.020

K VALUE KNOWN TO BE
LESS THAN INDICATED