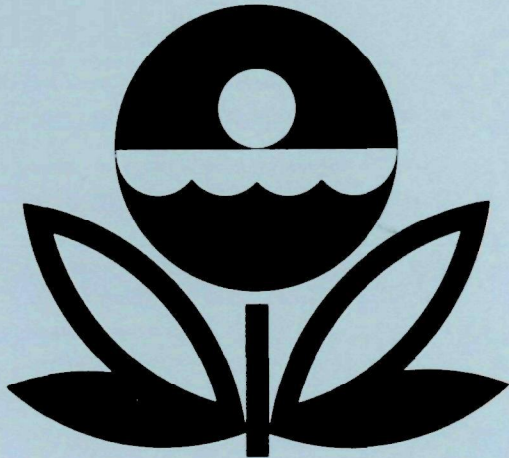


**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL EUTROPHICATION SURVEY
WORKING PAPER SERIES**



REPORT
ON
WRIGHT PATMAN (TEXARKANA) RESERVOIR
BOWIE AND CASS COUNTIES
TEXAS
EPA REGION VI
WORKING PAPER No. 669

**CORVALLIS ENVIRONMENTAL RESEARCH LABORATORY - CORVALLIS, OREGON
and
ENVIRONMENTAL MONITORING & SUPPORT LABORATORY - LAS VEGAS, NEVADA**

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EPA REGION VI
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WITH THE COOPERATION OF THE
TEXAS WATER QUALITY BOARD
AND THE
TEXAS NATIONAL GUARD
MARCH, 1977

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F O R E W O R D

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

<u>NAME</u>	<u>COUNTY</u>
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

Medina

Meredith

O. C. Fisher (San Angelo)

Palestine

Possum Kingdom

Sam Rayburn

Somerville

E. V. Spence

Stamford

Stillhouse Hollow

Tawakoni

Texoma

Travis

Trinidad

Twin Buttes

White River

Whitney

Wright Patman (Texarkana)

Burnet, Llano

Bandera, Medina

Hutchinson, Moore,
Potter

Tom Green

Anderson, Cherokee,
Henderson, Smith

Palo Pinto, Stephens,
Young

Angelina, Jasper
Nacogdoches, Sabine, San
Augustine

Burleson, Lee, Washington

Coke

Haskell

Bell

Hunt, Rains, Van Zandt

Cooke, Grayson TX; Bryan,
Johnston, Love, Marshall, OK

Burnet, Travis

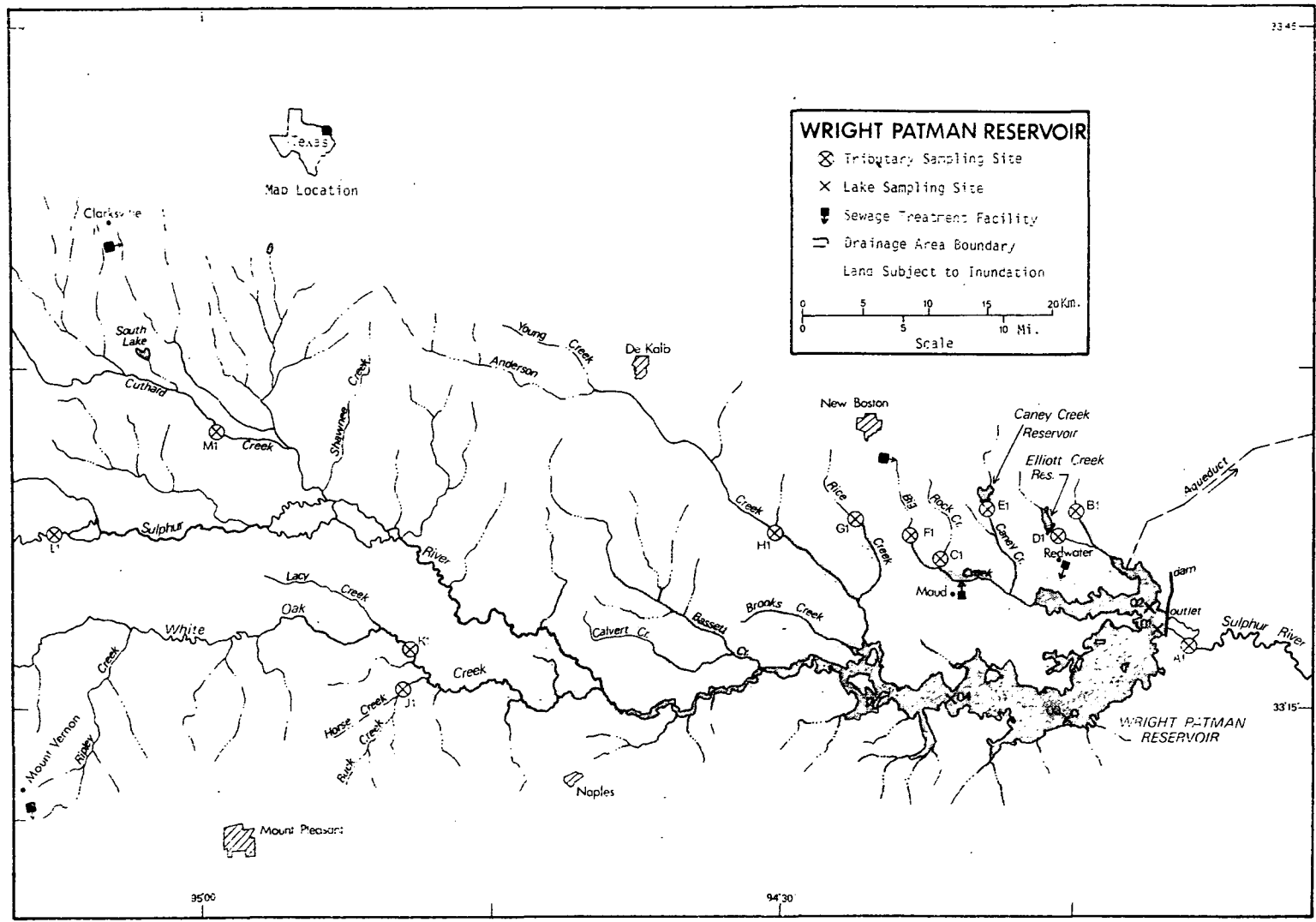
Henderson

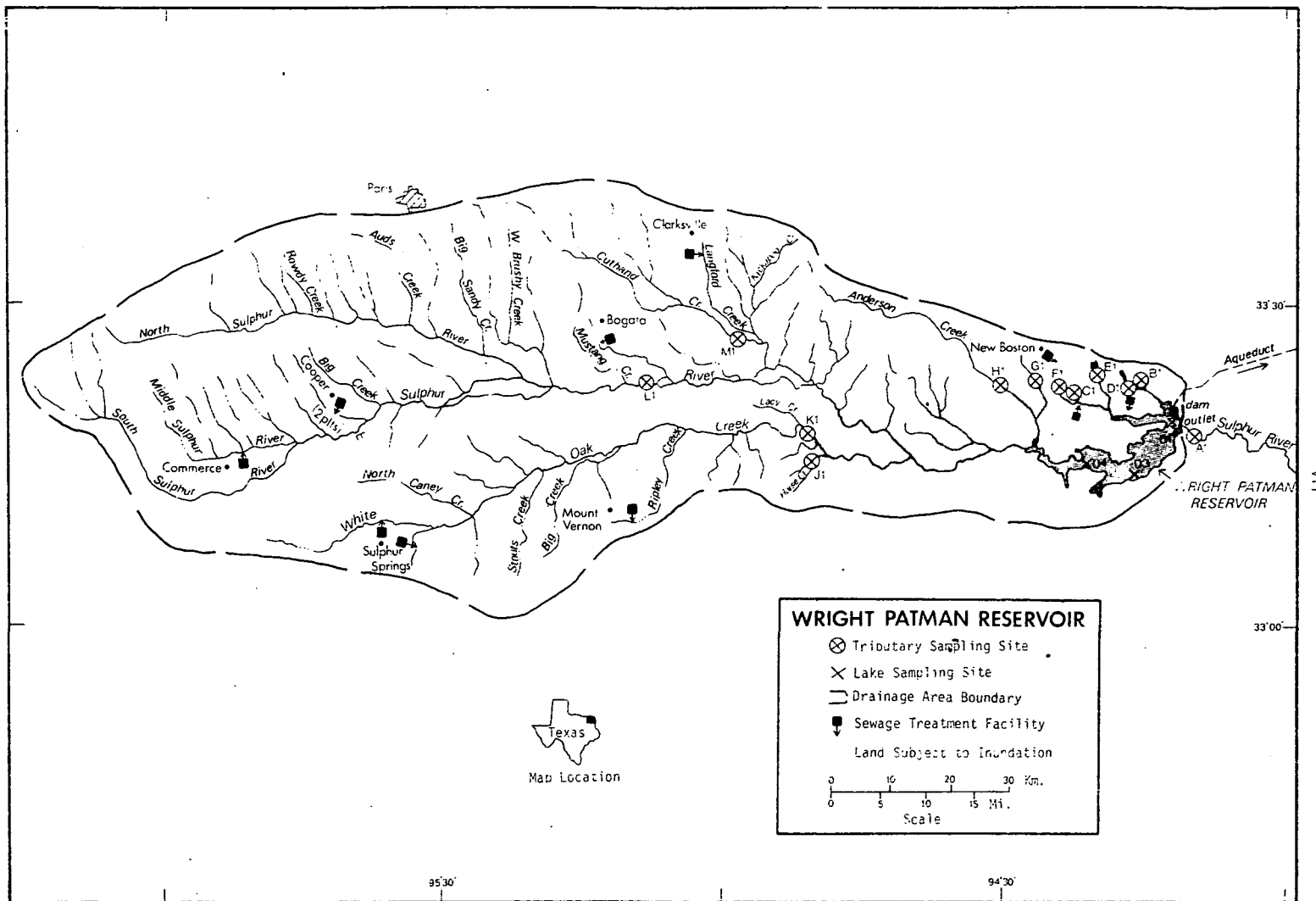
Tom Green

Crosby

Bosque, Hill

Bowie, Cass





WRIGHT PATMAN (TEXARKANA) RESERVOIR

STORET NO. 4833

I. CONCLUSIONS

A. Trophic Condition:

Survey data indicate that Wright Patman Reservoir 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 reservoir. 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.

Wright Patman Reservoir ranked thirty-third in overall trophic quality when the 39 Texas reservoirs sampled in 1974 were compared using a combination of six water quality parameters*. Thirty-four reservoirs had less median total phosphorus, 33 had less median dissolved orthophosphorus, 18 had less and one had the same median inorganic nitrogen, 32 had less mean chlorophyll a, and 33 had greater mean Secchi disc transparency.

Survey limnologists noted heavy growths of submerged and emergent vegetation at station 4 during the March, May, and November sampling visits.

* See Appendix A.

B. Rate-Limiting Nutrient:

The algal assay results indicate that Wright Patman Reservoir was limited by nitrogen at the time the samples were taken (03/22/74 and 11/08/74). The reservoir data indicate nitrogen limitation at all sampling times and stations.

C. Nutrient Controllability:

1. Point sources--During the sampling year, point sources contributed an estimated 13.8% of the total phosphorus load to Wright Patman Reservoir. The wastewater treatment plants at Sulphur Springs contributed 4.5%, the plant at Commerce contributed 3.9%, and seven other municipal facilities collectively contributed 5.4%. In addition, nine other domestic wastewater treatment plants discharge to tributaries in the drainage basin (Wyatt, 1976) beyond the 40-kilometer limit of the Survey*. These sources may be significant as indicated by the phosphorus export rates of Sulphur River and Cuthand Creek (see discussion below).

The present phosphorus loading of $2.05 \text{ g/m}^2/\text{year}$ is more than two times that proposed by Vollenweider (Vollenweider and Dillon, 1974) as a eutrophic loading (see page 18). However, even complete removal of phosphorus at the listed point sources would only reduce the loading to $1.77 \text{ g/m}^2/\text{year}$; and, regardless of the applicability of Vollenweider's eutrophic level to Texas reservoirs, because of the persistent nitrogen-limited condition of the reservoir, it does

* See Working Paper No. 175, "...Survey Methods 1973-1976".

not see likely that control of phosphorus at those sources would result in a shift to phosphorus limitation. Further investigation is needed to more accurately determine the controllability of phosphorus from all sources in the drainage basin, including land-use practices (see non-point discussion below).

There was an apparent phosphorus loss from the reservoir during the sampling year (see page 16). This probably is due in part to the great distances that the sampling sites were located upstream from the reservoir (see map, page vii); i.e., the entire phosphorus load from each drainage area would not have been measured. Also, it is possible that the loss may be the result of underestimation of point sources which discharge below tributary sampling sites; e.g., to Sulphur River below L-1 and Cuthand Creek below M-1.

2. Non-point sources--Non-point sources contributed an estimated 86.2% of the total phosphorus input to Wright Patman Reservoir during the sampling year. The Sulphur River contributed 44.4%, and seven other gaged tributaries collectively contributed 21.0% of the total. Ungaged minor tributaries and immediate drainage were estimated to have contributed 19.9%.

The phosphorus export rates of Sulphur River (32 g/km²/year) and Cuthand Creek (29 kg/km²/year) were appreciably higher than the rates of the other measured tributaries in the drainage basin (see page 17). This may be indicative of an underestimation of point sources impacting those streams, the impact of point sources

beyond the 40-kilometer Survey limit, or land-use practices. However, the export rates of the tributaries of this reservoir are similar to the rates of the tributaries of nearby Lake O' The Pines* and may be typical of this part of the state because of greater precipitation.

* Working Paper No. 648

II. RESERVOIR AND DRAINAGE BASIN CHARACTERISTICS[†]A. Morphometry^{††}:

1. Surface area: 126.13 kilometers².
2. Mean depth: 3.0 meters.
3. Maximum depth: >4.6 meters.
4. Volume: 373.727 x 10⁶ m³.
5. Mean hydraulic retention time: 57 days.

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

1. Tributaries -

<u>Name</u>	<u>Drainage area (km²)*</u>	<u>Mean flow (m³/sec)*</u>
Rock Creek	27.2	0.203
Elliot Creek	21.5	0.160
Caney Creek	18.4	0.135
Big Creek	40.4	0.297
Rice Creek	46.6	0.342
White Oak Creek	1,712.0	13.340
Sulphur River	3,535.3	29.960
Cuthand Creek	600.9	5.160
Minor tributaries & immediate drainage -	<u>2,789.0</u>	<u>25.920</u>
Totals	8,791.3	75.517

2. Outlet -

Aqueduct	0.0	1.287**
Sulphur River	<u>8,917.4</u>	<u>74.620</u>
Totals	8,917.4***	75.907

† Table of metric conversions--Appendix B.

†† Laurent, 1976 (mean volume and surface area in 1974).

* For limits of accuracy, see Working Paper No. 175.

** Anonymous, 1975.

*** Includes area of reservoir.

C. Precipitation*

1. Year of sampling: 156.5 centimeters.
2. Mean annual: 118.4 centimeters.

* See Working Paper No. 175.

III. WATER QUALITY SUMMARY

Wright Patman Reservoir 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 one or more depths at four stations on the reservoir (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 4.6 meters at stations 1 and 2, 4.9 meters at station 3, and 1.5 meters at station 4.

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

A. SUMMARY OF PHYSICAL AND CHEMICAL CHARACTERISTICS FOR TEXARKANA LAKE
STORET CODE 4833

PARAMETER	1ST SAMPLING (3/22/74)				2ND SAMPLING (5/31/74)				3RD SAMPLING (8/23/74)			
	4 SITES				4 SITES				4 SITES			
	RANGE	MEAN	MEDIAN		RANGE	MEAN	MEDIAN		RANGE	MEAN	MEDIAN	
TEMP (C)	13.5 - 16.4	15.3	15.6		27.0 - 28.0	27.4	27.3		20.2 - 30.1	28.2	29.3	
DISS OXY (MG/L)	7.2 - 9.4	8.7	9.0		5.4 - 7.2	6.7	6.8		2.6 - 7.0	4.1	3.9	
CNDCTVY (MCROMO)	177. - 271.	213.	195.		235. - 335.	258.	243.		199. - 263.	220.	210.	
PH (STAND UNITS)	7.2 - 7.8	7.5	7.6		7.6 - 8.2	8.0	8.0		7.4 - 8.3	7.6	7.4	
TOT ALK (MG/L)	47. - 75.	60.	61.		48. - 109.	66.	54.		*****	*****	*****	
TOT P (MG/L)	0.049 - 0.188	0.092	0.082		0.073 - 0.187	0.111	0.099		*****	*****	*****	
ORTHO P (MG/L)	0.016 - 0.047	0.027	0.026		0.013 - 0.061	0.025	0.022		*****	*****	*****	
NO2+NO3 (MG/L)	0.030 - 0.180	0.102	0.095		0.050 - 0.170	0.100	0.070		*****	*****	*****	
AMMONIA (MG/L)	0.030 - 0.120	0.056	0.050		0.040 - 0.100	0.067	0.065		*****	*****	*****	
KJEL N (MG/L)	0.500 - 1.000	0.750	0.700		0.600 - 1.000	0.770	0.800		*****	*****	*****	
INORG N (MG/L)	0.060 - 0.300	0.159	0.145		0.110 - 0.270	0.167	0.140		*****	*****	*****	
TOTAL N (MG/L)	0.530 - 1.180	0.852	0.795		0.650 - 1.060	0.870	0.915		*****	*****	*****	
CHLRPYL A (UG/L)	10.0 - 24.0	15.5	14.0		14.1 - 57.0	39.0	42.5		13.7 - 16.8	15.3	15.3	
SECCHI (METERS)	0.2 - 0.7	0.5	0.5		0.5 - 0.9	0.6	0.6		0.3 - 0.9	0.7	0.7	

A. SUMMARY OF PHYSICAL AND CHEMICAL CHARACTERISTICS FOR TEXARKANA LAKE
STORET CODE 4833

4TH SAMPLING (11/ 8/74)

PARAMETER	4 SITES			
	RANGE		MEAN	MEDIAN
TEMP (C)	16.3 - 18.4		17.1	16.8
DISS OXY (MG/L)	5.0 - 7.6		6.6	6.8
CNDCTVY (MCROMO)	99. - 144.		117.	110.
PH (STAND UNITS)	6.3 - 7.1		6.7	6.7
TOT ALK (MG/L)	34. - 58.		40.	37.
TOT P (MG/L)	0.087 - 0.227		0.150	0.164
ORTHO P (MG/L)	0.024 - 0.141		0.078	0.084
NO2+NO3 (MG/L)	0.020 - 0.060		0.042	0.040
AMMONIA (MG/L)	0.040 - 0.080		0.059	0.060
KJEL N (MG/L)	0.300 - 0.800		0.500	0.500
INORG N (MG/L)	0.070 - 0.140		0.101	0.100
TOTAL N (MG/L)	0.340 - 0.860		0.542	0.540
CHLRPYL A (UG/L)	1.5 - 13.7		6.6	5.6
SECCHI (METERS)	0.3 - 0.6		0.4	0.3

B. Biological characteristics:

1. Phytoplankton -

<u>Sampling Date</u>	<u>Dominant Genera</u>	<u>Algal Units per ml</u>
03/22/74	1. <u>Melosira sp.</u>	5,495
	2. <u>Centric diatoms</u>	1,672
	3. <u>Nitzschia sp.</u>	1,593
	4. <u>Chroomonas sp.</u>	1,274
	5. <u>Dactylococcopsis sp.</u>	637
	Other genera	<u>1,552</u>
	Total	12,223
05/31/74	1. <u>Centric diatoms</u>	4,824
	2. <u>Melosira sp.</u>	1,495
	3. <u>Pennate diatoms</u>	1,158
	4. <u>Chroomonas sp.</u>	579
	5. <u>Merismopedia sp.</u>	338
	Other genera	<u>1,846</u>
	Total	10,240
08/23/74	1. <u>Melosira sp.</u>	2,795
	2. <u>Oscillatoria sp.</u>	2,056
	3. <u>Nitzschia sp.</u>	1,529
	4. <u>Lyngbya sp.</u>	1,002
	5. <u>Dactylococcopsis sp.</u>	738
	Other genera	<u>3,586</u>
	Total	11,706
11/08/74	1. <u>Melosira sp.</u>	1,211
	2. <u>Chroomonas sp.</u>	413
	3. <u>Dactylococcopsis sp.</u>	330
	4. <u>Oscillatoria sp.</u>	248
	5. <u>Nitzschia sp.</u>	221
	Other genera	<u>1,294</u>
	Total	3,717

2. Chlorophyll a -

<u>Sampling Date</u>	<u>Station Number</u>	<u>Chlorophyll a ($\mu\text{g/l}$)</u>
03/22/74	1	10.0
	2	11.9
	3	24.0
	4	16.1
05/31/74	1	14.1
	2	32.1
	3	57.0
	4	53.0
08/23/74	1	13.7
	2	15.2
	3	16.8
	4	15.5
11/08/74	1	7.6
	2	13.7
	3	3.7
	4	1.5

C. Limiting Nutrient Study:

1. Autoclaved, filtered, and nutrient spiked -

a. March sample

<u>Spike (mg/l)</u>	<u>Ortho P Conc. (mg/l)</u>	<u>Inorganic N Conc. (mg/l)</u>	<u>Maximum yield (mg/l-dry wt.)</u>
Control	0.040	0.143	5.5
0.050 P	0.090	0.143	5.4
0.050 P + 1.0 N	0.090	1.143	21.9
1.0 N	0.040	1.143	15.6

b. November sample

<u>Spike (mg/l)</u>	<u>Ortho P Conc. (mg/l)</u>	<u>Inorganic N Conc. (mg/l)</u>	<u>Maximum yield (mg/l-dry wt.)</u>
Control	0.086	0.043	1.3
0.050 P	0.136	0.043	1.3
0.050 P + 1.0 N	0.136	1.043	27.5
1.0 N	0.086	1.043	28.2

2. Discussion -

The control yields of the assay alga, Selenastrum capricornutum, indicate that the potential primary productivity of Wright Patman Reservoir was moderately high at the times the samples were collected (03/22/74 and 11/8/74). Also, in both assays, the lack of increase in yield with the addition of phosphorus until nitrogen was also added, indicates that the reservoir was limited by nitrogen at those times. Note that the addition of nitrogen alone resulted in yields much greater than those of the controls.

The reservoir data indicate nitrogen limitation as well; i.e., the mean inorganic nitrogen to orthophosphorus ratios were 9 to 1 or less at all sampling stations and times, 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 vii), except for the months of April and May when two samples were collected. Sampling was begun in September, 1974, and was completed in August, 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 reservoir.

In this report, nutrient loads for sampled tributaries were calculated using mean annual concentrations and mean annual flows. Nutrient loads shown are those measured minus point-source loads, if any. Nutrient loads for the aqueduct were calculated using the mean concentrations measured in the Sulphur River outlet (station A-1) and multiplying by the mean aqueduct flow.

Nutrient loads for unsampled "minor tributaries and immediate drainage" ("ZZ" of U.S.G.S.) were estimated using the mean concentrations in Rock Creek at station C-1 and the mean ZZ flow.

The operators of the Maud and Redwater wastewater treatment plants provided monthly effluent samples and corresponding flow data. The nine other listed wastewater treatment plants did not participate; nutrient loads from these sources were estimated at 1.134 kg P and 3.401 kg N/capita/year, and flows were estimated at 0.3785 m³/capita/day.

A. Waste Sources:

1. Known municipal* -

<u>Name</u>	<u>Pop. Served</u>	<u>Treatment</u>	<u>Mean Flow (m³/d)</u>	<u>Receiving Water</u>
Maud**	1,100	act. sludge	241.9	Wright Patman Reservoir
Redwater**	450	stab. pond	49.2	Wright Patman Reservoir
New Boston	2,800	ox. ditch	1,059.8	Big Creek
Clarksville	3,600	tr. filter	1,362.6	Langford Creek
Bogata	800	stab. pond	302.8	L. Mustang Creek
Mount Vernon	1,200	stab. pond	454.2	Trib. of White Oak Creek
Commerce	8,800	stab. pond	3,330.8	Middle Sulphur River
Sulphur Springs old plant	8,000	tr. filter	3,028.0	White Oak Creek
SE plant	2,300	stab. pond	870.6	Rock Creek
Cooper	3,400	act. sludge	1,286.9	Trib. of Sulphur River

There are nine additional municipal facilities which discharge to tributaries within the drainage basin beyond the 40-kilometer limit of the Survey⁺. These include De Kalb South, Red River Army Depot, Annona, Talco, Blossom, Roxton (Lamar County WCID No. 1), Pecan Gap, Ladonia, and Wolfe City (Wyatt, 1976).

2. Industrial - Unknown

* Anonymous, 1971.

** Treatment plant questionnaires.

⁺ See Working Paper No. 175.

B. Annual Total Phosphorus Loading - Average Year:

1. Inputs -

<u>Source</u>	<u>kg P/ yr</u>	<u>% of total</u>
a. Tributaries (non-point load) -		
Rock Creek	405	0.2
Elliot Creek	210	<0.1
Caney Creek	225	0.1
Big Creek	245	0.1
Rice Creek	950	0.4
White Oak Creek	34,920	13.5
Sulphur River	114,660	44.4
Cuthand Creek	17,410	6.7
b. Minor tributaries & immediate drainage (non-point load) -	51,495	19.9
c. Known municipal STP's -		
Maud	565	0.2
Redwater	170	<0.1
New Boston	3,175	1.2
Clarksville	4,080	1.6
Bogata	905	0.4
Mount Vernon	1,360	0.5
Commerce	9,980	3.9
Sulphur Springs old plant	9,070	3.5
SE plant	2,610	1.0
Cooper	3,855	1.5
d. Septic tanks - Unknown	?	-
e. Industrial - Unknown	?	-
f. Direct precipitation* -	<u>2,205</u>	<u>0.9</u>
Total	258,495	100.0

* See Working Paper No. 175.

2. Outputs -

	<u>kg P/ yr</u>
Lake outlet - Aqueduct	4,990
Sulphur River	<u>289,445</u>
Total	294,435

3. Net annual P loss - 35,940 kg.

C. Annual Total Nitrogen Loading - Average Year:

1. Inputs -

<u>Source</u>	<u>kg N/ yr</u>	<u>% of total</u>
a. Tributaries (non-point load) -		
Rock Creek	4,330	0.2
Elliot Creek	3,350	0.2
Caney Creek	3,035	0.1
Big Creek	1,020	<0.1
Rice Creek	9,145	0.4
White Oak Creek	388,310	16.8
Sulphur River	946,790	40.9
Cuthand Creek	167,770	7.2
b. Minor tributaries & immediate drainage (non-point load) -	552,570	23.8
c. Known municipal STP's -		
Maud	635	<0.1
Redwater	270	<0.1
New Boston	9,525	0.4
Clarksville	12,245	0.5
Bogata	2,720	0.1
Mount Vernon	4,080	0.2
Commerce	29,930	1.3
Sulphur Springs		
old plant	27,210	1.2
SE plant	7,820	0.3
Cooper	11,560	0.5

<u>Source</u>	<u>kg N/ yr</u>	<u>% of total</u>
d. Septic tanks - Unknown	?	-
e. Industrial - Unknown	?	-
f. Direct precipitation* -	<u>136,170</u>	<u>5.9</u>
Total	2,318,485	100.0

2. Outputs -

Lake outlet - Aqueduct	38,110
Sulphur River	<u>2,209,670</u>
Total	2,247,780

3. Net annual N accumulation - 70,705 kg.

D. Non-point Nutrient Export by Subdrainage Area:

<u>Tributary</u>	<u>kg P/km²/yr</u>	<u>kg N/km²/yr</u>
Rock Creek	15	159
Elliot Creek	10	156
Caney Creek	12	165
Big Creek	6	25
Rice Creek	20	196
White Oak Creek	20	227
Sulphur River	32	268
Cuthand Creek	29	279

E. Mean Nutrient Concentrations in Ungaged Streams:

<u>Tributary</u>	<u>Mean Total P Conc. (mg/l)</u>	<u>Mean Total N Conc. (mg/l)</u>
E. Fork Elliot Creek	0.172	2.247
Anderson Creek	0.160	1.225
Horse Creek	0.109	0.920

* See Working Paper No. 175.

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	2.05	loss*	18.4	0.6

Vollenweider phosphorus loadings
(g/m²/yr) based on mean depth and mean
hydraulic retention time of Wright Patman Reservoir:

"Dangerous" (eutrophic loading)	0.84
"Permissible" (oligotrophic loading)	0.42

* There was an apparent loss of phosphorus during the sampling year. This would not be expected to occur even in a reservoir with a mean hydraulic retention time of only 57 days. This may indicate unknown point sources which discharge directly to the reservoir, underestimation of phosphorus loads from the point sources discharging directly to the reservoir, resobilization of previously sedimented phosphorus, or tributary sampling sites located too far upstream (see map, page vii).

V. LITERATURE REVIEWED

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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.

VI. APPENDICES

APPENDIX A

LAKE 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)	47 (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

03/15/76

LAKE CODE 4833 *RIGHT PATMAN RES.

TOTAL DRAINAGE AREA OF LAKE(SQ KM) 8917.4

TRIBUTARY	SUB-DRAINAGE AREA(SQ KM)	JAN	FEB	MAR	APR	MAY	NORMALIZED FLOWS(CMS)			SEP	OCT	NOV	DEC	MEAN
							JUN	JUL	AUG					
4833A1	8917.4	90.05	98.83	94.01	93.45	128.56	93.45	74.76	25.06	19.96	40.78	52.67	84.95	74.62
4833C1	27.2	0.275	0.311	0.283	0.283	0.396	0.198	0.068	0.023	0.062	0.125	0.161	0.258	0.203
4833D1	21.5	0.218	0.238	0.227	0.227	0.311	0.156	0.051	0.017	0.048	0.102	0.127	0.207	0.160
4833E1	18.4	0.184	0.204	0.193	0.193	0.263	0.130	0.088	0.014	0.040	0.085	0.048	0.176	0.135
4833F1	40.4	0.396	0.453	0.425	0.425	0.595	0.283	0.093	0.034	0.091	0.178	0.238	0.368	0.297
4833G1	46.6	0.481	0.510	0.481	0.481	0.651	0.340	0.105	0.040	0.102	0.198	0.272	0.453	0.342
4833K1	1712.0	16.54	20.87	19.85	19.74	27.13	10.90	4.25	1.13	4.25	6.85	11.13	17.95	13.34
4833L1	3535.3	40.49	44.17	42.19	42.48	57.77	35.11	7.36	3.68	8.95	18.24	23.59	36.53	29.96
4833M1	600.9	6.94	7.62	7.28	7.19	9.94	5.52	1.59	0.68	1.47	3.14	4.05	6.65	5.16
4833ZZ	2916.3	34.83	38.23	36.25	36.25	49.55	21.55	7.70	2.52	7.73	13.65	29.17	34.55	25.92

SUMMARY

TOTAL DRAINAGE AREA OF LAKE = 8917.4
SUM OF SUB-DRAINAGE AREAS = 8918.7

TOTAL FLOW IN = 908.86
TOTAL FLOW OUT = 896.51

NOTE *** ALSO TEXARKANA RESERVOIR.

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
4833A1	9	74	116.382	7	46.156				
	10	74	117.232	6	170.467				
	11	74	276.939	10	288.832				
	12	74	283.451	9	286.000				
	1	75	144.982	11	282.885				
	2	75	241.826	8	288.832				
	3	75	283.168	8	283.168				
	4	75	134.505	5	286.000	19	169.901		
	5	75	169.335	3	0.283	17	291.663		
	6	75	127.992	7	104.489				
	7	75	16.792	12	14.951				
	8	75	11.242	9	14.781				
4833C1	9	74	0.133	7	0.025				
	10	74	0.283	6	0.040				
	11	74	1.303	10	0.425				
	12	74	0.793	9	2.294				
	1	75	0.125	11	0.110				
	2	75	1.727	8	1.671				
	3	75	0.680	8	0.144				
	4	75	0.368	5	0.091	19	0.144		
	5	75	0.821	3	4.870	17	0.396		
	6	75	0.161	7	0.076				
	7	75	0.045	12	0.028				
	8	75	0.040	9	0.042				

TRIBUTARY FLOW INFORMATION FOR TEXAS

01/16/76

LAKE CODE 4833 WRIGHT PATMAN RES.

MEAN MONTHLY FLOWS AND DAILY FLOWS (CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
4833D1	9	74	0.105	7	0.020				
	10	74	0.227	6	0.031				
	11	74	1.019	9	0.130				
	12	74	0.623	9	1.812				
	1	75	0.099	11	0.088				
	2	75	1.388	8	1.331				
	3	75	0.538						
	4	75	0.283	5	0.074	19	0.116		
	5	75	0.651	3	3.851	17	0.311		
	6	75	0.127	7	0.062				
	7	75	0.034	12	0.0				
4833E1	8	75	0.031	9	0.0				
	9	74	0.091	7	0.017				
	10	74	0.193	5	0.031				
	11	74	0.878	9	0.110				
	12	74	0.538	9	1.557				
	1	75	0.085	11	0.074				
	2	75	1.161	8	1.133				
	3	75	0.453	8	0.099				
	4	75	0.252	6	0.0	20	0.0		
	5	75	0.538	3	3.285	17	0.269		
	6	75	0.108	7	0.051				
	7	75	0.031	12	0.0				
4833F1	8	75	0.025	9	0.0				
	9	74	0.198	7	0.037				
	10	74	0.425	5	0.065				
	11	74	1.926	10	0.623				
	12	74	1.189	8	2.718				
	1	75	0.187	11	0.164				
	2	75	2.577	8	2.492				
	3	75	0.991	8	0.215				
	4	75	0.566	5	0.136	19	0.215		
	5	75	1.218	3	7.249	17	0.595	24	0.246
	6	75	0.238	7	0.116				
	7	75	0.065	12	0.0				
4833G1	8	75	0.057	9	0.062				
	9	74	0.227	7	0.042				
	10	74	0.481	5	0.074				
	11	74	2.180	10	0.708				
	12	74	1.331	8	3.087				
	1	75	0.210	11	0.184				
	2	75	2.917	8	2.803				
	3	75	1.133	8	0.246				
	4	75	0.623	5	0.156	19	0.246		
	5	75	1.359	3	8.212	17	0.680	24	0.280
	6	75	0.272	7	0.130				
	7	75	0.076	12	0.0				
	8	75	0.065	3	0.0				

TRIBUTARY FLOW INFORMATION FOR TEXAS

03/10/76

LAKE CODE 4833 WRIGHT PATMAN RES.

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
4833K1	9	74	28.090	11	27.524				
	10	74	17.981	6	2.435				
	11	74	112.984	9	10.307				
	12	74	50.121	9	144.982				
	1	75	7.872	12	7.872				
	2	75	109.303	9	72.491				
	3	75	41.909	7	15.716				
	4	75	23.588	6	4.870	20	6.541		
	5	75	63.430	4	376.614	18	83.252		
	6	75	27.128	8	4.672				
	7	75	2.067	13	0.623				
	8	75	1.529	3	0.0	9	0.108		
4833L1	9	74	83.535	11	126.859				
	10	74	7.051	6	1.303				
	11	74	205.014	9	14.442				
	12	74	78.438	9	216.058				
	1	75	11.921	12	16.226				
	2	75	116.382	9	58.616				
	3	75	54.935	7	11.978				
	4	75	33.697	6	3.483	20	4.644		
	5	75	98.259	4	470.060	18	79.004		
	6	75	73.624	8	81.836				
	7	75	5.210	13	1.189				
	8	75	0.963	8	0.991				
4833M1	9	74	9.854						
	10	74	6.315	6	0.850				
	11	74	28.600	9	3.625				
	12	74	17.613	8	40.493				
	1	75	2.747	11	2.435				
	2	75	38.228	9	25.429				
	3	75	14.725	9	0.0				
	4	75	8.269	6	1.699	20	2.294		
	5	75	16.679	4	79.854	9	0.0	18	13.394
	6	75	12.544	8	13.932				
	7	75	0.850	13	0.204				
	8	75	0.164	8	0.170				
4833ZZ	9	74	14.357						
	10	74	30.582						
	11	74	139.036						
	12	74	85.517						
	1	75	13.394						
	2	75	186.325						
	3	75	71.358						
	4	75	40.210						
	5	75	108.170						
	6	75	46.156						
	7	75	3.511						
	8	75	2.605						

APPENDIX D

PHYSICAL and CHEMICAL DATA

STORET RETRIEVAL DATE 76/02/11

483301
33 18 33 0 094 09 41.0
TEXARKANA LAKE
48067 TEXAS

11EPALES
3

2111202
0007 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CONDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CAC03 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
74/03/22	09 40	0000	15.6		28	194	7.65	61	0.030	0.600	0.030	0.020
	09 40	0002	15.6	9.0		194						
	09 40	0004	15.6	9.0		195	7.50	60	0.040	0.600	0.030	0.016
74/05/31	13 40	0000	27.4		30	243	8.10	52	0.070	0.700	0.070	0.019
	13 40	0002	27.4	6.8		243						
	13 40	0007	27.4	6.8		243	8.00	50	0.060	0.700	0.060	0.014
74/08/23	11 25	0000	28.5	2.8	35	199	7.45					
	11 25	0015	28.2	2.6		199	7.40					
74/11/08	08 45	0000	16.3	7.4	14	105	6.62	37	0.080	0.800	0.060	0.096
	08 45	0005	16.6	7.0		99	6.75	37	0.070	0.500	0.040	0.096
	08 45	0010	16.8	6.6		108	6.69	41	0.080	0.500	0.050	0.108

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L	00031 INCDT LT REMNING PERCENT
74/03/22	09 40	0000	0.049	10.0	
	09 40	0004	0.058		
74/05/31	13 40	0000	0.084	14.1	
	13 40	0007	0.082		
74/08/23	11 25	0000		13.7	
74/11/08	08 45	0000	0.167	7.6	
	08 45	0005	0.164		
	08 45	0010	0.191		

STORET RETRIEVAL DATE 75/02/11

483302
33 19 35.0 094 10 39.0
TEXARKANA LAKE
48037 TEXAS

11EPALES
3

2111202
0012 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CONDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CAC03 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
74/03/22	10 00	0000	16.4		26	177	7.40	47	0.040	0.600	0.040	0.022
	10 00	0003	16.4	8.7		177						
	10 00	0008	16.4	8.8		178	7.40	47	0.040	0.500	0.030	0.020
74/05/31	13 30	0000	27.3		36	245	8.00	49	0.070	0.800	0.070	0.013
	13 30	0005	27.3	6.8		242	8.00	48	0.070	0.600	0.060	0.013
	13 30	0013	27.3	6.8		245	7.90	48	0.060	0.600	0.050	0.015
74/08/23	11 45	0000	29.8	7.0	36	203	8.30					
	11 45	0015	29.1	3.4		202	7.80					
74/11/08	09 05	0000	18.0	7.2	23	110	7.06	36	0.050	0.500	0.040	0.024
	09 05	0005	18.4			109	6.99	35	0.040	0.400	0.040	0.057
	09 05	0015	18.1	7.6		110	6.96	34	0.040	0.300	0.040	0.049

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L	00031 INCDT LT REMNING PERCENT
74/03/22	10 00	0000	0.058	11.9	
	10 00	0008	0.058		
74/05/31	13 30	0000	0.073	32.1	
	13 30	0005	0.077		
	13 30	0013	0.074		
74/08/23	11 45	0000		15.2	
74/11/08	09 05	0000	0.087	13.7	
	09 05	0005	0.090		
	09 05	0015	0.101		

STORET RETRIEVAL DATE 76/02/11

483303
33 14 33.0 C94 14 37.0
TEXARKANA LAKE
48067 TEXAS

11EPALES
3

2111202
0015 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CONDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CAC03 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
74/03/22	10 25	0000	13.6		13	270	7.80	72	0.060	0.800	0.150	0.030
	10 25	0005	13.6	9.0		271	7.70	72	0.060	1.000	0.180	0.032
	10 25	0011	13.5	9.4		270	7.70	75	0.060	0.900	0.180	0.030
74/05/31	11 55	0000	27.1		18	237	8.20	71	0.090	0.800	0.170	0.061
	11 55	0005	27.1	7.2		235	8.15	70	0.060	0.800	0.160	0.026
	11 55	0015	27.0	7.2		237	8.00	55	0.100	0.800	0.170	0.028
74/08/23	10 55	0000	29.9	5.2	24	216	7.80					
	10 55	0016	29.5	3.8		216	7.45					
74/11/08	09 30	0000	16.5	6.2	10	144	6.48	58	0.070	0.500	0.040	0.084
	09 30	0005	16.7	5.0		143	6.34	35	0.040	0.400	0.050	0.047

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L	00031 INCDT LT REMNING PERCENT
74/03/22	10 25	0000	0.106	24.0	
	10 25	0005	0.113		
	10 25	0011	0.110		
74/05/31	11 55	0000	0.114	57.0	
	11 55	0005	0.117		
	11 55	0015	0.127		
74/08/23	10 55	0000		16.8	
74/11/08	09 30	0000	0.218	3.7	
	09 30	0005	0.105		

STORED RETRIEVAL DATE 76/02/11

483304
33 15 51.0 094 20 57.0
TEXARKANA LAKE
48067 TEXAS

			11EPALES 3											2111202 0003 FEET DEPTH	
DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CONDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CAC03 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			
74/03/22	10 45	0000	16.0	7.2	9	199	7.20	47	0.120	1.000	0.180	0.047			
74/05/31	11 40	0000	28.0		18	328	7.65	109	0.050	1.000	0.060	0.037			
	11 40	0003	27.9	5.4		335	7.60	109	0.040	0.900	0.130	0.029			
74/08/23	10 40	0000	20.2	4.2	13	261	7.40								
	10 40	0005	30.1	4.0		263	7.40								
74/11/08	09 50	0000	16.8	6.2	11	125	6.41	47	0.050	0.600	0.020K	0.141			

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L	00031 INCDT LT REMNING PERCENT
74/03/22	10 45	0000	0.188	16.1	
74/05/31	11 40	0000	0.187	53.0	
	11 40	0003	0.169		1.0
74/08/23	10 40	0000		15.5	
74/11/08	09 50	0000	0.227	1.5	

K VALUE KNOWN TO BE
LESS THAN INDICATED

APPENDIX E
TRIBUTARY AND WASTEWATER
TREATMENT PLANT DATA

STORET RETRIEVAL DATE 76/03/10

483341
 33 17 50.0 094 08 20.0 4
 SULPHUR RIVER
 48231 7.5 L TEXARKANA
 O/LAKE TEXARKANA
 BANK SAMP 1.5 MI SE OF JCT W US RT 59
 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	09 00		0.012	0.800	0.012	0.025	0.040
74/10/06	09 00		0.016	1.100	0.125	0.060	0.260
74/11/10	09 00		0.032	1.100	0.080	0.065	0.130
74/12/09	09 00		0.088	0.600	0.088	0.100	0.120
75/01/11	11 10		0.144	0.400	0.040	0.064	0.120
75/02/08	13 00		0.155	0.575	0.042	0.057	0.120
75/03/08	12 30		0.165	0.750	0.045	0.065	0.120
75/04/05	17 00		0.200	0.600	0.200	0.035	0.100
75/04/19	14 40		0.175	1.000	0.143	0.022	0.120
75/05/03	07 30		0.120	1.000	0.055	0.050	0.150
75/05/17	08 00		0.135	0.700	0.080	0.055	0.171
75/06/07	13 00		0.005	0.850	0.145	0.005K	0.020
75/07/12	09 00		0.015	1.600	0.040	0.020	0.120
75/08/09	08 00		0.360	0.450	0.010	0.050	0.130

K VALUE KNOWN TO BE
 LESS THAN INDICATED

STORET RETRIEVAL DATE 76/03/10

483351
 33 23 36.0 094 14 20.0 4
 E FK ELLIOT CREEK
 48 7.5 LEARY
 T/LAKE TEXARKANA
 HWY 991 BRDG 5 MI W OF JCT W US RT 67
 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	14	10	1.800	2.200	1.250	0.130	0.260
74/10/06	13	00	0.016	0.300	0.025	0.030	0.080
74/11/10	10	00	0.528	1.900	1.450	0.090	0.160
74/12/09	13	00	0.144	2.000	1.300	0.096	0.210
75/01/11	10	45	0.016	1.700	0.960	0.080	0.180
75/02/08	10	30	0.960	2.800	2.200	0.160	0.280
75/03/08	10	20	0.960	3.150	1.100	0.155	0.280
75/04/05	13	45	0.050	0.800	0.070	0.015	0.090
75/04/19	13	20	0.045	0.750	0.095	0.020	0.090
75/05/03	13	10	3.400	0.575	0.030	0.095	0.245
75/05/17	13	00	3.600	0.400	0.030	0.095	0.210
75/06/07	10	00	0.170	0.350	0.075	0.005K	0.020
75/07/12	10	00	0.010	1.550	0.025	0.020	0.170
75/08/09	08	30	0.380	0.900	0.030	0.050	0.140

K VALUE KNOWN TO BE
 LESS THAN INDICATED

STORET RETRIEVAL DATE 75/03/10

4833C1
33 21 45.7 094 21 25.0 4
ROCK CREEK
48 7.5 MAUD
T/LAKE TEXARKANA
HWY A BRDG 2.8 MI NW OF JCT W US RT 67
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE	TIME	DEPTH	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS URTHO MG/L P	00665 PHOS-TOT MG/L P
FROM	OF						
TO	DAY	FEET					
74/09/07	14	50	0.064	0.800	0.075	0.030	0.085
74/10/06	15	00	0.048	0.400	0.030	0.015	0.050
74/11/10	13	00	0.032	0.800	0.035	0.015	0.030
74/12/09	10	00	0.104	0.600	0.160	0.048	0.090
75/01/11	13	00	0.008	0.300	0.048	0.015	0.040
75/02/08	08	30	0.005	0.350	0.025	0.015	0.030
75/03/08	09	50	0.005	0.300	0.020	0.015	0.040
75/04/05	10	00	0.075	0.150	0.095	0.010	0.040
75/04/19	09	30	0.110	0.400	0.055	0.012	0.070
75/05/03	08	30	0.020	0.600	0.060	0.015	0.030
75/05/17	08	45	0.020	0.450	0.055	0.030	0.040
75/06/07	09	00	0.005	1.000	0.090	0.005K	0.020
75/07/12	14	20	0.010	1.950	0.025	0.020	0.200
75/08/09	09	20	0.360	0.500	0.010	0.050	0.120

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/03/10

483301
 33 22 49.0 094 15 47.0 4
 ELLIOT CREEK RES
 48 7.5 HOOKS
 T/LAKE TEXARKANA
 DAM SPILLWAY 1.5 N OF REDWATER
 11EPALES 2111204
 0000 FEET DEPTH CLASS 00

DATE	TIME	DEPTH	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
FROM	OF						
TO	DAY	FEET					
74/09/07	13	50	0.032	0.700	0.200	0.005	0.025
74/10/06	08	00	0.136	0.450	0.090	0.010	0.025
74/11/04	13	20	0.056	1.100	0.085	0.015	0.030
74/12/09	14	20	0.008	0.500	0.016	0.025	0.085
75/01/11	09	30	0.048	0.300	0.008K	0.020	0.070
75/02/08	09	45	0.100	0.600	0.035	0.015	0.050
75/04/05	12	30	0.025	0.250	0.065	0.005	0.040
75/04/19	12	45	0.015	0.500	0.065	0.010	0.040
75/05/03	12	30	0.010	0.800	0.063	0.007	0.030
75/05/17	12	15	0.015	0.600	0.060	0.010	0.040
75/06/07	15	10	0.005	1.050	0.110	0.005K	0.030

K VALUE KNOWN TO BE
 LESS THAN INDICATED

STORET RETRIEVAL DATE 76/03/10

4R33E1
 33 24 07.0 094 19 10.0 4
 CANEY CREEK RES
 48 7.5 HOOKS
 T/LAKE TEXARKANA
 2NDRY RD BRDG 0.1 MI S CANEY DAM SPILLWY
 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	13 30		0.072	0.800	0.050	0.010	0.080
74/10/05	09 15		0.080	0.600	0.035		0.065
74/11/09	13 50		0.056	1.200	0.125	0.015	0.070
74/12/09	14 00		0.056	0.500	0.144	0.015	0.040
75/01/11	09 30		0.136	0.500	0.024	0.005	0.030
75/02/08	09 00		0.100	0.700	0.025	0.015	0.050
75/03/08	11 00		0.100	0.550	0.025	0.015	0.080
75/05/03	13 00		0.020	0.750	0.040	0.015	0.050
75/05/17	12 45		0.015	0.500	0.060	0.015	0.040
75/06/07	14 00		0.100	0.300	0.075	0.023	0.025

STORET RETRIEVAL DATE 76/03/10

4233F1
 33 23 05.1 094 22 52.0 4
 BIG CREEK
 48 7.5 NEW BOSTON
 T/LAKE TEXARKANA
 2NDRY RD BRDG 1.4 MI W JCT W HWY 8
 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	14 40		0.880	1.100	0.090	0.900	0.930
74/10/05	14 30		0.680	0.800	0.040	0.380	0.500
74/11/10	14 45		0.560	0.900	0.075	0.460	0.460
74/12/08	09 30		0.016	0.400	0.088	0.015	0.040
75/01/11	12 15		0.008	0.700	0.048	0.170	0.250
75/02/08	08 15		0.005	1.100	0.015	0.480	0.690
75/03/08	09 35		0.010	1.650	0.020	0.480	0.660
75/04/05	09 30		0.440	0.200	0.032	0.210	0.340
75/04/19	09 10		0.500	0.550	0.070	0.220	0.460
75/05/03	08 00		0.095	1.500	0.095	0.190	0.330
75/05/17	09 15		0.120	0.750	0.095	0.185	0.240
75/05/24	16 20		0.480	0.600	0.030	0.010	0.070
75/06/07	08 20		0.005	0.950	0.300	0.005K	0.020
75/08/09	10 00		0.360	0.400	0.010	0.050	0.120

K VALUE KNOWN TO BE
 LESS THAN INDICATED

STORET RETRIEVAL DATE 76/03/10

483361
 33 23 40.0 094 25 40.0 4
 RICE CREEK
 48 7.5 NEW BOSTON
 T/LAKE TEXARKANA
 HWY 2149 BRDG 1.0 MI SW OF OLD BOSTON
 11EPALES 2111204
 0000 FEET DEPTH CLASS 00

DATE	TIME	DEPTH	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
FROM TO	OF DAY	FEET					
74/09/07	16 00		0.064	0.700	0.040	0.040	0.070
74/10/05	14 00		0.024	0.900	0.035	0.020	0.100
74/11/10	15 00		0.064	0.800	0.050	0.020	0.050
74/12/08	09 30		0.352	0.500	0.168	0.220	0.300
75/01/11	13 20		0.032	0.900	0.048	0.030	0.090
75/02/08	07 50		0.015	1.250	0.035	0.030	0.050
75/03/08	09 15		0.015	0.750	0.025	0.025	0.060
75/04/05	09 00		0.055	0.300	0.190	0.005	0.040
75/04/19	08 45		0.065	0.450	0.090	0.010	0.060
75/05/03	09 40		0.045	0.900	0.150	0.050	0.120
75/05/17	08 55		0.050	0.700	0.045	0.055	0.110
75/05/24	16 00		0.490	0.700	0.035	0.010	0.080
75/06/07	08 00		0.005	0.900	0.470	0.005K	0.020

K VALUE KNOWN TO BE
 LESS THAN INDICATED

STORET RETRIEVAL DATE 76/03/10

4433H1
33 23 03.0 094 29 55.0 4
ANDERSON CREEK
48 7.5 NEW BOSTON
T/LAKE TEXARKANA
HWY 95 BRDG 4.2 MI SW OF JCT W HWY 1840
11EPALS 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	16 30		0.240	1.050	0.030	0.230	0.210
74/10/05	13 00		0.200		0.025	0.135	0.190
74/11/10	14 20		0.136	0.900	0.050	0.095	0.150
74/12/09	09 20		0.040	1.000	0.232	0.095	0.210
75/01/11	09 00		0.368	1.700	0.184	0.175	0.400
75/02/08	07 30		0.690	1.100	0.040	0.055	0.110
75/03/08	09 00		0.700	0.800	0.035	0.060	0.090
75/04/05	08 10		0.540	0.500	0.145	0.015	0.090
75/04/19	08 00		0.210	0.600	0.095	0.025	0.110
75/05/04	09 00		0.145	0.950	0.100	0.130	0.220
75/05/17	10 00		0.140	0.900	0.055	0.130	0.190
75/06/07	07 30		0.005	0.525	0.100	0.005K	0.020
75/07/12	15 35		0.015	1.850	0.065	0.020	0.130
75/08/09	14 30		0.375	0.450	0.010	0.050	0.120

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/03/10

4833J1
33 16 12.0 094 49 35.0 4
MORSE CREEK
48 7.5 COOPERS CHAP
T/ LAKE TEXARKANA
BRDG ON PRIVATE RD 2.8 MI E COOPERS CHAP
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
74/09/11	13 30		0.036	1.000	0.060	0.135	0.150
74/10/06	15 00		0.720	0.900	0.022	0.133	0.390
74/11/09	09 30		0.024	1.200	0.070	0.025	0.040
74/12/09	16 20		0.016	1.100	0.032	0.030	0.090
75/01/12	11 00		0.016	0.800	0.050	0.024	0.090
75/02/09	08 30		0.345	0.750	0.025	0.075	0.200
75/03/07	08 00		0.315	0.975	0.080	0.080	0.185
75/04/06	10 00		0.035	0.400	0.240	0.005	0.025
75/04/20	13 30		0.160	0.400	0.085	0.005	0.010K
75/05/04	10 30		0.045	0.500	0.055	0.025	0.090
75/05/18	11 00		0.045	0.750	0.055	0.025	0.080
75/06/08	13 00		0.025	0.850	0.050	0.005K	0.020
75/07/13	09 30		0.275	0.350	0.010	0.010	0.030
75/08/09	10 00		0.400	0.450	0.010	0.050	0.130

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/03/10

4833R1
 33 18 01.0 094 49 21.0 4
 WHITE OAK CREEK
 48 7.5 COOPERS CHAP
 T/ LAKE TEXARKANA
 BRDG ON PRIVATE RD 2.0 MI S JCT W HWY 71
 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
74/09/11	14	00	0.156	1.100	0.080	0.080	0.145
74/10/06	14	00	0.136	0.900	0.050	0.075	0.140
74/11/09	09	10	0.016	1.400	0.045	0.095	0.130
74/12/09	16	00	0.088	0.900	0.040	0.050	0.140
75/01/12	10	00	0.088	1.000	0.048	0.048	0.130
75/02/09	09	30	0.015	0.900	0.145	0.010	0.040
75/03/07	10	00	0.270	1.100	0.050	0.065	0.160
75/04/06	11	00	0.230	0.800	0.165	0.035	0.120
75/04/20	10	30	0.330	0.950	0.085	0.045	0.130
75/05/04	11	30	0.125	0.700	0.085	0.065	0.140
75/05/18	11	30	0.125	0.900	0.080	0.060	0.140
75/06/08	11	00	0.015	0.500	0.050	0.005	0.020
75/07/13	10	20	0.075	0.400	0.005	0.007	0.020
75/08/09	14	00	0.460	0.550	0.010	0.055	0.140

STORET RETRIEVAL DATE 76/03/10

4233L1
 33 22 35.0 095 06 50.0 4
 SULPHUR RIVER
 48387 RED RIVER CO MAP
 T/LAKE TEXARKANA
 US HWY 271 RDG 3 MI SE OF JOHNTOWN
 ILEPALES 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
74/09/11	11 30		0.044	0.700	0.030	0.120	0.187
74/10/06	09 30		0.072	0.700	0.040	0.105	0.200
74/11/09	09 50		0.024	1.300	0.170	0.210	0.260
74/12/09	15 45		0.128	1.300	0.072	0.050	0.180
75/01/12	09 00		0.128	1.200	0.032	0.048	0.190
75/02/09	10 20		0.250	0.800	0.050	0.065	0.150
75/03/07	10 30		0.015	0.800	0.040	0.015	0.040
75/04/06	09 00		0.400	0.450	0.050	0.040	0.110
75/04/20	09 10		0.210	1.050	0.095	0.040	0.140
75/05/04	12 15		0.300	0.500	0.012	0.045	0.130
75/05/18	12 00		0.345	0.700	0.015	0.040	0.130
75/06/08	09 30		0.015	0.500	0.040	0.005	0.030
75/07/13	13 30		1.500	0.350	0.005K	0.010	0.025
75/08/08	13 00		0.410	0.450	0.010	0.050	0.130

K VALUE KNOWN TO BE
 LESS THAN INDICATED

STORET RETRIEVAL DATE 76/03/10

4433M1
33 26 50.0 194 59 00.0 4
CUTHAND CREEK
48 RED RIVER CO MAP
T/LAKE TEXARKANA
SEC RD 1487 BRDG .6 MI E OF MAPLE
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
74/10/06	16 00		0.056	0.600	0.020	0.125	0.150
74/11/09	10 45		0.136	1.400	0.200	0.140	0.190
74/12/08	13 00		0.072	0.650	0.112	0.040	0.080
75/01/11	17 45		0.080	1.100	0.128	0.045	0.080
75/02/09	15 20		1.050	0.650	0.016	0.005K	0.010K
75/04/06	13 00		0.050	0.550	0.060	0.080	0.120
75/04/20	17 10		0.055	0.900	0.065	0.080	0.160
75/05/04	17 30		0.050	0.700	0.055	0.080	0.150
75/05/18	17 00		0.050	0.900	0.045	0.080	0.160
75/06/08	16 20		0.015	1.000	0.060	0.005K	0.030
75/07/13	15 45		1.150	0.300	0.005K	0.010	0.030
75/08/08	17 30		0.410	0.450	0.012	0.050	0.120

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/03/10

4833FA AS4833FA P001100
 33 20 00.0 094 20 00.0 4
 MAUD
 48 7.5 MAUD
 T/LAKE TEXARKANA
 BIG CREEK TO SULPHUR RIVER
 11EPALES 2141204
 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	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
74/08/12	11 00								
CP(T)-			0.640	3.400	0.350	14.500	15.000	0.045	0.045
74/08/12	15 00								
74/09/16	10 00								
CP(T)-			4.100	5.120	1.150	5.750	6.300	0.065	0.055
74/09/16	16 00								
74/10/23	10 15								
CP(T)-			5.520	2.100	0.094	12.500		0.045	0.048
74/10/23	15 00								
74/11/15	11 00								
CP(T)-			5.400	2.400	0.920	3.100	3.200	0.060	0.060
74/11/15	16 00								
74/12/19	10 00								
CP(T)-			5.520	1.900	0.050K	3.500	3.650	0.060	0.075
74/12/19	15 30								
75/01/27	14 10		4.640	3.900	2.300		5.000	0.045	0.055
75/02/24	12 30		3.360	5.600	2.840	2.720		0.075	0.075
75/03/20	14 20		3.840	5.500	1.450	2.300	3.800	0.095	0.075
75/04/17	10 00		3.400	0.500K	0.050K	3.300	3.400	0.080	0.085
75/05/27	10 00		3.300	1.250	0.190	5.020	5.200	0.065	0.068
75/06/27	10 30		4.700	2.700	0.320	7.003	7.900	0.060	0.060
75/07/15	10 00			3.300	0.120	5.750	10.400	0.060	0.065
75/08/04	09 40		4.900	2.300	0.050K	11.000	11.500	0.055	0.060

K VALUE KNOWN TO BE
 LESS THAN INDICATED

STORET RETRIEVAL DATE 75/03/10

4833XA PJ4833XA P
 33 22 00.0 094 15 00.0 4
 REWATER
 48387 7.5 MAUD
 T/LAKE TEXARKANA
 LAKE WRIGHT PATMAN TO SULPEUR RIVER
 11EPALES 2141204
 0000 FEET DEPTH CLASS 00

DATE	TIME	DEPTH	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	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
FROM TO	OF DAY	FEET							
74/10/14	17 00		0.120	15.000	0.880	9.000	15.000	0.013	0.013
74/11/21	14 30		0.880	10.750	0.210	5.200	5.900	0.013	0.013
74/12/26	10 30		0.400	8.600	0.530	3.750	5.100	0.013	0.013
75/01/27	14 30		0.800	23.000	0.920	5.400	8.100	0.013	0.013
75/03/09	16 15		0.320	11.000	0.410	3.900	5.500	0.013	0.013
75/06/20	14 30		0.300	14.800	1.350	8.600	9.150	0.013	0.013
75/07/29	18 30		0.200	15.500	0.800	11.000	11.000	0.013	0.013
75/09/10			0.150	18.500	0.530	14.500	16.000	0.013	0.013