U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL EUTROPHICATION SURVEY

WORKING PAPER SERIES

REPORT

ON

COCODRIE LAKE

RAPIDES PARISH

LOUISIANA

EPA REGION VI

WORKING PAPER No. 535

CORVALLIS ENVIRONMENTAL RESEARCH LABORATORY - CORVALLIS, OREGON

and

ENVIRONMENTAL MONITORING & SUPPORT LABORATORY - LAS VEGAS, NEVADA

☆G.P.O. 699-440

REPORT

ON

COCODRIE LAKE

RAPIDES PARISH

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EPA REGION VI

WORKING PAPER No. 535

WITH THE COOPERATION OF THE

LOUISIANA WILD LIFE AND FISHERIES COMMISSION

AND THE

LOUISIANA NATIONAL GUARD

MARCH, 1977

REPORT ON COCODRIE LAKE

RAPIDES PARISH, LOUISIANA

EPA REGION VI

by

National Eutrophication Survey

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

and

Special Studies Branch
Corvallis Environmental Research Laboratory
Corvallis, Oregon

Working Paper No. 535

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

March 1977

CONTENTS

FOREWORD

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to freshwater lakes and reservoirs.

OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impact on selected freshwater lakes as a basis for formulating comprehensive and coordinated national, regional, and state management practices relating to point source discharge reduction and nonpoint source pollution abatement in lake watersheds.

ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

a. A generalized representation or model relating sources, concentrations, and impacts can be constructed.

b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin, and related nutrients.

c. With such a transformation, an assessment of the potential for eutrophication control can be made.

LAKE ANALYSIS

In this report, the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin is documented. The report is formatted to provide state environmental agencies with specific information for basin planning [§303(e)], water quality criteria/standards review [§303(c)], clean lakes [§314(a,b)], and water quality monitoring [§106 and §305(b)] activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

Beyond the single lake analysis, broader based correlations between nutrient concentrations (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's freshwater lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export, and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by the U.S. Environmental Protection Agency and to augment plans implementation by the states.

ACKNOWLEDGMENTS

The staff of the National Eutrophication Survey (Office of Research and Development, U.S. Environmental Protection Agency) expresses sincere appreciation to the Louisiana Wild Life and Fisheries Commission, Division of Water Pollution Control for professional involvement, to the Louisiana National Guard for conducting the tributary sampling phase of the Survey, and to those Louisiana wastewater treatment plant operators who provided effluent samples and flow data.

Robert A. Lafleur, Chief; J. Dale Givens, Assistant Chief; Lewis R. Still, Biologist; Louis Johnson, Biologist; Lee Caubarreaux, Biologist; Darrell Reed, Engineer; Dempsey Alford, Biologist; and Elwood Goodwin, Water Quality Control Technician, all of the Louisiana Wild Life and Fisheries Commission, Division of Water Pollution Control reviewed the preliminary reports and provided critiques most useful in the preparation of this Working Paper Series.

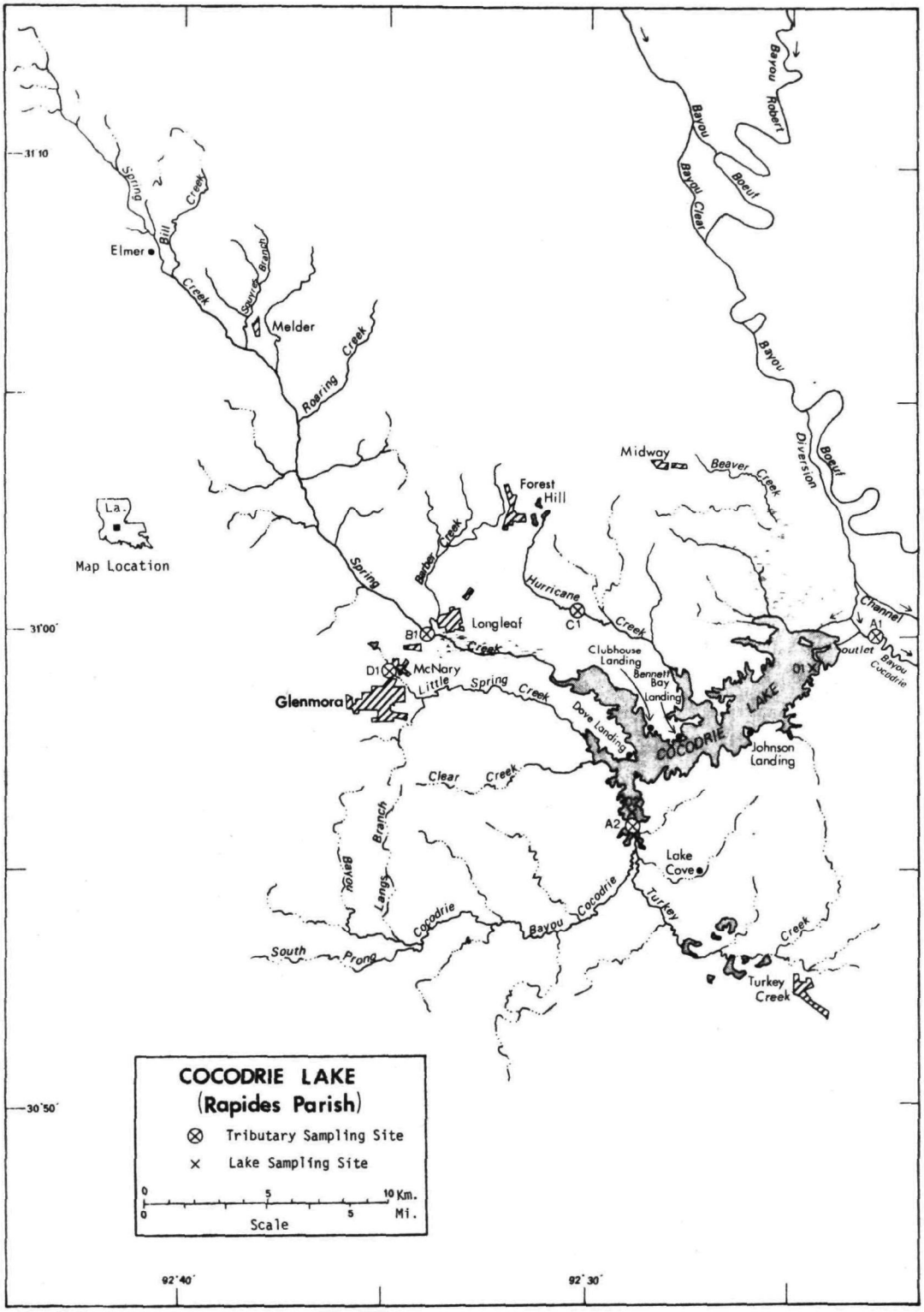
Major General O'Neil Daigle, Jr., the Adjutant General of Louisiana, and Project Officer Colonel Lawrence P. Dupre, who directed the volunteer efforts of the Louisiana National Guardsmen, are also gratefully acknowledged for their assistance to the Survey.

NATIONAL EUTROPHICATION SURVEY

STUDY LAKES

STATE OF LOUISIANA

LAKE NAME	PARISH
Anacoco Lake	Vernon
Lake Bistineau	Bienville, Webster
Black Bayou	Caddo
Black Lake	Natchitoches and Red River
Bruin Lake	Tensas
Bundick Lake	Beauregard
Caddo Lake	Caddo (Menon and Harrison in Texas)
Cocodrie Lake	Concordia
Cocodrie Lake (Lower)	Rapides
Concordia Lake	Concordia
Cotile Lake	Rapides
Cross Lake	Caddo
D'Arbonne Lake	Union
False River Lake	Pointe Coupee
Indian Creek Reservoir	Rapides
Saline Lake	LaSalle
Turkey Creek Lake	Franklin
Lake Vernon	Vernon
Lake Verret	Assumption


COCODRIE LAKE
(Rapides Parish)
Tributary Sampling Site
Lake Sampling Site
0 5 10 Km.
0 5 Mi.
Scale
Map Location
La.
Elmer
Melder
Glenmora
Longleaf
McNary
Forest Hill
Midway
Lake Cove
Johnson Landing
Clubhouse Landing
Bennett Bay Landing
Dove Landing
Turkey Creek
Spring Bill Creek
Spring Branch
Roaring Creek
Spring Creek
Parker Creek
Hurricane Creek
Beaver Creek
Little Spring Creek
Clear Creek
Bayou Lang
Bayou Cocodrie
South Prong
Turkey Creek
Bayou Robert
Bayou Boeuf
Bayou Cleal
Boeuf Diversion
Channel
Outlet
Bayou Cocodrie
A1
A2
B1
C1
D1
O1
31°10'
31°00'
30°50'
92°40'
92°30'

REPORT ON COCODRIE LAKE, LOUISIANA

STORET NO. 2220

1. CONCLUSIONS

A. Trophic Condition:*

On the basis of field observations and Survey data Cocodrie Lake is considered eutrophic, i.e., nutrient rich and highly productive. Whether such nutrient enrichment is to be considered beneficial or deleterious is determined by its actual or potential impact upon designated beneficial water uses.

Chlorophyll a levels in the lake were very high, ranging from 22.3 µg/l to 53.8 µg/l with a mean of 33.4 µg/l. Of the 19 Louisiana lakes sampled in 1974, 4 had greater median total phosphorus, 8 had greater median dissolved orthophosphorus and 18 had greater median inorganic nitrogen than Cocodrie Lake.

Survey limnologists noted abundant aquatic plants at Station 01 during March sampling. Ketelle and Uttormark (1971) reported that the lake had problems with silt pollution due to runoff from past gravel dredging operations.

*See Appendix E.

B. Rate-Limiting Nutrient:

Mean inorganic nitrogen to orthophosphorus ratios (N/P) for Cocodrie Lake were 13/1 or less on both sampling occasions suggesting primary limitation by nitrogen. Algal assay results show high potential for primary production in the reservoir, and support nitrogen limitation.

C. Nutrient Controllability:

1. Point sources -

There were no known point sources impacting Cocodrie Lake during the sampling year. The mean annual phosphorus loading of 0.60 g $P/m^2/yr$ was less than the "oligotrophic" level proposed by Vollenweider (1975) for a lake with such volume and retention time. However, the calculated loading for Cocodrie Lake is somewhat underestimated. The nutrient concentrations in Little Spring Creek were substantially higher than those of any other sampled tributary entering the lake (Section IV-E). Since Little Spring Creek was not gaged, and is included in the estimated ungaged nutrient loading to the lake (based upon background loading from other gaged tributaries), it is likely that the true nutrient loads to Cocodrie Lake are much higher than indicated herein. Additional sampling is needed to determine an accurate nutrient budget for the lake.

2. Nonpoint sources -

The mean annual phosphorus loads from measured tributaries amounted to 62.0% of the total load reaching Cocodrie Lake. Cocodrie Bayou contributed 45.2% of the total nonpoint load, and ungaged tributaries were estimated to have contributed 34.9%.

In general, few lakes are nitrogen limited as a result of low nitrogen. Rather, excessive phosphorus levels shift limitations to nitrogen or other factors. Regardless of the primary nutrient limitation suggested by either algal assay or nutrient ratios, the most feasible approach to nutrient control, if desirable, is through available phosphorus control technology and subsequent establishment of phosphorus limitation within the water body.

II. LAKE AND DRAINAGE BASIN CHARACTERISTICS

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

A. Lake Morphometry:

1. Surface area: 24.68 km^2.
2. Mean depth: 0.5 meters.
3. Maximum depth: 4.3 meters.
4. Volume: 13.569 x 10^6 m^3.
5. Mean hydraulic retention time: 14 days.

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

1. Tributaries -

Name	Drainage area (km^2)	Mean flow (m^3/sec)
A-2 Cocodrie Bayou	186.7	2.56
B-1 Spring Creek	177.7	2.44
Minor tributaries and immediate drainage -	205.0	4.66
Totals	569.4	9.66
2. Outlet - A-1 Cocodrie Bayou	621.4	11.24

C. Precipitation:

1. Year of sampling: 176.2 cm.
2. Mean annual: 155.4 cm.

III. LAKE WATER QUALITY SUMMARY

Cocodrie Lake was sampled two times during the open-water season of 1974 by means of a pontoon-equipped Huey helicopter. Each time, samples for physical and chemical parameters were collected from two stations on the lake (Station 02 was sampled only once) and from a number of depths at each station (see map, page v). During each visit, depth-integrated samples were collected from each station for chlorophyll a analysis and phytoplankton identification and enumeration. During the last visit, an 18.9-liter depth-integrated sample was composited for algal assays. Maximum depths sampled were 2.4 meters at Station 01 and 2.4 meters at Station 02. For a more detailed explanation of NES methods, see NES Working Paper No. 175.

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

COCODRIE
STORET CODE 2220

PHYSICAL AND CHEMICAL CHARACTERISTICS

PARAMETER	(5/29/74) S*** = 1 N*	RANGE	MEDIAN	MAX DEPTH RANGE (METERS)	(11/12/74) S*** = 1 N*	RANGE	MEDIAN	MAX DEPTH RANGE (METERS)
TEMPERATURE (DEG CENT)								
0.-1.5 M DEPTH	2	26.3- 26.8	26.6	0.0- 0.9	2	16.7- 16.7	16.7	0.0- 1.5
MAX DEPTH**	1	26.3- 26.3	26.3	0.9- 0.9	1	16.6- 16.6	16.6	2.4- 2.4
DISSOLVED OXYGEN (MG/L)								
0.-1.5 M DEPTH	1	3.2- 3.2	3.2	0.9- 0.9	2	8.2- 8.2	8.2	0.0- 1.5
MAX DEPTH**	1	3.2- 3.2	3.2	0.9- 0.9	1	8.0- 8.0	8.0	2.4- 2.4
CONDUCTIVITY (UMHOS)								
0.-1.5 M DEPTH	2	58.- 59.	59.	0.0- 0.9	2	167.- 180.	174.	0.0- 1.5
MAX DEPTH**	1	59.- 59.	59.	0.9- 0.9	1	210.- 210.	210.	2.4- 2.4
PH (STANDARD UNITS)								
0.-1.5 M DEPTH	2	6.5- 6.6	6.5	0.0- 0.9	2	7.7- 7.7	7.7	0.0- 1.5
MAX DEPTH**	1	6.5- 6.5	6.5	0.9- 0.9	1	7.6- 7.6	7.6	2.4- 2.4
TOTAL ALKALINITY (MG/L)								
0.-1.5 M DEPTH	2	12.- 13.	13.	0.0- 0.9	2	82.- 82.	82.	0.0- 1.5
MAX DEPTH**	1	13.- 13.	13.	0.9- 0.9	1	82.- 82.	82.	2.4- 2.4
TOTAL P (MG/L)								
0.-1.5 M DEPTH	2	0.070-0.083	0.076	0.0- 0.9	2	0.093-0.130	0.111	0.0- 1.5
MAX DEPTH**	1	0.070-0.070	0.070	0.9- 0.9	1	0.086-0.086	0.086	2.4- 2.4
DISSOLVED ORTHO P (MG/L)								
0.-1.5 M DEPTH	2	0.009-0.010	0.009	0.0- 0.9	2	0.014-0.027	0.020	0.0- 1.5
MAX DEPTH**	1	0.009-0.009	0.009	0.9- 0.9	1	0.014-0.014	0.014	2.4- 2.4
NO2+NO3 (MG/L)								
0.-1.5 M DEPTH	2	0.060-0.060	0.060	0.0- 0.9	2	0.020-0.020	0.020	0.0- 1.5
MAX DEPTH**	1	0.060-0.060	0.060	0.9- 0.9	1	0.020-0.020	0.020	2.4- 2.4
AMMONIA (MG/L)								
0.-1.5 M DEPTH	2	0.060-0.070	0.065	0.0- 0.9	2	0.020-0.030	0.025	0.0- 1.5
MAX DEPTH**	1	0.060-0.060	0.060	0.9- 0.9	1	0.020-0.020	0.020	2.4- 2.4
KJELDAHL N (MG/L)								
0.-1.5 M DEPTH	2	0.900-0.900	0.900	0.0- 0.9	2	0.700-0.800	0.750	0.0- 1.5
MAX DEPTH**	1	0.900-0.900	0.900	0.9- 0.9	1	0.800-0.800	0.800	2.4- 2.4
SECCHI DISC (METERS)								
	1	0.9- 0.9	0.9		1	0.5- 0.5	0.5	

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

B. Biological Characteristics:

1. Phytoplankton -

Sampling Date	Dominant Genera	Algal Units per ml
05/29/74	1. Flagellates	1,592
	2. Dactylococcopsis	1,493
	3. Synedra	1,393
	4. Cryptomonas	1,294
	5. Centric diatom	896
	Other genera	3,481
	Total	10,149
11/12/74	1. Lyngbya	17,947
	2. Dactylococcopsis	6,505
	3. Nitzschia	4,075
	4. Melosira	2,508
	5. Microcystis	940
	Other genera	6,348
	Total	38,323

2. Chlorophyll a -

Sampling Date	Station Number	Chlorophyll a (µg/l)
05/29/74	01	53.8
11/12/74	01	22.3
	02	24.2

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	0.026	0.063	1.8
0.05 P	0.076	0.063	2.7
0.05 P + 1.0 N	0.076	1.063	23.8
1.00 N	0.026	1.063	11.4

2. Discussion -

The control yield of the assay alga, Selenastrum capricornutum, indicates that the potential for primary production in Cocodrie Lake was high at the time of autumn assay sample collection. Strong growth response to the addition of nitrogen, as well as the lack of significant response to the addition of phosphorus indicates nitrogen limitation. Maximum yield was achieved with the simultaneous addition of both nutrients.

Cocodrie Lake was not sampled in March 1974. Consequently, no spring algal assay sample was collected.

The N/P ratios for Cocodrie Lake were 13/1 in the summer and 2/1 during autumn, suggesting primary limitation by nitrogen (an N/P ratio of 14/1 or greater generally reflects phosphorus limitation). It should be noted that significant chemical changes took place in Louisiana lake samples between collection and algal assay. The assay data should be considered in this context and until such difficulties are resolved, used with caution for any prediction of actual lake conditions. Such chemical changes are likely to alter the control yield as well as modifying the N/P ratio.

IV. NUTRIENT LOADINGS
(See Appendix D for data)

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

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

In this report, nutrient loads for sampled tributaries were determined by using a modification of a USGS computer program for calculating stream loadings. Nutrient loads indicated for tributaries are those measured minus known point source loads, if any.

Nutrient loadings for unsampled "minor tributaries and immediate drainage"("ZZ" of USGS) were estimated by using the mean annual of the nutrient loads, in $kg/km^2/yr$, in Cocodrie Bayou and Spring Creek at Stations A-2 and B-1, and multiplying the means by the ZZ area in km^2.

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 (nonpoint load) -		
A-2 Cocodrie Bayou	6,635	45.2
B-1 Spring Creek	2,465	16.8
b. Minor tributaries and immediate drainage (nonpoint load) -	5,125	34.9
c. Known municipal STP's - None		
d. Septic tanks* -	30	0.2
e. Known industrial - None		
f. Direct precipitation** -	430	2.9
Totals	14,685	100.0

2. Output - A-1 Cocodrie Bayou 13,075

3. Net annual P accumulation 1,610

*Estimate based on 100 lakeside residences.
**Estimated (see NES Working Paper No. 175).

C. Annual Total Nitrogen Loading - Average Year:

1. Inputs -

Source	kg N/yr	% of total
a. Tributaries (nonpoint load) -		
A-2 Cocodrie Bayou	64,040	35.5
B-1 Spring Creek	33,950	18.8
b. Minor tributaries and immediate drainage (nonpoint load) -	54,735	30.3
c. Known municipal STP's - None		
d. Septic tanks* -	1,065	0.6
e. Known industrial - None		
f. Direct precipitation** -	26,645	14.8
Totals	180,435	100.0
2. Output - A-1 Cocodrie Bayou	186,195	
3. Net annual N export*** -	5,760	

*Estimate based on 100 lakeside residences.
**Estimated (see NES Working Paper No. 175).
***Export probably due to unknown sources and/or sampling error.

D. Mean Annual Nonpoint Nutrient Export by Subdrainage Area:

Tributary	kg P/km^2/yr	kg N/km^2/yr
Cocodrie Bayou	36	343
Spring Creek	14	191

E. Mean Nutrient Concentrations in Ungaged Streams:

Tributary	Mean Total P (mg/l)	Mean Total N (mg/l)
C-1 Hurricane Creek	0.061	0.438
D-1 Little Spring Creek	0.384	1.893

Nutrient concentrations in Hurricane Creek are in line with those found in the gaged tributaries entering Cocodrie Lake. However, nutrient concentrations in Little Spring Creek are substantially higher. This could be due to the proximity of the D-1 sampling site to the town of Glenmora, or to unknown point sources impacting the creek upstream.

F. Yearly Loadings:

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

Note that Vollenweider's model may not apply to lakes with short hydraulic retention times or in which light penetration is severely restricted by high concentrations of suspended solids in the surface waters.

	Total Yearly Phosphorus Loading ($g/m^2/yr$)
Estimated loading for Cocodrie Lake	0.60
Vollenweider's "eutrophic" loading	1.54
Vollenweider's "oligotrophic" loading	0.77

V. LITERATURE REVIEWED

Ketelle, Martha J. and Paul D. Uttormark. 1971. Problem Lakes in the United States. U.S. Environmental Protection Agency Project #16010 EHR. University of Wisconsin, Madison, Wisc.

U.S. Environmental Protection Agency. 1975. National Eutrophication Survey Methods 1973-1976. Working Paper No. 175. National Environmental Research Center, Las Vegas, Nevada, and Pacific Northwest Environmental Research Laboratory, Corvallis, Oregon.

Vollenweider, R. A. 1975. Input-Output Models With Special Reference to the Phosphorus Loading Concept in Limnology. Schweiz. Z. Hydrol. 37:53-84.

VI. APPENDICES

APPENDIX A

CONVERSION FACTORS

CONVERSION FACTORS

Hectares x 2.471 = acres

Kilometers x 0.6214 = miles

Meters x 3.281 = feet

Cubic meters x 8.107×10^{-4} = acre/feet

Square kilometers x 0.3861 = square miles

Cubic meters/sec x 35.315 = cubic feet/sec

Centimeters x 0.3937 = inches

Kilograms x 2.205 = pounds

Kilograms/square kilometer x 5.711 = lbs/square mile

APPENDIX B

TRIBUTARY FLOW DATA

TRIBUTARY FLOW INFORMATION FOR LOUISIANA 04/11/77

LAKE CODE 2220 COCODRIE LAKE (RAPIDES)

TOTAL DRAINAGE AREA OF LAKE(SQ KM) 621.6

TRIBUTARY	SUB-DRAINAGE AREA(SQ KM)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
		NORMALIZED FLOWS(CMS)												
2220A1	621.6	16.[illegible]	17.27	16.54	16.59	16.91	8.50	6.54	6.26	4.98	4.76	7.53	12.71	11.24
2220A2	186.7	3.[illegible]	3.34	3.51	3.17	2.21	2.04	1.61	1.53	1.84	1.73	2.58	3.94	2.56
2220B1	177.7	3.[illegible]	3.17	3.34	3.03	2.10	1.93	1.53	1.44	1.76	1.64	2.46	3.74	2.44
2220Z2	257.2	6.[illegible]	7.14	6.85	6.88	7.02	3.51	2.72	2.58	2.07	1.98	3.11	5.27	4.66

SUMMARY

TOTAL DRAINAGE AREA OF LAKE = 621.6
SUM OF SUB-DRAINAGE AREAS = 621.6
TOTAL FLOW IN = 116.13
TOTAL FLOW OUT = 135.27

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
2220A1	6	74	7.957	8	8.495				
	7	74	5.267	6	4.899				
	8	74	5.040	10	4.955				
	9	74	6.768	7	5.663				
	10	74	3.341	6	3.710				
	11	74	4.332	2	2.973				
	12	74	16.735	7	21.379				
	1	75	25.174	4	23.276				
	2	75	13.790	1	20.898	23	13.847		
	3	75	13.366	2	8.382	23	18.434		
	4	75	9.911	6	7.079	20	5.465		
	5	75	28.883	4	30.299				
2220A2	6	74	2.209	8	1.812				
	7	74	1.756	6	1.784				
	9	74	1.671	7	1.388				
	10	74	1.359	6	1.359				
	11	74	2.690	2	1.388				
	12	74	4.304	7	20.813				
	1	75	3.228	4	3.653				
	2	75	2.209	1	1.727	23	1.841		
	3	75	3.143	2	1.586	23	2.237		
	4	75	2.973	6	1.699	20	1.642		
	5	75	8.665	4	26.561				
2220B1	6	74	2.090	8	1.727				
	7	74	1.671	6	1.699				
	8	74	1.552	10	1.388				
	9	74	1.591	7	1.331				
	10	74	1.303	6	1.303				
	11	74	2.549	2	1.331				
	12	74	4.106	7	19.822				
	1	75	3.058	4	3.455				
	2	75	2.095	1	1.642	23	1.756		
	3	75	2.973	2	1.501	23	2.124		
	4	75	2.803	6	1.614	20	1.557		
	5	75	8.212	4	25.174				

APPENDIX C

PHYSICAL AND CHEMICAL DATA

STORET RETRIEVAL DATE 75/12/11
NATL EUTROPHICATION SURVEY
EPA-LAS VEGAS

222001
31 30 30.0 091 43 48.0
COCODRIE
22 LOUISIANA

11EPALES 2111202
4 0006 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
74/05/29	14 35	0000	26.8		35	58	6.60	12	0.070	0.900	0.060	0.010
	14 35	0003	26.3	3.2		59	6.50	13	0.060	0.900	0.060	0.009
74/11/12	08 40	0000	16.7	8.2	18	167	7.67	82	0.020	0.800	0.020K	0.014
	08 40	0005	16.7	8.2		180	7.67	82	0.030	0.700	0.020K	0.027
	08 40	0008	16.6	8.0		210	7.63	82	0.020	0.800	0.020K	0.014

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L	00031 INCDT LT REMNING PERCENT
74/05/29	14 35	0000	0.083	53.8	
	14 35	0003	0.070		
74/11/12	08 40	0000	0.093	22.3	
	08 40	0005	0.130		
	08 40	0008	0.086		

— K VALUE KNOWN TO BE LESS THAN INDICATED —

STORET RETRIEVAL DATE 76/01/26
NATL EUTROPHICATION SURVEY
EPA-LAS VEGAS

222002
30 56 00.0 092 28 48.0
COCODRIE LAKE
22079 LOUISIANA

11EPALES
3

2111202
0010 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
74/11/12	08	15 0000	16.6	8.4	12	161	7.60	84	0.030	1.200	0.020K	0.015
	08	15 0005	16.7	8.2		162	7.53	83	0.020	0.800	0.020K	0.014
	08	15 0008	16.7	8.4		159	7.50	81	0.030	0.700	0.020K	0.028

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L	00031 INCDT LT REMNING PERCENT
74/11/12	08	15 0000	0.120	24.2	
	08	15 0003			1.0
	08	15 0005	0.139		
	08	15 0008	0.139		

— K VALUE KNOWN TO BE LESS THAN INDICATED —

APPENDIX D

TRIBUTARY AND WASTEWATER TREATMENT PLANT DATA

STORET RETRIEVAL DATE 77/04/11

2220A1
31 00 00.0 092 22 46.0 4
COCODRIE BAYOU
22 15 LECOMPTE
0/COCODRIE LAKE 101691
BRDG ON US RT 167 6.2 MI S OF LECOMPTE
11EPALES 04001004
0000 FEET DEPTH CLASS 00

/TYPA/AMBNT/STREAM

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
74/06/08	10	35	0.014	0.500K	0.042	0.020	0.025K
74/07/06	15	50	0.052	0.500	0.030	0.015	0.060
74/08/10	13	50	0.004	0.400	0.045	0.010	0.025
74/09/07	11	05	0.016	0.900	0.025	0.015	0.040
74/10/06	10	00	0.016	0.400	0.020	0.010	0.025
74/11/02	10	05	0.016	0.300	0.027	0.022	0.030
74/12/07	14	20	0.008		0.020	0.010	0.040
75/01/04	10	00	0.016	0.500	0.032	0.022	0.050
75/02/01	09	55	0.016	0.500	0.032	0.024	0.040
75/02/23	10	15	0.008	0.400	0.024	0.016	0.040
75/03/02	11	00	0.016	0.700	0.032	0.016	0.070
75/03/23	09	10	0.024	0.500	0.032	0.016	0.035
75/04/06	09	00	0.005	0.450	0.025	0.010	0.020
75/04/20	10	40	0.015	0.450	0.050	0.025	0.030
75/05/04	10	30	0.065	0.600	0.090	0.020	0.030

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 77/04/11

2220A2
30 56 00.0 092 28 45.0 4
COCODRIE BAYOU
22 15 TURKEY CREEK
T/COCODRIE LAKE 101991
SEC RD BRDG 8 MI E OF GLENMORA
11EPALES 04001004
0000 FEET DEPTH CLASS 00

/TYPA/AMBNT/STREAM

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
74/06/08	10 00		0.148	0.500K	0.045	0.042	0.100
74/07/06	15 15		0.152	0.800	0.075	0.060	0.170
74/09/07	10 40		0.100	0.800	0.045	0.050	0.090
74/10/06	10 28		0.056	0.200	0.070	0.070	0.085
74/11/02	10 36		0.040	0.400	0.020	0.010	0.080
74/12/07	13 55		0.024	0.900	0.025	0.015	0.020
75/01/04	10 39		0.028	0.700	0.032	0.025	0.070
75/02/01	10 25		0.040	0.600	0.048	0.040	0.080
75/02/23	10 45		0.040	1.000	0.064	0.032	0.080
75/03/02	11 25		0.060	0.600	0.040	0.056	0.130
75/03/23	09 40		0.048	0.600	0.048	0.032	0.080
75/04/06	10 25		0.105	0.550	0.060	0.045	0.090
75/04/20	11 10		0.125	1.100	0.110	0.040	0.120
75/05/04	11 00		0.095	0.700	0.125	0.040	0.040

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 77/04/11

222081
31 00 00.0 092 33 50.0 4
SPRING CREEK
22 15 FOREST HILL
T/COCODRIE LAKE 101993
BRDG ON HWY 497 3 MI SW OF FOREST HILL
11EPALES 04001004
0000 FEET DEPTH CLASS 00

/TYPA/AMBNT/STREAM

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
74/06/08	09	30	0.104	0.100	0.020	0.011	0.030
74/07/06	15	00	0.104	0.700	0.025	0.010	0.075
74/08/10	12	38	0.080	0.100	0.025	0.010	0.020
74/09/07	10	05	0.084	1.000	0.050	0.015	0.020
74/10/06	11	00	0.080	0.100K	0.015	0.025	0.025
74/11/02	11	15	0.064	0.200	0.025	0.010	0.030
74/12/07	13	20	0.032	0.400	0.040	0.020	
75/01/04	11	11	0.064	0.400	0.024	0.015	0.030
75/02/01	10	50	0.072	0.100K	0.016	0.016	0.020
75/02/23	11	15	0.080	0.200	0.016	0.016	0.030
75/03/02	12	00	0.048	0.500	0.012	0.016	0.040
75/03/23	10	05	0.088	0.400	0.024	0.016	0.030
75/04/06	11	00	0.100	0.150	0.027	0.015	0.020
75/04/20	11	46	0.115	0.600	0.055	0.020	0.070
75/05/04	11	30	0.095	0.500	0.055	0.015	0.020

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 77/04/11

2220C1
31 00 34.0 092 30 10.0 4
HURRICANE CREEK
22 15 FOREST HILL
T/COCODRIE LAKE 101993
BRDG ON SEC RD 2.6 M SE JCT US RT 165
11EPALES 04001004
0000 FEET DEPTH CLASS 00

/TYPA/AMBNT/STREAM

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
74/06/08	09	00	0.136	0.200	0.020	0.011	0.030
74/07/06	14	30	0.120	0.300	0.030	0.010	0.070
74/08/10	12	20	0.132	0.300	0.025	0.005	0.030
74/09/07	09	50	0.132	0.500	0.035	0.010	0.020
74/10/06	11	15	0.144	0.150	0.150	0.010	0.015
74/11/02	11	35	0.176	0.135	0.135	0.050	0.210
74/12/07	13	00	0.072	0.400	0.020	0.025	0.140
75/01/04	11	30	0.064	0.900	0.032	0.055	0.145
75/02/01	10	10	0.136	0.100	0.016	0.016	0.030
75/02/23	11	30	0.112	0.300	0.024	0.016	0.030
75/03/02	12	15	0.088	0.600	0.026	0.008	0.030
75/03/23	10	20	0.112	0.200	0.032	0.016	0.040
75/04/06			0.150	0.400	0.065	0.005K	0.020
75/04/20	12	15	0.155	0.850	0.085	0.015	0.080
75/05/04	11	45	0.160	0.450	0.070	0.020	0.020

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 77/04/11

222001
30 59 05.0 092 34 50.0 4
LITTLE SPRING CREEK
22 15 OAKDALE
T/COCOURIE LAKE 101992
BRDG ON HWY 165 AT N EDGE OF GLENMORA
11EPALES 04001004
0000 FEET DEPTH CLASS 00

/TYPA/AMBNT/STREAM

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
74/06/08	09	50	0.116	1.000	0.165	0.115	0.225
74/07/06	14	50	0.850	1.300	0.085	0.030	0.150
74/08/10	12	47	0.695	2.600	0.430	0.100	0.500
74/09/07	10	15	0.016	3.300	0.020	0.145	0.855
74/10/06	10	50	0.024	5.200	0.125		1.500
74/11/02	11	05	0.056	2.200	0.070		0.560
74/12/07	13	30	0.600	0.600	0.035	0.015	0.020
75/01/04	11	05	0.176	1.200	0.048	0.065	0.150
75/02/01	10	47	0.024	1.200	0.104	0.128	0.330
75/02/23	11	00	0.072	1.500	0.128	0.120	0.310
75/03/02	11	50	0.064	1.100	0.116	0.136	0.260
75/03/23	10	00	0.056	0.900	0.104	0.104	0.190
75/04/06	11	50	0.005	1.350	0.260	0.105	0.280
75/04/20	11	40	0.250	1.400	0.240	0.105	0.250
75/05/04	11	20	0.260	1.350	0.260	0.085	0.180

APPENDIX E

PARAMETRIC RANKINGS OF LAKES SAMPLED BY NES IN 1974

STATE OF LOUISIANA

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
2201	ANACOCO LAKE	0.031	0.080	455.833	8.700	10.400	0.007
2202	BRUIN LAKE	0.057	0.250	450.333	16.350	15.000	0.012
2203	LAKE BISTINEAU	0.061	0.100	458.000	12.933	13.200	0.018
2204	BLACK BAYOU	0.046	0.090	453.417	17.818	12.200	0.009
2205	BUNDICK LAKE	0.157	0.135	469.667	20.467	10.600	0.073
2207	COCODRIE LAKE	0.090	0.400	479.000	35.300	7.700	0.026
2208	COTILE LAKE	0.037	0.100	442.333	12.650	14.000	0.011
2209	CONCORDIA LAKE	0.076	0.080	468.333	32.950	14.800	0.009
2210	CROSS LAKE	0.057	0.080	475.250	38.385	11.400	0.010
2211	D'ARBONNE LAKE	0.038	0.100	458.250	6.800	13.200	0.011
2212	FALSE RIVER LAKE	0.082	0.130	442.500	24.550	14.900	0.023
2213	INDIAN CREEK	0.031	0.150	458.333	21.467	14.800	0.010
2214	SALINE LAKE	0.111	0.350	493.000	15.333	9.600	0.025
2215	TURKEY CREEK LAKE	0.176	0.170	477.833	21.967	14.600	0.033
2216	LAKE VERRET	0.163	0.100	481.428	62.028	12.000	0.056
2217	LAKE VERNON	0.018	0.120	436.667	4.900	14.400	0.007
2219	BLACK LAKE	0.077	0.150	454.000	12.733	11.600	0.015
2220	COCODRIE	0.106	0.050	478.333	33.433	11.800	0.014
4807	CADDO LAKE	0.049	0.070	463.562	20.125	10.000	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
2201	ANACOCO LAKE	92 (16)	83 (14)	67 (12)	89 (16)	83 (15)	94 (17)
2202	BRUIN LAKE	61 (11)	11 (2)	83 (15)	61 (11)	0 (0)	50 (9)
2203	LAKE BISTINEAU	50 (9)	58 (9)	61 (11)	72 (13)	42 (7)	33 (6)
2204	BLACK BAYOU	72 (13)	72 (13)	78 (14)	56 (10)	50 (9)	81 (14)
2205	BUNDICK LAKE	11 (2)	33 (6)	33 (6)	44 (8)	78 (14)	0 (0)
2207	COCODRIE LAKE	28 (5)	0 (0)	11 (2)	11 (2)	100 (18)	17 (3)
2208	COTILE LAKE	83 (15)	58 (9)	94 (17)	83 (15)	33 (6)	61 (11)
2209	CONCORDIA LAKE	44 (8)	83 (14)	39 (7)	22 (4)	14 (2)	81 (14)
2210	CROSS LAKE	56 (10)	83 (14)	28 (5)	6 (1)	72 (13)	69 (12)
2211	D'ARBONNE LAKE	78 (14)	58 (9)	56 (10)	94 (17)	42 (7)	56 (10)
2212	FALSE RIVER LAKE	33 (6)	39 (7)	89 (16)	28 (5)	6 (1)	28 (5)
2213	INDIAN CREEK	92 (16)	28 (5)	50 (9)	39 (7)	14 (2)	69 (12)
2214	SALINE LAKE	17 (3)	6 (1)	0 (0)	67 (12)	94 (17)	22 (4)
2215	TURKEY CREEK LAKE	0 (0)	17 (3)	22 (4)	33 (6)	22 (4)	11 (2)
2216	LAKE VERRET	6 (1)	58 (9)	6 (1)	0 (0)	56 (10)	6 (1)
2217	LAKE VERNON	100 (18)	44 (8)	100 (18)	100 (18)	28 (5)	100 (18)
2219	BLACK LAKE	39 (7)	22 (4)	72 (13)	78 (14)	67 (12)	39 (7)
2220	COCODRIE	22 (4)	100 (18)	17 (3)	17 (3)	61 (11)	44 (8)
4807	CADDO LAKE	67 (12)	94 (17)	44 (8)	50 (9)	89 (16)	89 (16)