'48 ENVIRONMENTAL EVALUATION OF LA PLATA AREA, TOA ALTA SECOND QUARTERLY REPORT (JAN.-MAR., 1962) CENTER FOR ENERGY AND ENVIRONMENT RESEARCH MARINE ECOLOGY DIVISION COLLEGE STATION MAYAGUEZ, PUERTO RICO. Other things? CENTER FOR ENERGY AND ENVIRONMENT RESEARCH.

AN ENVIRONMENTAL EVALUATION OF LA PLATA LAKE, TOA ALTA SECOND QUARTERLY REPORT (JAN.-MAR., 1962) CENTER FOR ENERGY AND ENVIRONMENT RESEARCH MARINE ECOLOGY DIVISION COLLEGE STATION MAYAGUEZ, PUERTO RICO

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23. Soluble Reactive Phosphorus

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This document is a report of work accomplished during the second quarter of the restoration-diagnostic/feasibility study of La Plata Lake. Included are the results and preliminary analyses of the data collected during routine sampling excursions to the study area which correspond to the months of January, February and March, 1982, and an additional sampling event performed on February 4, 1982.

The information which resulted from the first quarter of the study (Oct-Dec., 1981) provided a general indication of the major water quality problems of La Plata Lake. These were identified as hypolimnetic oxygen depletion, eutrophication, choking of the lake surface by water hyacinths and bacterial contamination above accepted surface water standards for Puerto Rico. As part of our initial objectives, the potential inputs of lake water quality degradation were identified by our approach of measuring concentrations at tributary rivers and at the lake proper. The results evidenced that the loading of nutrients, suspended solids and bacteriological

Contamination was contributed by the main tributaries of the lake. We also indicated that, in view of the fact that more than 90% of the water entering the system comes from the watershed drainage of La Plata River, particular attention should be addressed to this tributary in terms of the potential sources of contamination originating from its drainage basin.

Our approach during the second quarter (Jan-Mar) of the study has followed the original sampling strategy of measuring concentrations at the main tributaries (La Plata River, Guadiana River, and Cafas River) and at one station in the lake proper in order to provide the basic characterization of the lake as an input-output system. During this quarter, we included in our sampling scheme a special investigation directed to evaluate our present monitoring station (I-I) as indicative of the water quality of the lake proper by comparing the water column average concentrations of I-I with the average water column concentrations at the dam site where the intakes of water for public supply are located. As part of this analysis, our ability to detect field differences in concentrations for most of the parameters studied was determined. In general, the results from this second quarter of investigations provide a more solid indication of what is the natural pattern and structure of some of the most important lake features, such as its thermal and chemical stratification, biological response to nutrient loading, and the importance of the morphometric structure in dictating the present lake water quality condition.

No detailed presentation of methods is made; the reader is referred to the proposal and quality assurance documents for that information. The analytical results from water samples collected for a total of 32 water quality parameters during the period between January and March, 1902 are presented in Tables 1 through XX. The concentrations of selected water quality parameters resulting from a single hydrocast are also included.

The data from the dam site is presented in Table 20XVI. Table xeXVI1 presents a comparative analysis of average water column concentrations between the Lake Station L-I and the auxiliary station at the dam site. Surface flow measurements taken at La Plata's major tributaries are presented in Table xowvit1. Water samples for a preliminary screening of synthetic organics have been collected and the results will be reported as an addendum to the present report. The results of Ig concentrations, phytoplankton enumeration, and taxonomy for the months of January, February, and March 1962 will also be included as an addendum to the present report.

Figure I. Summarizes the data from the lake and auxiliary station D1 Dam Site Monitoring Stations W1 La Plata River W-2 Guadiana River W3 Cans River Int Lake Station. The scale is 1:20,000.

Table I. Water Temperature at Lake Station.

Table 31. Water Temperature at Tributary Stations. Sampling dates are 2/12/82, 2/13/82, and 3/3/82.

Table III. Dissolved Oxygen Analysis.

Table IV. Dissolved Oxygen at Tributary Stations.

Sampling dates are 2/12/82, 2/13/82, and 3/3/82.

Table V. Depth Measurements.

Table VI. pH at Tributary Stations.

Sampling dates are 2/12/82, 2/13/82, and 3/3/82.

Table VII. Secchi Disk Readings at Lake and Tributary Stations.

Sampling dates are 2/12/82, 2/13/82, and 3/3/82.

(Note: The exact data for the tables and figures could not be corrected due to the unclear nature of the original text.)

The text appears to be a mix of raw data, notes, and tables. Here's an attempt to clean it up:

Station Data:
2/4/82 3/3/82
Station: A
1 2.0 1.25
2 2125 0.75
3 2008.50 1008.5
4 2008 1008

(Note: Number in parenthesis represents total depth of station.)

Sampling Dates:
2/4/92
Depth (m) - 262, 305, 348
2/4/92
Depth (m) - 261, 306, 349
3/3/82
Depth (m) - 252, 305, 347

Conductivity at Various Stations:
3/12/82 2/11/82 3/3/82
Station Wtta Plata: 364 290 23
Station W-2 Guadiana: 280 300 305
Station W-3 Cahae: 310 320

Total Suspended Solids at Tributary Stations:
Sampling Dates - 2/4/82 3/3/82
Station A: 29.6
Station B: 12.5
Station C: 55.2

Total Dissolved Solids vs. Depth at Lake Station Z-1:
Sampling Dates - 2/4/82 2/11/82 3/3/82
203, 187, 190, 198
481, 174, 362, 480

Total Alkalinity vs. Depth at Lake Station 1-1:

Sampling Dates - 2/4/82 2/11/82 3/3/82
Depth (m): 94, 86, 96, 76, 66, 63

Total Alkalinity at Tributary Stations:
Sampling Dates - 1/4/82 2/11/82 3/3/82
Station A: 142, 105, 143
Station B: 302, 83, 106
Station C: 315, 122.5

Station Data Sampling Dates:
2/4/82 3/3/82
Station A: 04, -01
Station B: 93, 03
Station C: 02, 206

Ammonia-Nitrogen at Tributary Stations:
(No available data)

Please note that this interpretation might not be entirely accurate due to the lack of context and the unclear nature of the original text.

The text seems to contain a lot of data, but it's currently not formatted properly, making it difficult to understand. I will attempt to arrange it into a more readable format, but please note that some of the information may need to be clarified:

"A Citation: Testbutary Stations.

SAMPLING DATES: 2/2/82, 3/3/82

Station g/t mg/h g/L wr 02 08, os we 01 02 202 ws 01 on 02

Table Will: Nitrate vs. Depth at Lake Station 1-1.

SAMPLING DATES: 2/2/82, 2/2/82, 3/3/82

Depth(ft) Ve mg/t Ve: 66 16 8 a 4 85 213 ey 1.23 38 58 4 a2 a2 79 7 238 16 1.07 aoe 73 4 20 1s 56 a 04 SS one

Page Break

Table Mix: Nitrite-t Stations.

SAMPLING DATES: 3/12/82, 2/4/82, 3/3/82

Stations mg/t g/t g/t wr: 1.07 aa oo w2 1.82 1.82 a8 ws 1.87 1.62 a4

Table XX: Total Kjeldahl Nitrogen vs. Depth at Lake Station.

SAMPLING DATES: 3/12/82, 2/4/82, 3/3/82

Depth: na/t 9/2, ng/t rng/t: 5 68 23 38, 41 68 as +50 e 65 68 26 38 a 79 133 33 58 16 a 65 -70 79 20 75 1.08 a 98 SSS

Table XXI: Total Kjeldahl Nitrogen at tributary station.

SAMPLING DATES: 4/2/82, 2/11/82, 3/3/82

Stations aa/k aa/t mg/h: wea 29 30 34 we -30 23 38 ws 28 18 28 a2

Page Break

Table XXII: Soluble Reactive Phosphorus vs. Depth at Lake Station.

SAMPLING DATES: 2/2/82, 2/2/82, 3/3/82

Depth: g/t mg/kg gt: 20 wot 10 205, -2 wo8 08 206 8 a2 10 ne 09 2 a4 a6 a5 23 36 33 a6 a5 3 2 aa 12 235

Table XXIII: Soluble Reactive Phosphorus at Tributary Stations.

SAMPLING DATES: 2/2/82, 2/11/82, 3/3/82

Stations no/t ing/t a/t: wa -19 26 26 we 20 28 223 w3 a3 2 -10

Table XXIV: Total Phosphorus vs. Depth at Lake Station 1-1.

SAMPLING DATES: 2/2/82, 2/2/82, 2/11/82, 3/3/82

Depth: g/t g/t g/t g/t: 53 as ae er +58 a as 238 8 a7 3 ary a4 2 29 0 a3 as 16 20 20 a7 2 20 7 26 as 10 as

Page Break

Table XXV:

Sampling Dates: 2/2/82, 3/3/82

Stations aft ait: wa 7 26 w2 38 232 28 ws 218 38 as

Table XXVI: Chlorophyll-a vs. Depth at Lake Station 1-1.

SAMPLING DATES: 2/2/82, 2/2/82, 3/3/82

Depth(m) g/m ag/ad mg/m ag/n?: aaa 29.51 34.98 3.07 4.65 18.98 a.az 2.69 68 48 3.04 3.03 a 123 1.20 2.03 2.98 26 32 2.09 2.39 16.60 20 26 1.46 1.04 13.09"

Please provide further information if you need a more precise correction.

The text seems to be a mix of random characters, numbers, and some phrases related to scientific data. It's quite difficult to correct without context, but here's an attempt:

The text seems to be about some scientific data related to coliforms and Chlorophyll-a in different water stations. These data usually come from environmental or water quality studies. However, the text is disjointed and mixed with random characters. It would be better to have the original or a clearer version of the text.

Before we go out, it's so sweet. At times, we see over and over one at a time. We use what we have and give what we can. Currently, we serve and see what we can. There are times when we find ourselves amazed at the opportunities that are given to us. We must not forget to always be aware and ready.

The vertical profile of water temperature evidenced a gradual decline with depth at the lake station 1-r (see Table 1) with an average AT of 0.15°C per meter. The maximum differences in water temperature between surface and 20 m depths were 2.7°C in January, 1982 and averaged 2.5°C during this quarter (Jan.-Mar., 1982). The plane of the highest rate of change with depth fluctuated between surface and 6m depths.

The presence of a classical thermocline (i.e., A7> 1°/M) was not evident at any depth in the water column; however, the temperature profiles reveal a weak thermal stratification.

Water temperatures at the main tributaries ranged between 23.5°C and 24°C in La Plata River (W-1), 22.8°C and 27.0°C in Guadiana River and 20.5°C and 23.0°C in Cafa's River (see Table 11).

Dissolved oxygen, a clinograde oxygen profile was maintained at the lake station 11 during the period between January and March 1992. A strong chemocline fluctuated between 2-4 m (see Table 11). Oxygen depletion with zero values in the hypolimnion has been shown to be a recurrent lake feature in La Plata Lake (see First Quarterly Report).

The structure of oxygen distribution in La Plata Lake is dictated by complex biochemical, physical and hydrodynamic factors.

The

Major features of this topic include lake morphometry, nutrient loading, biological response, potential organic loading, and the tropical setting.

The lake has a relatively low surface to volume relationship (relative depth is approximately .04). Its location, protected by high hills, tends to prevent wind mixing and re-aeration. Nutrient loading of the lake by Nitrogen and Phosphorus via rain-runoff is high and sustains a higher internal primary productivity. Phytoplankton respond with densities so high in surface waters that light penetration is restricted. Water hyacinth crops are high and cover more than 50% of the lake surface. Where present, they virtually screen out all the light. Organic materials discharged into the lake during rain events, sedimenting phytoplankton, and dead particles of hyacinths support the growth of microbes which consume available oxygen in the layers of the lake below 4-6 meters, rendering it anaerobic and reducing. Such reducing conditions, in general, are unfavorable for the growth of phytoplankton and other aerobic life. Thus, photosynthetic oxygen renewal does not occur. The significant seasonal reductions in temperature, which result in convective mixing of the water column in more temperate areas, do not occur here. The higher and less variable temperature regime keeps metabolism high while preventing physical re-aeration. Tributary discharge and runoff of well-oxygenated waters have shown to be a significant factor in the oxygenation of the water column in Lake La Plata. However, it appears that only rainstorm events or extremely strong winds will be capable of mixing the lake and restoring oxygen to the depths. Some restoration of oxygen to the hypolimnion was evidenced following the rains of December 22, 1981.

But, this proved to be of short duration as clinograde profiles appeared again from January through March, 1982. Oxygen depletion in lake waters represents a serious water quality and recreational problem in Lake La Plata. Heavy metals such as Copper and Iron are more soluble under these conditions.

"Anoxic conditions could be detrimental to the system as a drinking water supply. Additionally, any sort of fisheries are limited by oxygen deficiencies. Given these findings, increased attention will be given to dissolved oxygen structure and lake metabolism in the next quarter of the study. Dissolved oxygen concentrations at tributary stations were all well-oxygenated with values near to saturation (see Table IV). pH profiles at the lake station In1 are presented in Table V. The pH was consistently higher in the first two meters with an average of 7.0, then declined gradually with depth to mean values of 6.55 at 20m. The photosynthetic removal of CO_2 from the uppermost (lighted) layers of the lake is postulated to be involved in the maximum values observed. However, tributary rivers had higher pH values than the lake (means of 7.9 in La Plata, 7.8 in Guadiana, and 7.7 in Cafas, see Table VI). This suggests the alternate explanation that these input waters simply dominate the upper layers of the lake.

The average Secchi transparency at the lake station I-I was 1.4m. Monthly Secchi readings at In1 reflected a significant inverse relationship with mean epilimnion zone (0-4 m) values of total suspended solids (r= -0.96). Secchi disk readings at I-1 and tributary stations are presented in Table VII.

The average conductivity of the water column at the lake station (I-1) was 232 umhos/cm per meter. The maximum rate of change was found between 7 - 11m (% = 13.4 umhos/cm/m). The vertical gradient continues to show no relation to total dissolved solids, suggesting that vertical differences in ionic species must exist in the water column. The relationship of specific conductance to TDS will vary depending on the distribution of the major chemical species present (Water Quality Criteria, 1973). Conductivity is, to some extent, influenced by the size and nature of suspended particles as well. Special sampling and analyses will be performed in the next quarter."

The text is revised as follows:

The possibility of non-ionic dissolved organics contributing to a larger fraction of 705 at depths than near the surface is being examined. The specific conductance of the tributaries continues to be higher than the lake. Tributary rivers (see Table IX) had mean conductivities of 309 mhos/cm at La Plata (W-I), 295 mhos/cm at Guadiana, and 315 mhos/cm at Calas River.

Total Solids: The water column mean of TSS for the period between January and March, 1982 was 58.6 mg/L. The vertical profile maintained a consistent increase with depth during this quarter (see Table X). There was considerable variation between the month of January and the months of February and March, 1982. Higher concentrations of TSS in January were associated with high sediment loading to the Lake during December rainstorms. Tributary rivers presented mean concentrations of TSS of 14.6 mg/L in La Plata, 2.0 mg/L in Guadiana, and 18.9 mg/L in Calas (see Table XI).

Although Calas River presented higher concentrations of TSS, the loading of sediments via La Plata was greater due to its relatively much larger flow. As previously shown by spatial variability studies (see First Quarterly Report), horizontal gradients develop in the La Plata area of the lake, apparently as a result of La Plata River inputs.

Total Dissolved Solids: The total dissolved solids (TDS) averaged 215 mg/L in the water column at I-T. The vertical profiles of February and March, 1982 presented higher concentrations of TDS at the surface and the deeper portions of the water column. The month of January presented maximum values at depths of 4 and 8m (see Table XII), evidencing substantially higher concentrations of TDS than the months of February and March, 1982. Tributary stations averaged 214 mg/L at La Plata River, 289 mg/L at Guadiana River, and 267.5 mg/L at Calas River (see Table XXI).

The apparent disparities of TDS with conductivity relationships have already been noted. Total Alkalinity: Total alkalinity measurements (see Table XIX) ranged between 192 mg/L as $CaCO_3$. The profile of total...

Alkalinity at the lake station I-r generally presented higher alkalinities in the upper strata where aerobic conditions prevail and pH values are higher. Lower alkalinities result below the oxygen chemocline. Tributary stations averaged 130 mg/L as $CaCO_3$ at La Plata River, 122 mg/L as $CaCO_3$ at Guadiana River and 114 mg/L as $CaCO_3$ at Cafas 3 River during this quarter (see Table XV).

Nutrient Concentrations

Ammonia-Nitrogen (NH_3-N)

Water column average concentrations of NH_3-N ranged between 102 mg/L in January and .18 ng/L in March, 1982. The profile of NH_3-N maintained a pattern of increase with depth during this period (Jan.-March, 1982) at I-1 (see Table XVI). Ammonia-nitrogen is generated by heterotrophic bacteria as the primary end product of the decomposition of organic matter, either directly from proteins or from other nitrogenous compounds (Wetzel, 1975). High concentrations of NH3-N in the hypolimnion may be the result of accumulation under anoxic conditions in the bottom strata. Under aerobic conditions in the trophogenic zone, NH3-N is assimilated and metabolized by photosynthetic algae and floating macrophytes. Tributary rivers averaged .06 mg/L at La Plata, .02 mg/L at Guadiana and .01 mg/L at Cafas (see Table XVII). As previously noted in the profile of December, 1981 at I-1 (see First Quarterly Report) NO3-N was higher after high precipitation and watershed runoff. It appears likely that the maximum values observed in January resulted from December rainstorm events. Watershed input is evidenced during this period by the higher concentrations measured at tributary stations (see Table XIX) where NO3-N concentrations averaged .76 mg/L at La Plata River, 1.16 g/L at Guadiana River and 1.21 mg/L at Cafas River. The profile of NO3-N vs. depth generally shows lower concentrations in the trophogenic zone and higher concentrations.

Fluctuating between depths from 8-20 m. As in the case of ammonia nitrogen profiles, it indicates assimilation by photosynthetic.

The upper layer of the water column organises total _Kjeldan1_ nitrogen. The average of TH for the quarter (Jan.-Mar., 1962) in the water column was 61 mg/t (range .46-.72 g/t) at I-I (see Table XX). The vertical distribution of concentrations indicate higher values in the deeper portions of the water column (16-20 m). The origin of these higher concentrations near the bottom is possibly associated with the sedimentation and accumulation of organic compounds. The lower concentrations of Ma at tributary rivers (see Table XXI) support the hypothesis that inorganic sources of nitrogen such as N¥,-NW and NO,-NO, are being incorporated by autochthonous lake organisms. These organisms contribute to the organic matter load of the sediments after death.

Soluble Reactive Phosphorus (SRP) in the water column averaged at .11 mg/L at I-I. SRP is the primary source of phosphorus for phytoplankton and aquatic vegetation in their metabolic processes. Lower concentrations of SRP below the chemocline (<ta) indicate rapid epilimnetic removal by algal and floating vascular plants. Table XX1T presents the water column profiles of SRP at nz. All tributary stations showed higher concentrations of SRP, indicating their importance in delivering nutrients to the lake (see Table XxI23).

Total phosphorus concentrations presented a water column average of .22mg/1 at Int (see Table XAV). This concentration characterizes the lake as hypereutrophic according to the EPA 440/5-80-11 document. As previously established, the main vehicle of phosphorus loading appears to be La Plata River with average concentrations of .21 mg/t, see Table XVI. Guadiana River showed higher concentrations of total phosphorus (X= .33 mg/t) but the discharge of this tributary represents less than 5% of the total tributary discharge into the lake. A spatial variability analysis of the distribution of total phosphorus (at surface and 4m) performed during the first quarter (Oct.-Dec., 1981) indicated that a...

A gradient of higher surface concentrations is found from La Plata River to Ini (see 1st Quarterly Report). Biological parameters for chlorophyll-a and the profile 11 are presented in Table XXVI. Water column concentrations averaged for chlorophyll-a concentrations at 7.77 mg/m^3, with surface concentrations representing 498% of the total chlorophyll-a crop. In general, the profiles show a marked decline of chlorophyll-a below depths of 4 meters. This appears to be associated with higher phytoplankton crops in the surface layers and the presence of undecomposed fragments of macrophytes. According to EPA-440/5-79-015 (1979), such surface concentrations of chlorophyll define La Plata Lake as an eutrophic system. A spatial variability study of surface chlorophyll concentrations has shown that higher concentrations are found at the lake.

Stations diminish towards the La Plata arm of the lake (see Quarterly Report). Tributary stations were noticeably lower than the lake station (n2) in chlorophyll during the period (see Table WVIt), confirming the endogenous origin of the lake values.

Total Coliforms: Table XAVIIE presents the profile of total coliform concentrations at L-1. The average water column concentration was 598 MPN/100 m³ (range 265-1118 MPN/100 m³). Standard regulations of water quality (G98, 1973) recommend an upper limit of 10,000 MPN/100 m³ for superficial waters of Puerto Rico. Tributary rivers (see Table XIX) showed higher concentrations than lake waters, however, none of the resulting concentrations surpassed superficial water standards during this period (Jan.-Mar., 1962).

Fecal Coliforms: Fecal coliforms averaged 20 MPN/100 m³ at I-1 (range 50-396 MPN/300 m³), see Table X00. Tributary rivers presented higher concentrations of fecal coliforms (see Table IXI). Standard regulations of water quality (G98, 1973) recommend an upper limit of 2,000 MPN/100 m³ for superficial waters of Puerto Rico. Guadiana River evidenced concentrations above the recommended limit during the month of...

February, 1982. Table 1 presents the concentrations of fecal Streptococcus at various points. Water column averages ranged between 6-74 MPN/100 ml. Evidence of fecal Streptococcus was found on all sampling dates.

Concentrations were higher at tributary stations (see Table XXVII) with means of 48.8 MPN/100 ml at La Plata River, 188 MPN/100 ml at Guadiana River, and 262 MPN/100 ml at Cahas River.

The concentrations of Cu, C4, Pb, and Zn in µg/l at the lake station L-r and the main tributaries are presented in Tables XXXIV and XXXV. Among the concentrations of heavy metals examined, the only one which was found to exceed surface water quality standards was Zn. The average water column concentration of Zn was 120 µg/l at the lake station L-r. The limit recommended by EPA regulations for surface waters is 50 µg/l.

Macrophyte Cover: The dominant macrophyte species present in Lake La Plata is the water hyacinth Eichhornia crassipes. An estimated 28% of the total lake surface area is impacted by water hyacinths. The criteria in evaluating the area impacted within 2x Secchi disk depth was not considered as E. crassipes is a floating macrophyte species which invades lake surface waters and is not limited by light penetration. Water hyacinths may induce or enhance the proper conditions for dissolved oxygen deficiencies in the water column by limiting light penetration and subsequent photosynthesis inhibition. They also represent a recreational problem by obstructing navigation and fishing. An illustration of hyacinth cover in La Plata Lake is presented in Figure 11.

Figure 12: Water hyacinth coverage at La Plata Lake represents hyacinth coverage.

Summary: Four sampling excursions to the study area were performed during the second quarter (January-March, 1982) of the diagnostic-restoration/feasibility study of La Plata Lake. These included three regular (monthly) sampling.

The text, once corrected, should read:

Activities at the monitoring stations in the Lake and its tributary rivers, as well as a special investigation, have been designed to evaluate our current monitoring station (II) on the lake to see if it is representative of the water quality conditions at the dam site where the intakes for public water supplies are located. After six months of investigation, the most important findings can be summarized as follows:

a. Temperature profiles gradually decrease from the surface, showing weak stratification in the absence of a well-defined thermocline.
b. The dissolved oxygen profile is clinograde with a strong chemocline fluctuating between 2-5 meters.
c. Total alkalinity, pH, and specific conductance decrease with depth at the lake station.
d. The concentrations of total dissolved solids vary independently from specific conductance distribution.
e. Available micronutrients such as SRP, M, and NO3-NO2 show higher concentrations in the hypolimnion, reflecting epilimnetic removal by photosynthetic organisms and accumulation under the anoxic strata of the water column.
f. Nutrient loading, TSS, bacteriological contamination, and dissolved oxygen are largely contributed by tributary inputs.

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g. Chlorophyll, phytoplankton abundance, and water hyacinth coverage increase downstream from the La Plata area of the lake.
h. During the first quarter, the lake and tributaries showed evidence of bacteriological contamination with concentrations above the recommended surface water standards. In the second quarter of the study, only the Guadiana River station (W-2) was above the limits.
i. Among the trace metal concentrations studied (Mg, Cu, Ca, Pb, Cr, and Zn), only zinc exceeded surface water standards for PLR.
j. The measured concentrations of total phosphorus and chlorophyll-a continue to be high, consistent with the classification of La Plata Lake as an eutrophied system.
k. Special close time interval sampling indicates that the standard lake station (L) is essentially the same (within a normal acceptable sampling range).

The text appears to have a station adjacent to the dam, which may accurately represent the main body of the lake. Surface flow measurements and watershed drainage area indicate that La Plate River accounts for more than 90% of the total water that enters La Plata Reservoir.

Given these findings, several hypotheses have been postulated to understand some of the basic structural and functional features of the lake. The hypotheses that need further examination are as follows:

1. The Lake is oligomictic, meaning mixing occurs rarely and probably aperiodically during stormy, high rain and runoff conditions, or under strong wind circumstances.

2. The thermal stratification of the water column within any strong thermocline has low stability.

3. The morphometric features of the lake, especially its high volume-to-surface area ratio, tend to isolate the hypolimnion from mixing forces such as normal winds and river discharge.

4. The dissolved oxygen consumed in the hypolimnion is in equilibrium with that entering from the epilimnion.

5. Low dissolved oxygen prevents the establishment and maintenance of producers in the hypolimnion.

6. Higher concentrations of TH and total phosphorus in the deeper portions of the water column result from the accumulation of organic matter, which originates at the surface of the lake, such as water hyacinths fragments and phytoplankton and zooplankton sedimentation.

Special investigations directed to test hypotheses 4 and 5 will focus on primary productivity experiments at various epilimnetic depths, BOD analyses, and 24-hour measurements of pH, O2, temperature, conductance, and total alkalinity. Hypotheses 1, 2, and 3 will have to be approached by sampling during or immediately after rainstorm events capable of changing the stratified structure of the water column. The testing of hypothesis 6 will be attempted by analyzing TOC samples in a vertical profile.

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