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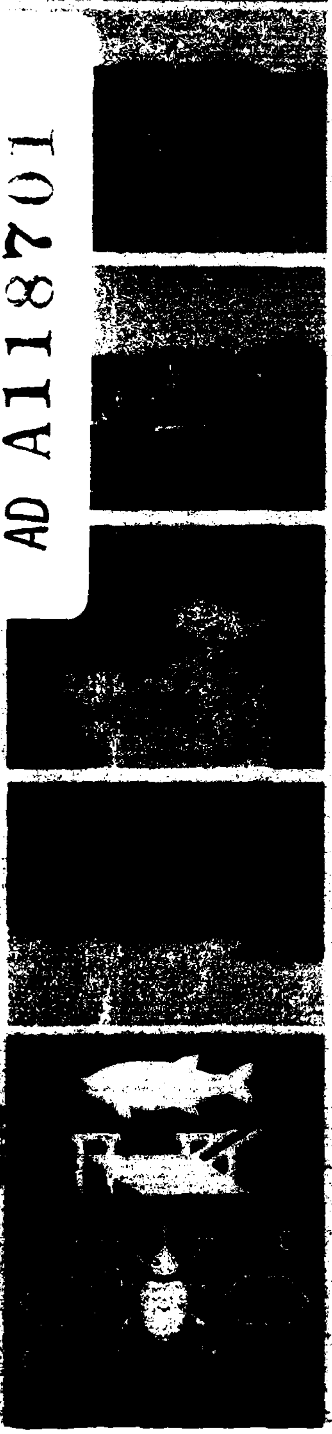

TECHNICAL REPORT A-78-2

LARGE-SCALE OPERATIONS MANAGEMENT TEST OF USE OF THE WHITE AMUR FOR CONTROL OF PROBLEM AQUATIC PLANTS

Report 3

SECOND YEAR POSTSTOCKING RESULTS

Volume VI

The Water and Sediment Quality of Lake Conway, Florida

By H. Douglas Miller, Rick Potts

Canin/Miller Associates
Orlando, Fla. 32801

August 1982

Report 3 of a Series

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Prepared for U. S. Army Engineer District, Jacksonville
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LARGE-SCALE OPERATIONS MANAGEMENT TEST OF
USE OF THE WHITE AMUR FOR CONTROL OF
PROBLEM AQUATIC PLANTS

Report 1: Baseline Studies

Volume I: The Aquatic Macrophytes of Lake Conway, Florida

Volume II: The Fish, Mammals, and Waterfowl of Lake Conway, Florida

Volume III: The Plankton and Benthos of Lake Conway, Florida

Volume IV: Interim Report on the Nitrogen and Phosphorus Loading Characteristics of the Lake Conway, Florida, Ecosystem

Volume V: The Herpetofauna of Lake Conway, Florida

Volume VI: The Water and Sediment Quality of Lake Conway, Florida

Volume VII: A Model for Evaluation of the Response of the Lake Conway, Florida, Ecosystem to Introduction of the White Amur

Volume VIII: Summary of Baseline Studies and Data

Report 2: First Year Poststocking Results

Report 3: Second Year Poststocking Results

Report 4: Third Year Poststocking Results

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White amur

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report presents the results of the second annual poststocking period covering the 12-month period from September 1978 through August 1979. The data collected during this period were compiled in a format similar to that utilized in the baseline report and the first poststocking report. The compiled poststocking data were compared to the baseline data to determine if any significant changes had occurred subsequent to the introduction of the white amur to Lake Conway.

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20. ABSTRACT (Continued).

The baseline report established specific water quality factors for future data comparisons. These included concentration variability as a function of sampling depth, water quality variability between the five major lake pools, phytoplankton and nutrient relationships, and seasonal variations in water quality. Each of these factors is reviewed in this report, and changes which have occurred relative to the baseline period are documented and discussed.

Since the baseline and poststocking periods represent different lengths of time, a certain degree of seasonal bias exists between the two data sets. This bias was previously accounted for in the first poststocking report. The adjusted baseline data were also used in making comparisons in this report.

Two parameters, organic nitrogen and volatile suspended solids, were observed to have greater than a 5 percent variation in mean values at different sampling depths. Relatively low concentration levels for these parameters and the smaller data base of this period may account for variability in mean value as a function of sampling depth in these instances.

The baseline report noted a trend of decreasing water quality, i.e., increasing concentrations of nutrients, minerals, and chlorophyll-a proceeding from the South pool of Lake Conway to Lake Gatlin. This trend appeared to change during the first poststocking period in that the southern, middle, eastern, and western pools developed a tendency toward similar water quality conditions. This report notes that this change appears to continue through the second poststocking period. As previously noted, Lake Gatlin continues to exhibit the highest concentrations of nutrients, hardness, and chlorophyll-a.

Comparing this poststocking water quality data to the baseline period, nine parameters are identified as having changed in concentration levels. These parameters include: total filterable phosphorus, total unfilterable phosphorus, organic nitrogen, ammonia nitrogen, volatile suspended solids, biochemical oxygen demand, chemical oxygen demand, carotenoids, and chlorophyll-a.

Seasonal trends established during the baseline period are evaluated based on the poststocking data. Total phosphorus concentrations have appreciably decreased from concentrations reported for the baseline studies and exhibit little or no variation as a function of seasons. Temperature and chlorophyll-a followed similar seasonal patterns compared to the baseline period. Organic nitrogen developed a deviation from the trend established during the baseline period. Mean seasonal values calculated for this parameter tended to fluctuate through a greater range than previously noted.

Sediment quality data collected during the poststocking period are generally similar to the baseline data. However, some variations in concentration levels are apparent. Total phosphorus mean values decreased during the poststocking period by approximately 30 percent. An increase was observed for mean concentrations of copper compared to the baseline period.

A large standard deviation for copper was noted, indicative of the greater range of concentration values detected at each sampling station. Lead concentrations also exhibited an increase in mean value for the combined sampling stations when compared to the baseline period.

PREFACE

The work described in this volume was performed in accordance with modification No. DACW39-76-C-0084-P006, Supplemental Agreement to Contract No. DACW39-76-C-0084, between the U. S. Army Engineer Waterways Experiment Station (WES), Vicksburg, Miss., and the Orange County Pollution Control Department, Orlando, Fla. The work was sponsored by the U. S. Army Engineer District, Jacksonville, and by the Office, Chief of Engineers, U. S. Army, Washington, D. C.

This is the sixth of seven volumes that constitute Report 3 of a series of reports documenting a Large-Scale Operations Management Test of use of the white amur for control of problem aquatic plants in Lake Conway, Fla. Report 1 of the series presents the results of the baseline studies of Lake Conway; Report 2 presents the first year poststocking results.

This volume was prepared by Mr. H. Douglas Miller, Canin/Miller Associates, Orlando, Fla. Mr. Rick Potts, also of Canin/Miller Associates, assisted in report preparation. Mr. Raymond T. Kaleel, Orange County Pollution Control Department, served as Project Manager. Orange County Pollution Control Department personnel were responsible for data collection. Mr. John Bateman was the Director of the Orange County Pollution Control Department.

The work was monitored by the WES Environmental Laboratory (EL), Dr. John Harrison, Chief. The study was under the general supervision of Mr. B. O. Benn, Chief, Environmental Systems Division, EL, and the direct supervision of Dr. T. D. Wright, Chief, Waterway Habitat and Monitoring Group. Mr. J. L. Decell was Manager of the Aquatic Plant Control Research Program, EL. Principal investigators at WES for the study were Messrs. Eugene Buglewicz and Drew Miller, both of ESD, EL.

Commanders and Directors of WES during the conduct of the study and preparation of the report were COL J. L. Cannon, CE, COL Nelson P. Conover, CE, and COL Tilford C. Creel, CE. Technical Director was Mr. F. R. Brown.

This report should be cited as follows:

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LARGE-SCALE OPERATIONS MANAGEMENT TEST OF USE OF THE
WHITE AMUR FOR CONTROL OF PROBLEM AQUATIC PLANTS

SECOND YEAR POSTSTOCKING RESULTS

The Water and Sediment Quality of
Lake Conway, Florida

PART I: INTRODUCTION

1. The U. S. Army Engineer Waterways Experiment Station (WES) has been conducting a Large-Scale Operations Management Test (LSOMT) since January 1976 for the introduction of the white amur (*Ctenopharyngodon idella*) into Lake Conway, Florida, to control the nuisance aquatic macrophyte hydrilla (*Hydrilla verticillata*). Through Contract No. DACW39-76-0084 with WES, the Orange County Polltion Control Department has the responsibility for monitoring water and sediment quality and reporting the test results on a regular basis to WES.

2. To define baseline conditions in Lake Conway prior to introduction of the white amur, a 20-month testing period from January 1976-August 1977 was undertaken. A water and sediment quality baseline data report was prepared and submitted to WES to describe and document these baseline conditions. Due to the large volume of data being collected, it was imperative to consolidate the data into a workable format so that reasonable comparisons could be made during future reporting periods. Simplistic statistical data reduction procedures were used, including mean values and standard deviations. Another technique was to eliminate sampling depth from consideration when little or no data variability existed. An arbitrary figure of 5 percent variability was initially used as the breakpoint for considering sampling depth. The information presented in the baseline report (Report 1) will be used to document any changes in water or sediment quality which may occur subsequent to stocking the lake with the white amur.

3. Report 2 of this series was prepared evaluating the first 12 months of the poststocking period, September 1977-August 1978. The

format for Report 2 was identical to Report 1 (baseline report) for ease of data comparison. A major emphasis was placed on identifying changes which occurred compared to the baseline conditions, and also in determining the significance of these changes. The baseline report referenced certain water quality characteristics that were compared to the poststocking conditions, including variations between lake pools, seasonal changes in water and sediment quality, and, in particular, nutrient and productivity levels.

4. This report (Report 3) evaluates the second 12 months of the poststocking period, September 1978-August 1979. Data collected during this period are utilized to document water and sediment quality changes that have occurred subsequent to the period September 1977-August 1978. These data are compared to the baseline conditions and to the data contained in the first poststocking report to identify changes and trends in the various water and sediment quality parameters.

PART II: POSTSTOCKING DATA COMPILATION AND ANALYSIS SEPTEMBER 1978-AUGUST 1979

Water Quality

Data compilation

5. For comparison purposes, the poststocking data presented in this report have been compiled in a format similar to the baseline report and to the report evaluating the first 12-month poststocking period, September 1977-August 1978, subsequent to the introduction of the white amur into the Lake Conway lake system. Table 1 lists various parameters that are frequently found in concentrations near or below the lower detection limits of the measuring devices utilized. Table 2 lists those parameters which previously were found to exhibit no substantial variability relative to changes in sampling depths. All data were analyzed, regardless of depth, so that comparisons to previous reports could be properly made. Tables 3-13 present mean values and standard deviations for the second 12-month poststocking period as calculated for each of the 11 sampling stations. The mean value and standard deviation for various parameters as calculated for all 11 stations combined are presented in Table 14.

6. The baseline data report identified specific parameters that exhibited appreciable variability as a function of sampling depth: dissolved oxygen, turbidity, pH, and chlorophyll-a. Tables 15-18 present the mean values for these parameters as calculated from the data collected at each of the 11 sampling stations at varying depths.

7. As shown in Figure 1, all 11 sampling station locations remain unchanged from the baseline and first poststocking periods. Data collected during the baseline period suggested a trend of varying water quality from one lake pool to another at a given point in time. During the baseline period, water quality was also found to be consistently higher* in the southern and middle pools of Lake Conway. Biochemical

* High water quality is defined as water low in biochemical oxygen demand, chemical oxygen demand, solids, nutrients, and chlorophyll.

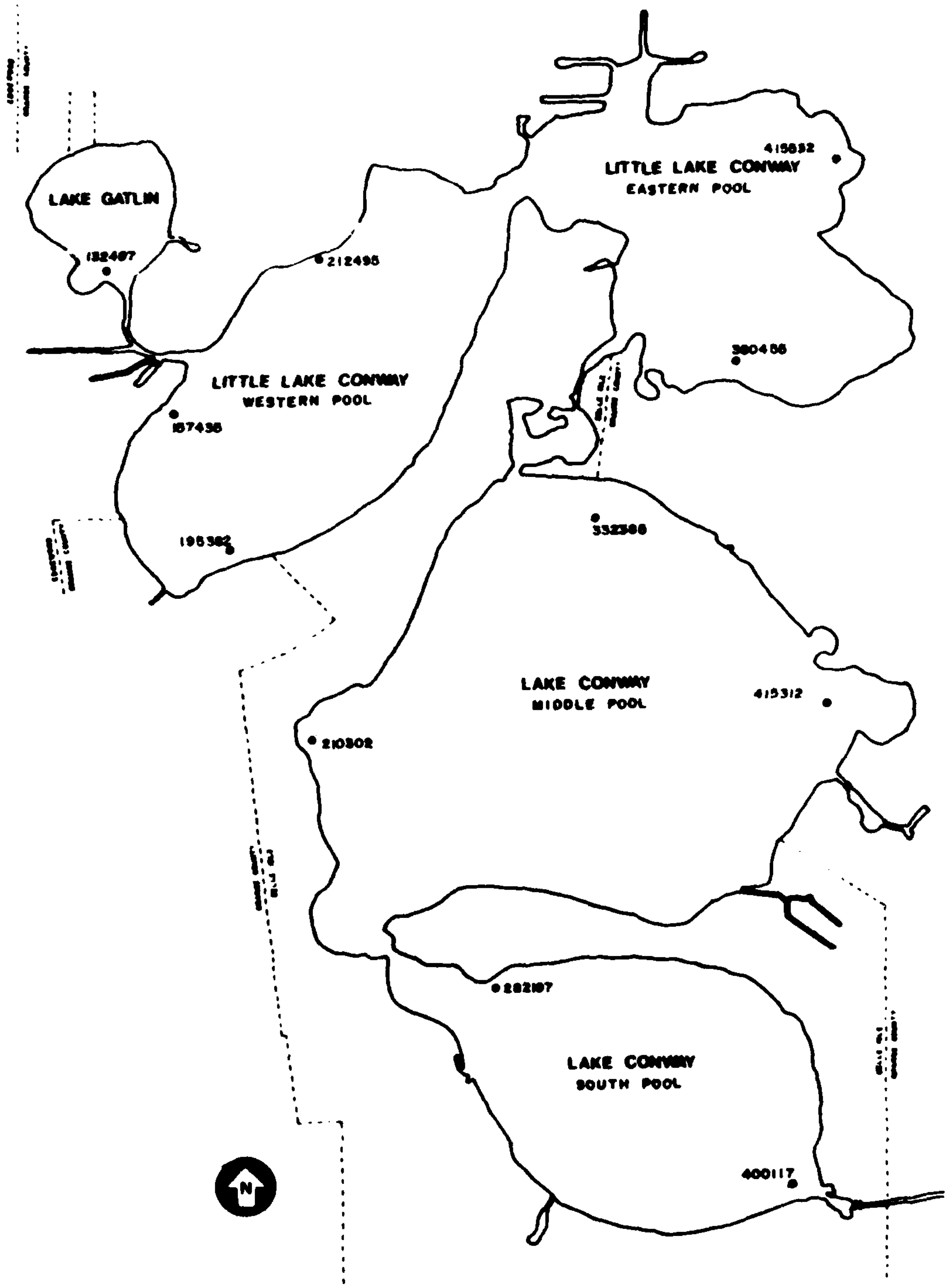

Figure 1. LSOMT sampling station locations

oxygen demand (BOD) and chemical oxygen demand (COD), solids, and nutrient concentrations were previously found to increase from the southern and middle pools to the eastern and western pools. A further increase occurs in Lake Gatlin. This trend changed somewhat during the first poststocking period (September 1977-August 1978) in that the southern, middle, eastern, and western pools exhibited a tendency toward similar water quality conditions. However, Lake Gatlin continued to exhibit higher concentrations of most parameters (nutrients, minerals, and chlorophyll-a). Figures 2-7 are provided for comparison with similar tables compiled for the baseline and first poststocking reports. The respective parameters included are hardness (as $CaCO_3$), magnesium, organic nitrogen, BOD, total solids, and chlorophyll-a. Generally, the mean concentration for these parameters (for this time frame) fell within one standard deviation of those means reported as baseline concentrations.

8. During the baseline and first poststocking time frame (January 1976-August 1978), ammonia was occasionally measured in concentrations above detection limits (0.050 mg/ℓ). However, from September 1978-August 1979 (second poststocking time frame), ammonia was consistently measured in concentrations greater than the detection limits. Figure 8 presents the mean value and standard deviation of ammonia nitrogen concentrations as calculated from data collected at the 11 sampling stations.

9. In the baseline report, emphasis was placed on determining the relationships between nutrient concentrations and the productivity of the various aquatic plant communities in the major pools of the Lake Conway system. These relationships were addressed in the first poststocking report and are reviewed herein to determine if significant changes have occurred subsequent to the introduction of the white amur. As in the preceding reports, the phytoplankton biomass has been monitored utilizing pigment analysis for chlorophylls and carotenoids. Figures 9 and 10 graphically present nitrate, organic nitrogen, and chlorophyll-a data collected during this poststocking period in Lake Gatlin and the South pool of Lake Conway, respectively. As in the baseline and first poststocking reports, Figure 9 shows the relationship of the phytoplankton community to nitrate and organic nitrogen. An inverse relation exists between

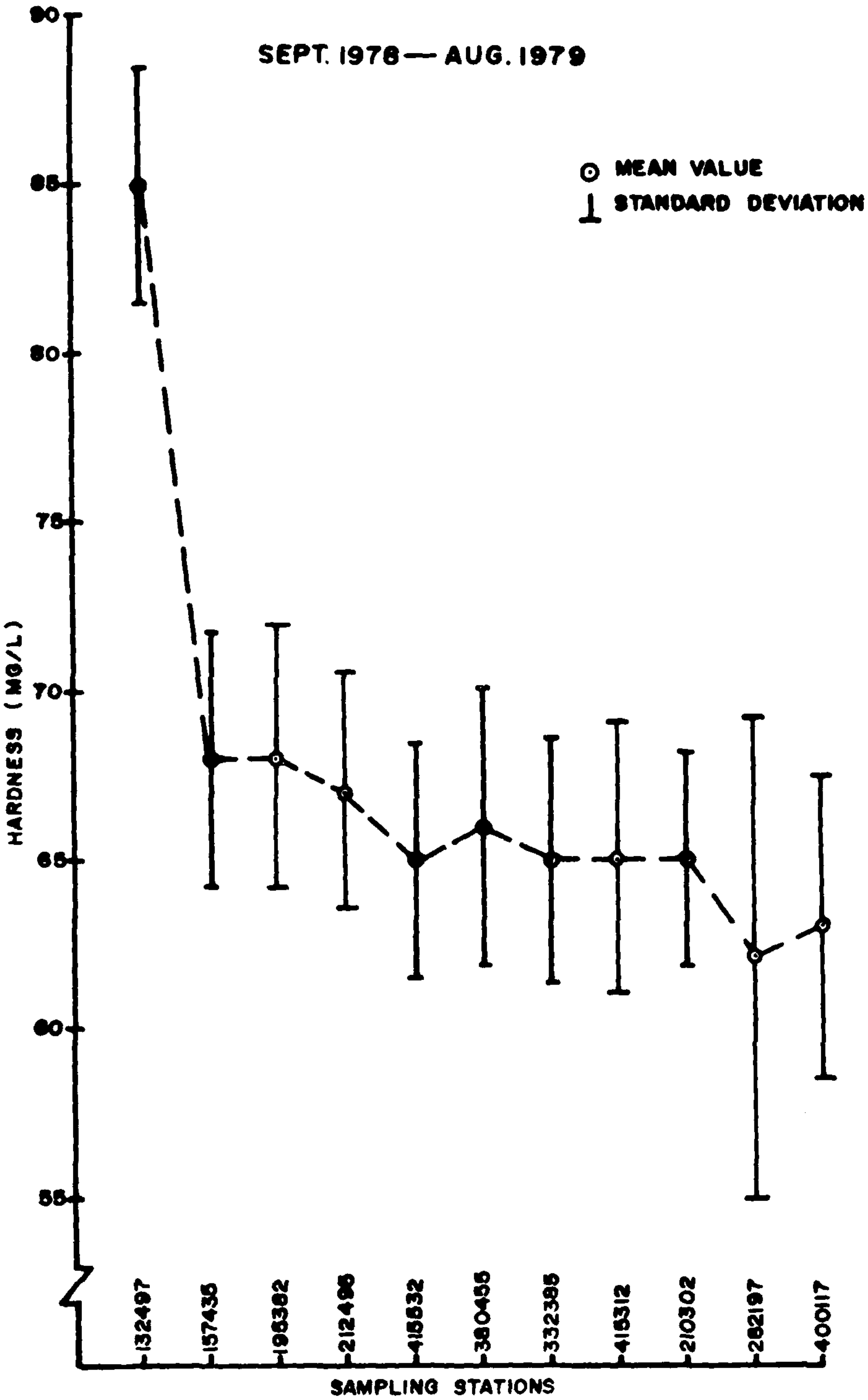

Figure 2. Trends in hardness concentrations

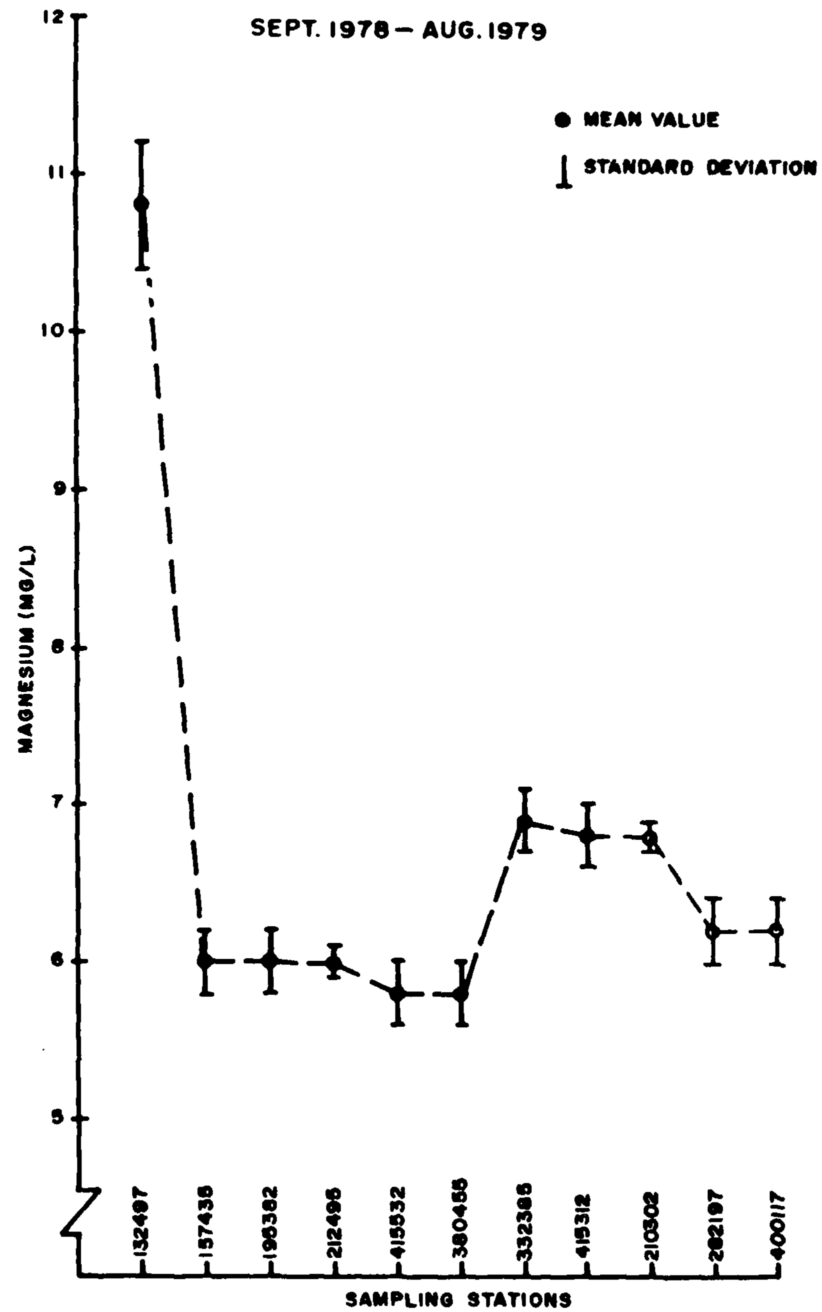

Figure 3. Trends in magnesium concentrations

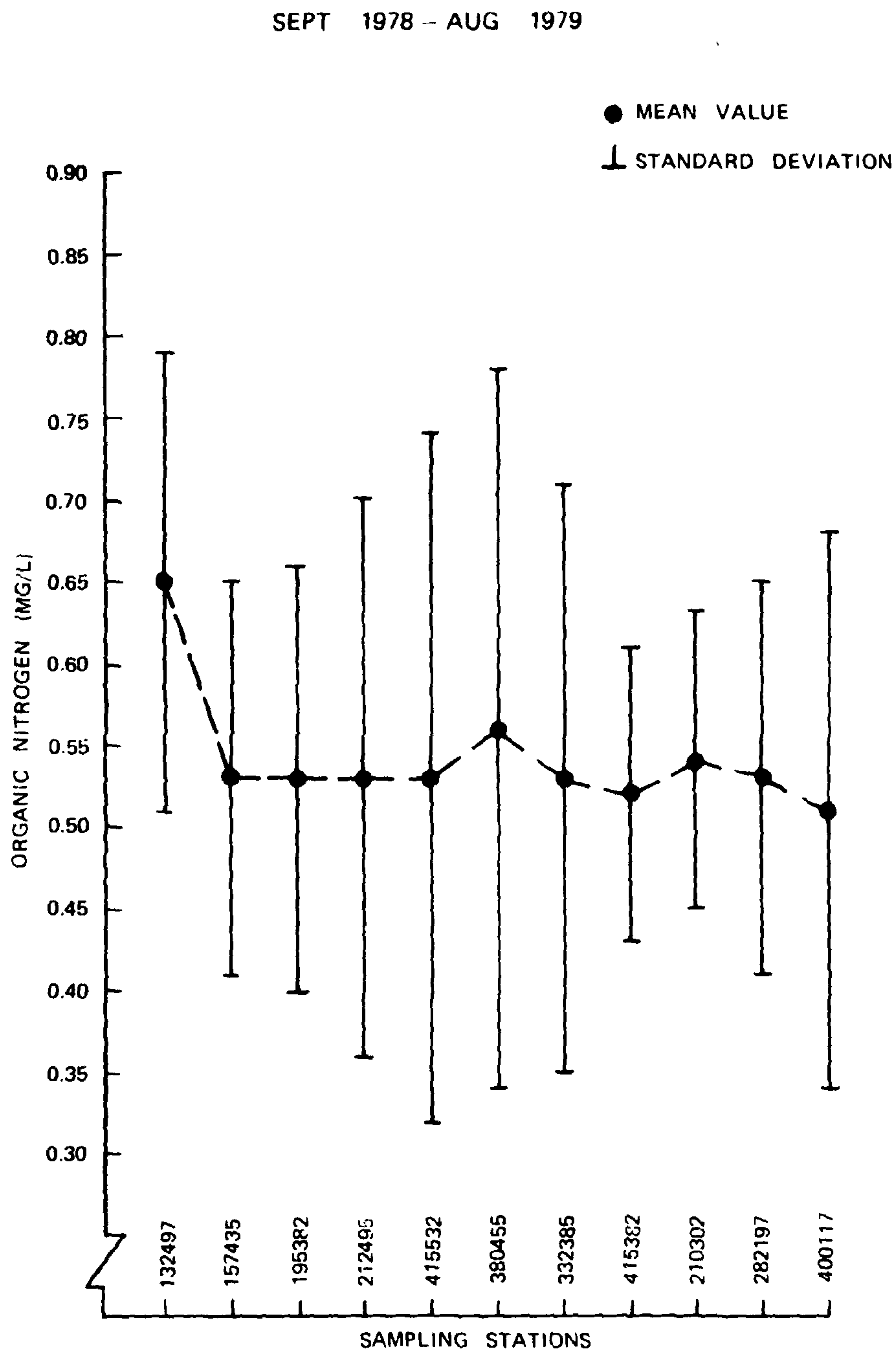

Figure 4. Trends in organic nitrogen concentrations

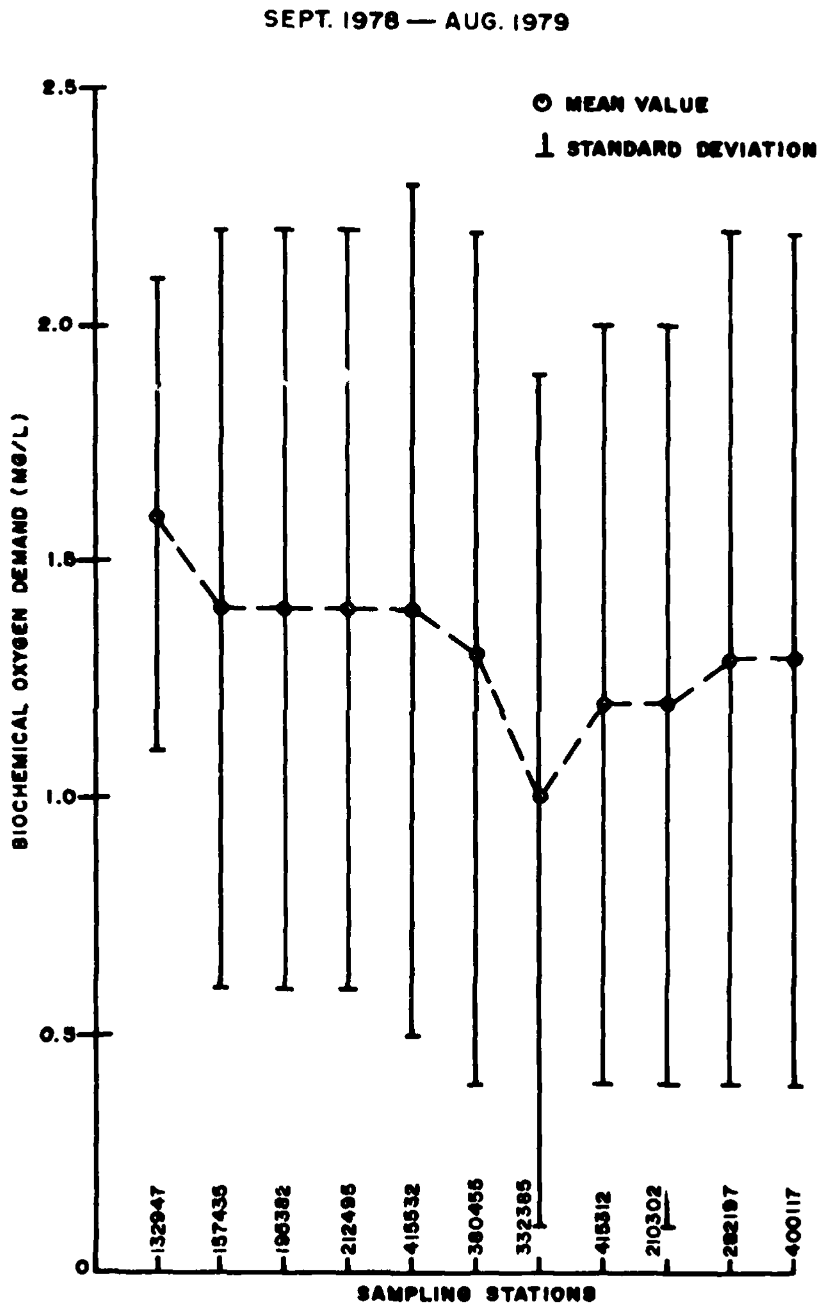

Figure 5. Trends in BOD concentrations

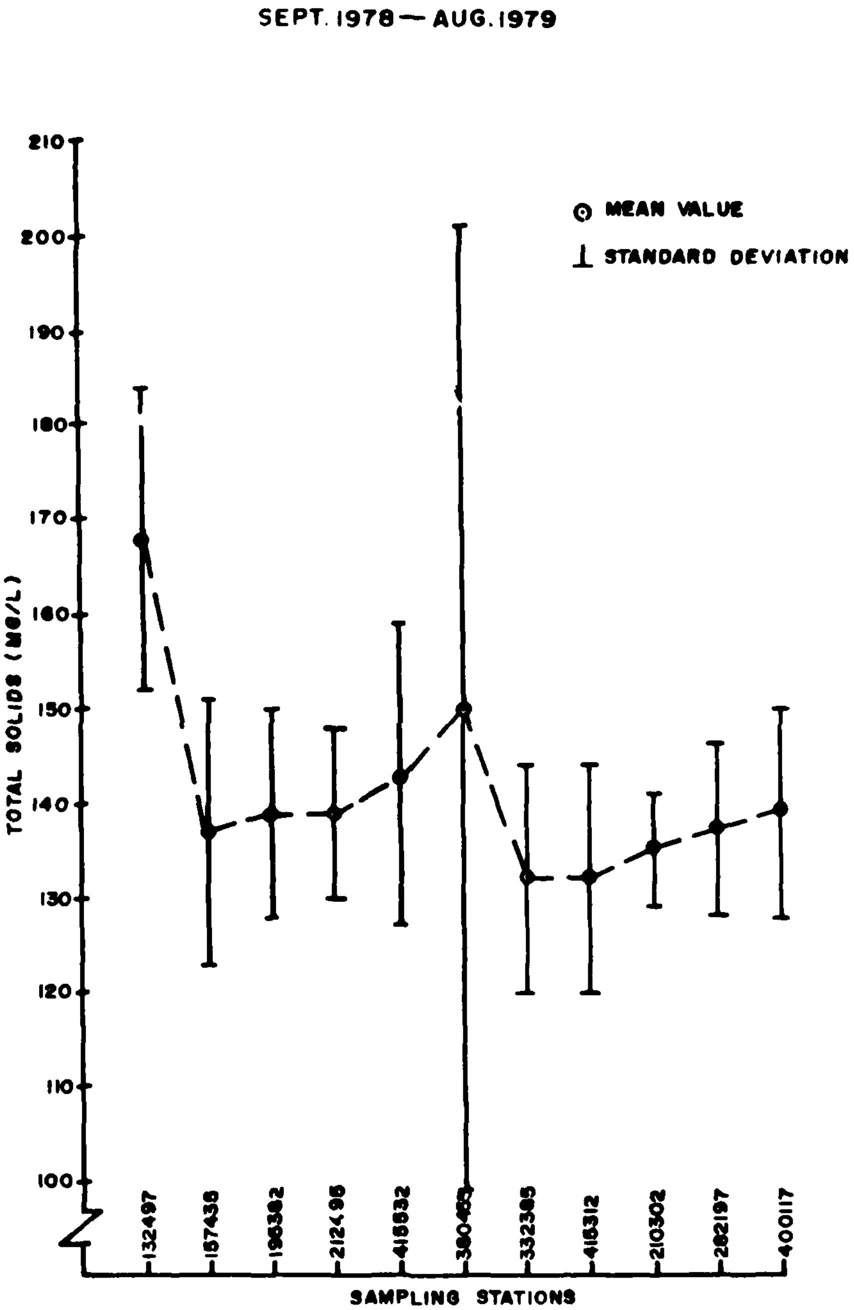

Figure 6. Trends in total solids concentrations

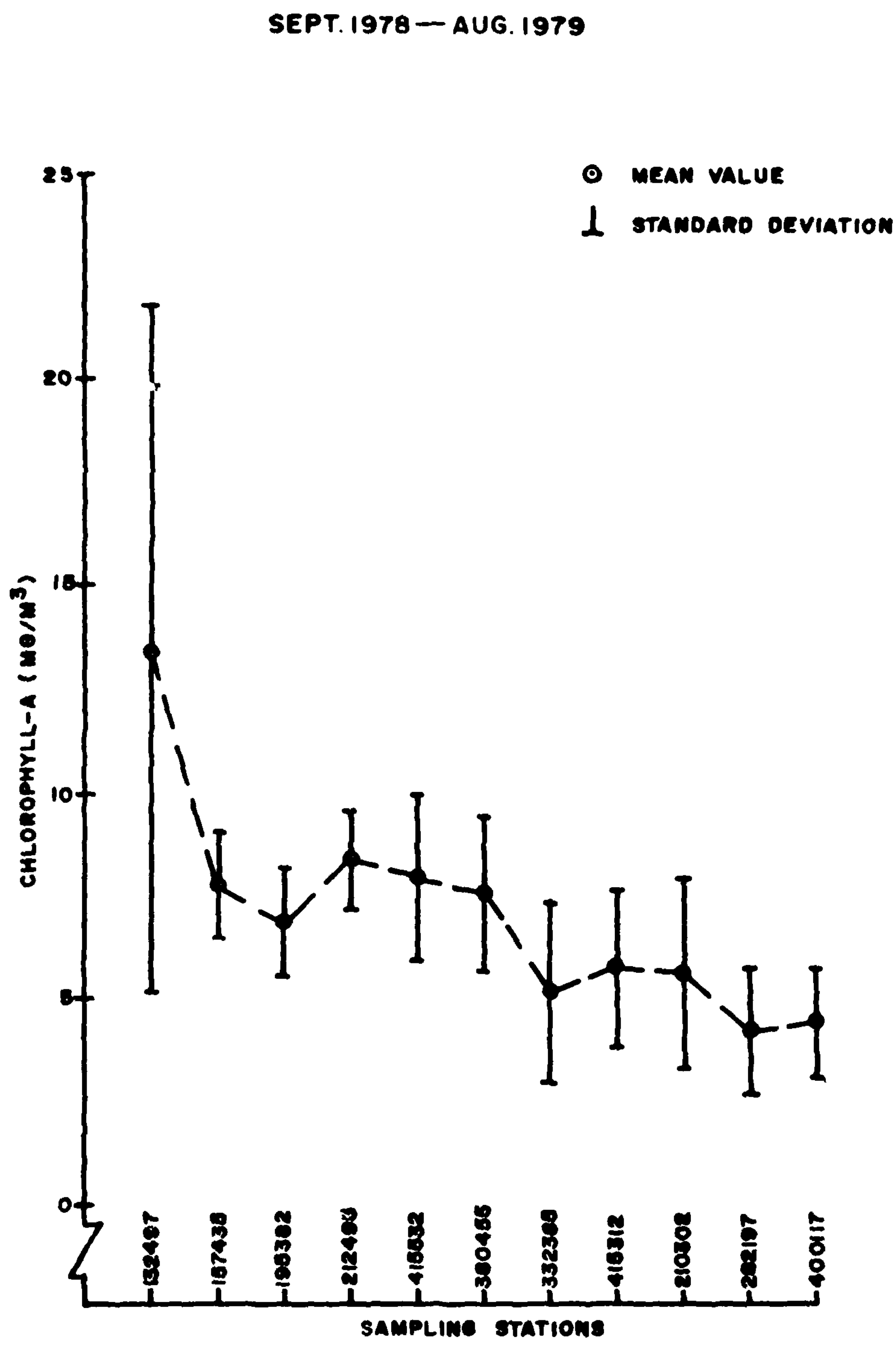

Figure 7. Trends in chlorophyll-a concentrations

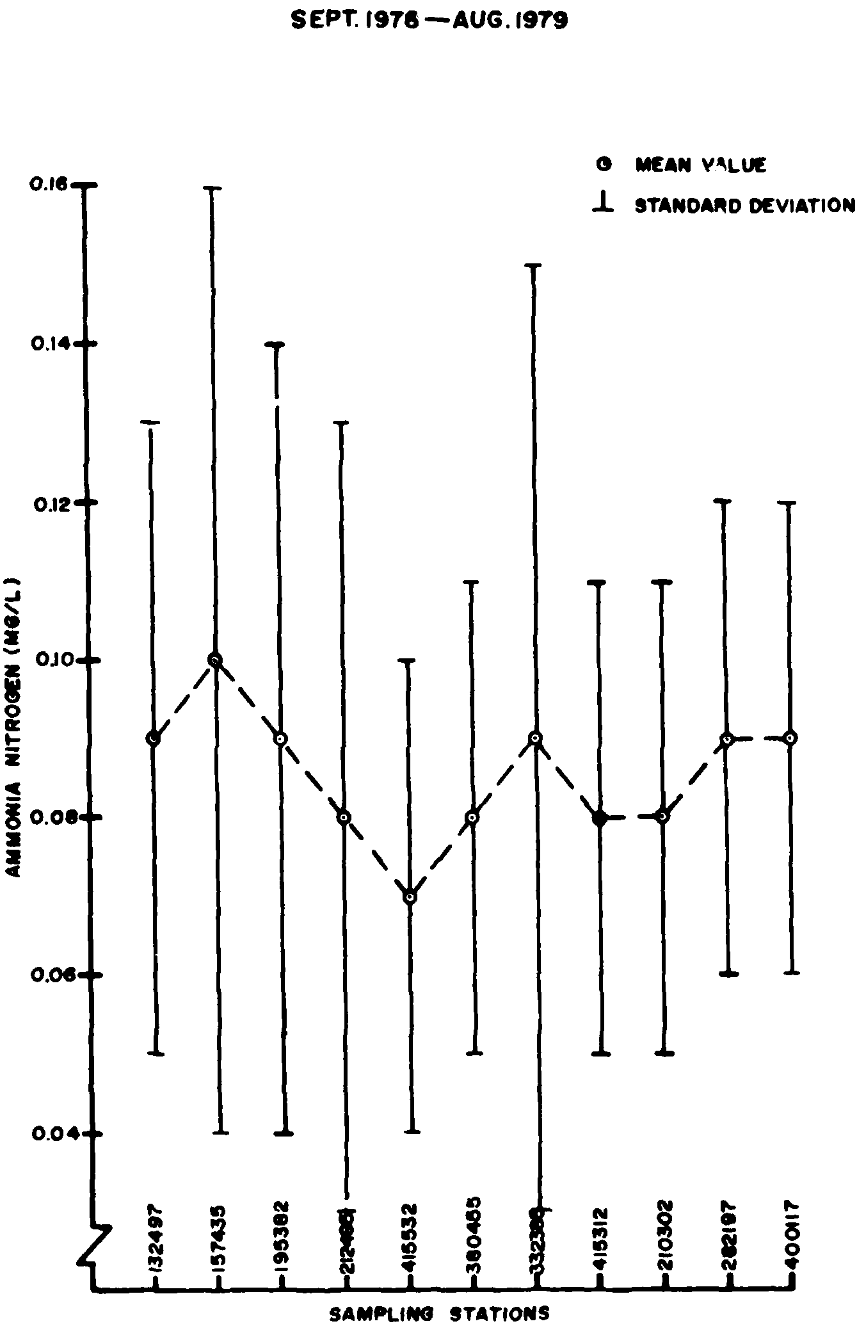

Figure 8. Trends in ammonia nitrogen concentrations

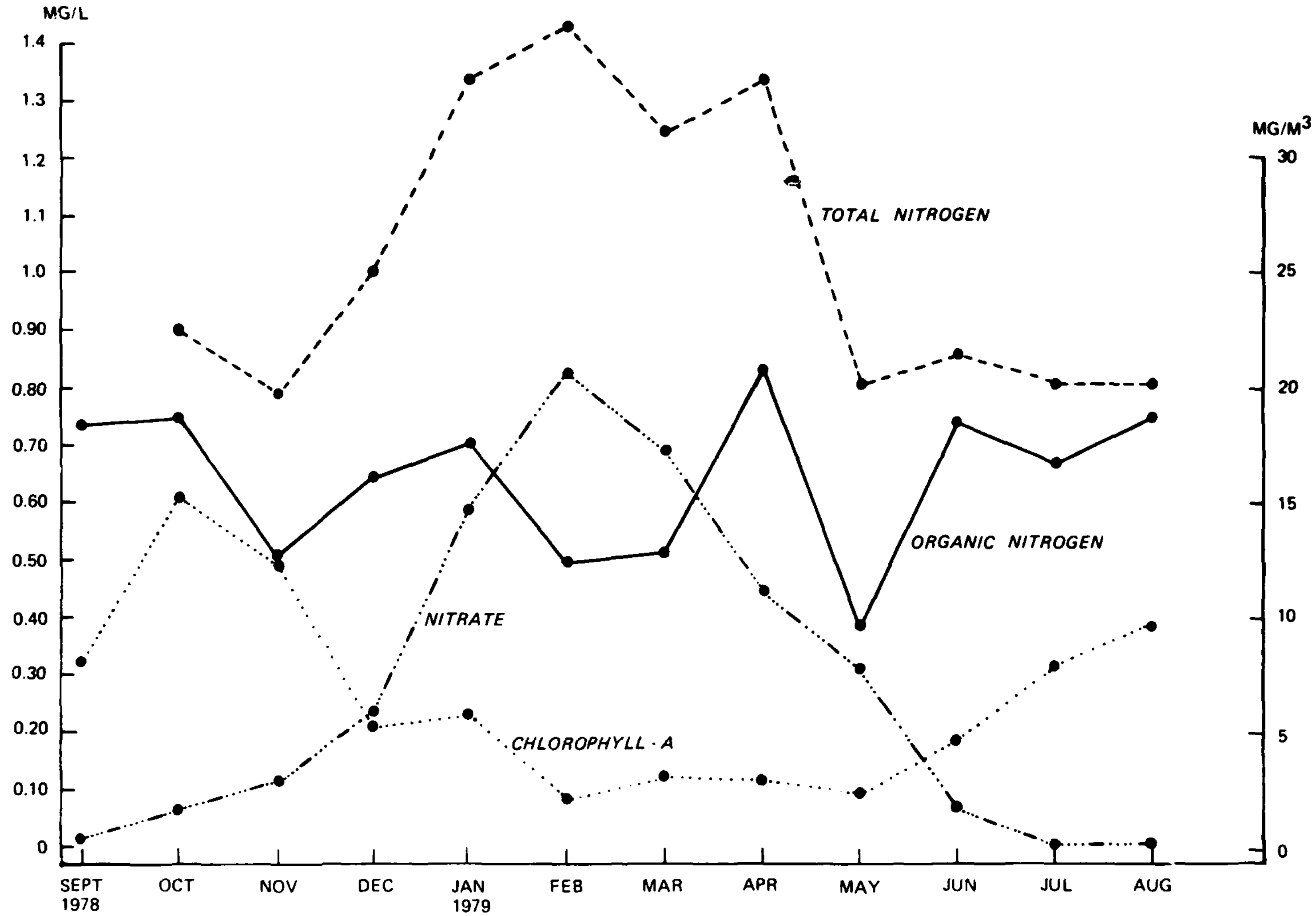

Figure 9. Trends in nitrogen and chlorophyll-a, Lake Gatlin

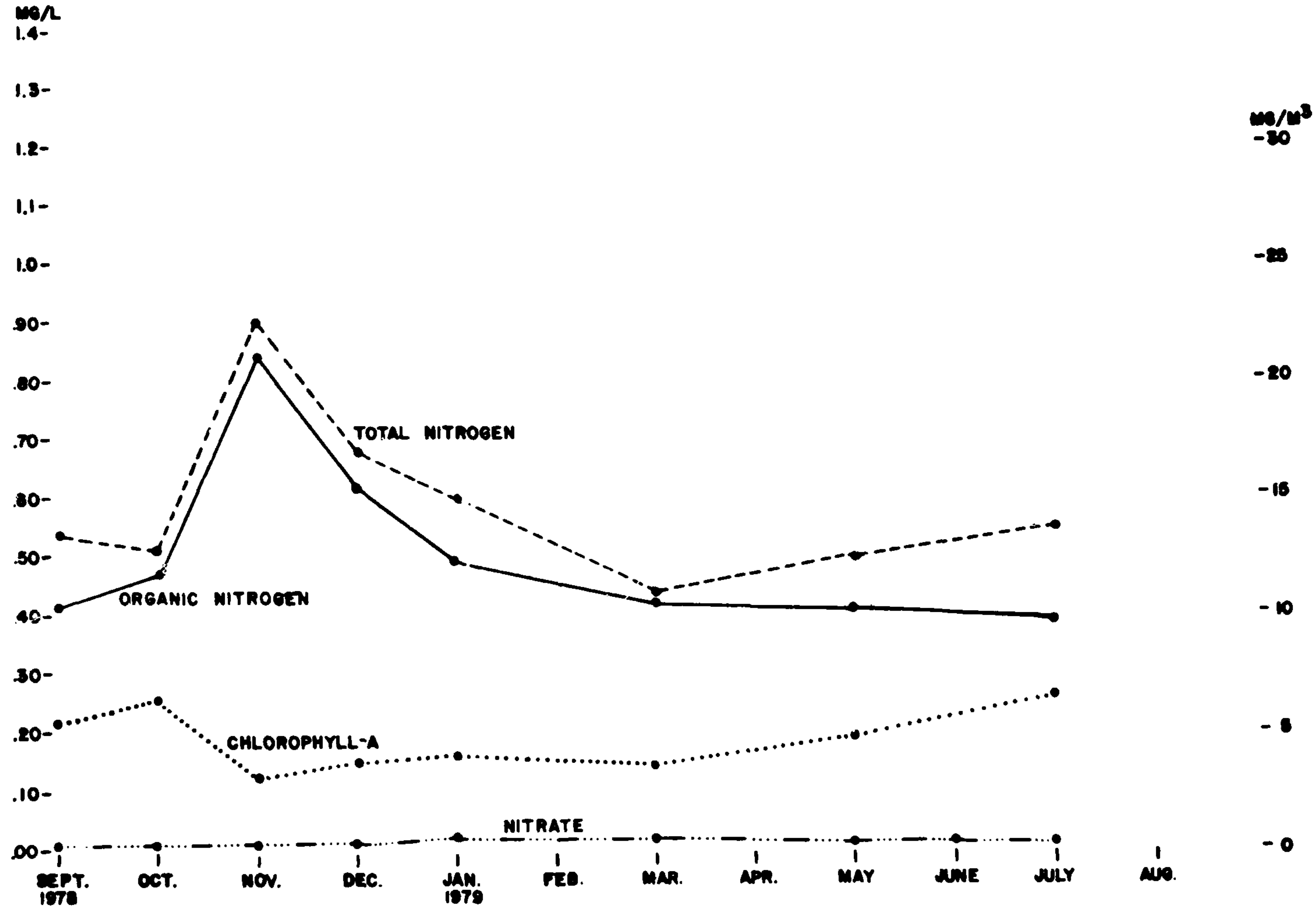

Figure 10. Trends in nitrogen and chlorophyll-a, Lake Conway South pool, station 400117

nitrate and chlorophyll-a; i.e., during summer and fall, chlorophyll-a reaches maximum while nitrate is at a minimum. However, during the winter months, while the various plant communities are dormant, the opposite relation exists; i.e., chlorophyll-a is at a minimum and nitrate is nearer maximum concentrations in the water column. With few exceptions, concomitant increases and declines in organic nitrogen and chlorophyll-a occurred, indicating a correlation between these parameters. Visual observations suggest that the phytoplankton has dominated and continues to dominate the aquatic plant community in Lake Gatlin. However, this is not the case at station 400117 in the South pool of Lake Conway where the phytoplankton does not dominate the aquatic plant community. Here the growths of submerged aquatic macrophytes and epiphytes also influence the concentrations of nitrate and organic nitrogen in the water column. At station 400117, nitrate exceeded the detection limits (0.010 mg/ℓ) in January 1979. Generally, nitrate (nitrate-nitrite) concentrations remained at or below the detection limits (Figure 10). Chlorophyll-a concentrations did not exceed 7 mg/m^3 showing the relative paucity of the phytoplankton community at this South pool station compared to the Lake Gatlin station.

10. Seasonal trends in water quality are presented in Figures 11-15. These figures present seasonal mean values of temperature, chlorophyll-a, total filterable phosphorus, and organic nitrogen for a selected sampling station in each of the major pools.

11. The water quality data have been compiled in a format similar to the baseline report and the report covering the first 12-month post-stocking period. A major variation does exist, however, in the number of months of data collected at each sampling station. The baseline period included 20 months of sampling from January 1976-August 1977. The first poststocking period reported on the subsequent 12-month period, September 1977-August 1978. This report, covering the second 12-month poststocking period from September 1978-August 1979, differs from the previous post-stocking report in that 6 of the 11 sampling stations lack data for some months of the 12-month period. Beginning in January 1979, sampling events were staggered on a monthly basis in the South pool, Middle pool, and

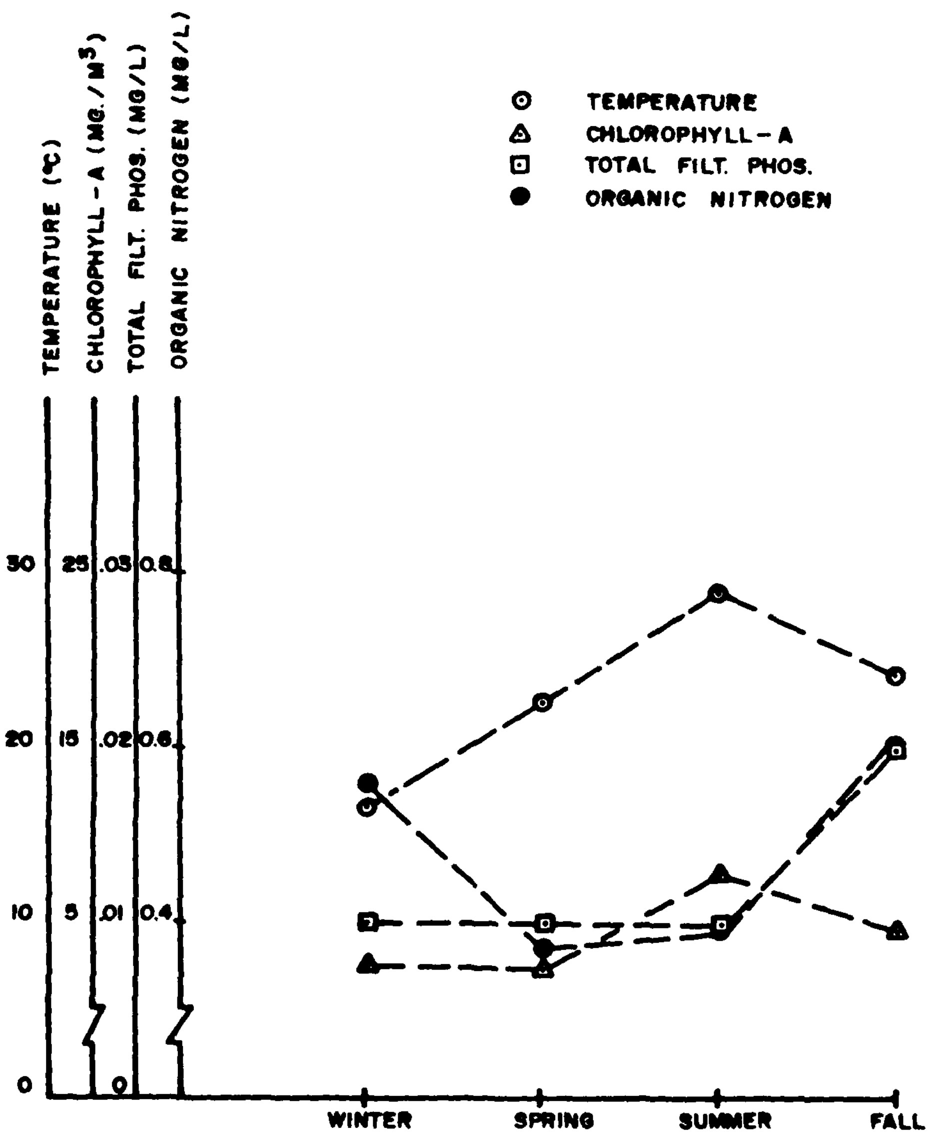

Figure 11. Correlation of selected parameters for sampling station 400117, Lake Conway, South pool

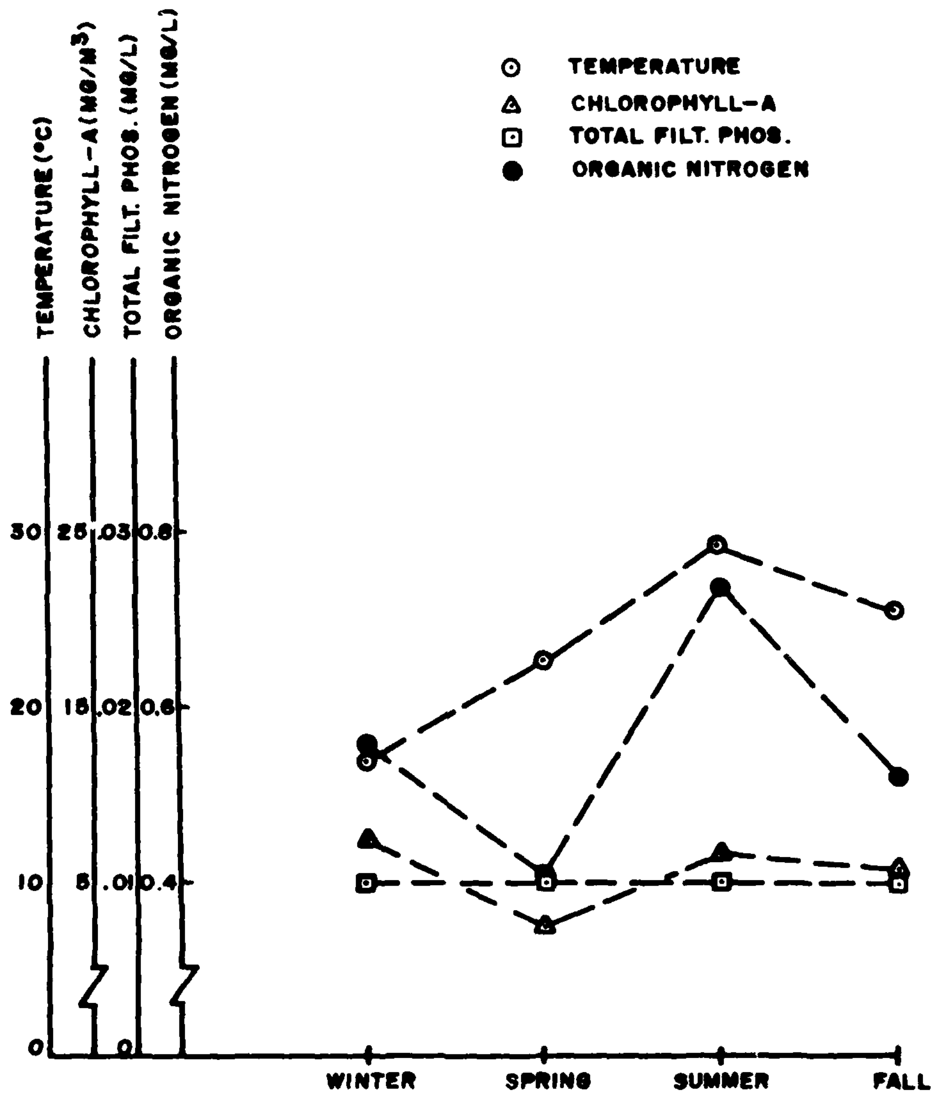

Figure 12. Correlation of selected parameters for sampling station 210302, Lake Conway, Middle pool

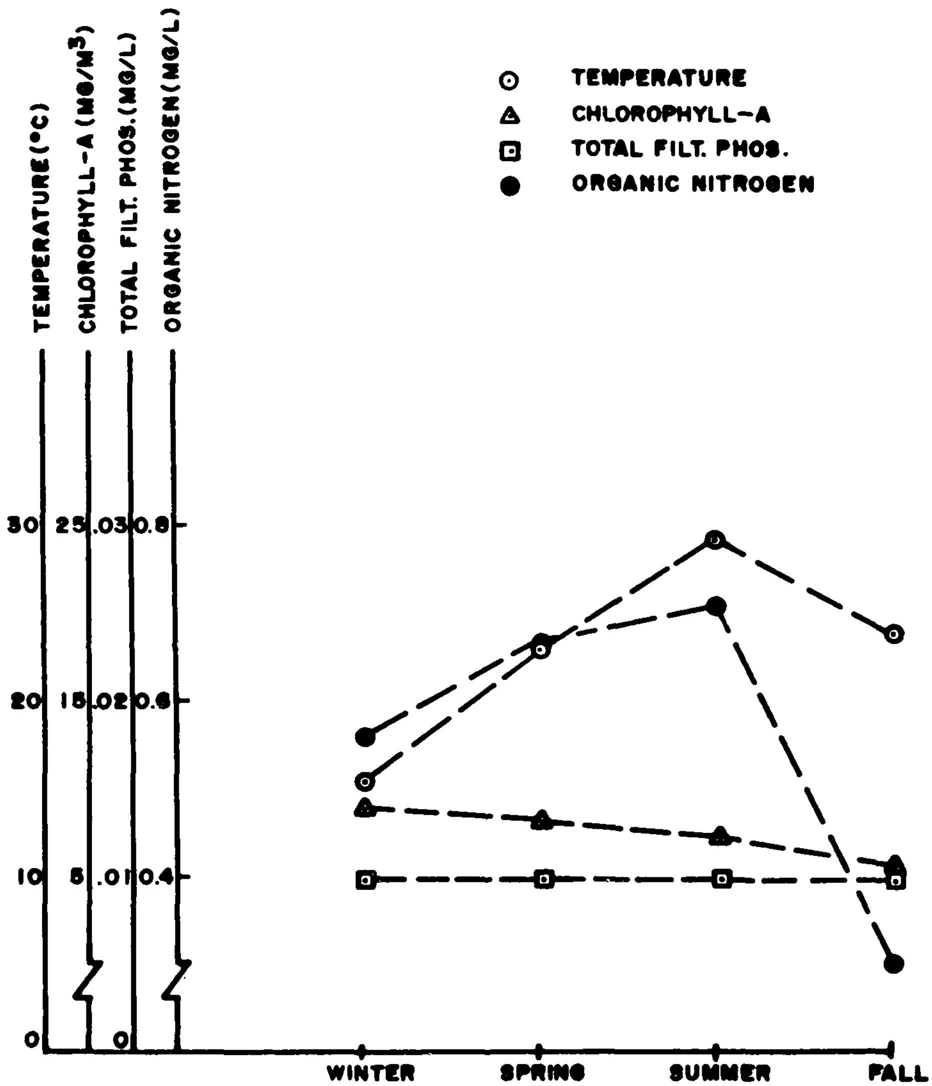

Figure 13. Correlation of selected parameters for sampling station 380455, Lake Conway, East pool

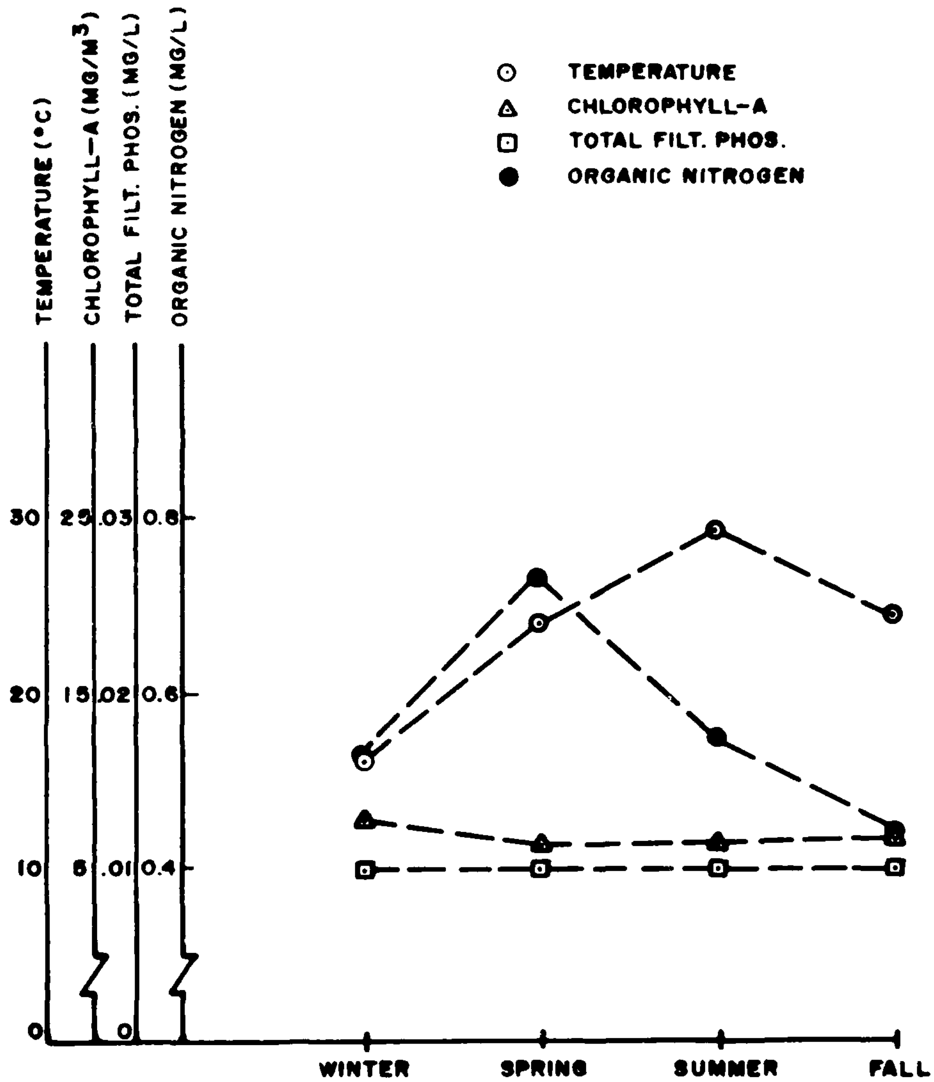

Figure 14. Correlation of selected parameters for sampling station 195382, Lake Conway, West pool

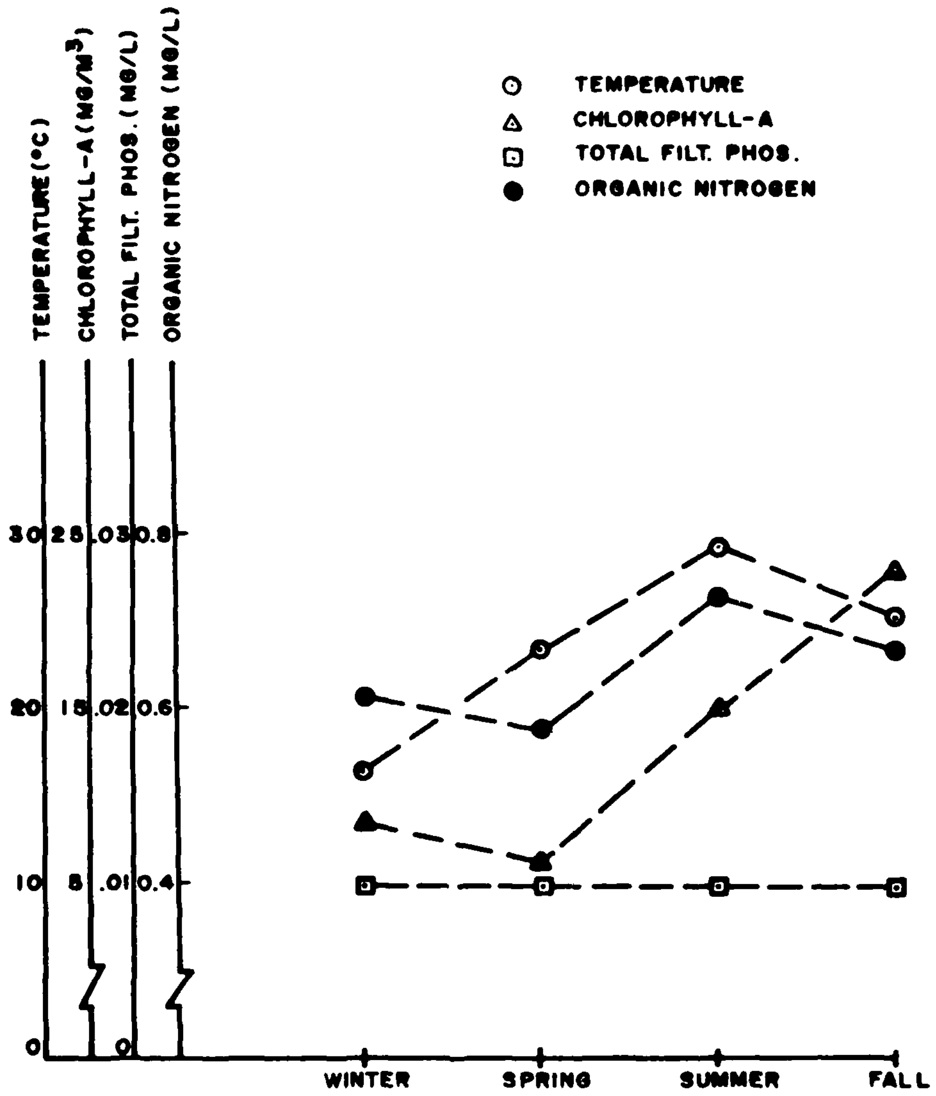

Figure 15. Correlation of selected parameters for sampling station 132497, Lake Gatlin

West pool where paired and triplet sampling stations exist. The following tabulation identifies the sampling stations and months when samples were collected (as noted by an "X").

		1978				1979							
Station	Location	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
400117	South pool	X	X	X	X	X		X		X		X	
282197	South pool	X	X	X	X		X		X		X		X
210302	Middle pool	X	X	X	X	X		X		X		X	
415312	Middle pool	X	X	X	X		X		X		X		X
332385	Middle pool	X	X	X	X	X	X	X	X	X	X	X	X
380455	East pool	X	X	X	X	X	X	X	X	X	X	X	X
415532	East pool	X	X	X	X	X	X	X	X	X	X	X	X
212495	West pool	X	X	X	X	X		X		X		X	
195382	West pool	X	X	X	X		X		X		X		X
157435	West pool	X	X	X	X	X	X	X	X	X	X	X	X
132497	Lake Gatlin	X	X	X	X	X	X	X	X	X	X	X	X

Data analysis

12. The minimum detection limit for nitrate was changed from 0.10 mg/ℓ to 0.010 mg/ℓ in December 1977.* The following tabulation summarizes ranges of nitrate concentrations (mg/ℓ) found throughout the study for each major pool:

	Baseline 1/76-8/77	Poststocking I 9/77-8/78	Poststocking II 9/78-8/79
South pool	<0.10 to 0.12	<0.01 to 0.06	<0.01 to 0.03
Middle pool	<0.10 to 0.10	<0.01 to 0.09	<0.01 to 0.02
East pool	<0.10 to 0.10	<0.01 to 0.03	<0.01 to 0.08
West pool	<0.10 to 0.11	<0.01 to 0.09	<0.01 to 0.08
Lake Gatlin	<0.10 to 0.70	<0.01 to 0.97	<0.01 to 0.70

In all pools, except Lake Gatlin, nitrate concentrations exceeded the minimum detection limits only in the winter months. Excluding Lake Gatlin,

* Changed to Technician Automated Methodology--per U. S. Environmental Protection Agency and U. S. Army Corps of Engineers.

during the first and second poststocking time frames, nitrate did not exceed 0.10 mg/ℓ, i.e., the minimum detection limit for the baseline time period. Also, after the change in detection limits, the maximum concentration observed was 0.08 mg/ℓ. These concentration ranges are minor when compared to Lake Gatlin where nitrate concentrations reached 0.97 mg/ℓ. The mean value for concentrations of nitrate in Lake Gatlin for this poststocking period was 0.28 mg/ℓ with a standard deviation of 0.29 mg/ℓ.

13. Along with nitrate, ammonia nitrogen has also been deleted from Table 1. Concentrations of this constituent occasionally exceeded the minimum detection level of 0.05 mg/ℓ during the baseline and first poststocking period; however, ammonia nitrogen has been observed to exceed the minimum detection level at all 11 sampling stations. Figure 8 shows the trend of the mean value for ammonia nitrogen concentrations as calculated for each station.

14. During the baseline time frame, for all pools total filterable phosphorus (TFP) concentrations ranged from <0.01 to 0.041 mg/ℓ. During this second poststocking time frame, concentrations ranged from <0.01 to 0.02 mg/ℓ. During the second 12-month poststocking period, TFP concentrations have been only occasionally measured in concentrations exceeding the minimum detection limit of 0.010 mg/ℓ. The following tabulation gives a comparison of ranges of concentrations of total filterable phosphorus (mg/ℓ) reported throughout the study, for all stations, located in each major pool:

	Baseline 1/76-8/77	Poststocking I 9/77-8/78	Poststocking II 9/78-8/79
South pool	<0.010 to 0.041	<0.010 to 0.017	<0.010 to 0.010
Middle pool	<0.010 to 0.035	<0.010 to 0.024	<0.020 to 0.020
East pool	<0.010 to 0.041	<0.010 to 0.021	<0.010 to 0.020
West pool	<0.010 to 0.033	<0.010 to 0.050	<0.010 to 0.020
Lake Gatlin	<0.010 to 0.032	<0.010 to 0.024	<0.010 to 0.010

15. Table 2 shows some changes relative to the baseline period in percent variability due to changes in sampling depths. Two constituents

were found to have greater than a 5 percent variation in mean value concentrations at different depths. These parameters, organic nitrogen and volatile suspended solids, are shown in Table 2 to have a mean value variance as a function of sampling depth of 6 and 18 percent, respectively. As noted in the previous poststocking report, these variations are not considered important as these particular constituents are present in relatively low concentrations in the water column. Variations of these parameters are probably the result of experimental error.

16. When comparing Tables 3-13 to the baseline data, some changes in constituent mean value and standard deviation become apparent. Phosphorus concentrations exhibited a decrease at all 11 sampling stations. This decrease is a continuation of a downward trend noted in the first poststocking period. Mean concentration values of organic nitrogen increased at seven of the stations, decreased slightly at three stations, and remained constant at one station. Chemical oxygen demand values increased at all 11 sampling stations. Carotenoid concentrations increased slightly at six of the stations and showed an increase at five of the stations, particularly in Lake Gatlin. Biochemical oxygen demand and volatile suspended solids concentrations have decreased slightly from the baseline values. However, this appears to be a reversal of a declining trend noted in the first poststocking period. Mean value concentrations of chlorophyll-a exhibited a marked increase throughout the lake system with the exception of the South pool, where mean values for this parameter showed a minor decrease in samples collected from the water surface and from the bottom of the lake. As previously discussed, ammonia nitrogen concentrations have shown a substantial increase over both the baseline data and the first poststocking period data. The remaining parameters were present in concentrations similar to those previously detected during the baseline period.

17. To further evaluate these nine water quality parameters exhibiting changes from the baseline period, the adjusted baseline mean values for the 11 stations combined are presented below with the corresponding poststocking data:

Parameter	Adjusted Baseline Mean Value	Poststocking II Mean Value	Net Change percent
Total filtered phosphorus	0.0165 mg/ℓ	0.010 mg/ℓ	-39
Total unfiltered phosphorus	0.025 mg/ℓ	0.015 mg/ℓ	-40
Organic nitrogen	0.515 mg/ℓ	0.53 mg/ℓ	+5
Carotenoids	3.1 mg/m^3	4.4 mg/m^3	+30
Volatile suspended solids	1.8 mg/ℓ	1.6 mg/ℓ	-11
BOD	1.4 mg/ℓ	1.6 mg/ℓ	+14
COD	15 mg/ℓ	20 mg/ℓ	+25
Chlorophyll-a	5.5 mg/m^3	6.4 mg/m^3	+14
Ammonia nitrogen	<0.05 mg/ℓ	0.09 mg/ℓ	$>+44$

18. As previously discussed in the first poststocking report, the baseline data have been adjusted. The baseline values presented in the above tabulation are mean values subsequent to adjustment to correct for seasonal bias.

19. Three of the nine constituents show a decrease in concentration values when compared to the baseline data. Substantial net decreases are noted for total filterable phosphorus, total unfilterable phosphorus, and volatile suspended solids. Organic nitrogen values have not changed significantly on a percent basis from the baseline period. Five parameters exhibit an increase in mean value concentrations as compared to the baseline data. Substantial percent increases are noted for ammonia nitrogen, COD, BOD, chlorophyll-a, and carotenoids.

20. As noted in the preceding baseline and poststocking reports, changes in water quality data are probably related to climatic or other factors, as well as the introduction of the white amur.

21. Figures 2-7 in the baseline report depict mean concentrations and standard deviations of selected parameters by station. For ease of comparison, the same parameters are presented for this poststocking period. Also, Figure 8 has been added which gives the mean concentrations of ammonia with respective standard deviations for each station.

22. Figures 2 and 3 presented herein are similar to the baseline period in that the highest parameter concentrations are associated with

Lake Gatlin. Concentration values at the other sampling stations representing the four remaining pools are consistently lower. This trend was previously detected during the first poststocking period.

23. During the baseline period, higher organic nitrogen values were reported for Lake Gatlin and Little Lake Conway (East and West pools). During this poststocking period, as in the first poststocking period, Lake Gatlin recorded the highest values. The remaining stations were fairly consistent in regard to concentration levels of this parameter. The standard deviations increased at most stations when compared to the baseline data.

24. Biochemical oxygen demand concentrations, shown in Figure 5, are relatively consistent throughout the lake system. Lake Gatlin has recorded the highest mean value of BOD concentrations.

25. The trend of total solids concentrations shown in Figure 6 has changed from the baseline period in that the trend has become more inconsistent from the South pool through the lake system to the West pool. The highest mean value still occurred in Lake Gatlin, as was the case during the baseline period. The trend of chlorophyll-a concentrations depicted in Figure 7 remained essentially unchanged from the baseline period. Figure 8, showing the trend in ammonia nitrogen concentrations, is presented for the first time; subsequently, there are no comparisons of trends between the baseline and second poststocking periods. It should be noted that ammonia nitrogen values were generally consistent in terms of mean concentrations throughout the five major pools.

26. Figure 9 graphically presents nitrate nitrogen, total nitrogen, organic nitrogen, and chlorophyll-a data for Lake Gatlin. Nitrate nitrogen levels appear to be functioning in an inverse relationship with chlorophyll-a concentrations. During the summer and fall months, when the phytoplankton community is actively growing, chlorophyll-a concentrations increase and nitrate nitrogen values decrease. The opposite occur during the winter months. This relationship was previously identified during the baseline and first poststocking periods. As shown in Figure 9, organic nitrogen concentration values fluctuated throughout the sampling period.

27. Figure 10 presents data similar to that shown in Figure 9, but for the South pool of Lake Conway. Nitrate nitrogen levels are extremely low throughout the sampling period. This trend is identical to the trend observed for this parameter during the baseline period. Chlorophyll-a levels generally parallel the trend depicted during the baseline period. A change in seasonal organic nitrogen concentrations is apparent from the data presented in Figure 10. Highest organic nitrogen values are reported during the winter of 1978. This event is similar to the trend of this parameter previously established during the baseline period.

28. Figures 11-15 present seasonal trends for four water quality parameters: temperature, chlorophyll-a, total filterable phosphorus, and organic nitrogen. Each of the figures is based on data from a representative station in each of the five major pools. As reported during the first poststocking period, temperature and chlorophyll-a trends are very similar to the baseline period. The trend of total filterable phosphorus has undergone significant change relative to the baseline data. During the poststocking period concentration values are consistently lower and occur generally with little or no seasonal variation. In contrast, this constituent exhibited a distinct seasonal trend during the baseline period. The final parameter, organic nitrogen, also presented a dissimilar trend during this period. Mean values as calculated for the various seasons tended to fluctuate through a greater range than previously recorded during the baseline period.

Sediment Quality

Data compilation

29. Sediment data were collected at three times during this poststocking period at each of the 11 sampling stations. The complete set of data is presented in Table 19. These data are also compiled in the form of mean value and standard deviation (Table 20).

Data analysis

30. The baseline report noted that nitrogen and phosphorus concentrations varied somewhat between sampling stations but in a random

fashion. A similar trend was identified during the first poststocking period and has continued through the second poststocking period. The mean value for total nitrogen as calculated for all 11 sampling stations combined has shown essentially no change from the baseline period, although the standard deviation for this parameter increased from 2.69 mg/g to 3.3 mg/g. The total phosphorus mean value decreased from 0.44 mg/g during the baseline period to a value of 0.31 mg/g for the poststocking period.

31. As shown in Table 20, mean concentrations of copper increased when compared to the baseline data. However, this parameter has decreased from the value determined for the first poststocking period. The rather large standard deviation for copper, as shown in Table 20, is indicative of the large range of values detected at each sampling station. Lead concentrations in the sediments show an increase in mean value for the combined stations and a decrease in the standard deviation relative to the baseline period.

32. Chemical oxygen demand concentrations did not appear to change. Mean iron concentrations have decreased throughout the lake system.

33. Manganese concentrations were not recorded during the baseline period. This parameter was added during the first poststocking period and the mean value for this parameter was calculated to be 23 μg/g with a range of values from 5 to 66 μg/g. As shown in Table 20, concentrations of this constituent have exhibited a decrease during the second poststocking period.

Aquatic Plant Data Presentation

34. Table 21 presents the raw data collected during this 12-month sampling period. The data relate to nutrient, organic, and other chemical contents of the various aquatic vegetation identified in the Lake Conway chain.

PART III: CONCLUSIONS

35. Several previously undetected water quality parameters were observed in detectable concentrations. Nitrate nitrogen was observed in measurable concentrations as the result of a decrease in the detection level. Previously, ammonia nitrogen was only occasionally measured in amounts exceeding the minimum detectable level. During this poststocking period, this parameter was found to exceed the detection limit at all 11 sampling stations. Total filterable phosphorus concentrations were consistently present in amounts less than the detectable level. Other minor changes were noted concerning the frequency in which detectable values occurred.

36. At several stations two constituents were found to have greater than a 5 percent variation in mean value at different sampling depths. These parameters were organic nitrogen and volatile suspended solids. Both of these water quality parameters exist in relatively low concentrations. During the baseline period, none of the 17 parameters tested exhibited greater than a 5 percent variability as a function of changes in sampling depth. The variations observed during this poststocking period are in part the result of the smaller quantity of data collected during this sampling period.

37. Comparing the mean values of the two sampling periods for each of the 11 sampling stations, several changes were noted. Phosphorus concentrations decreased at all 11 stations; organic nitrogen and volatile suspended solids values increased at seven stations; and carotenoid concentrations increased at all 11 stations. Biochemical oxygen demand concentrations decreased slightly throughout the lake system although three sampling stations recorded minor increases in concentration levels of this parameter. Ammonia nitrogen values increased substantially at all stations during this sampling period. Chemical oxygen demand concentrations also exhibited an increase at all 11 sampling stations. The mean chlorophyll-a values for the entire lake system, as calculated from the 11 stations combined, showed an increase in concentrations of this parameter over the adjusted baseline value.

38. The baseline report noted a trend of decreasing water quality proceeding from the South pool of Lake Conway to Lake Gatlin. This trend appeared to change during the first poststocking period in that the South, Middle, East, and West pools developed a tendency toward similar water quality conditions. This change appears to continue during the second 12-month poststocking period. As before, Lake Gatlin continues to exhibit the poorest water quality conditions of the five major pools.

39. Data collected during this poststocking period indicate that the water quality conditions in the Lake Conway system have remained stable with the exception of ammonia nitrogen (which increased) and total phosphorus concentrations (which decreased).

40. Sediment quality data were generally similar to the baseline data with the following exceptions: the total phosphorus mean value has decreased from the value calculated for the baseline period; mean copper concentration has also increased; and lead concentrations calculated for all stations combined have showed an increase in mean value and standard deviation compared to the baseline period. Manganese concentrations were not recorded during the baseline period but have exhibited a decrease in mean value over the first poststocking period.

Table 1

Parameters Present in Amounts Too Small to Register on the Measuring Device

Parameter	Detectable Level, mg/ℓ
Nitrite nitrogen (N)	0.010
Total phosphorus (filtered) (P)	0.010
Orthophosphorus* (P)	0.010
Copper** (Cu)	0.010
Iron (Fe)	0.050
Lead* (Pb)	0.010

* Rarely measured in amounts exceeding detectable level.

** Occasionally measured in amounts exceeding detectable level.

Table 2

Parameters Previously Found to Have No Significant Variability Due to Changes in Depth

Parameters	Percent Variability Sep 1978-Aug 1979
Temperature	1
Conductivity	0
Alkalinity	3
Hardness	2
Calcium	0
Sodium	0
Potassium	2
Magnesium	0
Organic nitrogen	6
BOD	3
COD	5
Total solids	2
Total phosphorus (filtered)	0
Total phosphorus (unfiltered)	0
Volatile suspended solids	18
Carotenoids	4

Table 3

Poststocking Data Compilation

Sampling Station 400117

Parameter	Mean Value	Standard Deviation
Temperature	23.4°C	5.1°C
Conductivity	228 μmho/cm	7 μmho/cm
Alkalinity	31 mg/ℓ	0.8 mg/ℓ
Hardness	63 mg/ℓ	4.5 mg/ℓ
Calcium	15 mg/ℓ	1.8 mg/ℓ
Sodium	17 mg/ℓ	0.4 mg/ℓ
Potassium	4.7 mg/ℓ	0.3 mg/ℓ
Magnesium	6.2 mg/ℓ	0.2 mg/ℓ
Secchi disk	2.5 m	0.5 m
Organic nitrogen	0.51 mg/ℓ	0.17 mg/ℓ
BOD	1.3 mg/ℓ	0.8 mg/ℓ
COD	21 mg/ℓ	6 mg/ℓ
Total solids	139 mg/ℓ	11 mg/ℓ
Total phosphorus (filtered)	0.010 mg/ℓ	0.000 mg/ℓ
Total phosphorus (unfiltered)	0.011 mg/ℓ	0.003 mg/ℓ
Volatile suspended solids	1.5 mg/ℓ	1.4 mg/ℓ
Carotenoids	2.5 mg/m^3	1.3 mg/m^3
Ammonia nitrogen	0.09 mg/ℓ	0.03 mg/ℓ

Table 4

Poststocking Data Compilation

Sampling Station 282197

Parameter	Mean Value	Standard Deviation
Temperature	23.4°C	5.1°C
Conductivity	228 μmho/cm	7 μmho/cm
Alkalinity	32 mg/ℓ	1.0 mg/ℓ
Hardness	62 mg/ℓ	7.1 mg/ℓ
Calcium	15 mg/ℓ	1.9 mg/ℓ
Sodium	17 mg/ℓ	0.5 mg/ℓ
Potassium	4.7 mg/ℓ	0.3 mg/ℓ
Magnesium	6.1 mg/ℓ	0.2 mg/ℓ
Secchi disk	2.6 m	0.5 m
Organic nitrogen	0.53 mg/ℓ	0.10 mg/ℓ
BOD ı	1.3 mg/ℓ	0.9 mg/ℓ
COD	20 mg/ℓ	7 mg/ℓ
Total solids	137 mg/ℓ	9 mg/ℓ
Total phosphorus (filtered)	0.010 mg/ℓ	0.000 mg/ℓ
Total phosphorus (unfiltered)	0.011 mg/ℓ	0.003 mg/ℓ
Volatile suspended solids	1.8 mg/ℓ	1.6 mg/ℓ
Carotenoids	2.5 mg/m^3	1.4 mg/m^3
Ammonia nitrogen	0.09 mg/ℓ	0.03 mg/ℓ

Table 5

Poststocking Data Compilation

Sampling Station 210302

Parameter	Mean Value	Standard Deviation
Temperature	23.3°C	5.3°C
Conductivity	229 μmho/cm	8 μmho/cm
Alkalinity	26 mg/ℓ	1.5 mg/ℓ
Hardness	65 mg/ℓ	4.3 mg/ℓ
Calcium	15 mg/ℓ	1.7 mg/ℓ
Sodium	17 mg/ℓ	0.4 mg/ℓ
Potassium	4.5 mg/ℓ	0.2 mg/ℓ
Magnesium	6.8 mg/ℓ	0.1 mg/ℓ
Secchi disk	2.5 m	0.5 m
Organic nitrogen	0.54 mg/ℓ	0.09 mg/ℓ
BOD	1.2 mg/ℓ	0.8 mg/ℓ
COD	17 mg/ℓ	4 mg/ℓ
Total solids	135 mg/ℓ	6 mg/ℓ
Total phosphorus (filtered)	0.010 mg/ℓ	0.000 mg/ℓ
Total phosphorus (unfiltered)	0.013 mg/ℓ	0.004 mg/ℓ
Volatile suspended solids	1.4 mg/ℓ	1.4 mg/ℓ
Carotenoids	3.2 mg/m^3	1.5 mg/m^3
Ammonia nitrogen	0.08 mg/ℓ	0.03 mg/ℓ

Table 6

Poststocking Data Compilation

Sampling Station 415312

Parameter	Mean Value	Standard Deviation
Temperature	23.2°C	5.3°C
Conductivity	229 μmho/cm	8 μmho/cm
Alkalinity	36 mg/ℓ	1.5 mg/ℓ
Hardness	65 mg/ℓ	4.0 mg/ℓ
Calcium	15 mg/ℓ	1.6 mg/ℓ
Sodium	17 mg/ℓ	0.4 mg/ℓ
Potassium	4.4 mg/ℓ	0.2 mg/ℓ
Magnesium	6.8 mg/ℓ	0.1 mg/ℓ
Secchi disk	2.7 m	0.6 m
Organic nitrogen	0.52 mg/ℓ	0.11 mg/ℓ
BOD	1.2 mg/ℓ	0.8 mg/ℓ
COD	17 mg/ℓ	5 mg/ℓ
Total solids	132 mg/ℓ	12 mg/ℓ
Total phosphorus (filtered)	0.010 mg/ℓ	0.000 mg/ℓ
Total phosphorus (unfiltered)	0.013 mg/ℓ	0.004 mg/ℓ
Volatile suspended solids	1.1 mg/ℓ	1.4 mg/ℓ
Carotenoids	3.2 mg/m^3	1.5 mg/m^3
Ammonia nitrogen	0.08 mg/ℓ	0.03 mg/ℓ

Table 7

Poststocking Data Compilation

Sampling Station 332385

Parameter	Mean Value	Standard Deviation
Temperature	23.3°C	5.4°C
Conductivity	230 μmho/cm	7 μmho/cm
Alkalinity	36 mg/ℓ	1.6 mg/ℓ
Hardness	65 mg/ℓ	3.7 mg/ℓ
Calcium	15 mg/ℓ	1.5 mg/ℓ
Sodium	17 mg/ℓ	0.4 mg/ℓ
Potassium	4.4 mg/ℓ	0.2 mg/ℓ
Magnesium	6.9 mg/ℓ	0.2 mg/ℓ
Secchi disk	1.7 m	0.2 m
Organic nitrogen	0.53 mg/ℓ	0.18 mg/ℓ
BOD	1.0 mg/ℓ	0.9 mg/ℓ
COD	17 mg/ℓ	6 mg/ℓ
Total solids	132 mg/ℓ	12 mg/ℓ
Total phosphorus (filtered)	0.010 mg/ℓ	0.000 mg/ℓ
Total phosphorus (unfiltered)	0.012 mg/ℓ	0.006 mg/ℓ
Volatile suspended solids	0.7 mg/ℓ	1.3 mg/ℓ
Carotenoids	3.0 mg/m^3	1.4 mg/m^3
Ammonia nitrogen	0.09 mg/ℓ	0.06 mg/ℓ

Table 8

Poststocking Data Compilation

Sampling Station 380455

Parameter	Mean Value	Standard Deviation
Temperature	22.9°C	5.6°C
Conductivity	228 µmho/cm	10 µmho/cm
Alkalinity	35 mg/ℓ	1.3 mg/ℓ
Hardness	66 mg/ℓ	4.1 mg/ℓ
Calcium	17 mg/ℓ	1.7 mg/ℓ
Sodium	17 mg/ℓ	0.5 mg/ℓ
Potassium	4.7 mg/ℓ	0.4 mg/ℓ
Magnesium	5.8 mg/ℓ	0.2 mg/ℓ
Secchi disk	1.1 m	0.2 m
Organic nitrogen	0.56 mg/ℓ	0.22 mg/ℓ
BOD	1.3 mg/ℓ	0.9 mg/ℓ
COD	22 mg/ℓ	8 mg/ℓ
Total solids	150 mg/ℓ	51 mg/ℓ
Total phosphorus (filtered)	0.010 mg/ℓ	0.000 mg/ℓ
Total phosphorus (unfiltered)	0.026 mg/ℓ	0.031 mg/ℓ
Volatile suspended solids	2.5 mg/ℓ	4.0 mg/ℓ
Carotenoids	4.8 mg/m^3	1.5 mg/m^3
Ammonia nitrogen	0.08 mg/ℓ	0.03 mg/ℓ

Table 9

Poststocking Data Compilation

Sampling Station 415532

Parameter	Mean Value	Standard Deviation
Temperature	23.4°C	5.2°C
Conductivity	228 μmho/cm	11 μmho/cm
Alkalinity	35 mg/ℓ	1.8 mg/ℓ
Hardness	65 mg/ℓ	3.5 mg/ℓ
Calcium	17 mg/ℓ	1.4 mg/ℓ
Sodium	17 mg/ℓ	0.5 mg/ℓ
Potassium	4.7 mg/ℓ	0.4 mg/ℓ
Magnesium	5.8 mg/ℓ	0.2 mg/ℓ
Secchi disk	2.1 m	0.4 m
Organic nitrogen	0.53 mg/ℓ	0.21 mg/ℓ
BOD	1.4 mg/ℓ	0.9 mg/ℓ
COD	21 mg/ℓ	8 mg/ℓ
Total solids	143 mg/ℓ	16 mg/ℓ
Total phosphorus (filtered)	0.010 mg/ℓ	0.000 mg/ℓ
Total phosphorus (unfiltered)	0.017 mg/ℓ	0.007 mg/ℓ
Volatile suspended solids	0.9 mg/ℓ	0.9 mg/ℓ
Carotenoids	5.2 mg/m^3	1.2 mg/m^3
Ammonia nitrogen	0.07 mg/ℓ	0.03 mg/ℓ

Table 10

Poststocking Data Compilation

Sampling Station 212495

Parameter	Mean Value	Standard Deviation
Temperature	23.5°C	5.2°C
Conductivity	231 μmho/cm	9 μmho/cm
Alkalinity	37 mg/ℓ	1.9 mg/ℓ
Hardness	67 mg/ℓ	3.5 mg/ℓ
Calcium	17 mg/ℓ	1.5 mg/ℓ
Sodium	17 mg/ℓ	0.4 mg/ℓ
Potassium	4.8 mg/ℓ	0.4 mg/ℓ
Magnesium	6.0 mg/ℓ	0.2 mg/ℓ
Secchi disk	2.0 m	0.3 m
Organic nitrogen	0.53 mg/ℓ	0.17 mg/ℓ
BOD	1.4 mg/ℓ	0.8 mg/ℓ
COD	18 mg/ℓ	3 mg/ℓ
Total solids	139 mg/ℓ	9 mg/ℓ
Total phosphorus (filtered)	0.010 mg/ℓ	0.000 mg/ℓ
Total phosphorus (unfiltered)	0.015 mg/ℓ	0.007 mg/ℓ
Volatile suspended solids	1.3 mg/ℓ	1.0 mg/ℓ
Carotenoids	5.3 mg/m^3	1.2 mg/m^3
Ammonia nitrogen	0.08 mg/ℓ	0.05 mg/ℓ

Table 11

Poststocking Data Compilation

Sampling Station 195382

Parameter	Mean Value	Standard Deviation
Temperature	23.4°C	5.3°C
Conductivity	231 μmho/cm	9 μmho/cm
Alkalinity	36 mg/ℓ	1.7 mg/ℓ
Hardness	68 mg/ℓ	3.9 mg/ℓ
Calcium	17 mg/ℓ	1.7 mg/ℓ
Sodium	17 mg/ℓ	0.5 mg/ℓ
Potassium	4.9 mg/ℓ	0.3 mg/ℓ
Magnesium	6.0 mg/ℓ	0.2 mg/ℓ
Secchi disk	2.0 m	0.2 m
Organic nitrogen	0.53 mg/ℓ	0.13 mg/ℓ
BOD	1.4 mg/ℓ	0.8 mg/ℓ
COD	20 mg/ℓ	11 mg/ℓ
Total solids	139 mg/ℓ	9 mg/ℓ
Total phosphorus (filtered)	0.010 mg/ℓ	0.000 mg/ℓ
Total phosphorus (unfiltered)	0.015 mg/ℓ	0.007 mg/ℓ
Volatile suspended solids	1.4 mg/ℓ	1.1 mg/ℓ
Carotenoids	5.1 mg/m^3	1.3 mg/m^3
Ammonia nitrogen	0.09 mg/ℓ	0.05 mg/ℓ

Table 12

Poststocking Data Compilation

Sampling Station 157435

Parameter	Mean Value	Standard Deviation
Temperature	23.5°C	5.2°C
Conductivity	231 μmho/cm	9 μmho/cm
Alkalinity	37 mg/ℓ	2.0 mg/ℓ
Hardness	68 mg/ℓ	3.8 mg/ℓ
Calcium	17 mg/ℓ	1.7 mg/ℓ
Sodium	17 mg/ℓ	0.5 mg/ℓ
Potassium	4.9 mg/ℓ	0.3 mg/ℓ
Magnesium	6.0 mg/ℓ	0.2 mg/ℓ
Secchi disk	2.0 m	0.4 m
Organic nitrogen	0.53 mg/ℓ	0.12 mg/ℓ
BOD	1.4 mg/ℓ	0.8 mg/ℓ
COD	23 mg/ℓ	9 mg/ℓ
Total solids	137 mg/ℓ	14 mg/ℓ
Total phosphorus (filtered)	0.010 mg/ℓ	0.000 mg/ℓ
Total phosphorus (unfiltered)	0.015 mg/ℓ	0.007 mg/ℓ
Volatile suspended solids	1.9 mg/ℓ	2.2 mg/ℓ
Carotenoids	5.2 mg/m^3	1.3 mg/m^3
Ammonia nitrogen	0.10 mg/ℓ	0.06 mg/ℓ

Table 13

Poststocking Data Compilation

Sampling Station 132497

Parameter	Mean Value	Standard Deviation
Temperature	23.7°C	5.2°C
Conductivity	273 μmho/cm	12 μmho/cm
Alkalinity	42 mg/ℓ	2.3 mg/ℓ
Hardness	85 mg/ℓ	3.5 mg/ℓ
Calcium	16 mg/ℓ	2.0 mg/ℓ
Sodium	17 mg/ℓ	0.6 mg/ℓ
Potassium	5.6 mg/ℓ	0.3 mg/ℓ
Magnesium	10.8 mg/ℓ	0.4 mg/ℓ
Secchi disk	1.8 m	0.8 m
Organic nitrogen	0.65 mg/ℓ	0.14 mg/ℓ
BOD	1.6 mg/ℓ	0.5 mg/ℓ
COD	29 mg/ℓ	19 mg/ℓ
Total solids	168 mg/ℓ	16 mg/ℓ
Total phosphorus (filtered)	0.010 mg/ℓ	0.000 mg/ℓ
Total phosphorus (unfiltered)	0.015 mg/ℓ	0.006 mg/ℓ
Volatile suspended solids	3.5 mg/ℓ	3.6 mg/ℓ
Carotenoids	8.7 mg/m^3	6.1 mg/m^3
Ammonia nitrogen	0.09 mg/ℓ	0.04 mg/ℓ

Table 14

Poststocking Data Compilation

Lake Conway*

Parameter	Mean Value	Standard Deviation
Temperature	23.4°C	5.3°C
Conductivity	233 μmho/cm	9 μmho/cm
Alkalinity	36 mg/ℓ	1.6 mg/ℓ
Hardness	67 mg/ℓ	4.2 mg/ℓ
Calcium	16 mg/ℓ	1.7 mg/ℓ
Sodium	17 mg/ℓ	0.5 mg/ℓ
Potassium	4.8 mg/ℓ	0.3 mg/ℓ
Magnesium	6.7 mg/ℓ	0.2 mg/ℓ
Secchi disk	2.1 m	0.4 m
Organic nitrogen	0.54 mg/ℓ	0.15 mg/ℓ
BOD	1.3 mg/ℓ	0.8 mg/ℓ
COD	20 mg/ℓ	8 mg/ℓ
Total solids	141 mg/ℓ	15 mg/ℓ
Total phosphorus (filtered)	0.010 mg/ℓ	0.000 mg/ℓ
Total phosphorus (unfiltered)	0.015 mg/ℓ	0.008 mg/ℓ
Volatile suspended solids	1.6 mg/ℓ	1.8 mg/ℓ
Carotenoids	4.4 mg/m^3	1.8 mg/m^3
Ammonia nitrogen	0.09 mg/ℓ	0.04 mg/ℓ

* Based on data collected at all 11 sampling stations.

Table 15

Poststocking Data Compilation

Dissolved Oxygen, mg/ℓ

Station No.	Surface $\bar{X}$	Surface SD	Middepth $\bar{X}$	Middepth SD	Bottom $\bar{X}$	Bottom SD
400117	7.7	1.1	7.6	1.0	7.6	1.2
282197	7.9	0.7	7.6	0.8	7.8	0.6
210302	7.9	0.9	ID	ID	7.8	0.9
415312	8.3	1.2	7.5	0.8	7.6	1.1
332385	8.5	1.0	ND	ND	ND	ND
380455	8.1	1.2	ND	ND	ND	ND
415532	7.9	1.1	ND	ND	7.4	1.3
212495	7.5	0.9	ND	ND	7.4	1.1
195382	8.0	1.3	ND	ND	7.7	1.4
157435	8.0	1.2	ID	ID	7.6	1.0
132497	8.0	0.8	ID	ID	7.7	1.2

Note: $\bar{X}$ = average, SD = standard deviation, ID = insufficient data, and ND = no data.

Table 16

Poststocking Data Compilation

pH

Station No.	Surface		Middepth		Bottom	
	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
400117	7.5	0.5	7.2	0.2	7.4	0.5
282197	7.4	0.5	7.2	0.1	7.3	0.4
210302	7.6	0.4	ND	ND	7.5	0.3
415312	7.4	0.5	7.3	0.2	7.4	0.4
332385	7.7	0.4	ND	ND	ND	ND
380455	7.3	0.4	ND	ND	ND	ND
415532	7.5	0.3	ND	ND	7.2	0.2
212495	7.3	0.2	ND	ND	7.4	0.3
195382	7.3	0.3	ND	ND	7.2	0.3
157435	7.4	0.3	ID	ID	7.3	0.4
132497	7.6	0.7	ID	ID	7.6	0.6

Note: $\bar{X}$ = average, SD = standard deviation, ID = insufficient data, and ND = no data.

Table 17

Poststocking Data Compilation

Turbidity, FTU

Station No.	Surface $\bar{X}$	Surface SD	Middepth $\bar{X}$	Middepth SD	Bottom $\bar{X}$	Bottom SD
400117	1.1	0.3	ID	ID	1.2	0.3
282197	0.8	0.2	ND	ND	0.8	0.1
210302	1.4	0.4	ND	ND	1.2	0.4
415312	1.0	0.6	ND	ND	1.0	0.6
332385	1.0	0.4	ND	ND	ND	ND
380455	2.0	0.9	ND	ND	ND	ND
415532	1.0	0.7	ND	ND	1.7	0.6
212495	2.1	0.6	ND	ND	2.3	0.5
195382	1.6	0.7	ND	ND	1.7	0.7
157435	2.0	0.9	ND	ND	2.0	0.7
132497	1.9	0.8	ND	ND	2.0	1.0

Note: $\bar{X}$ = average, SD = standard deviation, ID = insufficient data, and ND = no data.

Table 18

Poststocking Data Compilation

Chlorophyll-a, mg/m^3

Station	Surface		Middepth		Bottom	
No.	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
400117	4.3	1.4	4.5	1.7	4.1	1.5
282197	4.3	1.5	4.5	1.5	4.4	1.8
210302	5.7	2.3	ND	ND	5.4	2.1
415312	5.6	2.3	6.0	0.2	5.5	2.1
332385	5.2	2.2	ND	ND	ND	ND
380455	7.6	1.9	ND	ND	ND	ND
415532	8.0	2.0	ND	ND	8.1	1.5
212495	7.8	1.4	ND	ND	7.8	1.2
195382	7.3	1.3	ND	ND	7.4	1.3
157435	7.8	1.3	ID	ID	7.6	1.3
132497	13.5	8.3	ID	ID	13.6	8.1

Note: $\bar{X}$ = average, SD = standard deviation, ID = insufficient data, and ND = no data.

Table 19

Poststocking Data Presentation

Sediment Quality

Date	Station No.	Total Nitrogen mg/g	Total PO_4-P mg/g	Cu µg/g	Pb µg/g	COD mg/g	Fe µg/g	Mn µg/g
1-10-79	400117	8.0	0.28	62	34	200	980	26
4-9-79	400117	3.0	0.46	19	19	57	305	8
7-9-79	400117	1.3	0.10	10	10	50	220	5
1-10-79	282197	1.8	0.33	8	24	63	215	8
4-9-79	282197	2.5	0.10	1	8	3	85	3
7-9-79	282197	1.3	0.08	9	15	42	210	3
1-10-79	210302	1.9	0.75	23	22	83	380	10
4-9-79	210302	0.5	0.31	9	7	25	340	6
7-9-79	210302	5.6	0.57	43	22	218	940	23
1-10-79	415312	8.7	0.35	28	14	220	760	32
4-9-79	415312	1.3	0.14	3	4	14	165	6
7-9-79	415312	3.6	0.07	15	30	122	415	11
1-10-79	332385	0.4	0.27	3	7	10	105	2
4-9-79	332385	0.6	0.05	1	4	3	80	2
7-9-79	332385	0.2	0.01	2	5	5	75	2
1-10-79	380455	2.6	0.75	27	27	86	305	6
4-9-79	380455	0.5	0.39	22	10	67	255	4
7-9-79	380455	0.2	0.35	6	5	9	100	1
1-10-79	415532	17.0	0.67	500	49	760	3250	60
4-9-79	415532	2.5	0.71	50	10	150	350	14
7-9-79	415532	0.3	0.05	8	5	14	130	2
1-19-79	212495	2.1	0.61	13	10	57	345	6
4-9-79	212495	5.0	0.32	15	9	57	310	9
7-9-79	212495	1.9	0.36	16	11	53	400	7

(Continued)

Table 19 (Concluded)

Date	Station No.	Total Nitrogen mg/g	Total PO_4-P mg/g	Cu µg/g	Pb µg/g	COD mg/g	Fe µg/g	Mn µg/g
1-10-79	195382	3.6	0.61	21	28	98	335	6
4-9-79	195382	2.5	0.31	12	5	76	195	5
7-9-79	195382	2.2	0.08	20	21	86	305	6
1-10-79	157435	0.9	0.28	6	14	22	200	3
4-9-79	157435	2.5	0.14	4	3	10	100	4
7-9-79	157435	0.3	0.14	8	9	11	80	2
1-10-79	132497	0.5	0.14	5	3	13	120	2
4-9-79	132497	0.6	0.15	5	2	3	150	55
7-9-79	132497	0.2	0.17	6	4	3	155	11

Table 20

Poststocking Data Compilation Sediment Quality

Parameter	Baseline		Poststocking I		Poststocking II	
	Mean Value	Standard Deviation	Mean Value	Standard Deviation	Mean Value	Standard Deviation
Total nitrogen, mg/g	2.66	2.69	3.3	3.4	2.6	3.3
Total phosphorus, mg/g	0.44	0.37	0.37	0.21	0.31	0.22
Copper, μg/g	13.49	22.60	36	48	30	86
Lead, μg/g	9.08	13.65	28	40	14	11
Total organic carbon, mg/g	28.6	24.1	---	---	---	---
Chemical oxygen demand, mg/g	88.3	99.5	95	108	82	136
Iron, μg/g	727	670	817	773	375	562
Manganese, μg/g	---	---	23	23	11	14

Table 21

Poststocking Data Presentation

Aquatic Plant Content, mg/g

Date	Station No.	Plant Species	Percent Water	COD	PO_4-P	N	Cu*
10-18-78	400117	Nitella	96	1336	1.3	36	60
1-15-79	400117	Nitella	96	1015	0.8	29	45
4-9-79	400117	Nitella	96	1003	1.0	20	60
7-10-79	400117	Nitella	96	1067	1.2	33	35
10-18-78	282197	Nitella	97	1062	0.7	33	37
10-18-78	282197	Potamogeton	92	1127	0.2	22	14
10-18-78	282197	Hydrilla	94	1046	1.0	30	10
1-15-79	282197	Potamogeton	92	1125	0.8	17	17
4-9-79	282197	Nitella	95	1067	0.9	20	48
4-9-79	282197	Hydrilla	94	892	0.9	21	27
4-9-79	282197	Potamogeton	92	1178	0.4	11	18
7-10-79	282197	Nitella	97	965	1.6	32	36
7-10-79	282197	Potamogeton	91	1067	0.9	15	18
10-18-78	210302	Nitella	97	1062	1.4	41	53
1-15-79	210302	Nitella	96	940	1.6	34	45
4-9-79	210302	Nitella	96	939	1.3	26	65
7-10-79	210302	Nitella	96	1067	1.5	27	40
10-18-78	415312	Nitella	97	1062	1.7	36	36
10-18-78	415312	Coontail	94	1095	1.0	29	17
1-15-79	415312	Nitella	97	1000	1.0	26	35
4-9-79	415312	Nitella	96	939	0.8	28	63
7-10-79	415312	Nitella	96	1098	1.1	30	40
10-18-78	332385	Nitella	96	1030	1.6	32	31
10-18-78	332385	Potamogeton	90	1046	1.3	22	16
1-15-79	332385	Nitella	96	1000	1.7	29	23

(Continued)

* Values for copper reported in μg/g.

Table 21 (Continued)

Date	Station No.	Plant Species	Percent Water	COD	PO_4-P	N	Cu
1-15-79	332385	Potamogeton	90	1060	1.3	19	14
4-9-79	332385	Nitella	94	876	0.5	21	30
4-9-79	332385	Potamogeton	91	1051	0.5	15	11
7-10-79	332385	Potamogeton	90	1020	1.0	15	12
10-18-78	380455	Nitella	95	966	1.2	24	30
10-18-78	380455	Potamogeton	90	1127	1.0	24	18
10-18-78	380455	Naiad	91	1046	1.3	28	15
1-15-79	380455	Naiad	91	980	1.4	21	35
1-15-79	380455	Vallisneria	95	980	0.8	15	11
1-15-79	380455	Nitella	94	940	1.3	30	53
1-15-79	380455	Potamogeton	90	1160	1.3	22	23
4-9-79	380455	Nitella	94	907	0.4	25	40
4-9-79	380455	Vallisneria	94	1019	0.9	18	20
4-9-79	380455	Potamogeton	93	1043	0.7	24	24
7-10-79	380455	Vallisneria	94	1098	1.4	18	22
7-10-79	380455	Potamogeton	90	988	1.1	19	19
10-18-78	415532	Hydrilla	95	982	1.9	20	23
1-15-79	415532	Hydrilla	95	920	2.2	28	44
4-9-79	415532	Hydrilla	91	772	0.5	26	90
7-10-79	415532	No plants recovered from station					
10-18-78	212495	Nitella	94	1046	1.1	38	45
10-18-78	212495	Hydrilla	91	1062	1.4	13	14
1-15-79	212495	Hydrilla	95	595	1.3	18	30
4-9-79	212495	Hydrilla	89	454	0.5	18	22
4-9-79	212495	Potamogeton	93	621	0.5	22	23
7-10-79	212495	No plants recovered from station					
10-18-78	195382	Nitella	95	1030	1.2	36	30
10-18-78	195382	Potamogeton	90	1159	1.0	18	15

(Continued)

Table 21 (Concluded)

Date	Station No.	Plant Species	Percent Water	COD	PO_4-P	N	Cu
1-15-79	195382	Vallisneria	95	905	0.7	24	21
1-15-79	195382	Nitella	96	1000	0.9	24	29
4-9-79	195382	Nitella	94	939	0.2	22	43
4-9-79	195382	Vallisneria	92	923	0.3	23	24
4-9-79	195382	Potamogeton	91	1003	0.7	26	30
7-10-79	195382	Nitella	95	1130	1.1	26	34
7-10-79	195382	Vallisneria	94	941	1.3	19	19
7-10-79	195382	Potamogeton	90	1114	0.8	15	18
10-18-78	157435	Nitella	94	1062	2.3	27	47
10-18-78	157435	Potamogeton	91	1078	1.4	21	18
10-18-78	157435	Hydrilla	90	917	1.3	23	14
10-18-78	157435	Vallisneria	94	982	1.2	30	13
1-15-79	157435	Vallisneria	94	955	1.3	24	19
1-15-79	157435	Nitella	96	1015	1.3	31	36
4-9-79	157435	Vallisneria	93	955	0.6	22	19
7-10-79	157435	Vallisneria	93	863	0.8	16	19
7-10-79	157435	Nitella	96	863	1.7	36	47
10-18-78	132497	No plants recovered from station					
1-10-79	132497	No plants recovered from station					
4-9-79	132497	No plants recovered from station					
7-10-79	132497	No plants recovered from station					

(Sheet 3 of 3)

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Miller, H. Douglas
  Large-scale operations management test of use of the white amur for control of problem aquatic plants : Report 3 : second year poststocking results : Volume VI : the water and sediment quality of Lake Conway, Florida / by H. Douglas Miller, Rick Potts (Canin/Miller Associates). -- Vicksburg, Miss. : U.S. Army Engineer Waterways Experiment Station ; Springfield, Va. ; available from NTIS, 1982.
  32, [24] p. : ill. ; 27 cm. -- (Technical report ; A-78-2, Rept. 3, Vol. 6)
  Cover title.
  "August 1982."
  "Prepared for U.S. Army Engineer District, Jacksonville and Office, Chief of Engineers, U.S. Army under Contract No. DACW39-76-C-0084."
  "Monitored by Environmental Laboratory, U.S. Army Engineer Waterways Experiment Station."
  At head of title: Aquatic Plant Control Research Program.

Miller, H. Douglas
  Large-scale operations management test of use : ... 1982.
(Card 2)

  1. Aquatic biology. 2. Aquatic weeds. 3. Conway, Lake (Fla.) 4. Weed control--Biological control. I. Potts, Rick. II. United States. Army. Corps of Engineers. Jacksonville District. III. United States. Army. Corps of Engineers. Office of the Chief of Engineers. IV. Aquatic Plant Control Research Program. V. Canin/Miller Associates. VI. U.S. Army Engineer Waterways Experiment Station. Environmental Laboratory. VII. Title VII. Series: Technical report (U.S. Army Engineer Waterways Experiment Station) ; A-78-2, Rept. 3, Vol. 6.
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