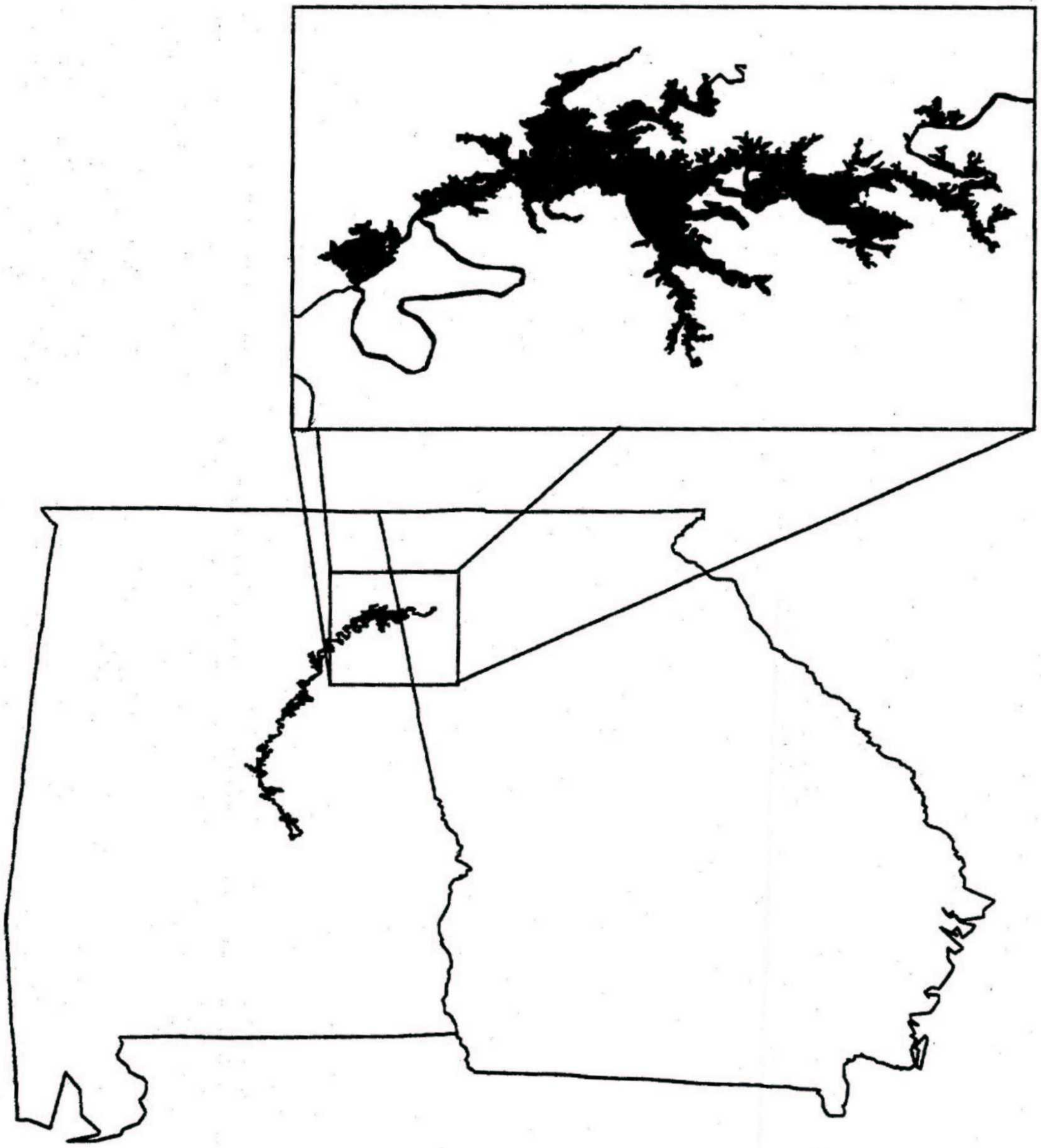
WEISS RESERVOIR
PHASE I DIAGNOSTIC/FEASIBILITY STUDY
FINAL REPORT



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FIELD OPERATIONS DIVISION
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WEISS RESERVOIR

Phase I Diagnostic/Feasibility Study

FINAL REPORT

December, 1997

Preface

A 70% federal and 30% state matching grant to the state of Alabama provided funding for this study. This grant was made available through the Clean Water Act Section 314 nationally competitive Clean Lakes Program. Federal funding was administered through the United States Environmental Protection Agency and Auburn University provided the matching funds through cooperative agreement with the Alabama Department of Environmental Management.

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WEISS LAKE

PHASE I DIAGNOSTIC/FEASIBILITY STUDY

FINAL REPORT

1993

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EXECUTIVE SUMMARY

Diagnostic Study

Weiss Lake was chosen for a Phase I, Clean Lakes, Diagnostic/Feasibility Study based on the results of several previous studies that showed degraded water quality and toxic contamination of the lake from point and nonpoint sources of pollution. The lake has been affected to the extent that it does not fully support designated uses. A somewhat unique situation exists in that the lake lies within the State of Alabama but the lake basin is mostly in Georgia. Historically this has created some problems in water management. The objectives of this study were to gather historic and current data on Weiss Lake, identify water quality problems and determine feasible solutions for their correction.

Weiss Lake was constructed on the Coosa River by Alabama Power Company for hydroelectric power generation in 1961. The lake has a surface area of 12,222 hectares at full pool and serves as a potable water supply, recreational (swimming and boating) resource, fishery and as flood protection. Studies conducted by ADEM, U.S. EPA and Auburn University have revealed water quality problems caused by excessive nutrient loading and the presence of toxic contaminants. As early as 1948, the Coosa River at Cedar Bluff was considered to be "moderately polluted" with organic waste causing low dissolved oxygen concentrations and elevated coliform bacteria levels.

Weiss Lake is a relatively shallow reservoir (mean depth 3.1 m) with a mean hydraulic retention time (volume/mean discharge) of 18 days. The high flushing rate, particularly along the mainstem of the lake, weakened thermal stratification even in the deeper lacustrine areas. On the mainstem, classical thermoclines ($\Delta T \geq 1^{\circ}C/m$ depth) were found on occasions in lacustrine areas but did not persist throughout the summer months. Mainstem temperature gradients within the water column seldom exceeded 5°C. Weak thermal stratification in some tributary embayments (e.g., Chattooga River) did persist throughout the summer months.

Even though Weiss Lake did not stratify thermally during the growing season (April through October) as is typical of warm monomictic lakes, chemical stratification did occur. Dissolved oxygen concentrations declined with depth and, at times, reached levels of less than 1.0 mg/l. Similar trends were noted for embayment D.O. concentrations. D.O. measured at 2 m depth ranged between 3.0 and 12.0 mg/l and varied inversely with water temperature during the growing season. D.O. levels during the warmer months were frequently below saturation for existing temperature and atmospheric pressure.

The Coosa River is one of the more alkaline and naturally fertile rivers in Alabama. Some of the soils in the basin are rich in limestone yielding abundant $CO_3^{=}$ and HCO_3^{-} ions to surface waters. Specific conductance, a measure of the ionic content of water, ranged from a low of 45 μmhos/cm in the Little River to a high of 407 μmhos/cm in the Chattooga River embayment at a depth of 2 m. Mainstem Alabama reservoirs were found to have specific conductance values ranging from about 23 μmhos/cm to 200 μmhos/cm. Weiss Lake ranks in the upper half of the Alabama range indicating that it is one of the more fertile lakes in the state. Specific conductance at the Chattooga River embayment station was about double that measured at any other sampling station. This was apparently a result of mostly municipal and industrial waste discharged into the Chattooga River from upstream locations.

Nitrogen and phosphorus are plant nutrients that are required in relatively high concentrations to support plant growth. Nitrogen concentrations normally exceed phosphorus concentrations by an order of magnitude or more (Wetzel 1983). Of the macronutrients, phosphorus is usually in shortest supply and therefore is the element most often limiting to plant growth in freshwater ecosystems. In some cases, phosphorus concentrations, relative to nitrogen, are high and thus nitrogen becomes limiting. This usually occurs at total nitrogen to total phosphorus ratios < 16:1 (Porcella and Cleave 1981).

Nitrogen is available to plants as nitrates ($NO_3^{\equiv}$) or as the ammonium ion (NH_4^+). In Weiss Lake, during the winter and spring, bioavailable nitrogen was relatively high (200-500 μg/l) but during the fall and particularly during the summer bioavailable nitrogen declined to very low levels. Apparently during the winter and spring, higher rainfall and surface runoff (Figure 10-2) created high abiogenic turbidity (Tables 10-9 and 10-10) in the lake and phytoplankton biomass (chlorophyll a) declined (Figure 10-16). At that time, photosynthesis was light limited and nutrient uptake was minimal. During the summer and fall, abiogenic turbidity decreased and chlorophyll a concentrations increased. This resulted in greater phytoplankton photosynthesis and more rapid utilization of bioavailable nutrients. Total nitrogen (organic and inorganic) concentrations at mainstem stations varied between about 430 μg/l and 900 μg/l. Ammonia and nitrite concentrations remained well below levels known to have direct adverse effects on aquatic organisms (EPA 1986).

Tributary embayment nitrogen concentrations were quite variable. However tributary total nitrogen concentrations were usually similar to concentrations at the nearest mainstem lake station. Nitrogen concentrations in the Chattooga River embayment (station 7) were similar to levels found in some of the other tributaries.

Phosphorus in water is routinely reported as total phosphorus (all forms of phosphorus expressed as P) and soluble reactive phosphorus which is an estimate of orthophosphate ($PO_4^{=}$ expressed as P), the most important and abundant form of phosphorus directly available to plants. Under the relatively low flow conditions existing during summer and fall, both orthophosphate and total phosphorus concentrations exhibited the longitudinal gradient typical of many mainstream impoundments (Thornton et al. 1990), with higher concentrations upstream and declining concentrations downstream. Concentrations of orthophosphate entering the lake by way of the Coosa River ranged from 12 to 146 μg/l and total phosphorus concentrations at that location ranged from 76 to 190 μg/l. These are high phosphorus concentrations. Total phosphorus concentrations > 100 μg/l are indicative of highly eutrophic waters (Wetzel 1983). Seasonal mean total phosphorus concentrations > 100 μg/l were found throughout the lake during the winter 1991-1992 and well into the lacustrine zone of the lake during the growing season. EPA (1986) suggested a limit of 50 μg/l total phosphorus at the point where a stream enters a lake or reservoir in order to prevent excessive loading.

With the exception of the Chattooga River, tributary embayment phosphorus (both orthophosphate and total phosphorus) concentrations were usually less than concentrations encountered at the nearest mainstem sampling location. In the Chattooga River embayment, seasonal mean orthophosphate varied from a low of 33 μg/l in the summer of 1991 to a high of 136 μg/l in the winter of 1990-1991. Total phosphorus at this site ranged from 103 μg/l in the spring of 1992 to 201 μg/l during the fall of 1991. These values were always higher, at times an order of magnitude or two higher, than other tributary embayment phosphorus concentrations. Chattooga River embayment phosphorus levels were consistently higher than nearby mainstem sampling stations. The point source pollution of the Chattooga River resulted in elevated specific conductance, total alkalinity, orthophosphate and total phosphorus but did not seem to increase nitrogen levels.

In reservoirs, phosphorus associated with suspended particles tends to sink if water movement subsides sufficiently in lentic areas of the lake. This phosphorus is deposited in bottom sediments and may remain there indefinitely. Mainstream reservoirs are known to trap large quantities of incoming phosphorus. Under certain circumstances some of the accumulated phosphorus can become soluble, reenter the water column and reach the photic zone, a process known as internal loading of phosphorus. Lakes with anaerobic hypolimnia are more prone to internal loading since reducing conditions mobilize phosphorus in the sediments and release soluble phosphorus to the overlying water column. The relatively high flushing rate of Weiss Lake (18 day mean retention time) prevents rigid thermal and chemical stratification thus decreasing the incidence of internal phosphorus loading. Decreased discharge of the Coosa River into Weiss Lake will increase hydraulic retention time and strengthen thermal and chemical stratification. If this occurs during the growing season, internal loading could become a significant additional source of phosphorus to the lake.

During the summer growing seasons the ratio of total nitrogen (TN) to total phosphorus (TP) at mainstem sampling stations varied from 6.8 to 9.9 in

1991 and from 5.5 to 7.0 in 1992. Optimum TN to TP ratios for phytoplankton growth is in the range of 11 to 16 (Porcella and Cleave 1981). Phytoplankton growth in Weiss Lake was nitrogen limited because of the high concentration of phosphorus entering the lake primarily by way of the Coosa and Chattooga Rivers. Waters receiving treated municipal waste often have relatively low (2-5) TN:TP (Raschke and Schultz 1987). Upstream Coosa River (station 12) had ratios of 6.9 in 1991 and 6.3 in 1992 and the Chattooga River ratios were 4.9 in 1991 and 4.0 in 1992. Any increases in bioavailable nitrogen to Weiss Lake will increase, perhaps dramatically, phytoplankton production. Controlling phosphorus loading of the lake is the only practical solution to the problem of algal growth in the lake (EPA 1990) but the low TN to TP ratio means that much phosphorus must be removed just to force the lake into phosphorus limitation of phytoplankton growth.

The obvious response to nutrient enrichment of Weiss Lake was excessive growth of plankton algae. Sixty two algal taxa were identified during the study. Phytoplankton communities were indicative of nutrient enriched, southeastern reservoirs. Corrected chlorophyll a concentrations in Weiss Lake ranged from a high of 46.9 μg/l in the dam forebay in July 1991 to a low of 0.0 μg/l at several locations in January 1991. Mean winter and spring concentrations were generally lower than mean summer or fall concentrations. The relatively short mean hydraulic retention time of Weiss Lake (18 days) resulted in unidirectional downstream (advective) currents that transport nutrients and phytoplankton rapidly toward the dam. The absence of strong chemical stratification, particularly in the mainstem of the reservoir, caused a rather uniform nutrient dispersal throughout the water column. These conditions typically result in minimal longitudinal gradients of physicochemical and biological variables (Thornton et al. 1990). Seasonal mean chlorophyll a levels at lacustrine sampling stations (stations 1-8) were similar throughout (Figure 10-16). There was also little variation in chlorophyll a concentrations between years for a particular season. However, Bayne and Maceina (1992) found that the mean Weiss Lake chlorophyll a concentration measured during the relatively rainy 1989 growing season (27 μg/l) almost doubled during the drier 1990 growing season (41 μg/l).

Mean growing season (June through October) primary productivity exceeded levels considered eutrophic (1000 mgC/m^2.day) at all sampling stations except riverine station 12 in 1991. As a result, the 1991 productivity was somewhat lower than the 1992 productivity. The increase in mean productivity in 1992 was apparently caused by an increase in bioavailable nitrogen at upstream locations on two (June and August) of the three sampling dates used to characterize primary productivity for the season. Moderate increases in watershed runoff during the 1992 growing season following a relatively dry spring apparently raised nutrient levels in the lake above those encountered in 1991.

The Algal Growth Potential Test (AGPT) determines the total quantity of algal biomass supportable by the test waters and provides a reliable estimate of the bioavailable and limiting nutrients. Growing season mean dry weights on the mainstem of Weiss Lake during 1991 and 1992 ranged from 2.24 mg/L at mid reservoir in 1992 to 11.4 mg/L in the headwaters near the Alabama/Georgia state line in 1992. Concentrations below 5.0 mg/l are thought to assure protection from nuisance phytoplankton blooms and fish-kills in southeastern lakes, excluding Florida (Raschke and Schultz 1987). Mean maximum dry weights above 10.0 mg/l indicate highly productive waters that may be subjected to nuisance blooms. Higher weights upstream were obviously an effect of higher nutrient (N and P) concentrations existing at upstream locations. The AGPT confirmed water chemistry results indicating that nitrogen, not phosphorus, was the essential nutrient limiting algal growth throughout the lake. Nitrogen limitation was caused by unusually high concentrations of phosphorus.

At mainstem sampling stations in Weiss Lake individual total organic carbon (TOC) concentrations ranged from a low of 2.0 mg/l to a high of 11.0 mg/l. Seasonal mean concentrations were less variable with a low of 2.3 mg/l at upstream station 12 and a high of 5.9 mg/l at station 4 during the winters of 1991 and 1992, respectively. Seasonal and spatial trends in TOC concentrations at mainstem stations were not obvious. As for embayments, Mud Creek seasonal mean TOC levels were higher on six of eight occasions and Little River TOC levels were lowest on six of eight occasions. Erosion and transport of relatively large quantities of suspended matter in Mud Creek likely contributed to the elevated TOC levels in that stream. Conversely, Little River basin had less agricultural activity and a more complete forest coverage than the Mud Creek basin.

Fecal coliform densities in Weiss Lake were low during the summer of 1991 (Table 10-36). Only three samples exceeded a density of 20 fecal coliform colonies per 100 ml and, in those cases, densities were well below the limits established to maintain water quality to support designated water uses of the lake.

Duplicate sediment samples were collected at sampling stations 1 through 13 in Weiss Lake on 21 September 1992. The sediment samples were analyzed for the following organic chemicals: chlordane, 4,4'-DDD, 4,4'-DDE, DDT, dieldrin, dursban, endrin, heptachlor epoxide, heptachlor, mirex, polychlorinated biphenyls (PCBs) and toxaphene. The only chemicals found in concentrations above detection limits of the analytical procedure were PCBs at concentrations of <0.20 μg/g. There are no regulatory guidelines for PCBs sediment levels, however, the U.S. Food and Drug Administration has established an action level of 2.0 μg/g for PCBs in edible portions of fish tissue. The primary source of PCB contamination for this area has been identified as the General Electric Company in Rome, Georgia. The company is under a consent order to reduce PCBs contaminated runoff from the plant site into the Coosa River.

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1.0 LAKE IDENTIFICATION

Located on the Coosa River, Weiss Lake was impounded by Alabama Power Company in 1961 for hydroelectric power generation. The reservoir lies in the northeastern portion of the state, almost entirely within Cherokee County, with the upper end of the reservoir extending into Floyd County, Georgia (Figure 1-1). Municipalities in the immediate vicinity of Weiss Lake include Leesburg, Cedar Bluff and Centre (Figure 10-1).

Morphometric characteristics of Weiss Lake appear in Table 1-1. Weiss hydroelectric dam and turbine specifications appear in Table 1-2. Normal pool elevation is maintained at 172 meters, which constitutes a reservoir volume of 37,869 hectare-meters and an average depth of 3.1 meters. Drawdown is initiated in mid-September and completed by mid-December at an elevation of 170 meters. Drawdown volume is 19,337 hectare-meters, representing a 51% decrease in volume. Average depth after drawdown is 2.5 meters. Depending on the amount of rainfall, the reservoir is slowly raised to normal pool by early May.

The Alabama Department of Environmental Management water-use classifications for the Weiss Lake portion of the Coosa River are as follows:

a) Weiss Dam powerhouse to Spring Creek:
Public Water Supply/Swimming/Fish and Wildlife

b) Spring Creek to state line:
Swimming/Fish and Wildlife

Water quality criteria for the classifications appears in Appendix 1.0.

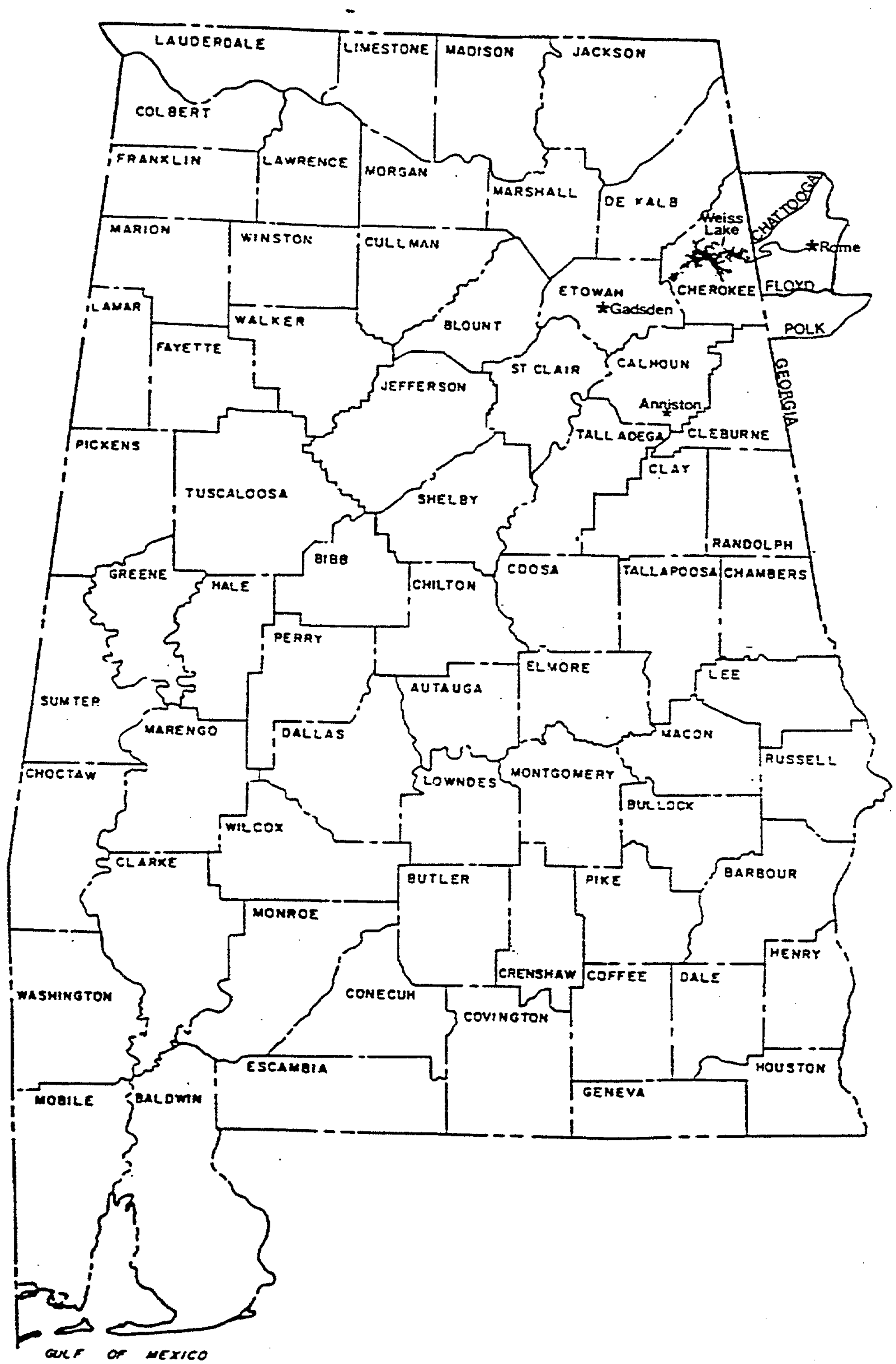


Figure 1-1. State of Alabama with Georgia counties in the vicinity of Weiss Lake.

Table 1-1. Morphometric characteristics of Weiss Lake.

Drainage area	13,657 square kilometers
Surface area	12,222 hectares
Shoreline length	719 kilometers
Full reservoir length	84 kilometers
Maximum depth at dam	19 meters
Average depth	3.1 meters
Normal pool elevation	172 meters
Normal pool volume	37,869 hectare-meters
Drawdown pool elevation	170 meters
Drawdown pool volume	19,337 hectare-meters
Average depth at drawdown	2.5 meters
Hydraulic retention time	18 days

Table 1-2. Weiss Lake hydroelectric dam and turbine specifications.

Location	
Town	Near Leesburg, Alabama
County	Cherokee
River	Coosa
Construction started	July 31, 1958
In-service date	June 5, 1961
Total investment at completion	$38,654,000
Dam	
Type	Gravity concrete and earth fill
Maximum height	26 meters
Spillway gates	
Number	5
Size	12 meters X 11 meters
Capacity (ea.)	12,567,000 gpm
Hydraulic Turbines	
Number	3
Type	Propeller
Water discharge (ea.)	3,927,000 gpm

2.0 BASIN GEOLOGY AND DRAINAGE

The major portion of the Coosa River basin in Georgia and the Weiss Lake portion of the basin in Alabama lie within the Valley and Ridge physiographic province (Figure 2-1). The Coosa Valley District of this province is composed of plains with varied relief characterized by parallelism of northeastward-trending valleys and ridges resulting from the erosion of extensively folded and faulted beds. The plain is formed on limestone and shale. A small area in the northwestern part of Cherokee County is in the Cumberland Plateau section of the Appalachian Plateaus province. The maximum relief of the county is about 427 meters and the highest altitude of the land surface is about 610 meters (Causey 1965).

The Alabama portion of Weiss Lake lies in Cherokee County. The county can be divided topographically into three areas. One area lies north of the Gadsden fault where folding dominates and thrust faults strike northeast. Erosion of the folds has formed a series of relatively narrow northeastward-trending valleys and ridges. The valleys were formed in soluble limestone of Mississippian age and in the Cambrian or Ordovician dolomites undifferentiated. The ridges were formed by the more resistant Fort Payne Chert and Red Mountain Formation. The second structural area is the Coosa Valley which is 16 to 19 km wide, occupies more than the center third of the county, and is underlain by the Conasauga Formation. The valley is of low relief and is without local structural trend. The third structural area is in the southeastern part of the county. Thrust faults are the dominating feature of this area, comprising steep and rugged mountains surrounded by valleys. Faulting is very complex and the thrust planes do not strike consistently to the northeast as in the northern part of the county.

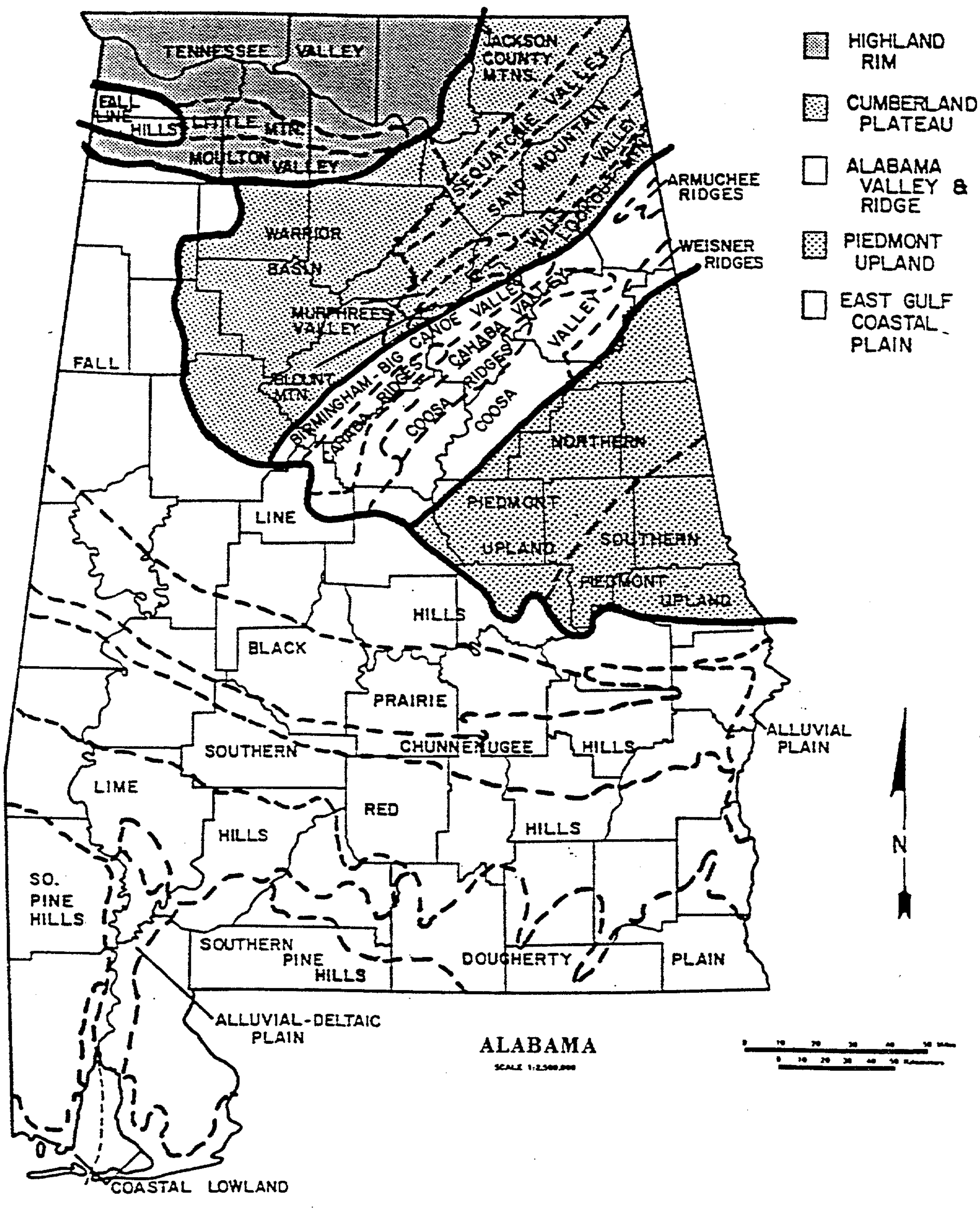


Figure 2-1. Physiographic provinces of Alabama.

Soils immediately surrounding Weiss Lake are those of the Limestone Valleys and Uplands (Figure 2-2). Soil associations of the region, their general characteristics, as well as suitability and limitations of selected uses of the associations appear in Table 2-1.

Major tributaries to the reservoir include the Coosa, Little and Chattooga rivers. The Coosa River is formed by the confluence of the Oostanaula and Etowah Rivers at Rome, Georgia. The river flows generally westward and enters Alabama and Cherokee County approximately 31 miles west of Rome, Georgia. The northern part of Cherokee County is drained southward to the reservoir by Yellow Creek, Ballplay Creek, Little and Chattooga rivers and their tributaries, which consist chiefly of Wolf, Spring Mills and Culstigh creeks. The Chattooga and Little rivers flow southwestward out of Georgia and enter the reservoir near Cedar Bluff, Alabama. The southern part of Cherokee County is drained northward to the reservoir by Spring, Cowan, Frog, Mud and Big Nose creeks and their tributaries.

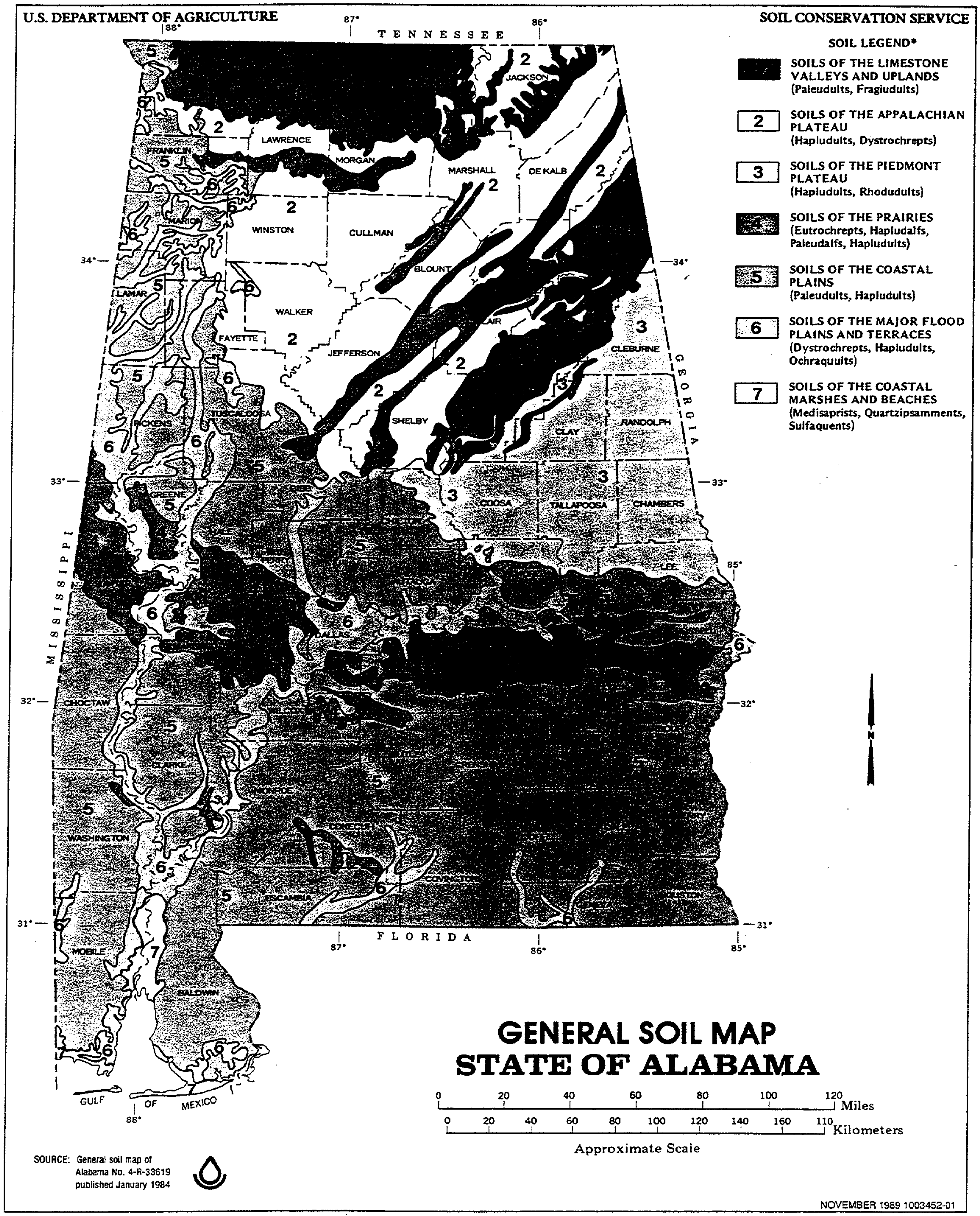


Figure 2-2. General soils map of the state of Alabama, 1989.

Table 2-1. Characteristics of soil associations surrounding Weiss Lake and their suitability/limitations for selected uses.

	Characteristics						Suitability/Limitations					
Soil association	Soil and landscape	Soil series	Depth	Bedrock	Drainage	Surface texture	Dominant slope(%)	Cropland	Pasture	Septic tanks	Roads	Building
Cheaha-Leesburg	Steep, wooded.	Cheaha	Moderate	Sandstone	Well-drained	Stony, loamy	20-50	Poor: slope, large stones	Poor: slope	Severe: slope, depth to rock	Severe: slope	Severe: slope
		Leesburg	Deep	---	Well-drained	Gravelly, loamy						
Conasauga-Firestone-Talbott	Wooded, rolling hills, pasture.	Conasauga	Moderate	Shale	Well-drained	Loamy	1-6	Fair: slope, too clayey	Good	Severe: percs slowly	Severe: low strength	Moderate: low strength, shrink-swell
		Firestone	Moderate	Shale	Well-drained	Gravelly, loamy						
		Talbott	Moderate	---	Well-drained	Loamy						
Holston-McQueen-Chewacla	Large, level fields.	Holston	Deep	---	Well-drained	Loamy	0-6	Good	Good	Slight	Moderate: low strength	Moderate: low strength
		McQueen	Deep	---	Well-drained	Loamy						
		Chewacla	Deep	---	Poorly-drained	Loamy						
Minvale-Fullerton	Hilly woodlands, pasture.	Minvale	Deep	---	Well-drained	Cherty, loamy	2-20	Fair: slope	Good	Moderate: slope	Moderate: slope, low strength	Severe: slope
		Fullerton	Deep	---	Well-drained	Cherty, loamy						
Hartsells-Linker-Albertville	Gently rolling fields.	Hartsells	Moderate	Sandstone	Well-drained	Loamy	2-15	Good	Good	Severe: depth to rock	Moderate: depth to rock	Moderate: slope, depth to rock
		Linker	Moderate	Sandstone	Well-drained	Loamy						
		Albertville	Deep	Shale	Well-drained	Loamy						
Hector-Rockland, Limestone-Allen	Steep, wooded slopes. Rock ledges, boulders.	Hector	Shallow	Sandstone	Well-drained	Gravelly, loamy	25-40	Poor: slope, depth to rock	Poor: slope	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock
		Allen	Deep	---	Well-drained	Loamy						

U.S. Army Corps of Engineers. 1981.

3.0 PUBLIC ACCESS

A survey conducted by Alabama Power Company (APC) in 1990 determined that public access was provided to Weiss Lake through 38 public boat launching sites (personal communication, Bill Sim). Three state of Alabama launching sites on the Alabama portion of Weiss Lake were constructed through the joint efforts of APC and the Alabama Department of Conservation and Natural Resources (ADCNR) and are free of charge. In addition, seven other boat launches are open to the public and are free of charge. Twenty-eight of the available boat launches require that fees be payed. Public access for shoreline anglers is available at all state launching sites.

The majority of anglers interviewed during a 1988 survey of Weiss Lake used privately-owned boat launch sites for access to the reservoir (Davies *et al.* 1990). Boat launches owned by private businesses that were used most often included Bay Springs, Big Oak, Cedar Bluff and Yellow Creek Falls. Boat launches at the two state launching sites available during the survey constituted 5% of the total number of launchings during the year.

4.0 SIZE AND ECONOMIC STRUCTURE OF POTENTIAL USER POPULATION

Cherokee County is bordered by the Alabama counties of DeKalb, Etowah, Calhoun and Cleburne with Chattooga, Floyd and Polk Counties of Georgia lying to the east. Gadsden, located in Etowah County, and Anniston located in Calhoun County, are the largest nearby Alabama cities with Rome in Floyd County the largest nearby Georgia city. Smaller municipalities in the immediate vicinity of Weiss Lake include Cedar Bluff, Leesburg and Centre.

Population and income data for each county in the vicinity of Weiss Lake appear in Table 4-1. Calhoun County had the highest population in the area with Floyd County the highest per capita income. Cherokee and DeKalb Counties had the highest percentage of families with incomes below the poverty level.

Business and employment data for each county in the vicinity of Weiss Lake appear in Tables 4-2 and 4-3. Service businesses were most numerous of the types of businesses in the eight-county area, followed by retail trade and manufacturing establishments. Manufacturing businesses employed the greatest number of people in the area, followed by retail trade and service establishments. In Cherokee County, retail trade businesses were most numerous while manufacturing businesses employed the most people.

Agricultural production data for each county in the vicinity of Weiss Lake appear in Table 4-4. Of the eight counties, Cherokee County was second in total farm and cropland acreage and led the counties in wheat, soybean and cotton production. DeKalb County had the greatest number of farms and the most farm acreage in the area and also led in overall farm production.

Table 4-1. Total population and income characterictics of Alabama and Georgia counties in the vicinity of Weiss Lake.

State County	Total Population	Per Capita Income	% Families With Income Below Poverty Level
Alabama			
Calhoun	116,034	10,704	11.7
Cherokee	19,543	9,915	14.2
Cleburne	12,730	9,876	11.4
DeKalb	54,651	9,604	14.2
Etowah	99,840	10,997	13.2
Georgia			
Chattooga	22,242	9,281	11.5
Floyd	81,251	12,121	10.9
Polk	33,815	10,184	12.2

U.S. Bureau of the Census. 1990.

Table 4-2. Number of business establishments of Alabama and Georgia counties in the vicinity of Weiss Lake.

State County	Total	Agricultural, Forestry, Fishing	Mining	Construction	Manufacturing	Transportation, Public Utilities	Wholesale Trade	Retail Trade	Finance, Insurance, Real Estate	Services	Unclassified Establishments
Alabama											
Calhoun	2,299	24	3	198	168	87	140	660	174	757	88
Cherokee	288	5	2	20	32	14	18	96	18	67	16
Cleburne	157	1	--	22	22	5	7	52	6	40	2
DeKalb	1,038	4	1	69	200	34	54	305	55	266	50
Etowah	1,948	11	4	149	138	72	135	568	145	666	60
Georgia											
Chattooga	292	3	--	25	27	13	11	104	14	76	19
Floyd	1,825	23	1	156	114	61	141	550	146	583	70
Polk	532	3	1	59	40	15	21	185	39	150	19
Total	8,379	74	12	698	741	301	527	2,520	597	2,605	324

U.S. Bureau of the Census. 1990.

Table 4-3. Number of employees for business establishments of Alabama and Georgia counties in the vicinity of Weiss Lake.

State	County	Total	Agricultural, Forestry, Fishing	Mining	Construction	Manufacturing	Transportation, Public Utilities	Wholesale Trade	Retail Trade	Finance, Insurance, Real Estate	Services	Unclassified Establishments
Alabama												
	Calhoun	33,433	155	81	1,477	11,426	1,366	2,200	7,973	1,192	7,439	124
	Cherokee	3,500	(B)	(A)	72	1,795	147	139	768	119	422	12
	Cleburne	1,887	(A)	---	247	1,071	(A)	21	334	58	124	(A)
	DeKalb	16,422	(B)	(A)	552	8,973	556	821	2,817	405	2,188	(B)
	Etowah	31,219	29	65	1,382	11,129	1,285	1,601	6,785	1,268	7,614	61
Georgia												
	Chattooga	5,615	7	--	170	3,825	122	46	1,039	151	239	15
	Floyd	31,410	242	(B)	1,475	12,030	1,310	1,382	6,206	1,368	7,258	(C)
	Polk	7,835	(A)	(A)	426	3,425	319	417	1,794	(E)	1,159	(A)
	Total	131,321	---	---	5,801	53,674	---	6,627	27,716	___	26,443	---

Note: Employment-size classes indicated as follows: A-0 to 19; B-20 to 99; C-100 to 249; E-250 to 499.

U.S. Bureau of the Census. 1990.

Table 4-4. Agricultural production of Alabama and Georgia counties in the vicinity of Weiss Lake.

State County	Total Farms	Farm Acreage	Total Cropland Acreage	Cattle Sold x 1000	Hogs Sold x 1000	Broilers Sold x 1000	Corn Bushels x 1000	Wheat Bushels x 1000	Soybeans Bushels x 1000	Cotton Bales
Alabama										
Calhoun	685	90,474	41,055	6.5	1.5	10,209	87	36	128	500
Cherokee	487	119,956	72,603	11.4	10.1	1,099	136	116	495	14,500
Cleburne	366	49,177	18,769	5.8	4.6	9,928	45	---	---	---
DeKalb	2,047	213,440	122,392	25.7	50.3	55,565	1,169	100	412	900
Etowah	928	100,517	47,478	10.4	4.1	15,491	82	27	143	1,700
Georgia										
Chattooga	296	55,316	25,211	5.5	3.1	553	78	4	28	---
Floyd	476	83,152	40,510	7.9	3.0	3,611	181	16	99	464
Polk	314	46,954	24,871	5.4	0.7	1,127	24	28	58	3,117
Total	5,599	758,986	392,889	78.6	77.4	97,583	1,802	327	1,363	21,181

U.S. Bureau of the Census. 1987.

5.0 HISTORY OF LAKE USES

Weiss Lake was impounded by the Alabama Power Company in 1961 for hydroelectric power generation. Soon after impoundment, the town of Cedar Bluff began use of the reservoir as its source of public water supply. Residential development was initiated with the approval of 27 shoreline subdivisions within the first 3 years of the reservoir's impoundment. Bait and tackle shops, marinas and other businesses related to lake uses also developed.

The reservoir's popularity as a recreational fishery developed rapidly. From 1961-1962, the total number of fishing licenses issued in Cherokee County increased ten-fold, with almost one-third issued to non-residents (AWIC 1963). Fishing has consistently been the primary recreational usage of Weiss, with the reservoir at one time considered the best crappie fishery in Alabama (Bayne and Maceina 1992). Also popular with bass anglers, Weiss Lake hosted the second highest number of bass tournaments of all Alabama reservoirs during 1991 (Reeves and McHugh 1991).

6.0 USER POPULATION AFFECTED BY LAKE DEGRADATION

The effects of point source pollution from industrial discharges in Georgia began to threaten the reservoir soon after its impoundment (AWIC 1963), and concern over the effects of point and non-point source pollution on the water quality of Weiss Lake have continued to the present. The contamination of fish in Weiss Lake with polychlorinated biphenyls (PCB's) originating from an industrial source in Georgia was originally discovered in 1976. Though concentrations in collected fish declined for a number of years, catfish collected in 1988 contained PCB concentrations above the FDA action level. In May 1989, a health advisory was issued by the Alabama Department of Public Health concerning consumption of catfish from Weiss Lake. Impact of the health advisory on angler usage of the recreational fishery seems certain, though the extent has not been investigated.

A business survey conducted the year before institution of the health advisory determined that the Weiss Lake fishery was an important part of the economy of Cherokee County, with 30% of the county business community consisting of businesses associated with the fishery (Davies *et al.* 1990). Types of businesses in the Weiss Lake fishery business community included: restaurants, automotive suppliers, grocery stores, fishing equipment stores, hardware/country stores and accomodations (motels, campgrounds and marinas). Many of the primary products and services offered by the businesses reflected a strong focus toward out-of-state anglers and tourists. General merchandise topped the ranking followed by gas, food, camping, lodging, automotive parts and tackle, in that order.

The average annual gross income for businesses of the fishery community was $276,000 while median business income was $218,000 (Table 6-1). Gross

Table 6-1. Estimates of economic values from business and on-water angler survey of Weiss Lake fishery.

Economic Values	Estimate ($)
Business Survey	
Business Revenue	11,250,000
Mean Gross Business Income	276,000
Median Gross Business Income	218,000
On-Water Survey	
Trip Expenditures	2,042,000
Durable Costs	9,558,000
Willingness-to-pay	4,153,000

business revenue due to fishing was $11,250,000 annually. Thirty-six percent of the gross business revenue, approximately $4,000,000, was obtained from out-of-state angler expenditures.

Fishing trip expenditures and investments in durable fishing equipment were estimated for the Weiss Lake fishery from an on-water creel survey of anglers (Table 6-1). Trip expenditures were based on costs for gas, food, bait and lodging. Durable goods were considered to be any tackle or equipment purchased for fishing. Total estimated trip expenditures by anglers fishing Weiss Lake were $2,042,000 during 1988. The estimated total expenditure for durable goods by anglers fishing Weiss Lake was $9,558,000.

With the percentage of Cherokee County families with incomes below the poverty level one of the highest in the area, increased business growth appears especially important. As a means of determining the potential for growth in the fishery business community, angler willingness-to-pay was estimated from results of the on-water creel survey (Table 6-1). Mean willingness-to-pay was estimated to be $24 per angler trip for a total of $4,153,000. Comparison of the total willingness-to-pay value with actual expenses of $2,042,000 yielded a ratio of approximately 2:1. Comparison of willingness-to-pay with total user expenditures (trip plus durable costs) showed that Weiss Lake anglers were willing to spend about 36% more than they had spent in 1988. With respect to gross business revenues, anglers were willing to spend 30% more money than the fishery businesses captured in 1988, indicating the potential for substantial growth in the fishery business community. During the three-year period prior to the 1988 survey, 80% of the businesses surveyed had grown, 20% had remained stable and none had declined.

Ninety percent of the people owning businesses that had grown felt that the fishery was responsible for the positive change.

In addition to the importance of the fishery to area businesses, the fishery also served as an important food source to many anglers and their families. Fifty-six percent of the anglers interviewed stated that the fish they took home with them were important for their family meals. Of those responding that fish were important to their family meals, 25% said that fish were important because of positive health reasons while 16% felt that fish were important because they saved money on their food bills.

Though the majority of Weiss Lake anglers come from counties in Alabama, the 1988 survey determined that nearly 50% of the anglers originated from other states. Fifty-three percent of the anglers interviewed were Alabama residents with the majority coming form Cherokee, Calhoun, Etowah and DeKalb Counties (Table 6-2). Thirty-one percent of anglers interviewed were Georgia residents with the majority coming from Floyd, Chattooga and Polk Counties. The remaining 16% of Weiss Lake anglers came from the states of Kentucky, Tennessee, Indiana, Illinois, Florida and South Carolina.

Table 6-2. Place of origin (state and county) percentage distribution of Weiss Lake anglers.

State	County	Percentage
Alabama		
	Calhoun	11
	Cherokee	16
	DeKalb	8
	Etowah	10
	Jackson	1
	Jefferson	3
	Madison	1
	Marshall	1
	Other counties	2
	Subtotal	53
Georgia		
	Carroll	1
	Chattooga	5
	Cherokee	1
	Cobb	3
	Douglas	1
	Floyd	7
	Gordon	1
	Haralson	1
	Murray	1
	Polk	4
	Spalding	1
	Walker	3
	Whitfield	2
	Subtotal	31
Kentucky		7
Tennessee		6
Florida		< 1
Indiana		2
Illinois		< 1
South Carolina		< 1

7.0 LAKE USE COMPARISON WITH NEARBY LAKES

Neely Henry Reservoir is located on the Coosa River near Gadsden, Alabama, approximately 30 miles downstream of Weiss Lake. Impounded in 1966 by Alabama Power Company for hydroelectric power generation, the 4547 hectare reservoir serves as a water supply for the city of Gadsden and several area industries in addition to receiving discharges from several industries and wastewater treatment facilities. Neely Henry provides a variety of recreational opportunities for area residents including boating, swimming, skiing and fishing. However, several areas of concern related to water quality and PCB contamination have led to the initiation of a Phase I Diagnostic/Feasibility Study on Neely Henry Reservoir during 1993.

Guntersville Reservoir is located on the Tennessee River, approximately 40 miles northwest of Weiss Lake. Impounded by the Tennessee Valley Authority (TVA) in 1939 for hydroelectric power generation purposes, the reservoir has a surface area of 27,114 hectares. In addition to power generation, the reservoir serves as a water supply and discharge point for several municipalities and industries. The reservoir is also maintained by the Corps of Engineers as a navigable waterway of the Tennessee River System. Though recreational activities are hampered by extensive areal coverage of aquatic macrophytes, the reservoir remains popular with area residents for fishing, boating and skiing.

8.0 POINT SOURCE POLLUTION INVENTORY

The point source pollution inventory was compiled using discharge monitoring reports (DMR) furnished by the Georgia Department of Natural Resources and the Alabama Department of Environmental Management (ADEM). The Coosa River Water Quality Management Plan (EPD 1992) and the Alabama Clean Water Strategy - Water Quality Assessment Report (ADEM 1989) were used as a guide to identify the major point sources located from Weiss Lake dam to Carters dam on the Coosawattee River and from Weiss Lake dam to Allatoona dam on the Etowah River from November 1990 through October 1992. Only one facility discharged into the Conasauga River in Tennessee during the study period. S & S Rock Inc. was applying for a permit during this period so no data were available (Personal communication, Fran Baker, Tennessee Department of Environment and Conservation). Efforts were made to include all permitted dischargers but some minor dischargers were not included. Minor dischargers were defined as:

1) Municipal and privately-owned facilities discharging less than 10,000 gallons/day; and

2) Industrial facilities with: no discharge system, discharge consisting of uncontaminated cooling water, ground water and/or rainfall runoff, or discharge with no significant organic (less than 2.5 lbs. of BOD_5) or chemical contaminants.

Estimates of annual point source flow and annual point source loads of biochemical oxygen demand (BOD), total phosphorus (TP), total suspended solids (TSS) and ammonia-nitrogen were calculated using the daily average for the month and extrapolating to a monthly load. Monthly loads were summed to obtain an annual load. Some dischargers did not report data for all months; values for the missing months were assumed to be the average for the months that were reported.

Flows for the Georgia Power Company fossil fuels plants, Hammond and Bowen, were obtained from the 1990 and 1991 (Hammond) and 1991 (Bowen) flow monitoring and characterization studies. Municipal and industrial dischargers were not required to monitor phosphorus in their effluents. A 2.5 mg/l total phosphorus concentration was assumed for municipal effluents (Personal communication, D. Kamps, Georgia EPD, 1992, and R. Cooner, ADEM, 1993). Total phosphorus concentration for Inland-Rome's effluent treatment plant (DSN001) and ash pond discharge (DSN002) were assumed to be 4.2 mg/l and 0.01 mg/l, respectively (Personal communication, D. Kamps, GA EPD, 1993). TP loading for other industrial sources was not attempted because of lack of data on which to base such an assumption.

The river basin was partitioned into the following areas (Figure 8-1):

1) Weiss Lake (direct discharge);
2) Chattooga River;
3) Little River;
4) Coosa River from GA/AL state line to Etowah River at Southern Railway bridge in Rome, GA and Oostanaula River at Rome, GA water intake;
5) Etowah River from Southern Railway bridge in Rome, GA to Allatoona Dam;
6) Oostanaula River from Rome, GA water intake to Coosawattee River at GA Hwy 225 bridge and Conasauga River at GA Hwy 136 bridge;
7) Coosawattee River from GA Hwy 225 bridge to Carters Dam;
8) Conasauga River from GA Hwy 136 bridge to headwaters.

Permitted municipal and industrial dischargers for study year 1991 (November 1990 - October 1991) and 1992 (November 1991 - October 1992) and their discharge data are listed in Table 8-1 and 8-2. Subtotals are shown for each area and are summed to obtain a total annual load. A total of 53 municipal and 40 industrial facilities discharged wastewater during the two years (Table 8-1 and 8-2). Point source discharge was similar for the 2 years with an estimated 36.327 and 37.059 billion gallons of wastewater discharged during 1991 and 1992,

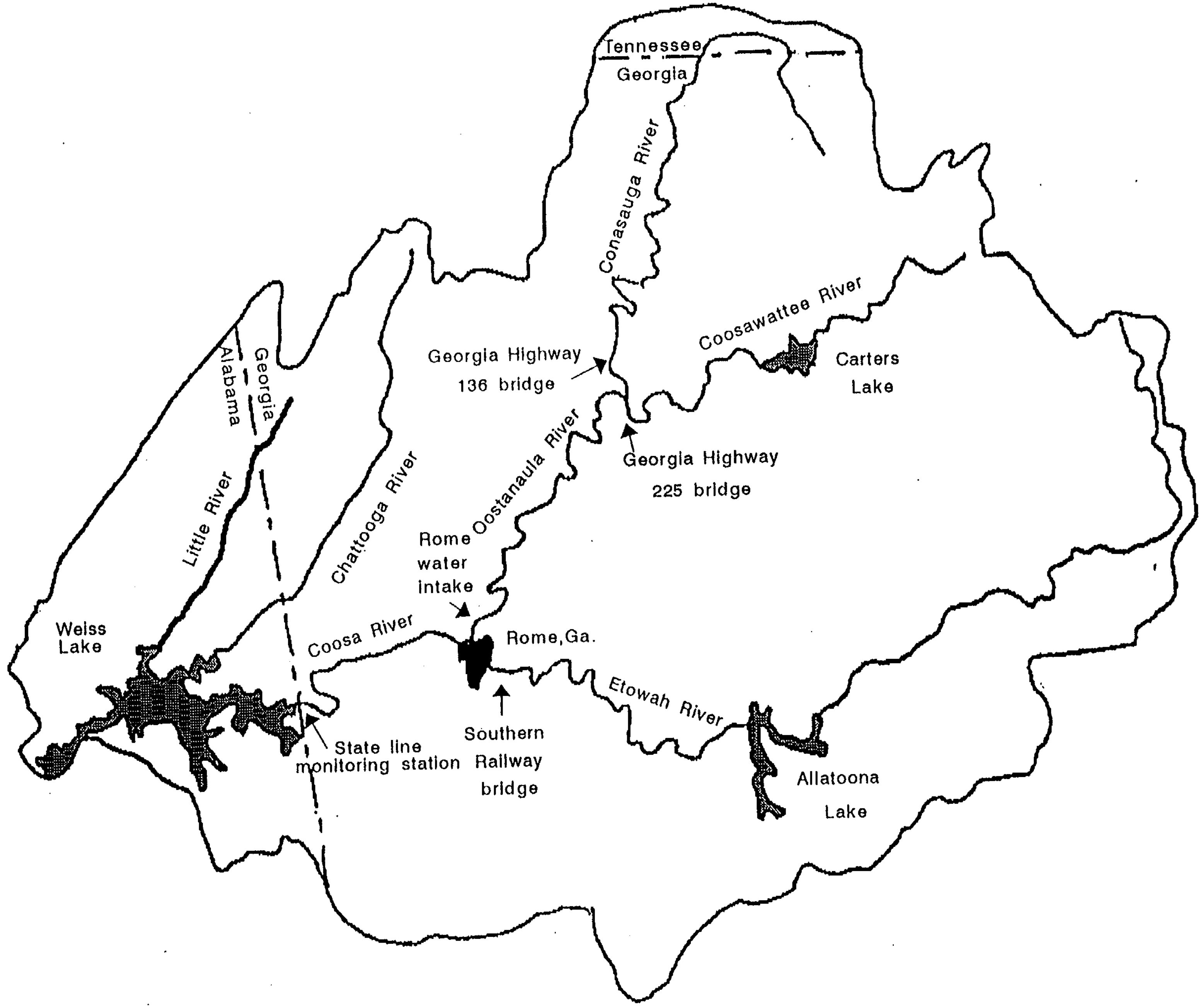


Figure 8-1. Partitioned areas for point source pollution inventory in Weiss Lake basin during the diagnostic study, 1990 - 1992.

Table 8-1. Permitted industrial (I) and municipal (M) dischargers for study year 1991 (November 1990 - October 1991) into Weiss Lake during the diagnostic study, 1990 - 1992.

Facility	NPDES No.	Fac	Receiving stream	Permitted flow (MGD)	Actual flow (MGD)	Total flow (MG)	BOD loading (lbs)	TSS loading (lbs)	NH_3-N loading (kg)	TP^8 loading (kg)
Discharge directly into Weiss Lake										
Cedar Bluff WWTF	AL0024678	M	Weiss Lake	0.300	0.204	74.63	13,772	10,556	6,390	706
Subtotal				*	0.204	74.63	13,772	10,556	6,390	706
Chattooga River										
Menlo WPCP	GA0047023	M	Chattooga R.	0.100	0.015	5.29	133	310	56	50
Summerville WPCP	GA0025704	M	Chattooga R.	2.000	1.883	687.42	21,832	44,844	1,526	6,498
Trion WPCP	GA0025607	M	Chattooga R.	5.000	3.713	1,355.06	413,915	960,252	12,380	12,972
Lafayette WPCP	GA0025712	M	Chattooga R.	3.500	2.197	801.78	27,357	83,321	1,761	7,571
Lylerly Elem.	GA0022144	M	Chattooga R.	0.006	0.002	0.65	49	38	*	6
Karastan-Bigelow	GA0024104 DSN001	I	Chattooga R.	*	0.868	316.82	44,338	106,384	*	*
Karastan-Bigelow	GA0024104 DSN002	I	Chattooga R.	*	0.269	99.28	*	19,549	*	*
Harriett and Hend.	GA0000841 DSN001	I	Raccoon Cr.	*	0.001	0.18	40	22	*	*
Reigel Textile	GA0001422 DSN003	I	Spring Branch	*	0.103	37.60	*	2,609	*	*
Fish Hatchery	GA0034631	I	Chattooga R.	*	*	*	*	*	*	*
Subtotal				*	9.051	3,304.08	507,664	1,217,329	15,723	27,097
Little River										
DeSoto State Park	AL0046701	M	Little R.	*	*	*	*	*	*	*
Subtotal				*	*	*	*	*	*	*
Coosa River from GA/AL state line to Etowah River at Southern Railway bridge in Rome,GA and Oostanaula River at Rome, GA water intake										
Coosa WPCP	GA0024341	M	Coosa R.	0.90	0.924	337.41	21,289	56,179	*	3,191
Rome WPCP	GA0024112	M	Coosa R.	18.00	12.008	4,383.04	390,104	522,984	*	41,450
Cave Springs WPCP	GA0025721	M	Little Cedar Cr.	0.22	0.439	160.17	8,101	13,154	*	1,516

Table 8-1. Continued.

Facility	NPDES No.	Fac	Receiving stream	Permitted flow (MGD)	Actual flow (MGD)	Total flow (MG)	BOD loading (lbs)	TSS loading (lbs)	NH_3-N loading (kg)	TP[8] loading (kg)
Coosa River from GA/AL state line to Etowah River at Southern Railway bridge in Rome,GA and Oostanaula River at Rome, GA water intake (continued)										
Cedartown WPCP	GA0024074	M	Cedar Cr.	2.25	1.652	602.86	71,138	115,554	1,400	5,705
Plant Hammond[1]	GA0001457 DSN001	I	Coosa R.	*	547.920	199,990.80	*	*	*	*
Plant Hammond	GA0001457 DSN001B	I	Coosa R.	*	8.352	3,048.48	*	160,330	*	*
Henkel Corp.	GA0001708 DSN002	I	Big Cedar CR.	*	0.288	105.27	10,388	45,801	2,133	*
Lindale Man.	GA0000345 DSN002	I	Silver Cr.	*	1.590	580.35	*	*	*	*
Inland-Rome[10]	GA0001104 DSN001	I	Coosa R.	*	16.434	5,998.26	1,382,224	3,409,223	*	95,350
Inland-Rome[9]	GA0001104 DSN002	I	Coosa R.	*	5.459	1,992.44	38,216	540,380	*	76
General Electric	GA0024155 DSN001	I	Coosa R.	*	0.189	69.02	*	*	*	*
General Electric	GA0024155 DSN002	I	Coosa R.	*	0.212	77.38	*	*	*	*
General Electric	GA0024155 DSN003	I	Coosa R.	*	0.298	108.71	*	*	*	*
General Electric	GA0024155 DSN004	I	Coosa R.	*	0.394	143.63	*	*	*	*
General Electric	GA0024155 DSN005	I	Coosa R.	*	0.235	85.78	*	*	*	*
Subtotal				*	46.884[2,3]	17,112.45[2,3]	1,921,460	4,863,705	3,533	147,288
Etowah River from Southern Railway bridge in Rome to Alatoona Dam										
Rockmart WPCP	GA0026042	M	Euharlee Cr.	1.20	0.817	298.36	27,942	53,568	5,846	2,820
W. C. Abney Elem.	GA0029921	M	Possum Cr.	0.01	0.010	3.65	571	527	*	35
Dallas West WPCP	GA0026026	M	Weaver Cr.	0.42	0.212	77.44	4,015	12,274	34	732
Dallas North WPCP	GA0026034	M	Lawrence Cr.	0.25	0.097	35.34	1,988	6,679	49	335
Cartersville WPCP	GA0024091	M	Etowah R.	10.00	5.733	2092.67	254,868	364,912	14,645	19,806
Aragon WPCP	GA0026182	M	Euharlee Cr.	0.17	0.077	28.17	2,662	3,661	*	267
Three Cedars MHP	GA0032042	M	Picketts Mill Cr.	0.01	0.007	2.47	412	406	*	23
White Elem.	GA0029904	M	Pettit Cr.	0.01	0.000	0.00	0	0	0	0
Emerson WPCP	GA0026115	M	Pumpkinvine Cr.	0.17	0.121	44.26	4,449	7,725	*	420
Crown Inn	GA0023540	M	*	0.01	0.000	0.00	0	0	0	0
Two Run Cr. WPCP	GA0020702	M	Two Run Cr.	0.10	0.053	19.25	1,477	5,122	*	182

Table 8-1. Continued.

Facility	NPDES No.	Fac	Receiving stream	Permitted flow (MGD)	Actual flow (MGD)	Total flow (MG)	BOD loading (lbs)	TSS loading (lbs)	NH_3-N loading (kg)	TP[8] loading (kg)
Etowah River from Southern Railway bridge in Rome to Alatoona Dam (continued)										
White WPCP	GA0046671	M	Wolfpen Branch	0.03	0.003	1.19	42	48	*	11
Habersham Estates[4]	GA0022535	M	Pettit Cr.	0.04	0.031	11.17	1,397	1,397	*	106
New Riverside Ochre Co.	GA0029823 DSN002	I	Etowah R.	*	0.049	17.96	*	*	*	*
New Riverside Ochre Co.	GA0029823 DSN003	I	Etowah R.	*	2.315	844.98	*	150,593	*	*
Chemical Products	GA0000281	I	Etowah R.	*	0.000	0.00	0	0	0	0
Plant Bowen[5]	GA0001449 DSN001	I	Euharlee Cr.	*	13.752	5,019.23	*	*	*	*
Plant Bowen	GA0001449 DSN003A	I	Euharlee Cr.	*	18.313	6,684.25	*	907,505	*	*
K & F Ind.	GA0000523	I	Euharlee Cr.	*	0.015	5.48	*	*	*	*
Goodyear Tire	GA0000515	I	Pettit Cr.	*	0.543	198.34	250	564	*	*
Riverside Products	GA0047335	I	*	*	0.166	60.56	*	*	*	*
USCOE - Old cons. site	GA0047074	I	Etowah R.	*	*	*	*	*	*	*
USCOE -Cooper furnace	GA0047082	I	*	*	0.000	0.00	0	0	0	0
CW Matthews	GA0036803	I	*	*	*	*	*	*	*	*
Stone Man	GA0047635 DSN001	I	*	*	0.800	292.00	*	5,062	*	*
Stone Man	GA0047635 DSN002	I	*	*	0.733	267.67	*	4,615	*	*
Stone Man	GA0047635 DSN003	I	*	*	0.733	267.67	*	4,055	*	*
Lever Bros.	GA0046639 DSN001	I	Pettit Cr.	*	0.002	0.70	*	529	*	*
Lever Bros.	GA0046639 DSN002	I	Pettit Cr.	*	0.001	0.25	*	116	*	*
First Brands Corp.	GA0000591 DSN001-004	I	Etowah R.	*	*	*	*	*	*	*
Criterion Mills	GA0032751	I	*	*	0.006	2.20	317	126	*	*
Subtotal				*	30.837[6]	11,256.03[6]	300,390	1,529,484	20,574	24,737
Oostanaula River from Rome, GA water intake to Coosawattee River at GA Hwy 225 bridge and Conasuaga River at GA Hwy 136 bridge										
Thunderburg Inn	GA0029912	M	Oothkalooga Cr.	0.004	0.035	12.78	160	1,118	*	121
Ga. Cumberland Acd.	GA0035947	M	Trib to Oostanaula R.	0.016	0.008	3.00	399	809	*	28
Ga. DOT SRA # 34	GA0023639	M	Oothkalooga Cr.	0.033	0.019	6.96	239	513	*	66

Table 8-1. Continued.

Facility	NPDES No.	Fac	Receiving stream	Permitted flow (MGD)	Actual flow (MGD)	Total flow (MG)	BOD loading (lbs)	TSS loading (lbs)	NH_3-N loading (kg)	TP[8] loading (kg)
Oostanaula River from Rome, GA water intake to Coosawattee River at GA Hwy 225 bridge and Conasuaga River at GA Hwy 136 bridge (continued)										
W.L. Swain Elem.	GA0003222	M	Robins Cr.	0.010	0.007	2.37	118	196	*	22
Patty's Truck Stop	GA0022331	M	Oothkalooga Cr.	0.010	0.001	0.42	92	120	*	4
Shell Service Sta.	GA0035181	M	Oothkalooga Cr.	0.002	0.003	0.91	33	21	*	*
Adairsville North WPCP	GA0046035	M	Oothkalooga Cr.	1.000	0.026	9.49	217	313	*	90
Calhoun WPCP	GA0030333	M	Oostanaula R.	12.000	9.328	3,404.84	326,093	609,741	11,462	32,226
Shannon WPCP	GA0025402	M	Ward Cr.	0.226	0.282	102.79	6,829	6,294	*	972
Adairsville WPCP	GA0032832	M	Oothkalooga Cr.	0.500	0.335	122.44	8,671	15,185	*	1,159
Old Armuchee School	GA0034428	M	Armuchee Cr.	0.006	0.000	0.00	0	0	0	0
Red Carpet Inn	GA0049049	M	Oothkalooga Cr.	0.025	0.015	5.48	388	640	*	52
Burlington Ind.	GA0000850 DSN001	I	Ward Cr.	*	0.101	36.82	6,153	6,676	*	*
Burlington Ind.	GA0000850 DSN001A	I	Ward Cr.	*	0.084	30.57	4,978	4,272	*	*
Burlington Ind.	GA0000850 DSN002	I	Ward Cr.	*	0.093	33.82	1,377	2,031	*	*
Burlington Ind.	GA0000850 DSN003	I	Ward Cr.	*	0.020	7.39	223	108	*	*
Goodyear Tire	GA0000329	I	Oothkalooga Cr.	*	0.174	63.68	7,078	12,689	2,330	*
Backings, Inc.	GA0000639	I	Oostanaula R.	*	0.000	0.00	0	0	0	0
Vulcan Mat.	GA0033413	I	Oothkalooga Cr.	*	0.000	0.00	0	0	0	0
Vulcan Mat.	GA0046515	I	Oothkalooga Cr.	*	0.100	36.68	*	5,990	*	*
Florida Rock Ind.	GA0003956 DSN001	I	Little Dry Cr.	*	0.120	43.86	*	6,108	*	*
Florida Rock Ind.	GA0003956 DSN002	I	Little Dry Cr.	*	*	*	*	*	*	*
Power Plant Cont.	GA0036897	I	Heather Cr.	*	*	*	*	*	*	*
Florida Tile	GA0048151 DSN001	I	Woodward Cr.	*	*	*	*	*	*	*
Florida Tile	GA0048151 DSN001-002	I	Woodward Cr.	*	0.000	0.00	0	0	0	0
Subtotal				*	10.751	3,924.30	363,048	672,824	13,792	34,740

Table 8-1. Continued.

Facility	NPDES No.	Fac	Receiving stream	Permitted flow (MGD)	Actual flow (MGD)	Total flow (MG)	BOD loading (lbs)	TSS loading (lbs)	NH_3-N loading (kg)	TP[8] loading (kg)
Coosawattee River from GA Hwy 225 bridge to Carters Dam										
Fairmount WPCP	GA000655 GA0046388	M	Salacoa Cr.	0.128	0.029	10.65	1,261	4,254	*	100
Vulcan Mat.	GA0033421 DSN002 & 003	I	*	*	*	*	*	*	*	*
Vulcan Mat.	GA0003342	I	*	*	*	*	*	*	*	*
Subtotal				*	0.029	10.65	1,261	4,254	*	100
Conasauga River from GA Hwy 136 bridge to headwaters										
Valley Point Elem.[4]	GA0034011	M	Swamp Cr.	0.011	0.009	3.41	427	427	*	32
Valley Point Mid.[4]	GA0033995	M	Swamp Cr.	0.010	0.009	3.10	388	388	*	29
Rolling Hills MHP	GA0023426	M	Ketchum Branch	0.038	0.017	6.36	827	1,765	*	60
Fort Mtn. Park	GA0049191	M	Fort Mtn. Lake	0.007	0.000	0.00	0	0	0	0
Spring Place Elem.	GA0034967	M	Town Branch	0.015	0.009	3.19	441	349	*	30
Chatsworth WPCP	GA0032492	M	Holly Cr.	3.000	1.534	560.03	29,625	75,138	1,038	5,298
Dawnville Elem.	GA0034002	M	Smithey Branch	0.012	0.004	1.39	36	35	*	13
Econo Lodge	GA0048887	M	Swamp Cr.	0.025	0.017	6.25	485	736	*	59
Westside Elem.	GA0049158	M	*	0.015	0.004	1.57	186	281	*	15
Antioch Elem.	GA0048488	M	David Cr.	0.005	0.003	1.02	13	36	*	10
Pa Paw Park	GA0022560	M	Swamp Cr.	0.012	0.004	1.28	40	93	9	12
Varnell Elem.	GA0034029	M	Spring Cr.	0.010	0.003	1.15	18	37	*	11
Dug Gap Elem.	GA0034011	M	Drowning Bear Cr.	0.010	0.002	0.76	40	34	*	7
East Brook Middle	GA0034037	M	Davis Cr.	0.017	0.002	0.82	25	46	*	8
Perlis Truck Stop	GA0034240	M	Swamp Cr.	0.007	0.007	2.39	325	292	*	23
Ga. Cumberland Acd.	GA0035696	M	Sumac Cr.	0.039	0.000	0.00	0	0	0	0
Whitfield Mtn.	GA0047848	M	Stone Branch	0.084	0.047	17.03	1,543	1,983	*	161
Dow Chemical	GA0000426	I	Conasauga R.	*	0.089	32.49	2,990	2,681	1,774	*
Armstrong E & B Carpet	GA0000451	I	Town Branch	*	*	*	*	*	*	*
General Latex	GA0029947	I	Mill Cr.	*	*	*	*	*	*	*
Cabin Crafts	GA0027251	I	Swamp Cr.	*	*	*	*	*	*	*
C & J Co.	GA0000574	I	Swamp Cr.	*	0.009	3.15	211	79	39	*
Vulcan Mat.	GA0046345 DSN001	I	Mill Cr.	*	*	*	*	*	*	*

Table 8-1. Continued.

Facility	NPDES No.	Fac	Receiving stream	Permitted flow (MGD)	Actual flow (MGD)	Total flow (MG)	BOD loading (lbs)	TSS loading (lbs)	NH_3-N loading (kg)	TP[8] loading (kg)
Conasauga River from GA Hwy 136 bridge to headwaters (continued)										
Vulcan Mat.	GA0046345 DSN002	I	Mill Cr.	*	*	*	*	*	*	*
Vulcan Mat.	GA0003772	I	*	*	0.000	0.00	0	0	0	0
Subtotals				*	1.769	645.39	37,620	84,400	2,860	5,768
Totals				*	99.797[7]	37,416.93[7]	3,145,215	8,383,452	62,872	240,436

[1]-Does not include values for Plant Hammond DSN001B (Ash transport water).
[2]-Does not include Plant Hammond DSN001.
[3]-Does not include Lindale Manufacturing (once-thru cooling water).
[4]-No DMR available. Figured actual flow was 85% of permitted flow and BOD and TSS concentrations were half of permitted value.
[5]-Does not include Plant Bowen DSN003A (Ash treatment water).
[6]-Does not include Plant Bowen DSN001.
[7]-Does not include Plant Hammond DSN001, Lindale Manufacturing, and Plant Bowen DSN001.
[8]-Facilities not required to monitor phosphorus, assumed 2.5 mg/l as phosphorus concentration.
[9]-Ash pond discharge for Inland-Rome was the average for Jul 92, Aug 92, Sep 92 and Oct 92. TP concentration was assumed to be 0.01 mg/l.
[10]-Effluent treatment plant TP concentration assumed to be 4.2 mg/l.
*-No information available.

Table 8-2. Permitted industrial (I) and municipal (M) dischargers for study year 1992 (November 1991 - October 1992) into Weiss Lake during the diagnostic study, 1990 - 1992.

Facility	NPDES No.	FAC	Receiving stream	Permitted flow (MGD)	Actual flow (MGD)	Total flow (MG)	BOD loading (lbs)	TSS loading (lbs)	NH_3-N loading (kg)	TP[8] loading (kg)
Discharge directly into Weiss Lake										
Cedar Bluff WWTF	AL0024678	M	Weiss Lake	0.300	0.198	72.48	16,606	36,139	9,693	686
Subtotal				*	0.198	72.48	16,606	36,139	9,693	686
Chattooga River										
Menlo WPCP	GA0047023	M	Chattooga R.	0.100	0.020	7.23	153	191	53	69
Summerville WPCP	GA0025704	M	Chattooga R.	2.000	1.750	640.50	19,161	40,834	713	6,052
Trion WPCP	GA0025607	M	Chattooga R.	5.000	3.854	1,410.63	309,844	1,196,912	5,395	13,345
Lafayette WPCP	GA0025712	M	Chattooga R.	3.500	1.975	722.85	25,058	76,996	810	6,831
Lylerly Elem.	GA0022144	M	Chattooga R.	0.006	0.002	0.70	67	39	*	7
Karastan-Bigelow	GA0024104 DSN001	I	Chattooga R.	*	0.750	274.41	38,037	84,529	*	*
Karastan-Bigelow	GA0024104 DSN002	I	Chattooga R.	*	0.242	88.42	*	11,474	*	*
Harriett and Hend.	GA0000841 DSN001	I	Raccoon Cr.	*	0.001	0.18	38	25	*	*
Reigel Textile	GA0001422 DSN003	I	Spring Branch	*	0.075	27.35	*	2,129	*	*
Fish Hatchery foot	GA0034631	I	Chattooga R.	*	*	*	*	*	*	*
Subtotal				*	8.669	3,172.27	392,358	1,413,129	6,971	26,304
Little River										
DeSoto State Park	AL0046701	M	Little River	*	*	*	*	*	*	*
Subtotal				*	*	*	*	*	*	*
Coosa River from GA/AL state line to Etowah River at Southern railway bridge in Rome, GA and Oostanaula River at Rome, GA water intake										
Coosa WPCP	GA0024341	M	Coosa R.	0.900	0.851	311.47	4,547	19,963	*	2,943
Rome WPCP	GA0024112	M	Coosa R.	18.000	12.058	4,413.35	542,342	603,513	*	41,750
Cave Springs WPCP	GA0025721	M	Little Cedar Cr.	0.220	0.447	163.51	6,922	17,797	*	1,547
Cedartown WTF	GA0024074	M	Cedar Cr.	2.250	2.154	788.33	64,450	61,221	2,382	7,457

Table 8-2. Continued.

Facility	NPDES No.	FAC	Receiving stream	Permitted flow (MGD)	Actual flow (MGD)	Total flow (MG)	BOD loading (lbs)	TSS loading (lbs)	NH^3-N loading (kg)	TP[8] loading (kg)
Coosa River from GA/AL state line to Etowah River at Southern railway bridge in Rome, GA and Oostanaula River at Rome, GA water intake (continued)										
Plant Hammond[1]	GA0001457 DSN001	I	Coosa R.	*	547.920	200,538.72	*	*	*	*
Plant Hammond	GA0001457 DSN001B	I	Coosa R.	*	8.352	3,056.83	*	161,235	*	*
Henkel Corp.	GA0001708 DSN002	I	Big Cedar Cr.	*	0.223	81.59	11,745	50,271	362	*
Lindale Man.	GA0000345 DSN002	I	Silver Cr.	*	1.590	581.94	*	*	*	*
Inland-Rome[10]	GA0001104 DSN001	I	Coosa R.	*	15.896	5,818.00	1,807,438	3,548,781	*	92,516
Inland-Rome[9]	GA0001104 DSN002	I	Coosa R.	*	5.955	2,179.47	40,214	398,566	*	83
General Electric	GA0024155 DSN001	I	Coosa R.	*	0.119	43.68	*	*	*	*
General Electric	GA0024155 DSN002	I	Coosa R.	*	0.196	71.61	*	*	*	*
General Electric	GA0024155 DSN003	I	Coosa R.	*	0.324	118.68	*	*	*	*
General Electric	GA0024155 DSN004	I	Coosa R.	*	0.389	142.31	*	*	*	*
General Electric	GA0024155 DSN005	I	Coosa R.	*	0.157	57.40	*	*	*	*
Subtotal				*	47.121[2,3]	17,246.23[2,3]	2,477,658	4,911,347	2,744	146,296
Etowah River at Southern Railway bridge to Alatoona Dam										
Rockmart WPCP	GA0026042	M	Euharlee Cr.	1.200	0.764	279.59	28,503	55,122	5,744	2,643
W.C. Abney Elem.	GA0029921	M	Possum Cr.	0.010	0.010	3.66	595	563	*	35
Dallas West WPCP	GA0026026	M	Weaver Cr.	0.416	0.184	67.41	4,778	8,186	4	638
Dallas North WPCP	GA0026034	M	Lawrence Cr.	0.250	0.101	36.91	2,000	6,259	5	348
Cartersville WPCP	GA0024091	M	Etowah R.	10.000	6.558	2,400.35	137,623	316,716	11,063	22,681
Aragon WPCP	GA0026182	M	Euharlee Cr.	0.170	0.071	25.93	1,178	1,143	*	245
Three Cedars MHP	GA0032042	M	Picketts Mill Cr.	0.014	0.006	2.13	345	451	*	18
White Elem.	GA0029904	M	Pettit Cr.	0.013	0.000	0.00	0	0	0	0
Emerson WPCP	GA0026115	M	Pumpkinvine Cr.	0.172	0.149	54.44	2,552	9,086	*	515
Crown Inn	GA0023540	M	*	0.006	0.000	0.00	0	0	0	0
Two Run Cr. WPCP	GA0020702	M	Two Run Cr.	0.100	0.043	15.74	463	3,226	*	149
White WPCP	GA0046671	M	Wolfpen Cr.	0.025	0.003	1.22	53	52	*	12
Habersham Estates WTF[4]	GA0022535	M	Pettit Cr.	0.036	0.031	11.20	1,401	1,401	*	106

Table 8-2. Continued.

Facility	NPDES No.	FAC	Receiving stream	Permitted flow (MGD)	Actual flow (MGD)	Total flow (MG)	BOD loading (lbs)	TSS loading (lbs)	NH_3-N loading (kg)	TP[8] loading (kg)
Etowah River at Southern Railway bridge to Alatoona Dam (continued)										
New Riverside Ochre Co.	GA0029823 DSN002	I	Etowah R.	*	0.036	13.18	*	*	*	*
New Riverside Ochre Co.	GA0029823 DSN003	I	Etowah R.	*	2.528	925.37	*	183,505	*	*
Chemical Products	GA0000281	I	Etowah R.	*	0.000	0.00	0	0	0	0
Plant Bowen[5]	GA0001449 DSN001	I	Euharlee Cr.	*	13.752	5,033.23	*	*	*	*
Plant Bowen	GA0001449 DSN003A	I	Euharlee Cr.	*	18.313	6,702.56	*	844,801	*	*
K & F Ind.	GA0000523	I	Euharlee Cr.	*	0.028	10.10	*	*	*	*
Goodyear Tire	GA0000515	I	Pettit Cr.	*	0.537	196.42	197	617	*	*
Riverside Products Corp.	GA0047335	I	*	*	0.186	68.20	*	*	*	*
USCOE - Old Const. Site	GA0047074	I	Etowah R.	*	*	*	*	*	*	*
USCOE - Cooper Furnace	GA0047082	I	*	*	0.000	0.00	0	0	0	0
C.W. Matthews	GA0036803	I	*	*	*	*	*	*	*	*
Stone Man	GA0047635 DSN001	I	*	*	0.088	32.03	*	1,356	*	*
Stone Man	GA0047635 DSN002	I	*	*	0.032	11.65	*	592	*	*
Stone Man	GA0047635 DSN003	I	*	*	0.838	306.53	*	8,112	*	*
Lever Bros.	GA0046639 DSN001	I	Pettit Cr.	*	0.010	3.67	*	1,472	*	*
Lever Bros.	GA0046639 DSN002	I	Pettit Cr.	*	0.001	0.33	*	509	*	*
First Brands Corp.	GA0000591 DSN001-004	I	Etowah R.	*	*	*	*	*	*	*
Criterion Mills	GA0032751	I	*	*	0.006	2.20	378	151	*	*
Subtotal				*	30.517[6]	11,168.62[6]	180,066	1,443,320	16,816	27,390
Oostanaula River from Rome, GA water intake to Coosawattee River at GA Hwy 225 bridge and Conasauga River at GA Hwy 136 bridge										
Thunderburg Inn	GA0029912	M	Oothkalooga Cr.	0.004	0.035	12.81	161	1,106	*	121
Ga. Ciumberland Aca.	GA0035947	M	Trib to Oostanaula	0.016	0.004	1.63	318	267	*	15
Ga. DOT SRA #34	GA0023639	M	Oothkalooga Cr.	0.033	0.015	5.40	438	1,078	*	51
W. L. Swain Elem.	GA0003222	M	Robins Cr.	0.010	0.004	1.55	54	168	*	15
Patty's Truck Stop	GA0022331	M	Oothkalooga Cr.	0.010	0.001	0.26	76	88	*	2
Shell Service Sta	GA0035181	M	Oothkalooga Cr.	0.002	0.003	0.92	33	48	*	*
Adairsville North WPCP	GA0046035	M	Oothkalooga Cr.	1.000	0.026	9.44	216	313	*	89

Table 8-2. Continued.

Facility	NPDES No.	FAC	Receiving stream	Permitted flow (MGD)	Actual flow (MGD)	Total flow (MG)	BOD loading (lbs)	TSS loading (lbs)	NH_3-N loading (kg)	TP[8] loading (kg)
Oostanaula River from Rome, GA water intake to Coosawattee River at GA Hwy 225 bridge and Conasauga River at GA Hwy 136 bridge (continued)										
Calhoun WPCP	GA0030333	M	Oostanaula R.	12.000	9.310	3,407.46	529,899	706,350	13,900	32,221
Shannon WPCP	GA0025402	M	Ward Cr.	0.226	0.291	106.45	3,612	3,958	*	1,007
Adairsville WPCP	GA0032832	M	Oothkalooga Cr.	0.500	0.362	132.35	4,183	26,107	*	1,252
Old Armuchee School	GA0034428	M	Armuchee Cr.	0.006	0.000	0.00	0	0	0	0
Red Carpet Inn	GA0049049	M	Oothkalooga Cr.	0.025	0.015	5.49	389	641	*	52
Burlington Ind.	GA0000850 DSN001	I	Ward Cr.	*	0.080	29.46	4,309	4,051	*	*
Burlington Ind.	GA0000850 DSN001A	I	Ward Cr.	*	0.000	0.00	0	0	0	0
Burlington Ind.	GA0000850 DSN002	I	Ward Cr.	*	0.091	33.18	1,198	2,228	*	*
Burlington Ind.	GA0000850 DSN003	I	Ward Cr.	*	0.024	8.66	144	90	*	*
Goodyear Tire	GA0000329	I	Oothkalooga Cr.	*	0.135	49.26	4,491	8,226	2,139	*
Backings, Inc.	GA0000639	I	Oostanaula R.	*	0.000	0.00	0	0	0	0
Vulcan Mat.	GA0033413	I	Oothkalooga Cr.	*	0.000	0.00	0	0	0	0
Vulcan Mat.	GA0046515	I	Oothkalooga Cr.	*	0.168	61.35	*	2,170	*	*
Florida Rock Ind.	GA0003956 DSN001	I	Little Dry Cr.	*	2.029	742.68	*	122,128	*	*
Florida Rock Ind.	GA0003956 DSN002	I	Little Dry Cr.	*	*	*	*	*	*	*
Power Plant Cont.	GA0036897	I	Heather Cr.	*	*	*	*	*	*	*
Florida Tile	GA0048151 DSN001-002	I	Woodward Cr.	*	*	*	*	*	*	*
Subtotal				*	12.593	4,608.35	549,521	879,017	16,039	34,825
Coosawatte River from GA Hwy 225 bridge to Carters Dam										
Fairmount WPCP	GA000655 GA0046388	M	Salacoa Cr.	0.128	0.129	47.24	1,812	6,140	*	443
Vulcan Mat.	GA0033421 DSN002 & 003	I	*	*	*	*	*	*	*	*
Vulcan Mat.	GA0003342	I	*	*	*	*	*	*	*	*
Subtotal				*	0.129	47.24	1,812	6,140	0	443

Table 8-2. Continued.

Facility	NPDES No.	FAC	Receiving stream	Permitted flow (MGD)	Actual flow (MGD)	Total flow (MG)	BOD loading (lbs)	TSS loading (lbs)	NH_3-N loading (kg)	TP[8] loading (kg)
			Conasauga River from GA Hwy 136 bridge to headwaters							
Valley Point Elem.[4]	GA0034011	M	Swamp Cr.	0.011	0.009	3.42	428	428	*	32
Valley Point Mid.[4]	GA0033995	M	Swamp Cr.	0.010	0.009	3.11	389	389	*	29
Rolling Hills MHP	GA0023426	M	Ketchum Branch	0.038	0.021	7.75	1,267	3,090	*	73
Fort Mtn. Park	GA0049191	M	Fort Mtn. Lake	0.007	0.000	*	*	*	*	*
Spring Place Elem.	GA0034967	M	Town Branch	0.015	0.009	3.26	348	436	*	31
Chatsworth WPCP	GA0032492	M	Holly Cr.	3.000	1.783	652.40	34,188	50,347	495	6,174
Dawnville Elem.	GA0034002	M	Smithey Cr.	0.012	0.003	1.27	22	25	*	12
Econo Lodge	GA0048887	M	Swamp Cr.	0.025	0.014	5.07	448	561	*	48
Westside Elem.	GA0049158	M	*	0.015	0.004	1.36	252	191	*	13
Antioch Elem.	GA0048488	M	David Cr.	0.005	0.003	1.26	17	28	*	12
Pa Paw Park	GA0022560	M	Swamp Cr.	0.012	0.000	0.12	4	6	3	1
Varnell Elem.	GA0034029	M	Spring Cr.	0.010	0.003	0.99	29	48	*	9
Dug Gup Elem.	GA0034011	M	Drowning Bear Cr.	0.010	0.002	0.72	31	35	*	7
East Brook Middle	GA0034037	M	Davis Cr.	0.017	0.002	0.80	23	35	*	8
Perlis Truck Stop	GA0034240	M	Swamp Cr.	0.007	0.007	2.53	344	357	*	24
Ga. Cumberland Aca.	GA0035696	M	Sumac Cr.	0.039	*	*	*	*	*	*
Whitfield Mtn.	GA0047848	M	Stone Branch	0.084	0.037	13.67	489	976	*	129
Dow Chemical	GA0000426	I	Conasuaga R.	*	0.128	46.79	2,591	1,205	1,098	*
Armstrong E & B Carpet	GA0000451	I	Town Branch	*	*	*	*	*	*	*
General Latex	GA0029947	I	Mill Cr.	*	*	*	*	*	*	*
Cabin Crafts	GA0027251	I	Swamp Cr.	*	*	*	*	*	*	*
C & J Co.	GA0000574	I	Swamp Cr.	*	0.000	0.00	0	0	0	0
Vulcan Mat.	GA0046345 DSN001	I	Mill Cr.	*	*	*	*	*	*	*
Vulcan Mat.	GA0046345 DSN002	I	Mill Cr.	*	*	*	*	*	*	*
Vulcan Mat.	GA0003772	I	*	*	0.000	0.00	*	*	*	*
Subtotal				*	2.034	744.52	40,870	58,157	1,596	6,602
Total				*	101.261[7]	37,059.71[7]	3,658,891	8,747,249	53,859	242,546

1-Does not include Plant Hammond DSN001B (Ash transport water).
2-Does not include Plant Hammond DSN001.
3-Does not include Lindale Manufacturing (once-thru cooling water).
4-No DMR available figured actual flow was 85% of permitted flow and BOD and TSS concentrations were half of permitted values.
5-Does not include Plant Bowen DSN003A (Ash transport water blowdown).
6-Does not include Plant Bowen DSN001.
7-Does not include Plant Hammond DSN001, Lindale Manufacturing, and Plant Bowen DSN001.
8-Facilities not required to monitor phosphorus, assumed 2.5 mg/l as phosphorus concentrations for municipal facilities.
9-Ash pond discharge for Inland-Rome was the average from Jul 92, Aug 92, Sep 92 and Oct 92. TP concentration in effluent was assumed to be 0.01 mg/l.
10-Effluent treatment plant TP concentration was assumed to be 4.2 mg/l.
*-No information available.

respectively. Industrial facilities discharged 58% and 57% of the total wastewater for 1991 and 1992, respectively. Eight major industrial facilities (discharged more than 1 MGD at least one of the two study years) were responsible for 97% of the industrial wastewater discharged for 1991 and 1992. Inland-Rome, a pulp and paper manufacturer near Rome, GA, discharged 22% of the total wastewater and 38% of the industrial wastewater for both years. Ten major municipal facilities (permitted for more than 1 MGD) were responsible for 93% of the municipal wastewater discharged for both years.

Biochemical oxygen demand load for 1991 and 1992 was 3,145,215 lbs. (1430 metric tons) and 3,658,891 lbs. (1663 metric tons) respectively (Table 8-1 and 8-2). Industrial facilities were responsible for 47% and 52% for 1991 and 1992 respectively of the total BOD load. The major industrial facilities contributed over 98% of the industrial BOD load for both years. The major municipal facilities discharged 95% and 97% of the municipal BOD load for 1991 and 1992, respectively. Inland-Rome was responsible for 45% and 50% of the total BOD load for 1991 and 1992, respectively.

Total suspended solids load was higher in 1992, 8,747,249 lbs. (3,976 metric tons) than in 1991, 8,382,552 lbs. (3,810 metric tons) (Table 8-1 and 8-2). Industrial facilities discharged 64% and 63% of the total TSS load for 1991 and 1992, respectively. The major industrial facilities were responsible for 98% of the industrial load for both years. The major municipal facilities discharged 95% of the municipal TSS load for both years. Inland-Rome was responsible for at least 73% of the industrial TSS load and 46% of the total TSS load for both years. Trion WPCP, located on the Chattooga River, although only discharging about 9% of the municipal flow, was responsible for 32% and 37% of the municipal TSS load for 1991 and 1992, respectively.

Municipal facilities contributed 90% and 93% of the total ammonia-nitrogen load for 1991 and 1992, respectively (Table 8-1 and 8-2). Ammonia-nitrogen load was probably underestimated because some dischargers failed to report values.

Total phosphorus loading was 240,436 kg and 242,546 kg for 1991 and 1992, respectively (Table 8-1 and 8-2). Municipal facilities discharged 60% and 62% of the entire TP load for 1991 and 1992, respectively. The major municipal facilities discharged 93% of the municipal TP load for both years. Inland-Rome was the only industrial facility for which TP effluent concentration was available. This facility discharged 95,426 kg and 92,599 kg (for 1991 and 1992 respectively) which was 42% and 38% of the entire TP load for 1991 and 1992, respectively.

The Coosa River area contributed the highest BOD, TSS and TP load in the basin (Figure 8-2 and 8-3). This was because Inland-Rome, with its high BOD, TSS and TP load as well as Rome WPCP, the largest municial discharger, were located within this area. The Coosa River area was responsible for 47% of the total point source flow, at least 60% of the TP load, 61% of the total BOD load and 56% of the entire TSS load. The Chattooga River, a tributary to Weiss Lake, had an annual U.S.G.S. discharge of about 10% of the Coosa River's discharge but was responsible for at least 9% of the total point source flow; 11% of the total BOD load, 15% of the TSS load and 11% of the TP load.

The Coosa River area was permitted to discharge 61% of the BOD load, 65% of the TSS load, and 55% of the TP load (Table 8-3). Inland-Rome, was permitted to discharge 38% of the BOD load, 49% of the TSS load, and 30% of the TP load.

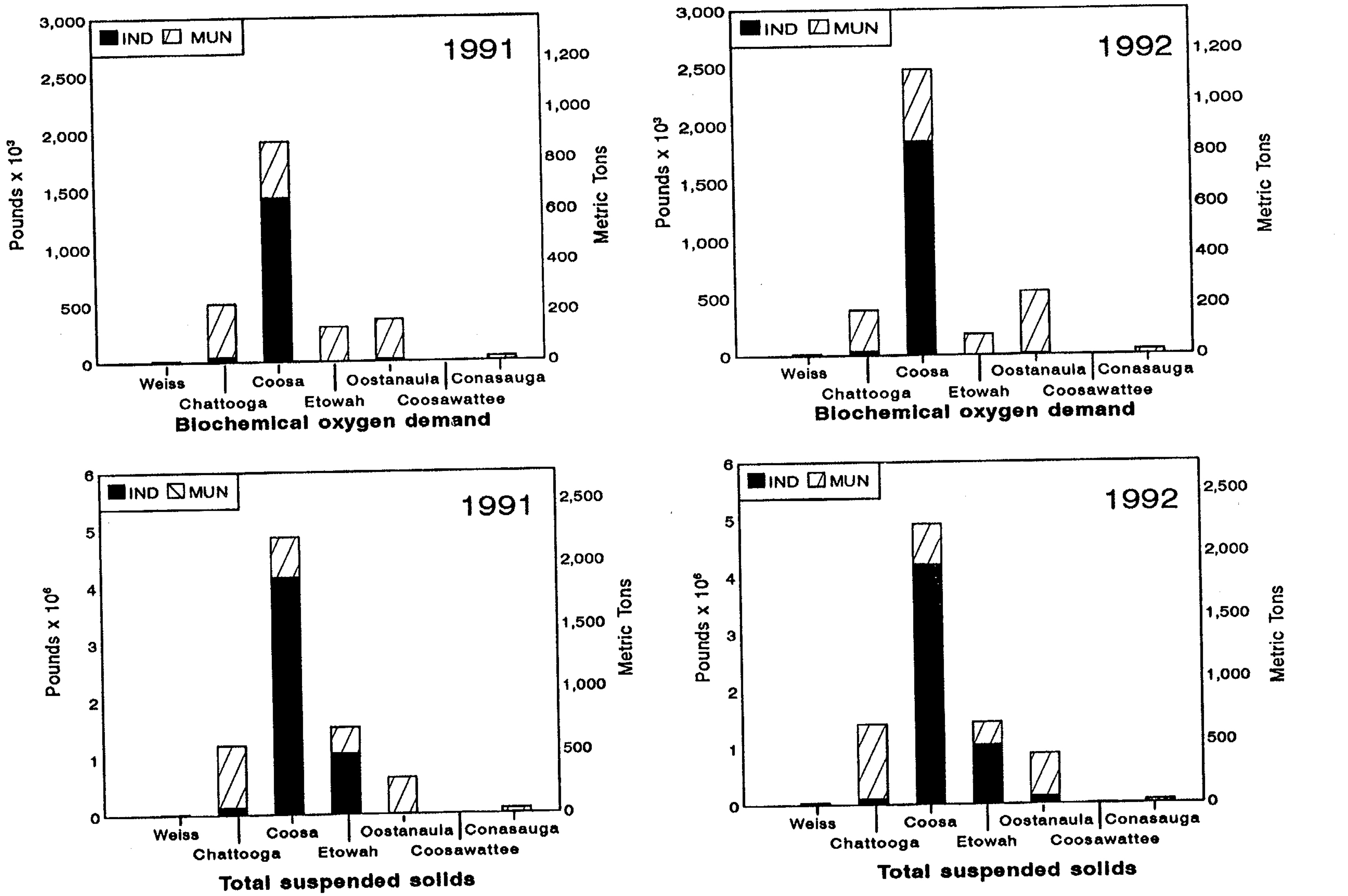


Figure 8-2. Point source pollution load from industrial (IND) and municipal (MUN) permitted facilities of biochemical oxygen demand and total suspended solids for partitioned areas for study year 1991 (November 1990 - October 1991) and 1992 (November 1991 - October 1992) during the diagnostic study of Weiss Lake, 1990 - 1992.

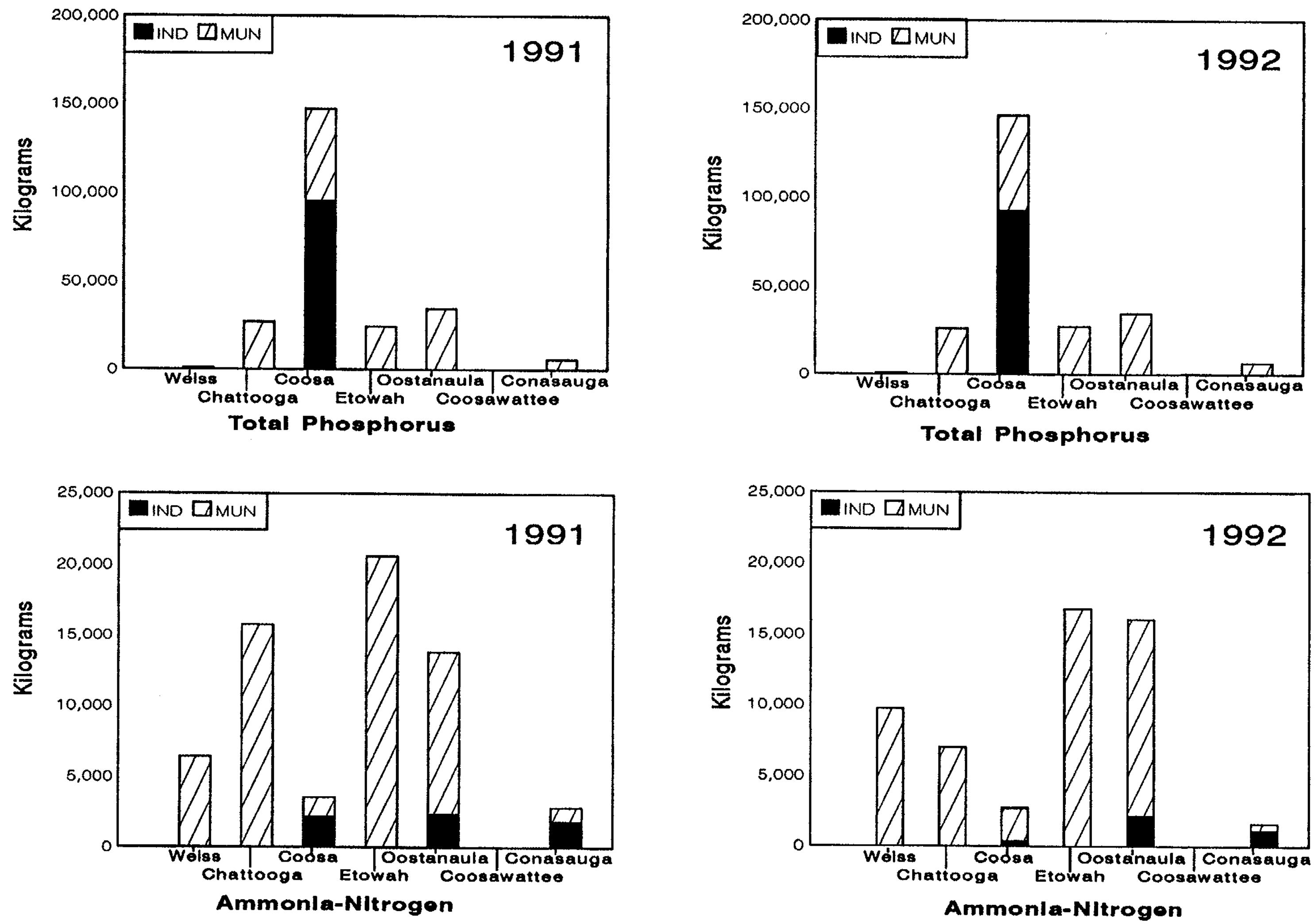


Figure 8-3. Point source pollution load from industrial (IND) and municipal (MUN) permitted facilities of total phosphorus and ammonia-nitrogen for partitioned areas for study year 1991 (November 1990 - October 1991) and 1992 (November 1991 - October 1992) during the diagnostic study of Weiss Lake, 1990 - 1992.

Table 8-3. Potential annual point source pollution load of biochemical oxygen demand (BOD), total suspended solids (TSS), ammonia-nitrogen (NH_3-N) and total phosphorus (TP) from permitted dischargers into Weiss Lake during the diagnostic study, 1990 - 1992.

Facility	NPDES No.	Permitted flow (MGD)	Permitted BOD (mg/l)	Permitted BOD (lbs/day)	Max BOD loading (lbs)	Permitted TSS (mg/l)	Permitted TSS (lbs/day)	Max TSS loading (lbs)	Permitted NH_3-N (mg/l)	Permitted NH_3-N (kg/day)	Max NH_3-N (kg)	MAX TP conc (mg/l)	Max TP loading (kg)
Discharge directly into Weiss Lake													
Cedar Bluff WWTF	Al0024678	0.300	40.00	-	36,516	30.00	-	27,387	-	-	-	2.5	1,036
Subtotal					31,516			27,387					1,036
Chattooga River													
Karastan-Bigelow	GA0024104	*	-	400.0	146,000	-	1567.0	571,955	-	-	-	-	-
Harriet and Henderson	GA0000841	*	-	1.4	496	-	1.36	496	-	-	-	-	-
Reigel Textile [1 & 2]	GA0001422	0.089	-	-	-	30.00	-	8,125	-	-	-	-	-
Menlo WPCP	GA0047023	0.100	20.00	-	6,086	30.00	-	9,129	8.00	-	1,107	2.5	345
Summerville WPCP	GA0025704	2.000	25.00	-	152,150	30.00	-	182,580	10.00	-	27,664	2.5	6,908
Trion WPCP	GA0025067	5.000	26.00	-	395,591	30.00	-	456,451	10.50	-	72,617	2.5	17,269
Lafayette WPCP [3]	GA0025712	3.500	16.08	-	171,260	30.00	-	319,516	7.56	-	36,599	2.5	12,088
Lylerly Elem Sch	GA0022144	0.006	30.00	-	548	30.00	-	548	-	-	-	2.5	21
Subtotal					872,131			1,548,800			137,987		36,631
Little River													
DeSoto State Park [8]	AL0046701	0.060	20.00	-	1825	30.00	-	2739	8.00	-	332	2.5	228
Subtotal					1825			2739			332		228
Coosa River from GA/AL state line to Etowah River at Southern railway bridge and Oostanaula River at Rome, GA water intake													
Coosa WPCP	GA0024341	2.000	30.00	-	182,580	30.00	-	182,580	17.40	-	48,135	2.5	6,908
Rome WPCP	GA0024112	18.000	30.00	-	1,643,223	30.00	-	1,643,223	17.40	-	433,213	2.5	62,169
Cave Springs WPCP	GA0025721	0.220	30.00	-	20,084	30.00	-	20,084	-	-	-	2.5	760
Cedartown WPCP [3]	GA0024074	2.250	26.12	-	178,837	30.00	-	205,403	12.56	-	39,089	2.5	7,771
Plant Hammond [6]	GA0001457	18.720	-	-	-	30.00	-	1,708,952	-	-	-	-	-
Henkel Corp.	GA0001708	*	-	135.1	49,311	-	500.0	182,500	-	30	10,950	-	-
Inland-Rome [9,10]	GA0001104	*	-	9429.0	3,441,585	-	31956.0	11,663,940	-	-	-	4.2[11]	94,013
Subtotal					5,515,620			15,606,682			531,387		171,621
Etowah River from Southern railway bridge in Rome, GA to Allatoona Dam													
Rockmart WPCP	GA0026042	1.200	30.00	-	109,548	30.00	-	109,548	-	-	-	2.5	4,145
W.C. Abney School	GA0029921	0.010	30.00	-	913	30.00	-	913	-	-	-	2.5	35
Dallas West WPCP	GA0026026	0.416	20.00	-	25,318	30.00	-	37,977	5.00	-	2,877	2.5	1,437
Dallas North WPCP	GA0026034	0.250	20.00	-	15,215	30.00	-	22,823	5.00	-	1,729	2.5	863
Cartersville WPCP	GA0024091	10.000	30.00	-	912,902	30.00	-	912,902	17.40	-	240,674	2.5	34,538
Aragon WPCP	GA0026182	0.170	30.00	-	15,519	30.00	-	15,519	-	-	-	2.5	587
Three Cedars MHP	GA0032042	0.014	30.00	-	1,278	90.00	-	3,834	-	-	-	2.5	48

Table 8-3. Continued.

Facility	NPDES No.	Permitted flow (MGD)	Permitted BOD (mg/l)	Permitted BOD (lbs/day)	Max BOD loading (lbs)	Permitted TSS (mg/l)	Permitted TSS (lbs/day)	Max TSS loading (lbs)	Permitted NH_3-N (mg/l)	Permitted NH_3-N (kg/day)	Max NH_3-N (kg)	MAX TP conc (mg/l)	Max TP loading (kg)
Etowah River from Southern railway bridge in Rome, GA to Allatoona Dam (continued)													
White Elem.	GA0029904	0.013	30.00	-	1,187	30.00	-	1,187	-	-	-	2.5	45
Emersom WPCP	GA0026115	0.172	30.00	-	15,702	90.00	-	47,106	-	-	-	2.5	594
Crown Inn	GA0023540	0.006	30.00	-	548	30.00	-	548	-	-	-	2.5	21
Two Run Creek WPCP [3]	GA0020702	0.100	24.56	-	7,474	30.00	-	9,129	11.39	-	1,575	2.5	345
White WPCP	GA0046671	0.025	30.00	-	2,282	30.00	-	2,282	-	-	-	2.5	86
Habersham Estates WTF	GA0022535	0.036	30.00	-	3,286	30.00	-	3,286	-	-	-	2.5	124
New Riverside Ochre Co.5	GA0029823	2.420	-	-		100.00	-	736,407	-	-	-	-	-
Plant Bowen [7]	GA0001449	27.280	-	-	-	30.00	-	2,490,395	-	-	-	-	-
Goodyear	GA0000515	-	-	3.4	1,241	-	68.0	24,820	-	-	-	-	-
Stone Man [8]	GA0047635	1.613	-	-	-	55.00	-	269,960	-	-	-	-	-
Criterion Mills	GA0032751	0.006	45.00	-	822	45.00	-	822	-	-	-	-	-
USCOE Cooper Furnace	GA0047082	0.003	30.00	-	228	30.00	-	228	-	-	-	-	-
USCOE Old Cons. Site	GA0047074	0.003	30.00	-	274	30.00	-	274	-	-	-	-	-
Chemical Products	GA0000281	-	-	-	-	-	375.0	136,875	-	-	-	-	-
Subtotal					1,113,737			4,826,835			246,855		42,868
Oostanaula River from Rome, GA water intake to Conasauga River at GA Hwy 136 bridge and Coosawattee River at GA Hwy 225 bridge													
Thunderburg Inn	GA0029912	0.004	30.00	-	365	30.00	-	365	-	-	-	2.5	14
Ga. Cumberland Academy	GA0035947	0.016	30.00	-	1,461	90.00	-	4,382	-	-	-	2.5	55
Ga. DOT SRA # 34	GA0023639	0.033	30.00	-	3,013	30.00	-	3,013	-	-	-	2.5	114
W. L. Swain Elem School	GA0003221	0.010	30.00	-	913	30.00	-	913	-	-	-	2.5	35
Patty's Truck Stop	GA0022331	0.010	30.00	-	913	90.00	-	2,739	-	-	-	2.5	35
Adairsville North WPCP [3]	GA0046035	1.000	28.66	-	87,213	30.00	-	91,290	5.97	-	8,258	2.5	3,454
Calhoun WPCP	GA0030333	12.000	30.00	-	1,095,482	30.00	-	1,095,482	10.00	-	165,982	2.5	41,446
Shannon WPCP	GA0025402	0.226	30.00	-	20,632	30.00	-	20,632	-	-	-	2.5	781
Adairsville WPCP	GA0032832	0.500	30.00	-	45,645	30.00	-	45,645	17.40	-	12,034	2.5	1,727
Red Carpet Inn	GA0049049	0.025	30.00	-	2,282	30.00	-	2,282	-	-	-	-	-
Burlington Ind.	GA0000850 DNS001	*	-	29.0	10,585	-	34.4	12,556	-	-	-	-	-
Burlington Ind.	GA0000850 DSN001A	*	-	29.0	10,585	-	34.4	12,556	-	-	-	-	-
Burlington Ind.	GA0000850 DSN002	*	-	19.0	6,935	-	21.0	7,665	-	-	-	-	-
Burlington Ind.	GA0000850 DSN003	*	-	2.0	730	-	3.0	1,095	-	-	-	-	-
Goodyear Tire	GA0000329	*	-	42.0	15,330	-	41.0	14,965	-	9	3,152	-	-
Backings Inc.	GA0000639	*	-	5.5	2,008	-	7.5	2,738	-	2	680	-	-
Vulcan Materials [1]	GA0046515	0.134	-	-	-	55.00	-	22,427	-	-	-	-	-

Table 8-3. Continued.

Facility	NPDES No.	Permitted flow (MGD)	Permitted BOD (mg/l)	Permitted BOD (lbs/day)	Max BOD loading (lbs)	Permitted TSS (mg/l)	Permitted TSS (lbs/day)	Max TSS loading (lbs)	Permitted NH_3-N (mg/l)	Permitted NH_3-N (kg/day)	Max NH_3-N (kg)	MAX TP conc (mg/l)	Max TP loading (kg)
Oostanaula River from Rome, GA water intake to Conasauga River at GA Hwy 136 bridge and Coosawattee River at GA Hwy 225 bridge (continued)													
Florida Rock Ind. [1]	GA0003956	1.074	-	-	-	55.00	-	179,750	-	-	-	-	-
Shell Service Sta.	GA0035181	0.002	30.00	-	146	30.00	-	146	-	-	-	-	-
Subtotal					1,304,236			1,520,641			190,106		47,661
Coosawatteee River from GA Hwy 225 bridge to Carters Dam													
Fairmount WPCP[3]	GA0000655 GA0046388	0.200	-	27.6	10,074	30.00	-	18,258	16.16	-	4,466	2.5	691
Subtotal					10,074			18,258			4,466		691
Conasauga River from GA Hwy 136 bridge to headwaters													
Valley Point Elem.	GA0034011	0.011	30.00	-	1,004	30.00	-	1,004	-	-	-	2.5	38
Valley Point Middle	GA0033995	0.010	30.00	-	913	30.00	-	913	-	-	-	2.5	35
Rolling Hills MHP	GA0023426	0.038	30.00	-	3,469	90.00	-	10,407	-	-	-	2.5	131
Fort Mtn. Park	GA0049191	0.007	30.00	-	639	30.00	-	639	-	-	-	2.5	24
Spring Place Elem.	GA0034967	0.015	30.00	-	1,369	30.00	-	1,369	-	-	-	2.5	52
Chatsworth WPCP [3]	GA0032492	3.000	23.68	-	216,175	30.00	-	273,870	10.84	-	44,981	2.5	10,361
Dawnville Elem.	GA0034002	0.012	30.00	-	1,095	30.00	-	1,095	-	-	-	2.5	41
Econo Lodge	GA0048887	0.025	30.00	-	2,282	90.00	-	6,847	-	-	-	2.5	86
Westside Elem.	GA0049158	0.015	30.00	-	1,369	30.00	-	1,369	-	-	-	2.5	52
Antioch Elem.	GA0048488	0.005	30.00	-	456	30.00	-	456	-	-	-	2.5	17
Pa Paw Park	GA0022560	0.012	20.00	-	730	30.00	-	1,095	10.00	-	166	2.5	41
Varnell Elem.	GA0034029	0.010	30.00	-	913	30.00	-	913	-	-	-	2.5	35
Dug Gap Elem.	GA0034011	0.010	30.00	-	913	30.00	-	913	-	-	-	2.5	35
East Brook Middle	GA0034037	0.017	30.00	-	1,506	30.00	-	1,506	-	-	-	2.5	57
Perlis Truck Stop	GA0034240	0.007	30.00	-	639	30.00	-	639	-	-	-	2.5	24
Cohutta Spr. Adventist	GA0035696	0.039	30.00	-	3,560	30.00	-	3,560	-	-	-	2.5	135
Whitfield Mtn.	GA0047848	0.084	30.00	-	7,668	30.00	-	7,668	-	-	-	2.5	290
Dow Chemical	GA0000426	*	-	16.0	5,840	-	20.0	7,300	-	39	14,268	-	-
C & J Co.	GA0000574	*	-	4.4	1,606	-	5.3	1,935	-	3	1,161	-	-
Subtotal					252,146			323,498			60,576		11,454
TOTAL					9,101,285			23,874,840			1,171,709		312,190

1 - Permitted flow not part of facilities permit, potential loading was average for all reported months during two year study period and multiplying that value by maximum permitted value for each variable.
2 - Only included DSN003 - no information available for DSN001 and DSN002.
3 - Seasonal limit for BOD and NH_3-N, value was weighted-mean concentration.
4 - Only included DSN002, (DSN001 and DSN003 were non-contact cooling water).
5 - Only included DSN001 (final effluent).
6 - Only included DSN001B (ash transport water blowdown).
7 - Only included DSN003A (ash transport water blowdown).
8 - Facililty only permitted to operate during summer months (6 months).
9 - Seasonal limit for BOD, value was weighted-mean concentration.
10 - Permitted TP was average of actual loading for study year 1991 and 1992.
11 - Concentration for effluent treatment plant was assumed to be 4.2 mg/l and ash pond discharge was assumed to be 0.01 mg/l.
* - Facility is required to monitor flow but a permitted flow is not included in their permit.
- - No information available.

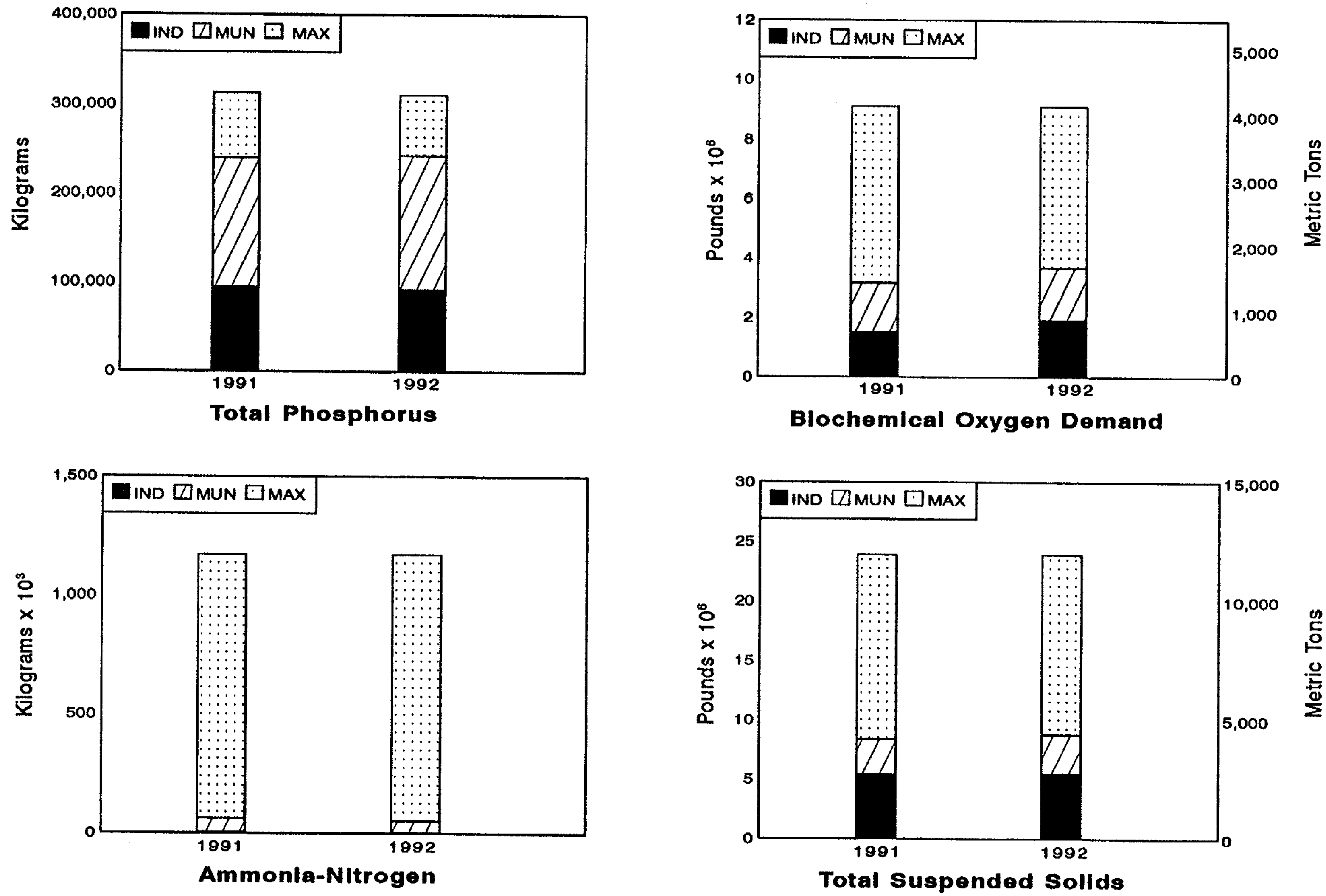


Figure 8-4. Actual point source pollution load from industrial (IND) and municipal (MUN) permitted facilities and maximum permitted load (MAX) for study year 1991 (November 1990 - October 1991) and 1992 (November 1991 - October 1992) during the diagnostic study of Weiss Lake, 1990 - 1992.

During the two study years, permitted dischargers discharged less than 40% of their permitted BOD and TSS loads and about 77% of their TP load (Figure 8-4). Municipal facilities discharged about 68% of their permitted flow.

9.0 Nonpoint Source Pollution Inventory

Three tributary streams (Table 9-1 and 9-2, and Figure 9-1) were sampled twenty times for study year 1991 (November 1990 - October 1991) and nineteen times for 1992 (November 1991 - October 1992). Streams were sampled twice monthly from December through May, and once monthly from June through October. In addition, two samples were collected after significant rainfall events in 1991 and one in 1992. Replicate water samples were collected with a Van Dorn water sampler and placed in Nalgene bottles for transport to laboratory facilities at Auburn University. Water samples used to estimate total suspended solids concentrations were collected with a depth-integrated, suspended sediment sampler using methods described by Glysson and Edwards (1988). Water samples were analyzed for total phosphorus (TP), soluble reactive phosphorus (orthophosphate), nitrate-nitrogen, nitrite-nitrogen, total ammonia-nitrogen, total Kjeldahl nitrogen (TKN), alkalinity, specific conductance, and total suspended solids (TSS) utilizing methods described in Table 10-3. Stream discharge, temperature, and dissolved oxygen were measured in situ at each stream on all sampling dates. Temperature and dissolved oxygen were measured using a Yellow Springs Instrument, Model 51B, dissolved oxygen meter and current velocity was determined using a Marsh-McBirney, Model 201D, flowmeter. Discharge for ungauged streams was calculated by dividing the stream into equal intervals (usually 1 or 2 meters wide). The average velocity x depth x interval width was summed for all intervals to estimate discharge.

Table 9-1. Location of tributary sampling sites for nonpoint source pollution assessment of Weiss Lake watershed during the diagnostic study, 1990 - 1992.

Stream	Station	Description
Little River	14	Alabama Hwy 273 bridge
Chattooga River	15	Alabama Hwy 97 bridge
Spring Creek	16	Alabama Hwy 16 bridge

Table 9-2. Station number and description of locations used for nutrient loading models of Weiss Lake basin during the diagnostic study, 1990 - 1992.

Station	Description	Water Quality Agency	Water Quality Description	Discharge Agency	Discharge Description
14	Little River	Auburn Univ	Little River-AL Hwy 273 bridge	USGS	02399200[2]-Little River near Blue Pond, AL
15	Chattooga River	Auburn Univ	Chattooga River-AL Hwy 97 bridge	USGS	02398300[2]-Chattooga River above Gaylesville, AL
16	Spring Creek	Auburn Univ	Spring Creek-AL Hwy 16 bridge	Auburn Univ	Spring Creek
17	Coosa R. at GA/AL state line monitoring station	GA EPD	14450001[1]-Coosa River-GA/AL state line monitoring station	USGS	02397000[2]-Coosa River near Coosa,GA
18	Etowah River at Rome	GA EPD	14350001[1]-Etowah River-Southern Railway bridge in Rome, GA	USGS	02396000[2]-Etowah River at Rome, GA
19	Etowah River at	GA EPD	14310001[1]-Etowah River-	USGS	02394000[2]-Etowah River at Allatoona Dam,
	Allatoona Dam	Burrass Inst.	0.75 miles DS from Allatoona Dam		above Cartersville, GA
20	Oostanaula River at Rome	GA EPD	14250001[1]-Oostanaula River-Rome water intake	USGS	02388500[2]-Oostanaula River near Rome, GA
21 Chapel,	Coosawattee River	GA EPD	14130001[1]-Coosawattee River- GA Hwy 225	USGS	02383500[2]-Coosawattee River near Pine GA
22	Conasauga River	GA EPD	14040001[1]-Conasauga River-FAS 1800 near Resaca GA	USGS	02387000[2]-Conasauga River at Tilton, GA

GA EPD = Georgia Department of Natural Resources, Environmental Protection Division.
[1] - GA EPD Trend monitoring station number.
[2] - United States Geological Survey gaging station number.

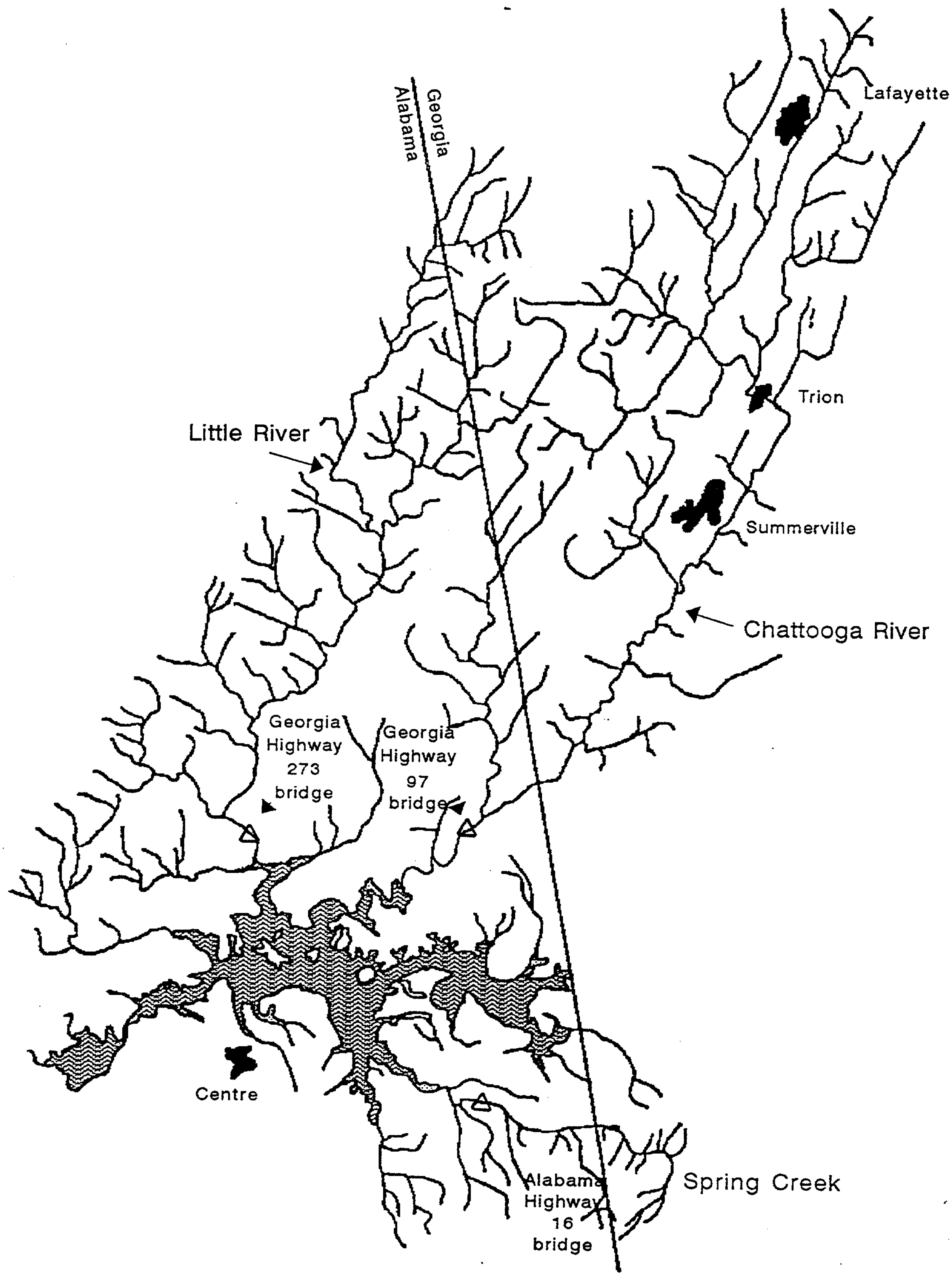


Figure 9-1. Sampling locations (Δ) for nonpoint source pollution assessment of Weiss Lake basin during the diagnostic study, 1990 - 1992.

Landuse/landcover and livestock operations for the portion of the Weiss Lake basin from Weiss Lake hydroelectric power plant to the Alabama-Georgia state line (Figure 9-1) was determined using 1981 and 1982 low-altitude color infrared photography (nominal scale 1:24,000) (Appendix 9). The basin was divided into watersheds (nodes) based on tributary drainage patterns (Appendix 9).

Aerial photography information was compiled into an atlas (a series of 7.5 minute topographic maps that contain clear overlays of landuse/landcover and livestock operation sites). Landuse/landcover was photointerpreted and a field number was assigned to each landuse/landcover polygon. Polygon area was summed by landuse/landcover categories and by node using a Lasico, Model 42P, planimeter. Livestock operations (poultry, cattle, and swine) were photo interpreted and compiled by cattle sites, area of cattle operation, poultry sites, square footage of poultry houses and swine operations for each node.

Total loading (point and nonpoint) of the three tributary streams for TP, total nitrogen (TN), total inorganic nitrogen (TIN), and TSS were determined using FLUX (Walker 1986). FLUX is a computer program designed to estimate nutrient loading from grab-sample concentration data and continuous flow records using various calculation methods and stratification schemes which permit quantification of potential errors. To estimate a continuous flow (mean daily discharge), for an ungauged stream (Spring Creek), discharge measured in Spring Creek was regressed against discharge from the Chattooga River (gauged) for all sampling dates to determine the discharge relationship between the two streams. Stratification of the data based on flow and rainfall helped reduce variation and improved the estimate. The mean daily discharges from the Chattooga River were then placed into the regression formula to estimate a mean daily discharge for Spring Creek.

The nonpoint source loading for each of the three tributary streams was determined by subtracting the point source load from the estimated total load (from FLUX). A multiple linear regression model based on a forward selection procedure was developed using landuse/landcover and estimated nonpoint source loading of TP, TN and TSS for the three tributary streams. In the regression analysis, if the intercept was significantly different from zero ($P > 0.05$) a no-intercept model was used. The no-intercept model was preferred since it avoids estimated negative load due to a negative intercept. The significant landuse or landuses predictor coeffecent were selected based on the combination of minimizing the number of variables (landuse/landcover) and the mean square error in the regression model. These predictor coeffecents were used along with the area of the significant landuse located within the basin to estimate NPS TP, TN and TSS load for the entire basin (Figure 9-1) and the major tributaries. An alternate formula was used if the significant landuse to be used in the equation was not found within a particular watershed. The twenty landuse/landcover categories (Table 9-3) were condensed into seven categories: urban (11,12,140,144,1207, and 1236), pasture (21), agriculture (210 and 22), meadow (213 and 32), forest (4 and 45), wetland (6) and disturbed land (75 and 77) as well as square footage of poultry operations.

Forest land comprised 138,054 hectares (58%) of the total basin area of 236,763 hectares (913.8 mi^2) (Table 9-3). About 17% of the total basin landuse was agriculture and 9% was meadow. The total lake area was an estimated 11,209 hectares. Urban areas (1.7%) were primarily Summerville, GA, Trion, GA, Lafayette, GA, Cedar Bluff, AL, and portions of Centre, AL. There

Table 9-3. Description and area of landuse/landcover categories as revealed by analysis of aerial photographs of the Weiss Lake basin during the diagnostic study, 1990 - 1992.

Landuse Class Category	Landuse Class Description	Alabama Area (ha)	Georgia Area (ha)	Total Area (ha)
11	Urban	665	3,475	4,140
12	Suburban	347	379	726
140	Airport	12	0	12
144	Dam	3	0	3
1207	Golf Course	21	45	66
1236	Sewage treatment plant	7	42	49
21	Pasture	3,219	2,799	6,018
22	Orchard, vineyards, and nursery	38	38	76
210	Agriculture	29,229	11,788	41,017
213	Meadow	9,071	13,149	22,220
32	Rangeland	1,058	587	1,645
4	Forest	75,490	62,564	138,054
45	Clearcut-Forest	6,131	3,047	9,178
51	Water-lakes and farmponds	391	465	856
53	Water-lake	9,661	24	9,685
55	Water-settling pond-stripmines	22	7	29
56	Drawdown Area-exposed	1,524	0	1,524
6	Wetlands	48	8	56
75	Stripmines	753	599	1,352
77	Borrow areas	12	45	57
TOTALS		137,702	99,061	236,763

Table 9-4. Landuse/landcover for major tributaries in the Weiss Lake basin during the diagnostic study, 1990 - 1992.

Landuse/ Landcover Description	Yellow Creek (ha)	Little River (ha)	Chattooga River (ha)	Mud Creek (ha)	Spring Creek (ha)	Cowan Creek (ha)
Urban	0	80	3,701	0	0	26
Suburban	2	198	386	0	0	0
Airport	0	0	0	0	0	0
Dam	0	0	0	0	0	0
Golf Course	0	21	45	0	0	0
Sewage treatment plant	0	1	46	0	0	0
Pasture	281	963	3,365	0	495	471
Orchards	0	0	35	0	0	0
Agriculture	3,194	9,605	14,736	807	3,678	2,057
Meadow	1,020	4,984	13,061	224	1,604	267
Rangeland	106	405	500	213	64	46
Forest	5,763	46,503	61,549	2,083	8,482	3,216
Clear-cut forest	79	3,832	2,223	1,950	155	351
Water-lakes and farmponds	43	334	433	2	17	9
Water-reservoir	465	77	870	401	305	290
Water-settling ponds-stripmines	7	22	0	0	0	0
Drawdown area exposed	193	60	181	0	51	37
Wetlands	0	11	45	0	0	0
Stripmines	175	1,077	64	0	12	2
Borrow areas	0	6	41	5	5	0
TOTAL	11,328	68,179	101,281	5,685	14,868	6,772

was extensive strip mining mostly in the Little River watershed but this was discontinued in the mid-1980's. The areas have been reclaimed in Georgia and are in various stages of reclamation in Alabama (personal communication, Ben Earnest, GA DNR, 1993 and Steve Foster, ADEM, 1993). About 58% of the total basin was in Alabama and 42% in Georgia.

The Chattooga River watershed comprised 43% (101,281 hectares) of the total basin area (Table 9-4). Forest land accounted for 61% and agriculture about 15% of the Chattooga River watershed. Eighty-nine percent of the urban area was located within the Chattooga River watershed. The Little River watershed comprised 29% of the total basin area with 68% being forested. Agricultural land comprised 28%, 25% and 30% of the landuse in Yellow River, Spring Creek and Cowan Creek, respectively. Except for Mud Creek, forest land comprised at least 47% of the watershed area of major tributaries.

A total of 272 livestock operations (65% located within Alabama) were identified (Table 9-5 and Appendix 9). Cattle operations accounted for 142 sites (52%) with an estimated 6,018 hectares being in pasture. An estimated 2.4 million square feet of poultry production (191 houses) was located within the basin with 71% being in Alabama. This represents a potential load of 715,903 kilograms of nitrogen and 297,908 kilograms of phosphorus per year (Payne and Donald 1991).

The Chattooga River watershed accounted for 40% of the livestock sites with 61% being cattle operations (Table 9-6). The Little River watershed accounted for 29% of the livestock operations with only 45% being cattle. Poultry square footage was highest in the Little River watershed (866,100 sq. ft.) followed by the Chattooga River watershed (814,550 sq. ft.).

Table 9-5. Livestock operation categories, description and number of sites by state for aerial photography analysis of the Weiss Lake basin during the diagnostic study, 1990 - 1992.

Livestock Operation Categories	Livestock Operation Description	Alabama				Georgia				Total			
		Poultry sites	Poultry houses	Poultry houses (ft^2)	Cattle area (ha)	Poultry sites	Poultry houses	Poultry houses (ft^2)	Cattle area (ha)	Poultry sites	Poultry houses	Poultry houses (ft^2)	Cattle area (ha)
C	cattle	85	*	*	3,219	57	*	*	2,799	142	*	*	6,018
P	poultry	90	130	1,740,100	*	39	61	713,000	*	129	191	2,453,100	*
S	swine	1	*	*	*	*	*	*	*	1	*	*	*

* not applicable.

Table 9-6. Livestock operations for major tributaries in the Weiss Lake basin during the diagnostic study, 1990 - 1992.

Tributary	Area (ha)	Cattle sites	Cattle area (ha)	Poultry sites	Poultry houses	Poultry (ft^2)
Yellow Creek	11,328	11	281	16	19	260,000
Little River	68,179	35.5	963	43	61	866,100
Chattooga River	101,281	65.5	3,365	42	68	814,550
Spring Creek	14,868	12	495	9	14	184,500
Cowan Creek	6,772	13	471	11	17	214,500
Mud Creek	5,685	0	0	0	0	0

Table 9-7. Estimated loading (point and nonpoint) of total phosphorus (TP), total nitrogen (TN), total inorganic nitrogen (TIN) and total suspended solids (TSS) and point source load at sampling locations of tributary streams for nonpoint source pollution assessment of Weiss Lake basin for study year 1991 (November 1990 - October 1991) and 1992 (November 1991 - October 1992) during the diagnostic study, 1990 - 1992.

Stream	Area (ha)	Avg cfs	Total TP loading (kg)	Point TP loading (kg)	Nonpoint TP loading (kg)	Total TN loading (kg)	Point[2] TN loading (kg)	Nonpoint TN loading (kg)	Total TIN loading (kg)	Point[2] TIN loading (kg)	Nonpoint TIN loading (kg)	Total TSS loading (mt)	Point TSS loading (mt)	Nonpoint TSS loading (mt)
							1991							
Little R.	52,157	459	8,832	0[1]	8,832	177,328	0[1]	177,328	114,600	0[1]	114,600	5,357	0[1]	5,357
Chattooga R.	93,028	682	111,148	27,097[3]	84,051	442,854	*	*	243,486	*	*	23,468	533	22,915
Spring Cr.	11,090	49	3,281	0	3,281	26,536	0	26,536	12,592	0	12,592	1,303	*	1,303
							1992							
Little R.	52,157	452	9,314	0[1]	9,314	212,439	0[1]	212,439	160,684	0[1]	160,684	5,152	0[1]	5,152
Chattooga R.	93,028	600	110,419	26,304[3]	84,115	448,795	*	*	272,124	*	*	21,202	642	20,560
Spring Cr.	11,090	39	2,642	0	2,642	20,163	0	20,163	11,607	0	11,607	630	0	630

[1] DeSoto State Park was permitted to discharge into Little River during study period but no information was available, point source loading was assumed to be zero.
[2] No point source total nitrogen and total inorganic nitrogen data available because dischargers are not required to monitor either TN or TIN in their effluent.
[3] Includes only point source TP loading from municipal dischargers, industrial dischargers were not required to monitor TP in their effluent.
* No information available.

The Chattooga River had the highest total loading of TP, TN, TIN and TSS of the three tributary streams sampled (Table 9-7). While discharge for Spring Creek and Little River was consistent between the two study years, the Chattooga River discharge for 1991 was higher than in 1992. Rainfall was 69 and 56 inches (Gadsden, AL) for 1991 and 1992, respectively and appeared to affect discharge more in the Chattooga River than the other two tributaries. Loading associated with particulate matter (TP and TSS) generally was higher during the higher discharge year. The ratio of TN:TP varied from 4:1 (Chattooga River) to 23:1 (Little River). In Little River, TIN made up 65% and 76% of the TN for 1991 and 1992, respectively. In Spring Creek, the percentages were 47% and 58% for 1991 and 1992, respectively. The percentage of soluble reactive phosphorus to TP was 65% (Chattooga River), 24% (Spring Creek) and 15% (Little River).

Loading was closely correlated with flow for the three tributary streams (Figure 9-2, 9-3, 9-4, 9-5, 9-6 and 9-7). Generally, higher loading occurred during months with higher discharge (winter). Point sources accounted for 24% of the load (point and nonpoint) of TP and 3% of the entire TSS load for both years in the Chattooga River (Figure 9-4).

The amount of urban area in the three tributary stream watersheds provided the minimum mean square error in the regression model for nonpoint source TP. Using the regression equation, nonpoint source TP loading from the portion of the Weiss Lake basin under consideration (Figure 9-1) was an estimated 107,064 kg/yr (Table 9-8). The area (ft^2) of poultry houses located within the three tributary stream watersheds provided the minimum mean square error in the regression model for nonpoint source TN loading. The estimated nonpoint source TN load from the basin was 669,696 kg/yr (Table 9-8). The

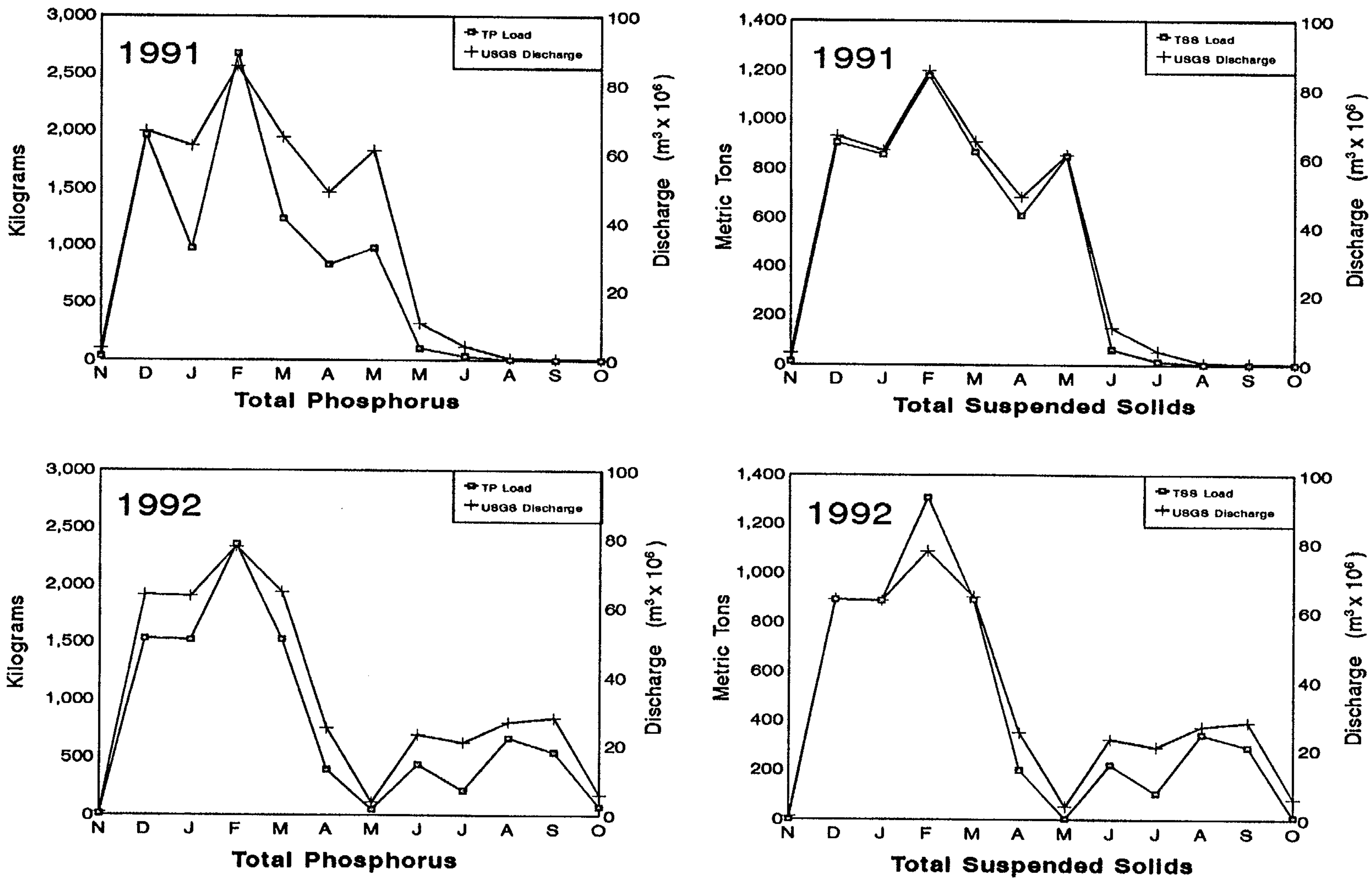


Figure 9-2. Estimated total loading (point and nonpoint sources) per month of total phosphorus (TP) and total suspended solids (TSS) for sampling location on Little River at Al. Hwy. 273 bridge for study year 1991 (November 1990 - October 1991) and 1992 (November 1991 - October 1992) during diagnostic study of Weiss Lake, 1990 - 1992.

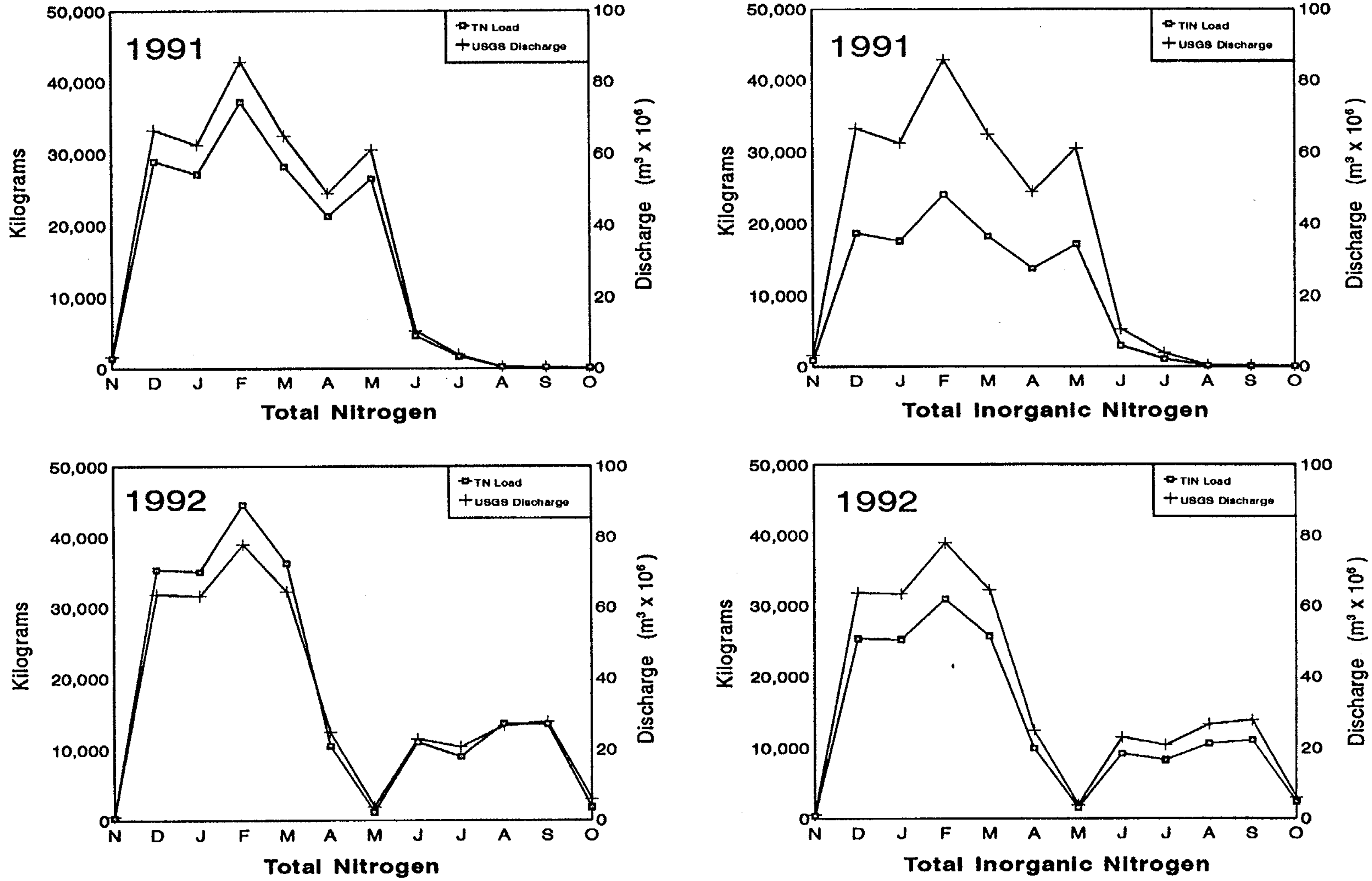


Figure 9-3. Estimated total loading (point and nonpoint sources) per month of total nitrogen (TN) and total inorganic nitrogen (TIN) for sampling location on Little River at Al. Hwy. 273 bridge for study year 1991 (November 1990 - October 1991) and 1992 (November 1991 - October 1992) during the diagnostic study of Weiss Lake, 1990 - 1992.

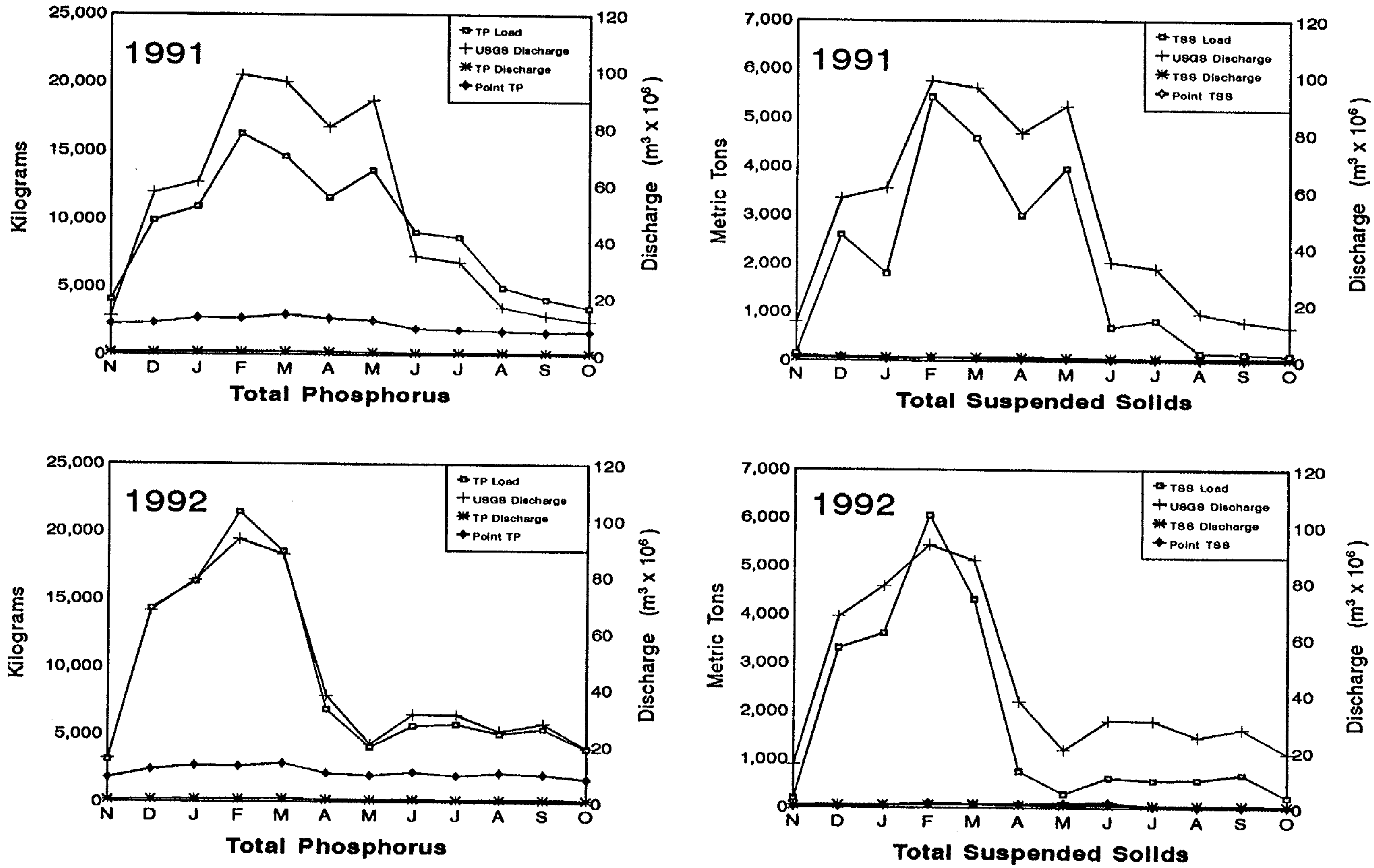


Figure 9-4. Estimated total loading (point and nonpoint sources) of total phosphorus (TP) and total suspended solids (TSS) and point source discharge and load for sampling location on the Chattooga River at Al. Hwy. 97 bridge for study year 1991 (November 1990 - October 1991) and 1992 (November 1991 - October 1992) during diagnostic study of Weiss Lake, 1990 - 1992.

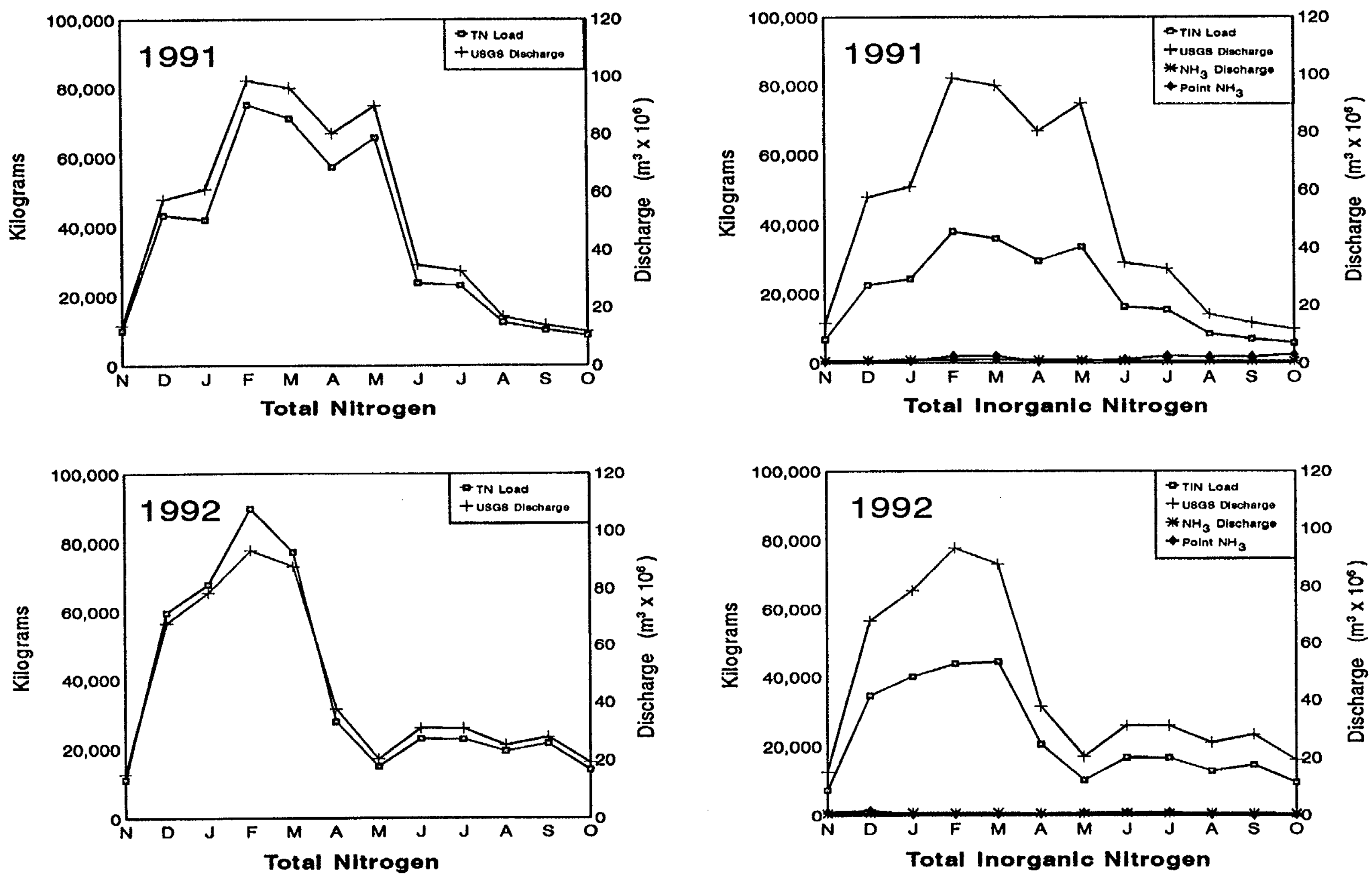


Figure 9-5. Estimated total loading (point and nonpoint sources) per month of total nitrogen (TN), total inorganic nitrogen (TIN) and point source ammonia-nitrogen discharge and load for sampling location on Chattooga River at Al. Hwy. 97 bridge for study year 1991 (November 1990 - October 1991) and 1992 (November 1991 - October 1992) during diagnostic study of Weiss Lake, 1990 - 1992.

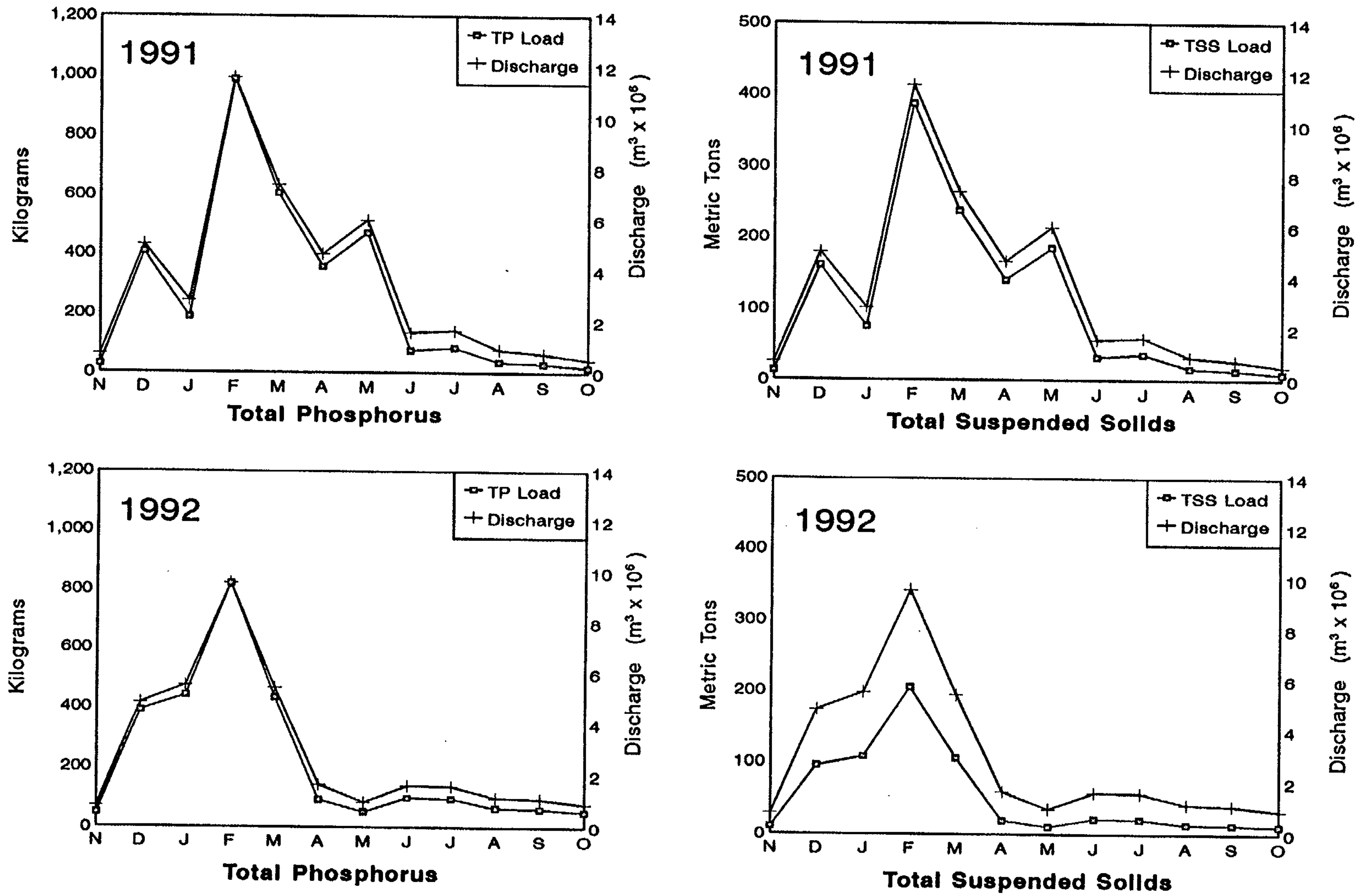


Figure 9-6. Estimated total loading (point and nonpoint sources) per month of total phosphorus (TP) and total suspended solids (TSS) for sampling location on Spring Creek at Al. Hwy. 16 bridge for study year 1991 (November 1990 - October 1991) and 1992 (November 1991 - October 1992) during the diagnostic study of Weiss Lake, 1990 - 1992.

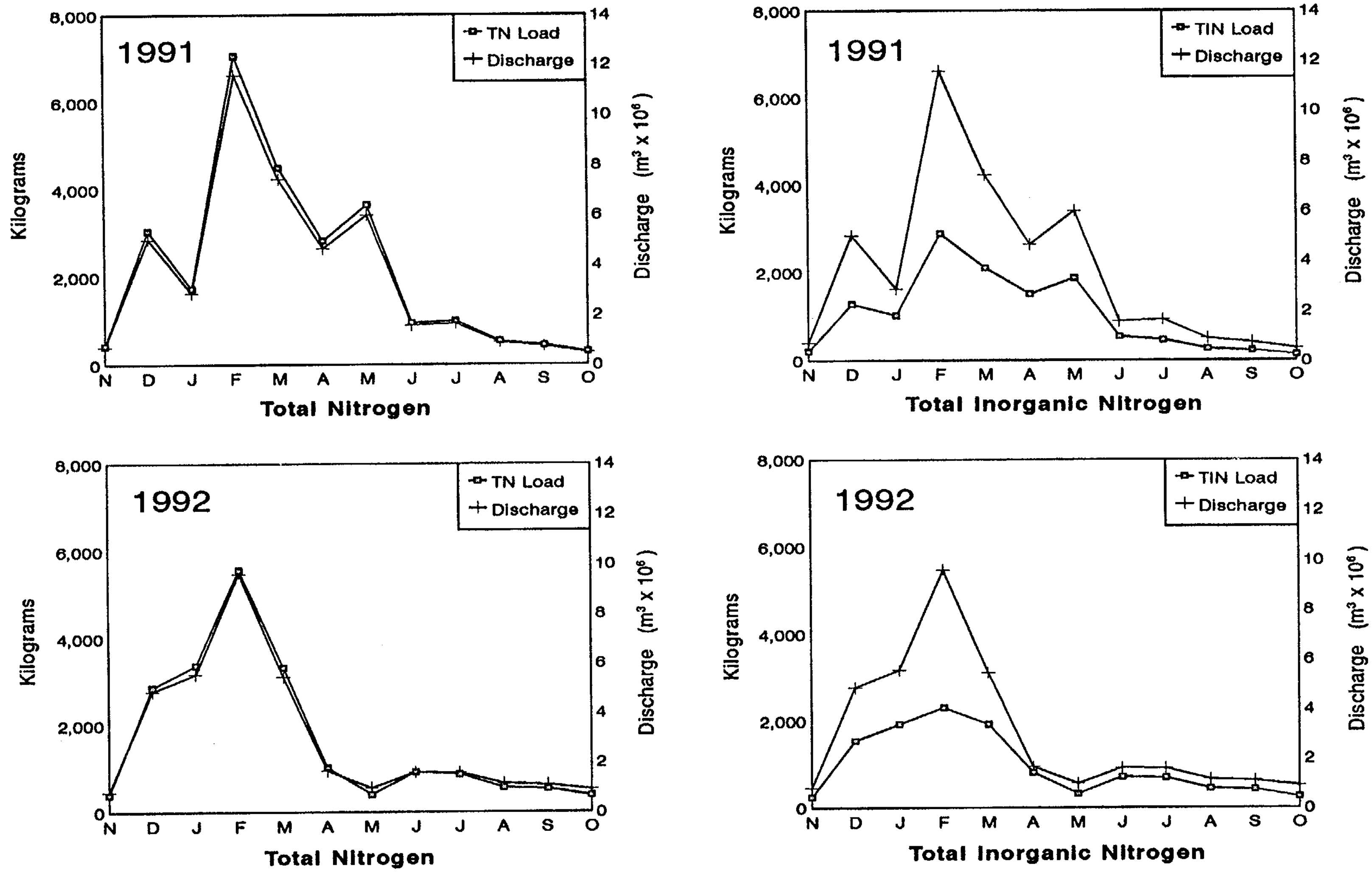


Figure 9-7. Estimated total loading (point and nonpoint sources) per month of total nitrogen (TN) and total inorganic nitrogen (TIN) for sampling location on Spring Creek at Al. Hwy. 16 bridge for study year 1991 (November 1990 - October 1991) and 1992 (November 1991 - October 1992) during the diagnostic study of Weiss Lake, 1990 - 1992.

amount of pasture land in the three tributary stream watersheds provided the minimum mean square error in the regression model for nonpoint source TSS loading. Nonpoint source TSS load from the basin was an estimated 39,298 metric tons (Table 9-8).

A review of landuse export coefficients in the literature (Uttormark *et al.* 1974, Browne and Grizzard 1979, Reckhow *et al.* 1980 and Rast and Lee 1983) revealed a wide range of coefficient values (Table 9-9). Total phosphorus and total nitrogen export coefficients generally ranged an order of magnitude between the high and low estimates and total suspended solids ranged up to three orders of magnitude. Estimates of nonpoint source pollution loading from the Weiss Lake basin using multiple linear regression models compared favorably with estimates using the mean export coefficient values (Table 9-8 and 9-9).

The Chattooga River watershed accounted for 83%, 33% and 56% of the nonpoint source TP, TN and TSS load, respectively from the Weiss Lake basin (Table 9-10). The Little River contributed 33% of the nonpoint TN load but only 6% of the nonpoint TP load. Loading estimates for tributary stream watersheds (Table 9-10) using the multiple linear regression models generally were comparable to the mean export coefficient loading for TN but varied for TP.

Weiss Lake Loading

Nutrient loading of TP, TN, TIN, BOD and TSS into Weiss Lake was quantified by estimating loading at the Alabama/Georgia state line and adding both point and nonpoint source loads from within the Weiss Lake basin.

Table 9-8. Estimated nonpoint source pollution loading of Weiss Lake basin for total phosphorus, total nitrogen and total suspended solids based on multiple linear regression models for study year 1991 (November 1990 - October 1991) and 1992 (November 1991 - October 1992) and for 1991 and 1992 combined during the diagnostic study of Weiss Lake, 1990 1992.

Year	Landuse[2]	Area of Landuse (ha)	Predictor Coefficient	Loading per year
		Total Phosphorus		
1991	Urban	4,996	21.40	106,964 kg
1992	Urban	4,996	21.56	107,642 kg
both years	Urban	4,996	21.43	107,064 kg
		Total Nitrogen		
1991	Poultry	2,453,100[1]	0.0249	610,822 kg
1992	Poultry	2,453,100[1]	0.0296	726,118 kg
both years	Poultry	2,453,100[1]	0.0273	669,696 kg
		Total Suspended Solids		
1991	Pasture	6,018	6.88	41,464 mt
1992	Meadow	23,865	1.54	36,752 mt
both years	Pasture	6,018	6.53	39,298 mt

[1] Value reported in square feet.

[2] Significant landuse as revealed by multiple linear regression models for total phosphorus, total nitrogen and total suspended solids.

Table 9-9. Estimated nonpoint source pollution loading for the Weiss Lake basin using a range of export coefficients reported in the literature for total phosphorus, total nitrogen and total suspended solids.

Landuse[1]	Area (ha)	Export Coefficients High	Mean	Low
		Total Phosphorus (kg/ha/yr)		
Agriculture	41,093	9.10	1.00	0.10
Forest	147,288	0.67	0.20	0.02
Urban	4,996	5.00	1.50	0.30
Pasture	6,018	0.50	0.35	0.10
Improved Pasture	25,274	0.50	0.30	0.10
TP Loading (kg)		513,254	87,773	11,683
		Total Nitrogen (kg/ha/yr)		
Agriculture	41,093	42.0	5.0	0.6
Forest	147,288	6.3	2.5	1.0
Urban	4,996	10.0	5.0	2.5
Pasture	6,018	6.2	6.2	6.2
Improved Pasture	25,274	14.0	8.6	3.2
TN Loading (kg)		3,094,928	853,334	302,623
		Total Suspended Solids (kg/ha/yr)		
Agriculture	41,093	5,600	*	3
Forest	147,288	820	*	1
Urban	4,996	1,750	*	210
Pasture	6,018	343	*	343
Improved Pasture	25,274	80	*	30
TSS Loading (kg)		363,726,054	*	4,142,121

* No information available.

[1] Landuse categories for the Weiss Lake basin (Table 9-2) were consolidated into landuse categories from the literature as follows: agriculture (210 and 22), forest (4, 45 and 6), urban (11, 12, 144, 1207 and 1236), pasture (21) and improved pasture (213, 32, 75 and 75).

Estimates of loading rates at the sampling locations (Table 9-2 and Figure 9-8) were determined by FLUX. Water quality data for stations 17 through 22 (Table 9-2) were generally collected once monthly by GA EPD and discharge information was obtained from the United States Geological Survey (USGS). Detection levels for GA EPD water quality data were generally 0.03 mg/l for total ammonia-nitrogen, 0.02 mg/l for total phosphorus and 0.01 mg/l for total Kjeldahl nitrogen. When a value was reported as less than detection limit, a value of one-half of the detection limit was assumed.

Estimates of phosphorus retention within Weiss Lake were determined by subtracting output total phosphorus (TP) load from input TP load. Input was estimated using methods discussed in previous sections (8 and 9). Output TP load was estimated using FLUX. Output TP concentration was assumed to be the TP concentration measured at the powerhouse forebay (station 1) (Figure 10-1) sampling site.

Total phosphorus load at the state line was 1,146,412 kg and 947,607 kg for 1991 and 1992, respectively (Table 9-11). The TP load into the Coosa River at Rome, GA from the Oostanaula and Etowah Rivers combined was an estimated 884,301 kg and 770,914 kg for 1991 and 1992, respectively. The Conasauga River appeared to be the major contributor of TP to the Oostanaula River. The Conasauga River TP load was three times the load of the Coosawattee River. TP load generally was higher at the sampling locations for 1991 than in 1992. Coosa River discharge at the state line was about 6% above normal in 1991 and 6% below normal in 1992. Mean TP concentration at the state line (Table 9-11) exceeded by a factor of three the recommended TP concentration required to control accelerated eutrophication of lakes

Table 9-10. Estimated nonpoint source pollution loading of major tributaries using multiple linear regression models based on landuse and loading data from 1991, 1992 and 1991 and 1992 combined and export coefficients (high/mean/low) for study year 1991 (November 1990 - October 1991) and 1992 (November 1991 - October 1992) during the diagnostic study of Weiss Lake, 1990 - 1992.

Study year	Total phosphorus (kg/yr)	Total nitrogen (kg/yr)	Total Suspended solids (kg/yr)
		Yellow Creek	
1991	43	64,470	1,936
1992	43	76,960	1,734
both years	43	70,720	1,835
Export coefficients	(29,065/3,194/319)	(190,929/56,634/13,668)	(22,880/*/151)
		Little River	
1991	6,423	215,659	6,635
1992	6,408	256,366	8,299
both years	6,414	235,579	6,288
Export coefficients	(126,356/22,403/2,801)	(820,169/237,000/83,540)	(96,444/*/666)
		Chattooga River	
1991	89,451	202,823	23,185
1992	89,242	241,107	20,883
both years	89,326	221,558	21,973
Export coefficients	(206,629/39,079/5,710)	(1,276,396/392,678/147,359)	(96,444/*/666)
		Mud Creek	
1991	2,632[1]	17,943[1]	746[1]
1992	2,635[1]	989[1]	673[1]
both years	2,635[1]	19,600[1]	708[1]
Export coefficients	(10,266/1,747/125)	(65,490/17,919/5,931)	(7,861/*/19)
		Spring Creek	
1991	12,202[1]	45,941	3,411
1992	12,212[1]	54,612	2,568
both years	12,207[1]	50,184	3,232
Export coefficients	(40,438/6,084/760)	(235,548/57,543/19,305)	(27,916/*/240)

Table 9-10. Continued.

Study year	Total phosphorus (kg/yr)	Total nitrogen (kg/yr)	Total Suspended solids (kg/yr)
		Cowan Creek	
1991	557	53,411	3,245
1992	555	63,492	482
both years	556	58,344	3,076
Export coefficients	(21,633/3,069/364)	(119,456/25,012/8,794)	(41,001/*/186)

[1] Based on alternate formula.

* No information available.

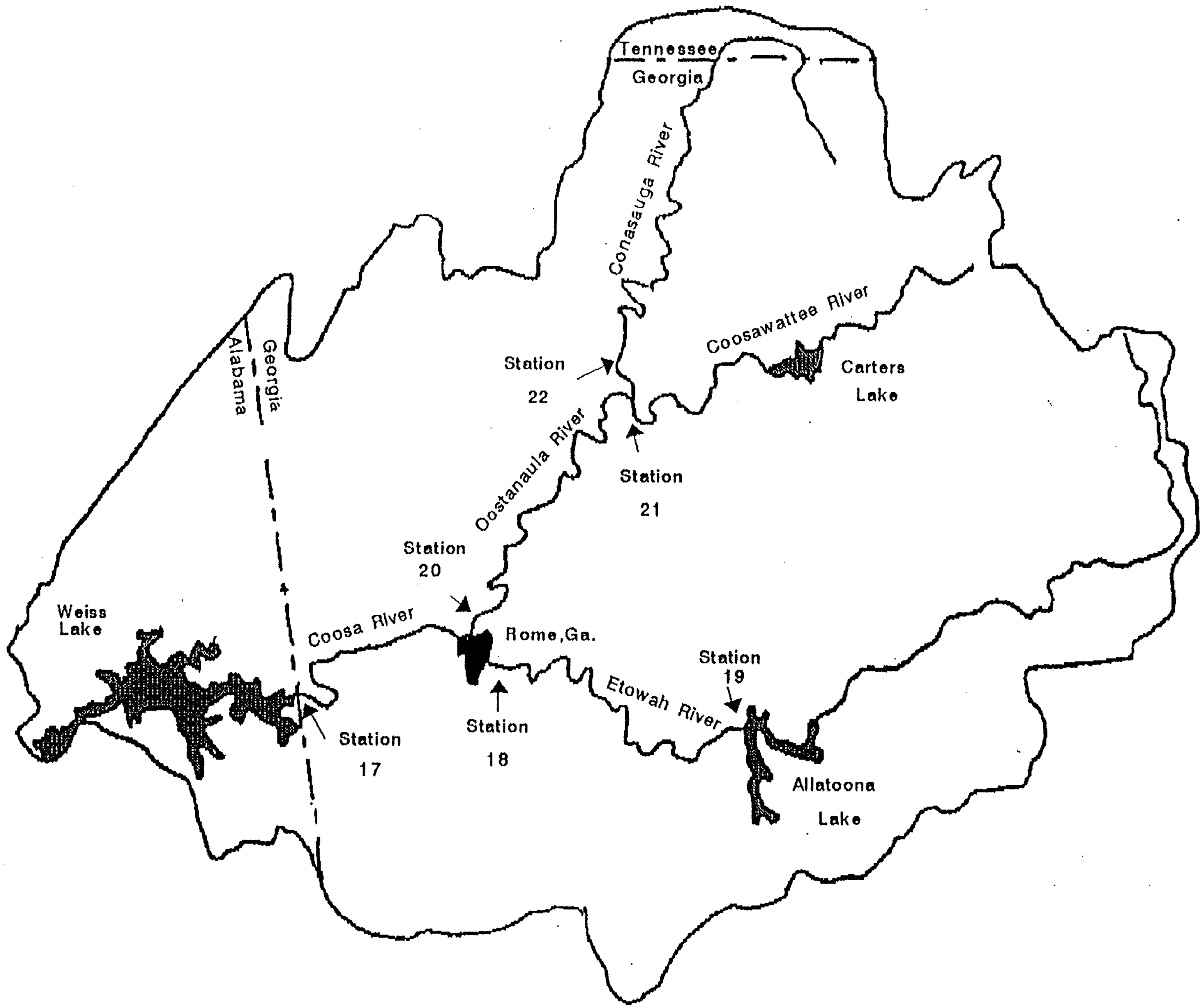


Figure 9-8. Basin map showing sampling locations for loading estimates during the diagnostic study of Weiss Lake, 1990 - 1992.

Table 9-11. Estimated total loading (point and nonpoint sources) using FLUX for total phosphorus (TP), total nitrogen (TN), total inorganic nitrogen (TIN), biochemical oxygen demand (BOD) and total suspended solids (TSS) in Weiss Lake basin for study year 1991 (November 1990 - October 1991) and 1992 (November 1991 -October 1992) during the diagnostic study, 1990 - 1992.

Study Year	Mean[1] Flow (cfs)	Avg.[2] Flow (cfs)	TP loading (kg)	TP[3] Conc. (mg/l)	TN loading (kg)	TN[3] Conc. (mg/l)	TIN loading (kg)	TIN[3] Conc. (mg/l)	BOD loading (metric tons)	BOD[3] Conc. (mg/l)	TSS loading (metric tons)	TSS[3] Conc. (mg/l)
						Station 17:	Coosa River at GA/AL state line					
1991	7,097	6,699	1,146,442	0.181	3,929,748	0.622	2,572,699	0.407	7,640	1.21	166,545	26.4
1992	6,313		947,607	0.168	3,451,139	0.612	2,401,008	0.426	6,975	1.23	207,638	36.8
						Station 18:	Etowah River at Rome, GA					
1991	3,035	2,944	278,994	0.103	*	*	1,051,582	0.389	2,982	1.10	102,125	37.8
1992	2,774		188,394	0.076	*	*	927,227	0.375	2,727	1.10	73,999	29.9
						Station 19:	Etowah River at Allatoona Dam					
1991	2,102	1,904	88,448	0.047	*	*	565,848	0.302	1,259	0.67	6,742	3.6
1992	1,804		87,590	0.054	*	*	695,377	0.432	1,174	0.73	9,442	5.9
						Station 20:	Oostanaula River at Rome, GA					
1991	3,760	3,627	605,307	0.181	*	*	1,415,664	0.423	5,215	1.56	91,549	27.4
1992	3,409		582,520	0.191	*	*	1,105,874	0.363	3,533	1.16	89,394	29.4
						Station 21:	Coosawattee River					
1991	1,604	1,494	123,073	0.086	*	*	439,314	0.307	764	0.53	*	*
1992	1,511		99,106	0.073	*	*	406,641	0.301	1,404	1.04	*	*
						Station 22:	Conasauga River					
1991	1,389	1,213	366,360	0.296	*	*	665,435	0.476	486	0.39	*	*
1992	1,175		353,213	0.336	*	*	438,432	0.418	1,173	1.18	*	*

1 - mean discharge from U.S.G.S. gaging station for study year.
2 - Average discharge from U.S.G.S. gaging station for period of record.
3 - Estimated flow-weighted mean concentration.
* - no information available.

(Mackenthum 1974). Point sources accounted for an estimated 21% and 26% of the TP load at the state line for 1991 and 1992, respectively.

TP retention was an estimated 47% (606,870 kg) in 1991 and 27% (291,719 kg) in 1992. Inflow (water entering from the state line) and outflow (Weiss power plant) were higher in 1991 than in 1992.

Total nitrogen (TN) data were only available at the state line (station 17) (Figure 9-8) and the TN:TP ratio was 3.5:1 for both years suggesting nitrogen limitation in waters entering the lake (Table 9-11) (Porcella and Cleave 1981). TN concentrations at the state line exceeded the recommendation of Mackenthum (1974) of less than 0.6 mg/l of TN to avoid excessive aquatic plant growth. Total inorganic nitrogen made up 65% and 69% (1991 and 1992, respectively) of the TN at the state line.

About 88% of the entire TP load and 82% of the TSS load entered the lake from upstream of the state line (Table 9-12). The Weiss Lake basin contributed only about 12% of the TP load and 18% of the TSS load.

Total loading (point and nonpoint sources) was closely correlated with river discharge at all sampling locations (Figure 9-9, 9-10, 9-11, 9-12, 9-13, 9-14, 9-15, 9-16, 9-17, 9-18, 9-19, 9-20 and 9-21). Point source loading appeared to be a minor portion of the total load. However, point source dischargers were not required to monitor plant nutrients in their effluents and this made it difficult to estimate point source nutrient loading. Effluents from municipal wastewater treatment plants were assumed to have a TP concentration of 2.5 mg/l but other nutrients were not considered. With the exception of Inland-Rome (paper manufacturer), no estimates of nutrient loading were attempted for industrial point sources. This analysis likely underestimated point source loading of Weiss Lake.

Table 9-12. Estimated loading of Weiss Lake during study year 1991 (November 1990 - October 1991) and 1992 (November 1991 - October 1992) of the diagnostic study, 1990 - 1992.

Year	Loading	Loading (GA/AL line)	Weiss Lake point loading	Weiss Lake nonpoint loading
		Total phosphorus (kg)		
1991	1,281,209	1,146,442	27,803	106,964
1992	1,082,239	947,607	26,990	107,642
		Total nitrogen (kg)		
1991	*	3,292,748	*	610,822
1992	*	3,451,139	*	726,118
		Total suspended solids (mt)		
1991	208,749	166,545	558	41,464
1992	245,048	207,638	658	36,752
		Biochemical oxygen demand (mt)		
1991	*	7,640	237	*
1992	*	6,975	185	*

* No information available.

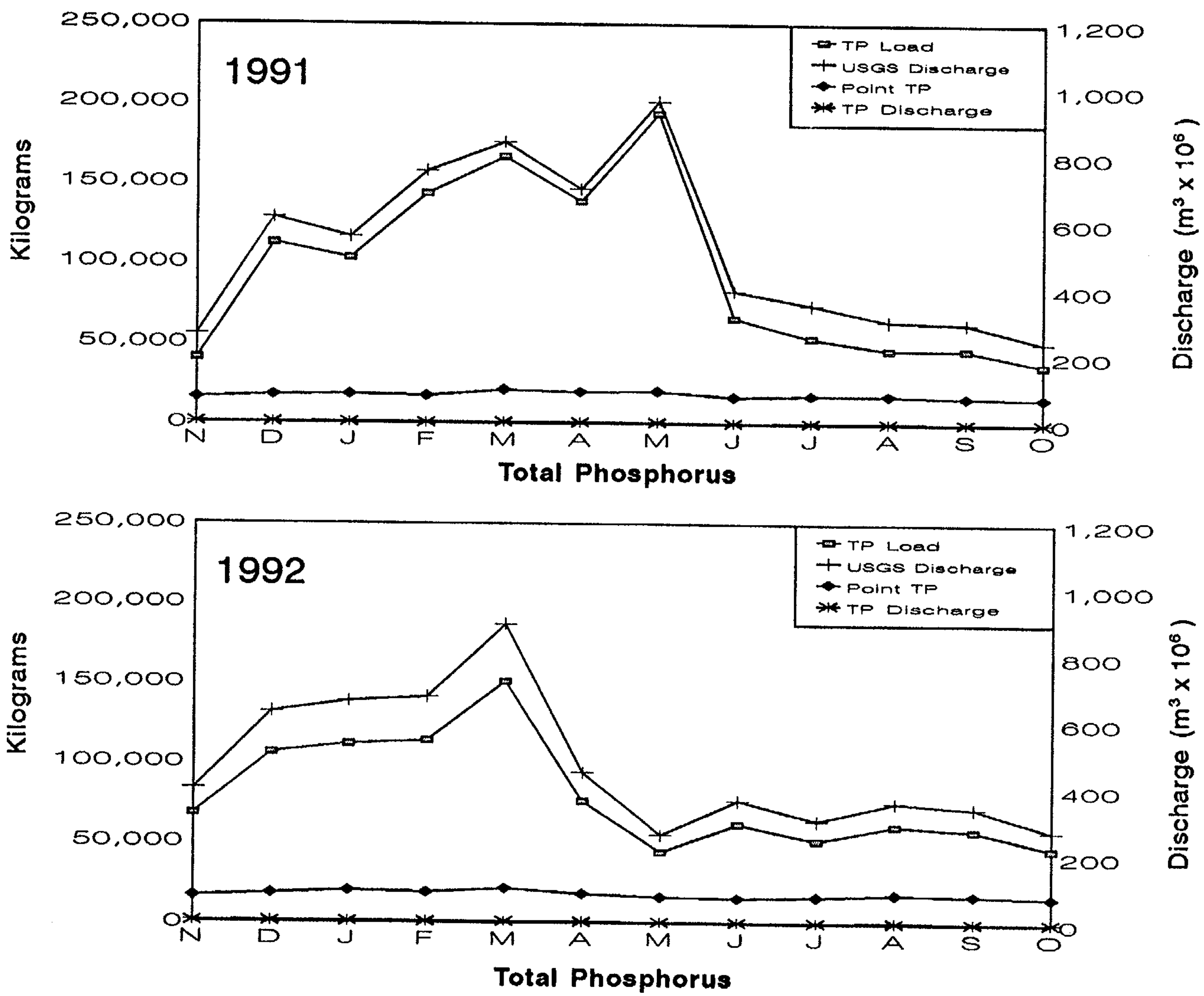


Figure 9-9. Estimated total loading (point and nonpoint sources) per month of total phosphorus (TP) and point source TP discharge and load for sampling location at GA/AL state line for study year 1991 (November 1990 - October 1991) and 1992 (November 1991 - October 1992) during the diagnostic study, 1990 - 1992.

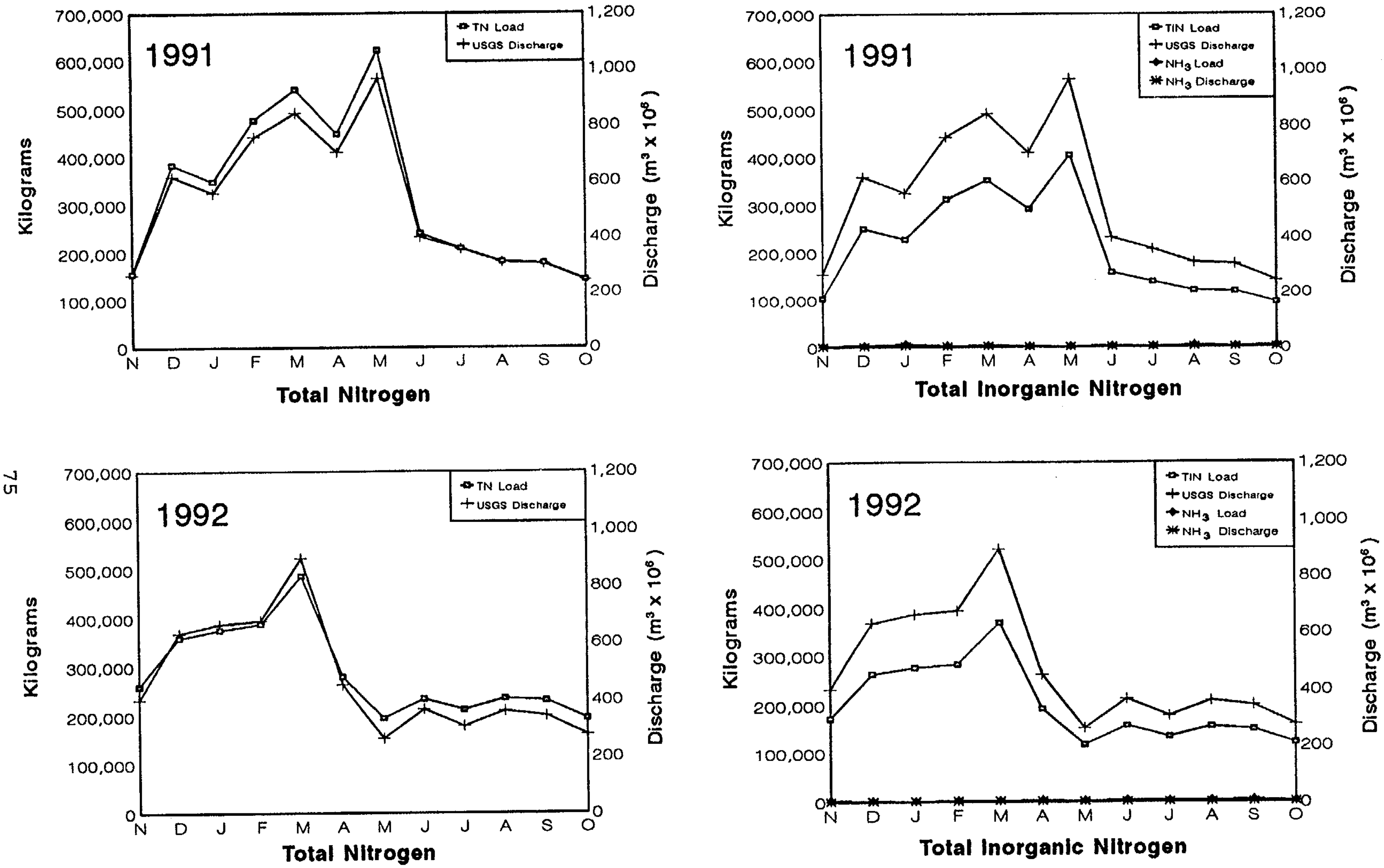


Figure 9-10. Estimated total loading (point and nonpoint sources) per month of total nitrogen (TN) and total inorganic nitrogen (TIN) and point source load and discharge of ammonia-nitrogen for sampling location at GA/AL state line for study year 1991 (November 1990 - October 1991) and 1992 (November 1991 - October 1992) during the diagnostic study of Weiss Lake, 1990 - 1992.

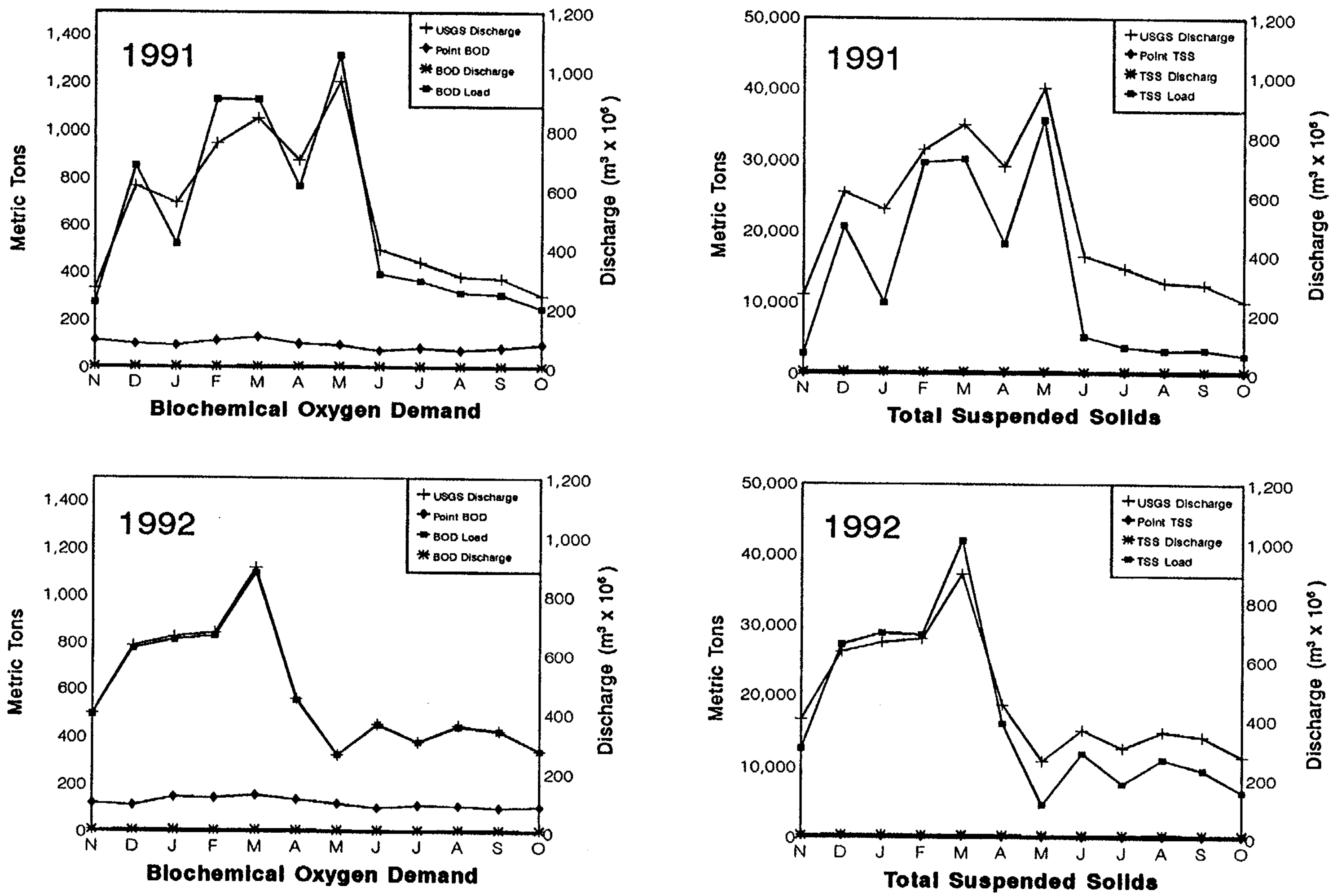


Figure 9-11. Estimated total loading (point and nonpoint sources) per month of biochemical oxygen demand (BOD), total suspended solids (TSS), and point source discharge and load for sampling location at GA/Al state line for study year 1991 (November 1990 - October 1991) and 1992 (November 1991 - October 1992) during the diagnostic study of Weiss Lake, 1990 - 1992.

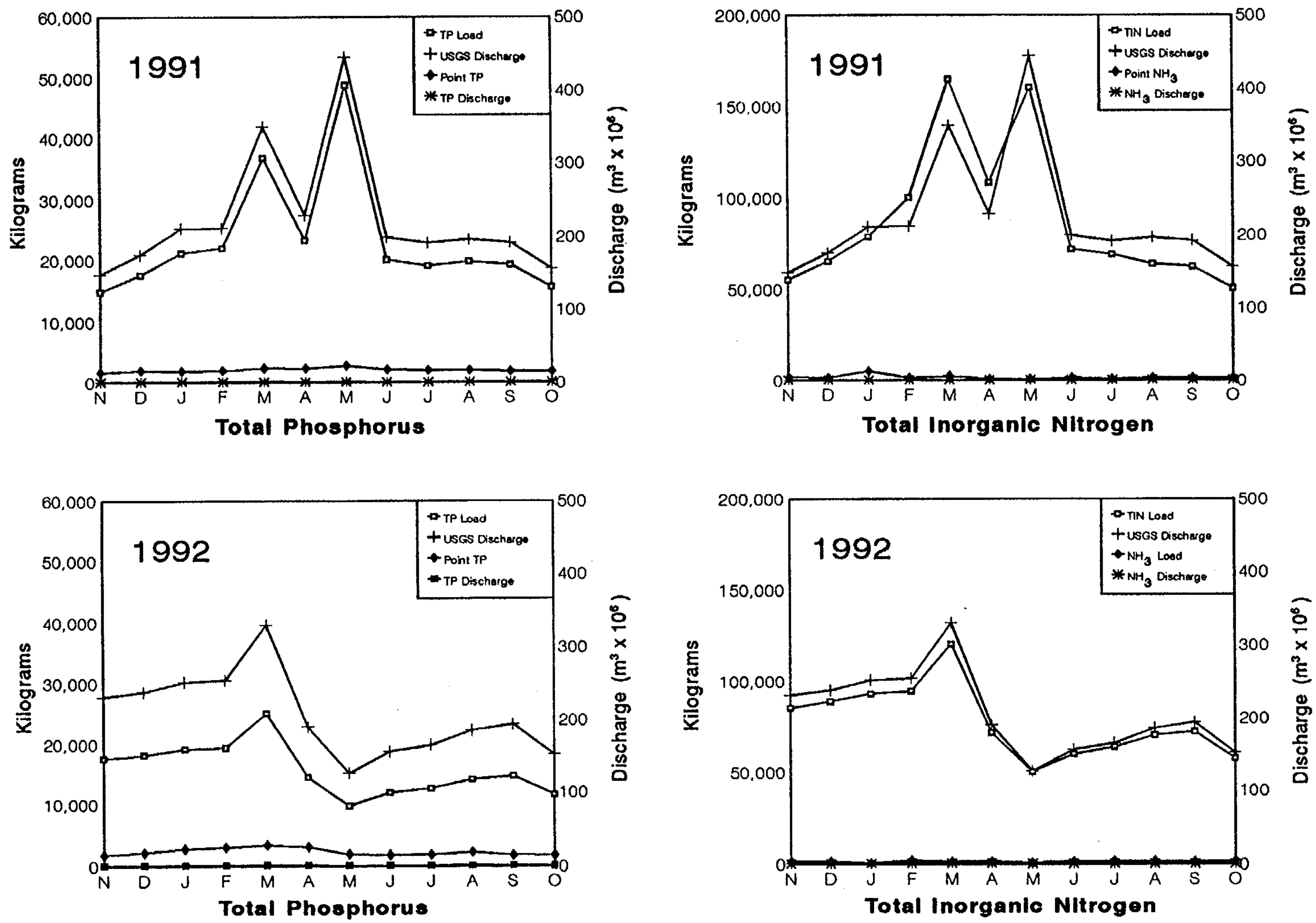


Figure 9-12. Estimated total loading (point and nonpoint sources) per month of total phosphorus (TP), total inorganic nitrogen (TIN) and point source discharge and load for sampling location on Etowah River at Southern railway bridge in Rome, Ga. for study year 1991 (November 1990 - October 1991) and 1992 (November 1991 - October 1992) during the diagnostic study of Weiss Lake, 1990 - 1992.

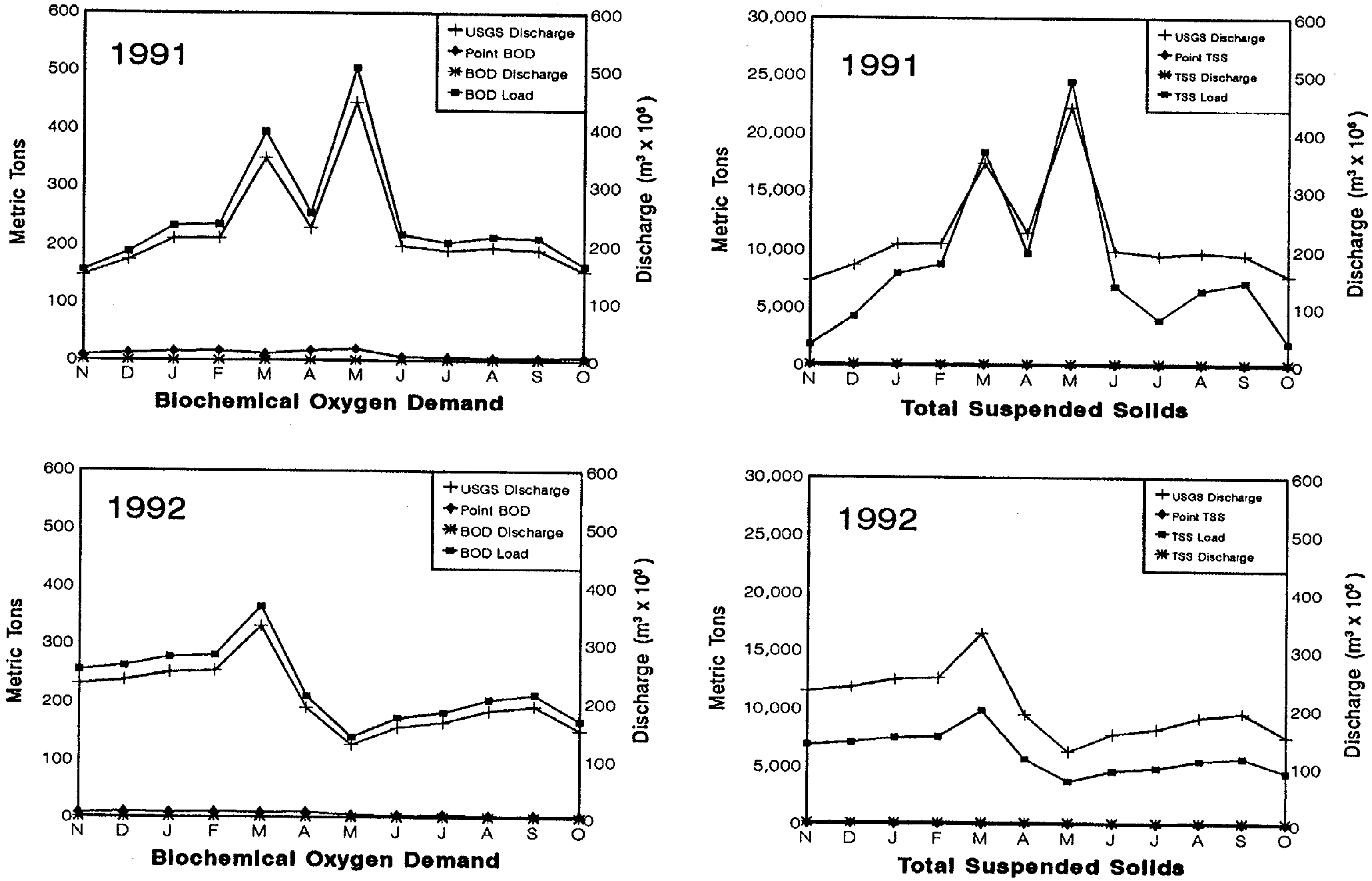


Figure 9-13. Estimated total loading (point and nonpoint sources) per month of biochemical oxygen demand (BOD), total suspended solids (TSS), and point source discharge and load for sampling location on Etowah River at Southern railway bridge in Rome, Ga. for study year 1991 (November 1990 - October 1991) and 1992 (November 1991 - October 1992) during the diagnostic study of Weiss Lake, 1990 - 1992.

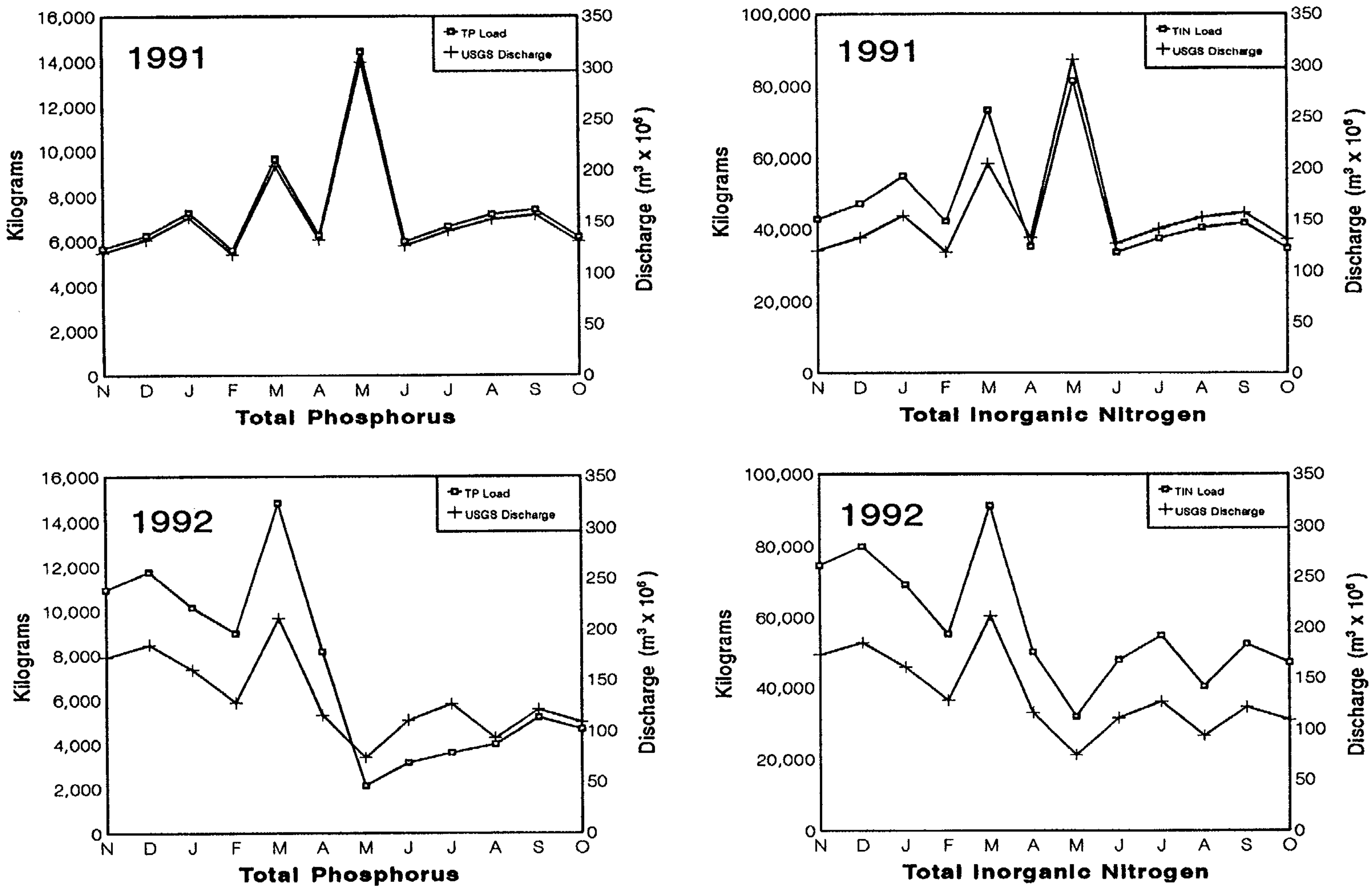


Figure 9-14. Estimated total loading (point and nonpoint sources) per month of total phosphorus (TP) and total inorganic nitrogen (TIN) for sampling location on Etowah River, 0.75 miles downstream of Allatoona Dam for study year 1991 (November 1990 - October 1991) and 1992 (November 1991 - October 1992) during the diagnostic study of Weiss Lake, 1990 -1992.

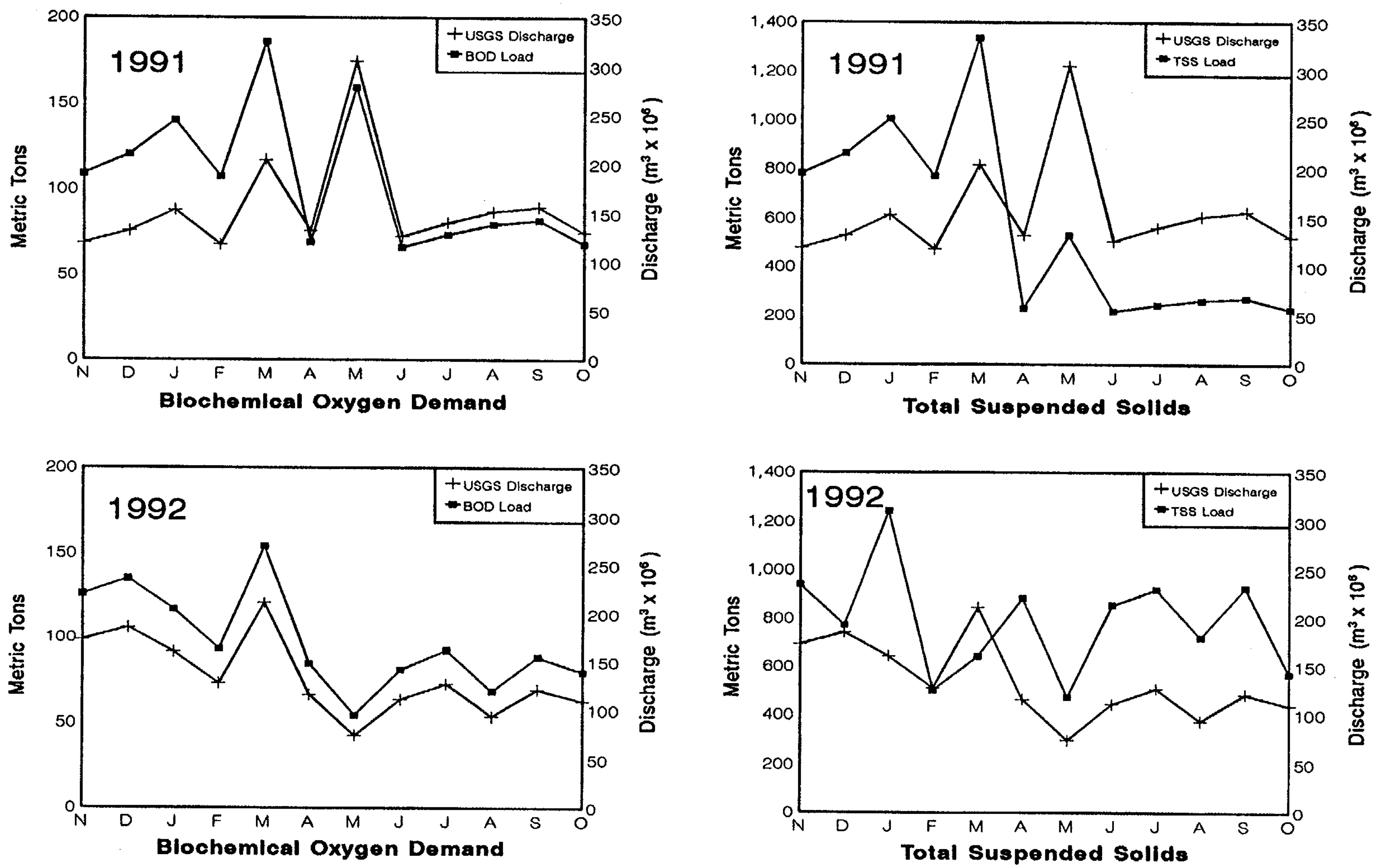


Figure 9-15. Estimated total loading (point and nonpoint sources) per month of biochemical oxygen demand (BOD) and total suspended solids (TSS) for sampling location on Etowah River, 0.75 miles downstream of Allatoona Dam for study year 1991 (November 1990 - October 1991) and 1992 (November 1991- October 1992) during diagnostic study of Weiss Lake, 1990 - 1992.

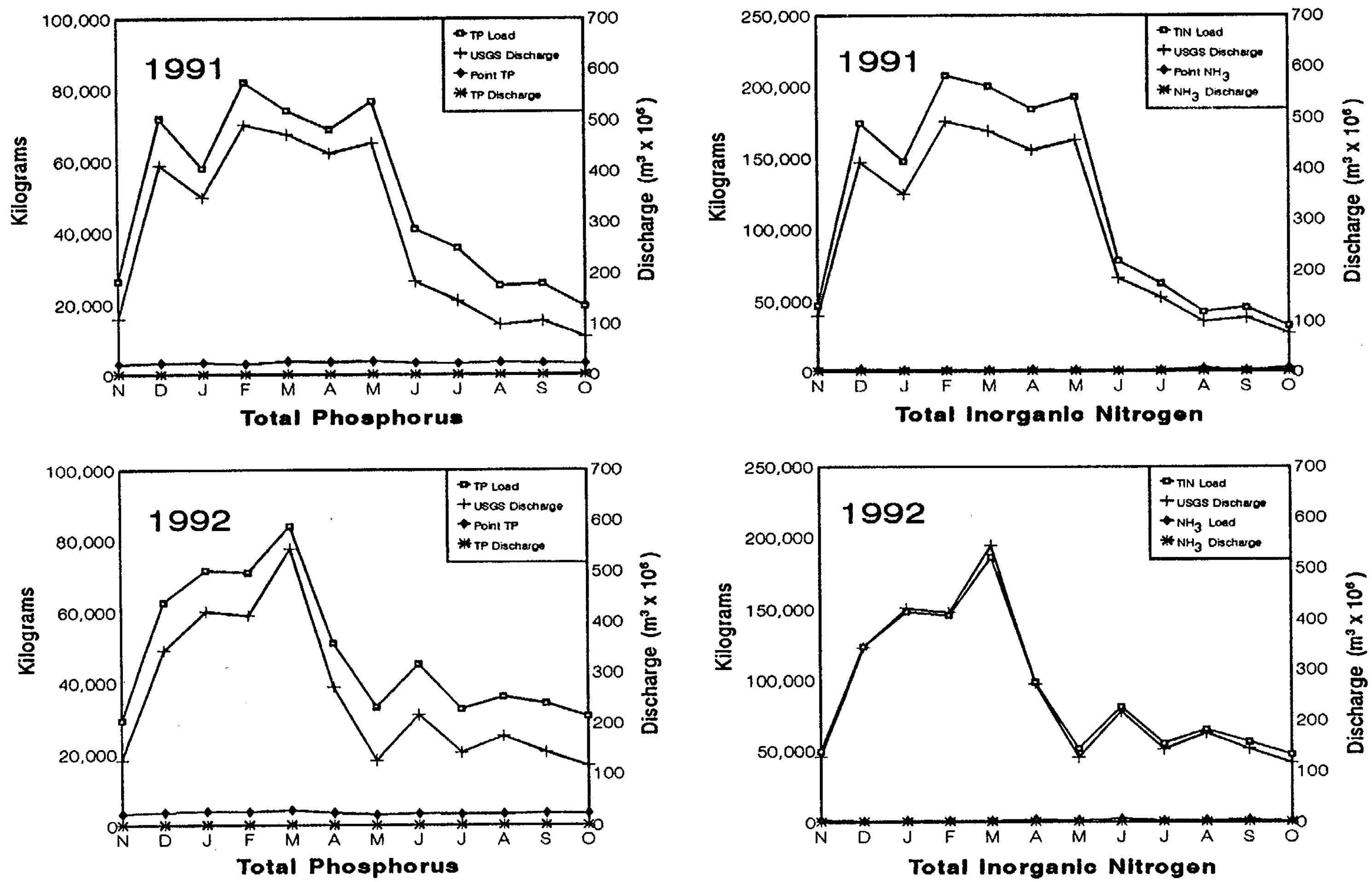


Figure 9-16. Estimated total loading (point and nonpoint sources) per month of total phosphorus (TP), total inorganic nitrogen (TIN), and point source discharge and load for sampling location on the Oostanaula River at the Rome, Ga. water intake for study year 1991 (November 1990 - October 1991) and 1992 (November 1991 - October 1992) during diagnostic study of Weiss Lake, 1990 - 1992.

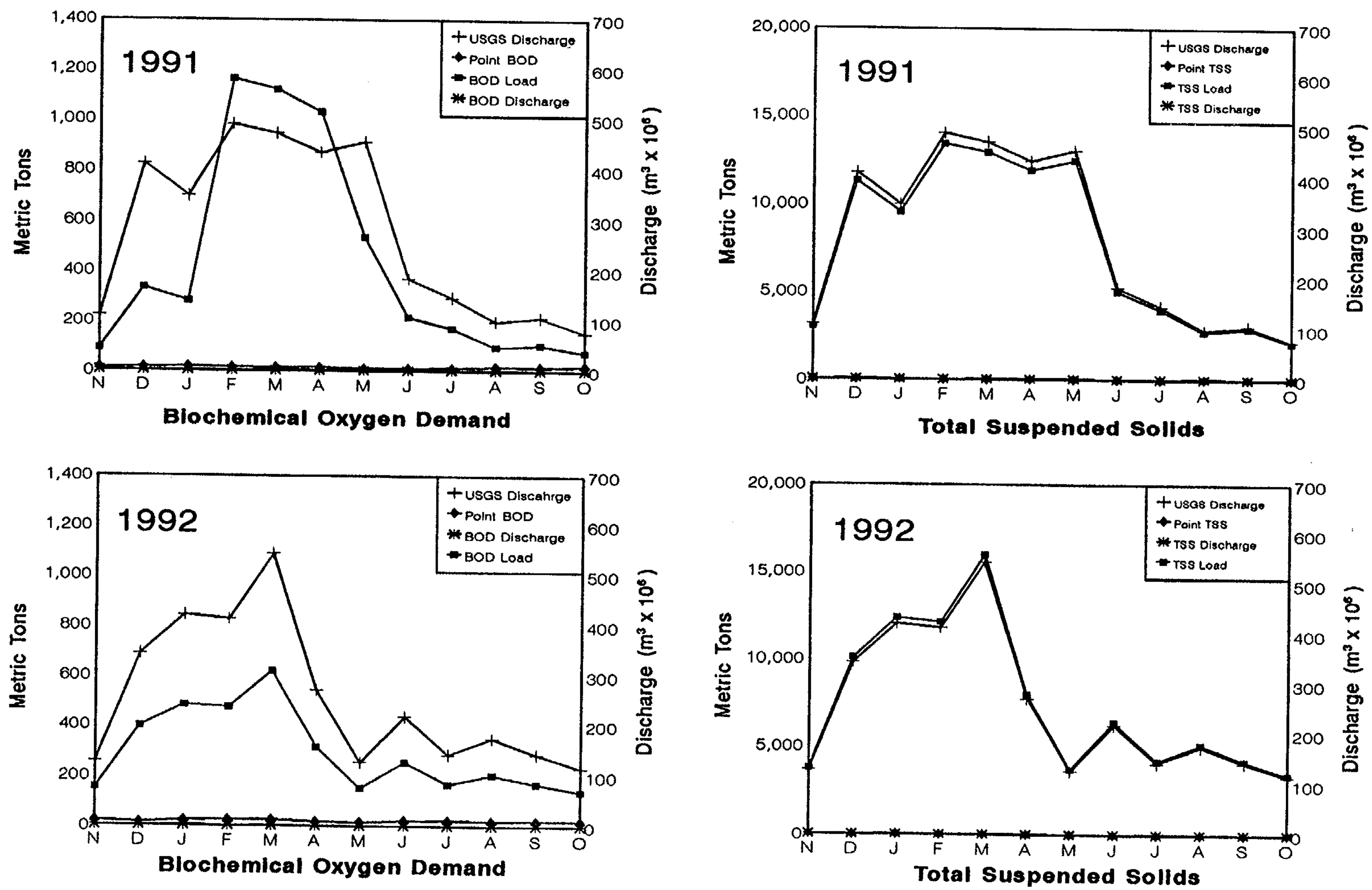


Figure 9-17. Estimated total loading (point and nonpoint sources) per month of biochemical oxygen demand (BOD), total suspended solids (TSS), and point source discharge and load for sampling location on the Oostanaula River at the Rome, Ga. water intake for study year 1991 (November 1990 - October 1991) and 1992 (November 1991 - October 1992) during the diagnostic study, 1990 - 1992.

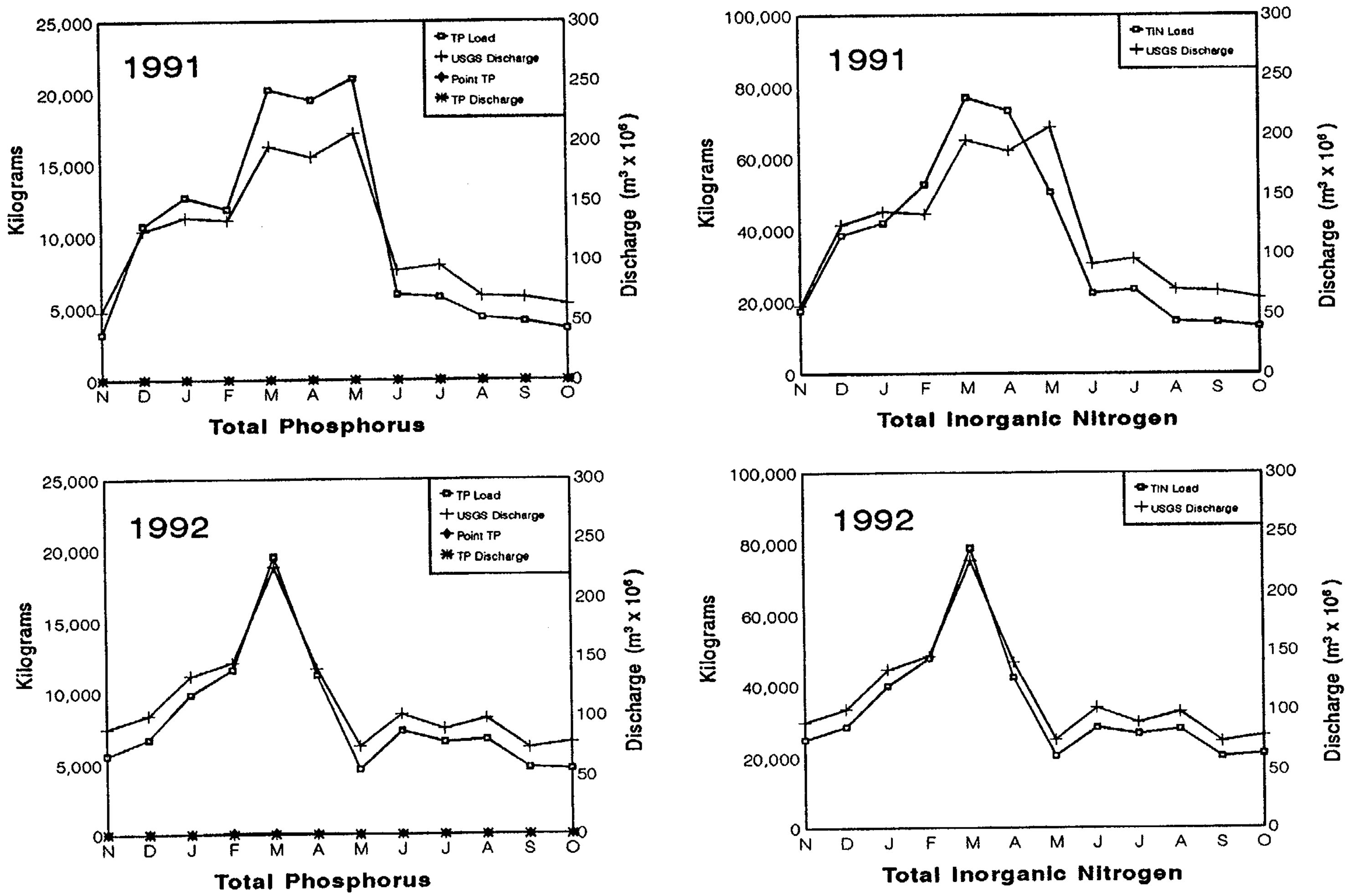


Figure 9-18. Estimated total loading (point and nonpoint sources) per month of total phosphorus (TP), total inorganic nitrogen (TIN), and point source discharge and load for sampling location on Coosawattee River at Ga. Hwy. 225 bridge for study year 1991 (November 1990 - October 1991) and 1992 (November 1991 - October 1992) during the diagnostic study of Weiss Lake, 1990 - 1992.

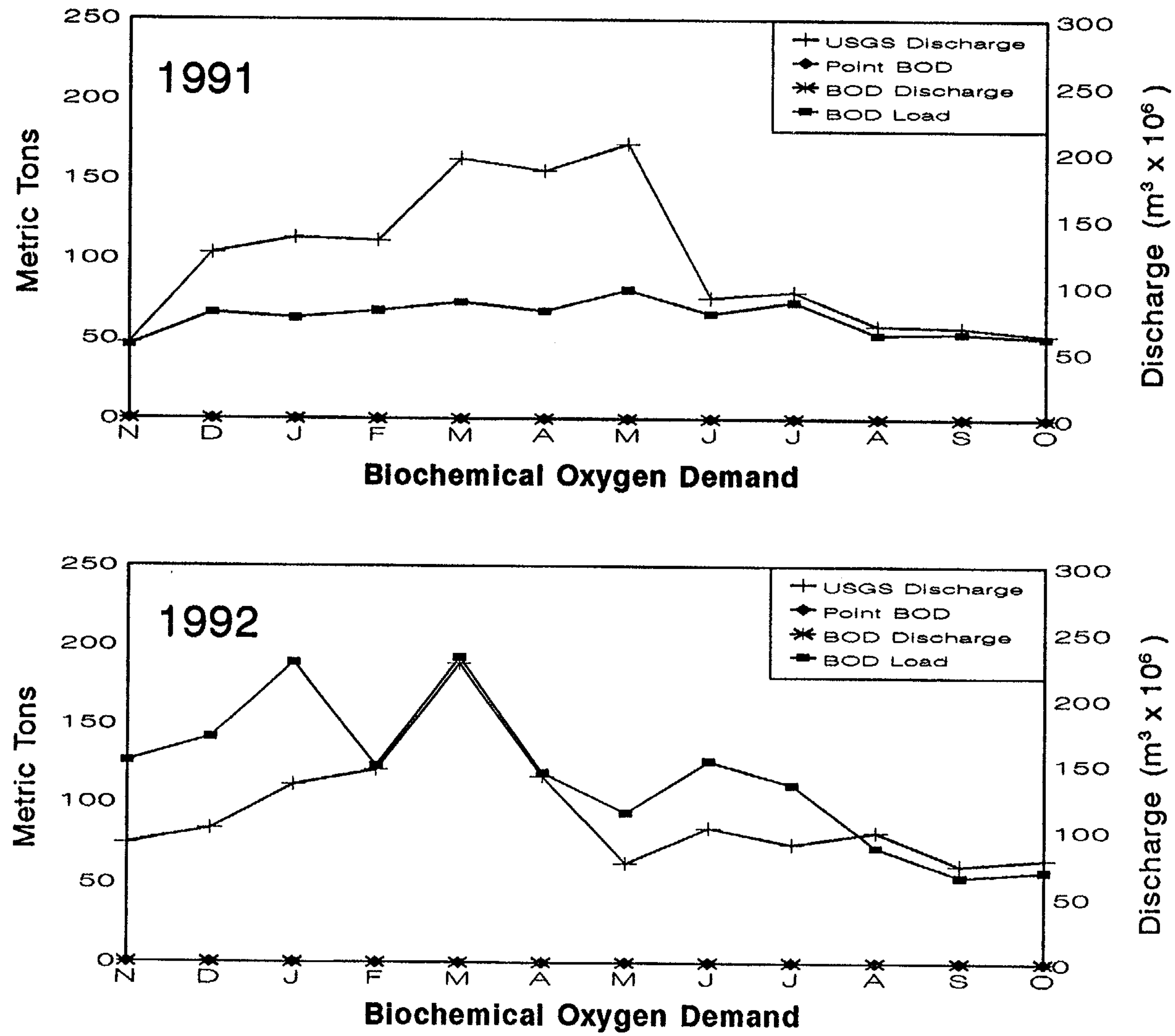


Figure 9-19. Estimated total loading (point and nonpoint sources) per month of biochemical oxygen demand (BOD) and point source discharge and load for sampling location on Coosawattee River at Ga. Hwy. 225 bridge for study year 1991 (November 1990 - October 1991) and study year 1992 (November 1991 - October 1992) during the diagnostic study of Weiss Lake, 1990 - 1992.

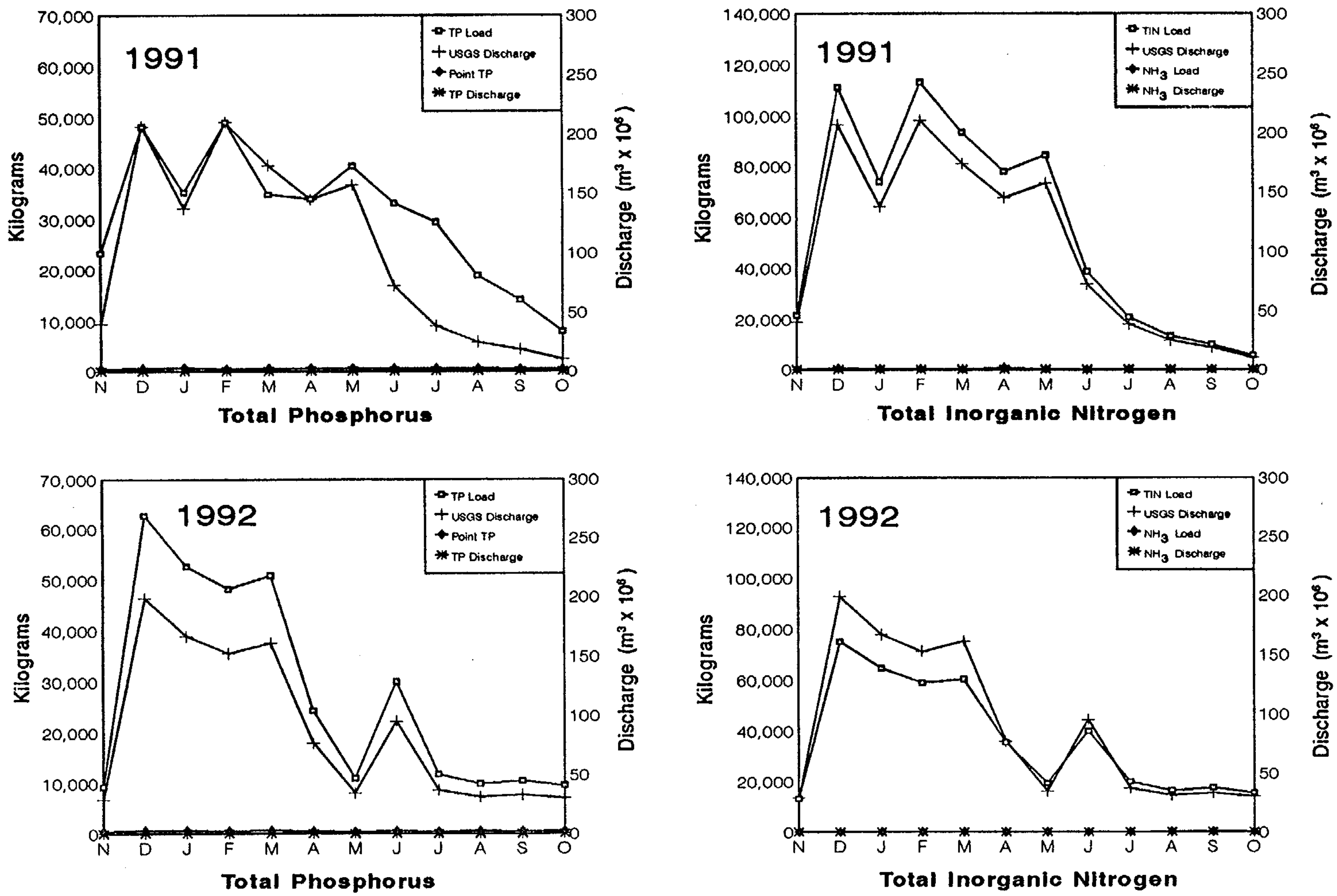


Figure 9-20. Estimated total loading (point and nonpoint sources) per month of total phosphorus (TP), total inorganic nitrogen (TIN), and point source discharge and load for sampling location on the Conasuaga River at Ga. Hwy. 136 bridge for study year 1991 (November 1990 - October 1991) and 1992 (November 1991 - October 1992) during the diagnostic study of Weiss Lake, 1990 - 1992.

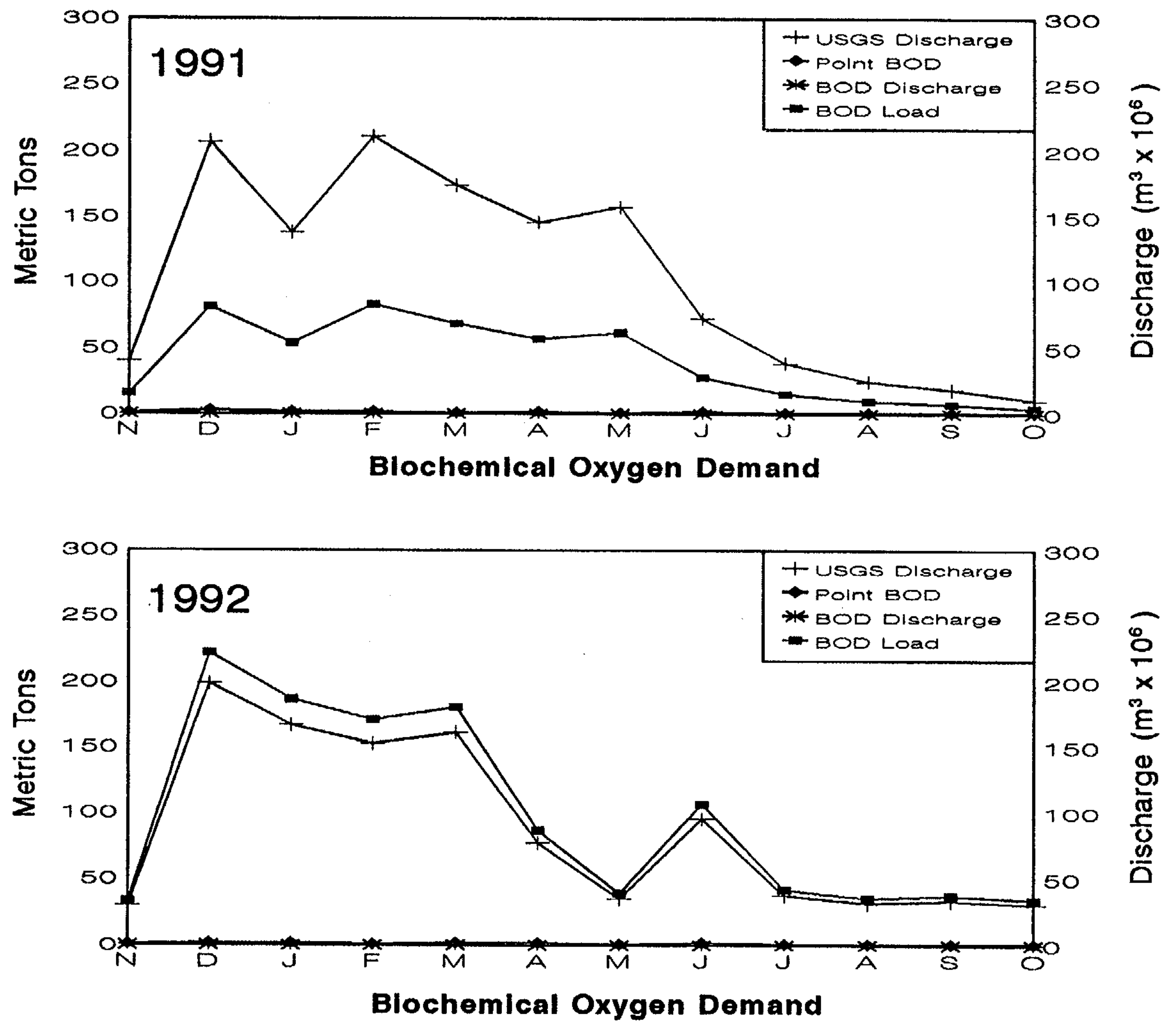


Figure 9-21. Estimated loading (point and nonpoint sources) per month of biochemical oxygen demand (BOD) and point source discharge and load for sampling location on Conasauga River at Ga. Hwy. 136 bridge for study year 1991 (November 1990 - October 1991) and 1992 (November 1991 - October 1992) during the diagnostic study of Weiss Lake, 1990 - 1992.

10.0 HISTORICAL AND CURRENT LIMNOLOGICAL DATA

10.1 Limnological History of Weiss Lake

Concern over water quality in the Coosa River just downstream from the Alabama-Georgia state line began prior to impoundment of the river near Cedar Bluff, Alabama to create Weiss Lake. The dam, built by the Alabama Power Company, was completed in 1961 and Weiss Lake reached full pool in 1962. The earliest published information on water quality of the Coosa River near Cedar Bluff was gathered in the summer of 1948 during a survey of Alabama streams conducted by the newly created Alabama Water Improvement Commission (Water Improvement Advisory Commission 1949). The river at Cedar Bluff was considered "moderately polluted" with organic waste resulting in dissolved oxygen saturation levels ranging between 79 and 96% and coliform levels of from 900 to 24,000 colonies/100 ml.

In the early 1950's, plans were revealed for construction of a paper mill (Rome Kraft Company, currently Inland-Rome) on the Coosa River about 16 miles upstream from the Alabama-Georgia state line. In 1954, prior to construction of the paper mill, the Alabama Water Improvement Commission (AWIC) conducted studies to provide baseline data on river conditions (AWIC 1963). Results of this study revealed the river to be "relatively normal" with only slight effects of organic pollution present where the river entered Alabama (AWIC 1963). A similar study was conducted in 1955, nine months after the paper mill began operation. A significant decline in dissolved oxygen (D.O.) had occurred in the Coosa River beginning at a point 1.5 miles from the Georgia-Alabama state line (closest sampling site to the paper mill) and extending downstream for 53 miles (AWIC 1963). A third study of the upper Coosa River in 1957 showed declining conditions with a marked depression of

D.O. further downstream into Alabama. This prompted AWIC in August 1958 to request that "positive action" be taken by the Water Quality Division of the Georgia Department of Public Health to assure "satisfactory" water quality in the Coosa River as it entered Alabama. AWIC also pointed out that Weiss Dam was under construction and that water quality criteria may be upgraded to support anticipated recreational uses of that lake. In 1961, citizen complaints about water pollution and fish kills that had occurred on both the Coosa and Chattooga Rivers inspired another letter (November 1961) to the Georgia Department of Public Health requesting "that your department take such action as may be necessary to control pollution of Chattooga and Coosa Rivers to the point that the water of these rivers as they enter Alabama are of a quality compatible with water uses in Alabama" (AWIC 1963). In a 1961 special session of the Alabama Legislature both the Senate and House passed joint resolutions deploring pollution of Weiss Lake and requesting remedial action be taken (AWIC 1963).

Between 1957 and 1962, Rome Kraft Company (Inland-Rome) installed waste treatment facilities for their liquid waste and subsequently doubled production of the mill. The increased effluent load exceeded the previous untreated load (Stein *et al.* 1963). Weiss Lake reached full pool in 1962 reducing flow and natural reaeration of the Coosa River as it flowed into Alabama. In 1962, Alabama initiated a fifth study of the Coosa River and included the Chattooga River as well. Results indicated the presence of gross pollution from sources within Georgia affecting both rivers (AWIC 1963). Water quality in the Coosa River had deteriorated, as minimum D.O. concentrations were depressed increasing distances into Alabama. On the Chattooga River at Gaylesville, about 8.5 miles downstream from the Alabama-

Georgia state line, over 60 percent of the samples collected contained less than 4.0 mg/l D.O. (AWIC 1963).

Apparently, as a result of the impasse reached by the states of Alabama and Georgia in regards to this interstate conflict over water quality of the Coosa and Chattooga Rivers, the U.S. Public Health Service (Robert A. Taft Sanitary Engineering Center) got involved. In conjunction with both states, they coordinated studies on the Coosa, Chattooga, Etowah and Oostanaula Rivers in Georgia and Alabama (West 1963). Results of 5-day biochemical oxygen demand (B.O.D.) and D.O. analyses led them to conclude that the Chattooga River was grossly polluted by municipal sewage and industrial wastes with the most severe effects near Summerville, Georgia. Conditions remained critical as the river flowed into Alabama. High coliform bacteria densities made water contact recreation unadvisable. In addition, textile mill wastes (dye) degraded the appearance of the river in many areas.

In the Coosa River, the oxygen demand of the Rome Kraft (Inland-Rome) treated waste and the residual organic loading from Rome, Georgia exceeded available oxygen supply. This resulted in depressed D.O. concentrations well into Alabama waters. Densities of coliform bacteria from Rome, Georgia to a point 5 miles downstream of the Alabama-Georgia state line exceeded levels considered acceptable for water contact recreation. Raw sewage from Rome, Georgia was the source of contamination (West 1963). Silt and clay from mineral washing waste discharges increased turbidity and sediment loads to levels that adversely affected benthic communities. West (1963) concluded that "wastes entering the Chattooga River from Trion, the Riegel Textile Corporation of Trion, and Summerville and associated industries and wastes entering the Coosa River and tributaries from the New Riverside Ochre Company of Cartersville, the Pepperell Manufacturing Company of Lindale, Rome and associated industries, and Rome Kraft Company in Georgia endangers the health and welfare of persons in Alabama."

In August 1963, a conference was held in Rome, Georgia to consider the problem of interstate water pollution of the Coosa River and its tributaries (Stein *et al.* 1963). The meeting was attended by representatives of the U.S. Public Health Service, Department of Health, Education and Welfare, Division of Water Supply and Pollution Control, the Georgia Department of Public Health and the AWIC.

Judging from results of studies conducted by the Georgia Water Quality Control Board (GWQCB) in 1969, conditions in the Coosa and Chattooga Rivers had not improved at that time. Using water quality analyses and macroinvertebrate bioassessment techniques, studies were conducted throughout the Coosa River and its tributaries within Georgia (GWQCB 1970). The Coosa River downstream from Rome, Georgia was assessed as seriously polluted and conditions deteriorated downstream from the Georgia Kraft (Inland-Rome) paper mill and the Georgia Power Company steam electric generating plant. Water quality of the Coosa River between Rome and the Alabama-Georgia state line was not supporting the designated use classification (fishing) for that portion of the stream (GWQCB 1970). The Chattooga River was severely polluted from headwaters to the Alabama-Georgia state line. Considering the size of the stream, the Chattooga was the most heavily polluted major stream in the Coosa Basin (GWQCB 1970).

In 1973 Weiss Lake was one of eleven Alabama lakes included as part of the National Eutrophication Survey (EPA 1976). Weiss Lake was classified as eutrophic and was the most enriched of the eleven lakes studied. The high phosphorus loading of the lake via the Coosa River resulted in nitrogen limitation of algal production in the upstream lake areas and colmitation (N and P) downstream. About 22% of the phosphorus load was from known point sources and 78% from nonpoint sources. The Coosa River accounted for 73% of this nonpoint load, an unusually high background level.

In 1976, the Georgia Department of Natural Resources (DNR) collected fish from the Coosa River and analyzed tissue samples for toxic substances. Some of the fish sampled had concentrations of polychlorinated biphenyls (PCB's), that exceeded the limit (5 mg/kg) established by the U.S. Food and Drug Administration (FDA) for human consumption (DNR 1976). A fish consumption advisory was issued for the lower Coosa River from Rome, Georgia downstream to the Alabama-Georgia state line. The advisory included all species of fish. A commercial fishing ban was imposed soon after (EPD 1991). The source of the contamination was identified as a General Electric Company plant at Rome, Georgia (DNR 1976 and DNR 1991). The plant manufactured electrical transformers that contained PCB's. When the company became aware of the environmental problems associated with this persistent industrial chemical in the early 1970's, they took action to minimize losses of spills of PCB's (DNR 1976). General Electric was later placed under a consent order to reduce PCB contaminated runoff from their plant site (DNR 1991).

DNR notified Alabama officials of the PCB problem in 1976 (DNR 1976). From 1976 until 1988, the Alabama Department of Environmental Management (ADEM) sampled fish in Weiss Lake and found that the PCB concentrations had declined below FDA action levels. However, in 1988 the Alabama Department of Agriculture and Industries tested filets of catfish allegedly caught in the Coosa River and found that almost one-half of the filets had PCB concentrations above the FDA tolerance level (revised to 2 mg/kg in 1979). As a result in May, 1989, the State Health Officer issued a health advisory recommending that women who were or may become pregnant; women who were breastfeeding or may breastfeed; and children under the age of 15 avoid eating large (>1.0 lb) catfish taken from the affected waters (ADPH 1989). The advisory covered a 160 mile stretch of the Coosa River from the Alabama-Georgia state line downstream to Logan Martin Dam and included lakes Weiss, Neely Henry and Logan Martin (ADEM 1992).

Nutrient enrichment has continued to cause problems for Weiss Lake. Based on water quality studies conducted in 1985 (Raschke 1985), 1989 (Bayne *et al.* 1989) and 1990 (ADEM 1992), Weiss Lake was consistently ranked eutrophic using the Carlson Trophic State Index (Carlson 1977). Dissolved oxygen problems related to excessive organic enrichment have been cited as major concerns in this lake (ADEM 1992). Bayne and Maceina (1992) reported mean total phosphorus concentrations in Weiss Lake of 102 μg/l and mean chlorophyll a (uncorrected for phaeopigments) concentrations of 34.2 μg/l during the growing seasons of 1989 and 1990. These values would indicate that Weiss Lake was bordering on hypereutrophic conditions.

10.2. Current Limnological Condition

From November 1990 through October 1992, as part of a Phase I, Clean Lakes, Diagnostic/Feasibility Study, Weiss Lake was sampled and monitored to assess current limnological condition. The study was conducted by Auburn University (AU) under contract with the Alabama Department of Environmental Management (ADEM). Others providing data used in this lake assessment included the U.S. Environmental Protection Agency (EPA), the Georgia Department of Natural Resources, Environmental Protection Division (EPD), ADEM, the U.S. Geological Survey (USGS) and the Alabama Public Health Department (ADPH).

10.2.1 Lake Water Quality

Weiss Lake water quality was measured in January 1991 and monthly from March 1991 through October 1992 (Table 10-1). Thirteen sampling stations were established within the lake (Table 10-2 and Figure 10-1). At each sampling station in situ measurements of temperature, pH, dissolved oxygen (D.O.) and specific conductance were made throughout the water column with a Hydrolab® Surveyor II (Table 10-3). Sampling was usually conducted between 0700 and 1300 hours. Secchi disk visibility was measured and the 1% incident light depth was determined with a submarine photometer.

A composite water sample was collected from the photic zone of the water column at each sampling station (Figure 10-1) for additional water quality analyses. The photic zone depth was defined as four times the Secchi disk visibility (Taylor 1971). This depth usually exceeded the 1% incident light depth. A submersible electric pump and hose apparatus was raised and lowered throughout the photic zone and the water was collected in a plastic container onboard boat. Aliquots from this composite sample were poured into Nalgene® containers and stored, on ice, prior to transport to laboratory facilities. Samples to be held for later analysis (total phosphorus and Kjeldahl nitrogen) were preserved in the field (APHA *et al.* 1989). All analyses were conducted within the recommended holding times (APHA *et al.* 1989). Monthly samples were collected during the study period (Table 10-1). Water quality variables analyzed and methods used appear in Table 10-3.

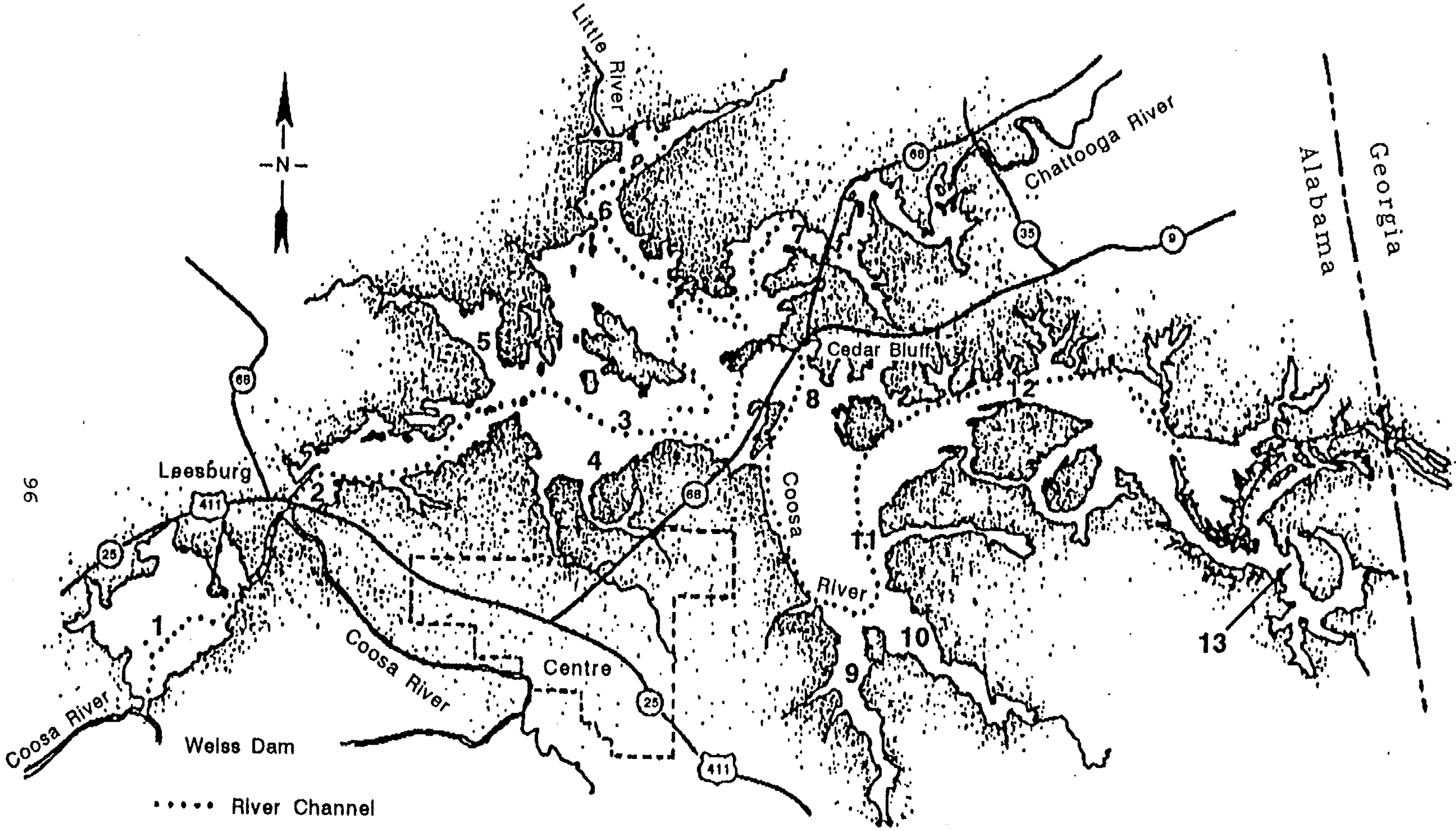
Table 10-1. Schedule of activities for the diagnostic study of Weiss Lake, November 1990 through October 1992.

	Year																							
	1990		1991												1992									
Variable	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O
Water Quality			X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Phytoplankton			X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Chlorophyll *a*			X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Algal Growth Potential							X	X	X	X	X							X	X	X	X	X		
Primary Productivity								X		X		X			X					X		X		X
Fecal Coliform								X	X	X	X													
Sediment Oxygen Demand						X																		
Tributary Sampling	X	XX	XX	XXX	XXX	XX	XX	X	X	X	X	X	X	XX	XX	XXX	XX	XX	X	X	X	X	X	X
Land Use/Cover				----	----	----	----	----	----	----	----	----	----	----	----	----	----	----						
Toxics																							X	

Table 10-2. Locations and designations of sampling stations for the diagnostic study of Weiss Lake, November 1990 - October 1992.

Sampling Stations	Description
Lake Stations	
1	Weiss Lake in the powerhouse embayment
2	Weiss Lake in the dam forebay WLM 0.5
3	Weiss Lake mid-channel approx. midway between stations 2 and 8
4	Weiss Lake shallow overbank approx. midway between stations 2 and 8
5	Yellow Creek embayment YCM 5.5
6	Little River embayment LRM 12.5
7	Chattooga River embayment CRM 12.5
8	Weiss Lake upstream Hwy 68 bridge at Cedar Bluff WLM 11.5
9	Cowan Creek embayment downstream Cherokee Co. Hwy 16 bridge
10	Spring Creek embayment downstream Cherokee Co. Hwy 31 bridge
11	Weiss Lake upstream of Three Mile Creek
12	Weiss Lake at overhead powerline, WLM 20.5
13	Mud Creek embayment downstream Cherokee Co. Hwy 31 bridge
Tributary Stations	
14	Little River at USGS gauging station in Blue Pond, AL
15	Chattooga River USGS gauging station at Gaylesville, AL
16	Spring Creek

WLM = Weiss Lake mile measured from Weiss dam.
YCM = Yellow Creek mile measured from Weiss dam.
LRM = Little River mile measured from Weiss dam.
CRM = Chattooga River mile measured from Weiss dam.



WEISS LAKE

Figure 10-1. Map showing the locations of mainstem and embayment sampling stations (1-13) on Weiss Lake during the diagnostic study, November 1990 through October 1992.

Table 10-3. Analytical methods used in measuring quality of Weiss Lake during the diagnostic study, November 1990 through October 1992.

Variable	Method	Reference
In Situ		
Temperature	thermistor	APHA 1989
Dissolved Oxygen	membrane electrode	APHA 1989
pH	glass electrode	APHA 1989
Specific conductance	conductivity cell	APHA 1989
Visibility	Secchi disk	Lind 1985
Euphotic zone determination	submarine photometer	Lind 1985
Laboratory Analyses		
Total suspended solids	vacuum filtration	APHA 1989
Turbidity	HACH turbidimeter	APHA 1989
Alkalinity	potentiometric titration	APHA 1989
Total ammonia (NH_3-N)	phenate method	APHA 1989
Nitrite (NO_2-N)	diazotizing method	APHA 1989
Nitrate (NO_3-N)	cadmium reduction	APHA 1989
Total phosphorus	persulfate digestion,	
ascorbic acid	APHA 1989	
Total organic carbon	persulfate digestion, with Dohrman DC-80	APHA 1989
Organic nitrogen	macro Kjeldahl	APHA 1989
Soluble reactive phosphorus	ascorbic acid	APHA 1989
Hardness	EDTA titrimetric	Boyd 1979

Monthly variations in meteorological conditions and discharge from November 1990 through October 1992 are summarized in Table 10-4 and Figure 10-2. During the 24 month study, the weather was warmer (monthly mean +0.82°C) and wetter (monthly mean +1.8 cm) than normal although monthly and seasonal exceptions to this pattern were common. To minimize water quality variations caused by seasonal changes in meteorological conditions, water quality data were grouped and examined by season. The seasons were defined as follows: summer (June, July and August); fall (September, October and November); winter (December, January and February); and spring (March, April and May). The fall 1992 quarter consisted of only two months since the study ended in October 1992. The winter quarter of 1990-1991 consisted of only one month, January 1991 (Table 10-1).

Weiss Lake is a relatively shallow reservoir (mean depth 3.1 m) with a mean hydraulic retention time of 18 days. The rather high flushing rate, particularly along the mainstem of the lake, weakened thermal stratification (Δ1.0°C/m depth) even in the deeper lacustrine areas (Figures 10-3, 10-4, 10-5 and 10-6). Thermocline temperature gradients in excess of 2°C and water column temperature gradients greater than 5°C were seldom encountered. At mainstem stations, thermal stratification began in May and disappeared before September. Thermal stratification at mainstem stations did not persist throughout the summer months although some tributary embayments stations (e.g. station 7) did remain weakly stratified.

Even though Weiss Lake did not remain thermally stratified during the growing season (May-September), as some warm monomictic lakes do, chemical stratification did occur as is evidenced by the depth-time diagrams of D.O. isopleths (Figures 10-7, 10-8, 10-9 and 10-10). D.O. concentrations declined

Table 10-4. Meteorological conditions and river and lake discharge measured during the diagnostic study of Weiss Lake 1990-1992.

Year	Month	Temp[1] (oC)	DFN[3] (oC)	Rainfall[1] (cm)	DFN[3] (cm)	Mean Daily[2] Solar Radiation (Langleys)	Mayo Lock and Dam Mean Daily Discharge (CFS)	Weiss Lake Mean Daily Discharge (CFS)
1990	Nov	12.9	+2.37	10.4	+0.71	222	3,624	4,611
	Dec	9.9	+3.41	18.2	+4.62	120	8,107	10,983
1991	Jan	6.7	+1.71	13.4	-0.58	118	7,345	9,520
	Feb	9.2	+2.48	17.0	+4.75	195	11,060	12,299
	Mar	13.3	+2.37	25.0	+7.52	267	11,130	14,790
	Apr	17.9	+1.49	28.1	+14.35	289	9,567	13,366
	May	22.1	+1.54	23.3	+12.52	317	12,740	16,163
	June	24.4	+0.06	6.4	-3.00	419	5,418	6,505
	July	27.3	+1.05	7.8	-3.76	505	4,649	5,335
	Aug	26.1	+0.28	14.0	+5.26	450	4,063	4,638
	Sept	23.4	+0.55	11.4	+1.68	411	4,109	5,073
	Oct	18.0	+1.82	0.3	-6.20	346	3,214	3,770
	Nov	9.9	-0.50	12.2	+2.54	203	5,455	6,236
	Dec	9.2	+2.64	11.5	-2.08	314	8,328	10,696
1992	Jan	6.3	+1.27	10.1	-3.81	172	8,746	12,111
	Feb	9.8	+2.97	15.3	+2.59	266	9,530	11,664
	Mar	11.8	+0.88	10.1	-7.32	348	11,800	16,670
	Apr	15.8	-0.55	9.4	-4.37	448	6,142	7,212
	May	19.1	-1.43	8.1	-2.72	474	3,465	3,799
	June	22.9	-1.43	22.0	+12.57	450	4,989	6,643
	July	26.3	+0.11	21.0	+9.47	481	4,037	5,157
	Aug	23.3	-2.53	11.2	+2.49	393	4,752	7,023
	Sept	22.3	-0.55	5.5	-4.27	339	4,685	7,296
	Oct	15.7	-0.44	6.7	+0.15	303	3,643	4,967

[1] Gadsden, Alabama
[2] Calhoun, Georgia
[3] DFN = Deviation from normal

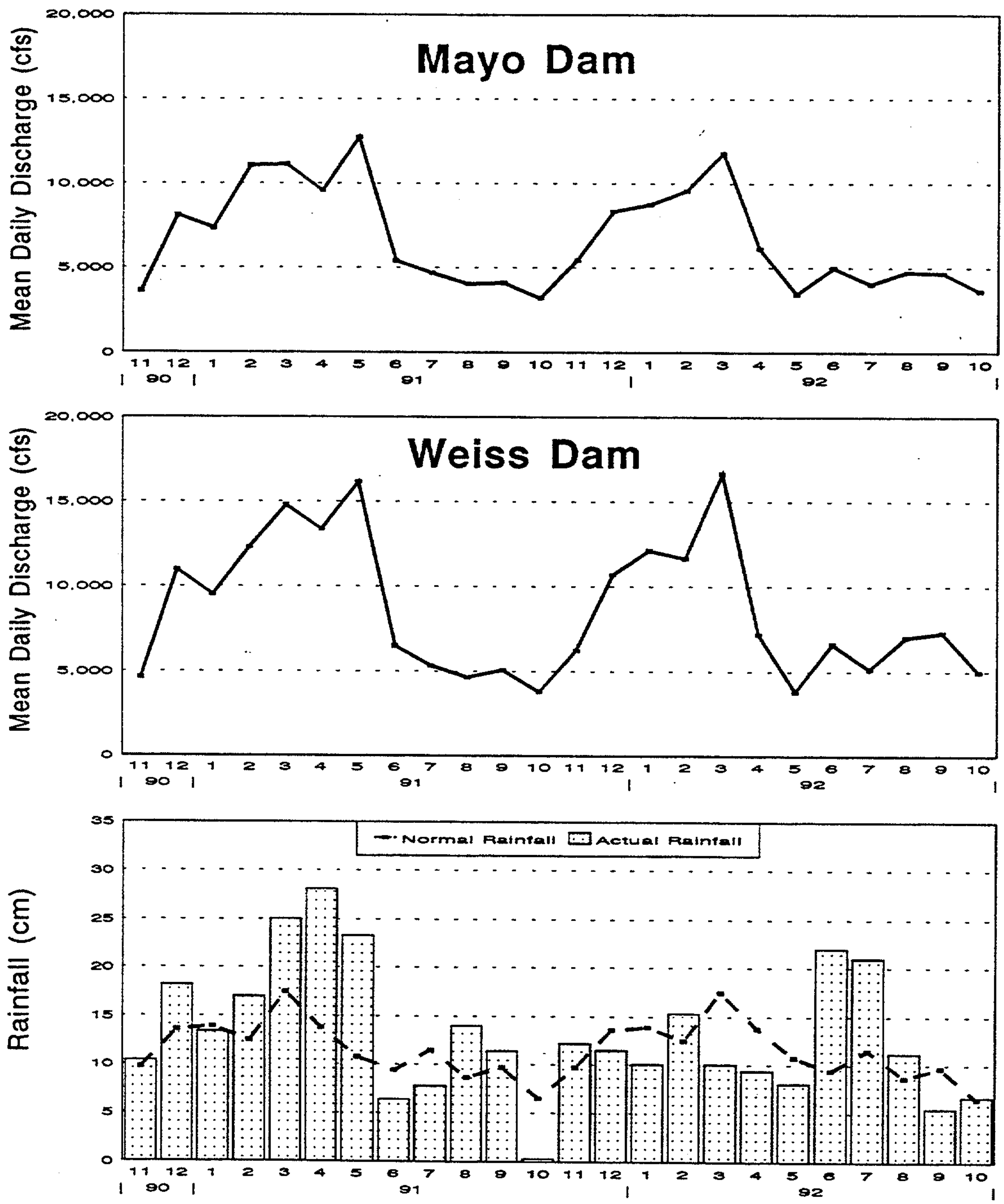


Figure 10-2. Mean daily discharge of the Coosa River at Mayo Dam, Georgia and at Weiss Dam. Mean monthly rainfall at Gadsden, AL during the diagnostic study of Weiss Lake, November 1990 through October 1992.

with depth, and, at times, fell below 1.0 mg/l. At some of the embayment stations D.O. concentrations were < 1.0 mg/l at depths of 3 m but mainstem stations maintained a level > 1.0 mg/l to a depth of at least 6 m (See electronic data set and Figure 10-7, 10-8, 10-9 and 10-10). Specific conductance measured throughout the water column generally did not increase with water depth during the growing season (See electronic data set). This indicated the lack of accumulation of decomposition products in the hypolimnion during this study.

Water temperature measured at 2 m depth varied from a low of 8°C in the winter to a high of 31°C in the summer of 1991 (Tables 10-5, 10-6, 10-7 and 10-8). D.O. concentrations measured at 2 m depth ranged between 3 and 12 mg/l and seasonally varied inversely with water temperature. Highest mean D.O. concentrations occurred during the winter and spring and lowest during the summer and fall.

Specific conductance, a measure of the ionic content of water, ranged from a low of 45 μmhos/cm in the Little River embayment to a high of 407 μmhos/cm in the Chattooga River embayment at a depth of 2 m (Tables 10-5, 10-6, 10-7 and 10-8). At mainstem sampling stations conductivity varied between 80 μmhos/cm and 177 μmhos/cm. Specific conductance is a crude indicator of natural fertility since increases in ionic content are usually accompanied by increases of plant nutrients. Mainstream Alabama reservoirs were found to have specific conductance values ranging from about 23 μmhos/cm to 200 μmhos/cm (Bayne et al. 1989). Weiss Lake ranks in the upper half of the Alabama range indicating that it is one of the more fertile lakes in the state. The high conductivity measured in the Chattooga River embayment resulted from upstream pollution that consistently produced seasonal mean

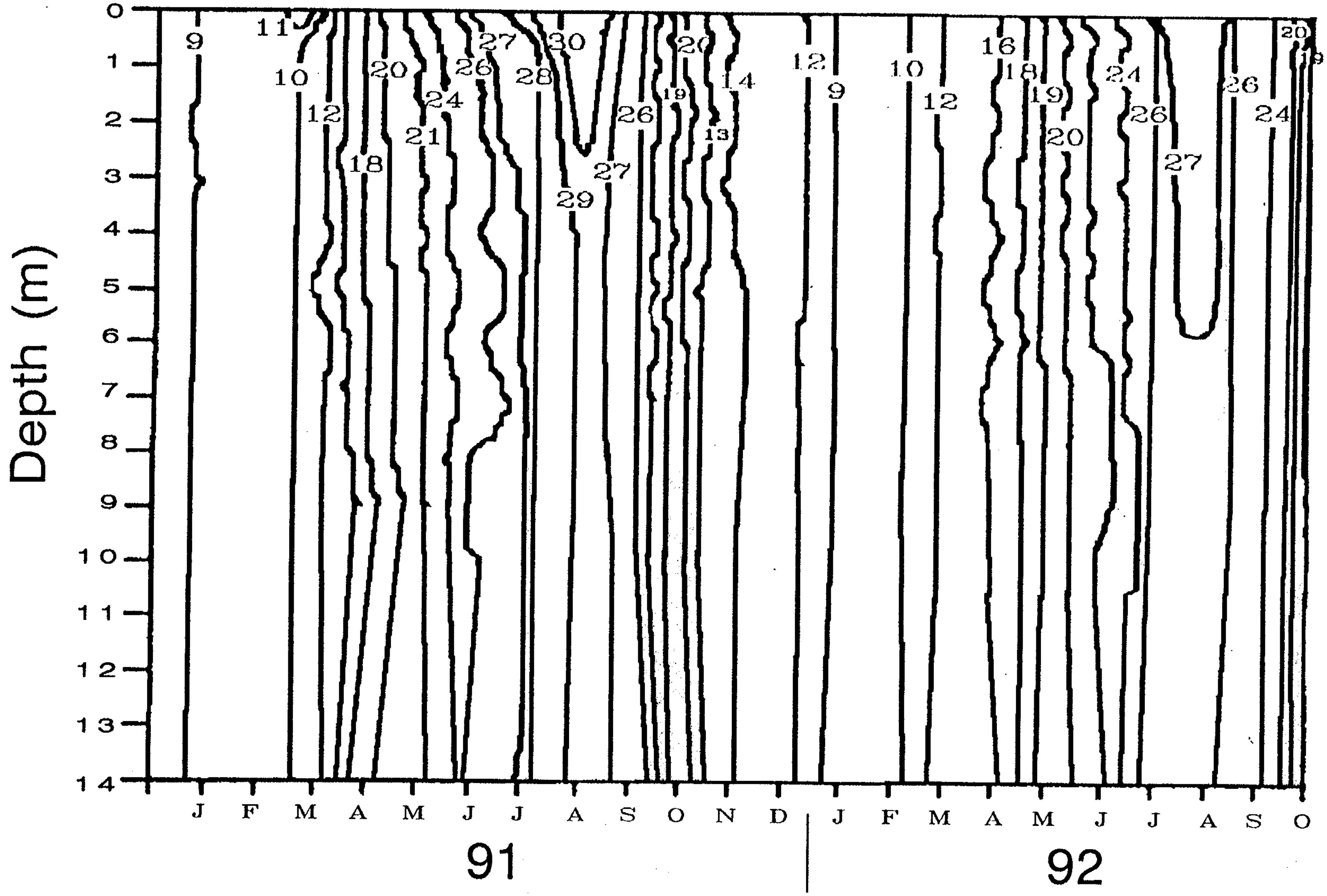


Figure 10-3. Depth-time diagram of isotherms (°C) at station 1 (dam forebay) during the diagnostic study of Weiss Lake, January 1991 through October 1992.

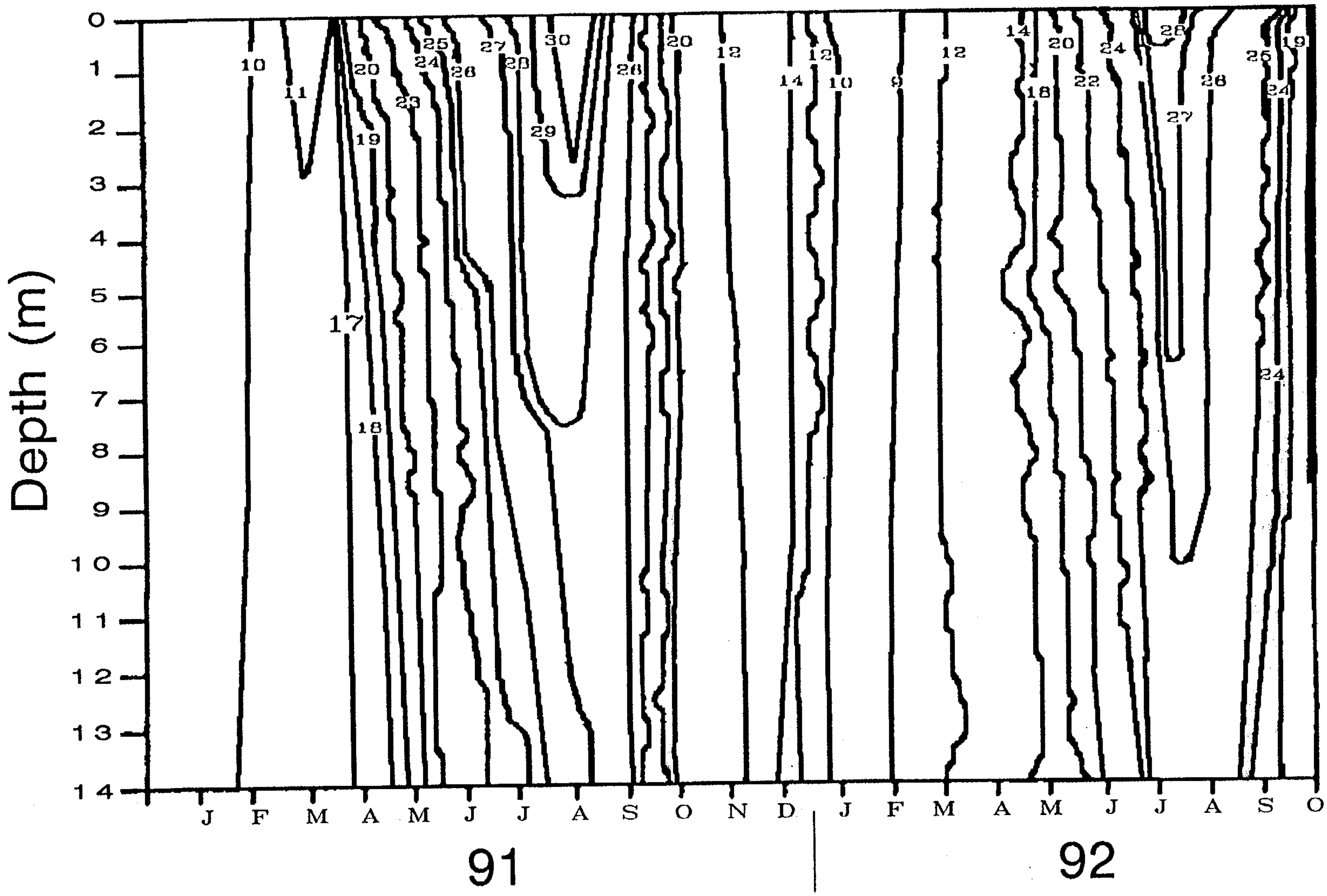


Figure 10-4. Depth-time diagram of isotherms (°C) at station 3 during the diagnostic study of Weiss Lake, January 1991 through October 1992.

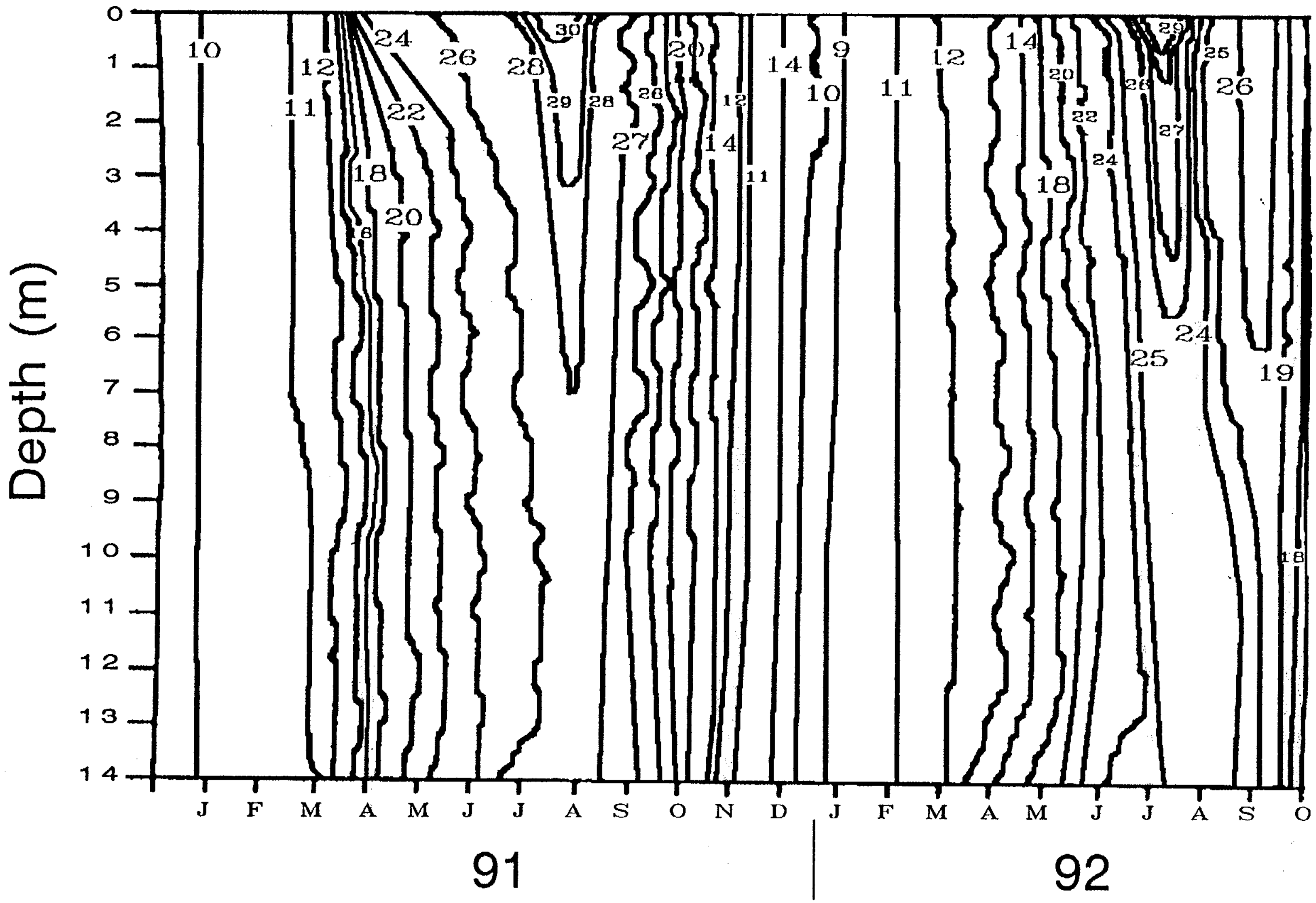


Figure 10-5. Depth-time diagram of isotherms (°C) at station 8 during the diagnostic study of Weiss Lake, January 1991 through October 1992.

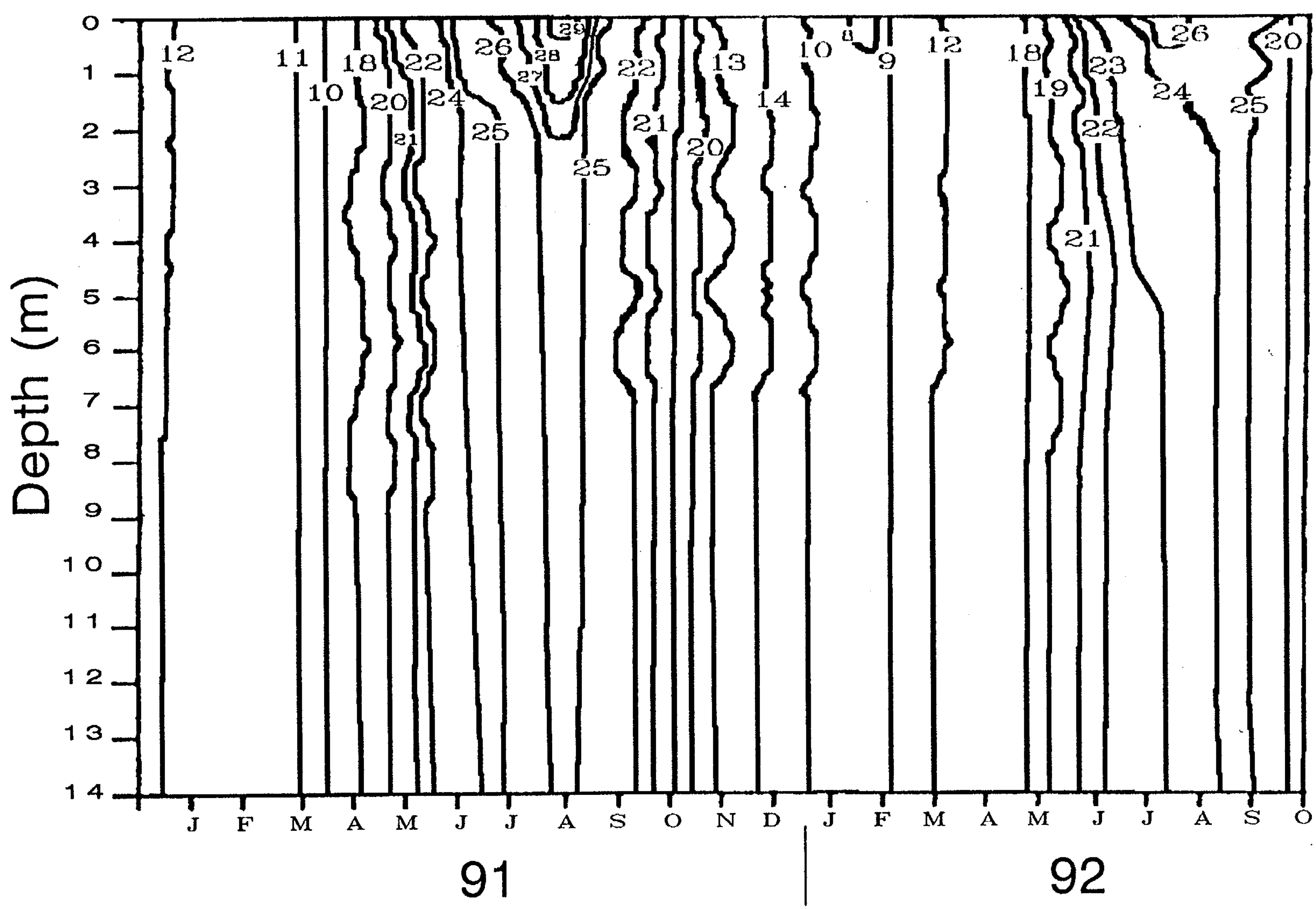


Figure 10-6. Depth-time diagram of isotherms (°C) at station 12 during the diagnostic study of Weis Lake, January 1991 through October 1992.

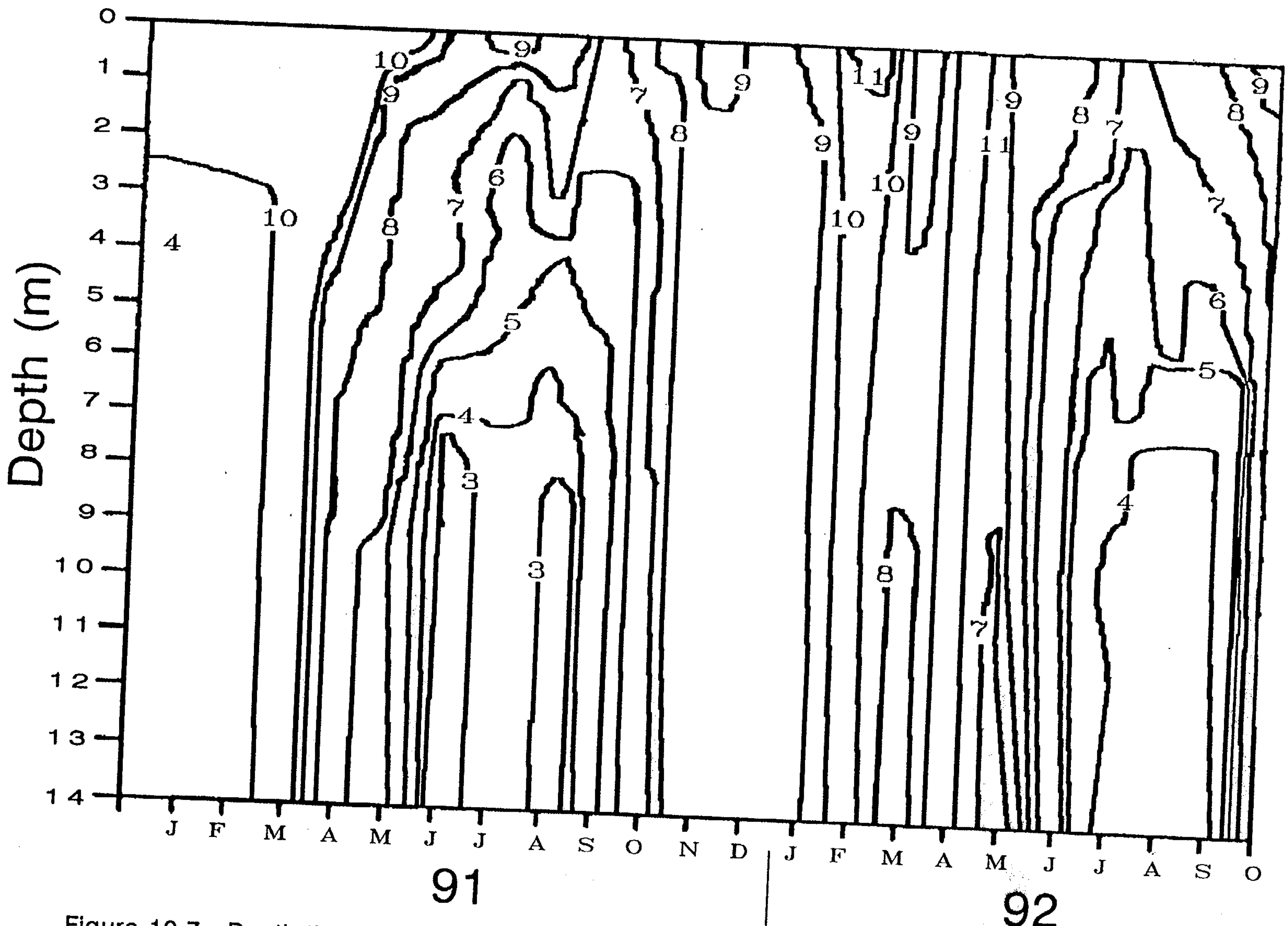


Figure 10-7. Depth-time diagram of dissolved oxygen isopleths (mg/l) at station 1 (dam forebay) during the diagnostic study of Weiss Lake, January 1991 through October 1992.

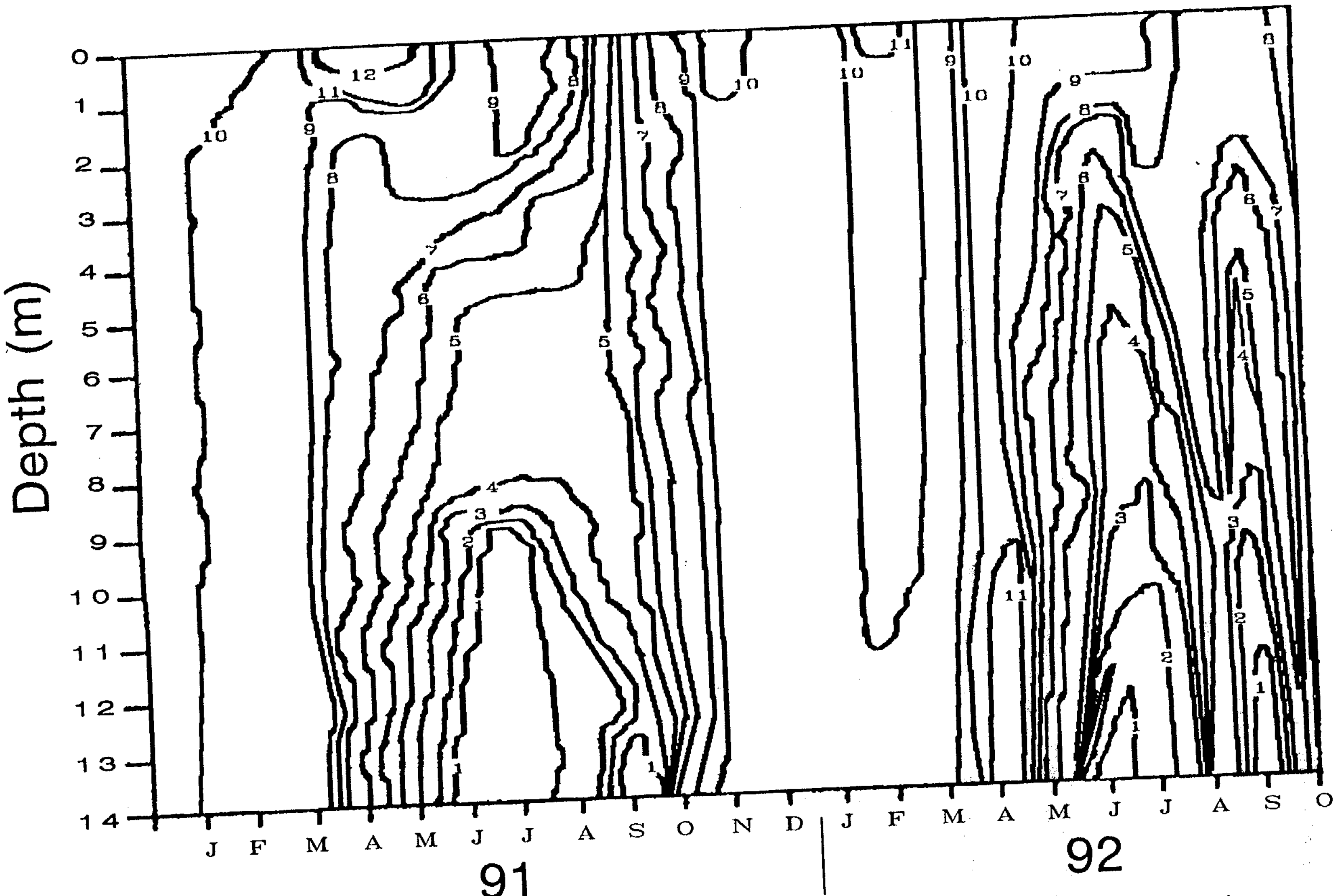


Figure 10-8. Depth-time diagram of dissolved oxygen isopleths (mg/l) at station 3 during the diagnostic study of Weiss Lake, January 1991 through October 1992.

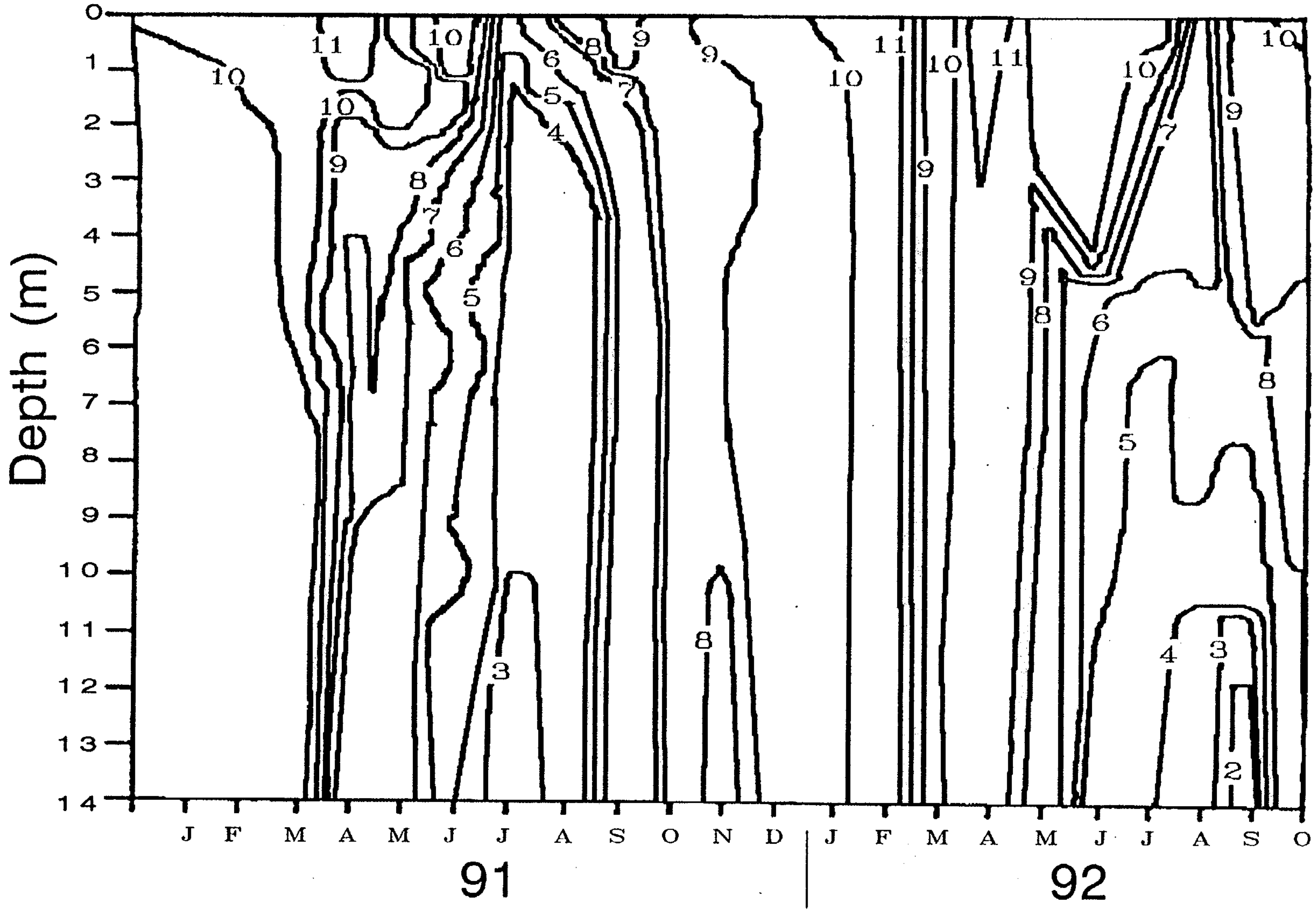


Figure 10-9. Depth-time diagram of dissolved oxygen isopleths (mg/l) at station 8 during the diagnostic study of Weiss Lake, January 1991 through October 1992.

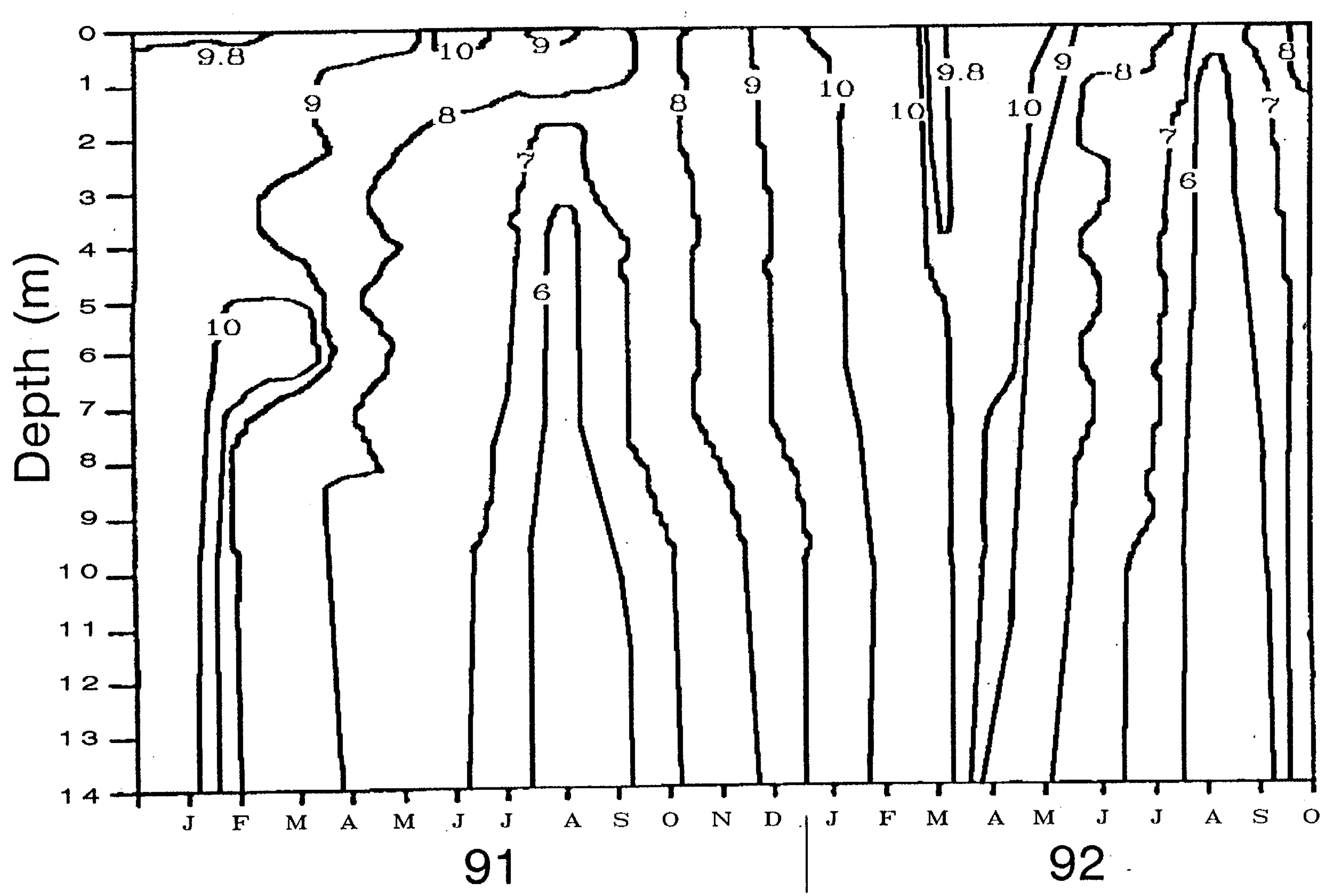


Figure 10-10. Depth-time diagram of dissolved oxygen isopleths (mg/l) at station 12 during the diagnostic study of Weiss Lake, January 1991 through October 1992.

Table 10-5. Mean (range) winter water temperature, dissolved oxygen and specific conductance measured at a depth of 2 m during the Weiss Lake diagnostic study, 1990 - 1992.

Mainstem Stations	Temperature (°C) 1991*	Temperature (°C) 1991-92	Dissolved Oxygen (mg/l) 1991*	Dissolved Oxygen (mg/l) 1991-92	Conductivity (µmhos/cm) 1991*	Conductivity (µmhos/cm) 1991-92
1	9.6	10.5 (9-13)	10.2	9.2 (9-10)	111.2	114.2 (96-136)
2	9.6	10.5 (9-13)	9.9	9.5 (9-10)	111.8	113.7 (96-135)
3	9.7	10.9 (9-14)	10.0	9.8 (9-11)	118.4	111.3 (99-125)
4	9.8	10.9 (9-14)	10.0	9.7 (9-10)	119.0	113.2 (99-130)
8	10.2	11.0 (9-14)	9.6	9.9 (9-10)	122.4	112.1 (105-117)
11	10.6	10.8 (9-14)	9.6	9.9 (9-10)	128.2	123.0 (109-134)
12	11.2	11.0 (9-14)	9.5	9.9 (9-11)	143.6	129.7 (110-151)
Embayment Stations						
5	9.5	10.2 (9-14)	9.6	10.2 (9-11)	70.4	100.0 (77-141)
6	10.6	10.6 (8-15)	9.9	10.2 (9-11)	53.0	64.8 (49-73)
7	11.1	11.7 (9-16)	9.1	9.4 (8-10)	223.4	194.8 (146-255)
9	9.6	10.2 (8-13)	8.3	9.4 (9-10)	109.0	122.5 (111-128)
10	9.6	8.8 (9-9)	10.1	9.7 (10-10)	126.4	123.8 (116-132)
13	---	10.6 (8-14)	---	9.2 (9-10)	---	102.7 (77-143)

* Data from January 1991.

Table 10-6. Mean (range) spring water temperature, dissolved oxygen and specific conductance measured at a depth of 2 m during the Weiss Lake diagnostic study, 1990 - 1992.

Mainstem Stations	Temperature (°C) 1991	Temperature (°C) 1992	Dissolved Oxygen (mg/l) 1991	Dissolved Oxygen (mg/l) 1992	Conductivity (µmhos/cm) 1991	Conductivity (µmhos/cm) 1992
1	17.3 (11-22)	14.9 (12-19)	9.4 (8-10)	9.7 (9-11)	100.5 (94-112)	110.2 (80-144)
2	17.8 (11-23)	14.8 (12-19)	10.3 (10-11)	9.9 (9-11)	102.3 (95-116)	111.3 (81-144)
3	16.7 (11-21)	15.0 (12-20)	8.6 (8-10)	9.9 (9-11)	104.9 (97-120)	112.0 (83-139)
4	17.0 (11-22)	15.1 (12-20)	9.0 (8-10)	9.9 (9-11)	105.0 (96-120)	111.5 (83-138)
8	17.7 (12-23)	14.7 (12-19)	9.7 (8-10)	10.3 (10-11)	107.3 (102-114)	108.3 (83-130)
11	17.0 (11-22)	14.5 (11-19)	8.9 (8-10)	10.2 (10-11)	114.9 (101-129)	109.8 (85-129)
12	16.6 (11-21)	14.2 (12-18)	8.9 (8-10)	9.8 (10-10)	123.5 (105-139)	110.4 (85-124)
Embayment Stations						
5	17.8 (11-22)	15.2 (13-20)	10.8 (11-11)	11.0 (10-12)	83.5 (63-95)	91.7 (62-133)
6	16.6 (11-21)	15.0 (12-20)	9.6 (9-11)	10.4 (9-11)	61.6 (36-90)	81.5 (45-127)
7	17.8 (12-22)	16.2 (13-22)	8.4 (7-10)	9.6 (9-11)	191.4 (178-200)	199.0 (153-223)
9	17.2 (11-22)	15.0 (12-20)	8.7 (8-9)	10.1 (9-11)	105.1 (100-113)	110.1 (92-130)
10	17.4 (11-22)	15.5 (12-21)	9.2 (8-10)	10.0 (9-11)	105.5 (101-110)	109.9 (79-139)
13	20.0 (19-22)	15.3 (13-19)	8.0 (8-8)	9.7 (9-10)	117.5 (96-139)	97.9 (68-124)

Table 10-7. Mean (range) summer water temperature, dissolved oxygen and specific conductance measured at a depth of 2 m during the Weiss Lake diagnostic study, 1990 - 1992.

Mainstem Stations	Temperature (°C) 1991	Temperature (°C) 1992	Dissolved Oxygen (mg/l) 1991	Dissolved Oxygen (mg/l) 1992	Conductivity (µmhos/cm) 1991	Conductivity (µmhos/cm) 1992
1	28.1 (27-30)	25.9 (24-27)	7.0 (6-8)	6.7 (6-8)	133.2 (116-147)	148.5 (142-161)
2	28.5 (27-30)	26.0 (24-27)	8.0 (8-8)	6.6 (6-8)	130.3 (115-147)	149.9 (142-164)
3	28.4 (27-30)	25.8 (23-28)	8.6 (8-9)	7.4 (7-8)	131.2 (122-145)	151.9 (138-177)
4	28.5 (27-31)	25.9 (24-28)	8.5 (8-9)	7.1 (6-8)	132.9 (123-146)	152.0 (141-173)
8	27.9 (27-29)	25.8 (25-28)	6.1 (4-10)	8.1 (6-10)	133.7 (126-138)	146.5 (127-163)
11	27.5 (26-30)	24.8 (23-26)	8.9 (8-10)	7.7 (7-8)	130.3 (125-136)	136.9 (122-149)
12	25.8 (25-27)	23.4 (22-24)	7.1 (6-7)	6.9 (5-8)	138.2 (123-151)	126.8 (120-139)
Embayment Stations						
5	28.4 (27-30)	26.8 (25-28)	6.8 (6-8)	8.5 (8-9)	128.2 (113-146)	144.5 (132-163)
6	28.2 (27-29)	26.6 (26-27)	8.2 (8-9)	8.2 (7-9)	135.6 (116-164)	139.7 (113-166)
7	28.0 (26-30)	26.3 (24-28)	6.8 (5-9)	6.0 (3-9)	213.5 (189-243)	264.1 (232-299)
9	28.5 (27-31)	25.7 (24-27)	8.6 (8-9)	7.0 (5-8)	131.9 (120-140)	149.1 (141-161)
10	28.3 (26-30)	25.8 (23-28)	6.2 (4-9)	4.3 (3-7)	134.3 (119-142)	151.0 (144-163)
13	27.2 (26-29)	26.0 (25-27)	5.1 (3-8)	6.2 (5-7)	130.4 (117-141)	130.9 (120-137)

Table 10-8. Mean (range) fall water temperature, dissolved oxygen, pH and specific conductance measured at a depth of 2 m during the Weiss Lake diagnostic study, 1990 - 1992.

Mainstem Stations	Temperature (°C) 1991	1992*	Dissolved Oxygen (mg/l) 1991	1992*	Conductivity (µmhos/cm) 1991	1992*
1	20.6 (14-28)	22.3 (19-26)	7.7 (6-9)	8.1 (8-9)	151.0 (143-164)	144.5 (120-169)
2	20.5 (14-27)	22.1 (18-26)	7.4 (6-9)	7.5 (7-8)	151.9 (144-166)	145.0 (121-169)
3	19.5 (12-27)	22.1 (18-26)	7.7 (5-10)	7.7 (7-8)	147.0 (143-156)	135.5 (121-150)
4	23.3 (20-27)	22.1 (19-26)	6.7 (6-8)	7.7 (7-8)	141.1 (141-142)	135.1 (122-148)
8	19.3 (12-27)	22.5 (19-26)	8.1 (7-9)	9.5 (9-10)	134.4 (129-145)	134.6 (132-137)
11	19.8 (14-26)	22.2 (19-26)	8.2 (8-9)	7.4 (7-8)	132.0 (117-150)	129.4 (119-140)
12	20.1 (13-26)	22.5 (20-26)	7.8 (7-9)	7.3 (7-8)	133.2 (114-162)	129.6 (117-142)
Embayment Stations						
5	20.6 (14-28)	22.3 (18-26)	7.5 (6-9)	8.4 (8-9)	152.6 (147-163)	128.9 (118-140)
6	19.6 (13-28)	22.0 (18-26)	7.9 (6-10)	8.6 (8-9)	185.2 (173-198)	131.4 (117-145)
7	19.2 (12-27)	22.1 (18-26)	7.3 (5-10)	9.4 (8-11)	346.1 (292-407)	288.6 (231-346)
9	19.6 (13-27)	22.2 (19-26)	8.1 (7-9)	7.9 (8-8)	139.7 (129-151)	139.9 (133-147)
10	19.3 (12-27)	22.4 (19-26)	8.0 (6-9)	8.8 (9-9)	140.9 (131-152)	138.9 (125-152)
13	19.1 (11-27)	21.8 (18-26)	8.0 (7-9)	7.4 (6-8)	124.9 (115-134)	116.9 (115-119)

* Data from September and October 1992.

conductivity values about double those measured at other stations (Tables 10-5, 10-6, 10-7 and 10-8). Discharge of tributaries into the main body of the reservoir apparently influenced specific conductance at mainstem sampling stations but not consistently enough to result in predictable patterns of conductivity for the whole lake (Figure 10-11). During winter and spring seasons with higher discharge rates (Figure 10-2) conductivity was usually highest in the headwaters and declined downstream. However, during summer and fall seasons under lower flow conditions conductivity was usually highest at some point downstream.

Secchi disk visibility and light penetration varied seasonally with lowest transparency and light penetration in winter and highest in summer (Tables 10-9, 10-10, 10-11 and 10-12). Winter turbidity in Weiss Lake was caused primarily by abiogenic particles and in the summer as abiogenic turbidity decreased phytoplankton densities increased. Spring and fall were transitional periods between the two extremes. The typical longitudinal gradient in suspended particles, from high levels in the relatively fast moving reservoir headwaters to the lower levels in lacustrine areas downstream, was rarely observed in Weiss Lake. Such patterns were apparently obscured by the relatively rapid flow of water through the lake keeping particles in suspension and to a lesser extent, tributary influence on the mainstem of the lake. Mud Creek (station 13) and the Chattooga River (station 7) were tributaries with the highest concentrations of suspended solids and these streams frequently had levels of suspended particles higher than nearby mainstem lake stations.

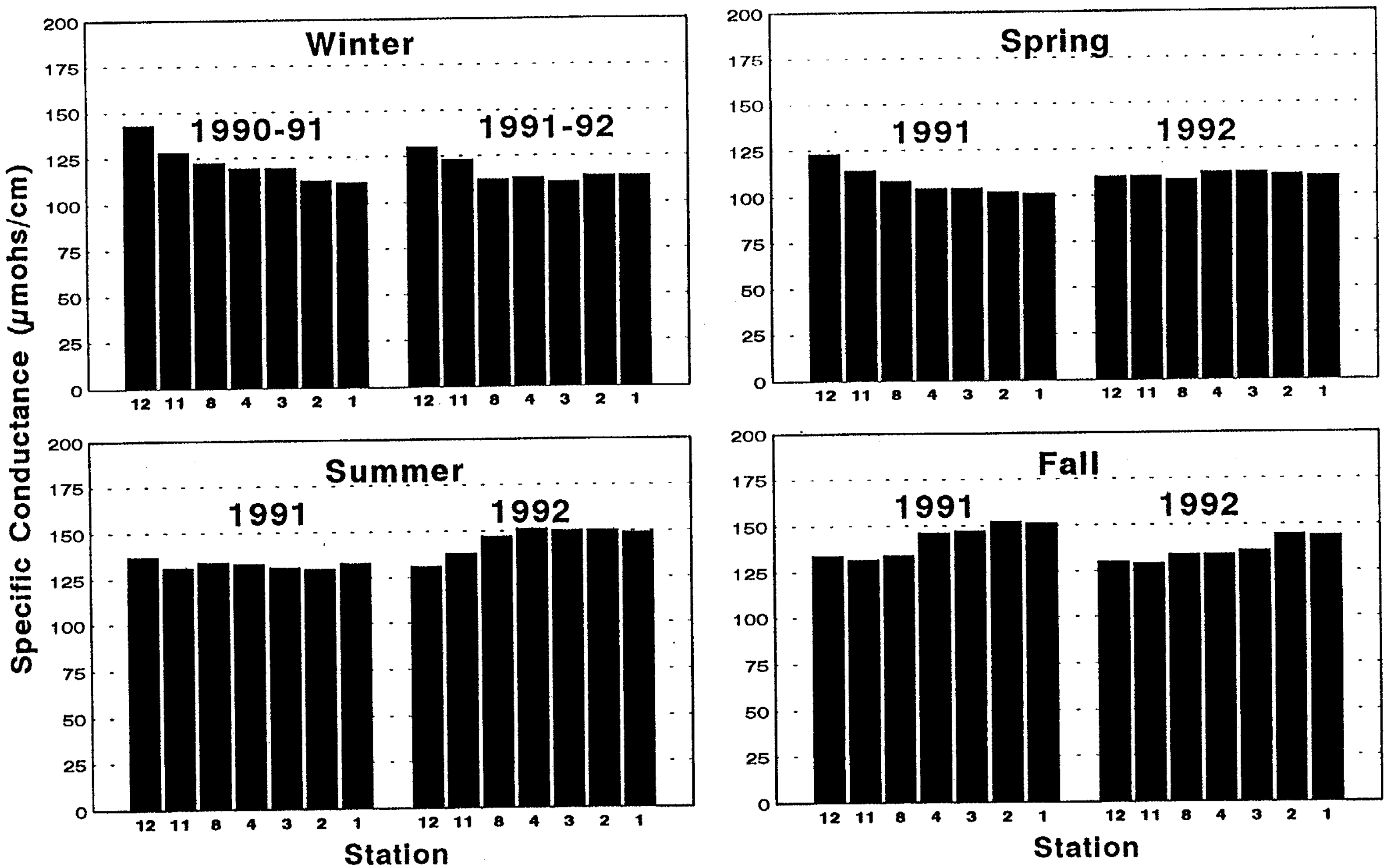


Figure 10-11. Seasonal mean near surface (1-3m) specific conductance measured at all mainstem sampling stations (headwaters at station 12 and dam at station 1) during the diagnostic study of Weiss Lake, November 1990 through October 1992.

Table 10-9. Mean (range) winter Secchi disk visibility, 1% incident light depth, turbidity and total suspended solids measured during the Weiss Lake diagnostic study, 1990 -1992.

Mainstem Stations	Secchi (cm) 1991*	Secchi (cm) 1991-1992	1% Incident Light (cm) 1991*	1% Incident Light (cm) 1991-1992	Turbidity (NTU) 1991*	Turbidity (NTU) 1991-1992	Total Suspended Solids (mg/l) 1991*	Total Suspended Solids (mg/l) 1991-1992
1	47.0	49.0 (40-54)	159.0	130.7 (102-155)	32.0	39.0 (26-60)	12.7	26.9 (17-37)
2	50.0	47.3 (33-57)	136.0	130.7 (100-158)	29.0	35.7 (25-54)	11.7	22.8 (14-33)
3	48.0	48.3 (34-57)	142.0	144.3 (99-180)	26.0	35.0 (23-52)	10.1	23.2 (12-30)
4	52.0	48.0 (36-58)	156.0	143.0 (113-176)	29.0	34.3 (23-48)	11.6	25.0 (13-32)
8	51.0	48.0 (36-64)	171.0	152.3 (123-206)	26.0	35.0 (23-45)	12.2	26.6 (14-34)
11	59.0	60.7 (47-82)	236.0	174.3 (117-250)	19.3	32.3 (16-48)	6.4	30.6 (9-45)
12	71.0	58.3 (43-75)	221.0	183.7 (147-221)	18.9	32.0 (21-42)	7.6	30.6 (9-44)
Embayment Stations								
5	82.0	90.7 (77-100)	252.0	237.7 (200-262)	13.9	14.2 (9-18)	2.6	9.3 (6-12)
6	87.0	92.3 (46-134)	323.0	320.0 (138-491)	10.9	15.7 (8-29)	2.0	13.7 (7-26)
7	---	54.0 (21-71)	---	149.7 (58-197)	20.0	41.3 (14-90)	13.6	33.1 (10-72)
9	39.0	50.3 (40-56)	132.0	156.3 (133-173)	33.0	27.7 (22-34)	4.2	14.0 (9-18)
10	32.0	48.3 (37-63)	100.0	144.3 (130-169)	43.0	33.0 (27-38)	12.4	17.4 (8-27)
13	16.0	27.0 (25-30)	56.0	79.7 (70-95)	92.0	70.7 (58-80)	36.0	37.7 (26-54)

* Data from January 1991 sample.

Table 10-10. Mean (range) spring Secchi disk visibility, 1% incident light depth, turbidity and total suspended solids measured during the Weiss Lake diagnostic study 1990 -1992.

Mainstem Stations	Secchi (cm) 1991	Secchi (cm) 1992	1% Incident Light (cm) 1991	1% Incident Light (cm) 1992	Turbidity (NTU) 1991	Turbidity (NTU) 1992	Total Suspended Solids (mg/l) 1991	Total Suspended Solids (mg/l) 1992
1	76.3 (61-86)	67.3 (53-75)	210.7 (177-231)	182.7 (149-206)	16.5 (12-25)	21.3 (14-33)	12.4 (8-18)	16.0 (14-18)
2	76.3 (63-84)	71.7 (49-97)	202.3 (158-231)	216.0 (131-275)	14.9 (12-21)	19.9 (9-34)	10.9 (8-16)	14.0 (10-17)
3	73.0 (63-82)	65.3 (56-79)	186.0 (152-207)	166.7 (142-183)	19.0 (15-25)	22.7 (13-33)	13.4 (11-18)	16.2 (15-17)
4	71.7 (60-81)	69.7 (53-89)	187.7 (160-213)	195.3 (148-228)	19.5 (15-26)	21.5 (12-31)	13.4 (11-18)	16.1 (12-19)
8	60.7 (54-69)	54.3 (50-61)	186.0 (174-208)	186.0 (187-190)	18.0 (15-24)	22.6 (18-27)	12.6 (11-16)	16.5 (13-19)
11	68.7 (55-76)	58.7 (51-66)	191.3 (171-204)	179.3 (178-180)	19.9 (14-25)	21.8 (16-25)	16.0 (10-23)	17.5 (13-23)
12	70.7 (64-74)	68.7 (57-76)	204.7 (201-209)	202.7 (165-254)	17.4 (14-20)	20.6 (16-28)	13.3 (11-15)	17.6 (14-23)
Embayment Stations								
5	118.7 (114-127)	104.0 (101-106)	307.0 (280-323)	304.3 (284-324)	7.3 (6-8)	7.9 (7-9)	5.4 (4-7)	8.0 (7-10)
6	128.0 (75-189)	115.7 (101-137)	371.3 (280-431)	387.0 (326-473)	9.0 (6-13)	8.2 (7-11)	6.4 (5-7)	6.4 (5-9)
7	80.0 (62-111)	74.0 (71-80)	202.3 (149-263)	207.7 (173-269)	15.7 (10-22)	14.0 (10-17)	14.4 (8-25)	11.7 (10-14)
9	83.3 (52-101)	69.3 (63-76)	203.0 (155-231)	204.0 (162-248)	14.8 (9-24)	15.0 (12-20)	9.1 (6-12)	11.4 (10-15)
10	86.0 (53-136)	69.7 (47-88)	224.7 (173-287)	216.3 (146-272)	13.9 (9-21)	19.7 (11-34)	9.9 (8-14)	13.3 (12-14)
13	61.0 (41-73)	42.0 (35-54)	201.0 (199-203)	127.3 (73-178)	21.0 (16-29)	38.5 (18-58)	15.2 (8-24)	23.0 (18-28)

Table 10-11. Mean (range) summer Secchi disk visibility, 1% incident light depth, turbidity and total suspended solids measured during the Weiss Lake diagnostic study 1990 - 1992.

Mainstem Stations	Secchi (cm) 1991	Secchi (cm) 1992	1% Incident Light (cm) 1991	1% Incident Light (cm) 1992	Turbidity (NTU) 1991	Turbidity (NTU) 1992	Total Suspended Solids (mg/l) 1991	Total Suspended Solids (mg/l) 1992
1	96.0 (76-107)	105.0 (84-138)	234.7 (199-267)	268.7 (216-360)	7.7 (6-9)	9.0 (8-10)	8.4 (7-10)	9.3 (7-11)
2	102.3 (76-124)	98.7 (84-116)	290.7 (249-344)	237.3 (191-292)	6.6 (5-7)	10.4 (9-12)	6.6 (5-8)	10.0 (9-12)
3	95.7 (74-116)	101.7 (76-124)	258.3 (195-301)	246.0 (186-291)	10.0 (8-13)	10.7 (9-13)	9.8 (8-14)	11.1 (9-13)
4	99.0 (78-118)	94.0 (69-124)	247.7 (159-317)	216.7 (163-278)	10.9 (8-14)	12.1 (9-16)	10.9 (9-12)	11.8 (9-16)
8	83.7 (68-101)	76.7 (51-91)	213.7 (172-266)	184.0 (152-216)	12.2 (10-15)	15.5 (10-21)	9.6 (7-12)	13.6 (7-17)
11	84.3 (62-96)	70.7 (51-97)	228.3 (222-239)	172.0 (143-190)	13.0 (11-15)	19.2 (18-20)	11.5 (11-13)	15.2 (12-17)
12	72.3 (69-78)	74.7 (53-101)	192.7 (177-213)	184.0 (137-211)	13.7 (10-16)	20.3 (16-24)	11.8 (8-16)	14.7 (13-17)
Embayment Stations								
5	118.7 (94-143)	124.3 (101-149)	300.3 (236-372)	330.0 (258-396)	6.0 (5-8)	5.5 (5-6)	6.4 (6-8)	6.4 (5-8)
6	120.0 (97-140)	135.3 (90-187)	318.0 (284-346)	354.0 (230-452)	8.4 (8-9)	7.4 (7-9)	7.6 (6-9)	7.9 (6-11)
7	96.0 (86-111)	92.7 (69-126)	237.0 (208-263)	217.3 (178-253)	12.0 (10-15)	11.0 (9-13)	11.9 (10-15)	11.5 (9-15)
9	102.7 (80-122)	111.0 (84-128)	296.7 (252-338)	275.0 (234-325)	6.7 (5-8)	8.0 (7-9)	7.0 (7-8)	7.4 (6-9)
10	103.0 (83-120)	98.0 (61-117)	290.0 (236-325)	232.0 (167-294)	9.4 (7-12)	12.2 (10-16)	10.2 (9-12)	10.9 (7-15)
13	49.0 (40-55)	63.3 (41-86)	127.0 (104-145)	142.0 (107-165)	23.0 (21-26)	27.3 (23-36)	21.7 (20-24)	28.7 (18-38)

Table 10-12. Mean (range) fall Secchi disk visibility, 1% incident light depth, turbidity and total suspended solids measured during the Weiss Lake diagnostic study 1990 - 1992.

Mainstem Stations	Secchi (cm) 1991	Secchi (cm) 1992*	1% Incident Light (cm) 1991	1% Incident Light (cm) 1992*	Turbidity (NTU) 1991	Turbidity (NTU) 1992*	Total Suspended Solids (mg/l) 1991	Total Suspended Solids (mg/l) 1992*
1	86.7 (70-118)	81.0 (71-91)	213.3 (185-261)	217.0 (164-270)	12.5 (8-15)	12.7 (8-18)	11.6 (8-14)	13.3 (9-17)
2	83.7 (63-110)	86.0 (72-100)	215.3 (200-243)	226.5 (174-279)	12.9 (8-16)	11.4 (8-15)	11.3 (8-14)	11.3 (8-15)
3	76.7 (66-94)	74.0 (58-90)	187.0 (165-217)	189.0 (152-226)	16.1 (12-19)	14.2 (11-18)	11.9 (7-15)	13.3 (11-16)
4	71.0 (62-87)	75.0 (62-88)	176.0 (152-200)	195.5 (171-220)	19.1 (13-23)	15.3 (11-20)	15.4 (11-19)	13.9 (11-17)
8	65.0 (55-72)	69.0 (69-69)	191.7 (159-218)	173.0 (170-176)	17.9 (13-24)	16.6 (14-19)	17.2 (11-29)	14.8 (14-16)
11	71.7 (61-91)	75.0 (71-79)	193.3 (164-242)	199.0 (198-200)	15.4 (12-18)	16.9 (16-18)	13.5 (10-16)	13.8 (13-15)
12	89.7 (73-113)	88.0 (83-93)	190.7 (86-270)	234.5 (229-240)	12.7 (12-14)	14.9 (12-18)	9.8 (8-11)	12.5 (9-16)
Embayment Stations								
5	94.7 (75-125)	91.0 (81-101)	218.7 (112-348)	255.0 (218-292)	9.7 (5-14)	7.9 (6-10)	8.6 (3-13)	9.0 (7-11)
6	85.7 (74-94)	94.0 (83-105)	220.3 (205-229)	284.5 (237-332)	12.0 (9-14)	8.4 (7-10)	11.6 (8-15)	8.9 (7-11)
7	73.3 (59-88)	89.5 (78-101)	169.7 (141-192)	243.5 (208-279)	14.7 (10-21)	9.9 (9-11)	13.1 (9-20)	11.3 (10-12)
9	77.3 (63-99)	80.0 (76-84)	226.3 (184-282)	207.5 (202-213)	13.1 (7-17)	11.9 (10-14)	10.2 (7-15)	12.0 (10-14)
10	67.7 (48-81)	86.5 (80-93)	178.3 (129-212)	205.0 (167-243)	20.4 (13-29)	12.3 (9-16)	18.7 (13-27)	12.1 (9-15)
13	46.0 (40-55)	45.0 (43-47)	135.3 (116-148)	113.0 (92-134)	27.7 (20-34)	35.0 (34-36)	20.6 (19-22)	26.6 (20-33)

* Data from September and October 1992 samples.

Total alkalinity, the concentration of bases in water (expressed as mg/l $CaCO_3$), primarily composed of bicarbonate (HCO_3^-) and carbonate ($CO_3^=$) ions, usually increases as basin soil fertility increases. In a recent study, total alkalinity of large mainstream impoundments of Alabama varied from a low of 7 mg/l to a high of 67 mg/l (Bayne *et al.* 1989). At the mainstem sampling stations in Weiss Lake, total alkalinity ranged from 27 mg/l (as $CaCO_3$) during the spring of 1992 (Table 10-14) to 67 mg/l in the summer 1992 (Table 10-15). In the summer of 1948, prior to impoundment of Weiss Lake, total alkalinity of the Coosa River near Cedar Bluff, Alabama varied from 52 mg/l to 61 mg/l (Alabama Water Improvement Advisory Commission 1949). The Coosa River is one of the more alkaline and naturally fertile rivers in Alabama. Some of the soils in the basin are rich in limestone yielding abundant $CO_3^=$ and HCO_3^- to surface water (Lineback 1973).

Total alkalinity of tributary embayments varied greatly with highest values occurring in the Chattooga River (166 mg/l) and lowest in Little River (10 mg/l). As was the case with specific conductance, total alkalinity in the Chattooga River embayment was about twice the concentration measured at most other sampling stations. Water pollution of the Chattooga River upstream of Weiss Lake contributed to this high alkalinity. High surface runoff during the rainy winter and spring periods (Table 10-13 and 10-14) resulted in the lowest seasonal mean total alkalinity concentrations apparently because of greater dilution at that time.

Carbonate minerals function as natural chemical buffers that prevent wide fluctuation in pH of lake water. The pH of Weiss Lake waters was relatively stable ranging between 7 and 9 with mean pH values only slightly higher during the summer (Table 10-15) than during the winter (Table 10-13).

Table 10-13. Mean (range) winter total alkalinity and pH measured during the Weiss Lake diagnostic study, 1990 - 1992.

Mainstem Stations	Total Alkalinity (mg/l as $CaCO_3$) 1991*	Total Alkalinity (mg/l as $CaCO_3$) 1991-1992	pH 1991*	pH 1991-1992
1	37.3	44.4 (40-48)	7.3	7.3 (7-7)
2	37.8	43.3 (38-48)	7.4	7.3 (7-7)
3	40.3	43.0 (38-47)	7.4	7.3 (7-7)
4	41.3	43.3 (37-47)	7.4	7.3 (7-7)
8	43.3	39.4 (39-40)	7.5	7.4 (7-8)
11	47.3	44.3 (43-46)	7.5	7.2 (7-7)
12	54.0	47.5 (43-51)	7.5	7.2 (7-7)
Embayment Stations				
5	13.5	34.7 (24-52)	7.0	7.4 (7-8)
6	14.0	21.5 (15-30)	7.1	7.4 (7-8)
7	91.3	83.7 (55-118)	7.6	7.6 (7-8)
9	35.3	42.0 (39-44)	7.4	7.4 (7-7)
10	41.8	42.3 (41-45)	7.4	7.4 (7-7)
13	17.3	30.8 (20-46)	--	6.9 (7-7)

* Data for January 1991 sample.

Table 10-14. Mean (range) spring total alkalinity and pH measured during the Weiss Lake diagnostic study, 1990 - 1992.

Mainstem Stations	Total Alkalinity (mg/l as $CaCO_3$) 1991	1992	pH 1991	1992
1	35.2 (33-38)	42.6 (28-54)	7.5 (7-8)	7.5 (7-8)
2	39.2 (36-43)	41.8 (28-55)	7.8 (8-8)	7.5 (7-9)
3	40.4 (38-44)	43.1 (27-51)	7.4 (7-8)	7.5 (7-9)
4	39.8 (36-44)	43.5 (31-52)	7.6 (7-8)	7.5 (7-9)
8	43.0 (39-46)	40.4 (30-48)	7.7 (7-8)	7.5 (7-9)
11	43.3 (38-47)	41.3 (31-48)	7.4 (7-8)	7.5 (7-9)
12	48.8 (45-53)	40.9 (30-50)	7.2 (7-7)	7.3 (7-8)
Embayment Stations				
5	27.7 (20-37)	33.0 (18-49)	8.0 (8-9)	8.2 (8-9)
6	18.7 (10-28)	29.1 (11-48)	7.2 (7-8)	7.5 (7-9)
7	81.9 (80-84)	84.8 (62-98)	7.7 (8-8)	7.8 (7-9)
9	40.3 (40-41)	42.5 (35-48)	7.6 (7-8)	7.7 (7-9)
10	41.8 (40-43)	42.5 (30-53)	7.7 (8-8)	7.7 (7-9)
13	45.4 (40-51)	33.8 (18-45)	7.0 (7-8)	7.3 (7-8)

Table 10-15. Mean (range) summer total alkalinity and pH measured during the Weiss Lake diagnostic study, 1990 - 1992.

Mainstem Stations	Total Alkalinity (mg/l as $CaCO_3$) 1991	1992	pH 1991	1992
1	55.8 (45-63)	56.6 (54-60)	8.0 (8-8)	7.8 (8-8)
2	54.2 (44-62)	58.8 (55-64)	8.5 (8-9)	7.9 (8-8)
3	53.3 (46-60)	58.4 (54-65)	8.3 (8-9)	8.2 (8-9)
4	52.9 (45-59)	60.2 (54-67)	8.6 (9-9)	8.0 (8-8)
8	53.1 (46-59)	55.9 (47-66)	7.9 (8-9)	7.8 (7-9)
11	50.8 (48-54)	51.3 (44-59)	7.9 (8-9)	7.8 (8-8)
12	51.8 (51-53)	48.8 (45-56)	7.2 (7-8)	7.3 (7-8)
Embayment Stations				
5	52.3 (44-57)	59.7 (56-63)	8.3 (8-9)	8.7 (9-9)
6	58.0 (45-70)	58.3 (39-74)	8.4 (8-9)	8.5 (8-9)
7	98.4 (89-109)	113.2 (97-127)	8.2 (8-9)	8.1 (8-9)
9	51.3 (44-59)	56.8 (52-65)	8.3 (8-9)	7.8 (8-8)
10	52.5 (46-58)	58.3 (54-65)	7.9 (8-8)	7.4 (7-8)
13	49.1 (48-51)	46.9 (39-54)	7.1 (7-7)	7.2 (7-8)

Table 10-16. Mean (range) fall total alkalinity and pH measured during the Weiss Lake diagnostic study, 1990 - 1992.

Mainstem Stations	Total Alkalinity (mg/l as $CaCO_3$) 1991	1992*	pH 1991	1992*
1	62.3 (60-64)	55.4 (50-61)	8.0 (8-8)	8.1 (8-8)
2	60.0 (57-63)	57.1 (50-64)	7.9 (8-8)	7.9 (8-8)
3	57.5 (56-60)	53.1 (51-55)	7.8 (8-8)	7.8 (8-8)
4	57.5 (54-64)	54.8 (54-56)	7.7 (8-8)	7.8 (8-8)
8	53.2 (50-56)	50.4 (46-55)	7.6 (7-8)	8.2 (8-9)
11	52.4 (46-56)	48.9 (44-54)	7.6 (7-8)	7.4 (7-8)
12	52.2 (45-58)	48.9 (43-55)	7.3 (7-8)	7.4 (7-7)
Embayment Stations				
5	61.2 (60-63)	51.6 (50-53)	7.9 (8-8)	8.2 (8-9)
6	81.8 (78-88)	53.3 (52-55)	8.1 (8-8)	8.3 (8-9)
7	149.0 (131-166)	134.4 (121-148)	8.3 (8-8)	8.5 (8-8)
9	56.2 (54-58)	55.1 (54-56)	7.7 (8-8)	7.8 (8-8)
10	56.8 (57-58)	51.6 (51-53)	7.7 (7-8)	8.2 (8-9)
13	49.1 (46-53)	42.4 (41-44)	7.3 (7-8)	7.5 (8-8)

* Data from September and October 1992 samples.

Nitrogen and phosphorus are plant nutrients that are required in relatively high concentrations to support plant growth. Nitrogen concentrations normally exceed phosphorus concentrations by an order of magnitude or more (Wetzel 1983). Of the macronutrients, phosphorus is usually in shortest supply and therefore is the element most often limiting to plant growth in freshwater ecosystems. In some cases, phosphorus concentrations, relative to nitrogen, are high and nitrogen availability becomes limiting. This usually occurs at total nitrogen to total phosphorus ratios $< 16:1$ (Porcella and Cleave 1981).

Nitrogen is available to plants as nitrates ($NO_3^{=}$) or as the ammonium ion (NH_4^+). In Weiss Lake, during the winter and spring, bioavailable nitrogen was relatively high (200-500 μg/l) but during the fall and particularly during the summer bioavailable nitrogen declined to very low levels (Tables 10-17, 10-18, 10-19, 10-20 and Figure 10-12). Apparently during the winter and spring, higher rainfall and surface runoff (Figure 10-2) created high abiogenic turbidity (Tables 10-9 and 10-10) in the lake and phytoplankton biomass (chlorophyll a) declined (Figure 10-16). At that time, photosynthesis was light limited and nutrient uptake was minimal. During the summer and fall, abiogenic turbidity decreased (Tables 10-11 and 10-12) and chlorophyll a concentrations increased (Figure 10-16). This resulted in greater phytoplankton photosynthesis and more rapid utilization of bioavailable nutrients. Total nitrogen concentrations at mainstem stations varied between about 430 μg/l and 900 μg/l (Figure 10-12). Ammonia and nitrite concentrations remained well below levels known to have direct adverse effects on aquatic organisms (EPA 1986).

Table 10-17. Mean (range) winter concentrations of NO_2-N, NO_3-N, NH_3-N and organic nitrogen measured during the Weiss Lake diagnostic study, 1990 - 1992.

Mainstem Stations	NO_2 (µg/l) 1991*	NO_2 (µg/l) 1991-92	NO_3 (µg/l) 1991*	NO_3 (µg/l) 1991-92	NH_3 (µg/l) 1991-92	Total Organic Nitrogen (µg/l) 1991*	Total Organic Nitrogen (µg/l) 1991-92
1	5	3 (3-4)	408	347 (279-394)	100 (26-152)	263	372 (291-431)
2	5	3 (2-3)	385	342 (260-425)	105 (34-146)	59	363 (277-419)
3	12	3 (2-4)	392	371 (297-495)	71 (21-106)	205	312 (189-373)
4	4	3 (2-4)	397	361 (302-445)	108 (41-190)	205	358 (282-399)
8	3	4 (2-6)	400	367 (295-443)	59 (54-66)	252	300 (230-335)
11	3	4 (2-6)	418	406 (342-514)	61 (30-99)	205	245 (195-309)
12	3	5 (2-7)	459	421 (365-503)	64 (33-106)	199	289 (215-332)
Embayment Stations							
5	3	3 (2-3)	881	589 (157-870)	64 (19-97)	176	379 (341-451)
6	2	1 (0-2)	460	445 (249-544)	36 (28-42)	146	220 (160-335)
7	3	3 (2-3)	569	414 (301-474)	115 (56-205)	170	251 (26-480)
9	4	4 (3-5)	282	281 (219-369)	131 (59-189)	410	452 (399-536)
10	4	4 (3-5)	278	300 (228-415)	110 (35-205)	410	467 (402-530)
13	2	3 (1-5)	118	187 (99-277)	188 (175-211)	603	533 (364-658)

* Data from January 1991 sample.

Table 10-18. Mean (range) spring concentrations of NO_2-N, NO_3-N, NH_3-N and organic nitrogen measured during the Weiss Lake diagnostic study, 1990 - 1992.

Mainstem Stations	NO_2 (µg/l) 1991	NO_2 (µg/l) 1992	NO_3 (µg/l) 1991	NO_3 (µg/l) 1992	NH_3 (µg/l) 1991*	NH_3 (µg/l) 1992	Total Organic Nitrogen (µg/l) 1991	Total Organic Nitrogen (µg/l) 1992
1	4 (4-5)	2 (1-3)	215 (121-367)	161 (1-297)		71 (46-110)	410 (291-501)	380 (291-428)
2	5 (4-6)	3 (1-6)	194 (94-374)	167 (1-300)		39 (15-69)	410 (274-478)	374 (341-414)
3	5 (4-6)	2 (1-3)	250 (166-411)	194 (1-334)		28 (16-44)	305 (186-390)	340 (277-443)
4	4 (4-5)	2 (1-3)	244 (128-414)	195 (2-329)		30 (13-55)	340 (227-408)	317 (265-400)
8	5 (4-6)	3 (2-3)	231 (86-396)	213 (4-376)		64 (20-128)	334 (250-379)	349 (228-514)
11	4 (3-5)	3 (2-3)	259 (173-391)	254 (41-383)		52 (41-61)	297 (262-338)	376 (253-588)
12	4 (3-6)	3 (2-4)	380 (314-424)	363 (324-405)		39 (20-61)	246 (215-291)	269 (200-360)
Embayment Stations								
5	3 (3-4)	2 (1-3)	231 (90-477)	244 (3-496)		11 (0-19)	348 (291-414)	342 (243-403)
6	2 (2-3)	1 (1-1)	200 (143-311)	219 (2-405)		14 (1-24)	190 (134-233)	213 (123-343)
7	5 (4-7)	2 (1-3)	271 (169-406)	216 (8-361)		26 (0-53)	326 (227-390)	341 (224-500)
9	3 (2-4)	2 (1-4)	156 (75-277)	93 (0-171)		44 (24-56)	431 (390-466)	539 (497-585)
10	4 (3-5)	2 (1-3)	163 (85-313)	136 (8-254)		52 (39-63)	433 (355-483)	475 (423-551)
13	4 (3-4)	3 (2-4)	357 (337-374)	115 (86-147)		72 (42-94)	258 (245-268)	487 (443-518)

* Data not available.

Table 10-19. Mean (range) summer concentrations of NO_2-N, NO_3-N, NH_3-N and organic nitrogen measured during the Weiss Lake diagnostic study, 1990 - 1992.

Mainstem Stations	NO_2 (µg/l) 1991	NO_2 (µg/l) 1992	NO_3 (µg/l) 1991	NO_3 (µg/l) 1992	NH_3 (µg/l) 1991	NH_3 (µg/l) 1992	Total Organic Nitrogen (µg/l) 1991	Total Organic Nitrogen (µg/l) 1992
1	2 (1-2)	3 (1-4)	6 (5-8)	11 (2-21)	9 (0-15)	27 (23-32)	579 (501-693)	474 (414-565)
2	2 (0-3)	3 (1-4)	13 (1-22)	10 (5-13)	20 (0-40)	35 (19-47)	511 (367-588)	500 (451-526)
3	1 (0-1)	2 (1-4)	2 (2-3)	22 (1-44)	15 (0-23)	45 (7-71)	433 (262-568)	442 (386-471)
4	1 (0-1)	3 (2-4)	6 (1-11)	28 (0-43)	11 (2-23)	41 (16-83)	523 (472-620)	477 (357-557)
8	1 (1-1)	2 (1-3)	24 (2-55)	18 (0-36)	8 (0-18)	23 (0-43)	540 (434-661)	616 (548-717)
11	3 (2-4)	2 (1-3)	108 (65-150)	110 (0-190)	4 (0-8)	27 (9-36)	498 (352-626)	560 (477-631)
12	3 (3-4)	4 (2-6)	246 (220-284)	267 (254-277)	12 (3-21)	39 (25-48)	402 (364-463)	584 (400-743)
Embayment Stations								
5	1 (0-3)	0 (0-1)	5 (1-11)	1 (0-3)	15 (0-27)	15 (10-19)	474 (344-612)	496 (388-628)
6	1 (1-1)	1 (1-2)	18 (2-47)	9 (2-19)	18 (13-21)	26 (2-49)	457 (344-533)	430 (348-545)
7	2 (1-4)	4 (0-10)	18 (7-37)	54 (0-159)	19 (8-29)	53 (0-145)	566 (387-757)	590 (508-663)
9	1 (1-2)	3 (2-3)	17 (3-44)	46 (8-104)	8 (0-17)	63 (29-96)	558 (411-678)	527 (414-625)
10	1 (0-1)	2 (1-3)	2 (1-3)	34 (1-95)	30 (11-65)	61 (22-114)	560 (448-722)	552 (360-665)
13	2 (1-3)	1 (1-2)	94 (33-173)	45 (4-105)	11 (5-21)	53 (26-88)	467 (192-670)	462 (397-545)

Table 10-20. Mean (range) fall concentrations of NO_2-N, NO_3-N, NH_3-N and organic nitrogen measured during the Weiss Lake diagnostic study, 1990 - 1992.

Mainstem Stations	NO_2 (µg/l) 1991	NO_2 (µg/l) 1992*	NO_3 (µg/l) 1991	NO_3 (µg/l) 1992*	NH_3 (µg/l) 1991	NH_3 (µg/l) 1992*	Total Organic Nitrogen (µg/l) 1991	Total Organic Nitrogen (µg/l) 1992*
1	2 (2-3)	3 (1-5)	9 (5-12)	81 (1-161)	34 (0-65)	71 (29-113)	527 (475-588)	480 (437-523)
2	3 (2-4)	4 (2-6)	10 (7-15)	82 (4-159)	65 (18-104)	23 (21-24)	509 (443-568)	386 (348-423)
3	3 (3-4)	5 (2-7)	56 (17-123)	128 (6-250)	88 (18-213)	31 (20-42)	421 (323-510)	366 (366-366)
4	4 (3-4)	4 (1-6)	60 (26-120)	127 (8-246)	64 (7-117)	22 (20-24)	465 (448-478)	401 (351-451)
8	3 (1-5)	3 (0-5)	85 (0-204)	78 (0-156)	18 (1-41)	18 (12-23)	468 (373-524)	426 (386-466)
11	4 (3-6)	5 (3-6)	182 (93-322)	252 (246-257)	61 (36-99)	23 (18-27)	380 (306-463)	289 (280-297)
12	4 (2-6)	5 (4-6)	281 (154-377)	280 (246-314)	18 (2-29)	35 (24-45)	250 (230-277)	223 (203-243)
Embayment Stations								
5	2 (2-3)	1 (0-2)	8 (5-15)	2 (1-2)	31 (4-67)	15 (11-18)	520 (489-547)	517 (506-528)
6	0 (0-0)	1 (0-1)	1 (0-2)	5 (3-7)	27 (0-66)	15 (5-24)	557 (539-582)	369 (343-394)
7	0 (0-0)	1 (0-1)	1 (0-3)	4 (0-7)	5 (0-9)	21 (11-31)	593 (510-699)	533 (471-594)
9	6 (3-9)	4 (3-5)	72 (28-130)	74 (38-109)	25 (0-40)	17 (9-24)	466 (384-547)	506 (474-537)
10	4 (3-6)	3 (0-5)	64 (21-139)	47 (1-92)	51 (39-72)	12 (10-14)	550 (466-649)	543 (528-557)
13	3 (1-5)	2 (1-3)	81 (12-138)	19 (3-34)	50 (6-115)	62 (38-86)	513 (469-591)	432 (206-657)

* Data from September and October 1992 samples.

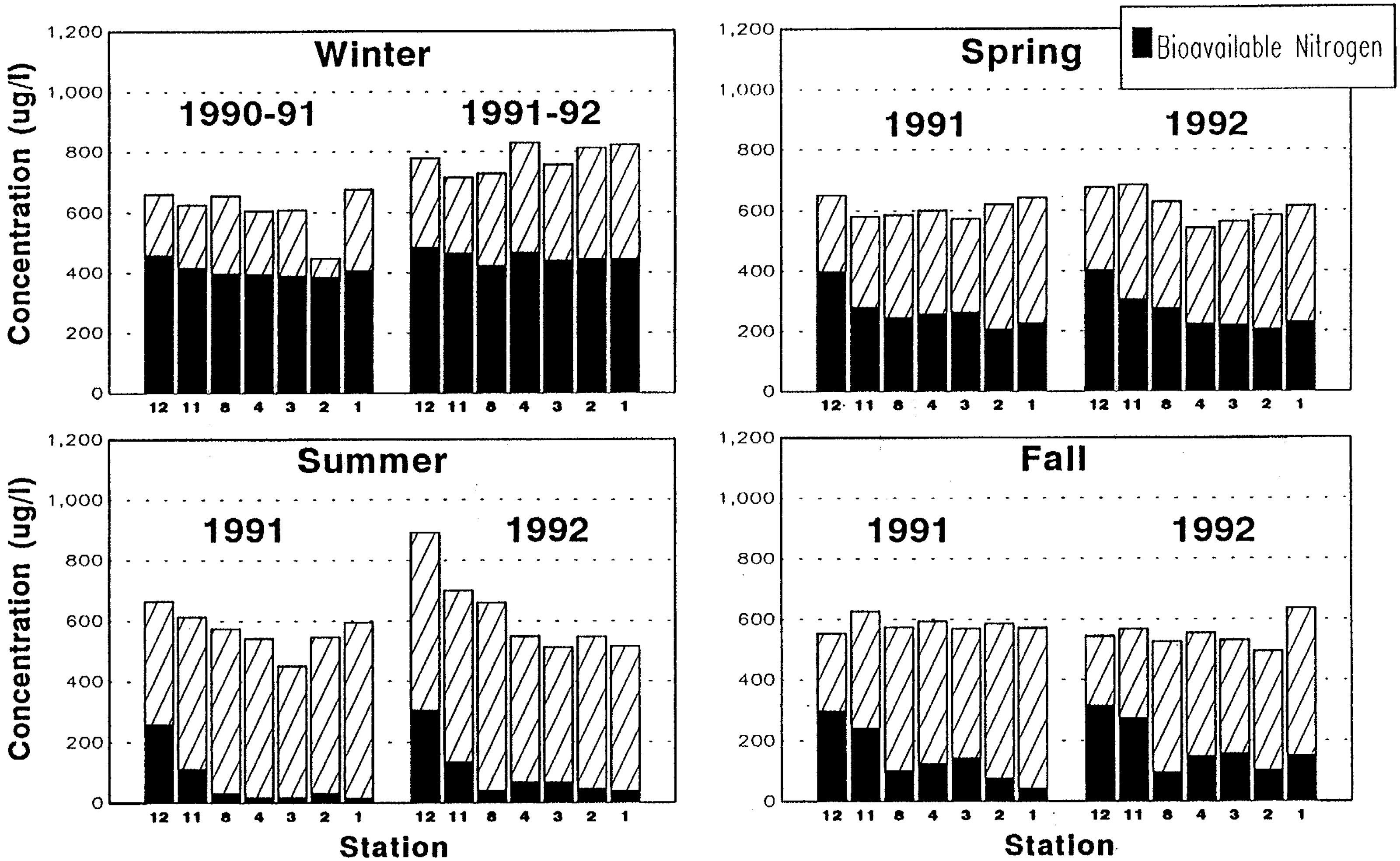


Figure 10-12. Seasonal mean total nitrogen and bioavailable nitrogen concentrations at all mainstem sampling stations (headwaters at station 12 and dam at station 1) during the diagnostic study of Weiss Lake, November 1990 through October 1992.

Tributary embayment nitrogen concentrations were quite variable (Tables 10-17 through 10-20). However tributary total nitrogen concentrations were usually similar to concentrations at the nearest mainstem lake station. Nitrogen concentrations in the Chattooga River embayment (station 7) were similar to levels found in some of the other tributaries.

Phosphorus in water is routinely reported as total phosphorus (all forms of phosphorus expressed as P) and soluble reactive phosphorus which is an estimate of orthophosphate ($PO_4^{\equiv}$ expressed as P), the most important and abundant form of phosphorus directly available to plants. Under the relatively low flow conditions existing during summer and fall, both orthophosphate and total phosphorus concentrations exhibited the longitudinal gradient typical of many mainstream impoundments (Thornton et al. 1990) with higher concentrations upstream and declining concentrations downstream (Table 10-23, 10-24, and Figure 10-13). Concentrations of orthophosphate at station 12 (Coosa River) ranged from 12 to 146 μg/l and total phosphorus concentrations at that location ranged from 76 to 190 μg/l. These are high phosphorus concentrations. Total phosphorus concentrations > 100 μg/l are indicative of highly eutrophic waters (Wetzel 1983). Seasonal mean total phosphorus concentrations > 100 μg/l were found throughout the lake during the winter 1991-1992 (Figure 10-13) and as far downstream as station 8 (summer 1992) and station 3 (fall 1991 and 1992) during the growing season (Figure 10-13). EPA (1986) suggested a limit of 50 μg/l total phosphorus at the point where a stream enters a lake or reservoir in order to prevent excessive loading. Under higher flow conditions existing during winter and spring, there was no longitudinal gradient in phosphorus concentration (Figure 10-13). Phosphorus tends to adsorb onto surfaces of suspended inorganic particles, and therefore, increases in abiogenic turbidity are frequently accompanied by increased phosphorus concentrations. The relatively high flushing rate of Weiss Lake during the rainy season (winter and spring) maintained suspended particles in the water column throughout the lake (Tables 10-9 and 10-10) and phosphorus concentrations remained consistently high from headwaters (station 12) to the powerhouse embayment (station 1).

With the exception of the Chattooga River, tributary embayment phosphorus (both orthophosphate and total phosphorus) concentrations were usually less than concentrations encountered at the nearest mainstem sampling location (Tables 10-21 through 10-24). Among these embayments, Mud Creek (station 13), Spring Creek (station 10) and Cowan Creek (station 9) always had higher phosphorus concentrations than Little River (station 6) and Yellow Creek (station 5) located further downstream. In the Chattooga River embayment, seasonal mean orthophosphate varied from a low of 33 μg/l in the summer of 1991 to a high of 136 μg/l in the winter of 1990-1991. Total phosphorus at this site ranged from 103 μg/l in the spring of 1992 to 201 μg/l during the fall of 1991. These values were always higher, at times an order of magnitude or two higher, than other tributary embayment phosphorus concentrations. Chattooga River embayment phosphorus levels were consistently higher than nearby mainstem sampling stations. The point source contamination of the Chattooga River resulted in elevated specific conductance, total alkalinity, orthophosphate and total phosphorus but did not seem to increase nitrogen levels.

In reservoirs, phosphorus associated with suspended particles tends to sink if water movement subsides sufficiently in lentic areas of the lake. This phosphorus is deposited in bottom sediments and may remain there

Table 10-21. Mean (range) winter concentrations of orthophosphate and total phosphorus measured during the Weiss Lake diagnostic study, 1990 - 1992.

Mainstem Stations	Orthophosphate (µg/l) 1991*	Orthophosphate (µg/l) 1991-92	Total Phosphorus (µg/l) 1991*	Total Phosphorus (µg/l) 1991-92
1	31	43 (34-58)	100	141 (108-166)
2	27	43 (35-58)	101	132 (99-158)
3	71	50 (43-61)	110	136 (108-151)
4	39	50 (41-63)	110	140 (110-159)
8	38	50 (42-55)	110	134 (104-155)
11	38	58 (46-69)	92	134 (113-144)
12	42	73 (48-98)	93	148 (120-187)
Embayment Stations				
5	3	10 (3-22)	47	67 (51-98)
6	2	2 (1-4)	33	42 (21-65)
7	136	103 (44-174)	181	195 (86-284)
9	23	24 (15-29)	105	108 (100-112)
10	14	23 (10-40)	111	113 (89-139)
13	2	21 (2-58)	140	149 (108-209)

* Data from January 1991 samples.

Table 10-22. Mean (range) spring concentrations of orthophosphate and total phosphorus measured during the Weiss Lake diagnostic study, 1990 - 1992.

Mainstem Stations	Orthophosphate (µg/l) 1991	Orthophosphate (µg/l) 1992	Total Phosphorus (µg/l) 1991	Total Phosphorus (µg/l) 1992
1	11 (3-23)	12 (2-29)	70 (59-83)	83 (69-109)
2	10 (5-20)	13 (2-29)	69 (62-82)	81 (63-107)
3	16 (7-27)	17 (2-32)	71 (53-93)	87 (70-105)
4	17 (6-29)	17 (2-33)	79 (66-91)	88 (67-108)
8	14 (6-30)	19 (3-35)	80 (69-92)	91 (88-93)
11	23 (17-34)	19 (3-29)	88 (78-104)	90 (82-101)
12	30 (23-38)	36 (23-54)	84 (76-88)	96 (80-108)
Embayment Stations				
5	2 (0-5)	1 (0-2)	43 (36-46)	44 (38-55)
6	0 (0-0)	1 (0-2)	27 (23-30)	29 (20-45)
7	43 (31-54)	44 (20-82)	109 (92-118)	103 (70-142)
9	10 (2-22)	5 (1-11)	68 (58-79)	71 (60-79)
10	5 (2-10)	9 (2-22)	69 (57-86)	78 (67-99)
13	28 (17-38)	7 (1-15)	90 (75-102)	93 (86-98)

Table 10-23. Mean (range) summer concentrations of orthophosphate and total phosphorus measured during the Weiss Lake diagnostic study, 1990 - 1992.

Mainstem Stations	Orthophosphate (µg/l) 1991	Orthophosphate (µg/l) 1992	Total Phosphorus (µg/l) 1991	Total Phosphorus (µg/l) 1992
1	2 (2-2)	6 (2-10)	60 (49-72)	75 (60-84)
2	4 (2-7)	11 (4-15)	58 (52-65)	78 (64-94)
3	2 (1-3)	12 (6-21)	67 (50-81)	83 (72-101)
4	3 (1-5)	13 (8-22)	71 (59-82)	89 (74-114)
8	6 (2-9)	17 (5-24)	83 (63-93)	111 (92-121)
11	14 (5-19)	31 (8-51)	90 (87-95)	127 (109-141)
12	32 (12-51)	57 (45-67)	96 (76-109)	143 (134-155)
Embayment Stations				
5	2 (1-3)	2 (0-4)	50 (39-64)	60 (54-70)
6	1 (0-2)	2 (0-4)	44 (33-54)	47 (39-60)
7	33 (15-55)	85 (29-138)	124 (105-149)	177 (123-211)
9	1 (0-3)	22 (10-41)	58 (51-64)	76 (73-80)
10	3 (0-6)	8 (1-13)	67 (47-89)	90 (82-99)
13	8 (0-23)	6 (2-15)	96 (83-116)	99 (81-110)

Table 10-24. Mean (range) fall concentrations of orthophosphate and total phosphorus measured during the Weiss Lake diagnostic study, 1990 - 1992.

Mainstem Stations	Orthophosphate ($\mu g/l$)		Total Phosphorus ($\mu g/l$)	
	1991	1992*	1991	1992*
1	6 (4-8)	17 (2-32)	75 (67-91)	91 (67-114)
2	7 (6-8)	18 (3-32)	75 (66-91)	88 (65-110)
3	26 (16-40)	33 (6-59)	98 (83-125)	106 (74-137)
4	24 (19-33)	33 (6-59)	105 (91-125)	106 (70-141)
8	34 (13-65)	31 (8-54)	110 (89-139)	114 (90-137)
11	56 (22-120)	48 (33-63)	123 (88-176)	112 (90-133)
12	85 (31-146)	65 (61-68)	129 (92-190)	118 (116-119)
Embayment Stations				
5	1 (0-3)	2 (1-2)	60 (52-72)	61 (57-65)
6	1 (0-2)	1 (0-2)	57 (51-69)	47 (40-54)
7	113 (85-162)	63 (39-87)	201 (164-239)	155 (127-182)
9	15 (2-33)	11 (7-15)	86 (71-104)	86 (72-99)
10	20 (5-39)	17 (1-33)	100 (79-127)	91 (69-112)
13	18 (3-42)	3 (3-3)	114 (95-144)	96 (85-107)

* Data from September and October 1992 samples.

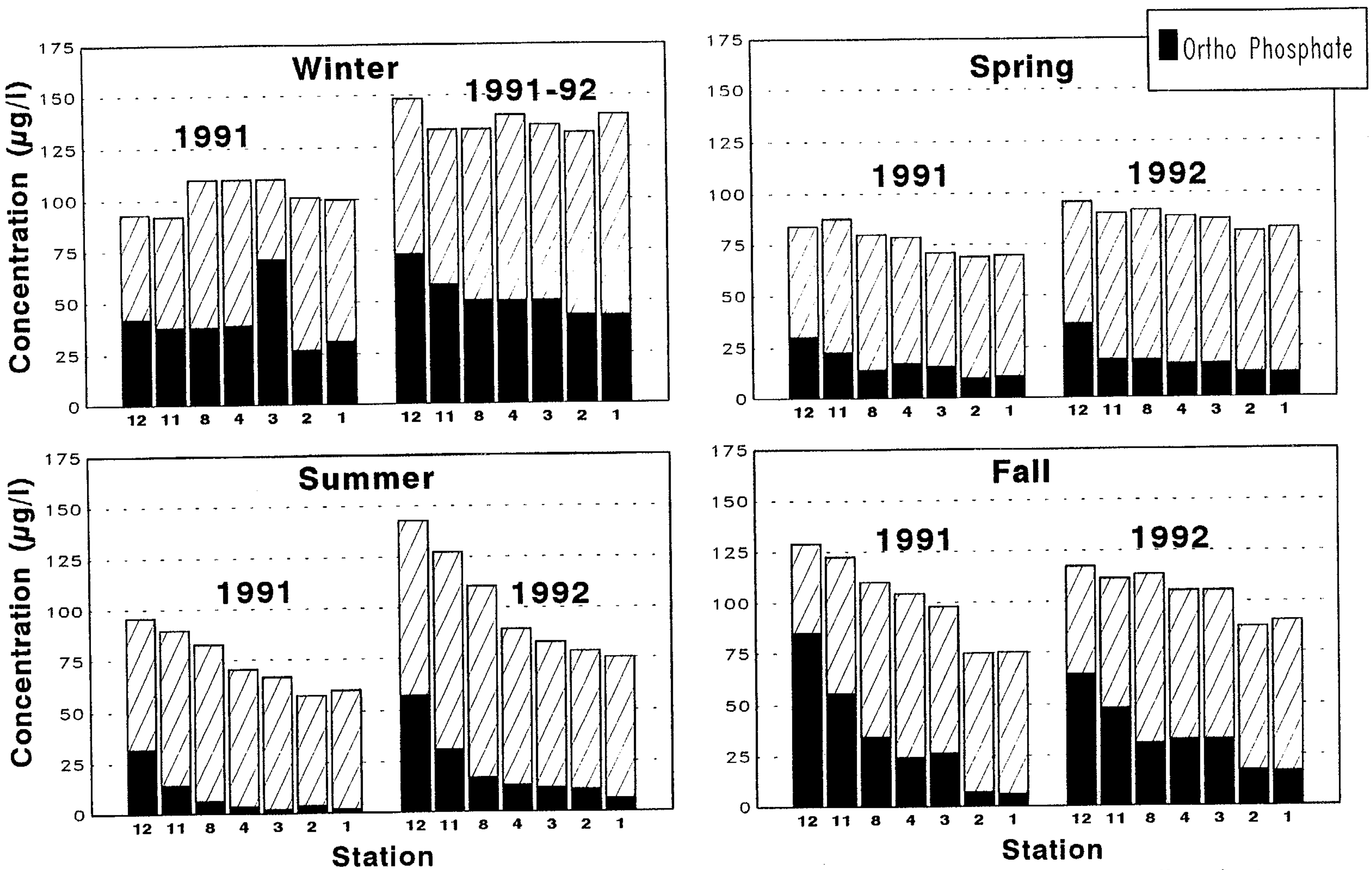


Figure 10-13. Seasonal mean total phosphorus and orthophosphate concentrations at all mainstem sampling stations (headwaters at station 12 and dam at station 1) during the diagnostic study of Weiss Lake, November 1990 through October 1992. Winter quarter of 1991 represents data collected in January.

indefinitely. Mainstream reservoirs are known to trap large quantities of incoming phosphorus. Lawrence (1970) reported phosphorus losses of 61% and 75% in Lakes Seminole and Eufaula, respectively, two lakes located on the Chattahoochee River downstream from West Point Lake. Under certain circumstances some of the accumulated phosphorus can reenter the water column and reach the photic zone, a process known as internal loading of phosphorus. Lakes with anaerobic hypolimnia are more prone to internal loading since reducing conditions mobilize phosphorus in the sediments and release soluble phosphorus to the overlying water column. The relatively high flushing rate of Weiss Lake (18 day mean retention time) prevents rigid thermal and chemical stratification decreasing the incidence of internal phosphorus loading.

During the summer growing seasons the ratio of total nitrogen (TN) to total phosphorus (TP) at mainstem sampling stations varied from 6.8 to 9.9 in 1991 and from 5.5 to 7.0 in 1992 (Table 10-25). Only two tributary embayments had higher ratios; Little River (station 6) and Cowan Creek (station 9) both in 1991. Optimum TN to TP ratios for phytoplankton growth is in the range of 11 to 16 (Porcella and Cleave 1981). Phytoplankton growth in Weiss Lake was nitrogen limited because of the high concentration of phosphorus entering the lake primarily by way of the Coosa and Chattooga Rivers (Tables 10-21 through 10-24). Waters receiving treated municipal waste often have relatively low (2-5) TN:TP (Raschke and Schultz 1987). Upstream Coosa River (station 12) had ratios of 6.9 in 1991 and 6.3 in 1992 and the Chattooga River ratios were 4.9 in 1991 and 4.0 in 1992. Any increases in bioavailable nitrogen to Weiss Lake will increase, perhaps dramatically, phytoplankton production. Controlling phosphorus loading of the lake is the only practical solution to the problem of algal growth in the lake (EPA 1990) but the low TN to TP ratio means that

Table 10-25. Summer mean total nitrogen (μg/l TN), total phosphorus (μg/l TP) and the ratio of TN to TP at all mainstem and tributary embayment stations during the Weiss Lake diagnostic study, 1990 - 1992.

Mainstem Stations	1991 TN	1991 TP	1991 TN:TP	1992 TN	1992 TP	1992 TN:TP
1	596	60	9.9	515	75	6.9
2	546	58	9.4	548	78	7.0
3	451	67	6.7	511	83	6.2
4	541	71	7.6	549	89	6.2
8	573	83	6.9	659	111	5.9
11	613	90	6.8	699	127	5.5
12	663	96	6.9	894	143	6.3
Embayment Stations						
5	495	50	9.9	512	60	8.5
6	494	44	11.2	466	47	9.9
7	605	124	4.9	701	177	4.0
9	584	58	10.1	639	76	8.4
10	593	67	8.9	649	90	7.2
13	574	96	6.0	561	99	5.7

much phosphorus must be removed just to force the lake into phosphorus limitation of phytoplankton growth.

10.2.2 Phytoplankton

The photic zone composite water sample collected at each sampling station (Table 10-2) was the source of water used for analysis of phytoplankton related variables. Aliquots of the composite sample were separated for total organic carbon (TOC) analyses (Table 10-3), phytoplankton identification and enumeration,chlorophyll a analyses and Algal Growth Potential Test (AGPT) (Table 10-26). Chlorophyll a was corrected for presence of pheophytin a. Phytoplankton enumeration, chlorophyll a analysis and TOC analysis was conducted in January 1991 and monthly March 1991 through October 1992 (Table 10-1). Phytoplankton primary productivity was measured in June, August and October of 1991 and 1992 and in January 1992 at stations 2, 3, 8 and 12 (Table 10-2 and Figure 10-1). The carbon-14 method of estimating net productivity was used (Table 10-26). Duplicate light and dark bottles were incubated for 3 h at midday at each of three depths within the euphotic zone: the lower limit of the euphotic zone, midway between the lower limit and the surface and about 0.3 m below the water surface. The lower limit of the euphotic zone was determined by multiplying the Secchi disk visibility by a factor of four (Taylor 1971). Productivity measured during the 3 h exposure was expanded to mean daily productivity ($mgC/m^2 \bullet day$) for the month using solar radiation data obtained at the site during the exposure and mean daily radiation calculated from monthly radiation totals (Boyd 1979). Continuous solar radiation was measured in Calhoun, Georgia by a cooperative observer for the National Oceanic and Atmospheric Administration (NOAA) (Table 10-4).

Table 10-26. Analytical methods used in measuring microbiological variables in Weiss Lake, during the diagnostic study 1990 - 1992.

Variable	Method	Reference
Chlorophyll a	Spectrophotometric (pheophytin corrected)	APHA, 1989
Algal Growth Potential Test	U.S.E.P.A. Methodology	Athens, GA E.P.A. Lab.
Phytoplankton Enumeration	Sedimentation chamber	APHA, 1989
Phytoplankton Primary Productivity	Carbon 14 Method	APHA, 1989

Table 10-27. Mean (range) winter total organic carbon concentrations, chlorophyll a and phytoplankton densities during the Weiss Lake diagnostic study, 1990 - 1992.

Mainstem Stations	Total Organic Carbon (mg/l) 1991[1]	Total Organic Carbon (mg/l) 1991-1992	Chlorophyll a (µg/l) 1991[1]	Chlorophyll a (µg/l) 1991-1992	Phytoplankton Density (Organisms/ml) 1991-1992
1	3.6	5.6 (4-7)	3	6 (4-10)	1394.0 (1322-1500)
2	3.5	5.7 (3-10)	3	5 (2-8)	636.0 (848-1060)
3	3.8	4.6 (4-5)	0	6 (3-10)	1213.7 (928-1531)
4	3.5	5.9 (4-9)	2	6 (3-10)	1220.0 (532-1932)
8	3.5	4.6 (4-5)	2	6 (2-10)	1473.3 (1157-1746)
11	2.7	3.7 (3-4)	0	3 (2-4)	1083.7 (642-1622)
12	2.3	4.5 (4-5)	2	3 (2-4)	1114.3 (793-1598)
Embayment Stations					
5	2.6	3.9 (4-4)	7	15 (9-20)	2277.3 (1921-2833)
6	1.9	2.5 (1-3)	1	3 (1-6)	1582.3 (1084-1916)
7	3.3	8.1 (4-12)	3	2 (1-4)	1082.7 (664-1848)
9	5.4	6.7 (6-8)	6	10 (8-11)	1580.7 (1234-1846)
10	6.3	6.7 (6-7)	7	10 (8-12)	1276.7 (1125-1404)
13	10.3	10.8 (5-17)	6	13 (8-19)	1027.7 (881-1251)

[1] Data from January 1991 only.

Table 10-28. Mean (range) spring total organic carbon concentrations, chlorophyll a and phytoplankton densities during the Weiss Lake diagnostic study, 1990 - 1992.

Mainstem Stations	Total Organic Carbon (mg/l)		Chlorophyll a (µg/l)		Phytoplankton Density (Organisms/ml)	
	1991	1992	1991	1992	1991	1992
1	4.5 (4-5)	3.3 (2-4)	19 (7-30)	16 (6-25)	2051.3 (1603-2675)	2221.7 (1229-3009)
2	4.1 (4-4)	3.9 (2-5)	18 (5-28)	15 (5-20)	2572.7 (1654-3474)	2723.3 (1558-4741)
3	4.5 (4-6)	4.1 (3-5)	15 (6-25)	13 (5-20)	1756.0 (1211-2435)	1967.0 (1200-2792)
4	4.0 (4-4)	4.0 (2-5)	16 (6-31)	14 (5-19)	2065.3 (1375-3250)	1734.7 (1266-2126)
8	3.6 (3-4)	4.4 (3-6)	21 (6-31)	16 (5-26)	2320.0 (1946-2605)	2344.7 (1314-3503)
11	3.6 (3-4)	3.2 (2-4)	10 (4-14)	15 (3-29)	2052.3 (1126-2562)	2003.3 (1295-3132)
12	3.5 (3-4)	3.0 (2-4)	6 (1-8)	8 (3-16)	1768.0 (1762-1774)	1882.7 (1226-2901)
Embayment Stations						
5	3.7 (3-4)	4.0 (3-5)	17 (10-26)	18 (15-22)	2761.3 (1998-4221)	2419.0 (1498-3970)
6	2.3 (2-3)	2.4 (2-3)	5 (2-10)	7 (2-10)	1628.3 (1487-1838)	1423.3 (1037-2121)
7	4.1 (4-4)	4.5 (3-6)	15 (2-21)	12 (4-18)	1491.0 (1287-1628)	1370.3 (1000-1600)
9	7.9 (5-14)	5.5 (4-7)	20 (10-36)	21 (15-28)	2364.0 (1626-3065)	2390.3 (2104-2687)
10	5.1 (5-6)	4.9 (3-7)	20 (12-28)	17 (9-26)	3072.0 (1824-4197)	2355.0 (1240-3691)
13	4.3 (3-5)	7.4 (5-12)	9 (3-15)	17 (16-18)	1888.3 (1461-2104)	2339.3 (1244-3350)

Table 10-29. Mean (range) summer total organic carbon concentrations, chlorophyll a and phytoplankton densities during the Weiss Lake diagnostic study, 1990 - 1992.

Mainstem Stations	Total Organic Carbon (mg/l) 1991	1992	Chlorophyll a (µg/l) 1991	1992	Phytoplankton Density (Organisms/ml) 1991	1992
1	5.2 (5-6)	4.6 (3-6)	25 (0-47)	23 (12-33)	2651.7 (1927-3214)	2881.7 (1681-4411)
2	4.2 (4-4)	3.7 (3-4)	28 (13-40)	22 (13-34)	2430.7 (1976-2769)	3973.7 (2279-6185)
3	4.4 (4-5)	3.8 (3-4)	24 (14-40)	23 (12-37)	3236.3 (1140-6029)	3795.3 (2119-4658)
4	4.4 (4-5)	3.8 (3-4)	23 (11-41)	19 (11-24)	1916.7 (1439-2274)	2895.0 (1916-4445)
8	4.4 (4-5)	4.8 (4-6)	26 (12-37)	27 (22-32)	1943.7 (571-2750)	3083.0 (2615-3800)
11	4.0 (3-4)	4.3 (3-6)	25 (15-35)	23 (19-29)	2306.0 (1600-2909)	3300.0 (2833-3841)
12	3.8 (3-4)	4.1 (3-6)	15 (12-18)	10 (0-17)	1929.7 (1250-2458)	2467.7 (2454-2487)
Embayment Stations						
5	4.0 (3-5)	4.2 (3-5)	22 (11-33)	21 (14-34)	2732.0 (1542-3626)	4354.3 (2347-7460)
6	3.9 (4-4)	4.4 (3-7)	19 (8-28)	15 (9-25)	2418.0 (1414-3169)	5430.7 (2379-7490)
7	5.0 (4-6)	4.5 (4-5)	27 (15-39)	25 (13-37)	1786.0 (1469-2209)	3699.7 (1345-5499)
9	5.1 (4-6)	4.1 (3-5)	22 (11-34)	18 (13-25)	2560.3 (2260-2975)	3123.0 (2405-4355)
10	4.8 (4-5)	4.8 (3-6)	18 (13-23)	20 (13-30)	2383.3 (2150-2747)	3458.7 (2231-5188)
13	5.4 (5-6)	5.3 (5-6)	20 (18-22)	18 (13-26)	1854.3 (1117-2761)	2845.0 (2354-3444)

Table 10-30. Mean (range) fall total organic carbon concentrations, chlorophyll a and phytoplankton densities during the Weiss Lake diagnostic study, 1990 - 1992.

Mainstem Stations	Total Organic Carbon (mg/l) 1991	1992	Chlorophyll a (µg/l) 1991	1992	Phytoplankton Density (Organisms/ml) 1991	1992
1	4.8 (4-8)	4.5 (4-5)	29 (23-32)	28 (24-33)	2812.0 (2007-3399)	4024.5 (3501-4548)
2	4.7 (4-5)	4.5 (4-5)	24 (22-29)	25 (23-28)	2776.7 (2285-3396)	4544.5 (4076-5013)
3	4.2 (4-5)	4.4 (4-5)	24 (17-32)	26 (23-30)	2349.7 (2091-2648)	3242.0 (2945-3539)
4	4.0 (4-4)	4.7 (4-5)	25 (20-32)	20 (15-25)	2504.0 (1947-3051)	3522.0 (3062-3982)
8	6.2 (4-11)	3.9 (3-4)	25 (15-33)	24 (17-31)	3074.7 (2786-3538)	3316.0 (2303-4329)
11	3.7 (3-4)	3.5 (3-4)	18 (7-24)	11 (8-15)	2630.7 (2063-3566)	2583.0 (2098-3068)
12	3.6 (3-4)	3.5 (3-4)	10 (4-17)	7 (6-7)	1919.0 (1559-2134)	1982.5 (1915-2050)
Embayment Stations						
5	4.5 (4-5)	4.7 (4-5)	26 (24-28)	25 (24-26)	3701.3 (2924-4257)	4701.0 (4324-5078)
6	4.7 (4-5)	3.9 (4-4)	21 (21-22)	20 (18-23)	3638.7 (3375-4100)	3305.5 (2331-4280)
7	5.1 (5-5)	5.4 (4-6)	24 (14-31)	25 (22-29)	3025.7 (2357-3656)	3265.0 (3183-3347)
9	4.8 (4-6)	4.5 (4-5)	23 (18-26)	25 (23-27)	3577.7 (2477-5094)	3900.5 (3646-4155)
10	4.2 (4-5)	5.5 (3-7)	26 (18-30)	25 (24-25)	3109.3 (1838-4750)	4405.5 (4075-4736)
13	4.8 (4-6)	7.3 (7-8)	24 (16-30)	16 (15-18)	2493.0 (1854-3405)	3417.5 (3198-3637)

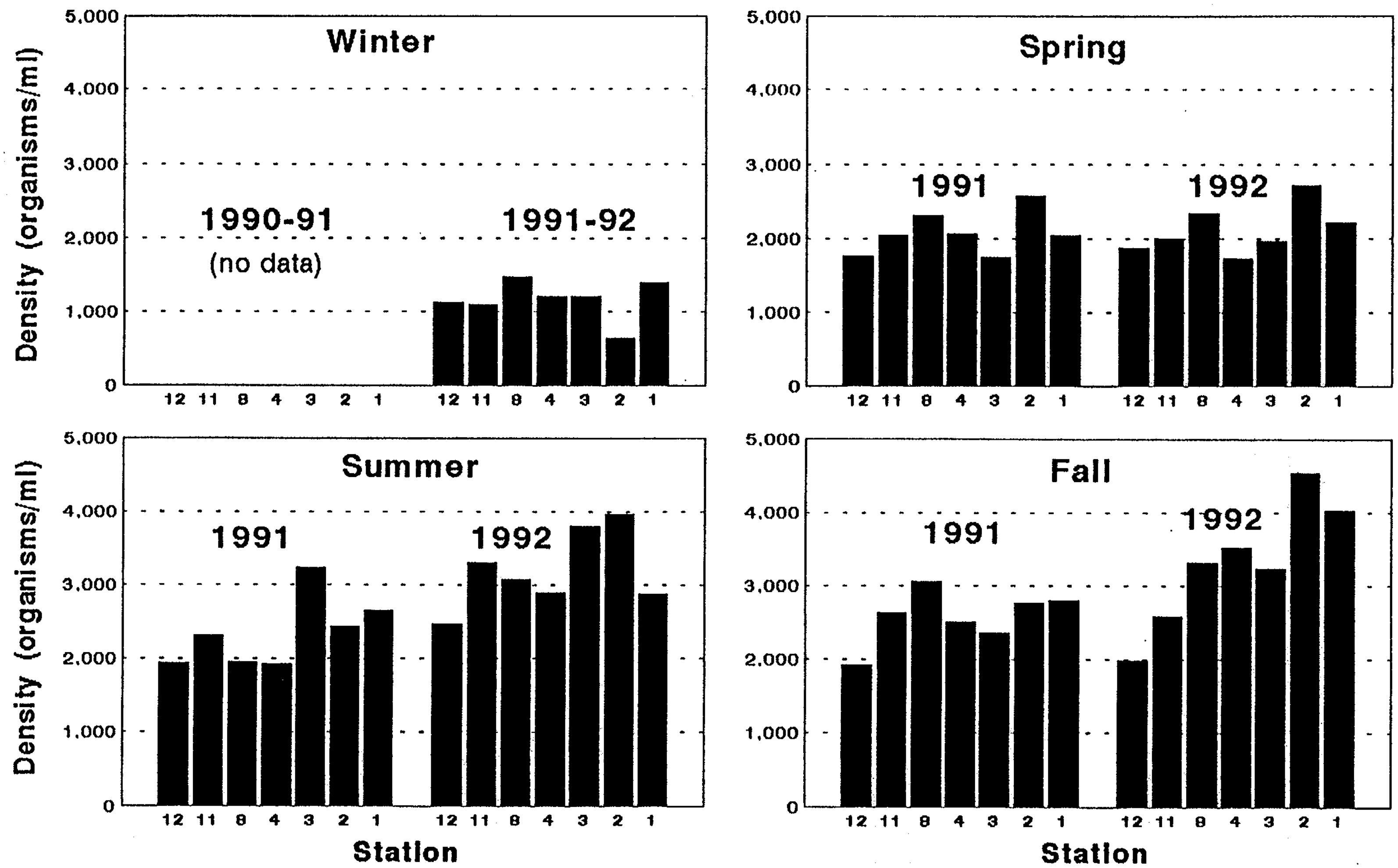


Figure 10-14. Seasonal mean phytoplankton densities at all mainstem sampling stations (headwaters at station 12 and dam at station 1) during the diagnostic study of Weiss Lake, November 1990 through October 1992.

Phytoplankton densities ranged from a low of 532 organisms/ml at station 4 during the winter 1991 (Table 10-27) to 7,490 organisms/ml at station 6 during the summer 1992 (Table 10-29). Highest densities occurred during the summer and fall and lowest densities during the winter and spring (Figure 10-14). Riverine station 12 generally supported lower densities of phytoplankton than most other stations and lentic stations 1, 2 and 3 usually had higher densities than most other stations (Figure 10-14). Embayment station phytoplankton densities varied seasonally and were usually similar to the nearest mainstem station densities (Tables 10-27, 10-28, 10-29 and 10-30). Yellow Creek embayment (station 5) usually had densities somewhat higher than the other embayments.

Numerical dominance was shared by green algae (Division Chlorophyta) and diatoms (Division Chrysophyta) at mainstem sampling stations (Figure 10-15). Diatoms were generally more abundant in winter and spring months and green algae more abundant in summer and fall months. The euglenoids (Division Euglenophyta) were the third most abundant algal group followed by blue-green algae (Division Cyanobacteria) and dinoflagellates (Division Pyrrhophyta) (Figure 10-15). Bayne and Maceina (1992) reported similar community composition of Weiss Lake phytoplankton in studies conducted during the growing seasons (May-September) of 1989 and 1990.

Sixty-two algal taxa were identified from samples taken from Weiss Lake (Table 10-31). These taxa are generally common constituents of lake phytoplankton communities in this region (Morris *et al.* 1977 and Taylor *et al.* 1979). Green algal taxa were most numerous followed by blue-green algae and diatoms.

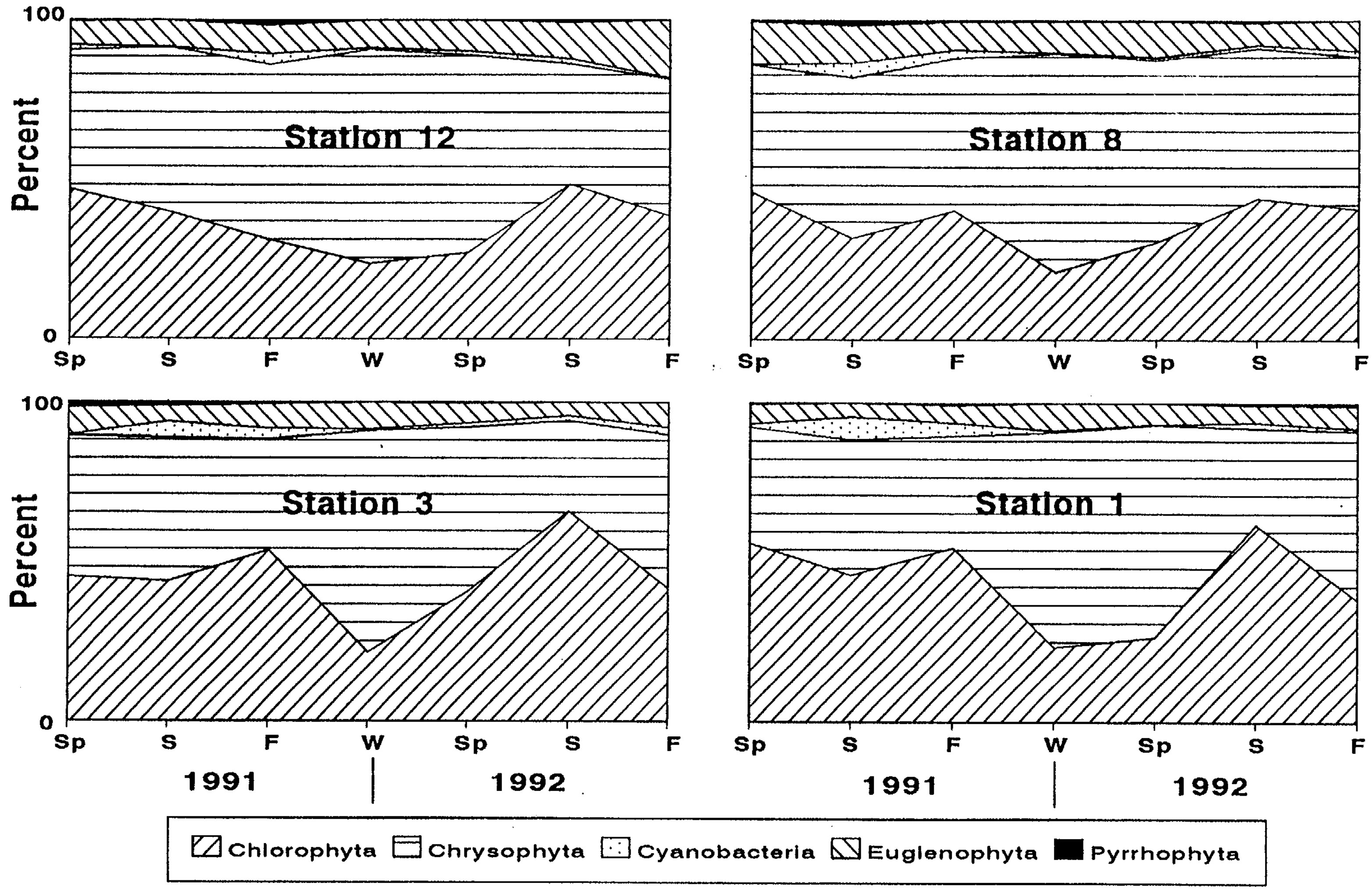


Figure 10-15. Seasonal mean percent composition of phytoplankton communities by algal Division at mainstem stations 12, 8, 3 and 1 during the diagnostic study of Weiss Lake, November 1990 through October 1992.

Table 10-31. Taxa list of plankton algae identified during the Weiss Lake diagnostic study 1990 - 1992.

CHLOROPHYTA	
Actinastrum sp.	Micrasterias sp.
Ankistrodesmus convolutus	Oocystis sp.
Ankistrodesmus falcatus	Pachycladon sp.
Ankistrodesmus nannoselene	Pandorina sp.
Arthrodesmus sp.	Pediastrum sp.
Chlamydomonas sp.	Quadrigula sp.
Chodatella sp.	Scenedesmus abundans
Closteriopsis sp.	Scenedesmus acuminatus
Closterium sp.	Scenedesmus armatus
Coelastrum sp.	Scenedesmus bijuga
Cosmarium sp.	Scenedesmus denticulatus
Crucigenia crucifera	Scenedesmus quadricauda
Crucigenia sp.	Scenedesmus sp.
Desmidium sp.	Schroederia sp.
Dictyosphaerium sp.	Selenastrum sp.
Elakatothrix sp.	Sphaerocystis sp.
Euastrum sp.	Staurastum sp.
Franceia sp.	Tetraedron minimum
Gloeocystis sp.	Tetraedron trigonum
Golenkinia sp.	Tetraedron sp.
Gonium sp.	Tetrastrum sp.
Kirchneriella sp.	Treubaria sp.

CHRYSOPHYTA	
Asterionella sp.	Melosira granulata
Dinobryon sp.	Centric diatoms
Melosira distans	Pennate diatoms

CYANOBACTERIA	
Aphanotheca sp.	Merismopedia sp.
Chroococcus sp.	Raphidiopsis sp.
Coelosphaerium sp.	Spirulina sp.
Gomphosphaeria sp.	
	B-G Filament

EUGLENOPHYTA	
Euglena sp.	Trachelomonas sp.
Phacus sp.	

PYRRHOPHYTA	
Ceratium sp.	Peridinium sp.

Table 10-32. Dominant algal taxa encountered at representative mainstem sampling stations during the Weiss Lake diagnostic study, 1990 - 1992.

Season	1	3	8	12
Spring 1991	1. Chlamydomonas sp. 2. Melosira distans 3. Pennate diatoms	1. Pennate diatoms 2. Chlamydomonas sp. 3. Melosira distans	1. Pennate diatoms 2. Chlamydomonas sp. 3. Melosira distans 3. Trachelomonas sp.	1. Pennate diatoms 2. Chlamydomonas sp. 3. Melosira distans
Summer 1991	1. Pennate diatoms 2. Melosira distans 3. Ankistrodesmus convolutus	1. Pennate diatoms 2. Ankistrodesmus convolutus 3. Melosira distans	1. Pennate diatoms 2. Melosira distans 3. Chlamydomonas sp.	1. Pennate diatoms 2. Melosira distans 3. Chlamydomonas sp.
Fall 1991	1. Melosira distans 2. Ankistrodesmus convolutus 3. Pennate diatoms	1. Pennate diatoms 2. Chlamydomonas sp. 2. Ankistrodesmus convolutus 3. Melosira distans	1. Pennate diatoms 2. Ankistrodesmus convolutus 3. Melosira distans	1. Pennate diatoms 2. Melosira distans 3. Melosira granulata 3. Trachelomonas sp.
Winter 1991-92	1. Pennate diatoms 2. Melosira distans 3. Melosira granulata	1. Pennate diatoms 2. Melosira distans 3. Melosira granulata	1. Pennate diatoms 2. Melosira distans 3. Melosira granulata 3. Trachelomonas sp.	1. Pennate diatoms 2. Melosira distans 3. Trachelomonas sp.
Spring 1992	1. Melosira distans 2. Pennate diatoms 3. Melosira granulata 3. Ankistrodesmus convolutus	1. Melosira distans 2. Ankistrodesmus convolutus 3. Pennate diatoms	1. Melosira distans 2. Pennate diatoms 3. Trachelomonas sp.	1. Pennate diatoms 2. Melosira distans 3. Chlamydomonas sp.
Summer 1992	1. Ankistrodesmus convolutus 2. Pennate diatoms 3. Chlamydomonas sp.	1. Ankistrodesmus convolutus 2. Melosira distans 3. Chlamydomonas sp. 3. Pennate diatoms	1. Melosira distans 2. Ankistrodesmus convolutus 3. Pennate diatoms	1. Pennate diatoms 2. Melosira distans 3. Ankistrodesmus convolutus
Fall 1992 (2 mo.)	1. Pennate diatoms 1. Melosira distans 2. Chlamydomonas sp. 3. Ankistrodesmus convolutus	1. Melosira distans 2. Pennate diatoms 3. Chlamydomonas sp.	1. Pennate diatoms 1. Melosira distans 2. Chlamydomonas sp. 3. Melosira distans	1. Pennate diatoms 2. Chlamydomonas sp. 2. Trachelomonas sp.

Pennate diatoms were common and abundant throughout the reservoir and, in aggregate, were numerically dominant on most sampling occasions (Table 10-32). The most commonly encountered pennate diatoms that could be identified without special preparation were Tabellaria spp., Synedra spp. and Asterionella formosa. The centric diatom, Melosira distans, ranked second in dominance to the pennate diatoms. Dominant green algae included Ankistrodesmus convolutus and Chlamydomonas spp. (Table 10-32). The euglenoids, Trachelomonas spp., were frequently ranked among the dominant taxa but blue-green algal taxa were not. The most commonly occurring blue-green taxa were Merismopedia spp.

Among the dominant phytoplankton genera, all occur with great frequency in reservoirs of the southeastern United States (Taylor *et al.* 1979). Palmer (1969) listed Ankistrodesmus, Chlamydomonas and Melosira as genera of algae tolerant of organic pollution. In addition, each of the dominant genera listed in Table 10-32 were found to occur most frequently at mean total phosphorus concentrations ranging from 100 to 200 μg/l and mean NO_2 + NO_3 concentrations of from 350 to 700 μg/l (Lambou *et al.* 1981). The phytoplankton of Weiss Lake were indicative of a typical nutrient enriched southeastern reservoir.

Pheophytin-corrected, chlorophyll a concentration is an indicator of phytoplankton biomass and is a variable often used to determine the trophic status of lakes in the absence of macrophytes (Carlson 1977 and EPA 1990). It is a variable that integrates the physical, chemical and biological environmental components into one expression of biotic response and is, therefore, superior to simple physical (water transparency) or chemical (nutrients) variables used to characterize trophic status (Hern *et al.* 1981).

Corrected chlorophyll a concentrations from about 6.4 to 56.0 μg/l are indicative of eutrophic waters (Carlson 1977). Waters having concentrations >56.0 μg/l are considered hypereutrophic. Chlorophyll a concentrations in Weiss Lake ranged from a low of 0.0 μg/l at mainstem stations 3 and 11 in January 1991 to a high of 46.9 μg/l at station 1 in July 1991 (See electronic data set). Seasonal mean chlorophyll a concentrations varied considerably, with highest values occurring during summer and fall and lowest values during the winter (Table 10-27, 10-28, 10-29 and 10-30). Spring concentrations were intermediate between winter and summer levels (Figure 10-14).

Of the mainstem sampling stations, riverine station 12 had the lowest mean chlorophyll a concentrations (Figure 10-16). Highest seasonal mean concentrations occurred at stations 1, 2 and 8. Station 11 was in the transition zone of the reservoir between the upstream riverine area (station 12) and the downstream, lacustrine zone (stations 8, 4, 3, 2 and 1). During the summers, under relatively low-flow conditions, phytoplankton chlorophyll a concentrations at station 11 were similar to the lacustrine stations downstream. A combination of declining abiogenic turbidity (Table 10-11), abundant plant nutrients (Tables 10-19 and 10-23) and annual peaks in solar radiation (Table 10-4) at station 11 during the summer seasons resulted in optimum conditions for phytoplankton growth. During the fall, winter and spring, the most favorable growing conditions shifted further downstream (Figure 10-16).

The relatively short mean hydraulic retention time of Weiss Lake (18 days) resulted in unidirectional downstream (advective) currents that transport nutrients and phytoplankton rapidly toward the dam. The absence of strong chemical stratification, particularly in the mainstem of the reservoir,

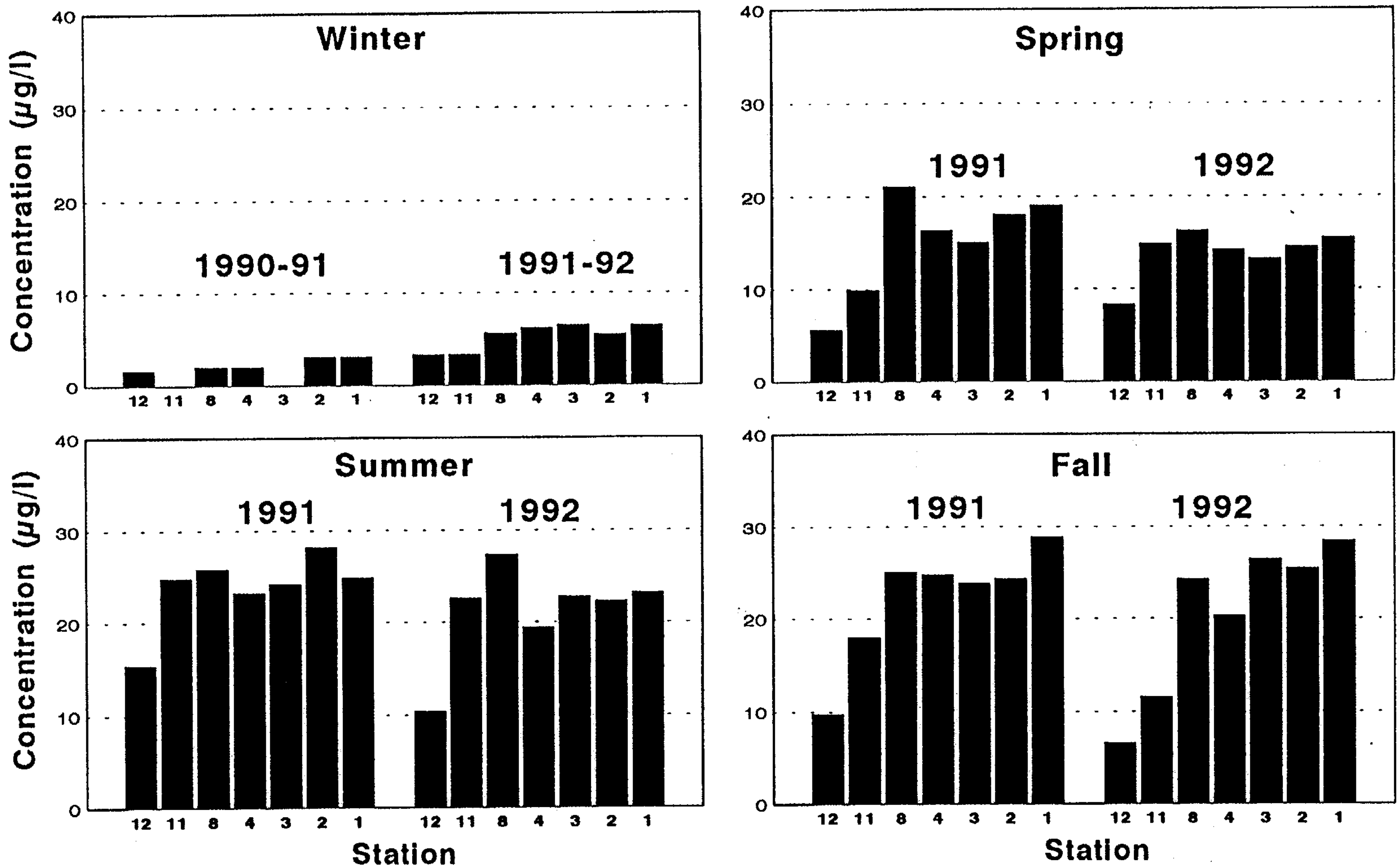


Figure 10-16. Seasonal mean chlorophyll a concentrations at all mainstem sampling stations (headwaters at station 12 and dam at station 1) during the diagnostic study of Weiss Lake, November 1990 through October 1992.

caused a rather uniform nutrient dispersal throughout the water column. These conditions typically result in minimal longitudinal gradients of physicochemical and biological variables (Thornton *et al.* 1990). Seasonal mean chlorophyll a levels at lacustrine sampling stations (stations 1-8) were similar throughout (Figure 10-16). There was also little variation in chlorophyll a concentrations between years for a particular season. However, Bayne and Maceina (1992) found that Weiss Lake chlorophyll a concentration measured during the relatively rainy 1989 growing season (27 μg/l) almost doubled during the drier 1990 growing season (41 μg/l).

Among the tributary embayment sampling stations, Little River (station 6) and Mud Creek (station 13) usually had chlorophyll a concentrations somewhat lower than the other embayments (Table 10-27, 10-28, 10-29 and 10-30). Phytoplankton in Mud Creek was probably light-limited because of the relatively high abiogenic turbidity typically found at this location (Table 10-11). In contrast, Little River embayment usually had the clearest water of any location on the lake (Table 10-11) but was likely nutrient limited (Table 10-23 and 10-24). Highest chlorophyll a concentrations measured in embayments were in the Chattooga River (station 7) in July 1991 (39 μg/l) and August 1992 (37 μg/l). Mean chlorophyll a in Yellow Creek (station 5), Chattooga River (station 7), Cowan Creek (station 9) and Spring Creek (station 10) were generally comparable within a season (Tables 10-27, 10-28, 10-29 and 10-30).

Phytoplankton primary productivity is the rate of formation of organic matter over a specified time period (Wetzel 1983). The C-14 method of measuring productivity approximates net productivity, which is the gross accumulation of new organic matter minus any losses (e.g. respiration) that occur during the specified time interval. Phytoplankton biomass is an important variable influencing primary productivity although the efficiency with which a unit of phytoplankton biomass produces a unit of organic matter (photosynthetic efficiency) is quite variable (Fogg 1965). Efficiency can be affected by such physicochemical variables as light, temperature, degree of turbulence and nutrients. Species composition, size structure of the plankton algae and predation are examples of biotic influences on efficiency. Bayne *et al.* (1990) reported photosynthetic efficiencies (mgC fixed per mg chlorophyll a•hour) of West Point Lake phytoplankton communities ranging from 0.2 to 4.9. Phytoplankton primary productivity integrates a number of environmental variables in addition to algal biomass into an expression of system productivity. Productivity rates have also been used to trophically categorize lakes. Lakes with productivities ranging from 250-1000 mgC/m^2•day are considered mesotrophic and values >1000 mgC/m^2•day are considered eutrophic (Wetzel 1983).

Mean growing season (June through October) primary productivity exceeded levels considered eutrophic (1000 mgC/m^2•day) at all sampling stations except riverine station 12 in 1991 (Table 10-33 and Figure 10-17). In 1991 productivity increased from upstream to downstream and in 1992 productivity decreased from upstream to downstream (Figure 10-17). The increase in mean productivity at station 12 from 1991 to 1992 was apparently caused by an increase in bioavailable nitrogen at that location on two (June and August) of the three sampling dates used to characterize primary productivity for the season (See electronic data set). Light-related conditions (TSS, turbidity and Secchi visibility) were similar on sampling dates in 1991 and 1992 as were chlorophyll a concentrations (See electronic data set). Since phytoplankton growth and productivity in Weiss Lake were nitrogen limited, increases in

Table 10-33. Seasonal mean (range) phytoplankton primary productivity (expressed on volume and areal bases) for selected mainstem stations during the Weiss Lake diagnostic study 1990 - 1992.

Season	Year	Station	Primary Productivity ($mgC/m^3/hr$)	Primary Productivity ($mgC/m^2/day$)
Growing Season[a]	1991	2	55.3 (22-78)	1570.2 (1277-2145)
		3	51.5 (24-83)	1253.7 (1119-1501)
		8	53.2 (23-76)	1156.1 (808-1723)
		12	20.5 (8-30)	457.1 (350-560)
Winter Season[b]	1991	2	4.4	17.5
		3	3.5	16.7
		8	2.5	14.9
		12	1.5	8.6
Growing Season[a]	1992	2	57.2 (18-93)	1159.7 (694-1423)
		3	64.5 (19-136)	1271.3 (392-1786)
		8	67.3 (32-111)	1545.1 (350-2759)
		12	54.9 (14-97)	1577.3 (213-3195)

[a]Mean of June, August and October.
[b]1 month (January).

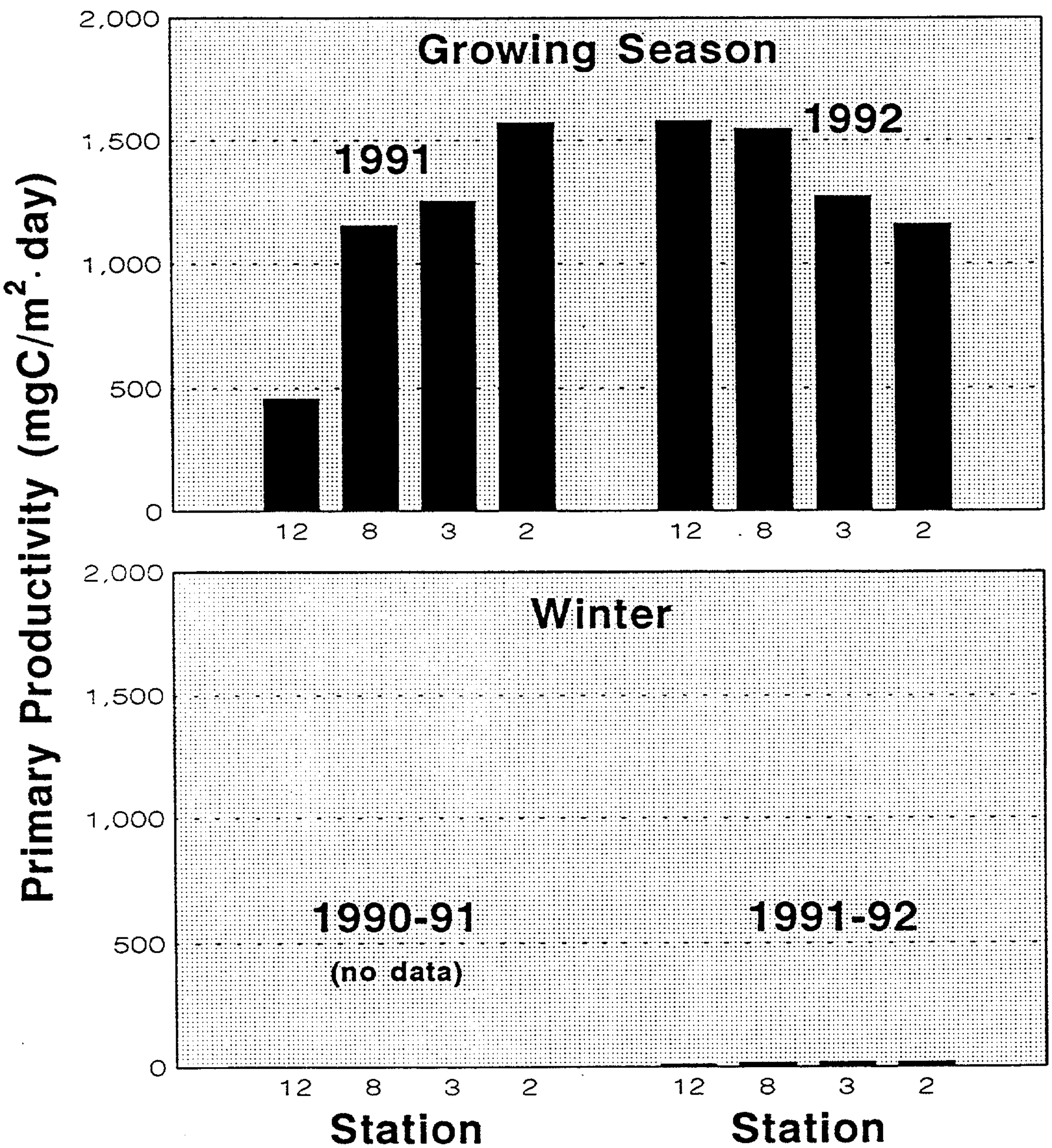


Figure 10-17. Mean growing season and winter primary productivity at mainstem stations 12, 8, 3 and 2 during the diagnostic study of Weiss Lake, November 1990 through October 1992.

bioavailable nitrogen in 1992 could have stimulated algal production. Varying patterns of rainfall and runoff likely contributed to increased nitrogen concentrations in the lake in 1992. Rainfall in 1991 was well above average in the spring and average to below average in the growing season, in contrast, in 1992 spring rainfall was below average and growing season rainfall was well above average (Table 10-4, Figure 10-2). Moderate increases in watershed runoff during the 1992 growing season following a relatively dry spring raised nutrient levels in the lake above those encountered in 1991.

Bayne and Maceina (1992) documented the effects of extreme growing season rainfall/runoff on Weiss Lake primary productivity. In 1989, unusually heavy rainfall during the growing season resulted in light-limited conditions (high abiogenic turbidity) and increased discharge (shortened retention time) that suppressed algal productivity below 1000 $mgC/m^2 \bullet day$. The 1990 mean growing season productivity under more normal rainfall conditions averaged 1,554 $mgC/m^2 \bullet day$ (excluding outlying data gathered at one station in July 1990).

The AGPT determines the total quantity of algal biomass supportable by the test waters and provides a reliable estimate of the bioavailable and limiting nutrients (Raschke and Schultz 1987). During both 1991 and 1992, upstream stations 11 and 12 supported concentrations of Selenastrum capricornutum in excess of 5.0 mg/l (dry weight) (Table 10-34). Concentrations below 5.0 mg/l are thought to assure protection from nuisance phytoplankton blooms and fish-kills in southeastern lakes, excluding Florida (Raschke and Schultz 1987). Stations 1, 2, 3 and 8 maintained levels below 5.0 mg/l during both years. Mean maximum dry weights above 10.0 mg/l indicate

Table 10-34. Mean maximum dry weight (mg/l) of *Selenastrum capricornutum* cultured in Weiss Lake waters. Values represent growing season (May through September) means for 1991 and 1992.[1]

Mainstem Stations	Mean Maximum Dry Weight (mg/l) Year 1991	1992
1	4.09	2.79
2	4.51	2.73
3	3.51	2.56
8	4.60	2.24
11	6.68	5.64
12	8.90	11.41

[1] Results of Algal Growth Potential Tests conducted by the Ecological Support Branch, U.S. Environmental Protection Agency, Region IV.

highly productive waters that may be subjected to nuisance blooms. Mean values at upstream station 12 were 8.9 mg/l and 11.4 mg/l in 1991 and 1992, respectively. Higher weights at upstream locations were obviously an effect of higher nutrient (N and P) concentrations existing at upstream locations (Tables 10-19 and 10-23). Lacustrine stations 1, 2, 3 and 8 were capable of supporting higher algal biomass in 1991 than in 1992 (Table 10-34 and electronic data set). This might have been a result of more favorable TN:TP ratios that occurred throughout the lake during the 1991 growing season (Table 10-25).

In most freshwater lakes, phosphorus is the essential plant nutrient that limits growth and productivity of plankton algae (Wetzel 1983). Nitrogen usually becomes the limiting nutrient when bioavailable phosphorus increases relative to nitrogen, as in the case of waters receiving quantities of treated municipal waste (Raschke and Schultz 1987). The AGPT is helpful in identifying these common growth limiting nutrients. In Weiss Lake, nitrogen was the limiting nutrient throughout (Table 10-35). The relatively high concentrations of phosphorus entering the lake by way of the Coosa and Chattooga Rivers (Tables 10-21, 10-22, 10-23 and 10-24) caused an imbalance in the relationship between the bioavailable nitrogen and phosphorus. This conclusion is supported by water chemistry data showing TN:TP ratios well below the 11-16 range (Table 10-25), considered optimum for phytoplankton growth (Porcella and Cleave 1981).

Total organic carbon (TOC) concentrations are composed of dissolved and particulate fractions and the ratio of dissolved to particulate ranges from 6:1 to 10:1 in most unpolluted lakes (Wetzel 1983). Most of the particulate fraction is composed of dead organic matter with living plankton contributing

Table 10-35. Temporal and spacial variation in nutrient limitation based on results of Algal Growth Potential Tests[1] conducted during the growing seasons of 1991 and 1992.

	Limiting Nutrient					
Mainstem Station	1	2	3	8	11	12
Date						
1991						
May	N[2]	N	N	N	-	-
June	N	N	N	N	N	N
July	N	N	N	N	N	N
August	N	N	N	N	N	N
September	N	N	N	N	-	N
1992						
May	N	N	N	N	N	N
June	N	N	N	N	N	N
July	N	N	N	N	-	N
August	N	-	N	N	N	N
September	N	N	N	N	-	-

[1] AGPT conducted by the Ecological Support Branch, U.S. Environmental Protection Agency, Region IV.
[2] N = nitrogen

a small amount to the total (Wetzel 1983). The overwhelming influence of dissolved organic carbon, most of which is contributed from the watershed, tends to stabilize TOC concentrations and prevents wide fluctuations in concentration both spatially and temporally (Tables 10-27, 10-28, 10-29 and 10-30). At mainstem sampling stations in Weiss Lake individual TOC concentrations ranged from a low of 2.0 mg/l to a high of 11.0 mg/l. Seasonal mean concentrations were less variable with a low of 2.3 mg/l at station 12 and a high of 5.9 mg/l at station 4 during the winters of 1991 and 1992, respectively (Table 10-27). Seasonal trends in TOC concentrations at mainstem stations were not obvious. For example, TOC concentrations in winter 1991 were among the lowest measured and winter 1992 values were among the highest measured (Table 10-27). Spatial (upstream to downstream) trends were equally obscure. Bayne and Maceina (1992) reported mean growing season (May through September) TOC concentrations in Weiss Lake of 11.9 mg/l in 1989 and 4.1 mg/l in 1990. The large difference between years was attributed to unusually heavy rainfall during the 1989 growing season that affected TOC in all four lakes being studied.

TOC concentrations in Weiss Lake tributary embayments were somewhat more variable than concentrations on the mainstem (Tables 10-27, 10-28, 10-29 and 10-30). Individual concentrations ranged from 1.0 mg/l in the Little River embayment to 17 mg/l in Mud Creek embayment, both measured in winter 1992 (Table 10-27). Mud Creek seasonal mean TOC levels were highest on six of eight occasions and Little River TOC levels were lowest on six of eight occasions (Tables 10-27, 10-28, 10-29 and 10-30). Erosion and transport of relatively large quantities of suspended matter (Tables 10-9, 10-10, 10-11 and 10-12) in Mud Creek likely contributed to the elevated TOC levels in that stream. Conversely, Little River basin had less agricultural activity and a more complete forest coverage than the Mud Creek basin (Table 9-4).

10.2.3 Bacteria

The coliform group of bacteria are found in the intestines and feces of warm-blooded animals. This group of bacteria is used as an indicator of suitability of water for various uses (APHA *et al.* 1989). Coliform density is widely accepted as a criterion of the degree of pollution and sanitary quality of surface waters.

Water samples for total fecal coliform analysis were collected monthly at Weiss Lake sampling stations 1 through 13 from June through September 1991 (Table 10-1). Samples were taken just under the water surface using a sterilized container. The container was then placed on ice and transported to ADEM laboratory facilities in Montgomery, Alabama for analysis. Total fecal coliform densities were determined using the membrane filter procedure (APHA *et al.* 1989).

Fecal coliform densities in Weiss Lake were low during the summer of 1991 (Table 10-36). Only three samples exceeded a density of 20 fecal coliform colonies per 100 ml and, in those cases, densities were below the limits established to maintain water quality to support designated water uses of the lake. Weiss Lake is classified as swimming waters from Weiss dam to the Alabama-Georgia state line and the acceptable bacterial quality of swimming waters in Alabama is a geometric mean (at least five samples within a 30 day period) of 200 fecal coliform colonies per 100 ml of lake water. There were no spatial trends in the data that would indicate areas of the lake (e.g. tributaries) adversely affected by bacterial contamination.

Table 10-36. Fecal coliform bacterial densities (fecal coliform colonies per 100 ml) measured during monthly sampling of Weiss Lake, June through September 1991.

Sampling		Fecal Coliform Colonies per 100 ml			
Stations	DATE	June	July	August	September
1		<20	<20	<20	<20
2		66	<20	24	<20
3		<20	<20	<20	<20
4		<20	<20	<20	<20
5		<20	<20	<20	<20
6		<20	<20	<20	<20
7		<20	<20	<20	<20
8		<20	<20	<20	<20
9		<20	<20	<20	<20
10		<20	<20	<20	<20
11		<20	<20	<20	<20
12		<20	<20	<20	<20
13		30	<20	<20	<20

10.2.4 Toxic Contaminants

Duplicate sediment samples were collected at sampling station 1 through 13 (Table 10-2) in Weiss Lake on 21 September 1992. Samples were taken with a KB®, 2-inch diameter, core sampler equipped with a cellulose-acetate-butyrate (CAB) liner tube. The tubes, containing sediment, were sealed and placed on ice for transport to ADEM laboratory facilities in Montgomery, Alabama where the samples were frozen. The upper 5 cm of each core sample was removed for analysis. Preparation of the samples and analytical procedures used appear in Appendix 10. The sediment samples were analyzed for the following organic chemicals: chlordane, 4,4'-DDD, 4,4'-DDE, DDT, dieldrin, dursban, endrin, heptachlor epoxide, heptachlor, mirex, polychlorinated biphenyls (PCBs) and toxaphene.

The only chemicals found in concentrations above detection limits of the analytical procedure were PCB's (Table 10-37 and Appendix 10). They were found at concentrations of <0.20 μg/g at three locations; the powerhouse embayment (station 1), overbank area of mid-reservoir (station 4) and Yellow Creek embayment (station 5). The source of PCB's contamination has been identified as the General Electric Company in Rome, Georgia (EPD 1991). The distribution of detectable levels of PCB's in the downstream, lacustrine areas of Weiss Lake may indicate that contaminated sediments have been transported downstream during periods of high discharge. However, this can not be substantiated in the absence of historical data on sediment PCB's concentrations. There are no regulatory guidelines for PCB's sediment levels, however, the U.S. Food and Drug Administration has established an action level of 2.0 μg/g for PCB's in edible portions of fish tissue (Appendix 10).

Table 10-37. Concentrations of PCB's measured in sediment samples collected at sampling stations 1 through 13 on Weiss Lake, 21 September 1992.

Station	Replicate	Concentration ($\mu g/g$)
1	A	0.16
	B	0.15
2	A	U*
	B	U
3	A	U
	B	U
4	A	U
	B	0.18
5	A	0.15
	B	0.19
6	A	U
	B	U
7	A	U
	B	U
8	A	U
	B	U
9	A	U
	B	U
10	A	U
	B	U
11	A	U
	B	U
12	A	U
	B	U
13	A	U
	B	U

* Less than instrument detection limit.

10.2.5 Sediment Oxygen Demand

Sediment oxygen demand (SOD) is an expression of the rate at which lake sediments consume dissolved oxygen from the overlying water column (Hatcher 1986). Two processes, respiration of living organisms and decomposition of organic matter in the sediment, account for most of the oxygen consumption. SOD is an important component of water quality models that attempt to account for variations in dissolved oxygen of waterbodies. During the week of 9-11 April 1991, personnel from the U.S.E.P.A., Region IV, and ADEM conducted field measurements of SOD using SOD chambers placed on the lake bottom (Murphy and Hicks 1986). Mean water temperature ranged between 16.0 and 19.0°C and initial chamber dissolved oxygen concentrations ranged from 6.0 to 9.0 mg/l. The studies were conducted at six locations near water quality sampling stations 1, 2, 3, 6, 8 and 12. The results are summarized in Table 10-38 and the report containing all data gathered appears in Appendix 10.

Mean SOD's ranged from a low of 0.52 g $O_2/m^2 \bullet$day in the Little River embayment (station 6) to 1.02 g $O_2/m^2 \bullet$day at the upstream riverine location (station 12). Sediment texture was similar at all locations. Murphy and Hicks (1986) reported mean SOD rates detected with the EPA in-situ method ranging between 0.89 g $O_2/m^2 \bullet$ day and 3.91 g $O_2/m^2 \bullet$day in several TVA reservoirs.

Table 10-38. Sediment oxygen demand rates, water column respiration and bottom sediment characteristics for Weiss Lake, 9-11 April 1991.

Mainstem Sampling Stations	Mean SOD $g\ O_2/m^2 \cdot day$	Water Column Respiration $\mu g/l \cdot min$	Bottom Sediment
1[1] (2)[2]	0.8502[3] (0.6968-0.7579)	0.94	Soft fluffy muck
2 (1)	0.7648 (0.6151-0.7443)	2.78	About 7.5 cm muck over sandy clay
3 (3)	0.9029 (0.6958-0.8381)	0.27	About 7.5 cm muck over sandy clay
8 (4)	0.7092 (0.4676-0.6698)	0.49	About 7.5 cm muck over sandy clay
12 (5)	1.0232 (0.7876-1.1164)	0.29	About 7.5 cm muck over sandy clay
Embayment Station			
6 (6)	0.5247 (0.3871-0.4922)	1.61	About 7.5 cm muck over sandy clay

[1]Nearest water quality sampling station.
[2]EPA-ADEM station designation.
[3]Values adjusted to 20°C

11.0 BIOLOGICAL RESOURCES

11.1 FISHERY

Weiss Lake, recognized nationally for its crappie fishery, is known as the "crappie capital of the world". This lake has maintained a successful crappie fishery since the mid-1960's. Crappie fishing on Weiss Lake is so popular that more out-of-state fishing licenses are sold in Cherokee County than all other Alabama counties combined. The bass fishery also has an excellent reputation as evidenced by the number of bass tournaments held on the lake each year (Table 11-1 and 11-2). The Alabama Department of Conservation, Game and Fish Division conducts sampling of the reservoir on a regular basis. Some results of the 1987 and 1990-91 reservoir management reports are presented in Tables 11-3 through 11-5. A variety of sampling methods were utilized to determine the composition and condition of the sportfish and other species in the lake. Electrofishing was utilized in the spring and gill and trap netting in the fall. Additional results from the Bass Anglers Information Team (B.A.I.T.) are presented in Tables 11-6 through 11-8. The B.A.I.T. program began in 1986 with the objective of gathering information on the bass population and its utilization by fishermen through the combined efforts of bass club members and state fisheries biologists (Reeves and McHugh 1987).

According to state biologists the crappie fishery began to decline during the mid-1980's. As a result of this decline, an intensive research program was initiated by the state and Auburn University Fisheries personnel. A 10 inch minimum length limit was implemented in March 1990 as a result of the intensive study. A daily limit of three crappie per angler less than 10 inches is allowed for hooking mortality. Research is ongoing to assess the

Table 11-1. Statewide summary of reservoir results for all bass clubs participating in the 1987 B.A.I.T. program.

Reservoir	Tourn. Number	Bass Anglers	Success	Bass Number	Bass Weight	Bass >5LB	Total Hours	Percent Success	Average Weight	Bass per Man-day	Pounds per Man-day	Hours per Bass > 5LB
Aliceville	7	145	124	372	516.50	9	1534	85.52	1.39	2.43	3.37	170
Aberdeen	1	23	18	41	78.38	0	253	78.26	1.91	1.62	3.10	
Bankhead	7	117	83	194	271.31	1	1110	70.94	1.40	1.75	2.44	1110
Bay Springs	2	48	28	64	94.94	1	456	58.33	1.48	1.40	2.08	456
Big Creek	1	10	6	10	13.10	0	90	60	1.31	1.11	1.46	
Blackshear	1	14	6	24	50.38	1	112	42.86	2.10	2.14	4.50	112
Cedar Creek	2	55	37	70	114.69	2	548	67.27	1.64	1.28	2.09	274
Claiborne	2	45	38	133	214.25	0	516	84.44	1.61	2.58	4.15	
Coffeeville	8	78	47	95	134.51	0	575	60.26	1.42	1.65	2.34	
Demopolis	16	361	294	943	1357.71	4	4199	81.44	1.44	2.25	3.23	1050
Dog River	3	46	35	92	122.84	0	479	76.09	1.34	1.92	2.56	
Eufaula	33	1493	1096	3847	7839.08	163	14692	73.41	2.04	2.62	5.34	90
Gainesville	9	170	138	377	585.57	7	1724	81.18	1.55	2.19	3.40	246
Gantt	2	21	10	19	30.19	0	205	47.62	1.59	.93	1.47	
Guntersville	18	300	233	785	980.03	5	2819	77.67	1.25	2.78	3.48	564
Harding	8	126	96	201	434.45	5	1070	76.19	2.16	1.88	4.06	214
Harris	10	180	145	356	471.47	7	1723	80.56	1.32	2.07	2.74	246
Holt	2	38	33	110	137.37	0	364	86.84	1.25	3.02	3.77	
Jackson	1	17	16	55	61.94	0	221	94.12	1.13	2.49	2.80	
Jones Bluff	8	451	358	834	1360.41	23	4083	79.38	1.63	2.04	3.33	178
Jordan	15	547	448	1201	2148.81	23	5054	81.90	1.79	2.38	4.25	220
Lay	7	242	181	520	915.52	7	2245	74.79	1.76	2.32	4.08	321
Little Bear	1	20	16	63	95.19	1	260	80	1.51	2.42	3.66	260
Logan Martin	27	517	364	1172	1655.48	9	4914	70.41	1.41	2.39	3.37	546
Martin	18	559	311	906	1319.36	10	5136	55.64	1.46	1.76	2.57	514
Millers Ferry	33	633	558	2139	3359.79	23	7869	88.15	1.57	2.72	4.27	342
Mitchell	10	210	163	445	753.36	4	2009	77.62	1.69	2.22	3.75	502
Mobile Delta	39	555	378	1047	1396.44	2	5665	68.11	1.33	1.85	2.47	2833
Neely Henry	13	295	159	521	746.84	4	2639	53.90	1.43	1.97	2.83	660
Pickwick	14	267	190	670	921.33	7	2547	71.16	1.38	2.63	3.62	364
Seminole	2	36	20	55	96.13	2	398	55.56	1.75	1.38	2.42	199
Smith	4	77	34	108	122.07	0	660	44.16	1.13	1.64	1.85	
Tuscaloosa	2	33	19	39	61.13	2	304	57.58	1.57	1.28	2.01	152
Warrior	5	163	131	407	632.06	4	1664	80.37	1.55	2.45	3.80	416
Weiss	16	383	238	1010	1472.85	15	3702	62.14	1.46	2.73	3.98	247
West Point	11	198	84	164	525.10	16	2040	42.42	3.20	.80	2.57	128
Wheeler	15	270	198	737	1200.14	4	2588	73.33	1.63	2.85	4.64	647
Wilson	8	135	81	181	267.76	2	1261	60	1.48	1.44	2.12	631
Yates	1	16	16	51	85.31	2	128	100	1.67	3.98	6.66	64
Statewide	382	8894	6430	20058	32643.79	365	87856	72.30	1.63	2.28	3.72	241

Table 11-2. Statewide summary of tournaments for bass clubs participating in the 1993 B.A.I.T. program.

Reservoir	Tourn. Number	Bass Anglers	Success	Bass Number	Bass Weight	Bass >5LB	Total Hours	Percent Success	Average Weight	Bass per Man-day	Pounds per Man-day	Hours per Bass > 5LB
Aliceville	5	126	83	190	340.01	5	1188.1	65.87	1.79	1.60	2.86	238
Bankhead	2	22	19	70	105.19	2	209.0	86.36	1.50	3.35	5.03	105
Cedar Creek	3	49	37	100	139.73	4	502.0	75.51	1.40	1.99	2.78	126
Claiborne	3	36	28	98	135.63	0	360.0	77.78	1.38	2.72	3.77	
Coffeeville	13	223	141	345	490.14	3	1794.0	63.23	1.42	1.92	2.73	598
Demopolis	15	409	336	1096	1722.55	13	4018.5	82.15	1.57	2.73	4.29	309
Eufaula	26	1468	775	1265	4354.31	133	17667.0	52.79	3.44	0.72	2.46	133
Gainesville	7	234	172	584	864.83	8	2243.5	73.50	1.48	2.60	3.85	280
Guntersville	47	1010	635	1495	2568.65	39	7147.0	62.87	1.72	2.09	3.59	183
Harding	8	130	100	302	511.92	7	1170.0	76.92	1.70	2.58	4.38	167
Harris	36	680	570	2024	2600.16	8	6599.8	83.82	1.28	3.07	3.94	825
Holt	6	172	121	322	457.94	2	1546.2	70.35	1.42	2.08	2.96	773
Jones Bluff	9	128	103	328	573.38	4	1140.8	80.47	1.75	2.88	5.03	285
Jordan	21	449	334	1082	2020.1	14	3998.8	74.39	1.87	2.71	5.05	286
Lay	31	785	622	2022	3518.46	17	7373.3	79.24	1.74	2.74	4.77	434
Little Bear	3	71	54	139	161.57	1	607.5	76.06	1.16	2.29	2.66	608
Logan Martin	49	1246	924	3061	4985.51	37	12155.5	74.16	1.63	2.52	4.10	329
Martin	38	841	691	2705	3511.05	14	8110.8	82.16	1.30	3.34	4.33	579
Millers Ferry	31	684	565	2029	3559.35	29	8052.0	82.60	1.75	2.52	4.42	278
Mitchell	15`	289	238	737	1215.54	2	2612.0	82.35	1.65	2.82	4.65	1306
Mobile Delta	25	398	249	655	1044.12	1	4054.0	62.56	1.59	1.62	2.58	4054
Neely Henry	15	463	366	1114	1762.96	7	4230.0	79.05	1.58	2.63	4.17	604
Pickwick	13	401	251	681	1097.43	8	3919.0	62.59	1.61	1.74	2.80	490
Smith	8	531	356	770	1005.34	10	5086.8	67.04	1.31	1.51	1.98	509
Tuscaloosa	2	63	39	90	121.38	0	525.0	61.90	1.35	1.71	2.31	
Upper Bear	3	80	42	104	126.81	1	614.0	52.50	1.22	1.69	2.07	614
Warrior	11	261	190	539	858.95	6	2482.5	72.80	1.59	2.17	3.46	414
Weiss	37	750	605	1835	3034.1	27	7429.0	80.67	1.65	2.47	4.08	275
West Point	30	460	219	570	1293.99	21	4342.0	47.61	2.27	1.31	2.98	207
Wheeler	33	659	518	1889	3290.73	42	6679.5	78.60	1.74	2.83	4.93	159
Wilson	13	302	200	643	963.32	14	2627.5	66.23	1.50	2.45	3.67	188
Statewide	558	13420	9583	28884	48435.15	479	130484.8	71.41	1.68	2.21	3.71	272

Table 11-3. Number of species collected by gear type in Weiss Reservoir, 1990.

	Gear Type											
	Spring Electrofishing			Gill Netting			Seining			Trap Netting		
Species	No.	CPE	Tot.E	No.	CPE	Tot.E	No.	CPE	Tot.E	No.	CPE	Tot.E
Gizzard Shad	472	295	1.6	189	18.9	10	3	0.2	19			
Threadfin Shad	8	5	1.7									
Largemouth Bass	132	69	1.9	2	0.2	10	21	1.1	19			
Spotted Bass	22	13	1.7				5	0.3	19			
Bluegill Sunfish	109	68	1.6	6	0.6	10	6	0.3	19			
Striped Bass				41	4.1	10						
White Bass				21	2.1	10						
Green Sunfish	4	4	1.0				1	0.1	19			
Redbreast Sunfish	8	8	1.0									
Redear Sunfish	4	4	1.0									
Longear Sunfish							1	0.1	19			
Black Crappie	15	5	3.0	10	1.0	10				218	2.7	80
White Crappie	18	6	3.0	7	0.7	10				158	2.0	80
Blacktail Redhorse	1	1	1.0									
Spotted Sucker	3	3	1.0	7	0.7	10						
Brown Bullhead				1	0.1	10						
White Catfish				4	0.4	10						
Channel Catfish				31	3.1	10						
Blue Catfish				170	17.0	10						
Flathead Catfish				2	0.2	10						
Blacktail Shiner	1	1	1.0									
Misc. Minnow							77	4.1	19			
Logperch							3	0.2	19			
Carp				10	1.0	10						
Golden Shiner	3	3	1.0				5	0.3	19			
Highfin Carpsucker				3	0.3	10			19			
Mosquitofish							13	0.7	19			
Smallmouth Buffalo				6	0.6	10						
Black Redhorse	1	1	1.0									
Warmouth Sunfish	1	1	1.0									
Fathead Minnow	1	1	1.0									

Table 11-4. Number of species collected by gear type in Weiss Reservoir, 1991.

	Gear Type											
	Spring Electrofishing			Fall Gill Netting			Seining			Fall Trap Netting		
Species	No.	CPE	Tot.E	No.	CPE	Tot.E	No.	CPE	Tot.E	No.	CPE	Tot.E
Gizzard Shad	305	305	1.0	50	5.0	10	11	0.5	21	5	0.3	20
Threadfin Shad	131	101	1.3				4	0.2	21	18	0.9	20
Largemouth Bass	110	37	3.0				10	0.5	21	1	0.1	20
Spotted Bass	35	12	3.0				8	0.4	21			
Bluegill Sunfish	100	37	2.7				52	2.5	21	296	14.8	20
Redbreast Sunfish	7	7	1.0				4	0.2	21	7	0.4	20
Redear Sunfish	4	7	1.0	1	0.1	10				6	0.3	20
Black Crappie	25	8	3.0	14	1.4	10				374	3.7	100
White Crappie	37	12	3.0	7	0.7	10				297	2.97	100
Striped Bass	1	1	1.0	32	3.2	10						
White Bass				6	0.6	10						
Blacktail Redhorse	1	1	1.0									
Spotted Sucker	16	16	1.0	19	1.9	10						
Black Redhorse	1	1	1.0							1	0.1	20
Flathead Catfish	1	1	1.0	12	1.2	10						
Warmouth Sunfish	1	1	1.0							3	0.2	20
Golden Shiner	4	4	1.0									
Misc. Minnow	2	2	1.0				172	8.2	21			
Freshwater Drum	1	1	1.0									
Logperch							1	0.1	21	11	0.6	20
Blacktail Shiner							44	2.1	21			
Carp				9	0.9	10						
Blue Catfish				378	37.8		5	0.3	19			
Channel Catfish				85	8.5	10				4	0.2	20
White Catfish				4	0.4	10				1	0.1	20
Highfin Carpsucker				19	1.9	10						
Smallmouth Buffalo				5	0.5	10						
Freshwater Drum				19	1.9	10						
Goldfish				1	0.1	10						
Green Sunfish										3	0.2	20

Table 11-5. Total number, catch per unit effort (CPE) and percent of sample of target species collected by electrofishing in Weiss Lake. RSD-S = relative stock density (stock size), RSD-Q = relative stock density (quality size), RSD-P = relative stock density (preferred size), RSD-M = relative stock density (memorable size), RSD-T = relative stock density (trophy size).

Species	Year	No. of Samples	Substock			RSD-S				RSD-Q				SD-P				RSD-M				RSD-T			TOTAL		PSD
			No.	CPE	Pct	No.	CPE	Pct.	Wr	No.	CPE	Pct.	Wr	No.	CPE	Pct	Wr	No.	CPE	Pct.	Wr	No.	CPE	Wr	No.	CPE	
Largemouth Bass	1987	4.0	14	7.0	16	44	22	51	95	16	8.0	19	101	22	11.0	26	106	4	2	5	111	0	0	0	100	50.0	49
	1990	3.8	28	14.7	27	34	17.8	33	98	44	23.1	42	107	20	10.5	19	108	6	3.1	6	107	0	0	0	132	69.5	67
	1991	6.0	10	3.3	10	27	9	27	97	45	15.0	45	105	26	8.7	26	109	2	0.7	2	117	0	0	0	110	36.6	73
Bluegill	1987	3.2	3	1.7	3	50	29.4	52	78	47	27.6	48	82												100	66.7	48
	1990	3.2	5	3.1	5	94	58.7	89	91	10	6.2	11	86												109	68.0	10
	1991	5.4	2	0.7	2	82	30.3	84	85	16	5.9	16	77												100	37.0	16
Striped Bass	1987	12.0	0	0.0	0	37	3.1	97		1	0.1	3													38	3.2	
	1990	10.0	0	0.0	0	33	3.3	80	109	8	0.8	20	98												41	4.1	
	1991	10.0	0	0.0	0	3	0.3	9	105	29	2.9	91	102												32	3.2	
White Crappie	1990	80.0	64	0.8	68	40	0.5	43	74	23	0.3	24	94	25	0.2	27	110	6	0.1	6	104	0	0	0	158	2	
	1991	100.0	106	1.1	55	65	0.7	34	79	97	1.0	51	100	23	0.2	12	110	6	0.1	3	104	0	0	0	297	3	
	1992	76.0	27	0.4	22.8	28	0.37	24	78	46	0.6	39	88	37	0.5	31	94	7	0.09	6	109	0	0	0	145	1.9	
	1993	76.0	66	0.9	92	6	0.08	8	78	26	0.3	36	97	35	0.5	49	102	5	0.07	7	101	0	0	0	138	1.8	
Black Crappie	1990	80.0	44	0.6	25	73	0.9	42	69	51	0.6	29	85	40	0.5	23	99	10	0.1	6	101	0	0	0	218	2.7	
	1991	100.0	30	0.3	9	107	1.1	31	79	137	1.4	40	97	86	0.9	25	105	14	0.1	4	107	0	0	0	374	3.7	
	1992	76.0	23	0.3	21.7	25	0.33	24	77	38	0.5	36	87	36	0.5	34	90	7	0.09	7	99	0	0	0	129	1.7	
	1993	76.0	38	0.5	31.4	54	0.71	45	84	37	0.5	31	93	27	0.4	22	100	2	0.03	2	105	1	0.01	114	159	2.1	

*Substock Pct. is substock ratio: number of substock size fish collected for every 100 fish of stock size and larger.

Table 11-6. Ranking by quality indicators for all reservoirs with five or more tournament reports in the 1987 B.A.I.T. program.

Rank	Percent Success	Average Weight	Bass per Man-day	Pounds per Man-day	Hours per Bass > 5LB	Overall	Value
1	Millers Ferry	West Point	Wheeler	Eufaula	Eufaula	Eufaula	101
2	Aliceville	Harding	Guntersville	Wheeler	West Point	Jordan	98
3	Jordan	Eufaula	**Weiss**	Millers Ferry	Aliceville	Millers Ferry	97
4	Demopolis	Jordan	Millers Ferry	Jordan	Jones Bluff	Harding	83
5	Gainesville	Lay	Pickwick	Lay	Harding	Lay	82
6	Harris	Mitchell	Eufaula	Harding	Jordan	Wheeler	81
7	Warrior	Jones Bluff	Warrior	**Weiss**	Harris	Warrior	79
8	Jones Bluff	Wheeler	Aliceville	Warrior	Gainesville	Aliceville	78
9	Guntersville	Millers Ferry	Logan Martin	Mitchell	**Weiss**	Gainesville	76
10	Mitchell	Gainesville	Jordan	Pickwick	Lay	Jones Bluff	75
11	Harding	Warrior	Lay	Guntersville	Millers Ferry	**Weiss**	74
12	Lay	Wilson	Demopolis	Gainesville	Pickwick	Mitchell	73
13	Eufaula	**Weiss**	Mitchell	Logan Martin	Warrior	Guntersville	62
14	Wheeler	Martin	Gainesville	Aliceville	Mitchell	Pickwick	62
15	Pickwick	Demopolis	Harris	Jones Bluff	Martin	Demopolis	57
16	Bankhead	Neely Henry	Jones Bluff	Demopolis	Logan Martin	Harris	56
17	Logan Martin	Coffeeville	Neely Henry	Neely Henry	Guntersville	West Point	55
18	Mobile Delta	Logan Martin	Harding	Harris	Wilson	Logan Martin	52
19	**Weiss**	Bankhead	Mobile Delta	West Point	Wheeler	Martin	34
20	Coffeeville	Aliceville	Martin	Martin	Neely Henry	Neely Henry	32
21	Wilson	Pickwick	Bankhead	Mobile Delta	Demopolis	Wilson	27
22	Martin	Mobile Delta	Coffeeville	Bankhead	Bankhead	Bankhead	25
23	Neely Henry	Harris	Wilson	Coffeeville	Mobile Delta	Mobile Delta	22
24	West Point	Guntersville	West Point	Wilson	Coffeeville	Coffeeville	19

Table 11-7. Ranking by quality indicators for all reservoirs with five or more tournament reports in the 1990 B.A.I.T. program.

Rank	Percent Success	Average Weight	Bass per Man-day	Pounds per Man-day	Hours per Bass > 5LB	Overall	Value
1	Logan Martin	West Point	Little Bear	Mitchell	Pickwick	**Weiss**	91
2	**Weiss**	Wilson	**Weiss**	**Weiss**	Eufaula	Mitchell	87
3	Little Bear	Pickwick	Mitchell	Eufaula	Wilson	Eufaula	83
4	Millers Ferry	Millers Ferry	Martin	Lay	Aliceville	Wheeler	83
5	Warrior	Mitchell	Neely Henry	Little Bear	West Point	Logan Martin	81
6	Wheeler	Lay	Logan Martin	Wheeler	Warrior	Millers Ferry	79
7	Mitchell	Eufaula	Eufaula	Millers Ferry	Guntersville	Warrior	75
8	Harris	Wheeler	Wheeler	Neely Henry	**Weiss**	Little Bear	67
9	Aliceville	Jordan	Demopolis	Logan Martin	Wheeler	Neely Henry	65
10	Jordan	Jones Bluff	Lay	Warrior	Neely Henry	Lay	62
11	Demopolis	Logan Martin	Warrior	West Point	Demopolis	Pickwick	62
12	Mobile Delta	Neely Henry	Millers Ferry	Demopolis	Logan Martin	Demopolis	58
13	Jones Bluff	Warrior	Harris	Martin	Gainesville	West Point	58
14	Guntersville	Coffeeville	Coffeeville	Jones Bluff	Millers Ferry	Jones Bluff	52
15	Martin	**Weiss**	Guntersville	Coffeeville	Jones Bluff	Martin	49
16	Gainesville	Aliceville	Jones Bluff	Jordan	Martin	Aliceville	48
17	Pickwick	Gainesville	Jordan	Pickwick	Mitchell	Guntersville	48
18	Eufaula	Guntersville	Mobile Delta	Guntersville	Coffeeville	Jordan	48
19	Lay	Demopolis	Gainesville	Harris	Lay	Wilson	47
20	Neely Henry	Mobile Delta	Pickwick	Gainesville	Jordan	Coffeeville	38
21	Coffeeville	Little Bear	Aliceville	Mobile Delta	Harris	Harris	37
22	Wilson	Harris	West Point	Aliceville	Mobile Delta	Gainesville	35
23	West Point	Martin	Wilson	Wilson	Little Bear	Mobile Delta	27

Table 11-8. Ranking by quality indicators for all reservoirs with five or more tournament reports in the 1993 B.A.I.T. program.

Rank	Percent Success	Average Weight	Bass per Man-day	Pounds per Man-day	Hours per Bass > 5LB	Overall	Value
1	Harris	Eufaula	Martin	Jordan	Eufaula	Wheeler	104
2	Millers Ferry	West Point	Harris	Jones Bluff	Wheeler	Jones Bluff	101
3	Mitchell	Jordan	Jones Bluff	Wheeler	Harding	Millers Ferry	96
4	Martin	Aliceville	Wheeler	Lay	Guntersville	Jordan	94
5	Demopolis	Millers Ferry	Mitchell	Mitchell	Wilson	Harding	88
6	**Weiss**	Jones Bluff	Lay	Millers Ferry	West Point	Lay	88
7	Jones Bluff	Wheeler	Demopolis	Harding	Aliceville	Mitchell	81
8	Lay	Lay	Jordan	Martin	**Weiss**	**Weiss**	
9	Neely Henry	Guntersville	Neely Henry	Demopolis	Millers Ferry	Demopolis	78
10	Wheeler	Harding	Gainesville	Neely Henry	Gainesville	Martin	74
11	Harding	**Weiss**	Harding	Logan Martin	Jones Bluff	Logan Martin	66
12	Jordan	Mitchell	Millers Ferry	**Weiss**	Jordan	Harris	65
13	Logan Martin	Logan Martin	Logan Martin	Harris	Demopolis	Neely Henry	64
14	Gainesville	Pickwick	**Weiss**	Gainesville	Logan Martin	Guntersville	63
15	Warrior	Mobile Delta	Wilson	Wilson	Warrior	Gainesville	62
16	Holt	Warrior	Warrior	Guntersville	Lay	Aliceville	58
17	Smith	Neely Henry	Guntersville	Warrior	Pickwick	Wilson	58
18	Wilson	Demopolis	Holt	West Point	Smith	Eufaula	55
19	Aliceville	Wilson	Coffeeville	Holt	Martin	West Point	55
20	Coffeeville	Gainesville	Pickwick	Aliceville	Coffeeville	Warrior	51
21	Guntersville	Holt	Mobile Delta	Pickwick	Neely Henry	Pickwick	36
22	Pickwick	Coffeeville	Aliceville	Coffeeville	Holt	Holt	34
23	Mobile Delta	Smith	Smith	Mobile Delta	Harris	Coffeeville	27
24	Eufaula	Martin	West Point	Eufaula	Mitchell	Smith	24
25	West Point	Harris	Eufaula	Smith	Mobile Delta	Mobile Delta	23

results of this length limit and any changes to the fishery as a result of the implementation.

The 1990 year class of crappie was the dominant year class collected during 1991. Flooding during the spring of 1990 was a major factor contributing to the success of the crappie spawn (Catchings et al. 1994).

The bass fishery had increased in popularity and apparently in production from 1987 through 1991 (Tables 11-6 and 11-7, 11-8). The largemouth bass population was dominated in 1987 by stock size fish, however during 1990 and 1991, quality size fish were predominant (Table 11-5). The number of bass tournaments increased on the lake during this time and the overall ranking of Weiss Lake went from 11 out of 25 in 1987 to number 1 in 1990. The overall ranking dropped to 6 in 1993 (Table 11-8), but remained high in most all B.A.I.T. categories ranking bass fishing in state reservoirs.

The state has stocked Gulf Coast striped bass and Florida largemouth bass in Weiss Lake since 1980 (striped bass) and 1981 (Florida largemouth bass), Table 11-9. A limited striped bass fishery exists primarily in the cooler Little River arm of the reservoir, where there were reports of some fish exceeding 15 pounds. A strong 1989 year class of striped bass was present both in the 1990 and 1991 collections. Since striped bass have not been stocked in the lake since 1986, there was some question about the source of these fish. They could either be escaped fish from stockings done by the Georgia Department of Natural Resources into reservoirs upstream of Weiss or the progeny of natural reproduction (Catchings et al. 1994). Testing of these fish was recommended to identify whether the fish were Atlantic or Gulf Coast strain striped bass.

Table 11-9. Fish stockings in Weiss Reservoir, 1981-1991.

Species	Date	Rate	Size Group (in.)	Total
Striped Bass	1980	0.8/A	1-2	21,560
	1985	1.0/A	1-2	30,000
	1986	2.0/A	1-2	59,700
			Total	89,700
Largemouth Bass	1981	0.8/A	1-2	23,000
	1985	1.0/A	1-2	30,010
	1986	1.2/A	1-2	34,700
	1987	1.0/A	1-2	29,996
	1988	2.0/A	1-2	60,000
	1989	4.0/A	1-2	120,696
	1990	2.0/A	1-2	60,400
	1991	0.4/A	1-2	10,778
			Total	369,580

11.2 Wildlife

A checklist of birds, amphibians and reptiles expected in the Weiss Lake watershed appears in Table 11-9. The majority of the watershed surrounding Weiss Lake is forested, followed closely by land utilized for agricultural practices. These forested areas provide habitat for many of these diverse species. Abundant habitat in and around the lake attracts numerous waterfowl year round, but particularly in the fall and winter. Osprey (Pandion haliaetus carolinenses) have been observed nesting on navigation markers located in the lake during spring months and the bald eagle (Haliaeetus leucocephalus) is likely a visitor to the area.

Table 11-9. Checklist of birds, amphibians and reptiles expected in and around Weiss Lake and its surrounding watershed.

Family Scientific Name	Common name
BIRDS	
Gaviidae	
Gavia immer	common loon
Podicipedidae	
Podiceps auritus	horned grebe
Podiceps nigricollis	eared grebe
Podilymbus podiceps	pied-billed grebe
Pelecanidae	
Pelecanus erythrorhynchos	white pelican
Phalacrocoracidae	
Phalacrocorax auritus	double-crested cormorant
Anhingidae	
Anhinga anhinga	anhinga
Ardeidae	
Ardea herodias	great blue heron
Butorides virescens	green heron
Florida caerula	little blue heron
Bubulcus ibis	cattle egret
Casmerodius albus	great egret
Egretta thula	snowy egret
Hydranassa tricolor	Louisiana heron
Nycticorax hycticorax	black-crowned night heron
Nyctanassa violacea	yellow-crowned night heron
Ixobrychus exilis	least bittern
Botaurus lentiginosus	American bittern
Ciconiidae	
Mycteria americana	wood stork
Threskiornithidae	
Plegadis falcinellus	glossy ibis
Eudocimus albus	white ibis
Anatidae	
Olor columbianus	whistling swan
Branta canadensis	Canada goose
Anser albifrons	white-fronted goose
Chen caerulescens	snow goose
Dendrocygna bicolor	fulvous tree duck
Anas platyrhynchos	mallard
Anas rubripes	black duck
Anas strepera	gadwall
Anas acuta	pintail

Table 11-9. (Continued)

Family	Scientific Name	Common name
	Anas crecca	green-winged teal
	Anas discors	blue-winged teal
	Anas americana	American wigeon
	Anas cylpeata	northern shoveler
	Aix sponsa	wood duck
	Aythya americana	redhead
	Aythya collaris	ring-necked duck
	Aythya valisineria	canvas back
	Aythya marila	greater scaup
	Aythya affinis	lesser scaup
	Bucephala clangula	common goldeneye
	Bucephala albeola	bufflehead
	Clangula hyemalis	oldsquaw
	Melanitta delglandi	white-winged scoter
	Melanitta perspicillata	surf scoter
	Oxyura jamaicensis	ruddy duck
	Lophodytes cucullatus	hooded merganser
	Mergus merganser	common merganser
	Mergus serrator	red-breasted merganser
Cathartidae		
	Cathartes aura	turkey vulture
	Coragyps atratus	black vulture
Accipitridae		
	Elanoides forficatus	swallow-tailed kite
	Ictinia misisippiensis	Mississippi kite
	Accipter striatus	sharp-shinned hawk
	Accipter cooperii	Cooper's hawk
	Buteo jamaicensis	red-tailed hawk
	Buteo lineatus	red-shouldered hawk
	Buteo platypterus	broad-winged hawk
	Buteo swainsoni	Swainson's hawk
	Buteo lagopus	rough-legged hawk
	Aquila chrysaetos	golden eagle
	Haliaeetus leucocephalus	bald eagle
	Circus cyaneus	marsh hawk
Pandionidae		
	Pandion haliaetus	osprey
Falconidae		
	Falco perigrinus	peregrin falcon
	Falco columbarius	merlin
	Falco sparverius	American kestrel
Tetraonidae		
	Bonasa umbellus	ruffed grouse

Table 11-9. (Continued)

Family Scientific Name	Common name
Phasianidae	
Colinus virginianus	bobwhite
Meleagrididae	
Meleagris gallopavo	turkey
Gruidae	
Grus canadensis	sandhill crane
Rallidae	
Rallus elegans	kingrail
Rallus limicola	Virginia rail
Porzana carolina	sora
Porphyrula martinica	purple gallinule
Gallinula chloropus	common gallinule
Fulica americama	American coot
Charadriidae	
Charadrius semipalmatus	semipalmated plover
Charadrius melodus	piping plover
Charadrius vociferus	killdeer
Pluvialus dominica	American golden plover
Pluvialus squatarola	black-bellied plover
Scolopacidae	
Arenaria interpres	ruddy turnstone
Philohela minor	American woodcock
Capella gallinago	common snipe
Numenius phaeopus	whimbrel
Bartramia longicauda	upland sandpiper
Actitis macularia	spotted sandpiper
Tringa solitaria	solitary sandpiper
Tringa melanoleuca	greater yellow legs
Tringa flavipes	lesser yellow legs
Catoptraphorus semipalmatus	willet
Calidris melanotus	pectoral sandpiper
Calidris fuscicollis	white-rumped sandpiper
Calidris bairdii	Baird's sandpiper
Calidris minutilla	least sandpiper
Calidris alpina	dulin
Calidris pusilla	semipalmated sandpiper
Calidris mauri	western sandpiper
Calidris alba	sanderling
Limnodromus griseus	short-billed dowitcher
Limnodromus scolopaceus	land-billed dowitcher
Micropalama himantopus	stilt sandpiper
Tryngites subruficollis	buff-breasted sandpiper
Limosa fedoa	marbled godwit

Table 11-9. (Continued)

Family	Scientific Name	Common name
Recurvirostridae		
	Recurvirostra americama	American avocet
Phalaropodidae		
	Phalaropus fulicarius	red phalarope
	Steganopus tricolor	Wilson's phalarope
	Lobipes lobatus	northern phalarope
Laridae		
	Larus argentatus	herring gull
	Larus delawarensis	ring-billed gull
	Larus artricilla	laughing gull
	Larus philadelphia	Bonaparte's gull
	Sterna forsteri	Forster's tern
	Sterna hirundo	common tern
	Sterna albifrons	least tern
	Thalasseus maximus*	royal tern
	Hydroprogne caspia	caspian tern
	Chlidonias niger	black tern
Columbidae		
	Columba livia	rock dove (pigeon)
	Zenaida asiatica	white-winged dove
	Zenaida macroura	mourning dove
	Columbina passerina	ground dove
Cuculidae		
	Cocoyzus americanus	yellow-billed cuckoo
	Cocoyzus erythropthalmus	black-billed cuckoo
Tytonidae		
	Tyto alba	barn owl
	Otus asio	screech owl
	Bubo virginianus	great horned owl
	Strix varia	barred owl
	Asio flammeus	short-eared owl
	Aegolius acadicus	saw-whet owl
Caprimulgidae		
	Caprimulgus carolinensis	Chuck-Will's-widow
	Caprimulgus vociferus	whip-poor-will
	Chordeiles minor	common nighthawk
Apodidae		
	Chaetura pelagica	chimney swift
Trochilidae		
	Archilochus colubris	ruby-throated hummingbird
Alcedinidae		
	Megacerle alcyon	belted kingfisher

Table 11-9. (Continued)

Family	Scientific Name	Common name
Picidae		
	Colaptes auratus	common flicker
	Dryocopus pileatus	pileated woodpecker
	Centurus carolinus	red-bellied woodpecker
	Melanerpea erythrocephalus	red-headed woodpecker
	Sphyrapicus varius	yellow-bellied sapsucker
	Dendrocopos villosus	hairy woodpecker
	Dendrocopos pubescens	downy woodpecker
	Picoides borealis	red-cockaded woodpecker
Tyrannidae		
	Tyrannus tyrannus	eastern kingbird
	Tyrannus verticalis	western kingbird
	Muscivora forficata	scissor-tailed flycatcher
	Myiarchus crinitus	great creasted flycatcher
	Sayornis phoebe	eastern phoebe
	Empidonax flaviventris	yellow-bellied flycatcher
	Empidonax virescens	acadian flycatcher
	Empidonax traillii	willow flycatcher
	Empidonax alnorum	alder flycatcher
	Empidonax minimus	least flycatcher
	Contopus virens	eastern wood pewee
	Nuttallornis borealis	olive-sided flycatcher
Alaudidae		
	Eremophila alpestris	horned lark
Hirundinidae		
	Iridoprocne bicolor	tree swallow
	Riparia riparia	bank swallow
	Stelgidopteryx ruficollis	rough-winged swallow
	Hirundo rustica	barn swallow
	Petrochelidon pyrrhonota	cliff swallow
	Progne subis purple martin	
Corvidae		
	Cyanocitta cristata	blue jay
	Corvus brachyrhynchos	common crow
Paridae		
	Parus carolinensis	carolina chickadee
	Parus bicolor	tufted titmouse
Sittidae		
	Sitta carolinensis	white-breasted nuthatch
	Sitta canadensis	red-breasted nuthatch
	Sitta pusilla	brown-headed nuthatch
Certhidae		
	Certhia familiaris	brown creeper

Table 11-9. (Continued)

Family Scientific Name	Common name
Troglodytidae	
Troglodytes aedon	house wren
Troglodytes troglodytes	winter wren
Thryomanes bewickii	Bewick's wren
Thryothorus ludovicianus	carolina wren
Telmatodytes palustris	long-billed marsh wren
Cistothorus platensis	short-billed marsh wren
Mimidae	
Mimus polyglottos	mocking bird
Dumetella carolinensis	gray catbird
Toxostoma rufum	brown thrasher
Turdidae	
Turdus migratorius	american robin
Hylocichla mustelina	wood thrush
Catharus guttatus	hermit thrush
Catharus ustulatus	Swainson's thrush
Catharus minimus	gray-cheeked thrush
Catharus fuscescens	veery
Sialia sialis	eastern bluebird
Sylviidae	
Polioptila caerula	blue-gray gnatcatcher
Regulus satrapa	golden-crowned kinglet
Regulus calendula	ruby-crowned kinglet
Motacillidae	
Anthus spinoletta	water pipit
Anthus spragueii	Sprague's pipit
Bombycillidae	
Bombycilla cedrorum	cedar waxwing
Laniidae	
Lanius ludovicianus	loggerhead shrike
Sturnidae	
Sturnus vulgaris	starling
Vireonidae	
Vireo griseus	white-eyed vireo
Vireo bellii	Bell's vireo
Vireo flavifrons	yellow-throated vireo
Vireo solitarius	solitary vireo
Vireo olivaceus	red-eyed vireo
Vireo philadelphicus	Philadelphia vireo
Vireo gilvus	warbling vireo

Table 11-9. (Continued)

Family Scientific Name	Common name
Parulidae	
Mniotilta varia	black-and-white warbler
Protonotaria citrea	prothonotary warbler
Limnothlypis swainsonii	Swainson's warbler
Helmitheros vermivorus	worm-eating warbler
Vermivora chrysoptera	golden-winged warbler
Vermivora pinus	blue-winged warbler
Vermivora bachmanii	Bachman's warbler
Vermivora peregrina	Tennessee warbler
Vermivora celata	orange-crowned warbler
Vermivora ruficapilla	Nashville warbler
Parula americana	northern parula
Dendroica petechia	yellow warbler
Dendroica magnolia	magnolia warbler
Dendroica tigrina	cape may warbler
Dendroica caerulescens	black-throated blue warbler
Dendroica coronata	yellow-rumped warbler
Dendroica virens	black-throated green warbler
Dendroica cerulea	cerulean warbler
Dendroica fusca	blackburnian warbler
Dendroica dominica	yellow-throated warbler
Dendroica pensylvanica	chestnut-sided warbler
Dendroica castanea	bay-breasted warbler
Dendroica striata	blackpoll warbler
Dendroica pinus	pine warbler
Dendroica kirtlandii	Kirtland's warbler
Dendroica discolor	prairie warbler
Dendroica palmarum	palm warbler
Seiurus aurocapillus	ovenbird
Seiurus noveboracensis	northern waterthrush
Seiurus motacilla	Louisiana waterthrush
Oporornis formosus	Kentucky warbler
Oporornis agilis	Connecticut warbler
Oporornis philadelphia	mourning warbler
Geothypis trichas	common yellowthroat
Icteria virens	yellow-breasted chat
Wilsonia citrina	hooded warbler
Wilsonia pusilla	Wilson's warbler
Wilsonia canadensis	Canada warbler
Setophaga ruticilla	american redstart
Ploceidae	
Passer domesticus	house sparrow
Icteridae	
Dolichonyx oryzivorus	bobolink
Sturnella magna	eastern meadowlark
Sturnella neglecta	western meadowlark
Agelaius phoeniceus	red-winged blackbird
Icterus spurius	orchard oriole

Table 11-9. (Continued)

Family	Scientific Name	Common name
Icteridae		
	Icterus galbula	northern oriole
	Euphagus carolinus	rusty blackbird
	Euphagus cyanocephalus	Brewer's blackbird
	Quiscalus quiscula	common crackle
	Molothrus ater	brown-headed cowbird
Thraupinae		
	Piranga olivacea	scarlet tanager
	Piranga rubra	summer tanager
Fringillidae		
	Cardinalis cardinalis	cardinal
	Pheucticus ludovicianus	rose-breasted grosbeak
	Pheucticus melanocephalus	black-headed grosbeak
	Guiraca caerulea	blue grosbeak
	Passerina cyanea	indigo bunting
	Passerina ciris	painted bunting
	Spiza americana	dickcissel
	Hesperiphona vespertina	evening grosbeak
	Carpodacus purpureus	purple finch
	Spinus pinus	pink siskin
	Spinus tristis	american goldfinch
	Loxia curvirostra	red crossbill
	Piplio erythrophthalmus	rufous-sided towhee
	Passerculus sandwichensis	Savannah sparrow
	Ammondramus savannarum	grasshopper sparrow
	Ammondramus henslowii	Henslow's sparrow
	Ammospiza leconteii	Le Conte's sparrow
	Ammospiza caudacuta	sharp-tailed sparrow
	Pooecetes gramineus	vesper sparrow
	Aimophila aestivalis	Bachman's sparrow
	Junco hyemalis	dark-eyed junco
	Spizella passerina	chipping sparrow
	Spizella pallida	clay-colored sparrow
	Spizella pusilla	field sparrow
	Zonotrichia querula	Harris' sparrow
	Zonotrichia leucophrys	white-crowned sparrow
	Zonotrichia albicollis	white-throated sparrow
	Passerella iliaca	fox sparrow
	Melospiza lincolnii	Lincoln's sparrow
	Melospiza georgiana	swamp sparrow
	Melsopiza melodi	song sparrow
	Calcarius lapponicus	lapland longspur
	Calcarius pictus	Smith's longspur

Table 11-9. (Continued)

Family Scientific Name	Common name
AMPHIBIANS	
Bufonidae	
Bufo americanus americanus	american toad
Bufo quercicus	oak toad
Bufo terrestris	southern toad
Bufo woodhousei	Fowler's toad
Hylidae	
Acris crepitans crepitans	northern cricket frog
Acris gryllus gryllus	southern cricket frog
Hyla cinerea	green treefrog
Hyla crucifer crucifer	northern spring peeper
Hyla femoralis	pine woods treefrog
Hyla gratiosa	barking treefrog
Hyla squirella	squirrel treefrog
Hyla versicolor	gray treefrog
Pseudacris brachyphona	mountain chorus frog
Pseudacris triseriata feriarum	upland chorus frog
Microrhylidae	
Gastrophyryne carolinensis	eastern narrow-mouthed toad
Pelobatidae	
Scaphiopus holbrooki holbrooki	eastern spadefoot toad
Ranidae	
Rana areolata sevosa	dusky gopher frog
Rana catesbeiana	bullfrog
Rana clamitans melaneta	green frog
Rana palustris	pickerel frog
Rana pipiens sphenocephala	southern leopard frog
Ambystomatidae	
Ambystoma maculatum	spotted salamander
Ambystoma opacum	marbled salamander
Ambystoma talpoideum	mole salamander
Ambystoma tigrinum tigrinum	eastern tiger salamander
Cryptobranchidae	
Cryptobranchus alleganiensis	hellbender
Plethodontidae	
Aneides aeneus	green salamander
Desmognathus aeneus	seepage salamander
Desmognathus fuscus fuscus	northern dusky salamander
Desmognathus monticola spp.	seal salamander
Desmognathus ochrohaeus	mountain dusky salamander
Eurycea aquatica	brown-backed salamander
Eurycea bislineata	two-lined salamander

Table 11-9. (Continued)

Family Scientific Name	Common name
Plethodontidae	
Eurycea longicauda longicauda	long-tailed salamander
Eurycea longicauda guttolineata	three-lined salamander
Eurycea lucifuga	cave salamander
Gryinophilus palleucus palleucus	Tennessee cave salamander
Gryinophilus palleucus necturoides	no common name
Gryinophilus porphyriticus porphyriticus	northern spring salamander
Gryinophilus porphyriticus dunni	carolina spring salamander
Gryinophilus porphyriticus duryi	Kentucky spring salamander
Hemidactylium scutatum	four-toed salamander
Plethodon dorsalis dorsalis	zigzag salamander
Plethodon glutinosus glutinosus	slimy salamander
Pseudotriton montanus flavissumus	gulf coast mud salamander
Pseudotriton ruber ruber	northern red salamander
Proteidae	
Necturus beyeri	Beyer's waterdog
Necturus maculosus	mudpuppy
Salamandridae	
Notopthalmus viridescens viridenscens	red-spotted newt
REPTILES	
Anguidae	
Ophisaurus attenuatus longicaudus	eastern slender glass lizard
Ophisaurus ventralis	eastern glass lizard
Iguanidae	
Anolis carolinensis carolinensis	green anole
Sceloporus undulatus undulatus	southern fence lizard
Sceloporus undulatus hyacinthus	northern fence lizard
Scincidae	
Eumeces anthracinus anthracinus	northern coal skink
Eumeces anthracinus pluvialis	southern coal skink
Eumeces egregius similis	northern mole skink
Eumeces fasciatus	five-lined skink
Eumeces inexpectatus	southeastern five-lined skink
Eumeces laticeps	broad-headed skink
Spincella laterale	ground skink
Teidae	
Cnemidophorus sexlineatus sexlineatus	eastern six-lined racerunner
Colubridae	
Carphophis amoenus amoenus	eastern worm snake
Cemophora coccinea copei	northern scarlet snake
Coluber constrictor constrictor	northern black racer

Table 11-9. (Continued)

Family	Scientific Name	Common name
Colubridae		
	Diadophis punctatus punctatus	southern ringneck snake
	Diadophis punctatus edwardsi	northern ringneck snake
	Diadophis punctatus stictogenys	Mississippi ringneck snake
	Elaphe guttata guttata	corn snake
	Elaphe obsoleta obsoleta	black rat snake
	Elaphe obsoleta spiloides	gray rat snake
	Farancia abacura reinwardti	western mud snake
	Heterodon platyrhinos	eastern hognose snake
	Heterodon simus	southern hognose snake
	Lampropeltis calligaster rhombomaculata	mole snake
	Lampropeltis getulus niger	black kingsnake
	Lampropeltis triangulum triangulum	eastern milksnake
	Lampropeltis triangulum elapsoides	scarlet kingsnake
	Lampropeltis triangulum syspila	red milk snake
	Masticophis flagellum flagellum	eastern coachwhip
	Nerodia erythrogaster erythrogaster	red-bellied water snake
	Nerodia erythrogaster flavigaster	yellow-bellied water snake
	Nerodia septemvittata	queen snake
	Nerodia sipedon pleuralis	midland water snake
	Opheodrys aestivus	rough green snake
	Pituophis melanoleucus melanoleucus	northern pine snake
	Storeria dekayi dekayi	northern brown snake
	Storeria wrightorum	midland brown snake
	Storeria occipitomaculata occipitomaculata	northern red-bellied snake
	Tantilla coronata	southeastern crowned snake
	Thamnophis sauritus sauritus	eastern ribbon snake
	Thamnophis sauritus sirtalis	eastern garter snake
	Virginia striatula	rough earth snake
	Virginia valeriae valeriae	eastern smooth earth snake
Elapidae		
	Micrurus fulvius fulvius	eastern coral snake
Viperidae		
	Agkistrodon contortrix mokeson	northern copperhead
	Agkistrodon piscivorus piscivorus	eastern cottonmouth
	Crotalus horridus	timber rattlesnake
	Sistrurus miliarius miliarius	carolina pigmy rattlesnake
Chelydridae		
	Chelydra serpentina serpentina	common snapping turtle
	Macroclemys temmincki	alligator snapping turtle
Emydidae		
	Chrysemys picta marginata	midland painted turtle
	Deirochelys reticularia reticularis	eastern chicken turtle
	Graptemys geographica	map turtle
	Graptemys nigrinoda nigrinoda	northern black-knobbed sawback
	Graptemys pseudogeographica ouachitensis	ouachita map turtle

Table 11-9. (Continued)

Family Scientific Name	Common name
Emydidae	
Graptemys pulchra	Alabama map turtle
Pseudemys concinna concinna	river cooter
Pseudemys scripta elegans	red-eared pond slider
Terrapene carolina carolina	eastern box turtle
Terrapene carolina triungis	three-toed box turtle
Kinosternidae	
Kinosternon subrubrum subrubrum	eastern mud turtle
Sternotherus minor depressus	flattened mud turtle
Sternotherus minor peltifer	stripe-necked musk turtle
Sternotherus odoratus	common musk turtle
Trionychidae	
Trionyx muticus muticus	midland smooth softshell
Trionyx spiniferus spiniferus	eastern spiny softshell
Trionyx spiniferus asper	gulf coast spiny softshell

Feasibility Study

The diagnostic study of Weiss Lake revealed two basic problems; cultural eutrophication and toxic contamination. Both of these problems are caused by point and nonpoint source pollution from within the basin.

Eutrophication

The annual mean total phosphorus (TP) load of the Coosa River at the Alabama/Georgia state line for 1991 and 1992 was 1,047 metric tons. The mean TP concentration at that location was 175 μg/l, over three times the concentration (50 μg/l) recommended to prevent accelerated eutrophication of lakes (EPA 1986). Coosa River TP entering Alabama from Georgia accounted for 88% of the entire annual load into Weiss Lake. The mean annual total nitrogen (TN) load of the Coosa River as it entered Alabama was 3,372 metric tons for 1991 and 1992. TN concentrations at the state line were consistently higher than 600 μg/l, considered by MacKenthum (1974) as the maximum concentration to avoid excessive aquatic plant growth. Over 60% of the total nitrogen was in an inorganic form readily available for plant growth. Although TN concentrations were high, the excessive amount of TP in lake waters resulted in nitrogen limitation of algal growth. Additional sources of bioavailable nitrogen could cause dramatic increases in algal biomass in the lake. But since nitrogen control is generally considered impractical in combating eutrophication (EPA 1990), reduction of TP loading will have to be undertaken in order to force the lake into phosphorus limitation and make it possible to control, through phosphorus manipulation, the trophic status of the lake.

An increase in plankton algae biomass has been the predominant manifestation of nutrient enrichment of Weiss Lake. In July 1991 corrected chlorophyll a concentration in the dam forebay was 46.9 μg/l. Corrected chlorophyll a concentrations in excess of 6.4 μg/l are considered eutrophic and in excess of 56.0 μg/l, hypereutrophic. Growing season (April - October) mean chlorophyll a concentrations in the dam forebay (station 1) were 29.9 μg/l and 23.9 μg/l for 1991 and 1992, respectively. At a mid-reservoir location (station 8) the growing season mean chlorophyll a concentrations were 27.9 μg/l and 24.9 μg/l for 1991 and 1992, respectively. Such high levels of algal biomass exert increasing demands for dissolved oxygen in the lake. If the demand exceeds the supply some aerobic organisms (e.g., fishes) will suffer. Cultural eutrophication of reservoirs has led to numerous "fish kills" in the Southeastern U.S.A.

Increased organic matter content in surface waters can cause problems in potable water supply lakes. Chlorination of the water during the treatment process forms organohalides called trihalomethanes (THM's) that threaten human health (Cooke et al. 1986). These compounds are known or suspected of being carcinogenic and/or mutagenic agents and the U. S. Environmental Protection Agency has established a maximum contaminant level of 100 μg/l in finished drinking water (Vogt and Regli 1981). Palmstrom et al. (1988) demonstrated that 30% of the precursors entering a treatment plant withdrawing water from an Ohio water supply reservoir was generated within the lake, primarily by algae.

Weiss Lake is use-classified as swimming/fish and wildlife throughout and as a public water supply from the dam powerhouse upstream to Spring Creek (ADEM 1990). In its Water Quality Report to Congress covering the calendar years 1994 and 1995, ADEM (1996) found that excessive nutrient loading and elevated trophic state of Weiss Lake threatened the recreational, aquatic life and water supply uses as designated throughout the entire lake.

RECOMMENDATIONS

Any steps taken to address the problem of cultural eutrophication of Weiss Lake will require the cooperation of the states of Georgia and Alabama. It is important that these states recognize that water quality and water quantity are strongly interrelated in mainstem reservoirs. A basinwide integrated approach by these two states will be necessary to effectively and economically deal with this problem.

The following steps are recommended to assure that cultural eutrophication of Weiss Lake is halted and that lake waters will be safe and suitable for fishing, swimming and public water supply.

1. Major point source dischargers (>0.5 MGD) into the Coosa River basin upstream of Weiss Lake dam (Alabama and Georgia) must be requested to measure TP and TN in their effluent and report these findings in monthly discharge monitoring reports. Should this result in inaction, monitoring for TP and TN should be included as a condition of discharge through the NPDES.

   NOTE. This information will make it possible to identify significant point sources of plant nutrients entering the Coosa River. In addition, by subtracting point source nutrient loading from total nutrient loading (measured directly) it is possible to estimate nonpoint source loading. Once the sources of nutrients are known, actions can be taken to control nutrient additions to the system if necessary.

2. Chlorophyll a should be added to the list of water quality criteria used to protect, maintain and improve the quality of Weiss Lake. Mean, photic zone chlorophyll a (corrected for phaeopigments) concentrations measured monthly during the growing season (April through October) in

the dam forebay and at mid-reservoir (station 8 - Cedar Bluff Hwy 68) should not exceed 18 μg/l at either location. This criterion will be subject to the general conditions applicable to all water quality criteria as stated in section 335-6-10-.05 of the Alabama Water Quality Criteria (ADEM 1990).

NOTE. Excessive chlorophyll a concentrations can be reduced by controlling nutrient additions through permitting (point sources) or use of best management practices (nonpoint sources). The following water quality improvements should result from this chlorophyll limit:

- greater water clarity;
- reduced oxygen demand caused by overproliferation and decomposition of organic matter (plankton algae);
- higher minimum and lower maximum pH;
- reduced probability that trihalomethane precursors will result from excessive phytoplankton blooms and
- reduced probability of taste and odor problems developing in potable water supplies taken from the lake.

A chlorophyll a concentration of 18 μg/l during the growing season should be more than adequate to support a productive lake fishery.

Toxic Contamination

Excessive PCB's concentrations in Coosa River fish were first reported in 1971 by the Alabama Pesticide Laboratory (1971). In 1976, the Georgia Environmental Protection Division reported high concentrations of PCBs in fish collected on the Coosa River between Rome, Georgia and the Georgia/ Alabama state line. In 1979, the EPA banned the manufacture, processing, distribution and use of PCBs with the exception of that material existing in enclosed electrical equipment (Laws 1993). Environmental PCBs concentrations have decreased since the EPA ban went into effect, however, the stability of PCBs (50-300 times more persistent than DDT) will prolong the period of concern for these contaminants (Laws 1993). A limited fish consumption advisory issued by the State Health Officer in 1989 is currently in effect for Weiss Lake.

RECOMMENDATIONS

1. Annual monitoring of Weiss Lake fish for the presence of PCBs should be continued to document any changes in residue levels. This sampling should include fish captured from the lake by state biologists as well as commercially caught fish from the lake that enter markets for sale to the public. Less frequent sampling can be conducted when PCBs residue levels decline below FDA tolerance limits in fish for three consecutive years.

Monitoring

Weiss Lake should be sampled each month during the growing season (April through October) to assure that water quality standards (including the new chlorophyll a standard) are being met. Weiss Lake fish should be tested for PCBs residues annually. All Alabama sampling should be coordinated with the Georgia sampling of the Coosa River and results shared among the two states.

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Appendix

Documentation of aerial photography for Weiss Lake watershed during diagnostic study, November 1990 - October 1992.

Documentation of aerial photography for Weiss Lake watershed during diagnostic study, November 1990 - October 1992.

Project:	Weiss Lake
Photography program:	NHAP-National High-Altitude Photography Program
Date of photography:	3 February 1981, 14 March 1981, 3 May 1981, 20 December 1981, 11 April 1982, and 23 April 1982.
Photo acquisition (contractor):	United States Geological Survey
Medium:	Color infrared (Kodak Aerochrome 2443 film)
Camera type:	Cartographic aerial camera
Flight altitude (above mean ground level):	40,000 feet
Focal length:	8.25 inches
Resolution:	3 meters
Photo scale:	1:53,000
Role frame series:	357, 359, 403, 563, 595, and 607

Descrpition and location of nodes in Weiss Lake watershed during diagnostic study, November 1990 - October 1992.

Descrpition and location of nodes in Weiss Lake watershed during diagnostic study, November 1990 - October 1992.

Node	Area (Ha)	Description
01	3,243	Coosa River from Weiss power plant to east side of canal.
02	277	Coosa River from east side of canal to Weiss Dam.
03	3,054	Coosa River from Weiss Dam to Yellow Cr.
04	3,768	Coosa River from Yellow Cr. to Chattooga R.
0401	2,340	Yellow Cr. from Coosa River to Yellow Cr. falls.
0402	1,128	Yellow Cr. from Yellow Cr. falls to unnamed trib (1.5 miles SSE of Sand Rock, Al.)
0403	348	Yellow Cr. from unnamed trib (1.5 miles SSE of Sand Rock, Al.) to unnamed trib (2.25 miles SSW of Sand Rock, Al.).
040301	827	Unnamed trib (1.5 miles SSE of Sand Rock, Al.) from Yellow Cr. to headwaters
0404	161	Yellow Cr. from unnamed trib (1 mile SE of state route 68) to unnamed trib (1/4 mile S of Co. Rd. 17).
040401	496	Unnamed trib (2.25 miles SSW of Sand Rock, Al.) from Yellow Cr. to headwaters.
0405	861	Yellow Creek from unnamed trib (2.25 miles SW of Sand Rock, Al.) to Jones Branch.
040501	915	Unnamed trib (2.25 miles SW of Sand Rock, Al.) from Yellow Cr. to headwaters.
0406	182	Yellow Cr. from Jones Branch to unnamed trib (2.0 miles W of Sand Rock, Al.).
040601	1,021	Jones Branch from Yellow Cr. to headwaters.
0407	332	Yellow Cr. from unnamed trib (2.0 miles W of Sand Rock, Al.) to Indian Cr.
040701	429	Unnamed trib (2.0 miles W of Sand Rock, Al.) from Yellow Cr. to unnamed Cherokee Co. bridge (3.5 miles NW of Sand Rock, Al.).
040702	513	Unnamed trib (2.0 miles W of Sand Rock, Al.) from unnamed Cherokee Co. bridge (3.5 miles NW of Sand Rock, Al.) to headwaters.
0408	489	Yellow Cr. from Indian Cr. to Al. Hgh. 176 bridge.
040801	609	Indian Cr. from Yellow Cr. to headwaters.
0409	26	Yellow Creek from Al. Hgh. 176 bridge to Stapp Cr.
0410	122	Yellow Cr. from Stapp Cr. to headwaters.
041001	464	Stapp Cr. from Yellow Cr. to headwaters.
05	3,075	Coosa River from Chattooga R. to Cowan Cr.
0501	596	Chattooga R. from Coosa R. to Little R.
0502	4,887	Chattooga R. from Little R. to full pool.
050201	1,745	Little R. fom Chattooga R. to Spring Cr.
050202	215	Little R. from Spring Cr. to full pool.
05020201	1,457	Spring Cr. from Little R. to unnamed trib (0.5 miles NE of Hurley, Al.).
05020202	329	Spring Cr. from unnamed trib (0.5 miles NE of Hurley, Al.) to full pool.
0502020201	58	Unnamed trib (0.5 miles NE of Hurley, Al.) from Spring Cr. to Cherokee Co. Rd. 77 bridge.
0502020202	752	Unnamed trib (0.5 miles NE of Hurley, Al.) from Cherokee Co. Rd. 77 bridge to headwaters.
05020203	968	Spring Cr. from full pool to Mud Cr.
05020204	274	Spring Cr. from Mud Cr. to unnamed trib (0.25 miles S of Waterloo Springs).
0502020401	2	Mud Cr. from Spring Cr. to Al. Hgh. 35 bridge.
0502020402	1,745	Mud Cr. from Al. Hgh 35 bridge to headwaters.
05020205	129	Spring Cr. from unnamed trib (0.25 miles S of Waterloo Springs) to unnamed trib (0.5 miles N of Waterloo Springs).
0502020501	393	Unnamed trib (0.25 miles S of Waterloo Springs) from Spring Cr. to headwaters.
05020206	658	Spring Cr. from unnamed trib (0.5 miles N of Waterloo Springs) to Cherokee Co. Rd. 87 bridge.
0502020601	45	Unnamed trib (0.5 miles N of Waterloo Springs) from Spring Cr. to unnamed Cherokee Co. Rd. bridge (1 mile W of Watson, Al.).
0502020602	1,209	Unnamed trib (0.5 miles N of Waterloo Springs) from unnamed Cherokee Co. Rd. bridge (1 mile W of Watson, Al.) to headwaters.
05020207	843	Spring Cr. from Cherokee Co. Rd. 87 bridge to headwaters.
050203	11	Little R. from Wolf Cr. to full pool.
05020301	152	Wolf Cr. from Little R. to full pool.
05020302	942	Wolf Cr. from full pool to Cherokee Co. Rd. 47 bridge.
05020303	195	Wolf Cr. from Cherokee Co. Rd. 47 bridge to unnamed trib (0.75 miles W of Starling Gap).
05020304	86	Wolf Cr. from unnamed trib (0.75 mile W of Starling Gap) to unnamed trib (1 mile W of Starling Gap).
0502030401	375	Unnamed trib (0.75 mile W of Starling Gap) from Wolf Cr. to Cherokee Co. Rd. 43 bridge.

Descrpition and location of nodes (Cont.)

Node	Area (Ha)	Description
0502030402	17	Unnamed trib (0.75 miles W of Starling Gap) from Cherokee Co. Rd. 43 bridge to unnamed trib (0.75 mile WNW of Starling Gap).
0502030403	810	Unnamed trib (0.75 miles W of Starling Gap) from unnamed trib (0.75 miles WNW of Starling Gap) to headwaters.
050203040301	405	Unnamed trib (0.75 miles WNW of Starling Gap) from unnamed trib (0.75 miles W of Starling Gap) to headwaters.
05020305	496	Wolf Cr. from unnamed trib (1 mile W of Starling Gap) to Cherokee Co. Rd. 49 bridge.
0502030501	13	Unnamed trib (1 mile W of Starling Gap) from Wolf Cr. to Cherokee Co Rd. 43 bridge.
0502030502	535	Unnamed trib (1 mile W of Starling Gap) from Cherokee Co. Rd. 43 bridge to headwaters.
05020306	101	Wolf Cr. from Cherokee Co. Rd. 49 bridge to unnamed trib (1.5 mile NNE of Sand Rock, Al.).
05020307	236	Wolf Cr. from unnamed trib (1.5 mile NNE of Sand Rock, Al.) to headwaters.
0502030701	333	Unnamed trib (1.5 mile NNE of Sand Rock, Al.) from Wolf Cr. to headwaters.
050204	234	Little R. from full pool to unnamed trib (0.5 miles SE of Little River, Al).
050205	39	Little R. from unnamed trib (0.5 miles SE of Little River, Al.) to Al. 273 Hgh. bridge.
05020501	2,027	Unnamed trib (0.5 miles SE of Little River, Al.) from Little River to headwaters.
050206	251	Little R. from Al. Hgh. 273 bridge to Johnnies Cr.
050207	1,081	Little R. from Johnnies Cr. to unnamed trib (1.5 miles ESE of Lickskillet, Al.).
05020701	342	Johnnies Cr. from Little R. to Johnnies Cr. falls.
05020702	953	Johnnies Cr. from Johnnies Cr. falls to bridge off of DeKalb Co. Rd. 115.
05020703	87	Johnnies Cr. from bridge off of De Kalb Co. Rd 115 to unnamed trib (0.25 miles E of Loveless Lake).
05020704	326	Johnnies Cr. from unnamed trib (0.25 miles E of Loveless Lake) to Camprock Cr.
0502070401	14	Unnamed trib (0.25 miles E of Loveless Lake) from Johnnies Cr. to DeKalb Co. Rd. 155 bridge.
0502070402	480	Unnamed trib (0.25 miles E of Loveless Lake) from DeKalb Co. Rd. 155 bridge to headwaters.
05020705	402	Johnnies Cr. from Camprock Cr. to Dry Cr.
0502070501	595	Camprock Cr. from Johnnies Cr. to headwaters.
05020706	192	Johnnies Cr. from Dry Cr. to Straight Hollow.
0502070601	596	Dry Cr. from Johnnies Cr. to headwaters.
05020707	763	Johnnies Cr. from Straight Hollow to DeKalb Co. Rd. 81 bridge.
0502070701	139	Straight Hollow from Johnnies Cr. to headwaters.
05020708	764	Johnnies Cr. from DeKalb Co. Rd. 81 bridge to headwaters.
050208	619	Little R. from unnamed trib (1.5 miles ESE of Licksville, Al.) to Bear Cr.
05020801	834	Unnamed trib (1.5 miles ESE of Lickskillet, Al.) from Little R. to unnamed DeKalb Co. Rd. bridge.
05020802	561	Unnamed trib (1.5 miles ESE of Lickskillet, Al.) from unnamed DeKalb Co. Rd. bridge to headwaters.
050209	133	Little R. from Bear Creek to unnamed trib (3 miles SSE of Adamsburg, Al.).
05020901	897	Bear Cr. from Little R. to Al. Hgh. 176 bridge.
05020902	210	Bear Cr. from Al. Hgh. 176 bridge to Falls Branch.
05020903	32	Bear Cr. from Falls Branch to Hicks Cr.
0502090301	611	Falls Branch from Bear Cr. to headwaters.
05020904	791	Bear Cr. from Hicks Cr. to DeKalb Co. Rd. 78 bridge.
0502090401	99	Hicks Cr. from Little R. to DeKalb Co. Rd. 127 bridge.
0502090402	478	Hicks Cr. from DeKalb Co. Rd. 127 bridge to headwaters.
05020905	5	Bear Cr. from DeKalb Co. Rd. 78 bridge to unnamed trib (0.75 miles SE of Fort Payne Gap).
0502090501	182	Unnamed trib (1 mile SE of Fort Payne Gap) from DeKalb Co. Rd. 78 bridge to headwaters.
05020906	247	Unnamed trib (0.75 miles SE of Fort Payne Gap) from Bear Cr. to headwaters.
0502090601	160	Bear Cr. from unnamed trib (0.75 miles SE of Fort Payne Gap) to DeKalb Co. Rd. 129 bridge.
0502090602	212	Bear Cr. from DeKalb Co. Rd. bridge 129 to headwaters.
050210	866	Little R. from unnamed trib (3 miles SSE of Adamsburg, Al.) to Brooks Branch.
05021001	50	Unnamed trib (3 mile SSE of Adamsburg, Al.) from Little R. to DeKalb Co. Rd. 176 bridge.

Descrpition and location of nodes (Cont.)

Node	Area (Ha)	Description
05021002	611	Unnamed trib (3 miles SSE of Adamsburg, Al.) from DeKalb Co. Rd. 176 bridge to headwaters.
050211	248	Little R. from Brooks Branch to Yellow Cr.
05021101	317	Brooks Branch from Little R. to headwaters.
050212	1,298	Little R. from Yellow Cr. to Hurricane Cr.
05021201	119	Yellow Cr. from Little R. to DeKalb Co. Rd. 78 bridge.
05021202	114	Yellow Cr. from DeKalb Co. Rd. 78 bridge to Straight Cr.
05021203	14	Yellow Cr. from Straight Cr. to unnamed DeKalb Co. Rd. bridge (1.75 miles ENE of Adamsburg, Al.).
0502120301	236	Straight Cr. from Yellow Cr. to Al. Hgh. 35 bridge.
0502120302	705	Straight Cr. from Al Hgh. 35 bridge to headwaters.
05021204	92	Yellow Cr. from unnamed DeKalb Co. Rd. bridge (1.75 miles ENE of Adamsburg, Al.)to unnamed trib (2.25 miles NE of Adamsburg, Al.)
05021205	1,114	Yellow Cr. from unnamed trib (2.25 miles NE of Adamsburg, Al.) to unnamed trin (1.75 miles SE of Beeson Gap).
0502120501	349	Unnamed trib (2.25 miles NE of Adamsburg, Al.) from Yellow Cr. to headwaters.
05021206	38	Yellow Cr. from unnamed trib (1.75 miles SE of Beesson Gap) to unnamed trib (1.5 miles SE of Beeson Gap).
0502120601	208	Unnamed trib (1.75 miles SE of Beeson Gap) from Yellow Cr. to headwaters.
05021207	455	Yellow Cr. from unnamed trib (1.5 miles SE of Beeson Gap) to headwaters.
0502120701	506	Unnamed trib (1.5 miles SE of Beeson Gap) from Yellow Cr. to headwaters.
050213	711	Little R. from Huuricane Cr. to jeep trial access (3 miles N of Jamestown, Al.)
05021301	1,227	Hurricane Cr. from Little R. to unnamed DeKalb Co. Rd. bridge (1.25 miles W of Fisher Crossroads).
05021302	159	Hurricane Cr. from unnamed DeKalb Co. Rd. bridge (1.75 miles W of Fisher Crossroads) to unnamed trib (1.5 miles NE of Fisher crossroads).
05021303	124	Hurricane Cr. from unnamed trib (1.5 miles NE of Fisher Crossroads) to headwaters.
0502130301	329	Unnamed trib (1.5 miles NE of Fisher Crossroads) from Hurricane Cr. to headwaters.
050214	324	Little R. from jeep trial access (3 miles N of Jamestown, Al.) to unnamed trib (3.5 miles N of Jamestown, Al.).
050215	679	Little R. from unnamed trib (3.5 miles N of Jamestown, Al.) to East Fork Little R.
05021501	843	Unnamed trib (3.5 miles N of Jamestown, Al.) from Little R. to headwaters.
050216	51	W. F. Little R. from E. F. Little R. to Straight Cr.
05021601	326	E. F. Little R. from W. F. Little R. to unnamed trib (3 miles ENW of Chesterfield, Al.)
05021602	1,023	E.F. Little R. from unnamed trib (3 mile ENW of Chesterfield, Al.) to Laurel Cr.
0502160201	649	Unnamed trib (3 miles ENW of Chesterfield, Al.) from E. F. Little R. to headwaters.
05021603	34	E. F. Little R. from Laurel Cr. to Gilbert Branch.
0502160301	250	Laurel Cr. from E. F. Little R. to Shroder Branch.
0502160302	23	Laurel Cr. from Shroder Branch to Armstrong Branch.
050216030201	242	Shroder Branch from Laurel Branch to headwaters.
0502160303	564	Laurel Cr. from Armstrong Branch to headweaters.
050216030301	493	Armstrong Branch from Laurel Branch to headwaters.
05021604	1,352	E. F. Litle R. from Gilbert Branch to M. F. Little R.
0502160401	268	Gilbert Branch from E. F. Little R. to headwaters.
05021605	126	M. F. Little R. from E. F. Little R. to Brush Cr.
0502160501	113	E. F. Little R. from M. F. Little R. to Cherokeee Co. Rd. 103 bridge.
0502160502	2,288	E. F. Little R. from Cherokee Co. Rd. 103 bridge to Gamble Branch.
0502160503	6	Gilbreath Cr. from E. F. Little R. to unnamed Chattooga Co. Rd.
050216050301	323	Gamble Branch from E. F. Little R. to headwaters.
0502160504	1,075	Gilbreath Cr. from Gamble Branch to headwaters.
05021606	33	M. F. Little R. from Brush Cr. to Al. Hgh. 117 bridge.
0502160601	16	Brush Cr. from M. F. Little R. to Al. Hgh. 176.
0502160602	865	Brush Cr. from Al. Hgh 176 bridge to headwaters.
05021607	413	M. F. Little R. from Al. Hgh. 177 to Anna Branch.
05021608	47	M. F. Little R. from Anna Branch to Berry Cr.
0502160801	32	Anna Branch from M. F. Little R. to Blalock Branch.
050216080101	328	Anna Branch from Blalock Branch to headwaters.

Descrpition and location of nodes (Cont.)

Node	Area (Ha)	Description
0502160802	181	Blalock Branch from Anna Branch to unnamed DeKalb Co Rd. bridge (0.75 miles ENE of Bankhead, Al.).
0502160803	491	Blalock Branch from unnamed DeKalb Co. Rd. bridge (0.75 miles Ene of Bankhead, Al.) to headwaters.
05021609	159	M. F. Little R. from Berry Cr. to Keiselburg Branch.
0502160901	743	Berry Cr. from M. F. Little R. to headwaters.
05021610	634	M. F. Little R. from Keiselburg Branch to Hale Branch.
0502161001	220	Keiselburg Branch from M. F. Little R. to headwaters.
05021611	740	Hale Branch from M. F. Little R. to headwaters.
0502161101	409	Cannon Branch from Hale Branch to M. F. Little R.
050217	1,136	W. F. Little R. from Sharp Branch.
05021701	565	Straight Cr. from W. F. Little R. to unnamed trib (1.75 miles NE of Fisher Crossroads).
05021702	156	Straight Cr. from unnamed trib (1.75 miles NE of Fisher Crossroads) to headwaters.
0502170201	215	Unnamed trib (1.75 miles NE of Fisher Crossroads) from Straight Cr. to headwaters.
050218	991	W. F. Little R. from Sharp Branch to unnamed DeKalb Co. Rd. bridge.
05021801	25	Sharp Branch from W. F. Little R. to DeKalb Co. Rd. 165.
05021802	211	Sharp Branch from W.F. Little R. to headwaters.
050219	1,136	W. F. Little R. from DeKalb Co. Rd. 89 bridge to unnamed trib (0.25 miles SE of Mentone, Al.)
050220	2	W. F. Little R. from unnamed trib (0.25 miles SE of Mentone, Al.) to Al. hgh. 117 bridge.
05022001	125	Unnamed trib (0.25 mile SE of Mentone, Al.) from W. F. Little R. to headwaters.
050221	3,001	W. F. Little R. from Al. Hgh. 177 bridge to East Fork.
050222	841	W. F. Little R. from East Fork to unnamed Dade Co. Rd. (1.5 miles SE of Sulphur Springs, Ga.)
05022201	159	East Fork from W. F. Little R. to Long Branch.
05022202	18	East Fork from Long Branch to Murray Branch.
0502220201	624	Long Branch from East Fork to headwaters.
05022203	494	East Fork from Murray Branch to unnamed Walker Co. Rd. (3 miles SSE of Sulphur Springs Gap.
0502220301	239	Murray Branch from East Fork to headwaters.
05022204	1,631	East Fork from unnanmed Walker Co. Rd. (3 miles SSE of Sulphur Springs Gap) to headwaters.
050223	1,276	W. F. Little R. from unnamed Dade Co. Rd. (1.5 miles SE of Sulphur Springs Gap) to headwaters.
0503	20	Chattooga R. from full pool to Al. Hgh. 35 bridge.
0504	502	Chattooga R. from Al. Hgh. 35 bridge to unnamed trib (0.75 miles NE of Gaylesville, Al.).
0505	1,435	Chattooga R. from unnamed trib (0.75 miles NE of Gaylesville, Al.) to Cherokee Co. Rd. 97 bridge.
050501	153	Unnamed trib (0.75 miles NE of Gaylseville, Al.) from Chattooga R. to Al. Hgh. 68 bridge.
050502	1,256	Unnamed trib (0.75 miles NE of Gaylesville, Al.) from Al. Hgh. 68 bridge to headwaters.
0506	44	Chattooga R. from Cherokee Co. Rd. 97 bridge to Mills Cr.
0507	3,374	Chattooga R. from Mills Cr. to Hinton Cr.
050701	127	Mills Cr. from Chattooga R. to Al. Hgh. 68 bridge.
050702	1,603	Mills Cr. from Al. Hgh. 68 bridge to Panther Cr.
050703	151	Mills Cr. from Panther Cr. to unnamed trib (1 mile SE of Broomtown, Al.).
05070301	1,152	Panther Cr. from Mills Cr. to headwaters.
050704	185	Mills Cr. from unnamed trib (1 mile SE of Broomtown, Al.) to Culstigh Cr.
05070401	1,101	Unnamed trib (1 mile SE of Broomtown, Al.) from Mills Cr. to headwaters.
050705	465	Mills Cr. from Culstigh Cr. to unnamed trib (1.75 miles NE of Broomtown, Al.).
05070501	39	Culstigh Cr. from Mills Cr. to Cherokee Co. Rd. 41 bridge.
05070502	750	Culstigh Cr. from Cherokee Co. Rd. 41 bridge to unnamed Cherokee Co. Rd. bridge (2.25 miles NW of Broomtown,Al.).
05070503	1,266	Culstigh Cr. from unnamed Cherokee Co. bridge (2.25 miles NW of Broomtown, Al.) to headwaters.

Descrpition and location of nodes (Cont.)

Node	Area (Ha)	Description
050706	1,438	Mills Cr. from unnamed trib (1.75 miles NE of Broomtown, Al.) to unnamed Cherokeee Co. Rd. bridge (0.5 miles SE of Grover, Al.).
05070601	267	Unnamed trib (1.75 miles NE of Broomtown, Al.) from Mills Cr. to unnamed Cherokee Co. Rd. bridge (2.5 miles NE of Broomtown, AL.).
05070602	1,621	Unnamed trib (1.75 miles NE of Broomtown, AL.) from unnamed Cherokee Co. Rd. bridge (2.25 miles NE of Broomtown, Al.) to Oak Hill Rd. bridge.
05070603	824	Unnamed trib (1.75 miles NE of Broomtown, AL.) from Oak Hill Rd. bridge to headwaters.
050707	644	Mills Cr. from unnamed Cherokee Co. Rd. bridge (0.5 miles SE of Grover, Al.) to unnamed trib (0.75 miles N of Grover, Al.).
050708	213	Mills Cr. from unnamed trib (0.75 miles N of Grover, AL.) to unnamed trib (0.25 miles N of Berry Springs, Al.).
05070801	8	Unnamed trib (0.75 miles N of Grover, Al.) from Mills Cr. to Cherokee Co. Rd. 99 bridge.
05070802	924	Unnamed trib (0.75 miles N of Grover, AL.) from Cherokee Co. Rd. 99 bridge to headwaters.
050709	151	Mills Cr. from unnamed trib (0.25 miles N of Berry Springs, Al.) to Alpine Cr.
05070901	3	Unnamed trib (0.25 miles N of Berry Springs, Al.) from Mills Cr. to Cherokee Co. Rd. 99 bridge.
05070902	277	Unnamed trib (0.25 miles N of Berry Springs, AL.) from Cherokee Co. Rd. 99 bridge to unnamed trib (Chesterfied, Al.).
05070903	551	Unnamed trib (0.25 miles N of Berry Springs, Al.) from unnamed trib (Chesterfield, Al.) to headwaters.
0507090301	399	Unnamed trib (Chesterfield, Al.) from unnamed trib (0.25 miles N of Berry Springs, AL.) to headwaters.
050710	624	Mills Cr. from Alpine Cr. to Cherokee Co. Rd. 15 bridge.
05071001	304	Alpine Cr. from Mills Cr. to Chattoga Co. Rd. 337 bridge.
05071002	566	Alpine Cr. from Chattooga Co. Rd. 337 bridge to Peach Orchard Rd. bridge.
05071003	89	Alpine Cr. from Peach Orchard Rd. bridge to unnamed trib (0.75 miles SE of Menlo, Ga.).
05071004	816	Alpine Cr. from unnamed trib (0.75 miles SE of Menlo, Ga.) to headwaters.
0507100401	144	Unnamed trib (0.75 miles SE of Menlo, Ga.) from Alpine Cr. to Chattooga Co. Rd. 48 bridge.
0507100402	303	Unnamed trib (0.75 miles SE of Menlo, Ga.) from Chattooga Co. Rd. 48 bridge to headwaters.
050711	1,898	Mills Cr. from Cherokee Co. Rd. 15 bridge to headwaters.
0508	2,449	Chattooga R. from Hinton Cr. to Taliaferro Cr.
050801	19	Hinton Cr. from Chattooga R. to Holland Chattoogaville Rd. bridge.
050802	2,886	Hinton Cr. from Holland Chattoogaville Rd. bridge to headwaters.
0509	158	Chattooga R. from Taliaferro Cr. to Lylerly Holland Rd. bridge.
050901	743	Taliaferro Cr. from Chattooga R. to Clarks Cr.
050902	463	Taliaferro Cr. from Clarks Cr. to headwaters.
05090201	292	Clarks Cr. from Taliaferro Cr. to Chattooga Co. Rd. 100 bridge.
05090202	1,626	Clarks Cr. from Chattooga Co. Rd. 100 bridge to headwaters.
0510	100	Chattooga R. from Lylerly Holland Rd. bridge to Mosteller Cr.
0511	253	Chattooga R. from Mosteller Cr. to Oak Hill Rd. bridge.
051101	1,167	Mosteller Cr. from Chattooga R. to headwaters.
0512	1,349	Chattooga R. from unnamed Chattooga Co. Rd. bridge (0.5 miles E of Lylerly, Ga.) to Raccoon Cr.
0513	1,666	Chattooga R. from Raccoon Cr. to Town Branch.
051301	501	Raccoon Cr. from Chattooga R. to Ga. Hgh. 144 bridge.
051302	756	Raccoon Cr. from Ga. Hgh. 144 bridge to Perennial Cr.
051303	1,367	Raccoon Cr. from Perennial Cr. to Ga. Hgh. 48 bridge.
05130301	2,245	Perennial Cr. from Raccoon Cr. to headwaters.
051304	1,702	Raccoon Cr. from Ga. Hgh. 48 bridge to unnamed Chattooga Co. Rd. bridge (1.5 miles NE of Hair Lake).
051305	751	Raccoon Cr. from unnamed Chattooga Co. Rd. bridge (1.25 miles NE of Hair Lake) to headwaters.
0514	758	Chattooga R. from Town Branch to Ga. Hgh. 48 bridge.
051401	597	Town Branch from Chattooga R. to Bellah Ave. (Summerville, Ga.) bridge.
051402	504	Town Branch from Bellah Ave. (Summerville, Ga.) bridge to headwaters.
0515	974	Chattooga R. from Ga. Hgh. 48 bridge to Henry Branch.
0516	2,757	Chattooga R. from Henry Branch to Spring Branch.

Descrpition and location of nodes (Cont.)

Node	Area (Ha)	Description
051601	1,232	Henry Branch from Chattooga R. to headwaters.
0517	333	Chattooga R. from Chappel Cr. to Spring Branch.
051701	2,458	Chappel Cr. from Chattooga R. to headwaters.
0518	380	Chattooga R. from Spring Branch to Cane Cr.
051801	1,047	Spring Branch from Chattooga R. to headwaters.
0519	2,336	Chattooga R. from Cane Cr. to Spring Cr.
051901	31	Cane Cr. from Chattooga R. to Welcome Hill Rd. bridge.
051902	2,134	Cane Cr. from Welcome Hill Rd. bridge to Dry Cr.
051903	24	Cane Cr. from Dry Creek to Howard Taft Hgh. bridge.
05190301	244	Dry Cr. from Cane Cr. to unnamed Walker Co. bridge (1 mile SSE of Walnut Grove, Ga.).
05190302	595	Dry Cr. from unnamed Walker Co. Rd. (1 mile SSE of Walnut Grove, Ga.) to Rocky Branch.
05190303	896	Dry Cr. from Rocky Branch to unnamed Walker Co. Rd. bridge (1.5 miles SW of Dry Creek, Ga.)
0519030301	707	Rocky Branch from Dry Cr. to headwaters.
05190304	1,380	Dry Cr. from unnamed Walker Co. Rd. bridge (1.5 miles SW of Dry CReek, Ga.) to headwaters.
051904	2,494	Cane Cr. from Howard Taft Rd. bridge to unnamed Walker Co. Rd. bridge (1 mile NE of Smith Gap).
051905	1,851	Cane Cr. from unnamed Walker Co. Rd. bridge (1 mile SE of Smith Gap) to headwaters.
0520	283	Chattooga R. from Spring Cr. to Duck Cr.
052001	6	Spring Cr. from Chattooga R. to Teloga Cr.
052002	1,542	Spring Cr. from Teloga Cr. to Harrisburg Cr.
05200201	1,178	Teloga Cr. from Spring Cr. to Chelsea Cr.
05200202	1,232	Teloga Cr. from Chelsea Cr. to Allgood Branch.
0520020201	2,101	Chelsea Cr. from Teloga Cr. to headwaters.
05200203	238	Teloga Cr. from Allgood Branch to headwaters.
0520020301	641	Allgood Branch from Teloga Cr. to headwaters.
052003	885	Spring Cr. from Harrisburg Branch to headwaters.
05200301	31	Harrisburg Branch from Spring Branch to unnamed Walker Co. Rd. bridge (0.5 miles S of Harrisburg, Ga.).
05200302	118	Harrisburg Cr. from unnamed Walker Co. Rd. (0.5 miles S of Harrisburg, Ga.) to Allen Cr.
0520030201	1,058	Dougherty Cr.from Harrisburg Cr. to headwaters.
05200303	899	Allen Cr. from Harrisburg Cr. to headwaters.
0520030301	251	Harrisburg Cr. from Allen Cr. to headwaters.
0521	2,098	Chattooga R. from Duck Cr. to Shattuck Industrial Blvd. bridge (Lafayette, Ga.)
052101	452	Duck Cr. from Chattooga R. to Ga. Hgh. 337 bridge.
052102	1,255	Duck Cr. from Ga. Hgh. 337 bridge to unnamed trib (0.25 miles E of Sharp, Ga.).
052103	47	Duck Cr. from unnamed trib (0.25 miles E of Sharp, Ga.) to unnamed trib (1 mile NE of Sharp, Ga.).
05210301	749	Unnamed trib (0.25 miles E of Sharp, Ga.) from Duck Cr. to headwaters.
052104	1,787	Duck Cr. from unnamed trib (1 mile NE of Sharp, Ga.) to Dry Cr.
05210401	942	Unnamed trib (1 mile NE of Sharp, Ga.) from Duck Cr. to headwaters.
052105	1,896	Duck Cr. from Dry Cr. to headwaters.
05210501	1,958	Dry Cr. from Duck Cr. to headwaters.
0522	466	Chattooga R. from Shattuck Industrial Blvd. bridge (Lafayette, Ga.) to Town Cr.
0523	583	Chattooga R. from Town Cr. to headwaters.
052301	635	Town Cr. from Chattooga R. to unnamed Walker Co. Rd. (0.5 miles E of North Lafayette School).
052302	3,150	Town Cr. from unnamed Walker Co. Rd. (0.5 miles E of Lafayette North School) to headwaters.
06	8,994	Coosa R. from Spring Cr. to Mud Cr.
0601	46	Spring Cr. from Coosa R. to Cowan Cr.
0602	1,861	Spring Cr. from Cowan Cr. to full pool.
060201	1,676	Cowan Cr. from Spring Cr. to unnamed trib (0.25 miles W of Bomar, Al.).
060202	297	Cowan Cr. from unnamed trib (0.25 miles W of Bomar, Al.) to full pool.
06020201	31	Unnamed trib (0.25 miles W of Bomar, Al.) from Cowan Cr. to full pool.
06020202	702	Unnamed trib (0.25 miles W of Bomar, Al.) from full pool to headwaters.
060203	1,161	Cowan Cr. from unnamed trib (0.25 miles W of Bomar, Al.) to Cherokee Co. Rd. 34 bridge.

Descrpition and location of nodes (Cont.)

Node	Area (Ha)	Description
060204	174	Cowan Cr. from Cherokee Co. Rd. 34 bridge to Firestone Branch.
060205	267	Cowan Cr. from Firestone Branch to Dry Slough.
06020501	195	Firestone Branch from Cowan Cr. to Bob Hollow Branch.
06020502	29	Firestone Branch from Bob Hollow Branch to Cherokee Co. Rd. 33 bridge.
0602050201	182	Bob Hollow Branch from Firestone Branch to headwaters.
06020503	624	Firestone Branch from Cherokee Co. Rd. 33 bridge to headwaters.
060206	128	Cowan Cr. from Dry Slough to unnamed Cherokee Co. Rd. bridge (2 miles N of Exie, Al.).
06020601	11	Dry Slough from Cowan Cr. to unnamed Cherokee Co. Rd. bridge (3 miles N of Exie, Al.).
06020602	563	Dry Slough from unnamed Cherokee Co. Rd. bridge (3 miles N of Exie, Al.) to headwaters.
060207	733	Cowan Cr. from unnamed Cherokee Co. Rd. bridge (2 miles N of Exie, Al.) to headwaters.
0603	32	Spring Cr. from full pool to Locust Branch.
0604	101	Spring Cr. from Locust Branch to Cherokee Co. Rd. 16 bridge.
060401	42	Locust Branch from Spring Cr. to Cherokee Co. Rd. 113 bridge.
060402	1,741	Locust Branch from Cherokee Co. Rd. 113 bridge to headwaters.
0605	29	Spring Branch from Cherokee Co. Rd. 16 bridge to Sandy Cr.
0606	7	Spring Cr. from Sandy Cr. to Dry Branch.
060601	93	Sandy Cr. from Spring Cr. to Cherokee Co. Rd. 40 bridge.
060602	437	Sandy Cr. from Cherokee Co. Rd. 40 bridge to jeep trail access (1.25 miles SE of Key, Al.).
060603	1,312	Sandy Cr. from jeep trail access (1.25 miles SE of Key, Al.) headwaters.
0607	478	Spring Cr. from Dry Cr. to Forney Branch.
060701	783	Dry Cr. from Spring Cr. to headwaters.
0608	271	Spring Cr. from Forney Branch to Cherokee Co. Rd. 157 bridge.
060801	56	Forney Branch from Spring Cr. to Cherokee Co. Rd. 162.
060802	1,471	Forney Branch from Cherokee Co. Rd. 162 bridge to headwaters.
0609	799	Spring Cr. from Cherokee Co. Rd. 175 bridge to Lumpkin Mill Cr.
0610	770	Spring Cr. from Lumpkin Mill Cr. to Angle Rd. bridge.
061001	99	Lumpkin Mill Cr. from Spring Cr. to Cherokee Co. Rd. 101 bridge.
061002	1,586	Lumpkin Mill Cr. from Cherokee Co. Rd. 101 bridge to headwaters.
0611	1,851	Spring Cr. from Angle Rd. bridge to U.S. Route 411 bridge.
0612	1,049	Spring Cr. from U.S. Route 411 bridge to headwaters.
07	489	Coosa R. from Mud Cr. to Ballplay Cr.
0701	3,273	Mud Cr. from Coosa R. to full pool.
0702	169	Mud Cr. from full pool to unnamed trib (1.5 miles SSE of Oliver Mt., Ga.).
0703	914	Mud Cr. from unnamed trib (1.5 miles NNW of Oliver Mt., Ga.) to unnamed trib (1.25 miles SE of Oliver Mt., Ga.).
070301	73	Unnamed trib (1.5 miles NNE of Oliver Mt., Ga.) from Mud Cr. to unnamed trib (1.25 miles SE of Oliver Mt., Ga.).
0704	347	Mud Cr. from unnamed trib (1.25 miles SE of Oliver Mt., Ga.) to headwaters.
070401	39	Unnamed trib (1.25 miles SE of Oliver Mt., Ga.) from Mud Cr. to Jefferson Rd. bridge.
070402	871	Unnamed trib (1.25 miles SE of Oliver Mt., Ga.) from Jefferson Rd. to headwaters.
08	576	Coosa R. from Ballplay Cr. to Ga/Al state line.
0801	426	Ballplay Cr. from Coosa R. to unnamed trib (1.75 miles NW of Kirks Grove, Al.).
0802	74	Ballplay Cr. from unnamed trib (1.75 miles NW of Kirks Grove, Al.) to full pool.
080201	91	Unnamed trib (1.75 miles NW of Kirks Grove, Al.) from Ballplay Cr. to full pool.
080202	119	Unnamed trib (1.75 miles NW of Kirks Grove, Al.) from full pool to bridge off Pig Trail Rd.
080203	812	Unnamed trib (1.75 miles NW of Kirks Grove, Al.) from Bridge off Pig Trail Rd. to headwaters.
0803	1,264	Ballplay Cr. from full pool to headwaters.
	236,763	Coosa River from Weiss Lake power plant to Ga/Al state line

Location of swine site by node in Weiss Lake watershed during diagnostic study, November 1990 - October 1992.

Location of swine site by node in Weiss Lake watershed during diagnostic study, November 1990 - October 1992.

State	Node	Amount[1]	County
Alabama	05070502	1.0	Cherokee

[1] - Amount of swine site that was located within node with 1 being 100%.

Location of cattle sites by node in Weiss Lake watershed during diagnostic study, November 1990 - October 1992.

Location of cattle sites by node in Weiss Lake watershed during diagnostic study, November 1990 - October 1992.

State	Node	Amount[1]	County
Alabama	01	1.0	Cherokee
Alabama	01	1.0	Cherokee
Alabama	01	1.0	Cherokee
Alabama	01	1.0	Cherokee
Alabama	01	1.0	Cherokee
Alabama	03	1.0	Cherokee
Alabama	04	1.0	Cherokee
Alabama	04	1.0	Cherokee
Alabama	04	1.0	Cherokee
Alabama	0401	1.0	Cherokee
Alabama	040301	0.5	Cherokee
Alabama	040301	1.0	Cherokee
Alabama	040301	1.0	DeKalb
Alabama	0405	0.5	Cherokee
Alabama	040501	0.5	Cherokee
Alabama	0406	1.0	DeKalb
Alabama	040601	0.5	Cherokee
Alabama	040601	1.0	DeKalb
Alabama	040601	1.0	DeKalb
Alabama	0407	1.0	Cherokee
Alabama	040702	1.0	DeKalb
Alabama	041001	1.0	DeKalb
Alabama	05020203	0.5	Cherokee
Alabama	0502020402	1.0	Cherokee
Alabama	0502020402	1.0	Cherokee
Alabama	0502020402	0.5	Cherokee
Alabama	05020205	0.5	Cherokee
Alabama	0502020501	0.5	Cherokee
Alabama	05020206	1.0	Cherokee
Alabama	0502020602	1.0	Cherokee
Alabama	05020305	1.0	Cherokee
Alabama	05020501	1.0	Cherokee
Alabama	05020501	1.0	Cherokee
Alabama	05020501	1.0	Cherokee
Alabama	050207	0.5	Cherokee
Alabama	05020702	0.5	Cherokee
Alabama	0502070501	1.0	DeKalb
Alabama	05020708	1.0	DeKalb
Alabama	05020708	1.0	DeKalb
Alabama	05020708	1.0	DeKalb
Alabama	05020802	1.0	DeKalb
Alabama	05020901	1.0	DeKalb
Alabama	0502090301	1.0	DeKalb
Alabama	05021205	1.0	DeKalb
Alabama	050216030201	0.5	Cherokee
Alabama	050216030201	1.0	Cherokee
Alabama	0502160303	1.0	Cherokee

Location of cattle sites (Cont.)

State	Node	Amount[1]	County
Alabama	0502160602	1.0	Cherokee
Alabama	0502160602	1.0	Cherokee
Alabama	050216080101	1.0	Cherokee
Alabama	050217	1.0	Cherokee
Alabama	05021702	1.0	DeKalb
Alabama	050218	0.5	Cherokee
Alabama	050219	1.0	Cherokee
Alabama	050219	1.0	Cherokee
Alabama	050221	1.0	DeKalb
Alabama	050221	1.0	Cherokee
Alabama	050502	0.5	Cherokee
Alabama	050701	0.5	Cherokee
Alabama	050702	1.0	Cherokee
Alabama	050704	0.5	Cherokee
Alabama	05070401	0.5	Cherokee
Alabama	05070401	1.0	Cherokee
Alabama	05070401	1.0	Cherokee
Alabama	05070401	1.0	Cherokee
Alabama	050705	0.5	Cherokee
Alabama	050705	1.0	Cherokee
Alabama	05070502	0.5	Cherokee
Alabama	05070502	1.0	Cherokee
Alabama	05070503	0.5	Cherokee
Alabama	050706	0.5	Cherokee
Alabama	05070601	1.0	Cherokee
Alabama	05070902	1.0	Cherokee
Alabama	05070902	0.5	Cherokee
Alabama	0507090301	1.0	Cherokee
Alabama	050710	0.5	Cherokee
Alabama	06	1.0	Cherokee
Alabama	06	1.0	Cherokee
Alabama	0602	1.0	Cherokee
Alabama	060201	1.0	Cherokee
Alabama	060201	1.0	Cherokee
Alabama	060202	1.0	Cherokee
Alabama	060203	1.0	Cherokee
Alabama	060203	1.0	Cherokee
Alabama	060205	1.0	Cherokee
Alabama	060402	1.0	Cherokee
Alabama	060402	1.0	Cherokee
Alabama	060402	0.5	Cherokee
Alabama	060402	1.0	Cherokee
Alabama	060602	1.0	Cherokee
Alabama	060602	1.0	Cherokee
Alabama	060603	1.0	Cherokee
Alabama	0609	1.0	Cherokee
Alabama	0609	0.5	Cherokee
Alabama	0611	1.0	Cherokee
Alabama	0611	1.0	Cherokee

Location of cattle sites (Cont.)

State	Node	Amount[1]	County
Alabama	08	0.5	Cherokee
Alabama	0803	0.5	Cherokee
Georgia	0502160504	0.5	Chattooga
Georgia	0502220201	1.0	Dade
Georgia	0502220201	1.0	Dade
Georgia	05022204	1.0	Walker
Georgia	050223	1.0	Dade
Georgia	0507	1.0	Chattooga
Georgia	0507	0.5	Chattooga
Georgia	05070602	0.5	Chattooga
Georgia	05070602	0.5	Chattooga
Georgia	05070602	0.5	Chattooga
Georgia	05070603	0.5	Chattooga
Georgia	05070603	0.5	Chattooga
Georgia	05071004	1.0	Chattooga
Georgia	05071004	1.0	Chattooga
Georgia	050711	1.0	Chattooga
Georgia	050711	1.0	Chattooga
Georgia	050711	1.0	Chattooga
Georgia	0508	1.0	Chattooga
Georgia	0508	1.0	Chattooga
Georgia	0508	0.5	Chattooga
Georgia	0509	1.0	Chattooga
Georgia	050901	1.0	Chattooga
Georgia	050901	0.5	Chattooga
Georgia	050901	1.0	Chattooga
Georgia	0510	0.5	Chattooga
Georgia	051101	1.0	Chattooga
Georgia	0513	1.0	Chattooga
Georgia	051302	1.0	Chattooga
Georgia	05130301	1.0	Chattooga
Georgia	05130301	1.0	Chattooga
Georgia	05130301	1.0	Chattooga
Georgia	05130301	0.5	Chattooga
Georgia	051304	1.0	Chattooga
Georgia	051305	1.0	Chattooga
Georgia	051305	0.5	Chattooga
Georgia	051701	1.0	Chattooga
Georgia	051701	1.0	Chattooga
Georgia	051701	1.0	Chattooga
Georgia	051701	1.0	Chattooga
Georgia	051701	1.0	Walker
Georgia	051701	1.0	Walker
Georgia	0518	1.0	Chattooga
Georgia	0519	1.0	Chattooga
Georgia	051902	1.0	Chattooga
Georgia	0519030301	1.0	Walker
Georgia	051904	1.0	Walker
Georgia	052002	1.0	Chattooga

Location of cattle sites (Cont.)

State	Node	Amount[1]	County
Georgia	05200201	0.5	Chattooga
Georgia	05200202	1.0	Chattooga
Georgia	0520020201	1.0	Chattooga
Georgia	0520020201	1.0	Chattooga
Georgia	0520020201	1.0	Chattooga
Georgia	0520020301	0.5	Chattooga
Georgia	0520030201	1.0	Walker
Georgia	0521	1.0	Walker
Georgia	0521	1.0	Walker
Georgia	0521	1.0	Walker
Georgia	052102	1.0	Walker
Georgia	052102	1.0	Walker
Georgia	052104	1.0	Walker
Georgia	052105	1.0	Walker
Georgia	052105	1.0	Walker
Georgia	052302	1.0	Walker
Georgia	0612	1.0	Floyd

1 - Amount of the cattle site that was located within node with 1 being 100%.

Location of poultry sites by node in Weiss Lake watershed during diagnostic study, November 1990 - October 1992.

Location of poultry sites by node in Weiss Lake watershed during diagnostic study, November 1990 - October 1992.

State	Node	# of houses	Total ft	Amount	County
Alabama	03	1	12,500	1	Cherokee
Alabama	04	3	27,000	1	Cherokee
Alabama	04	1	16,000	1	Cherokee
Alabama	04	1	11,000	1	Cherokee
Alabama	04	1	10,000	1	Cherokee
Alabama	0402	2	28,500	1	Cherokee
Alabama	0402	1	12,500	1	Cherokee
Alabama	0402	2	31,500	1	Cherokee
Alabama	040301	1	12,500	1	Cherokee
Alabama	040301	1	12,500	1	Cherokee
Alabama	040301	1	12,500	1	DeKalb
Alabama	040301	1	16,000	1	DeKalb
Alabama	0405	1	16,000	1	Cherokee
Alabama	040501	1	12,500	1	Cherokee
Alabama	040601	2	28,500	1	DeKalb
Alabama	040601	1	12,500	1	DeKalb
Alabama	040601	1	14,000	1	DeKalb
Alabama	040601	1	9,500	1	DeKalb
Alabama	0408	0.5	8,000	0.5	DeKalb
Alabama	040801	1	12,500	1	DeKalb
Alabama	041001	0.5	8,000	0.5	DeKalb
Alabama	05	1	14,000	1	Cherokee
Alabama	05	2	19,000	1	Cherokee
Alabama	0502	6	75,500	1	Cherokee
Alabama	0502020402	1	9,500	1	Cherokee
Alabama	05020303	1	12,500	1	Cherokee
Alabama	0502030401	1	16,000	1	Cherokee
Alabama	0502030401	2	28,000	1	Cherokee
Alabama	0502030403	1	14,000	1	Cherokee
Alabama	05020305	1	16,000	1	Cherokee
Alabama	05020305	1	11,000	1	Cherokee
Alabama	05020305	1	16,000	1	Cherokee
Alabama	05020307	1	14,000	1	DeKalb
Alabama	05020501	1	16,000	1	Cherokee
Alabama	05020705	0.5	9,500	0.5	DeKalb
Alabama	05020706	2	38,000	1	DeKalb
Alabama	05020706	0.5	9,500	0.5	DeKalb
Alabama	05020706	0.5	6,250	0.5	DeKalb
Alabama	0502070601	0.5	6,250	0.5	DeKalb
Alabama	05020707	1	6,500	1	DeKalb
Alabama	05020707	2	25,000	1	DeKalb
Alabama	05020708	1	9,500	1	DeKalb
Alabama	05020708	1	9,500	1	DeKalb
Alabama	05020901	0.5	4,750	0.5	DeKalb
Alabama	05020902	0.5	4,750	0.5	DeKalb
Alabama	05020904	1	14,750	0.5	DeKalb
Alabama	0502090402	1	12,500	1	DeKalb

Location of poultry sites (Cont.)

State	Node	# of houses	Total ft	Amount	County
Alabama	0502090501	1	14,750	0.5	DeKalb
Alabama	050212	1	9,500	1	DeKalb
Alabama	05021202	1	9,500	1	DeKalb
Alabama	0502120301	1	8,000	1	DeKalb
Alabama	05021204	1	12,500	1	DeKalb
Alabama	05021205	1	12,600	1	DeKalb
Alabama	05021205	1	12,500	0.5	DeKalb
Alabama	0502120501	1	12,500	0.5	DeKalb
Alabama	05021207	1	16,000	1	DeKalb
Alabama	05021301	1	12,500	1	Cherokee
Alabama	0502130301	1	17,000	1	DeKalb
Alabama	050216030201	1.5	27,000	0.5	Cherokee
Alabama	0502160303	0.5	9,500	0.5	Cherokee
Alabama	05021604	2	30,000	1	Cherokee
Alabama	050217	4	68,000	1	Cherokee
Alabama	050217	2	31,000	1	Cherokee
Alabama	050217	0.5	8,000	0.5	Cherokee
Alabama	05021701	0.5	8,000	0.5	Cherokee
Alabama	050218	1.5	27,000	0.5	Cherokee
Alabama	050219	2	26,000	0.5	Cherokee
Alabama	050219	1	12,500	1	Cherokee
Alabama	050219	2	31,500	1	Cherokee
Alabama	050219	0.5	9,500	0.5	Cherokee
Alabama	05022001	2	26,000	0.5	Cherokee
Alabama	050221	1	16,000	1	DeKalb
Alabama	050221	3	54,000	1	Cherokee
Alabama	0504	1	12,500	1	Cherokee
Alabama	0504	1	21,500	1	Cherokee
Alabama	0506090601	1	12,500	1	DeKalb
Alabama	05070503	2	20,500	1	Cherokee
Alabama	05070503	1	14,000	1	Cherokee
Alabama	06	1	12,500	1	Cherokee
Alabama	06	2	25,000	1	Cherokee
Alabama	06	1	12,500	1	Cherokee
Alabama	06	3	45,500	1	Cherokee
Alabama	06	1	9,500	1	Cherokee
Alabama	0602	3	38,000	1	Cherokee
Alabama	0602	1	12,500	1	Cherokee
Alabama	060201	1	16,000	1	Cherokee
Alabama	060201	1	11,000	1	Cherokee
Alabama	060204	2	28,500	1	Cherokee
Alabama	060204	2	22,000	1	Cherokee
Alabama	060401	2	16,000	1	Cherokee
Alabama	060402	2	25,000	1	Cherokee
Alabama	060602	2	28,500	1	Cherokee
Alabama	060602	1	9,500	1	Cherokee
Georgia	0507	2	31,500	1	Chattooga
Georgia	0508	1	16,000	1	Chattooga

Location of poultry sites (Cont.)

State	Node	# of houses	Total ft	Amount	County
Georgia	0508	1	12,500	1	Chattooga
Georgia	050901	2	20,500	1	Chattooga
Georgia	0511	1	12,500	1	Chattooga
Georgia	0511	2	22,000	1	Chattooga
Georgia	0512	3	28,500	1	Chattooga
Georgia	051302	2	22,000	1	Chattooga
Georgia	051303	1	14,000	1	Chattooga
Georgia	05130301	3	31,500	1	Chattooga
Georgia	051304	2	25,000	1	Chattooga
Georgia	051304	1	12,500	1	Chattooga
Georgia	051304	1	12,500	1	Chattooga
Georgia	051304	1	12,500	1	Chattooga
Georgia	0516	1	11,000	1	Chattooga
Georgia	0516	1	8,000	1	Chattooga
Georgia	051601	0.5	5,500	0.5	Chattooga
Georgia	0519	2	24,000	1	Chattooga
Georgia	0519	0.5	5,500	0.5	Chattooga
Georgia	051902	2	31,000	1	Chattooga
Georgia	051902	1	9,500	1	Walker
Georgia	051902	1	12,500	1	Walker
Georgia	051902	3	47,000	1	Walker
Georgia	051902	1	6,000	1	Walker
Georgia	0519030301	1	11,000	1	Walker
Georgia	05190304	4	44,000	1	Walker
Georgia	05190304	3	39,000	1	Walker
Georgia	051905	2	19,000	1	Walker
Georgia	052002	1	16,000	1	Walker
Georgia	052002	1	9,500	1	Chattooga
Georgia	05200202	1	11,000	1	Chattooga
Georgia	0520020201	1	11,000	1	Chattooga
Georgia	0520020201	1	11,000	1	Chattooga
Georgia	0521	1	12,500	1	Walker
Georgia	052102	2	19,000	1	Walker
Georgia	052302	1	12,500	1	Cherokee
Georgia	052302	1	9,500	1	Walker
Georgia	0611	1	11,000	1	Floyd
Georgia	0612	2	19,000	1	Floyd
Georgia	0612	2	25,000	1	Polk
Totals		191	2,453,100		

[1]Amount of the poultry site that was located within node with 1 being 100%.

U. S. Food and Drug Administration action level guidelines for chemical contamination in fish tissue.

U. S. Food and Drug Administration action level guidelines for chemical contamination in fish tissue.

Metal	Value
Mercury	1.0 ppm[1]
Pesticides	**Value**
Aldrin	0.3 ppm[1]
Chlordane	0.3 ppm[1]
DDT	5.0 ppm[1]
Dieldrin	0.3 ppm[1]
Endrin	0.3 ppm[1]
Heptachlor	0.3 ppm[1]
Kepone (chlorodecone)	0.3 ppm[1]
Mirex	0.10 ppm[1]
PBC's	2.0 ppm[2]
Toxaphene	5.0 ppm[1]

[1]Action level.
[2]Tolerance level.

Sediment oxygen demand. Dissolved oxygen-time series regression analysis. Alabama Department of Environmental Management, May 1991.

Sediment Oxygen Demand
Dissolved Oxygen - Time Series Regression Analysis
Alabama Department of Environmental Management
May 1991

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******* Station/Location Information *******

STATION: Lake Weiss, Near mouth of Bay Springs Creek (STATION 1)
DATE: 11-Apr-91
SED. TYPE: 3 inches muck over sandy clay

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******* Dissolved Oxygen - Time Series *******

ELAPSED TIME (min.)	REP. 0 DISSOLVED OXYGEN (mg/L)	(water only) REP. 00 DISSOLVED OXYGEN (mg/L)	REP. 1 DISSOLVED OXYGEN (mg/L)	REP. 2 DISSOLVED OXYGEN (mg/L)	REP. 3 DISSOLVED OXYGEN (mg/L)	REP. 4 DISSOLVED OXYGEN (mg/L)
0	8.775	8.825	8.700	8.600	8.550	8.550
15	8.775	8.825	8.650	8.550	8.500	8.500
30	8.725	8.825	8.600	8.500	8.425	8.450
45	8.725	8.825	8.550	8.475	8.400	8.400
60	8.725	8.800	8.500	8.400	8.325	8.350
75	8.700	8.800	8.450	8.375	8.300	8.300
90	8.700	8.800	8.400	8.325	8.250	8.250
105	8.700	8.800	8.375	8.300	8.200	8.200
120	8.700	8.775	8.300	8.225	8.150	8.125
135	8.675	8.775	8.275	8.200	8.100	8.100
150	8.675	8.750	8.225	8.175	8.050	8.050
165	8.675	8.775	8.200	8.125	8.025	8.000

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***** Linear Regression Analysis *****

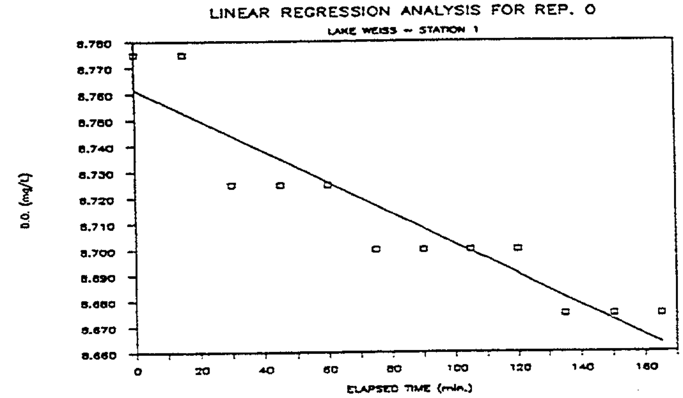
REP. 0

Regression Output:

Constant		8.7615384615
Std Err of Y Est		0.0132551613
R Squared		0.8661338661
No. of Observations		12
Degrees of Freedom		10
X Coefficient(s)	-0.000594405	
Std Err of Coef.	0.0000738968	

MIN.	REGRES. D.O.
0	8.762
15	8.753
30	8.744
45	8.735
60	8.726
75	8.717
90	8.708
105	8.699
120	8.690
135	8.681
150	8.672
165	8.663

LINEAR REGRESSION ANALYSIS FOR REP. 0



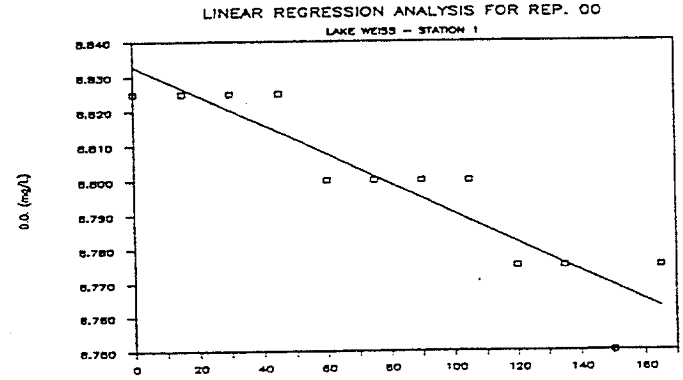
REP. 00

Regression Output:

Constant		8.8330128205
Std Err of Y Est		0.0100007284
R Squared		0.8534137618
No. of Observations		12
Degrees of Freedom		10
X Coefficient(s)	-0.000425407	
Std Err of Coef.	0.0000557535	

MIN.	REGRES. D.O.
0	8.833
15	8.827
30	8.820
45	8.814
60	8.807
75	8.801
90	8.795
105	8.788
120	8.782
135	8.776
150	8.769
165	8.763

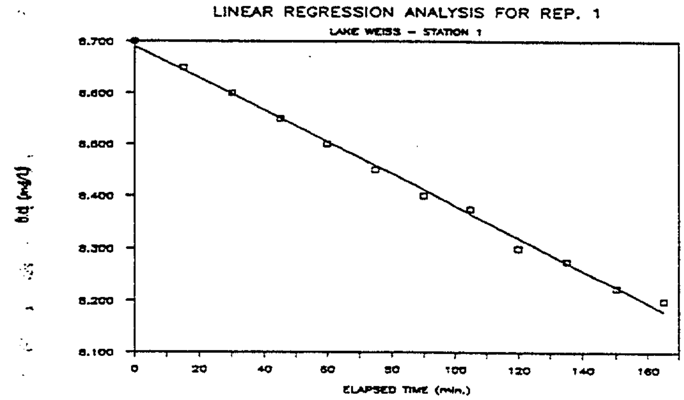
LINEAR REGRESSION ANALYSIS FOR REP. 00



REP. 1

Regression Output:

Constant		8.6907051282
Std Err of Y Est		0.0111182718
R Squared		0.9960036596
No. of Observations		12
Degrees of Freedom		10
X Coefficient(s)	-0.003094405	
Std Err of Coef.	0.0000619838	

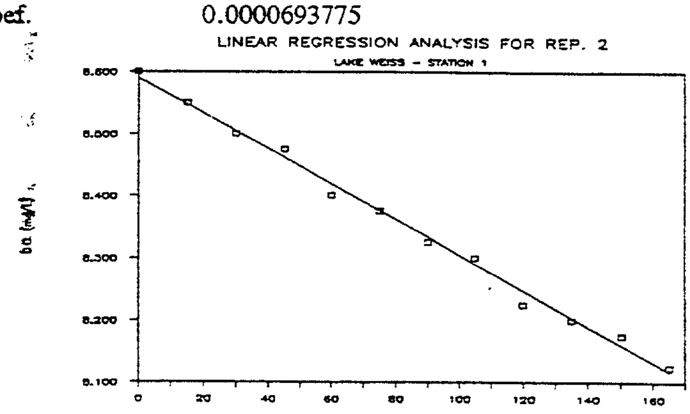


MIN.	REGRES. D.O.
0	8.691
15	8.644
30	8.598
45	8.551
60	8.505
75	8.459
90	8.412
105	8.366
120	8.319
135	8.273
150	8.227
165	8.180

REP. 2

Regression Output:

Constant		8.5907051282
Std Err of Y Est		0.0124445156
R Squared		0.994178883
No. of Observations		12
Degrees of Freedom		10
X Coefficient(s)	-0.002867132	
Std Err of Coef.	0.0000693775	



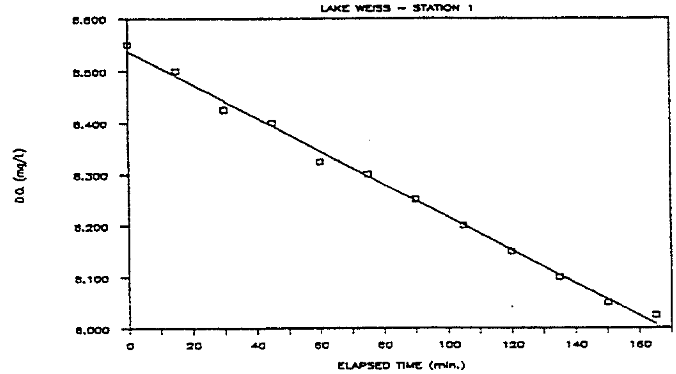
MIN.	REGRES. D.O.
0	8.591
15	8.548
30	8.505
45	8.462
60	8.419
75	8.376
90	8.333
105	8.290
120	8.247
135	8.204
150	8.161
165	8.118

REP. 3

Regression Output:

Constant		8.5378205128
Std Err of Y Est		0.011580392
R Squared		0.9959736901
No. of Observations		12
Degrees of Freedom		10
X Coefficient(s)	-0.003210955	
Std Err of Coef.	0.0000645601	

MIN.	REGRES. D.O.
0	8.538
15	8.490
30	8.441
45	8.393
60	8.345
75	8.297
90	8.249
105	8.201
120	8.153
135	8.104
150	8.056
165	8.008

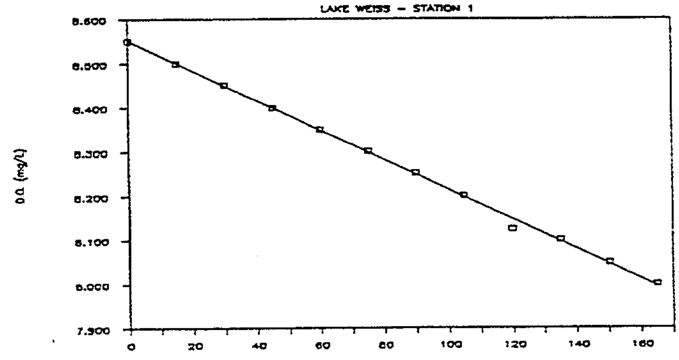


REP. 4

Regression Output:

Constant		8.5503205128
Std Err of Y Est		0.0073864757
R Squared		0.9985024268
No. of Observations		12
Degrees of Freedom		10
X Coefficient(s)	-0.003362470	
Std Err of Coef.	0.0000411792	

MIN.	REGRES. D.O.
0	8.550
15	8.500
30	8.449
45	8.399
60	8.349
75	8.298
90	8.248
105	8.197
120	8.147
135	8.096
150	8.046
165	7.996



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***** SOD Calculations *****

TEMPERATURE DATA :

CHAMBER	REP 0	REP 00	REP 1	REP 2	REP 3	REP 4
INITIAL T.	18.5	18	18	18	18	17.5
FINAL T.	18.5	18	18	18	18	18
AVG. T.	18.5	18	18	18	18	17.75

CHAMBER AREA: 0.15 sq. m.
CHAMBER VOLUME: 27.18 L

RESPIRATION RATES:

REP 0: 0.0005944056 mg/L-min.
REP 00: 0.0004254079 mg/L-min.
AVG. RESP.: 0.0005099068 mg/L-min. <--- USE THIS RESP. RATE

LIGHT BOTTLE - DARK BOTTLE:

TIME IN:	09:22 AM	TIME OUT:	12:40 PM
D.O. IN:	8.65 mg/L	D.O. OUT:	8.1 mg/L
RESP.:	0.0027777778 mg/L-min.		

	REP 1	REP 2	REP 3	REP 4
SOD RATE: (g/m^2-day)	0.6744	0.6151	0.7048	0.7443

AVG. RATE:	0.6846 g/m^2-day	TEMP. =	18.1 deg C
	0.7648 g/m^2-day	TEMP. =	20 deg C
-------->	0.0710 g/ft^2-day	TEMP. =	20 deg C

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Sediment Oxygen Demand
Dissolved Oxygen – Time Series Regression Analysis
Alabama Department of Environmental Management
May 1991

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***** Station/Location Information *****

Weiss 2

STATION: Lake Weiss.One Mile N. of P–Dam & 200 yds S. of middle island

DATE: 09–Apr–91

SED. TYPE: soft fluffy muck

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***** Dissolved Oxygen – Time Series *****

ELAPSED TIME (min.)	REP. 0 DISSOLVED OXYGEN (mg/L)	REP. 00 DISSOLVED OXYGEN (mg/L)	REP. 1 DISSOLVED OXYGEN (mg/L)	REP. 2 DISSOLVED OXYGEN (mg/L)	REP. 3 DISSOLVED OXYGEN (mg/L)	REP. 4 DISSOLVED OXYGEN (mg/L)
0	8.600	8.550	7.350	7.000	7.100	7.600
15	8.600	8.550	7.250	6.950	7.000	7.550
30	8.600	8.500	7.200	6.900	6.950	7.500
45	8.550	8.450	7.150	6.850	6.900	7.400
60	8.550	8.500	7.100	6.800	6.850	7.400
75	8.550	8.500	7.000	6.750	6.800	7.300
90	8.500	8.450	7.000	6.700	6.700	7.250
105	8.500	8.500	6.900	6.650	6.650	7.200
120	8.500	8.500	6.850	6.600	6.600	7.150
135	8.500	8.450	6.800	6.500	6.550	7.100
150	8.450	8.400	6.750	6.450	6.500	7.050
165	8.450	8.400	6.700	6.400	6.450	7.000
180	8.400	8.350	6.600	6.350	6.400	6.950
195	8.400	8.400	6.600	6.300	6.350	6.900

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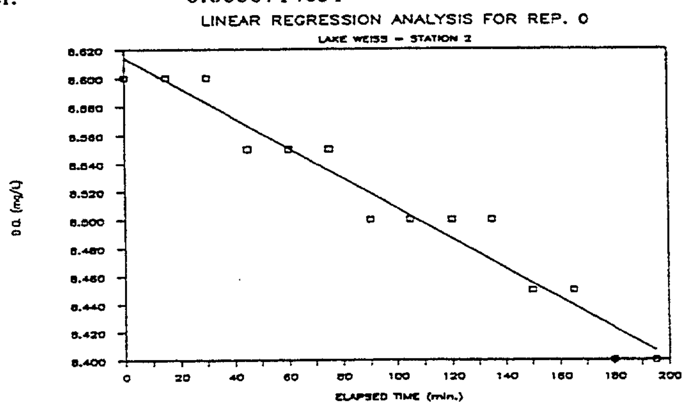
***** Linear Regression Analysis *****

REP. 0

Regression Output:

Constant	8.6142857143
Std Err of Y Est	0.0161551543
R Squared	0.9485675615
No. of Observations	14
Degrees of Freedom	12

X Coefficient(s)	-0.001062271
Std Err of Coef.	0.0000714051



MIN.	REGRES. D.O.
0	8.614
15	8.598
30	8.582
45	8.566
60	8.551
75	8.535
90	8.519
105	8.503
120	8.487
135	8.471
150	8.455
165	8.439
180	8.423
195	8.407

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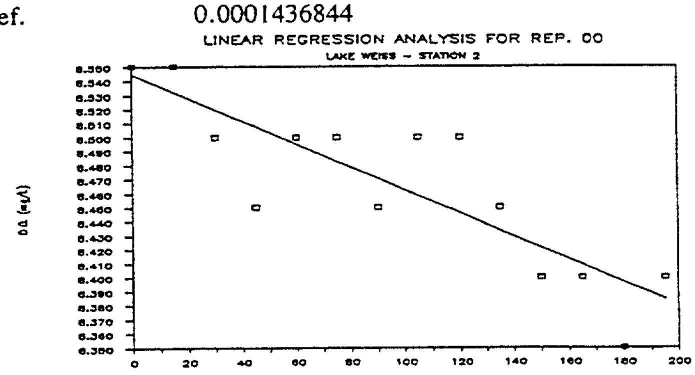
REP. 00

Regression Output:

Constant	8.5442857143
Std Err of Y Est	0.0325080999
R Squared	0.731002331
No. of Observations	14
Degrees of Freedom	12

X Coefficient(s)	-0.000820512
Std Err of Coef.	0.0001436844



MIN.	REGRES. D.O.
0	8.544
15	8.532
30	8.520
45	8.507
60	8.495
75	8.483
90	8.470
105	8.458
120	8.446
135	8.434
150	8.421
165	8.409
180	8.397
195	8.384

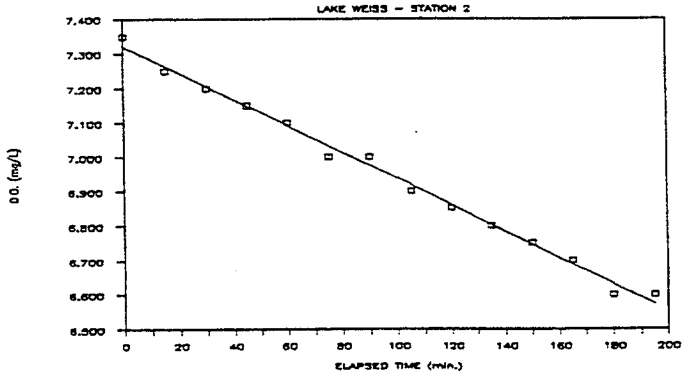
REP. 1

Regression Output:

Constant	7.3214285714
Std Err of Y Est	0.0206355076
R Squared	0.993296935
No. of Observations	14
Degrees of Freedom	12
X Coefficient(s)	-0.003846153
Std Err of Coef.	0.0000912081

LINEAR REGRESSION ANALYSIS FOR REP. 1

LAKE WEISS - STATION 2



MIN.	REGRES. D.O.
0	7.321
15	7.264
30	7.206
45	7.148
60	7.091
75	7.033
90	6.975
105	6.918
120	6.860
135	6.802
150	6.745
165	6.687
180	6.629
195	6.571

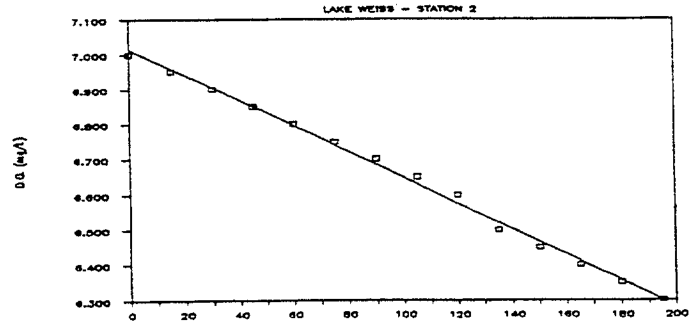
REP. 2

Regression Output:

Constant	7.0142857143
Std Err of Y Est	0.0143542313
R Squared	0.9964129135
No. of Observations	14
Degrees of Freedom	12
X Coefficient(s)	-0.003663003
Std Err of Coef.	0.0000634451

LINEAR REGRESSION ANALYSIS FOR REP. 2

LAKE WEISS - STATION 2

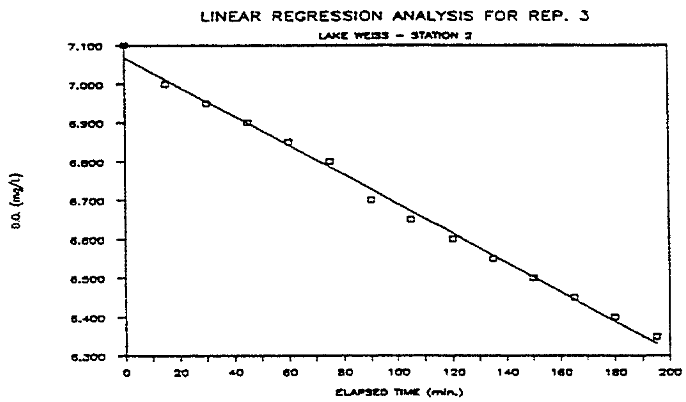


MIN.	REGRES. D.O.
0	7.014
15	6.959
30	6.904
45	6.849
60	6.795
75	6.740
90	6.685
105	6.630
120	6.575
135	6.520
150	6.465
165	6.410
180	6.355
195	6.300

REP. 3

Regression Output:

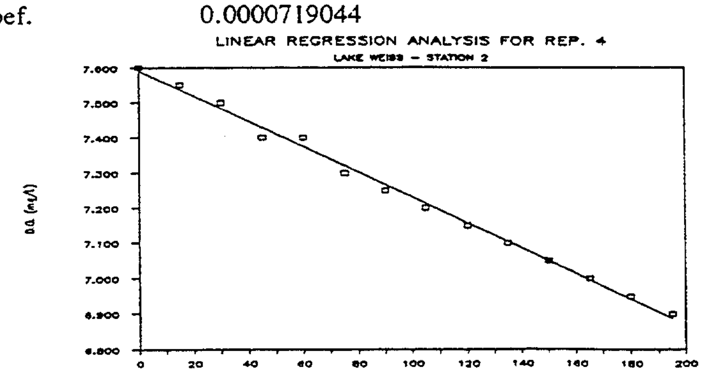
			MIN.	REGRES. D.O.
Constant		7.0685714286	0	7.069
Std Err of Y Est		0.0171451464	15	7.012
R Squared		0.9952007176	30	6.955
No. of Observations		14	45	6.898
Degrees of Freedom		12	60	6.842
			75	6.785
X Coefficient(s)	-0.003780219		90	6.728
Std Err of Coef.	0.0000757808		105	6.672
			120	6.615
			135	6.558
			150	6.502
			165	6.445
			180	6.388
			195	6.331



REP. 4

Regression Output:

			MIN.	REGRES. D.O.
Constant		7.5914285714	0	7.591
Std Err of Y Est		0.0162681288	15	7.537
R Squared		0.9952662722	30	7.483
No. of Observations		14	45	7.429
Degrees of Freedom		12	60	7.375
			75	7.321
X Coefficient(s)	-0.003611721		90	7.266
Std Err of Coef.	0.0000719044		105	7.212
			120	7.158
			135	7.104
			150	7.050
			165	6.995
			180	6.941
			195	6.887



***** SOD Calculations *****

TEMPERATURE DATA :

CHAMBER	REP 0	REP 00	REP 1	REP 2	REP 3	REP 4
INITIAL T.	17.5	17.5	17	17	17	17
FINAL T.	17.5	17.5	17	17.5	17.5	17.5
AVG. T.	17.5	17.5	17	17.25	17.25	17.25

CHAMBER AREA: 0.15 sq. m.
CHAMBER VOLUME: 27.18 L

RESPIRATION RATES:

REP 0: 0.0010622711 mg/L-min.
REP 00: 0.0008205128 mg/L-min.
AVG. RESP.: 0.0009413919 mg/L-min. <--- USE THIS RESP. RATE

LIGHT BOTTLE = DARK BOTTLE:

TIME IN:	09:57 AM	TIME OUT:	01:51 PM
D.O. IN:	8.3 mg/L	D.O. OUT:	8.1 mg/L
RESP.:	0.0008547009 mg/L-min.		

	REP 1	REP 2	REP 3	REP 4
→ SOD RATE: (g/m^2-day)	0.7579	0.7101	0.7407	0.6968

AVG. RATE:	0.7264 g/m^2-day	TEMP. =	17.3 deg C
	0.8502 g/m^2-day	TEMP. =	20 deg C
-------->	0.0790 g/ft^2-day	TEMP. =	20 deg C

per DAY

Sediment Oxygen Demand
Dissolved Oxygen - Time Series Regression Analysis
Alabama Department of Environmental Management
May 1991

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***** Station/Location Information *****

WEISS 3

STATION: Lake Weiss, Left Overbank Near Yellowleaf Ck.&Big Nose Ck.(STA3)

DATE: 09-Apr-91

SED. TYPE: 3 inches muck over sandy clay

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***** Dissolved Oxygen - Time Series *****

ELAPSED TIME (min.)	REP. 0 DISSOLVED OXYGEN (mg/L)	REP. 00 DISSOLVED OXYGEN (mg/L)	REP. 1 DISSOLVED OXYGEN (mg/L)	REP. 2 DISSOLVED OXYGEN (mg/L)	REP. 3 DISSOLVED OXYGEN (mg/L)	REP. 4 DISSOLVED OXYGEN (mg/L)
0	9.000	8.650	8.550	8.400	8.400	8.200
15	9.050	8.600	8.500	8.350	8.350	8.100
30	9.000	8.600	8.450	8.300	8.300	8.050
45	9.000	8.600	8.400	8.200	8.200	8.000
60	9.000	8.600	8.350	8.200	8.200	7.950
75	9.000	8.600	8.300	8.100	8.100	7.900
90	9.000	8.600	8.300	8.100	8.050	7.850
105	9.000	8.600	8.200	8.000	8.000	7.800
120	9.000	8.600	8.200	8.000	8.000	7.750
135	9.000	8.550	8.150	7.950	7.900	7.700
150	9.000	8.550	8.100	7.900	7.900	7.700

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***** Linear Regression Analysis *****

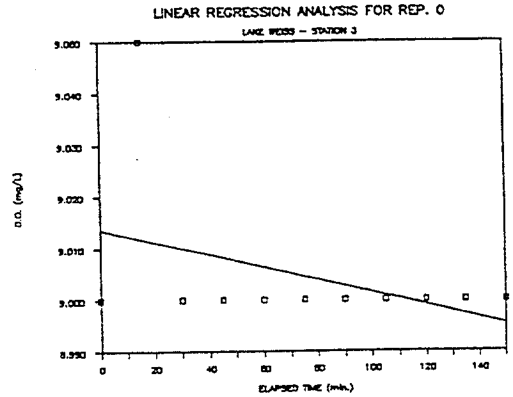
REP. 0

Regression Output:

Constant	9.0136363636
Std Err of Y Est	0.0145643816
R Squared	0.16
No. of Observations	11
Degrees of Freedom	9
X Coefficient(s)	-0.000121212
Std Err of Coef.	0.0000925773

MIN.	REGRES. D.O.
0	9.014
15	9.012
30	9.010
45	9.008
60	9.006
75	9.005
90	9.003
105	9.001
120	8.999
135	8.997
150	8.995

LINEAR REGRESSION ANALYSIS FOR REP. 0



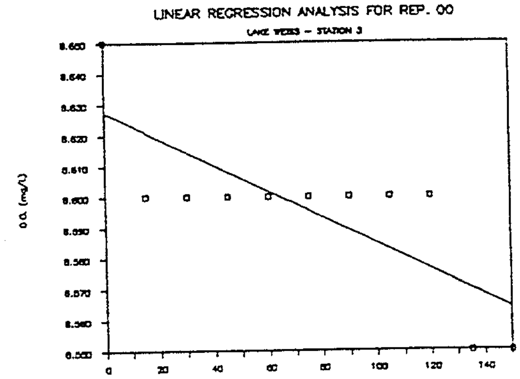
REP. 00

Regression Output:

Constant	8.6272727273
Std Err of Y Est	0.0176955168
R Squared	0.6125
No. of Observations	11
Degrees of Freedom	9
X Coefficient(s)	-0.000424242
Std Err of Coef.	0.0001124801

MIN.	REGRES. D.O.
0	8.627
15	8.621
30	8.615
45	8.608
60	8.602
75	8.595
90	8.589
105	8.583
120	8.576
135	8.570
150	8.564

LINEAR REGRESSION ANALYSIS FOR REP. 00

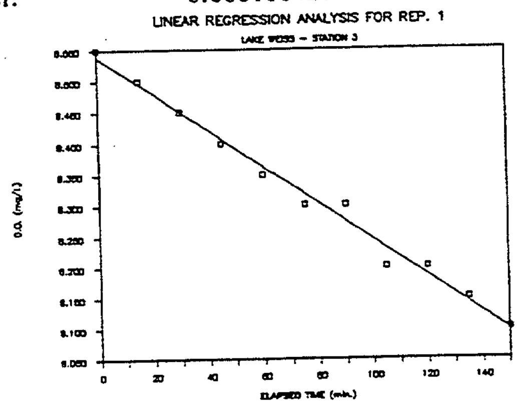


REP. 1

Regression Output:

Constant	8.5386363636
Std Err of Y Est	0.0167422528
R Squared	0.9883403361
No. of Observations	11
Degrees of Freedom	9

X Coefficient(s)	-0.002939393
Std Err of Coef.	0.0001064207



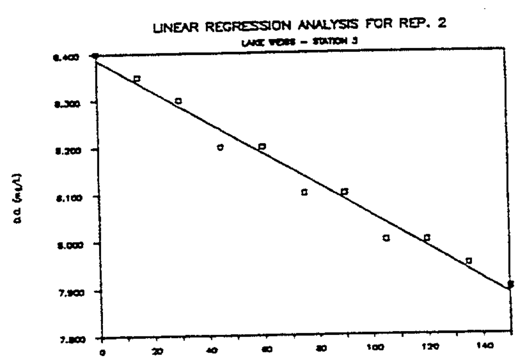
MIN.	REGRES. D.O.
0	8.539
15	8.495
30	8.450
45	8.406
60	8.362
75	8.318
90	8.274
105	8.230
120	8.186
135	8.142
150	8.098

REP. 2

Regression Output:

Constant	8.3863636364
Std Err of Y Est	0.0246182982
R Squared	0.9805510535
No. of Observations	11
Degrees of Freedom	9

X Coefficient(s)	-0.003333333
Std Err of Coef.	0.0001564842

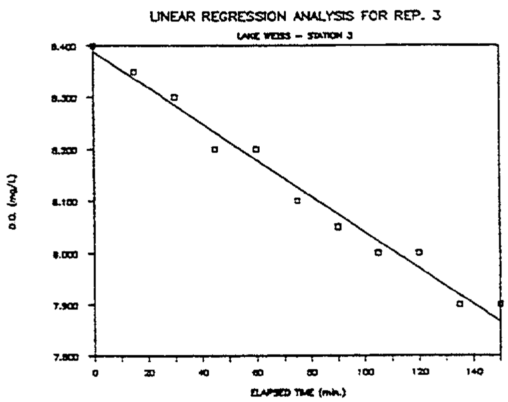


MIN.	REGRES. D.O.
0	8.386
15	8.336
30	8.286
45	8.236
60	8.186
75	8.136
90	8.086
105	8.036
120	7.986
135	7.936
150	7.886

REP. 3

Regression Output:

Constant		8.3886363636
Std Err of Y Est		0.0263523138
R Squared		0.9796296296
No. of Observations		11
Degrees of Freedom		9
X Coefficient(s)	-0.003484848	
Std Err of Coef.	0.0001675063	

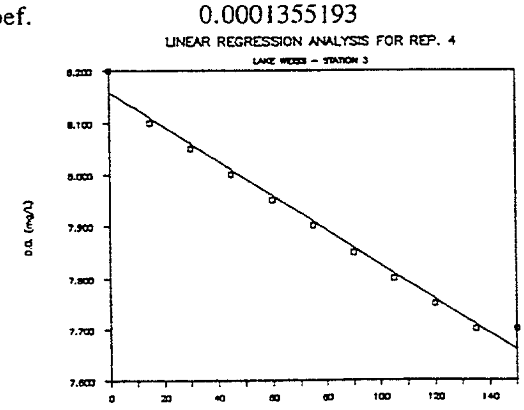


MIN.	REGRES. D.O.
0	8.389
15	8.336
30	8.284
45	8.232
60	8.180
75	8.127
90	8.075
105	8.023
120	7.970
135	7.918
150	7.866

REP. 4

Regression Output:

Constant		8.1590909091
Std Err of Y Est		0.0213200716
R Squared		0.9853420195
No. of Observations		11
Degrees of Freedom		9
X Coefficient(s)	-0.003333333	
Std Err of Coef.	0.0001355193	



MIN.	REGRES. D.O.
0	8.159
15	8.109
30	8.059
45	8.009
60	7.959
75	7.909
90	7.859
105	7.809
120	7.759
135	7.709
150	7.659

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***** SOD Calculations *****

TEMPERATURE DATA :

CHAMBER	REP 0	REP 00	REP 1	REP 2	REP 3	REP 4
INITIAL T.	18	18	17.5	17.5	18	17
FINAL T.	17.5	17.5	17	17	17.5	17.5
AVG. T.	17.75	17.75	17.25	17.25	17.75	17.25

CHAMBER AREA: 0.15 sq. m.
CHAMBER VOLUME: 27.18 L

RESPIRATION RATES:

REP 0: 0.0001212121 mg/L-min.
REP 00: 0.0004242424 mg/L-min.
AVG. RESP.: 0.0002727273 mg/L-min. <--- USE THIS RESP. RATE

LIGHT BOTTLE - DARK BOTTLE:

TIME IN: 03:45 PM TIME OUT: 06:32 PM
D.O. IN: 8.6 mg/L D.O. OUT: 8.5 mg/L
RESP.: 0.0005988024 mg/L-min.

	REP 1	REP 2	REP 3	REP 4
SOD RATE: (g/m^2-day)	0.6958	0.7986	0.8381	0.7986

AVG. RATE:	0.7828 g/m^2-day	TEMP. =	17.55 deg C
	0.9029 g/m^2-day	TEMP. =	20 deg C
-------->	0.0839 g/ft^2-day	TEMP. =	20 deg C

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Sediment Oxygen Demand
Dissolved Oxygen - Time Series Regression Analysis
Alabama Department of Environmental Management
May 1991

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***** Station/Location Information *****

WEISS 4

STATION: Lake Weiss, SW1/4,SW1/4,SEC 5,T10S,R10E. (STATION 4)

DATE: 10-Apr-91

SED. TYPE: 3 inches muck over sandy clay

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***** Dissolved Oxygen - Time Series *****

ELAPSED TIME (min.)	REP. 0 DISSOLVED OXYGEN (mg/L)	REP. 00 DISSOLVED OXYGEN (mg/L)	REP. 1 DISSOLVED OXYGEN (mg/L)	REP. 2 DISSOLVED OXYGEN (mg/L)	REP. 3 DISSOLVED OXYGEN (mg/L)	REP. 4 DISSOLVED OXYGEN (mg/L)
0	8.750	8.650	8.400	8.250	8.100	8.200
15	8.700	8.625	8.350	8.200	8.050	8.125
30	8.700	8.625	8.300	8.150	8.000	8.100
45	8.700	8.600	8.250	8.100	7.975	8.025
60	8.625	8.600	8.150	8.025	7.875	7.950
75	8.625	8.525	8.150	8.000	7.850	7.925
90	8.650	8.600	8.150	8.000	7.800	7.900
105	8.650	8.600	8.150	7.950	7.775	7.850
120	8.650	8.575	8.150	7.900	7.700	7.800
135	8.650	8.575	8.125	7.900	7.700	7.775
150	8.650	8.575	8.000	7.850	7.625	7.700
165	8.625	8.550	7.950	7.800	7.600	7.700

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***** Linear Regression Analysis *****

REP. 0

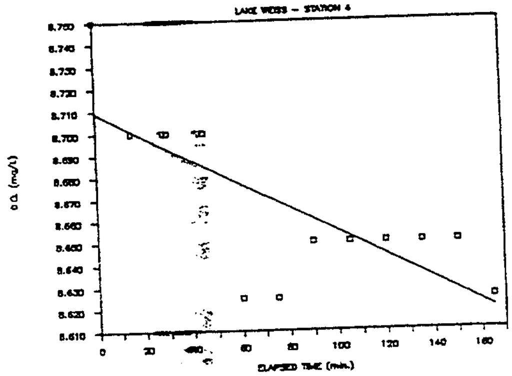
Regression Output:

Constant	8.7092948718
Std Err of Y Est	0.0271523909
R Squared	0.5617571283
No. of Observations	12
Degrees of Freedom	10
X Coefficient(s)	-0.000541958
Std Err of Coef.	0.0001513731

MIN.	REGRES. D.O.
0	8.709
15	8.701
30	8.693
45	8.685
60	8.677
75	8.669
90	8.661
105	8.652
120	8.644
135	8.636
150	8.628
165	8.620

LINEAR REGRESSION ANALYSIS FOR REP. 0

LAKE WEISS – STATION 4



REP. 00

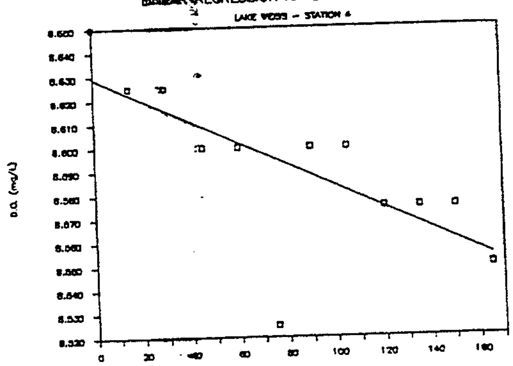
Regression Output:

Constant	8.6291666667
Std Err of Y Est	0.0250378501
R Squared	0.5146627566
No. of Observations	12
Degrees of Freedom	10
X Coefficient(s)	-0.000454545
Std Err of Coef.	0.0001395847

MIN.	REGRES. D.O.
0	8.629
15	8.622
30	8.616
45	8.609
60	8.602
75	8.595
90	8.588
105	8.581
120	8.575
135	8.568
150	8.561
165	8.554

LINEAR REGRESSION ANALYSIS FOR REP. 00

LAKE WEISS – STATION 4



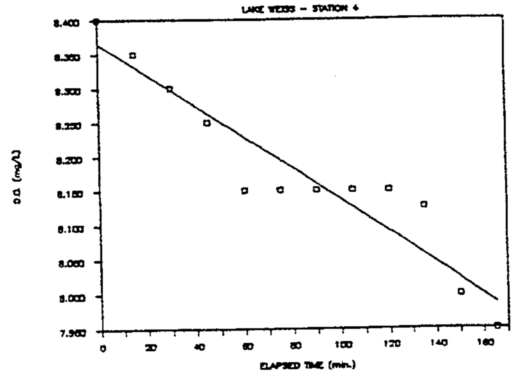
REP. 1

Regression Output:

Constant	8.366025641
Std Err of Y Est	0.0453465354
R Squared	0.8913861929
No. of Observations	12
Degrees of Freedom	10
X Coefficient(s)	-0.002290209
Std Err of Coef.	0.0002528045

LINEAR REGRESSION ANALYSIS FOR REP. 1

LAKE WEISS – STATION 4



MIN.	REGRES. D.O.
0	8.366
15	8.332
30	8.297
45	8.263
60	8.229
75	8.194
90	8.160
105	8.126
120	8.091
135	8.057
150	8.022
165	7.988

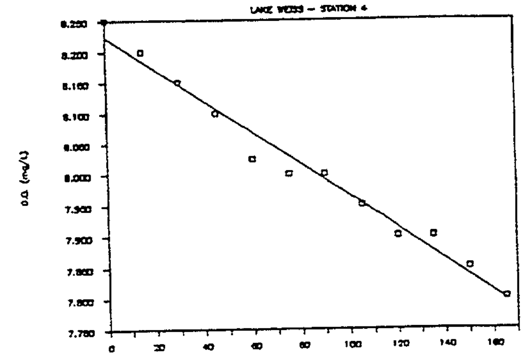
REP. 2

Regression Output:

Constant	8.2233974359
Std Err of Y Est	0.0221133576
R Squared	0.9777040817
No. of Observations	12
Degrees of Freedom	10
X Coefficient(s)	-0.002581585
Std Err of Coef.	0.0001232808

LINEAR REGRESSION ANALYSIS FOR REP. 2

LAKE WEISS – STATION 4



MIN.	REGRES. D.O.
0	8.223
15	8.185
30	8.146
45	8.107
60	8.069
75	8.030
90	7.991
105	7.952
120	7.914
135	7.875
150	7.836
165	7.797

REP. 3

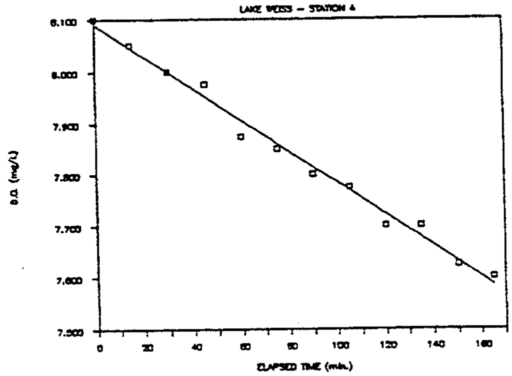
Regression Output:

Constant	8.0903846154
Std Err of Y Est	0.0182014754
R Squared	0.9891601241
No. of Observations	12
Degrees of Freedom	10

X Coefficient(s)	-0.003065268
Std Err of Coef.	0.0001014723

LINEAR REGRESSION ANALYSIS FOR REP. 3

LAKE WEISS – STATION 4



	REGRES.
MIN.	D.O.
0	8.090
15	8.044
30	7.998
45	7.952
60	7.906
75	7.860
90	7.815
105	7.769
120	7.723
135	7.677
150	7.631
165	7.585

REP. 4

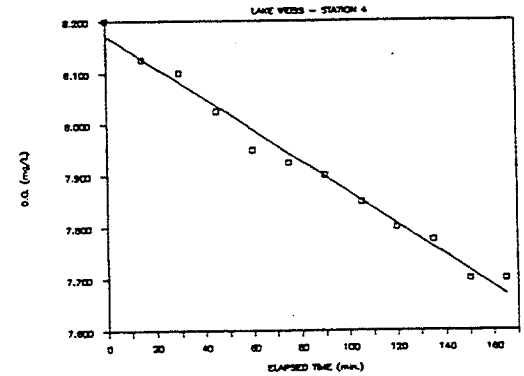
Regression Output:

Constant	8.1717948718
Std Err of Y Est	0.0213542111
R Squared	0.9849151538
No. of Observations	12
Degrees of Freedom	10

X Coefficient(s)	-0.003041958
Std Err of Coef.	0.0001190486

LINEAR REGRESSION ANALYSIS FOR REP. 4

LAKE WEISS – STATION 4



	REGRES.
MIN.	D.O.
0	8.172
15	8.126
30	8.081
45	8.035
60	7.989
75	7.944
90	7.898
105	7.852
120	7.807
135	7.761
150	7.716
165	7.670

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***** SOD Calculations *****

TEMPERATURE DATA :

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CHAMBER	REP 0	REP 00	REP 1	REP 2	REP 3	REP 4
INITIAL T.	18	18	17.5	17.5	18	17.5
FINAL T.	18	18	17.5	18	18	17.5
AVG. T.	18	18	17.5	17.75	18	17.5

CHAMBER AREA: 0.15 sq. m.
CHAMBER VOLUME: 27.18 L

RESPIRATION RATES:

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REP 0: 0.000541958 mg/L-min.
REP 00: 0.0004545455 mg/L-min.
AVG. RESP.: 0.0004982517 mg/L-min. <--- USE THIS RESP. RATE

LIGHT BOTTLE - DARK BOTTLE:

TIME IN:	09:07 AM	TIME OUT:	12:20 PM
D.O. IN:	8.6 mg/L	D.O. OUT:	8.45 mg/L
RESP.:	0.0007772021 mg/L-min.		

	REP 1	REP 2	REP 3	REP 4
SOD RATE: (g/m^2-day)	0.4676	0.5436	0.6698	0.6637

***AVG. SOD RATE DOES NOT INCLUDE REP. 1 DUE TO PUMP MALFUNCTION

AVG. RATE:	0.6257 g/m^2-day	TEMP. =	17.85 deg C
	0.7092 g/m^2-day	TEMP. =	20 deg C
-------->	0.0659 g/ft^2-day	TEMP. =	20 deg C

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Sediment Oxygen Demand
Dissolved Oxygen – Time Series Regression Analysis
Alabama Department of Environmental Management
May 1991

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***** Station/Location Information *****

WEISS 5

STATION: Lake Weiss, NE1/4,SW1/4,SEC 36,T9S,R10E. (STATION5)

DATE: 10-Apr-91

SED. TYPE: 3 inches muck over sandy clay

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***** Dissolved Oxygen – Time Series *****

ELAPSED TIME (min.)	REP. 0 DISSOLVED OXYGEN (mg/L)	REP. 00 DISSOLVED OXYGEN (mg/L)	REP. 1 DISSOLVED OXYGEN (mg/L)	REP. 2 DISSOLVED OXYGEN (mg/L)	REP. 3 DISSOLVED OXYGEN (mg/L)	REP. 4 DISSOLVED OXYGEN (mg/L)
0	7.900	7.950	7.900	7.700	7.900	7.900
15	7.900	7.950	7.825	7.550	7.825	7.825
30	7.900	7.950	7.750	7.475	7.750	7.750
45	7.875	7.950	7.700	7.400	7.700	7.700
60	7.850	7.950	7.650	7.325	7.625	7.650
75	7.850	7.925	7.600	7.275	7.575	7.575
90	7.825	7.950	7.550	7.200	7.525	7.500
105	7.825	7.950	7.500	7.150	7.475	7.450
120	7.850	7.950	7.475	7.075	7.425	7.375
135	7.850	7.950	7.400	7.025	7.400	7.325
150	7.825	7.925	7.400	6.975	7.325	7.275
165	7.800	7.950	7.325		7.275	7.200

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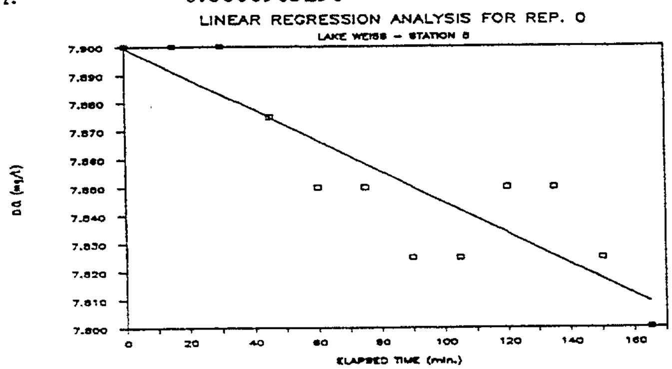
***** Linear Regression Analysis *****

REP. 0

Regression Output:

Constant	7.8993589744
Std Err of Y Est	0.0162386772
R Squared	0.7854687685
No. of Observations	12
Degrees of Freedom	10

X Coefficient(s)	-0.000547785
Std Err of Coef.	0.0000905298



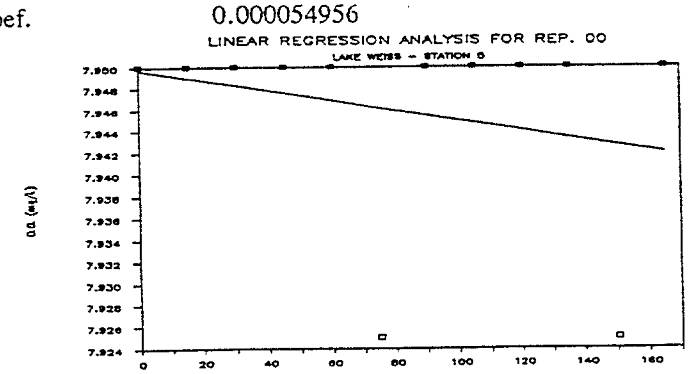
MIN.	REGRES. D.O.
0	7.899
15	7.891
30	7.883
45	7.875
60	7.866
75	7.858
90	7.850
105	7.842
120	7.834
135	7.825
150	7.817
165	7.809

REP. 00

Regression Output:

Constant	7.9496794872
Std Err of Y Est	0.0098576701
R Squared	0.0671328671
No. of Observations	12
Degrees of Freedom	10

X Coefficient(s)	-0.00004662
Std Err of Coef.	0.000054956



MIN.	REGRES. D.O.
0	7.950
15	7.949
30	7.948
45	7.948
60	7.947
75	7.946
90	7.945
105	7.945
120	7.944
135	7.943
150	7.943
165	7.942

REP. 1

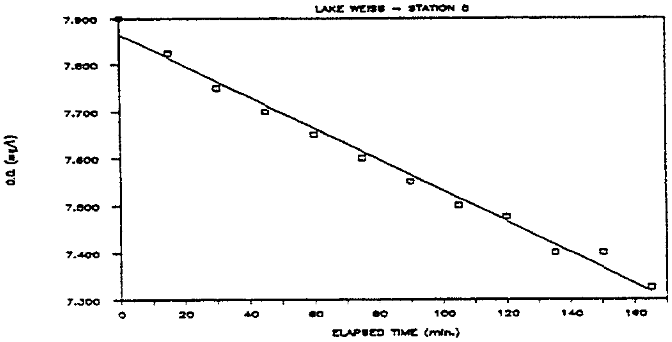
Regression Output:

Constant	7.8631410256
Std Err of Y Est	0.0207679627
R Squared	0.9879547362
No. of Observations	12
Degrees of Freedom	10
X Coefficient(s)	-0.003315850
Std Err of Coef.	0.0001157803

MIN.	REGRES. D.O.
0	7.863
15	7.813
30	7.764
45	7.714
60	7.664
75	7.614
90	7.565
105	7.515
120	7.465
135	7.416
150	7.366
165	7.316

LINEAR REGRESSION ANALYSIS FOR REP. 1

LAKE WEISS – STATION 6



REP. 2

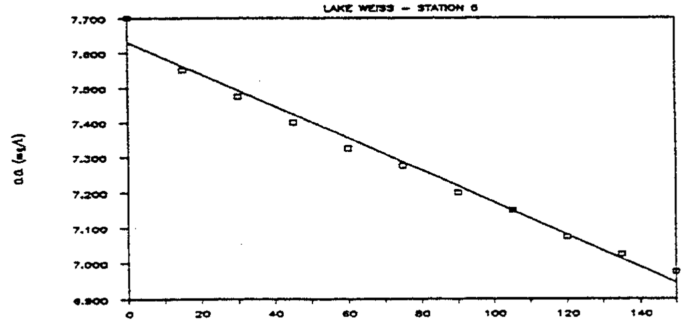
Regression Output:

Constant	7.6295454545
Std Err of Y Est	0.0307318149
R Squared	0.9838619202
No. of Observations	11
Degrees of Freedom	9
X Coefficient(s)	-0.004575757
Std Err of Coef.	0.0001953442

MIN.	REGRES. D.O.
0	7.630
15	7.561
30	7.492
45	7.424
60	7.355
75	7.286
90	7.218
105	7.149
120	7.080
135	7.012
150	6.943

LINEAR REGRESSION ANALYSIS FOR REP. 2

LAKE WEISS – STATION 6

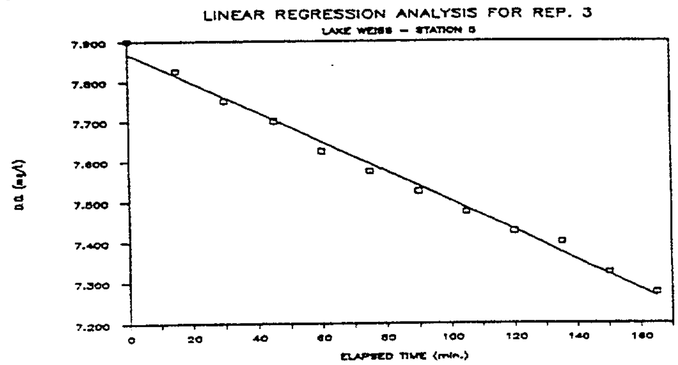


REP. 3

Regression Output:

Constant	7.8685871795
Std Err of Y Est	0.0179954344
R Squared	0.9925402402
No. of Observations	12
Degrees of Freedom	10
X Coefficient(s)	-0.003659440
Std Err of Coef.	0.0001003236

MIN.	REGRES. D.O.
0	7.869
15	7.814
30	7.759
45	7.704
60	7.649
75	7.594
90	7.539
105	7.484
120	7.429
135	7.375
150	7.320
165	7.265

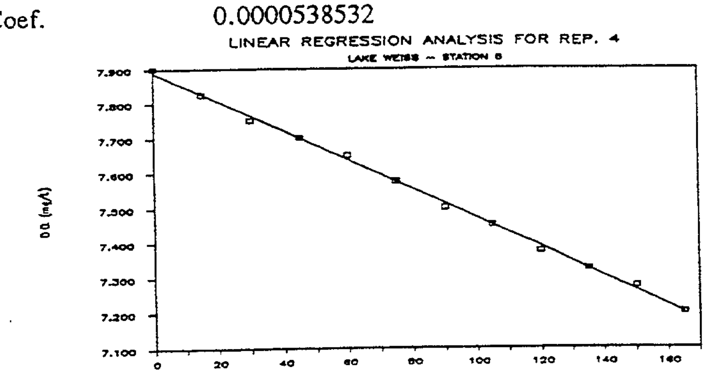


REP. 4

Regression Output:

Constant	7.8884615385
Std Err of Y Est	0.0096598622
R Squared	0.998341564
No. of Observations	12
Degrees of Freedom	10
X Coefficient(s)	-0.004178321
Std Err of Coef.	0.0000538532

MIN.	REGRES. D.O.
0	7.888
15	7.826
30	7.763
45	7.700
60	7.638
75	7.575
90	7.512
105	7.450
120	7.387
135	7.324
150	7.262
165	7.199



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***** SOD Calculations *****

TEMPERATURE DATA :

CHAMBER	REP 0	REP 00	REP 1	REP 2	REP 3	REP 4
INITIAL T.	19	19	18.5	18.5	19	18.5
FINAL T.	19	18.5	18	18.5	19	18
AVG. T.	19	18.75	18.25	18.5	19	18.25

CHAMBER AREA: 0.15 sq. m.
CHAMBER VOLUME: 27.18 L

RESPIRATION RATES:

REP 0: 0.0005477855 mg/L-min.
REP 00: 0.00004662 mg/L-min.
AVG. RESP.: 0.0002972028 mg/L-min. <--- USE THIS RESP. RATE

LIGHT BOTTLE - DARK BOTTLE:

TIME IN:	02:30 PM	TIME OUT:	05:30 PM
D.O. IN:	8 mg/L	D.O. OUT:	7.7 mg/L
RESP.:	0.0016666667 mg/L-min.		

	REP 1	REP 2	REP 3	REP 4
SOD RATE: (g/m^2-day)	0.7876	1.1164	0.8773	1.0127

AVG. RATE:	0.9485 g/m^2-day	TEMP. =	18.7 deg C
	1.0232 g/m^2-day	TEMP. =	20 deg C
-------->	0.0951 g/ft^2-day	TEMP. =	20 deg C

************ ********** ********** ********** ********** ********** *********

Sediment Oxygen Demand
Dissolved Oxygen - Time Series Regression Analysis
Alabama Department of Environmental Management
May 1991

************ ************ ************ ************ ************ ************ ***********

***** Station/Location Information *****

WEISS 6

STATION: Lake Weiss, SW1/4,SW1/4,SEC.23,T9S,R9E. (STATION6)

DATE: 11-Apr-91

SED. TYPE: 3 inches muck over sandy clay

************ ************ ************ ************ ************ ************ ***********

***** Dissolved Oxygen - Time Series *****

ELAPSED TIME (min.)	REP. 0 DISSOLVED OXYGEN (mg/L)	REP. 00 DISSOLVED OXYGEN (mg/L)	REP. 1 DISSOLVED OXYGEN (mg/L)	REP. 2 DISSOLVED OXYGEN (mg/L)	REP. 3 DISSOLVED OXYGEN (mg/L)	REP. 4 DISSOLVED OXYGEN (mg/L)
0	6.000	6.000	6.000	5.975	5.950	6.000
15	5.950	5.900	5.925	5.900	5.900	5.950
30	5.950	5.875	5.900	5.800	5.875	5.925
45	5.925	5.800	5.875	5.700	5.825	5.875
60	5.925	5.725	5.825	5.600	5.800	5.850
75	5.900	5.650	5.775	5.500	5.775	5.800
90	5.900	5.625	5.725	5.400	5.725	5.775
105	5.900	5.650	5.700	5.350	5.700	5.750
120	5.900	5.625	5.675	5.300	5.650	5.700
135	5.875	5.600	5.625	5.250	5.625	5.700
150	5.875	5.575	5.600	5.200	5.600	5.650
165	5.850	5.550	5.550	5.150	5.575	5.600
180	5.825	5.500	5.500	5.125	5.550	5.600

************ ************ ************ ************ ************ ************ ***********

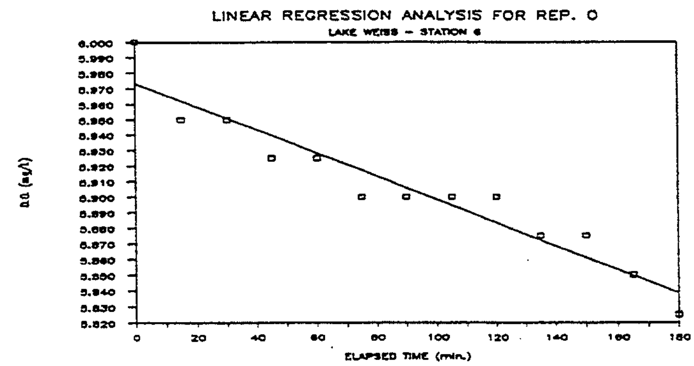
***** Linear Regression Analysis *****

REP. 0

Regression Output:

Constant	5.9733516484
Std Err of Y Est	0.0138224072
R Squared	0.9165757906
No. of Observations	13
Degrees of Freedom	11
X Coefficient(s)	-0.000750915
Std Err of Coef.	0.0000683057

MIN.	REGRES. D.O.
0	5.973
15	5.962
30	5.951
45	5.940
60	5.928
75	5.917
90	5.906
105	5.895
120	5.883
135	5.872
150	5.861
165	5.849
180	5.838

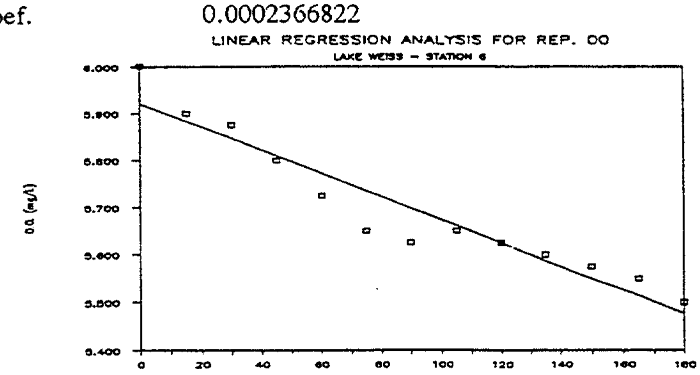


REP. 00

Regression Output:

Constant	5.9206043956
Std Err of Y Est	0.0478952612
R Squared	0.908433855
No. of Observations	13
Degrees of Freedom	11
X Coefficient(s)	-0.002472527
Std Err of Coef.	0.0002366822

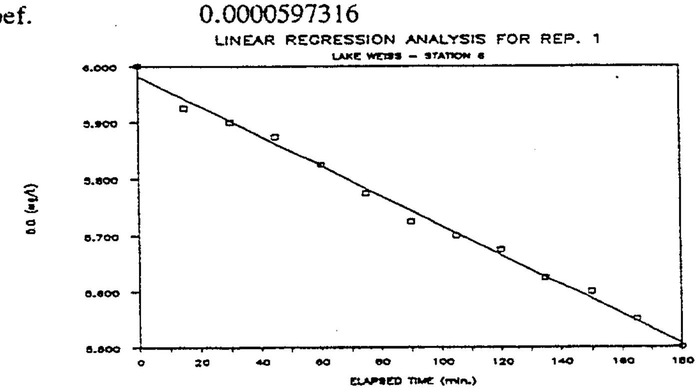
MIN.	REGRES. D.O.
0	5.921
15	5.884
30	5.846
45	5.809
60	5.772
75	5.735
90	5.698
105	5.661
120	5.624
135	5.587
150	5.550
165	5.513
180	5.476



REP. 1

Regression Output:

Constant	5.9815934066
Std Err of Y Est	0.0120873445
R Squared	0.9943892965
No. of Observations	13
Degrees of Freedom	11
X Coefficient(s)	-0.002637362
Std Err of Coef.	0.0000597316

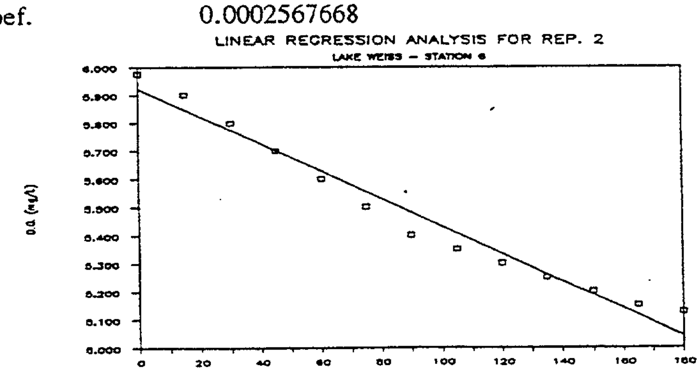


MIN.	REGRES. D.O.
0	5.982
15	5.942
30	5.902
45	5.863
60	5.823
75	5.784
90	5.744
105	5.705
120	5.665
135	5.626
150	5.586
165	5.546
180	5.507

REP. 2

Regression Output:

Constant	5.9208791209
Std Err of Y Est	0.0519596016
R Squared	0.970565411
No. of Observations	13
Degrees of Freedom	11
X Coefficient(s)	-0.004890109
Std Err of Coef.	0.0002567668



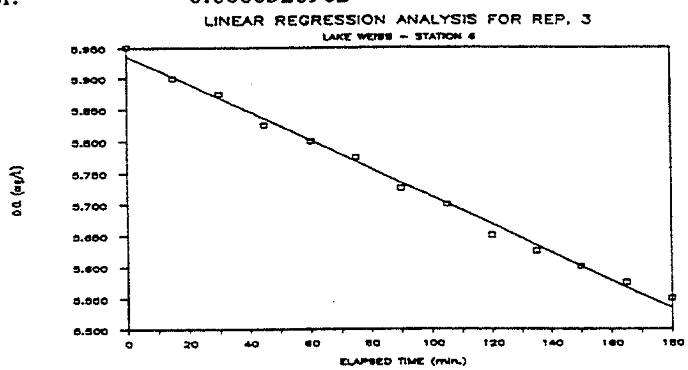
MIN.	REGRES. D.O.
0	5.921
15	5.848
30	5.774
45	5.701
60	5.627
75	5.554
90	5.481
105	5.407
120	5.334
135	5.261
150	5.187
165	5.114
180	5.041

REP. 3

Regression Output:

Constant	5.9357142857
Std Err of Y Est	0.0105422418
R Squared	0.9940559674
No. of Observations	13
Degrees of Freedom	11
X Coefficient(s)	-0.002234432
Std Err of Coef.	0.0000520962

MIN.	REGRES. D.O.
0	5.936
15	5.902
30	5.869
45	5.835
60	5.802
75	5.768
90	5.735
105	5.701
120	5.668
135	5.634
150	5.601
165	5.567
180	5.534

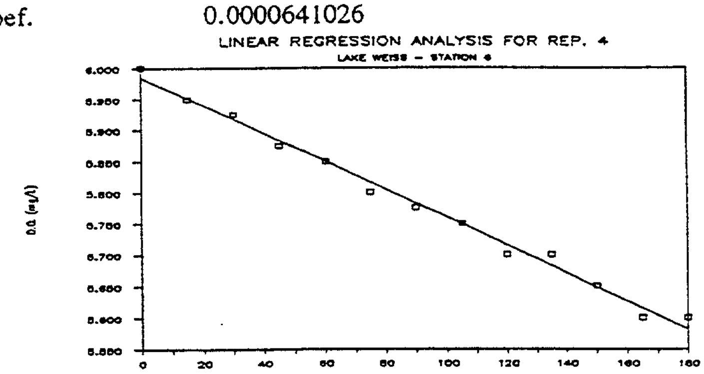


REP. 4

Regression Output:

Constant	5.9846153846
Std Err of Y Est	0.012971863
R Squared	0.9911003236
No. of Observations	13
Degrees of Freedom	11
X Coefficient(s)	-0.002243589
Std Err of Coef.	0.0000641026

MIN.	REGRES. D.O.
0	5.985
15	5.951
30	5.917
45	5.884
60	5.850
75	5.816
90	5.783
105	5.749
120	5.715
135	5.682
150	5.648
165	5.614
180	5.581



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***** SOD Calculations *****

TEMPERATURE DATA :

CHAMBER	REP 0	REP 00	REP 1	REP 2	REP 3	REP 4
INITIAL T.	17	16.5	16	16	17	16
FINAL T.	16.5	16	16	16	16	16
AVG. T.	16.75	16.25	16	16	16.5	16

CHAMBER AREA: 0.15 sq. m.
CHAMBER VOLUME: 27.18 L

RESPIRATION RATES:

REP 0:	0.0007509158	mg/L-min.	<--- USE THIS RESP. RATE
REP 00:	0.0024725275	mg/L-min.	
AVG. RESP.:	0.0016117216	mg/L-min.	

LIGHT BOTTLE - DARK BOTTLE:

TIME IN:	02:40 PM	TIME OUT:	06:20 PM
D.O. IN:	6.925 mg/L	D.O. OUT:	6.65 mg/L
RESP.:	0.00125 mg/L-min.		

	REP 1	REP 2	REP 3	REP 4
SOD RATE: (g/m^2-day)	0.4922	1.0800	0.3871	0.3895

***OMIT REP.2 FROM AVG. SOD RATE ***

AVG. RATE:	0.4229 g/m^2-day	TEMP. =	16.3	deg C
	0.5247 g/m^2-day	TEMP. =	20	deg C
-------->	0.0487 g/ft^2-day	TEMP. =	20	deg C

************ ************ ************ ************ ************ ************ ***********

Toxics analysis of sediments from Weiss Lake, 21 September 1992.

ADEM CENTRAL LABORATORY

- SAMPLE ANALYSIS REPORT -
10/15/92

RECEIVED
OCT 1992
ADEM-FO
MONTGOMERY

To: 106 Water Program
1751 Cong. W.L.Dickinson Drive
Montgomery AL 36109

Attn:

Report Date: 10/15/92

Lab number : 2108656
Sample number : 210
Sample matrix : SOIL

COLLECTION INFORMATION

Date/Time/By: 09/21/92 BAYNE
Location : WEISS LAKE, #1A

ADEM CENTRAL LABORATORY
- RESULTS REPORT - October 15, 1992

Lab#	Test	Result	Units	DL*	Analdate
2108656	Chlordane in Soil	0.05	ug/g	U	10/09/92
	4,4´-DDD in Soil	0.01	ug/g	U	10/09/92
	4,4´-DDE in Soil	0.01	ug/g	U	10/09/92
	DDT in Soil	0.01	ug/g	U	10/09/92
	Dieldrin in Soil	0.01	ug/g	U	10/09/92
	Dursban in Soil	0.01	ug/g	U	10/09/92
	Endrin in Soil	0.01	ug/g	U	10/09/92
	Heptachlor Epoxide in S	0.01	ug/g	U	10/09/92
	Hepachlor in Soil	0.01	ug/g	U	10/09/92
	Mirex in Soil	0.03	ug/g	U	10/09/92
	PCB in Soil	0.16	ug/g		10/09/92
	Toxaphene in Soil	0.05	ug/g	U	10/09/92

* U denotes results less than the instrument detection limit.

ADEM CENTRAL LABORATORY

- SAMPLE ANALYSIS REPORT -
10/15/92

To: 106 Water Program
1751 Cong. W.L.Dickinson Drive
Montgomery AL 36109

OCT 1992
RECEIVED
ADEM-FO
MONTGOMERY

Attn:

Report Date: 10/15/92

Lab number : 2108657
Sample number : 210
Sample matrix : SOIL

COLLECTION INFORMATION
Date/Time/By: 09/21/92 BAYNE
Location : WEISS LAKE, #1B

ADEM CENTRAL LABORATORY
- RESULTS REPORT - October 15, 1992

Lab#	Test	Result	Units	DL*	Analdate
2108657	Chlordane in Soil	0.05	ug/g	U	10/09/92
	4,4´-DDD in Soil	0.01	ug/g	U	10/09/92
	4,4´-DDE in Soil	0.01	ug/g	U	10/09/92
	DDT in Soil	0.01	ug/g	U	10/09/92
	Dieldrin in Soil	0.01	ug/g	U	10/09/92
	Dursban in Soil	0.01	ug/g	U	10/09/92
	Endrin in Soil	0.01	ug/g	U	10/09/92
	Heptachlor Epoxide in S	0.01	ug/g	U	10/09/92
	Hepachlor in Soil	0.01	ug/g	U	10/09/92
	Mirex in Soil	0.03	ug/g	U	10/09/92
	PCB in Soil	0.15	ug/g		10/09/92
	Toxaphene in Soil	0.05	ug/g	U	10/09/92

* U denotes results less than the instrument detection limit.

ADEM CENTRAL LABORATORY

- SAMPLE ANALYSIS REPORT -
10/15/92

To: 106 Water Program
1751 Cong. W.L.Dickinson Drive
Montgomery AL 36109

Attn:

Report Date: 10/15/92

Lab number : 2108658
Sample number : 210
Sample matrix : SOIL

COLLECTION INFORMATION

Date/Time/By: 09/21/92 BAYNE
Location : WEISS LAKE, #2A

ADEM CENTRAL LABORATORY
- RESULTS REPORT -

October 15, 1992

Lab#	Test	Result	Units	DL*	Analdate
2108658	Chlordane in Soil	0.05	ug/g	U	10/09/92
	4,4´-DDD in Soil	0.01	ug/g	U	10/09/92
	4,4´-DDE in Soil	0.01	ug/g	U	10/09/92
	DDT in Soil	0.01	ug/g	U	10/09/92
	Dieldrin in Soil	0.01	ug/g	U	10/09/92
	Dursban in Soil	0.01	ug/g	U	10/09/92
	Endrin in Soil	0.01	ug/g	U	10/09/92
	Heptachlor Epoxide in S	0.01	ug/g	U	10/09/92
	Hepachlor in Soil	0.01	ug/g	U	10/09/92
	Mirex in Soil	0.03	ug/g	U	10/09/92
	PCB in Soil	0.05	ug/g	U	10/09/92
	Toxaphene in Soil	0.05	ug/g	U	10/09/92

* U denotes results less than the instrument detection limit.

ADEM CENTRAL LABORATORY

- SAMPLE ANALYSIS REPORT -
10/19/92

To: 106 Water Program
1751 Cong. W.L.Dickinson Drive
Montgomery AL 36109

RECEIVED OCT 1992 ADEM-FO MONTGOMERY

Attn:

Lab number : 2108659
Sample number : 210
Sample matrix : SOIL

Report Date: 10/19/92

COLLECTION INFORMATION

Date/Time/By: 09/21/92 BAYNE
Location : WEISS LAKE, #2B

ADEM CENTRAL LABORATORY
- RESULTS REPORT - October 19, 1992

Lab#	Test	Result	Units	DL*	Analdate
2108659	Chlordane in Soil	0.05	ug/g	U	10/09/92
	4,4'-DDD in Soil	0.01	ug/g	U	10/09/92
	4,4'-DDE in Soil	0.01	ug/g	U	10/09/92
	DDT in Soil	0.01	ug/g	U	10/09/92
	Dieldrin in Soil	0.01	ug/g	U	10/09/92
	Dursban in Soil	0.01	ug/g	U	10/09/92
	Endrin in Soil	0.01	ug/g	U	10/09/92
	Heptachlor Epoxide in S	0.01	ug/g	U	10/09/92
	Hepachlor in Soil	0.01	ug/g	U	10/09/92
	Mirex in Soil	0.03	ug/g	U	10/09/92
	PCB in Soil	0.05	ug/g	U	10/09/92
	Toxaphene in Soil	0.05	ug/g	U	10/09/92

* U denotes results less than the instrument detection limit.

ADEM CENTRAL LABORATORY

- SAMPLE ANALYSIS REPORT -
10/19/92

To: 106 Water Program
1751 Cong. W.L.Dickinson Drive
Montgomery AL 36109

Attn:

Report Date: 10/19/92

Lab number : 2108660
Sample number : 210
Sample matrix : SOIL

COLLECTION INFORMATION

Date/Time/By: 09/21/92 BAYNE
Location : WEISS LAKE, #3A

ADEM CENTRAL LABORATORY
- RESULTS REPORT - October 19, 1992

Lab#	Test	Result	Units	DL*	Analdate
2108660	Chlordane in Soil	0.05	ug/g	U	10/09/92
	4,4'-DDD in Soil	0.01	ug/g	U	10/09/92
	4,4'-DDE in Soil	0.01	ug/g	U	10/09/92
	DDT in Soil	0.01	ug/g	U	10/09/92
	Dieldrin in Soil	0.01	ug/g	U	10/09/92
	Dursban in Soil	0.01	ug/g	U	10/09/92
	Endrin in Soil	0.01	ug/g	U	10/09/92
	Heptachlor Epoxide in S	0.01	ug/g	U	10/09/92
	Hepachlor in Soil	0.01	ug/g	U	10/09/92
	Mirex in Soil	0.03	ug/g	U	10/09/92
	PCB in Soil	0.05	ug/g	U	10/09/92
	Toxaphene in Soil	0.05	ug/g	U	10/09/92

* U denotes results less than the instrument detection limit.

ADEM CENTRAL LABORATORY

- SAMPLE ANALYSIS REPORT -
10/19/92

To: 106 Water Program
1751 Cong. W.L.Dickinson Drive
Montgomery AL 36109

Attn:

Lab number : 2108661
Sample number : 210
Sample matrix : SOIL

Report Date: 10/19/92

COLLECTION INFORMATION
Date/Time/By: 09/21/92 BAYNE
Location : WEISS LAKE, #3B

ADEM CENTRAL LABORATORY
- RESULTS REPORT - October 19, 1992

Lab#	Test	Result	Units	DL*	Analdate
2108661	Chlordane in Soil	0.05	ug/g	U	10/09/92
	4,4'-DDD in Soil	0.01	ug/g	U	10/09/92
	4,4'-DDE in Soil	0.01	ug/g	U	10/09/92
	DDT in Soil	0.01	ug/g	U	10/09/92
	Dieldrin in Soil	0.01	ug/g	U	10/09/92
	Dursban in Soil	0.01	ug/g	U	10/09/92
	Endrin in Soil	0.01	ug/g	U	10/09/92
	Heptachlor Epoxide in S	0.01	ug/g	U	10/09/92
	Hepachlor in Soil	0.01	ug/g	U	10/09/92
	Mirex in Soil	0.03	ug/g	U	10/09/92
	PCB in Soil	0.05	ug/g	U	10/09/92
	Toxaphene in Soil	0.05	ug/g	U	10/09/92

* U denotes results less than the instrument detection limit.

ADEM CENTRAL LABORATORY

- SAMPLE ANALYSIS REPORT -
10/15/92

To: 106 Water Program
1751 Cong. W.L.Dickinson Drive
Montgomery AL 36109

OCT 1992 RECEIVED MONTGOMERY

Attn:

Report Date: 10/15/92

Lab number : 2108662
Sample number : 210
Sample matrix : SOIL

COLLECTION INFORMATION

Date/Time/By: 09/21/92 BAYNE
Location : WEISS LAKE, #4A

ADEM CENTRAL LABORATORY
- RESULTS REPORT - October 15, 1992

Lab#	Test	Result	Units	DL*	Analdate
2108662	Chlordane in Soil	0.05	ug/g	U	10/09/92
	4,4´-DDD in Soil	0.01	ug/g	U	10/09/92
	4,4´-DDE in Soil	0.01	ug/g	U	10/09/92
	DDT in Soil	0.01	ug/g	U	10/09/92
	Dieldrin in Soil	0.01	ug/g	U	10/09/92
	Dursban in Soil	0.01	ug/g	U	10/09/92
	Endrin in Soil	0.01	ug/g	U	10/09/92
	Heptachlor Epoxide in S	0.01	ug/g	U	10/09/92
	Hepachlor in Soil	0.01	ug/g	U	10/09/92
	Mirex in Soil	0.03	ug/g	U	10/09/92
	PCB in Soil	0.05	ug/g	U	10/09/92
	Toxaphene in Soil	0.05	ug/g	U	10/09/92

* U denotes results less than the instrument detection limit.

ADEM CENTRAL LABORATORY

- SAMPLE ANALYSIS REPORT -
10/19/92

To: 106 Water Program
1751 Cong. W.L.Dickinson Drive
Montgomery AL 36109

Attn:

Lab number : 2108663
Sample number : 210
Sample matrix : SOIL

Report Date: 10/19/92

COLLECTION INFORMATION

Date/Time/By: 09/21/92 . BAYNE
Location : WEISS LAKE, #4B

ADEM CENTRAL LABORATORY
- RESULTS REPORT - October 19, 1992

Lab#	Test	Result	Units	DL*	Analdate
2108663	Chlordane in Soil	0.05	ug/g	U	10/09/92
	4,4´-DDD in Soil	0.01	ug/g	U	10/09/92
	4,4´-DDE in Soil	0.01	ug/g	U	10/09/92
	DDT in Soil	0.01	ug/g	U	10/09/92
	Dieldrin in Soil	0.01	ug/g	U	10/09/92
	Dursban in Soil	0.01	ug/g	U	10/09/92
	Endrin in Soil	0.01	ug/g	U	10/09/92
	Heptachlor Epoxide in S	0.01	ug/g	U	10/09/92
	Hepachlor in Soil	0.01	ug/g	U	10/09/92
	Mirex in Soil	0.03	ug/g	U	10/09/92
	PCB in Soil	0.18	ug/g		10/09/92
	Toxaphene in Soil	0.05	ug/g	U	10/09/92

* U denotes results less than the instrument detection limit.

ADEM CENTRAL LABORATORY

- SAMPLE ANALYSIS REPORT -
10/20/92

To: 106 Water Program
1751 Cong. W.L.Dickinson Drive
Montgomery AL 36109

Attn:

Report Date: 10/20/92

Lab number : 2108664
Sample number : 210
Sample matrix : SOIL

COLLECTION INFORMATION

Date/Time/By: 09/21/92 BAYNE
Location : WEISS LAKE, #5A

ADEM CENTRAL LABORATORY
- RESULTS REPORT - October 20. 1992

Lab#	Test	Result	Units	DL*	Analdate
2108664	Chlordane in Soil	0.05	ug/g	U	10/09/92
	4,4´-DDD in Soil	0.01	ug/g	U	10/09/92
	4,4´-DDE in Soil	0.01	ug/g	U	10/09/92
	DDT in Soil	0.01	ug/g	U	10/09/92
	Dieldrin in Soil	0.01	ug/g	U	10/09/92
	Dursban in Soil	0.01	ug/g	U	10/09/92
	Endrin in Soil	0.01	ug/g	U	10/09/92
	Heptachlor Epoxide in S	0.01	ug/g	U	10/09/92
	Hepachlor in Soil	0.01	ug/g	U	10/09/92
	Mirex in Soil	0.03	ug/g	U	10/09/92
	PCB in Soil	0.15	ug/g		10/09/92
	Toxaphene in Soil	0.05	ug/g	U	10/09/92

* U denotes results less than the instrument detection limit.

ADEM CENTRAL LABORATORY

- SAMPLE ANALYSIS REPORT -
10/20/92

To: 106 Water Program
1751 Cong. W.L.Dickinson Drive
Montgomery AL 36109

Attn:

Lab number : 2108665
Sample number : 210
Sample matrix : SOIL

Report Date: 10/20/92

COLLECTION INFORMATION

Date/Time/By: 09/21/92 BAYNE
Location : WEISS LAKE, #5B

ADEM CENTRAL LABORATORY
- RESULTS REPORT - October 20, 1992

Lab#	Test	Result	Units	DL*	Analdate
2108665	Chlordane in Soil	0.05	ug/g	U	10/09/92
	4,4´-DDD in Soil	0.01	ug/g	U	10/09/92
	4,4´-DDE in Soil	0.01	ug/g	U	10/09/92
	DDT in Soil	0.01	ug/g	U	10/09/92
	Dieldrin in Soil	0.01	ug/g	U	10/09/92
	Dursban in Soil	0.01	ug/g	U	10/09/92
	Endrin in Soil	0.01	ug/g	U	10/09/92
	Heptachlor Epoxide in S	0.01	ug/g	U	10/09/92
	Hepachlor in Soil	0.01	ug/g	U	10/09/92
	Mirex in Soil	0.03	ug/g	U	10/09/92
	PCB in Soil	0.19	ug/g		10/09/92
	Toxaphene in Soil	0.05	ug/g	U	10/09/92

* U denotes results less than the instrument detection limit.

ADEM CENTRAL LABORATORY

- SAMPLE ANALYSIS REPORT -
10/20/92

To: 106 Water Program
1751 Cong. W.L.Dickinson Drive
Montgomery AL 36109

Attn:

Report Date: 10/20/92

Lab number : 2108666
Sample number : 210
Sample matrix : SOIL

COLLECTION INFORMATION

Date/Time/By: 09/21/92 BAYNE
Location : WEISS LAKE, #6A

ADEM CENTRAL LABORATORY
- RESULTS REPORT - October 20, 1992

Lab#	Test	Result	Units	DL*	Analdate
2108666	Chlordane in Soil	0.05	ug/g	U	10/09/92
	4,4'-DDD in Soil	0.01	ug/g	U	10/09/92
	4,4'-DDE in Soil	0.01	ug/g	U	10/09/92
	DDT in Soil	0.01	ug/g	U	10/09/92
	Dieldrin in Soil	0.01	ug/g	U	10/09/92
	Dursban in Soil	0.01	ug/g	U	10/09/92
	Endrin in Soil	0.01	ug/g	U	10/09/92
	Heptachlor Epoxide in S	0.01	ug/g	U	10/09/92
	Hepachlor in Soil	0.01	ug/g	U	10/09/92
	Mirex in Soil	0.03	ug/g	U	10/09/92
	PCB in Soil	0.05	ug/g	U	10/09/92
	Toxaphene in Soil	0.05	ug/g	U	10/09/92

* U denotes results less than the instrument detection limit.

ADEM CENTRAL LABORATORY

- SAMPLE ANALYSIS REPORT -
10/20/92

To: 106 Water Program
1751 Cong. W.L.Dickinson Drive
Montgomery AL 36109

Attn:

Lab number : 2108667
Sample number : 210
Sample matrix : SOIL

Report Date: 10/20/92

COLLECTION INFORMATION

Date/Time/By: 09/21/92 BAYNE
Location : WEISS LAKE, #6B

ADEM CENTRAL LABORATORY
- RESULTS REPORT - October 20, 1992

Lab#	Test	Result	Units	DL*	Analdate
2108667	Chlordane in Soil	0.05	ug/g	U	10/09/92
	4,4'-DDD in Soil	0.01	ug/g	U	10/09/92
	4,4'-DDE in Soil	0.01	ug/g	U	10/09/92
	DDT in Soil	0.01	ug/g	U	10/09/92
	Dieldrin in Soil	0.01	ug/g	U	10/09/92
	Dursban in Soil	0.01	ug/g	U	10/09/92
	Endrin in Soil	0.01	ug/g	U	10/09/92
	Heptachlor Epoxide in S	0.01	ug/g	U	10/09/92
	Hepachlor in Soil	0.01	ug/g	U	10/09/92
	Mirex in Soil	0.03	ug/g	U	10/09/92
	PCB in Soil	0.05	ug/g	U	10/09/92
	Toxaphene in Soil	0.05	ug/g	U	10/09/92

* U denotes results less than the instrument detection limit.

ADEM CENTRAL LABORATORY

- SAMPLE ANALYSIS REPORT -
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To: 106 Water Program
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Attn:

Report Date: 10/20/92

Lab number : 2108668
Sample number : 210
Sample matrix : SOIL

COLLECTION INFORMATION

Date/Time/By: 09/21/92 BAYNE
Location : WEISS LAKE, #7A

ADEM CENTRAL LABORATORY
- RESULTS REPORT - October 20, 1992

Lab#	Test	Result	Units	DL*	Analdate
2108668	Chlordane in Soil	0.05	ug/g	U	10/09/92
	4,4´-DDD in Soil	0.01	ug/g	U	10/09/92
	4,4´-DDE in Soil	0.01	ug/g	U	10/09/92
	DDT in Soil	0.01	ug/g	U	10/09/92
	Dieldrin in Soil	0.01	ug/g	U	10/09/92
	Dursban in Soil	0.01	ug/g	U	10/09/92
	Endrin in Soil	0.01	ug/g	U	10/09/92
	Heptachlor Epoxide in S	0.01	ug/g	U	10/09/92
	Hepachlor in Soil	0.01	ug/g	U	10/09/92
	Mirex in Soil	0.03	ug/g	U	10/09/92
	PCB in Soil	0.05	ug/g	U	10/09/92
	Toxaphene in Soil	0.05	ug/g	U	10/09/92

* U denotes results less than the instrument detection limit.

ADEM CENTRAL LABORATORY

- SAMPLE ANALYSIS REPORT -
10/20/92

To: 106 Water Program
1751 Cong. W.L.Dickinson Drive
Montgomery AL 36109

Attn:

Report Date: 10/20/92

Lab number : 2108669
Sample number : 210
Sample matrix : SOIL

COLLECTION INFORMATION

Date/Time/By: 09/21/92 BAYNE
Location : WEISS LAKE, #7B

ADEM CENTRAL LABORATORY
- RESULTS REPORT - October 20, 1992

Lab#	Test	Result	Units	DL*	Analdate
2108669	Chlordane in Soil	0.05	ug/g	U	10/09/92
	4,4'-DDD in Soil	0.01	ug/g	U	10/09/92
	4,4'-DDE in Soil	0.01	ug/g	U	10/09/92
	DDT in Soil	0.01	ug/g	U	10/09/92
	Dieldrin in Soil	0.01	ug/g	U	10/09/92
	Dursban in Soil	0.01	ug/g	U	10/09/92
	Endrin in Soil	0.01	ug/g	U	10/09/92
	Heptachlor Epoxide in S	0.01	ug/g	U	10/09/92
	Hepachlor in Soil	0.01	ug/g	U	10/09/92
	Mirex in Soil	0.03	ug/g	U	10/09/92
	PCB in Soil	0.05	ug/g	U	10/09/92
	Toxaphene in Soil	0.05	ug/g	U	10/09/92

* U denotes results less than the instrument detection limit.

ADEM CENTRAL LABORATORY

- SAMPLE ANALYSIS REPORT -
10/20/92

To: 106 Water Program
1751 Cong. W.L.Dickinson Drive
Montgomery AL 36109

Attn:

Report Date: 10/20/92

Lab number : 2108670
Sample number : 210
Sample matrix : SOIL

COLLECTION INFORMATION

Date/Time/By: 09/21/92 BAYNE
Location : WEISS LAKE, #8A

ADEM CENTRAL LABORATORY
- RESULTS REPORT - October 20, 1992

Lab#	Test	Result	Units	DL*	Analdate
2108670	Chlordane in Soil	0.05	ug/g	U	10/09/92
	4,4´-DDD in Soil	0.01	ug/g	U	10/09/92
	4,4´-DDE in Soil	0.01	ug/g	U	10/09/92
	DDT in Soil	0.01	ug/g	U	10/09/92
	Dieldrin in Soil	0.01	ug/g	U	10/09/92
	Dursban in Soil	0.01	ug/g	U	10/09/92
	Endrin in Soil	0.01	ug/g	U	10/09/92
	Heptachlor Epoxide in S	0.01	ug/g	U	10/09/92
	Hepachlor in Soil	0.01	ug/g	U	10/09/92
	Mirex in Soil	0.03	ug/g	U	10/09/92
	PCB in Soil	0.05	ug/g	U	10/09/92
	Toxaphene in Soil	0.05	ug/g	U	10/09/92

* U denotes results less than the instrument detection limit.

ADEM CENTRAL LABORATORY

- SAMPLE ANALYSIS REPORT -
10/20/92

To: 106 Water Program
1751 Cong. W.L.Dickinson Drive
Montgomery AL 36109

Attn:

Lab number : 2108671
Sample number : 210
Sample matrix : SOIL

Report Date: 10/20/92

COLLECTION INFORMATION

Date/Time/By: 09/21/92 BAYNE
Location : WEISS LAKE, #8B

ADEM CENTRAL LABORATORY
- RESULTS REPORT - October 20, 1992

Lab#	Test	Result	Units	DL*	Analdate
2108671	Chlordane in Soil	0.05	ug/g	U	10/09/92
	4,4'-DDD in Soil	0.01	ug/g	U	10/09/92
	4,4'-DDE in Soil	0.01	ug/g	U	10/09/92
	DDT in Soil	0.01	ug/g	U	10/09/92
	Dieldrin in Soil	0.01	ug/g	U	10/09/92
	Dursban in Soil	0.01	ug/g	U	10/09/92
	Endrin in Soil	0.01	ug/g	U	10/09/92
	Heptachlor Epoxide in S	0.01	ug/g	U	10/09/92
	Hepachlor in Soil	0.01	ug/g	U	10/09/92
	Mirex in Soil	0.03	ug/g	U	10/09/92
	PCB in Soil	0.05	ug/g	U	10/09/92
	Toxaphene in Soil	0.05	ug/g	U	10/09/92

* U denotes results less than the instrument detection limit.

ADEM CENTRAL LABORATORY

- SAMPLE ANALYSIS REPORT -
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Report Date: 10/20/92

Lab number : 2108672
Sample number : 210
Sample matrix : SOIL

COLLECTION INFORMATION

Date/Time/By: 09/21/92 BAYNE
Location : WEISS LAKE, #9A

ADEM CENTRAL LABORATORY
- RESULTS REPORT - October 20, 1992

Lab#	Test	Result	Units	DL*	Analdate
2108672	Chlordane in Soil	0.05	ug/g	U	10/09/92
	4,4'-DDD in Soil	0.01	ug/g	U	10/09/92
	4,4'-DDE in Soil	0.01	ug/g	U	10/09/92
	DDT in Soil	0.01	ug/g	U	10/09/92
	Dieldrin in Soil	0.01	ug/g	U	10/09/92
	Dursban in Soil	0.01	ug/g	U	10/09/92
	Endrin in Soil	0.01	ug/g	U	10/09/92
	Heptachlor Epoxide in S	0.01	ug/g	U	10/09/92
	Hepachlor in Soil	0.01	ug/g	U	10/09/92
	Mirex in Soil	0.03	ug/g	U	10/09/92
	PCB in Soil	0.05	ug/g	U	10/09/92
	Toxaphene in Soil	0.05	ug/g	U	10/09/92

* U denotes results less than the instrument detection limit.

ADEM CENTRAL LABORATORY

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Attn:

Report Date: 10/20/92

Lab number : 2108673
Sample number : 210
Sample matrix : SOIL

COLLECTION INFORMATION

Date/Time/By: 09/21/92 . BAYNE
Location : WEISS LAKE, #9B

ADEM CENTRAL LABORATORY
- RESULTS REPORT - October 20, 1992

Lab#	Test	Result	Units	DL*	Analdate
2108673	Chlordane in Soil	0.05	ug/g	U	10/09/92
	4,4'-DDD in Soil	0.01	ug/g	U	10/09/92
	4,4'-DDE in Soil	0.01	ug/g	U	10/09/92
	DDT in Soil	0.01	ug/g	U	10/09/92
	Dieldrin in Soil	0.01	ug/g	U	10/09/92
	Dursban in Soil	0.01	ug/g	U	10/09/92
	Endrin in Soil	0.01	ug/g	U	10/09/92
	Heptachlor Epoxide in S	0.01	ug/g	U	10/09/92
	Hepachlor in Soil	0.01	ug/g	U	10/09/92
	Mirex in Soil	0.03	ug/g	U	10/09/92
	PCB in Soil	0.05	ug/g	U	10/09/92
	Toxaphene in Soil	0.05	ug/g	U	10/09/92

* U denotes results less than the instrument detection limit.

ADEM CENTRAL LABORATORY

- SAMPLE ANALYSIS REPORT -
10/20/92

To: 106 Water Program
1751 Cong. W.L.Dickinson Drive
Montgomery AL 36109

Attn:

Report Date: 10/20/92

Lab number : 2108674
Sample number : 210
Sample matrix : SOIL

COLLECTION INFORMATION

Date/Time/By: 09/21/92 BAYNE
Location : WEISS LAKE, #10A

ADEM CENTRAL LABORATORY
- RESULTS REPORT - October 20, 1992

Lab#	Test	Result	Units	DL*	Analdate
2108674	Chlordane in Soil	0.05	ug/g	U	10/09/92
	4,4´-DDD in Soil	0.01	ug/g	U	10/09/92
	4,4´-DDE in Soil	0.01	ug/g	U	10/09/92
	DDT in Soil	0.01	ug/g	U	10/09/92
	Dieldrin in Soil	0.01	ug/g	U	10/09/92
	Dursban in Soil	0.01	ug/g	U	10/09/92
	Endrin in Soil	0.01	ug/g	U	10/09/92
	Heptachlor Epoxide in S	0.01	ug/g	U	10/09/92
	Hepachlor in Soil	0.01	ug/g	U	10/09/92
	Mirex in Soil	0.03	ug/g	U	10/09/92
	PCB in Soil	0.05	ug/g	U	10/09/92
	Toxaphene in Soil	0.05	ug/g	U	10/09/92

* U denotes results less than the instrument detection limit.

ADEM CENTRAL LABORATORY

- SAMPLE ANALYSIS REPORT -
10/20/92

To: 106 Water Program
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Attn:

Lab number : 2108675
Sample number : 210
Sample matrix : SOIL

Report Date: 10/20/92

COLLECTION INFORMATION
Date/Time/By: 09/21/92 . BAYNE
Location : WEISS LAKE, #10B

ADEM CENTRAL LABORATORY
- RESULTS REPORT - October 20, 1992

Lab#	Test	Result	Units	DL*	Analdate
2108675	Chlordane in Soil	0.05	ug/g	U	10/09/92
	4,4´-DDD in Soil	0.01	ug/g	U	10/09/92
	4,4´-DDE in Soil	0.01	ug/g	U	10/09/92
	DDT in Soil	0.01	ug/g	U	10/09/92
	Dieldrin in Soil	0.01	ug/g	U	10/09/92
	Dursban in Soil	0.01	ug/g	U	10/09/92
	Endrin in Soil	0.01	ug/g	U	10/09/92
	Heptachlor Epoxide in S	0.01	ug/g	U	10/09/92
	Hepachlor in Soil	0.01	ug/g	U	10/09/92
	Mirex in Soil	0.03	ug/g	U	10/09/92
	PCB in Soil	0.05	ug/g	U	10/09/92
	Toxaphene in Soil	0.05	ug/g	U	10/09/92

* U denotes results less than the instrument detection limit.

ADEM CENTRAL LABORATORY

- SAMPLE ANALYSIS REPORT -
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Attn:

Report Date: 10/20/92

Lab number : 2108676
Sample number : 210
Sample matrix : SOIL

COLLECTION INFORMATION

Date/Time/By: 09/21/92 BAYNE
Location : WEISS LAKE, #11A

ADEM CENTRAL LABORATORY
- RESULTS REPORT - October 20, 1992

Lab#	Test	Result	Units	DL*	Analdate
2108676	Chlordane in Soil	0.05	ug/g	U	10/09/92
	4,4'-DDD in Soil	0.01	ug/g	U	10/09/92
	4,4'-DDE in Soil	0.01	ug/g	U	10/09/92
	DDT in Soil	0.01	ug/g	U	10/09/92
	Dieldrin in Soil	0.01	ug/g	U	10/09/92
	Dursban in Soil	0.01	ug/g	U	10/09/92
	Endrin in Soil	0.01	ug/g	U	10/09/92
	Heptachlor Epoxide in S	0.01	ug/g	U	10/09/92
	Hepachlor in Soil	0.01	ug/g	U	10/09/92
	Mirex in Soil	0.03	ug/g	U	10/09/92
	PCB in Soil	0.05	ug/g	U	10/09/92
	Toxaphene in Soil	0.05	ug/g	U	10/09/92

* U denotes results less than the instrument detection limit.

ADEM CENTRAL LABORATORY

- SAMPLE ANALYSIS REPORT -
10/20/92

To: 106 Water Program
1751 Cong. W.L.Dickinson Drive
Montgomery AL 36109

Attn:

Lab number : 2108677
Sample number : 210
Sample matrix : SOIL

Report Date: 10/20/92

COLLECTION INFORMATION

Date/Time/By: 09/21/92 BAYNE
Location : WEISS LAKE, #11B

ADEM CENTRAL LABORATORY
- RESULTS REPORT - October 20, 1992

Lab#	Test	Result	Units	DL*	Analdate
2108677	Chlordane in Soil	0.05	ug/g	U	10/09/92
	4,4´-DDD in Soil	0.01	ug/g	U	10/09/92
	4,4´-DDE in Soil	0.01	ug/g	U	10/09/92
	DDT in Soil	0.01	ug/g	U	10/09/92
	Dieldrin in Soil	0.01	ug/g	U	10/09/92
	Dursban in Soil	0.01	ug/g	U	10/09/92
	Endrin in Soil	0.01	ug/g	U	10/09/92
	Heptachlor Epoxide in S	0.01	ug/g	U	10/09/92
	Hepachlor in Soil	0.01	ug/g	U	10/09/92
	Mirex in Soil	0.03	ug/g	U	10/09/92
	PCB in Soil	0.05	ug/g	U	10/09/92
	Toxaphene in Soil	0.05	ug/g	U	10/09/92

* U denotes results less than the instrument detection limit.

ADEM CENTRAL LABORATORY

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Attn:

Report Date: 10/20/92

Lab number : 2108678
Sample number : 210
Sample matrix : SOIL

COLLECTION INFORMATION

Date/Time/By: 09/21/92 BAYNE
Location : WEISS LAKE, #12A

ADEM CENTRAL LABORATORY
- RESULTS REPORT - October 20, 1992

Lab#	Test	Result	Units	DL*	Analdate
2108678	Chlordane in Soil	0.05	ug/g	U	10/09/92
	4,4'-DDD in Soil	0.01	ug/g	U	10/09/92
	4,4'-DDE in Soil	0.01	ug/g	U	10/09/92
	DDT in Soil	0.01	ug/g	U	10/09/92
	Dieldrin in Soil	0.01	ug/g	U	10/09/92
	Dursban in Soil	0.01	ug/g	U	10/09/92
	Endrin in Soil	0.01	ug/g	U	10/09/92
	Heptachlor Epoxide in S	0.01	ug/g	U	10/09/92
	Hepachlor in Soil	0.01	ug/g	U	10/09/92
	Mirex in Soil	0.03	ug/g	U	10/09/92
	PCB in Soil	0.05	ug/g	U	10/09/92
	Toxaphene in Soil	0.05	ug/g	U	10/09/92

* U denotes results less than the instrument detection limit.

ADEM CENTRAL LABORATORY

- SAMPLE ANALYSIS REPORT -
10/20/92

To: 106 Water Program
1751 Cong. W.L.Dickinson Drive
Montgomery AL 36109

Attn:

Lab number : 2108679
Sample number : 210
Sample matrix : SOIL

Report Date: 10/20/92

COLLECTION INFORMATION

Date/Time/By: 09/21/92 BAYNE
Location : WEISS LAKE, #12B

ADEM CENTRAL LABORATORY
- RESULTS REPORT - October 20, 1992

Lab#	Test	Result	Units	DL*	Analdate
2108679	Chlordane in Soil	0.05	ug/g	U	10/09/92
	4,4´-DDD in Soil	0.01	ug/g	U	10/09/92
	4,4´-DDE in Soil	0.01	ug/g	U	10/09/92
	DDT in Soil	0.01	ug/g	U	10/09/92
	Dieldrin in Soil	0.01	ug/g	U	10/09/92
	Dursban in Soil	0.01	ug/g	U	10/09/92
	Endrin in Soil	0.01	ug/g	U	10/09/92
	Heptachlor Epoxide in S	0.01	ug/g	U	10/09/92
	Hepachlor in Soil	0.01	ug/g	U	10/09/92
	Mirex in Soil	0.03	ug/g	U	10/09/92
	PCB in Soil	0.05	ug/g	U	10/09/92
	Toxaphene in Soil	0.05	ug/g	U	10/09/92

* U denotes results less than the instrument detection limit.

ADEM CENTRAL LABORATORY

- SAMPLE ANALYSIS REPORT -
10/20/92

To: 106 Water Program
1751 Cong. W.L.Dickinson Drive
Montgomery AL 36109

Attn:

Report Date: 10/20/92

Lab number : 2108680
Sample number : 210
Sample matrix : SOIL

COLLECTION INFORMATION

Date/Time/By: 09/22/92 BAYNE
Location : WEISS LAKE, #13A

ADEM CENTRAL LABORATORY
- RESULTS REPORT - October 20, 1992

Lab#	Test	Result	Units	DL*	Analdate
2108680	Chlordane in Soil	0.05	ug/g	U	10/09/92
	4,4'-DDD in Soil	0.01	ug/g	U	10/09/92
	4,4'-DDE in Soil	0.01	ug/g	U	10/09/92
	DDT in Soil	0.01	ug/g	U	10/09/92
	Dieldrin in Soil	0.01	ug/g	U	10/09/92
	Dursban in Soil	0.01	ug/g	U	10/09/92
	Endrin in Soil	0.01	ug/g	U	10/09/92
	Heptachlor Epoxide in S	0.01	ug/g	U	10/09/92
	Hepachlor in Soil	0.01	ug/g	U	10/09/92
	Mirex in Soil	0.03	ug/g	U	10/09/92
	PCB in Soil	0.05	ug/g	U	10/09/92
	Toxaphene in Soil	0.05	ug/g	U	10/09/92

* U denotes results less than the instrument detection limit.

ADEM CENTRAL LABORATORY

- SAMPLE ANALYSIS REPORT -
10/20/92

To: 106 Water Program
1751 Cong. W.L.Dickinson Drive
Montgomery AL 36109

Attn:

Lab number : 2108681
Sample number : 210
Sample matrix : SOIL

Report Date: 10/20/92

COLLECTION INFORMATION

Date/Time/By: 09/22/92 BAYNE
Location : WEISS LAKE, #13B

ADEM CENTRAL LABORATORY
- RESULTS REPORT - October 20, 1992

Lab#	Test	Result	Units	DL*	Analdate
2108681	Chlordane in Soil	0.05	ug/g	U	10/09/92
	4,4´-DDD in Soil	0.01	ug/g	U	10/09/92
	4,4´-DDE in Soil	0.01	ug/g	U	10/09/92
	DDT in Soil	0.01	ug/g	U	10/09/92
	Dieldrin in Soil	0.01	ug/g	U	10/09/92
	Dursban in Soil	0.01	ug/g	U	10/09/92
	Endrin in Soil	0.01	ug/g	U	10/09/92
	Heptachlor Epoxide in S	0.01	ug/g	U	10/09/92
	Hepachlor in Soil	0.01	ug/g	U	10/09/92
	Mirex in Soil	0.03	ug/g	U	10/09/92
	PCB in Soil	0.05	ug/g	U	10/09/92
	Toxaphene in Soil	0.05	ug/g	U	10/09/92

* U denotes results less than the instrument detection limit.