5-1996

The Hydrologic Characterization of Three Forested Headwater Riparian Wetlands in East Tennessee

Mark Hale Eisenbies
University of Tennessee, Knoxville

To the Graduate Council:

I am submitting herewith a thesis written by Mark Hale Eisenbies entitled "The Hydrologic Characterization of Three Forested Headwater Riparian Wetlands in East Tennessee." I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Plant Sciences.

Glenn Wilson, Major Professor

We have read this thesis and recommend its acceptance:

John E. Foss, R. J. Luxmoore

Accepted for the Council:
Carolyn R. Hodges

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

To the Graduate Council:

I am submitting herewith a thesis presented by Mark Hale Eisenbies entitled "The Hydrologic Characterization of Three Forested Headwater Riparian Wetlands in East Tennessee." I have examined the final copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Plant and Soil Science.

Glenn Wilson, Major Professor

We have read this thesis
and recommend its acceptance

Accepted for the Council:

Associate Vice Chancellor
and Dean of the Graduate School

THE HYDROLOGIC CHARACTERIZATION OF THREE FORESTED HEADWATER RIPARIAN WETLANDS IN EAST TENNESSEE

A Thesis

Presented for the

Master of Science

Degree

The University of Tennessee, Knoxville

Mark Hale Eisenbies

May 1996

DEDICATION

This thesis is dedicated to my parents

Mr. John Lawrence Eisenbies

and

Mrs. Serita Keeling Weaver Eisenbies

who have given me the support, guidance, and opportunities which have made the differences in my life.

ACKNOWLEDGMENTS

I would like to thank my major professor, Dr. Glenn Wilson, for his invaluable editing skills. I would also like to thank Dr. Carl Trettin for, his guidance involving me with this project, and for securing funds from the Bear Creek Monitoring and Abatement Program which made this project possible. I would also like to thank the other members of my committee, Dr. John Foss and Dr. Bob Luxmoore, for their comments and assistance. Thanks also to Joan Breiner, Cary Coppock, Mike Kirshner, David O'Dell, Barbara Rosensteel, Richard Roy, John Sneider, Cindy Stiles, David Walker, and Jack Williams for their various contributions.

ABSTRACT

Headwater riparian wetlands form an important hydrologic link between terrestrial and aquatic systems. These wetlands are small and account for only nine percent of the total wetland area in the US, however, they account for nearly half of the upland/wetland edge. Three headwater riparian wetlands were instrumented with flumes, solution samplers and shallow wells to monitor hydrologic and chemical interactions between physiographic positions and streams within the watersheds. The objectives of this study were to examine the general hydrologic and chemical characteristics of such wetlands. Water sampling was conducted in soils and streams during baseflow and stormflow conditions. Cross sections of water tables on wetlands had distinctive differences from those on non-wetlands. Wetland areas had generally level, shallow water tables, while non-wetland bottoms had deeper, more sloping water tables. Calcium concentrations in streams and soils ranged from 2 mg L^{-1} to 25 mg L^{-1}, and were usually highest on wetland physiographic positions. Magnesium concentrations ranged from 1 mg L^{-1} to 4 mg L^{-1} and had similar patterns to those seen for calcium. Dissolved organic carbon concentrations ranged from 5 to 17 mg L^{-1} and were also highest in wetlands. Total nitrogen concentrations were consistently less than 1 mg L^{-1} at all positions. Although these wetlands were small, the hydrogeochemical processes occurring were sufficient to alter soil water chemistry. Although wetlands generally had the highest concentrations of the observed solutes, the solute concentrations of non-wetland bottom was closer to wetland values during drier periods on the watersheds.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF ABBREVIATIONS

CHAPTER I

INTRODUCTION

Introduction:

Literature Review:

Headwater riparian wetlands form an important hydrologic link between terrestrial and aquatic systems (Adams and Hackney, 1992). These wetlands are functionally important ecosystems because they influence the storage, transformation, and release of energy, nutrients, and water (Bardecki, 1984). These wetlands contain some of the most unique and endangered plant and animal communities in the Southern Appalachian Mountains (Pearson, 1994). Riparian wetlands serve to buffer aquatic environments from direct inputs from adjoining ecosystems, as well as act as a source and sink for nutrient and energy exchanges (Walbridge, 1993; Yeakley *et al.*, 1994). This buffering capacity of wetlands enables them to mitigate point and non-point pollution inputs.

Wetlands are currently classified under a hierarchy developed by the US Fish and Wildlife Service (Mitsch and Gosselink, 1993). In this hierarchy, five systems with ten subsystems and 56 classes are identified. Headwater riparian wetlands fall in the palustrine forested class (Mitsch and Gosselink, 1993), and account for approximately 9% of the total wetland area in the United States (Brinson, 1993). These wetlands are usually small, but they account for nearly half of the upland-wetland edge (Brinson, 1993). The length of this interface is important because many wetland processes occur in the transition zone between upland and wetland.

Wetland Functions and Values:

When discussing wetlands it is important to distinguish between their functions and their values. Wetland functions consist of biotic and abiotic processes inherent to the wetland ecosystems. Five functions basic to all wetland ecosystems are hydrology, productivity, biogeochemistry, decomposition, and community dynamics (Trettin *et al.*, 1994). More specific functions that are of particular importance to aquatic ecosystems include nutrient cycling, flood controls, stream temperature regulation (Mitsch and Gosselink, 1986), and sediment retention (Phillips, 1989). Although these functions are found in all wetland classes, the degree of their expression will vary among morphological characteristics (Trettin *et al.*, 1994).

Wetland values are the anthropogenic interpretation of the quality or importance of given functions. Aesthetics, hunting, fishing, timber production, water quality, landscape and biological diversity are some examples of values given to wetlands (Trettin *et al.*, 1994; Lugo *et al.*, 1990). Values, unlike functions, are subjective and can differ between wetland classes, and some classes may have more intrinsic value than others (Davis, 1994)

General Wetland Definition:

Jurisdictional wetlands must fulfill the following three criteria to be delineated: wetland hydrology, hydric soils, and hydrophytic vegetation (Federal Interagency Committee for Wetlands Delineation, 1987). Debates over the technical criteria revolve primarily around the failure of the laws to adequately describe the means for delineating the areas subject to their jurisdiction (Faulkner and Patrick, 1992).

Wetland hydrology is generally considered to be the most important criteria because it controls the whole system, but it is also the most difficult criteria to observe and characterize (Wakeley, 1994). The definition of hydric soils, as well as, hydrophytic vegetation are not without their own debates.

Wetland Hydrology as a Delineator:

Wetlands exist under a variety of climatic and geomorphic conditions. Hydrology is the most important and driving component, however not all wet soils are hydric (Hurt and Puckett, 1992). Wetland hydrology is basic to hydric soil formation, aquatic vegetative composition, and abiotic conditions controlling biogeochemical processes (Roulet, 1990). Many factors affect the wetness and transport processes within an area (Fig. 1): precipitation, evapotranspiration, runoff, subsurface flow, groundwater discharge, flooding, stratigraphy, topography, soil physical properties, and plant cover (Federal Interagency Committee for Wetlands Delineation, 1987).

According to the Federal Interagency Committee for Wetland Delineation (1987), wetland hydrology is defined as "a permanent or periodic saturated condition within the soil profile." The saturated conditions can either be the result of conditions found in flow-through or flood-dominated systems. Either condition will affect the interactions and exchanges between upland, wetland, and aquatic systems (Trettin and Rosensteel, 1992). Of the three technical criteria, wetland hydrology is the least exact and most difficult to establish in the field due to annual, seasonal, and daily changes in

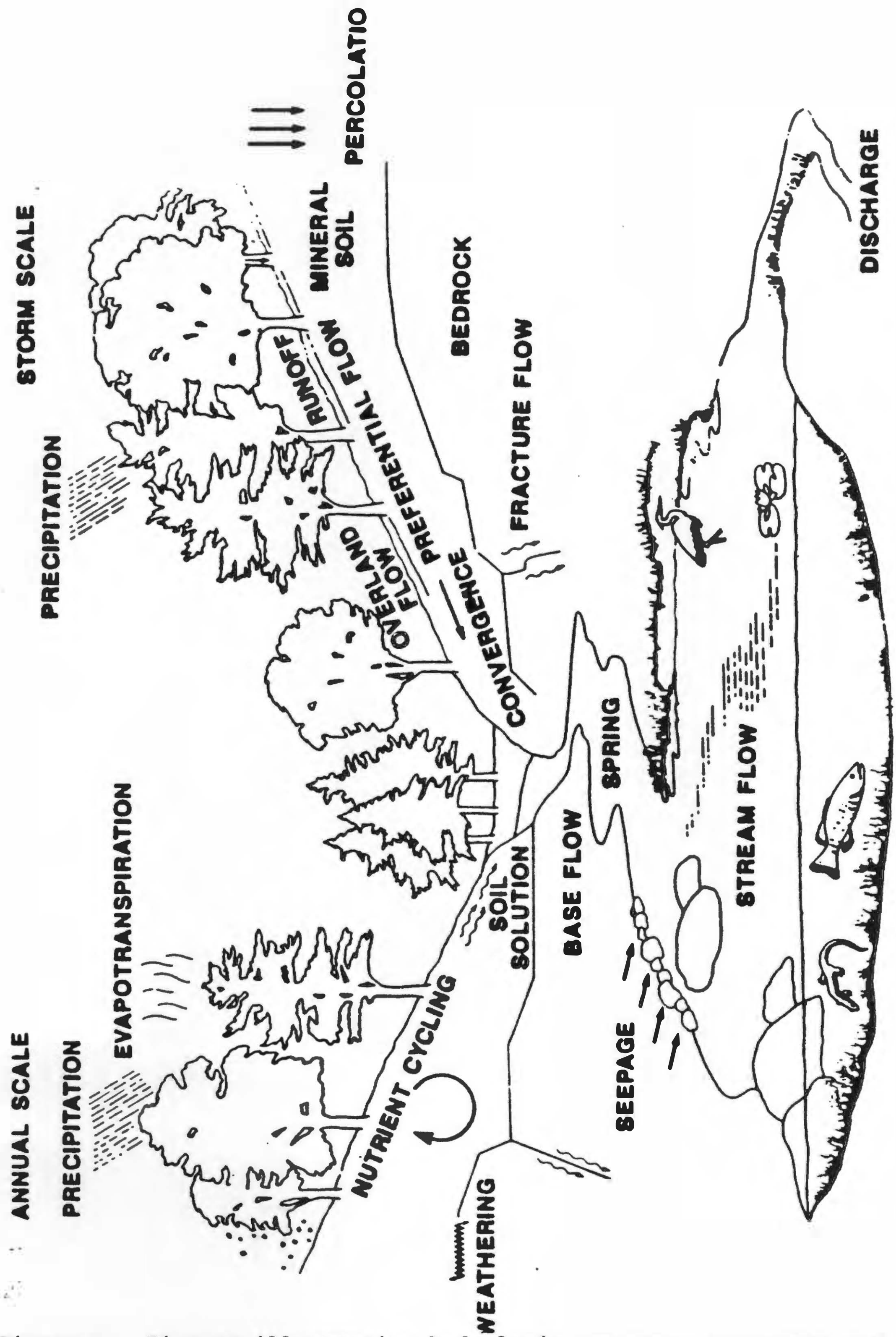

Figure 1. Diagram illustrating hydrologic transport processes and linkages affecting riparian areas (Johnson and Van Hook, 1989).

hydrologic conditions (Federal Interagency Committee for Wetlands Delineation, 1987).

Water tables mark the top of the saturation zone not including the capillary fringe. Soil investigations of redoximorphic features generally include the capillary fringe. Water affects soil development through many factors: abundance and seasonal distribution, flux (any direction), and preferential pathways (Daniels and Boul, 1992). Epi-, endo-, and anthric-saturation are terms used to specifically identify the type of wetness present in the soil. These may be found exclusive of each other, or coexistent, depending on the season (Szogi and Hudnall, 1992).

Epi-saturation is the presence of at least one unsaturated zone/horizon below a saturated zone. Endo-saturation is the condition where all layers are saturated to at least two meters. Anthric-saturation is like epi-saturation, but anthropically influenced (Soil Survey Staff, 1992). Although these features are the most definitive for defining a hydric soil, they must be monitored for long periods to determine the soil's true characteristics (Szogi and Hudnall, 1992).

Despite the importance of determining the hydrology of a given site, the COE manual does not give an absolute definition of wetland hydrology. Most sites lack any direct, long term measurements of their hydrologic parameters, and therefore decisions are left to field indicators. Some hydrologic indicators include direct observation of saturated conditions, water marks, debris lines, sediment deposits, water stained leaves, and oxidized rhizospheres around living roots and rhizomes (Wakeley, 1994).

Hydric Soils as a Delineator:

Moisture regimes for soils are defined by three categories in soil taxonomy: saturated, enough water to allow leaching to occur, and no leaching (Witty and Engel, 1992). The aquic moisture regime is dependent on the frequency and duration of saturated conditions. The factors used to ascertain whether an aquic moisture exists include length of saturation, depth to saturated zone, thickness of saturated zone, presence of anaerobic conditions, pore size distribution, and temperature (Mausbach, 1992). Thus, an aquic regime implies reducing conditions virtually free of dissolved oxygen for a sufficient period of the year to affect soil morphology (Witty and Engel, 1992).

Specific criteria must be met within the Keys to Soil Taxonomy to be classified as a hydric soil. These criteria include all Histosols except Folists, soils that are frequently flooded or ponded for long periods during the growing season, and soils in the Aquic suborders, Aquic subgroups, or Cumulic subgroups that have a water table frequently occurring within 30 cm of the soil surface during the growing season. The actual depth of the water tables varies with texture, drainage class, and permeability (Soil Survey Staff, 1992).

Most of the problems surrounding the identification of hydric soils is the difficulty in defining and applying the concept of the aquic moisture regime (Witty and Engel, 1992; Mausbach, 1992). The authors of the Keys to Soil Taxonomy were themselves unsure of the precise definition, and were therefore hesitant to use the vague, but important, condition. Within the Keys to Soil Taxonomy there are eight aquic suborders and 225 aquic/aquic-combination subgroups possible.

Very few of these require saturation as the only delineator, and roughly half mention mottling within the profile. Only four of the 200 plus suborder-level soils explicitly express the presence of an aquic moisture regime (Witty and Engel, 1992).

The operational definition of hydric soils also does not adjust for situations where the water table is perched due to layers with low hydraulic conductivities (Witty and Engel, 1992). Most of the common morphological characteristics (redoximorphic features, gleization) applied in the Keys to Soil Taxonomy do not necessarily show current hydrologic conditions, and may even depict relict features of past saturation (Vepraskas and Guertal, 1992). The recognition of this problem prompted the revision of the "aquic moisture regime" and the use of the alternative term "aquic conditions" by the International Committee on Aquic Moisture Regimes (ICOMAQ)(Szogi and Hudnall, 1992).

Usually wetlands and hydric soils are used together with a certain degree of synonymy. These terms pose further problems because by definition hydric soils are not always wet, and wetland soils may not always be hydric; however, there is a great deal of overlap (Hurt and Puckett, 1992). Wetland identification attempts to address this problem by requiring the three essential characteristics: wetland hydrology, hydrophytic vegetation, and hydric soils. Delineation requires at least one characteristic from each criterion (Faulkner and Patrick, 1992). To properly determine the presence of aquic conditions a site should be monitored a year or more (Szogi and Hudnall, 1992). Hydric soil identification in the field, therefore, depends on morphological characteristics which may not be reliable in some cases (Vepraskas and

Guertal, 1992; James and Fenton, 1993). Efforts are being made to develop improved field identification methods (Hurt and Puckett, 1992).

Mottling and gleization are the most common morphological characteristics to identify seasonal wetness (Vepraskas and Guertal, 1992; Chen, 1992). Mottles form in anaerobic conditions where microbes use iron (Fe) and manganese (Mn) in place of oxygen as electron acceptors (Faukner and Patrick, 1992). These Fe and Mn redoximorphic features can take many forms depending on the frequency and duration of saturation (Mausbach, 1992). Nodules develop when coatings form in and around soil peds, while depletion coatings are found in soils where saturation is more intermittent, i.e. perched water tables (Vepraskas and Guertal, 1992).

Depletion coatings include features such as hypoalbans (ferrans) which develop in the macropore void, and hyposkeletans (neoferrans) which impregnate peds. Iron rich quasi-coatings are enrichment coatings which form in the groundmass. Time of formation for these features is dependent on Fe concentration, and the diameter of macropores (Vepraskas and Guertal, 1992). Once these features have formed they are very persistent (lasting many years) after dewatering, and can cause problems in identification since the conditions that caused the features formation are no longer present (Mitsuchi, 1992; Vepraskas and Guertal, 1992).

Accumulation of organic matter is the second commonly used soil morphological characteristic for identifying wetland soils. The anaerobic conditions found in wetlands can retard the decomposition of organic solids causing the formation of histic epipedons (Wakeley, 1994). The microbes that govern this process are controlled by temperature and moisture conditions. The formation of organic layers is due to the anaerobic, and nitrogen-limiting conditions that prevent oxidation of organic carbon. Organic carbon accumulation can take decades or centuries to be significant (Mitsch and Gosselink, 1993).

Hydrophytic Vegetation as a Delineator:

The third component of the technical criteria for delineating wetlands is the presence of hydrophytic vegetation. A hydrophyte is defined as a plant that grows in water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content (Wakeley, 1994). Plant species can be placed in one of four wetland indicator categories based on the expected frequency of occurrence: obligate wetland (OBL), facultative wetland (FACW), facultative (FAC), and facultative upland (FACU) (Tiner, 1991).

Generally OBL and FAC are used as indicators between wetlands and non-wetlands (Tiner, 1991). Obligate species are nearly always found in wetlands; their frequency of occurrence is 99% or more (99% of individuals observed in the field will be found on a jurisdictional wetland). Facultative wetland species have a frequency of occurrence between 67% and 99%, and FAC and FACU occupy 33% to 67%, and 1% to 33% respectively. The federal manual delineates wetlands based on a 50 percent rule where more than 50% of the plant community is dominated by hydrophytic species (Federal Interagency Committee for Wetlands Delineation, 1987). Debate over delineation usually centers on how to apply this rule and into which category some FAC species are placed. Facultative species generally have a wide tolerance for different ecosystem types without any real affinity for either wetlands or uplands (Tiner, 1991).

Watersheds as the basic ecosystem:

Watersheds form the smallest independent unit of the ecosystem concept (Lotspeich, 1980). Ecosystems are defined as "a system resulting from the integration of all living and non-living factors of the environment" (Tansley, 1935). The greatest difficulty in studying ecosystems are the diffuse ecotones that develop between adjacent ecosystems. Watersheds are well suited as the basic ecosystem unit because they form relatively discrete boundaries that other subunits lack. Watersheds are also subject to, and the product of, the same forces that govern ecosystems (Lotspeich, 1980).

The physiographic boundaries of watersheds prevent most interaction with neighboring watersheds with the exception of mobile biota and transcending hydrologic conditions (Lotspeich, 1980). Boundaries may or may not be topographic. Watershed catchment areas may be controlled by subsurface water divides causing catchment contributing areas to be unequal to topographic areas (Hewlett, 1982). Within each watershed, climate (temperature and rainfall) and geology (lithology and structure) are the principal elements that control the development of microclimates, soils, vegetation, and hydrology. Stream flow is the final integrated product of the ecological processes occurring within the watershed (Lotspeich, 1980), but flow off site can occur as stream flow, subsurface flux, or groundwater recharge (Wilson *et al.*, 1991a).

Ecosystem investigations are facilitated by studying small watersheds. Small watersheds, such as headwater catchments, are advantageous because they are less complex and more homogeneous in geology, soils, and vegetation (Lotspeich, 1980).

Landscape Processes:

Broad scale processes are important to sustaining wetland systems. The general functions of hydrology, nutrient cycling, and species dynamics within a wetland interact through soil chemistry and biology, evapotranspiration, and primary and secondary productivity. Outside of this framework wetlands are influenced by broad scale processes such as climate, surrounding ecosystems, and anthropogenic activity (Pearson, 1994).

Wetland Hydrology:

A basic hydrologic balance model for headwater riparian wetlands (Fig. 2) consist of inputs from net precipitation, surface runoff, and groundwater inflow (Mitsch and Gosselink, 1993). Water storage within a wetland occurs in the soil or surface water. Interactions across the stream and physiographic position occur through any flooding influences (Kangas, 1990). The basic outputs of a riparian system include evapotranspiration, streamflow (surface runoff), and groundwater outflow (Mitsch and Gosselink, 1993).

Headwater riparian systems behave differently than other flood controlled systems. Their hydrology, depicted in Fig. 3, can be generalized as flow-through or flood-controlled systems (Trettin and Rosensteel, 1992). Flow-through systems occur on gently sloping terrain or terraces where interactions occur before entering the stream. Flood-controlled systems, conversely, may receive water directly from the aquatic systems it influences (Roulet, 1990). Interactions between the

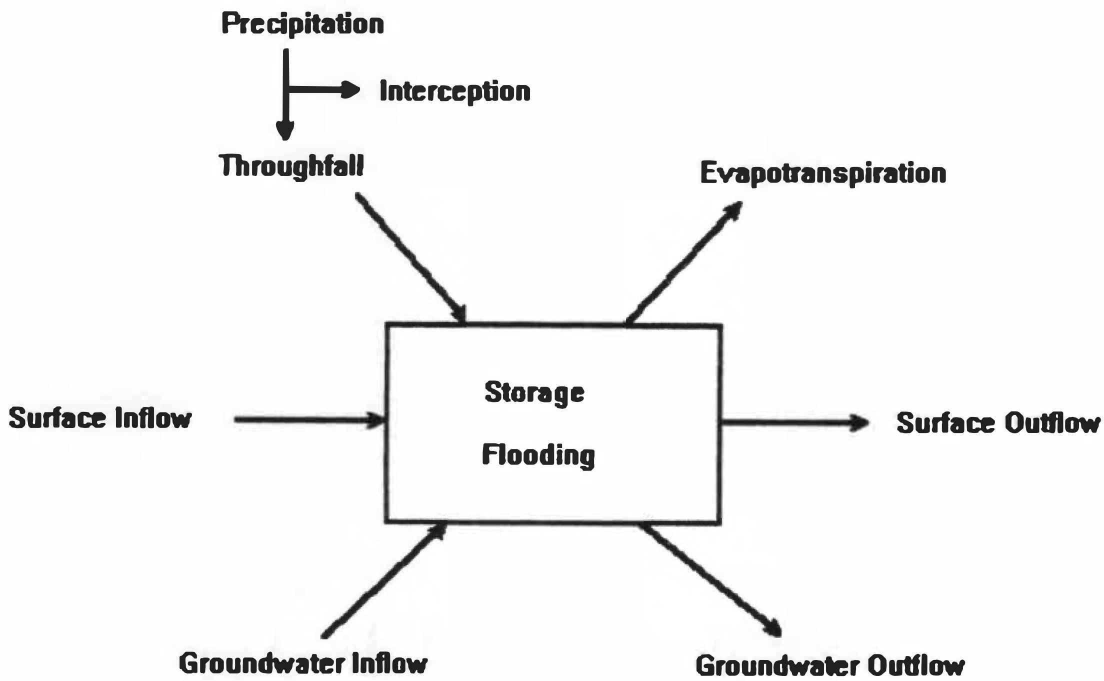

Figure 2. A basic hydrologic balance model for riparian wetlands (Adapted from Mitsch and Gosselink, 1993).

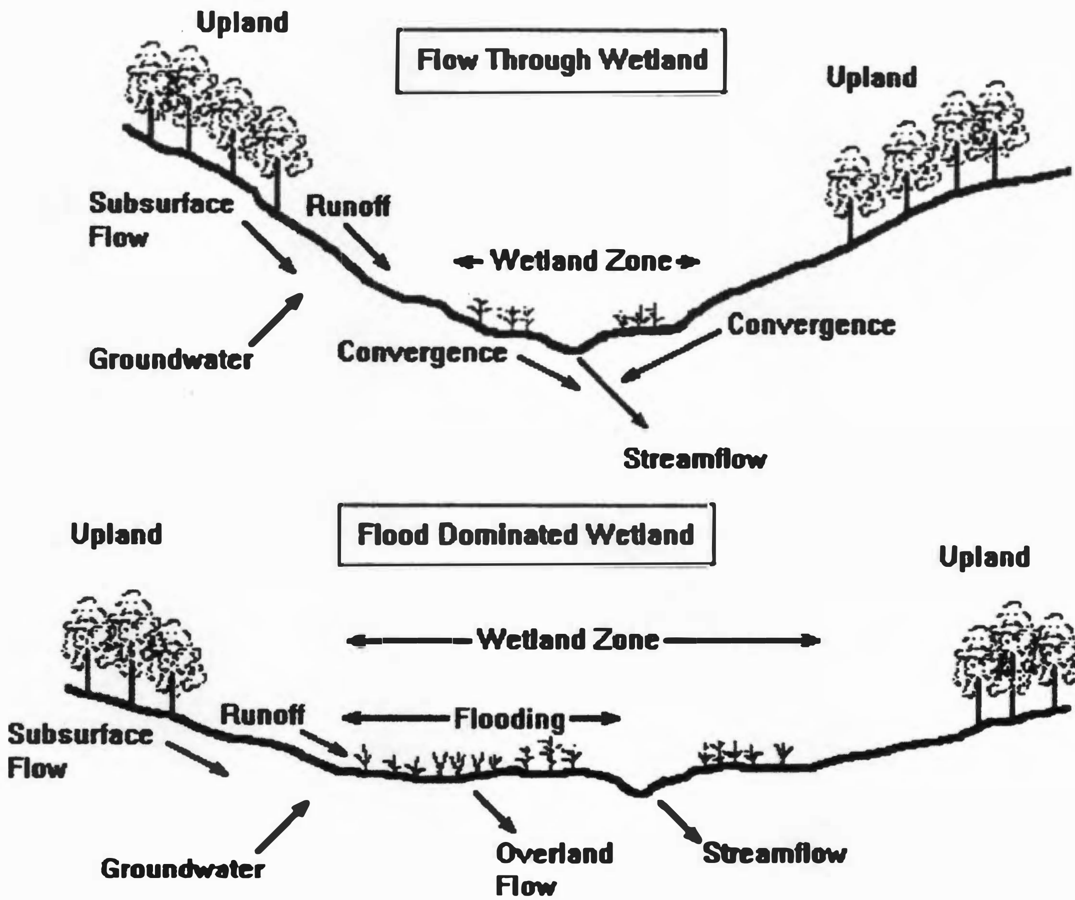

Figure 3. Comparison of hydrological components of flow-through and flood-dominated riparian wetlands (Modified from Trettin and Rosensteel, 1992).

physiographic position and stream are essentially one sided in a flow-through system, whereas flood-dominated systems can be greatly influenced by the aquatic system (Winter, 1988).

The hydric conditions may either be the result of groundwater recharge or groundwater discharge. In recharge systems, drainage flows downward into the groundwater supply. This flux is somehow impeded enough for wetland characteristics to develop. In a discharge system, baseflow from the groundwater system enters the wetland (Winter, 1988; Freeze and Cherry, 1979). Groundwater flowpaths into wetland areas can occur from local or regional sources (Hill, 1993).

Subsurface Flow:

Water movement through forested hillslopes into wetlands or streams may be primarily controlled by preferential flow through shallow and deep pathways (Wilson *et al.*, 1990). Pore size distribution and perched water table dynamics were important to the hydrologic and chemical activity of soil water and colloids. Macropores (pores >1 mm diameter (Luxmoore, 1981)) are relatively small fractions of total porosity, but can act as the principal conduit of water movement in soil. Mesopores (pores <1 mm that are generally drained at field capacity) are hydrologically active for longer periods following storms, but at slower flow rates and greater solute attenuation than macropores. Micropores constitute the remainder, and are the most chemically interactive with the immediate soil solution (Luxmoore *et al.*, 1990) serving as a source/sink for macro- and meso-pores.

Preferential flow through macro- and mesopore sizes may be responsible for rapid hydrograph responses to storm events. Wilson *et.*

al., 1991a, found that subsurface lateral movement of water through hillslope was primarily the result of perched water tables. Hydrophobic conditions in the soil profile may enhance the lateral preferential flow in dry conditions (Wilson *et al.*, 1990). Hydrologic and chemical interaction between larger and smaller pore sizes occur to a larger degree during long duration, low intensity storm events (Wilson *et al.*, 1991b).

Similar subsurface preferential flowpaths can be found in wetland systems. These may be in the form of animal burrows, root channels, or fractures in the bedrock. Aside from having an impact on the movement of water and nutrients through wetland soils, these flowpaths also affect water table equilibration, soil mixing, and subsurface respiration (Stone, 1993).

Streamflow Generation:

Several conceptual models have been developed to explain the origins of water in streamflow generation. One of the earliest models was the variable source area concept (Hewlett and Hibbert, 1967) which attempted to explain why neither stormflow nor baseflow was uniformly produced from the entire surface or subsurface area of a basin. Several recent efforts have concentrated on separating the components of the hydrograph based on the origins of the source water (Hill and Waddington, 1993; Genereux *et al.*, 1993; Mulholland, 1993; and Bazemore *et al.*, 1994). The origins of water in headwater systems will vary both temporally and spatially. Water has been shown to vary in chemical solutes based on shallow or deep flowpaths.

Hill and Waddington's (1993) model was designed to identify shallow and deep groundwater contributions using concentrations of oxygen-18. This model used two components to identify the main source of streamflow: pre-event (old) water, or event (new) water. They reported that the hydrograph was dominated by old water. The conclusion was that small volumes of new water were mixing with a large reservoir of old water. In the cases of large events, a large component of new water was identified.

Mulholland (1993) used a three component model to discern three sources of streamflow generation: bedrock groundwater (BG), saturated soil groundwater (SG), and vadose groundwater (VG). Using calcium and sulfate he showed that SG and VG were important components of the hydrograph while BG remained relatively constant. Bedrock groundwater had high calcium and low sulfate content, SG had low calcium and low sulfate, and VG had low calcium and high sulfate. The implication was that shallow pathways are important sources of streamflow generation.

Wetland Chemistry:

Calcium and magnesium chemistry is related to the characteristics of the soil parent material and bedrock. Studies have used calcium and magnesium as indicators of the bedrock contribution to stream chemistry (Mulholland, 1993; Wels *et al.*, 1990). Calcium and magnesium are the byproducts of carbonate bedrock dissolution, and their concentrations will be much greater based on the contribution of bedrock groundwater.

Carbon and nitrogen cycling are important ecological processes that occur in wetlands. Organic carbon is the fundamental energy source for aquatic biota (Adams and Hackney, 1992). The organic carbon in riparian soils depends on a number of processes in its formation: primary production, organic matter decomposition rates, and erosion (Mitsch and Gosselink, 1993). Watersheds containing riparian wetlands are a considerably larger exporter of organic carbon than non-wetland watersheds (Mitsch and Gosselink, 1986). Increased organic carbon has also been observed in headwater systems in response to storm events (Jardine *et al.*, 1990).

Nitrogen cycling is important because nitrogen deficiencies frequently limit wetland productivity. The anaerobic conditions of wetland soils favor the activity of microorganisms which perform nitrogen transformations such as denitrification (Mitsch and Gosselink, 1986). Denitrification is a primary activity of riparian wetland zones converting nitrates and nitrites to nitrogen gas and nitrous oxide (Triska *et al.* 1993). These systems act effectively as buffers during baseflow conditions, but the majority of nitrogen export occurs only during a few, larger scale rain events (Johnson and Van Hook, 1989)

Hydrologic Monitoring Techniques:

Many methods of hydrologic monitoring are used in the study of wetlands. Depths to water table, components of the water budget, as well as water chemistry are the basic requirements for understanding the inputs and outputs in wetland systems. Several past studies have employed the use of trapezoidal flumes or weirs for the measurement of overland flow (Johnson and Van Hook, 1989; Hill, 1993). While these are useful, an area being studied must be an effectively closed system for reliable measures to be made. Some researchers employed subsurface weirs in order to isolate that component of flow off site (Wilson *et* *al.*, 1990 and 1991a). The main concerns of any system are the definition the contributing area, site disturbance, effect on water table, and effect on soil and water chemistry.

Wells and piezometers are commonly used for monitoring water tables and estimating water movement, as well as for the collection of water samples. Although continuous monitoring is preferred in the case of water tables, and is possible with todays technology, the expense makes extensive coverage of some sites difficult (Szogi and Hudnall, 1992).

Well construction varies from complex stainless steel versions, to plastic pipes fit into augured holes in the ground. Wells that are used for monitoring chemistry must be carefully installed to eliminate interference from surface water in the samples. Wells should be sealed around the annulus to prevent seepage, and the heads capped to prevent rainfall from entering. Much debate surrounds the use of wells and piezometers for the collection of water samples. In the arena of contaminant monitoring, the EPA has adopted the practice of purging the well volume three times before samples are taken. However, the accuracy of this method has been questioned due to the induced flow which may cause a flushing of adsorbed solutes as the potentiometric surface around the well is lowered. Although there is a possibility for the contamination of well shafts, some studies may benefit more from information gathered from groundwater in wells that have equilibrated with their surroundings.

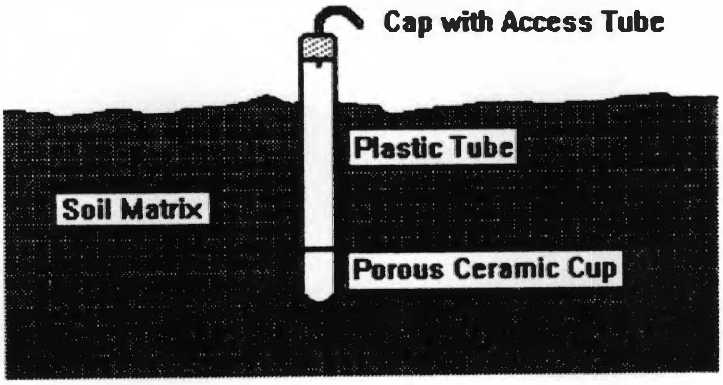

Figure 4: A soil solution sampler.

A widely used device for collecting water from the unsaturated portion of the soil profile is the solution sampler. This sampler consists of a PVC or plastic tube with a porous ceramic cup at the bottom end (Fig. 4). The open end is capped, and a suction applied to the chamber. Depending on soil conditions, solution is drawn from the soil matrix into the tube under the applied suction; the solution can be collected later. Although this is a useful sampling method there are two limitations that need to be considered. Collection of samples under suction can alter the pH (CO_2 decreasing) and chemical composition of the solution. Additionally, the ceramic cups can interfere with the sampling of certain solutes such as P, Ca, K, and NO_3 (Severson and Grigal, 1976; Litator, 1988). Others have offered several steps that can be taken to limit the error associated with these devices: flushing before first use, maintaining a constant suction, consistent sample timing, and careful technique to avoid contamination (Severson and Grigal, 1976).

Objectives:

An important objective within the scope of the Bear Creek Monitoring and Abatement Program is to establish the functional linkages between riparian wetlands and tributaries of Bear Creek (Trettin and Rosensteel, 1993). The objective of this study was to examine the general hydrologic processes occurring within these wetlands. This objective was met through an investigation of the impact of physiographic position on stream hydrology and chemistry during baseflow and stormflow conditions. The experimental approach to this study was to instrument both streams and general landscapes with water monitoring and collection devices.

There are three primary hypotheses in this study. First, wetlands serve as a nutrient source during baseflow conditions. Stream flow from wetland watersheds will have higher solute concentrations than from non-wetland watersheds, while solute concentrations will be higher in wetland physiographic positions than bottomland and upland positions. Second, solute concentrations will be higher during the growing season than during the non growing season. Third, solutes will experience either dilution effects (Ca, Mg, N) or concentration/flushing effects (DOC) with increased flow. These three hypothesized processes were expected to act synergically.

It was also expected that localized physiographic features specific to these watersheds would influence stream hydrology and chemistry. Springs, insurgences (points where a stream flow into the ground), and resurgences (points where a stream flow from the ground) may diminish the role of wetland processes by bypassing the points where wetland functions were occurring. Water flowing from underground sources may be from a different source than the flow from hillslopes, and therefore the solute chemistry may differ. Calcium and magnesium concentrations will be higher in water that has been influenced by the dissolution of the carbonate bedrock, thus groundwater will have higher Ca and Mg concentrations than soil water. DOC and total nitrogen concentrations are expected to be lower in water that has not been influenced by biologic functions.

CHAPTER II

MATERIALS AND METHODS

Site Description:

Morphology:

Three first order headwater riparian areas were selected within the Bear Creek Valley on the Oak Ridge Reservation, Anderson and Roane Counties, Tennessee (Fig. 5). This area is located in the ridge and valley province of the Appalachians (Fig. 6). These watersheds were located on three geologic groups which parallel Bear Creek and Pine Ridge (Fig. 7). The Rome Formation is comprised of sandstone and occupies the upper third of the south side of Pine Ridge. The Rome transitions to Pumpkin Valley Shale which contains an upper and lower member. The low permeability upper member is comprised of interbedded claystone and siltstone with strata of fine grained glauconitic sandstone. The lower member is primarily composed of a highly fractured, permeable siltstone and very fine grained glauconitic sandstone. Most instrumentation for this study was installed over the Pumpkin Valley Shale. The Pumpkin Valley formation transitions to the Rutledge Limestone covered mostly by alluvium and colluvium (Lietzke *et al.*, 1988).

These watersheds were typical of the Bear Creek Valley, and contained both wetland and non-wetland riparian bottoms. Wetland areas were delineated using the 1987 US Corps of Engineers methodology (Rosensteel and Trettin, 1993). Watershed 13A was approximately 1.5 ha, and is the smallest watershed. It contained wetlands throughout the riparian bottom with stream flow characterized as intermittent. Soils

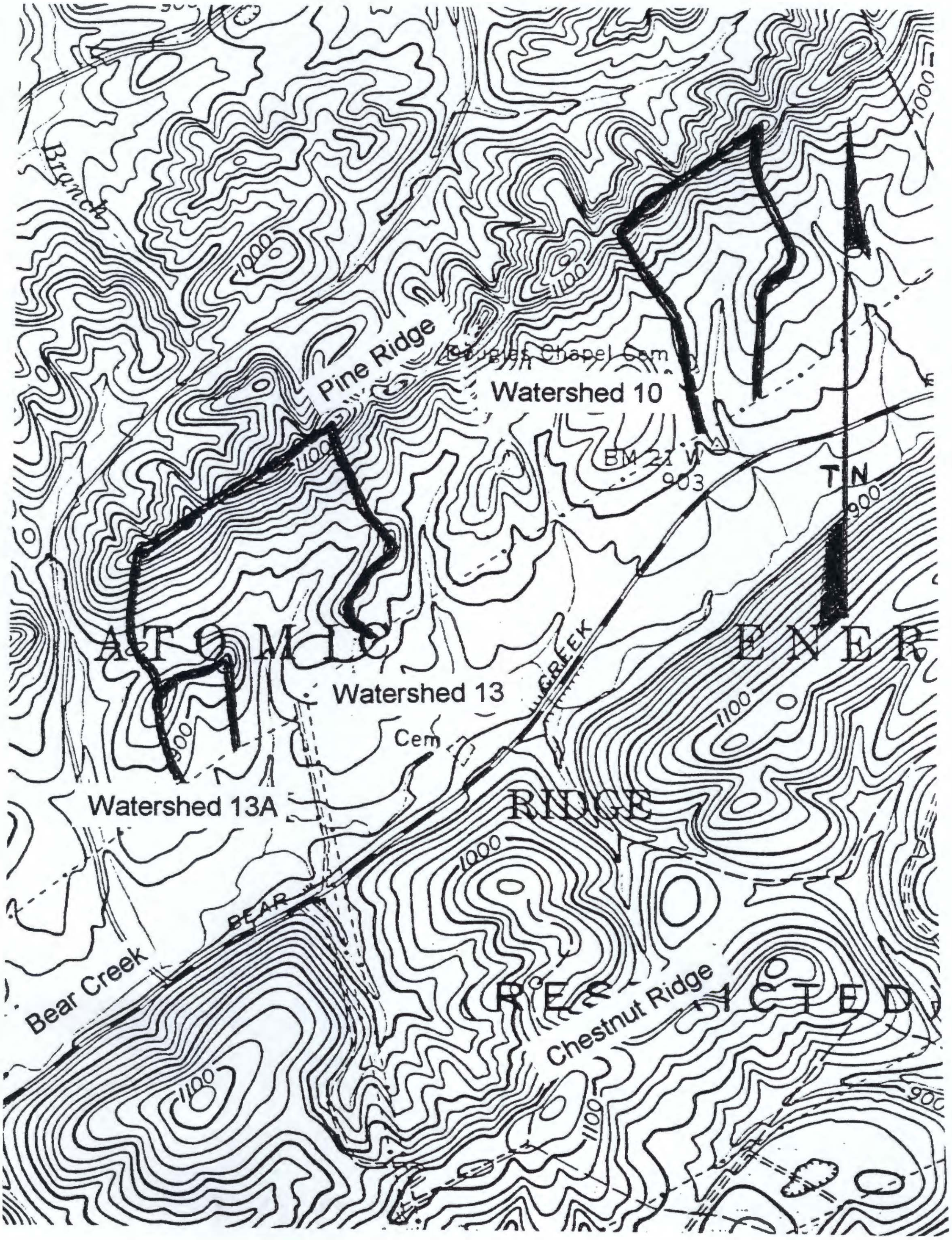

Figure 5. Topographic map showing relative locations of watersheds in the Bear Creek Valley.

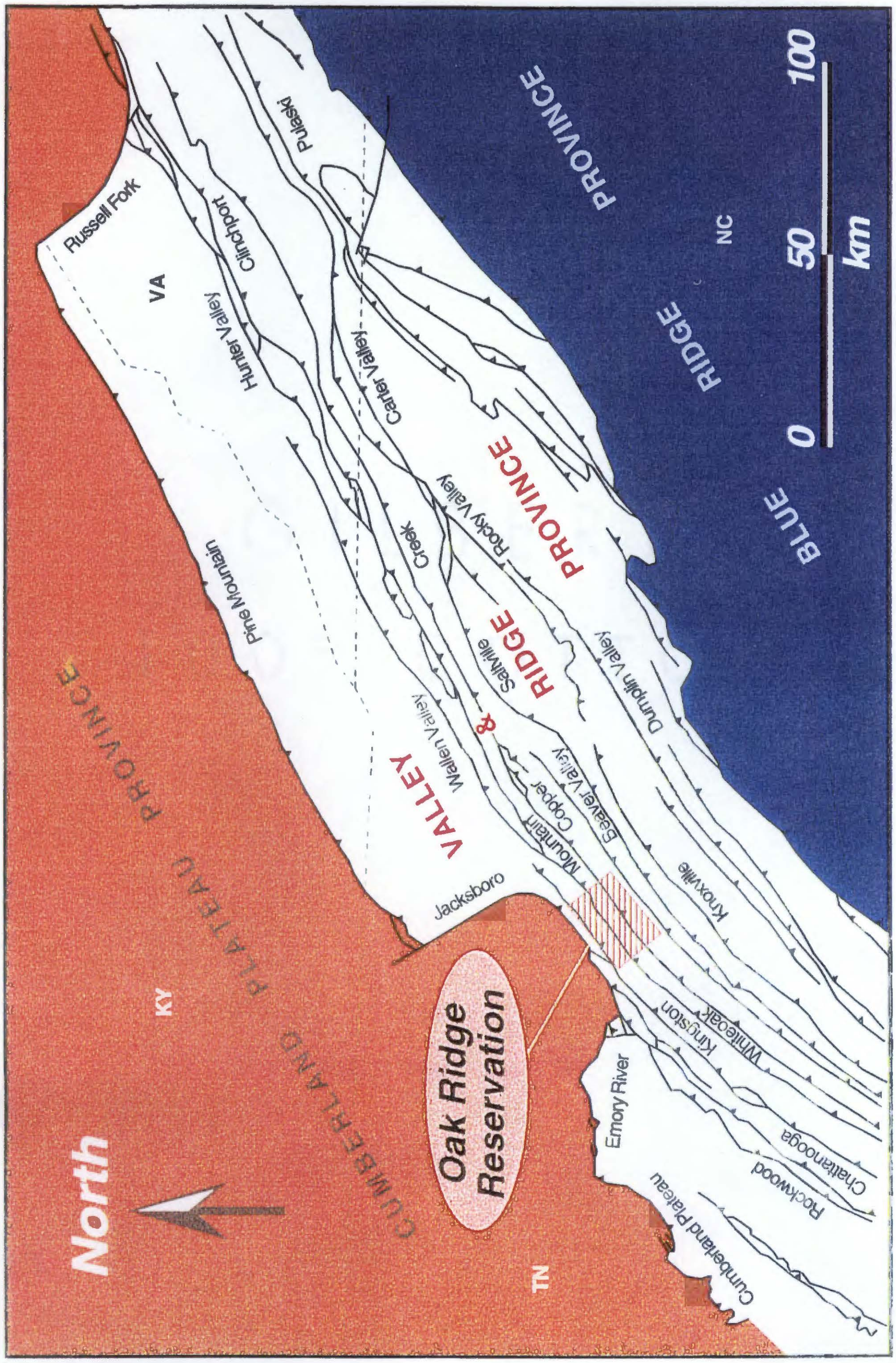

Figure 6. The Valley and Ridge Province and its neighboring physiographic regions as they relate to East Tennessee (Limiztky, 1995).

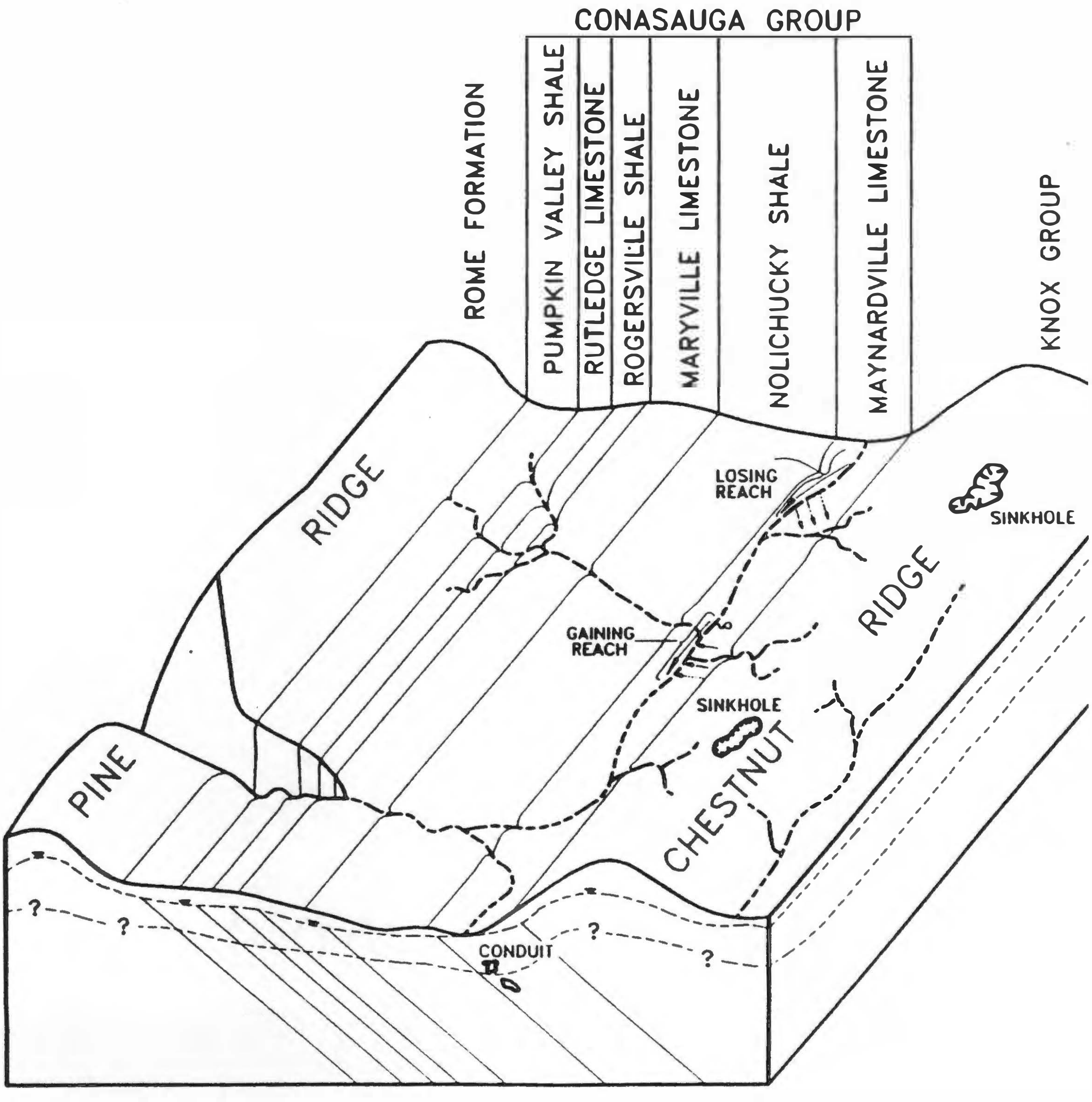

Figure 7. Geologic units underlying Pine Ridge, Bear Creek Valley, and Chestnut Ridge (ORNL).

were 1 m to 1.5 m deep across the riparian bottom, and as deep as 2 m near the origin of the stream channel. Soils were classified as Aquic or Typic Udifluvents (Lietzke *et al.*, 1988) formed over silty alluvium and silty alluvium over clay residuum (Tab. 1, Fig. 8). CEC's from profiles ranged between 4 and 12.5 cmol kg^{-1}. Base saturations were from 60 to 99 percent (Foss *et al.* 1995).

Watershed 13 was approximately 24 ha and was the largest watershed. It contained no jurisdictional wetlands, and streamflow occurred year round. Soils were 1 m to 2 m deep across the riparian bottom and were classified as Typic Udifluvents (Lietzke *et al.*, 1988). Parent materials included silty alluvium, silty alluvium over clay residuum, and sandy alluvium over colluvium over clay residuum (Tab. 1, Fig. 9). CEC's ranged from 2.5 to 11 cmol kg^{-1}. Base saturations were between 50 and 75 percent (Foss *et al.* 1995).

Watershed 10 was 13 ha and also had a stream that flowed year round. It contained intermittent stretches of wetland in the riparian bottoms. A subcatchment was identified to subdivide the wetland areas from non-wetland areas. Soils were 1 m to 1.5 m deep and were classified as Aquic or Typic Udifluvents (Lietzke *et al.*, 1988). Parent material varied between silty alluvium, silty alluvium over clay residuum, and sandy alluvium over colluvium over clay residuum (Tab. 1, Fig. 10). CEC ranged from 2.5 to 8 cmol kg^{-1}. Base saturations were between 5 and 60 percent (Foss *et al.* 1995).

Vegetation on the riparian zones and wetlands on these sites were characterized as palustrine forested. This cover type is common among the tributaries of the Bear Creek Valley. Palustrine forests are

Table 1: Soil units, descriptions, and drainage classifications for soils found on watershed bottoms (Stiles *et al.*, 1995).

Soil Unit	Description	Drainage
	<u>Silty Alluvium</u>	
1	Soils formed in 50-100 cm Silty alluvium over shale bedrock	p
2	Soils formed in 100-150 cm Silty alluvium over shale bedrock	p-swp
4	Soils formed in 150-150 cm Silty alluvium over shale bedrock	swp-mw
	<u>Silty Alluvium/Clayey Residuum</u>	
5	Soils formed in silty alluvium over clayey residuum; bedrock at 100-200 cm	swp-p
6	Soils formed in silty alluvium over clayey residuum; bedrock > 200 cm	swp
	<u>Sandy Alluvium/Colluvium/Clay Residuum</u>	
7	Soils formed in sandy alluvium over clayey residuum; bedrock at 100-200 cm	swp
8	Soils formed in sandy alluvium-colluvium with argillic overlying clayey residuum; bedrock < 200 cm	mw-w

see list of abbreviations, page ix

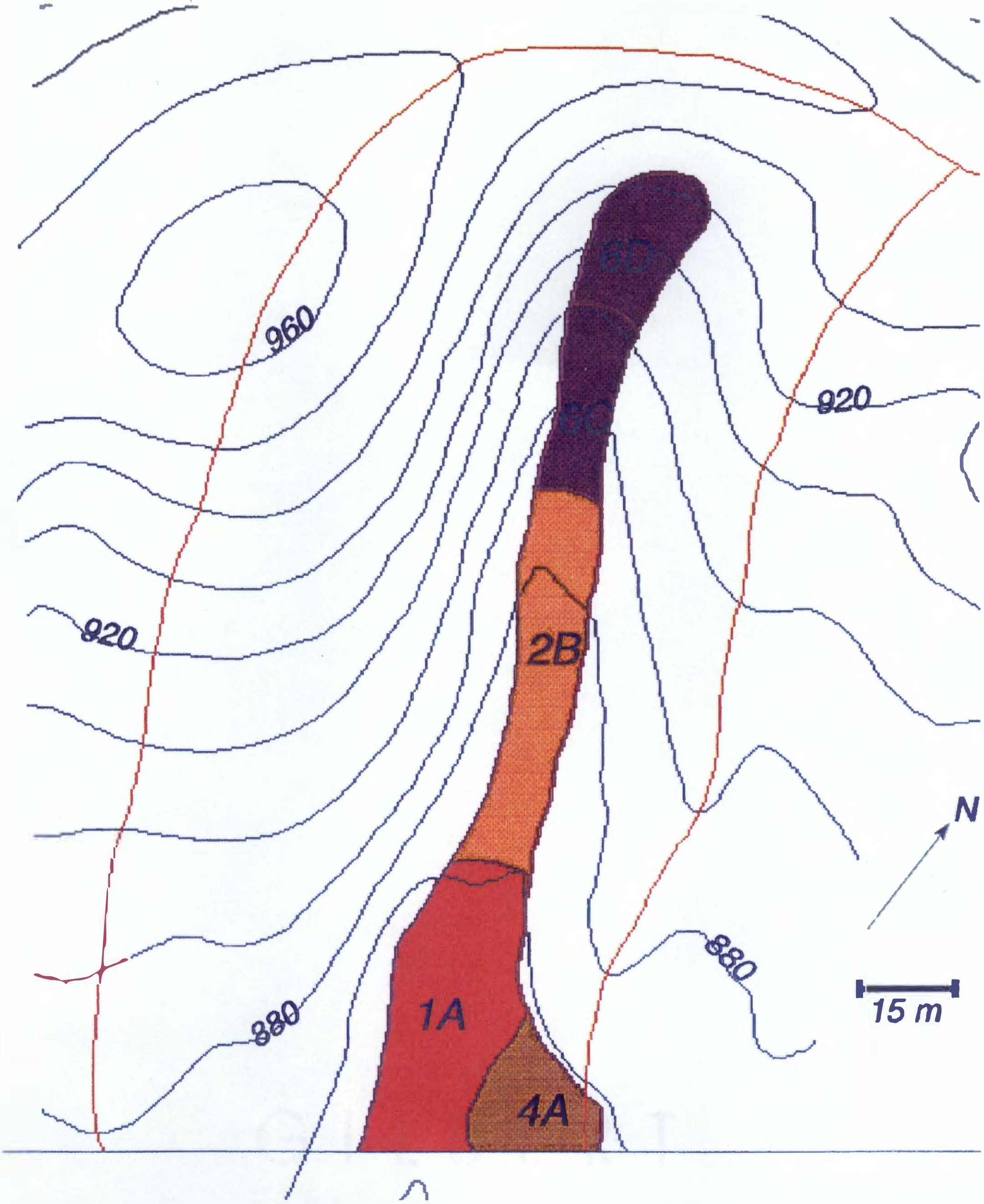

Figure 8. Soil units of riparian bottom, watershed 13A (Stiles *et al.*, 1995).

Figure 9. Soil units of riparian bottoms, watershed 13 (Stiles *et al.*, 1995).

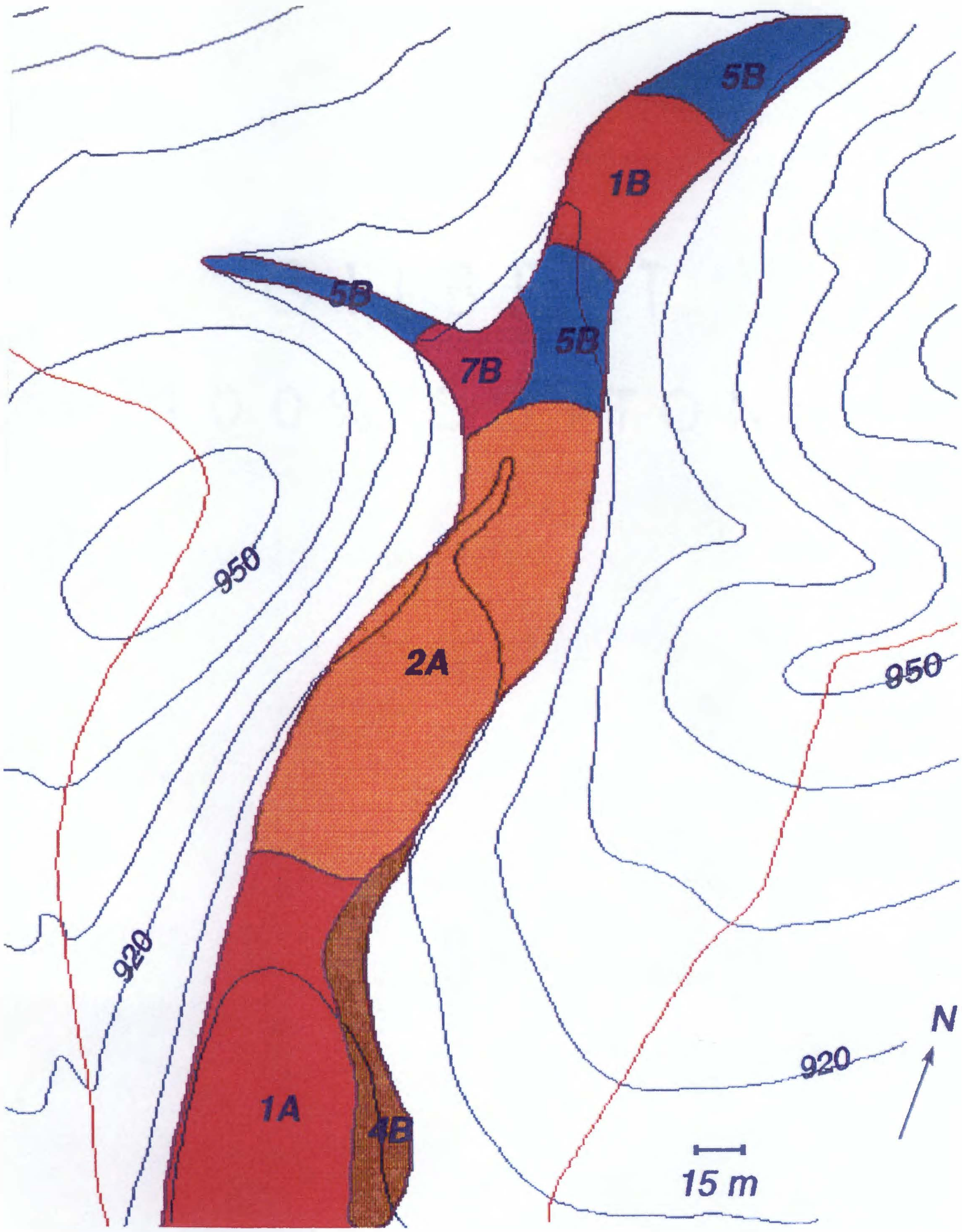

Figure 10. Soil units of riparian bottom, watershed 10 (Stiles *et al.*, 1995).

characterized by poorly to somewhat poorly drained soils with chroma, gleying, and depth to mottling being the primary wetland delineator. The overstory among this wetland type was typified as a red maple (*Acer rubrum*), sweetgum (*Liquidambar styraciflua*), and green ash (*Fraxinus pennsylvanica*) cover type (Rosensteel and Trettin, 1993). On the instrumented sites, red maple, yellow poplar (*Liriodendron tulipifera*), and American beech (*Fagus grandifolia*) were also important overstory species. Ironwood (*Carpinus caroliniana*) occurs with many obligate wetland shrubs and herbaceous species in the understory (Rosensteel and Trettin, 1993).

Climate:

The Anderson County Soil Survey (Moneymaker, 1981) reported National Climatic Center 25 year records for Oak Ridge Tennessee. Temperatures in Anderson County are coolest in January with an average daily temperatures ranging between 28° F and 47° F. The average daily maximum temperatures range between 66° F and 87° F in July. The average yearly precipitation is 1400 mm, and 45 percent of this falls during the growing season. Average monthly precipitation is over 125 mm from December until March, between 10 cm and 11 cm April through July, and below 100 mm August through November. Two years in ten, monthly precipitation can be as high as 210 mm, or as low as 75 mm during the winter months. During the summer, the maximum monthly rainfall can be as high as 180 mm or as low as 35 mm. The forest growing season generally begins in March, peaks in July, and ends in October.

Field Installations:

Flumes:

Four trapezoidal flumes (Plastifab Inc. models XL-60-V and 2"-45°-WSC) with stage recorders (Stevens Inc.) and autosamplers (ISCO Inc.) were installed to monitor channel flow and collect water samples (Fig. 11). Three flumes (FLM10L, FLM13, and FLM13A) were placed at the main discharge point of each watershed (Figs. 12, 13, and 14). A forth flume (FLM10U) was installed at the junction between non-wetland and wetland areas within watershed 10. Flumes were positioned in the stream channel and built into the banks using wooden planks, plastic sheeting, and sandbags.

Flume installations were considered temporary and required occasional maintenance. Flumes were leveled intermittently to correct problems caused by freeze/thaw heaving. Heavy rains would also occasionally cause flumes to tilt, or wash out sheet pile and sandbags causing leakage. Leaf litter was cleared from flume mouth and basin at regular intervals.

Overland flow that bypassed the flumes was sometimes observed in channels during high flow rain events. This was minimized by installing sheet pile to redirect flow back into the main channel. Some overland bypass flow was not redirected due to the width of the riparian zone.

Transects:

Fourteen transects (four to six per watershed) extended orthogonally from the stream channel, and were used for hydrologic monitoring across physiographic positions (Fig 15). Nests of shallow PVC wells and solution samplers were installed along each transect.

Figure 11. Trapezoidal flume equipped with Stevens recorder and autosampler.

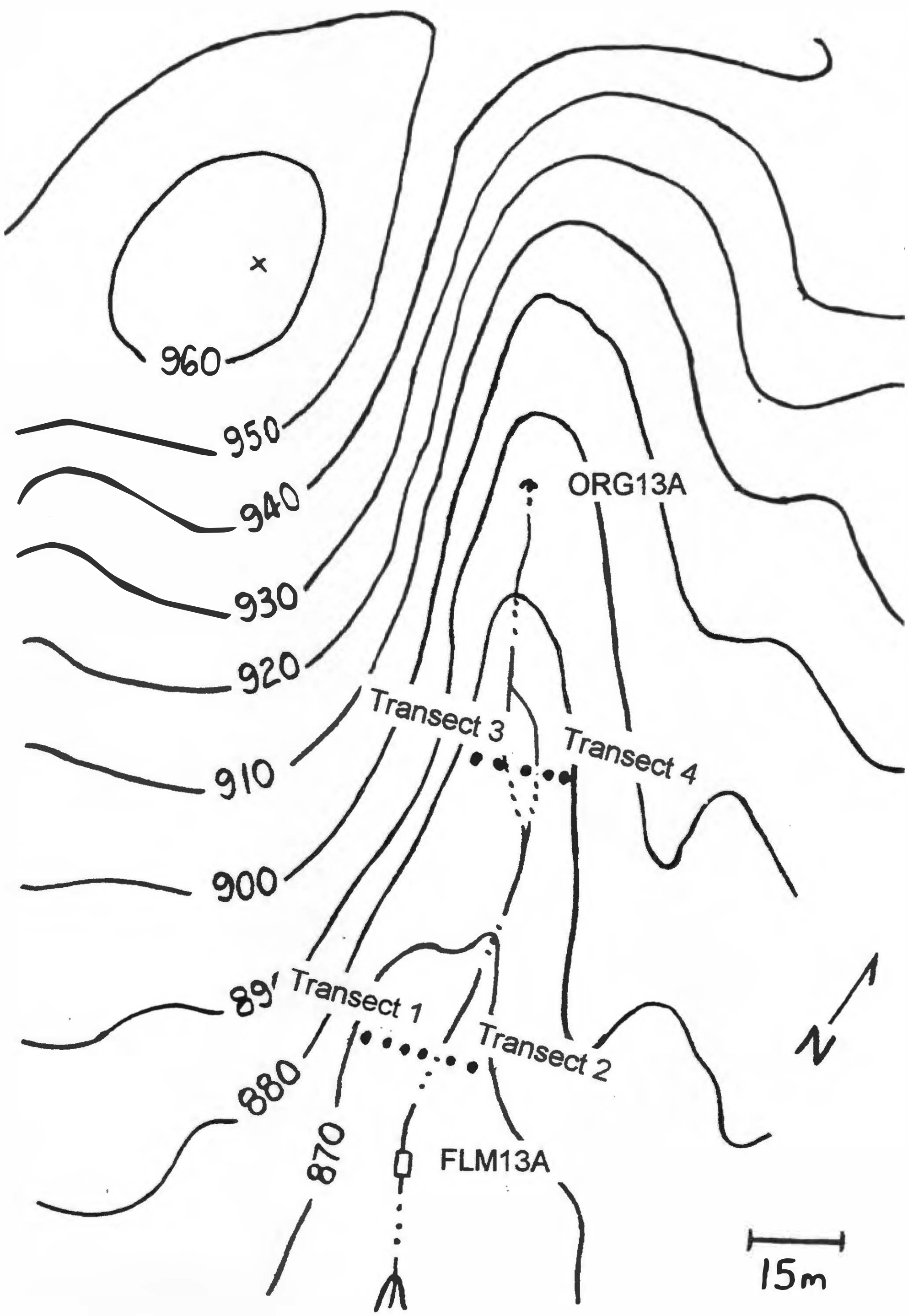

Figure 12. Locations of measurement points in Watershed 13A.

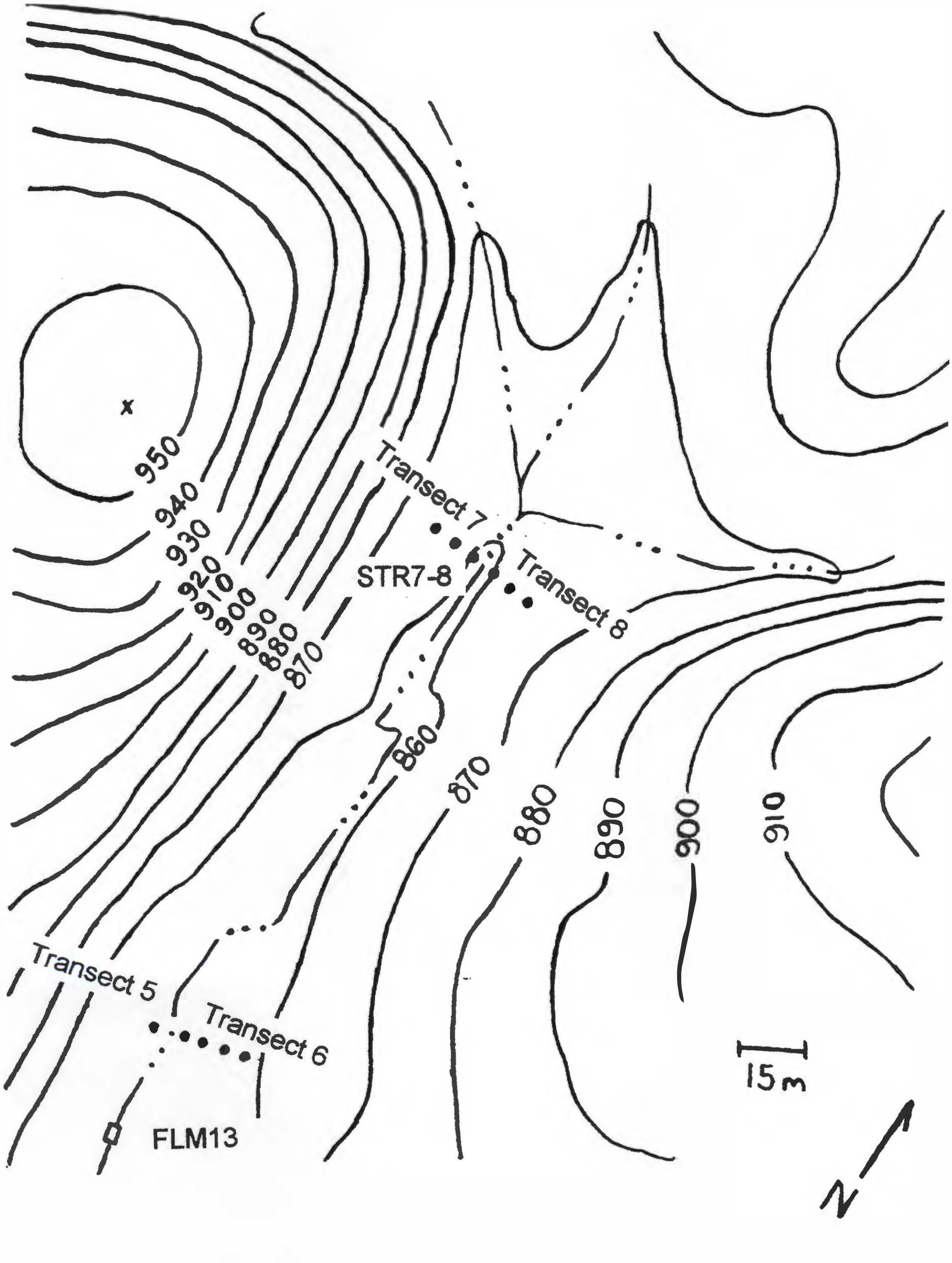

Figure 13. Locations of measurement points in Watershed 13.

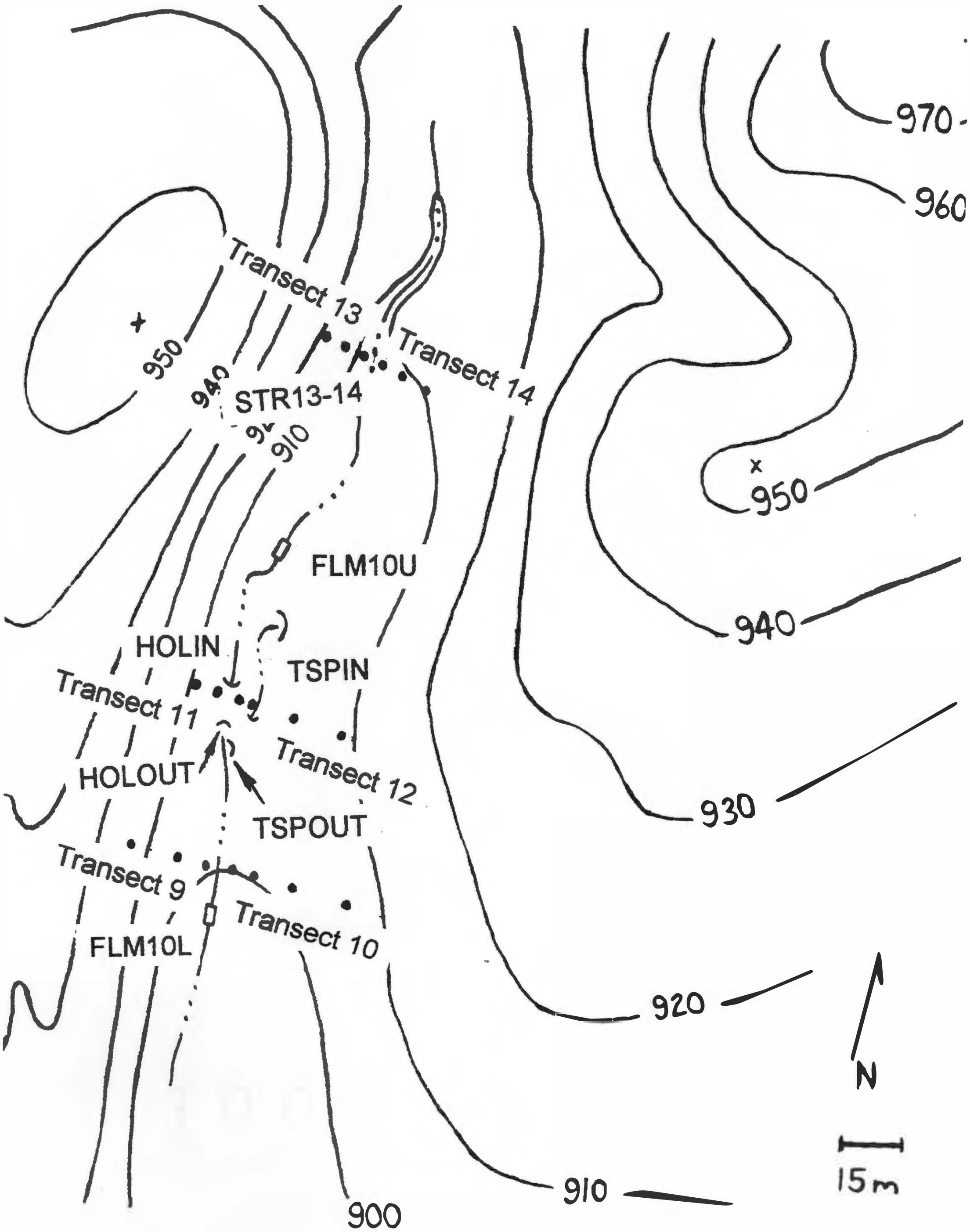

Figure 14. Locations of measurement points in Watershed 10.

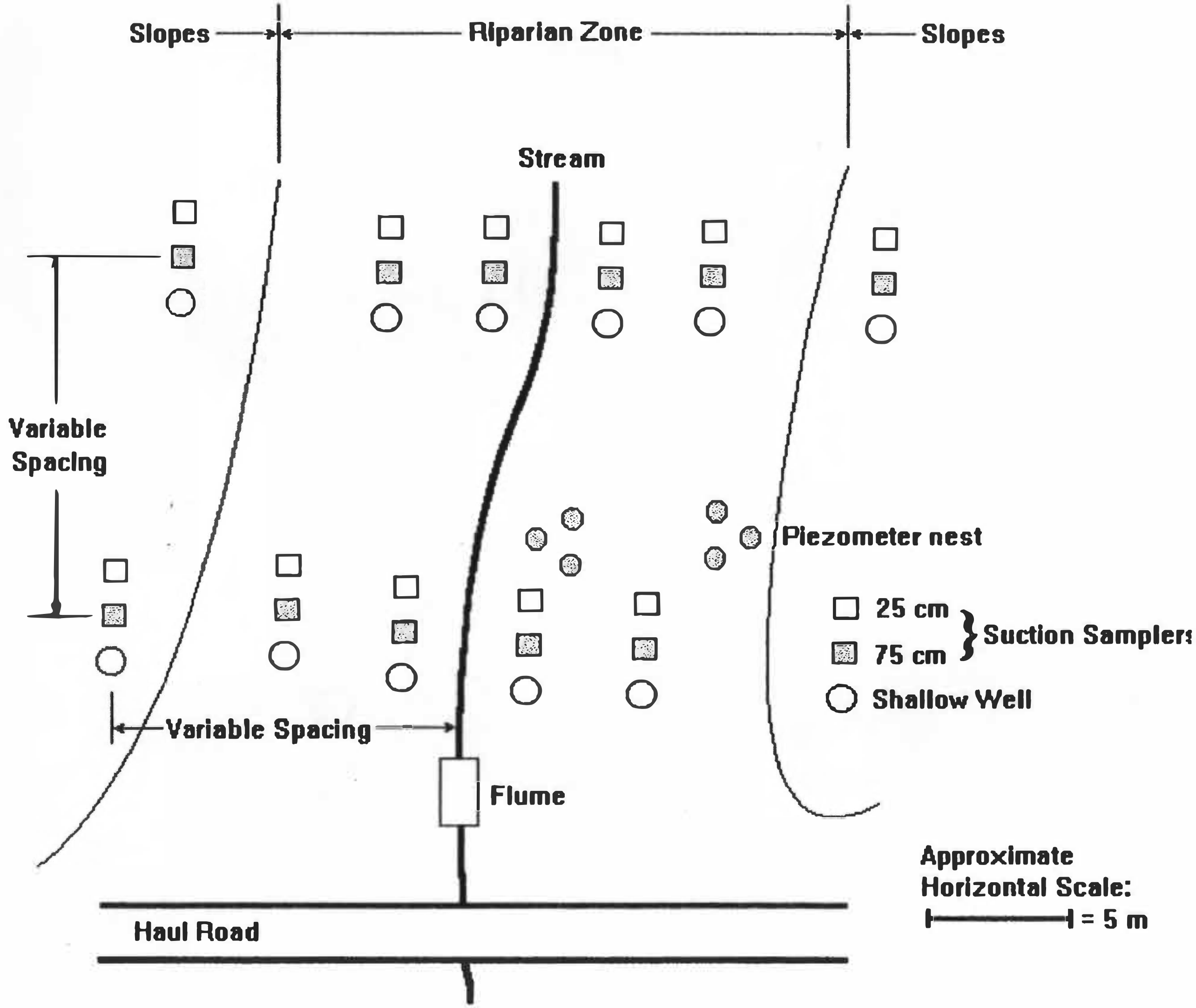

Figure 15. General schematic of instrumentation.

Each nest (1-6 per transect) was installed 1 to 32 meters from the stream channel (Figs. 12, 13, and 14). PVC wells were constructed of one-inch PVC piping slotted over the whole length with a hacksaw at one to two inch intervals. Wells were installed 1.5 m deep or to bedrock in an augured hole. The above ground end was capped. Wells were not screened, and the annulus was sealed with augur spoils tamped around the pipe. Wells were used for water sampling, and to monitor water table elevations. Suction samplers (Soil Moisture Inc.) were installed to depths of 25 and 75 centimeters, and were used to collect soil water samples above the water table. Elevations of all emplacements relative to the flume were determined using a tripod mounted surveying level.

Supplemental Instrumentation:

Piezometer nests were installed to monitor potentiometric surfaces and to evaluate subsurface flow conditions within the large wetland riparian area located in watershed 10. Piezometers were constructed from one-inch diameter PVC. Piezometers in each nest were installed in an augured hole to three depths: deep (98 cm to 134 cm), medium (62 cm to 88 cm), and shallow (40 cm to 58 cm). Deep Piezometers were at or near the contact with bedrock.

An eight-inch diameter PVC well was installed in the wetland area of watershed ten (Fig. 16). This well was slotted using a hacksaw at one to two inch intervals over the entire length. The well was screened with nylon mesh (20 holes per inch) and packed with sand. Sand was packed for approximately the first 30 cm, and the remainder filled with tamped augur spoils. The water table was monitored continuously using a Stevens recorder.

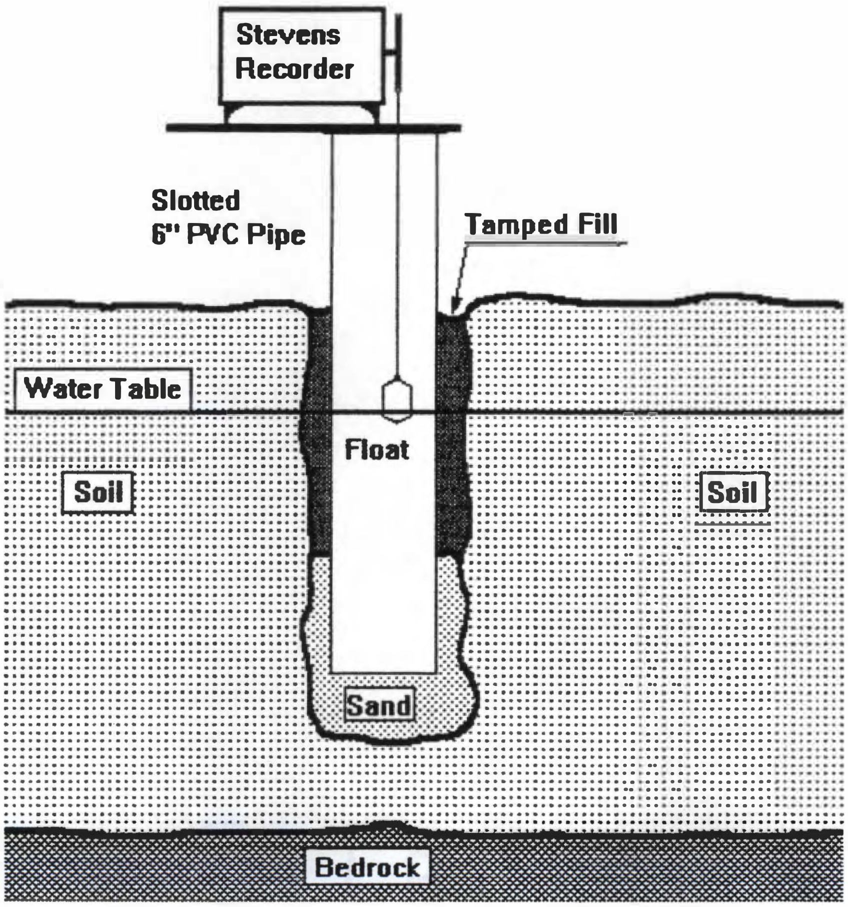

Figure 16. Supplemental well equipped with Stevens recorder.

Sampling Regime:

Water Sampling:

Three types of water sampling occurred between December 1993 and June 1995. Biweekly, 120 ml, grab samples were taken from eleven locations to examine baseflow conditions. Watershed 13A contained two biweekly sample locations: the main discharge point at the flume (FLM13A), and the spring where the stream originates (ORG13A)(Fig. 12). Watershed 13 also contained two of the eleven sample locations: the main discharge point at the flume (FLM13), and the point where the upper transect crossed the stream (STR7-8)(Fig. 13). Insurgence (points where the stream entered an underground channel) and resurgence (points where the stream exited an underground channel) were found within watershed 10. The remaining locations for biweekly sampling were contained in this watershed: the main discharge point at the flume (FLM10L), two insurgence points, and their corresponding resurgence points (HOLIN, HOLOUT, TSPIN, and TSPOUT), the flume at the junction between the delineated wetland and non-wetland areas (FLM10U), and the point where the upper transect crossed the stream (STR13-14)(Fig. 14).

Intensive transect sampling was the second type of water sample collection. This occurred approximately once a month to examine differences in water chemistry across physiographic positions. Two to three days before sampling, suction samplers were inspected for debris or water and a 60-70 centibar suction applied. Samplers were not tensioned where the ceramic cup extended below the water table. After two days, water samples were drawn by peristalic pump from shallow wells and suction samplers. All sampling devices were purged long enough to clear the pump of remaining water from the previous device.

Flume sampling during selected storm events was the third type of sampling undertaken. For the rain events analyzed ISCO autosamplers were programmed to collect one sample every two hours (multiplexed one sample per hour, two samples per bottle).

Flow Data:

Stage charts from Stevens recorders were collected every two weeks. Stage recorders were set on a 16-day resolution with one inch along the horizontal axis on the chart equaling two days. The vertical axis measured stream depth at the flume at a 1:1 ratio. Stage readings were transferred from the charts into a computer file using a digitizer. The digitizing software (DIGLOG) allowed a measurement resolution of one hour, as compared to a four-hour resolution by eye. Within each chart, timing discrepancies tended to occur during the digitizing process. These discrepancies consisted of a shortfall of data points for the measurement period. Any chart displaying a time discrepancy greater than one percent from the digitized data set was redigitized. Timing errors were distributed evenly within each individual chart data set.

Digitized data sets were compiled into flume records for the duration of the study period. Stream depths were converted to flow rate (L s^{-1}) using regression formulae provided by the manufacturer for the individual flumes. Flow rates were normalized by dividing the watershed area (ha) to allow comparison between the experimental sites. Hydrographs were separated using an assumed increase in baseflow for each of the events (Hewlett, 1982)

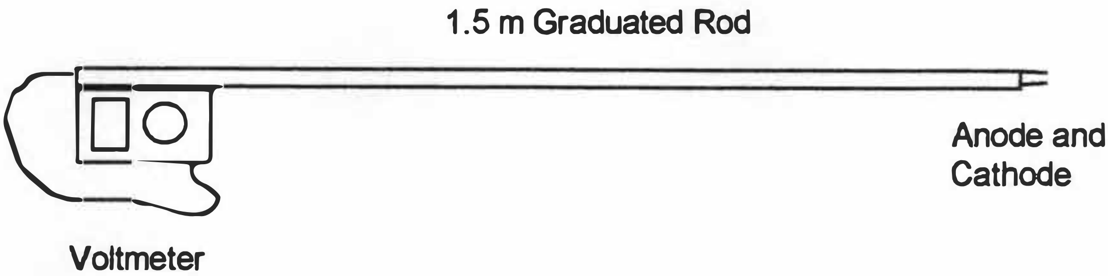

Figure 17. Well measurement device.

Water Table and Piezometer Monitoring:

Water levels were measured in shallow wells and piezometers during intensive transect sampling (approximately one month intervals). Depth to water table was determined using a voltmeter and graduated rod (Fig. 17). A cathode and anode were attached to the end of the rod and wired to a voltmeter. The device indicated contact with the water table by a change in voltage, and the level on the rod was recorded. Water levels were converted to elevations relative to the watershed outflow point (FLM13A, FLM13, and FLM10L).

A large PVC well located in watershed 10 was equipped with a Stevens recorder and produced charts similar to those for the flumes. A continuous record of water table levels was maintained in the wetland area of watershed 10. Water levels on charts were digitized in the same fashion as the stage charts from the flumes.

Sample Processing:

Blind chemical standards were included with the field samples at a rate of eight to ten percent. Upon removal from the field, pH was measured directly using a Ross combination electrode (model 815600) on various pH meters (commonly an Orion model SA250). Water samples were filtered through glass fiber filters (Gelham type A/E) on a vacuum filtration apparatus, and subsampled into required volumes for various chemical analyses, and stored in a refrigerator at 7° C until measurements were made.

Dissolved organic carbon (DOC) was determined on a low temperature carbon analyzer (Dohrman DC-80). Approximately 25 ml (18x150 pyrex glass test tubes) was required to determine DOC content. Test tube racks were wrapped in cellophane and aluminum foil to prevent evaporation and protect from direct light.

Solute concentrations of Ca, Fe, Mg, Mn, S and Si were determined by plasma atomic emission spectrometer (ICP, Thermo Jarrel Ash ICAP 61®). Approximately 15 ml (16x100 pyrex glass test tubes) was required to determine cation concentrations. Test tube racks were wrapped in cellophane and stored in a refrigerator until analysis. One drop of concentrated nitric acid was added to each test tube to inhibit precipitates forming during storage.

Anion concentrations (F, Cl, and SO_4) were determined using ion chromatography (Dionex IONPAC AS4A-SC). Approximately 15 ml (16x100 pyrex glass test tubes) was required for this analysis. Test tube racks were wrapped in cellophane and stored at 7°C until analysis.

Total nitrogen was determined using a persulphate digestion technique (Ameel *et al.*, 1993) which converted organic and inorganic nitrogen to NO_3^{-1}. Fifteen milliliters of sample was required for this method. After digestion samples were refrigerated and analyzed within 2 weeks. Total nitrogen and NH_4-nitrogen concentrations were determined on an inorganic nitrogen analyzer (Alltech model 380).

Statistical Analyses:

Differences between measurements obtained for different watershed and physiographic positions at baseflow were analyzed using the general linear model procedure (SAS Inc. 1995)(alpha = 5%). Components of the model included season, watershed, position, aspect, and sample type. All combinations of the model components were tested for significant interactions. Models of particular interest in this study included those for dissolved organic carbon, calcium, magnesium, and total nitrogen for the interactions of season by position, season by sample type, and season by position by sample type.

Seasons were differentiated by rain events and growing season on the stage charts provided for each flume. Winter, in this case, commonly began in late November to early December with the onset of the rainy season. Spring began in middle to late March when evapotranspiration began to cause a daily fluctuation in flow, but rains continued to keep stream levels relatively high. Summer began in early to middle June as the stream levels fell off due to less rain and high evapotranspiration. Fall began with the senescence of leaves marking the end of evapotranspiration, and low stream flow which lasted until the winter rains recharged the soil.

Three general distinctions in physiographic positions (landscape types) were chosen for any water sample collected. The classification wetland (WL) was for water samples collected within the boundary of an area delineated as wetland based on the 1987 COE manual. The bottomland (BL) classification were samples collected within riparian zones that did not qualify as wetland. Upland (UL) samples were collected from any point outside of the riparian zone.

Aspect was a distinction based on transect instruments being placed on East (E) or West (W) facing hillslopes. The term "S" was assigned to any samples collected from the stream channel.

Sample types were designated based on where and how the water sample was taken. Samples that were taken from transect sampling nests received the designations "W" for wells, "L2" for 25 centimeter suction samplers, and "L7" for 75 centimeter suction samplers. Samples designated FLM10L, FLM10U, FLM13, or FLM13A were grab samples taken at the flumes. Open channel samples received the designation "STR" for stream samples. Other samples of interest were the insurgence and resurgence sample pairs which received the designations "HOLIN" or "HOLOUT", and "TSPIN" or "TSPOUT."

CHAPTER III

RESULTS AND DISCUSSION

Transect Hydrology:

Water Tables:

Low soil chroma, gleying, and depth to mottling in the soil profile were the primary delineators for distinguishing between wetland and non-wetland areas on the watersheds. The water table level was the controlling factor for the formation of hydric soil properties.

Diurnal changes in water table elevations as a result of evapotranspiration or atmospheric pressure can cause changes in stream flow. The dynamic nature of the water table profiles suggested that water tables measured at discrete times should be interpreted as "snapshots."

Cross sections of water table elevations for watershed 13A recorded 20 meters upstream from FLM13A at transects one and two on five measurement dates are illustrated in Fig. 18. Water tables in the wetland bottom were relatively level, and ranged from less than 20 cm to approximately 50 cm below the surface. Water tables on the upland slopes ranged from 80 to greater than 150 cm below the surface. October 1993 marked the end of a drought season for the region and the lowest recorded water tables for the measurement period. Water tables during February 1994 and an April 1994 rain event corresponded with an above average rainfall for the region. Measurements from October 1994, and February 1995 were included as comparable dates within the measurement period. It was assumed that the stream was not perched above the water table because of the shallow, highly porous soils. Data points at the

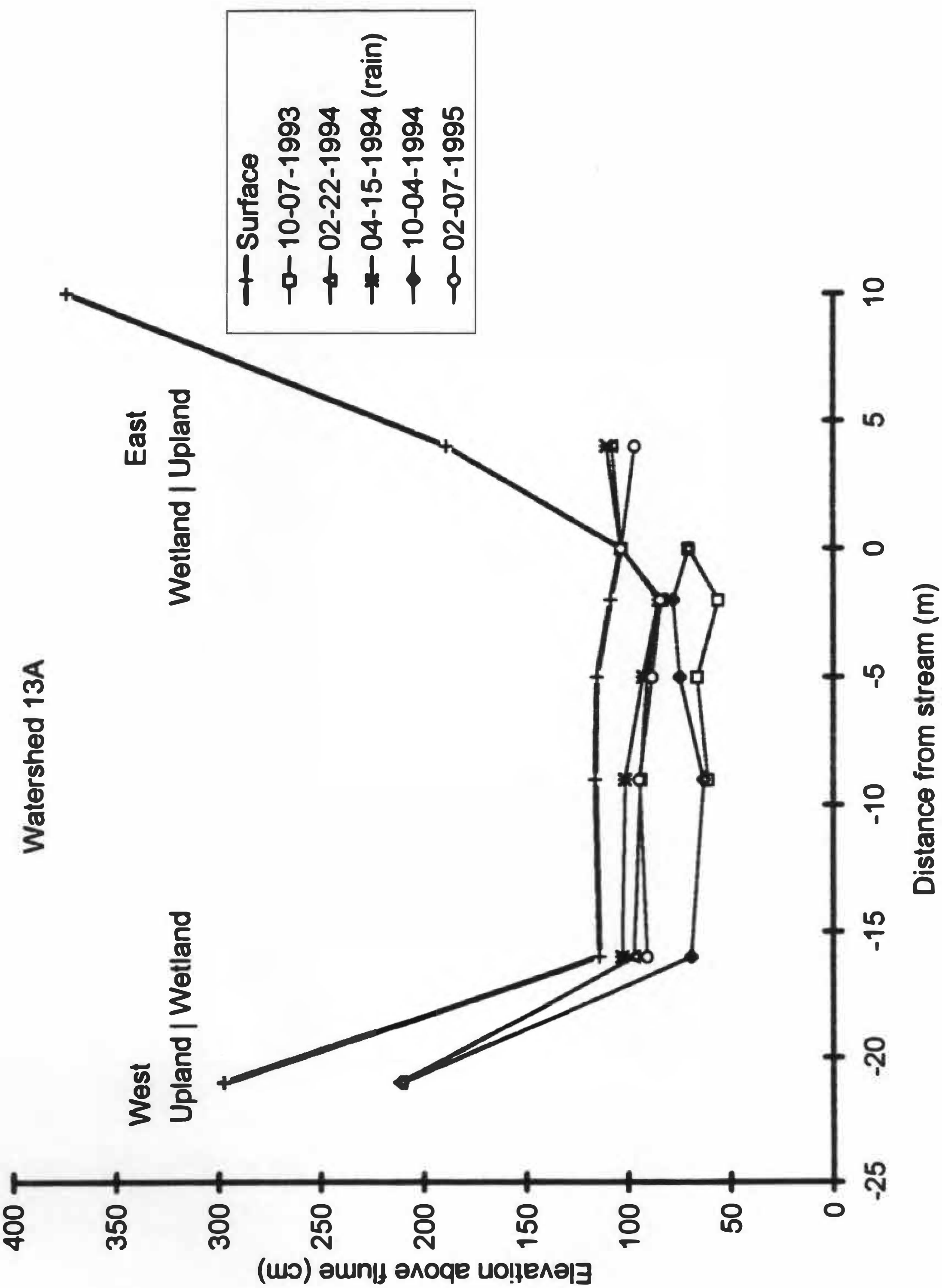

Figure 18. Water table elevations above flume at transects 1 and 2 for five measurement dates.

stream location indicate stream depth. In the case where the stream was dry and the measure indicates a level below the soil was inferred by a pool approximately one meter downstream of the transect. A key feature of this cross section was the elevation of the flowing channel in relation to the water table. During the wet season, the main channel flow was above the surrounding water table. This condition suggests that the water table was being fed by the stream, and implies that physiographic position processes on stream hydrology and chemistry were minimized. Water tables on the upland positions were higher than the wetland area and supports the inference that subsurface flow from hillslopes is a source for the riparian bottoms. During drought conditions the streambed was dry, and water table depths below the streambed were not determined.

The water table elevations recorded for transects three and four 75 m upstream from FLM13A ranged from just below the surface to almost a meter deep (Fig. 19). On the upland portion of the transects, the water table was never less than a meter below the surface. A number of seeps are also located along the western side slope which feed into the stream. The elevated water tables may also have influenced the seeps along the slope edge, and is a condition similar to those seen on other sites (Winter, 1988). Like the first transect pair, another feature of transects three and four showed the stream channel to be elevated above portions of the water table. Water table elevations were considerably lower on the east side of the main channel. This further suggests that the hydrologic interaction was from the stream into the profile on the East side, but from the soil to stream on the West side during wet (high

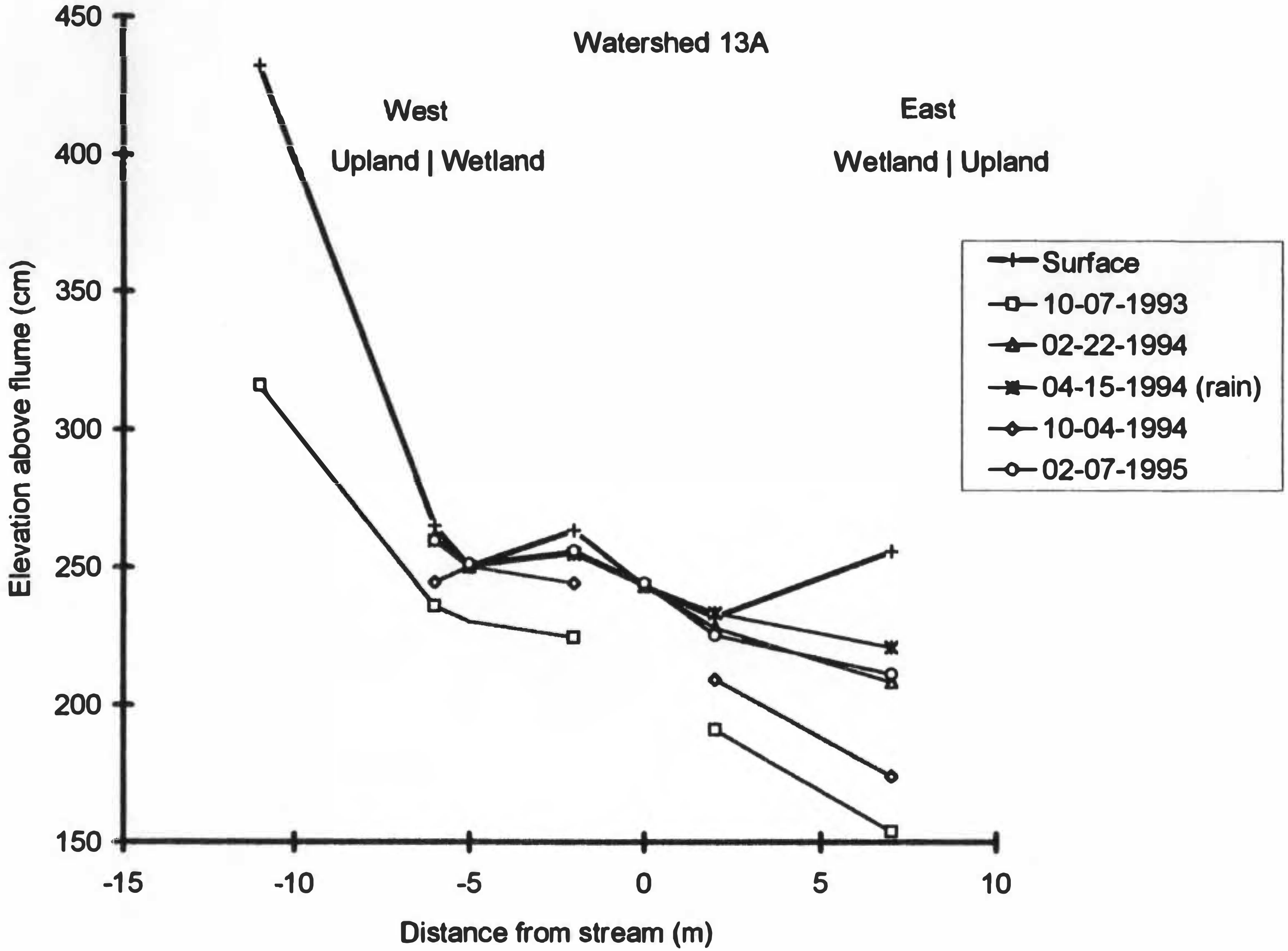

Figure 19. Water table elevations above flume at transects 3 and 4 for five measurement dates.

water table) periods. Another key feature of this transect pair was a change in position of the main channel during the period of study. During the study period, the stream channel moved after a large 1993 storm event to a position five meters west of its former position. The microtopography at this new location was the main factor controlling channel position. Surface features such as coarse woody debris tended to direct the streams course. These features were altered during rain events where stream flow was sufficient to move these debris.

Water table depths at transects five and six within the non-wetland bottom of watershed 13 ranged from approximately 30 cm to 70 cm, 30 m upstream of FLM13 (Fig. 20). The upland portions of the transect pair had water tables ranging from approximately 40 cm to greater than 150 cm depth. The key features of this transect pair were the deeply incised stream channel, the upward sloping water tables, and a more pronounced hydraulic gradient toward the stream during the wetter seasons and rain events. Thus, uplands positions should have had a more direct impact on stream hydrology and chemistry at this point in the watershed due to the hydraulic gradient towards the stream.

Cross sections of transects seven and eight within the non-wetland bottom indicate water table depths less than 20 cm to approximately 100 cm below the surface 150 m upstream of FLM13 (Fig. 21). On the upland positions, the water tables ranged from 75 to greater than 150 cm. This transect pair had features similar to those of transects five and six. The channel was deeply incised, and there was an upward sloping water table on the hillslopes. The one exception occurred on October 1993 with a water table that likely had little effect on stream hydrology and

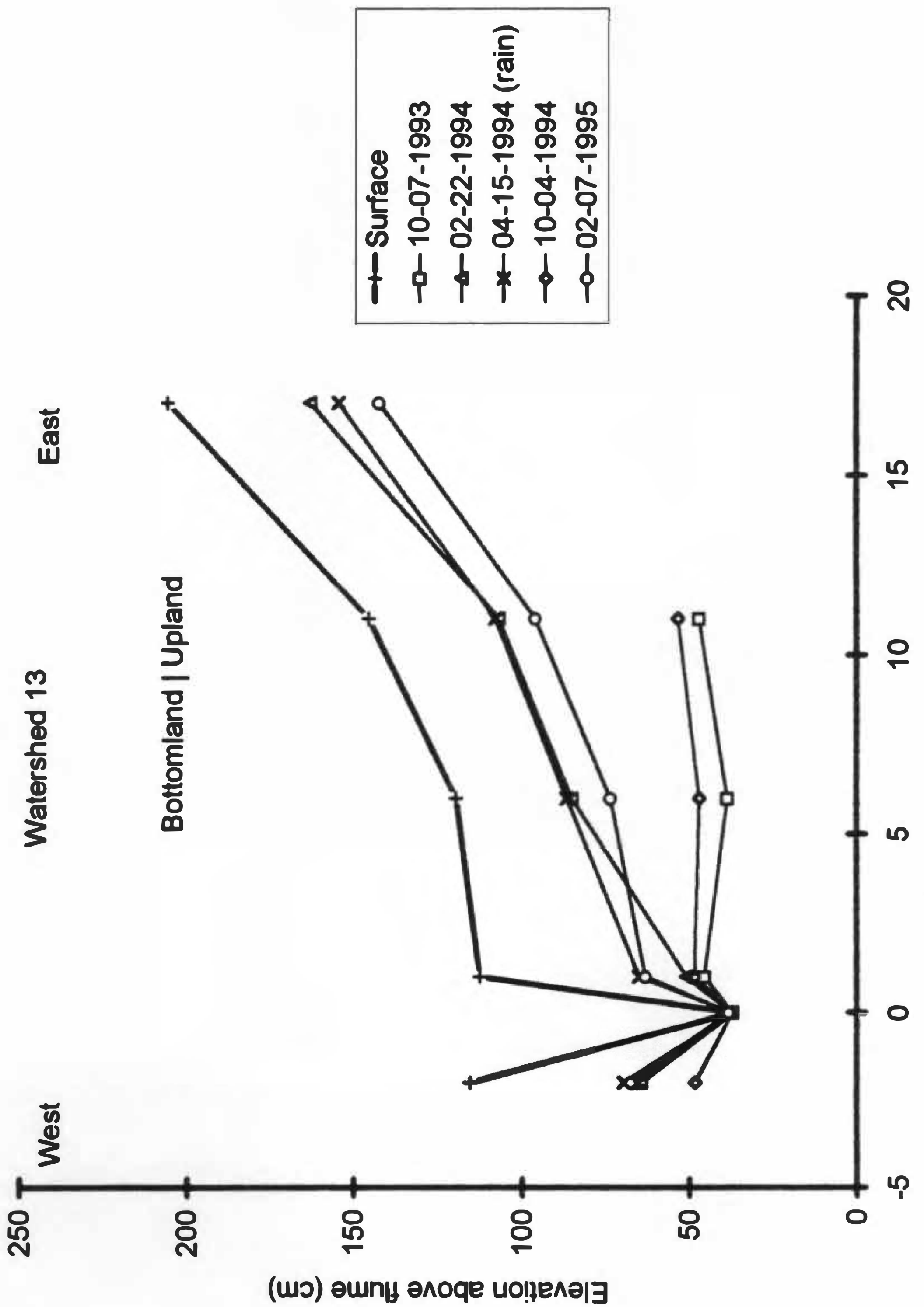

Figure 20. Water table elevations above flume at transects 5 and 6 for five measurement dates.

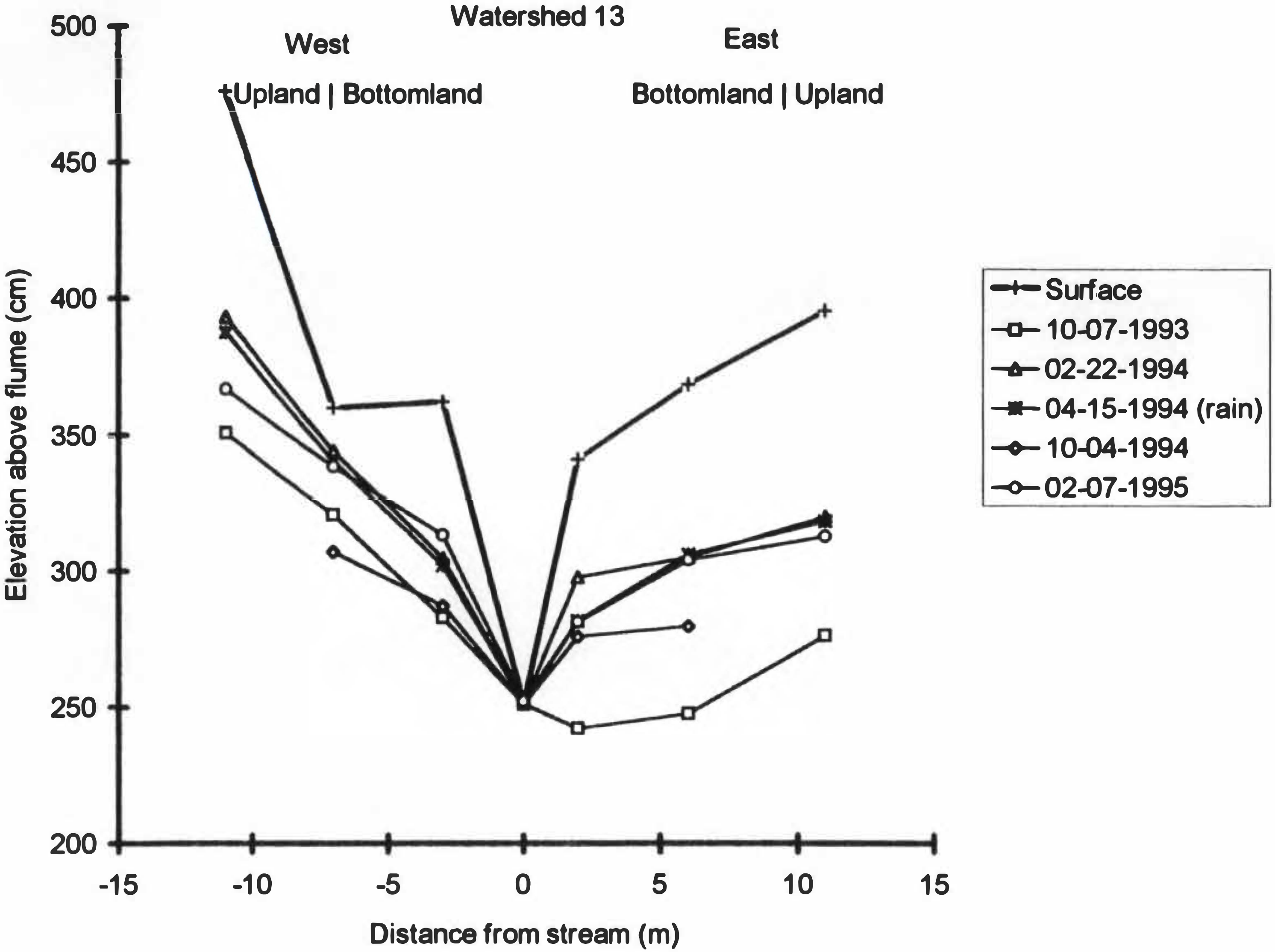

Figure 21. Water table elevations above flume at transects 7 and 8 for five measurement dates.

chemistry suggested by the hydraulic gradient. However, this condition was not present at a comparable time in the following year.

Water tables across the wetland bottom at transects nine and ten in watershed 10 were continually within 30 cm of the surface (Fig. 22). These transects intersected the channel 5 m upstream of FLM10L. On the upland positions, water tables ranged from approximately 20 cm to over 120 cm below the surface. This cross section indicated that stream was more influenced by the physiographic position during high water table conditions. This transect pair was also marked by the presence of a shallow pool which appeared as a deep incision on the cross section of the soil surface. The pool had a similar incision as those of non-wetland transects. However, the bottom of this incision was at a lower elevation than the outflow point at the flume.

Forty-five meters upstream of FLM10L, water tables within the wetland transects 11 and 12 ranged from less than 10 cm to approximately 70 cm below the surface (Fig. 23). The upland positions ranged between 50 to over 150 cm on the eastern hillslope. Water tables were never detected on the western hillslope. A key feature of this transect pair was two stream insurgences. The main flow of the stream at this point followed an underground channel formed under a root ball of a tree throw. The insurgence for a second minor channel was in close proximity originating from a nearby spring (TSPIN).

Water tables on transects 13 and 14, which corresponded to a non-wetland area in watershed 10, ranged from 50 cm to greater than 120 cm below the surface. This transect pair was located 40 m upstream of FLM10U. The upland positions of this transect pair showed water tables

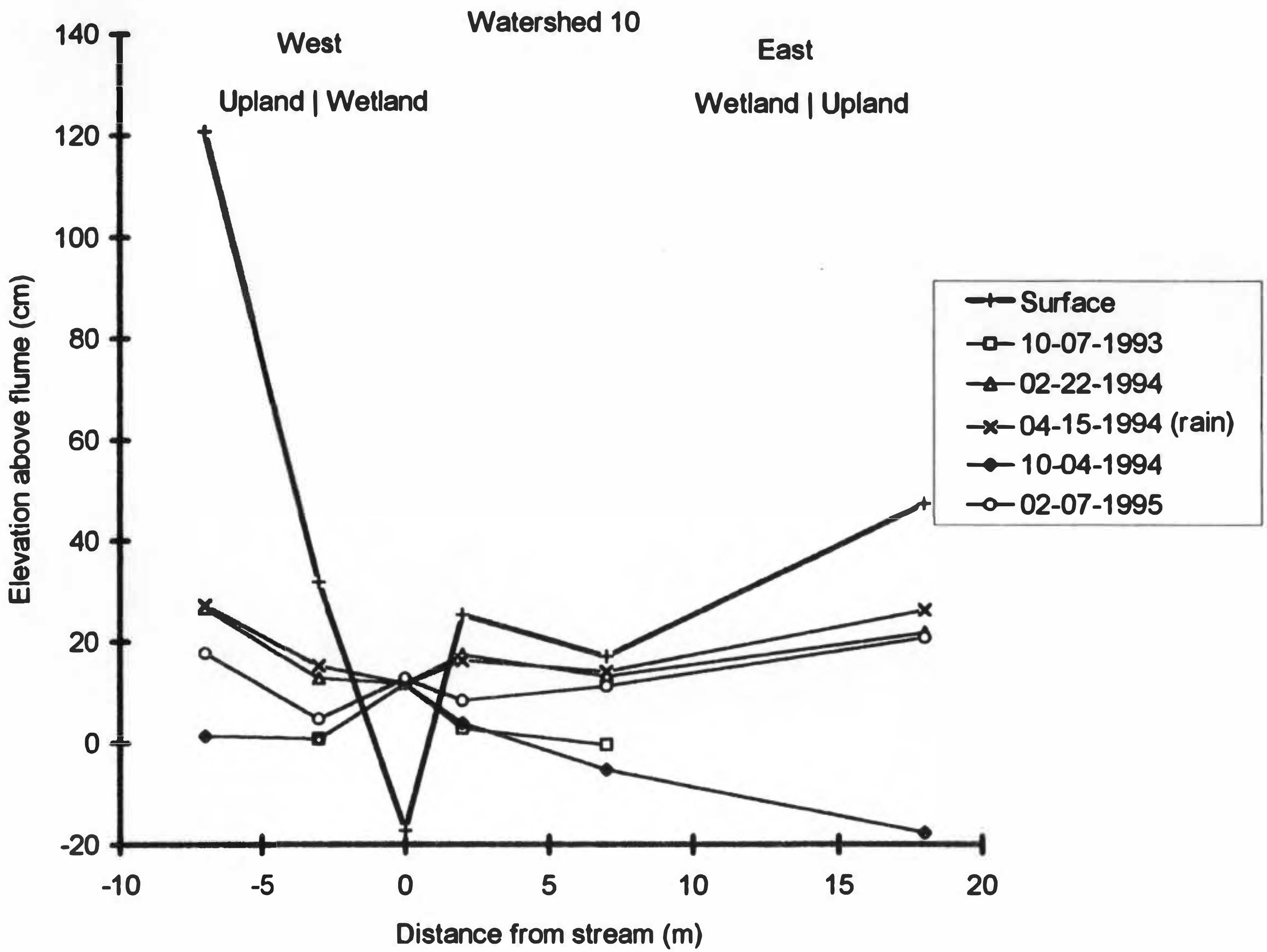

Figure 22. Water table elevations above flume at transects 9 and 10 for five measurement dates.

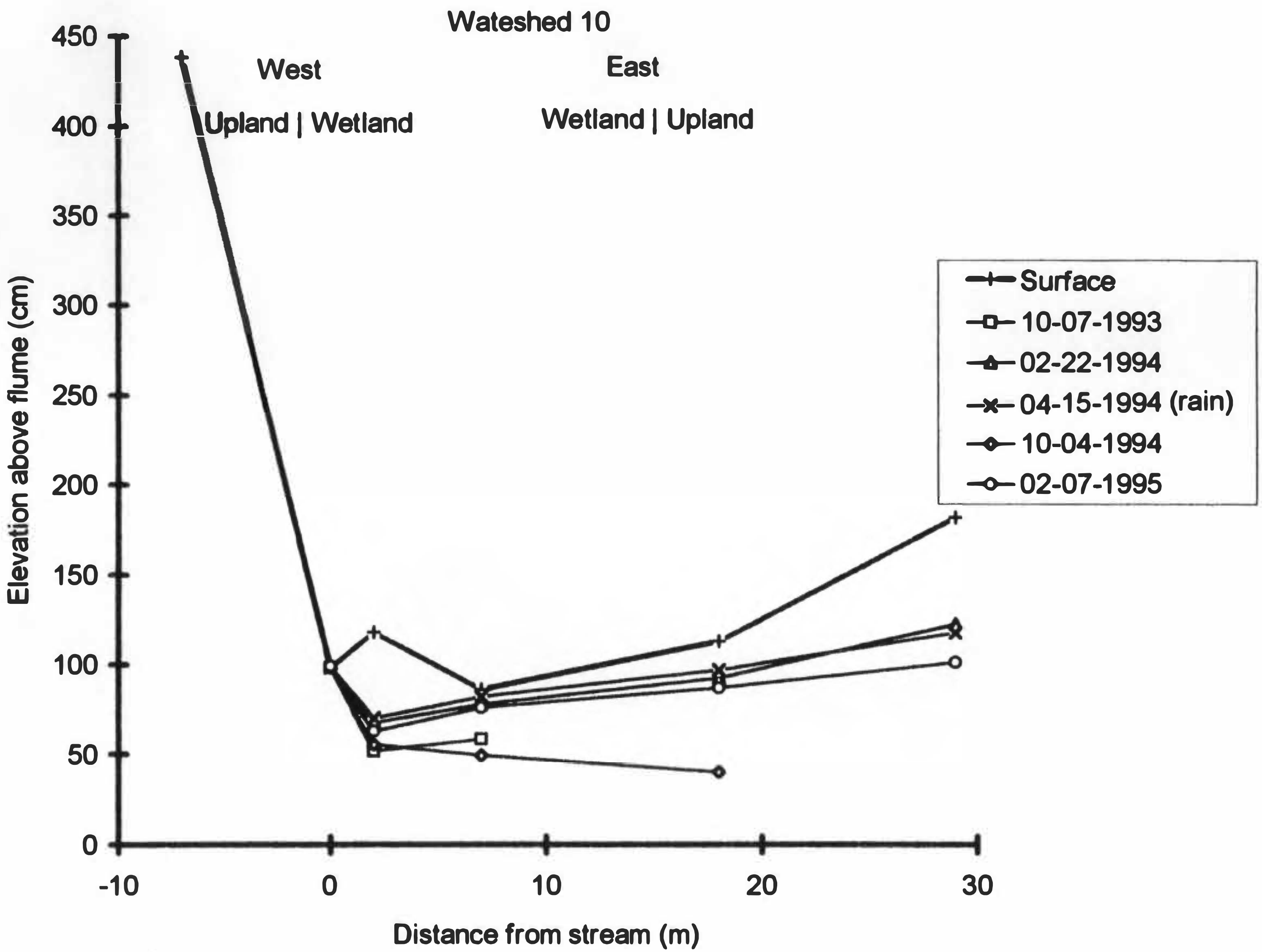

Figure 23. Water table elevations above flume at transects 11 and 12 for five measurement dates.

no closer than 100 cm from the surface (Fig. 24). Like the other non-wetland transects, this stream section was contained in a deeply incised channel. The key feature of this transect pair was the presence of water tables below the stream elevation within a few meters of the stream. At points greater than 5 m from the stream the water table generally sloped upward with the hillslope. In this case, the elevation of the stream above the water table was not as pronounced as in the wetland transects with the exception of the October 1993 measurement.

Water Table Summary:

Water tables on wetland and non-wetland transects showed distinguishing features across physiographic positions and corresponded to the wet and dry seasons. Winter and spring baseflow conditions, as well as rain events, produced elevated water tables, while summer and fall conditions resulted in lower levels. Water tables elevations on these sites were seasonally and diurnally dynamic ranging between 5 cm above and 35 cm below the surface at one point in watershed 10 between winter and summer months of 1995 (Fig. 25). Diurnal fluctuations changed the water table as much as 5 cm in June, 1995. These fluctuations were probably the effect of rainfall, evapotranspiration, and changes in atmospheric pressure.

Non-wetland transects had deeper, more sloping water tables, and deeply incised stream channels. Thus, the hydraulic gradient in non-wetland transect pairs were more likely to have conditions where groundwater was influencing stream hydrology and chemistry. Water tables crossing wetland transects were typified as shallow and nearly level. Wetland areas had shallow stream channels, and were more prone

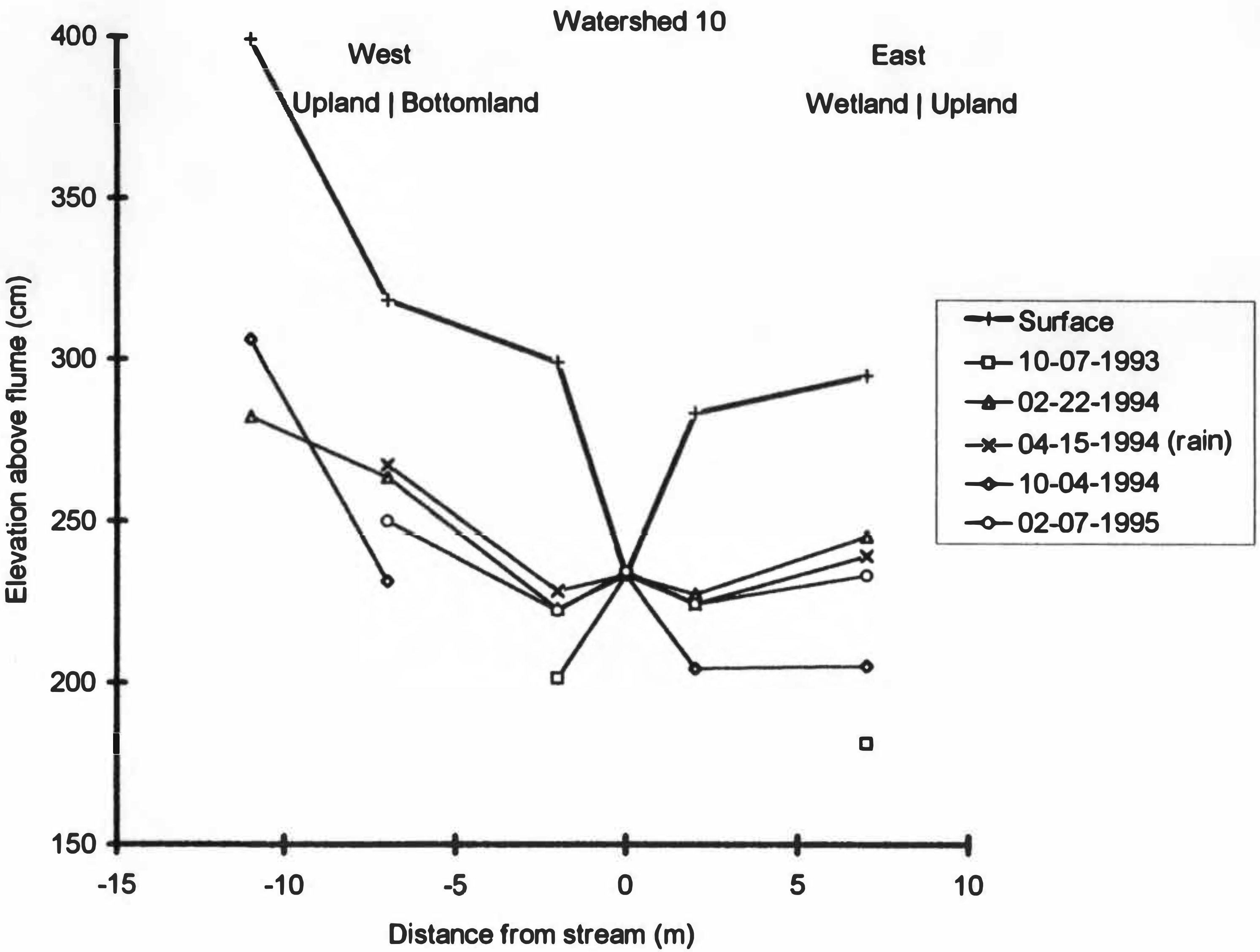

Figure 24. Water table elevations above flume at transects 13 and 14 for five measurement dates.

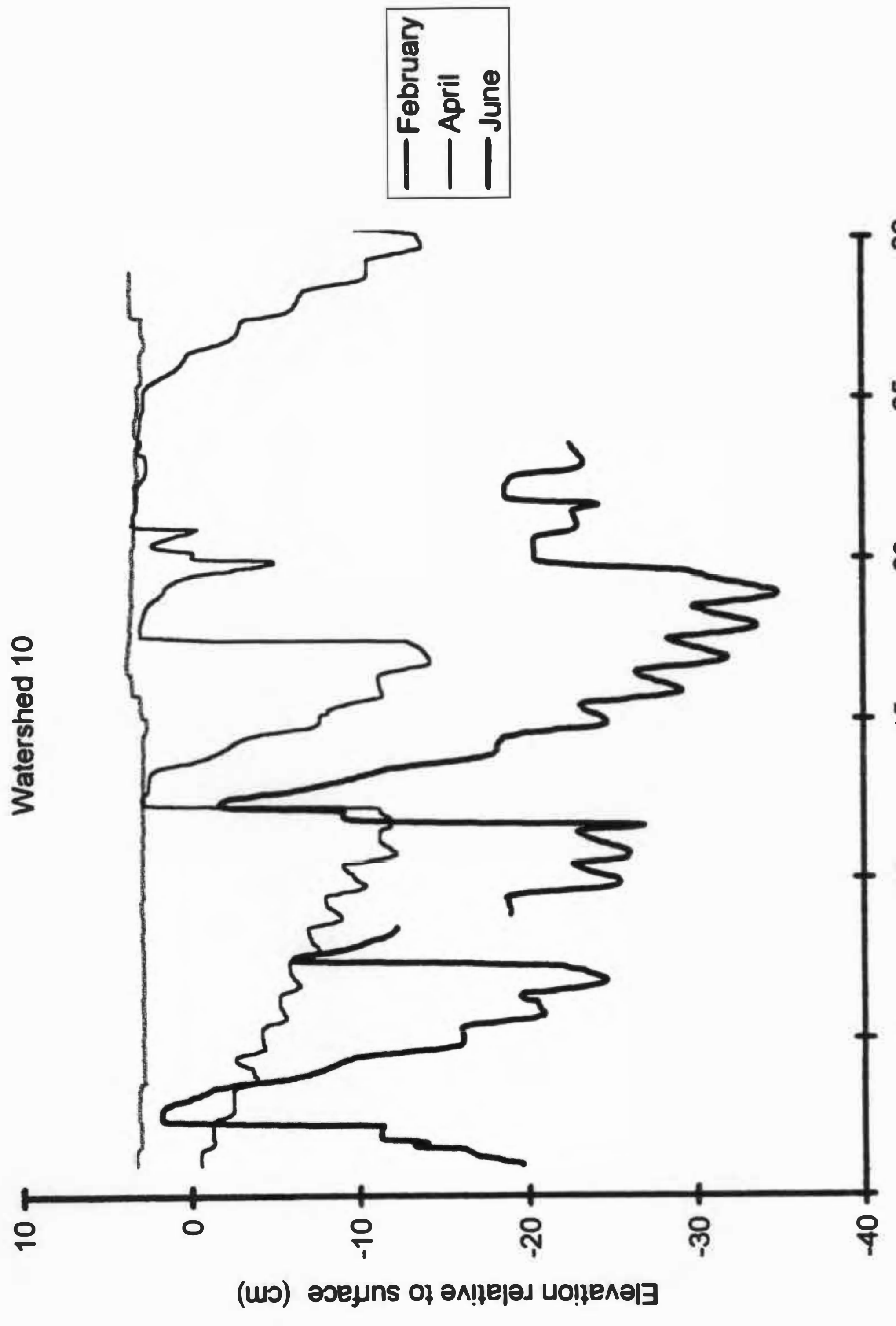

Figure 25. Water table fluctuations at the supplemental well in watershed 10 during February, April, and June 1995.

to widespread flooding across the whole bottom. Water table profiles also indicated that subsurface flow occurring parallel to the stream through the whole cross section was probably an important, yet unmeasured, component of the water leaving each watershed. Water tables on wetland transects indicated a substantial gradient from the hillslopes into the riparian area, but did not extend to the stream. Wetland transects generally indicated that stream hydrology and chemistry at these points was probably marginally affected by groundwater from the adjacent physiographic positions. Water tables were dynamic, and warrant continuous monitoring to make a more intensive study of their function.

Hydraulic Heads:

Piezometer data from the wetland transects of watershed 10 show the difficulties in describing the hydrologic conditions of these sites. Piezometer nests 10-2 (transect 10, 2 m from stream) and 10-16 (transect 10, 16 m from stream) showed hydraulic heads that suggested an upward movement of groundwater from the bedrock into the soil profile (Figs. 26 and 27). Upward movement was more limited within the soil profile. The high hydraulic heads at the deep piezometers may also suggest a lateral component to water movement at the bedrock-soil contact. Present instrumentation was not adequate to fully quantify the three dimensional hydraulic head distribution. Changes in hydraulic head did not seem to be directly affected by seasonal changes, however, heads may be more directly influenced by antecedent moisture conditions.

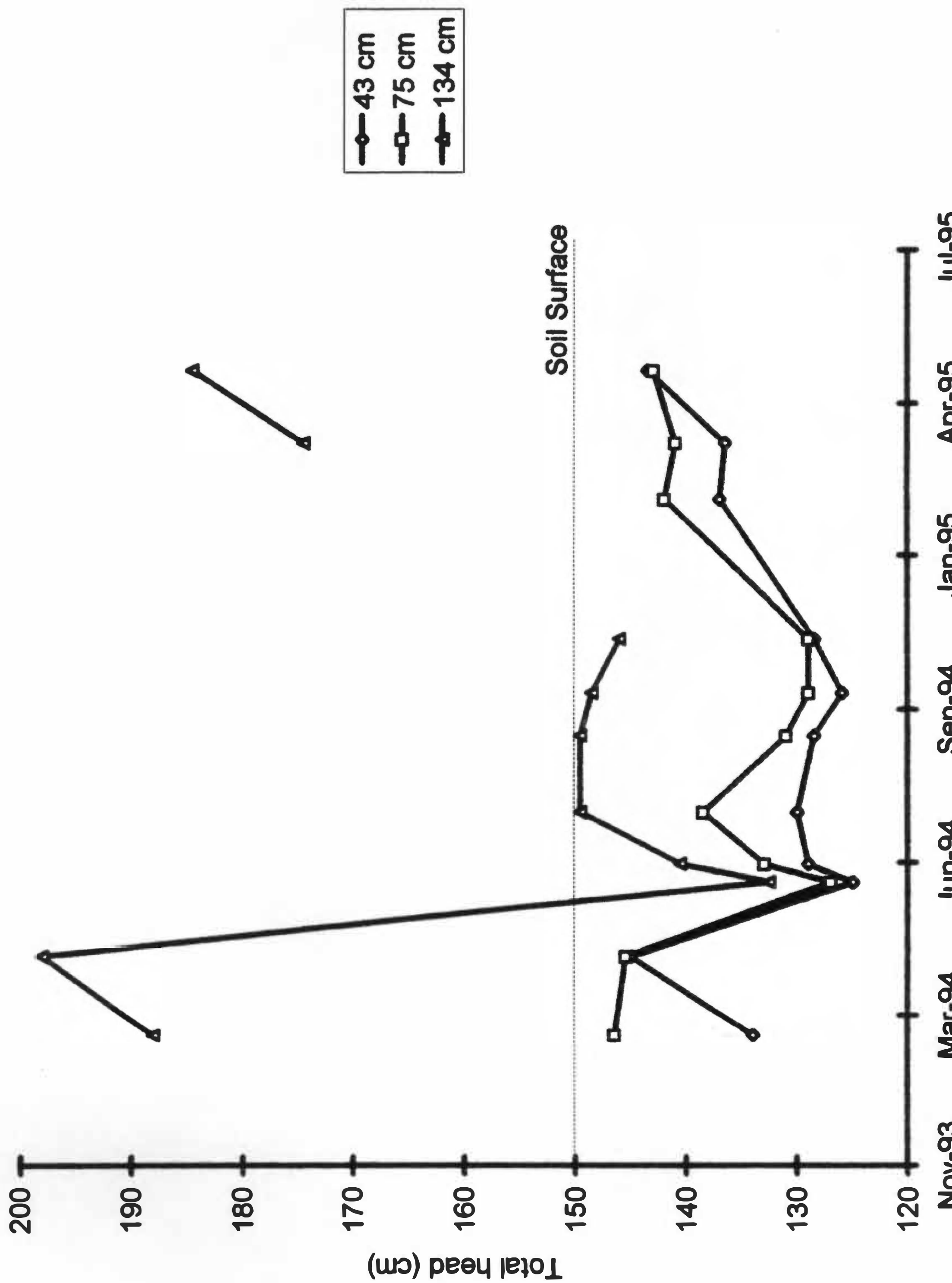

Figure 26. Total heads at piezometer nest 10-2 during the monitoring period.

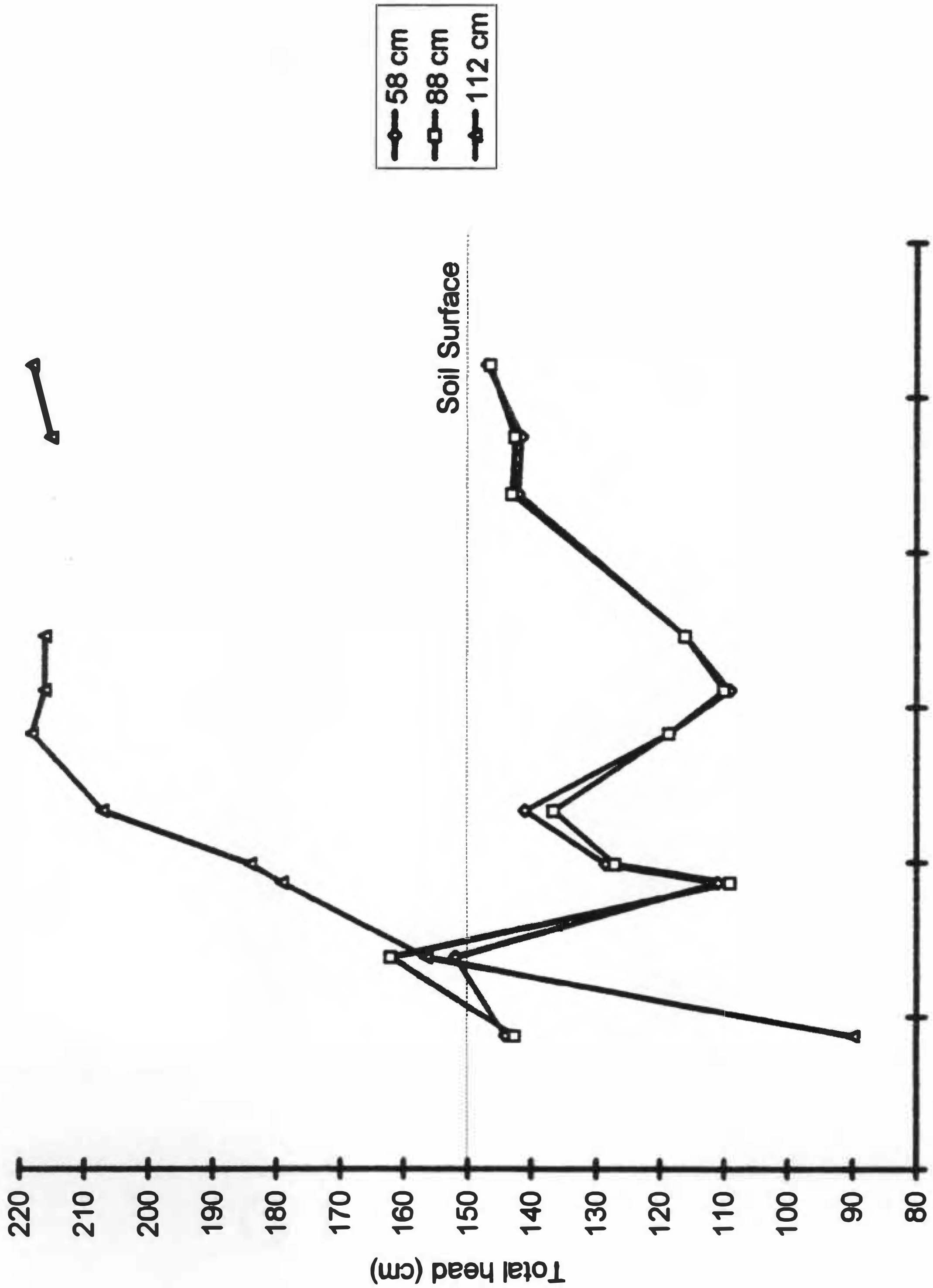

Figure 27. Total heads at piezometer nest 10-16 during the monitoring period.

Two positions on transect 12 (2 m and 18 m from stream) indicated higher hydraulic heads at the middle depths within this profile (Figs. 28 and 29). This may indicate contact with a highly active portion of the profile where preferential pathways are controlling subsurface flow. Lateral flow was observed to occur out of certain horizons into soil pits in the wetland bottom. Along with the corresponding water table profiles of transects 10 and 12, the piezometer data further illustrate the importance of subsurface flow for the transport of water through these sites. More intensive instrumentation would be required to properly characterize such processes.

Transect Water Chemistry:

Calcium:

The five component model (Season, Position, Aspect, Watershed, Sample Type) explained 71% of the variance observed in calcium concentrations (Table 2). The Season by Position by Type interaction had a significance of 0.12 Probability > F. Wetland calcium concentrations averaged about 14 mg L^{-1} during the winter months, and increased to 20 to 25 mg L^{-1} during the other seasons (Fig. 30). These concentrations were 30 to 100 percent larger than those taken from non-wetland bottomland sites in winter and spring, but relatively similar to the summer bottomland concentrations. It was a possibility that these physiographic positions were behaving more similarly during drier The lower concentrations of calcium during the winter months for wetlands and bottomlands was probably a dilution effect due to the wetter conditions. Calcium concentrations in these positions doubled from

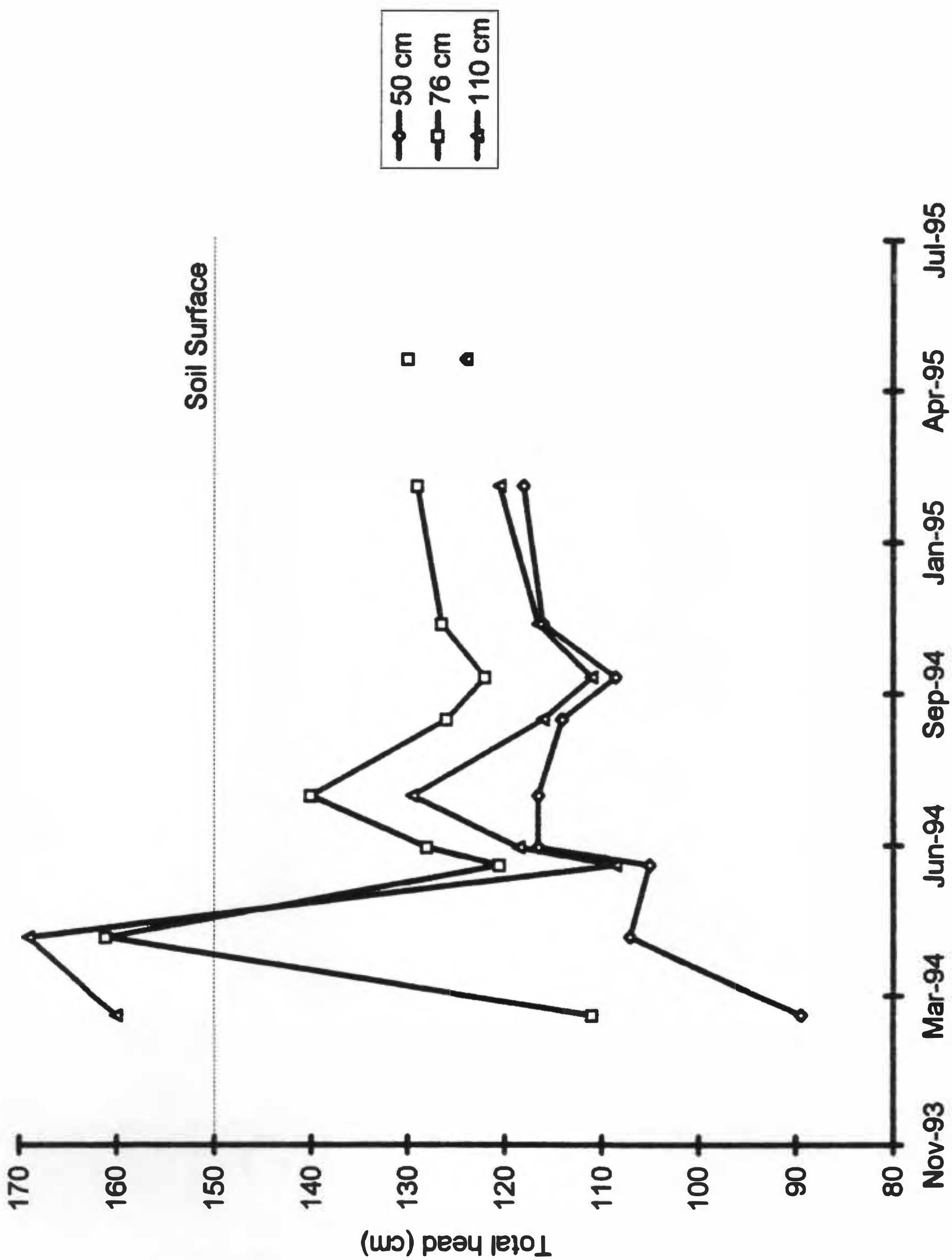

Figure 28. Total heads at piezometer nest 12-2 during the monitoring period.

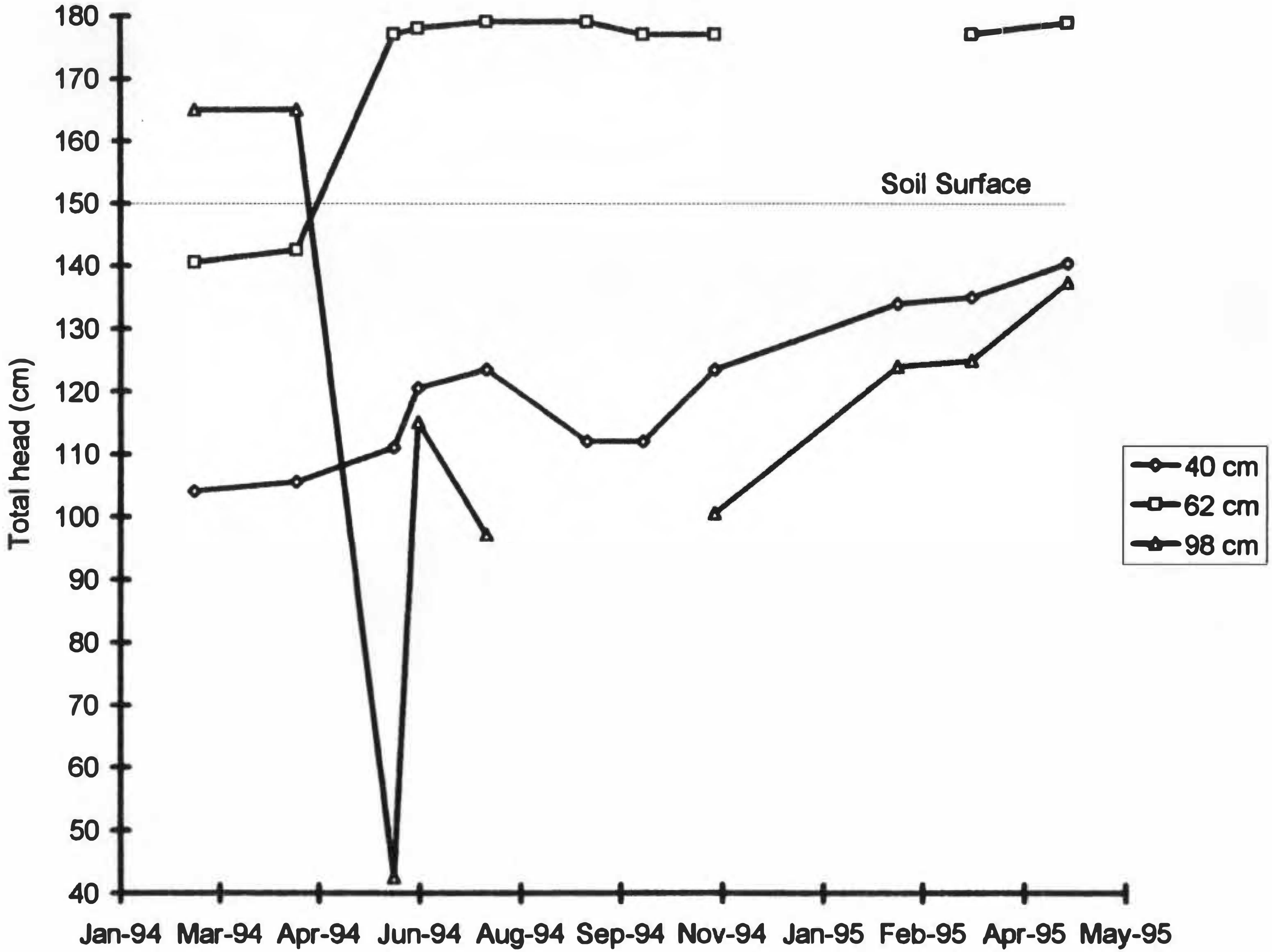

Figure 29. Total heads at piezometer nest 12-18 during the monitoring period.

Table 2. Comparison of R-squares and statistical significance of interactions for elements in this study conditions.

Model	Ca	Mg	DOC	TotN
R-squared	0.71	0.69	0.40	0.70
C.V.	56.0	42.7	146.6	55.9
<u>Probability > F</u>				
Position	1.0×10^{-37}	6.0×10^{-22}	2.0×10^{-3}	2.0×10^{-7}
Season*Position	1.0×10^{-6}	5.0×10^{-6}	7.5×10^{-1}	6.0×10^{-3}
Season*Type	1.7×10^{-4}	2.0×10^{-2}	2.0×10^{-3}	5.0×10^{-6}
Season*Position*Type	1.2×10^{-1}	6.4×10^{-1}	9.8×10^{-1}	2.9×10^{-2}

winter to spring, and re-doubled again from spring to summer for the bottomland position.

Calcium concentrations presented in Fig. 30 indicate that streams flowing through the wetland areas were not strongly influenced by these physiographic positions. Note that there is no stream present in the upland positions along the riparian bottoms. Also note that samples were not taken from 75 cm suction samplers along the wetland transects due to the high water table. Water tables under wetland physiographic positions indicated that they were being fed by the stream, and piezometer data indicated potential additions by bedrock groundwater. Elevated calcium concentrations were only observed in samples taken from wells and suction samplers along the wetland transects. Calcium

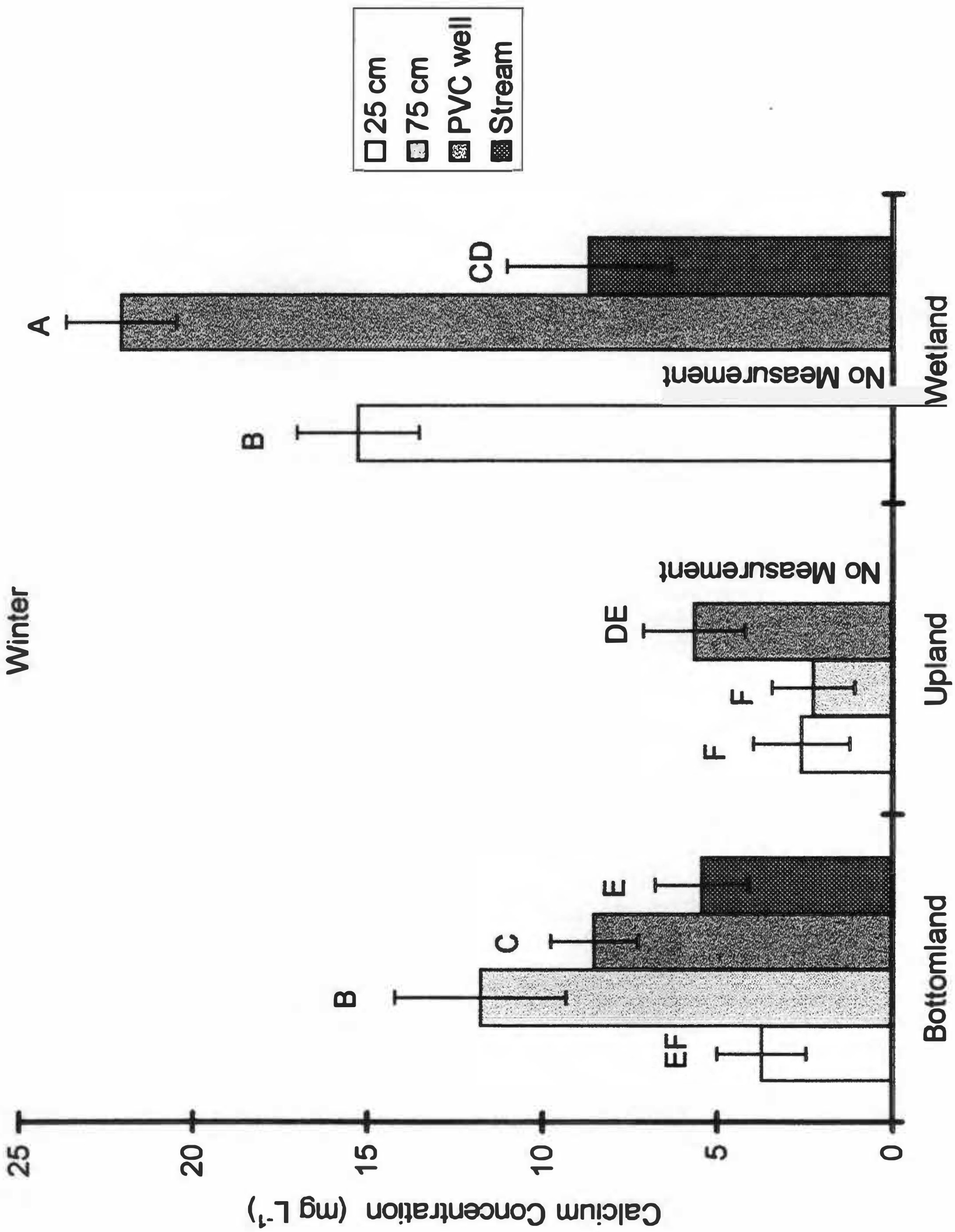

Figure 30. Average seasonal calcium concentrations by sample type for three physiographic positions across transects. Letters indicate significant differences within season only and crossbars indicate the standard error.

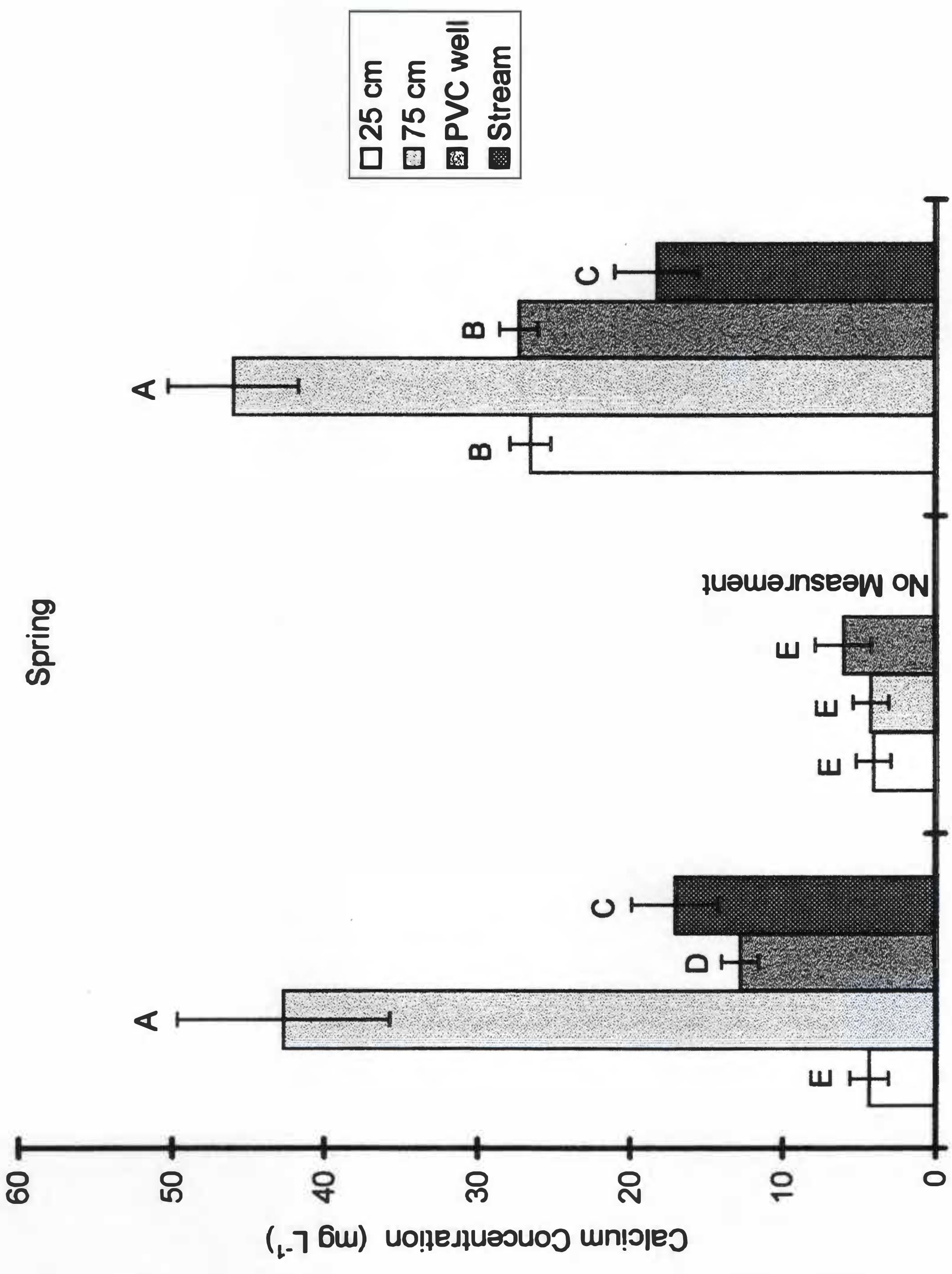

Figure 30. (continued).

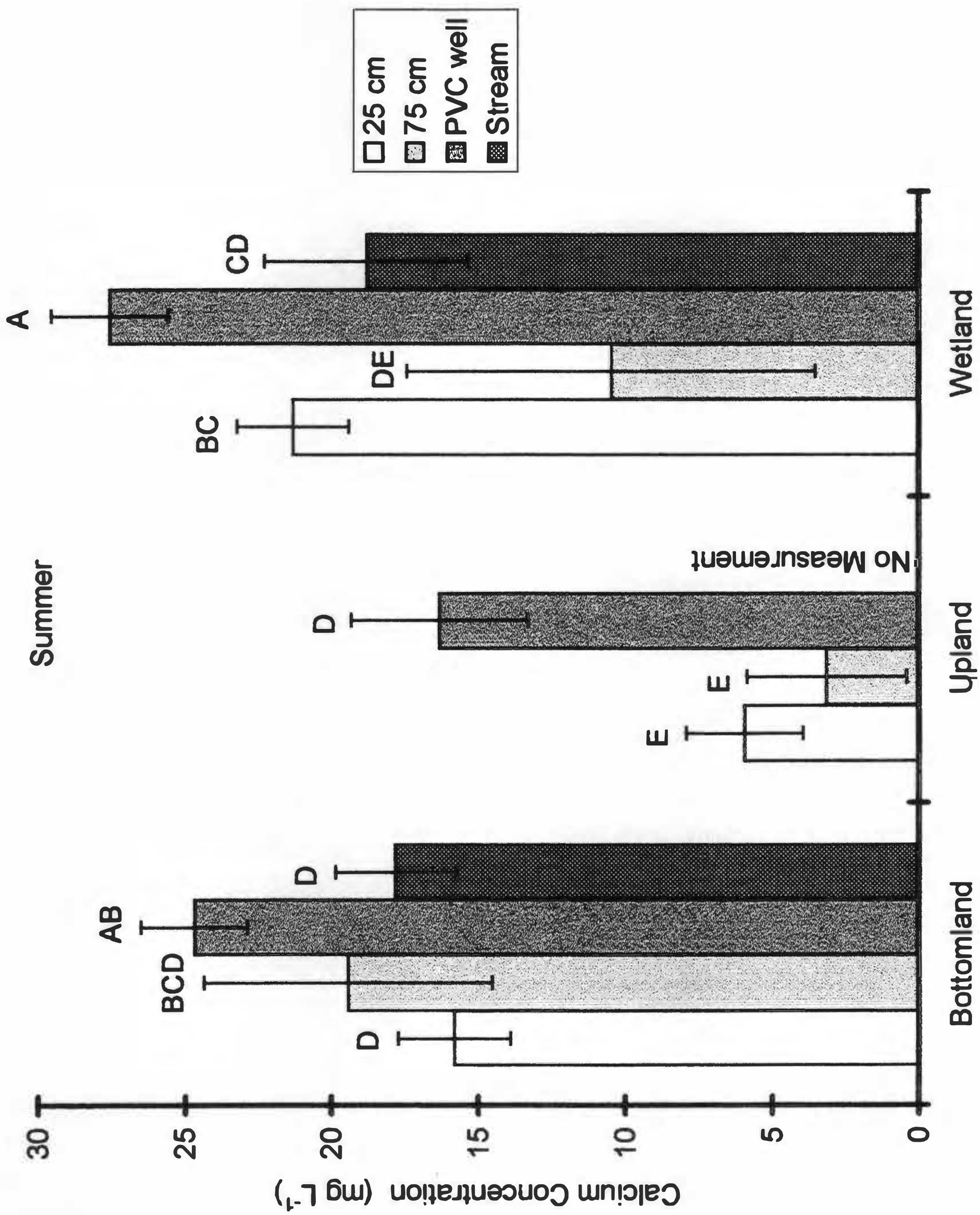

Figure 30. (continued).

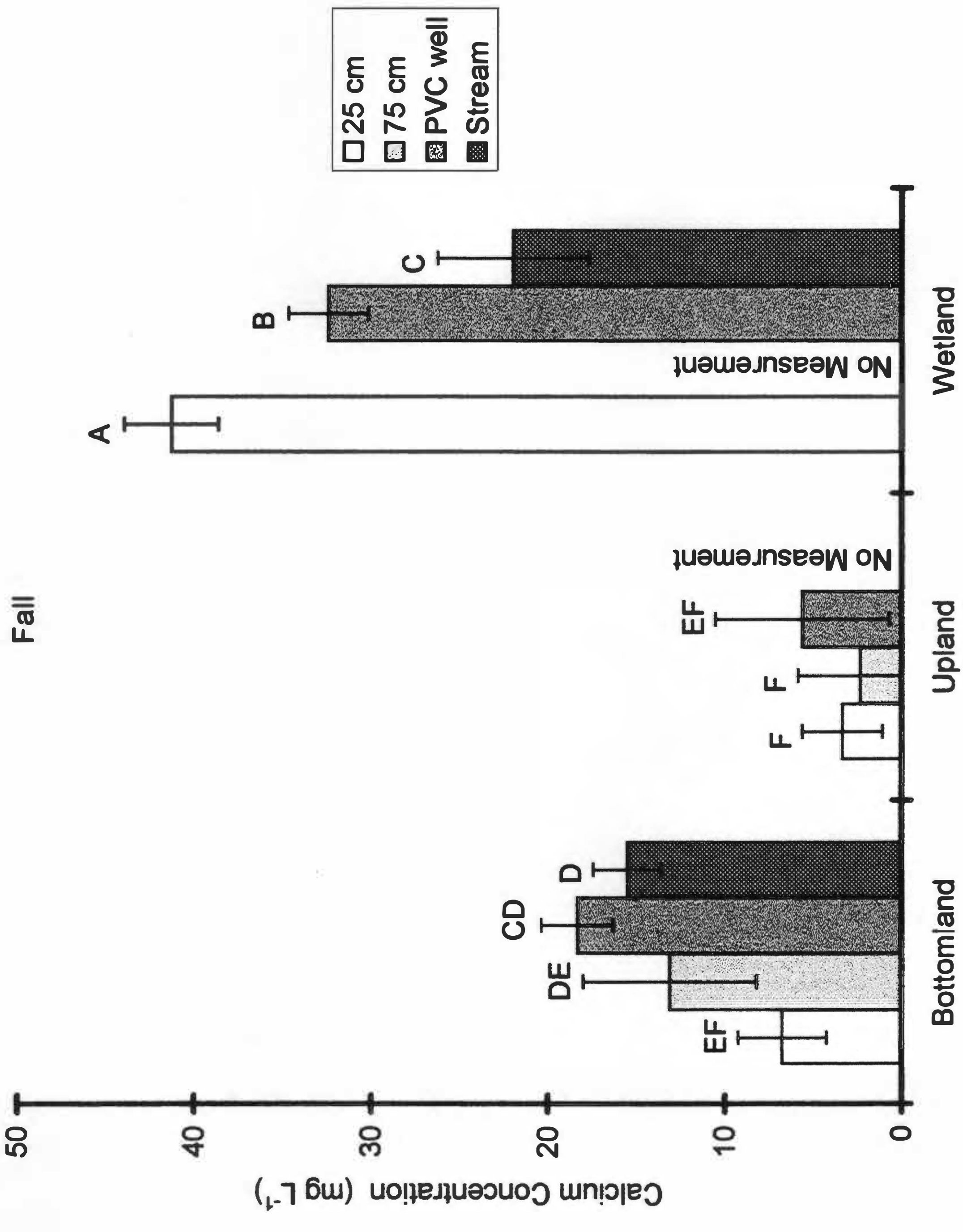

Figure 30. (continued).

concentrations were 5 to 7 mg L^{-1} in winter, and gradually increased to 18 to 22 mg L^{-1}.

Wetlands had significantly higher calcium concentrations than bottomland positions in winter and fall, but the streams were essentially the same. Upland positions exhibited significantly lower calcium concentrations than bottomlands or wetlands. Bottomland transects showed intermediate calcium concentrations except for samples taken from 75 cm suction samplers. In the bottomland, the 25 cm suction samplers consistently had the lowest concentrations, which, except for the summer, were like those from upland positions. This indicates that the shallow zones on the non-wetland transects were not as influenced by deeper groundwater. Except for the summer, the stream had the lowest concentrations in the wetland areas. This further indicates streams were not strongly influenced by the immediate surroundings during the drier seasons, and that the wetland and bottomlands may be functioning similarly during the summer months.

Calcium concentrations were in the same range as those reported by Mullholand (1993) for the Walker Branch Watershed. Unfiltered water samples from the main channel of Bear Creek had calcium concentrations which ranged between 18 and 510 mg L^{-1} and were higher than the watersheds in this study (Science Applications International Corporation, 1993). Schot and Wassen (1993) compared some peatland calcium concentrations from various locations which they found to be somewhat higher, ranging between 30 and 75 mg L^{-1}. Upland positions in the Schot and Wassen study had the lowest, streams were intermediate, and wetland positions had the highest calcium concentrations. Yavitt

(1994) reported calcium concentrations for an Appalachian swamp, marsh, and bog less than 1 mg L^{-1}. However, these sites were peatlands with organic soils.

Calcium can be used to illustrate the importance of deeper groundwater sources on the hydrology of these sites. Calcium is one of the major weathering products of the carbonate bedrock underlying these sites. It was unlikely that the upland physiographic position would be greatly influenced by deeper groundwater sources. Water tables were generally well below the sampling depths of the wells and suction samplers in the upland hillslopes. Calcium concentrations varied little between seasons in water samples taken from solution samplers on upland sites.

Magnesium:

The five component model (Season, Position, Aspect, Watershed, Sample Type) explained 69% of the variance observed in magnesium concentrations (Table 2). Patterns in mean magnesium concentrations among the three physiographic positions were similar to the patterns of calcium concentrations (Fig. 31). However, the mean magnesium concentrations were much lower, ranging from 1 to 5 mg L^{-1}. The coefficient of variation was 42.6% as compared to 56.0% for calcium which indicated there was less variance (Table 2). The three-way interaction of Season by Position by Type was not significant ($6.4x10^{-1}$ probability > F), thus, means separations are not presented, but the two-way interaction of Season by Position was significant ($5.0x10^{-6}$ probability > F). Upland magnesium levels remained fairly constant across all four seasons. Wetland magnesium concentrations were about

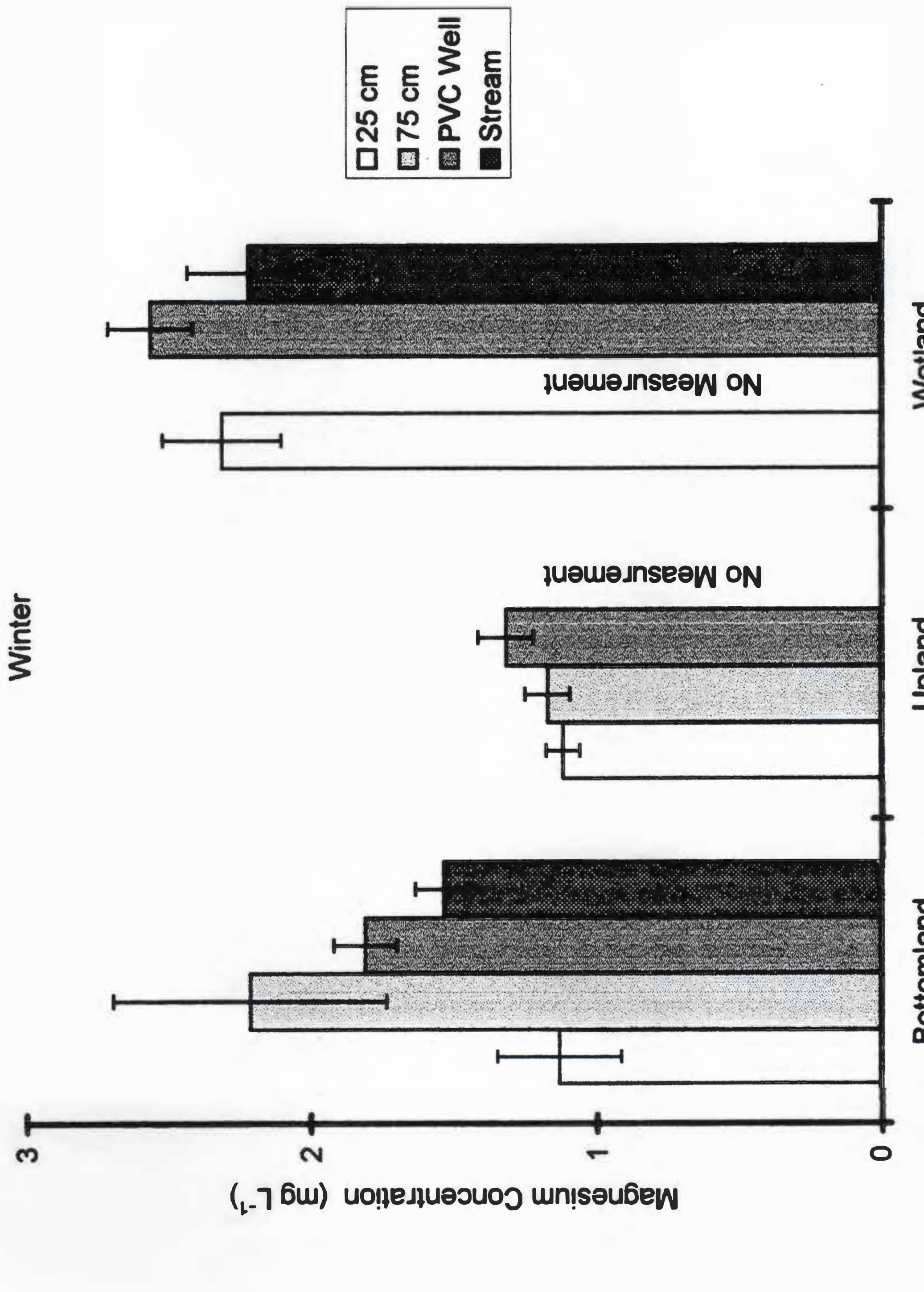

Figure 31. Average seasonal magnesium concentrations by sample type for three physiographic positions across transects. Crossbars indicate the standard error.

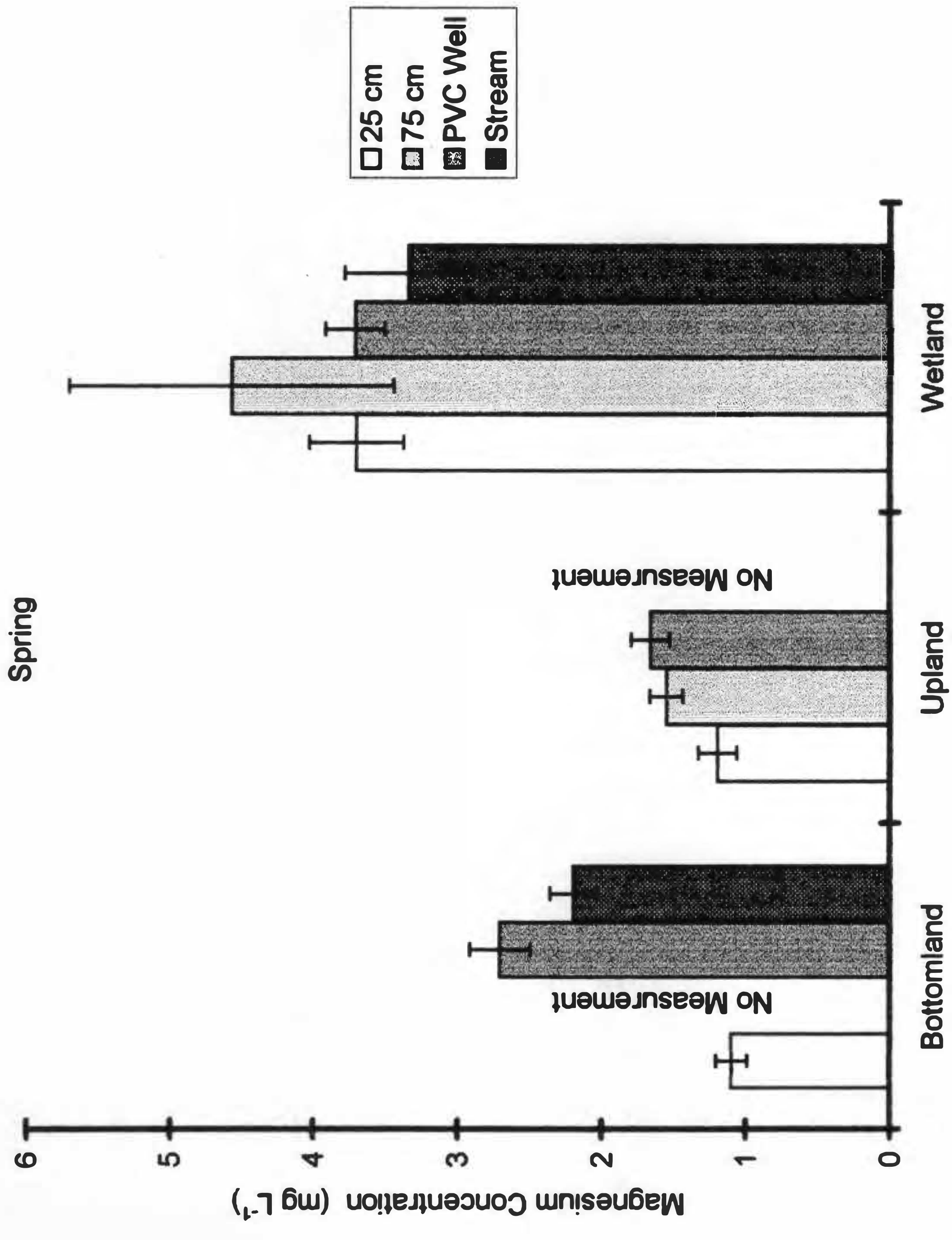

Figure 31. (continued).

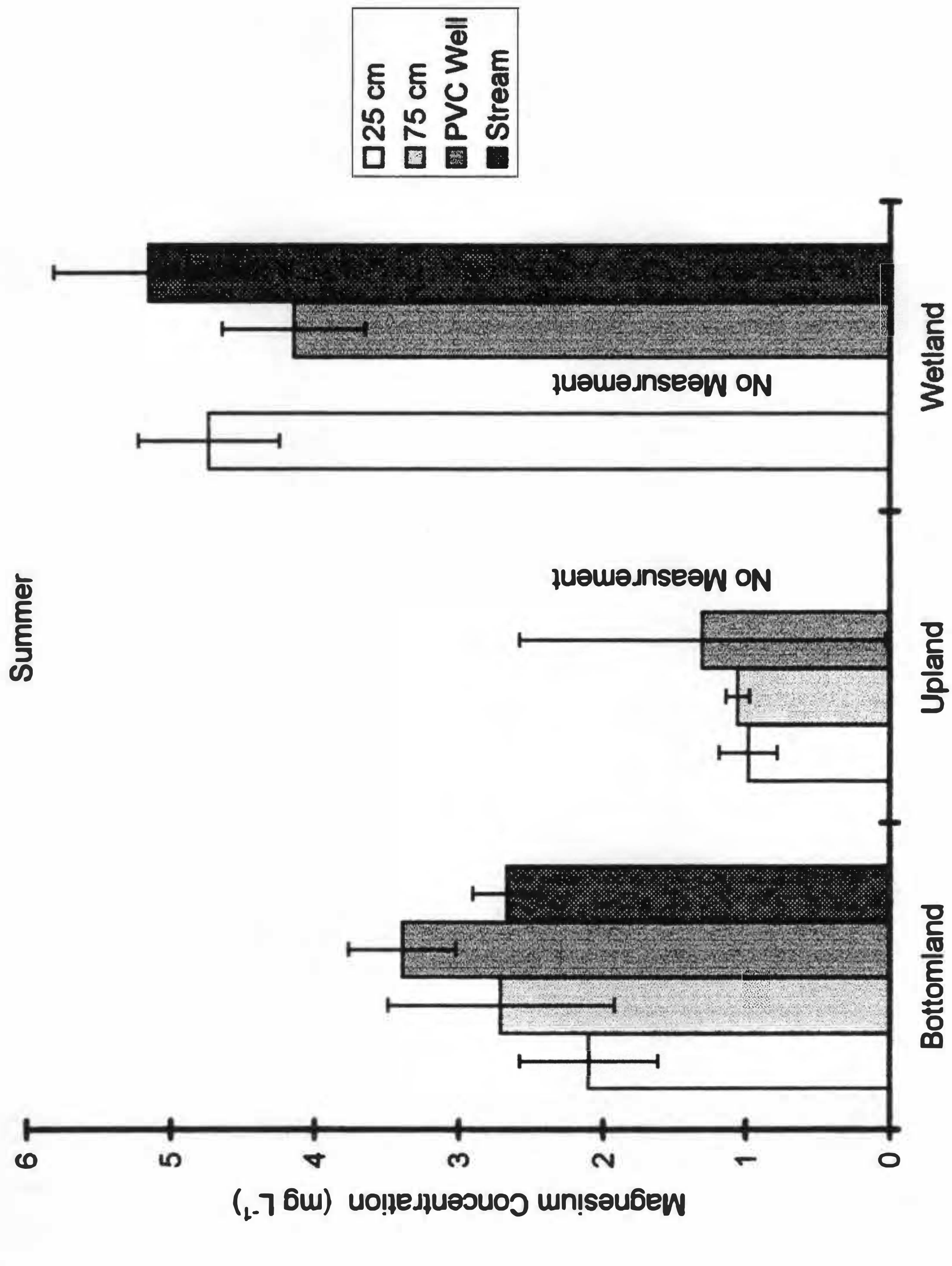

Figure 31. (continued).

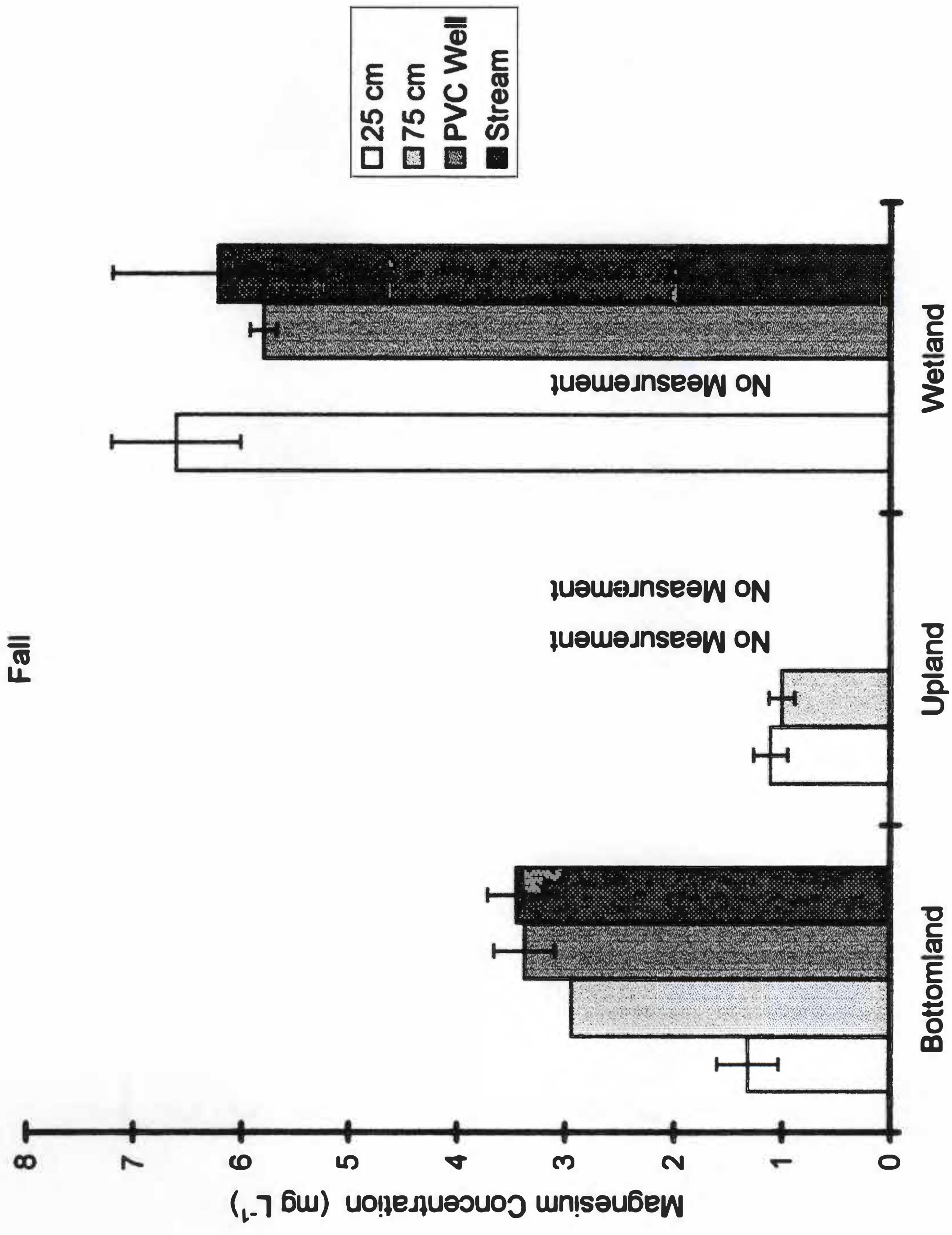

Figure 31. (continued).

2.2 mg L^{-1} in the winter and increased to 3.5 to 4.0 mg L^{-1} through the rest of the year. Bottomlands concentrations were low in winter, 1.2 to 2.2 mg L^{-1}, increased to almost 1.2 to 2.8 mg L^{-1} in spring, and reached a maximum around 1.4 to 3.5 mg L^{-1} in summer and fall. Again, this is probably due to a dilution effect. Standard errors (Fig. 31) were between 0.1 and 0.5 mg L^{-1} for wetland and upland positions, but were primarily less than 0.2 for the upland positions. Like calcium, magnesium indicates that the non-wetland and wetland riparian bottoms may have similar functions during drier seasons.

Magnesium concentrations were about half those reported by Schot and Wassen (1993), and displayed less discrepancies between sample types. Magnesium concentrations were much less than 14 to 69 mg L^{-1} reported for unfiltered water samples from the main channel of Bear Creek (Science Applications International Corporation, 1993).

Dissolved Organic Carbon:

Soil carbon storage is an important wetland function. The five component model (Season, Position, Aspect, Watershed, Sample Type) explained 40% of the variance observed in DOC concentrations (Table 2). The three-way interaction of Season by Position by Type was not significant ($9.8x10^{-1}$ probability > F), thus, means separations are not presented, but the Position component of the model was significant ($2.0x10^{-6}$ probability > F). DOC concentrations were highest in water samples taken from wetland positions, and lowest in uplands (Fig. 32). Upland water samples had DOC concentrations near 5 mg L^{-1}. Bottomland physiographic positions yielded concentrations near 9 mg L^{-1} in the soil and 11 mg L^{-1} in the stream, but there was a large amount of variation

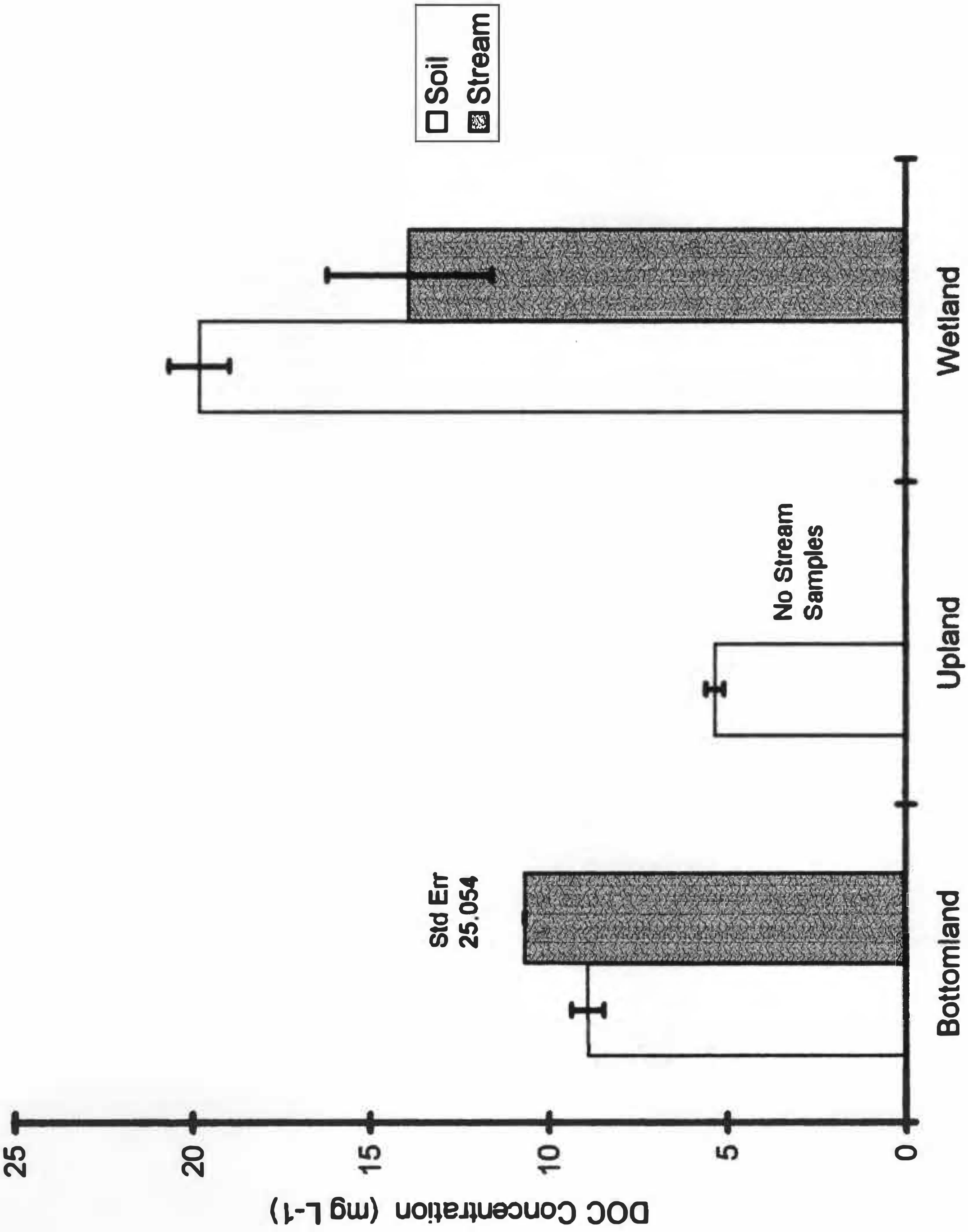

Figure 32. Average soil and stream DOC concentrations for three physiographic positions. Crossbars indicate the standard error except for the bottomland stream which was too large to present.

caused by high DOC content in the summer (baseflow water chemistry discussion, pg. 86). Wetland physiographic positions were nearly 20 mg L^{-1} in the soil, and about 15 mg L^{-1} in the stream. This illustrates that wetland positions were acting as a carbon sink, and the bottomland positions were acting as a carbon source.

Total Nitrogen:

It is difficult to ascertain what impacts physiographic positions had on total nitrogen (TotN). The five component model (Season, Position, Aspect, Watershed, Sample Type) explained 70% of the variance observed in TotN concentrations (Table 2). The three-way interaction of Season by Position by type was significant (2.9×10^{-2} probability > F). Total nitrogen was generally found at very low concentrations of less than 1 mg L^{-1} (Fig. 33). Numerical differences in concentration were indicated between physiographic positions during winter and spring; with wetland TotN concentrations twice those found in upland or bottomland water samples. During the summer and fall, differences in TotN between the three physiographic positions were generally not statistically significant at the 5% level of probability.

Within both wetland and non-wetland transects, TotN concentration for the 25 cm suction samplers during the winter and spring were significantly higher than the other instruments (Fig. 33). This result may be due to the higher organic matter content near the soil surface, or water table dilution in the deeper measurements. However, differences in TotN from the various sampler types were not evident during the summer and fall. The variability of TotN within and between sampler type increased greatly in spring and fall, and was highest in

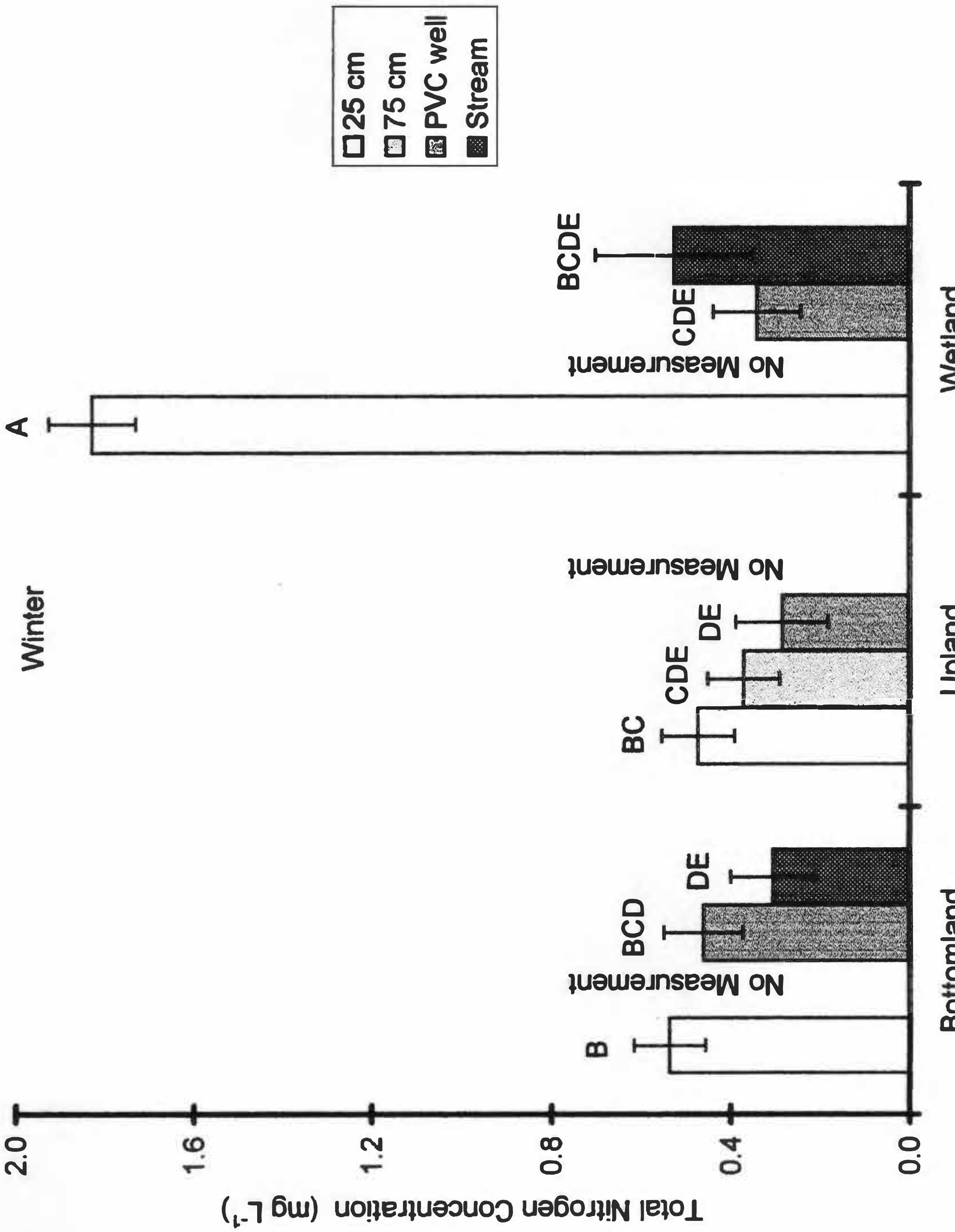

Figure 33. Average seasonal TotN concentrations by sample type for three physiographic positions across transects. Letters indicate significant differences within season only and crossbars indicate the standard error.

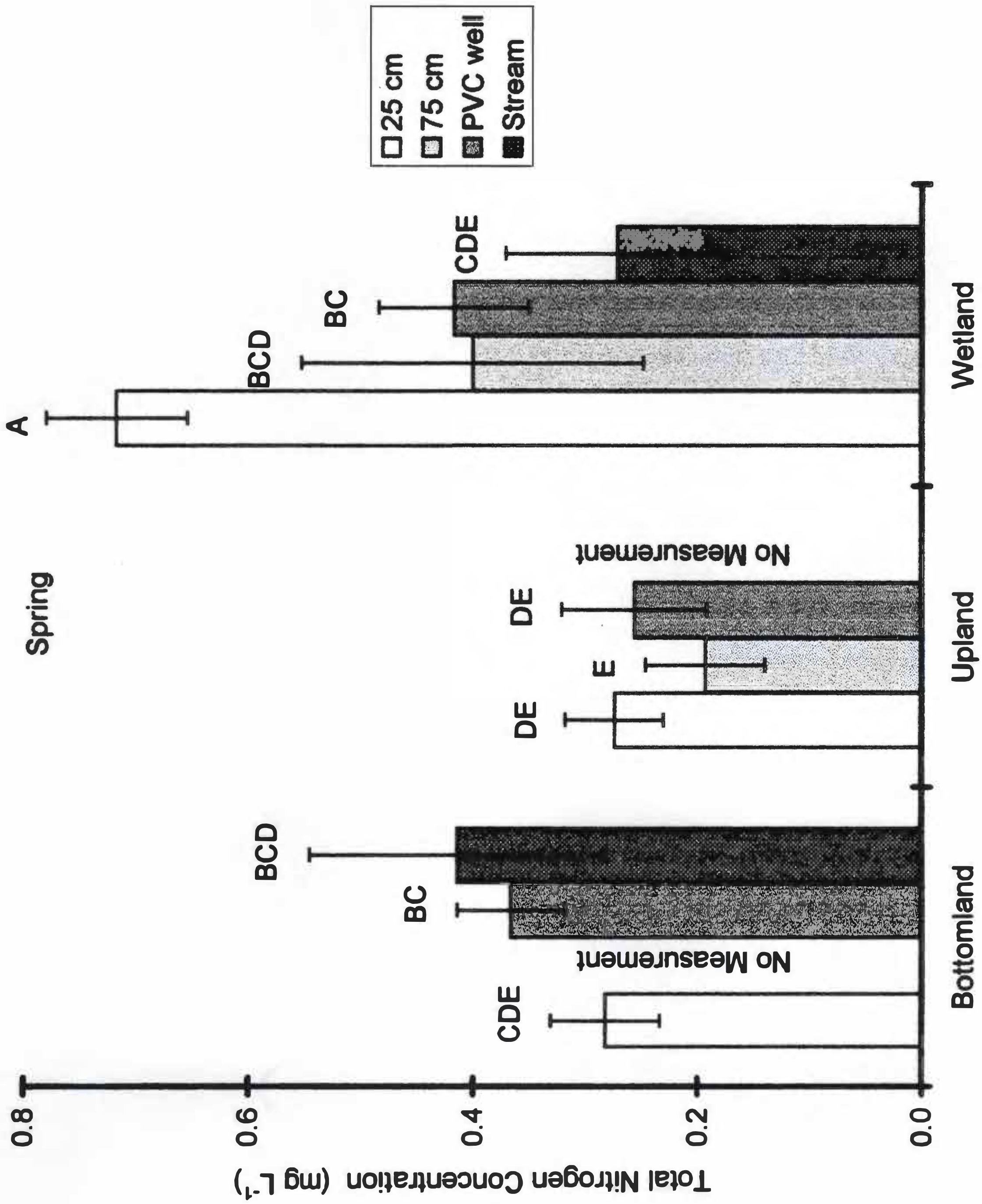

Figure 33. (continued).

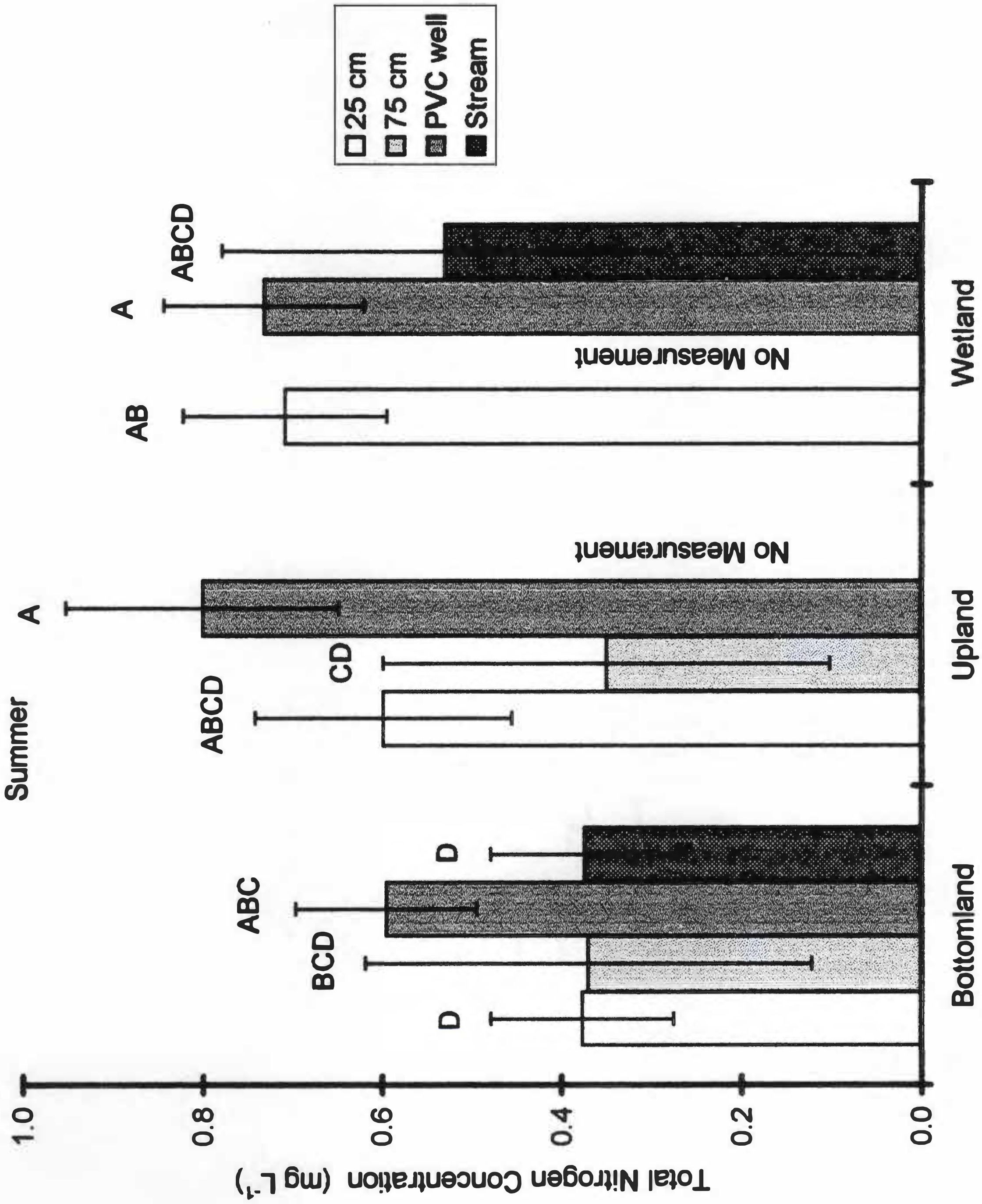

Figure 33. (continued).

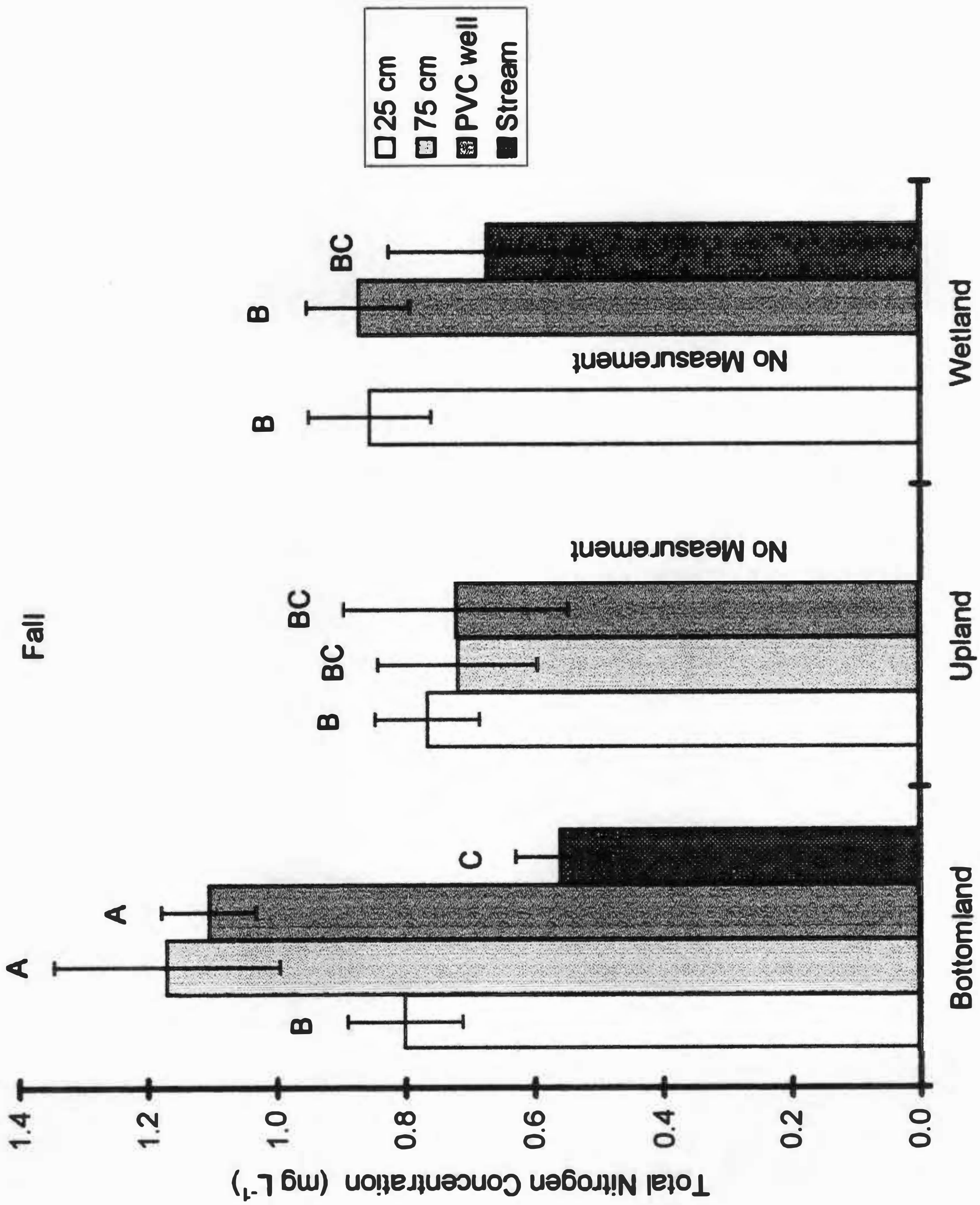

Figure 33. (continued).

the summer. Biological activity and nitrogen cycling was probably the cause of the increased variability.

Baseflow Hydrology:

Rainfall was above average in five of the six winter and spring months of 1994. February, March, April, and June had between 200 and 250 mm of rain, almost two times the average for those months (Fig. 34). January was about 15 mm above average and May was about 20 mm below average. The summer and fall of 1994 had average rainfall between 60 and 150 mm. The winter and spring of 1995 were slightly below average with rainfall totaling 75 mm in December, 190 mm in January, 80 mm in February, and 90 mm in March 50 mm in April, and 150 mm in May. Stream flow normalized by watershed area for baseflow conditions prior to rain events during winter and spring in 1994, was predominantly between 0.2 and 0.8 L s^{-1} ha^{-1} (Fig. 35). In the summer and fall of 1994, normalized flow dropped between 0.00 and 0.05 L s^{-1} ha^{-1}, and increased to flow rates between 0.1 and 0.5 L s^{-1} ha^{-1} in the winter and spring of 1995. Clearly average monthly rainfall is an important factor in determining baseflow.

Normalized flow was observed to drop significantly in April and May despite monthly rainfalls of over 100 mm in this period and through most of the summer. This suggests that evapotranspiration strongly affected baseflow rate (Fig. 25). During the growing season, forest systems are capable of translocating 200 to 400 L of water into the atmosphere per mature tree per day (Kramer and Kozlowski, 1979). Rainfall may also fail to recharge the sites due to short flowpaths between the infiltration points on the hillslopes and exfiltration

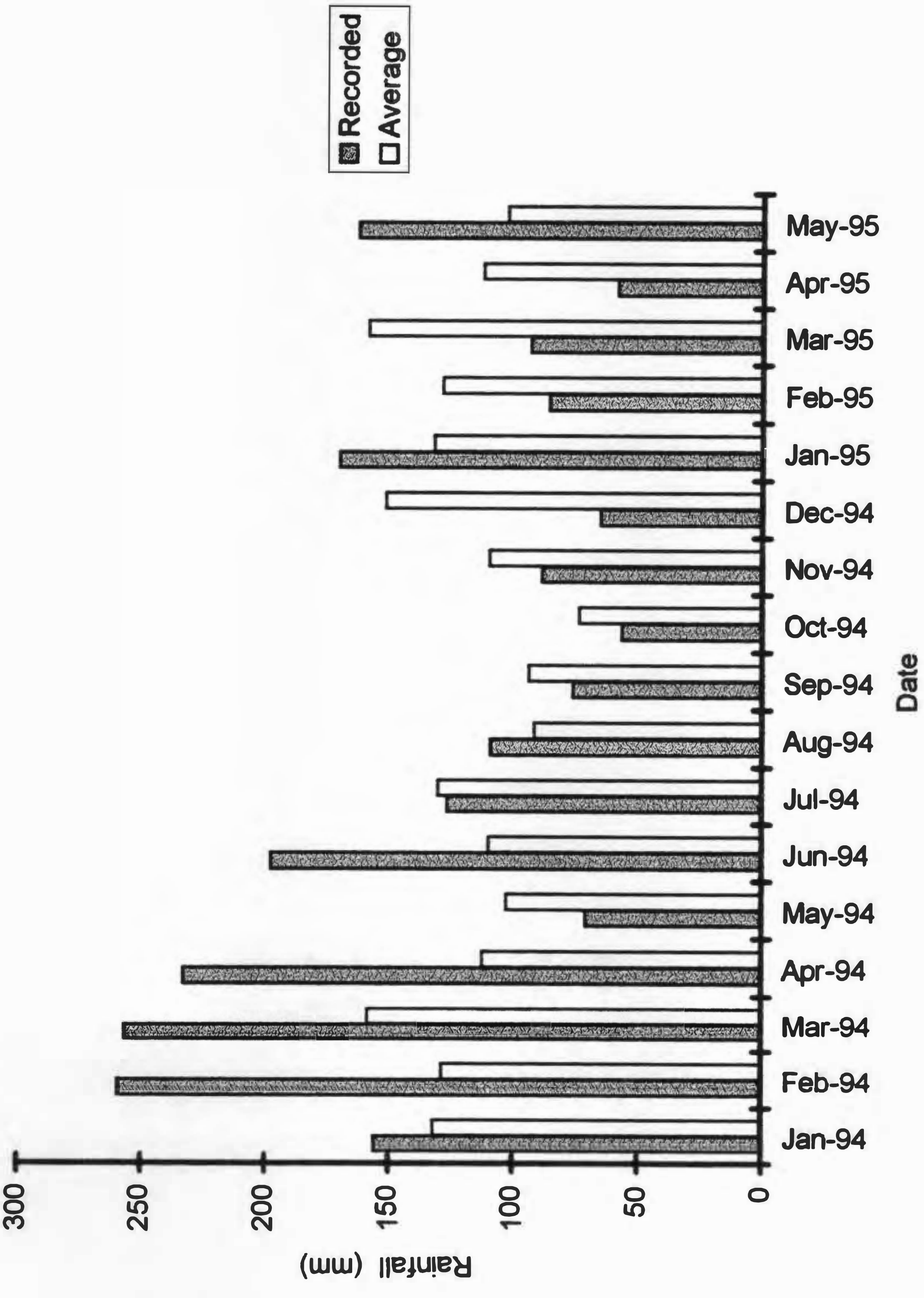

Figure 34. Recorded monthly rainfall for the site compared to 25-year average rainfall for Anderson County.

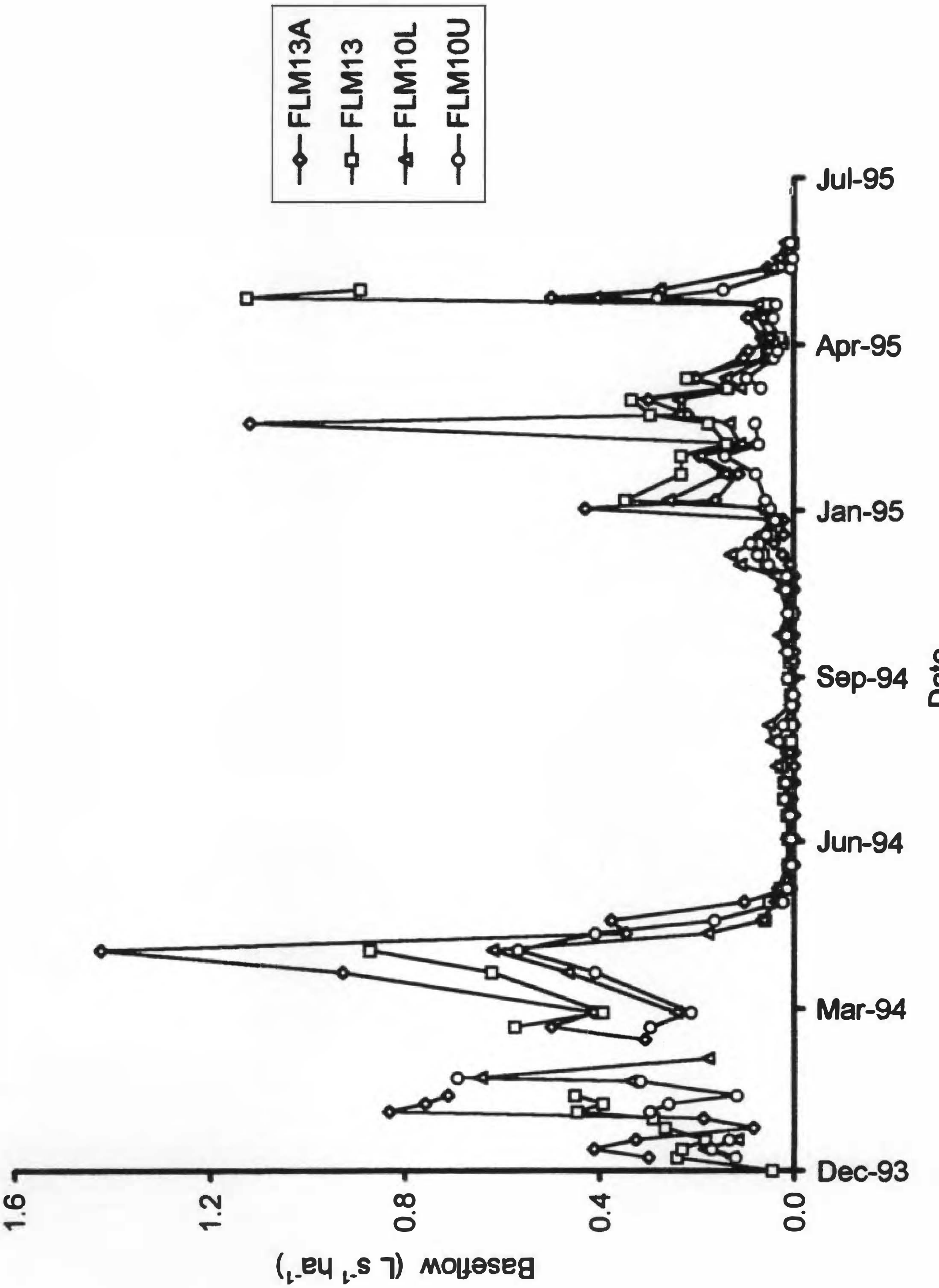

Figure 35. Normalized baseflow recorded at each of the flumes prior to storm events.

points into the streams. Rain events in winter generally deliver with more even spatial and temporal distribution than summer events. Summer events, on the contrary, generally deliver high amounts over very short intervals, and sporadic spatial patterns associated with thunderstorms.

Baseflow Water Chemistry:

Calcium:

The most notable effect on calcium chemistry was the seasonal increase in concentration from winter to fall. Calcium concentrations at the flumes under baseflow conditions in winter averaged 14 mg L^{-1} at FLM13A, and near 6 mg L^{-1} at FLM13, FLM10L, and FLM10U (Fig. 36). Calcium concentrations averaged 20 mg L^{-1} at FLM13A, 10 mg L^{-1} at FLM13 and FLM10L, and 7 mg L^{-1} at FLM10U in the spring. Concentrations increased in summer to 23 mg L^{-1} at FLM13A, 15 mg L^{-1} at FLM13, 10 mg L^{-1} at FLM10L, and 7 mg L^{-1} at FLM10U. In fall, calcium concentrations continued to increase and averaged 28 mg L^{-1} at FLM13A, 24 mg L^{-1} at FLM13, 15 mg L^{-1} at FLM10L, and 12 mg L^{-1} at FLM10U. Calcium concentration between FLM10L, FLM10U, and FLM13 were generally not significantly different. The dilution effect of larger volumes of water passing through the physiographic positions during the winter and spring months resulted in low calcium concentrations. However, because of the larger flow rates in winter and spring, these seasons exported the largest mass of calcium.

The springs and insurgence/resurgence samples were compared in an attempt to observe a bedrock effect on stream chemistry. Calcium concentrations in winter at the insurgence/resurgence pairs and the springs averaged 5 mg L^{-1} for HOLIN and HOLOUT, 7 mg L^{-1} for TSPIN and

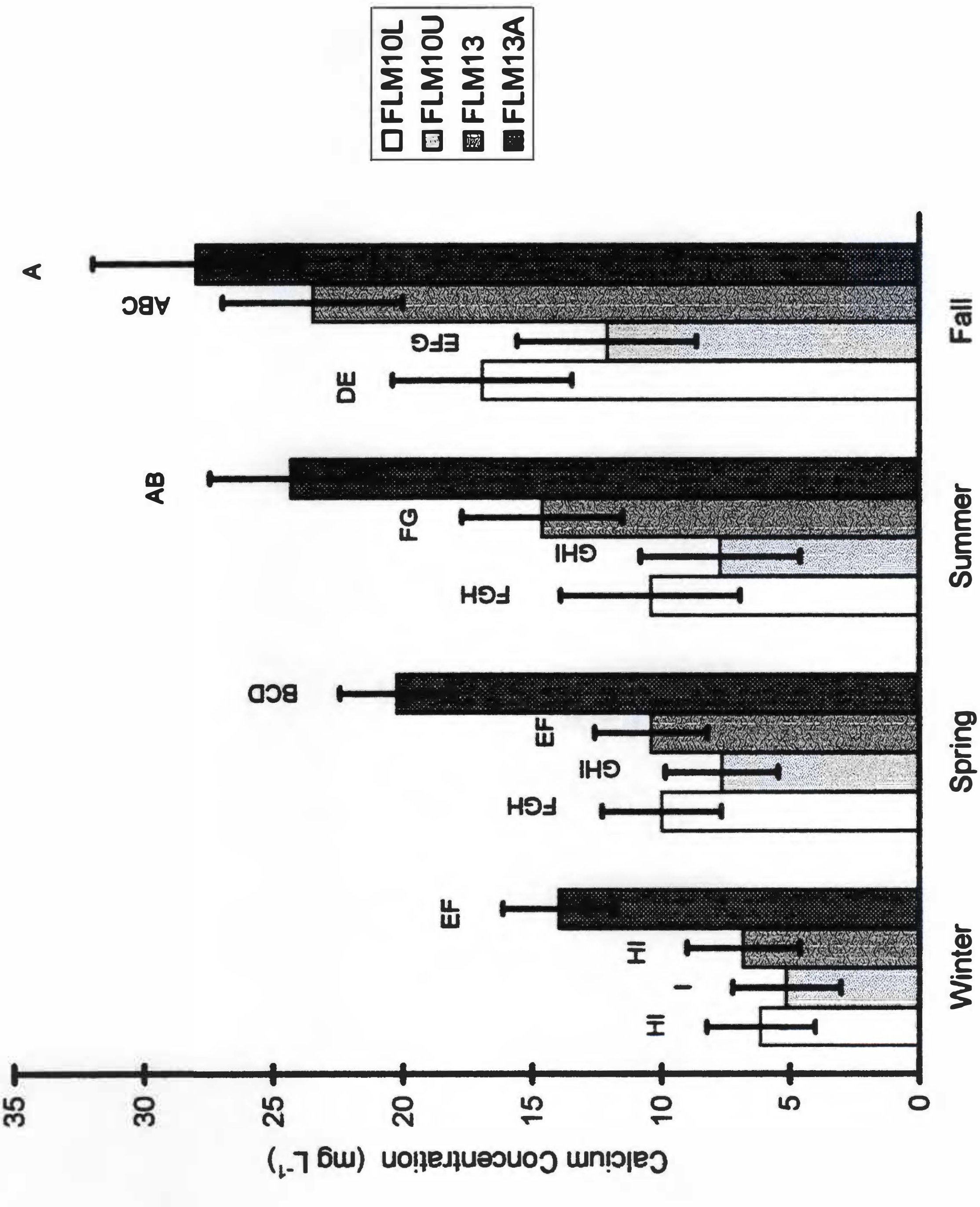

Figure 36. Average seasonal calcium concentrations at flumes during baseflow conditions. Letters indicate significant differences and crossbars indicate the standard error.

TSPOUT, and 15 mg L^{-1} for ORG13A (Fig. 37). Spring concentrations averaged 8 mg L^{-1} for HOLIN and HOLOUT, 22 mg L^{-1} for TSPIN, and 15 mg L^{-1} for TSPOUT and ORG13A. Concentrations in summer averaged 10 mg L^{-1} for HOLIN and HOLOUT, 13 mg L^{-1} for TSPIN, and 25 mg L^{-1} for TSPOUT and ORG13A. Fall concentrations averaged 12 mg L^{-1} for HOLIN and HOLOUT, and 30 mg L^{-1} for ORG13A, TSPIN, and TSPOUT. Standard errors ranged from 2.0 to 3.0 mg L^{-1} at the 5% level. The dilution effect was also evident in calcium concentration differences between seasons. Differences in calcium concentrations between the insurgence and resurgence locations were inconsistent and not statistically significant at the 5% level. In spring, TSPIN had significantly higher concentration than TSPOUT, while in summer the opposite was significant. In contrast, there was no significant change in calcium concentration between ORG13A and FLM13A through the seasons.

These results imply little change in calcium chemistry occurred as streams flowed through the wetland areas even where the stream flowed underground and resurfaced. Calcium concentrations at the flumes were roughly half those in the wells for the four seasons. However, this difference was not prevalent in the samples from FLM13A. The only significant difference between watersheds, i.e. water samples at the main outflows, was for FLM13A. Watershed 13A may have a higher proportion of limey-shales in the bedrock causing high baseflow calcium concentrations. This is supported by the observations of high base saturation in the soil profiles (Stiles *et al.*, 1995).

Increased variability in calcium chemistry was observed between the insurgence/resurgence pairs and the outflow point FLM10L in the

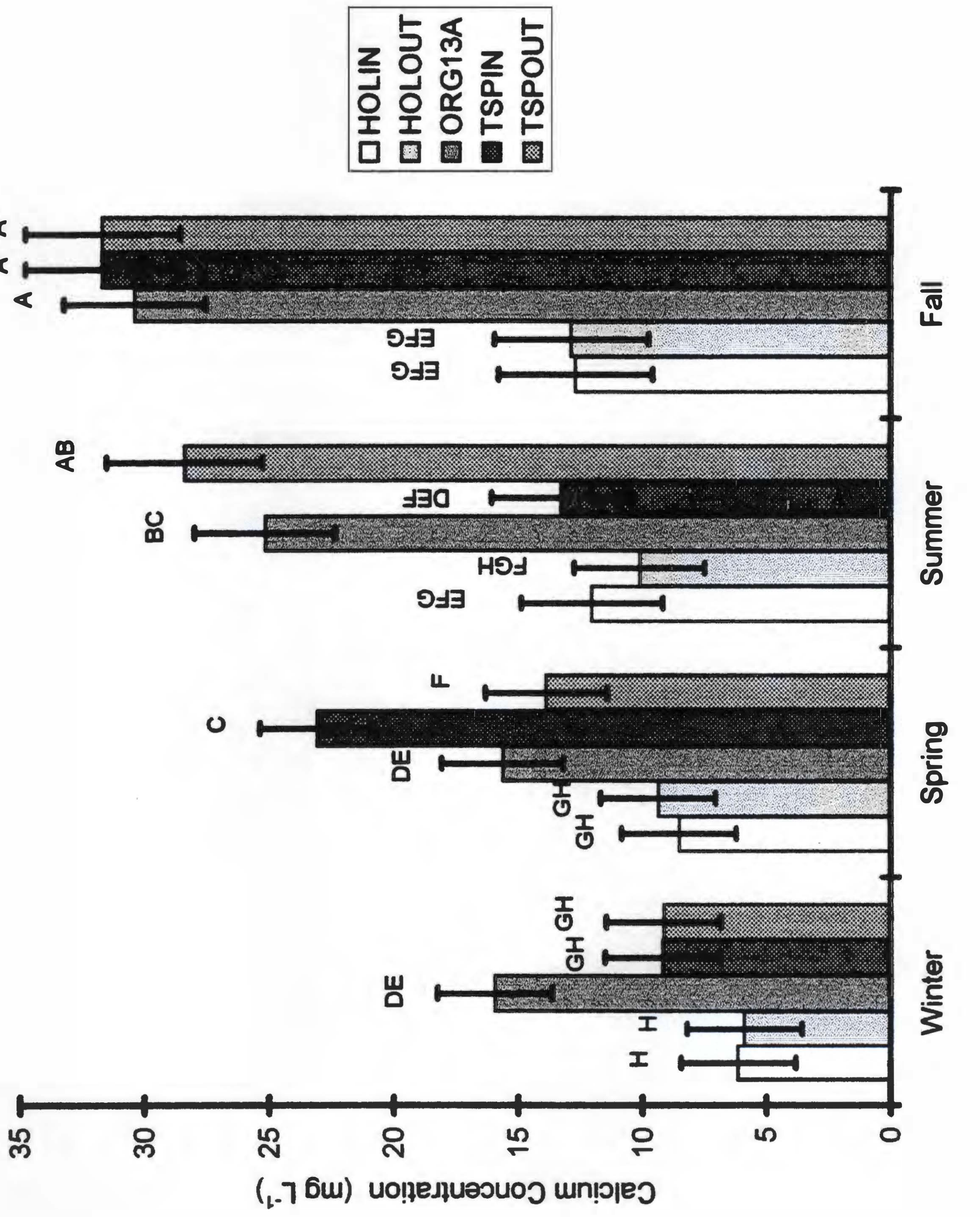

Figure 37. Average seasonal calcium concentrations at springs and insurgence/resurgence pairs during baseflow conditions. Letters indicate significant differences and crossbars indicate the standard error.

summer and fall. This variability was due to the disparity between calcium sources within the watershed. A watershed outflow can be viewed as an integration point for water leaving the site. In this case, the contributing sources to this flow, HOLIN, HOLOUT, TSPIN, TSPOUT, AND FLM10U had significantly different calcium concentrations at the 5% level which contributed to the increased variability at FLM10L. There was little difference between ORG13A and FLM13A. This indicated that the contributing factors affecting calcium chemistry in this watershed were not disparate.

Magnesium:

Average magnesium concentrations at the flume had a similar pattern to calcium with a general increase from winter to fall. Concentrations at the flumes under baseflow conditions in winter averaged 3 mg L^{-1} at FLM13A, and between 1.5 and 2 mg L^{-1} at FLM13, FLM10L, and FLM10U (Fig. 38). In spring, concentrations averaged 4 mg L^{-1} at FLM13A, to just over 2 mg L^{-1} at FLM13, FLM10L, and FLM10U. Concentrations increased in summer to 4.5 mg L^{-1} at FLM13A, and remained just over 2 mg L^{-1} at FLM13, FLM10L, and FLM10U. In the fall, magnesium averaged 5 mg L^{-1} at FLM13A, and about 3.5 mg L^{-1} at FLM13, FLM10L, and FLM10U. The most notable effect was the increase in concentration across seasons that paralleled the increases in calcium.

In winter, magnesium concentrations at the springs, insurgence, and resurgence samples averaged 4 mg L^{-1} for ORG13A, and 2 mg L^{-1} for HOLIN, HOLOUT, TSPIN, and TSPOUT (Fig. 39). Spring concentrations averaged 4 mg L^{-1} for ORG13A, and 2.5 mg L^{-1} for HOLIN, HOLOUT, TSPIN, and TSPOUT. Concentrations in summer averaged 5.5 mg L^{-1} for ORG13A,

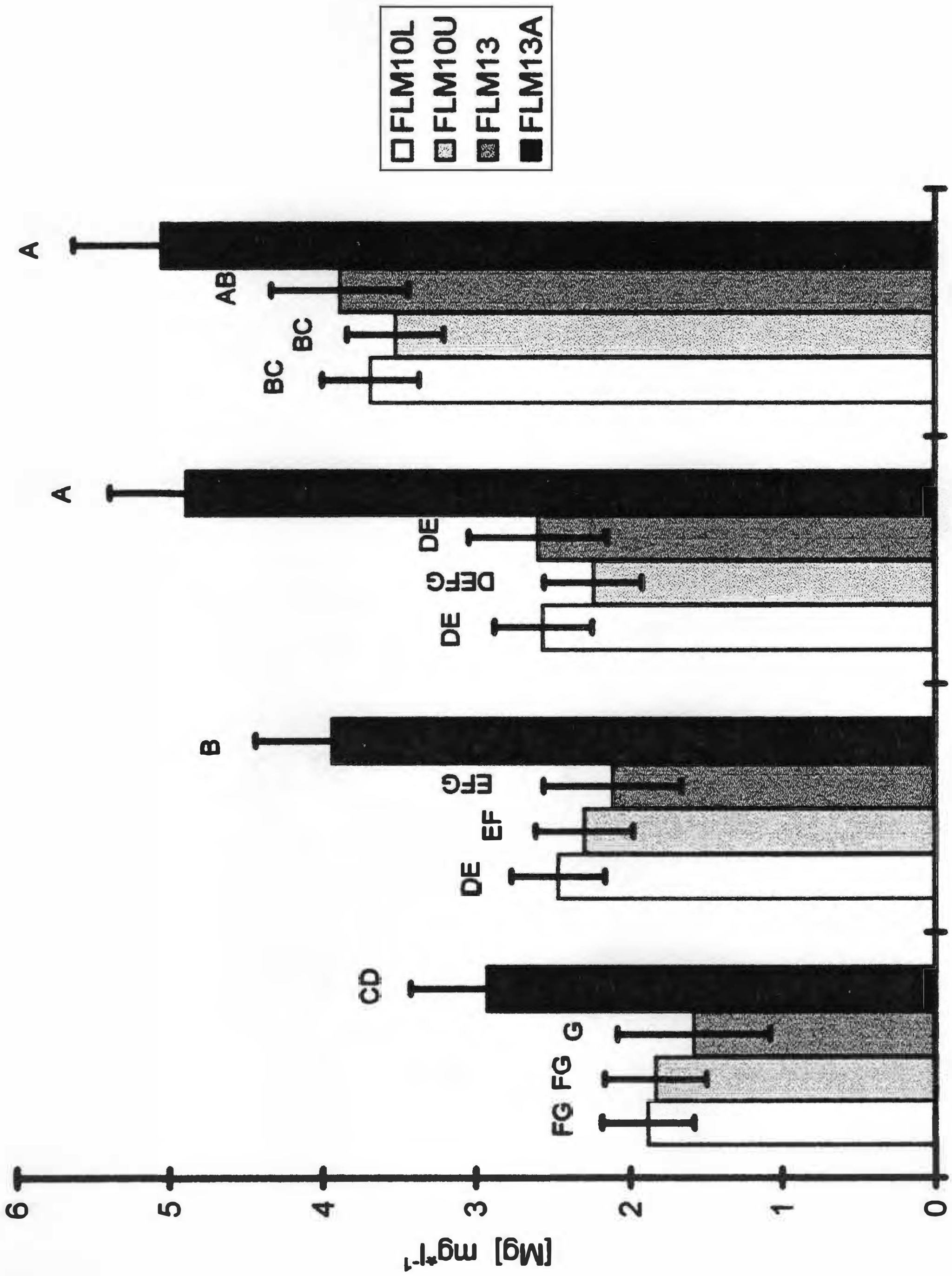

Figure 38. Average seasonal magnesium concentrations at flumes during baseflow conditions. Letters indicate significant differences and crossbars indicate the standard error.

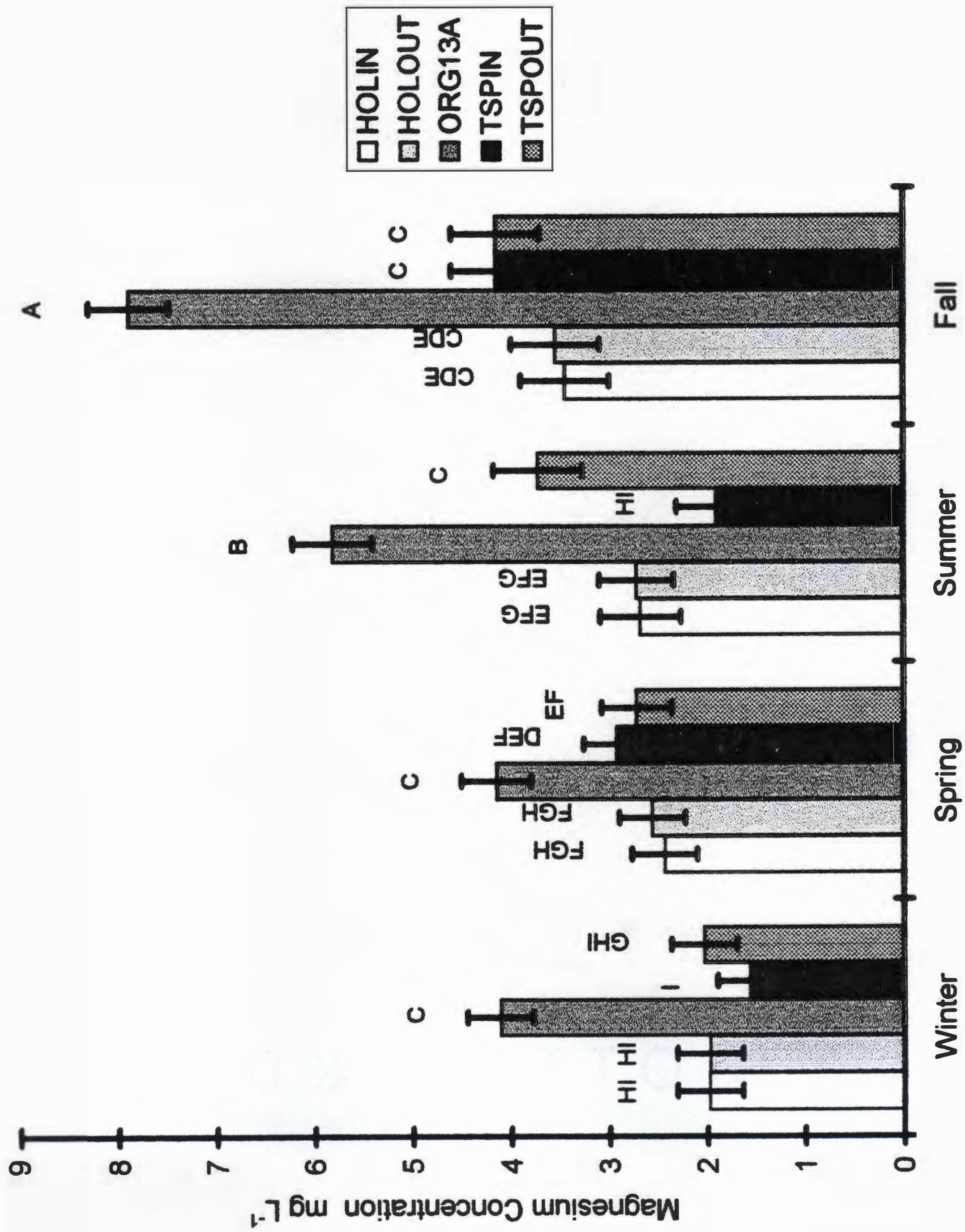

Figure 39. Average seasonal magnesium concentrations at springs and insurgence/resurgence pairs during baseflow conditions. Letters indicate significant differences and crossbars indicate the standard error.

2.5 mg L^{-1} for HOLIN and HOLOUT, 2 mg L^{-1} for TSPIN, and 3 mg L^{-1} for TSPOUT. Fall concentrations averaged 3.5 mg L^{-1} for HOLIN and HOLOUT, and 4 mg L^{-1} for TSPIN and TSPOUT, and almost 8 mg L^{-1}. Magnesium concentrations were 25% to 100% larger at ORG13A than the insurgence/resurgence pairs while standard errors were about 0.25 mg L^{-1}. ORG13A appeared to be much more strongly influenced by groundwater magnesium than the other points. The elevated calcium concentrations observed at TSPIN and TSPOUT in summer and fall were not observed in magnesium concentrations, but the cause of this was not determined.

Dissolved Organic Carbon:

DOC averaged between 5 and 20 mg L^{-1} at flumes during the entire year with the exception of the summer DOC concentrations at FLM13 and FLM13A which averaged almost 80 mg L^{-1} (Fig. 40). It was difficult to explain this large increase in DOC for summer. There did not seem to be a wetland versus non-wetland effect as FLM13 is associated with a non-wetland physiographic position, while FLM13A is associated with a wetland. A second possibility was microbial activity, but the DOC increase was not observed at either FLM10L or FLM10U in watershed 10. C:N ratios in stream water were also very high, 175:1, at FLM13A and FLM13 which tended to discount microbial activity. C:N predominately ranged between approximately 15 and 60 at FLM10U and FLM10L, as well as FLM13A and FLM13 during the winter, summer, and fall. The standard errors for these measurements did not indicate a large variance.

There were also difficulties comparing DOC values from the springs and insurgence/resurgence water samples due to the high degree of

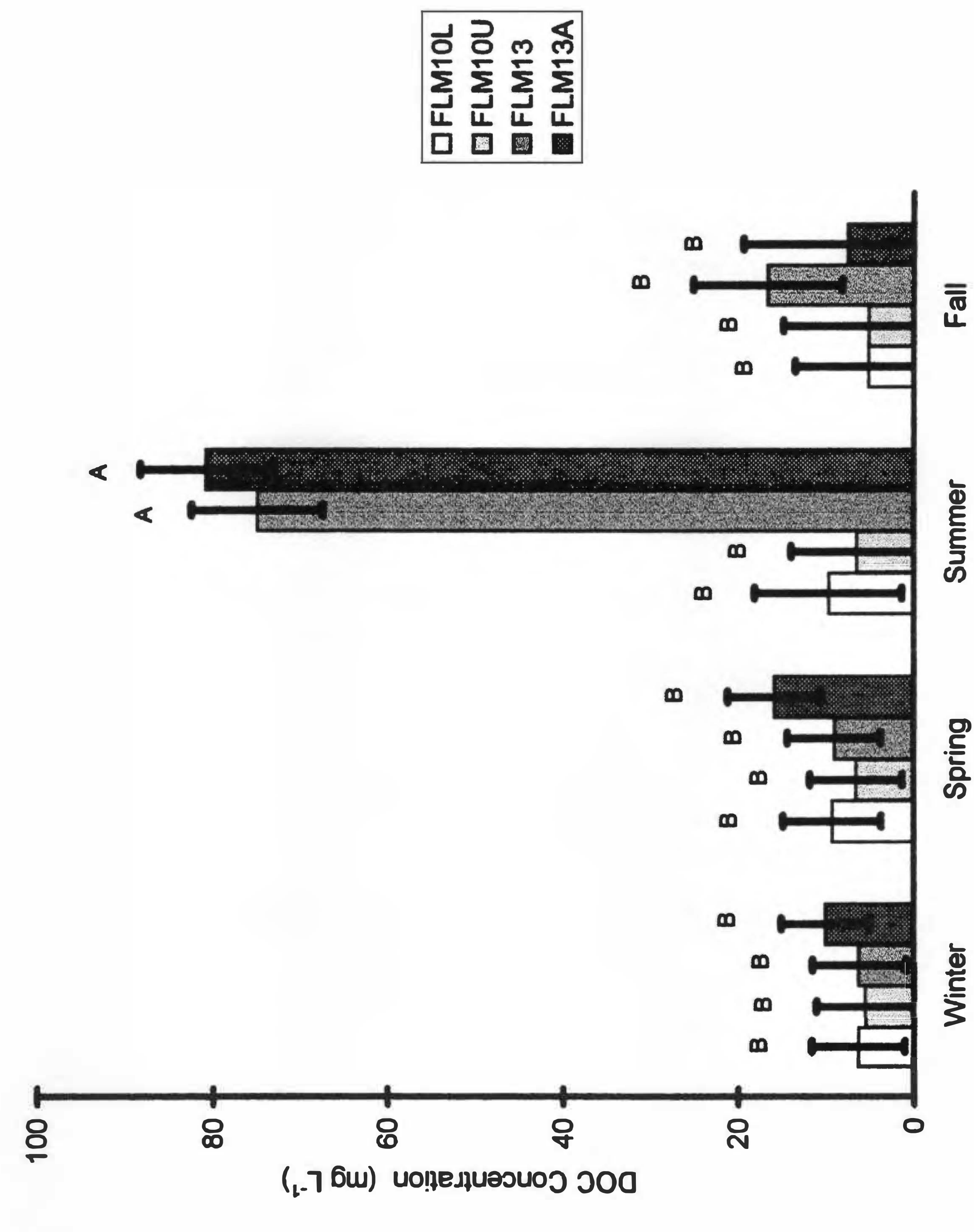

Figure 40. Average seasonal DOC concentrations at flumes during baseflow conditions. Letters indicate significant differences and crossbars indicate the standard error.

variability (Fig. 41). Numerical differences between some of the pairs had inconsistencies similar to calcium and magnesium where an increase noted for one season inverted into a decrease for another season. The variability among samples during the season caused large standard errors at the 5% level for these locations, whereas, the "integrated" samples at the flumes had lower standard errors for DOC concentration.

Total Nitrogen:

There was high variation present in TotN concentrations causing large standard errors and marginally significant differences at the 5% level. Average concentrations ranged from 0.1 to 0.8 mg L^{-1} at the flumes (Fig. 42). Low TotN concentrations in winter suggest a dilution effect during elevated baseflow conditions. However, minimum TotN concentrations were observed in the spring. This may have been caused by immobilization due to biological uptake during rapid growth early in the growing season. This was not observed for the spring and insurgence/resurgence pair comparisons due to an apparent dilution effect (Fig. 43). The standard errors for TotN concentrations were very high, and tended to mask the characteristics of sample types given that concentrations were less than 1 mg L^{-1}.

Stormflow Hydrology:

Medium and Low Flow Responses:

Sixteen medium and low flow events were compared for differences in hydrograph response. Streams generally had flashy hydrologic responses to these storm events. In 56% of the events, 20% to 50% of the flow occurred before the hydrograph peak (Fig. 44). Responses at wetland flumes averaged between 40% and 50% of flow occurring before the

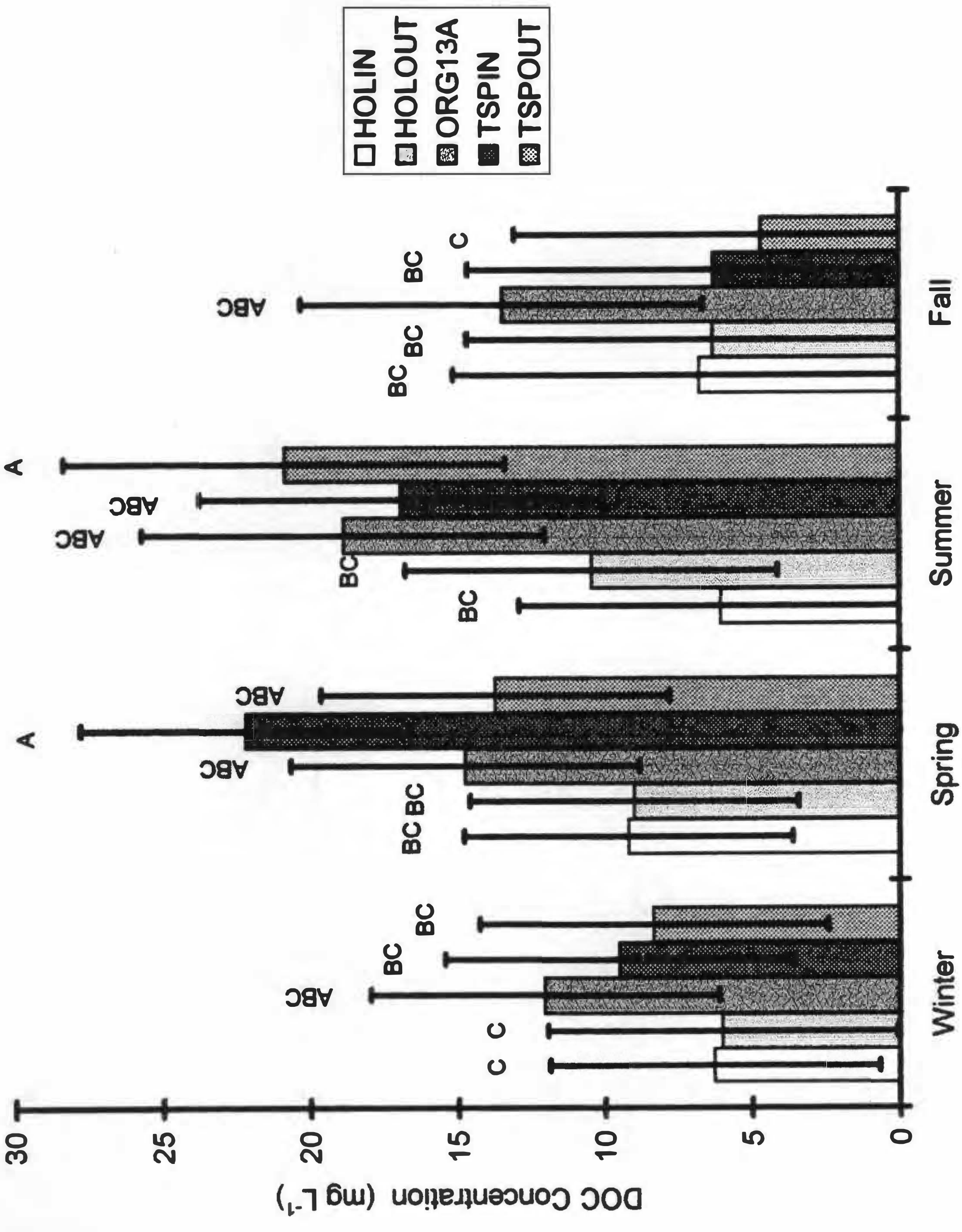

Figure 41. Average seasonal DOC concentrations at springs and insurgence/resurgence pairs during baseflow conditions. Letters indicate significant differences and crossbars indicate the standard error.

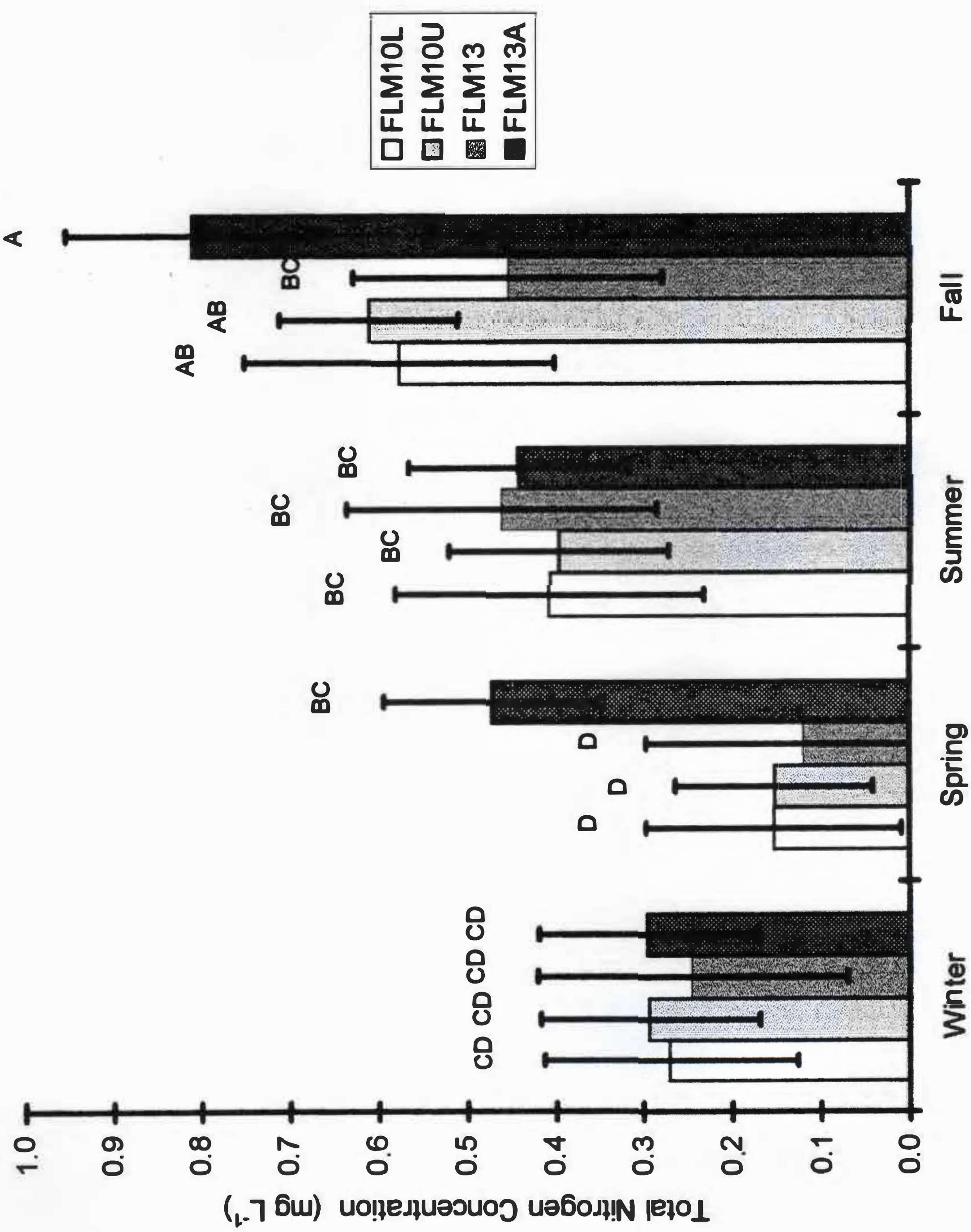

Figure 42. Average seasonal TotN concentrations at flumes during baseflow conditions. Letters indicate significant differences and crossbars indicate the standard error.

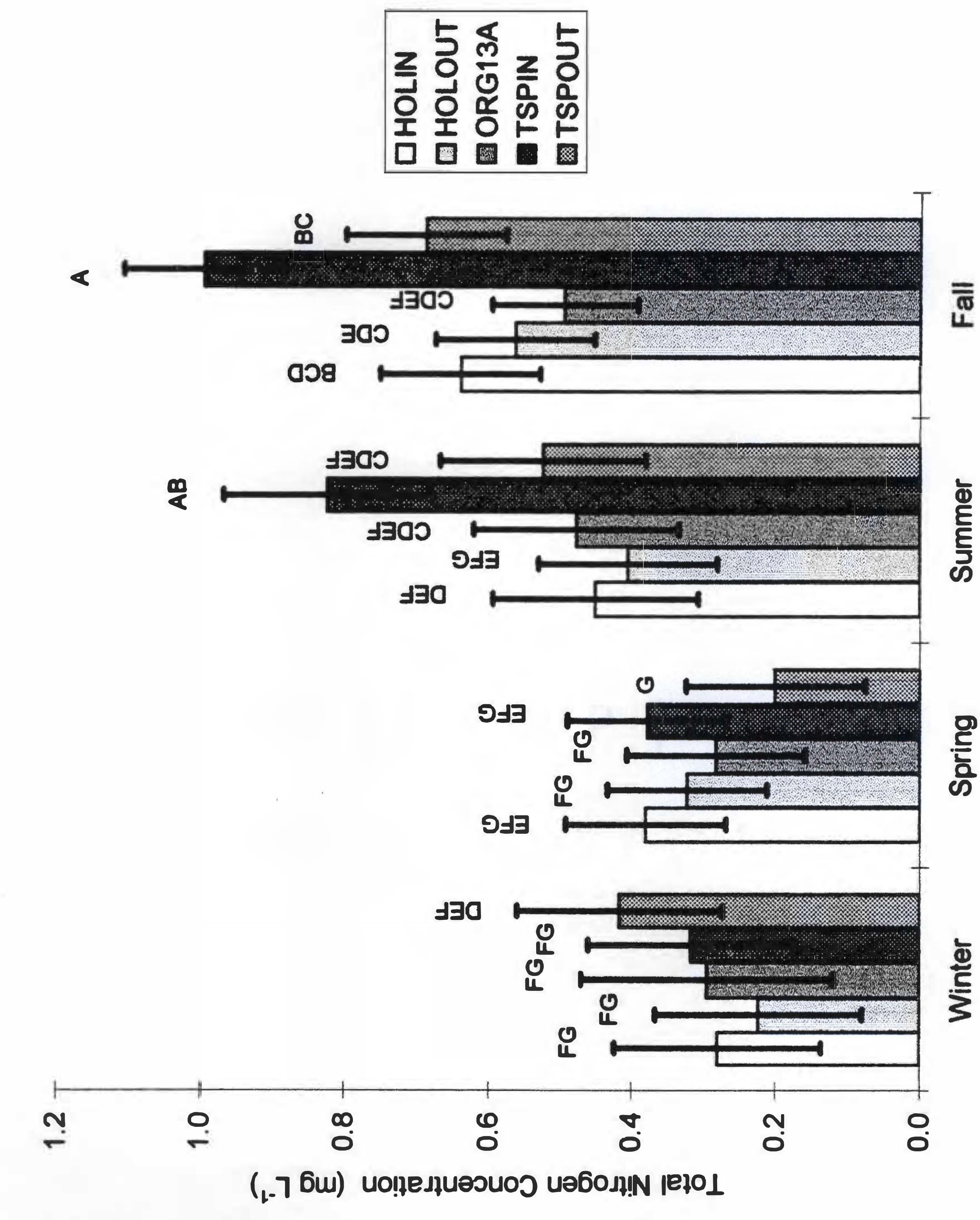

Figure 43. Average seasonal TotN concentrations at springs and insurgence/resurgence pairs during baseflow conditions. Letters indicate significant differences and crossbars indicate the standard error.

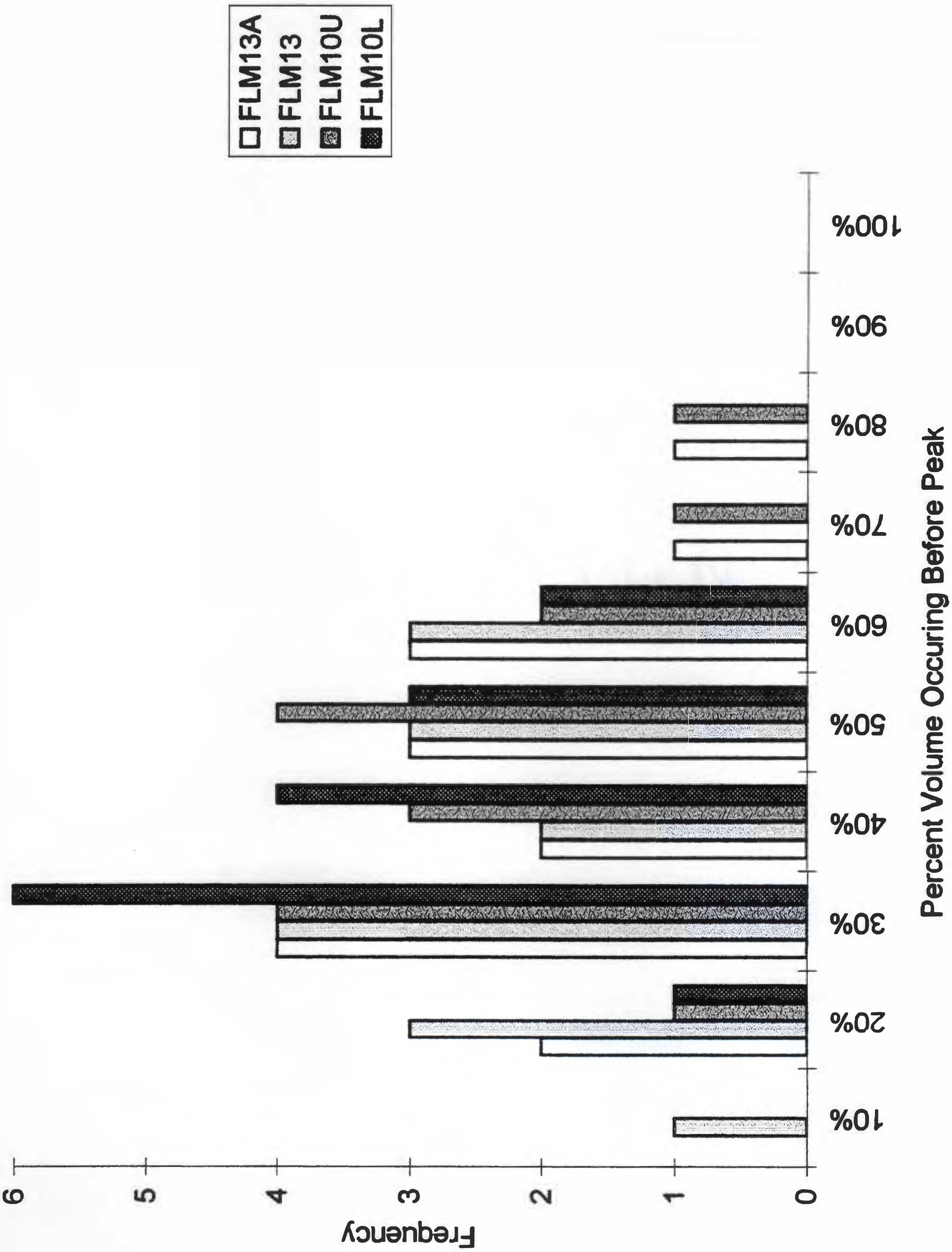

Figure 44. Frequency of storms in terms of percent cumulative event volume before peak for 16 medium and low flow events at each flume.

hydrograph peak, while non-wetland flume responses averaged between 30% and 40% occurring before the hydrograph peaks. The slight shifting of the response was probably influenced by the smaller watersheds reaching baseflow conditions more quickly. The arbitrary methods by which hydrographs were separated may also compound the difficulty in comparing watersheds.

There were a number of factors controlling the stream hydrologic responses. Antecedent moisture conditions, and rainfall are probably the most significant factors controlling hydrograph dynamics. Wilson *et al.*, 1990 and 1991a, reported a subsurface component to stream flow as a result of perched water tables developing during winter periods. Winter events where rainfall was of low intensity, long duration, would allow more water to be infiltrated. Thus, hydrographs responded slowly with more flow occurring before the peak. Spring, summer, and fall rainfall events were of high intensity and short duration. These conditions would likely cause infiltration capacity in the wetter areas near streams to be exceeded more quickly causing overland flow which would result in a quicker stream response. Large rain events, as opposed to small, where the water table was allowed to rise, streams had increased percentages of flow occurring after the peak. Conditions associated with winter rain events were more likely to have a larger percentage of flow occurring before the peak, while those associated with spring, summer, and fall had a smaller percentage occurring before the peak.

The average cumulative volume generated by each watershed for the 16 events observed were 27×10^3 L ha^{-1} for FLM13A, 11×10^3 L ha^{-1} for FLM13, 15×10^3 L ha^{-1} for FLM10U, and 18×10^3 L ha^{-1} for FLM10L. This indicated that watersheds influenced by wetlands generated more water per unit area than the non-wetland watersheds. This is supported by piezometer data which showed that wetlands can serve as discharge areas. While streams were independent of influences from physiographic position during baseflow conditions this was probably not the case during stormflow. Mulholland (1993) showed in hydrograph separation models that water from the vadose zone and saturated soil were the predominant components of stream storm response. Another observation was that as watershed size increased, it appeared that less water on a per area basis was measured at the flumes. This may have been caused by a discrepancy between topographic area versus catchment area, or that subsurface flow may have bypassed the flumes in the larger watersheds. For instance, while watershed 13A was only 1.5 ha topographically, its effective catchment contributing area may have been larger due to subsurface flow. The flow lost from the larger watersheds could either be due to subsurface lateral flow, or increased downward movement into the bedrock. The loss of flow due to overland bypass would not be a factor during medium and low flow events.

High Flow Hydrologic Responses:

Two large storm events were intensively studied for flow rates and chemistry. The January 14, 1995 event delivered 74 mm of rain over 40 hours, and reached a peak rate of 10 mm in a single hour. Watershed 13 had the largest measured hydrologic response on a per area basis to this event (Fig. 45), and watershed 10 may have had a larger response at FLM10L where an undetermined amount of flow was occurring as bypass. Normalized peak flow rates were approximately 12 L s^{-1} ha^{-1} at FLM13,

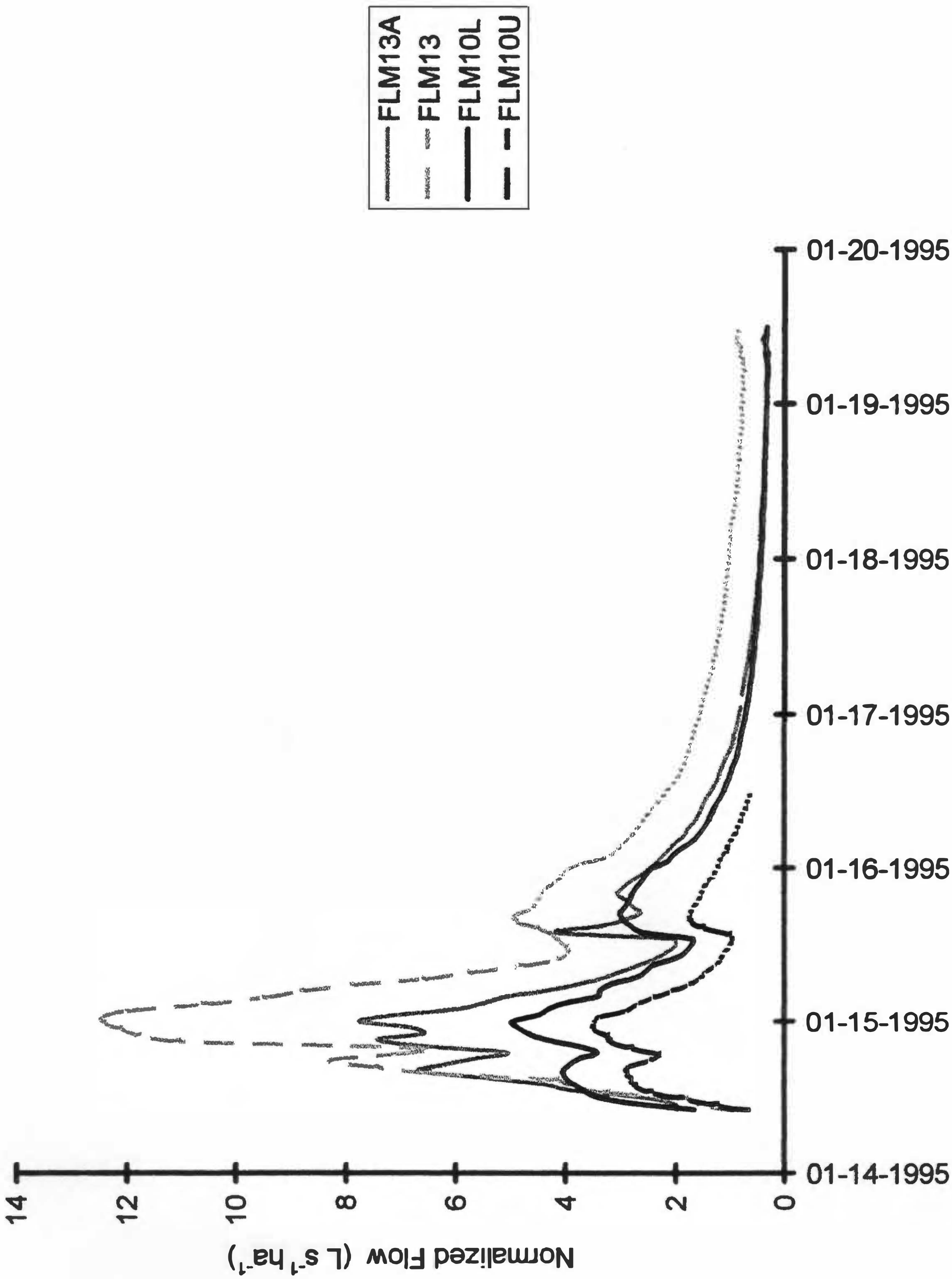

Figure 45. Normalized flow recorded at each of the flumes during a storm event, January 14, 1995.

8.0 L s^{-1} ha^{-1} at FLM13A, 5.0 L s^{-1} ha^{-1} at FLM10L, and 3.5 L s^{-1} ha^{-1} at flume FLM10U. The May 1, 1995 event delivered 30 mm in 8 hours, and peaked at 20 mm in a single hour. In this event, watershed 13A had the largest hydrologic response to the event (Fig. 46). Normalized, peak flow rates were approximately 7.5 L s^{-1} ha^{-1} at FLM13A, and 3.0 L s^{-1} ha^{-1} at the other flumes. The flow rates measured at these flumes may be biased by overland bypass that was not observed. Stream responses to the large January 14 event were longer and less flashy. Each flume registered a peak flow rate within six to 12 hours, and returned to baseflow conditions in about two to three days. During the May 1 event, flumes registered peak flow within three hours, and returned to baseflow conditions within 18 hours. The difference was likely due to antecedent moisture conditions, and the type of rain event. The January 14 event delivered rain intermittently over a longer period while the watersheds were already very wet. The streams responded with multiple peaks and more even distribution of flow before and after each peak. The May 1 event was more intense and of shorter duration, the watersheds likely had less water as evapotranspiration actively dewatered the watersheds.

Stormflow Water Chemistry:

Medium and low flow water chemistry:

Analysis of chemistry responses to medium and low flow events was not successful. Stream responses were less than 12 hours total duration for the events where the autosamplers were activated. This allowed for only three to five samples per watershed being collected during the event, or the event was missed altogether. Programming of autosamplers

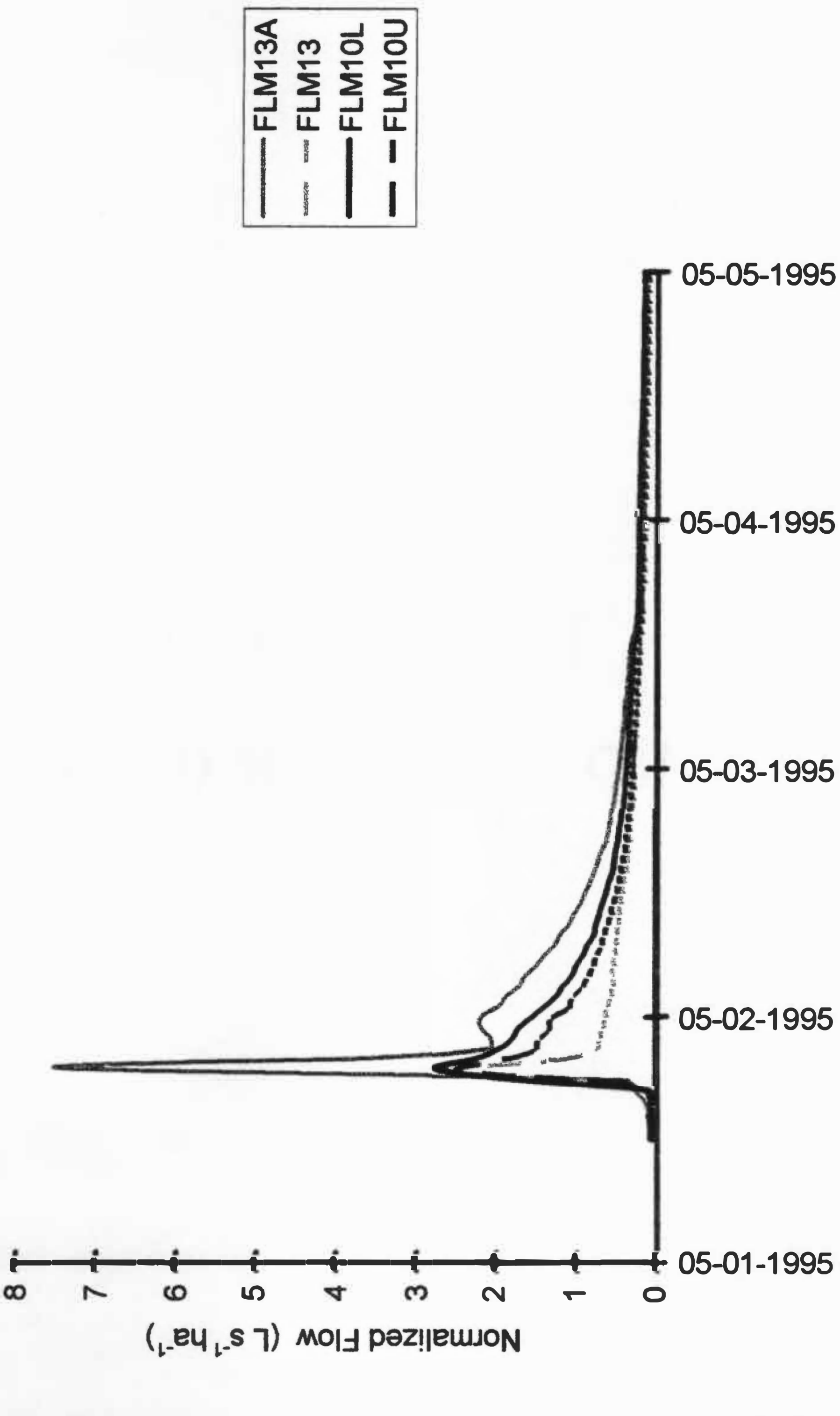

Figure 46. Normalized flow recorded at each of the flumes during a storm event, May 1, 1995.

needed to be much more intensive, and started precisely at the beginning of these unpredictable storms.

High Flow Calcium Response:

Calcium concentrations decreased as stream flow rates increased in response to the January 14, 1995, and May 1, 1995 storm events (Figs. 47 and 48). During the winter event, calcium concentrations started at an initial concentration of about 12 mg L^{-1} at FLM13A, 9 mg L^{-1} at FLM13, and 6 mg L^{-1} at FLM10U and FLM10L. As flow increased, calcium concentrations decreased rapidly, and at peak flow, concentrations had dropped to a minimum of 8 mg L^{-1} at FLM13A and 3 mg L^{-1} at the other flumes. Similar responses in calcium chemistry were reported by Wilson *et al.*, 1991b, and Mulholland, 1993. Initial concentrations were 22 mg L^{-1} at FLM13A, 12 mg L^{-1} at FLM13, 15 mg L^{-1} at FLM10L, and 10 mg L^{-1} at FLM10U during the summer event. Two key features were observed for the calcium concentrations. Absolute concentrations were higher in spring as compared to winter, and as the streams returned to baseflow conditions the calcium concentrations gradually increased toward pre-event concentrations. This was possibly the result of seasonal dilution or calcium dissolution based on flow rates and flow paths. As the watersheds dewatered, bedrock dissolution caused higher calcium concentrations in groundwater.

Luxmoore *et al.*, 1990, proposed flow contributed along shorter path lengths during rain events would cause lower concentrations due to less interaction with the matrix. However, Wilson *et al.*(1991 a and b), reported results which contradicted this conclusion, and calcium concentrations did not return to their original values as quickly as

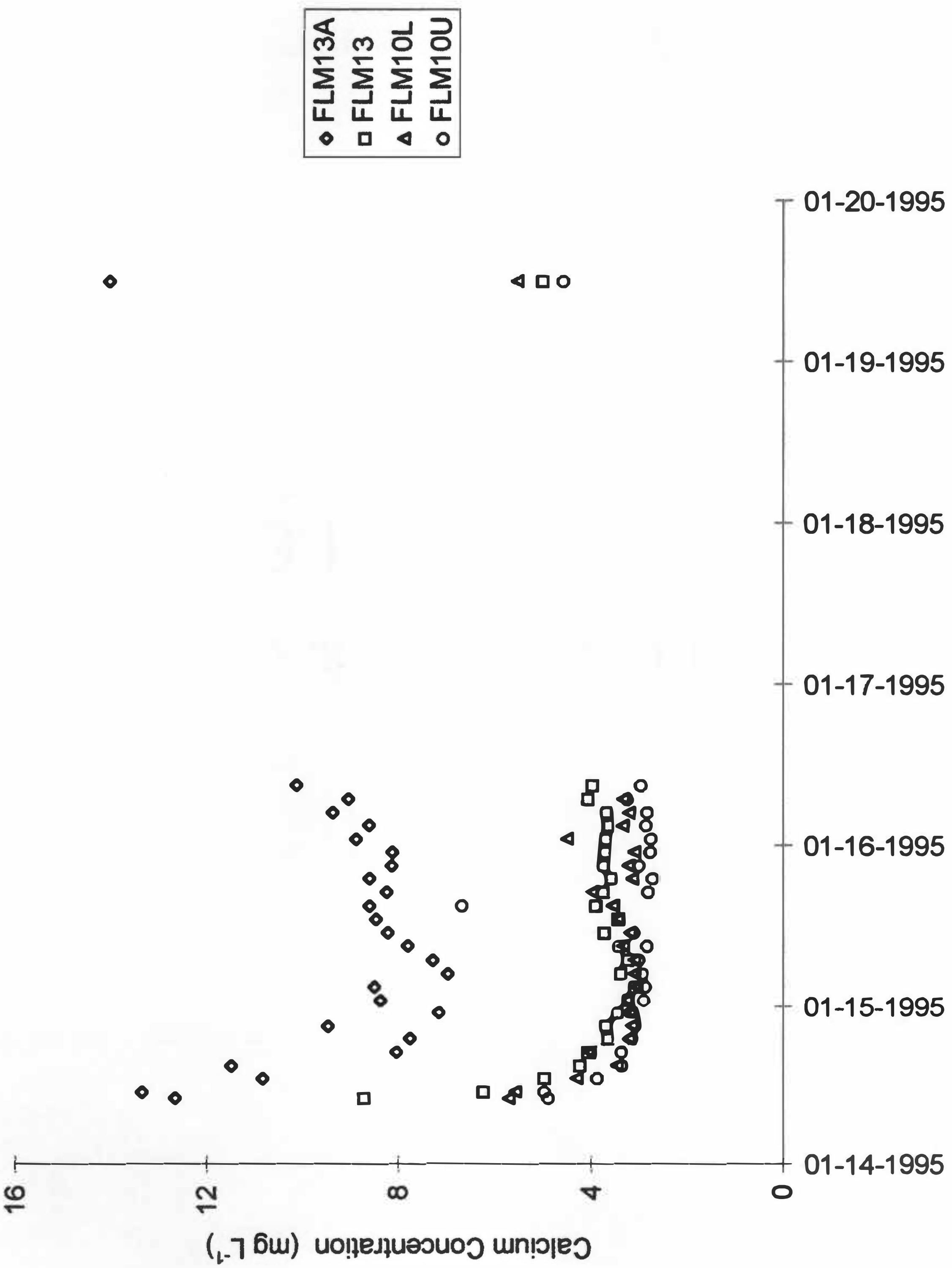

Figure 47. Calcium concentration response to the January 14, 1995 storm event.

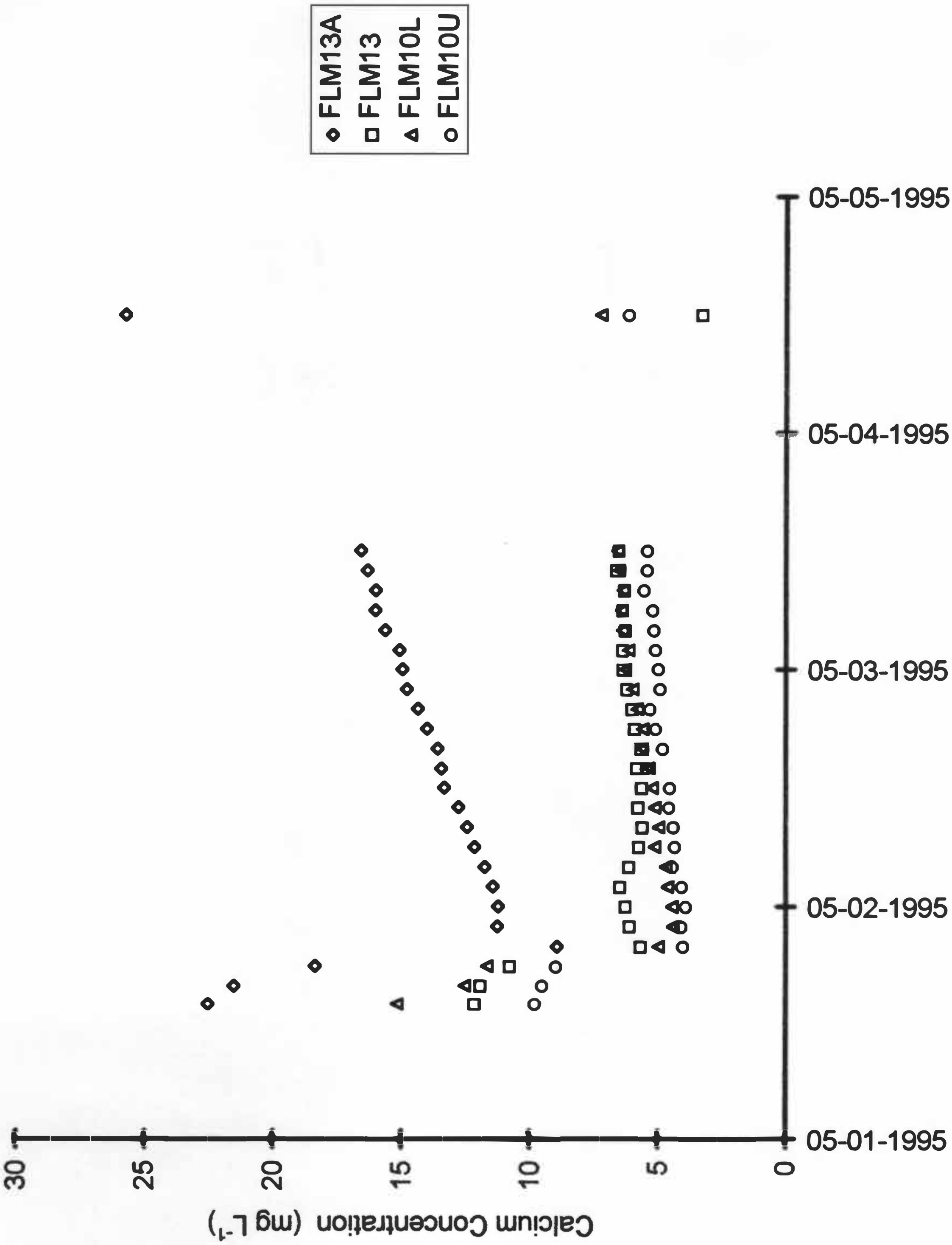

Figure 48. Calcium concentration response to the May 1, 1995 storm event.

flow rates decreased. Mulholland (1993) reported that soil water, both vadose and phreatic, were responsible for the bulk of streamflow generated in response to a rain event. Lower concentrations of calcium in the soil would explain the decrease in calcium concentrations as the soil water component of flow increased. The relative differences between water samples from watersheds are like those seen in soil samples. Despite the decrease in calcium concentrations, peak export of calcium occurred close to peak flow as concentrations only decreased by 30 to 50 percent while flow rates increased by more than 1000 percent.

High Flow Magnesium Response:

Magnesium concentrations also decreased as the stream flow increased in response to the January 14, 1995, and May 1, 1995 storm events (Figs. 49 and 50). During the January 14 event, magnesium concentrations had initial concentrations of 2.5 mg L^{-1} at FLM13A and about 1.7 mg L^{-1} at FLM13, FLM10U, and FLM10L. Concentrations dropped to 1.7 mg L^{-1} at FLM13A and 1.1 mg L^{-1} at the other flumes at peak flow. During the summer event initial concentrations were 4.5 mg L^{-1} at FLM13A, 2.3 mg L^{-1} at FLM13, and 3 mg L^{-1} at FLM10U and FLM10L. Magnesium rich water was flushed by new, low magnesium water in a similar response to calcium. Hill (1993), reported a similar dilution effect although the concentrations were about twice those observed on these watersheds. Magnesium concentrations dropped rapidly, and rebounded more slowly than the flow rates. This may be due to a lag in the dissolution of magnesium into the groundwater. As in calcium, peak export of magnesium was also observed as flow increased by more than

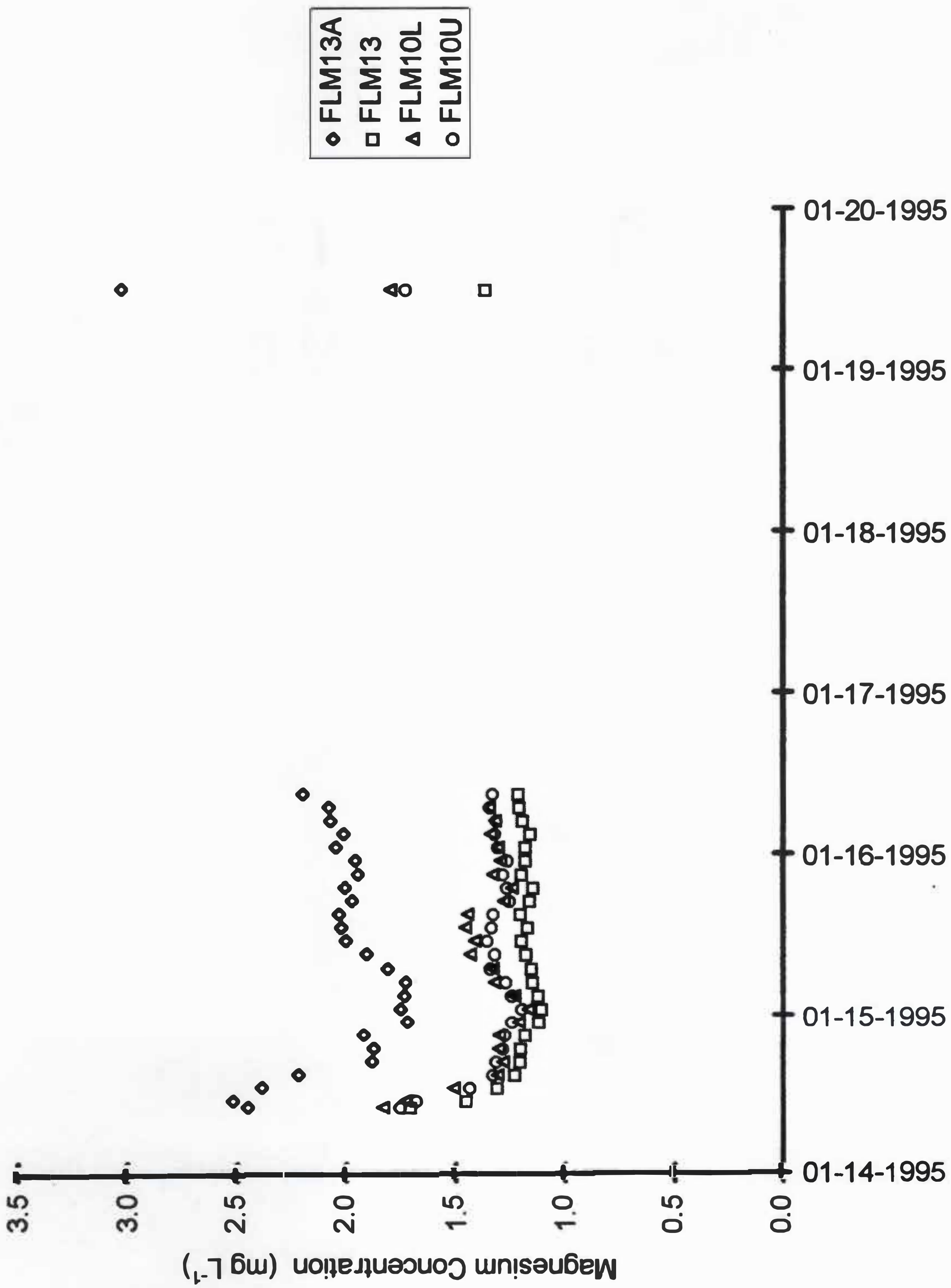

Figure 49. Magnesium concentration response to the January 14, 1995 storm event.

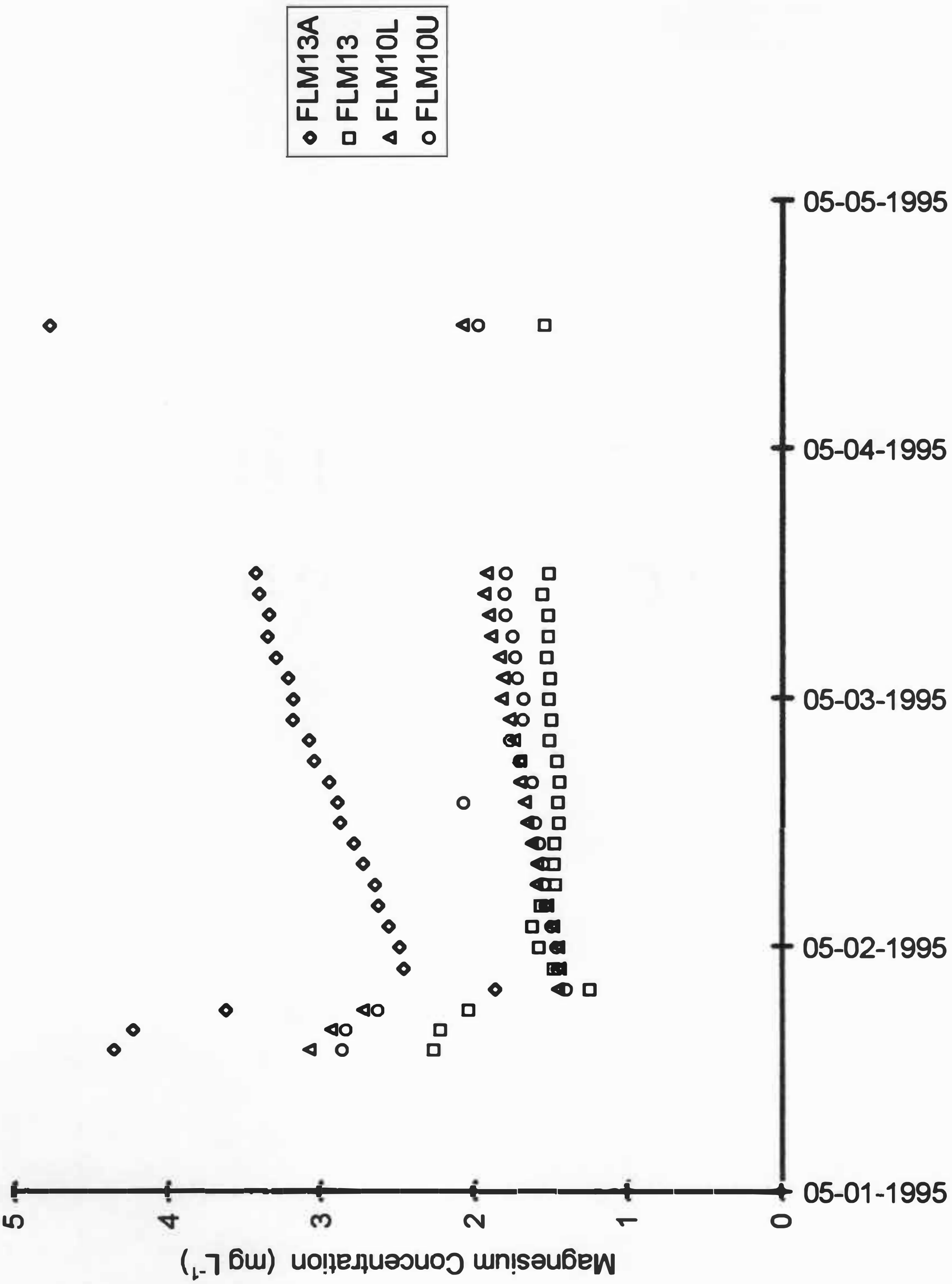

Figure 50. Magnesium concentration response to the May 1, 1995 storm event.

1000 percent while concentrations only dropped by 30 percent from baseflow. These responses support the discussion made for calcium.

High Flow DOC Response:

DOC concentrations decreased as the streams responded to the January 14, 1995, and May 1, 1995 storm events (Figs. 51 and 52). During the January 14 event, the initial DOC concentrations was 18 mg L^{-1} at FLM13A. the concentrations dropped to a minimum of 7 mg L^{-1} at FLM13A at, or near, peak flow. During the summer event initial concentrations were 20 mg L^{-1} at FLM13A, and between 10 and 13 mg L^{-1} at FLM13, FLM10L, and FLM10U. It was difficult to describe the observations from this event. These observations appear to indicate a dilution effect as in calcium and magnesium. However, with the exception of FLM13A on the May 1 event, DOC concentrations did not increase as baseflow conditions returned. There may have been a flushing effect of organic carbon sources, and slow rebound of DOC concentration due to the solubility. Jardine *et al.*, 1990, reported increases in DOC concentrations where DOC peaked at, or slightly before, peak stream flow. They concluded that DOC rich water was flushed early in a rain event, and limited DOC exchanges occurred thereafter. Peak export of carbon also occurred during these events as DOC concentrations decreased by only 30 to 50 percent while flow rates increased by more than 1000 percent.

High Flow Total N Response:

Total nitrogen concentrations appeared to be independent of flow rates for both the January 14, 1995 and the May 1, 1995 events (Figs. 53 and 54). The majority of concentrations at the flumes ranged from

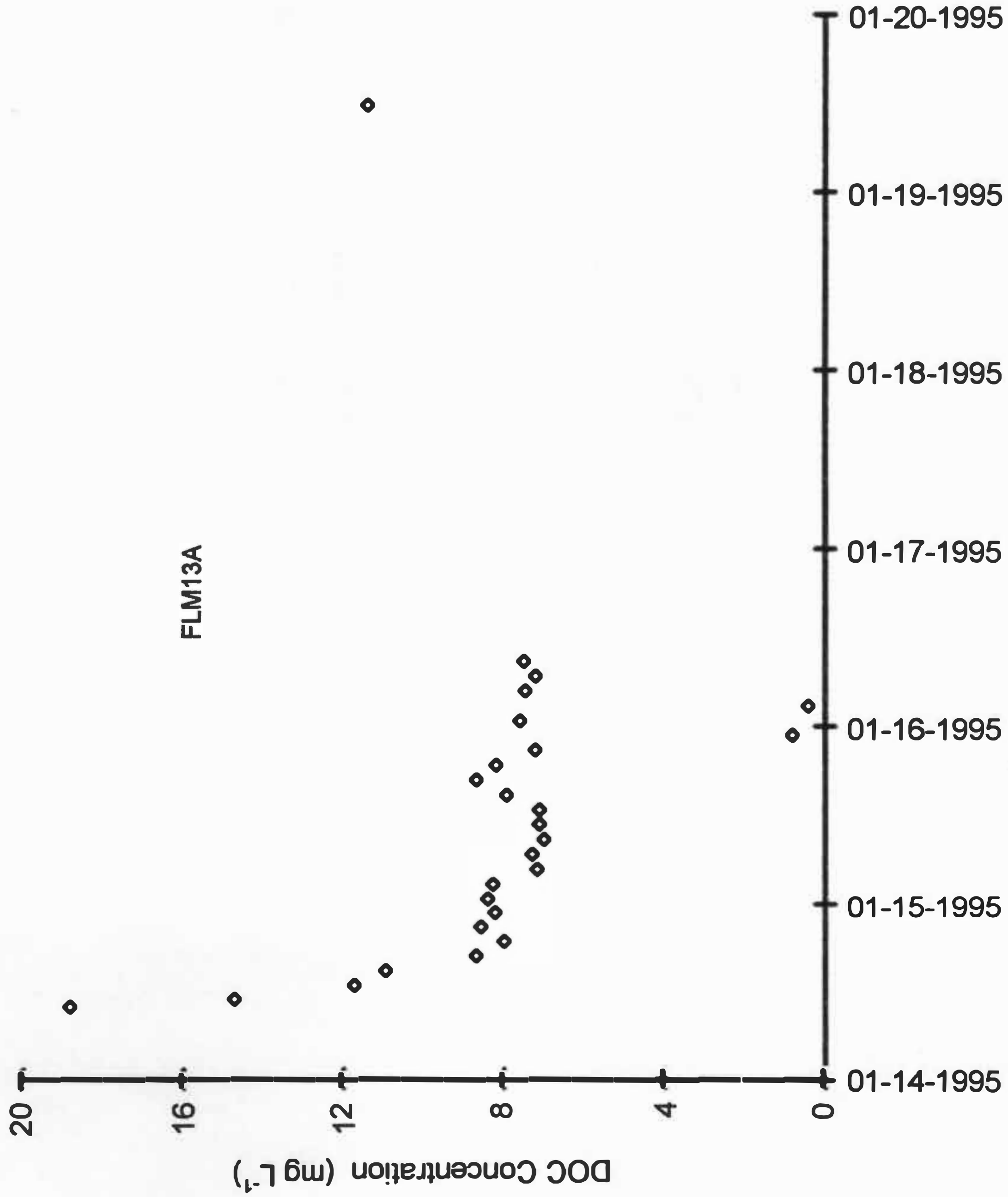

Figure 51. DOC concentration response to the January 14, 1995 storm event.

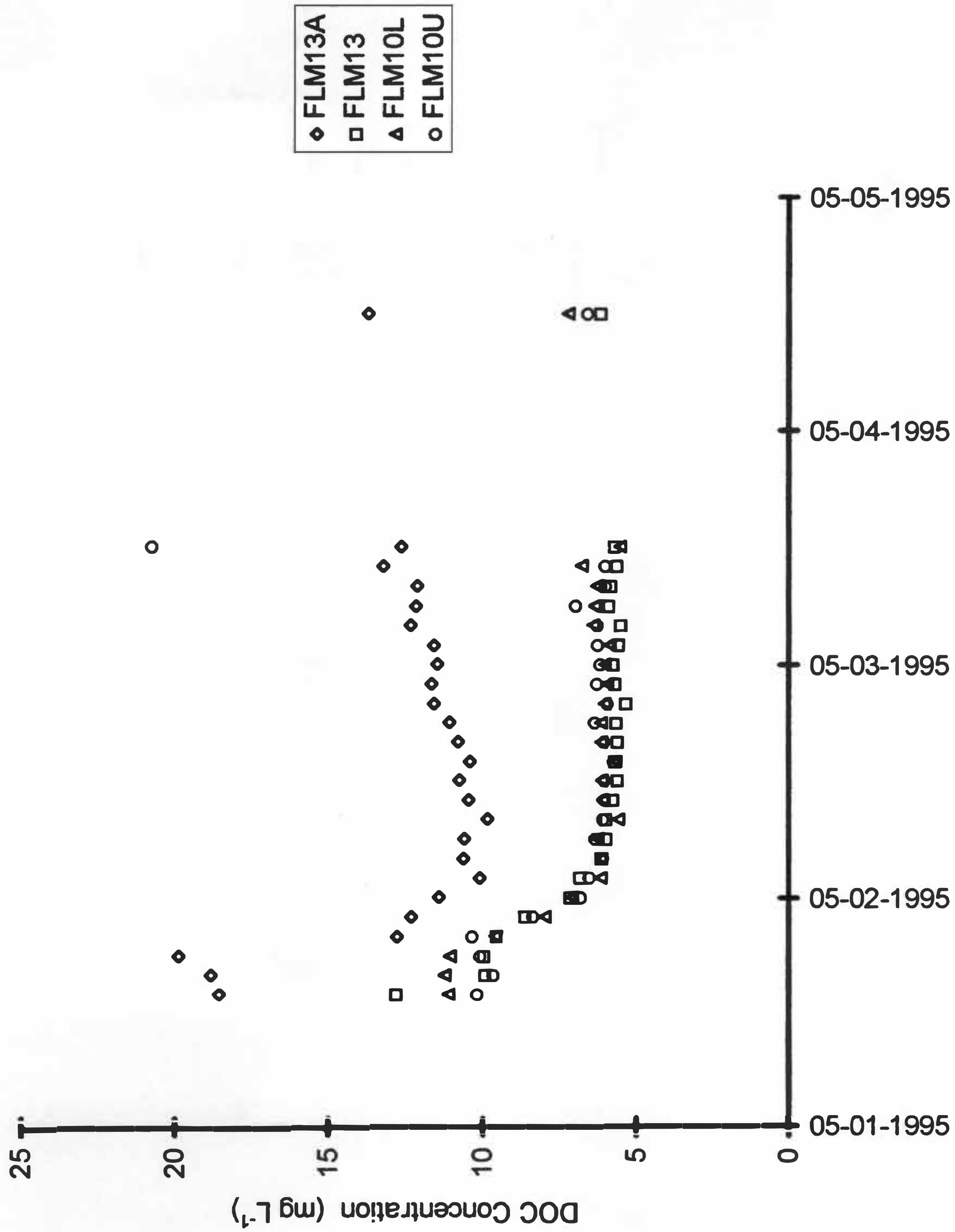

Figure 52. DOC concentration response to the May 1, 1995 storm event.

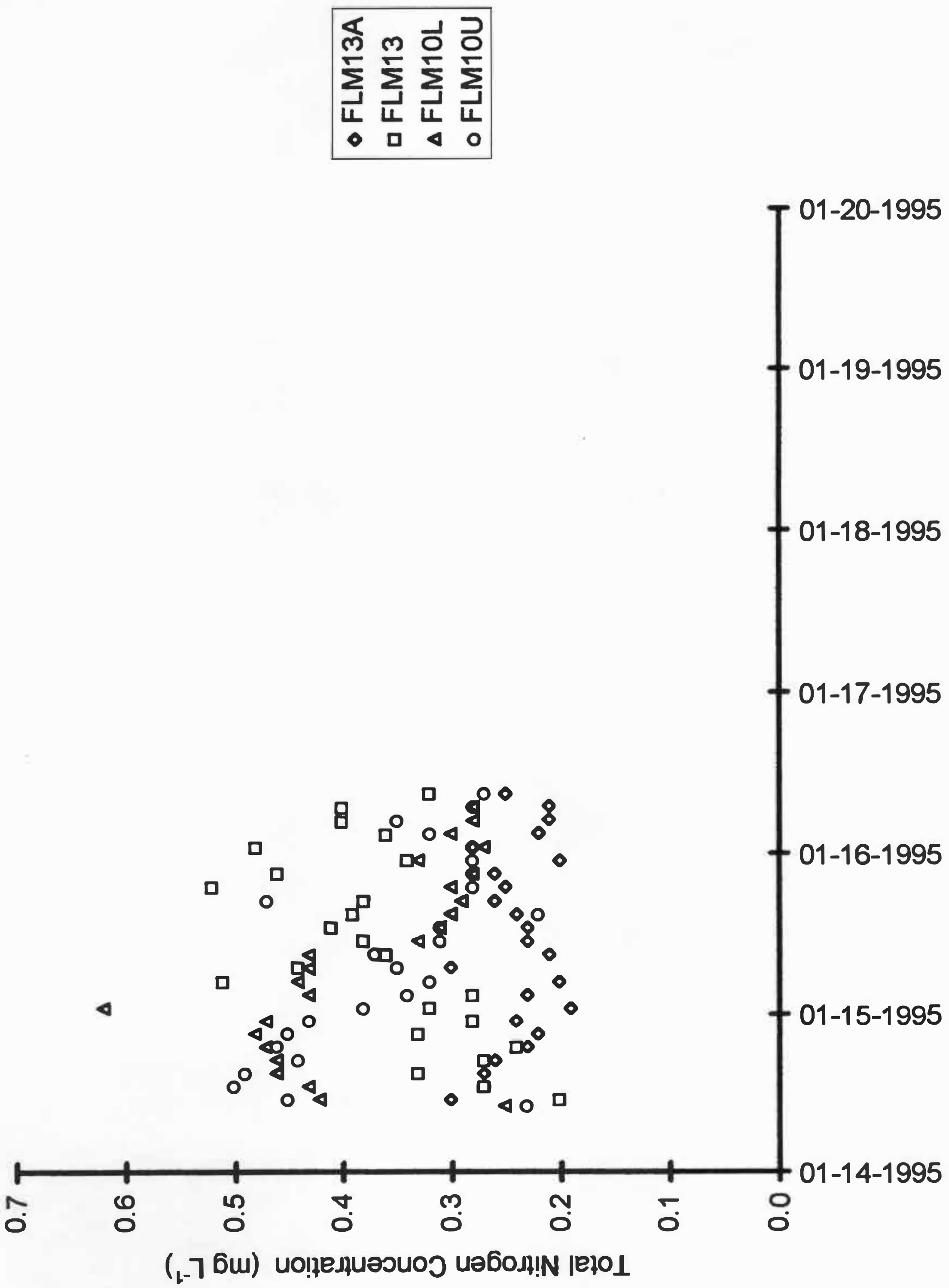

Figure 53. TotN concentration response to the January 14, 1995 storm event.

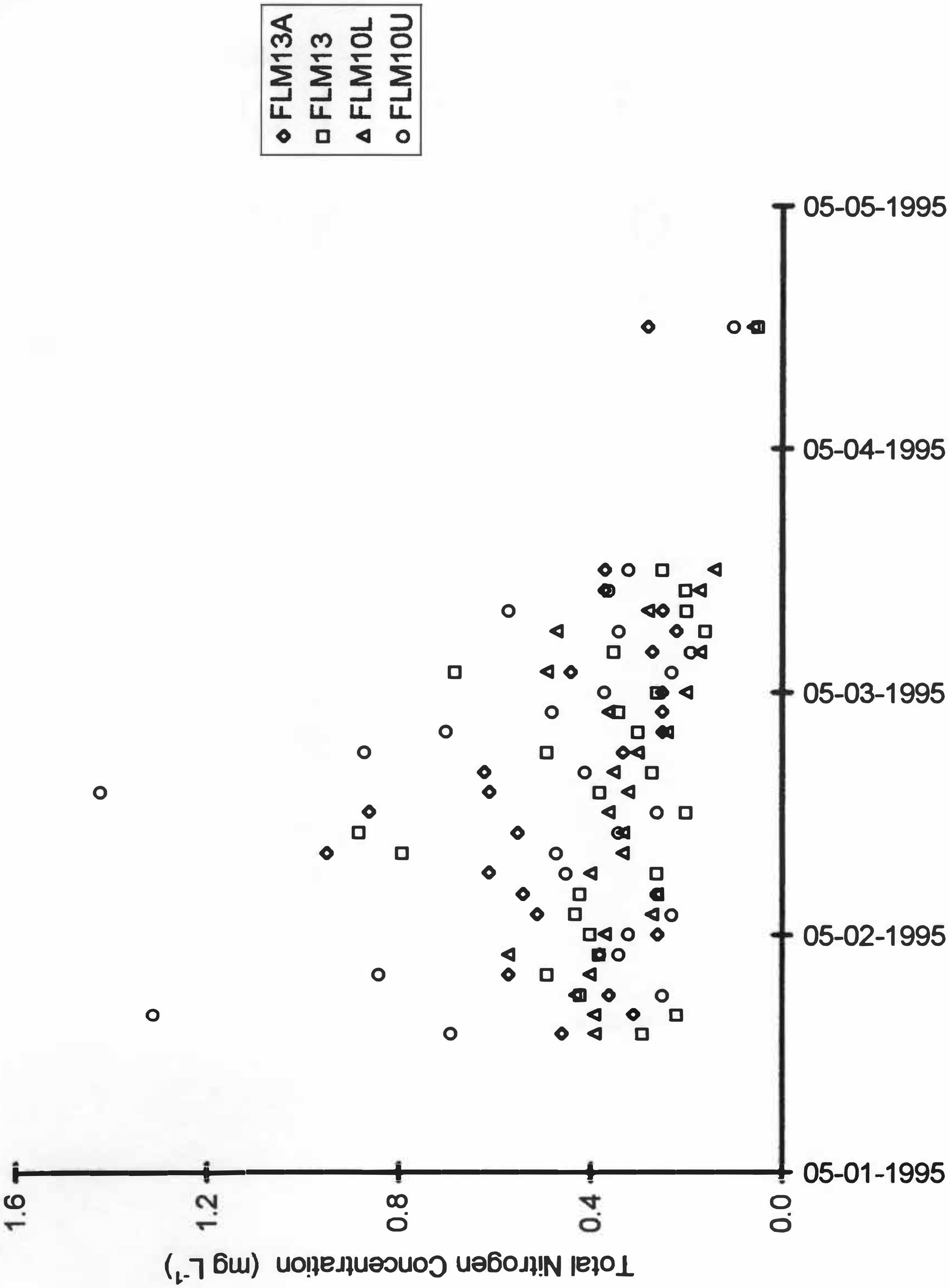

Figure 54. TotN concentration response to the May 1, 1995 storm event.

0.2 mg L^{-1} to 0.6 mg L^{-1} during both events. However, the May 1 event did have concentrations from any given flume that were as high as 0.8 mg L^{-1} to 1.5 mg L^{-1} at 6, 8, 20, 22, 24, and 28 hours into the event. This observation was possibly due to the higher biological activity during May.

CHAPTER IV

CONCLUSIONS

Hydrology:

Water tables elevations on these sites were dynamic, and measurements would have to be continuous to fully study their characteristics. Water tables monitored on wetland and non-wetland transects had several distinguishing features between seasons and physiographic positions. Winter and spring baseflow conditions, as well as large rain events caused elevated water tables, while summer and fall conditions resulted in lower levels. In terms of physiographic positions, water tables on non-wetlands were deeper with a hydraulic gradient towards the stream channels which were deeply incised. Water tables across wetland transects were typified by shallow stream channels, and shallow and level water tables. The wetland areas were more prone to widespread flooding, and changes in physical and hydrologic characteristics across the entire bottom.

Cross sections of wetland transects indicated that streams were feeding the water table during the drier periods of the year. This suggested that riparian bottoms may have had a limited impact on stream hydrology and chemistry within the watersheds during baseflow conditions. This condition or process was less apparent in the non-wetland transects. However, the non-wetland and wetland transects seemed hydrologically similar during the dry season. This may suggest that functions in the wetland and non-wetland systems became somewhat alike during the drier periods.

Well and piezometer data also indicated that subsurface lateral flow through the riparian cross section was probably an important unmeasured component of the water leaving each watershed. This component was not directly measured, but these results suggest it should be considered in future studies of these wetlands. Areas of possible upward recharge were detected which would indicate a system similar to that of Hill, 1993. However, the spatial features of this system were too complex to make a clear determination of subsurface water movement within these areas given the instrumentation available in this study.

Streamflow from the watersheds during baseflow conditions was primarily affected by precipitation and evapotranspiration. Baseflow dropped off considerably as forest biological activity increased. Streamflow was predominantly controlled by the antecedent moisture conditions, watershed size, and rainfall duration and intensity during rain events. Wetland areas appeared to yield more flow per unit area under medium and low flow events. However, there was evidence of bypass by subsurface lateral flow and surface channel bypass in both wetlands and non-wetlands during some high flow conditions.

Water Chemistry:

Wetlands had higher concentrations of calcium, magnesium, and DOC than non-wetland bottoms, and uplands contained the lowest concentrations of these solutes under baseflow conditions. Total nitrogen dynamics was difficult to assess due to the high variability and the low concentrations detected (< 1 mg L^{-1}) within sample classifications. The high solute concentrations within the physiographic positions did not translate to higher concentrations in the stream under baseflow conditions. Calcium chemistry indicated streams appeared to be independent of influences from physiographic positions during baseflow, and many factors appeared to be affecting this: wetland functions, subsurface flow, and soil characteristics of the watersheds.

Higher solute concentrations in wetlands, rather than other physiographic positions and stream channels indicate that wetlands are acting as nutrient sinks assuming that the instruments were in equilibrium with the immediate surroundings. Subsurface lateral flow may have prevented the wetland processes on water chemistry from being seen within the areas of study, however, it was not known whether these processes may have come to fruition further downstream. If water moved from stream channel into the profile in wetland areas, and from the profile to the channel in non-wetland areas, it is possible that water influenced by the wetlands may have an effect on stream chemistry in physiographic positions further downstream.

Pedological characterization of the watersheds indicated that water chemistry should be strongly influenced by soils. Water samples that were collected from watershed 13A, and to a lesser extent watershed 13, had higher solute concentrations than watershed 10 as in the soil characterization. Calcium and magnesium are weathering products from the dissolution of the limestone and limey-shale parent materials. The high base saturations, and CEC's in watershed 13A gave it a higher availability of solutes such as calcium and magnesium.

Flow rates during baseflow and storm flow also had an influence on calcium and magnesium chemistry. Higher flow rates resulted in significantly lower solute concentrations. This was probably a dilution effect of calcium and magnesium rich baseflow water by incoming water from precipitation. Absolute concentrations of calcium and magnesium were observed to drop during the high flow rates of stormflow, and winter and spring baseflow. Peak export of these solutes was occurring close to peak flow since the decrease in solute concentration was much less than the increased flow rates.

In terms of export, DOC concentrations were basically unaffected by seasonal changes in baseflow. Storm events caused brief, sudden flushing of DOC, but concentrations in the stream channel remained between 10 and 20 mg L^{-1} throughout the study period.

Wetlands appeared to have a limited effect on channel chemistry. Springs and insurgence/resurgence locations did not seem to act as an interface between the stream and wetland areas. The main effect appeared to be less variability in solute chemistry in the localized sources as compared to the outflow points. The outflow point is generally considered to integrate these localized sources within the watershed, and should result in a lessening of variability. However, the variability at the flume was greater than the variability within each local source, and is the result of the variability between these local sources. There was significant variation between insurgence/resurgence pairs in watershed 10, but there was little difference between the insurgence and resurgence within the pair. Clearly they were not acting as an interface between wetland and stream processes.

REFERENCES

REFERENCES

Adams, S.M., and C.T. Hackney. 1992. Ecological processes in Southeastern United States aquatic ecosystems. Ch. 1: pp. 3-17. Offprints from Biodiversity of southeastern United States/Aquatic Communities. John Wiley & Sons, NY

Ameel, J.J., R.P. Axler, and C.J. Owen. 1993. Persulphate digestion for determination of total nitrogen and phosphorous in low-nutrient waters. American Environmental Laboratory, 5(6):1,8-11

Bardecki, M. 1984. What value wetlands? Journal of Soil and Water Conservation 39(3):166-169.

Bazemore, D.E., K.N. Eshleman, and K.J. Hollenbeck. 1994. The role of soil water in stormflow generation in a forested headwater catchment: synthesis of natural tracer and hydrometric evidence. Journal of Hydrology, 162:47-75.

Brinson, M.M. 1993. Changes in the functioning of wetlands along environmental gradients. Wetlands 13(2):65-74.

Chen, Z.S. 1992. Morphological characteristics, pedogenic processes, and classification of wet soils in Taiwan. Proceedings of the eighth international soil correlation meeting (VIII ISCOM): Characterization, classification, and utilization of wet soils. USDA, SCS, National Soil Survey Center, Lincoln, NE. pp. 53-59.

Daniels, R.B., and S.W. Boul. 1992. Water table dynamics and significance to soil genesis. Proceedings of the eighth international soil correlation meeting (VIII ISCOM): Characterization, classification, and utilization of wet soils. USDA, SCS, National Soil Survey Center, Lincoln, NE. pp. 64-74.

Davis, M.M. 1994. Decision sequence for functional wetlands restoration. Water, Air and Soil Pollution 77:497-511.

Faulkner, S.P., and W.H. Patrick, Jr. 1992. Redox processes and diagnostic wetland soil indicators in bottomland hardwood forests. Soil Science Society of America Journal, 56:856-865.

Federal Interagency Committee for Wetlands Delineation. 1987. Federal Manual for Identifying and Delineating Jurisdictional Wetlands. U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, Washington DC Cooperative technical publication. 76 pp.

Foss, J.E., C.R. Coppock, C.A. Stiles, and M.J. Boyce. 1995. Detailed soil mapping of three small wetland riparian areas in East Tennessee. Agronomy Abstracts. p. 333.

Freeze, R.A., and J.A. Cherry. 1979. Groundwater. Prentice-Hall, NY. 604 pp.

Genereux, D.P., H.F. Hemond, and P.J. Mulholland. 1993 Use of radon-222 and calcium as tracers in a three end-member model for streamflow generation of the West Fork of Walker Branch Watershed. Journal of Hydrology, 142:167-211.

Hewlett, J.D., and A.R. Hibbert. 1967. Factors affecting the response of small watersheds to precipitation in humid areas. International Symposium on Forest Hydrology, Sopper and Lull (eds.), Pergamon Press, Oxford, pp. 275-290.

Hewlett, J.D. 1982. Principles of forest hydrology. University of Georgia Press, Athens, Ga. 183 pp.

Hill, A.R., and J.M. Waddington. 1993. Analysis of storm run-off sources using oxygen-18 in a headwater swamp. Hydrologic Processes, 7:305-316.

Hill, A.R. 1993. Base cation chemistry of storm runoff in a forested headwater wetland. Water Resources Research, 29(8):2663-2673.

Hurt, G.W., and W.E. Puckett. 1992. Proposed hydric soil criteria and their field identification. Proceedings of the eighth international soil correlation meeting (VIII ISCOM): Characterization, classification, and utilization of wet soils. USDA, SCS, National Soil Survey Center, Lincoln, NE. pp. 148-151.

James, H.R., and T.E. Fenton. 1993. Water tables in paired artificially drained and undrained soil catenas in Iowa. Soil Science Society of America Journal, 57:774-781.

Jardine, P.M., G.V. Wilson, J.F. McCarthy, R.J. Luxmoore, D.L. Taylor, and L.W. Zelazny. 1990. Hydrogeochemical processes controlling the transport of dissolved organic carbon through a forested hillslope. Journal of Contaminant Hydrology, 6:3-19.

Johnson, D.W., and R.I. Van Hook (eds.). 1989. Analysis of biogeochemical chemical cycling processes in Walker Branch Watershed. Springer-Verlag, NY. 401 pp.

Kangas, P.C. 1990. Long-term development of forested wetlands. Ecosystems of the World 15: Forested Wetlands. Ch 3. Elsevier, NY pp. 25-52.

Kramer, P.J., and T.T. Kozlowski. 1979. Physiology of woody plants. Academic Press. 811 pp.

Limiztke, P.J. 1995. Map of physiographic and geologic features of the East Tennessee region. ORNL.

Lietzke, D.A., S.Y. Lee, and R.E. Lambert. 1988. Soils, surficial geology, and geomorphology of the Bear Creek Valley Low-Level Waste Disposal Development and Demonstration Program Site. ORNL/TM-10573. Oak Ridge, TN. 151 pp.

Litator, M.I. 1988. Review of soil solution samplers. Water Resources Research, 24(5):727-733.

Lotspeich, F.B. 1980. Watersheds as the basic ecosystem. Water Resources Bulletin 16(4):581-586.

Lugo, A.E., S. Brown, and M.M. Brinson. 1990. Concepts in wetland ecology. Ecosystems of the World 15: Forested Wetlands. Ch 4. Elsevier, NY pp. 53-79.

Luxmoore, R.J. 1981. Micro-, meso-, and macroporosity of soil. Soil Science Society of America Journal 45:671-672.

Luxmoore, R.J., P.M. Jardine, G.V. Wilson, J.R. Jones, and L.W. Zelazny. 1990. Physical and chemical controls of preferred path flow through a forested hillslope. Geoderma 46:139-154.

Mausbach, M.J. 1992. Soil survey interpretations of wet soils. Proceedings of the eighth international soil correlation meeting (VIII ISCOM): Characterization, classification, and utilization of wet soils. USDA, SCS, National Soil Survey Center, Lincoln, NE. pp. 179-184.

Mitsch, W.J., and J.G. Gosselink. 1986. Wetlands. 1st ed. Van Nostrand Reinhold Co., NY 539 pp.

Mitsch, W.J., and J.G. Gosselink. 1993. Wetlands. 2nd ed. Van Nostrand Reinhold Co., NY 722 pp.

Mitsuchi, M. 1992. Anthropically induced wet soils. Proceedings of the eighth international soil correlation meeting (VIII ISCOM): Characterization, classification, and utilization of wet soils. USDA, SCS, National Soil Survey Center, Lincoln, NE. pp. 179-184.

Moneymaker, R.H. 1981. Soil survey of Anderson County, Tennessee. USDA, Washington D.C. 165 pp.

Mullholland, P.J. 1993. Hydrometric and stream chemistry evidence of three storm flowpaths in Walker Branch Watershed. Journal of Hydrology, 151:291-316.

Pearson, S.M. 1994. Landscape-level processes and wetland conservation in the southern Appalachian mountains. Water, Air, and Soil Pollution, 77:321-332.

Phillips, J.D. 1989. Fluvial sediment storage in wetlands. Water Resources Bulletin 25(4):867-873.

Rosensteel, B.A., and C.C. Trettin. 1993. Identification and characterization of wetlands in the Bear Creek Watershed. ORNL Y/TS-1016. Oak Ridge, TN. 53 pp.

Roulet, N.T. 1990. Hydrology of a headwater basin wetland: groundwater discharge and wetland maintenance. Hydrologic Processes 4:387-400.

Schot, P.P., and M.J. Wassen. 1993. Calcium concentrations in wetland groundwater in relation to water sources and soil conditions in the recharge area. Journal of Hydrology, 141:197-217.

Science Applications International Corporation. 1993. Remedial investigation work plan for Bear Creek Valley operable unit 4 (shallow groundwater in Bear Creek Valley) at the Oak Ridge Y-12 Plant, Oak Ridge, Tennessee. Department of Energy, DOE/OR/01-1115&D3 y/ER-56&D3.

Severson, R.C., and D.F. Grigal. 1976. Soil solution concentrations: effect of extraction time using porous ceramic cups under constant tension. Water Resources Bulletin, 12(6):1161:1170.

Soil Survey Staff. 1992. Keys to Soil Taxonomy. SMSS Technical Monograph No. 19. AID-USDA-SCS-SMSS. 5th ed. VPI&SU, Blacksburg, Va. pp. 541.

Stiles, C.A., J.E. Foss, R.J. Luxmoore, and S.Y. Lee. 1995. Application of soil characterization data to detailed riparian wetland maps. Agronomy abstracts. p. 333.

Stone, E.L. 1993. Soil burrowing and mixing by a crayfish. Soil Science Society of America Journal, 57:1096-1099.

Szogi, A.A., and W.H. Hudnall. 1992. Classification of soils in Louisiana according to "endoaquic" and "epiaquic" concepts. Proceedings of the eighth international soil correlation meeting (VIII ISCOM): Characterization, classification, and utilization of wet soils. USDA, SCS, National Soil Survey Center, Lincoln, NE. pp. 271-278.

Tansley, A.G. 1935. The use and abuse of vegetational concepts and terms. Ecology 16:284-307.

Tiner, R.W. 1991. The concept of a hydrophytae for wetland identification. Bioscience 41(4):236-247.

Trettin, C.C., and B.A. Rosensteel. 1992. Functional linkages between riparian wetlands and tributaries of Bear Creek. Unpublished proposal. Oak Ridge National Laboratory. 9 pp.

Trettin, C.C., W.M. Aust, M.M. Davis, A.S. Weakley, and J. Wisniewski. 1994. Wetlands of the interior Southeastern United States: conference summary statement. Water, Air and Soil Pollution 77:199-205.

Triska, F.G., J.H. Duff, and R.J. Avanzino. 1993. Patterns of hydrological exchange and nutrient transformations in the hyporeic zone of a gravel-bottom stream: examining terrestrial-aquatic linkages. Freshwater Biology, 29:259-274.

Wakeley, J.S. 1994. Identification of wetlands in the Southern Appalachian region and the certification of wetland delineators. Water, Air and Soil Pollution 77:217-226.

Walbridge, M.R. 1993. Functions and values of forested wetlands in the Southern United States. Journal of Forestry 91(5):15-19.

Wels, C., R.J. Cornett, and B.D. Lazerte. 1990. Hydrograph separation: a comparison of geochemical and isotopic tracers. Journal of Hydrology, 122:253-274.

Wilson, G.V., P.M. Jardine, R.J. Luxmoore, and J.R. Jones. 1990. Hydrology of a forested hillslope during storm events. Geoderma 46:119-138.

Wilson, G.V., P.M. Jardine, R.J. Luxmoore, L.W. Zelazny, D.A. Lietzke, and D.E. Todd. 1991a. Hydrogeochemical processes controlling subsurface transport from an upper subcatchment of Walker Branch Watershed during storm events: 1. Hydrologic transport processes. Journal of Hydrology 123:297-316.

Wilson, G.V., P.M. Jardine, R.J. Luxmoore, L.W. Zelazny, D.A. Lietzke, and D.E. Todd. 1991b. Hydrogeochemical processes controlling subsurface transport from an upper subcatchment of Walker Branch Watershed during storm events: 2. Solute transport processes. Journal of Hydrology 123:317-336.

Winter, T.C. 1988. A conceptual framework for assessing cumulative impacts on the hydrology of non-tidal wetlands. Environmental Management, 12(5):605-620.

Witty, J.E., and R.J. Engel. 1992. The concept of the aquic soil moisture regime: intent and difficulties. Proceedings of the eighth international soil correlation meeting (VIII ISCOM): Characterization, classification, and utilization of wet soils. USDA, SCS, National Soil Survey Center, Lincoln, NE. pp. 236-327.

Vepraskas, M.J., and W.R. Guertal. 1992. Morphological indicators of soil wetness. Proceedings of the eighth international soil correlation meeting (VIII ISCOM): Characterization, classification, and utilization of wet soils. USDA, SCS, National Soil Survey Center, Lincoln, NE. pp. 307-312.

Yeakley, J.A., J.L. Meyer, and W.T. Swank. 1994. Hillslope nutrient flux during near-stream vegetation removal 1) a multi-scaled modeling design. Water, Air, and Soil Pollution, 77:229-246.

Yavitt, J.B. 1994. Carbon dynamics in Appalachian peatlands of West Virginia, and Western Maryland. Water, Air, and Soil Pollution, 77:271-290.

APPENDIX

Appendix A: R-squares and statistical significance for all chemistry four-way interactions.

	Element												
	DOC	F	Cl	NO3	SO4	Ca	Fe	Mg	Mn	S	Si	TotN	N-NH4
R-squared	0.397	0.609	0.358	0.231	0.586	0.710	0.402	0.693	0.680	0.559	0.407	0.704	0.323
Model	Probability > F												
Seasl	2.0E-06	6.0E-75	1.0E-08	0.083	3.0E-08	4.0E-19	0.001	1.0E-20	5.0E-09	0.350	2.0E-21	4.0E-28	1.7E-04
Wshd	0.107	0.060	0.296	0.663	1.0E-27	0.002	0.013	5.0E-07	0.028	3.0E-26	0.407	0.003	0.015
Seasl*Wshd	2.0E-05	4.0E-05	0.333	0.984	0.317	0.285	0.900	0.191	0.277	0.689	0.366	3.7E-04	0.417
Pos	0.002	0.803	0.707	0.311	0.479	1.0E-37	0.001	6.0E-22	9.0E-26	0.673	9.0E-05	2.0E-07	0.004
Seasl*Pos	0.745	0.966	0.847	0.882	0.036	1.0E-06	2.0E-04	5.0E-06	4.0E-12	0.130	0.206	0.006	0.322
Wshd*Pos	0.165	0.971	0.195	0.829	0.001	0.046	0.931	0.117	0.004	0.001	0.995	0.005	0.228
Seasl*Wshd*Pos	0.958	0.618	0.910	0.953	0.500	0.001	0.026	1.3E-04	2.0E-05	0.089	0.558	1.5E-04	0.542
Asp	0.135	0.779	0.656	0.534	0.005	0.001	0.958	1.0E-07	0.140	0.103	0.970	0.001	0.884
Seasl*Asp	0.977	0.001	0.785	0.392	0.992	0.026	0.830	0.008	0.995	0.158	0.259	4.6E-04	0.529
Wshd*Asp	0.932	0.323	0.722	0.919	0.280	0.262	0.497	0.817	0.001	0.560	0.618	0.042	0.268
Seasl*Wshd*Asp	1.000	0.118	0.937	0.991	0.245	0.191	0.760	0.034	0.546	2.2E-04	0.765	6.0E-05	0.285
Pos*Asp	0.090	0.090	0.976	0.891	0.777	1.0E-09	0.937	2.0E-06	0.138	0.964	0.002	2.0E-07	0.920
Seasl*Pos*Asp	0.992	0.290	0.892	0.987	0.913	0.583	0.410	0.283	0.980	0.419	0.324	9.0E-07	0.572
Wshd*Pos*Asp	0.516	0.907	0.281	0.813	0.060	0.062	0.864	0.056	1.0E-08	0.010	0.679	3.0E-06	0.676
Seasl*Wshd*Pos*Asp	0.894	0.819	0.237	0.961	0.001	0.779	0.089	0.461	0.199	0.001	0.995	1.0E-05	0.457
NType(Wshd)	0.002	0.753	0.004	0.122	3.0E-07	0.100	7.0E-05	2.0E-05	4.0E-23	4.0E-05	0.786	4.0E-06	0.132
Seasl*NType(Wshd)	0.002	0.851	0.004	0.142	0.581	1.7E-04	0.010	0.020	2.0E-09	0.055	0.367	5.0E-06	0.017
Pos*NType(Wshd)	0.897	0.584	0.222	0.862	0.963	1.4E-04	0.860	6.0E-05	2.0E-23	0.381	0.237	4.0E-08	0.280
Seasl*Pos*NType(Wshd)	0.983	0.533	0.108	0.623	0.193	0.120	0.366	0.642	5.0E-06	0.399	0.996	0.029	0.834
Asp*NType(Wshd)	0.937	0.690	0.174	0.968	1.0E-05	0.265	0.583	0.245	1.0E-13	0.004	0.842	6.0E-05	0.257
Seasl*Asp*NType(Wshd)	1.000	0.927	0.343	0.806	0.600	0.973	0.574	0.518	0.062	0.510	0.043	2.0E-06	0.810
Pos*Asp*NType(Wshd)	0.907	0.773	0.775	0.909	0.594	0.293	2.5E-04	0.010	4.0E-18	0.418	0.112	1.0E-12	0.024

Appendix B. Sample classification and water chemistry data from all collected water samples.

SN	Date	Season	Position Pos	Asp	Location WS	Tran	Dist	Type	pH	DOC	IC Anions F	CL	NO3	SO4	ICP Cations Ca	Fe	Mg	Mn	S	Si	Nitrogen Total N	N-NH4
										mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
1	12-01-1993	Wi	UL	E	10L	9	20	2	5	.	.	.	.	.	2.983	0.017	1.268	0.039	2.810	2.506	.	.
2	12-01-1993	Wi	UL	E	10L	9	9	W	5.8	.	.	.	.	.	6.728	0.016	1.900	0.061	4.364	3.425	.	.
3	12-01-1993	Wi	UL	E	10L	9	9	2	5.9	.	.	.	.	.	6.224	0.026	1.553	0.007	3.919	2.967	.	.
4	12-01-1993	Wi	UL	E	10L	9	9	7	5.4	.	.	.	.	.	2.667	0.000	1.028	0.019	2.442	3.875	.	.
5	12-01-1993	Wi	WL	E	10L	9	3	W	6.9	.	.	.	.	.	41.730	0.010	4.788	0.494	3.231	6.727	.	.
6	12-01-1993	Wi	WL	E	10L	9	3	2	5.5	.	.	.	.	.	24.670	0.037	4.727	4.497	1.352	4.390	.	.
7	12-01-1993	Wi	WL	W	10L	10	2	2	6.8	.	.	.	.	.	14.140	0.125	1.334	1.305	2.349	4.409	.	.
8	12-01-1993	Wi	WL	W	10L	10	7	W	6.6	.	.	.	.	.	23.990	0.048	2.745	2.908	0.874	3.494	.	.
9	12-01-1993	Wi	UL	W	10L	10	18	W	.	.	.	.	.	.	3.060	0.082	0.766	0.179	1.899	3.003	.	.
10	12-01-1993	Wi	UL	W	10L	10	18	2	6.8	.	.	.	.	.	1.560	0.000	0.682	0.086	1.172	2.768	.	.
11	12-01-1993	Wi	UL	W	10L	10	32	2	6	.	.	.	.	.	4.150	0.000	0.684	0.127	3.998	2.962	.	.
12	12-01-1993	Wi	UL	W	10L	10	32	7	5.2	.	.	.	.	.	1.278	0.000	2.395	0.113	3.916	2.545	.	.
13	12-01-1993	Wi	UL	W	10L	10	32	7	5.2	.	.	.	.	.	1.249	0.000	2.381	0.110	3.899	2.519	.	.
14	12-01-1993	Wi	UL	W	10L	12	29	W	5.1	.	.	.	.	.	1.550	0.014	0.542	0.062	1.789	2.797	.	.
15	12-01-1993	Wi	UL	W	10L	12	29	7	6	.	.	.	.	.	1.901	0.000	0.671	0.042	1.391	3.131	.	.
16	12-01-1993	Wi	UL	W	10L	12	16	W	5.4	.	.	.	.	.	1.609	0.044	0.520	0.046	1.672	3.764	.	.
17	12-01-1993	Wi	UL	W	10L	12	16	2	5.6	.	.	.	.	.	1.204	0.000	0.431	0.037	1.645	4.270	.	.
18	12-01-1993	Wi	WL	W	10L	12	7	W	6.2	.	.	.	.	.	18.190	0.217	2.414	0.933	2.255	3.839	.	.
19	12-01-1993	Wi	WL	W	10L	12	2	W	6.2	.	.	.	.	.	10.150	0.050	2.197	0.556	3.537	3.530	.	.
20	12-01-1993	Wi	WL	W	10L	12	2	2	6.1	.	.	.	.	.	7.105	0.011	2.297	0.042	6.585	3.157	.	.
21	12-01-1993	Wi	UL	E	10L	11	2	2	6.2	.	.	.	.	.	1.802	0.033	0.987	0.019	2.223	2.366	.	.
22	12-01-1993	Wi	UL	E	10L	11	7	7	6.2	.	.	.	.	.	1.015	0.000	0.667	0.007	1.495	2.304	.	.
23	12-01-1993	Wi	UL	E	10U	13	11	2	5.9	.	.	.	.	.	2.769	0.000	1.252	0.054	2.695	4.572	.	.
24	12-01-1993	Wi	BL	E	10U	13	2	2	5.9	.	.	.	.	.	5.594	0.000	1.027	0.000	3.559	4.165	.	.
25	12-01-1993	Wi	BL	W	10U	14	2	W	6	.	.	.	.	.	5.596	0.033	1.461	0.360	2.318	3.332	.	.
26	12-01-1993	Wi	BL	W	10U	14	2	2	6.1	.	.	.	.	.	5.108	0.024	1.407	0.027	2.495	2.790	.	.
27	12-01-1993	Wi	BL	W	10U	14	2	7	5.8	.	.	.	.	.	3.443	0.000	1.096	0.700	1.916	3.540	.	.
28	12-01-1993	Wi	BL	W	10U	14	7	W	5.5	.	.	.	.	.	2.506	0.111	0.881	0.014	2.197	3.495	.	.
29	12-01-1993	Wi	BL	W	10U	14	7	2	5.8	.	.	.	.	.	1.896	0.000	0.726	0.011	1.364	2.693	.	.
30	12-01-1993	Wi	BL	W	10U	14	7	7	5.6	.	.	.	.	.	2.751	0.000	1.001	0.021	2.348	4.019	.	.
31	12-01-1993	Wi	UL	W	10U	14	11	2	5.8	.	.	.	.	.	2.629	0.000	1.179	0.316	2.294	3.551	.	.
32	12-01-1993	Wi	UL	W	10U	14	11	7	32	.	.	.	.	.	1.953	0.000	0.775	0.019	2.042	3.429	.	.
33	12-01-1993	Wi	WL	S	10L	FLM	10L	FLM	6.2	.	.	.	.	.	4.678	0.108	1.416	0.037	2.283	3.554	.	.
34	12-01-1993	Wi	WL	S	10L	9-10	10L	STR	6.3	.	.	.	.	.	9.649	0.689	1.505	0.257	1.935	4.101	.	.
35	12-01-1993	Wi	BL	S	10U	FLM	10U	FLM	6.4	.	.	.	.	.	4.038	0.095	1.380	0.026	2.285	3.491	.	.
36	12-01-1993	Wi	UL	E	13A	1	21	2	5.8	.	.	.	.	.	1.716	0.000	1.825	0.039	3.105	3.011	.	.
37	12-01-1993	Wi	UL	E	13A	1	21	7	5.8	.	.	.	.	.	1.912	0.021	1.307	0.038	2.519	3.176	.	.
38	12-01-1993	Wi	WL	E	13A	1	16	2	5.9	.	.	.	.	.	15.220	0.000	1.401	0.008	6.196	4.103	.	.
39	12-01-1993	Wi	WL	E	13A	1	9	2	6.1	.	.	.	.	.	21.270	0.000	3.041	0.000	9.597	4.349	.	.
40	12-01-1993	Wi	WL	E	13A	1	2	2	6	.	.	.	.	.	16.120	0.000	3.021	0.643	11.050	4.493	.	.
41	12-01-1993	Wi	UL	W	13A	2	4	2	6.2	.	.	.	.	.	2.905	0.000	0.640	0.022	2.147	2.473	.	.
42	12-01-1993	Wi	UL	W	13A	2	4	7	6.4	.	.	.	.	.	3.067	0.000	0.404	0.013	1.919	2.877	.	.
43	12-01-1993	Wi	UL	W	13A	2	10	2	6.2	.	.	.	.	.	2.887	0.000	1.992	0.042	4.192	3.344	.	.
44	12-01-1993	Wi	UL	W	13A	2	10	7	6.1	.	.	.	.	.	1.393	0.000	1.194	0.024	2.230	2.188	.	.
45	12-01-1993	Wi	UL	W	13A	4	7	2	6.2	.	.	.	.	.	4.815	0.000	1.319	0.006	4.497	3.481	.	.
46	12-01-1993	STD	STD	STD	STD	STD	STD	STD	.	.	.	.	.	.	11.240	1.703	7.356	0.147	0.000	5.076	.	.
47	12-01-1993	Wi	UL	E	13A	3	11	2	6.3	.	.	.	.	.	3.116	0.000	1.025	0.013	2.675	2.802	.	.
48	12-01-1993	Wi	UL	E	13A	3	11	7	6.3	.	.	.	.	.	2.009	0.000	1.013	0.000	2.510	3.009	.	.
49	12-01-1993	Wi	WL	E	13A	3	6	W	6.5	.	.	.	.	.	18.720	0.010	2.702	0.102	7.636	5.504	.	.
50	12-01-1993	Wi	WL	E	13A	3	2	W	6.5	.	.	.	.	.	13.880	0.672	2.786	0.477	6.367	3.669	.	.
51	12-01-1993	Wi	WL	W	13A	4	2	W	6.4	.	.	.	.	.	11.150	0.019	1.825	0.327	7.220	4.511	.	.
52	12-01-1993	Wi	UL	W	13A	4	7	W	6.2	.	.	.	.	.	7.843	0.022	1.461	0.047	4.518	4.229	.	.
53	12-01-1993	Wi	UL	W	13A	4	7	W	6.2	.	.	.	.	.	7.786	0.025	1.459	0.045	4.529	4.259	.	.

SN	Date	Season	Position Pos	Position Asp	Location WS	Location Tran	Location Dist	Location Type	pH	DOC	IC Anions F	CL	NO3	SO4	ICP Cations Ca	Fe	Mg	Mn	S	Si	Nitrogen Total N	N-NH4
										mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
54	12-01-1993	Wi	UL	W	13A	2	4	W	6.4	.	.	.	.	.	9.749	0.019	1.146	0.006	4.165	5.005	.	.
55	12-01-1993	Wi	WL	E	13A	1	2	W	6.4	.	.	.	.	.	17.780	0.000	2.716	0.036	7.379	4.997	.	.
56	12-01-1993	Wi	WL	E	13A	1	5	W	6.4	.	.	.	.	.	18.990	0.000	2.819	0.051	7.278	4.959	.	.
57	12-01-1993	Wi	WL	E	13A	1	9	W	6.6	.	.	.	.	.	26.390	0.000	3.191	0.243	4.651	3.718	.	.
58	12-01-1993	Wi	WL	E	13A	1	16	W	6.7	.	.	.	.	.	25.200	0.000	2.091	0.185	4.251	5.250	.	.
59	12-01-1993	Wi	WL	S	13A	1-2	13A	STR	6.8	.	.	.	.	.	12.400	0.011	2.281	0.000	7.054	9.939	.	.
60	12-01-1993	Wi	WL	S	13A	1-2	13A	STR	6.8	.	.	.	.	.	12.370	0.012	2.304	0.000	7.103	3.885	.	.
61	12-01-1993	Wi	BL	W	13	6	1	2	6.3	.	.	.	.	.	3.167	0.000	0.497	0.006	1.724	1.965	.	.
62	12-01-1993	Wi	BL	W	13	6	6	2	5.5	.	.	.	.	.	5.030	0.089	0.767	0.020	2.984	3.040	.	.
63	12-01-1993	Wi	BL	W	13	6	11	2	5.8	.	.	.	.	.	3.989	0.021	0.899	0.000	2.685	4.333	.	.
64	12-01-1993	Wi	BL	W	13	6	11	7	6.4	.	.	.	.	.	20.500	0.000	2.242	0.000	4.850	3.494	.	.
65	12-01-1993	Wi	UL	W	13	6	17	2	6.4	.	.	.	.	.	1.888	0.000	1.046	0.042	1.853	3.226	.	.
66	12-01-1993	Wi	UL	W	13	8	11	7	6.2	.	.	.	.	.	2.795	0.000	0.597	0.000	2.225	2.865	.	.
67	12-01-1993	Wi	UL	W	13	8	11	7	6.1	.	.	.	.	.	2.506	0.000	0.578	0.000	2.185	2.807	.	.
68	12-01-1993	Wi	BL	W	13	8	6	7	6.2	.	.	.	.	.	4.055	0.000	0.868	0.000	2.918	3.781	.	.
69	12-01-1993	Wi	BL	W	13	8	2	2	6.2	.	.	.	.	.	3.037	0.000	0.807	0.000	2.115	3.253	.	.
70	12-01-1993	Wi	BL	E	13	7	3	W	6.2	.	.	.	.	.	2.033	0.000	0.556	0.000	1.841	2.302	.	.
71	12-01-1993	Wi	BL	E	13	7	7	2	5.9	.	.	.	.	.	6.079	0.000	1.980	0.279	4.166	3.802	.	.
72	12-01-1993	Wi	BL	E	13	7	7	7	6.3	.	.	.	.	.	10.600	0.000	3.015	0.045	3.207	3.163	.	.
73	12-01-1993	Wi	UL	E	13	7	11	2	6.2	.	.	.	.	.	1.986	0.000	1.036	0.000	2.129	2.971	.	.
74	12-01-1993	Wi	UL	E	13	7	11	7	5.9	.	.	.	.	.	1.575	0.000	1.069	0.000	2.278	2.755	.	.
75	12-01-1993	Wi	UL	E	13	7	11	7	6	.	.	.	.	.	1.470	0.000	1.067	0.000	2.262	2.722	.	.
76	12-01-1993	Wi	BL	E	13	7	7	W	6.1	.	.	.	.	.	8.222	0.011	2.103	1.072	2.954	3.545	.	.
77	12-01-1993	Wi	BL	E	13	7	3	W	6.2	.	.	.	.	.	10.930	0.110	2.403	0.609	3.628	3.682	.	.
78	12-01-1993	Wi	BL	E	13	7	3	W	6.4	.	.	.	.	.	10.930	0.104	2.394	0.612	3.584	3.619	.	.
79	12-01-1993	Wi	BL	W	13	8	2	W	6.3	.	.	.	.	.	5.923	0.000	1.416	0.077	3.503	3.088	.	.
80	12-01-1993	Wi	BL	W	13	8	6	W	6.2	.	.	.	.	.	7.281	0.035	1.670	0.000	3.744	3.281	.	.
81	12-01-1993	Wi	UL	W	13	8	11	W	6.3	.	.	.	.	.	6.633	0.037	1.346	0.023	3.323	3.492	.	.
82	12-01-1993	Wi	UL	W	13	6	17	W	6.3	.	.	.	.	.	5.622	0.027	0.801	0.000	2.240	3.855	.	.
83	12-01-1993	Wi	BL	W	13	6	11	W	6.3	.	.	.	.	.	20.500	0.000	2.432	0.070	4.917	4.080	.	.
84	12-01-1993	Wi	BL	W	13	6	6	W	6.7	.	.	.	.	.	22.170	0.000	2.459	0.009	5.497	3.605	.	.
85	12-01-1993	Wi	BL	W	13	6	1	W	6.6	.	.	.	.	.	25.030	0.000	2.850	0.058	4.946	4.460	.	.
86	12-01-1993	Wi	BL	W	13	6	1	W	6.6	.	.	.	.	.	25.410	0.000	2.921	0.059	4.975	4.488	.	.
87	12-01-1993	Wi	BL	E	13	5	2	W	6.4	.	.	.	.	.	7.115	0.018	1.690	0.018	4.755	3.419	.	.
88	12-01-1993	Wi	BL	S	13	5-6	13	STR	6.6	.	.	.	.	.	6.808	0.216	1.384	0.000	2.612	3.671	.	.
89	12-01-1993	Wi	BL	S	13	5-6	13	STR	6.6	.	.	.	.	.	6.832	0.223	1.388	0.000	2.622	3.625	.	.
90	01-26-1994	Wi	UL	E	13A	1	21	7	6.1	5.343	2.646	1.336	0.046	15.922	1.577	0.000	1.703	0.000	3.342	2.235	.	0.110
91	01-26-1994	Wi	UL	E	13A	1	21	2	5.8	8.262	2.639	0.861	0.000	13.526	1.428	0.000	1.247	0.018	2.937	2.147	.	0.150
92	01-26-1994	Wi	WL	E	13A	1	16	2	6	15.000	2.594	1.017	0.102	13.516	14.900	0.000	1.357	0.000	3.039	4.249	.	0.090
93	01-26-1994	Wi	WL	E	13A	1	9	2	6.2	13.630	2.561	0.997	0.598	14.900	11.170	0.000	1.549	0.000	3.254	3.014	.	0.040
94	01-26-1994	Wi	WL	E	13A	1	5	2	6.5	8.624	2.669	0.706	0.227	7.031	3.302	0.032	0.573	0.000	1.621	1.593	.	0.050
95	01-26-1994	Wi	WL	E	13A	1	2	2	6	6.938	2.600	1.076	0.073	36.956	8.996	0.000	1.753	0.074	7.406	3.573	.	0.200
96	01-26-1994	Wi	UL	W	13A	2	4	2	6.7	3.340	1.044	0.786	0.000	9.556	2.164	0.000	0.547	0.000	2.132	1.694	.	0.190
97	01-26-1994	Wi	UL	W	13A	2	4	7	6.6	3.153	2.720	0.552	0.000	7.314	2.334	0.000	0.292	0.000	1.620	2.225	.	0.050
98	01-26-1994	Wi	UL	W	13A	2	10	2	6.3	7.460	2.727	1.128	0.000	19.607	2.559	0.000	1.847	0.000	4.037	2.540	.	0.000
99	01-26-1994	Wi	UL	W	13A	2	10	7	6.3	2.171	1.062	0.792	0.000	11.861	1.304	0.000	1.186	0.000	2.611	1.708	.	0.050
100	01-26-1994	Wi	UL	W	13A	2	10	7	6	3.026	1.039	0.688	0.000	12.273	1.279	0.000	1.200	0.000	2.664	1.700	.	0.220
101	01-26-1994	Wi	UL	W	13A	4	7	2	5.4	6.069	0.989	1.210	0.000	15.206	3.314	0.000	0.929	0.000	3.299	2.941	.	0.110
102	01-26-1994	Wi	WL	E	13A	3	2	2	5.2	3.929	2.710	0.775	0.083	28.036	5.104	0.158	1.006	0.737	5.847	2.292	.	0.290
103	01-26-1994	Wi	WL	E	13A	3	6	2	5.6	18.580	2.724	1.058	0.000	23.888	11.750	0.000	1.998	0.083	5.100	4.820	.	0.340
104	01-26-1994	Wi	UL	E	13A	3	11	2	5.9	6.790	2.600	0.698	0.000	8.212	1.966	0.000	0.654	0.000	1.839	1.745	.	0.030
105	01-26-1994	Wi	WL	E	13A	3	6	W	6.2	15.280	2.531	1.032	0.000	23.806	16.190	0.000	2.294	0.123	5.119	5.187	.	0.220
106	01-26-1994	Wi	WL	E	13A	3	2	2	6.4	10.760	2.578	1.068	0.000	21.633	9.462	0.088	2.197	0.899	4.659	3.092	.	0.530

SN	Date	Season	Position Pos	Asp	Location WS	Tran	Dist	Type	pH	DOC	IC Anions F	CL	NO3	SO4	ICP Cations Ca	Fe	Mg	Mn	S	Si	Nitrogen Total N	N-NH4
										mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
107	01-26-1994	Wi	WL	E	13A	3	2	2	6.4	10.720	2.539	1.045	0.000	22.061	9.489	0.100	2.199	0.924	4.687	3.062	.	0.580
108	01-26-1994	Wi	WL	E	13A	3	2	W	6.4	10.240	2.584	1.073	0.084	20.632	8.771	0.000	1.906	0.235	4.446	3.303	.	0.280
109	01-26-1994	Wi	WL	W	13A	4	2	W	6.2	5.045	2.556	0.918	0.047	19.408	6.230	0.000	1.102	0.099	4.203	3.351	.	0.180
110	01-26-1994	Wi	WL	W	13A	4	2	W	6.1	5.879	2.553	0.907	0.047	19.392	6.302	0.000	1.107	0.096	4.221	3.381	.	0.150
111	01-26-1994	Wi	UL	W	13A	4	7	W	6	6.788	2.735	0.814	0.000	13.255	8.398	0.000	1.599	0.028	3.044	3.793	.	0.000
112	01-26-1994	Wi	UL	W	13A	2	4	W	6.1	9.791	2.732	1.096	0.000	13.284	14.310	0.000	1.612	0.067	3.044	4.730	.	0.050
113	01-26-1994	Wi	WL	E	13A	1	2	W	6.2	14.290	2.680	1.007	0.169	20.205	20.940	0.107	3.009	0.463	4.412	4.258	.	0.240
114	01-26-1994	Wi	WL	E	13A	1	5	W	6.2	14.250	2.692	0.884	0.096	19.108	20.900	0.000	2.918	0.057	4.241	4.379	.	0.060
115	01-26-1994	Wi	WL	E	13A	1	9	W	6.3	20.390	2.636	1.054	0.054	20.823	31.160	0.000	3.757	0.493	4.539	3.363	.	0.050
116	01-26-1994	Wi	WL	E	13A	1	16	W	6.5	14.820	2.673	0.989	0.207	12.059	23.380	0.000	1.987	0.046	2.791	4.890	.	0.070
117	01-26-1994	Wi	WL	S	13A	3-4	13A	STR	6.7	7.976	2.697	0.908	0.000	16.160	9.351	0.000	2.233	0.000	3.577	3.306	.	0.000
118	01-26-1994	Wi	WL	S	13A	1-2	13A	STR	6.6	7.594	1.876	0.943	0.000	17.085	10.030	0.000	2.168	0.000	3.732	3.350	.	0.030
119	01-26-1994	Wi	WL	S	13A	FLM	13A	FLM	6.6	7.478	1.903	0.918	0.000	16.471	10.240	0.000	2.149	0.000	3.713	3.356	.	0.070
120	01-26-1994	Wi	BL	S	13	FLM	13	FLM	6.7	4.467	1.884	0.951	0.000	8.974	4.180	0.000	1.187	0.000	2.056	2.602	.	0.000
121	01-26-1994	Wi	BL	S	13	5-6	13	STR	6.6	4.495	1.868	1.001	0.000	9.059	3.797	0.000	1.142	0.010	2.018	2.559	.	0.000
122	01-26-1994	Wi	BL	E	13	5	2	2	6.2	5.478	1.892	0.739	0.000	8.859	2.868	0.000	0.886	0.000	1.963	2.442	.	0.000
123	01-26-1994	Wi	BL	E	13	5	2	7	6.6	28.310	1.839	1.328	0.143	19.333	37.500	0.000	5.162	2.184	4.249	3.981	.	0.000
124	01-26-1994	Wi	BL	E	13	5	2	7	6.9	26.980	1.820	1.302	0.134	19.237	37.960	0.000	5.211	2.242	4.301	3.954	.	0.050
125	01-26-1994	Wi	BL	E	13	5	2	W	6.6	5.193	2.724	0.866	0.000	14.143	5.702	0.000	1.423	0.053	3.096	3.242	.	0.050
126	01-26-1994	Wi	BL	W	13	6	1	2	6.6	7.409	2.723	0.548	0.000	5.014	3.062	0.017	0.441	0.000	1.156	1.122	.	0.060
127	01-26-1994	Wi	BL	W	13	6	6	2	5.9	10.700	2.784	1.180	0.000	9.227	4.849	0.095	0.781	0.119	2.086	2.412	.	0.070
128	01-26-1994	Wi	BL	W	13	6	11	2	5.9	7.003	2.712	0.787	0.000	9.502	3.653	0.033	0.739	0.000	2.068	3.016	.	0.280
129	01-26-1994	Wi	UL	W	13	6	17	2	5.8	3.758	2.783	0.998	0.243	9.795	2.211	0.000	1.219	0.065	2.189	2.056	.	0.100
130	01-26-1994	Wi	UL	W	13	8	11	7	5.5	2.751	2.712	0.812	0.000	10.305	3.593	0.000	0.753	0.000	2.330	2.734	.	0.060
131	01-26-1994	Wi	BL	S	13	7-8	13	STR	5.6	3.530	2.722	0.960	0.000	8.342	2.756	0.000	0.975	0.000	1.863	2.402	.	0.140
132	01-26-1994	Wi	BL	W	13	8	6	2	5.6	4.870	2.665	1.047	0.000	14.556	4.095	0.000	1.205	0.000	3.131	3.041	.	0.070
133	01-26-1994	Wi	BL	W	13	8	6	2	5.5	4.871	2.637	1.029	0.000	14.579	4.058	0.000	1.210	0.000	3.126	3.042	.	0.120
134	01-26-1994	Wi	BL	W	13	8	6	7	5.7	4.525	2.642	1.134	0.082	11.997	4.788	0.000	1.060	0.000	2.644	2.890	.	0.090
135	01-26-1994	Wi	BL	W	13	8	2	2	5.8	3.838	2.657	0.547	0.000	7.391	2.440	0.000	0.688	0.000	1.628	1.974	.	0.110
136	01-26-1994	Wi	BL	E	13	7	3	2	5.7	4.382	2.644	0.531	0.169	5.014	1.520	0.000	0.459	0.000	1.104	1.362	.	0.110
137	01-26-1994	Wi	BL	E	13	7	7	2	5.6	6.417	2.646	1.283	0.074	14.969	5.981	0.000	1.940	0.214	3.244	2.825	.	0.170
138	01-26-1994	Wi	UL	E	13	7	11	7	5.6	1.579	2.650	0.913	0.000	10.854	1.698	0.000	1.338	0.000	2.363	2.076	.	.
139	01-26-1994	Wi	UL	E	13	7	11	W	.	.	.	.	.	.	.	.	.	.	.	.	.	.
140	01-26-1994	Wi	BL	E	13	7	7	W	5.7	4.453	2.394	0.609	0.000	6.607	4.238	0.000	1.397	0.271	0.000	0.000	.	.
141	01-26-1994	Wi	BL	E	13	7	3	W	6.1	11.130	2.398	0.632	0.000	6.708	12.090	0.000	2.881	0.329	0.000	0.000	.	.
142	01-26-1994	Wi	BL	E	13	7	3	W	6.1	9.559	2.414	1.102	0.054	10.339	10.520	0.000	2.543	0.242	0.000	0.000	.	.
143	01-26-1994	Wi	BL	W	13	8	2	W	6.1	7.149	2.377	1.294	0.069	11.659	7.916	0.000	1.758	0.505	0.000	0.000	.	.
144	01-26-1994	Wi	BL	W	13	8	6	W	5.6	5.964	2.370	1.299	0.069	11.572	7.270	0.000	1.434	0.011	0.000	0.000	.	.
145	01-26-1994	Wi	UL	W	13	8	11	W	6	5.200	2.416	0.853	0.083	10.422	5.878	0.000	1.153	0.000	0.000	0.000	.	.
146	01-26-1994	Wi	UL	W	13	6	17	W	6	7.107	2.376	0.787	0.000	10.010	8.351	0.000	1.142	0.000	0.000	0.000	.	.
147	01-26-1994	Wi	BL	W	13	6	11	W	6	11.640	2.467	0.864	0.060	9.796	14.270	0.000	1.738	0.033	0.000	0.000	.	.
148	01-26-1994	Wi	BL	W	13	6	6	W	6.2	14.020	2.472	0.971	0.000	7.486	18.470	0.000	2.066	0.000	0.000	0.000	.	.
149	01-26-1994	Wi	BL	W	13	6	1	W	6.3	17.000	2.470	1.629	0.075	18.712	2.499	0.000	2.845	0.037	0.000	0.000	.	.
150	01-26-1994	Wi	UL	E	10L	9	20	2	5.1	8.269	2.499	1.017	0.000	9.999	3.323	0.015	1.362	0.000	0.000	0.000	.	.
151	01-26-1994	Wi	UL	E	10L	9	9	2	5.5	11.830	2.456	1.054	0.068	12.774	4.904	0.035	1.259	0.000	0.000	0.000	.	.
152	01-26-1994	Wi	UL	E	10L	9	9	7	5.3	2.915	2.899	1.129	0.000	10.753	2.967	0.000	1.143	0.000	0.000	0.000	.	.
153	01-26-1994	Wi	UL	E	10L	9	9	W	5.3	2.313	2.478	0.733	0.000	9.587	2.970	0.000	1.126	0.000	0.000	0.000	.	.
154	01-26-1994	Wi	UL	E	10L	9	9	W	6.3	2.922	2.480	0.736	0.000	10.521	3.506	0.000	1.123	0.000	0.000	0.000	.	.
155	01-26-1994	Wi	WL	E	10L	9	3	2	5.9	3.549	2.510	0.762	0.000	10.483	32.140	11.330	6.089	7.016	0.000	0.000	.	.
156	01-26-1994	Wi	WL	E	10L	9	3	W	6.2	30.110	2.476	0.949	0.000	11.015	42.110	0.502	5.023	0.450	0.000	0.000	.	.
157	01-26-1994	Wi	WL	W	10L	10	2	2	6.2	10.400	2.460	1.016	0.000	5.132	13.270	0.000	1.913	1.650	3.767	3.343	.	0.330
158	01-26-1994	Wi	WL	W	10L	10	2	W	6.2	10.430	2.497	1.405	0.125	12.250	10.280	1.335	1.101	0.997	2.135	3.571	.	0.540
159	01-26-1994	Wi	WL	W	10L	10	7	W	6.1	20.260	2.478	1.644	0.131	15.828	22.660	0.595	2.613	2.904	1.264	3.223	.	0.510

SN	Date	Season	Position Pos	Asp	Location WS	Tran	Dist	Type	pH	DOC	IC Anions F	CL	NO3	SO4	ICP Cations Ca	Fe	Mg	Mn	S	Si	Nitrogen Total N	N-NH4
										mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
160	01-26-1994	Wi	UL	W	10L	10	18	2	6.4	3.028	2.440	1.614	0.048	8.837	2.254	0.115	0.993	0.114	1.863	1.818	.	0.090
161	01-26-1994	Wi	UL	W	10L	10	18	W	5.9	4.289	2.465	1.452	0.000	5.201	2.669	0.000	0.959	0.029	1.875	1.900	.	0.000
162	01-26-1994	Wi	UL	W	10L	10	32	2	6.3	7.797	2.489	0.925	0.000	8.060	4.195	0.000	0.600	0.034	2.621	1.917	.	0.280
163	01-26-1994	Wi	UL	W	10L	10	32	2	6.2	7.840	2.469	0.684	0.000	8.069	4.268	0.028	0.589	0.025	2.671	1.957	.	0.100
164	01-26-1994	Wi	UL	W	10L	10	32	7	5	4.116	2.464	0.758	0.000	11.422	2.674	0.0718	2.244	0.1453	3.564	1.758	.	0.1
165	01-26-1994	Wi	UL	W	10L	12	29	2	5.2	5.209	2.493	0.933	0.000	11.523	3.203	0.0159	1.411	0.0387	3.385	1.61	.	0.11
166	01-26-1994	Wi	UL	W	10L	12	29	W	5.1	4.511	2.496	0.908	0.908	16.006	2.14	0	0.8136	0	1.997	1.698	.	0.13
167	01-26-1994	Wi	UL	W	10L	12	16	2	5.2	4.652	2.532	1.587	0.062	15.245	1.61	0	0.5703	0	1.704	2.689	.	0.16
168	01-26-1994	Wi	UL	W	10L	12	16	W	5.1	6.589	2.540	0.612	0.000	8.280	1.562	0.012	0.571	0	1.59	2.207	.	0.17
169	01-26-1994	Wi	UL	W	10L	12	16	W	5.1	5.037	2.525	0.671	0.000	6.941	1.533	0.0169	0.6074	0	1.594	2.217	.	0.01
170	01-26-1994	Wi	WL	W	10L	12	7	W	5.8	13.200	2.545	0.602	0.000	6.726	12.72	0.5634	1.8	0.7629	1.875	3.17	.	0.71
171	01-26-1994	Wi	WL	W	10L	12	2	W	5.8	8.609	2.521	0.581	0.000	6.688	10.16	0	2.474	0.7612	4.2	2.86	.	0.26
172	01-26-1994	Wi	WL	W	10L	12	2	2	5.7	7.893	2.571	1.143	0.406	8.004	4.558	0.032	1.674	0	3.3	1.943	.	0.37
173	01-26-1994	Wi	UL	B	10L	11	2	7	6.0	4.735	2.470	0.849	0.081	18.200	1.754	0	1.153	0	2.327	2.348	.	0.12
174	01-26-1994	Wi	UL	B	10L	11	7	7	6.0	3.988	2.527	0.923	0.063	14.076	1.135	0	0.8287	0	1.7	2.221	.	0.12
175	01-26-1994	Wi	UL	B	10U	13	11	7	5.6	4.020	1.590	0.724	0.000	9.856	1.912	0	1.473	0	2.726	2.509	.	0.14
176	01-26-1994	Wi	BL	B	10U	13	7	2	5.4	7.514	1.590	0.496	0.000	6.965	3.401	0	1.048	0.0066	2.702	2.729	.	0.26
177	01-26-1994	Wi	BL	B	10U	13	7	7	5.3	5.848	1.586	0.871	0.000	11.780	5.291	0.000	1.278	0.000	3.068	4.269	.	0.160
178	01-26-1994	Wi	BL	B	10U	13	7	W	5.5	7.549	1.589	0.935	0.100	11.943	3.701	0.018	0.846	0.000	2.034	2.565	.	0.380
179	01-26-1994	Wi	BL	B	10U	13	2	W	5.7	9.993	1.578	1.228	0.000	13.318	11.350	0.010	1.616	0.000	3.475	4.455	.	0.450
180	01-26-1994	Wi	BL	W	10U	14	2	2	5.6	15.470	1.581	0.724	0.000	8.410	4.730	0.043	1.347	0.000	2.223	2.176	.	0.000
181	01-26-1994	Wi	BL	W	10U	14	2	2	5.5	14.980	1.623	1.148	0.000	14.773	4.332	0.037	1.266	0.018	2.161	1.991	.	0.060
182	01-26-1994	Wi	BL	W	10U	14	2	7	5.5	4.502	2.466	0.878	0.082	9.007	3.672	0.000	1.197	0.068	2.000	2.797	.	0.250
183	01-26-1994	Wi	BL	W	10U	14	2	W	5.6	9.971	2.495	0.941	0.145	9.209	11.020	0.000	2.578	0.069	2.264	3.047	.	0.090
184	01-26-1994	Wi	BL	W	10U	14	7	2	5.7	3.922	2.480	0.830	0.082	8.492	1.970	0.000	0.834	0.000	1.541	2.047	.	0.360
185	01-26-1994	Wi	BL	W	10U	14	7	W	5.3	4.468	2.461	0.723	0.108	9.468	2.463	0.000	0.924	0.000	2.126	2.395	.	0.350
186	01-26-1994	Wi	UL	W	10U	14	11	2	5.3	4.565	2.468	0.804	0.132	6.373	2.493	0.000	1.108	0.000	2.386	2.422	.	0.340
187	01-26-1994	Wi	BL	S	10U	13-14	10U	STR	5.6	5.023	2.482	0.655	0.000	9.039	2.259	0.020	1.163	0.000	2.122	2.239	.	0.310
188	01-26-1994	Wi	BL	S	10U	FLM	10U	FLM	5.7	4.829	2.478	0.871	0.070	10.244	2.258	0.011	1.166	0.000	2.155	2.308	.	0.290
189	01-26-1994	Wi	WL	S	10L	FLM	10L	FLM	5.7	4.026	2.453	0.809	0.000	9.071	2.738	0.000	1.153	0.000	2.174	2.301	.	0.280
190	01-26-1994	Wi	WL	S	13A	FLM	13A	FLM	.	0.000	2.448	0.792	0.000	9.021	.	.	.	.	.	.	.	.
191	02-24-1994	Wi	UL	B	13A	1	21	2	5.8	8.875	0.124	0.580	0.000	10.876	1.751	0.014	1.370	0.028	3.337	3.335	0.220	0.610
192	02-24-1994	Wi	UL	B	13A	1	21	7	5.8	17.990	0.426	0.623	0.000	16.884	2.167	0.000	2.770	0.052	4.679	3.058	0.230	0.610
193	02-24-1994	Wi	WL	B	13A	1	16	2	5.8	15.460	0.130	0.699	0.080	10.399	19.450	0.000	1.765	0.020	3.118	6.492	0.180	0.430
194	02-24-1994	Wi	WL	B	13A	1	16	W	6	17.800	0.116	0.652	0.082	9.093	21.480	0.197	1.882	0.081	2.688	6.729	0.190	0.370
195	02-24-1994	Wi	WL	B	13A	1	9	2	6	15.730	0.112	0.658	0.071	13.631	16.850	0.000	2.397	0.012	3.520	4.927	0.240	0.480
196	02-24-1994	Wi	WL	B	13A	1	9	W	6.2	15.780	0.151	0.657	0.080	20.173	16.060	0.000	2.128	0.007	4.185	3.503	0.170	0.470
197	02-24-1994	Wi	WL	B	13A	1	5	2	6.2	9.758	0.142	1.263	0.068	12.408	7.377	0.000	1.268	0.044	2.690	3.250	0.240	0.630
198	02-24-1994	Wi	WL	B	13A	1	5	W	.	13.740	0.109	0.895	0.000	12.699	11.270	0.000	1.567	0.040	2.719	3.849	0.150	0.510
199	02-24-1994	Wi	WL	B	13A	1	2	2	6.4	7.968	0.397	0.023	0.000	0.000	8.515	0.000	1.444	0.259	3.826	3.879	0.200	0.510
200	02-24-1994	Wi	WL	B	13A	1	2	W	6.3	21.960	0.099	0.924	0.000	12.005	31.810	0.112	3.968	0.444	3.770	6.375	0.100	0.470
201	02-24-1994	STD	STD	STD	STD	STD	STD	STD	.	.	.	.	.	.	.	.	.	.	.	.	1.080	.
202	02-24-1994	Wi	UL	W	13A	2	4	2	6.7	2.737	0.388	0.742	0.000	7.161	2.535	0.000	0.646	0.000	2.326	3.020	0.260	0.670
203	02-24-1994	Wi	UL	W	13A	2	4	7	6.4	3.668	0.108	0.791	0.000	9.609	5.080	0.000	0.645	0.000	3.032	4.327	0.180	0.600
204	02-24-1994	Wi	UL	W	13A	2	4	W	6.4	6.625	0.110	0.920	0.000	9.587	8.667	0.000	1.129	0.031	3.056	4.693	0.220	0.550
205	02-24-1994	Wi	UL	W	13A	2	10	2	6.3	5.974	0.114	1.058	0.000	12.585	2.555	0.000	1.680	0.016	3.864	3.901	0.290	0.600
206	02-24-1994	Wi	UL	W	13A	2	10	7	6.1	2.329	0.410	0.763	0.000	10.641	1.462	0.000	1.417	0.013	3.280	2.511	0.250	0.650
207	02-24-1994	Wi	UL	W	13A	2	10	7	6.1	2.737	0.000	0.786	0.000	10.733	1.660	0.000	1.453	0.014	3.325	2.618	0.270	0.680
208	02-24-1994	Wi	UL	W	13A	4	7	2	6	4.432	0.113	0.965	0.000	13.483	4.676	0.000	1.206	0.008	4.124	4.341	0.230	0.670
209	02-24-1994	Wi	UL	W	13A	4	7	W	6	6.426	0.109	0.799	0.000	10.705	7.379	0.000	1.318	0.020	3.361	5.096	0.130	0.410
210	02-24-1994	Wi	WL	W	13A	4	2	2	5.7	3.090	0.117	0.830	0.000	23.776	6.077	0.253	1.201	1.164	6.805	4.214	0.200	0.770
211	02-24-1994	Wi	WL	W	13A	4	2	W	5.8	6.543	0.103	0.834	0.000	14.756	9.038	0.022	1.523	0.195	4.559	4.854	0.200	0.680
212	02-24-1994	Wi	WL	B	13A	3	2	2	6	10.340	0.135	0.927	0.000	15.744	11.410	0.390	2.699	1.071	4.843	4.853	0.520	0.960

SN	Date	Season	Position Pos	Asp	Location WS	Tran	Dist	Type	pH	DOC	IC Anions F	CL	NO3	SO4	ICP Cations Ca	Fe	Mg	Mn	S	Si	Nitrogen Total N	N-NH4
										mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
213	02-24-1994	Wi	WL	E	13A	3	2	W	6.2	6.719	0.101	0.839	0.057	13.777	7.977	0.000	1.879	0.113	4.244	4.431	0.210	0.670
214	02-24-1994	Wi	WL	E	13A	3	6	2	6.1	12.180	0.099	0.972	0.000	19.867	16.920	0.000	2.812	0.264	5.971	6.865	0.100	0.620
215	02-24-1994	Wi	WL	E	13A	3	6	2	6.2	12.560	0.102	0.952	0.000	20.146	17.12	0	2.829	0.2669	6.037	6.89	.	0.57
216	02-24-1994	Wi	WL	E	13A	3	6	W	6.3	14.690	0.110	0.975	0.000	16.293	19.53	0.1145	2.899	0.2592	5.033	6.916	.	0.49
217	02-24-1994	Wi	UL	E	13A	3	11	2	6.7	4.590	0.124	0.501	0.000	6.023	2.393	0	0.7294	0.0108	1.968	3.141	.	0.51
218	02-24-1994	Wi	UL	E	13A	3	11	7	6.4	3.214	0.119	0.902	0.000	11.780	3.054	0	1.353	0.0131	3.606	3.827	.	0.6
219	02-24-1994	Wi	WL	S	13A	3-4	13A	STR	6.3	6.586	0.102	0.844	0.000	12.098	6.664	0	1.748	0.0279	3.777	4.328	.	0.47
220	02-24-1994	STD	STD	STD	STD	STD	STD	STD	.	.	.	.	.	.	.	.	.	.	.	.	.	.
221	02-24-1994	Wi	BL	S	13	5-6	13	STR	6.5	2.660	0.115	0.808	0.000	7.338	2.506	0	0.8776	0.0159	2.399	3.625	.	0.61
222	02-24-1994	Wi	BL	S	13	5-6	13	STR	6.5	2.738	0.115	0.791	0.000	7.172	2.291	0	0.8543	0.0112	2.373	3.549	.	0.6
223	02-24-1994	Wi	BL	E	13	5	2	2	6.0	3.614	0.116	0.757	0.000	7.614	2.445	0	0.7697	0.0204	2.525	3.892	.	.
224	02-24-1994	Wi	BL	E	13	5	2	W	5.9	4.407	0.108	0.788	0.000	11.241	5.071	0.0215	1.394	0.0212	3.619	4.86	.	0.53
225	02-24-1994	Wi	BL	W	13	6	1	2	5.9	4.746	0.120	0.499	0.000	3.915	2.384	0.0123	0.397	0	1.361	1.964	.	0.61
226	02-24-1994	Wi	BL	W	13	6	1	W	6.0	19.130	0.090	0.948	0.000	9.930	25.64	0	2.82	0.0761	3.222	5.564	.	0.5
227	02-24-1994	Wi	BL	W	13	6	6	2	6.1	7.208	0.113	0.890	0.000	6.751	3.727	0.0456	0.6249	0.1546	2.457	3.749	.	0.64
228	02-24-1994	Wi	BL	W	13	6	6	W	6.0	9.989	0.102	0.870	0.000	8.516	12.77	0	1.468	0.0051	2.841	5.257	.	0.61
229	02-24-1994	Wi	BL	W	13	6	11	2	6.0	6.566	0.118	0.660	0.000	6.880	3.079	0.0134	0.5967	0.0169	2.336	4.11	.	0.5
230	02-24-1994	Wi	BL	W	13	6	11	W	5.8	10.430	0.123	0.890	0.000	8.207	4.836	0.1353	0.715	0.0448	2.775	4.293	.	0.48
231	02-24-1994	Wi	UL	W	13	6	17	2	5.6	3.835	0.121	0.912	0.270	7.939	1.517	0	0.8859	0.0509	2.645	3.191	.	0.7
232	02-24-1994	Wi	UL	W	13	6	17	W	5.7	4.632	0.112	0.836	0.000	7.776	6.089	0	0.8167	0.0073	2.604	4.755	.	0.58
233	02-24-1994	Wi	UL	W	13	8	11	2	5.8	3.869	0.118	0.646	0.000	8.080	2.463	0	0.6663	0.0216	2.712	3.549	.	0.66
234	02-24-1994	Wi	UL	W	13	8	11	7	5.8	2.828	0.116	0.851	0.000	9.752	3.519	0	0.7105	0	3.263	4.494	.	0.66
235	02-24-1994	Wi	UL	W	13	8	11	7	5.8	3.241	0.113	0.912	0.000	9.736	3.649	0.000	0.721	0.000	3.249	4.502	0.630	0.420
236	02-24-1994	Wi	UL	W	13	8	11	W	5.7	3.610	0.113	0.866	0.000	9.402	4.428	0.000	0.900	0.000	3.157	4.978	0.280	0.430
237	02-24-1994	Wi	BL	W	13	8	6	2	5.6	4.352	0.115	0.869	0.000	10.403	3.241	0.000	0.948	0.006	3.418	4.106	0.550	0.560
238	02-24-1994	STD	STD	STD	STD	STD	STD	STD	.	.	.	.	.	.	.	.	.	.	.	.	4.000	.
239	02-24-1994	Wi	BL	W	13	8	6	W	5.6	4.397	0.111	0.787	0.000	9.453	5.374	0.000	1.089	0.000	3.223	4.789	0.420	0.380
240	02-24-1994	Wi	BL	W	13	8	2	2	5.6	3.182	2.691	0.511	0.000	5.652	2.161	0.000	0.618	0.029	1.952	3.402	0.500	0.340
241	02-24-1994	Wi	BL	W	13	8	2	W	5.6	4.452	2.677	0.783	0.069	9.674	4.777	0.000	1.102	0.009	3.259	4.343	0.310	0.420
242	02-24-1994	Wi	BL	S	13	7-8	13	STR	5.3	3.038	2.674	0.843	0.000	7.017	1.923	0.000	0.801	0.000	2.401	3.497	0.560	0.490
243	02-24-1994	Wi	BL	E	13	7	3	2	5.3	4.729	2.687	0.618	0.000	4.667	1.309	0.000	0.406	0.008	1.650	2.480	0.580	0.480
244	02-24-1994	Wi	BL	E	13	7	3	2	5.3	4.749	2.693	0.553	0.000	4.755	1.468	0.000	0.418	0.009	1.642	2.497	0.810	0.400
245	02-24-1994	Wi	BL	E	13	7	3	W	5.4	4.137	2.666	0.979	0.048	10.350	3.508	0.000	1.226	0.029	3.501	4.383	0.510	0.220
246	02-24-1994	Wi	BL	E	13	7	7	2	5.6	6.441	2.659	1.202	0.046	12.622	5.621	0.000	1.801	0.311	4.244	4.691	0.520	0.330
247	02-24-1994	Wi	BL	E	13	7	7	W	5.6	5.648	2.717	1.407	0.388	10.300	5.031	0.000	1.421	0.084	3.534	4.744	0.900	0.530
248	02-24-1994	Wi	UL	E	13	7	11	2	5.7	2.292	2.661	0.532	0.000	8.966	1.889	0.000	1.062	0.015	3.047	3.522	0.670	0.420
249	02-24-1994	Wi	UL	E	13	7	11	7	.	2.037	2.648	0.849	0.000	10.133	1.764	0.000	1.199	0.019	3.392	3.425	0.280	0.360
250	02-24-1994	Wi	UL	E	10L	9	20	2	6.2	8.230	2.671	1.169	0.000	8.358	2.442	0.013	1.063	0.037	2.925	3.019	0.860	0.630
251	02-24-1994	Wi	UL	E	10L	9	9	2	6.4	12.180	2.674	0.805	0.000	6.982	4.861	0.047	1.210	0.009	2.505	3.265	1.290	0.410
252	02-24-1994	Wi	UL	E	10L	9	9	7	6	2.561	2.644	0.804	0.000	10.306	2.755	0.000	1.115	0.006	3.485	4.484	0.540	0.440
253	02-24-1994	Wi	UL	E	10L	9	9	7	5.7	2.781	2.826	0.885	0.000	10.404	2.778	0.000	1.115	0.018	3.421	4.616	0.420	0.240
254	02-24-1994	Wi	WL	E	10L	9	3	2	6.9	33.900	2.449	1.410	0.000	3.764	26.290	5.101	4.956	6.127	1.548	6.872	6.060	0.940
255	02-24-1994	Wi	WL	W	10L	10	2	2	6.8	11.050	2.804	0.737	0.000	8.379	11.850	0.056	1.353	2.400	2.920	5.162	1.250	0.380
256	02-24-1994	Wi	WL	S	10L	9-10	10L	STR	6.3	4.516	2.808	0.876	0.000	8.261	3.547	0.000	1.249	0.090	2.895	4.398	0.680	0.390
257	02-24-1994	STD	STD	STD	STD	STD	STD	STD	.	.	.	.	.	.	.	.	.	.	.	.	3.940	.
258	02-24-1994	Wi	UL	W	10L	10	18	2	6.2	0.000	2.798	0.649	0.000	6.445	1.651	0.000	0.842	0.041	2.326	3.424	0.580	0.390
259	02-24-1994	Wi	UL	W	10L	10	32	2	5.9	6.623	2.855	0.737	0.000	9.114	3.204	0.055	0.552	0.157	3.177	2.731	0.830	0.450
260	02-24-1994	Wi	UL	W	10L	10	32	7	5.3	2.802	2.619	0.781	0.062	13.720	1.510	0.000	2.101	0.143	4.463	2.450	0.540	0.640
261	02-24-1994	Wi	UL	W	10L	12	29	2	5.5	3.640	2.663	0.613	0.070	10.783	2.086	0.000	0.928	0.072	3.619	2.424	0.340	0.340
262	02-24-1994	Wi	UL	W	10L	12	16	2	5.6	3.466	2.616	0.830	0.070	6.528	1.534	0.000	0.539	0.029	2.280	4.174	0.470	0.630
263	02-24-1994	Wi	WL	W	10L	12	2	2	5.8	6.480	2.585	0.828	0.000	14.076	4.950	0.014	1.710	0.016	4.635	4.031	0.520	0.590
264	02-24-1994	Wi	WL	W	10L	12	2	2	5.9	6.588	2.559	0.824	0.000	14.071	4.980	0.000	1.710	0.016	4.636	4.008	0.650	0.630
265	02-24-1994	Wi	WL	S	10L	11-12	10L	STR	6.2	3.902	2.587	0.861	0.000	8.449	3.123	0.000	1.259	0.021	2.977	4.340	0.370	0.570

SN	Date	Season	Position Pos	Asp	Location WS	Tran	Dist	Type	pH	DOC	IC Anions F	CL	NO3	SO4	ICP Cations Ca	Fe	Mg	Mn	S	Si	Nitrogen Total N	N-NH4
										mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
266	02-24-1994	Wi	UL	E	10L	11	2	2	6.2	8.755	2.590	0.474	0.000	5.495	1.460	0.059	0.773	0.018	1.950	2.786	0.650	0.580
267	02-24-1994	Wi	UL	E	10L	11	2	7	6.2	4.485	2.609	0.742	0.000	9.865	1.644	0.000	1.078	0.012	3.298	3.703	0.540	0.350
268	02-24-1994	Wi	UL	E	10L	11	7	2	6	3.639	2.622	0.597	0.102	7.216	1.481	0.010	0.740	0.026	2.465	1.925	0.490	0.440
269	02-24-1994	Wi	UL	E	10L	11	7	7	6.1	3.235	2.604	0.619	0.000	6.699	1.150	0.000	0.787	0.006	2.348	3.408	0.450	0.450
270	02-24-1994	Wi	UL	E	10U	13	11	7	5.9	2.572	2.616	0.894	0.000	12.095	1.729	0.000	1.442	0.053	3.918	3.889	0.280	0.590
271	02-24-1994	Wi	BL	E	10U	13	7	2	5.8	5.638	2.600	0.833	0.000	12.272	3.341	0.000	1.055	0.026	4.126	4.958	0.310	0.580
272	02-24-1994	Wi	BL	E	10U	13	2	2	5.7	4.251	2.628	0.936	0.071	10.799	2.487	0.000	1.125	0.033	3.628	4.821	0.410	0.430
273	02-24-1994	Wi	BL	S	10U	13-14	10U	STR	6	4.048	2.613	0.900	0.000	8.306	2.798	0.000	1.194	0.019	2.842	4.153	0.220	0.370
274	02-24-1994	Wi	BL	W	10U	14	2	2	.	0.000	2.595	0.037	0.000	0.799	13.600	1.835	9.013	0.180	0.000	12.250	1.110	.
275	02-24-1994	Wi	BL	W	10U	14	2	2	5.8	13.160	2.579	0.642	0.000	6.813	4.044	0.030	1.217	0.009	2.499	3.422	0.400	0.410
276	02-24-1994	STD	STD	STD	STD	STD	STD	STD	.	.	.	.	.	.	.	.	.	.	.	.	1.060	.
277	02-24-1994	Wi	BL	W	10U	14	7	2	6	3.329	2.580	0.512	0.127	4.920	1.421	0.000	0.602	0.009	1.728	2.578	0.350	0.500
278	02-24-1994	Wi	UL	W	10U	14	11	2	5.8	2.641	2.590	0.985	0.000	9.632	2.303	0.000	1.094	0.016	3.318	4.426	0.300	0.480
279	02-24-1994	Wi	UL	W	10U	14	11	7	5.8	2.581	2.626	0.903	0.000	9.930	2.461	0.000	0.916	0.012	3.384	4.372	0.280	0.560
280	02-24-1994	Wi	BL	W	10U	14	7	W	5.7	3.182	2.584	0.739	0.000	8.862	2.493	0.000	0.930	0.032	3.091	4.210	0.380	0.470
281	02-24-1994	Wi	BL	W	10U	14	2	W	5.9	7.228	2.606	0.727	0.000	8.694	7.289	0.036	1.828	0.360	3.089	4.926	0.380	0.450
282	02-24-1994	Wi	BL	E	10U	13	2	W	6	8.967	2.610	0.626	0.000	9.090	9.438	0.000	1.352	0.023	3.244	5.497	0.370	0.120
283	02-24-1994	Wi	BL	E	10U	13	7	W	6	5.145	2.620	0.928	0.000	11.602	5.454	0.000	1.168	0.009	3.982	5.878	0.400	0.150
284	02-24-1994	Wi	WL	W	10L	12	2	W	5.1	13.440	2.580	1.017	0.000	11.898	13.960	0.602	2.732	1.657	4.152	5.112	0.420	0.380
285	02-24-1994	Wi	WL	W	10L	12	7	W	6.2	16.840	2.569	0.871	0.048	5.427	17.260	1.226	2.414	1.463	2.068	5.448	0.760	0.640
286	02-24-1994	Wi	UL	W	10L	12	16	W	6.3	2.910	2.596	0.683	0.000	6.466	1.746	0.038	0.586	0.086	2.276	4.101	0.400	0.370
287	02-24-1994	Wi	UL	W	10L	12	29	W	6.2	2.533	2.623	0.754	0.000	6.900	1.797	0.000	7.144	0.029	2.443	3.050	0.500	0.350
288	02-24-1994	Wi	UL	W	10L	10	18	W	6.2	2.457	.	.	.	.	2.331	0.000	0.774	0.043	2.377	3.557	0.420	0.340
289	02-24-1994	Wi	UL	W	10L	10	18	W	6.1	2.152	.	.	.	.	2.076	0.000	0.719	0.022	2.357	3.521	0.340	0.250
290	02-24-1994	Wi	WL	W	10L	10	7	W	6	16.330	.	.	.	.	.	.	.	.	.	.	0.460	.
291	02-24-1994	Wi	WL	W	10L	10	2	W	6.2	8.517	.	.	.	.	.	.	.	.	.	.	0.470	.
292	02-24-1994	Wi	WL	E	10L	9	3	W	6.2	38.170	.	.	.	.	.	.	.	.	.	.	0.470	.
293	02-24-1994	Wi	UL	E	10L	9	9	W	6.7	3.497	.	.	.	.	.	.	.	.	.	.	0.270	.
294	03-10-1994	Wi	WL	S	10L	FLM	10L	ISCO	.	4.694	0.421	1.004	0.000	8.618	4.329	0.010	1.532	0.029	3.008	5.169	0.200	0.290
295	03-10-1994	Wi	WL	S	10L	FLM	10L	ISCO	.	5.674	0.332	1.012	0.087	8.453	4.268	0.010	1.538	0.016	2.962	5.177	0.230	0.370
296	03-10-1994	Wi	WL	S	10L	FLM	10L	ISCO	.	6.336	0.336	0.930	0.096	7.948	4.034	0.010	1.475	0.009	2.913	4.940	0.220	0.310
297	03-10-1994	Wi	WL	S	10L	FLM	10L	ISCO	.	6.622	0.374	0.832	0.000	7.561	3.214	0.014	1.160	0.005	2.567	3.685	0.230	0.290
298	03-10-1994	Wi	WL	S	10L	FLM	10L	ISCO	.	7.694	0.328	0.847	0.054	7.562	2.433	0.029	0.941	0.009	2.553	2.572	0.400	0.450
299	03-10-1994	Wi	WL	S	10L	FLM	10L	ISCO	.	7.119	0.309	0.645	0.000	7.591	1.884	0.260	0.901	0.006	2.563	2.902	0.250	0.410
300	03-10-1994	Wi	WL	S	10L	FLM	10L	ISCO	.	6.129	0.243	0.698	0.000	7.963	2.016	0.268	0.995	0.012	2.737	3.533	0.200	0.360
301	03-10-1994	Wi	WL	S	10L	FLM	10L	ISCO	.	6.345	0.437	0.665	0.000	7.398	1.860	0.262	0.923	0.009	2.544	3.282	0.190	0.360
302	03-10-1994	Wi	WL	S	10L	FLM	10L	ISCO	.	6.766	0.368	0.666	0.000	7.640	1.745	0.221	0.963	0.010	2.630	2.900	0.250	0.330
303	03-10-1994	Wi	WL	S	10L	FLM	10L	ISCO	.	6.061	0.465	0.722	0.000	7.674	1.998	0.217	0.995	0.009	2.641	2.967	0.300	0.400
304	03-10-1994	Wi	WL	S	10L	FLM	10L	ISCO	.	5.818	0.320	0.719	0.000	7.913	1.920	0.232	1.022	0.023	2.842	3.376	0.240	0.320
305	03-10-1994	Wi	WL	S	10L	FLM	10L	ISCO	.	5.468	0.330	0.711	0.000	7.935	1.938	0.241	1.031	0.011	2.782	3.513	0.220	0.370
306	03-10-1994	Wi	WL	S	10L	FLM	10L	ISCO	.	5.039	0.416	0.745	0.000	7.763	1.969	0.249	1.034	0.013	2.803	3.750	0.210	0.340
307	03-10-1994	Wi	WL	S	10L	FLM	10L	ISCO	.	.	.	.	.	.	.	.	.	.	.	.	1.000	0.330
308	03-10-1994	Wi	WL	S	10L	FLM	10L	ISCO	.	.	.	.	.	.	.	.	.	.	.	.	1.040	0.320
309	03-10-1994	Wi	WL	S	10L	FLM	10L	ISCO	.	4.713	0.411	0.783	0.000	8.180	2.184	0.265	1.113	0.010	2.925	4.291	0.200	0.400
310	03-10-1994	Wi	WL	S	10L	FLM	10L	ISCO	.	4.758	0.429	0.784	0.000	8.227	2.267	0.281	1.098	0.022	2.899	4.333	0.290	0.410
311	03-10-1994	Wi	WL	S	10L	FLM	10L	ISCO	.	4.651	0.370	0.822	0.000	8.073	2.466	0.292	1.137	0.012	2.923	4.890	0.180	0.410
312	03-10-1994	Wi	WL	S	10L	FLM	10L	ISCO	.	4.293	0.377	0.827	0.000	8.036	2.460	0.301	1.162	0.012	2.947	4.668	0.120	0.440
313	03-10-1994	Wi	WL	S	10L	FLM	10L	ISCO	.	4.299	0.345	0.823	0.000	8.029	2.549	0.306	1.157	0.017	2.933	4.796	0.110	0.390
314	03-10-1994	Wi	WL	S	10L	FLM	10L	ISCO	.	4.512	0.343	0.850	0.000	7.945	2.620	0.307	1.183	0.012	2.920	4.884	0.460	0.370
315	03-10-1994	Wi	WL	S	10L	FLM	10L	ISCO	.	4.467	0.406	0.870	0.000	8.014	2.764	0.320	1.224	0.011	2.911	4.999	0.180	0.370
316	03-10-1994	Wi	WL	S	10L	FLM	10L	ISCO	.	4.635	0.409	0.879	0.000	8.132	2.805	0.332	1.233	0.030	2.939	5.282	0.190	0.350
317	03-10-1994	Wi	WL	S	10L	FLM	10L	ISCO	.	5.136	0.406	0.897	0.000	8.109	2.883	0.320	1.256	0.015	2.914	5.309	0.180	0.360
318	03-10-1994	Wi	BL	S	10U	FLM	10U	ISCO	.	6.609	0.444	1.028	0.000	8.265	4.908	0.312	1.615	0.008	3.044	5.983	0.190	0.320

SN	Date	Season	Position Pos	Position Asp	Location WS	Location Tran	Location Dist	Location Type	pH	DOC mg/L	IC Anions F mg/L	CL mg/L	NO3 mg/L	SO4 mg/L	ICP Cations Ca mg/L	Fe mg/L	Mg mg/L	Mn mg/L	S mg/L	Si mg/L	Nitrogen Total N mg/L	N-NH4 mg/L
319	03-10-1994	Wi	BL	S	10U	FLM	10U	ISCO	.	8.020	0.436	1.018	0.000	8.049	5.030	0.290	1.623	0.005	3.077	6.177	0.210	0.310
320	03-10-1994	Wi	BL	S	10U	FLM	10U	ISCO	.	8.123	0.446	0.988	0.073	7.849	5.039	0.319	1.580	0.005	2.887	5.854	0.190	0.330
321	03-10-1994	Wi	BL	S	10U	FLM	10U	ISCO	.	8.077	0.485	0.951	0.000	7.514	4.003	0.309	1.334	0.005	2.657	4.949	0.210	0.360
322	03-10-1994	Wi	BL	S	10U	FLM	10U	ISCO	.	8.613	0.431	0.678	0.000	6.866	2.249	0.390	0.912	0.021	2.409	3.457	0.290	0.420
323	03-10-1994	Wi	BL	S	10U	FLM	10U	ISCO	.	7.948	0.468	0.650	0.000	7.278	2.047	0.309	0.928	0.009	2.671	3.294	0.250	0.350
324	03-10-1994	Wi	BL	S	10U	FLM	10U	ISCO	.	7.195	0.490	0.696	0.000	7.624	2.078	0.281	0.962	0.008	2.792	3.489	0.240	0.370
325	03-10-1994	Wi	BL	S	10U	FLM	10U	ISCO	.	7.067	0.460	0.701	0.000	7.245	2.006	0.281	0.944	0.007	2.645	3.528	0.200	0.380
326	03-10-1994	Wi	BL	S	10U	FLM	10U	ISCO	.	7.094	0.455	0.691	0.000	7.692	1.998	0.257	0.966	0.023	2.796	3.447	0.450	0.340
327	03-10-1994	Wi	BL	S	10U	FLM	10U	ISCO	.	6.721	0.449	0.662	0.000	7.337	1.955	0.237	0.949	0.011	2.742	3.382	0.270	0.370
328	03-10-1994	Wi	BL	S	10U	FLM	10U	ISCO	.	6.546	0.430	0.712	0.000	7.890	2.057	0.237	1.004	0.010	2.903	3.697	0.210	0.350
329	03-10-1994	Wi	BL	S	10U	FLM	10U	ISCO	.	6.303	0.418	0.718	0.000	7.015	2.187	0.257	1.032	0.007	2.941	3.912	0.230	0.350
330	03-10-1994	Wi	BL	S	10U	FLM	10U	ISCO	.	6.105	0.429	0.724	0.000	7.136	2.210	0.246	1.044	0.006	2.932	3.908	0.200	0.350
331	03-10-1994	Wi	BL	S	10U	FLM	10U	ISCO	.	6.018	0.417	0.725	0.000	7.294	2.310	0.262	1.074	0.007	2.956	4.081	0.220	0.370
332	03-10-1994	Wi	BL	S	10U	FLM	10U	ISCO	.	5.836	0.411	0.749	0.000	7.498	2.471	0.261	1.111	0.008	3.061	4.272	0.210	0.380
333	03-10-1994	Wi	BL	S	10U	FLM	10U	ISCO	.	5.558	0.399	0.794	0.000	7.485	2.565	0.277	1.136	0.005	3.057	4.452	0.190	0.310
334	03-10-1994	Wi	BL	S	10U	FLM	10U	ISCO	.	5.581	0.397	0.784	0.000	7.446	2.694	0.284	1.167	0.006	3.056	4.591	0.470	0.350
335	03-10-1994	Wi	BL	S	10U	FLM	10U	ISCO	.	5.335	0.398	0.779	0.000	7.414	2.826	0.308	1.170	0.007	3.052	4.914	0.220	0.380
336	03-10-1994	Wi	BL	S	10U	FLM	10U	ISCO	.	5.365	0.398	0.839	0.000	6.932	2.825	0.282	1.217	0.021	2.911	4.842	0.190	0.350
337	03-10-1994	Wi	BL	S	10U	FLM	10U	ISCO	.	5.658	0.399	0.867	0.000	6.814	3.067	0.291	1.245	0.007	2.887	4.987	0.190	0.370
338	03-10-1994	Wi	BL	S	10U	FLM	10U	ISCO	.	5.425	0.407	0.864	0.000	6.714	3.135	0.304	1.250	0.005	2.830	5.103	0.180	0.310
339	03-10-1994	Wi	BL	S	10U	FLM	10U	ISCO	.	5.549	0.397	0.873	0.000	7.359	3.285	0.304	1.275	0.005	2.868	5.316	0.160	0.380
340	03-10-1994	Wi	BL	S	10U	FLM	10U	ISCO	.	5.378	0.417	0.950	0.000	7.295	3.382	0.318	1.281	0.006	2.883	5.352	0.160	0.380
341	03-10-1994	Wi	BL	S	10U	FLM	10U	ISCO	.	5.736	0.404	0.874	0.000	6.469	3.501	0.316	1.296	0.005	2.844	5.521	0.190	0.390
342	04-19-1994	Sp	UL	E	13A	1	21	2	5.8	9.134	0.163	0.773	0.000	4.449	2.090	0.032	0.973	0.017	2.072	3.610	0.380	0.400
343	04-19-1994	Sp	UL	E	13A	1	21	7	5.7	11.140	0.357	1.147	0.000	13.535	2.435	0.010	2.878	0.063	5.255	4.439	0.260	0.350
344	04-19-1994	Sp	WL	E	13A	1	16	2	6.8	15.500	0.156	2.726	0.086	8.590	22.884	0.010	2.011	0.050	2.920	8.189	0.280	0.020
345	04-19-1994	Sp	WL	E	13A	1	16	W	6.8	21.890	0.163	1.609	0.078	0.000	32.981	0.157	2.759	0.196	2.643	9.237	0.430	0.080
346	04-19-1994	Sp	WL	E	13A	1	9	2	6.6	18.300	0.154	1.639	0.000	10.065	25.556	0.010	3.521	0.034	3.359	7.024	0.270	0.020
347	04-19-1994	Sp	WL	E	13A	1	9	W	6.6	21.020	0.156	1.019	0.102	11.792	31.357	0.157	3.661	0.484	3.808	6.421	0.320	0.050
348	04-19-1994	Sp	WL	E	13A	1	5	2	6.5	12.420	0.156	0.868	0.000	9.773	13.665	0.033	2.366	0.277	3.237	5.764	0.350	0.020
349	04-19-1994	Sp	WL	E	13A	1	5	W	6.6	20.350	0.180	1.392	0.088	11.176	30.296	0.425	3.481	0.346	3.559	7.518	0.700	0.440
350	04-19-1994	Sp	WL	E	13A	1	2	2	6.6	9.300	0.160	1.029	0.000	12.697	11.678	0.120	2.058	0.952	3.938	6.010	0.290	0.070
351	04-19-1994	Sp	WL	E	13A	1	2	2	6.6	9.122	0.167	0.956	0.000	10.845	11.552	0.137	2.091	0.957	3.999	5.927	0.290	0.070
352	04-19-1994	Sp	WL	E	13A	1	2	W	6.5	16.600	0.155	1.029	0.082	11.319	24.168	0.199	3.327	0.072	4.067	7.986	0.210	0.010
353	04-19-1994	Sp	WL	S	13A	1-2	13A	STR	6.7	9.010	0.170	1.046	0.000	11.743	11.511	0.262	2.501	0.027	4.264	6.861	0.230	0.010
354	04-19-1994	Sp	UL	W	13A	2	4	2	6.1	3.499	0.142	0.476	0.000	4.580	3.169	0.013	0.695	0.018	1.689	3.827	0.200	0.000
355	04-19-1994	Sp	UL	W	13A	2	4	W	6.2	6.521	0.149	1.054	0.000	8.268	9.244	0.254	1.309	0.037	2.988	6.314	0.160	0.020
356	04-19-1994	STD	STD	STD	STD	STD	STD	STD	.	.	.	.	.	.	.	.	.	.	.	.	.	0.000
357	04-19-1994	Sp	UL	W	13A	2	4	7	6.3	6.608	0.134	1.015	0.000	9.119	8.353	0.010	1.023	0.037	3.286	5.546	0.190	0.010
358	04-19-1994	Sp	UL	W	13A	2	10	2	5.9	8.042	0.140	0.933	0.000	9.223	2.510	0.014	1.497	0.023	3.284	5.248	0.200	0.040
359	04-19-1994	Sp	UL	W	13A	2	10	7	5.7	2.075	0.138	0.904	0.000	9.069	1.837	0.010	1.515	0.018	3.216	3.309	0.150	0.000
360	04-19-1994	Sp	UL	E	13A	3	11	2	6.1	6.073	0.156	0.471	0.000	2.896	2.256	0.020	0.712	0.007	1.092	3.461	0.290	0.030
361	04-19-1994	Sp	UL	E	13A	3	11	7	5.9	2.891	0.141	1.006	0.000	9.722	2.887	0.011	1.439	0.007	3.460	4.927	0.180	0.030
362	04-19-1994	Sp	UL	E	13A	3	11	7	6.1	3.979	0.136	1.074	0.000	9.738	4.048	0.010	1.487	0.008	3.493	4.852	0.220	0.060
363	04-19-1994	Sp	WL	E	13A	3	6	2	6.5	17.270	0.178	1.077	0.000	14.188	23.137	0.026	3.796	0.536	4.998	8.169	0.180	0.060
364	04-19-1994	Sp	WL	E	13A	3	6	W	6.8	17.550	0.190	1.108	0.091	14.271	26.306	0.131	3.620	0.191	5.017	9.116	0.280	0.050
365	04-19-1994	Sp	WL	S	13A	3-4	13A	STR	6.9	8.401	0.149	1.044	0.000	11.719	10.199	0.304	2.548	0.081	4.224	6.617	0.210	0.030
366	04-19-1994	Sp	WL	E	13A	3	2	W	6.7	12.890	0.173	1.061	0.085	11.762	16.325	0.338	3.126	0.704	4.208	7.029	0.260	0.040
367	04-19-1994	Sp	WL	S	13A	3-4	13A	STR	6.8	8.419	0.150	1.056	0.000	11.835	10.136	0.315	2.558	0.107	4.218	6.683	0.180	0.020
368	04-19-1994	Sp	WL	W	13A	4	2	2	6	3.725	0.146	1.134	0.000	21.903	7.478	0.018	1.423	1.001	7.417	5.735	0.260	0.090
369	04-19-1994	Sp	WL	W	13A	4	2	W	6.1	9.666	0.150	0.959	0.000	12.085	12.379	0.522	1.847	0.529	4.345	7.180	0.210	0.060
370	04-19-1994	Sp	UL	W	13A	4	7	2	5.9	3.898	0.137	0.957	0.000	9.806	4.996	0.017	1.313	0.027	3.533	5.314	0.190	0.040
371	04-19-1994	Sp	UL	W	13A	4	7	W	6.1	6.609	0.144	0.986	0.000	9.973	9.568	0.360	1.930	0.048	3.612	7.526	0.180	0.010

SN	Date	Season	Position Pos	Position Asp	Location WS	Location Tran	Location Dist	Location Type	pH	DOC	IC Anions F	IC Anions CL	IC Anions NO3	IC Anions SO4	ICP Cations Ca	ICP Cations Fe	ICP Cations Mg	ICP Cations Mn	ICP Cations S	ICP Cations Si	Nitrogen Total N	Nitrogen N-NH4
										mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
372	04-19-1994	STD	STD	STD	STD	STD	STD	STD	.	.	.	.	.	.	.	.	.	.	.	.	0.920	0.010
373	04-19-1994	Sp	BL	E	13	5	2	2	5.6	3.535	0.138	0.642	0.000	5.754	2.663	0.010	0.797	0.031	2.125	4.637	0.250	0.010
374	04-19-1994	Sp	BL	E	13	5	2	W	5.9	6.796	0.149	0.949	0.000	10.068	7.908	5.178	3.088	0.134	3.655	31.704	0.400	0.060
375	04-19-1994	Sp	BL	S	13	5-6	13	STR	6.6	3.096	0.144	0.913	0.000	6.592	3.619	0.280	1.110	0.027	2.357	5.121	0.150	0.030
376	04-19-1994	Sp	BL	W	13	6	1	2	5.9	4.725	0.153	0.520	0.000	3.766	3.258	0.021	0.501	0.007	1.387	3.182	0.240	0.020
377	04-19-1994	Sp	BL	W	13	6	1	W	6.2	7.522	0.168	0.933	0.163	6.972	10.002	0.746	1.420	0.021	2.541	8.552	0.270	0.020
378	04-19-1994	Sp	BL	W	13	6	6	2	5.9	6.272	0.158	0.870	0.000	4.966	4.764	0.197	0.766	0.285	1.876	4.394	0.320	0.030
379	04-19-1994	Sp	BL	W	13	6	6	2	6.2	6.772	0.163	1.049	0.000	5.042	4.972	0.302	0.818	0.288	1.928	4.867	0.370	0.070
380	04-19-1994	Sp	BL	W	13	6	6	W	6.2	8.720	0.194	1.189	0.000	7.343	12.660	0.690	1.630	0.053	2.720	8.253	0.270	0.060
381	04-19-1994	Sp	BL	W	13	6	11	2	5.7	5.650	0.153	0.550	0.000	4.872	3.199	0.021	0.623	0.026	1.836	4.706	0.410	0.060
382	04-19-1994	Sp	BL	W	13	6	11	W	6.2	7.244	0.162	0.945	0.000	7.241	11.111	0.638	1.558	0.013	2.635	7.839	0.190	0.010
383	04-19-1994	Sp	UL	W	13	6	17	2	5.6	3.556	0.147	0.783	0.000	5.698	2.139	0.017	0.843	0.038	2.115	4.077	0.230	0.020
384	04-19-1994	Sp	UL	W	13	6	17	W	6.1	5.465	0.154	1.163	0.000	6.660	7.436	0.731	1.170	0.022	2.450	8.240	0.330	0.060
385	04-19-1994	Sp	UL	E	13	7	11	2	5.9	2.305	0.146	0.784	0.000	6.738	2.024	0.030	0.975	0.016	2.429	3.625	0.260	0.050
386	04-19-1994	Sp	UL	E	13	7	11	7	5.5	1.976	0.142	0.975	0.000	9.731	1.766	0.010	1.307	0.015	3.493	4.062	0.140	0.020
387	04-19-1994	Sp	UL	E	13	7	11	7	5.5	1.780	0.142	1.062	0.000	9.795	1.871	0.016	1.334	0.014	3.478	3.965	0.180	0.020
388	04-19-1994	Sp	UL	E	13	7	11	W	5.3	1.792	0.143	1.264	0.062	9.918	1.343	0.124	1.197	0.038	3.541	4.880	0.210	0.030
389	04-19-1994	Sp	BL	E	13	7	7	2	6.1	8.659	0.147	1.713	0.123	11.164	8.885	0.029	2.738	0.650	4.018	4.872	0.270	0.060
390	04-19-1994	Sp	BL	E	13	7	7	W	6.1	5.624	0.147	1.288	0.230	9.426	6.158	0.207	1.872	0.426	3.413	5.644	0.180	0.030
391	04-19-1994	Sp	BL	E	13	7	3	2	5.7	3.885	0.152	0.345	0.000	3.192	1.238	0.010	0.382	0.031	1.203	2.552	0.190	0.020
392	04-19-1994	Sp	BL	E	13	7	3	W	6.9	24.370	0.178	2.236	0.131	12.869	33.255	0.138	7.023	0.683	4.597	6.568	0.290	0.040
393	04-19-1994	Sp	BL	W	13	8	2	2	5.9	3.493	0.137	0.578	0.000	3.715	2.252	0.010	0.612	0.028	1.405	3.317	0.190	0.030
394	04-19-1994	Sp	BL	W	13	8	2	W	6.2	5.908	0.162	1.206	0.063	9.565	7.176	1.009	1.742	0.075	3.452	7.986	0.190	0.020
395	04-19-1994	Sp	BL	W	13	8	6	2	5.7	3.737	0.141	0.826	0.000	8.273	3.433	0.012	0.965	0.034	2.973	4.668	0.230	0.010
396	04-19-1994	Sp	BL	W	13	8	6	W	6.1	4.679	0.149	1.060	0.063	9.363	6.841	0.572	1.439	0.015	3.393	6.763	0.240	0.010
397	04-19-1994	Sp	UL	W	13	8	11	2	5.7	5.102	0.157	0.676	0.000	5.743	2.625	0.029	0.700	0.027	2.110	3.234	0.290	0.010
398	04-19-1994	Sp	UL	W	13	8	11	W	6.1	4.531	0.155	1.066	0.000	9.663	6.410	0.164	1.330	0.019	3.489	5.705	0.180	0.000
399	04-19-1994	Sp	BL	S	13	7-8	13	STR	6.5	4.337	0.145	0.967	0.000	6.225	2.867	0.241	1.001	0.026	2.301	4.830	0.220	0.000
400	04-21-1994	STD	STD	STD	STD	STD	STD	STD	.	.	.	.	.	.	.	.	.	.	.	.	0.960	0.010
401	04-21-1994	Sp	UL	E	10L	9	20	2	5.6	6.942	0.138	1.316	0.000	6.692	2.586	0.017	1.016	0.020	2.432	3.781	0.310	0.030
402	04-21-1994	Sp	UL	E	10L	9	9	2	6	10.930	0.148	0.555	0.000	5.357	5.739	0.056	1.369	0.010	2.027	3.819	0.340	0.010
403	04-21-1994	Sp	UL	E	10L	9	9	7	5.4	2.445	0.137	0.950	0.000	8.993	3.125	0.010	1.217	0.015	3.229	4.917	0.130	0.000
404	04-21-1994	Sp	UL	E	10L	9	9	W	5.8	4.659	0.153	1.398	0.000	12.568	6.149	0.440	1.850	0.058	4.476	6.928	0.100	0.030
405	04-21-1994	Sp	WL	E	10L	9	3	2	6.7	42.250	0.350	1.913	0.000	0.800	36.298	9.591	6.574	7.982	0.522	8.638	1.790	1.360
406	04-21-1994	Sp	WL	E	10L	9	3	W	6.9	34.200	0.114	1.179	0.059	14.257	56.649	0.046	6.241	0.387	5.034	10.696	0.130	0.020
407	04-21-1994	Sp	WL	S	10L	9-10	10L	STR	6.9	0.448	0.149	1.025	0.000	7.431	6.261	0.410	1.828	0.076	2.713	6.590	0.090	0.000
408	04-21-1994	Sp	WL	W	10L	10	2	2	6.4	11.700	0.270	0.823	0.370	4.749	13.004	0.231	1.465	2.813	1.822	6.194	0.410	0.210
409	04-21-1994	Sp	WL	W	10L	10	2	2	6.3	11.850	0.278	1.131	0.336	4.938	12.692	0.145	1.446	2.657	1.842	6.435	0.430	0.210
410	04-21-1994	Sp	WL	W	10L	10	2	W	6.6	15.510	0.182	0.760	0.000	3.081	18.026	5.697	1.790	1.821	1.233	6.895	0.630	0.460
411	04-21-1994	Sp	WL	W	10L	10	7	W	6.6	14.930	0.242	0.538	0.081	2.011	18.633	1.088	2.018	2.249	0.804	5.844	0.270	0.100
412	04-21-1994	Sp	UL	W	10L	10	18	2	5.6	2.693	0.146	0.898	0.080	4.959	2.019	0.013	0.809	0.145	1.804	3.691	0.200	0.080
413	04-21-1994	Sp	UL	W	10L	10	18	W	5.4	2.969	0.159	0.898	0.000	6.134	2.686	0.645	0.965	0.113	2.223	5.879	0.190	0.010
414	04-21-1994	Sp	UL	W	10L	10	32	2	5.2	8.852	0.160	0.496	0.000	4.561	2.370	0.048	0.356	0.087	1.713	2.600	0.310	0.010
415	04-21-1994	STD	STD	STD	STD	STD	STD	STD	.	.	.	.	.	.	.	.	.	.	.	.	0.970	0.020
416	04-21-1994	Sp	UL	W	10L	12	29	2	5.4	4.244	0.157	0.480	0.000	6.002	1.838	0.146	0.633	0.158	2.203	2.257	0.140	0.010
417	04-21-1994	Sp	UL	W	10L	12	29	W	5.1	2.160	0.160	0.878	0.000	6.166	1.721	0.513	0.758	0.080	2.250	5.319	0.120	0.010
418	04-21-1994	Sp	UL	W	10L	12	16	2	5.4	2.997	0.156	0.781	0.000	5.142	1.588	0.014	0.563	0.054	1.881	5.005	0.140	0.020
419	04-21-1994	Sp	UL	W	10L	12	16	W	5.2	3.285	0.160	0.852	0.000	5.944	1.771	1.289	0.856	0.083	2.152	8.835	0.150	0.030
420	04-21-1994	Sp	WL	W	10L	12	7	2	6.6	26.110	0.244	1.051	0.000	0.236	34.811	6.347	5.384	4.159	0.222	7.066	1.140	0.770
421	04-21-1994	Sp	WL	W	10L	12	7	W	6.7	13.650	0.208	0.676	0.263	3.616	9.593	3.632	1.984	1.161	1.426	5.180	0.480	0.080
422	04-21-1994	Sp	WL	W	10L	12	2	2	5.9	7.101	0.169	0.958	0.000	7.226	5.559	0.185	1.652	0.149	2.496	4.029	0.230	0.060
423	04-21-1994	Sp	WL	W	10L	12	2	2	5.7	6.289	0.168	0.978	0.000	7.465	4.785	0.018	1.538	0.022	2.518	3.887	0.240	0.040
424	04-21-1994	Sp	WL	W	10L	12	2	W	6.6	23.090	0.183	1.144	0.000	5.571	27.366	1.335	4.833	2.753	1.949	6.097	0.350	0.220

SN	Date	Season	Position Pos	Asp	Location WS	Tran	Dist	Type	pH	DOC	IC Anions F	CL	NO3	SO4	ICP Cations Ca	Fe	Mg	Mn	S	Si	Nitrogen Total N	N-NH4
										mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
425	04-21-1994	Sp	UL	E	10L	11	2	2	6.2	11.460	0.171	0.457	0.000	3.361	1.853	0.140	0.740	0.108	1.210	2.945	0.360	0.020
426	04-21-1994	Sp	UL	E	10L	11	2	7	6.3	3.539	0.156	0.839	0.000	9.836	1.847	0.034	1.128	0.029	3.206	4.359	0.190	0.000
427	04-21-1994	Sp	UL	E	10L	11	7	2	6.2	3.019	0.136	0.739	0.000	4.936	1.200	0.010	0.763	0.008	1.810	4.076	0.180	0.000
428	04-21-1994	Sp	UL	E	10L	11	2	7	5.6	3.274	0.142	0.592	0.077	6.031	1.345	0.010	0.770	0.013	2.192	2.763	0.220	0.020
429	04-21-1994	STD	STD	STD	STD	STD	STD	STD	.	.	.	.	.	.	.	.	.	.	.	.	0.990	0.000
430	04-21-1994	Sp	BL	S	10U	FLM	10U	FLM	6.6	3.106	0.150	1.070	0.000	7.536	4.616	0.395	1.679	0.028	2.739	6.358	0.120	0.020
431	04-21-1994	Sp	BL	S	10U	13-14	10U	STR	6.8	4.671	0.147	1.121	0.000	7.623	4.465	0.366	1.676	0.038	2.749	6.378	0.190	0.000
432	04-21-1994	Sp	UL	E	10U	13	11	7	5.6	1.933	0.143	0.944	0.000	10.715	1.996	0.010	1.483	0.024	3.705	4.539	0.120	0.000
433	04-21-1994	Sp	BL	E	10U	13	7	2	5.4	4.223	0.145	0.781	0.000	9.673	3.544	0.029	1.062	0.021	3.374	5.356	0.150	0.020
434	04-21-1994	Sp	BL	E	10U	13	7	W	5.8	5.552	0.168	1.066	0.000	11.218	7.281	2.146	1.900	0.101	4.012	13.929	0.120	0.010
435	04-21-1994	Sp	BL	E	10U	13	2	2	5.5	3.651	0.149	0.612	0.000	6.534	2.212	0.018	0.886	0.060	2.370	4.753	0.180	0.030
436	04-21-1994	Sp	BL	E	10U	13	2	W	6.1	9.076	0.167	0.745	0.000	8.149	11.305	4.628	2.199	0.025	2.962	18.472	0.200	0.010
437	04-21-1994	Sp	BL	W	10U	14	2	2	5.7	10.740	0.147	0.612	0.000	5.798	4.766	0.040	1.335	0.010	2.158	4.306	0.190	0.000
438	04-21-1994	Sp	BL	W	10U	14	2	W	.	4.306	0.147	0.919	0.000	7.919	4.475	0.731	1.388	0.179	2.866	7.055	0.170	0.050
439	04-21-1994	Sp	BL	W	10U	14	7	2	5.6	4.960	0.151	0.495	0.000	2.804	1.328	0.041	0.465	0.022	1.059	2.254	0.180	0.040
440	04-21-1994	Sp	BL	W	10U	14	7	W	5.5	2.555	0.135	0.757	0.000	8.532	3.063	0.946	1.217	0.023	3.041	7.708	0.100	0.020
441	04-21-1994	Sp	UL	W	10U	14	11	2	5.4	2.637	0.138	0.885	0.000	8.018	2.431	0.127	1.112	0.055	2.878	5.280	0.090	0.010
442	04-21-1994	Sp	UL	W	10U	14	11	7	5.5	2.355	0.133	0.810	0.000	8.459	2.656	0.010	0.938	0.015	3.053	4.328	0.100	0.030
443	04-21-1994	Sp	UL	W	10U	14	11	7	5.4	2.086	0.133	0.811	0.000	8.274	2.664	0.010	0.936	0.016	2.967	4.346	0.080	0.020
444	06-16-1994	Sp	UL	E	13A	1	21	2	5.7	10.910	0.135	0.921	0.000	.	1.604	0.029	0.948	0.048	2.381	5.619	0.520	0.000
445	06-16-1994	Sp	UL	E	13A	1	21	2	5.8	8.245	0.171	1.512	0.063	.	2.567	0.014	1.222	0.030	3.027	6.091	.	0.000
446	06-16-1994	Sp	WL	E	13A	1	16	2	6.7	1.143	0.136	1.188	0.000	4.844	30.521	0.045	2.877	0.349	2.770	8.230	0.340	0.000
447	06-16-1994	Sp	WL	E	13A	1	16	7	7.1	30.540	0.164	1.070	0.037	.	45.011	1.826	3.436	0.351	1.905	10.765	0.460	0.160
448	06-16-1994	Sp	WL	E	13A	1	16	W	7.1	31.540	0.149	1.461	0.092	.	41.657	0.020	3.326	0.432	2.205	9.431	1.390	1.310
449	06-16-1994	Sp	WL	E	13A	1	9	2	6.5	27.740	0.119	1.503	0.076	9.251	39.751	0.010	5.446	0.044	4.253	8.371	0.310	0.000
450	06-16-1994	Sp	WL	E	13A	1	9	W	6.7	24.250	0.148	1.251	0.079	9.192	34.965	0.042	4.321	0.677	3.956	6.184	0.330	0.050
451	06-16-1994	Sp	WL	E	13A	1	5	2	6.4	17.880	0.128	1.192	0.032	10.736	23.823	0.033	3.975	1.132	4.172	7.911	0.390	0.000
452	06-16-1994	Sp	WL	E	13A	1	5	W	6.5	26.620	0.129	1.255	0.054	11.408	37.860	0.103	4.867	0.904	4.422	8.158	0.550	0.250
453	06-16-1994	Sp	WL	E	13A	1	2	2	6.5	19.140	0.128	1.347	0.032	16.923	24.783	0.071	4.506	2.534	6.273	6.764	0.400	0.050
454	06-16-1994	Sp	WL	E	13A	1	2	W	6.5	23.050	0.135	1.217	0.092	14.884	32.813	0.291	4.789	0.575	5.601	8.692	0.910	0.000
455	06-16-1994	Sp	WL	S	13A	1-2	13A	STR	6.7	16.810	0.131	1.247	0.037	16.674	23.696	0.047	4.459	0.208	6.204	6.660	0.290	0.000
456	06-16-1994	STD	STD	STD	STD	STD	STD	STD	.	109.400	0.374	0.894	1.023	19.723	5.206	0.114	2.011	0.105	5.349	0.326	1.060	.
457	06-16-1994	Sp	UL	W	13A	2	4	2	6.2	4.219	0.176	0.690	0.000	4.740	3.488	0.010	0.790	0.012	1.997	4.801	0.380	0.020
458	06-16-1994	Sp	UL	W	13A	4	7	2	5.8	4.406	0.122	1.252	0.027	12.634	5.399	0.010	1.393	0.030	4.780	5.952	0.340	0.020
459	06-16-1994	Sp	UL	W	13A	4	7	7	6	9.240	0.129	1.326	0.000	12.682	12.511	0.010	2.254	0.128	4.883	6.890	0.260	0.030
460	06-16-1994	Sp	UL	W	13A	4	7	7	6	9.300	0.121	1.323	0.000	12.789	12.436	0.010	2.232	0.169	4.865	6.793	0.250	0.020
461	06-16-1994	Sp	UL	W	13A	4	7	W	6	9.878	0.125	1.294	0.032	12.627	13.168	0.375	2.464	0.208	4.839	7.939	0.280	0.030
462	06-16-1994	Sp	WL	W	13A	4	2	2	6	11.700	0.207	1.194	0.019	17.821	13.593	0.246	2.676	2.416	6.650	5.496	0.420	0.120
463	06-16-1994	Sp	WL	W	13A	4	2	W	6.1	11.900	0.148	1.211	0.074	15.020	14.993	0.675	2.392	1.142	5.785	7.675	0.390	0.080
464	06-16-1994	Sp	WL	E	13A	3	2	2	6.7	27.040	0.247	1.416	0.429	1.590	27.339	2.214	6.220	2.242	0.890	7.063	0.840	0.400
465	06-16-1994	Sp	WL	E	13A	3	2	7	6.7	25.650	0.177	1.461	0.026	10.951	27.775	0.264	5.701	1.912	4.546	7.185	0.680	0.180
466	06-16-1994	Sp	WL	S	13A	3-4	13A	STR	7.2	17.900	0.140	1.273	0.120	19.779	26.297	0.091	5.706	0.363	7.678	6.620	0.340	0.020
467	06-16-1994	Sp	WL	E	13A	3	6	2	6.5	32.360	0.142	1.403	0.000	13.334	41.084	0.038	6.593	2.777	5.493	9.829	0.440	0.050
468	06-16-1994	Sp	WL	E	13A	3	6	W	7.1	29.060	0.197	1.440	0.054	14.611	40.065	0.093	5.375	0.391	5.940	10.479	0.530	0.080
469	06-16-1994	Sp	WL	S	13A	FLM	13A	FLM	7.3	17.240	0.132	1.233	0.073	16.014	23.835	0.055	4.465	0.064	6.348	6.635	0.440	0.000
470	06-16-1994	STD	STD	STD	STD	STD	STD	STD	.	107.700	0.416	0.945	1.001	19.552	5.404	0.118	2.032	0.107	5.562	0.224	0.990	.
471	06-16-1994	Sp	BL	E	13	5	2	2	6.3	6.271	0.133	0.807	0.031	7.154	5.539	0.012	1.173	0.027	3.099	7.042	.	0.000
472	06-16-1994	Sp	BL	E	13	5	2	W	6.3	20.110	0.179	1.374	0.249	7.349	14.945	12.954	6.356	0.370	3.129	72.215	1.110	0.120
473	06-16-1994	Sp	BL	S	13	5-6	13	STR	7.2	13.960	0.189	1.810	0.230	8.356	15.335	0.519	3.031	0.020	3.484	7.992	0.490	0.000
474	06-16-1994	Sp	BL	W	13	6	1	2	6	6.408	0.140	0.605	0.032	4.254	5.013	0.092	0.817	0.050	1.842	6.066	0.400	0.000
475	06-16-1994	Sp	BL	W	13	6	1	W	7.1	27.870	0.156	1.521	0.075	5.488	37.158	0.070	4.256	0.402	2.407	7.736	0.980	0.620
476	06-16-1994	Sp	BL	W	13	6	6	2	6.4	6.713	0.131	1.010	0.032	11.122	6.905	0.021	1.047	0.075	4.509	6.744	0.730	0.000
477	06-16-1994	Sp	BL	W	13	6	6	2	5.6	6.391	0.132	0.891	0.032	11.269	6.955	0.031	1.025	0.049	4.484	6.745	0.340	0.000

SN	Date	Season	Position		Location				pH	DOC	IC Anions				ICP Cations						Nitrogen	
			Pos	Asp	WS	Tran	Dist	Type			F	CL	NO3	SO4	Ca	Fe	Mg	Mn	S	Si	Total N	N-NH4
										mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
478	06-16-1994	Sp	BL	W	13	6	6	W	6.6	15.540	0.194	1.581	0.086	9.654	19.975	0.373	2.409	0.463	3.971	7.418	0.540	0.150
479	06-16-1994	Sp	BL	W	13	6	11	2	6.5	5.746	0.138	0.675	0.032	6.899	3.778	0.055	0.684	0.056	2.918	8.504	0.360	0.000
480	06-16-1994	Sp	UL	W	13	6	17	2	.	21.850	0.113	1.255	0.187	5.992	32.781	0.015	3.418	0.102	2.608	6.034	0.290	0.030
481	06-16-1994	STD	STD	STD	STD	STD	STD	STD	.	108.700	0.368	0.893	1.009	19.849	5.488	0.115	2.042	0.105	5.670	0.434	0.950	.
482	06-16-1994	Sp	UL	W	13	8	11	2	.	8.568	0.145	1.356	0.049	6.288	9.920	0.010	1.207	0.021	2.681	6.534	.	0.070
483	06-16-1994	Sp	UL	W	13	8	11	7	6	3.119	0.175	1.329	0.031	9.800	4.526	0.010	0.916	0.011	3.983	4.892	0.290	0.000
484	06-16-1994	Sp	UL	W	13	8	11	W	6.4	8.568	0.134	1.206	0.131	11.205	8.839	0.157	1.714	0.079	4.411	5.089	0.610	0.010
485	06-16-1994	Sp	BL	W	13	8	6	2	5.8	4.938	0.177	1.027	0.032	10.548	4.719	0.010	1.199	0.092	4.227	7.843	0.350	0.010
486	06-16-1994	Sp	BL	W	13	8	6	W	6.1	7.244	0.131	1.343	0.078	10.499	9.557	0.439	2.051	0.017	4.258	6.587	0.590	0.000
487	06-16-1994	Sp	BL	W	13	8	2	2	5.8	4.419	0.178	0.750	0.032	4.374	3.451	0.010	0.768	0.020	1.927	5.261	0.280	0.010
488	06-16-1994	Sp	BL	W	13	8	2	W	6	8.476	0.134	1.437	0.073	10.139	10.524	0.699	2.433	0.543	4.145	6.616	0.400	0.070
489	06-16-1994	Sp	BL	S	13	7-8	13	STR	7.1	11.380	0.146	1.319	0.153	4.061	12.135	0.275	2.517	0.011	3.081	6.483	0.170	0.020
490	06-16-1994	Sp	BL	E	13	7	3	2	5.7	4.611	0.135	0.703	0.000	3.817	1.789	0.010	0.502	0.060	1.674	4.066	0.370	0.000
491	06-16-1994	Sp	BL	E	13	7	3	W	6.6	12.460	0.141	1.879	0.228	8.986	13.811	0.223	2.908	1.042	3.700	5.580	0.400	0.010
492	06-16-1994	Sp	BL	E	13	7	7	2	6.2	12.510	0.143	1.914	0.000	10.140	13.298	0.010	3.161	1.245	4.142	5.688	0.180	0.030
493	06-16-1994	Sp	BL	E	13	7	7	W	6.1	10.020	0.147	2.028	0.037	10.034	9.430	0.010	2.866	0.884	4.081	5.825	0.410	0.010
494	06-16-1994	Sp	BL	E	13	7	7	W	6.4	12.070	0.144	2.207	1.952	10.139	12.927	0.107	3.269	2.111	4.249	5.546	0.820	0.260
495	06-16-1994	Sp	UL	E	13	7	11	2	6	3.597	0.181	1.238	0.031	6.468	2.205	0.011	0.967	0.050	2.779	4.377	0.560	0.090
496	06-16-1994	Sp	UL	E	13	7	11	7	6	3.473	0.183	1.651	0.113	8.886	2.510	0.013	1.264	0.056	3.790	5.626	0.330	0.020
497	06-16-1994	STD	STD	STD	STD	STD	STD	STD	.	109.100	0.420	0.960	0.999	19.681	5.416	0.122	2.069	0.108	5.804	0.539	0.960	.
498	06-16-1994	Sp	UL	E	10L	9	9	2	6.3	15.900	0.159	1.171	0.049	8.467	6.335	0.028	1.605	0.052	3.747	5.839	.	0.010
499	06-16-1994	Sp	UL	E	10L	9	9	7	5.5	3.048	0.174	1.529	0.054	8.520	3.443	0.010	1.259	0.069	3.521	6.271	0.360	0.030
500	06-16-1994	Sp	WL	E	10L	9	3	2	6.6	48.310	0.313	1.288	0.032	0.655	43.494	1.740	7.814	8.694	0.494	8.673	1.770	1.500
501	06-16-1994	Sp	WL	E	10L	9	3	W	7	39.300	0.132	1.420	0.080	12.435	57.225	0.031	6.501	0.815	5.036	10.938	0.480	0.130
502	06-16-1994	Sp	WL	S	10L	9-10	10L	STR	7	12.920	0.180	1.448	0.206	7.423	14.898	0.334	3.246	0.329	3.193	7.039	0.440	0.050
503	06-16-1994	Sp	WL	W	10L	10	2	2	6.7	22.770	0.258	8.280	0.122	1.284	26.787	0.122	2.877	4.872	0.708	6.911	0.600	0.420
504	06-16-1994	Sp	WL	W	10L	10	2	W	6.7	20.990	0.179	1.168	0.079	2.232	25.627	3.797	2.518	1.868	1.018	8.254	0.820	0.750
505	06-16-1994	Sp	WL	W	10L	10	7	2	6.8	30.040	0.296	1.483	0.042	1.395	38.187	0.036	3.900	5.212	0.705	5.903	0.630	0.090
506	06-16-1994	Sp	WL	W	10L	10	7	W	6.6	17.620	0.191	0.644	0.031	2.759	21.947	0.095	2.533	2.977	1.363	6.041	0.430	0.150
507	06-16-1994	Sp	UL	W	10L	10	18	2	5.7	4.005	0.134	1.133	0.074	6.056	3.548	0.306	0.989	0.457	2.641	4.917	0.290	0.050
508	06-16-1994	Sp	UL	W	10L	10	18	2	5.5	3.538	0.127	1.027	0.032	6.131	2.844	0.100	0.881	0.263	2.615	4.834	0.340	0.030
509	06-16-1994	Sp	UL	W	10L	10	18	W	6	7.052	0.161	1.764	0.087	5.755	5.033	0.575	1.279	0.933	2.530	6.067	0.690	0.070
510	06-16-1994	Sp	UL	W	10L	12	29	2	5.4	3.740	0.187	0.567	0.000	9.156	2.391	0.019	0.767	0.573	3.666	3.644	0.300	0.010
511	06-16-1994	Sp	UL	W	10L	12	29	7	5.9	3.930	0.179	1.151	0.032	6.498	4.076	0.010	0.680	0.069	2.693	4.557	0.270	0.020
512	06-16-1994	Sp	UL	W	10L	12	16	2	5.3	3.251	0.140	1.055	0.000	5.017	1.775	0.041	0.599	0.076	2.159	6.983	0.270	0.000
513	06-16-1994	Sp	UL	W	10L	12	16	W	5.1	5.023	0.193	1.057	0.086	5.817	2.874	5.353	1.832	0.091	2.492	24.735	0.450	0.010
514	06-16-1994	Sp	WL	W	10L	12	7	2	6.2	33.750	0.235	1.103	0.000	5.480	33.026	1.320	4.599	2.312	0.468	6.631	1.680	1.820
515	06-16-1994	Sp	WL	W	10L	12	7	W	6.8	23.940	0.247	1.153	0.504	2.079	23.964	1.946	3.551	2.803	0.994	7.129	0.950	0.340
516	06-16-1994	Sp	WL	S	10L	TSP	10L	IN	6.8	29.550	0.178	0.915	0.000	1.346	33.285	3.215	3.977	2.093	0.777	8.274	0.470	0.070
517	06-16-1994	Sp	BL	E	10U	13	2	2	6.8	10.960	0.119	3.050	0.000	15.934	14.718	0.061	3.790	0.137	6.457	5.763	0.340	0.010
518	06-16-1994	Sp	BL	E	10U	13	2	W	7.1	33.830	0.228	1.523	0.145	3.065	33.413	1.232	6.127	4.834	1.520	6.605	1.110	0.900
519	06-16-1994	Sp	WL	S	10L	HOL	10L	IN	7	11.880	0.372	0.917	1.000	19.786	5.514	0.136	2.050	0.141	5.797	0.416	0.960	.
520	06-16-1994	Sp	WL	S	10L	HOL	10L	OUT	6.4	11.460	0.143	1.433	0.232	7.672	12.186	0.177	3.078	0.196	3.326	6.637	0.360	0.020
521	06-16-1994	Sp	UL	E	10L	11	2	2	6.6	9.459	0.183	0.621	0.033	4.454	2.287	0.080	0.794	0.060	2.012	4.902	0.320	0.000
522	06-16-1994	Sp	UL	E	10L	11	2	7	6.1	5.468	0.134	1.273	0.033	9.590	2.720	0.020	1.316	0.040	4.112	5.920	.	0.020
523	06-16-1994	Sp	UL	E	10L	11	7	2	5.8	4.183	0.181	1.058	0.032	6.990	2.151	0.037	0.984	0.091	3.089	4.038	0.200	0.010
524	06-16-1994	Sp	UL	E	10U	13	11	7	.	2.862	0.129	1.217	0.032	10.384	2.721	0.024	1.438	0.103	3.713	6.283	0.160	0.000
525	06-16-1994	Sp	BL	E	10U	13	7	2	5.3	6.333	0.131	9.450	0.032	10.275	3.800	0.022	1.129	0.007	3.610	7.237	0.230	0.000
526	06-16-1994	Sp	BL	E	10U	13	7	W	5.9	9.658	0.145	1.165	0.000	9.633	10.338	0.722	1.992	0.304	3.550	9.648	0.250	0.010
527	06-16-1994	STD	STD	STD	STD	STD	STD	STD	.	109.400	0.372	0.921	1.020	19.809	5.139	0.157	1.963	0.071	4.983	0.392	1.020	.
528	06-16-1994	Sp	BL	E	10U	13	2	2	5.3	4.709	0.145	0.911	0.032	7.186	2.343	0.017	0.984	0.121	2.771	7.034	0.280	0.020
529	06-16-1994	Sp	BL	E	10U	13	2	W	6.2	14.240	0.164	1.436	0.142	10.954	20.288	5.236	3.627	0.005	3.984	24.819	0.340	0.030
530	06-16-1994	Sp	BL	S	10U	13-14	10U	STR	6.9	9.934	0.143	1.223	0.231	8.000	10.324	0.212	2.916	0.005	3.059	6.959	0.230	0.030

SN	Date	Season	Position Pos	Position Asp	Location WS	Location Tran	Location Dist	Location Type	pH	DOC	IC Anions F	CL	NO3	SO4	ICP Cations Ca	Fe	Mg	Mn	S	Si	Nitrogen Total N	Nitrogen N-NH4
										mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
531	06-16-1994	Sp	BL	W	10U	14	2	2	6.1	8.955	0.183	0.673	0.000	6.087	5.073	0.070	1.386	0.005	2.420	5.855	0.220	0.030
532	06-16-1994	Sp	BL	W	10U	14	2	W	6.4	9.288	0.131	1.189	0.032	7.872	9.675	1.550	2.506	0.674	3.031	9.243	0.290	0.100
533	06-16-1994	Sp	BL	W	10U	14	7	2	5.6	4.063	0.153	0.895	0.053	4.554	2.262	0.011	0.833	0.010	1.807	5.291	0.500	0.010
534	06-16-1994	Sp	BL	W	10U	14	7	W	5.6	5.505	0.175	1.233	0.032	7.788	4.461	2.466	1.593	0.057	2.877	13.274	0.300	0.000
535	06-16-1994	Sp	UL	W	10U	14	11	2	5.5	3.875	0.130	1.168	0.032	8.503	2.918	0.021	1.224	0.023	3.201	5.924	0.200	0.000
536	06-16-1994	Sp	UL	W	10U	14	11	2	5.5	3.932	0.132	1.775	0.036	8.599	2.617	0.010	1.129	0.013	3.130	5.750	0.380	0.020
537	06-16-1994	Sp	UL	W	10U	14	11	7	5.3	2.779	0.171	1.017	0.000	8.586	3.190	0.085	1.065	0.014	3.189	5.886	0.230	0.010
538	06-16-1994	Sp	UL	W	10U	14	11	7	5.2	3.193	0.173	1.155	0.031	8.646	3.022	0.010	1.017	0.005	3.213	5.648	0.230	0.010
539	06-16-1994	STD	STD	STD	STD	STD	STD	STD	.	101.000	0.372	0.917	1.010	19.747	5.299	0.123	1.997	0.072	5.094	0.520	0.850	.
540	06-16-1994	STD	STD	STD	STD	STD	STD	STD	.	106.600	0.372	0.923	1.011	20.910	5.442	0.139	2.025	0.074	5.218	0.566	0.800	.
541	06-30-1994	Su	WL	S	13A	FLM	13A	FLM	.	326.100	0.215	1.377	0.057	15.675	22.985	0.042	4.166	0.027	5.352	6.474	.	0.150
542	06-30-1994	Su	WL	S	13A	1-2	13A	STR	.	327.000	0.206	1.449	0.103	16.421	24.134	0.025	4.491	0.006	5.609	6.531	.	0.150
543	06-30-1994	Su	BL	S	13	FLM	13	FLM	.	327.400	0.238	1.312	0.148	0.038	14.008	0.335	2.461	0.005	2.914	6.219	.	0.100
544	06-30-1994	Su	BL	S	13	5-6	13	STR	.	0.559	0.216	1.296	0.155	0.031	12.033	0.328	2.348	0.005	2.960	6.358	.	0.110
545	06-30-1994	Su	WL	S	10L	FLM	10L	FLM	.	9.675	0.206	1.235	0.150	7.715	10.625	0.281	2.562	0.018	2.736	6.750	.	0.110
546	06-30-1994	Su	WL	S	10L	HOL	10L	OUT	.	11.140	0.206	1.419	0.017	7.951	11.609	0.278	3.063	0.031	2.854	7.252	.	0.170
547	06-30-1994	Su	WL	S	10L	HOL	10L	IN	.	8.206	0.186	1.187	0.148	7.795	8.444	0.302	2.390	0.005	2.762	6.675	.	0.120
548	06-30-1994	Su	WL	S	10L	TSP	10L	IN	.	9.032	0.183	0.849	0.046	4.111	3.738	2.861	0.942	0.006	1.645	6.064	.	0.120
549	06-30-1994	Su	BL	S	10U	FLM	10U	FLM	.	7.756	0.171	1.136	0.170	7.538	8.047	0.376	2.373	0.009	2.805	6.721	.	0.110
550	06-30-1994	Su	BL	S	10U	13-14	10U	STR	.	7.695	0.201	1.157	0.152	7.520	8.046	0.322	2.417	0.005	2.824	6.873	.	0.100
551	07-14-1994	Su	WL	S	13A	FLM	13A	FLM	.	18.620	0.143	1.490	0.046	15.958	25.238	0.125	4.559	0.031	5.712	7.460	.	0.170
552	07-14-1994	Su	BL	S	13A	ORG	13A	ORG	.	19.150	0.146	1.519	0.096	19.525	24.492	0.153	6.138	0.778	6.760	6.612	.	0.110
553	07-14-1994	Su	BL	S	13	FLM	13	FLM	.	13.630	0.156	1.208	0.147	8.106	17.156	0.449	2.930	0.118	3.167	7.327	.	0.060
554	07-14-1994	Su	BL	S	13	7-8	13	STR	.	12.350	0.155	1.270	0.153	8.319	15.126	0.344	2.834	0.017	3.181	7.196	.	0.060
555	07-14-1994	Su	WL	S	10L	FLM	10L	FLM	.	13.210	0.179	1.100	0.146	7.148	15.176	0.480	3.299	0.015	2.789	7.542	.	0.090
556	07-14-1994	Su	WL	S	10L	HOL	10L	IN	.	0.338	0.175	1.280	0.142	7.508	8.810	0.296	2.447	0.005	2.896	6.726	.	0.110
557	07-14-1994	Su	WL	S	10L	HOL	10L	OUT	.	11.250	0.165	1.174	0.141	7.753	12.891	0.308	3.258	0.080	3.099	7.525	.	0.060
558	07-14-1994	Su	WL	S	10L	TSP	10L	IN	.	26.900	0.205	0.982	0.000	1.145	29.602	3.431	3.575	0.227	0.567	8.057	.	0.110
559	07-14-1994	Su	WL	S	10L	TSP	10L	OUT	.	28.830	0.180	1.033	0.019	2.007	35.268	1.662	4.301	1.732	0.875	8.343	.	0.330
560	07-14-1994	Su	BL	S	10U	FLM	10U	FLM	.	0.525	0.155	1.226	0.149	7.883	11.362	0.341	3.136	0.204	3.116	7.321	.	0.050
561	07-15-1994 05 pm	Su	WL	S	13A	FLM	13A	ISCO	.	25.440	0.500	1.334	0.149	12.391	21.396	0.119	3.941	0.005	4.200	12.097	.	0.120
562	07-15-1994 08 pm	Su	WL	S	13A	FLM	13A	ISCO	.	0.966	0.603	1.084	0.129	10.843	17.640	0.259	3.273	0.005	3.733	11.931	.	0.160
563	07-15-1994 11 pm	Su	WL	S	13A	FLM	13A	ISCO	.	26.220	0.519	1.254	0.079	13.713	21.836	0.296	4.110	0.005	4.655	13.056	.	0.150
564	07-16-1994 02 am	Su	WL	S	13A	FLM	13A	ISCO	.	1.031	0.459	1.269	0.070	14.395	23.325	0.238	4.391	0.006	4.907	13.170	.	0.150
565	07-16-1994 05 am	Su	WL	S	13A	FLM	13A	ISCO	.	25.750	0.286	1.315	0.054	14.929	23.656	0.170	4.493	0.005	5.150	13.563	.	0.150
566	07-16-1994 08 am	Su	WL	S	13A	FLM	13A	ISCO	.	0.975	0.287	1.268	0.046	15.223	24.271	0.143	4.533	0.005	5.256	13.730	.	0.180
567	07-16-1994 11 am	Su	WL	S	13A	FLM	13A	ISCO	.	25.750	0.259	1.282	0.047	15.180	24.620	0.116	4.520	0.005	5.296	13.444	.	0.170
568	07-16-1994 02 pm	Su	WL	S	13A	FLM	13A	ISCO	.	0.959	0.441	1.423	0.128	13.774	21.987	0.086	3.527	0.005	4.355	13.764	.	0.090
569	07-16-1994 05 pm	Su	WL	S	13A	FLM	13A	ISCO	.	24.740	0.469	1.076	0.193	10.877	18.396	0.235	2.768	0.005	3.269	12.549	.	0.150
570	07-16-1994 08 pm	Su	WL	S	13A	FLM	13A	ISCO	.	0.865	0.440	1.268	0.080	13.508	21.074	0.235	3.449	0.005	4.231	14.909	.	0.120
571	07-16-1994 11 pm	Su	WL	S	13A	FLM	13A	ISCO	.	26.560	0.336	1.287	0.107	14.147	20.950	0.306	4.158	0.033	4.762	13.037	.	0.080
572	07-17-1994 02 am	Su	WL	S	13A	FLM	13A	ISCO	.	1.067	0.408	1.241	0.083	14.451	21.482	0.227	4.228	0.005	4.864	13.218	.	0.080
573		STD	STD	STD	STD	STD	STD	STD	.	106.100	0.153	0.889	1.014	20.144	5.237	0.144	1.936	0.092	4.912	0.472	.	.
574	07-17-1994 08 am	Su	WL	S	13A	FLM	13A	ISCO	.	23.400	0.406	1.363	0.086	14.770	22.152	0.156	4.290	0.006	4.901	13.108	.	0.120
575	07-17-1994 11 am	Su	WL	S	13A	FLM	13A	ISCO	.	15.030	0.305	1.315	0.083	14.874	22.651	0.142	4.324	0.005	4.926	13.248	.	0.090
576	07-17-1994 02 pm	Su	WL	S	13A	FLM	13A	ISCO	.	24.380	0.486	1.391	0.106	15.021	22.459	0.116	4.352	0.005	5.026	13.169	.	0.120
577	07-15-1994 05 pm	Su	BL	S	13	FLM	13	ISCO	.	19.500	0.384	1.350	0.324	7.110	15.209	0.359	2.683	0.005	2.545	13.561	.	0.060
578	07-15-1994 08 pm	Su	BL	S	13	FLM	13	ISCO	.	19.110	0.360	1.138	0.174	6.563	10.420	0.720	1.953	0.005	2.415	13.349	.	0.050
579	07-15-1994 11 pm	Su	BL	S	13	FLM	13	ISCO	.	14.610	0.369	1.241	0.938	7.753	11.209	0.724	2.149	0.005	2.745	8.559	.	0.040
580	07-16-1994 02 am	Su	BL	S	13	FLM	13	ISCO	.	15.630	0.326	1.302	0.775	8.315	12.214	0.653	2.308	0.005	2.918	9.793	.	0.040
581	07-16-1994 05 am	Su	BL	S	13	FLM	13	ISCO	.	18.180	0.348	1.399	0.138	8.505	12.715	0.705	2.495	0.033	2.959	15.683	.	0.030
582	07-16-1994 08 am	Su	BL	S	13	FLM	13	ISCO	.	16.630	0.283	1.483	0.557	8.501	13.265	0.633	2.447	0.005	2.951	9.073	.	0.040
583	07-16-1994 11 am	Su	BL	S	13	FLM	13	ISCO	.	9.022	0.334	1.458	0.192	8.638	13.908	0.668	2.569	0.005	3.064	12.696	.	0.070

SN	Date	Season	Position Pos	Asp	Location WS	Tran	Dist	Type	pH	DOC	IC Anions F	CL	NO3	SO4	ICP Cations Ca	Fe	Mg	Mn	S	Si	Nitrogen Total N	N-NH4
										mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
584	07-16-1994 02 pm	Su	BL	S	13	FLM	13	ISCO	.	15.490	0.338	1.445	0.403	8.274	13.600	0.600	2.434	0.005	2.933	8.775	.	0.050
585	07-16-1994 05 pm	Su	BL	S	13	FLM	13	ISCO	.	15.000	0.353	1.201	0.524	6.922	9.461	0.842	1.871	0.005	2.520	7.718	.	0.060
586	07-16-1994 08 pm	Su	BL	S	13	FLM	13	ISCO	.	15.980	0.300	1.348	0.119	8.226	10.544	1.046	2.178	0.005	2.968	15.893	.	0.430
587	07-16-1994 11 pm	Su	BL	S	13	FLM	13	ISCO	.	14.960	0.327	1.321	0.139	8.471	10.565	0.948	2.186	0.007	2.980	16.067	.	0.080
588	07-17-1994 02 am	Su	BL	S	13	FLM	13	ISCO	.	15.670	0.333	1.390	0.145	8.512	11.016	0.910	2.255	0.009	3.042	16.506	.	0.080
589	07-17-1994 05 am	Su	BL	S	13	FLM	13	ISCO	.	13.010	0.300	1.294	1.319	8.273	10.520	0.770	2.069	0.007	2.941	8.750	.	0.070
590	07-17-1994 08 am	Su	BL	S	13	FLM	13	ISCO	.	13.530	0.324	1.378	0.489	8.438	11.245	0.724	2.172	0.022	2.944	8.457	.	0.000
591	07-17-1994 11 am	Su	BL	S	13	FLM	13	ISCO	.	13.930	0.293	1.383	0.579	8.492	11.124	0.772	2.213	0.053	2.999	9.019	.	0.000
592	07-17-1994 02 pm	Su	BL	S	13	FLM	13	ISCO	.	0.720	0.368	1.412	0.877	8.397	11.421	0.747	2.186	0.014	2.946	8.830	.	0.020
593	07-15-1994	STD	STD	STD	STD	STD	STD	STD	.	.	0.384	0.933	1.044	20.223	5.201	0.119	1.910	0.093	4.851	0.509	.	.
594	07-20-1994	Su	UL	B	13A	1	21	2	6.5	0.833	0.181	1.176	0.030	5.557	1.184	0.010	0.725	0.012	2.052	6.594	.	0.040
595	07-20-1994	Su	WL	B	13A	1	16	2	6.6	26.020	0.156	1.335	0.378	6.944	35.535	0.010	3.082	0.070	2.541	9.681	.	0.110
596	07-20-1994	Su	WL	B	13A	1	16	W	7.1	30.060	0.211	1.468	0.106	5.060	44.266	0.035	3.149	0.268	1.835	10.645	.	0.640
597	07-20-1994	Su	WL	B	13A	1	9	2	6.9	29.260	0.150	1.805	0.106	11.802	41.766	0.010	5.535	0.022	4.122	9.069	.	0.060
598	07-20-1994	Su	WL	B	13A	1	9	W	7	24.670	0.173	1.431	0.141	10.066	35.739	0.016	4.339	0.431	3.543	6.829	.	0.050
599	07-20-1994	Su	WL	B	13A	1	5	2	6.7	14.700	0.152	1.392	0.080	14.307	20.671	0.010	3.493	0.822	4.902	9.041	.	0.010
600	07-20-1994	Su	WL	B	13A	1	5	W	6.5	26.010	0.163	1.418	0.105	10.928	36.977	0.301	4.858	0.752	3.899	8.599	.	0.230
601	07-20-1994	Su	WL	B	13A	1	2	2	6.6	18.870	0.158	1.600	0.034	16.907	25.232	0.205	4.587	1.778	5.734	7.053	.	0.050
602	07-20-1994	Su	WL	B	13A	1	2	W	6.6	24.600	0.166	1.495	0.119	13.708	34.504	0.067	4.891	0.821	4.746	8.189	.	0.060
603	07-20-1994	Su	UL	W	13A	2	4	2	6.5	4.905	0.215	0.946	0.030	4.553	3.648	0.010	0.707	0.061	1.682	5.552	.	0.030
604	07-20-1994	Su	UL	W	13A	2	4	7	6.5	6.356	0.219	1.491	0.037	8.306	7.520	0.010	0.940	0.043	3.020	6.771	.	0.030
605	07-20-1994	Su	UL	W	13A	2	10	7	6.4	3.396	0.179	1.424	0.000	8.533	2.748	0.010	1.292	0.035	3.074	5.356	.	0.050
606	07-20-1994	Su	UL	W	13A	4	7	2	6.2	4.187	0.211	2.246	0.000	15.214	6.836	0.010	1.437	0.037	5.148	6.550	.	0.080
607	07-20-1994	Su	UL	W	13A	4	7	W	6.1	10.220	0.216	2.333	0.056	13.228	13.554	0.450	2.574	0.246	4.558	8.765	.	0.120
608	07-20-1994	Su	WL	W	13A	4	2	2	6.3	19.860	0.195	1.427	0.000	13.175	21.911	0.010	4.101	3.534	4.607	5.750	.	0.230
609	07-20-1994	Su	WL	W	13A	4	2	2	6.3	19.420	0.189	1.235	0.000	12.270	22.982	0.010	4.285	3.798	4.295	5.727	.	0.250
610	07-20-1994	Su	WL	W	13A	4	2	W	6.2	12.500	0.165	1.339	0.024	10.927	15.721	1.610	2.519	1.245	3.896	7.458	.	0.660
611	07-20-1994	Su	WL	B	13A	3	2	2	6.8	36.420	0.189	1.562	0.341	1.305	35.988	0.482	7.777	3.102	0.535	7.462	.	0.600
612	07-20-1994	Su	WL	B	13A	3	2	W	6.8	20.070	0.190	1.623	0.099	15.399	24.853	0.235	5.127	0.718	5.222	6.827	.	0.130
613	07-20-1994	Su	WL	B	13A	3	6	2	6.6	37.850	0.176	1.636	0.000	13.220	46.873	0.139	7.233	4.075	4.631	10.357	.	0.100
614	07-20-1994	Su	WL	B	13A	3	6	W	7.1	34.040	0.188	1.506	0.152	14.376	44.778	0.075	6.208	2.194	4.906	10.481	.	0.090
615	07-20-1994	Su	UL	B	13A	3	11	2	6.1	6.513	0.229	0.934	0.056	3.992	3.145	0.036	0.793	0.130	1.502	5.005	.	0.080
616	07-20-1994	Su	BL	S	13A	ORG	13A	ORG	6.8	20.150	0.157	2.195	0.116	18.338	24.536	0.119	6.161	1.075	6.165	6.243	.	0.170
617	07-20-1994	Su	BL	S	13A	ORG	13A	ORG	7	19.800	0.170	1.750	0.110	18.435	24.517	0.164	6.148	1.132	6.203	6.308	.	0.080
618	07-20-1994	Su	WL	S	13A	3-4	13A	STR	7.2	20.740	0.166	1.441	0.107	18.498	27.321	0.159	5.816	0.781	6.157	6.603	.	0.080
619	07-20-1994	Su	WL	S	13A	FLM	13A	FLM	7.1	16.060	0.161	1.474	0.035	14.917	25.059	0.043	4.368	0.096	5.074	6.789	.	0.020
620	07-20-1994	STD	STD	STD	STD	STD	STD	STD	.	104.300	0.154	0.921	0.740	20.106	5.348	0.127	1.914	0.109	4.883	0.619	.	.
621	07-20-1994	Su	BL	S	13	FLM	13	FLM	7.5	12.120	0.170	3.319	0.144	7.911	15.302	0.384	2.675	0.094	2.860	6.756	.	0.570
622	07-20-1994	Su	BL	B	13	5	2	W	6.4	25.880	0.176	3.266	0.035	2.966	27.771	1.462	4.739	0.757	1.228	11.610	.	1.950
623	07-20-1994	Su	BL	S	13	5-6	13	STR	7.3	11.750	0.178	2.028	0.107	8.223	13.636	0.340	2.593	0.070	2.943	6.651	.	0.130
624	07-20-1994	Su	BL	W	13	6	1	W	6.9	25.680	0.188	2.893	0.266	6.566	31.831	0.108	3.559	0.302	2.418	8.098	.	0.690
625	07-20-1994	Su	BL	W	13	6	6	2	6	0.705	0.183	1.208	0.000	11.269	6.945	0.058	0.941	0.063	3.899	6.992	.	0.040
626	07-20-1994	Su	BL	W	13	6	6	2	5.9	0.280	0.211	1.390	0.000	10.737	6.343	0.040	0.865	0.032	3.797	6.877	.	0.040
627	07-20-1994	Su	BL	W	13	6	6	W	6.4	20.370	0.151	1.606	0.057	11.121	30.279	0.393	3.316	0.122	3.934	8.437	.	0.180
628	07-20-1994	Su	BL	W	13	6	11	W	6.5	19.810	0.241	2.636	0.930	10.593	23.583	0.444	2.958	0.249	3.785	8.042	.	0.880
629	07-20-1994	Su	UL	W	13	6	17	2	6.3	4.525	0.205	0.661	0.000	5.531	1.911	0.010	0.569	0.038	2.015	6.227	.	0.050
630	07-20-1994	Su	UL	W	13	8	11	2	6.1	6.425	0.176	0.840	0.000	6.950	3.208	0.040	0.700	0.121	2.499	6.590	.	0.380
631	07-20-1994	Su	UL	W	13	8	11	7	6	3.965	0.157	1.334	0.027	8.882	4.833	0.037	0.981	0.117	3.153	4.651	.	1.060
632	07-20-1994	Su	BL	W	13	8	6	2	6.1	4.970	0.149	6.038	0.070	7.809	5.804	0.063	1.367	0.301	2.769	6.544	.	1.800
633	07-20-1994	Su	BL	W	13	8	6	W	6.2	7.625	0.202	1.657	0.070	10.477	9.971	0.418	1.961	0.035	3.682	6.248	.	0.090
634	07-20-1994	Su	BL	W	13	8	2	2	6.2	4.191	0.152	1.283	0.049	4.835	3.441	0.082	0.716	0.015	1.725	5.275	.	0.160
635	07-20-1994	Su	BL	W	13	8	2	W	6.2	9.520	0.199	1.546	0.000	10.410	11.636	0.423	2.646	0.644	3.650	6.166	.	0.070
636	07-20-1994	Su	BL	S	13	7-8	13	STR	7	9.680	0.160	1.396	0.143	7.614	10.572	0.340	2.144	0.088	2.732	6.350	.	0.050

SN	Date	Season	Position Pos	Asp	Location WS	Tran	Dist	Type	pH	DOC	IC Anions F	CL	NO3	SO4	ICP Cations Ca	Fe	Mg	Mn	S	Si	Nitrogen Total N	N-NH4
										mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
637	07-20-1994	Su	BL	S	13	7-8	13	STR	7.1	9.470	0.159	1.501	0.146	7.596	10.455	0.390	2.126	0.051	2.688	6.555	.	0.090
638	07-20-1994	Su	BL	E	13	7	3	W	6.5	13.390	0.166	2.747	0.107	9.250	16.275	0.256	3.351	1.151	3.237	5.910	.	0.200
639	07-20-1994	Su	BL	E	13	7	7	2	6	7.787	0.223	2.395	0.300	11.588	8.080	0.010	2.238	0.154	4.039	7.464	.	0.040
640	07-20-1994	Su	BL	E	13	7	7	W	6.5	15.040	0.173	2.611	0.519	9.097	16.625	0.138	3.913	2.808	3.241	6.102	.	0.140
641	07-20-1994	Su	UL	E	13	7	11	2	6	2.355	0.153	0.677	0.030	6.263	5.123	0.132	1.921	0.132	4.959	0.533	.	0.050
642	07-20-1994	Su	UL	E	13	7	11	7	5.7	1.169	0.170	0.851	0.030	9.255	2.799	0.012	0.944	0.023	3.089	6.316	.	0.040
643	07-20-1994	STD	STD	STD	STD	STD	STD	STD	.	106.400	0.152	0.922	1.012	20.134	2.596	0.010	1.115	0.030	3.287	5.993	.	.
644	07-20-1994	Su	UL	E	10L	9	9	2	6.2	16.200	0.158	0.969	0.029	11.551	5.975	1.707	1.541	0.101	2.881	11.430	.	0.170
645	07-20-1994	Su	WL	E	10L	9	3	2	6.5	50.900	0.261	0.766	0.000	0.460	2.026	0.010	0.735	0.046	1.740	5.614	.	1.840
646	07-20-1994	Su	WL	E	10L	9	3	W	7	28.270	0.117	2.330	0.030	10.571	7.575	1.148	2.009	0.583	2.806	7.688	.	0.930
647	07-20-1994	Su	WL	S	10L	9-10	10L	STR	7.4	6.650	0.150	8.462	0.276	7.149	4.451	0.014	1.179	0.058	2.339	6.049	.	3.680
648	07-20-1994	Su	WL	W	10L	10	2	2	6.7	26.780	0.272	0.966	0.047	1.013	9.189	0.300	2.649	0.043	2.751	6.887	.	0.570
649	07-20-1994	Su	WL	W	10L	10	2	W	6.7	21.450	0.183	1.107	0.030	1.860	24.113	0.651	3.252	0.095	4.092	11.091	.	0.510
650	07-20-1994	Su	WL	W	10L	10	7	2	6.7	1.966	0.298	1.084	0.000	0.845	2.821	0.010	0.945	0.182	2.709	7.528	.	0.130
651	07-20-1994	Su	WL	W	10L	10	7	W	6.6	23.980	0.212	1.190	0.029	1.113	2.514	0.011	0.963	0.299	2.934	7.413	.	0.540
652	07-20-1994	Su	UL	W	10L	10	18	2	5.7	3.659	0.169	1.564	0.034	6.230	13.831	1.360	2.364	0.731	2.809	9.531	.	0.220
653	07-20-1994	Su	UL	W	10L	10	18	2	5.8	4.696	0.167	0.950	0.030	5.942	4.302	0.022	1.097	0.059	3.536	7.895	.	0.080
654	07-20-1994	Su	UL	W	10L	10	18	W	5.8	7.304	0.210	1.069	0.029	4.720	10.554	0.294	2.729	0.090	2.680	6.674	.	0.110
655	07-20-1994	STD	STD	STD	STD	STD	STD	STD	.	109.300	0.194	0.971	1.006	20.038	1.743	0.022	0.743	0.010	2.486	4.150	.	.
656	07-20-1994	Su	UL	W	10L	12	29	2	5.4	4.992	0.199	0.710	0.000	8.392	15.174	0.010	1.219	0.041	3.544	6.540	.	0.060
657	07-20-1994	Su	UL	W	10L	12	29	2	5.2	3.342	0.177	1.236	0.029	6.773	30.353	1.094	5.099	3.093	1.096	6.699	.	0.030
658	07-20-1994	Su	UL	W	10L	12	16	2	5.3	4.163	0.208	1.198	0.000	5.087	13.922	0.041	4.027	0.238	5.546	6.353	.	0.030
659	07-20-1994	Su	UL	W	10L	12	16	W	5.3	4.508	0.156	1.048	0.047	5.579	11.280	0.261	2.783	0.068	2.699	6.779	.	0.070
660	07-20-1994	Su	WL	W	10L	12	7	7	5.3	28.740	0.229	0.875	0.027	0.236	10.455	0.560	2.773	0.129	2.669	6.722	.	0.970
661	07-20-1994	Su	WL	W	10L	12	7	W	6.9	6.093	0.205	1.372	0.126	2.689	35.793	1.837	4.072	1.616	0.781	8.399	.	0.620
662	07-20-1994	Su	WL	S	10L	TSP	10L	IN	7	32.230	0.206	1.321	0.000	1.388	31.787	6.024	3.695	1.717	0.635	8.586	.	0.230
663	07-20-1994	Su	WL	S	10L	TSP	10L	OUT	6.8	32.640	0.182	1.103	0.000	1.982	27.986	0.243	3.883	2.106	1.084	6.926	.	0.250
664	07-20-1994	Su	WL	S	10L	HOL	10L	IN	7.4	10.360	0.155	1.880	0.188	7.140	27.486	5.585	3.546	1.560	0.140	7.064	.	0.190
665	07-20-1994	Su	WL	S	10L	HOL	10L	OUT	7.4	16.030	0.152	1.548	0.188	7.256	2.123	1.958	0.932	0.126	2.011	12.806	.	0.120
666	07-20-1994	Su	WL	W	10L	12	2	2	6.6	.	0.137	5.994	0.093	15.840	1.963	0.015	0.512	0.100	1.897	7.510	.	0.390
667	07-20-1994	Su	WL	W	10L	12	2	W	6.9	27.980	0.186	1.524	0.039	2.828	1.992	0.010	0.586	0.032	2.447	5.233	.	0.510
668	07-20-1994	Su	UL	E	10L	11	2	7	7.2	5.054	0.129	1.062	0.025	9.832	1.864	0.183	0.646	0.466	3.056	3.713	.	0.140
669	07-20-1994	Su	UL	E	10L	11	7	2	7.1	4.106	0.190	1.011	0.025	6.831	5.271	0.120	1.934	0.126	5.081	0.649	.	0.100
670	07-20-1994	Su	BL	S	10U	FLM	10U	FLM	6.9	9.670	0.164	1.440	0.202	7.346	5.926	1.613	1.395	0.679	1.761	8.235	.	0.080
671	07-20-1994	Su	BL	E	10U	13	7	2	6.3	6.062	0.161	0.911	0.000	9.883	3.362	0.211	0.867	0.448	2.192	5.373	.	0.060
672	07-20-1994	Su	BL	E	10U	13	7	W	6.3	15.090	0.177	2.057	0.067	7.630	2.467	0.044	0.771	0.194	2.259	5.193	.	0.450
673	07-20-1994	Su	BL	E	10U	13	2	2	5.5	4.727	0.204	1.199	0.000	8.137	26.692	0.048	2.811	3.252	0.470	6.685	.	0.080
674	07-20-1994	Su	BL	E	10U	13	2	2	5.4	6.023	0.212	1.903	0.028	7.484	43.526	0.075	4.119	5.426	0.349	6.801	.	0.120
675	07-20-1994	Su	BL	E	10U	13	2	W	6.2	17.180	0.167	1.640	0.025	11.640	27.696	0.659	2.555	2.260	0.735	8.911	.	0.160
676	07-20-1994	Su	BL	S	10U	13-14	10U	STR	6.3	9.158	0.170	1.428	0.187	7.493	32.493	0.043	3.211	4.390	0.418	8.024	.	0.090
677	07-20-1994	Su	BL	W	10U	14	2	2	6.1	8.279	0.207	1.057	0.040	6.312	13.795	0.669	3.197	0.444	2.681	6.987	.	0.110
678	07-20-1994	Su	BL	W	10U	14	2	W	5.9	7.476	0.199	1.449	0.060	7.652	62.967	0.093	6.643	0.501	3.869	12.092	.	0.230
679	07-20-1994	Su	BL	W	10U	14	7	2	5.5	3.224	0.207	0.630	0.000	4.819	53.310	0.740	9.235	9.277	0.353	9.212	.	0.080
680	07-20-1994	Su	BL	W	10U	14	7	W	5.7	6.226	0.193	1.313	0.000	7.932	7.914	0.024	1.813	0.192	4.173	6.083	.	0.060
681	07-20-1994	Su	UL	W	10U	14	11	2	5.5	3.435	0.193	1.670	0.039	9.132	5.218	0.119	1.960	0.129	5.086	0.682	.	0.320
682	07-20-1994	Su	UL	W	10U	14	11	7	5.4	3.124	0.187	1.088	0.000	8.592	1.327	0.010	1.107	0.009	3.365	5.360	.	0.060
683	07-20-1994	STD	STD	STD	STD	STD	STD	STD	.	108.300	0.410	1.000	0.842	20.171	1.714	0.010	0.823	0.040	2.275	4.505	.	.
684	07-28-1994	Su	WL	S	13A	FLM	13A	FLM	.	15.790	0.114	4.548	0.044	14.752	20.795	0.051	4.332	0.039	4.549	6.431	0.470	0.050
685	07-28-1994	Su	BL	S	13A	ORG	13A	ORG	.	16.860	0.083	1.499	0.032	15.488	20.269	0.150	5.010	0.101	4.749	6.028	0.420	0.080
686	07-28-1994	Su	BL	S	13	FLM	13	FLM	.	10.060	0.051	1.352	0.053	7.581	10.125	0.147	2.054	0.009	2.762	5.527	0.500	0.020
687	07-28-1994	Su	BL	S	13	7-8	13	STR	.	9.110	0.071	1.509	0.057	8.746	9.215	0.124	2.025	0.008	2.809	5.546	0.460	0.000
688	07-28-1994	Su	WL	S	10L	FLM	10L	FLM	.	6.490	0.030	0.962	0.031	5.940	4.882	0.126	1.562	0.009	2.433	5.119	0.430	0.020
689	07-28-1994	Su	WL	S	10L	HOL	10L	IN	.	7.470	0.056	1.336	0.024	7.411	4.834	0.082	1.586	0.010	2.412	5.113	0.490	0.100

SN	Date	Season	Position Pos	Asp	Location WS	Tran	Dist	Type	pH	DOC	IC Anions F	CL	NO3	SO4	ICP Cations Ca	Fe	Mg	Mn	S	Si	Nitrogen Total N	N-NH4
										mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
690	07-28-1994	Su	WL	S	10L	HOL	10L	OUT	.	9.790	0.029	1.179	0.028	7.560	4.925	0.097	1.593	0.014	2.458	5.163	0.430	0.020
691	07-28-1994	Su	WL	S	10L	TSP	10L	IN	.	7.560	0.072	0.951	0.034	6.251	2.726	0.284	0.704	0.122	2.043	6.022	0.500	0.080
692	07-28-1994	Su	WL	S	10L	TSP	10L	OUT	.	10.450	0.053	1.315	0.037	7.594	4.555	0.091	1.558	0.012	2.439	5.210	0.450	0.020
693	07-28-1994	Su	BL	S	10U	FLM	10U	FLM	.	6.460	0.041	1.243	0.028	7.501	4.132	0.082	1.514	0.006	2.408	5.002	0.440	0.020
694	07-28-1994	STD	STD	STD	STD	STD	STD	STD	.	103.900	0.030	1.079	0.248	19.924	5.087	0.108	1.951	0.130	4.711	0.254	1.080	0.000
695	08-25-1994	Su	WL	S	13A	FLM	13A	FLM	.	27.360	0.083	1.482	0.044	18.477	27.454	0.101	7.007	1.339	5.915	6.393	0.410	0.150
696	08-25-1994	Su	BL	S	13A	ORG	13A	ORG	.	12.030	0.069	2.037	0.021	14.735	27.283	0.023	5.028	0.008	4.675	7.111	0.680	0.230
697	08-25-1994	Su	BL	S	13	FLM	13	FLM	.	11.640	0.062	1.413	0.041	8.056	16.425	0.180	2.841	0.103	2.508	6.091	0.420	0.030
698	08-25-1994	Su	BL	S	13	7-8	13	STR	.	9.200	0.060	1.514	0.187	7.624	11.890	0.120	2.431	0.025	2.372	5.883	0.400	0.040
699	08-25-1994	Su	WL	S	10L	FLM	10L	FLM	.	9.650	0.041	1.313	0.046	6.754	10.930	0.202	2.811	0.164	2.214	6.337	0.380	0.020
700	08-25-1994	Su	WL	S	10L	HOL	10L	IN	.	8.770	0.048	1.341	0.175	6.954	9.273	0.117	2.717	0.130	2.308	6.508	0.430	0.130
701	08-25-1994	Su	WL	S	10L	HOL	10L	OUT	.	10.340	0.048	1.084	0.281	5.905	11.548	0.115	3.243	0.246	2.716	6.499	0.390	0.120
702	08-25-1994	Su	WL	S	10L	TSP	10L	IN	.	10.850	0.076	0.835	0.786	4.151	7.074	1.730	1.478	0.153	1.409	6.007	0.490	0.150
703	08-25-1994	Su	WL	S	10L	TSP	10L	OUT	.	30.540	0.157	1.059	2.058	1.613	36.532	11.939	4.473	1.959	0.561	9.095	0.610	0.270
704	08-25-1994	Su	BL	S	10U	FLM	10U	FLM	.	8.200	0.046	1.395	0.056	7.047	9.028	0.106	2.752	0.144	2.268	6.070	0.350	0.030
705	08-25-1994	Su	BL	S	10U	13-14	10U	STR	.	3.920	0.042	1.395	0.267	7.006	8.599	0.096	2.648	0.070	2.110	5.923	0.360	0.040
706	08-25-1994	Su	WL	E	13A	1	16	W	.	30.910	0.124	1.391	0.000	10.219	41.215	0.033	2.815	0.313	2.736	8.444	2.040	1.560
707	08-25-1994	STD	STD	STD	STD	STD	STD	STD	.	101.000	0.000	0.938	0.245	19.488	4.209	0.086	1.362	0.076	3.327	0.211	0.150	.
708	09-09-1994	Su	WL	E	13A	1	9	2	.	29.630	0.074	1.848	0.000	16.514	38.682	0.010	5.621	0.022	7.286	12.101	0.490	0.030
709	09-09-1994	Su	WL	E	13A	1	9	W	.	27.990	0.113	1.485	0.610	8.627	35.684	0.025	4.092	0.521	3.973	9.613	0.660	0.300
710	09-09-1994	Su	WL	E	13A	1	5	2	.	12.300	0.033	1.173	0.000	14.534	16.064	0.010	2.818	0.110	6.560	12.278	0.360	0.100
711	09-09-1994	Su	WL	E	13A	1	5	W	.	34.260	0.088	1.241	0.035	9.803	41.513	0.054	5.898	1.871	4.231	11.452	0.550	0.260
712	09-09-1994	Su	WL	E	13A	1	2	2	.	26.070	0.055	1.461	0.016	16.589	30.279	0.010	5.776	3.001	7.301	9.929	0.390	0.060
713	09-09-1994	Su	WL	E	13A	1	2	W	.	30.990	0.081	1.367	0.018	11.919	37.791	0.022	5.696	1.623	5.117	11.228	0.370	0.100
714	09-09-1994	Su	BL	S	13	5-6	13	STR	.	23.140	0.076	1.317	0.000	15.968	32.434	0.023	4.194	0.005	6.075	9.222	0.350	0.040
715	09-09-1994	Su	UL	W	13A	4	7	2	.	3.390	0.021	2.102	0.000	19.677	6.770	0.010	0.030	0.005	8.080	8.498	0.350	0.030
716	09-09-1994	Su	UL	W	13A	4	7	W	.	14.110	0.060	1.740	0.045	13.131	20.074	0.141	0.030	0.005	5.338	10.556	0.520	0.140
717	09-09-1994	Su	WL	W	13A	4	2	2	.	24.220	0.108	1.276	0.053	8.763	28.262	0.038	2.532	1.486	3.790	8.350	0.610	0.200
718	09-09-1994	Su	WL	W	13A	4	2	W	.	12.430	0.092	1.335	0.000	11.872	24.135	0.078	0.212	0.005	5.124	10.115	0.690	0.640
719	09-09-1994	Su	BL	S	13A	ORG	13A	ORG	.	25.130	0.089	1.460	0.037	18.374	29.920	0.118	6.405	0.005	7.953	8.016	0.330	0.050
720	09-09-1994	STD	STD	STD	STD	STD	STD	STD	.	103.000	0.000	0.899	0.364	19.792	5.219	0.103	0.030	0.005	6.708	0.318	1.070	.
721	09-09-1994	Su	BL	S	13	5-6	13	STR	.	20.230	0.083	1.394	0.065	9.178	25.986	0.047	0.749	0.005	3.890	9.466	0.060	0.030
722	09-09-1994	Su	BL	W	13	6	1	W	.	40.020	0.083	1.096	0.076	2.609	54.661	0.028	3.816	0.005	1.169	12.270	0.590	0.250
723	09-09-1994	Su	BL	W	13	6	6	2	.	16.370	0.044	1.446	0.000	14.170	6.889	0.033	0.030	0.005	6.279	10.104	0.450	0.030
724	09-09-1994	Su	BL	W	13	6	6	2	.	9.220	0.068	1.599	0.000	14.427	7.276	0.057	0.941	0.051	6.406	10.005	0.360	0.030
725	09-09-1994	Su	BL	W	13	6	6	W	.	1.400	0.084	1.256	0.044	7.254	41.839	0.142	4.433	0.829	3.295	9.431	0.400	0.520
726	09-09-1994	Su	BL	W	13	6	11	7	.	1.200	0.045	1.150	0.058	10.954	33.614	0.010	3.493	0.005	4.884	8.960	0.370	0.040
727	09-09-1994	Su	BL	W	13	6	11	7	.	16.340	0.000	0.943	0.374	20.457	5.230	0.103	1.920	0.079	6.747	0.205	.	.
728	09-09-1994	STD	STD	STD	STD	STD	STD	STD	.	102.900	0.000	0.701	0.285	14.582	5.125	0.097	1.913	0.078	6.761	0.186	1.030	.
729	09-09-1994	STD	STD	STD	STD	STD	STD	STD	.	103.000	0.000	0.956	0.376	20.315	5.157	0.095	1.922	0.079	6.782	0.201	1.130	.
730	09-09-1994	Su	BL	S	13	7-8	13	STR	.	20.910	0.083	1.585	0.093	8.317	23.497	0.099	3.856	0.087	3.840	9.944	0.520	0.240
731	09-09-1994	Su	BL	E	13	7	3	2	.	3.900	0.026	0.998	0.000	3.946	1.969	0.010	0.335	0.058	1.939	7.825	0.350	0.050
732	09-09-1994	Su	BL	E	13	7	3	W	.	20.280	0.108	2.258	0.000	10.419	34.080	0.073	6.911	1.858	4.930	9.326	0.400	0.230
733	09-09-1994	Su	BL	E	13	7	7	2	.	6.660	0.027	1.944	0.000	12.292	7.165	0.010	1.963	0.013	5.842	11.258	0.280	0.050
734	09-09-1994	Su	BL	E	13	7	7	W	.	15.310	0.105	3.519	0.360	12.629	17.398	0.047	4.279	2.223	4.263	8.549	0.560	0.200
735	09-09-1994	Su	WL	E	10L	9	3	2	.	41.600	0.407	1.894	0.360	1.346	41.331	1.247	7.364	8.910	0.570	12.498	1.400	1.120
736	09-09-1994	Su	WL	E	10L	9	3	W	.	41.310	0.154	1.738	0.000	12.463	61.305	0.028	6.574	0.668	3.968	16.595	0.490	0.250
737	09-09-1994	Su	WL	S	10L	9-10	10L	STR	.	15.730	0.087	1.763	0.054	10.179	19.207	0.300	3.749	0.438	3.382	9.448	0.530	0.060
738	09-09-1994	Su	UL	W	10L	12	29	2	.	3.670	0.133	0.740	0.000	11.932	2.053	0.043	0.611	0.419	4.056	5.611	0.340	0.050
739	09-09-1994	Su	UL	W	10L	12	29	7	.	3.320	0.040	1.892	0.000	8.954	2.744	0.010	0.591	0.011	3.016	8.452	0.350	0.020
740	09-09-1994	Su	UL	W	10L	12	16	2	.	3.760	0.057	1.728	0.000	7.298	1.726	0.010	0.418	0.061	2.511	10.536	0.310	0.010
741	09-09-1994	Su	UL	W	10L	12	16	W	.	0.400	0.092	3.637	0.027	7.302	7.567	1.364	1.759	0.244	2.512	9.237	0.910	0.600
742	09-09-1994	Su	UL	W	10L	12	16	2	.	40.500	0.188	3.029	0.032	1.171	37.483	0.048	5.206	2.853	0.495	11.349	1.890	1.500

SN	Date	Season	Position Pos	Asp	Location WS	Tran	Dist	Type	pH	DOC	IC Anions F	CL	NO3	SO4	ICP Cations Ca	Fe	Mg	Mn	S	Si	Nitrogen Total N	N-NH4
										mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
743	09-09-1994	Su	UL	W	10L	12	16	W	.	1.480	0.179	1.645	0.156	4.036	33.658	0.047	4.592	2.000	1.453	10.187	1.250	0.910
744	09-09-1994	Su	WL	W	10L	12	2	2	.	11.170	0.068	4.047	0.000	20.523	13.135	0.010	4.043	0.081	8.533	8.724	0.410	0.050
745	09-09-1994	Su	WL	W	10L	12	2	W	.	25.630	0.166	1.946	0.000	4.421	25.980	0.369	4.683	3.234	1.568	9.188	0.840	0.530
746	09-09-1994	Su	WL	S	10L	HOL	10L	IN	.	1.110	0.088	2.107	0.052	11.031	13.310	0.179	3.366	0.162	3.765	8.270	0.430	0.050
747	09-09-1994	Su	WL	S	10L	HOL	10L	OUT	.	13.370	0.074	2.135	0.070	10.860	13.792	0.173	3.477	0.152	3.691	8.540	0.400	0.070
748	09-09-1994	Su	WL	S	10L	HOL	10L	OUT	.	1.140	0.070	2.034	0.085	10.800	13.773	0.168	3.458	0.145	3.712	8.556	0.400	0.060
749	09-09-1994	Su	WL	S	10L	TSP	10L	IN	.	14.920	0.115	1.210	0.079	4.819	4.515	1.815	1.009	0.146	1.784	5.371	1.480	0.700
750	09-09-1994	Su	WL	S	10L	TSP	10L	OUT	.	1.760	0.178	2.425	0.000	2.788	37.571	0.300	4.384	2.009	0.915	11.613	0.510	0.250
751	09-09-1994	Su	BL	E	10U	13	7	2	.	5.910	0.030	1.820	0.000	13.381	3.573	0.048	0.890	0.022	4.468	11.479	0.410	0.080
752	09-09-1994	Su	BL	E	10U	13	7	W	.	16.060	0.142	2.741	1.265	11.165	13.847	0.110	2.500	1.038	3.721	11.697	1.230	0.930
753	09-09-1994	Su	BL	E	10U	13	2	2	.	0.980	0.062	1.946	0.071	11.538	11.651	0.055	3.039	0.030	3.890	8.731	0.410	0.040
754	09-09-1994	Su	BL	E	10U	13	2	W	.	6.020	0.047	2.467	0.000	10.626	2.573	0.031	0.901	0.326	3.563	11.367	0.390	0.050
755	09-09-1994	Su	BL	S	10U	13-14	10U	STR	.	1.300	0.122	2.129	0.035	15.414	27.262	0.060	3.708	0.357	5.286	13.387	0.420	0.240
756	09-16-1994 08 pm	Su	WL	S	13A	FLM	13A	ISCO	.	104.100	0.776	2.696	0.534	11.404	12.291	0.098	2.333	0.005	5.230	7.480	1.530	0.150
757	09-16-1994 10 pm	Su	WL	S	13A	FLM	13A	ISCO	.	1.630	1.612	1.892	0.060	17.604	11.268	0.109	2.368	0.005	5.070	7.815	0.740	0.020
758	09-17-1994 12 am	Su	WL	S	13A	FLM	13A	ISCO	.	2.060	1.474	2.576	0.054	24.686	16.804	0.096	3.203	0.009	7.461	14.445	0.800	0.030
759	09-17-1994 02 am	Su	WL	S	13A	FLM	13A	ISCO	.	2.550	1.436	2.924	0.820	29.398	18.536	0.086	3.592	0.005	8.391	10.737	0.770	0.030
760	09-17-1994 04 am	Su	WL	S	13A	FLM	13A	ISCO	.	1.700	1.044	2.668	0.208	20.996	14.080	0.093	2.717	0.005	6.243	10.955	0.820	0.020
761	09-17-1994 06 am	Su	WL	S	13A	FLM	13A	ISCO	.	2.430	0.432	2.510	0.080	24.412	16.279	0.117	3.112	0.005	7.207	11.049	0.830	0.020
762	09-17-1994 08 am	Su	WL	S	13A	FLM	13A	ISCO	.	2.630	0.942	2.546	0.000	28.320	18.135	0.087	3.544	0.005	8.157	17.785	0.650	0.010
763	09-17-1994 10 am	Su	WL	S	13A	FLM	13A	ISCO	.	0.030	0.000	1.518	0.348	20.888	4.993	0.093	1.903	0.075	6.768	0.203	1.470	0.500
764		STD	STD	STD	STD	STD	STD	STD	.	24.960	0.908	2.226	0.000	29.634	19.319	0.070	3.789	0.006	8.540	16.709	0.580	0.050
765	09-17-1994 11 am	Su	WL	S	13A	FLM	13A	ISCO	.	2.070	0.776	2.216	0.000	30.016	19.770	0.071	3.887	0.005	8.702	17.283	0.720	0.010
766	09-17-1994 12 am	Su	WL	S	13A	FLM	13A	ISCO	.	1.740	0.574	2.230	0.000	30.052	21.700	0.062	3.969	0.005	8.775	16.261	0.610	0.020
767	09-16-1994 01 pm	Su	WL	S	13A	FLM	13A	ISCO	.	24.070	0.092	2.576	0.000	29.710	20.696	0.055	3.910	0.005	8.693	14.182	0.500	0.200
768	09-16-1994 02 am	Su	WL	S	13A	FLM	13A	ISCO	.	0.000	0.908	2.802	0.000	29.668	21.021	0.171	3.845	0.005	8.583	11.005	0.600	0.030
769	09-15-1994 03 pm	Su	WL	S	13A	FLM	13A	ISCO	.	0.010	0.114	2.416	0.000	27.126	19.790	0.051	3.961	0.005	8.492	22.129	0.610	0.060
770	09-16-1994	STD	STD	STD	STD	STD	STD	STD	.	103.100	0.000	1.325	0.338	21.038	5.021	0.094	1.909	0.075	6.654	0.382	1.040	0.250
771	09-16-1994 08 pm	Su	BL	S	13	FLM	13	ISCO	.	32.920	0.000	2.800	0.688	42.018	5.003	0.095	1.886	0.076	6.768	0.342	0.960	0.500
772	09-16-1994 10 pm	Su	BL	S	13	FLM	13	ISCO	.	0.000	0.472	2.856	0.390	12.358	14.927	0.061	2.853	0.039	5.763	4.388	0.740	0.000
773	09-17-1994 12 am	Su	BL	S	13	FLM	13	ISCO	.	0.000	0.320	1.702	0.198	8.739	31.692	0.014	4.710	0.005	4.206	12.669	0.650	0.000
774	09-17-1994 02 am	Su	BL	S	13	FLM	13	ISCO	.	1.280	0.112	2.226	0.098	12.084	31.027	0.042	4.533	0.005	4.108	12.704	0.760	0.030
775	09-17-1994 04 am	Su	BL	S	13	FLM	13	ISCO	.	50.220	0.111	2.266	0.192	12.280	30.760	0.046	4.566	0.005	4.164	12.995	0.970	0.000
776	09-17-1994 06 am	Su	BL	S	13	FLM	13	ISCO	.	0.000	0.166	3.438	0.508	14.062	28.067	0.028	4.508	0.005	4.310	13.028	1.450	0.050
777	09-17-1994 08 am	Su	BL	S	13	FLM	13	ISCO	.	0.120	0.704	3.966	0.836	13.846	28.831	0.019	4.583	0.005	4.128	13.090	1.480	0.500
778	09-17-1994 10 am	Su	BL	S	13	FLM	13	ISCO	.	0.000	0.132	2.364	0.182	12.620	23.587	0.040	3.731	0.005	3.782	10.229	1.240	0.020
779	09-17-1994 11 am	Su	BL	S	13	FLM	13	ISCO	.	0.004	0.514	1.980	0.472	10.544	13.343	0.226	2.122	0.005	3.706	8.699	0.990	.
780		STD	STD	STD	STD	STD	STD	STD	.	0.000	0.000	2.078	0.528	35.820	4.992	0.095	1.895	0.075	6.656	0.359	1.480	.
781	09-17-1994 12 am	Su	BL	S	13	FLM	13	ISCO	.	0.001	0.110	2.460	0.658	13.234	13.667	0.163	2.262	0.005	4.353	9.088	1.200	.
782	09-17-1994 01 pm	Su	BL	S	13	FLM	13	ISCO	.	0.030	0.106	2.302	0.430	13.624	16.090	0.140	2.711	0.005	4.461	10.515	1.020	0.050
783	09-18-1994 02 am	Su	BL	S	13	FLM	13	ISCO	.	0.000	0.132	2.402	3.604	12.634	13.559	0.121	2.355	0.005	4.001	9.756	1.200	.
784	09-18-1994 03 pm	Su	BL	S	13	FLM	13	ISCO	.	0.330	0.182	2.212	0.536	12.382	14.152	0.188	2.100	0.008	4.090	8.922	0.920	0.010
785	09-19-1994 04 am	Su	BL	S	13	FLM	13	ISCO	.	0.030	0.084	2.070	0.896	12.510	12.650	0.185	2.280	0.005	4.389	9.918	0.960	0.010
786	09-19-1994 05 pm	Su	BL	S	13	FLM	13	ISCO	.	0.220	0.126	2.474	0.662	15.024	13.738	0.146	2.463	0.005	4.410	10.102	0.890	0.020
787	09-20-1994 06 am	Su	BL	S	13	FLM	13	ISCO	.	0.190	0.102	2.300	0.622	13.644	14.389	0.129	2.589	0.005	4.451	10.548	0.950	0.030
788	09-20-1994 07 pm	Su	BL	S	13	FLM	13	ISCO	.	0.000	0.308	3.046	0.746	15.006	15.995	0.135	2.775	0.005	4.448	10.825	0.910	0.020
789	09-21-1994 08 am	Su	BL	S	13	FLM	13	ISCO	.	0.000	0.130	2.800	0.754	14.746	15.340	0.088	2.700	0.005	4.391	10.867	0.980	0.020
790	09-21-1994 09 pm	Su	BL	S	13	FLM	13	ISCO	.	0.050	0.394	2.956	0.662	13.790	15.710	0.135	2.759	0.005	4.380	10.836	0.840	0.030
791	09-22-1994 10 am	Su	BL	S	13	FLM	13	ISCO	.	0.000	0.276	3.158	0.864	14.386	15.159	0.099	2.530	0.005	3.922	9.755	0.980	0.010
792	09-22-1994 11 pm	Su	BL	S	13	FLM	13	ISCO	.	0.020	0.128	2.748	0.606	16.022	16.900	0.151	2.977	0.005	4.415	10.597	0.870	0.040
793		STD	STD	STD	STD	STD	STD	STD	.	0.000	0.000	1.302	0.347	21.038	4.630	0.089	1.820	0.070	6.481	0.150	1.440	0.350
794	09-16-1994 08 pm	Su	WL	S	10L	FLM	10L	ISCO	.	0.000	1.490	2.282	0.768	11.294	29.258	0.059	4.589	0.026	2.224	8.482	1.000	0.180
795	09-16-1994 10 pm	Su	WL	S	10L	FLM	10L	ISCO	.	0.020	0.408	1.767	0.063	9.455	27.328	0.082	4.350	0.005	2.311	9.252	0.610	0.050

SN	Date	Season	Position Pos	Position Asp	Location WS	Location Tran	Location Dist	Location Type	pH	DOC	IC Anions F	CL	NO3	SO4	ICP Cations Ca	Fe	Mg	Mn	S	Si	Nitrogen Total N	N-NH4
										mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
796	09-17-1994 12 am	Su	WL	S	10L	FLM	10L	ISCO	.	0.000	0.416	1.840	0.139	10.138	22.444	0.130	3.988	0.007	2.487	8.865	0.550	0.020
797	09-17-1994 02 am	Su	WL	S	10L	FLM	10L	ISCO	.	0.000	0.486	1.993	0.121	11.150	20.449	0.114	3.928	0.005	2.624	8.263	0.630	0.090
798	09-17-1994 04 am	Su	WL	S	10L	FLM	10L	ISCO	.	2.020	0.569	1.838	0.176	11.320	20.768	0.137	4.049	0.005	2.767	7.584	0.660	0.020
799	09-17-1994 06 am	Su	WL	S	10L	FLM	10L	ISCO	.	0.870	0.280	1.691	0.000	10.774	16.330	0.162	3.311	0.005	2.700	6.685	0.740	0.050
800	09-17-1994 08 am	Su	WL	S	10L	FLM	10L	ISCO	.	0.000	0.244	1.239	0.040	7.354	10.347	0.265	2.340	0.005	2.533	5.326	0.740	0.050
801		STD	STD	STD	STD	STD	STD	STD	.	0.000	0.000	0.979	0.250	19.824	5.165	0.105	1.974	0.100	4.810	0.139	1.550	0.500
802	09-17-1994 10 am	Su	WL	S	10L	FLM	10L	ISCO	.	1.140	0.216	1.162	0.077	8.523	11.357	0.283	2.688	0.005	2.809	7.339	0.810	0.070
803	09-17-1994 12 pm	Su	WL	S	10L	FLM	10L	ISCO	.	1.140	0.231	1.213	0.149	8.707	12.846	0.268	2.982	0.005	2.911	7.192	1.010	0.030
804	09-17-1994 02 pm	Su	WL	S	10L	FLM	10L	ISCO	.	1.450	0.193	1.099	0.073	6.941	8.160	0.219	2.023	0.029	2.318	4.655	0.830	0.050
805	09-17-1994 04 pm	Su	WL	S	10L	FLM	10L	ISCO	.	1.780	0.034	0.988	0.039	7.666	7.425	0.250	1.983	0.007	2.599	5.054	0.700	0.010
806	09-17-1994 06 pm	Su	WL	S	10L	FLM	10L	ISCO	.	1.750	0.122	1.170	0.172	8.122	7.644	0.232	2.082	0.005	2.644	5.396	0.720	0.000
807	09-17-1994 08 pm	Su	WL	S	10L	FLM	10L	ISCO	.	1.840	0.089	1.149	0.148	8.123	7.444	0.195	2.067	0.005	2.673	5.521	0.680	0.000
808	09-17-1994 10 pm	Su	WL	S	10L	FLM	10L	ISCO	.	2.330	0.131	1.232	0.116	8.060	7.632	0.167	2.071	0.010	2.660	6.292	0.630	0.000
809	09-18-1994 12 am	Su	WL	S	10L	FLM	10L	ISCO	.	2.210	0.129	1.184	0.097	7.865	7.431	0.164	2.041	0.005	2.587	5.668	0.290	0.010
810	09-18-1994 02 am	Su	WL	S	10L	FLM	10L	ISCO	.	2.370	0.076	1.382	0.088	7.962	7.895	0.157	2.131	0.005	2.627	6.238	0.370	0.010
811	09-18-1994 04 am	Su	WL	S	10L	FLM	10L	ISCO	.	2.420	0.195	1.273	0.070	7.837	8.205	0.156	2.207	0.005	2.619	6.455	0.250	0.010
812	09-18-1994 06 am	Su	WL	S	10L	FLM	10L	ISCO	.	2.510	0.153	1.377	0.126	7.853	8.731	0.174	2.268	0.005	2.620	6.154	0.300	0.020
813	09-18-1994 08 am	Su	WL	S	10L	FLM	10L	ISCO	.	2.500	0.143	1.231	0.186	7.808	8.834	0.169	2.319	0.005	2.575	6.082	0.350	0.010
814	09-16-1994	STD	STD	STD	STD	STD	STD	STD	.	0.000	0.000	0.966	0.257	19.907	5.250	0.106	1.999	0.133	4.847	0.115	1.520	0.150
815	09-22-1994	Fa	WL	S	13A	1-2	13A	STR	.	4.700	0.045	3.719	0.035	17.023	26.932	0.047	5.244	0.008	5.553	7.522	1.210	0.020
816	09-22-1994	Fa	BL	S	13A	ORG	13A	ORG	.	6.270	0.089	1.487	0.027	18.711	29.529	0.074	7.724	0.702	5.986	5.823	0.430	0.060
817	09-22-1994	Fa	BL	S	13	FLM	13	FLM	.	4.700	0.058	1.286	0.022	8.698	24.230	0.184	3.876	0.067	2.961	7.042	0.390	0.020
818	09-22-1994	Fa	BL	S	13	7-8	13	STR	.	4.190	0.057	1.332	0.043	8.279	18.366	0.098	3.417	0.008	2.868	7.003	0.390	0.010
819	09-22-1994	Fa	WL	S	10L	FLM	10L	FLM	.	3.610	0.043	1.198	0.035	7.342	13.628	0.204	3.174	0.161	2.417	6.222	0.460	0.010
820	09-22-1994	Fa	WL	S	10L	HOL	10L	IN	.	2.600	0.046	1.393	0.033	7.894	10.707	0.129	3.036	0.056	2.500	5.997	0.470	0.030
821	09-22-1994	Fa	WL	S	10L	HOL	10L	OUT	.	2.240	0.049	1.348	0.029	8.243	12.047	0.117	3.331	0.056	2.725	5.920	0.420	0.020
822	09-22-1994	Fa	WL	S	10L	TSP	10L	IN	.	2.950	0.049	0.573	0.040	5.100	4.816	1.446	1.179	0.036	1.807	3.561	0.830	0.100
823	09-22-1994	Fa	WL	S	10L	TSP	10L	OUT	.	6.260	0.084	0.792	1.537	2.418	35.760	1.273	4.385	0.978	0.984	8.786	0.570	0.180
824	09-22-1994	Fa	BL	S	10U	FLM	10U	FLM	.	1.720	0.031	1.242	0.025	7.832	10.434	0.112	3.063	0.119	2.579	5.955	0.450	0.020
825	09-22-1994	Fa	BL	S	10U	13-14	10U	STR	.	1.610	0.045	1.332	0.042	7.831	10.393	0.069	2.980	0.012	2.582	6.507	0.410	0.000
826	09-22-1994	STD	STD	STD	STD	STD	STD	STD	.	4.590	0.000	0.951	0.254	19.700	5.030	0.101	1.950	0.099	4.785	0.120	1.400	0.150
827	10-06-1994	Fa	WL	E	13A	1	2	W	6.6	4.850	0.066	2.676	0.067	12.839	36.379	0.028	5.583	0.916	4.024	8.011	0.820	0.050
828	10-06-1994	Fa	WL	E	13A	3	2	W	6.9	4.660	0.082	1.644	0.000	15.436	35.274	0.447	6.359	1.791	5.333	8.278	0.960	0.250
829	10-06-1994	Fa	WL	E	13A	3	6	2	6.9	3.960	0.152	1.647	0.088	18.507	47.411	0.299	7.780	5.315	5.796	10.405	0.640	0.180
830	10-06-1994	Fa	WL	E	13A	3	6	W	7	1.230	0.121	1.361	0.020	14.820	45.255	0.172	5.835	0.434	5.707	11.369	0.910	0.270
831	10-06-1994	Fa	UL	E	13A	3	11	2	.	2.540	0.040	1.279	0.028	8.106	8.371	0.070	1.552	0.603	2.623	6.099	1.510	0.030
832	10-06-1994	Fa	WL	S	13A	3-4	13A	STR	7.1	2.570	0.086	1.524	0.026	24.356	31.405	0.010	7.193	0.055	7.528	5.965	0.480	0.020
833	10-06-1994	Fa	BL	S	13A	ORG	13A	ORG	7.2	2.540	0.087	1.518	0.053	18.488	29.528	0.066	8.100	0.972	5.865	5.748	0.330	0.020
834	10-06-1994	Fa	BL	S	13	5-6	13	STR	7.3	3.370	0.066	1.545	0.029	9.165	30.350	0.062	4.842	0.221	3.129	7.331	0.430	0.000
835	10-06-1994	Fa	BL	E	13	5	2	W	6.9	0.920	0.078	1.069	3.206	1.826	25.564	2.890	4.842	0.852	0.744	6.145	2.270	0.740
836	10-06-1994	Fa	BL	W	13	8	6	W	6.4	0.480	0.028	1.963	0.954	11.277	11.788	0.100	2.421	0.154	3.661	5.817	0.810	0.020
837	10-06-1994	Fa	BL	W	13	8	2	2	6.5	1.600	0.000	1.227	0.265	6.244	3.555	0.012	0.752	0.022	2.121	6.609	1.490	0.010
838	10-06-1994	Fa	BL	W	13	8	2	7	6.6	0.970	0.041	1.558	0.041	5.795	22.625	4.818	4.835	3.656	2.035	4.839	1.560	0.830
839	10-06-1994	Fa	BL	W	13	8	2	W	6.5	1.670	0.039	1.814	0.080	10.230	15.842	0.178	3.731	0.743	3.345	5.414	0.650	0.040
840	10-06-1994	Fa	BL	S	13	7-8	13	STR	7.2	1.400	0.071	1.507	0.099	8.541	26.367	0.202	4.414	0.074	2.782	7.764	0.700	0.000
841	10-06-1994	Fa	BL	S	13	7-8	13	STR	7.3	0.990	0.065	1.213	0.000	7.028	26.404	0.110	4.390	0.057	2.814	7.759	0.660	0.000
842	10-06-1994	Fa	WL	S	10L	FLM	10L	FLM	7.3	0.530	0.059	1.276	0.000	7.097	21.547	0.401	4.000	0.352	2.315	6.998	0.690	0.010
843	10-06-1994	Fa	WL	W	10L	10	2	2	6.7	0.810	0.227	1.071	0.071	0.333	41.201	10.332	4.220	8.163	0.100	8.148	1.190	0.540
844	10-06-1994	Fa	WL	W	10L	10	2	W	7	1.870	0.102	1.142	2.547	4.387	24.445	5.000	2.695	1.151	1.492	7.758	1.050	0.250
845	10-06-1994	Fa	WL	W	10L	10	7	2	7.1	0.210	0.230	1.084	0.025	0.428	41.756	0.068	4.073	6.440	0.181	7.271	0.840	0.130
846	10-06-1994	Fa	WL	W	10L	10	7	W	6.6	0.560	0.149	0.910	0.000	0.599	30.989	19.649	3.239	4.005	0.218	7.750	1.400	0.750
847	10-06-1994	Fa	UL	W	10L	10	18	2	6.7	0.800	0.018	0.625	0.000	6.255	4.887	0.118	0.942	0.654	1.966	5.058	0.840	0.000
848	10-06-1994	Fa	UL	W	10L	10	18	W	6	23.480	0.037	0.953	0.000	5.410	6.039	2.679	1.528	1.253	1.700	5.227	0.820	0.270

SN	Date	Season	Position		Location				pH	DOC	IC Anions				ICP Cations						Nitrogen	
			Pos	Asp	WS	Tran	Dist	Type			F	CL	NO3	SO4	Ca	Fe	Mg	Mn	S	Si	Total N	N-NH4
										mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
849	10-06-1994	STD	STD	STD	STD	STD	STD	STD	.	1.920	0.000	0.966	0.262	20.270	5.130	0.148	1.904	0.106	4.725	0.170	1.330	0.350
850	10-06-1994	Fa	WL	S	10L	HOL	10L	IN	6.9	0.000	0.041	1.404	0.000	8.348	14.596	0.202	3.603	0.216	2.729	6.093	0.680	0.020
851	10-06-1994	Fa	WL	S	10L	HOL	10L	OUT	7.2	0.820	0.046	1.439	0.000	8.204	15.255	0.248	3.792	0.200	2.706	6.014	0.730	0.020
852	10-06-1994	Fa	WL	S	10L	TSP	10L	IN	6.7	1.110	0.108	1.490	2.115	2.884	6.926	2.783	1.652	1.634	1.121	3.489	1.240	0.050
853	10-06-1994	Fa	WL	S	10L	TSP	10L	OUT	7.1	0.200	0.106	1.082	0.015	3.978	39.002	2.360	4.295	1.445	1.335	9.002	0.730	0.150
854	10-06-1994	Fa	BL	S	10U	FLM	10U	FLM	7.2	0.170	0.039	1.483	0.000	9.505	14.042	0.236	3.848	0.169	3.070	5.932	0.690	0.000
855	10-06-1994	Fa	BL	S	10U	13-14	10U	STR	7.4	0.750	0.039	1.367	0.000	9.945	14.133	0.059	3.824	0.040	3.115	6.035	0.680	0.000
856	10-06-1994	Fa	BL	W	10U	14	2	W	6.4	0.030	0.098	2.782	0.017	5.186	13.770	3.262	3.160	1.595	1.744	6.073	1.950	1.630
857	10-06-1994	Fa	BL	W	10U	14	7	2	6.3	0.000	0.012	0.526	0.000	4.355	2.244	0.091	0.593	0.074	1.398	5.907	0.790	0.140
858	10-06-1994	Fa	BL	W	10U	14	7	7	5.9	0.190	0.016	1.254	0.000	8.142	3.550	0.054	1.038	0.246	2.605	6.523	0.780	0.230
859	10-06-1994	Fa	BL	W	10U	14	7	W	5.6	0.060	0.010	1.097	0.045	8.773	4.187	0.173	1.327	0.145	2.774	6.072	0.720	0.030
860	10-06-1994	Fa	UL	W	10U	14	11	2	5.6	0.020	0.009	0.535	0.000	10.436	2.503	0.071	1.093	0.091	3.360	5.739	0.720	0.020
861	10-06-1994	Fa	UL	W	10U	14	11	7	5.5	10.900	0.009	1.038	0.000	8.220	2.716	0.061	0.877	0.129	2.621	6.292	0.750	0.040
862	10-06-1994	STD	STD	STD	STD	STD	STD	STD	.	.	0.000	0.974	0.263	20.260	5.199	0.110	1.935	0.101	4.855	0.155	1.230	.
863	10-20-1994	Fa	WL	S	13A	FLM	13A	FLM	5.7	14.010	0.051	1.939	0.019	18.511	28.389	0.024	5.180	0.021	6.948	8.718	0.550	0.350
864	10-20-1994	Fa	BL	S	13A	ORG	13A	ORG	5.7	25.220	0.060	1.540	0.043	21.174	30.176	0.029	7.868	0.019	7.637	6.675	0.530	0.510
865	10-20-1994	Fa	BL	S	13	FLM	13	FLM	5.8	33.040	0.051	1.658	0.000	9.497	22.583	0.117	3.846	0.009	3.518	8.534	0.400	0.200
866	10-20-1994	Fa	BL	S	13	7-8	13	STR	5.8	1.370	0.078	1.657	0.000	8.877	16.178	0.078	3.250	0.005	3.318	7.996	0.640	0.500
867	10-20-1994	Fa	WL	S	10L	FLM	10L	FLM	5.7	15.500	0.054	1.311	0.000	7.657	15.632	0.124	3.770	0.005	2.885	8.193	0.630	0.450
868	10-20-1994	Fa	WL	S	10L	HOL	10L	IN	5.7	14.320	0.025	0.958	0.000	5.132	13.093	0.075	3.670	0.005	3.087	7.972	0.570	0.510
869	10-20-1994	Fa	WL	S	10L	HOL	10L	OUT	5.7	13.740	0.034	1.381	0.000	8.094	12.965	0.099	3.687	0.007	3.081	7.740	0.570	0.550
870	10-20-1994	Fa	WL	S	10L	TSP	10L	IN	5.8	13.060	0.027	0.949	0.000	3.998	6.991	0.352	1.724	0.005	2.062	6.446	0.820	0.680
871	10-20-1994	Fa	WL	S	10L	TSP	10L	OUT	5.6	1.690	0.118	1.300	0.028	1.271	33.222	0.982	4.456	0.062	0.408	9.129	0.820	0.810
872	10-20-1994	Fa	BL	S	10U	FLM	10U	FLM	5.7	13.630	0.040	1.443	0.015	8.207	11.729	0.087	3.599	0.005	3.086	7.662	0.770	0.750
873	10-20-1994	Fa	BL	S	10U	13-14	10U	STR	5.7	13.270	0.033	1.176	0.000	6.728	11.248	0.047	3.576	0.019	3.110	8.050	0.500	0.480
874	10-20-1994	STD	STD	STD	STD	STD	STD	STD	.	.	0.000	0.851	0.225	24.288	4.906	0.095	1.994	0.101	5.324	0.431	1.220	1.100
875	11-03-1994	Fa	WL	S	13A	FLM	13A	FLM	6.6	.	0.052	5.227	0.052	22.748	28.627	0.021	5.124	0.007	5.622	7.808	1.040	0.620
876	11-03-1994	Fa	BL	S	13A	ORG	13A	ORG	7	4.030	0.083	1.637	0.000	25.967	29.741	0.045	7.843	0.005	7.493	6.037	0.550	0.310
877	11-03-1994	Fa	BL	S	13	FLM	13	FLM	7.2	13.730	0.050	1.450	0.152	7.628	23.899	0.086	3.996	0.022	3.117	8.273	0.550	0.290
878	11-03-1994	Fa	BL	S	13	7-8	13	STR	7.2	2.290	0.048	1.715	0.000	7.688	18.551	0.056	3.406	0.013	2.926	8.235	0.400	0.350
879	11-03-1994	Fa	WL	S	10L	FLM	10L	FLM	7.2	1.070	0.043	1.215	0.000	6.906	16.868	0.131	3.804	0.045	2.760	7.827	0.520	0.510
880	11-03-1994	Fa	WL	S	10L	HOL	10L	IN	7.2	.	0.015	0.870	0.000	4.760	12.926	0.077	3.635	0.023	3.148	7.460	0.710	0.180
881	11-03-1994	Fa	WL	S	10L	HOL	10L	OUT	7	.	0.031	1.443	0.000	8.506	13.110	0.067	3.698	0.005	3.154	7.345	0.540	0.370
882	11-03-1994	Fa	WL	S	10L	TSP	10L	IN	6.8	.	0.041	1.259	0.000	3.468	6.324	1.028	1.911	0.008	1.602	4.711	1.200	0.750
883	11-03-1994	Fa	WL	S	10L	TSP	10L	OUT	6.8	.	0.102	1.162	0.025	2.319	36.797	0.730	4.352	1.075	0.779	9.893	0.570	0.550
884	11-03-1994	Fa	BL	S	10U	FLM	10U	FLM	7.1	.	0.021	1.081	0.000	6.437	12.207	0.074	3.584	0.026	3.184	7.363	0.530	0.410
885	11-03-1994	Fa	BL	S	10U	13-14	10U	STR	7.1	.	0.027	1.379	0.000	8.569	12.245	0.035	3.585	0.006	3.257	7.496	0.440	0.310
886	11-03-1994	STD	STD	STD	STD	STD	STD	STD	.	1.679	0.000	0.633	0.173	13.267	4.959	0.096	2.001	0.099	5.452	0.390	1.040	1.350
887	11-14-1994	Fa	WL	S	13A	FLM	13A	FLM	.	1.069	0.039	1.643	0.000	23.687	26.854	0.046	4.849	0.085	6.315	7.468	0.840	0.320
888	11-14-1994	Fa	WL	E	13A	1	2	W	6.6	1.388	0.024	1.103	0.037	12.019	29.717	0.021	5.670	1.205	6.733	8.892	0.500	0.250
889	11-14-1994	Fa	WL	E	13A	1	2	2	6.8	3.344	0.052	1.323	0.000	13.349	38.081	0.910	5.878	1.167	5.639	9.570	0.810	0.560
890	11-14-1994	Fa	UL	W	13A	2	2	2	6.5	.	0.000	0.723	0.000	4.871	2.685	0.010	0.687	0.009	2.203	5.342	0.530	0.390
891	11-14-1994	Fa	WL	E	13A	3	2	W	6.8	7.968	0.068	1.761	0.057	26.306	24.962	0.177	5.779	0.365	7.656	7.113	0.650	0.420
892	11-14-1994	Fa	WL	E	13A	3	6	2	6.8	.	0.105	1.748	0.082	26.971	37.316	0.010	6.151	2.797	8.291	11.215	0.780	0.730
893	11-14-1994	Fa	WL	E	13A	3	6	W	6.8	.	0.055	1.301	0.048	24.243	36.416	0.130	5.546	0.244	9.395	10.905	0.510	0.710
894	11-14-1994	Fa	UL	E	13A	3	11	2	6.7	3.403	0.000	0.523	0.000	3.882	4.216	0.027	1.139	0.035	3.029	5.587	0.490	0.250
895	11-14-1994	Fa	BL	S	13A	ORG	13A	ORG	7	21.100	0.052	1.253	0.000	23.719	31.212	0.061	7.900	0.777	7.942	6.466	0.490	0.500
896	11-14-1994	Fa	BL	S	13A	ORG	13A	ORG	7.2	21.590	0.060	1.560	0.023	26.082	32.116	0.061	7.942	0.744	8.239	6.529	0.630	0.250
897	11-14-1994	STD	STD	STD	STD	STD	STD	STD	.	96.860	0.000	0.635	0.170	13.453	5.629	0.116	2.204	0.110	6.086	0.654	1.160	1.160
898	11-14-1994	Fa	BL	S	13	FLM	13	FLM	7.5	15.100	0.039	1.516	0.029	8.557	23.177	0.210	3.836	0.112	4.233	8.353	0.470	0.250
899	11-14-1994	Fa	BL	S	13	5-6	13	STR	7.4	13.530	0.026	1.228	0.051	6.572	20.344	0.094	3.748	0.034	4.248	8.131	0.630	0.250
900	11-14-1994	Fa	BL	W	13	6	1	W	6.7	21.380	0.036	1.116	0.677	9.571	38.346	0.093	4.463	0.184	5.717	9.275	0.710	0.490
901	11-14-1994	Fa	BL	W	13	6	6	2	5.9	8.876	0.019	2.248	0.000	24.646	9.442	0.084	1.442	0.049	7.895	7.958	0.780	0.580

SN	Date	Season	Position Pos	Asp	Location WS	Tran	Dist	Type	pH	DOC	IC Anions F	CL	NO3	SO4	ICP Cations Ca	Fe	Mg	Mn	S	Si	Nitrogen Total N	N-NH4
										mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
902	11-14-1994	Fa	BL	W	13	6	6	W	6.2	13.530	0.039	1.618	0.030	23.179	27.761	0.111	3.104	0.073	8.555	8.509	0.730	0.730
903	11-14-1994	Fa	BL	W	13	6	11	2	6.4	5.108	0.014	1.797	0.000	6.266	4.543	0.024	0.715	0.015	2.510	9.111	0.630	0.400
904	11-14-1994	Fa	BL	W	13	6	11	W	6.3	23.310	0.085	2.034	0.495	8.118	28.364	4.005	3.374	0.486	3.346	6.811	1.620	1.460
905	11-14-1994	Fa	BL	S	13	7-8	13	STR	6.9	11.420	0.032	1.526	0.000	7.796	14.954	0.137	2.871	0.018	3.447	7.341	0.470	0.600
906	11-14-1994	Fa	BL	S	13	7-8	13	STR	5.1	3.916	0.013	0.974	0.000	4.924	2.601	0.010	0.709	0.031	2.666	6.282	0.530	0.270
907	11-14-1994	Fa	BL	E	13	7	3	2	6.8	12.100	0.041	1.769	0.242	8.759	15.022	0.115	2.930	0.015	3.530	7.549	0.630	0.590
908	11-14-1994	Fa	BL	E	13	7	3	W	6.3	14.730	0.045	2.538	0.072	9.345	19.357	0.065	4.048	1.410	3.750	7.208	0.800	0.400
909	11-14-1994	Fa	BL	E	13	7	7	2	5.7	6.182	0.013	2.481	0.085	14.205	7.940	0.051	2.146	0.022	5.598	8.514	0.840	1.030
910	11-14-1994	Fa	BL	E	13	7	7	W	6.6	16.410	0.062	2.335	0.464	8.309	21.858	0.120	5.577	0.307	3.430	7.190	1.030	0.740
911	11-14-1994	Fa	UL	E	13	7	11	2	6.4	1.752	0.000	0.553	0.000	3.625	1.808	0.010	0.801	0.013	2.548	5.479	0.860	0.690
912	11-14-1994	STD	STD	STD	STD	STD	STD	STD	.	97.000	0.000	0.980	0.256	26.029	5.313	0.105	2.118	0.092	5.738	0.470	1.100	1.610
913	11-14-1994	Fa	WL	S	10L	9-10	10L	STR	6.8	12.860	0.039	1.543	0.000	7.786	14.771	0.226	3.449	0.237	3.199	7.785	0.500	0.250
914	11-14-1994	Fa	WL	W	10L	10	2	2	6.4	30.110	0.098	0.660	0.019	0.194	44.300	2.394	4.470	7.139	0.236	9.622	1.030	1.180
915	11-14-1994	Fa	WL	W	10L	10	2	W	6.6	24.800	0.064	0.723	0.000	1.219	34.635	4.418	3.422	3.019	0.977	9.908	0.860	0.810
916	11-14-1994	Fa	WL	W	10L	10	7	2	6.5	28.270	0.187	1.031	0.000	0.750	38.894	0.133	3.667	6.283	0.362	8.435	0.800	0.750
917	11-14-1994	Fa	WL	W	10L	10	7	W	6.6	22.110	0.174	1.185	0.000	2.055	30.497	8.909	3.109	3.903	0.910	8.111	0.760	0.730
918	11-14-1994	Fa	UL	W	10L	10	18	2	6	3.634	0.030	0.646	0.000	4.963	2.513	0.130	0.780	0.157	2.590	5.866	0.580	0.300
919	11-14-1994	Fa	UL	W	10L	10	18	W	5.4	5.707	0.015	0.787	0.000	4.481	5.134	0.430	1.257	0.369	2.481	6.597	0.620	0.600
920	11-14-1994	Fa	UL	W	10L	10	32	2	5.3	8.553	0.026	1.805	0.000	9.195	4.780	0.076	0.693	0.118	4.027	5.830	0.700	1.010
921	11-14-1994	STD	STD	STD	STD	STD	STD	STD	.	95.630	0.000	0.661	0.177	13.879	5.601	0.111	2.077	0.097	6.003	0.485	1.190	1.600
922	11-14-1994	Fa	WL	S	10L	HOL	10L	IN	6.5	10.110	0.021	0.961	0.000	5.205	12.124	0.131	3.261	0.118	3.515	7.575	0.760	0.740
923	11-14-1994	Fa	WL	S	10L	HOL	10L	OUT	6.8	8.436	0.034	1.544	0.000	8.360	10.898	0.129	3.202	0.105	3.223	7.259	0.550	0.770
924	11-14-1994	Fa	WL	S	10L	TSP	10L	IN	6.2	8.003	0.040	1.110	0.000	5.465	6.417	0.677	1.675	0.183	2.264	7.068	0.880	0.740
925	11-14-1994	Fa	WL	S	10L	TSP	10L	OUT	6.8	10.540	0.038	1.720	0.000	8.038	13.622	0.184	3.271	0.144	3.154	7.684	0.740	0.630
926	11-14-1994	Fa	UL	E	10L	11	2	2	6.5	11.640	0.000	0.516	0.015	4.437	3.013	0.052	1.187	0.093	3.110	5.855	1.010	0.810
927	11-14-1994	Fa	UL	E	10L	11	2	7	6.3	3.517	0.012	0.906	0.021	11.549	2.095	0.016	1.159	0.005	4.523	7.620	0.820	0.750
928	11-14-1994	Fa	UL	E	10L	11	7	2	5.8	3.521	0.018	1.393	0.000	8.273	1.924	0.010	1.213	0.005	3.289	3.849	0.730	0.710
929	11-14-1994	Fa	UL	E	10L	11	7	7	6.2	3.658	0.000	0.971	0.000	5.613	1.416	0.014	0.818	0.005	2.276	6.711	0.790	0.760
930	11-14-1994	Fa	BL	S	10U	13-14	10U	STR	6.6	9.234	0.019	1.009	0.000	5.631	10.142	0.071	3.208	0.019	3.376	7.551	0.860	0.840
931	11-14-1994	Fa	BL	W	10U	14	2	2	5.8	7.226	0.023	1.030	0.000	7.878	4.251	0.012	1.198	0.014	3.660	5.461	0.640	1.000
932	11-14-1994	Fa	BL	W	10U	14	2	W	5.9	9.567	0.074	2.130	0.000	12.118	10.739	0.067	2.842	0.761	3.585	7.778	0.550	0.760
933	11-14-1994	Fa	BL	W	10U	14	7	2	5.5	10.660	0.024	1.303	0.000	6.708	1.959	0.013	0.729	0.017	2.081	6.096	0.670	0.560
934	11-14-1994	Fa	BL	W	10U	14	7	W	5.4	0.185	0.000	1.939	0.000	15.078	4.448	0.163	1.535	0.041	3.621	7.628	0.950	0.900
935	11-14-1994	Fa	UL	W	10U	14	11	2	5.4	3.055	0.052	1.972	0.000	16.045	2.901	0.011	1.318	0.017	3.966	6.398	0.520	1.090
936	11-14-1994	Fa	UL	W	10U	14	11	7	5.3	2.608	0.019	1.239	0.000	10.129	3.146	0.010	1.109	0.011	3.755	7.904	0.510	0.990
937	11-14-1994	STD	STD	STD	STD	STD	STD	STD	.	95.810	0.000	1.408	0.303	23.588	5.279	0.104	2.113	0.090	5.754	0.574	1.120	1.720
938	12-01-1994	Wi	WL	S	13A	FLM	13A	FLM	.	14.270	0.047	2.693	0.039	24.330	23.192	0.016	4.325	0.005	7.194	7.385	0.280	0.120
939	12-01-1994	Wi	BL	S	13A	ORG	13A	ORG	.	15.720	0.055	1.892	0.021	20.417	23.540	0.023	6.089	0.005	7.377	6.074	0.290	0.290
940	12-01-1994	Wi	BL	S	13	FLM	13	FLM	.	6.668	0.026	2.498	0.290	14.922	8.742	0.302	1.968	0.005	3.633	6.875	0.240	0.330
941	12-01-1994	Wi	BL	S	13	7-8	13	STR	.	5.746	0.000	1.757	0.029	9.274	6.436	0.058	1.657	0.005	3.452	5.691	0.290	0.280
942	12-01-1994	Wi	WL	S	10L	FLM	10L	FLM	.	7.150	0.020	1.639	0.035	9.750	8.817	0.154	2.511	0.030	3.504	6.778	0.270	0.160
943	12-01-1994	Wi	WL	S	10L	HOL	10L	IN	.	6.527	0.027	2.374	0.053	13.707	7.606	0.075	2.449	0.027	3.459	6.879	0.250	0.250
944	12-01-1994	Wi	WL	S	10L	HOL	10L	OUT	.	6.274	0.032	2.278	0.083	13.808	8.102	0.092	2.487	0.005	3.435	6.966	0.250	0.120
945	12-01-1994	Wi	WL	S	10L	TSP	10L	IN	.	22.540	0.143	2.222	1.967	5.313	33.155	1.709	4.259	1.038	1.413	8.723	0.310	0.080
946	12-01-1994	Wi	WL	S	10L	TSP	10L	OUT	.	6.629	0.035	1.379	0.040	8.254	5.913	0.219	1.362	0.005	2.995	6.748	0.380	0.460
947	12-01-1994	Wi	BL	S	10U	FLM	10U	FLM	.	6.172	0.025	2.302	0.042	13.886	7.205	0.069	2.404	0.005	3.454	6.555	0.400	0.310
948	12-01-1994	Wi	BL	S	10U	13-14	10U	STR	.	13.100	0.043	2.129	0.042	19.754	21.840	0.022	3.884	0.005	6.677	7.012	0.280	0.390
949	12-01-1994	STD	STD	STD	STD	STD	STD	STD	.	95.530	0.000	1.463	0.317	24.244	5.361	0.103	2.131	0.090	5.891	0.250	1.240	0.960
950	12-16-1994	Wi	WL	S	13A	FLM	13A	FLM	6.7	6.013	0.024	2.187	0.048	13.027	6.868	0.247	2.329	0.005	3.439	7.268	0.310	0.360
951	12-16-1994	Wi	BL	S	13A	ORG	13A	ORG	6.7	15.320	0.070	2.085	0.090	20.556	23.073	0.068	5.673	0.017	7.402	6.280	0.300	0.290
952	12-16-1994	Wi	BL	S	13	FLM	13	FLM	6.8	8.365	0.032	2.887	0.037	14.077	10.595	0.094	2.031	0.008	3.513	6.152	0.250	0.080
953	12-16-1994	Wi	BL	S	13	7-8	13	STR	6.8	5.928	0.027	2.377	0.124	13.193	7.181	0.087	1.696	0.005	3.365	5.808	0.290	0.290
954	12-16-1994	Wi	WL	S	10L	FLM	10L	FLM	6.8	8.059	0.046	2.354	0.033	13.866	10.023	0.174	2.604	0.056	3.361	7.098	0.290	0.070

SN	Date	Season	Position Pos	Position Asp	Location WS	Location Tran	Location Dist	Location Type	pH	DOC	IC Anions F	CL	NO3	SO4	ICP Cations Ca	Fe	Mg	Mn	S	Si	Nitrogen Total N	N-NH4
										mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
955	12-16-1994	Wi	WL	S	10L	HOL	10L	IN	6.8	6.839	0.037	2.336	0.039	13.871	8.025	0.085	2.481	0.005	3.407	6.726	0.400	0.280
956	12-16-1994	Wi	WL	S	10L	HOL	10L	OUT	6.8	6.713	0.030	1.805	0.027	11.164	8.297	0.084	2.558	0.005	3.488	6.818	0.260	0.100
957	12-16-1994	Wi	WL	S	10L	TSP	10L	IN	6.3	4.254	0.025	1.105	0.026	6.613	3.142	0.186	0.926	0.005	2.644	6.509	0.380	0.360
958	12-16-1994	Wi	WL	S	10L	TSP	10L	OUT	6.7	24.820	0.152	2.055	0.075	6.795	37.985	1.147	4.093	0.880	1.805	10.140	0.690	0.460
959	12-16-1994	Wi	BL	S	10U	FLM	10U	FLM	6.9	6.650	0.033	2.367	0.043	13.299	8.041	0.073	2.534	0.005	3.508	6.898	0.250	0.410
960	12-16-1994	Wi	BL	S	10U	13-14	10U	STR	6.9	6.335	0.025	2.303	0.045	13.557	7.271	0.177	2.385	0.005	3.318	6.987	0.250	0.400
961	12-16-1994	STD	STD	STD	STD	STD	STD	STD	.	95.420	0.000	1.083	0.221	18.866	5.297	0.107	2.096	0.090	5.802	0.254	1.040	1.090
962	01-09-1995	Wi	WL	S	13A	FLM	13A	FLM	6.6	10.700	0.042	1.843	0.028	19.348	17.374	0.043	3.507	0.005	6.569	6.406	.	0.380
963	01-09-1995	Wi	BL	S	13A	ORG	13A	ORG	6.8	11.030	0.066	2.188	0.109	20.463	16.816	0.057	4.239	0.311	6.334	6.098	.	0.360
964	01-09-1995	Wi	BL	S	13	FLM	13	FLM	6.7	4.838	0.024	2.109	0.031	13.821	6.367	0.081	1.513	0.035	3.471	5.326	.	0.410
965	01-09-1995	Wi	BL	S	13	7-8	13	STR	6.6	4.436	0.000	1.247	0.000	7.527	4.175	0.053	1.294	0.023	3.268	4.954	.	0.350
966	01-09-1995	Wi	WL	S	10L	FLM	10L	FLM	6.6	5.409	0.021	1.540	0.037	10.176	6.184	0.127	1.911	0.080	3.479	6.050	.	0.360
967	01-09-1995	Wi	WL	S	10L	HOL	10L	IN	6.6	5.124	0.021	2.187	0.000	14.588	5.529	0.071	1.860	0.069	3.560	5.954	.	0.280
968	01-09-1995	Wi	WL	S	10L	HOL	10L	OUT	6.6	5.284	0.022	1.763	0.025	11.755	5.693	0.069	1.915	0.063	3.593	6.057	.	0.150
969	01-09-1995	Wi	WL	S	10L	TSP	10L	IN	6.5	3.892	0.031	1.513	0.000	10.194	2.734	0.173	0.835	0.110	3.094	6.317	.	0.250
970	01-09-1995	Wi	WL	S	10L	TSP	10L	OUT	6.2	5.039	0.033	1.996	0.000	13.015	5.594	0.267	1.888	0.054	3.520	6.809	.	0.310
971	01-09-1995	Wi	BL	S	10U	FLM	10U	FLM	6.6	3.271	0.027	1.715	0.000	11.680	5.679	0.068	1.866	0.075	3.534	6.013	.	0.300
972	01-09-1995	Wi	BL	S	10U	13-14	10U	STR	6.5	4.608	0.017	1.313	0.021	8.625	5.070	0.057	1.883	0.070	3.604	6.046	.	0.320
973	01-09-1995	STD	STD	STD	STD	STD	STD	STD	.	96.340	0.000	1.186	0.252	21.003	5.365	0.107	2.175	0.108	5.937	0.264	.	1.000
974	01-14-1995	Wi	WL	S	13A	FLM	13A	FLM	.	18.780	0.048	0.893	0.000	9.415	12.650	0.195	2.440	0.005	3.894	4.554	.	0.160
975	01-14-1995	Wi	BL	S	13A	ORG	13A	ORG	.	.	0.045	1.261	0.047	13.378	16.546	0.170	3.774	0.098	5.454	5.741	.	0.160
976	01-14-1995	Wi	BL	S	13	FLM	13	FLM	.	8.268	0.020	1.209	0.000	8.214	8.698	0.207	1.699	0.018	3.246	4.883	.	0.190
977	01-14-1995	Wi	BL	S	13	7-8	13	STR	.	7.254	0.022	1.148	0.000	7.384	6.481	0.197	1.510	0.019	3.101	4.804	.	0.220
978	01-14-1995	Wi	WL	S	10L	FLM	10L	FLM	.	6.937	0.018	1.139	0.000	8.009	5.694	0.216	1.823	0.073	3.267	5.572	0.250	0.160
979	01-14-1995	Wi	WL	S	10L	HOL	10L	IN	.	8.096	0.023	1.145	0.000	7.807	8.352	0.204	2.004	0.076	3.232	5.470	0.190	0.270
980	01-14-1995	Wi	WL	S	10L	HOL	10L	OUT	.	6.508	0.016	1.074	0.000	7.732	5.220	0.194	1.793	0.054	3.214	5.483	0.160	0.250
981	01-14-1995	Wi	WL	S	10L	TSP	10L	IN	.	8.566	0.023	0.866	0.016	6.166	4.906	0.338	0.950	0.116	2.658	5.707	0.260	0.230
982	01-14-1995	Wi	WL	S	10L	TSP	10L	OUT	.	6.768	0.018	1.315	0.016	7.704	5.676	0.171	1.835	0.009	3.222	5.528	0.180	0.180
983	01-14-1995	Wi	BL	S	10U	FLM	10U	FLM	.	6.946	0.014	1.066	0.000	7.659	4.871	0.196	1.743	0.072	3.213	5.429	0.230	0.210
984	01-14-1995	Wi	BL	S	10U	13-14	10U	STR	.	7.041	0.010	1.067	0.000	7.551	6.281	0.195	1.787	0.049	3.119	5.317	0.170	0.270
985	01-14-1995	STD	STD	STD	STD	STD	STD	STD	.	95.510	0.000	1.009	0.264	19.996	5.320	0.109	2.165	0.093	5.991	0.193	1.040	.
986	01-14-1995 11 am	Wi	WL	S	13A	FLM	13A	ISCO	.	14.680	0.228	1.012	0.000	10.144	13.329	0.195	2.510	0.016	4.134	5.285	0.300	0.360
987	01-14-1995 01 pm	Wi	WL	S	13A	FLM	13A	ISCO	.	11.690	0.134	0.966	0.000	10.222	10.804	0.162	2.379	0.005	4.252	5.244	0.270	0.250
988	01-14-1995 03 pm	Wi	WL	S	13A	FLM	13A	ISCO	.	10.890	0.130	0.896	0.000	10.250	11.457	0.151	2.208	0.005	4.319	5.292	0.270	0.220
989	01-14-1995 05 pm	Wi	WL	S	13A	FLM	13A	ISCO	.	8.645	0.060	0.936	0.000	10.332	8.024	0.112	1.872	0.005	4.363	5.127	0.260	0.150
990	01-14-1995 07 pm	Wi	WL	S	13A	FLM	13A	ISCO	.	7.959	0.092	1.003	0.000	11.189	7.744	0.104	1.865	0.005	4.599	5.563	0.230	0.170
991	01-14-1995 09 pm	Wi	WL	S	13A	FLM	13A	ISCO	.	8.525	0.041	0.896	0.000	9.451	9.461	0.116	1.911	0.005	4.423	5.282	0.220	0.220
992	01-14-1995 11 pm	Wi	WL	S	13A	FLM	13A	ISCO	.	8.182	0.089	0.962	0.022	10.366	7.137	0.120	1.714	0.005	4.295	5.121	0.240	0.210
993	01-15-1995 01 am	Wi	WL	S	13A	FLM	13A	ISCO	.	8.349	0.034	0.922	0.000	10.204	8.368	0.119	1.744	0.015	3.979	4.766	0.190	0.170
994	01-15-1995 03 am	Wi	WL	S	13A	FLM	13A	ISCO	.	8.234	0.061	1.026	0.000	11.338	8.497	0.081	1.727	0.005	4.297	5.152	0.230	0.220
995	01-15-1995 05 am	Wi	WL	S	13A	FLM	13A	ISCO	.	7.124	0.043	1.030	0.000	11.618	6.954	0.066	1.720	0.005	4.368	5.135	0.200	0.310
996		STD	STD	STD	STD	STD	STD	STD	.	95.320	0.000	0.964	0.258	19.831	5.070	0.104	2.102	0.090	5.605	0.222	1.050	.
997	01-15-1995 07 am	Wi	WL	S	13A	FLM	13A	ISCO	.	7.244	0.023	1.062	0.000	11.666	7.264	0.065	1.802	0.005	4.564	5.234	0.300	0.240
998	01-15-1995 09 am	Wi	WL	S	13A	FLM	13A	ISCO	.	6.953	0.039	1.055	0.000	12.009	7.789	0.059	1.897	0.005	4.586	5.301	0.210	0.150
999	01-15-1995 11 am	Wi	WL	S	13A	FLM	13A	ISCO	.	7.076	0.031	1.077	0.000	12.450	8.201	0.059	1.993	0.005	4.685	5.427	0.230	0.050
1000	01-15-1995 01 pm	Wi	WL	S	13A	FLM	13A	ISCO	.	7.069	0.052	1.138	0.000	12.304	8.457	0.053	2.017	0.005	4.642	5.320	0.230	0.100
1001	01-15-1995 03 pm	Wi	WL	S	13A	FLM	13A	ISCO	.	7.890	0.046	1.060	0.170	11.848	8.583	0.073	2.026	0.005	4.514	5.318	0.240	0.100
1002	01-15-1995 05 pm	Wi	WL	S	13A	FLM	13A	ISCO	.	8.655	0.051	1.072	0.000	10.777	8.231	0.115	1.963	0.005	4.133	4.910	0.260	0.090
1003	01-15-1995 07 pm	Wi	WL	S	13A	FLM	13A	ISCO	.	8.168	0.037	1.309	0.015	11.677	8.584	0.089	1.998	0.009	4.420	5.228	0.250	0.130
1004		STD	STD	STD	STD	STD	STD	STD	.	95.570	0.000	0.953	0.262	19.827	5.094	0.102	2.120	0.094	5.638	0.193	1.050	.
1005	01-15-1995 09 pm	Wi	WL	S	13A	FLM	13A	ISCO	.	7.179	0.038	1.035	0.000	11.946	8.123	0.062	1.938	0.005	4.410	5.186	0.260	0.470
1006	01-15-1995 11 pm	Wi	WL	S	13A	FLM	13A	ISCO	.	0.775	0.029	1.073	0.000	11.782	8.110	0.064	1.950	0.005	4.450	5.240	0.200	0.290
1007	01-16-1995 01 am	Wi	WL	S	13A	FLM	13A	ISCO	.	7.571	0.026	1.118	0.000	12.173	8.869	0.056	2.039	0.005	4.602	5.523	0.280	0.220

SN	Date	Season	Position		Location				pH	DOC	IC Anions				ICP Cations						Nitrogen	
			Pos	Asp	WS	Tran	Dist	Type			F	CL	NO3	SO4	Ca	Fe	Mg	Mn	S	Si	Total N	N-NH4
										mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
1008	01-16-1995 03 am	Wi	WL	S	13A	FLM	13A	ISCO	.	0.404	0.024	1.087	0.000	12.286	8.588	0.058	2.004	0.005	4.632	5.371	0.220	0.170
1009	01-16-1995 05 am	Wi	WL	S	13A	FLM	13A	ISCO	.	7.413	0.027	1.120	0.000	12.434	9.359	0.049	2.066	0.005	4.661	5.505	0.210	0.080
1010	01-16-1995 07 am	Wi	WL	S	13A	FLM	13A	ISCO	.	7.170	0.027	1.059	0.000	12.449	9.035	0.045	2.072	0.005	4.654	5.455	0.210	0.030
1011	01-16-1995 09 am	Wi	WL	S	13A	FLM	13A	ISCO	.	7.463	0.027	1.170	0.028	12.786	10.104	0.049	2.190	0.005	4.833	5.690	0.250	0.110
1012		STD	STD	STD	STD	STD	STD	STD	.	95.610	0.000	0.986	0.260	20.185	5.104	0.103	2.104	0.090	5.597	0.180	0.960	.
1013	01-14-1995 11 am	Wi	BL	S	13	FLM	13	ISCO	.	1.693	0.148	1.103	0.020	7.756	6.219	0.146	1.443	0.024	2.955	4.730	0.200	0.300
1014	01-14-1995 01 pm	Wi	BL	S	13	FLM	13	ISCO	.	.	0.077	1.090	0.022	8.103	4.954	0.136	1.303	0.014	3.061	4.417	0.270	0.250
1015	01-14-1995 03 pm	Wi	BL	S	13	FLM	13	ISCO	.	.	0.058	0.995	0.000	8.064	4.216	0.149	1.223	0.026	3.147	4.298	0.330	0.310
1016	01-14-1995 05 pm	Wi	BL	S	13	FLM	13	ISCO	.	.	0.064	1.006	0.018	8.197	4.043	0.122	1.197	0.005	3.174	4.132	0.270	0.190
1017	01-14-1995 07 pm	Wi	BL	S	13	FLM	13	ISCO	.	.	0.075	1.003	0.000	8.432	3.640	0.099	1.196	0.030	3.252	4.029	0.240	0.140
1018	01-14-1995 09 pm	Wi	BL	S	13	FLM	13	ISCO	.	.	0.061	1.058	0.023	8.344	3.689	0.086	1.176	0.035	3.231	4.109	0.330	0.250
1019	01-14-1995 11 pm	Wi	BL	S	13	FLM	13	ISCO	.	.	0.059	0.947	0.000	7.879	3.452	0.117	1.111	0.031	3.081	3.842	0.280	0.190
1020	01-15-1995 01 am	Wi	BL	S	13	FLM	13	ISCO	.	.	0.055	0.977	0.016	8.077	3.212	0.103	1.100	0.029	3.096	3.787	0.320	0.180
1021	01-15-1995 03 am	Wi	BL	S	13	FLM	13	ISCO	.	.	0.056	1.043	0.000	8.364	3.069	0.091	1.115	0.028	3.218	3.899	0.280	0.090
1022	01-15-1995 05 am	Wi	BL	S	13	FLM	13	ISCO	.	.	0.052	1.035	0.000	8.532	3.365	0.061	1.139	0.017	3.250	4.037	0.510	0.100
1023	01-15-1995 07 am	Wi	BL	S	13	FLM	13	ISCO	.	.	0.015	1.019	0.000	8.450	3.223	0.050	1.144	0.031	3.273	4.062	0.440	0.070
1024	01-15-1995 09 am	Wi	BL	S	13	FLM	13	ISCO	.	.	0.040	1.073	0.000	8.385	3.417	0.043	1.171	0.024	3.223	4.220	0.360	0.470
1025		STD	STD	STD	STD	STD	STD	STD	.	.	0.000	0.964	0.257	19.753	5.096	0.100	2.116	0.091	5.659	0.175	1.110	.
1026	01-15-1995 11 am	Wi	BL	S	13	FLM	13	ISCO	.	.	0.012	1.046	0.023	8.510	3.722	0.069	1.190	0.016	3.308	4.414	0.380	0.410
1027	01-15-1995 01 pm	Wi	BL	S	13	FLM	13	ISCO	.	.	0.053	1.089	0.000	8.434	3.424	0.046	1.163	0.017	3.243	4.484	0.410	0.230
1028	01-15-1995 03 pm	Wi	BL	S	13	FLM	13	ISCO	.	.	0.053	1.062	0.000	8.130	3.884	0.052	1.196	0.020	3.208	4.591	0.390	0.210
1029	01-15-1995 05 pm	Wi	BL	S	13	FLM	13	ISCO	.	.	0.051	1.000	0.000	7.711	3.742	0.110	1.153	0.013	3.053	4.378	0.380	0.200
1030	01-15-1995 07 pm	Wi	BL	S	13	FLM	13	ISCO	.	.	0.049	1.201	0.000	7.957	3.561	0.085	1.137	0.014	3.095	4.279	0.520	0.200
1031	01-15-1995 09 pm	Wi	BL	S	13	FLM	13	ISCO	.	.	0.055	1.069	0.018	8.112	3.733	0.067	1.189	0.024	3.212	4.352	0.460	0.240
1032	01-15-1995 11 pm	Wi	BL	S	13	FLM	13	ISCO	.	.	0.056	1.134	0.000	8.177	3.692	0.048	1.173	0.015	3.153	4.395	0.340	0.210
1033	01-16-1995 01 am	Wi	BL	S	13	FLM	13	ISCO	.	.	0.015	1.142	0.000	8.224	3.687	0.057	1.172	0.036	3.167	4.401	0.480	0.250
1034	01-16-1995 03 am	Wi	BL	S	13	FLM	13	ISCO	.	.	0.035	1.091	0.000	8.308	3.626	0.046	1.151	0.032	3.181	4.265	0.360	0.220
1035	01-16-1995 05 am	Wi	BL	S	13	FLM	13	ISCO	.	.	0.033	0.913	0.000	6.965	3.662	0.048	1.185	0.029	3.239	4.449	0.400	0.210
1036	01-16-1995 07 am	Wi	BL	S	13	FLM	13	ISCO	.	.	0.017	1.051	0.017	8.210	4.045	0.041	1.201	0.025	3.176	4.443	0.400	0.140
1037	01-16-1995 09 am	Wi	BL	S	13	FLM	13	ISCO	.	.	0.035	1.005	0.000	8.193	3.953	0.041	1.206	0.026	3.238	4.513	0.320	0.160
1038		STD	STD	STD	STD	STD	STD	STD	.	.	0.000	0.947	0.258	19.378	5.144	0.101	2.117	0.102	5.661	0.187	1.000	.
1039	01-14-1995 11 am	Wi	WL	S	10L	FLM	10L	ISCO	.	.	0.175	1.120	0.000	7.544	5.555	0.204	1.717	0.115	2.949	5.253	0.420	0.260
1040	01-14-1995 01 pm	Wi	WL	S	10L	FLM	10L	ISCO	.	.	0.093	1.309	0.000	9.082	4.283	0.194	1.502	0.057	3.025	4.669	0.430	0.120
1041	01-14-1995 03 pm	Wi	WL	S	10L	FLM	10L	ISCO	.	.	0.019	1.323	0.000	9.879	3.450	0.180	1.302	0.055	3.099	4.139	0.460	0.140
1042	01-14-1995 05 pm	Wi	WL	S	10L	FLM	10L	ISCO	.	.	0.093	1.729	0.000	13.610	4.013	0.156	1.276	0.062	3.228	3.924	0.460	0.130
1043	01-14-1995 07 pm	Wi	WL	S	10L	FLM	10L	ISCO	.	.	0.082	1.780	0.000	13.359	3.192	0.126	1.297	0.073	3.350	4.005	0.470	0.300
1044	01-14-1995 09 pm	Wi	WL	S	10L	FLM	10L	ISCO	.	.	0.063	1.700	0.000	13.778	3.140	0.110	1.294	0.066	3.322	4.038	0.480	0.220
1045	01-14-1995 11 pm	Wi	WL	S	10L	FLM	10L	ISCO	.	.	0.080	1.268	0.000	10.242	3.143	0.157	1.203	0.047	3.278	3.826	0.470	0.210
1046	01-15-1995 01 am	Wi	WL	S	10L	FLM	10L	ISCO	.	.	0.196	1.801	0.039	13.737	3.256	0.195	1.160	0.024	3.301	3.876	0.620	0.260
1047	01-15-1995 03 am	Wi	WL	S	10L	FLM	10L	ISCO	.	.	0.110	1.256	0.000	10.853	3.036	0.128	1.222	0.068	3.359	3.741	0.430	0.230
1048	01-15-1995 05 am	Wi	WL	S	10L	FLM	10L	ISCO	.	.	0.069	1.582	0.000	12.761	3.086	0.094	1.315	0.063	3.504	4.016	0.440	0.220
1049	01-15-1995 07 am	Wi	WL	S	10L	FLM	10L	ISCO	.	.	0.066	1.351	0.000	11.366	3.087	0.079	1.321	0.055	3.587	4.176	0.430	0.170
1050	01-15-1995 09 am	Wi	WL	S	10L	FLM	10L	ISCO	.	.	0.700	1.331	0.000	11.082	3.320	0.084	1.424	0.048	3.618	4.534	0.430	0.120
1051	01-15-1995 11 am	Wi	WL	S	10L	FLM	10L	ISCO	.	.	0.069	1.766	0.028	13.805	3.178	0.062	1.406	0.053	3.595	4.676	0.330	0.080
1052		STD	STD	STD	STD	STD	STD	STD	.	.	0.000	1.334	0.284	22.516	5.201	0.101	2.217	0.102	5.747	0.255	0.780	.
1053	01-15-1995 01 pm	Wi	WL	S	10L	FLM	10L	ISCO	.	.	0.077	1.658	0.000	12.324	3.428	0.121	1.449	0.063	3.629	5.036	0.310	0.300
1054	01-15-1995 03 pm	Wi	WL	S	10L	FLM	10L	ISCO	.	.	0.084	1.872	0.027	14.567	3.535	0.074	1.438	0.047	3.505	4.854	0.300	0.120
1055	01-15-1995 05 pm	Wi	WL	S	10L	FLM	10L	ISCO	.	.	0.059	1.282	0.000	9.841	3.964	0.108	1.270	0.066	3.100	4.239	0.290	0.230
1056	01-15-1995 07 pm	Wi	WL	S	10L	FLM	10L	ISCO	.	.	0.067	1.380	0.000	10.616	3.117	0.096	1.232	0.049	3.204	4.180	0.300	0.150
1057	01-15-1995 09 pm	Wi	WL	S	10L	FLM	10L	ISCO	.	.	0.066	1.876	0.000	14.645	3.192	0.057	1.322	0.051	3.337	4.625	0.280	0.120
1058	01-15-1995 11 pm	Wi	WL	S	10L	FLM	10L	ISCO	.	.	0.077	1.530	0.000	12.169	3.068	0.086	1.287	0.047	3.288	4.363	0.330	0.090
1059	01-16-1995 01 am	Wi	WL	S	10L	FLM	10L	ISCO	.	.	0.082	1.744	0.000	14.222	4.486	0.086	1.296	0.051	3.371	4.376	0.270	0.140
1060	01-16-1995 03 am	Wi	WL	S	10L	FLM	10L	ISCO	.	.	0.093	1.858	0.000	14.327	3.311	0.082	1.332	0.055	3.433	4.597	0.300	0.140

SN	Date	Season	Position Pos	Position Asp	Location WS	Location Tran	Location Dist	Location Type	pH	DOC	IC Anions F	CL	NO3	SO4	ICP Cations Ca	Fe	Mg	Mn	S	Si	Nitrogen Total N	N-NH4
										mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
1061	01-16-1995 05 am	Wi	WL	S	10L	FLM	10L	ISCO	.	.	0.045	1.076	0.000	8.526	3.191	0.059	1.310	0.048	3.392	4.552	0.280	0.150
1062	01-16-1995 07 am	Wi	WL	S	10L	FLM	10L	ISCO	.	.	0.052	1.323	0.000	11.118	3.314	0.058	1.340	0.052	3.427	4.668	0.280	0.050
1063		STD	STD	STD	STD	STD	STD	STD	.	.	0.000	1.361	0.274	21.923	5.200	0.102	2.082	0.104	5.599	0.187	0.980	.
1064	01-14-1995 11 am	Wi	BL	S	10U	FLM	10U	ISCO	.	.	0.183	1.427	0.024	8.197	4.953	0.134	1.674	0.044	3.051	5.364	0.450	0.100
1065	01-14-1995 01 pm	Wi	BL	S	10U	FLM	10U	ISCO	.	.	0.107	1.021	0.024	7.287	3.862	0.164	1.428	0.046	3.065	4.755	0.500	0.100
1066	01-14-1995 03 pm	Wi	BL	S	10U	FLM	10U	ISCO	.	.	0.191	1.147	0.019	7.827	3.340	0.157	1.324	0.035	3.204	4.376	0.490	0.190
1067	01-14-1995 05 pm	Wi	BL	S	10U	FLM	10U	ISCO	.	.	0.141	1.082	0.000	7.733	3.354	0.142	1.309	0.041	3.241	4.315	0.440	0.140
1068	01-14-1995 07 pm	Wi	BL	S	10U	FLM	10U	ISCO	.	.	0.167	0.923	0.000	7.320	3.124	0.121	1.280	0.056	3.351	4.214	0.460	0.190
1069	01-14-1995 09 pm	Wi	BL	S	10U	FLM	10U	ISCO	.	.	0.158	1.425	0.019	11.089	3.073	0.098	1.267	0.045	3.285	4.137	0.450	0.120
1070	01-14-1995 11 pm	Wi	BL	S	10U	FLM	10U	ISCO	.	.	0.242	1.431	0.019	10.736	3.173	0.123	1.236	0.043	3.240	4.143	0.430	0.120
1071		STD	STD	STD	STD	STD	STD	STD	.	.	0.000	0.611	0.132	12.349	5.260	0.106	1.998	0.107	5.527	0.247	0.950	.
1072	01-15-1995 01 am	Wi	BL	S	10U	FLM	10U	ISCO	.	.	0.243	1.211	0.000	10.225	2.893	0.145	1.190	0.059	3.217	3.931	0.380	0.140
1073	01-15-1995 03 am	Wi	BL	S	10U	FLM	10U	ISCO	.	.	0.162	1.383	0.019	11.493	2.859	0.110	1.237	0.069	3.337	3.952	0.340	0.090
1074	01-15-1995 05 am	Wi	BL	S	10U	FLM	10U	ISCO	.	.	0.203	1.072	0.000	9.372	2.910	0.079	1.264	0.055	3.467	3.987	0.320	0.200
1075	01-15-1995 07 am	Wi	BL	S	10U	FLM	10U	ISCO	.	.	0.216	1.113	0.017	9.458	2.992	0.075	1.335	0.041	3.474	4.217	0.350	0.240
1076	01-15-1995 09 am	Wi	BL	S	10U	FLM	10U	ISCO	.	.	0.169	1.168	0.000	9.499	2.827	0.068	1.314	0.036	3.460	4.285	0.370	0.180
1077	01-15-1995 11 am	Wi	BL	S	10U	FLM	10U	ISCO	.	.	0.171	1.082	0.015	9.352	3.094	0.062	1.350	0.034	3.429	4.441	0.310	0.160
1078	01-15-1995 01 pm	Wi	BL	S	10U	FLM	10U	ISCO	.	.	0.017	1.153	0.023	9.389	3.396	0.064	1.330	0.038	3.389	4.574	0.310	0.190
1079	01-15-1995 03 pm	Wi	BL	S	10U	FLM	10U	ISCO	.	.	0.071	1.191	0.033	9.111	6.656	0.059	1.322	0.035	3.308	4.659	0.220	0.140
1080		STD	STD	STD	STD	STD	STD	STD	.	.	0.000	1.030	0.229	20.658	4.890	0.098	2.038	0.084	5.398	0.227	0.900	.
1081	01-15-1995 05 pm	Wi	BL	S	10U	FLM	10U	ISCO	.	.	0.144	1.015	0.020	8.475	2.790	0.099	1.245	0.029	3.088	4.155	0.470	0.200
1082	01-15-1995 07 pm	Wi	BL	S	10U	FLM	10U	ISCO	.	.	0.177	1.103	0.016	8.908	2.699	0.107	1.259	0.027	3.156	4.171	0.280	0.190
1083	01-15-1995 09 pm	Wi	BL	S	10U	FLM	10U	ISCO	.	.	0.112	1.195	0.022	8.925	2.986	0.069	1.277	0.088	3.193	4.198	0.280	0.060
1084	01-15-1995 11 pm	Wi	BL	S	10U	FLM	10U	ISCO	.	.	0.092	1.079	0.015	8.951	2.742	0.069	1.256	0.028	3.201	4.209	0.280	0.130
1085	01-16-1995 01 am	Wi	BL	S	10U	FLM	10U	ISCO	.	.	0.091	1.184	0.028	9.248	2.740	0.060	1.298	0.041	3.209	4.196	0.280	0.270
1086	01-16-1995 03 am	Wi	BL	S	10U	FLM	10U	ISCO	.	.	0.074	1.180	0.020	9.198	2.836	0.048	1.314	0.030	3.308	4.350	0.320	0.280
1087	01-16-1995 05 am	Wi	BL	S	10U	FLM	10U	ISCO	.	.	0.155	1.287	0.026	9.430	2.817	0.053	1.305	0.029	3.272	4.368	0.350	0.290
1088	01-16-1995 07 am	Wi	BL	S	10U	FLM	10U	ISCO	.	.	0.076	1.094	0.000	9.110	3.231	0.063	1.337	0.036	3.265	4.413	0.280	0.250
1089	01-16-1995 09 am	Wi	BL	S	10U	FLM	10U	ISCO	.	.	0.155	1.154	0.000	9.325	2.934	0.047	1.325	0.037	3.260	4.469	0.270	0.270
1090		STD	STD	STD	STD	STD	STD	STD	.	.	0.000	1.049	0.233	20.817	4.836	0.093	2.109	0.079	5.363	0.201	.	.
1091	01-19-1985	Wi	WL	S	13A	FLM	13A	FLM	.	11.390	0.049	1.120	0.025	14.839	14.001	0.038	3.018	0.005	5.270	6.164	.	.
1092	01-19-1995	Wi	BL	S	13A	ORG	13A	ORG	.	11.950	0.041	1.771	0.030	15.683	13.367	0.021	3.742	0.005	5.463	6.052	.	.
1093	01-19-1995	Wi	BL	S	13	FLM	13	FLM	.	4.918	0.012	1.120	0.014	8.115	4.980	0.045	1.363	0.005	2.924	5.043	.	.
1094	01-19-1995	Wi	BL	S	13	7-8	13	STR	.	3.926	0.064	1.183	0.000	7.787	3.591	0.046	1.246	0.006	2.775	4.787	.	.
1095	01-19-1995	Wi	WL	S	10L	FLM	10L	FLM	.	5.816	0.038	1.207	0.014	8.700	5.511	0.086	1.795	0.005	3.126	5.874	.	.
1096	01-19-1995	Wi	WL	S	10L	HOL	10L	IN	.	5.991	0.018	1.343	0.031	8.909	4.951	0.064	1.738	0.005	3.287	5.743	.	.
1097	01-19-1995	Wi	WL	S	10L	HOL	10L	OUT	.	5.401	0.021	1.237	0.027	8.814	4.836	0.056	1.749	0.005	3.227	5.774	.	.
1098	01-19-1995	Wi	WL	S	10L	TSP	10L	IN	.	3.547	0.017	1.030	0.000	7.528	2.722	0.082	0.849	0.033	2.833	5.623	.	.
1099	01-19-1995	Wi	WL	S	10L	TSP	10L	OUT	.	5.157	0.033	1.179	0.019	8.735	4.818	0.058	1.713	0.005	3.162	5.658	.	.
1100	01-19-1995	Wi	BL	S	10U	FLM	10U	FLM	.	5.160	0.015	1.189	0.000	8.589	4.560	0.061	1.726	0.005	3.228	5.686	.	.
1101	01-19-1995	Wi	BL	S	10U	13-14	10U	STR	.	5.242	0.014	1.229	0.014	8.456	4.275	0.061	1.683	0.005	3.217	5.760	.	.
1102	01-19-1995	STD	STD	STD	STD	STD	STD	STD	.	107.500	0.000	1.004	0.233	1.960	4.845	0.101	2.030	0.081	5.442	0.205	.	.
1103	02-09-1995	Wi	WL	S	13A	FLM	13A	FLM	6.9	12.380	0.044	1.229	0.000	16.553	17.019	0.020	3.349	0.005	5.911	5.840	.	.
1104	02-09-1995	Wi	UL	E	13A	1	21	7	6.5	10.600	0.000	1.097	0.000	16.771	2.747	0.010	2.800	0.005	6.151	4.996	.	.
1105	02-09-1995	Wi	WL	E	13A	1	16	W	7.1	25.700	0.081	1.057	0.109	9.282	38.279	0.112	2.885	0.073	3.369	9.130	.	.
1106	02-09-1995	Wi	WL	E	13A	1	9	2	6.4	21.070	0.056	1.119	0.000	13.935	29.016	0.010	3.912	0.005	5.050	7.750	.	.
1107	02-09-1995	Wi	WL	E	13A	1	9	W	6.6	18.240	0.051	1.247	0.035	14.424	26.446	0.025	3.378	0.005	5.154	7.069	.	.
1108	02-09-1995	Wi	WL	E	13A	1	5	W	6.6	20.830	0.059	1.306	0.097	13.621	28.131	0.574	3.872	0.347	4.881	7.353	.	.
1109	02-09-1995	Wi	WL	E	13A	1	2	2	7	13.540	0.036	1.441	0.043	17.360	17.606	0.041	3.386	0.204	6.212	6.394	.	.
1110	02-09-1995	Wi	WL	E	13A	1	2	W	6.6	19.960	0.054	1.315	0.029	15.510	28.105	0.042	4.127	0.048	5.569	7.953	.	.
1111	02-09-1995	Wi	WL	S	13A	1-2	13A	STR	6.8	12.570	0.033	1.194	0.016	16.710	16.921	0.025	3.541	0.033	6.083	6.051	.	.
1112	02-09-1995	STD	STD	STD	STD	STD	STD	STD	.	109.500	0.000	0.997	0.226	1.957	4.851	0.114	2.052	0.081	5.481	0.193	.	.
1113	02-09-1995	Wi	UL	W	13A	4	7	W	6.2	10.820	0.032	1.274	0.028	12.831	14.752	0.036	2.523	0.476	4.671	7.228	.	.

SN	Date	Season	Position Pos	Asp	Location WS	Tran	Dist	Type	pH	DOC	IC Anions F	CL	NO3	SO4	ICP Cations Ca	Fe	Mg	Mn	S	Si	Nitrogen Total N	N-NH4
										mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
1114	02-09-1995	Wi	WL	W	13A	4	2	2	6.3	6.949	0.061	1.436	0.103	10.430	14.106	0.010	2.744	2.046	3.922	5.357	.	.
1115	02-09-1995	Wi	WL	W	13A	4	2	W	6.1	7.934	0.023	1.264	0.051	15.511	9.814	0.779	1.743	0.672	5.550	6.259	.	.
1116	02-09-1995	Wi	WL	S	13A	3-4	13A	STR	6.3	8.189	0.039	1.193	0.000	14.364	10.890	0.157	2.099	0.469	5.234	6.225	.	.
1117	02-09-1995	Wi	WL	S	13A	3-4	13A	STR	6.9	12.990	0.046	1.244	0.012	18.533	16.723	0.055	4.042	0.243	6.817	6.072	.	.
1118	02-09-1995	Wi	BL	S	13A	ORG	13A	ORG	7.1	12.940	0.041	1.320	0.023	17.397	16.087	0.036	4.287	0.298	6.388	6.279	.	.
1119	02-09-1995	Wi	BL	S	13	FLM	13	FLM	7.1	7.809	0.028	1.290	0.013	8.813	8.953	0.060	1.862	0.087	3.290	5.099	.	.
1120	02-09-1995	Wi	BL	E	13	5	2	2	5.9	3.872	0.010	1.078	0.000	10.567	3.637	0.013	1.051	0.015	3.842	5.474	.	.
1121	02-09-1995	Wi	BL	E	13	5	2	W	6.2	7.776	0.032	1.291	0.799	13.000	9.529	0.299	2.245	0.292	4.774	5.705	.	.
1122	02-09-1995	Wi	BL	S	13	5-6	13	STR	6.9	6.634	0.023	1.270	0.000	9.021	7.458	0.043	1.675	0.035	3.293	4.756	.	.
1123	02-09-1995	STD	STD	STD	STD	STD	STD	STD	.	111.500	0.000	1.008	0.227	2.001	4.887	0.100	1.992	0.086	5.461	0.181	.	.
1124	02-09-1995	Wi	UL	W	13	8	11	2	5.7	13.640	0.013	0.552	0.000	8.887	3.808	0.105	0.846	0.021	3.302	4.978	.	.
1125	02-09-1995	Wi	UL	W	13	8	11	7	6.1	4.782	0.015	1.081	0.032	12.204	6.627	0.039	1.293	0.013	4.412	5.177	.	.
1126	02-09-1995	Wi	BL	W	13	8	6	W	6.3	6.854	0.021	1.175	0.017	11.435	9.353	0.023	1.822	0.005	4.201	5.279	.	.
1127	02-09-1995	Wi	BL	W	13	8	2	2	6.1	2.866	0.000	0.687	0.000	5.182	2.224	0.011	0.539	0.005	1.907	4.417	.	.
1128	02-09-1995	Wi	BL	W	13	8	2	W	6.4	10.700	0.049	1.259	0.000	10.867	12.436	0.194	2.985	0.985	3.986	5.157	.	.
1129	02-09-1995	Wi	BL	S	13	7-8	13	STR	6.8	5.361	0.017	1.271	0.000	8.590	5.444	0.058	1.463	0.043	3.198	5.175	.	.
1130	02-09-1995	Wi	WL	S	10L	FLM	10L	FLM	7	7.490	0.024	1.239	0.000	8.472	7.932	0.131	2.274	0.104	3.301	6.403	.	.
1131	02-09-1995	Wi	WL	W	10L	10	2	2	6.6	15.920	0.178	1.075	0.000	2.660	17.091	2.829	1.986	3.599	1.040	6.765	.	.
1132	02-09-1995	Wi	WL	W	10L	10	2	W	6.7	15.970	0.086	1.013	0.016	4.455	20.733	2.330	1.952	1.621	1.725	8.251	.	.
1133	02-09-1995	Wi	WL	W	10L	10	7	W	6.7	15.330	0.090	0.888	0.015	3.765	19.465	13.025	2.172	2.140	1.383	6.255	.	.
1134	02-09-1995	STD	STD	STD	STD	STD	STD	STD	.	108.900	0.000	0.992	0.221	1.895	4.873	0.157	2.025	0.088	5.476	0.256	.	.
1135	02-09-1995	Wi	UL	W	10L	10	18	2	5.9	4.413	0.009	0.984	0.000	7.076	4.207	0.179	1.201	0.092	2.663	4.742	.	.
1136	02-09-1995	Wi	UL	W	10L	10	18	W	5.8	4.434	0.019	1.027	0.000	7.188	4.225	0.061	1.227	0.051	2.722	4.792	.	.
1137	02-09-1995	Wi	UL	W	10L	10	32	2	5.4	6.107	0.025	0.866	0.000	10.769	4.180	0.070	0.674	0.096	4.136	4.086	.	.
1138	02-09-1995	Wi	UL	W	10L	10	32	7	5.2	3.153	0.070	1.052	0.000	13.477	1.736	0.068	2.715	0.088	4.982	4.022	.	.
1139	02-09-1995	STD	STD	STD	STD	STD	STD	STD	.	108.000	0.000	0.980	0.224	1.914	4.821	0.102	2.026	0.085	5.524	0.252	.	.
1140	02-09-1995	Wi	WL	S	10L	HOL	10L	IN	6.4	6.487	0.037	1.340	0.000	8.653	6.803	0.169	2.137	0.121	3.228	6.003	.	.
1141	02-09-1995	Wi	WL	S	10L	HOL	10L	OUT	6.7	.	0.040	1.335	0.000	8.370	6.510	0.068	2.117	0.081	3.214	5.594	.	.
1142	02-09-1995	Wi	WL	S	10L	TSP	10L	IN	6	.	0.051	1.179	0.000	8.957	4.081	0.200	1.134	0.128	3.443	5.885	.	.
1143	02-09-1995	Wi	WL	S	10L	TSP	10L	OUT	6.5	.	0.038	1.274	0.000	8.491	6.918	0.066	2.132	0.080	3.283	5.739	.	.
1144	02-09-1995	Wi	UL	E	10L	11	7	2	6.1	.	0.019	0.863	0.000	8.003	1.390	0.011	1.111	0.005	3.056	2.366	.	.
1145	02-09-1995	Wi	UL	E	10L	11	2	7	6.3	.	0.021	0.851	0.016	8.230	1.787	0.014	1.027	0.009	3.129	5.691	.	.
1146	02-09-1995	Wi	BL	S	10U	FLM	10U	FLM	6.6	.	0.044	1.381	0.000	8.628	6.293	0.064	2.136	0.088	3.281	5.705	.	.
1147	02-09-1995	Wi	BL	S	10U	13-14	10U	STR	5.6	.	0.041	1.310	0.000	8.617	6.165	0.057	2.139	0.087	3.298	5.796	.	.
1148	02-09-1995	Wi	BL	W	10U	14	2	W	5.6	.	0.049	1.093	0.000	9.227	15.616	0.219	3.572	0.521	3.531	5.883	.	.
1149	02-09-1995	Wi	BL	W	10U	14	7	2	5.8	.	0.023	0.735	0.000	5.692	1.897	0.029	0.734	0.018	2.217	4.101	.	.
1150	02-09-1995	Wi	BL	W	10U	14	7	W	6.3	.	0.020	1.029	0.000	9.747	3.780	0.022	1.297	0.053	3.696	5.319	.	.
1151	02-09-1995	Wi	UL	W	10U	14	11	7	6.6	.	0.028	1.095	0.000	10.232	3.400	0.010	1.195	0.033	3.438	4.917	.	.
1152	02-09-1995	STD	STD	STD	STD	STD	STD	STD	.	.	0.000	0.987	0.221	1.879	5.014	0.105	2.090	0.100	5.024	0.370	.	.
1153	02-16-1995	Wi	WL	S	13A	FLM	13A	FLM	6.7	6.528	0.030	0.961	0.017	11.137	6.108	0.401	1.598	0.005	3.821	5.008	.	.
1154	02-16-1995	Wi	BL	S	13A	ORG	13A	ORG	6.6	6.269	0.033	0.985	0.018	10.799	5.177	0.299	1.522	0.005	3.717	4.270	.	.
1155	02-16-1995	Wi	BL	S	13	FLM	13	FLM	6.4	5.300	0.026	0.948	0.020	8.523	2.754	0.209	1.093	0.005	2.950	3.270	.	.
1156	02-16-1995	Wi	BL	S	13	7-8	13	STR	6.2	4.958	0.020	0.888	0.017	8.059	2.706	0.172	1.110	0.005	2.885	3.165	.	.
1157	02-16-1995	Wi	WL	S	10L	FLM	10L	FLM	6.2	5.660	0.030	1.002	0.000	9.265	2.619	0.177	1.254	0.005	3.210	3.334	.	.
1158	02-16-1995	Wi	WL	S	10L	HOL	10L	IN	6.2	5.264	0.027	0.920	0.000	9.148	2.389	0.180	1.230	0.005	3.129	3.239	.	.
1159	02-16-1995	Wi	WL	S	10L	HOL	10L	OUT	6.2	5.273	0.037	0.918	0.000	9.023	2.472	0.194	1.265	0.005	3.218	3.308	.	.
1160	02-16-1995	Wi	WL	S	10L	TSP	10L	IN	5.5	6.108	0.036	0.856	0.000	6.859	1.567	0.149	0.683	0.028	2.413	3.523	.	.
1161	02-16-1995	Wi	WL	S	10L	TSP	10L	OUT	6.2	5.529	0.032	0.951	0.000	9.355	2.390	0.174	1.237	0.008	3.188	3.300	.	.
1162	02-16-1995	Wi	BL	S	10U	FLM	10U	FLM	6.1	5.539	0.038	1.107	0.000	9.204	2.381	0.174	1.264	0.005	3.270	3.358	.	.
1163	02-16-1995	Wi	BL	S	10U	13-14	10U	STR	6.1	4.586	0.026	0.913	0.000	9.277	2.194	0.174	1.247	0.005	3.191	3.268	.	.
1164	02-16-1995	STD	STD	STD	STD	STD	STD	STD	.	109.100	0.000	1.008	0.213	19.621	0.020	0.010	0.030	0.005	0.100	0.040	.	.
1165	03-02-1995	Wi	WL	S	13A	FLM	13A	FLM	.	11.250	0.059	1.267	0.000	14.239	14.668	0.151	3.109	0.005	4.870	6.010	.	.
1166	03-02-1995	Wi	BL	S	13A	ORG	13A	ORG	.	11.440	0.051	1.214	0.023	14.660	14.003	0.127	3.637	0.005	5.007	5.692	.	.

SN	Date	Season	Position Pos	Position Asp	Location WS	Location Tran	Location Dist	Location Type	pH	DOC	IC Anions F	CL	NO3	SO4	ICP Cations Ca	Fe	Mg	Mn	S	Si	Nitrogen Total N	Nitrogen N-NH4
										mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
1167	03-02-1995	Wi	BL	S	13	FLM	13	FLM	.	5.696	0.030	1.525	0.026	9.070	6.126	0.171	1.520	0.005	3.198	4.870	.	.
1168	03-02-1995	Wi	BL	S	13	7-8	13	STR	.	4.509	0.025	1.158	0.015	7.858	3.866	0.159	1.309	0.005	2.766	4.493	.	.
1169	03-02-1995	Wi	WL	S	10L	FLM	10L	FLM	.	5.849	0.035	1.206	0.000	8.527	5.717	0.197	1.829	0.005	3.003	5.434	.	.
1170	03-02-1995	Wi	WL	S	10L	HOL	10L	IN	.	5.925	0.028	1.241	0.200	8.685	5.127	0.244	1.829	0.005	3.046	5.706	.	.
1171	03-02-1995	Wi	WL	S	10L	HOL	10L	OUT	.	5.761	0.030	1.247	0.019	8.660	5.191	0.165	1.848	0.006	3.080	5.557	.	.
1172	03-02-1995	Wi	WL	S	10L	TSP	10L	IN	.	10.470	0.071	0.998	0.300	6.048	12.094	0.697	1.872	0.015	2.207	5.979	.	.
1173	03-02-1995	Wi	WL	S	10L	TSP	10L	OUT	.	5.855	0.031	1.246	0.021	8.534	5.615	0.190	1.879	0.005	3.052	5.746	.	.
1174	03-02-1995	Wi	BL	S	10U	FLM	10U	FLM	.	4.980	0.031	1.287	0.000	8.583	4.846	0.185	1.845	0.005	3.121	5.630	.	.
1175	03-02-1995	Wi	BL	S	10U	13-14	10U	STR	.	5.010	0.030	1.265	0.023	8.467	4.654	0.177	1.822	0.005	3.092	5.477	.	.
1176	03-02-1995	STD	STD	STD	STD	STD	STD	STD	.	108.800	0.000	0.986	0.210	19.472	0.028	0.010	0.030	0.005	0.100	0.040	.	.
1177	03-16-1995	Wi	WL	S	13A	FLM	13A	FLM	.	12.210	0.051	1.168	0.000	14.807	17.332	0.087	3.447	0.005	5.280	5.896	.	.
1178	03-16-1995	Wi	BL	S	13A	ORG	13A	ORG	.	11.680	0.055	1.905	0.026	15.544	14.805	0.092	3.981	0.005	5.397	5.994	.	.
1179	03-16-1995	Wi	BL	S	13	FLM	13	FLM	.	6.483	0.040	1.216	0.000	7.946	6.642	0.199	1.554	0.016	2.865	5.122	.	.
1180	03-16-1995	Wi	BL	S	13	7-8	13	STR	.	4.696	0.028	1.223	0.000	7.577	4.212	0.197	1.327	0.022	2.726	4.831	.	.
1181	03-16-1995	Wi	WL	S	10L	FLM	10L	FLM	.	7.349	0.040	1.217	0.000	8.379	7.641	0.240	2.112	0.087	2.991	5.736	.	.
1182	03-16-1995	Wi	WL	S	10L	HOL	10L	IN	.	6.407	0.038	1.241	0.000	8.461	6.422	0.194	2.027	0.057	3.032	5.623	.	.
1183	03-16-1995	Wi	WL	S	10L	HOL	10L	OUT	.	6.837	0.034	1.259	0.000	8.468	6.648	0.208	2.017	0.040	3.087	5.768	.	.
1184	03-16-1995	Wi	WL	S	10L	TSP	10L	IN	.	16.730	0.104	1.009	0.017	3.378	18.223	0.376	2.521	0.276	1.238	5.962	.	.
1185	03-16-1995	Wi	WL	S	10L	TSP	10L	OUT	.	6.963	0.034	1.271	0.000	8.335	7.257	0.191	2.135	0.093	2.967	5.456	.	.
1186	03-16-1995	Wi	BL	S	10U	FLM	10U	FLM	.	6.191	0.031	1.210	0.000	8.539	6.341	0.156	2.068	0.053	3.113	5.442	.	.
1187	03-16-1995	Wi	BL	S	10U	13-14	10U	STR	.	6.004	0.036	1.280	0.000	8.483	5.969	0.178	2.037	0.045	3.065	5.559	.	.
1188	03-16-1995	STD	STD	STD	STD	STD	STD	STD	.	109.500	0.000	0.978	0.214	19.670	0.020	0.010	0.030	0.005	0.100	0.040	.	.
1189	03-21-1995	Sp	WL	S	13A	FLM	13A	FLM	5.4	10.110	0.042	1.105	0.000	12.695	11.814	0.349	2.676	0.005	4.556	6.158	.	.
1190	03-21-1995	Sp	UL	E	13A	1	21	2	5.9	10.480	0.022	0.805	0.000	6.712	1.543	0.024	1.072	0.007	2.397	3.692	.	.
1191	03-21-1995	Sp	UL	E	13A	1	21	7	5.7	13.100	0.009	1.111	0.000	16.222	2.473	0.010	2.906	0.028	5.671	4.200	.	.
1192	03-21-1995	Sp	WL	E	13A	1	16	W	5.3	24.650	0.093	1.197	0.051	9.337	38.118	0.013	2.795	0.005	3.325	8.253	.	.
1193	03-21-1995	Sp	WL	E	13A	1	9	2	5.3	21.670	0.070	1.207	0.000	12.295	31.055	0.010	3.955	0.005	4.254	7.228	.	.
1194	03-21-1995	Sp	WL	E	13A	1	7	W	7.3	19.830	0.085	1.214	0.018	12.514	29.122	0.028	3.452	0.153	4.347	6.504	.	.
1195	03-21-1995	Sp	WL	E	13A	1	5	W	6.8	18.730	0.069	1.240	0.033	12.295	25.315	0.373	3.311	0.069	4.321	7.621	.	.
1196	03-21-1995	Sp	WL	E	13A	1	2	W	6.9	15.440	0.063	1.097	0.078	12.334	20.026	0.290	3.133	0.069	4.415	6.528	.	.
1197	03-21-1995	Sp	WL	S	13A	1-2	13A	STR	6.2	9.091	0.050	1.138	0.000	12.843	11.450	0.328	2.653	0.005	4.500	6.115	.	.
1198	03-21-1995	Sp	UL	W	13A	4	7	2	6.8	4.712	0.028	1.136	0.000	11.658	5.462	0.010	1.420	0.024	4.140	5.270	.	.
1199	03-21-1995	Sp	UL	W	13A	4	7	W	6.8	8.718	0.050	1.219	0.024	11.848	10.640	0.260	2.063	0.162	4.111	6.803	.	.
1200	03-21-1995	STD	STD	STD	STD	STD	STD	STD	.	0.633	0.000	0.991	0.220	19.705	0.020	0.010	0.030	0.005	0.100	0.040	.	.
1201	03-21-1995	Sp	WL	W	13A	4	2	2	6.8	7.494	0.078	1.224	0.045	10.301	8.435	0.010	1.632	1.051	3.654	5.234	.	.
1202	03-21-1995	Sp	WL	W	13A	4	2	W	6.2	6.868	0.037	1.167	0.000	12.802	7.488	0.417	1.627	0.226	4.576	6.387	.	.
1203	03-21-1995	Sp	WL	S	13A	3-4	13A	STR	6.2	11.510	0.059	1.159	0.000	11.594	11.991	0.658	2.360	0.424	4.159	5.893	.	.
1204	03-21-1995	Sp	WL	S	13A	3-4	13A	STR	6	8.620	0.039	1.148	0.000	13.105	10.326	0.347	2.710	0.045	4.698	6.021	.	.
1205	03-21-1995	Sp	BL	S	13A	ORG	13A	ORG	6.4	8.942	0.047	1.206	0.000	12.237	10.549	0.361	2.758	0.024	4.346	6.009	.	.
1206	03-21-1995	STD	STD	STD	STD	STD	STD	STD	.	105.700	0.000	0.928	0.209	19.419	0.025	0.010	0.030	0.005	0.100	0.040	.	.
1207	03-21-1995	Sp	BL	S	13	FLM	13	FLM	6.4	6.455	0.035	1.134	0.000	8.930	7.380	0.364	1.693	0.044	3.323	5.559	.	.
1208	03-21-1995	Sp	BL	E	13	5	2	2	6.1	4.803	0.022	1.065	0.000	9.195	5.592	0.010	1.093	0.017	3.434	5.173	.	.
1209	03-21-1995	Sp	BL	E	13	5	2	W	5.8	6.610	0.037	1.197	0.051	11.133	6.821	0.692	1.907	0.067	4.168	7.482	.	.
1210	03-21-1995	Sp	BL	S	13	5-6	13	STR	5.9	5.355	0.026	1.085	0.000	8.963	5.437	0.350	1.608	0.024	3.337	5.161	.	.
1211	03-21-1995	Sp	UL	W	13	8	11	2	5.8	7.389	0.023	0.547	0.011	7.580	2.959	0.031	0.738	0.031	2.711	4.306	.	.
1212	03-21-1995	Sp	UL	W	13	8	11	7	6.1	5.094	0.027	1.027	0.022	11.128	6.484	0.010	1.285	0.005	3.797	5.714	.	.
1213	03-21-1995	Sp	UL	W	13	8	11	W	5.9	5.450	0.030	0.963	0.000	10.259	6.476	0.194	1.311	0.005	3.525	6.272	.	.
1214	03-21-1995	Sp	BL	W	13	8	7	2	5.9	3.810	0.018	0.945	0.000	10.591	3.504	0.010	0.964	0.005	3.640	7.393	.	.
1215	03-21-1995	Sp	BL	W	13	8	7	W	5.2	6.556	0.029	1.037	0.025	10.630	8.488	0.201	1.690	0.005	3.645	6.165	.	.
1216	03-21-1995	Sp	BL	W	13	8	2	2	5.8	3.307	0.017	0.606	0.019	4.203	1.865	0.010	0.453	0.005	1.478	5.108	.	.
1217	03-21-1995	Sp	BL	W	13	8	2	2	5.7	2.972	0.014	0.597	0.022	5.062	1.803	0.010	0.506	0.005	1.784	5.166	.	.
1218	03-21-1995	Sp	BL	W	13	8	2	W	5.7	9.536	0.053	1.219	0.000	10.368	11.008	0.087	2.551	0.849	3.462	5.806	.	.
1219	03-21-1995	Sp	BL	S	13	7-8	13	STR	5.8	4.323	0.029	1.133	0.000	8.345	3.770	0.369	1.357	0.019	2.843	5.990	.	.

SN	Date	Season	Position		Location				pH	DOC	IC Anions				ICP Cations						Nitrogen	
			Pos	Asp	WS	Tran	Dist	Type			F	CL	NO3	SO4	Ca	Fe	Mg	Mn	S	Si	Total N	N-NH4
										mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
1220	03-21-1995	Sp	WL	S	10L	FLM	10L	FLM	5.8	6.056	0.031	1.080	0.000	8.283	5.277	0.381	1.702	0.078	2.861	6.754	.	.
1221	03-21-1995	Sp	WL	E	10L	9	3	2	5.7	9.613	0.033	0.778	0.000	8.041	4.838	0.027	1.275	0.009	2.807	3.371	.	.
1222	03-21-1995	Sp	WL	E	10L	9	3	W	6.2	5.507	0.034	1.211	0.000	9.678	5.846	0.457	1.626	0.082	3.296	6.415	.	.
1223	03-21-1995	Sp	WL	E	10L	9	3	2	5.6	57.570	0.165	1.405	0.064	1.580	57.492	0.010	11.220	6.378	0.656	6.096	.	.
1224	03-21-1995	Sp	WL	E	10L	9	3	W	5.6	31.570	0.084	1.283	0.035	13.680	43.003	0.051	5.031	0.444	4.383	9.682	.	.
1225	03-21-1995	Sp	UL	W	10L	12	29	2	5.6	3.422	0.040	0.752	0.000	9.447	2.407	0.010	0.916	0.061	3.138	3.214	.	.
1226	03-21-1995	Sp	UL	W	10L	12	29	7	5.8	2.489	0.031	0.961	0.000	8.180	2.235	0.010	0.760	0.005	2.807	4.483	.	.
1227	03-21-1995	Sp	UL	W	10L	12	29	W	5.6	2.531	0.027	0.668	0.000	7.794	2.135	0.134	0.757	0.005	2.636	4.271	.	.
1228	03-21-1995	STD	STD	STD	STD	STD	STD	STD	.	107.500	0.000	0.904	0.207	19.432	0.020	0.010	0.030	0.005	0.100	0.156	.	.
1229	03-21-1995	Sp	UL	W	10L	12	16	2	5.7	3.717	0.034	0.903	0.000	6.694	2.275	0.010	0.778	0.111	2.244	5.719	.	.
1230	03-21-1995	Sp	UL	W	10L	12	16	W	5.9	3.823	0.028	0.874	0.014	6.689	2.065	0.533	0.769	0.034	2.271	7.270	.	.
1231	03-21-1995	Sp	WL	W	10L	12	7	2	5.8	31.830	0.148	1.083	0.000	0.842	30.533	0.037	4.403	2.830	0.363	6.037	.	.
1232	03-21-1995	Sp	WL	W	10L	12	7	W	6	10.300	0.700	0.963	0.368	5.915	9.373	0.224	1.674	0.020	2.081	6.169	.	.
1233	03-21-1995	Sp	WL	W	10L	12	2	W	5.9	12.660	0.060	1.151	0.198	14.152	15.173	0.279	3.217	0.267	4.716	6.527	.	.
1234	03-21-1995	Sp	WL	S	10L	HOL	10L	IN	5.8	5.309	0.026	1.103	0.000	8.328	4.467	0.406	1.642	0.069	2.859	6.914	.	.
1235	03-21-1995	Sp	WL	S	10L	HOL	10L	OUT	5.9	5.508	0.034	1.139	0.000	8.365	4.510	0.429	1.656	0.058	2.858	6.759	.	.
1236	03-21-1995	Sp	WL	S	10L	TSP	10L	IN	5.8	11.360	0.073	0.902	0.023	5.812	10.956	0.953	1.680	0.319	2.096	6.408	.	.
1237	03-21-1995	Sp	WL	S	10L	TSP	10L	OUT	5.9	5.443	0.029	1.120	0.000	8.304	4.641	0.376	1.673	0.054	2.884	6.939	.	.
1238	03-21-1995	Sp	BL	S	10U	FLM	10U	FLM	5.7	5.531	0.030	1.213	0.000	8.503	4.426	0.406	1.665	0.056	2.931	6.970	.	.
1239	03-21-1995	Sp	UL	E	10U	13	11	7	5.7	2.213	0.022	0.999	0.000	11.244	1.958	0.010	1.396	0.017	3.720	5.658	.	.
1240	03-21-1995	Sp	UL	E	10U	13	11	W	5.6	6.297	0.053	1.200	0.000	11.706	6.472	0.259	2.044	0.005	3.798	9.536	.	.
1241	03-21-1995	Sp	BL	E	10U	13	7	2	6.1	3.940	0.026	0.879	0.000	9.754	3.595	0.021	1.013	0.025	3.261	6.446	.	0.780
1242	03-21-1995	Sp	BL	E	10U	13	7	W	5.9	7.260	0.042	1.024	0.026	10.694	7.391	0.064	1.646	0.024	3.578	7.427	.	1.170
1243	03-21-1995	Sp	BL	E	10U	13	2	2	6.1	3.862	0.026	1.048	0.000	7.456	2.527	0.010	0.998	0.026	2.566	5.995	.	0.850
1244	03-21-1995	Sp	BL	E	10U	13	2	2	6.2	3.718	0.024	1.009	0.000	7.338	2.510	0.010	0.992	0.027	2.557	5.962	.	.
1245	03-21-1995	Sp	BL	E	10U	13	2	W	5.8	10.760	0.058	1.257	0.021	11.825	15.153	0.321	2.225	0.134	3.959	9.095	.	.
1246	03-21-1995	Sp	BL	S	10U	13-14	10U	STR	6.1	5.132	0.027	1.139	0.000	8.448	4.410	0.069	1.627	0.071	2.885	5.980	.	0.880
1247	03-21-1995	STD	STD	STD	STD	STD	STD	STD	.	108.800	0.000	0.973	0.212	19.786	5.015	0.106	2.002	0.087	4.929	0.629	.	.
1248	03-30-1995	Sp	WL	S	13A	FLM	13A	FLM	.	14.220	0.052	1.153	0.000	14.876	19.015	0.034	3.788	0.005	4.952	6.011	0.120	0.280
1249	03-30-1995	Sp	BL	S	13A	ORG	13A	ORG	.	12.620	0.052	1.617	0.025	16.219	16.030	0.017	4.326	0.005	5.304	6.233	0.190	0.440
1250	03-30-1995	Sp	BL	S	13	FLM	13	FLM	.	6.953	0.029	1.115	0.000	8.102	8.898	0.083	1.832	0.005	2.775	5.435	0.110	0.320
1251	03-30-1995	Sp	BL	S	13	7-8	13	STR	.	4.868	0.026	1.203	0.000	7.666	5.493	0.060	1.455	0.044	2.626	4.796	0.090	0.680
1252	03-30-1995	Sp	WL	S	10L	FLM	10L	FLM	.	7.813	0.038	1.210	0.000	8.050	9.466	0.181	2.442	0.084	2.810	5.740	0.090	0.490
1253	03-30-1995	Sp	WL	S	10L	HOL	10L	IN	.	7.109	0.033	1.169	0.000	8.282	8.006	0.094	2.363	0.013	2.884	5.897	0.080	0.550
1254	03-30-1995	Sp	WL	S	10L	HOL	10L	OUT	.	7.135	0.032	1.210	0.000	8.295	8.254	0.093	2.391	0.006	2.984	5.819	0.080	0.510
1255	03-30-1995	Sp	WL	S	10L	TSP	10L	IN	.	17.740	0.096	0.785	0.077	2.169	20.786	0.794	2.772	0.005	0.844	6.503	0.160	0.290
1256	03-30-1995	Sp	WL	S	10L	TSP	10L	OUT	.	8.813	0.045	1.138	0.000	7.243	10.972	0.557	2.477	0.095	2.586	5.932	0.110	0.240
1257	03-30-1995	Sp	BL	S	10U	FLM	10U	FLM	.	6.759	0.034	1.206	0.000	8.278	7.865	0.092	2.335	0.052	3.000	5.778	0.080	0.500
1258	03-30-1995	Sp	BL	S	10U	13-14	10U	STR	.	6.581	0.033	1.170	0.000	8.199	7.587	0.072	2.294	0.047	2.999	5.997	0.060	0.300
1259	03-30-1995	STD	STD	STD	STD	STD	STD	STD	.	103.500	0.000	0.958	0.217	19.865	5.192	0.104	2.051	0.105	5.241	0.204	1.260	.
1260	04-13-1995	Sp	WL	S	13A	FLM	13A	FLM	.	16.630	0.065	1.271	0.000	14.986	23.065	0.040	4.197	0.005	5.286	6.349	0.110	0.620
1261	04-13-1995	Sp	BL	S	13A	ORG	13A	ORG	.	14.550	0.057	1.698	0.034	17.387	18.428	0.029	4.897	0.005	5.728	6.377	0.210	.
1262	04-13-1995	Sp	BL	S	13	FLM	13	FLM	.	10.030	0.048	1.230	0.000	8.301	12.069	0.154	2.168	0.005	2.843	5.796	0.100	0.550
1263	04-13-1995	Sp	BL	S	13	7-8	13	STR	.	7.214	0.034	1.233	0.000	7.716	7.524	0.126	1.753	0.005	2.642	5.330	0.100	0.490
1264	04-13-1995	Sp	WL	S	10L	FLM	10L	FLM	.	10.290	0.047	1.193	0.000	7.778	11.991	0.313	2.805	0.005	2.659	6.420	0.110	0.340
1265	04-13-1995	Sp	WL	S	10L	HOL	10L	IN	.	9.174	0.045	1.231	0.000	8.299	9.988	0.210	2.718	0.005	2.812	6.221	0.160	0.380
1266	04-13-1995	Sp	WL	S	10L	HOL	10L	OUT	.	9.188	0.044	1.175	0.000	8.301	10.079	0.202	2.713	0.005	2.853	6.411	0.320	0.340
1267	04-13-1995	Sp	WL	S	10L	TSP	10L	IN	.	21.430	0.110	0.790	0.000	1.022	22.302	1.282	2.893	0.005	0.410	6.871	0.530	0.480
1268	04-13-1995	Sp	WL	S	10L	TSP	10L	OUT	.	9.762	0.051	1.198	0.000	8.001	11.008	0.306	2.729	0.005	2.711	6.411	0.320	0.390
1269	04-13-1995	Sp	BL	S	10U	FLM	10U	FLM	.	0.633	0.400	1.186	0.000	8.365	9.656	0.180	2.766	0.005	2.875	6.788	0.270	0.600
1270	04-13-1995	Sp	BL	S	10U	13-14	10U	STR	.	9.049	0.047	1.308	0.000	8.536	10.065	0.160	2.779	0.005	2.927	7.168	0.190	0.610
1271	04-13-1995	STD	STD	STD	STD	STD	STD	STD	.	104.800	0.000	0.935	0.216	20.051	4.941	0.101	1.962	0.105	4.796	0.796	1.410	.
1272	04-27-1995	Sp	WL	S	13A	FLM	13A	FLM	.	15.570	0.054	1.087	0.000	14.113	20.643	0.051	4.035	0.005	4.598	6.119	0.350	1.470

SN	Date	Season	Position Pos	Position Asp	Location WS	Location Tran	Location Dist	Location Type	pH	DOC mg/L	IC Anions F mg/L	CL mg/L	NO3 mg/L	SO4 mg/L	ICP Cations Ca mg/L	Fe mg/L	Mg mg/L	Mn mg/L	S mg/L	Si mg/L	Nitrogen Total N mg/L	N-NH4 mg/L
1273	04-27-1995	Sp	BL	S	13A	ORG	13A	ORG	.	15.100	0.050	1.428	0.023	16.222	18.744	0.039	4.805	0.005	5.364	6.200	0.330	0.640
1274	04-27-1995	Sp	BL	S	13	FLM	13	FLM	.	7.313	0.031	1.152	0.000	7.881	8.840	0.106	1.775	0.025	2.686	5.144	0.220	0.700
1275	04-27-1995	Sp	BL	S	13	7-8	13	STR	.	5.232	0.020	1.117	0.000	7.504	5.675	0.089	1.514	0.034	2.572	4.863	0.170	0.700
1276	04-27-1995	Sp	WL	S	10L	FLM	10L	FLM	.	8.461	0.039	1.299	0.000	7.600	9.634	0.208	2.457	0.146	2.646	6.135	0.350	0.480
1277	04-27-1995	Sp	WL	S	10L	HOL	10L	IN	.	7.681	0.032	1.270	0.000	7.828	8.183	0.121	2.354	0.110	2.709	5.975	0.330	0.230
1278	04-27-1995	Sp	WL	S	10L	HOL	10L	OUT	.	7.617	0.029	1.168	0.000	7.849	8.341	0.114	2.392	0.077	2.698	5.776	0.640	0.400
1279	04-27-1995	Sp	WL	S	10L	TSP	10L	IN	.	20.690	0.091	0.667	0.000	0.890	22.194	3.401	2.768	1.214	0.378	6.965	0.400	0.620
1280	04-27-1995	Sp	WL	S	10L	TSP	10L	OUT	.	7.907	0.038	1.229	0.000	7.621	9.285	0.218	2.464	0.152	2.686	6.219	0.300	0.580
1281	04-27-1995	Sp	BL	S	10U	FLM	10U	FLM	.	7.247	0.030	1.155	0.000	7.895	7.653	0.116	2.390	0.085	2.726	5.882	0.190	0.610
1282	04-27-1995	Sp	BL	S	10U	13-14	10U	STR	.	7.120	0.027	1.160	0.011	7.850	7.363	0.097	2.309	0.096	2.744	5.898	0.180	0.660
1283	04-27-1995	STD	STD	STD	STD	STD	STD	STD	.	105.100	0.000	0.909	0.209	19.349	4.887	0.102	1.946	0.080	4.860	0.723	1.580	.
1284	05-01-1995 02 pm	Sp	WL	S	13A	FLM	13A	ISCO	.	18.530	0.122	1.137	0.059	14.649	22.494	0.051	4.343	0.005	4.908	6.580	0.460	0.520
1285	05-01-1995 04 pm	Sp	WL	S	13A	FLM	13A	ISCO	.	18.800	0.109	1.096	0.046	14.564	21.497	0.125	4.221	0.005	4.793	6.648	0.310	0.540
1286	05-01-1995 06 pm	Sp	WL	S	13A	FLM	13A	ISCO	.	19.850	0.177	1.084	0.210	12.763	18.344	0.143	3.616	0.005	4.383	5.855	0.360	0.320
1287	05-01-1995 08 pm	Sp	WL	S	13A	FLM	13A	ISCO	.	12.770	0.114	0.708	0.021	7.698	8.922	0.151	1.860	0.005	2.777	3.595	0.570	0.350
1288	05-01-1995 10 pm	Sp	WL	S	13A	FLM	13A	ISCO	.	12.280	0.092	0.898	0.014	10.735	11.255	0.111	2.454	0.005	3.695	5.340	0.380	0.360
1289	05-02-1995 12 am	Sp	WL	S	13A	FLM	13A	ISCO	.	11.400	0.086	0.982	0.015	11.591	11.231	0.084	2.483	0.005	3.947	5.528	0.260	0.600
1290	05-02-1995 02 am	Sp	WL	S	13A	FLM	13A	ISCO	.	10.080	0.087	1.247	0.400	12.696	11.439	0.068	2.555	0.005	4.353	5.674	0.510	0.330
1291	05-02-1995 04 am	Sp	WL	S	13A	FLM	13A	ISCO	.	10.630	0.080	1.018	0.042	11.879	11.764	0.060	2.616	0.022	4.095	5.015	0.540	0.630
1292	05-02-1995 06 am	Sp	WL	S	13A	FLM	13A	ISCO	.	10.600	0.058	1.021	0.015	12.044	12.131	0.063	2.636	0.005	4.142	5.059	0.610	0.540
1293		STD	STD	STD	STD	STD	STD	STD	.	106.000	0.000	0.931	0.211	19.550	4.915	0.102	1.969	0.078	4.913	0.173	2.020	.
1294	05-02-1995 08 am	Sp	WL	S	13A	FLM	13A	ISCO	.	9.840	0.027	1.012	0.032	12.199	12.428	0.052	2.721	0.028	4.222	5.108	0.950	0.470
1295	05-02-1995 10 am	Sp	WL	S	13A	FLM	13A	ISCO	.	10.450	0.052	1.076	0.046	12.290	12.773	0.058	2.776	0.029	4.153	5.200	0.550	0.560
1296	05-02-1995 12 pm	Sp	WL	S	13A	FLM	13A	ISCO	.	10.730	0.036	1.047	0.041	12.350	13.319	0.057	2.869	0.031	4.235	5.277	0.860	0.500
1297	05-02-1995 02 pm	Sp	WL	S	13A	FLM	13A	ISCO	.	10.400	0.039	1.028	0.032	12.390	13.446	0.056	2.885	0.029	4.319	5.248	0.610	0.550
1298	05-02-1995 04 pm	Sp	WL	S	13A	FLM	13A	ISCO	.	10.770	0.035	1.084	0.017	12.460	13.580	0.065	2.940	0.027	4.217	5.266	0.620	0.470
1299	05-02-1995 06 pm	Sp	WL	S	13A	FLM	13A	ISCO	.	11.070	0.028	1.033	0.039	12.472	13.990	0.052	3.038	0.035	4.329	5.346	0.330	0.610
1300	05-02-1995 08 pm	Sp	WL	S	13A	FLM	13A	ISCO	.	11.580	0.045	1.109	0.037	12.654	14.339	0.052	3.072	0.022	4.266	5.369	0.250	0.510
1301	05-02-1995 10 pm	Sp	WL	S	13A	FLM	13A	ISCO	.	11.650	0.051	1.063	0.039	12.683	14.780	0.044	3.176	0.072	4.338	5.309	0.250	0.610
1302	05-03-1995 12 am	Sp	WL	S	13A	FLM	13A	ISCO	.	11.480	0.025	1.049	0.043	12.804	14.952	0.054	3.176	0.063	4.334	5.364	0.250	0.550
1303	05-03-1995 02 am	Sp	WL	S	13A	FLM	13A	ISCO	.	11.570	0.024	1.121	0.000	12.807	15.065	0.049	3.212	0.058	4.378	5.339	0.440	0.590
1304	05-03-1995 04 am	Sp	WL	S	13A	FLM	13A	ISCO	.	12.320	0.029	1.070	0.014	12.931	15.608	0.048	3.292	0.056	4.402	5.392	0.270	0.350
1305		STD	STD	STD	STD	STD	STD	STD	.	104.100	0.000	0.952	0.216	19.683	4.911	0.104	1.984	0.081	4.906	0.161	1.690	.
1306	05-03-1995 06 am	Sp	WL	S	13A	FLM	13A	ISCO	.	12.160	0.030	1.149	0.000	12.869	15.993	0.051	3.341	0.069	4.462	5.419	0.220	0.420
1307	05-03-1995 08 am	Sp	WL	S	13A	FLM	13A	ISCO	.	12.110	0.028	1.117	0.000	13.041	15.970	0.052	3.333	0.052	4.409	5.397	0.250	0.430
1308	05-03-1995 10 am	Sp	WL	S	13A	FLM	13A	ISCO	.	13.200	0.033	1.150	0.016	13.295	16.298	0.045	3.400	0.084	4.483	5.324	0.370	0.450
1309	05-03-1995 12 pm	Sp	WL	S	13A	FLM	13A	ISCO	.	12.630	0.035	1.276	0.093	13.225	16.556	0.052	3.420	0.033	4.470	5.536	0.370	0.560
1310	05-01-1995 02 pm	Sp	BL	S	13	FLM	13	ISCO	.	12.780	0.305	1.257	0.079	8.206	12.144	0.124	2.257	0.020	2.884	5.506	0.290	0.700
1311	05-01-1995 04 pm	Sp	BL	S	13	FLM	13	ISCO	.	9.885	0.034	1.219	0.080	8.206	11.910	0.143	2.218	0.037	2.900	5.488	0.220	0.660
1312	05-01-1995 06 pm	Sp	BL	S	13	FLM	13	ISCO	.	9.926	0.049	1.217	0.101	8.017	10.782	0.199	2.035	0.005	2.811	5.035	0.420	0.530
1313	05-01-1995 08 pm	Sp	BL	S	13	FLM	13	ISCO	.	9.515	0.067	0.892	0.053	6.817	5.679	0.213	1.246	0.005	2.448	3.356	0.490	0.480
1314	05-01-1995 10 pm	Sp	BL	S	13	FLM	13	ISCO	.	8.600	0.042	0.963	0.045	8.431	6.089	0.115	1.477	0.020	2.977	4.224	0.380	0.530
1315	05-02-1995 12 am	Sp	BL	S	13	FLM	13	ISCO	.	7.107	0.040	1.013	0.045	9.008	6.247	0.083	1.577	0.011	3.152	4.573	0.400	0.620
1316	05-02-1995 02 am	Sp	BL	S	13	FLM	13	ISCO	.	6.812	0.026	1.113	0.060	9.046	6.460	0.075	1.618	0.005	3.243	4.728	0.430	0.620
1317	05-02-1995 04 am	Sp	BL	S	13	FLM	13	ISCO	.	6.128	0.017	1.099	0.039	8.800	6.127	0.069	1.561	0.005	3.101	4.715	0.420	0.760
1318		STD	STD	STD	STD	STD	STD	STD	.	104.500	0.000	0.966	0.220	20.130	4.934	0.101	1.982	0.078	4.940	0.173	1.280	.
1319	05-02-1995 06 am	Sp	BL	S	13	FLM	13	ISCO	.	5.976	0.014	1.135	0.480	8.516	5.729	0.061	1.463	0.007	2.993	4.565	0.260	0.690
1320	05-02-1995 08 am	Sp	BL	S	13	FLM	13	ISCO	.	5.948	0.032	1.077	0.052	8.653	5.614	0.066	1.477	0.012	2.995	4.449	0.790	0.470
1321	05-02-1995 10 am	Sp	BL	S	13	FLM	13	ISCO	.	5.734	0.028	1.097	0.053	8.328	5.734	0.056	1.463	0.032	2.960	4.590	0.880	0.660
1322	05-02-1995 12 pm	Sp	BL	S	13	FLM	13	ISCO	.	5.586	0.019	1.124	0.050	8.407	5.623	0.055	1.444	0.010	2.911	4.603	0.200	0.470
1323	05-02-1995 02 pm	Sp	BL	S	13	FLM	13	ISCO	.	5.693	0.018	1.150	0.036	8.318	5.813	0.056	1.451	0.012	2.919	4.633	0.380	0.650
1324	05-02-1995 04 pm	Sp	BL	S	13	FLM	13	ISCO	.	5.577	0.014	1.103	0.041	8.322	5.626	0.056	1.439	0.017	2.868	4.581	0.270	0.330
1325	05-02-1995 06 pm	Sp	BL	S	13	FLM	13	ISCO	.	5.593	0.018	1.114	0.043	8.236	5.896	0.056	1.453	0.026	2.887	4.716	0.490	0.340

SN	Date	Season	Position Pos	Asp	Location WS	Tran	Dist	Type	pH	DOC	IC Anions F	CL	NO3	SO4	ICP Cations Ca	Fe	Mg	Mn	S	Si	Nitrogen Total N	N-NH4
										mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
1326	05-02-1995 08 pm	Sp	BL	S	13	FLM	13	ISCO	.	5.299	0.029	1.115	0.049	8.100	6.005	0.062	1.504	0.031	2.928	4.658	0.300	0.470
1327		STD	STD	STD	STD	STD	STD	STD	.	104.200	0.000	0.922	0.211	19.633	4.998	0.106	1.999	0.080	5.097	0.196	1.770	.
1328	05-02-1995 10 pm	Sp	BL	S	13	FLM	13	ISCO	.	5.660	0.014	1.117	0.043	8.160	6.179	0.055	1.490	0.020	2.890	4.746	0.340	0.810
1329	05-03-1995 12 am	Sp	BL	S	13	FLM	13	ISCO	.	5.741	0.019	1.121	0.046	8.108	6.362	0.058	1.508	0.028	2.888	4.721	0.260	0.740
1330	05-03-1995 02 am	Sp	BL	S	13	FLM	13	ISCO	.	5.551	0.017	1.119	0.050	8.157	6.372	0.071	1.502	0.032	2.888	4.754	0.680	0.800
1331	05-03-1995 04 am	Sp	BL	S	13	FLM	13	ISCO	.	5.476	0.014	1.209	0.054	8.180	6.265	0.058	1.523	0.048	2.881	4.776	0.350	0.640
1332	05-03-1995 06 am	Sp	BL	S	13	FLM	13	ISCO	.	5.868	0.011	1.096	0.035	8.046	6.355	0.059	1.512	0.037	2.865	4.746	0.160	0.650
1333	05-03-1995 08 am	Sp	BL	S	13	FLM	13	ISCO	.	5.815	0.020	1.175	0.018	8.047	6.303	0.070	1.514	0.036	2.811	4.659	0.200	0.330
1334	05-03-1995 10 am	Sp	BL	S	13	FLM	13	ISCO	.	5.597	0.013	1.163	0.040	8.085	6.606	0.063	1.553	0.036	2.854	4.725	0.200	0.450
1335	05-03-1995 12 pm	Sp	BL	S	13	FLM	13	ISCO	.	5.691	0.013	1.143	0.041	8.012	6.523	0.068	1.509	0.028	2.829	4.756	0.250	0.350
1336		STD	STD	STD	STD	STD	STD	STD	.	104.500	0.000	0.928	0.216	19.675	5.141	0.109	2.033	0.082	5.065	0.129	1.460	.
1337	05-01-1995 02 pm	Sp	WL	S	10L	FLM	10L	ISCO	.	11.080	0.054	1.250	0.800	7.693	15.164	0.308	3.070	0.193	2.989	6.808	0.390	0.530
1338	05-01-1995 04 pm	Sp	WL	S	10L	FLM	10L	ISCO	.	11.220	0.041	1.179	0.089	7.576	12.522	0.319	2.930	0.184	2.729	6.280	0.390	0.620
1339	05-01-1995 06 pm	Sp	WL	S	10L	FLM	10L	ISCO	.	11.040	0.044	1.199	0.104	7.415	11.670	0.327	2.716	0.122	2.713	5.772	0.430	0.530
1340	05-01-1995 08 pm	Sp	WL	S	10L	FLM	10L	ISCO	.	9.571	0.062	0.839	0.095	6.476	4.960	0.255	1.450	0.031	2.361	3.552	0.400	0.590
1341	05-01-1995 10 pm	Sp	WL	S	10L	FLM	10L	ISCO	.	7.939	0.071	0.943	0.060	7.456	4.376	0.165	1.435	0.097	2.775	4.543	0.570	0.390
1342	05-02-1995 12 am	Sp	WL	S	10L	FLM	10L	ISCO	.	7.062	0.048	1.067	0.067	7.894	4.418	0.110	1.445	0.061	2.865	4.844	0.370	0.790
1343	05-02-1995 02 am	Sp	WL	S	10L	FLM	10L	ISCO	.	6.145	0.037	1.070	0.032	7.810	4.580	0.089	1.479	0.068	2.871	4.989	0.270	0.570
1344	05-02-1995 04 am	Sp	WL	S	10L	FLM	10L	ISCO	.	6.116	0.045	1.106	0.053	7.846	4.660	0.088	1.519	0.074	2.896	5.062	0.260	0.600
1345		STD	STD	STD	STD	STD	STD	STD	.		0.000	0.960	0.208	19.081	4.973	0.099	2.010	0.078	4.971	0.891	1.400	.
1346	05-02-1995 06 am	Sp	WL	S	10L	FLM	10L	ISCO	.	6.235	0.040	1.077	0.051	7.898	5.102	0.087	1.593	0.078	2.991	5.395	0.400	0.580
1347	05-02-1995 08 am	Sp	WL	S	10L	FLM	10L	ISCO	.	5.540	0.052	1.122	0.060	7.897	4.965	0.082	1.587	0.072	2.935	5.597	0.330	0.600
1348	05-02-1995 10 am	Sp	WL	S	10L	FLM	10L	ISCO	.	6.077	0.036	1.081	0.047	7.835	5.101	0.084	1.623	0.080	2.923	5.650	0.330	0.510
1349	05-02-1995 12 pm	Sp	WL	S	10L	FLM	10L	ISCO	.	6.083	0.040	1.110	0.040	7.858	5.222	0.090	1.653	0.090	2.896	5.816	0.360	0.490
1350	05-02-1995 02 pm	Sp	WL	S	10L	FLM	10L	ISCO	.	5.643	0.040	1.150	0.016	7.876	5.349	0.091	1.668	0.085	2.880	5.790	0.320	0.450
1351	05-02-1995 04 pm	Sp	WL	S	10L	FLM	10L	ISCO	.	6.109	0.034	1.177	0.020	7.806	5.597	0.090	1.698	0.139	2.787	5.671	0.350	0.460
1352	05-02-1995 06 pm	Sp	WL	S	10L	FLM	10L	ISCO	.	6.135	0.030	1.098	0.059	7.789	5.562	0.100	1.701	0.118	2.762	5.717	0.300	0.410
1353	05-02-1995 08 pm	Sp	WL	S	10L	FLM	10L	ISCO	.	6.008	0.030	1.159	0.033	7.755	5.777	0.102	1.737	0.112	2.799	5.819	0.240	0.420
1354		STD	STD	STD	STD	STD	STD	STD	.		0.000	0.931	0.209	19.052	5.114	0.108	1.998	0.103	5.068	0.604	1.490	.
1355	05-02-1995 10 pm	Sp	WL	S	10L	FLM	10L	ISCO	.	5.923	0.038	1.161	0.030	7.753	5.948	0.112	1.766	0.123	2.800	5.880	0.360	0.420
1356	05-03-1995 12 am	Sp	WL	S	10L	FLM	10L	ISCO	.	6.011	0.031	1.215	0.081	7.730	6.262	0.113	1.817	0.141	2.905	5.919	0.200	0.410
1357	05-03-1995 02 am	Sp	WL	S	10L	FLM	10L	ISCO	.	5.831	0.035	1.215	0.072	7.754	6.137	0.120	1.807	0.133	2.825	5.928	0.490	0.420
1358	05-03-1995 04 am	Sp	WL	S	10L	FLM	10L	ISCO	.	6.373	0.035	1.158	0.036	7.763	6.378	0.118	1.828	0.143	2.790	5.779	0.170	0.420
1359	05-03-1995 06 am	Sp	WL	S	10L	FLM	10L	ISCO	.	6.326	0.027	1.175	0.063	7.696	6.421	0.127	1.888	0.136	2.818	6.073	0.470	0.430
1360	05-03-1995 08 am	Sp	WL	S	10L	FLM	10L	ISCO	.	6.261	0.032	1.189	0.042	7.643	6.363	0.124	1.899	0.136	2.824	6.125	0.280	0.420
1361	05-03-1995 10 am	Sp	WL	S	10L	FLM	10L	ISCO	.	6.750	0.020	1.138	0.043	7.593	6.514	0.122	1.928	0.160	2.854	5.871	0.170	0.430
1362	05-03-1995 12 pm	Sp	WL	S	10L	FLM	10L	ISCO	.	5.504	0.032	1.252	0.044	7.668	6.561	0.111	1.912	0.125	2.807	5.856	0.140	0.240
1363		STD	STD	STD	STD	STD	STD	STD	.		0.071	1.233	0.026	7.990	5.044	0.101	2.062	0.101	5.141	0.865	1.760	.
1364	05-01-1995 02 pm	Sp	BL	S	10U	FLM	10U	ISCO	.	10.150	0.092	1.242	0.078	7.912	9.798	0.149	2.858	0.054	2.969	6.637	0.690	0.240
1365	05-01-1995 04 pm	Sp	BL	S	10U	FLM	10U	ISCO	.	9.630	0.057	1.242	0.092	7.947	9.521	0.165	2.826	0.054	2.973	6.462	1.310	.
1366	05-01-1995 06 pm	Sp	BL	S	10U	FLM	10U	ISCO	.	10.050	0.066	1.180	0.094	7.829	8.956	0.216	2.618	0.031	3.006	6.367	0.250	0.390
1367	05-01-1995 08 pm	Sp	BL	S	10U	FLM	10U	ISCO	.	10.330	0.194	1.074	0.069	7.058	4.009	0.199	1.396	0.026	2.734	4.240	0.840	0.420
1368	05-01-1995 10 pm	Sp	BL	S	10U	FLM	10U	ISCO	.	8.339	0.181	1.038	0.091	7.588	4.066	0.143	1.450	0.052	2.866	4.479	0.340	0.560
1369	05-02-1995 12 am	Sp	BL	S	10U	FLM	10U	ISCO	.	6.795	0.080	1.008	0.114	7.783	3.900	0.089	1.458	0.053	2.963	4.682	0.320	0.380
1370	05-02-1995 02 am	Sp	BL	S	10U	FLM	10U	ISCO	.	6.511	0.078	1.046	0.048	7.905	4.028	0.088	1.493	0.061	3.065	5.212	0.230	0.420
1371	05-02-1995 04 am	Sp	BL	S	10U	FLM	10U	ISCO	.	6.069	0.045	1.038	0.056	7.973	4.400	0.073	1.529	0.076	3.015	5.094	0.260	0.420
1372	05-02-1995 06 am	Sp	BL	S	10U	FLM	10U	ISCO	.	6.317	0.067	1.068	0.016	7.977	4.312	0.065	1.537	0.067	3.051	5.277	0.450	0.590
1373	05-02-1995 08 am	Sp	BL	S	10U	FLM	10U	ISCO	.	6.061	0.000	0.965	0.210	19.289	4.382	0.071	1.543	0.074	3.089	5.447	0.470	0.650
1374	05-02-1995 10 am	Sp	BL	S	10U	FLM	10U	ISCO	.	5.997	0.056	1.160	0.065	8.059	4.550	0.066	1.573	0.081	3.107	5.420	0.340	0.570
1375	05-02-1995 12 pm	Sp	BL	S	10U	FLM	10U	ISCO	.	6.008	0.048	1.124	0.052	8.000	4.534	0.068	1.598	0.079	3.000	5.566	0.260	0.560
1376	05-02-1995 02 pm	Sp	BL	S	10U	FLM	10U	ISCO	.	5.718	0.000	0.940	0.208	19.355	5.429	0.107	2.062	0.108	5.455	0.852	1.420	.
1377	05-02-1995 04 pm	Sp	BL	S	10U	FLM	10U	ISCO	.	6.025	0.053	1.111	0.036	8.001	4.809	0.072	1.621	0.085	3.055	5.653	0.410	0.550
1378		STD	STD	STD	STD	STD	STD	STD	.		0.047	1.120	0.064	7.941	4.971	0.080	1.662	0.112	3.083	5.704	0.670	0.510

SN	Date	Season	Position Pos	Asp	Location WS	Tran	Dist	Type	pH	DOC	IC Anions F	CL	NO3	SO4	ICP Cations Ca	Fe	Mg	Mn	S	Si	Nitrogen Total N	N-NH4
										mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
1379	05-02-1995 06 pm	Sp	BL	S	10U	FLM	10U	ISCO	.	6.343	0.036	1.239	0.077	7.990	5.076	0.071	1.702	0.102	3.036	5.537	0.870	0.510
1380	05-02-1995 08 pm	Sp	BL	S	10U	FLM	10U	ISCO	.	5.921	0.069	1.157	0.049	8.045	5.299	0.067	1.763	0.104	3.055	5.761	0.700	0.430
1381	05-02-1995 10 pm	Sp	BL	S	10U	FLM	10U	ISCO	.	6.268	0.040	1.177	0.019	7.979	4.916	0.068	1.683	0.108	2.745	5.400	0.480	0.470
1382	05-03-1995 12 am	Sp	BL	S	10U	FLM	10U	ISCO	.	6.163	0.036	1.161	0.016	7.910	4.968	0.067	1.676	0.094	2.743	5.601	0.370	0.530
1383	05-03-1995 02 am	Sp	BL	S	10U	FLM	10U	ISCO	.	6.231	0.037	1.264	0.025	7.921	5.087	0.068	1.717	0.094	2.732	5.710	0.230	0.630
1384	05-03-1995 04 am	Sp	BL	S	10U	FLM	10U	ISCO	.	6.246	0.040	1.230	0.017	7.899	5.125	0.100	1.730	0.097	2.715	5.667	0.190	0.540
1385	05-03-1995 06 am	Sp	BL	S	10U	FLM	10U	ISCO	.	6.941	0.038	1.178	0.019	7.955	5.201	0.070	1.741	0.109	2.746	5.641	0.340	0.520
1386	05-03-1995 08 am	Sp	BL	S	10U	FLM	10U	ISCO	.	5.989	0.031	1.242	0.019	7.955	5.521	0.072	1.790	0.091	2.822	5.918	0.570	0.540
1387	05-03-1995 10 am	Sp	BL	S	10U	FLM	10U	ISCO	.	5.985	0.036	1.170	0.019	7.879	5.407	0.074	1.796	0.101	2.778	5.758	0.360	0.520
1388	05-03-1995 12 pm	Sp	BL	S	10U	FLM	10U	ISCO	.	20.710	0.039	1.197	0.033	7.861	5.410	0.079	1.789	0.099	2.743	5.776	0.320	0.560
1389		STD	STD	STD	STD	STD	STD	STD	.		0.000	0.964	0.205	19.274	5.022	0.097	1.994	0.083	4.912	0.806	1.420	.
1390	05-04-1995	Sp	WL	S	13A	FLM	13A	FLM	7.1	13.680	0.051	1.244	0.026	14.893	25.735	0.010	4.765	1.706	5.113	5.840	0.280	0.540
1391	05-04-1995	Sp	WL	E	13A	1	2	2	6.7	26.010	0.047	1.217	0.026	13.979	18.575	0.054	3.768	0.094	4.734	5.988	0.200	0.540
1392	05-04-1995	Sp	WL	E	13A	1	2	W	6.7	14.610	0.076	1.151	0.028	10.607	35.904	0.585	4.758	0.964	3.682	7.914	0.270	0.460
1393	05-04-1995	Sp	WL	S	13A	1-2	13a	STR	6.9	3.553	0.053	1.261	0.016	14.148	18.838	0.072	3.950	0.164	4.789	5.936	0.230	0.230
1394	05-04-1995	Sp	UL	W	13A	2	2	2	6.2	6.949	0.015	1.201	0.000	6.577	3.357	0.010	0.858	0.005	2.408	4.423	0.180	0.400
1395	05-04-1995	Sp	UL	W	13A	2	2	7	6.3	9.804	0.024	1.261	0.016	14.148	18.838	0.072	3.950	0.164	4.789	5.936	0.230	0.230
1396	05-04-1995	Sp	UL	W	13A	2	2	W	6.3	20.590	0.033	1.201	0.000	6.577	3.357	0.010	0.858	0.005	2.408	4.423	0.180	0.400
1397	05-04-1995	Sp	UL	W	13A	2	10	2	6	.	.	1.029	0.000	8.988	10.550	0.012	1.163	0.005	3.142	6.219	0.180	0.380
1398	05-04-1995	Sp	UL	W	13A	2	10	7	5.4	3.001	.	1.510	0.000	8.833	14.579	0.015	1.797	0.018	3.125	6.335	0.220	0.530
1399	05-04-1995	STD	STD	STD	STD	STD	STD	STD	.	.	.	.	.	.	5.012	0.035	1.900	0.027	3.991	7.513	0.490	.
1400	05-04-1995	Sp	WL	S	13A	3-4	13a	STR	6.8	21.520	.	0.000	0.000	0.000	2.059	0.084	1.762	0.005	3.479	4.015	0.160	0.240
1401	05-04-1995	Sp	WL	E	13A	3	2	2	.	21.290	.	0.000	0.000	0.000	5.045	0.103	1.994	0.077	4.869	0.878	1.290	.
1402	05-04-1995	Sp	WL	E	13A	3	2	W	7	24.520	.	0.000	0.000	0.000	22.975	1.771	4.271	2.206	3.007	6.741	0.280	0.450
1403	05-04-1995	Sp	WL	S	13A	3-4	13A	STR	7.1	13.730	.	0.000	0.000	0.000	0.235	0.010	0.063	0.189	0.100	0.040	0.590	.
1404	05-04-1995	Sp	WL	E	13A	3	6	2	.	24.270	.	0.000	0.000	0.000	25.731	1.559	5.165	2.331	4.094	7.239	0.340	0.580
1405	05-04-1995	Sp	WL	E	13A	3	6	W	6.7	15.890	0.061	0.000	0.000	0.000	17.196	0.170	4.044	0.423	5.081	5.466	0.210	0.590
1406	05-04-1995	Sp	UL	E	13A	3	11	2	6.1	4.846	0.021	0.000	0.000	0.000	0.644	0.012	0.034	0.005	0.100	0.108	0.360	.
1407	05-04-1995	Sp	UL	E	13A	3	11	2	6	5.044	0.022	1.250	0.068	16.193	21.438	0.408	3.511	0.097	5.532	8.345	0.300	0.600
1408	05-04-1995	Sp	UL	E	13A	3	11	7	5.8	3.008	0.011	0.665	0.000	6.287	3.498	0.014	0.984	0.005	2.252	3.871	0.230	0.850
1409	05-04-1995	Sp	BL	S	13A	ORG	13A	ORG	6.7	16.130	0.044	0.855	0.000	6.410	3.785	0.063	0.949	0.031	2.247	3.782	0.400	0.750
1410	05-04-1995	Sp	BL	S	13	FLM	13	FLM	7.1	6.142	0.024	0.928	0.000	10.412	3.246	0.015	1.540	0.005	3.627	5.449	0.050	0.870
1411	05-04-1995	Sp	BL	S	13	5-6	13	STR	7	5.651	0.022	1.473	0.019	14.674	17.224	0.035	4.289	0.250	5.036	5.696	0.240	0.770
1412	05-04-1995	Sp	BL	W	13	6	2	2	6.4	16.630	0.057	1.198	0.000	7.633	7.022	0.088	1.593	0.036	2.698	4.681	0.330	0.460
1413	05-04-1995	Sp	BL	W	13	6	6	2	6.4	13.220	0.036	1.226	0.000	7.489	6.073	0.063	1.505	0.043	2.667	4.578	0.280	0.700
1414	05-04-1995	Sp	BL	W	13	6	6	W	6.5	12.930	0.035	1.664	0.070	8.792	22.658	0.058	2.545	0.191	3.108	6.946	0.460	0.550
1415	05-04-1995	Sp	BL	W	13	6	11	2	5.7	4.120	0.021	0.963	0.000	8.154	4.618	0.014	0.803	0.005	2.891	6.752	0.290	0.630
1416	05-04-1995	Sp	BL	W	13	6	11	W	6.4	10.720	0.047	1.216	0.014	7.436	15.959	0.035	1.952	0.005	2.719	6.226	0.220	0.540
1417	05-04-1995	Sp	UL	W	13	6	17	2	.	4.635	0.018	1.052	0.000	6.748	2.569	0.034	0.927	0.043	2.445	4.648	0.220	0.500
1418	05-04-1995	Sp	UL	W	13	6	17	7	6.1	6.505	0.024	1.058	0.000	7.140	8.872	0.012	1.132	0.005	2.558	5.811	0.050	0.580
1419	05-04-1995	STD	STD	STD	STD	STD	STD	STD	.		0.000	0.925	0.216	19.197	5.187	0.105	2.003	0.080	4.939	0.232	1.440	.
1420	05-04-1995	Sp	BL	S	13	7-8	13	STR	6.9	4.674	0.018	1.151	0.000	7.247	4.719	0.070	1.332	0.044	2.572	4.421	0.170	1.880
1421	05-04-1995	Sp	BL	E	13	7	2	W	6.5	11.520	0.047	1.501	0.000	9.583	13.186	0.264	2.965	0.561	3.208	4.762	0.240	0.680
1422	05-04-1995	Sp	BL	E	13	7	7	2	5.9	7.553	0.017	1.574	0.000	9.147	7.153	0.014	2.015	0.072	3.024	4.885	0.070	0.500
1423	05-04-1995	Sp	BL	E	13	7	7	W	6.3	7.498	0.028	1.489	0.098	9.391	7.451	0.070	1.932	0.260	3.158	4.726	0.420	0.550
1424	05-04-1995	Sp	UL	E	13	7	11	2	5.8	2.540	0.012	0.592	0.000	7.021	1.981	0.010	0.955	0.005	2.404	3.142	0.140	0.460
1425	05-04-1995	Sp	UL	E	13	7	11	7	5.4	2.231	0.014	0.979	0.000	10.198	1.517	0.010	1.294	0.005	3.342	3.959	0.050	0.490
1426	05-04-1995	Sp	UL	E	13	7	11	W	5.1	2.332	0.018	1.403	0.016	10.268	1.654	0.012	1.343	0.139	3.504	4.546	0.060	0.520
1427	05-04-1995	STD	STD	STD	STD	STD	STD	STD	.	.	0.000	0.913	0.211	19.180	4.840	0.097	1.962	0.079	4.749	0.153	1.420	.
1428	05-04-1995	Sp	UL	E	10L	9	20	2	6	6.355	0.027	1.249	0.000	9.539	2.903	0.015	1.095	0.005	3.264	4.192	.	0.510
1429	05-04-1995	Sp	UL	E	10L	9	9	7	5.4	3.032	0.015	1.146	0.000	11.178	3.480	0.010	1.381	0.005	3.705	5.564	0.060	0.600
1430	05-04-1995	Sp	UL	E	10L	9	9	W	6.1	6.954	0.039	1.358	0.000	11.757	8.703	0.178	1.991	0.081	3.798	5.210	0.570	0.700
1431	05-04-1995	Sp	WL	E	10L	9	3	2	6.8	67.880	0.176	0.082	0.037	1.444	64.628	0.037	12.867	7.900	0.661	5.411	0.760	0.440

SN	Date	Season	Position		Location				pH	DOC	IC Anions				ICP Cations						Nitrogen	
			Pos	Asp	WS	Tran	Dist	Type			F	CL	NO3	SO4	Ca	Fe	Mg	Mn	S	Si	Total N	N-NH4
										mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
1432	05-04-1995	Sp	WL	E	10L	9	3	7	7	40.630	0.080	0.062	0.098	14.696	55.493	0.035	6.371	0.484	4.593	10.104	0.230	0.410
1433	05-04-1995	Sp	WL	S	10L	FLM	10L	FLM	7.1	7.190	0.026	1.247	0.013	7.982	7.218	0.162	2.076	0.122	2.580	5.396	0.060	0.400
1434	05-04-1995	Sp	WL	W	10L	10	2	W	6.8	19.610	0.100	0.848	0.000	3.481	23.768	1.125	2.242	1.883	1.187	8.057	1.300	.
1435	05-04-1995	Sp	WL	W	10L	10	7	W	6.6	19.150	0.104	0.524	0.168	2.800	22.205	10.083	2.500	2.386	0.962	6.111	0.500	0.620
1436	05-04-1995	Sp	UL	W	10L	10	18	W	5.6	1.505	0.022	1.063	0.062	6.602	4.380	0.211	1.098	0.092	2.168	4.370	0.040	0.390
1437	05-04-1995	STD	STD	STD	STD	STD	STD	STD	.	.	0.000	1.020	0.215	19.605	4.850	0.100	1.969	0.078	4.756	0.249	1.330	.
1438	05-04-1995	Sp	UL	W	10L	12	29	2	5.2	3.239	0.042	0.691	0.024	10.431	2.371	0.025	0.927	0.055	3.271	2.731	0.190	0.670
1439	05-04-1995	Sp	UL	W	10L	12	29	W	5.1	2.836	0.028	0.903	0.000	0.000	2.157	0.033	0.718	0.048	2.308	3.759	0.100	0.560
1440	05-04-1995	Sp	UL	W	10L	12	16	2	5.5	3.497	0.034	1.061	0.000	6.323	1.962	0.046	0.669	0.077	2.074	5.834	0.040	0.370
1441	05-04-1995	Sp	UL	W	10L	12	16	W	5.3	3.952	0.019	1.160	0.000	7.674	2.538	0.152	0.774	0.139	2.570	5.602	0.150	0.780
1442	05-04-1995	Sp	WL	W	10L	12	7	W	7	20.610	0.102	0.632	0.104	2.351	17.082	1.501	2.901	1.798	0.893	5.732	0.470	0.850
1443	05-04-1995	Sp	WL	W	10L	12	2	W	6.3	19.040	0.044	1.204	0.039	12.837	20.356	0.445	3.923	2.133	4.059	5.226	0.220	1.000
1444	05-04-1995	Sp	WL	S	10L	HOL	10L	IN	7	6.331	0.016	1.126	0.000	7.925	6.246	0.111	1.930	0.129	2.594	5.008	0.370	0.820
1445	05-04-1995	Sp	WL	S	10L	HOL	10L	OUT	7	5.931	0.012	1.150	0.000	7.687	6.019	0.104	1.933	0.089	2.543	5.111	0.210	0.820
1446	05-04-1995	Sp	WL	S	10L	TSP	10L	IN	6.8	19.400	0.069	0.848	0.000	2.093	19.853	3.146	2.494	1.147	0.782	6.517	0.330	0.820
1447	05-04-1995	Sp	WL	S	10L	TSP	10L	OUT	7	7.312	0.014	1.218	0.013	7.474	6.940	0.193	1.992	0.192	2.518	5.075	0.070	0.790
1448	05-04-1995	Sp	BL	S	10U	FLM	10U	FLM	.	6.559	0.012	1.164	0.000	7.788	6.148	0.103	1.969	0.148	2.578	4.976	0.100	0.570
1449	05-04-1995	STD	STD	STD	STD	STD	STD	STD	.	27.190	0.000	0.977	0.206	19.440	4.888	0.104	1.949	0.081	4.784	0.145	1.270	.
1450	05-04-1995	Sp	UL	E	10U	13	11	7	5.6	3.320	0.000	1.023	0.000	11.750	2.434	0.068	1.490	0.020	3.741	5.021	0.130	0.140
1451	05-04-1995	Sp	BL	E	10U	13	7	2	5.5	5.068	0.010	0.773	0.000	9.496	3.806	0.040	1.027	0.061	3.158	5.815	0.230	0.440
1452	05-04-1995	Sp	BL	E	10U	13	7	W	6.1	8.174	0.026	1.186	0.000	11.159	9.535	0.057	1.873	0.087	3.604	7.452	0.410	0.670
1453	05-04-1995	Sp	BL	E	10U	13	2	2	5.4	4.980	0.011	0.977	0.000	7.858	2.681	0.014	1.016	0.035	2.628	5.779	0.510	0.630
1454	05-04-1995	Sp	BL	E	10U	13	2	2	5.4	4.688	0.014	1.102	0.000	7.650	2.501	0.010	0.975	0.022	2.596	5.712	0.430	0.500
1455	05-04-1995	Sp	BL	E	10U	13	2	W	6.2	10.630	0.042	1.088	0.000	11.596	14.575	0.174	2.256	0.005	3.812	8.479	0.210	0.580
1456	05-04-1995	Sp	BL	S	10U	13-14	10U	STR	6.9	6.066	0.011	1.253	0.000	7.708	5.517	0.096	1.872	0.092	2.575	5.052	0.430	0.570
1457	05-04-1995	STD	STD	STD	STD	STD	STD	STD	.	104.500	.	.	.	.	4.806	0.097	1.993	0.076	4.751	0.160	0.070	.
1458	05-11-1995	Sp	WL	S	13A	FLM	13A	FLM	.	8.186	.	.	.	.	3.519	0.291	1.134	0.005	2.628	4.578	1.520	0.430
1459	05-11-1995	Sp	BL	S	13	FLM	13	FLM	.	4.319	0.000	0.941	0.000	7.740	9.534	0.452	2.201	0.005	3.849	6.031	.	0.310
1460	05-11-1995	Sp	WL	S	10L	FLM	10L	FLM	.	5.637	0.007	1.131	0.000	8.427	3.559	0.333	1.350	0.023	3.071	5.079	.	0.420
1461	05-11-1995	Sp	BL	S	10U	FLM	10U	FLM	.	4.287	0.000	1.006	0.000	8.299	3.404	0.325	1.322	0.008	3.019	5.085	.	0.440
1462	05-11-1995	STD	STD	STD	STD	STD	STD	STD	.	108.700	0.000	0.894	0.212	1.817	4.94906	0.11179	1.98069	0.09981	4.89414	0.27742	.	1.250
1463	05-23-1995	Sp	WL	S	13A	FLM	13A	FLM	.	17.460	0.000	0.905	0.208	1.843	20.231	0.053	4.057	0.005	4.747	6.085	.	0.570
1464	05-23-1995	Sp	BL	S	13A	ORG	13A	ORG	.	14.610	0.024	1.578	0.049	15.064	15.99761	0.08433	4.251	0.00499	5.14521	6.46265	.	0.560
1465	05-23-1995	Sp	BL	S	13	FLM	13	FLM	.	6.903	0.013	1.180	0.014	7.064	7.727	0.201	1.698	0.005	2.520	5.508	.	0.540
1466	05-23-1995	Sp	BL	S	13	7-8	13	STR	.	5.327	0.007	1.188	0.000	6.831	4.78798	0.19906	1.40459	0.03702	2.51563	5.15036	.	0.550
1467	05-23-1995	Sp	WL	S	10L	FLM	10L	FLM	.	8.514	0.015	1.089	0.020	7.210	8.935	0.274	2.369	0.099	2.619	6.290	.	0.370
1468	05-23-1995	Sp	WL	S	10L	HOL	10L	IN	.	7.437	0.008	1.154	0.021	7.424	7.36234	0.21475	2.25075	0.06205	2.58789	6.09346	.	0.420
1469	05-23-1995	Sp	WL	S	10L	HOL	10L	OUT	.	7.674	0.010	1.122	0.021	7.325	7.52071	0.18484	2.27852	0.0221	2.56996	6.10052	.	0.210
1470	05-23-1995	Sp	WL	S	10L	TSP	10L	IN	.	22.320	0.069	0.921	0.020	1.064	21.04881	1.68031	2.79215	0.01946	0.3767	7.13398	.	0.830
1471	05-23-1995	Sp	WL	S	10L	TSP	10L	OUT	.	25.790	0.092	1.120	0.000	0.679	24.3452	1.1287	3.4162	0.00556	0.2304	6.99703	.	0.600
1472	05-23-1995	Sp	BL	S	10U	FLM	10U	FLM	.	6.785	0.000	1.115	0.020	7.104	6.891	0.166	2.183	0.007	2.395	5.924	.	0.360
1473	05-23-1995	Sp	BL	S	10U	13-14	10U	STR	.	6.715	0.007	1.111	0.022	7.186	6.73294	0.18533	2.21226	0.05473	2.47882	6.12311	.	0.480
1474	05-23-1995	STD	STD	STD	STD	STD	STD	STD	.	109.800	0.000	0.902	0.207	1.825	4.96482	0.11179	1.987	0.09864	4.75616	0.28448	.	1.050
1475	06-08-1995	Sp	WL	S	13A	FLM	13A	FLM	.	23.020	0.040	1.355	0.016	12.688	26.465	0.056	5.020	0.061	4.465	6.574	.	0.460
1476	06-08-1995	Sp	BL	S	13A	ORG	13A	ORG	.	18.020	0.028	1.362	0.029	16.960	20.75516	0.09953	5.44169	0.15353	5.80391	6.98432	.	0.330
1477	06-08-1995	Sp	BL	S	13	FLM	13	FLM	.	14.140	0.020	1.280	0.039	6.909	15.615	0.219	2.711	0.034	2.361	6.517	.	0.470
1478	06-08-1995	Sp	BL	S	13	FLM	13	STR	.	10.270	0.014	1.242	0.032	6.461	10.22627	0.20691	2.2476	0.11884	2.18003	6.1817	.	0.300
1479	06-08-1995	Sp	WL	S	10L	FLM	10L	FLM	.	14.180	0.024	1.132	0.043	6.739	15.831	0.292	3.402	0.296	2.314	7.246	.	0.270
1480	06-08-1995	Sp	WL	S	10L	HOL	10L	IN	.	13.630	0.018	1.463	0.045	7.169	12.68628	0.14807	3.25277	0.09425	2.41659	6.89467	.	0.250
1481	06-08-1995	Sp	WL	S	10L	HOL	10L	OUT	.	12.820	0.025	1.226	0.047	7.135	13.13938	0.13483	3.23763	0.0821	2.3579	6.90032	.	0.280
1482	06-08-1995	Sp	WL	S	10L	TSP	10L	IN	.	26.480	0.066	0.933	0.016	2.120	27.3599	0.54081	3.30767	0.0098	0.64434	8.01284	.	0.340
1483	06-08-1995	Sp	WL	S	10L	TSP	10L	OUT	.	15.050	0.023	1.101	0.043	6.591	15.91937	0.37215	3.36698	0.38419	2.20613	7.22786	.	0.290
1484	06-08-1995	Sp	BL	S	10U	FLM	10U	FLM	.	11.910	0.014	1.192	0.046	7.315	12.227	0.145	3.279	0.036	2.430	6.956	.	0.300

SN	Date	Season	Position Pos	Asp	Location WS	Tran	Dist	Type	pH	DOC	IC Anions F	CL	NO3	SO4	ICP Cations Ca	Fe	Mg	Mn	S	Si	Nitrogen Total N	N-NH4
										mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
1485	06-08-1995	Sp	BL	S	10U	13-14	10U	STR	.	11.650	0.016	1.169	0.047	7.470	12.09382	0.14219	3.19472	0.042	2.62514	7.21939	.	0.360
1486	06-08-1995	STD	STD	STD	STD	STD	STD	STD	.	105.900	0.000	0.893	0.211	1.829	5.17534	0.11669	2.01728	0.10069	4.9467	0.27389	.	1.070
1487	06-16-1995	Sp	WL	S	13A	FLM	13A	FLM	7.5	22.770	0.046	1.190	0.013	12.163	27.966	0.051	5.252	0.053	4.222	6.446	.	0.440
1488	06-16-1995	Sp	UL	E	13A	1	21	2	.	9.956	0.000	1.608	0.019	9.225	2.37008	0.08825	1.39197	0.00499	3.10744	6.41889	.	1.010
1489	06-16-1995	Sp	WL	E	13A	1	16	W	6.9	30.010	0.074	1.201	0.048	7.626	40.10023	0.01912	3.09755	0.08005	2.58043	9.67245	.	0.230
1490	06-16-1995	Sp	WL	E	13A	1	9	2	6.6	28.800	0.041	1.350	0.000	10.855	37.13878	0.00999	4.82773	0.03117	3.62475	8.65523	.	0.170
1491	06-16-1995	Sp	WL	E	13A	1	9	W	6.6	25.910	0.059	1.342	0.020	9.548	33.23662	0.07501	4.14689	0.12469	3.17131	7.85189	.	0.190
1492	06-16-1995	Sp	WL	E	13A	1	5	2	6.4	21.320	0.017	1.285	0.040	10.099	25.75204	0.00999	4.32735	0.91533	3.33108	7.36834	.	0.220
1493	06-16-1995	Sp	WL	E	13A	1	5	W	6.5	33.860	0.057	1.342	0.014	10.244	39.40102	0.06472	5.22841	1.36099	3.4267	8.11873	.	0.170
1494	06-16-1995	Sp	WL	E	13A	1	2	2	6.8	32.190	0.042	1.330	0.016	13.082	36.1193	0.00999	6.49356	4.89967	4.38879	6.14358	.	0.190
1495	06-16-1995	Sp	WL	E	13A	1	2	W	6.7	32.760	0.053	1.342	0.027	9.580	41.85505	0.0353	5.2505	1.64785	3.25391	8.28674	.	0.240
1496	06-16-1995	Sp	WL	S	13A	1-2	13a	STR	6.8	25.730	0.040	1.190	0.000	12.126	30.02635	0.06766	5.46188	0.76355	4.15689	6.65184	.	0.340
1497	06-16-1995	STD	STD	STD	STD	STD	STD	STD	.	105.300	0.000	0.903	0.212	1.846	5.33181	0.11277	2.01602	0.10698	4.82887	0.28589	.	1.200
1498	06-16-1995	Sp	UL	W	13A	4	7	2	5.8	4.521	0.000	1.080	0.000	12.865	5.56977	0.00999	1.38377	0.11942	4.31635	6.10758	.	0.190
1499	06-16-1995	Sp	UL	W	13A	4	7	W	6.1	10.550	0.020	1.268	0.020	11.590	11.9254	0.26722	2.53659	0.60021	3.84381	7.99308	.	0.550
1500	06-16-1995	Sp	WL	W	13A	4	2	2	6.7	16.950	0.084	1.202	0.020	8.310	17.17029	0.01458	3.28378	3.32989	2.92291	5.3369	.	0.200
1501	06-16-1995	Sp	WL	W	13A	4	2	W	6.2	12.330	0.017	1.187	0.000	11.074	14.21286	0.71011	2.47394	0.93917	3.73108	6.43827	.	0.340
1502	06-16-1995	Sp	WL	S	13A	3-4	13a	STR	6.6	20.380	0.050	1.172	0.000	7.084	20.94918	0.74749	4.04181	1.73747	2.53407	6.3834	.	0.290
1503	06-16-1995	Sp	WL	E	13A	3	2	W	6.9	28.430	0.058	1.280	0.000	8.237	27.99351	3.3824	5.5696	2.9748	2.90147	8.12044	.	0.390
1504	06-16-1995	Sp	WL	E	13A	3	5	STR	7.7	23.100	0.052	1.250	0.035	18.605	27.14087	0.12944	5.94029	0.61873	6.24532	6.28972	.	0.280
1505	06-16-1995	Sp	BL	S	13A	ORG	13A	ORG	7.4	17.900	0.034	1.615	0.026	18.800	20.69925	0.067	5.73058	0.33365	6.42719	7.08865	.	0.450
1506	06-16-1995	STD	STD	STD	STD	STD	STD	STD	.	110.300	0.000	0.928	0.216	1.866	4.9624	0.11121	1.93918	0.08226	4.80619	0.27099	.	1.240
1507	06-16-1995	Sp	BL	S	13	FLM	13	FLM	7.7	18.630	0.031	1.241	0.051	7.321	20.318	0.207	3.199	0.065	2.544	6.577	.	0.370
1508	06-16-1995	Sp	BL	E	13	5	2	7	7.2	36.110	0.049	1.240	0.065	6.014	42.65796	0.0123	5.51964	0.81305	2.07111	5.82	.	0.460
1509	06-16-1995	Sp	BL	E	13	5	2	W	6.7	27.470	0.057	1.404	0.043	3.133	24.57117	0.73199	4.49269	0.44668	1.16749	9.65272	.	1.410
1510	06-16-1995	Sp	BL	S	13	5-6	13	STR	7.7	16.540	0.029	1.334	0.047	7.737	18.04832	0.12123	3.17646	0.01364	2.65067	6.46303	.	0.490
1511	06-16-1995	Sp	BL	W	13	6	2	W	6.7	28.840	0.063	1.554	0.000	5.827	31.1272	0.05606	3.10738	0.59354	2.08313	6.98695	.	2.890
1512	06-16-1995	Sp	BL	W	13	6	6	W	6.7	38.440	0.087	1.783	0.068	3.169	48.90346	0.02324	5.24023	1.31542	1.14683	8.94412	.	1.530
1513	06-16-1995	Sp	UL	W	13	8	11	7	6.2	3.990	0.000	1.495	0.000	12.367	4.76729	0.00999	1.19657	0.00499	4.15892	9.24456	.	0.380
1514	06-16-1995	Sp	UL	W	13	8	7	W	5.8	8.548	0.012	1.157	0.028	9.640	10.29217	0.13582	1.95213	0.02881	3.30494	5.45935	.	0.420
1515	06-16-1995	Sp	BL	W	13	8	2	W	6.4	12.920	0.020	1.431	0.017	9.222	13.76782	0.50364	3.19373	0.99721	3.04648	5.12278	.	0.390
1516	06-16-1995	Sp	BL	S	13	7-8	13	STR	6.4	13.920	0.028	1.346	0.044	6.941	12.97301	0.18869	2.54733	0.05108	2.33843	6.41217	.	0.290
1517	06-16-1995	Sp	BL	S	13	7-8	13	STR	7.6	13.840	0.027	1.225	0.042	6.678	13.09547	0.24339	2.53315	0.05052	2.22305	6.52927	.	0.410
1518	06-16-1995	STD	STD	STD	STD	STD	STD	STD	.	109.300	0.000	1.037	0.213	1.887	4.89024	0.10711	1.94843	0.0959	4.71575	0.27567	.	1.060
1519	06-16-1995	Sp	WL	S	10L	FLM	10L	FLM	7.5	15.840	0.035	1.178	0.045	7.418	17.850	0.258	3.554	0.257	2.526	6.917	.	0.200
1520	06-16-1995	Sp	UL	E	10L	9	9	7	.	4.080	0.000	1.105	0.000	8.871	3.28832	0.01458	1.06026	0.0238	2.87857	6.52592	.	0.190
1521	06-16-1995	Sp	WL	E	10L	9	3	2	6.8	84.990	0.200	0.454	0.031	0.824	75.20001	0.00999	14.99907	7.40993	0.4711	6.53663	.	0.270
1522	06-16-1995	Sp	WL	E	10L	9	3	W	7.1	44.350	0.082	1.844	0.085	15.669	60.59616	0.00999	6.48862	0.22299	5.17599	11.6186	.	0.100
1523	06-16-1995	Sp	WL	S	10L	9-10	10L	STR	7.5	16.600	0.034	1.281	0.051	7.451	18.36815	0.23381	3.58231	0.2809	2.59933	6.96553	.	0.150
1524	06-16-1995	Sp	WL	W	10L	10	2	W	6.8	20.440	0.086	1.186	0.086	2.555	24.40069	0.03099	2.35181	1.51489	0.92819	7.88223	.	0.430
1525	06-16-1995	Sp	WL	W	10L	10	7	W	6.6	24.550	0.105	1.041	0.020	0.505	24.93324	0.00999	2.63122	2.72146	0.21782	6.639	.	1.060
1526	06-16-1995	Sp	UL	W	10L	10	18	W	5.6	6.370	0.015	1.271	0.016	5.713	4.76	0.3391	1.2237	0.61678	1.92395	5.90498	.	0.260
1527	06-16-1995	STD	STD	STD	STD	STD	STD	STD	.	108.600	0.000	0.916	0.215	1.883	4.89326	0.10938	1.93425	0.0831	4.77223	0.26363	.	1.210
1528	06-16-1995	Sp	UL	W	10L	12	29	2	5.2	3.458	0.014	0.826	0.000	9.114	2.81964	0.01048	0.84191	0.16091	3.01023	3.63198	.	0.350
1529	06-16-1995	Sp	UL	W	10L	12	29	7	5.4	2.578	0.000	1.330	0.000	7.148	2.25968	0.00999	0.6982	0.0089	2.39329	5.16694	.	0.370
1530	06-16-1995	Sp	UL	W	10L	12	16	2	5.3	3.828	1.961	2.929	2.010	15.031	1.86819	0.08842	0.53907	0.08463	1.74878	6.99029	.	0.310
1531	06-16-1995	Sp	UL	W	10L	12	16	W	5.4	4.799	0.025	1.475	0.000	6.159	2.38867	0.59662	0.85178	0.07433	2.01557	8.42087	.	0.320
1532	06-16-1995	Sp	WL	W	10L	12	7	W	6.7	56.400	2.608	1.524	0.000	0.384	29.81393	1.5711	5.28279	2.74373	0.26732	8.08899	.	2.210
1533	06-16-1995	Sp	WL	W	10L	12	2	W	6.5	25.320	0.089	1.865	0.000	3.455	20.13552	0.20282	3.86171	2.28981	1.23371	6.51656	.	1.340
1534	06-16-1995	Sp	WL	S	10L	HOL	10L	IN	7.5	14.170	0.078	1.874	0.000	3.385	14.26189	0.15724	3.31832	0.16648	2.55727	6.31783	.	0.450
1535	06-16-1995	Sp	WL	S	10L	HOL	10L	OUT	7.4	13.550	0.040	1.546	0.061	7.708	14.24555	0.09662	3.33312	0.00499	2.59257	6.43693	.	0.280
1536	06-16-1995	Sp	WL	S	10L	TSP	10L	IN	6.9	30.820	0.096	1.355	0.000	0.857	29.79733	1.23245	3.56935	1.23635	0.30029	8.41284	.	0.510
1537	06-16-1995	Sp	WL	S	10L	TSP	10L	OUT	6.9	29.550	0.091	1.114	0.000	1.064	27.80191	2.81814	3.63658	1.72731	0.38301	7.37972	.	0.410

SN	Date	Season	Position Pos	Position Asp	Location WS	Location Tran	Location Dist	Location Type	pH	DOC	IC Anions F	CL	NO3	SO4	ICP Cations Ca	Fe	Mg	Mn	S	Si	Nitrogen Total N	N-NH4
										mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
1538	06-16-1995	STD	STD	STD	STD	STD	STD	STD	.	119.100	0.000	0.907	0.207	1.814	4.98353	0.10984	1.96817	0.0966	4.71002	0.26831	.	1.220
1539	06-16-1995	Sp	BL	S	10U	FLM	10U	FLM	7.6	13.310	0.028	1.386	0.051	7.875	13.545	0.165	3.346	0.102	2.644	6.284	.	0.350
1540	06-16-1995	Sp	UL	E	10U	13	11	7	6.4	4.421	0.013	1.504	0.000	10.382	3.22395	0.19644	1.35446	0.03827	3.41909	6.57811	.	0.500
1541	06-16-1995	Sp	BL	E	10U	13	7	W	6.2	11.680	0.050	1.541	0.000	9.946	12.6557	0.31996	2.31419	0.52575	3.24117	9.08129	.	0.650
1542	06-16-1995	Sp	BL	E	10U	13	2	2	5.5	4.402	0.000	1.446	0.000	7.373	2.50484	0.0164	0.90051	0.03466	2.32903	7.68016	.	0.660
1543	06-16-1995	Sp	BL	E	10U	13	2	W	6.4	14.990	0.046	1.455	0.067	11.311	18.88033	0.18322	2.75149	0.08296	3.75746	9.9478	.	0.710
1544	06-16-1995	Sp	BL	S	10U	13-14	10U	STR	7.5	12.730	0.029	1.372	0.050	8.313	13.33383	0.09936	3.2807	0.02157	2.81924	6.53128	.	0.480
1545	06-16-1995	STD	STD	STD	STD	STD	STD	STD	.	109.400	0.000	0.901	0.214	1.906	5.01998	0.10802	1.9546	0.07989	4.76732	0.26028	.	1.350

VITA

Mark Hale Eisenbies was born in Raleigh, North Carolina on April 30, 1969. He attended elementary schools in the Wake County School System, and graduated from Sanderson High School in June, 1987. In August, 1987 he entered Virginia Polytechnic Institute and State University, Blacksburg, majoring in general engineering, and in 1989 changed to forestry. In May, 1993 he received a Bachelor of Science in Forestry and Wildlife with concentrations in forest resource management, and environmental conservation. In August, 1993 he entered The University of Tennessee, Knoxville and in May, 1996 received a Master of Science degree in Plant and Soil Science.